OU 1 PHASE II INVESTIGATION REPORT

NAVAL BASE KITSAP KEYPORT
KEYPORT, WASHINGTON

FINAL
Version: 0

Prepared for:



Department of the Navy
Naval Facilities Engineering Command, Northwest
1101 Tautog Circle,
Silverdale, Washington 98315-1101

April 21, 2017

OU 1 PHASE II INVESTIGATION REPORT

Naval Base Kitsap Keyport
Keyport, Washington

FINAL
VERSION: 0

Prepared for:

Department of the Navy
Naval Facilities Engineering Command, Northwest
1101 Tautog Circle,
Silverdale, Washington 98315-1101

Prepared by:

Resolution Consultants
A Joint Venture of AECOM & EnSafe
1500 Wells Fargo Building
440 Monticello Avenue
Norfolk, Virginia 23510

Contract Number: N62470-11-D-8013
CTO JP09

April 21, 2017

James Flynn, L.H.G
Resolution Technical Lead

Deborah Rodenhizer, P.E.
Contract Task Order Manager

Table of Contents

Acronyms and Abbreviations v

1.0 INTRODUCTION 1
1.1 Site Description and Background 1
1.1.1 Remedial Investigation 2
1.1.2 Remedial Action 3
1.1.3 Supplementary Investigation 5
1.2 Pre-Investigation Conceptual Site Model 6

2.0 OBJECTIVES AND SCOPE OF WORK FOR PHASE II INVESTIGATION 11
2.1 Membrane Interface Probe Investigation 12
2.2 Soil Gas Sampling 13
2.3 Revisions to Scope of Work 13
2.4 Deviations from Sampling and Analysis Plan 14
2.4.1 Flame Ionization Detector 14
2.4.2 Pilot Hole Installation 14
2.4.3 Borehole Abandonment 14
2.4.4 MIP Completion Depth 14
2.4.5 MIP Borings in the South Plantation and Central Landfill 15
2.4.6 Soil Gas Sampling 15
2.4.7 Changes in Project Team 16

3.0 MEMBRANE INTERFACE PROBE INVESTIGATION 17
3.1 Membrane Interface Probe Investigation Methods 17
3.2 Membrane Interface Probe Data Evaluation 19
3.2.1 Evaluation Process 19
3.2.2 South Plantation 22
3.2.3 Central Landfill 26

4.0 SOIL GAS SAMPLING 29
4.1 Soil Gas Probe Installation 29
4.2 Soil Gas Sampling Methods 29
4.3 Soil Gas Laboratory Analysis and Data Validation 31
4.4 Soil Gas Data Evaluation 31

5.0 SUMMARY OF DECISIONS BASED ON SAP DECISION RULES 33
5.1 Decision 1C 33
5.2 Decision 5 33
5.2.1 South Plantation 34
5.2.2 Central Landfill 34

6.0 REFERENCES 37

Appendices

A Responses to Agency and Stakeholder Comments on the Draft Report
B Select Sampling and Analysis Plan Figures
C Approved Field Change Request Forms
D NAVFAC NW Permits and Approvals
E Daily Safe Work Assessment and Permit Forms
F Photographic Log
G Daily Field Reports and Field Logbook
H MIP Logs
I MIP Data Package
J Soil Gas Sampling Field Forms and Calculations
K Laboratory Data Packages and Validation Reports

Figures

1 NBK Keyport Vicinity Map
2 Operable Unit 1
3 MIP Boring Locations at the South Plantation
4 Soil Gas Locations and MIP Boring Locations at the Central Landfill
5 South Plantation XSD Isoconcentration Map 0 to 9 Feet Below Ground Surface
6 South Plantation XSD Isoconcentration Map 9 to 18 Feet Below Ground Surface
7 South Plantation XSD Isoconcentration Map Greater Than 18 Feet Below Ground Surface
8 Cross Section A-A', Eastern South Plantation – North/South
9 Cross Section B-B', Western South Plantation – North/South
10 Cross Section C-C', Southern South Plantation – West/East
11 Cross Section D-D', Northern South Plantation – West/East
12 Cross Section C-C' (with Geologic Interpretation)
13 Contour Map of Inferred Depth to Clover Park Silt Contact
14 Central Landfill XSD Isoconcentration Map Greater Than 15 Feet Below Ground Surface
15 Cross Section E-E', Central Landfill – North/South
16 Cross Section F-F', Central Landfill – Northwest/Southeast
17 Soil Gas Sampling Locations and Results

Tables

1 Summary of Deviations from Sampling and Analysis Plan
2 Summary of MIP Boring Completion Data
3 Summary of Field Measurements for Soil Gas Samples
4 Summary of Analytical Results for cVOCs, Methane, and Helium in Soil Gas Samples

This page left intentionally blank.

ACRONYMS AND ABBREVIATIONS

bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CLEAN	Comprehensive Long-Term Environmental Action, Navy
cm/sec	centimeters per second
COC	contaminant of concern
CSM	conceptual site model
CTO	Contract Task Order
cVOC	chlorinated volatile organic compound
DNAPL	dense nonaqueous-phase liquid
EC	electrical conductivity
Ecology	Washington State Department of Ecology
EPA	U.S. Environmental Protection Agency
FID	flame ionization detector
HPT	hydraulic profiling tool
LEL	lower explosive limit
LTM	long-term monitoring
µg/m^3	micrograms per cubic meter
µg/L	micrograms per liter
µV	microvolts
mL/min	milliliters per minute
mS/m	millisiemens per meter
MIP	membrane interface probe
NAVFAC NW	Naval Facilities Engineering Command Northwest
Navy	U.S. Department of the Navy
NBK	Naval Base Kitsap
OU	Operable Unit
PCB	polychlorinated biphenyl
PCE	tetrachloroethene
PID	photoionization detector
psi	pounds per square inch
RAO	remedial action objective

ACRONYMS AND ABBREVIATIONS (Continued)

Resolution	Resolution Consultants
RG	remediation goal
RI	remedial investigation
ROD	Record of Decision
SAP	sampling and analysis plan
TCA	trichloroethane
TCE	trichloroethene
VOC	volatile organic compound
XSD	halogen-specific detector

1.0 INTRODUCTION

This report summarizes the background, scope, field activities, and results of the membrane interface probe (MIP) investigation and soil gas sampling conducted at the Area 1 former landfill, which constitutes Operable Unit 1 (OU 1) of Naval Base Kitsap (NBK) Keyport in Keyport, Washington (Figures 1 and 2). This report documents the activities that were completed in August and September 2016 as part of Phase II of the OU 1 site recharacterization program.

The U.S. Department of the Navy (Navy) performs routine long-term monitoring (LTM) of groundwater and surface water on an annual basis at OU 1. The specific LTM requirements have been defined and updated in sampling plans developed by the Navy and reviewed by the Washington State Department of Ecology (Ecology), the U.S. Environmental Protection Agency (EPA), and the Suquamish Tribe. The U.S. Geological Survey performs annual monitoring of natural biodegradation conditions beneath and near the landfill. The results of LTM and biodegradation sampling are reported separately by others.

The activities documented in this report were conducted in accordance with the project-specific sampling and analysis plan (SAP; U.S. Navy 2016) under Navy Contract No. N62470-11-D-8013, Contract Task Order JP09, for Naval Facilities Engineering Command Northwest (NAVFAC NW). As the prime contractor, Resolution Consultants (Resolution) oversaw the field sampling, field data collection, and data usability evaluation and analysis described herein and prepared this report. Subcontractors to Resolution performed the MIP investigation, direct-push drilling for soil gas sampling, laboratory analytical tasks, and analytical data validation. Subcontractors to Resolution also performed utility location, vegetation clearing, and fence removal as part of site preparation for drill rig access.

The following subsections provide a description of OU 1, the site background, and the historical conceptual site model (CSM).

1.1 Site Description and Background

NBK Keyport occupies 340 acres (including tidelands) adjacent to the town of Keyport in Kitsap County, Washington, on a small peninsula in the central portion of Puget Sound (Figure 1). The Navy acquired the Keyport property in 1913, with property acquisition continuing through World War II. The property was first used as a quiet-water range for torpedo testing, with the first range facility located in Port Orchard Inlet southeast of NBK Keyport. During the early 1960s, the role of the base was expanded to include manufacturing and fabrication, such as welding, metal plating, carpentry, and sheet metal work. Further expansion in 1966 consisted of a new torpedo shop. In 1978, the functions were broadened to include engineering and development activities associated

with various undersea warfare weapons and systems. Operations currently include engineering, fabrication, assembly, and testing of underwater weapons systems.

Keyport Area 1 (OU 1) is a former landfill at NBK Keyport that received solid waste from base operations. It comprises approximately 9 acres in the western portion of the base, next to a wetlands area and the tide flats that flow into Dogfish Bay (Figure 2). Most of the area of the landfill was part of the wetlands that now border the landfill to the west, northwest, southwest, and south. The wetlands area is referred to as the "marsh" and is further described in the conceptual site model in Section 1.1.2.

The Area 1 landfill was the primary disposal area for domestic and industrial wastes generated by the base from the 1930s until 1973, when the landfill was closed. A burn pile for refuse and demolition debris was located at the north end of the landfill from the 1930s to the 1960s. Unburned or partially burned materials from this pile were buried in the landfill or pushed into the marsh. A trash incinerator was operated at the north end of the landfill from the 1930s to the 1960s, and incinerator ash was disposed of in the landfill. Burning continued at the landfill until the early 1970s.

From the 1930s until the 1970s, waste paint, thinners, and strippers from the paint and stripper shop were disposed of in the southwest area of the landfill (U.S. Navy 1984). The Navy interviewed more than 50 former and current employees, 8 of whom had been directly involved in landfill operations, to determine whether intact drums of liquid wastes had been placed in the landfill. One person remembered that 12 to 14 pallets of 5-gallon cans of paint and some 55-gallon drums were buried whole. The other people who were interviewed believed that whole drums were not buried intact. Some said that the drums were emptied into the landfill or crushed before burial. Overall, the interviews indicated that the disposal of liquids in drums was not a common practice, and substantial amounts of drummed liquid wastes are unlikely to be in the landfill (U.S. Navy, USEPA, and Ecology 1998).

1.1.1 Remedial Investigation

During various site investigation and assessment studies between 1984 and 1988, Area 1 was determined to have possible environmental contamination. In 1989, NBK Keyport was officially listed on the National Priorities List, becoming a Superfund site under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). Area 1 was included in a remedial investigation (RI) and feasibility study that were conducted at NBK Keyport between 1988 and 1993 (U.S. Navy 1993a, 1993b), and the RI included human health and ecological risk assessments (U.S. Navy 1993c, 1993d). Two classes of chemicals, chlorinated volatile organic

compounds (cVOCs) and polychlorinated biphenyls (PCBs), were identified as contaminants of concern (COCs) at the site; cVOCs are COCs for soil, sediment, tissue, groundwater, and surface water; and PCBs are COCs for sediment and seep water at Area 1.

The RI also identified indoor air risks to workers from vapor intrusion into modular units that were located on the landfill at the time. Shortly after the baseline risk assessment, the Navy removed the modular office buildings from the landfill surface to eliminate these potential risks. In addition, Navy personnel were no longer assigned to work full time in the buildings that remained in the southern portion of the landfill. The vapor intrusion studies did not indicate vapor intrusion as a pathway of concern outside the landfill boundary east of Bradley Road based on the soil gas action levels that were established at the time.

1.1.2 Remedial Action

After the RI was completed, the feasibility study evaluated seven remedial alternatives for Area 1. The Navy, Ecology, and the EPA selected a preferred remedial alternative for Area 1, which was described in the 1994 proposed plan (U.S. Navy 1994). However, because public comment regarding the preferred remedial alternative was not favorable, the proposed plan was withdrawn, and Area 1 was separated from the remaining areas assessed during the RI to become OU 1.

To address the public's concerns, the Navy, Ecology, and the EPA conducted further site characterization to collect data to supplement the RI. Beginning in 1995 and ending in September 1996, five quarterly rounds of sampling were conducted. The additional data were used to evaluate the potential risks from three key COC pathways at OU 1 (U.S. Navy, USEPA, and Ecology 1998):

- Drinking water pathway (human health risk)
- Seafood ingestion pathway (human health risk)
- Ecological pathway (risk to aquatic organisms)

The environmental media identified as those that could potentially result in receptor exposures to contaminants were groundwater, surface water, and sediment downgradient of OU 1. The new data obtained from the site characterizations were discussed and evaluated in the summary data assessment report (U.S. Navy 1997a), which supplemented the RI. Several additional alternatives were then evaluated in a supplemental focused feasibility study (U.S. Navy 1997b), from which a new preferred remedial alternative was selected and eventually accepted, based on public comment. The Record of Decision (ROD) for OU 1 was executed in September 1998 (U.S. Navy, USEPA, and Ecology 1998).

To achieve the remedial action objectives (RAOs), the remedial action components specified in the OU 1 ROD included the following:

- Treat volatile organic compound (VOC) hotspots in the landfill using phytoremediation by poplar trees in concert with natural attenuation.
- Remove PCB-contaminated sediments from around the seep area, which has the highest documented concentrations of PCBs.
- Upgrade the tide gate to protect the landfill from flooding and erosion during extreme tide events.
- Upgrade and maintain the landfill cover.
- Conduct LTM, including phytoremediation monitoring, intrinsic biodegradation monitoring, and risk and compliance monitoring.
- Take contingent actions for off-base domestic wells, if necessary.
- Implement institutional controls.

The OU 1 ROD also included an RAO to prevent human exposure to vapors from the landfill. As part of the selected remedy, all of the remaining occupied buildings were removed from the landfill, and institutional controls were established to prohibit construction of occupied structures on the landfill that could result in vapor exposure.

The LTM results have indicated no need for the implementation of contingent actions for off-base domestic wells. All of the components of the selected remedy have been implemented, the most recent being the upgrade of the landfill cover completed in 2003. The upgrade included regrading of the landfill material and modification and construction of a stormwater conveyance system that includes catch basins and an oil/water separator and discharges to the marsh on the western edge of the landfill cover. The phytoremediation component of the remedy was implemented in 1999 and consisted of planting two plantations of hybrid poplar trees (referred to as the “north plantation” and the “south plantation”) (Figure 2). The area between the north and south plantations is referred to as the “central landfill.”

In spite of a high degree of biodegradation and reductions in cVOC mass over time, the concentrations of cVOCs beneath the south plantation remain very high (trichloroethene [TCE] concentrations up to 33,800 micrograms per liter (µg/L) and a cis-1,2-dichloroethene (DCE)

concentration of 55,700 µg/L in 2014), and cVOC concentrations in surface water adjacent to the south plantation consistently exceed the surface water remediation goals (RGs).

1.1.3 Supplementary Investigation

Based on concerns that the phytoremediation component of the selected remedy was not performing as expected in the south plantation, the third 5-year review (U.S. Navy 2010) recommended that the Navy perform an evaluation of natural attenuation as a stand-alone remedy, as called for in the ROD. The Navy performed this evaluation in 2011 and 2012 (U.S. Navy 2012) and concluded that the RG for discharge to surface water adjacent to the south plantation would not be met within a reasonable restoration time frame (30 to 50 years). The evaluation recommended that additional investigation of the south plantation be performed to identify cVOC hotspots. In addition, trend analysis of the LTM results from well MW1-17 in the central landfill indicates the potential presence of a source area upgradient of well MW1-17, between the two plantations. Well MW1-17 is screened in the upper aquifer. Although contaminant concentrations in MW1-17 remain less than the RGs, LTM data from 2009 to the present indicate increasing trends of three cVOCs in this well.

The project team (consisting of the Navy, regulators, and stakeholders) agreed on a two-phased approach for a site recharacterization program designed to collect the data necessary to evaluate additional remedial alternatives for hotspot treatment to reduce the restoration timeframe. Phase I, which comprised the collection of screening-level data, was completed in 2014 (U.S. Navy 2015a). The Phase I investigation included the collection of tree core samples for analysis of cVOCs to identify potential contaminant hotspots in groundwater in the vicinity of the south plantation and the central landfill. Given the location (in the central landfill between the two plantations and at the edge of the paved portion of the landfill), it was not possible to collect tree core samples upgradient of MW1-17. Geophysical surveys were also conducted in the south plantation and a portion of the central landfill to identify the presence or absence of subsurface anomalies that could represent potential contaminant sources and pose health risks for workers during future intrusive investigations. Results from the Phase I screening level investigation are described in conjunction with the historical CSM in the following section. Responses to project team comments on the draft version of this document are included in Appendix A.

1.2 Pre-Investigation Conceptual Site Model

This section provides a description of the historical CSM at OU 1. This CSM was used to develop the investigative approaches prescribed in the SAP and in Section 2.0.

NBK Keyport occupies 340 acres (including tidelands) on a small peninsula in the central portion of Puget Sound and is bordered by Liberty Bay on the east and north and Port Orchard Inlet on the southeast (Figure 1). The topography of NBK Keyport rises gently from the shoreline to an average of 25 to 30 feet above mean sea level and then rises steeply at the southeast corner of the base to approximately 130 feet above mean sea level.

Marine or brackish water bodies on and near OU 1 consist of Liberty Bay, Dogfish Bay, tide flats, a marsh, and a shallow lagoon. Freshwater bodies include two creeks draining into the marsh pond and two creeks that discharge into the shallow lagoon.

An archeological survey conducted in 2013 indicated that most of the landfill area of OU 1 was formerly part of the marsh that now borders the landfill to the west and south (U.S. Navy 2013). The historical shoreline is shown on Figure 2. This marsh drains northward into the tide flats of Dogfish Bay through a culvert under Keys Road. A tide gate was installed at this culvert to control tidal inundation of the marsh and landfill soils. The tide flats are connected to Dogfish Bay by a narrow channel through structural fill material that forms the foundation of the Highway 308 causeway and bridge. The landfill is unlined at the bottom, and the top is covered with areas of grass, trees, concrete, and asphalt. The remaining marsh adjacent to the landfill borders the landfill to the west, northwest, southwest, and south (Figure 2). In the central portion of the marsh is a small pond, referred to as the “marsh pond”, which is drained by a small creek that flows north to the tide flats. The marsh pond is fed by the remainder of the marsh located south and southeast of the pond.

Surface water discharges to the marsh pond via two small freshwater creeks that enter the pond from the south end. The marsh also receives input from stormwater drainage systems at two outfalls and from shallow groundwater flowing toward the marsh from all sides in the water table aquifer. The marsh creek drains into the tide flats through the tide gate under Keys Road. This tide gate controls tidal flow into the marsh, regulating surface water levels in the marsh.

The surface water bodies near the landfill constitute a complex, tidally influenced hydrologic system. Tidal fluctuations in Dogfish Bay influence the water levels in the tide flats, marsh creek, and marsh pond, and groundwater levels in the northwestern portion of the landfill. The typical

range in tide level of the tide flats at a measuring point close to the southeast side of the Highway 308 bridge is about 10 feet between higher high and lower low tides.

The historical glacial and interglacial deposition and erosion in the Puget Sound area has created a complex stratigraphy beneath OU 1. Stratigraphic units in the vicinity of the landfill are vertically and laterally variable and complex. They generally include interbedded glacial deposits and nonglacial fluvial/floodplain deposits.

For the purpose of this investigation, the aquifer of primary interest is the upper aquifer, which is the uppermost of the two shallow aquifers, the other one being the intermediate aquifer. This unconfined upper aquifer is present throughout the landfill area and is approximately 4 to 15 feet thick (U.S. Navy 1993a). The groundwater surface in the upper aquifer intersects the landfill waste material beneath much of the landfill. That is, roughly 5 feet of landfill material lies above the groundwater surface in the unsaturated zone, and up to approximately 10 feet of landfill material lies in the saturated zone. The landfill material is underlain by a marsh/estuary deposit consisting of organic-rich silt that is up to 5 feet thick, but generally is less than 2 feet thick, and in some places is not present.

The groundwater in the upper aquifer generally flows through the landfill in a westerly direction and discharges into the marsh. In the southern portion of the landfill, the groundwater discharges south or southwest toward the shore of the marsh. The depth to groundwater in the upper aquifer beneath the landfill is typically 4 to 5 feet below ground surface (bgs). Groundwater monitoring wells within the south plantation are screened within the upper aquifer, with the deepest screen interval located from 10 to 15 feet bgs (wells P1-6, P1-7, P1-8, P1-9, and P1-10). Groundwater monitoring wells in the central landfill, including MW1-6, MW-1-15, and MW1-17, are screened within the upper aquifer at depths from 8 to 13 feet bgs, 6 to 11 feet bgs, and 7.5 to 13.5 feet bgs, respectively.

The middle aquitard separates the upper aquifer from the intermediate aquifer and is the first significant confining layer below the landfill. The middle aquitard consists primarily of sandy silt to clean silt. During the RI, it was reported to be mostly continuous below the landfill but was depicted as absent in the central landfill near MW1-15 (U.S. Navy 1993a). This silt unit was estimated to be approximately 4 to 15 feet thick across the landfill, where present. Vertical hydraulic conductivity in the middle aquitard was measured during the RI, yielding a value of 10^{-7} centimeters per second (cm/sec), which indicates very low permeability (U.S. Navy 1993a).

According to the RI (Navy 1993a), the intermediate aquifer near OU 1 is typically 5 to 25 feet thick, the top of the aquifer generally occurs between 15 and 35 feet bgs, and groundwater flow within the intermediate aquifer is generally to the north within the landfill.

NBK Keyport OU 1 is underlain by a thick nonglacial silt and clay informally known as the Clover Park Silt, which is commonly approximately 100 feet thick and is an aquitard separating the two shallow aquifers within the Kitsap Formation from deeper regional water-bearing units. This silt unit was reported to occur from approximately 25 to greater than 40 feet bgs within OU 1 (Navy 1993a). Measurements of vertical hydraulic conductivity in the Clover Park Silt during the RI yielded values ranging from of 10^{-6} to 10^{-8} cm/sec, indicating very low permeability (U.S. Navy 1993a).

Studies of groundwater/surface water tidal interaction and groundwater salinity were performed, and the results were included in the 1997 summary data assessment report (U.S. Navy 1997a). Additional assessment of tidal influence was performed during phytoremediation monitoring. The 1997 focused feasibility study concluded that "groundwater levels at OU 1 are influenced by seasonal and tidal changes, but not enough to change the general flow patterns. Tidal influence occurs in wells close to the shore, but rapidly attenuates with distance from the tide flats or Dogfish Bay" (U.S. Navy 1997b).

Phase I was performed in an attempt to identify contaminant hotspots in soil and groundwater and to identify possible source material in the central landfill. A hotspot is defined by the project team as an area where cVOC concentrations in any sampled medium are substantially higher than the concentrations in the surrounding areas, as determined by consensus of the project team. Areas of higher concentration within a contaminant plume represent one type of source (commonly referred to as a "residual source") for contamination migration to areas with lower concentrations. Residual sources often consist of nonaqueous-phase liquid ganglia sorbed to soil and occupying some of the pore spaces in the soil. A metallic object can also be a source, more typically a "primary" source—potentially a storage container slowly releasing contaminants to the surrounding environment.

Potential buried source material was identified as a component of the geophysical investigation. The identification of potential buried source material and/or the results of the tree core sampling served as a first step in the delineation of any previously unidentified hotspots in the central landfill and the south plantation where high concentrations of cVOCs have been detected in groundwater. Figure 3 in Appendix B depicts the results of the geophysical investigation of the central landfill. Figure 4 in Appendix B presents an overlay of the geophysical data onto chemical concentrations detected in tree core samples, and site groundwater samples as available, for the south plantation. These data were used to identify and provide evidence regarding discrete contaminant sources in

the south plantation. An evaluation of the south plantation overlay resulted in a refined understanding of the cVOC distribution, which was used to guide sampling during the Phase II investigation. The highest concentrations of cVOCs, particularly TCE, appear to be located south of former Building 884 and along the southern edge of the landfill, as shown on Figure 4 in Appendix B. In addition, the reported detection of 1,1,1-trichloroethane (TCA) in the sample collected from one tree adjacent to a stormwater outfall at the southeast corner of the landfill indicate a possible association with contaminant transport through damaged stormwater piping.

The Phase I investigation concluded that the identified geophysical anomalies are not collocated with the locations of high cVOC concentrations in tree cores or groundwater. Therefore, the contaminant source was not expected to be a buried primary source (such as a product-containing drum). Instead, the Phase I results suggested the presence of a residual source.

The geophysical survey conducted during Phase I included the area upgradient of well MW1-17 to collect data that would guide the Phase II investigation of this area. In the central landfill upgradient of well MW1-17, there was a significant variation in geophysical response. The northern portion of the area appears to have more anomalies than the southern portion, with areas of voids and metal, as shown on Figure 3 in Appendix B. Tree core samples were collected from four native trees located downgradient of well MW1-17; tetrachloroethene (PCE) and TCE were detected in all four trees. Daughter products of PCE and TCE were not reported in any of the tree core samples. Although PCE and TCE were not reported in groundwater samples collected from well MW1-17 in 2014, daughter products (1,1-DCE, cis-1,2-DCE, trans-1,2-DCE, and vinyl chloride) were detected. The detected concentrations of all constituents except trans-1,2-DCE were greater than the remediation goals. Since 2006, a general increase in daughter products has been reported in groundwater samples from MW1-17.

During the timeframe in which the Phase I investigation was finalized, the fourth 5-year review was completed (U.S. Navy 2015b). The review determined that the results of the vapor intrusion evaluation performed during the RI east of Bradley Road do not meet current Ecology risk-based action levels. Although cVOCs were not detected in groundwater at the two wells east of Bradley Road, historically high soil gas concentrations were detected at a location near Building 893, just northeast of the landfill. An evaluation of the vapor intrusion pathway was recommended because of limited current cVOC data for groundwater and soil gas east of Bradley Road, cVOC detections in groundwater at the adjacent landfill, and the undefined eastern extent of the TCE plume. The 5-year review also recommended sediment sampling from locations in the vicinity of seep SP1-1 for PCBs, due to increasing contaminant trends at this location.

This page left intentionally blank.

2.0 OBJECTIVES AND SCOPE OF WORK FOR PHASE II INVESTIGATION

The purpose of the Phase II investigation is to complete the site recharacterization of OU 1 and collect the data necessary to evaluate additional remedial alternatives designed to treat identified hotspots and reduce the restoration timeframe. Phase II was initiated in 2016 and comprised the collection of additional screening-level data using MIP borings, to be followed by the collection of quantitative data to identify and delimit contaminant hotspots and investigate geophysical anomalies identified during Phase I. Phase II was also scoped to include the recommendations from the fourth 5-year review regarding determining the concentration of PCBs in sediment and the potential for a vapor intrusion pathway east of Bradley Road.

The objectives for the Phase II investigation, as prescribed in the SAP (U.S. Navy 2016), are as follows:

1. Refine the understanding of contamination in groundwater in the upper aquifer beneath the central landfill and the south plantation and in sediment and surface water present in watercourses immediately adjacent to the south plantation and upstream of station MA-12.

2. Refine the understanding of transport pathways for cVOC contamination from the south plantation to the adjacent marsh.

3. Assess the presence or absence of a source or sources of cVOC contamination in groundwater in the upper aquifer beneath the central landfill, upgradient of monitoring well MW1-17.

4. If one or more source of cVOCs are found, attempt to assess the lateral and vertical extent of the source(s).

5. Assess the presence or absence of the middle aquitard in the area of MW1-17.

6. Collect data necessary to allow screening of remedial technologies that could potentially be incorporated into hotspot cleanup alternatives for remedy optimization.

7. Identify any data gaps based on the Phase II investigation data, including the need for and location of additional monitoring wells, if warranted.

8. Establish current concentrations of PCBs in sediment.

9. Investigate the vapor intrusion pathway by collecting soil gas samples along the east side of Bradley Road.

The Phase II investigation was intended to include the collection of additional samples to meet these objectives. The original scope of work for Phase II specifically included the following:

- Investigation in the south plantation and central landfill to screen relative cVOC concentrations in soil and groundwater in the field and acquire additional soil lithology data.
- Advancement and sampling of soil borings in both areas using a sonic drill rig to correlate the MIP data with historical soil boring data and delimit the vertical extent of cVOCs in soil and groundwater.
- Stormwater sampling from two outfalls in the area to assess the potential COC transport pathway in stormwater.
- Porewater sampling to assess the lateral extent of cVOCs in groundwater before it daylights to surface water.
- Surface water sampling to assess cVOC concentrations and provide additional information regarding the groundwater-to-surface water pathway.
- Soil gas sampling along Bradley Road to investigate the potential vapor intrusion pathway.
- Sediment sampling to assess current PCB concentrations in sediment.
- Installation and monitoring of new groundwater monitoring wells based on quantitative data results collected during Phase II investigation, if warranted.

The MIP investigation and soil gas sampling are the two components of the Phase II investigation that were completed in 2016 and are documented in this report. The Navy plans to complete the remainder of the Phase II investigation at OU 1 during summer 2017. After the completion of the Phase II investigation, the Navy will engage in a collaborative process to determine the best administrative option (engineering evaluation/cost analysis or focused feasibility study, followed by a non-time-critical removal action, ROD amendment, or explanation of significant differences) to address the OU 1 hotspots.

2.1 Membrane Interface Probe Investigation

At the south plantation, MIP boring locations were positioned to assess the apparent distribution of cVOCs in groundwater based on tree core sample results from the Phase I investigation and

groundwater data from the LTM program (Figure 3). The MIP was used to refine the apparent lateral and vertical extent of relatively higher concentrations of cVOCs in the upper aquifer. "Relatively higher concentrations" are defined qualitatively, based on best professional judgement and comparisons of results relative to other adjacent MIP boring locations.

In the central landfill, MIP boring location placement was restricted due to the presence of a motorcycle training area that could not be closed at that time. Therefore, sample locations were positioned in the vicinity of well MW1-17 and surrounding the motorcycle training area to assess the presence or absence of a cVOC plume migrating toward well MW1-17 and the presence or absence of a cVOC plume migrating to the northwest from former Building 884 toward well MW1-17 (Figure 4). Comparisons of MIP results between boring locations was used to evaluate the presence or absence of a cVOC plume in upper aquifer groundwater in this area.

2.2 Soil Gas Sampling

Thirteen soil gas sampling locations were proposed along Bradley Road to evaluate the vapor intrusion pathway from the landfill to occupied buildings east of Bradley Road (Figure 4). Because the results of the vapor intrusion evaluation performed during the RI do not meet the current Ecology risk-based action levels, the sampling was designed to provide an updated evaluation of concentrations of cVOCs in soil gas in this area.

2.3 Revisions to Scope of Work

The scope of work for the Phase II investigation was revised to include vegetation clearing and fence removal to provide access for the sampling activities between the south plantation and the marsh.

During the field investigation, the scope of work for the initial field mobilization was further changed compared to the planned scope included in the SAP and discussed in Section 2.2 because of unanticipated conditions identified during the initial MIP data collection and unanticipated funding issues. Based on results from the initial MIP investigation work, the project team decided to expand the MIP investigation work to collect screening-level data at more points across the south plantation and central landfill. Soil gas sampling along Bradley Road was also retained as part of the revised scope of work; however, the project team agreed to postpone the sonic drilling and soil, groundwater, sediment, surface water, and stormwater sampling with the intention of completing the remainder of the Phase II investigation as part of a separate field mobilization in summer 2017.

2.4 Deviations from Sampling and Analysis Plan

During the field investigation, certain deviations from the SAP (U.S. Navy 2016) were necessary (Table 1). Resolution submitted three field change requests to the Navy for approval of significant deviations from the SAP (Appendix C). All deviations from the SAP during the field investigation were made with concurrence from the Navy.

2.4.1 Flame Ionization Detector

The flame ionization detector (FID) is typically included with the MIP detector suite and is used to evaluate volatile petroleum compounds. The MIP investigation at OU 1 initially included the use of the FID. However, because volatile petroleum compounds are not COCs at OU 1, the MIP subcontractor recommended that the FID be disabled. Disabling the FID allowed the entire volume of the gas sample to be run through the halogen-specific detector (XSD), which provides a better response for cVOCs. Therefore, FID use was discontinued after boring MIP-004.

2.4.2 Pilot Hole Installation

A pilot hole was drilled using a solid drive point from the ground surface to 5 feet bgs at each MIP boring location, instead of using the MIP from the ground surface down. The pilot hole was used to displace large landfill debris including concrete chunks, gravel, and cobbles that could potentially damage the MIP. The 1.75-inch-diameter pilot hole was slightly smaller than the 2.25-inch-diameter MIP, which allowed the MIP detectors to make contact with the borehole sidewall from the ground surface on. Using pilot holes to begin the borings reduced the risk of damaging the MIP through an encounter with debris.

2.4.3 Borehole Abandonment

The procedure for abandoning boreholes specified in the SAP was to pressure grout the boreholes by injecting grout through a tremie pipe. During the field investigation, the boreholes were observed to be collapsing to approximately 8 to 10 feet bgs after the MIP was removed. Based on this finding, Resolution determined that pressure grouting was infeasible due to the potential for rapid surfacing. The MIP boreholes were, therefore, abandoned using hydrated bentonite chips.

2.4.4 MIP Completion Depth

As prescribed in the SAP, MIP borings were to be completed to depths ranging from 15 to 20 feet bgs. Borings MIP-005, MIP-009, and MIP-016 were completed to slightly deeper depths of approximately 21 feet bgs. In addition, during the drilling of MIP-017, a significant XSD response was observed from 15 to 20 feet bgs, so the boring was extended to define the vertical extent of

contamination. Based on the presence of contamination between 15 and 20 feet bgs, the Navy requested that future borings be drilled deeper in an attempt to identify the regional aquitard. Therefore boring MIP-018 was advanced to 36 feet bgs and a significant XSD response was observed from about 17 to 30 feet bgs, suggesting that contamination likely extended below the completion depth prescribed in the SAP. Based on this observation, subsequent MIP borings were advanced deeper (up to 42.5 feet bgs) in an attempt to both assess the vertical extent of impacts and identify the depth of the underlying regional aquitard.

2.4.5 MIP Borings in the South Plantation and Central Landfill

Up to 120 MIP borings were specified in the SAP, including at least 66 borings in the south plantation and 12 borings in the central landfill. During the field investigation, 62 MIP borings were completed in the south plantation, and 7 MIP borings were completed in central landfill. Throughout the investigation, the boring locations were refined in the field based on MIP results obtained, with a majority of the actual boring locations differing from the planned locations in the SAP. The locations of completed MIP borings are described in Section 3.

2.4.6 Soil Gas Sampling

During the investigation, soil gas sampling was completed at 9 of the 13 locations specified in the SAP along Bradley Road. At all 13 sampling locations, soil gas probes were installed using a direct-push drilling rig and 6 samples (SV-01 through SV-06) were initially collected; however, a major rain event occurred prior to continuing the sampling effort and 3 locations (SV-07, SV-08, and SV-09) were abandoned due to the presence of groundwater in the borings. Location SV-10 was also abandoned due to abnormal pressure in the sample tubing. During the sampling attempts at SV-10, the pressure gauge on the SUMMA canister indicated that air was moving slower than the flow rate of the flow controller. Sampling was attempted with the use of two different flow controllers, with similar results. After the SUMMA canister was closed, the pressure measured on the gauge held and was released when the controller was disconnected. A hand pump was connected, but no groundwater was encountered during pumping. Groundwater was also not encountered during installation of the probes, and groundwater measurements taken from monitoring wells prior to the installation of soil gas sample probes indicated that groundwater was at a depth below the target depth for soil gas sampling.

Soil gas samples were collected in accordance with the SAP; however, due to methane interference with the helium detector, leak testing was successfully completed only at SV-01 and SV-05. Methane is an atmospheric gas associated with landfills, and it was identified at the site by field measurements of combustible gases using an RKI GX 6000 meter calibrated to methane. For

locations SV-11, SV-12, and SV-13, sampling was conducted through the shroud with helium. Because of the methane interference, methane was included as an analyte for all soil gas samples. Helium was included as an analyte for samples collected at locations SV-11, SV-12, and SV-13.

The soil gas sampling locations, including the locations at which sampling was unsuccessful, were moved as close as possible to the east side of Bradley Road because of the presence of utilities and stormwater drainage features.

2.4.7 Changes in Project Team

Because of personnel changes at both AECOM and the Navy, and the addition of vegetation clearing fence removal to the scope of work, four changes were made to the project team specified in the SAP. The Resolution project manager, Resolution technical lead, and Navy technical representative were changed, and an additional subcontractor was hired for the vegetation clearing and fence removal. These changes occurred before the field investigation began and affected only the SAP worksheets that specified the project team members.

3.0 MEMBRANE INTERFACE PROBE INVESTIGATION

The MIP is a direct-push tool that produces continuous VOC and soil lithology logs of vadose and saturated soil zones. It is inserted into the target investigation zone by means of direct-push drilling technology. The downhole tool heats the soils and groundwater adjacent to the probe, which increases the volatility of VOCs, enabling the vapor phase to diffuse across a membrane into a closed, inert nitrogen gas loop that carries the vapors to a series of detectors housed at the surface. The MIP was selected for collection of screening-level data because it generates a continuous vertical log of soil lithology and groundwater parameters, including relative contaminant concentrations. These continuous logs from borings throughout OU 1 provide a high degree of resolution regarding contaminant distribution and subsurface conditions that can be useful in selecting zones for the collection of quantitative data. The details and rationale of the MIP investigation are provided in the following subsections.

3.1 Membrane Interface Probe Investigation Methods

A total of 69 MIP borings (MIP-001 through MIP-069) were advanced during the investigation. In the south plantation, 61 MIP borings (MIP-001 through MIP-061) were drilled (Figure 3 and Table 2). MIP borings MIP-001 through MIP-016 were completed to depths ranging from 15 to 21 feet bgs, in general accordance with the SAP. As described in Section 2.0, during the drilling of MIP-017, a significant XSD response was observed from 15 to 20 feet bgs, so the boring was extended to define the vertical extent of contamination. Based on the presence of contamination between 15 and 20 feet bgs, the Navy requested that future borings be drilled deeper in an attempt to identify the regional aquitard. Therefore boring MIP-018 was advanced to 36 feet bgs and a significant XSD response was observed from about 17 to 30 feet bgs, suggesting that contamination likely extended below the completion depth prescribed in the SAP. In order to assess the vertical extent of contamination and the depth to the regional aquitard, subsequent MIP borings were advanced until the regional aquitard was encountered or the probe could not be advanced farther (refusal). The MIP boring locations proposed in the SAP were repositioned in a grid pattern to refine the apparent lateral and vertical extent of relatively higher concentrations of cVOCs and identify and delineate potential hotspots and residual sources extending deeper than anticipated.

In the central landfill, eight MIP borings (MIP-062 through MIP-069) were drilled (Figure 4 and Table 2). The MIP boring location placement was restricted due to the presence of a motorcycle training area that could not be closed during the investigation. Therefore, sample locations were positioned in the vicinity of well MW1-17 and surrounding the motorcycle training area to assess the extent of a cVOC plume migrating west toward well MW1-17 and the presence or absence of a cVOC plume migrating to the northwest from former Building 884 toward well MW1-17.

Dig permits were submitted to the Navy for approval prior to field mobilization. The permits, which were approved by NAVFAC NW, are included in Appendix D. Throughout the field investigation, Resolution completed daily safe work assessments, a photograph log, daily field reports, and documented site activities in a field logbook. The safe work assessments and photographic log are included as Appendices E and F, respectively. The daily field reports, which were submitted to the Navy on a regular basis during the investigation, and copies of the field logbook are included in Appendix G.

MIP detectors utilized during the OU 1 investigation included the following:

- **Halogen-specific detector.** The XSD is used to specifically evaluate chlorinated or halogenated VOCs. It was the primary detector used in the evaluation of cVOC contamination at OU 1. This detector was calibrated daily to a 10 percent TCE solution and bump checked at the completion of each MIP boring. XSD responses are reported in microvolts (µV).
- **Photoionization detector (PID).** The PID is typically used to evaluate volatile petroleum compounds but also responds to VOCs. This detector is less relevant for OU 1 because petroleum compounds are not COCs; however, it is typically included in the MIP detector suite. PID responses are reported in µV.
- **Electrical conductivity (EC) probe.** The EC probe indicates the general size of soil particles, which can help determine zones of sands, silts, and clays. EC responses are reported in millisiemens per meter (mS/m).
- **Hydraulic profiling tool (HPT).** The HPT is a logging tool that is a part of the MIP that measures the pressure required to inject a prescribed volume of water at a constant flow rate into the soil as the MIP is advanced into the subsurface. It also measures the volume and flow rate of the water injected into the soil as the probe is advanced into the subsurface. The injection pressure in the HPT system is measured by a downhole pressure transducer, and the volume of injected water is measured by a flow transducer housed at the surface. Injection pressure and flow rate correlate well with formation permeability, providing an estimate of relative permeability with depth. Pressure and flow rate data also allow the comparison of lithology between locations based on relative permeability. HPT pressure responses are reported in pounds per square inch (psi), and HPT flow responses are reported in milliliters per minute (mL/min).

Detector response as a function of depth was provided in graphical log format by the MIP subcontractor to assess the lateral and vertical extent of contamination.

Unusual or invalid responses of the MIP can result from malfunctions such as carrier or makeup gas leakage, blockage of gas flow, heater failure, and carryover of water vapor across the sensor membrane or excessive chemical saturation. The MIP operator is trained to recognize these problems and take the appropriate corrective action in the field. As a quality control check, the MIP response was evaluated prior to and upon completion of each MIP borehole location. An aqueous-phase performance test was conducted using specific compounds designed to evaluate the sensitivity of the particular probe, transfer line, and detector suite that was used. The resulting values were recorded and compared to predetermined values. As an additional quality control procedure, the MIP subcontractor started the baseline above 0 for the PID and XSD. This way, any natural fluctuations in the detector response, sometimes experienced while the probe moved into different media (i.e., saturated versus unsaturated, fill versus natural, etc.), or pressure changes in the system (e.g., a blocked gas line) did not result in a 0 or negative number. The MIP subcontractor set the two detectors to slightly different baselines so that as one detector showed a rapid response, the operator could visually tell which detector line was responding in real time with ease while advancing the probe. The baselines for the XSD and PID detectors generally ranged from approximately 20,000 to 50,000 µV. The MIP subcontractor's systems and protocols were standardized to provide reliable and comparable detection of cVOCs in soil and groundwater.

3.2 Membrane Interface Probe Data Evaluation

The following sections describe the MIP data evaluation process and results obtained for the south plantation and central landfill.

3.2.1 Evaluation Process

To facilitate the data evaluation process, the data on graphical logs from each individual boring location are depicted at the same vertical and horizontal scales. The MIP boring logs are provided in Appendix H. The results of the MIP responses by boring, depth, and response type are included as a spreadsheet data package in Appendix I. MIP data were reviewed during the field investigation in real time to select step-out locations and maximize the efficiency of the MIP data for use in source characterization. A description of each detector and how it was used to characterize the south plantation and central landfill is provided in the following subsections.

XSD Responses

The detector baseline ranged from approximately 20,000 to 50,000 µV. In general, responses greater than 50,000 µV are considered detections, and the higher the response, the higher the relative concentration of cVOCs is inferred to be.

PID Responses

The detector baseline ranged from 20,000 to 50,000 µV. In general, responses greater than 50,000 µV are considered detections, and the higher the response, the higher the relative concentration of cVOCs is inferred to be.

EC Detector Responses

The EC detector responses were used to evaluate the general lithology at each MIP boring location. Soil conductivity, in general, varies with grain size. Coarser grained soils such as sand and gravel tend to produce lower conductivity responses compared to finer grained soils, such as silts or clays. Several MIP borings were drilled near existing monitoring wells or historical soil borings in an attempt to correlate the EC responses with known lithology at OU 1 (Table 2). A brief description of the general lithology as described in the RI (U.S. Navy 1993a) and the associated conductivity ranges reported on the EC logs are provided below, although the ranges may vary slightly between locations and, therefore, the interpretations may also vary slightly:

- **Fill Material.** The composition of this unit varies widely but is most commonly sandy to gravelly silt or silty sand and can contain landfill debris. Material in this unit is mostly soft to firm or loose. The EC responses appear to correlate well with this unit and generally ranged from 0 to 20 mS/m. Several anomalously high EC responses were observed within the Fill Material. These responses were attributed to contact of the EC sensor with landfill debris in the Fill Material (e.g., metal). These anomalous responses were removed from the data set prior to evaluation so that the resulting scale on the EC log would allow for viewing of changes in soil lithology.

- **Marsh Deposit.** This unit is typically a dark, organic-rich silt, sandy silt, or silty fine sand, containing wood/plant material and landfill debris. Material in this unit is very soft to firm. The EC responses appear to correlate well with this unit and generally ranged from 20 to 60 mS/m.

- **Kitsap Formation.** As described in the ROD, this unit is subdivided into four subunits, including from youngest to oldest:

1. Upper Kitsap Sand: Typically a fine- to medium-grained, poorly graded clean sand but also forms a coarse sand or silty sand. Material in this unit is generally medium dense.

2. Kitsap Silt/Clay: Typically sandy silt to clean silt to clayey silt. Material in this unit is generally firm to stiff.

3. Kitsap Silt and Sand: Typically consists of interbedded silt and sand with local gravel and organic matter. Material in this unit is generally firm to stiff, or medium to very dense.

4. Lower Kitsap Sand: Typically consists of fine- to medium-grained, poorly graded clean sand but locally contains some silt, trace fine gravel, and organic matter. Material in this unit is generally medium to very dense.

The EC responses appear to correlate well with the overall Kitsap Formation, which appears to be distinguishable from the overlying Marsh Deposit and the underlying Clover Park Silt. However, with the exception of the Upper Kitsap Sand (upper aquifer) it is difficult to differentiate the remaining Kitsap Formation subunits based solely on EC responses. The EC responses within the Kitsap Formation generally ranged from 10 to 50 mS/m.

- **Clover Park Formation Silt.** This unit typically includes silt and peat, with little clay, very fine sand, silty sand, and local gravel. Material in this unit is generally stiff to very hard. Based on the findings in the RI (U.S. Navy 1993a), historical soil borings within the south plantation investigation area were not advanced deep enough to encounter the Clover Park Silt. Therefore, direct MIP correlation with known lithology (i.e., existing wells or historical soil borings) was not possible for the Clover Park Silt. Contact with the Clover Park Silt was inferred based on a relatively high (i.e., greater than 40 mS/m) EC response and a coincident HPT pressure increase and flow decrease (as described below), that was consistent over several feet. An exception to this correlation occurred at MIP-049 and MIP-057 in the eastern portion of the south plantation along Bradley Road. Based on information in the RI (U.S. Navy 1993a), the relatively high EC responses (greater than 50 mS/m) and coincident HPT pressure increase and flow decrease in these two MIP borings is inferred to be contact with Vashon Glaciolacustrine Deposits (Lawton Clay).

HPT Responses

HPT pressure and flow responses were used to evaluate the relative permeability of the soil. Soil permeability, in general, varies with grain size. Coarser grained soils such as sand and gravel tend

to produce lower pressure/higher flow responses than finer grained soils such as silts or clays, which tend to produce high pressure/low flow responses. A discussion of the HPT responses, relative permeability, and a comparison with EC responses for each lithologic unit at the site is presented below.

Fill Material. This unit generally exhibited a low pressure and high flow response consistent with a relatively permeable unit. Occasional lenses of lower permeability material also appear to have been encountered within the Fill Material. These low pressure and high flow responses are consistent with the generally low EC responses at corresponding shallow depths which suggest the presence of coarser-grained materials.

Marsh Deposit. An increase in HPT pressure response was generally observed near the contact with the Marsh Deposit as identified on the EC logs consistent with a decrease in permeability relative to the overlying Fill Material. However, several MIP borings (e.g., MIP-017, MIP-031, MIP-036, MIP-040, MIP-046, MIP-062, MIP-063, MIP-064) exhibited an increased EC response without a coincident HPT pressure increase/flow decrease. This is likely attributed to the soft consistency of this deposit (U.S. Navy 1993a), which may allow the HPT water injection to displace soil adjacent to the probe, resulting in a low pressure/high flow response.

Kitsap Formation. HPT responses within the Kitsap Formation were variable. Higher flow and lower pressure responses were frequently seen at depths identifying the higher permeability deposits of the Upper Kitsap Sand (e.g., MIP-009 and MIP-029 through MIP-031) and at some locations within the Lower Kitsap Sand (e.g., MIP-026, MIP-033, and MIP-035). HPT responses within the Kitsap Formation fluctuate significantly more than the EC responses suggesting heterogeneity that was not directly measured by the EC detector. Similar to the EC responses, it is difficult to differentiate the Kitsap Formation subunits in most borings based solely on HPT responses.

Clover Park Formation Silt. The apparent contact with the Clover Park Formation Silt was typically characterized by a sharp increase in HPT pressure response and decrease in HPT flow responses (e.g., MIP-024 though MIP-027) consistent with a low permeability deposit. These changes in flow and pressure generally corresponded with higher EC responses.

3.2.2 South Plantation

In the south plantation, 61 MIP borings (MIP-001 through MIP-061) were drilled (Figure 3 and Table 2).

XSD Responses

Isoconcentration maps of the maximum reported XSD responses from 0 to 9 feet bgs, 9 to 18 feet bgs, and greater than 18 feet bgs are shown on Figures 5, 6, and 7, respectively. Cross-sectional views of the XSD responses are shown on Figures 8, 9, 10, and 11, and a plan view of the cross section locations is provided on Figure 3. The XSD results for the south plantation can be summarized as follows:

- The two highest XSD responses in the south plantation were reported at MIP-017 (eastern portion of south plantation). The two maximum responses within the contoured depth intervals at MP-017 were 1,023,896 µV at 7.05 feet bgs (Figure 5) and 864,437 µV at 19.05 feet bgs (Figure 7). Each of these responses corresponds to a "peak" of two separate contaminant masses (Figure 8). Significant responses were also reported at MIP-018 and MIP-019 (eastern portion of south plantation). The maximum XSD responses reported at MIP-018 and MIP-019 were 740,837 µV (17.65 feet bgs) and 781,274 µV (19.95 feet bgs), respectively (Figures 6, 7, and 8). The only significant XSD response in the unsaturated zone was reported at MIP-059 (northeastern portion of south plantation): 118,259 µV at a depth of 1.95 feet bgs (Figure 8). This observation, in conjunction with the XSD responses reported at MIP-017, MIP-018, and MIP-019, suggests the presence of a significant residual source southeast of the Former Hazardous Waste Storage Area near the eastern edge of the landfill. The depth of the cVOC contamination appears to range from approximately 2 to 30 feet bgs in the eastern portion of the south plantation with two hot spots at different depths within this range (Figures 5, 6, 7, and 8). The XSD results in this area indicate that contamination extends deeper than the existing well network.

- The XSD responses at MIP-041 (northcentral portion of south plantation), MIP-052 (southwestern portion of south plantation), and MIP-058 (southeastern portion of south plantation) suggest the possible presence of additional source areas at depths as great as 18 feet bgs (Figures 5 and 6).

- The XSD responses at MIP-018 and MIP-019 suggest that the deepest contamination observed during the investigation does not extend into the Clover Park Silt, which was encountered at approximately 31 to 33 feet bgs in the eastern portion of south plantation (Figure 8).

- Minimal to no XSD response greater than the baseline was reported in the northwestern portion of the south plantation (Figures 5, 6, and 7).

PID Responses

The PID responses are reported on the MIP boring logs provided in Appendix H. The PID results for the south plantation can be summarized as follows:

- PID responses were reported at varying magnitudes at most of the MIP borings and generally corresponded with the locations and depths of the XSD responses.
- Several PID responses were observed to occur independently of XSD responses in the western portion of the south plantation, suggesting the potential presence of contaminants other than cVOCs.

EC and HPT Responses

The EC and HPT detectors were used to evaluate the general lithology at each MIP boring location at the south plantation using the evaluation process described above. The EC and HPT responses are reported on the MIP boring logs provided in Appendix H.

The Fill Material was observed in all of the MIP borings from the ground surface to depths as great as approximately 7 feet bgs and appears to be laterally continuous across the south plantation.

The Marsh Deposit appears to have been encountered in all of the south plantation MIP borings between approximately 5 and 7 feet bgs and was observed to be approximately 1 to 4 feet thick. The Marsh Deposit appears to be laterally continuous across the south plantation.

The Kitsap Formation appears to extend from a depth of approximately 10 feet bgs down to depths greater than 42.5 feet bgs in all MIP borings completed at the south plantation. The thickness of the unit appears to range from approximately 18 feet to greater than 35 feet. The Upper Kitsap Sand (upper aquifer) was encountered from approximately 6 to 9 feet bgs and was observed to be approximately 2 to 8 feet thick across the south plantation. The EC and HPT responses within the Kitsap Formation below the upper aquifer suggest a high degree of heterogeneity within the formation, and it is inferred to consist of interbedded sands, silts, and clays from the bottom of the upper aquifer to the top of the Clover Park Silt. Therefore, it is difficult to correlate the EC and HPT results with the Kitsap Formation subunits. For example, a distinguishable aquitard was not consistently evident between the upper aquifer and intermediate aquifer on the basis of the EC and HPT responses.

The Clover Park Silt, when encountered, was observed between approximately 28 and 40 feet bgs across the south plantation. The Clover Park Silt does not appear to have been encountered in the deepest boring, MIP-029, which was completed to 42.5 feet bgs on the west side of the south

plantation. As described in Section 3.2.1, the relatively high EC responses (greater than 40 mS/m) and coincident HPT pressure increase and flow decrease observed at MIP-049 and MIP-057 in the eastern portion of the south plantation along Bradley Road are inferred to be contact with Vashon Glaciolacustrine Deposits (Lawton Clay).

Summary of South Plantation Data Evaluation

Geologic Interpretation: The EC, HPT, and XSD results that were used to develop the geologic interpretation presented on cross section C-C' are shown on Figure 12. As shown on cross section C-C', the Fill Material is present near the surface and extends from 5 to 7.5 feet bgs (Figure 12), with the thickest fill encountered at MIP-004, near the west edge of the south plantation. The Fill Material was placed on top of the Marsh Deposit and ranges from less than 1 foot thick to 2 feet thick (Figure 12). The top of the upper aquifer is interpreted to be approximately 7 to 8.5 feet bgs, and ranges from 3.5 to 6 feet thick along cross section C-C'. The thickness of the Kitsap Formation below the upper aquifer (interbedded sand, silt, and clay) was not determined in the western portion of the area represented by cross section C-C', since the Clover Park Silt was not observed in these borings. In the eastern portion of the south plantation, the Kitsap Formation below the upper aquifer (interbedded sand, silt, and clay) ranges from 14 feet thick at the east end of cross section C-C' (MIP-049) to approximately 29 feet thick in the central portion of cross section C-C' (MIP-033). The base of the Kitsap Formation, where identified, represents the top of the Clover Park Silt. An exception to this was observed at MIP-049, where the relatively high EC response (greater than 50 mS/m) and coincident HPT pressure increase and flow decrease are inferred to be contact with Vashon Glaciolacustrine Deposits (Lawton Clay). The top of the Clover Park Silt appears to slope downward from east to west along the cross section C-C' trace, ranging from 33 feet bgs in the east at MIP-018 to greater than 41 feet bgs at MIP-033.

The top of the Clover Park Silt, an eroded surface contact, or unconformity (U.S. Navy 1993a), slopes downward from northeast to southwest in the eastern portion of the south plantation and from the southwest to the northeast in the western portion of the south plantation (Figure 13). An apparent drainage cut is observed in the surface of the Clover Park Unit sloping from MIP-018 west towards MIP-037. If dense nonaqueous-phase liquid (DNAPL) is (or was) present and has reached the top of the Clover Park Silt, drainage cuts along the erosional contact between the Kitsap Formation and the underlying Clover Park Silt could provide preferential migration paths for mobile DNAPL.

Contaminant Distribution: The distribution of cVOCs in vadose zone soil and groundwater in the south plantation were interpreted for three depth intervals: 0 to 9, 9 to 18, and greater than 18 feet bgs. At the 0 to 9 feet depth interval, four areas have elevated concentrations of cVOCs, with

the highest concentrations appearing in the extreme eastern portion of the south plantation (Figure 5). This contaminated area appears to be connected via lower cVOC concentrations to a second area of elevated cVOC concentrations in the central-northern portion of the south plantation. Two less-contaminated, isolated areas of elevated concentrations are located along the western and southern portions of the south plantation shoreline.

In the 9 to 18 feet depth interval, it appears that the area of elevated cVOC concentrations along the eastern boundary of the landfill has lower concentrations compared to the 0 to 9 feet depth interval and has migrated slightly to the south (Figure 6). The interpreted concentrations of cVOC west of this area are relatively heterogeneous and not as elevated.

At greater than 18 feet bgs, elevated cVOC concentrations are interpreted to be present only along the eastern boundary of the landfill and have further elongated to the south (Figure 7). These data indicate that the top of the Clover Park Silt has not influenced the migration of cVOCs.

3.2.3 Central Landfill

In the central landfill, eight MIP borings (MIP-062 through MIP-069) were drilled (Figure 4 and Table 2).

XSD Responses

An isoconcentration map of the maximum reported XSD responses from depths greater than 15 feet bgs is shown on Figure 14. No XSD response significantly greater than the baseline was reported from the ground surface to a depth of approximately 15 feet bgs in the completed MIP borings. Therefore, an isoconcentration map of this interval could not be produced. Cross-sectional views of the XSD responses are shown on Figures 15 and 16, and a plan view of the cross section locations is provided on Figure 4. The XSD results for the central landfill can be summarized as follows:

- The highest XSD response in the central landfill was reported at MIP-064, which is located southeast of monitoring well MW1-17 (Figure 14). The response was 267,037 µV at a depth of 18.9 feet bgs. Significant responses were also reported at MIP-062 (256,355 µV at 17.3 feet bgs), MIP-065 (247,200 µV at 20.3 at feet bgs), and MIP-063 (215,156 µV at 16.95 feet bgs) (Figures 14, 15, and 16). These results suggest the presence of a source near MW1-17.
- As stated above, no XSD response significantly greater than the baseline was reported from the ground surface to a depth of approximately 15 feet bgs in the completed MIP borings.

- The XSD responses at MIP-065 suggest that the deepest contamination reported during the investigation does not extend into the Clover Park Silt, which was encountered at approximately 32 feet bgs at this boring (Figure 16). However, the elevated XSD responses at depths between approximately 17 and 20 feet bgs indicate that contamination in this area extends deeper than the existing well network.

PID Responses

PID responses are reported on the MIP boring logs provided in Appendix H. The PID results for the central landfill can be summarized as follows:

- PID responses were reported at varying magnitudes at most of the MIP borings and generally corresponded with the locations and depths of the XSD responses.
- No PID responses were observed to occur independently of XSD responses.

EC and HPT Responses

The EC and HPT detectors were used to evaluate the general lithology at each MIP boring location at the central landfill using the evaluation process described above. The EC and HPT responses are reported on the MIP boring logs provided in Appendix H.

The Fill Material is present from the ground surface to depths as great as approximately 10 feet bgs in all of the MIP borings in the central landfill.

The Marsh Deposit was encountered between approximately 3 and 10 feet bgs and was observed to be 2 to 4 feet thick in all of the MIP borings in the central landfill.

The Upper Kitsap Sand (upper aquifer) was encountered between approximately 6 to 12 feet bgs and was observed to be approximately 4 to 8 feet thick in the MIP borings completed in the central landfill. What is inferred to be the Kitsap Silt/Clay was encountered between approximately 13 and 15 feet bgs, was observed to be approximately 3 to 5 feet thick and is inferred to be the middle aquitard that separates the upper and intermediate aquifers. What is inferred to be the Kitsap Silt and Sand was encountered between approximately 16 to 21 feet bgs, was observed to be approximately 6 to 13 feet thick and is inferred to be the intermediate aquifer.

The Clover Park Silt, when encountered, was observed between 26 and 34 feet bgs in the MIP borings in the central landfill.

Summary of Central Landfill Data Evaluation

Geologic Interpretation: The Fill Material appears to range from 4 to 10 feet thick within the investigated area of the central landfill. The Fill Material was placed on top of the Marsh Deposit, which was observed to be 2 to 4 feet thick in the central landfill. The top of the upper aquifer is interpreted to be approximately 6 to 12 feet bgs, and its thickness ranges from 4 to 8 feet. The upper aquifer is underlain by the Kitsap Silt/Clay (middle aquitard), which ranges from 3 to 5 feet thick. The Kitsap Silt and Sand (intermediate aquifer) underlies the Kitsap Silt/Clay and ranges from 6 to 13 feet thick. The base of the Kitsap Formation represents the top of the Clover Park Silt. The top of the Clover Park Silt, when encountered, was observed between 26 and 34 feet bgs in the MIP borings in the central landfill. Figure 13 presents a contour map of the inferred depth to the Clover Park Silt contact, which appears to slope from south to north in the eastern portion of the central landfill and from northwest to southeast in the western portion of the central landfill. An apparent drainage cut is observed in the Clover Park Unit sloping from MIP-064 northeast towards MIP-065.

Contaminant Distribution: The distribution of cVOCs in vadose zone soil and groundwater in the central landfill were interpreted at two depth intervals: 0 to 15 feet bgs and greater than 15 feet bgs. In the depth interval from 0 to 15 feet, the observed cVOC responses were no greater than the baseline response of the detector. At depths greater than 15 feet bgs, elevated cVOC responses were observed near MW1-17 (Figure 14). This suggests that contamination is present in the intermediate aquifer. The interpreted cVOC concentrations in borings farther east/southeast of MW1-17 are relatively heterogeneous and lower.

4.0 SOIL GAS SAMPLING

Thirteen soil gas probes (SV-1 through SV-13) were installed along the east side of Bradley Road (Figure 17) for the collection of soil gas samples. Before the drilling and installation of the sample probes, a utility locate was completed. Because of the presence of communication lines, SV-13 was relocated slightly south. All of the marked locations were cleared. A dig permit for work in Bradley Road was submitted to NAVFAC NW on August 19, 2016, and approved on August 23, 2016 (Appendix D). Throughout the field investigation, Resolution completed daily safe work assessments, a photograph log, daily field reports, and documented site activities in a field logbook. The safe work assessments and photographic log are included as Appendices E and F, respectively. The daily field reports, which were submitted to the Navy on a regular basis during the investigation, and copies of the field logbook are included in Appendix G.

4.1 Soil Gas Probe Installation

Soil gas probes were installed in accordance with the SAP on August 29, 2016. A direct-push drilling rig was used to core to 3.5 feet bgs. Typically, groundwater at OU 1 is encountered between 4 to 5 feet bgs in the summer and as shallow as 3 feet bgs in the winter. Assuming these typical depths to groundwater and a capillary fringe of 1 foot, the selected target depth for soil gas sampling was 3 feet bgs (U.S. Navy 2016).

In the locations where the soil gas probes were installed, the asphalt thicknesses varied from 4 to 9 inches, and no water was encountered during drilling. An inch of sand was placed at the bottom of each boring, and a 6-inch soil gas sampling screen was installed, surrounded with sand to 1 inch above the screen and overlain with approximately 1 inch of hydrated granular bentonite, with Teflon tubing attached to the screen and extending above the bentonite. A one-way valve was placed in the closed position on the top of the Teflon tubing, and then the tubing was curled into the hole, backfilled with sand, and capped with a thin layer of cement/bentonite mixture. The probes were allowed to equilibrate overnight.

4.2 Soil Gas Sampling Methods

SV-01 through SV-06 were sampled on August 30, 2016. The thin layer of cement/bentonite mixture and sand were removed from the surface to expose the tubing. Cement/bentonite was then placed around the tubing to form a seal with the ground surface. The tubing was connected to a hand pump, and the Teflon tubing and screen were purged at a flow rate of approximately 200 mL/min until approximately three void volumes were removed. A shroud was then placed over the sample tubing, and ultrapure helium was introduced to the shroud for leak testing. The hand pump

was used to partially fill a Tedlar bag to compare the helium concentration measured in the shroud with the concentration in the sample tubing. A helium concentration in the purge air sample in excess of 10 percent of the helium concentration in the shroud indicates an inadequate probe seal. If the helium concentration in the purge air exceeded the 10 percent threshold, additional sealant was added, and the leak test was repeated. The results of the leak testing are provided in Appendix J. Samples were collected in 6-liter SUMMA canisters using a flow controller with a constant flow rate of approximately 200 mL/min.

During the leak testing at SV-01, the measured helium concentration in the purge air sample was less than the 10 percent threshold, and a soil gas sample was collected as planned. During leak testing at SV-02, the helium concentration in the purge air sample was greater than 10 percent of the helium concentration in the shroud (approximately 50 percent) on two separate attempts, with additional sealant added between leak tests. Similar results were encountered during the leak testing at SV-03, SV-04, and SV-06. The presence of methane is known to interfere with helium detectors; therefore, methane concentrations in the soil gas were measured by attaching a landfill gas meter to the sample tubing. Methane was detected at all of the locations with the failed leak tests (SV-02, SV-03, SV-04, and SV-06) (Table 3). After the failed leak test and before sample collection, additional sealant was added at each of the four locations to mitigate the potential impacts of ambient air. SV-05 passed the leak testing, and methane was not detected in field measurements.

After detecting methane during soil gas sampling, existing monitoring wells were measured to determine if the landfill was the potential source of the combustible gas readings (Table 3). However, the water levels in all but one monitoring well (MW1-15) were above the top of the screen depths; therefore, the readings at all wells except MW1-15 are likely not representative of subsurface conditions. Field measurements were also collected from the MIP borings starting at MIP-059 after pre-probing with a drill rod, prior to connecting the MIP, and again after removal of the MIP prior to backfilling (Table 3).

Field measurements were collected using an RKI GX-6000. Although the combustible gas readings were calibrated to methane, the catalytic combustible sensor will respond to any combustible gas. Therefore, the readings may be a result of methane combined with other combustible gases.

Because of concerns about the high concentrations of methane detected during the first day of soil gas sampling, the collection of soil gas samples from the remaining locations (SV-7 through SV-13) was postponed until September 8, 2016. Because of the failed leak tests at SV-02, SV-03, SV-04 and SV-06, helium was added to the analyte list for the remaining samples and a relatively constant

concentration of ultrapure helium was maintained in the shroud throughout the duration of sample collection.

A major rain event occurred prior to collection of the remaining soil gas samples, and groundwater was encountered during purging at SV-07, SV-08, and SV-09. So, soil gas samples could not be collected and the locations were abandoned. Standing water was also observed in a drainage swale east of Bradley Road and in a low spot above the asphalt on the west side of Bradley road.

At SV-11, SV-12, and SV-13, methane concentrations were detected; therefore, the samples were collected with additional sealant added and the helium shroud in place. Helium concentrations in the shroud were recorded at 5-minute intervals for comparison to laboratory helium concentrations.

At SV-10, methane concentrations were detected; therefore additional sealant was added and the helium shroud put in place. However, after 10 minutes of sampling, the mercury level on the pressure gauge of the SUMMA canister had decreased only approximately 1 inch; therefore, a new flow controller was connected. After an additional 10 minutes, the mercury level had decreased another 4 inches. After the SUMMA canister was closed, the pressure gauge on the canister still read 25 inches of mercury, indicating a vacuum in the sample tubing and screen. This pressure was released when the flow controller was disconnected from the tubing. The hand pump was connected to the tubing to determine whether the presence of groundwater could have caused the increased pressure, and air was briefly pumped before pumping became difficult, but no groundwater was encountered. SV-10 was subsequently abandoned due the lack of air flow.

4.3 Soil Gas Laboratory Analysis and Data Validation

The soil gas samples collected during both sampling events were analyzed for cVOCs by EPA Method TO-15 and for methane by EPA Method TO-3. The samples collected on September 8, 2016, (SV-11, SV-12, and SV-13) were also analyzed for helium by EPA Method 3C. A duplicate sample was collected at SV-12, and the results in the two samples were comparable. Data validation was completed by Laboratory Data Consultants (Appendix K).

4.4 Soil Gas Data Evaluation

Laboratory-measured helium concentrations were compared to a time-weighted average of the helium concentrations measured in the shroud during sampling (Appendix J). Helium concentrations recorded during each sampling event were averaged over the recorded time step to determine an average concentration for the sampling duration. The laboratory-measured helium concentration was less than 10 percent of the helium concentration in the shroud helium concentration for the sampling locations analyzed for helium (SV-11, SV-12, and SV-13).

Ecology and EPA soil gas screening levels for subslab soil gas were compared and the more conservative Ecology value was used for all constituents (Ecology 2015 and USEPA 2016). TCE concentrations in six of the nine samples and vinyl chloride concentrations in five of the nine samples exceeded the applicable soil gas screening levels: 12 micrograms per cubic meter [µg/m^3] for TCE and 9.3 µg/m^3 for vinyl chloride (Figure 17; Table 4). Concentrations of other COCs were either less than the screening levels or reported as not detected.

TCE concentrations were highest at SV-13 (420 µg/m^3) and SV-06 (210 µg/m^3). Vinyl chloride concentrations were highest at SV-01 (9,100 µg/m^3) and SV-06 (1,400 µg/m^3) and were an order of magnitude higher than the concentrations at the other sampling locations (refer to Figure 17).

Methane concentrations were greater than the lower explosive limit (LEL) of 5 percent (50,000 parts per million, or approximately 33,000 milligrams per cubic meter [mg/m^3]) at all locations except SV-05, SV-12, and SV-13. At SV-05, the methane concentration was less than 1 percent of the LEL; at SV-12, the methane concentration was approximately 10 percent of the LEL; and at SV-13, the methane concentration was approximately 60 percent of the LEL. The field measurements and laboratory results for methane were consistent for all sampling locations (Tables 3 and 4). The field measurements at SV-05 indicated low or nonexistent concentrations of methane, comparable to the low concentrations detected in the laboratory analyses.

5.0 SUMMARY OF DECISIONS BASED ON SAP DECISION RULES

As outlined in the SAP, decision rules were developed to guide field decisions and data interpretations for identified issues and decisions. After the Phase II investigation, two decisions from the SAP (1C and 5) were addressed (U.S. Navy 2016). Other decisions were not addressed because they were related to sampling efforts that have not been completed as part of this scope of work or will need to be adjusted on the basis of the updated CSM, required in response to decision rule 5 and described below in Section 5.2.

5.1 Decision 1C

Decision 1C from the SAP can be summarized as follows:

Decide whether a vapor intrusion study of buildings east of Bradley Road is warranted.

1. Sample soil gas from locations along the east side of Bradley Road and analyze the samples for cVOCs.
2. Compare the cVOC results to Ecology's current soil gas screening values (Ecology 2015) and the EPA's screening values (USEPA 2016).
3. If concentrations of any cVOCs related to the landfill exceed the lower of Ecology's or the EPA's screening criteria, recommend further investigation of potential vapor intrusion at buildings east of Bradley Road.

Soil gas samples were collected as described above. The sampling locations were as close to the east side of Bradley Road as possible based on the presence of utilities and stormwater drainage features.

The cVOC concentrations were compared to the applicable screening criteria and results are summarized in Table 4. As described in Section 4.4, detected concentrations of TCE and vinyl chloride exceed the screening criteria at multiple sampling locations. Therefore, further investigation of potential vapor intrusion at buildings east of Bradley Road is recommended.

5.2 Decision 5

Decision 5 from the SAP can be summarized as follows:

Conclude whether the existing CSM is accurate or needs refinement and refine, as necessary for accuracy.

1. Use soil lithology data obtained from MIPs and sonic drill locations in the central landfill and the south plantation to develop fence diagrams that illustrate contaminant pathways and potential receptors.

2. Compare the existing CSM to the fence diagrams to determine whether refinement of the CSM is warranted and if so, refine the CSM to make Decision 5.

Refinements to the CSM based on the results of the Phase II investigation for the south plantation and central landfill are discussed in the following subsections.

5.2.1 South Plantation

At the south plantation, the EC and HPT responses within the Kitsap Formation below the upper aquifer suggest a high of degree of heterogeneity within the formation, which is inferred to be interbedded sands, silts, and clays from the bottom of the upper aquifer to the top of the Clover Park Silt. Therefore, it is difficult to correlate the EC and HPT results with Kitsap Formation subunits. A distinguishable aquitard between the upper aquifer and intermediate aquifer was not evident based on the EC and HPT responses. This finding is not consistent with the pre-investigation CSM.

The XSD responses indicate that contamination extends to approximately 30 feet bgs in the eastern portion of the south plantation, which is deeper than the existing well network. The most significant source observed during the investigation is located on the east side of the landfill adjacent to Bradley Road, south of the former Hazardous Waste Building (Building 884). The distribution pattern exhibits characteristics consistent with DNAPL or residual DNAPL.

5.2.2 Central Landfill

In the central landfill, the EC and HPT responses indicate that the Upper Kitsap Sand (upper aquifer) was encountered between approximately 6 and 12 feet bgs and was observed to be approximately 4 to 8 feet thick in the MIP borings completed in the central landfill. What is inferred to be the Kitsap Silt/Clay was encountered between approximately 13 to 15 feet bgs, is interpreted to be approximately 3 to 5 feet thick and is inferred to be the aquitard that separates the upper and intermediate aquifers. What is inferred to be the Kitsap Silt and Sand was encountered between approximately 16 and 21 feet bgs, is interpreted to be approximately 6 to 13 feet thick, and is inferred to be the intermediate aquifer. This finding is consistent with the pre-investigation CSM. The XSD responses indicate that contamination extends to approximately 32 feet bgs in the western portion of the central landfill, which is deeper than the existing well network.

On the basis of these findings and refinements of the CSM, the following recommendations have been developed to refine the CSM:

- Collection of quantitative soil and groundwater data to verify the XSD results of the MIP investigation and to estimate the extent of hotspots in the south plantation and the central landfill.
- Visual logging of soils and collection of physical soil samples for geotechnical analysis to verify the EC and HPT results of the MIP investigation and to refine the hydrogeologic units at OU 1.
- Installation of a network of deeper monitoring wells and collection of quantitative groundwater data to further assess the extent of groundwater contamination and confirm the groundwater flow patterns within the intermediate aquifer beneath the south plantation and the central landfill.

This page left intentionally blank.

6.0 REFERENCES

U.S. Department of the Navy (U.S. Navy). 2016. Project-Specific Sampling and Analysis Plan for Keyport OU 1 Site Recharacterization, Naval Base Kitsap Keyport, Washington. Prepared by Resolution Consultants for Naval Facilities Engineering Command Northwest under Contract N62470-11-D-8013, Contract Task Order JP09. Executed July 1, 2016.

———. 2015a. Site Recharacterization, Phase I, Operable Unit 1, Naval Base Kitsap Keyport, Washington. Prepared by URS Group, Inc., for Naval Facilities Engineering Command Northwest under Contract N44255-09-D-4001, Delivery Order 88. May 27, 2015.

———. 2015b. Fourth Five-Year Review, Naval Base Kitsap Keyport, Washington. Prepared by URS Group, Inc., for Naval Facilities Engineering Command Northwest under Contract N44255-09-D-4001, Delivery Order 81. Executed December 11, 2015.

———. 2013. Results of an Archeological Survey at Naval Base Kitsap Keyport, Keyport, Washington. Prepared by Stell Environmental Enterprises, Inc. for Naval Facilities Engineering Command Northwest. December 2013.

———. 2012. Final Natural Attenuation Evaluation, Operable Unit 1, Naval Base Kitsap Keyport, Washington. Prepared by URS Group, Inc., for Naval Facilities Engineering Command Northwest under Contract N44255-09-D-4001. November 2012.

———. 2010. Third Five-Year Review, Naval Base Kitsap Keyport, Washington. Prepared by URS Group, Inc., for Naval Facilities Engineering Command Northwest under Contract N44255-09-D-4001. December 2010.

———. 1997a. Final Summary Data Assessment Report for Operable Unit 1, Additional Pre-ROD Data Collection for the CLEAN Northwest Area, Naval Undersea Warfare Center Division, Keyport, Washington. Prepared by URS Consultants and Science Applications International Corporation for Engineering Field Activity Northwest under CLEAN Contract No. N62474-89-D-9295. November 1997.

———. 1997b. Final Focused Feasibility Study for Operable Unit 1, Naval Undersea Warfare Center Division, Keyport, Washington. Prepared by URS Consultants and Science Applications International Corporation for Engineering Field Activity Northwest under CLEAN Contract No. N62474-89-D-9295. November 1997.

———. 1994. The Navy, EPA, and Ecology Announce the Proposed Plan for the Cleanup of NUWCD Keyport. Naval Undersea Warfare Center Division, Keyport, Kitsap County, Washington. January 1994.

———. 1993a. Final Remedial Investigation Report, Naval Undersea Warfare Center Division, Keyport, Washington. Prepared by URS Consultants and Science Applications International Corporation for Engineering Field Activity Northwest under CLEAN Contract No. N62474-89-D-9295. October 25, 1993.

———. 1993b. Final Feasibility Study, Naval Undersea Warfare Center, Keyport, Washington. Prepared for Engineering Field Activity Northwest, Western Division, Naval Facilities Engineering Command, Silverdale, Washington. Prepared by URS Consultants, Inc., Seattle, Washington, and Science Applications International Corporation, Bothell, Washington. November 15, 1993.

———. 1993c. Final Baseline Risk Assessment, Naval Undersea Warfare Center, Keyport, Washington. Volume I: Human Health Risk Assessment. Prepared for Engineering Field Activity Northwest, Western Division, Naval Facilities Engineering Command, Silverdale, Washington. Prepared by URS Consultants, Inc., Seattle, Washington, and Science Applications International Corporation, Bothell, Washington. October 25, 1993.

———. 1993d. Final Baseline Risk Assessment, Naval Undersea Warfare Center, Keyport, Washington. Volume II: Ecological Risk Assessment. Prepared for Engineering Field Activity Northwest, Western Division, Naval Facilities Engineering Command, Silverdale, Washington. Prepared by URS Consultants, Inc., Seattle, Washington, and Science Applications International Corporation, Bothell, Washington. October 25, 1993.

———. 1984. Initial Assessment Study of Naval Undersea Warfare Engineering Station, Keyport, Washington. Prepared by SCS Engineers under NEESA 13-054.

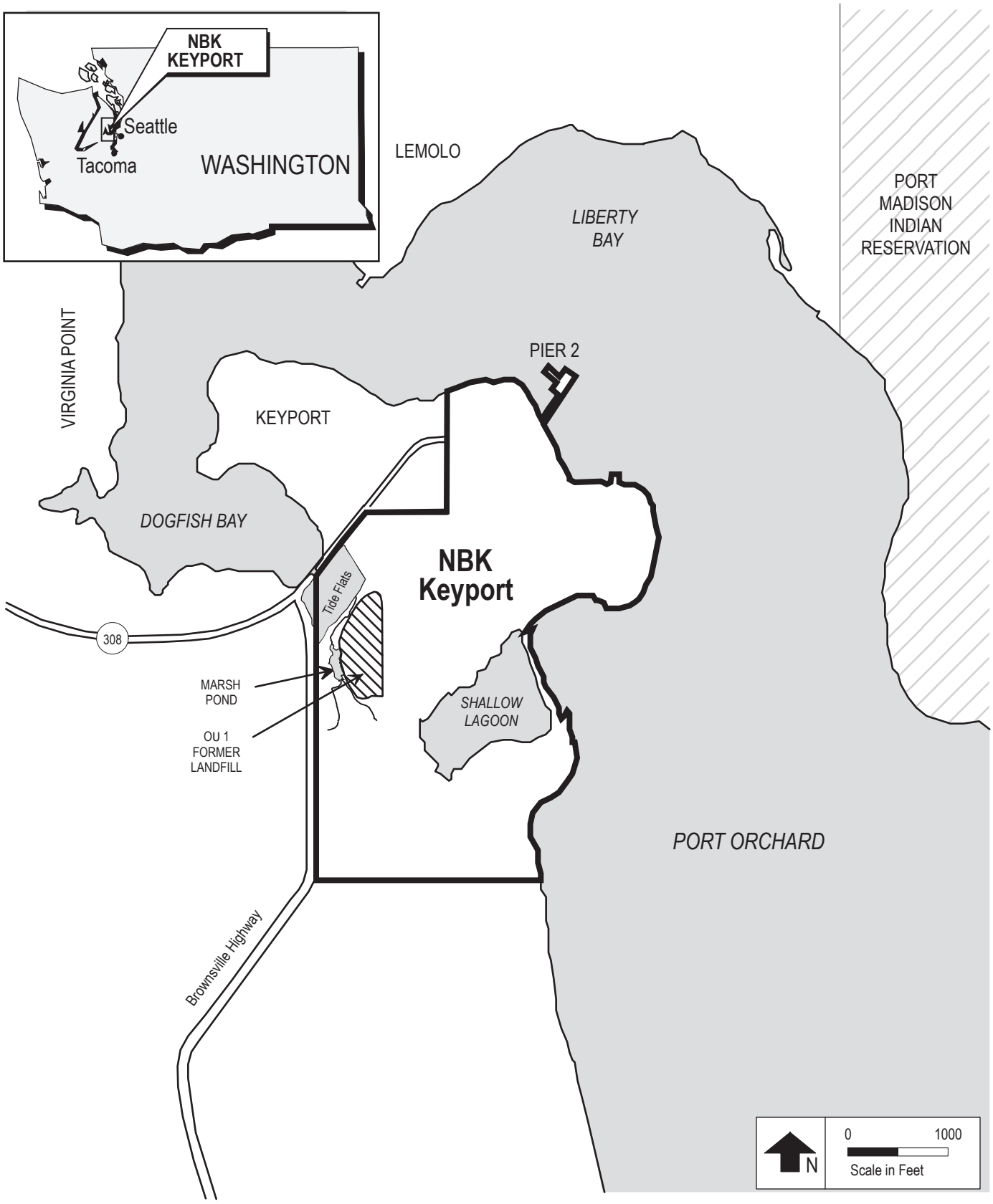
U.S. Department of the Navy (U.S. Navy), U.S. Environmental Protection Agency (USEPA), and Washington State Department of Ecology (Ecology). 1998. Record of Decision for Operable Unit 1, Naval Undersea Warfare Center Division, Keyport, Washington. Prepared by URS Greiner and Science Applications International Corporation for Engineering Field Activity Northwest under CLEAN Contract No. N62474-89-D-9295, CTO 10. September 30, 1998.

U.S. Environmental Protection Agency (USEPA). 2016. Vapor Intrusion Screening Level Calculator. May 2016. Available at https://www.epa.gov/vaporintrusion/vapor-intrusion-screening-levels-visls.

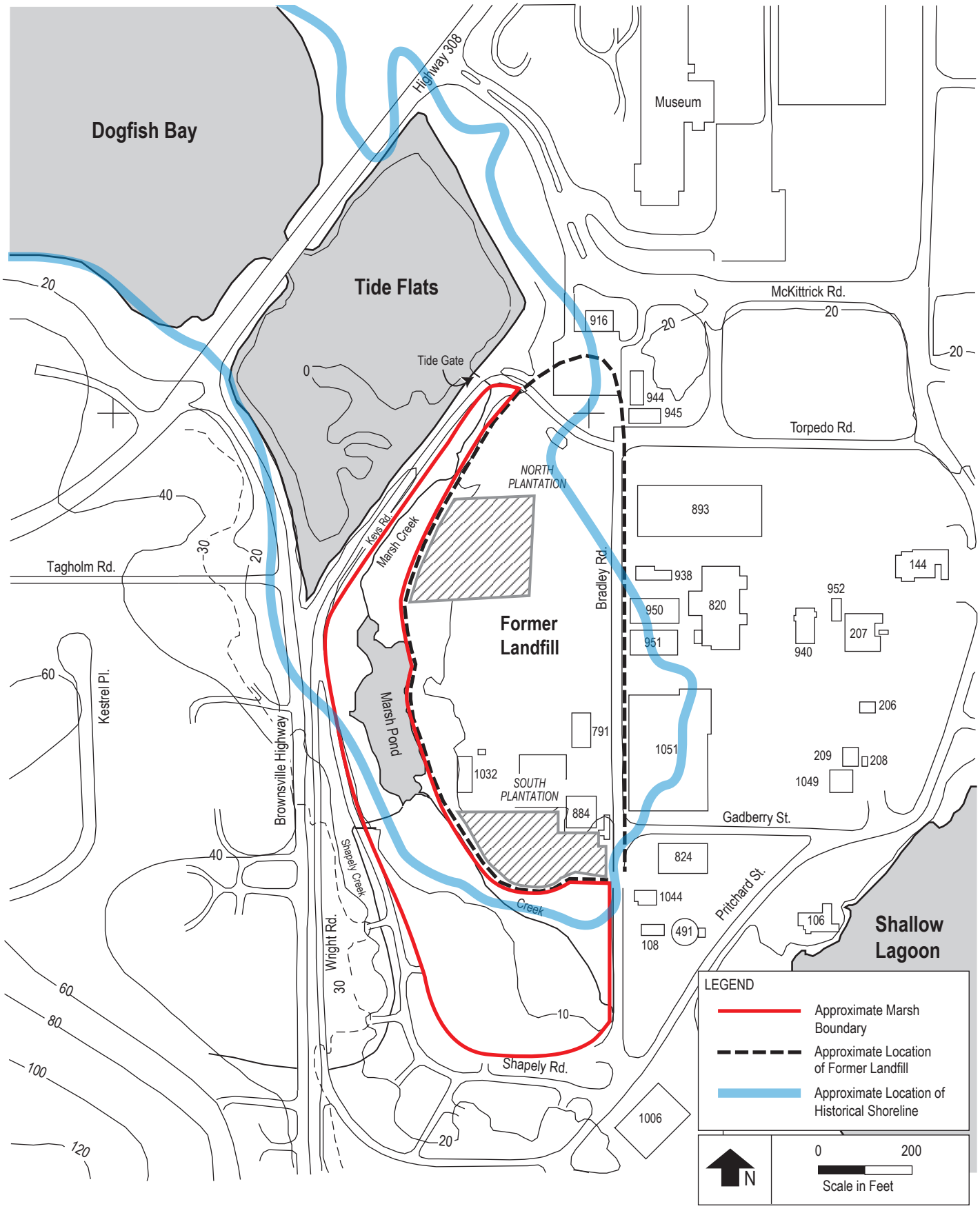
Washington State Department of Ecology (Ecology). 2015. Cleanup Levels and Risk Calculation (CLARC) Master Table. August 2015. Available at https://fortress.wa.gov/ecy/clarc/CLARCHome.aspx.

Figures

\\Seattle.na.aecomnet.com\Seattle\DCS\Projects\Legacy_URS\NNavy AE\Navy CLEAN - RTC\JP09 (XY15)- 2015 Keyport OU 1 Phase II QAPP\07 Deliverables\60343583 GRFX\60343583_09.ai

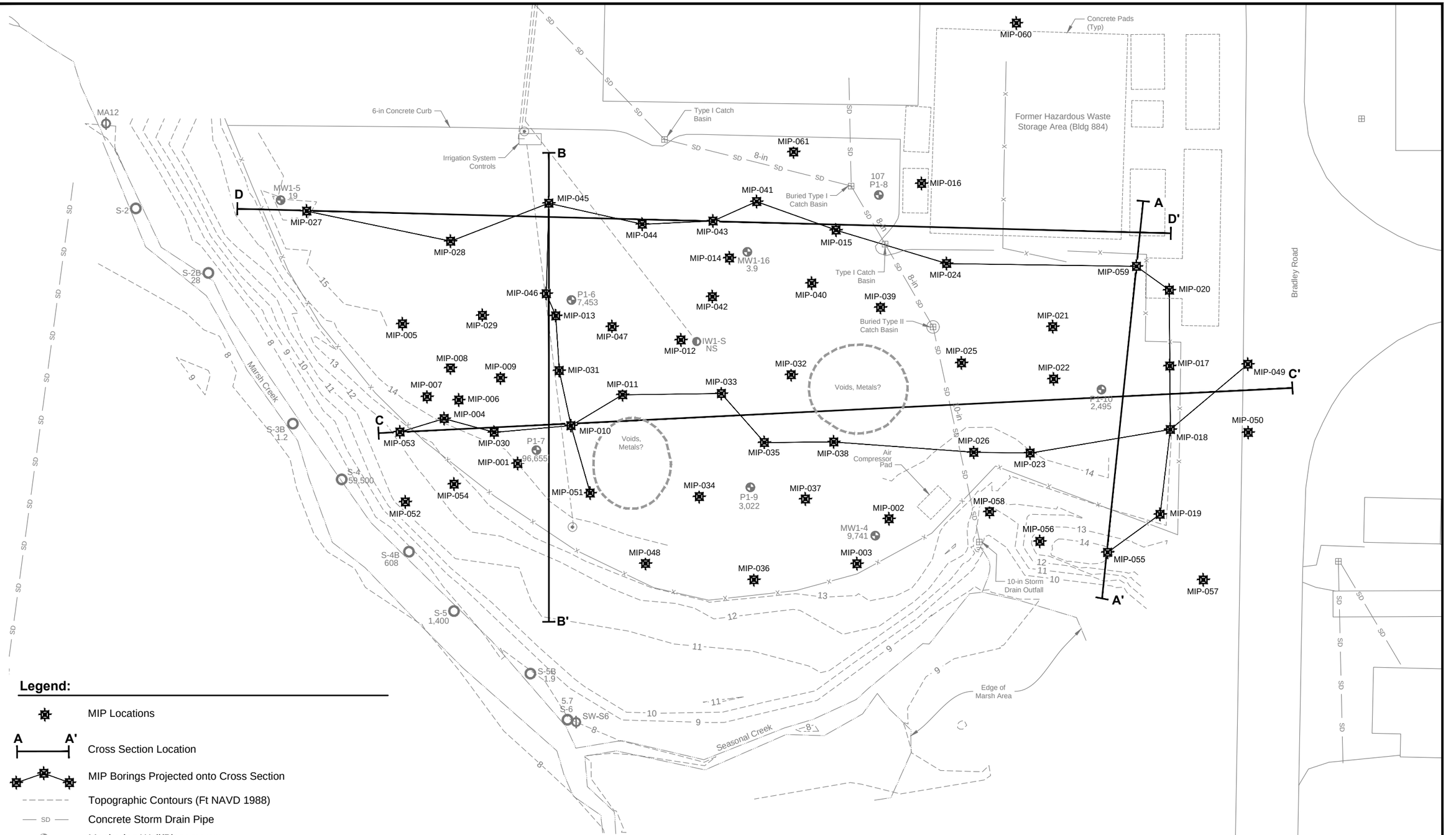


U.S. NAVY	CTO JP09 NBK Keyport PHASE II INVESTIGATION REPORT	**Figure 1** **NBK Keyport Vicinity Map**



\\Seattle.na.aecomnet.com\Seattle\DCS\Projects\Legacy_URS\NNavy AE\Navy CLEAN - RTC\JP09 (XY15)- 2015 Keyport OU 1 Phase II QAPP\07 Deliverables\60343583 GRFX\60343583_07.ai

U.S. NAVY	CTO JP09 NBK Keyport PHASE II INVESTIGATION REPORT	**Figure 2** **Operable Unit 1**

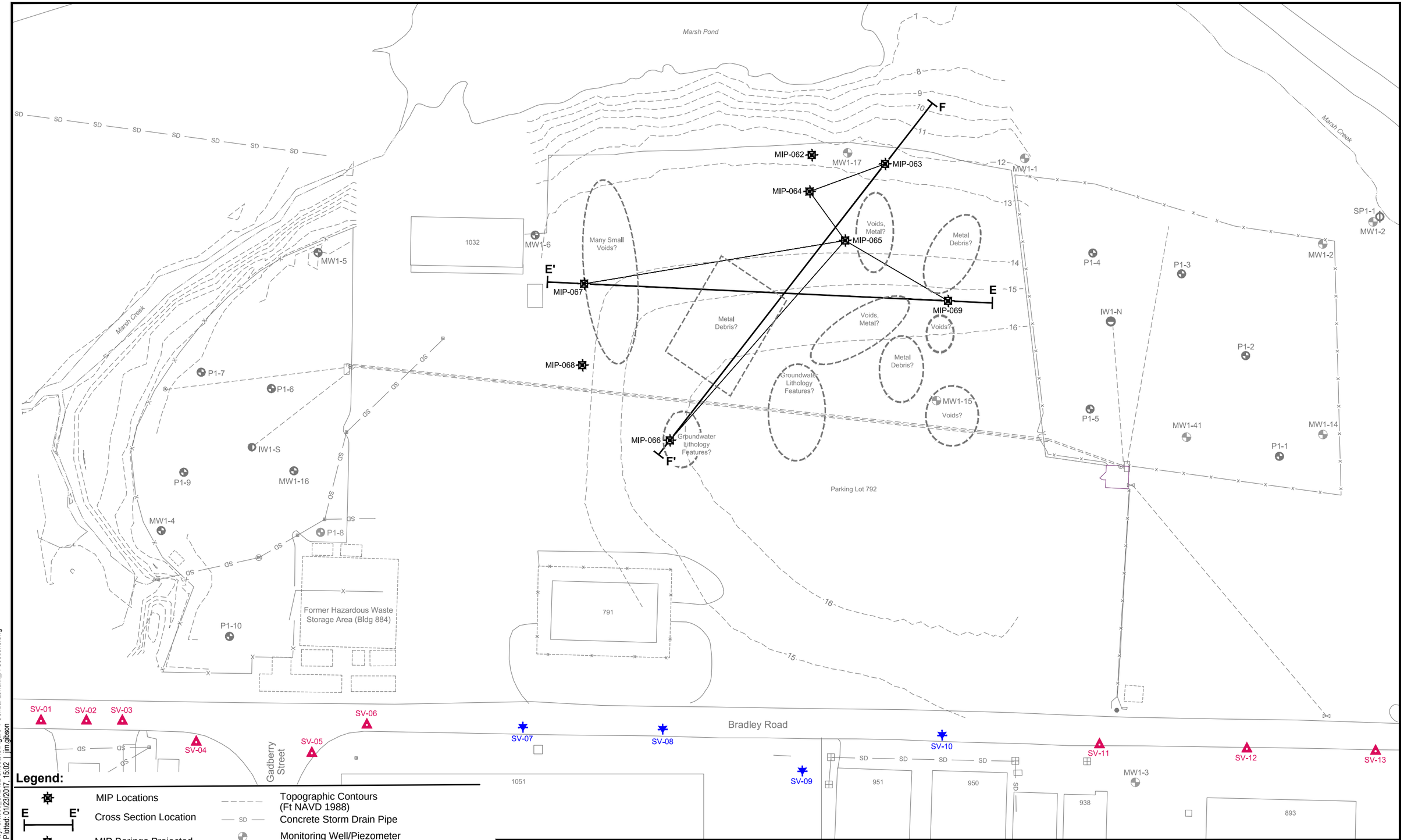


Legend:

- MIP Locations
- A — A' Cross Section Location
- MIP Borings Projected onto Cross Section
- Topographic Contours (Ft NAVD 1988)
- SD Concrete Storm Drain Pipe
- Monitoring Well/Piezometer
- Historical Passive Diffusion Sample
- Historical Surface Water Sample
- Irrigation Well
- NS Not Sampled
- 3,022 Concentration of Total CVOCs in Groundwater (ug/L) as Reported in the Phase I Recharacterization Report (U.S. Navy 2014)

U.S. NAVY	CTO JP09 NBK Keyport PHASE II INVESTIGATION REPORT	N 0 15 30 SCALE IN FEET	**Figure 3** **MIP Boring Locations at the South Plantation**

Z:\DCS\Projects\Legacy_URS\N\Navy AE\Navy CLEAN - RTC\JP09 (XY15)- 2015 Keyport OU 1 Phase II QAPP\07 Deliverables\Phase II Report\CAD\Figure 3-South Plantation_X-Sections.dwg
Mod: 01/03/2017, 11:33 | Plotted: 01/03/2017, 11:34 | jim.gibson

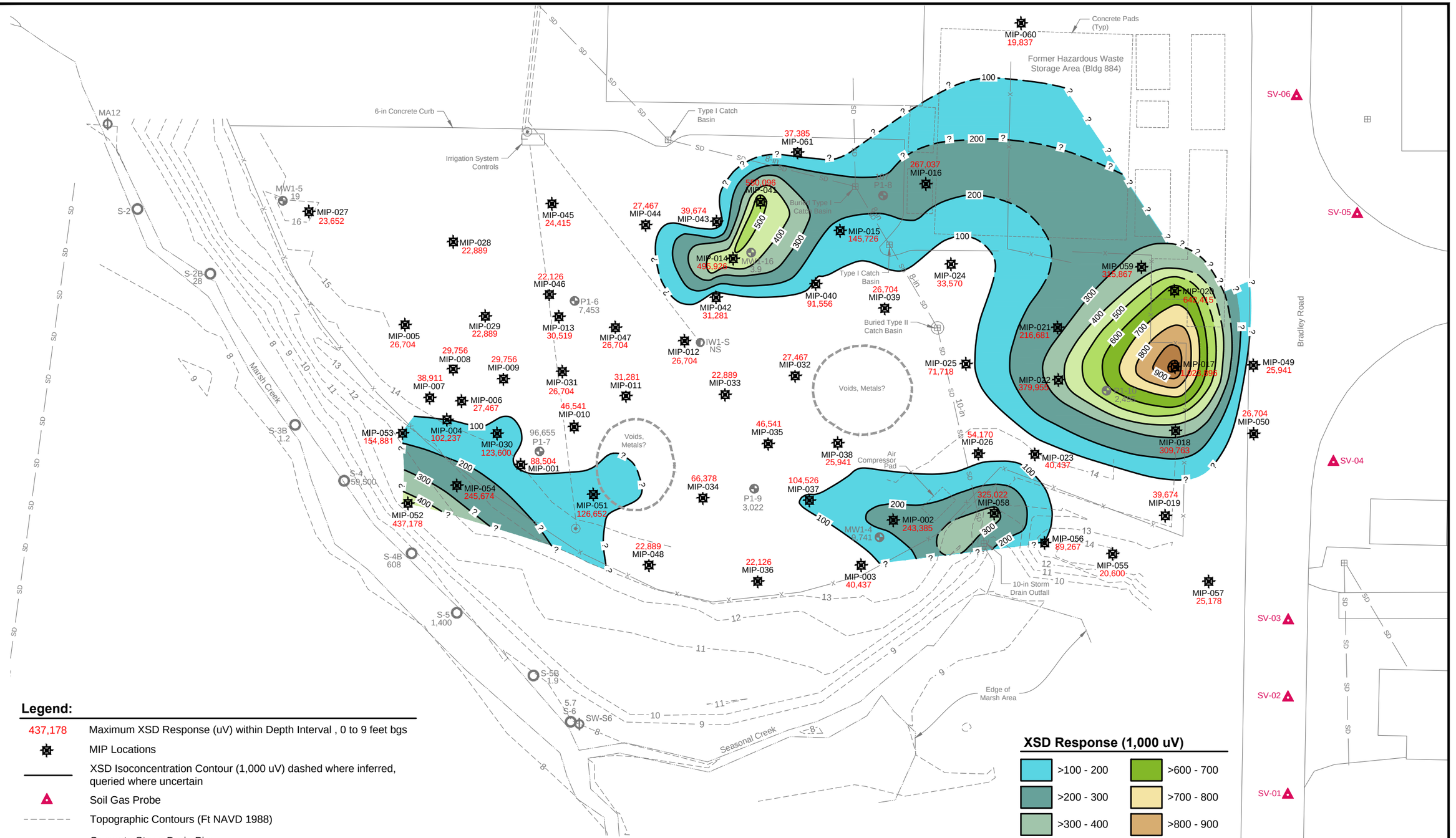


Legend:

- MIP Locations
- E E' Cross Section Location
- MIP Borings Projected onto Cross Section
- Soil Gas Probe
- Abandoned Soil Gas Locations
- Topographic Contours (Ft NAVD 1988)
- SD Concrete Storm Drain Pipe
- Monitoring Well/Piezometer
- Historical Surface Water Sample
- Irrigation Well

U.S. NAVY	CTO JP09 NBK Keyport PHASE II INVESTIGATION REPORT	0 30 60 SCALE IN FEET	**Figure 4** **Soil Gas Locations and MIP Boring Locations at the Central Landfill**

J:\Seattle Support\NAVY_Key\Port\000_CAD\02-Sheets\CI\Figure 4-Central Landfill_X-Sections.dwg
Mod: 01/23/2017, 15:00 | Plotted: 01/23/2017, 15:02 | jim.gibson



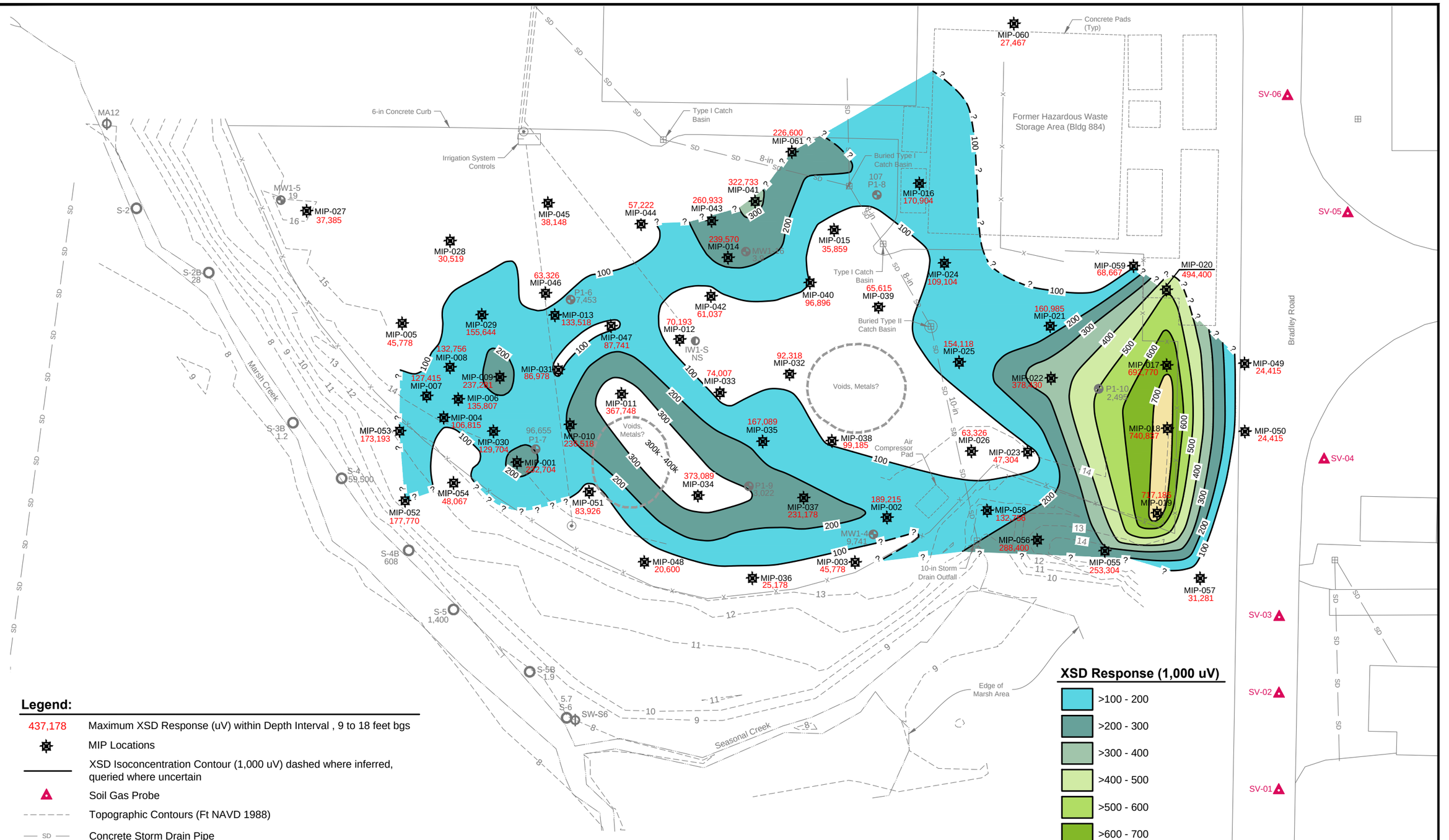
U.S. NAVY

CTO JP09
NBK Keyport
PHASE II
INVESTIGATION REPORT

0 15 30
SCALE IN FEET

Figure 5
South Plantation XSD Isoconcentration Map
0 to 9 Feet Below Ground Surface

Z:\DCS\Projects\Legacy_URS\NINavy AE\Navy CLEAN - RTC\JP09 (XY15)- 2015 Keyport OU 1 Phase II QAPP\07 Deliverables\Phase II Report\CAD\Figure 5-South Plantation_ 0-9 ft bgs.dwg
Mod: 01/03/2017, 11:47 | Plotted: 01/03/2017, 11:48 | jim.gibson



Legend:

437,178	Maximum XSD Response (uV) within Depth Interval , 9 to 18 feet bgs
	MIP Locations
	XSD Isoconcentration Contour (1,000 uV) dashed where inferred, queried where uncertain
	Soil Gas Probe
	Topographic Contours (Ft NAVD 1988)
SD	Concrete Storm Drain Pipe
	Monitoring Well/Piezometer
	Historical Passive Diffusion Sample
	Historical Surface Water Sample
	Irrigation Well
NS	Not Sampled
3,022	Concentration of Total CVOCs in Groundwater (ug/L) as Reported in the Phase I Recharacterization Report (U.S. Navy 2014)

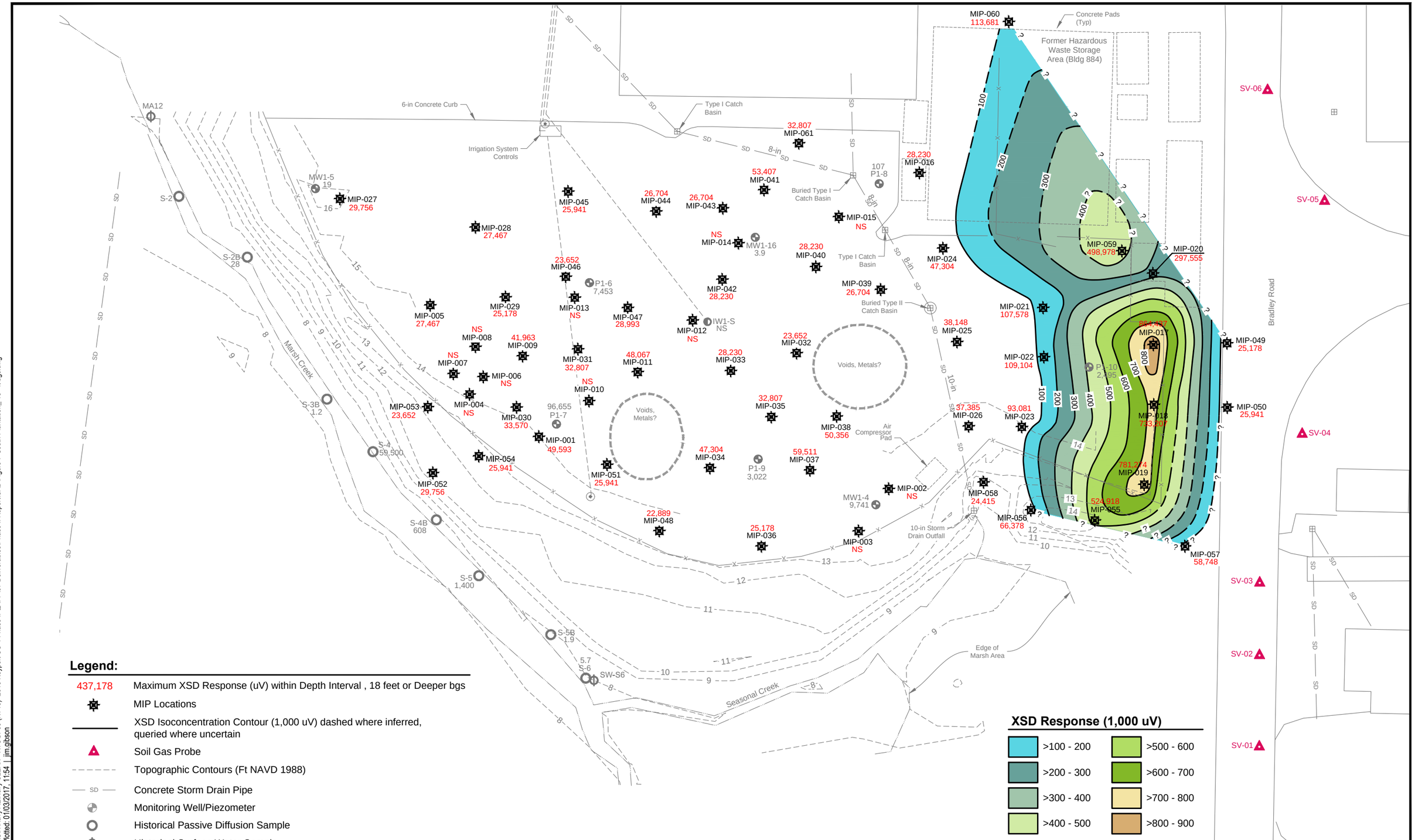
U.S. NAVY

CTO JP09
NBK Keyport
PHASE II
INVESTIGATION REPORT

0 15 30
SCALE IN FEET

Figure 6
South Plantation XSD Isoconcentration Map
9 to 18 Feet Below Ground Surface

Z:\DCS\Projects\Legacy_URS\NN\Navy AEINavy CLEAN - RTCV\JP09 (XY15)- 2015 Keyport OU 1 Phase II QAPP\07 Deliverables\Phase II Report\CAD\Figure 6-South Plantation_ 9-18 ft bgs.dwg
Mod: 01/03/2017, 11:51 | Plotted: 01/03/2017, 11:51 | jim.gibson



Legend:

437,178	Maximum XSD Response (uV) within Depth Interval , 18 feet or Deeper bgs
	MIP Locations
	XSD Isoconcentration Contour (1,000 uV) dashed where inferred, queried where uncertain
	Soil Gas Probe
	Topographic Contours (Ft NAVD 1988)
SD	Concrete Storm Drain Pipe
	Monitoring Well/Piezometer
	Historical Passive Diffusion Sample
	Historical Surface Water Sample
	Irrigation Well
NS	Not Sampled
3,022	Concentration of Total CVOCs in Groundwater (ug/L) as Reported in the Phase I Recharacterization Report (U.S. Navy 2014)

XSD Response (1,000 uV)

>100 - 200	>500 - 600
>200 - 300	>600 - 700
>300 - 400	>700 - 800
>400 - 500	>800 - 900

U.S. NAVY

CTO JP09
NBK Keyport
PHASE II
INVESTIGATION REPORT

0 15 30
SCALE IN FEET

Figure 7
South Plantation XSD Isoconcentration Map
Greater Than 18 Feet Below Ground Surface

Z:\DCS\Projects\Legacy_URS\N\Navy AE\Navy CLEAN - RTC\JP09 (XY15)- 2015 Keyport OU 1 Phase II QAPP\07 Deliverables\Phase II Report\CAD\Figure 7-South Plantation_ 18+ ft bgs.dwg
Mod: 01/03/2017, 11:53 | Plotted: 01/03/2017, 11:54 | jim.gibson

\\Seattle.na.aecomnet.com\Seattle\DCS\Projects\Legacy_URS\N\Navy AE\Navy CLEAN - RTC\JP09 (XY15)- 2015 Keyport OU 1 Phase II QAPP\07 Deliverables\60343583 GRFX\60343583_01.ai

A
North

(Section D-D')

Former Hazardous Waste Storage Area

Fence

MIP-059 (Offset 0 ft)

MIP-020 (Offset 11 ft E)

(Section C-C')

MIP-017 (Offset 14 ft E)

MIP-018 (Offset 16 ft E)

Fence

MIP-019 (Offset 15 ft E)

MIP-055 (Offset 0 ft)

Marsh Area

A'
South

Elevation (Feet MSL)

15
10
5
0
-5
-10
-15
-20
-25

Legend:

0.0 0.25 0.5
XSD Max (μV x 10^6)
XSD Response

0 50 100
EC (mS/m)
EC Response

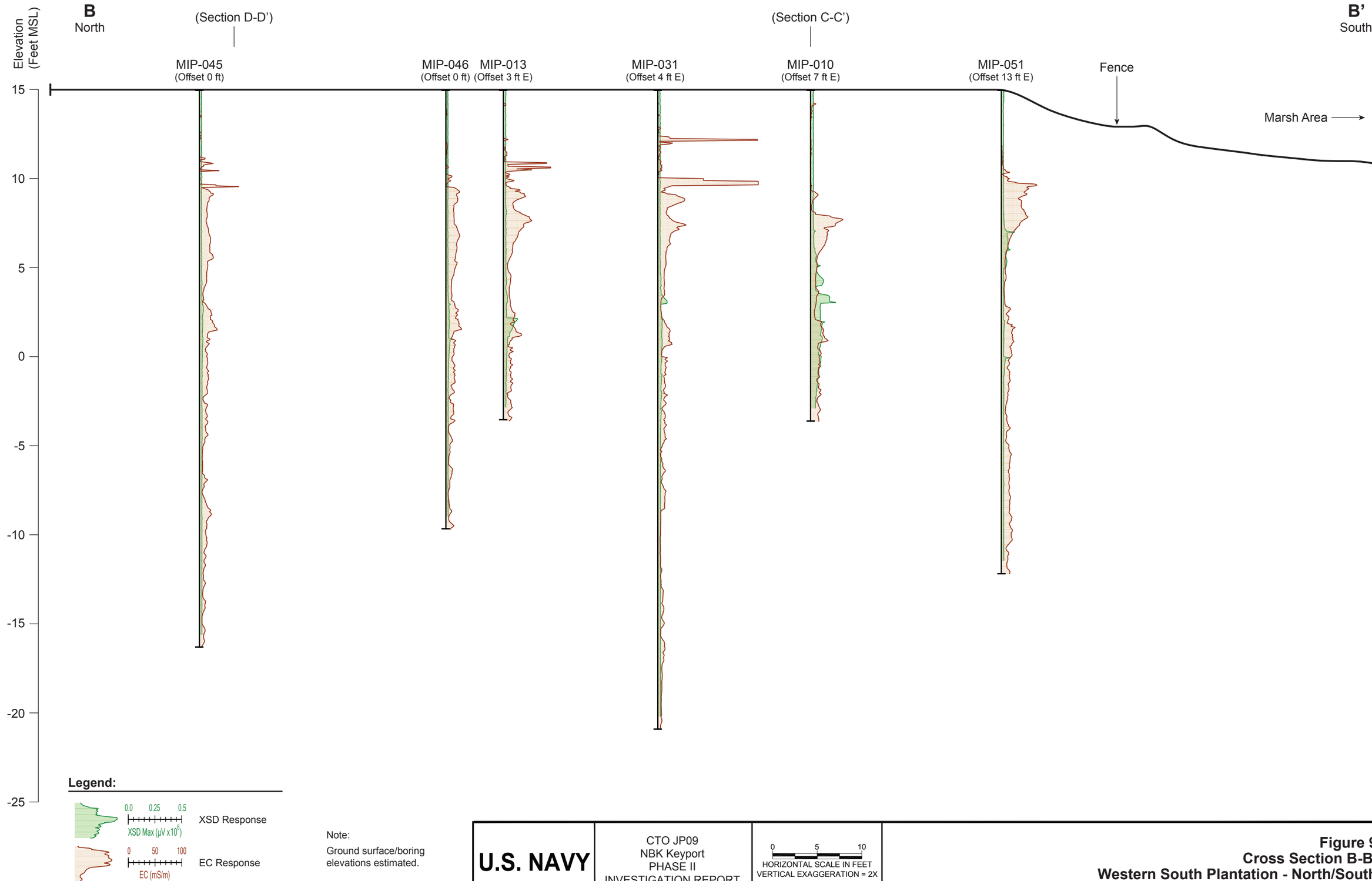
Note:
Ground surface/boring elevations estimated.

U.S. NAVY

CTO JP09
NBK Keyport
PHASE II
INVESTIGATION REPORT

0 5 10
HORIZONTAL SCALE IN FEET
VERTICAL EXAGGERATION = 2X

Figure 8
Cross Section A-A'
Eastern South Plantation - North/South



Note:
Ground surface/boring elevations estimated.

U.S. NAVY

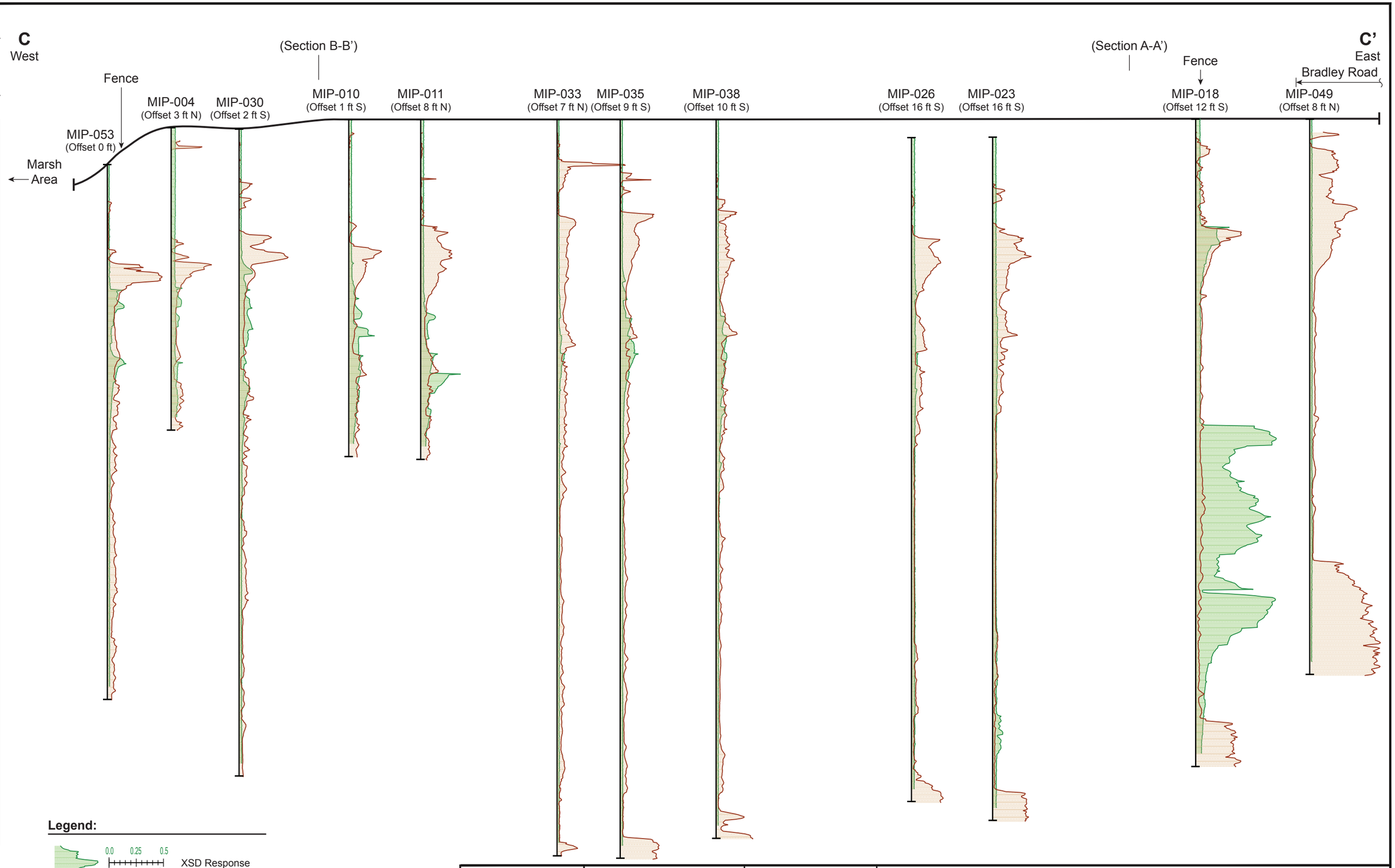
CTO JP09
NBK Keyport
PHASE II
INVESTIGATION REPORT

0 5 10
HORIZONTAL SCALE IN FEET
VERTICAL EXAGGERATION = 2X

Figure 9
Cross Section B-B'
Western South Plantation - North/South

\\Seattle.na.aecomnet.com\Seattle\DCS\Projects\Legacy_URS\N\Navy AE\Navy CLEAN - RTC\JP09 (XY15)- 2015 Keyport OU 1 Phase II QAPP\07 Deliverables\60343583 GRFX\60343583_02.ai

\\Seattle.na.aecomnet.com\Seattle\DCS\Projects\Legacy_URS\N\Navy AE\Navy CLEAN - RTC\UP09 (XY15)- 2015 Keyport OU 1 Phase II QAPP\07 Deliverables\60343583 GRFX\60343583_03.ai



Note:
Ground surface/boring elevations estimated.

U.S. NAVY

CTO JP09
NBK Keyport
PHASE II
INVESTIGATION REPORT

0 10 20
HORIZONTAL SCALE IN FEET
VERTICAL EXAGGERATION = 4X

Figure 10
Cross Section C-C'
Southern South Plantation - West/East

\\Seattle.na.aecomnet.com\Seattle\DCS\Projects\Legacy_URS\N\Navy AE\Navy CLEAN - RTC\UP09 (XY15)- 2015 Keyport OU 1 Phase II QAPP\07 Deliverables\60343583 GRFX\60343583_04.ai

D West

D' East

Elevation (Feet MSL)

15
10
5
0
-5
-10
-15
-20
-25

Fence

Marsh Area

MIP-027 (Offset 0 ft)

MIP-028 (Offset 8 ft S)

(Section B-B')

MIP-045 (Offset 4 ft N)

Irrigation Line

Irrigation Line

MIP-044 (Offset 2 ft S)

MIP-043 (Offset 0 ft)

MIP-041 (Offset 7 ft N)

MIP-015 (Offset 2 ft S)

MIP-024 (Offset 12 ft S)

(Section A-A')

Fence

MIP-059 (Offset 11 ft S)

MIP-020 (Offset 18 ft S)

Bradley Rd.

Legend:

0.0 0.25 0.5
XSD Max ($\mu V \times 10^6$)
XSD Response

0 50 100
EC (mS/m)
EC Response

Note:
Ground surface/boring elevations estimated.

U.S. NAVY

CTO JP09
NBK Keyport
PHASE II
INVESTIGATION REPORT

0 10 20
HORIZONTAL SCALE IN FEET
VERTICAL EXAGGERATION = 4X

Figure 11
Cross Section D-D'
Northern South Plantation - West/East

\\Seattle.na.aecomnet.com\Seattle\DCS\Projects\Legacy_URS\N\Navy AE\Navy CLEAN - RTC\UP09 (XY15)- 2015 Keyport OU 1 Phase II QAPP\07 Deliverables\60343583 GRFX\60343583_08.ai

C West

(Section B-B')

(Section A-A')

Fence

Fence

C' East

Bradley Road

Elevation (Feet MSL)

15
10
5
0
-5
-10
-15
-20
-25

MIP-053 (Offset 0 ft)
MIP-004 (Offset 3 ft N)
MIP-030 (Offset 2 ft S)
MIP-010 (Offset 1 ft S)
MIP-011 (Offset 8 ft N)
MIP-033 (Offset 7 ft N)
MIP-035 (Offset 9 ft S)
MIP-038 (Offset 10 ft S)
MIP-026 (Offset 16 ft S)
MIP-023 (Offset 16 ft S)
MIP-018 (Offset 12 ft S)
MIP-049 (Offset 8 ft N)

Marsh Area

Marsh Deposit

Fill Material

Kitsap Formation (Upper Aquifer)

Kitsap Formation (Interbedded SAND, SILT, and CLAY)

Kitsap Formation (Interbedded SAND, SILT, and CLAY)

Kitsap Formation (Interbedded SAND, SILT, and CLAY)

(Lawton Clay?)

Clover Park Unit (SILT)

Legend:

XSD Response — XSD Max (μV x10^{6}): 0.0, 0.25, 0.5

EC Response — EC (mS/m): 0, 50, 100

HPT Response — HPT Press. Avg (psi): 0, 30, 60; HPT Flow Avg (mL/min): 0, 75, 150

Note:
Ground surface/boring elevations estimated.

U.S. NAVY

CTO JP09
NBK Keyport
PHASE II
INVESTIGATION REPORT

0 10 20
HORIZONTAL SCALE IN FEET
VERTICAL EXAGGERATION = 4X

Figure 12
Cross Section C-C'
(with Geologic Interpretation)

Marsh Pond

Marsh Creek

Seasonal Creek

Bradley Road

Gadberry Street

Parking Lot 792

Many Small Voids?

Metal Debris?

Voids, Metal?

Voids?

Groundwater Lithology Features?

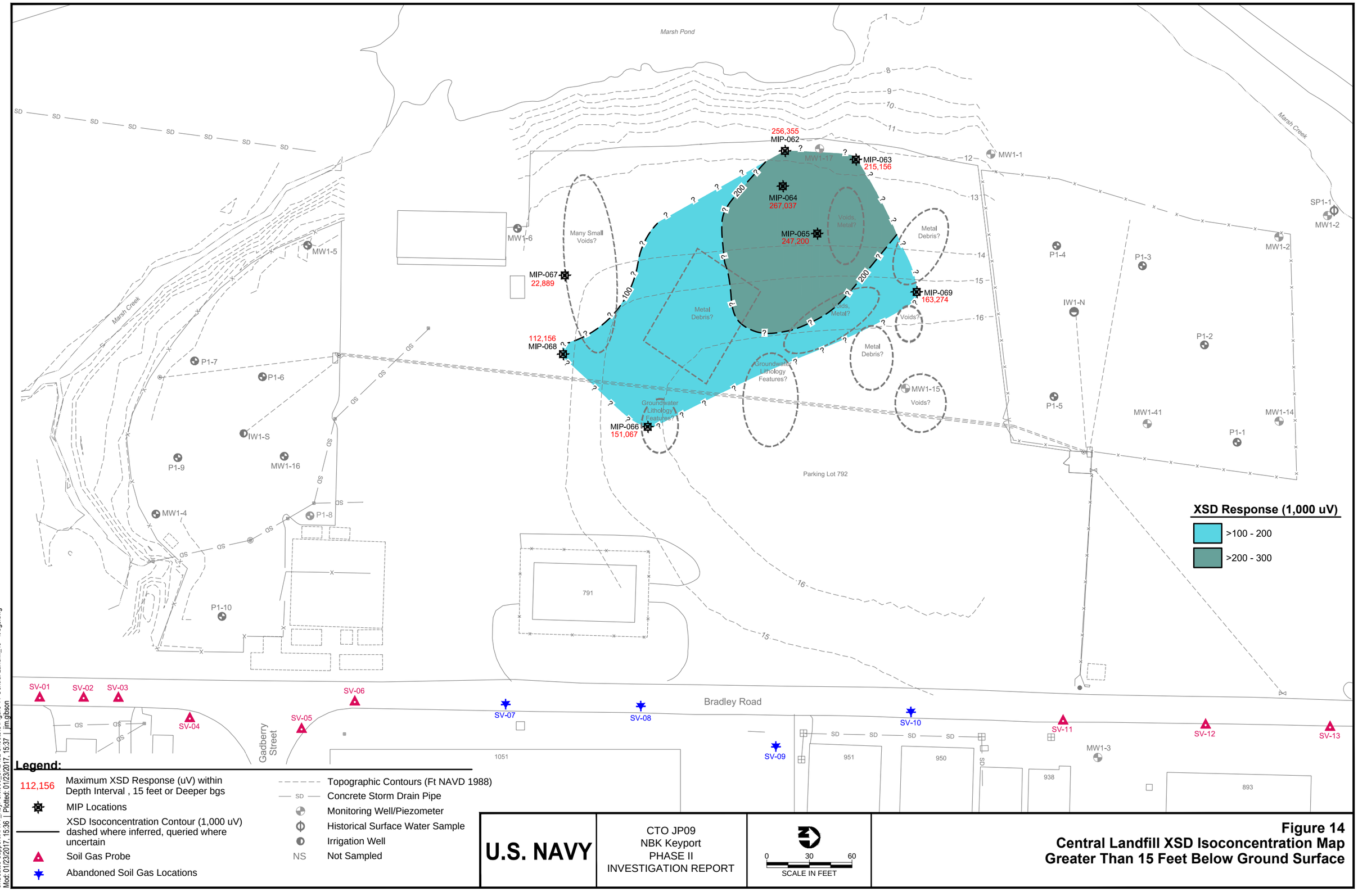
Former Hazardous Waste Storage Area (Bldg 884)

Legend:

- MIP Location
- Historical Boring Locations
- Soil Gas Probe
- Irrigation Well
- Monitoring Well/Piezometer
- Historical Surface Water Sample
- Storm Drain/Catch Basin
- Topographic Contours (Ft NAVD 1988)
- 36.0' Inferred Depth to the Top Silt of the Clover Park. (Feet Below Ground Surface)
- >36.0' Completion Depth of Boring Where Clover Park Silt Was Not Encountered, Indicates That Clover Park Silt is Inferred to be Deeper Than Boring Completion Depth.
- 38' Topographic Contours of the Inferred Depth to the Top of the Clover Park Silt (Feet Below Ground Surface, Dashed Where Inferred, Queried Where Uncertain)
- Slope Direction

U.S. NAVY	CTO JP09 NBK Keyport PHASE II INVESTIGATION REPORT	0 30 60 SCALE IN FEET	**Figure 13** **Contour Map of Inferred Depth to Clover Park Silt Contact**

J:\Seattle Support\NAVY_KeyPort\000_CAD\02-Sheets\C\Figure 13-Inferred Clover Park Formation .dwg
Mod: 01/09/2017, 15:34 | Plotted: 01/09/2017, 15:35 | jim.gibson


Marsh Pond
Marsh Creek
Marsh Creek
256,355
MIP-062
MIP-063
215,156
MW1-17
MIP-064
267,037
MIP-065
247,200
MIP-067
22,889
MIP-069
163,274
112,156
MIP-068
MIP-066
151,067
Many Small Voids?
Metal Debris?
Voids, Metal?
Metal Debris?
Voids, Metal?
Voids?
Metal Debris?
Groundwater Lithology Features?
Groundwater Lithology Features?
Voids?
MW1-1
MW1-2
SP1-1
MW1-2
MW1-5
MW1-6
P1-4
P1-3
IW1-N
P1-2
P1-5
MW1-15
MW1-41
MW1-14
P1-1
P1-7
P1-6
IW1-S
P1-9
MW1-16
MW1-4
P1-8
P1-10
Parking Lot 792
791
1051
951
950
938
893
MW1-3
SV-01
SV-02
SV-03
SV-04
SV-05
SV-06
SV-07
SV-08
SV-09
SV-10
SV-11
SV-12
SV-13
Gadberry Street
Bradley Road
SD
XSD Response (1,000 uV)
>100 - 200
>200 - 300
Legend:
112,156 Maximum XSD Response (uV) within Depth Interval , 15 feet or Deeper bgs
MIP Locations
XSD Isoconcentration Contour (1,000 uV) dashed where inferred, queried where uncertain
Soil Gas Probe
Abandoned Soil Gas Locations
Topographic Contours (Ft NAVD 1988)
SD Concrete Storm Drain Pipe
Monitoring Well/Piezometer
Historical Surface Water Sample
Irrigation Well
NS Not Sampled
U.S. NAVY
CTO JP09
NBK Keyport
PHASE II
INVESTIGATION REPORT
0 30 60
SCALE IN FEET
Figure 14
Central Landfill XSD Isoconcentration Map
Greater Than 15 Feet Below Ground Surface
J:\Seattle Support\NAVY_KeyPort\000_CAD\02-Sheets\CF\Figure 14-Central Landfill_15+ ft bgs.dwg
Mod: 01/23/2017, 15:36 | Plotted: 01/23/2017, 15:37 | jim.gibson

\\Seattle.na.aecomnet.com\Seattle\DCS\Projects\Legacy_URS\N\Navy AE\Navy CLEAN - RTC\JP09 (XY15)- 2015 Keyport OU 1 Phase II QAPP\07 Deliverables\60343583 GRFX\60343583_05.ai

E
North

(Section F-F')

E'
South

Elevation (Feet MSL)

15
10
5
0
-5
-10
-15
-20
-25

North Plantation ←

MIP-069
(Offset 0 ft)

MIP-065
(Offset 39' W)

MIP-067
(Offset 0 ft)

→ Building 1032

Legend:

XSD Response
0 1 2
XSD Max (μV x 10^5)

EC Response
0 100 200
EC (mS/m)

Note:
Ground surface/boring elevations estimated.

U.S. NAVY

CTO JP09
NBK Keyport
PHASE II
INVESTIGATION REPORT

0 10 20
HORIZONTAL SCALE IN FEET
VERTICAL EXAGGERATION = 4X

Figure 15
Cross Section E-E'
Central Landfill - North/South

\\Seattle.na.aecomnet.com\Seattle\DCS\Projects\Legacy_URS\N\Navy AE\Navy CLEAN - RTC\JP09 (XY15)- 2015 Keyport OU 1 Phase II QAPP\07 Deliverables\60343583 GRFX\60343583_06.ai

F
Northwest

(Section E-E')

F'
Southeast

Depth (Feet MSL)

15
10
5
0
-5
-10
-15
-20
-25

Marsh Area

Curb

MIP-063
(Offset 0 ft)

MIP-064
(Offset 29' SW)

MIP-065
(Offset 12 ft NE)

MIP-066
(Offset 0 ft)

Legend:

XSD Response
0 1 2
XSD Max (μV x 10^5)

EC Response
0 100 200
EC (mS/m)

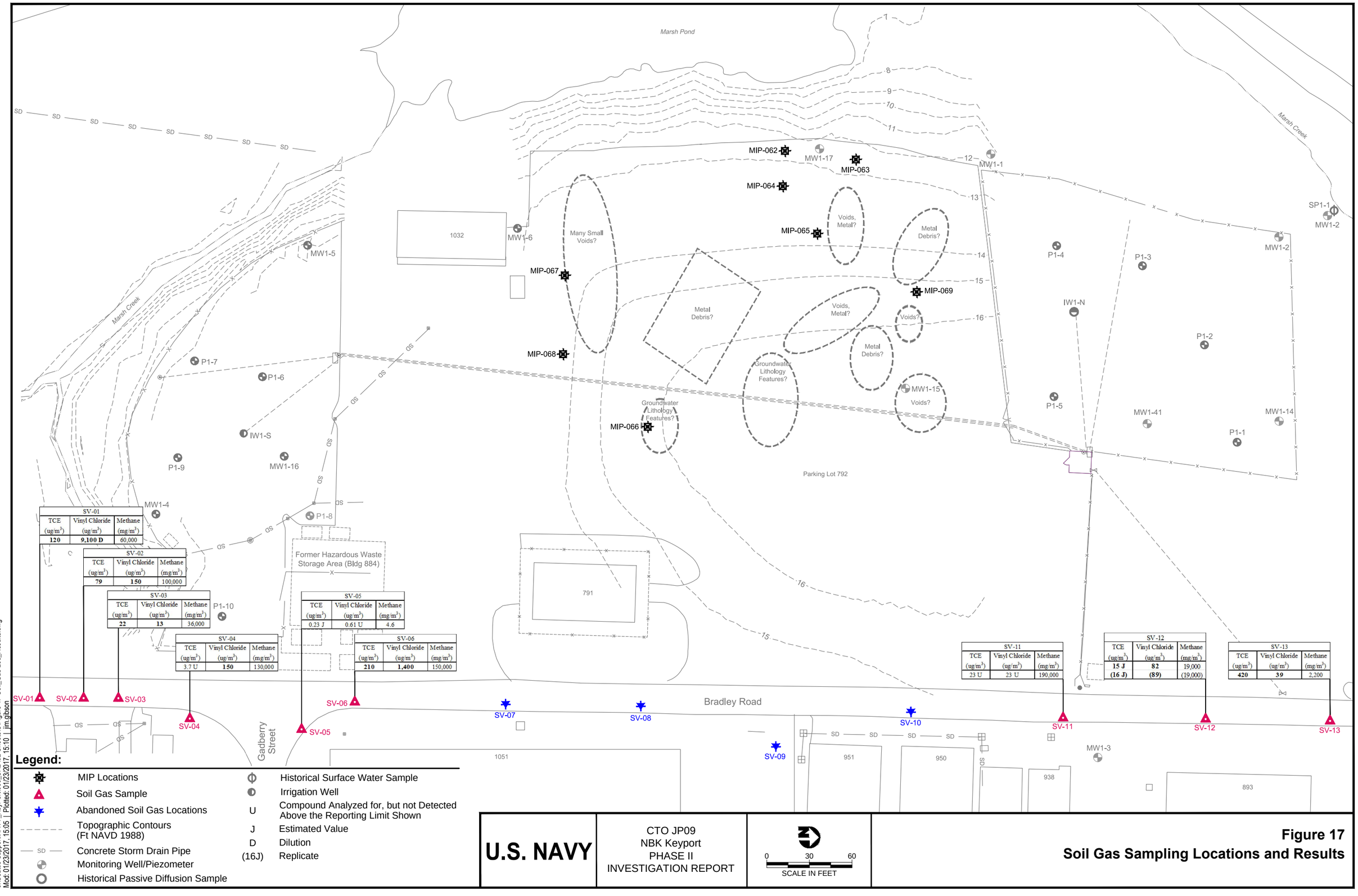
Note:
Ground surface/boring elevations estimated.

U.S. NAVY

CTO JP09
NBK Keyport
PHASE II
INVESTIGATION REPORT

0 10 20
HORIZONTAL SCALE IN FEET
VERTICAL EXAGGERATION = 4X

Figure 16
Cross Section F-F'
Central Landfill - Northwest/Southeast



SV-01		
TCE (ug/m^3)	Vinyl Chloride (ug/m^3)	Methane (mg/m^3)
120	**9,100 D**	60,000

SV-02		
TCE (ug/m^3)	Vinyl Chloride (ug/m^3)	Methane (mg/m^3)
79	**150**	100,000

SV-03		
TCE (ug/m^3)	Vinyl Chloride (ug/m^3)	Methane (mg/m^3)
22	**13**	36,000

SV-04		
TCE (ug/m^3)	Vinyl Chloride (ug/m^3)	Methane (mg/m^3)
3.7 U	**150**	130,000

SV-05		
TCE (ug/m^3)	Vinyl Chloride (ug/m^3)	Methane (mg/m^3)
0.23 J	0.61 U	4.6

SV-06		
TCE (ug/m^3)	Vinyl Chloride (ug/m^3)	Methane (mg/m^3)
210	**1,400**	150,000

SV-11		
TCE (ug/m^3)	Vinyl Chloride (ug/m^3)	Methane (mg/m^3)
23 U	23 U	190,000

SV-12		
TCE (ug/m^3)	Vinyl Chloride (ug/m^3)	Methane (mg/m^3)
15 J	**82**	19,000
(16 J)	**(89)**	(19,000)

SV-13		
TCE (ug/m^3)	Vinyl Chloride (ug/m^3)	Methane (mg/m^3)
420	**39**	2,200

Legend:

- MIP Locations
- Soil Gas Sample
- Abandoned Soil Gas Locations
- Topographic Contours (Ft NAVD 1988)
- SD — Concrete Storm Drain Pipe
- Monitoring Well/Piezometer
- Historical Passive Diffusion Sample
- Historical Surface Water Sample
- Irrigation Well
- U — Compound Analyzed for, but not Detected Above the Reporting Limit Shown
- J — Estimated Value
- D — Dilution
- (16J) — Replicate

U.S. NAVY

CTO JP09
NBK Keyport
PHASE II
INVESTIGATION REPORT

0 30 60
SCALE IN FEET

Figure 17
Soil Gas Sampling Locations and Results

J:\Seattle Support\NAVY_KeyPort\000_CAD\02-Sheets\CIFigure 17-Soil_Gas Loc_Results.dwg
Mod: 01/23/2017, 15:05 | Plotted: 01/23/2017, 15:10 | jim.gibson

Tables

Table 1
Summary of Deviations from Sampling and Analysis Plan

Deviation	Description	Rationale	Effective Date	Samples Affected	SAP Section(s) Affected
Flame ionization detector	The FID was disabled based on recommendations from the drilling contractor, Columbia Technologies, and concurrence between Resolution and the Navy.	The FID is typically used to evaluate volatile petroleum compounds, which are not COCs at OU 1. Disabling the FID allowed the entire volume of the gas sample to be run through the XSD, which provided a better response for cVOCs.	08/24/16	None	Worksheet 17
Pilot hole installation	A pilot hole was drilled using a solid drive point from the ground surface to 5 feet bgs at each MIP location instead of using the MIP to advance from the ground surface to the termination depth.	The pilot hole was used to displace large landfill debris including concrete chunks, gravel, and cobbles that could potentially damage the MIP. The 1.75-inch-diameter pilot hole is slightly smaller than the 2.25-inch-diameter MIP, allowing the MIP sensors to still make contact with the borehole sidewall from ground surface to 5 feet bgs. This allowed for MIP logging of the borehole while reducing the risk of encountering debris that could damage the MIP.	08/24/16	All MIP borehole locations.	Worksheets 14 and 17
Borehole abandonment	MIP boreholes were abandoned using hydrated bentonite chips, which is different from the SAP-specified procedure of abandoning them using grout injected through a tremie pipe.	Upon removal of the MIP, the boreholes were observed to be collapsing to approximately 8 to 10 feet bgs. Based on this finding, Resolution in concurrence with the drilling subcontractor, determined that pressure grouting was not feasible due to the potential for rapid surfacing. Resolution and Holt chose to abandoned the boreholes using hydrated bentonite chips.	08/24/16	All MIP borehole locations.	Worksheet 17
MIP completion depth	The majority of the MIP borings were advanced to depths deeper than the 20 feet bgs prescribed in the SAP (up to 42.5 feet).	The boreholes were advanced to deeper depths than proposed to assess the vertical extent of impacts and determine the depth of the aquitard.	08/24/16	MIP-005, MIP-009, MIP-016 through MIP-069	Worksheet 18
MIP borings locations	Sixty-two MIP borings were completed in the south plantation, and seven borings were completed in the central landfill. The SAP proposed 66 borings in the south plantation and 12 borings in the central landfill. The actual boring locations were different from the planned locations.	The MIP boring locations were determined in the field throughout the investigation. The completion of fewer MIP borings than the number anticipated was a result of budgetary constraints.	08/15/16	All MIP borehole locations.	Figures 3 and 4
Soil gas sampling	Samples were successfully collected at 9 of the 13 soil gas sample locations specified in the SAP. The sample locations were moved as close as possible to the east side of Bradley Road. Leak testing was completed successfully only at SV-01 and SV-05 due to interference with the helium detector. For SV-11, SV-12, and SV-13, sampling was conducted through the shroud with helium. Methane was included as an analyte for all soil gas samples, and helium was included as an analyte for samples collected at SV-11, SV-12, and SV-13.	Three sampling locations (SV-07, SV-08, and SV-09) were abandoned during sampling attempts due to the presence of groundwater in the borings, and location SV-10 was abandoned due to abnormal pressure in the sample tubing. The soil gas sample points were installed farther to the east side of Bradley Road to avoid subsurface utilities and stormwater features. Methane was added as an analyte because of what was observed to be methane interference during leak testing. Because of the unsuccessful leak tests during the collection of SV-01 through SV-06 during the initial round of sampling, sampling was conducted through the shroud with helium at subsequent locations (SV-11, SV-12, and SV-13). Because of this change in sampling technique, helium was added to the analyte list for these remaining samples.	08/29/16	All soil gas locations (SV-07 through SV-10 not sampled).	Worksheets 14, 15, 17 through 20, 30, 34 through 36A, Figures 3 and 4

Table 1
Summary of Deviations from Sampling and Analysis Plan

Deviation	Description	Rationale	Effective Date	Samples Affected	SAP Section(s) Affected
Changes in project team	Changed the AECOM project manager to Debbie Rodenhizer, the technical lead to Jim Flynn, and the Navy technical representative to Charlie Escola.	Changes in the project team resulted from personnel changes.	08/18/16	None	Worksheets 3 through 7
Revised scope of work	Added brush clearing and fence removal to the scope of work and Dan Hawk of Clearcreek Contractors as the subcontractor project manager.	Brush clearing and fence removal were required for MIP work outside the fenced area between the south plantation and the creek.	08/18/16	None	Worksheets 5 and 7

Notes:

bgs - below ground surface

COC - contaminant of concern

cVOC - chlorinated volatile organic compound

FID - flame ionization detector

MIP - membrane interface probe

Navy - U.S. Navy

OU 1 - Operable Unit 1

Resolution - Resolution Consultants

SAP - sampling and anlysis plan

XSD - halogen-specific detector

Table 2
Summary of MIP Boring Completion Data

Area	MIP Boring Location	Date Drilled	Approximate Depth to Top of Clover Park Silt (feet bgs)	Approximate Total Boring Depth[a] (feet bgs)	Historical Borings Used for Lithologic Correlation
South Plantation	MIP-001	8/15/2016	NE	19.0	P1-7
	MIP-002	8/15/2016	NE	15.5	MW1-4, SB1-4
	MIP-003	8/15/2016	NE	16.0	MW1-4, SB1-4
	MIP-004	8/15/2016	NE	16.5	
	MIP-005	8/16/2016	NE	21.0	B-7
	MIP-006	8/16/2016	NE	18.5	
	MIP-007	8/16/2016	NE	19.0	
	MIP-008	8/16/2016	NE	18.5	
	MIP-009	8/16/2016	NE	20.5	
	MIP-010	8/16/2016	NE	18.5	
	MIP-011	8/16/2016	NE	19.0	
	MIP-012	8/17/2016	NE	17.0	IW1-5
	MIP-013	8/17/2016	NE	18.5	
	MIP-014	8/17/2016	NE	18.5	MW1-16
	MIP-015	8/17/2016	NE	18.5	
	MIP-016	8/17/2016	NE	20.5	
	MIP-017	8/17/2016	NE	23.0	
	MIP-018	8/17/2016	33	36.0	
	MIP-019	8/18/2016	31	37.0	
	MIP-020	8/18/2016	NE	36.5	
	MIP-021	8/18/2016	28	38.5	
	MIP-022	8/18/2016	NE	22.5	P1-10
	MIP-023	8/22/2016	36	38.0	
	MIP-024	8/22/2016	33	38.5	
	MIP-025	8/22/2016	32	34.5	
	MIP-026	8/22/2016	36	37.0	
	MIP-027	8/23/2016	37	38.0	MW1-5, SB1-5
	MIP-028	8/23/2016	NE	38.5	
	MIP-029	8/23/2016	NE	42.5	
	MIP-030	8/23/2016	NE	36.0	
	MIP-031	8/23/2016	NE	36.0	
	MIP-032	8/24/2016	39	41.0	
	MIP-033	8/24/2016	NE	41.0	B-8
	MIP-034	8/24/2016	NE	40.0	P1-9
	MIP-035	8/24/2016	40	41.0	
	MIP-036	8/25/2016	NE	35.0	
	MIP-037	8/25/2016	39	41.0	P1-9
	MIP-038	8/25/2016	38	40.0	B-13
	MIP-039	8/25/2016	36	42.0	
	MIP-040	8/26/2016	NE	38.5	

Table 2
Summary of MIP Boring Completion Data

Area	MIP Boring Location	Date Drilled	Approximate Depth to Top of Clover Park Silt (feet bgs)	Approximate Total Boring Depth[a] (feet bgs)	Historical Borings Used for Lithologic Correlation
South Plantation (continued)	MIP-041	8/26/2016	NE	42.5	B-3
	MIP-042	8/26/2016	NE	38.5	
	MIP-043	8/26/2016	NE	36.0	
	MIP-044	8/26/2016	NE	41.0	
	MIP-045	8/27/2016	NE	31.5	
	MIP-046	8/27/2016	NE	25.0	
	MIP-047	8/27/2016	NE	34.5	
	MIP-048	8/27/2016	NE	31.0	
	MIP-049	8/29/2016	NE	30.5	
	MIP-050	8/29/2016	NE	23.0	
	MIP-051	8/29/2016	NE	27.5	B-2
	MIP-052	8/29/2016	NE	28.5	
	MIP-053	8/30/2016	NE	29.5	
	MIP-054	8/30/2016	NE	30.5	
	MIP-055	8/30/2016	NE	30.5	
	MIP-056	8/30/2016	NE	25.0	
	MIP-057	8/30/2016	NE	32.5	
	MIP-058	8/31/2016	NE	23.0	
	MIP-059	8/31/2016	NE	29.5	
	MIP-060	8/31/2016	NE	34.0	
	MIP-061	8/31/2016	NE	36.5	B-3
Central Landfill	MIP-062	9/1/2016	28	34.0	
	MIP-063	9/1/2016	26	29.0	
	MIP-064	9/1/2016	31	35.0	
	MIP-065	9/1/2016	33	36.0	
	MIP-066	9/1/2016	29	32.0	
	MIP-067	9/2/2016	NE	28.5	
	MIP-068	9/2/2016	NE	31.5	
	MIP-069	9/2/2016	34	38.0	

Notes:

[a] Approximate total depth of boring rounded to the nearest 0.5 foot.

bgs - below ground surface

MIP - membrane interface probe

NE - not encountered

Table 3
Summary of Field Measurements for Soil Gas Samples

Well/Sample ID[a]	Depth to Water (feet bgs)	Measurement Depth (inches bgs)	CH_4[b] (% LEL)	CO (ppm)	O_2 (%)	H_2S (ppm)	VOC (ppm)
SV-02	--	36	20	--	--	--	--
SV-03	--	36	66	--	--	--	--
SV-04	--	36	44	--	--	--	--
SV-05	--	36	0	--	--	--	--
SV-06	--	36	>100	--	--	--	--
SV-06 (2)[c]	--	36	24	>500	--	--	--
MW1-15[d]	7.00	6	100	12	24	3	--
MW1-17	6.15	6	1	2	20.3	0	0.2
P1-10	5.95	6	1	3	20.9	0	0.3
MW1-20	4.38	6	1	2	20	0	0
MIP-058	--	6	1	>500	20.9	2	65
MIP-059 Initial	--	6	3	71	19.4	2	204.9
MIP-059 Final	--	6	1	450	20.9	0.5	103
MIP-060 Initial	--	6	>100	76	16.1	--	0.1
MIP-060 Final	--	6	>100	458	17.9	1	0.5
MIP-061 Final	--	6	>100	115	7.2	15.5	9.5
MIP-062 Initial	--	6	4	14	9.2	0	30
MIP-062 Final	--	6	9	7	20	0	0
MIP-063 Initial	--	6	3	8	10.8	0	15
MIP-063 Initial (2)[c]	--	6	4	12	8.9	0	0.8
MIP-063 Final	--	6	1	49	18.5	0	1.5
MIP-064 Initial	--	6	54	1.6	4.2	0	10.4
MIP-064 Final	--	0	3	0	20.9	0	4.3
MIP-064 Final (2)[c]	--	6	48	13	3.2	0.5	3.6
MIP-065 Initial	--	6	85	1	20.4	0	5.8
MIP-065 Final	--	6	>100	54	14.3	0	8.8
MIP-066 Initial	--	0	>100	22	18.1	0	0
MIP-066 Initial (2)[c]	--	6	>100	168	18.1	0	0
MIP-066 Final	--	0	>100	320	18.7	0.5	0
MIP-066 Final (2)[c]	--	6	>100	>500	17.1	1	0
MIP-067 Initial	--	6	58	100	4.2	0.5	122
MIP-067 Final	--	0	89	51	18.4	0	5.7
MIP-067 Final (2)[c]	--	6	0	410	3.3	9	7.8
MIP-068 Initial	--	0	91	8	10.8	40	6.4
MIP-68 Initial (2)[c]	--	6	0	8	5.3	32	3.6
MIP-068 Final	--	0	>100	4.8	18.4	11.5	0
MIP-68 Final (2)[c]	--	6	21	122	3	30.5	4.8
MIP-069 Initial	--	0	>100	16	3.1	0	4.8
MIP-069 Initial (2)[c]	--	6	0	12	3.4	0	4.2
MIP-069 Final	--	0	53	14	18	0	2.5
MIP-069 Final (2)[c]	--	6	34	23	20	0	2.6
SV-07	Water Present	36	1	0	20.8	0	0.8
SV-11	--	36	44	2.1	35	0	0
SV-11 (2)[c]	--	36	45	2.1	21	0	0
SV-12	--	36	15	2.2	1	0	0
SV-12 (2)[c]	--	36	40	2.8	0	0	0

Table 3
Summary of Field Measurements for Soil Gas Samples

Well/Sample ID[a]	Depth to Water (feet bgs)	Measurement Depth (inches bgs)	CH_4[b] (% LEL)	CO (ppm)	O_2 (%)	H_2S (ppm)	VOC (ppm)
SV-13	--	36	8	97	1.8	0	2.4
SV-13 (2)[c]	--	36	8	58	1.6	0	2.1

Notes:

[a] Initial readings were collected after removal of the solid rod pre-probe before drilling with the MIP in place (boring open to 5 feet bgs at MIP-058 through MIP-061 and 10 feet bgs at MIP-062 through MIP-069), and final readings were collected after removal of the MIP.

[b] Combustible gas readings calibrated to methane.

[c] Second measurement collected as verification.

[d] MW1-15 is the only well with the water level measured below the top of the screen.

bgs - below ground surface

CH_4 - methane

CO - carbon monoxide

H_2S - hydrogen sulfide

LEL - lower explosive limit

O_2 - oxygen

ppm - parts per million

VOC - volatile organic compound

Table 4
Summary of Analytical Results for cVOCs, Methane, and Helium in Soil Gas Samples

Sample ID:	Soil Gas Screening Level		SV-01	SV-02	SV-03	SV-04	SV-05	SV-06	SV-11	SV-12		SV-13
Sample Date:	Ecology MTCA	EPA[b]	8/30/2016	8/30/2016	8/30/2016	8/30/2016	8/30/2016	8/30/2016	9/8/2016	9/8/2016		9/8/2016
Other:	Method B[a]										REP	
Chlorinated Volatile Organic Compounds (ug/m^3)												
1,1-Dichloroethane	52	260	21	3.2 J	2.9 J	3.3 J	0.64 U	25 U	24 U	24 U	39 U	2.3 U
Chloroethane	NE	NE	4.4 J	4.1	3.4 U	3.7 U	0.61 U	24 U	23 U	22 U	38 U	0.98 J
Tetrachloroethene	320	1,600	3.7 U	2.6 U	3.4 U	3.7 U	0.42 J	24 U	23 U	22 U	38 U	6.0
trans-1,2-Dichloroethene	NE	NE	310	29	5.5	5.4	0.64 U	68	24 U	24 U	39 U	89
1,1-Dichloroethene	3,050	29,000	140	49	7.5	3.9 U	0.66 U	130	24 U	24 U	40 U	39
1,2-Dichloroethane	3.2	16	3.9 U	2.8 U	3.6 U	3.8 U	0.42 J	25 U	24 U	24 U	39 U	2.3 U
1,1,1-Trichloroethane	76,000	730,000	3.8 U	2.7 U	3.5 U	3.7 U	0.63 U	24 U	23 U	23 U	39 U	2.2 U
Trichloroethene	12	100	**120**	**79**	**22**	3.7 U	0.23 J	**210**	23 U	**15 J**	**16 J**	**420**
cis-1,2-Dichloroethene	NE	NE	1,900 D	220	110	23	0.66 U	470	11 J	42	43 J	760 D
Vinyl Chloride	9.3	93	**9,100 D**	**150**	**13**	**150**	0.61 U	**1,400**	23 U	**82**	**89**	**39**
Methane (mg/m^3)	NE	NE	60,000	100,000	36,000	130,000	4.6	150,000	190,000	19,000	19,000	2,200
Helium (ppmv)[c]	NE	NE	NA	NA	NA	NA	NA	NA	92	2,800	5,200	6.7
TWA Helium (ppmv in shroud)[d]	NE	NE	NA	NA	NA	NA	NA	NA	38,000	60,700	70,200	77,000
Helium (% as ratio)[e]	NA		NA	NA	NA	NA	NA	NA	0.24	4.6	7.4	0.0087

Notes:
Bold value indicates that the reported result exceeds the lowest soil gas screening level.
Shaded value indicates the reporting limit exceeds the lowest soil gas screening level.
[a]Model Toxics Control Act (MTCA) Cleanup Regulation, WAC 173-340. MTCA values are from Ecology website CLARC tables dated August 2015. (https://fortress.wa.gov/ecy/clarc/CLARCDataTables.aspx)
[b]United States Environmental Protection Agency (USEPA) Vapor Intrusion Screening Levels (VISLs) from Vapor Intrusion Screening Level Calculator with May 2016 Regional Screening Levels. (https://www.epa.gov/vaporintrusion/vapor-intrusion-screening-levels-visls).
[c] Helium concentration within sampling shroud enclosing the sampling apparatus was measured in field at the time of sampling. Time-weighted average of concentrations throughout the duration of sampling was used for comparison to the laboratory results (Appendix H).
[d] Values converted from mg/m^3.
[e] Helium concentration in sample canister expressed as a percentage of the concentration in the sampling shroud at the time of sampling. Leak tests results are considered passing results if the percentage is less than 10 percen
% - percent
D - reported result is from a dilution
EPA - U.S. Environmental Protection Agency
J - estimated value
ug/m^3 - micrograms per cubic meter
mg/m^3 - milligrams per cubic meter
MTCA - Model Toxics Control Act
NA - not applicable
NE - not established
ppmv - parts per million by volume
REP - field replicate sample
TWA - time-weighted average
U - compound was analyzed for but not detected above the reporting limit shown.
VOC - volatile organic compound

Appendix A

Responses to Agency and Stakeholder Comments on the Draft Report

DRAFT Responses to Washington State Department of Ecology
Comments on the Draft OU 1 Phase II Site Investigation Report, Naval Base Kitsap Keyport, Keyport, Washington
Commenter: Mahbub Alam Comments Developed: 3/16/17 Responses Provided: 3/28/17

Cmt. No.	Page	Sec.	Comment/Recommendation	Response
1.			**Limited MIP investigation in central landfill area:** The central landfill area only had 8 MIP borings compared to 69 in the south plantation area. Clearly, this was not enough to characterize the whole area as the figures shown too many "unknowns" in the report. The reason was cited as the motorcycle training area that could not be closed. Ecology thinks alternate approach should be investigated to access the area.	Comment noted. This motorcycle training area will be investigated during the next phase of investigation. No change is recommended.
2.			**High level of TCE found in soil gas sampling:** The highest level of TCE was found at sample location SV-13 which is far away from any MIP field activity area (about 150 ft east of north-east corner on north plantation. This seems to suggest a nearby source. While upcoming VI study could confirm or shed more light on this issue, Ecology believes more investigation is necessary to pinpoint the source areas.	Comment noted. Further discussions regarding the need for additional investigation will be conducted during the VI study. No change is recommended.
3.	Page 22		**HPT Responses:** It seems form the field data of EC responses and HPT responses that there is not a good correlation for the following statement in the report. "*In general, lower pressure/higher flow responses correlated with lower range EC responses and higher pressure/lower flow responses correlated with higher range EC responses.*" Regression analysis of randomly picked MIP location data (MIP-001, MIP-018, MIP-041, MIP-066) shows very poor or no correlation. MIP-041 data shows opposite trend and this location is not near the marsh. MIP locations in Marsh deposit have been referred to as anomalies in the in the report. There may be other locations with this trend. Therefore, we believe we should interpret these EC and HPT responses very carefully and preferably with some	The term "correlate" was used in the geologic context rather than the statistical context in this section. The section on HPT responses (pages 22 and 23) has been revised to describe the general HPT responses and the corresponding EC responses within each of the lithologic units at the site (see attached report). Lithology will be confirmed at selected locations during the next phase of investigation once quantitative data is available.

Cmt. No.	Page	Sec.	Comment/Recommendation	Response
			more investigations as envisioned in the recommendations of this report.	
4.	Page 23		**XSD results indicate contamination extends deeper than the existing well network:** Ecology believes this is very significant finding and calls for additional investigation including installing deep monitoring wells to characterize the vertical extent of contamination. A refinement of CSM is likely.	Comment noted. Recommendations in the report include the installation of deeper monitoring wells. The CSM will be updated if new receptors are identified based on the results of quantitative sampling to be performed in Summer 2017. No change is recommended.
5.	Page 23		**PID Responses:** The report stated: *"Several PID responses were observed to occur independently of XSD responses in the western portion of the south plantation, suggesting the potential presence of contaminants other than cVOCs."* Ecology would like to follow up on this finding. Specifically, if TPH is not a site COC, and there were several PID responses show there may be left over TPH or other VOCs, what would be the Navy's appropriate course of action?	Many constituents, including petroleum hydrocarbons, were detected during the remedial investigation. cVOCs were selected as the COCs because they are more persistent and difficult to remediate than the other contaminants detected at the site, and it was anticipated that any remedial action selected to address cVOCs would also address petroleum hydrocarbons. No change is recommended.
6.	Page 24		**EC and HPT Responses to interpret lithology:** Several places in the report discussed EC and HPT responses to correlate with different geological units including fill. One example stated: *"The EC and HPT responses appear to correlate well with the general Kitsap Formation."* It would be helpful to describe briefly how EC and HPT data were used to interpret the different formations.	A description of how the EC detector responses were used to interpret the different lithologic units at the site was already included in the draft report in Section 3.2.1 (pages 20 and 21). The section on HPT responses (pages 22 and 23) has been revised to generally describe the observed pattern of HPT responses within each lithologic unit and the corresponding EC responses. General statements regarding EC and HPT responses correlating with lithologic units have been deleted (see attached report). No change is recommended.

DRAFT Responses to Washington State Department of Ecology
Comments on the Draft OU 1 Phase II Site Investigation Report, Naval Base Kitsap Keyport, Keyport, Washington
Commenter: Mahbub Alam Comments Developed: 3/16/17 Responses Provided: 3/28/17

Cmt. No.	Page	Sec.	Comment/Recommendation	Response
7.	Page 25		**Extent of DNAPL:** The report stated: *"Drainage cuts along the erosional contact between the Kitsap Formation and the underlying Clover Park Silt could provide preferential migration paths for mobile dense nonaqueous-phase liquid (DNAPL), if DNAPL is (or was) present and has reached the top of the Clover Park Silt."* Ecology expects that this pathway is further investigated to refine the CSM.	The next phase of investigation planned for summer 2017 will indicate whether DNAPL is present. If DNAPL is present and has reached the top of the Clover Park Formation Silt, then additional investigation of the contact with this silt layer will be warranted. The sentence referred to in the comment will be replaced with the following sentence for clarity: If dense nonaqueous-phase liquid (DNAPL) is (or was) present and has reached the top of the Clover Park Silt, drainage cuts along the erosional contact between the Kitsap Formation and the underlying Clover Park Silt could provide preferential migration paths for mobile DNAPL.

DRAFT Responses to Suquamish Tribe
Comments on the Draft OU 1 Phase II Site Investigation Report, Naval Base Kitsap Keyport, Keyport, Washington
Commenter: Denice Taylor Comments Developed: 3/9/17 Responses Provided: 3/28/17

Cmt. No.	Page	Section	Comment/Recommendation	Response
1.	Page 12	2.0	On page 12, the report states that after the completion of the Phase II investigation, the Navy will evaluate potential additional remedial technologies for treatment of identified hotspots by means of an EE/CA and make recommendations as to whether treatment of associated contaminant hotspots under a CERCLA non-time-critical removal action is practical and appropriate. After we discussed this at our last project team meeting we agreed to engage in a collaborative process by which to determine the best administrative option (EE/CA, ROD amendment, ESD) to address the Area 1 hotspots, when the Phase II investigation is complete.	The last paragraph of Section 2.0, page 12, will be replaced with the following: The MIP investigation and soil gas sampling are the two components of the Phase II investigation that were completed in 2016 and are documented in this report. The Navy plans to complete the remainder of the Phase II investigation at OU 1 during summer 2017. After the completion of the Phase II investigation, the Navy will engage in a collaborative process to determine the best administrative option (engineering evaluation/cost analysis or focused feasibility study, followed by a non-time-critical removal action, ROD amendment, or explanation of significant differences) to address the OU 1 hotspots.

Rodenhizer, Debbie

From: Cellucci, Carlotta CIV NAVFAC NW, EV31 <carlotta.cellucci@navy.mil>
Sent: Thursday, March 16, 2017 5:44 PM
To: 'Craig, Harry'; Denice Taylor
Cc: Alam, Mahbub (ECY); Rodenhizer, Debbie; anthony.palmieri@aecom.com; james.flynn@aecom.com
Subject: RE: Keyport OU 1 Phase II report
Signed By: CARLOTTA.CELLUCCI@NAVY.MIL

Hi Harry,

The Phase II report represents the first mobilization of a three mobilization field effort that was terminated in the middle, because the contract ran out of time and money before we could mod the contract to complete all of the tasks outlined in the SAP. Given that only a small portion of the total data to be collected was collected during the first mobilization, we decided that it would be best to produce only a data report to close out the task order. However, given the results obtained, some explanation of the findings was necessary.

So, once the additional investigations are completed this summer/fall, a data report that pulls together the data from all of the mobilizations, in addition to LTM data obtained, and includes conclusions and recommendations will be produced. So, once we complete the remainder of the investigation, much more data evaluation will be performed. Let me know if this answer is sufficient, or if I've misunderstood your concerns. Thanks,,

C.

Carlotta Cellucci, R.G.
Remedial Project Manager
NAVFAC Northwest
(360) 396-1518 Office
(206) 595-6711 Cell
carlotta.cellucci@navy.mil

Those who can make you believe absurdities can make you commit atrocities.
-Voltaire

-----Original Message-----
From: Craig, Harry [mailto:Craig.Harry@epa.gov]
Sent: Thursday, March 16, 2017 4:52 PM
To: Cellucci, Carlotta CIV NAVFAC NW, EV31; Denice Taylor
Cc: Alam, Mahbub (ECY); Rodenhizer, Debbie; anthony.palmieri@aecom.com; james.flynn@aecom.com
Subject: [Non-DoD Source] RE: Keyport OU 1 Phase II report

Carlotta,

I did not have any comments on the Phase II Report itself, but some comments on how this data would be integrated along with other data on groundwater for this site.

Given there is potential for both 1,4-dioxane and PFAS compounds in this aquifer, would those results be reported separately in another report? Also if there is CVOCs, 1,4-dioxane, and PFAS co-contamination in the intermediate aquifer, would those COCs be addressed concurrently in follow on work?

Regards,

Harry

-----Original Message-----
From: Cellucci, Carlotta CIV NAVFAC NW, EV31 [mailto:carlotta.cellucci@navy.mil]
Sent: Tuesday, March 14, 2017 8:50 AM
To: Denice Taylor <dtaylor@suquamish.nsn.us>
Cc: Craig, Harry <Craig.Harry@epa.gov>; Alam, Mahbub (ECY) <MALA461@ECY.WA.GOV>; Rodenhizer, Debbie <debbie.rodenhizer@aecom.com>; anthony.palmieri@aecom.com; james.flynn@aecom.com
Subject: RE: Keyport OU 1 Phase II report

Hi Denice,

Before I realized that we could have the PM meeting without the contractors, this is how I had planned on getting feedback on the path forward. So, thanks for the comment and we'll change the language to match the agreement made at the PM meeting. Take care,

C.

Carlotta Cellucci, R.G.
Remedial Project Manager
NAVFAC Northwest
(360) 396-1518 Office
(206) 595-6711 Cell
carlotta.cellucci@navy.mil

Those who can make you believe absurdities can make you commit atrocities.
-Voltaire

-----Original Message-----
From: Denice Taylor [mailto:dtaylor@suquamish.nsn.us]
Sent: Thursday, March 09, 2017 8:18 PM
To: Cellucci, Carlotta CIV NAVFAC NW, EV31
Cc: craig.harry@epa.gov; Alam, Mahbub (ECY)
Subject: [Non-DoD Source] Keyport OU 1 Phase II report

Carlotta,

I only have one comment on the draft OU 1 Phase II report:

On page 12, the report states that after the completion of the Phase II investigation, the Navy will evaluate potential additional remedial technologies for treatment of identified hotspots by means of an EE/CA and make recommendations as to whether treatment of associated contaminant hotspots under a CERCLA non-time-critical removal action is practical and appropriate.

After we discussed this at our last project team meeting we agreed to engage in a collaborative process by which to determine the best administrative option (EE/CA, ROD amendment, ESD) to address the Area 1 hotspots, when the Phase II investigation is complete.

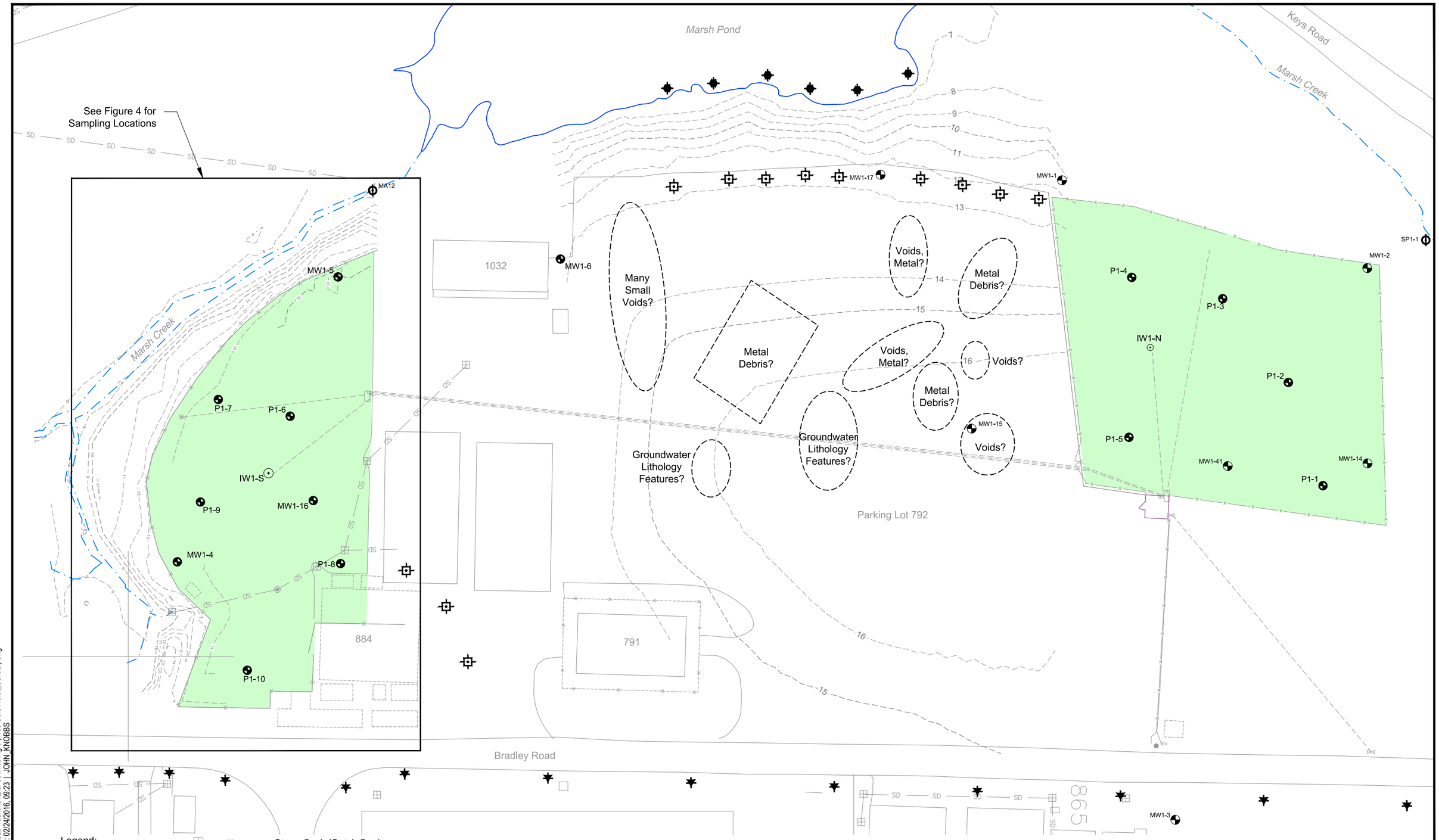
If this is the only revision to the report, I can let it go as is, given that we have the project meeting notes to clarify.

Thanks,

Denice

Appendix B

Select Sampling and Analysis Plan Figures



Legend:

- Irrigation Well
- Monitoring Well/Piezometer
- Plantation Area
- Historical Surface Water Sample
- Storm Drain/Catch Basin
- Topographic Contours (Ft NAVD 1988)
- Proposed Membrane Interface Probe (MIP) Boring
- Proposed Porewater Sample
- Proposed Soil Gas Sample

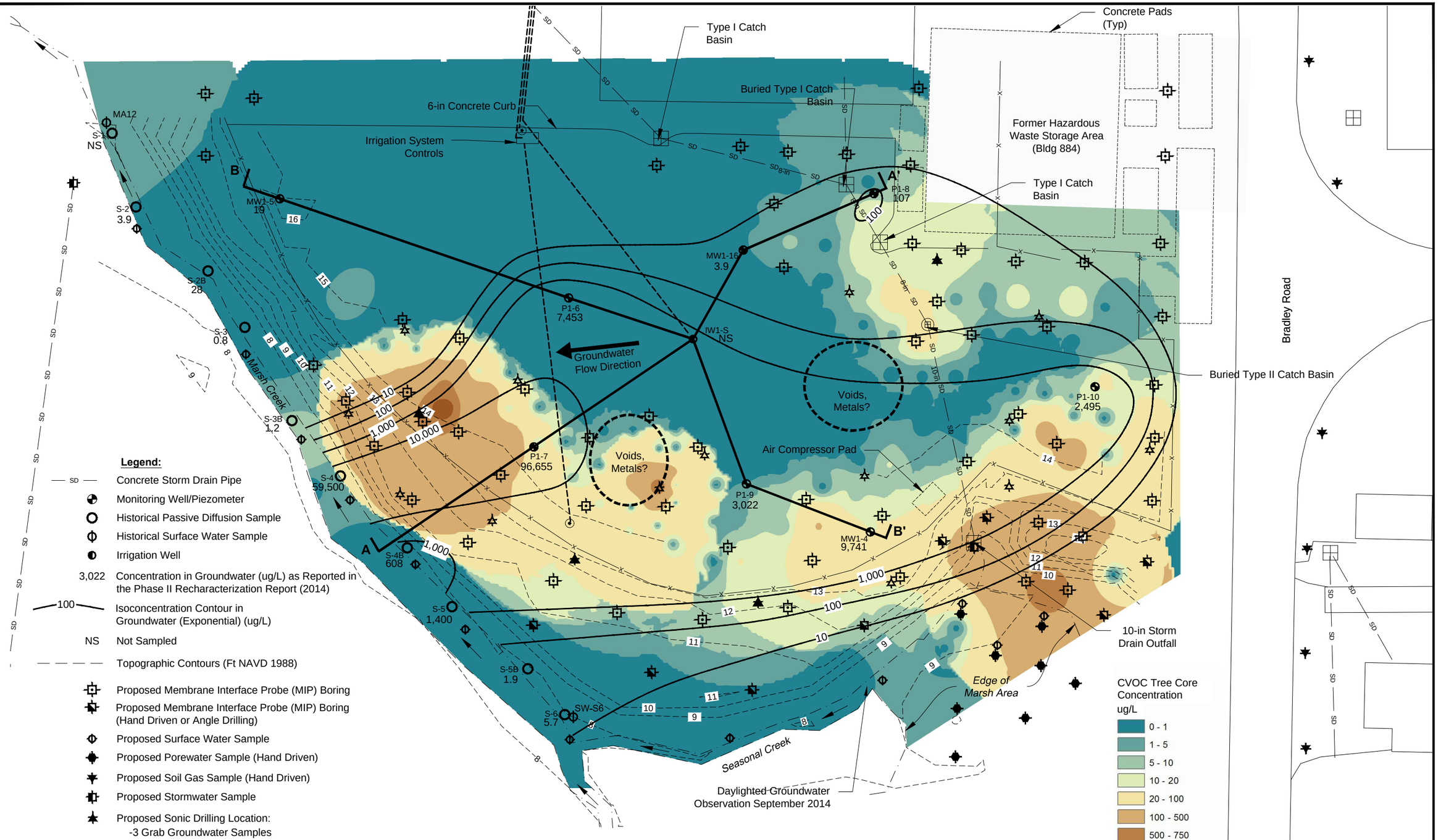
U.S. NAVY

CTO JP09
NBK Keyport
PHASE II SITE
RECHARACTERIZATION
SAP

0 30 60
SCALE IN FEET

Figure 3
Plan View
Plantations and Central Landfill Area

J:\GIS\Projects\NAVY\KEYPORT\Sub-Tasks\IDIQ\JP09\Misc\Fig 3 (Tree Core North_Central).dwg
Mod: 02/24/2016, 09:23 | Plotted: 02/24/2016, 09:23 | JOHN_KNOBBS



Legend:

- Concrete Storm Drain Pipe
- Monitoring Well/Piezometer
- Historical Passive Diffusion Sample
- Historical Surface Water Sample
- Irrigation Well
- 3,022 — Concentration in Groundwater (ug/L) as Reported in the Phase II Recharacterization Report (2014)
- 100 — Isoconcentration Contour in Groundwater (Exponential) (ug/L)
- NS — Not Sampled
- Topographic Contours (Ft NAVD 1988)
- Proposed Membrane Interface Probe (MIP) Boring
- Proposed Membrane Interface Probe (MIP) Boring (Hand Driven or Angle Drilling)
- Proposed Surface Water Sample
- Proposed Porewater Sample (Hand Driven)
- Proposed Soil Gas Sample (Hand Driven)
- Proposed Stormwater Sample
- Proposed Sonic Drilling Location:
  - -3 Grab Groundwater Samples
  - -1 Split Spoon Sample
  - -Monitoring Well
  - -3 Grab Soil
- Proposed Sonic Drilling Location:
  - -3 Grab Groundwater Samples
  - -3 Grab Soil Samples
- A — A' Cross Section Location

Notes:
1. Actual proposed MIPs and boring sample locations will be selected based on field conditions and observed data.
2. Additional proposed soil gas sample locations are shown on Figure 3.

U.S. NAVY	CTO JP09 NBK Keyport PHASE II SITE RECHARACTERIZATION SAP	N 0 15 30 SCALE IN FEET	**Figure 4** **Proposed Sampling Locations at the South Plantation**

J:\DCS\Projects\GIS\NAVY\KEYPORT\Sub-Tasks\IDIQ\JP09\Misc\Fig 4 (CVOC GW South).dwg
Mod: 06/23/2016, 16:28 | Plotted: 06/29/2016, 11:06 | elyssa_dixon

Appendix C

Approved Field Change Request Forms

RESOLUTION CONSULTANTS

CONTRACT NUMBER: N62470-11-D-8013

FIELD CHANGE REQUEST (FCR)

TASK ORDER # JP09 **FCR #** 01 **DATE** 8/17/2016

LOCATION: NBK Keyport, WA **NTR / RPM** Carlotta Cellucci

1. Document to be changed. Identify revision, date, section, drawing, etc.

Final Accident Prevention Plan for Keyport Operable Unit 1 Site Recharacterization, Naval Base Kitsap, Keyport, Washington - Section

2. Description of existing requirement and proposed change (Attach sheet if necessary)

REQUIREMENT: On site fueling must be performed by Resolution Consultants subcontractors Columbia Technologies and Holt Services to expedite the field effort. Columbia Technologies uses a portable gasoline powered generator to power the MIP tooling and on site laboratory equipment. The MIP tooling and laboratory are also transported around the site using a Utility Task Vehicle (UTV) that is also powered by gasoline. The generator and UTV require a total of 5 gallons of gasoline to operate per week. Holt Services advances the MIP tooling using a track-mounted direct push drilling rig that is powered by diesel. The drilling rig requires approximately 5 gallons of diesel to operate per week.

PROPOSED CHANGE: Require that refueling of equipment be performed in accordance with the following procedures:

1. Refueling shall be performed by authorized personnel under the direction of the NAVFAC RPM or RPM's designee, on a hard, level surface (asphalt, concrete, etc), a minimum of 75 feet from storm drains; refueling shall be overseen by the operator at all times (operator will not leave the point of refueling).
2. Refueling shall be conducted at the start of the work day when equipment is cold.
3. Oil and hazardous substance valves, fill lines, nozzles, etc., shall be protected from damage or inadvertent contact to minimize the potential for spills.
4. Refueling shall be performed using a Type I Safety fuel can with a volume no greater than 5 gallons. The operator conducting the refueling shall attend the transfer from start to finish and shall be solely focused on the task until completed.
5. Sorbent pads shall be placed around the point of refueling when refueling occurs to contain overfill spillage.
6. Adequate headspace shall be left in refueling cans to allow for product expansion.
7. Fuel shall be No more than 5 gallons of each gasoline and diesel will be stored on site at any given time.
8. Sorbent materials and portable spill kit material shall be immediately on hand in the work area and at the refueling location.
9. Portable Spill Kit: A sufficiently stocked portable spill kit shall be located where it is immediately available for use when refueling takes place. The quantity of material to be stocked in the portable spill kit shall be sufficient to allow for an initial response to the type of spill most likely to occur (e.g., small release during refueling). When any material is used, the portable spill kits shall be restocked immediately. The content of a typical portable spill kit includes:

3. Reason for Change (Attach sheet if necessary)

On site refueling is required; see above under "Requirement" and refueling procedures were not originally included in the APP.

4. Originator: (print name and sign) Debbie Rodenhizer		**Title** Project Manager	**Date** 8/17/2016
Reviewed by: (print name and sign) Jim Flynn		**Title** Project Technical Lead	**Date** 8/17/2016
Site Superintendent (Print name and sign) Anthony Palmieri	**Date** 8/17/2016	**Task Order Manager (Print name and sign)** Carlotta Cellucci CELLUCCI.CARLOTTA.1383387 546	**Date** 8/17/2016
Program QC Manager (Print Name and Sign) Constance Lapite	**Date** 8/17/2016	**NTR Acknowledgement (Print name and sign)** Carlotta Cellucci CELLUCCI.CARLOTTA.1383387 546	**Date** 8/17/2016

RESOLUTION CONSULTANTS

CONTRACT NUMBER: N62470-11-D-8013

FIELD CHANGE REQUEST (FCR)

TASK ORDER # JP09 **FCR #** 02 **DATE** 8/18/2016

LOCATION: NBK Keyport, WA **NTR / RPM** Carlotta Cellucci

1. Document to be changed. Identify revision, date, section, drawing, etc.

Sampling and Analysis Plan, Keyport OU 1 Site Recharacterization, Keyport, Washington

2. Description of existing requirement and proposed change (Attach sheet if necessary)

The following changes to SAP Worksheets 3, 4, 5, 6, and 7 are necessary due to staffing changes (see below):

1. Change the Project Manager to Debbie Rodenhizer, 206-438-2295, debbie.rodenhizer@aecom.com
2. Change the Technical Lead to Jim Flynn, 206-438-2113, james.flynn@aecom.com
3. Change the Navy Technical Representative to Charlie Escola, 360-315-5401, charles.escola@navy.mil

Add the following project manager for the brush clearing/fence removal subcontractor to SAP Worksheet 3:

Dan Hawk, Project Manager, Clearcreek Contractors, 360-659-2459, danh@clearcreekcon.com

Add a box for the brush clearing/fence removal subcontractor to the bottom of SAP Worksheet 5.

3. Reason for Change (Attach sheet if necessary)

Resolution Consultants and Navy project staffing have changed. Debbie Rodenhizer is now the Resolution Consultants project manager, and Jim Flynn is the Resolutions Consultants Technical Lead. Charlie Escola is now the Navy Technical Representative.

In addition, a brush clearing/fence removal subcontractor is required for MIP work outside of the fenced area between the South Plantation and the creek.

4. Originator: (print name and sign) Debbie Rodenhizer Deborah S. Rodenhizer		**Title** Project Manager	**Date** 8/18/16
Reviewed by: (print name and sign) Jim Flynn		**Title** Project Technical Lead	**Date** 8/18/16
Site Superintendent (Print name and sign) Anthony Palmieri	**Date** 8/18/16	**Task Order Manager (Print name and sign)** Carlotta Cellucci	**Date** 8/18/16
Program QC Manager (Print Name and Sign) Constance Lapite	**Date** 8/18/16	**NTR Acknowledgement (Print name and sign)** Carlotta Cellucci	**Date** 8/18/16

CONTRACT NUMBER:

FIELD CHANGE REQUEST (FCR)

TASK ORDER # JP09 FCR # 03 DATE 8/24/2016

LOCATION: NBK Keyport, WA NTR / RPM Carlotta Cellucci

1. Document to be changed. Identify revision, date, section, drawing, etc.

Sampling and Analysis Plan, Keyport OU 1 Site Recharacterization, Keyport, Washington

2. Description of existing requirement and proposed change (Attach sheet if necessary)

The Sampling and Analysis Plan prescribes using a Flame Ionization Detector (FID) within the Membrane Interface Probe (MIP) system to assess site conditions. Based on recommendations from Columbia Technologies and concurrence among Resolution Consultants and the Navy, the flame ionization detector (FID) instrumentation was disabled. This allows for the entire sample gas volume to be run through the XSD detector, which enables a better response.

The Sampling and Analysis Plan prescribes advancing the MIP from ground surface to the termination depth. Based on recommendations from Columbia Technologies, prior to advancing the MIP, a pilot hole was drilled using a solid drive point from ground surface to 5 feet below ground surface (bgs) at each MIP location.

The Sampling and Analysis Plan prescribes that boreholes be abandoned in accordance with NAVFAC NW SOP I-B-4, which states that boreholes shall be abandoned using grout injected through a tremie pipe. Resolution, in concurrence with Columbia Technologies and Holt Services, recommend that boreholes be abandoned using hydrated bentonite chips.

MIP-018 was advanced to a total depth of 35 feet bgs, which is deeper than the total depth of 20 feet bgs proposed in the Sampling and Analysis Plan. Completing all subsequent MIP borings to greater than 20 feet bgs is anticipated.

3. Reason for Change (Attach sheet if necessary)

Based on recommendations from Columbia Technologies and concurrence among Resolution Consultants and the Navy, the flame ionization detector (FID) instrumentation was disabled. The FID is typically used to evaluate volatile petroleum compounds, which are not the primary constituents of concern (COCs) at this site. This allows for the entire sample gas volume to be run through the XSD detector, which enables a better response for chlorinated volatile organics, which are the primary COCs.

The purpose of the pilot hole is to displace large landfill debris including concrete chunks, gravel and cobbles that could potential damage the MIP. The pilot hole was drilled using 1.75 inch diameter solid drive tip. The pilot hole is slight smaller in diameter than the 2.25 inch diameter MIP tool, which allows for the MIP sensors to still make contact with the borehole sidewall from ground surface to 5 feet bgs. This allows for MIP logging of the borehole while reducing the risk of encountering debris that could damage the MIP tooling.

Pressure grouting utilizes a pneumatic pump to inject a concrete/bentonite mixture (grout) through a pipe that is placed on the bottom of the borehole. Upon removal of MIP tooling, it was observed that the boreholes were collapsing to approximately 8 to 10 feet bgs. Based on this finding, Resolution in concurrence with Holt Services, determined pressure grouting not to be feasible due to the potential of rapid surfacing. Resolution and Holt chose to abandoned the boreholes using hydrated bentonite chips.

This was done to assess vertical extent of impacts and determine the depth of the aquitard, which appears to be encountered at 33 feet bgs.

4. Originator: (print name and sign) Debbie Rodenhizer Deborah S. Rodenhizer		**Title** Project Manager	**Date** 8/24/16
Reviewed by: (print name and sign) Jim Flynn		**Title** Project Technical Lead	**Date** 8/24/16
Site Superintendent (Print name and sign) Anthony Palmieri	**Date** 8.24.16	**Task Order Manager (Print name and sign)** Carlotta Cellucci CELLUCCI.CARLOTTA.1383387546 Digitally signed by CELLUCCI.CARLOTTA.1383387546 DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=USN, cn=CELLUCCI.CARLOTTA.1383387546 Date: 2016.08.25 08:38:21 -07'00'	**Date** 8/25/16
Program QC Manager (Print Name and Sign) Constance Lapite	**Date** 8/24/16	**NTR Acknowledgement (Print name and sign)** Carlotta Cellucci CELLUCCI.CARLOTTA.13833875 46 Digitally signed by CELLUCCI.CARLOTTA.1383387546 DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=USN, cn=CELLUCCI.CARLOTTA.1383387546 Date: 2016.08.25 08:38:47 -07'00'	**Date** 8/25/16

Appendix D

NAVFAC NW Permits and Approvals

16-EP097

PERMIT NUMBER

Date to BOSC:

EXCAVATION/UTILITY LOCATES PERMIT

NAVBASEKITSAPINST 11300.3A

REQUESTER

From (Requester's name): Anthony Palmieri Organization: AECOM Email: anthony.palmieri@aecom.com	Phone & Fax #'s: **P** 206.245.7679 **F**	**Location** of Excavation/Command/Bldg#/Street Name **South Poplar Tree Plantation located west of Bradley Road on the NUWC KEYPORT FACILITY**

PURPOSE of Excavation (Provide a description of work to be performed and attach a DWG/sketch. Be specific): ***Membrance Interface Probe borings and Sonic soil borings will be advanced in the South Tree Plantation located to the west of Bradley Road. The boring locations are shown on the attached figure.***

Contract#/Work Request#: **NAVFAC #N62470-11-D-8013** FUNDING:

Government Representative (Name/Email): Carlotta Cellucci, carlotta.cellucci@navy.mil
(Phone and Fax): 360.396.1518

Desired Excavation Begin Date and Time:	Estimated Completion Date:	Method of Excavation and Depth:
8/15/2016	**9/13/2016**	**direct push/sonic drilling to 20 feet**

Requester **SHALL** mark excavation site with white paint. Requester **MUST** provide map/drawing of the excavation area.

Requester **SHALL call ONE CALL (811)** prior to excavation and provide the 8-digit file number. **File# 16253702**

Requester: Send excavation request to nbkbangpwdrequests@navy.mil via the designated Government Rep

Requester's Signature: [signature] Date: 8.10.16

LOCATES COMPLETE

	DEPARTMENT	COLOR	COMMENTS	SIGNATURE/INITIALS	DATE
	Communications, Fiber, Phone, etc. (CNRNW N/6 & SWFPAC)	Orange	*Cannot be signed off by Private Locate Services if in MLA or WRA*		
	Alarms/ESU (Civil Service)	Orange	Not applicable	DWA	8/10/16
	ICS	Orange	not applicable	DWA	8/10/16
	Fire Alarm	Orange	not applicable	DWA.	8/10/16
	Propane	Yellow	not applicable	DWA.	8/10/16
	Natural Gas	Yellow	not applicable	DWA.	8/10/16
	Steam	Yellow	not applicable	DWA.	8/10/16
	Fuel Oil	Yellow	not applicable	DWA.	8/10/16
	LV Electrical	Red	marked w/red paint	DWA.	8/10/16
	HV Electrical	Red	not applicable	DWA.	8/10/16
	Water/Sewage	Blue/Green	~~marked w/ pin flags~~ AP Not applicable	DWA.	8/10/16
	Storm Drain	Green	marked w/ pin flags	DWA.	8/10/16
	Irrigation	Blue	marked w/ red paint	DWA.	8/10/16
	HVAC, Air, Chill Water	Purple	not applicable	DWA.	8/10/16
SWF	ALL UTILITIES	ALL	*Work within the MLA & WRA Mandatory Sign Off*		
NUWC	ALL UTILITIES	ALL			
N6	ALL UTILITIES	ALL			
NMII	ALL UTILITIES	ALL			
NHB JPH	Video viewing required per NAVBASEKITSAPINST 8020.1	Date Comp	*"All personnel responsible for managing or performing excavation work have viewed the Munitions Precaution Briefing DVD prior to starting work under this request."*		

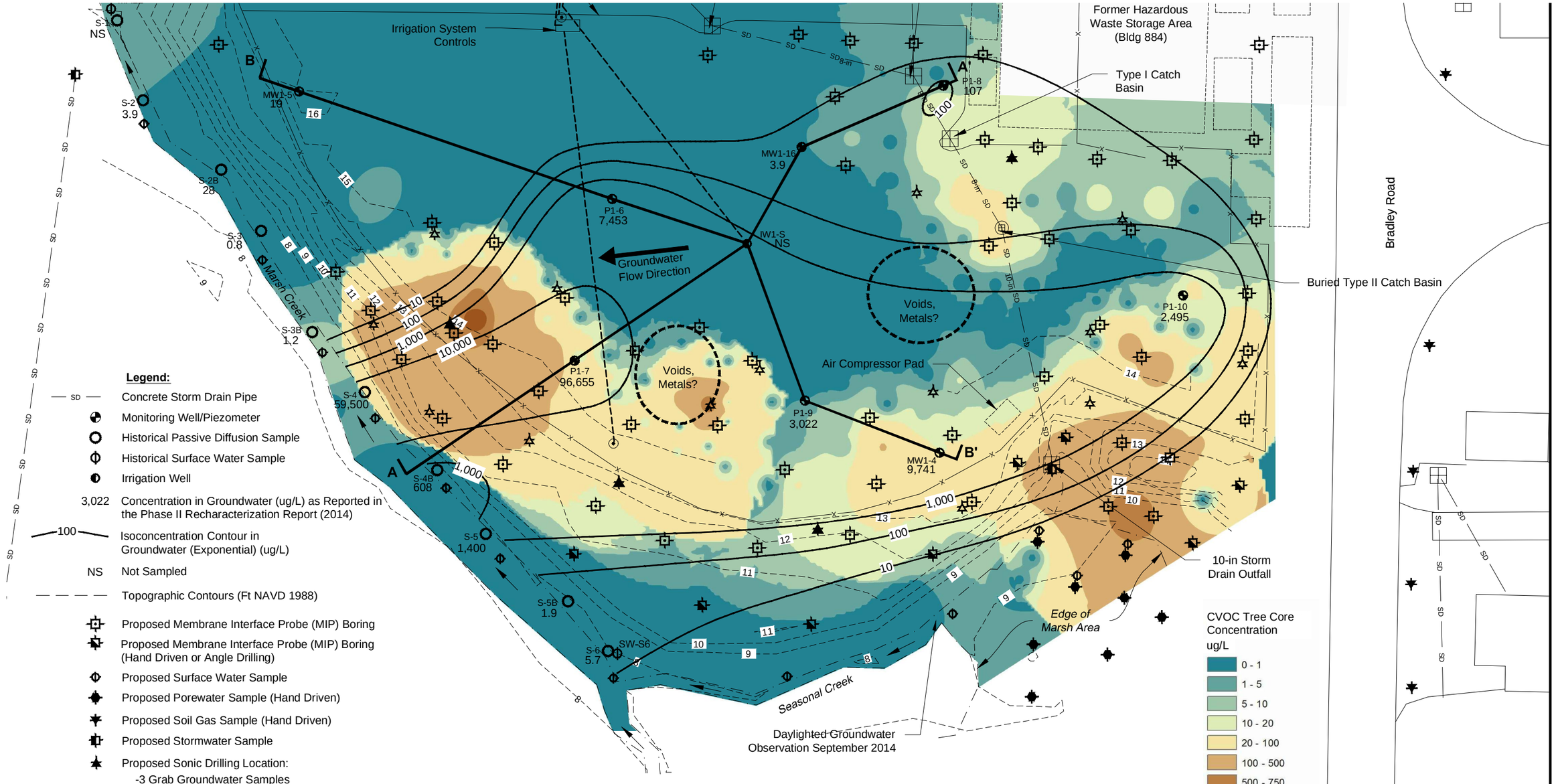
Locating Company: Applied Professional Services
(Name, POC, Telephone #): [signature] (Dane Aaro) 425 864-4451 APS

[X] **Approved** [ ] **Disapproved**	**Permit Expires:** **9/15/2016**	**Extensions:** Extension requests should be received 5 days before the current approved expiration date

NBK OUTAGE COORDINATOR: CULLEN.BRIAN.KEITH.1165572056 Digitally signed by CULLEN.BRIAN.KEITH.1165572056 DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=USN, cn=CULLEN.BRIAN.KEITH.1165572056 Date: 2016.08.15 08:02:47 -07'00' **Date:** 8/15/16

Dist: All APPROVED Distribution List (Available upon Request), Requester, and Government Rep

Enclosure (1)



Legend:

- Concrete Storm Drain Pipe
- Monitoring Well/Piezometer
- Historical Passive Diffusion Sample
- Historical Surface Water Sample
- Irrigation Well
- 3,022 — Concentration in Groundwater (ug/L) as Reported in the Phase II Recharacterization Report (2014)
- 100 — Isoconcentration Contour in Groundwater (Exponential) (ug/L)
- NS — Not Sampled
- Topographic Contours (Ft NAVD 1988)
- Proposed Membrane Interface Probe (MIP) Boring
- Proposed Membrane Interface Probe (MIP) Boring (Hand Driven or Angle Drilling)
- Proposed Surface Water Sample
- Proposed Porewater Sample (Hand Driven)
- Proposed Soil Gas Sample (Hand Driven)
- Proposed Stormwater Sample
- Proposed Sonic Drilling Location:
  - -3 Grab Groundwater Samples
  - -1 Split Spoon Sample
  - -Monitoring Well
  - -3 Grab Soil
- Proposed Sonic Drilling Location:
  - -3 Grab Groundwater Samples
  - -3 Grab Soil Samples

Notes:
1. Actual proposed MIPs and boring sample locations will be selected based on field conditions and observed data.
2. Additional proposed soil gas sample locations are shown on Figure 3.

U.S. NAVY
CTO JP09
NBK Keyport

Figure 4
Proposed Sampling Locations

...sts\GIS\NAVY\KEYPORT\Sub-Tasks\IDIQ\JP09\Misc\Fig 4 (CVOC GW South).dwg
...016, 16:28 | Plotted: 06/29/2016, 11:06 | elyssa_dixon

16-EP099

PERMIT NUMBER

Date to BOSC: 8/19/16

EXCAVATION/UTILITY LOCATES PERMIT

NAVBASEKITSAPINST 11300.3A

REQUESTER

From (Requester's name): Anthony Palmieri Organization: AECOM Email: anthony.palmieri@aercom.com	Phone & Fax #'s: P206.245.7679 F	**Location** of Excavation/Command/Bldg#/Street Name **Bradley Road between Keyes Road and 5th Street on the NUWC Keyport Facility**

PURPOSE of Excavation (Provide a description of work to be performed and attach a DWG/sketch. Be specific): ***AECOM will conduct a soil gas sampling event in the northbound lane of Bradley Road, between Keyes Road and 5th Street. The soil gas sampling will be performed using a direct push drill rig. Traffic control will be used to establish the workzone and manage traffic on Bradley road during work hours.***

Contract#/Work Request#: **NAVFAC #N2470-11-D-8013** FUNDING:

Government Representative (Name/Email): Carlotta Cellucci

(Phone and Fax): 360.396.1518

Desired Excavation Begin Date and Time:	Estimated Completion Date:	Method of Excavation and Depth:
8/29/2016 @08:00	**9/1/2016**	**Direct push drilling**

Requester **SHALL** mark excavation site with white paint. Requester **MUST** provide map/drawing of the excavation area.

Requester **SHALL call ONE CALL (811)** prior to excavation and provide the 8-digit file number. **File#16253575**

Requester: Send excavation request to nbkbangpwdrequests@navy.mil via the designated Government Rep

Requester's Signature: Date: 8/19/16

LOCATES COMPLETE

	DEPARTMENT	COLOR	COMMENTS	SIGNATURE/INITIALS	DATE
	Communications, Fiber, Phone, etc. (CNRNW N/6 & SWFPAC)	Orange	*Cannot be signed off by Private Locate Services if in MLA or WRA*		8/19/16
	Alarms/ESU (Civil Service)	Orange	N/A		
	ICS	Orange	N/A		
	Fire Alarm	Orange	N/A		
	Propane	Yellow	N/A		
	Natural Gas	Yellow	One Call		
	Steam	Yellow	N/A		
	Fuel Oil	Yellow	N/A		
	LV Electrical	Red			
	HV Electrical	Red			
	Water/Sewage	Blue/Green			
	Storm Drain	Green			
	Irrigation	Blue			
	HVAC, Air, Chill Water	Purple	N/A		8/19/16
SWF	ALL UTILITIES	ALL	*Work within the MLA & WRA Mandatory Sign Off*		
NUWC	ALL UTILITIES	ALL			
N6	ALL UTILITIES	ALL	CNRNW has no fiber in the area of dig permit 16-EP099-KEY-BRADLEY RD Rod Brown N6		
NMII	ALL UTILITIES	ALL			
NHB JPH	Video viewing required per NAVBASEKITSAPINST 8020.1	Date Comp	*"All personnel responsible for managing or performing excavation work have viewed the Munitions Precaution Briefing DVD prior to starting work under this request."*		

Locating Company: APS

(Name, POC, Telephone #): Dane Asco 425-864-4451

[X] Approved [ ] Disapproved	**Permit Expires:** **9/26/2016**	**Extensions:** Extension requests should be received 5 days before the current approved expiration date

CULLEN.BRIAN.KEITH.1165572056

Digitally signed by CULLEN.BRIAN.KEITH.1165572056
DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=USN, cn=CULLEN.BRIAN.KEITH.1165572056
Date: 2016.08.26 07:09:40 -07'00'

Dist: All APPROVED Distribution List (Available upon Request), Requester, and Government Rep

Enclosure (1)

16-EP099
PERMIT NUMBER

Date to BOSC:

EXCAVATION/UTILITY LOCATES PERMIT
NAVBASEKITSAPINST 11300.3A

NBK OUTAGE COORDINATOR:	**Date:** 8/25/16

EXCAVATION EXTENSION PAGE

(This signature sheet MUST accompany the original approved Excavation Permit)

OUTAGE COORDINATURES SIGNATURE	DATE SIGNED:	EXTENDED TO:

See Figure 4 for Sampling Locations

Marsh Pond

Keys Road

Marsh Creek

Marsh Creek

Many Small Voids?

Metal Debris?

Groundwater Lithology Features?

Groundwater Lithology Features?

Voids, Metal?

Metal Debris?

Voids, Metal?

Metal Debris?

Voids?

Voids?

1032

884

791

Parking Lot 792

Bradley Road

MA12

MW1-5

MW1-6

MW1-17

MW1-1

SP1-1

MW1-2

P1-4

P1-3

IW1-N

P1-2

P1-5

MW1-41

MW1-14

P1-1

MW1-15

MW1-3

P1-7

P1-6

IW1-S

P1-9

MW1-16

MW1-4

P1-8

P1-10

1

8

9

10

11

12

13

14

15

16

SD

Legend:

- Irrigation Well
- Monitoring Well/Piezometer
- Plantation Area
- Historical Surface Water Sample
- Storm Drain/Catch Basin
- Topographic Contours (Ft NAVD 1988)
- Proposed Membrane Interface Probe (MIP) Boring
- Proposed Porewater Sample
- Proposed Soil Gas Sample

U.S. NAVY	CTO JP09 NBK Keyport PHASE II SITE RECHARACTERIZATION SAP	0 30 60 SCALE IN FEET	Project Area

Figure 3
Plan View
Plantations and Central Landfill Area

J:\GIS\Projects\NAVY\KEYPORT\Sub-Tasks\IDIQ\JP09\Misc\Fig 3 (Tree Core North_Central).dwg
Mod: 02/24/2016, 09:23 | Plotted: 02/24/2016, 09:23 | JOHN_KNOBBS

From:	Roadruck, James Ray CTR NAVSEA, 1023
To:	Robinson, Carl M CIV NAVFAC NW, PRB23; NBK Bang PWD Requests
Cc:	Fowler, Lee Anne M CIV NAVSEA KPWA; Beste, Duane P (Phil) CIV NAVSEA KPWA; Neal, Erik J CIV NAVSEA KPWA
Subject:	FW: 16-EP099-KEY-BRADLEY RD - Approval
Date:	Tuesday, August 23, 2016 10:14:30
Attachments:	16-EP099-KEY-BRADLEY RD.pdf

NUWC Keyport approves excavation request. Thanks, Jim

-----Original Message-----
From: Robinson, Carl M CIV NAVFAC NW, PRB23
Sent: Friday, 19 August, 2016 11:04 AM
To: Beste, Duane P (Phil) CIV NAVSEA KPWA; Fowler, Lee Anne M CIV NAVSEA KPWA; Neal, Erik J CIV NAVSEA KPWA; Roadruck, James Ray CTR NAVSEA, 1023; Swan, Brian E CIV NAVFAC NW, PRB325; Whalen, Stephen NAVFAC NW, PRB112; Brown, Rod F CIV Navy Region NW, N61; Gardner, James D CIV Navy Region NW, N61; Potter, Keith K CIV Navy Region NW, N61
Cc: Cellucci, Carlotta CIV NAVFAC NW, EV31
Subject: 16-EP099-KEY-BRADLEY RD - Original Req

Please process. Notice that the location map is embedded with the request form

Carl M. Robinson
Engineering Technician/BOSC PAR
Public Works, Naval Base Kitsap
(360)315-6175 Desk
(360)396-4090 Fax
carl.robinson2@navy.mil

-----Original Message-----
From: Cellucci, Carlotta CIV NAVFAC NW, EV31
Sent: Friday, August 19, 2016 9:49 AM
To: Cullen, Brian K CIV NAVFAC NW, PRB23; NBK Bang PWD Requests
Subject: Dig Permit Request

Hi All,

Please let me know if this dig permit can be approved by Monday, August 29. Thank you,

C.

Carlotta Cellucci, R.G.
Remedial Project Manager
NAVFAC Northwest
(360) 396-1518 Office
(206) 595-6711 Cell
carlotta.cellucci@navy.mil

Those who can make you believe absurdities can make you commit atrocities.
-Voltaire

From: Brown, Rod F CIV Navy Region NW, N61
To: Cullen, Brian K CIV NAVFAC NW, PRB23
Subject: RE: 16-EP099-KEY-BRADLEY RD
Date: Friday, August 26, 2016 6:55:00

CNRNW has no fiber in the area of dig permit 16-EP099-KEY-BRADLEY RD

Respectfully
Roderick Brown
Infrastructure Specialist
CNRNW N61
864 Dewey street Bremerton, WA 98317
Ph 360 627-6231

-----Original Message-----
From: Cullen, Brian K CIV NAVFAC NW, PRB23
Sent: Tuesday, August 23, 2016 3:44 PM
To: Robinson, Carl M CIV NAVFAC NW, PRB23; Beste, Duane P (Phil) CIV NAVSEA KPWA; Fowler, Lee Anne M CIV NAVSEA KPWA; Neal, Erik J CIV NAVSEA KPWA; Roadruck, James Ray CTR NAVSEA, 1023; Swan, Brian E CIV NAVFAC NW, PRB325; Whalen, Stephen NAVFAC NW, PRB112; Brown, Rod F CIV Navy Region NW, N61; Gardner, James D CIV Navy Region NW, N61; Potter, Keith K CIV Navy Region NW, N61
Cc: Cellucci, Carlotta CIV NAVFAC NW, EV31
Subject: RE: 16-EP099-KEY-BRADLEY RD

Status please.

r/

Brian K. Cullen
Engineering Tech
NBK-Outage Coordinator
NBK-COR/COT/PAR
Public Works Dept.
FMFS PRB23
brian.cullen@navy.mil
O: 360-396-4445
C: 360-531-3997
F: 360-396-4090

Send your permit requests to:
nbkbangpwdrequests@navy.mil
or call 360-396-4030 for Emergencies

-----Original Message-----
From: Robinson, Carl M CIV NAVFAC NW, PRB23
Sent: Friday, August 19, 2016 11:04 AM
To: Beste, Duane P (Phil) CIV NAVSEA KPWA; Fowler, Lee Anne M CIV NAVSEA KPWA; 'Neal, Erik J CIV NAVSEA KPWA- KYPT, 173'; Roadruck, James Ray CTR NAVSEA, 1023; Swan, Brian E CIV NAVFAC NW, PRB325; Whalen, Stephen NAVFAC NW, PRB112; 'Brown, Rod F CIV Navy Region NW, N61 (rod.brown@navy.mil)'; Gardner, James D CIV Navy Region NW, N61; 'Potter, Keith K CIV Navy Region NW,

N61 (keith.potter1@navy.mil)'
Cc: Cellucci, Carlotta CIV NAVFAC NW, EV31
Subject: 16-EP099-KEY-BRADLEY RD

Please process. Notice that the location map is embedded with the request form

Carl M. Robinson
Engineering Technician/BOSC PAR
Public Works, Naval Base Kitsap
(360)315-6175 Desk
(360)396-4090 Fax
carl.robinson2@navy.mil

-----Original Message-----
From: Cellucci, Carlotta CIV NAVFAC NW, EV31
Sent: Friday, August 19, 2016 9:49 AM
To: Cullen, Brian K CIV NAVFAC NW, PRB23; NBK Bang PWD Requests
Subject: Dig Permit Request

Hi All,

Please let me know if this dig permit can be approved by Monday, August 29. Thank you,

C.

Carlotta Cellucci, R.G.
Remedial Project Manager
NAVFAC Northwest
(360) 396-1518 Office
(206) 595-6711 Cell
carlotta.cellucci@navy.mil

Those who can make you believe absurdities can make you commit atrocities.
-Voltaire

16-EP100

PERMIT NUMBER

Date to BOSC: 8/19/16

EXCAVATION/UTILITY LOCATES PERMIT

NAVBASEKITSAPINST 11300.3A

REQUESTER

From (Requester's name):Anthony Palmieri Organization:AECOM Email:anthony.palmieri@aercom.com	Phone & Fax #'s: P206.245.7679 F	**Location** of Excavation/Command/Bldg#/Street Name **Bradley Road between Keyes Road and 5th Street on the NUWC Keyport Facility**

PURPOSE of Excavation(Provide a description of work to be performed and attach a DWG/sketch. Be specific):***Membrane Interface Probe borings and sonic soil borings will be advanced in the parking lot and motorcycle training area located on the west side of Bradley Road.***

Contract#/Work Request#:**NAVFAC #N2470-11-D-8013** FUNDING:

Government Representative(Name/Email): Carlotta Cellucci

(Phone and Fax):360.396.1518

Desired Excavation Begin Date and Time:	Estimated Completion Date:	Method of Excavation and Depth:
8/23/2016 @08:00	**9/1/2016**	**Direct push and sonic drilling**

Requester **SHALL** mark excavation site with white paint. Requester **MUST** provide map/drawing of the excavation area.

Requester **SHALL call ONE CALL (811)** prior to excavation and provide the 8-digit file number. **File#16261616**

Requester: Send excavation request to nbkbangpwdrequests@navy.mil via the designated Government Rep

Requester's Signature: Date:8/19/16

LOCATES COMPLETE

	DEPARTMENT	COLOR	COMMENTS	SIGNATURE/INITIALS	DATE
	Communications, Fiber, Phone, etc. (CNRNW N/6 & SWFPAC)	Orange	*Cannot be signed off by Private Locate Services if in MLA or WRA*	Dwa	8/19/16
	Alarms/ESU (Civil Service)	Orange	N/A	Dwa.	
	ICS	Orange	N/A	Dwa	
	Fire Alarm	Orange	N/A	Dwa.	
	Propane	Yellow	N/A	Dwa.	
	Natural Gas	Yellow	One Call	Dwa.	
	Steam	Yellow	N/A	Dwa.	
	Fuel Oil	Yellow	N/A	Dwa.	
	LV Electrical	Red		Dwa.	
	HV Electrical	Red		Dwa.	
	Water/Sewage	Blue/Green		Dwa.	
	Storm Drain	Green		Dwa.	
	Irrigation	Blue		Dwa.	
	HVAC, Air, Chill Water	Purple	N/A	Dwa.	8/19/16
SWF	ALL UTILITIES	ALL	*Work within the MLA & WRA Mandatory Sign Off*		
NUWC	ALL UTILITIES	ALL			
N6	ALL UTILITIES	ALL	No fiber in the area	see attached	
NMII	ALL UTILITIES	ALL			
NHB JPH	Video viewing required per NAVBASEKITSAPINST 8020.1	Date Comp	*"All personnel responsible for managing or performing excavation work have viewed the Munitions Precaution Briefing DVD prior to starting work under this request."*		

Locating Company: APS Dane Aaro

(Name, POC, Telephone #): 425 864 4456

☒ Approved ☐ Disapproved

Permit Expires: **9/25/2016**

Extensions: Extension requests should be received5 days before the current approved expiration date

NBK OUTAGE COORDINATOR: CULLEN.BRIAN.KEITH.1165572056

Digitally signed by CULLEN.BRIAN.KEITH.1165572056
DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=USN, cn=CULLEN.BRIAN.KEITH.1165572056
Date: 2016.08.25 08:54:27 -07'00'

Date: 8/25/16

Dist: All APPROVED Distribution List (Available upon Request), Requester, and Government Rep

Enclosure (1)

PERMIT NUMBER

Date to BOSC:

EXCAVATION/UTILITY LOCATES PERMIT
NAVBASEKITSAPINST 11300.3A

EXCAVATION EXTENSION PAGE

(This signature sheet MUST accompany the original approved Excavation Permit)

OUTAGE COORDINATURES SIGNATURE	DATE SIGNED:	EXTENDED TO:

Dist: All APPROVED Distribution List (Available upon Request), Requester, and Government Rep

Enclosure (1)

See Figure 4 for Sampling Locations

Marsh Pond

Keys Road

Marsh Creek

Marsh Creek

1032

884

791

865

Parking Lot 792

Bradley Road

Many Small Voids?

Metal Debris?

Voids, Metal?

Metal Debris?

Voids, Metal?

Voids?

Metal Debris?

Groundwater Lithology Features?

Groundwater Lithology Features?

Voids?

MW1-1

MW1-2

MW1-3

MW1-4

MW1-5

MW1-6

MW1-14

MW1-15

MW1-16

MW1-17

MW1-41

MA12

SP1-1

IW1-N

IW1-S

P1-1

P1-2

P1-3

P1-4

P1-5

P1-6

P1-7

P1-8

P1-9

P1-10

Legend:

- Irrigation Well
- Monitoring Well/Piezometer
- Plantation Area
- Historical Surface Water Sample
- Storm Drain/Catch Basin
- Topographic Contours (Ft NAVD 1988)
- Proposed Membrane Interface Probe (MIP) Boring
- Proposed Porewater Sample
- Proposed Soil Gas Sample

U.S. NAVY	CTO JP09 NBK Keyport PHASE II SITE RECHARACTERIZATION SAP	0 30 60 SCALE IN FEET	Project Area

Figure 3
Plan View
Plantations and Central Landfill Area

J:\GIS\Projects\NAVY\KEYPORT\Sub-Tasks\IDIQ\JP09\Misc\Fig 3 (Tree Core North_Central).dwg
Mod: 02/24/2016, 09:23 | Plotted: 02/24/2016, 09:23 | JOHN_KNOBBS

From:	Roadruck, James Ray CTR NAVSEA, 1023
To:	Cullen, Brian K CIV NAVFAC NW, PRB23; Robinson, Carl M CIV NAVFAC NW, PRB23; NBK Bang PWD Requests
Cc:	Fowler, Lee Anne M CIV NAVSEA KPWA; Beste, Duane P (Phil) CIV NAVSEA KPWA; Neal, Erik J CIV NAVSEA KPWA
Subject:	FW: 16-EP100-KEY-MTR CYCLE TRAINING AREA - Approval
Date:	Tuesday, August 23, 2016 10:13:23
Attachments:	16-EP100-KEY-MTR CYCLE TRAINING AREA.pdf

NUWC Keyport approves excavation request. Thanks, Jim

-----Original Message-----
From: Robinson, Carl M CIV NAVFAC NW, PRB23
Sent: Friday, 19 August, 2016 11:30 AM
To: Brown, Rod F CIV Navy Region NW, N61; Gardner, James D CIV Navy Region NW, N61; Potter, Keith K CIV Navy Region NW, N61; Beste, Duane P (Phil) CIV NAVSEA KPWA; Fowler, Lee Anne M CIV NAVSEA KPWA; Neal, Erik J CIV NAVSEA KPWA; Roadruck, James Ray CTR NAVSEA, 1023; Swan, Brian E CIV NAVFAC NW, PRB325; Whalen, Stephen NAVFAC NW, PRB112
Cc: Cellucci, Carlotta CIV NAVFAC NW, EV31
Subject: 16-EP100-KEY-MTR CYCLE TRAINING AREA - Original Req

Please process. Also please notice that the location map is located within the excavation permit request

Pardon me everyone. I sent the previous email off before attaching the correct document.

Carl M. Robinson
Engineering Technician/BOSC PAR
Public Works, Naval Base Kitsap
(360)315-6175 Desk
(360)396-4090 Fax
carl.robinson2@navy.mil

-----Original Message-----
From: Robinson, Carl M CIV NAVFAC NW, PRB23
Sent: Friday, August 19, 2016 11:26 AM
To: 'Brown, Rod F CIV Navy Region NW, N61 (rod.brown@navy.mil)'; Gardner, James D CIV Navy Region NW, N61; 'Potter, Keith K CIV Navy Region NW, N61 (keith.potter1@navy.mil)'; Beste, Duane P (Phil) CIV NAVSEA KPWA; Fowler, Lee Anne M CIV NAVSEA KPWA; 'Neal, Erik J CIV NAVSEA KPWA- KYPT, 173'; Roadruck, James Ray CTR NAVSEA, 1023; Swan, Brian E CIV NAVFAC NW, PRB325; Whalen, Stephen NAVFAC NW, PRB112
Cc: Cellucci, Carlotta CIV NAVFAC NW, EV31
Subject: FW: Dig Permit Request

Please process. Also please notice that the location map is located within the excavation permit request

Carl M. Robinson
Engineering Technician/BOSC PAR
Public Works, Naval Base Kitsap
(360)315-6175 Desk
(360)396-4090 Fax
carl.robinson2@navy.mil

-----Original Message-----

From: Cellucci, Carlotta CIV NAVFAC NW, EV31
Sent: Friday, August 19, 2016 9:46 AM
To: Cullen, Brian K CIV NAVFAC NW, PRB23; NBK Bang PWD Requests
Subject: Dig Permit Request

Hi All,

Please let me know if the attached dig permit can be approved before Thursday, August 25.
Thank you,

C.

Carlotta Cellucci, R.G.
Remedial Project Manager
NAVFAC Northwest
(360) 396-1518 Office
(206) 595-6711 Cell
carlotta.cellucci@navy.mil

Those who can make you believe absurdities can make you commit atrocities.
-Voltaire

From:	Brown, Rod F CIV Navy Region NW, N61
To:	Cullen, Brian K CIV NAVFAC NW, PRB23
Cc:	Gardner, James D CIV Navy Region NW, N61; Becker, Larry P CIV Navy Region NW, N61; Potter, Keith K CIV Navy Region NW, N61
Subject:	RE: 16-EP100-KEY-MTR CYCLE TRAINING AREA
Date:	Thursday, August 25, 2016 8:49:10

CNRNW has no fiber in the area of dig request 16-EP100

Respectfully
Roderick Brown
Infrastructure Specialist
CNRNW N61
864 Dewey street Bremerton, WA 98317
Ph 360 627-6231

-----Original Message-----
From: Cullen, Brian K CIV NAVFAC NW, PRB23
Sent: Tuesday, August 23, 2016 3:44 PM
To: Robinson, Carl M CIV NAVFAC NW, PRB23; Brown, Rod F CIV Navy Region NW, N61; Gardner, James D CIV Navy Region NW, N61; Potter, Keith K CIV Navy Region NW, N61; Beste, Duane P (Phil) CIV NAVSEA KPWA; Fowler, Lee Anne M CIV NAVSEA KPWA; Neal, Erik J CIV NAVSEA KPWA; Roadruck, James Ray CTR NAVSEA, 1023; Swan, Brian E CIV NAVFAC NW, PRB325; Whalen, Stephen NAVFAC NW, PRB112
Cc: Cellucci, Carlotta CIV NAVFAC NW, EV31
Subject: RE: 16-EP100-KEY-MTR CYCLE TRAINING AREA

Status please.

r/

Brian K. Cullen
Engineering Tech
NBK-Outage Coordinator
NBK-COR/COT/PAR
Public Works Dept.
FMFS PRB23
brian.cullen@navy.mil
O: 360-396-4445
C: 360-531-3997
F: 360-396-4090

Send your permit requests to:
nbkbangpwdrequests@navy.mil
or call 360-396-4030 for Emergencies

-----Original Message-----
From: Robinson, Carl M CIV NAVFAC NW, PRB23
Sent: Friday, August 19, 2016 11:30 AM
To: 'Brown, Rod F CIV Navy Region NW, N61 (rod.brown@navy.mil)'; Gardner, James D CIV Navy Region NW, N61; 'Potter, Keith K CIV Navy Region NW, N61 (keith.potter1@navy.mil)'; Beste, Duane P (Phil) CIV NAVSEA KPWA; Fowler, Lee Anne M CIV NAVSEA KPWA; 'Neal, Erik J CIV NAVSEA KPWA- KYPT, 173'; Roadruck,

James Ray CTR NAVSEA, 1023; Swan, Brian E CIV NAVFAC NW, PRB325; Whalen, Stephen NAVFAC NW, PRB112
Cc: Cellucci, Carlotta CIV NAVFAC NW, EV31
Subject: 16-EP100-KEY-MTR CYCLE TRAINING AREA

Please process. Also please notice that the location map is located within the excavation permit request

Pardon me everyone. I sent the previous email off before attaching the correct document.

Carl M. Robinson
Engineering Technician/BOSC PAR
Public Works, Naval Base Kitsap
(360)315-6175 Desk
(360)396-4090 Fax
carl.robinson2@navy.mil

-----Original Message-----
From: Robinson, Carl M CIV NAVFAC NW, PRB23
Sent: Friday, August 19, 2016 11:26 AM
To: 'Brown, Rod F CIV Navy Region NW, N61 (rod.brown@navy.mil)'; Gardner, James D CIV Navy Region NW, N61; 'Potter, Keith K CIV Navy Region NW, N61 (keith.potter1@navy.mil)'; Beste, Duane P (Phil) CIV NAVSEA KPWA; Fowler, Lee Anne M CIV NAVSEA KPWA; 'Neal, Erik J CIV NAVSEA KPWA- KYPT, 173'; Roadruck, James Ray CTR NAVSEA, 1023; Swan, Brian E CIV NAVFAC NW, PRB325; Whalen, Stephen NAVFAC NW, PRB112
Cc: Cellucci, Carlotta CIV NAVFAC NW, EV31
Subject: FW: Dig Permit Request

Please process. Also please notice that the location map is located within the excavation permit request

Carl M. Robinson
Engineering Technician/BOSC PAR
Public Works, Naval Base Kitsap
(360)315-6175 Desk
(360)396-4090 Fax
carl.robinson2@navy.mil

-----Original Message-----
From: Cellucci, Carlotta CIV NAVFAC NW, EV31
Sent: Friday, August 19, 2016 9:46 AM
To: Cullen, Brian K CIV NAVFAC NW, PRB23; NBK Bang PWD Requests
Subject: Dig Permit Request

Hi All,

Please let me know if the attached dig permit can be approved before Thursday, August 25.
Thank you,

C.

Carlotta Cellucci, R.G.
Remedial Project Manager
NAVFAC Northwest
(360) 396-1518 Office
(206) 595-6711 Cell

carlotta.cellucci@navy.mil

Those who can make you believe absurdities can make you commit atrocities.
-Voltaire

Appendix E

Daily Safe Work Assessment and Permit Forms
(Electronic format on CD)

Resolution Consultants
Daily Safe Work Assessment & Permit (SWAP)

This form must be filled out daily prior to work in the field and reviewed with all project personnel in a daily safety brief. The SWAP is to be completed before each work day to continually assess and communicate project-related hazards. Please have all SWAPs initialed by the Project Manager or Supervisor after returning from the field and place all completed SWAPs in the project file.

Section 1: Project Information

Project/Client Name: NAVY **SWAP Date/Time:** 0820 8/15/2016

Location of the Work: Keyport OU-2 **Project Number:**

Description of Work: MTP Sampling

Has a HASP been created for this job? ☑ Yes ☐ No **If Yes, has the HASP been reviewed prior to work?** ☑ Yes ☐ No

Section 2: Identify hazards associated with tasks and tools FOR THIS DAY:

Critical Safety Tasks are listed below: (If answered "Yes" please call H&S for additional guidance/checks)

	Yes	No		Yes	No
Performing work in Confined Spaces	☐	☑	Use of Respiratory Protection	☐	☑
Hazardous Chemical Exposure	☑	☐	Involvement with Lockout/Tagout Activities	☐	☑
Falls Greater than Six (6) Feet	☐	☑	Trenching or Excavation	☐	☑

List each task that presents hazards and identify controls you will take to minimize risk. If No hazards were identified, write NONE in the first Task box. All additional project personnel involved must initial the bottom of each task identified below signifying that they have reviewed this information. Use back of SWAP as necessary for General Safety and Precautions, and to add additional hazards.

Following is a non-inclusive list of potential hazards.

- Chemicals (inhalation, dermal)
- Biologic Hazards (poison ivy, ants, snakes)
- Potentially unsafe area or neighborhood
- Sampling around heavy equipment (backhoe bucket, Vac. Truck, etc.)
- Working around high noise (> 85 dBA)
- Activities that require coring or drilling
- Drilling around underground utilities
- Work with equipment around power lines
- Slick, uneven walking/working surfaces
- Climbing ladders / scaffolds
- Using gas or propane powered equipment in enclosed areas
- Work in extreme heat (> 104°F) or extreme cold (<30°F)
- Working around heavy equipment / traffic
- Power tools (hammer drills, auger, etc.)
- Working with lifting / hoisting equipment
- Vehicular traffic, fork lifts, scissors lifts
- Inclement weather (lightning, high winds)
- Work with ergonomic hazards (lifting hazards, twisting, excessive repetitive)
- Working in proximity to deep water > 3ft
- Remote location w/ limited communication

Task: Drilling
Hazards: Struck by, pinch points
Controls: Safety vests, clear communication

Task: Walking Around plantation
Hazards: slips, trips, falls
Controls: watch where you are stepping, no cellphones when walking

Task:
Hazards:
Controls:

Task:
Hazards:
Controls:

Section 3: Chemical Hazards and PPE:

Chemical Hazards

	Yes	No		Yes	No
Radiation or Other Contamination	☑	☐	Environmental Toxin	☐	☑
Flammable/Combustible Materials or Vapors (< 140° FP)	☐	☑	Reactive, Volatile or Explosive	☑	☐
RCRA Hazardous Materials (listed or characteristic)	☐	☑	Irritant or Sensitizer	☐	☑
Corrosive (pH >12.5 or < 2)	☐	☑	Oxidizer	☐	☑
Poison, Target Organ Toxin	☐	☑	Teratogen or Mutagen	☐	☑
Biological (mold, poison oak-ivy-sumac, etc.)	☑	☐	Carcinogen	☑	☐

Routes of Exposure:

	Yes	No		Yes	No
Inhalation	☑	☐	Ingestion (poor hygiene and work practice)	☐	☐
Skin (dermal absorp.) or Mucus Membranes (eyes, etc.)	☑	☐	Injection (rare)	☐	☑

Personal Protective Equipment (PPE) FOR THIS DAY

Level of Protection: ☐ A ☐ B ☐ C ☑ D

Respiratory Protection: ☐ None ☐ Full Face ☐ Half Face Cartridge Type: _____

Protective Clothing: ☐ Work Uniform ☐ Protective Suit: _____ ☐ High-Visibility Vest/Shirt

Gloves: ☐ Latex ☑ Nitrile ☐ Butyl ☐ PVC ☐ Neoprene ☐ Leather ☐ Other: _____

Footwear: ☑ Steel-Toe Leather ☐ Steel-Toe Rubber ☐ Other: _____

Eye/Face Protection: ☑ Safety Glasses ☐ Face Shield ☐ Chemical Goggles

Head Protection: ☑ Hard Hat ☐ Bump Cap ☐ Other: _____

Hearing Protection: ☐ Ear Plugs ☐ Muffs ☐ Combination (List) _____

Section 4: Emergency Contact Information

Name: Keyport Emergency	**Name:**
Number(s): (360) 369-2244	**Number(s):**
Name:	**Name:** Resolution Consultants Health and Safety – John Knopf
Number(s):	**Number(s):** 901-451-1464 (Cell) 901-937-4255 (Office)

Section 5: SWAP Review and Certification (All crew members and affected subcontractors)

Printed Name	Signature
Michael Running	
Clifford Letts IV	
Doug Mitnaul	
Elyssa Dixon	

THE LOCATION WHERE THE WORK IS TO BE DONE HAS BEEN EXAMINED AND NECESSARY PRECAUTIONS TAKEN FOR THE WORK.
I certify that the above listed project has been evaluated for hazards, protective measures assigned and communicated with all personnel on the jobsite. Changes in scope of work or work conditions may require the modification of existing SWAP or creation of a new SWAP.

Anthony Palmieri		DGR
SWAP Completed By: Print	**SWAP Completed By: Sign**	**PM Review (Initials)**

Contact H&S if you have any questions.

Resolution Consultants
Daily Safe Work Assessment & Permit (SWAP)

This form must be filled out daily prior to work in the field and reviewed with all project personnel in a daily safety brief. The SWAP is to be completed before each work day to continually assess and communicate project-related hazards. Please have all SWAPs initialed by the Project Manager or Supervisor after returning from the field and place all completed SWAPs in the project file.

Section 1: Project Information

Project/Client Name: Keyport OU-1 Site Rechracterization **SWAP Date/Time:** 8/16/2016 @ 0730

Location of the Work: South Plantation **Project Number:**

Description of Work: MIP borings

Has a HASP been created for this job? ☑ Yes ☐ No **If Yes, has the HASP been reviewed prior to work?** ☑ Yes ☐ No

Section 2: Identify hazards associated with tasks and tools FOR THIS DAY:

Critical Safety Tasks are listed below: (If answered "Yes" please call H&S for additional guidance/checks)

	Yes	No		Yes	No
Performing work in Confined Spaces	☐	☑	Use of Respiratory Protection	☐	☑
Hazardous Chemical Exposure	☑	☐	Involvement with Lockout/Tagout Activities	☐	☑
Falls Greater than Six (6) Feet	☐	☑	Trenching or Excavation	☐	☑

List each task that presents hazards and identify controls you will take to minimize risk. If No hazards were identified, write NONE in the first Task box. All additional project personnel involved must initial the bottom of each task identified below signifying that they have reviewed this information. Use back of SWAP as necessary for General Safety and Precautions, and to add additional hazards.

Following is a non-inclusive list of potential hazards.

- Chemicals (inhalation, dermal)
- Biologic Hazards (poison ivy, ants, snakes)
- Potentially unsafe area or neighborhood
- Sampling around heavy equipment (backhoe bucket, Vac. Truck, etc.)
- Working around high noise (> 85 dBA)
- Activities that require coring or drilling
- Drilling around underground utilities
- Work with equipment around power lines
- Slick, uneven walking/working surfaces
- Climbing ladders / scaffolds
- Using gas or propane powered equipment in enclosed areas
- Work in extreme heat (> 104°F) or extreme cold (<30°F)
- Working around heavy equipment / traffic
- Power tools (hammer drills, auger, etc.)
- Working with lifting / hoisting equipment
- Vehicular traffic, fork lifts, scissors lifts
- Inclement weather (lightning, high winds)
- Work with ergonomic hazards (lifting hazards, twisting, excessive repetitive)
- Working in proximity to deep water > 3ft
- Remote location w/ limited communication

Task: MIP borings installation
Hazards: struck by, pinch points,
Controls: high vis. clothing, clear communication

Task: walking around the plantation
Hazards: slips, trips, falls, biological hazards (yellow jackets)
Controls:

Task:
Hazards:
Controls:

Task:
Hazards:
Controls:

Section 3: Chemical Hazards and PPE:

Chemical Hazards

	Yes	No		Yes	No
Radiation or Other Contamination	☐	☐	Environmental Toxin	☐	☐
Flammable/Combustible Materials or Vapors (< 140° FP)	☐	☐	Reactive, Volatile or Explosive	☐	☐
RCRA Hazardous Materials (listed or characteristic)	☐	☐	Irritant or Sensitizer	☐	☐
Corrosive (pH >12.5 or < 2)	☐	☐	Oxidizer	☐	☐
Poison, Target Organ Toxin	☐	☐	Teratogen or Mutagen	☐	☐
Biological (mold, poison oak-ivy-sumac, etc.) - bees	☐	☐	Carcinogen	☐	☐

Routes of Exposure:

	Yes	No		Yes	No
Inhalation	☐	☐	Ingestion (poor hygiene and work practice)	☐	☐
Skin (dermal absorp.) or Mucus Membranes (eyes, etc.)	☐	☐	Injection (rare)	☐	☐

Personal Protective Equipment (PPE) FOR THIS DAY

Level of Protection: ☐ A ☐ B ☐ C ☐ D

Respiratory Protection: ☐ None ☐ Full Face ☐ Half Face Cartridge Type: _____

Protective Clothing: ☐ Work Uniform ☐ Protective Suit: _____ ☐ High-Visibility Vest/Shirt

Gloves: ☐ Latex ☐ Nitrile ☐ Butyl ☐ PVC ☐ Neoprene ☐ Leather ☐ Other: _____

Footwear: ☐ Steel-Toe Leather ☐ Steel-Toe Rubber ☐ Other: _____

Eye/Face Protection: ☐ Safety Glasses ☐ Face Shield ☐ Chemical Goggles

Head Protection: ☐ Hard Hat ☐ Bump Cap ☐ Other: _____

Hearing Protection: ☐ Ear Plugs ☐ Muffs ☐ Combination (List) _____

Section 4: Emergency Contact Information

Name: Key Port Emergency	**Name:**
Number(s): (360) 396-2244	**Number(s):**
Name:	**Name:** Resolution Consultants Health and Safety – John Knopf
Number(s):	**Number(s):** 901-451-1464 (Cell) 901-937-4255 (Office)

Section 5: SWAP Review and Certification (All crew members and affected subcontractors)

Printed Name	Signature
Elyssa Dixon	Elyssa Dixon
Clifford Letts IV	Clifford L. Letts IV
Carlotta Cellucci	
Michael Running	
Day McEvoy	

THE LOCATION WHERE THE WORK IS TO BE DONE HAS BEEN EXAMINED AND NECESSARY PRECAUTIONS TAKEN FOR THE WORK.
I certify that the above listed project has been evaluated for hazards, protective measures assigned and communicated with all personnel on the jobsite. Changes in scope of work or work conditions may require the modification of existing SWAP or creation of a new SWAP.

Anthony Palmieri	Anthony Palmieri	DGR
SWAP Completed By: Print	**SWAP Completed By: Sign**	**PM Review (Initials)**

Contact H&S if you have any questions.

Resolution Consultants
Daily Safe Work Assessment & Permit (SWAP)

This form must be filled out daily prior to work in the field and reviewed with all project personnel in a daily safety brief. The SWAP is to be completed before each work day to continually assess and communicate project-related hazards. Please have all SWAPs initialed by the Project Manager or Supervisor after returning from the field and place all completed SWAPs in the project file.

Section 1: Project Information

Project/Client Name: Keyport OU-1 Site Recharacterization **SWAP Date/Time:** 8.17.2016

Location of the Work: South Plantation / Landfill **Project Number:**

Description of Work: MIP Soil Borings

Has a HASP been created for this job? ☐ Yes ☐ No **If Yes, has the HASP been reviewed prior to work?** ☐ Yes ☐ No

Section 2: Identify hazards associated with tasks and tools FOR THIS DAY:

Critical Safety Tasks are listed below: (If answered "Yes" please call H&S for additional guidance/checks)

	Yes	No		Yes	No
Performing work in Confined Spaces	☐	☒	Use of Respiratory Protection	☐	☒
Hazardous Chemical Exposure	☒	☐	Involvement with Lockout/Tagout Activities	☐	☒
Falls Greater than Six (6) Feet	☐	☒	Trenching or Excavation	☐	☒

List each task that presents hazards and identify controls you will take to minimize risk. If No hazards were identified, write NONE in the first Task box. All additional project personnel involved must initial the bottom of each task identified below signifying that they have reviewed this information. Use back of SWAP as necessary for General Safety and Precautions, and to add additional hazards.

Following is a non-inclusive list of potential hazards.

- Chemicals (inhalation, dermal)
- Biologic Hazards (poison ivy, ants, snakes)
- Potentially unsafe area or neighborhood
- Sampling around heavy equipment (backhoe bucket, Vac. Truck, etc.)
- Working around high noise (> 85 dBA)
- Activities that require coring or drilling
- Drilling around underground utilities
- Work with equipment around power lines
- Slick, uneven walking/working surfaces
- Climbing ladders / scaffolds
- Using gas or propane powered equipment in enclosed areas
- Work in extreme heat (> 104^{0}F) or extreme cold (<30^{0}F)
- Working around heavy equipment / traffic
- Power tools (hammer drills, auger, etc.)
- Working with lifting / hoisting equipment
- Vehicular traffic, fork lifts, scissors lifts
- Inclement weather (lightning, high winds)
- Work with ergonomic hazards (lifting hazards, twisting, excessive repetitive)
- Working in proximity to deep water > 3ft
- Remote location w/ limited communication

Task: MIP Installation

Hazards: Drilling → struck by, pinch points,

Controls: high vis. vests, clear communication

Task: Walking around landfill

Hazards: Slips, trips, falls

Controls: Care while walking, NO cellphone use will walking.

Task:

Hazards:

Controls:

Task:

Hazards:

Controls:

Section 3: Chemical Hazards and PPE:

Chemical Hazards

	Yes	No		Yes	No
Radiation or Other Contamination	☑	☐	Environmental Toxin	☐	☑
Flammable/Combustible Materials or Vapors (< 140° FP)	☐	☑	Reactive, Volatile or Explosive	☐	☑
RCRA Hazardous Materials (listed or characteristic)	☐	☑	Irritant or Sensitizer	☐	☑
Corrosive (pH >12.5 or < 2)	☐	☑	Oxidizer	☐	☑
Poison, Target Organ Toxin	☐	☑	Teratogen or Mutagen	☐	☑
Biological (mold, poison oak-ivy-sumac, etc.)	☑	☐	Carcinogen	☑	☐

Routes of Exposure:

	Yes	No		Yes	No
Inhalation	☑	☐	Ingestion (poor hygiene and work practice)	☑	☐
Skin (dermal absorp.) or Mucus Membranes (eyes, etc.)	☑	☐	Injection (rare)	☐	☑

Personal Protective Equipment (PPE) FOR THIS DAY

Level of Protection: ☐ A ☐ B ☐ C ☑ D

Respiratory Protection: ☑ None ☐ Full Face ☐ Half Face Cartridge Type: _____

Protective Clothing: ☐ Work Uniform ☐ Protective Suit: _____ ☑ High-Visibility Vest/Shirt

Gloves: ☐ Latex ☑ Nitrile ☐ Butyl ☐ PVC ☐ Neoprene ☐ Leather ☐ Other: _____

Footwear: ☑ Steel-Toe Leather ☐ Steel-Toe Rubber ☐ Other: _____

Eye/Face Protection: ☑ Safety Glasses ☐ Face Shield ☐ Chemical Goggles

Head Protection: ☑ Hard Hat ☐ Bump Cap ☐ Other: _____

Hearing Protection: ☑ Ear Plugs ☐ Muffs ☐ Combination (List) _____

Section 4: Emergency Contact Information

Name: Keyport Emergency	**Name:**
Number(s):	**Number(s):**
Name:	**Name:** Resolution Consultants Health and Safety – John Knopf
Number(s):	**Number(s):** 901-451-1464 (Cell) 901-937-4255 (Office)

Section 5: SWAP Review and Certification (All crew members and affected subcontractors)

Printed Name	Signature
Dan Bunnell	
Clifford Edward Letts III	
Carlotta Cellucci	
Elyssa Dixon	
Michael Running	

THE LOCATION WHERE THE WORK IS TO BE DONE HAS BEEN EXAMINED AND NECESSARY PRECAUTIONS TAKEN FOR THE WORK.

I certify that the above listed project has been evaluated for hazards, protective measures assigned and communicated with all personnel on the jobsite. Changes in scope of work or work conditions may require the modification of existing SWAP or creation of a new SWAP.

Anthony Palmieri		DGR
SWAP Completed By: Print	**SWAP Completed By: Sign**	**PM Review (Initials)**

Contact H&S if you have any questions.

Resolution Consultants
Daily Safe Work Assessment & Permit (SWAP)

This form must be filled out daily prior to work in the field and reviewed with all project personnel in a daily safety brief. The SWAP is to be completed before each work day to continually assess and communicate project-related hazards. Please have all SWAPs initialed by the Project Manager or Supervisor after returning from the field and place all completed SWAPs in the project file.

Section 1: Project Information

Project/Client Name: _____ **SWAP Date/Time:** 8.18.2016 0715

Location of the Work: South Plantation **Project Number:** _____

Description of Work: MIP Soil Borings

Has a HASP been created for this job? ☑ Yes ☐ No **If Yes, has the HASP been reviewed prior to work?** ☑ Yes ☐ No

Section 2: Identify hazards associated with tasks and tools FOR THIS DAY:

Critical Safety Tasks are listed below: (If answered "Yes" please call H&S for additional guidance/checks)

	Yes	No		Yes	No
Performing work in Confined Spaces	☐	☑	Use of Respiratory Protection	☐	☑
Hazardous Chemical Exposure	☑	☐	Involvement with Lockout/Tagout Activities	☐	☑
Falls Greater than Six (6) Feet	☐	☑	Trenching or Excavation	☐	☑

List each task that presents hazards and identify controls you will take to minimize risk. If No hazards were identified, write NONE in the first Task box. All additional project personnel involved must initial the bottom of each task identified below signifying that they have reviewed this information. Use back of SWAP as necessary for General Safety and Precautions, and to add additional hazards.

Following is a non-inclusive list of potential hazards.

- Chemicals (inhalation, dermal)
- Biologic Hazards (poison ivy, ants, snakes)
- Potentially unsafe area or neighborhood
- Sampling around heavy equipment (backhoe bucket, Vac. Truck, etc.)
- Working around high noise (> 85 dBA)
- Activities that require coring or drilling
- Drilling around underground utilities
- Work with equipment around power lines
- Slick, uneven walking/working surfaces
- Climbing ladders / scaffolds
- Using gas or propane powered equipment in enclosed areas
- Work in extreme heat (> 104°F) or extreme cold (<30°F)
- Working around heavy equipment / traffic
- Power tools (hammer drills, auger, etc.)
- Working with lifting / hoisting equipment
- Vehicular traffic, fork lifts, scissors lifts
- Inclement weather (lightning, high winds)
- Work with ergonomic hazards (lifting hazards, twisting, excessive repetitive)
- Working in proximity to deep water > 3ft
- Remote location w/ limited communication

Task: MIP work

Hazards: Struck by, pinch points, hearing

Controls: high vis. vest, clear communication, hearing protection

Task: Walking around the site

Hazards: ~~PAYATH~~ slips, trips, and falls

Controls: pay attention to where you are walking, no cellphone use while walking

Task: _____

Hazards: _____

Controls: _____

Task: _____

Hazards: _____

Controls: _____

Section 3: Chemical Hazards and PPE:

Chemical Hazards

	Yes	No		Yes	No
Radiation or Other Contamination	☑	☐	Environmental Toxin	☐	☑
Flammable/Combustible Materials or Vapors (< 140° FP)	☐	☑	Reactive, Volatile or Explosive	☐	☑
RCRA Hazardous Materials (listed or characteristic)	☑	☐	Irritant or Sensitizer	☐	☑
Corrosive (pH >12.5 or < 2)	☐	☑	Oxidizer	☐	☑
Poison, Target Organ Toxin	☐	☑	Teratogen or Mutagen	☐	☑
Biological (mold, poison oak-ivy-sumac, etc.) - bees	☑	☐	Carcinogen	☐	☑

Routes of Exposure:

	Yes	No		Yes	No
Inhalation	☑	☐	Ingestion (poor hygiene and work practice)	☑	☐
Skin (dermal absorp.) or Mucus Membranes (eyes, etc.)	☑	☐	Injection (rare)	☐	☑

Personal Protective Equipment (PPE) FOR THIS DAY

Level of Protection:	☐ A ☐ B	☐ C	☑ D	
Respiratory Protection:	☑ None ☐ Full Face	☐ Half Face	Cartridge Type: _____	
Protective Clothing:	☐ Work Uniform	☐ Protective Suit: _____	☑ High-Visibility Vest/Shirt	
Gloves:	☐ Latex ☑ Nitrile	☐ Butyl ☐ PVC	☐ Neoprene ☐ Leather	☐ Other: _____
Footwear:	☑ Steel-Toe Leather	☐ Steel-Toe Rubber	☐ Other: _____	
Eye/Face Protection:	☑ Safety Glasses	☐ Face Shield	☐ Chemical Goggles	
Head Protection:	☑ Hard Hat	☐ Bump Cap	☐ Other: _____	
Hearing Protection:	☑ Ear Plugs	☐ Muffs	☐ Combination (List) _____	

Section 4: Emergency Contact Information

Name:	**Name:**
Number(s):	**Number(s):**
Name:	**Name: Resolution Consultants Health and Safety – John Knopf**
Number(s):	**Number(s): 901-451-1464 (Cell) 901-937-4255 (Office)**

Section 5: SWAP Review and Certification (All crew members and affected subcontractors)

Printed Name	Signature
Michael Running	
Clifford Edward Letts IV	
Elyssa Dixon	
Doug McInnis	

THE LOCATION WHERE THE WORK IS TO BE DONE HAS BEEN EXAMINED AND NECESSARY PRECAUTIONS TAKEN FOR THE WORK.
I certify that the above listed project has been evaluated for hazards, protective measures assigned and communicated with all personnel on the jobsite. Changes in scope of work or work conditions may require the modification of existing SWAP or creation of a new SWAP.

Anthony Palmieri		DWR
SWAP Completed By: Print	**SWAP Completed By: Sign**	**PM Review (Initials)**

Contact H&S if you have any questions.

Resolution Consultants
Daily Safe Work Assessment & Permit (SWAP)

This form must be filled out daily prior to work in the field and reviewed with all project personnel in a daily safety brief. The SWAP is to be completed before each work day to continually assess and communicate project-related hazards. Please have all SWAPs initialed by the Project Manager or Supervisor after returning from the field and place all completed SWAPs in the project file.

Section 1: Project Information

Project/Client Name: OU1 Phase II Site Recharacterization **SWAP Date/Time:** 8/22/16

Location of the Work: Keyport, WA **Project Number:**

Description of Work: MIP borings

Has a HASP been created for this job? ☒ Yes ☐ No **If Yes, has the HASP been reviewed prior to work?** ☒ Yes ☐ No

Section 2: Identify hazards associated with tasks and tools FOR THIS DAY:

Critical Safety Tasks are listed below: (If answered "Yes" please call H&S for additional guidance/checks)

	Yes	No		Yes	No
Performing work in Confined Spaces	☐	☒	Use of Respiratory Protection	☐	☒
Hazardous Chemical Exposure	☐	☒	Involvement with Lockout/Tagout Activities	☐	☒
Falls Greater than Six (6) Feet	☐	☒	Trenching or Excavation	☐	☒

List each task that presents hazards and identify controls you will take to minimize risk. If No hazards were identified, write NONE in the first Task box. All additional project personnel involved must initial the bottom of each task identified below signifying that they have reviewed this information. Use back of SWAP as necessary for General Safety and Precautions, and to add additional hazards.

Following is a non-inclusive list of potential hazards.

- Chemicals (inhalation, dermal)
- Biologic Hazards (poison ivy, ants, snakes)
- Potentially unsafe area or neighborhood
- Sampling around heavy equipment (backhoe bucket, Vac. Truck, etc.)
- Working around high noise (> 85 dBA)
- Activities that require coring or drilling
- Drilling around underground utilities
- Work with equipment around power lines
- Slick, uneven walking/working surfaces
- Climbing ladders / scaffolds
- Using gas or propane powered equipment in enclosed areas
- Work in extreme heat (> 104^{0}F) or extreme cold (<30^{0}F)
- Working around heavy equipment / traffic
- Power tools (hammer drills, auger, etc.)
- Working with lifting / hoisting equipment
- Vehicular traffic, fork lifts, scissors lifts
- Inclement weather (lightning, high winds)
- Work with ergonomic hazards (lifting hazards, twisting, excessive repetitive)
- Working in proximity to deep water > 3ft
- Remote location w/ limited communication

Task: Drilling
Hazards: Struck by, pinch points, overhead, noise
Controls: safety vests, hard hats, hearing protection, communication

Task: Walking around plantation
Hazards: slips, trips, falls; biological
Controls: watch where walking, sturdy boots, no walking/talking cell phones

Task:
Hazards:
Controls:

Task:
Hazards:
Controls:

Section 3: Chemical Hazards and PPE:

Chemical Hazards

	Yes	No		Yes	No
Radiation or Other Contamination	☒	☒	Environmental Toxin	☐	☒
Flammable/Combustible Materials or Vapors (< 140° FP)	☐	☒	Reactive, Volatile or Explosive	☐	☒
RCRA Hazardous Materials (listed or characteristic)	☐	☒	Irritant or Sensitizer	☐	☒
Corrosive (pH >12.5 or < 2)	☐	☒	Oxidizer	☐	☒
Poison, Target Organ Toxin	☐	☒	Teratogen or Mutagen	☐	☒
Biological (mold, poison oak-ivy-sumac, etc.)	☒	☐	Carcinogen	☒	☐

Routes of Exposure:

	Yes	No		Yes	No
Inhalation	☐	☒	Ingestion (poor hygiene and work practice)	☒	☐
Skin (dermal absorp.) or Mucus Membranes (eyes, etc.)	☒	☐	Injection (rare)	☐	☒

Personal Protective Equipment (PPE) FOR THIS DAY

Level of Protection: ☐ A ☐ B ☐ C ☒ D

Respiratory Protection: ☒ None ☐ Full Face ☐ Half Face Cartridge Type: _____

Protective Clothing: ☐ Work Uniform ☐ Protective Suit: _____ ☒ High-Visibility Vest/Shirt

Gloves: ☐ Latex ☒ Nitrile ☐ Butyl ☐ PVC ☐ Neoprene ☐ Leather ☐ Other: _____

Footwear: ☒ Steel-Toe Leather ☐ Steel-Toe Rubber ☐ Other: _____

Eye/Face Protection: ☒ Safety Glasses ☐ Face Shield ☐ Chemical Goggles

Head Protection: ☒ Hard Hat ☐ Bump Cap ☐ Other: _____

Hearing Protection: ☒ Ear Plugs ☐ Muffs ☐ Combination (List) _____

Section 4: Emergency Contact Information

Name: Keyport Emergency	**Name:**
Number(s): (360) 369-2244	**Number(s):**
Name:	**Name:** Resolution Consultants Health and Safety – John Knopf
Number(s):	**Number(s):** 901-451-1464 (Cell) 901-937-4255 (Office)

Section 5: SWAP Review and Certification (All crew members and affected subcontractors)

Printed Name	Signature
Don McInnis	
Michael Running	
Clifford Letts IV	

THE LOCATION WHERE THE WORK IS TO BE DONE HAS BEEN EXAMINED AND NECESSARY PRECAUTIONS TAKEN FOR THE WORK.
I certify that the above listed project has been evaluated for hazards, protective measures assigned and communicated with all personnel on the jobsite. Changes in scope of work or work conditions may require the modification of existing SWAP or creation of a new SWAP.

Elyssa Dixon	Elyssa Dixon	DWR
SWAP Completed By: Print	**SWAP Completed By: Sign**	**PM Review (Initials)**

Contact H&S if you have any questions.

Resolution Consultants
Daily Safe Work Assessment & Permit (SWAP)

This form must be filled out daily prior to work in the field and reviewed with all project personnel in a daily safety brief. The SWAP is to be completed before each work day to continually assess and communicate project-related hazards. Please have all SWAPs initialed by the Project Manager or Supervisor after returning from the field and place all completed SWAPs in the project file.

Section 1: Project Information

Project/Client Name: OU1 Site Recharacterization **SWAP Date/Time:** 8/23/16

Location of the Work: Keyport, WA **Project Number:**

Description of Work: Drilling

Has a HASP been created for this job? ☐ Yes ☐ No **If Yes, has the HASP been reviewed prior to work?** ☐ Yes ☐ No

Section 2: Identify hazards associated with tasks and tools FOR THIS DAY:

Critical Safety Tasks are listed below: (If answered "Yes" please call H&S for additional guidance/checks)

	Yes	No		Yes	No
Performing work in Confined Spaces	☐	☒	Use of Respiratory Protection	☐	☒
Hazardous Chemical Exposure	☒	☐	Involvement with Lockout/Tagout Activities	☐	☒
Falls Greater than Six (6) Feet	☐	☒	Trenching or Excavation	☐	☒

List each task that presents hazards and identify controls you will take to minimize risk. If No hazards were identified, write NONE in the first Task box. All additional project personnel involved must initial the bottom of each task identified below signifying that they have reviewed this information. Use back of SWAP as necessary for General Safety and Precautions, and to add additional hazards.

Following is a non-inclusive list of potential hazards.

- Chemicals (inhalation, dermal)
- Biologic Hazards (poison ivy, ants, snakes)
- Potentially unsafe area or neighborhood
- Sampling around heavy equipment (backhoe bucket, Vac. Truck, etc.)
- Working around high noise (> 85 dBA)
- Activities that require coring or drilling
- Drilling around underground utilities
- Work with equipment around power lines
- Slick, uneven walking/working surfaces
- Climbing ladders / scaffolds
- Using gas or propane powered equipment in enclosed areas
- Work in extreme heat (> 104°F) or extreme cold (<30°F)
- Working around heavy equipment / traffic
- Power tools (hammer drills, auger, etc.)
- Working with lifting / hoisting equipment
- Vehicular traffic, fork lifts, scissors lifts
- Inclement weather (lightning, high winds)
- Work with ergonomic hazards (lifting hazards, twisting, excessive repetitive)
- Working in proximity to deep water > 3ft
- Remote location w/ limited communication

Task: Drilling
Hazards: Struck by, pinch points, overhead; hearing/noise
Controls: Safety vest, glasses, hard hat, communication, hearing protection

Task: Walking around site
Hazards: Slips, trips, falls; biological;
Controls: Walk carefully, sturdy shoes, no walking/talking cell phone

Task: Work
Hazards: Heat Stress
Controls: Shade, water, sunscreen

Task:
Hazards:
Controls:

Section 3: Chemical Hazards and PPE:

Chemical Hazards

	Yes	No		Yes	No
Radiation or Other Contamination	☒	☐	Environmental Toxin	☒	☐
Flammable/Combustible Materials or Vapors (< 140^0 FP)	☐	☒	Reactive, Volatile or Explosive	☒	☐
RCRA Hazardous Materials (listed or characteristic)	☐	☒	Irritant or Sensitizer	☐	☒
Corrosive (pH >12.5 or < 2)	☐	☒	Oxidizer	☐	☒
Poison, Target Organ Toxin	☐	☒	Teratogen or Mutagen	☐	☒
Biological (mold, poison oak-ivy-sumac, etc.)	☒	☐	Carcinogen	☒	☐

Routes of Exposure:

	Yes	No		Yes	No
Inhalation	☐	☒	Ingestion (poor hygiene and work practice)	☒	☐
Skin (dermal absorp.) or Mucus Membranes (eyes, etc.)	☒	☐	Injection (rare)	☐	☒

Personal Protective Equipment (PPE) FOR THIS DAY

Level of Protection: ☐ A ☐ B ☐ C ☒ D

Respiratory Protection: ☒ None ☐ Full Face ☐ Half Face Cartridge Type: _____

Protective Clothing: ☐ Work Uniform ☐ Protective Suit: _____ ☒ High-Visibility Vest/Shirt

Gloves: ☐ Latex ☒ Nitrile ☐ Butyl ☐ PVC ☐ Neoprene ☐ Leather ☐ Other: _____

Footwear: ☒ Steel-Toe Leather ☐ Steel-Toe Rubber ☐ Other: _____

Eye/Face Protection: ☒ Safety Glasses ☐ Face Shield ☐ Chemical Goggles

Head Protection: ☒ Hard Hat ☐ Bump Cap ☐ Other: _____

Hearing Protection: ☒ Ear Plugs ☐ Muffs ☐ Combination (List) _____

Section 4: Emergency Contact Information

Name: Keyport Emergency	**Name:**
Number(s): 360-396-2244	**Number(s):**
Name:	**Name:** Resolution Consultants Health and Safety – John Knopf
Number(s):	**Number(s):** 901-451-1464 (Cell) 901-937-4255 (Office)

Section 5: SWAP Review and Certification (All crew members and affected subcontractors)

Printed Name	Signature
Dou McInnel	[signature]
Michael Runnins	[signature]
Clifford Letts	[signature]

THE LOCATION WHERE THE WORK IS TO BE DONE HAS BEEN EXAMINED AND NECESSARY PRECAUTIONS TAKEN FOR THE WORK.
I certify that the above listed project has been evaluated for hazards, protective measures assigned and communicated with all personnel on the jobsite. Changes in scope of work or work conditions may require the modification of existing SWAP or creation of a new SWAP.

Elyssa Dixon	Elyssa Dixon	DLR
SWAP Completed By: Print	**SWAP Completed By: Sign**	**PM Review (Initials)**

Contact H&S if you have any questions.

Resolution Consultants
Daily Safe Work Assessment & Permit (SWAP)

This form must be filled out daily prior to work in the field and reviewed with all project personnel in a daily safety brief. The SWAP is to be completed before each work day to continually assess and communicate project-related hazards. Please have all SWAPs initialed by the Project Manager or Supervisor after returning from the field and place all completed SWAPs in the project file.

Section 1: Project Information

Project/Client Name: Out Phase II Site Recharacterization **SWAP Date/Time:** 8/24/16

Location of the Work: Keyport, WA **Project Number:**

Description of Work: MIP Drilling

Has a HASP been created for this job? ☒ Yes ☐ No **If Yes, has the HASP been reviewed prior to work?** ☒ Yes ☐ No

Section 2: Identify hazards associated with tasks and tools FOR THIS DAY:

Critical Safety Tasks are listed below: (If answered "Yes" please call H&S for additional guidance/checks)

	Yes	No		Yes	No
Performing work in Confined Spaces	☐	☒	Use of Respiratory Protection	☐	☒
Hazardous Chemical Exposure	☒	☐	Involvement with Lockout/Tagout Activities	☐	☒
Falls Greater than Six (6) Feet	☐	☒	Trenching or Excavation	☐	☒

List each task that presents hazards and identify controls you will take to minimize risk. If No hazards were identified, write NONE in the first Task box. All additional project personnel involved must initial the bottom of each task identified below signifying that they have reviewed this information. Use back of SWAP as necessary for General Safety and Precautions, and to add additional hazards.

Following is a non-inclusive list of potential hazards.

- Chemicals (inhalation, dermal)
- Biologic Hazards (poison ivy, ants, snakes)
- Potentially unsafe area or neighborhood
- Sampling around heavy equipment (backhoe bucket, Vac. Truck, etc.)
- Working around high noise (> 85 dBA)
- Activities that require coring or drilling
- Drilling around underground utilities
- Work with equipment around power lines
- Slick, uneven walking/working surfaces
- Climbing ladders / scaffolds
- Using gas or propane powered equipment in enclosed areas
- Work in extreme heat (> 104°F) or extreme cold (<30°F)
- Working around heavy equipment / traffic
- Power tools (hammer drills, auger, etc.)
- Working with lifting / hoisting equipment
- Vehicular traffic, fork lifts, scissors lifts
- Inclement weather (lightning, high winds)
- Work with ergonomic hazards (lifting hazards, twisting, excessive repetitive)
- Working in proximity to deep water > 3ft
- Remote location w/ limited communication

Task: Drilling
Hazards: Struck by, pinch points, noise
Controls: Wear appropriate PPE, communicate

Task: Walk around site
Hazards: Slips, trips, falls; biological; heat
Controls: PPE, don't walk/talk cell phone, water/shade/sunscreen

Task: Pulling up probe
Hazards: Chemical
Controls: Don't touch face, wash hands before eating, gloves

Task:
Hazards:
Controls:

Section 3: Chemical Hazards and PPE:

Chemical Hazards

	Yes	No		Yes	No
Radiation or Other Contamination	☒	☐	Environmental Toxin	☒	☐
Flammable/Combustible Materials or Vapors (< 140° FP)	☐	☒	Reactive, Volatile or Explosive	☒	☐
RCRA Hazardous Materials (listed or characteristic)	☐	☒	Irritant or Sensitizer	☐	☒
Corrosive (pH >12.5 or < 2)	☐	☒	Oxidizer	☐	☒
Poison, Target Organ Toxin	☐	☒	Teratogen or Mutagen	☐	☒
Biological (mold, poison oak-ivy-sumac, etc.)	☒	☐	Carcinogen	☒	☐

Routes of Exposure:

	Yes	No		Yes	No
Inhalation	☐	☒	Ingestion (poor hygiene and work practice)	☒	☐
Skin (dermal absorp.) or Mucus Membranes (eyes, etc.)	☒	☐	Injection (rare)	☐	☒

Personal Protective Equipment (PPE) FOR THIS DAY

Level of Protection: ☐ A ☐ B ☐ C ☒ D

Respiratory Protection: ☒ None ☐ Full Face ☐ Half Face Cartridge Type: _____

Protective Clothing: ☐ Work Uniform ☐ Protective Suit: _____ ☒ High-Visibility Vest/Shirt

Gloves: ☐ Latex ☒ Nitrile ☐ Butyl ☐ PVC ☐ Neoprene ☐ Leather ☐ Other: _____

Footwear: ☒ Steel-Toe Leather ☐ Steel-Toe Rubber ☐ Other: _____

Eye/Face Protection: ☒ Safety Glasses ☐ Face Shield ☐ Chemical Goggles

Head Protection: ☒ Hard Hat ☐ Bump Cap ☐ Other: _____

Hearing Protection: ☒ Ear Plugs ☐ Muffs ☐ Combination (List) _____

Section 4: Emergency Contact Information

Name: Keyport Emergency	**Name:**
Number(s): 360-396-2244	**Number(s):**
Name:	**Name:** Resolution Consultants Health and Safety – John Knopf
Number(s):	**Number(s):** 901-451-1464 (Cell) 901-937-4255 (Office)

Section 5: SWAP Review and Certification (All crew members and affected subcontractors)

Printed Name	Signature
Doug McGarry	
Michael Running	
Clifford Letts	

THE LOCATION WHERE THE WORK IS TO BE DONE HAS BEEN EXAMINED AND NECESSARY PRECAUTIONS TAKEN FOR THE WORK.
I certify that the above listed project has been evaluated for hazards, protective measures assigned and communicated with all personnel on the jobsite. Changes in scope of work or work conditions may require the modification of existing SWAP or creation of a new SWAP.

Elyssa Dixon	Elyssa Dixon	~~8/24~~ DLR
SWAP Completed By: Print	**SWAP Completed By: Sign**	**PM Review (Initials)**

Contact H&S if you have any questions.

Resolution Consultants
Daily Safe Work Assessment & Permit (SWAP)

This form must be filled out daily prior to work in the field and reviewed with all project personnel in a daily safety brief. The SWAP is to be completed before each work day to continually assess and communicate project-related hazards. Please have all SWAPs initialed by the Project Manager or Supervisor after returning from the field and place all completed SWAPs in the project file.

Section 1: Project Information

Project/Client Name: Ort Phase II Site Recharacterization **SWAP Date/Time:** 8/25/16

Location of the Work: Keyport, WA **Project Number:**

Description of Work: MIP Drilling

Has a HASP been created for this job? ☒ Yes ☐ No **If Yes, has the HASP been reviewed prior to work?** ☒ Yes ☐ No

Section 2: Identify hazards associated with tasks and tools FOR THIS DAY:

Critical Safety Tasks are listed below: (If answered "Yes" please call H&S for additional guidance/checks)

	Yes	No		Yes	No
Performing work in Confined Spaces	☐	☒	Use of Respiratory Protection	☐	☒
Hazardous Chemical Exposure	☒	☐	Involvement with Lockout/Tagout Activities	☐	☒
Falls Greater than Six (6) Feet	☐	☒	Trenching or Excavation	☐	☒

List each task that presents hazards and identify controls you will take to minimize risk. If No hazards were identified, write NONE in the first Task box. All additional project personnel involved must initial the bottom of each task identified below signifying that they have reviewed this information. Use back of SWAP as necessary for General Safety and Precautions, and to add additional hazards.

Following is a non-inclusive list of potential hazards.

- Chemicals (inhalation, dermal)
- Biologic Hazards (poison ivy, ants, snakes)
- Potentially unsafe area or neighborhood
- Sampling around heavy equipment (backhoe bucket, Vac. Truck, etc.)
- Working around high noise (> 85 dBA)
- Activities that require coring or drilling
- Drilling around underground utilities
- Work with equipment around power lines
- Slick, uneven walking/working surfaces
- Climbing ladders / scaffolds
- Using gas or propane powered equipment in enclosed areas
- Work in extreme heat (> 104°F) or extreme cold (<30°F)
- Working around heavy equipment / traffic
- Power tools (hammer drills, auger, etc.)
- Working with lifting / hoisting equipment
- Vehicular traffic, fork lifts, scissors lifts
- Inclement weather (lightning, high winds)
- Work with ergonomic hazards (lifting hazards, twisting, excessive repetitive)
- Working in proximity to deep water > 3ft
- Remote location w/ limited communication

Task: Drilling
Hazards: Struck by, Pinch points, noise
Controls: Appropriate PPE, good communication

Task: Walking around site
Hazards: Slips, trips, falls, biological
Controls: Sturdy shoes, no walking/talking cell phone

Task: Work
Hazards: Heat stress
Controls: Water, sunscreen, shade

Task:
Hazards:
Controls:

Section 3: Chemical Hazards and PPE:

Chemical Hazards

	Yes	No		Yes	No
Radiation or Other Contamination	☒	☐	Environmental Toxin	☒	☐
Flammable/Combustible Materials or Vapors (< 140° FP)	☐	☒	Reactive, Volatile or Explosive	☐	☒
RCRA Hazardous Materials (listed or characteristic)	☐	☒	Irritant or Sensitizer	☐	☒
Corrosive (pH >12.5 or < 2)	☐	☒	Oxidizer	☐	☒
Poison, Target Organ Toxin	☐	☒	Teratogen or Mutagen	☐	☒
Biological (mold, poison oak-ivy-sumac, etc.)	☒	☐	Carcinogen	☒	☐

Routes of Exposure:

	Yes	No		Yes	No
Inhalation	☐	☒	Ingestion (poor hygiene and work practice)	☒	☐
Skin (dermal absorp.) or Mucus Membranes (eyes, etc.)	☒	☐	Injection (rare)	☐	☒

Personal Protective Equipment (PPE) FOR THIS DAY

Level of Protection: ☐ A ☐ B ☐ C ☒ D

Respiratory Protection: ☒ None ☐ Full Face ☐ Half Face Cartridge Type: _____

Protective Clothing: ☐ Work Uniform ☐ Protective Suit: _____ ☒ High-Visibility Vest/Shirt

Gloves: ☐ Latex ☒ Nitrile ☐ Butyl ☐ PVC ☐ Neoprene ☐ Leather ☐ Other: _____

Footwear: ☒ Steel-Toe Leather ☐ Steel-Toe Rubber ☐ Other: _____

Eye/Face Protection: ☒ Safety Glasses ☐ Face Shield ☐ Chemical Goggles

Head Protection: ☒ Hard Hat ☐ Bump Cap ☐ Other: _____

Hearing Protection: ☒ Ear Plugs ☐ Muffs ☐ Combination (List) _____

Section 4: Emergency Contact Information

Name: Keyport Emergency	**Name:**
Number(s): 360-396-2244	**Number(s):**
Name:	**Name:** Resolution Consultants Health and Safety – John Knopf
Number(s):	**Number(s):** 901-451-1464 (Cell) 901-937-4255 (Office)

Section 5: SWAP Review and Certification (All crew members and affected subcontractors)

Printed Name	Signature
Doug Mann	
Michael Running	
Clifford Letts	

THE LOCATION WHERE THE WORK IS TO BE DONE HAS BEEN EXAMINED AND NECESSARY PRECAUTIONS TAKEN FOR THE WORK.

I certify that the above listed project has been evaluated for hazards, protective measures assigned and communicated with all personnel on the jobsite. Changes in scope of work or work conditions may require the modification of existing SWAP or creation of a new SWAP.

Elyssa Dixon	Elyssa Dixon	DGR
SWAP Completed By: Print	**SWAP Completed By: Sign**	**PM Review (Initials)**

Contact H&S if you have any questions.

Resolution Consultants
Daily Safe Work Assessment & Permit (SWAP)

This form must be filled out daily prior to work in the field and reviewed with all project personnel in a daily safety brief. The SWAP is to be completed before each work day to continually assess and communicate project-related hazards. Please have all SWAPs initialed by the Project Manager or Supervisor after returning from the field and place all completed SWAPs in the project file.

Section 1: Project Information

Project/Client Name: OU1 Phase II Site Recharacterization **SWAP Date/Time:** 8/26/14

Location of the Work: Keyport, WA **Project Number:**

Description of Work: MIP Drilling

Has a HASP been created for this job? ☒ Yes ☐ No **If Yes, has the HASP been reviewed prior to work?** ☒ Yes ☐ No

Section 2: Identify hazards associated with tasks and tools FOR THIS DAY:

Critical Safety Tasks are listed below: (If answered "Yes" please call H&S for additional guidance/checks)

	Yes	No		Yes	No
Performing work in Confined Spaces	☐	☒	Use of Respiratory Protection	☐	☒
Hazardous Chemical Exposure	☒	☐	Involvement with Lockout/Tagout Activities	☐	☒
Falls Greater than Six (6) Feet	☐	☒	Trenching or Excavation	☐	☒

List each task that presents hazards and identify controls you will take to minimize risk. If No hazards were identified, write NONE in the first Task box. All additional project personnel involved must initial the bottom of each task identified below signifying that they have reviewed this information. Use back of SWAP as necessary for General Safety and Precautions, and to add additional hazards.

Following is a non-inclusive list of potential hazards.

- Chemicals (inhalation, dermal)
- Biologic Hazards (poison ivy, ants, snakes)
- Potentially unsafe area or neighborhood
- Sampling around heavy equipment (backhoe bucket, Vac. Truck, etc.)
- Working around high noise (> 85 dBA)
- Activities that require coring or drilling
- Drilling around underground utilities
- Work with equipment around power lines
- Slick, uneven walking/working surfaces
- Climbing ladders / scaffolds
- Using gas or propane powered equipment in enclosed areas
- Work in extreme heat (> 104°F) or extreme cold (<30°F)
- Working around heavy equipment / traffic
- Power tools (hammer drills, auger, etc.)
- Working with lifting / hoisting equipment
- Vehicular traffic, fork lifts, scissors lifts
- Inclement weather (lightning, high winds)
- Work with ergonomic hazards (lifting hazards, twisting, excessive repetitive)
- Working in proximity to deep water > 3ft
- Remote location w/ limited communication

Task: Drilling
Hazards: Struck by, pinch points, noise
Controls: Appropriate PPE, good communication

Task: Walking around site
Hazards: Slips, trips, falls; biological; heat stress
Controls: Sturdy shoes, no walk/talk cell phone, sunscreen, water, shade

Task:
Hazards:
Controls:

Task:
Hazards:
Controls:

Section 3: Chemical Hazards and PPE:

Chemical Hazards

	Yes	No		Yes	No
Radiation or Other Contamination	☒	☐	Environmental Toxin	☒	☐
Flammable/Combustible Materials or Vapors (< 140° FP)	☐	☒	Reactive, Volatile or Explosive	☐	☒
RCRA Hazardous Materials (listed or characteristic)	☐	☒	Irritant or Sensitizer	☐	☒
Corrosive (pH >12.5 or < 2)	☐	☒	Oxidizer	☐	☒
Poison, Target Organ Toxin	☐	☒	Teratogen or Mutagen	☐	☒
Biological (mold, poison oak-ivy-sumac, etc.)	☒	☐	Carcinogen	☒	☐

Routes of Exposure:

	Yes	No		Yes	No
Inhalation	☐	☒	Ingestion (poor hygiene and work practice)	☒	☐
Skin (dermal absorp.) or Mucus Membranes (eyes, etc.)	☒	☐	Injection (rare)	☐	☒

Personal Protective Equipment (PPE) FOR THIS DAY

Level of Protection: ☐ A ☐ B ☐ C ☒ D

Respiratory Protection: ☒ None ☐ Full Face ☐ Half Face Cartridge Type: _____

Protective Clothing: ☐ Work Uniform ☐ Protective Suit: _____ ☒ High-Visibility Vest/Shirt

Gloves: ☐ Latex ☒ Nitrile ☐ Butyl ☐ PVC ☐ Neoprene ☐ Leather ☐ Other: _____

Footwear: ☒ Steel-Toe Leather ☐ Steel-Toe Rubber ☐ Other: _____

Eye/Face Protection: ☒ Safety Glasses ☐ Face Shield ☐ Chemical Goggles

Head Protection: ☒ Hard Hat ☐ Bump Cap ☐ Other: _____

Hearing Protection: ☒ Ear Plugs ☐ Muffs ☐ Combination (List) _____

Section 4: Emergency Contact Information

Name: Keyport Emergency	**Name:**
Number(s): 360-396-2244	**Number(s):**
Name:	**Name:** Resolution Consultants Health and Safety – John Knopf
Number(s):	**Number(s):** 901-451-1464 (Cell) 901-937-4255 (Office)

Section 5: SWAP Review and Certification (All crew members and affected subcontractors)

Printed Name	Signature
Doug Mitry	
Michael Running	
Clifford Letts	

THE LOCATION WHERE THE WORK IS TO BE DONE HAS BEEN EXAMINED AND NECESSARY PRECAUTIONS TAKEN FOR THE WORK.

I certify that the above listed project has been evaluated for hazards, protective measures assigned and communicated with all personnel on the jobsite. Changes in scope of work or work conditions may require the modification of existing SWAP or creation of a new SWAP.

Elyssa Dixon	Elyssa Dixon	DHR
SWAP Completed By: Print	**SWAP Completed By: Sign**	**PM Review (Initials)**

Contact H&S if you have any questions.

Resolution Consultants
Daily Safe Work Assessment & Permit (SWAP)

This form must be filled out daily prior to work in the field and reviewed with all project personnel in a daily safety brief. The SWAP is to be completed before each work day to continually assess and communicate project-related hazards. Please have all SWAPs initialed by the Project Manager or Supervisor after returning from the field and place all completed SWAPs in the project file.

Section 1: Project Information

Project/Client Name: OU1 Phase II Site Recharacterization **SWAP Date/Time:** 8/27/16

Location of the Work: Keyport, WA **Project Number:**

Description of Work: MIP Drilling

Has a HASP been created for this job? ☐ Yes ☐ No **If Yes, has the HASP been reviewed prior to work?** ☐ Yes ☐ No

Section 2: Identify hazards associated with tasks and tools FOR THIS DAY:

Critical Safety Tasks are listed below: (If answered "Yes" please call H&S for additional guidance/checks)

	Yes	No		Yes	No
Performing work in Confined Spaces	☐	☒	Use of Respiratory Protection	☐	☒
Hazardous Chemical Exposure	☒	☐	Involvement with Lockout/Tagout Activities	☐	☒
Falls Greater than Six (6) Feet	☐	☒	Trenching or Excavation	☐	☒

List each task that presents hazards and identify controls you will take to minimize risk. If No hazards were identified, write NONE in the first Task box. All additional project personnel involved must initial the bottom of each task identified below signifying that they have reviewed this information. Use back of SWAP as necessary for General Safety and Precautions, and to add additional hazards.

Following is a non-inclusive list of potential hazards.

- Chemicals (inhalation, dermal)
- Biologic Hazards (poison ivy, ants, snakes)
- Potentially unsafe area or neighborhood
- Sampling around heavy equipment (backhoe bucket, Vac. Truck, etc.)
- Working around high noise (> 85 dBA)
- Activities that require coring or drilling
- Drilling around underground utilities
- Work with equipment around power lines
- Slick, uneven walking/working surfaces
- Climbing ladders / scaffolds
- Using gas or propane powered equipment in enclosed areas
- Work in extreme heat (> 104°F) or extreme cold (<30°F)
- Working around heavy equipment / traffic
- Power tools (hammer drills, auger, etc.)
- Working with lifting / hoisting equipment
- Vehicular traffic, fork lifts, scissors lifts
- Inclement weather (lightning, high winds)
- Work with ergonomic hazards (lifting hazards, twisting, excessive repetitive)
- Working in proximity to deep water > 3ft
- Remote location w/ limited communication

Task: Drilling
Hazards: Struck by, pinch points, noise
Controls: Appropriate PPE, communication

Task: Walking around site
Hazards: Slips, trips, falls, biological
Controls: Sturdy shoes, no walk/talk cell phone.

Task:
Hazards:
Controls:

Task:
Hazards:
Controls:

Section 3: Chemical Hazards and PPE:

Chemical Hazards

	Yes	No		Yes	No
Radiation or Other Contamination	☒	☐	Environmental Toxin	☒	☐
Flammable/Combustible Materials or Vapors (< 140° FP)	☐	☒	Reactive, Volatile or Explosive	☐	☒
RCRA Hazardous Materials (listed or characteristic)	☐	☒	Irritant or Sensitizer	☐	☒
Corrosive (pH >12.5 or < 2)	☐	☒	Oxidizer	☐	☒
Poison, Target Organ Toxin	☐	☒	Teratogen or Mutagen	☐	☒
Biological (mold, poison oak-ivy-sumac, etc.)	☒	☐	Carcinogen	☒	☐

Routes of Exposure:

	Yes	No		Yes	No
Inhalation	☐	☒	Ingestion (poor hygiene and work practice)	☒	☐
Skin (dermal absorp.) or Mucus Membranes (eyes, etc.)	☒	☐	Injection (rare)	☐	☒

Personal Protective Equipment (PPE) FOR THIS DAY

Level of Protection: ☐ A ☐ B ☐ C ☒ D

Respiratory Protection: ☒ None ☐ Full Face ☐ Half Face Cartridge Type: _____

Protective Clothing: ☐ Work Uniform ☐ Protective Suit: _____ ☒ High-Visibility Vest/Shirt

Gloves: ☐ Latex ☒ Nitrile ☐ Butyl ☐ PVC ☐ Neoprene ☐ Leather ☐ Other: _____

Footwear: ☒ Steel-Toe Leather ☐ Steel-Toe Rubber ☐ Other: _____

Eye/Face Protection: ☒ Safety Glasses ☐ Face Shield ☐ Chemical Goggles

Head Protection: ☒ Hard Hat ☐ Bump Cap ☐ Other: _____

Hearing Protection: ☐ Ear Plugs ☐ Muffs ☐ Combination (List) _____

Section 4: Emergency Contact Information

Name: Keyport Emergency	**Name:**
Number(s): 360 -	**Number(s):**
Name:	**Name:** Resolution Consultants Health and Safety – John Knopf
Number(s):	**Number(s):** 901-451-1464 (Cell) 901-937-4255 (Office)

Section 5: SWAP Review and Certification (All crew members and affected subcontractors)

Printed Name	Signature
Michael Running	
Doug Mi[illegible]	
Chuck L. Stell IV	

THE LOCATION WHERE THE WORK IS TO BE DONE HAS BEEN EXAMINED AND NECESSARY PRECAUTIONS TAKEN FOR THE WORK.
I certify that the above listed project has been evaluated for hazards, protective measures assigned and communicated with all personnel on the jobsite. Changes in scope of work or work conditions may require the modification of existing SWAP or creation of a new SWAP.

Elyssa Dixon	Elyssa Dixon	DLR
SWAP Completed By: Print	**SWAP Completed By: Sign**	**PM Review (Initials)**

Contact H&S if you have any questions.

Resolution Consultants
Daily Safe Work Assessment & Permit (SWAP)

This form must be filled out daily prior to work in the field and reviewed with all project personnel in a daily safety brief. The SWAP is to be completed before each work day to continually assess and communicate project-related hazards. Please have all SWAPs initialed by the Project Manager or Supervisor after returning from the field and place all completed SWAPs in the project file.

Section 1: Project Information

Project/Client Name: Oy's Phase II Site Recharacterization **SWAP Date/Time:** 8/30/16

Location of the Work: Keyport, WA **Project Number:**

Description of Work: MIP Drilling, Soil gas sampling

Has a HASP been created for this job? ☒ Yes ☐ No **If Yes, has the HASP been reviewed prior to work?** ☒ Yes ☐ No

Section 2: Identify hazards associated with tasks and tools FOR THIS DAY:

Critical Safety Tasks are listed below: (If answered "Yes" please call H&S for additional guidance/checks)

	Yes	No		Yes	No
Performing work in Confined Spaces	☐	☒	Use of Respiratory Protection	☐	☒
Hazardous Chemical Exposure	☒	☐	Involvement with Lockout/Tagout Activities	☐	☒
Falls Greater than Six (6) Feet	☐	☒	Trenching or Excavation	☐	☒

List each task that presents hazards and identify controls you will take to minimize risk. If No hazards were identified, write NONE in the first Task box. All additional project personnel involved must initial the bottom of each task identified below signifying that they have reviewed this information. Use back of SWAP as necessary for General Safety and Precautions, and to add additional hazards.

Following is a non-inclusive list of potential hazards.

- Chemicals (inhalation, dermal)
- Biologic Hazards (poison ivy, ants, snakes)
- Potentially unsafe area or neighborhood
- Sampling around heavy equipment (backhoe bucket, Vac. Truck, etc.)
- Working around high noise (> 85 dBA)
- Activities that require coring or drilling
- Drilling around underground utilities
- Work with equipment around power lines
- Slick, uneven walking/working surfaces
- Climbing ladders / scaffolds
- Using gas or propane powered equipment in enclosed areas
- Work in extreme heat (> 104°F) or extreme cold (<30°F)
- Working around heavy equipment / traffic
- Power tools (hammer drills, auger, etc.)
- Working with lifting / hoisting equipment
- Vehicular traffic, fork lifts, scissors lifts
- Inclement weather (lightning, high winds)
- Work with ergonomic hazards (lifting hazards, twisting, excessive repetitive)
- Working in proximity to deep water > 3ft
- Remote location w/ limited communication

Task: Drilling
Hazards: Struck by, pinch points, noise
Controls: Appropriate PPE, communication

Task: Walking around site
Hazards: Slips, trips, falls; biological, heat
Controls: sturdy shoes, no walk/talk cell phone, water/sunscreen/shade

Task: Soil gas sampling
Hazards: Work in road, helium canister (heavy load)
Controls: Traffic control, watch for cars before moving, lift proper techniques

Task:
Hazards:
Controls:

Section 3: Chemical Hazards and PPE:

Chemical Hazards

	Yes	No		Yes	No
Radiation or Other Contamination	☒	☐	Environmental Toxin	☒	☐
Flammable/Combustible Materials or Vapors (< 140° FP)	☐	☒	Reactive, Volatile or Explosive	☐	☒
RCRA Hazardous Materials (listed or characteristic)	☐	☒	Irritant or Sensitizer	☐	☒
Corrosive (pH >12.5 or < 2)	☐	☒	Oxidizer	☐	☒
Poison, Target Organ Toxin	☐	☒	Teratogen or Mutagen	☐	☒
Biological (mold, poison oak-ivy-sumac, etc.)	☒	☐	Carcinogen	☒	☐

Routes of Exposure:

	Yes	No		Yes	No
Inhalation	☒	☒	Ingestion (poor hygiene and work practice)	☒	☐
Skin (dermal absorp.) or Mucus Membranes (eyes, etc.)	☒	☐	Injection (rare)	☐	☒

Personal Protective Equipment (PPE) FOR THIS DAY

Level of Protection: ☐ A ☐ B ☐ C ☒ D

Respiratory Protection: ☒ None ☐ Full Face ☐ Half Face Cartridge Type: _____

Protective Clothing: ☐ Work Uniform ☐ Protective Suit: _____ ☒ High-Visibility Vest/Shirt

Gloves: ☐ Latex ☒ Nitrile ☐ Butyl ☐ PVC ☐ Neoprene ☒ Leather ☐ Other: _____

Footwear: ☒ Steel-Toe Leather ☐ Steel-Toe Rubber ☐ Other: _____

Eye/Face Protection: ☒ Safety Glasses ☐ Face Shield ☐ Chemical Goggles

Head Protection: ☒ Hard Hat ☐ Bump Cap ☐ Other: _____

Hearing Protection: ☒ Ear Plugs ☐ Muffs ☐ Combination (List) _____

Section 4: Emergency Contact Information

Name: Keyport Emergency	**Name:**
Number(s): 360-396-2244	**Number(s):**
Name:	**Name:** Resolution Consultants Health and Safety – John Knopf
Number(s):	**Number(s):** 901-451-1464 (Cell) 901-937-4255 (Office)

Section 5: SWAP Review and Certification (All crew members and affected subcontractors)

Printed Name	Signature
Larry Brown	
Day McInnis	
Michael Runnels	
Clifford Letts IV	
Nathaniel Tardecki	
Bric Pauley	
Kyle Cook	

THE LOCATION WHERE THE WORK IS TO BE DONE HAS BEEN EXAMINED AND NECESSARY PRECAUTIONS TAKEN FOR THE WORK.
I certify that the above listed project has been evaluated for hazards, protective measures assigned and communicated with all personnel on the jobsite. Changes in scope of work or work conditions may require the modification of existing SWAP or creation of a new SWAP.

Elyssa Dixon	Elyssa Dixon	DHR
SWAP Completed By: Print	**SWAP Completed By: Sign**	**PM Review (Initials)**

Contact H&S if you have any questions.

Resolution Consultants
Daily Safe Work Assessment & Permit (SWAP)

This form must be filled out daily prior to work in the field and reviewed with all project personnel in a daily safety brief. The SWAP is to be completed before each work day to continually assess and communicate project-related hazards. Please have all SWAPs initialed by the Project Manager or Supervisor after returning from the field and place all completed SWAPs in the project file.

Section 1: Project Information

Project/Client Name: Our Phase II Site Recharacterization **SWAP Date/Time:** 8/31/16

Location of the Work: Keyport, WA **Project Number:**

Description of Work: MIP Drilling, soil gas sampling

Has a HASP been created for this job? ☒ Yes ☐ No **If Yes, has the HASP been reviewed prior to work?** ☒ Yes ☐ No

Section 2: Identify hazards associated with tasks and tools FOR THIS DAY:

Critical Safety Tasks are listed below: (If answered "Yes" please call H&S for additional guidance/checks)

	Yes	No		Yes	No
Performing work in Confined Spaces	☐	☒	Use of Respiratory Protection	☐	☒
Hazardous Chemical Exposure	☒	☐	Involvement with Lockout/Tagout Activities	☐	☒
Falls Greater than Six (6) Feet	☐	☒	Trenching or Excavation	☐	☒

List each task that presents hazards and identify controls you will take to minimize risk. If No hazards were identified, write NONE in the first Task box. All additional project personnel involved must initial the bottom of each task identified below signifying that they have reviewed this information. Use back of SWAP as necessary for General Safety and Precautions, and to add additional hazards.

Following is a non-inclusive list of potential hazards.

- Chemicals (inhalation, dermal)
- Biologic Hazards (poison ivy, ants, snakes)
- Potentially unsafe area or neighborhood
- Sampling around heavy equipment (backhoe bucket, Vac. Truck, etc.)
- Working around high noise (> 85 dBA)
- Activities that require coring or drilling
- Drilling around underground utilities
- Work with equipment around power lines
- Slick, uneven walking/working surfaces
- Climbing ladders / scaffolds
- Using gas or propane powered equipment in enclosed areas
- Work in extreme heat (> 104°F) or extreme cold (<30°F)
- Working around heavy equipment / traffic
- Power tools (hammer drills, auger, etc.)
- Working with lifting / hoisting equipment
- Vehicular traffic, fork lifts, scissors lifts
- Inclement weather (lightning, high winds)
- Work with ergonomic hazards (lifting hazards, twisting, excessive repetitive)
- Working in proximity to deep water > 3ft
- Remote location w/ limited communication

Task: Drilling
Hazards: ~~Slips~~ Struck by, pinch points, noise
Controls: Appropriate PPE, good communication

Task: Walk around site
Hazards: slips, trips, falls; biological; [no walk/talk cell phone]
Controls: sturdy shoes, awareness,

Task: Work in Road (soil gas)
Hazards: Traffic
Controls: Traffic control; look before moving

Task:
Hazards:
Controls:

Section 3: Chemical Hazards and PPE:

Chemical Hazards

	Yes	No		Yes	No
Radiation or Other Contamination	☒	☐	Environmental Toxin	☒	☐
Flammable/Combustible Materials or Vapors (< 140° FP)	☐	☒	Reactive, Volatile or Explosive	☐	☒
RCRA Hazardous Materials (listed or characteristic)	☐	☒	Irritant or Sensitizer	☐	☒
Corrosive (pH >12.5 or < 2)	☐	☒	Oxidizer	☐	☒
Poison, Target Organ Toxin	☐	☒	Teratogen or Mutagen	☐	☒
Biological (mold, poison oak-ivy-sumac, etc.)	☒	☐	Carcinogen	☒	☐

Routes of Exposure:

	Yes	No		Yes	No
Inhalation	☐	☒	Ingestion (poor hygiene and work practice)	☒	☐
Skin (dermal absorp.) or Mucus Membranes (eyes, etc.)	☒	☐	Injection (rare)	☐	☒

Personal Protective Equipment (PPE) FOR THIS DAY

Level of Protection: ☐ A ☐ B ☐ C ☒ D

Respiratory Protection: ☐ None ☐ Full Face ☐ Half Face Cartridge Type: _____

Protective Clothing: ☐ Work Uniform ☐ Protective Suit: _____ ☒ High-Visibility Vest/Shirt

Gloves: ☐ Latex ☒ Nitrile ☐ Butyl ☐ PVC ☐ Neoprene ☒ Leather ☐ Other: _____

Footwear: ☒ Steel-Toe Leather ☐ Steel-Toe Rubber ☐ Other: _____

Eye/Face Protection: ☒ Safety Glasses ☐ Face Shield ☐ Chemical Goggles

Head Protection: ☒ Hard Hat ☐ Bump Cap ☐ Other: _____

Hearing Protection: ☒ Ear Plugs ☐ Muffs ☐ Combination (List) _____

Section 4: Emergency Contact Information

Name: Keyport Emergency	**Name:**
Number(s): 360-396-2244	**Number(s):**
Name:	**Name:** Resolution Consultants Health and Safety – John Knopf
Number(s):	**Number(s):** 901-451-1464 (Cell) 901-937-4255 (Office)

Section 5: SWAP Review and Certification (All crew members and affected subcontractors)

Printed Name	Signature
Doug McTurg	
Michael Cummings	
Clifford Letts IV	
Larry Brown	
Nathaniel Tanderski	
Brian Pauly	
Kyle Cerski	

THE LOCATION WHERE THE WORK IS TO BE DONE HAS BEEN EXAMINED AND NECESSARY PRECAUTIONS TAKEN FOR THE WORK.
I certify that the above listed project has been evaluated for hazards, protective measures assigned and communicated with all personnel on the jobsite. Changes in scope of work or work conditions may require the modification of existing SWAP or creation of a new SWAP.

Elyssa Dixon	Elyssa Dixon	DGR
SWAP Completed By: Print	**SWAP Completed By: Sign**	**PM Review (Initials)**

Contact H&S if you have any questions.

Resolution Consultants
Daily Safe Work Assessment & Permit (SWAP)

This form must be filled out daily prior to work in the field and reviewed with all project personnel in a daily safety brief. The SWAP is to be completed before each work day to continually assess and communicate project-related hazards. Please have all SWAPs initialed by the Project Manager or Supervisor after returning from the field and place all completed SWAPs in the project file.

Section 1: Project Information

Project/Client Name: OU 1 Phase II Site Recharacterization **SWAP Date/Time:** 9/1/16

Location of the Work: Keyport, WA **Project Number:**

Description of Work: MIP Drilling

Has a HASP been created for this job? ☒ Yes ☐ No **If Yes, has the HASP been reviewed prior to work?** ☑ Yes ☐ No

Section 2: Identify hazards associated with tasks and tools FOR THIS DAY:

Critical Safety Tasks are listed below: (If answered "Yes" please call H&S for additional guidance/checks)

	Yes	No		Yes	No
Performing work in Confined Spaces	☐	☒	Use of Respiratory Protection	☐	☒
Hazardous Chemical Exposure	☒	☐	Involvement with Lockout/Tagout Activities	☐	☒
Falls Greater than Six (6) Feet	☐	☒	Trenching or Excavation	☐	☒

List each task that presents hazards and identify controls you will take to minimize risk. If No hazards were identified, write NONE in the first Task box. All additional project personnel involved must initial the bottom of each task identified below signifying that they have reviewed this information. Use back of SWAP as necessary for General Safety and Precautions, and to add additional hazards.

Following is a non-inclusive list of potential hazards.

- Chemicals (inhalation, dermal)
- Biologic Hazards (poison ivy, ants, snakes)
- Potentially unsafe area or neighborhood
- Sampling around heavy equipment (backhoe bucket, Vac. Truck, etc.)
- Working around high noise (> 85 dBA)
- Activities that require coring or drilling
- Drilling around underground utilities
- Work with equipment around power lines
- Slick, uneven walking/working surfaces
- Climbing ladders / scaffolds
- Using gas or propane powered equipment in enclosed areas
- Work in extreme heat (> 104°F) or extreme cold (<30°F)
- Working around heavy equipment / traffic
- Power tools (hammer drills, auger, etc.)
- Working with lifting / hoisting equipment
- Vehicular traffic, fork lifts, scissors lifts
- Inclement weather (lightning, high winds)
- Work with ergonomic hazards (lifting hazards, twisting, excessive repetitive)
- Working in proximity to deep water > 3ft
- Remote location w/ limited communication

Task: Drilling
Hazards: Struck by, pinch points, noise, methane
Controls: Appropriate PPE, communication, air monitoring

Task: Walk around site
Hazards: Limited (parking lot), potential slips, trips + falls
Controls: Watch where walking, sturdy shoes, no walk/talk cell phone

Task:
Hazards:
Controls:

Task:
Hazards:
Controls:

Section 3: Chemical Hazards and PPE:

Chemical Hazards

	Yes	No		Yes	No
Radiation or Other Contamination	☒	☐	Environmental Toxin	☒	☐
Flammable/Combustible Materials or Vapors (< 140° FP)	☐	☒	Reactive, Volatile or Explosive	☐	☒
RCRA Hazardous Materials (listed or characteristic)	☐	☒	Irritant or Sensitizer	☐	☒
Corrosive (pH >12.5 or < 2)	☐	☒	Oxidizer	☐	☒
Poison, Target Organ Toxin	☐	☒	Teratogen or Mutagen	☐	☒
Biological (mold, poison oak-ivy-sumac, etc.)	☒	☐	Carcinogen	☒	☐

Routes of Exposure:

	Yes	No		Yes	No
Inhalation	☐	☒	Ingestion (poor hygiene and work practice)	☒	☐
Skin (dermal absorp.) or Mucus Membranes (eyes, etc.)	☒	☐	Injection (rare)	☐	☒

Personal Protective Equipment (PPE) FOR THIS DAY

Level of Protection: ☐ A ☐ B ☐ C ☒ D

Respiratory Protection: ☒ None ☐ Full Face ☐ Half Face Cartridge Type: _____

Protective Clothing: ☐ Work Uniform ☐ Protective Suit: _____ ☒ High-Visibility Vest/Shirt

Gloves: ☐ Latex ☒ Nitrile ☐ Butyl ☐ PVC ☐ Neoprene ☐ Leather ☐ Other: _____

Footwear: ☒ Steel-Toe Leather ☐ Steel-Toe Rubber ☐ Other: _____

Eye/Face Protection: ☒ Safety Glasses ☐ Face Shield ☐ Chemical Goggles

Head Protection: ☒ Hard Hat ☐ Bump Cap ☐ Other: _____

Hearing Protection: ☒ Ear Plugs ☐ Muffs ☐ Combination (List) _____

Section 4: Emergency Contact Information

Name: Keyport Emergency	**Name:**
Number(s): 360-396-2244	**Number(s):**
Name:	**Name:** Resolution Consultants Health and Safety – John Knopf
Number(s):	**Number(s):** 901-451-1464 (Cell) 901-937-4255 (Office)

Section 5: SWAP Review and Certification (All crew members and affected subcontractors)

Printed Name	Signature
Doug Myers	
Michael Running	
Clifford Letts IV	

THE LOCATION WHERE THE WORK IS TO BE DONE HAS BEEN EXAMINED AND NECESSARY PRECAUTIONS TAKEN FOR THE WORK.

I certify that the above listed project has been evaluated for hazards, protective measures assigned and communicated with all personnel on the jobsite. Changes in scope of work or work conditions may require the modification of existing SWAP or creation of a new SWAP.

Elyssa Dixon	Elyssa Dixon	DdR
SWAP Completed By: Print	**SWAP Completed By: Sign**	**PM Review (Initials)**

Contact H&S if you have any questions.

Resolution Consultants
Daily Safe Work Assessment & Permit (SWAP)

This form must be filled out daily prior to work in the field and reviewed with all project personnel in a daily safety brief. The SWAP is to be completed before each work day to continually assess and communicate project-related hazards. Please have all SWAPs initialed by the Project Manager or Supervisor after returning from the field and place all completed SWAPs in the project file.

Section 1: Project Information

Project/Client Name: OU 1 Phase II Site Recharacterization **SWAP Date/Time:** _____

Location of the Work: Kaypart, WA **Project Number:** _____

Description of Work: MIP Drilling, Soil gas sample point, clearing/grubbing

Has a HASP been created for this job? ☒ Yes ☐ No **If Yes, has the HASP been reviewed prior to work?** ☒ Yes ☐ No

Section 2: Identify hazards associated with tasks and tools FOR THIS DAY:

Critical Safety Tasks are listed below: (If answered "Yes" please call H&S for additional guidance/checks)

	Yes	No		Yes	No
Performing work in Confined Spaces	☐	☒	Use of Respiratory Protection	☐	☒
Hazardous Chemical Exposure	☒	☐	Involvement with Lockout/Tagout Activities	☐	☒
Falls Greater than Six (6) Feet	☐	☒	Trenching or Excavation	☐	☒

List each task that presents hazards and identify controls you will take to minimize risk. If No hazards were identified, write NONE in the first Task box. All additional project personnel involved must initial the bottom of each task identified below signifying that they have reviewed this information. Use back of SWAP as necessary for General Safety and Precautions, and to add additional hazards.

Following is a non-inclusive list of potential hazards.

- Chemicals (inhalation, dermal)
- Biologic Hazards (poison ivy, ants, snakes)
- Potentially unsafe area or neighborhood
- Sampling around heavy equipment (backhoe bucket, Vac. Truck, etc.)
- Working around high noise (> 85 dBA)
- Activities that require coring or drilling
- Drilling around underground utilities
- Work with equipment around power lines
- Slick, uneven walking/working surfaces
- Climbing ladders / scaffolds
- Using gas or propane powered equipment in enclosed areas
- Work in extreme heat (> 104°F) or extreme cold (<30°F)
- Working around heavy equipment / traffic
- Power tools (hammer drills, auger, etc.)
- Working with lifting / hoisting equipment
- Vehicular traffic, fork lifts, scissors lifts
- Inclement weather (lightning, high winds)
- Work with ergonomic hazards (lifting hazards, twisting, excessive repetitive)
- Working in proximity to deep water > 3ft
- Remote location w/ limited communication

Task: Drilling
Hazards: Pinch points, struck by, noise, traffic
Controls: Appropriate PPE, communication, traffic control/flaggers

Task: Walking around site
Hazards: Slips, trips, falls; biological
Controls: Sturdy shoes, no walk/talk cell, awareness

Task: Working w/ multiple contractors
Hazards: Struck by, struck against,
Controls: Good communication, safety vests/hard hats/signage

Task: Clearing + grubbing
Hazards: Struck by/against, biological, noise
Controls: Gloves, safety glasses, long sleeves/sturdy shoes, ear plugs communication

Section 3: Chemical Hazards and PPE:

Chemical Hazards

	Yes	No		Yes	No
Radiation or Other Contamination	☒	☐	Environmental Toxin	☒	☐
Flammable/Combustible Materials or Vapors (< 140° FP)	☐	☒	Reactive, Volatile or Explosive	☐	☒
RCRA Hazardous Materials (listed or characteristic)	☐	☒	Irritant or Sensitizer	☐	☒
Corrosive (pH >12.5 or < 2)	☐	☒	Oxidizer	☐	☒
Poison, Target Organ Toxin	☐	☒	Teratogen or Mutagen	☐	☒
Biological (mold, poison oak-ivy-sumac, etc.)	☒	☐	Carcinogen	☒	☐

Routes of Exposure:

	Yes	No		Yes	No
Inhalation	☐	☒	Ingestion (poor hygiene and work practice)	☒	☐
Skin (dermal absorp.) or Mucus Membranes (eyes, etc.)	☒	☐	Injection (rare)	☐	☒

Personal Protective Equipment (PPE) FOR THIS DAY

Level of Protection: ☐ A ☐ B ☐ C ☒ D

Respiratory Protection: ☐ None ☐ Full Face ☐ Half Face Cartridge Type: _____

Protective Clothing: ☐ Work Uniform ☐ Protective Suit: _____ ☒ High-Visibility Vest/Shirt

Gloves: ☐ Latex ☒ Nitrile ☐ Butyl ☐ PVC ☐ Neoprene ☒ Leather ☐ Other: _____

Footwear: ☒ Steel-Toe Leather ☐ Steel-Toe Rubber ☐ Other: _____

Eye/Face Protection: ☒ Safety Glasses ☐ Face Shield ☐ Chemical Goggles

Head Protection: ☒ Hard Hat ☐ Bump Cap ☐ Other: _____

Hearing Protection: ☒ Ear Plugs ☐ Muffs ☐ Combination (List) _____

Section 4: Emergency Contact Information

Name: Keyport Emergency	**Name:**
Number(s): 360-396-2244	**Number(s):**
Name:	**Name: Resolution Consultants Health and Safety – John Knopf**
Number(s):	**Number(s): 901-451-1464 (Cell) 901-937-4255 (Office)**

Section 5: SWAP Review and Certification (All crew members and affected subcontractors)

Printed Name	Signature
Larry Brown	
Doug Mitchell	
Anthony Palmieri	
Michael Runnins	
Clifford Letts IV	
Kyle Centi	
Nathaniel Tandecki	
Brian Pauley	

THE LOCATION WHERE THE WORK IS TO BE DONE HAS BEEN EXAMINED AND NECESSARY PRECAUTIONS TAKEN FOR THE WORK.
I certify that the above listed project has been evaluated for hazards, protective measures assigned and communicated with all personnel on the jobsite. Changes in scope of work or work conditions may require the modification of existing SWAP or creation of a new SWAP.

Elyssa Dixon	Elyssa Dixon	DGR
SWAP Completed By: Print	**SWAP Completed By: Sign**	**PM Review (Initials)**

Contact H&S if you have any questions.

Resolution Consultants
Daily Safe Work Assessment & Permit (SWAP)

This form must be filled out daily prior to work in the field and reviewed with all project personnel in a daily safety brief. The SWAP is to be completed before each work day to continually assess and communicate project-related hazards. Please have all SWAPs initialed by the Project Manager or Supervisor after returning from the field and place all completed SWAPs in the project file.

Section 1: Project Information

Project/Client Name: Our Phase II Site Recharacterization **SWAP Date/Time:** _____

Location of the Work: Keyport, WA **Project Number:** _____

Description of Work: MIP Drilling

Has a HASP been created for this job? ☐ Yes ☐ No **If Yes, has the HASP been reviewed prior to work?** ☐ Yes ☐ No

Section 2: Identify hazards associated with tasks and tools FOR THIS DAY:

Critical Safety Tasks are listed below: (If answered "Yes" please call H&S for additional guidance/checks)

	Yes	No		Yes	No
Performing work in Confined Spaces	☐	☒	Use of Respiratory Protection	☐	☒
Hazardous Chemical Exposure	☒	☐	Involvement with Lockout/Tagout Activities	☐	☒
Falls Greater than Six (6) Feet	☐	☒	Trenching or Excavation	☐	☒

List each task that presents hazards and identify controls you will take to minimize risk. If No hazards were identified, write NONE in the first Task box. All additional project personnel involved must initial the bottom of each task identified below signifying that they have reviewed this information. Use back of SWAP as necessary for General Safety and Precautions, and to add additional hazards.

Following is a non-inclusive list of potential hazards.

- Chemicals (inhalation, dermal)
- Biologic Hazards (poison ivy, ants, snakes)
- Potentially unsafe area or neighborhood
- Sampling around heavy equipment (backhoe bucket, Vac. Truck, etc.)
- Working around high noise (> 85 dBA)
- Activities that require coring or drilling
- Drilling around underground utilities
- Work with equipment around power lines
- Slick, uneven walking/working surfaces
- Climbing ladders / scaffolds
- Using gas or propane powered equipment in enclosed areas
- Work in extreme heat (> 104°F) or extreme cold (<30°F)
- Working around heavy equipment / traffic
- Power tools (hammer drills, auger, etc.)
- Working with lifting / hoisting equipment
- Vehicular traffic, fork lifts, scissors lifts
- Inclement weather (lightning, high winds)
- Work with ergonomic hazards (lifting hazards, twisting, excessive repetitive)
- Working in proximity to deep water > 3ft
- Remote location w/ limited communication

Task: Drilling
Hazards: Struck by, pinch points, noise, methane
Controls: Appropriate PPE, good communication, air monitoring

Task: Walk around site
Hazards: Slips, trips, falls
Controls: Watch footing + avoid walking in cord areas, no walk/talk cell phone

Task: Work
Hazards: Weather → potential thunder storms
Controls: If Lightening/thunder seen/heard, stop work + get in vehicles

Task:
Hazards:
Controls:

Section 3: Chemical Hazards and PPE:

Chemical Hazards

	Yes	No		Yes	No
Radiation or Other Contamination	☒	☐	Environmental Toxin	☒	☐
Flammable/Combustible Materials or Vapors (< 140° FP)	☐	☒	Reactive, Volatile or Explosive	☒	☒
RCRA Hazardous Materials (listed or characteristic)	☐	☒	Irritant or Sensitizer	☐	☒
Corrosive (pH >12.5 or < 2)	☐	☒	Oxidizer	☐	☒
Poison, Target Organ Toxin	☐	☒	Teratogen or Mutagen	☐	☒
Biological (mold, poison oak-ivy-sumac, etc.)	☒	☐	Carcinogen	☒	☐

Routes of Exposure:

	Yes	No		Yes	No
Inhalation	☒	☐	Ingestion (poor hygiene and work practice)	☒	☐
Skin (dermal absorp.) or Mucus Membranes (eyes, etc.)	☒	☐	Injection (rare)	☐	☒

Personal Protective Equipment (PPE) FOR THIS DAY

Level of Protection:	☐ A	☐ B	☐ C	☒ D		
Respiratory Protection:	☒ None	☐ Full Face	☐ Half Face	Cartridge Type: _____		
Protective Clothing:	☐ Work Uniform		☐ Protective Suit: _____		☒ High-Visibility Vest/Shirt	
Gloves:	☐ Latex	☒ Nitrile	☐ Butyl	☐ PVC	☐ Neoprene	☒ Leather ☐ Other: _____
Footwear:	☒ Steel-Toe Leather		☐ Steel-Toe Rubber		☐ Other: _____	
Eye/Face Protection:	☒ Safety Glasses		☐ Face Shield		☐ Chemical Goggles	
Head Protection:	☒ Hard Hat		☐ Bump Cap		☐ Other: _____	
Hearing Protection:	☒ Ear Plugs		☐ Muffs		☐ Combination (List) _____	

Section 4: Emergency Contact Information

Name: Keyport Emergency	**Name:**
Number(s): 360-396-2244	**Number(s):**
Name:	**Name:** Resolution Consultants Health and Safety – John Knopf
Number(s):	**Number(s):** 901-451-1464 (Cell) 901-937-4255 (Office)

Section 5: SWAP Review and Certification (All crew members and affected subcontractors)

Printed Name	Signature
Doug McInnis	
Lukas Lauren	
Michael Running	

THE LOCATION WHERE THE WORK IS TO BE DONE HAS BEEN EXAMINED AND NECESSARY PRECAUTIONS TAKEN FOR THE WORK.
I certify that the above listed project has been evaluated for hazards, protective measures assigned and communicated with all personnel on the jobsite. Changes in scope of work or work conditions may require the modification of existing SWAP or creation of a new SWAP.

Elyssa Dixon	Elyssa Dixon	DGR
SWAP Completed By: Print	**SWAP Completed By: Sign**	**PM Review (Initials)**

Contact H&S if you have any questions.

Resolution Consultants
Daily Safe Work Assessment & Permit (SWAP)

This form must be filled out daily prior to work in the field and reviewed with all project personnel in a daily safety brief. The SWAP is to be completed before each work day to continually assess and communicate project-related hazards. Please have all SWAPs initialed by the Project Manager or Supervisor after returning from the field and place all completed SWAPs in the project file.

Section 1: Project Information

Project/Client Name: OU1 Phase II Site Recharacterization **SWAP Date/Time:** 9/8/16

Location of the Work: Keyport, WA **Project Number:**

Description of Work: soil gas sampling

Has a HASP been created for this job? ☐ Yes ☐ No **If Yes, has the HASP been reviewed prior to work?** ☐ Yes ☐ No

Section 2: Identify hazards associated with tasks and tools FOR THIS DAY:

Critical Safety Tasks are listed below: (If answered "Yes" please call H&S for additional guidance/checks)

	Yes	No		Yes	No
Performing work in Confined Spaces	☐	☒	Use of Respiratory Protection	☐	☒
Hazardous Chemical Exposure	☒	☐	Involvement with Lockout/Tagout Activities	☐	☒
Falls Greater than Six (6) Feet	☐	☒	Trenching or Excavation	☐	☒

List each task that presents hazards and identify controls you will take to minimize risk. If No hazards were identified, write NONE in the first Task box. All additional project personnel involved must initial the bottom of each task identified below signifying that they have reviewed this information. Use back of SWAP as necessary for General Safety and Precautions, and to add additional hazards.

Following is a non-inclusive list of potential hazards.

- Chemicals (inhalation, dermal)
- Biologic Hazards (poison ivy, ants, snakes)
- Potentially unsafe area or neighborhood
- Sampling around heavy equipment (backhoe bucket, Vac. Truck, etc.)
- Working around high noise (> 85 dBA)
- Activities that require coring or drilling
- Drilling around underground utilities
- Work with equipment around power lines
- Slick, uneven walking/working surfaces
- Climbing ladders / scaffolds
- Using gas or propane powered equipment in enclosed areas
- Work in extreme heat (> 104°F) or extreme cold (<30°F)
- Working around heavy equipment / traffic
- Power tools (hammer drills, auger, etc.)
- Working with lifting / hoisting equipment
- Vehicular traffic, fork lifts, scissors lifts
- Inclement weather (lightning, high winds)
- Work with ergonomic hazards (lifting hazards, twisting, excessive repetitive)
- Working in proximity to deep water > 3ft
- Remote location w/ limited communication

Task: Work in Road
Hazards: Struck by
Controls: Traffic Control, look before moving, no walk/talk cell phones

Task: Sample collection
Hazards: Pinch points, compressed gas (helium), methane
Controls: Proper PPE, work slowly, air monitoring

Task:
Hazards:
Controls:

Task:
Hazards:
Controls:

Section 3: Chemical Hazards and PPE:

Chemical Hazards

	Yes	No		Yes	No
Radiation or Other Contamination	☒	☐	Environmental Toxin	☒	☐
Flammable/Combustible Materials or Vapors (< 140° FP)	☐	☒	Reactive, Volatile or Explosive	☒	☐
RCRA Hazardous Materials (listed or characteristic)	☐	☒	Irritant or Sensitizer	☐	☒
Corrosive (pH >12.5 or < 2)	☐	☒	Oxidizer	☐	☒
Poison, Target Organ Toxin	☐	☒	Teratogen or Mutagen	☐	☒
Biological (mold, poison oak-ivy-sumac, etc.)	☐	☒	Carcinogen	☒	☐

Routes of Exposure:

	Yes	No		Yes	No
Inhalation	☒	☐	Ingestion (poor hygiene and work practice)	☒	☐
Skin (dermal absorp.) or Mucus Membranes (eyes, etc.)	☒	☐	Injection (rare)	☐	☒

Personal Protective Equipment (PPE) FOR THIS DAY

Level of Protection: ☐ A ☐ B ☐ C ☒ D

Respiratory Protection: ☒ None ☐ Full Face ☐ Half Face Cartridge Type: _____

Protective Clothing: ☐ Work Uniform ☐ Protective Suit: _____ ☒ High-Visibility Vest/Shirt

Gloves: ☐ Latex ☒ Nitrile ☐ Butyl ☐ PVC ☐ Neoprene ☒ Leather ☐ Other: _____

Footwear: ☒ Steel-Toe Leather ☐ Steel-Toe Rubber ☐ Other: _____

Eye/Face Protection: ☒ Safety Glasses ☐ Face Shield ☐ Chemical Goggles

Head Protection: ☒ Hard Hat ☐ Bump Cap ☐ Other: _____

Hearing Protection: ☐ Ear Plugs ☐ Muffs ☐ Combination (List) _____

Section 4: Emergency Contact Information

Name: Keyport Emergency	**Name:**
Number(s): 360-396-2244	**Number(s):**
Name:	**Name:** Resolution Consultants Health and Safety – John Knopf
Number(s):	**Number(s):** 901-451-1464 (Cell) 901-937-4255 (Office)

Section 5: SWAP Review and Certification (All crew members and affected subcontractors)

Printed Name	Signature
Brian Pauley / GHD	
Nate Tondecki / GHD	
Kyle Cerda CDLD	

THE LOCATION WHERE THE WORK IS TO BE DONE HAS BEEN EXAMINED AND NECESSARY PRECAUTIONS TAKEN FOR THE WORK.
I certify that the above listed project has been evaluated for hazards, protective measures assigned and communicated with all personnel on the jobsite. Changes in scope of work or work conditions may require the modification of existing SWAP or creation of a new SWAP.

Elyssa Dixon	Elyssa Dixon	DGR
SWAP Completed By: Print	**SWAP Completed By: Sign**	**PM Review (Initials)**

Contact H&S if you have any questions.

Appendix F

Photographic Log

APPENDIX F: PHOTOGRAPHIC LOG



Description: MIP drilling **Direction:** Northeast	**Date Taken:** 08/15/16	**File Name:** IMG_0004



Description: MIP set up with drill rig **Direction:** Southeast	**Date Taken:** 08/15/16	**File Name:** IMG_0006

APPENDIX F: PHOTOGRAPHIC LOG



Description: MIP set up **Direction:** NA	**Date Taken:** 08/15/16	**File Name:** IMG_0008



Description: Location of buried catch basin **Direction:** Southwest	**Date Taken:** 8/18/16	**File Name:** IMG_0506

APPENDIX F: PHOTOGRAPHIC LOG



Description: Location of buried catch basin **Direction:** Southwest	**Date Taken:** 8/8/16	**File Name:** IMG_0508



Description: MIP drilling **Direction:** Southeast	**Date Taken:** 8/24/16	**File Name:** IMG_0523

APPENDIX F: PHOTOGRAPHIC LOG



Description: MIP **Direction:** NA	**Date Taken:** 8/24/16	**File Name:** IMG_0525



Description: MIP **Direction:** NA	**Date Taken:** 8/24/16	**File Name:** IMG_0527

APPENDIX F: PHOTOGRAPHIC LOG



Description: MIP **Direction:** NA	**Date Taken:** 8/24/16	**File Name:** IMG_0528



Description: SE corner of south plantation **Direction:** Southwest	**Date Taken:** 8/25/16	**File Name:** IMG_0532

APPENDIX F: PHOTOGRAPHIC LOG



Description: MIP drilling **Direction:** West	**Date Taken:** 8/25/16	**File Name:** IMG_0538



Description: South plantation, MIP-025 in foreground **Direction:** East	**Date Taken:** 8/25/16	**File Name:** IMG_0539

APPENDIX F: PHOTOGRAPHIC LOG



Description: Eastern edge of south plantation **Direction:** Southeast	**Date Taken:** 8/25/16	**File Name:** IMG_0540



Description: Northwest corner of south plantation **Direction:** Northwest	**Date Taken:** 8/25/16	**File Name:** IMG_0541

APPENDIX F: PHOTOGRAPHIC LOG



Description: MW1-16 and MIP-014 **Direction:** North	**Date Taken:** 8/25/16	**File Name:** IMG_0544



Description: IW1-S and MIP-012 **Direction:** Southeast	**Date Taken:** 8/25/16	**File Name:** IMG_0547

APPENDIX F: PHOTOGRAPHIC LOG



Description: P1-6 and MIP-013 **Direction:** Northwest	**Date Taken:** 8/25/16	**File Name:** IMG_0548



Description: MIP-010 and P1-7 **Direction:** Southwest	**Date Taken:** 8/25/16	**File Name:** IMG_0551

APPENDIX F: PHOTOGRAPHIC LOG



Description: MIP-030 (foreground) **Direction:** West	**Date Taken:** 8/25/16	**File Name:** IMG_0552



Description: R22-T2, MIP-005 (foreground) **Direction:** North	**Date Taken:** 8/25/16	**File Name:** IMG_0553

APPENDIX F: PHOTOGRAPHIC LOG



Description: MIP-027 and MW1-5 **Direction:** Northwest	**Date Taken:** 8/25/16	**File Name:** IMG_0555



Description: South plantation **Direction:** Southeast	**Date Taken:** 8/25/16	**File Name:** IMG_0556

APPENDIX F: PHOTOGRAPHIC LOG



Description: MIP calibration: creating TCE solution **Direction:** NA	**Date Taken:** 8/25/16	**File Name:** IMG_0561



Description: MIP calibration: TCE **Direction:** NA	**Date Taken:** 8/25/16	**File Name:** IMG_0564

APPENDIX F: PHOTOGRAPHIC LOG



Description: MIP calibration: FID **Direction:** NA	**Date Taken:** 8/25/16	**File Name:** IMG_0567



Description: MIP calibration: EC **Direction:** NA	**Date Taken:** 8/25/16	**File Name:** IMG_0570

APPENDIX F: PHOTOGRAPHIC LOG



Description: MIP calibration: water level **Direction:** NA	**Date Taken:** 8/25/16	**File Name:** IMG_0571



Description: MIP calibration: water level **Direction:** NA	**Date Taken:** 8/25/16	**File Name:** IMG_0574

APPENDIX F: PHOTOGRAPHIC LOG



Description: MW1-4, MIP-002, and MIP-003 **Direction:** Southwest	**Date Taken:** 8/25/16	**File Name:** IMG_0575



Description: MIP-003 **Direction:** West	**Date Taken:** 8/25/16	**File Name:** IMG_0576

APPENDIX F: PHOTOGRAPHIC LOG



Description: MIP-036 **Direction:** Southwest	**Date Taken:** 8/25/16	**File Name:** IMG_0577



Description: Central Landfill and North Plantation **Direction:** North	**Date Taken:** 8/25/16	**File Name:** IMG_0578

APPENDIX F: PHOTOGRAPHIC LOG



Description: Central Landfill **Direction:** Northwest	**Date Taken:** 8/25/16	**File Name:** IMG_0579



Description: Central Landfill **Direction:** North	**Date Taken:** 8/25/16	**File Name:** IMG_0580

APPENDIX F: PHOTOGRAPHIC LOG



Description: Central Landfill and South Plantation **Direction:** Southeast	**Date Taken:** 8/25/16	**File Name:** IMG_0581



Description: Central Landfill (MW1-17) **Direction:** Southeast	**Date Taken:** 8/25/16	**File Name:** IMG_0583

APPENDIX F: PHOTOGRAPHIC LOG



Description: Central Landfill (MW1-17) **Direction:** Northeast	**Date Taken:** 8/25/16	**File Name:** IMG_0584



Description: Central Landfill (MW1-17) **Direction:** South	**Date Taken:** 8/25/16	**File Name:** IMG_0585

APPENDIX F: PHOTOGRAPHIC LOG



Description: Bradley Road **Direction:** South	**Date Taken:** 8/25/16	**File Name:** IMG_0590



Description: Bradley Road **Direction:** North	**Date Taken:** 8/25/16	**File Name:** IMG_0591

APPENDIX F: PHOTOGRAPHIC LOG



Description: Bradley Road **Direction:** North	**Date Taken:** 8/25/16	**File Name:** IMG_0592



Description: MIP-060 **Direction:** Southwest	**Date Taken:** 8/25/16	**File Name:** IMG_0593

APPENDIX F: PHOTOGRAPHIC LOG



Description: Installing SV-01 **Direction:** NA	**Date Taken:** 8/29/16	**File Name:** IMG_0600



Description: SV-01 **Direction:** NA	**Date Taken:** 8/29/16	**File Name:** IMG_0602

APPENDIX F: PHOTOGRAPHIC LOG



Description: Installing SV-04 and drilling MIP-049 **Direction:** North	**Date Taken:** 8/29/16	**File Name:** IMG_0604



Description: Soil gas leak testing equipment **Direction:** NA	**Date Taken:** 8/30/16	**File Name:** IMG_0606

APPENDIX F: PHOTOGRAPHIC LOG



Description: Drilling MIP-058 **Direction:** West	**Date Taken:** 8/31/16	**File Name:** IMG_0613



Description: Central Landfill, drilling MIP-64 **Direction:** Southwest	**Date Taken:** 9/1/16	**File Name:** IMG_0621

APPENDIX F: PHOTOGRAPHIC LOG



Description: Central Landfill, drilling MIP-066	**Date Taken:** 9/1/16	**File Name:** IMG_0629



Description: Central Landfill, drilling MIP-067 **Direction:** Southwest	**Date Taken:** 9/2/16	**File Name:** IMG_0630

APPENDIX F: PHOTOGRAPHIC LOG



Description: Central Landfill, drilling MIP-069 **Direction:** North	**Date Taken:** 9/2/16	**File Name:** IMG_0631



Description: Standing water in swale east of Bradley Road **Direction:** Southwest	**Date Taken:** 9/8/16	**File Name:** IMG_0647

APPENDIX F: PHOTOGRAPHIC LOG



Description: Standing water in swale east of Bradley Road **Direction:** South	**Date Taken:** 9/8/16	**File Name:** IMG_0648



Description: Soil gas sampling equipment **Direction:** NA	**Date Taken:** 9/8/16	**File Name:** IMG_0652

APPENDIX F: PHOTOGRAPHIC LOG



Description: Attempted soil gas sampling location; water below slabuthwest	**Date Taken:** 9/8/16	**File Name:** IMG_0655



Description: Standing water in paved low spot **Direction:** Southwest	**Date Taken:** 9/8/16	**File Name:** IMG_0656

Appendix G

Daily Field Reports and Field Logbook
(Electronic format on CD)

Resolution Consultants *A Joint Venture of AECOM & EnSafe* 1111 Third Avenue Seattle, Washington 98101 206-438-2700	**Contract No.** N62470-11-D-8013, CTO JP09 Reference – Sampling and Analysis Plan – Keyport OU-1 Site Recharacterization; NAVFAC Northwest, dated July 1, 2016	**DAILY FIELD REPORT #1** **08/15/2016**
	Project: Keyport OU-1 Site Recharacterization	
	Location: Keyport, Washington	
	Client: Naval Facilities Engineering Command Northwest	**Contractor:** Resolution Consultants
	Weather: 80s; sunny; calm	
To: James Flynn, Debbie Rodenhizer	**From:** Anthony Palmieri	

DAILY FIELD REPORT

Personnel Onsite

Anthony Palmieri and Elyssa Dixon (Resolution)
Doug McInnes (Columbia Technologies)
Michael Running, Clifford Letts, and Dale Smith (Holt Services)
Carlotta Cellucci and Bryan Ransom (NAVFAC NW)

Summary of Work Completed

- Mobilized Columbia Technologies and Holt Services to the site.
- Completed four MIP boring locations: MIP-001, MIP-002, MIP-003, and MIP-004.

Deviations from Work Plan

- The SAP prescribes the abandoning of boreholes using injected grout. Pressure grouting utilizes a pneumatic pump to inject a concrete/bentonite mixture (grout) through a pipe that is placed on the bottom of the borehole. Upon removal of MIP tooling, it was observed that the boreholes were collapsing to approximately 8 to 10 feet bgs. Based on this finding, Resolution in concurrence with Holt Services, determined pressure grouting was not feasible due to the potential of rapid surfacing. Therefore, boreholes will be abandoned using hydrated bentonite chips.

Field Activity Summary

0730 Resolution Consultants onsite. Label trees within south plantation for use as reference points.

0800 Columbia Technologies and Holt Services onsite.

0820 Daily safety meeting – Meeting focused on drilling hazards and slips, trips, and falls. Discussed scope of work for the day.

0930 Mobilized to MIP-001, located approximately 7.5 feet southwest of monitoring well P1-7.

1005 Start MIP-001.

1043 Complete MIP-001 to 18 feet bgs.

1059 Carlotta Cellucci (NAVFAC NW) offsite.

1116 Mobilize to MIP-002.

1147 Start MIP-002.

1200 Resolution completes measurement of south plantation groundwater monitoring well water levels.

1215 Complete MIP-002 to 15 feet bgs. Take lunch.

1300 Dale Smith (Holt Services) onsite.

1325 Mobilize to MIP-003.

1348 Start MIP-003.

1350 Carlotta Cellucci and Bryan Ransom (NAVFAC NW) onsite.

1420 Complete MIP-003 to 15 feet bgs.

1440 Mobilize to MIP-004.

1510 Start MIP-004.

1520 Refusal at 4 feet bgs, move 3 feet west to reattempt boring.

1527 Start MIP-004 second location.

1527 Refusal at 4.5 feet bgs. Move 5 feet east of tree R22-T1 to reattempt boring.

1545 Start MIP-004 third location.

1615 Complete MIP-004 to 16 feet bgs. Begin to demobilize for day.

1630 Holt Services offsite.

1730 Resolution offsite. Columbia to remain onsite to perform equipment mantainence.

1920 Columbia offsite.

Summary of Findings/Conclusions

Boring ID	Total Depth (ft bgs)	Max. XSD detection (uV) and depth (ft. bgs)	Max. PID detection (uV) and depth (ft. bgs)
MIP-001	18	232,704 uV at 12.15	243,461 uV at 12.15
MIP-002	16	243,385 uV at 8.95	272,454 uV at 8.95
MIP-003	16	45,778 uV at 9.95	of 56,078 uV at 12.50
MIP-004	16	106,815 uV at 13.00	133,824 uV at 16.00

It was later observed that the heater block within the MIP was cracked during the refusal attempts. This damage is not field-repairable and requires that the entire MIP unit be shipped to Geoprobe for repair. Columbia will use a backup MIP for the work scheduled for Tuesday 8/16. Columbia recommended that a pilot hole be drilled using a solid drive point from ground surface to 5 feet bgs through the landfill debris to avoid damaging the backup MIP.

Plans for Next Work Day:

Planned MIP work for Tuesday 8/16/2016 includes assessing the northwest side of the CVOC hotspot associated with tree R22-T1. MIP borings will then be advanced to the north and northeast of monitoring well P1-7 in an attempt to identify potential source areas.

Attachments:
None

Distribution:	**Resolution Consultants - DAILY FIELD REPORT**
Carlotta Cellucci, NAVFAC NW Tanwir Chaudhry, Navy EXWC Michael Singletary, NAVFAC SE David Einan, USEPA Hun Seak Park, Ecology John Evered, Ecology Denice Taylor, Suquamish Tribe Joann Grady, Grady and Associates	Signed: _Anthony Palmieri_____

Resolution Consultants *A Joint Venture of AECOM & EnSafe* 1111 Third Avenue Seattle, Washington 98101 206-438-2700	**Contract No.** N62470-11-D-8013, CTO JP09 Reference – Sampling and Analysis Plan – Keyport OU-1 Site Recharacterization; NAVFAC Northwest, dated July 1, 2016	**DAILY FIELD REPORT #2** **08/16/2016**
	Project: Keyport OU-1 Site Recharacterization	
	Location: Keyport, Washington	
	Client: Naval Facilities Engineering Command Northwest	**Contractor:** Resolution Consultants
	Weather: 70s; sunny; calm	
To: James Flynn, Debbie Rodenhizer	**From:** Anthony Palmieri	

DAILY FIELD REPORT

Personnel Onsite

Anthony Palmieri and Elyssa Dixon (Resolution)
Doug McInnes (Columbia Technologies)
Michael Running, Clifford Letts, and Dale Smith (Holt Services)
Carlotta Cellucci (NAVFAC NW)

Summary of Work Completed

- Completed seven MIP boring locations: MIP-005, MIP-006, MIP-007, MIP-008, MIP-009, MIP-010, and MIP-011.

Deviations from Work Plan

- Based on recommendations from Columbia Technologies and concurrence among Resolution Consultants and the Navy, the flame ionization detector (FID) instrumentation was disabled. The FID is typically used to evaluate volatile petroleum compounds, which are not the primary constituents of concern (COCs) at this site. This allows for the entire sample gas volume to be run through the XSD detector, which enables a better response for chlorinated volatile organics, which are the primary COCs.

- Prior to advancing the MIP, a pilot hole was drilled using a solid drive point from ground surface to 5 feet below ground surface (bgs) at each MIP location. The purpose of the pilot hole is to displace large landfill debris including concrete chunks, gravel and cobbles that could potential damage the MIP. The pilot hole was drilled using 1.75 inch diameter solid drive tip. The pilot hole is slight smaller in diameter than the 2.25 inch diameter MIP tool, which allows for the MIP sensors to still make contact with the borehole sidewall from ground surface to 5 feet bgs. This allows for MIP logging of the borehole while reducing the risk of encountering debris that could damage the MIP tooling.

Field Activity Summary

0700 Resolution Consultants onsite.

0715 Columbia Technologies onsite.

0725 Holt Services onsite.

0730 Daily safety meeting – Meeting focused on biological hazards (bees). Discussed scope of work for the day.

0830 Start MIP-005, which located between trees R23-T2 and R24-T2.

0935 Complete MIP-005 to 20 feet bgs.

1000 Holt sets up on MIP-006, located between trees R22-T2 and R21-T1.

1029 Start MIP-006.

1052 Complete MIP-006 to 18 feet bgs. Move to MIP-007

1117 Start MIP-007.

1147 Complete MIP-007 to 18 feet bgs.

1200 Move to MIP-008. Take lunch.

1258 Start MIP-008.

1330 Complete MIP-008 to 18 feet bgs.

1335 Move to MIP-009.

1345 Start MIP-009.

1420 Complete MIP-009 to 20 feet bgs.

1426 Move to MIP-010.

1442 Start MIP-010.

1510 Complete MIP-010 to 18 feet bgs.

1523 Move to MIP-011.

1545 Start MIP-011.

1605 Complete MIP-011 to 18 feet bgs. Begin to demobilize for day.

1630 Holt offsite.

1657 Columbia offsite.

1730 Resolution offsite.

Summary of Findings/Conclusions

Boring ID	Total Depth (ft bgs)	Max. XSD detection (uV) / depth (ft bgs)	Max. PID detection (uV) / depth (ft bgs)
MIP-005	20	45,778 uV / 11.95	353,481 uV / 16.95
MIP-006	18	135,807 uV /14.35	130,696 uV / 14.20
MIP-007	18	127,415 uV / 12.90	576,037 uV / 7.45
MIP-008	18	132,756 uV / 12.90	153,127 uV / 7.95
MIP-009	20	237,281 uV / 14.90	136,113 uV / 14.90
MIP—010	18	236,518 uV / 11.95	121,006 uV / 11.95
MIP-011	18	367,748 uV / 14.05	220,573 uV / 14.05

Plans for Next Work Day:

Planned MIP work for Wednesday 8/17/2016 includes assessing conditions adjacent to irrigation well IW1-S and monitoring wells MW1-16 and P1-6. MIP borings will then be advanced on the east and northeast portion of the landfill adjacent to Bradley Road and the former Hazardous Waste Building.

Attachments:
None

Distribution:	**Resolution Consultants - DAILY FIELD REPORT**
Carlotta Cellucci, NAVFAC NW Tanwir Chaudhry, Navy EXWC Michael Singletary, NAVFAC SE David Einan, USEPA Hun Seak Park, Ecology John Evered, Ecology Denice Taylor, Suquamish Tribe Joann Grady, Grady and Associates	Signed: Anthony Palmieri

Resolution Consultants *A Joint Venture of AECOM & EnSafe* 1111 Third Avenue Seattle, Washington 98101 206-438-2700	**Contract No.** N62470-11-D-8013, CTO JP09 Reference – Sampling and Analysis Plan – Keyport OU-1 Site Recharacterization; NAVFAC Northwest, dated July 1, 2016	**DAILY FIELD REPORT #3** **08/17/2016**
	Project: Keyport OU-1 Site Recharacterization	
	Location: Keyport, Washington	
	Client: Naval Facilities Engineering Command Northwest	**Contractor:** Resolution Consultants
	Weather: 70s; sunny; calm	
To: James Flynn, Debbie Rodenhizer	**From:** Anthony Palmieri	

DAILY FIELD REPORT

Personnel Onsite

Anthony Palmieri and Elyssa Dixon (Resolution)
Doug McInnes (Columbia Technologies)
Michael Running and Clifford Letts (Holt Services)
Carlotta Cellucci (NAVFAC NW)

Summary of Work Completed

- Completed seven MIP boring locations: MIP-012, MIP-013, MIP-014, MIP-015, MIP-016, MIP-017, and MIP-018.

Deviations from Work Plan

- MIP-018 was advanced to a total depth of 35 feet bgs, which is deeper than the total depth of 20 feet bgs proposed in the Sampling and Analysis Plan. This was done to assess vertical extent of impacts and determine the depth of the aquitard, which was encountered at 33 feet bgs. Therefore, future borings will be advanced to a minimum of 35 feet bgs in an attempt to ensure characterization of the vertical extent of contamination and attempt to encounter the aquitard.

Field Activities Summary

0650 Resolution Consultants onsite.

0705 Columbia Technologies onsite.

0708 Carlotta Cellucci (NAVFAC NW) onsite.

0715 Holt Services onsite.

0727 Daily safety meeting – Meeting focused on cellphone use while walking. Discussed scope of work for the day.

0812 Start MIP-012.

0837 Complete MIP-012 to 16 feet bgs.

0846 Move to MIP-013.

0905 Start MIP-013.

0928 Complete MIP-013 to 18 feet bgs.

0934 NAVFAC NW offsite. Move to MIP-014.

1000 Start MIP-014.

1027 Complete MIP-014 to 18 feet bgs.

1052 Move to MIP-015.

1107 Start MIP-015.

1145 Complete MIP-015 to 18 feet bgs. Take lunch.

1250 Start MIP-016.

1325 Complete MIP-016 to 20 feet bgs.

1340 Move to MIP-017.

1400 Start MIP-017.

1445 Complete MIP-017 to 22 feet bgs.

1530 Start MIP-018.

1620 @ 26 feet bgs, EC and HPT logs show no indication of materials consistent with an aquitard, discuss with Carlotta Cellucci (NAVFAC NW) and Jim Flynn (Resolution). All agree that MIP should be advanced until an aquitard is encountered.

1643 Encounter aquitard at 33 feet bgs. Complete MIP-018 to 35 feet bgs. Begin to demobilize for day.

1700 Holt and NAVFAC NW offsite.

1708 Resolution offsite.

1808 Columbia offsite.

Summary of Findings/Conclusions

Boring ID	Total Depth (ft bgs)	Max. XSD detection (uV) / depth (ft. bgs)	Max. PID detection (uV) / depth (ft. bgs)
MIP-012	16	70.193 uV / 11.00	75,838 uV / 1.00
MIP-013	18	133,518 uV / 12.85	139,241 uV / 12.85
MIP-014	18	495,926 uV / 7.95	398,114 uV / 5.85
MIP-015	18	145,726 uV / 7.00	70,421 uV / 13.55
MIP-016	20	267,037 uV / 8.90	276,498 uV / 8.55
MIP-017	22	1,023,896 uV / 7.05	1,893,521 uV / 19.55
MIP-018	35	740,837 uV / 17.65	1,765,877,573 uV / 21.95

Plans for Next Work Day:

Planned MIP work for Thursday 8/18/2016 includes stepout borings north and west of MIP-0017 and MIP-018 to further characterize the extent of contamination in the eastern portion of the landfill.

Attachments:
None

Distribution:	**Resolution Consultants - DAILY FIELD REPORT**
Carlotta Cellucci, NAVFAC NW Tanwir Chaudhry, Navy EXWC Michael Singletary, NAVFAC SE David Einan, USEPA Hun Seak Park, Ecology John Evered, Ecology Denice Taylor, Suquamish Tribe Joann Grady, Grady and Associates	Signed: _Anthony Palmieri_____

Resolution Consultants *A Joint Venture of AECOM & EnSafe* 1111 Third Avenue Seattle, Washington 98101 206-438-2700	**Contract No.** N62470-11-D-8013, CTO JP09 Reference – Sampling and Analysis Plan – Keyport OU-1 Site Recharacterization; NAVFAC Northwest, dated July 1, 2016	**DAILY FIELD REPORT #4** **08/18/2016**
	Project: Keyport OU-1 Site Recharacterization	
	Location: Keyport, Washington	
	Client: Naval Facilities Engineering Command Northwest	**Contractor:** Resolution Consultants
	Weather: 80s; sunny; light wind	
To: James Flynn, Debbie Rodenhizer	**From:** Elyssa Dixon	

DAILY FIELD REPORT

Personnel Onsite

Anthony Palmieri and Elyssa Dixon (Resolution)
Doug McInnes (Columbia Technologies)
Michael Running and Clifford Letts (Holt Services)
Carlotta Cellucci (NAVFAC NW)

Summary of Work Completed

- Completed four MIP boring locations: MIP-019, MIP-020, MIP-021, and MIP-022.
- Partially complete one additional MIP boring location: MIP-023
- NAVFAC NW contracted Pipe Experts LLC to complete video surveillance of onsite storm drains.

Deviations from Work Plan

- None

Field Activities Summary

0630 Resolution Consultants onsite.

0705 Holt Services onsite.

0708 NAVFAC NW onsite.

0710 Columbia Service onsite.

0715 Daily safety meeting – Meeting focused on drilling hazards and heat stress. Discussed scope of work for the day.

0735 Mobilize to MIP-019, located approximately 20 feet south of MIP-018 and approximately 9 feet northwest of the southeastern site fence corner.

0805 Start MIP-019.

0900 Complete MIP-019 to 36 feet bgs.

0910 Holt noted damaged thread on probe rod. Columbia disconnected trunk line and replaced the rod.

0952 Start MIP-020, located approximately 14 feet southeast of the corner fence post southeastern of the Former Hazardous Waste Storage Area.

1055 Met refusal at MIP-020 at 36 feet bgs. Aquitard not encountered.

1100 Driller strips another probe rod cap while pulling rods out. Resolution advises that Holt use rod grip.

1125 Mobilize to MIP-021, located approximately 4.5 feet north of tree R3-T4. Buried catch basin indicated on drawings north of tree R7-T5 is a manhole based on Pipe Experts LLC video. Concrete pipe runs approximately 45 degrees to the northeast in addition to south towards known outfall. Observe concrete pipe could connect to swale located on east side of Bradley Road.

1135 Resolution (Anthony Palmieri) and NAVFAC NW offsite. Resolution (Elyssa Dixon) oversees Pipe Experts LLC work to locate storm drains.

1145 Start MIP-021.

1210 Open manhole cover with "Drain" label located in center of Bradley Road. No pipes observed to west. Observe swale north of South Plantation on west side of Bradley Road has culvert (corrugated metal) to south. Pipe Experts LLC will video.

1305 Complete MIP-021 to 28 ft bgs. Aquitard encountered. Pipe Experts LLC video equipment was stopped by Styrofoam in corrugated metal pipe. Attempt to uncover buried manhole at tree R7-T5, but 2-3" tree root crosses over top and lid cannot be opened (present approximately 1 ft bgs). Review known stormwater pipe locations with Holt to avoid conflicts with planned drilling locations are placed out of limits.

1335 Holt onsite.

1405 Mobilize to MIP-022, located approximately half way between trees R3-T2 and R3-T3.

1415 Start MIP-022.

1445 Refusal at 22 feet bgs. Aquitard not encountered.

1500 Mobilize to MIP-023 located approximately 7 feet southeast of tree R4-T1.

1530 Reach 15 feet bgs and pressure in probe increases to levels above operable conditions. Columbia stops boring and pulls probe up to troubleshoot.

1600 MIP box is broken – leak is visible. Columbia will follow up on delivery schedule for replacement MIP Friday AM. Contingency plan developed for potential half day work on Friday.

1620 Holt Services offsite.

16400 Resolution offsite. Columbia to remain onsite to perform equipment preparation for replacement MIP.

1715 Columbia offsite.

Summary of Findings/Conclusions

Boring ID	Total Depth (ft bgs)	Max. XSD detection (uV) / depth (ft. bgs)	Max. PID detection (uV) / depth (ft. bgs)
MIP—019	20	1,468,017 uV at 19.95	781,274 uV at 19.95
MIP-020	16	800,806 uV at 7.05	642,415 uV at 7.05
MIP-021	16	315,790 uV at 7.10	216,681 uV at 7.90
MIP-022	22	749,840 uV at 5.95	379,955 uV at 5.95

MIP-023 was abandoned at 15 feet bgs when the probe pressure increased above operable conditions. Collected data for MIP-023 reported a maximum XSD detection of 95,828 uV at 6.95 feet bgs and a maximum PID detection of 93,844 uV at 10.00 feet bgs.

It was observed that the heater block within the MIP was cracked during drilling. This damage is not field-repairable and requires that the entire MIP unit be shipped to Geoprobe for repair. Columbia will follow up with Geoprobe to obtain shipment information regarding backup MIP ordered earlier in the week. Resolution requested that Columbia order two additional backup MIPs to prevent lost days in the future.

Plans for Next Work Day:

Planned work for Friday 8/19/2016 includes completing utility locate for Bradley Road and the Central Landfill. Columbia will call Geoprobe in the morning and share delivery timeline for replacement probe. If probe is delivered before 1200, Columbia and Holt will mobilize to the site and re-drill MIP-023 to locate the aquitard and continue at locations to the east of MIP-021, MIP-022 and MIP-023 for a half day of work.

Attachments:

None

Distribution:	**Resolution Consultants - DAILY FIELD REPORT**
Carlotta Cellucci, NAVFAC NW Tanwir Chaudhry, Navy EXWC Michael Singletary, NAVFAC SE David Einan, USEPA Hun Seak Park, Ecology John Evered, Ecology Denice Taylor, Suquamish Tribe Joann Grady, Grady and Associates	Signed: Elyssa Dixon

Resolution Consultants *A Joint Venture of AECOM & EnSafe* 1111 Third Avenue Seattle, Washington 98101 206-438-2700	**Contract No.** N62470-11-D-8013, CTO JP09 Reference – Sampling and Analysis Plan – Keyport OU-1 Site Recharacterization; NAVFAC Northwest, dated July 1, 2016	**DAILY FIELD REPORT #5** **08/19/2016**
	Project: Keyport OU-1 Site Recharacterization	
	Location: Keyport, Washington	
	Client: Naval Facilities Engineering Command Northwest	**Contractor:** Resolution Consultants
	Weather: 80s; sunny; no wind	
To: James Flynn, Debbie Rodenhizer	**From:** Elyssa Dixon	

DAILY FIELD REPORT

Personnel Onsite
Elyssa Dixon (Resolution)
Carlotta Cellucci (NAVFAC NW)
Dane Aaro (APS)

Summary of Work Completed
- Completed utility locate of Bradley Road and the Central Landfill

Deviations from Work Plan
- None

Field Activity Summary

0620 Resolution Consultants onsite. APS onsite prior to arrival and partially complete with Bradley Road locate. Mark additional locations from map for locate.

0640 NAVFAC NW onsite. Resolution and NAVFAC NW walk marked locations and shift some within the Central Landfill to be closer to the motorcycle area.

0715 NAVFAC NW checks Central Landfill locations with motorcycle training staff and adjust as necessary.

0745 Columbia notifies that replacement MIP will not be delivered in time to complete additional locations. He will notify Holt and plans to get Saturday daily badge to set probe set up for Monday work.

0845 Complete utility locate and APS signs dig permits.

0850 NAVFAC NW and APS offsite.

0900 Update site map with MIP-022 and MIP-023 locations and drop off additional coolers in storage shed.

0920 Resolution offsite.

Summary of Findings/Conclusions

- None

Plans for Next Work Day:

Planned work for Monday 8/22/2016 includes completing additional MIP locations including re-drilling MIP-023 to locate the aquitard and continue at locations to the east of MIP-021, MIP-022 and MIP-023.

ATTACHMENTS:
None

Distribution: Carlotta Cellucci, NAVFAC NW Tanwir Chaudhry, Navy EXWC Michael Singletary, NAVFAC SE David Einan, USEPA Hun Seak Park, Ecology John Evered, Ecology Denice Taylor, Suquamish Tribe Joann Grady, Grady and Associates	**Resolution Consultants - DAILY FIELD REPORT** Signed: _Elyssa Dixon_____

Resolution Consultants *A Joint Venture of AECOM & EnSafe* 1111 Third Avenue Seattle, Washington 98101 206-438-2700	**Contract No.** N62470-11-D-8013, CTO JP09 Reference – Sampling and Analysis Plan – Keyport OU-1 Site Recharacterization; NAVFAC Northwest, dated July 1, 2016	**DAILY FIELD REPORT #6** **08/22/2016**
	Project: Keyport OU-1 Site Recharacterization	
	Location: Keyport, Washington	
	Client: Naval Facilities Engineering Command Northwest	**Contractor:** Resolution Consultants
	Weather: 60s/70s; overcast; light wind	
To: James Flynn, Debbie Rodenhizer	**From:** Elyssa Dixon	

DAILY FIELD REPORT

Personnel Onsite
Elyssa Dixon (Resolution)
Doug McInnes (Columbia Technologies)
Michael Running and Clifford Letts (Holt Services)
Carlotta Cellucci (NAVFAC NW)

Summary of Work Completed
- Completed four MIP boring locations: MIP-023, MIP-024, MIP-025, and MIP-026. MIP-023 was re-drilled to depth.

Deviations from Work Plan
- None

Field Activities Summary

06500 Resolution Consultants onsite.

0700 Holt Services and NAVFAC NW onsite.

0715 NAVFAC NW offsite to review status of dig permits.

0725 Columbia Services onsite.

0730 Daily safety meeting – Meeting focused on drilling hazards and slips, trips and falls – hole with buried manhole in work area and marked with cone. Discussed scope of work for the day. Columbia start set up of replacement probe.

0845 Mobilize to MIP-023, originally located approximately 7 feet southeast of tree R4-T1. Location was shifted approximately 1 foot south to re-drill.

0900 Start MIP-023. NAVFAC NW on site for conference call with stakeholders.

1000 Complete MIP-023 to 37 feet bgs. Aquitard encountered.Holt noted damaged thread on probe rod. Columbia disconnected trunk line and replaced the rod.

1015 Mobilize to MIP-024 located approximately 9 feet northeast of tree R7-T7.

1035 Start MIP-024.

1100 NAVFAC NW off site.

1105 Soil in MIP-024 starting at approximately 19 feet bgs transitions to very hard.

1145 Complete MIP-024 to 37 feet bgs. Aquitard encountered based on HPT response.

1210 Holt offsite for lunch.

1240 Mobilize to MIP-025 located approximately 6 feet southwest of tree R6-T3.

1255 Start MIP-025.

1355 Complete MIP-025 to 34 feet bgs. Aquitard encountered. Soil transitions to hard at similar depth to MIP-024.

1415 Mobilize to MIP-026 located approximately 12 feet southeast of tree R6-T1.

1440 Start MIP-026.

1535 Discuss next locations approach with Anthony Palmieri (Resolution). Will move to location next to catch basin if drilling more today.

1555 Complete MIP-026 to 36 feet bgs. Aquitard encountered. Soil transitions to hard at similar depth to MIP-024 and MIP-025.

1610 Not enough time to drill fifth location, but will move to eastern side of site to start Tuesday morning.

1625 Mobilize to MIP-027 located between MW1-5 and tree R26-T3.

1635 Holt offsite.

1640 Depth potentiometer and probe membrane were broken in MIP-026 and replaced.

1645 Resolution offsite. Columbia to remain onsite to prepare for Tuesday work.

1700 Columbia offsite.

Summary of Findings/Conclusions

Boring ID	Total Depth (ft bgs)	Max. XSD detection (uV) / depth (ft. bgs)	Max. PID detection (uV) / depth (ft. bgs)
MIP-023	37	93,081 uV / 32.85	131,611 uV / 32.85
MIP-024	37	109,104 uV / 12.05	114,597 uV / 11.95
MIP-025	34	154,118 uV / 10.95	138,096 uV / 10.95
MIP-026	36	63,326 uV / 11.95	64,928 uV at 33.45

It was observed that the membrane and depth potentiometer broke during the final boring. Both pieces of equipment were replaced.

Plans for Next Work Day:

Planned work for Tuesday 8/23/2016 includes completing additional MIP boring locations starting on the eastern side of the South Plantation.

Attachements:
None

Distribution:	**Resolution Consultants - DAILY FIELD REPORT**
Carlotta Cellucci, NAVFAC NW Tanwir Chaudhry, Navy EXWC Michael Singletary, NAVFAC SE David Einan, USEPA Hun Seak Park, Ecology John Evered, Ecology Denice Taylor, Suquamish Tribe Joann Grady, Grady and Associates	Signed: _Elyssa Dixon_____

Resolution Consultants
A Joint Venture of AECOM & EnSafe
1111 Third Avenue
Seattle, Washington 98101
206-438-2700

Contract No. N62470-11-D-8013, CTO JP09 Reference – Sampling and Analysis Plan – Keyport OU-1 Site Recharacterization; NAVFAC Northwest, dated July 1, 2016	**DAILY FIELD REPORT #7** **08/23/2016**
Project: Keyport OU-1 Site Recharacterization	
Location: Keyport, Washington	
Client: Naval Facilities Engineering Command Northwest	**Contractor:** Resolution Consultants
Weather: 70s; sunny; light wind	
To: James Flynn, Debbie Rodenhizer	**From:** Elyssa Dixon

DAILY FIELD REPORT

Personnel Onsite
Elyssa Dixon (Resolution)
Doug McInnes (Columbia Technologies)
Michael Running and Clifford Letts (Holt Services)
Carlotta Cellucci (NAVFAC NW)

Summary of Work Completed
- Completed five MIP boring locations: MIP-027, MIP-028, MIP-029, MIP-030, and MIP-031.

Deviations from Work Plan
- None

Field Activity Summary

0700 Resolution Consultants and Holt Services onsite.

0705 Columbia Services onsite.

0715 Daily safety meeting – Meeting focused on drilling hazards and not becoming complacent with work. Discussed scope of work for the day.

0720 Mobilize to MIP-027 located approximately 9 feet southeast of tree MW1-5.

0750 Start MIP-027.

0820 Hard layer encountered at approximately 19 feet bgs in MIP-027.

0900 Complete MIP-027 to 37 feet bgs. Aquitard encountered.

0915 Mobilize to MIP-028 located approximately 6 feet southeast for tree R22-T7.

0930 Start drilling MIP-028.

1000 Drilling gets harder at approximately 24 feet bgs. Columbia comments that increased PID levels could be from heavier compounds (paint/paint thinner/xylenes). PID calibration shows consistent zero readings and peaks indicative of TCE and isobutylene used to check the response.

1035 Complete MIP-028 to 38 feet bgs in MIP-028. Aquitard not encountered.

1050 Mobilize to MIP-029 located approximately 5 feet southeast of tree R21-T4.

1100 Start MIP-029.

1145 Softer soil encountered at approximately 12 feet bgs in MIP-029. PID shows similar response to MIP-028. Columbia will check filters and instruments in line for potential contamination if XSD response is impacted.

1155 NAVFAC NW onsite. Review complete locations and requests drilling move back to the east to west approach. Review map and determine next location between MIP-001 and MIP-004. Then move to the northeast across site.

1205 MIP-029 reach bottom of rods at approximately 38 feet bgs and aquitard not encountered. Add rod to attempt deeper probe at request of NAVFAC NW.

1210 NAVFAC NW offsite.

1230 Complete MIP-029 at 41.7 feet bgs. Do not reach aquitard, but decide to finish boring without adding more rods because XSD and PID responses are minimal.

1240 Creosote-type odor observed when pulling probe up from MIP-029. Mobilize to MIP-030 located approximately 7 feet southeast of R21-T1.

1250 Holt offsite to get lunch.

1300 Holt onsite. Columbia start set up for MIP-030.

1315 AECOM discusses moving next location to uncharacterized zone near tree rows 8-13.

1320 Start MIP-030.

1330 NAVFAC NW on site. Discuss AECOM plan and NAVFAC NW recommends sticking with original discussion as samples to depth are limited in the western central zone as existing MIP locations were completed at original shallow depths.

1405 MIP-030 drilling gets hard at approximately 32-33 feet bgs. Columbia asks Holt to slow the hammer.

1410 MIP-030 completed to refusal at 35 feet bgs. Soil too hard to continue drilling. Aquitard not encountered.

1430 Mobilize to MIP-031 located approximately 5 feet southeast of tree R19-T4. Review ROD and RI/FS with NAVFAC NW to identify suspected fenster depth in central landfill.

1435 Start MIP-031.

1445 NAVFAC NW offsite.

1530 MIP-031 completed to refusal at 35 feet bgs. Soil too hard to continue drilling. Aquitard not encountered.

1540 Columbia completed end of day tests. AECOM discuss time savings with Columbia of stopping borings at 35 feet bgs if not XSD or PID responses are present at deeper depths. This will likely save at least 10 minutes per boring because this deep soil has been observed as fairly dense.

1600 Mobilize to MIP-032 located next to tree R11-T6.

1610 Holt offsite.

1620 Resolution offsite. Columbia remained on site to refuel generator and finalize paperwork in preparation for work on Wednesday.

1645 Columbia offsite.

Summary of Findings/Conclusions

Boring ID	Total Depth (ft bgs)	Max. XSD detection (uV) / depth (ft. bgs)	Max. PID detection (uV) / depth (ft. bgs)
MIP-027	37	37,385 uV / 15.30	131,458 uV / 31.85
MIP-028	38	30,519 uV / 12.95	112,918 uV / 32.00
MIP-029	41.7	155,644 uV / 14.90	442,213 uV / 14.90
MIP-030	35	129,704 uV / 11.05	209,128 uV / 7.85
MIP-031	35	86,978 uV / 11.90	106,204 uV / 11.85

The aquitard was not encountered at most locations due to reaching maximum desired exploration depths (MIP-028 and MIP-029) or refusal (MIP-030 and MIP-031).

Plans for Next Work Day:

Planned work for Wednesday 8/24/2016 includes completing additional MIP boring locations starting in the uncharacterized zone in the western central portion of the South Plantation.

Attachments:
None

Distribution: Carlotta Cellucci, NAVFAC NW Tanwir Chaudhry, Navy EXWC Michael Singletary, NAVFAC SE David Einan, USEPA Hun Seak Park, Ecology John Evered, Ecology Denice Taylor, Suquamish Tribe Joann Grady, Grady and Associates	**Resolution Consultants - DAILY FIELD REPORT** Signed: _Elyssa Dixon_____

Resolution Consultants *A Joint Venture of AECOM & EnSafe* 1111 Third Avenue Seattle, Washington 98101 206-438-2700	**Contract No.** N62470-11-D-8013, CTO JP09 Reference – Sampling and Analysis Plan – Keyport OU-1 Site Recharacterization; NAVFAC Northwest, dated July 1, 2016	**DAILY FIELD REPORT #8** **08/24/2016**
	Project: Keyport OU-1 Site Recharacterization	
	Location: Keyport, Washington	
	Client: Naval Facilities Engineering Command Northwest	**Contractor:** Resolution Consultants
	Weather: 70s; sunny; light wind	
To: James Flynn, Debbie Rodenhizer	**From:** Elyssa Dixon	

DAILY FIELD REPORT

Personnel Onsite
Elyssa Dixon (Resolution)
Doug McInnes (Columbia Technologies)
Michael Running and Clifford Letts (Holt Services)

Summary of Work Completed
- Completed four MIP boring locations: MIP-032, MIP-033, MIP-034, and MIP-035.

Deviations from Work Plan
- None

Field Activities Summary

0655 Resolution Consultants onsite.

0705 Columbia Services onsite.

0715 Holt Services onsite.

0720 Daily safety meeting – Meeting focused on drilling hazards and avoiding chemical exposure. Discussed scope of work for the day.

0725 Set up at MIP-032 located approximately 5 feet southwest of tree R11-T6.

0750 Start drilling MIP-032.

0850 Complete MIP-032 to 40 feet bgs. Aquitard encountered. Overall soil was less hard over depth profile than locations from Monday and Tuesday.

0905 Mobilize to MIP-033 located approximately 6 feet southwest of tree R13-T6.

0930 Start drilling MIP-033.

0940 Tear in trunk line is identified near connection to MIP as a result of a sharp metal edge in the rod cap. Holt grinds this down and Columbia begins repairs.

1105 Columbia finishes tests on repaired MIP. Start drilling MIP-033. High electrical conductivity encountered at 2 feet bgs likely from metal or comparable – drilled through.

1120 High temperature warning on MIP at 14 feet bgs. Columbia states that actual probe temperatures cannot fluctuate as rapidly as shown, so likely a result of thermocouple failure. Readings for other sensors appear unaffected, so will continue to monitor.

1125 High temperature readings at MIP-033 return to more normal readings, so Columbia does not believe it was caused by the thermocouple.

1140 HPT at MIP-033 fluctuating a lot, but Columbia does not believe this to be a result of equipment failure because readings would remain consistently high. Columbia will clean the filter this weekend to reduce potential issues.

1200 Complete MIP-033 to 40 feet bgs at refusal due to hard drilling. Aquitard possibly encountered. No tears are observed in the trunk line to cause the high temperature readings and thermocouple tests all pass.

1220 Holt offsite to get lunch.

1245 Holt onsite. Lunch.

1300 Mobilize to MIP-034 located approximately 7 feet southeast of tree R14-T3.

1310 Start drilling MIP-034.

1320 Conversation with NAVFAC NW on status of work; will not be on site today, but will come out tomorrow. Aiming to complete some clearing and grubbing on Monday. The Dig Permit for the Central Landfill has not been processed, so will continue to work in the South Plantation Thursday and Friday.

1345 Temperature has not been an issue at MIP-034.

1405 Complete MIP-034 to 39 feet bgs. Aquitard not encountered.

1415 Mobilize to MIP-035 located approximately 6 feet southeast of tree R12-T4.

1435 Start drilling MIP-035.

1505 Discuss soil gas sampling methodology for sampling next week with Anthony Palmieri (AECOM).

1515 Call NAVFAC NW to discuss escort required for clearing and grubbing subcontractor on Monday; escort is fine, but escorts cannot drive vehicle onsite. If equipment is smaller, NAVFAC NW could transport onsite. Anthony indicates that subcontractor intends to bring vehicle onsite requiring class c permit. Leave message with Scott Skolnik to discuss day pass options.

1540 Complete MIP-035 to 40 feet bgs. Aquitard encountered.

1600 Mobilize to MIP-036 located near tree R12-T1.

1620 Holt offsite.

1630 Resolution offsite. Columbia remained on site to refuel generator and finalize paperwork in preparation for work on Thursday.

1640 Columbia offsite.

Summary of Findings/Conclusions

Boring ID	Total Depth (ft bgs)	Max. XSD detection (uV) / depth (ft. bgs)	Max. PID detection (uV) / depth (ft. bgs)
MIP-032	40	92,318 uV / 9.95	127,949 uV / 9.95
MIP-033	40	74,007 uV / 12.95	80,645 uV / 29.00
MIP-034	39	373,089 uV / 9.85	270,623 uV / 9.85
MIP-035	40	167,089 uV / 12.95	112,537 uV / 12.95

The aquitard was encountered at two locations (MIP-032 and MIP-035) at approximately 40 feet bgs.

Plans for the Following Day:

Planned work for Thursday 8/25/2016 includes completing additional MIP boring locations continuing in the uncharacterized zone in the western central portion of the South Plantation.

Attachments:
None

Distribution:	**Resolution Consultants - DAILY FIELD REPORT**
Carlotta Cellucci, NAVFAC NW Tanwir Chaudhry, Navy EXWC Michael Singletary, NAVFAC SE David Einan, USEPA Hun Seak Park, Ecology John Evered, Ecology Denice Taylor, Suquamish Tribe Joann Grady, Grady and Associates	Signed: _Elyssa Dixon_____

Resolution Consultants *A Joint Venture of AECOM & EnSafe* 1111 Third Avenue Seattle, Washington 98101 206-438-2700	**Contract No.** N62470-11-D-8013, CTO JP09 Reference – Sampling and Analysis Plan – Keyport OU-1 Site Recharacterization; NAVFAC Northwest, dated July 1, 2016	**DAILY FIELD REPORT #9** **08/25/2016**
	Project: Keyport OU-1 Site Recharacterization	
	Location: Keyport, Washington	
	Client: Naval Facilities Engineering Command Northwest	**Contractor:** Resolution Consultants
	Weather: 70s/80s; sunny; light wind	
To: James Flynn, Debbie Rodenhizer	**From:** Elyssa Dixon	

DAILY FIELD REPORT

Personnel Onsite

Elyssa Dixon (Resolution)
Doug McInnes (Columbia Technologies)
Michael Running and Clifford Letts (Holt Services)
Carlotta Cellucci and Charlie Escola (NAVFAC NW)

Summary of Work Completed

- Completed four MIP boring locations: MIP-036, MIP-037, MIP-038, and MIP-039.

Deviations from Work Plan

- None

Field Activities Summary

0700 Resolution Consultants onsite.

0705 Holt Services onsite.

0715 Columbia Services onsite.

0720 Daily safety meeting – Meeting focused on drilling hazards and orienting drill rig and MIP support vehicle to avoid exhaust fumes in work space. Discussed scope of work for the day.

0725 Set up at MIP-036 located approximately 6 feet southeast of tree R12-T1.

0745 Start drilling MIP-036.

0750 Temperature readings start fluctuating, so Columbia pulls probe back. Columbia believes the thermocouple needs replacement. Bubbles are also observed on the heat box. A new probe was delivered on Wednesday if needed.

0800 MIP heating up to touch, but temperature changes are not registering on the gauge. Flow readings are within an acceptable range, so probe likely not leaking. Columbia will replace the thermocouple.

0815 Thermocouple replaced.

0830 Conversation with Scott Skolnik (NAVFAC NW Security) regarding access for clearing and grubbing subcontractor (Clearcreek Contractors). He should be able to process daily pass request for Monday work if submitted Thursday morning. Charlie Escola (NAVFAC NW) onsite.

0840 Thermcouple tests passed on probe. Start drilling MIP-036.

0845 Charlie (NAVFAC NW) offsite.

0920 Reach 30 feet bgs in MIP-036 and XSD shows no signs of contamination. Columbia suggest that high EC spikes near surface are likely a result of landfill debris. Charlie (NAVFAC NW) onsite to inform that waste disposal for the drums is set up and will send paperwork to Carlotta Cellucci (NAVFAC NW). Resolution notified by Carlotta (NAVFAC NW) that dig permit for Central Landfill is in place.

0930 Complete MIP-036 to 34 feet bgs; stopped high than 35 feet bgs because rod transition occurs at 34 feet bgs and XSD concentrations didn't change. Charlie (NAVFAC NW) offsite.

0940 Plan to move to Central Landfill on Friday.

0945 Mobilize to MIP-037 approximately 7 feet northeast of tree R11-T2.

1000 Start MIP-037.

1040 Pressure out of range warning on MIP. No bubbles or kinks in lines. Flow level staying constant. Columbia will monitor.

1100 Complete MIP-037 to 40.5 feet bgs. Aquitard encountered. Start pulling probe. Columbia will troubleshoot potential issues causing pressure warning.

1115 Holt offsite to get lunch.

1120 Carlotta (NAVFAC NW) onsite. Discuss approach for remaining work. Due to unknown nature of Central Landfill and possibility of breaking probe, decide to postpone Central Landfill work until access next week.

1130 MIP is not functioning properly, so Columbia will install new probe.

1140 Carlotta (NAVFAC NW) offsite. Holt onsite.

1155 Conversation with Constance Lapite (Resolution) to discuss waste characterization.

1225 Decon water and calibration solution (TCE and water) are currently in the same drum. About a quarter of a bucket of calibration solution is in the drum. Holt does not believe a full drum will be used.

1230 Pressure readings are not correct, but new probe has been installed. Columbia troubleshoots.

1300 Pressure fixed through testing individual sections of lines and backwashing section likely causing block. Mobilize to MIP-038 located approximately 4 feet southeast of tree R10-T4.

1305 Start drilling MIP-038.

1330 Conversations with Tony Palmieri (Resolution) regarding potential rain forecast for soil gas sampling next week. Will notify Cascade Drilling to give heads up.

1345 Conversation with Debbie Rodenhizer (Resolution) regarding waste characterization.

1400 Soil got harder in MIP-038 around 25 feet bgs (at approximately 34 feet now).

1410 Complete MIP-038 to 39 feet bgs. Aquitard possibly encountered.

1425 Mobilize to MIP-039 located approximately 7 feet southeast of tree R9-8.

1445 Start drilling MIP-039.

1500 John Sohl (Columbia) onsite to review the status of MIP work.

1520 John (Columbia) offsite.

1550 Complete MIP-039 to approximately 41 feet bgs. Aquitard not encountered based on no EC spike.

1625 Holt offsite. Conversation with Carlotta (NAVFAC NW) – calibration solution can likely go in same drum as decon water because diluted (not pure) TCE. Dig permit update for Bradley Road should come Friday AM.

1640 Columbia has only used TCE for calibration and no toluene.

1645 Resolution offsite. Columbia will remain to finish paperwork and prepare for Friday work.

1700 Columbia offsite.

Summary of Findings/Conclusions

Boring ID	Total Depth (ft bgs)	Max. XSD detection (uV) / depth (ft. bgs)	Max. PID detection (uV) / depth (ft. bgs)
MIP-036	34	25,178 uV / 12.00	64,318 uV / 33.55
MIP-037	40.5	231,178 uV / 11.95	183,264 uV / 11.95
MIP-038	39	99,185 uV / 11.95	94,607 uV / 35.95
MIP-039	41	65,615 uV / 14.95	90,335 uV / 14.95

The aquitard was encountered at one location (MIP-039) at approximately 40 feet bgs.

Plans for the Following Day:

Planned work for Friday 8/26/2016 includes completing additional MIP boring locations continuing in the uncharacterized zone in the western central portion of the South Plantation.

ATTACHMENTS:
None

Distribution:	**Resolution Consultants - DAILY FIELD REPORT**
Carlotta Cellucci, NAVFAC NW Tanwir Chaudhry, Navy EXWC Michael Singletary, NAVFAC SE David Einan, USEPA Hun Seak Park, Ecology John Evered, Ecology Denice Taylor, Suquamish Tribe Joann Grady, Grady and Associates	Signed: _Elyssa Dixon_____

Resolution Consultants *A Joint Venture of AECOM & EnSafe* 1111 Third Avenue Seattle, Washington 98101 206-438-2700	**Contract No.** N62470-11-D-8013, CTO JP09 Reference – Sampling and Analysis Plan – Keyport OU-1 Site Recharacterization; NAVFAC Northwest, dated July 1, 2016	**DAILY FIELD REPORT #10** **08/26/2016**
	Project: Keyport OU-1 Site Recharacterization	
	Location: Keyport, Washington	
	Client: Naval Facilities Engineering Command Northwest	**Contractor:** Resolution Consultants
	Weather: 70s/80s; sunny; light wind	
To: James Flynn, Debbie Rodenhizer	**From:** Elyssa Dixon	

DAILY FIELD REPORT

Personnel Onsite

Elyssa Dixon (Resolution)
Doug McInnes (Columbia Technologies)
Michael Running and Clifford Letts (Holt Services)

Summary of Work Completed

- Completed five MIP boring locations: MIP-040, MIP-041, MIP-042, MIP-043, and MIP-044.

Deviations for Work Plan

- None

Field Activities Summary

0700 Resolution Consultants and Holt Services onsite.

0710 Columbia Services onsite.

0715 Daily safety meeting – Meeting focused on drilling hazards and heat stress. Discussed scope of work for the day.

0720 Mobilize to MIP-040 located approximately 6 feet east of tree R11-T8 and set up.

0750 Start drilling MIP-040.

0845 Notified that Bradley Road dig permit has been approved.

0900 Complete MIP-040 to 38 feet bgs. Aquitard not encountered. Start pulling probe.

0915 Mobilize to MIP-041 located approximately 6 feet south of tree R12-T11.

0930 Start MIP-041.

1005 Soil gets harder starting around 26 feet bgs.

1040 Complete MIP-041 to 42 feet bgs. Aquitard not encountered. PID detections higher over most of depth. Pull up probe.

1100 Mobilize to MIP-042 located approximately 7 feet southeast of tree R14-T9.

1105 Decon bucket on back of drill rig splashing over while moving. Request Holt keep less full or hand carry between locations to prevent spillage.

1120 Start MIP-042.

1130 Inform Carlotta Cellucci (NAVFAC NW) of approved Bradley Road dig permit and discuss work next week, completed locations today and PID detections.

1150 Call from Kasey Goble (Cascade Drilling) to confirm logistics for soil gas sampling starting on Monday.

1225 Complete MIP-042 to 38 feet bgs. Aquitard not encountered. Hit something hard near the bottom. Start pulling up probe.

1240 Holt offsite for lunch.

1305 Columbia prepping for MIP-043.

1310 Holt onsite.

1320 Mobilize to MIP-043 located approximately 8 feet southeast of tree R14-T11.

1325 Start MIP-043.

1410 Additional backup MIP should be delivered tomorrow. Drilling gets pretty hard around 25 feet bgs.

1425 Complete MIP-043 to 35 feet bgs. Aquitard not encountered.

1440 Mobilize to MIP-044 located approximately 6 feet south of tree R16-T11. Start set up.

1455 Start MIP-044. Day passes were approved for Clearcreek (clearing and grubbing subcontractor) for work on Monday.

1610 Complete MIP-044 to 40 feet bgs. Aquitard not encountered.

1620 MIP and rods not coming up. Tried rethreading twice and didn't work, but will try again.

1625 Pulled up 6 rods and manually pulled on trunk line to break as close to MIP as possible. 5-6 rods and MIP stuck in ground. Timing of delivery for back up MIP tomorrow not known.

1630 Conversation with Anthony Palmieri (Resolution) regarding status of planned Saturday work. Have approximately 15 locations remaining in South Plantation area if get everything currently planned. Decide to try to work Saturday afternoon depending on the time the probe arrives.

1645 Inform Carlotta Cellucci (NAVFAC NW) of work status; bad service cuts off call.

1650 Decide Holt will get to their shop at 10 am on Saturday and wait for a call when Columbia receives the probe. If it isn't delivered before 12 pm, we will not work. Holt offsite.

1715 Columbia offsite.

1725 Resolution offsite.

Summary of Findings/Conclusions

Boring ID	Total Depth (ft bgs)	Max. XSD detection (uV) / depth (ft. bgs)	Max. PID detection (uV) / depth (ft. bgs)
MIP-040	38	96,896 uV / 12.00	131,993 uV / 12.00
MIP-041	42	550,096 uV / 8.90	128,330 uV / 8.90
MIP-042	38	61,037 uV / 12.10	86,825 uV / 12.10
MIP-043	35	260,933 uV / 12.05	309,305 uV / 12.05
MIP-044	40	57,222 uV / 13.20	78,814 uV / 33

The aquitard was not encountered at any locations. PID readings are observed at depths without comparable XSD readings.

Plans for the Following Day:

Planned work for Saturday 8/27/2016 includes completing additional MIP boring locations in the central portion of the South Plantation. Work is dependent on arrival time of the backup MIP.

Attachments:
None

Distribution:	**Resolution Consultants - DAILY FIELD REPORT**
Carlotta Cellucci, NAVFAC NW Tanwir Chaudhry, Navy EXWC Michael Singletary, NAVFAC SE David Einan, USEPA Hun Seak Park, Ecology John Evered, Ecology Denice Taylor, Suquamish Tribe Joann Grady, Grady and Associates	Signed: _Elyssa Dixon_____

Resolution Consultants *A Joint Venture of AECOM & EnSafe* 1111 Third Avenue Seattle, Washington 98101 206-438-2700	**Contract No.** N62470-11-D-8013, CTO JP09 Reference – Sampling and Analysis Plan – Keyport OU-1 Site Recharacterization; NAVFAC Northwest, dated July 1, 2016	**DAILY FIELD REPORT #11** **08/27/2016**
	Project: Keyport OU-1 Site Recharacterization	
	Location: Keyport, Washington	
	Client: Naval Facilities Engineering Command Northwest	**Contractor:** Resolution Consultants
	Weather: 70s/80s; sunny; light wind	
To: James Flynn, Debbie Rodenhizer	**From:** Elyssa Dixon	

DAILY FIELD REPORT

Personnel Onsite

Elyssa Dixon (Resolution)
Doug McInnes (Columbia Technologies)
Michael Running and Clifford Letts (Holt Services)

Summary of Work Completed

- Completed four MIP boring locations: MIP-045, MIP-046, MIP-047, and MIP-048.

Deviations from Work Plan

- None

Field Activities Summary

1050 Resolution Consultants (Elyssa Dixon) arrive at gate at Keyport base. Rapidgate badge was not set up for weekend work. Columbia Services is onsite and will escort.

1100 Resolution and Columbia onsite. Columbia begins set up of new probe and selection of new rods and Resolution sort coolers.

1210 Holt Services onsite. Columbia continues set up.

1235 Daily safety meeting – Meeting focused on drilling hazards and remaining observant during work after a long week. Discussed scope of work for the day.

1250 Mobilize to MIP-045 located approximately 5 feet south of tree R19-T10 and set up. Columbia completes startup tests.

1310 Start drilling MIP-045. Holt bends pilot test rod and has to replace.

1350 Drilling got hard starting at approximately 18 feet bgs. Minimal XSD and PID responses.

1400 Meet refusal at MIP-045 at 31 feet bgs. Soil too hard; aquitard not encountered. Start pulling up probe.

1415 Mobilize to MIP-046 located approximately 5 feet south of tree R19-T7.

1430 Start drilling MIP-046.

1440 Temperature out of range warning at 6 feet bgs. Will pull probe and replace thermocouple then continue log at 6 feet.

1500 Columbia fixed loose wires in the probe and did not need to replace the thermocouple.

1515 Drilling got hard at approximately 18 feet bgs.

1520 Drilling got harder at 22 feet bgs. Columbia's approach is to monitor rate of penetration (ROP) and call refusal if consistent hammering and ROP stays less than 0.5 ft/min for more than a minute.

1525 Meet refusal at MIP-046 at 24 feet bgs. Soil too hard; aquitard not encountered. Start pulling up probe.

1540 Mobilize to MIP-047 located approximately 4 feet southeast of tree R17-T7 and start set up.

1550 Start MIP-047.

1615 Drilling got hard at approximately 20 feet bgs.

1630 Drilling got harder at approximately 30 feet bgs.

1640 Complete MIP-047 to 34 feet bgs. Aquitard not encountered. Start pulling up probe. Observer PID increases at depth when soil gets harder at most locations.

1650 Mobilize to MIP-048 located approximately 12 feet southeast of tree R15-T1 and set up.

1705 Start MIP-048.

1735 Drilling got hard at 28 feet bgs.

1740 Meet refusal at 30 feet bgs. Soil too hard; aquitard not encountered. PID jumps when soil harder and no XSD hits. Start pulling up probe.

1750 Clean up area.

1755 Holt offsite. Columbia completing end of day tests.

1810 Resolution and Columbia offsite.

Summary of Findings/Conclusions

Boring ID	Total Depth (ft bgs)	Max. XSD detection (uV) / depth (ft. bgs)	Max. PID detection (uV) / depth (ft. bgs)
MIP-045	31	38,148 uV / 12.4	71,337 uV / 28.9
MIP-046	24	63,326 uV / 14.00	77,059 uV / 14.00
MIP-047	34	87,741 uV / 13.85	112,308 uV / 13.85
MIP-048	30	22,889 uV / 4.3	65,996 uV / 28.9

The aquitard was not encountered at any locations. PID readings are observed at depths without comparable XSD readings corresponding to depths where drilling got harder.

Plans for the Following Day:

Planned work for Monday 8/29/2016 includes completing additional MIP boring locations in the South Plantation, installing soil gas sample locations on Bradley Road and clearing and grubbing south of the South Plantation.

Attachments:
None

Distribution:	**Resolution Consultants - DAILY FIELD REPORT**
Carlotta Cellucci, NAVFAC NW Tanwir Chaudhry, Navy EXWC Michael Singletary, NAVFAC SE David Einan, USEPA Hun Seak Park, Ecology John Evered, Ecology Denice Taylor, Suquamish Tribe Joann Grady, Grady and Associates	Signed: _Elyssa Dixon_____

Resolution Consultants *A Joint Venture of AECOM & EnSafe* 1111 Third Avenue Seattle, Washington 98101 206-438-2700	**Contract No.** N62470-11-D-8013, CTO JP09 Reference – Sampling and Analysis Plan – Keyport OU-1 Site Recharacterization; NAVFAC Northwest, dated July 1, 2016	**DAILY FIELD REPORT #12** **08/29/2016**
	Project: Keyport OU-1 Site Recharacterization	
	Location: Keyport, Washington	
	Client: Naval Facilities Engineering Command Northwest	**Contractor:** Resolution Consultants
	Weather: 60s/70s; partially sunny; light wind	
To: James Flynn, Debbie Rodenhizer	**From:** Elyssa Dixon, Anthony Palmieri, Larry Brown	

DAILY FIELD REPORT

PERSONNEL ON SITE

Elyssa Dixon, Anthony Palmieri and Larry Brown (Resolution)
Doug McInnes (Columbia Technologies)
Michael Running and Clifford Letts (Holt Services)
Carlotta Cellucci (NAVFAC NW)
Kyle Ceruti (Cascade Drilling)
Brian Pouley and Nate Tandecki (GHD)
Orlando and Justin Bartholamu (Clearcreek Contractors)

Summary of Work Completed

- Completed four MIP boring locations: MIP-049, MIP-050, MIP-051, MIP-052.
- Installed 13 soil gas points s: SV-01, SV-02, SV-03, SV-04, SV-05, and SV-06.
- Spill response/cleanup of vegetation impacted by hydraulic oil spill.

DEVIATIONS FROM WORKPLAN

None

FIELD ACTIVITY SUMMARY

0635 Resolution Consultants (Elyssa Dixon, Anthony Palmieri and Larry Brown) on site.

0700 Carlotta on site.

0705 Holt Services on site.

0720 Columbia Technologies (Columbia) on site.

0725 Daily Safety meeting conducted with Holt and Columbia – Meeting focused on hazards relating to working in roadway and on uneven terrain.

0740 Columbia unable to locate key to ATV. Demobed to search hotel.

0750 Resolution gauged groundwater monitoring well MW1-20. Depth to water was 4.20 feet below the top of casing / 4.70 feet below ground surface (bgs).

0755 Resolution (E. Dixon) at Pass & ID station to ensure Cascade & GHD could access site.

0815 Cascade and GHD on site.

0825 Daily Safety meeting conducted with Cascade and GHD – Meeting focused on hazards relating to working in roadway

0835 Resolution (A. Palmieri and L. Brown) at Pass & ID to ensure that Clearcreek Contractors (Clearcreek) could access site.

0845 Columbia located key to ATV and will return to site.
Cascade setting up to begin installation of soil gas probes in Bradley Road.
GHD review JSAs.

0900 Columbia returns to site.

0905 Carlotta and Resolution discuss current status of MIPs probing.
Carlotta off site.

0910 Holt setup at MIP-049 location approximately 50 feet southeast of tree R1-T6.
Columbia could not start ATV. Key would not engage ignition.

0920 Columbia ATV pushed to MIP-049 location and Columbia commenced setup to begin MIPs logging.

0930 GHD completed setting up cones in Bradley Road.

0935 Resolution and Clearcreek reviewing areas of planned clearing and grubbing.

0940 Cascade mobilized to SV-01 (farthest south proposed soil gas location) and commenced boring for soil gas probe installation. Soil gas sample IDs increase numerically moving north on Bradley Road.
Clearcreek begins clearing and grubbing at southeast site corner.

0945 SV-01 advanced to 3.5 feet bgs and Cascade installed probe. Noted nine inches of asphalt. No groundwater encountered.

0950 Columbia completed bump calibration of MIP probe sensors and Holt commenced advancement of MIP-049.

1000 Cascade and Resolution moved to SV-02 location.

1005 Cascade commenced boring for soil gas probe installation.
Increased density noted in MIP-049 at 8 feet bgs.

1007 Decreased density noted in MIP-049 at 10 feet bgs.

1010 SV-02 advanced to 3.5 feet bgs and Cascade installed probe. Noted eight to nine inches of asphalt. No groundwater encountered.

1017 MIP-049 at approximately 18 feet bgs. Increased density was noted at approximately 14 feet bgs. Only minor PID response and no XSD.

1030 Hydraulic line ruptured on Clearcreek's bobcat during clearing/grubbing activities in the southeast corner of the site. Clearcreek responded with spill control materials.
Cascade commenced boring for SV-03.

1033 Decreased density and increased conductivity/pressure in MIP-049 at 24 feet bgs.

1040 Cascade completed installation of SV-03. Noted eight inches of asphalt. No groundwater encountered.
Cascade directed GHD to set up traffic control for SV-4 location.
MIP-049 terminated at 30 feet bgs due to suspected aquitard.

1045 Cascade completed installation of SV-04. Noted four inches of asphalt. No groundwater encountered.

1050 Clearcreek off site to obtain missing part for repairs
Resolution (A. Palmieri) notified Carlotta of hydraulic oil spill. Additionally notified Debbie Rodenhizer (AECOM) and NBK Fire Dept.
MIP-049 backfilled with bentonite chips.

1055 Resolution investigating potential downstream impacts of hydraulic coil spill.
Cascade moved rig out of roadway and directed GHD to relocate traffic control to area north of Gadberry Street.

1100 NAVFAC NW representatives Gary Simmons and Carl Haselman on site to observe the hydraulic spill.
NAVFAC NW Reps. suggested drumming of impacted vegetation, but recommended that Carlotta make the formal request to drum the impacted vegetation.

1105 A. Palmieri notified Fred Merrill (AECOM HSSE Manager) of the hydraulic oil spill.
Holt/Columbia setup to drill at MIP-050 location approximately 45 feet northeast of tree R1-T1.

1120 Cascade moved to SV-05 location and began drilling.

1125 Fred Merrill requested that A. Palmieri report the hydraulic spill to AECOM as an incident and A. Palmieri did so.
Noted approximately 6 inches of asphalt in SV-05 and no groundwater encountered.

1130 Carlotta on site.

1135 Cascade moved to SV-06 and began drilling. Boring located approximately 6 inches away from surveyed mark due to truck positioning /road closure.
Noted approximately 4 inches of asphalt and no groundwater encountered in SV-06.
MIP-050 at 16.5 feet bgs. Noted very low PID response to this depth but no XSD response.

1145 Star Rentals representative on site to fix Columbia's ATV rental.

1150 Carlotta discussing disposal options with NAVFAC NW Waste Disposal for the impacted vegetation from hydraulic oil spill region.
Columbia informed AECOM that backup MIP probe to be delivered tomorrow.
MIP-050 met refusal at 22 feet bgs due to very hard conditions.

1155 Cascade moved to SV-07 and began drilling.

1200 Clearcreek cleaning hydraulic oil off of bobcat and repairing hydraulic line (line had been caught by branch and then cut by grubbing attachment blade).
Noted approximately four inches of asphalt and no groundwater encountered in SV-07.

1215 All subcontractors on lunch.
Clearcreek reported that approximately two gallons of hydraulic oil had spilled.

1220 Carlotta on site to review the area of hydraulic oil spill. Estimated that approximately one gallon of hydraulic oil had contacted ground surface and one gallon had sprayed on surrounding vegetation and bobcat equipment. Carlotta directed Resolution/Clearcreek to containerize impacted vegetation and soil in drums.

1225 Star Rentals off site (had repaired Columbia ATV ignition switch).

1235 Resolution off site (lunch).

1255 Resolution, Cascade, Holt on site (returned from lunch).

1300 Clearcreek cut section of chain link fence south of MIP-004 location during lunch and moved bobcat/grubbing equipment south of fence line to clear brush. Commenced clearing/grubbing.
Holt/Columbia setup on MIP-051 location approximately 5 feet northeast of tree R18-T1.

1305 GHD on site and setting up traffic control.

1315 Cascade moved to SV-08.

1320 Carlotta off site.
Commenced drilling of SV-08.
Columbia completed bump calibration of MIP sensors and Holt commenced advancement of MIP-051.

1321 Issue with string potentiometer. Columbia began troubleshooting.

1325 SV-08 boring completed.
Approximately 4 inches of asphalt and no groundwater encountered.

1335 Carlotta on site.
Cascade moved to SV-09 and provided traffic control.

1345 SV-09 boring completed: Approximately 4" asphalt and no groundwater noted.

1355 Columbia had replaced string potentiometer and MIP-051 had been advanced to 10 feet bgs. PID and XSD response noted from approximately 8 to 10 feet bgs.

1400 GHD resetting traffic control for northern-most soil gas borings in Bradley Road.

1410 Cascade moved to SV-10 and commenced drilling.

1415 Cascade completed SV-10 boring and installed probe. Approximately 4 inches of asphalt and no groundwater noted.
Two 55 gallon drums filled with impacted vegetation and approximately 2 gallons impacted soil were generated from the cleanup of the hydraulic oil spill. Additionally, an absorbent sock was placed at the base of a tree which had been sprayed with oil (on trunk portion).

1418 MIP-051 became very dense at 25 feet bgs.

1420 Clearcreek off site.
MIP-051 pressure spike at 26.4 feet bgs. Columbia directed Holt to discontinue advancement of probe due to very hard conditions (Refusal).

1425 Cascade moved to SV-11 and commenced drilling.

1435 SV-11 boring completed. Noted approximately 5 inches of asphalt and no groundwater observed.

1440 Holt completed backfill of MIP-051 and setup at MIP-052 location approximately 48 feet southeast of tree R23-T1.

1445 GHD finish setup of cones in preparation for installation of the northern-most soil vapor probes.

1450 Cascade moved to SV-12 location and commenced drilling.

1500 Cascade completed drilling SV-12 location and installed probe. Noted approximately 4 inches of asphalt and no groundwater encountered.

1510 Cascade moved to SV-13 location and commenced drilling. Very dense soil conditions noted.
Holt commenced drilling MIP-052.

1520 Noted an increase in soil hardness moving northward along Bradley Road.

1525 Cascade completed drilling SV-13 location and began installing probe. Noted approximately 4 inches of asphalt and no groundwater encountered.
Gary (NAVFAC NW representative) inspecting the hydraulic oil spill area.
MIP-052: PID and XSD spike noted from 8 to 10 feet bgs.

1530 Cascade completed installation of SV-13 and GHD began breaking down traffic control.

1550 Cascade offsite.
MIP-052 Refusal at 25 feet bgs due to very hard conditions.

1605 Columbia completing post daily calibration of MIP sensors.
Holt moved Geoprobe rig to MIP-053 location in preparation for continued drilling tomorrow.

1610 Resolution performing reconnaissance of porewater sampling locations west of the Central Landfill. Locations were noted to be densely vegetated and will require additional clearing with hand tools to access.

1625 Holt and GHD off site.

1640 Resolution performing reconnaissance of porewater sampling locations south of the South Plantation. Easternmost porewater sampling location is in very soft/muddy ground and will require boards to walk across for access.

1720 Resolution off site.

Summary of Findings/Conclusions

Boring ID	Total Depth (ft bgs)	Max. XSD detection (uV) / depth (ft. bgs)	Max. PID detection (uV) / depth (ft. bgs)
MIP-049	30.70	25,941uV / 8.00	99,414 uV / 4.95
MIP-050	22.85	26,704 uV / 7.85	97,583 uV / 18.35
MIP-051	27.20	126,652 uV / 8.00	128,025 uV / 8.00
MIP-052	28.40	437,178 uV / 8.90	446,867 uV / 8.90

A potential aquitardwas encountered in MIP-049 at a depth of approximately 25 feet bgs. Aquitard conditions were not observed in MIP-050, MIP-051 or MIP-052.

Plans for the Following Day:

Planned work for Tuesday 8/30/2016 includes completing additional MIP boring locations in the South Plantation and collecting soil gas samples in Bradley Road.

ATTACHMENTS:
None

Distribution: Carlotta Cellucci, NAVFAC NW Tanwir Chaudhry, Navy EXWC Michael Singletary, NAVFAC SE David Einan, USEPA Hun Seak Park, Ecology John Evered, Ecology Denice Taylor, Suquamish Tribe Joann Grady, Grady and Associates	**Resolution Consultants - DAILY FIELD REPORT** Signed: _Elyssa Dixon, Larry Brown_____

Resolution Consultants *A Joint Venture of AECOM & EnSafe* 1111 Third Avenue Seattle, Washington 98101 206-438-2700	**Contract No.** N62470-11-D-8013, CTO JP09 Reference – Sampling and Analysis Plan – Keyport OU-1 Site Recharacterization; NAVFAC Northwest, dated July 1, 2016	**DAILY FIELD REPORT #13** **08/30/2016**
	Project: Keyport OU-1 Site Recharacterization	
	Location: Keyport, Washington	
	Client: Naval Facilities Engineering Command Northwest	**Contractor:** Resolution Consultants
	Weather: 60s/70s; partially sunny; light wind	
To: James Flynn, Debbie Rodenhizer	**From:** Elyssa Dixon, Larry Brown	

DAILY FIELD REPORT

PERSONNEL ON SITE

Elyssa Dixon and Larry Brown (Resolution)
Doug McInnes (Columbia Technologies)
Michael Running and Clifford Letts (Holt Services)
Carlotta CellucciNAVFAC NW)
Kyle Ceruti (Cascade Drilling)
Brian Pouley and Nate Tandecki (GHD)

Summary of Work Completed

- Completed five MIP boring locations: MIP-053, MIP-054, MIP-055, MIP-056, and MIP-057.
- Collected 6 soil gas samples: SV-01, SV-02, SV-03, SV-04, SV-05, and SV-06.

DEVIATIONS FROM WORKPLAN

- While completing leak test on SV-02, helium concentrations observed in the tedlar bag used to purge the sample were up to 50% of the helium concentration observed in the shroud. This indicates a leak or interference with the helium detector. Additional surface sealant was added and the results were confirmed. Methane is known to interfere with the helium detector, so methane concentrations were measured at 20% of the LEL. After removal of the shroud and helium, the helium detector was also used to check helium directly from the sample tubing. Helium concentrations increased in the absence of helium, indicating interference. Leak testing cannot be completed with accurate helium measurements; the additional surface sealant combined with the depth of the probes were determined as an effective measure to prevent ambient air leaking. For additional locations, the sample tubing will be purged and tested for methane and helium prior to leak testing. If methane and helium concentrations are observed, additional surface sealant will be installed and a sample will be collected. If concentrations are not observed, leak testing will be completed.

FIELD ACTIVITY SUMMARY

0650 Resolution Consultants (Elyssa Dixon and Larry Brown) on site.

0705 Holt Services onsite.

0720 Columbia Technologies continues set up.

0730 Conversation with NAVFAC NW regarding next MIP locations. Will focus on locations outside of tree area first. Locations in trees and north of former hazardous waste building are lowest priority. Daily safety meeting with Holt and Columbia – Meeting focused on drilling hazards and potential biological hazards while working in recently cleared area. Discussed scope of work for the day.

0740 Cascade Drilling onsite. Mark next MIPs locations. Columbia and Holt setting up.

0755 GHD onsite; completing traffic control specific health and safety.

0800 Start drilling MIP-053

0815 Daily safety meeting with Cascade and GHD – Meeting focused on working in road hazards.

0830 GHD set up traffic control to start at SV-01.

0840 Meet refusal at MIP-053 at approximately 29 feet bgs due to soil too hard.

0905 Mobilize and begin sampling set up at SV-01. First leak test fails with tedlar bag sample concentration approximately 10% of shroud concentration. Second leak test passes with tedlar bag sample concentration approximately 4% of shroud.

0907 Holt and Columbia mobilize to MIP-054
0910 Start drilling MIP-054.

0955 Meet refusal at MIP-054 at 39.75 feet bgs due to very hard conditions.

1010 Start sampling at SV-01 and can hear air leaking from flow controller, so turn off. Try different flow controller, which has no flow sounds. SUMMA canister has ambient air now, so must replace. Attach a new SUMMA canister and the initial pressure is at 11 in Hg (cannot use).

1015 Holt and Columbia mobilize to MIP-055

1035 Start drilling MIP-055.

1030 Attach another SUMMA canister that works and start sampling SV-01. Call Constance Lapite (AECOM) to request additional SUMMA canisters to complete work and for backup.

1040 Mobilize to SV-02. Leak test failed with tedlar bag sample concentrations approximately 50% of the shroud concentration.

1050 Carlotta on site. Add concrete bentonite seal to top of sample locations.

1105 SV-02 fails second leak test with tedlar bag sample concentrations approximately 50% of the shroud concentration. Test potential methane concentrations resulting in reading of 20% of the LEL in the sample tubing. Remove the helium shroud and place helium detector in sample tubing and concentrations start increasing, indicating interference from methane or other subsurface conditions.

1130 Mobilize to SV-03. Test helium concentrations in SV-03 without any helium added and concentrations increase. These samples are located near an existing marsh and in former marsh/tidal area and adjacent to a gas line. Methane could be impacting the readings. Will check each location with helium and landfill gas detectors prior to leak testing. If concentrations increase, will mound seal and collect samples. If no change, will conduct leak testing.

1135 Start sampling SV-02.

1140 Meet refusal at MIP-055 at approximately 30 feet bgs due to very hard drilling conditions. Location was progressively denser from 8 feet to 30 feet bgs.

1145 Will skip SV-03 until after lunch because in middle of road, so GHD can take lunch break and remove traffic control. Mobilize to SV-04 located on shoulder. Check SV-04 with the helium detector; results at 0 ppm, so will leak test.

1200 Complete leak tests on SV-04. First leak test failed with tedlar bag sample concentrations approximately 22% of the shroud concentration. Second leak test failed with tedlar bag sample concentrations approximately 12% of the shroud concentration.

Holt and Columbia mobilize to MIP-056.
Holt and Columbia on lunch.

1201 Finish sampling SV-02.

1210 NAVFAC NW transport two 55-gallon drums and log (hydraulic oil contaminated materials) from location at southeast corner of South Plantation to drum storage at Building 1057 on Bradley Road.

1215 Helium in sample tubing at SV-04 still at 0 ppm with minor spikes after some time. Will re-leak test.

1230 Carlotta check-in and offsite.

1233 Finish sampling SV-01.

1240 Holt and Columbia return from lunch and start drilling MIP-056.

1245 Test methane at SV-04; max concentration observed at 44% of LEL, so will add seal and collect sample.

1250 GHD remove traffic control. GHD and Cascade offsite for lunch.

1255 First flow controller tried on SV-04 did not show pressure changes. Replace flow controller and start sampling at 1257.

1315 Calibrate RKI.

1322 Very hard drilling encountered at MIP-056 at approximately 22 feet bgs.

1325 GHD and Cascade onsite.

1330 Set up traffic control and return to SV-03. Request Cascade patch locations with asphalt.
Meet refusal at MIP-056 at approximately 24 feet bgs due to hard drilling conditions.

1337 Stop sampling SV-04.

1340 Purge SV-03 to tedlar bag for methane test; concentrations at 66% of the LEL.
Holt and Columbia mobilize to MIP-057 and set up to begin drilling.

1347 Start sampling SV-03.

1355 Move to SV-05 to test methane. Worker briefly using hand week trimmer in vicinity of sample location.
Start drilling MIP-057.

1400 Methane and helium concentrations in SV-05 are 0.

1405 Cannot leak test SV-05 until SV-03 finishes and traffic control is relocated.

1413 Finish sampling SV-03.

1420 GHD relocate traffic control.

1439 MIP-057 very dense from approximately 8 – 18 feet bgs and slightly softer at 18 feet bgs.

1445 Set up to leak test at SV-05. Both helium detector desiccants are very pink/yellow (damp/saturated), so dry in car prior to leak testing.

1500 Test methane at SV-06, while waiting for desiccants to dry.

1505 Methane, CO, O_2 all exceed detector limits on RKI in first purge.

1515 Re-purge line and test again. Methane at 0%, but CO exceeds again. Check RKI with calibration gas. CO level at 22 ppm (should be 50 ppm), so re-calibrate.

1520 Meet refusal at MIP-057 at approximately 32 feet bgs based on hard drilling conditions.

1525 Desiccant dried. Test helium in SV-06 directly (0 ppm). Test methane directly, but receive low flow warning; levels still increase despite warning and methane is observed at 24% of the LEL and CO exceeded detection limits.

1530 Return to SV-05 and complete leak test. Leak test passes with helium concentration in the tedlar bag sample at 0 ppm.

1541 Start sampling SV-05.

1545 Move to SV-06. Complete leak test to confirm findings. Leak test failed with tedlar bag sample concentrations approximately 50% of the shroud concentration.

1550 Holt mobilize to marked location north of South Plantation and Former Hazardous Materials Storage Area.

1554 Add sealant and start sampling SV-06.

1602 Holt offsite.

1610 Finish sampling SV-05.

1618 Finish sampling SV-06.

1625 All sampled holes are patched with asphalt. Start cleanup of traffic control.

1630 Cascade offsite. Columbia offsite.

1635 Carlotta onsite. Discuss MIPs and soil gas results from today. Carlotta will report methane hits to gas company as potential leak. Review and plan locations in South Plantation for tomorrow.

1725 Carlotta offsite.

1735 Resolution offsite.

Summary of Findings/Conclusions

Boring ID	Total Depth (ft bgs)	Max. XSD detection (uV) / depth (ft. bgs)	Max. PID detection (uV) / depth (ft. bgs)
MIP-053	29.55	173,193 uV / 11.00	217,368 uV / 11.00
MIP-054	31.14	245,674 uV / 7.05	267,800 uV / 7.05
MIP-055	30.60	524,918 uV / 25.85	1,095,080 uV / 25.85
MIP-056	24.60	288,400 uV / 11.15	359,432 uV / 11.15
MIP-057	32.75	58,748 uV / 27.55	125,050 uV / 27.55

A potential aquitard was encountered at approximately 28 feet bgs in MIP-057. Aquitard conditions were not encountered in other borings completed today.

Soil Gas Sampling Summary

Sample ID	Start Time	Initial Pressure (in Hg)	Stop Time	Final Pressure (in Hg)
SV-01	1030	30	1233	5
SV-02	1135	30	1201	5
SV-03	1347	29	1413	5
SV-04	1257	30	1337	5
SV-05	1541	28	1610	5
SV-06	1554	28	1618	4.5

Plans for the Following Day:

Planned work for Wednesday 8/31/2016 includes completing additional MIP boring locations in the South Plantation and collecting soil gas samples in Bradley Road.

ATTACHMENTS:
None

Distribution:	**Resolution Consultants - DAILY FIELD REPORT**
Carlotta Cellucci, NAVFAC NW Tanwir Chaudhry, Navy EXWC Michael Singletary, NAVFAC SE David Einan, USEPA Hun Seak Park, Ecology John Evered, Ecology Denice Taylor, Suquamish Tribe Joann Grady, Grady and Associates	Signed: _Elyssa Dixon, Larry Brown_____

Resolution Consultants *A Joint Venture of AECOM & EnSafe* 1111 Third Avenue Seattle, Washington 98101 206-438-2700	**Contract No.** N62470-11-D-8013, CTO JP09 Reference – Sampling and Analysis Plan – Keyport OU-1 Site Recharacterization; NAVFAC Northwest, dated July 1, 2016	**DAILY FIELD REPORT #14** **08/31/2016**
	Project: Keyport OU-1 Site Recharacterization	
	Location: Keyport, Washington	
	Client: Naval Facilities Engineering Command Northwest	**Contractor:** Resolution Consultants
	Weather: 60s; partially rainy; light wind	
To: James Flynn, Debbie Rodenhizer	**From:** Elyssa Dixon, Larry Brown	

DAILY FIELD REPORT

PERSONNEL ON SITE

Elyssa Dixon and Larry Brown (Resolution)
Doug McInnes (Columbia Technologies)
Michael Running and Clifford Letts (Holt Services)
Carlotta Cellucci (NAVFAC NW)
Kyle Ceruti (Cascade Drilling)
Brian Pouley and Nate Tandecki (GHD)

Summary of Work Completed

- Completed four MIP boring locations: MIP-058, MIP-059, MIP-060, and MIP-061.

DEVIATIONS FROM WORKPLAN

- None

FIELD ACTIVITY SUMMARY

0655 Resolution Consultants (Elyssa Dixon and Larry Brown) on site.

0705 Holt Services onsite.

0710 Columbia Services onsite.

0715 Daily safety meeting with Holt and Columbia – Meeting focused on drilling hazards and discuss methane observations in Bradley Road. Discussed scope of work for the day.

0720 NAVFAC NW onsite. Review first MIP location with Holt and mark planned locations.

0735 NAVFAC NW offsite. Holt mobilize to MIP-058 located approximately 32 feet southeast of R6-T1. Set up.

0740 GHD onsite.

0745 Cascade Drilling onsite.

0755 Daily safety meeting with Holt and Columbia – Meeting focused on traffic hazards. Discussed scope of work for the day.

0805 Discuss potential gas leak with Anthony Palmieri (AECOM). He will talk to AECOM Health and Safety to determine if there are concerns regarding continuing sampling.

0810 Stop work for soil gas sampling until more is known about potential gas leak. Tell Cascade and GHD to standby and ask NAVFAC NW to report leak.
Start drilling MIP-058.

0815 GHD offsite.

0830 GHD onsite.

0845 Check in with NAVFAC NW. Will try to get an ETA on gas investigation.

0855 Conversation with Debbie Rodenhizer (AECOM) regarding remaining work.

0857 Meet refusal at MIP-058 at 22 feet bgs based on very hard soil. Measure headspace (results in table below).
RKI calibrated prior to measurements. Ground level around borings was screened to check for possible background concentration from equipment exhaust and readings were nominal.

0905 Discuss MIP with Larry. Meet refusal at MIP-058 at similar depth as MIP-056. Will move to next planned point rather than continuing to try to get deeper in this area.
Holt mobilize to MIP-059 located approximately 10 feet northeast of tree R1-T6.

0915 Conversation with Josie Smith (AECOM) to plan sediment and porewater sampling for next week.

0920 Start drilling MIP-059. Measure headspace after solid probe removed prior to MIP (results in table below).

0925 NAVFAC NW calls. Fire Department should be on site at Building 1044 shortly. Request they are informed that methane concentrations increased from south to north. Employees in the building located at the corner of Bradley and Torpedo Roads have reported sewer-like odors.

0935 Fire Department onsite to observe potential gas leak. Share observations and comments from NAVFAC NW. Fire Department does not detect anything at the surface level, so no hazard is observed. They request that

the RKI is used to advice of any hazards and the alarm is set for flammable range or below. Chugach will be onsite shortly to conduct additional tests.

0950 Fire Department offsite.

1010 Chugach onsite. Has similar detector to one used by Fire Department and can only review surface level concentrations. Calls scheduler who believes Cascade Natural Gas will need to be involved and will likely require a subconsultant to complete a test on the line.

1020 NAVFAC NW onsite. Resolution will demob soil gas sampling until gas line testing is complete and will determine potential methane impacts on analysis of samples. GHD loads traffic control into truck.

1030 NAVFAC NW offsite. Chugach offsite.

1035 Conversation with Kasey Goble (Cascade Drilling) to confirm status of work.

1039 Meet refusal at MIP-059 at 29 feet bgs due to very hard drilling.

1045 Cascade offsite. Receive message from Chugach scheduler who reported an emergency call to get another company onsite as soon as possible.

1050 Notify Anthony of work status. GHD offsite.

1053 Measure headspace in MIP-059 after probe pulled (results in table below).

1055 Discuss potential sample impacts with Constance Lapite (AECOM). She will call ALS to discuss.

1100 Call Chugach scheduler. Holmes Mechanical is subbed to Chugach and will likely be on site today.
Holt mobilize to MIP-060 located approximately 15 feet northeast of the northern corner of the Former Hazardous Waste Storage Building.

1115 Discuss sediment and porewater sampling with Josie.

1125 Call from Tony Palmieri regarding additional MIP locations. Recommends adding location north of MIP-041 to bound higher XSD and PID values. Tony will confirm with NAVFAC NW. Thermocouple on MIP failed during bump check, so Columbia begin troubleshooting. Holt take lunch.

1130 Leave message for Constance. Drum sampling requires halogenated VOCs in addition to previously requested analyses. Flashpoint will not be required because toluene is not in use onsite.

1135 Columbia identified that trunk line needs replacement not thermocouple, so begins reconnecting lines.

1205 Holmes Mechanical onsite. Review observations and show sample locations. Holmes will look at site map to determine potential ways to isolate the line for testing. Holmes has replaced most of the gas lines on the base, but not this section. Believes it is still an old line, which was in bad shape at other locations where lines were replaced.

1220 Notify NAVFAC NW that Holmes arrived.

1225 Discuss Holmes and remaining sampling efforts with Anthony.

1230 Holmes needs to go get map for review. Will need to notify buildings that gas line will need to be turned off, so timeline of testing is uncertain.
Columbia finishes repairing trunk line and bump check of MIP. Start drilling MIP-060. Measure headspace after removing solid probe before using MIP (results in table below). Rechecked RKI; bumped all sensors and were good. Screened again with similar results.

1250 Call Tony to discuss health and safety based on screening results; determine ok to continue drilling.

1300 Discuss methane and helium analysis and waste disposal sampling with Constance.

1310 NAVFAC NW Public Works onsite. Discuss gas line observations and conversations with Holmes. They do not believe this is an emergency situation, but will work with Holmes on testing. They could likely turn off the gas along Bradley Road for a day for Resolution to complete soil gas sampling, but will need to check with buildings and coordination could take a few days.

1340 Discuss methane observations with Jim Flynn (AECOM). Recommends testing methane concentrations in wells located in the Central Landfill (capped area).

1400 Meet refusal at MIP-060 at 33 feet bgs based on very hard drilling.

1410 Holmes on site. Waiting to see about potential gas shutoff to complete test.
Screen MIP-060 following removal of tooling (results in table below).

1423 Holt mobilize to MIP-061 located approximately 13 feet northeast of tree R11-T11.

1430 Test MW1-15 (results in table below).

1440 Holmes informs working on gas shut off for buildings on Bradley Road. Holmes offsite.

1445 Test MW1-17 (results in table below).

1450 Start drilling MIP-061.

1500 Test P1-10 (results in table below).

1505 Test MW1-20 (results in table below).

1525 Discuss well measurements with Jim Flynn. MW1-15 is only well with water level below top of screen.

1530 NAVFAC NW onsite. Discuss MIP and methane. Need to further discuss soil vapor with experts. No longer need to sample drums for disposal – NAVFAC NW will take without samples. Will plan to pre-probe to 10

feet bgs at locations in the Central Landfill to avoid any damage to the MIP in unknown subsurface conditions.

1545 Call with Tony; protocol will be sent detailing drilling procedures for Central Landfill work based on methane concentrations observed in MW1-15.

1550 Hold time for SUMMAs is 30 days. RKI uses methane as a reference gas in correlation with CO sensor to provide explosive gas levels. Methane is lighter than air. No odors have been observed so far.

1605 Meet refusal of MIP-061 at 36 feet bgs due to very hard drilling.

1620 Screen headspace in MIP-061 following removal of tooling (results in table below). Odor observed briefly (sulfide-like).

1630 Review RI with NAVFAC NW. Methane was detected using semi-quantitative methods at high levels in soil gas sampling in 1993. NAVFAC NW offsite.

1640 Cleanup and put RKI on charger.

1700 Measure clearcut areas.

1720 Resolution offsite. Columbia remain onsite to complete work and prep.

1900 Columbia offsite.

Summary of Findings/Conclusions

Boring ID	Total Depth (ft bgs)	Max. XSD detection (uV) / depth (ft. bgs)	Max. PID detection (uV) / depth (ft. bgs)
MIP-058	22.70	325,022 uV / 3.55	384,762 uV / 8.30
MIP-059	29.65	498,978 uV / 26.75	1,285,363 uV / 26.85
MIP-060	33.70	113,681 uV / 28.65	286,874 uV / 8.90
MIP-061	36.60	226,600 uV / 11.00	436,262 uV / 11.00

Aquitard conditions were not encountered in any of the boring locations.

Summary of Gas Monitoring

Well/MIP ID	Depth to Water (ft BTOC)	CH_4 (% LEL)	CO (ppm)	O_2 (%)	H_2S (ppm)	VOC (ppm)
MW1-15	7.00	100	12	24	3	--
MW1-17	6.15	1	2	20.3	0	0.2
P1-10	5.95	1	3	20.9	0	0.3
MW1-20	4.38	1	2	20	0	0.0
MIP-058	NA	1	>500	20.9	2.0	65
MIP-059 Initial	NA	3	71	19.4	2.0	204.9

MIP-059 Post	NA	1	450	20.9	0.5	103
MIP-060 Initial	NA	>100	76	16.1	--	0.1
MIP-060 Post	NA	>100	458	17.9	1.0	0.5
MIP-061 Post	NA	>100	115	7.2	15.5	9.5

Plans for the Following Day:

Planned work for Thursday 9/1/2016 includes completing MIP boring locations in the Central Landfill.

ATTACHMENTS:

None

Distribution:	**Resolution Consultants - DAILY FIELD REPORT**
Carlotta Cellucci, NAVFAC NW Tanwir Chaudhry, Navy EXWC Michael Singletary, NAVFAC SE David Einan, USEPA Hun Seak Park, Ecology John Evered, Ecology Denice Taylor, Suquamish Tribe Joann Grady, Grady and Associates	Signed: _Elyssa Dixon, Larry Brown_____

Resolution Consultants *A Joint Venture of AECOM & EnSafe* 1111 Third Avenue Seattle, Washington 98101 206-438-2700	**Contract No.** N62470-11-D-8013, CTO JP09 Reference – Sampling and Analysis Plan – Keyport OU-1 Site Recharacterization; NAVFAC Northwest, dated July 1, 2016	**DAILY FIELD REPORT #15** **09/01/2016**
	Project: Keyport OU-1 Site Recharacterization	
	Location: Keyport, Washington	
	Client: Naval Facilities Engineering Command Northwest	**Contractor:** Resolution Consultants
	Weather: 60s; overcast; some wind	
To: James Flynn, Debbie Rodenhizer	**From:** Elyssa Dixon	

DAILY FIELD REPORT

PERSONNEL ON SITE

Elyssa Dixon (Resolution)
Doug McInnes (Columbia Technologies)
Michael Running and Clifford Letts (Holt Services)
Carlotta Cellucci (NAVFAC NW)

Summary of Work Completed

- Completed five MIP boring locations: MIP-062, MIP-063, MIP-064, MIP-065, and MIP-066.

DEVIATIONS FROM WORKPLAN

- None

FIELD ACTIVITY SUMMARY

0700 Resolution Consultants (Elyssa Dixon) on site.

0710 Holt Services and Columbia Services onsite.

0720 Daily safety meeting with Holt and Columbia – Meeting focused on drilling hazards, work in new area of site and methane monitoring. Discussed scope of work for the day.

0730 Calibrate RKI.

0740 Mobilize to MIP-062 in Central Landfill located south of MW1-17. Pre-probe to 10 feet bgs to avoid pushing MIP through potential landfill debris (recorded to 6 feet bgs).

0750 Start MIP test. Columbia informs Resolution that some keys on the computer are broken ("5", "6", "-", "+"), so notes may contain an "S" or a "b" if Columbia misses replacing later.

0755 RKI reading 1% LEL of CH_4 in ambient air.

0805 Start drilling MIP-062. Pre-probe met minimal resistance. Measure headspace (results in table below). Ambient air readings all normal.

0835 Ambient air readings remain normal. Soil very soft.

0840 Drilling gets harder at approximately 17 feet bgs. XSD/PID spike at same depth.

0915 Complete MIP-062 to 33 feet bgs based on reduced XSD/PID response for multiple feet. Start pulling up probe. Low/no readings on RKI, but soil gets stuck in the RKI, so tubing will need to be replaced. Replace tubing and collect measurements (results in table below).

0940 Mobilize to MIP-063 located east of MW1-17 and start drilling. Measure headspace (results in table below). Ambient air readings normal.

0955 Temperature out of range warning. Holt mark rod depth (at 7 feet bgs) and pull up probe for Columbia to check wiring. Columbia pauses logging to resume after repairs. Measure headspace (results in table below).

1015 Columbia repairs wire in MIP. NAVFAC NW onsite. Discuss MIP-062 results with NAVFAC NW. NAVFAC NW is shutting down gas line on Bradley Road today and asked if Resolution is available to complete soil gas sampling. Resolution indicated that there is not enough time to mobilize subs back on site.

1025 Resume drilling MIP-063 at 7 feet bgs.

1040 Drilling gets harder at approximately 14 feet bgs. RKI readings are normal at boring. Slight chemical smell at MIP vehicle coming from southeast (wind), but no readings on the RKI.

1105 Complete MIP-063 at 28 feet bgs based on reduced XSD/PID readings and increased EC and HPT combined with decreased flow. Start pulling up probe. Measure headspace (results in table below).

1120 Mobilize to MIP-064 located north of MW1-17. NAVFAC NW requests Resolution see if Cascade and GHD can come on site Friday to complete soil gas sampling. Call Tony Palmeiri (Resolution) to discuss and review weather forecast.

1140 Leave message for Kasey Goble (Cascade) to discuss availability. Start drilling MIP-064.

1145 Measure headspace in MIP-064 after pre-probe (results in table below). Friday is 80% chance of rain with thunderstorms, so Resolution prefers not to collect soil gas samples.

1155 NAVFAC NW offsite. RKI reading 3% of LEL for CH_4 in ambient air. Bump check and RKI readings are accurate.

1205 Call from Josh (NAVFAC NW Public Works) to discuss methane detections from Tuesday readings. Holmes should isolate gas line today to test.

1215 Resolution offsite to scope sediment sample locations. Columbia will complete MIP-064 at 30 feet bgs if XSD/PID readings do not increase.

1225 Resolution onsite.

1235 Complete MIP-064 to 34 feet bgs based on PID/XSD decreased values and increases in EC and HPT. Boring looks almost identical to MIP-062 with slightly lower EC values. Start pulling up probe.

1245 Call from Kasey (Cascade) to discuss scheduling; not available on Friday, but will look into potential for next week.

1250 Measure headspace at MIP-064 (results in table below).

1255 Notify NAVFAC NW of boring similarity to MIP-062. Mobilize to MIP-063 located directly east of MW1-17.

1300 Holt offsite for lunch.

1320 Holt onsite.

1335 Start drilling MIP-065. Measure headspace (results in table below).

1425 Josh (PW NAVFAC) on site with additional representatives from PW in uniform. Share observations from methane detections and explain LEL.

1445 Drilling gets harder at 34 feet bgs (initially harder at 17 feet bgs). PID/XSD taper off. Ambient air normal throughout. Complete MIP-065 to 35 feet bgs. Start pulling up probe.

1455 Talk to NAVFAC NW about results from completed borings; decide to move across landfill.

1505 Measure headspace in MIP-065 (results in table below). Soil and water in tubing following reading, so replaced.

1515 Mobilize to MIP-066 located in the southeastern portion of the landfill (on the eastern side).

1520 Start drilling MIP-066. Measure headspace (results in table below).

1530 RKI CH_4 at 6% LEL in ambient air and Resolution vehicle. Complete bump test and readings are in line with calibration solution. CH_4 drops to 5% LEL in ambient air after and then 4% LEL shortly after.

1540 Start sprinkling.

1555 Ambient air CH_4 stays between 4-5% LEL. MIP-066 drilling gets harder at approximately 18 feet bgs.

1600 At 21.5 feet bgs, Columbia observed that Holt stopped drilling in the middle of a foot according to his computer output. Check with Holt and realize that computer depth reading is about 6" off (actual depth is 22 feet bgs). Columbia and Holt trick into the correct reading and adjust (depth reading was correct at 18 feet bgs, so error occurred between 18 and 22 feet bgs).

1610 Drilling harder at approximately 24 feet bgs. Call from NAVFAC NW – discuss status of gas/methane readings and MIP results.

1625 Complete MIP-066 to 31 feet bgs. Aquitard likely encountered. Ambient air readings still at 4% LEL for CH_4, while everything else reads normally. Start pulling up probe.

1640 Measure headspace (results in table below). Complete bump test and results are good.

1650 Call from NAVFAC NW – discuss results of MIP-066. Will move to southwest corner of Central Landfill to start on Friday. Holt mobilize to MIP-067.

1655 Holt offsite. All locations patched with asphalt, except MIP-066 patched with concrete.

1700 Resolution collect GPS points of MIP locations.

1715 Resolution offsite.

1745 Columbia offsite.

Summary of Findings/Conclusions

Boring ID	Total Depth (ft bgs)	Max. XSD detection (uV) / depth (ft. bgs)	Max. PID detection (uV) / depth (ft. bgs)
MIP-062	33	256,355 uV / 17.33	256,355 uV / 17.33
MIP-063	28	302,210 uV / 16.95	215,156 uV / 16.95
MIP-064	34	358,287 uV / 23.85	267,037 uV / 18.9
MIP-065	35	318,995 uV / 19.65	247,200 uV / 20.3
MIP-066	31	206,458 uV / 20	151,067 uV / 20

The aquitard was likely encountered at MIP-066. MIP logs do not differ significantly, but maximum values are slightly higher south of MW1-17.

Summary of Gas Monitoring

Well/MIP ID	Measurement Depth (in bgs)	CH_4 (% LEL)	CO (ppm)	O_2 (%)	H_2S (ppm)	VOC (ppm)
MIP-062 Initial	6	4	14	9.2	0	30
MIP-062 Final	6	9	7	20.0	0	0
MIP-063 Initial	6	3	8	10.8	0	15

MIP-063 Initial (2)	6	4	12	8.9	0	0.8
MIP-063 Final	6	1	49	18.5	0	1.5
MIP-064 Initial	6	54	1.6	4.2	0	10.4
MIP-064 Final	0	3	0	20.9	0	4.3
MIP-064 Final (2)	6	48	13	3.2	0.5	3.6
MIP-065 Initial	6	85	1	20.4	0	5.8
MIP-065 Final	6	>100	54	14.3	0	8.8
MIP-066 Initial	0	>100	22	18.1	0	0
MIP-066 Initial (2)	6	>100	168	18.1	0	0
MIP-066 Final	0	>100	168	18.1	0	0
MIP-066 Final (2)	6	>100	>500	17.1	1	0

Plans for the Following Day:

Planned work for Friday 9/2/2016 includes completing MIP boring locations in the Central Landfill.

ATTACHMENTS:

None

Distribution:	**Resolution Consultants - DAILY FIELD REPORT**
Carlotta Cellucci, NAVFAC NW Tanwir Chaudhry, Navy EXWC Michael Singletary, NAVFAC SE David Einan, USEPA Hun Seak Park, Ecology John Evered, Ecology Denice Taylor, Suquamish Tribe Joann Grady, Grady and Associates	Signed: _Elyssa Dixon_____

Resolution Consultants *A Joint Venture of AECOM & EnSafe* 1111 Third Avenue Seattle, Washington 98101 206-438-2700	**Contract No.** N62470-11-D-8013, CTO JP09 Reference – Sampling and Analysis Plan – Keyport OU-1 Site Recharacterization; NAVFAC Northwest, dated July 1, 2016	**DAILY FIELD REPORT #16** **09/02/2016**
	Project: Keyport OU-1 Site Recharacterization	
	Location: Keyport, Washington	
	Client: Naval Facilities Engineering Command Northwest	**Contractor:** Resolution Consultants
	Weather: 60s; rain; thunderstorm; partially sunny; some wind	
To: James Flynn, Debbie Rodenhizer	**From:** Elyssa Dixon	

DAILY FIELD REPORT

PERSONNEL ON SITE

Elyssa Dixon (Resolution)
Doug McInnes (Columbia Technologies)
Michael Running and Clifford Letts (Holt Services)
Carlotta Cellucci and Steven Saepoff (NAVFAC NW)

Summary of Work Completed

- Completed three MIP boring locations: MIP-067, MIP-068, and MIP-069.

DEVIATIONS FROM WORKPLAN

- None

FIELD ACTIVITY SUMMARY

0705 Resolution Consultants (Elyssa Dixon) and Columbia Services on site. Holt Services at Pass & ID to get daily badge for driller's helper (Lucas Lou).

0710 Lucas (Holt) does not have proper ID, so can only be escorted on site. Call Carlotta, who might be able to assist, but will not be on site for a bit. She will check to see if someone else can come. Columbia start prep for work.

0720 Holt onsite, but leave Lucas at Pass & ID. Michael (Carlotta's supervisor) will be on site shortly to escort.

0740 Calibrate RKI.

0750 Lucas (Holt) onsite. Michael offsite and leaves Resolution in charge of escorting Lucas.

0755 Daily safety meeting – Meeting focused on drilling hazards and protocol for forecasted thunderstorms. Discussed scope of work for the day.

0800 Start drilling MIP-067. Lines carrying gas to MIP blocked, so Columbia will take apart system to check. Measure headspace after pre-probe (results in table below). Readings normal in ambient air and directly above borehole.

0815 Start raining.

0820 Columbia replace membrane on MIP and backflushed. Resume drilling MIP-067.

0840 Out of pressure range warning on MIP. Levels return to normal and Columbia believes a drop of water might still be in the line from backflushing.

0845 Ambient air readings normal. Call from Carlotta.

0910 Drilling harder at approximately 26 feet bgs. Meet refusal at MIP-067 at 28 feet bgs due to hard drilling conditions. Start pulling out probe.

0925 Carlotta on site. NAVFAC H&S on site. They discuss methane in buildings adjacent to Bradley Road. Measure headspace (results in table below).

0930 Call from Tony Palmieri (Resolution). Alternative tracer gas for helium will still cause interference from methane, so remaining soil gas samples will likely need to be analyzed for helium and collected using helium for the duration of sampling.

0935 Membrane on MIP has a nick, so Columbia backwashes line and replaces. This is likely the cause of pressure reading issues. Carlotta offsite.

0950 Wayne Forber (NAVFAC NW) onsite to request RKI readings.

0955 MIP looks better in tests, but readings still aren't quite right. Columbia will open probe to see if there is a leak.

1000 Rain gets harder.

1010 Rain lightens. Carlotta on site with extra rain gear.

1015 Carlotta offsite. Columbia cannot repair probe, so need to replace. Resolution load car from shed while waiting (rain eased off).

1100 Carlotta on site. Carlotta and Holt offsite to get lunch. New probe assembled buts responses not right. Columbia completing proper leak test.

1115 Carlotta and Holt onsite.

1125 MIP responding ok, but Columbia can't make systems fail in the right way to test properly. Will test pressure again before reassembling – replaced membrane and backwashed lines.

1140 Columbia remade calibration solution because it was beginning to degrade. Tests look better and are within an acceptable range.

1200 Mobilize to MIP-068. Carlotta offsite.

1205 Start drilling MIP-068. Measure headspace (results in table below).

1215 Steven Saepoff (NAVFAC NW) on site. Discuss job status.

1225 MIP pressure is increasing slowly, but flow remains fine (boring at 12 feet bgs). Will continue to monitor. Columbia will check flow in line before pulling up probe and will complete additional testing after boring is complete to ensure MIP is in good condition for next location.

1230 Ambient air readings are normal.

1240 Drilling gets hard at approximately 25 feet bgs. PID/XSD responses present.

1300 Meet refusal at MIP-068 due to hard drilling. Complete flow check at depth; reading on valve and computer almost same value, so test passes.

1310 Measure headspace (results in table below).

1325 Columbia will cut back trunk line to try to fix pressure increases; these increases could be caused by something stuck in the line. Could keep drilling and see if pressure goes down, but it has continued to climb without signs of decreasing. Too much pressure will result in inaccurate readings. Cutting the trunk line is the next best option to try to fix. Columbia does have a spare trunk line if needed, but it is shorter and hasn't been used for a while.

1400 Thunder observed.

1410 Columbia continuing to reconnect trunk line. Pressure is down.

1415 Start raining, but no more thunder observed.

1435 Lightning and thunder observed. Request Columbia stop work. Rain gets harder. Will wait and see if conditions change. Notify Tony.

1505 Storm passed and sun is out. Resume work.

1510 MIP passed tests and pressure is down. Mobilize to MIP-069 located in the northwestern corner of the central landfill.

1515 Start drilling MIP-069. Measure headspace (results in table below).

1530 Ambient air readings are normal.

1535 Call from Kasey Goble (Cascade). Cascade is available on Thursday and likely Friday next week to complete soil gas sampling without a rig. Resolution will confirm prior to scheduling.

1540 Holt reports portion of trunk line is hard to pull through rods, but manageable and not broken.

1545 Drilling gets hard at approximately 18 feet bgs.

1550 Ambit air readings are normal. Pressure in MIP start increasing, which Columbia says could be soil or dust in the line or natural increases with drilling).

1600 Discuss soil gas sampling with Tony. Resolution calls Cascade to schedule for next week.

1605 Reach approximately 28 feet bgs and drilling gets harder.

1620 Complete MIP-069 to 37 feet bgs. Aquitard likely encountered. Start pulling up probe. Raining lightly. Measure headspace (results in table below). Carlotta onsite.
Holt and Columbia clean up. Ask Columbia about XSD picking up natural compounds; FID would get responses, but PID/XSD does not (aliphatic vs aromatic compounds). Columbia suggests lower hits may be from organic material capturing halogenated VOCs.

1635 Steven offsite. Start demobing. Holt patches SV-04, which was missed by Cascade on Tuesday. Resolution label drums with sharpie. Carlotta will bring labels out from Resolution when in AECOM office on Tuesday.

1720 Holt and Carlotta offsite.

1735 Resolution offsite. Columbia to remain onsite to demob.

1945 Columbia offsite.

Summary of Findings/Conclusions

Boring ID	Total Depth (ft bgs)	Max. XSD detection (uV) / depth (ft. bgs)	Max. PID detection (uV) / depth (ft. bgs)
MIP-067	28	61,800 uV / 28.05	22,889 uV / 19.8
MIP-068	31	138,554 uV / 28.7	112,156 uV / 24.9
MIP-069	37	235,374 uV / 22.75	163,274 uV / 22.75

The aquitard was likely encountered at MIP-069. Elevated PID/XSD levels were only observed at a deeper depth interval in MIP-068.

Summary of Gas Monitoring

MIP ID	Measurement Depth (in bgs)	CH_4 (% LEL)	CO (ppm)	O_2 (%)	H_2S (ppm)	VOC (ppm)
MIP-067 Initial	6	58	100	4.2	0.5	122
MIP-067 Final	0	89	51	18.4	0	5.7
MIP-067 Final (2)	6	0	410	3.3	9	7.8
MIP-068 Initial	0	91	8	10.8	40	6.4
MIP-68 Initial (2)	6	0	8	5.3	32	3.6
MIP-068 Final	0	>100	4.8	18.4	11.5	0
MIP-68 Final (2)	6	21	122	3	30.5	4.8
MIP-069 Initial	0	>100	16	3.1	0	4.8
MIP-069 Initial (2)	6	0	12	3.4	0	4.2
MIP-069 Final	0	53	14	18	0	2.5
MIP-069 Final (2)	6	34	23	20	0	2.6

High levels of hydrogen sulfide accompanied by a sulfide odor were encountered at all locations.

Plans for the Following Day:

Remaining soil gas samples will be collected on Thursday 9/8/16 and Friday 9/9/16.

ATTACHMENTS:
None

Distribution:	**Resolution Consultants - DAILY FIELD REPORT**
Carlotta Cellucci, NAVFAC NW Tanwir Chaudhry, Navy EXWC Michael Singletary, NAVFAC SE David Einan, USEPA Hun Seak Park, Ecology John Evered, Ecology Denice Taylor, Suquamish Tribe Joann Grady, Grady and Associates	Signed: _Elyssa Dixon_____

Resolution Consultants *A Joint Venture of AECOM & EnSafe* 1111 Third Avenue Seattle, Washington 98101 206-438-2700	**Contract No.** N62470-11-D-8013, CTO JP09 Reference – Sampling and Analysis Plan – Keyport OU-1 Site Recharacterization; NAVFAC Northwest, dated July 1, 2016	**DAILY FIELD REPORT #17** **09/08/2016**
	Project: Keyport OU-1 Site Recharacterization	
	Location: Keyport, Washington	
	Client: Naval Facilities Engineering Command Northwest	**Contractor:** Resolution Consultants
	Weather: 60s,70s; partially sunny; some wind	
To: James Flynn, Debbie Rodenhizer	**From:** Elyssa Dixon	

DAILY FIELD REPORT

PERSONNEL ON SITE

Elyssa Dixon (Resolution)
Kyle Ceruti (Cascade Drilling)
Brian Pouley and Nate Tandecki (GHD)

Summary of Work Completed

- Collected 3 soil gas samples: SV-11, SV-12, and SV-13.

DEVIATIONS FROM WORKPLAN

- Soil gas samples were collected using a shroud with helium tracer gas for the duration of sampling. Leak tests could not be conducted because methane concentrations in the soil gas registered as helium in the helium detector.

FIELD ACTIVITY SUMMARY

0750 Resolution Consultants (Elyssa Dixon) and GHD on site. Calibrate RKI and prepare helium detector desiccant.

0810 Cascade on site.

0815 Daily safety meeting – Meeting focused on work in road. Discussed scope of work for the day. GHD start set up of traffic control.

0900 Mobilize to SV-07. Request Cascade add concrete/bentonite to top of sample locations to provide additional seal.

0905 Purge line to check gas readings (results in table below). Concentrations low, so will conduct leak test.

0915 Start purging for leak test and start pumping water from soil gas sampling probe. Standing water (about 1-2 feet bgs) present in swale east of Bradley Road approximately 10 feet from sample location.

0930 Call Jim Flynn (Resolution) to discuss.

0935 Check water level in MW1-20; depth is greater than 4 feet bgs, but well is located south of sample location and not near drainage swales.

0940 Check SV-08; groundwater encountered in first purge.

0950 Call from Kasey Goble (Cascade) to check in on work. Temporary fill SV-07 and SV-08 to surface and move traffic control to northern-most point to check for groundwater.

1035 Traffic control moved. Mobilize to SV-13.

1045 Purge SV-13 twice (results in table below) into a tedlar bag. Cascade add concrete bentonite seal in between purges. Cannot conduct leak test with CH_4 detections, so set up to sample.

1057 Start collecting SV-13.

1130 Stop collection of SV-13. No groundwater observed during sampling.

1135 Screen pulled out of ground and hole patched with asphalt.

1145 Call from Carlotta Cellucci (NAVFAC NW) – update on status. Resolution will meet her at the museum to get drum labels. Resolution offsite.

1155 Resolution onsite. GHD take down traffic control for lunch.

1200 GHD offsite.

1215 Resolution label decon water drum from MIP work.

1245 GHD onsite. Mobilize to SV-12 and set up to purge. Cascade add concrete/bentonite to sample location.

1255 Purge SV-12 (results in table below) into a tedlar bag. CH_4 readings jump to 41% immediately after removing tedlar bag from sensor and then dropped to 0% in ambient air.

1305 Purge SV-12 (results in table below) into a tedlar bag to check for groundwater. Cannot conduct leak test with CH_4 detections, so set up to sample.

1312 Start sampling SV-12.

1320 Cascade abandon SV-07 and SV-08 and measure water level at approximately 1.5 feet bgs. Locations patched with asphalt.

1341 Stop collection of SV-12. No groundwater observed during sampling.

1346 Start sampling SV-FD (field duplicated of SV-12).

1413 Stop collection of SV-FD. No groundwater observed during sampling.

1415 Abandon SV-12 and patch hole with asphalt.

1425 Move traffic control and mob to SV-11.

1430 Cascade add concrete/bentonite to SV-11. Purge SV-11 (results in table below) into a tedlar bag.

1440 Purge SV-11 (results in table below) into a tedlar bag to check for groundwater. Cannot conduct leak test with CH_4 detections, so set up to sample.

1450 Move to SV-10 to purge into a tedlar bag and check for groundwater (results in table below).

1500 Purge SV-10 a second ntime. Pumping gets harder, but no groundwater encountered (results in table below).

1515 Return to SV-11. Cannot conduct leak test with CH_4 detections, so set up to sample. Start collection of SV-11.

1542 Stop collection of SV-11.

1545 Cascade abandon SV-11 and patch with asphalt. Mobilize to SV-10. Cannot conduct leak test with CH_4 detections, so set up to sample. Conrete/bentonite seal added.

1554 Start sampling SV-10.

1604 After 10 minutes of sampling, pressure in canister has decreased 1 in Hg. Resolution stop sampling and connect different flow controller.

1607 Restart sampling SV-10. Pressure in line was released when disconnecting fitting from tubing to change controller.

1617 After 10 minutes of sampling with different flow controller, pressure decreased approximately 2 in Hg. Groundwater could be present causing limited flow, but the flow controller pumping rate is not great enough to pull up groundwater. Disconnect summa and try pumping with hand pump at faster rate for groundwater. Pressure on flow controller read 25 in Hg when the summa was open and after it was closed, so pressure build up is in the sample tubing and screen.

1625 Groundwater not encountered during hand pumping, but subsurface conditions preventing sample collection, so abandon SV-10 and patch with asphalt.

1630 Traffic control start cleanup. Mobilize to SV-09.

1635 Start purging SV-09. Groundwater encountered within two pumps of hand pump.

1637 Abandon SV-09 and patch with asphalt. Groundwater appears to be directly below slab. Water appears to be coming out of asphalt crack on west side of Bradley Road.

1645 Notify Tony Palmieri (Resolution) of status.

1650 Cascade offsite.

1700 GHD offsite. Resolution collect GPS points of sample locations.

1800 Resolution offsite.

Summary of Findings/Conclusions

Sample ID	Start Time	Initial Pressure (in Hg)	Stop Time	Final Pressure (in Hg)
SV-11	1515	27	1542	5
SV-12	1312	30	1341	5
SV-13	1057	28	1130	5
SV-FD*	1346	30	1413	5

*Field duplicate of SV-12.

Summary of Gas Monitoring

Sample ID	CH_4 (% LEL)	CO (ppm)	O_2 (%)	H_2S (ppm)	VOC (ppm)
SV-08 Purge	1	20.5	0	0	0.8
SV-10 Purge 1	67	>500	17.1	1.5	0
SV-10 Purge 2	>100	>500	17.1	1.5	0
SV-11 Purge 1	44	35	2.1	0	0
SV-11 Purge 2	45[A]	21	2.1	0	0
SV-12 Purge 1	15	1	2.2	0	0
SV-12 Purge 2	40[B]	0	2.8	0	0
SV-13 Purge 1	8	97	1.8	0	2.4
SV-13 Purge 2	8	58	1.6	0	2.1

[A]CH_4 readings increased to >100% after removing the probe from the tedlar bag and then back to 0% in ambient air.

[B]CH_4 readings decreased to 16% about 2 seconds into measuring the air in the tedlar bag.

Plans for the Following Day:

None

ATTACHMENTS:

None

Distribution: Carlotta Cellucci, NAVFAC NW Tanwir Chaudhry, Navy EXWC Michael Singletary, NAVFAC SE David Einan, USEPA Hun Seak Park, Ecology John Evered, Ecology Denice Taylor, Suquamish Tribe Joann Grady, Grady and Associates	**Resolution Consultants - DAILY FIELD REPORT** Signed: _Elyssa Dixon_____

Location _____ Date 8.15.16

Project / Client _____

* Safety observation → secured MIP to gator tailgate & prepped calibration solution up higher on tool box to prevent spillage of solution
* Note that folks are stepping over MIP trunk lines to get around. Suggest they walk around front of gator to Avoid.

Density change @ ~5.2 ft bgs (softer)
Density change @ 15 ft bgs (harder)
*1043 Complete to 18 ft bgs
1059 Cahlotta offsite.
* Attempt to plot MIP-001 on the Smart Data Solutions website, realize that base map has not been updated w/ our base maps. Will call Wendi (Columbia) to discuss.
1110 Speak w/ Wendi, she indicates that they are working ON resolving the website issues.
Mobe to MIP-002, just east of MW1-4.
1147 Start MIP-002.

Location _____ Date 8.15.16

Project / Client _____

Density change (softer) @ 5 ft bgs
Higher density @ 8 ft
~~Higher~~ Softer @ 10ft

1215 Complete MIP-002 to 15 ft bgs. Holt/AECOM take lunch.

Site Groundwater Levels

Well	DTW (ft below TOC)	Time
MW1-5	9.10	1221
P1-9	6.75	1202
P1-6	7.80	1224
P1-8	6.55	1210
P1-7	7.15	1217
MW1-4	6.90	1158
P1-10	5.90	1213
MW1-6	8.10	1206

1300 Dale Smith (Holt) onsite.
1325 Setup on MIP-003, SW of MW1-4.
1348 Start MIP-003, "
1350 Carlotta + Brian Ransom onsite.
* Softer @ 5 ft
* Spike in FID meter, seems to correlate to marsh deposit.
* More dense @ 8ft
* Softer @ 11ft

Location _____ Date 8.15.16

Project / Client _____

1420 Complete MIP-003 to 16 ft.
1440 Mobe to MIP-004.
1510 Start MIP-004.
* Less dense @ 3 ft bgs
1520 * Refusal @ 4ft bgs. Step over ~ 3ft west of original location. Will start logging @ 4 ft bgs on new boring and use 0-4 ft data from original boring.
1527 Start new location.
1534 Refusal @ 4.5 ft. Will attempt 3rd boring 5 ft east of R22-T1
1545 Start 3rd location.
1552 Note higher pressure in trunk line. Columbia indicate it could be a kink in line, water inside sensor. Keeps advancing probe and monitors pressure. Softer @ 15 ft
1615 Stop log @ 16 ft.
1630 Talk w/ Charlotta and Doug about possibly taking the FID offline. This would allow more of the carrier gas to go to the XSD, allowing for a lower detection limit and better response. Relay to Jim Flynn for review.
1630 Holt offsite.

Location _____ Date 8.15.16

Project / Client _____

1725 Columbia indicates that heating block on MIP was cracked and that probe would need to be shipped to Geoprobe for repair. Will install new MIP ~~probe~~ tonight and order another backup
1730 AECOM offsite. Columbia to remain onsite for equipment prep. Will call A. Palmieri when he leaves site.

1920 Call from Doug McInnes, he is leaving the site.

8.15.2016

Location _____ Date 8.16.16

Project / Client _____

0700 Palmieri and Dixon onsite. Raphee ~~MIP to~~ completed MIP location pin flags w/ stakes.

0715 Columbia onsite.

0725 Holt on site

0700 Late entry → Carlotta on site.

0730 Hold daily H&S meeting. Topic is biological hazards (bees).

Onsite Personnel

Aecom: Anthony Palmieri + Elyssa Dixon

Columbia: Doug McInnes

Holt: Michael Running + Cliff Letts

NAVFAC: Carlotta Cellucci

Plan is to drive a point from ground surface to 5 feet bgs to avoid damaging MIP on gravel. Detectors should still pickup COCs if present. Columbia will also take FID offline and run PID & XSD only.

0830 Start MIP-005, halfway between R23-T2 and R24-T2. Drilled probes 1.75" pilot hole with drive point to 5 ft bgs.

* Void noted @ 5.5 feet, then very

Location _____ Date 8.16.2016

Project / Client _____

soft. * More dense @ 6.5 to 7 feet.

~~0858 Complete MIP-005 to 17 ft bgs.~~ AP

0906 Spoke w/ Carlotta. There is still a slight XSD response @ bottom of borings. Decide to go 2 more feet to see if the detection tapers down.

0916 @ 20 ft. Discuss w/ Carlotta on path forward.

0935 Stop @ 20 ft.

0940 Carlotta offsite.

1000 Holt moves to MIP-006, roughly midpoint between R22-T2 and R21-T1. Columbia indicates that PID will not return to baseline currently troubleshooting. → Late entry, PID was having trouble @ MIP-005, so PID log should be disregarded.

1029 Start MIP-006. PID is still above baseline, but appears to be coming down. We will proceed w/ MIP-006 and decide @ end of boring if PID data is usable. Pilot hole to first 5 feet.

Location _____ Date 8.16.2016

Project / Client _____

* Hard first 2-3 feet (Gravel), then soft.
* Harden @ 9ft. * Soften @ 14.5 ft.
* Soften last 2 feet.

1052 Complete MIP-006 to 18 feet ~~bgs~~.
↳ PID data is usable based on discussion w/ Columbia.
* Notice drillers helper (C1, ft) using A dremel to grind drill rods w/o wearing safety glasses. Stop him and tell him to put on glasses.
* Columbia will stop running dissipation test at the end of each boring. The K values of the material are too low for the test to be effective and are taking 20+ minutes.

1117 Start MIP-007. * Soft @ 6 ft.
* Harden @ ~9 ft. * Soften @ 15 ft.
1147 Complete to 18 feet bgs.
1200 Holt sets up on MIP-008. Take lunch.
1258 Start MIP-008.
* Harden @ 7 ft
1330 Complete MIP-008 to 14 ft bgs

Location _____ Date 8.16.2016

Project / Client _____

1335 Mobe to MIP-009.
1345 Starting MIP-009
1420 Complete MIP-009 to 20 ft.
1426 Mobe to MIP-010.
1442 Start MIP-010.
1500 Carlotta onsite.
1523 Mobe to MIP-011.
1515 Late entry → Have call w/ Jim Elyea, Carlotta, Anthony, & Elyssa, to discuss path forward.
1545 Start MIP-011.
1605 Complete MIP-011 to 18 ft
1630 Holt offsite
1657 Columbia offsite.
1730 AECOM offsite.

Late entry → 1520 Complete MIP-010 to 18 ft bgs

8.16.2016.

Location _____ Date 8.17.2016

Project / Client _____

0650 Resolution onsite.
0705 Columbia onsite.
0708 Carlotta onsite.
0715 Holt onsite.
0727 H&S meeting. Topic is no cellphone use while walking.

Onsite Personnel
Anthony Palmieri & Elyssa Dixon (Resolution)
Doug McInnes (Columbia)
Michael Runnings & Cliff Le Hs (Holt)
Carlotta Cellucci (NAVFAC NW)

0812 Start MIP-012. Located 5 ft west of IW1-S.
* Soften e 7 ft
0837 Complete MIP-012 to 16 ft bgs.
0846 Mobe to MIP-013.
0905 Start MIP-013. Located 8 ft

0928 Complete MIP-013 to 18 ft bgs.
0934 Carlotta offsite. Mobe to MIP-014.
1005 Start MIP-014
1027 Complete MIP-014 to 18 ft bgs.
1052 Mobe to MIP-015
1107 Start MIP-015

Location _____ Date 8.17.2016

Project / Client _____

1145 Complete MIP-015 to 18 ft bgs. Take lunch.
1250 Start MIP-016.
1325 Complete MIP-016 to 20 ft bgs.
1340 Mobe to MIP-017.
1400 Start MIP-017.
HPT not started until 10 ft.
1445 Complete to 22 ft bgs.
1530 Start MIP-018
1620 Speak w/ Carlotta & Jim. MIP-018 is at 26 ft w/ relatively high, no sign of confining unit. Suggest MP All agree the we should go until we find the confining unit.
1643 Encounter brighter conductivity material @ 33 ft bgs. Borings completed to 35 ft bgs. Begin demobe.
1700 Holt offsite.
1708 AECOM offsite.
1808 Columbia offsite.

8.17.2016

Location _____ Date 8.18.2016

Project / Client _____

0630	Resolution onsite.
0705	Holt onsite
0708	Carlotta onsite.
0710	Columbia onsite.
0715	Daily HaS meeting. Topic is heat stress. Discuss scope of work for day.
0735	Move to MIP-019.
0805	Start MIP-019.
0900	Complete MIP-019 to 36 ft bgs.
0910	Driller note damaged thread on probe rod. Columbia will need to disconnect trunk line to replace rod.
0952	Start MIP-020.
1055	Refusal @ 36 ft bgs. Aquitard not encountered.
1057	Cliff (Holt) not wearing safety glasses. Asked to put on.
1100	Drill strips mother probe rod cap pulling rods. Advise that he uses Rod grip.
1125	Setup on MIP-021

Observe buried catchbasin at R7-T5 is manhole with line running to ~~east~~ we ED. Likely runs to ED

Location _____ Date 8.18.2016

Project / Client _____

drain cover in center of Bradley Rd and culvert from swale at corner of Bradley and roads (NW corner). Observed by Pipe Experts LLC (onsite from Carlotta). Will move to look at Rd

1135	Tony and Carlotta offsite. Check SW line locations w/ Holt. Compared to proposed drilling locations. All looks clear.
1145	Start MIP-021
1210	Open drain cover in Bradley Rd and no pipe going east present. Observe culvert from swale on east side of Bradley Rd heading in rough direction of buried manhole. Pipe leaving manhole is concrete, and this pipe is corrugated metal. Pipe Experts will run camera down culvert → might hit buried CB/MH and transition to concrete.
1235	MIP-021 harder starting at 17 ft bgs (currently at ~26 ft bgs) ED

Location _____ Date 8/18/16

Project / Client _____

1305	Reach final depth of 28 ft bgs in MIP-021. Aquitard encountered. Concentrations via XSD/PID lower and more similar to earlier probes in trees. Start pulling at probe. Buried MH partially uncovered, but 2-3" diameter root running across center of lid. Call Carlotta, she says to see if we can get it. Decide not feasible after talking with Pipe Experts. Will place cones around hole.
1320	Holt offsite for lunch
1335	Holt onsite. (Eat lunch)
1405	Start set up at MIP-022
1410	Check in with Jim Flynn (AECOM) regarding status of day.
1415	Start MIP-022
1445	Hit something hard at ~22 ft bgs. Try to get more depth. Reach refusal at 22 ft bgs. Start pulling probe up.
1500	Set up at MIP-023
1530	Reach 15 ft bgs and pressure

ED

Location _____ Date 8/18/16

Project / Client _____

	In probe increases to too high levels. Pull back up and will troubleshoot and try to fix. Backup probe may not be on site until tomorrow afternoon. Doug will look at probe and let us know by 1400 potential status. Update Tony and Jim.
1548	APS will be on site at 630 tomorrow to locate Bradley Rd and the Central Landfill
1600	Probe is broken. Leak is visible in box on probe → cannot be repaired on site. Will get set up to attach new probe tonight. Plan to call geoprobe and boss in AM (Doug) and will find out delivery status. Doug will send tracking number to Elyssa and Tony. If new probe arrives before 12, Doug will notify Elyssa and Holt and will mobilize to site.

ED

Location _____ Date 8/18/16

Project / Client _____

1610	Notify Tony, Jim and Carlotta
1620	Holt offsite
1640	Elyssa offsite
1715	Doug offsite

Elyssa Dixon
8/19/16

Location _____ Date 8/19/16

Project / Client _____

0620	Elyssa Dixon (AECOM) on site Payne (APS) on site and located ~9 soil vapor locations. Review utility maps. Elyssa will mark remaining locations.
0640	Carlotta onsite. Complete walk of marked locations and shift some closer to motorcycle area.
0715	Check locations with Motorcycle club and shift some
0845	Complete locate and sign dig permits.
0745	Doug calls to inform replacement MIP will not be on site on time to complete work today. He will notify Holt. Elyssa notify Tony and Jim.
0850	APS and Carlotta offsite
0900	Update base map with MIP-022 and MIP-023 locations
0920	Elyssa offsite

Elyssa Dixon
8/19/16

Location _____ Date 8/22/16

Project / Client _____

0650	Elyssa Dixon (Resolution) on site
0700	Holt and Carlotta onsite
0715	Carlotta offsite to check progress of dig permits
0725	Columbia onsite
0730	Health & Safety meeting. Columbia start set up of replacement probe
0845	Move MIP-023 ~1 ft off previous location. Start set up.
0900	Carlotta onsite. Conference call with stakeholders.
1000	Complete MIP-023 at 37 ft bgs. Reach aquitard ~36 ft bgs. Columbia expressed concerns about probe retrieval through denser soil to this depth.
1015	Mob to MIP-024. Locate based on map location shifted to accomodate estimated SW line location from buried MH (45° to NW)
1035	Start MIP-024.
1100	Carlotta offsite
1105	Soil starting at ~19 ft bgs transitions to very hard

ED

Location _____ Date 8/22/16

Project / Client _____

1145	Complete MIP-024 to 37 ft bgs. Aquitard encountered based on HPT response
1210	Holt offsite to get lunch. Tony ask about backfill - using 1/4 bag of chips per hole and caving is minimal. Notify Constance Lapite (Resolution) of cancellation of sonic drilling and associated samples. Will add porewater to this mob.
1220	Holt onsite. Lunch
1240	Mob to MIP-025 and set up
1255	Start MIP-025
1355	Complete MIP-025 to 34 ft bgs. Aquitard encountered. Start pulling probe. Will measure cave in depth prior to backfilling.
1410	Cave in depth at 12 ft bgs
1415	Mob to MIP-026 and set up.
1440	Start MIP-026
1535	Talk to Tony about approach. Will move to location next to CB if time to do one more. Wait on direction

ED

Location _____ Date 8/22/16

Project / Client _____

for tomorrow.

1555 Complete MIP-026 to 36 ft bgs. Aquitard encountered. Start pulling probe

1010 Not enough time for fifth boring, but will move to the next location tonight to be ready to go in AM. Call Tony → moving to eastern edge of site and will start with location next to MW1-5.

1625 Mob to MIP-027 and start clean up

1635 Holt offsite

1040 Depth potentiometer broke at MIP-026. Columbia has 2 backups, so equipment has been replaced. Membrane on MIP got small hole, so replaced on probe (cannot function properly with hole).

1045 Resolution offsite

1700 Columbia offsite

Elyssa Dixon
8/22/16

Location _____ Date 8/23/16

Project / Client _____

0700 Resolution on site (Elyssa Dixon) Holt already on site.

0705 Columbia on site.

0715 Health & Safety Meeting Holt refueling daily now w/ increased depth. Columbia will pour off some calibration solution into drum to prevent bucket spilling while driving around

0720 Mob MIPs gator to MIP-027 and start set up

0750 Start MIP-027

0820 Hard layer around 19 ft bgs present, but not as hard as locations yesterday in west.

0900 Complete MIP-027 to 37 ft bgs. Aquitard encountered at bottom. Start pulling probe.

0915 Mob to MIP-028 and set up.

0930 Start drilling MIP-028

1000 Drilling gets harder at ~24 ft Columbia comments that increasing PID could be from heavier ED

Location _____ Date 8/23/16

Project / Client _____

compound (paint, paint thinner, etc) (like xylenes).

1030 Reach 38 ft bgs and do not hit aquitard. Can add rod to go deeper. Call Tony to ask.

1035 Complete MIP-028 to 38 ft bgs. Pull up probe. Aquitard not encountered

1050 Mob to MIP-029 and set up

1100 Start MIP-029

1145 Soil softer around 12 ft bgs, which corresponds to XSD increase. At 30 ft bgs now and no other XSD hits. Columbia not sure why PID increasing gradually here either PID has similar gradual increase. Columbia unsure why, but PID checks look good inbetween borings and first few feet of MIP-029 stable → peak also corresponds w/ XSD peak. Will only check filters in line for potential caught contaminants if start showing in XSD.

1155 Carlotta onsite ED

Location _____ Date 8/23/16

Project / Client _____

1200 Review completed locations w/ Carlotta. She had requested keep going west to east. Review map and determine next location and plan to step across site to west.

1205 MIP-029 reach bottom of rods and aquitard not encountered. Will add rod and try to reach. based on Carlotta's recommendation.

1210 Carlotta offsite.

1220 Rod installed. Resume drilling

1230 Reach 41.7 ft bgs and haven't encountered aquitard. Carlotta suggests asking Tony or Jim if we want to add another rod as they expressed interest in reaching the aquitard. Tony indicates want to get more lateral coverage rather than spend too long at one location, so MIP-029 is completed to 41.7 ft bgs → aquitard not encountered Begin pulling up probe

1240 Kreosote odor observed when pulling up rods ED

Location _____ Date 8/23/16

Project / Client _____

1250	Holt offsite to get lunch (Mobed to MIP-030 prior to leaving)
1300	Holt onsite. Lunch Columbia start set up for MIP-030
1315	Conversation with Jim and Tony regarding approach for next samples. Will move to uncharacterized zone around R8-R13 after MIP-030.
1320	Start MIP-030
1330	Carlotta onsite. Wants to collect data to deeper depth at other locations NE of MIP-030. Discuss location priority for Central Landfill.
1405	Drilling gets hard ~ 32-33 ft bgs. Columbia asks Holt to slow hammer.
1410	MIP-030 completed to refusal at 35 ft bgs → subsurface conditions too hard. Don't want to break probe. Start pulling up probe
1430	Mob to MIP-031 and set up.
1435	Start MIP-031.
1445	Carlotta offsite. ED

Location _____ Date 8/23/16

Project / Client _____

1520	Soil hard ~ 31 ft bgs. Started getting a little harder ~ 22 ft bgs.
1530	Complete MIP-031 at 35 ft bgs (Refusal met based on hard soils). Aquitard not encountered. Start pulling probe. Not enough time to complete sixth location.
1540	Columbia completing end of day tests, then will unhook and move to MIP-032 located next to tree R11-T6.
1600	Mob to MIP-032 Columbia will refuel generator tonight to save time in AM
1610	Holt offsite
1620	Resolution offsite
1645	Columbia offsite

Alyssa Dion 8/23/16

Location _____ Date 8/24/16

Project / Client _____

0655 Resolution (Elyssa Dixon) on site
0705 Columbia onsite
0715 Holt onsite
0720 Health & Safety Meeting
0725 Set up at MIP-032
0750 Start MIP-032
0850 Complete MIP-032 to 40 ft bgs. Reach aquitard. Soil less hard at this location overall than those previous
0905 Move to MIP-033 and set up
0925 Columbia set up. Waiting on Holt.
0930 Start MIP-033
0940 Cut in line to probe has hole, tear, so need to shorten and replace. Will take about an hour. Tear caused by sharp edge inside rod. Holt will grind down to prevent happening again.
1055 Columbia finishing tests on MIP before resuming drilling
1105 ED Start drilling MIP-033
High EC ~2 ft bgs from metal or comparable → drilled through
1120 High temp warning on MIP (14 ft bgs) ED

Location _____ Date 8/24/16

Project / Client _____

Actual temp of probe can't change as quickly as readings show, so likely thermocouple has failed. Readings for other sensors look fine, so will continue to drill and monitor (currently at ~18 ft bgs).
1125 Temperature readings returned to more normal readings, so likely not thermocouple.
1140 Columbia will clean filter on HPT this weekend. HPT variability wouldn't occur if blocked (would stay high), but Columbia will clean to make sure no issues.
1200 Complete MIP-033 to 40 ft bgs. Aquitard possibly encountered and close to refusal (hard soil) Start pulling probe up.
1220 Holt offsite to get lunch
1245 Holt onsite.
No tears found when trunk line pulled. Thermocouple tested fine. Will monitor. ED

Location _____ Date 8/24/16

Project / Client _____

1300	Mobilize to MIP-034. Columbia generator turns off - fuel is low. Will refuel.
1310	Start MIP-034.
1320	Conversation with Carlotta. Will not be on site today, but will try to come by tomorrow. Aiming to complete clearing + grubbing of some areas on Monday. Dig permit for Central Landfill will not be in place by tomorrow, so postpone work there until next week.
1345	Temperature has not been an issue at MIP-034. Soil starts getting hard ~28 ft bgs.
1405	Complete MIP-034 to 39 ft bgs. No aquitard encountered. Start pulling up probe.
1415	Mob to MIP-035
1435	Start MIP-035
1505	Call from TONY → discuss soil gas sampling approach ED

Location _____ Date 8/24/16

Project / Client _____

1515	Call Carlotta to confirm she can escort Clearcreek on Monday to complete clearing + grubbing. She is available, but remembers that escorted people cannot drive vehicles onto base, but she could drive them if equipment fits in truck. Tony indicates that Clearcreek requires Class C driver. Leave message with Scott Skolnik (NAVFAC NW Security) to discuss badging timing.
1540	Complete MIP-035 to 40 ft bgs. Aquitard encountered. Start pulling up probe
1600	Mob to MIP-036
1610	Holt offsite
1630	Resolution offsite
1640	Columbia offsite

Elyssa Dixon 8/24/16

Location _____ Date 8/25/16

Project / Client _____

0700	Resolution (Elyssa Dixon) on site
0705	Holt onsite
0715	Columbia onsite
0720	Health & Safety Meeting. Start set up at MIP-036
0745	Start MIP-036
0750	Temperature readings start fluctuating again, so pull probe out. Likely thermocouple failure. Observe leaking out of heat box as well. New probe was delivered yesterday if needed.
0800	MIP heating up to touch, but not registering on gauge. Flow is at 42 mL/min, so that is at acceptable range and probe not leaking. Will replace thermocouple (wires functioning properly after testing)
0815	Thermocouple replaced and functioning properly according to values shown on gauges
0830	Talk to Scott Skolnik, should be able to get clearing/grubbing contractor daily passes for Monday ED

Location _____ Date 8/25/16

Project / Client _____

	Charlie Escola (NAVFAC NW) on site
0840	Tests passed on probe. Start drilling MIP-036 again.
0845	Charlie offsite
0920	Reach 30 ft bgs, XSD shows no signs of contamination. EC spike near surface likely result of landfill debris. Charlie onsite to inform waste disposal for drums is set up (paperwork will be sent to Carlotta)
	Notified by Carlotta that Central Landfill dig permit is approved
0930	Complete MIP-036 to 34 ft bgs. Stopped earlier because low XSD response & more shallow
	Charlie offsite
0940	Will remain in South Plantation today and move to Central Landfill tomorrow
0945	Mob to MIP-037 ED

Location _____ Date 8/25/16

Project / Client _____

1000 Start MIP-037

1040 Pressure out of range warning. No bubbles in line or kinks. Flow staying constant, will monitor.

1100 Complete MIP-037 to 40.5 ft bgs. Aquitard encountered. Start pulling up probe. Columbia will troubleshoot potential issues causing pressure warning.

1115 Holt offsite to get lunch, while Columbia troubleshoots

1120 Carlotta onsite. Discuss approach for remaining work. Due to unknown nature of Central Landfill and possibility of breaking probe, may decide to postpone until late next week.

1130 Probe is not functioning properly, so Columbia will install new probe.

1140 Carlotta offsite. Holt onsite.

1155 Discuss approach, waste characterization sampling and clearing/grubbing with Tony.

1215 Call Constance Lapite (AECOM) ED

Location _____ Date 8/25/16

Project / Client _____

to discuss waste characterization

1225 Decon water and calibration solution (TCE/toluene) are in same drum. ~~Approx~~ ¼ bucket of cal solution. Unlikely to use full drum

1230 Pressure readings are not correct, but new probe has been installed. Columbia is troubleshooting.

1300 Pressure fixed. Mob to MIP-38. Inform Holt and Columbia waste needs to be put in separate drums moving forward.

1305 Start drilling MIP-038

1330 Conversations with Tony regarding potential rain forecast for soil gas next week

1345 Conversation with Debbie Rodenhizer (AECOM) regarding waste characterization.

1400 At approx 34 ft bgs. Soil hard around 25 ft bgs.

1440 Complete MIP-038 to 39 ft bgs ED

Location _____ Date 8/25/16

Project / Client _____

1425	Mob to MIP-039. Set up.
1445	Start drilling MIP-039
1500	John Sohl (Columbia) on site Review status of MIPs work
1520	John offsite. Mentions would be good to get RapidGate for next phase.
1550	Complete MIP-039 to 44 ft bgs Aquitard not encountered (no EC spike). Start pulling probe and cleanup
1625	Holt offsite Conversation with Carlotta. Calibration can likely go in same drum because mixed with water. Will check if Toluene being used. Dig permit update should come tomorrow AM.
1640	Columbia has not used any toluene.
1645	Resolution offsite
1700	Columbia offsite

Elyssa Dixon
8/25/16

Location _____ Date 8/26/16

Project / Client _____

0700	Resolution (Elyssa Dixon) and Holt onsite
0710	Columbia onsite
0715	Health&Safety Meeting
0720	Set up for work Mobilize to MIP-040
0750	Start MIP-040
0845	Notified Bradley Road dig permit has been approved
0900	Complete MIP-040 to 38 ft bgs Aquitard not encountered Start pulling probe
0915	Mobilize to MIP-041 and start set up.
0930	Start MIP-041
1005	Soil hard ~ 36 ft bgs
1040	Complete MIP-041 to 42 ft bgs Aquitard not encountered PID hits higher over most of depth. Pull up probe.
1100	Mobilize to MIP-042
1105	Decon bucket on back of drill rig splashing over while moving. Request Holt keep less full or

Location _____ Date 8/26/16

Project / Client _____

	hand carry between locations to prevent spillage
1120	Start MIP-042
1130	Inform Carlotta of approved Dig Permit (did not receive forwarded email because on vacation today). Discuss work next week, completed locations today and PID hits
1150	Call from Kasey Goble (Cascade) to confirm logistics for soil gas on Monday.
1225	Complete MIP-042 to 38 ft bgs. Aquitard not encountered. Hit something hard near bottom. Start pulling up probe.
1240	Holt offsite to get lunch
1305	Columbia prepping for MIP-043
1310	Holt on site
1320	Mobilize to MIP-043
1325	Start drilling MIP-043
1410	Additional backup MIP should be delivered tomorrow. Drilling gets pretty hard ~25 ft bgs
1425	Complete MIP-043 to 35 ft bgs Aquitard not encountered.

Location _____ Date 8/26/16

Project / Client _____

1440	Mobilize to MIP-044 and set up
1455	Start drilling MIP-044
	Day passes were approved for Clearcreek for Monday work.
1610	Complete MIP-044 to 40 ft bgs Aquitard not encountered
1620	MIP not coming up. Tried rethreading twice and didn't work, but will keep trying
1625	Pulled up 6 rods. Manually pulled on trunk line to break and bring up 4 rods left in hole Back MIP not scheduled to be delivered until tomorrow. Columbia does not have tracking info, but assumes not before 12.
1630	Conversation with Tony. Have approximately 15 locations in South Plantation area if get everything planned. Decide to try to work in afternoon if probe comes in to get ahead.
1645	Call Carlotta. Inform of probe

Location _____ Date 8/26/16

Project / Client _____

~~hand carry between locations to prevent spillage~~ ED 8/26/16

and 4 rods stuck, but service is bad, so can't discuss more.

1650 Decide Holt will get to shop at 10 am and wait for call when Doug gets the probe. If probe not arrived before 12, will not work. Holt offsite.

Finish measuring locations.

1715 Columbia offsite

1725 Resolution offsite

Elyssa Dixon 8/26/16

Location _____ Date 8/27/16

Project / Client _____

1050 Resolution (Elyssa Dixon) at Keyport gate. Rapidgate not set up for Saturday work, so Doug McInnes (Columbia) will escort.

1100 Resolution and Columbia on site. Columbia begin probe set up and Resolution sort coolers. Call Holt to check on their Rapidgate status.

1210 Holt on site. Columbia has ~40 mins left of set up and testing.

1235 complete Health & Safety.

1250 Mobilize to MIP-045. Columbia test probe.

1310 Tests passed. Start MIP-045 Holt bends pilot test rod and has to replace

1350 Drilling hard starting ~18 ft bgs XSD and PID minimal responses

1400 Meet refusal at MIP-045 at 31 ft bgs. Soil too hard. Start pulling up.

1415 Mobilize to MIP-046

1430 Start MIP-046 ED

Location _____ Date 8/27/16

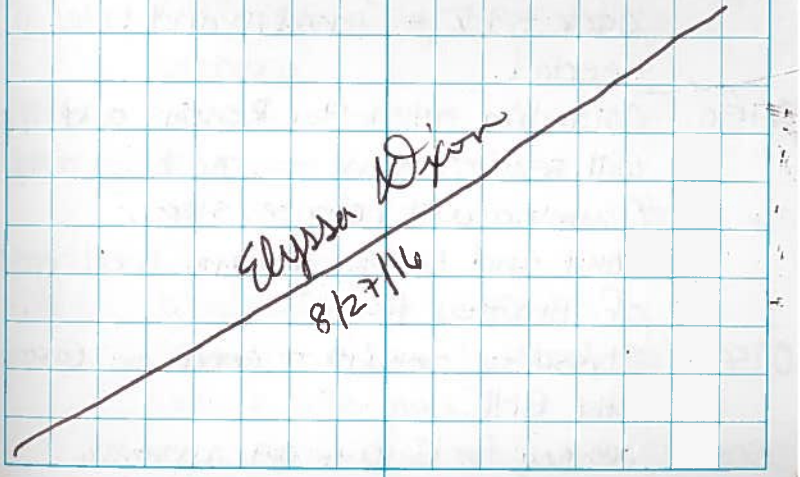
Project / Client _____

1440	Temperature out of range warning at 6 ft bgs. Will pull probe and replace thermocouple, then continue log at 6ft.
1500	Columbia fixed loose wires in probe (did not need to replace thermocouple). Resume drilling
1515	Drilling gets hard ~18 ft bgs
1520	Gets harder at 22 ft bgs. Columbia's approach to call refusal if consistent hammering and ROP < 0.5 ft/min for more than a minute.
1525	Meet refusal at 24 ft bgs at MIP-046. Soil too hard. Aquitard not encountered. Start pulling up probe.
1540	Mobilize to MIP-047. Start set up
1550	Start MIP-047
1615	Drilling gets hard ~20 ft bgs
1630	Harder at ~30 ft bgs.
1640	Complete MIP-047 to 34 ft bgs Aquitard not encountered. Start pulling probe. Observe PID increases when soil is harder

Location _____ Date 8/27/16

Project / Client _____

1650	Mobilize to MIP-048. Start set up
1705	Start MIP-048.
1735	Drilling hard ~28 ft bgs
1740	Meet refusal at 30 ft bgs (MIP-048) Aquitard not encountered. Soil too hard. PID increases when soil hard (as seen in other borings). XSD no hits. Start pulling probe
1750	Clean up area
1755	Holt offsite. Columbia completing end of day tests.
1810	Columbia and Resolution offsite



Location _____ Date 8/29/16

Project / Client _____

0635	Resolution (Elyssa Dixon, Anthony Palmieri and Larry Brown) on site
0700	Carlotta on site
0705	Holt on site.
0720	Columbia on site
0725	Health & Safety Meeting Holt/Columbia will set up exclusion zone and start at locations adjacent to Bradley Road to couple with Cascade traffic control for soil gas
0740	Columbia cannot locate key for gator. Last had Saturday on key ring. Will double check truck, call rental company to see if extras and back track to pass&ID and hotel if needed.
0750	Columbia called Star Rentals and they will send someone to try keys and Columbia will retrace steps. Tony and Larry gauging well east of Bradley Road
0755	Elyssa to pass&ID to check on Cascade and GHD.
0806	Waiting for GHD to get approval.

Location _____ Date 8/29/16

Project / Client _____

0815	Cascade and GHD on site Cascade: Kyle Ceruth GHD: Brian Pauley Nate Tandecki
0825	Health & Safety meeting for Cascade and GHD. Walk through of sample locations and approach GHD will cover traffic control for Holt on road.
0835	Tony and Larry offsite to check on Clearcreek at Pass&ID
0845	Holt receives call from Columbia that key was located. Will call off Star Rentals. GHD reviewing JSAs and Cascade prepping.
0900	Columbia on site
0905	Tony and Larry onsite. Discuss status with Carlotta Carlotta offsite
0910	Mobilize to MIP-049. Columbia trying to start gator (key a little stuck)

Location _____ Date 8/29/16

Project / Client _____

0920	Columbia gator key won't work with lubricant. Call Star Rentals who will send someone to replace Clearcreek onsite
0930	GHD finishing core set up. Request Clearcreek relocate outside of drilling zone. Back into gravel road. Columbia completing probe set up. Walked gator in neutral to MIP-049.
0935	Tony review clearing/grubbing locations with Clearcreek.
0940	Cascade mob to SV-1 and set up.
0942	Start SV-01 installation Clearcreek start clearing+grubbing
0945	SV-01 ~ 3.5 ft bgs Asphalt: 9" No water Install tubing to 6" screen. Place closed fitting on end for overnight
0955	Need to cut down tubing because won't coil in hole without kinking. Will use star bit first at next location.

Location _____ Date 8/29/16

Project / Client _____

1000	Mobilize to SV-02 (cascade)
1005	Start drilling SV-02
1010	Asphalt: 8-9" No water Install screen and tubing
1020	Clearcreek ruptured hydraulic line on bobcat. Getting spill kit. Cascade mobilize to SV-03 Start drilling SV-03
1025	Supply line on bobcat broke Start drilling SV-03
1027	Asphalt: ~8"
~~1027~~	No water
1040	Notify GHD done with three south locations. Relocate traffic control and truck (next location underneath)
1045	mob to SV-04 and start drilling Concrete: 4" No water
1050	Clearcreek offsite to get missing CTO. Tony notified: Carlotta, Debbie Rodenhizer (AECOM) and NBK fire department of spill.

Location _____ Date 8/29/16

Project / Client _____

1055 Observe hydraulic fluid on tree near bobcat, Tony investigating potential downstream. Cascade move off road and notify GHD to relocate traffic control for North of Gadberry Street

1100 NAVFAC NW reps on site to observe hydraulic spill.
Gary Simmons, Carl Haselman (NAVFAC NW).
Request drum vegetation for disposal; but Carlotta needs to formally request/suggest

1105 Notify Fred Merrill (AECOM H&S) of spill.

1120 Mobilize to SV-05 and set up
Start drilling SV-05

1125 Fred requested Tony report as incident to AECOM. Tony reported.
SV-05 Asphalt: 6"
No water

1130 Carlotta onsite

1135 Mobilize to SV-06 and start drilling. Located about 6" from survey mark due to truck positioning + road

Location _____ Date 8/29/16

Project / Client _____

closure.
SV-06 asphalt 4"; no water

1145 Star Rentals onsite to fix Columbia's gator

1150 Columbia reports probe scheduled for delivery tomorrow.
Clearcreek onsite. Carlotta discussing potential disposal for vegetation w/ NAVFAC NW waste disposal

1155 Mob to SV-07 and set up
Start drilling.

1200 Clearcreek cleaning up bobcat and repairing. Hydraulic line got caught in branch and blades cut.
SV-07 Asphalt 4", no water

1215 GHD and Cascade break for lunch. Shift traffic cones.
Clearcreek reports 2 gallons hydraulic fluid.
All subcontractors take lunch

1820 Carlotta returns! Look at hydraulic spill. Likely gallon in ground.

Location _____ Date 8/29/16

Project / Client _____

and gallon sprayed. Will need to dig soil and put soil and vegetation in drums.

1225 Star Rentals offsite

1235 Resolution offsite

1255 Resolution onsite, Cascade and Holt onsite

1305 GHD onsite. Starting setting up traffic control.
Holt/Columbia will move back into trees and leave additional road samples for later/sample collection.
Concern regarding harder soil, and breaking probe observed in historical boring logs.

1315 Mobilize to SV-08 and set up.

1320 Carlotta offsite. Start drilling SV-08.

1325 SV-08 Asphalt 4", no water, Install

1335 Carlotta onsite. Mobilize to SV-09 located in driveway to space between buildings. Cascade will set up own cones (no traffic control), while GHD shifts traffic control north for next locations

Location _____ Date 8/29/16

Project / Client _____

1345 SV-09 Asphalt 4", no water
Install probe

1400 Finish SV-09. Wait GHD finish resetting up traffic control for final stretch.

1410 Mob to SV-10 and set up
Start drilling

1415 SV-10 Asphalt 4", no water
Install probe
Two drums of plant debris and 3 gallons of soil from hydraulic fluid spill. Absorbent sock placed around tree w/ splash.

1420 Clearcreek offsite

1425 Mobilize to SV-11 and set up
Start drilling

1435 Install probe.
SV-11 Asphalt 4", no water

1445 GHD set up cones for final locations

1450 Mobilize to SV-12 and set up.
Start drilling

1500 SV-12 Aspalt 4", no water

Location _____ Date 8/29/16

Project / Client _____

Install probe

1510 Mobilize to SV-13 and set up. Start drilling. Dense soil

1520 Soil observed to increases in hardness moving North

1525 SV-13 Asphalt 4", no water
Install probe
Gary (NAVFAC NW) inspected spill site and says looks good.

1530 Car needs to reverse out of parking spot, so cap tubing and move truck.
Finish installing.
Start cleanup of traffic control.
GHD will leave cones and signs on site.

1550 Cascade offsite.

1610 Elyssa and Tony go scope out ~~sediment~~ sample locations (central landfill) GD

1640 Densely vegetated. Will need to bring proper tools for access (3 locations marked)
Move to mark porewater (Larry joined) near South Plantation GD

Location _____ Date 8/29/16

Project / Client _____

1655 Mark two porewater locations. Sink in one section up to 12", so can't go farther. Will get boards to access for sampling.
Review soil gas equipment. Missing 10 tedlar bags ordered. Call FEI and they will overnight 10 more bags to hotel for delivery on Wednesday.

1715 Review porewater sampling techniques. Will need to buy nose clamps.

1720 Resolution offsite
~~leak test 2~~
~~tedlar: 6800 ppm~~
~~Shroud: 5.3%~~ } wrong day GD

* See Larry Brown notes for MIPs *

Elyssa Dixon
8/30/16

Location _____ Date 3/30/16

Project / Client _____

0650	Resolution (Elyssa Dixon, Larry Brown) on site
0705	Holt on site
0720	Columbia on site
0730	Conversation with Carlotta regarding next MIP locations. Focus on locations outside of trees first. Locations in trees and north of structure are lowest priority. Health & Safety Meeting. Start set up.
0740	Cascade on site Mark next MIPs locations
0800	GHD on site Completing GHD health & safety
0815	Health&Safety meeting with GHD and Cascade
0830	GHD set up traffic control
0905	Mobilize and begin set up at SV-01 Sample SV-01 SUMMA: SC01476 P_i = 30 in Hg

Location _____ Date 8/30/16

Project / Client _____

SV-01 Leak Test 1
Shroud: Avg 210,000 ppm
Tedlar: 22,035 ppm
10% of Shroud, re test
Leak Test 2
Shroud: 20,000 ppm
Tedlar: ~~84,000~~ 8,400 ppm
4% of shroud, pass

1010	Start test and can hear air flowing so turn off. Try different flow controller and no flow sounds Canister has ambient air now, so cannot use Attach SC00973 and P_i = 11 in Hg. So cannot use Attach SC00283. P_i = 30 in Hg
1030	Start sampling SV-01. Constance Lapite (AECOM) will call lab regarding faulty equipment
1040	Mob to SV-02 Leak Test Shroud: 4.7% (47,000) Tedlar: 2.1% (21,000) ~50% Test Fail.

Location _____ Date 8/30/16

Project / Client _____

1050	Carlotta on site. Add seal to hole.
1105	Leak test 2 Shroud: 8.6% Tedlar: 4.1% FAIL.
	Test potential methane concentrations 20% LEL from sample tubing Remove helium shroud and place helium detector in sample tubing and concentrations start increasing → something in subsurface impacting leak testing.
1130	Test helium in SV-03 without any helium added → concentrations increase. Samples located near marsh and in former marsh area and adjacent to gas line. Methane could be impacting readings. Will check each location w/ helium detector and if concentrations ↑, will mound seal and sample. If no change, will conduct leak test.
1135	Start SV-02 P_i = 30 in Hg
1139	SV-01 at 13.5 in Hg

Location _____ Date 8/30/16

Project / Client _____

1145	Will skip SV-03 until after lunch Check SV-04 w/ helium detector → 0 ppm, so will leak test.
1157	SV-01 at 10 in Hg SV-02 at 8 in Hg
1200	Complete leak test on SV-04 Shroud: 10% ppm Shroud: 5.3% Tedlar: 2.2% ppm Tedlar: 6800 ppm 22% 12% FAIL
1201	Finish SV-02. 5 in Hg = P_f Gauge / Flow controller: OAΦ1878
1215	Helium in sample tubing at SV-04 at zero with minor spikes after some time. Will re-leak test
1230	Carlotta check in. Offsite
1233	Stop SV-01, 5 in Hg = P_f Flow controller: OAΦΦ97Φ
1245	Test methane at SV-04 44% LEL, no interference and will set up sample.
1250 →	GHD and Cascade offsite
1257	Start SV-04, 29 in Hg Flow controller OAΦ444 First flow controller failed

Location _____ Date 8/30/16

Project / Client _____

(gauge did not move when summa opened). OA0470833 is faulty

1316 SV-04 at 15 in Hg. Calibrate RKI

1325 GHD and Cascade on site.

1330 Set up Traffic Control and return to SV-03. Will test methane Request Cascade patch w/ asphalt.

1337 Stop SV-04 at 5 in Hg. Pressure on canister reads 2.5 in Hg with valve closed (didn't drop to 0)

1340 Purge SV-03 to tedlar bag for methane test → 66% LEL

1347 Start SV-03; 29 in Hg

1355 Move to SV-05 to test methane Employee using hand weed trimmer in vicinity of sample location

1400 Methane and helium 0 in SV-05

1405 SV-03 at 10 in Hg. Will wait until finished, then relocate traffic control and leak test SV-05.

1413 Stop SV-03, 5 in Hg

1420 Set up traffic control North.

1445 set up at SV-05. Helium detector dessicant very wet, so dry in car

Location _____ Date 8/30/16

Project / Client _____

1500 Test methane at SV-06 while waiting for dessicant to dry

1505 Methane, CO_2, O_2 all exceed detector limits at SV-06.

1515 Re-purge SV-06 and test again. CH_4 at 0, but CO exceeds again.
Check RKI with cal gas. CO level at 22 ppm, should be 50 ppm. Calibrate.
Re-purge and CO exceed limits CH_4 jump to 24% LEL, then 0

1525 Test helium in SV-06 directly, 0. Test methane directly → low flow warning, but methane increased to 24% and CO exceeded

1530 (Dessicant dried. Return to SV-05 and complete leak test.
Shroud: 2.5%
Tedlar: 0 ppm PASS

1541 Start SV-05. 28 in Hg

1545 Move to SV-06.
Shroud: 2.0% FAIL => proof
Tedlar: 4.1% of interference

Location _____ Date 8/30/16

Project / Client _____

1554	Start SV-06, 28 in Hg SV-05 at 15 in Hg
1610	End SV-05, 5 in Hg SUMMA: SSC00764 Flow: OA01812
1618	End SV-06, 4.5 in Hg SUMMA: SC02064 Flow: OA01157
1625	All holes sampled patched with asphalt, start clean up
1630	Cascade offsite.
1635	Carlotta onsite. Discuss sample results from today and plan next locations. Carlotta will report methane hits to gas company.
1725	Carlotta offsite. Charge instruments in shed
1735	Resolution offsite. See Larry Brown Notes for MIP

1710 GHD offsite

Elyssa Dixon
8/30/16

Location _____ Date 8/31/16

Project / Client _____

0655	Resolution (Elyssa Dixon, Larry Brown) onsite
0705	Holt onsite
0710	Columbia onsite
0715	Health & Safety meeting
0720	Carlotta onsite. Review first MIP location with Holt and mark locations for Today
0735	Carlotta offsite
0740	GHD onsite
0745	Cascade onsite
0755	Complete Cascade/GHD Health & Safety
0805	Discuss potential gas leak with Tony Palmeiri (AECOM). He will talk to H&S to determine if concerns about continuing sampling Start sprinkling
0810	Will stop work until check out leak. Tell Cascade and ~~Holt~~ GHD to standby and ask Carlotta to report leak/check if she has.
0815	GHD offsite to get coffee
0830	GHD onsite.

ED

Location _____ Date 8/31/16

Project / Client _____

0845	Check in with Carlotta. She will try to get an ETA on gas investigation
0855	Conversation with Debbie Rodenhizer (AECOM) regarding remaining work
0905	Discuss MIP w/ Larry. Meet refusal at 22 ft bgs, which is a similar depth to adjacent location. Will move on to next planned point rather than continuing to try to get deeper in the area near the stormwater outfall
0915	Conversation with Josie Smith (AECOM) to plan sediment and pore water sampling for next week
0925	Carlotta calls. Fire Department should be here to bldg 1044 shortly. Inform hits getting higher as moved North. Employees in bldg at corner of Bradley and Torpedo Rds reported sewer-like odors.
0935	Navy Fire Department onsite to observe potential gas leak. Didn't detect anything at the surface level, so no hazard observed. ED

Location _____ Date 8/31/16

Project / Client _____

	Requests confirm RKI is used to advice of any hazards and alarm is set for flammable range or below. TRUE gas will be onsite shortly to conduct additional tests.
0950	Fire Department offsite. Rain has stopped.
1010	Chugach onsite, has similar detector as fire Department. Sprinkling starts again. Chugach calls scheduler and believes Cascade Natural Gas needs to be involved and would likely need to sub out work to integrity test the line
1020	Carlotta onsite. Will demob soil gas sampling until testing completed. Will call to discuss potential methane impacts on analysis of samples GHD loading traffic control into truck
1030	Carlotta offsite ED

360-315-6059 (Chugach)

Location _____ Date 8/31/16

Project / Client _____

1035	Conversation with Kasey Goble (Cascade) to confirm status
1045	Cascade offsite Message from Chugach. Reported emergency call in to get another company onsite to test the line
1050	Notify Tony. GHD offsite
1055	Discuss potential sample impacts with Constance Lapite (AECOM). She will call ALS to discuss.
1100	Homes Mechanical is subbed to Chugach and will likely be on site today
1115	Discuss sediment/porewater with Josie
1130	Leave message for Constance. Drum sampling for waste disposal needs halogenated VOCs, no flashpoint.
1205	Holmes Mechanical onsite. Review observations and show sample locations. Will look at map to see potential ways to isolate to test. Has replaced most of gas lines on base, but not this

ED

Location _____ Date 8/31/16

Project / Client _____

	section. Believes still old line, which was in bad shape at other locations where lines were replaced.
1220	Notify Carlotta Holmes is on site. Likely no budget sediment/porewater
1225	Discuss Holmes and remaining samples/sampling planned with Tony
1230	Holmes needs to go get map and will review locations to isolate further. Will need to notify buildings that gas line needs to be turned off, so timeline of testing is uncertain.
1300	Discuss methane/helium and waste disposal sampling with Constance.
1310	NAVFAC NW Public Works onsite. Discuss gas line observations. They do not believe emergency, but will work with Holmes on testing, which could be a month to a year for

ED

Location _____ Date 8/31/16

Project / Client _____

funding for potential repairs. Could shut off gas along Bradley Road for a day for us to complete sampling (will need to check with buildings and could take a couple days to coordinate).

1340 Discuss methane observations with Jim Flynn (AECOM). Will go test methane concentrations in wells located in Central Landfill (capped area).

1410 Holmes on site. Waiting to see about potential gas shut off. to test.

1420 Holmes offsite

1430 Go to well MW1-15. Water in casing just below well cap, bail with ziplock bag. Slight negative pressure when cap removed.

Methane: 70% LEL max
92% LEL → 100% LEL

CO: 12 ppm H_2S: 3

O_2: 24 water level: 7 ft btoc ED

Location _____ Date 8/31/16

Project / Client _____

1440 Holmes informs working on gas shut off for buildings on Bradley

1445 Move to MW17

Slight pressure when cap opened

Methane: 1% LEL

CO: 2 ppm water level:

O_2: 20.3 6.15 ft

H_2S: 0 btoc

VOC: 0.2 ppm

1500 Move ~~P1-9~~ P1-10 ED

Methane: 1% LEL

O_2: 20.9 water: 5.95

H_2S: 0 ft btoc

CO: 3 ppm → 1 ppm

VOC: 0.3 ppm

1505 MW1-20

Slight pressure when cap removed

Methane: 1% LEL

O_2: 20% water level:

H_2S: 0.0 ppm 4.38 ft

CO: 2 ppm btoc

VOC: 0.0 ppm

ED

Location _____ Date 8/31/16

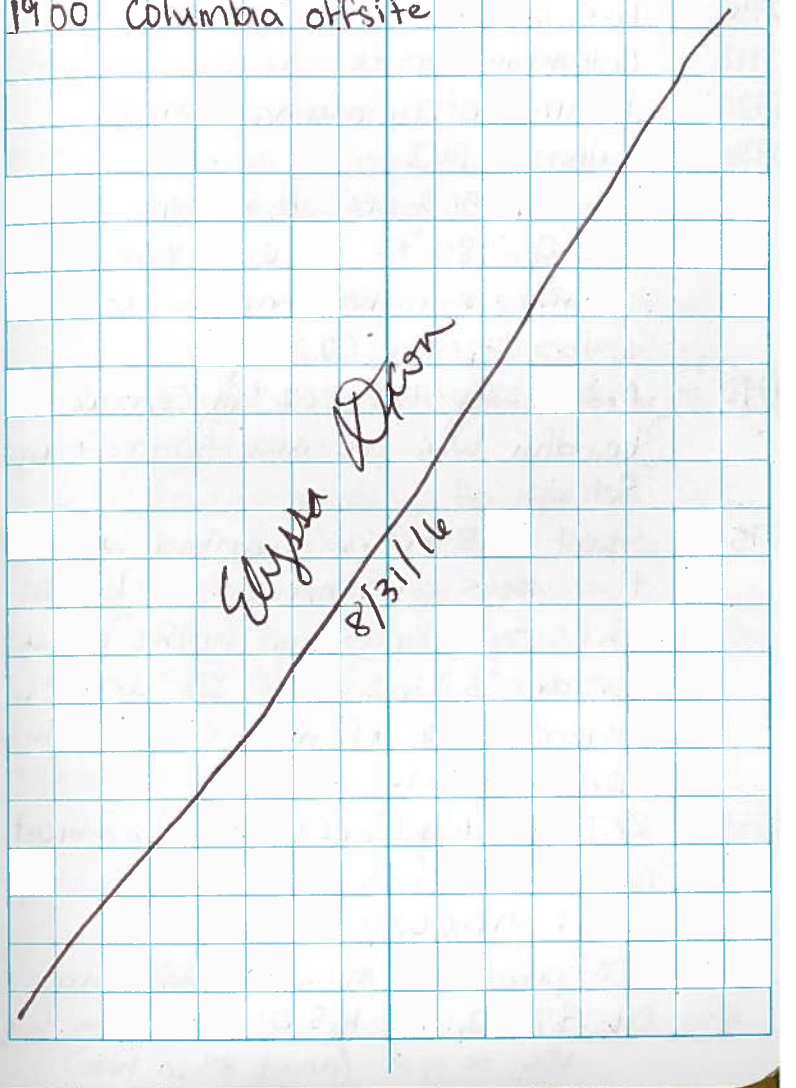
Project / Client _____

1525	Discuss well measurements with Jim Flynn.
1530	Carlotta on site. Discuss MIP and methane. Need to further discuss soil vapor with experts. Do we want to analyze? Potential displacement of landfill related soil gas if gas leak. Do not need to sample IDW drums prior to disposal.
1545	Call with Tony. Will receive protocol for monitoring breathing zone CH_4 for tomorrow and Friday work.
1550	Holding time for SUMMAs is 30 days. RKI uses CH_4 as a reference for explosive gases in combination with CO. CH_4 is lighter than air. No odors have been observed.
1630	Carlotta offsite. Before leaving, looked at RI. Methane was detected at high levels in soil gas sampling in 1993 (semi-quantitative data).
1640	Clean up and put RKI on charger
1700	Measure clearcut area. SD

Location _____ Date 8/31/16

Project / Client _____

1720	Resolution offsite. *See Larry Brown notes for MIPs*
1900	Columbia offsite



Location _____ Date 9/1/16

Project / Client _____

0700 Resolution (Elyssa Dixon) on site
Carlotta already onsite
0710 Holt on site
0712 Columbia onsite
0720 Health & Safety meeting. Set up.
0730 Calibrate RKI.
CH_4: 56% LEL H_2S: 11 ppm
O_2: 18.2% CO: 61 ppm
Levels are higher than cal solution for CH_4 and CO.
0740 Mobilize to MIP-062 in Central Landfill. Will pre-probe to 10 ft bgs. Set up
0750 Start MIP test. Columbia informs that keys on computer are broken (5, 6, −, + keys), so notes may contain "s" instead of "5" and "b" instead of "6" if misses some while replacing later.
0755 RKI reading 1% LEL CH_4 in ambient air
0805 Start MIP-062
Pre-probe met minimal resistance
CH_4: 4% O_2: 9.2 H_2S: 0 CO: 14 ppm
VOC: 30 ppm (about 8" in hole) ED

Location _____ Date 9/1/16

Project / Client _____

Ambient Air readings all normal
0835 Ambient Air remains normal
Soil very soft
0840 Soil harder at ~17 ft bgs.
XSD/PID spike at same depth
0905 At ~30 ft bgs, EC >100 mS/m.
Since ~26 ft bgs. Soil getting a little harder. XSD/PID tapered off
0915 Complete MIP-062 at 33 ft bgs based reduced XSD/PID response for multiple feet. Start pulling up probe.
Low/no readings for most on RKI, but get soil stuck in tubing. Replace tubing and observe soil in filter. Clean out as much as possible
CH_4: 9% LEL O_2: 20.0 CO: 7
H_2S: 0 VOC: 0
0940 Mobilize to MIP-063 and set up
Start drilling MIP-063.
CH_4: 3% O_2: 10.8 CO: 8 } Pre-probe to 10' removed
H_2S: 0 VOC: 15 ~6" ↑ in hole
Ambient air normal ED

Location _____ Date 9/1/16

Project / Client _____

0955 Temperature out of range warning. Will mark rod and pull up to check wiring. At ~7' bgs. Will pause log to resume after repairs
Check headspace
CH_4: 4% O_2: 8.9 CO: 12
H_2S: 0 VOC: 0.8

1015 Columbia repair wire in MIP
Discuss MIP-062 results with Carlotta
NAVFAC NW is shutting down gas line on Bradley Rd today and asked if available to complete soil gas sampling. Not enough time to mob subs back.

1025 Start drilling MIP-063 (at 7 ft start logging).

1040 Starts getting harder ~14 ft bgs
Gas readings normal at boring.
Slight chemical smell at MIP gator coming from southeast (wind). No readings on RKI.

1105 Complete MIP-063 at 28 ft bgs based on taper off of XSD/PID and EC↑ HPT↑ Flow↓
Start pulling up probe ED

Location _____ Date 9/1/16

Project / Client _____

CH_4: 1% O_2: 18.5 CO: 49
H_2S: 0 VOC: 1.5

1120 Mobilize to MIP-064
Carlotta asks to see if Cascade could come out to finish soil gas sampling tomorrow.
Call Tony to discuss. Review weather for sampling

1140 Leave message with Kasey Goble (Cascade)
Start drilling MIP-064.

1145 Check headspace max value (brief)
CH_4: 54% O_2: 4.2 CO: 1.6
H_2S: 0 VOC: ~~1.8~~ 10.4 ppm GD

Tomorrow is 80% chance rain with thunderstorms, so prefer not to sample soil gas.
Resolution going to check sediment sample locations at low tide ~1200. Columbia will stop MIP @ 30 ft if not XSD/PID

1155 Carlotta offsite ED
RKI reading 3% LEL in ambient

Location _____ Date 9/1/16

Project / Client _____

air. Bump check and all good.

1205 Call from NAVFAC Public Works ~Josh to discuss methane detections from Tuesday. Holmes should be isolating line today

1215 Offsite to scope out sediment sampling locations

1225 Onsite.

1235 Complete MIP-065 to 34 ft bgs based on PID/XSD tapering off and EC↑ HPT mostly ↑. Looks almost identical to MIP-062 with slightly lower EC.

1245 Call from Kasey to discuss scheduling. Not available tomorrow, but will look into potential for next week.

1250 Ambient Air:
CH_4: 3% O_2: 20.9 CO: 0
H_2S: 0 VOC: 4.3 ~6 in
(Windy)
Headspace:
CH_4: 48% O_2: 3.2 CO: 13
H_2S: 0.5 VOC: 3.6 ED

Location _____ Date 9/1/16

Project / Client _____

1255 Notify Carlotta of boring similarity. Will move to farthest from MW in center.

1300 Holt offsite for lunch.

1320 Holt onsite

1335 Start drilling MIP-065
Test headspace
CH_4: 85% O_2: 20.4 CO: 1
H_2S: 0 VOC: 5.8 ~6 in down
→ Wind causes readings to fluctuate greatly
Ambient Air: 4% CH_4 (of LEL)
Also 4% LEL in vehicle, so false reading?

1425 JOSH (PW NAVFAC) on site with additional representatives from PW. Share observations from methane detections and explain LEL.

1445 Reach 34 ft bgs, get harder (Got harder ~ 17 ft)
PID/XSD starting to taper off
Ambient air good throughout
Complete MIP-065 to 35 ft bgs

1455 Talk to Carlotta about results ED

Location _____ Date 9/1/16

Project / Client _____

~~air. Bump check and looks good.~~ ED
Will move across landfill.

1505 Check headspace
CH_4: >100 O_2: 14.3 CO: 54
H_2S: 0 VOC: 8.8
Soil/water in sensor tubing, so replace.

1515 Mobilize to MIP-066.

1520 Start drilling
Headspace
CH_4: >100 O_2: 18.1 CO: 22
H_2S: 0 VOC: 0 (directly above)
In hole
CH_4: >100 O_2: 11.4 CO: 168
H_2S: 0 VOC: 0
Holmes onsite to inform gas line is tight.

1530 RKI methane at 6% in ambient air and vehicle. Complete bump test ⇒ good.
CH_4 drops to 5% in AA after → returns to 4%

1540 Start sprinkling

1555 AA CH_4 Stays between 4-5% ED

Location _____ Date 9/1/16

Project / Client _____

1555 MIP-066 drilling gets harder at ~18 ft bgs

1600 Observe Holt stops hammering in the middle of ~~the~~ foot according to computer. Check and computer is about 6" off. Will trick into correct depth (21.5' on index, 22' on rods). Was correct at 18', so occurred somewhere between 18-22'

1610 Soil getting harder ~24 ft bgs
Call from Carlotta. Discuss status of gas/methane and MIP

1625 Complete MIP-066 to 31 ft bgs
Aquitard likely encountered.
Ambient Air still ~4% LEL with everything else normal.
Start pulling probe.

1640 Check headspace @ Directly Above
CH_4: >100 O_2: 18.7 CO: 320
H_2S 0.5 VOC: 0
In hole 6"
CH_4: >100 O_2: 17.1 CO: >500
H_2S: 1.0 VOC: 0.0
Bump test looks good → ED

Location _____ Date 9/1/16

Project / Client _____

Bump test
CH_4: 52 O_2: 17.8 CO: 47
H_2S: 10 VOC: 0

1650 Call from Carlotta. Discuss results of MIP-066. Will move to southwest corner to start tomorrow.
Holt mobilize to MIP-067.
1655 Holt offsite. All locations patched with asphalt
1700 GPS central landfill locations
1715 Resolution offsite
1745 Columbia offsite

Elyssa Dixon
9/1/16

Location _____ Date 9/2/16

Project / Client _____

0705 Resolution (Elyssa Dixon) on site. Columbia onsite already. Holt at Pass&ID to get daily badge for Lucas
0710 Holt does not have proper ID, so can only be escorted. Call Carlotta, who can do so, but will not be here for a bit. She will check to see if someone else can come.
Columbia set up to complete morning testing
0720 Holt onsite, leave Lucas at Pass&ID. Michael (Carlotta's boss) will be there soon to escort.
0740 Calibrate RKI gas cal
CH_4: 51 O_2: 18.0 CO: 50
H_2S: 9.5
Air cal
CH_4: 5 O_2: 20.8 CO: 0 } Pre-cal Adj to Ø
H_2S: 0 VOC: 0.6
0750 Lucas Louwien (Holt) on site.
0755 Health & Safety ED

Location _____ Date 9/2/16

Project / Client _____

Michael left after dropping off and put Resolution in charge of escorting Lucas.

0800 Start drilling MIP-067.
Lines carrying gas to MIP blocked up, so Columbia will take apart to check.
Headspace After Pre-Probe (6" down)
CH_4: 58 O_2: 4.2 CO: ~~100~~ 100
H_2S: 0.5 VOC: 222
Nothing observed in AA or directly above hole

0815 Start Raining

0820 Membrane replaced and backflushed
Start drilling again

0840 Out of pressure range warning. Looks ok. Doug believes drop of water might still be in line from backflushing

0845 ~~Ambient~~ Air normal
Call from Carlotta

0910 Drilling gets harder at ~24 ft bgs
Complete MIP-067 to 28 ft bgs
Drilling too hard, but XSD/PID clean ED

Location _____ Date 9/2/16

Project / Client _____

Start pulling probe

0910 Carlotta onsite. NAVFAC H&S on site. They discuss methane in the bldg. Above hole
CH_4: 89 O_2: 18.4 CO: 51
H_2S: 0 VOC: 5.7
Headspace (6")
CH_4 0 O_2 3.3 CO 410
H_2S 9 VOC 7.8 slight sulfide oder

0925 Carlotta and NAVFAC H&S offsite. Clean up and backfill

0930 Call from Tony. Alternative tracer for helium will still get interference from methane so likely will have to test for methane helium in soil gas samples.

0935 Membrane has nick, so Columbia backwash and replace → cause of pressure reading issues.

0950 Wayne Forber (NAVFAC NW) on site to request RKI readings. Will relay through Carlotta. ED

Location _____ Date 9/2/16

Project / Client _____

0955 MIP looks better, but readings still aren't quite right. Doug will open to see if there is a leak

1000 Rain gets harder

1010 Rain lightens. Carlotta on site with extra rain gear.

1015 Carlotta offsite. Columbia cannot repair probe, so needs to replace. Load up car from shed while waiting → rain eased up.

1100 Carlotta onsite. Carlotta and Holt offsite to get lunch. New probe assembled, but responses not right completing proper leak test.

1115 Carlotta and Holt onsite

1125 MIP responding ok, but Columbia can't make fail they way he wants. Will test pressure again before reassembling → replaced membrane and backfilled line.

1140 Columbia remade solution because was beginning to degrade. Tests look better and are within an ED acceptable range

Location _____ Date 9/2/16

Project / Client _____

1200 Mobilize to MIP-068. Carlotta offsite

1205 Start drilling MIP-068

CH_4: 91 O_2: 10.8 CO: 8 } above

H_2S: 40.0 VOC: 6.4 }

Strong H_2S odor

Headspace 6"

CH_4: 0 O_2: 5.3 CO: 8

H_2S: 32 VOC: 3.6

1215 Steven Saepoff (NAVFAC NW) onsite! Discuss job status.

1225 MIP Pressure is increasing, but flow is ok (~12 ft bgs). Will continue to monitor. Columbia will check flow in line before pulling up probe. Will complete additional testing after boring complete to ensure good for next location.

1230 Ambient Air normal readings

1240 Drilling gets hard ~25 ft bgs. PID/XSD responses

1300 Meet refusal at MIP-068 at 31 ft bgs due to hard drilling. Complete flow check at depth ED

Location _____ Date 9/2/16

Project / Client _____

Reading connected to line → ~~18~~ ED
and reading on computer = almost same value
Start pulling probe. AA normal.
Carlotta onsite.

1310 Above Boring >100 Strong Sulfide odor
CH_4: ~~65~~ O_2: 18.4 CO: 4.8
H_2S: 11.5 VOC: 0
in Boring (~6")
CH_4: 21 O_2: 3.0 CO: 122
H_2S: 30.5 VOC: 4.8

1325 Columbia will cut back trunk line to try to fix pressure. Could keep drilling and see if pressure goes down, but it has continued to climb without signs of decreasing. Cutting trunk line is next best option to try to fix. Columbia does have spare trunk line, but shorter and hasn't been used for awhile. Cutting trunkline because pressure could be caused by something stuck in line.

1400 Thunder observed. ED

Location _____ Date 9/2/16

Project / Client _____

1410 Columbia continuing to reconnect trunk line. Pressure is down.

1415 Start raining. No more thunder observed.

1435 Lightening and thunder observed. Request Columbia stop work. Rain gets harder. Will wait 15 mins and see if conditions change. Notify Tony.

1505 Storm passed and sun out

1510 MIP passed tests and pressure down. Mobilize to MIP-069. Start set up. Carlotta offsite.

1515 Start drilling MIP-069.
CH_4: >100 O_2: 3.1 CO: 16 } Above
H_2S: 0 VOC: 4.8
In boring ~6"
CH_4: 0 O_2: 3.4 CO: 12
H_2S: 0 VOC: 4.2
Kreosote (?) odor

1530 Ambient air readings normal.

1535 Call from Kasey Goble. Cascade is available on Thursday and likely Friday next week to finish soil

ED

Location _____ Date 9/2/16

Project / Client _____

gas sampling (no rig). Will check with Tony before putting on calendar.

1540 Holt ~~Cascade~~ reports portion of trunk line hard to pull through rods, but manageable and not broken.

1545 Drilling gets hard around 18 ft bgs

1550 Ambient Air normal.
Pressure in MIP starts increasing (could be soil or dust in line or natural increase w/ drilling)

1600 Discuss soil gas sampling with Tony → will get Cascade on calendar. Call Kasey and schedule.

1605 Reach ~28 ft bgs and drilling gets harder.
Less harder ~30 ft bgs.

1620 Complete MIP-069 to 37 ft bgs. Aquitard likely encountered.
Start pulling up probe. Raining lightly.

CH_4: 53	O_2: 18.0	CO: 14	} Above
H_2S: 0	VOC: 2.5		
CH_4: 34	O_2: 20	CO 23	} 6" in hole
H_2S: 0	VOC: 2.6		

Carlotta onsite

ED

Location _____ Date 9/2/16

Project / Client _____

Holt and Columbia cleaning up
Ask Doug about XSD picking up natural compounds. FID would pick it, but PID/XSD doesn't. Columbia suggests lower hits might be from organic material capturing halogenated VOCs

1635 Steven offsite.
Start demobing. Holt patches SV-04 → missed on Tuesday.
Label drums with sharpie
Carlotta will bring out labels from AECOM when she's in the office on Tuesday.

1720 Holt and Carlotta offsite

1735 Resolution offsite

1944 Columbia offsite

Elyssa Dixon
9/2/16

Location _____ Date 9/8/16

Project / Client _____

0750 Resolution (Elyssa Dixon) on site
GHD onsite
Calibrate RKI and prepare He detector dessicant.
0810 Cascade on site
0815 Complete Health & Safety meeting
GHD start set up of traffic control
0900 Mobilize to SV-07.
Request Cascade add concrete/bentonite to top of sample locations to further improve seal
0905 Purge line to check RKI readings
CH_4: 1% O_2: 20.5 CO: 0
H_2S: 0 VOC: 0.8
Will conduct leak test.
0915 Start purging for leak test and start pumping water. Standing water present in swale to east of Bradley Rd. About 1-2 ft bgs.
0930 Call Jim Flynn
0935 Check water level in MW1-20. Depth > 4 ft bgs, but located South and not near swales.
0940 Check SV-08. GW encountered ED

Location _____ Date 9/8/16

Project / Client _____

sooner in purging.
0950 Call from Kasey Goble (Cascade) to check on status.
Will find SV-07 and SV-08 to surface and move traffic control to northern-most point to check for groundwater
1035 Traffic control moved. Mobilize to SV-13 to check for water.
1045 Purge to check gas
CH_4: 8 O_2: 1.8 CO: 97
H_2S: 0 VOC: 2.4
Will conduct more purging to ensure no water. Cascade add additional seal
CH_4: 8 O_2: 1.6 CO: 58
H_2S: 0 VOC: 2.1
Cannot conduct leak test with CH_4 detections. Will sample.
1057 Start collecting SV-13
P_i: -28 in Hg
Canister: SC01653
Flow Controller: OA01195
ED

Location _____ Date 9/8/16

Project / Client _____

SV-13 Sampling

Time	Pressure (in Hg)	He	
1057	28	5.6%	
1100	28	11.6%	
1105	28 24 ED	4.5%	condensation
1110	19	9.2%	in shroud
1115	15	4.6%	
1120	11	3.2%	
1125	8	6.1%	
1130	5	9.6%	

No water observed at SV-13

1135 Screen pulled out of ground and hole patched with asphalt.

1145 Call from Carlotta. Explain status. Will meet her at museum to get drum labels (forgot badge). Elyssa offsite

1155 Elyssa onsite. Take down traffic control for lunch.

1200 GHD offsite.

1215 Label decon water drum

1245 GHD onsite Mob to SV-12 Set up to purge. Sealant added to hole. ED

Location _____ Date 9/8/16

Project / Client _____

1255 SV-12 purge 1

CH_4: 15 CO: 1 O_2: 2.2

H_2S: 0 VOC: 0

Methane jump to 41% immediately after removing Tedlar bag and then dropped to ϕ in ambient air

1305 SV-12 purge 2

CH_4: 40 CO: 0 O_2: 2.8

H_2S: 0 VOC: 0

(CH_4 decreased to 16% after about 2 s of sampling)

Will collect sample → CH_4 detection will interfere w/ leak test.

1312 Start sampling SV-12

Time	Pressure (in Hg)	He	
1312	30	5.2%	
1315	28	6.1%	
1320	23	11.2%	
1325	18	3.9%	
1330	13	6.4%	
1335	9	3.6%	
1340	6	5.8%	
1341	5	1.9%	ED

Location _____ Date 9/8/16

Project / Client _____

SV-12 Canister: SCΦ0817
Flow controller: OAΦ1394

1320 Cascade removed SV-08 and SV-07 screens and measured water level in borings at ~1.5 Ft bgs. Locations patched w/ asphalt.

1346 Start SV-FD (duplicate for SV-12). P_i = 30 in Hg
Canister: SCΦ1656
Flow controller: OAΦ1394

Time	Pressure (in Hg)	He
1346	30	2.4%
1350	27	16.6%
1355	21	6.0%
1400	15	5.9%
1405	11	6.8%
1410	7	3.4%
1413	5	2.0%

1415 Pull screen and patch hole
1425 Move traffic control and meb to SV-11.
1430 Sealant applied. Will purge,
CH_4: 44% CO: 2.1 O_2: 35
H_2S: 0 VOC: 0 GD GD

Location _____ Date 9/8/16

Project / Client _____

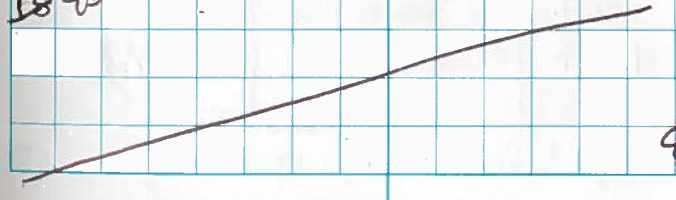
1440 Purge SV-11 second time.
CH_4: 45% CO: 21 O_2: 2.1
H_2S: 0 VOC: 0
CH_4 reading jumped to >100 after removing from tedlar bag and then back to Φ within 30s.

1450 Move to SV-10 to purge/check for gw.
CH_4: 67 CO: >500 O_2: 17.1
H_2S: 1.5 VOC: 0

1500 Purge SV-10 second time
CH_4: >100 CO: >500 O_2: 13.1
H_2S: 3.0 VOC: 0.0
Pumping gets harder but no gw

1515 Return to SV-11. Will collect sample → CH_4 detections will interfere with leak test.
Start collecting SV-11
P_i = 27 in Hg
Canister: SCΦ1508
Flow controller: OAΦ1357

15 GD



GD

Location _____ Date 9/8/16

Project / Client _____

SV-11 Sampling

Time	Pressure (in Hg)	He
1515	27	3.3%
1520	24	2.8%
1525	18	3.4%
1530	14	3.6%
1535	10	2.9%
1540	7	7.8%
1542	5	2.6%

1545 SV-11 screen removed and asphalt placed.
Mob to SV-10. CH_4 readings too high for leak test, so will set up to sample. Sealant added.

1554 Start sampling SV-10
P_i = 30 in Hg
Canister: SC0115
Flow Controller: 0A02060

Time	Pressure (in Hg)	He
1554	30	3.8%
1559	30	2.5%
1604	29	12.1%

Try different flow controller ED

Location _____ Date 9/8/16

Project / Client _____

1605 New flow controller: 0A01148
1607 Restart SV-10 P= 27 in Hg
Pressure released when disconnecting fitting from tubing to change controller.

Time	Pressure (in Hg)	He
1607	27	2.5%
1612	26	2.4%
1617	25	2.3%
~~1622~~ ED		

gw could be present causing limited flow. Will disconnect summa and pump w/ hand pump
Flow controller in closed position reads 25 in Hg. (Still connected to summa + tubing)
1625 Abandon SV-10. No gw pumped, but sample not attainable.
No gw observed in tubing and screen got stuck in ground.
Patch w/ asphalt.
1630 Traffic control start clean up
Mob to SV-09. ED

Location _____ Date 9/8/16

Project / Client _____

1635	Start purging SV-09. GW encountered with two pumps.
1637	Pull out tubing and screen. GW appears to be directly below slab. Water appears to be coming out of asphalt crack on west side of Bradley Road. Asphalt patched. Resolution ED
1645	Notify Tony Palmeir (~~AECOM~~) Resolution.
1650	Cascade offsite.
1700	GHD offsite. Resolution collect GPS points.
1800	Resolution offsite.

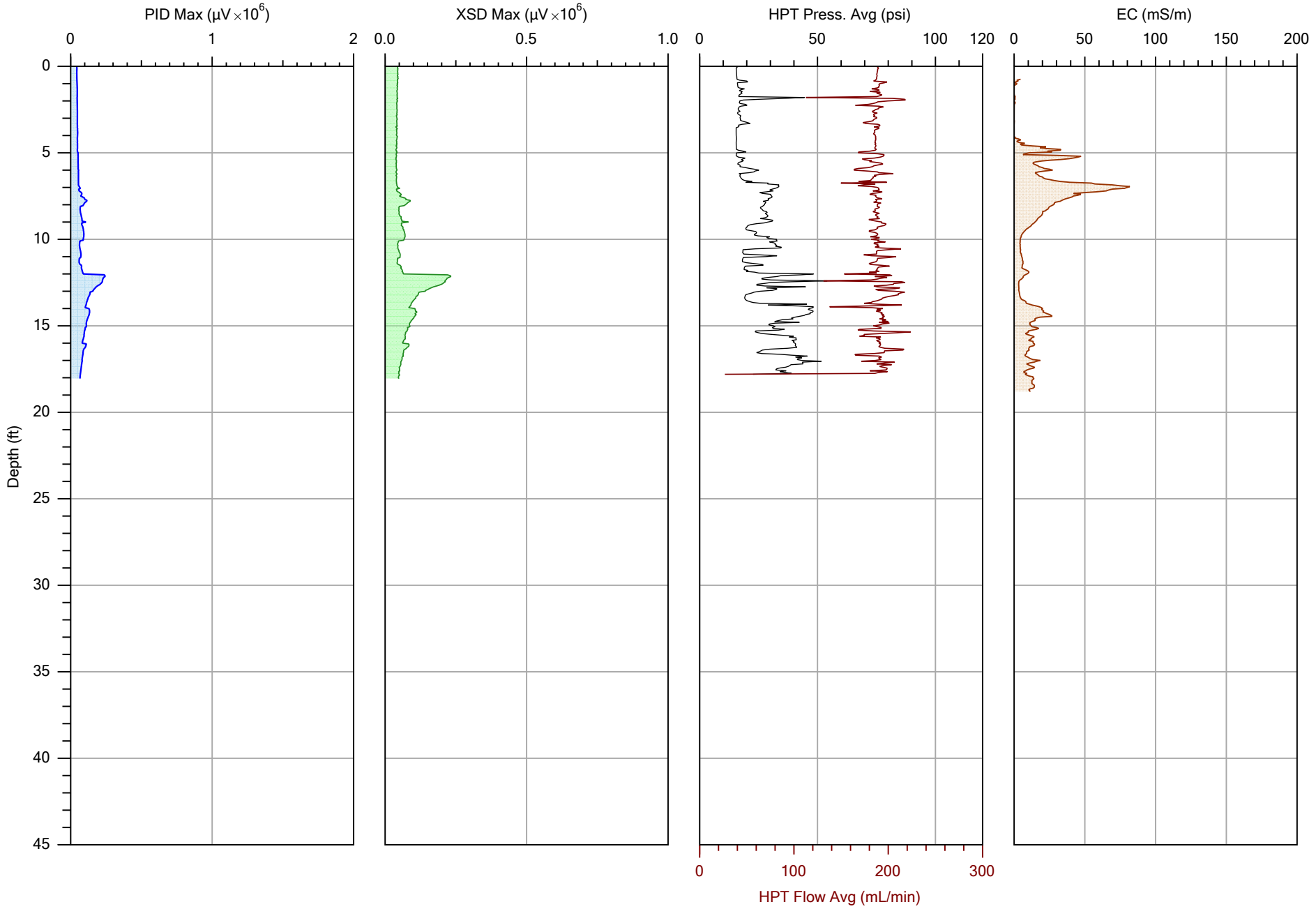
Elyssa Dixon
9/8/16

Location _____ Date _____

Project / Client _____

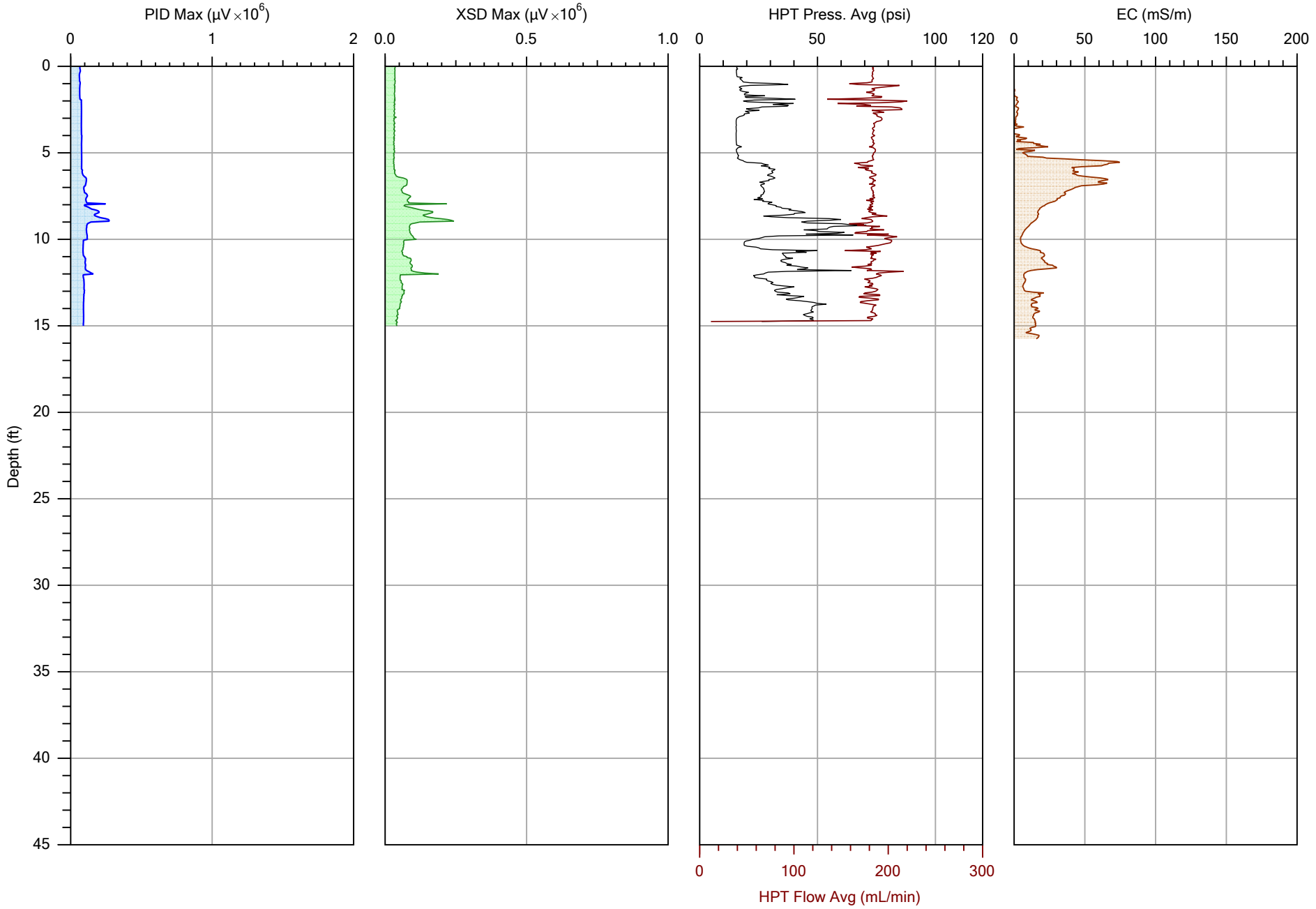
Appendix H

MIP Logs
(Electronic format on CD)



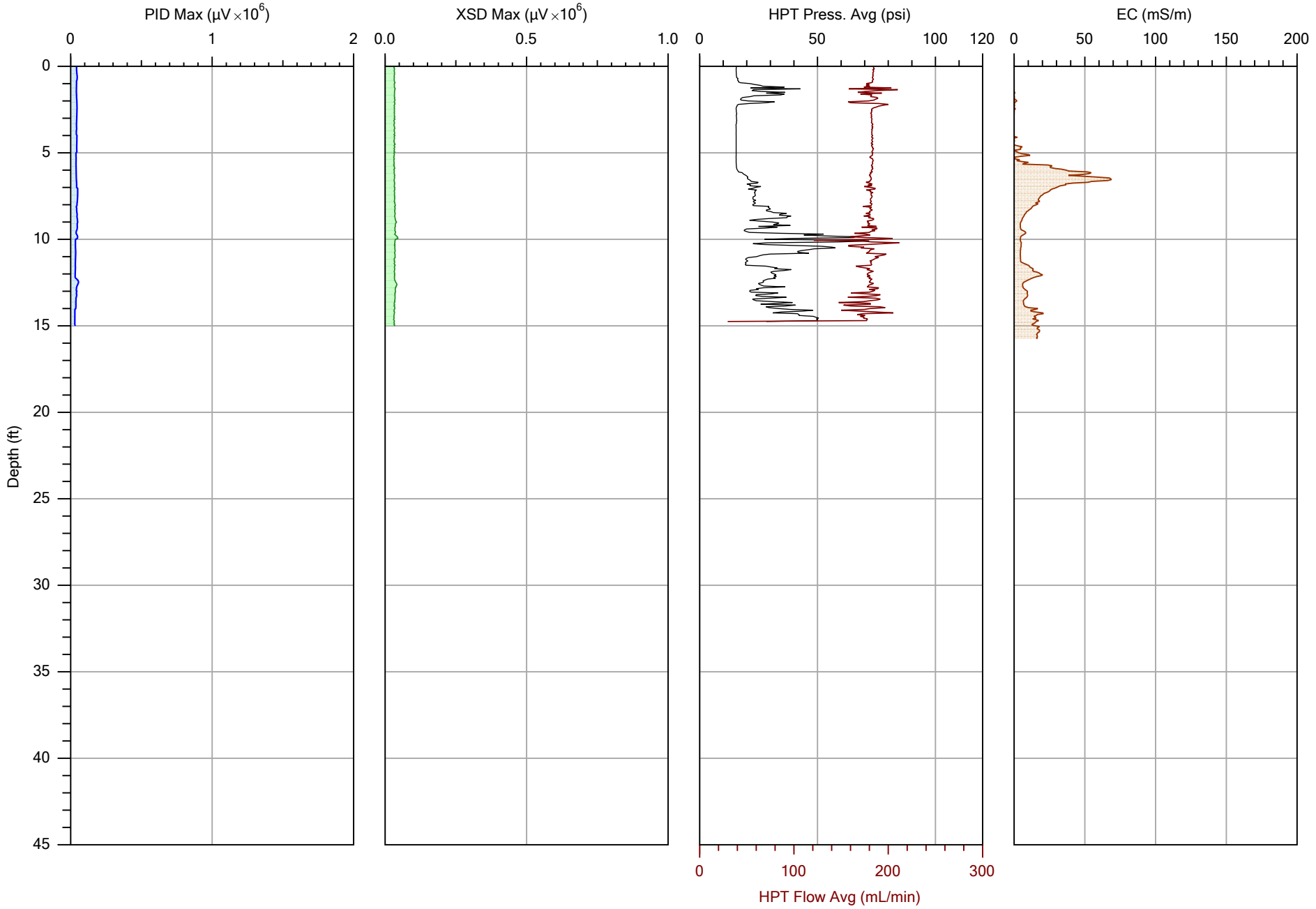
COLUMBIA TECHNOLOGIES

		File: MIP-001.MHP
Company: COLUMBIA Technologies	Operator: DJM	Date: 8/15/2016
Project ID: Keyport OU1 South Plantation	Client: AECOM	Location:



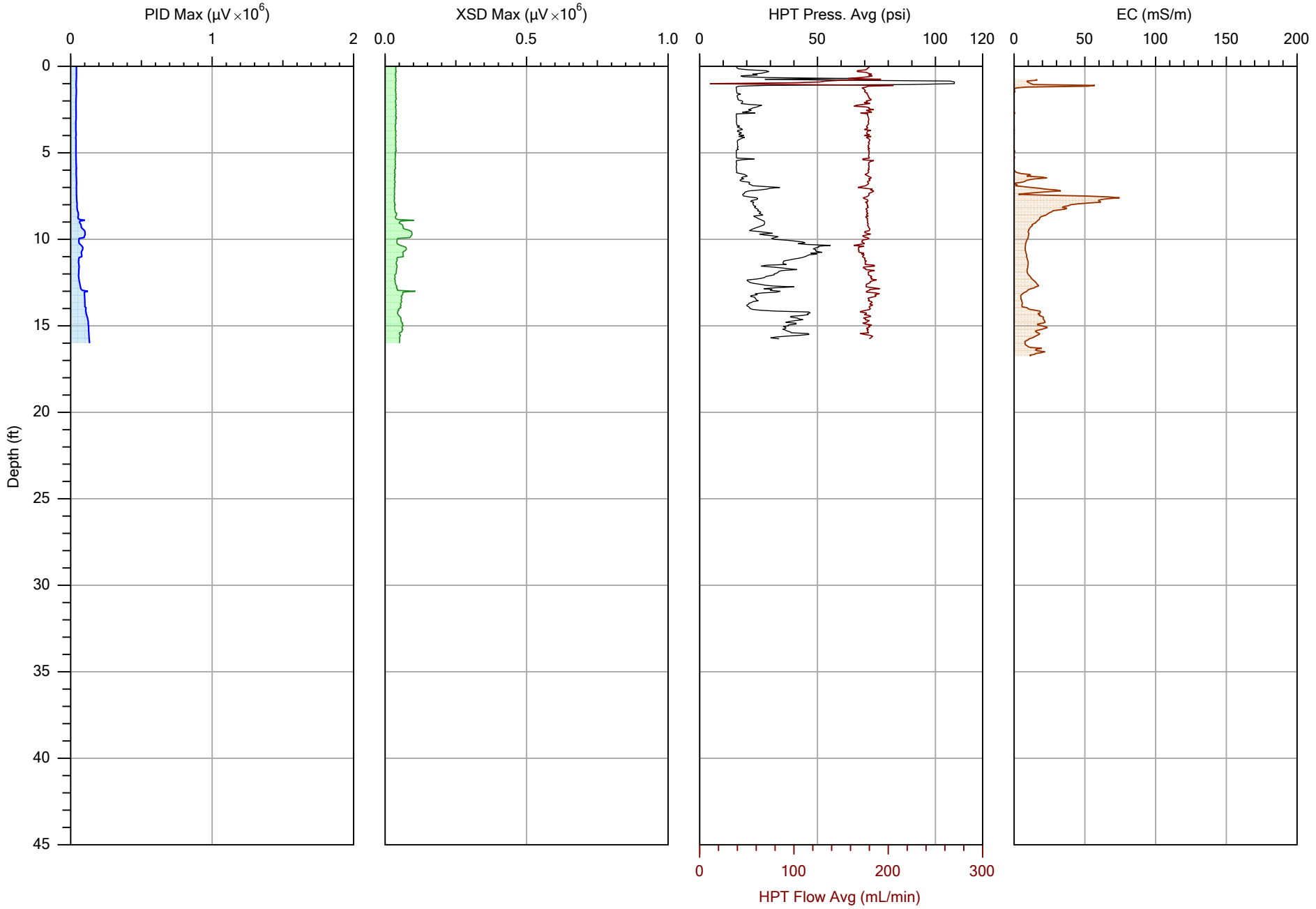
COLUMBIA TECHNOLOGIES

		File: MIP-002.MHP
Company: COLUMBIA Technologies	Operator: DJM	Date: 8/15/2016
Project ID: Keyport OU1 South Plantation	Client: AECOM	Location:



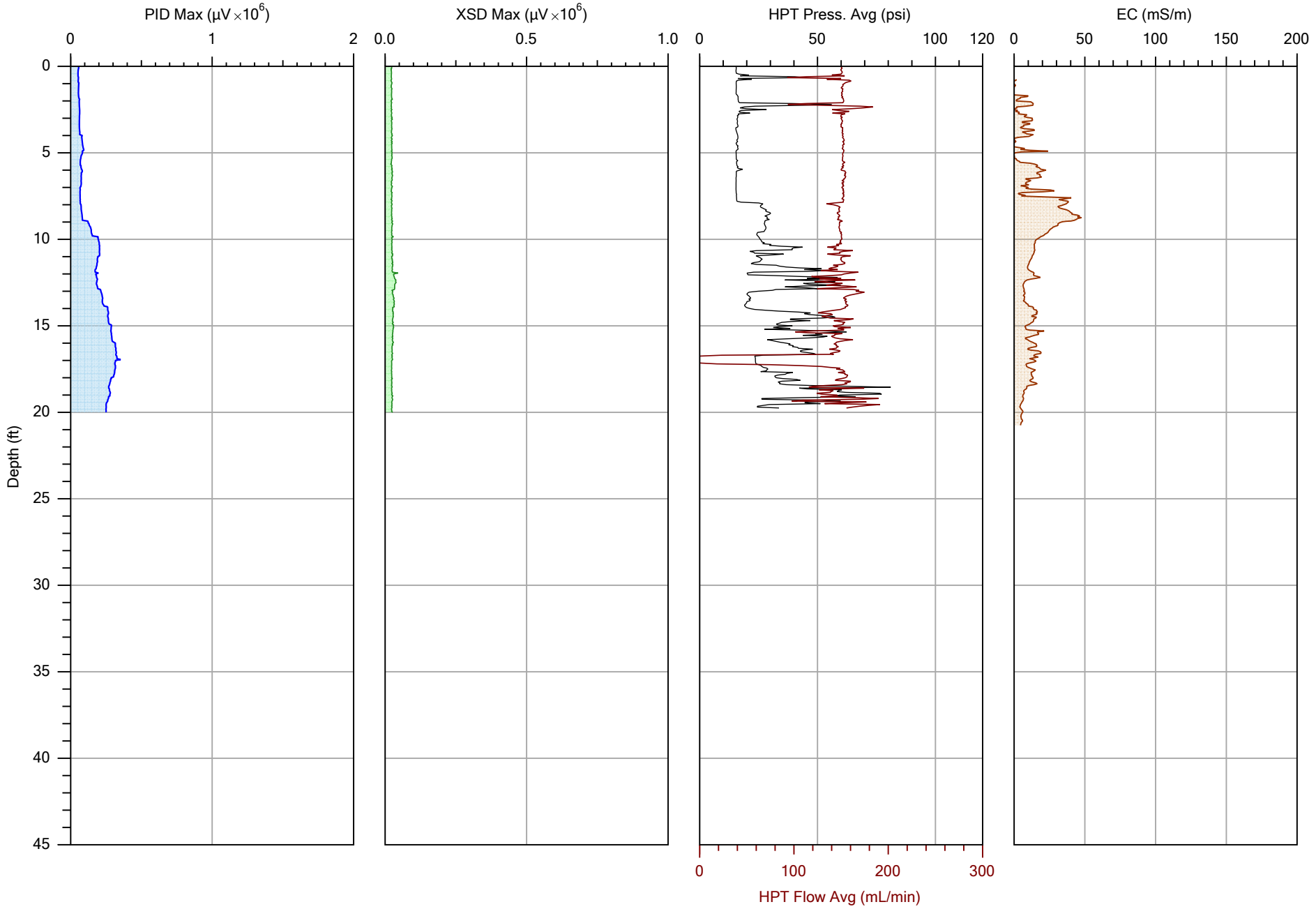
COLUMBIA TECHNOLOGIES

		File: MIP-003.MHP
Company: COLUMBIA Technologies	Operator: DJM	Date: 8/15/2016
Project ID: Keyport OU1 South Plantation	Client: AECOM	Location:



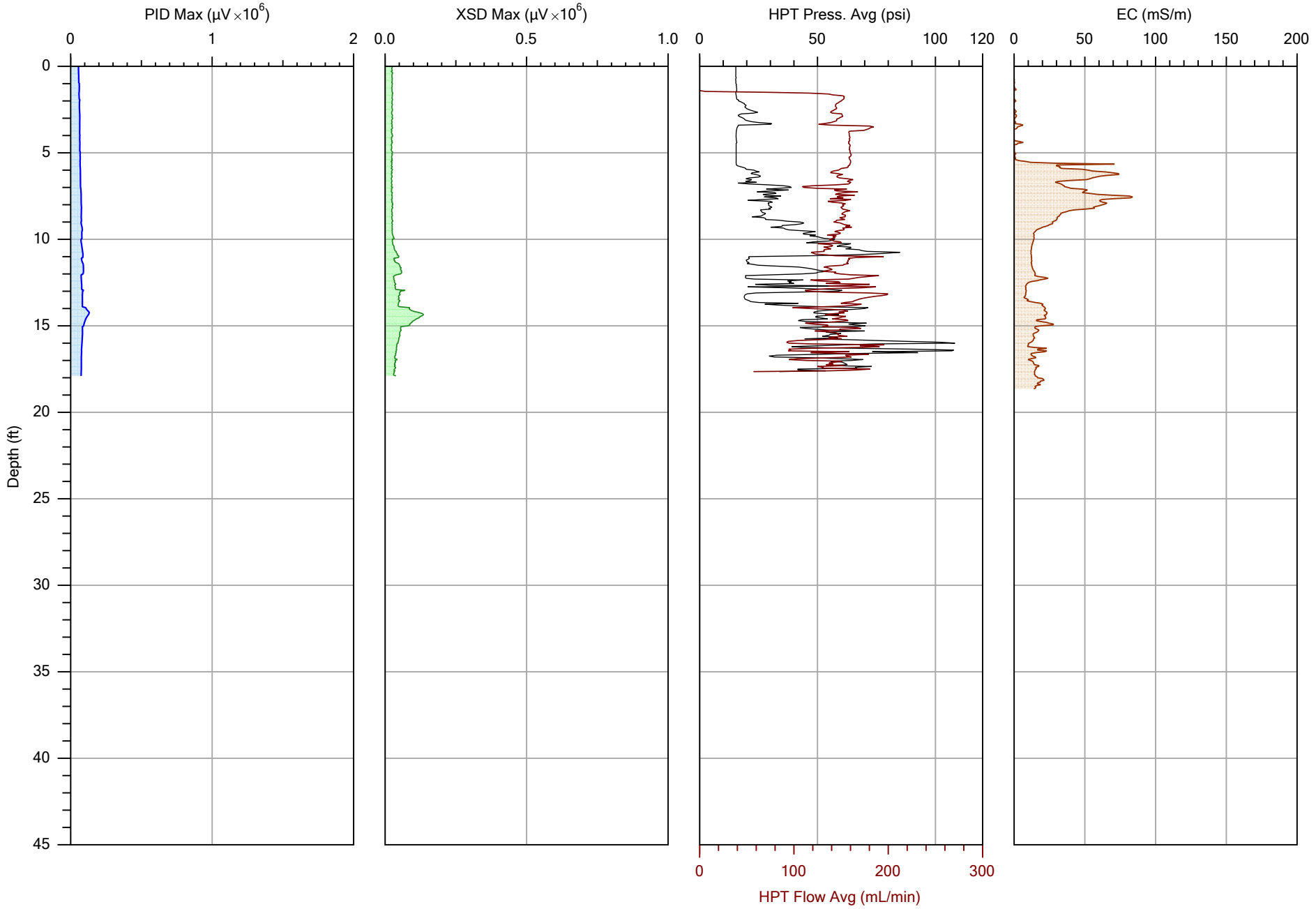
COLUMBIA TECHNOLOGIES

		File: MIP-004.MHP
Company: COLUMBIA Technologies	Operator: DJM	Date: 8/15/2016
Project ID: Keyport OU1 South Plantation	Client: AECOM	Location:



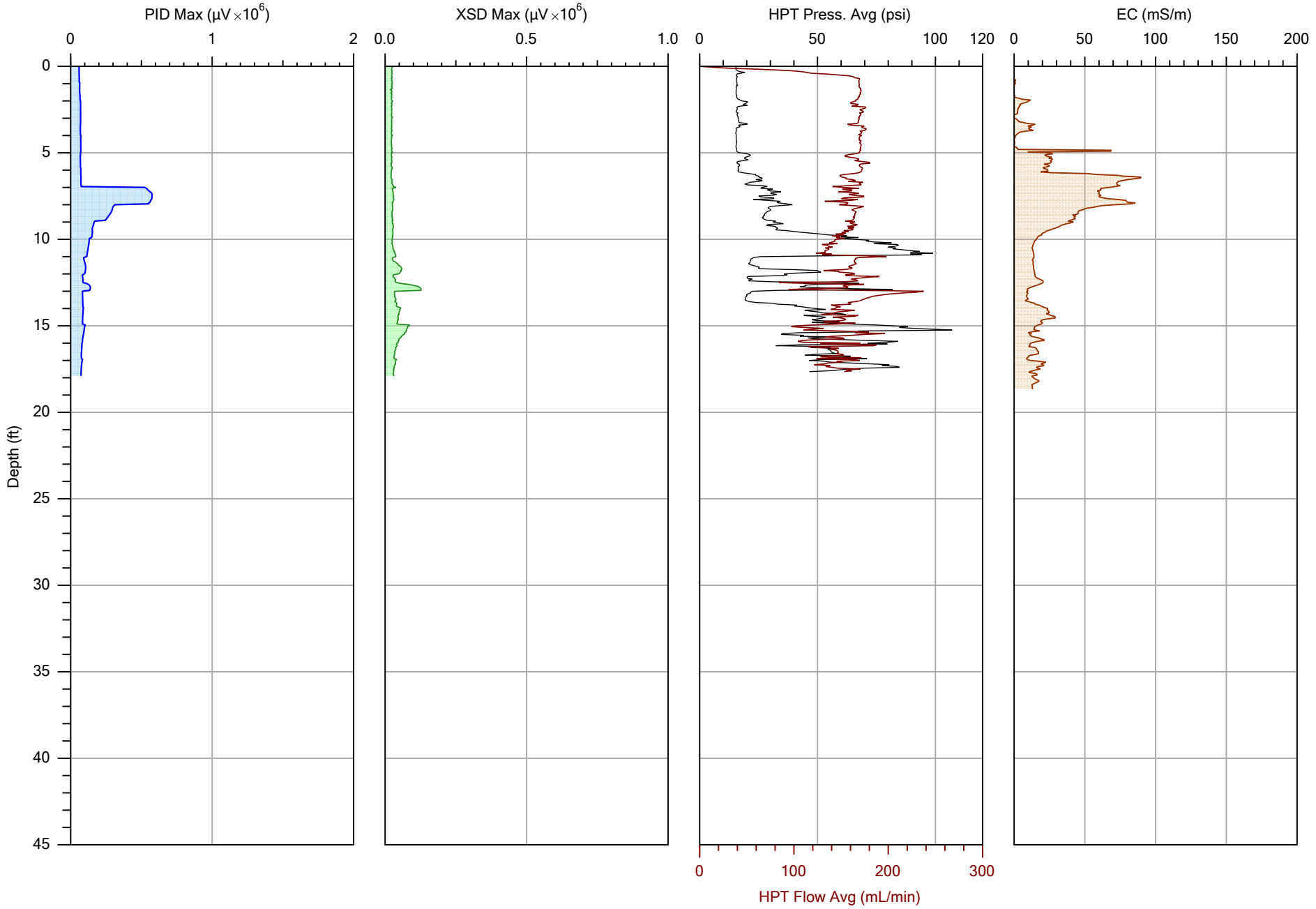
COLUMBIA TECHNOLOGIES

		File: MIP-005.MHP
Company: COLUMBIA Technologies	Operator: DJM	Date: 8/16/2016
Project ID: Keyport OU1 South Plantation	Client: AECOM	Location:



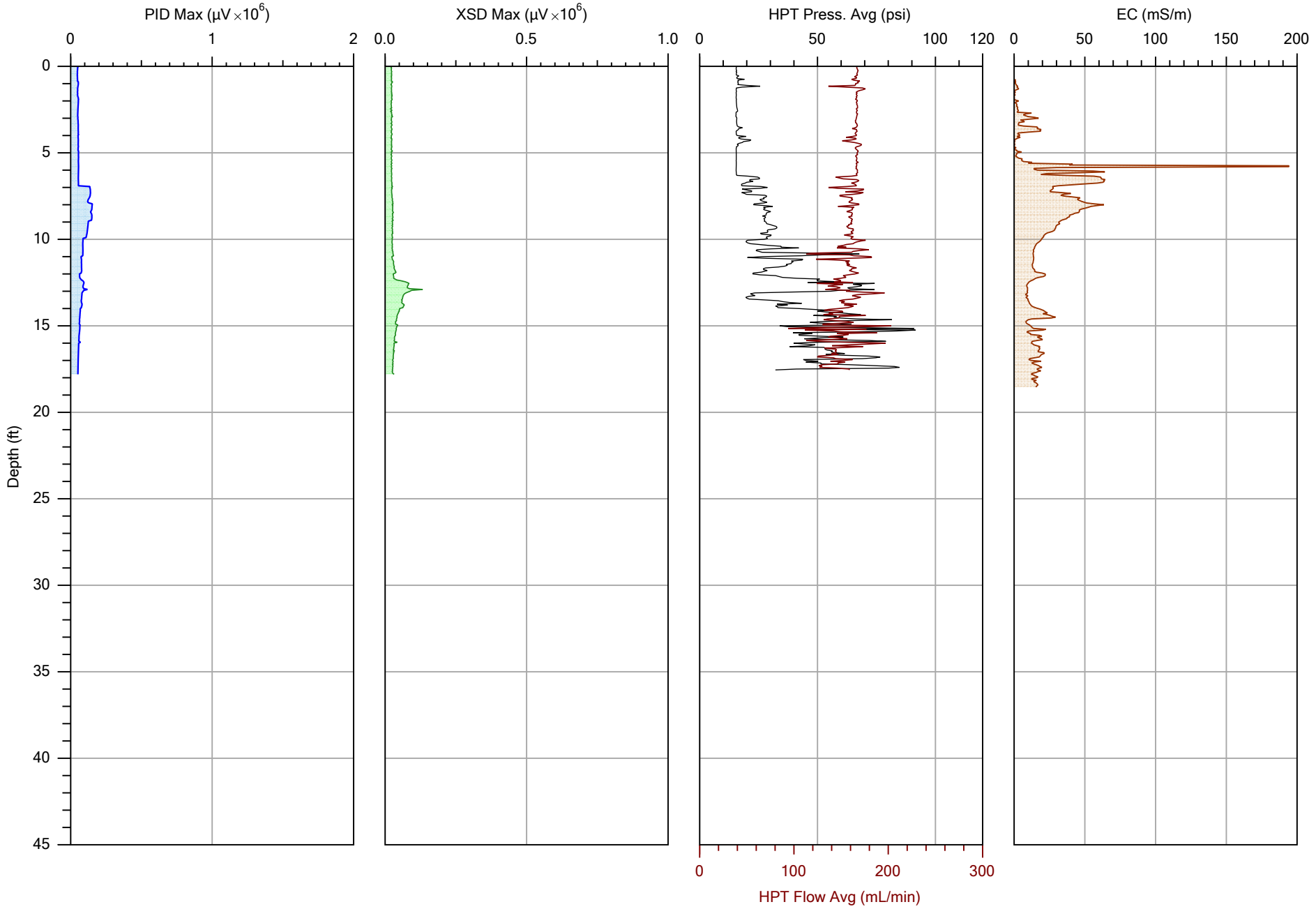
COLUMBIA TECHNOLOGIES

		File: MIP-006.MHP
Company: COLUMBIA Technologies	Operator: DJM	Date: 8/16/2016
Project ID: Keyport OU1 South Plantation	Client: AECOM	Location:



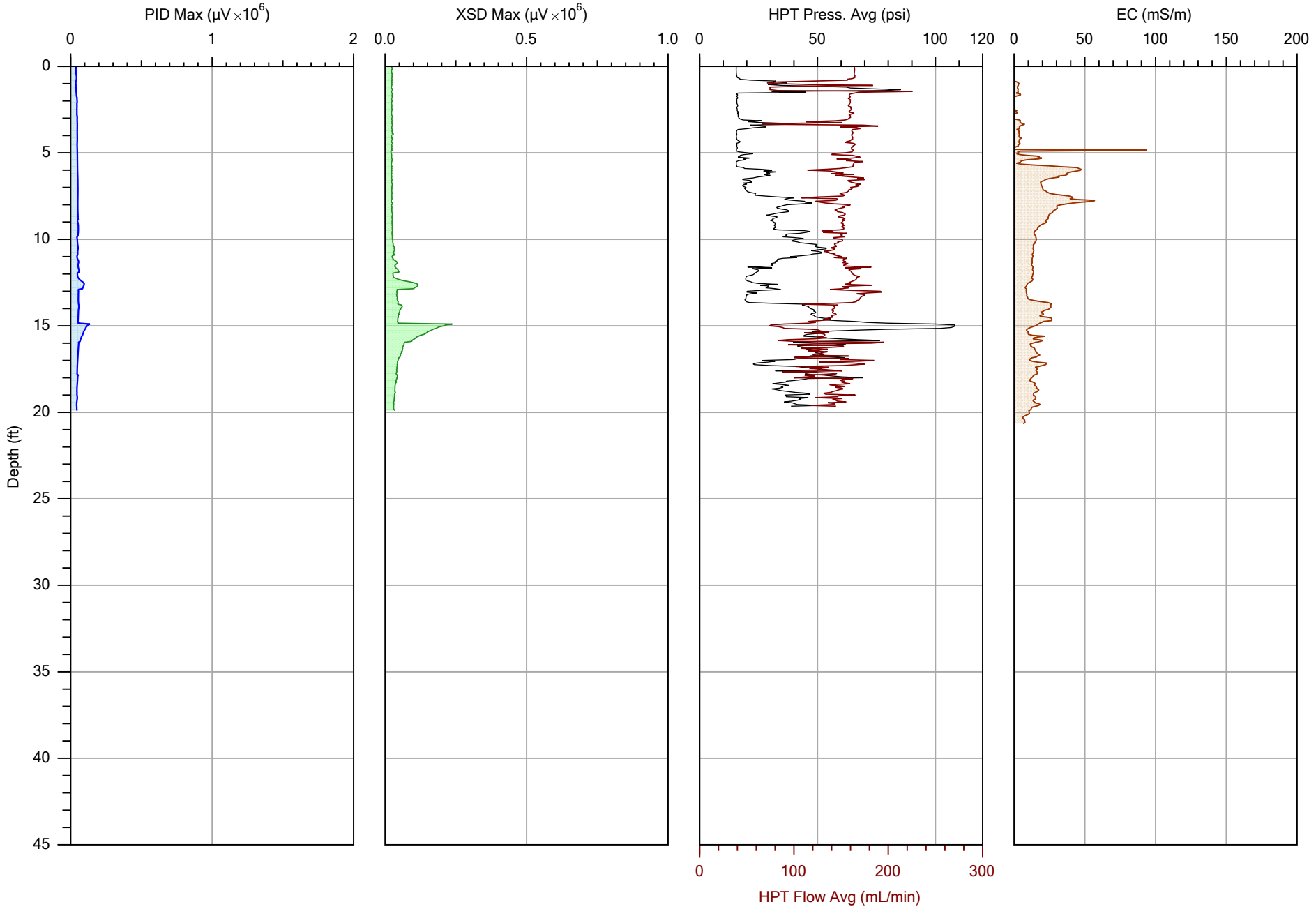
COLUMBIA TECHNOLOGIES

		File: MIP-007.MHP
Company: COLUMBIA Technologies	Operator: DJM	Date: 8/16/2016
Project ID: Keyport OU1 South Plantation	Client: AECOM	Location:



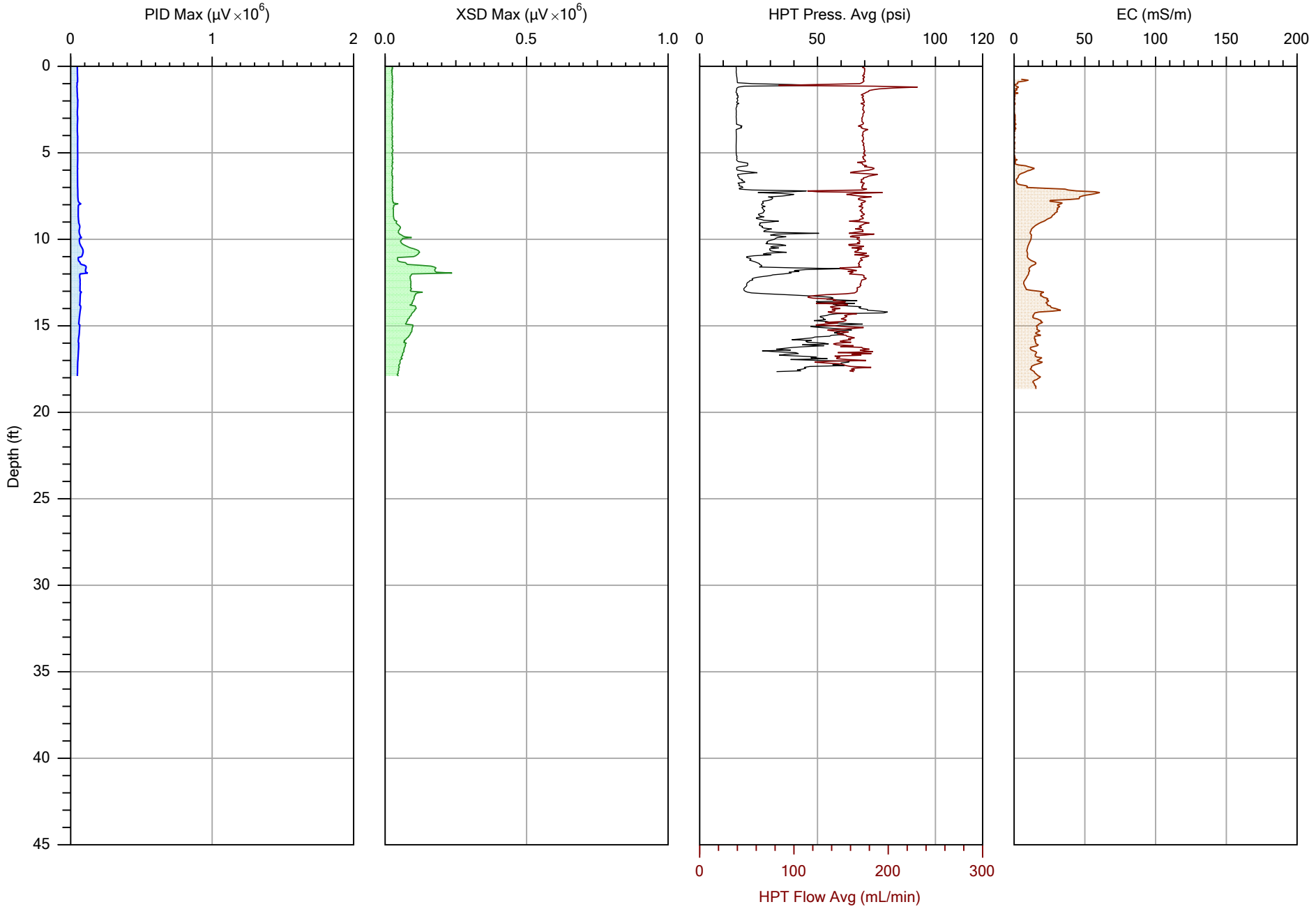
COLUMBIA TECHNOLOGIES

		File: MIP-008.MHP
Company: COLUMBIA Technologies	Operator: DJM	Date: 8/16/2016
Project ID: Keyport OU1 South Plantation	Client: AECOM	Location:



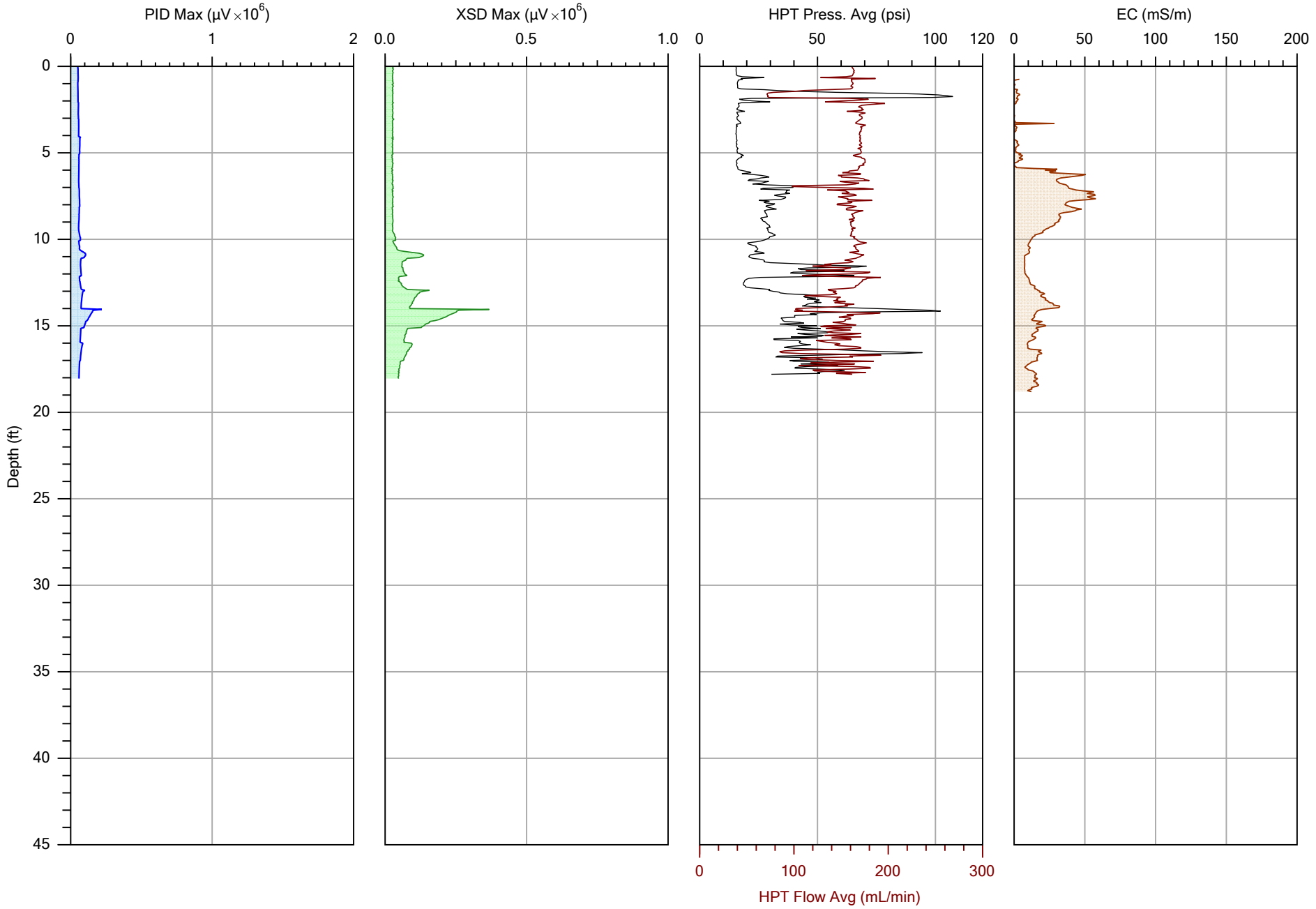
COLUMBIA TECHNOLOGIES

		File: MIP-009.MHP
Company: COLUMBIA Technologies	Operator: DJM	Date: 8/16/2016
Project ID: Keyport OU1 South Plantation	Client: AECOM	Location:



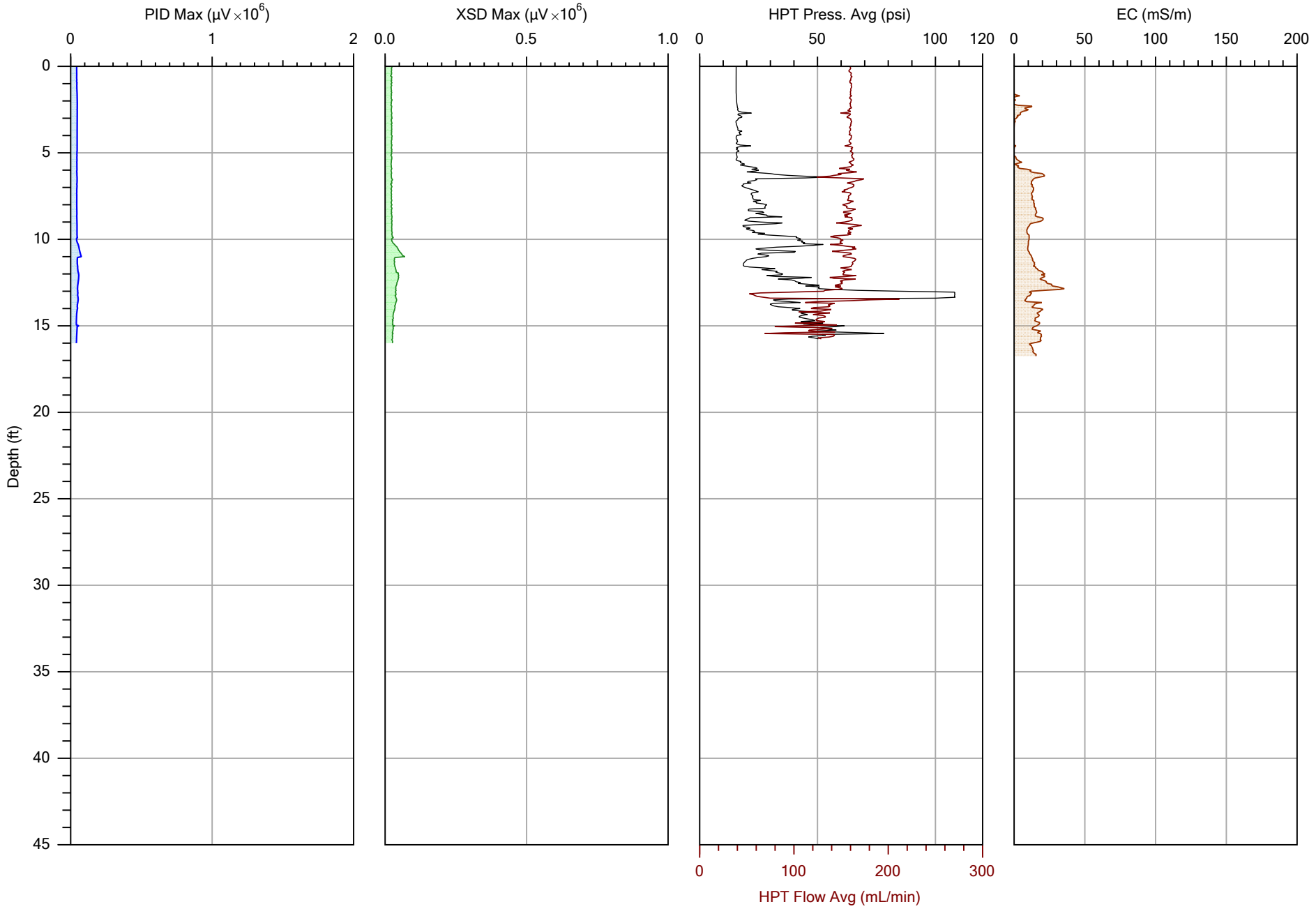
COLUMBIA TECHNOLOGIES

		File: MIP-010.MHP
Company: COLUMBIA Technologies	Operator: DJM	Date: 8/16/2016
Project ID: Keyport OU1 South Plantation	Client: AECOM	Location:



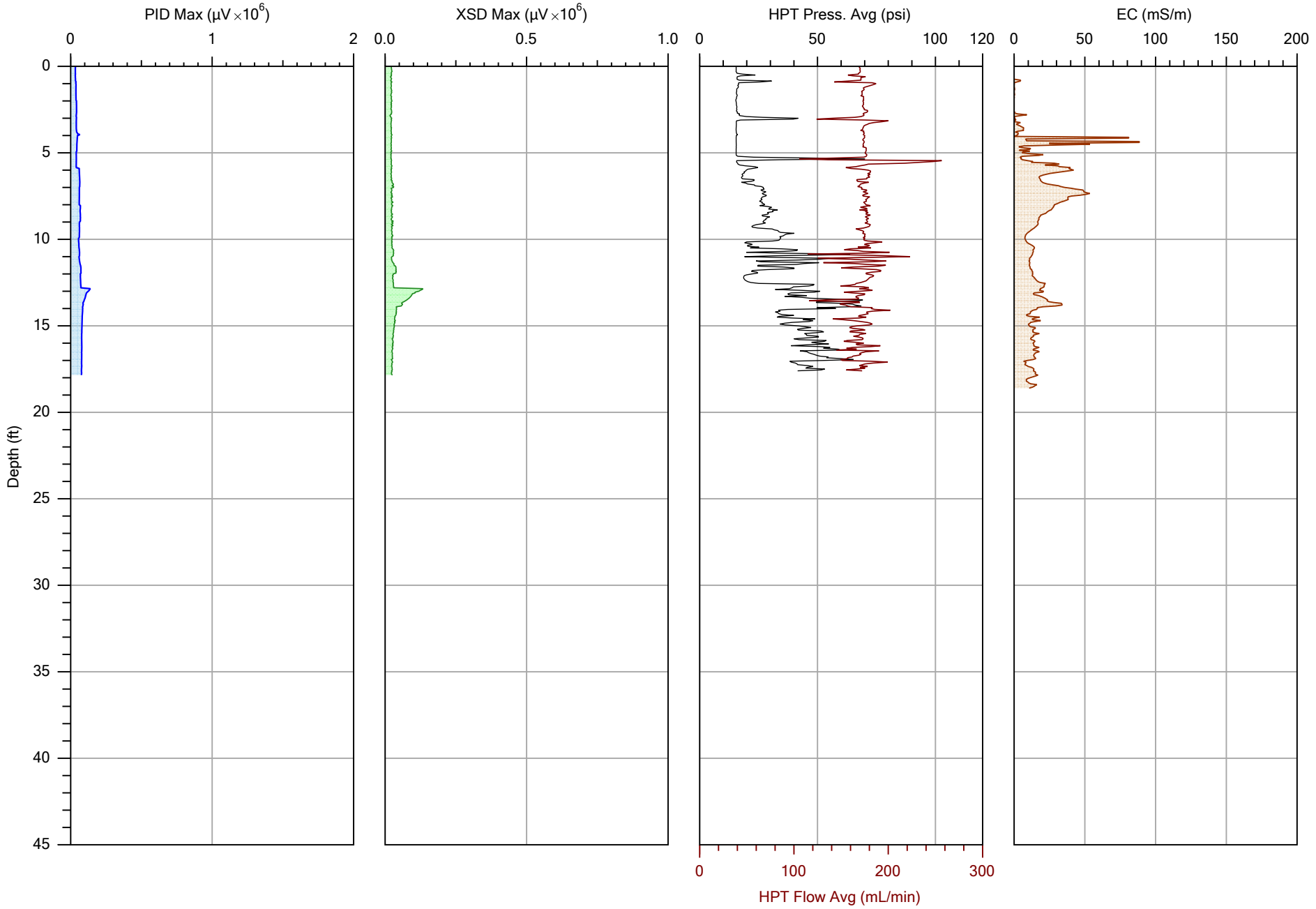
COLUMBIA TECHNOLOGIES

		File: MIP-011.MHP
Company: COLUMBIA Technologies	Operator: DJM	Date: 8/16/2016
Project ID: Keyport OU1 South Plantation	Client: AECOM	Location:



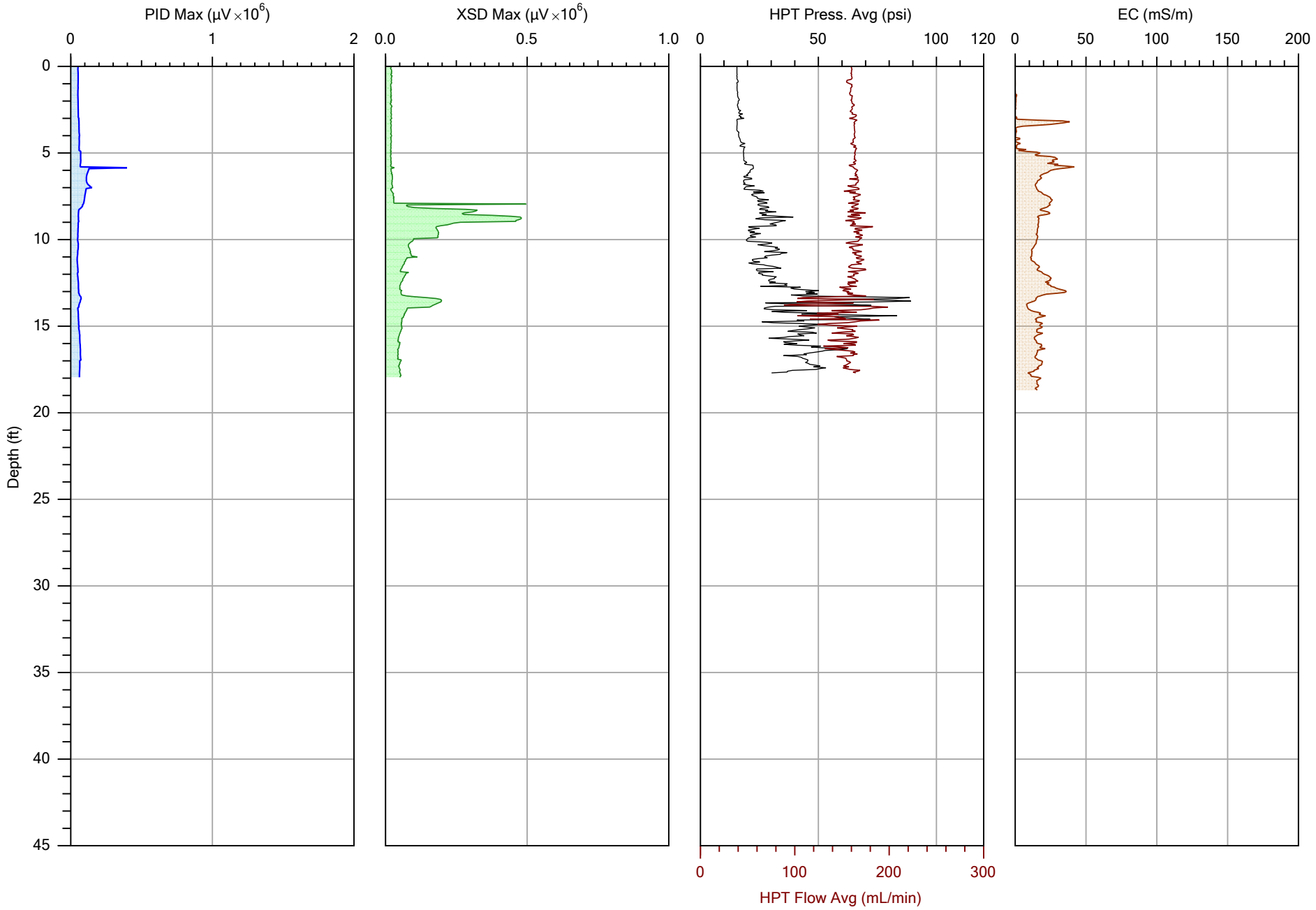
COLUMBIA TECHNOLOGIES

		File: MIP-012.MHP
Company: COLUMBIA Technologies	Operator: DJM	Date: 8/17/2016
Project ID: Keyport OU1 South Plantation	Client: AECOM	Location:



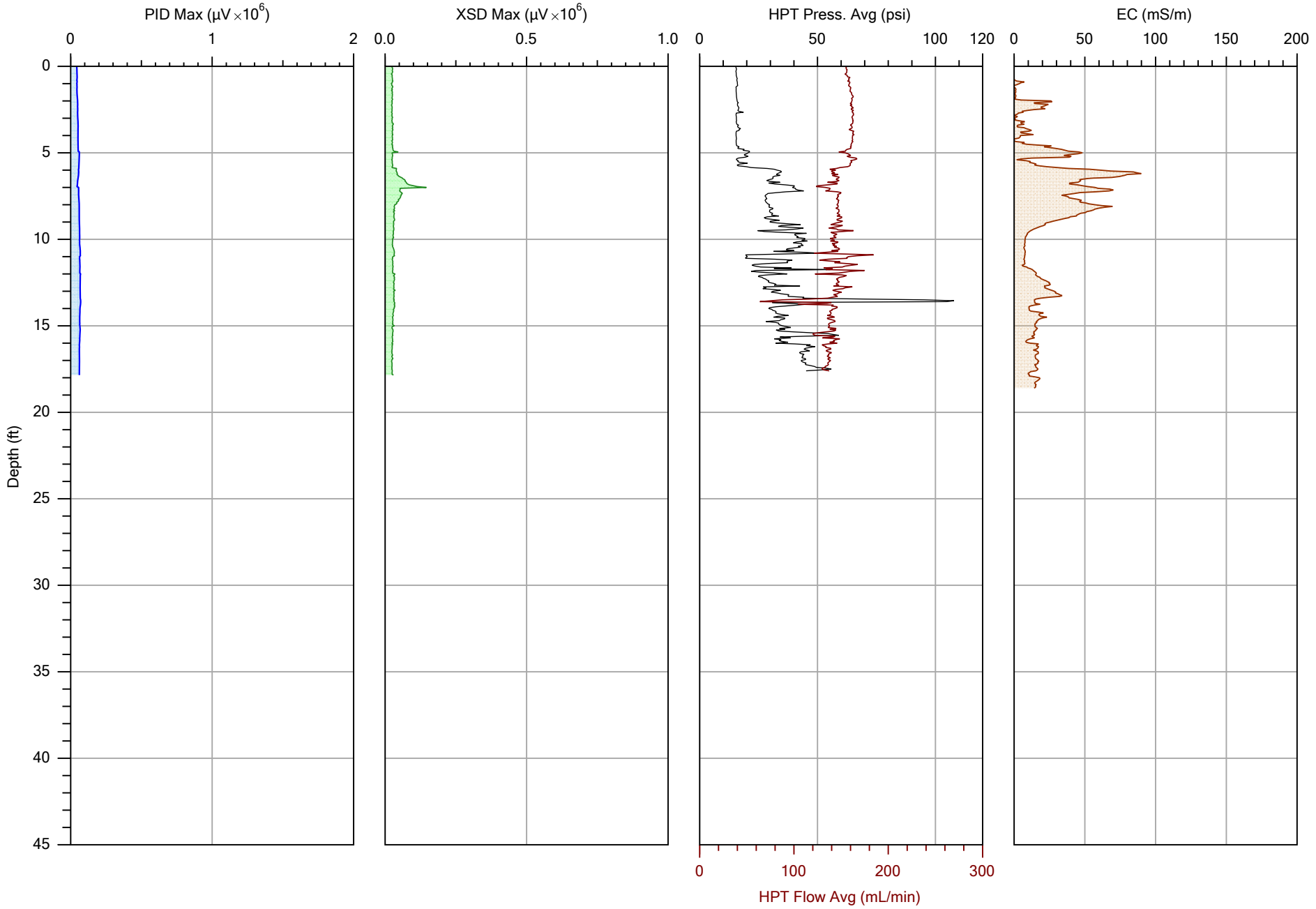
COLUMBIA TECHNOLOGIES

		File: MIP-013.MHP
Company: COLUMBIA Technologies	Operator: DJM	Date: 8/17/2016
Project ID: Keyport OU1 South Plantation	Client: AECOM	Location:



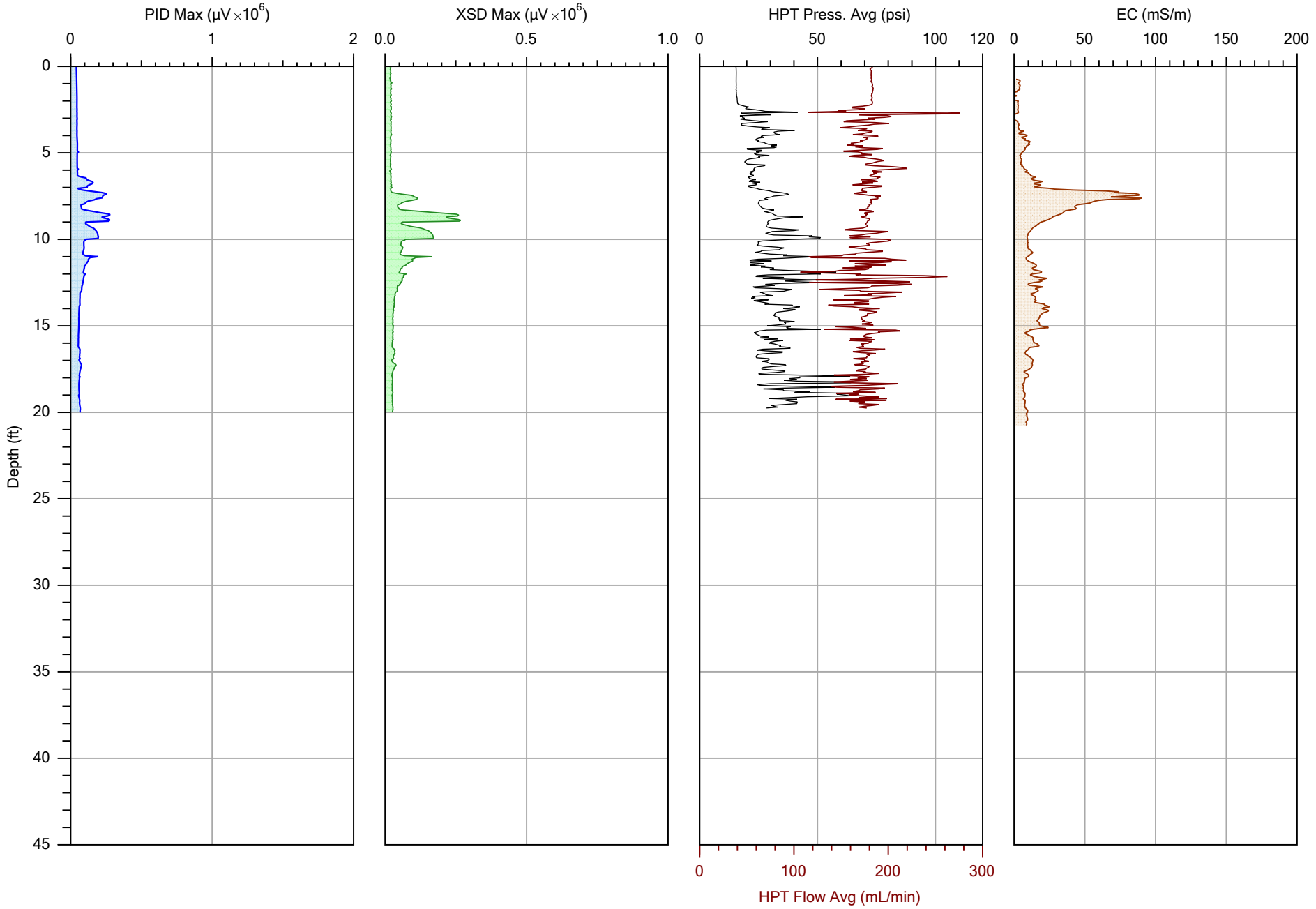
COLUMBIA TECHNOLOGIES

		File: MIP-014.MHP
Company: COLUMBIA Technologies	Operator: DJM	Date: 8/17/2016
Project ID: Keyport OU1 South Plantation	Client: AECOM	Location:



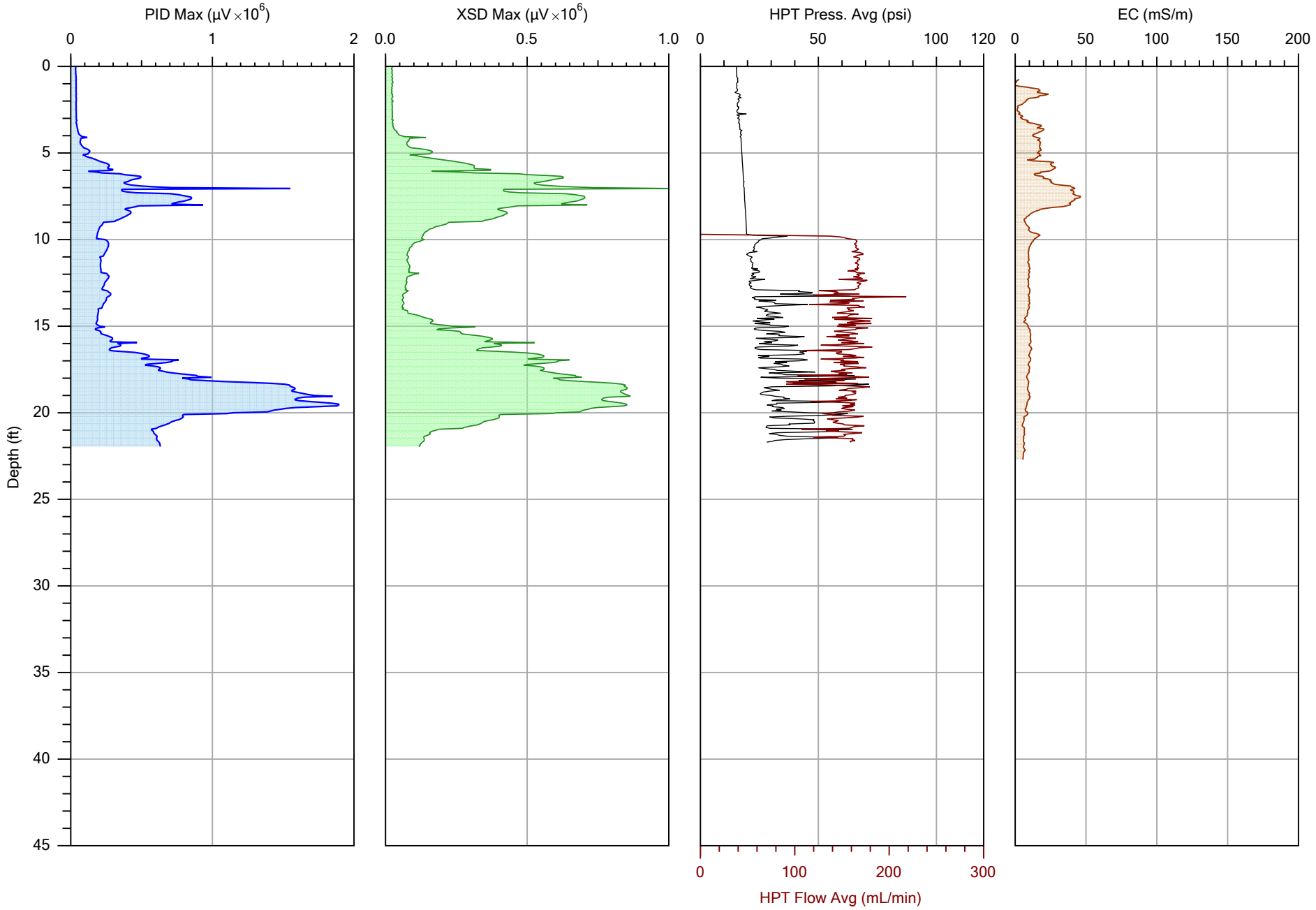
COLUMBIA TECHNOLOGIES

		File: MIP-015.MHP
Company: COLUMBIA Technologies	Operator: DJM	Date: 8/17/2016
Project ID: Keyport OU1 South Plantation	Client: AECOM	Location:



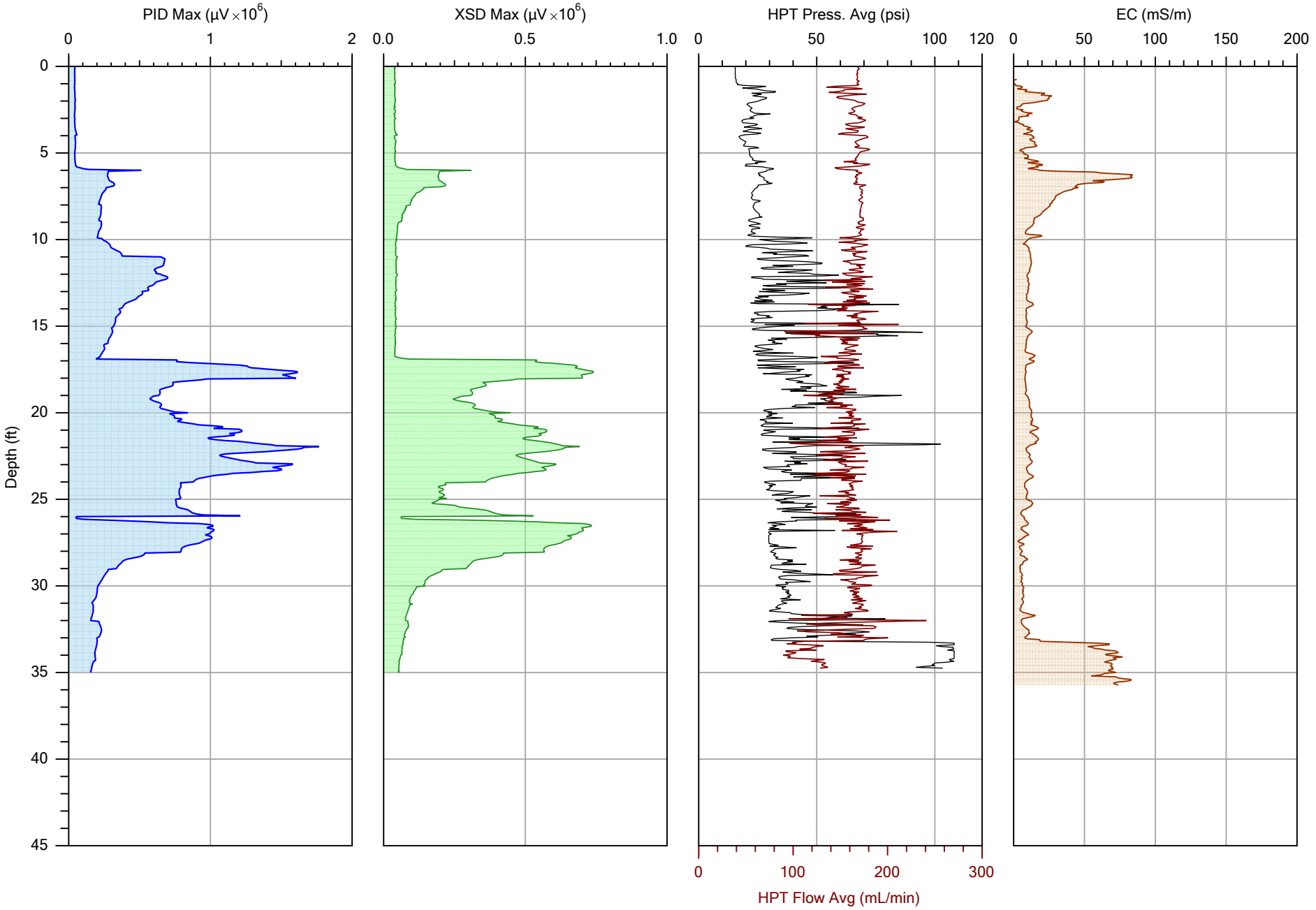
COLUMBIA TECHNOLOGIES

		File: MIP-016.MHP
Company: COLUMBIA Technologies	Operator: DJM	Date: 8/17/2016
Project ID: Keyport OU1 South Plantation	Client: AECOM	Location:



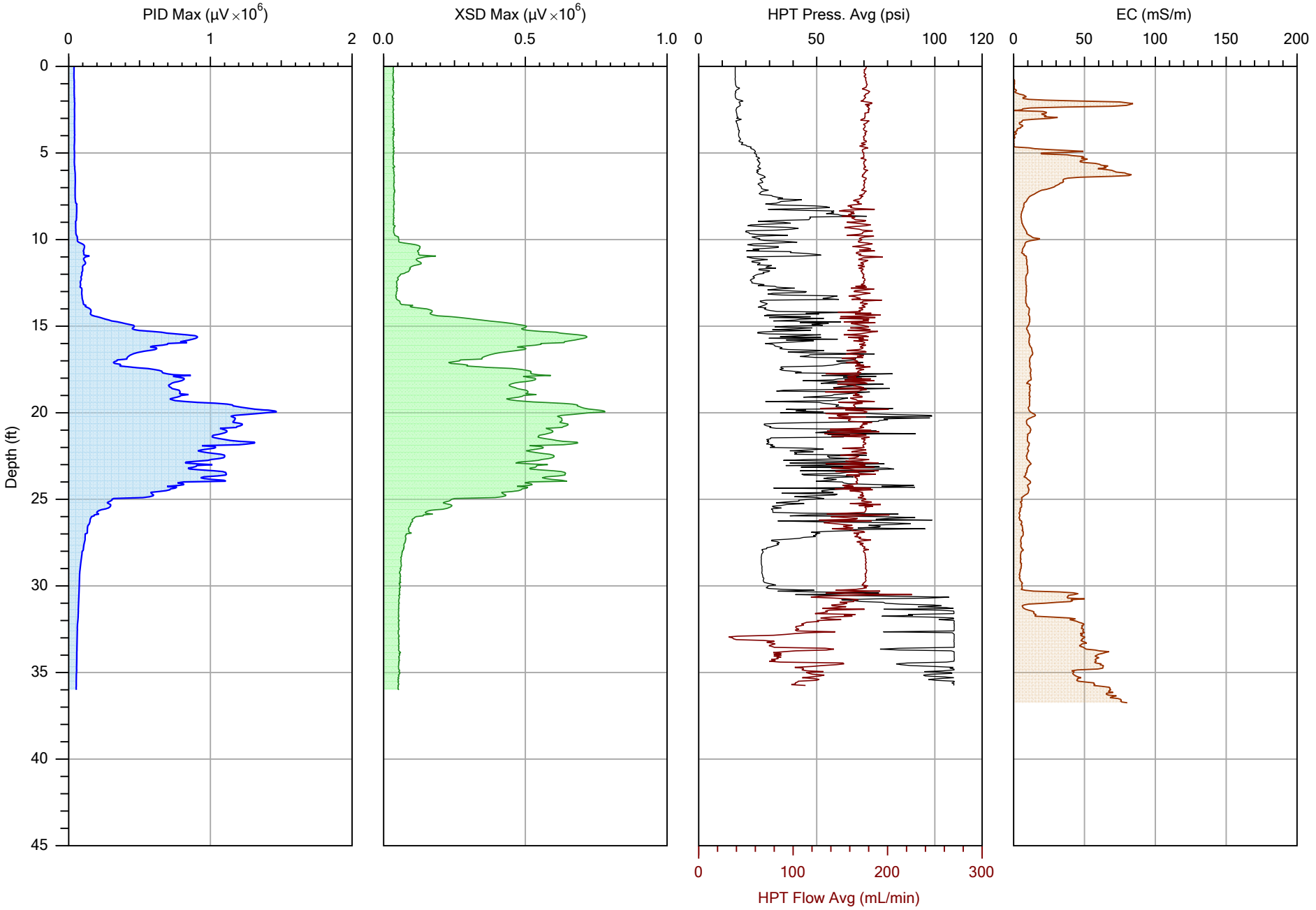
COLUMBIA TECHNOLOGIES

		File: MIP-017.MHP
Company: COLUMBIA Technologies	Operator: DJM	Date: 8/17/2016
Project ID: Keyport OU1 South Plantation	Client: AECOM	Location:



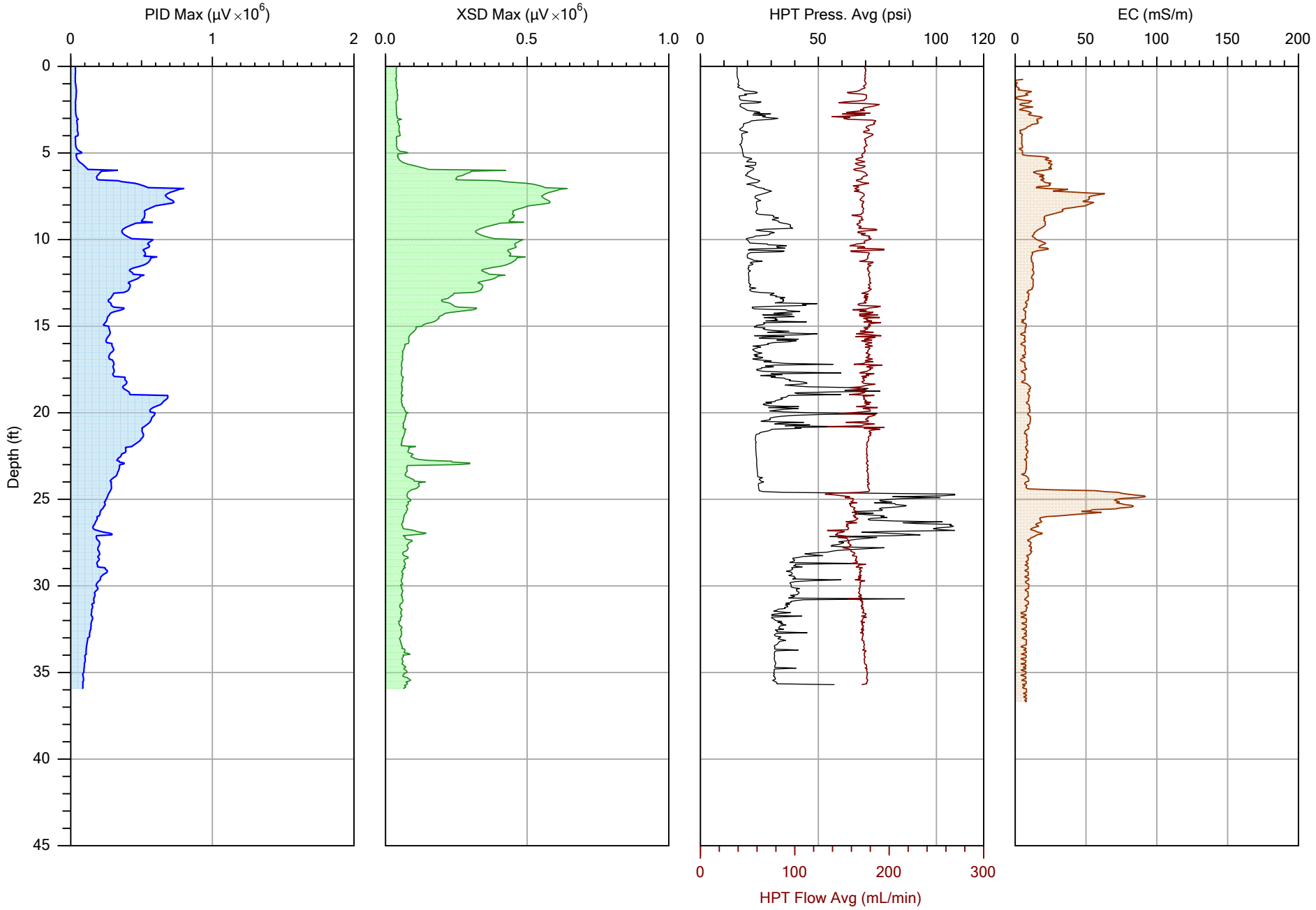
COLUMBIA TECHNOLOGIES

		File: MIP-018.MHP
Company: COLUMBIA Technologies	Operator: DJM	Date: 8/17/2016
Project ID: Keyport OU1 South Plantation	Client: AECOM	Location:



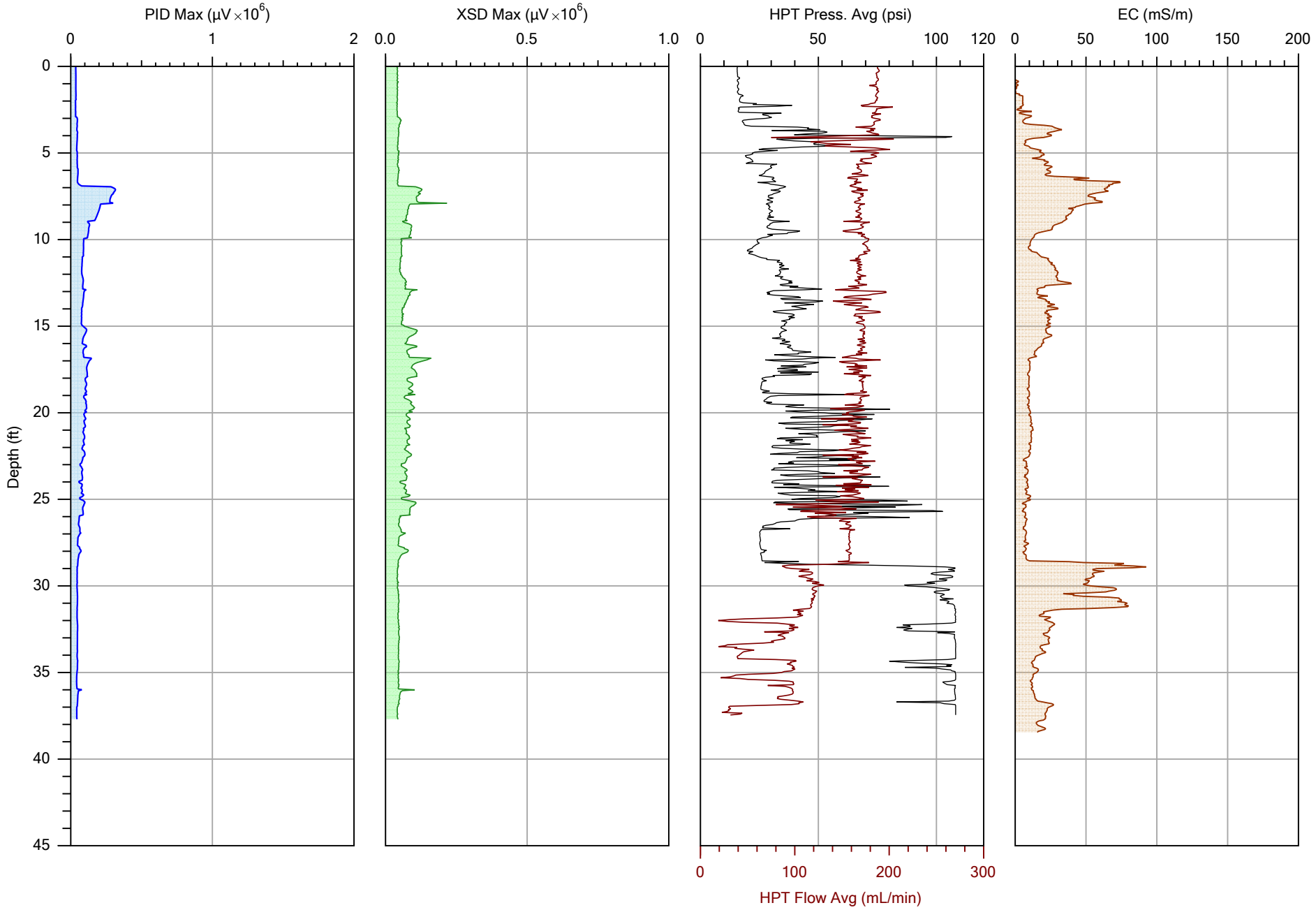
COLUMBIA TECHNOLOGIES

		File: MIP-019.MHP
Company: COLUMBIA Technologies	Operator: DJM	Date: 8/18/2016
Project ID: Keyport OU1 South Plantation	Client: AECOM	Location:



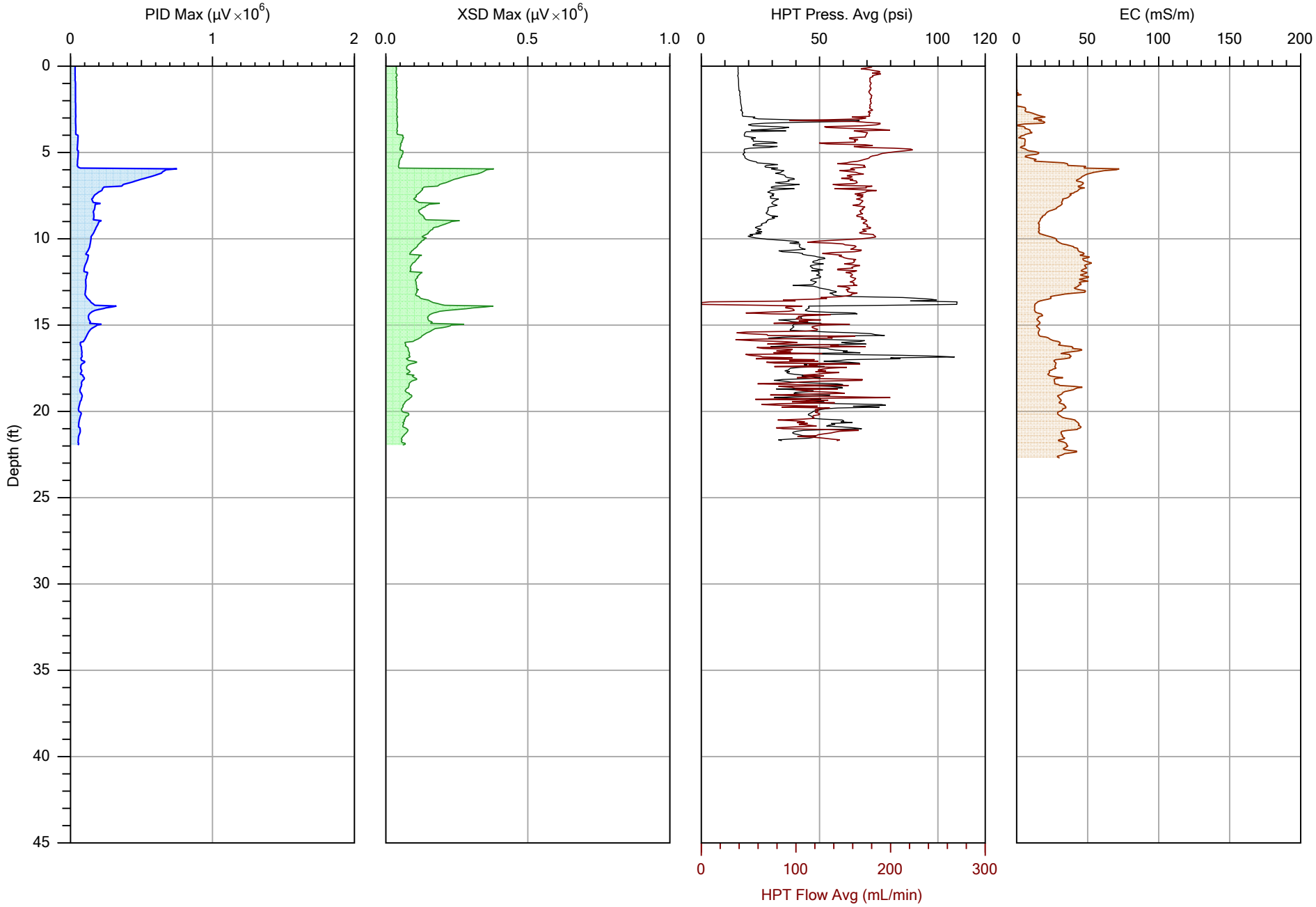
COLUMBIA TECHNOLOGIES

		File: MIP-020.MHP
Company: COLUMBIA Technologies	Operator: DJM	Date: 8/18/2016
Project ID: Keyport OU1 South Plantation	Client: AECOM	Location:



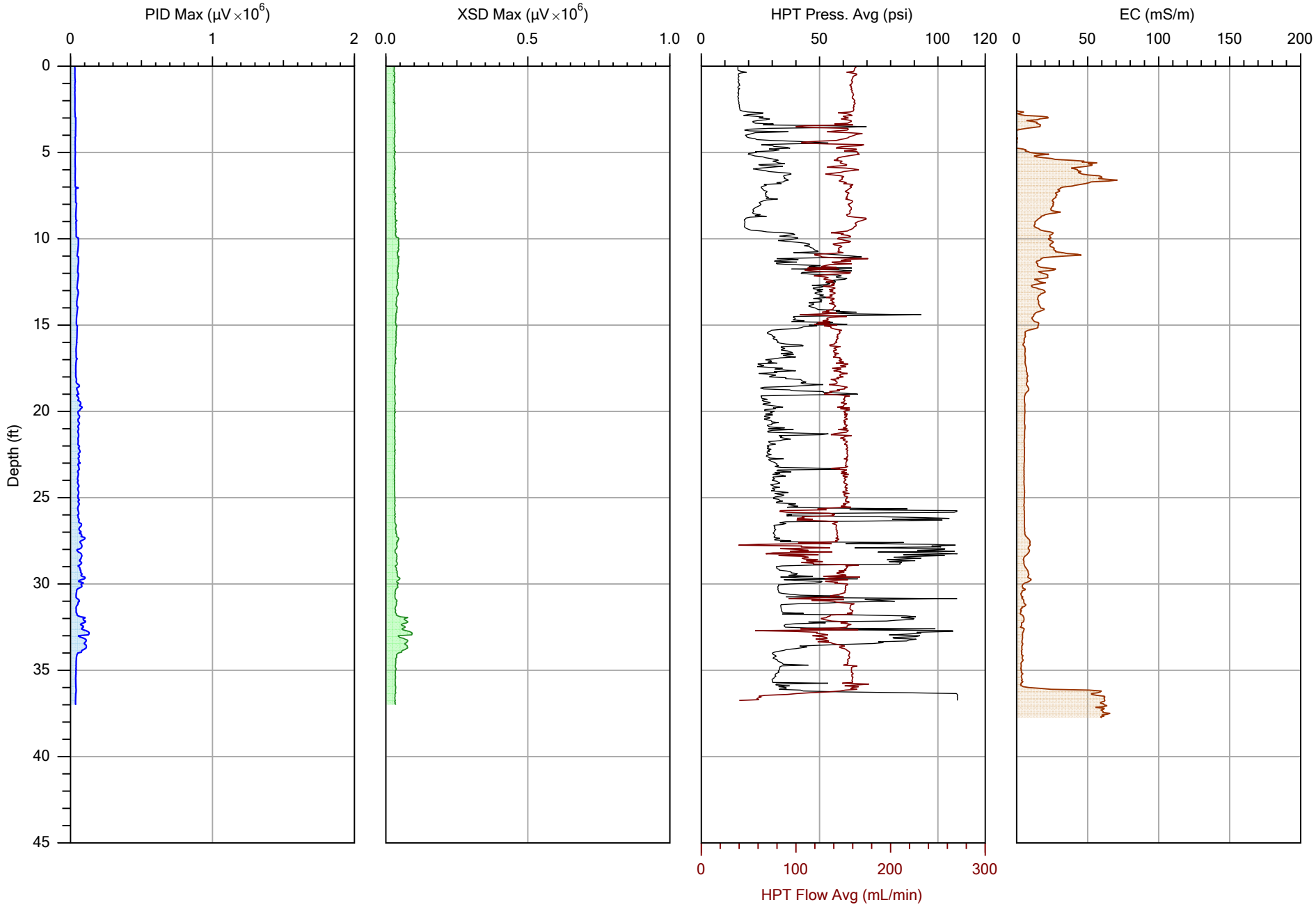
COLUMBIA TECHNOLOGIES

		File: MIP-021.MHP
Company: COLUMBIA Technologies	Operator: DJM	Date: 8/18/2016
Project ID: Keyport OU1 South Plantation	Client: AECOM	Location:



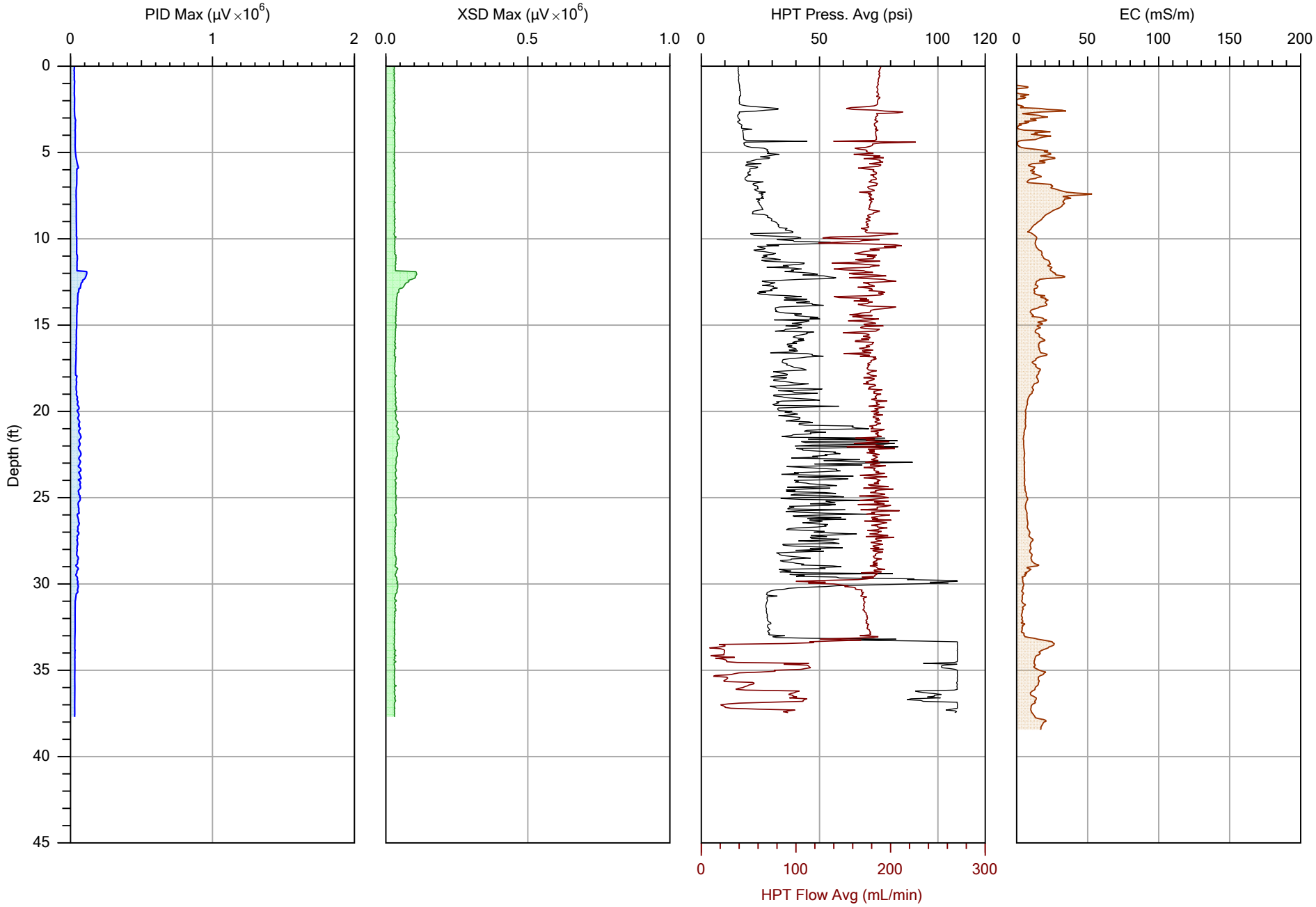
COLUMBIA TECHNOLOGIES

		File: MIP-022.MHP
Company: COLUMBIA Technologies	Operator: DJM	Date: 8/18/2016
Project ID: Keyport OU1 South Plantation	Client: AECOM	Location:



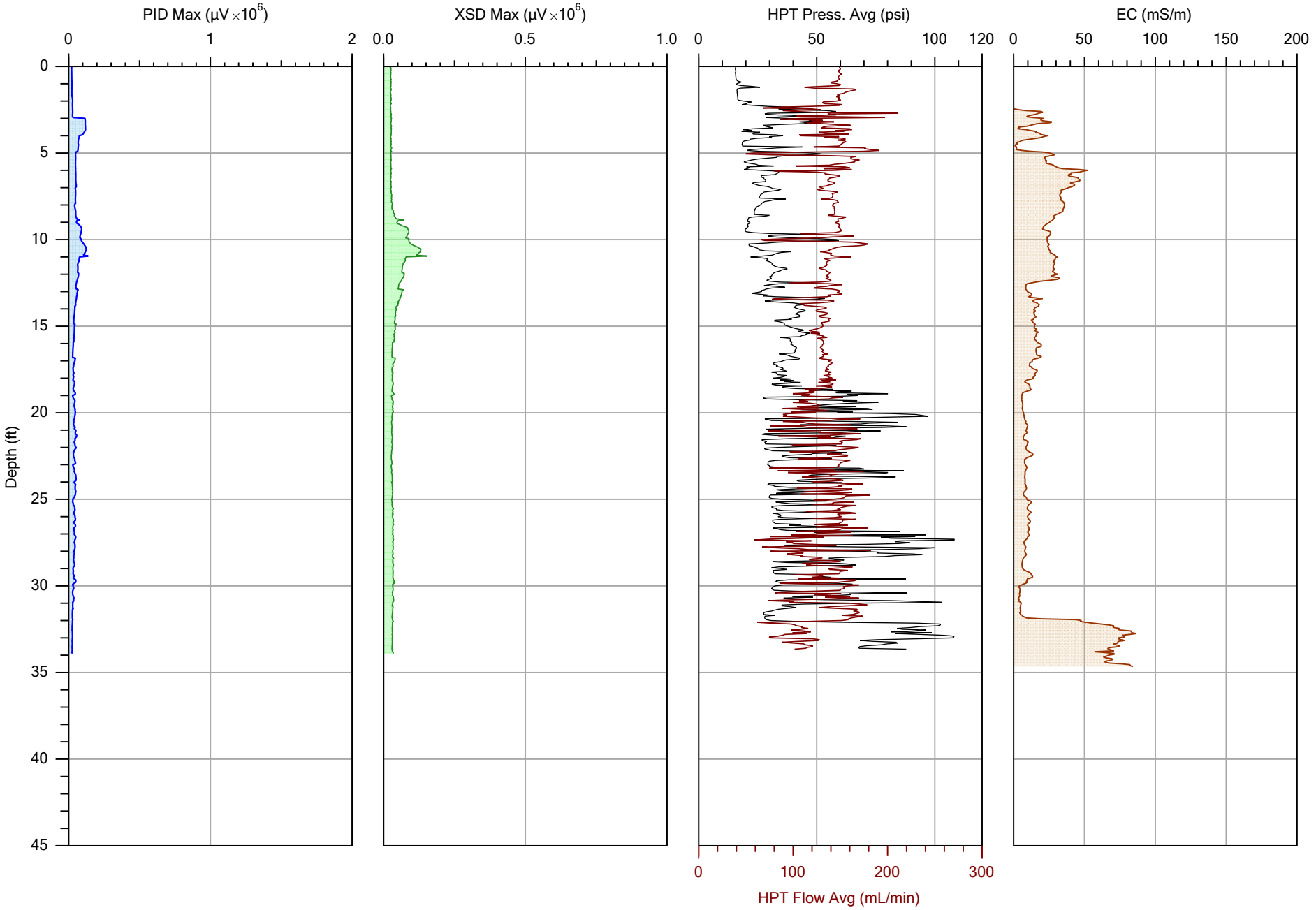
COLUMBIA TECHNOLOGIES

		File: MIP-023.MHP
Company: COLUMBIA Technologies	Operator: DJM	Date: 8/22/2016
Project ID: Keyport OU1 South Plantation	Client: AECOM	Location:



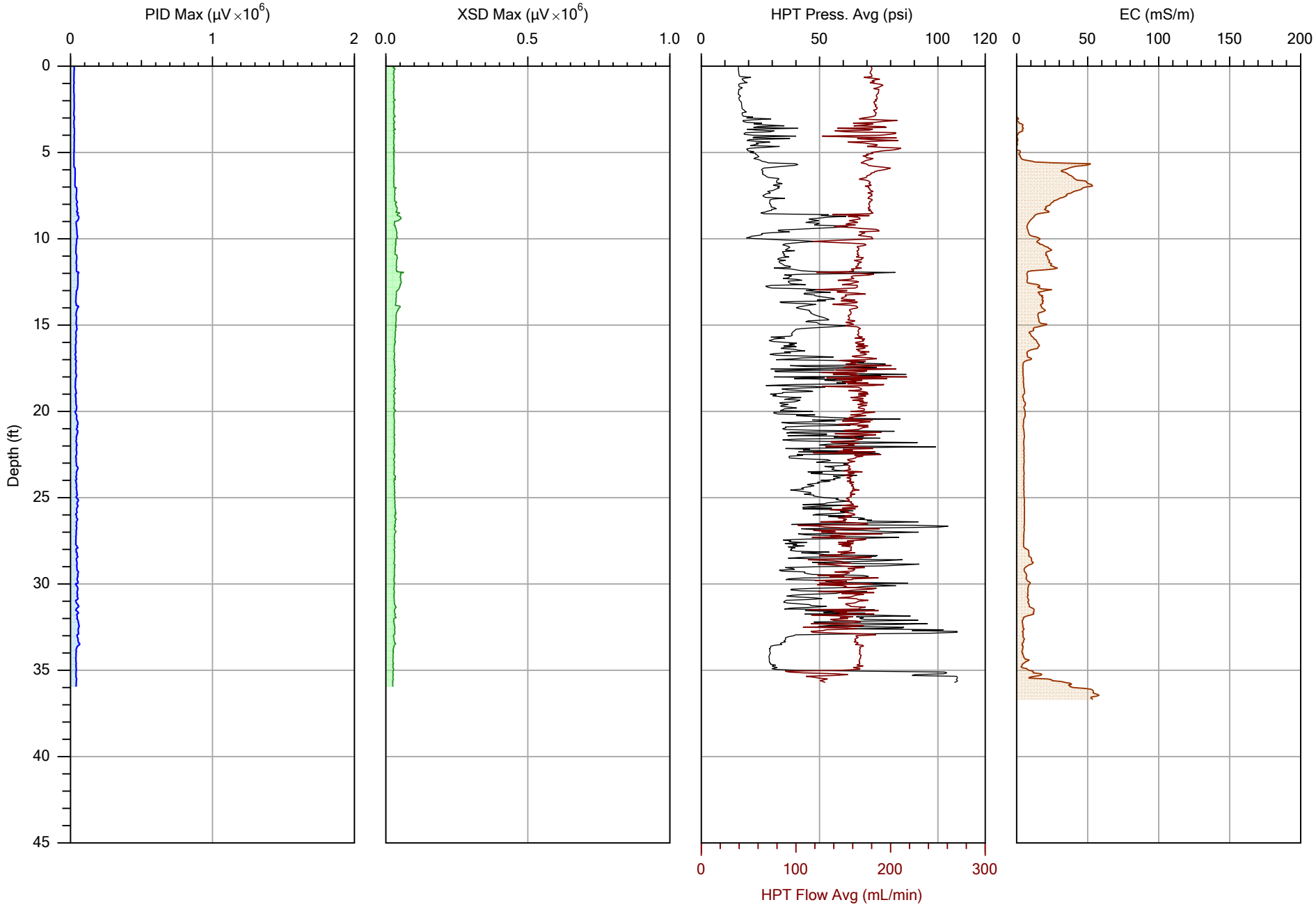
COLUMBIA TECHNOLOGIES

		File: MIP-024.MHP
Company: COLUMBIA Technologies	Operator: DJM	Date: 8/22/2016
Project ID: Keyport OU1 South Plantation	Client: AECOM	Location:



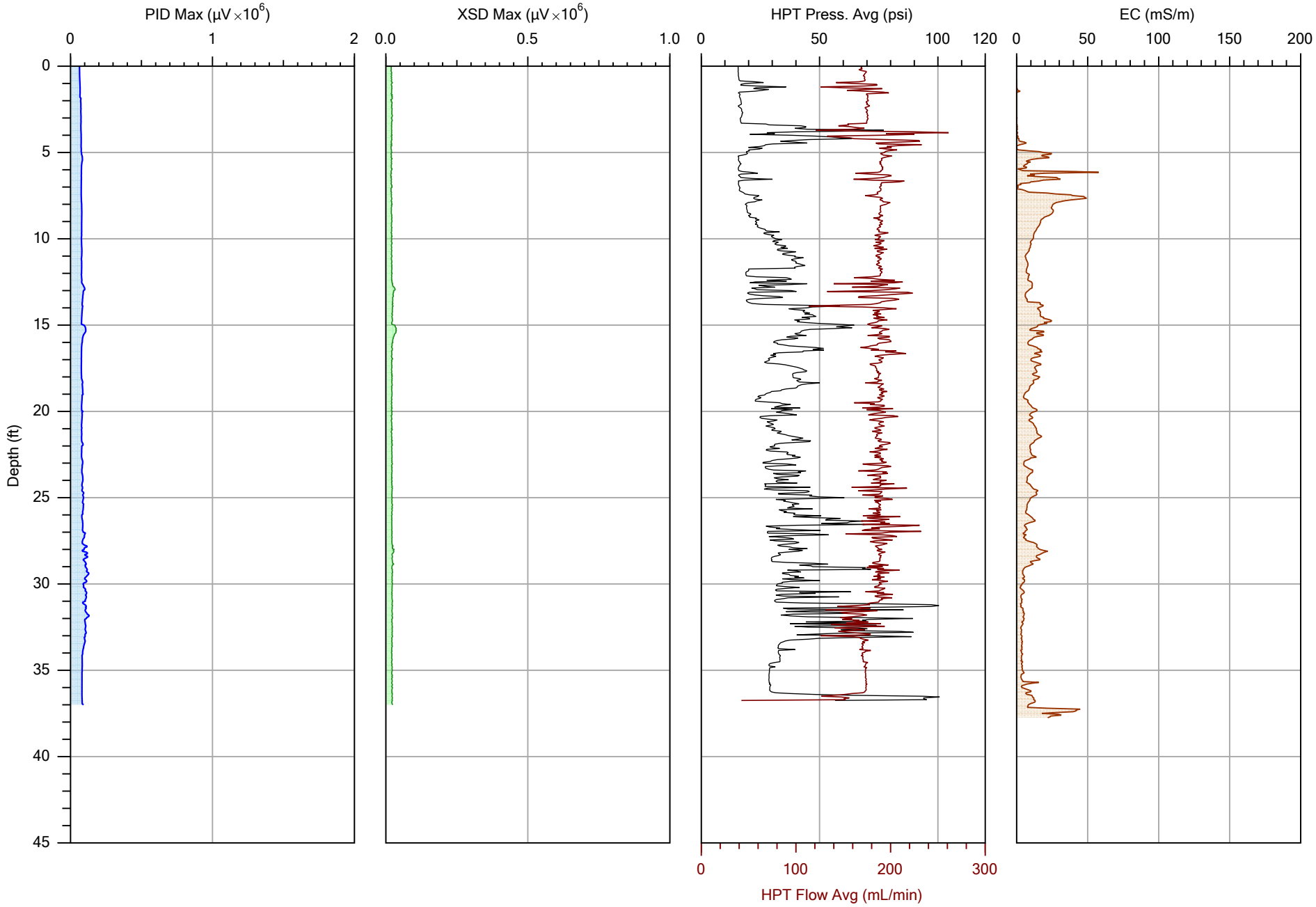
COLUMBIA TECHNOLOGIES

		File: MIP-025.MHP
Company: COLUMBIA Technologies	Operator: DJM	Date: 8/22/2016
Project ID: Keyport OU1 South Plantation	Client: AECOM	Location:



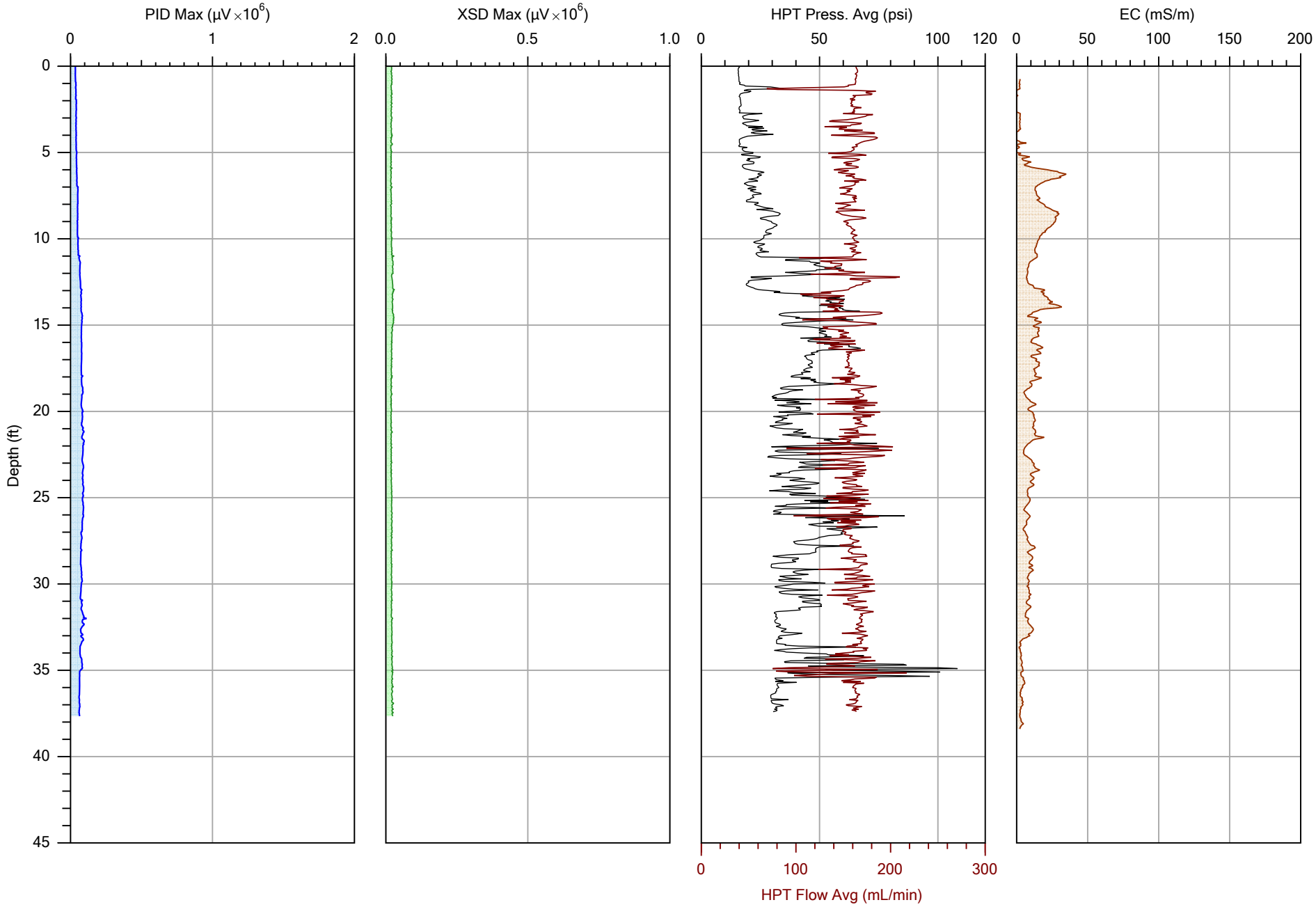
COLUMBIA TECHNOLOGIES

		File: MIP-026.MHP
Company: COLUMBIA Technologies	Operator: DJM	Date: 8/22/2016
Project ID: Keyport OU1 South Plantation	Client: AECOM	Location:



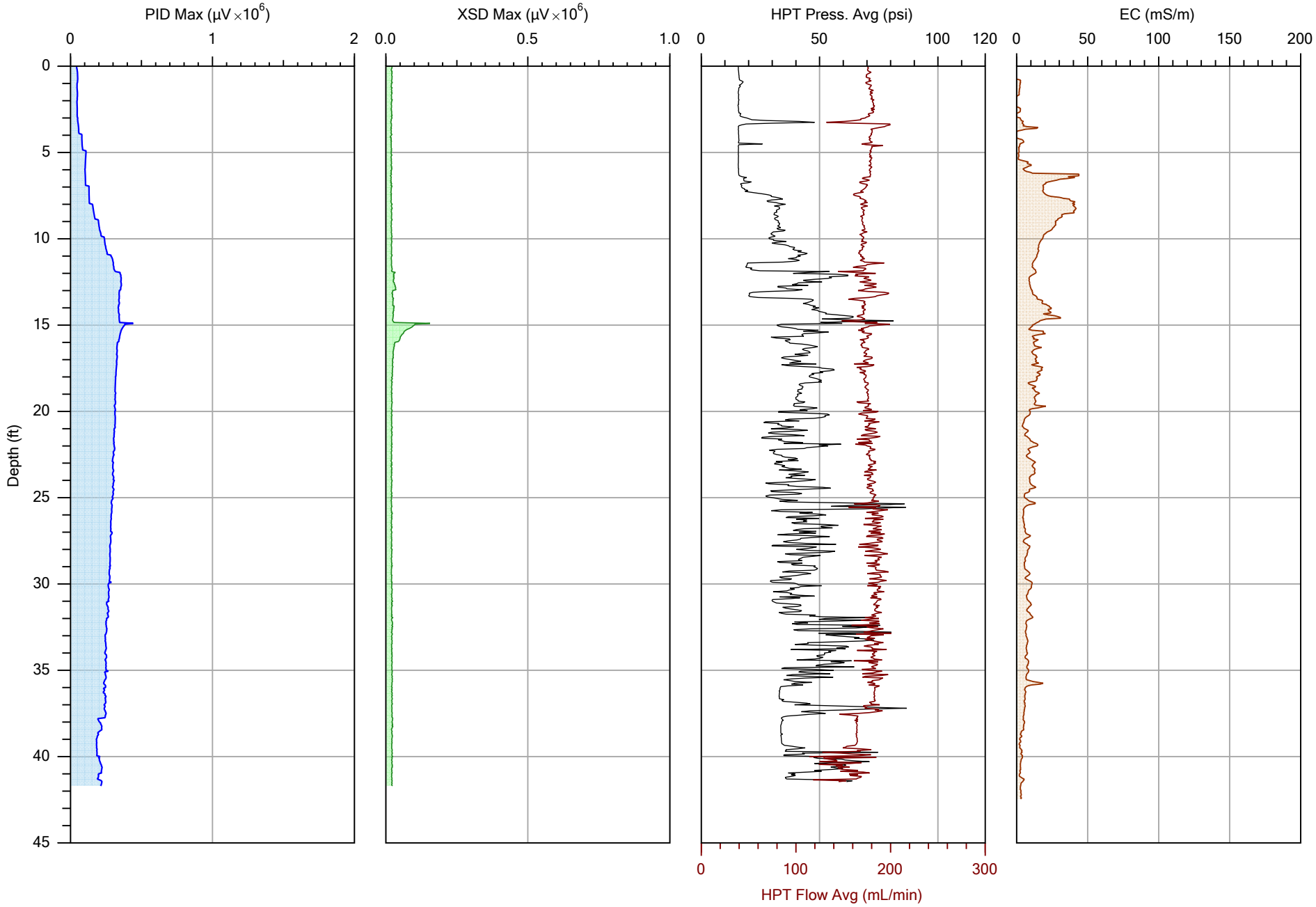
COLUMBIA TECHNOLOGIES

		File: MIP-027.MHP
Company: COLUMBIA Technologies	Operator: DJM	Date: 8/23/2016
Project ID: Keyport OU1 South Plantation	Client: AECOM	Location:



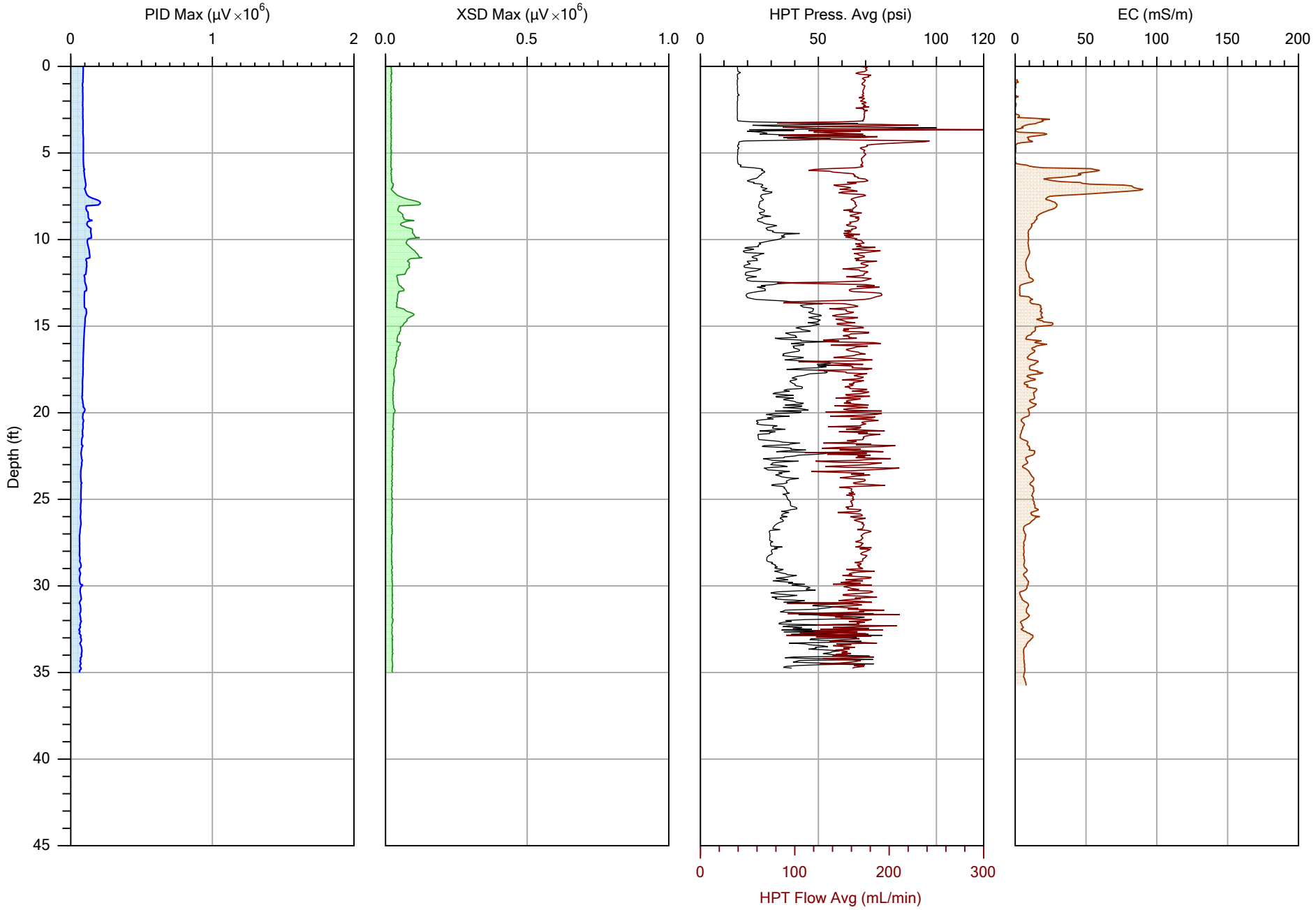
COLUMBIA TECHNOLOGIES

		File: MIP-028.MHP
Company: COLUMBIA Technologies	Operator: DJM	Date: 8/23/2016
Project ID: Keyport OU1 South Plantation	Client: AECOM	Location:



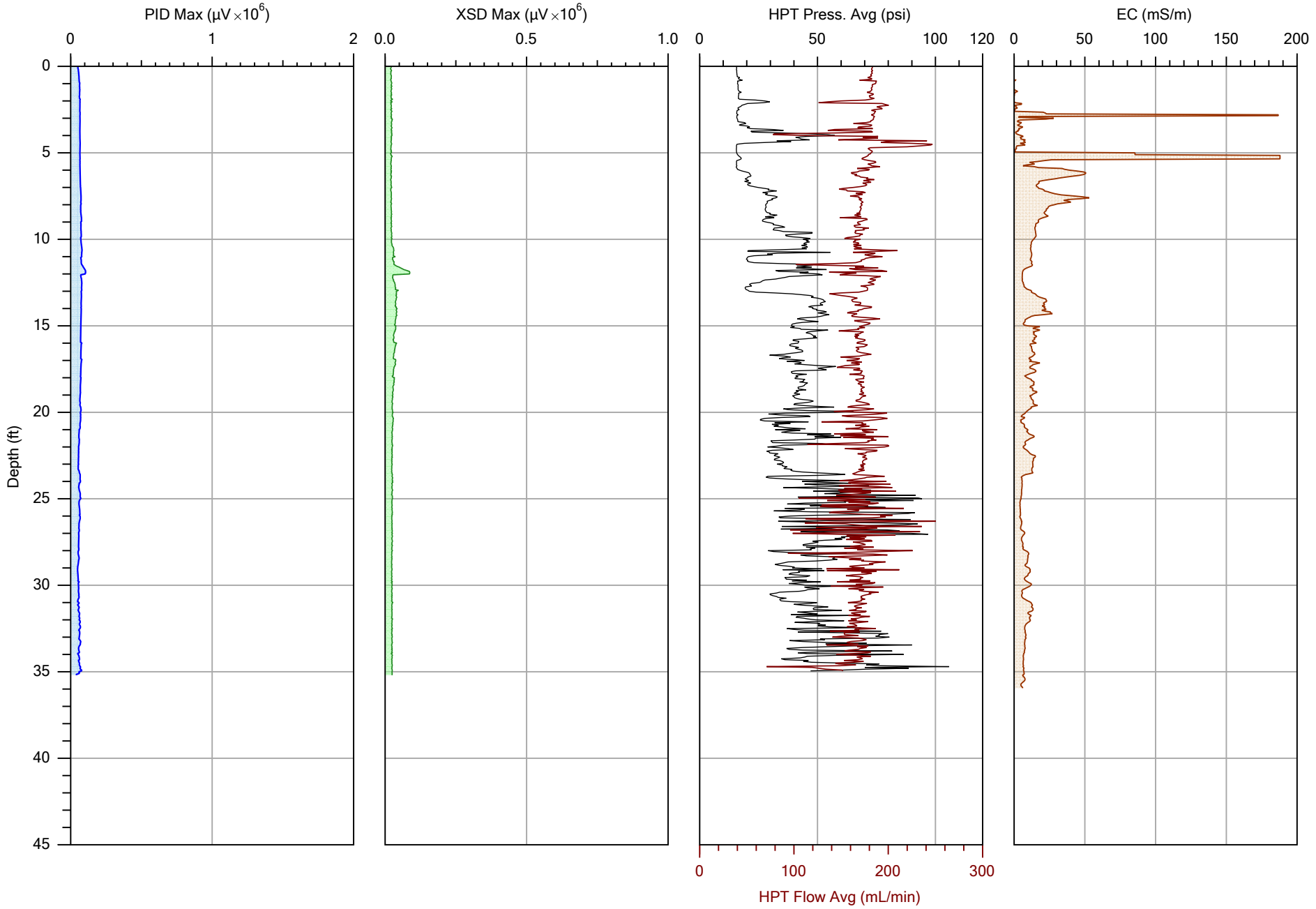
COLUMBIA TECHNOLOGIES

		File: MIP-029.MHP
Company: COLUMBIA Technologies	Operator: DJM	Date: 8/23/2016
Project ID: Keyport OU1 South Plantation	Client: AECOM	Location:



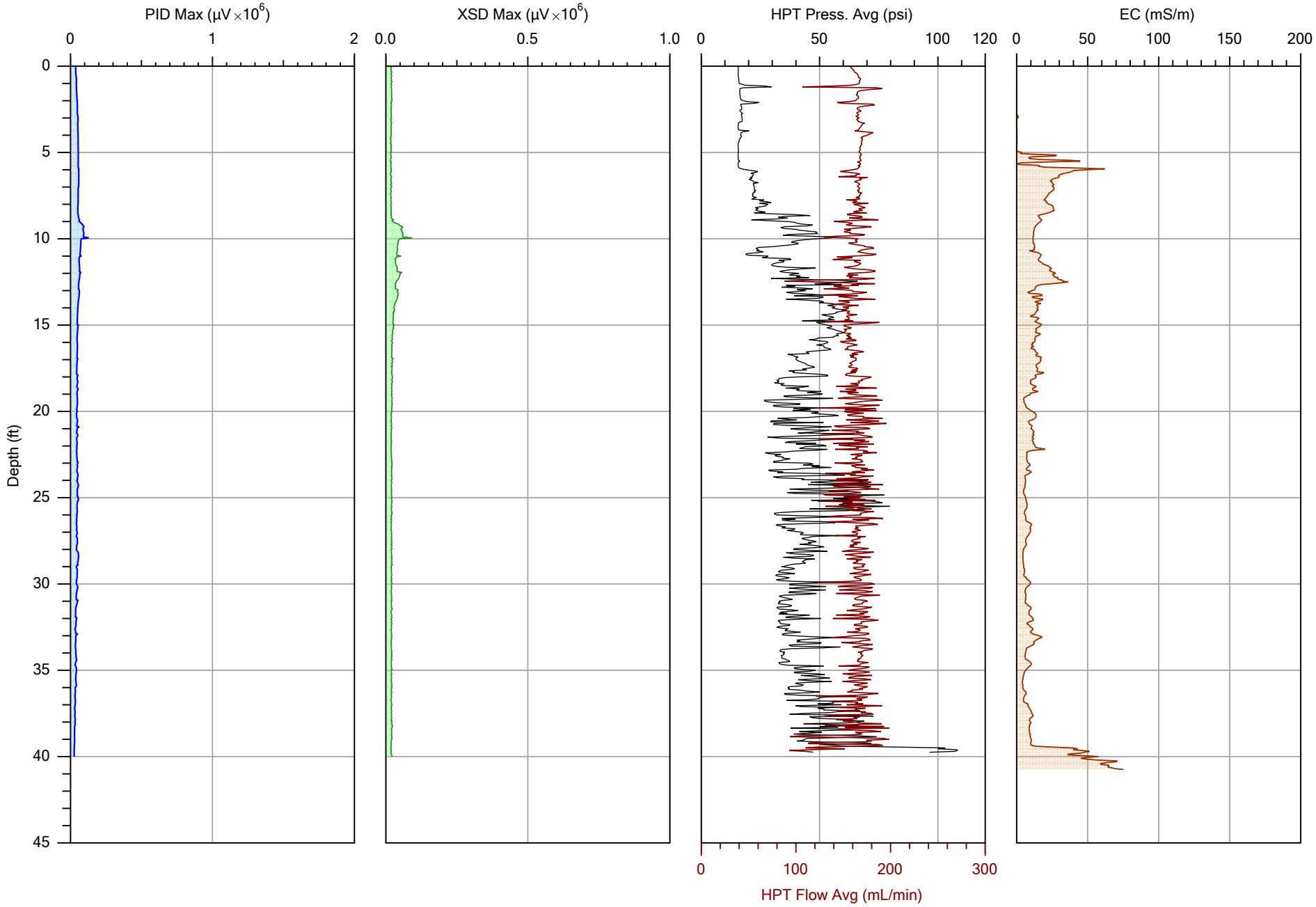
COLUMBIA TECHNOLOGIES

		File: MIP-030.MHP
Company: COLUMBIA Technologies	Operator: DJM	Date: 8/23/2016
Project ID: Keyport OU1 South Plantation	Client: AECOM	Location:



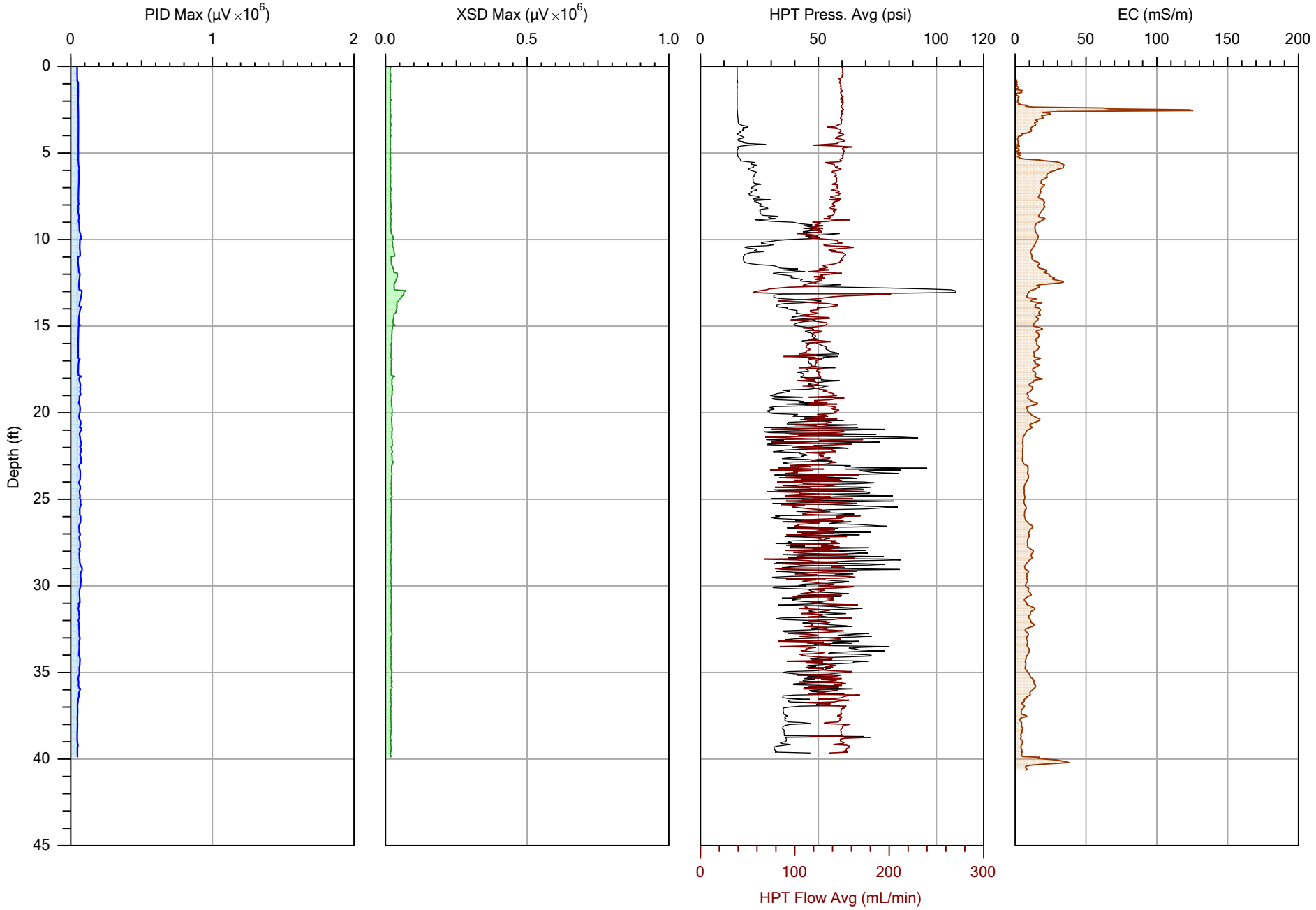
COLUMBIA TECHNOLOGIES

		File: MIP-031.MHP
Company: COLUMBIA Technologies	Operator: DJM	Date: 8/23/2016
Project ID: Keyport OU1 South Plantation	Client: AECOM	Location:



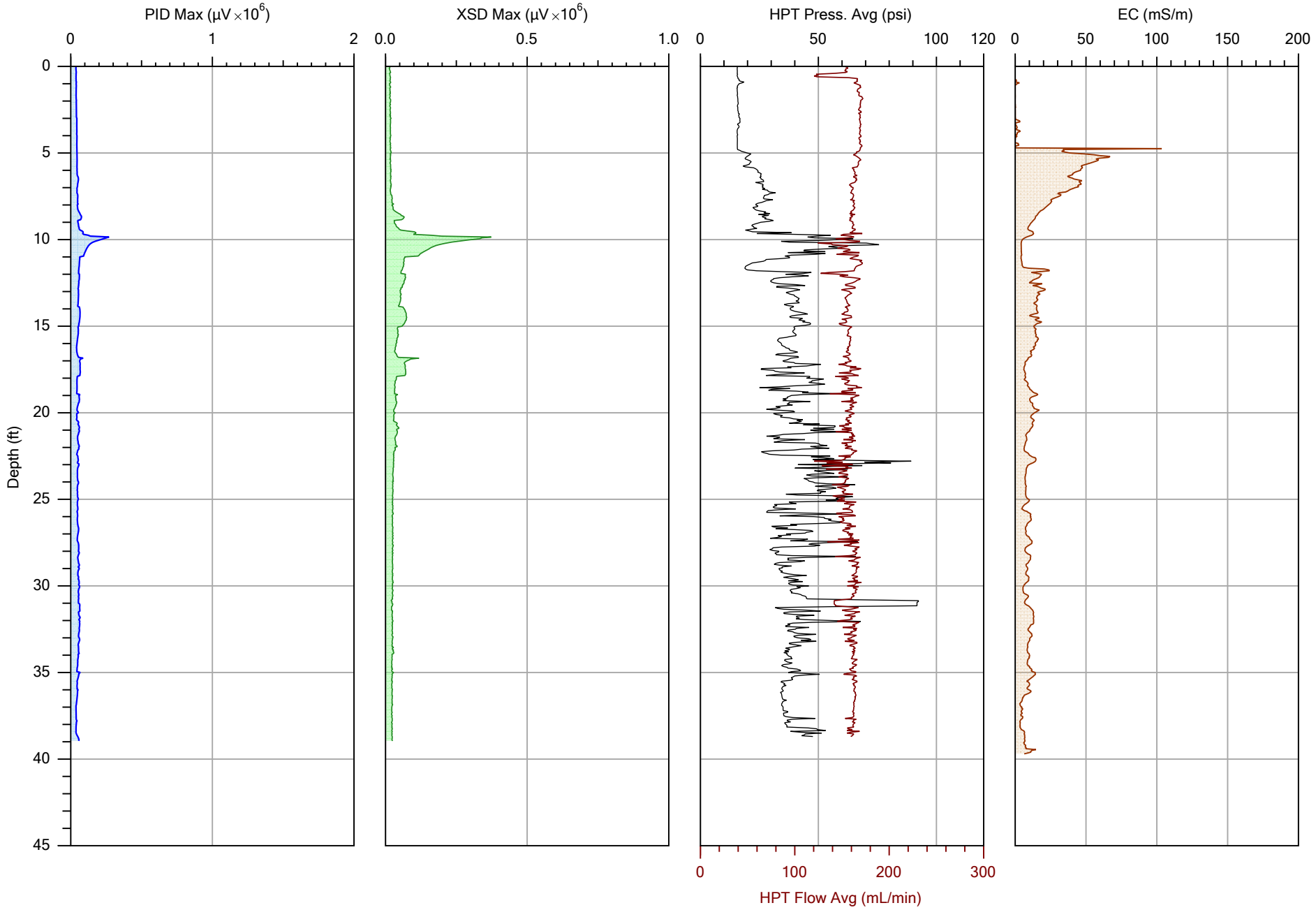
COLUMBIA TECHNOLOGIES

		File: MIP-032.MHP
Company: COLUMBIA Technologies	Operator: DJM	Date: 8/24/2016
Project ID: Keyport OU1 South Plantation	Client: AECOM	Location:



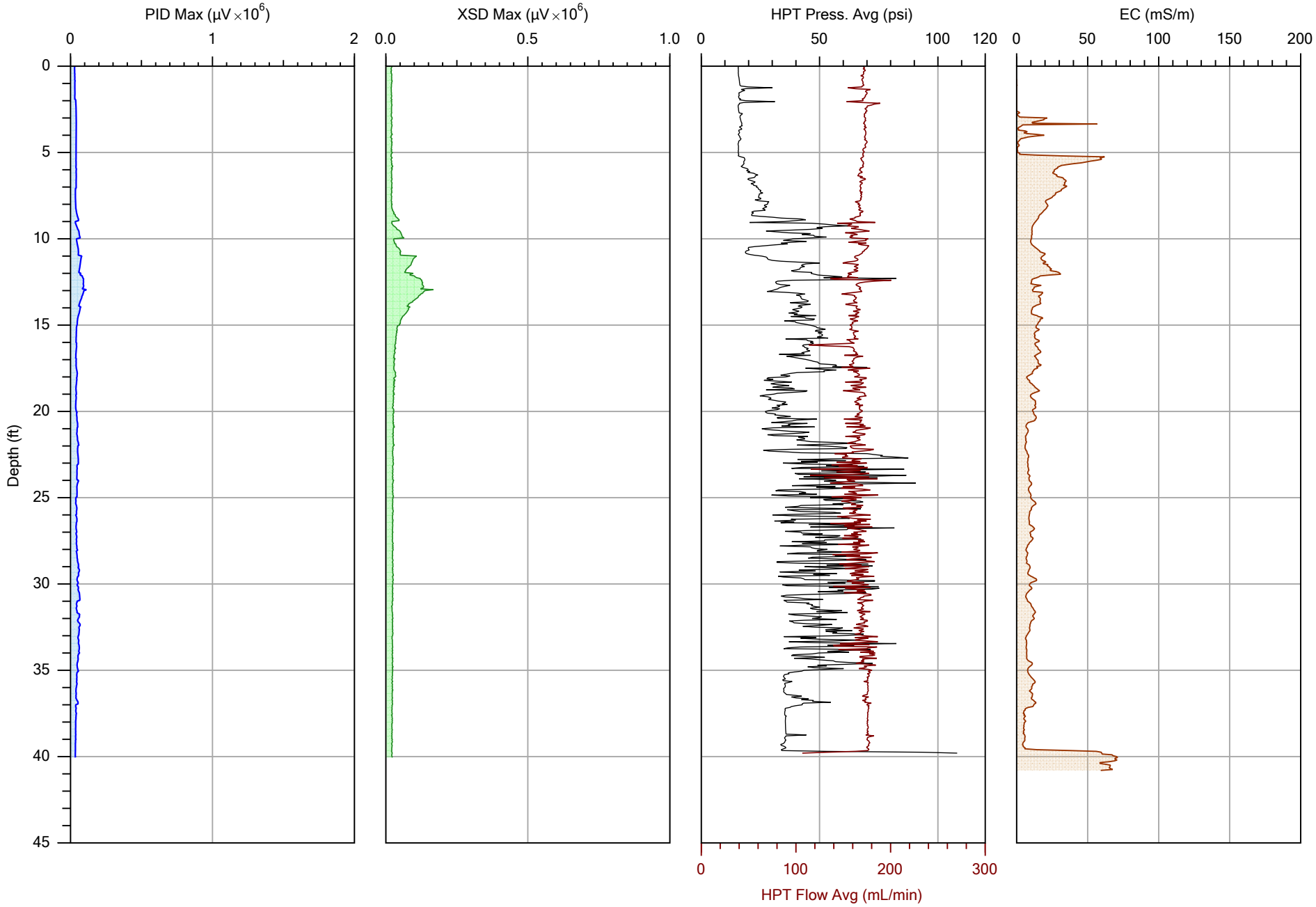
COLUMBIA TECHNOLOGIES

		File: MIP-033.MHP
Company: COLUMBIA Technologies	Operator: DJM	Date: 8/24/2016
Project ID: Keyport OU1 South Plantation	Client: AECOM	Location:



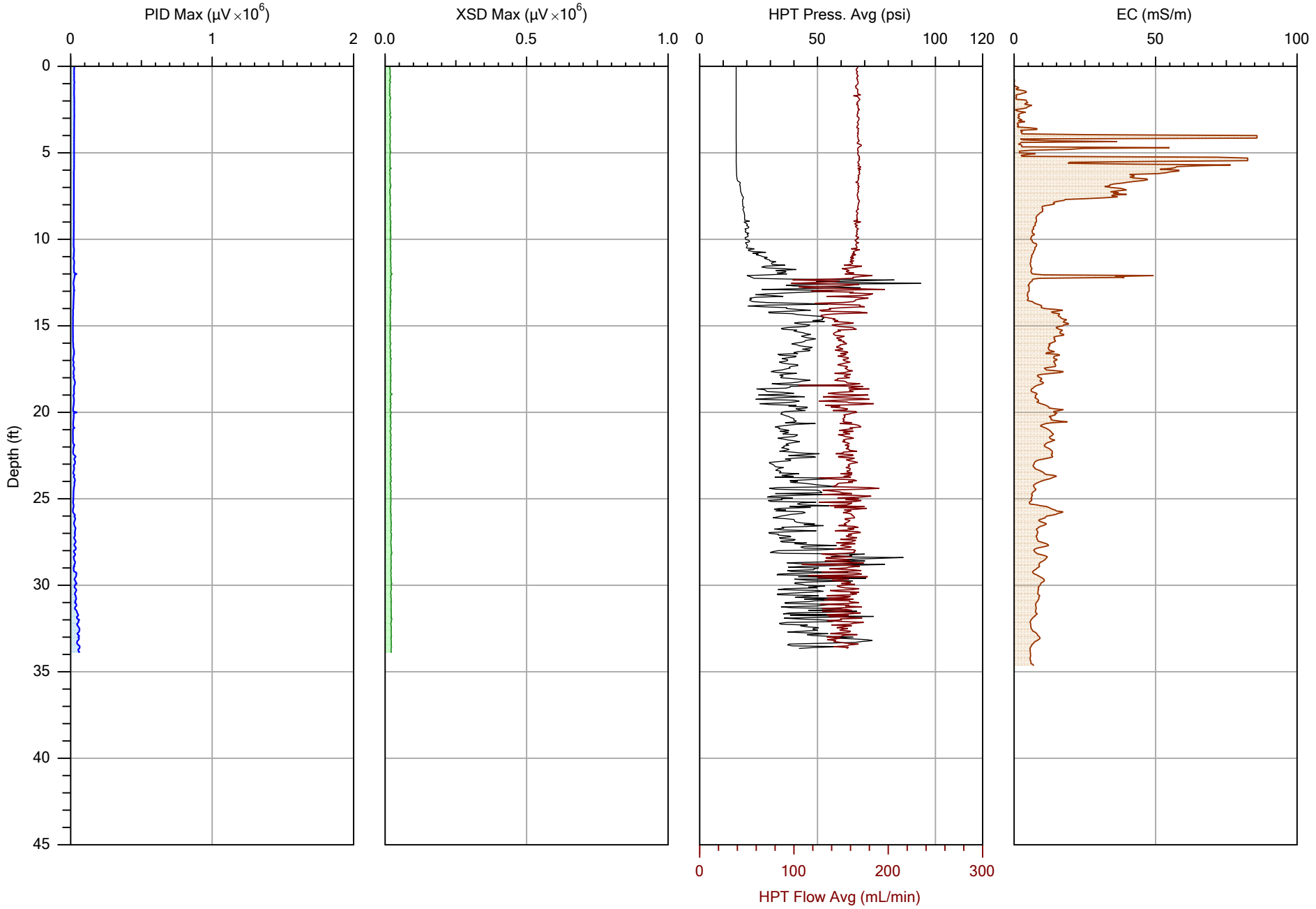
COLUMBIA TECHNOLOGIES

		File: MIP-034.MHP
Company: COLUMBIA Technologies	Operator: DJM	Date: 8/24/2016
Project ID: Keyport OU1 South Plantation	Client: AECOM	Location:



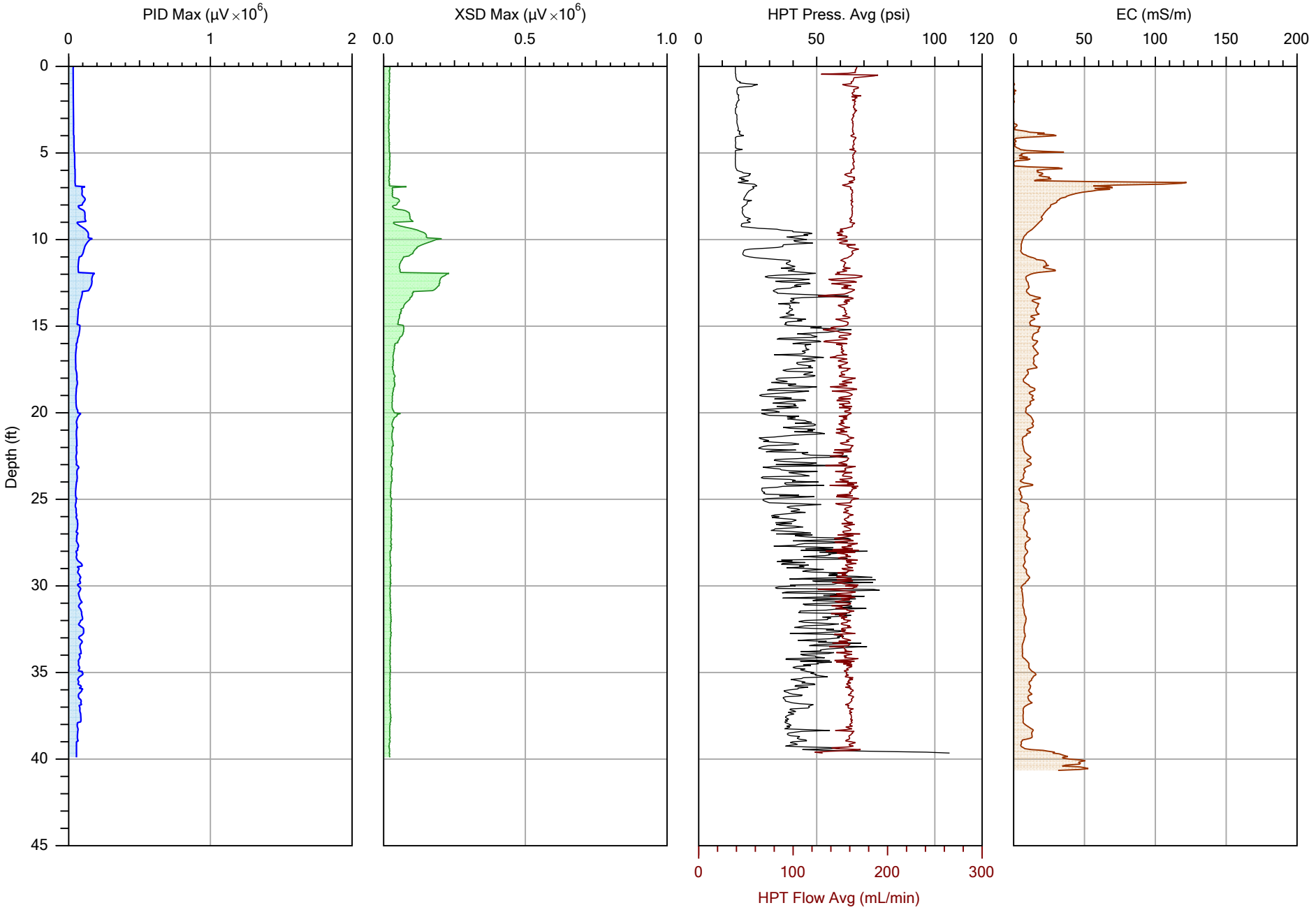
COLUMBIA TECHNOLOGIES

		File: MIP-035.MHP
Company: COLUMBIA Technologies	Operator: DJM	Date: 8/24/2016
Project ID: Keyport OU1 South Plantation	Client: AECOM	Location:



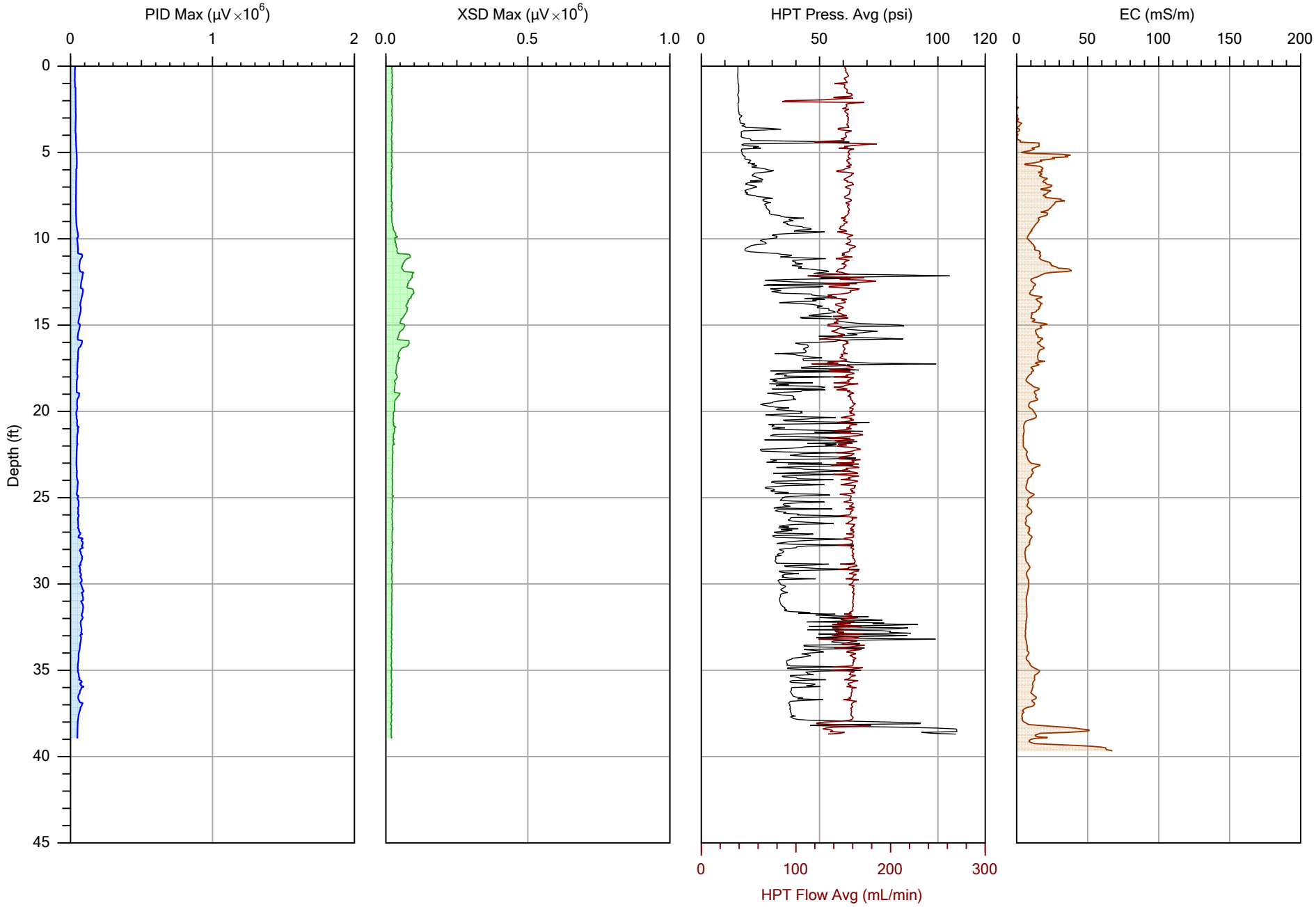
COLUMBIA TECHNOLOGIES

		File: MIP-036.MHP
Company: COLUMBIA Technologies	Operator: DJM	Date: 8/25/2016
Project ID: Keyport OU1 South Plantation	Client: AECOM	Location:



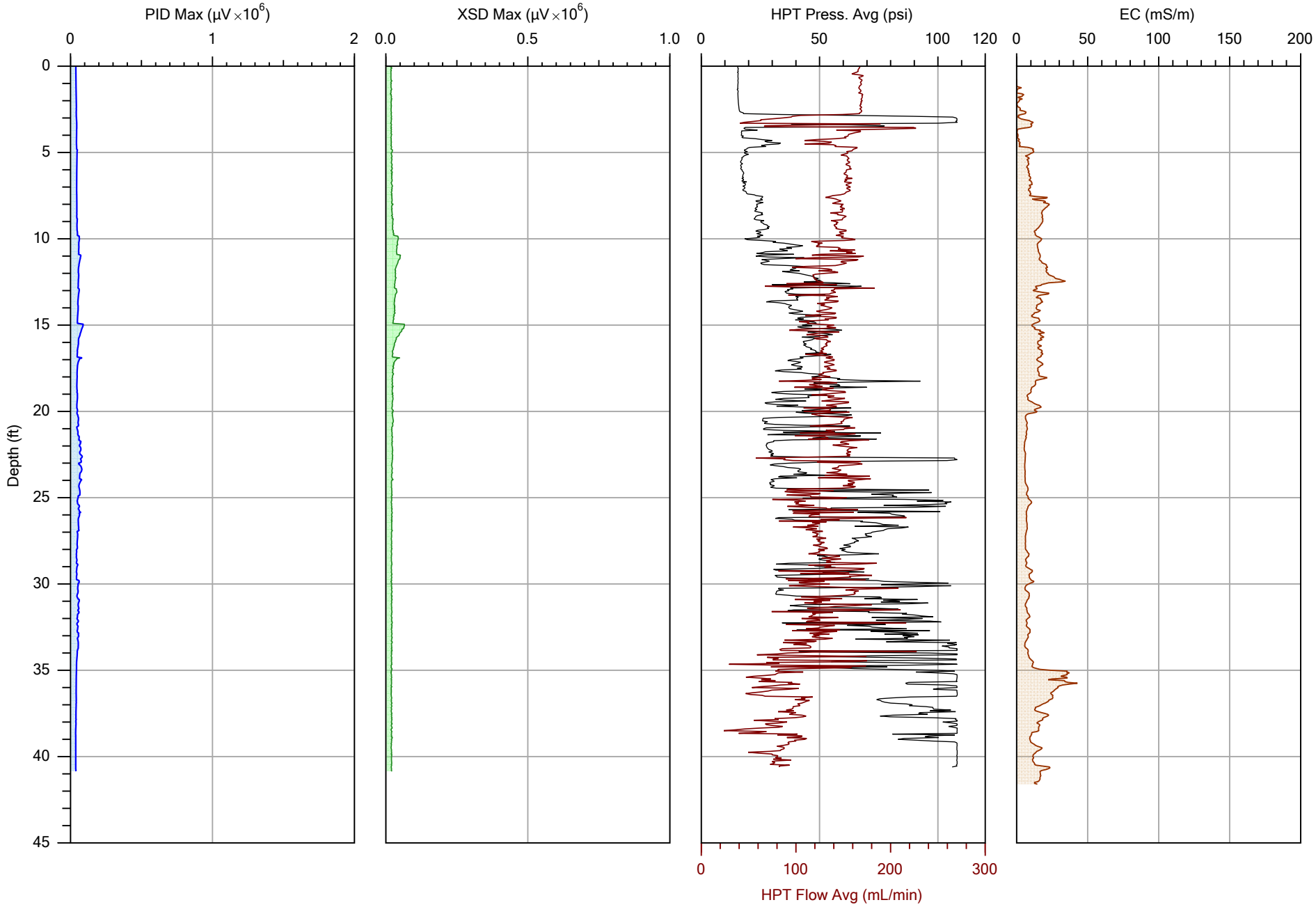
COLUMBIA TECHNOLOGIES

		File: MIP-037.MHP
Company: COLUMBIA Technologies	Operator: DJM	Date: 8/25/2016
Project ID: Keyport OU1 South Plantation	Client: AECOM	Location:



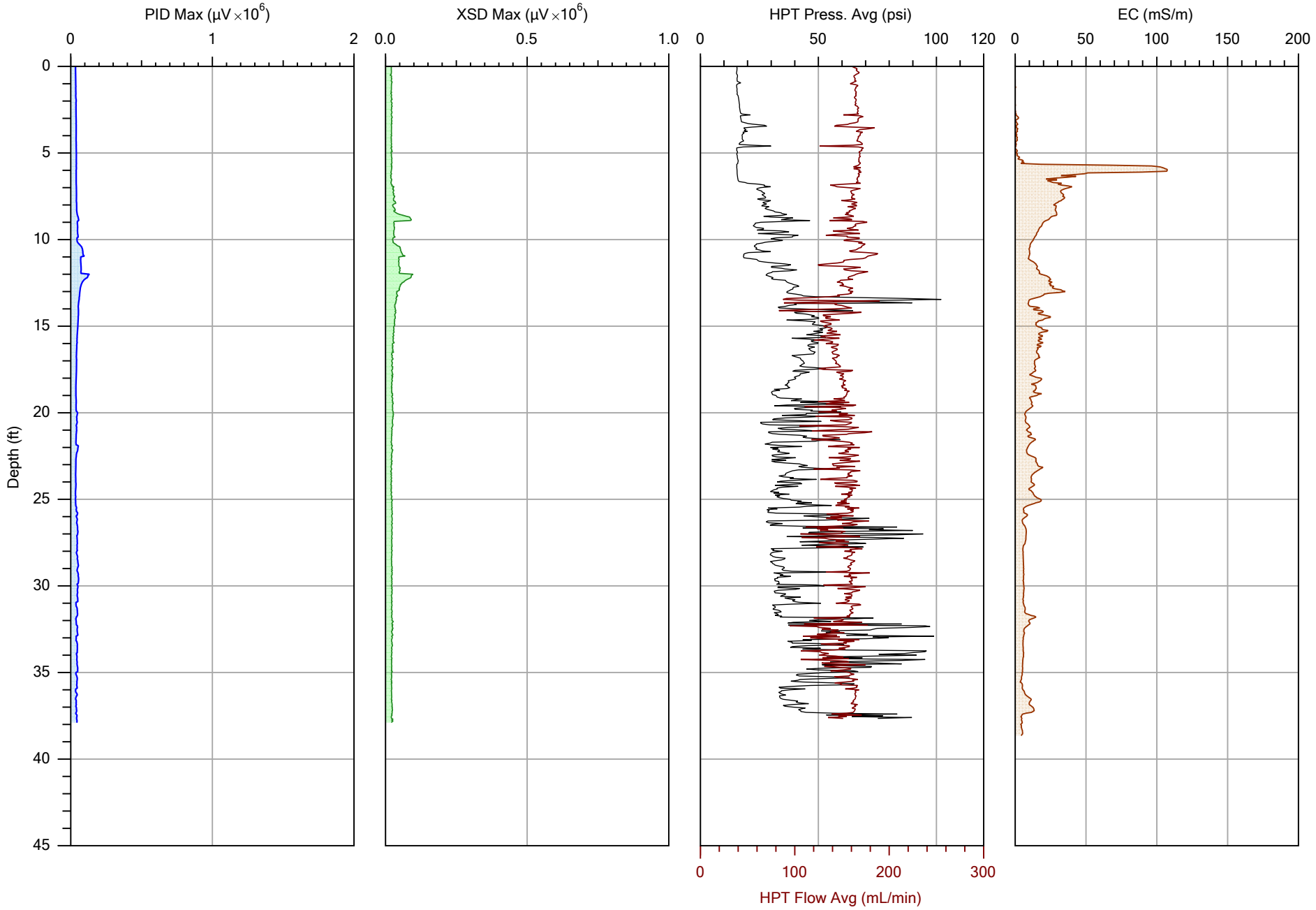
COLUMBIA TECHNOLOGIES

		File: MIP-038.MHP
Company: COLUMBIA Technologies	Operator: DJM	Date: 8/25/2016
Project ID: Keyport OU1 South Plantation	Client: AECOM	Location:



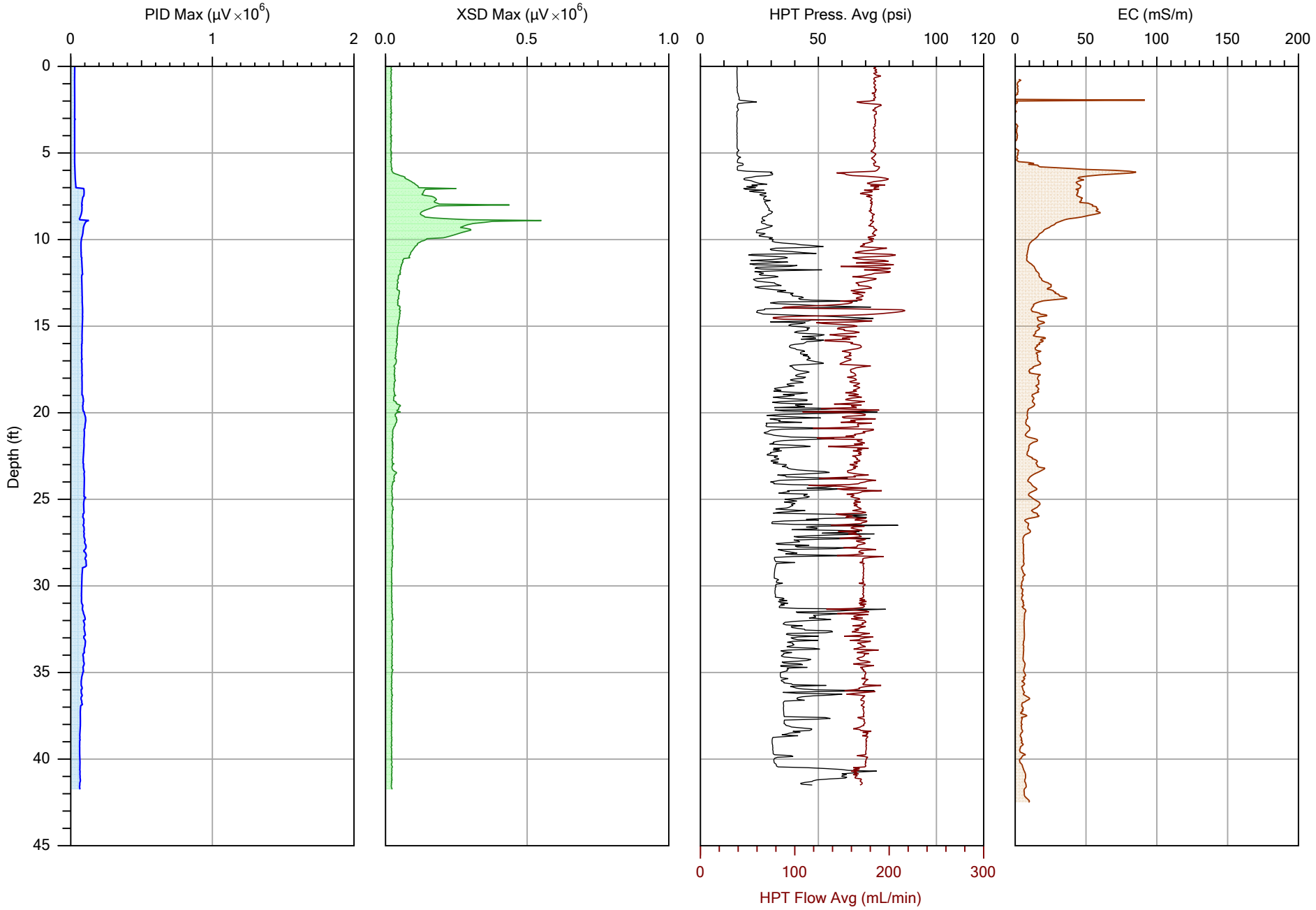
COLUMBIA TECHNOLOGIES

		File: MIP-039.MHP
Company: COLUMBIA Technologies	Operator: DJM	Date: 8/25/2016
Project ID: Keyport OU1 South Plantation	Client: AECOM	Location:



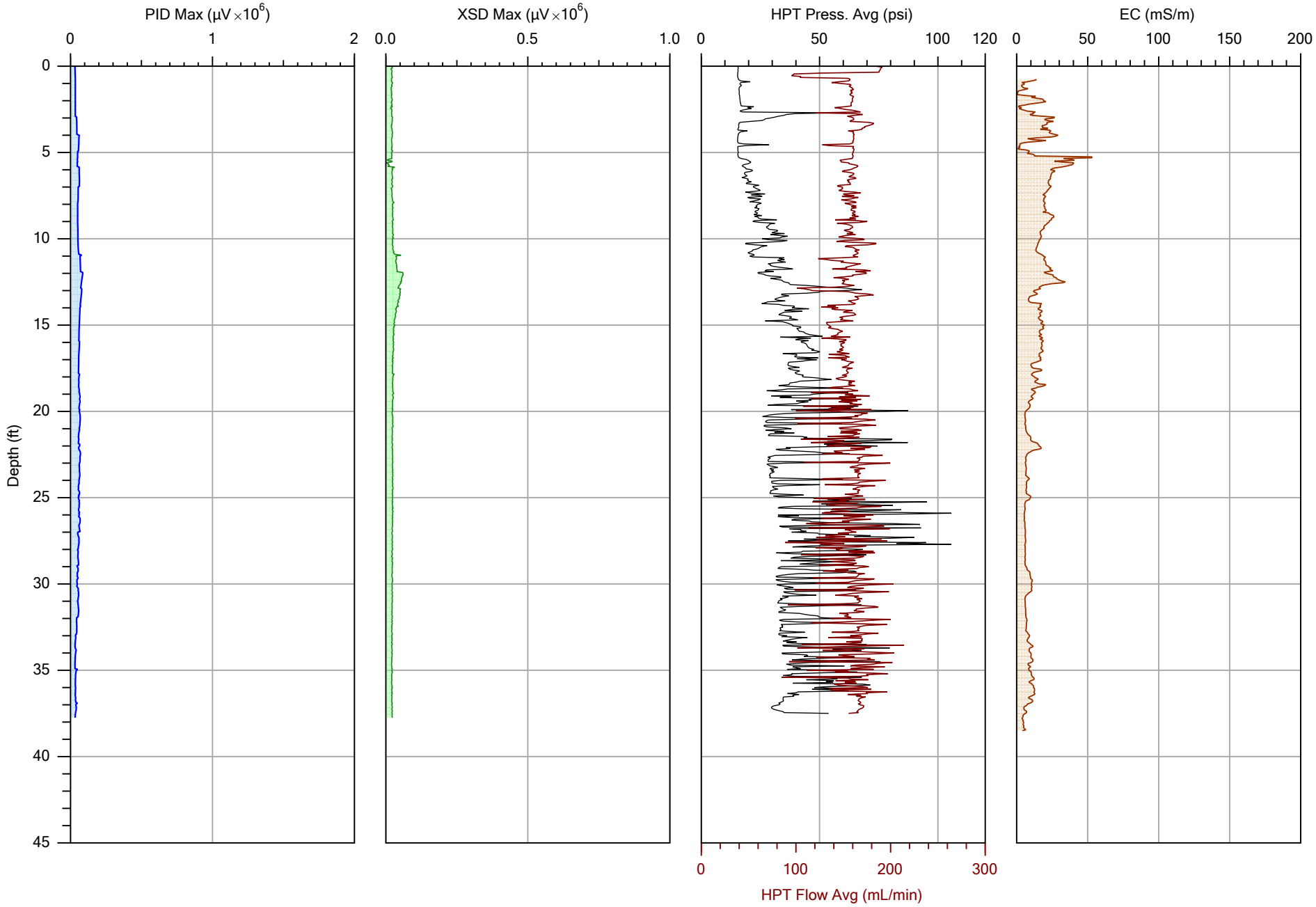
COLUMBIA TECHNOLOGIES

		File: MIP-040.MHP
Company: COLUMBIA Technologies	Operator: DJM	Date: 8/26/2016
Project ID: Keyport OU1 South Plantation	Client: AECOM	Location:



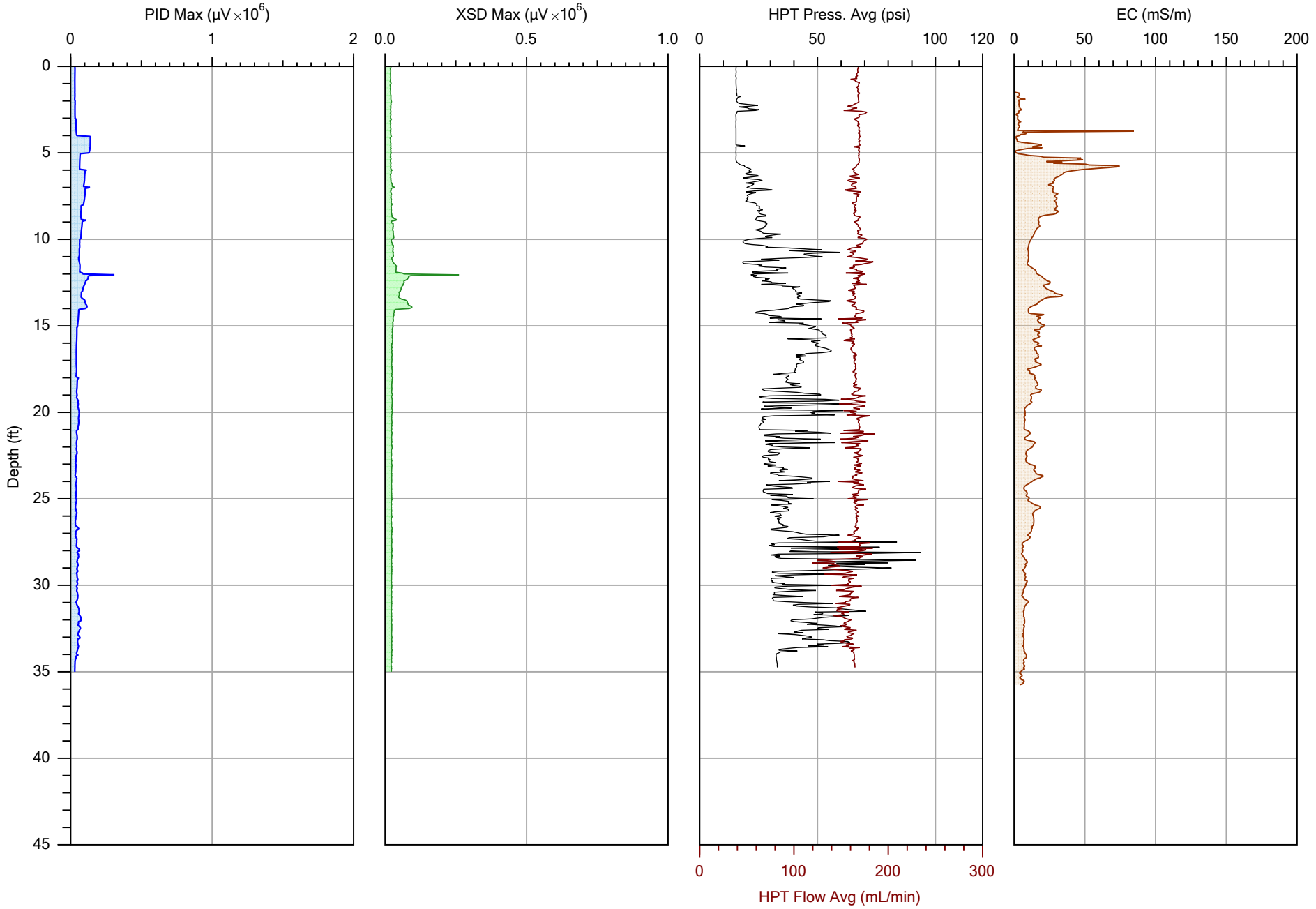
COLUMBIA TECHNOLOGIES

		File: MIP-041.MHP
Company: COLUMBIA Technologies	Operator: DJM	Date: 8/26/2016
Project ID: Keyport OU1 South Plantation	Client: AECOM	Location:



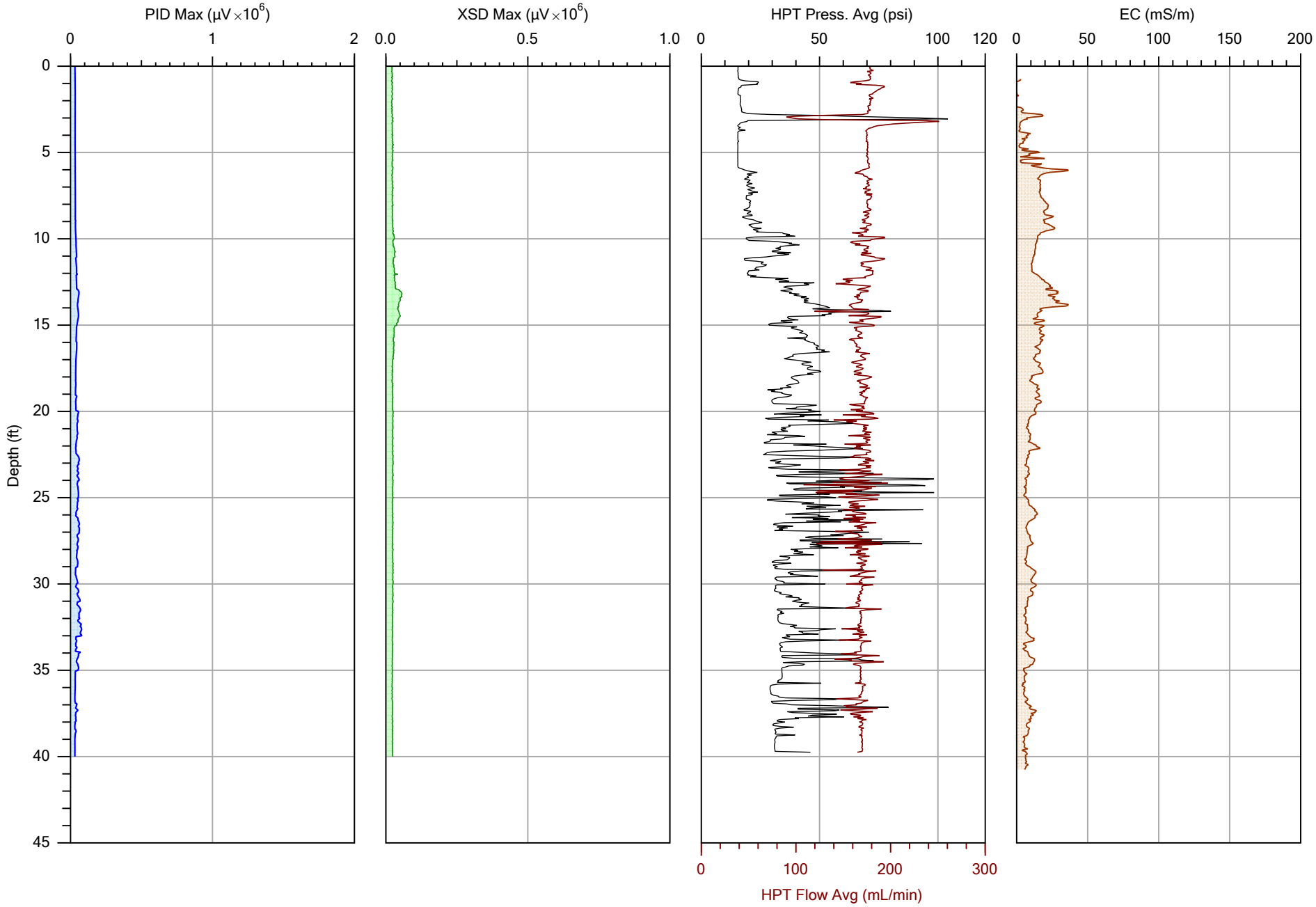
COLUMBIA TECHNOLOGIES

		File: MIP-042.MHP
Company: COLUMBIA Technologies	Operator: DJM	Date: 8/26/2016
Project ID: Keyport OU1 South Plantation	Client: AECOM	Location:



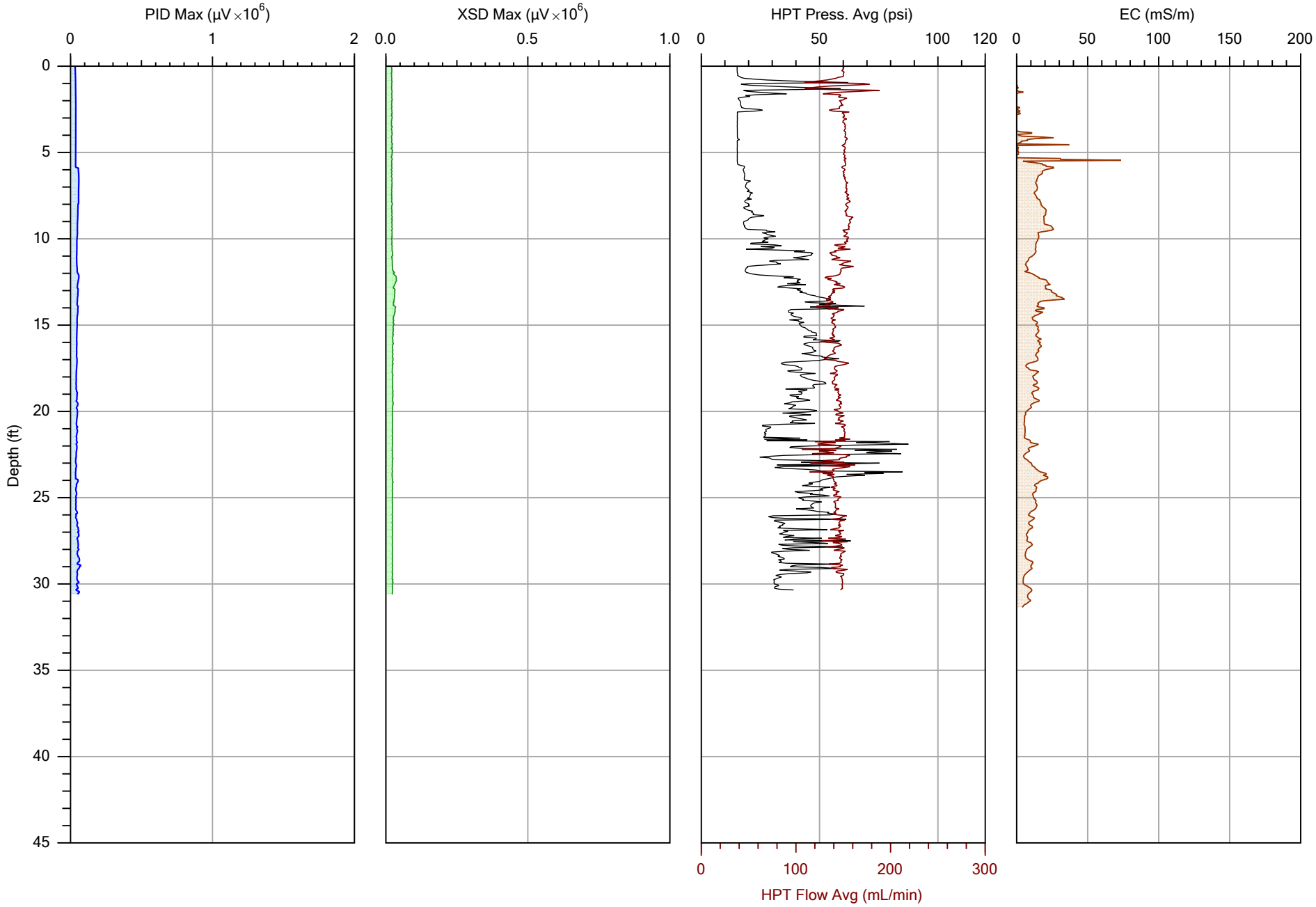
COLUMBIA TECHNOLOGIES

		File: MIP-043.MHP
Company: COLUMBIA Technologies	Operator: DJM	Date: 8/26/2016
Project ID: Keyport OU1 South Plantation	Client: AECOM	Location:



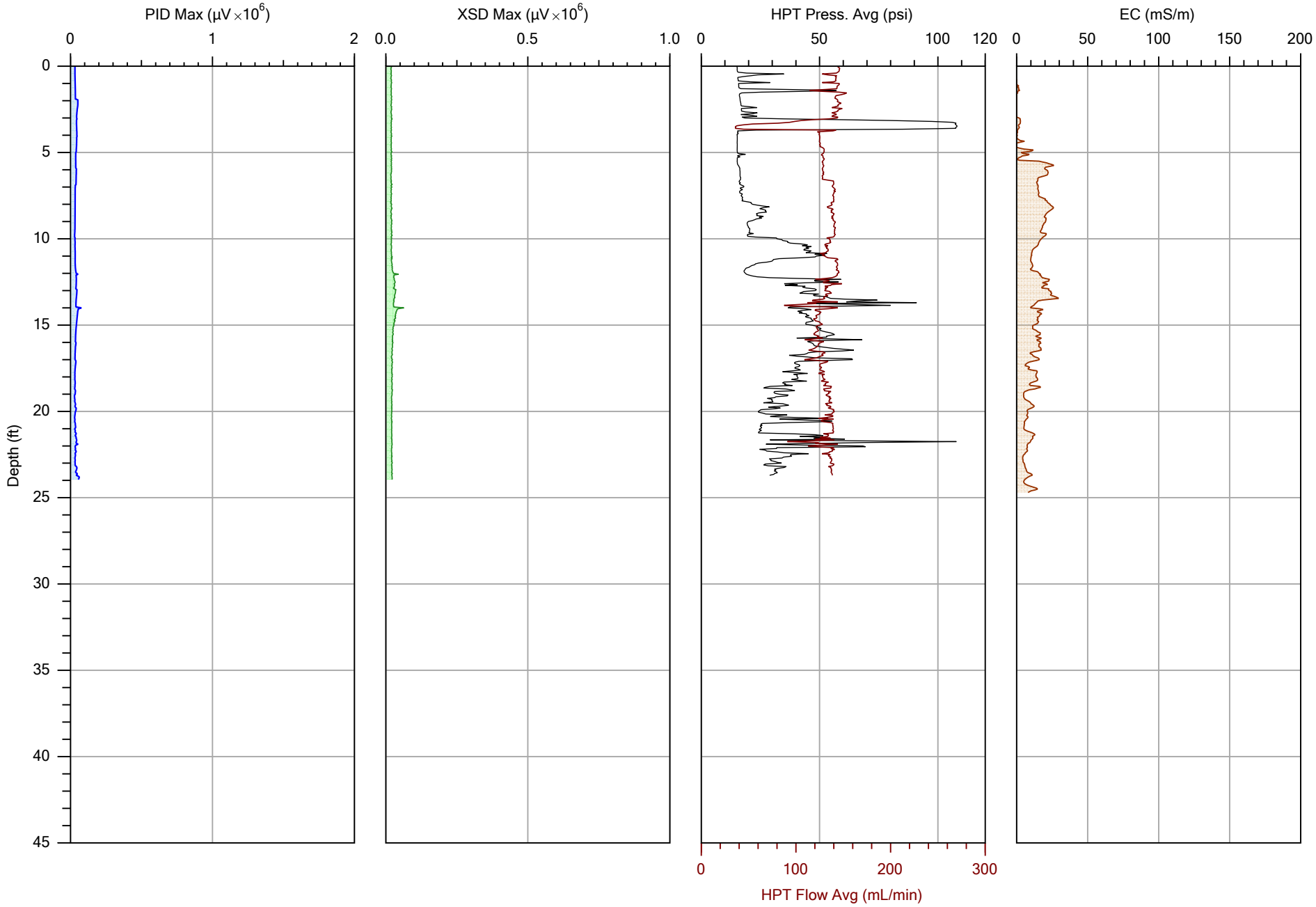
COLUMBIA TECHNOLOGIES

		File: MIP-044.MHP
Company: COLUMBIA Technologies	Operator: DJM	Date: 8/26/2016
Project ID: Keyport OU1 South Plantation	Client: AECOM	Location:



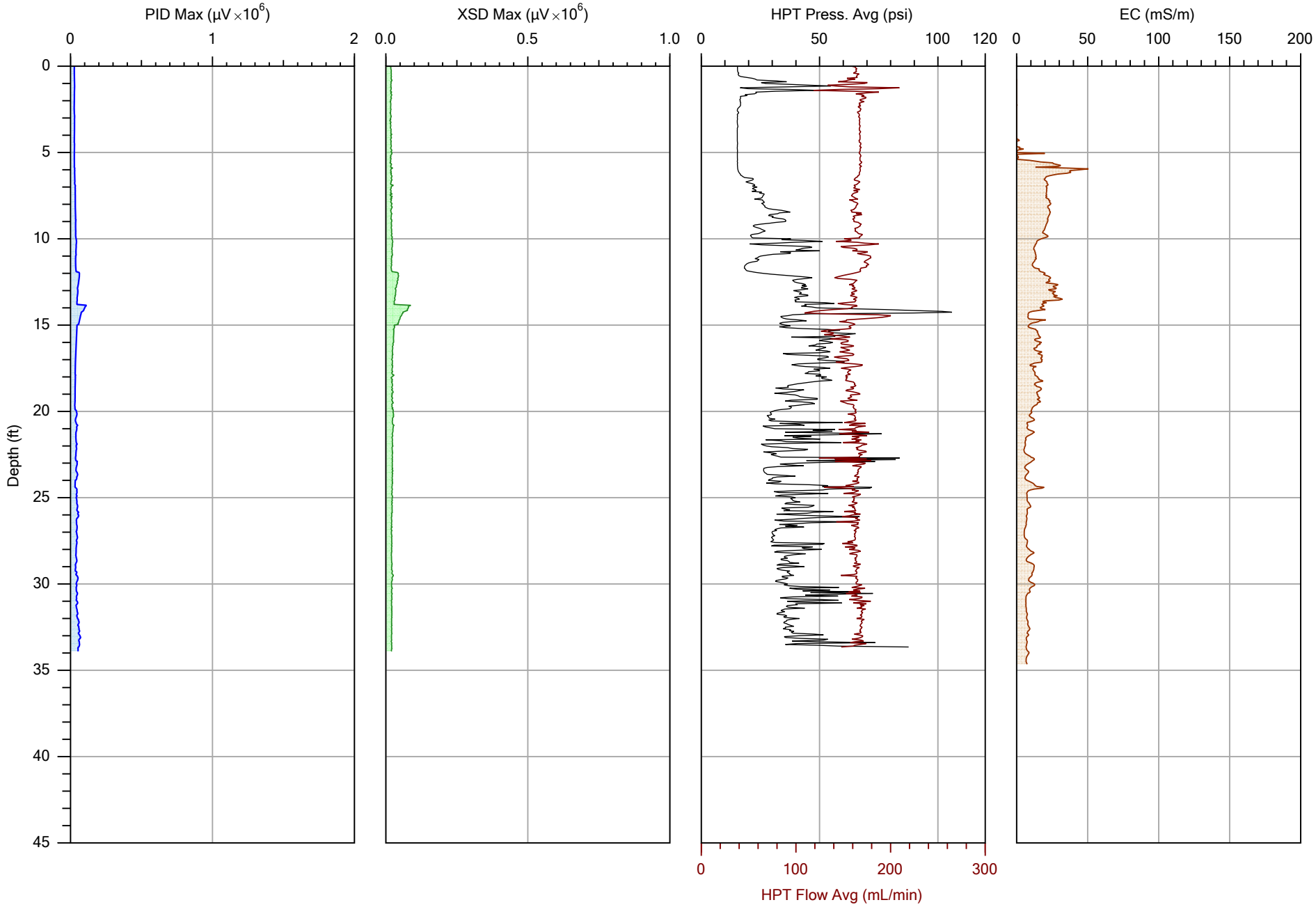
COLUMBIA TECHNOLOGIES

		File: MIP-045.MHP
Company: COLUMBIA Technologies	Operator: DJM	Date: 8/27/2016
Project ID: Keyport OU1 South Plantation	Client: AECOM	Location:



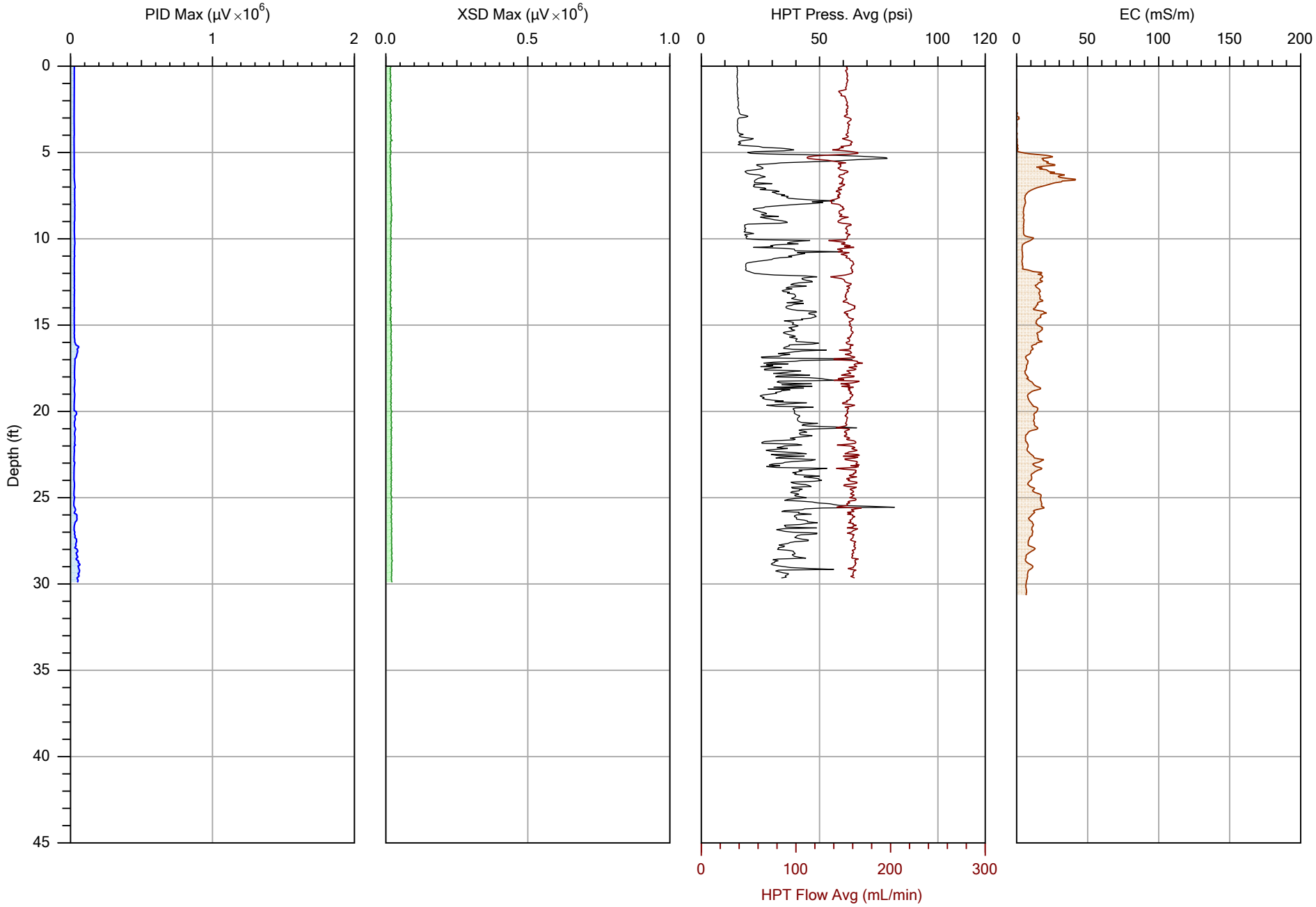
COLUMBIA TECHNOLOGIES

		File: MIP-046.MHP
Company: COLUMBIA Technologies	Operator: DJM	Date: 8/27/2016
Project ID: Keyport OU1 South Plantation	Client: AECOM	Location:



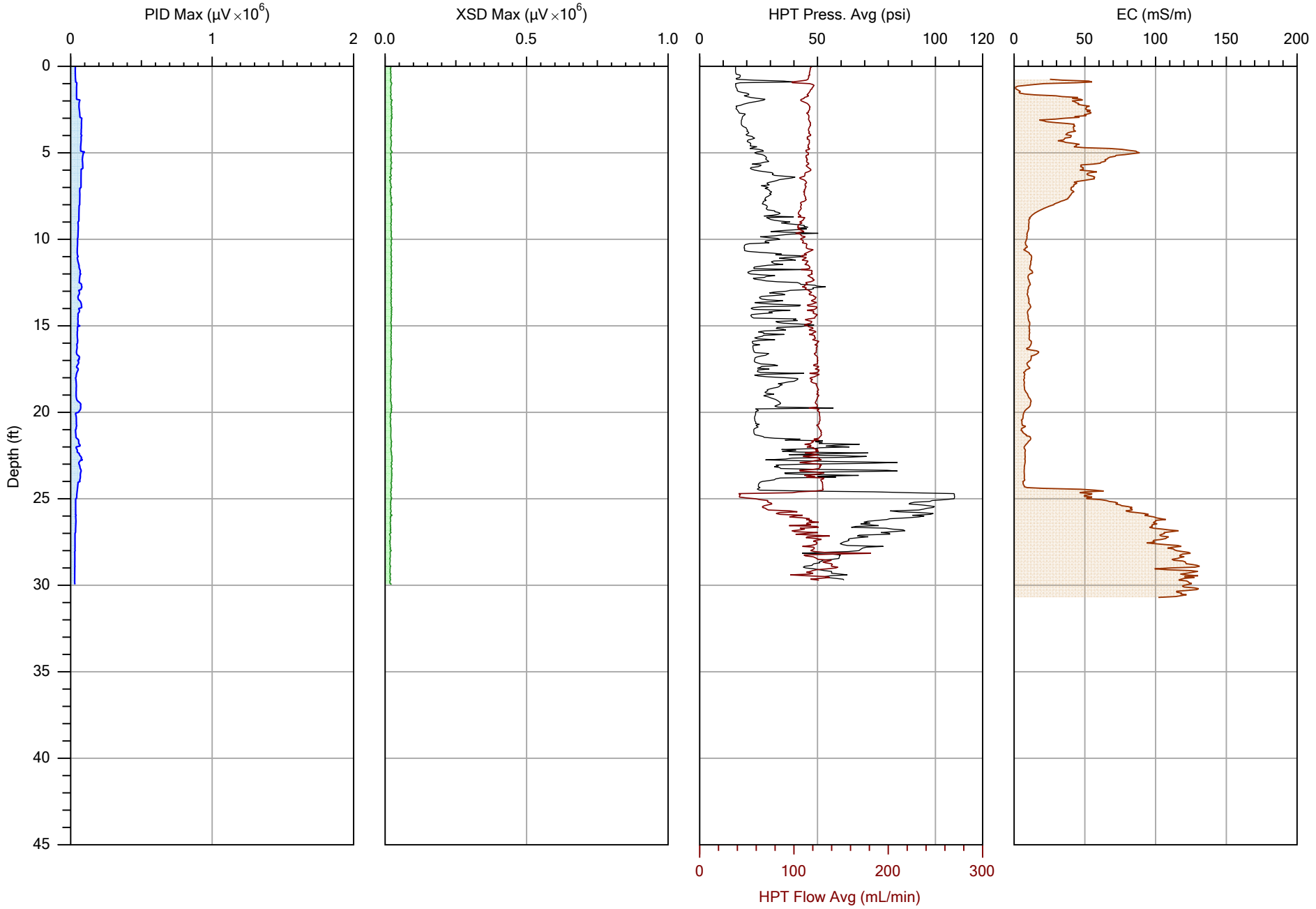
COLUMBIA TECHNOLOGIES

		File: MIP-047.MHP
Company: COLUMBIA Technologies	Operator: DJM	Date: 8/27/2016
Project ID: Keyport OU1 South Plantation	Client: AECOM	Location:



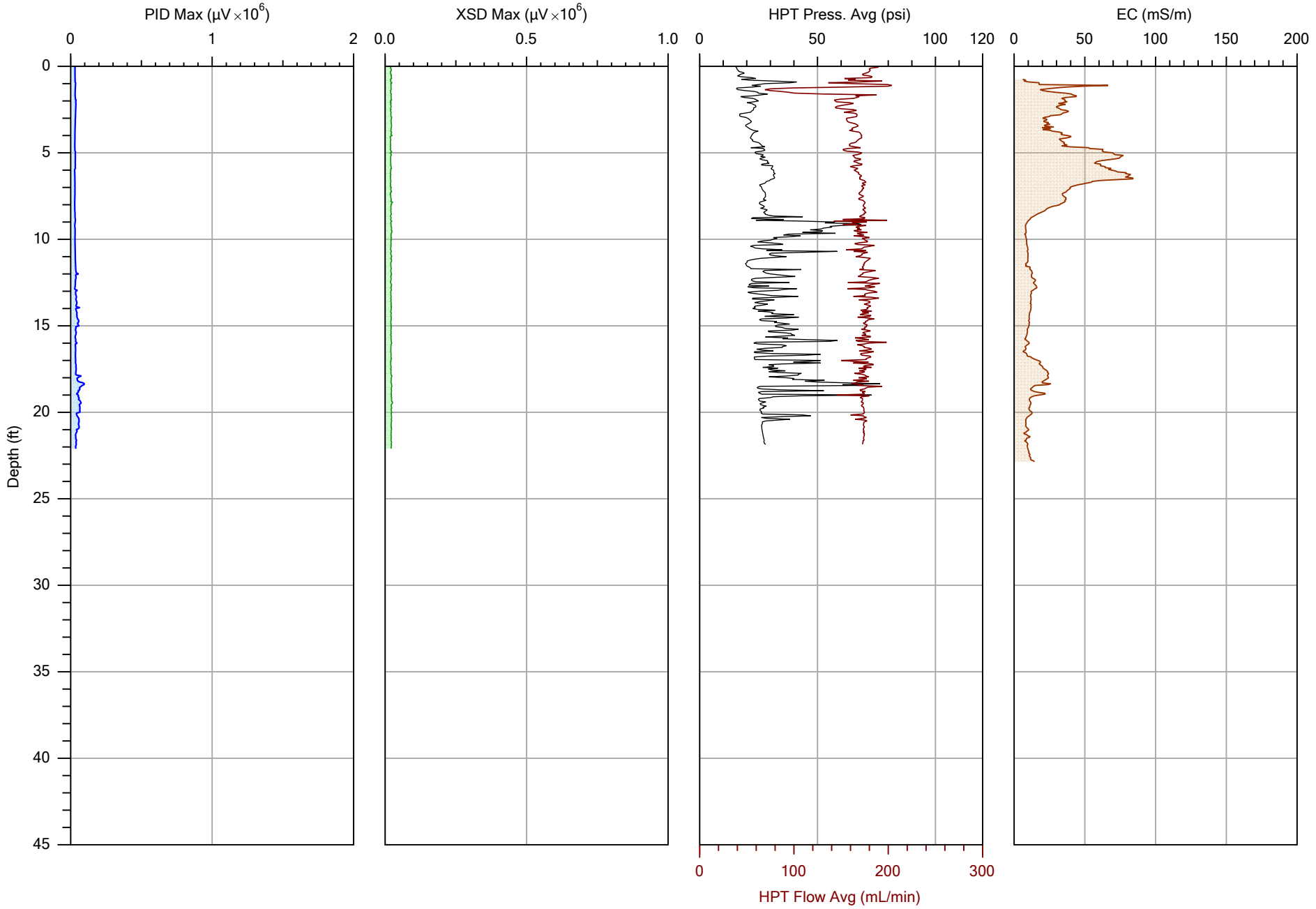
COLUMBIA TECHNOLOGIES

		File: MIP-048.MHP
Company: COLUMBIA Technologies	Operator: DJM	Date: 8/27/2016
Project ID: Keyport OU1 South Plantation	Client: AECOM	Location:



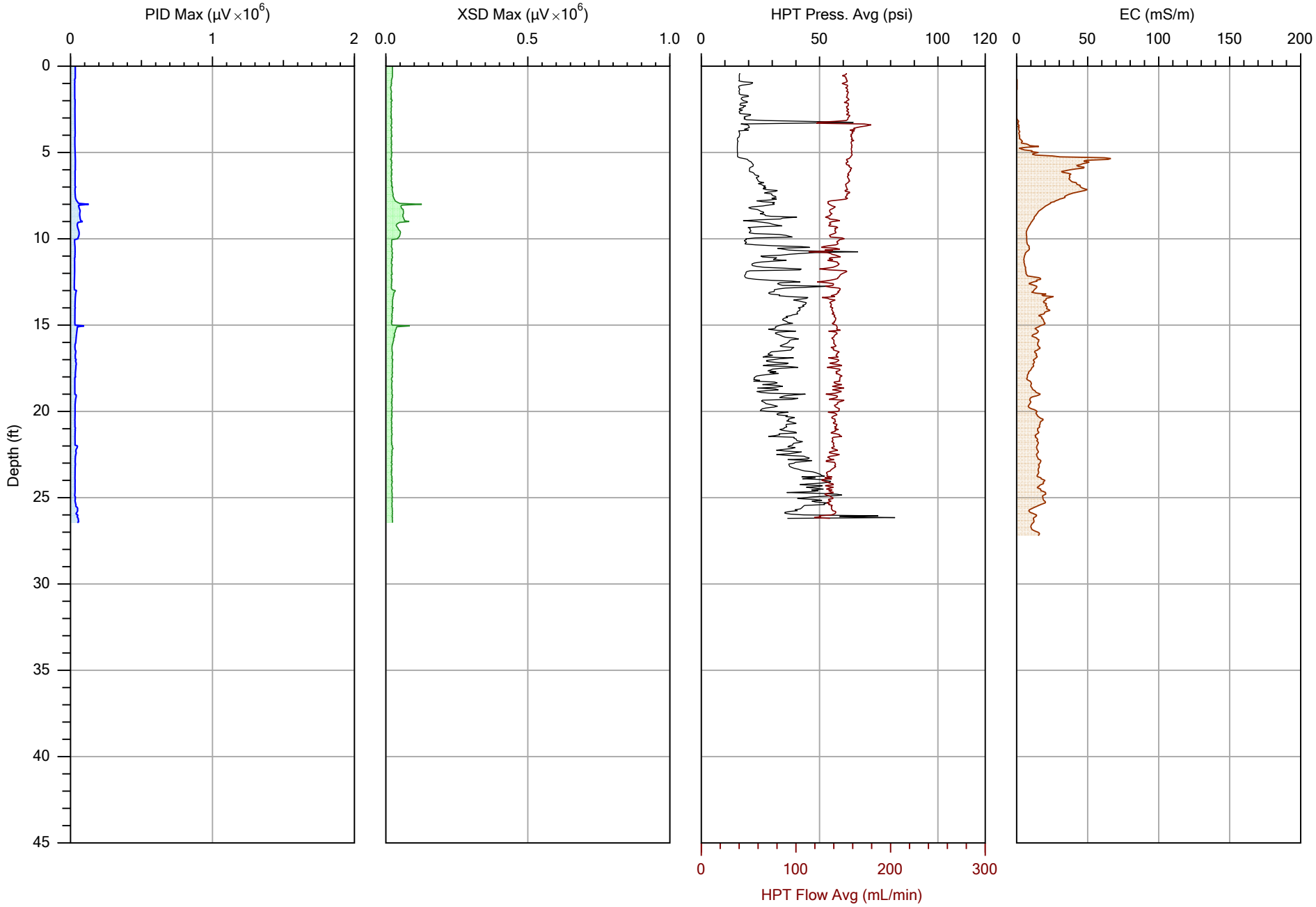
COLUMBIA TECHNOLOGIES

		File: MIP-049.MHP
Company: COLUMBIA Technologies	Operator: DJM	Date: 8/29/2016
Project ID: Keyport OU1 South Plantation	Client: AECOM	Location:



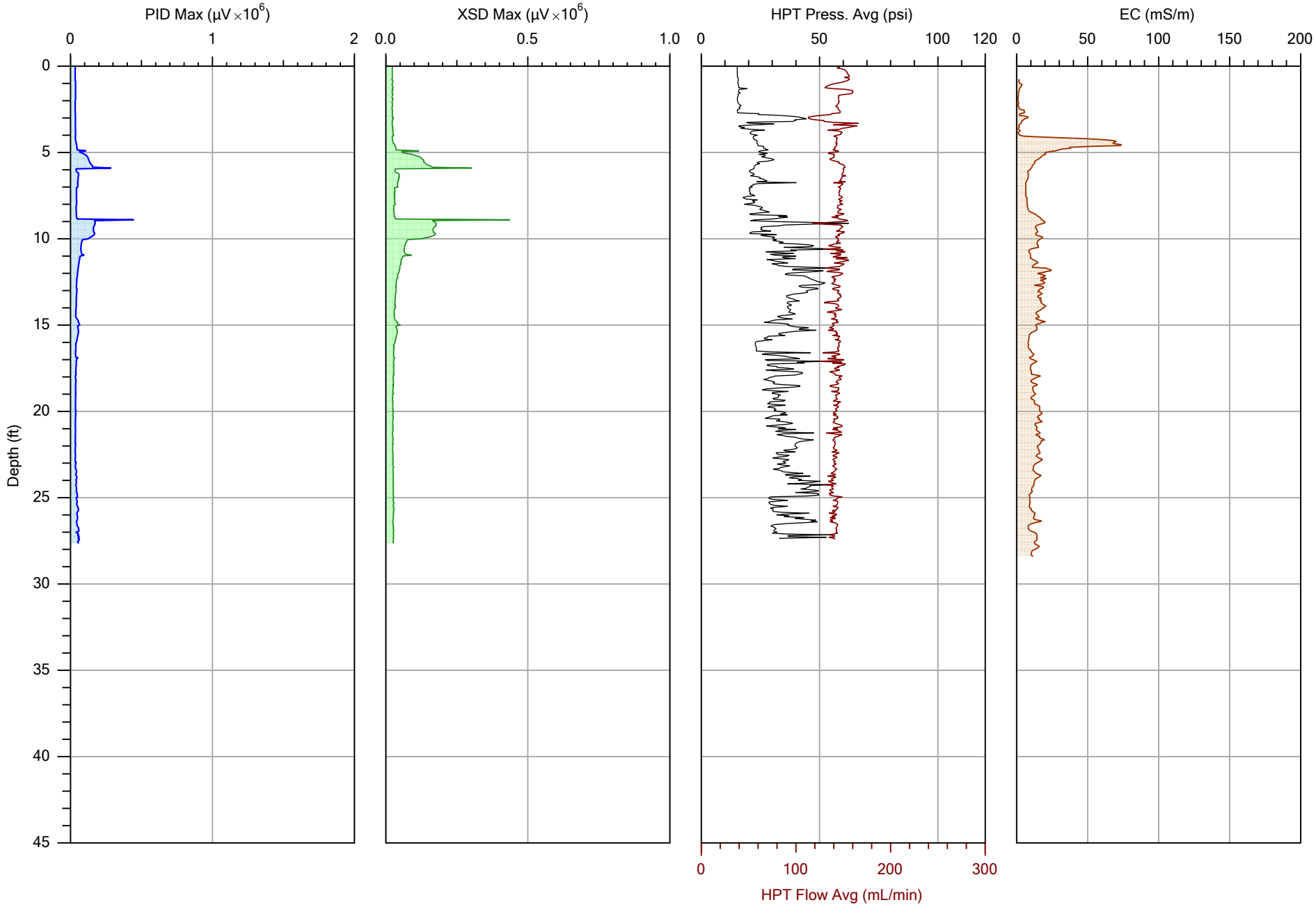
COLUMBIA TECHNOLOGIES

		File: MIP-050.MHP
Company: COLUMBIA Technologies	Operator: DJM	Date: 8/29/2016
Project ID: Keyport OU1 South Plantation	Client: AECOM	Location:



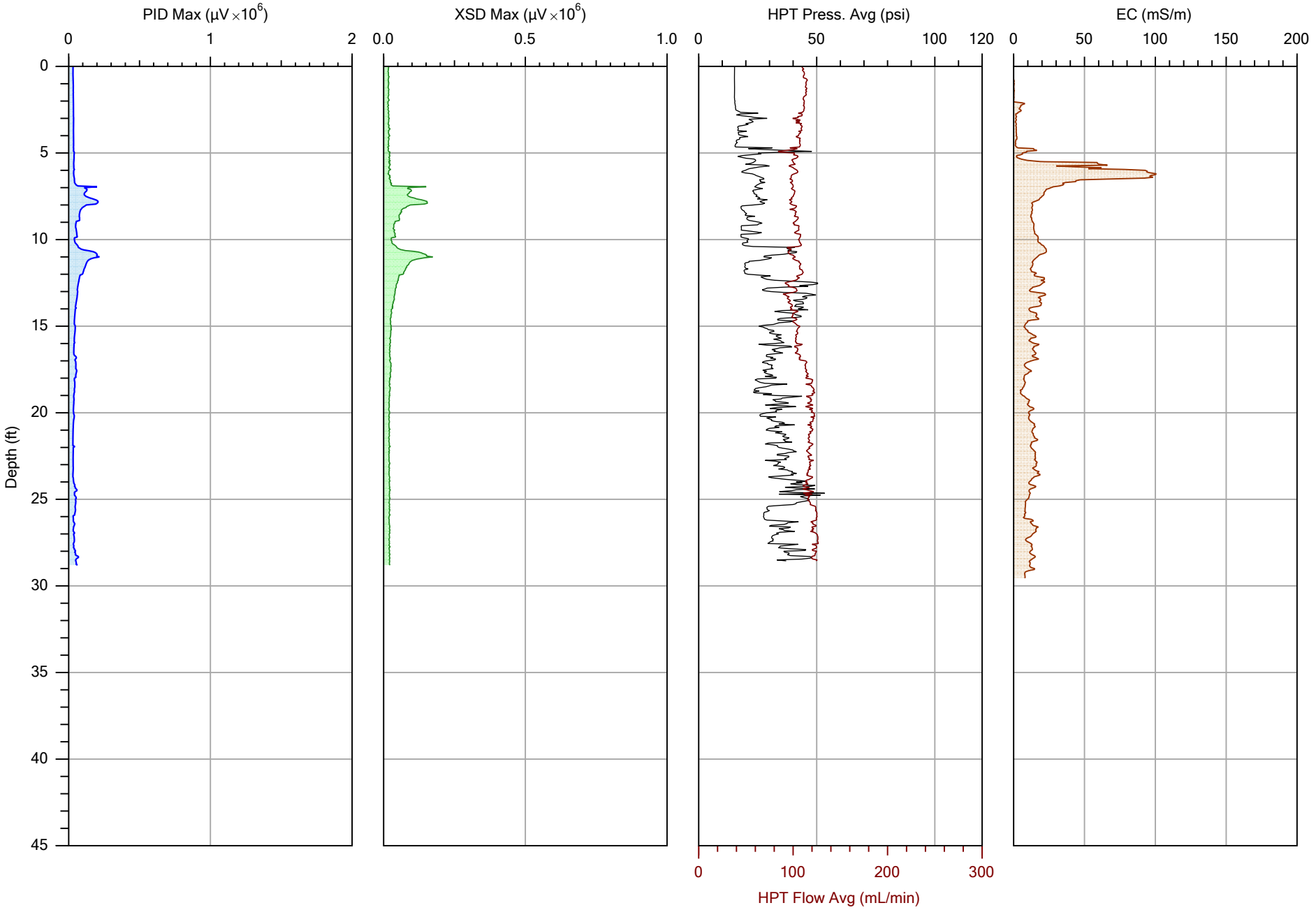
COLUMBIA TECHNOLOGIES

		File: MIP-051.MHP
Company: COLUMBIA Technologies	Operator: DJM	Date: 8/29/2016
Project ID: Keyport OU1 South Plantation	Client: AECOM	Location:



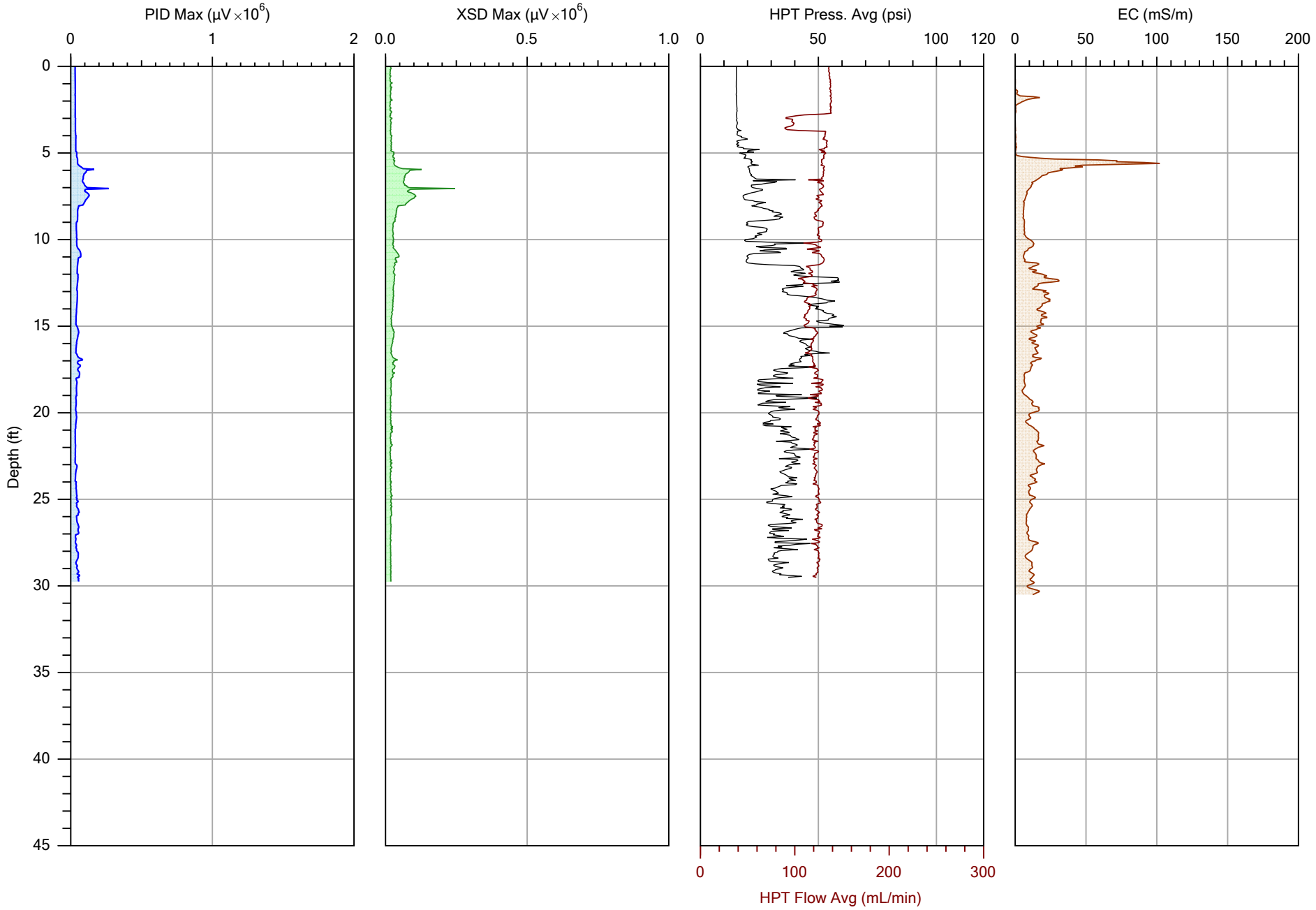
COLUMBIA TECHNOLOGIES

		File: MIP-052.MHP
Company: COLUMBIA Technologies	Operator: DJM	Date: 8/29/2016
Project ID: Keyport OU1 South Plantation	Client: AECOM	Location:



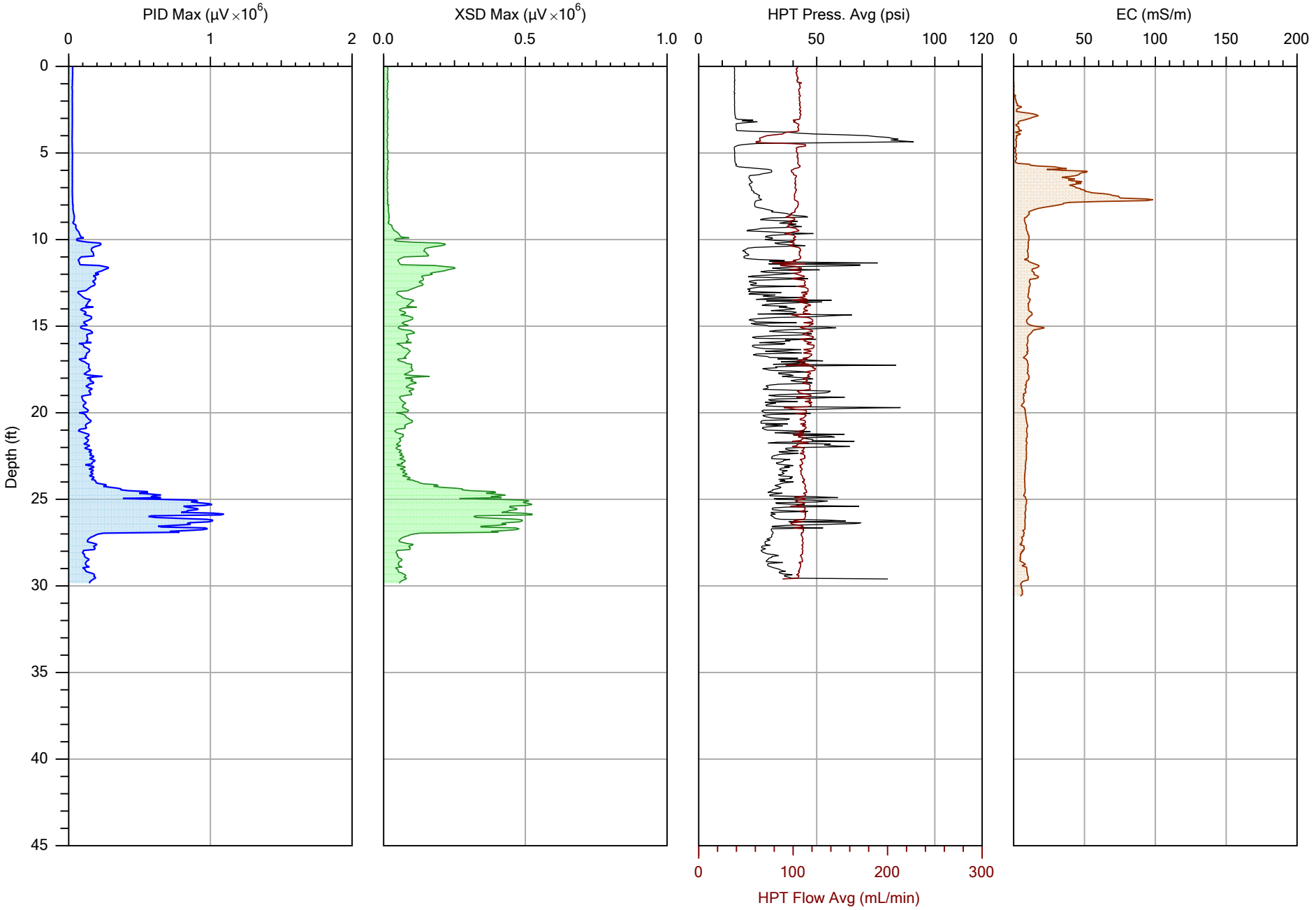
COLUMBIA TECHNOLOGIES

		File: MIP-053.MHP
Company: COLUMBIA Technologies	Operator: DJM	Date: 8/30/2016
Project ID: Keyport OU1 South Plantation	Client: AECOM	Location:



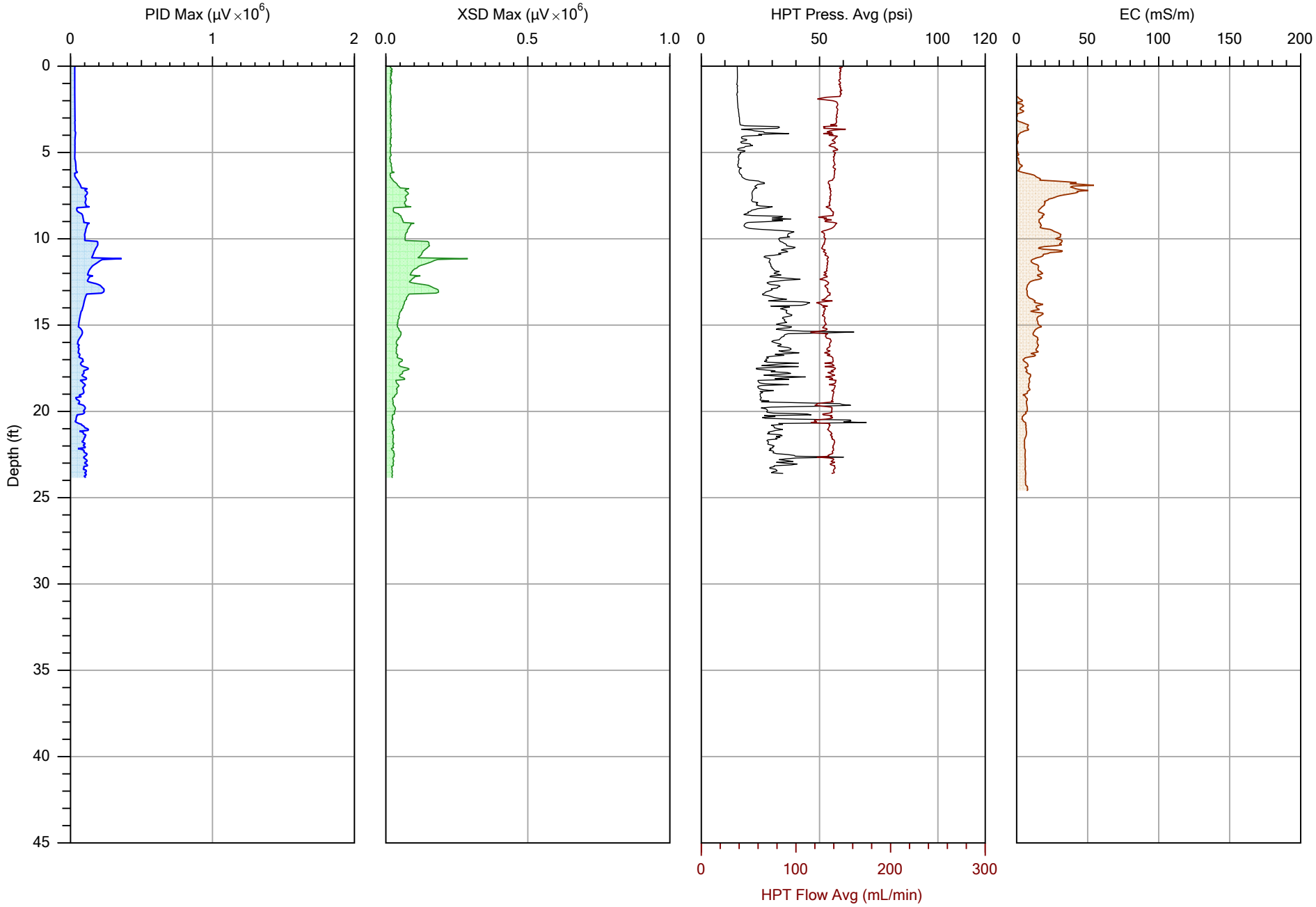
COLUMBIA TECHNOLOGIES

		File: MIP-054.MHP
Company: COLUMBIA Technologies	Operator: DJM	Date: 8/30/2016
Project ID: Keyport OU1 South Plantation	Client: AECOM	Location:



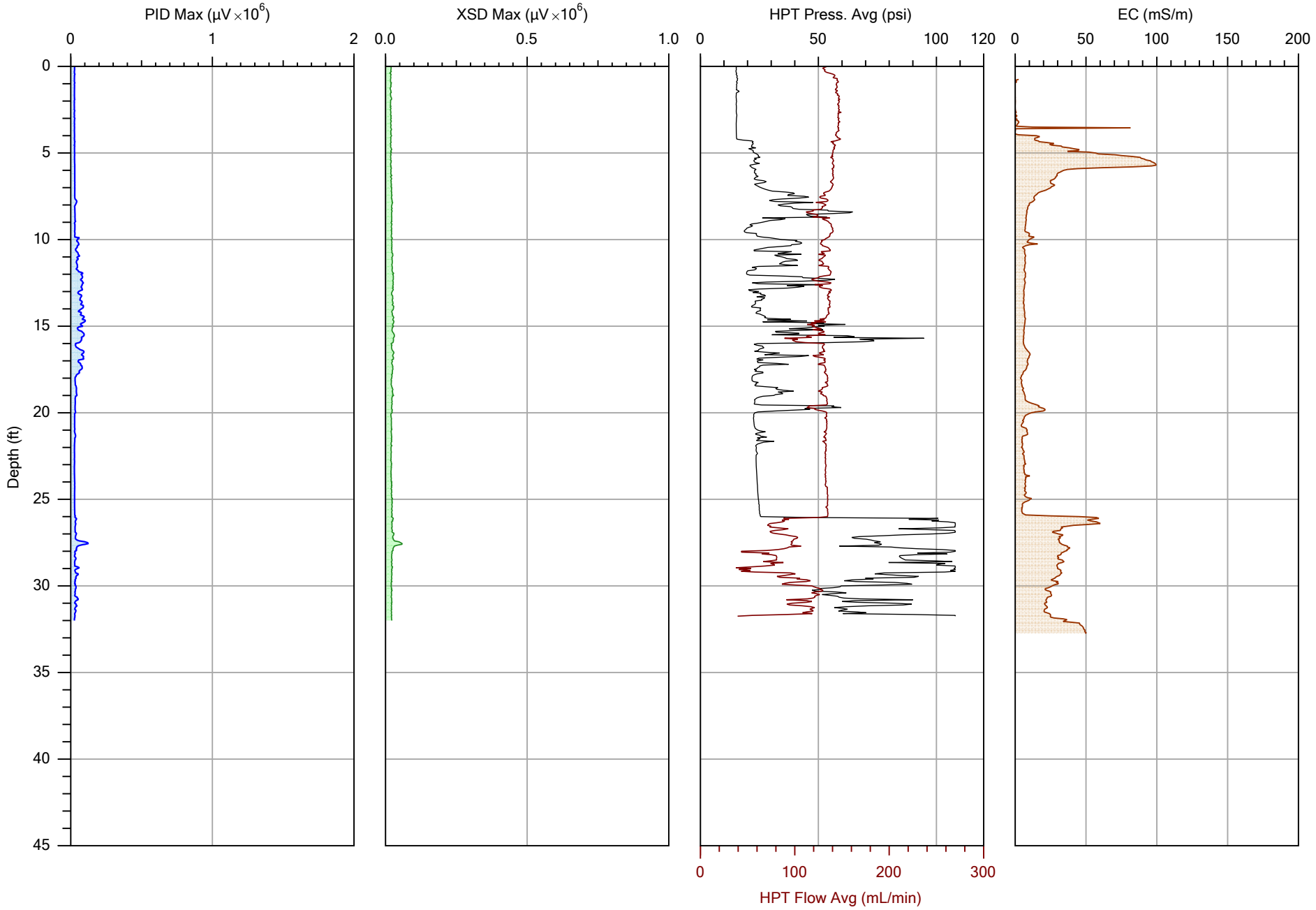
COLUMBIA TECHNOLOGIES

		File: MIP-055.MHP
Company: COLUMBIA Technologies	Operator: DJM	Date: 8/30/2016
Project ID: Keyport OU1 South Plantation	Client: AECOM	Location:



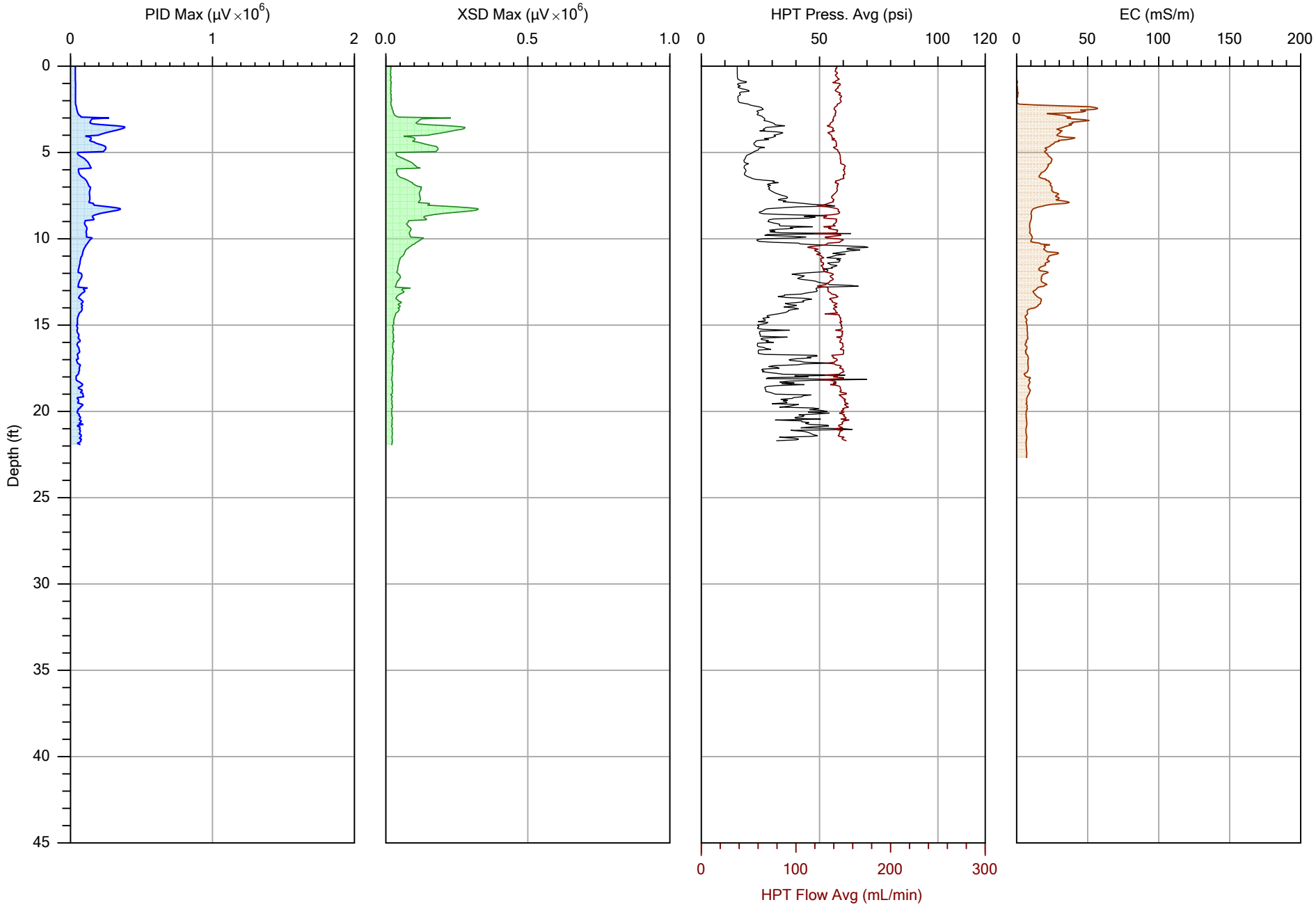
COLUMBIA TECHNOLOGIES

		File: MIP-056.MHP
Company: COLUMBIA Technologies	Operator: DJM	Date: 8/30/2016
Project ID: Keyport OU1 South Plantation	Client: AECOM	Location:



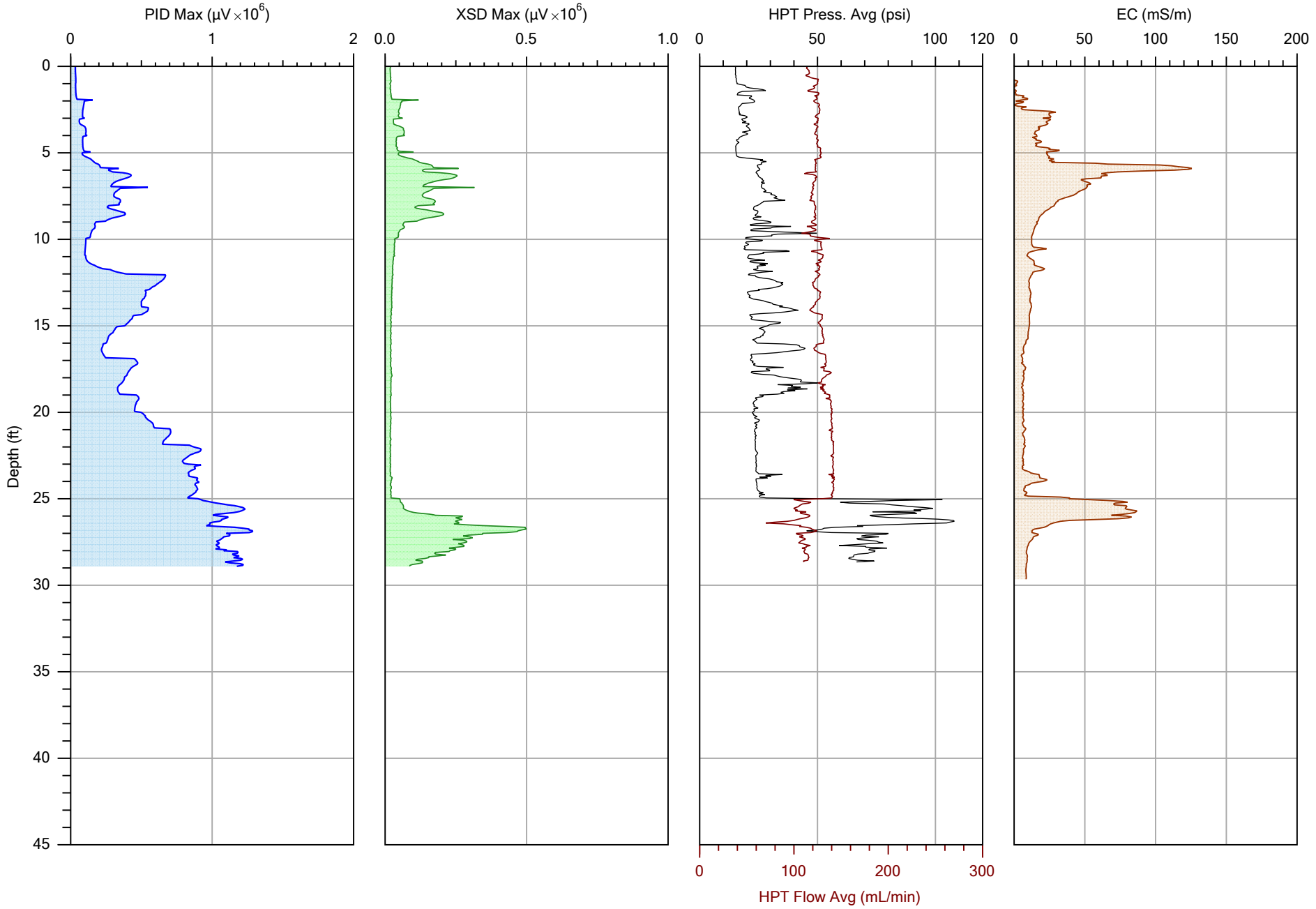
COLUMBIA TECHNOLOGIES

		File: MIP-057.MHP
Company: COLUMBIA Technologies	Operator: DJM	Date: 8/30/2016
Project ID: Keyport OU1 South Plantation	Client: AECOM	Location:



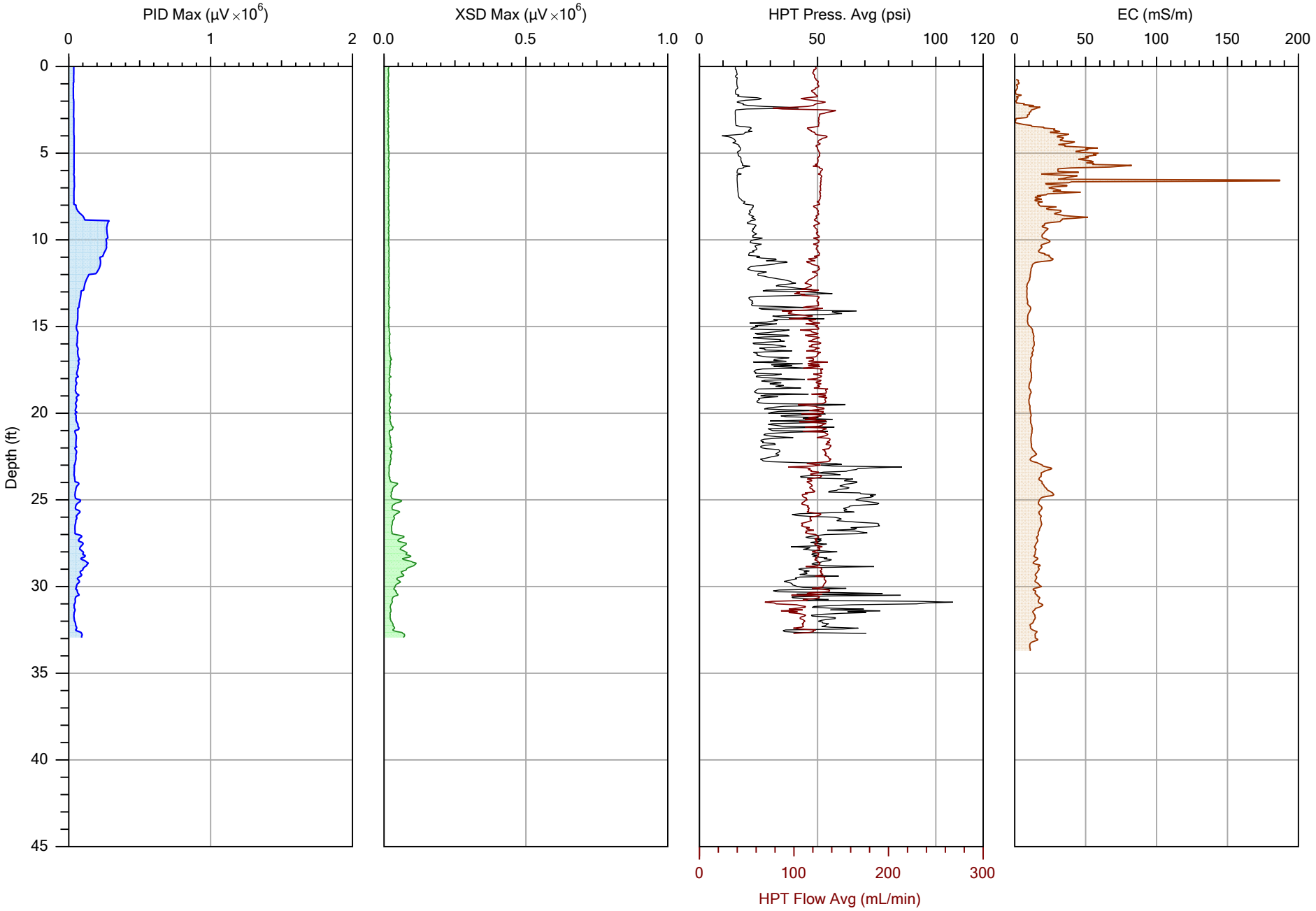
COLUMBIA TECHNOLOGIES

		File: MIP-058.MHP
Company: COLUMBIA Technologies	Operator: DJM	Date: 8/31/2016
Project ID: Keyport OU1 South Plantation	Client: AECOM	Location:



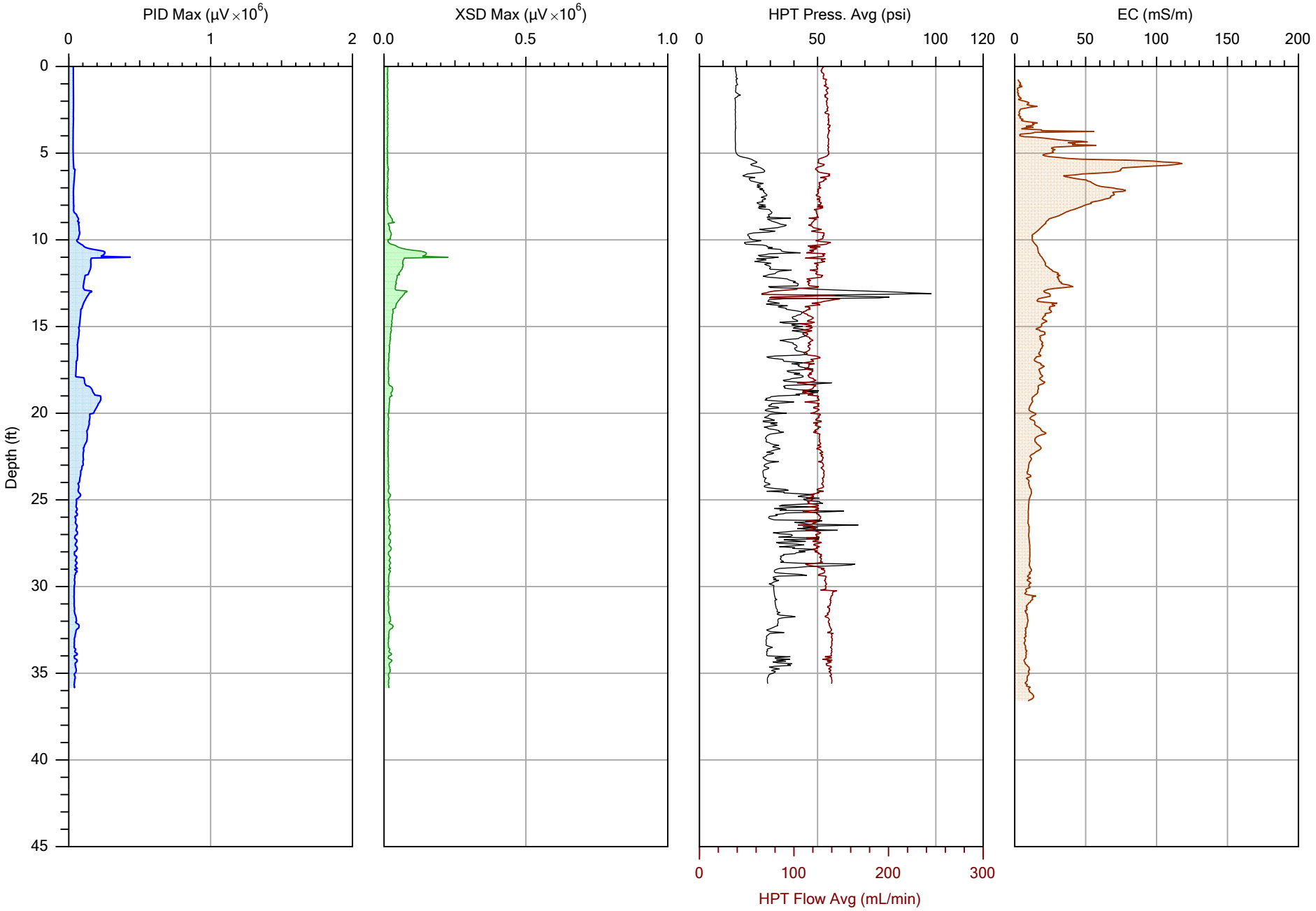
COLUMBIA TECHNOLOGIES

		File: MIP-059.MHP
Company: COLUMBIA Technologies	Operator: DJM	Date: 8/31/2016
Project ID: Keyport OU1 South Plantation	Client: AECOM	Location:



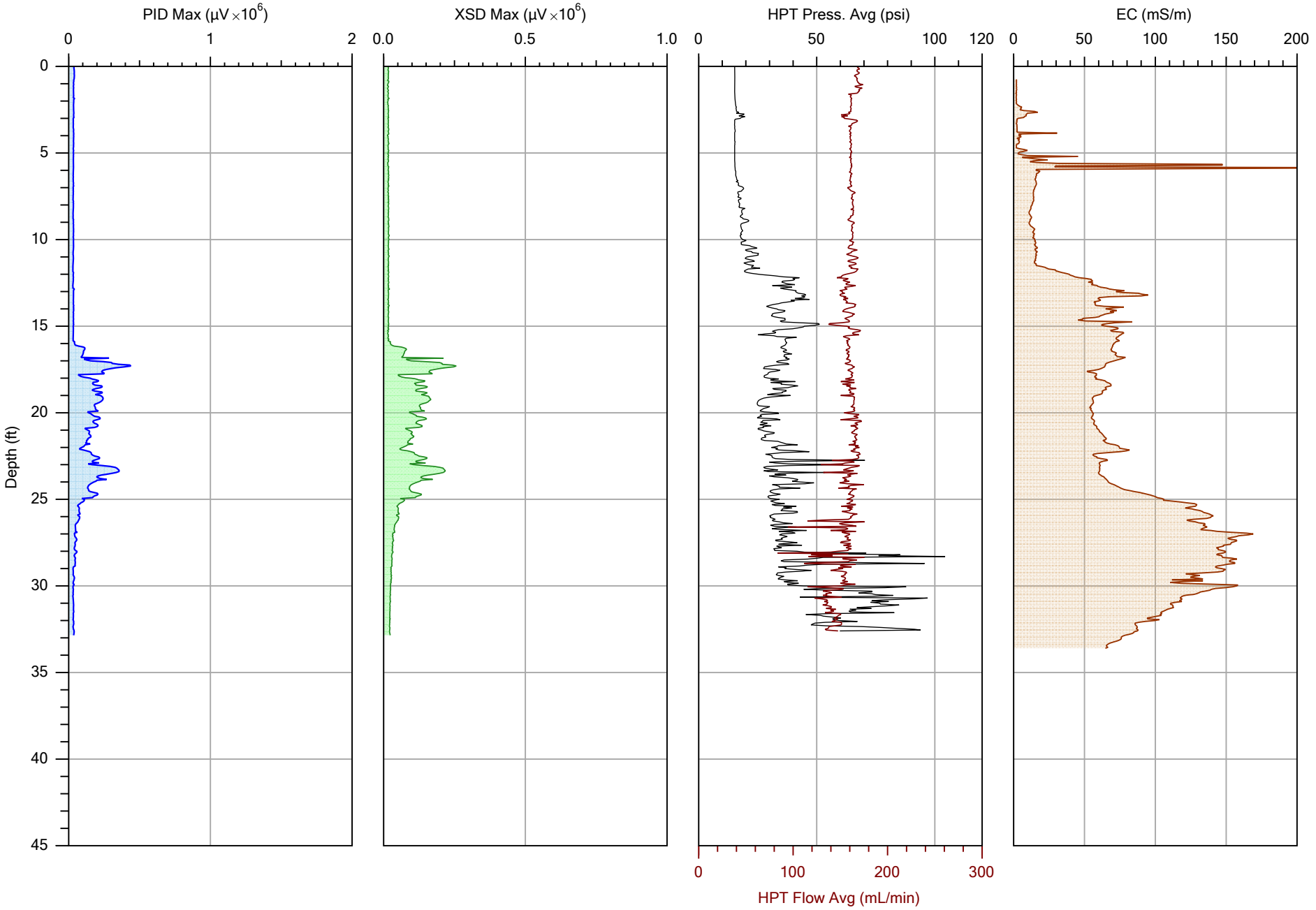
COLUMBIA TECHNOLOGIES

		File: MIP-060.MHP
Company: COLUMBIA Technologies	Operator: DJM	Date: 8/31/2016
Project ID: Keyport OU1 South Plantation	Client: AECOM	Location:



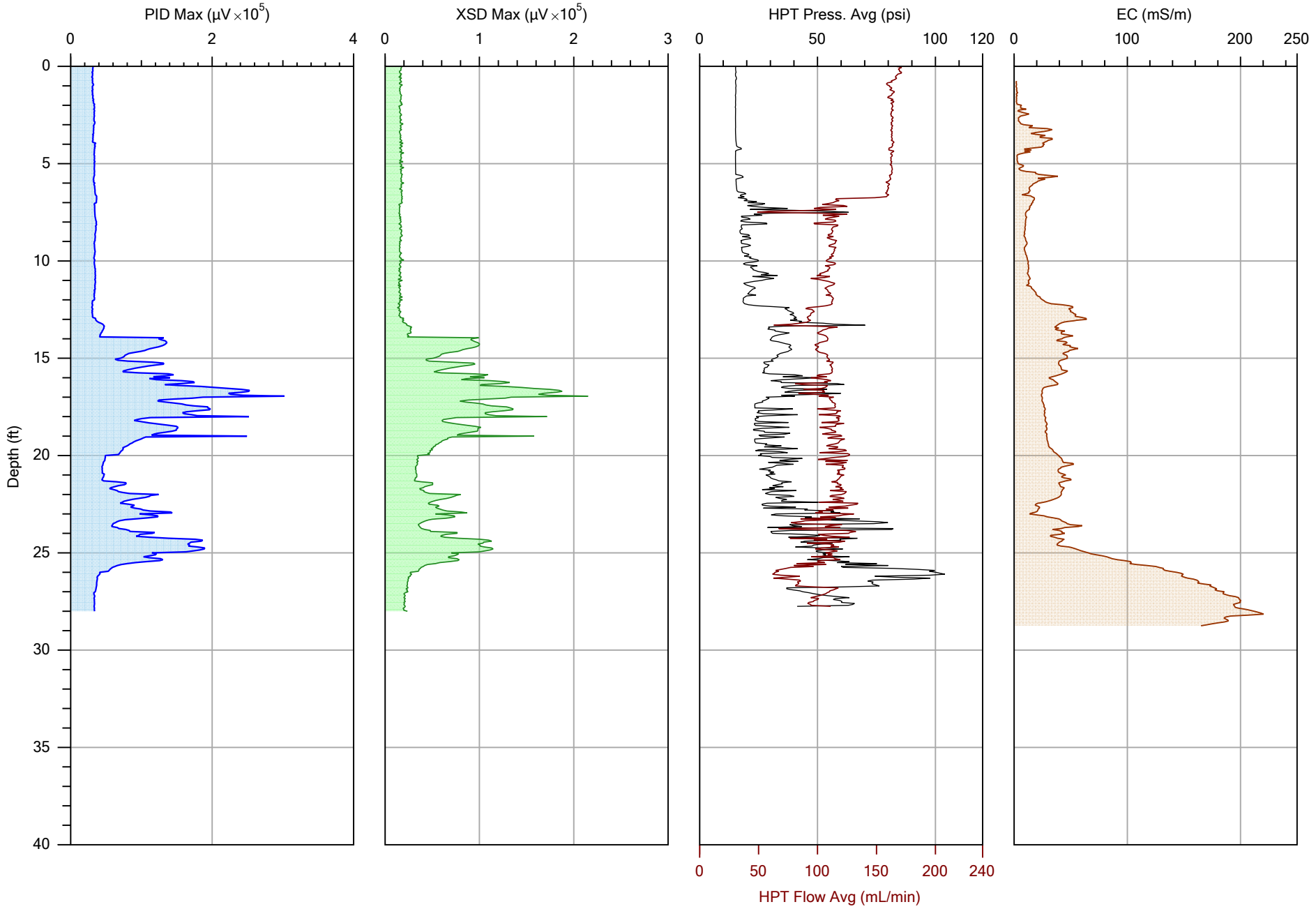
COLUMBIA TECHNOLOGIES

		File: MIP-061.MHP
Company: COLUMBIA Technologies	Operator: DJM	Date: 8/31/2016
Project ID: Keyport OU1 South Plantation	Client: AECOM	Location:



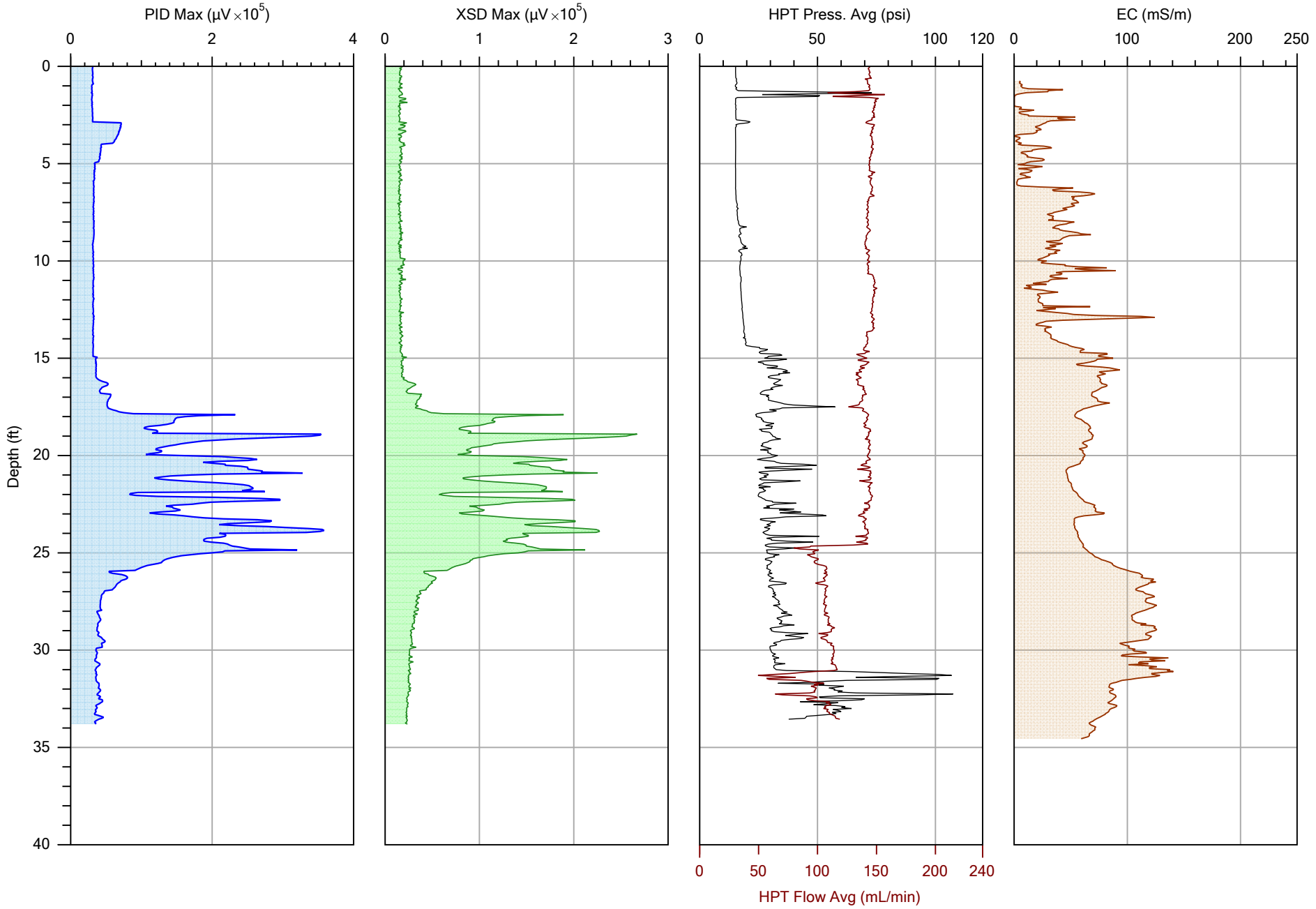
COLUMBIA TECHNOLOGIES

		File: MIP-062.MHP
Company: COLUMBIA Technologies	Operator: DJM	Date: 9/1/2016
Project ID: Keyport OU1 Central Landfill	Client: AECOM	Location:



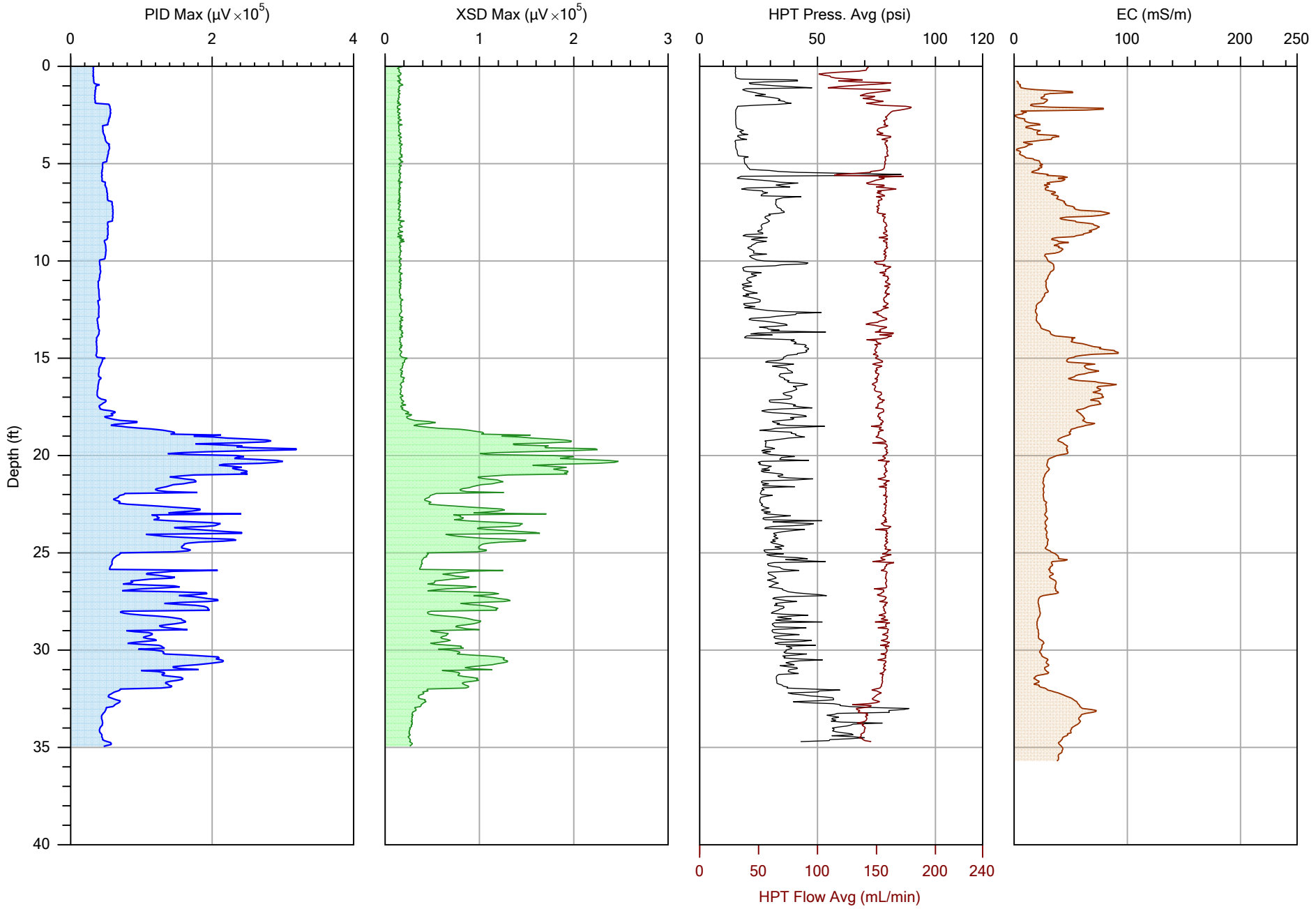
COLUMBIA TECHNOLOGIES

		File: MIP-063.MHP
Company: COLUMBIA Technologies	Operator: DJM	Date: 9/1/2016
Project ID: Keyport OU1 Central Landfill	Client: AECOM	Location:



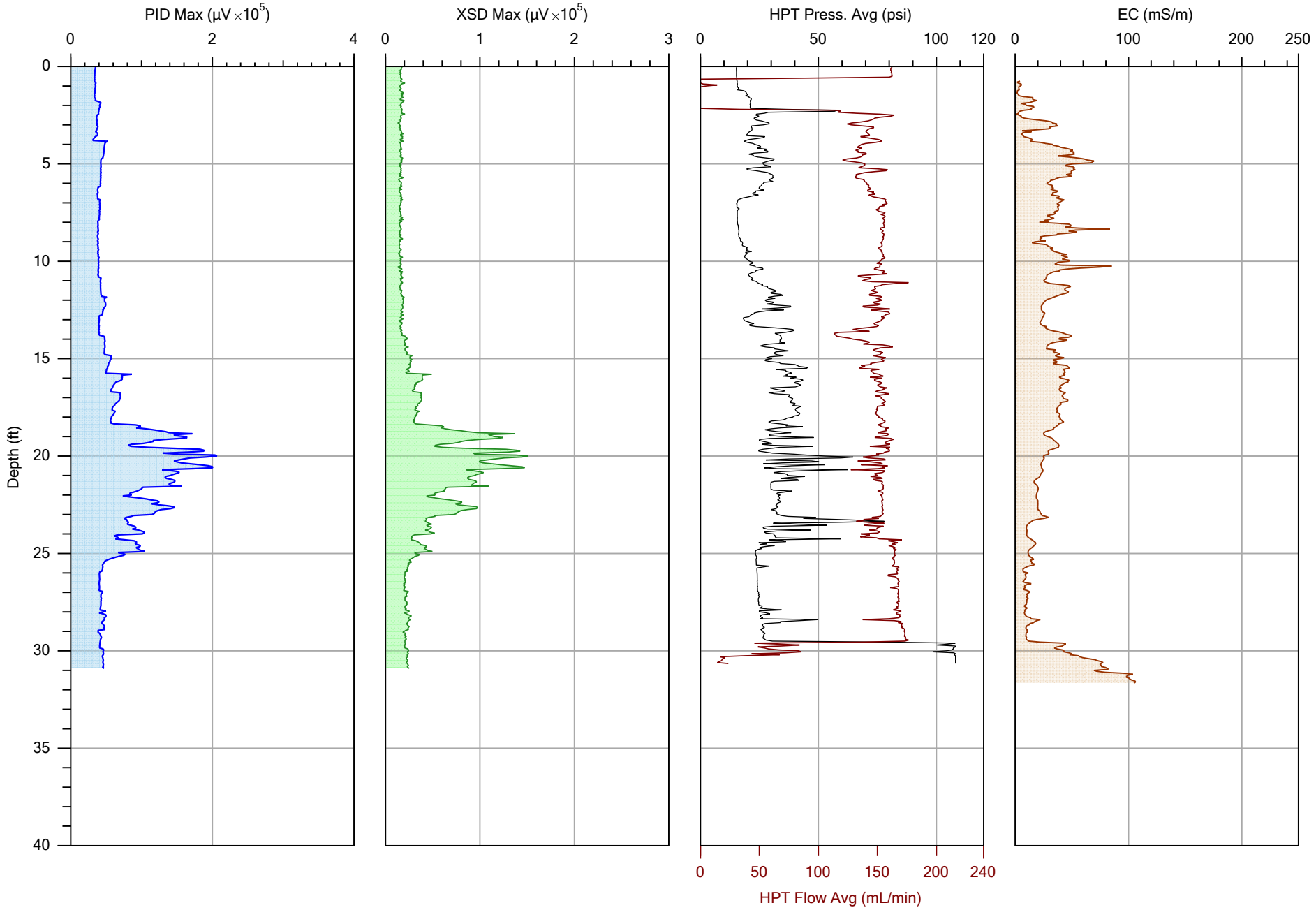
COLUMBIA TECHNOLOGIES

		File: MIP-064.MHP
Company: COLUMBIA Technologies	Operator: DJM	Date: 9/1/2016
Project ID: Keyport OU1 Central Landfill	Client: AECOM	Location:



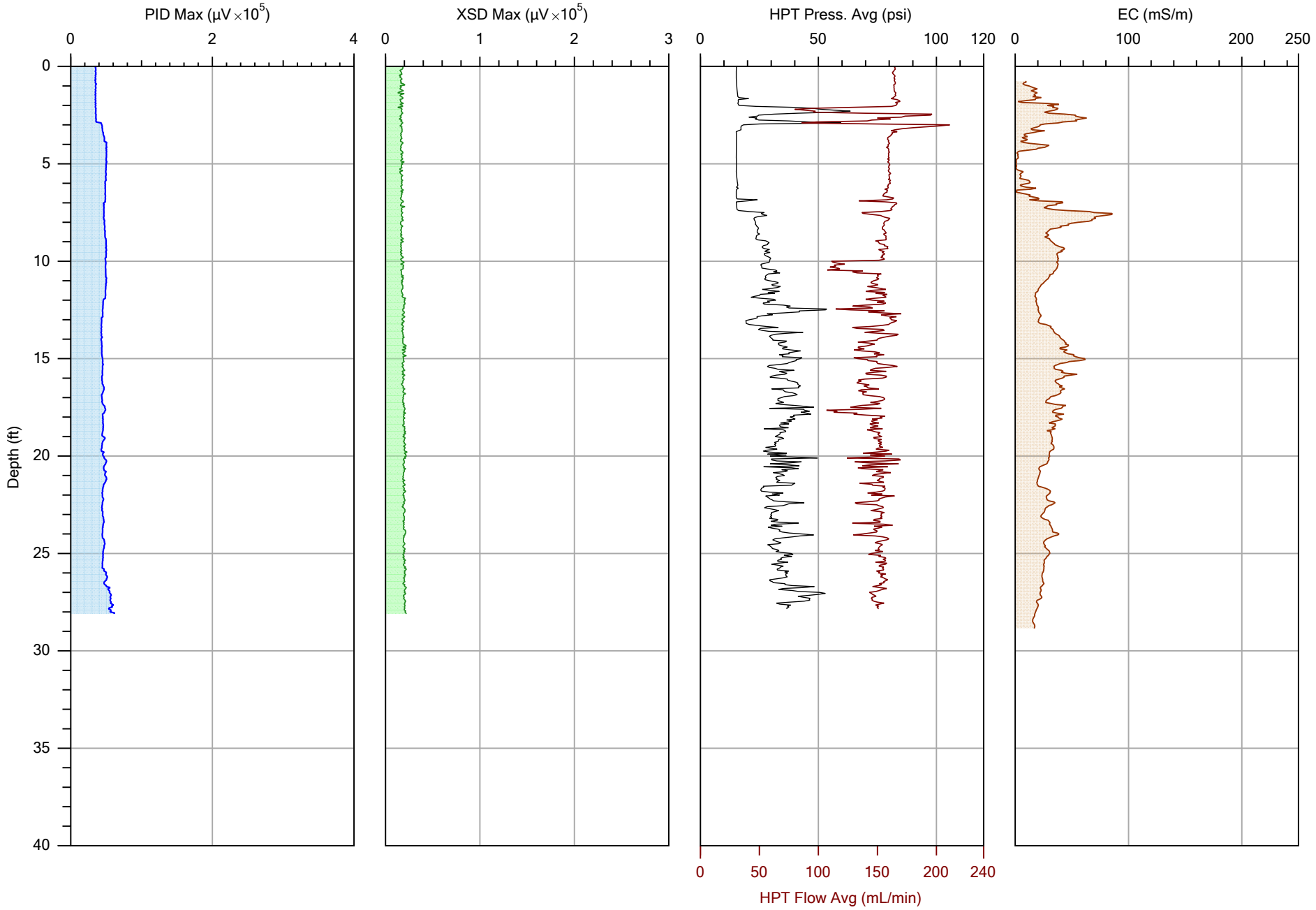
COLUMBIA TECHNOLOGIES

		File: MIP-065.MHP
Company: COLUMBIA Technologies	Operator: DJM	Date: 9/1/2016
Project ID: Keyport OU1 Central Landfill	Client: AECOM	Location:



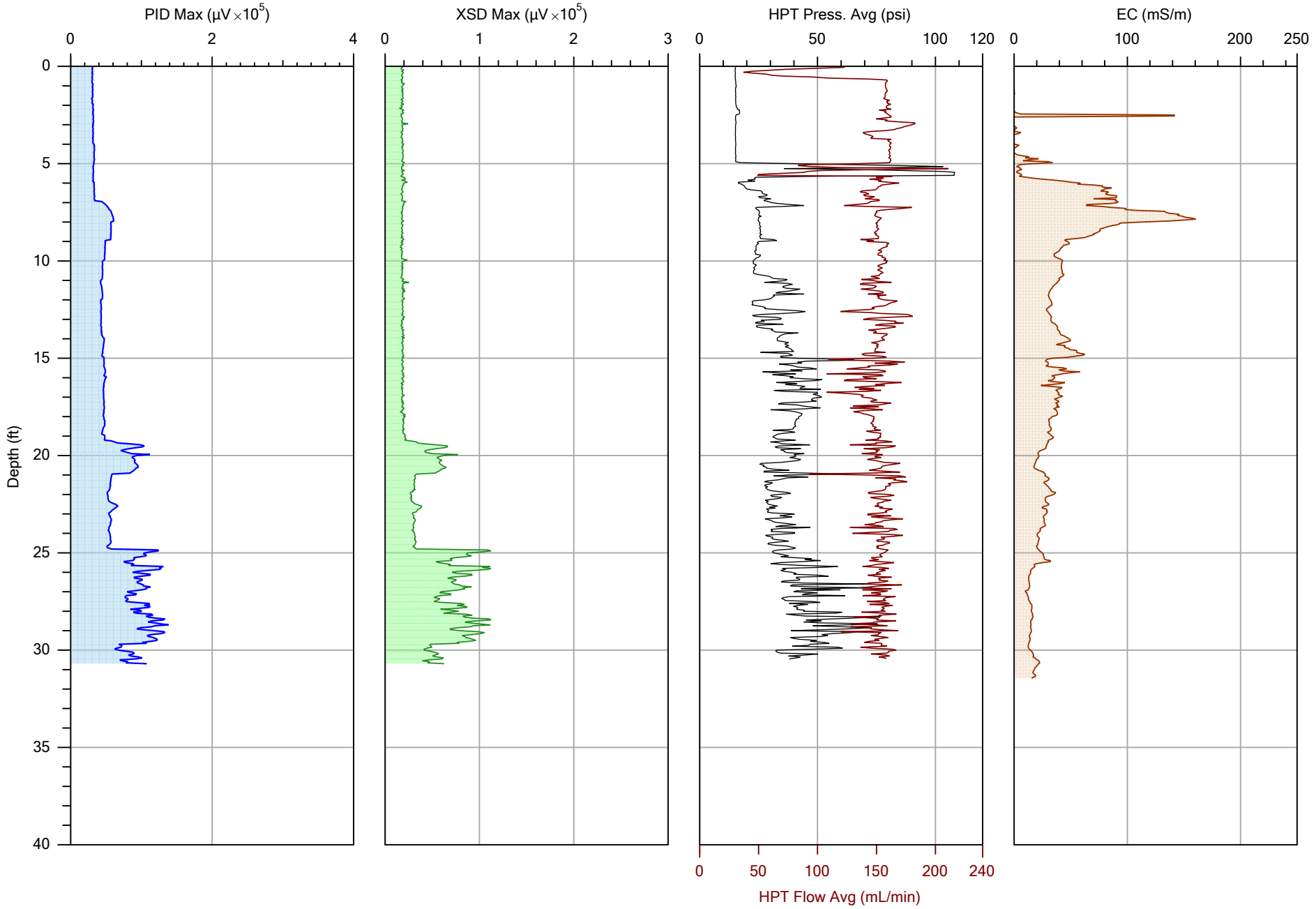
COLUMBIA TECHNOLOGIES

		File: MIP-066.MHP
Company: COLUMBIA Technologies	Operator: DJM	Date: 9/1/2016
Project ID: Keyport OU1 Central Landfill	Client: AECOM	Location:



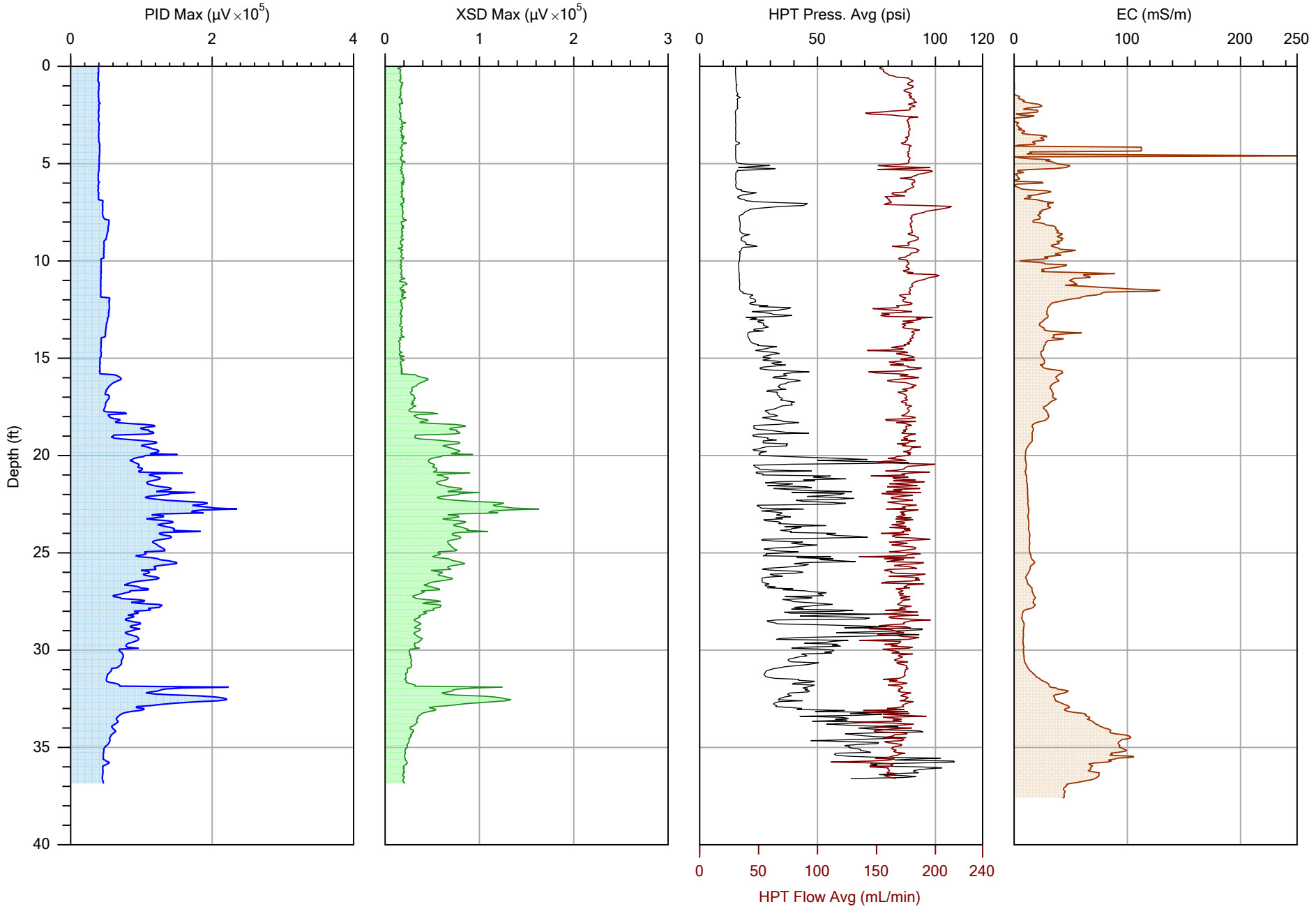
COLUMBIA TECHNOLOGIES

		File: MIP-067.MHP
Company: COLUMBIA Technologies	Operator: DJM	Date: 9/2/2016
Project ID: Keyport OU1 Central Landfill	Client: AECOM	Location:



COLUMBIA TECHNOLOGIES

		File: MIP-068.MHP
Company: COLUMBIA Technologies	Operator: DJM	Date: 9/2/2016
Project ID: Keyport OU1 Central Landfill	Client: AECOM	Location:



COLUMBIA TECHNOLOGIES

		File: MIP-069.MHP
Company: COLUMBIA Technologies	Operator: DJM	Date: 9/2/2016
Project ID: Keyport OU1 Central Landfill	Client: AECOM	Location:

Appendix I

MIP Data Package
(Native file in electronic format on CD)

Appendix J

Soil Gas Sampling Field Forms
(Electronic format on CD)

SV-01

SOIL VAPOR SAMPLING DATA SHEET

Project Information

Project Name:	Vapor Intrusion Sampling	Location:	Keyport, WA
Project/Task No.:	60343583	Weather:	60/70s partially cloudy
Date:	8/30/16	Samplers:	ED

Weather Conditions

Temperature	Wind	Humidity	Time

Meter Information

Model & Calibration Date

PID: MiniRae 3000 8/26/16

He: MGD2002 8/26/16

CH_4:

Sampling Data

Sample Name:	SV-01
Cannister ID	CA00970
Regulator ID	SC00283
Initial Can Vacuum	30 in Hg
Final Can Vacuum	5 in Hg

QA/QC Samples:

Duplicate: NA

Leak Test

Helium Concentration in the Shroud	26,000 ppm	210,000
Helium Concentration in the Sample Tubing	8,400 ppm	22,125
Percentage?	40%	10%
Leak Test Passed?	(Y)	N

If Leak Test Fail, record additional test results in the Comments Section or on the back of this sheet.

Time (24 hr)	Vacuum in Hg

Time (24 hr)	Vacuum in Hg

NA

Time	Vacuum
1030	30
1139	13.5
1157	10 ED
1233	5

Comments

ED

SV-02

SOIL VAPOR SAMPLING DATA SHEET

Project Information

Project Name:	Vapor Intrusion Sampling	Location:	Keyport, WA
Project/Task No.:	60343583	Weather:	60s/70s, partially cloudy
Date:	8/30/16	Samplers:	ED

Weather Conditions

Temperature	Wind	Humidity	Time

Meter Information

Model & Calibration Date

PID: MiniRae 3000 8/26/16

He: MGD2000 8/26/16

CH_4: _____

Sampling Data

Sample Name:	SV-02
Cannister ID	SC01498
Regulator ID	OA01878
Initial Can Vacuum	30 in Hg
Final Can Vacuum	5 in Hg

QA/QC Samples: NA

Duplicate: _____

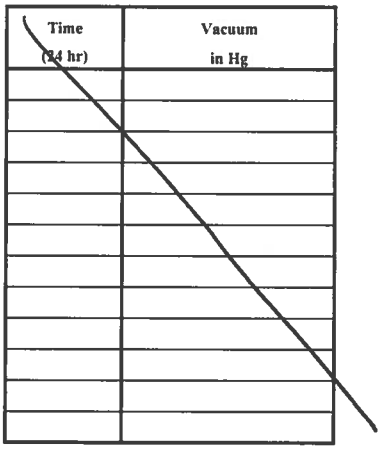
Leak Test

Helium Concentration in the Shroud	4.7%	8.6%
Helium Concentration in the Sample Tubing	2.1%	4.1%
Percentage?	50%	50%
Leak Test Passed?	Y	(N)

If Leak Test Fail, record additional test results in the Comments Section or on the back of this sheet.

Time (24 hr)	Vacuum in Hg
1135	30
1157	8
1201	5

Time (24 hr)	Vacuum in Hg



Comments

Add additional seal.
Measure ~20% LEL CH_4 in sample tubing.
See Field Notes.

ED

SV-03

SOIL VAPOR SAMPLING DATA SHEET

Project Information

Project Name:	Vapor Intrusion Sampling	Location:	Keyport, WA
Project/Task No.:	60343583	Weather:	60s, 70s partially cloudy
Date:	8/30/16	Samplers:	ED

Weather Conditions

Temperature	Wind	Humidity	Time

Meter Information

Model & Calibration Date

PID:	MiniRae 3000	8/26/16
He:	MGD2002	8/26/16
CH_4:	1	

Sampling Data

Sample Name:	SV-03
Cannister ID	SC01674
Regulator ID	
Initial Can Vacuum	29 in Hg
Final Can Vacuum	5 in Hg

QA/QC Samples:

Duplicate: NA

Leak Test

Helium Concentration in the Shroud		
Helium Concentration in the Sample Tubing		
Percentage?		
Leak Test Passed?	Y	N

CH_4 ~66% LEL cannot leak test. Add sealant + Sample.

If Leak Test Fail, record additional test results in the Comments Section or on the back of this sheet.

Time (24 hr)	Vacuum in Hg
1347	29
1405	10
1413	5

Time (24 hr)	Vacuum in Hg

Comments

ED

SV-04

SOIL VAPOR SAMPLING DATA SHEET

Project Information

Project Name:	Vapor Intrusion Sampling	Location:	Keyport, WA
Project/Task No.:	60343583	Weather:	60s, 70s partially cloudy
Date:	8/30/16	Samplers:	ED

Weather Conditions

Temperature	Wind	Humidity	Time

Meter Information

Model & Calibration Date

PID: MiniRae 3000 8/26/16

He: MGD2002 8/26/16

CH_4:

Sampling Data

Sample Name:	SV-04
Cannister ID	SC01687
Regulator ID	OA0444
Initial Can Vacuum	29
Final Can Vacuum	5

QA/QC Samples:

Duplicate: NA

Leak Test

Helium Concentration in the Shroud		
Helium Concentration in the Sample Tubing		
Percentage?		
Leak Test Passed?	Y	N

If Leak Test Fail, record additional test results in the Comments Section or on the back of this sheet.

CH_4 ~ 44% LEL. Add sealant + sample

Time (24 hr)	Vacuum in Hg
1257	29
1316	15
1337	5

Time (24 hr)	Vacuum in Hg

Comments

ED

SV-05

SOIL VAPOR SAMPLING DATA SHEET

Project Information

Project Name:	Vapor Intrusion Sampling	Location:	Keyport, WA
Project/Task No.:	603423583	Weather:	60s, 70s partially sunny
Date:	8/30/16	Samplers:	ED

Weather Conditions

Temperature	Wind	Humidity	Time

Meter Information

Model & Calibration Date

PID: MiniRae 3000 8/26/16

He: MGD2002 8/26/16

CH_4:

Sampling Data

Sample Name:	SV-05
Cannister ID	5C00260
Regulator ID	0A01812
Initial Can Vacuum	28
Final Can Vacuum	5

QA/QC Samples:

Duplicate: NA

Leak Test

Helium Concentration in the Shroud	2.5%
Helium Concentration in the Sample Tubing	0 ppm
Percentage?	0%
Leak Test Passed?	(Y) N

If Leak Test Fail, record additional test results in the Comments Section or on the back of this sheet.

1554, 15
ED

Time (24 hr)	Vacuum in Hg
1541	28
1610	5

Time (24 hr)	Vacuum in Hg

Comments

ED

SV-06

SOIL VAPOR SAMPLING DATA SHEET

Project Information

Project Name:	Vapor Intrusion Sampling	Location:	Keyport, WA
Project/Task No.:	60343583	Weather:	60s, 70s partially cloudy
Date:	8/30/16	Samplers:	ED

Weather Conditions

Temperature	Wind	Humidity	Time

Meter Information

Model & Calibration Date

PID:	MiniRae 3000 8/26/16
He:	MGD2002 8/26/16
CH_4:	

Sampling Data

Sample Name:	SV-06
Cannister ID	SC02064
Regulator ID	OA0157
Initial Can Vacuum	28
Final Can Vacuum	4.5

QA/QC Samples:

Duplicate:	NA

Leak Test

Helium Concentration in the Shroud	2.0%
Helium Concentration in the Sample Tubing	4.1%
Percentage?	50%
Leak Test Passed?	Y (N)

If Leak Test Fail, record additional test results in the Comments Section or on the back of this sheet.

Time (24 hr)	Vacuum in Hg
1554	28
1618	4.5

Time (24 hr)	Vacuum in Hg

X

CH_4 ~24%
add sealant + sample

Comments

ED

SV-11

SOIL VAPOR SAMPLING DATA SHEET

Project Information

Project Name:	Vapor Intrusion Sampling	Location:	Keyport, WA
Project/Task No.:	60343583	Weather:	60s, Sunny
Date:	9/8/16	Samplers:	ED

Weather Conditions

Temperature	Wind	Humidity	Time

Meter Information

Model & Calibration Date

PID:	MiniRae 3000 8/26/16
He:	MGD2002 8/26/16
CH_4:	RKI 9/8/16

Sampling Data

Sample Name:	SV-11
Cannister ID	SC01508
Regulator ID	OA01357
Initial Can Vacuum	27
Final Can Vacuum	5

QA/QC Samples:

Duplicate: NA

Leak Test

Helium Concentration in the Shroud		
Helium Concentration in the Sample Tubing		
Percentage?		
Leak Test Passed?	Y	N

CH_4 ~ 45%
see field book

If Leak Test Fail, record additional test results in the Comments Section or on the back of this sheet.

Time (24 hr)	Vacuum in Hg ↙	He
1515	27	3.3%
1520	24	2.8%
1525	18	3.4%
1530	14	3.6%
1535	10	2.9%
1540	7	7.8%
1542	5	2.6%

Time (24 hr)	Vacuum in Hg

Comments

ED

SV-12 and SV-FD

SOIL VAPOR SAMPLING DATA SHEET

Project Information

Project Name:	Vapor Intrusion Sampling	Location:	Keyport, WA
Project/Task No.:	60343583	Weather:	60s, sunny
Date:	9/8/16	Samplers:	ED

Weather Conditions

Temperature	Wind	Humidity	Time

Meter Information

Model & Calibration Date

PID: MiniRae 3000 8/26/16
He: MGD2002 8/26/16
CH4: RKI 9/8/16

Sampling Data

Sample Name:	SV-12
Cannister ID	SC01817
Regulator ID	0A01394
Initial Can Vacuum	30
Final Can Vacuum	5

QA/QC Samples:

Duplicate: SV-FD

Leak Test

Helium Concentration in the Shroud		
Helium Concentration in the Sample Tubing		
Percentage?		
Leak Test Passed?	Y	N

If Leak Test Fail, record additional test results in the Comments Section or on the back of this sheet.

SV-12

Time (24 hr)	Vacuum in Hg ↙	He
1312	30	5.2%
1315	28	6.1%
1320	23	11.2%
1325	18	3.9%
1330	13	6.4%
1335	9	3.6%
1340	6	5.8%
1341	5	1.9%

SV-FD

Time (24 hr)	Vacuum in Hg ↙	He
1346	30	2.4%
1350	27	16.6%
1355	21	6.0%
1400	15	5.9%
1405	11	6.8%
1410	7	3.4%
1413	5	2.0%

CH_4 ~15%, 40%
See field book

Comments

SV-FD: SC01656
0A01394

ED

SV-13

SOIL VAPOR SAMPLING DATA SHEET

Project Information

Project Name:	Vapor Intrusion Sampling	Location:	Keyport, WA
Project/Task No.:	60343583	Weather:	60s, sunny
Date:	9/8/16	Samplers:	Elyssa Dixon

Weather Conditions

Temperature	Wind	Humidity	Time

Meter Information

Model & Calibration Date

PID:	MiniRae 3000 8/26/16
He:	MGD2002 8/26/16
CH_4:	RKI 9/8/16

Sampling Data

Sample Name:	SV-13
Cannister ID	SC01683
Regulator ID	0A01195
Initial Can Vacuum	28 in Hg
Final Can Vacuum	

QA/QC Samples:

Duplicate: NA

Leak Test

Helium Concentration in the Shroud		
Helium Concentration in the Sample Tubing		
Percentage?		
Leak Test Passed?	Y	N

If Leak Test Fail, record additional test results in the Comments Section or on the back of this sheet.

Time (24 hr)	Vacuum in Hg

Time (24 hr)	Vacuum in Hg

see back

Comments

ED

Time	Pressure	He
1057	28	5.6%
1100	28	11.6%
1105	24	4.5%
1110	19	9.2%
1115	15	4.6%
1120	11	3.2%
1125	8	6.1%
1130	5	9.6%

JP09 Time Weighted Average Helium Concentration Calculations

SV-10

Time	Canister Pressure in Hg	Helium Concentration in Shroud Percent	ppmv
15:15	27	3.3%	33000
15:20	24	2.8%	28000
15:25	18	3.4%	34000
15:30	14	3.6%	36000
15:35	10	2.9%	29000
15:40	7	7.8%	78000
15:42	5	2.6%	26000
		TWA Concentration	**37648**

Analyzed Value	15,000	ug/m^3
	91.69	ppmv
Percent Sample/Shroud	0%	
	PASS	

SV-12

Time	Canister Pressure in Hg	Helium Concentration in Shroud Percent	ppmv
13:12	30	5.2%	52000
13:15	28	6.1%	61000
13:20	23	11.2%	112000
13:25	18	3.9%	39000
13:30	13	6.4%	64000
13:35	9	3.6%	36000
13:40	6	5.8%	58000
13:41	5	1.9%	19000
		TWA Concentration	**60707**

Analyzed Value	460,000	ug/m^3
	2,811.75	ppmv
Percent Sample/Shroud	5%	
	PASS	

SV-FD (SV-12 Duplicate)

Time	Canister Pressure in Hg	Helium Concentration in Shroud Percent	ppmv
13:46	30	2.4%	24000
13:50	27	16.6%	166000
13:55	21	6.0%	60000
14:00	15	5.9%	59000
14:05	11	6.8%	68000
14:10	7	3.4%	34000
14:13	5	2.0%	20000
		TWA Concentration	**70222**

Analyzed Value	850,000	ug/m^3
	5,195.63	ppmv
Percent Sample/Shroud	7%	
	PASS	

SV-13

Time	Canister Pressure in Hg	Helium Concentration in Shroud Percent	ppmv
1057	28	5.6%	56000
1100	28	11.6%	116000
1105	24	4.5%	45000
1110	19	9.2%	92000
1115	15	4.6%	46000
1120	11	3.2%	32000
1125	8	6.1%	61000
1130	5	9.6%	96000
		TWA Concentration	**76822**

Analyzed Value	1,100	ug/m^3
	6.72	ppmv
Percent Sample/Shroud	0%	
	PASS	

Conversions completed using: http://www.eurofinsus.com/environment-testing/laboratories/eurofins-air-toxics/resources/unit-conversion-calculator/

Appendix K

Laboratory Data Packages and Validation Reports
(Electronic format on CD)

ANALYTICAL DATA PACKAGE
SDG # 1609188

PROJECT NAME: NB Kitsap CTO JB09

SUBMITTAL TO:
Constance Lapite
AECOM Technical Services - VA
250 Apollo Drive
Chelmsford, MA 01824

SUBMITTAL BY:
Empirical Laboratories, LLC (EL)
621 Mainstream Drive, Suite 270
Nashville, TN 37228
Tel (615)345-1115
Fax (866)417-0548

LABORATORY CONTACT PERSON:
Project Manager: Marianne Walker
Tel (615)345-1115
Fax (866)417-0548
Email: mwalker@empirlabs.com

Original Report Date: October 3, 2016
Report Revision #: N/A
Revision Date: N/A

THIS DOCUMENT MEETS DoD QSM 4.2 STANDARDS

The results relate to only the samples associated with the referenced SDG and the submitted data has been produced in accordance with laboratory procedures. The Laboratory's Data Review Manager, Ms. Amy Barnett, is responsible for the final data produced and reported. Her signature is listed at the end of the Case Narrative within the Analytical Data Package. If applicable to this report package, details on report revisions and the information on subcontracted analysis are listed in the package Case Narrative. This report shall not be reproduced, except in full, without the written approval of Empirical Laboratories, LLC.

L-A-B Accredited - Certificate Number L2226 - Testing

Table of Contents

#	Description
1	Cover Page
2	Table of Contents
3	Case Narrative
4	Sample Receipt Information Chain of Custody Forms Sample Receipt Confirmations WorkOrder Summary Sample Delivery Group (SDG) Sheets
5	Subcontracted Data

Sample Delivery Group Case Narrative

Receipt Information:

The samples were received within the preservation guidelines for the associated methods. The information associated with sample receipt and the Sample Delivery Group (SDG) are included within section 4 of this package, which also provides information on the link between the client sample ID listed on the COC and laboratory's assigned unique sample ID or WorkOrder #. The sample is tracked through the laboratory for all analysis via the assigned WorkOrder #.

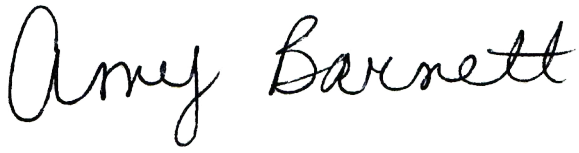
All samples that were received were analyzed and none of the samples were placed on hold without analyses. Samples were subcontracted to ALS Environmental for Helium by EPA Method 3C, Methane by EPA Method TO-3, and Volatile Organic Compounds by EPA Method TO-15.

Changes to the Revision:

This is an original submittal of the final report package.

Statement of Data Authenticity:

I certify that, based upon my inquiry of those individuals immediately responsible for obtaining the information and to the best of my knowledge, the data package is in compliance with the terms and conditions of the contract, both technically and for completeness, with the exception of the conditions detailed in this Case Narrative, as verified by my signature below. During absences, the Data Quality Manager, Technical Directors or Project Managers are authorized to sign this Statement of Data Authenticity.



Ms. Amy M. Barnett
Data Review Manager

Sample Receipt Information

Air - Chain of Custody Record & Analytical Service Request

Page 1 of 1

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

(ALS)

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: P1604352

Company Name & Address (Reporting Information): Empirical Laboratories LLC	Project Name: —	ALS Contact:
	Project Number: —	Analysis Method
Project Manager: —	P.O. # / Billing Information: —	
Phone: ~~978-905-3131~~ ED	Fax: —	
Email Address for Result Reporting: ~~constance.tapite@aecom.com~~ ED	Sampler (Print & Sign): Elyssa Dixon, Elyssa Dixon	

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	TO-15	Methane	Helium	Comments
SV-01-160830	1	8/30/16	1233	SSC00283	—	30	5	25	X	X		missed writing flow controller #
SV-02-160830	2	↓	1201	SC01498	OA01878	30	5	25	X	X		
SV-03-160830	3	↓	1413	SC01674	—	29	5	24	X	X		missed writing flow controller #
SV-04-160830	4	↓	1337	SC01687	OA0444	29	5	24	X	X		
SV-05-160830	5	↓	1610	SC00264	OA01812	28	5	23	X	X		
SV-06-160830	6	↓	1618	SC02064	OA01157	28	4.5	23.5	X	X		
SV-11-160908	7	9/8/16	1542	SC01508	OA01357	27	5	22	X	X	X	
SV-12-160908	8	↓	1341	SC00817	OA01394	30	5	25	X	X	X	
SV-13-160908	9	↓	1130	SC01653	OA01195	28	5	23	X	X	X	
SV-FD-160908	10	↓	—	SC01656	OA01394	30	5	25	X	X	X	

Report Tier Levels - please select

Tier I - Results (Default in not specified) _____ Tier III (Results + QC & Calibration Summaries) _____
Tier II (Results + QC 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:
Elyssa Dixon	9/9/16	1400			
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:

Cooler / Blank Temperature _____ °C

Empirical Laboratories, LLC

WORK ORDER

1609188

Client: AECOM Technical Services - VA
Project: NB Kitsap CTO JP09
Project Manager: Marianne J. Walker
Project Number: AEC-NBKITSAP

Report To:
AECOM Technical Services - VA
Constance Lapite
250 Apollo Drive
Chelmsford, MA 01824
Phone: (978) 905-3131
Fax: (978) 905-2101

Invoice To:
AECOM Technical Services - VA
Accounts Payable
3101 Wilson Boulevard, Suite 900
Glen Allen, VA 22201
Phone :(000) 000-0000
Fax: (703) 683-6549

Date Due: 10/03/2016 16:00 (15 day TAT)
Date Received: 09/10/2016 10:51
Logged In By: Marianne J. Walker
Received By: Marianne J. Walker

Samples Received at: **0.0°C**

Custody Seals	No	Received On Ice	No
Containers Intact	No		
COC/Labels Agree	No		
Preservation Confirme	No		

Analysis	TAT	Expires	Version	Comments
ALS Environmental - CA				
1609188-01 SV-01-160830 [Air] Sampled 08/30/2016 12:33 (GMT-06:00) Central Time (US & Canada)				
VOC -TO-3 Mod (Methane)	15	08/30/2016 12:33		
VOCs-TO15 SW 8260B	15	09/13/2016 12:33		
1609188-02 SV-02-160830 [Air] Sampled 08/30/2016 12:01 (GMT-06:00) Central Time (US & Canada)				
VOC -TO-3 Mod (Methane)	15	08/30/2016 12:01		
VOCs-TO15 SW 8260B	15	09/13/2016 12:01		
1609188-03 SV-03-160830 [Air] Sampled 08/30/2016 14:13 (GMT-06:00) Central Time (US & Canada)				
VOC -TO-3 Mod (Methane)	15	08/30/2016 14:13		
VOCs-TO15 SW 8260B	15	09/13/2016 14:13		
1609188-04 SV-04-160830 [Air] Sampled 08/30/2016 13:37 (GMT-06:00) Central Time (US & Canada)				
VOC -TO-3 Mod (Methane)	15	08/30/2016 13:37		
VOCs-TO15 SW 8260B	15	09/13/2016 13:37		

Empirical Laboratories, LLC

WORK ORDER

1609188

Client:	**AECOM Technical Services - VA**	**Project Manager:**	**Marianne J. Walker**
Project:	**NB Kitsap CTO JP09**	**Project Number:**	**AEC-NBKITSAP**

Analysis	TAT	Expires	Version	Comments
ALS Environmental - CA				
1609188-05 SV-05-160830 [Air] Sampled 08/30/2016 16:10 (GMT-06:00) Central Time (US & Canada)				
VOC -TO-3 Mod (Methane)	15	08/30/2016 16:10		
VOCs-TO15 SW 8260B	15	09/13/2016 16:10		
1609188-06 SV-06-160830 [Air] Sampled 08/30/2016 16:18 (GMT-06:00) Central Time (US & Canada)				
VOC -TO-3 Mod (Methane)	15	08/30/2016 16:18		
VOCs-TO15 SW 8260B	15	09/13/2016 16:18		
1609188-07 SV-11-160908 [Air] Sampled 09/08/2016 15:42 (GMT-06:00) Central Time (US & Canada)				
VOC -TO-3 Mod (Methane)	15	09/08/2016 15:42		
VOC-EPA 3 MOD (Helium)	15	09/08/2016 15:42		
VOCs-TO15 SW 8260B	15	09/22/2016 15:42		
1609188-08 SV-12-160908 [Air] Sampled 09/08/2016 13:41 (GMT-06:00) Central Time (US & Canada)				
VOC -TO-3 Mod (Methane)	15	09/08/2016 13:41		
VOC-EPA 3 MOD (Helium)	15	09/08/2016 13:41		
VOCs-TO15 SW 8260B	15	09/22/2016 13:41		
1609188-09 SV-13-160908 [Air] Sampled 09/08/2016 11:30 (GMT-06:00) Central Time (US & Canada)				
VOC -TO-3 Mod (Methane)	15	09/08/2016 11:30		
VOC-EPA 3 MOD (Helium)	15	09/08/2016 11:30		
VOCs-TO15 SW 8260B	15	09/22/2016 11:30		
1609188-10 SV-FD-160908 [Air] Sampled 09/08/2016 00:00 (GMT-06:00) Central Time (US & Canada)				
VOC -TO-3 Mod (Methane)	15	09/08/2016 00:00		
VOC-EPA 3 MOD (Helium)	15	09/08/2016 00:00		
VOCs-TO15 SW 8260B	15	09/22/2016 00:00		

Sample Delivery Group Assignment Form

CLIENT: AECOM Technical Services - VA
PROJECT NAME: NB Kitsap CTO JP09
SDG #: 1609188

QC LEVEL: Level IV
Report Due: 10/3/2016
Client Sample Count: 9

Sample Type	Sampled	Received	Lab ID	Client ID	Lab Matrix	% Calculation	bVOCs-TO15 SW 8260B-A
Client Sample	8/30/2016	9/10/2016	1609188-01	SV-01-160830	Air	X	X
Client Sample	8/30/2016	9/10/2016	1609188-02	SV-02-160830	Air	X	X
Client Sample	8/30/2016	9/10/2016	1609188-03	SV-03-160830	Air	X	X
Client Sample	8/30/2016	9/10/2016	1609188-04	SV-04-160830	Air	X	X
Client Sample	8/30/2016	9/10/2016	1609188-05	SV-05-160830	Air	X	X
Client Sample	8/30/2016	9/10/2016	1609188-06	SV-06-160830	Air	X	X
Client Sample	9/8/2016	9/10/2016	1609188-07	SV-11-160908	Air	X	X
Client Sample	9/8/2016	9/10/2016	1609188-08	SV-12-160908	Air	X	X
Client Sample	9/8/2016	9/10/2016	1609188-09	SV-13-160908	Air	X	X
Field Duplicate	9/8/2016	9/10/2016	1609188-10	SV-FD-160908	Air	X	X

LABORATORY REPORT

September 28, 2016

Marianne Walker
Empirical Labs
621 Mainstream Drive Suite 270
Nashville, TN 37228

Dear Marianne:

Enclosed are the results of the samples submitted to our laboratory on September 10, 2016. For your reference, these analyses have been assigned our service request number P1604352.

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

By Sue Anderson at 8:45 am, Sep 29, 2016

Sue Anderson
Project Manager

CASE NARRATIVE

The samples were received intact under chain of custody on September 10, 2016 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 samples at the time of sample receipt.

Helium Analysis

Four of the samples were analyzed for helium according to modified EPA Method 3C (single injection) using a gas chromatograph equipped with a thermal conductivity detector (TCD). This method is not included on the laboratory's NELAP, DoD-ELAP, or AIHA-LAP, LLC scope of accreditation.

Methane Analysis

All of the samples were analyzed per modified EPA Method TO-3 for methane using a gas chromatograph equipped with a flame ionization detector (FID). This procedure is described in laboratory SOP VOA-TO3C1C6. This method is included on the laboratory's DoD-ELAP scope of accreditation, however it is not part of the NELAP or AIHA-LAP, LLC accreditation.

Volatile Organic Compound Analysis

All of the samples were 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. This method is included on the laboratory's NELAP and DoD-ELAP scope of accreditation, however it is not part of the AIHA-LAP, LLC accreditation. Any analytes flagged with an X are not included on the NELAP or DoD-ELAP accreditation.

The containers were cleaned, prior to sampling, down to the method reporting limit (MRL) reported for this project. Please note, projects which require reporting below the MRL could have results between the MRL and method detection limit (MDL) that are biased high.

Manual integrations were performed on the following sample(s) and analyte(s). Refer to the raw data for additional information.

Sample Identification(s)	Analyte(s)
P1504352-003	Vinyl chloride

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.

ALS Environmental – Simi Valley

CERTIFICATIONS, ACCREDITATIONS, AND REGISTRATIONS

Agency	Web Site	Number
AIHA-LAP, LLC	http://www.aihaaccreditedlabs.org	101661
Arizona DHS	http://www.azdhs.gov/lab/license/env.htm	AZ0694
PJLA (DoD ELAP)	http://www.pjlabs.com/search-accredited-labs	65818 (Testing)
Florida DOH (NELAP)	http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm	E871020
Maine DHHS	http://www.maine.gov/dhhs/mecdc/environmental-health/water/dwp-services/labcert/labcert.htm	2014025
Minnesota DOH (NELAP)	http://www.health.state.mn.us/accreditation	977273
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	4068-003
Pennsylvania DEP	http://www.depweb.state.pa.us/labs	68-03307 (Registration)
Texas CEQ (NELAP)	http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html	T104704413-16-7
Utah DOH (NELAP)	http://www.health.utah.gov/lab/labimp/certification/index.html	CA016272016-6
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: Empirical Labs Service Request: P1604352

Date Received: 9/10/2016
Time Received: 10:37

Client Sample ID	Lab Code	Matrix	Date Collected	Time Collected	Container ID	Pi1 (psig)	Pf1 (psig)	TO-3 Modified - C1C6+ Can	TO-15 - VOC Cans	3C Modified - Helium Can
SV-01-160830	P1604352-001	Air	8/30/2016	12:33	SSC00283	-1.63	3.40	X	X	
SV-02-160830	P1604352-002	Air	8/30/2016	12:01	SC01498	-2.03	3.70	X	X	
SV-03-160830	P1604352-003	Air	8/30/2016	14:13	SC01674	-2.44	3.22	X	X	
SV-04-160830	P1604352-004	Air	8/30/2016	13:37	SC01687	-1.41	3.46	X	X	
SV-05-160830	P1604352-005	Air	8/30/2016	16:10	SSC00264	-2.95	3.30	X	X	
SV-06-160830	P1604352-006	Air	8/30/2016	16:18	SC02064	-2.40	3.35	X	X	
SV-11-160908	P1604352-007	Air	9/8/2016	15:42	SC01508	-1.99	3.25	X	X	X
SV-12-160908	P1604352-008	Air	9/8/2016	13:41	SC00817	-1.95	3.16	X	X	X
SV-13-160908	P1604352-009	Air	9/8/2016	11:30	SC01653	-2.35	3.16	X	X	X
SV-FD-160908	P1604352-010	Air	9/8/2016	00:00	SC01656	-2.00	3.25	X	X	X

1609188

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 P1604352

Company Name & Address (Reporting Information): Empirical Laboratories LLC

Project Name:

Project Number:

ALS Contact:

Project Manager:

P.O. # / Billing Information:

Phone: ~~978-905-3131~~ ED

Fax:

Email Address for Result Reporting: ~~constance.tapite@aecom.com~~ ED

Sampler (Print & Sign): Elyssa Dixon, Elyssa Dixon

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	Analysis Method: TO-15	Analysis Method: Methane	Analysis Method: Helium	Comments e.g. Actual Preservative or specific instructions
SV-01-160830	1	8/30/16	1233	SSC0283	—	30	5	25	X	X		missed writing flow controller #
SV-02-160830	2		1201	SC01498	OA01878	30	5	25	X	X		
SV-03-160830	3		1413	SC01674	—	29	5	24	X	X		missed writing flow controller #
SV-04-160830	4		1337	SC01687	OA0444	29	5	24	X	X		
SV-05-160830	5		1610	SC00264	OA01812	28	5	23	X	X		
SV-06-160830	6	↓	1618	SC02064	OA01157	28	4.5	23.5	X	X		
SV-11-160908	7	9/8/16	1542	SC01508	OA01357	27	5	22	X	X	X	
SV-12-160908	8		1341	SC00817	OA01394	30	5	25	X	X	X	
SV-13-160908	9		1130	SC01653	OA01195	28	5	23	X	X	X	
SV-FD-160908	10	↓	—	SC01656	OA01394	30	5	25	X	X	X	

Report Tier Levels - please select

Tier I - Results (Default in not specified) _____ Tier III (Results + QC & Calibration Summaries) _____

Tier II (Results + QC 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:
Elyssa Dixon	9/9/16	1400	Kate Kaneko	9/10/16	1037
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:

Cooler / Blank Temperature _____ °C

14

ALS Environmental
Sample Acceptance Check Form

Client: Empirical Labs Work order: P1604352

Project:

Sample(s) received on: 9/10/16 Date opened: 9/10/16 by: KKELPE

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
P1604352-001.01	6.0 L Silonite Can					
P1604352-002.01	6.0 L Source Can					
P1604352-003.01	6.0 L Source Can					
P1604352-004.01	6.0 L Source Can					
P1604352-005.01	6.0 L Silonite Can					
P1604352-006.01	6.0 L Source Can					
P1604352-007.01	6.0 L Source Can					
P1604352-008.01	6.0 L Source Can					
P1604352-009.01	6.0 L Source Can					
P1604352-010.01	6.0 L Source Can					
P1604352-011.01	6.0 L Source Can					
P1604352-012.01	6.0 L Source Can					
P1604352-013.01	6.0 L Source Can					
P1604352-014.01	6.0 L Source Can					
P1604352-015.01	6.0 L Ambient Can					

Explain any discrepancies: (include lab sample ID numbers):

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

ALS Environmental
Sample Acceptance Check Form

Client: Empirical Labs Work order: P1604352

Project:

Sample(s) received on: 9/10/16 Date opened: 9/10/16 by: KKELPE

Lab Sample ID	Container Description	Required pH *	Received pH	Adjusted pH	VOA Headspace (Presence/Absence)	Receipt / Preservation Comments
P1604352-016.01	6.0 L Ambient Can					
P1604352-017.01	6.0 L Ambient Can					
P1604352-018.01	6.0 L Ambient Can					

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Client: **Empirical Labs**

ALS Project ID: P1604352

Helium

Test Code: EPA 3C Modified
Instrument ID: HP5890 II/GC8/TCD
Analyst: Adam McAfee
Sample Type: 6.0 L Summa Canister(s)
Test Notes:

Date(s) Collected: 9/8/16
Date Received: 9/10/16
Date Analyzed: 9/13/16

Client Sample ID	ALS Sample ID	Injection Volume ml(s)	Canister Dilution Factor	Result µg/m³	MRL µg/m³	MDL µg/m³	Data Qualifier
SV-11-160908	P1604352-007	1.00	1.41	**15,000**	5,800	1,100	
SV-12-160908	P1604352-008	1.00	1.40	**460,000**	5,700	1,100	
SV-13-160908	P1604352-009	1.00	1.45	1,100	5,900	1,100	**U**
SV-FD-160908	P1604352-010	1.00	1.41	**850,000**	5,800	1,100	
Method Blank	P160913-MB	1.00	1.00	750	4,100	750	**U**

U = Compound was analyzed for, but not detected above the laboratory detection 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 / DUPLICATE LABORATORY CONTROL SAMPLE SUMMARY

Client: **Empirical Labs**
Client Sample ID: **Duplicate Lab Control Sample**

ALS Project ID: P1604352
ALS Sample ID: P160913-DLCS

Test Code: EPA 3C Modified
Instrument ID: HP5890 II/GC8/TCD
Analyst: Adam McAfee
Sample Type: 6.0 L Summa Canister
Test Notes:

Date Collected: NA
Date Received: NA
Date Analyzed: 9/13/16
Volume(s) Analyzed: NA ml(s)

CAS #	Compound	Spike Amount LCS / DLCS µg/m³	Result LCS µg/m³	Result DLCS µg/m³	% Recovery LCS	% Recovery DLCS	ALS Acceptance Limits	RPD	RPD Limit	Data Qualifier
7440-59-7	Helium	1,640,000	1,660,000	1,680,000	**101**	**102**	75-124	1.0	15	

Client: **Empirical Labs**

ALS Project ID: P1604352

Method Blank Summary

Test Code: EPA 3C Modified
Instrument ID: HP5890 II/GC8/TCD
Analyst: Adam McAfee
Sample Type: 6.0 L Summa Canister(s)
Test Notes:

Lab File ID: 09131602.D
Date Analyzed: 9/13/16
Time Analyzed: 13:28

Client Sample ID	ALS Sample ID	Lab File ID	Time Analyzed
Lab Control Sample	P160913-LCS	09131603.D	13:38
Duplicate Lab Control Sample	P160913-DLCS	09131604.D	13:47
SV-11-160908	P1604352-007	09131606.D	14:07
SV-12-160908	P1604352-008	09131607.D	14:16
SV-13-160908	P1604352-009	09131609.D	14:43
SV-FD-160908	P1604352-010	09131610.D	14:51

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Client: **Empirical Labs**

ALS Project ID: P1604352

Methane

Test Code: EPA TO-3 Modified
Instrument ID: HP5890 II/GC8/FID
Analyst: Adam McAfee
Sampling Media: 6.0 L Silonite Canister(s)
Test Notes:

Date(s) Collected: 8/30 - 9/8/16
Date Received: 9/10/16
Date Analyzed: 9/13/16

Client Sample ID	ALS Sample ID	Canister Dilution Factor	Injection Volume ml(s)	Result mg/m³	LOQ mg/m³	LOD mg/m³	MDL mg/m³	Data Qualifier
SV-01-160830	P1604352-001	1.38	0.10	**60,000**	4.5	2.4	0.98	
SV-02-160830	P1604352-002	1.45	0.10	**100,000**	4.8	2.5	1.0	
SV-03-160830	P1604352-003	1.46	0.10	**36,000**	4.8	2.5	1.0	
SV-04-160830	P1604352-004	1.37	0.050	**130,000**	9.0	4.7	2.0	
SV-05-160830	P1604352-005	1.53	1.0	**4.6**	0.50	0.26	0.11	
SV-06-160830	P1604352-006	1.47	0.10	**150,000**	4.8	2.5	1.0	
SV-11-160908	P1604352-007	1.41	0.10	**190,000**	4.6	2.4	1.0	
SV-12-160908	P1604352-008	1.40	0.10	**19,000**	4.6	2.4	0.98	
SV-13-160908	P1604352-009	1.45	0.10	**2,200**	4.8	2.5	1.0	
SV-FD-160908	P1604352-010	1.41	0.10	**19,000**	4.6	2.4	1.0	
Method Blank	P160913-MB	1.00	1.0	0.17	0.33	0.17	0.072	**U**

U = Compound was analyzed for, but not detected above the detection limit.
LOQ = Limit of Quantitation - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

ALS ENVIRONMENTAL

LABORATORY CONTROL SAMPLE / DUPLICATE LABORATORY CONTROL SAMPLE SUMMARY

Client: **Empirical Labs**
Client Sample ID: **Duplicate Lab Control Sample**

ALS Project ID: P1604352
ALS Sample ID: P160913-DLCS

Test Code: EPA TO-3 Modified
Instrument ID: HP5890 II/GC8/FID
Analyst: Adam McAfee
Sampling Media: 6.0 L Silonite Canister
Test Notes:

Date Collected: NA
Date Received: NA
Date Analyzed: 9/13/16
Volume(s) Analyzed: NA ml(s)

Compound	Spike Amount LCS / DLCS mg/m³	Result LCS mg/m³	Result DLCS mg/m³	% Recovery LCS	% Recovery DLCS	ALS Acceptance Limits	RPD	RPD Limit	Data Qualifier
Methane	662	648	652	**98**	**98**	79-107	0	8	

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Client: **Empirical Labs**
Client Project ID: ALS Project ID: P1604352

Method Blank Summary

Test Code: EPA TO-3 Modified
Instrument ID: HP5890 II/GC8/FID Lab File ID: 09131602.D
Analyst: Adam McAfee Date Analyzed: 9/13/16
Sampling Media: 6.0 L Silonite Canister(s) Time Analyzed: 08:53
Test Notes:

Client Sample ID	ALS Sample ID	Lab File ID	Time Analyzed
Lab Control Sample	P160913-LCS	09131603.D	09:17
Duplicate Lab Control Sample	P160913-DLCS	09131604.D	09:34
SV-01-160830	P1604352-001	09131606.D	10:00
SV-02-160830	P1604352-002	09131607.D	10:04
SV-03-160830	P1604352-003	09131608.D	10:07
SV-04-160830	P1604352-004	09131610.D	10:15
SV-05-160830	P1604352-005	09131612.D	10:45
SV-06-160830	P1604352-006	09131613.D	10:47
SV-11-160908	P1604352-007	09131614.D	10:52
SV-12-160908	P1604352-008	09131616.D	11:20
SV-13-160908	P1604352-009	09131617.D	11:24
SV-FD-160908	P1604352-010	09131618.D	11:28

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Client: **Empirical Labs**

Client Sample ID: **SV-01-160830**

ALS Project ID: P1604352

ALS Sample ID: P1604352-001

Test Code:	EPA TO-15	Date Collected:	8/30/16
Instrument ID:	Tekmar AUTOCAN/Agilent 5973inert/6890N/MS9	Date Received:	9/10/16
Analyst:	Simon Cao	Date Analyzed:	9/13 - 9/14/16
Sampling Media:	6.0 L Silonite Canister	Volume(s) Analyzed:	0.15 Liter(s)
Test Notes:			0.010 Liter(s)
Container ID:	SSC00283		

Initial Pressure (psig): -1.63 Final Pressure (psig): 3.40

Canister Dilution Factor: 1.38

CAS #	Compound	Result µg/m³	LOQ µg/m³	LOD µg/m³	MDL µg/m³	Data Qualifier
75-01-4	Vinyl Chloride	**9,100**	69	55	23	**D**
75-00-3	Chloroethane	**4.4**	4.6	3.7	1.6	**J**
75-35-4	1,1-Dichloroethene	**140**	4.6	4.0	1.6	
156-60-5	trans-1,2-Dichloroethene	**310**	4.6	3.9	1.7	
75-34-3	1,1-Dichloroethane	**21**	4.6	3.9	1.5	
156-59-2	cis-1,2-Dichloroethene	**1,900**	69	59	22	**D**
107-06-2	1,2-Dichloroethane	3.9	4.6	3.9	1.5	**U**
71-55-6	1,1,1-Trichloroethane	3.8	4.6	3.8	1.6	**U**
79-01-6	Trichloroethene	**120**	4.6	3.8	1.3	
127-18-4	Tetrachloroethene	3.7	4.6	3.7	1.3	**U**

U = Undetected at the limit of detection: The associated data value is the limit of detection, adjusted by any dilution factor used in the analysis.
LOQ = Limit of Quantitation - The minimum quantity of a target analyte that can be confidently determined by the referenced method.
J = The result is an estimated concentration that is less than the LOQ but greater than or equal to the MDL.
D = The reported result is from a dilution.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Client: **Empirical Labs**

Client Sample ID: **SV-02-160830**

ALS Project ID: P1604352

ALS Sample ID: P1604352-002

Test Code:	EPA TO-15	Date Collected:	8/30/16
Instrument ID:	Tekmar AUTOCAN/Agilent 5973inert/6890N/MS9	Date Received:	9/10/16
Analyst:	Simon Cao	Date Analyzed:	9/13/16
Sampling Media:	6.0 L Summa Canister	Volume(s) Analyzed:	0.22 Liter(s)
Test Notes:			
Container ID:	SC01498		

Initial Pressure (psig): -2.03 Final Pressure (psig): 3.70

Canister Dilution Factor: 1.45

CAS #	Compound	Result µg/m³	LOQ µg/m³	LOD µg/m³	MDL µg/m³	Data Qualifier
75-01-4	Vinyl Chloride	**150**	3.3	2.6	1.1	
75-00-3	Chloroethane	**4.1**	3.3	2.6	1.1	
75-35-4	1,1-Dichloroethene	**49**	3.3	2.8	1.1	
156-60-5	trans-1,2-Dichloroethene	**29**	3.3	2.8	1.3	
75-34-3	1,1-Dichloroethane	**3.2**	3.3	2.8	1.1	**J**
156-59-2	cis-1,2-Dichloroethene	**220**	3.3	2.8	1.1	
107-06-2	1,2-Dichloroethane	2.8	3.3	2.8	1.1	**U**
71-55-6	1,1,1-Trichloroethane	2.7	3.3	2.7	1.1	**U**
79-01-6	Trichloroethene	**79**	3.3	2.7	0.92	
127-18-4	Tetrachloroethene	2.6	3.3	2.6	0.92	**U**

U = Undetected at the limit of detection: The associated data value is the limit of detection, adjusted by any dilution factor used in the analysis.
LOQ = Limit of Quantitation - The minimum quantity of a target analyte that can be confidently determined by the referenced method.
J = The result is an estimated concentration that is less than the LOQ but greater than or equal to the MDL.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Client: **Empirical Labs**
Client Sample ID: **SV-03-160830**

ALS Project ID: P1604352
ALS Sample ID: P1604352-003

Test Code: EPA TO-15
Instrument ID: Tekmar AUTOCAN/Agilent 5973inert/6890N/MS9
Analyst: Simon Cao
Sampling Media: 6.0 L Summa Canister
Test Notes:
Container ID: SC01674

Date Collected: 8/30/16
Date Received: 9/10/16
Date Analyzed: 9/13/16
Volume(s) Analyzed: 0.17 Liter(s)

Initial Pressure (psig): -2.44 Final Pressure (psig): 3.22

Canister Dilution Factor: 1.46

CAS #	Compound	Result µg/m³	LOQ µg/m³	LOD µg/m³	MDL µg/m³	Data Qualifier
75-01-4	Vinyl Chloride	**13**	4.3	3.4	1.5	
75-00-3	Chloroethane	3.4	4.3	3.4	1.5	**U**
75-35-4	1,1-Dichloroethene	**7.5**	4.3	3.7	1.5	
156-60-5	trans-1,2-Dichloroethene	**5.5**	4.3	3.6	1.6	
75-34-3	1,1-Dichloroethane	**2.9**	4.3	3.6	1.4	**J**
156-59-2	cis-1,2-Dichloroethene	**110**	4.3	3.7	1.4	
107-06-2	1,2-Dichloroethane	3.6	4.3	3.6	1.4	**U**
71-55-6	1,1,1-Trichloroethane	3.5	4.3	3.5	1.5	**U**
79-01-6	Trichloroethene	**22**	4.3	3.5	1.2	
127-18-4	Tetrachloroethene	3.4	4.3	3.4	1.2	**U**

U = Undetected at the limit of detection: The associated data value is the limit of detection, adjusted by any dilution factor used in the analysis.
LOQ = Limit of Quantitation - The minimum quantity of a target analyte that can be confidently determined by the referenced method.
J = The result is an estimated concentration that is less than the LOQ but greater than or equal to the MDL.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Client: **Empirical Labs**
Client Sample ID: **SV-04-160830**

ALS Project ID: P1604352
ALS Sample ID: P1604352-004

Test Code: EPA TO-15
Instrument ID: Tekmar AUTOCAN/Agilent 5973inert/6890N/MS9
Analyst: Simon Cao
Sampling Media: 6.0 L Summa Canister
Test Notes:
Container ID: SC01687

Date Collected: 8/30/16
Date Received: 9/10/16
Date Analyzed: 9/13/16
Volume(s) Analyzed: 0.15 Liter(s)

Initial Pressure (psig): -1.41 Final Pressure (psig): 3.46

Canister Dilution Factor: 1.37

CAS #	Compound	Result µg/m³	LOQ µg/m³	LOD µg/m³	MDL µg/m³	Data Qualifier
75-01-4	Vinyl Chloride	**150**	4.6	3.7	1.6	
75-00-3	Chloroethane	3.7	4.6	3.7	1.6	**U**
75-35-4	1,1-Dichloroethene	3.9	4.6	3.9	1.6	**U**
156-60-5	trans-1,2-Dichloroethene	**5.4**	4.6	3.8	1.7	
75-34-3	1,1-Dichloroethane	**3.3**	4.6	3.8	1.5	**J**
156-59-2	cis-1,2-Dichloroethene	**23**	4.6	3.9	1.5	
107-06-2	1,2-Dichloroethane	3.8	4.6	3.8	1.5	**U**
71-55-6	1,1,1-Trichloroethane	3.7	4.6	3.7	1.6	**U**
79-01-6	Trichloroethene	3.7	4.6	3.7	1.3	**U**
127-18-4	Tetrachloroethene	3.7	4.6	3.7	1.3	**U**

U = Undetected at the limit of detection: The associated data value is the limit of detection, adjusted by any dilution factor used in the analysis.
LOQ = Limit of Quantitation - The minimum quantity of a target analyte that can be confidently determined by the referenced method.
J = The result is an estimated concentration that is less than the LOQ but greater than or equal to the MDL.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Client: **Empirical Labs**
Client Sample ID: **SV-05-160830**

ALS Project ID: P1604352
ALS Sample ID: P1604352-005

Test Code: EPA TO-15
Instrument ID: Tekmar AUTOCAN/Agilent 5973inert/6890N/MS9
Analyst: Simon Cao
Sampling Media: 6.0 L Silonite Canister
Test Notes:
Container ID: SSC00264

Date Collected: 8/30/16
Date Received: 9/10/16
Date Analyzed: 9/13/16
Volume(s) Analyzed: 1.00 Liter(s)

Initial Pressure (psig): -2.95 Final Pressure (psig): 3.30

Canister Dilution Factor: 1.53

CAS #	Compound	Result µg/m³	LOQ µg/m³	LOD µg/m³	MDL µg/m³	Data Qualifier
75-01-4	Vinyl Chloride	0.61	0.77	0.61	0.26	**U**
75-00-3	Chloroethane	0.61	0.77	0.61	0.26	**U**
75-35-4	1,1-Dichloroethene	0.66	0.77	0.66	0.26	**U**
156-60-5	trans-1,2-Dichloroethene	0.64	0.77	0.64	0.29	**U**
75-34-3	1,1-Dichloroethane	0.64	0.77	0.64	0.24	**U**
156-59-2	cis-1,2-Dichloroethene	0.66	0.77	0.66	0.24	**U**
107-06-2	1,2-Dichloroethane	**0.42**	0.77	0.64	0.24	**J**
71-55-6	1,1,1-Trichloroethane	0.63	0.77	0.63	0.26	**U**
79-01-6	Trichloroethene	**0.23**	0.77	0.63	0.21	**J**
127-18-4	Tetrachloroethene	**0.42**	0.77	0.61	0.21	**J**

U = Undetected at the limit of detection: The associated data value is the limit of detection, adjusted by any dilution factor used in the analysis.
LOQ = Limit of Quantitation - The minimum quantity of a target analyte that can be confidently determined by the referenced method.
J = The result is an estimated concentration that is less than the LOQ but greater than or equal to the MDL.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Client: **Empirical Labs**
Client Sample ID: **SV-06-160830**

ALS Project ID: P1604352
ALS Sample ID: P1604352-006

Test Code: EPA TO-15
Instrument ID: Tekmar AUTOCAN/Agilent 5973inert/6890N/MS9
Analyst: Simon Cao
Sampling Media: 6.0 L Summa Canister
Test Notes:
Container ID: SC02064

Date Collected: 8/30/16
Date Received: 9/10/16
Date Analyzed: 9/13/16
Volume(s) Analyzed: 0.025 Liter(s)

Initial Pressure (psig): -2.40 Final Pressure (psig): 3.35

Canister Dilution Factor: 1.47

CAS #	Compound	Result µg/m³	LOQ µg/m³	LOD µg/m³	MDL µg/m³	Data Qualifier
75-01-4	Vinyl Chloride	**1,400**	29	24	10	
75-00-3	Chloroethane	24	29	24	10	**U**
75-35-4	1,1-Dichloroethene	**130**	29	25	10	
156-60-5	trans-1,2-Dichloroethene	**68**	29	25	11	
75-34-3	1,1-Dichloroethane	25	29	25	9.4	**U**
156-59-2	cis-1,2-Dichloroethene	**470**	29	25	9.4	
107-06-2	1,2-Dichloroethane	25	29	25	9.4	**U**
71-55-6	1,1,1-Trichloroethane	24	29	24	10	**U**
79-01-6	Trichloroethene	**210**	29	24	8.2	
127-18-4	Tetrachloroethene	24	29	24	8.2	**U**

U = Undetected at the limit of detection: The associated data value is the limit of detection, adjusted by any dilution factor used in the analysis.
LOQ = Limit of Quantitation - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Client: **Empirical Labs**

Client Sample ID: **SV-11-160908**

ALS Project ID: P1604352

ALS Sample ID: P1604352-007

Test Code: EPA TO-15 Date Collected: 9/8/16

Instrument ID: Tekmar AUTOCAN/Agilent 5973inert/6890N/MS9 Date Received: 9/10/16

Analyst: Simon Cao Date Analyzed: 9/13/16

Sampling Media: 6.0 L Summa Canister Volume(s) Analyzed: 0.025 Liter(s)

Test Notes:

Container ID: SC01508

Initial Pressure (psig): -1.99 Final Pressure (psig): 3.25

Canister Dilution Factor: 1.41

CAS #	Compound	Result µg/m³	LOQ µg/m³	LOD µg/m³	MDL µg/m³	Data Qualifier
75-01-4	Vinyl Chloride	23	28	23	9.6	**U**
75-00-3	Chloroethane	23	28	23	9.6	**U**
75-35-4	1,1-Dichloroethene	24	28	24	9.6	**U**
156-60-5	trans-1,2-Dichloroethene	24	28	24	11	**U**
75-34-3	1,1-Dichloroethane	24	28	24	9.0	**U**
156-59-2	cis-1,2-Dichloroethene	**11**	28	24	9.0	**J**
107-06-2	1,2-Dichloroethane	24	28	24	9.0	**U**
71-55-6	1,1,1-Trichloroethane	23	28	23	9.6	**U**
79-01-6	Trichloroethene	23	28	23	7.9	**U**
127-18-4	Tetrachloroethene	23	28	23	7.9	**U**

U = Undetected at the limit of detection: The associated data value is the limit of detection, adjusted by any dilution factor used in the analysis.
LOQ = Limit of Quantitation - The minimum quantity of a target analyte that can be confidently determined by the referenced method.
J = The result is an estimated concentration that is less than the LOQ but greater than or equal to the MDL.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Client: **Empirical Labs**
Client Sample ID: **SV-12-160908**

ALS Project ID: P1604352
ALS Sample ID: P1604352-008

Test Code: EPA TO-15
Instrument ID: Tekmar AUTOCAN/Agilent 5973inert/6890N/MS9
Analyst: Simon Cao
Sampling Media: 6.0 L Summa Canister
Test Notes:
Container ID: SC00817

Date Collected: 9/8/16
Date Received: 9/10/16
Date Analyzed: 9/13/16
Volume(s) Analyzed: 0.025 Liter(s)

Initial Pressure (psig): -1.95 Final Pressure (psig): 3.16

Canister Dilution Factor: 1.40

CAS #	Compound	Result µg/m³	LOQ µg/m³	LOD µg/m³	MDL µg/m³	Data Qualifier
75-01-4	Vinyl Chloride	**82**	28	22	9.5	
75-00-3	Chloroethane	22	28	22	9.5	**U**
75-35-4	1,1-Dichloroethene	24	28	24	9.5	**U**
156-60-5	trans-1,2-Dichloroethene	24	28	24	11	**U**
75-34-3	1,1-Dichloroethane	24	28	24	9.0	**U**
156-59-2	cis-1,2-Dichloroethene	**42**	28	24	9.0	
107-06-2	1,2-Dichloroethane	24	28	24	9.0	**U**
71-55-6	1,1,1-Trichloroethane	23	28	23	9.5	**U**
79-01-6	Trichloroethene	**15**	28	23	7.8	**J**
127-18-4	Tetrachloroethene	22	28	22	7.8	**U**

U = Undetected at the limit of detection: The associated data value is the limit of detection, adjusted by any dilution factor used in the analysis.
LOQ = Limit of Quantitation - The minimum quantity of a target analyte that can be confidently determined by the referenced method.
J = The result is an estimated concentration that is less than the LOQ but greater than or equal to the MDL.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Client: **Empirical Labs**
Client Sample ID: **SV-13-160908**

ALS Project ID: P1604352
ALS Sample ID: P1604352-009

Test Code:	EPA TO-15	Date Collected:	9/8/16
Instrument ID:	Tekmar AUTOCAN/Agilent 5973inert/6890N/MS9	Date Received:	9/10/16
Analyst:	Simon Cao	Date Analyzed:	9/13 - 9/14/16
Sampling Media:	6.0 L Summa Canister	Volume(s) Analyzed:	0.27 Liter(s)
Test Notes:			0.025 Liter(s)
Container ID:	SC01653		

Initial Pressure (psig): -2.35 Final Pressure (psig): 3.16

Canister Dilution Factor: 1.45

CAS #	Compound	Result µg/m³	LOQ µg/m³	LOD µg/m³	MDL µg/m³	Data Qualifier
75-01-4	Vinyl Chloride	**39**	2.7	2.1	0.91	
75-00-3	Chloroethane	**0.98**	2.7	2.1	0.91	**J**
75-35-4	1,1-Dichloroethene	**39**	2.7	2.3	0.91	
156-60-5	trans-1,2-Dichloroethene	**89**	2.7	2.3	1.0	
75-34-3	1,1-Dichloroethane	2.3	2.7	2.3	0.86	**U**
156-59-2	cis-1,2-Dichloroethene	**760**	29	25	9.3	**D**
107-06-2	1,2-Dichloroethane	2.3	2.7	2.3	0.86	**U**
71-55-6	1,1,1-Trichloroethane	2.2	2.7	2.2	0.91	**U**
79-01-6	Trichloroethene	**420**	2.7	2.2	0.75	
127-18-4	Tetrachloroethene	**6.0**	2.7	2.1	0.75	

U = Undetected at the limit of detection: The associated data value is the limit of detection, adjusted by any dilution factor used in the analysis.
LOQ = Limit of Quantitation - The minimum quantity of a target analyte that can be confidently determined by the referenced method.
J = The result is an estimated concentration that is less than the LOQ but greater than or equal to the MDL.
D = The reported result is from a dilution.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Client: **Empirical Labs**
Client Sample ID: **SV-FD-160908**

ALS Project ID: P1604352
ALS Sample ID: P1604352-010

Test Code: EPA TO-15
Instrument ID: Tekmar AUTOCAN/Agilent 5973inert/6890N/MS9
Analyst: Simon Cao
Sampling Media: 6.0 L Summa Canister
Test Notes:
Container ID: SC01656

Date Collected: 9/8/16
Date Received: 9/10/16
Date Analyzed: 9/13/16
Volume(s) Analyzed: 0.015 Liter(s)

Initial Pressure (psig): -2.00 Final Pressure (psig): 3.25

Canister Dilution Factor: 1.41

CAS #	Compound	Result µg/m³	LOQ µg/m³	LOD µg/m³	MDL µg/m³	Data Qualifier
75-01-4	Vinyl Chloride	**89**	47	38	16	
75-00-3	Chloroethane	38	47	38	16	**U**
75-35-4	1,1-Dichloroethene	40	47	40	16	**U**
156-60-5	trans-1,2-Dichloroethene	39	47	39	18	**U**
75-34-3	1,1-Dichloroethane	39	47	39	15	**U**
156-59-2	cis-1,2-Dichloroethene	**43**	47	40	15	**J**
107-06-2	1,2-Dichloroethane	39	47	39	15	**U**
71-55-6	1,1,1-Trichloroethane	39	47	39	16	**U**
79-01-6	Trichloroethene	**16**	47	39	13	**J**
127-18-4	Tetrachloroethene	38	47	38	13	**U**

U = Undetected at the limit of detection: The associated data value is the limit of detection, adjusted by any dilution factor used in the analysis.
LOQ = Limit of Quantitation - The minimum quantity of a target analyte that can be confidently determined by the referenced method.
J = The result is an estimated concentration that is less than the LOQ but greater than or equal to the MDL.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Client: **Empirical Labs**
Client Sample ID: **Method Blank**

ALS Project ID: P1604352
ALS Sample ID: P160913-MB

Test Code: EPA TO-15
Instrument ID: Tekmar AUTOCAN/Agilent 5973inert/6890N/MS9
Analyst: Simon Cao
Sampling Media: 6.0 L Silonite Canister
Test Notes:

Date Collected: NA
Date Received: NA
Date Analyzed: 9/13/16
Volume(s) Analyzed: 1.00 Liter(s)

Canister Dilution Factor: 1.00

CAS #	Compound	Result µg/m³	LOQ µg/m³	LOD µg/m³	MDL µg/m³	Data Qualifier
75-01-4	Vinyl Chloride	0.40	0.50	0.40	0.17	**U**
75-00-3	Chloroethane	0.40	0.50	0.40	0.17	**U**
75-35-4	1,1-Dichloroethene	0.43	0.50	0.43	0.17	**U**
156-60-5	trans-1,2-Dichloroethene	0.42	0.50	0.42	0.19	**U**
75-34-3	1,1-Dichloroethane	0.42	0.50	0.42	0.16	**U**
156-59-2	cis-1,2-Dichloroethene	0.43	0.50	0.43	0.16	**U**
107-06-2	1,2-Dichloroethane	0.42	0.50	0.42	0.16	**U**
71-55-6	1,1,1-Trichloroethane	0.41	0.50	0.41	0.17	**U**
79-01-6	Trichloroethene	0.41	0.50	0.41	0.14	**U**
127-18-4	Tetrachloroethene	0.40	0.50	0.40	0.14	**U**

U = Undetected at the limit of detection: The associated data value is the limit of detection, adjusted by any dilution factor used in the analysis.
LOQ = Limit of Quantitation - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Client: **Empirical Labs**
Client Sample ID: **Method Blank**

ALS Project ID: P1604352
ALS Sample ID: P160914-MB

Test Code: EPA TO-15
Instrument ID: Tekmar AUTOCAN/Agilent 5973inert/6890N/MS9
Analyst: Simon Cao
Sampling Media: 6.0 L Silonite Canister
Test Notes:

Date Collected: NA
Date Received: NA
Date Analyzed: 9/14/16
Volume(s) Analyzed: 1.00 Liter(s)

Canister Dilution Factor: 1.00

CAS #	Compound	Result µg/m³	LOQ µg/m³	LOD µg/m³	MDL µg/m³	Data Qualifier
75-01-4	Vinyl Chloride	0.40	0.50	0.40	0.17	**U**
75-00-3	Chloroethane	0.40	0.50	0.40	0.17	**U**
75-35-4	1,1-Dichloroethene	0.43	0.50	0.43	0.17	**U**
156-60-5	trans-1,2-Dichloroethene	0.42	0.50	0.42	0.19	**U**
75-34-3	1,1-Dichloroethane	0.42	0.50	0.42	0.16	**U**
156-59-2	cis-1,2-Dichloroethene	0.43	0.50	0.43	0.16	**U**
107-06-2	1,2-Dichloroethane	0.42	0.50	0.42	0.16	**U**
71-55-6	1,1,1-Trichloroethane	0.41	0.50	0.41	0.17	**U**
79-01-6	Trichloroethene	0.41	0.50	0.41	0.14	**U**
127-18-4	Tetrachloroethene	0.40	0.50	0.40	0.14	**U**

U = Undetected at the limit of detection: The associated data value is the limit of detection, adjusted by any dilution factor used in the analysis.
LOQ = Limit of Quantitation - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

ALS ENVIRONMENTAL

SURROGATE SPIKE RECOVERY RESULTS

Client: **Empirical Labs**

ALS Project ID: P1604352

Test Code: EPA TO-15
Instrument ID: Tekmar AUTOCAN/Agilent 5973inert/6890N/MS9
Analyst: Simon Cao
Sampling Media: 6.0 L Silonite Canister(s)
Test Notes:

Date(s) Collected: 8/30 - 9/8/16
Date(s) Received: 9/10/16
Date(s) Analyzed: 9/13 - 9/14/16

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	P160913-MB	**104**	**103**	**99**	70-130	
Method Blank	P160914-MB	**94**	**104**	**96**	70-130	
Lab Control Sample	P160913-LCS	**94**	**103**	**101**	70-130	
Lab Control Sample	P160914-LCS	**94**	**102**	**99**	70-130	
Duplicate Lab Control Sample	P160913-DLCS	**95**	**102**	**102**	70-130	
Duplicate Lab Control Sample	P160914-DLCS	**94**	**103**	**100**	70-130	
SV-01-160830	P1604352-001	**94**	**100**	**99**	70-130	
SV-02-160830	P1604352-002	**96**	**100**	**99**	70-130	
SV-03-160830	P1604352-003	**95**	**102**	**101**	70-130	
SV-04-160830	P1604352-004	**95**	**98**	**97**	70-130	
SV-05-160830	P1604352-005	**95**	**100**	**101**	70-130	
SV-06-160830	P1604352-006	**94**	**97**	**97**	70-130	
SV-11-160908	P1604352-007	**95**	**102**	**98**	70-130	
SV-12-160908	P1604352-008	**94**	**100**	**98**	70-130	
SV-13-160908	P1604352-009	**94**	**101**	**100**	70-130	
SV-FD-160908	P1604352-010	**94**	**100**	**97**	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 / DUPLICATE LABORATORY CONTROL SAMPLE SUMMARY

Client: **Empirical Labs**
Client Sample ID: **Duplicate Lab Control Sample**

ALS Project ID: P1604352
ALS Sample ID: P160913-DLCS

Test Code: EPA TO-15
Instrument ID: Tekmar AUTOCAN/Agilent 5973inert/6890N/MS9
Analyst: Simon Cao
Sampling Media: 6.0 L Silonite Canister
Test Notes:

Date Collected: NA
Date Received: NA
Date Analyzed: 9/13/16
Volume(s) Analyzed: 0.125 Liter(s)

CAS #	Compound	Spike Amount LCS / DLCS µg/m³	Result LCS µg/m³	Result DLCS µg/m³	% Recovery LCS	% Recovery DLCS	DOD Acceptance Limits	RPD	RPD Limit	Data Qualifier
75-01-4	Vinyl Chloride	200	201	206	**101**	**103**	64-127	2	25	
75-00-3	Chloroethane	200	209	210	**105**	**105**	63-127	0	25	
75-35-4	1,1-Dichloroethene	216	218	221	**101**	**102**	61-133	1	25	
156-60-5	trans-1,2-Dichloroethene	210	228	231	**109**	**110**	67-124	0.9	25	
75-34-3	1,1-Dichloroethane	212	199	201	**94**	**95**	68-126	1	25	
156-59-2	cis-1,2-Dichloroethene	218	216	218	**99**	**100**	70-121	1	25	
107-06-2	1,2-Dichloroethane	214	202	204	**94**	**95**	65-128	1	25	
71-55-6	1,1,1-Trichloroethane	210	193	195	**92**	**93**	68-125	1	25	
79-01-6	Trichloroethene	216	193	196	**89**	**91**	71-123	2	25	
127-18-4	Tetrachloroethene	202	197	199	**98**	**99**	66-124	1	25	

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 / DUPLICATE LABORATORY CONTROL SAMPLE SUMMARY

Client: **Empirical Labs**
Client Sample ID: **Duplicate Lab Control Sample**

ALS Project ID: P1604352
ALS Sample ID: P160914-DLCS

Test Code: EPA TO-15
Instrument ID: Tekmar AUTOCAN/Agilent 5973inert/6890N/MS9
Analyst: Simon Cao
Sampling Media: 6.0 L Silonite Canister
Test Notes:

Date Collected: NA
Date Received: NA
Date Analyzed: 9/14/16
Volume(s) Analyzed: 0.125 Liter(s)

CAS #	Compound	Spike Amount LCS / DLCS µg/m³	Result LCS µg/m³	Result DLCS µg/m³	% Recovery LCS	% Recovery DLCS	DOD Acceptance Limits	RPD	RPD Limit	Data Qualifier
75-01-4	Vinyl Chloride	200	204	208	**102**	**104**	64-127	2	25	
75-00-3	Chloroethane	200	210	206	**105**	**103**	63-127	2	25	
75-35-4	1,1-Dichloroethene	216	215	217	**100**	**100**	61-133	0	25	
156-60-5	trans-1,2-Dichloroethene	210	225	229	**107**	**109**	67-124	2	25	
75-34-3	1,1-Dichloroethane	212	198	198	**93**	**93**	68-126	0	25	
156-59-2	cis-1,2-Dichloroethene	218	213	217	**98**	**100**	70-121	2	25	
107-06-2	1,2-Dichloroethane	214	198	200	**93**	**93**	65-128	0	25	
71-55-6	1,1,1-Trichloroethane	210	190	191	**90**	**91**	68-125	1	25	
79-01-6	Trichloroethene	216	189	191	**88**	**88**	71-123	0	25	
127-18-4	Tetrachloroethene	202	190	194	**94**	**96**	66-124	2	25	

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.

Client: **Empirical Labs** ALS Project ID: P1604352

Method Blank Summary

Test Code: EPA TO-15
Instrument ID: Tekmar AUTOCAN/Agilent 5973inert/6890N/MS9 Lab File ID: 09131604.D
Analyst: Simon Cao Date Analyzed: 9/13/16
Sampling Media: 6.0 L Silonite Canister(s) Time Analyzed: 10:53
Test Notes:

Client Sample ID	ALS Sample ID	Lab File ID	Time Analyzed
Lab Control Sample	P160913-LCS	09131605.D	11:26
Duplicate Lab Control Sample	P160913-DLCS	09131606.D	12:00
SV-01-160830	P1604352-001	09131616.D	18:05
SV-02-160830	P1604352-002	09131617.D	18:39
SV-03-160830	P1604352-003	09131618.D	19:13
SV-04-160830	P1604352-004	09131619.D	19:46
SV-05-160830	P1604352-005	09131620.D	20:20
SV-06-160830	P1604352-006	09131621.D	20:54
SV-11-160908	P1604352-007	09131622.D	21:28
SV-12-160908	P1604352-008	09131623.D	22:02
SV-13-160908	P1604352-009	09131624.D	22:36
SV-FD-160908	P1604352-010	09131625.D	23:10

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Client: **Empirical Labs** ALS Project ID: P1604352

Method Blank Summary

Test Code: EPA TO-15
Instrument ID: Tekmar AUTOCAN/Agilent 5973inert/6890N/MS9 Lab File ID: 09141603.D
Analyst: Simon Cao Date Analyzed: 9/14/16
Sampling Media: 6.0 L Silonite Canister(s) Time Analyzed: 06:47
Test Notes:

Client Sample ID	ALS Sample ID	Lab File ID	Time Analyzed
Lab Control Sample	P160914-LCS	09141604.D	07:20
Duplicate Lab Control Sample	P160914-DLCS	09141605.D	07:54
SV-13-160908 (Dilution)	P1604352-009	09141615.D	15:23
SV-01-160830 (Dilution)	P1604352-001	09141616.D	16:03

Client: **Empirical Labs** ALS Project ID: P1604352

Internal Standard Area and RT Summary

Test Code: EPA TO-15
Instrument ID: Tekmar AUTOCAN/Agilent 5973inert/6890N/MS9 Lab File ID: 09131602.D
Analyst: Simon Cao Date Analyzed: 9/13/16
Sampling Media: 6.0 L Silonite Canister(s) Time Analyzed: 09:46
Test Notes:

		IS1 (BCM)		IS2 (DFB)		IS3 (CBZ)	
		AREA #	RT #	AREA #	RT #	AREA #	RT #
	24 Hour Standard	185896	8.91	874653	10.88	338325	15.22
	Upper Limit	260254	9.24	1224514	11.21	473655	15.55
	Lower Limit	111538	8.58	524792	10.55	202995	14.89
	Client Sample ID						
01	Method Blank	166826	8.89	856703	10.87	328060	15.22
02	Lab Control Sample	190331	8.91	886341	10.88	342815	15.22
03	Duplicate Lab Control Sample	188715	8.92	881620	10.88	341925	15.22
04	SV-01-160830	192222	8.90	883657	10.87	356340	15.22
05	SV-02-160830	192098	8.90	906299	10.87	367834	15.22
06	SV-03-160830	194812	8.89	912470	10.87	365268	15.22
07	SV-04-160830	195608	8.89	922294	10.87	384058	15.22
08	SV-05-160830	193211	8.89	905512	10.87	366706	15.22
09	SV-06-160830	210139	8.89	968045	10.87	404691	15.22
10	SV-11-160908	206736	8.89	981972	10.87	389161	15.22
11	SV-12-160908	207271	8.89	964407	10.87	389043	15.22
12	SV-13-160908	198089	8.90	922882	10.87	371419	15.22
13	SV-FD-160908	206389	8.89	966370	10.87	388968	15.22
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.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Client: **Empirical Labs** ALS Project ID: P1604352

Internal Standard Area and RT Summary

Test Code: EPA TO-15
Instrument ID: Tekmar AUTOCAN/Agilent 5973inert/6890N/MS9 Lab File ID: 09141601.D
Analyst: Simon Cao Date Analyzed: 9/14/16
Sampling Media: 6.0 L Silonite Canister(s) Time Analyzed: 05:40
Test Notes:

		IS1 (BCM)		IS2 (DFB)		IS3 (CBZ)	
		AREA #	RT #	AREA #	RT #	AREA #	RT #
	24 Hour Standard	187795	8.91	884069	10.88	342921	15.22
	Upper Limit	262913	9.24	1237697	11.21	480089	15.55
	Lower Limit	112677	8.58	530441	10.55	205753	14.89
	Client Sample ID						
01	Method Blank	188913	8.89	889214	10.87	339220	15.22
02	Lab Control Sample	194719	8.92	909591	10.88	353867	15.22
03	Duplicate Lab Control Sample	194116	8.91	907525	10.88	351940	15.22
04	SV-13-160908 (Dilution)	201569	8.89	928077	10.87	366146	15.22
05	SV-01-160830 (Dilution)	195371	8.89	899724	10.87	363034	15.22
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

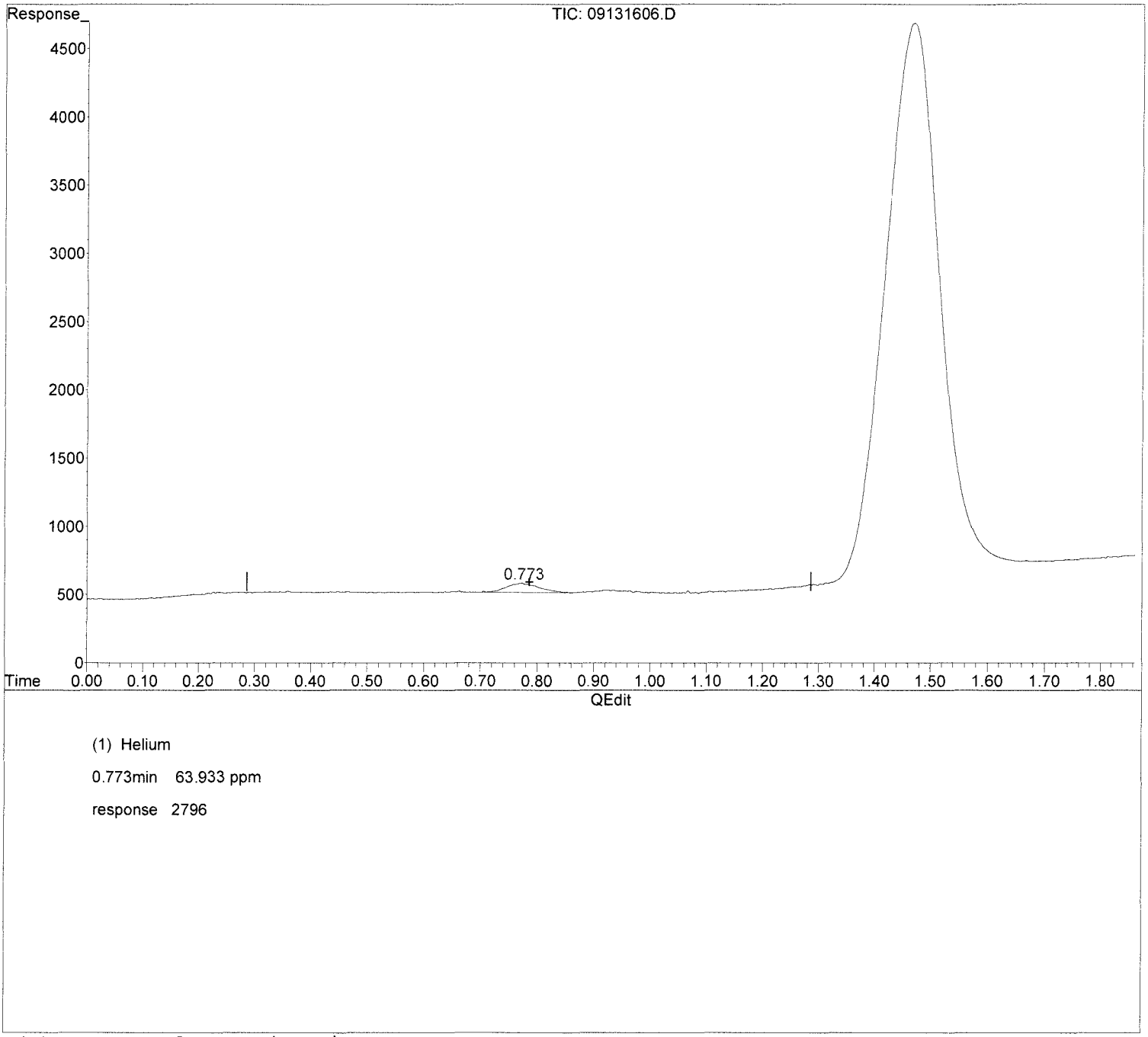
# Column used to flag values outside QC limits with an I.
I = Internal standard not within the specified limits.

Quantitation Report (Qedit)

Data Path : I:\GC08\DATA\H2_He\2016_09\13\
Data File : 09131606.D
Signal(s) : TCD1A.CH
Acq On : 13-Sep-2016, 14:07:56
Operator : amf
Sample : 4352-007 1ml
Misc :
ALS Vial : 1 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Sep 13 14:14:56 2016
Quant Method : I:\GC08\METHODS\H2HE092115.M
Quant Title : Hydrogen and Helium by EPA Method 3C
QLast Update : Mon Sep 21 15:38:09 2015
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. :
Signal Phase :
Signal Info :



(1) Helium

0.773min 63.933 ppm

response 2796

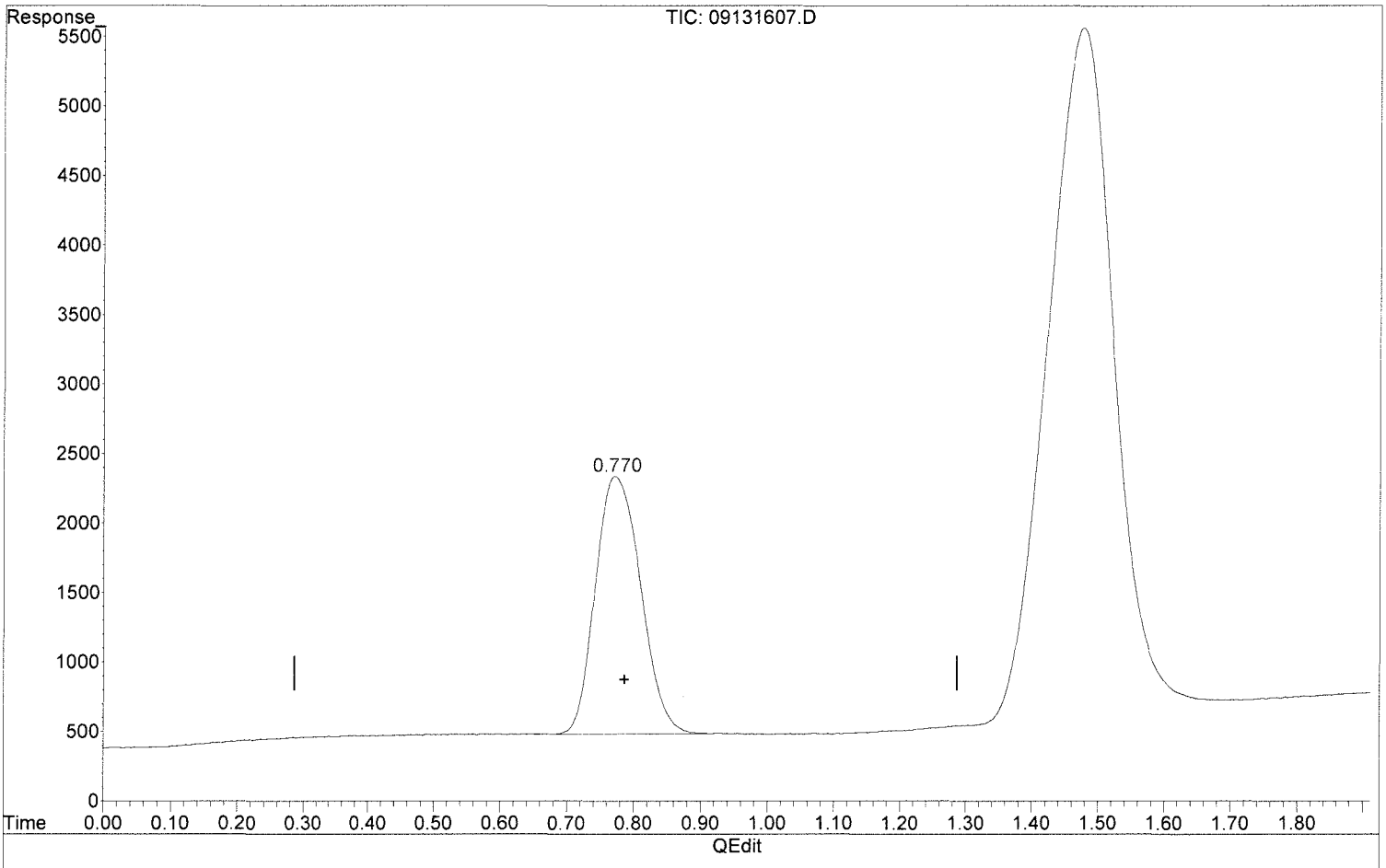
(+) = Expected Retention Time

Quantitation Report (Qedit)

Data Path : I:\GC08\DATA\H2_He\2016_09\13\
Data File : 09131607.D
Signal(s) : TCD1A.CH
Acq On : 13-Sep-2016, 14:16:20
Operator : amf
Sample : 4352-008 1ml
Misc :
ALS Vial : 1 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Sep 13 14:24:24 2016
Quant Method : I:\GC08\METHODS\H2HE092115.M
Quant Title : Hydrogen and Helium by EPA Method 3C
QLast Update : Mon Sep 21 15:38:09 2015
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. :
Signal Phase :
Signal Info :



(1) Helium

0.772min 2005.179 ppm

response 87688

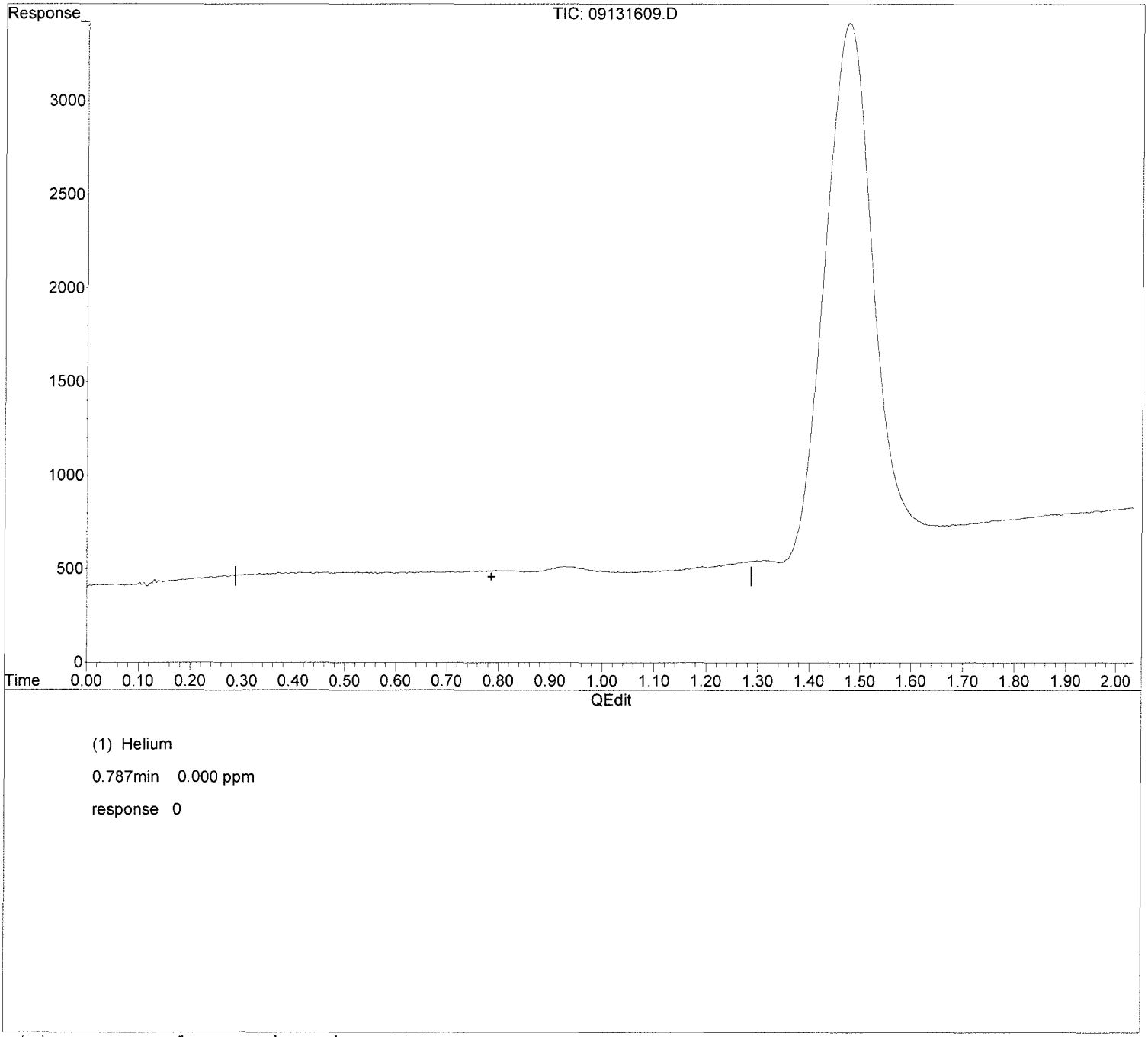
(+) = Expected Retention Time

Quantitation Report (Qedit)

Data Path : I:\GC08\DATA\H2_He\2016_09\13\
Data File : 09131609.D
Signal(s) : TCD1A.CH
Acq On : 13-Sep-2016, 14:43:05
Operator : amf
Sample : 4352-009 1ml
Misc :
ALS Vial : 1 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Sep 13 14:48:13 2016
Quant Method : I:\GC08\METHODS\H2HE092115.M
Quant Title : Hydrogen and Helium by EPA Method 3C
QLast Update : Mon Sep 21 15:38:09 2015
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. :
Signal Phase :
Signal Info :



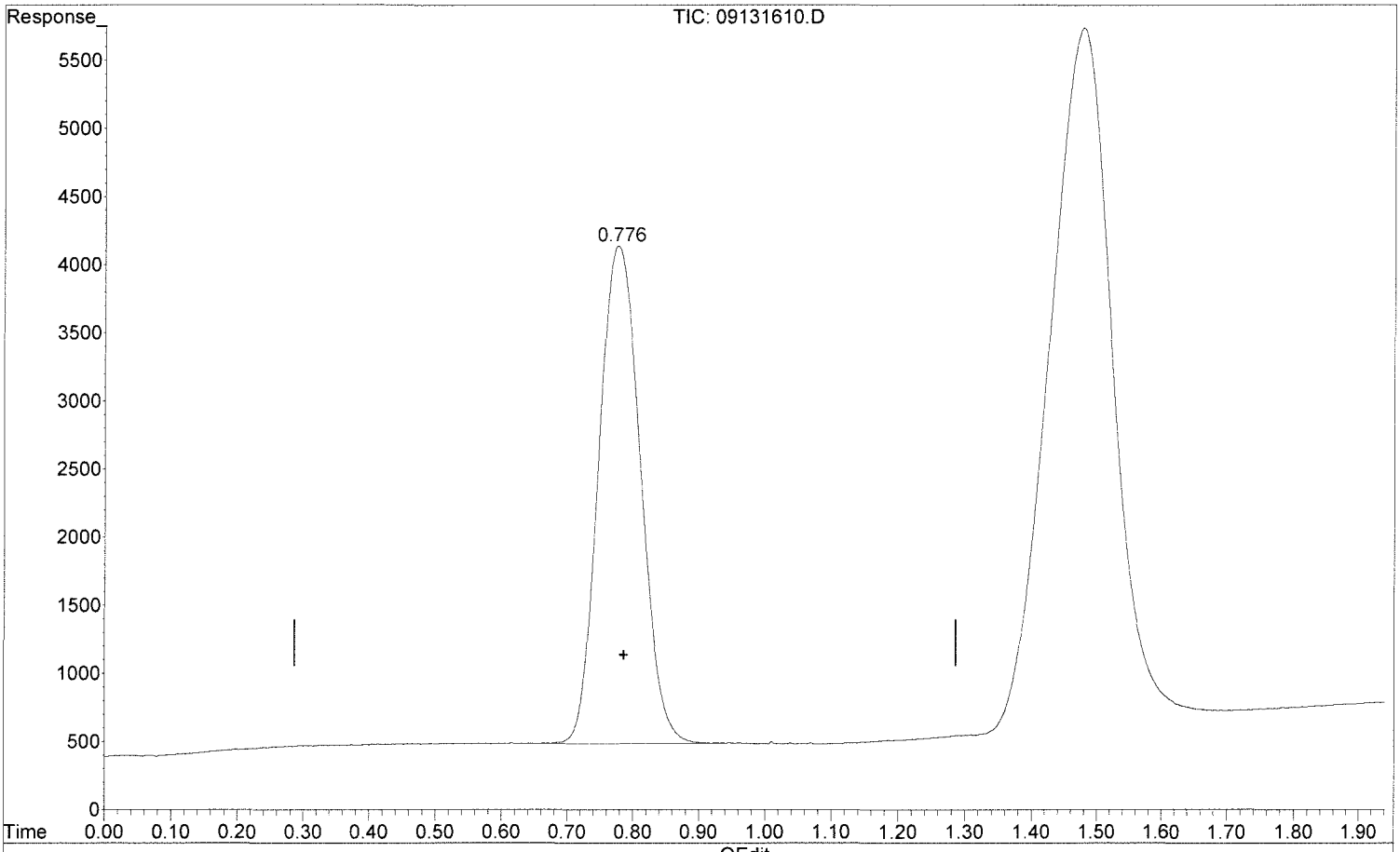
(+) = Expected Retention Time

Quantitation Report (Qedit)

Data Path : I:\GC08\DATA\H2_He\2016_09\13\
Data File : 09131610.D
Signal(s) : TCD1A.CH
Acq On : 13-Sep-2016, 14:51:37
Operator : amf
Sample : 4352-010 1ml
Misc :
ALS Vial : 1 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Sep 13 14:57:07 2016
Quant Method : I:\GC08\METHODS\H2HE092115.M
Quant Title : Hydrogen and Helium by EPA Method 3C
QLast Update : Mon Sep 21 15:38:09 2015
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. :
Signal Phase :
Signal Info :



(1) Helium

0.776min 3676.020 ppm

response 160755

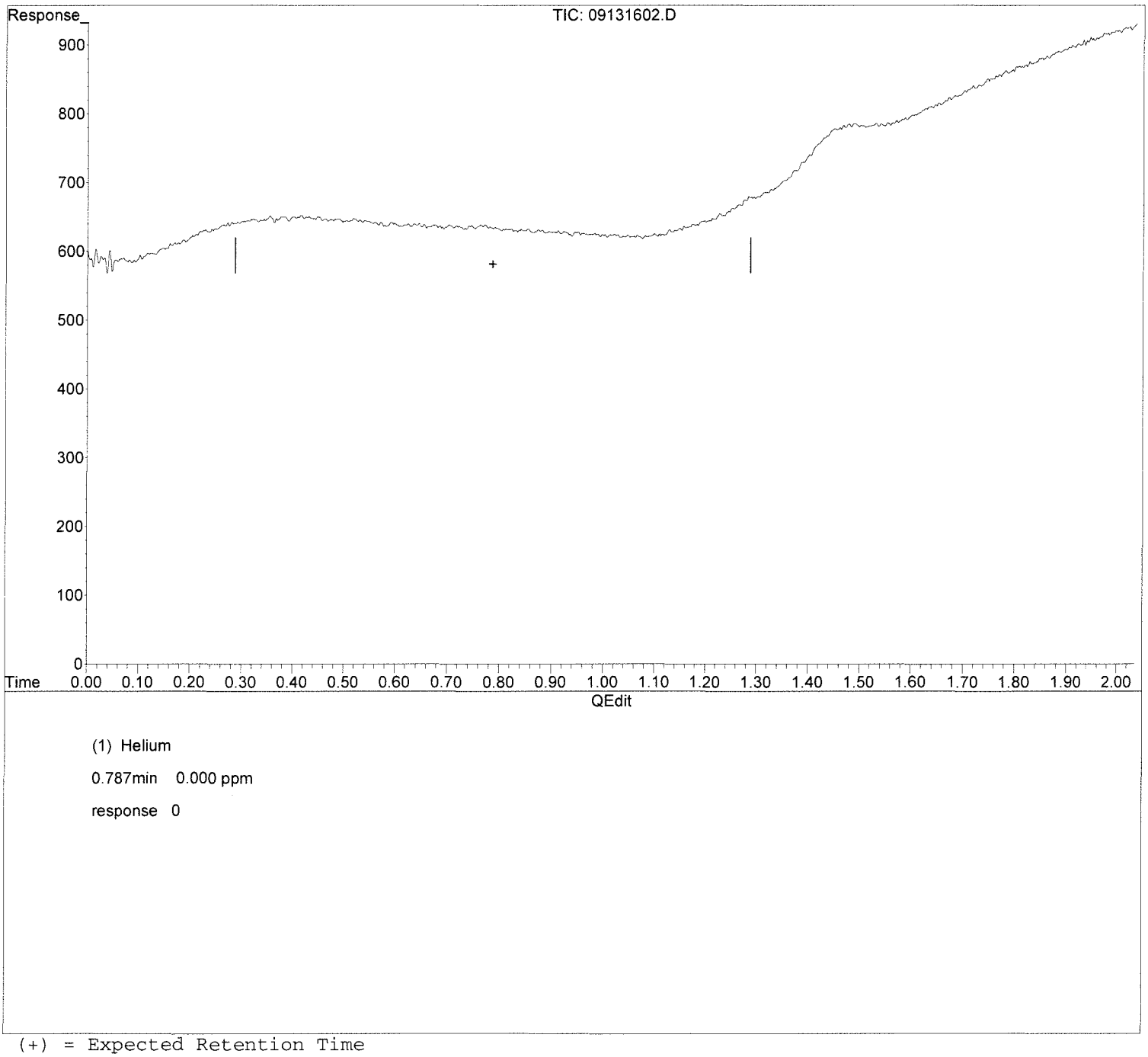
(+) = Expected Retention Time

Quantitation Report (Qedit)

Data Path : I:\GC08\DATA\H2_He\2016_09\13\
Data File : 09131602.D
Signal(s) : TCD1A.CH
Acq On : 13-Sep-2016, 13:28:02
Operator : amf
Sample : mb 1ml
Misc :
ALS Vial : 1 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Sep 13 13:35:12 2016
Quant Method : I:\GC08\METHODS\H2HE092115.M
Quant Title : Hydrogen and Helium by EPA Method 3C
QLast Update : Mon Sep 21 15:38:09 2015
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. :
Signal Phase :
Signal Info :



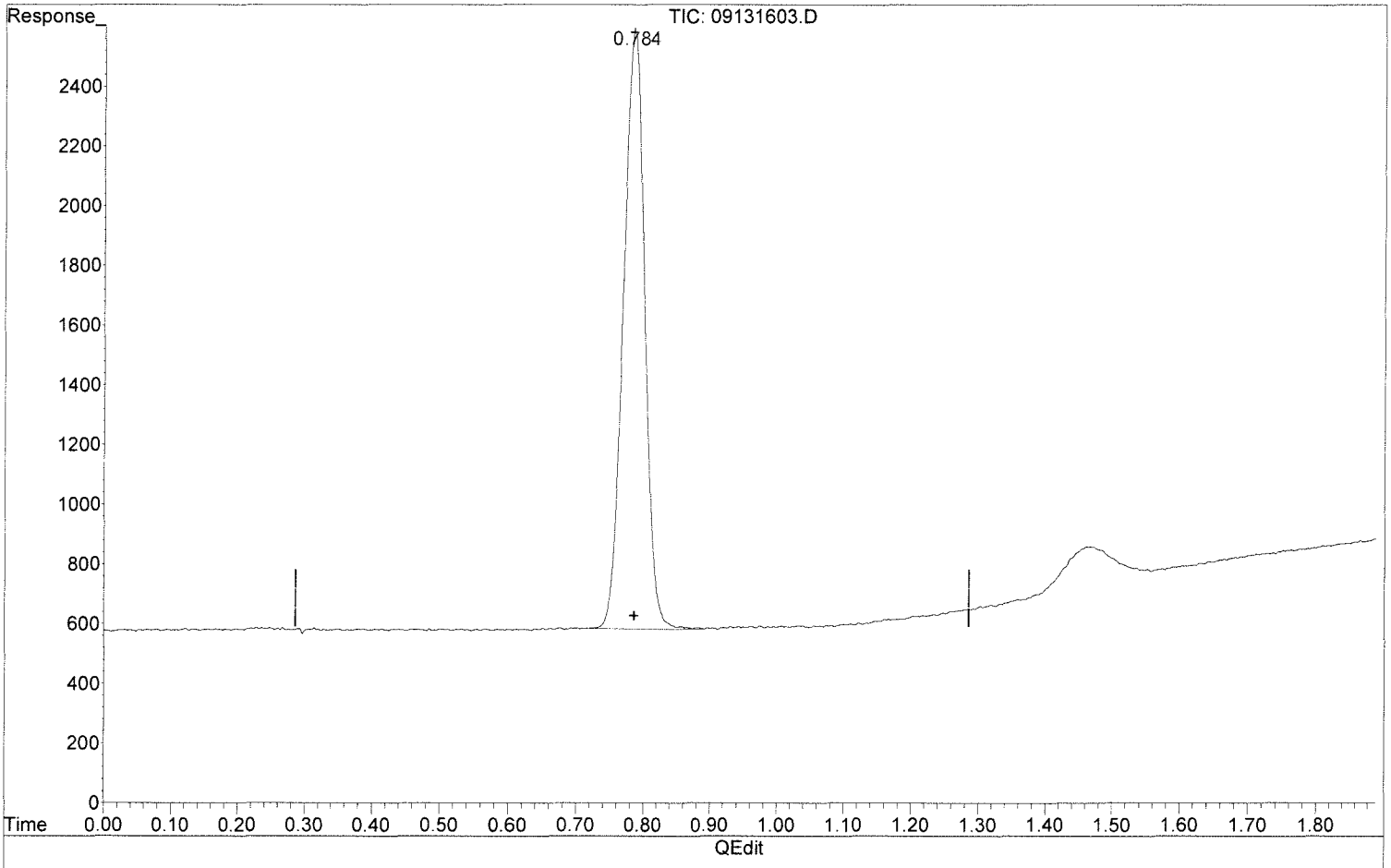
(+) = Expected Retention Time

Quantitation Report (Qedit)

Data Path : I:\GC08\DATA\H2_He\2016_09\13\
Data File : 09131603.D
Signal(s) : TCD1A.CH
Acq On : 13-Sep-2016, 13:38:14
Operator : amf
Sample : lcs s30-09131602
Misc :
ALS Vial : 1 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Sep 13 13:46:48 2016
Quant Method : I:\GC08\METHODS\H2HE092115.M
Quant Title : Hydrogen and Helium by EPA Method 3C
QLast Update : Mon Sep 21 15:38:09 2015
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. :
Signal Phase :
Signal Info :



(1) Helium

0.785min 1013.090 ppm

response 44303

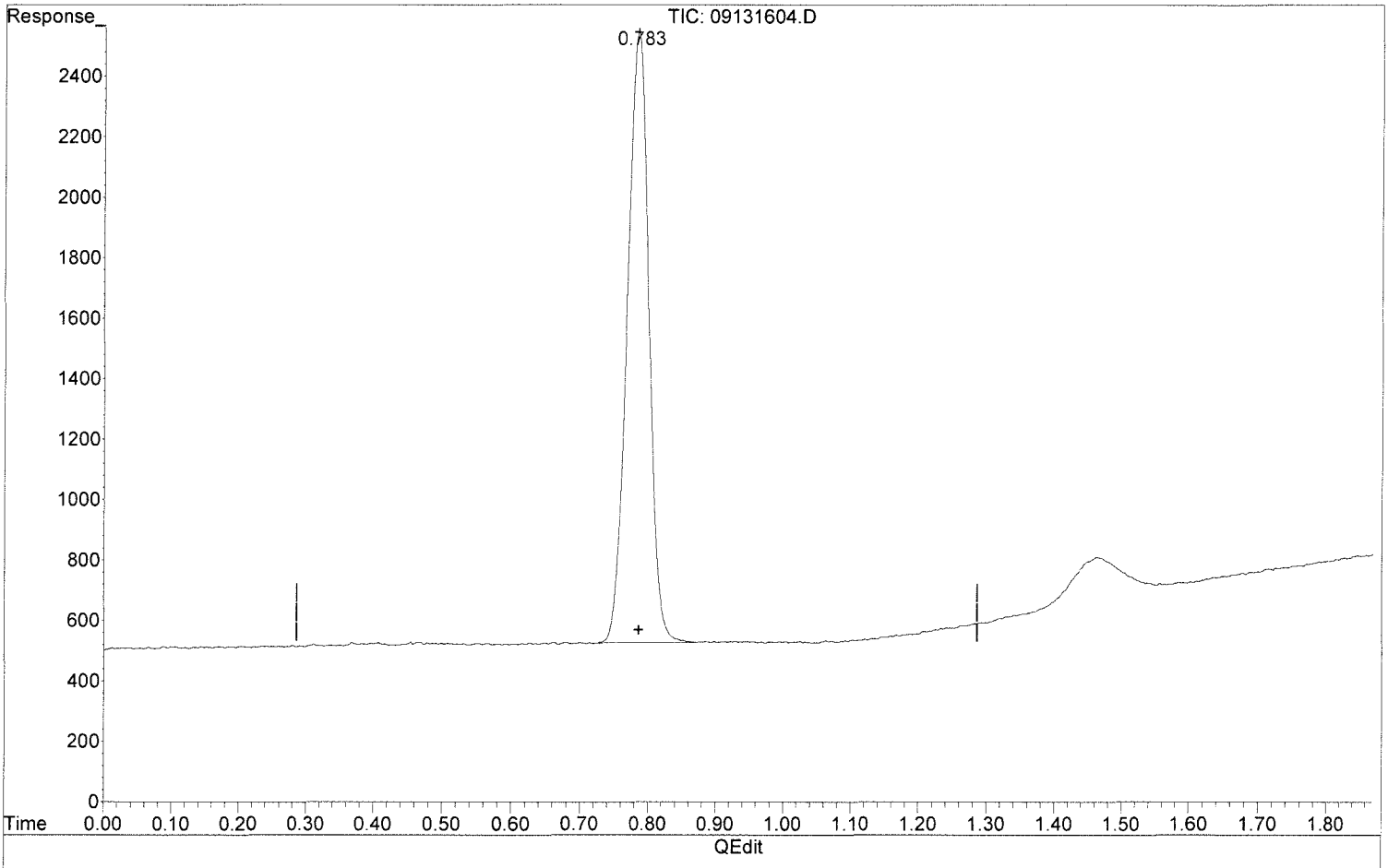
(+) = Expected Retention Time

Quantitation Report (Qedit)

Data Path : I:\GC08\DATA\H2_He\2016_09\13\
Data File : 09131604.D
Signal(s) : TCD1A.CH
Acq On : 13-Sep-2016, 13:47:38
Operator : amf
Sample : lcsds30-09131602
Misc :
ALS Vial : 1 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Sep 13 13:56:56 2016
Quant Method : I:\GC08\METHODS\H2HE092115.M
Quant Title : Hydrogen and Helium by EPA Method 3C
QLast Update : Mon Sep 21 15:38:09 2015
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. :
Signal Phase :
Signal Info :



(1) Helium

0.784min 1027.981 ppm

response 44954

(+) = Expected Retention Time

Response Factor Report HP5890

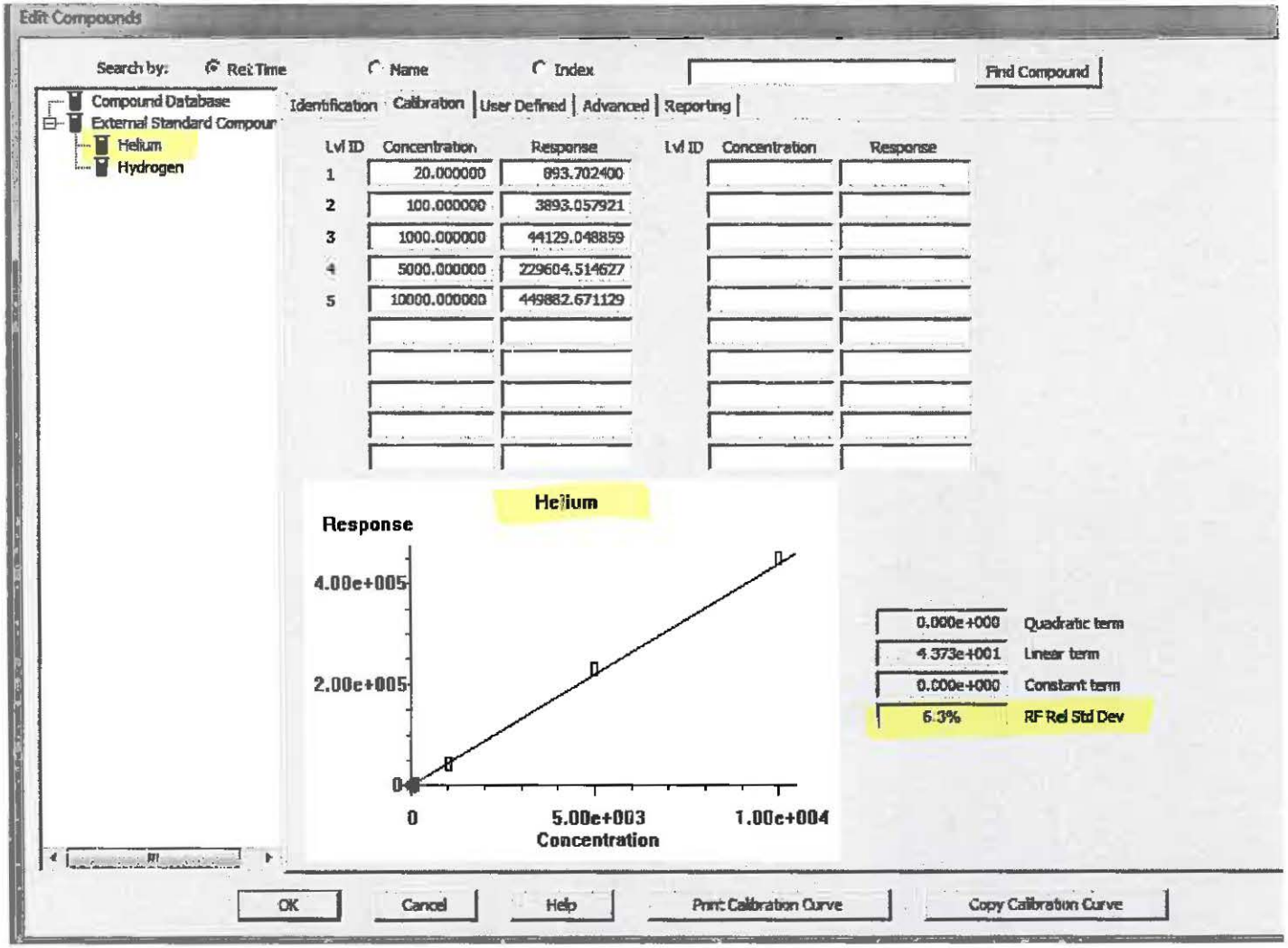
Method Path : J:\GC08\METHODS\
Method File : H2HE092115.M
Title : Hydrogen and Helium by EPA Method 3C
Last Update : Mon Sep 21 15:38:09 2015
Response Via : Initial Calibration

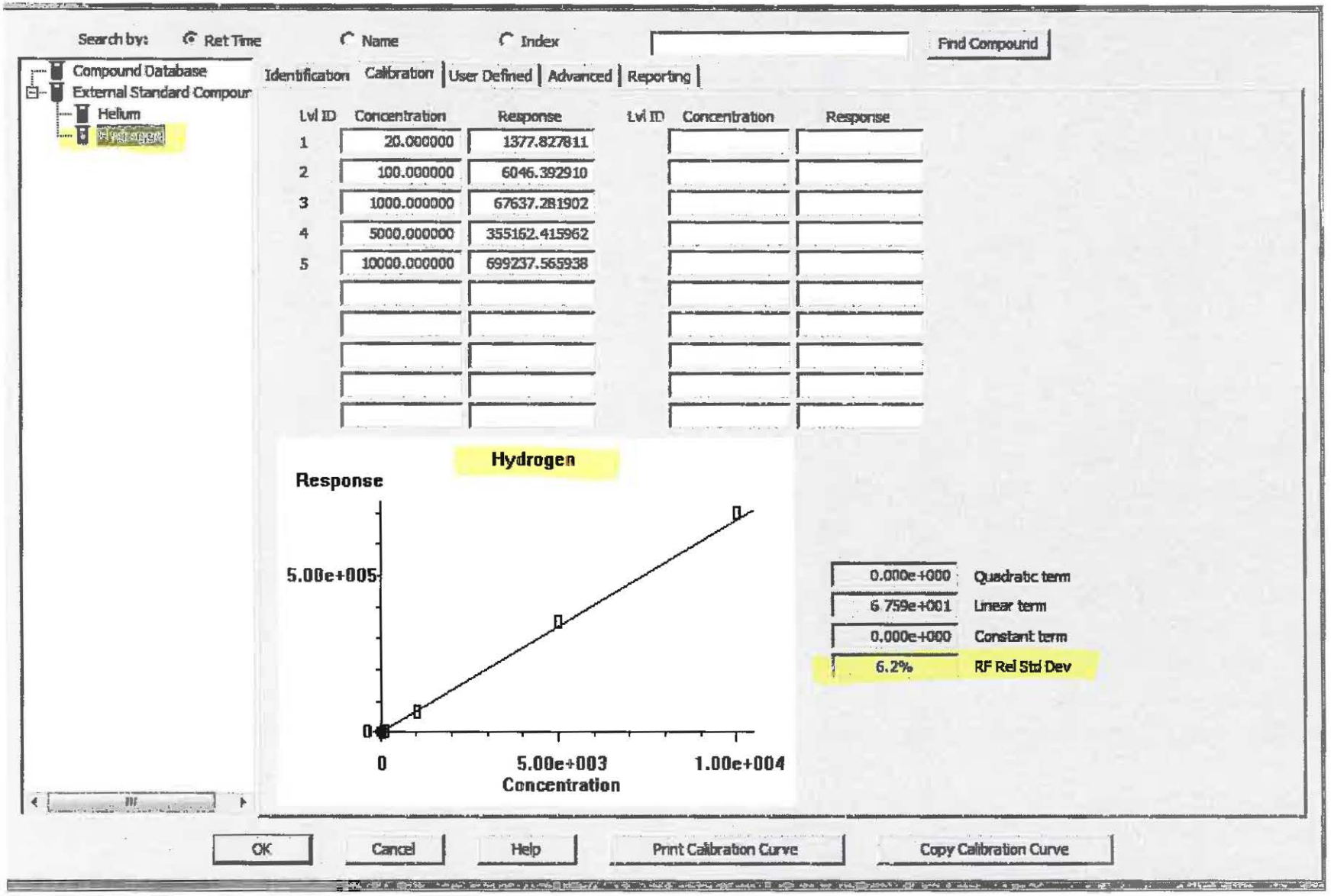
Calibration Files
1 =09211503.D 2 =09211504.D 3 =09211505.D
4 =09211506.D 5 =09211507.D

	Compound	1	2	3	4	5	Avg	%RSD
1)	Helium	4.469	3.893	4.413	4.592	4.499	4.373 E1	6.31
2)	Hydrogen	6.889	6.046	6.764	7.103	6.992	6.759 E1	6.18

(#) = Out of Range

H2HE092115.M Mon Sep 21 15:38:20 2015


Edit Compounds
Search by:
Rel Time
Name
Index
Find Compound
Compound Database
External Standard Compour
Helium
Hydrogen
Identification
Calibration
User Defined
Advanced
Reporting
Lvl ID
Concentration
Response
1
20.000000
893.702400
2
100.000000
3893.057921
3
1000.000000
44129.048859
4
5000.000000
229604.514627
5
10000.000000
449882.671129
Helium
Response
4.00e+005
2.00e+005
0
0
5.00e+003
1.00e+004
Concentration
0.000e+000
Quadratic term
4.373e+001
Linear term
0.000e+000
Constant term
6.3%
RF Rel Std Dev
OK
Cancel
Help
Print Calibration Curve
Copy Calibration Curve


Search by:
Ret Time
Name
Index
Find Compound
Compound Database
External Standard Compour
Helium
Identification
Calibration
User Defined
Advanced
Reporting
Lvl ID
Concentration
Response
1
20.000000
1377.827811
2
100.000000
6046.392910
3
1000.000000
67637.281902
4
5000.000000
355162.415962
5
10000.000000
699237.565938
Hydrogen
Response
5.00e+005
0
0
5.00e+003
1.00e+004
Concentration
0.000e+000
Quadratic term
6.759e+001
Linear term
0.000e+000
Constant term
6.2%
RF Rel Std Dev
OK
Cancel
Help
Print Calibration Curve
Copy Calibration Curve

Calibration Status Report HP5890

Method Path : J:\GC08\METHODS\
Method File : H2HE092115.M
Title : Hydrogen and Helium by EPA Method 3C
Last Update : Mon Sep 21 15:38:09 2015
Response Via : Initial Calibration

#	ID	Conc	ISTD Conc	Path\File
1	1	20	0	I:\GC08\DATA\H2_HE\2015_09\21\09211503.D
2	2	100	0	I:\GC08\DATA\H2_HE\2015_09\21\09211504.D
3	3	1000	0	I:\GC08\DATA\H2_HE\2015_09\21\09211505.D
4	4	5000	0	I:\GC08\DATA\H2_HE\2015_09\21\09211506.D
5	5	10000	0	I:\GC08\DATA\H2_HE\2015_09\21\09211507.D

#	ID	Update Time	Quant Time	Acquisition Time
1	1	Sep 21 15:36 2015	Sep 21 15:36 2015	21-Sep-2015, 08:22:59
2	2	Sep 21 15:37 2015	Sep 21 15:37 2015	21-Sep-2015, 14:12:20
3	3	Sep 21 15:37 2015	Sep 21 14:39 2015	21-Sep-2015, 14:23:31
4	4	Sep 21 15:37 2015	Sep 21 15:16 2015	21-Sep-2015, 14:46:03
5	5	Sep 21 15:38 2015	Sep 21 15:16 2015	21-Sep-2015, 15:00:33

H2HE092115.M Mon Sep 21 15:38:39 2015

Quantitation Report (QT Reviewed)

Data Path : I:\GC08\DATA\H2_HE\2015_09\21\
Data File : 09211503.D
Signal(s) : TCD1A.CH
Acq On : 21-Sep-2015, 08:22:59
Operator : NL
Sample : std s30-09211503 200ul
Misc :
ALS Vial : 1 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Sep 21 15:36:22 2015
Quant Method : J:\GC08\METHODS\H2HE092115.M
Quant Title : Hydrogen and Helium by EPA Method 3C
QLast Update : Mon Sep 21 15:17:17 2015
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. :
Signal Phase :
Signal Info :

	Compound	R.T.	Response	Conc	Units	
Target Compounds						
1)	Helium	0.730	894	20.392	ppm	m
2)	Hydrogen	0.878	1378	20.255	ppm	m

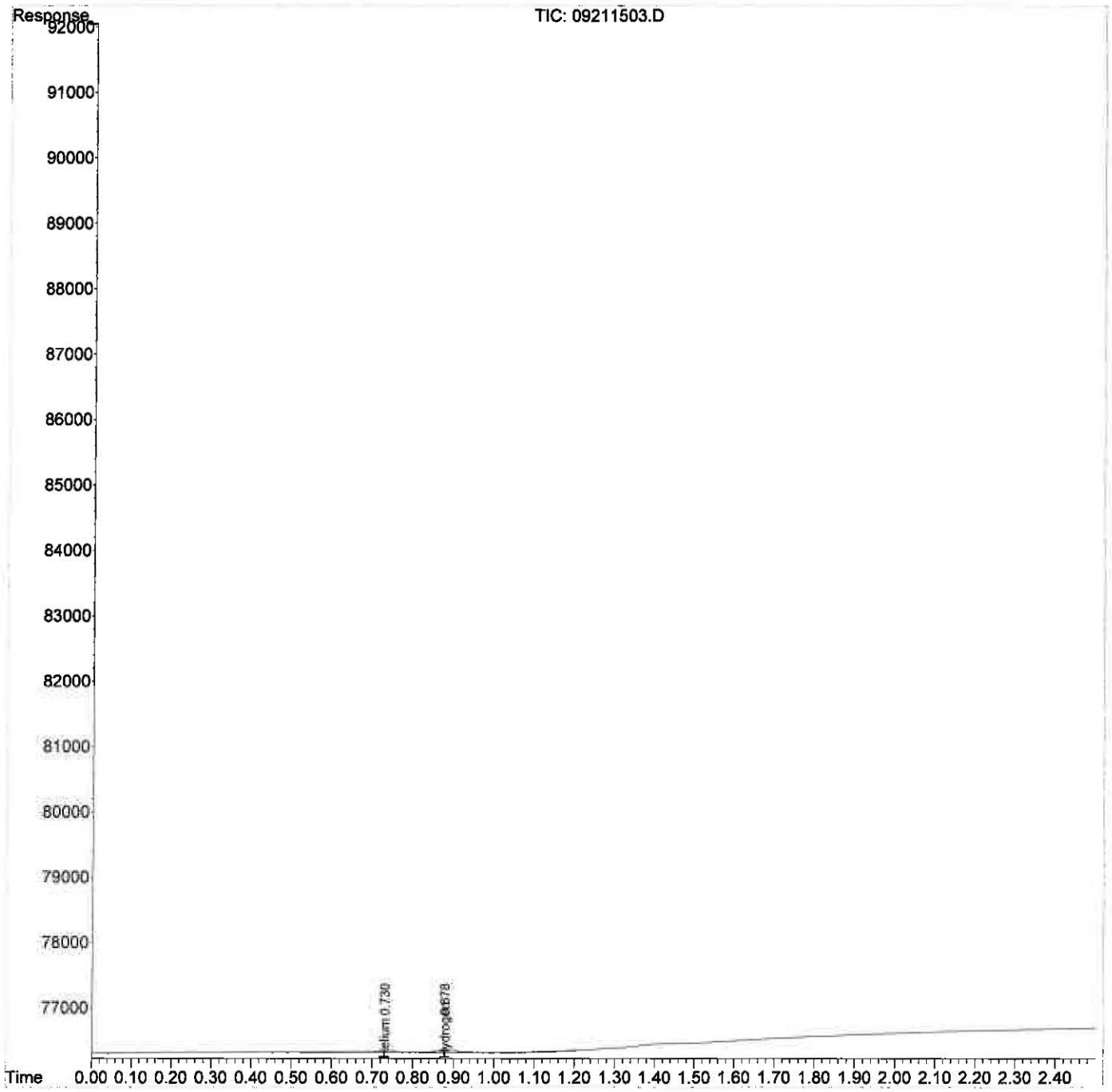
(f)=RT Delta > 1/2 Window (m)=manual int.

Quantitation Report (QT Reviewed)

Data Path : I:\GC08\DATA\H2_HE\2015_09\21\
Data File : 09211503.D
Signal(s) : TCD1A.CH
Acq On : 21-Sep-2015, 08:22:59
Operator : NL
Sample : std s30-09211503 200ul
Misc :
ALS Vial : 1 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Sep 21 15:36:22 2015
Quant Method : J:\GC08\METHODS\H2HE092115.M
Quant Title : Hydrogen and Helium by EPA Method 3C
QLast Update : Mon Sep 21 15:17:17 2015
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. :
Signal Phase :
Signal Info :

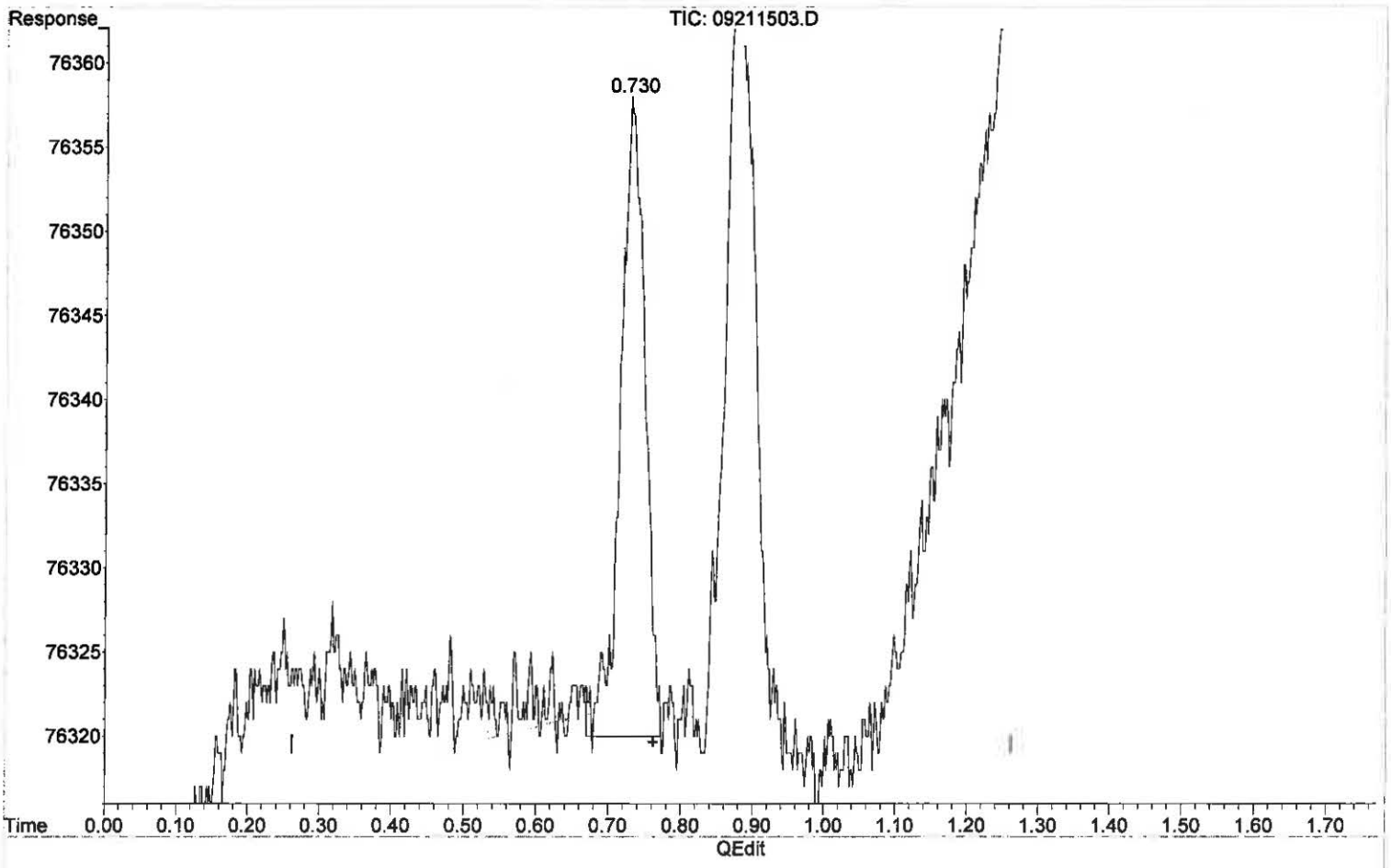


Quantitation Report (Qedit)

Data Path : I:\GC08\DATA\H2_HE\2015_09\21\
Data File : 09211503.D
Signal(s) : TCD1A.CH
Acq On : 21-Sep-2015, 08:22:59
Operator : NL
Sample : std s30-09211503 200ul
Misc :
ALS Vial : 1 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Sep 21 15:36:22 2015
Quant Method : J:\GC08\METHODS\H2HE092115.M
Quant Title : Hydrogen and Helium by EPA Method 3C
QLast Update : Mon Sep 21 15:17:17 2015
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. :
Signal Phase :
Signal Info :



(1) Helium

0.730min 20.392 ppm m

response 894

NP MP 9/21/15 NO prev

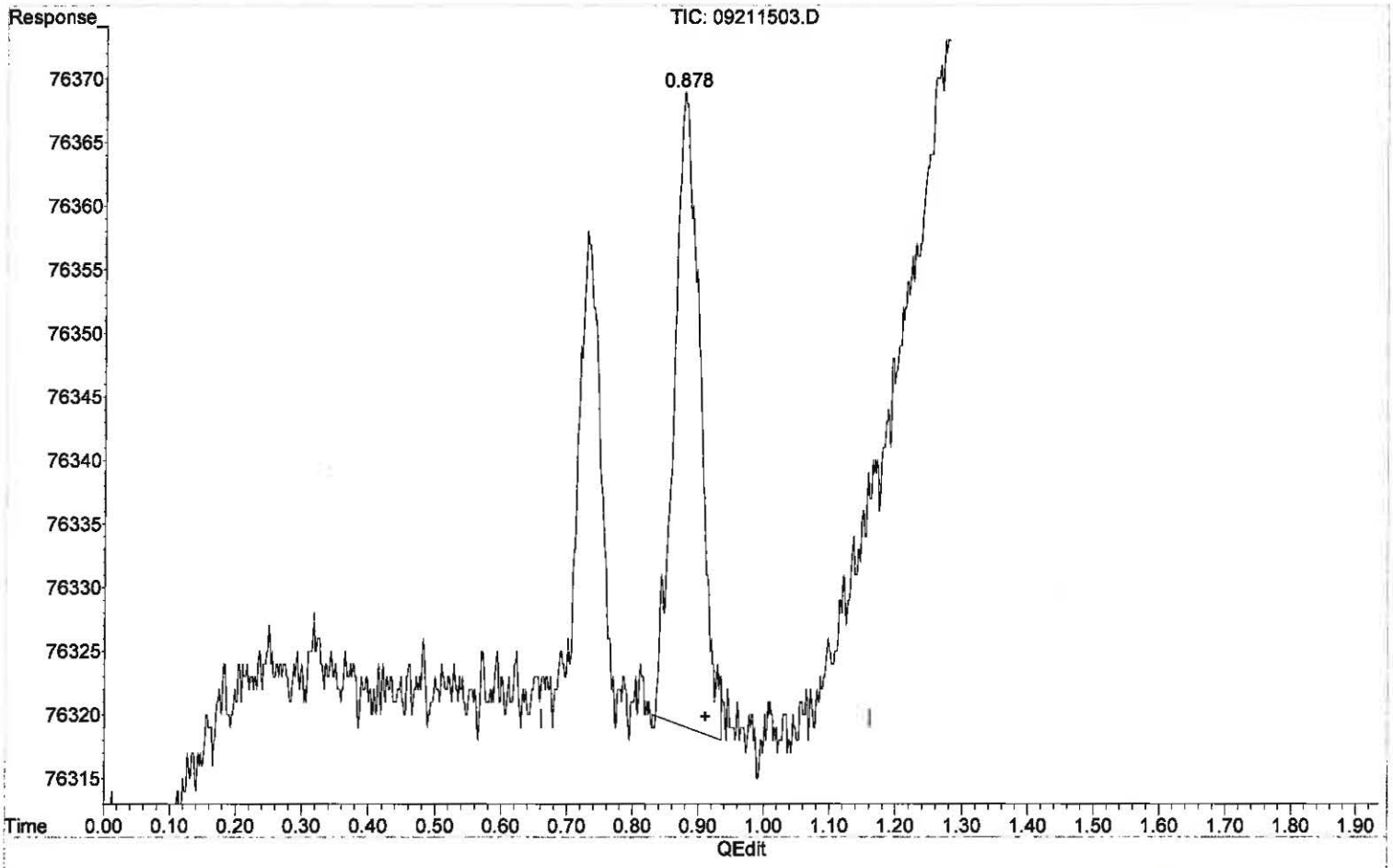
(+) = Expected Retention Time

Quantitation Report (Qedit)

Data Path : I:\GC08\DATA\H2_HE\2015_09\21\
Data File : 09211503.D
Signal(s) : TCD1A.CH
Acq On : 21-Sep-2015, 08:22:59
Operator : NL
Sample : std s30-09211503 200ul
Misc :
ALS Vial : 1 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Sep 21 15:36:22 2015
Quant Method : J:\GC08\METHODS\H2HE092115.M
Quant Title : Hydrogen and Helium by EPA Method 3C
QLast Update : Mon Sep 21 15:17:17 2015
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. :
Signal Phase :
Signal Info :



(2) Hydrogen

0.878min 20.255 ppm m

response 1378

MP
9/21/15
Noprev

9/22/15

(+) = Expected Retention Time

H2HE092115.M Mon Sep 21 15:40:04 2015 Page: 1

Quantitation Report (QT Reviewed)

Data Path : I:\GC08\DATA\H2_HE\2015_09\21\
Data File : 09211504.D
Signal(s) : TCD1A.CH
Acq On : 21-Sep-2015, 14:12:20
Operator : NL
Sample : std s30-09211503 1ml
Misc :
ALS Vial : 1 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Sep 21 15:37:23 2015
Quant Method : J:\GC08\METHODS\H2HE092115.M
Quant Title : Hydrogen and Helium by EPA Method 3C
QLast Update : Mon Sep 21 15:36:46 2015
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. :
Signal Phase :
Signal Info :

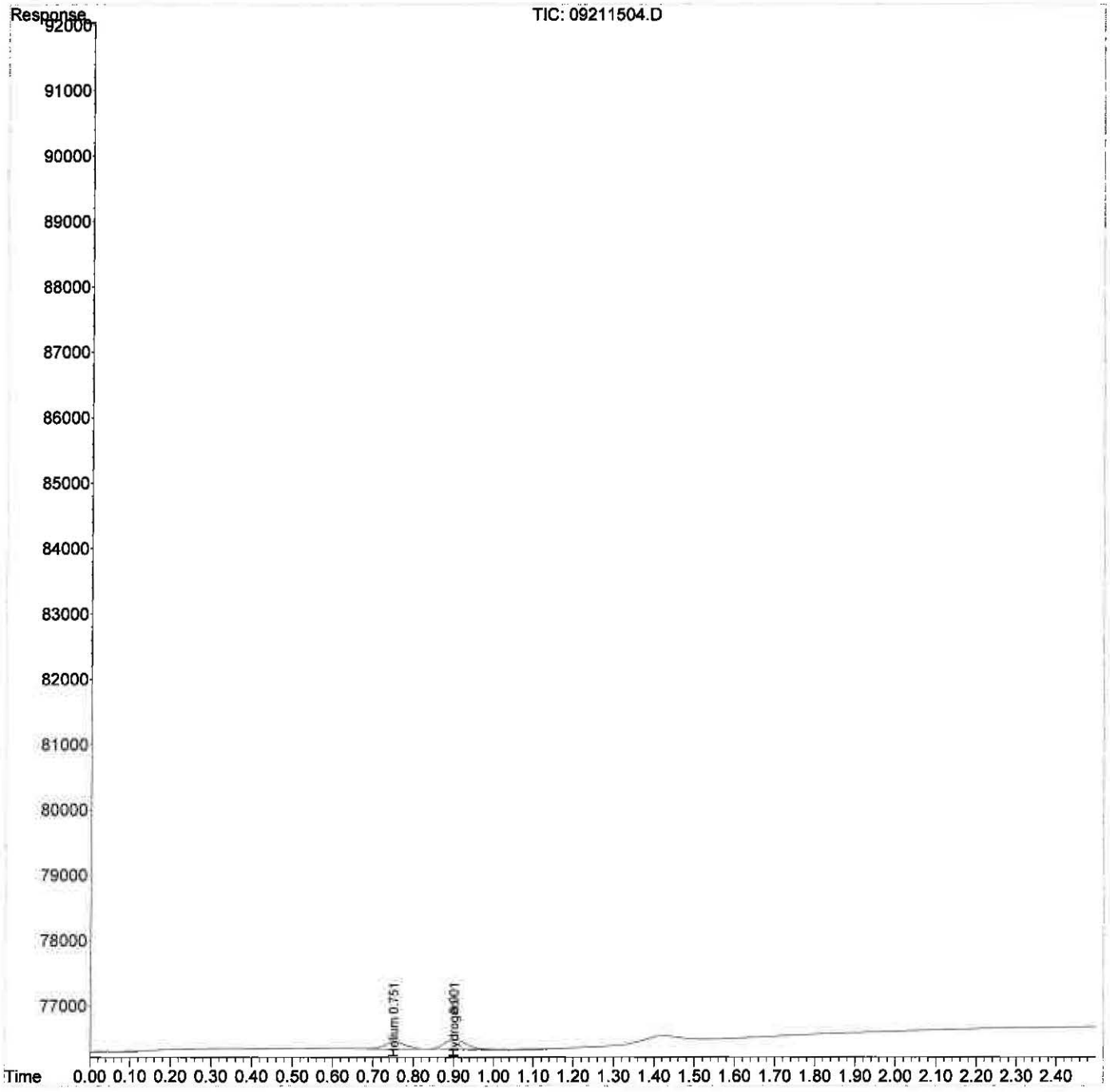
	Compound	R.T.	Response	Conc Units
Target Compounds				
1)	Helium	0.750	3893	88.830 ppm m
2)	Hydrogen	0.901	6046	89.572 ppm m

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

Data Path : I:\GC08\DATA\H2_HE\2015_09\21\
Data File : 09211504.D
Signal(s) : TCD1A.CH
Acq On : 21-Sep-2015, 14:12:20
Operator : NL
Sample : std s30-09211503 1ml
Misc :
ALS Vial : 1 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Sep 21 15:37:23 2015
Quant Method : J:\GC08\METHODS\H2HE092115.M
Quant Title : Hydrogen and Helium by EPA Method 3C
QLast Update : Mon Sep 21 15:36:46 2015
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. :
Signal Phase :
Signal Info :

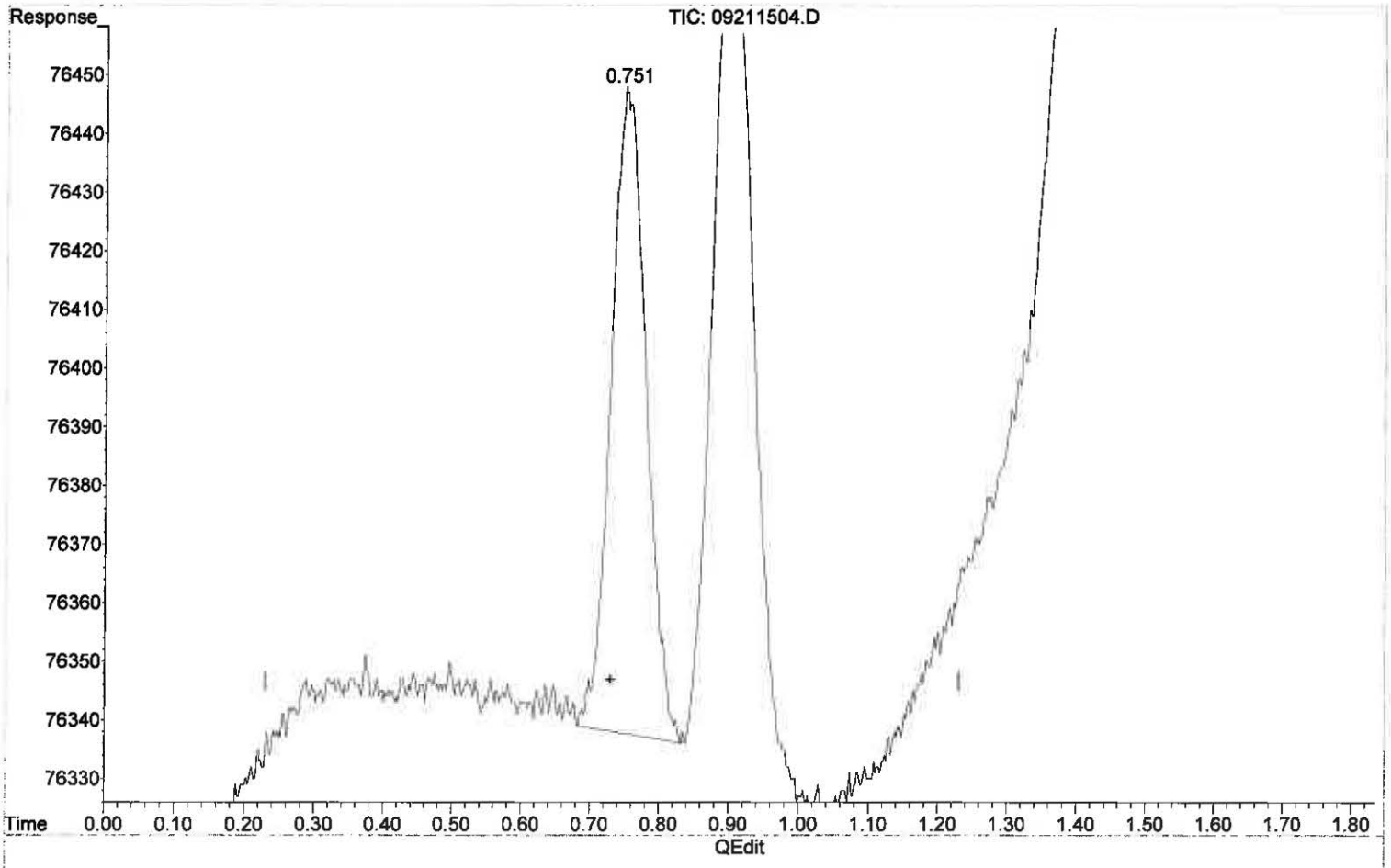


Quantitation Report (Qedit)

Data Path : I:\GC08\DATA\H2_HE\2015_09\21\
Data File : 09211504.D
Signal(s) : TCD1A.CH
Acq On : 21-Sep-2015, 14:12:20
Operator : NL
Sample : std s30-09211503 1ml
Misc :
ALS Vial : 1 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Sep 21 15:37:23 2015
Quant Method : J:\GC08\METHODS\H2HE092115.M
Quant Title : Hydrogen and Helium by EPA Method 3C
QLast Update : Mon Sep 21 15:36:46 2015
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. :
Signal Phase :
Signal Info :



(1) Helium

0.750min 88.830 ppm m

response 3893

MP 9/21/15 NOprev

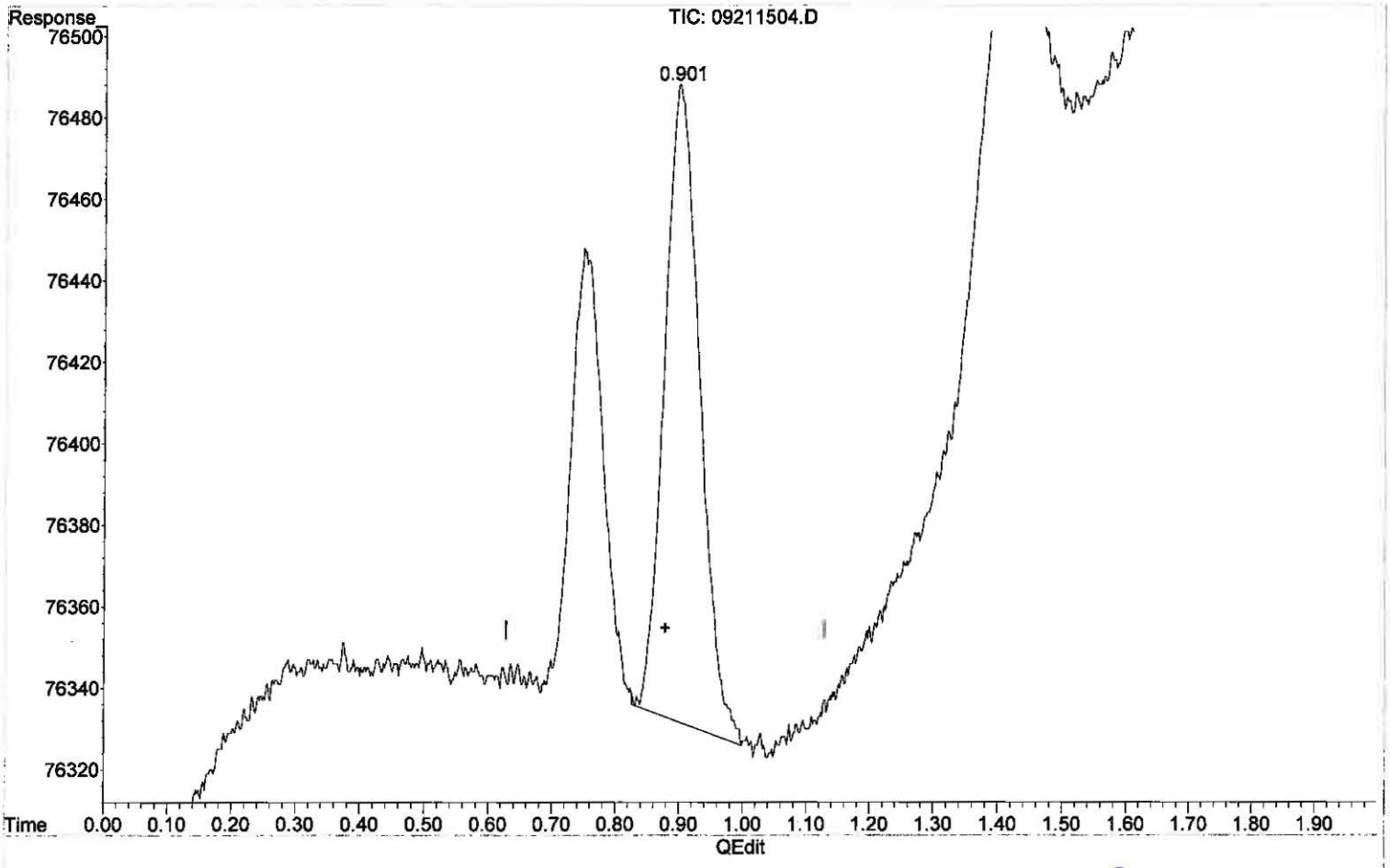
(+) = Expected Retention Time

Quantitation Report (Qedit)

Data Path : I:\GC08\DATA\H2_HE\2015_09\21\
Data File : 09211504.D
Signal(s) : TCD1A.CH
Acq On : 21-Sep-2015, 14:12:20
Operator : NL
Sample : std s30-09211503 1ml
Misc :
ALS Vial : 1 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Sep 21 15:37:23 2015
Quant Method : J:\GC08\METHODS\H2HE092115.M
Quant Title : Hydrogen and Helium by EPA Method 3C
QLast Update : Mon Sep 21 15:36:46 2015
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. :
Signal Phase :
Signal Info :



(2) Hydrogen

0.901min 89.572 ppm m

response 6046

MP
NJ
No prev
9/21/15

WM 9/22/15

(+) = Expected Retention Time

Quantitation Report (QT Reviewed)

Data Path : I:\GC08\DATA\H2_HE\2015_09\21\
Data File : 09211505.D
Signal(s) : TCD1A.CH
Acq On : 21-Sep-2015, 14:23:31
Operator : NL
Sample : std s30-09211502 100ul
Misc :
ALS Vial : 1 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Sep 21 14:39:20 2015
Quant Method : J:\GC08\METHODS\H2HE092115.M
Quant Title : Hydrogen and Helium by EPA Method 3C
QLast Update : Mon Sep 21 14:22:25 2015
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. :
Signal Phase :
Signal Info :

	Compound	R.T.	Response	Conc	Units	
Target Compounds						
1)	Helium	0.762	44129	1049.499	ppm	m
2)	Hydrogen	0.911	67637	1028.536	ppm	m

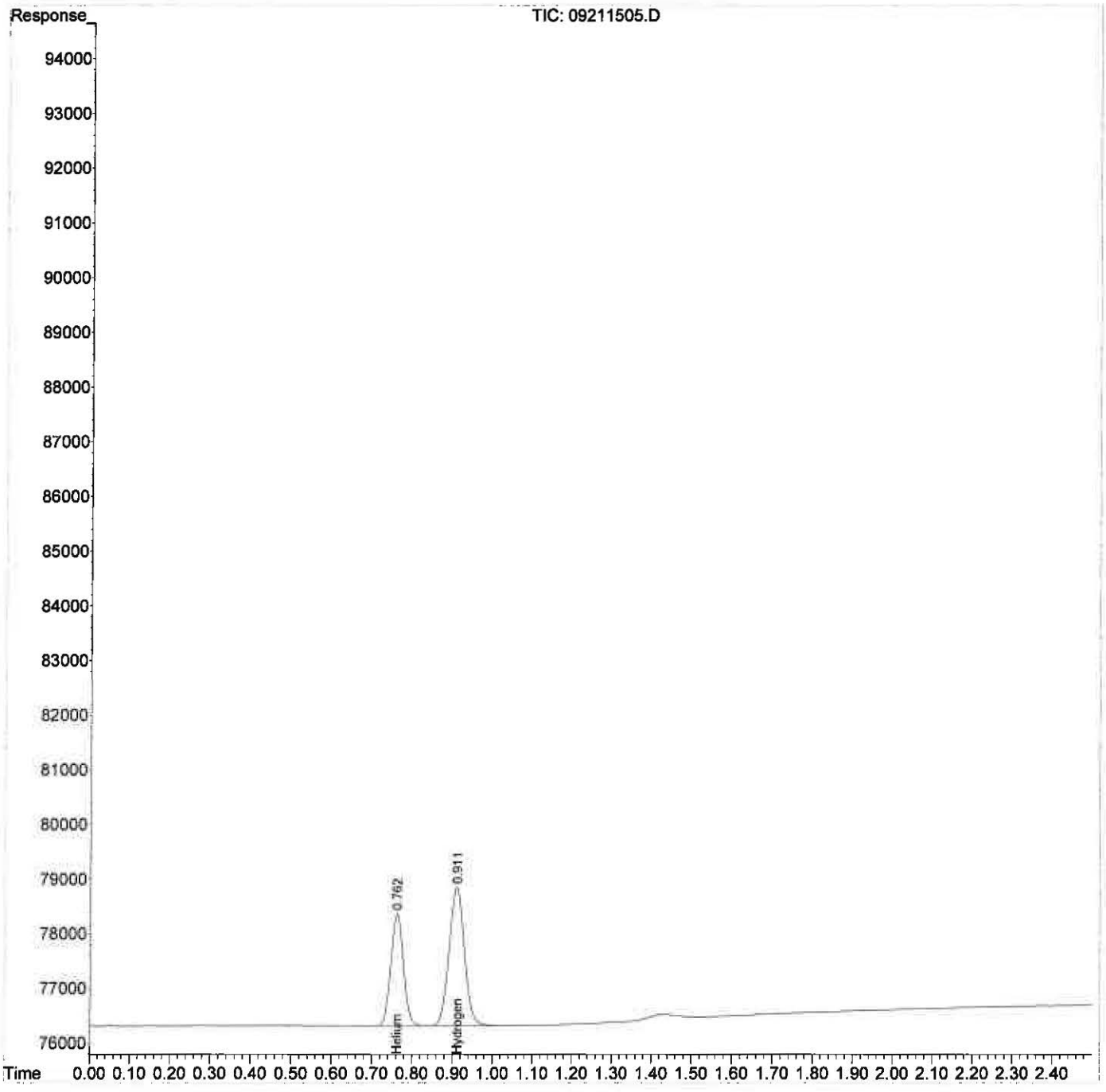
(f)=RT Delta > 1/2 Window (m)=manual int.

Quantitation Report (QT Reviewed)

Data Path : I:\GC08\DATA\H2_HE\2015_09\21\
Data File : 09211505.D
Signal(s) : TCD1A.CH
Acq On : 21-Sep-2015, 14:23:31
Operator : NL
Sample : std s30-09211502 100ul
Misc :
ALS Vial : 1 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Sep 21 14:39:20 2015
Quant Method : J:\GC08\METHODS\H2HE092115.M
Quant Title : Hydrogen and Helium by EPA Method 3C
QLast Update : Mon Sep 21 14:22:25 2015
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. :
Signal Phase :
Signal Info :

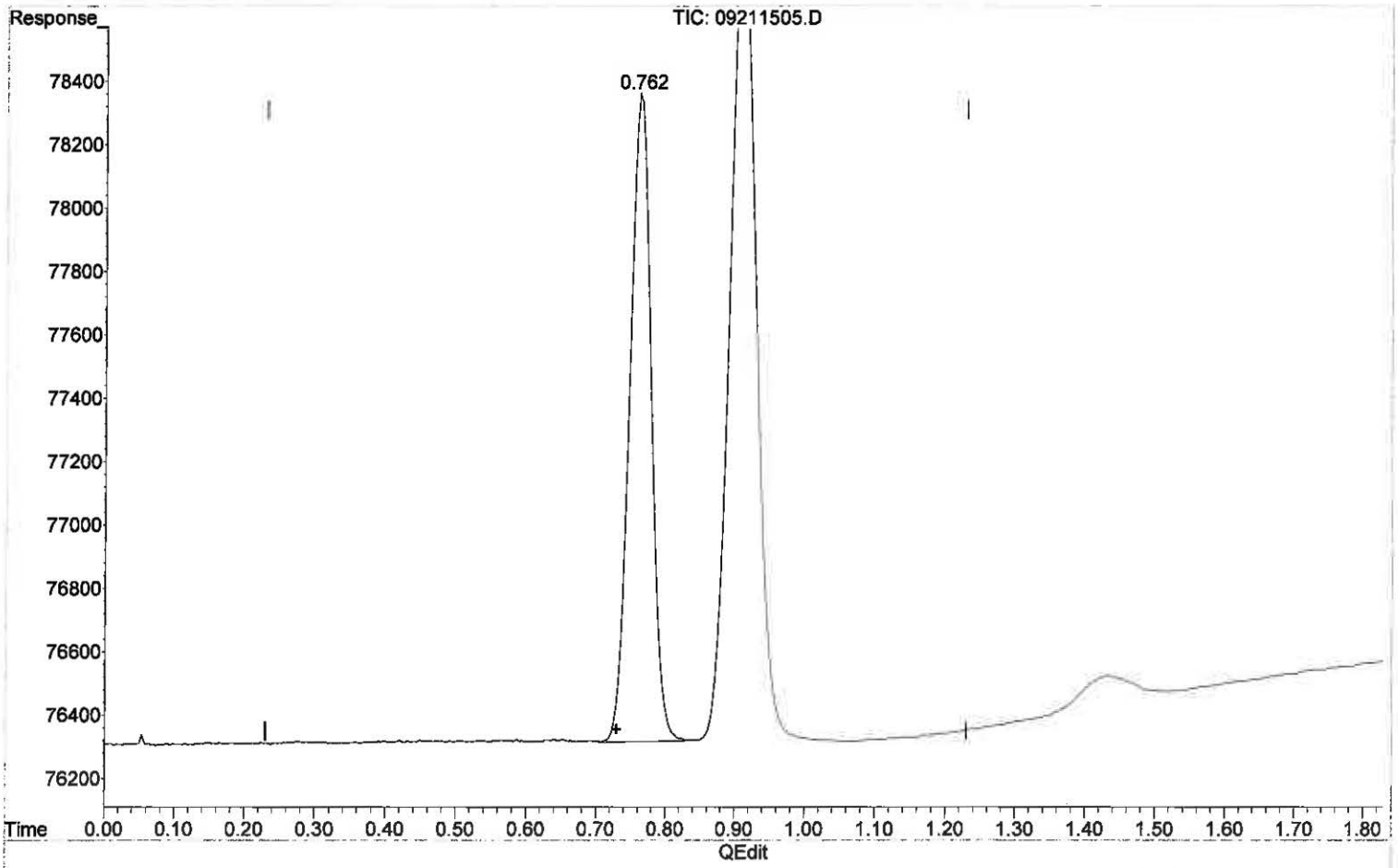


Quantitation Report (Qedit)

Data Path : I:\GC08\DATA\H2_HE\2015_09\21\
Data File : 09211505.D
Signal(s) : TCD1A.CH
Acq On : 21-Sep-2015, 14:23:31
Operator : NL
Sample : std s30-09211502 100ul
Misc :
ALS Vial : 1 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Sep 21 14:39:20 2015
Quant Method : J:\GC08\METHODS\H2HE092115.M
Quant Title : Hydrogen and Helium by EPA Method 3C
QLast Update : Mon Sep 21 14:22:25 2015
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. :
Signal Phase :
Signal Info :



(1) Helium

0.762min 1049.499 ppm m

response 44129

MP
Nopren
9/21/15

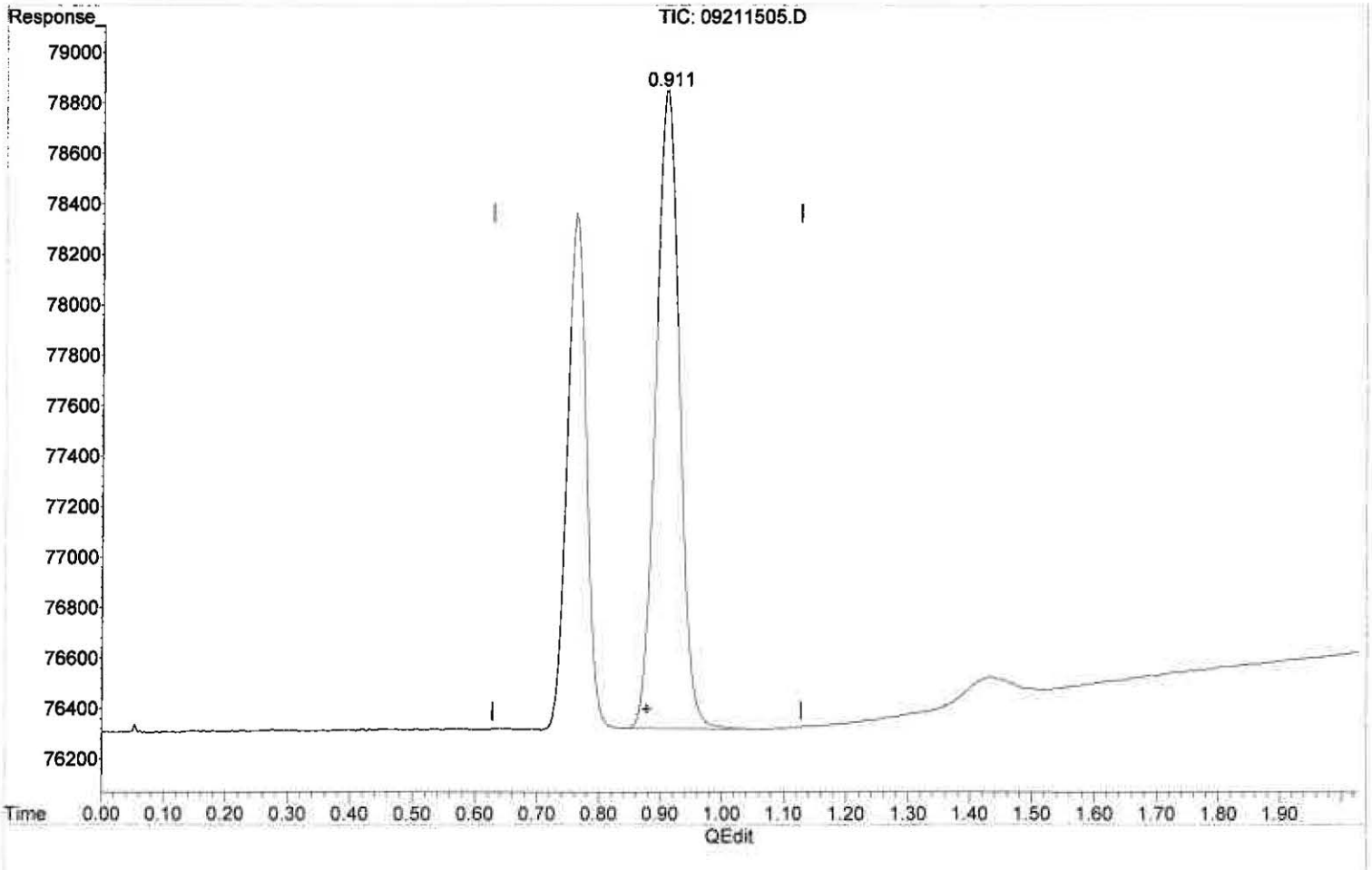
(+) = Expected Retention Time

Quantitation Report (Qedit)

Data Path : I:\GC08\DATA\H2_HE\2015_09\21\
Data File : 09211505.D
Signal(s) : TCD1A.CH
Acq On : 21-Sep-2015, 14:23:31
Operator : NL
Sample : std s30-09211502 100ul
Misc :
ALS Vial : 1 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Sep 21 14:39:20 2015
Quant Method : J:\GC08\METHODS\H2HE092115.M
Quant Title : Hydrogen and Helium by EPA Method 3C
QLast Update : Mon Sep 21 14:22:25 2015
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. :
Signal Phase :
Signal Info :



(2) Hydrogen

0.911min 1028.536 ppm m

response 67637

MP 9/22/15

MP 9/21/15 Nopres

(+) = Expected Retention Time

Quantitation Report (QT Reviewed)

Data Path : I:\GC08\DATA\H2_HE\2015_09\21\
Data File : 09211506.D
Signal(s) : TCD1A.CH
Acq On : 21-Sep-2015, 14:46:03
Operator : NL
Sample : std s30-09211502 0.5ml
Misc :
ALS Vial : 1 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Sep 21 15:16:25 2015
Quant Method : J:\GC08\METHODS\H2HE092115.M
Quant Title : Hydrogen and Helium by EPA Method 3C
QLast Update : Mon Sep 21 15:16:11 2015
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. :
Signal Phase :
Signal Info :

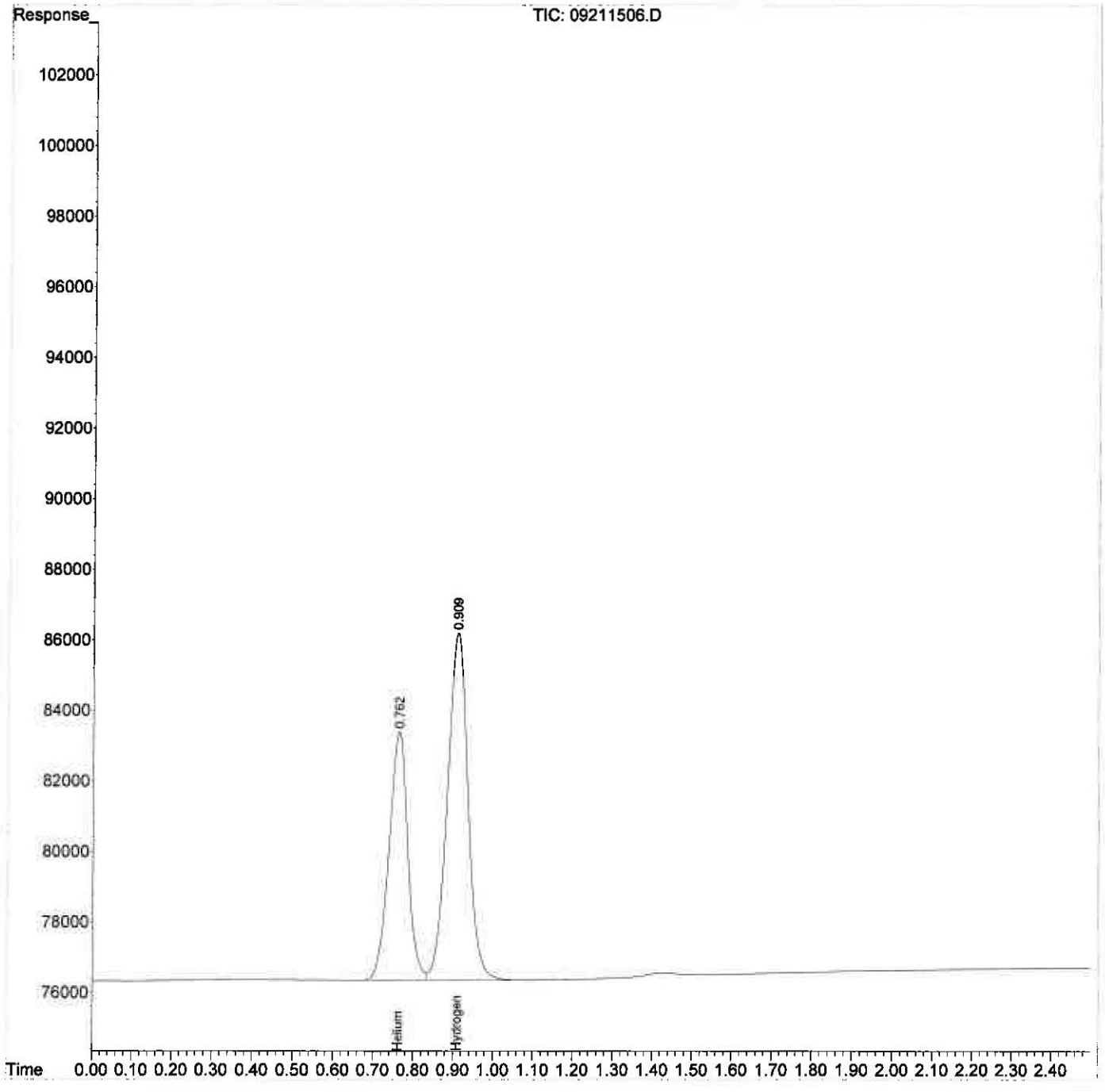
	Compound	R.T.	Response	Conc	Units
Target Compounds					
1)	Helium	0.763	229605	5371.935	ppm
2)	Hydrogen	0.910	355162	5349.941	ppm

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

Data Path : I:\GC08\DATA\H2_HE\2015_09\21\
Data File : 09211506.D
Signal(s) : TCD1A.CH
Acq On : 21-Sep-2015, 14:46:03
Operator : NL
Sample : std s30-09211502 0.5ml
Misc :
ALS Vial : 1 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Sep 21 15:16:25 2015
Quant Method : J:\GC08\METHODS\H2HE092115.M
Quant Title : Hydrogen and Helium by EPA Method 3C
QLast Update : Mon Sep 21 15:16:11 2015
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. :
Signal Phase :
Signal Info :



Quantitation Report (Not Reviewed)

Data Path : I:\GC08\DATA\H2_HE\2015_09\21\
Data File : 09211507.D
Signal(s) : TCD1A.CH
Acq On : 21-Sep-2015, 15:00:33
Operator : NL
Sample : std s30-09211502 1ml
Misc :
ALS Vial : 1 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Sep 21 15:16:53 2015
Quant Method : J:\GC08\METHODS\H2HE092115.M
Quant Title : Hydrogen and Helium by EPA Method 3C
QLast Update : Mon Sep 21 15:16:51 2015
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. :
Signal Phase :
Signal Info :

	Compound	R.T.	Response	Conc	Units
Target Compounds					
1)	Helium	0.764	449883	10333.496	ppm
2)	Hydrogen	0.912	699238	10351.745	ppm

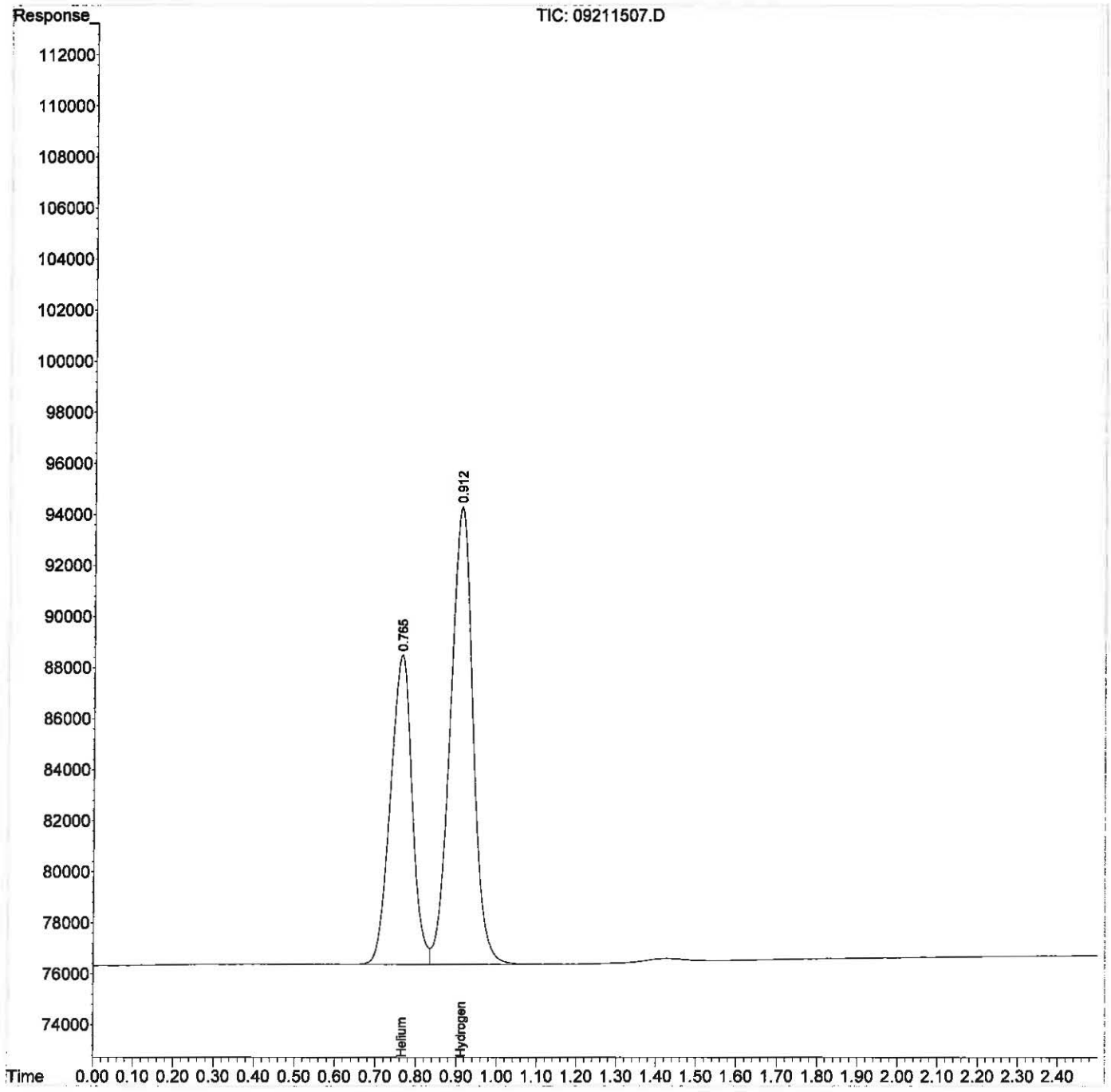
(f)=RT Delta > 1/2 Window (m)=manual int.

Quantitation Report (Not Reviewed)

Data Path : I:\GC08\DATA\H2_HE\2015_09\21\
Data File : 09211507.D
Signal(s) : TCD1A.CH
Acq On : 21-Sep-2015, 15:00:33
Operator : NL
Sample : std s30-09211502 1ml
Misc :
ALS Vial : 1 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Sep 21 15:16:53 2015
Quant Method : J:\GC08\METHODS\H2HE092115.M
Quant Title : Hydrogen and Helium by EPA Method 3C
QLast Update : Mon Sep 21 15:16:51 2015
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. :
Signal Phase :
Signal Info :



Quantitation Report (QT Reviewed)

Data Path : I:\GC08\DATA\H2_HE\2015_09\21\
Data File : 09211508.D
Signal(s) : TCD1A.CH
Acq On : 21-Sep-2015, 15:20:25
Operator : NL
Sample : std s30-09211504 (ICV)
Misc :
ALS Vial : 1 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Sep 21 15:39:05 2015
Quant Method : J:\GC08\METHODS\H2HE092115.M
Quant Title : Hydrogen and Helium by EPA Method 3C
QLast Update : Mon Sep 21 15:38:09 2015
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. :
Signal Phase :
Signal Info :

	Compound	R.T.	Response	Conc Units
Target Compounds				
1)	Helium	0.767	44024	1006.713 ppm
2)	Hydrogen	0.915	65026	962.072 ppm

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

Helium = 100.67%

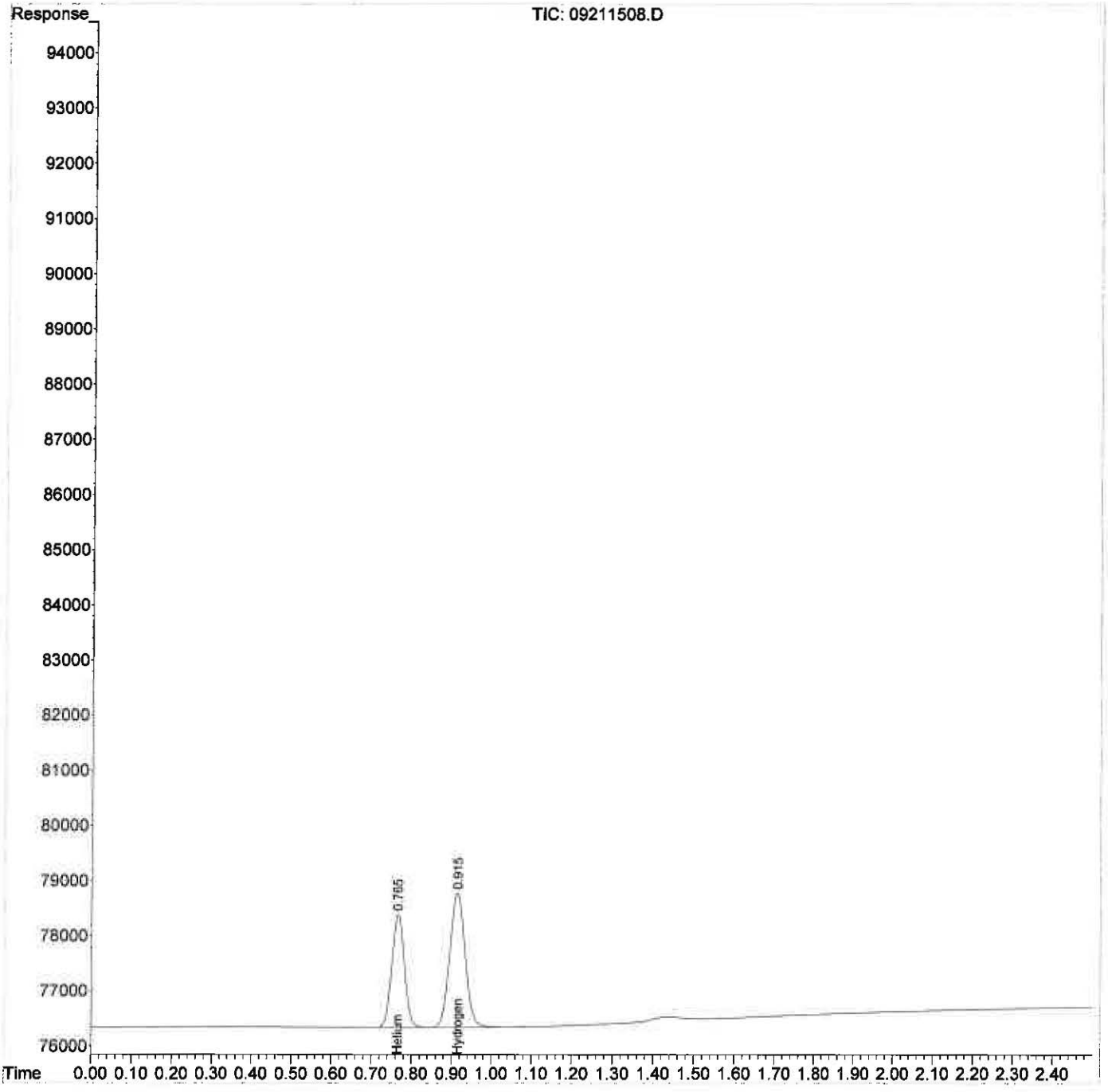
Hydrogen = 96.62%

WH 9/22/15

Data Path : I:\GC08\DATA\H2_HE\2015_09\21\
Data File : 09211508.D
Signal(s) : TCD1A.CH
Acq On : 21-Sep-2015, 15:20:25
Operator : NL
Sample : std s30-09211504
Misc :
ALS Vial : 1 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Sep 21 15:39:05 2015
Quant Method : J:\GC08\METHODS\H2HE092115.M
Quant Title : Hydrogen and Helium by EPA Method 3C
QLast Update : Mon Sep 21 15:38:09 2015
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. :
Signal Phase :
Signal Info :



1609188

ALS Enviromental

REPORT SUMMARY

Method : Helium by modified EPA 3C
Client : Empirical Labs
Analyst : amf

Instrument : Instrument #8 / TCD #8
Date Acquired : 9/13/2016
Sample Amount : 1 mL

Opening CCV[1]

std s30-09131601		He
Sample result (ppm)	**inj vol.**	10006.30
ACTUAL	0.10	10000.00
%Difference		0.06%

Closing CCV[1]

std s30-09131601		He
Sample result (ppm)	**inj vol.**	10202.10
ACTUAL	0.10	10000.00
%Difference		2.02%

Laboratory Control Spike[2]

lcs s30-09131602	He
sample result ppm	10130.9
spike amount	10000
% recovery	101.31%

Laboratory Control Spike[2]

lcsds30-09131602	He
sample result ppm	10279.8
spike amount	10000
% recovery	102.80%
% RPD	1.46%

FINAL SAMPLE RESULT SUMMARIES

Sample ID	Inject. Vol(ml)	Dilution DF	Pi	Pf	PiPf DF	He Result (ppm)	FINAL HELIUM RESULT ppm	FINAL HELIUM RESULT mg/M3	File ID	Acq time
Reporting Limit							25.0	4.09		
mb 1ml	1.000	1.0			1.00	0.00	**ND**	**ND**		
4352-007 1ml	1.00	1.0	-1.99	3.25	1.41	63.93	**90.287**	**14.774**	09131606.D	14:07:56
4352-008 1ml	1.00	1.0	-1.95	3.16	1.40	2005.18	**2808.825**	**459.632**	09131607.D	14:16:20
4352-009 1ml	1.00	1.0	-2.35	3.16	1.45	0.00	**ND**	**ND**	09131609.D	14:43:05
4352-010 1ml	1.00	1.0	-2.00	3.25	1.41	3676.02	**5195.635**	**850.206**	09131610.D	14:51:37

9/22/16

1. 15% difference allowed for the opening and closing standards.
2. 75-124% helium recovery for the lab control spike.
3. 15% helium RPD allowed between duplicate samples.

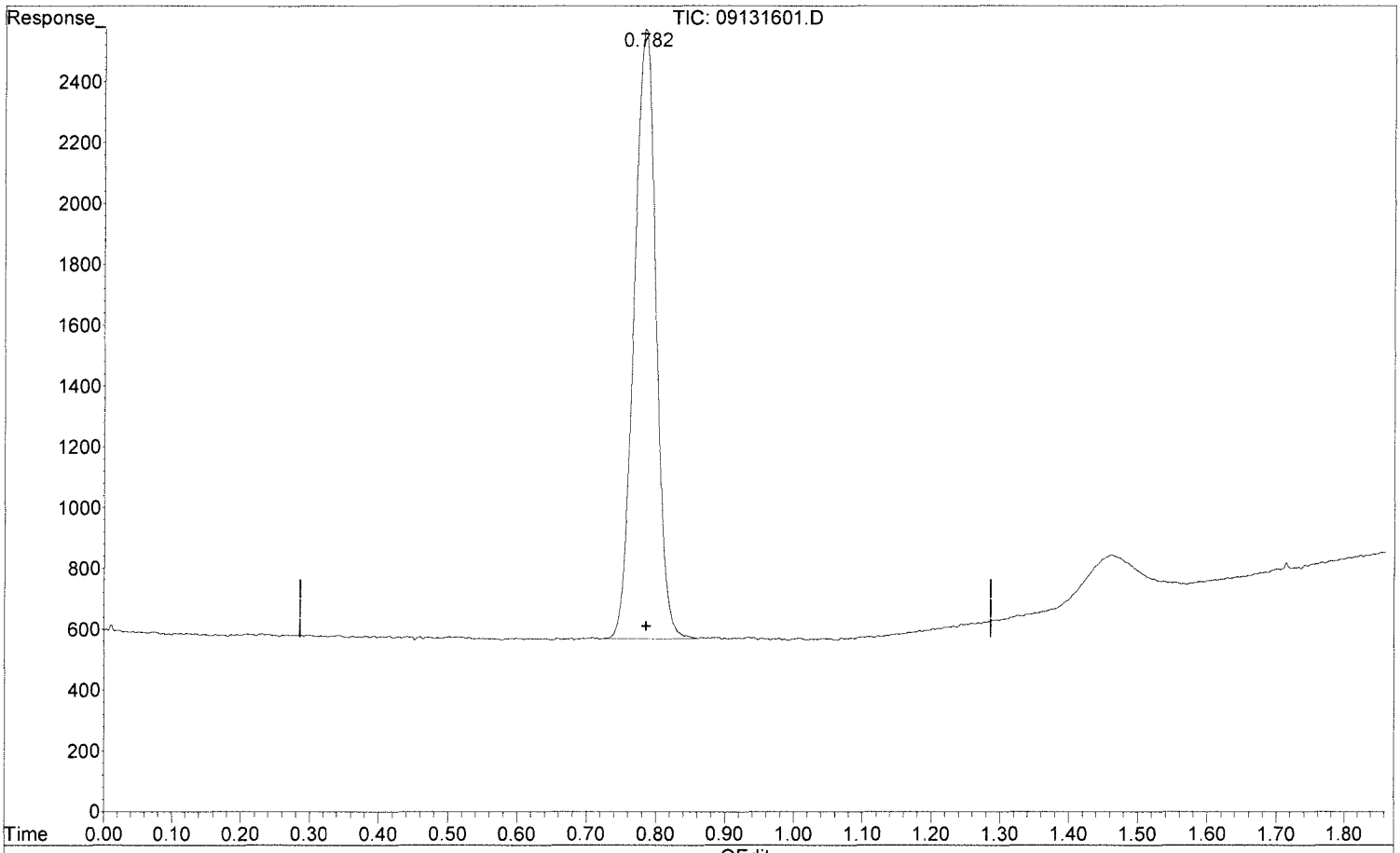
71

Quantitation Report (Qedit)

Data Path : I:\GC08\DATA\H2_He\2016_09\13\
Data File : 09131601.D
Signal(s) : TCD1A.CH
Acq On : 13-Sep-2016, 12:53:43
Operator : amf
Sample : std s30-09131601
Misc :
ALS Vial : 1 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Sep 13 13:26:55 2016
Quant Method : I:\GC08\METHODS\H2HE092115.M
Quant Title : Hydrogen and Helium by EPA Method 3C
QLast Update : Mon Sep 21 15:38:09 2015
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. :
Signal Phase :
Signal Info :



(1) Helium

0.784min 1000.627 ppm

response 43758

9/22/16

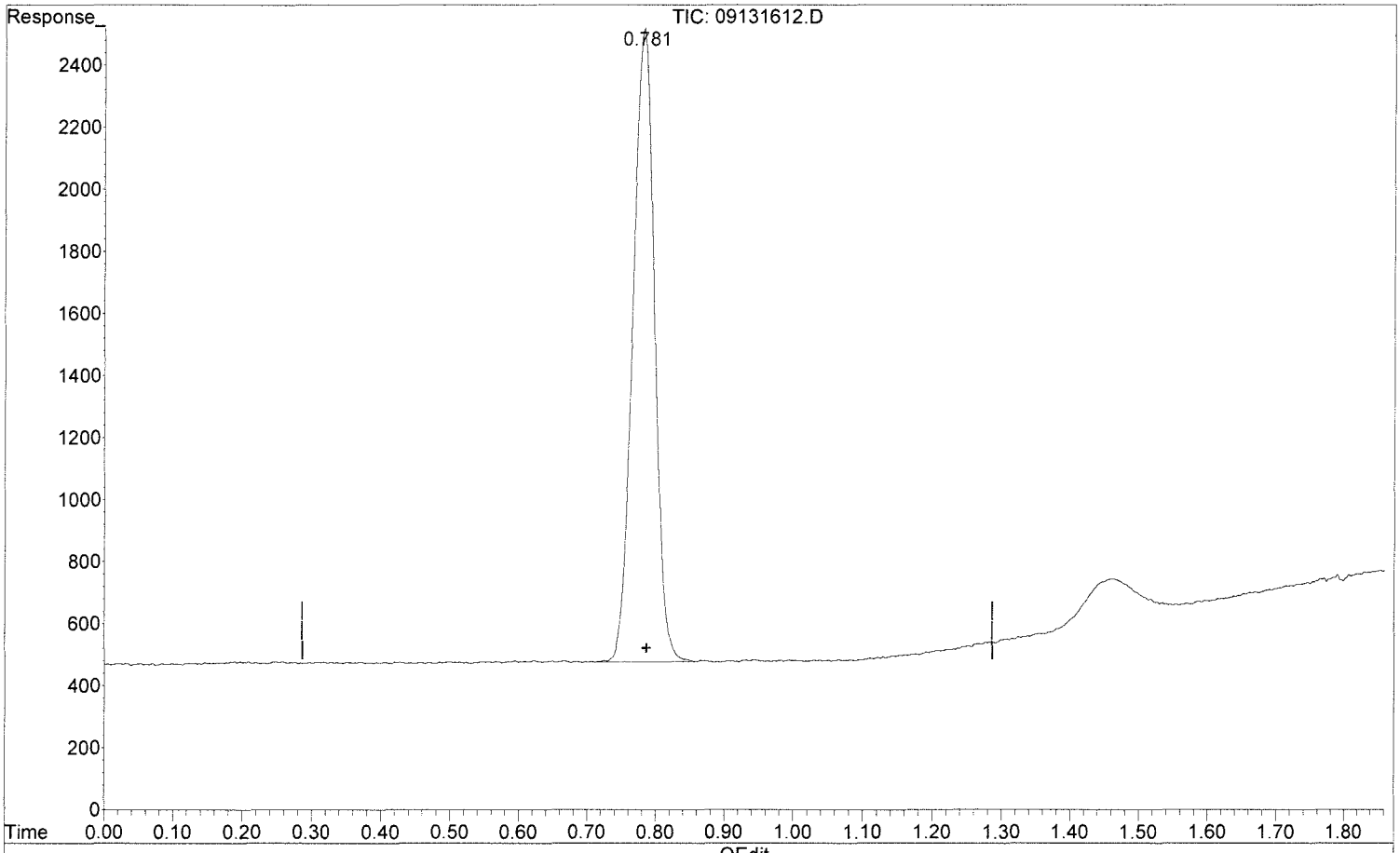
(+) = Expected Retention Time

Quantitation Report (Qedit)

Data Path : I:\GC08\DATA\H2_He\2016_09\13\
Data File : 09131612.D
Signal(s) : TCD1A.CH
Acq On : 13-Sep-2016, 15:09:21
Operator : amf
Sample : std s30-09131601
Misc :
ALS Vial : 1 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Sep 13 15:16:53 2016
Quant Method : I:\GC08\METHODS\H2HE092115.M
Quant Title : Hydrogen and Helium by EPA Method 3C
QLast Update : Mon Sep 21 15:38:09 2015
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. :
Signal Phase :
Signal Info :



(1) Helium

0.782min 1020.210 ppm

response 44615

(+) = Expected Retention Time

Injection Log

Directory: I:\GC08\DATA\H2_HE\2015_09\21

Line	Vial	FileName	Multiplier	SampleName	Misc Info	Injected
1	1	09211501.d	1.	test std s30-09211502		21-Sep-2015 19:49
2	1	09211502.d	1.	mb 1ml		21-Sep-2015 20:09
3	1	09211503.d	1.	std s30-09211503 200ul		21-Sep-2015 20:22
4	1	09211504.d	1.	std s30-09211503 1ml		21-Sep-2015 26:12
5	1	09211505.d	1.	std s30-09211502 100ul		21-Sep-2015 26:23
6	1	09211506.d	1.	std s30-09211502 0.5ml		21-Sep-2015 26:46
7	1	09211507.d	1.	std s30-09211502 1ml		21-Sep-2015 27:00
8	1	09211508.d	1.	std s30-09211504		21-Sep-2015 27:20
9	1	09211509.d	1.	mb 1ml		21-Sep-2015 27:29

Injection Log

Directory: I:\GC08\DATA\H2_HE\2016_09\13\

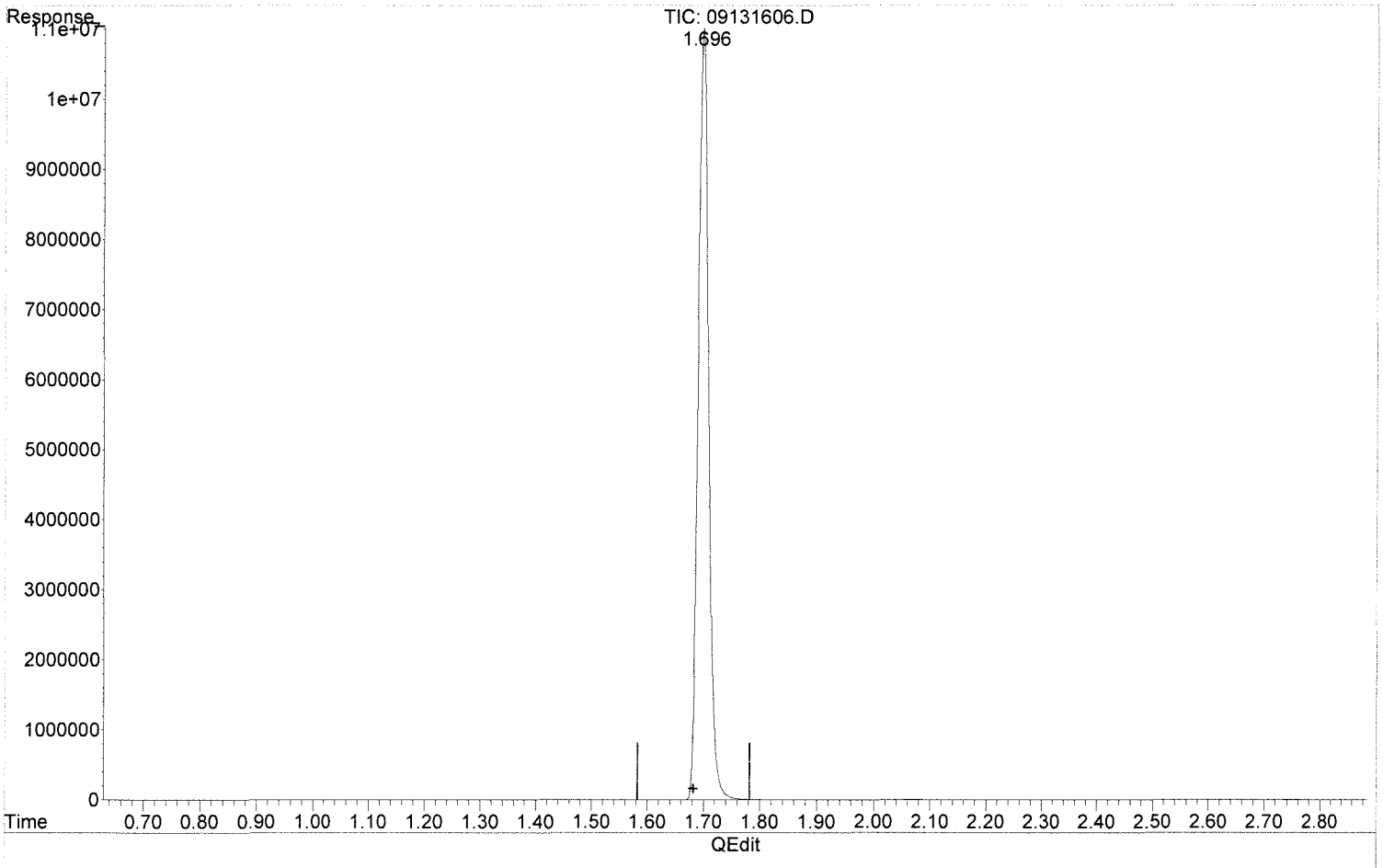
	Sample ID	Date/Time	Acquisition Method	File Name	Misc Info	Operator
	std s30-09131601	13-Sep-16, 12:53:43	H2_HE.M	09131601.D		amf
	mb 1ml	13-Sep-16, 13:28:02	H2_HE.M	09131602.D		amf
	lcs s30-09131602	13-Sep-16, 13:38:14	H2_HE.M	09131603.D		amf
	lcsds30-09131602	13-Sep-16, 13:47:38	H2_HE.M	09131604.D		amf
	4382-001 1ml	13-Sep-16, 13:58:35	H2_HE.M	09131605.D		amf
	4352-007 1ml	13-Sep-16, 14:07:56	H2_HE.M	09131606.D		amf
	4352-008 1ml	13-Sep-16, 14:16:20	H2_HE.M	09131607.D		amf
	4352-009 1ml	13-Sep-16, 14:25:57	H2_HE.M	09131608.D		amf
	4352-009 1ml	13-Sep-16, 14:43:05	H2_HE.M	09131609.D		amf
	4352-010 1ml	13-Sep-16, 14:51:37	H2_HE.M	09131610.D		amf
	xstd s30-09131601	13-Sep-16, 14:58:58	H2_HE.M	09131611.D		amf
	std s30-09131601	13-Sep-16, 15:09:21	H2_HE.M	09131612.D		amf

Quantitation Report (Qedit)

Data Path : I:\GC08\DATA\TO_3M\2016_09\13\
Data File : 09131606.D
Signal(s) : FID2B.CH
Acq On : 13-Sep-2016, 10:00:52
Operator : amf
Sample : 4352-001 0.1ml
Misc :
ALS Vial : 1 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Sep 13 10:03:50 2016
Quant Method : I:\GC08\METHODS\TF042116.M
Quant Title : VOA-TO3C1C6
QLast Update : Fri Apr 22 09:01:46 2016
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. :
Signal Phase :
Signal Info :



(1) Methane

1.697min 6567.844 ppm

response 144052510

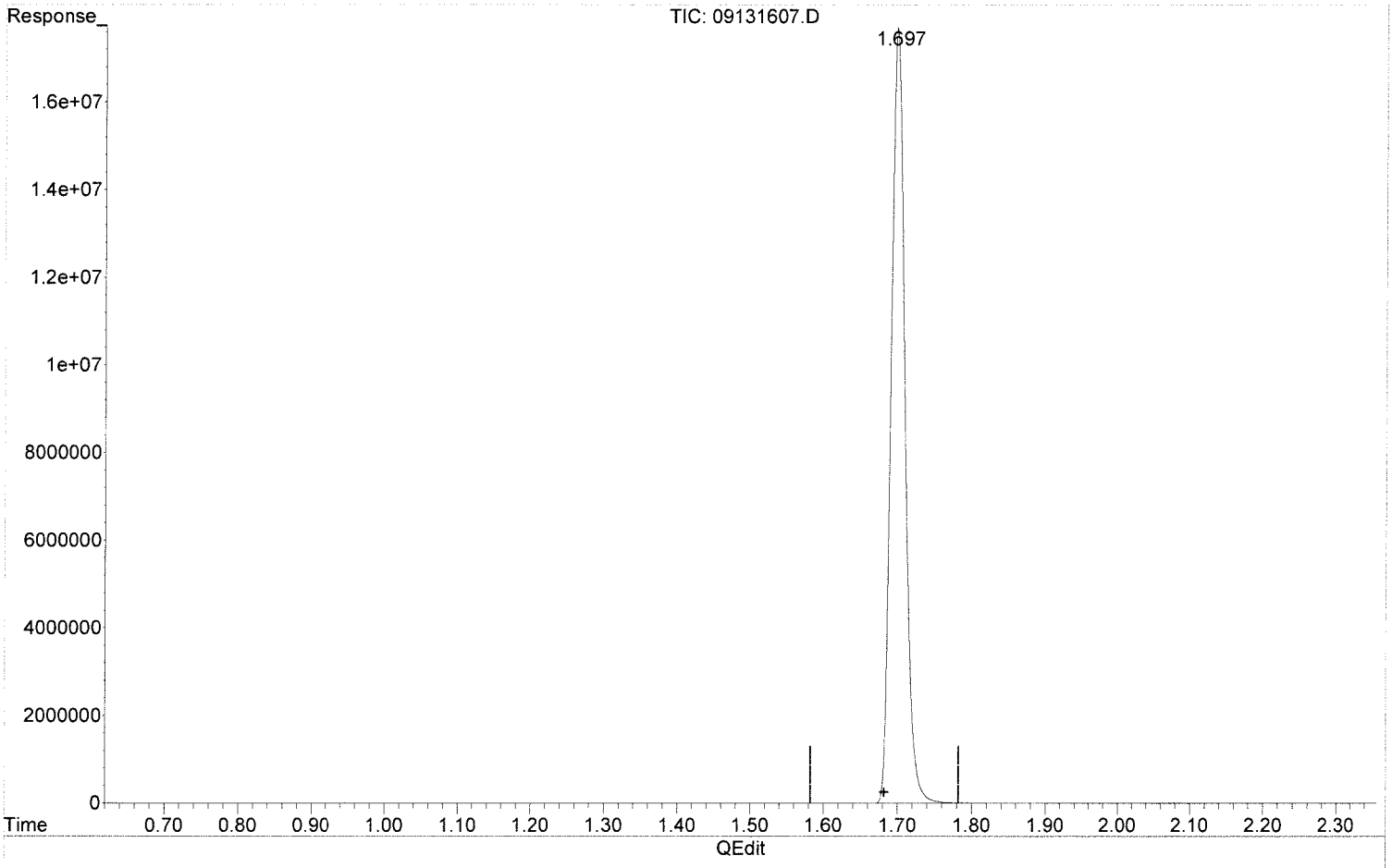
(+) = Expected Retention Time

Quantitation Report (Qedit)

Data Path : I:\GC08\DATA\TO_3M\2016_09\13\
Data File : 09131607.D
Signal(s) : FID2B.CH
Acq On : 13-Sep-2016, 10:04:43
Operator : amf
Sample : 4352-002 0.1ml
Misc :
ALS Vial : 1 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Sep 13 10:07:04 2016
Quant Method : I:\GC08\METHODS\TF042116.M
Quant Title : VOA-TO3C1C6
QLast Update : Fri Apr 22 09:01:46 2016
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. :
Signal Phase :
Signal Info :



(1) Methane

1.698min 10476.128 ppm

response 229772915

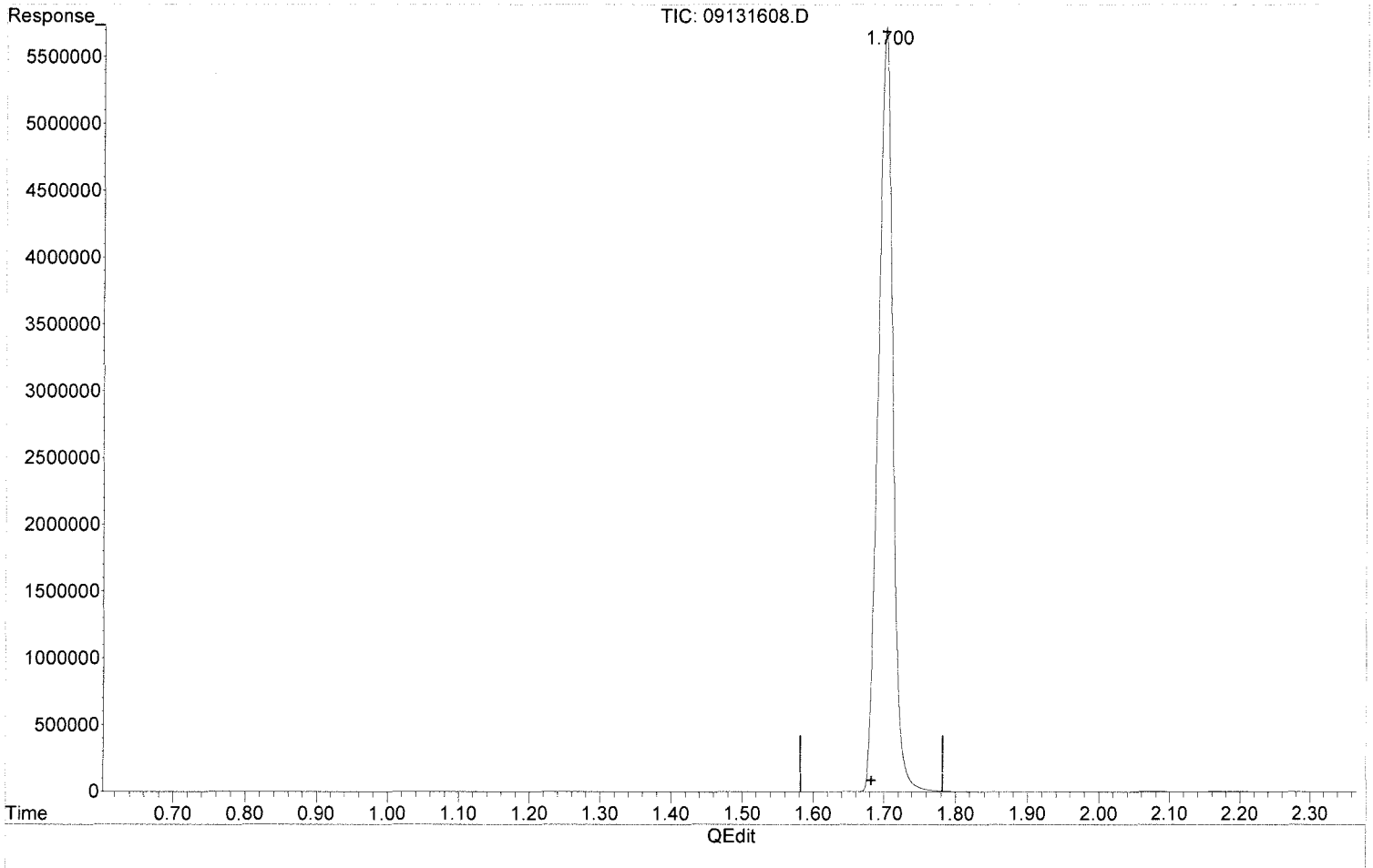
(+) = Expected Retention Time

Quantitation Report (Qedit)

Data Path : I:\GC08\DATA\TO_3M\2016_09\13\
Data File : 09131608.D
Signal(s) : FID2B.CH
Acq On : 13-Sep-2016, 10:07:53
Operator : amf
Sample : 4352-003 0.1ml
Misc :
ALS Vial : 1 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Sep 13 10:10:14 2016
Quant Method : I:\GC08\METHODS\TF042116.M
Quant Title : VOA-TO3C1C6
QLast Update : Fri Apr 22 09:01:46 2016
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. :
Signal Phase :
Signal Info :



(1) Methane

1.700min 3727.076 ppm

response 81745957

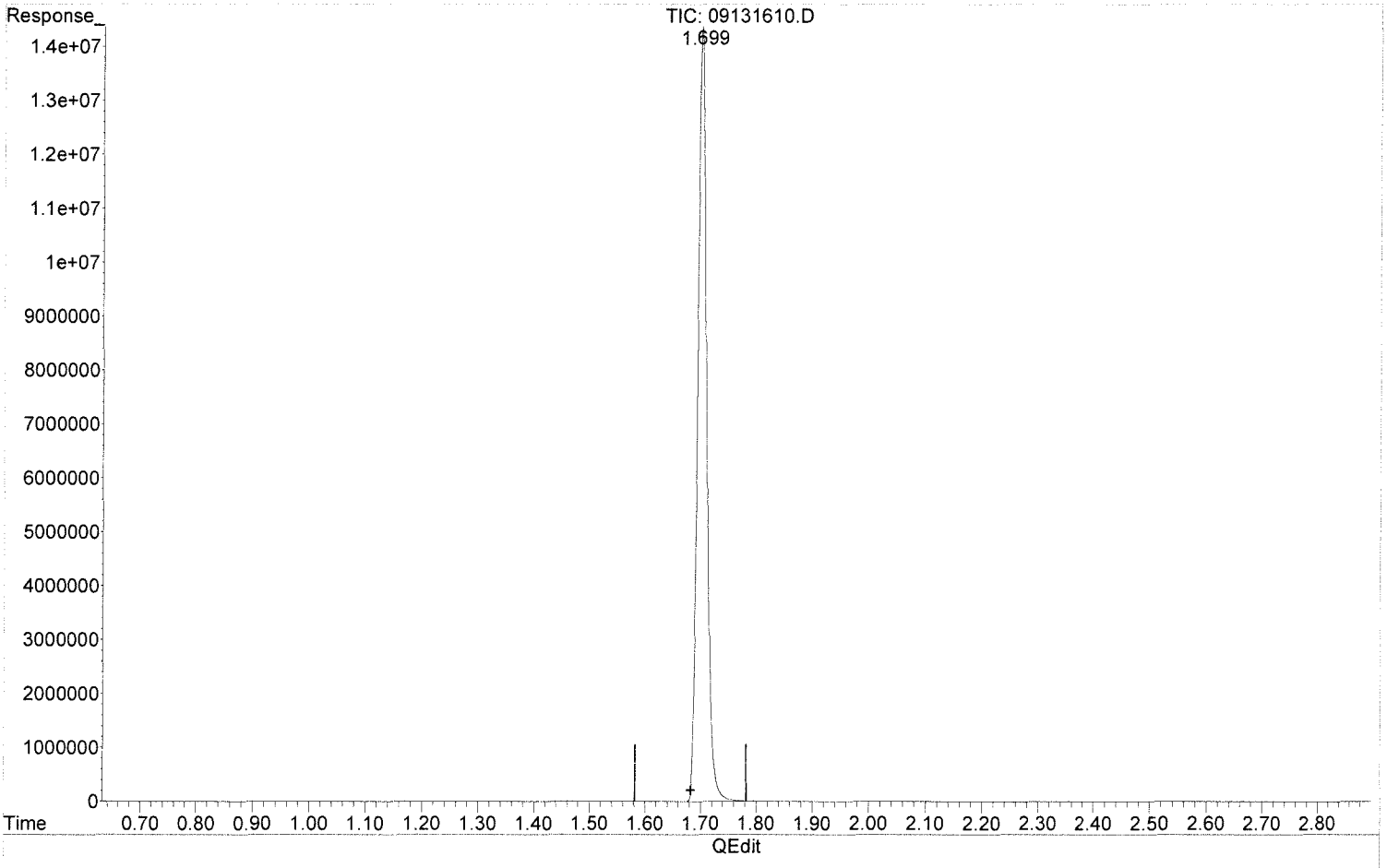
(+) = Expected Retention Time

Quantitation Report (Qedit)

Data Path : I:\GC08\DATA\TO_3M\2016_09\13\
Data File : 09131610.D
Signal(s) : FID2B.CH
Acq On : 13-Sep-2016, 10:15:28
Operator : amf
Sample : 4352-004 0.05ml
Misc :
ALS Vial : 1 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Sep 13 10:18:25 2016
Quant Method : I:\GC08\METHODS\TF042116.M
Quant Title : VOA-TO3C1C6
QLast Update : Fri Apr 22 09:01:46 2016
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. :
Signal Phase :
Signal Info :



(1) Methane

1.700min 7424.284 ppm

response 162836815

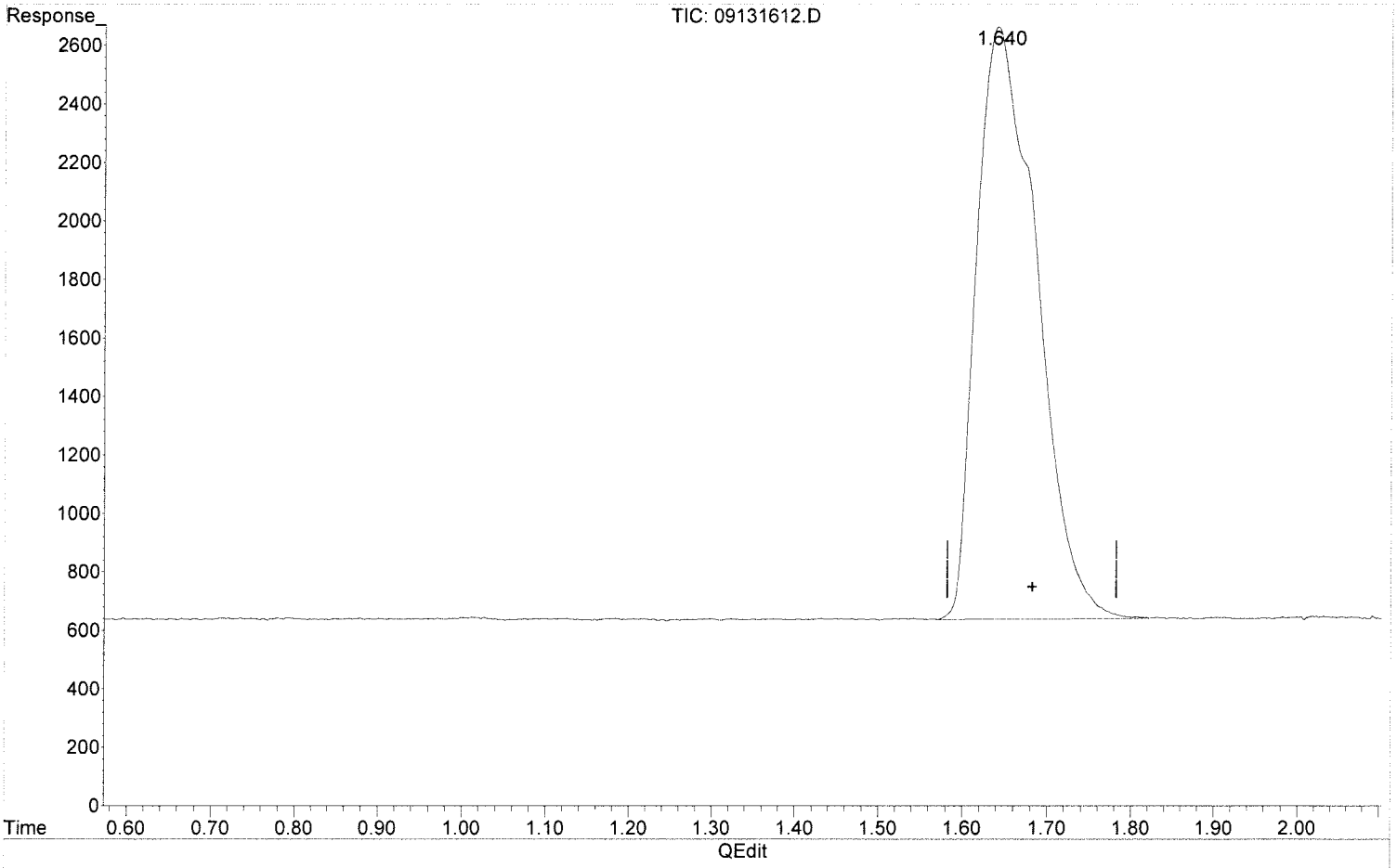
(+) = Expected Retention Time

Quantitation Report (Qedit)

Data Path : I:\GC08\DATA\TO_3M\2016_09\13\
Data File : 09131612.D
Signal(s) : FID2B.CH
Acq On : 13-Sep-2016, 10:45:18
Operator : amf
Sample : 4352-005 1ml
Misc :
ALS Vial : 1 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Sep 13 10:50:15 2016
Quant Method : I:\GC08\METHODS\TF042116.M
Quant Title : VOA-TO3C1C6
QLast Update : Fri Apr 22 09:01:46 2016
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. :
Signal Phase :
Signal Info :



(1) Methane

1.641min 4.559 ppm

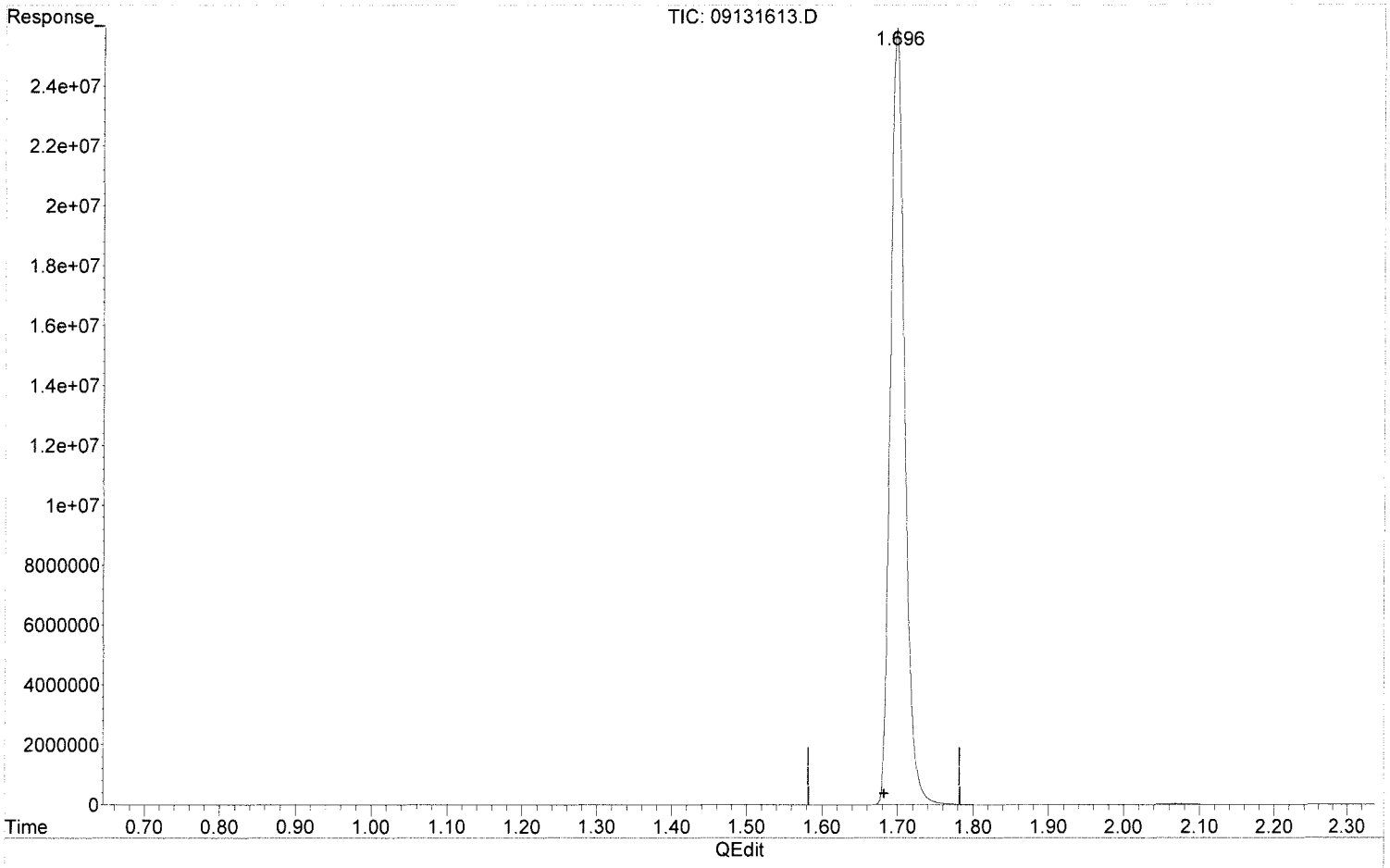
response 99992

(+) = Expected Retention Time

Data Path : I:\GC08\DATA\TO_3M\2016_09\13\
Data File : 09131613.D
Signal(s) : FID2B.CH
Acq On : 13-Sep-2016, 10:47:56
Operator : amf
Sample : 4352-006 0.1ml
Misc :
ALS Vial : 1 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Sep 13 10:50:23 2016
Quant Method : I:\GC08\METHODS\TF042116.M
Quant Title : VOA-TO3C1C6
QLast Update : Fri Apr 22 09:01:46 2016
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. :
Signal Phase :
Signal Info :



(1) Methane

1.697min 15611.640 ppm

response 342410086

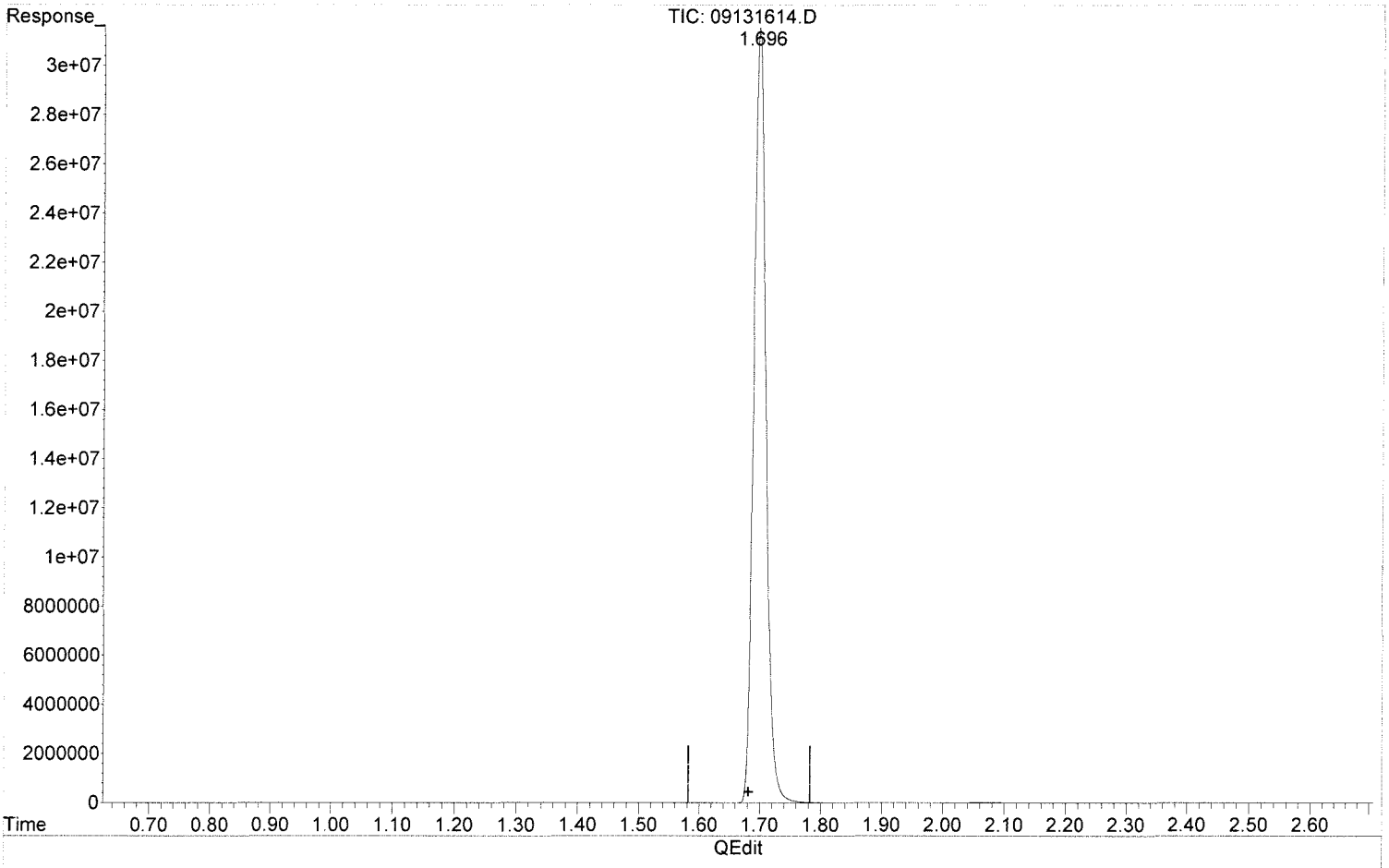
(+) = Expected Retention Time

Quantitation Report (Qedit)

Data Path : I:\GC08\DATA\TO_3M\2016_09\13\
Data File : 09131614.D
Signal(s) : FID2B.CH
Acq On : 13-Sep-2016, 10:52:17
Operator : amf
Sample : 4352-007 0.1ml
Misc :
ALS Vial : 1 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Sep 13 10:55:12 2016
Quant Method : I:\GC08\METHODS\TF042116.M
Quant Title : VOA-TO3C1C6
QLast Update : Fri Apr 22 09:01:46 2016
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. :
Signal Phase :
Signal Info :



(1) Methane

1.697min 20105.809 ppm

response 440980695

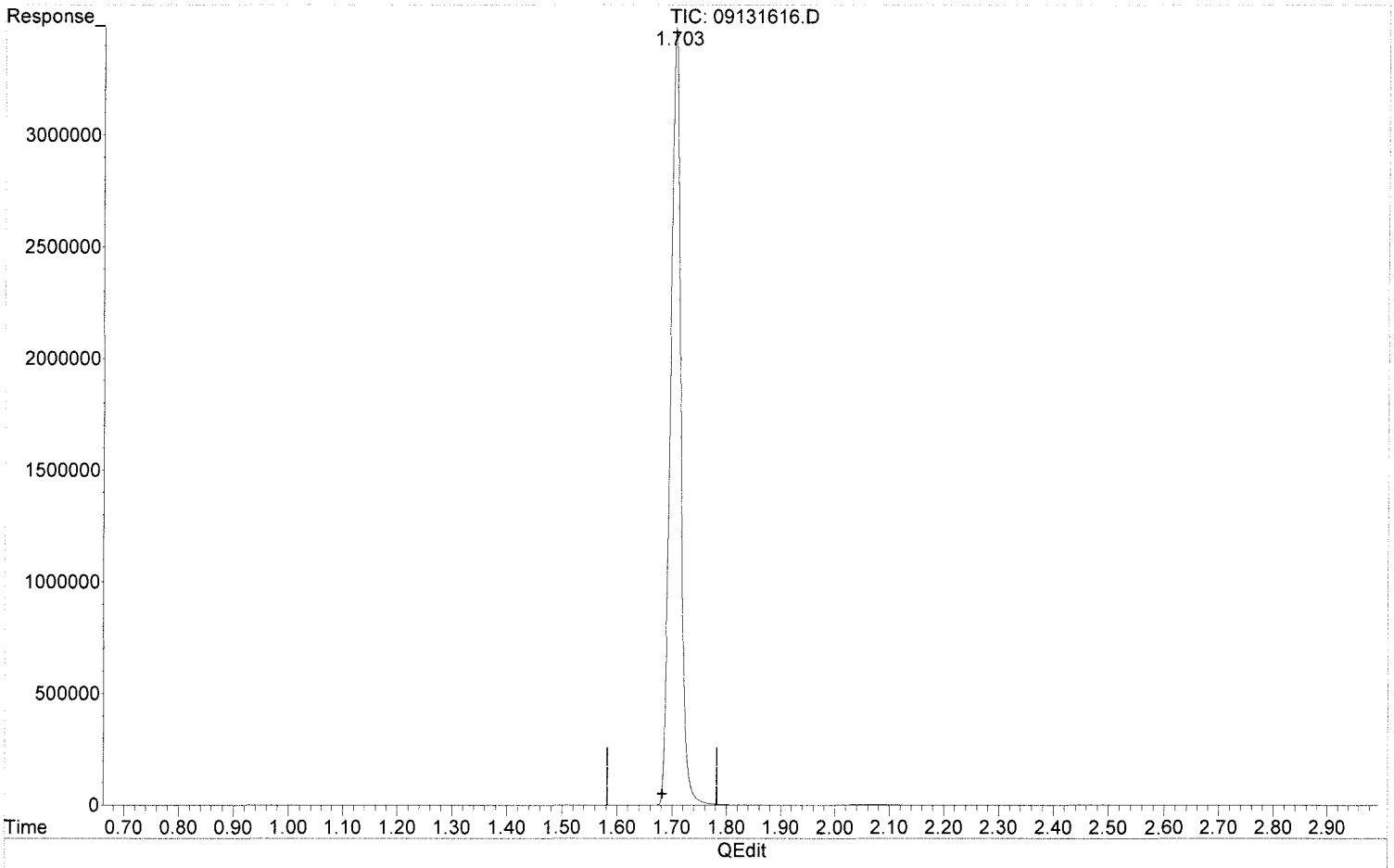
(+) = Expected Retention Time

Quantitation Report (Qedit)

Data Path : I:\GC08\DATA\TO_3M\2016_09\13\
Data File : 09131616.D
Signal(s) : FID2B.CH
Acq On : 13-Sep-2016, 11:20:03
Operator : amf
Sample : 4352-008 0.1ml
Misc :
ALS Vial : 1 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Sep 13 11:22:44 2016
Quant Method : I:\GC08\METHODS\TF042116.M
Quant Title : VOA-TO3C1C6
QLast Update : Fri Apr 22 09:01:46 2016
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. :
Signal Phase :
Signal Info :



(1) Methane

1.704min 2108.006 ppm

response 46234893

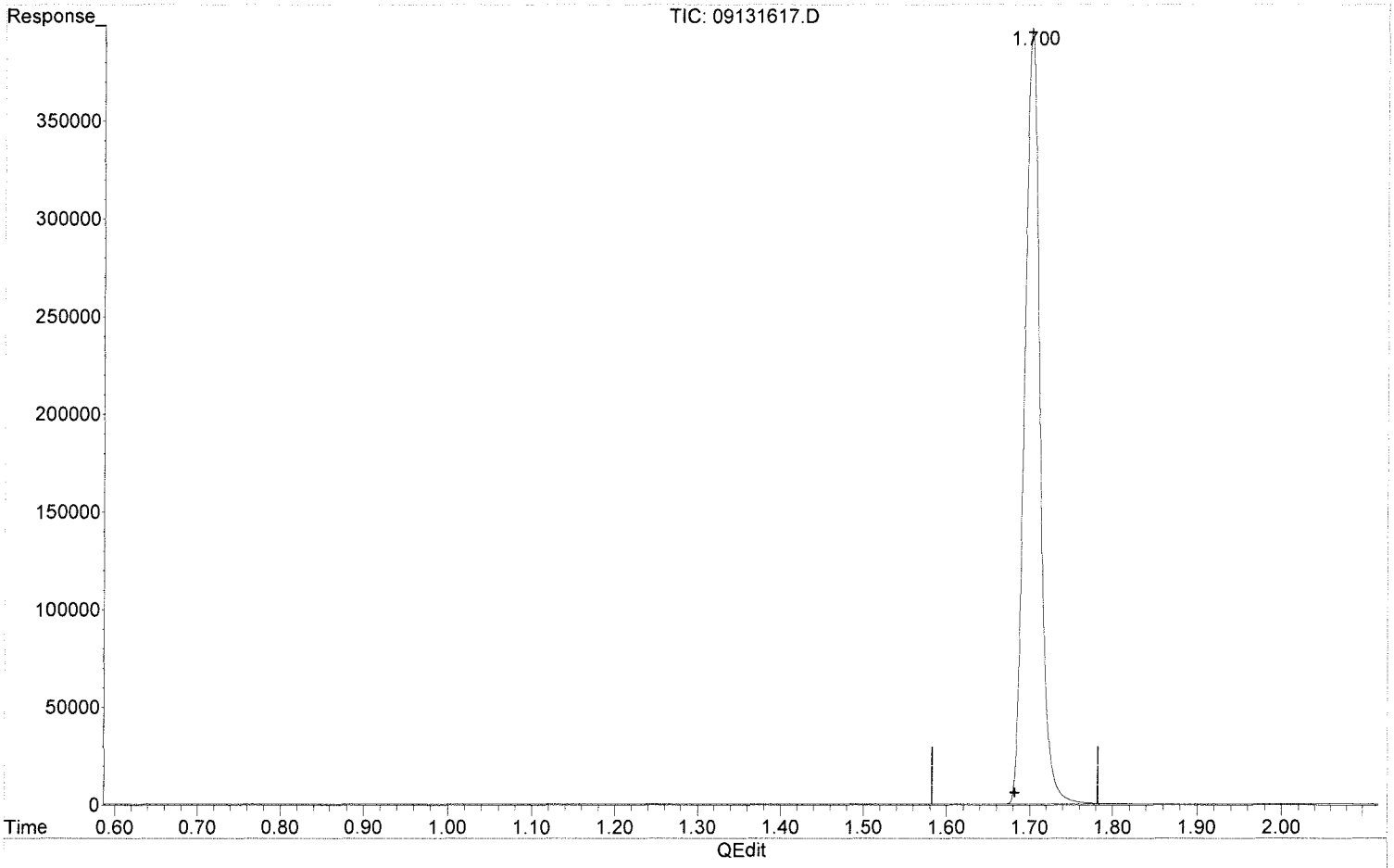
(+) = Expected Retention Time

Quantitation Report (Qedit)

Data Path : I:\GC08\DATA\TO_3M\2016_09\13\
Data File : 09131617.D
Signal(s) : FID2B.CH
Acq On : 13-Sep-2016, 11:24:55
Operator : amf
Sample : 4352-009 0.1ml
Misc :
ALS Vial : 1 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Sep 13 11:26:30 2016
Quant Method : I:\GC08\METHODS\TF042116.M
Quant Title : VOA-TO3C1C6
QLast Update : Fri Apr 22 09:01:46 2016
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. :
Signal Phase :
Signal Info :



(1) Methane

1.701min 233.613 ppm

response 5123843

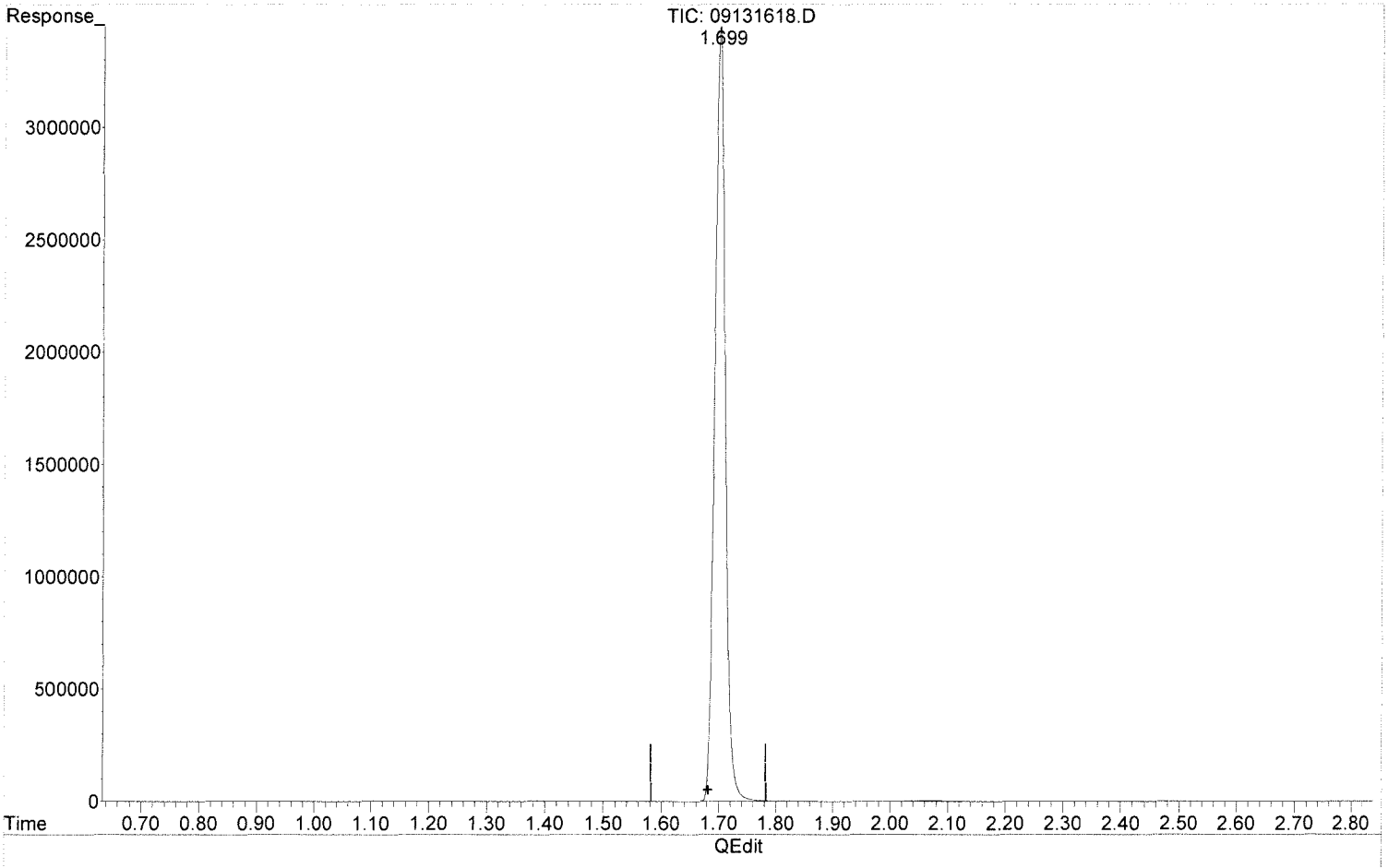
(+) = Expected Retention Time

Quantitation Report (Qedit)

Data Path : I:\GC08\DATA\TO_3M\2016_09\13\
Data File : 09131618.D
Signal(s) : FID2B.CH
Acq On : 13-Sep-2016, 11:28:23
Operator : amf
Sample : 4352-010 0.1ml
Misc :
ALS Vial : 1 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Sep 13 11:30:44 2016
Quant Method : I:\GC08\METHODS\TF042116.M
Quant Title : VOA-TO3C1C6
QLast Update : Fri Apr 22 09:01:46 2016
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. :
Signal Phase :
Signal Info :



(1) Methane

1.700min 2037.147 ppm

response 44680743

(+) = Expected Retention Time

Quantitation Report (QT Reviewed)

Data Path : I:\GC08\DATA\TO_3M\2016_09\13\
Data File : 09131602.D
Signal(s) : FID2B.CH
Acq On : 13-Sep-2016, 08:53:49
Operator : amf
Sample : mb 1ml
Misc :
ALS Vial : 1 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Sep 13 09:13:52 2016
Quant Method : I:\GC08\METHODS\TF042116.M
Quant Title : VOA-TO3C1C6
QLast Update : Fri Apr 22 09:01:46 2016
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. :
Signal Phase :
Signal Info :

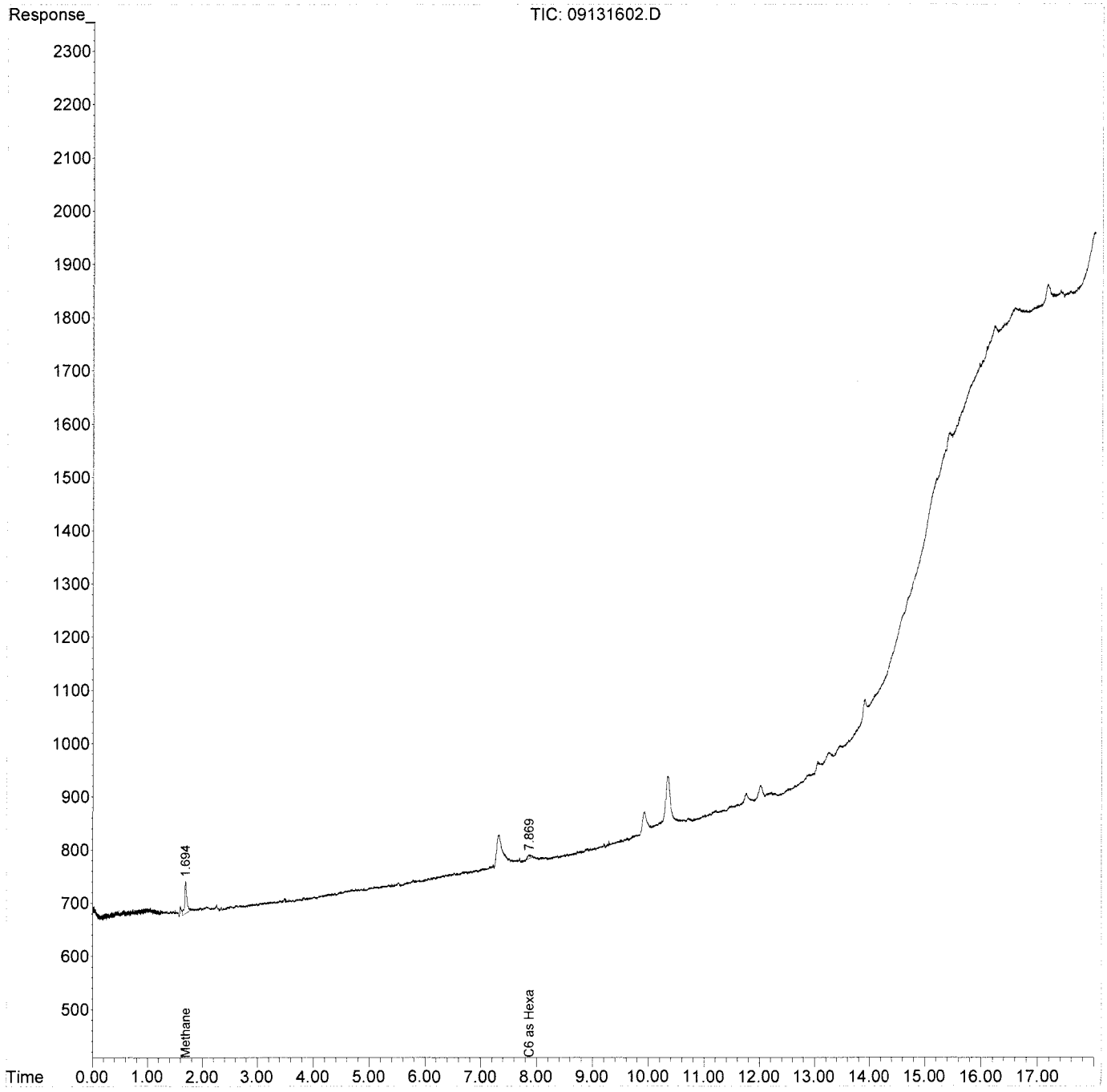
	Compound	R.T.	Response	Conc	Units
Target Compounds					
1)	Methane	1.696	1589	0.072	ppm
2)	C2 as Ethane	0.000	0	N.D.	ppm
3)	C3 as Propane	0.000	0	N.D.	ppm
4)	C4 as Butane	0.000	0	N.D.	ppm
5)	C5 as Pentane	0.000	0	N.D.	ppm
6)	C6 as Hexane	7.870	286	0.003	ppm
7)	>C6_1 as Hexane	0.000	0	N.D.	ppm
8)	>C6_2 as Hexane	0.000	0	N.D.	ppm
9)	>C6_3 as Hexane	0.000	0	N.D.	ppm

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

Data Path : I:\GC08\DATA\TO_3M\2016_09\13\
Data File : 09131602.D
Signal(s) : FID2B.CH
Acq On : 13-Sep-2016, 08:53:49
Operator : amf
Sample : mb 1ml
Misc :
ALS Vial : 1 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Sep 13 09:13:52 2016
Quant Method : I:\GC08\METHODS\TF042116.M
Quant Title : VOA-TO3C1C6
QLast Update : Fri Apr 22 09:01:46 2016
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. :
Signal Phase :
Signal Info :



Quantitation Report (QT Reviewed)

Data Path : I:\GC08\DATA\TO_3M\2016_09\13\
Data File : 09131603.D
Signal(s) : FID2B.CH
Acq On : 13-Sep-2016, 09:17:13
Operator : amf
Sample : lcs s30-08011601
Misc :
ALS Vial : 1 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Sep 13 09:30:07 2016
Quant Method : I:\GC08\METHODS\TF042116.M
Quant Title : VOA-TO3C1C6
QLast Update : Fri Apr 22 09:01:46 2016
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. :
Signal Phase :
Signal Info :

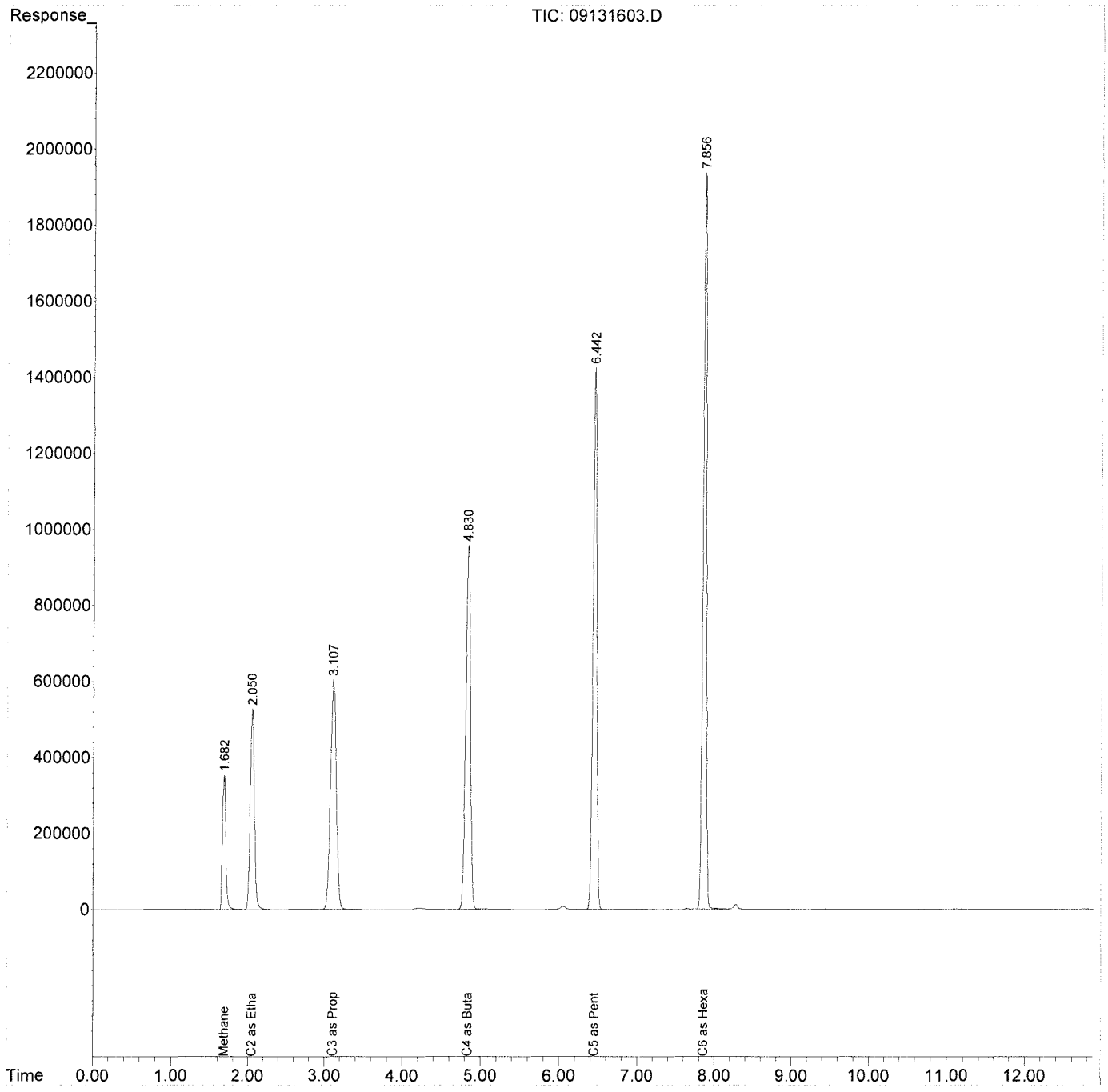
	Compound	R.T.	Response	Conc	Units
Target Compounds					
1)	Methane	1.682	10834508	493.982	ppm
2)	C2 as Ethane	2.050	20176755	510.316	ppm
3)	C3 as Propane	3.108	31059617	548.140	ppm
4)	C4 as Butane	4.830	40298809	536.321	ppm
5)	C5 as Pentane	6.443	49269939	518.702	ppm
6)	C6 as Hexane	7.856	60399116	580.542	ppm
7)	>C6_1 as Hexane	0.000	0	N.D.	ppm
8)	>C6_2 as Hexane	0.000	0	N.D.	ppm
9)	>C6_3 as Hexane	0.000	0	N.D.	ppm

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

Data Path : I:\GC08\DATA\TO_3M\2016_09\13\
Data File : 09131603.D
Signal(s) : FID2B.CH
Acq On : 13-Sep-2016, 09:17:13
Operator : amf
Sample : lcs s30-08011601
Misc :
ALS Vial : 1 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Sep 13 09:30:07 2016
Quant Method : I:\GC08\METHODS\TF042116.M
Quant Title : VOA-TO3C1C6
QLast Update : Fri Apr 22 09:01:46 2016
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. :
Signal Phase :
Signal Info :



Quantitation Report (QT Reviewed)

Data Path : I:\GC08\DATA\TO_3M\2016_09\13\
Data File : 09131604.D
Signal(s) : FID2B.CH
Acq On : 13-Sep-2016, 09:34:48
Operator : amf
Sample : lcsds30-08011601
Misc :
ALS Vial : 1 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Sep 13 09:51:20 2016
Quant Method : I:\GC08\METHODS\TF042116.M
Quant Title : VOA-TO3C1C6
QLast Update : Fri Apr 22 09:01:46 2016
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. :
Signal Phase :
Signal Info :

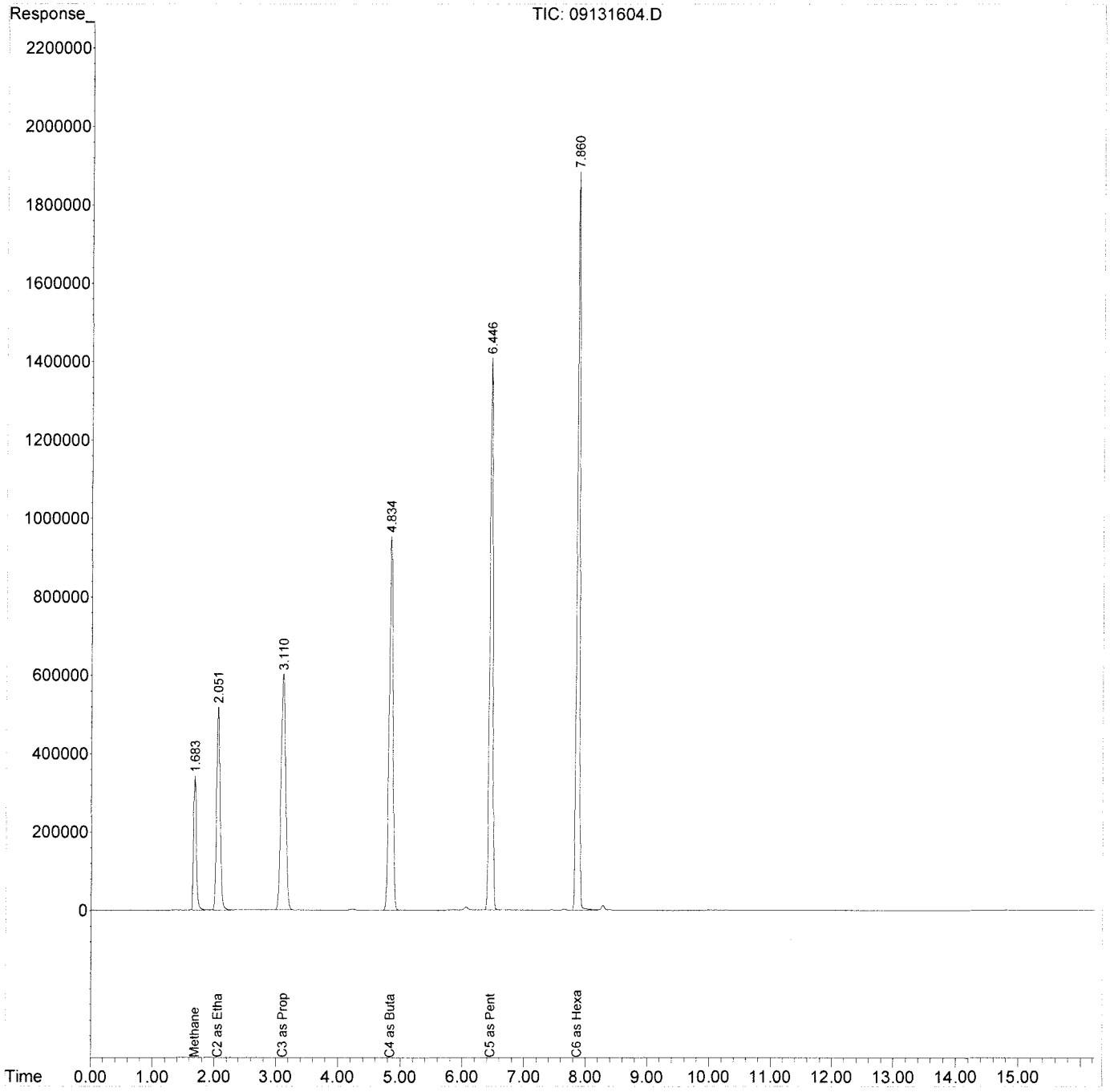
	Compound	R.T.	Response	Conc	Units	
Target Compounds						
1)	Methane	1.683	10900149	496.975	ppm	
2)	C2 as Ethane	2.052	20292177	513.236	ppm	
3)	C3 as Propane	3.111	31202551	550.663	ppm	
4)	C4 as Butane	4.834	40366225	537.218	ppm	
5)	C5 as Pentane	6.447	48899246	514.800	ppm	
6)	C6 as Hexane	7.861	58775496	564.936	ppm	
7)	>C6_1 as Hexane	0.000	0	N.D.	ppm	d
8)	>C6_2 as Hexane	0.000	0	N.D.	ppm	d
9)	>C6_3 as Hexane	0.000	0	N.D.	ppm	

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

Data Path : I:\GC08\DATA\TO_3M\2016_09\13\
Data File : 09131604.D
Signal(s) : FID2B.CH
Acq On : 13-Sep-2016, 09:34:48
Operator : amf
Sample : lcsds30-08011601
Misc :
ALS Vial : 1 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Sep 13 09:51:20 2016
Quant Method : I:\GC08\METHODS\TF042116.M
Quant Title : VOA-TO3C1C6
QLast Update : Fri Apr 22 09:01:46 2016
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. :
Signal Phase :
Signal Info :



Response Factor Report HP5890

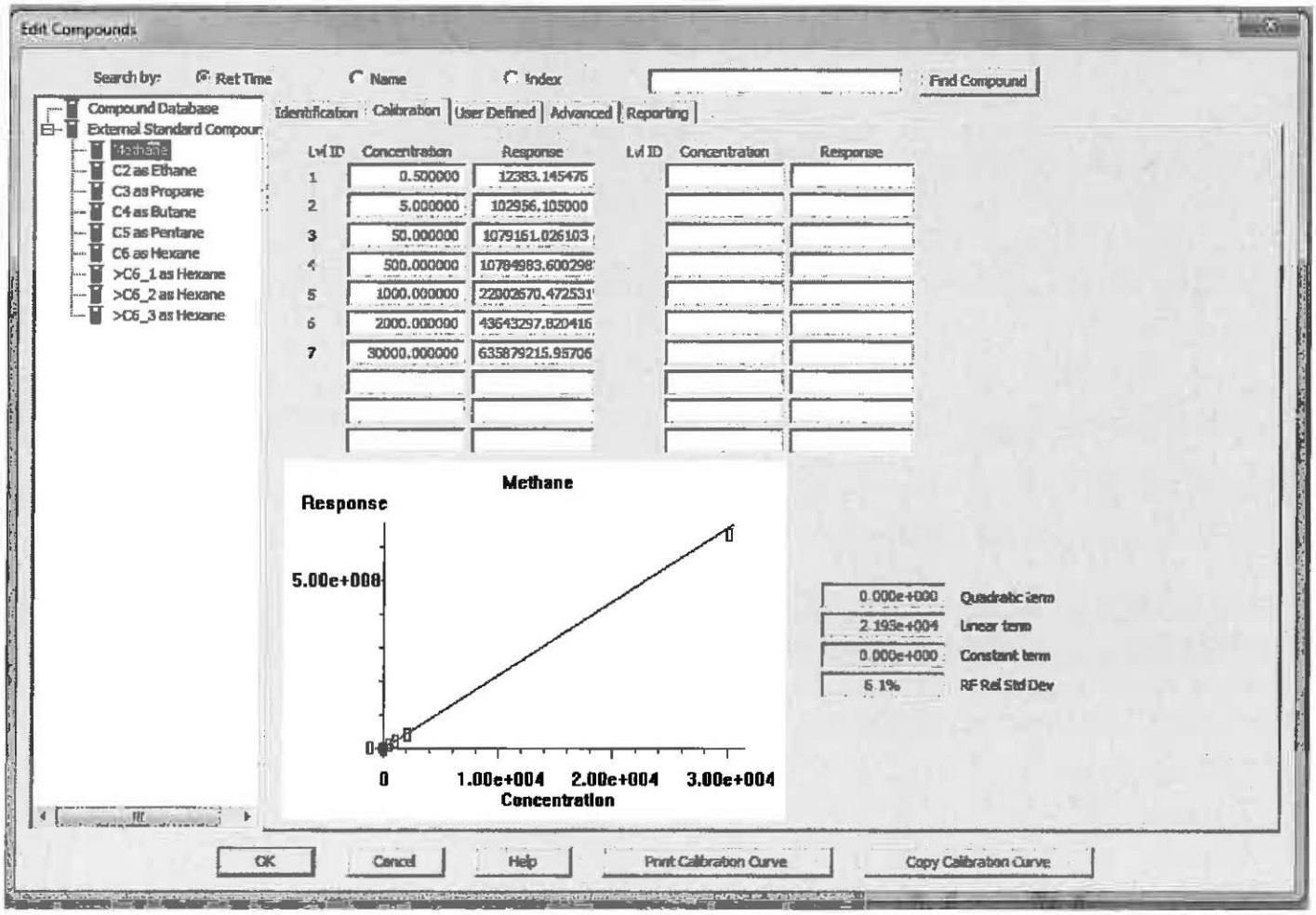
Method Path : I:\GC08\METHODS\
Method File : TF042116.M
Title : VOA-TO3C1C6
Last Update : Fri Apr 22 09:01:46 2016
Response Via : Initial Calibration

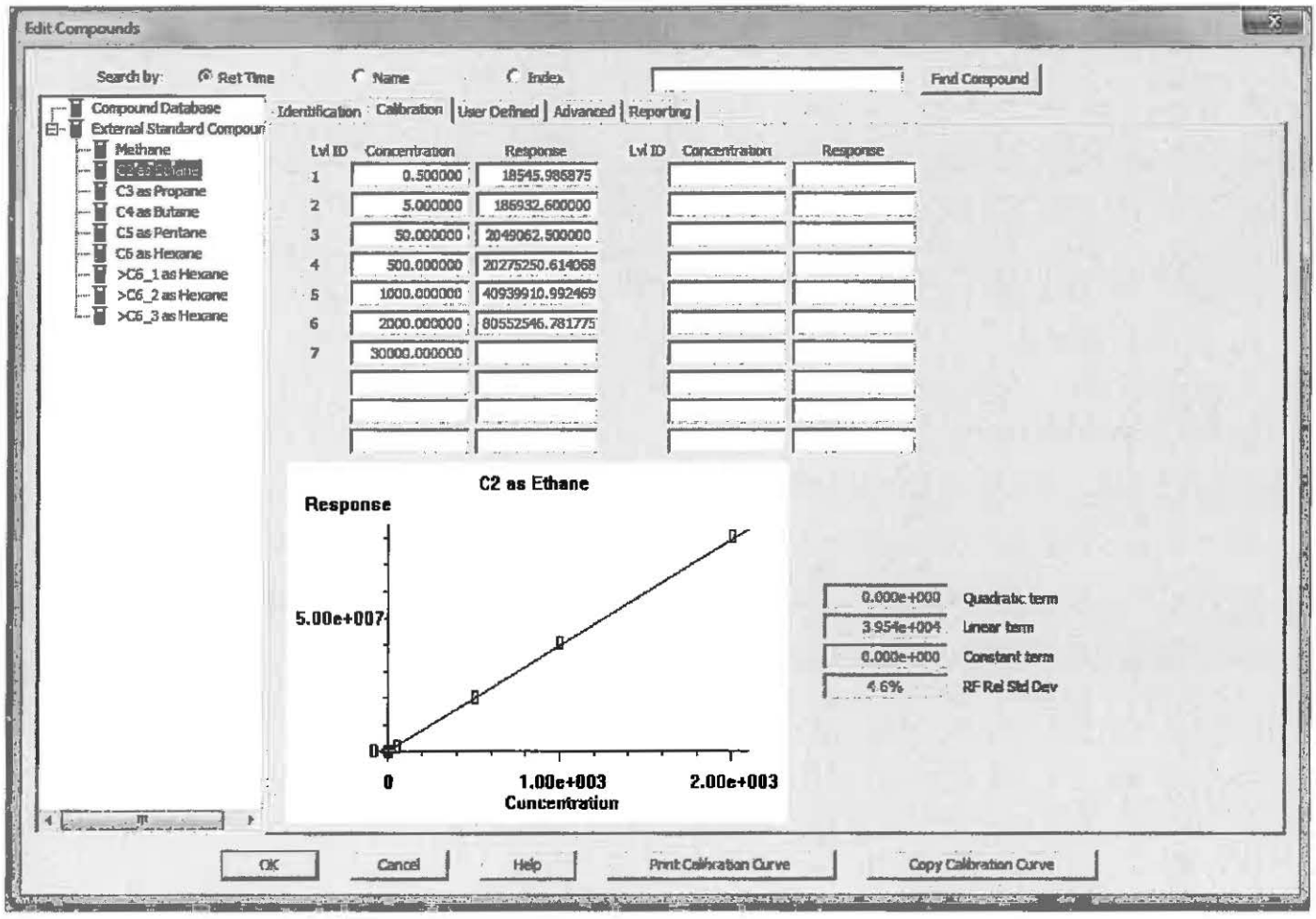
Calibration Files
1 =04211630.D 2 =04211631.D 3 =04211633.D
4 =04211634.D 5 =04211635.D 6 =04211636.D

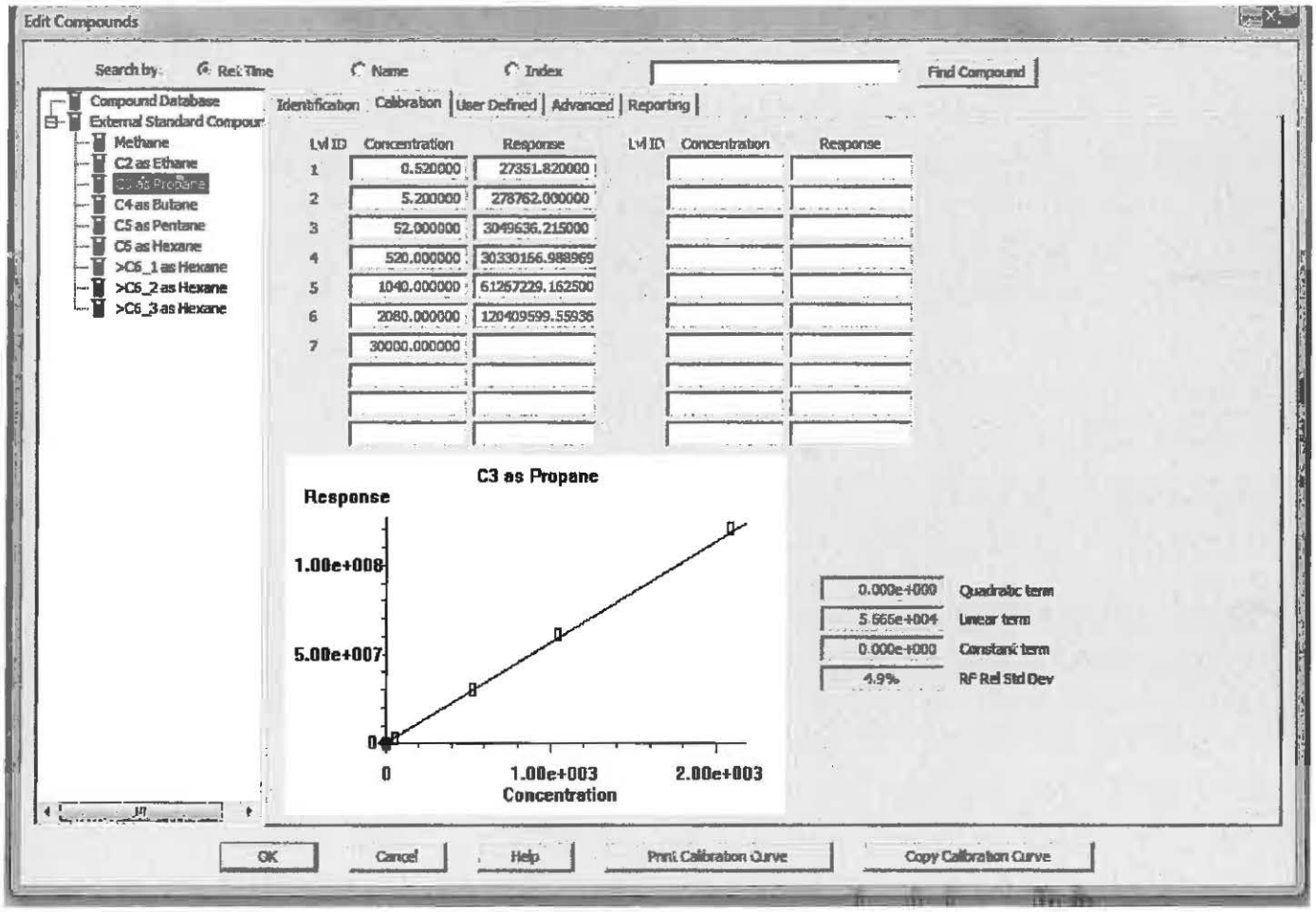
		Compound	1	2	3	4	5	6	Avg		%RSD
1)	T	Methane	2.477	2.059	2.158	2.157	2.200	2.182	2.193	E4	6.07
2)	T	C2 as Ethane	3.709	3.739	4.098	4.055	4.094	4.028	3.954	E4	4.56
3)	T	C3 as Propane	5.260	5.361	5.865	5.833	5.891	5.789	5.666	E4	4.94
4)	T	C4 as Butane	6.902	7.139	7.688	7.767	7.857	7.731	7.514	E4	5.23
5)	T	C5 as Pentane	0.857	0.911	0.941	0.989	1.005	0.996	0.950	E5	6.14
6)	T	C6 as Hexane	0.871	1.020	0.962	1.108	1.134	1.146	1.040	E5	10.53
7)	T	>C6_1 as Hexane	0.871	1.020	0.962	1.108	1.134	1.146	1.040	E5	10.53
8)	T	>C6_2 as Hexane	0.871	1.020	0.962	1.108	1.134	1.146	1.040	E5	10.53
9)	T	>C6_3 as Hexane	0.871	1.020	0.962	1.108	1.134	1.146	1.040	E5	10.53

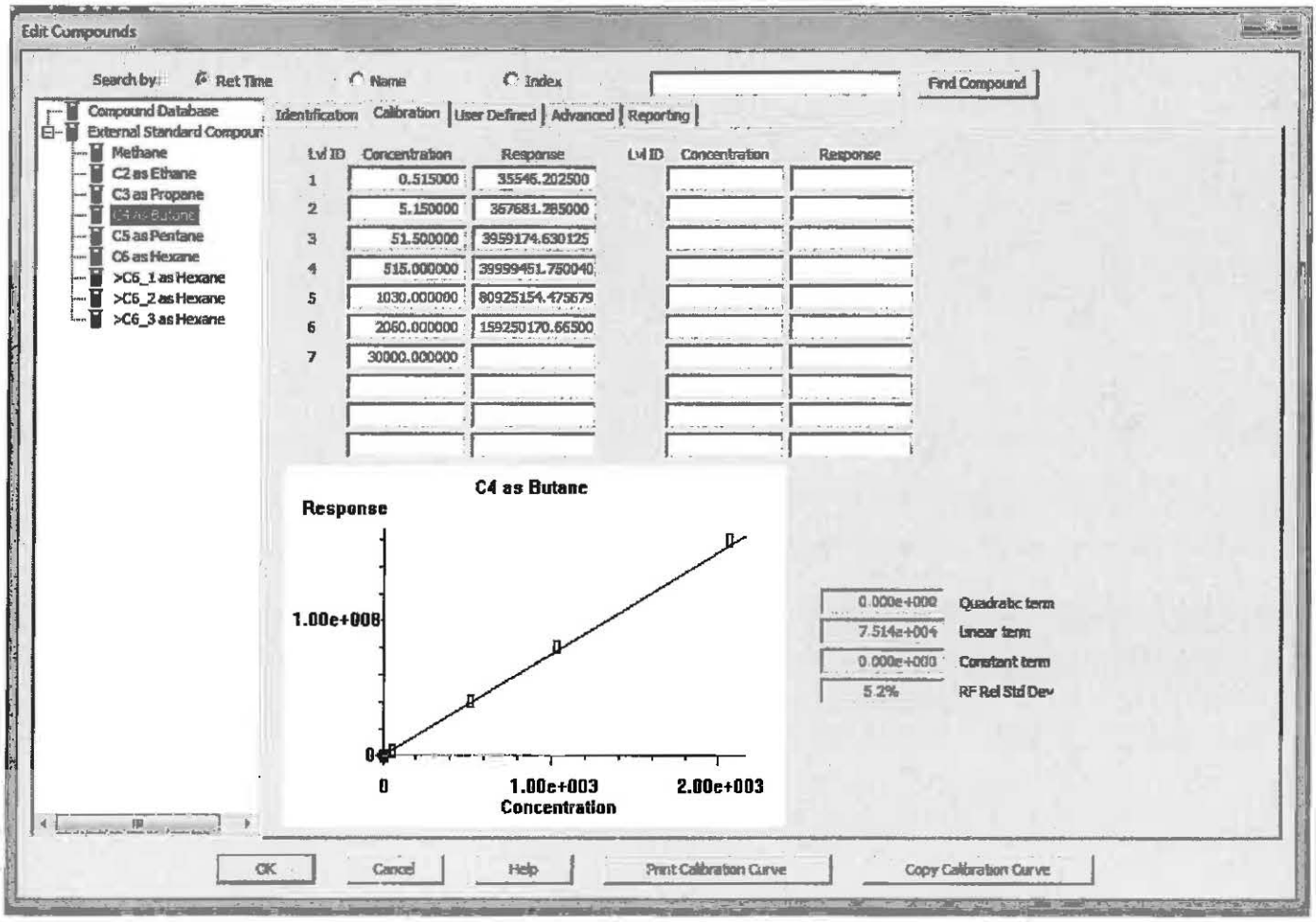
(#) = Out of Range ### Number of calibration levels exceeded format ###

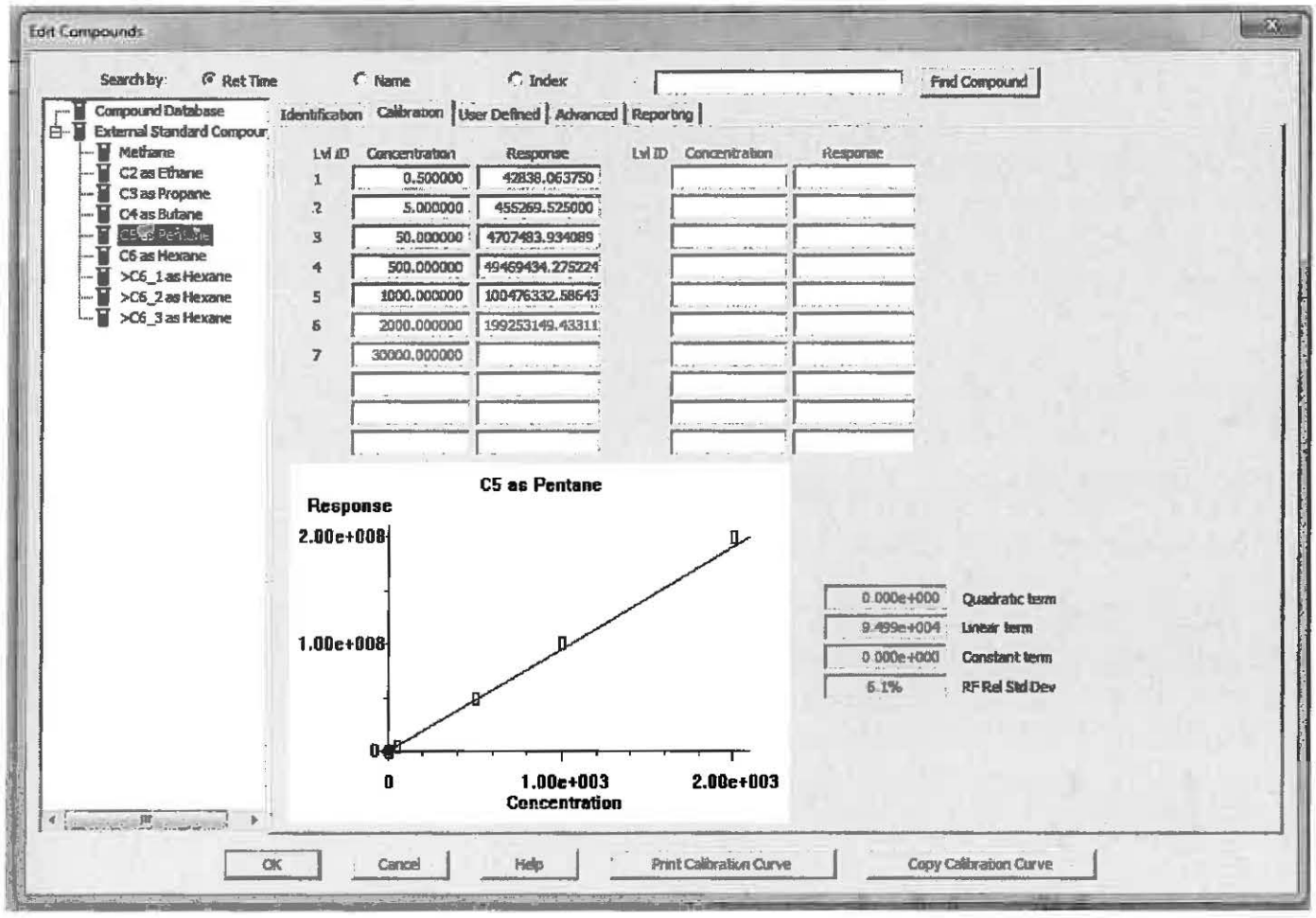
TF042116.M Fri Apr 22 09:01:57 2016

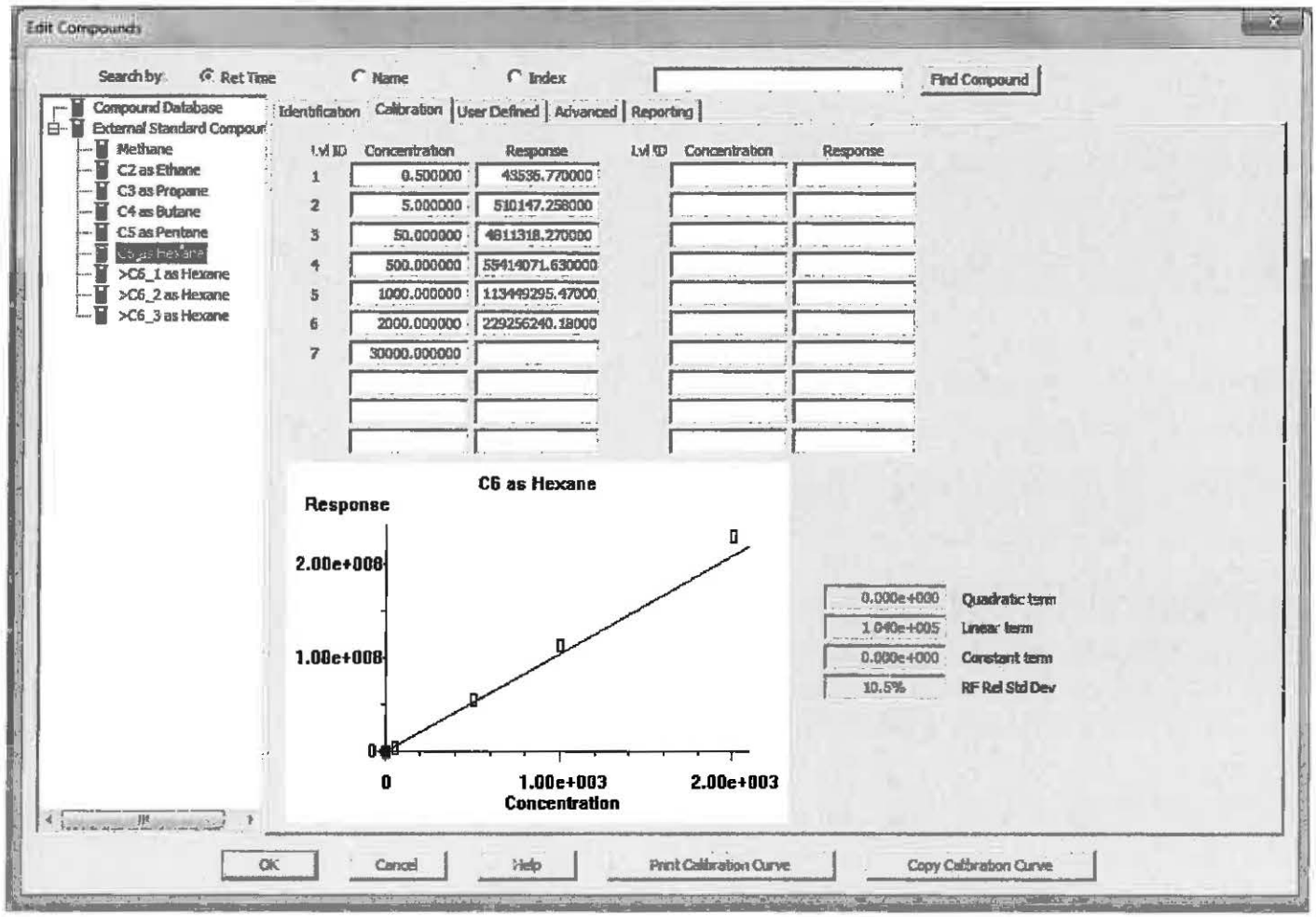

Edit Compounds
Search by:
Ret Time
Name
Index
Find Compound
Compound Database
External Standard Compour
Methane
C2 as Ethane
C3 as Propane
C4 as Butane
C5 as Pentane
C6 as Hexane
>C6_1 as Hexane
>C6_2 as Hexane
>C6_3 as Hexane
Identification
Calibration
User Defined
Advanced
Reporting
Lvl ID
Concentration
Response
1 0.500000 12383.145476
2 5.000000 102956.105000
3 50.000000 1079161.026103
4 500.000000 10784983.600298
5 1000.000000 22002670.472531
6 2000.000000 43643297.820416
7 30000.000000 635879215.95706
Methane
Response
5.00e+008
0
0
1.00e+004
2.00e+004
3.00e+004
Concentration
0.000e+000 Quadratic term
2.193e+004 Linear term
0.000e+000 Constant term
6.1% RF Rel Std Dev
OK
Cancel
Help
Print Calibration Curve
Copy Calibration Curve


Edit Compounds
Search by:
Ret Time
Name
Index
Find Compound
Compound Database
External Standard Compoun
Methane
C2 as Ethane
C3 as Propane
C4 as Butane
C5 as Pentane
C6 as Hexane
>C6_1 as Hexane
>C6_2 as Hexane
>C6_3 as Hexane
Identification
Calibration
User Defined
Advanced
Reporting
Lvl ID
Concentration
Response
1 0.500000 18545.986875
2 5.000000 186932.600000
3 50.000000 2049062.500000
4 500.000000 20275250.614068
5 1000.000000 40939910.992469
6 2000.000000 80552546.781775
7 30000.000000
C2 as Ethane
Response
5.00e+007
0
0
1.00e+003
2.00e+003
Concentration
0.000e+000 Quadratic term
3.954e+004 Linear term
0.000e+000 Constant term
4.6% RF Rel Std Dev
OK
Cancel
Help
Print Calibration Curve
Copy Calibration Curve


Edit Compounds
Search by:
Rel. Time
Name
Index
Find Compound
Compound Database
External Standard Compour
Methane
C2 as Ethane
C3 as Propane
C4 as Butane
C5 as Pentane
C6 as Hexane
>C6_1 as Hexane
>C6_2 as Hexane
>C6_3 as Hexane
Identification
Calibration
User Defined
Advanced
Reporting
Lvl ID
Concentration
Response
1 0.520000 27351.820000
2 5.200000 278762.000000
3 52.000000 3049636.215000
4 520.000000 30330166.988969
5 1040.000000 61257229.162500
6 2080.000000 120409599.55936
7 30000.000000
C3 as Propane
Response
1.00e+008
5.00e+007
0
0
1.00e+003
2.00e+003
Concentration
0.000e+000 Quadratic term
5.666e+004 Linear term
0.000e+000 Constant term
4.9% RF Rel Std Dev
OK
Cancel
Help
Print Calibration Curve
Copy Calibration Curve


Edit Compounds
Search by:
Ret Time
Name
Index
Find Compound
Compound Database
External Standard Compoun
Methane
C2 as Ethane
C3 as Propane
C4 as Butane
C5 as Pentane
C6 as Hexane
>C6_1 as Hexane
>C6_2 as Hexane
>C6_3 as Hexane
Identification
Calibration
User Defined
Advanced
Reporting
Lvl ID
Concentration
Response
1 0.515000 35546.202500
2 5.150000 357681.285000
3 51.500000 3959174.630125
4 515.000000 39999451.750040
5 1030.000000 80925154.475679
6 2060.000000 159250170.66500
7 30000.000000
C4 as Butane
Response
1.00e+008
0
0
1.00e+003
2.00e+003
Concentration
0.000e+000 Quadratic term
7.514e+004 Linear term
0.000e+000 Constant term
5.2% RF Rel Std Dev
OK
Cancel
Help
Print Calibration Curve
Copy Calibration Curve


Edit Compounds
Search by:
Ret Time
Name
Index
Find Compound
Compound Database
External Standard Compour
Methane
C2 as Ethane
C3 as Propane
C4 as Butane
C5 as Pentane
C6 as Hexane
>C6_1 as Hexane
>C6_2 as Hexane
>C6_3 as Hexane
Identification
Calibration
User Defined
Advanced
Reporting
Lvl ID
Concentration
Response
1 0.500000 42838.063750
2 5.000000 455269.525000
3 50.000000 4707483.934089
4 500.000000 49469434.275224
5 1000.000000 100476332.58643
6 2000.000000 199253149.43311
7 30000.000000
C5 as Pentane
Response
2.00e+008
1.00e+008
0
0
1.00e+003
2.00e+003
Concentration
0.000e+000 Quadratic term
9.499e+004 Linear term
0.000e+000 Constant term
6.1% RF Rel Std Dev
OK
Cancel
Help
Print Calibration Curve
Copy Calibration Curve


Edit Compounds
Search by:
Ret Time
Name
Index
Find Compound
Compound Database
External Standard Compour
Methane
C2 as Ethane
C3 as Propane
C4 as Butane
C5 as Pentane
C6 as Hexane
>C6_1 as Hexane
>C6_2 as Hexane
>C6_3 as Hexane
Identification
Calibration
User Defined
Advanced
Reporting
Lvl ID
Concentration
Response
1 0.500000 43536.770000
2 5.000000 510147.258000
3 50.000000 4811318.270000
4 500.000000 55414071.630000
5 1000.000000 113449295.47000
6 2000.000000 229256240.18000
7 30000.000000
C6 as Hexane
Response
2.00e+008
1.00e+008
0
0
1.00e+003
2.00e+003
Concentration
0.000e+000 Quadratic term
1.040e+005 Linear term
0.000e+000 Constant term
10.5% RF Rel Std Dev
OK
Cancel
Help
Print Calibration Curve
Copy Calibration Curve

Calibration Status Report HP5890

Method Path : I:\GC08\METHODS\
Method File : TF042116.M
Title : VOA-TO3C1C6
Last Update : Fri Apr 22 08:50:30 2016
Response Via : Initial Calibration

#	ID	Conc	ISTD Conc	Path\File
1	1	1	0	J:\GC08\DATA\TO_3M\2016_04\21\04211630.D
2	2	5	0	J:\GC08\DATA\TO_3M\2016_04\21\04211631.D
3	3	50	0	J:\GC08\DATA\TO_3M\2016_04\21\04211633.D
4	4	500	0	J:\GC08\DATA\TO_3M\2016_04\21\04211634.D
5	5	1000	0	J:\GC08\DATA\TO_3M\2016_04\21\04211635.D
6	6	2000	0	J:\GC08\DATA\TO_3M\2016_04\21\04211636.D
7	7	30000	0	J:\GC08\DATA\TO_3M\2016_04\21\04211637.D

#	ID	Update Time	Quant Time	Acquisition Time
1	1	Apr 22 08:41 2016	Apr 22 08:40 2016	21-Apr-2016, 16:45:35
2	2	Apr 22 08:43 2016	Apr 22 08:43 2016	21-Apr-2016, 16:57:19
3	3	Apr 22 08:46 2016	Apr 22 08:46 2016	21-Apr-2016, 17:44:30
4	4	Apr 22 08:47 2016	Apr 22 08:46 2016	21-Apr-2016, 17:57:49
5	5	Apr 22 08:48 2016	Apr 22 08:47 2016	21-Apr-2016, 18:22:30
6	6	Apr 22 08:48 2016	Apr 22 08:48 2016	21-Apr-2016, 18:46:21
7	7	Apr 22 08:50 2016	Apr 22 08:49 2016	21-Apr-2016, 18:58:10

TF042116.M Fri Apr 22 08:59:21 2016

Quantitation Report (QT Reviewed)

Data Path : J:\GC08\DATA\TO_3M\2016_04\21\
Data File : 04211637.D
Signal(s) : FID2B.CH
Acq On : 21-Apr-2016, 18:58:10
Operator : amf
Sample : 3C std s30-04081603 0.75ml
Misc :
ALS Vial : 1 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Apr 22 08:49:31 2016
Quant Method : I:\GC08\METHODS\TF042116.M
Quant Title : VOA-TO3C1C6
QLast Update : Fri Apr 22 08:48:57 2016
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. :
Signal Phase :
Signal Info :

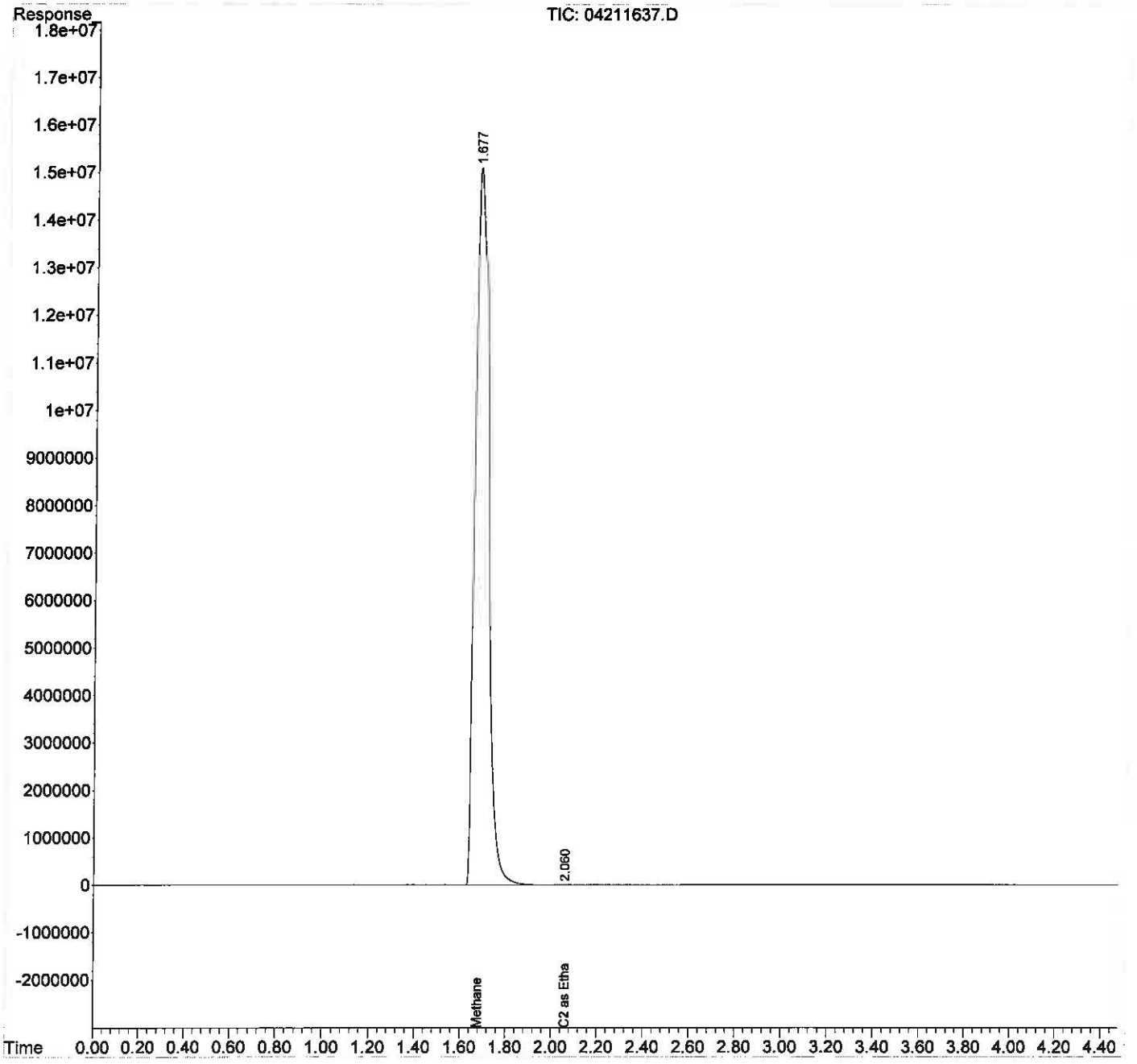
	Compound	R.T.	Response	Conc	Units
Target Compounds					
1) T	Methane	1.679	635879216	29164.446	ppm
2) T	C2 as Ethane	2.060	31606	0.799	ppm
3) T	C3 as Propane	0.000	0	N.D.	ppm
4) T	C4 as Butane	0.000	0	N.D.	ppm
5) T	C5 as Pentane	0.000	0	N.D.	ppm
6) T	C6 as Hexane	0.000	0	N.D.	ppm
7) T	>C6_1 as Hexane	0.000	0	N.D.	ppm
8) T	>C6_2 as Hexane	0.000	0	N.D.	ppm
9) T	>C6_3 as Hexane	0.000	0	N.D.	ppm

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

Data Path : J:\GC08\DATA\TO_3M\2016_04\21\
Data File : 04211637.D
Signal(s) : FID2B.CH
Acq On : 21-Apr-2016, 18:58:10
Operator : amf
Sample : 3C std s30-04081603 0.75ml
Misc :
ALS Vial : 1 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Apr 22 08:49:31 2016
Quant Method : I:\GC08\METHODS\TF042116.M
Quant Title : VOA-TO3C1C6
QLast Update : Fri Apr 22 08:48:57 2016
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. :
Signal Phase :
Signal Info :



Quantitation Report (QT Reviewed)

Data Path : J:\GC08\DATA\TO_3M\2016_04\21\
Data File : 04211630.D
Signal(s) : FID2B.CH
Acq On : 21-Apr-2016, 16:45:35
Operator : amf
Sample : std s30-04211601 0.05ml(x100)
Misc :
ALS Vial : 1 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Apr 22 08:40:36 2016
Quant Method : I:\GC08\METHODS\TF042116.M
Quant Title : VOA-TO3C1C6
QLast Update : Fri Apr 22 08:25:17 2016
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. :
Signal Phase :
Signal Info :

	Compound	R.T.	Response	Conc	Units
Target Compounds					
1) T	Methane	1.725	12383	0.645	ppm
2) T	C2 as Ethane	2.099	18546	0.553	ppm
3) T	C3 as Propane	3.154	27352	0.564	ppm
4) T	C4 as Butane	4.872	35546	0.546	ppm
5) T	C5 as Pentane	6.482	42838	0.517	ppm
6) T	C6 as Hexane	7.893	43537	0.518	ppm
7) T	>C6_1 as Hexane	0.000	0	N.D.	ppm
8) T	>C6_2 as Hexane	0.000	0	N.D.	ppm
9) T	>C6_3 as Hexane	0.000	0	N.D.	ppm

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

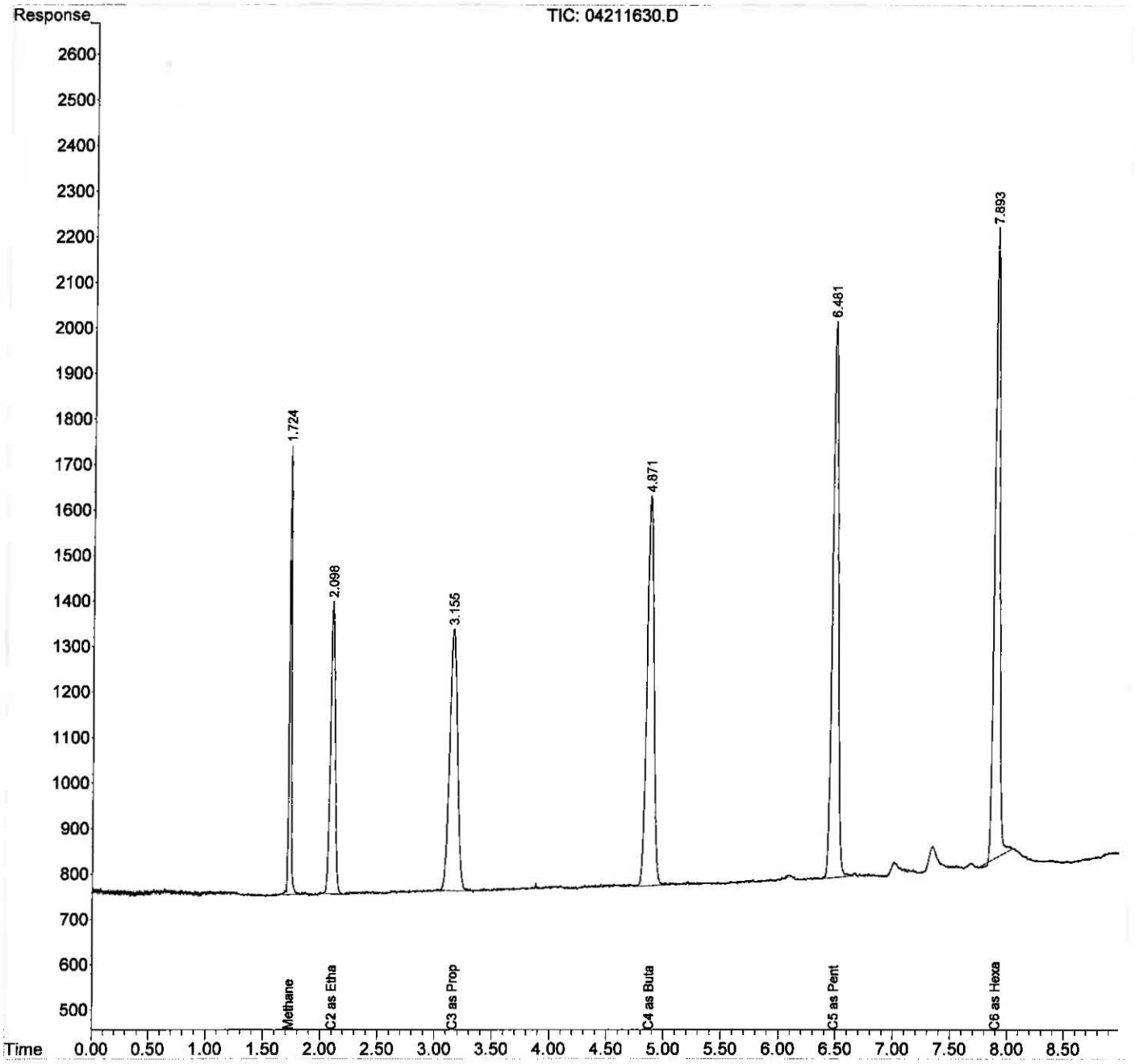
4/22/16

Quantitation Report (QT Reviewed)

Data Path : J:\GC08\DATA\TO_3M\2016_04\21\
Data File : 04211630.D
Signal(s) : FID2B.CH
Acq On : 21-Apr-2016, 16:45:35
Operator : amf
Sample : std s30-04211601 0.05ml(x100)
Misc :
ALS Vial : 1 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Apr 22 08:40:36 2016
Quant Method : I:\GC08\METHODS\TF042116.M
Quant Title : VOA-TO3C1C6
QLast Update : Fri Apr 22 08:25:17 2016
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. :
Signal Phase :
Signal Info :



Quantitation Report (QT Reviewed)

Data Path : J:\GC08\DATA\TO_3M\2016_04\21\
Data File : 04211631.D
Signal(s) : FID2B.CH
Acq On : 21-Apr-2016, 16:57:19
Operator : amf
Sample : std s30-04211601 0.5ml(x100)
Misc :
ALS Vial : 1 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Apr 22 08:43:02 2016
Quant Method : I:\GC08\METHODS\TF042116.M
Quant Title : VOA-TO3C1C6
QLast Update : Fri Apr 22 08:41:09 2016
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. :
Signal Phase :
Signal Info :

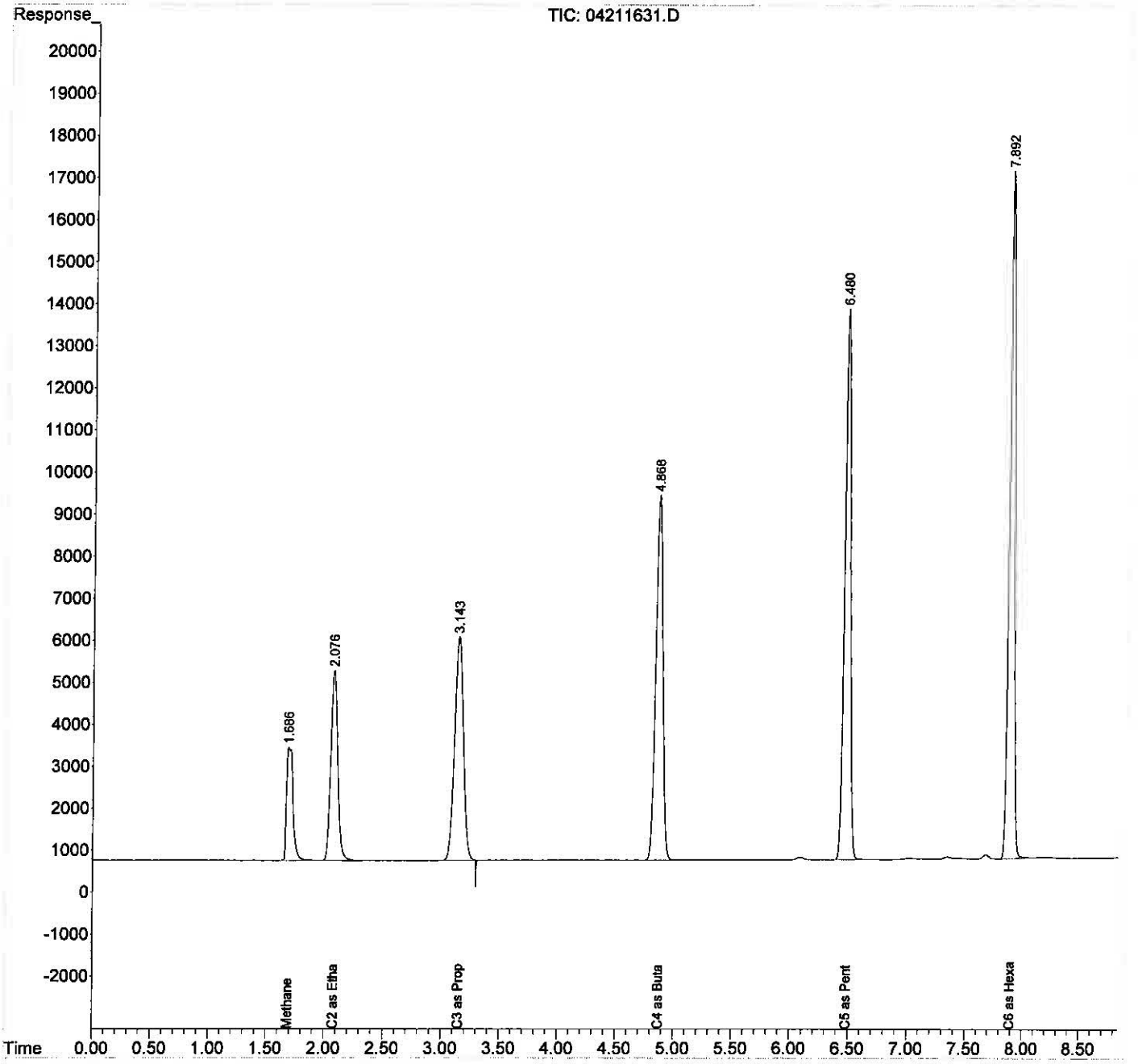
	Compound	R.T.	Response	Conc	Units	
Target Compounds						
1) T	Methane	1.690	102956	5.363	ppm	
2) T	C2 as Ethane	2.077	186933	5.501	ppm	
3) T	C3 as Propane	3.143	278762	5.725	ppm	m
4) T	C4 as Butane	4.868	367681	5.628	ppm	
5) T	C5 as Pentane	6.480	455270	5.496	ppm	
6) T	C6 as Hexane	7.892	510147	5.979	ppm	
7) T	>C6_1 as Hexane	0.000	0	N.D.	ppm	
8) T	>C6_2 as Hexane	0.000	0	N.D.	ppm	
9) T	>C6_3 as Hexane	0.000	0	N.D.	ppm	

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

Data Path : J:\GC08\DATA\TO_3M\2016_04\21\
Data File : 04211631.D
Signal(s) : FID2B.CH
Acq On : 21-Apr-2016, 16:57:19
Operator : amf
Sample : std s30-04211601 0.5ml(x100)
Misc :
ALS Vial : 1 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Apr 22 08:43:02 2016
Quant Method : I:\GC08\METHODS\TF042116.M
Quant Title : VOA-TO3C1C6
QLast Update : Fri Apr 22 08:41:09 2016
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. :
Signal Phase :
Signal Info :

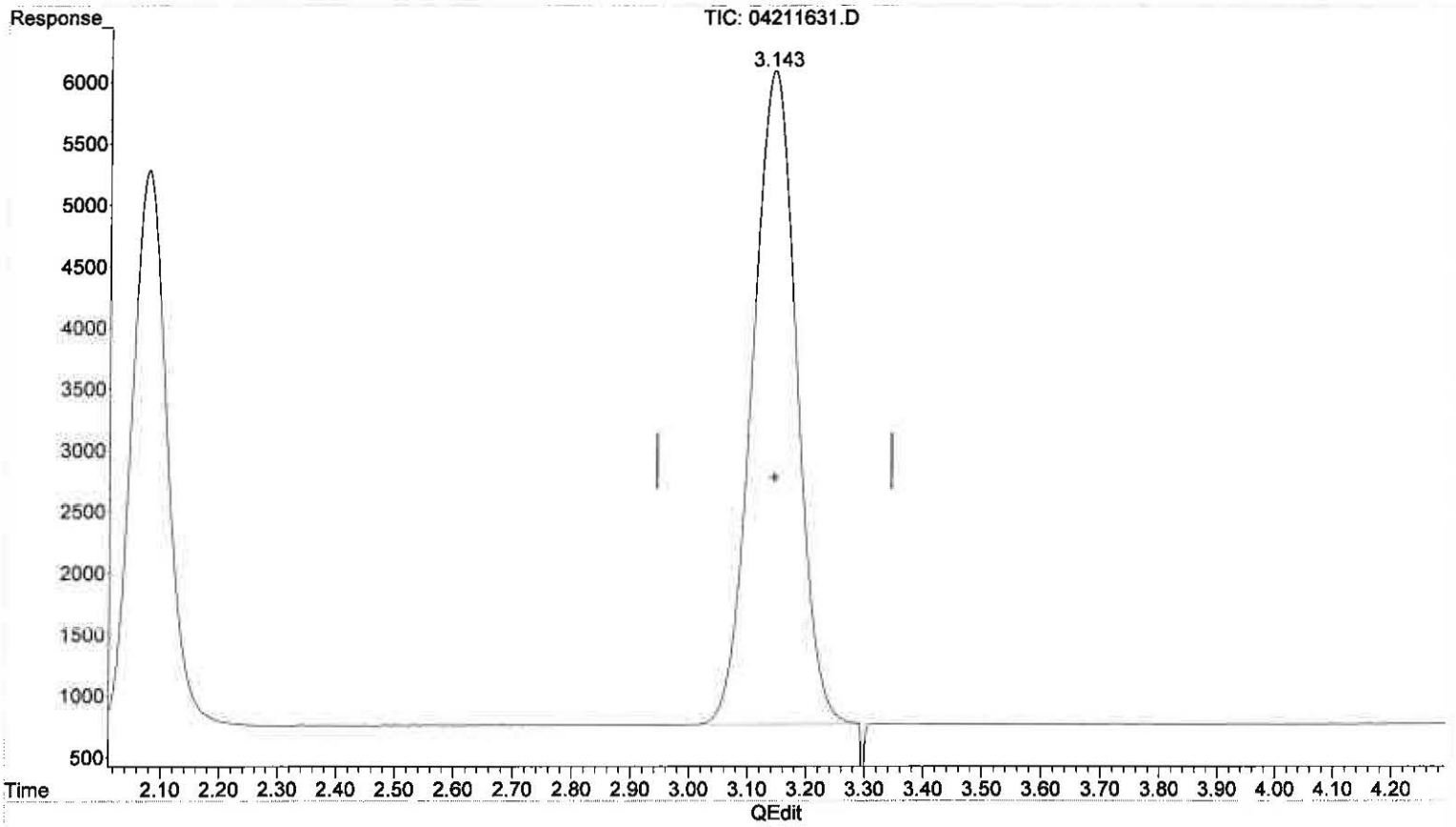


Quantitation Report (Qedit)

Data Path : J:\GC08\DATA\TO_3M\2016_04\21\
Data File : 04211631.D
Signal(s) : FID2B.CH
Acq On : 21-Apr-2016, 16:57:19
Operator : amf
Sample : std s30-04211601 0.5ml(x100)
Misc :
ALS Vial : 1 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Apr 22 08:43:02 2016
Quant Method : I:\GC08\METHODS\TF042116.M
Quant Title : VOA-TO3C1C6
QLast Update : Fri Apr 22 08:41:09 2016
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. :
Signal Phase :
Signal Info :



(3) C3 as Propane (T)
3.143min 5.725 ppm m
response 278762

Mc 4/22/16 No previous
BL
4/22/16

(+) = Expected Retention Time
TF042116.M Fri Apr 22 08:53:03 2016 Page: 1

Quantitation Report (QT Reviewed)

Data Path : J:\GC08\DATA\TO_3M\2016_04\21\
Data File : 04211633.D
Signal(s) : FID2B.CH
Acq On : 21-Apr-2016, 17:44:30
Operator : amf
Sample : std s30-10041501 0.05ml
Misc :
ALS Vial : 1 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Apr 22 08:46:14 2016
Quant Method : I:\GC08\METHODS\TF042116.M
Quant Title : VOA-TO3C1C6
QLast Update : Fri Apr 22 08:43:29 2016
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. :
Signal Phase :
Signal Info :

	Compound	R.T.	Response	Conc	Units
Target Compounds					
1) T	Methane	1.728	1079161	51.087	ppm
2) T	C2 as Ethane	2.101	2049062	53.728	ppm
3) T	C3 as Propane	3.156	3049636	55.984	ppm
4) T	C4 as Butane	4.873	3959175	54.285	ppm
5) T	C5 as Pentane	6.482	4707484	50.825	ppm
6) T	C6 as Hexane	7.894	4811318	49.469	ppm
7) T	>C6_1 as Hexane	0.000	0	N.D.	ppm
8) T	>C6_2 as Hexane	0.000	0	N.D.	ppm
9) T	>C6_3 as Hexane	0.000	0	N.D.	ppm

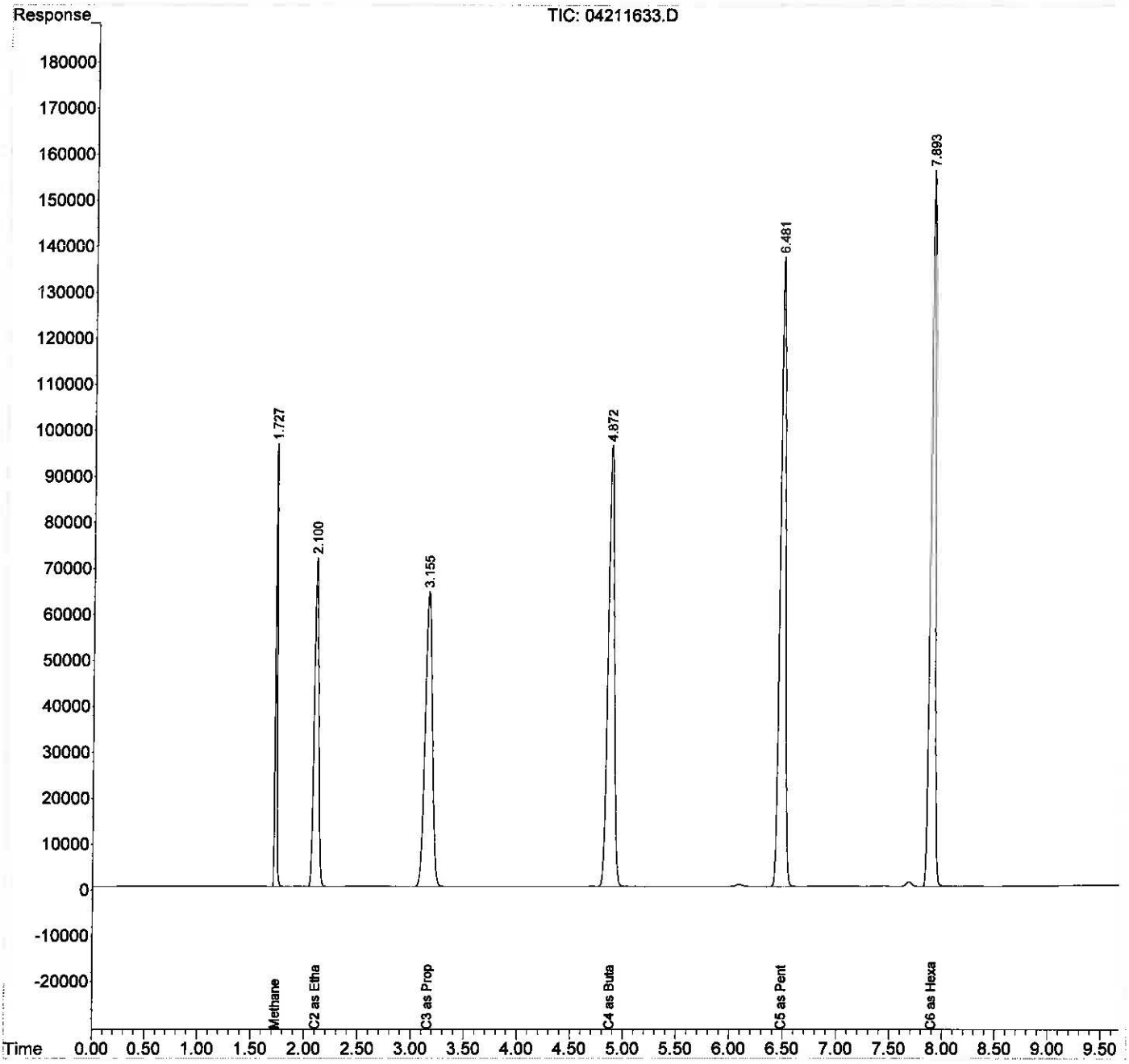
(f)=RT Delta > 1/2 Window (m)=manual int.

Quantitation Report (QT Reviewed)

Data Path : J:\GC08\DATA\TO_3M\2016_04\21\
Data File : 04211633.D
Signal(s) : FID2B.CH
Acq On : 21-Apr-2016, 17:44:30
Operator : amf
Sample : std s30-10041501 0.05ml
Misc :
ALS Vial : 1 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Apr 22 08:46:14 2016
Quant Method : I:\GC08\METHODS\TF042116.M
Quant Title : VOA-TO3C1C6
QLast Update : Fri Apr 22 08:43:29 2016
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. :
Signal Phase :
Signal Info :



Quantitation Report (QT Reviewed)

Data Path : J:\GC08\DATA\TO_3M\2016_04\21\
Data File : 04211634.D
Signal(s) : FID2B.CH
Acq On : 21-Apr-2016, 17:57:49
Operator : amf
Sample : std s30-10041501 0.5ml
Misc :
ALS Vial : 1 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Apr 22 08:46:55 2016
Quant Method : I:\GC08\METHODS\TF042116.M
Quant Title : VOA-TO3C1C6
QLast Update : Fri Apr 22 08:46:34 2016
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. :
Signal Phase :
Signal Info :

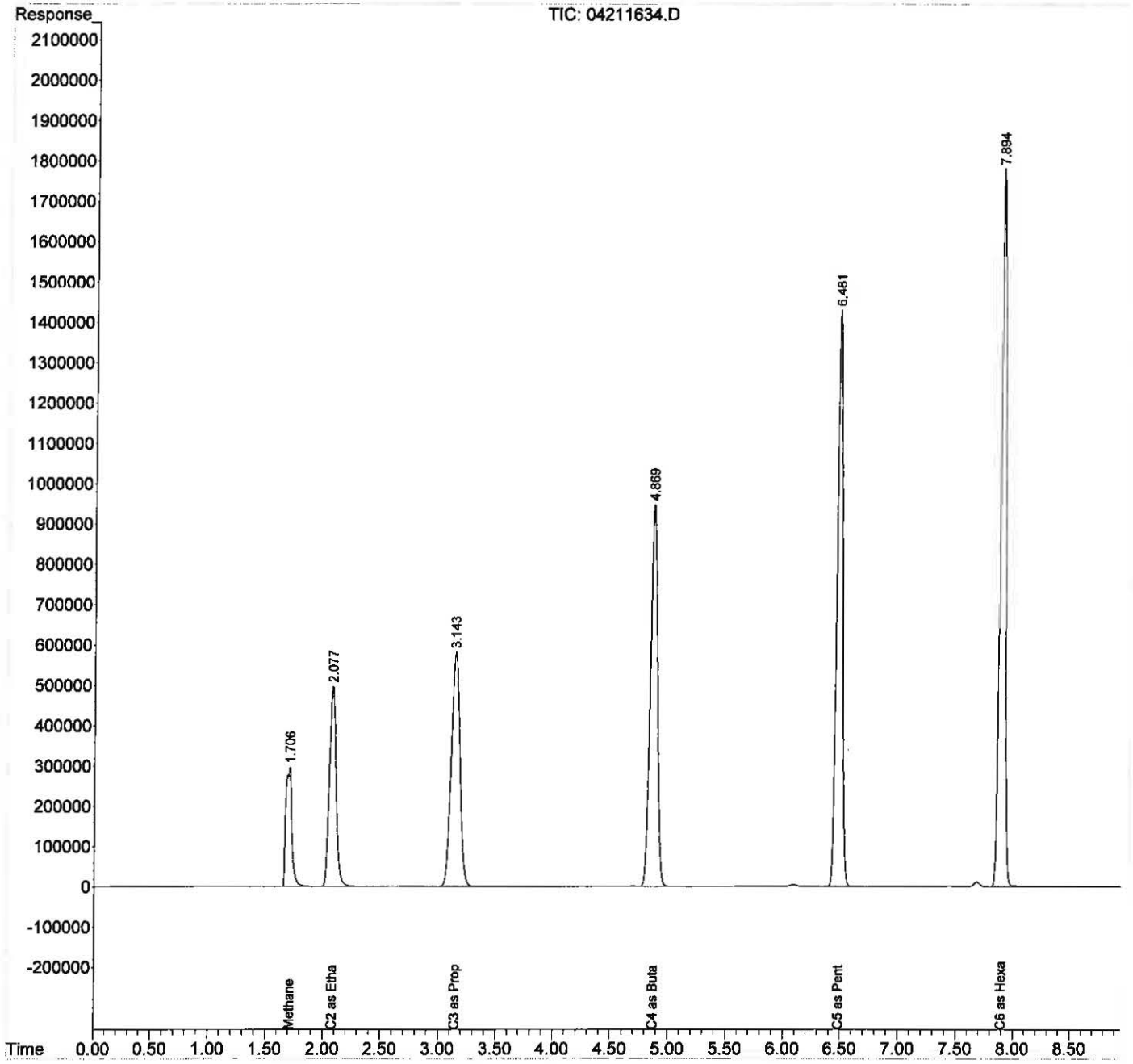
	Compound	R.T.	Response	Conc	Units
Target Compounds					
1) T	Methane	1.705	10784984	502.697	ppm
2) T	C2 as Ethane	2.077	20275251	518.598	ppm
3) T	C3 as Propane	3.144	30330167	542.143	ppm
4) T	C4 as Butane	4.869	39999452	534.106	ppm
5) T	C5 as Pentane	6.482	49469434	523.449	ppm
6) T	C6 as Hexane	7.894	55414072	562.603	ppm
7) T	>C6_1 as Hexane	0.000	0	N.D.	ppm
8) T	>C6_2 as Hexane	0.000	0	N.D.	ppm
9) T	>C6_3 as Hexane	0.000	0	N.D.	ppm

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

Data Path : J:\GC08\DATA\TO_3M\2016_04\21\
Data File : 04211634.D
Signal(s) : FID2B.CH
Acq On : 21-Apr-2016, 17:57:49
Operator : amf
Sample : std s30-10041501 0.5ml
Misc :
ALS Vial : 1 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Apr 22 08:46:55 2016
Quant Method : I:\GC08\METHODS\TF042116.M
Quant Title : VOA-TO3C1C6
QLast Update : Fri Apr 22 08:46:34 2016
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. :
Signal Phase :
Signal Info :



Quantitation Report (QT Reviewed)

Data Path : J:\GC08\DATA\TO_3M\2016_04\21\
Data File : 04211635.D
Signal(s) : FID2B.CH
Acq On : 21-Apr-2016, 18:22:30
Operator : amf
Sample : std s30-10041501 1ml
Misc :
ALS Vial : 1 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Apr 22 08:47:58 2016
Quant Method : I:\GC08\METHODS\TF042116.M
Quant Title : VOA-TO3C1C6
QLast Update : Fri Apr 22 08:47:52 2016
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. :
Signal Phase :
Signal Info :

	Compound	R.T.	Response	Conc	Units
Target Compounds					
1) T	Methane	1.659	22002670	1021.692	ppm
2) T	C2 as Ethane	2.055	40939911	1041.857	ppm
3) T	C3 as Propane	3.134	61267229	1089.893	ppm
4) T	C4 as Butane	4.867	80925154	1078.700	ppm
5) T	C5 as Pentane	6.481	100476333	1060.635	ppm
6) T	C6 as Hexane	7.895	113449295	1130.523	ppm
7) T	>C6_1 as Hexane	0.000	0	N.D.	ppm
8) T	>C6_2 as Hexane	0.000	0	N.D.	ppm
9) T	>C6_3 as Hexane	0.000	0	N.D.	ppm

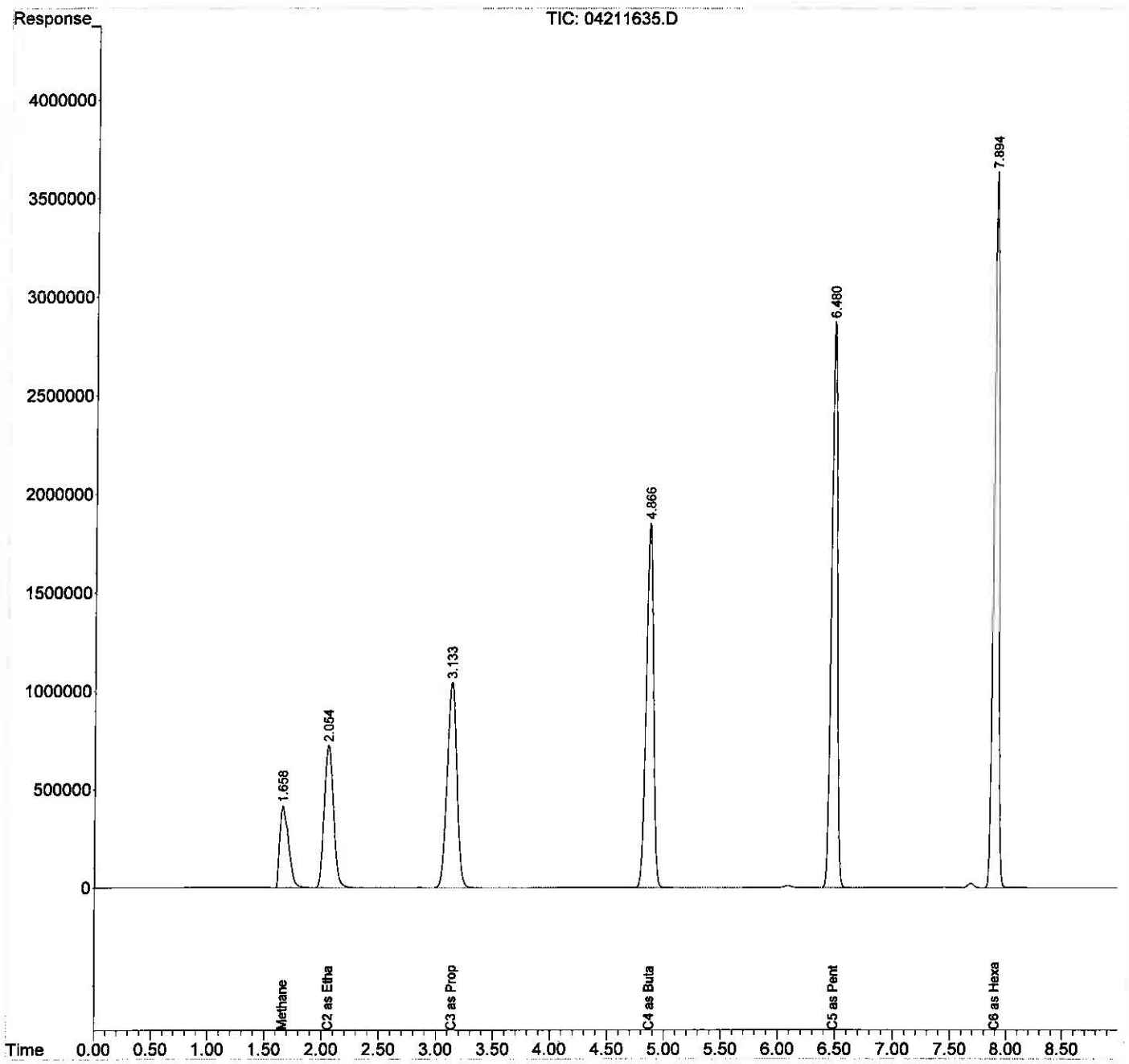
(f)=RT Delta > 1/2 Window (m)=manual int.

Quantitation Report (QT Reviewed)

Data Path : J:\GC08\DATA\TO_3M\2016_04\21\
Data File : 04211635.D
Signal(s) : FID2B.CH
Acq On : 21-Apr-2016, 18:22:30
Operator : amf
Sample : std s30-10041501 1ml
Misc :
ALS Vial : 1 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Apr 22 08:47:58 2016
Quant Method : I:\GC08\METHODS\TF042116.M
Quant Title : VOA-TO3C1C6
QLast Update : Fri Apr 22 08:47:52 2016
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. :
Signal Phase :
Signal Info :



Quantitation Report (QT Reviewed)

Data Path : J:\GC08\DATA\TO_3M\2016_04\21\
Data File : 04211636.D
Signal(s) : FID2B.CH
Acq On : 21-Apr-2016, 18:46:21
Operator : amf
Sample : std s30-10041501 2ml
Misc :
ALS Vial : 1 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Apr 22 08:48:35 2016
Quant Method : I:\GC08\METHODS\TF042116.M
Quant Title : VOA-TO3C1C6
QLast Update : Fri Apr 22 08:48:16 2016
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. :
Signal Phase :
Signal Info :

	Compound	R.T.	Response	Conc	Units
Target Compounds					
1) T	Methane	1.644	43643298	2011.697	ppm
2) T	C2 as Ethane	2.034	80552547	2035.967	ppm
3) T	C3 as Propane	3.121	120409600	2126.901	ppm
4) T	C4 as Butane	4.863	159250171	2114.540	ppm
5) T	C5 as Pentane	6.480	199253149	2096.400	ppm
6) T	C6 as Hexane	7.895	229256240	2244.813	ppm
7) T	>C6_1 as Hexane	0.000	0	N.D.	ppm
8) T	>C6_2 as Hexane	0.000	0	N.D.	ppm
9) T	>C6_3 as Hexane	0.000	0	N.D.	ppm

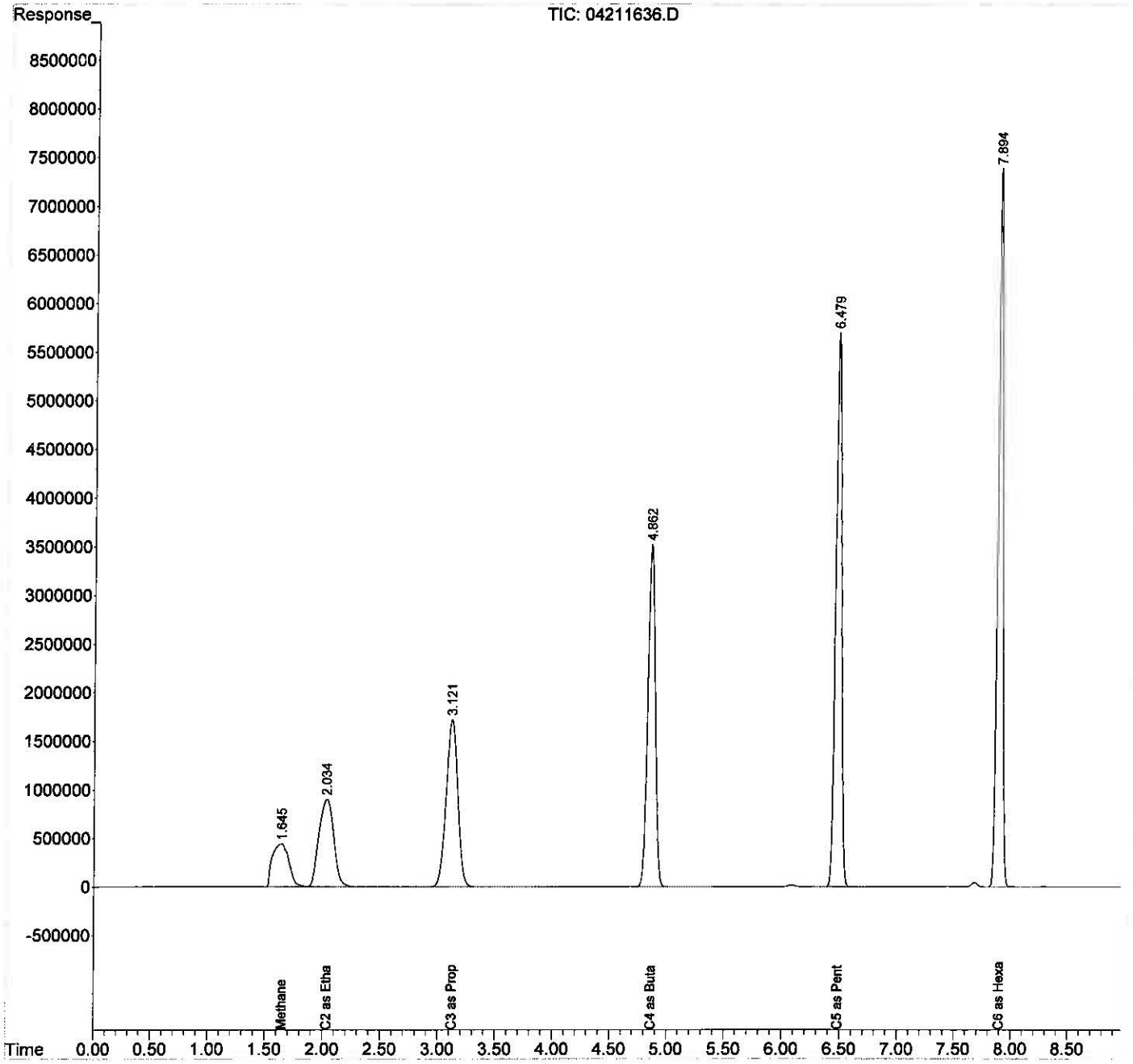
(f)=RT Delta > 1/2 Window (m)=manual int.

Quantitation Report (QT Reviewed)

Data Path : J:\GC08\DATA\TO_3M\2016_04\21\
Data File : 04211636.D
Signal(s) : FID2B.CH
Acq On : 21-Apr-2016, 18:46:21
Operator : amf
Sample : std s30-10041501 2ml
Misc :
ALS Vial : 1 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Apr 22 08:48:35 2016
Quant Method : I:\GC08\METHODS\TF042116.M
Quant Title : VOA-TO3C1C6
QLast Update : Fri Apr 22 08:48:16 2016
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. :
Signal Phase :
Signal Info :



Quantitation Report (QT Reviewed)

Data Path : I:\GC08\DATA\TO_3M\2016_04\22\
Data File : 04221604.D
Signal(s) : FID2B.CH
Acq On : 22-Apr-2016, 10:18:19
Operator : amf
Sample : ICV s30-12281501
Misc :
ALS Vial : 1 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Apr 22 10:30:21 2016
Quant Method : I:\GC08\METHODS\TF042116.M
Quant Title : VOA-TO3C1C6
QLast Update : Fri Apr 22 09:01:46 2016
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. :
Signal Phase :
Signal Info :

	Compound	R.T.	Response	Conc	Units	
						O/O Recovery
Target Compounds						
1) T	Methane	1.699	10911181	497.478	ppm	99.50
2) T	C2 as Ethane	2.071	20172372	510.206	ppm	102.04
3) T	C3 as Propane	3.134	30219396	533.312	ppm	106.66
4) T	C4 as Butane	4.859	39436863	524.850	ppm	104.97
5) T	C5 as Pentane	6.471	47617725	501.308	ppm	100.26
6) T	C6 as Hexane	7.884	52732688	506.854	ppm	101.37
7) T	>C6_1 as Hexane	0.000	0	N.D.	ppm	
8) T	>C6_2 as Hexane	0.000	0	N.D.	ppm	
9) T	>C6_3 as Hexane	0.000	0	N.D.	ppm	

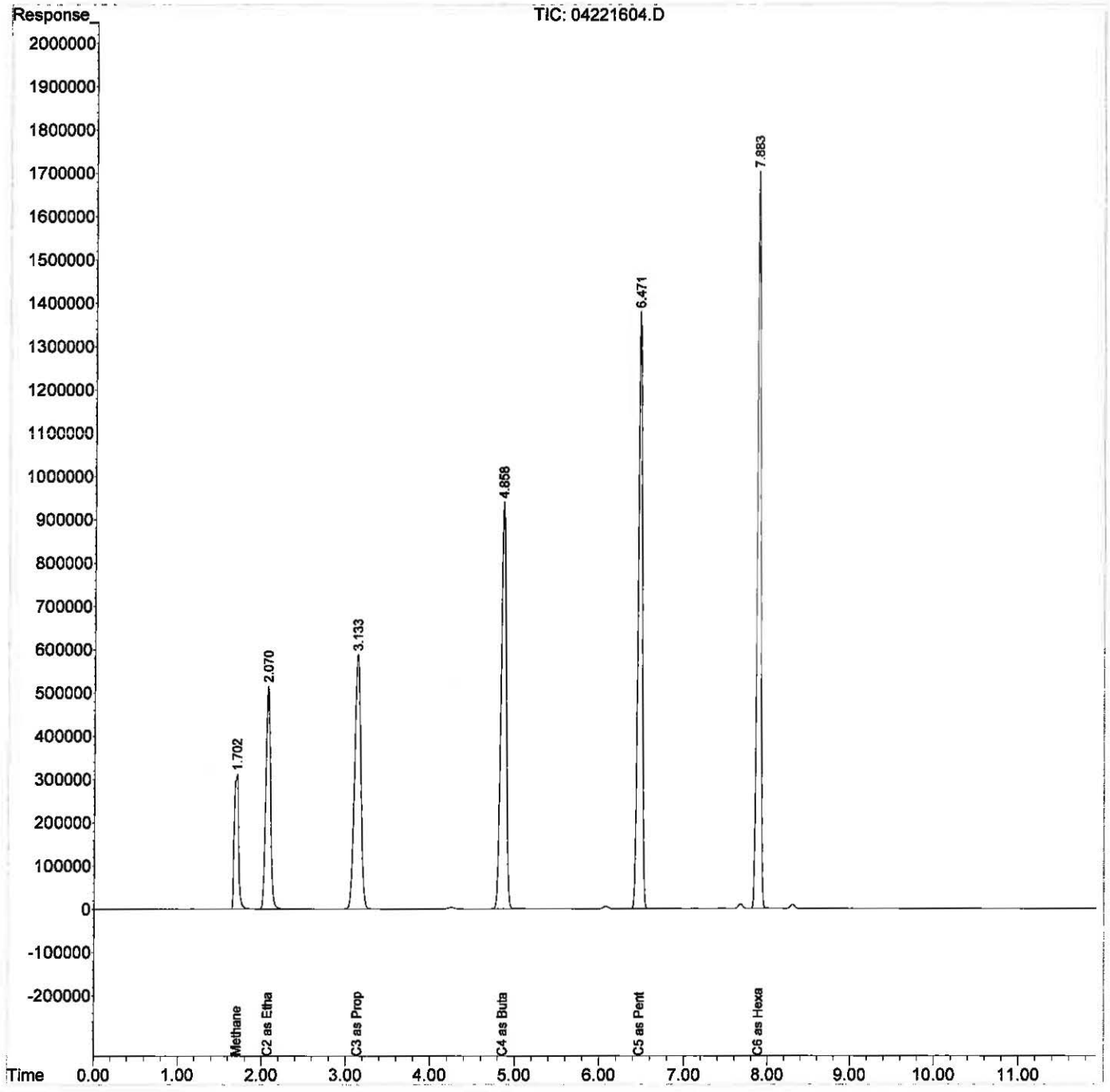
(f)=RT Delta > 1/2 Window (m)=manual int.

Quantitation Report (QT Reviewed)

Data Path : I:\GC08\DATA\TO_3M\2016_04\22\
Data File : 04221604.D
Signal(s) : FID2B.CH
Acq On : 22-Apr-2016, 10:18:19
Operator : amf
Sample : ICV s30-12281501
Misc :
ALS Vial : 1 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Apr 22 10:30:21 2016
Quant Method : I:\GC08\METHODS\TF042116.M
Quant Title : VOA-TO3C1C6
QLast Update : Fri Apr 22 09:01:46 2016
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. :
Signal Phase :
Signal Info :



ALS Environmental

REPORT SUMMARY

Method : VOA-TO3C1C6
Client : Empirical Labs
Analyst : amf

ALS Service Request P1604352
Instrument : Instrument 8 / FID #8
Date Acquired : 9/13/2016

SAMPLE RESULT SUMMARIES (ppm)

Sample ID	Inject. Vol(ml)	Dilution DF	Methane
std s30-09121601	0.5	1.0	983.4
ACTUAL			1000.0
%Difference			1.7%
lcs s30-08011601	0.5	1.0	987.96
ACTUAL			1010.0
%Recovery			97.8%
lcsds30-08011601	0.5	1.0	993.94
ACTUAL			1010.0
%Recovery			98.4%
%RPD			0.6%
mb 1ml	1.0	1.0	0.07
4352-001 0.1ml	0.1	1.0	6567.84
4352-002 0.1ml	0.1	1.0	10476.13
4352-003 0.1ml	0.1	1.0	3727.08
4352-004 0.05ml	0.1	1.0	7424.28
4352-005 1ml	1.0	1.0	4.56
4352-006 0.1ml	0.1	1.0	15611.64
4352-007 0.1ml	0.1	1.0	20105.81
4352-008 0.1ml	0.1	1.0	2108.01
4352-009 0.1ml	0.1	1.0	233.61
4352-010 0.1ml	0.1	1.0	2037.15
std s30-05021602	0.5	1.0	1023.3
ACTUAL			1000.0
%Difference			2.3%

FINAL SAMPLE RESULT SUMMARIES (ppm)

Sample ID	Pi	Pf	Methane
MRL			0.50
mb 1ml	0.00	0.00	ND
4352-001 0.1ml	-1.63	3.40	90954.79
4352-002 0.1ml	-2.03	3.70	152139.54
4352-003 0.1ml	-2.44	3.22	54477.38
4352-004 0.05m	-1.41	3.46	202896.80
4352-005 1ml	-2.95	3.30	6.99
4352-006 0.1ml	-2.40	3.35	229097.64
4352-007 0.1ml	-1.99	3.25	283949.09
4352-008 0.1ml	-1.95	3.16	29528.67
4352-009 0.1ml	-2.35	3.16	3378.36
4352-010 0.1ml	-2.00	3.25	28792.79

Quantitation Report (QT Reviewed)

Data Path : I:\GC08\DATA\TO_3M\2016_09\13\
Data File : 09131601.D
Signal(s) : FID2B.CH
Acq On : 13-Sep-2016, 08:28:52
Operator : amf
Sample : std s30-09121601
Misc :
ALS Vial : 1 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Sep 13 08:52:29 2016
Quant Method : I:\GC08\METHODS\TF042116.M
Quant Title : VOA-TO3C1C6
QLast Update : Fri Apr 22 09:01:46 2016
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. :
Signal Phase :
Signal Info :

	Compound	R.T.	Response	Conc	Units	
Target Compounds						
1)	Methane	1.678	10784592	491.706	ppm	
2)	C2 as Ethane	2.046	20037270	506.788	ppm	
3)	C3 as Propane	3.103	29922672	528.075	ppm	
4)	C4 as Butane	4.826	39110513	520.506	ppm	
5)	C5 as Pentane	6.439	47350087	498.491	ppm	
6)	C6 as Hexane	7.852	51267514	492.771	ppm	
7)	>C6_1 as Hexane	0.000	0	N.D.	ppm	d
8)	>C6_2 as Hexane	0.000	0	N.D.	ppm	
9)	>C6_3 as Hexane	0.000	0	N.D.	ppm	

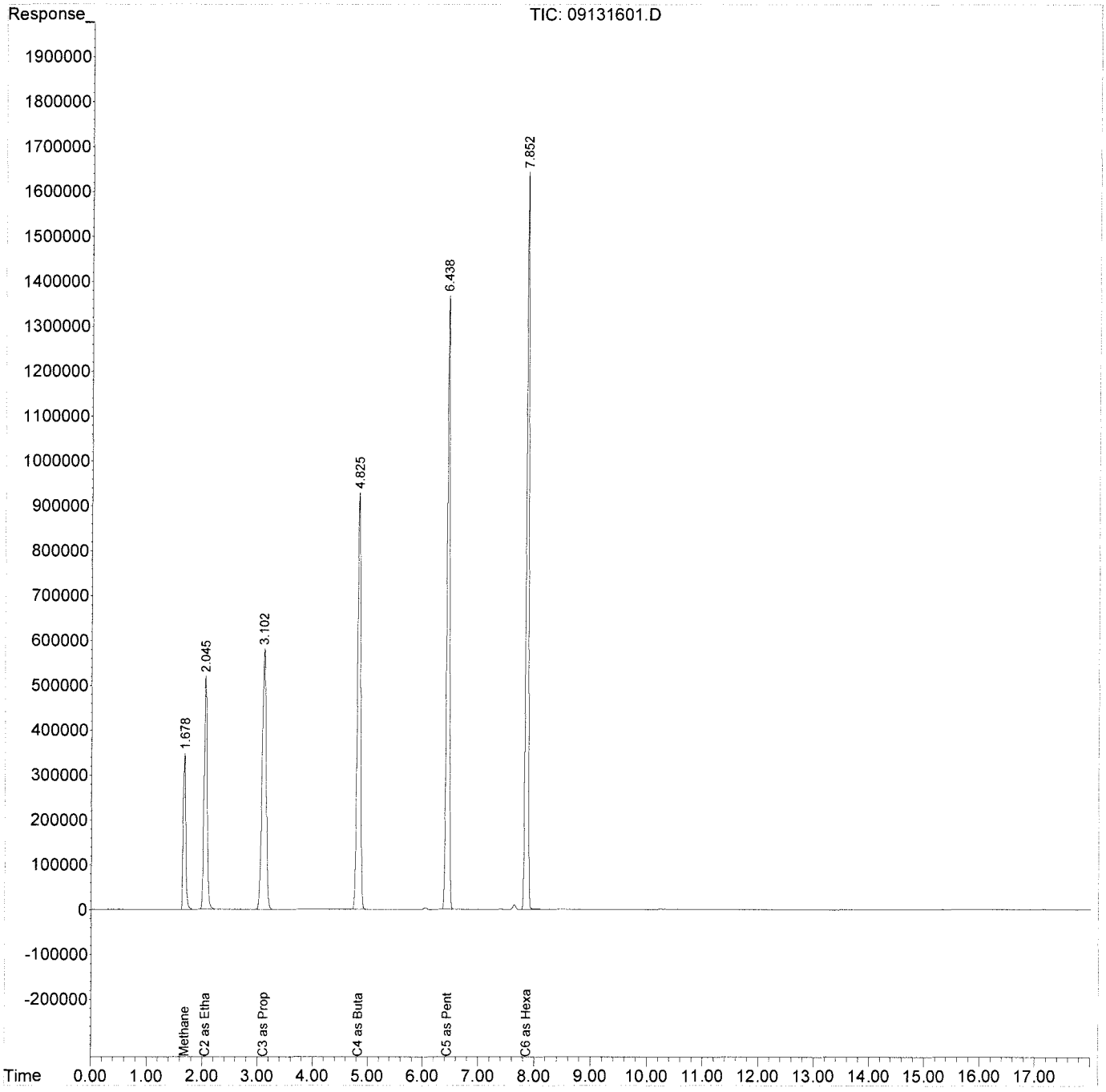
(f)=RT Delta > 1/2 Window (m)=manual int.

9/14/16

Data Path : I:\GC08\DATA\TO_3M\2016_09\13\
Data File : 09131601.D
Signal(s) : FID2B.CH
Acq On : 13-Sep-2016, 08:28:52
Operator : amf
Sample : std s30-09121601
Misc :
ALS Vial : 1 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Sep 13 08:52:29 2016
Quant Method : I:\GC08\METHODS\TF042116.M
Quant Title : VOA-TO3C1C6
QLast Update : Fri Apr 22 09:01:46 2016
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. :
Signal Phase :
Signal Info :



Quantitation Report (QT Reviewed)

Data Path : I:\GC08\DATA\TO_3M\2016_09\13\
Data File : 09131615.D
Signal(s) : FID2B.CH
Acq On : 13-Sep-2016, 10:57:07
Operator : amf
Sample : std s30-05021602
Misc :
ALS Vial : 1 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Sep 13 11:17:11 2016
Quant Method : I:\GC08\METHODS\TF042116.M
Quant Title : VOA-TO3C1C6
QLast Update : Fri Apr 22 09:01:46 2016
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. :
Signal Phase :
Signal Info :

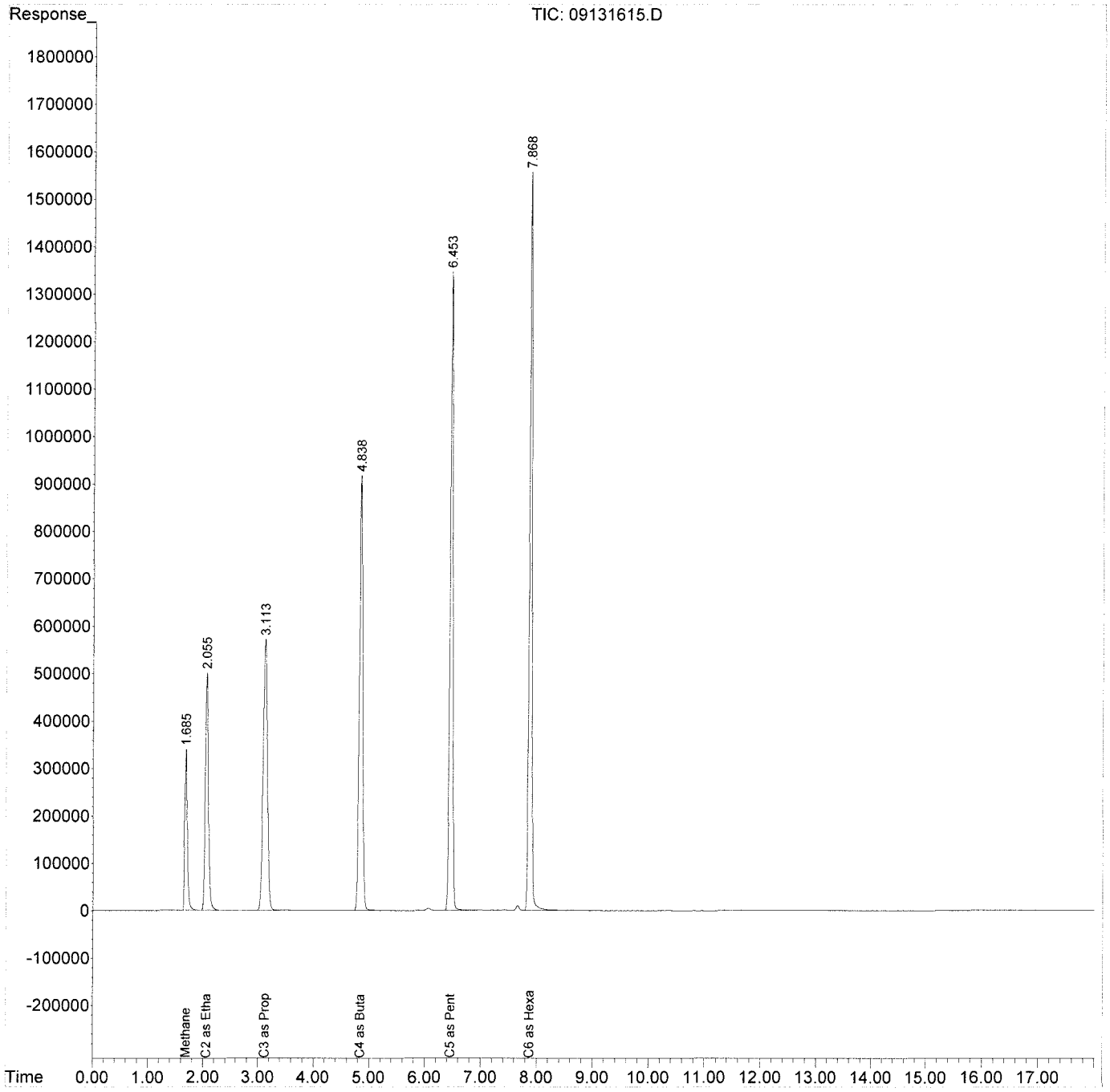
	Compound	R.T.	Response	Conc	Units	
Target Compounds						
1)	Methane	1.686	10672263	486.585	ppm	
2)	C2 as Ethane	2.056	20030711	506.623	ppm	
3)	C3 as Propane	3.114	29937643	528.340	ppm	
4)	C4 as Butane	4.838	39307353	523.126	ppm	
5)	C5 as Pentane	6.454	47540007	500.490	ppm	
6)	C6 as Hexane	7.869	50220548	482.708	ppm	
7)	>C6_1 as Hexane	0.000	0	N.D.	ppm	d
8)	>C6_2 as Hexane	0.000	0	N.D.	ppm	d
9)	>C6_3 as Hexane	0.000	0	N.D.	ppm	d

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

Data Path : I:\GC08\DATA\TO_3M\2016_09\13\
Data File : 09131615.D
Signal(s) : FID2B.CH
Acq On : 13-Sep-2016, 10:57:07
Operator : amf
Sample : std s30-05021602
Misc :
ALS Vial : 1 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Sep 13 11:17:11 2016
Quant Method : I:\GC08\METHODS\TF042116.M
Quant Title : VOA-TO3C1C6
QLast Update : Fri Apr 22 09:01:46 2016
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. :
Signal Phase :
Signal Info :



Quantitation Report (QT Reviewed)

Data Path : I:\GC08\DATA\TO_3M\2016_09\13\
Data File : 09131620.D
Signal(s) : FID2B.CH
Acq On : 13-Sep-2016, 12:37:01
Operator : amf
Sample : std s30-05021602
Misc :
ALS Vial : 1 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Sep 13 12:48:33 2016
Quant Method : I:\GC08\METHODS\TF042116.M
Quant Title : VOA-TO3C1C6
QLast Update : Fri Apr 22 09:01:46 2016
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. :
Signal Phase :
Signal Info :

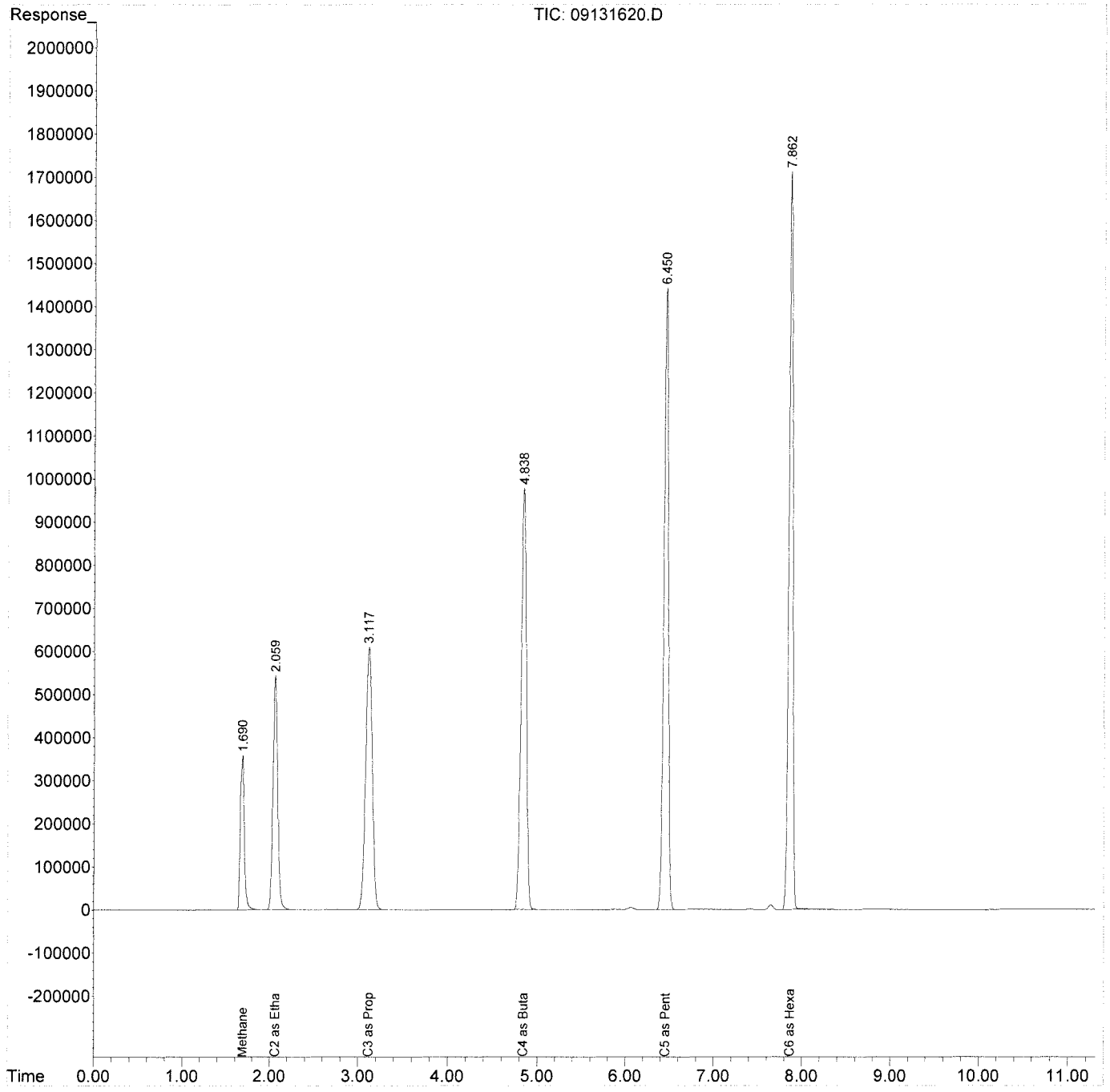
	Compound	R.T.	Response	Conc	Units	
Target Compounds						
1)	Methane	1.690	11222239	511.660	ppm	
2)	C2 as Ethane	2.059	20892891	528.429	ppm	
3)	C3 as Propane	3.117	31285031	552.118	ppm	
4)	C4 as Butane	4.839	41081716	546.740	ppm	
5)	C5 as Pentane	6.450	49790710	524.185	ppm	
6)	C6 as Hexane	7.863	53166349	511.023	ppm	
7)	>C6_1 as Hexane	0.000	0	N.D.	ppm	d
8)	>C6_2 as Hexane	0.000	0	N.D.	ppm	
9)	>C6_3 as Hexane	0.000	0	N.D.	ppm	

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

Data Path : I:\GC08\DATA\TO_3M\2016_09\13\
Data File : 09131620.D
Signal(s) : FID2B.CH
Acq On : 13-Sep-2016, 12:37:01
Operator : amf
Sample : std s30-05021602
Misc :
ALS Vial : 1 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Sep 13 12:48:33 2016
Quant Method : I:\GC08\METHODS\TF042116.M
Quant Title : VOA-TO3C1C6
QLast Update : Fri Apr 22 09:01:46 2016
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. :
Signal Phase :
Signal Info :



Injection Log

Directory: I:\GC08\DATA\TO_3M\2016_04\21

Line	Vial	FileName	Multiplier	SampleName	Misc Info
1	1	04211601.d	1.	std s30-10041501	
2	1	04211602.d	1.	mb 1ml	
3	1	04211603.d	1.	lcs s30-12281501	
4	1	04211604.d	1.	lcsds30-12281501	
5	1	04211605.d	1.	lcs s30-06171501	
6	1	04211606.d	1.	lcsds30-06171501	
7	1	04211607.d	1.	2076-001 1ml	
8	1	04211608.d	1.	2076-002 1ml	
9	1	04211609.d	1.	2076-003 1ml	
10	1	04211610.d	1.	2076-004 1ml	
11	1	04211611.d	1.	2076-005 1ml	
12	1	04211612.d	1.	2076-006 1ml	
13	1	04211613.d	1.	2076-007 1ml	
14	1	04211614.d	1.	2076-008 1ml	
15	1	04211615.d	1.	2076-009 1ml	
16	1	04211616.d	1.	2076-010 1ml	
17	1	04211617.d	1.	std s30-10041501	
18	1	04211618.d	1.	2076-011 1ml	
19	1	04211619.d	1.	2076-012 1ml	
20	1	04211620.d	1.	2076-013 1ml	
21	1	04211621.d	1.	2076-014 1ml	
22	1	04211622.d	1.	2069-001 0.1ml	
23	1	04211623.d	1.	2069-002 0.1ml	
24	1	04211624.d	1.	2072-001 0.1ml	
25	1	04211625.d	1.	2072-003 0.1ml	
26	1	04211626.d	1.	2073-004 0.1ml	
27	1	04211627.d	1.	std s30-10041501	
28	1	04211628.d	1.	std x100	
29	1	04211629.d	1.	std x100 0.05ml	
30	1	04211630.d	1.	std s30-04211601 0.05ml(x100)	
31	1	04211631.d	1.	std s30-04211601 0.5ml(x100)	
32	1	04211632.d	1.	xstd 0.05ml	
33	1	04211633.d	1.	std s30-10041501 0.05ml	
34	1	04211634.d	1.	std s30-10041501 0.5ml	
35	1	04211635.d	1.	std s30-10041501 1ml	
36	1	04211636.d	1.	std s30-10041501 2ml	
37	1	04211637.d	1.	3C std s30-04081603 0.75ml	

Injection Log

Directory: I:\GC08\DATA\TO_3M\2016_04\22

Line	Vial	FileName	Multiplier	SampleName	Misc Info
1	1	04221601.d	1.	std s30-10041501	
2	1	04221602.d	1.	std s30-10041501	
3	1	04221603.d	1.	mb 1ml	
4	1	04221604.d	1.	lcs s30-12281501	
5	1	04221605.d	1.	lcsds30-12281501	
6	1	04221606.d	1.	lcs s30-06171501	
7	1	04221607.d	1.	lcsds30-06171501	
8	1	04221608.d	1.	2090-001 1ml	
9	1	04221609.d	1.	2090-002 1ml	
10	1	04221610.d	1.	2090-003 1ml	
11	1	04221611.d	1.	2090-004 1ml	
12	1	04221612.d	1.	2090-005 1ml	
13	1	04221613.d	1.	2090-006 1ml	
14	1	04221614.d	1.	2090-007 1ml	
15	1	04221615.d	1.	2090-008 1ml	
16	1	04221616.d	1.	2090-009 1ml	
17	1	04221617.d	1.	2090-010 1ml	
18	1	04221618.d	1.	std s30-10041501	
19	1	04221619.d	1.	2090-011 1ml	
20	1	04221620.d	1.	2090-012 1ml	
21	1	04221621.d	1.	2090-013 1ml	
22	1	04221622.d	1.	2092-001 0.1ml	
23	1	04221623.d	1.	2092-002 0.1ml	
24	1	04221624.d	1.	2092-003 0.1ml	
25	1	04221625.d	1.	2092-004 0.1ml	
26	1	04221626.d	1.	std s30-10041501	
27	1	04221627.d	1.	mb 1ml	
28	1	04221628.d	1.	lcs s30-12281501	
29	1	04221629.d	1.	lcsds30-12281501	
30	1	04221630.d	1.	2094-001 1ml	
31	1	04221631.d	1.	2094-002 1ml	
32	1	04221632.d	1.	2094-003 1ml	
33	1	04221633.d	1.	std s30-10041501	

Injection Log

Directory: I:\GC08\DATA\TO_3M\2016_09\13\

	Sample ID	Date/Time	Acquisition Method	File Name	Misc Info	Operator
	std s30-09121601	13-Sep-16, 08:28:52	TO3.M	09131601.D		amf
	mb 1ml	13-Sep-16, 08:53:49	TO3.M	09131602.D		amf
	lcs s30-08011601	13-Sep-16, 09:17:13	TO3.M	09131603.D		amf
	lcsds30-08011601	13-Sep-16, 09:34:48	TO3.M	09131604.D		amf
	4352-001 1ml	13-Sep-16, 09:56:26	TO3.M	09131605.D		amf
	4352-001 0.1ml	13-Sep-16, 10:00:52	TO3.M	09131606.D		amf
	4352-002 0.1ml	13-Sep-16, 10:04:43	TO3.M	09131607.D		amf
	4352-003 0.1ml	13-Sep-16, 10:07:53	TO3.M	09131608.D		amf
	4352-004 0.1ml	13-Sep-16, 10:11:00	TO3.M	09131609.D		amf
	4352-004 0.05ml	13-Sep-16, 10:15:28	TO3.M	09131610.D		amf
	4352-005 0.1ml	13-Sep-16, 10:19:19	TO3.M	09131611.D		amf
	4352-005 1ml	13-Sep-16, 10:45:18	TO3.M	09131612.D		amf
	4352-006 0.1ml	13-Sep-16, 10:47:56	TO3.M	09131613.D		amf
	4352-007 0.1ml	13-Sep-16, 10:52:17	TO3.M	09131614.D		amf
	std s30-05021602	13-Sep-16, 10:57:07	TO3.M	09131615.D		amf
	4352-008 0.1ml	13-Sep-16, 11:20:03	TO3.M	09131616.D		amf
	4352-009 0.1ml	13-Sep-16, 11:24:55	TO3.M	09131617.D		amf
	4352-010 0.1ml	13-Sep-16, 11:28:23	TO3.M	09131618.D		amf
	4368-001 0.1ml	13-Sep-16, 11:52:34	TO3.M	09131619.D		amf
	std s30-05021602	13-Sep-16, 12:37:01	TO3.M	09131620.D		amf

Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2016_09\13\09131616.D
Acq On : 13 Sep 2016 18:05 Operator: SC
Sample : P1604352-001 (150mL)
Misc : S29-07211602
ALS Vial : 5 Sample Multiplier: 1

9/14/16

Quant Time: Sep 14 13:33:45 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M

Internal Standards	R.T.	QIon	Response	Conc	Units		Dev(Min)
1) Bromochloromethane (IS1)	8.90	130	192222	12.500	ng		-0.04
37) 1,4-Difluorobenzene (IS2)	10.87	114	883657	12.500	ng		-0.03
56) Chlorobenzene-d5 (IS3)	15.22	82	356340	12.500	ng		0.00
System Monitoring Compounds							
33) 1,2-Dichloroethane-d4(...	9.68	65	255995	11.719	ng		-0.03
Spiked Amount 12.500	Range 70 - 130		Recovery = 93.76%				
57) Toluene-d8 (SS2)	13.31	98	926280	12.480	ng		-0.01
Spiked Amount 12.500	Range 70 - 130		Recovery = 99.84%				
73) Bromofluorobenzene (SS3)	16.83	174	279367	12.379	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 99.04%				
Target Compounds							Qvalue
2) Propene	3.71	42	4068796m	166.111	ng		
3) Dichlorodifluoromethan...	3.81	85	4832	0.090	ng	#	90
4) Chloromethane	4.01	50	3121	N.D.			
5) 1,2-Dichloro-1,1,2,2-t...	0.00	135	0	N.D.			
6) Vinyl Chloride	4.26	62	23809732	660.363	ng		88
7) 1,3-Butadiene	0.00	54	0	N.D.	d		
8) Bromomethane	0.00	94	0	N.D.			
9) Chloroethane	4.96	64	8368	0.482	ng		97
10) Ethanol	5.17	45	11615	0.662	ng		93
11) Acetonitrile	0.00	41	0	N.D.	d		
12) Acrolein	5.52	56	1092	N.D.			
13) Acetone	0.00	58	0	N.D.	d		
14) Trichlorofluoromethane	5.81	101	1042	N.D.			
15) 2-Propanol (Isopropanol)	0.00	45	0	N.D.	d		
16) Acrylonitrile	0.00	53	0	N.D.	d		
17) 1,1-Dichloroethene	6.49	96	326842	14.737	ng		100
18) 2-Methyl-2-Propanol (t...	0.00	59	0	N.D.	d		
19) Methylene Chloride	6.63	84	834	N.D.			
20) 3-Chloro-1-propene (Al...	0.00	41	0	N.D.	d		
21) Trichlorotrifluoroethane	6.95	151	1143	N.D.			
22) Carbon Disulfide	6.91	76	187660	2.173	ng		98
23) trans-1,2-Dichloroethene	7.65	61	1007337	33.981	ng		99
24) 1,1-Dichloroethane	7.86	63	100083	2.336	ng		94
25) Methyl tert-Butyl Ether	8.07	73	827	N.D.			
26) Vinyl Acetate	0.00	86	0	N.D.	d		
27) 2-Butanone (MEK)	8.30	72	22401	1.432	ng		98
28) cis-1,2-Dichloroethene	8.73	61	6968856	228.748	ng		97
29) Diisopropyl Ether	0.00	87	0	N.D.	d		
30) Ethyl Acetate	0.00	61	0	N.D.			
31) n-Hexane	8.99	57	829537	21.105	ng		98
32) Chloroform	9.04	83	24798	0.609	ng		95
34) Tetrahydrofuran (THF)	9.49	72	960	N.D.			
35) Ethyl tert-Butyl Ether	0.00	87	0	N.D.			
36) 1,2-Dichloroethane	9.81	62	1789	N.D.			
38) 1,1,1-Trichloroethane	0.00	97	0	N.D.			
39) Isopropyl Acetate	10.47	61	747	N.D.			
40) 1-Butanol	0.00	56	0	N.D.	d		
41) Benzene	10.52	78	364694	3.816	ng		98
42) Carbon Tetrachloride	0.00	117	0	N.D.			
43) Cyclohexane	10.80	84	185703	5.203	ng		97
44) tert-Amyl Methyl Ether	11.25	73	423	N.D.			
45) 1,2-Dichloropropane	0.00	63	0	N.D.	d		
46) Bromodichloromethane	0.00	83	0	N.D.	d		
47) Trichloroethene	11.57	130	371972	13.417	ng		99
48) 1,4-Dioxane	0.00	88	0	N.D.			
49) 2,2,4-Trimethylpentane...	0.00	57	0	N.D.	d		

Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2016_09\13\09131616.D
Acq On : 13 Sep 2016 18:05 Operator: SC
Sample : P1604352-001 (150mL)
Misc : S29-07211602
ALS Vial : 5 Sample Multiplier: 1

Quant Time: Sep 14 13:33:45 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M

Internal Standards	R.T.	QIon	Response	Conc Units	Dev(Min)
50) Methyl Methacrylate	0.00	100	0	N.D. d	
51) n-Heptane	11.90	71	278578	12.104 ng	100
52) cis-1,3-Dichloropropene	0.00	75	0	N.D.	
53) 4-Methyl-2-pentanone	12.47	58	11222	0.514 ng	84
54) trans-1,3-Dichloropropene	0.00	75	0	N.D.	
55) 1,1,2-Trichloroethane	13.11	97	1208	N.D.	
58) Toluene	13.41	91	503235	4.844 ng	98
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	14.43	57	149405	7.244 ng	99
64) Tetrachloroethene	14.57	166	1882	N.D.	
65) Chlorobenzene	0.00	112	0	N.D. d	
66) Ethylbenzene	15.67	91	89692	0.823 ng	99
67) m- & p-Xylenes	15.85	91	229666	2.604 ng	100
68) Bromoform	0.00	173	0	N.D.	
69) Styrene	16.25	104	7551	0.116 ng	89
70) o-Xylene	16.36	91	152704	1.671 ng	94
71) n-Nonane	16.61	43	392756	8.246 ng	98
72) 1,1,2,2-Tetrachloroethane	0.00	83	0	N.D. d	
74) Cumene	16.99	105	31159	0.267 ng	99
75) alpha-Pinene	17.39	93	424239	7.522 ng	100
76) n-Propylbenzene	0.00	91	0	N.D. d	
77) 3-Ethyltoluene	0.00	105	0	N.D. d	
78) 4-Ethyltoluene	17.67	105	62006	0.592 ng	84
79) 1,3,5-Trimethylbenzene	17.75	105	143028	1.508 ng	100
80) alpha-Methylstyrene	17.91	118	1958	N.D.	
81) 2-Ethyltoluene	0.00	105	0	N.D. d	
82) 1,2,4-Trimethylbenzene	18.18	105	297921	3.200 ng	89
83) n-Decane	0.00	57	0	N.D. d	
84) Benzyl Chloride	18.28	91	4813	N.D.	
85) 1,3-Dichlorobenzene	18.41	146	3984	N.D.	
86) 1,4-Dichlorobenzene	18.41	146	3984	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	18.77	146	2138	N.D.	
91) d-Limonene	18.79	68	1453661	40.778 ng	100
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	20.59	180	1467	N.D.	
95) Naphthalene	20.70	128	51931	0.386 ng	75
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. d	
99) tert-Butylbenzene	0.00	119	0	N.D. d	
100) n-Butylbenzene	0.00	91	0	N.D. d	

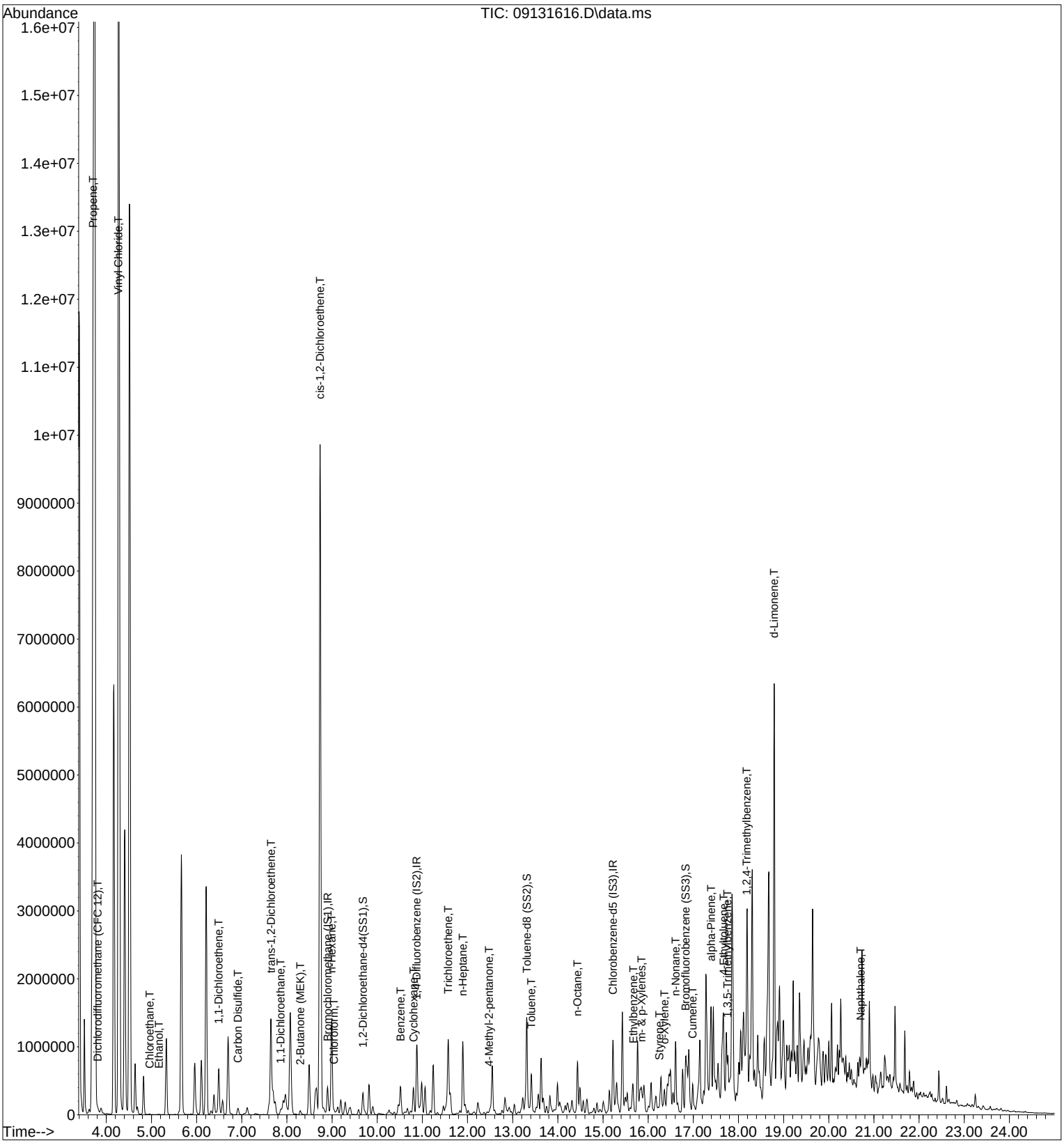
(#) = qualifier out of range (m) = manual integration (+) = signals summed

1609188
128

Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2016_09\13\09131616.D
Acq On : 13 Sep 2016 18:05 Operator: SC
Sample : P1604352-001 (150mL)
Misc : S29-07211602
ALS Vial : 5 Sample Multiplier: 1

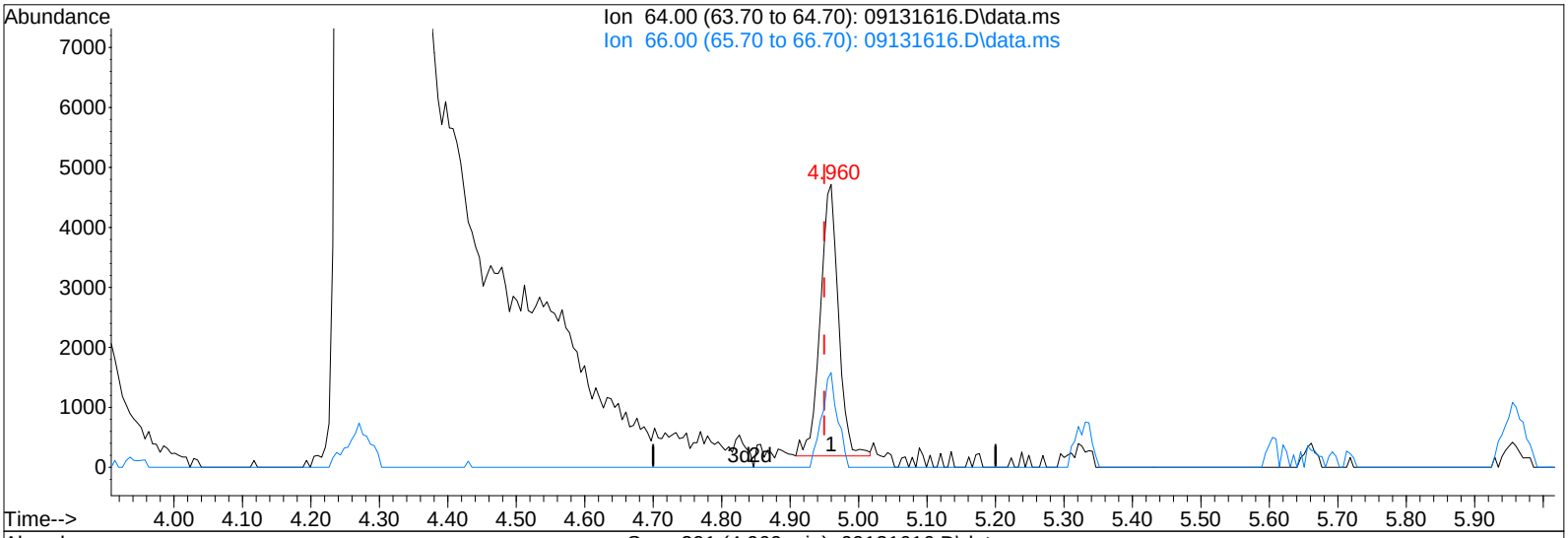
Quant Time: Sep 14 13:33:45 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M

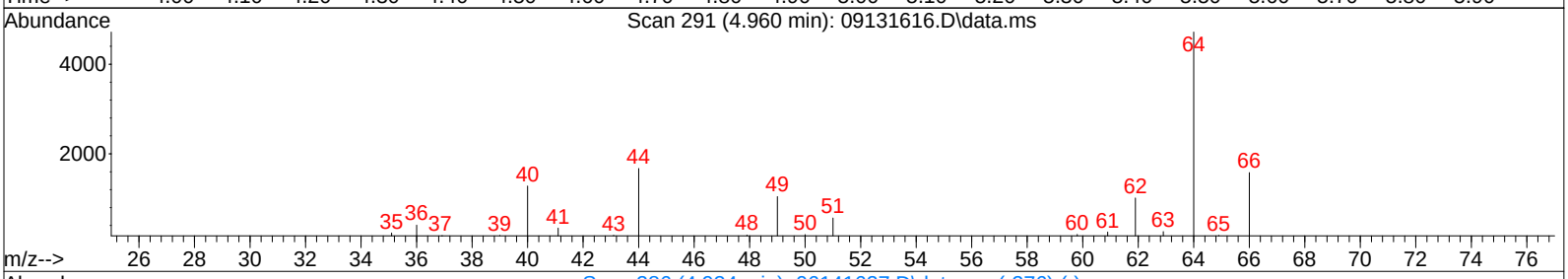


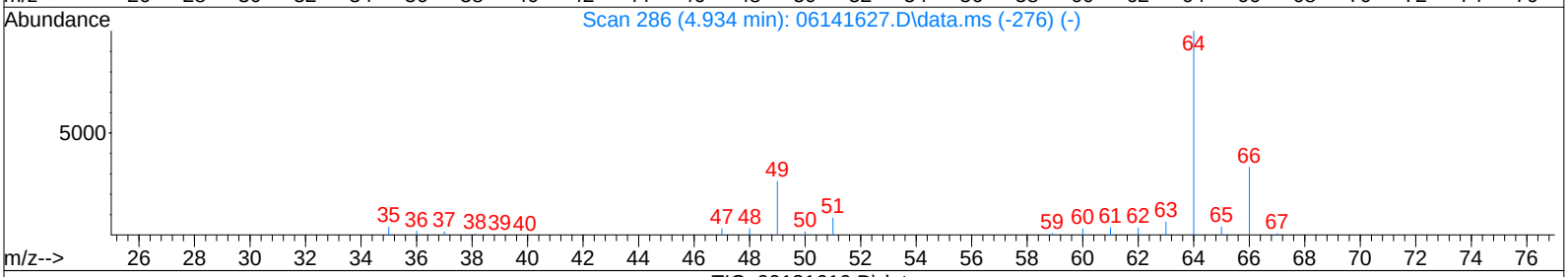
Quantitation Report (Qedit)

Data File: I:\MS09\Data\2016_09\13\09131616.D
Acq On : 13 Sep 2016 18:05 Operator: SC
Sample : P1604352-001 (150mL)
Misc : S29-07211602
ALS Vial : 5 Sample Multiplier: 1

Quant Time: Sep 14 08:59:41 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M







TIC: 09131616.D\data.ms

(9) Chloroethane (T)

4.960min (+0.010) 0.48ng

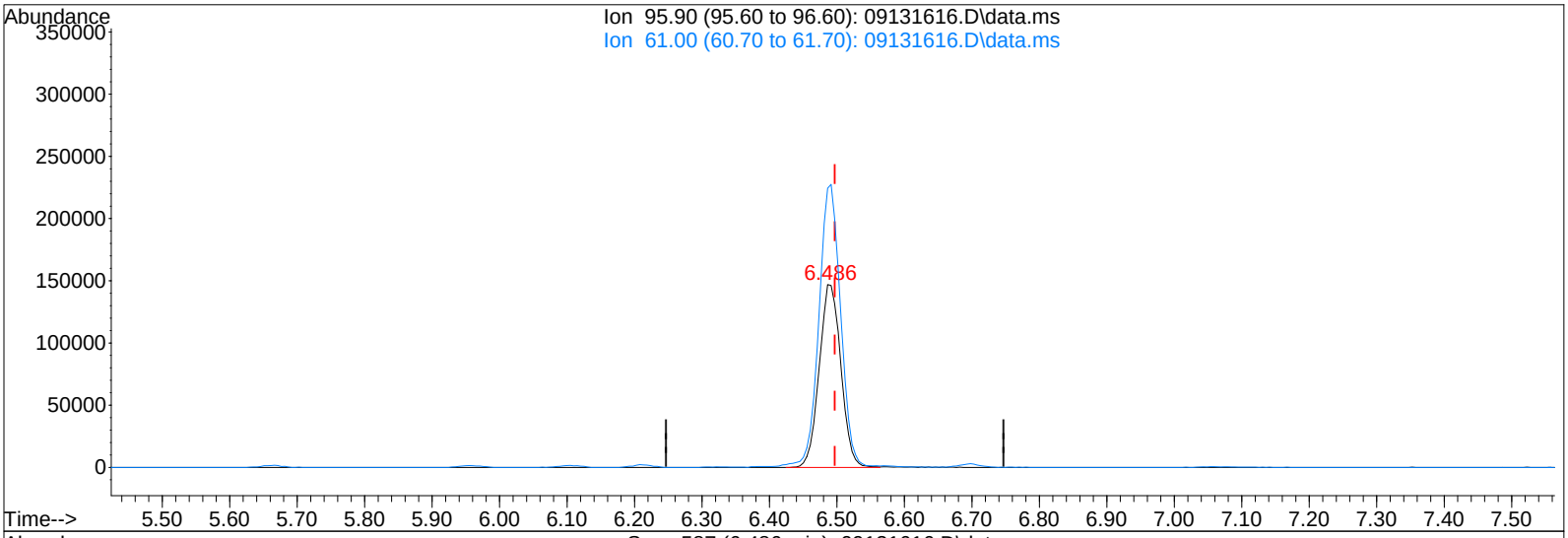
response 8368

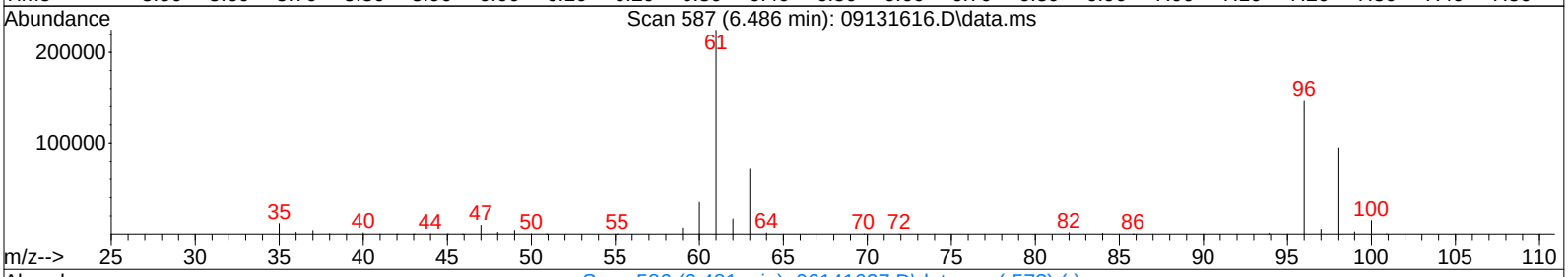
Ion	Exp%	Act%
64.00	100	100
66.00	32.30	30.40
0.00	0.00	0.00
0.00	0.00	0.00

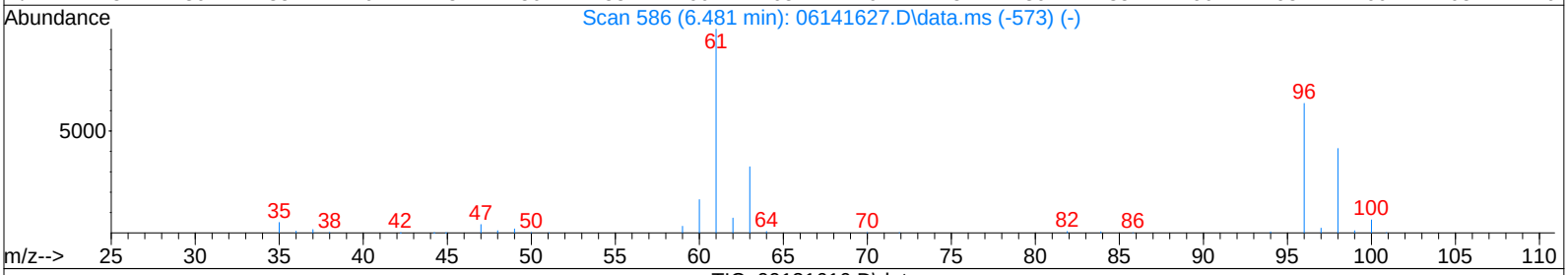
Quantitation Report (Qedit)

Data File: I:\MS09\Data\2016_09\13\09131616.D
Acq On : 13 Sep 2016 18:05 Operator: SC
Sample : P1604352-001 (150mL)
Misc : S29-07211602
ALS Vial : 5 Sample Multiplier: 1

Quant Time: Sep 14 08:59:41 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M







TIC: 09131616.D\data.ms

(17) 1,1-Dichloroethene (T)

6.486min (-0.011) 14.74ng

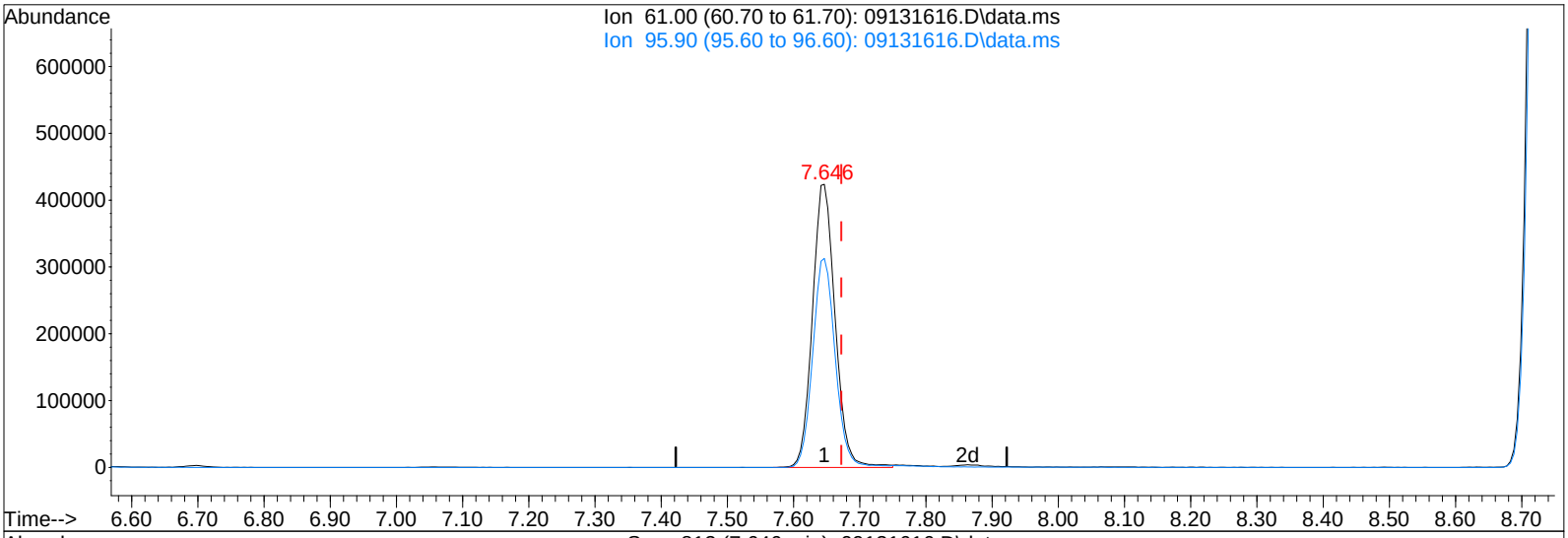
response 326842

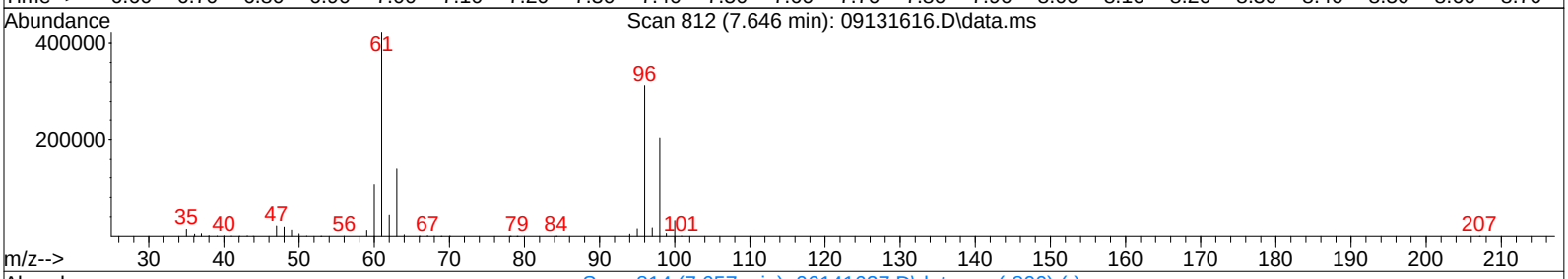
Ion	Exp%	Act%
95.90	100	100
61.00	155.80	156.27
0.00	0.00	0.00
0.00	0.00	0.00

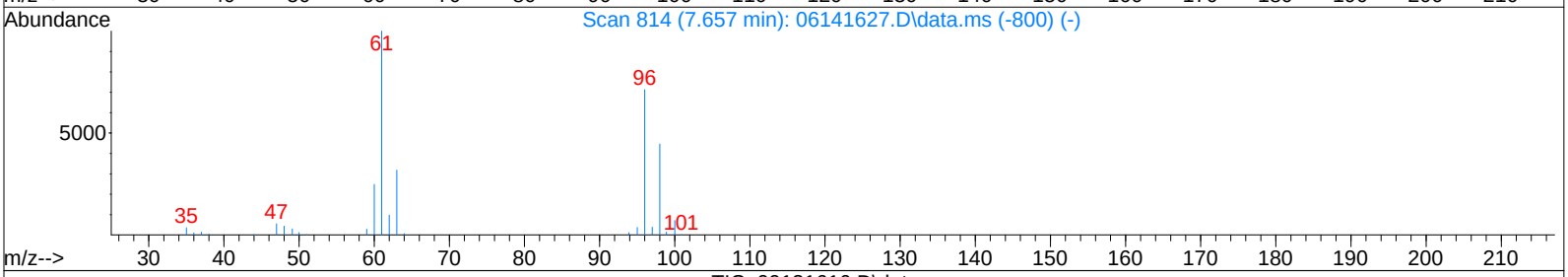
Quantitation Report (Qedit)

Data File: I:\MS09\Data\2016_09\13\09131616.D
Acq On : 13 Sep 2016 18:05 Operator: SC
Sample : P1604352-001 (150mL)
Misc : S29-07211602
ALS Vial : 5 Sample Multiplier: 1

Quant Time: Sep 14 08:59:41 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M







TIC: 09131616.D\data.ms

(23) trans-1,2-Dichloroethene (T)

7.646min (-0.026) 33.98ng

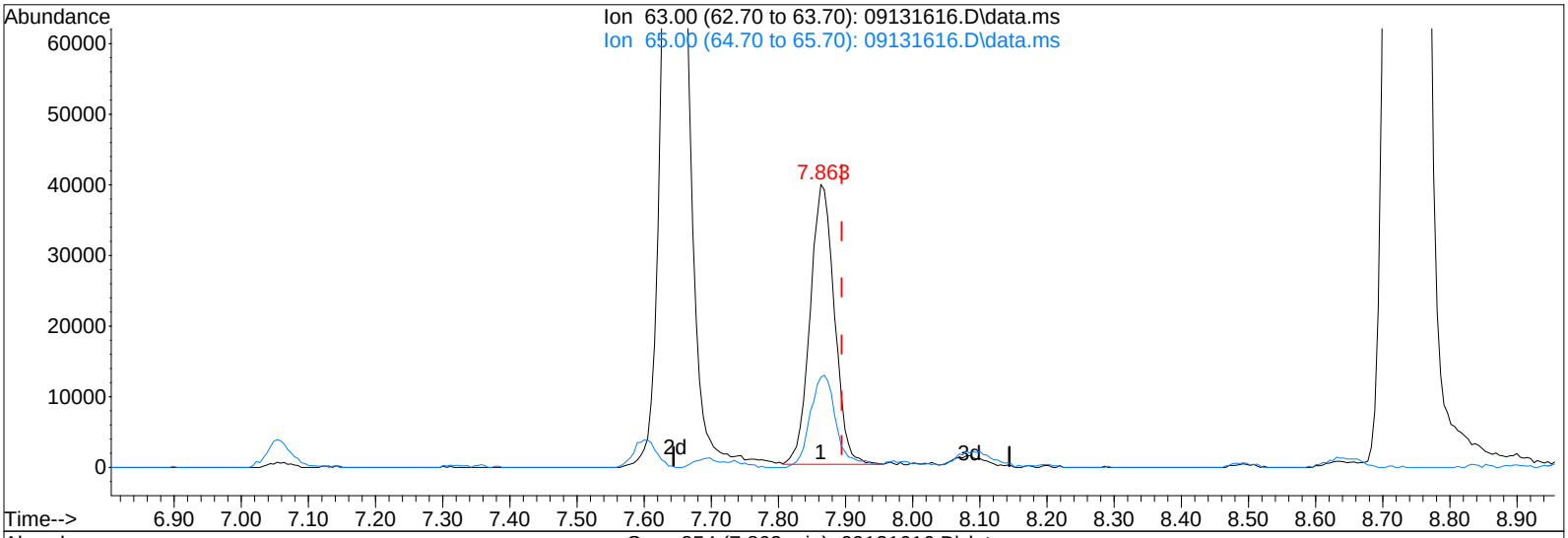
response 1007337

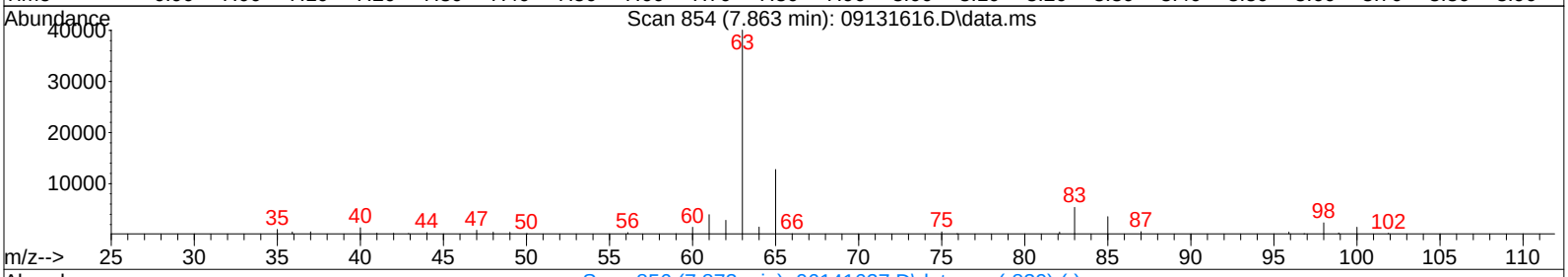
Ion	Exp%	Act%
61.00	100	100
95.90	72.50	73.39
0.00	0.00	0.00
0.00	0.00	0.00

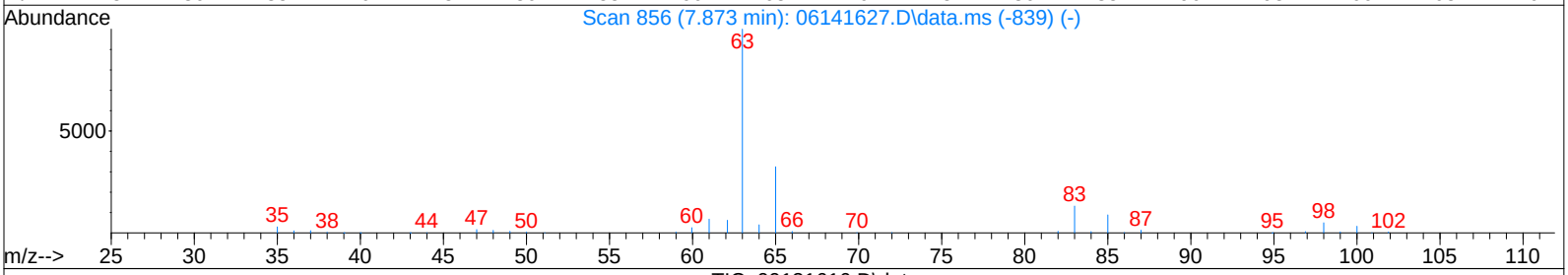
Quantitation Report (Qedit)

Data File: I:\MS09\Data\2016_09\13\09131616.D
Acq On : 13 Sep 2016 18:05 Operator: SC
Sample : P1604352-001 (150mL)
Misc : S29-07211602
ALS Vial : 5 Sample Multiplier: 1

Quant Time: Sep 14 08:59:41 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M







TIC: 09131616.D\data.ms

(24) 1,1-Dichloroethane (T)

7.863min (-0.031) 2.34ng

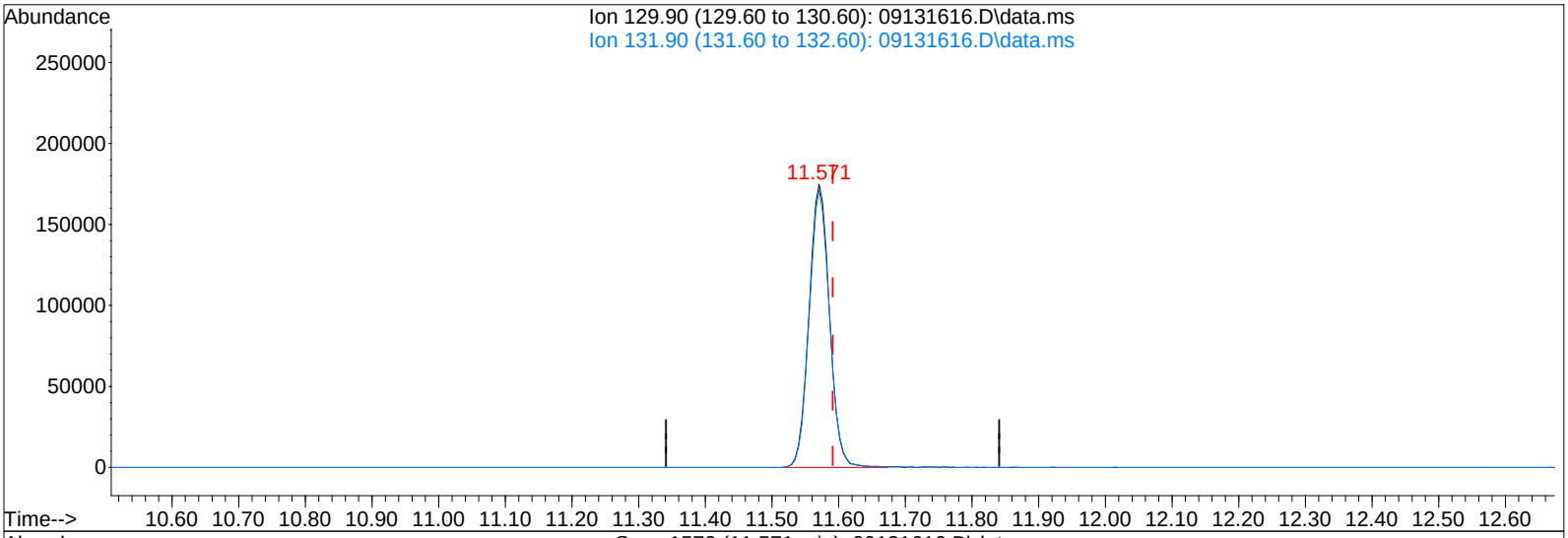
response 100083

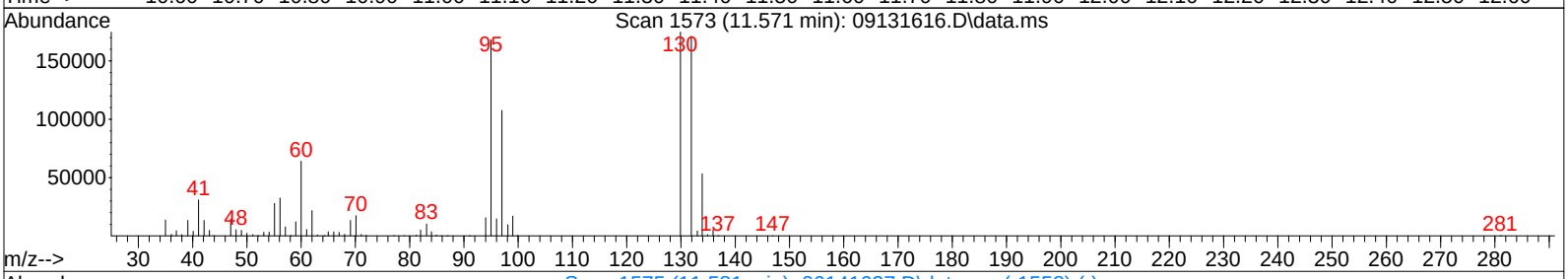
Ion	Exp%	Act%
63.00	100	100
65.00	32.10	35.54
0.00	0.00	0.00
0.00	0.00	0.00

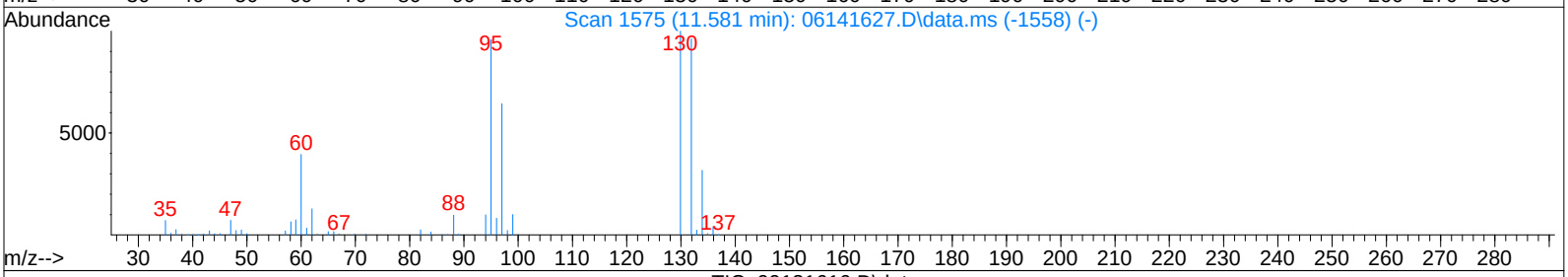
Quantitation Report (Qedit)

Data File: I:\MS09\Data\2016_09\13\09131616.D
Acq On : 13 Sep 2016 18:05 Operator: SC
Sample : P1604352-001 (150mL)
Misc : S29-07211602
ALS Vial : 5 Sample Multiplier: 1

Quant Time: Sep 14 08:59:41 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M







TIC: 09131616.D\data.ms

(47) Trichloroethene (T)

11.571min (-0.020) 13.42ng

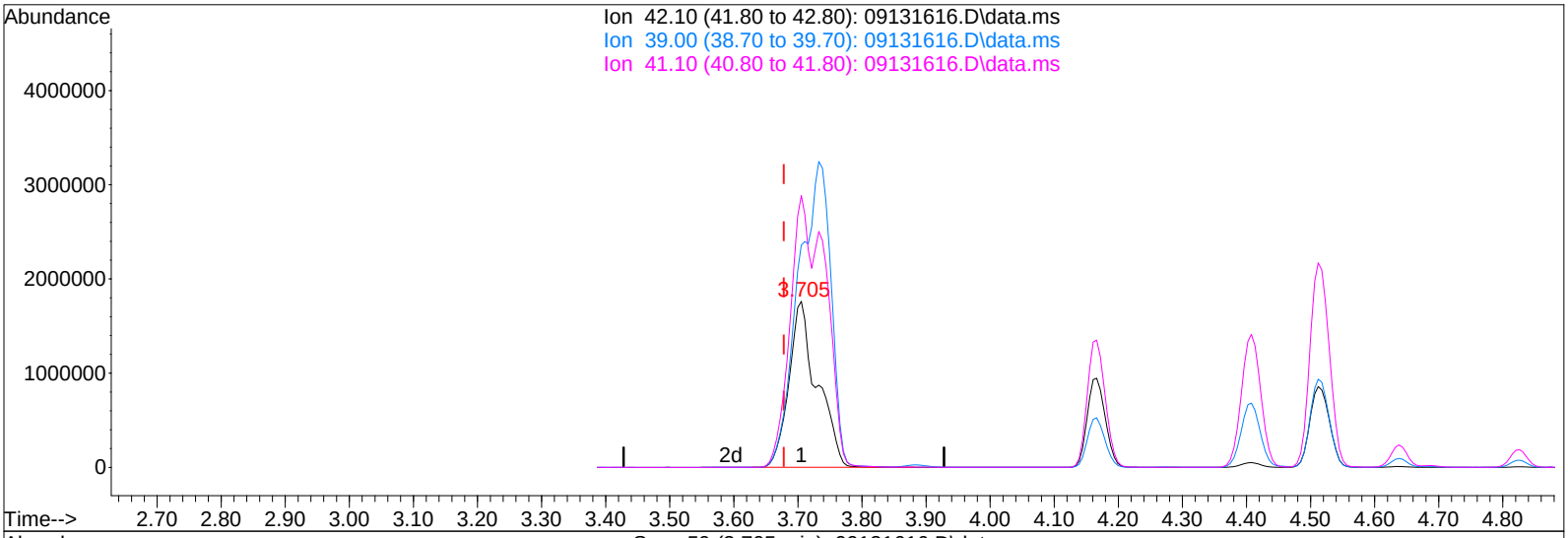
response 371972

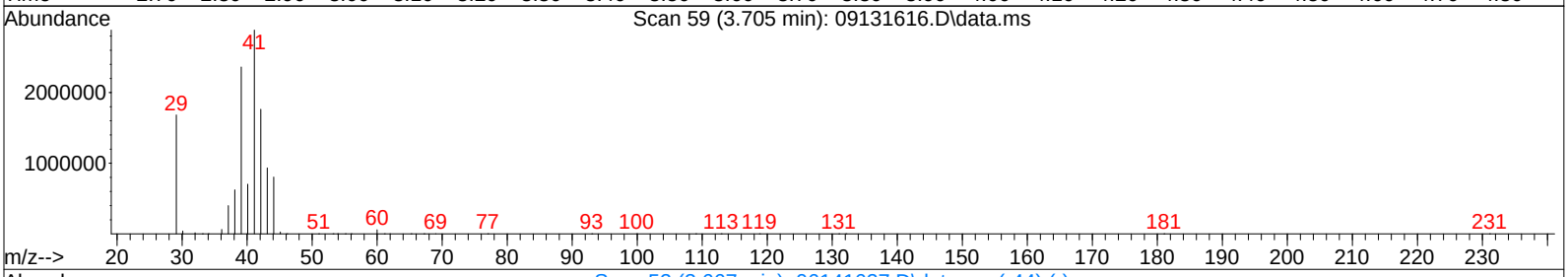
Ion	Exp%	Act%
129.90	100	100
131.90	96.30	96.91
0.00	0.00	0.00
0.00	0.00	0.00

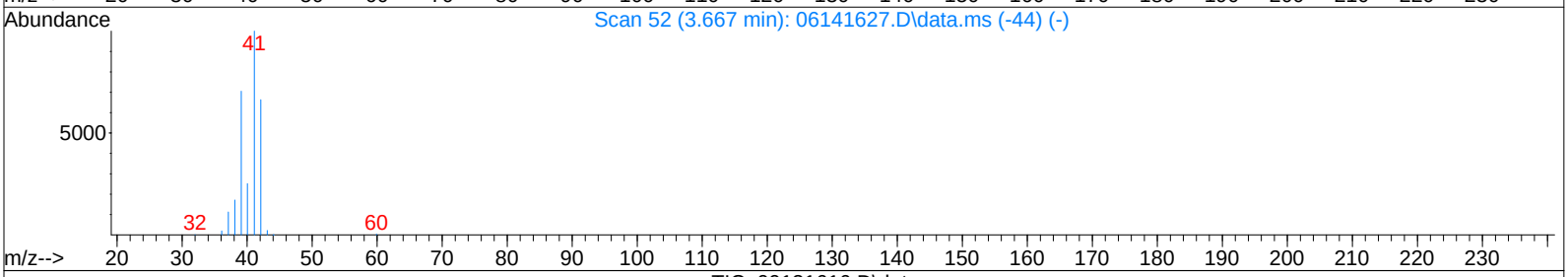
Quantitation Report (Qedit)

Data File: I:\MS09\Data\2016_09\13\09131616.D
Acq On : 13 Sep 2016 18:05 Operator: SC
Sample : P1604352-001 (150mL)
Misc : S29-07211602
ALS Vial : 5 Sample Multiplier: 1

Quant Time: Sep 14 08:59:41 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M







TIC: 09131616.D\data.ms

(2) Propene (T)

3.705min (+0.027) 220.26ng

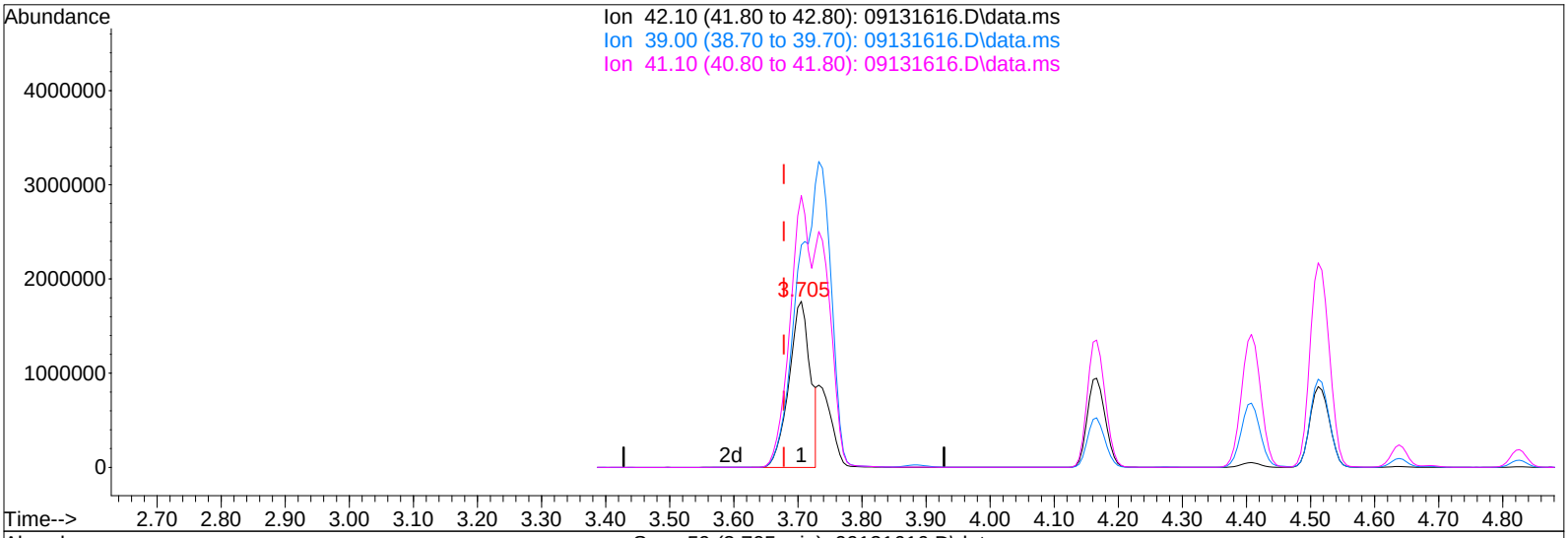
response 5395044

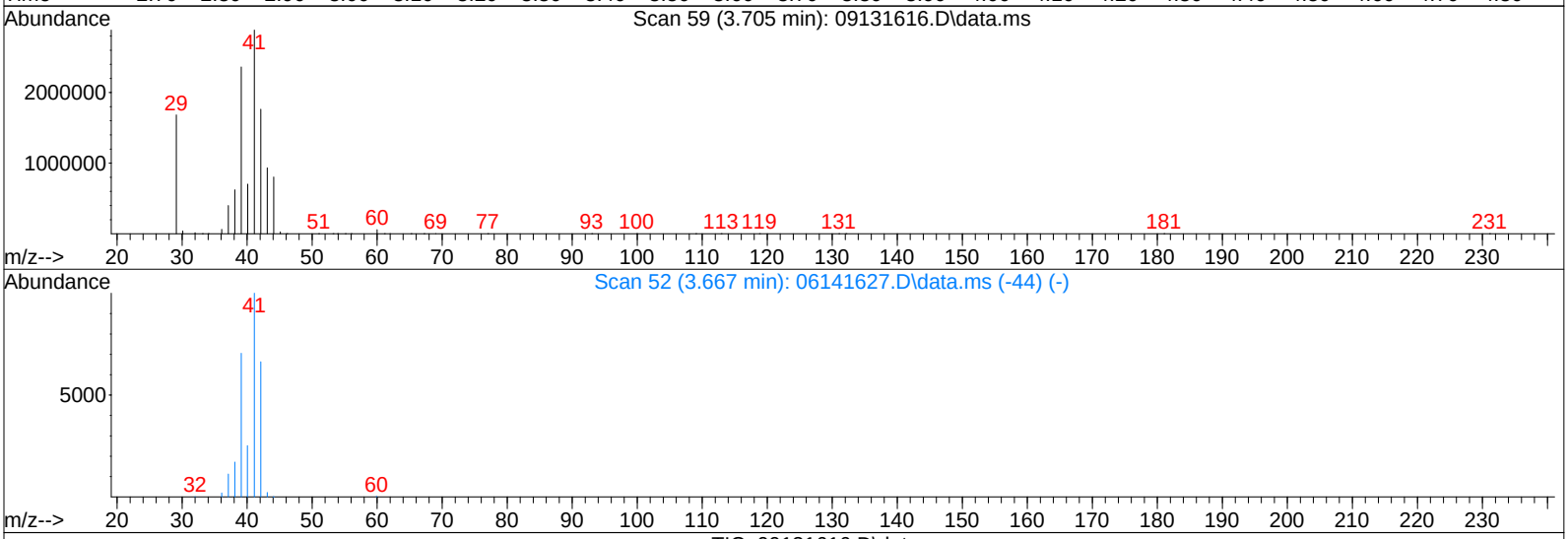
Ion	Exp%	Act%
42.10	100	100
39.00	106.20	212.42#
41.10	150.10	118.69#
0.00	0.00	0.00

Quantitation Report (Qedit)

Data File: I:\MS09\Data\2016_09\13\09131616.D
Acq On : 13 Sep 2016 18:05 Operator: SC
Sample : P1604352-001 (150mL)
Misc : S29-07211602
ALS Vial : 5 Sample Multiplier: 1

Quant Time: Sep 14 08:59:41 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M





TIC: 09131616.D\data.ms

(2) Propene (T)

3.705min (+0.027) 166.11ng m

response 4068796

Ion	Exp%	Act%
42.10	100	100
39.00	106.20	281.66#
41.10	150.10	157.37
0.00	0.00	0.00

IPC

9/14/16

9/26/16

Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2016_09\14\09141616.D
Acq On : 14 Sep 2016 16:03 Operator: SC
Sample : P1604352-001Dil (10mL)
Misc : S29-07211602
ALS Vial : 1 Sample Multiplier: 1

9/14/16

Quant Time: Sep 14 16:30:21 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M

Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
1) Bromochloromethane (IS1)	8.89	130	195371	12.500	ng	-0.05
37) 1,4-Difluorobenzene (IS2)	10.87	114	899724	12.500	ng	-0.03
56) Chlorobenzene-d5 (IS3)	15.22	82	363034	12.500	ng	0.00
System Monitoring Compounds						
33) 1,2-Dichloroethane-d4(...	9.67	65	264886	11.931	ng	-0.04
Spiked Amount 12.500	Range 70 - 130		Recovery = 95.44%			
57) Toluene-d8 (SS2)	13.31	98	963814	12.746	ng	-0.02
Spiked Amount 12.500	Range 70 - 130		Recovery = 102.00%			
73) Bromofluorobenzene (SS3)	16.83	174	285696	12.426	ng	0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 99.44%			
Target Compounds						Qvalue
2) Propene	3.68	42	242468	9.739	ng	92
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	4.25	62	2422069	66.093	ng	100
7) 1,3-Butadiene	4.44	54	886	N.D.		
8) Bromomethane	0.00	94	0	N.D.		
9) Chloroethane	4.95	64	468	N.D.		
10) Ethanol	5.20	45	666	N.D.		
11) Acetonitrile	0.00	41	0	N.D. d		
12) Acrolein	5.56	56	72	N.D.		
13) Acetone	0.00	58	0	N.D. d		
14) Trichlorofluoromethane	0.00	101	0	N.D.		
15) 2-Propanol (Isopropanol)	6.01	45	2723	N.D.		
16) Acrylonitrile	6.19	53	2395	N.D.		
17) 1,1-Dichloroethene	6.49	96	18666	0.828	ng	96
18) 2-Methyl-2-Propanol (t...	6.65	59	118	N.D.		
19) Methylene Chloride	0.00	84	0	N.D.		
20) 3-Chloro-1-propene (Al...	0.00	41	0	N.D. d		
21) Trichlorotrifluoroethane	0.00	151	0	N.D.		
22) Carbon Disulfide	6.92	76	12142	0.138	ng	93
23) trans-1,2-Dichloroethene	7.65	61	50015	1.660	ng	96
24) 1,1-Dichloroethane	7.85	63	7154	0.164	ng	87
25) Methyl tert-Butyl Ether	0.00	73	0	N.D.		
26) Vinyl Acetate	0.00	86	0	N.D. d		
27) 2-Butanone (MEK)	8.34	72	1010	N.D.		
28) cis-1,2-Dichloroethene	8.72	61	425289	13.735	ng	99
29) Diisopropyl Ether	0.00	87	0	N.D.		
30) Ethyl Acetate	0.00	61	0	N.D.		
31) n-Hexane	8.98	57	50059	1.253	ng	97
32) Chloroform	9.03	83	1577	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	10.50	56	1346	N.D.		
41) Benzene	10.52	78	28745	0.295	ng	98
42) Carbon Tetrachloride	10.67	117	722	N.D.		
43) Cyclohexane	10.80	84	10552	0.290	ng	95
44) tert-Amyl Methyl Ether	0.00	73	0	N.D.		
45) 1,2-Dichloropropane	0.00	63	0	N.D.		
46) Bromodichloromethane	11.46	83	693	N.D.		
47) Trichloroethene	11.57	130	21270	0.754	ng	99
48) 1,4-Dioxane	0.00	88	0	N.D.		
49) 2,2,4-Trimethylpentane...	11.63	57	3391	N.D.		

Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2016_09\14\09141616.D
Acq On : 14 Sep 2016 16:03 Operator: SC
Sample : P1604352-001Dil (10mL)
Misc : S29-07211602
ALS Vial : 1 Sample Multiplier: 1

Quant Time: Sep 14 16:30:21 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M

Internal Standards	R.T.	QIon	Response	Conc Units	Dev(Min)
50) Methyl Methacrylate	0.00	100	0	N.D. d	
51) n-Heptane	11.90	71	15483	0.661 ng	96
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	13.42	91	30438	0.288 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	14.31	43	530	N.D.	
63) n-Octane	14.43	57	8281	0.394 ng	96
64) Tetrachloroethene	14.57	166	1342	N.D.	
65) Chlorobenzene	15.26	112	438	N.D.	
66) Ethylbenzene	15.69	91	4869	N.D.	
67) m- & p-Xylenes	15.87	91	14084	0.157 ng	97
68) Bromoform	0.00	173	0	N.D.	
69) Styrene	0.00	104	0	N.D.	
70) o-Xylene	16.37	91	8751	0.094 ng	89
71) n-Nonane	16.61	43	21025	0.433 ng	98
72) 1,1,2,2-Tetrachloroethane	16.28	83	3462	N.D.	
74) Cumene	17.00	105	1550	N.D.	
75) alpha-Pinene	17.40	93	23442	0.408 ng	93
76) n-Propylbenzene	17.54	91	2434	N.D.	
77) 3-Ethyltoluene	17.64	105	9124	N.D.	
78) 4-Ethyltoluene	17.64	105	9124	N.D.	
79) 1,3,5-Trimethylbenzene	17.76	105	8160	N.D.	
80) alpha-Methylstyrene	0.00	118	0	N.D.	
81) 2-Ethyltoluene	17.96	105	5320	N.D.	
82) 1,2,4-Trimethylbenzene	18.19	105	16088	0.170 ng	84
83) n-Decane	0.00	57	0	N.D. d	
84) Benzyl Chloride	18.28	91	1107	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	18.47	105	3573	N.D.	
88) 4-Isopropyltoluene (p-...	18.64	119	9061	N.D.	
89) 1,2,3-Trimethylbenzene	0.00	105	0	N.D. d	
90) 1,2-Dichlorobenzene	0.00	146	0	N.D.	
91) d-Limonene	18.79	68	70400	1.938 ng	100
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	20.73	128	920	N.D.	
96) n-Dodecane	0.00	57	0	N.D. d	
97) Hexachlorobutadiene	0.00	225	0	N.D.	
98) Cyclohexanone	16.02	55	1573	N.D.	
99) tert-Butylbenzene	18.18	119	3300	N.D.	
100) n-Butylbenzene	19.08	91	3652	N.D.	

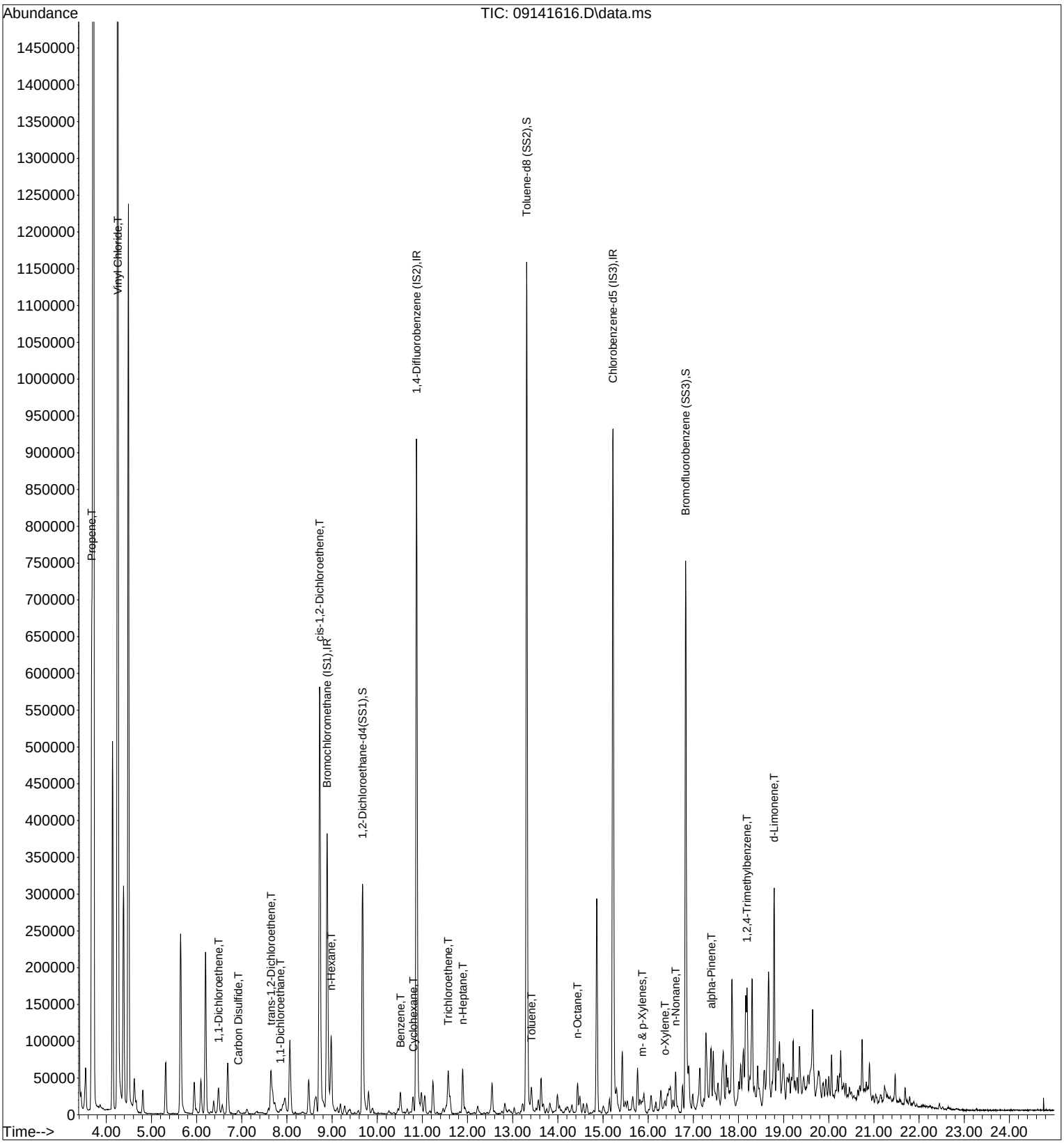
(#) = qualifier out of range (m) = manual integration (+) = signals summed

1609138
138

Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2016_09\14\09141616.D
Acq On : 14 Sep 2016 16:03 Operator: SC
Sample : P1604352-001Dil (10mL)
Misc : S29-07211602
ALS Vial : 1 Sample Multiplier: 1

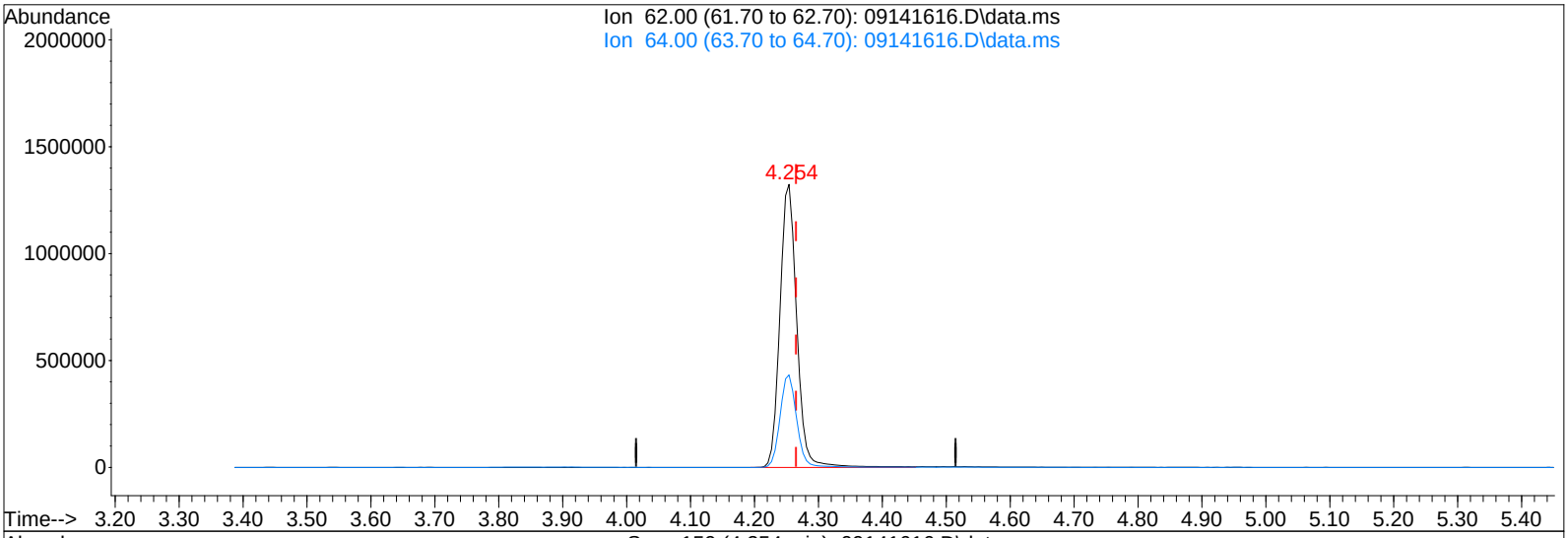
Quant Time: Sep 14 16:30:21 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M

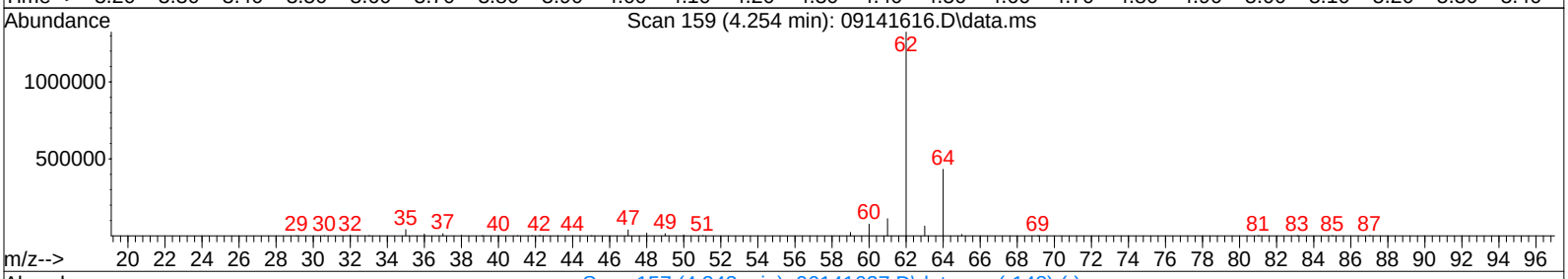


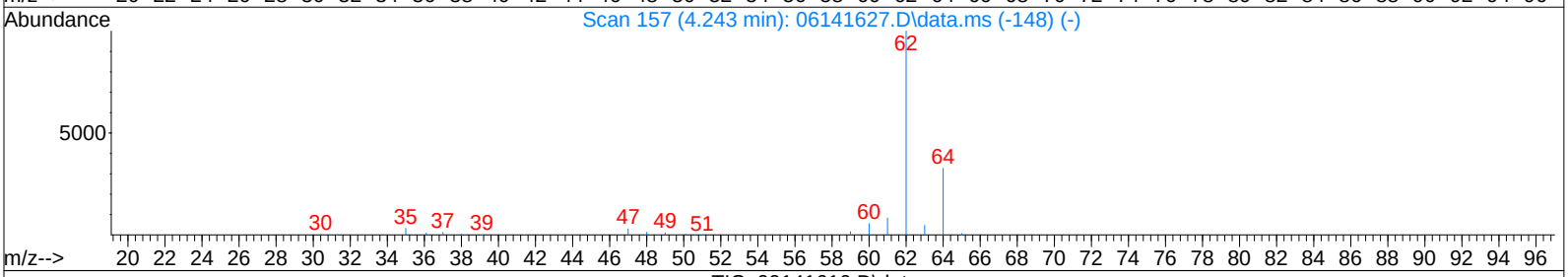
Quantitation Report (Qedit)

Data File: I:\MS09\Data\2016_09\14\09141616.D
Acq On : 14 Sep 2016 16:03 Operator: SC
Sample : P1604352-001Dil (10mL)
Misc : S29-07211602
ALS Vial : 1 Sample Multiplier: 1

Quant Time: Sep 14 16:28:48 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M







TIC: 09141616.D\data.ms

(6) Vinyl Chloride (T)

4.254min (-0.011) 66.09ng

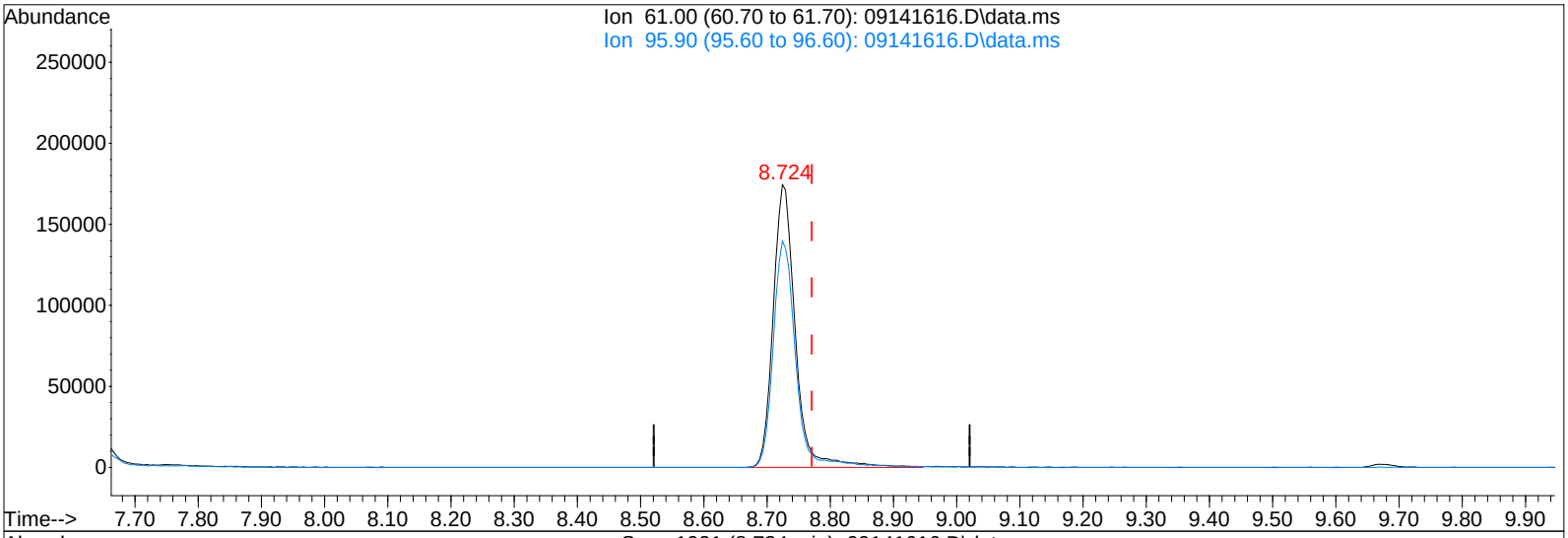
response 2422069

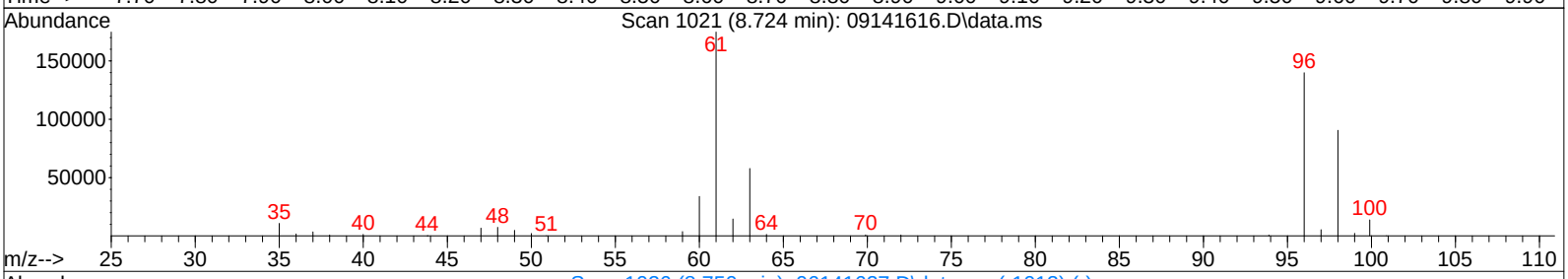
Ion	Exp%	Act%
62.00	100	100
64.00	32.30	32.29
0.00	0.00	0.00
0.00	0.00	0.00

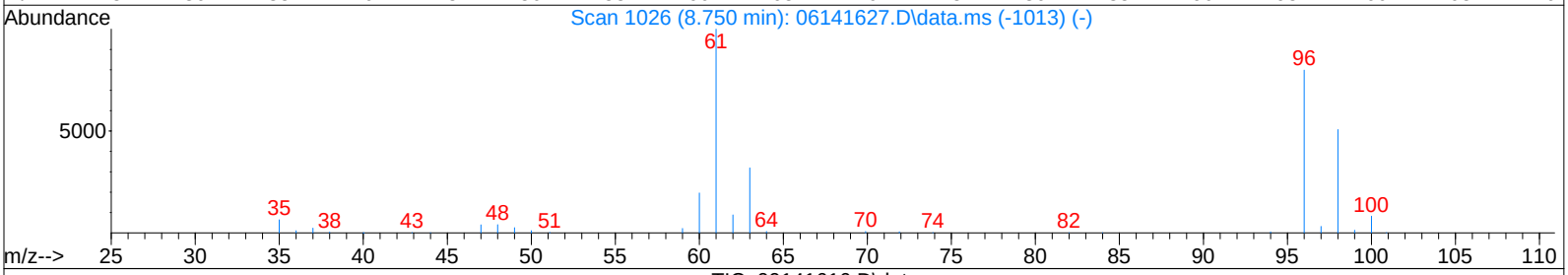
Quantitation Report (Qedit)

Data File: I:\MS09\Data\2016_09\14\09141616.D
Acq On : 14 Sep 2016 16:03 Operator: SC
Sample : P1604352-001Dil (10mL)
Misc : S29-07211602
ALS Vial : 1 Sample Multiplier: 1

Quant Time: Sep 14 16:28:48 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M







TIC: 09141616.D\data.ms

(28) cis-1,2-Dichloroethene (T)

8.724min (-0.047) 13.73ng

response 425289

Ion	Exp%	Act%
61.00	100	100
95.90	80.00	80.94
0.00	0.00	0.00
0.00	0.00	0.00

Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2016_09\13\09131617.D
Acq On : 13 Sep 2016 18:39 Operator: SC
Sample : P1604352-002 (220mL)
Misc : S29-07211602
ALS Vial : 6 Sample Multiplier: 1

9/14/16

Quant Time: Sep 14 13:41:27 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M

Internal Standards	R.T.	QIon	Response	Conc	Units		Dev(Min)
1) Bromochloromethane (IS1)	8.90	130	192098	12.500	ng		-0.04
37) 1,4-Difluorobenzene (IS2)	10.87	114	906299	12.500	ng		-0.03
56) Chlorobenzene-d5 (IS3)	15.22	82	367834	12.500	ng		0.00
System Monitoring Compounds							
33) 1,2-Dichloroethane-d4(...	9.68	65	260864	11.950	ng		-0.03
Spiked Amount 12.500	Range 70 - 130		Recovery = 95.60%				
57) Toluene-d8 (SS2)	13.31	98	954846	12.463	ng		-0.01
Spiked Amount 12.500	Range 70 - 130		Recovery = 99.68%				
73) Bromofluorobenzene (SS3)	16.83	174	289700	12.435	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 99.52%				
Target Compounds							Qvalue
2) Propene	3.71	42	4853040m	198.256	ng		
3) Dichlorodifluoromethan...	3.82	85	4434	N.D.			
4) Chloromethane	4.00	50	3221	N.D.			
5) 1,2-Dichloro-1,1,2,2-t...	4.16	135	420	N.D.			
6) Vinyl Chloride	4.28	62	821408	22.796	ng		99
7) 1,3-Butadiene	0.00	54	0	N.D.	d		
8) Bromomethane	0.00	94	0	N.D.			
9) Chloroethane	4.95	64	10831	0.624	ng		98
10) Ethanol	5.16	45	21062	1.201	ng		96
11) Acetonitrile	0.00	41	0	N.D.	d		
12) Acrolein	0.00	56	0	N.D.	d		
13) Acetone	0.00	58	0	N.D.	d		
14) Trichlorofluoromethane	5.82	101	687	N.D.			
15) 2-Propanol (Isopropanol)	0.00	45	0	N.D.	d		
16) Acrylonitrile	0.00	53	0	N.D.	d		
17) 1,1-Dichloroethene	6.49	96	165393	7.462	ng		98
18) 2-Methyl-2-Propanol (t...	0.00	59	0	N.D.	d		
19) Methylene Chloride	6.62	84	475	N.D.			
20) 3-Chloro-1-propene (Al...	0.00	41	0	N.D.	d		
21) Trichlorotrifluoroethane	6.96	151	13263	0.660	ng		97
22) Carbon Disulfide	6.92	76	273143	3.165	ng		98
23) trans-1,2-Dichloroethene	7.65	61	130420	4.402	ng		100
24) 1,1-Dichloroethane	7.86	63	20664	0.483	ng		97
25) Methyl tert-Butyl Ether	7.90	73	415	N.D.			
26) Vinyl Acetate	0.00	86	0	N.D.	d		
27) 2-Butanone (MEK)	8.27	72	235783	15.086	ng		97
28) cis-1,2-Dichloroethene	8.73	61	997329	32.758	ng		98
29) Diisopropyl Ether	0.00	87	0	N.D.	d		
30) Ethyl Acetate	0.00	61	0	N.D.	d		
31) n-Hexane	8.99	57	1441402	36.696	ng		98
32) Chloroform	9.04	83	17534	0.431	ng		97
34) Tetrahydrofuran (THF)	9.47	72	2796	0.179	ng	#	61
35) Ethyl tert-Butyl Ether	0.00	87	0	N.D.			
36) 1,2-Dichloroethane	9.82	62	1510	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	0.00	56	0	N.D.	d		
41) Benzene	10.51	78	836800	8.537	ng		98
42) Carbon Tetrachloride	0.00	117	0	N.D.			
43) Cyclohexane	10.80	84	245256	6.700	ng		99
44) tert-Amyl Methyl Ether	0.00	73	0	N.D.			
45) 1,2-Dichloropropane	0.00	63	0	N.D.	d		
46) Bromodichloromethane	0.00	83	0	N.D.	d		
47) Trichloroethene	11.57	130	341488	12.010	ng		100
48) 1,4-Dioxane	11.58	88	493	N.D.			
49) 2,2,4-Trimethylpentane...	0.00	57	0	N.D.	d		

160918
142

Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2016_09\13\09131617.D
Acq On : 13 Sep 2016 18:39 Operator: SC
Sample : P1604352-002 (220mL)
Misc : S29-07211602
ALS Vial : 6 Sample Multiplier: 1

Quant Time: Sep 14 13:41:27 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M

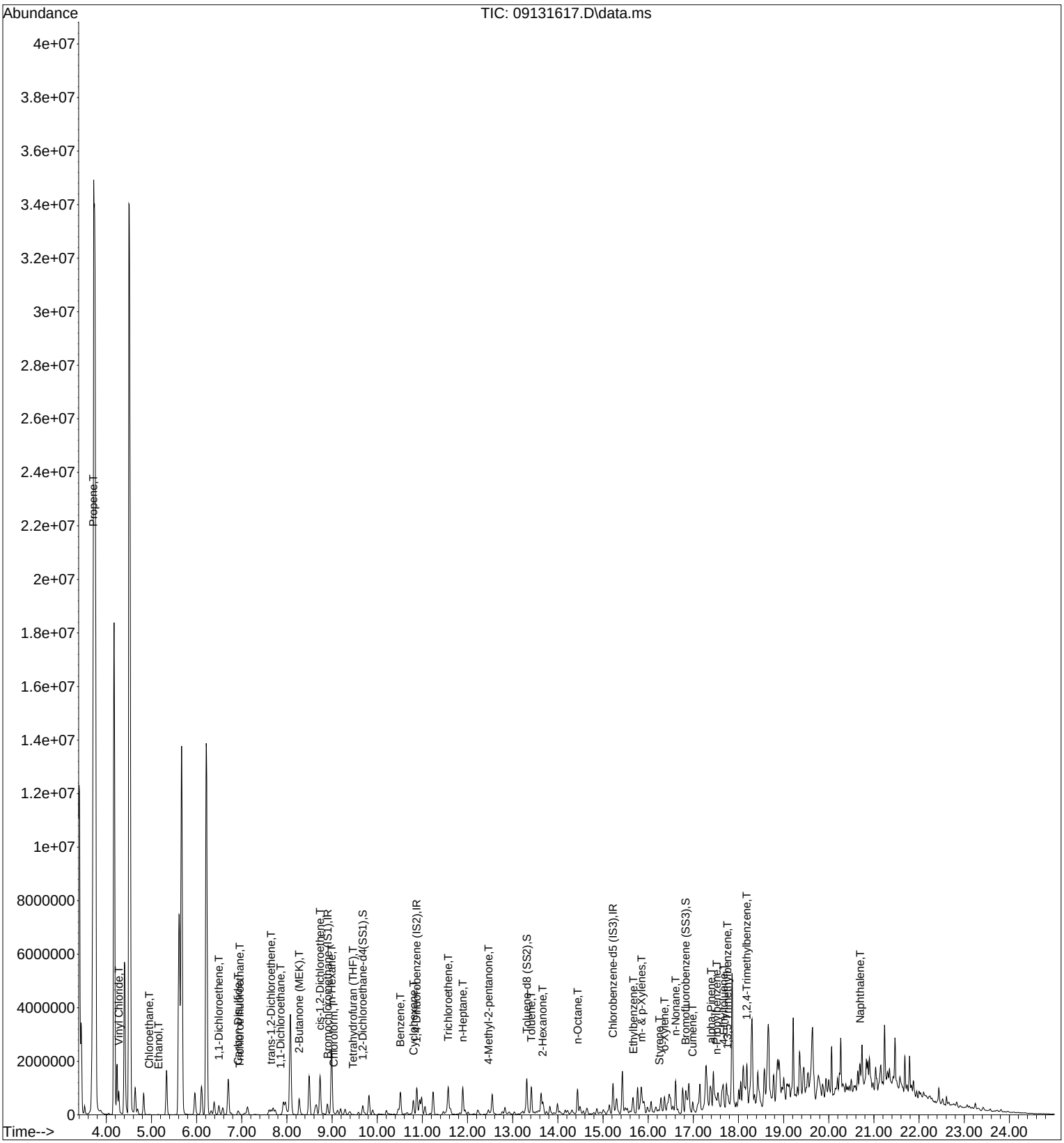
Internal Standards	R.T.	QIon	Response	Conc Units	Dev(Min)
50) Methyl Methacrylate	0.00	100	0	N.D. d	
51) n-Heptane	11.90	71	260470	11.034 ng	99
52) cis-1,3-Dichloropropene	0.00	75	0	N.D.	
53) 4-Methyl-2-pentanone	12.46	58	57816	2.581 ng	99
54) trans-1,3-Dichloropropene	0.00	75	0	N.D.	
55) 1,1,2-Trichloroethane	13.11	97	1092	N.D.	
58) Toluene	13.41	91	890889	8.307 ng	99
59) 2-Hexanone	13.66	43	210707	4.216 ng	87
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	14.44	57	181184	8.510 ng	98
64) Tetrachloroethene	14.57	166	949	N.D.	
65) Chlorobenzene	0.00	112	0	N.D. d	
66) Ethylbenzene	15.67	91	262200	2.330 ng	99
67) m- & p-Xylenes	15.85	91	763390	8.383 ng	99
68) Bromoform	0.00	173	0	N.D.	
69) Styrene	16.25	104	14777	0.221 ng	92
70) o-Xylene	16.36	91	343448	3.640 ng	98
71) n-Nonane	16.61	43	483120	9.827 ng	95
72) 1,1,2,2-Tetrachloroethane	0.00	83	0	N.D. d	
74) Cumene	16.99	105	67729	0.563 ng	98
75) alpha-Pinene	17.39	93	77342	1.328 ng	87
76) n-Propylbenzene	17.52	91	155616	1.083 ng	92
77) 3-Ethyltoluene	0.00	105	0	N.D. d	
78) 4-Ethyltoluene	17.67	105	123471	1.142 ng	97
79) 1,3,5-Trimethylbenzene	17.75	105	133133	1.360 ng	99
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	18.18	105	399739	4.160 ng	88
83) n-Decane	0.00	57	0	N.D. d	
84) Benzyl Chloride	0.00	91	0	N.D. d	
85) 1,3-Dichlorobenzene	18.42	146	923	N.D.	
86) 1,4-Dichlorobenzene	18.42	146	923	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	0.00	146	0	N.D.	
91) d-Limonene	0.00	68	0	N.D. d	
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	20.59	180	3402	N.D.	
95) Naphthalene	20.70	128	132664	0.955 ng	70
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. 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:\MS09\Data\2016_09\13\09131617.D
Acq On : 13 Sep 2016 18:39 Operator: SC
Sample : P1604352-002 (220mL)
Misc : S29-07211602
ALS Vial : 6 Sample Multiplier: 1

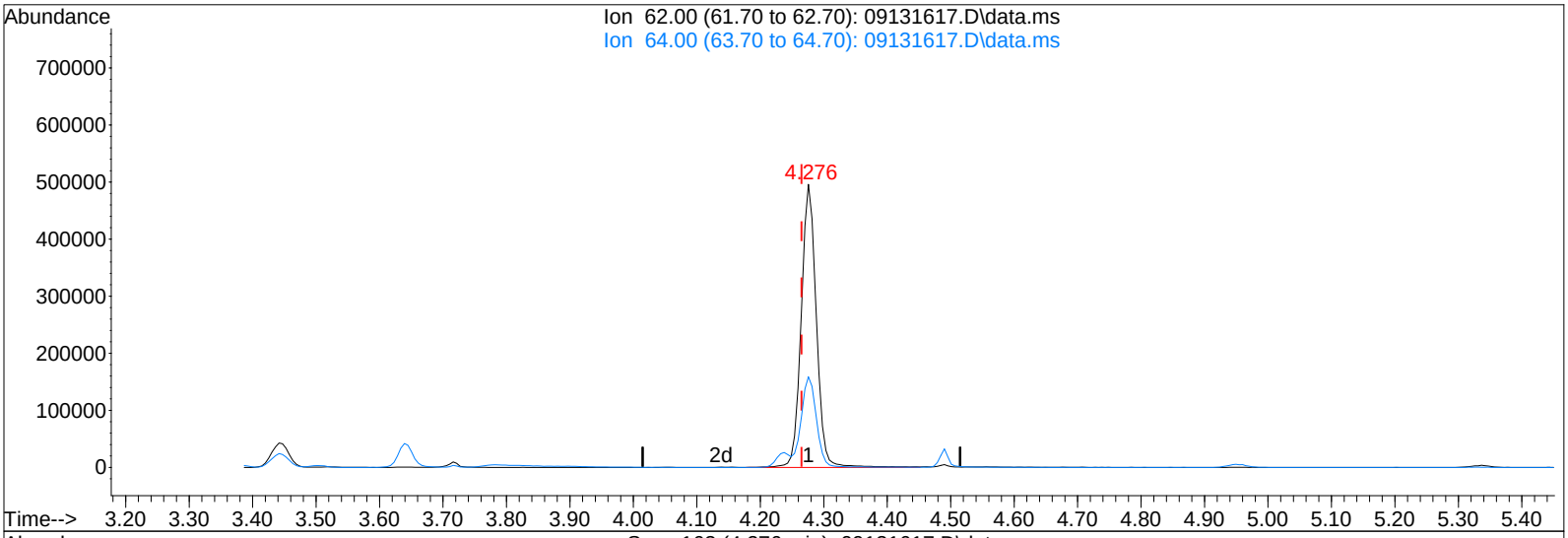
Quant Time: Sep 14 13:41:27 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M

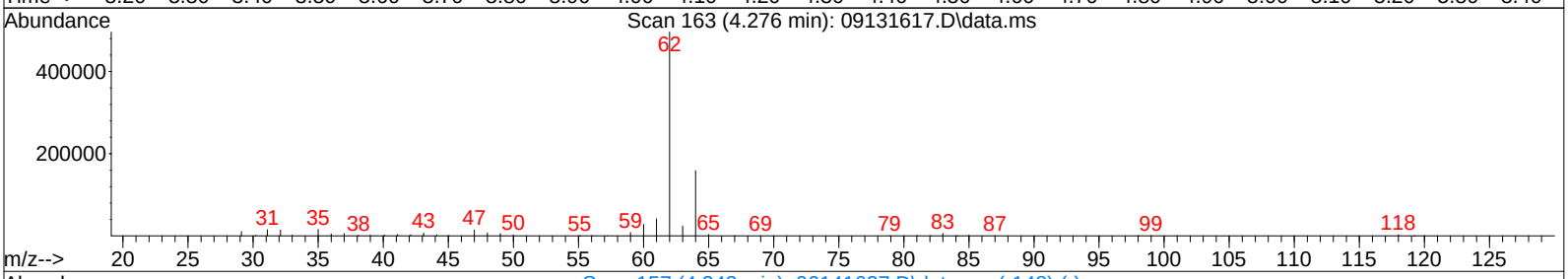


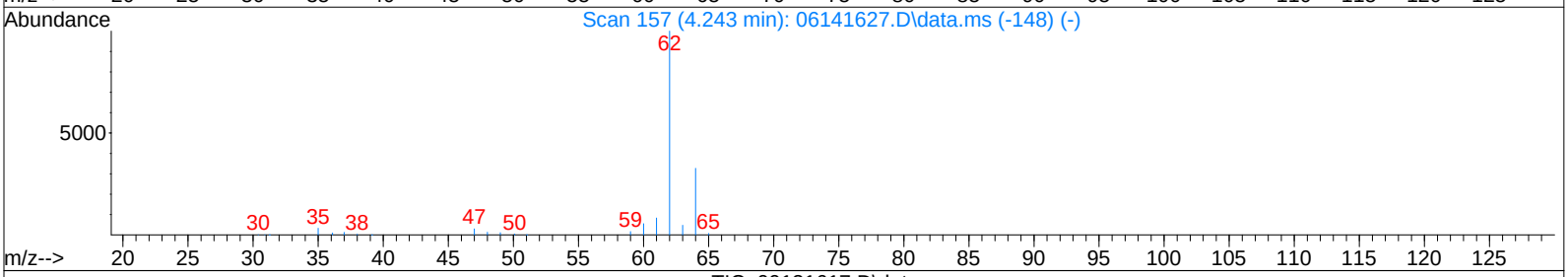
Quantitation Report (Qedit)

Data File: I:\MS09\Data\2016_09\13\09131617.D
Acq On : 13 Sep 2016 18:39 Operator: SC
Sample : P1604352-002 (220mL)
Misc : S29-07211602
ALS Vial : 6 Sample Multiplier: 1

Quant Time: Sep 14 09:00:00 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M







TIC: 09131617.D\data.ms

(6) Vinyl Chloride (T)

4.276min (+0.011) 22.80ng

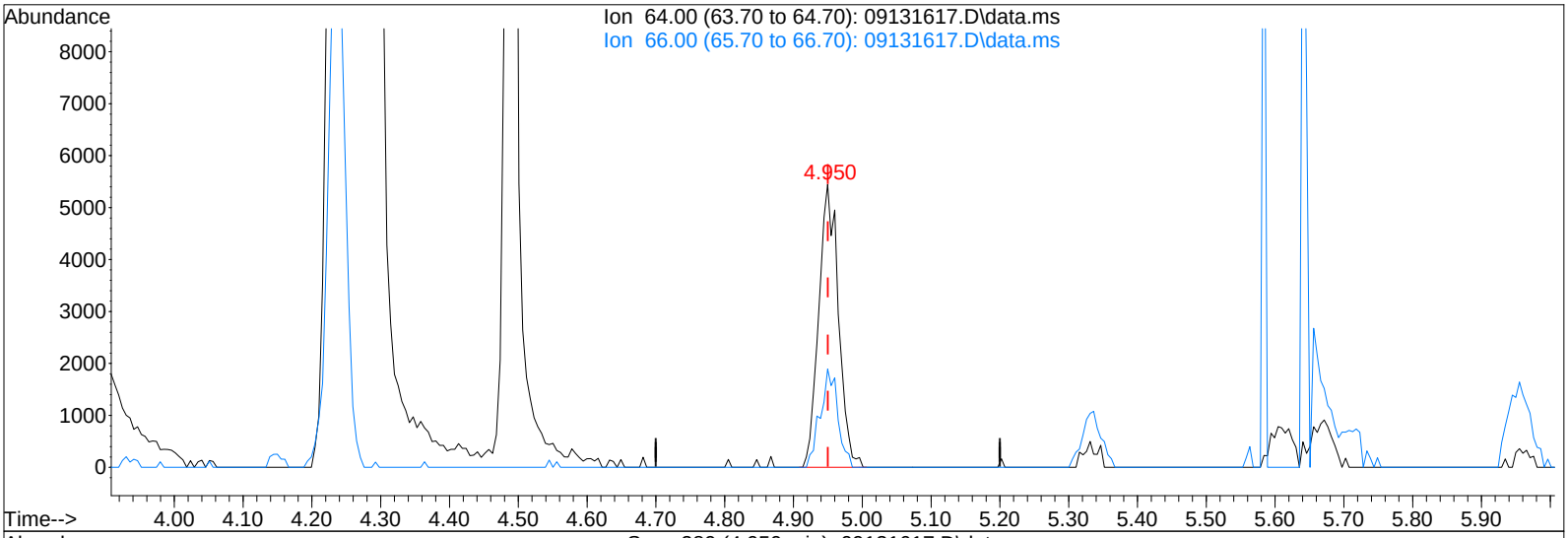
response 821408

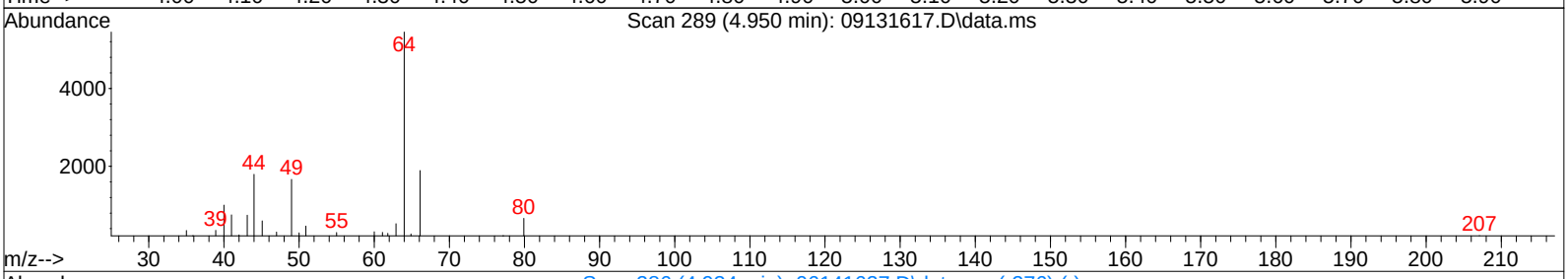
Ion	Exp%	Act%
62.00	100	100
64.00	32.30	32.01
0.00	0.00	0.00
0.00	0.00	0.00

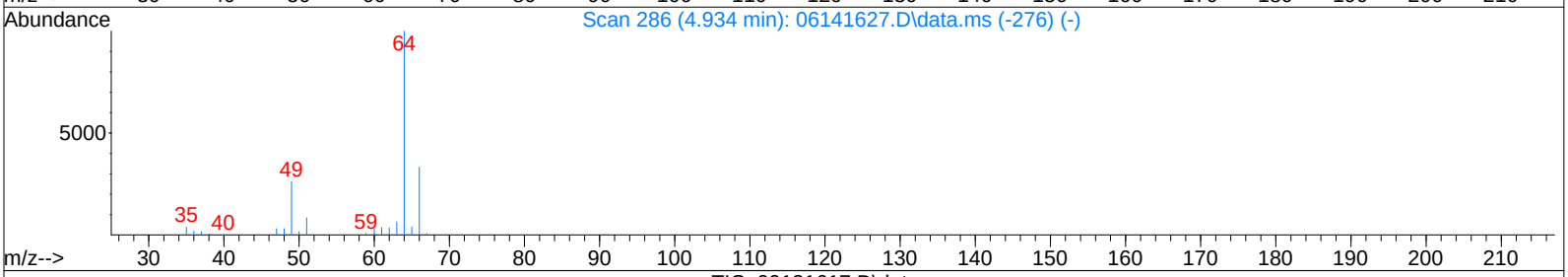
Quantitation Report (Qedit)

Data File: I:\MS09\Data\2016_09\13\09131617.D
Acq On : 13 Sep 2016 18:39 Operator: SC
Sample : P1604352-002 (220mL)
Misc : S29-07211602
ALS Vial : 6 Sample Multiplier: 1

Quant Time: Sep 14 09:00:00 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M







TIC: 09131617.D\data.ms

(9) Chloroethane (T)

4.950min (-0.000) 0.62ng

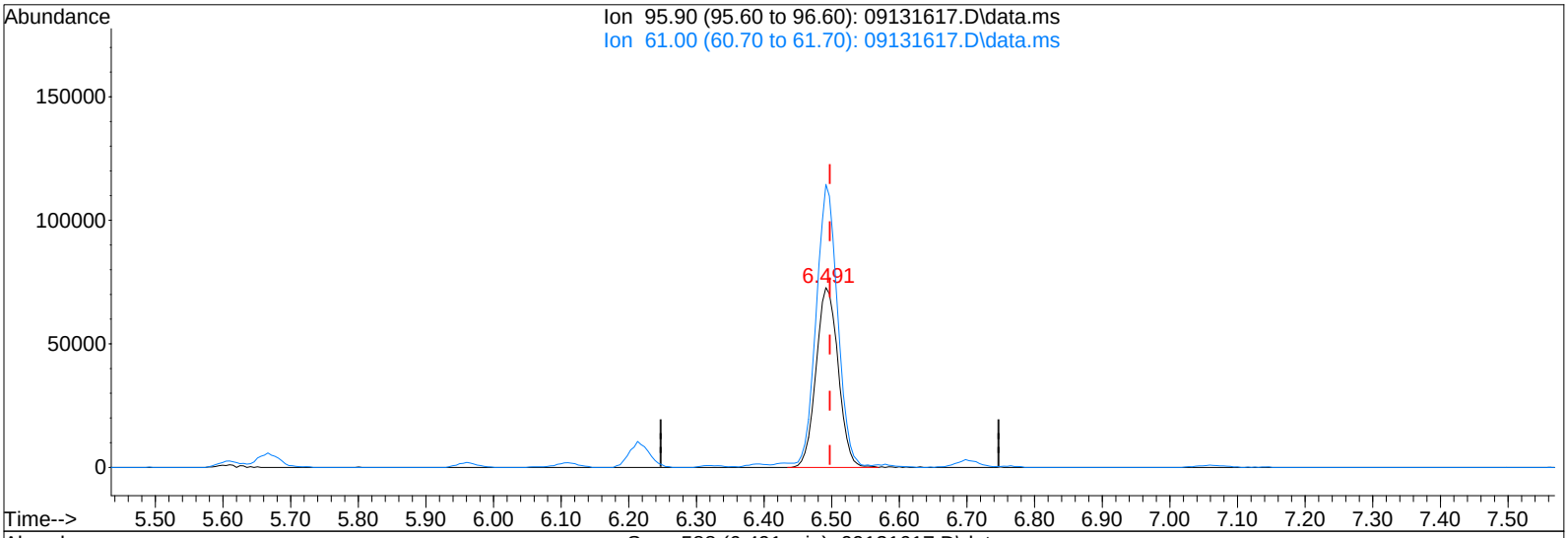
response 10831

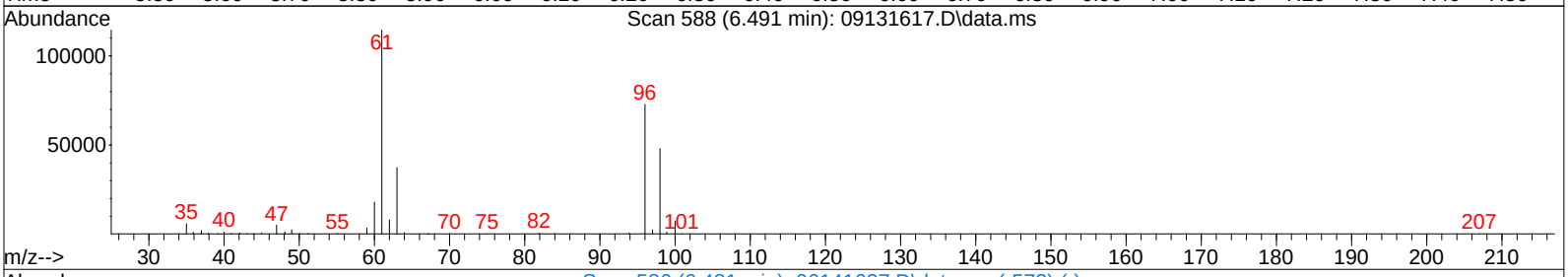
Ion	Exp%	Act%
64.00	100	100
66.00	32.30	31.10
0.00	0.00	0.00
0.00	0.00	0.00

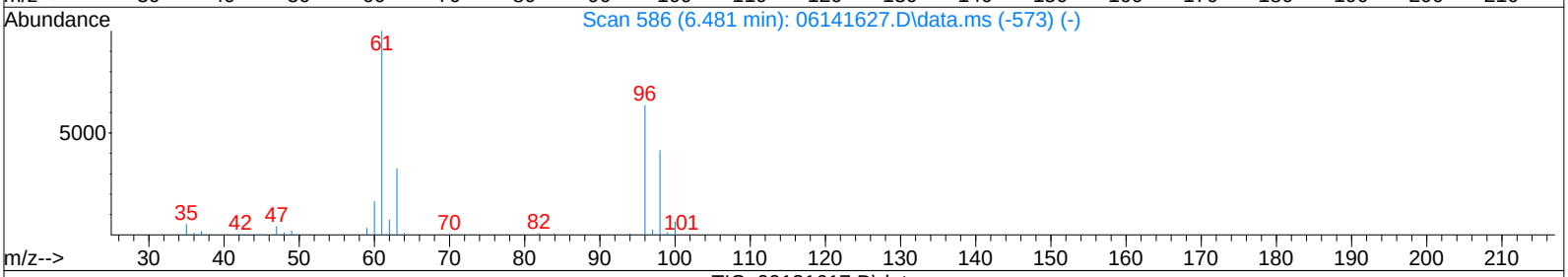
Quantitation Report (Qedit)

Data File: I:\MS09\Data\2016_09\13\09131617.D
Acq On : 13 Sep 2016 18:39 Operator: SC
Sample : P1604352-002 (220mL)
Misc : S29-07211602
ALS Vial : 6 Sample Multiplier: 1

Quant Time: Sep 14 09:00:00 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M







TIC: 09131617.D\data.ms

(17) 1,1-Dichloroethene (T)

6.491min (-0.006) 7.46ng

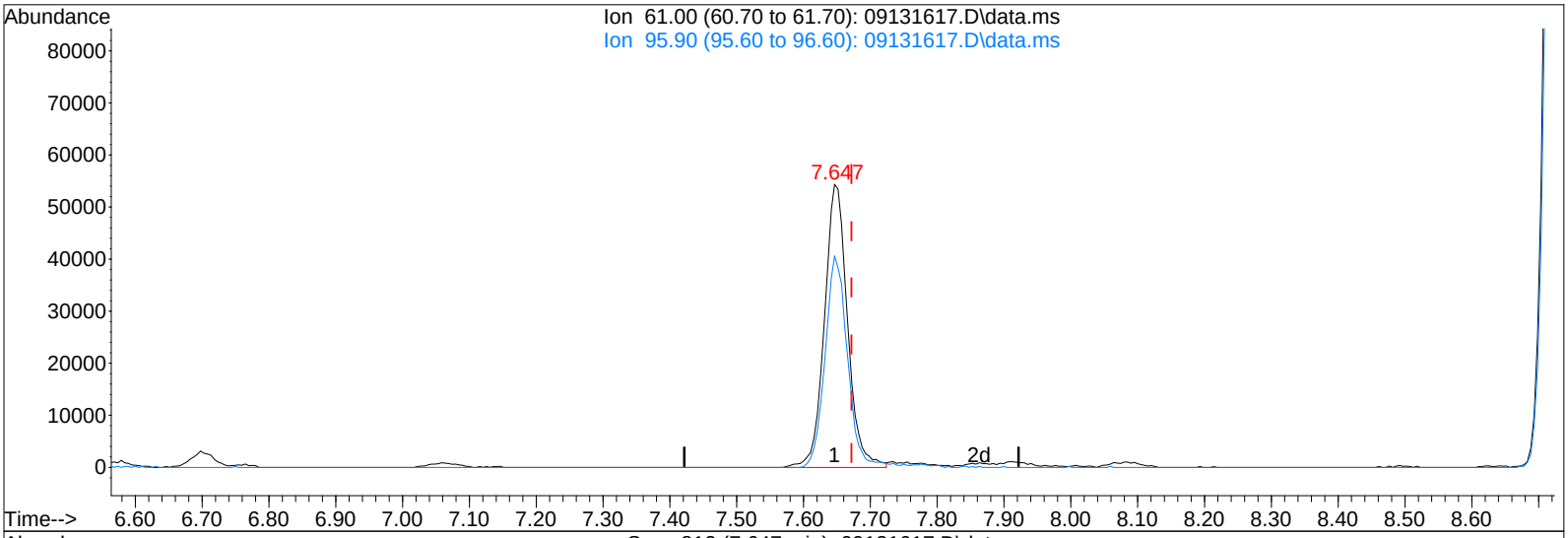
response 165393

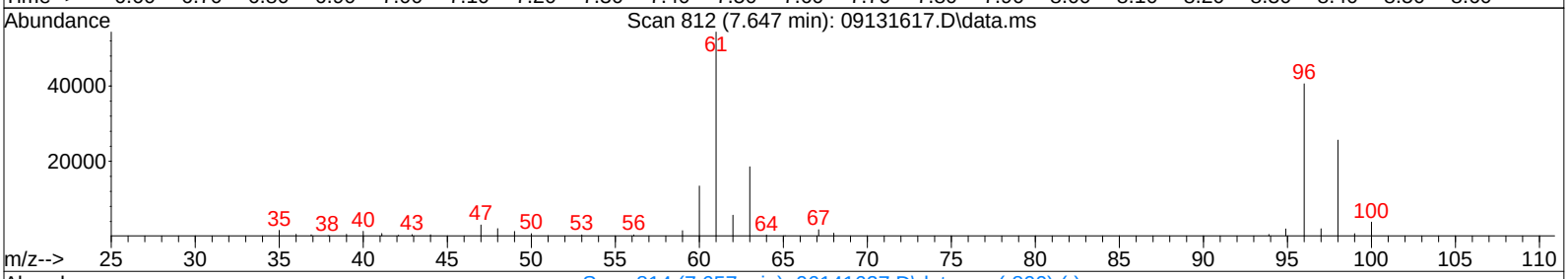
Ion	Exp%	Act%
95.90	100	100
61.00	155.80	152.96
0.00	0.00	0.00
0.00	0.00	0.00

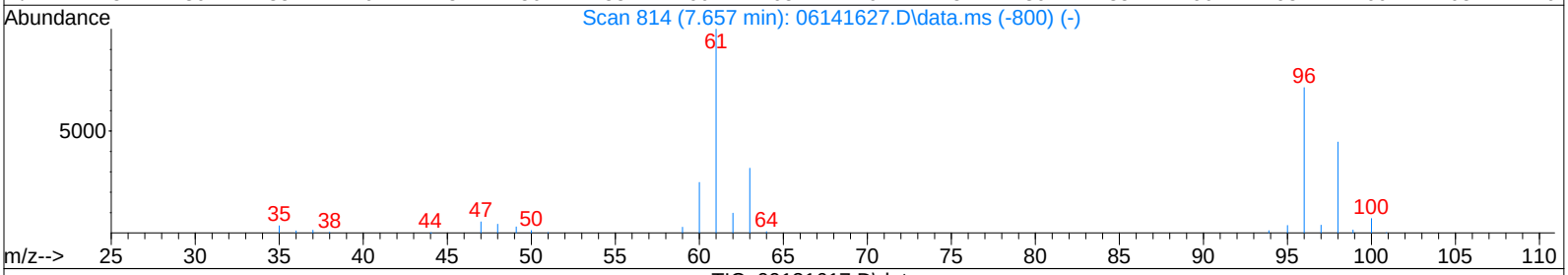
Quantitation Report (Qedit)

Data File: I:\MS09\Data\2016_09\13\09131617.D
Acq On : 13 Sep 2016 18:39 Operator: SC
Sample : P1604352-002 (220mL)
Misc : S29-07211602
ALS Vial : 6 Sample Multiplier: 1

Quant Time: Sep 14 09:00:00 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M







TIC: 09131617.D\data.ms

(23) trans-1,2-Dichloroethene (T)

7.647min (-0.025) 4.40ng

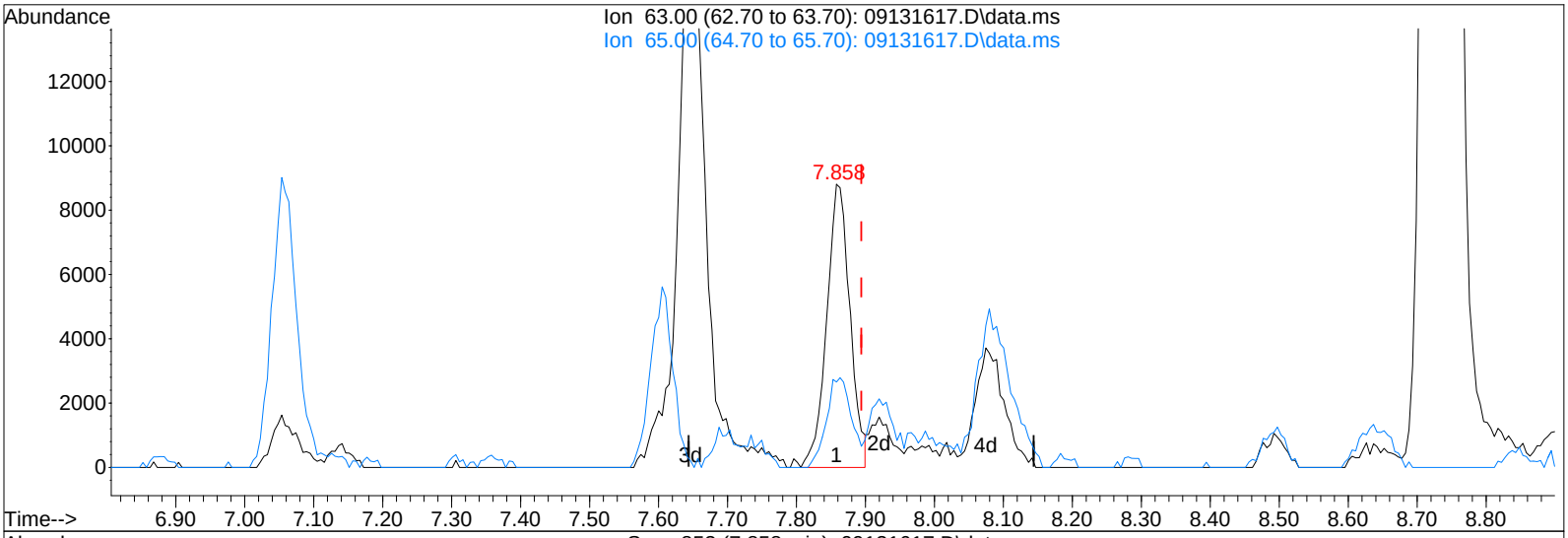
response 130420

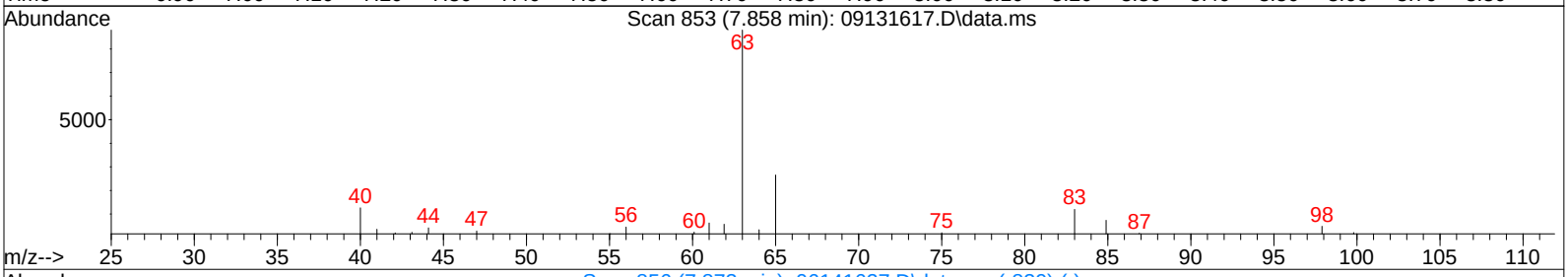
Ion	Exp%	Act%
61.00	100	100
95.90	72.50	72.84
0.00	0.00	0.00
0.00	0.00	0.00

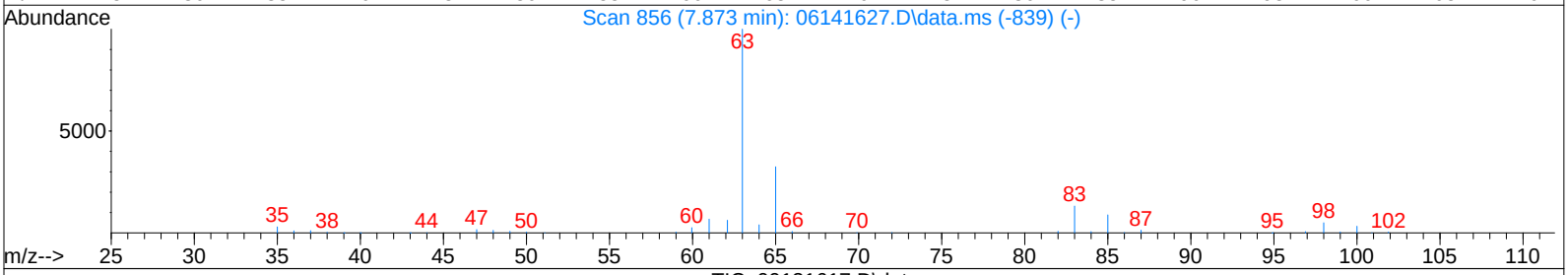
Quantitation Report (Qedit)

Data File: I:\MS09\Data\2016_09\13\09131617.D
Acq On : 13 Sep 2016 18:39 Operator: SC
Sample : P1604352-002 (220mL)
Misc : S29-07211602
ALS Vial : 6 Sample Multiplier: 1

Quant Time: Sep 14 09:00:00 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M







TIC: 09131617.D\data.ms

(24) 1,1-Dichloroethane (T)

7.858min (-0.036) 0.48ng

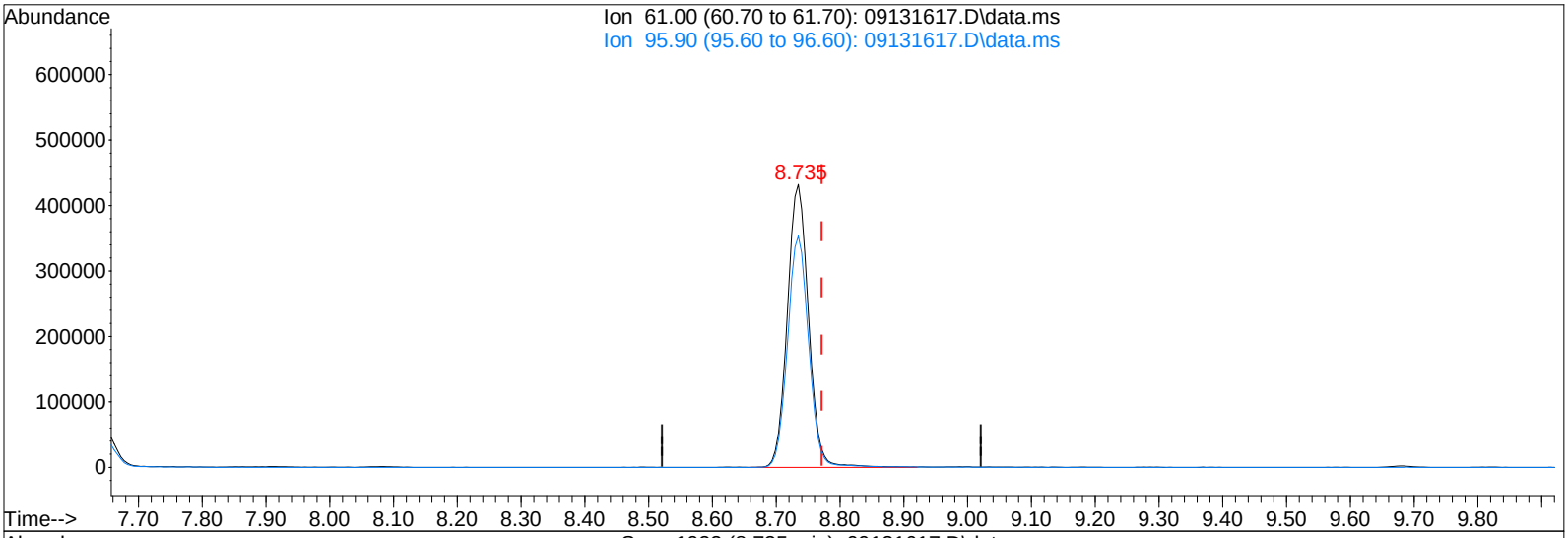
response 20664

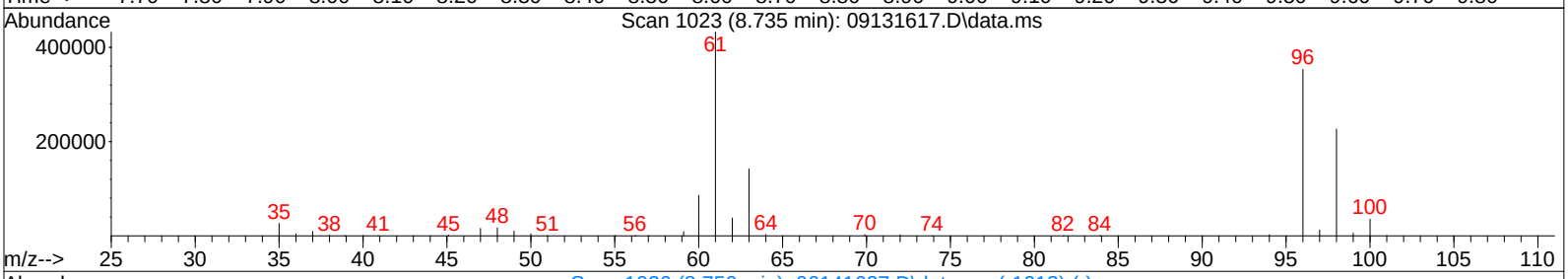
Ion	Exp%	Act%
63.00	100	100
65.00	32.10	34.04
0.00	0.00	0.00
0.00	0.00	0.00

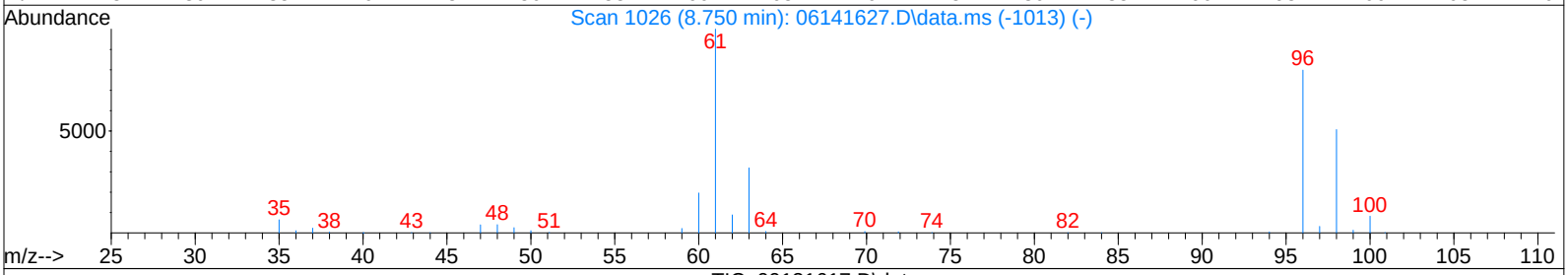
Quantitation Report (Qedit)

Data File: I:\MS09\Data\2016_09\13\09131617.D
Acq On : 13 Sep 2016 18:39 Operator: SC
Sample : P1604352-002 (220mL)
Misc : S29-07211602
ALS Vial : 6 Sample Multiplier: 1

Quant Time: Sep 14 09:00:00 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M







TIC: 09131617.D\data.ms

(28) cis-1,2-Dichloroethene (T)

8.735min (-0.036) 32.76ng

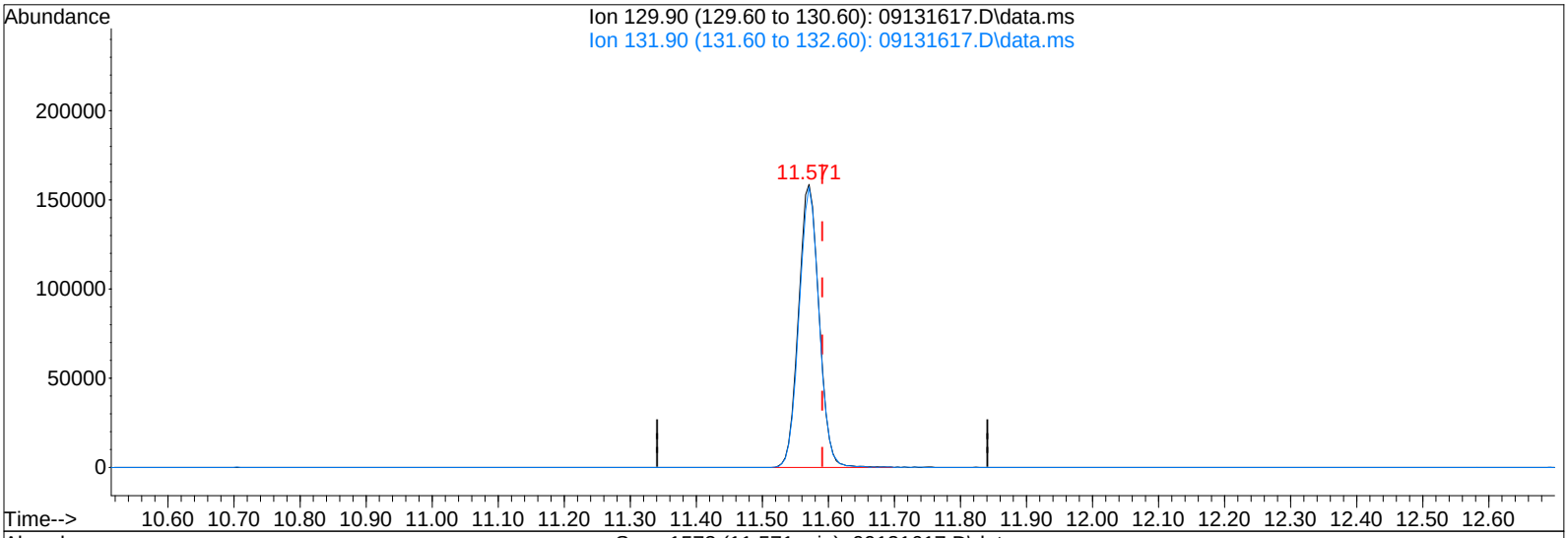
response 997329

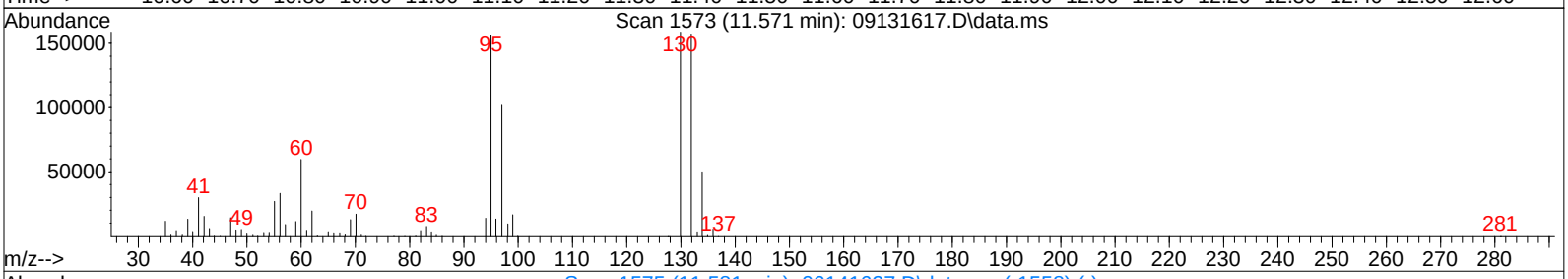
Ion	Exp%	Act%
61.00	100	100
95.90	80.00	81.72
0.00	0.00	0.00
0.00	0.00	0.00

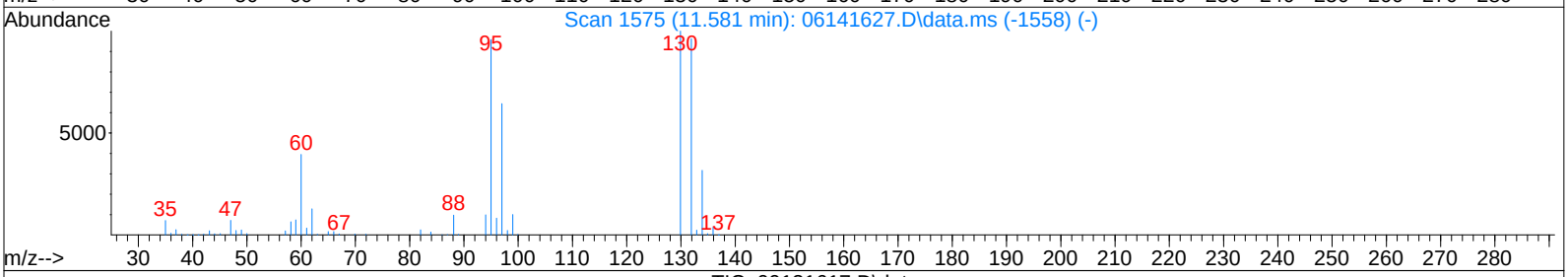
Quantitation Report (Qedit)

Data File: I:\MS09\Data\2016_09\13\09131617.D
Acq On : 13 Sep 2016 18:39 Operator: SC
Sample : P1604352-002 (220mL)
Misc : S29-07211602
ALS Vial : 6 Sample Multiplier: 1

Quant Time: Sep 14 09:00:00 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M







TIC: 09131617.D\data.ms

(47) Trichloroethene (T)

11.571min (-0.020) 12.01ng

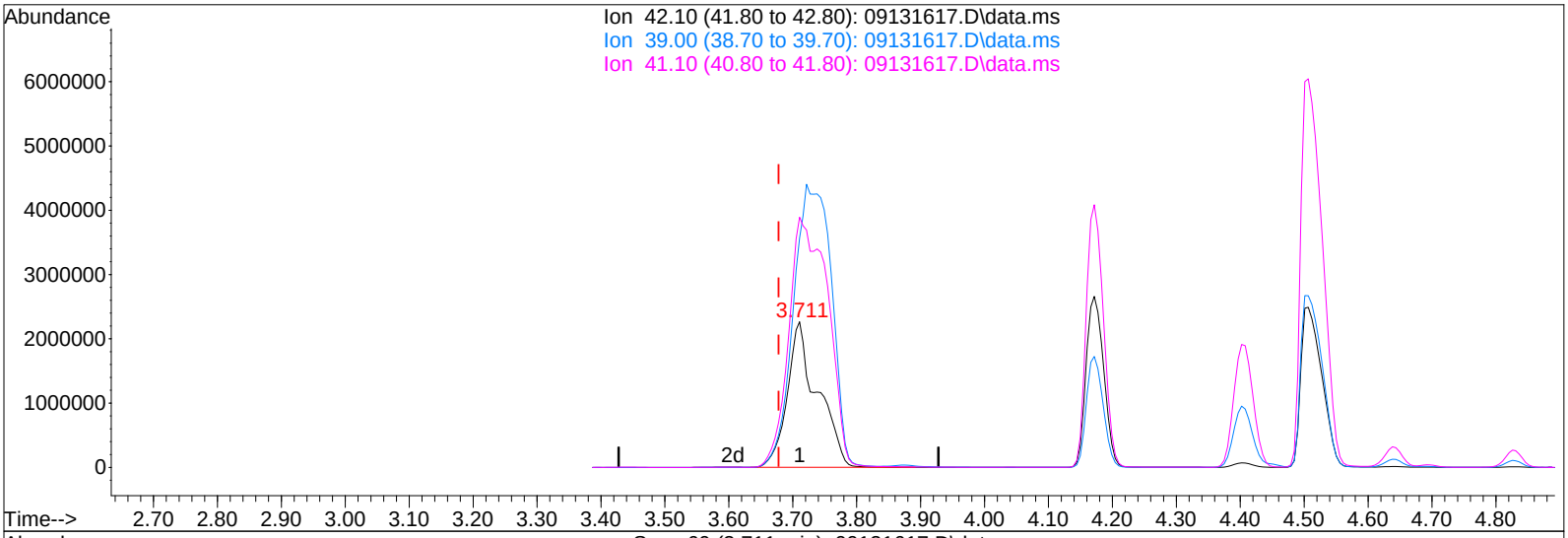
response 341488

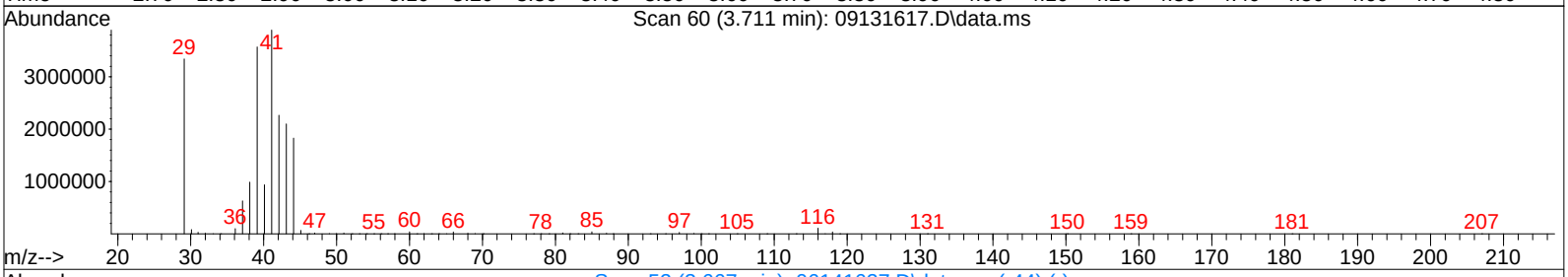
Ion	Exp%	Act%
129.90	100	100
131.90	96.30	96.58
0.00	0.00	0.00
0.00	0.00	0.00

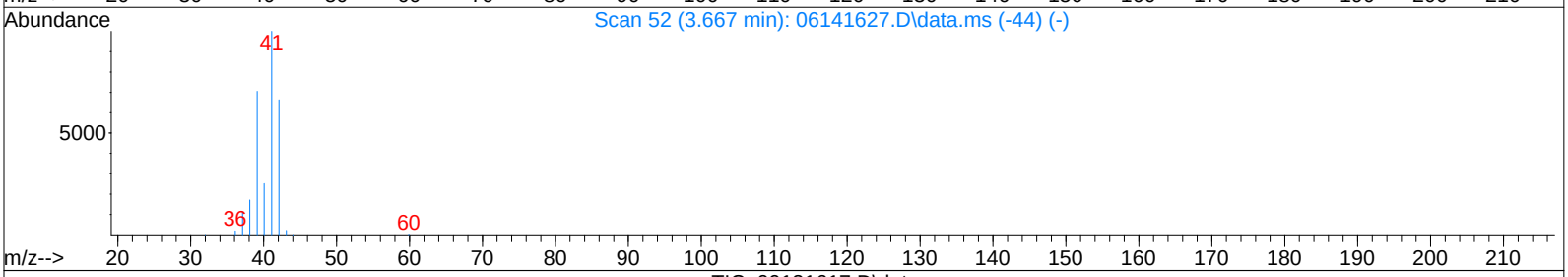
Quantitation Report (Qedit)

Data File: I:\MS09\Data\2016_09\13\09131617.D
Acq On : 13 Sep 2016 18:39 Operator: SC
Sample : P1604352-002 (220mL)
Misc : S29-07211602
ALS Vial : 6 Sample Multiplier: 1

Quant Time: Sep 14 09:00:00 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M







TIC: 09131617.D\data.ms

(2) Propene (T)

3.711min (+0.033) 304.05ng

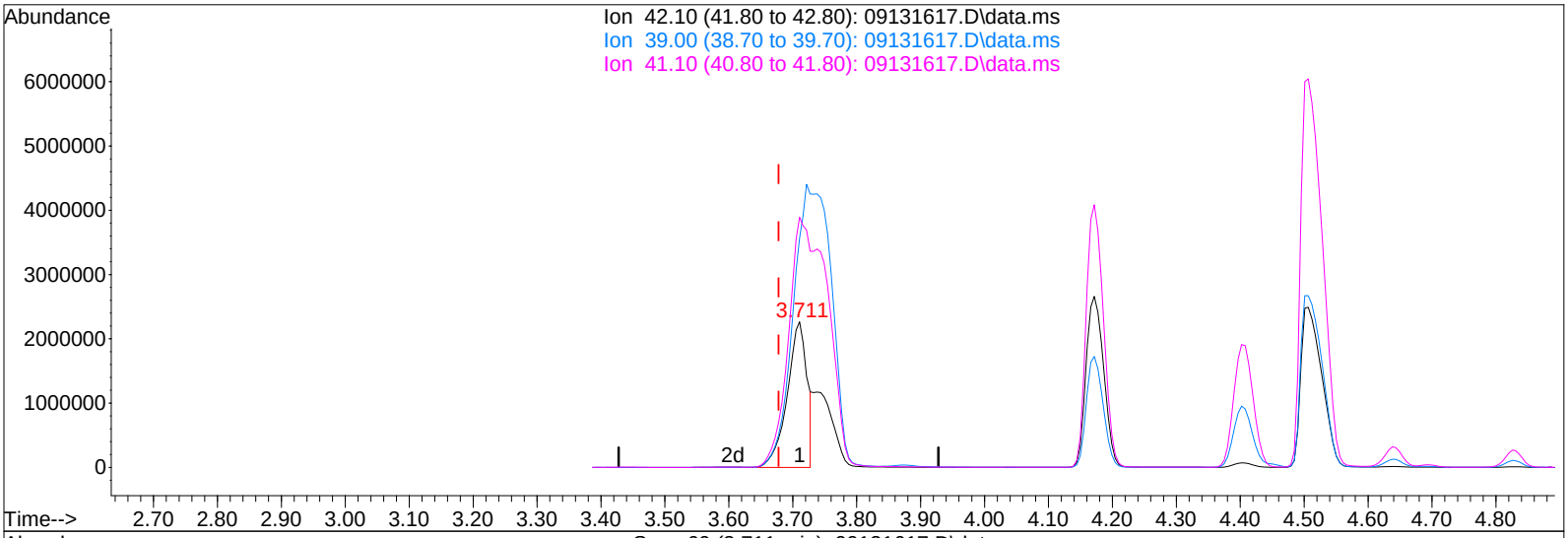
response 7442825

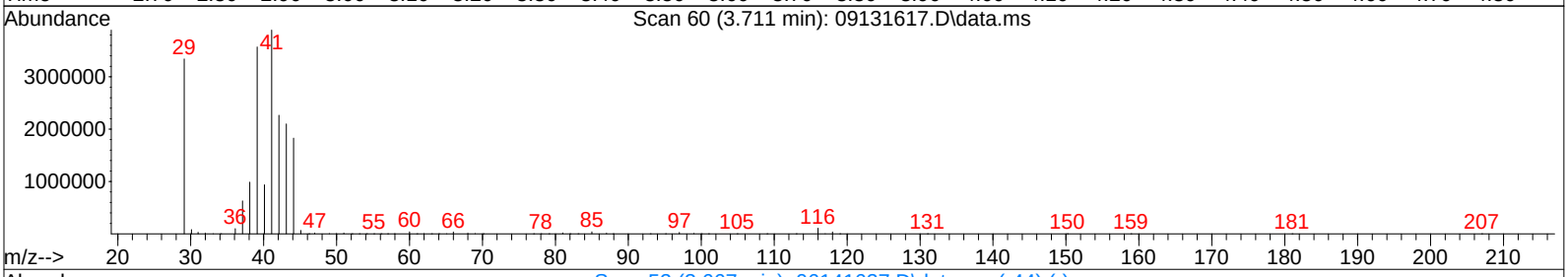
Ion	Exp%	Act%
42.10	100	100
39.00	106.20	244.39#
41.10	150.10	222.62#
0.00	0.00	0.00

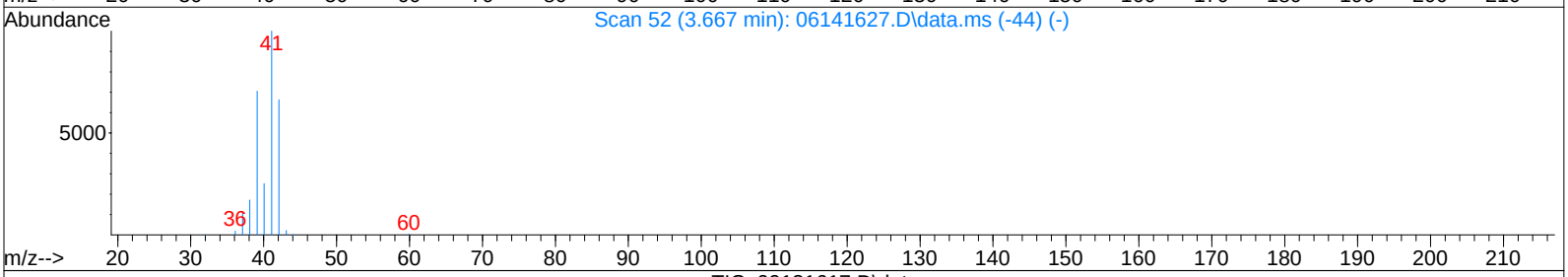
Quantitation Report (Qedit)

Data File: I:\MS09\Data\2016_09\13\09131617.D
Acq On : 13 Sep 2016 18:39 Operator: SC
Sample : P1604352-002 (220mL)
Misc : S29-07211602
ALS Vial : 6 Sample Multiplier: 1

Quant Time: Sep 14 09:00:00 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M







TIC: 09131617.D\data.ms

(2) Propene (T)

3.711min (+0.033) 198.26ng m

response 4853040

Ion	Exp%	Act%
42.10	100	100
39.00	106.20	374.81#
41.10	150.10	341.42#
0.00	0.00	0.00

IPC

9/14/16

9/26/16

Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2016_09\13\09131618.D
Acq On : 13 Sep 2016 19:13 Operator: SC
Sample : P1604352-003 (170mL)
Misc : S29-07211602
ALS Vial : 7 Sample Multiplier: 1

9/14/16

Quant Time: Sep 14 13:47:08 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M

Internal Standards	R.T.	QIon	Response	Conc	Units		Dev(Min)
1) Bromochloromethane (IS1)	8.89	130	194812	12.500	ng		-0.05
37) 1,4-Difluorobenzene (IS2)	10.87	114	912470	12.500	ng		-0.03
56) Chlorobenzene-d5 (IS3)	15.22	82	365268	12.500	ng		0.00
System Monitoring Compounds							
33) 1,2-Dichloroethane-d4(...	9.68	65	263350	11.896	ng		-0.03
Spiked Amount 12.500	Range 70 - 130		Recovery = 95.20%				
57) Toluene-d8 (SS2)	13.31	98	966614	12.705	ng		-0.01
Spiked Amount 12.500	Range 70 - 130		Recovery = 101.68%				
73) Bromofluorobenzene (SS3)	16.83	174	291578	12.604	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 100.80%				
Target Compounds							Qvalue
2) Propene	3.70	42	2027784	81.685	ng	#	37
3) Dichlorodifluoromethan...	0.00	85	0	N.D.	d		
4) Chloromethane	0.00	50	0	N.D.	d		
5) 1,2-Dichloro-1,1,2,2-t...	4.16	135	1821	N.D.			
6) Vinyl Chloride	4.28	62	57297m	1.568	ng		
7) 1,3-Butadiene	0.00	54	0	N.D.	d		
8) Bromomethane	4.75	94	479	N.D.			
9) Chloroethane	0.00	64	0	N.D.			
10) Ethanol	5.15	45	49486	2.782	ng		100
11) Acetonitrile	0.00	41	0	N.D.	d		
12) Acrolein	0.00	56	0	N.D.	d		
13) Acetone	0.00	58	0	N.D.	d		
14) Trichlorofluoromethane	0.00	101	0	N.D.	d		
15) 2-Propanol (Isopropanol)	0.00	45	0	N.D.	d		
16) Acrylonitrile	0.00	53	0	N.D.	d		
17) 1,1-Dichloroethene	6.49	96	19514	0.868	ng		94
18) 2-Methyl-2-Propanol (t...	0.00	59	0	N.D.	d		
19) Methylene Chloride	6.55	84	1292	N.D.			
20) 3-Chloro-1-propene (Al...	0.00	41	0	N.D.	d		
21) Trichlorotrifluoroethane	6.95	151	494854	24.285	ng		99
22) Carbon Disulfide	6.91	76	57608	0.658	ng	#	40
23) trans-1,2-Dichloroethene	7.65	61	19270	0.641	ng		97
24) 1,1-Dichloroethane	7.86	63	14525	0.335	ng		99
25) Methyl tert-Butyl Ether	0.00	73	0	N.D.	d		
26) Vinyl Acetate	0.00	86	0	N.D.	d		
27) 2-Butanone (MEK)	8.28	72	40221	2.538	ng		99
28) cis-1,2-Dichloroethene	8.73	61	386185	12.508	ng		100
29) Diisopropyl Ether	0.00	87	0	N.D.	d		
30) Ethyl Acetate	0.00	61	0	N.D.	d		
31) n-Hexane	8.99	57	1346478	33.801	ng		99
32) Chloroform	9.03	83	563	N.D.			
34) Tetrahydrofuran (THF)	9.48	72	1413	N.D.			
35) Ethyl tert-Butyl Ether	0.00	87	0	N.D.			
36) 1,2-Dichloroethane	9.81	62	2265	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	0.00	56	0	N.D.	d		
41) Benzene	10.51	78	390765	3.960	ng		98
42) Carbon Tetrachloride	0.00	117	0	N.D.			
43) Cyclohexane	10.80	84	273853	7.430	ng		99
44) tert-Amyl Methyl Ether	0.00	73	0	N.D.			
45) 1,2-Dichloropropane	11.23	63	1422	N.D.			
46) Bromodichloromethane	0.00	83	0	N.D.	d		
47) Trichloroethene	11.57	130	73661	2.573	ng		97
48) 1,4-Dioxane	0.00	88	0	N.D.			
49) 2,2,4-Trimethylpentane...	0.00	57	0	N.D.	d		

Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2016_09\13\09131618.D
Acq On : 13 Sep 2016 19:13 Operator: SC
Sample : P1604352-003 (170mL)
Misc : S29-07211602
ALS Vial : 7 Sample Multiplier: 1

Quant Time: Sep 14 13:47:08 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M

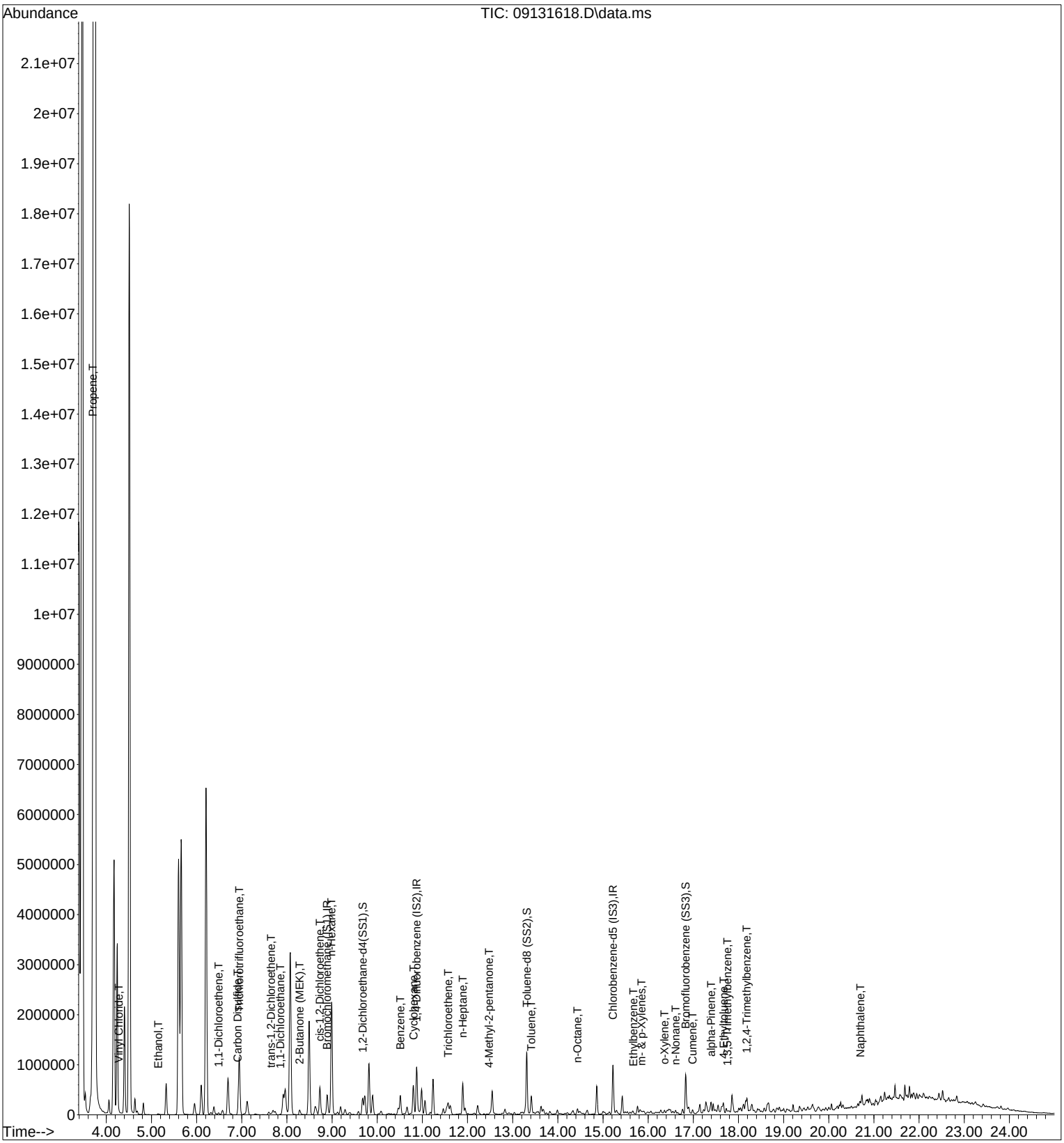
Internal Standards	R.T.	QIon	Response	Conc Units	Dev(Min)
50) Methyl Methacrylate	11.72	100	701	N.D.	
51) n-Heptane	11.90	71	150899	6.349 ng	99
52) cis-1,3-Dichloropropene	0.00	75	0	N.D.	
53) 4-Methyl-2-pentanone	12.48	58	5233	0.232 ng	78
54) trans-1,3-Dichloropropene	0.00	75	0	N.D.	
55) 1,1,2-Trichloroethane	13.04	97	1976	N.D.	
58) Toluene	13.41	91	320222	3.007 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	14.32	43	1265	N.D.	
63) n-Octane	14.43	57	20261	0.958 ng	95
64) Tetrachloroethene	0.00	166	0	N.D.	
65) Chlorobenzene	0.00	112	0	N.D. d	
66) Ethylbenzene	15.67	91	15500	0.139 ng	95
67) m- & p-Xylenes	15.85	91	38918	0.430 ng	98
68) Bromoform	0.00	173	0	N.D.	
69) Styrene	16.25	104	3253	N.D.	
70) o-Xylene	16.36	91	29261	0.312 ng	98
71) n-Nonane	16.61	43	29625	0.607 ng	94
72) 1,1,2,2-Tetrachloroethane	0.00	83	0	N.D. d	
74) Cumene	16.99	105	22614	0.189 ng	96
75) alpha-Pinene	17.39	93	74179	1.283 ng	98
76) n-Propylbenzene	0.00	91	0	N.D. d	
77) 3-Ethyltoluene	0.00	105	0	N.D. d	
78) 4-Ethyltoluene	17.67	105	15283	0.142 ng	90
79) 1,3,5-Trimethylbenzene	17.75	105	16733	0.172 ng	97
80) alpha-Methylstyrene	17.92	118	1169	N.D.	
81) 2-Ethyltoluene	0.00	105	0	N.D. d	
82) 1,2,4-Trimethylbenzene	18.18	105	48454	0.508 ng	88
83) n-Decane	0.00	57	0	N.D. d	
84) Benzyl Chloride	18.34	91	2376	N.D.	
85) 1,3-Dichlorobenzene	18.42	146	500	N.D.	
86) 1,4-Dichlorobenzene	18.42	146	500	N.D.	
87) sec-Butylbenzene	18.47	105	10729	N.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	0.00	146	0	N.D.	
91) d-Limonene	0.00	68	0	N.D. d	
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	20.59	180	1029	N.D.	
95) Naphthalene	20.70	128	22495	0.163 ng	56
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. d	
99) tert-Butylbenzene	18.18	119	8274	N.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:\MS09\Data\2016_09\13\09131618.D
Acq On : 13 Sep 2016 19:13 Operator: SC
Sample : P1604352-003 (170mL)
Misc : S29-07211602
ALS Vial : 7 Sample Multiplier: 1

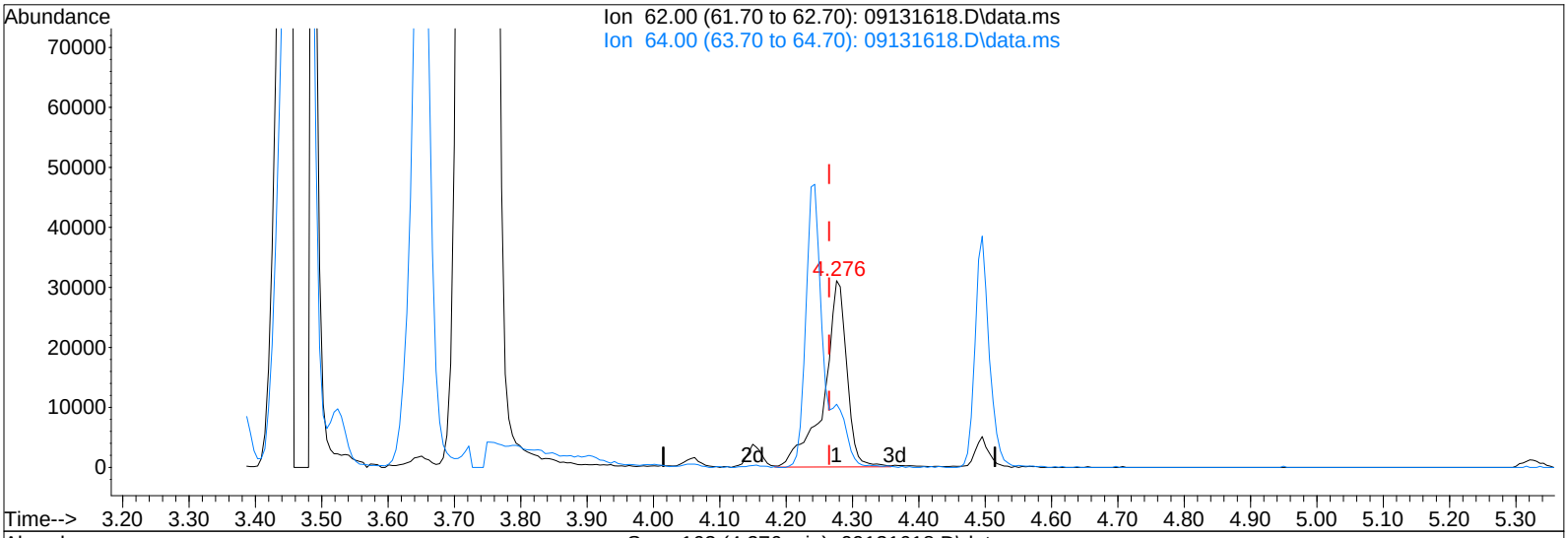
Quant Time: Sep 14 13:47:08 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M

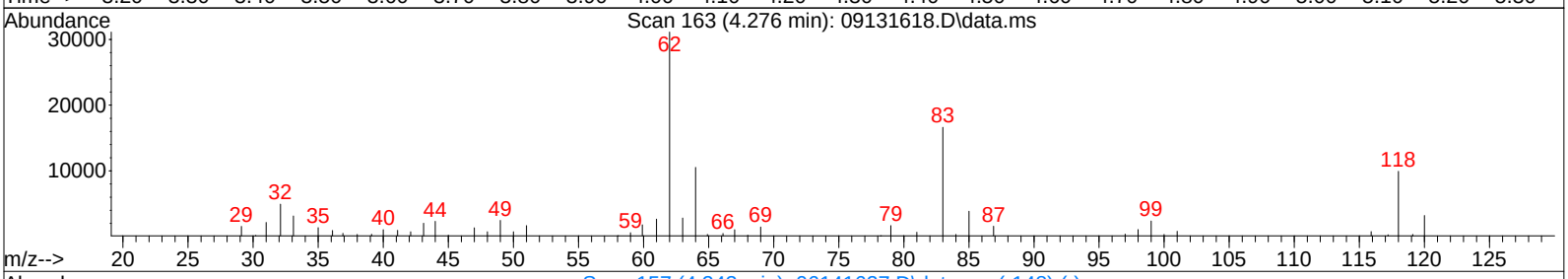


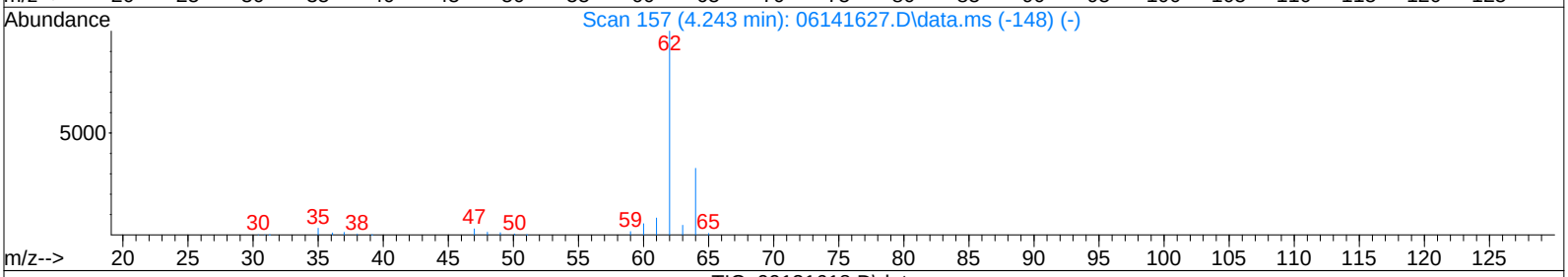
Quantitation Report (Qedit)

Data File: I:\MS09\Data\2016_09\13\09131618.D
Acq On : 13 Sep 2016 19:13 Operator: SC
Sample : P1604352-003 (170mL)
Misc : S29-07211602
ALS Vial : 7 Sample Multiplier: 1

Quant Time: Sep 14 09:00:23 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M







TIC: 09131618.D\data.ms

(6) Vinyl Chloride (T)

4.276min (+0.011) 2.03ng

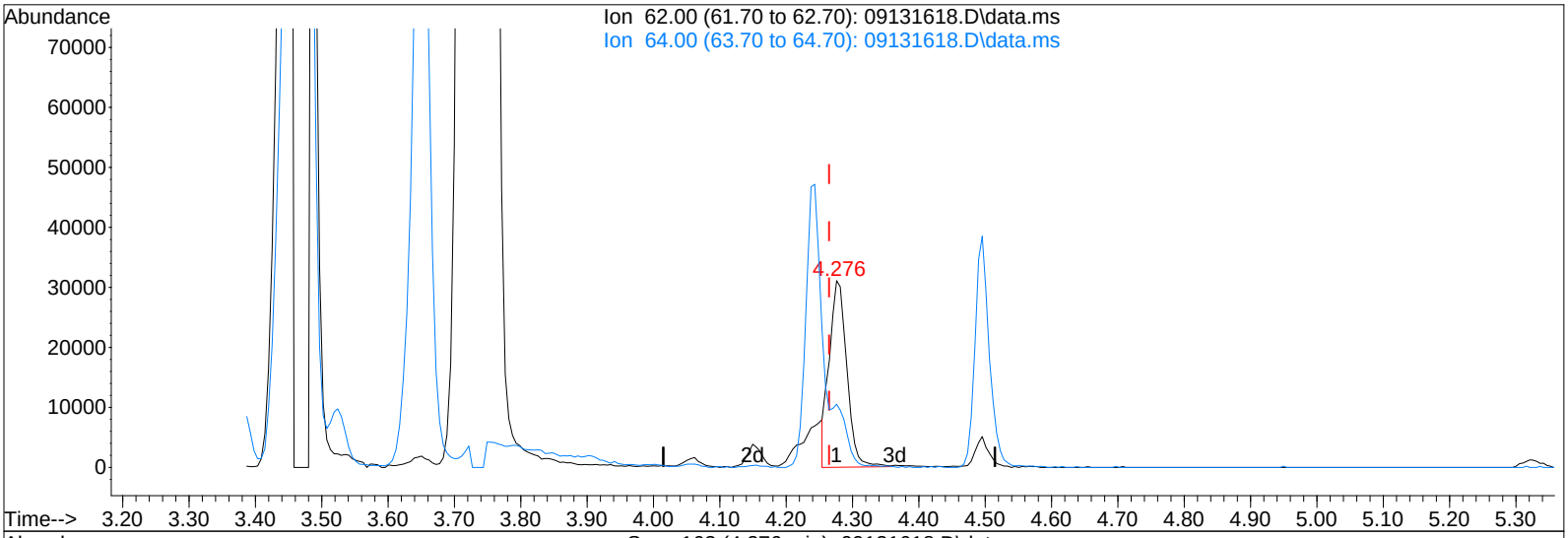
response 74315

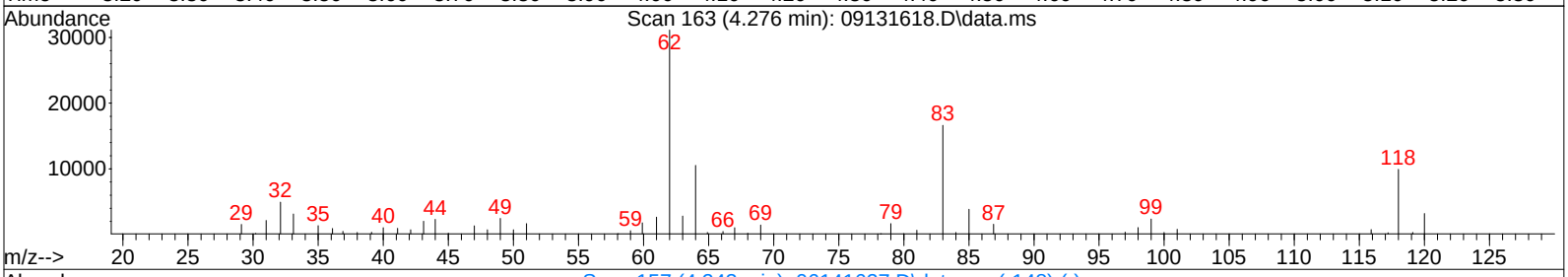
Ion	Exp%	Act%
62.00	100	100
64.00	32.30	126.79#
0.00	0.00	0.00
0.00	0.00	0.00

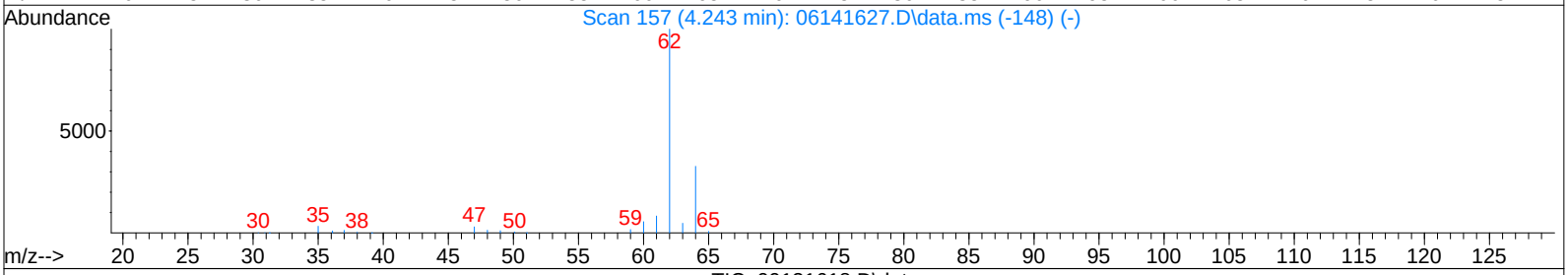
Quantitation Report (Qedit)

Data File: I:\MS09\Data\2016_09\13\09131618.D
Acq On : 13 Sep 2016 19:13 Operator: SC
Sample : P1604352-003 (170mL)
Misc : S29-07211602
ALS Vial : 7 Sample Multiplier: 1

Quant Time: Sep 14 09:00:23 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M







TIC: 09131618.D\data.ms

(6) Vinyl Chloride (T)

4.276min (+0.011) 1.57ng m

response 57297

Ion	Exp%	Act%
62.00	100	100
64.00	32.30	164.44#
0.00	0.00	0.00
0.00	0.00	0.00

IPC

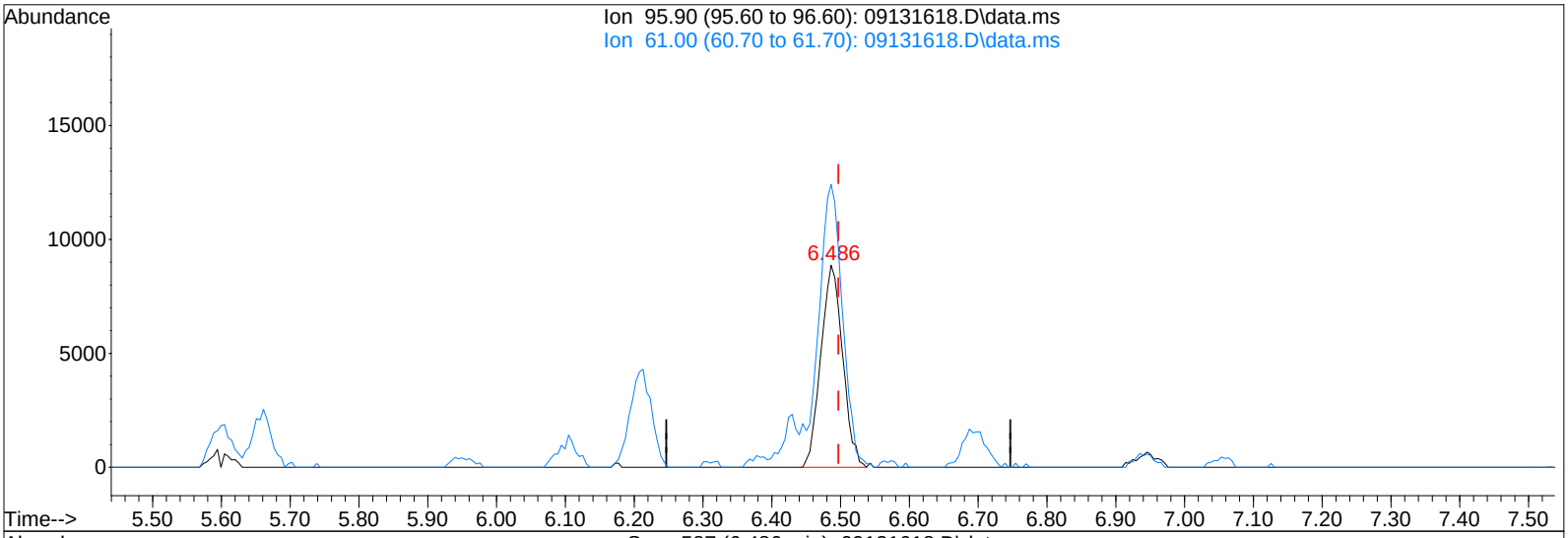
9/14/16

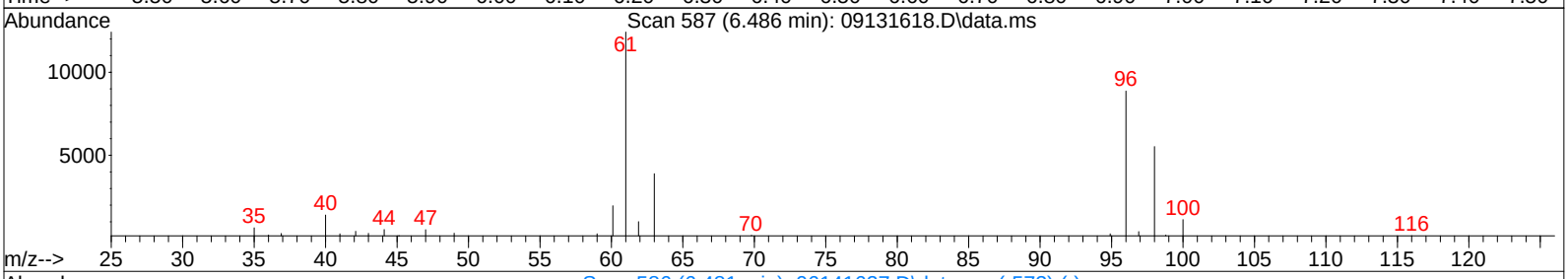
9/26/16

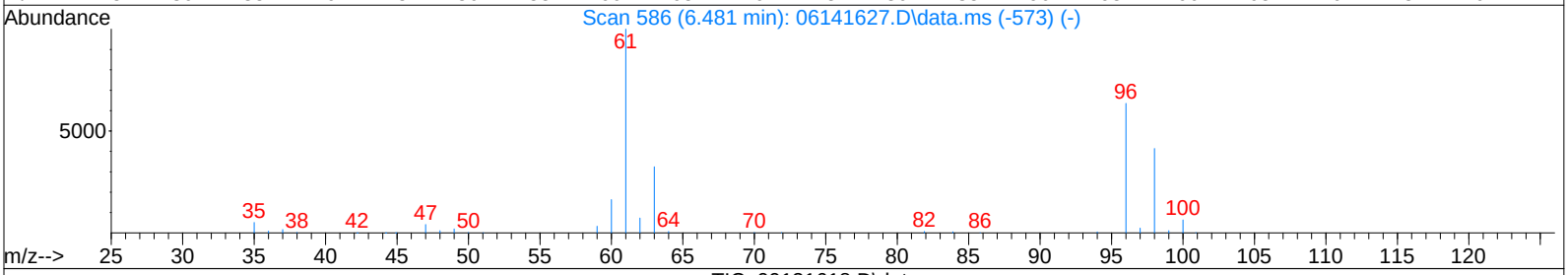
Quantitation Report (Qedit)

Data File: I:\MS09\Data\2016_09\13\09131618.D
Acq On : 13 Sep 2016 19:13 Operator: SC
Sample : P1604352-003 (170mL)
Misc : S29-07211602
ALS Vial : 7 Sample Multiplier: 1

Quant Time: Sep 14 09:00:23 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M







TIC: 09131618.D\data.ms

(17) 1,1-Dichloroethene (T)

6.486min (-0.011) 0.87ng

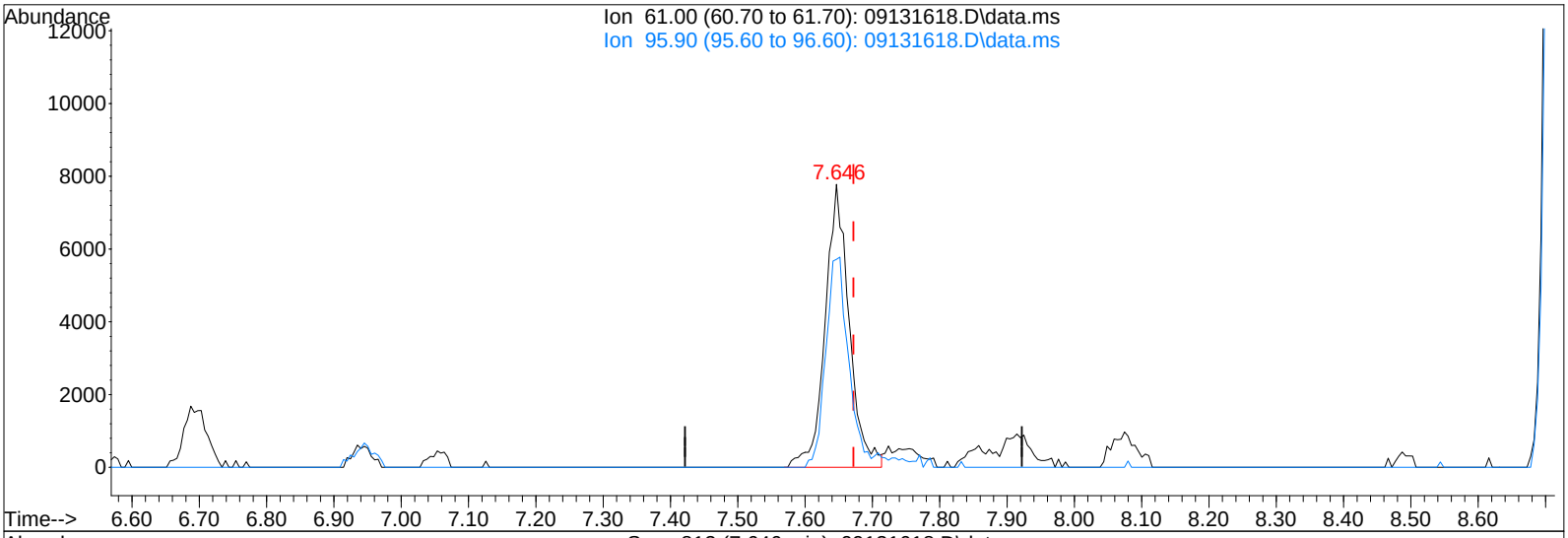
response 19514

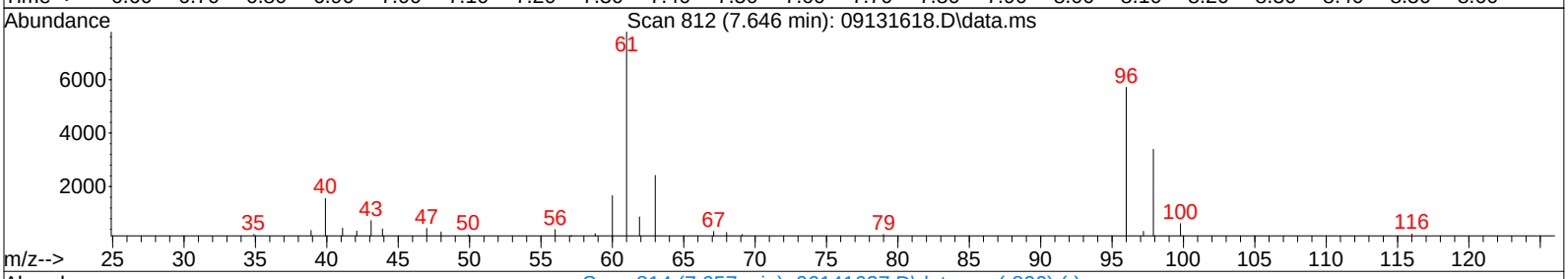
Ion	Exp%	Act%
95.90	100	100
61.00	155.80	147.93
0.00	0.00	0.00
0.00	0.00	0.00

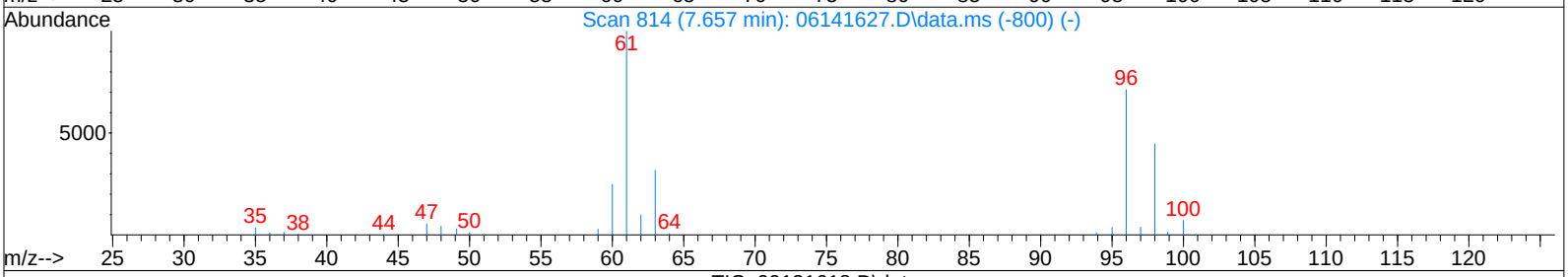
Quantitation Report (Qedit)

Data File: I:\MS09\Data\2016_09\13\09131618.D
Acq On : 13 Sep 2016 19:13 Operator: SC
Sample : P1604352-003 (170mL)
Misc : S29-07211602
ALS Vial : 7 Sample Multiplier: 1

Quant Time: Sep 14 09:00:23 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M







TIC: 09131618.D\data.ms

(23) trans-1,2-Dichloroethene (T)

7.646min (-0.026) 0.64ng

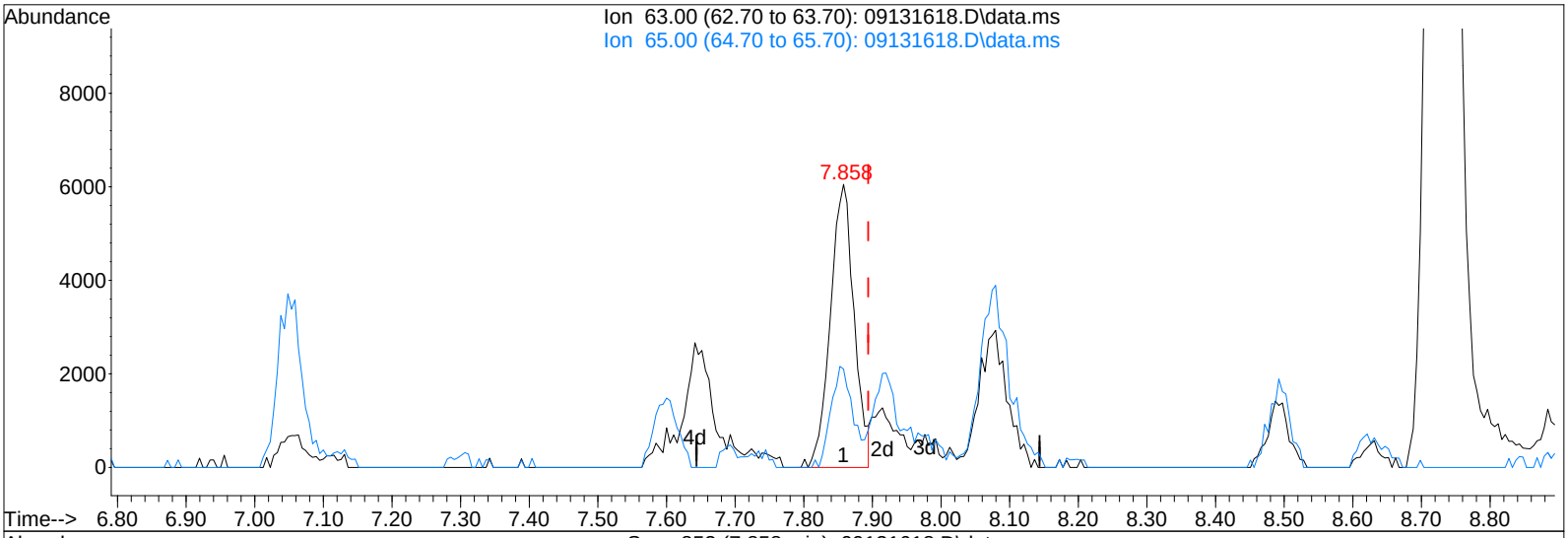
response 19270

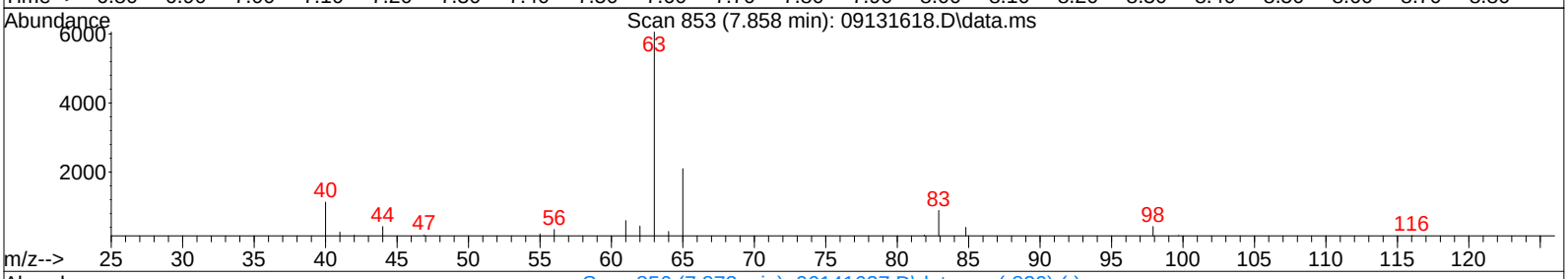
Ion	Exp%	Act%
61.00	100	100
95.90	72.50	70.32
0.00	0.00	0.00
0.00	0.00	0.00

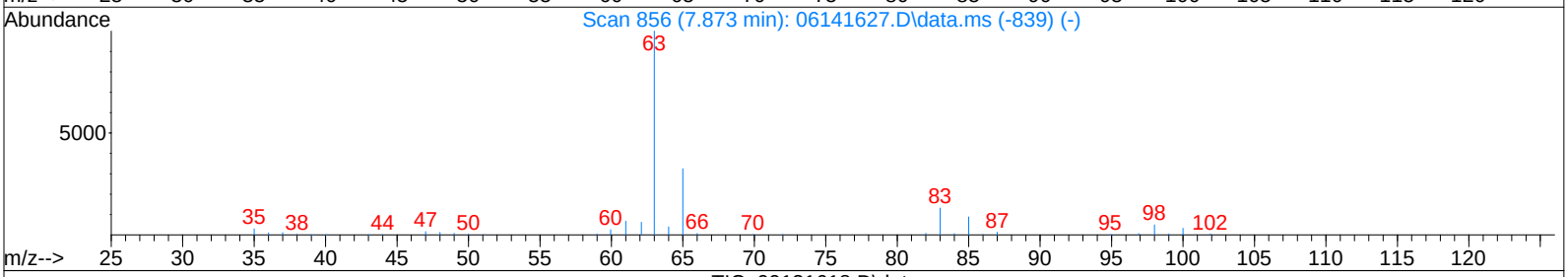
Quantitation Report (Qedit)

Data File: I:\MS09\Data\2016_09\13\09131618.D
Acq On : 13 Sep 2016 19:13 Operator: SC
Sample : P1604352-003 (170mL)
Misc : S29-07211602
ALS Vial : 7 Sample Multiplier: 1

Quant Time: Sep 14 09:00:23 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M







TIC: 09131618.D\data.ms

(24) 1,1-Dichloroethane (T)

7.858min (-0.036) 0.33ng

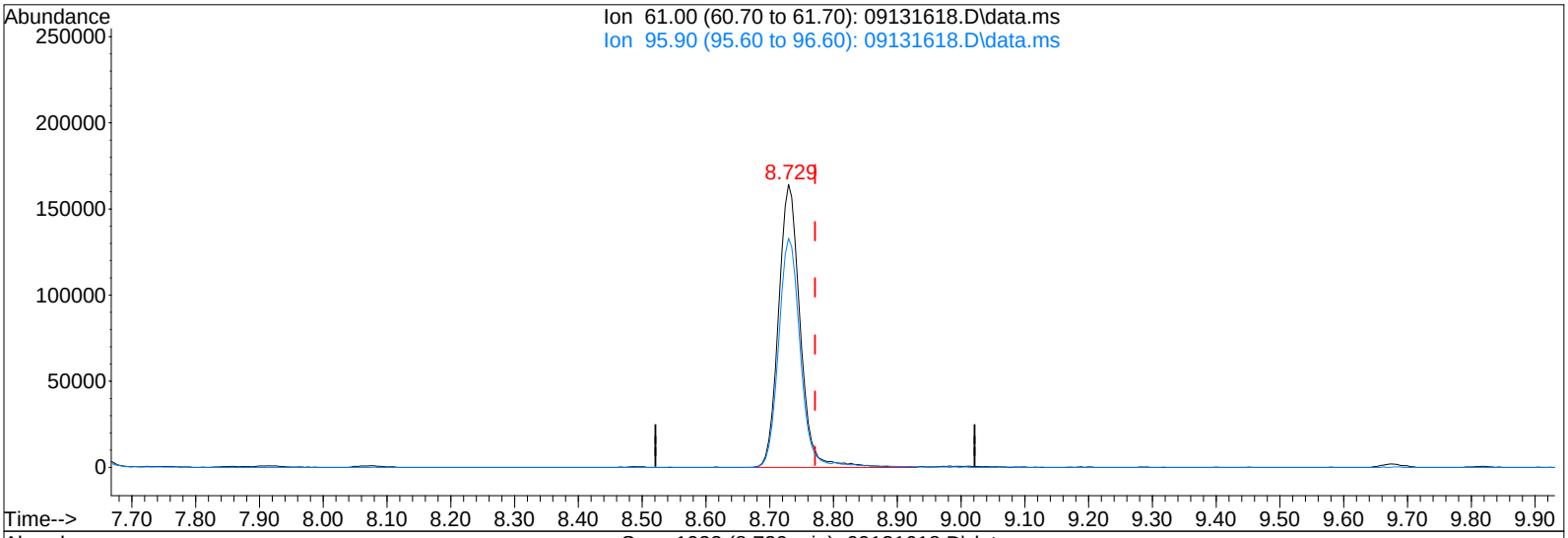
response 14525

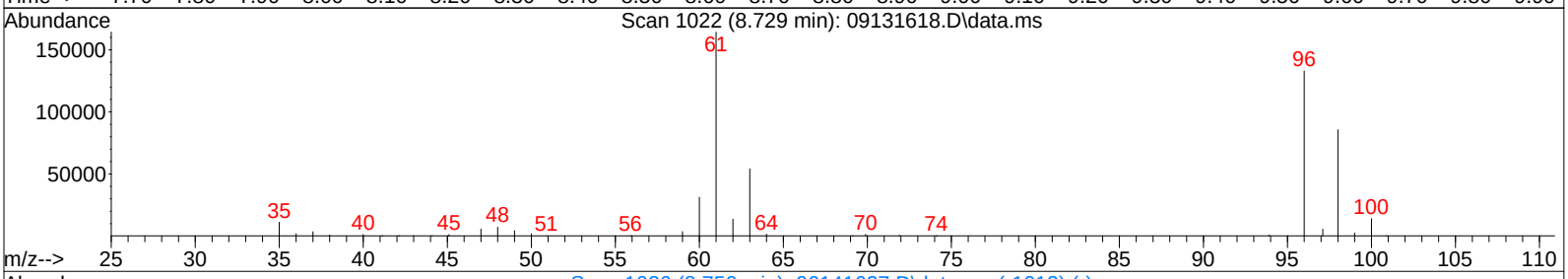
Ion	Exp%	Act%
63.00	100	100
65.00	32.10	32.39
0.00	0.00	0.00
0.00	0.00	0.00

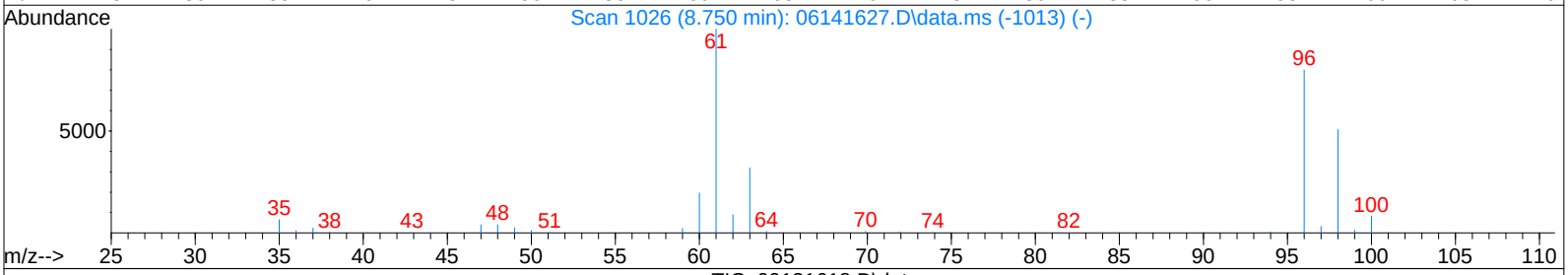
Quantitation Report (Qedit)

Data File: I:\MS09\Data\2016_09\13\09131618.D
Acq On : 13 Sep 2016 19:13 Operator: SC
Sample : P1604352-003 (170mL)
Misc : S29-07211602
ALS Vial : 7 Sample Multiplier: 1

Quant Time: Sep 14 09:00:23 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M







TIC: 09131618.D\data.ms

(28) cis-1,2-Dichloroethene (T)

8.729min (-0.042) 12.51ng

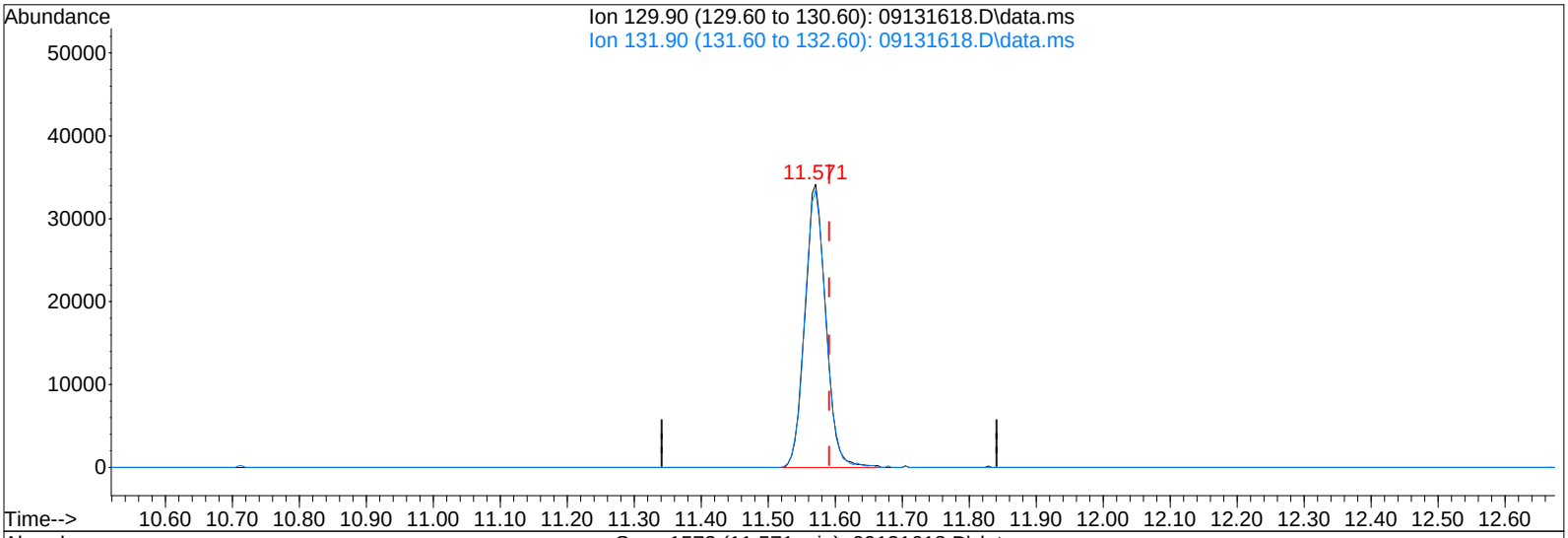
response 386185

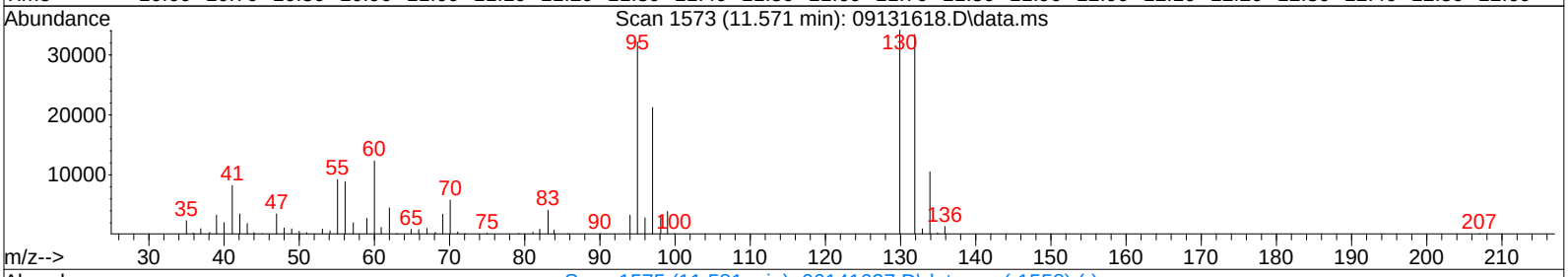
Ion	Exp%	Act%
61.00	100	100
95.90	80.00	79.68
0.00	0.00	0.00
0.00	0.00	0.00

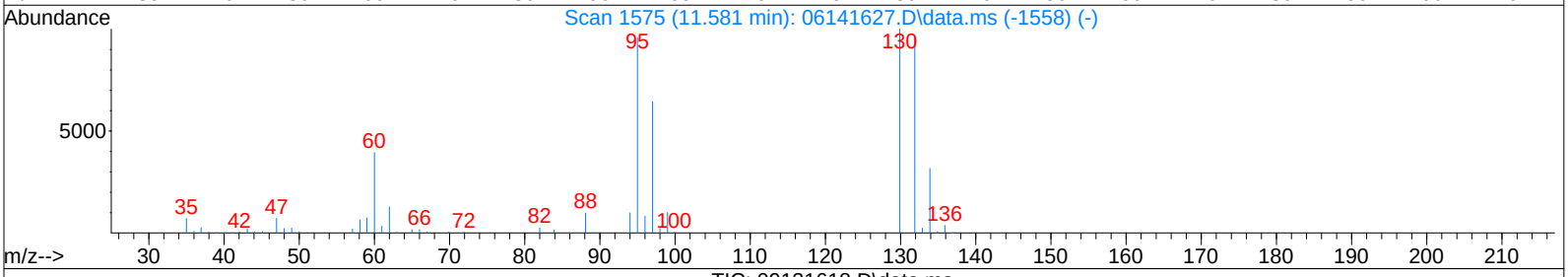
Quantitation Report (Qedit)

Data File: I:\MS09\Data\2016_09\13\09131618.D
Acq On : 13 Sep 2016 19:13 Operator: SC
Sample : P1604352-003 (170mL)
Misc : S29-07211602
ALS Vial : 7 Sample Multiplier: 1

Quant Time: Sep 14 09:00:23 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M







TIC: 09131618.D\data.ms

(47) Trichloroethene (T)

11.571min (-0.020) 2.57ng

response 73661

Ion	Exp%	Act%
129.90	100	100
131.90	96.30	98.96
0.00	0.00	0.00
0.00	0.00	0.00

Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2016_09\13\09131619.D
Acq On : 13 Sep 2016 19:46 Operator: SC
Sample : P1604352-004 (150mL)
Misc : S29-07211602
ALS Vial : 8 Sample Multiplier: 1

9/14/16

Quant Time: Sep 14 13:51:38 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M

Internal Standards	R.T.	QIon	Response	Conc	Units		Dev(Min)
1) Bromochloromethane (IS1)	8.89	130	195608	12.500	ng		-0.04
37) 1,4-Difluorobenzene (IS2)	10.87	114	922294	12.500	ng		-0.03
56) Chlorobenzene-d5 (IS3)	15.22	82	384058	12.500	ng		0.00
System Monitoring Compounds							
33) 1,2-Dichloroethane-d4(...	9.68	65	264715	11.909	ng		-0.03
Spiked Amount 12.500	Range 70 - 130		Recovery = 95.28%				
57) Toluene-d8 (SS2)	13.31	98	977434	12.219	ng		-0.01
Spiked Amount 12.500	Range 70 - 130		Recovery = 97.76%				
73) Bromofluorobenzene (SS3)	16.83	174	296357	12.184	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 97.44%				
Target Compounds							Qvalue
2) Propene	3.70	42	2863163	114.867	ng	#	1
3) Dichlorodifluoromethan...	3.81	85	1268	N.D.			
4) Chloromethane	3.99	50	2415	N.D.			
5) 1,2-Dichloro-1,1,2,2-t...	0.00	135	0	N.D.			
6) Vinyl Chloride	4.26	62	593978	16.189	ng		99
7) 1,3-Butadiene	0.00	54	0	N.D.	d		
8) Bromomethane	0.00	94	0	N.D.			
9) Chloroethane	0.00	64	0	N.D.			
10) Ethanol	5.16	45	12441	0.697	ng		89
11) Acetonitrile	0.00	41	0	N.D.	d		
12) Acrolein	0.00	56	0	N.D.	d		
13) Acetone	0.00	58	0	N.D.	d		
14) Trichlorofluoromethane	0.00	101	0	N.D.	d		
15) 2-Propanol (Isopropanol)	0.00	45	0	N.D.	d		
16) Acrylonitrile	0.00	53	0	N.D.	d		
17) 1,1-Dichloroethene	0.00	96	0	N.D.			
18) 2-Methyl-2-Propanol (t...	0.00	59	0	N.D.	d		
19) Methylene Chloride	6.56	84	1667	N.D.			
20) 3-Chloro-1-propene (Al...	0.00	41	0	N.D.	d		
21) Trichlorotrifluoroethane	6.95	151	56560	2.764	ng		99
22) Carbon Disulfide	6.92	76	28921	0.329	ng		89
23) trans-1,2-Dichloroethene	7.65	61	17762	0.589	ng		96
24) 1,1-Dichloroethane	7.86	63	15761	0.362	ng		98
25) Methyl tert-Butyl Ether	7.97	73	419	N.D.			
26) Vinyl Acetate	0.00	86	0	N.D.	d		
27) 2-Butanone (MEK)	8.29	72	19153	1.203	ng	#	81
28) cis-1,2-Dichloroethene	8.73	61	78449	2.530	ng		99
29) Diisopropyl Ether	0.00	87	0	N.D.	d		
30) Ethyl Acetate	0.00	61	0	N.D.	d		
31) n-Hexane	8.99	57	2770671	69.271	ng		99
32) Chloroform	9.04	83	746	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	9.82	62	2473	N.D.			
38) 1,1,1-Trichloroethane	0.00	97	0	N.D.			
39) Isopropyl Acetate	10.50	61	693	N.D.			
40) 1-Butanol	0.00	56	0	N.D.	d		
41) Benzene	10.51	78	198484	1.990	ng		93
42) Carbon Tetrachloride	0.00	117	0	N.D.			
43) Cyclohexane	10.80	84	381186	10.232	ng		95
44) tert-Amyl Methyl Ether	11.24	73	782	N.D.			
45) 1,2-Dichloropropane	0.00	63	0	N.D.	d		
46) Bromodichloromethane	0.00	83	0	N.D.	d		
47) Trichloroethene	11.56	130	803	N.D.			
48) 1,4-Dioxane	0.00	88	0	N.D.			
49) 2,2,4-Trimethylpentane...	0.00	57	0	N.D.	d		

Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2016_09\13\09131619.D
Acq On : 13 Sep 2016 19:46 Operator: SC
Sample : P1604352-004 (150mL)
Misc : S29-07211602
ALS Vial : 8 Sample Multiplier: 1

Quant Time: Sep 14 13:51:38 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M

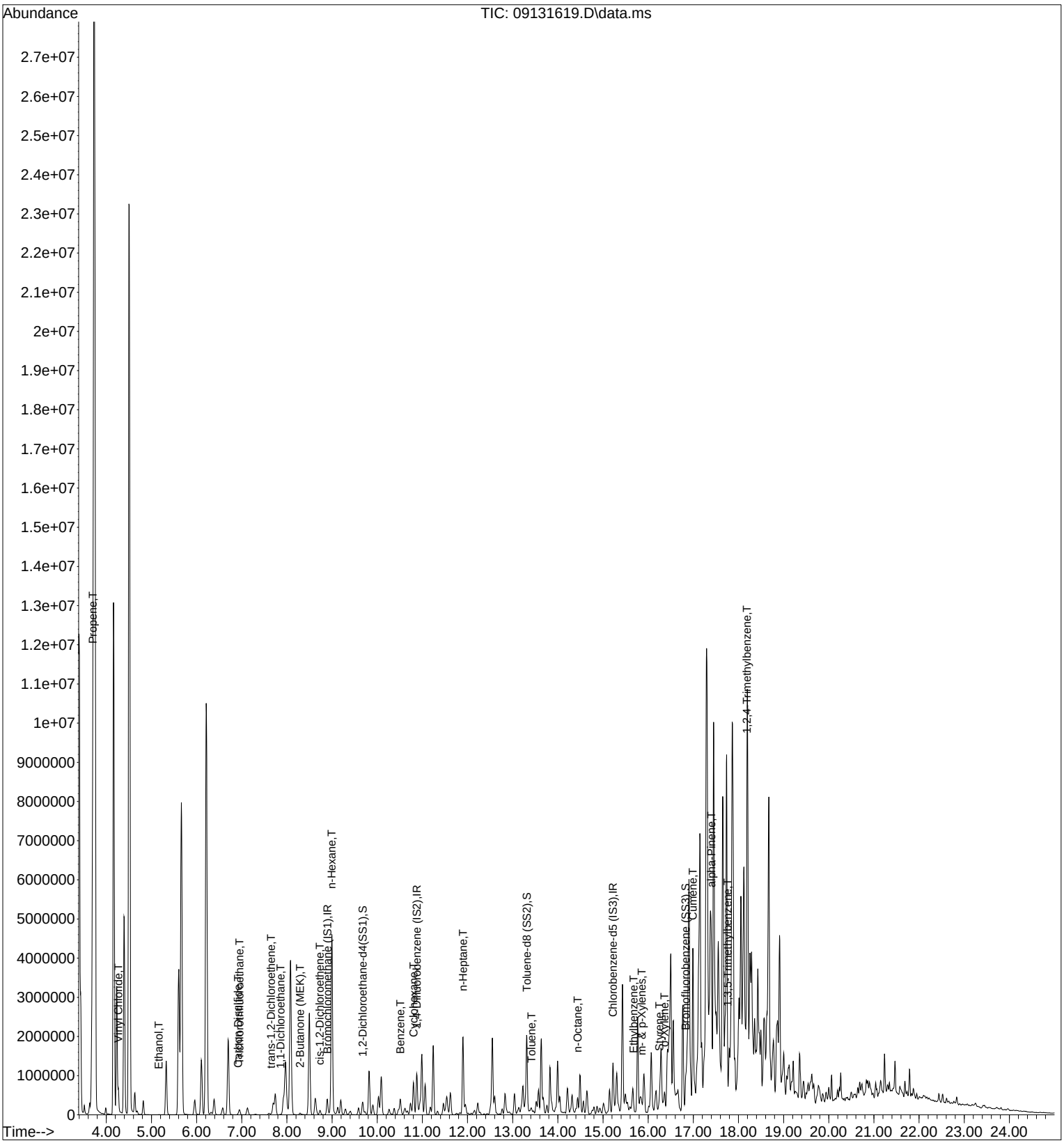
Internal Standards	R.T.	QIon	Response	Conc Units		Dev(Min)
50) Methyl Methacrylate	0.00	100	0	N.D. d		
51) n-Heptane	11.90	71	544534	22.668 ng		100
52) cis-1,3-Dichloropropene	0.00	75	0	N.D.		
53) 4-Methyl-2-pentanone	0.00	58	0	N.D. d		
54) trans-1,3-Dichloropropene	0.00	75	0	N.D.		
55) 1,1,2-Trichloroethane	0.00	97	0	N.D. d		
58) Toluene	13.42	91	48408	0.432 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	14.44	57	72364	3.255 ng		99
64) Tetrachloroethene	0.00	166	0	N.D.		
65) Chlorobenzene	0.00	112	0	N.D. d		
66) Ethylbenzene	15.68	91	43059	0.366 ng		96
67) m- & p-Xylenes	15.86	91	75758	0.797 ng		96
68) Bromoform	0.00	173	0	N.D.		
69) Styrene	16.25	104	78929	1.128 ng		96
70) o-Xylene	16.36	91	35283	0.358 ng		94
71) n-Nonane	0.00	43	0	N.D. d		
72) 1,1,2,2-Tetrachloroethane	0.00	83	0	N.D. d		
74) Cumene	16.99	105	21925	0.174 ng		99
75) alpha-Pinene	17.40	93	72847	1.198 ng	#	58
76) n-Propylbenzene	0.00	91	0	N.D. d		
77) 3-Ethyltoluene	0.00	105	0	N.D. d		
78) 4-Ethyltoluene	0.00	105	0	N.D. d		
79) 1,3,5-Trimethylbenzene	17.76	105	43218	0.423 ng		99
80) alpha-Methylstyrene	17.92	118	717	N.D.		
81) 2-Ethyltoluene	0.00	105	0	N.D. d		
82) 1,2,4-Trimethylbenzene	18.19	105	58211	0.580 ng		84
83) n-Decane	0.00	57	0	N.D. d		
84) Benzyl Chloride	0.00	91	0	N.D. d		
85) 1,3-Dichlorobenzene	18.41	146	723	N.D.		
86) 1,4-Dichlorobenzene	18.41	146	723	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	0.00	146	0	N.D.		
91) d-Limonene	0.00	68	0	N.D. d		
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	20.61	180	1861	N.D.		
95) Naphthalene	20.72	128	3983	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. 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:\MS09\Data\2016_09\13\09131619.D
Acq On : 13 Sep 2016 19:46 Operator: SC
Sample : P1604352-004 (150mL)
Misc : S29-07211602
ALS Vial : 8 Sample Multiplier: 1

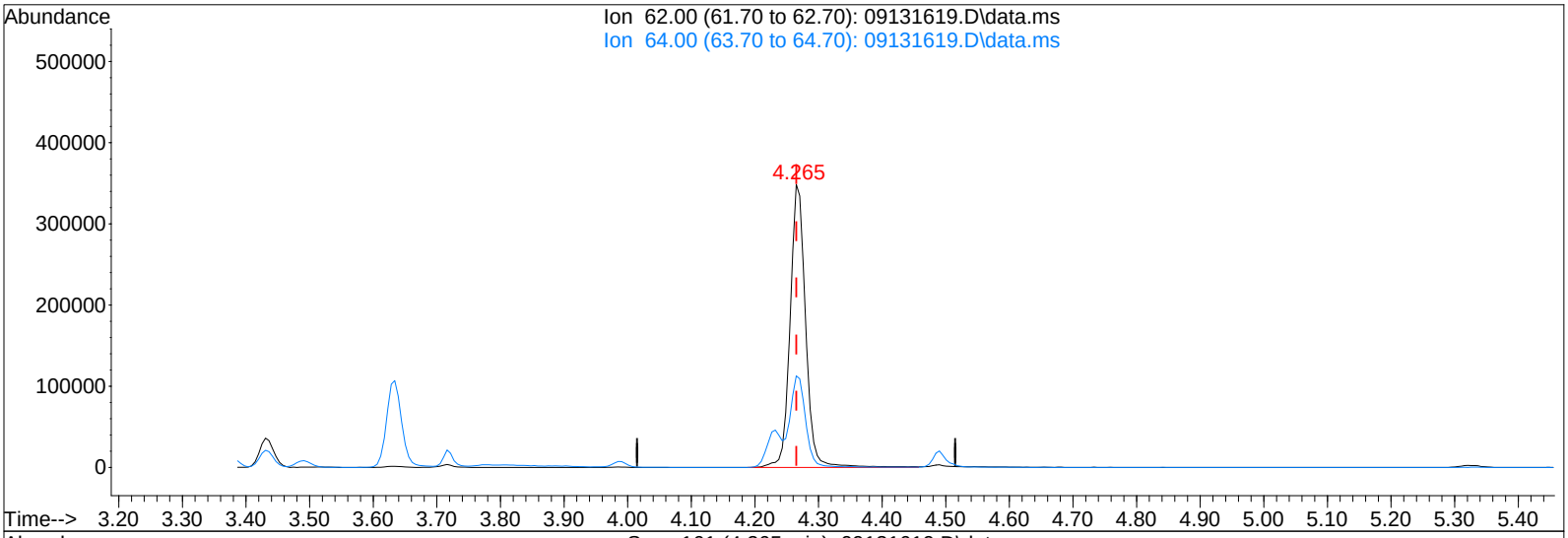
Quant Time: Sep 14 13:51:38 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M

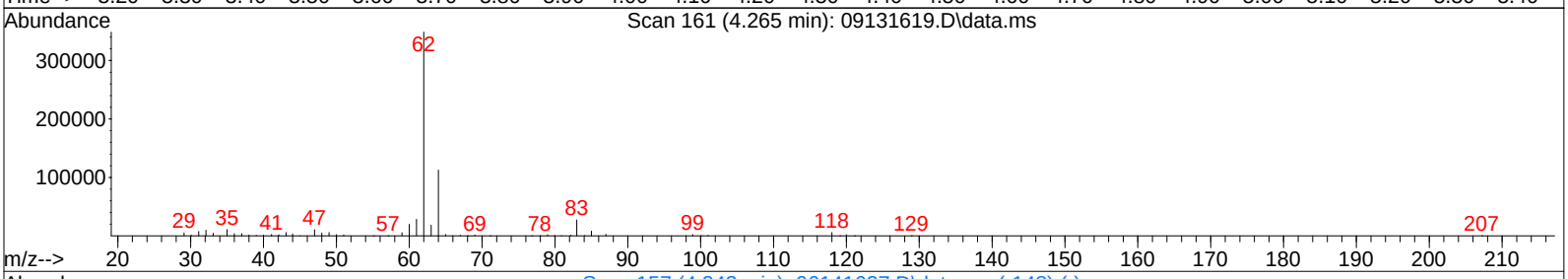


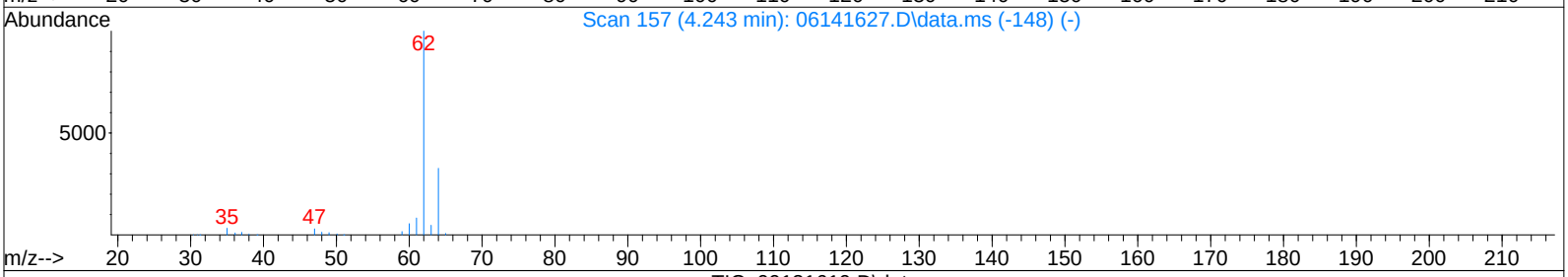
Quantitation Report (Qedit)

Data File: I:\MS09\Data\2016_09\13\09131619.D
Acq On : 13 Sep 2016 19:46 Operator: SC
Sample : P1604352-004 (150mL)
Misc : S29-07211602
ALS Vial : 8 Sample Multiplier: 1

Quant Time: Sep 14 09:00:39 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M







TIC: 09131619.D\data.ms

(6) Vinyl Chloride (T)

4.265min (-0.000) 16.19ng

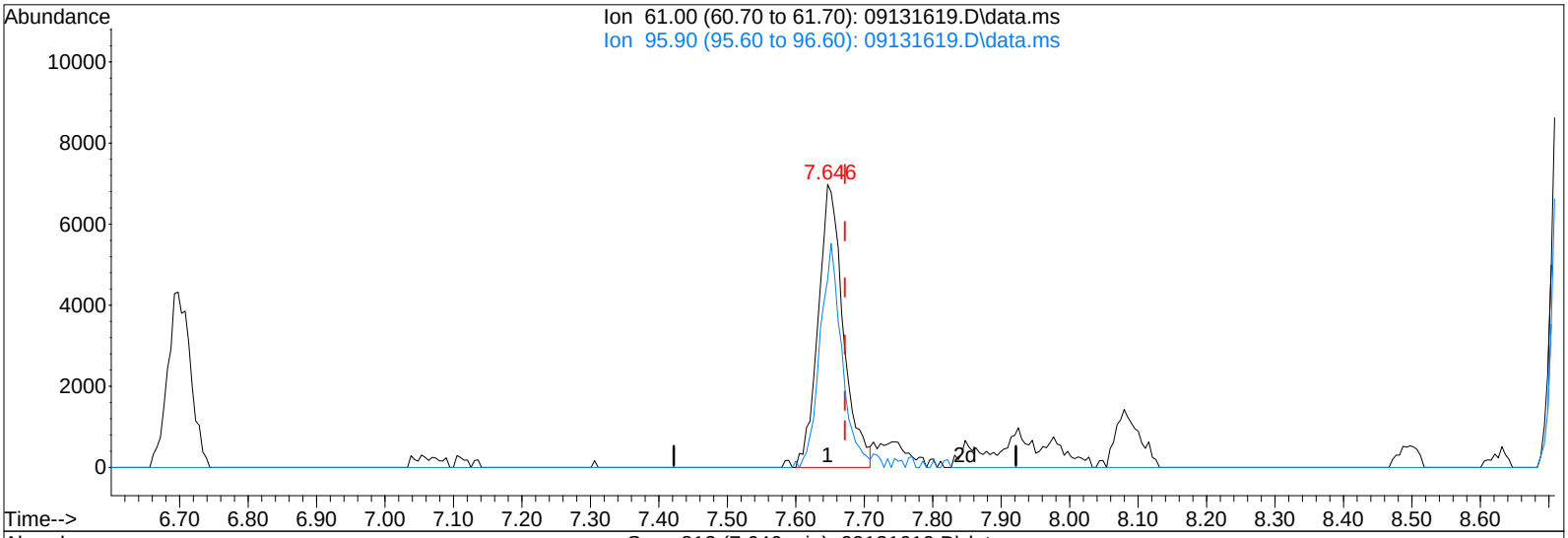
response 593978

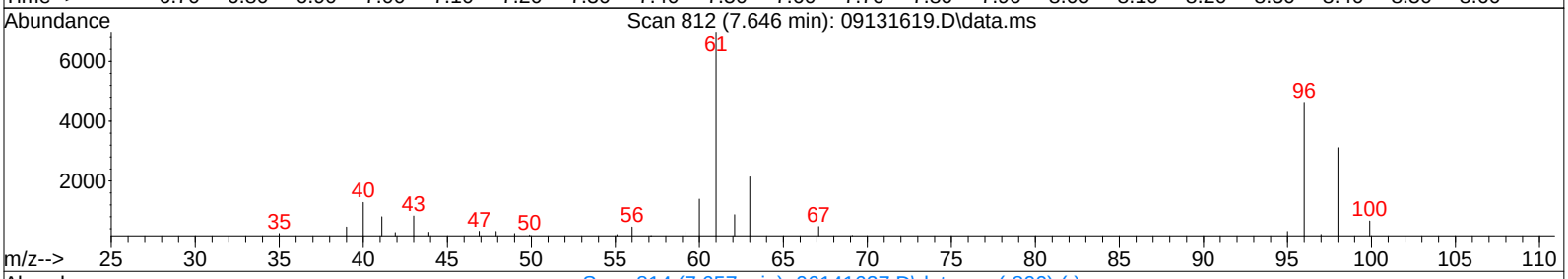
Ion	Exp%	Act%
62.00	100	100
64.00	32.30	31.91
0.00	0.00	0.00
0.00	0.00	0.00

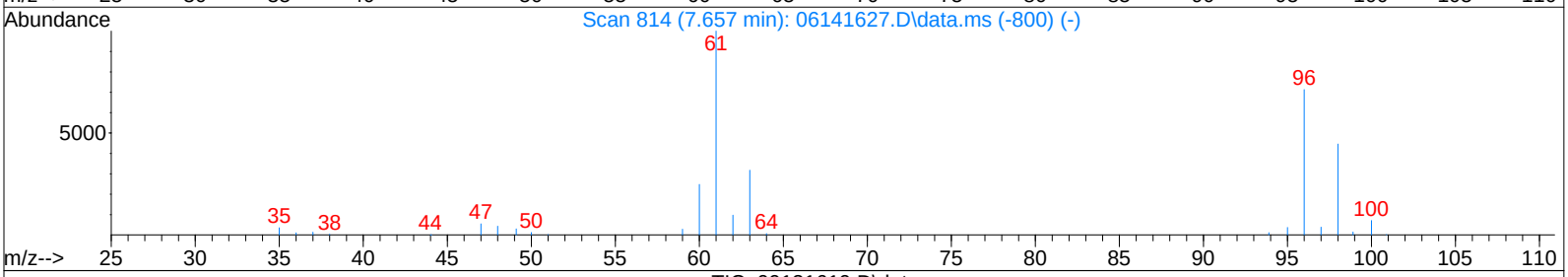
Quantitation Report (Qedit)

Data File: I:\MS09\Data\2016_09\13\09131619.D
Acq On : 13 Sep 2016 19:46 Operator: SC
Sample : P1604352-004 (150mL)
Misc : S29-07211602
ALS Vial : 8 Sample Multiplier: 1

Quant Time: Sep 14 09:00:39 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M







TIC: 09131619.D\data.ms

(23) trans-1,2-Dichloroethene (T)

7.646min (-0.026) 0.59ng

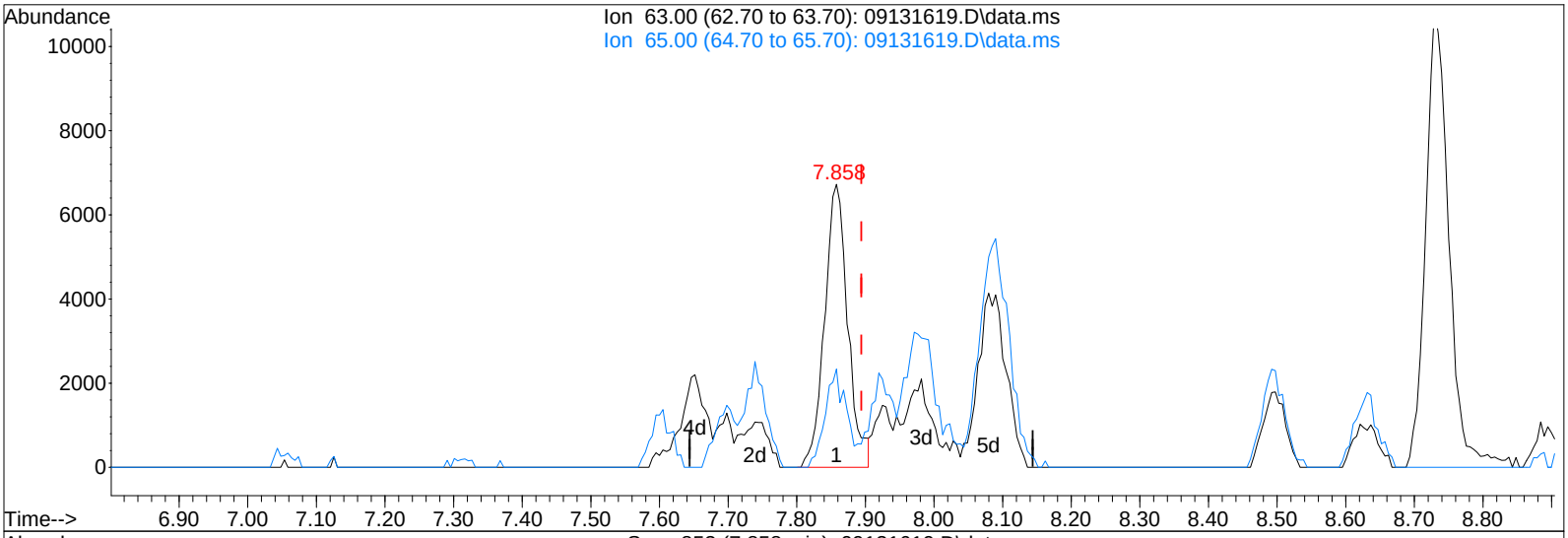
response 17762

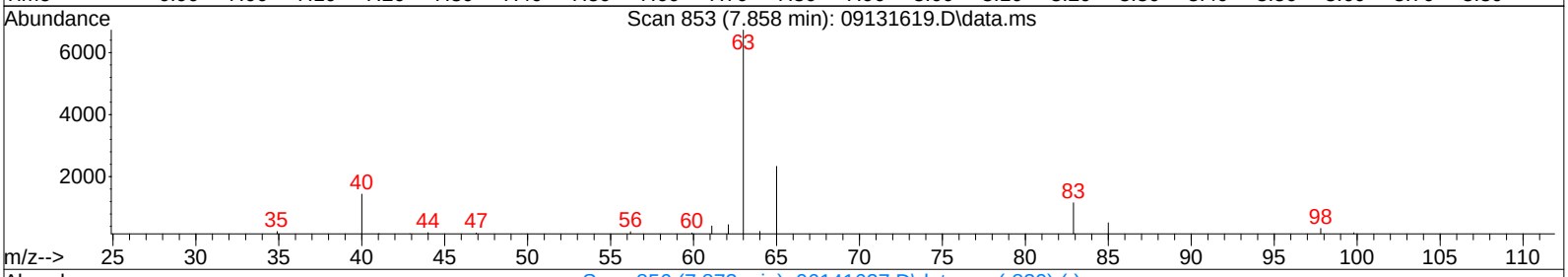
Ion	Exp%	Act%
61.00	100	100
95.90	72.50	69.18
0.00	0.00	0.00
0.00	0.00	0.00

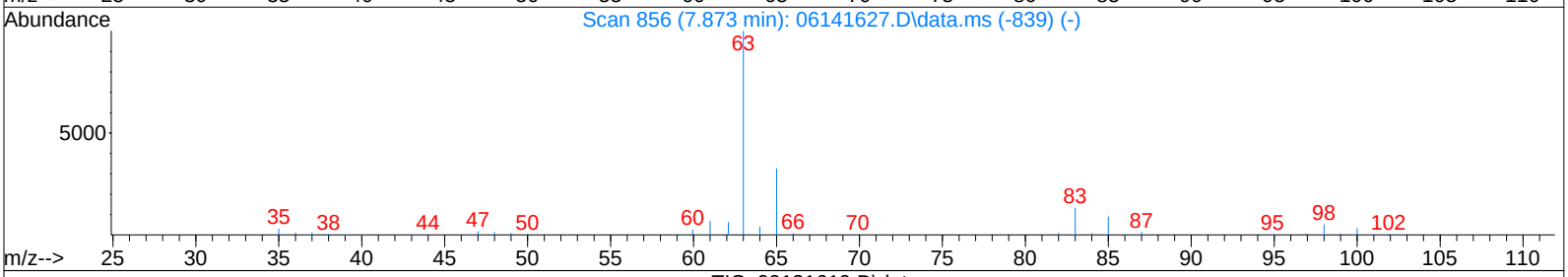
Quantitation Report (Qedit)

Data File: I:\MS09\Data\2016_09\13\09131619.D
Acq On : 13 Sep 2016 19:46 Operator: SC
Sample : P1604352-004 (150mL)
Misc : S29-07211602
ALS Vial : 8 Sample Multiplier: 1

Quant Time: Sep 14 09:00:39 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M







TIC: 09131619.D\data.ms

(24) 1,1-Dichloroethane (T)

7.858min (-0.036) 0.36ng

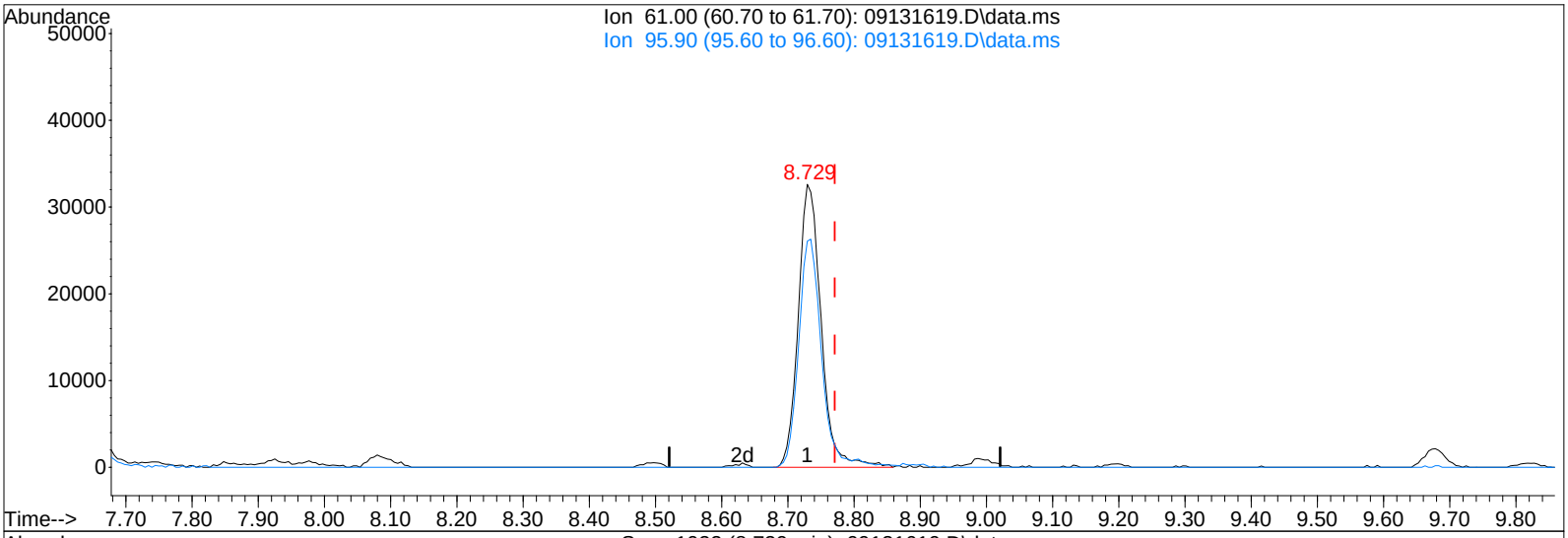
response 15761

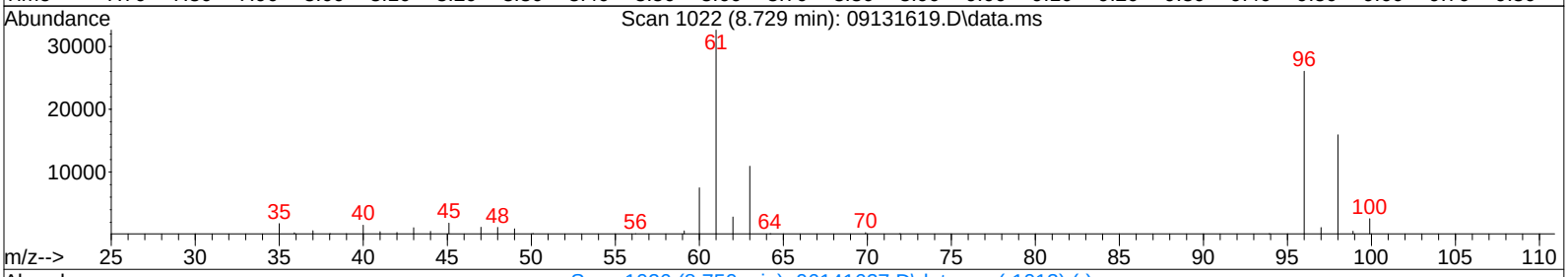
Ion	Exp%	Act%
63.00	100	100
65.00	32.10	33.18
0.00	0.00	0.00
0.00	0.00	0.00

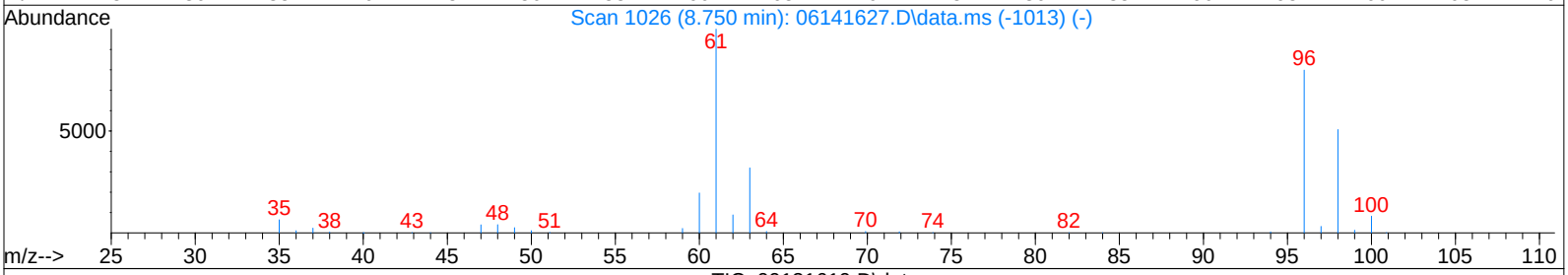
Quantitation Report (Qedit)

Data File: I:\MS09\Data\2016_09\13\09131619.D
Acq On : 13 Sep 2016 19:46 Operator: SC
Sample : P1604352-004 (150mL)
Misc : S29-07211602
ALS Vial : 8 Sample Multiplier: 1

Quant Time: Sep 14 09:00:39 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M







TIC: 09131619.D\data.ms

(28) cis-1,2-Dichloroethene (T)

8.729min (-0.042) 2.53ng

response 78449

Ion	Exp%	Act%
61.00	100	100
95.90	80.00	79.05
0.00	0.00	0.00
0.00	0.00	0.00

Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2016_09\13\09131620.D
Acq On : 13 Sep 2016 20:20 Operator: SC
Sample : P1604352-005 (1000mL)
Misc : S29-07211602
ALS Vial : 9 Sample Multiplier: 1

9/14/16

Quant Time: Sep 14 13:56:04 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M

Internal Standards	R.T.	QIon	Response	Conc	Units		Dev(Min)
1) Bromochloromethane (IS1)	8.89	130	193211	12.500	ng		-0.04
37) 1,4-Difluorobenzene (IS2)	10.87	114	905512	12.500	ng		-0.03
56) Chlorobenzene-d5 (IS3)	15.22	82	366706	12.500	ng		0.00
System Monitoring Compounds							
33) 1,2-Dichloroethane-d4(...	9.67	65	261561	11.913	ng		-0.04
Spiked Amount 12.500	Range 70 - 130		Recovery = 95.28%				
57) Toluene-d8 (SS2)	13.31	98	959179	12.558	ng		-0.01
Spiked Amount 12.500	Range 70 - 130		Recovery = 100.48%				
73) Bromofluorobenzene (SS3)	16.83	174	293062	12.618	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 100.96%				
Target Compounds							Qvalue
2) Propene	3.67	42	116978	4.751	ng	#	80
3) Dichlorodifluoromethan...	3.78	85	60691	1.131	ng		99
4) Chloromethane	0.00	50	0	N.D. d			
5) 1,2-Dichloro-1,1,2,2-t...	4.14	135	1558	N.D.			
6) Vinyl Chloride	4.25	62	1748	N.D.			
7) 1,3-Butadiene	4.42	54	3549	0.144	ng		94
8) Bromomethane	0.00	94	0	N.D.			
9) Chloroethane	0.00	64	0	N.D.			
10) Ethanol	5.16	45	34878	1.977	ng		97
11) Acetonitrile	0.00	41	0	N.D. d			
12) Acrolein	5.49	56	11333	0.806	ng		89
13) Acetone	5.62	58	159287	9.127	ng	#	75
14) Trichlorofluoromethane	5.78	101	23310	0.531	ng		97
15) 2-Propanol (Isopropanol)	5.94	45	46675	0.787	ng		77
16) Acrylonitrile	6.19	53	1674	N.D.			
17) 1,1-Dichloroethene	0.00	96	0	N.D.			
18) 2-Methyl-2-Propanol (t...	0.00	59	0	N.D. d			
19) Methylene Chloride	0.00	84	0	N.D.			
20) 3-Chloro-1-propene (Al...	6.74	41	2171	N.D.			
21) Trichlorotrifluoroethane	6.94	151	14235	0.704	ng		93
22) Carbon Disulfide	6.89	76	441909	5.092	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	7.95	73	49050	0.698	ng		99
26) Vinyl Acetate	8.01	86	11118	2.191	ng	#	1
27) 2-Butanone (MEK)	8.29	72	15713	1.000	ng	#	2
28) cis-1,2-Dichloroethene	8.73	61	4027	0.132	ng		96
29) Diisopropyl Ether	8.97	87	622	N.D.			
30) Ethyl Acetate	8.99	61	4461	0.523	ng		86
31) n-Hexane	8.98	57	73294	1.855	ng		95
32) Chloroform	9.03	83	107822	2.636	ng		100
34) Tetrahydrofuran (THF)	0.00	72	0	N.D. d			
35) Ethyl tert-Butyl Ether	0.00	87	0	N.D.			
36) 1,2-Dichloroethane	9.79	62	7876	0.274	ng		98
38) 1,1,1-Trichloroethane	0.00	97	0	N.D.			
39) Isopropyl Acetate	0.00	61	0	N.D. d			
40) 1-Butanol	0.00	56	0	N.D. d			
41) Benzene	10.51	78	279331	2.852	ng		100
42) Carbon Tetrachloride	10.66	117	545	N.D.			
43) Cyclohexane	10.79	84	40747	1.114	ng		98
44) tert-Amyl Methyl Ether	11.10	73	760	N.D.			
45) 1,2-Dichloropropane	11.23	63	786	N.D.			
46) Bromodichloromethane	0.00	83	0	N.D. d			
47) Trichloroethene	11.57	130	4312	0.152	ng		94
48) 1,4-Dioxane	11.58	88	548	N.D.			
49) 2,2,4-Trimethylpentane...	0.00	57	0	N.D. d			

Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2016_09\13\09131620.D
Acq On : 13 Sep 2016 20:20 Operator: SC
Sample : P1604352-005 (1000mL)
Misc : S29-07211602
ALS Vial : 9 Sample Multiplier: 1

Quant Time: Sep 14 13:56:04 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M

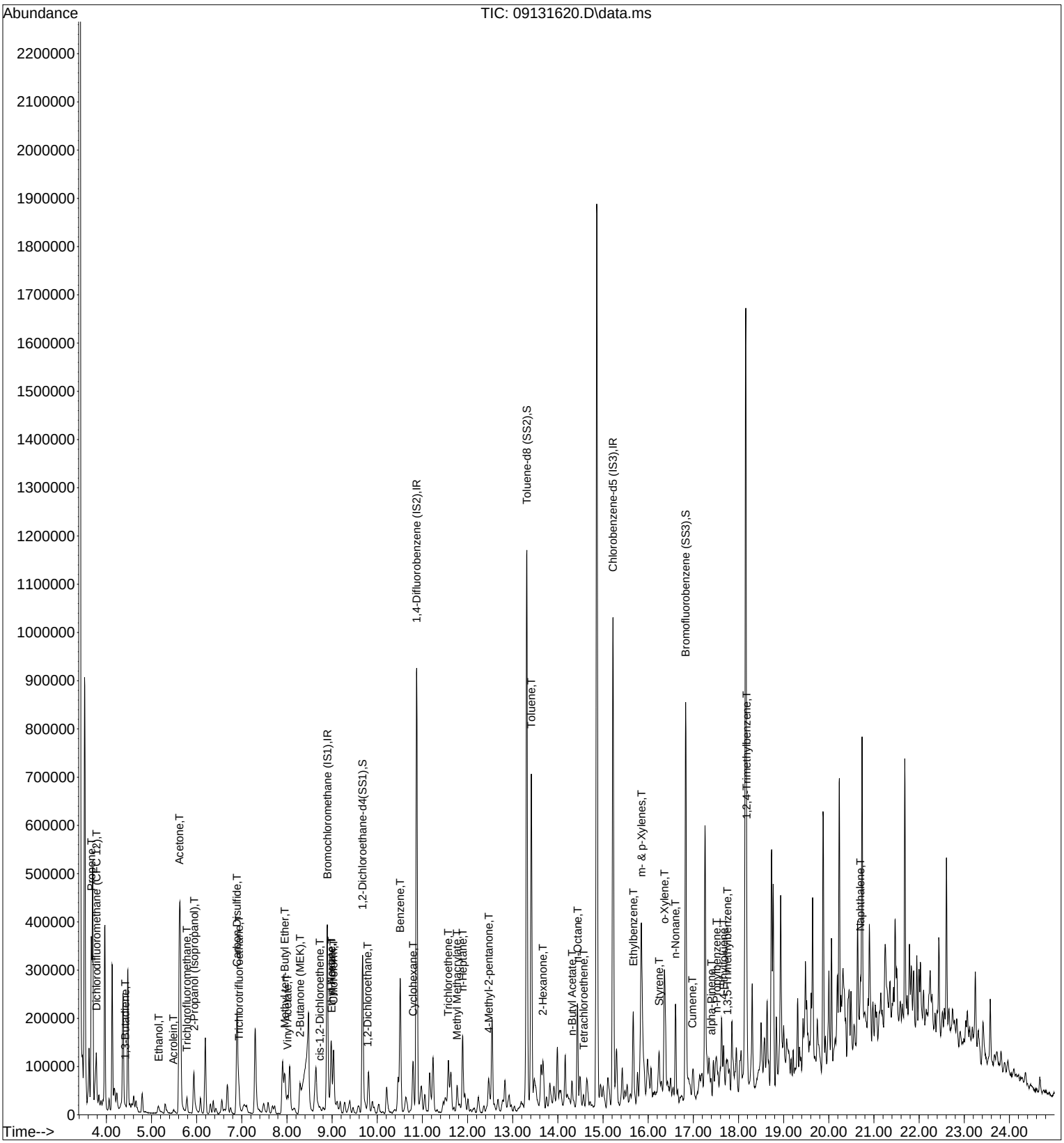
Internal Standards	R.T.	QIon	Response	Conc Units		Dev(Min)
50) Methyl Methacrylate	11.77	100	9961	1.026 ng		91
51) n-Heptane	11.90	71	40679	1.725 ng		98
52) cis-1,3-Dichloropropene	0.00	75	0	N.D.		
53) 4-Methyl-2-pentanone	12.47	58	21848	0.976 ng		99
54) trans-1,3-Dichloropropene	0.00	75	0	N.D.		
55) 1,1,2-Trichloroethane	13.03	97	408	N.D.		
58) Toluene	13.41	91	613853	5.741 ng		99
59) 2-Hexanone	13.67	43	30316	0.608 ng		82
60) Dibromochloromethane	0.00	129	0	N.D.		
61) 1,2-Dibromoethane	0.00	107	0	N.D.		
62) n-Butyl Acetate	14.31	43	32731	0.599 ng		82
63) n-Octane	14.44	57	41930	1.975 ng		98
64) Tetrachloroethene	14.57	166	8421	0.273 ng		100
65) Chlorobenzene	0.00	112	0	N.D. d		
66) Ethylbenzene	15.67	91	154198	1.374 ng		98
67) m- & p-Xylenes	15.85	91	318469	3.508 ng		98
68) Bromoform	0.00	173	0	N.D.		
69) Styrene	16.24	104	58445	0.875 ng		98
70) o-Xylene	16.36	91	153296	1.630 ng		97
71) n-Nonane	16.60	43	89008	1.816 ng		95
72) 1,1,2,2-Tetrachloroethane	16.29	83	2758	N.D.		
74) Cumene	16.98	105	19331	0.161 ng		97
75) alpha-Pinene	17.40	93	12153	0.209 ng	#	1
76) n-Propylbenzene	17.52	91	56563	0.395 ng		95
77) 3-Ethyltoluene	0.00	105	0	N.D. d		
78) 4-Ethyltoluene	17.67	105	54759	0.508 ng		100
79) 1,3,5-Trimethylbenzene	17.75	105	33661	0.345 ng		97
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	18.18	105	116838	1.220 ng		88
83) n-Decane	0.00	57	0	N.D. d		
84) Benzyl Chloride	18.33	91	2277	N.D.		
85) 1,3-Dichlorobenzene	18.41	146	2977	N.D.		
86) 1,4-Dichlorobenzene	18.41	146	2977	N.D.		
87) sec-Butylbenzene	18.47	105	7772	N.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	0.00	146	0	N.D.		
91) d-Limonene	0.00	68	0	N.D. d		
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	20.70	128	83315	0.602 ng		85
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. 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:\MS09\Data\2016_09\13\09131620.D
Acq On : 13 Sep 2016 20:20 Operator: SC
Sample : P1604352-005 (1000mL)
Misc : S29-07211602
ALS Vial : 9 Sample Multiplier: 1

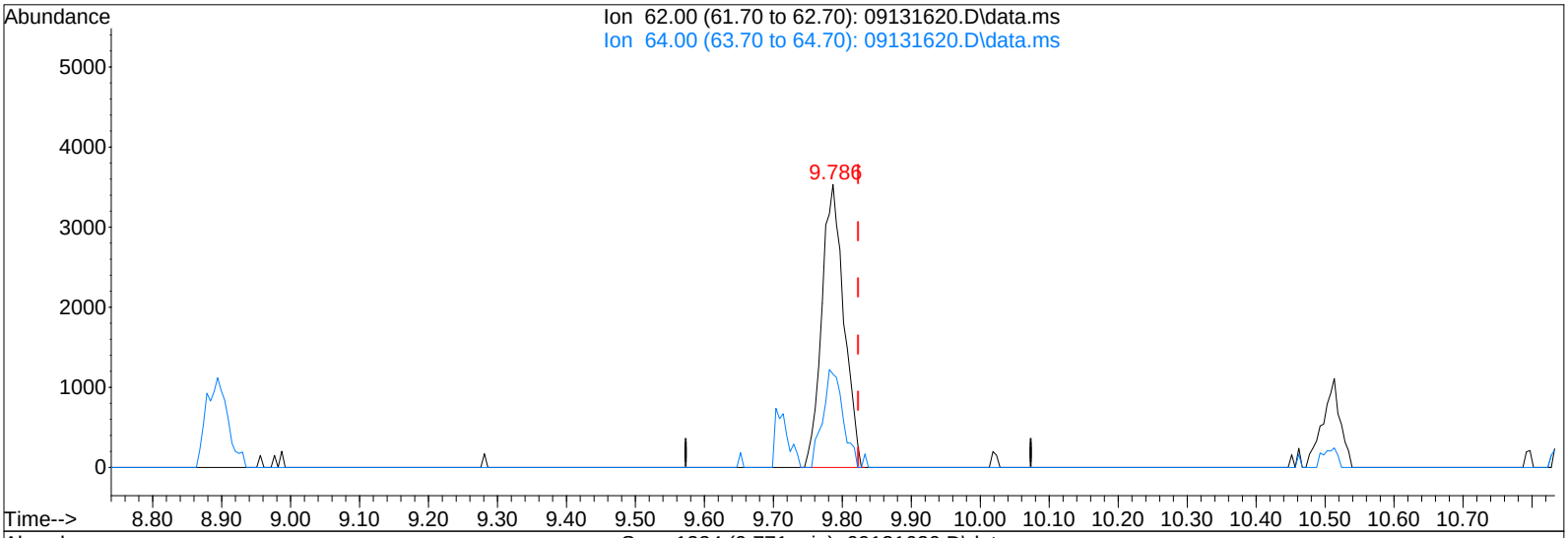
Quant Time: Sep 14 13:56:04 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M

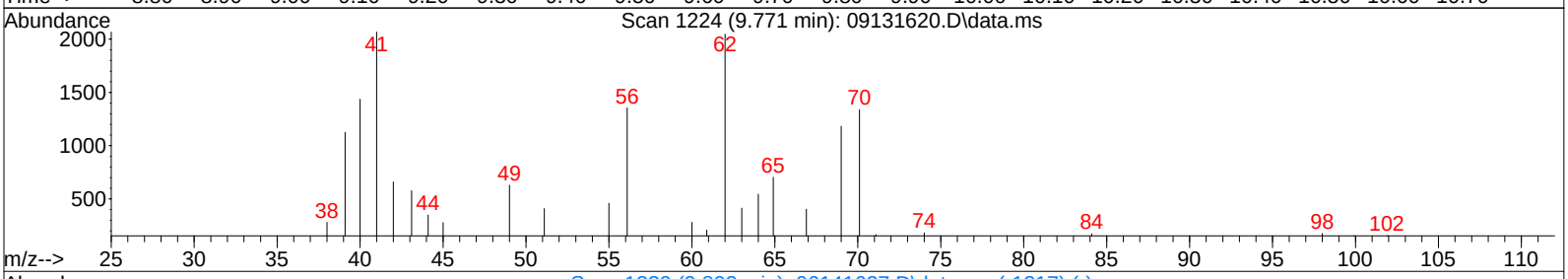


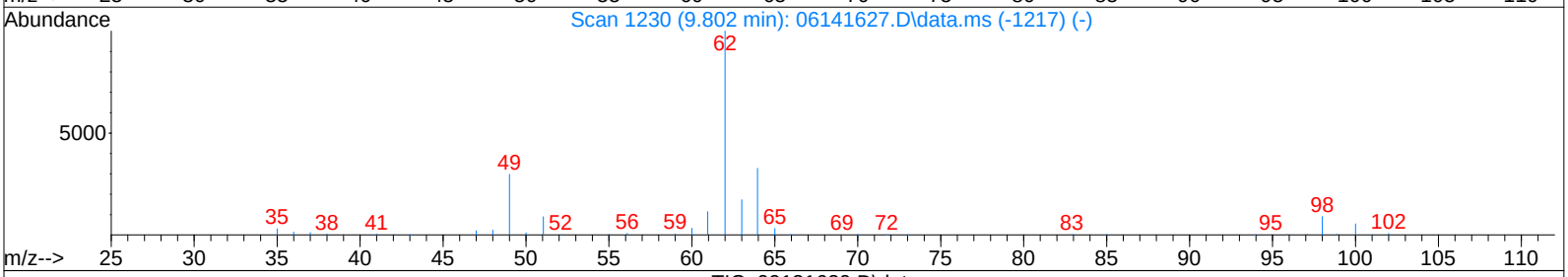
Quantitation Report (Qedit)

Data File: I:\MS09\Data\2016_09\13\09131620.D
Acq On : 13 Sep 2016 20:20 Operator: SC
Sample : P1604352-005 (1000mL)
Misc : S29-07211602
ALS Vial : 9 Sample Multiplier: 1

Quant Time: Sep 14 09:00:57 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M







TIC: 09131620.D\data.ms

(36) 1,2-Dichloroethane (T)

9.786min (-0.037) 0.27ng

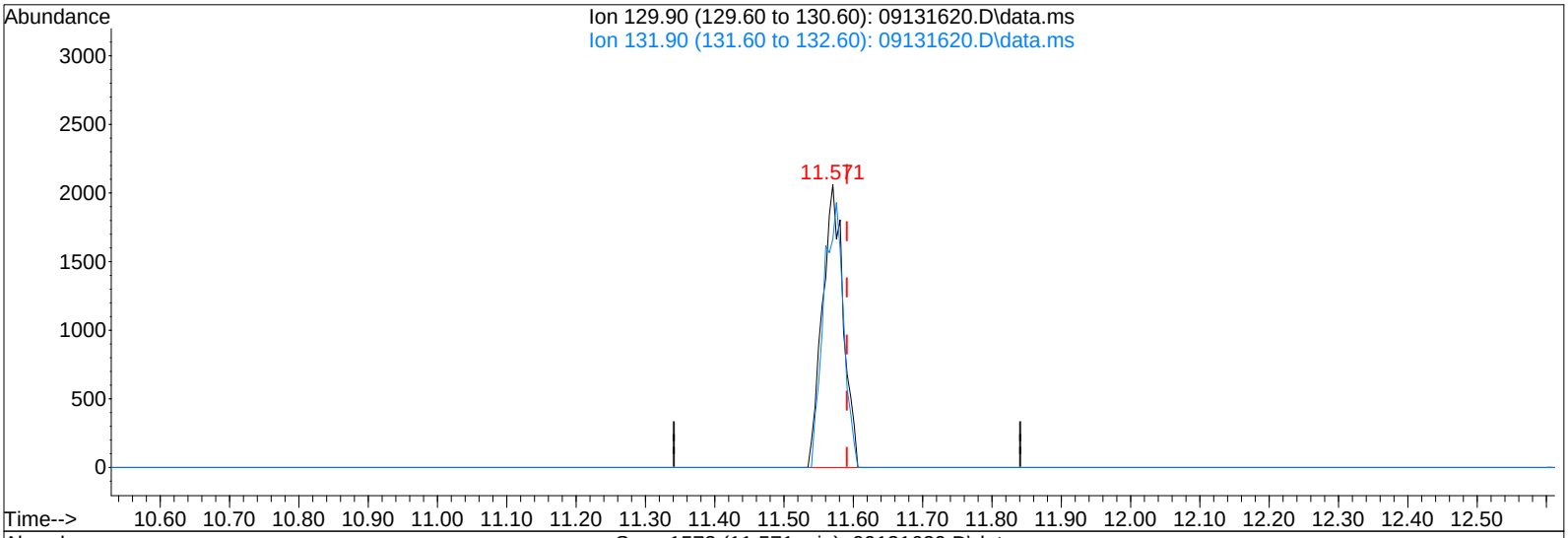
response 7876

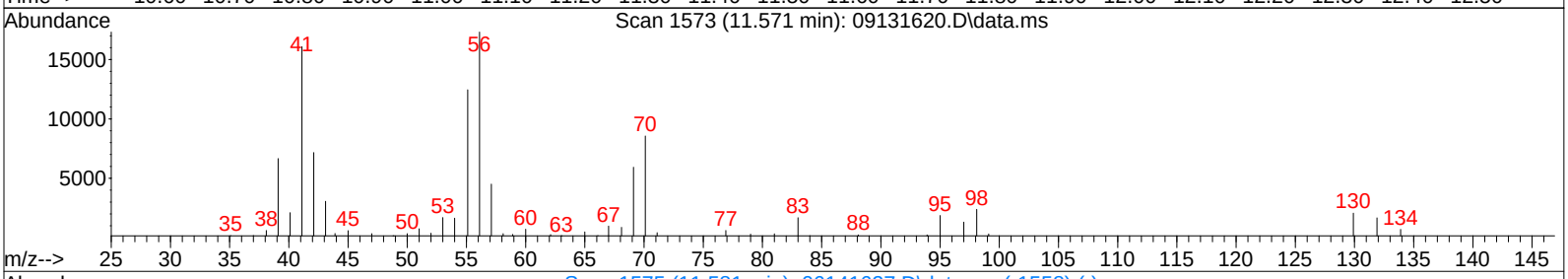
Ion	Exp%	Act%
62.00	100	100
64.00	32.70	31.48
0.00	0.00	0.00
0.00	0.00	0.00

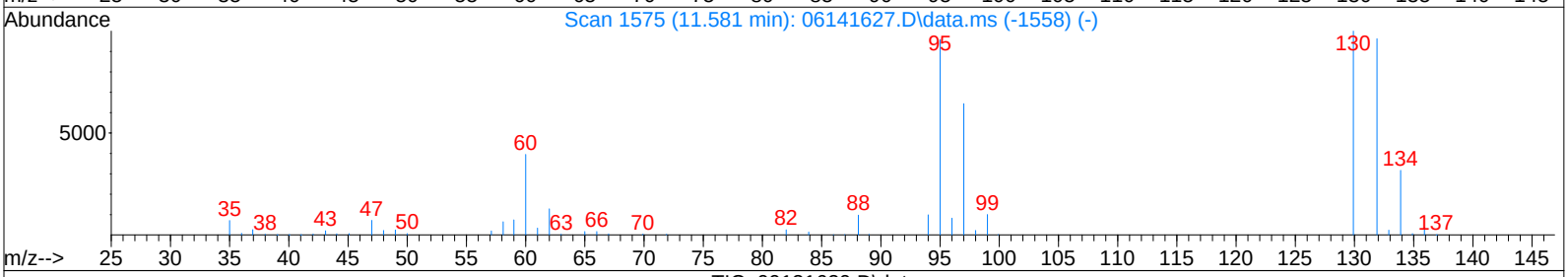
Quantitation Report (Qedit)

Data File: I:\MS09\Data\2016_09\13\09131620.D
Acq On : 13 Sep 2016 20:20 Operator: SC
Sample : P1604352-005 (1000mL)
Misc : S29-07211602
ALS Vial : 9 Sample Multiplier: 1

Quant Time: Sep 14 09:00:57 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M







TIC: 09131620.D\data.ms

(47) Trichloroethene (T)

11.571min (-0.020) 0.15ng

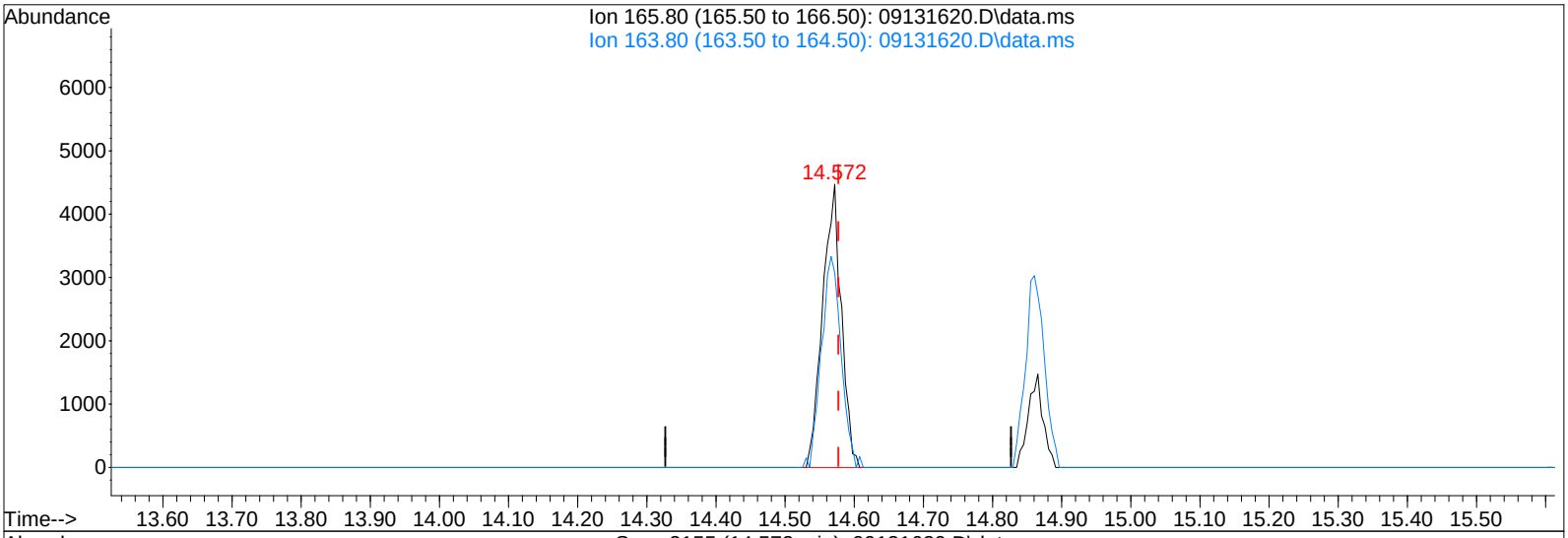
response 4312

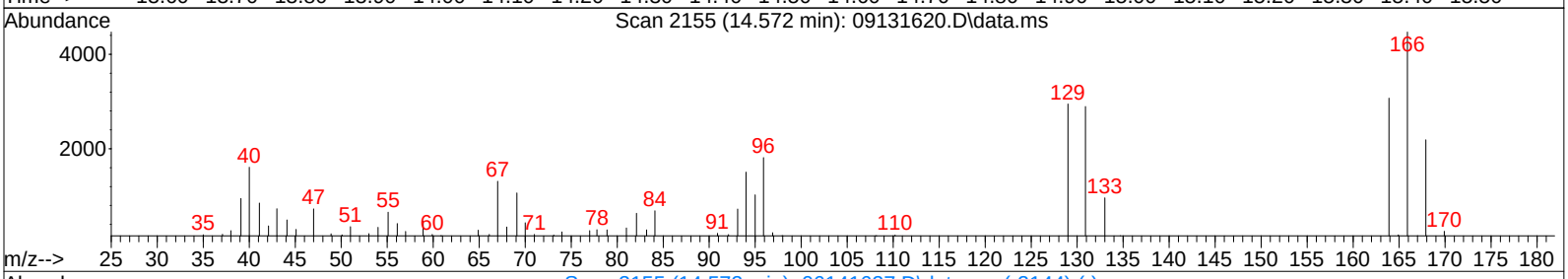
Ion	Exp%	Act%
129.90	100	100
131.90	96.30	90.17
0.00	0.00	0.00
0.00	0.00	0.00

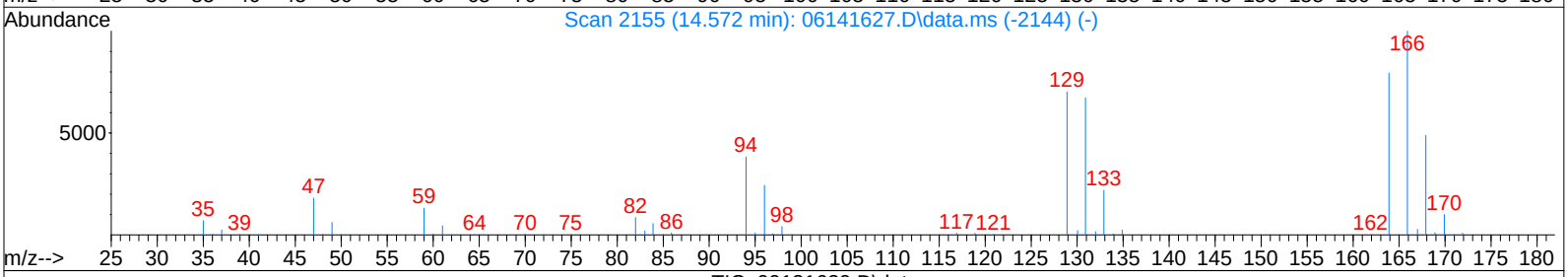
Quantitation Report (Qedit)

Data File: I:\MS09\Data\2016_09\13\09131620.D
Acq On : 13 Sep 2016 20:20 Operator: SC
Sample : P1604352-005 (1000mL)
Misc : S29-07211602
ALS Vial : 9 Sample Multiplier: 1

Quant Time: Sep 14 09:00:57 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M







TIC: 09131620.D\data.ms

(64) Tetrachloroethene (T)

14.572min (-0.005) 0.27ng

response 8421

Ion	Exp%	Act%
165.80	100	100
163.80	78.40	78.20
0.00	0.00	0.00
0.00	0.00	0.00

Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2016_09\13\09131621.D
Acq On : 13 Sep 2016 20:54 Operator: SC
Sample : P1604352-006 (25mL)
Misc : S29-07211602
ALS Vial : 10 Sample Multiplier: 1

9/14/16

Quant Time: Sep 14 15:59:45 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M

Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
1) Bromochloromethane (IS1)	8.89	130	210139	12.500	ng	-0.05
37) 1,4-Difluorobenzene (IS2)	10.87	114	968045	12.500	ng	-0.03
56) Chlorobenzene-d5 (IS3)	15.22	82	404691	12.500	ng	0.00
System Monitoring Compounds						
33) 1,2-Dichloroethane-d4(...	9.67	65	280323	11.739	ng	-0.04
Spiked Amount 12.500	Range 70 - 130		Recovery = 93.92%			
57) Toluene-d8 (SS2)	13.31	98	1025252	12.163	ng	-0.01
Spiked Amount 12.500	Range 70 - 130		Recovery = 97.28%			
73) Bromofluorobenzene (SS3)	16.83	174	311865	12.168	ng	0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 97.36%			
Target Compounds						Qvalue
2) Propene	0.00	42	0	N.D. d		
3) Dichlorodifluoromethan...	3.81	85	561	N.D.		
4) Chloromethane	0.00	50	0	N.D. d		
5) 1,2-Dichloro-1,1,2,2-t...	0.00	135	0	N.D.		
6) Vinyl Chloride	4.26	62	956684	24.271	ng	100
7) 1,3-Butadiene	0.00	54	0	N.D. d		
8) Bromomethane	0.00	94	0	N.D.		
9) Chloroethane	0.00	64	0	N.D.		
10) Ethanol	5.19	45	3827	0.199	ng	68
11) Acetonitrile	5.45	41	590	N.D.		
12) Acrolein	0.00	56	0	N.D. d		
13) Acetone	0.00	58	0	N.D. d		
14) Trichlorofluoromethane	0.00	101	0	N.D.		
15) 2-Propanol (Isopropanol)	0.00	45	0	N.D. d		
16) Acrylonitrile	0.00	53	0	N.D. d		
17) 1,1-Dichloroethene	6.49	96	55446	2.287	ng	100
18) 2-Methyl-2-Propanol (t...	0.00	59	0	N.D. d		
19) Methylene Chloride	0.00	84	0	N.D.		
20) 3-Chloro-1-propene (Al...	0.00	41	0	N.D. d		
21) Trichlorotrifluoroethane	0.00	151	0	N.D.		
22) Carbon Disulfide	6.91	76	26032	0.276	ng	94
23) trans-1,2-Dichloroethene	7.65	61	37532	1.158	ng	98
24) 1,1-Dichloroethane	7.86	63	4594	0.098	ng	89
25) Methyl tert-Butyl Ether	7.92	73	828	N.D.		
26) Vinyl Acetate	0.00	86	0	N.D. d		
27) 2-Butanone (MEK)	8.30	72	16120	0.943	ng	98
28) cis-1,2-Dichloroethene	8.73	61	267411	8.029	ng	99
29) Diisopropyl Ether	0.00	87	0	N.D. d		
30) Ethyl Acetate	0.00	61	0	N.D. d		
31) n-Hexane	8.99	57	1032882	24.038	ng	99
32) Chloroform	9.04	83	3630	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	9.82	62	958	N.D.		
38) 1,1,1-Trichloroethane	0.00	97	0	N.D.		
39) Isopropyl Acetate	10.52	61	1051	N.D.		
40) 1-Butanol	0.00	56	0	N.D. d		
41) Benzene	10.51	78	200171	1.912	ng	100
42) Carbon Tetrachloride	0.00	117	0	N.D.		
43) Cyclohexane	10.80	84	214718	5.491	ng	99
44) tert-Amyl Methyl Ether	0.00	73	0	N.D.		
45) 1,2-Dichloropropane	11.23	63	748	N.D.		
46) Bromodichloromethane	0.00	83	0	N.D. d		
47) Trichloroethene	11.57	130	110776	3.647	ng	100
48) 1,4-Dioxane	0.00	88	0	N.D.		
49) 2,2,4-Trimethylpentane...	0.00	57	0	N.D. d		

Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2016_09\13\09131621.D
Acq On : 13 Sep 2016 20:54 Operator: SC
Sample : P1604352-006 (25mL)
Misc : S29-07211602
ALS Vial : 10 Sample Multiplier: 1

Quant Time: Sep 14 15:59:45 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M

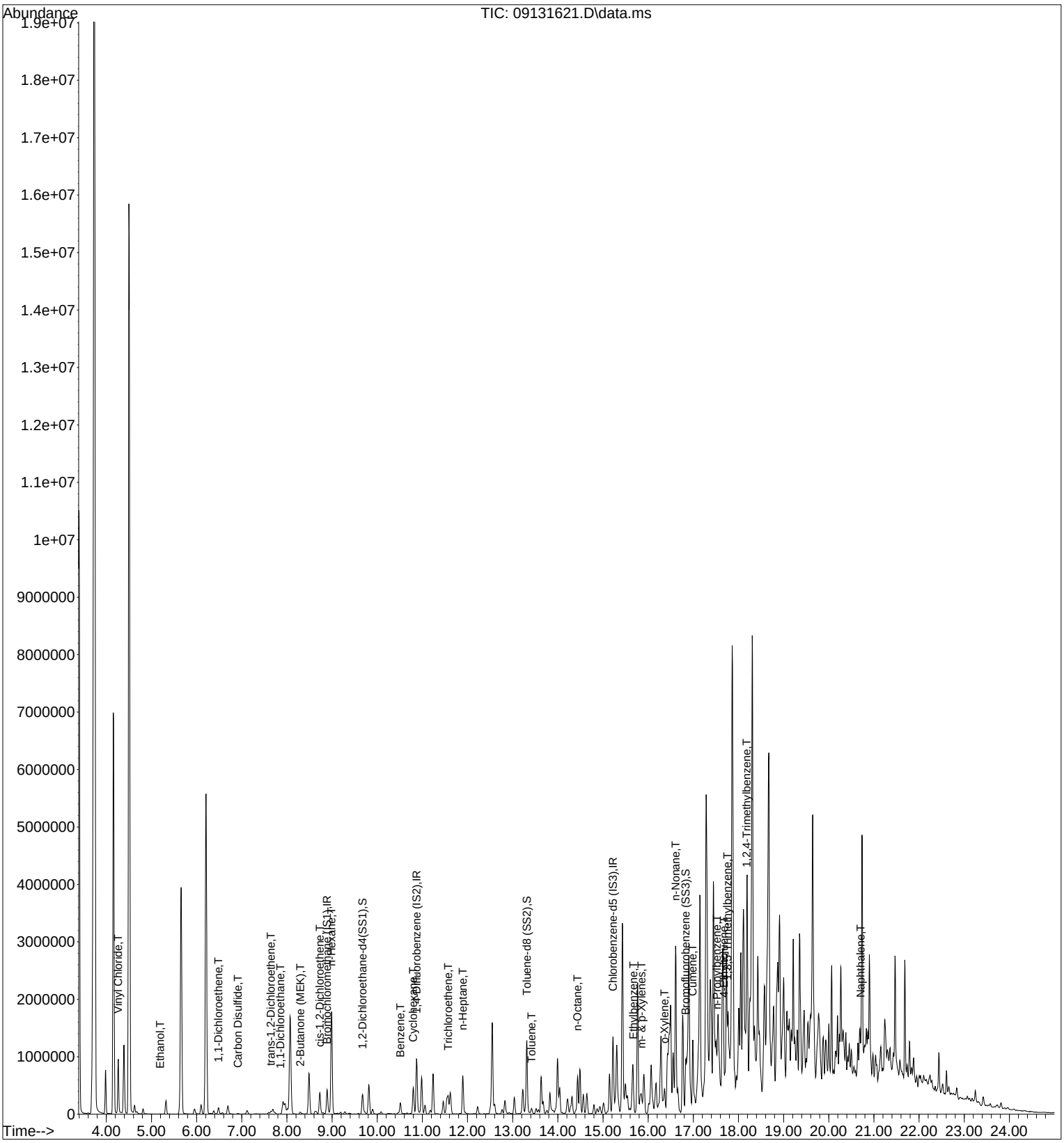
Internal Standards	R.T.	QIon	Response	Conc Units	Dev(Min)
50) Methyl Methacrylate	0.00	100	0	N.D. d	
51) n-Heptane	11.90	71	183656	7.284 ng	99
52) cis-1,3-Dichloropropene	0.00	75	0	N.D.	
53) 4-Methyl-2-pentanone	0.00	58	0	N.D. d	
54) trans-1,3-Dichloropropene	0.00	75	0	N.D.	
55) 1,1,2-Trichloroethane	0.00	97	0	N.D. d	
58) Toluene	13.42	91	63456	0.538 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	14.44	57	135332	5.777 ng	98
64) Tetrachloroethene	14.57	166	418	N.D.	
65) Chlorobenzene	0.00	112	0	N.D. d	
66) Ethylbenzene	15.68	91	58412	0.472 ng	100
67) m- & p-Xylenes	15.85	91	107343	1.071 ng	99
68) Bromoform	0.00	173	0	N.D.	
69) Styrene	16.26	104	1072	N.D.	
70) o-Xylene	16.36	91	111454	1.074 ng	98
71) n-Nonane	16.61	43	1073450	19.846 ng	99
72) 1,1,2,2-Tetrachloroethane	0.00	83	0	N.D. d	
74) Cumene	16.99	105	81478	0.615 ng	99
75) alpha-Pinene	0.00	93	0	N.D. d	
76) n-Propylbenzene	17.52	91	138659	0.877 ng	88
77) 3-Ethyltoluene	0.00	105	0	N.D. d	
78) 4-Ethyltoluene	17.68	105	89864	0.756 ng	100
79) 1,3,5-Trimethylbenzene	17.75	105	211584	1.964 ng	99
80) alpha-Methylstyrene	17.94	118	747	N.D.	
81) 2-Ethyltoluene	0.00	105	0	N.D. d	
82) 1,2,4-Trimethylbenzene	18.18	105	419747	3.970 ng	89
83) n-Decane	0.00	57	0	N.D. d	
84) Benzyl Chloride	0.00	91	0	N.D. 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	0.00	146	0	N.D.	
91) d-Limonene	0.00	68	0	N.D. d	
92) 1,2-Dibromo-3-Chloropr...	19.13	157	405	N.D.	
93) n-Undecane	0.00	57	0	N.D. d	
94) 1,2,4-Trichlorobenzene	20.61	180	1163	N.D.	
95) Naphthalene	20.70	128	90988	0.596 ng	80
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. 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:\MS09\Data\2016_09\13\09131621.D
Acq On : 13 Sep 2016 20:54 Operator: SC
Sample : P1604352-006 (25mL)
Misc : S29-07211602
ALS Vial : 10 Sample Multiplier: 1

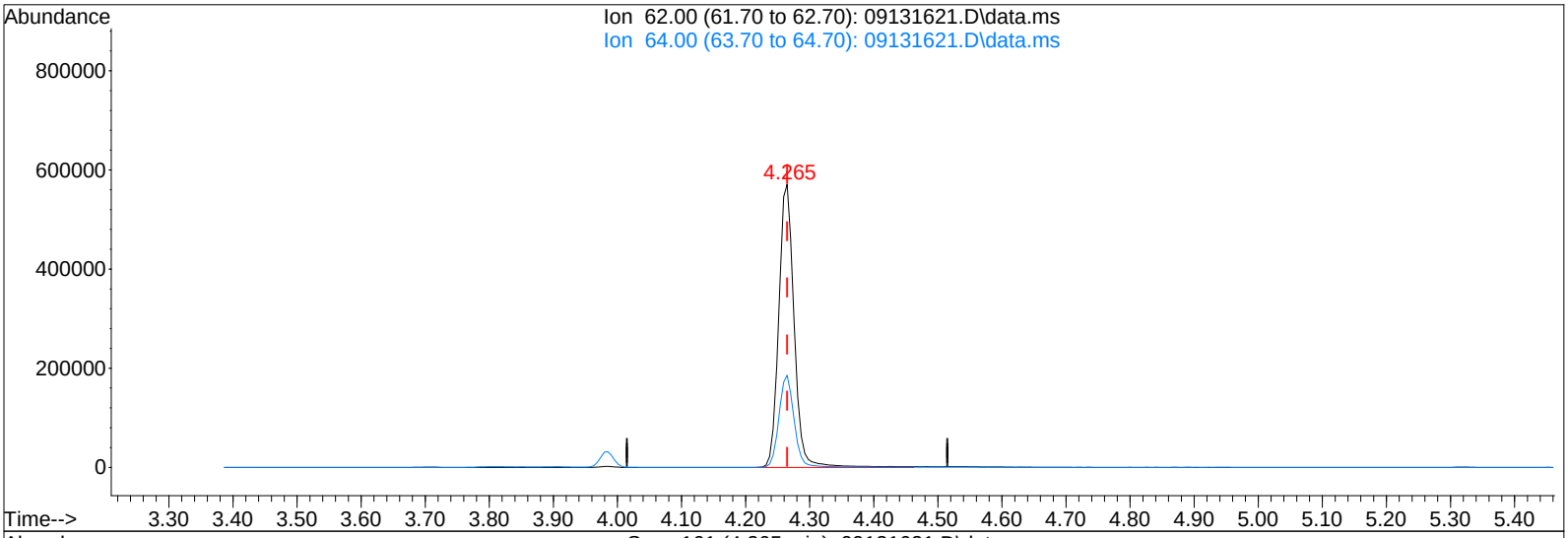
Quant Time: Sep 14 15:59:45 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M

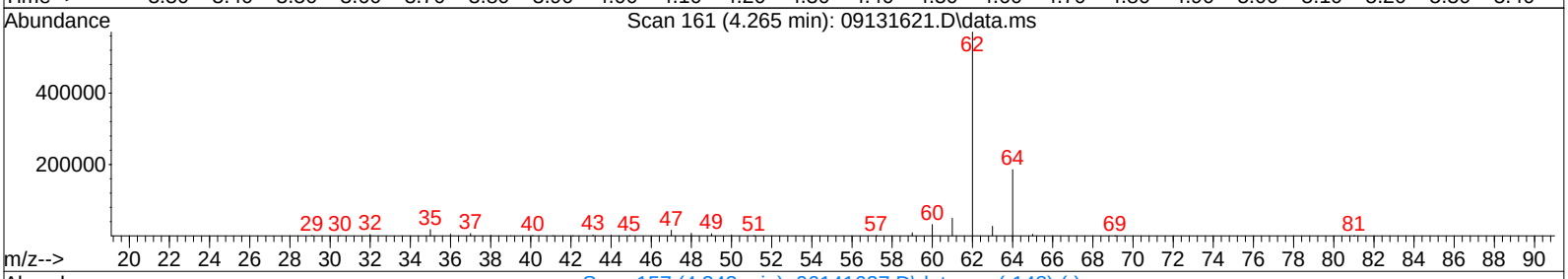


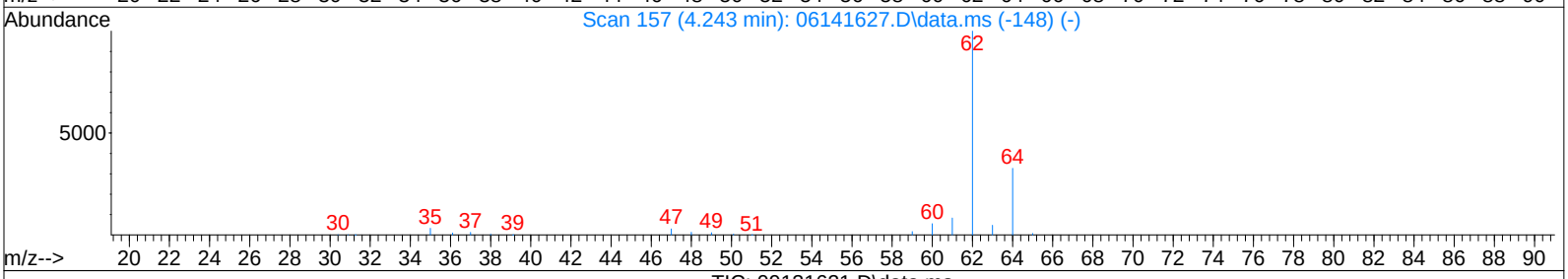
Quantitation Report (Qedit)

Data File: I:\MS09\Data\2016_09\13\09131621.D
Acq On : 13 Sep 2016 20:54 Operator: SC
Sample : P1604352-006 (25mL)
Misc : S29-07211602
ALS Vial : 10 Sample Multiplier: 1

Quant Time: Sep 14 09:01:11 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M







TIC: 09131621.D\data.ms

(6) Vinyl Chloride (T)

4.265min (-0.000) 24.27ng

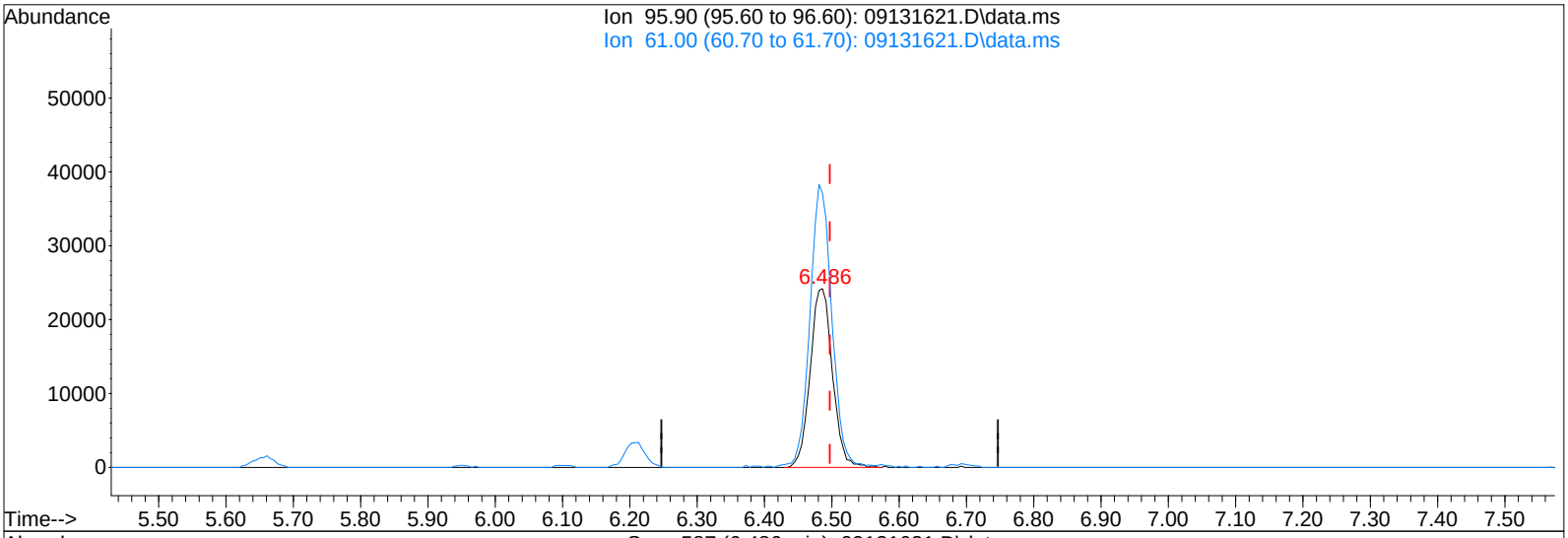
response 956684

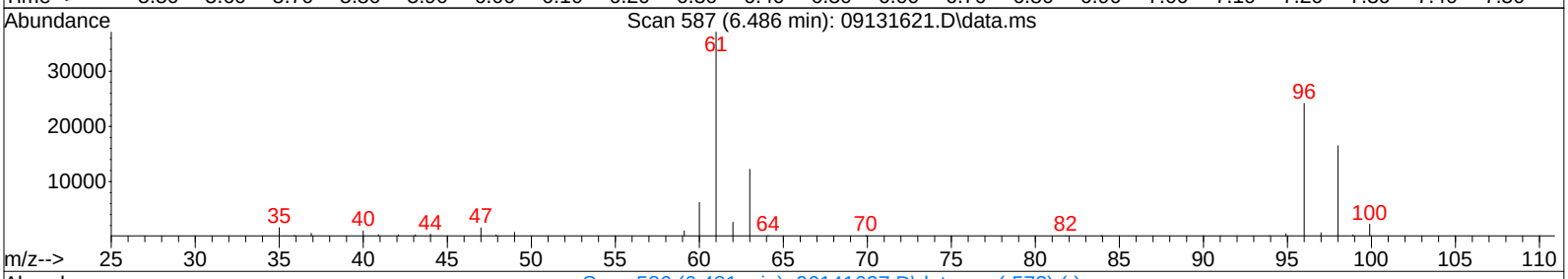
Ion	Exp%	Act%
62.00	100	100
64.00	32.30	32.29
0.00	0.00	0.00
0.00	0.00	0.00

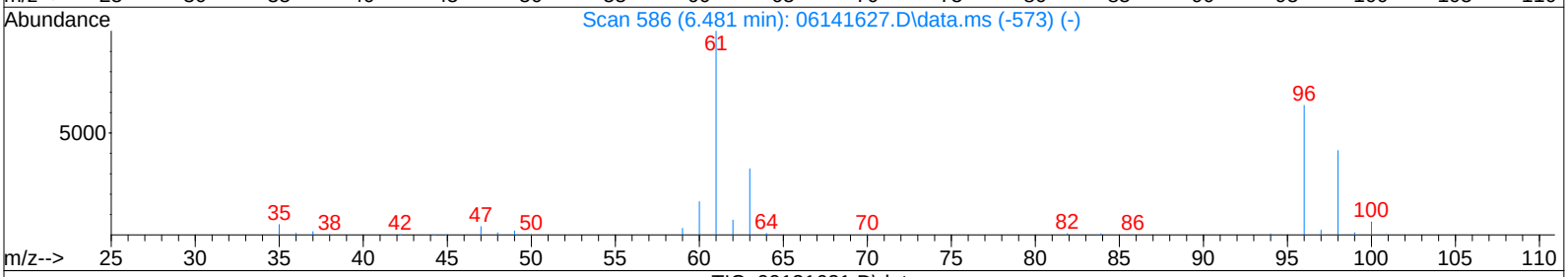
Quantitation Report (Qedit)

Data File: I:\MS09\Data\2016_09\13\09131621.D
Acq On : 13 Sep 2016 20:54 Operator: SC
Sample : P1604352-006 (25mL)
Misc : S29-07211602
ALS Vial : 10 Sample Multiplier: 1

Quant Time: Sep 14 09:01:11 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M







TIC: 09131621.D\data.ms

(17) 1,1-Dichloroethene (T)

6.486min (-0.011) 2.29ng

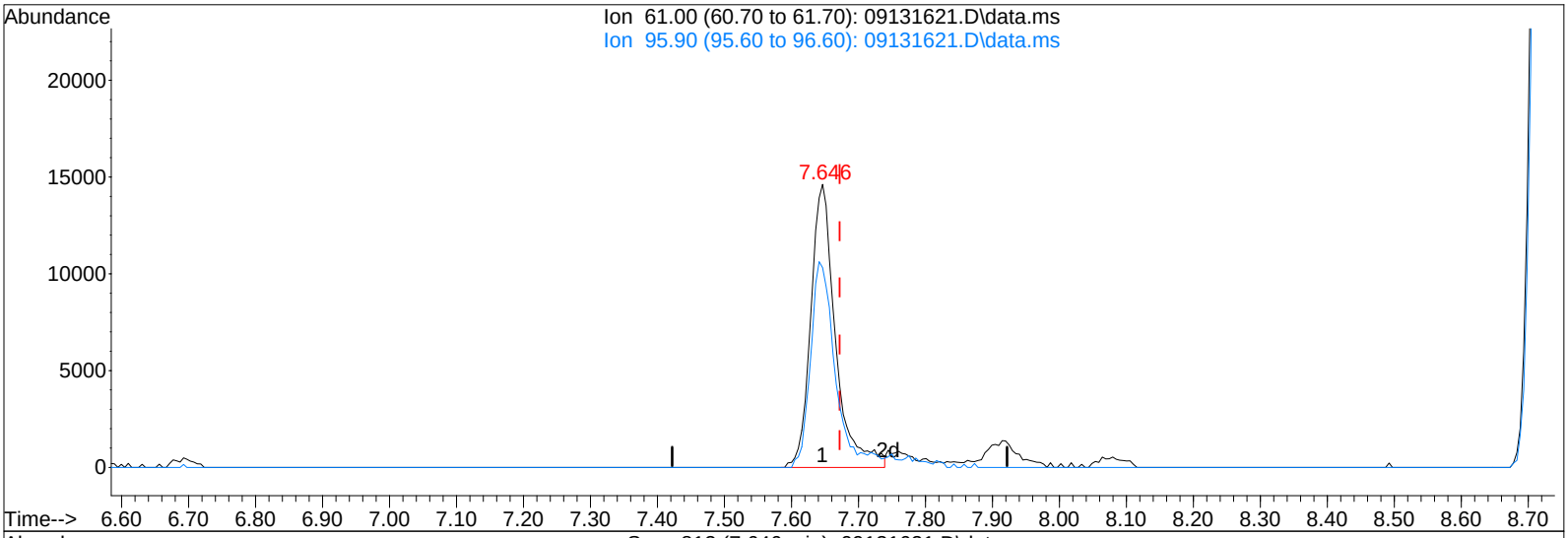
response 55446

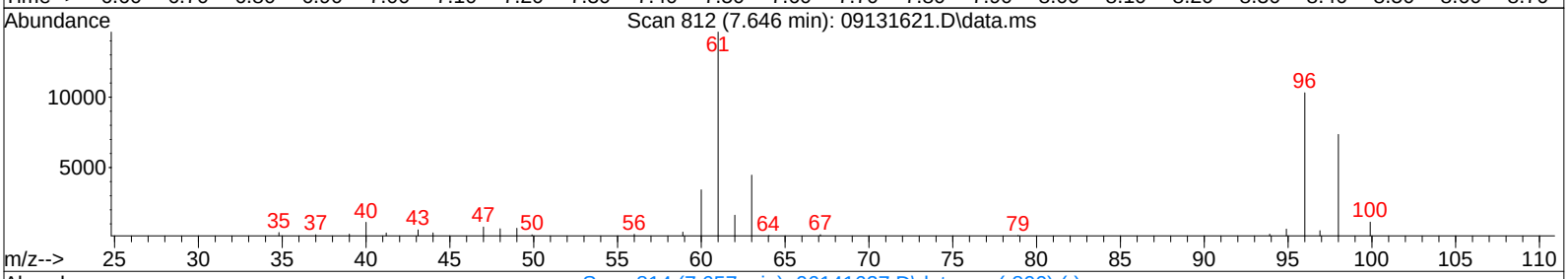
Ion	Exp%	Act%
95.90	100	100
61.00	155.80	155.98
0.00	0.00	0.00
0.00	0.00	0.00

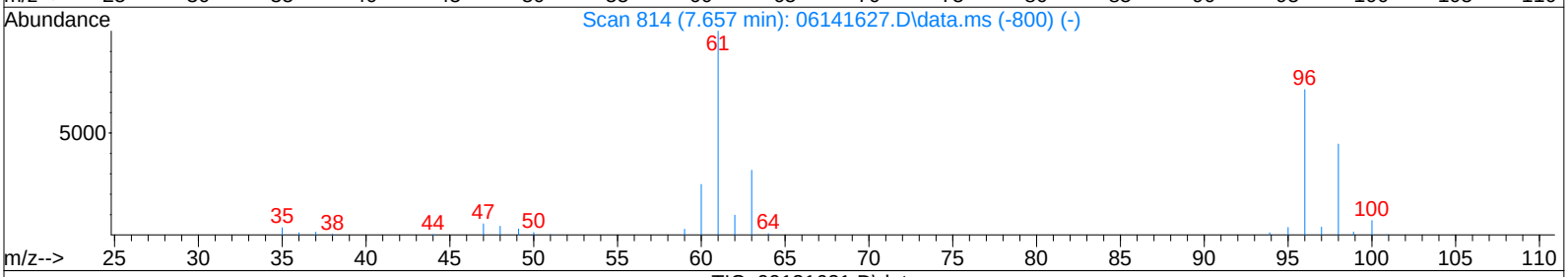
Quantitation Report (Qedit)

Data File: I:\MS09\Data\2016_09\13\09131621.D
Acq On : 13 Sep 2016 20:54 Operator: SC
Sample : P1604352-006 (25mL)
Misc : S29-07211602
ALS Vial : 10 Sample Multiplier: 1

Quant Time: Sep 14 09:01:11 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M







TIC: 09131621.D\data.ms

(23) trans-1,2-Dichloroethene (T)

7.646min (-0.026) 1.16ng

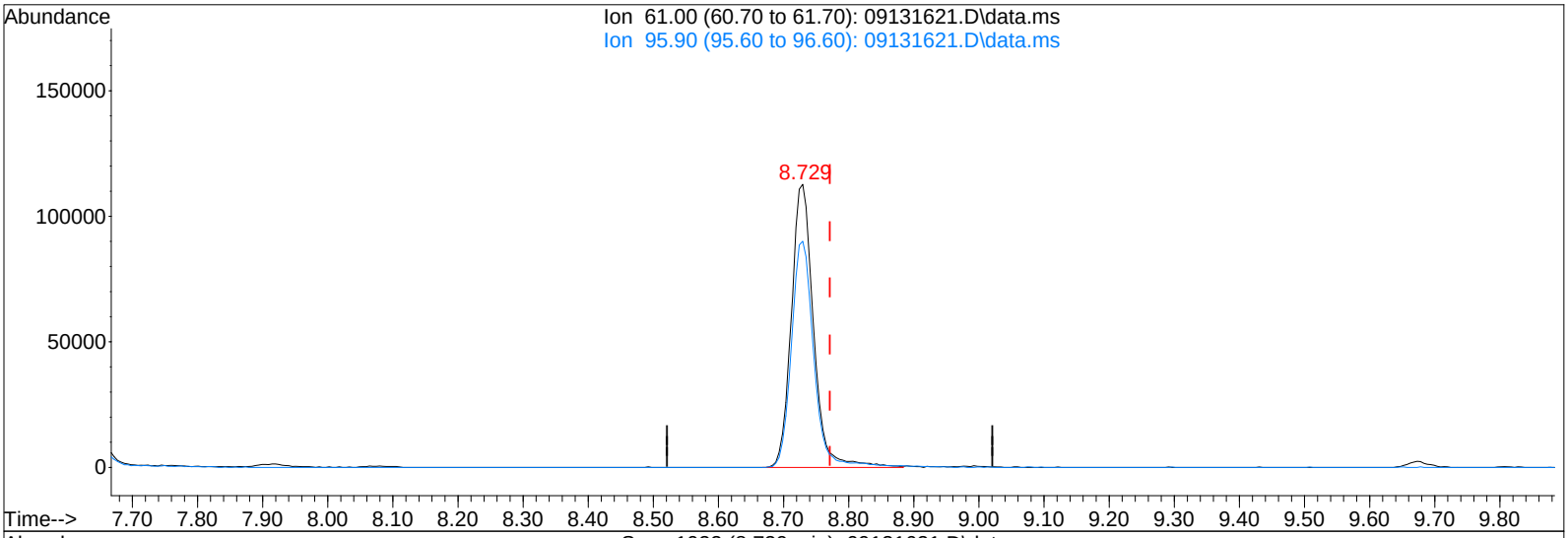
response 37532

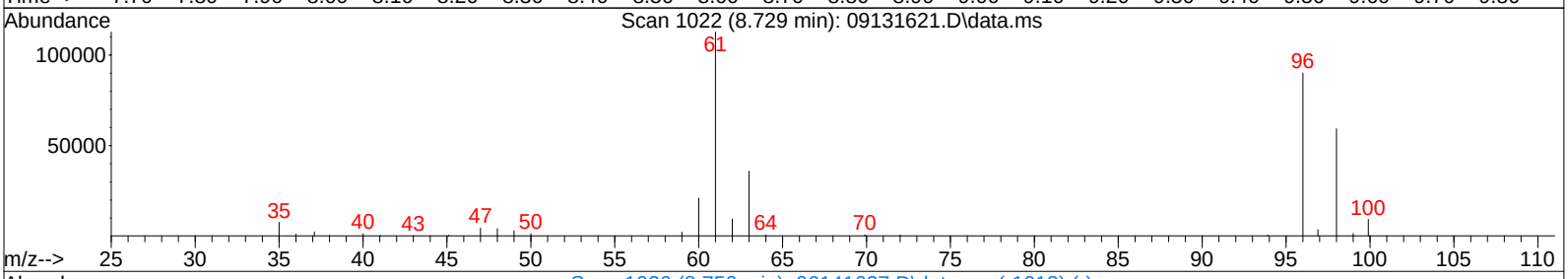
Ion	Exp%	Act%
61.00	100	100
95.90	72.50	70.86
0.00	0.00	0.00
0.00	0.00	0.00

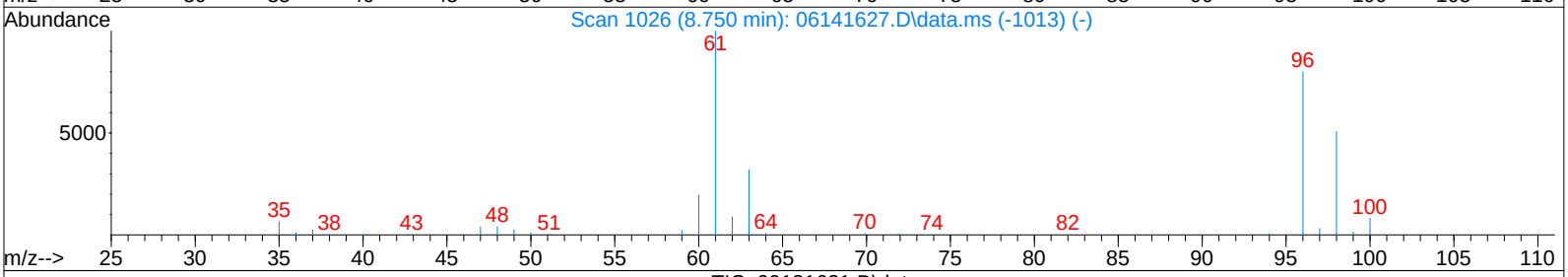
Quantitation Report (Qedit)

Data File: I:\MS09\Data\2016_09\13\09131621.D
Acq On : 13 Sep 2016 20:54 Operator: SC
Sample : P1604352-006 (25mL)
Misc : S29-07211602
ALS Vial : 10 Sample Multiplier: 1

Quant Time: Sep 14 09:01:11 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M







TIC: 09131621.D\data.ms

(28) cis-1,2-Dichloroethene (T)

8.729min (-0.042) 8.03ng

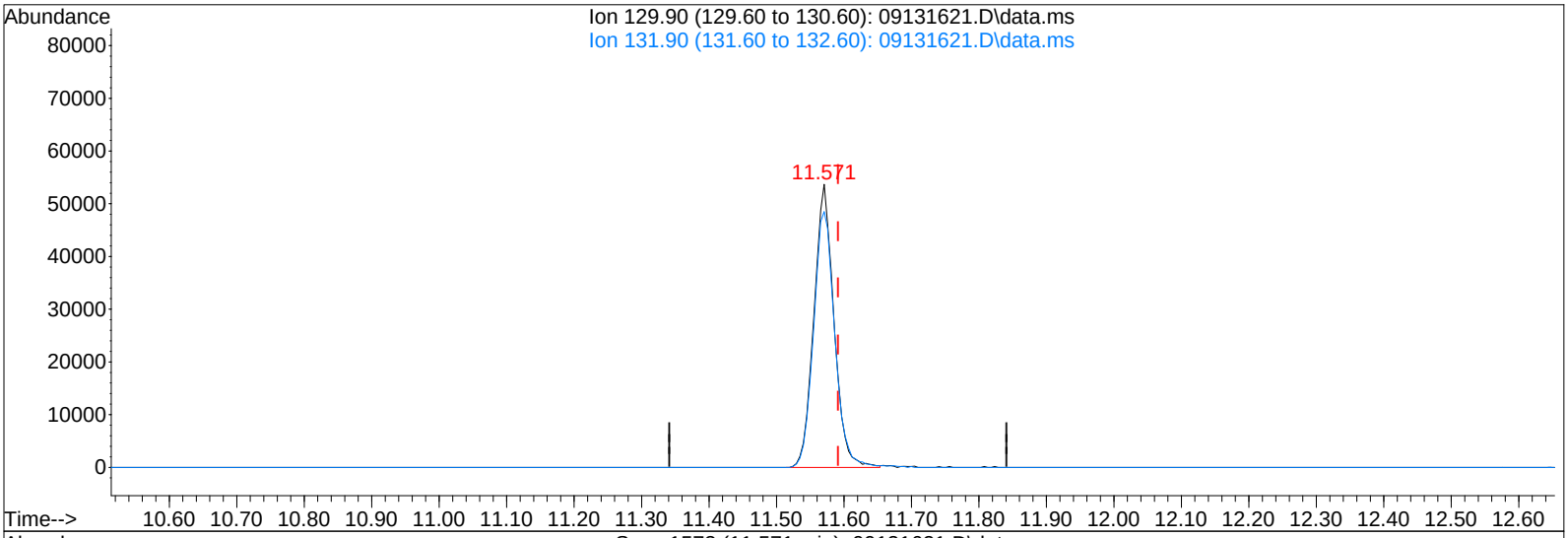
response 267411

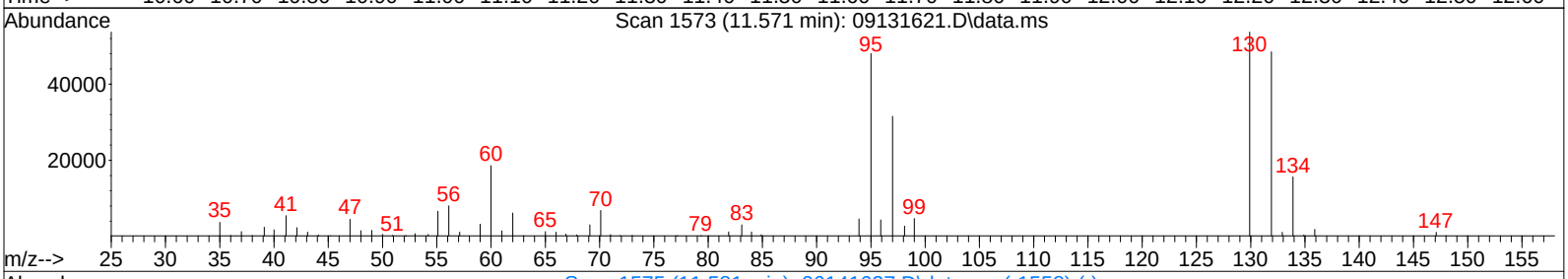
Ion	Exp%	Act%
61.00	100	100
95.90	80.00	80.57
0.00	0.00	0.00
0.00	0.00	0.00

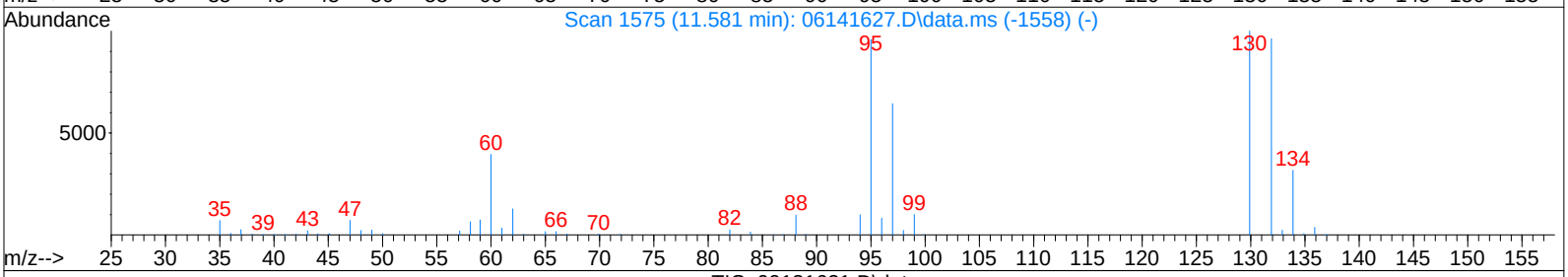
Quantitation Report (Qedit)

Data File: I:\MS09\Data\2016_09\13\09131621.D
Acq On : 13 Sep 2016 20:54 Operator: SC
Sample : P1604352-006 (25mL)
Misc : S29-07211602
ALS Vial : 10 Sample Multiplier: 1

Quant Time: Sep 14 09:01:11 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M







TIC: 09131621.D\data.ms

(47) Trichloroethene (T)

11.571min (-0.020) 3.65ng

response 110776

Ion	Exp%	Act%
129.90	100	100
131.90	96.30	96.00
0.00	0.00	0.00
0.00	0.00	0.00

Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2016_09\13\09131622.D
Acq On : 13 Sep 2016 21:28 Operator: SC
Sample : P1604352-007 (25mL)
Misc : S29-07211602
ALS Vial : 11 Sample Multiplier: 1

9/14/16

Quant Time: Sep 14 15:46:59 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M

Internal Standards	R.T.	QIon	Response	Conc Units	Dev(Min)
1) Bromochloromethane (IS1)	8.89	130	206736	12.500 ng	-0.05
37) 1,4-Difluorobenzene (IS2)	10.87	114	981972	12.500 ng	-0.03
56) Chlorobenzene-d5 (IS3)	15.22	82	389161	12.500 ng	0.00
System Monitoring Compounds					
33) 1,2-Dichloroethane-d4(...	9.67	65	279207	11.885 ng	-0.04
Spiked Amount 12.500	Range 70 - 130		Recovery = 95.04%		
57) Toluene-d8 (SS2)	13.31	98	1034808	12.767 ng	-0.01
Spiked Amount 12.500	Range 70 - 130		Recovery = 102.16%		
73) Bromofluorobenzene (SS3)	16.83	174	302001	12.253 ng	0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 98.00%		
Target Compounds					Qvalue
2) Propene	0.00	42	0	N.D. 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	4.27	62	2704	N.D.	
7) 1,3-Butadiene	0.00	54	0	N.D. d	
8) Bromomethane	0.00	94	0	N.D.	
9) Chloroethane	0.00	64	0	N.D.	
10) Ethanol	5.18	45	16675	0.883 ng	99
11) Acetonitrile	0.00	41	0	N.D. d	
12) Acrolein	0.00	56	0	N.D. d	
13) Acetone	0.00	58	0	N.D. d	
14) Trichlorofluoromethane	0.00	101	0	N.D.	
15) 2-Propanol (Isopropanol)	6.02	45	3750	N.D.	
16) Acrylonitrile	0.00	53	0	N.D. d	
17) 1,1-Dichloroethene	0.00	96	0	N.D.	
18) 2-Methyl-2-Propanol (t...	6.68	59	2816	N.D.	
19) Methylene Chloride	0.00	84	0	N.D.	
20) 3-Chloro-1-propene (Al...	0.00	41	0	N.D. d	
21) Trichlorotrifluoroethane	0.00	151	0	N.D.	
22) Carbon Disulfide	6.93	76	11578	0.125 ng	94
23) trans-1,2-Dichloroethene	0.00	61	0	N.D.	
24) 1,1-Dichloroethane	7.85	63	3936	N.D.	
25) Methyl tert-Butyl Ether	7.95	73	82366	1.095 ng	89
26) Vinyl Acetate	0.00	86	0	N.D. d	
27) 2-Butanone (MEK)	8.32	72	1369	N.D.	
28) cis-1,2-Dichloroethene	8.73	61	6268	0.191 ng	100
29) Diisopropyl Ether	0.00	87	0	N.D. d	
30) Ethyl Acetate	0.00	61	0	N.D. d	
31) n-Hexane	8.99	57	3056105	72.294 ng	100
32) Chloroform	9.03	83	671	N.D.	
34) Tetrahydrofuran (THF)	9.48	72	595	N.D.	
35) Ethyl tert-Butyl Ether	0.00	87	0	N.D.	
36) 1,2-Dichloroethane	9.81	62	1934	N.D.	
38) 1,1,1-Trichloroethane	0.00	97	0	N.D.	
39) Isopropyl Acetate	10.51	61	479	N.D.	
40) 1-Butanol	10.51	56	1090	N.D.	
41) Benzene	10.51	78	103366	0.973 ng	99
42) Carbon Tetrachloride	0.00	117	0	N.D.	
43) Cyclohexane	10.80	84	345488	8.710 ng	99
44) tert-Amyl Methyl Ether	0.00	73	0	N.D.	
45) 1,2-Dichloropropane	11.24	63	2116	N.D.	
46) Bromodichloromethane	0.00	83	0	N.D. d	
47) Trichloroethene	11.58	130	2976	0.097 ng	96
48) 1,4-Dioxane	0.00	88	0	N.D.	
49) 2,2,4-Trimethylpentane...	0.00	57	0	N.D. d	

Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2016_09\13\09131622.D
Acq On : 13 Sep 2016 21:28 Operator: SC
Sample : P1604352-007 (25mL)
Misc : S29-07211602
ALS Vial : 11 Sample Multiplier: 1

Quant Time: Sep 14 15:46:59 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M

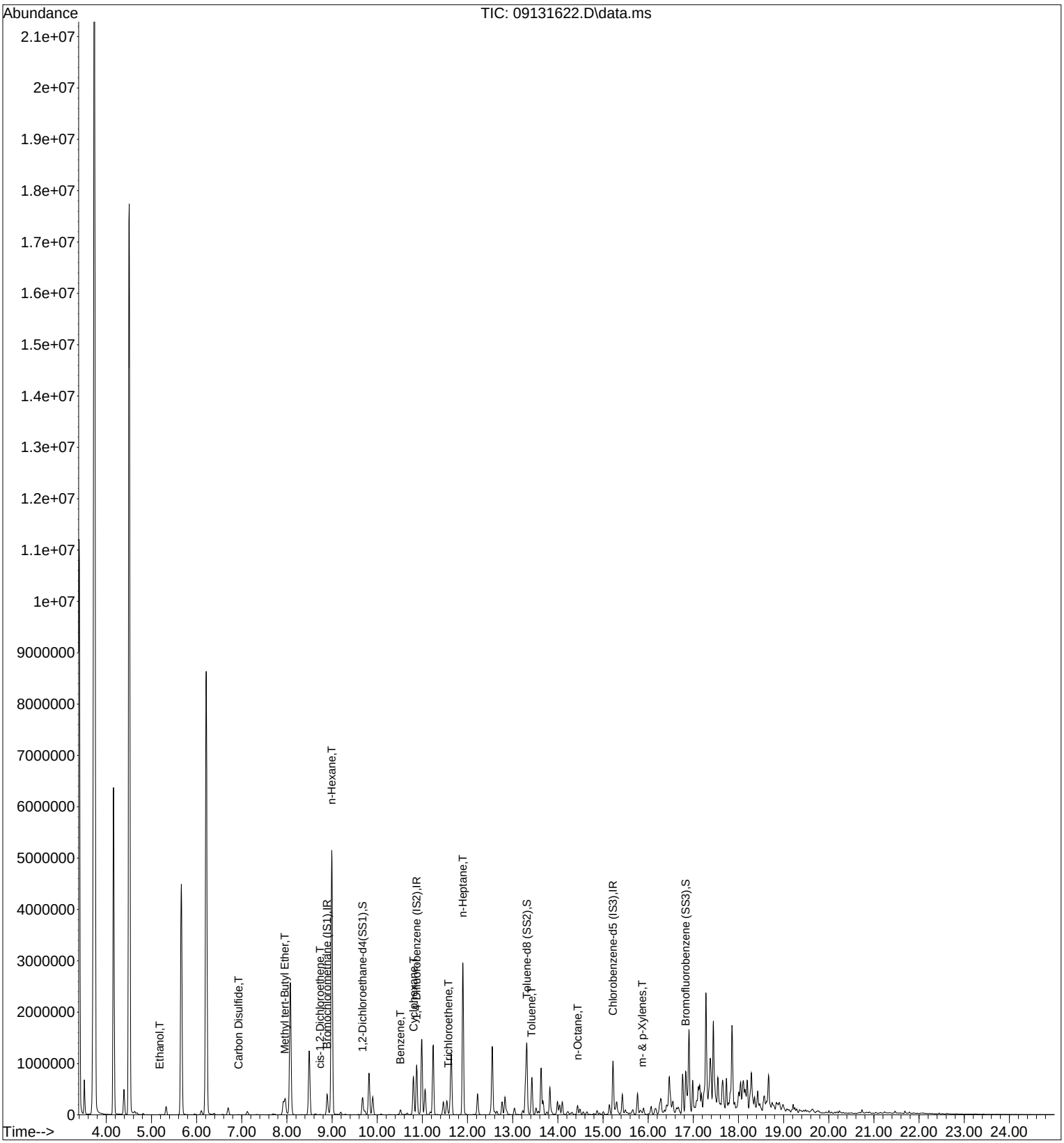
Internal Standards	R.T.	QIon	Response	Conc Units	Dev(Min)
50) Methyl Methacrylate	0.00	100	0	N.D. d	
51) n-Heptane	11.90	71	837315	32.737 ng	99
52) cis-1,3-Dichloropropene	0.00	75	0	N.D.	
53) 4-Methyl-2-pentanone	0.00	58	0	N.D. d	
54) trans-1,3-Dichloropropene	0.00	75	0	N.D.	
55) 1,1,2-Trichloroethane	0.00	97	0	N.D. d	
58) Toluene	13.42	91	39019	0.344 ng	98
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	14.31	43	2168	N.D.	
63) n-Octane	14.44	57	38658	1.716 ng	98
64) Tetrachloroethene	0.00	166	0	N.D.	
65) Chlorobenzene	0.00	112	0	N.D. d	
66) Ethylbenzene	15.68	91	5619	N.D.	
67) m- & p-Xylenes	15.87	91	12223	0.127 ng	84
68) Bromoform	0.00	173	0	N.D.	
69) Styrene	0.00	104	0	N.D.	
70) o-Xylene	16.37	91	7007	N.D.	
71) n-Nonane	0.00	43	0	N.D. d	
72) 1,1,2,2-Tetrachloroethane	16.37	83	1827	N.D.	
74) Cumene	16.99	105	6801	N.D.	
75) alpha-Pinene	0.00	93	0	N.D. d	
76) n-Propylbenzene	17.54	91	11640	N.D.	
77) 3-Ethyltoluene	17.63	105	6616	N.D.	
78) 4-Ethyltoluene	17.68	105	4056	N.D.	
79) 1,3,5-Trimethylbenzene	17.75	105	3299	N.D.	
80) alpha-Methylstyrene	0.00	118	0	N.D.	
81) 2-Ethyltoluene	17.95	105	5447	N.D.	
82) 1,2,4-Trimethylbenzene	0.00	105	0	N.D. d	
83) n-Decane	0.00	57	0	N.D. d	
84) Benzyl Chloride	18.35	91	2611	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-...	18.65	119	5634	N.D.	
89) 1,2,3-Trimethylbenzene	18.64	105	6176	N.D.	
90) 1,2-Dichlorobenzene	0.00	146	0	N.D.	
91) d-Limonene	0.00	68	0	N.D. d	
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	20.74	128	3809	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. d	
99) tert-Butylbenzene	18.19	119	3623	N.D.	
100) n-Butylbenzene	19.09	91	4418	N.D.	

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2016_09\13\09131622.D
Acq On : 13 Sep 2016 21:28 Operator: SC
Sample : P1604352-007 (25mL)
Misc : S29-07211602
ALS Vial : 11 Sample Multiplier: 1

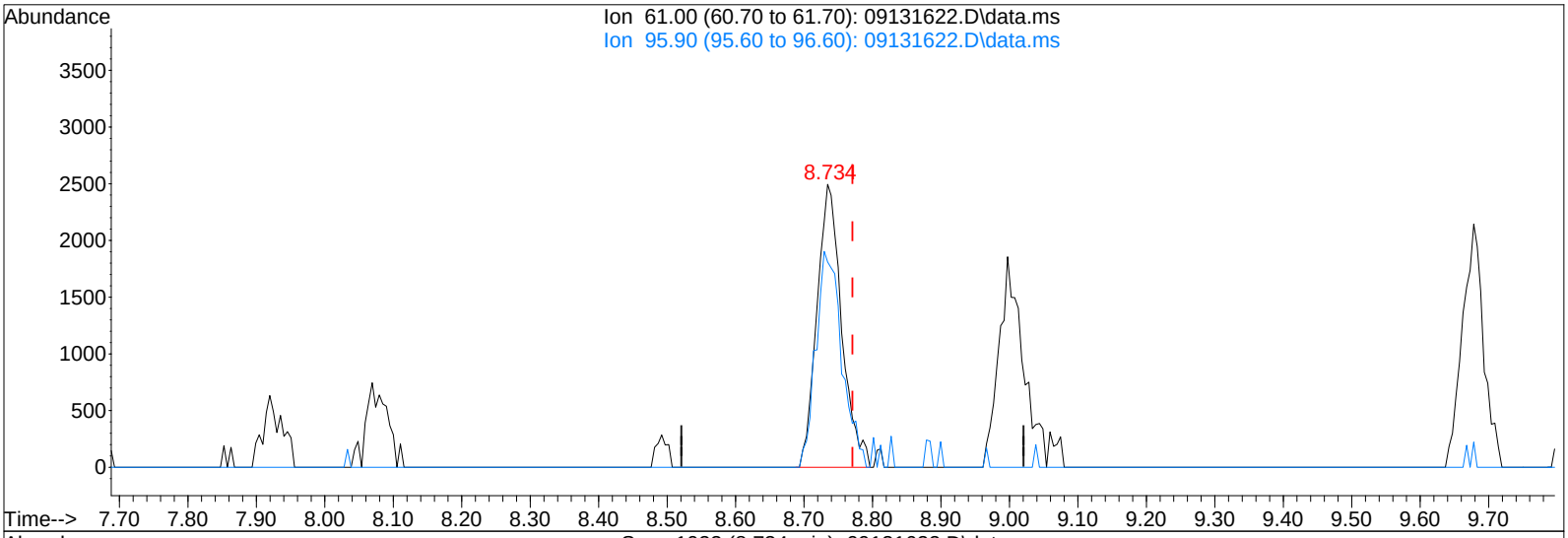
Quant Time: Sep 14 15:46:59 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M

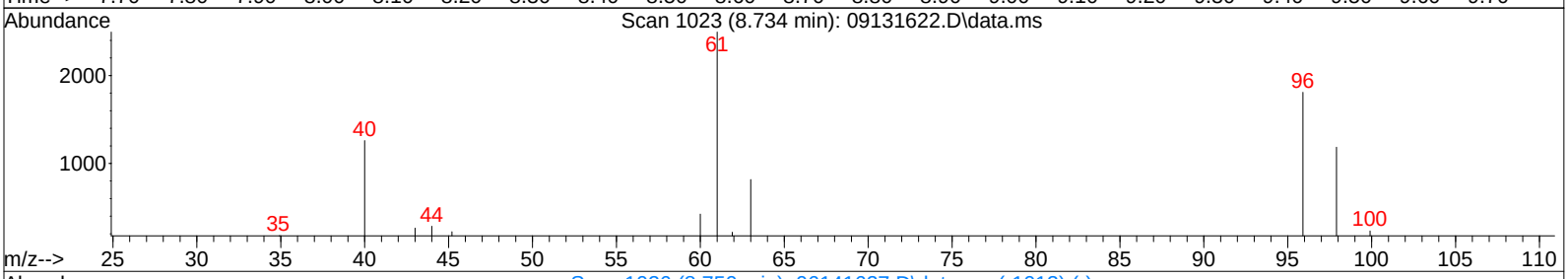


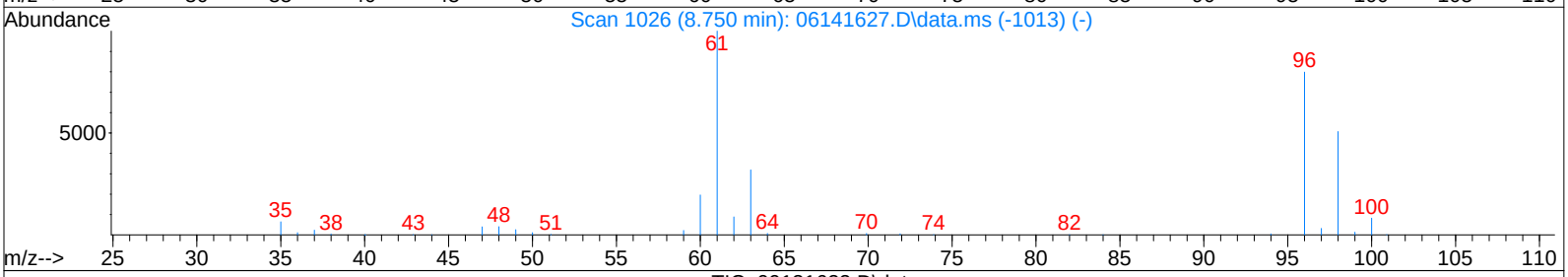
Quantitation Report (Qedit)

Data File: I:\MS09\Data\2016_09\13\09131622.D
Acq On : 13 Sep 2016 21:28 Operator: SC
Sample : P1604352-007 (25mL)
Misc : S29-07211602
ALS Vial : 11 Sample Multiplier: 1

Quant Time: Sep 14 09:01:26 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M







TIC: 09131622.D\data.ms

(28) cis-1,2-Dichloroethene (T)

8.734min (-0.037) 0.19ng

response 6268

Ion	Exp%	Act%
61.00	100	100
95.90	80.00	80.30
0.00	0.00	0.00
0.00	0.00	0.00

Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2016_09\13\09131623.D
Acq On : 13 Sep 2016 22:02 Operator: SC
Sample : P1604352-008 (25mL)
Misc : S29-07211602
ALS Vial : 12 Sample Multiplier: 1

9/14/16

Quant Time: Sep 14 15:40:27 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M

Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
1) Bromochloromethane (IS1)	8.89	130	207271	12.500	ng	-0.05
37) 1,4-Difluorobenzene (IS2)	10.87	114	964407	12.500	ng	-0.03
56) Chlorobenzene-d5 (IS3)	15.22	82	389043	12.500	ng	0.00
System Monitoring Compounds						
33) 1,2-Dichloroethane-d4(...	9.67	65	276312	11.731	ng	-0.04
Spiked Amount 12.500	Range 70 - 130		Recovery = 93.84%			
57) Toluene-d8 (SS2)	13.31	98	1017870	12.561	ng	-0.01
Spiked Amount 12.500	Range 70 - 130		Recovery = 100.48%			
73) Bromofluorobenzene (SS3)	16.84	174	301443	12.234	ng	0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 97.84%			
Target Compounds						Qvalue
2) Propene	3.68	42	130496m	4.941	ng	
3) Dichlorodifluoromethan...	3.79	85	73534	1.277	ng	100
4) Chloromethane	0.00	50	0	N.D.		
5) 1,2-Dichloro-1,1,2,2-t...	4.14	135	1481	N.D.		
6) Vinyl Chloride	4.25	62	57185	1.471	ng	99
7) 1,3-Butadiene	0.00	54	0	N.D.	d	
8) Bromomethane	0.00	94	0	N.D.		
9) Chloroethane	0.00	64	0	N.D.		
10) Ethanol	5.24	45	49	N.D.		
11) Acetonitrile	0.00	41	0	N.D.	d	
12) Acrolein	0.00	56	0	N.D.	d	
13) Acetone	0.00	58	0	N.D.	d	
14) Trichlorofluoromethane	0.00	101	0	N.D.		
15) 2-Propanol (Isopropanol)	6.01	45	167	N.D.		
16) Acrylonitrile	0.00	53	0	N.D.	d	
17) 1,1-Dichloroethene	6.48	96	618	N.D.		
18) 2-Methyl-2-Propanol (t...	6.70	59	926	N.D.		
19) Methylene Chloride	0.00	84	0	N.D.		
20) 3-Chloro-1-propene (Al...	0.00	41	0	N.D.	d	
21) Trichlorotrifluoroethane	0.00	151	0	N.D.		
22) Carbon Disulfide	6.91	76	56138	0.603	ng	94
23) trans-1,2-Dichloroethene	7.65	61	620	N.D.		
24) 1,1-Dichloroethane	8.06	63	817	N.D.		
25) Methyl tert-Butyl Ether	0.00	73	0	N.D.		
26) Vinyl Acetate	0.00	86	0	N.D.	d	
27) 2-Butanone (MEK)	8.35	72	767	N.D.		
28) cis-1,2-Dichloroethene	8.73	61	24856	0.757	ng	97
29) Diisopropyl Ether	0.00	87	0	N.D.	d	
30) Ethyl Acetate	8.98	61	520	N.D.		
31) n-Hexane	8.99	57	784459	18.509	ng	100
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.	d	
40) 1-Butanol	10.51	56	458	N.D.		
41) Benzene	10.51	78	289070	2.771	ng	99
42) Carbon Tetrachloride	0.00	117	0	N.D.		
43) Cyclohexane	10.80	84	73123	1.877	ng	96
44) tert-Amyl Methyl Ether	0.00	73	0	N.D.		
45) 1,2-Dichloropropane	11.24	63	558	N.D.		
46) Bromodichloromethane	0.00	83	0	N.D.	d	
47) Trichloroethene	11.58	130	7990	0.264	ng	100
48) 1,4-Dioxane	0.00	88	0	N.D.		
49) 2,2,4-Trimethylpentane...	0.00	57	0	N.D.	d	

160188
189

Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2016_09\13\09131623.D
Acq On : 13 Sep 2016 22:02 Operator: SC
Sample : P1604352-008 (25mL)
Misc : S29-07211602
ALS Vial : 12 Sample Multiplier: 1

Quant Time: Sep 14 15:40:27 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M

Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
50) Methyl Methacrylate	0.00	100	0	N.D.	d	
51) n-Heptane	11.90	71	246463	9.812	ng	99
52) cis-1,3-Dichloropropene	0.00	75	0	N.D.		
53) 4-Methyl-2-pentanone	12.51	58	670	N.D.		
54) trans-1,3-Dichloropropene	0.00	75	0	N.D.		
55) 1,1,2-Trichloroethane	0.00	97	0	N.D.	d	
58) Toluene	13.42	91	29410	0.259	ng	100
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	14.44	57	108772	4.830	ng	98
64) Tetrachloroethene	0.00	166	0	N.D.		
65) Chlorobenzene	0.00	112	0	N.D.	d	
66) Ethylbenzene	15.68	91	19951	0.168	ng	91
67) m- & p-Xylenes	15.86	91	49399	0.513	ng	100
68) Bromoform	0.00	173	0	N.D.		
69) Styrene	0.00	104	0	N.D.		
70) o-Xylene	16.37	91	17703	0.177	ng	97
71) n-Nonane	0.00	43	0	N.D.	d	
72) 1,1,2,2-Tetrachloroethane	0.00	83	0	N.D.	d	
74) Cumene	16.99	105	20389	0.160	ng	99
75) alpha-Pinene	0.00	93	0	N.D.	d	
76) n-Propylbenzene	0.00	91	0	N.D.	d	
77) 3-Ethyltoluene	0.00	105	0	N.D.	d	
78) 4-Ethyltoluene	17.68	105	8646	N.D.		
79) 1,3,5-Trimethylbenzene	17.76	105	19367	0.187	ng	100
80) alpha-Methylstyrene	0.00	118	0	N.D.		
81) 2-Ethyltoluene	0.00	105	0	N.D.	d	
82) 1,2,4-Trimethylbenzene	18.19	105	33996	0.334	ng	92
83) n-Decane	0.00	57	0	N.D.	d	
84) Benzyl Chloride	0.00	91	0	N.D.	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	0.00	146	0	N.D.		
91) d-Limonene	0.00	68	0	N.D.	d	
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	20.58	180	846	N.D.		
95) Naphthalene	20.73	128	507	N.D.		
96) n-Dodecane	20.73	57	3438	N.D.		
97) Hexachlorobutadiene	0.00	225	0	N.D.		
98) Cyclohexanone	0.00	55	0	N.D.	d	
99) tert-Butylbenzene	0.00	119	0	N.D.	d	
100) n-Butylbenzene	0.00	91	0	N.D.	d	

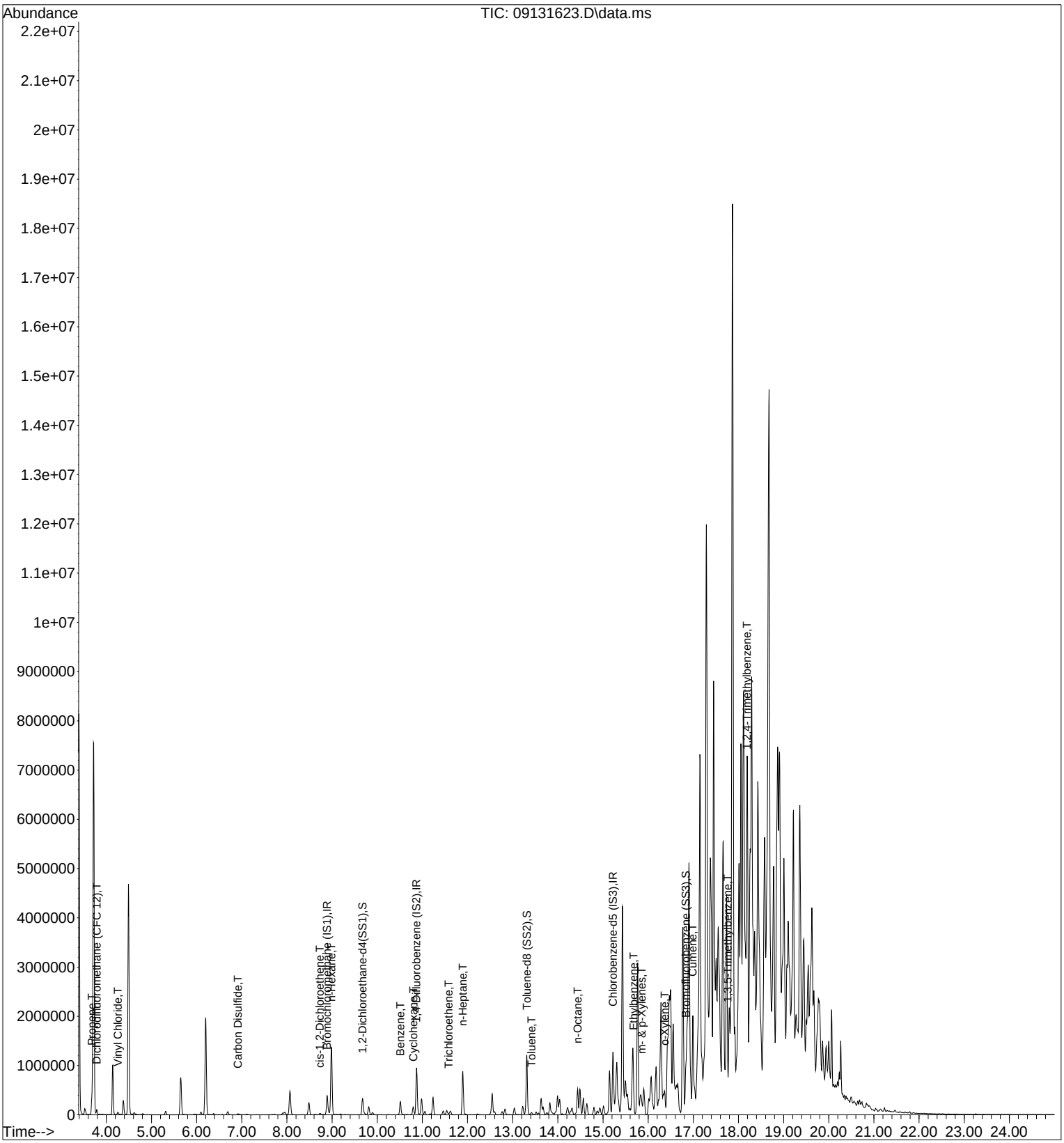
(#) = qualifier out of range (m) = manual integration (+) = signals summed

160918
190

Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2016_09\13\09131623.D
Acq On : 13 Sep 2016 22:02 Operator: SC
Sample : P1604352-008 (25mL)
Misc : S29-07211602
ALS Vial : 12 Sample Multiplier: 1

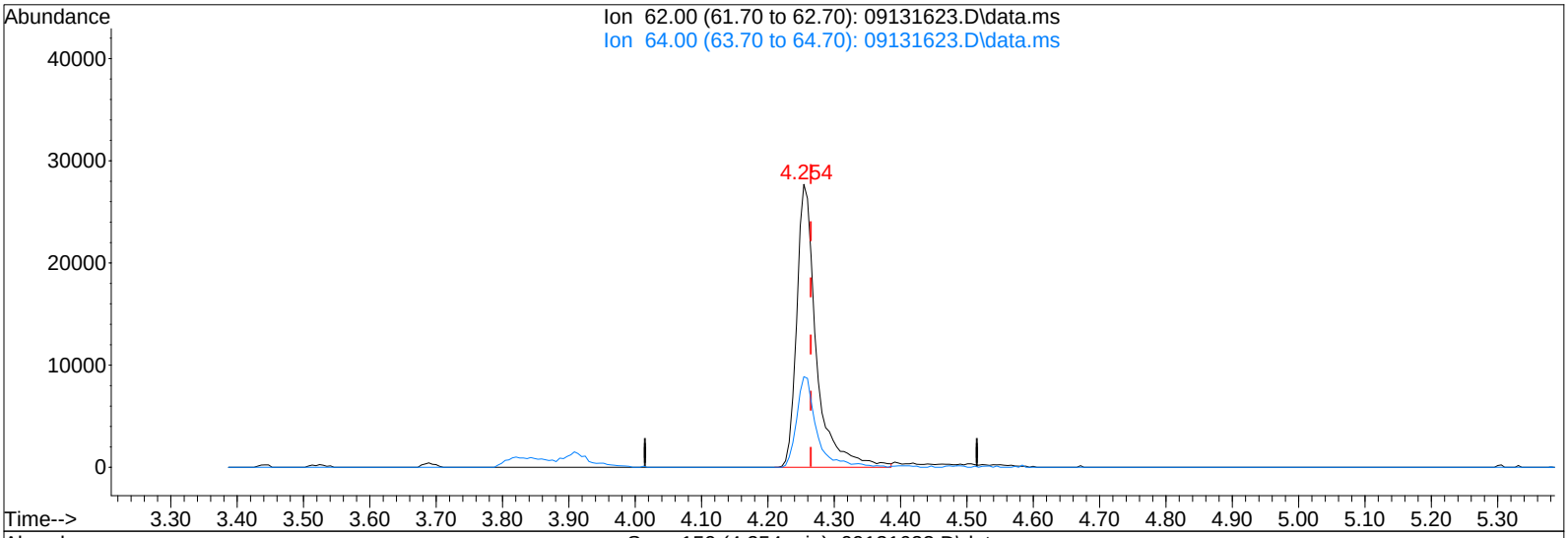
Quant Time: Sep 14 15:40:27 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M

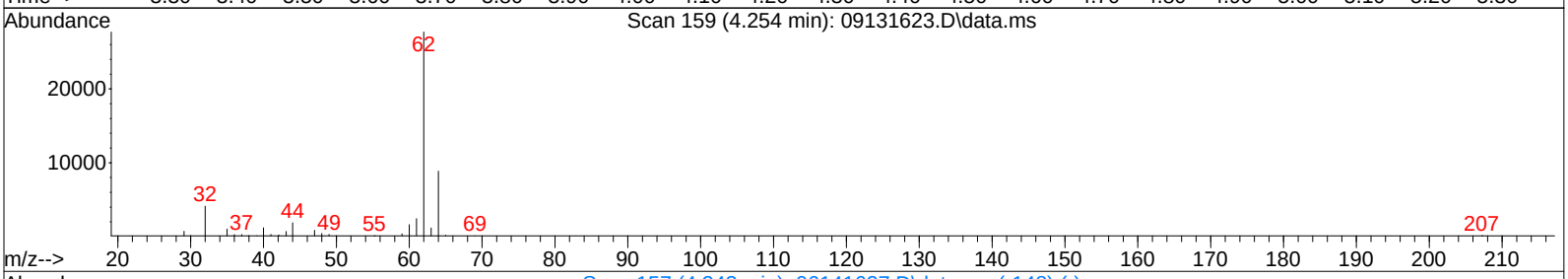


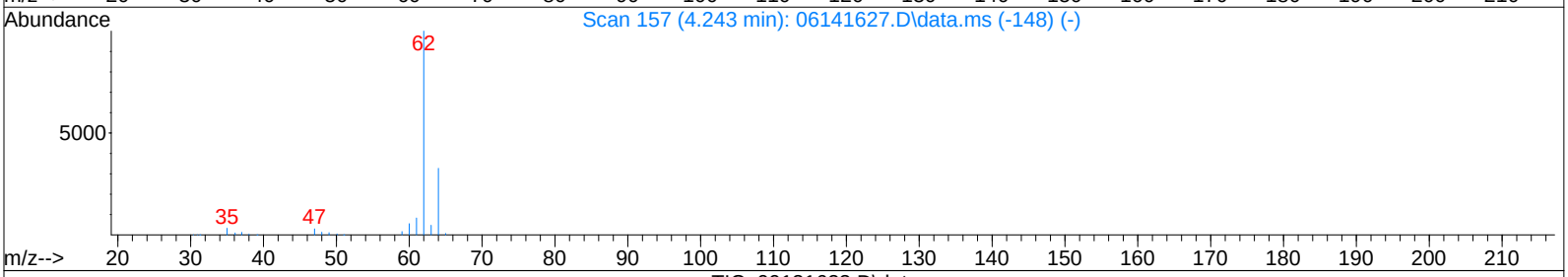
Quantitation Report (Qedit)

Data File: I:\MS09\Data\2016_09\13\09131623.D
Acq On : 13 Sep 2016 22:02 Operator: SC
Sample : P1604352-008 (25mL)
Misc : S29-07211602
ALS Vial : 12 Sample Multiplier: 1

Quant Time: Sep 14 09:01:37 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M







TIC: 09131623.D\data.ms

(6) Vinyl Chloride (T)

4.254min (-0.011) 1.47ng

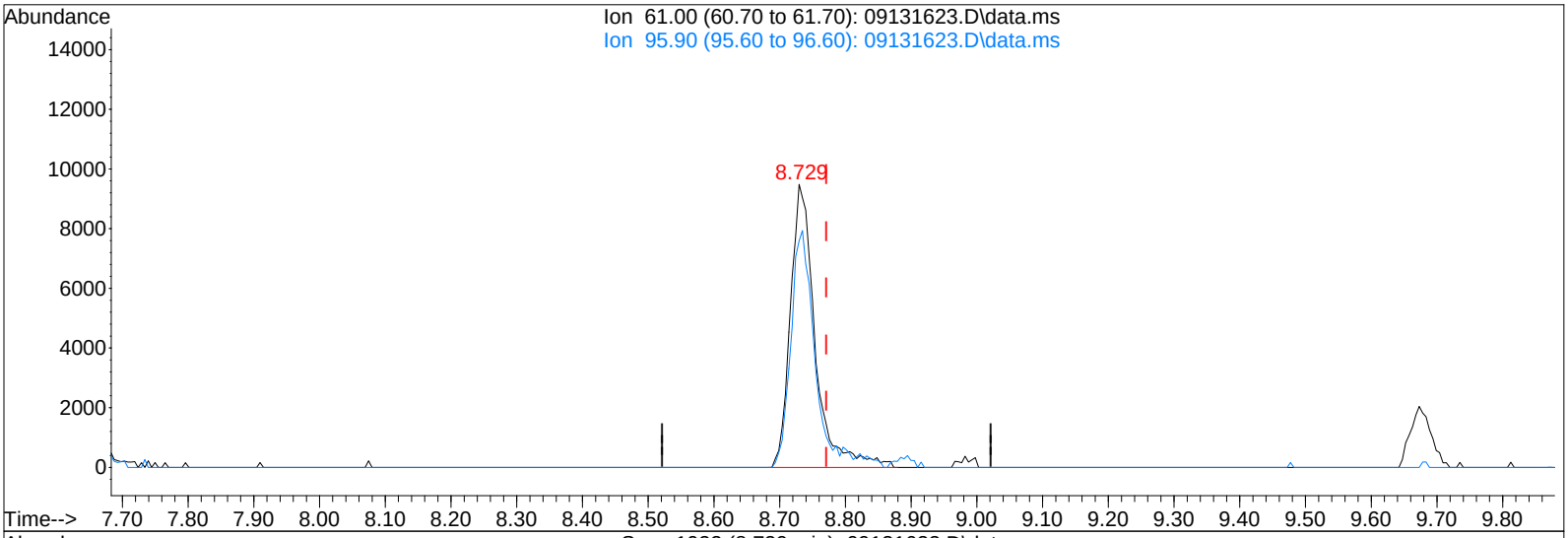
response 57185

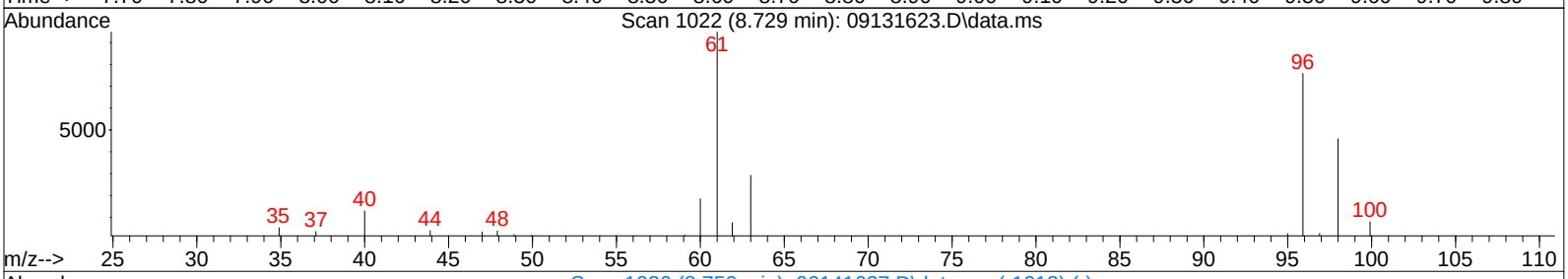
Ion	Exp%	Act%
62.00	100	100
64.00	32.30	32.61
0.00	0.00	0.00
0.00	0.00	0.00

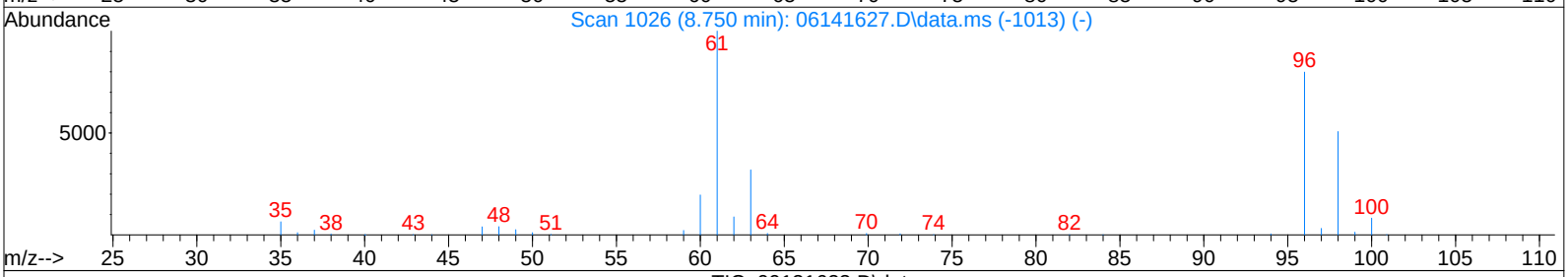
Quantitation Report (Qedit)

Data File: I:\MS09\Data\2016_09\13\09131623.D
Acq On : 13 Sep 2016 22:02 Operator: SC
Sample : P1604352-008 (25mL)
Misc : S29-07211602
ALS Vial : 12 Sample Multiplier: 1

Quant Time: Sep 14 09:01:37 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M







TIC: 09131623.D\data.ms

(28) cis-1,2-Dichloroethene (T)

8.729min (-0.042) 0.76ng

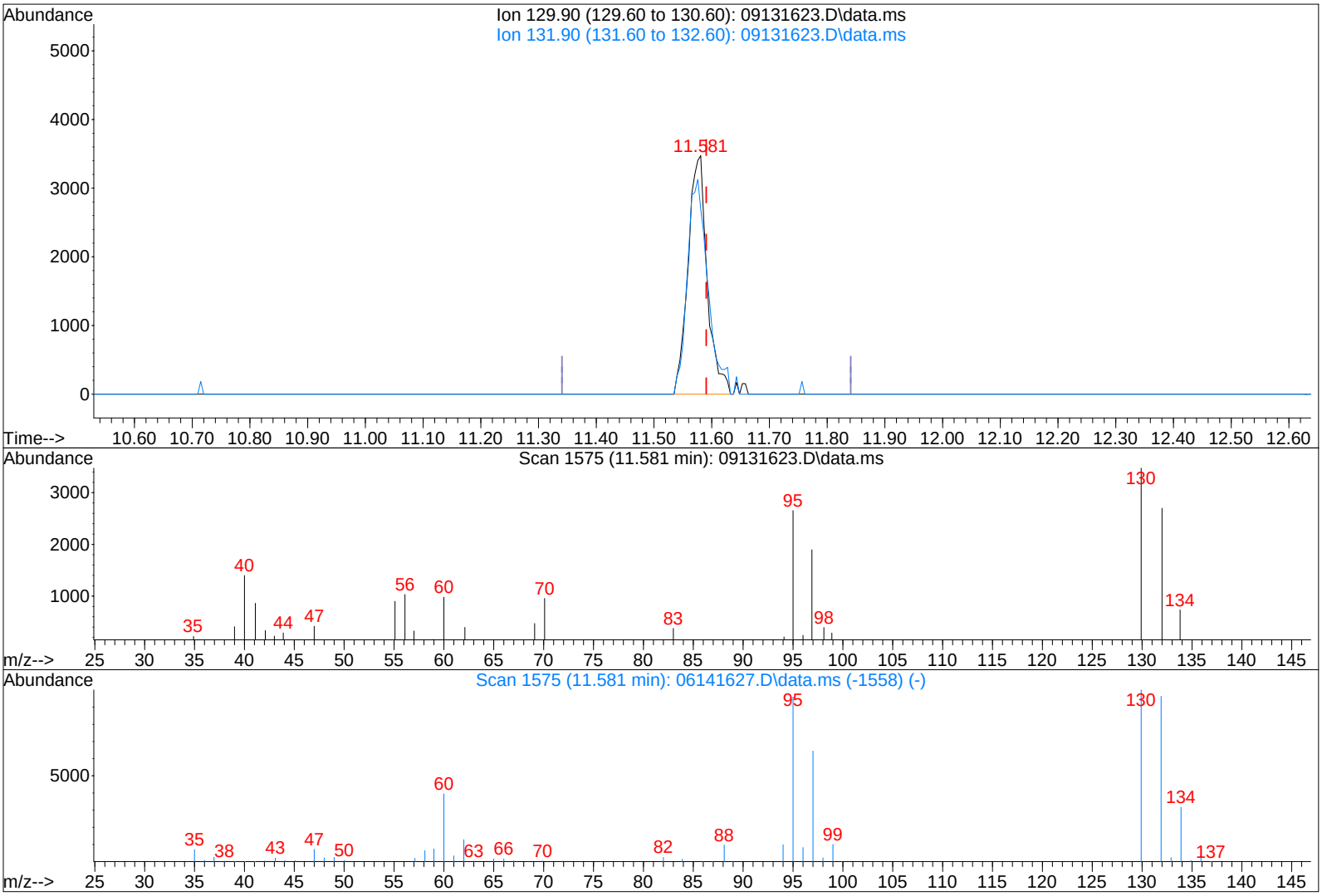
response 24856

Ion	Exp%	Act%
61.00	100	100
95.90	80.00	77.47
0.00	0.00	0.00
0.00	0.00	0.00

Quantitation Report (Qedit)

Data File : I:\MS09\Data\2016_09\13\09131623.D Vial: 12
Acq On : 13 Sep 2016 22:02 Operator: SC
Sample : P1604352-008 (25mL) Inst : MS09
Misc : S29-07211602

Quant Time: Sep 14 15:40:27 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M



TIC: 09131623.D\data.ms

(47) Trichloroethene (T)

11.581min (-0.010) 0.26ng

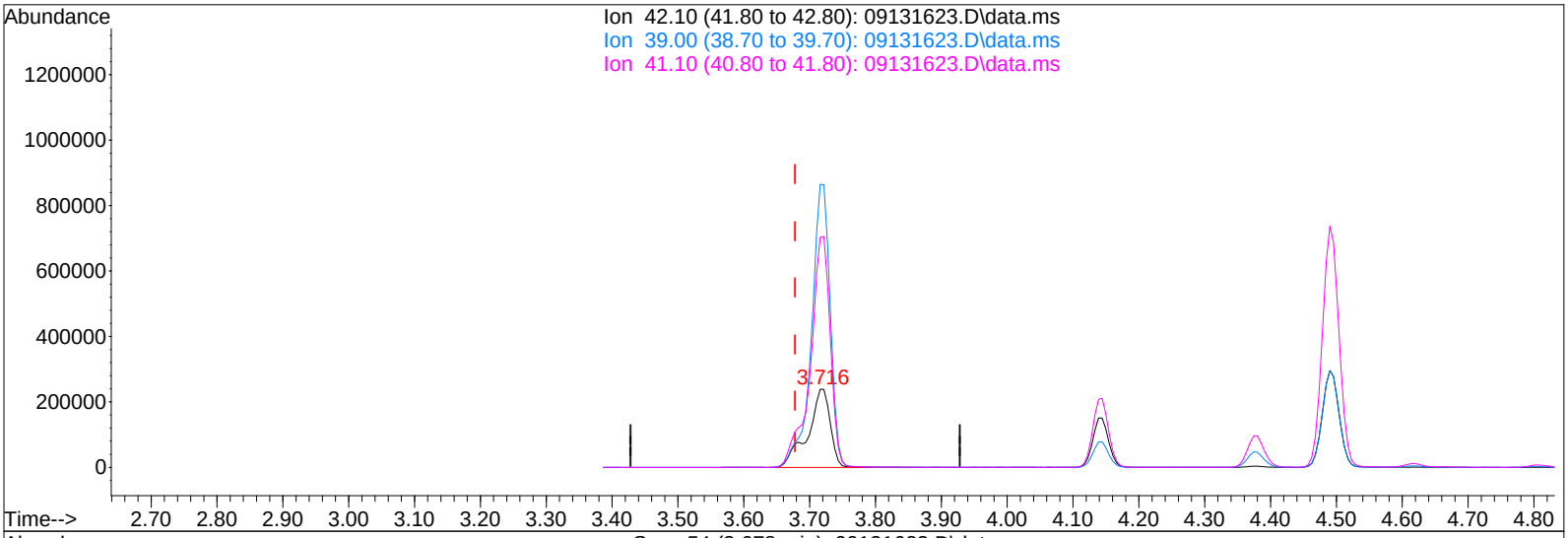
response 7990

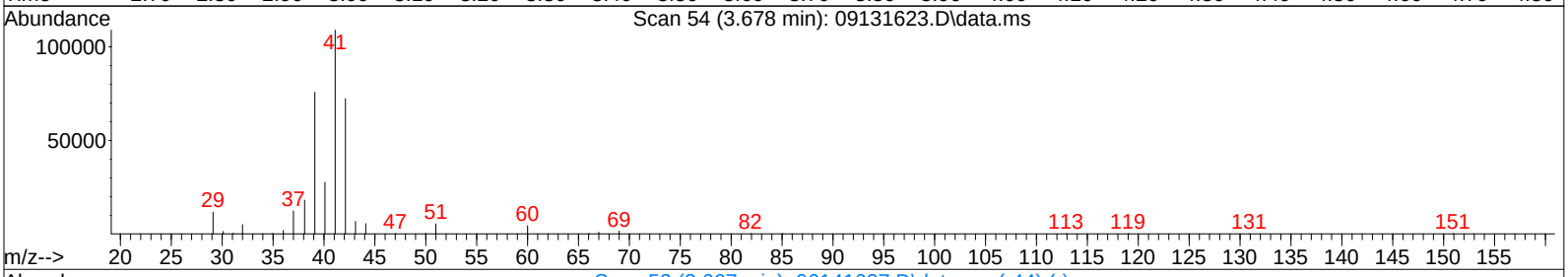
Ion	Exp%	Act%
129.90	100	100
131.90	96.30	96.70
0.00	0.00	0.00
0.00	0.00	0.00

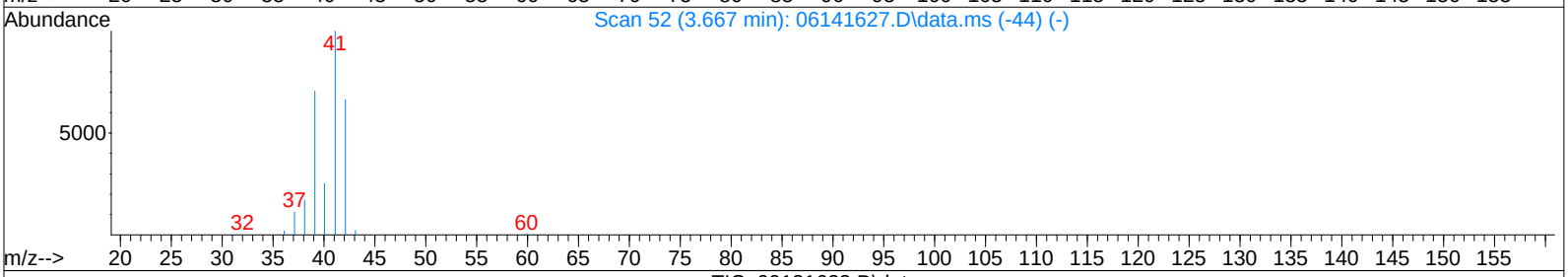
Quantitation Report (Qedit)

Data File: I:\MS09\Data\2016_09\13\09131623.D
Acq On : 13 Sep 2016 22:02 Operator: SC
Sample : P1604352-008 (25mL)
Misc : S29-07211602
ALS Vial : 12 Sample Multiplier: 1

Quant Time: Sep 14 09:01:37 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M







TIC: 09131623.D\data.ms

(2) Propene (T)

3.716min (+0.038) 21.42ng

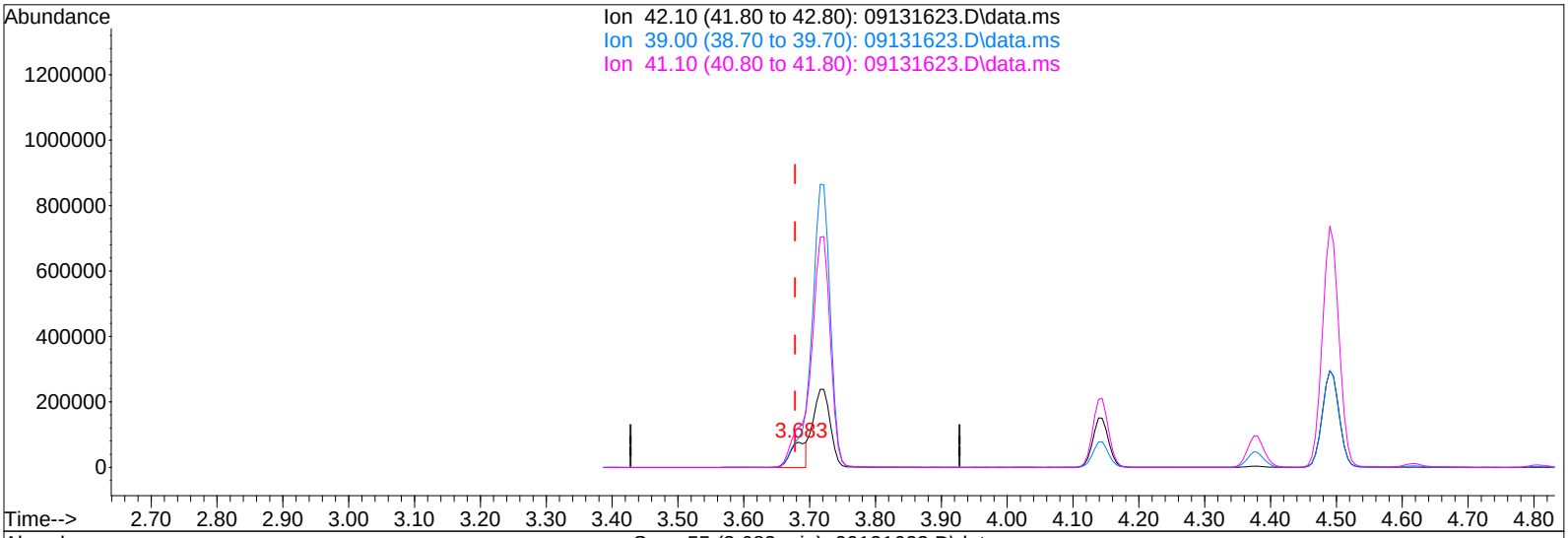
response 565832

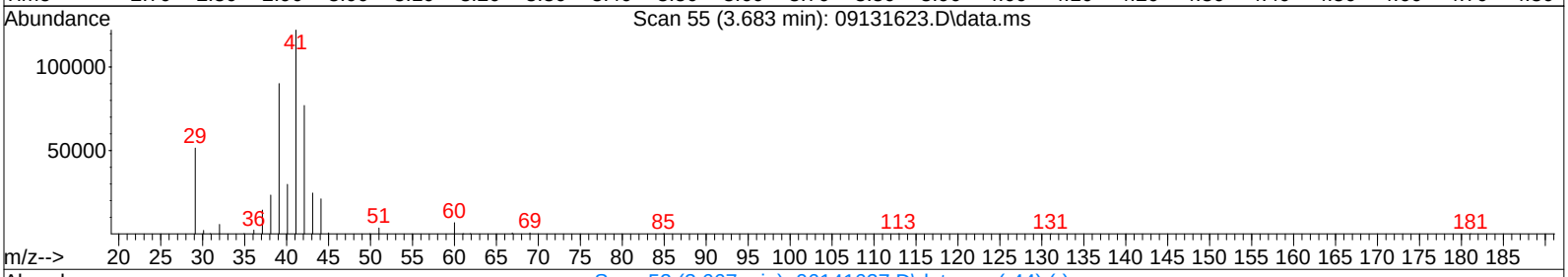
Ion	Exp%	Act%
42.10	100	100
39.00	106.20	304.23#
41.10	150.10	264.61#
0.00	0.00	0.00

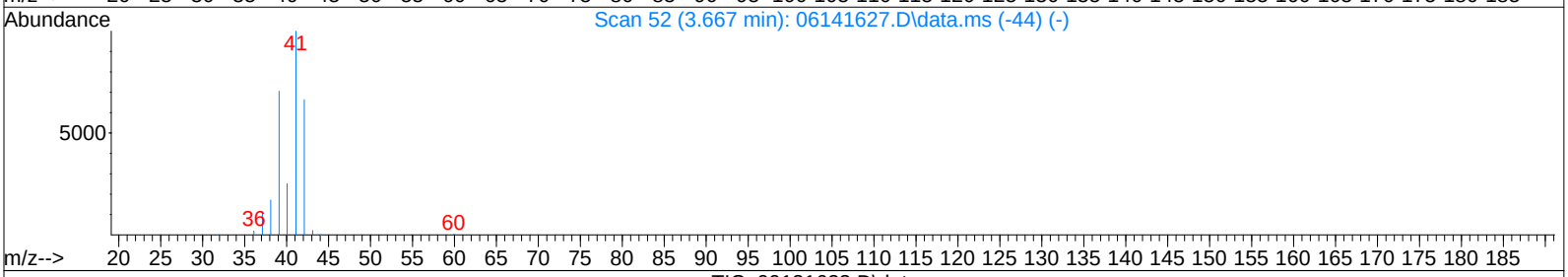
Quantitation Report (Qedit)

Data File: I:\MS09\Data\2016_09\13\09131623.D
Acq On : 13 Sep 2016 22:02 Operator: SC
Sample : P1604352-008 (25mL)
Misc : S29-07211602
ALS Vial : 12 Sample Multiplier: 1

Quant Time: Sep 14 09:01:37 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M







TIC: 09131623.D\data.ms

(2) Propene (T)

3.683min (+0.005) 4.94ng m

response 130496

Ion	Exp%	Act%
42.10	100	100
39.00	106.20	1319.16#
41.10	150.10	1147.34#
0.00	0.00	0.00

IPC

9/14/16 9/26/16

Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2016_09\13\09131624.D
Acq On : 13 Sep 2016 22:36 Operator: SC
Sample : P1604352-009 (270mL)
Misc : S29-07211602
ALS Vial : 13 Sample Multiplier: 1

9/14/16

Quant Time: Sep 14 15:30:52 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M

Internal Standards	R.T.	QIon	Response	Conc Units		Dev(Min)
1) Bromochloromethane (IS1)	8.90	130	198089	12.500 ng		-0.04
37) 1,4-Difluorobenzene (IS2)	10.87	114	922882	12.500 ng		-0.03
56) Chlorobenzene-d5 (IS3)	15.22	82	371419	12.500 ng		0.00
System Monitoring Compounds						
33) 1,2-Dichloroethane-d4(...	9.68	65	265363	11.788 ng		-0.03
Spiked Amount 12.500	Range 70 - 130		Recovery = 94.32%			
57) Toluene-d8 (SS2)	13.31	98	972499	12.571 ng		-0.01
Spiked Amount 12.500	Range 70 - 130		Recovery = 100.56%			
73) Bromofluorobenzene (SS3)	16.83	174	294294	12.511 ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 100.08%			
Target Compounds						Qvalue
2) Propene	3.69	42	2711880m	107.435 ng		
3) Dichlorodifluoromethan...	3.79	85	278749	5.065 ng		100
4) Chloromethane	3.99	50	891	N.D.		
5) 1,2-Dichloro-1,1,2,2-t...	4.14	135	4016	0.143 ng		98
6) Vinyl Chloride	4.25	62	273085	7.350 ng		99
7) 1,3-Butadiene	0.00	54	0	N.D. d		
8) Bromomethane	0.00	94	0	N.D.		
9) Chloroethane	4.94	64	3269	0.183 ng		94
10) Ethanol	5.23	45	106	N.D.		
11) Acetonitrile	0.00	41	0	N.D. d		
12) Acrolein	5.53	56	434	N.D.		
13) Acetone	0.00	58	0	N.D. d		
14) Trichlorofluoromethane	0.00	101	0	N.D.		
15) 2-Propanol (Isopropanol)	0.00	45	0	N.D. d		
16) Acrylonitrile	0.00	53	0	N.D. d		
17) 1,1-Dichloroethene	6.48	96	167434	7.326 ng		98
18) 2-Methyl-2-Propanol (t...	0.00	59	0	N.D. d		
19) Methylene Chloride	6.63	84	1440	N.D.		
20) 3-Chloro-1-propene (Al...	0.00	41	0	N.D. d		
21) Trichlorotrifluoroethane	6.93	151	488	N.D.		
22) Carbon Disulfide	6.90	76	47535	0.534 ng		96
23) trans-1,2-Dichloroethene	7.64	61	505668	16.553 ng		99
24) 1,1-Dichloroethane	7.86	63	2747	N.D.		
25) Methyl tert-Butyl Ether	7.97	73	1224	N.D.		
26) Vinyl Acetate	0.00	86	0	N.D. d		
27) 2-Butanone (MEK)	8.30	72	11793	0.732 ng	#	1
28) cis-1,2-Dichloroethene	8.73	61	4588167	146.143 ng		97
29) Diisopropyl Ether	0.00	87	0	N.D. d		
30) Ethyl Acetate	9.05	61	695	N.D.		
31) n-Hexane	8.99	57	217315	5.365 ng		96
32) Chloroform	9.03	83	8571	0.204 ng		98
34) Tetrahydrofuran (THF)	9.48	72	1357	N.D.		
35) Ethyl tert-Butyl Ether	0.00	87	0	N.D.		
36) 1,2-Dichloroethane	9.81	62	493	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	0.00	56	0	N.D. d		
41) Benzene	10.51	78	745587	7.470 ng		99
42) Carbon Tetrachloride	0.00	117	0	N.D.		
43) Cyclohexane	10.80	84	85704	2.299 ng		94
44) tert-Amyl Methyl Ether	0.00	73	0	N.D.		
45) 1,2-Dichloropropane	11.25	63	438	N.D.		
46) Bromodichloromethane	0.00	83	0	N.D. d		
47) Trichloroethene	11.57	130	2244001	77.503 ng		100
48) 1,4-Dioxane	0.00	88	0	N.D. d		
49) 2,2,4-Trimethylpentane...	0.00	57	0	N.D. d		

1609188
197

Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2016_09\13\09131624.D
Acq On : 13 Sep 2016 22:36 Operator: SC
Sample : P1604352-009 (270mL)
Misc : S29-07211602
ALS Vial : 13 Sample Multiplier: 1

Quant Time: Sep 14 15:30:52 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M

Internal Standards	R.T.	QIon	Response	Conc Units		Dev(Min)
50) Methyl Methacrylate	0.00	100	0	N.D. d		
51) n-Heptane	11.90	71	16785	0.698 ng		88
52) cis-1,3-Dichloropropene	0.00	75	0	N.D.		
53) 4-Methyl-2-pentanone	12.48	58	3128	0.137 ng		86
54) trans-1,3-Dichloropropene	0.00	75	0	N.D.		
55) 1,1,2-Trichloroethane	13.11	97	729	N.D.		
58) Toluene	13.41	91	64121	0.592 ng		97
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	14.31	43	2661	N.D.		
63) n-Octane	14.43	57	3226	0.150 ng	#	83
64) Tetrachloroethene	14.57	166	34770	1.112 ng		100
65) Chlorobenzene	15.28	112	14501m	0.211 ng		
66) Ethylbenzene	15.67	91	23201	0.204 ng		99
67) m- & p-Xylenes	15.85	91	100381	1.092 ng		100
68) Bromoform	0.00	173	0	N.D.		
69) Styrene	16.25	104	2668	N.D.		
70) o-Xylene	16.36	91	61673	0.647 ng		99
71) n-Nonane	0.00	43	0	N.D. d		
72) 1,1,2,2-Tetrachloroethane	16.36	83	1873	N.D.		
74) Cumene	16.99	105	52892	0.435 ng		99
75) alpha-Pinene	17.40	93	87112	1.482 ng		76
76) n-Propylbenzene	0.00	91	0	N.D. d		
77) 3-Ethyltoluene	0.00	105	0	N.D. d		
78) 4-Ethyltoluene	17.67	105	25478	0.233 ng		89
79) 1,3,5-Trimethylbenzene	17.75	105	32579	0.330 ng		100
80) alpha-Methylstyrene	17.92	118	878	N.D.		
81) 2-Ethyltoluene	0.00	105	0	N.D. d		
82) 1,2,4-Trimethylbenzene	18.19	105	120023	1.237 ng		88
83) n-Decane	0.00	57	0	N.D. d		
84) Benzyl Chloride	0.00	91	0	N.D. 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	18.77	146	3941	N.D.		
91) d-Limonene	0.00	68	0	N.D. d		
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	20.59	180	1251	N.D.		
95) Naphthalene	20.70	128	33645	0.240 ng		70
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. d		
99) tert-Butylbenzene	0.00	119	0	N.D. d		
100) n-Butylbenzene	0.00	91	0	N.D. d		

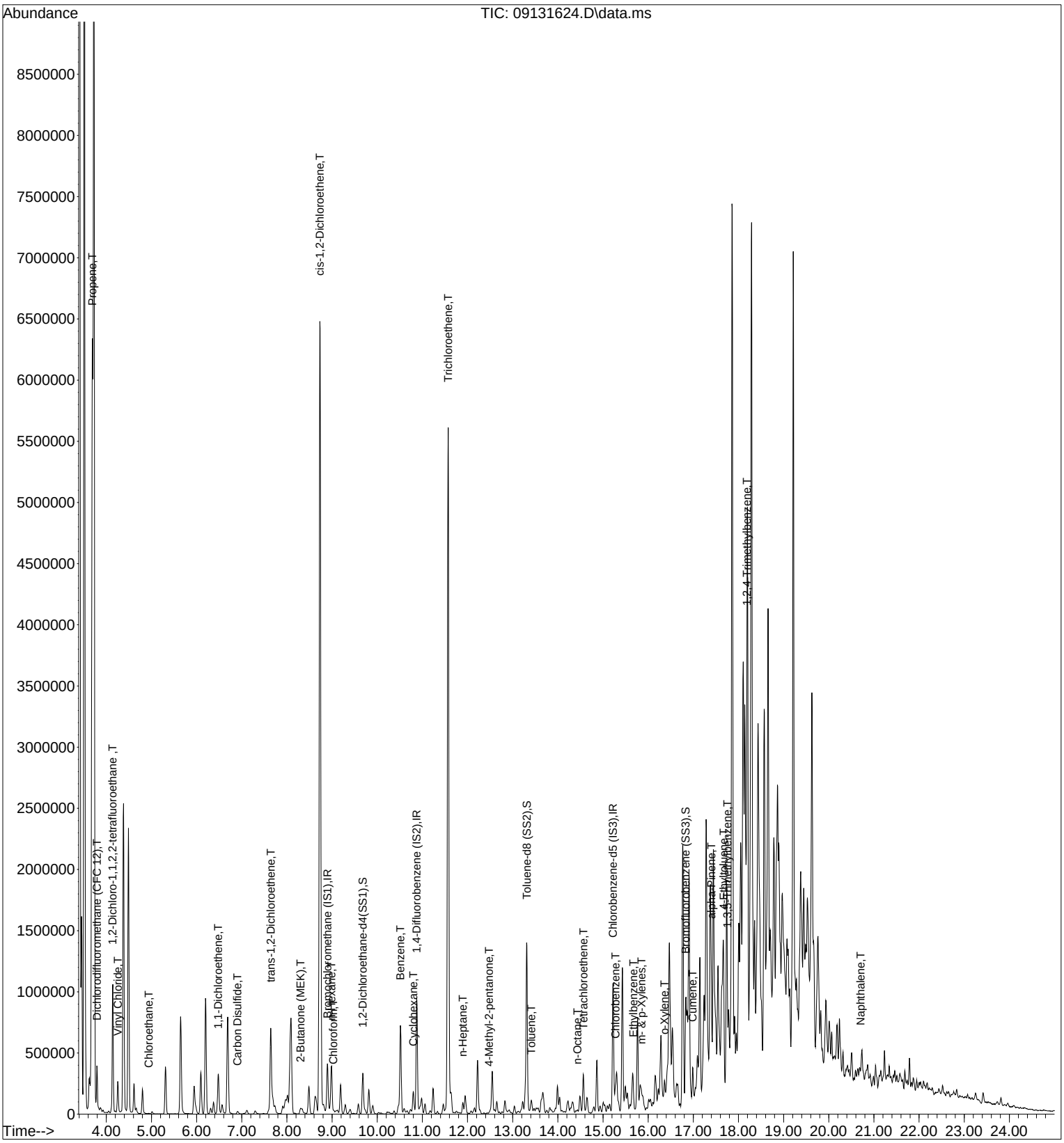
(#) = qualifier out of range (m) = manual integration (+) = signals summed

1609188
198

Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2016_09\13\09131624.D
Acq On : 13 Sep 2016 22:36 Operator: SC
Sample : P1604352-009 (270mL)
Misc : S29-07211602
ALS Vial : 13 Sample Multiplier: 1

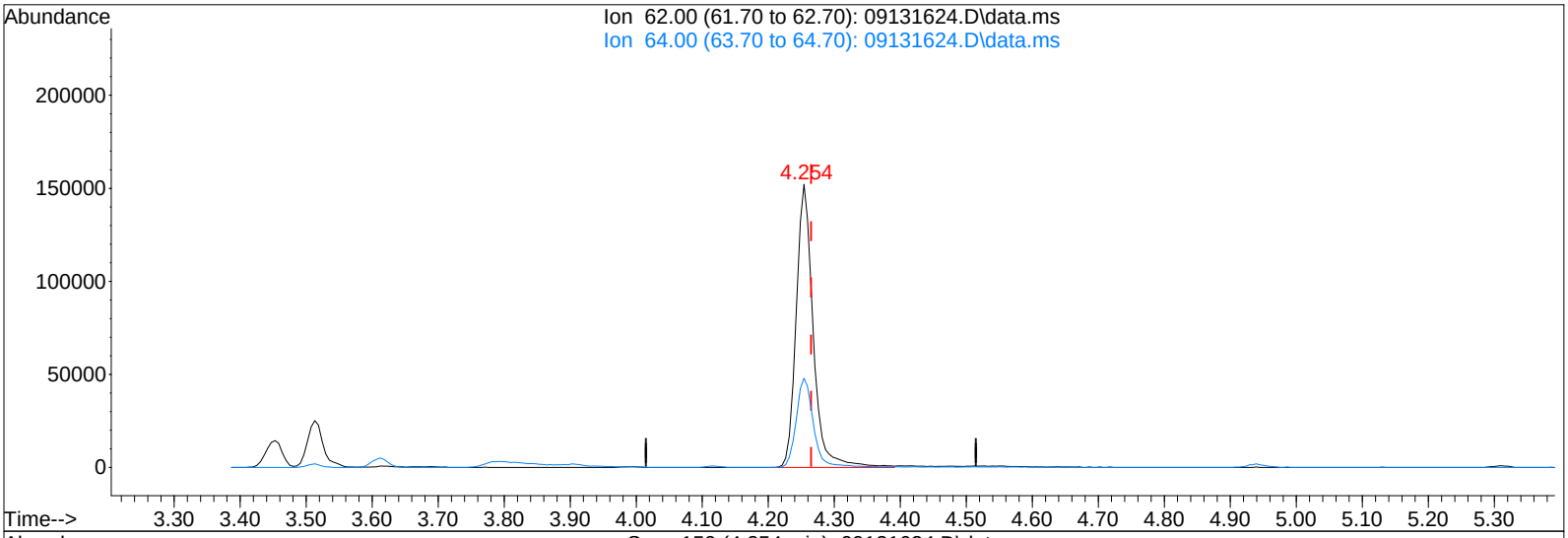
Quant Time: Sep 14 15:30:52 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M

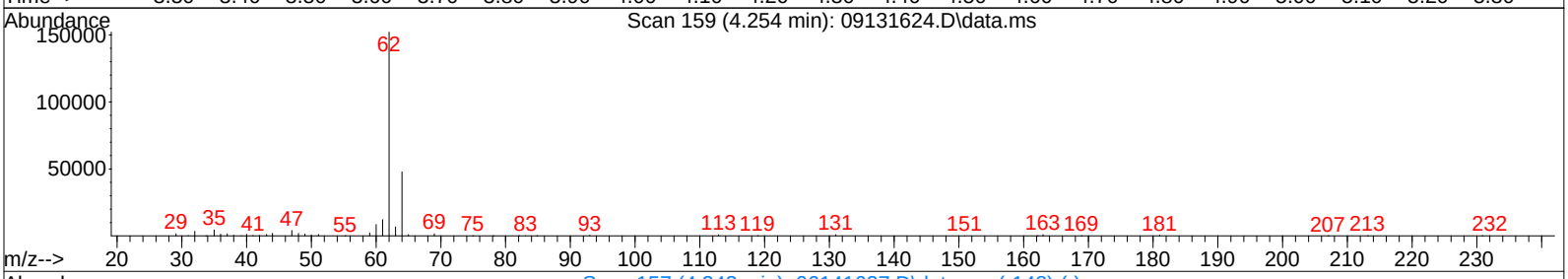


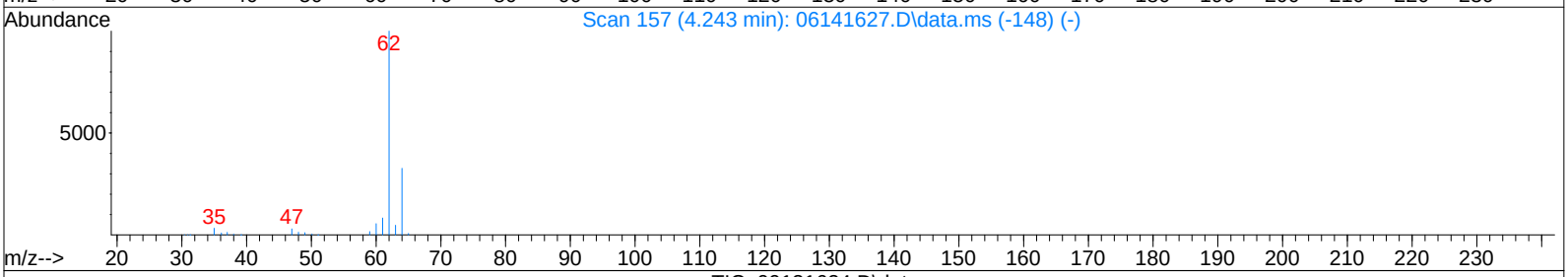
Quantitation Report (Qedit)

Data File: I:\MS09\Data\2016_09\13\09131624.D
Acq On : 13 Sep 2016 22:36 Operator: SC
Sample : P1604352-009 (270mL)
Misc : S29-07211602
ALS Vial : 13 Sample Multiplier: 1

Quant Time: Sep 14 09:01:52 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M







TIC: 09131624.D\data.ms

(6) Vinyl Chloride (T)

4.254min (-0.011) 7.35ng

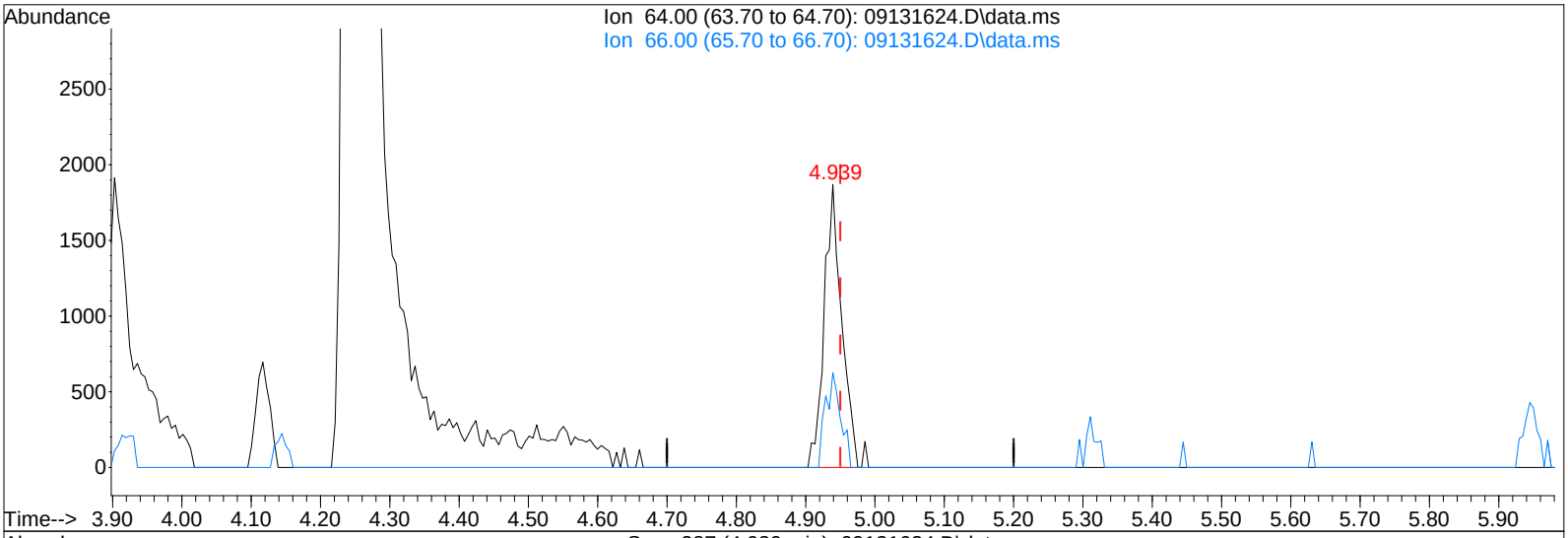
response 273085

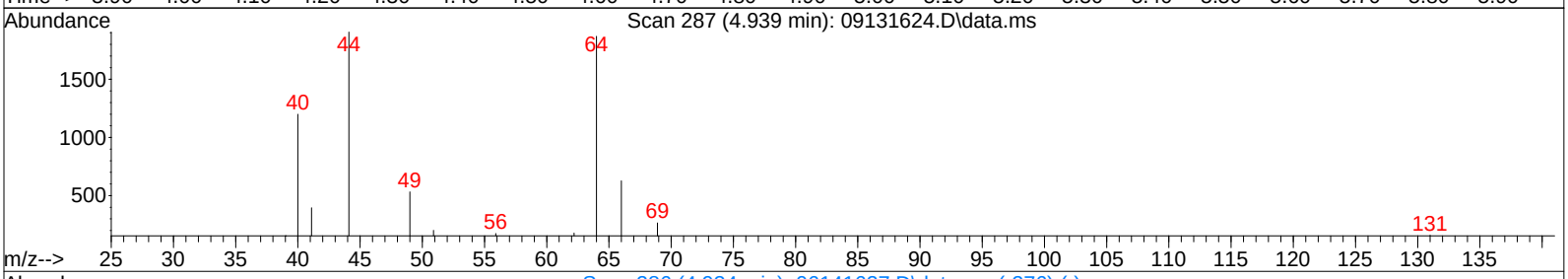
Ion	Exp%	Act%
62.00	100	100
64.00	32.30	31.90
0.00	0.00	0.00
0.00	0.00	0.00

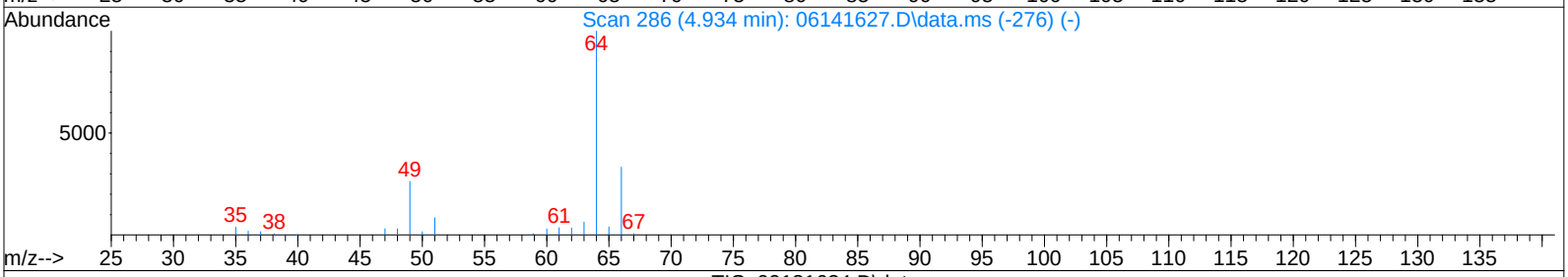
Quantitation Report (Qedit)

Data File: I:\MS09\Data\2016_09\13\09131624.D
Acq On : 13 Sep 2016 22:36 Operator: SC
Sample : P1604352-009 (270mL)
Misc : S29-07211602
ALS Vial : 13 Sample Multiplier: 1

Quant Time: Sep 14 09:01:52 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M







TIC: 09131624.D\data.ms

(9) Chloroethane (T)

4.939min (-0.011) 0.18ng

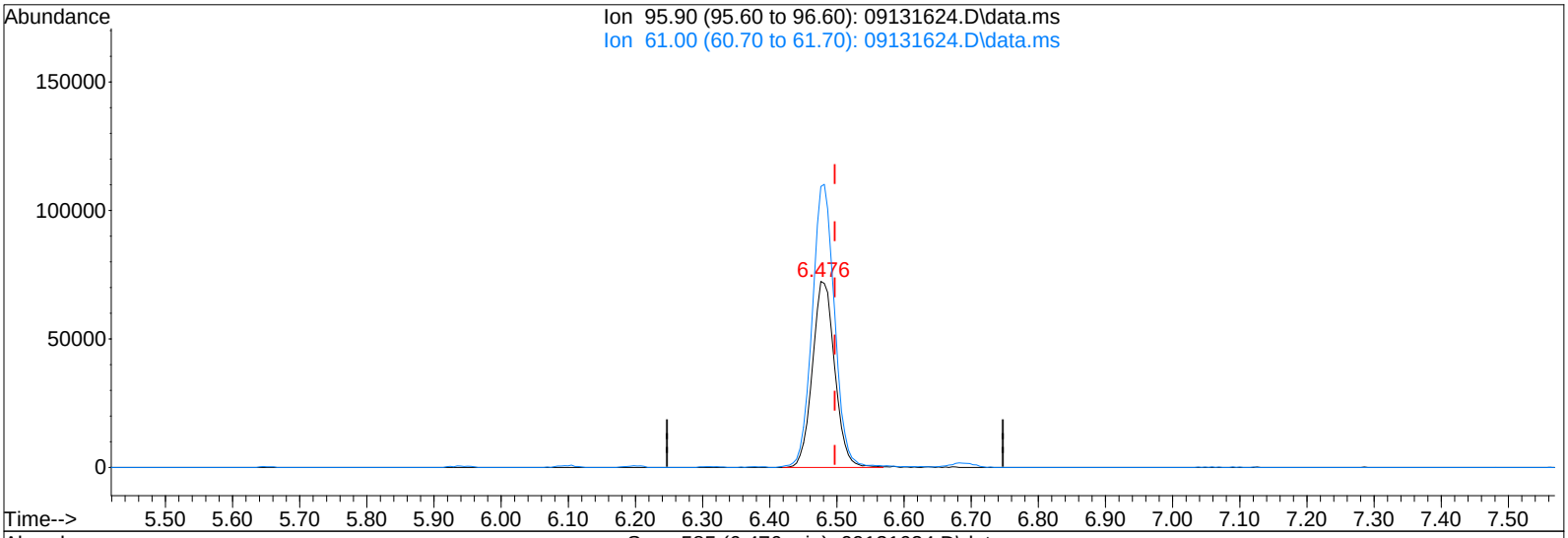
response 3269

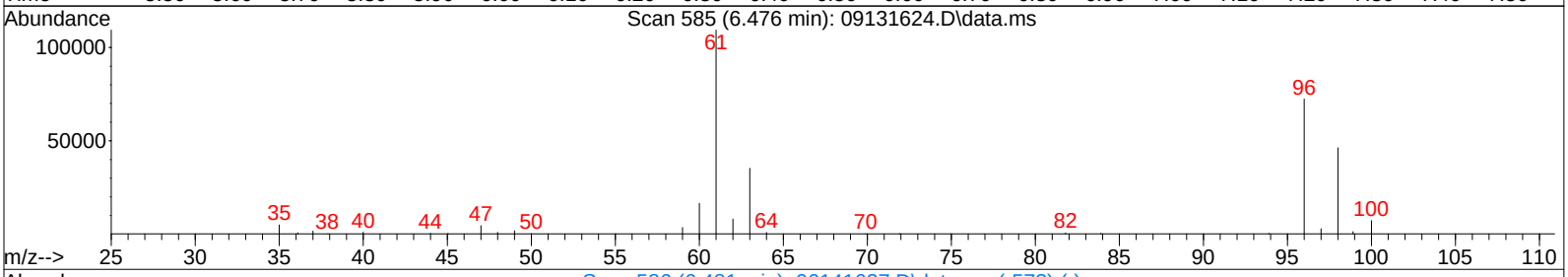
Ion	Exp%	Act%
64.00	100	100
66.00	32.30	29.15
0.00	0.00	0.00
0.00	0.00	0.00

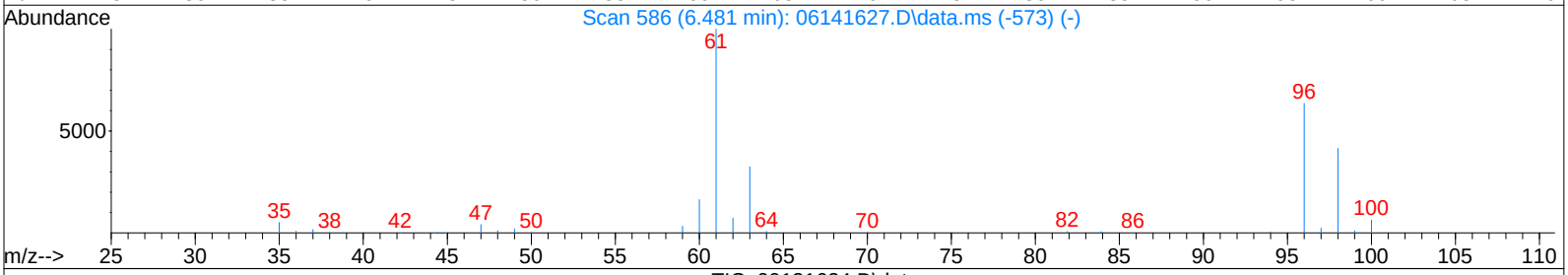
Quantitation Report (Qedit)

Data File: I:\MS09\Data\2016_09\13\09131624.D
Acq On : 13 Sep 2016 22:36 Operator: SC
Sample : P1604352-009 (270mL)
Misc : S29-07211602
ALS Vial : 13 Sample Multiplier: 1

Quant Time: Sep 14 09:01:52 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M







TIC: 09131624.D\data.ms

(17) 1,1-Dichloroethene (T)

6.476min (-0.021) 7.33ng

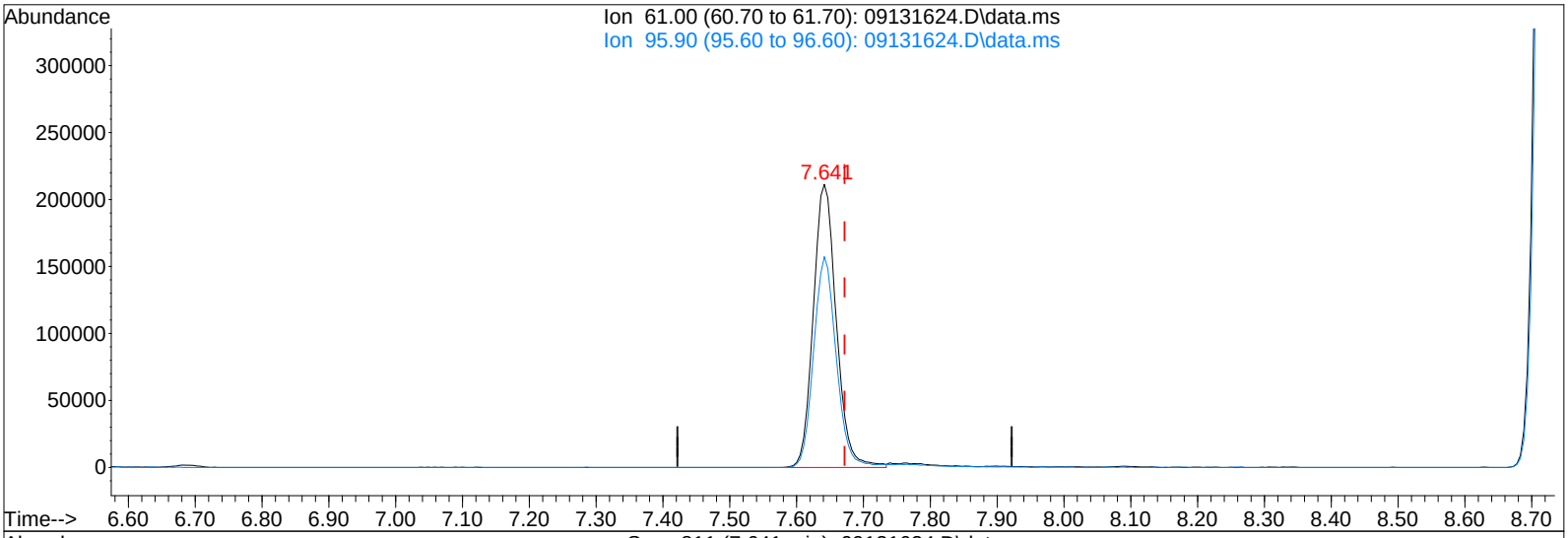
response 167434

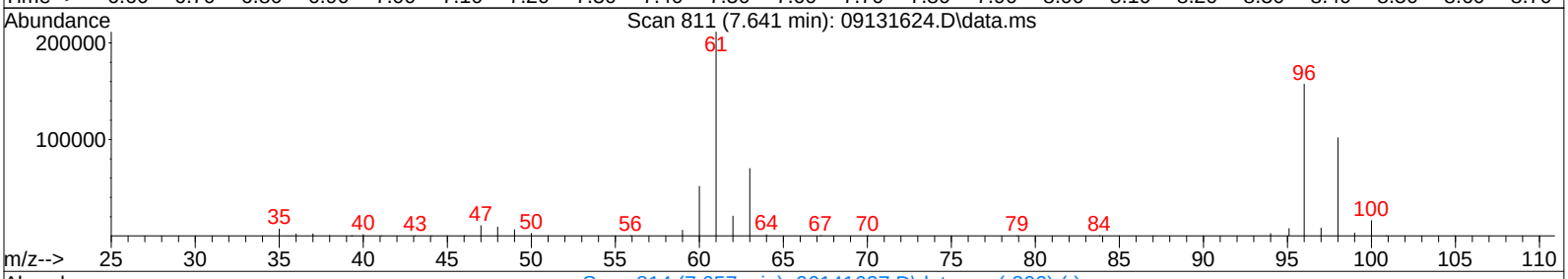
Ion	Exp%	Act%
95.90	100	100
61.00	155.80	153.14
0.00	0.00	0.00
0.00	0.00	0.00

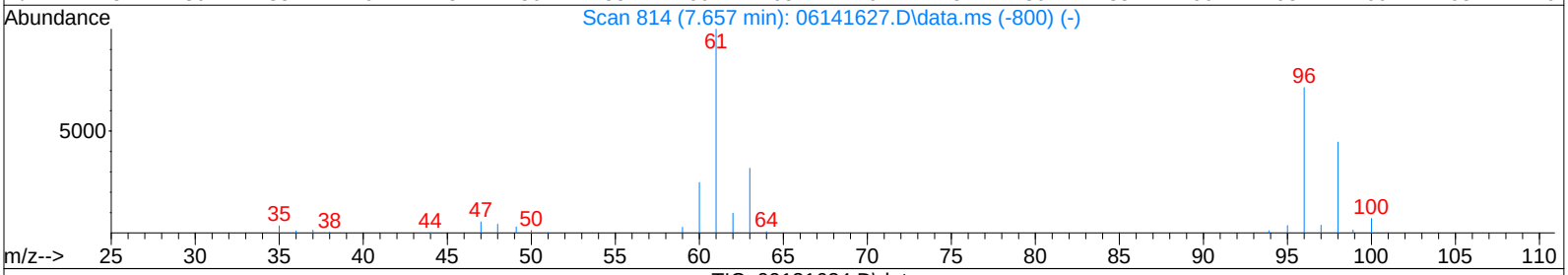
Quantitation Report (Qedit)

Data File: I:\MS09\Data\2016_09\13\09131624.D
Acq On : 13 Sep 2016 22:36 Operator: SC
Sample : P1604352-009 (270mL)
Misc : S29-07211602
ALS Vial : 13 Sample Multiplier: 1

Quant Time: Sep 14 09:01:52 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M







TIC: 09131624.D\data.ms

(23) trans-1,2-Dichloroethene (T)

7.641min (-0.031) 16.55ng

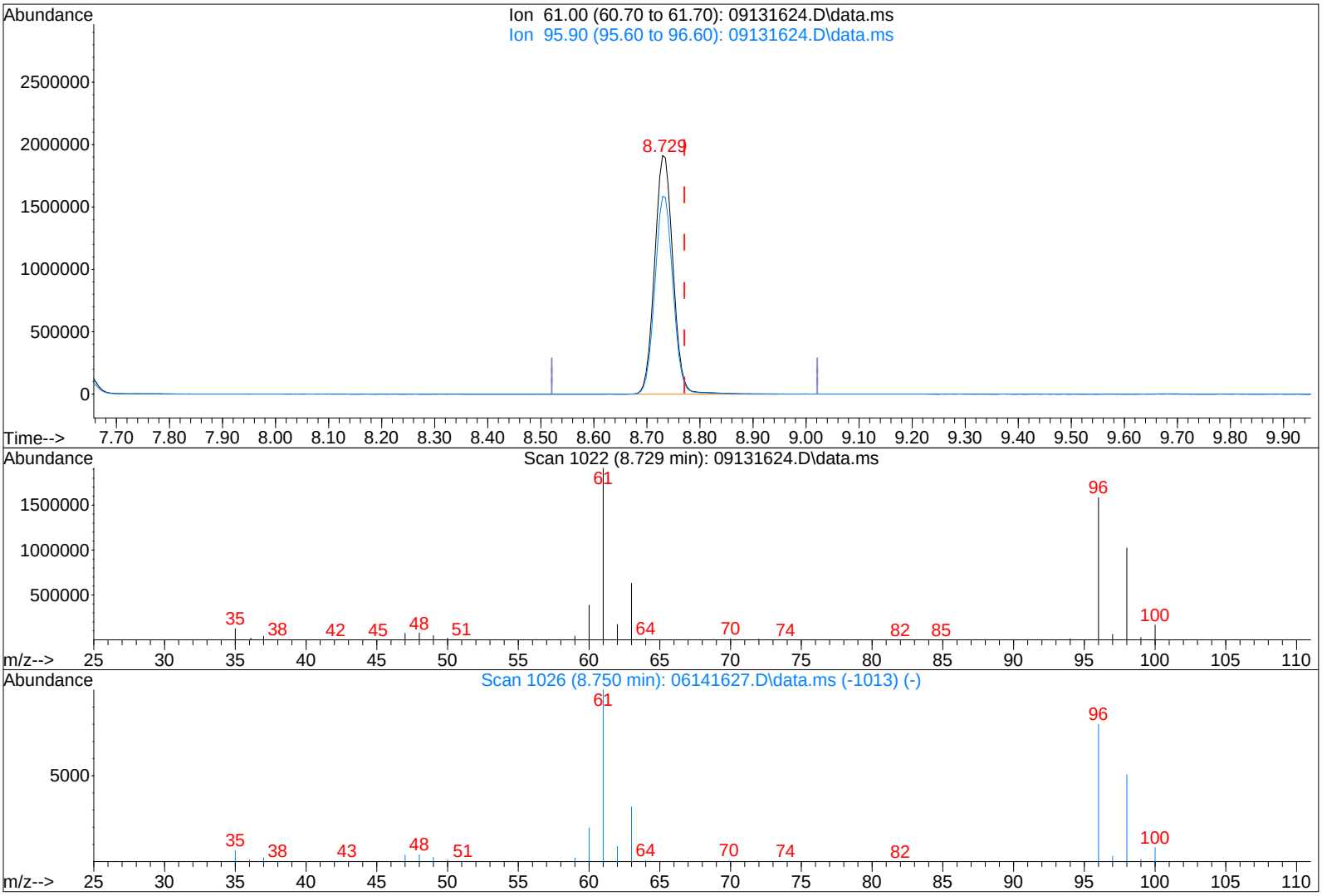
response 505668

Ion	Exp%	Act%
61.00	100	100
95.90	72.50	73.59
0.00	0.00	0.00
0.00	0.00	0.00

Quantitation Report (Qedit)

Data File : I:\MS09\Data\2016_09\13\09131624.D Vial: 13
Acq On : 13 Sep 2016 22:36 Operator: SC
Sample : P1604352-009 (270mL) Inst : MS09
Misc : S29-07211602

Quant Time: Sep 14 15:30:52 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M



TIC: 09131624.D\data.ms

(28) cis-1,2-Dichloroethene (T)

8.729min (-0.042) 146.14ng

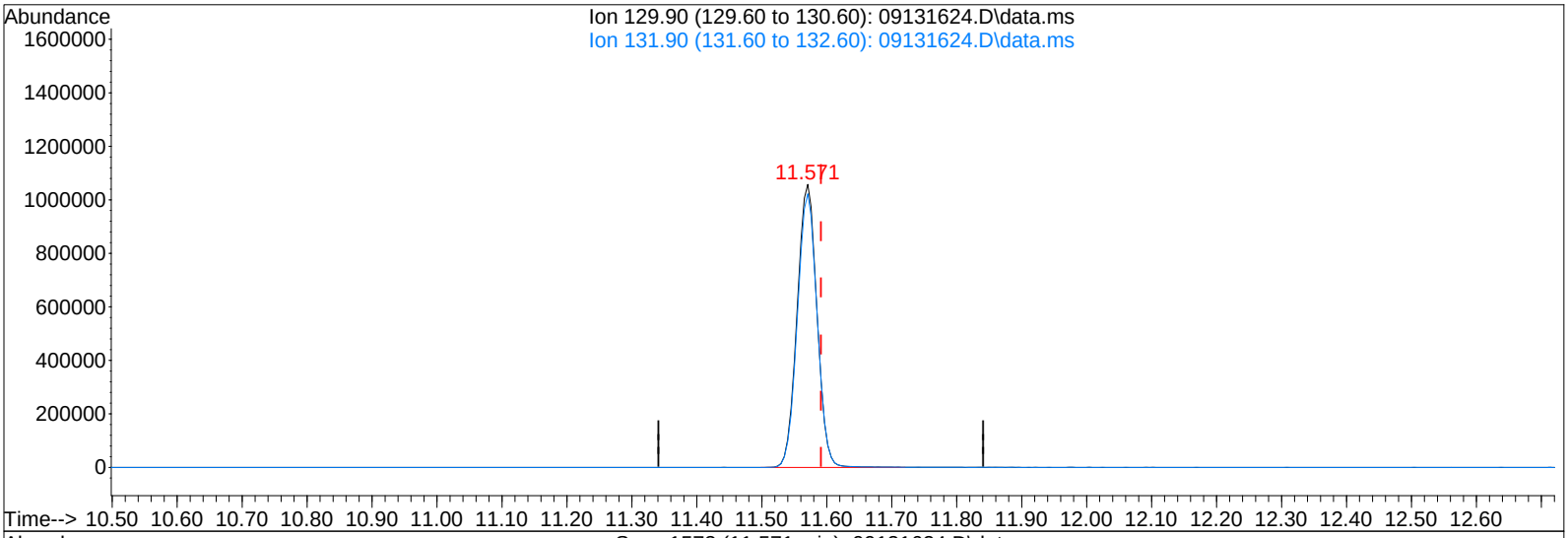
response 4588167

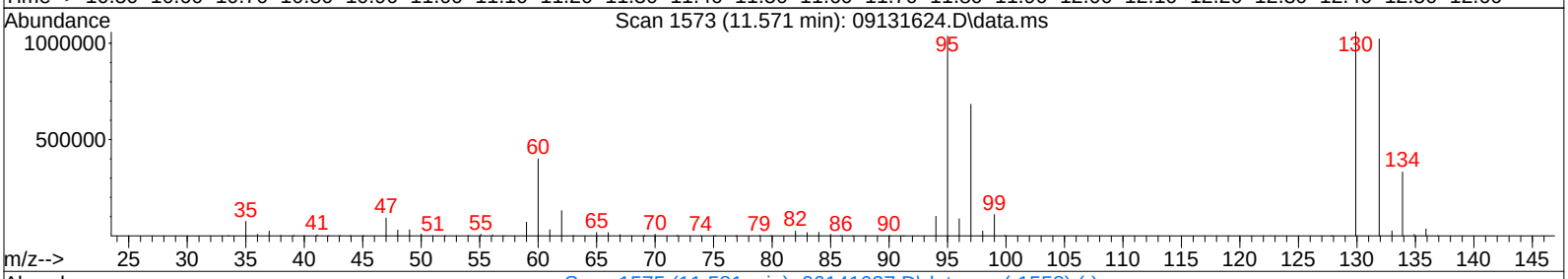
Ion	Exp%	Act%
61.00	100	100
95.90	80.00	82.44
0.00	0.00	0.00
0.00	0.00	0.00

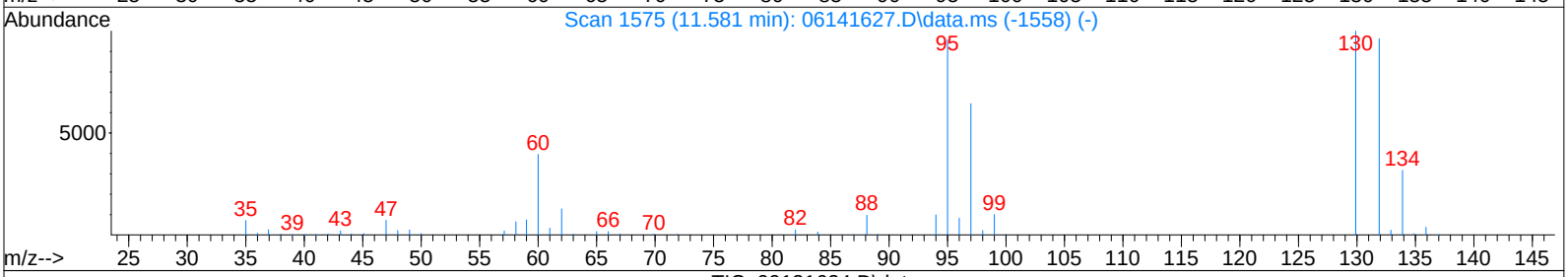
Quantitation Report (Qedit)

Data File: I:\MS09\Data\2016_09\13\09131624.D
Acq On : 13 Sep 2016 22:36 Operator: SC
Sample : P1604352-009 (270mL)
Misc : S29-07211602
ALS Vial : 13 Sample Multiplier: 1

Quant Time: Sep 14 09:01:52 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M







TIC: 09131624.D\data.ms

(47) Trichloroethene (T)

11.571min (-0.020) 77.50ng

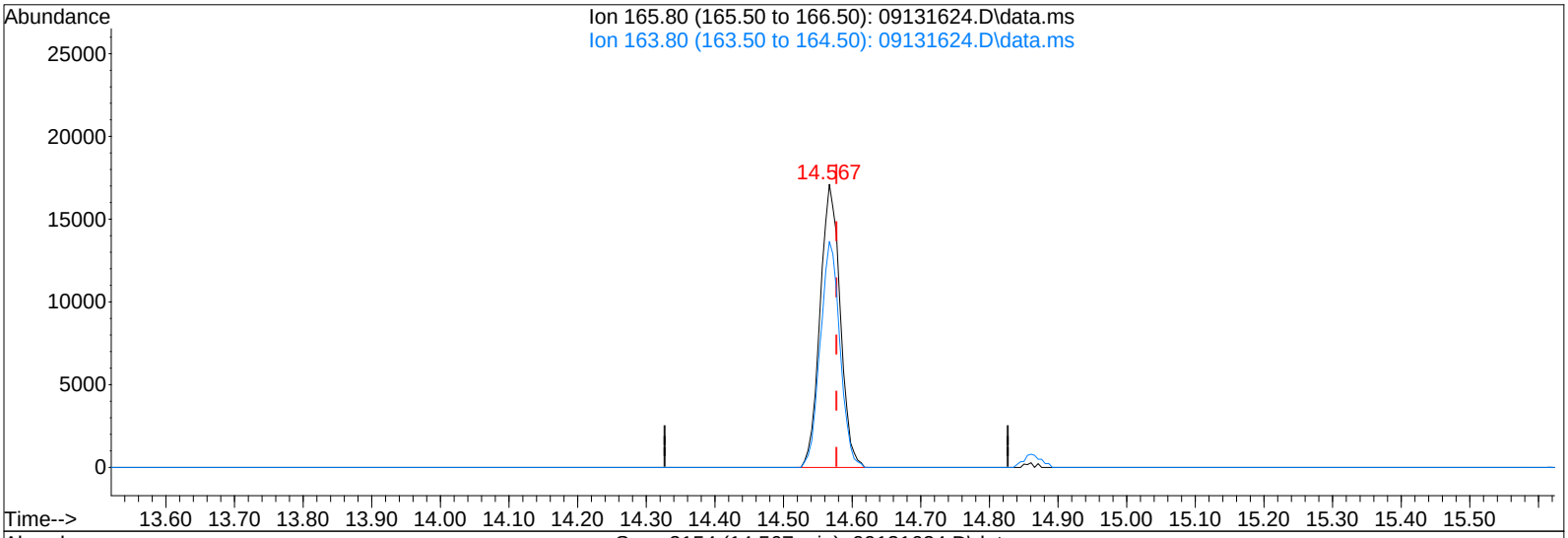
response 2244001

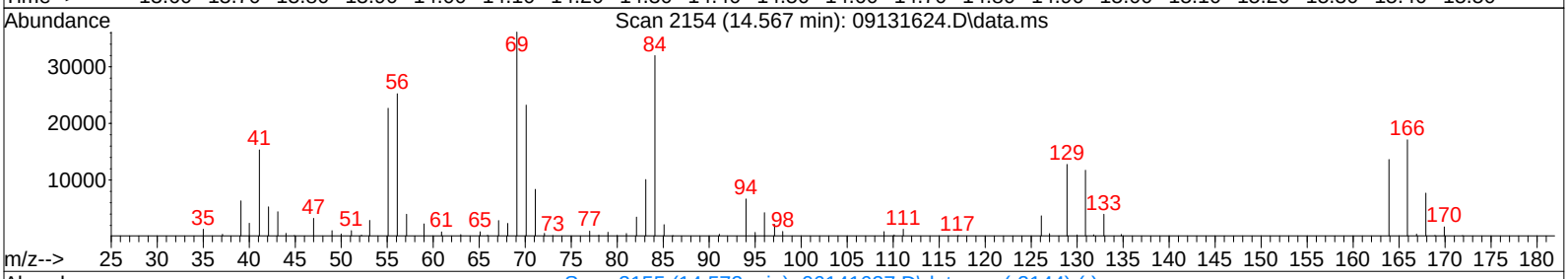
Ion	Exp%	Act%
129.90	100	100
131.90	96.30	96.43
0.00	0.00	0.00
0.00	0.00	0.00

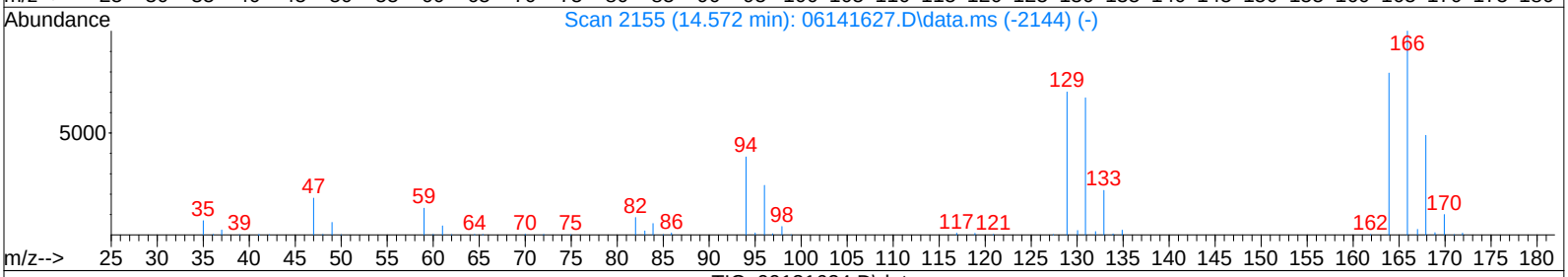
Quantitation Report (Qedit)

Data File: I:\MS09\Data\2016_09\13\09131624.D
Acq On : 13 Sep 2016 22:36 Operator: SC
Sample : P1604352-009 (270mL)
Misc : S29-07211602
ALS Vial : 13 Sample Multiplier: 1

Quant Time: Sep 14 09:01:52 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M







TIC: 09131624.D\data.ms

(64) Tetrachloroethene (T)

14.567min (-0.010) 1.11ng

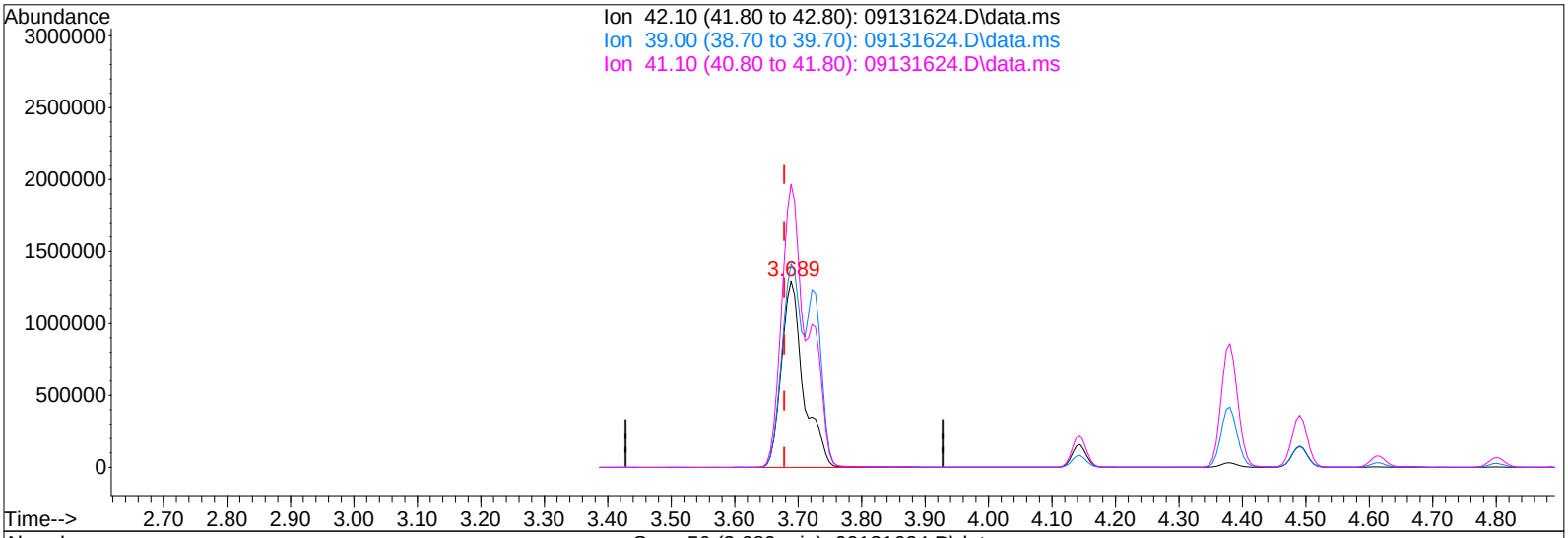
response 34770

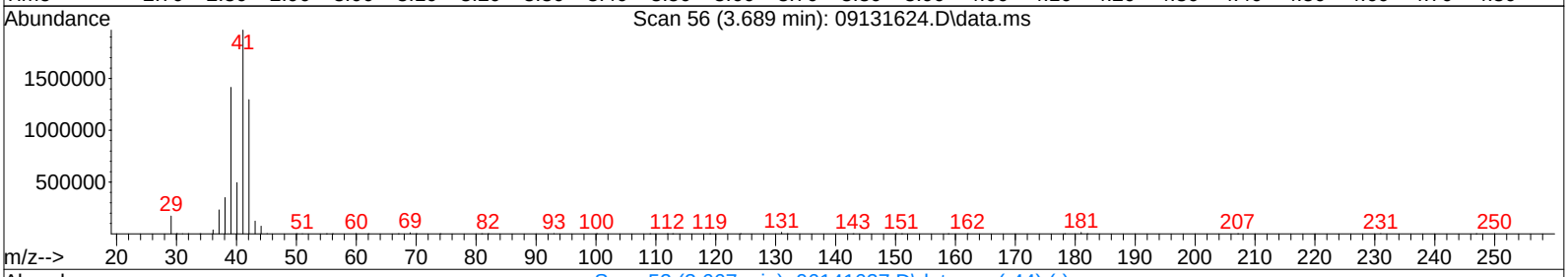
Ion	Exp%	Act%
165.80	100	100
163.80	78.40	78.31
0.00	0.00	0.00
0.00	0.00	0.00

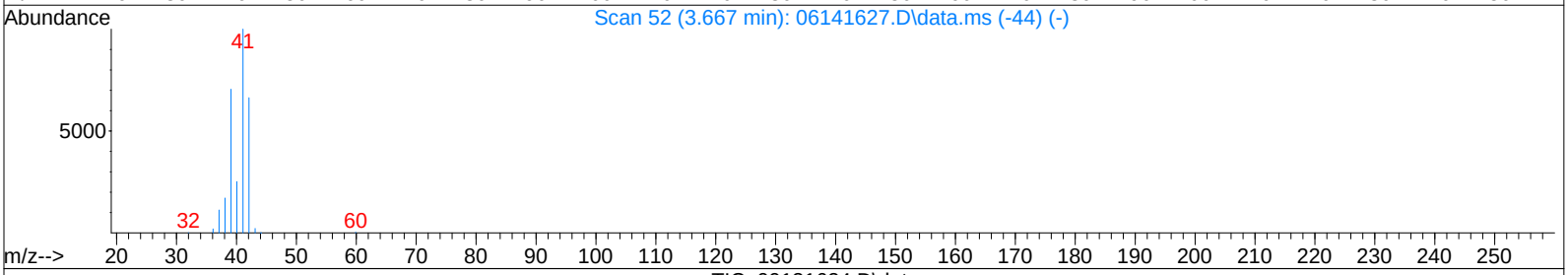
Quantitation Report (Qedit)

Data File: I:\MS09\Data\2016_09\13\09131624.D
Acq On : 13 Sep 2016 22:36 Operator: SC
Sample : P1604352-009 (270mL)
Misc : S29-07211602
ALS Vial : 13 Sample Multiplier: 1

Quant Time: Sep 14 09:01:52 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M







TIC: 09131624.D\data.ms

(2) Propene (T)

3.689min (+0.011) 124.71ng

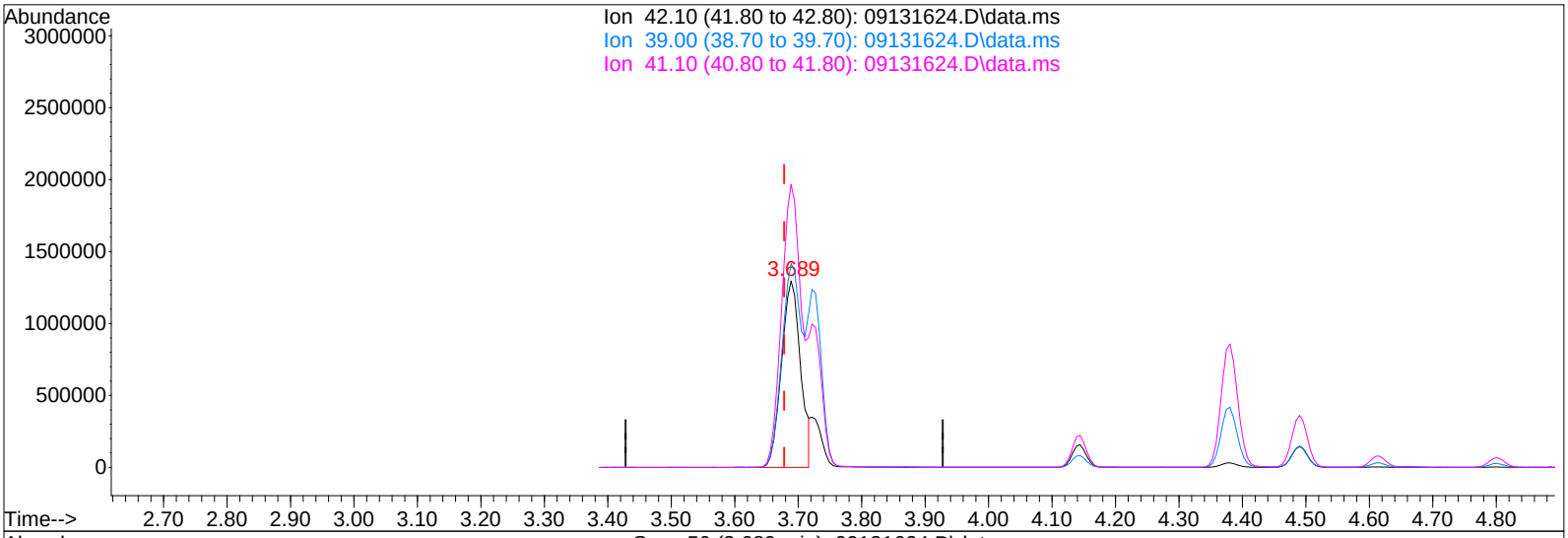
response 3148041

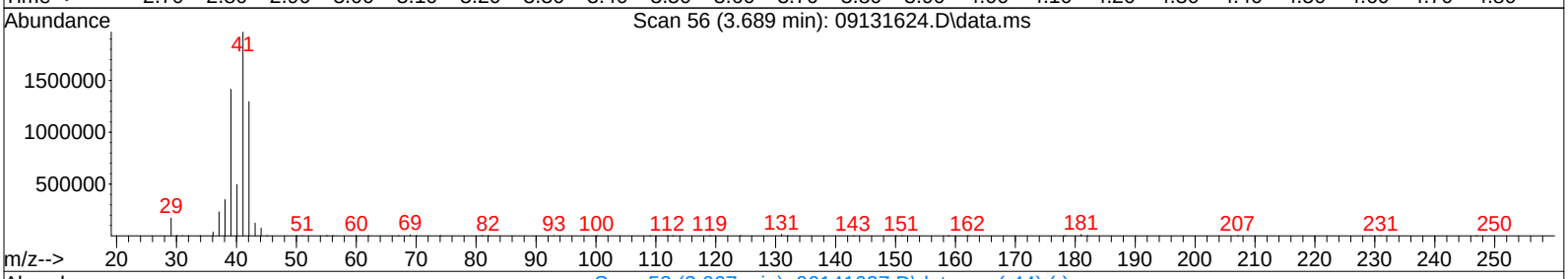
Ion	Exp%	Act%
42.10	100	100
39.00	106.20	99.22
41.10	150.10	140.21
0.00	0.00	0.00

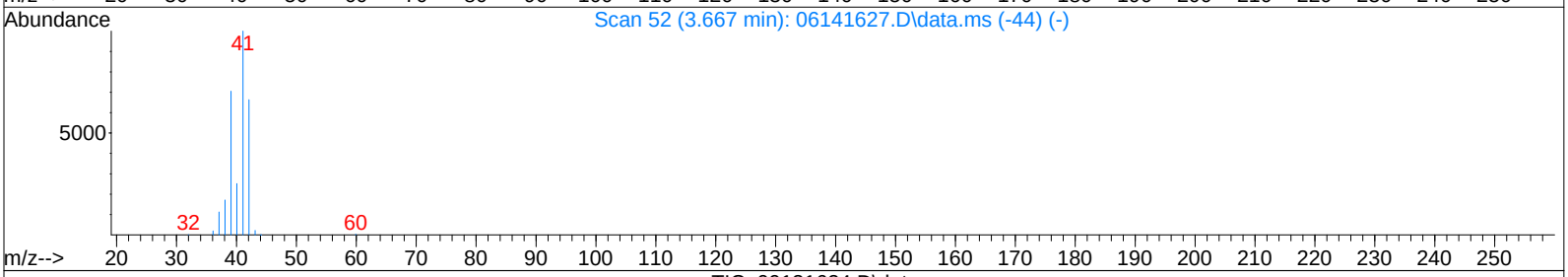
Quantitation Report (Qedit)

Data File: I:\MS09\Data\2016_09\13\09131624.D
Acq On : 13 Sep 2016 22:36 Operator: SC
Sample : P1604352-009 (270mL)
Misc : S29-07211602
ALS Vial : 13 Sample Multiplier: 1

Quant Time: Sep 14 09:01:52 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M







TIC: 09131624.D\data.ms

(2) Propene (T)

3.689min (+0.011) 107.43ng m

response 2711880

Ion	Exp%	Act%
42.10	100	100
39.00	106.20	115.17
41.10	150.10	162.76
0.00	0.00	0.00

IPC

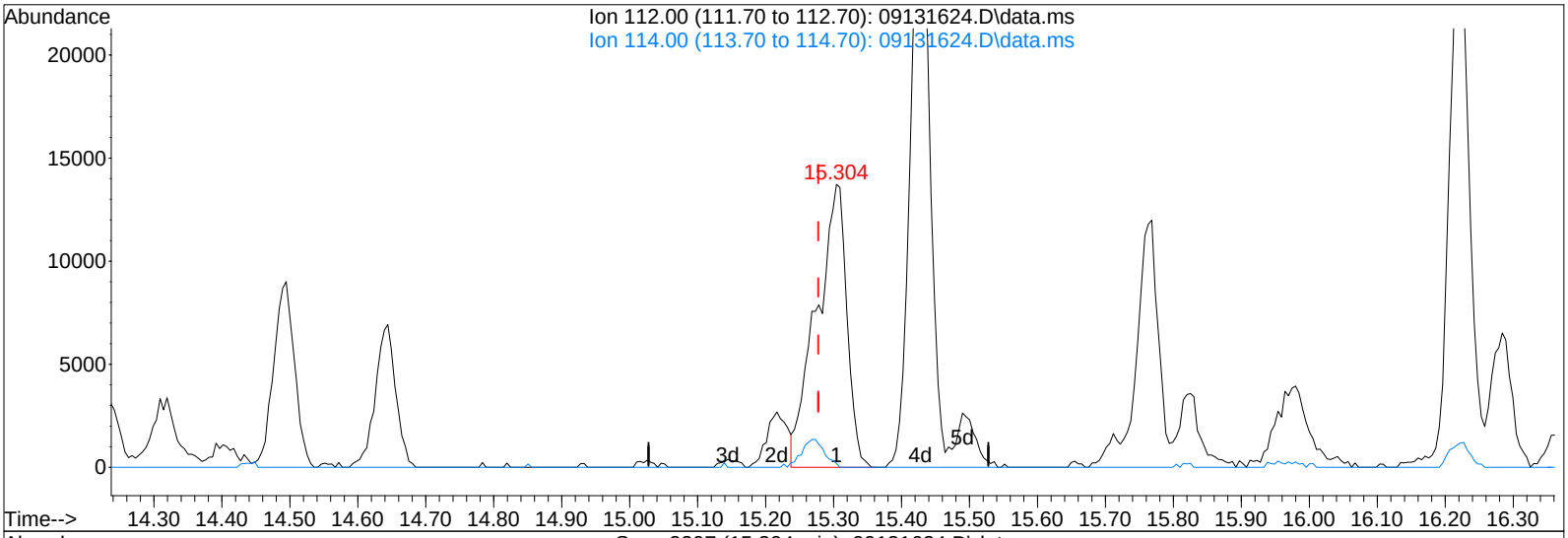
9/14/16

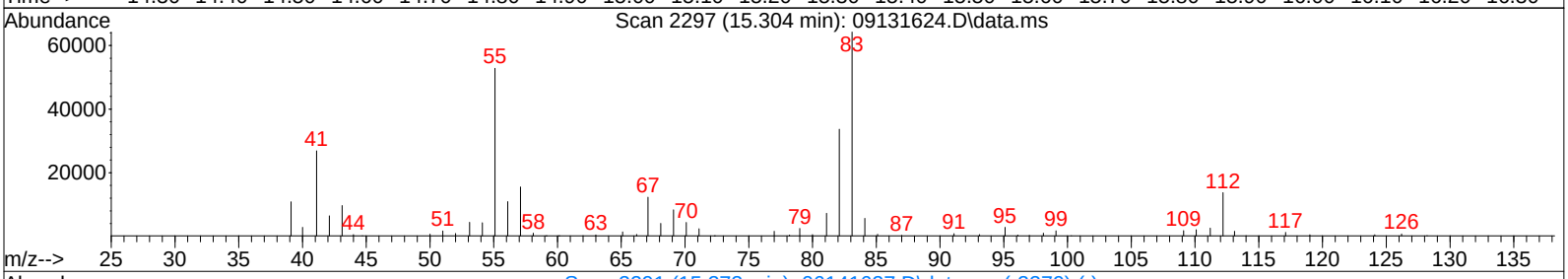
9/26/16

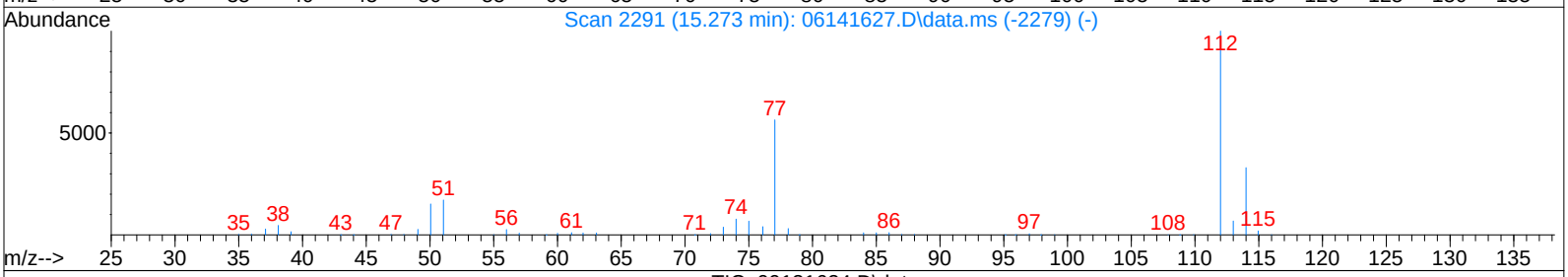
Quantitation Report (Qedit)

Data File: I:\MS09\Data\2016_09\13\09131624.D
Acq On : 13 Sep 2016 22:36 Operator: SC
Sample : P1604352-009 (270mL)
Misc : S29-07211602
ALS Vial : 13 Sample Multiplier: 1

Quant Time: Sep 14 09:01:52 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M







TIC: 09131624.D\data.ms

(65) Chlorobenzene (T)

15.304min (+0.026) 0.62ng

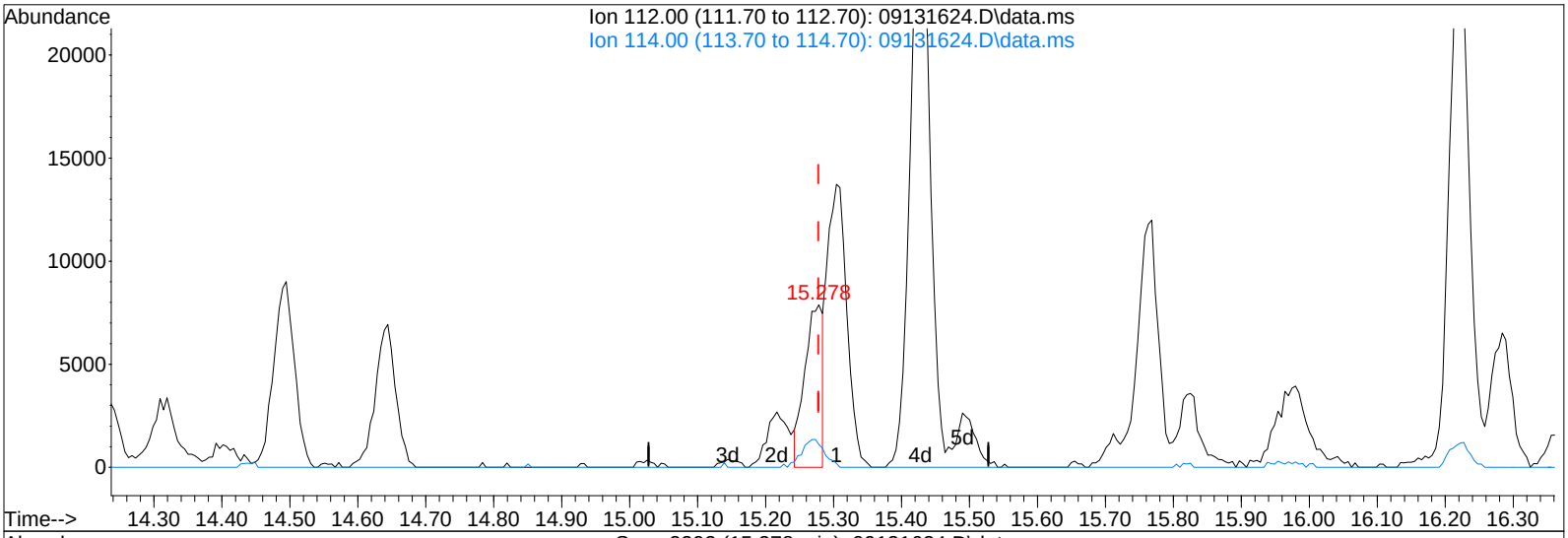
response 42587

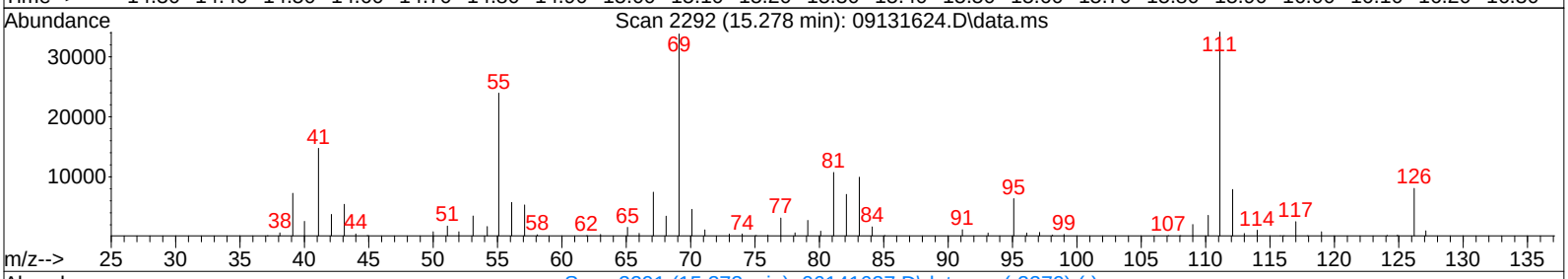
Ion	Exp%	Act%
112.00	100	100
114.00	32.50	7.49#
0.00	0.00	0.00
0.00	0.00	0.00

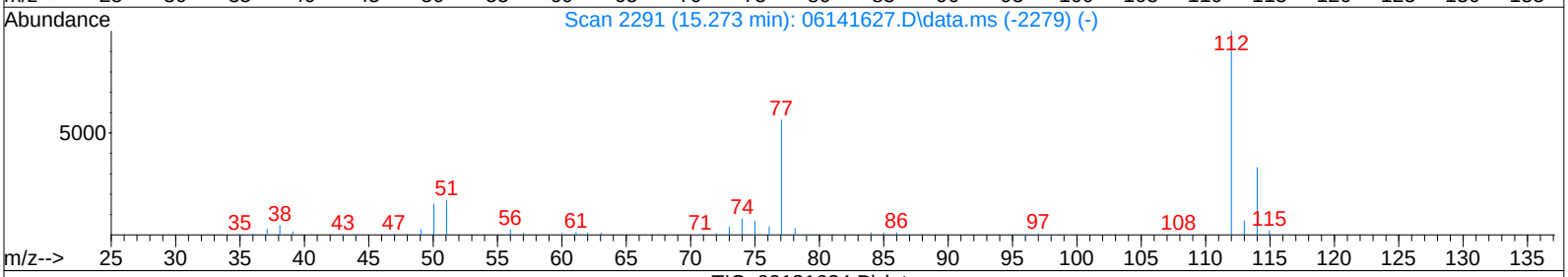
Quantitation Report (Qedit)

Data File: I:\MS09\Data\2016_09\13\09131624.D
Acq On : 13 Sep 2016 22:36 Operator: SC
Sample : P1604352-009 (270mL)
Misc : S29-07211602
ALS Vial : 13 Sample Multiplier: 1

Quant Time: Sep 14 09:01:52 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M







TIC: 09131624.D\data.ms

(65) Chlorobenzene (T)

15.278min (+0.000) 0.21ng m

response 14501

Ion	Exp%	Act%
112.00	100	100
114.00	32.50	22.01
0.00	0.00	0.00
0.00	0.00	0.00

IPC

9/14/16

9/26/16

Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2016_09\14\09141615.D
Acq On : 14 Sep 2016 15:23 Operator: SC
Sample : P1604352-009Dil (25mL)
Misc : S29-07211602
ALS Vial : 13 Sample Multiplier: 1

9/14/16

Quant Time: Sep 14 16:34:03 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M

Internal Standards	R.T.	QIon	Response	Conc Units	Dev(Min)
1) Bromochloromethane (IS1)	8.89	130	201569	12.500 ng	-0.05
37) 1,4-Difluorobenzene (IS2)	10.87	114	928077	12.500 ng	-0.03
56) Chlorobenzene-d5 (IS3)	15.22	82	366146	12.500 ng	0.00
System Monitoring Compounds					
33) 1,2-Dichloroethane-d4(...	9.68	65	274847	11.999 ng	-0.03
Spiked Amount 12.500	Range 70 - 130		Recovery = 96.00%		
57) Toluene-d8 (SS2)	13.31	98	982314	12.881 ng	-0.02
Spiked Amount 12.500	Range 70 - 130		Recovery = 103.04%		
73) Bromofluorobenzene (SS3)	16.83	174	289016	12.463 ng	0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 99.68%		
Target Compounds					Qvalue
2) Propene	3.67	42	252679m	9.837 ng	
3) Dichlorodifluoromethan...	3.79	85	25624	0.458 ng	99
4) Chloromethane	0.00	50	0	N.D.	
5) 1,2-Dichloro-1,1,2,2-t...	4.14	135	475	N.D.	
6) Vinyl Chloride	4.25	62	27768	0.734 ng	97
7) 1,3-Butadiene	0.00	54	0	N.D. d	
8) Bromomethane	0.00	94	0	N.D.	
9) Chloroethane	0.00	64	0	N.D.	
10) Ethanol	5.24	45	113	N.D.	
11) Acetonitrile	0.00	41	0	N.D. d	
12) Acrolein	0.00	56	0	N.D. d	
13) Acetone	0.00	58	0	N.D. d	
14) Trichlorofluoromethane	0.00	101	0	N.D.	
15) 2-Propanol (Isopropanol)	6.02	45	1161	N.D.	
16) Acrylonitrile	6.20	53	897	N.D.	
17) 1,1-Dichloroethene	6.49	96	14202	0.611 ng	97
18) 2-Methyl-2-Propanol (t...	6.68	59	2018	N.D.	
19) Methylene Chloride	0.00	84	0	N.D.	
20) 3-Chloro-1-propene (Al...	0.00	41	0	N.D. d	
21) Trichlorotrifluoroethane	0.00	151	0	N.D.	
22) Carbon Disulfide	6.94	76	6006	N.D.	
23) trans-1,2-Dichloroethene	7.65	61	38169	1.228 ng	97
24) 1,1-Dichloroethane	0.00	63	0	N.D. d	
25) Methyl tert-Butyl Ether	0.00	73	0	N.D.	
26) Vinyl Acetate	0.00	86	0	N.D. d	
27) 2-Butanone (MEK)	0.00	72	0	N.D.	
28) cis-1,2-Dichloroethene	8.72	61	419262	13.124 ng	99
29) Diisopropyl Ether	0.00	87	0	N.D.	
30) Ethyl Acetate	8.98	61	493	N.D.	
31) n-Hexane	8.99	57	19618	0.476 ng	96
32) Chloroform	9.03	83	712	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	10.50	56	554	N.D.	
41) Benzene	10.51	78	66747	0.665 ng	99
42) Carbon Tetrachloride	0.00	117	0	N.D.	
43) Cyclohexane	10.79	84	7471	0.199 ng	97
44) tert-Amyl Methyl Ether	0.00	73	0	N.D.	
45) 1,2-Dichloropropane	0.00	63	0	N.D.	
46) Bromodichloromethane	11.47	83	735	N.D.	
47) Trichloroethene	11.57	130	199433	6.849 ng	100
48) 1,4-Dioxane	0.00	88	0	N.D.	
49) 2,2,4-Trimethylpentane...	0.00	57	0	N.D. d	

Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2016_09\14\09141615.D
Acq On : 14 Sep 2016 15:23 Operator: SC
Sample : P1604352-009Dil (25mL)
Misc : S29-07211602
ALS Vial : 13 Sample Multiplier: 1

Quant Time: Sep 14 16:34:03 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M

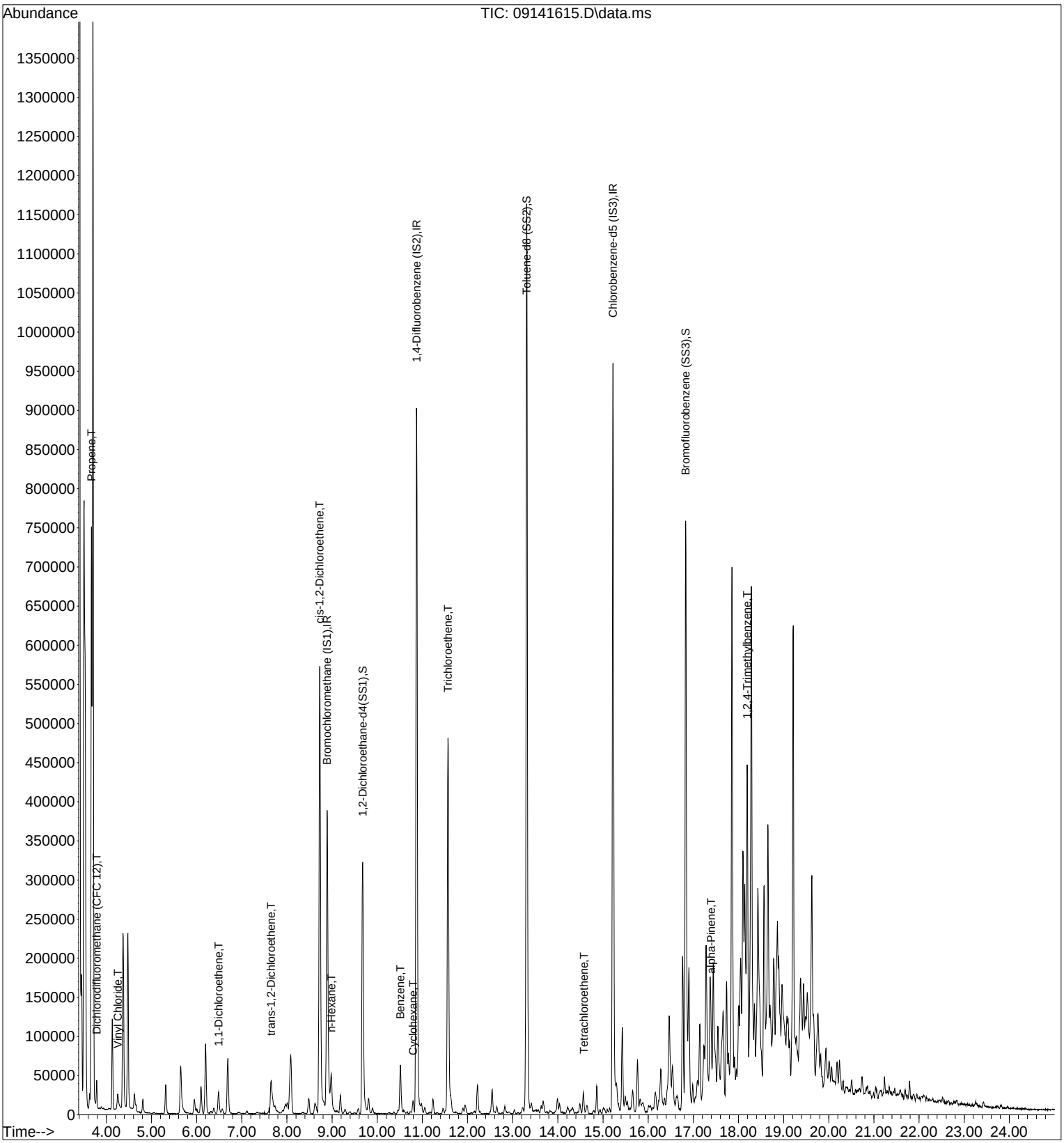
Internal Standards	R.T.	QIon	Response	Conc Units	Dev(Min)
50) Methyl Methacrylate	0.00	100	0	N.D.	
51) n-Heptane	11.89	71	1367	N.D.	
52) cis-1,3-Dichloropropene	0.00	75	0	N.D.	
53) 4-Methyl-2-pentanone	12.22	58	1082	N.D.	
54) trans-1,3-Dichloropropene	0.00	75	0	N.D.	
55) 1,1,2-Trichloroethane	0.00	97	0	N.D.	
58) Toluene	13.42	91	5815	N.D.	
59) 2-Hexanone	13.67	43	2526	N.D.	
60) Dibromochloromethane	0.00	129	0	N.D.	
61) 1,2-Dibromoethane	0.00	107	0	N.D.	
62) n-Butyl Acetate	14.44	43	811	N.D.	
63) n-Octane	14.57	57	601	N.D.	
64) Tetrachloroethene	14.58	166	3138	0.102 ng	97
65) Chlorobenzene	15.27	112	1297	N.D.	
66) Ethylbenzene	15.70	91	1801	N.D.	
67) m- & p-Xylenes	15.87	91	7597	N.D.	
68) Bromoform	0.00	173	0	N.D.	
69) Styrene	0.00	104	0	N.D.	
70) o-Xylene	16.38	91	7263	N.D.	
71) n-Nonane	16.62	43	1118	N.D.	
72) 1,1,2,2-Tetrachloroethane	16.35	83	437	N.D.	
74) Cumene	16.99	105	4208	N.D.	
75) alpha-Pinene	17.39	93	8596	0.148 ng	93
76) n-Propylbenzene	17.54	91	2297	N.D.	
77) 3-Ethyltoluene	17.65	105	6846	N.D.	
78) 4-Ethyltoluene	17.65	105	6846	N.D.	
79) 1,3,5-Trimethylbenzene	17.76	105	3456	N.D.	
80) alpha-Methylstyrene	0.00	118	0	N.D.	
81) 2-Ethyltoluene	17.96	105	5547	N.D.	
82) 1,2,4-Trimethylbenzene	18.19	105	10677	0.112 ng	81
83) n-Decane	0.00	57	0	N.D. d	
84) Benzyl Chloride	18.35	91	1085	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-...	18.65	119	4064	N.D.	
89) 1,2,3-Trimethylbenzene	0.00	105	0	N.D. d	
90) 1,2-Dichlorobenzene	0.00	146	0	N.D.	
91) d-Limonene	0.00	68	0	N.D. d	
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	20.75	128	1747	N.D.	
96) n-Dodecane	20.74	57	2618	N.D.	
97) Hexachlorobutadiene	0.00	225	0	N.D.	
98) Cyclohexanone	0.00	55	0	N.D. d	
99) tert-Butylbenzene	18.18	119	2747	N.D.	
100) n-Butylbenzene	19.08	91	991	N.D.	

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2016_09\14\09141615.D
Acq On : 14 Sep 2016 15:23 Operator: SC
Sample : P1604352-009Dil (25mL)
Misc : S29-07211602
ALS Vial : 13 Sample Multiplier: 1

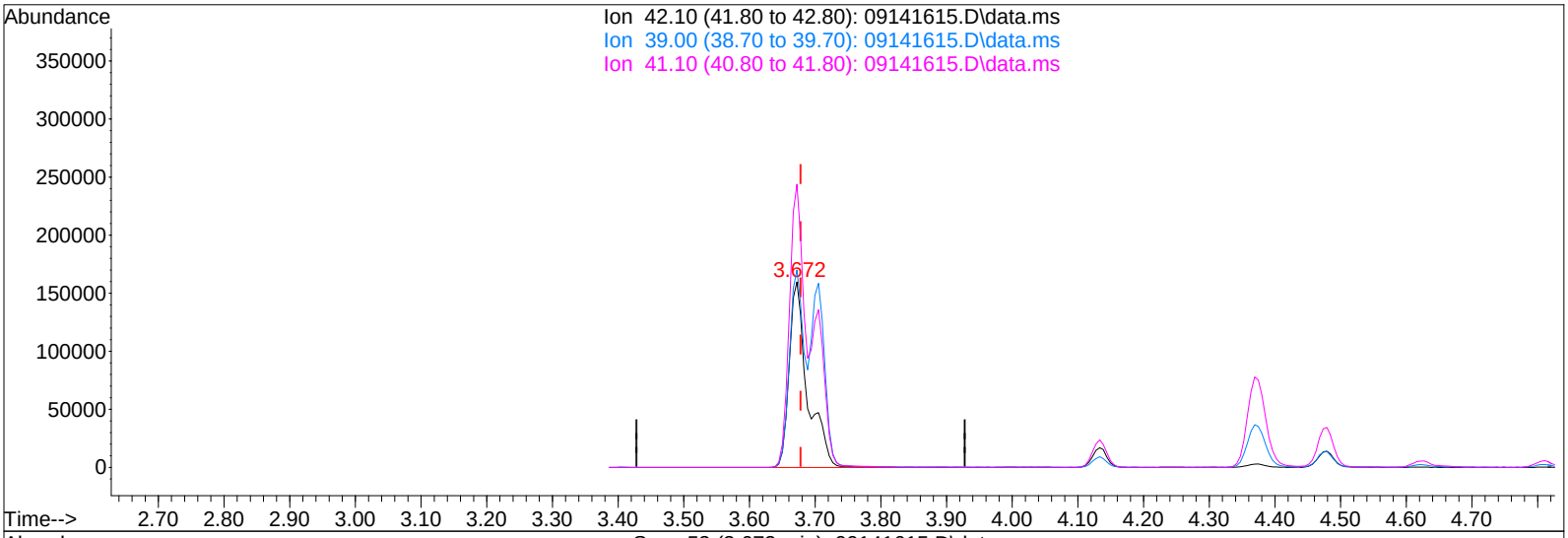
Quant Time: Sep 14 16:34:03 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M

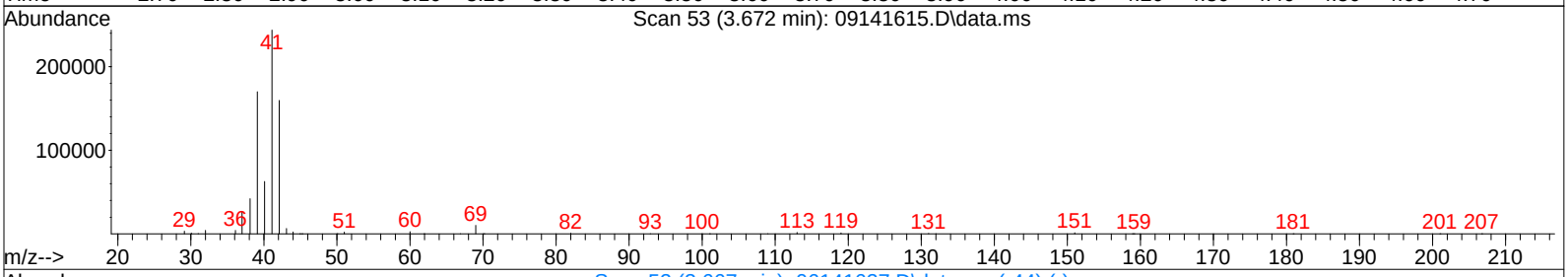


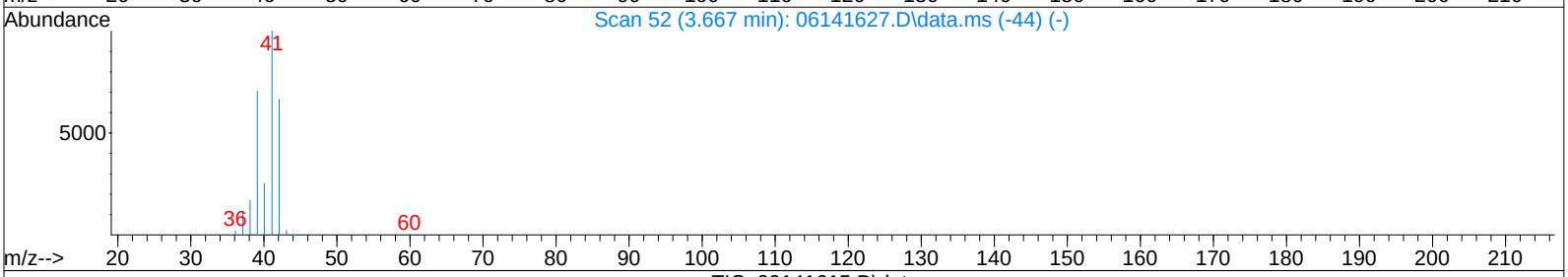
Quantitation Report (Qedit)

Data File: I:\MS09\Data\2016_09\14\09141615.D
Acq On : 14 Sep 2016 15:23 Operator: SC
Sample : P1604352-009Dil (25mL)
Misc : S29-07211602
ALS Vial : 13 Sample Multiplier: 1

Quant Time: Sep 14 16:31:56 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M







TIC: 09141615.D\data.ms

(2) Propene (T)

3.672min (-0.006) 12.09ng

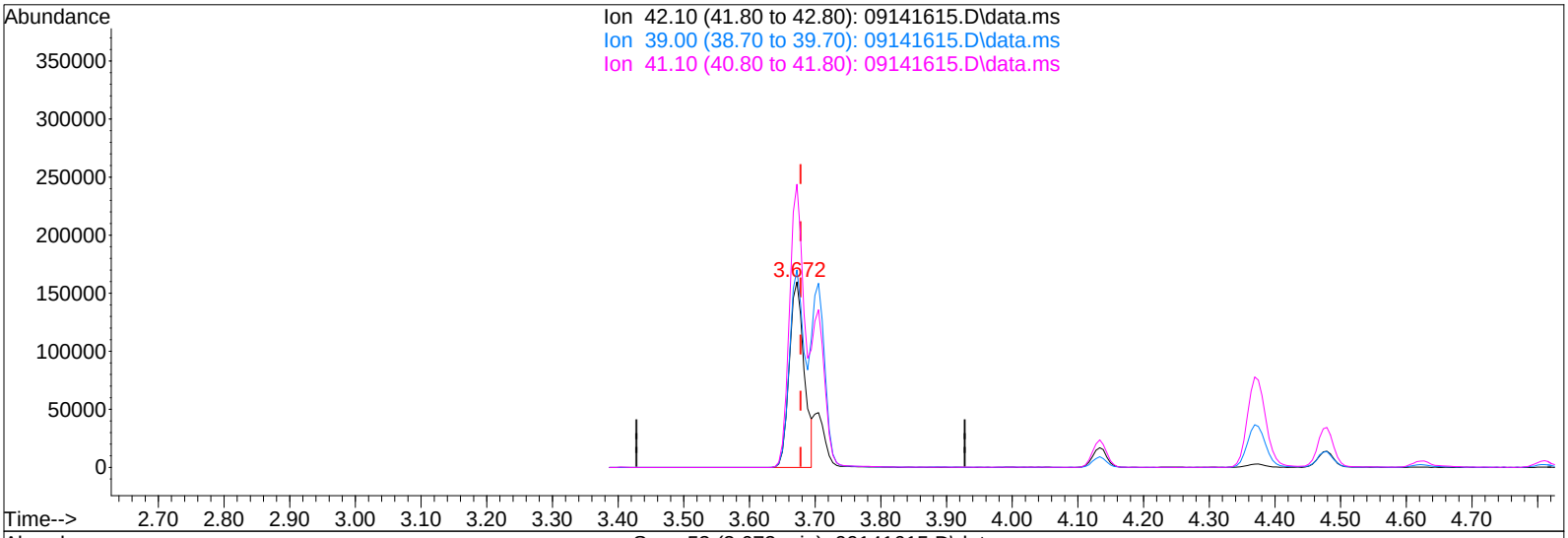
response 310439

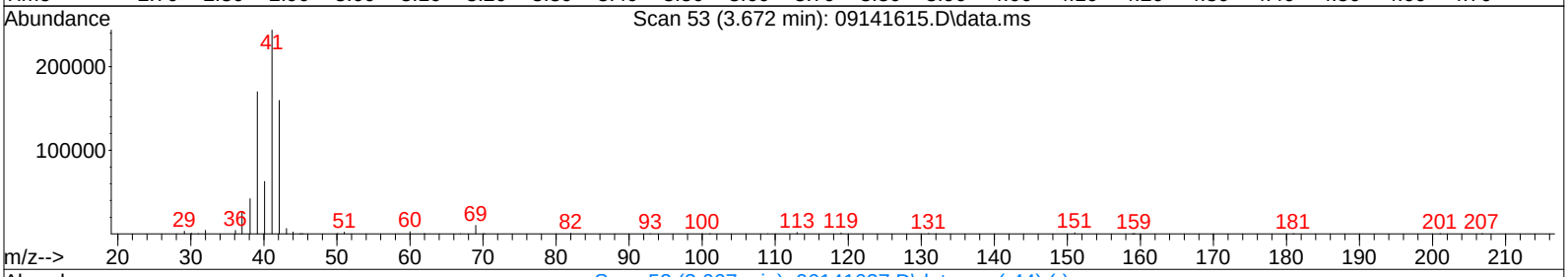
Ion	Exp%	Act%
42.10	100	100
39.00	106.20	85.79#
41.10	150.10	118.75#
0.00	0.00	0.00

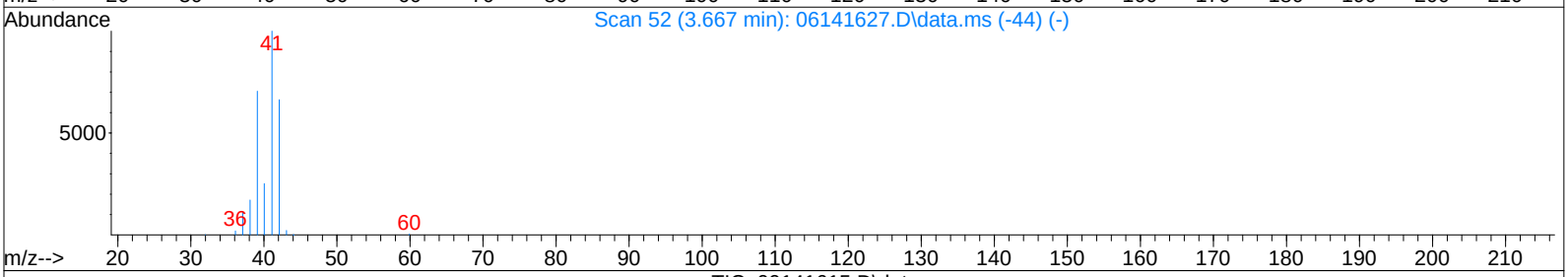
Quantitation Report (Qedit)

Data File: I:\MS09\Data\2016_09\14\09141615.D
Acq On : 14 Sep 2016 15:23 Operator: SC
Sample : P1604352-009Dil (25mL)
Misc : S29-07211602
ALS Vial : 13 Sample Multiplier: 1

Quant Time: Sep 14 16:31:56 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M







TIC: 09141615.D\data.ms

(2) Propene (T)

3.672min (-0.006) 9.84ng m

response 252679

Ion	Exp%	Act%
42.10	100	100
39.00	106.20	105.40
41.10	150.10	145.90
0.00	0.00	0.00

IPC

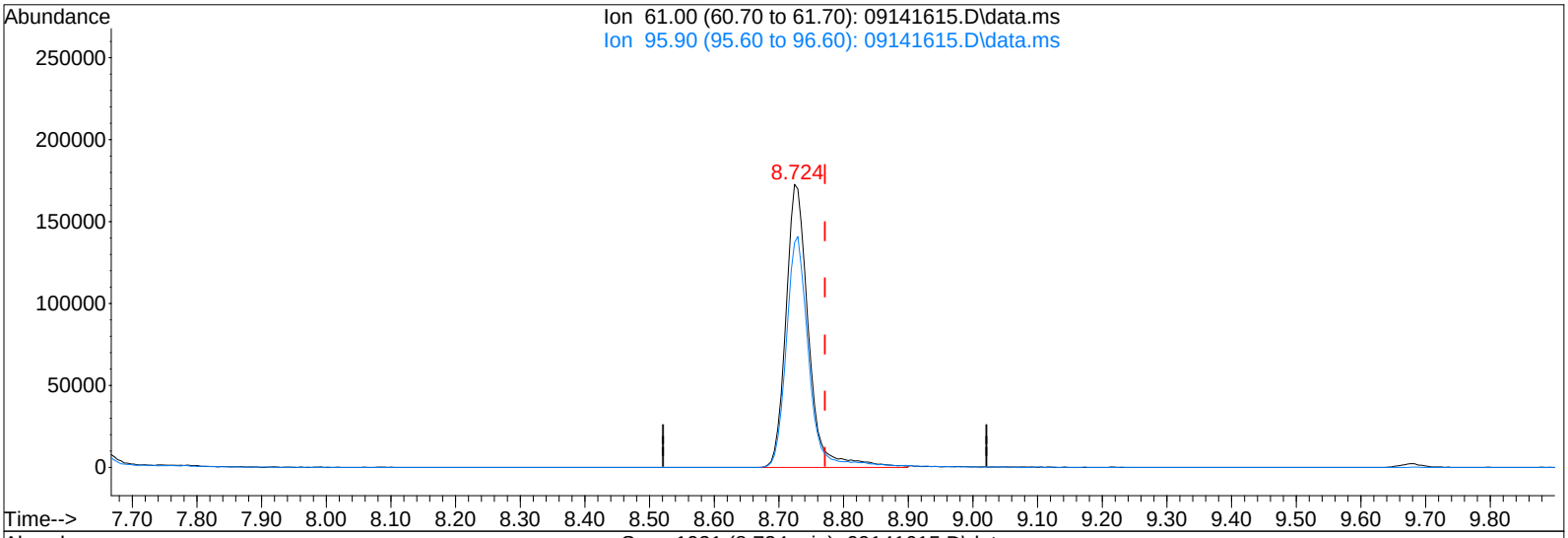
9/14/16

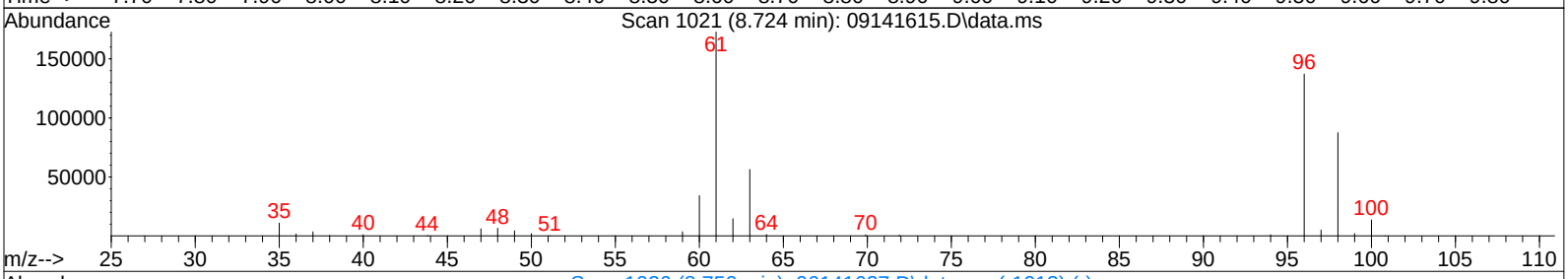
9/26/16

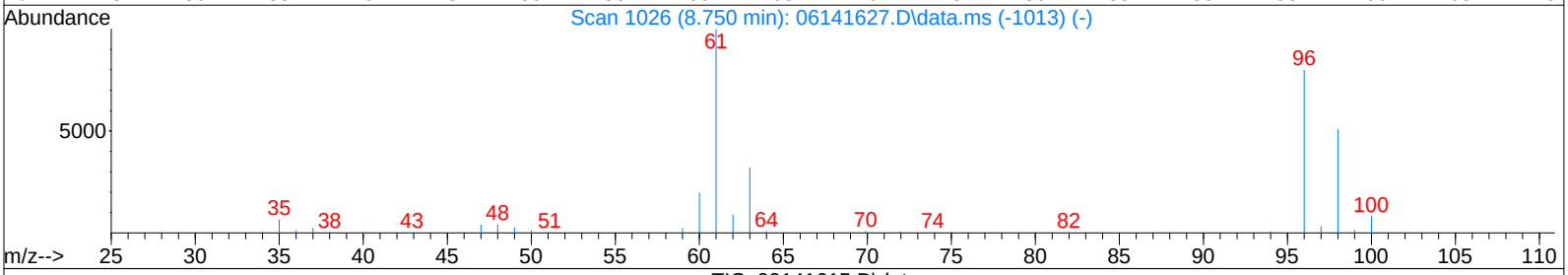
Quantitation Report (Qedit)

Data File: I:\MS09\Data\2016_09\14\09141615.D
Acq On : 14 Sep 2016 15:23 Operator: SC
Sample : P1604352-009Dil (25mL)
Misc : S29-07211602
ALS Vial : 13 Sample Multiplier: 1

Quant Time: Sep 14 16:31:56 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M







TIC: 09141615.D\data.ms

(28) cis-1,2-Dichloroethene (T)

8.724min (-0.047) 13.12ng

response 419262

Ion	Exp%	Act%
61.00	100	100
95.90	80.00	80.73
0.00	0.00	0.00
0.00	0.00	0.00

Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2016_09\13\09131625.D
Acq On : 13 Sep 2016 23:10 Operator: SC
Sample : P1604352-010 (15mL)
Misc : S29-07211602
ALS Vial : 14 Sample Multiplier: 1

9/14/16

Quant Time: Sep 14 15:21:21 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M

Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
1) Bromochloromethane (IS1)	8.89	130	206389	12.500	ng	-0.05
37) 1,4-Difluorobenzene (IS2)	10.87	114	966370	12.500	ng	-0.03
56) Chlorobenzene-d5 (IS3)	15.22	82	388968	12.500	ng	0.00
System Monitoring Compounds						
33) 1,2-Dichloroethane-d4(...	9.67	65	274439	11.701	ng	-0.04
Spiked Amount 12.500	Range 70 - 130		Recovery = 93.60%			
57) Toluene-d8 (SS2)	13.31	98	1015755	12.538	ng	-0.02
Spiked Amount 12.500	Range 70 - 130		Recovery = 100.32%			
73) Bromofluorobenzene (SS3)	16.84	174	299279	12.149	ng	0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 97.20%			
Target Compounds						Qvalue
2) Propene	3.68	42	69013m	2.624	ng	
3) Dichlorodifluoromethan...	3.79	85	46902	0.818	ng	99
4) Chloromethane	0.00	50	0	N.D.		
5) 1,2-Dichloro-1,1,2,2-t...	4.13	135	991	N.D.		
6) Vinyl Chloride	4.25	62	36597	0.945	ng	99
7) 1,3-Butadiene	0.00	54	0	N.D.	d	
8) Bromomethane	0.00	94	0	N.D.		
9) Chloroethane	0.00	64	0	N.D.		
10) Ethanol	5.24	45	47	N.D.		
11) Acetonitrile	0.00	41	0	N.D.	d	
12) Acrolein	0.00	56	0	N.D.	d	
13) Acetone	0.00	58	0	N.D.	d	
14) Trichlorofluoromethane	0.00	101	0	N.D.		
15) 2-Propanol (Isopropanol)	6.01	45	52	N.D.		
16) Acrylonitrile	0.00	53	0	N.D.	d	
17) 1,1-Dichloroethene	6.48	96	623	N.D.		
18) 2-Methyl-2-Propanol (t...	6.68	59	225	N.D.		
19) Methylene Chloride	0.00	84	0	N.D.		
20) 3-Chloro-1-propene (Al...	0.00	41	0	N.D.	d	
21) Trichlorotrifluoroethane	0.00	151	0	N.D.		
22) Carbon Disulfide	6.92	76	31374	0.338	ng	97
23) trans-1,2-Dichloroethene	7.67	61	863	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.	d	
27) 2-Butanone (MEK)	0.00	72	0	N.D.	d	
28) cis-1,2-Dichloroethene	8.73	61	14835	0.454	ng	99
29) Diisopropyl Ether	0.00	87	0	N.D.	d	
30) Ethyl Acetate	0.00	61	0	N.D.		
31) n-Hexane	8.98	57	509959	12.084	ng	100
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	10.51	61	738	N.D.		
40) 1-Butanol	10.36	56	1024	N.D.		
41) Benzene	10.51	78	182176	1.743	ng	99
42) Carbon Tetrachloride	0.00	117	0	N.D.		
43) Cyclohexane	10.80	84	45892	1.176	ng	98
44) tert-Amyl Methyl Ether	0.00	73	0	N.D.		
45) 1,2-Dichloropropane	11.22	63	488	N.D.		
46) Bromodichloromethane	0.00	83	0	N.D.	d	
47) Trichloroethene	11.58	130	4992	0.165	ng	100
48) 1,4-Dioxane	0.00	88	0	N.D.		
49) 2,2,4-Trimethylpentane...	0.00	57	0	N.D.	d	

Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2016_09\13\09131625.D
Acq On : 13 Sep 2016 23:10 Operator: SC
Sample : P1604352-010 (15mL)
Misc : S29-07211602
ALS Vial : 14 Sample Multiplier: 1

Quant Time: Sep 14 15:21:21 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M

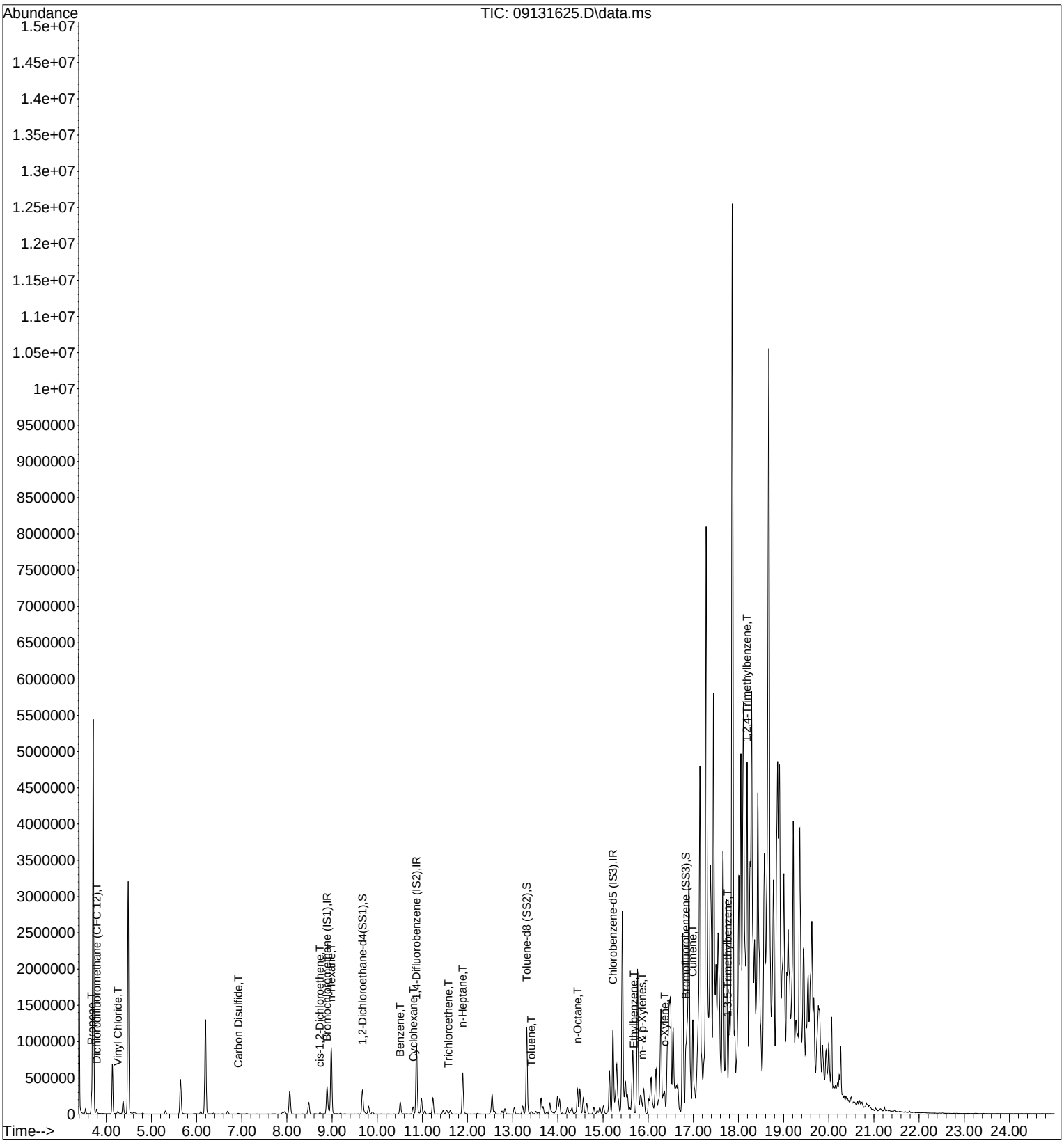
Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
50) Methyl Methacrylate	0.00	100	0	N.D.	d	
51) n-Heptane	11.89	71	161415	6.413	ng	99
52) cis-1,3-Dichloropropene	0.00	75	0	N.D.		
53) 4-Methyl-2-pentanone	12.51	58	456	N.D.		
54) trans-1,3-Dichloropropene	0.00	75	0	N.D.		
55) 1,1,2-Trichloroethane	0.00	97	0	N.D.	d	
58) Toluene	13.41	91	21873	0.193	ng	95
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	14.31	43	3318	N.D.		
63) n-Octane	14.44	57	73397	3.260	ng	99
64) Tetrachloroethene	0.00	166	0	N.D.		
65) Chlorobenzene	0.00	112	0	N.D.	d	
66) Ethylbenzene	15.68	91	12923	0.109	ng	88
67) m- & p-Xylenes	15.87	91	33188	0.345	ng	100
68) Bromoform	0.00	173	0	N.D.		
69) Styrene	0.00	104	0	N.D.		
70) o-Xylene	16.37	91	11777	0.118	ng	93
71) n-Nonane	0.00	43	0	N.D.	d	
72) 1,1,2,2-Tetrachloroethane	0.00	83	0	N.D.	d	
74) Cumene	16.99	105	12533	0.098	ng	97
75) alpha-Pinene	0.00	93	0	N.D.	d	
76) n-Propylbenzene	0.00	91	0	N.D.	d	
77) 3-Ethyltoluene	17.64	105	7544	N.D.		
78) 4-Ethyltoluene	17.68	105	5022	N.D.		
79) 1,3,5-Trimethylbenzene	17.76	105	13112	0.127	ng	95
80) alpha-Methylstyrene	0.00	118	0	N.D.		
81) 2-Ethyltoluene	0.00	105	0	N.D.	d	
82) 1,2,4-Trimethylbenzene	18.19	105	21162	0.208	ng	89
83) n-Decane	0.00	57	0	N.D.	d	
84) Benzyl Chloride	0.00	91	0	N.D.	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	0.00	146	0	N.D.		
91) d-Limonene	0.00	68	0	N.D.	d	
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	20.63	180	419	N.D.		
95) Naphthalene	20.72	128	450	N.D.		
96) n-Dodecane	20.79	57	4478	N.D.		
97) Hexachlorobutadiene	0.00	225	0	N.D.		
98) Cyclohexanone	0.00	55	0	N.D.	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:\MS09\Data\2016_09\13\09131625.D
Acq On : 13 Sep 2016 23:10 Operator: SC
Sample : P1604352-010 (15mL)
Misc : S29-07211602
ALS Vial : 14 Sample Multiplier: 1

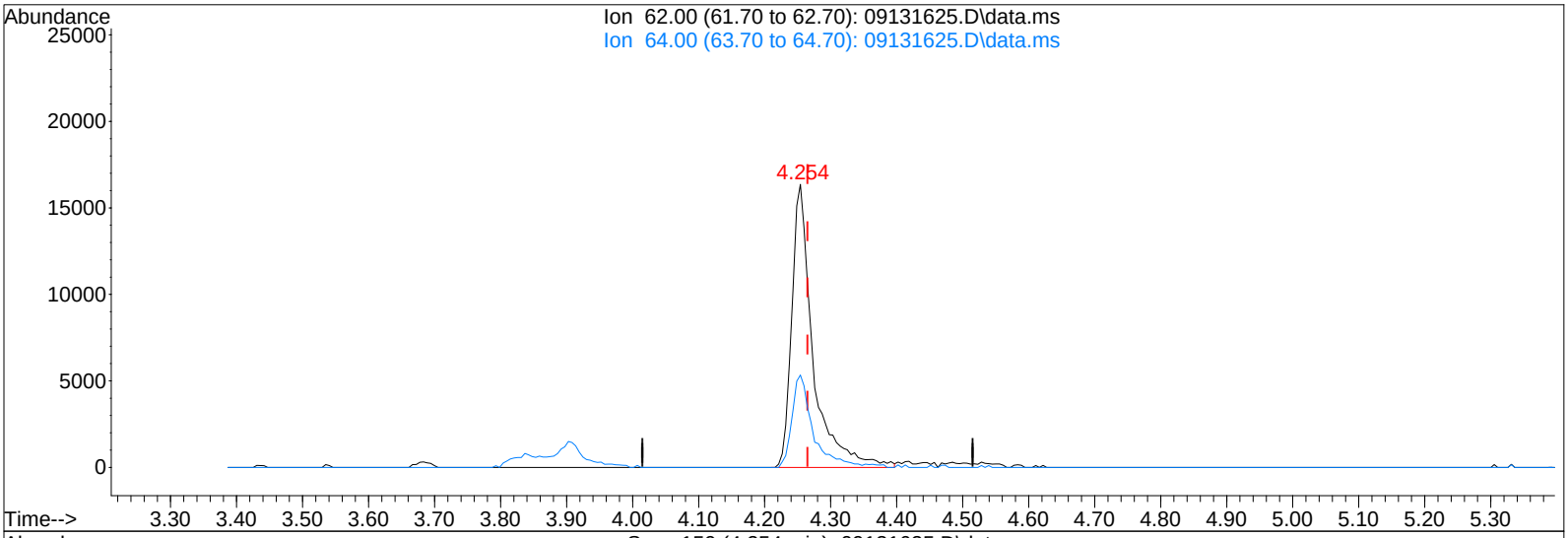
Quant Time: Sep 14 15:21:21 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M

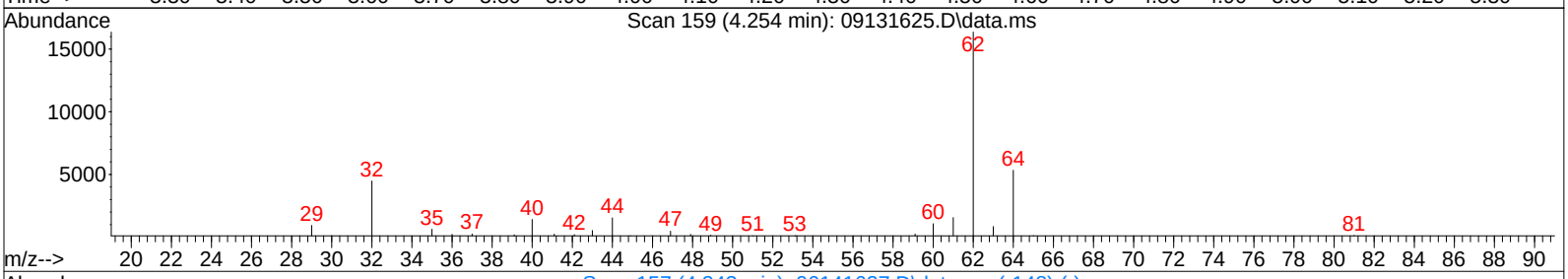


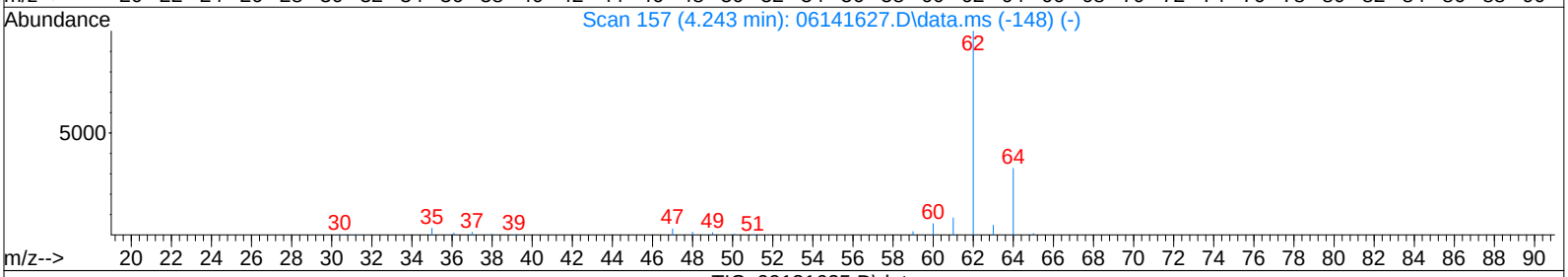
Quantitation Report (Qedit)

Data File: I:\MS09\Data\2016_09\13\09131625.D
Acq On : 13 Sep 2016 23:10 Operator: SC
Sample : P1604352-010 (15mL)
Misc : S29-07211602
ALS Vial : 14 Sample Multiplier: 1

Quant Time: Sep 14 09:02:19 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M







TIC: 09131625.D\data.ms

(6) Vinyl Chloride (T)

4.254min (-0.011) 0.95ng

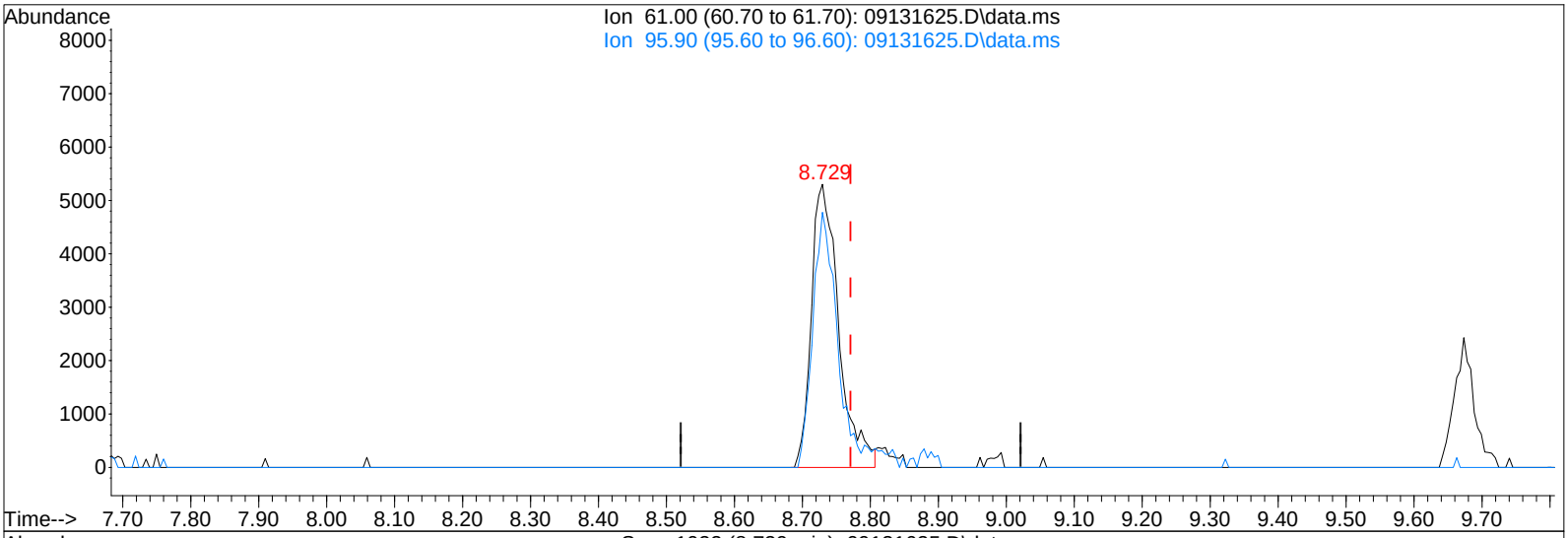
response 36597

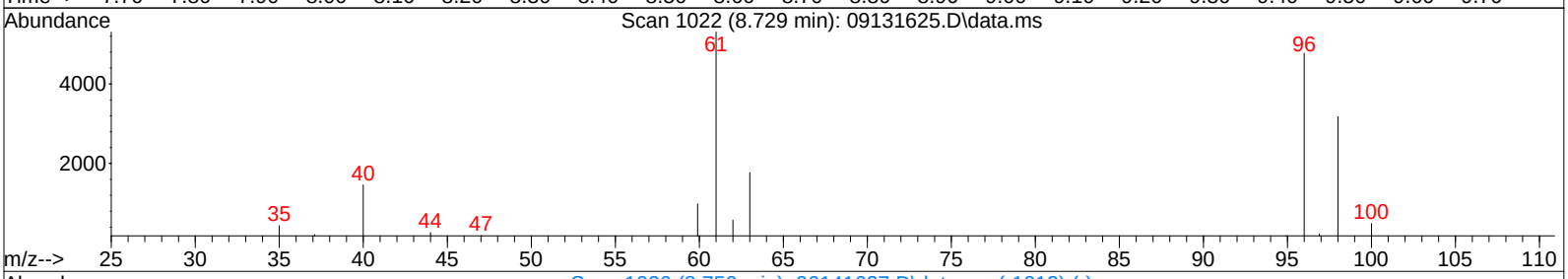
Ion	Exp%	Act%
62.00	100	100
64.00	32.30	31.93
0.00	0.00	0.00
0.00	0.00	0.00

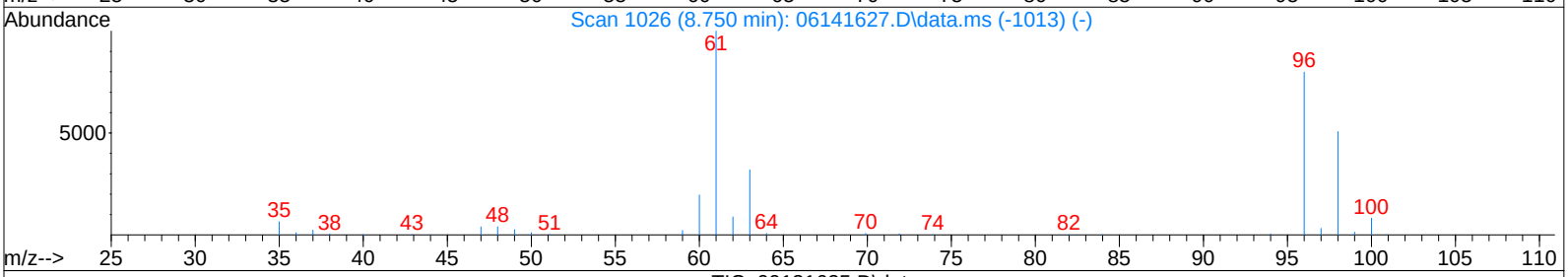
Quantitation Report (Qedit)

Data File: I:\MS09\Data\2016_09\13\09131625.D
Acq On : 13 Sep 2016 23:10 Operator: SC
Sample : P1604352-010 (15mL)
Misc : S29-07211602
ALS Vial : 14 Sample Multiplier: 1

Quant Time: Sep 14 09:02:19 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M







TIC: 09131625.D\data.ms

(28) cis-1,2-Dichloroethene (T)

8.729min (-0.042) 0.45ng

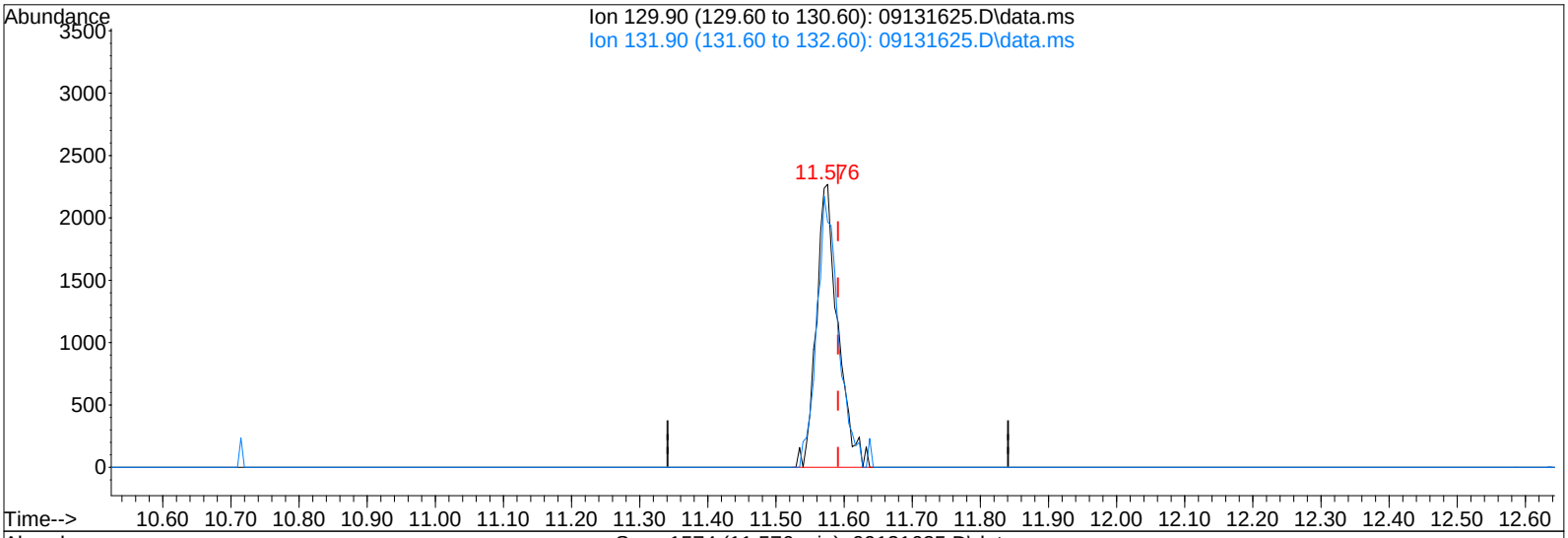
response 14835

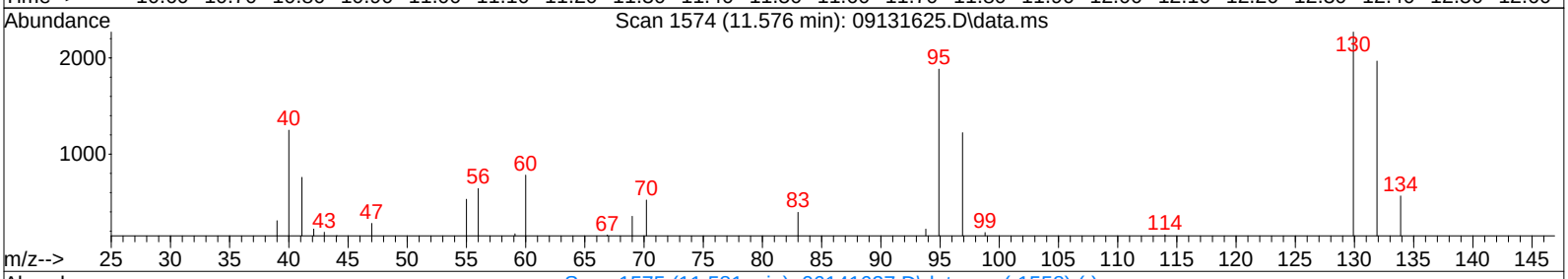
Ion	Exp%	Act%
61.00	100	100
95.90	80.00	79.10
0.00	0.00	0.00
0.00	0.00	0.00

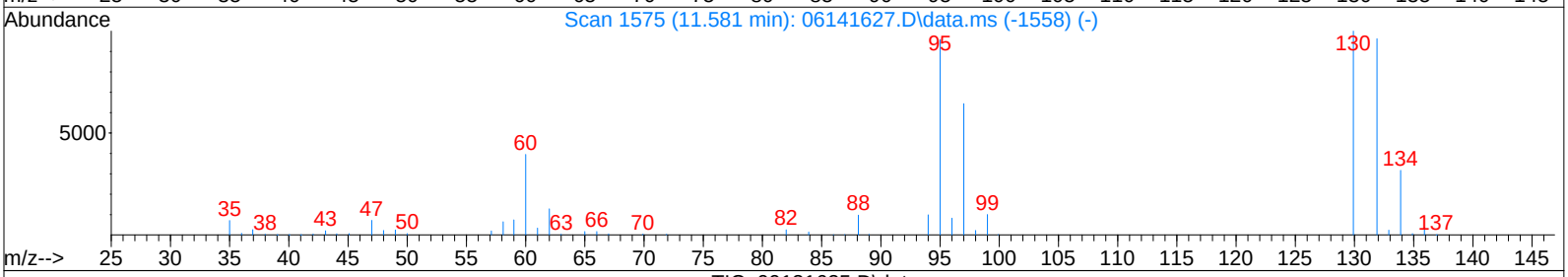
Quantitation Report (Qedit)

Data File: I:\MS09\Data\2016_09\13\09131625.D
Acq On : 13 Sep 2016 23:10 Operator: SC
Sample : P1604352-010 (15mL)
Misc : S29-07211602
ALS Vial : 14 Sample Multiplier: 1

Quant Time: Sep 14 09:02:19 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M







TIC: 09131625.D\data.ms

(47) Trichloroethene (T)

11.576min (-0.015) 0.16ng

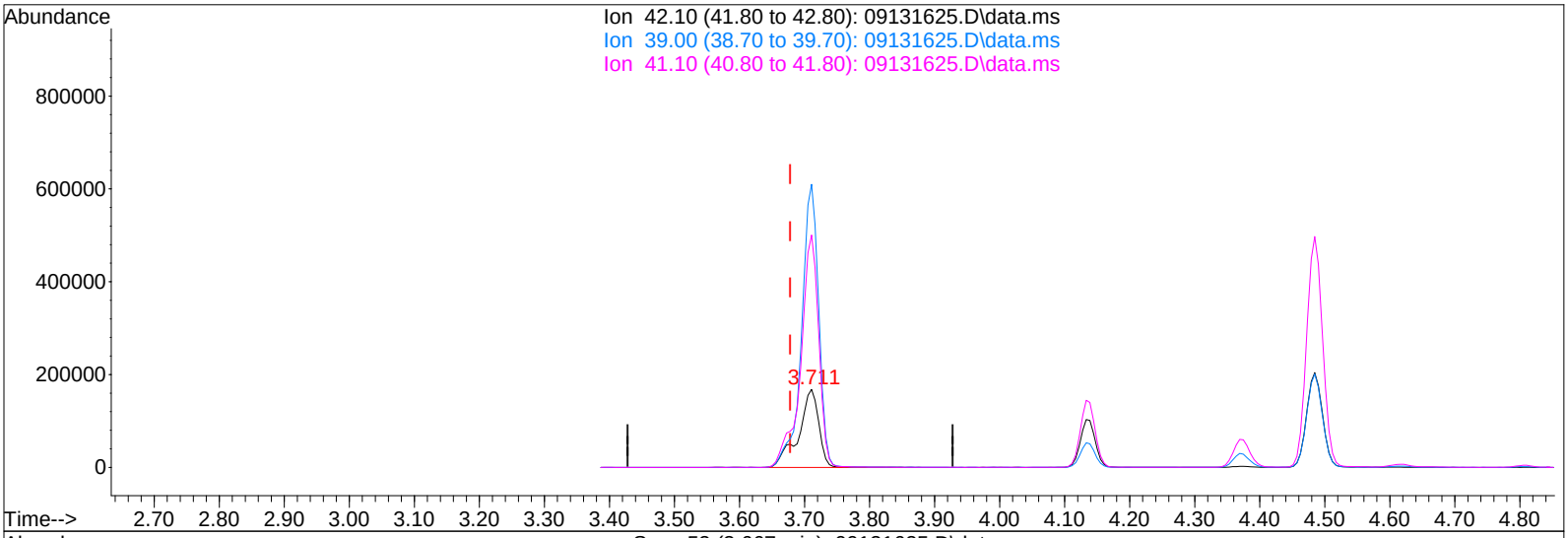
response 4992

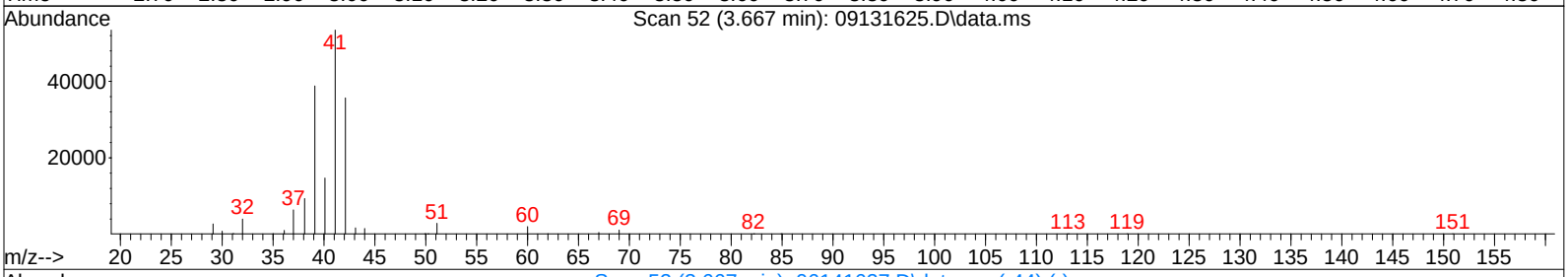
Ion	Exp%	Act%
129.90	100	100
131.90	96.30	95.97
0.00	0.00	0.00
0.00	0.00	0.00

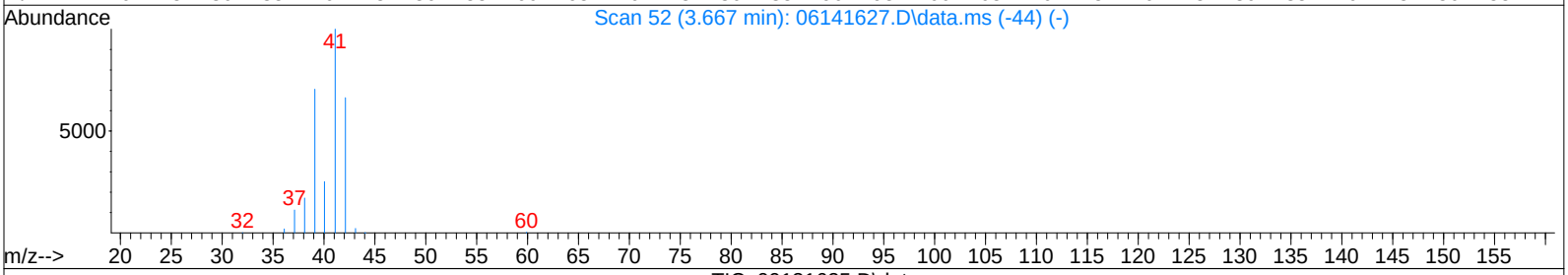
Quantitation Report (Qedit)

Data File: I:\MS09\Data\2016_09\13\09131625.D
Acq On : 13 Sep 2016 23:10 Operator: SC
Sample : P1604352-010 (15mL)
Misc : S29-07211602
ALS Vial : 14 Sample Multiplier: 1

Quant Time: Sep 14 09:02:19 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M







TIC: 09131625.D\data.ms

(2) Propene (T)

3.711min (+0.033) 13.84ng

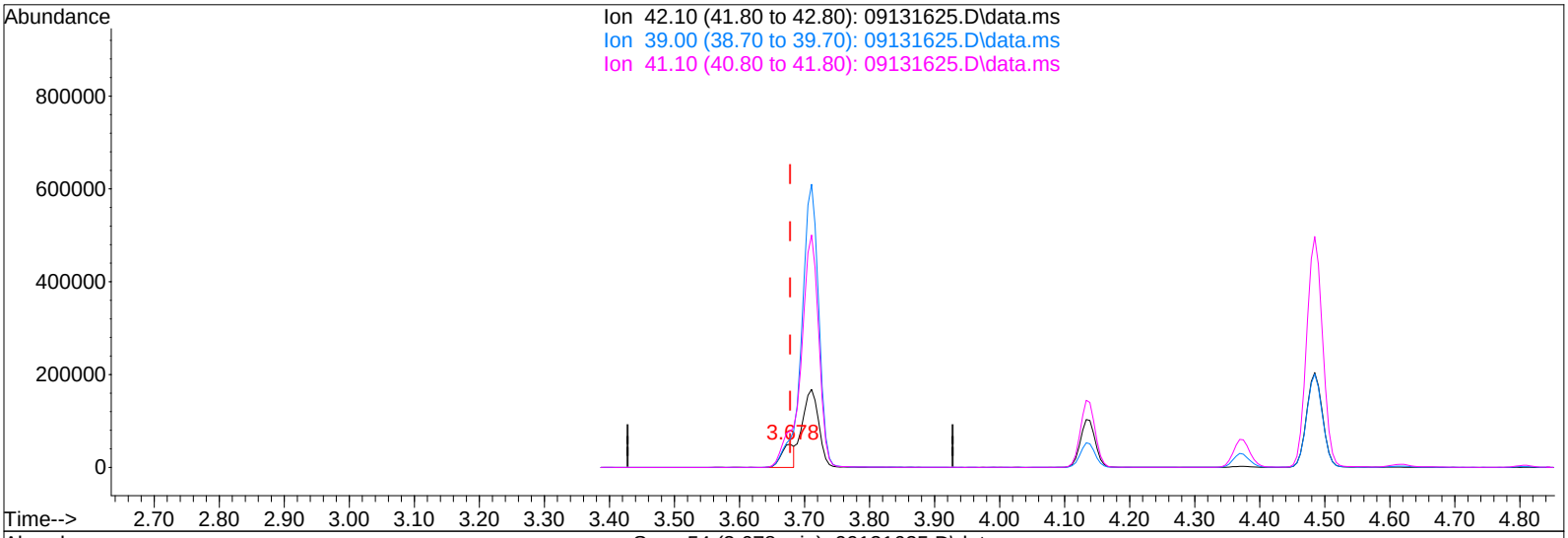
response 364101

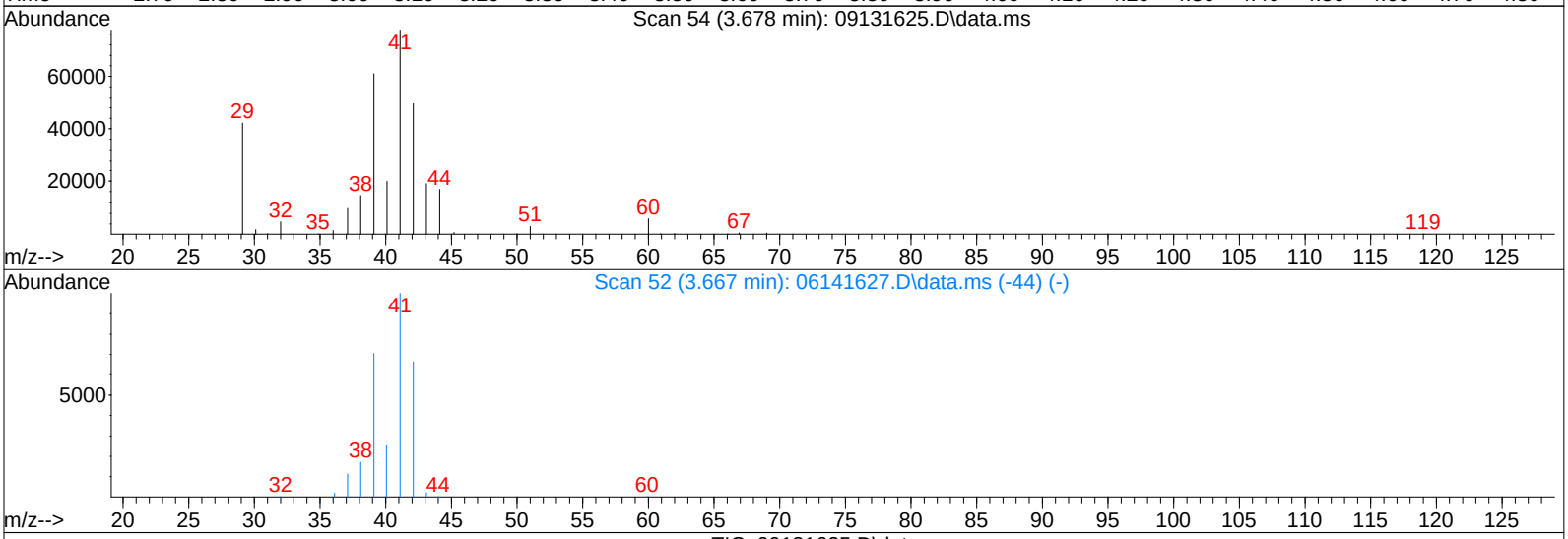
Ion	Exp%	Act%
42.10	100	100
39.00	106.20	307.22#
41.10	150.10	267.33#
0.00	0.00	0.00

Quantitation Report (Qedit)

Data File: I:\MS09\Data\2016_09\13\09131625.D
Acq On : 13 Sep 2016 23:10 Operator: SC
Sample : P1604352-010 (15mL)
Misc : S29-07211602
ALS Vial : 14 Sample Multiplier: 1

Quant Time: Sep 14 09:02:19 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M





TIC: 09131625.D\data.ms

(2) Propene (T)

3.678min (-0.000) 2.62ng m

response 69013

Ion	Exp%	Act%
42.10	100	100
39.00	106.20	1620.84#
41.10	150.10	1410.37#
0.00	0.00	0.00

IPC

9/14/16

9/26/16

Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2016_09\13\09131604.D
Acq On : 13 Sep 2016 10:53 Operator: SC
Sample : MB R9091316_1000mL
Misc : S29-07211602/AC00463
ALS Vial : 2 Sample Multiplier: 1

9/13/16

Quant Time: Sep 13 11:32:02 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M

Internal Standards	R.T.	QIon	Response	Conc	Units		Dev(Min)
1) Bromochloromethane (IS1)	8.89	130	166826	12.500	ng		-0.05
37) 1,4-Difluorobenzene (IS2)	10.87	114	856703	12.500	ng		-0.03
56) Chlorobenzene-d5 (IS3)	15.22	82	328060	12.500	ng		0.00
System Monitoring Compounds							
33) 1,2-Dichloroethane-d4(...	9.67	65	246509	13.003	ng		-0.04
Spiked Amount 12.500	Range 70 - 130		Recovery = 104.00%				
57) Toluene-d8 (SS2)	13.31	98	883729	12.933	ng		-0.02
Spiked Amount 12.500	Range 70 - 130		Recovery = 103.44%				
73) Bromofluorobenzene (SS3)	16.83	174	256305	12.336	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 98.72%				
Target Compounds							Qvalue
2) Propene	3.71	42	1468	N.D.			
3) Dichlorodifluoromethan...	3.80	85	747	N.D.			
4) Chloromethane	3.99	50	714	N.D.			
5) 1,2-Dichloro-1,1,2,2-t...	0.00	135	0	N.D.			
6) Vinyl Chloride	4.27	62	439	N.D.			
7) 1,3-Butadiene	0.00	54	0	N.D.			
8) Bromomethane	4.73	94	448	N.D.			
9) Chloroethane	0.00	64	0	N.D.			
10) Ethanol	5.20	45	4290	N.D.			
11) Acetonitrile	5.42	41	136	N.D.			
12) Acrolein	5.58	56	1693	N.D.			
13) Acetone	5.66	58	20719	1.375	ng	#	55
14) Trichlorofluoromethane	0.00	101	0	N.D.			
15) 2-Propanol (Isopropanol)	5.99	45	2326	N.D.			
16) Acrylonitrile	6.23	53	53	N.D.			
17) 1,1-Dichloroethene	0.00	96	0	N.D.			
18) 2-Methyl-2-Propanol (t...	6.66	59	226	N.D.			
19) Methylene Chloride	0.00	84	0	N.D.			
20) 3-Chloro-1-propene (Al...	0.00	41	0	N.D.			
21) Trichlorotrifluoroethane	0.00	151	0	N.D.			
22) Carbon Disulfide	6.91	76	5075	N.D.			
23) trans-1,2-Dichloroethene	0.00	61	0	N.D.			
24) 1,1-Dichloroethane	7.87	63	441	N.D.			
25) Methyl tert-Butyl Ether	0.00	73	0	N.D.			
26) Vinyl Acetate	8.03	86	2310	0.527	ng	#	1
27) 2-Butanone (MEK)	8.33	72	1678	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	8.99	57	600	N.D.			
32) Chloroform	9.03	83	532	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	10.52	56	1831	N.D.			
41) Benzene	10.51	78	6448	N.D.			
42) Carbon Tetrachloride	0.00	117	0	N.D.			
43) Cyclohexane	10.79	84	896	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...	11.64	57	1434	N.D.			

Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2016_09\13\09131604.D
Acq On : 13 Sep 2016 10:53 Operator: SC
Sample : MB R9091316_1000mL
Misc : S29-07211602/AC00463
ALS Vial : 2 Sample Multiplier: 1

Quant Time: Sep 13 11:32:02 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M

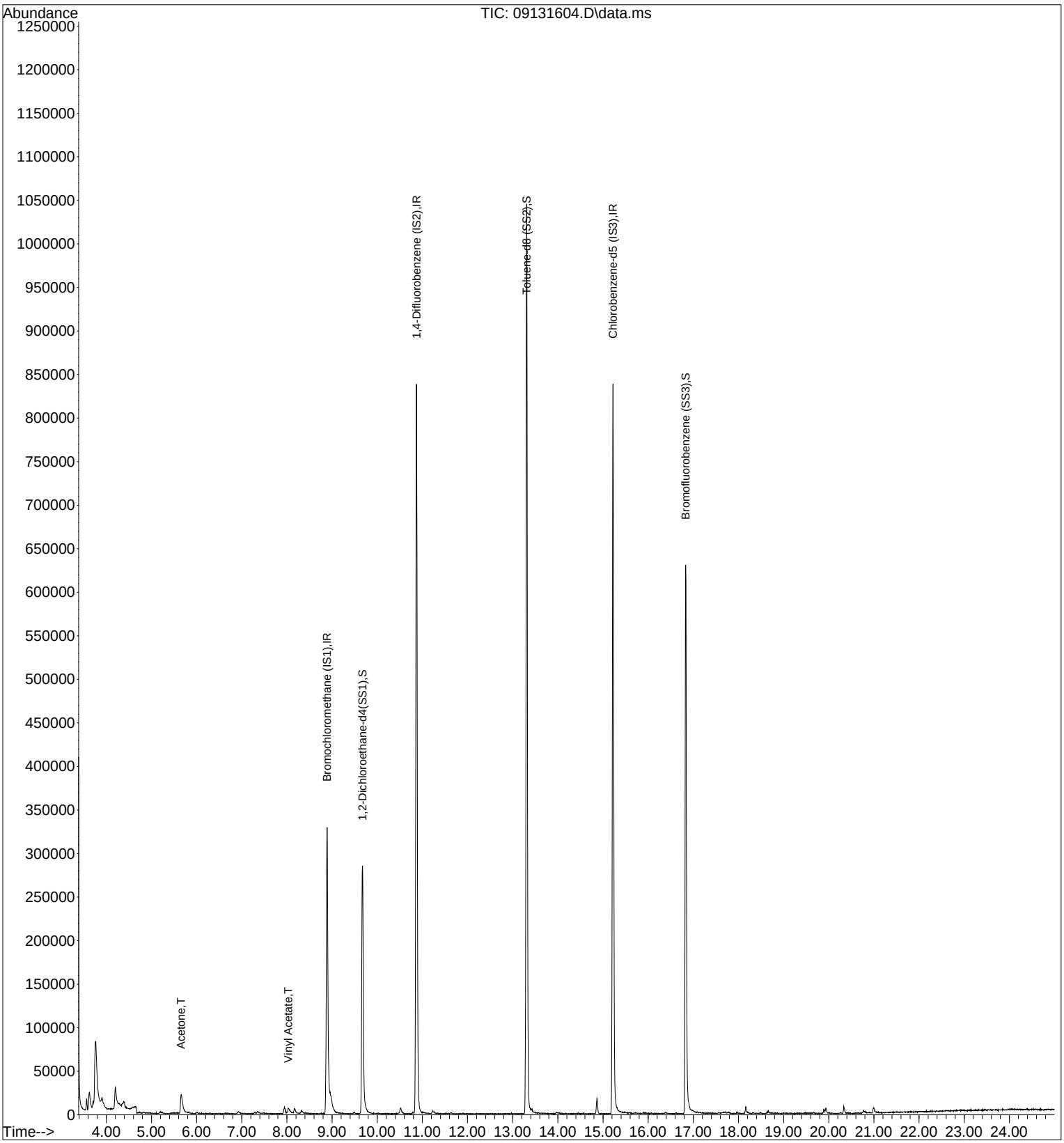
Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
50) Methyl Methacrylate	0.00	100	0	N.D.		
51) n-Heptane	0.00	71	0	N.D.		
52) cis-1,3-Dichloropropene	0.00	75	0	N.D.		
53) 4-Methyl-2-pentanone	0.00	58	0	N.D.		
54) trans-1,3-Dichloropropene	0.00	75	0	N.D.		
55) 1,1,2-Trichloroethane	0.00	97	0	N.D.		
58) Toluene	13.41	91	2753	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	14.44	43	609	N.D.		
63) n-Octane	0.00	57	0	N.D.		
64) Tetrachloroethene	0.00	166	0	N.D.		
65) Chlorobenzene	15.27	112	858	N.D.		
66) Ethylbenzene	15.69	91	621	N.D.		
67) m- & p-Xylenes	15.89	91	1316	N.D.		
68) Bromoform	0.00	173	0	N.D.		
69) Styrene	0.00	104	0	N.D.		
70) o-Xylene	16.39	91	1377	N.D.		
71) n-Nonane	16.61	43	598	N.D.		
72) 1,1,2,2-Tetrachloroethane	0.00	83	0	N.D.		
74) Cumene	17.00	105	1295	N.D.		
75) alpha-Pinene	0.00	93	0	N.D.		
76) n-Propylbenzene	17.56	91	1255	N.D.		
77) 3-Ethyltoluene	17.67	105	1888	N.D.		
78) 4-Ethyltoluene	17.67	105	1888	N.D.		
79) 1,3,5-Trimethylbenzene	17.78	105	1358	N.D.		
80) alpha-Methylstyrene	0.00	118	0	N.D.		
81) 2-Ethyltoluene	17.98	105	1404	N.D.		
82) 1,2,4-Trimethylbenzene	18.22	105	1029	N.D.		
83) n-Decane	0.00	57	0	N.D.		
84) Benzyl Chloride	18.19	91	480	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	18.49	105	1120	N.D.		
88) 4-Isopropyltoluene (p-...	18.66	119	1494	N.D.		
89) 1,2,3-Trimethylbenzene	18.66	105	498	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	19.69	57	631	N.D.		
94) 1,2,4-Trichlorobenzene	0.00	180	0	N.D.		
95) Naphthalene	20.77	128	1802	N.D.		
96) n-Dodecane	20.77	57	1105	N.D.		
97) Hexachlorobutadiene	0.00	225	0	N.D.		
98) Cyclohexanone	0.00	55	0	N.D.		
99) tert-Butylbenzene	18.19	119	699	N.D.		
100) n-Butylbenzene	19.15	91	592	N.D.		

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2016_09\13\09131604.D
Acq On : 13 Sep 2016 10:53 Operator: SC
Sample : MB R9091316_1000mL
Misc : S29-07211602/AC00463
ALS Vial : 2 Sample Multiplier: 1

Quant Time: Sep 13 11:32:02 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M



Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2016_09\14\09141603.D
Acq On : 14 Sep 2016 6:47 Operator: SC
Sample : MB R9091416_1000mL
Misc : S29-07211602/AC00463
ALS Vial : 2 Sample Multiplier: 1

9/14/16

Quant Time: Sep 14 09:05:56 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M

Internal Standards	R.T.	QIon	Response	Conc	Units		Dev(Min)
1) Bromochloromethane (IS1)	8.89	130	188913	12.500	ng		-0.05
37) 1,4-Difluorobenzene (IS2)	10.87	114	889214	12.500	ng		-0.03
56) Chlorobenzene-d5 (IS3)	15.22	82	339220	12.500	ng		0.00
System Monitoring Compounds							
33) 1,2-Dichloroethane-d4(...	9.67	65	252538	11.764	ng		-0.04
Spiked Amount 12.500	Range 70 - 130		Recovery = 94.08%				
57) Toluene-d8 (SS2)	13.31	98	917920	12.992	ng		-0.02
Spiked Amount 12.500	Range 70 - 130		Recovery = 103.92%				
73) Bromofluorobenzene (SS3)	16.83	174	258969	12.054	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 96.40%				
Target Compounds							Qvalue
2) Propene	3.72	42	1989	N.D.			
3) Dichlorodifluoromethan...	3.81	85	623	N.D.			
4) Chloromethane	4.02	50	443	N.D.			
5) 1,2-Dichloro-1,1,2,2-t...	0.00	135	0	N.D.			
6) Vinyl Chloride	4.30	62	599	N.D.			
7) 1,3-Butadiene	0.00	54	0	N.D.			
8) Bromomethane	4.75	94	410	N.D.			
9) Chloroethane	0.00	64	0	N.D.			
10) Ethanol	5.21	45	3683	0.214	ng		87
11) Acetonitrile	5.49	41	1767	N.D.			
12) Acrolein	5.58	56	1065	N.D.			
13) Acetone	5.66	58	21528	1.262	ng	#	62
14) Trichlorofluoromethane	5.81	101	569	N.D.			
15) 2-Propanol (Isopropanol)	6.00	45	2108	N.D.			
16) Acrylonitrile	6.28	53	117	N.D.			
17) 1,1-Dichloroethene	0.00	96	0	N.D.			
18) 2-Methyl-2-Propanol (t...	6.66	59	47	N.D.			
19) Methylene Chloride	0.00	84	0	N.D.			
20) 3-Chloro-1-propene (Al...	0.00	41	0	N.D.			
21) Trichlorotrifluoroethane	0.00	151	0	N.D.			
22) Carbon Disulfide	6.93	76	3836	N.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	8.05	86	2163	0.436	ng	#	21
27) 2-Butanone (MEK)	8.33	72	1700	0.111	ng	#	38
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	8.99	57	685	N.D.			
32) Chloroform	0.00	83	0	N.D.			
34) Tetrahydrofuran (THF)	9.49	72	436	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	10.55	56	1005	N.D.			
41) Benzene	10.52	78	6776	N.D.			
42) Carbon Tetrachloride	0.00	117	0	N.D.			
43) Cyclohexane	10.79	84	582	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...	11.64	57	1018	N.D.			

Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2016_09\14\09141603.D
Acq On : 14 Sep 2016 6:47 Operator: SC
Sample : MB R9091416_1000mL
Misc : S29-07211602/AC00463
ALS Vial : 2 Sample Multiplier: 1

Quant Time: Sep 14 09:05:56 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M

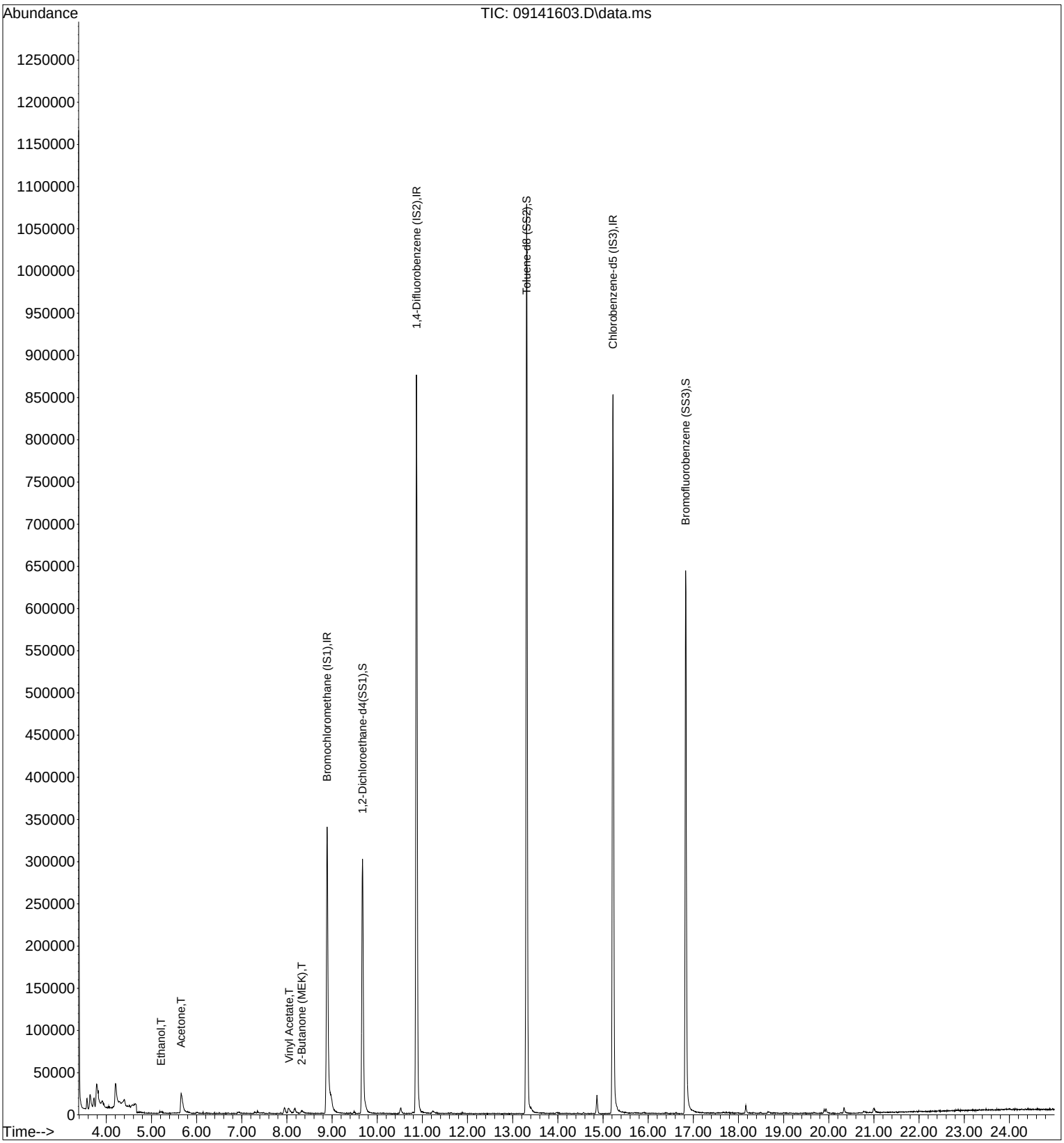
Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
50) Methyl Methacrylate	0.00	100	0	N.D.		
51) n-Heptane	0.00	71	0	N.D.		
52) cis-1,3-Dichloropropene	0.00	75	0	N.D.		
53) 4-Methyl-2-pentanone	0.00	58	0	N.D.		
54) trans-1,3-Dichloropropene	0.00	75	0	N.D.		
55) 1,1,2-Trichloroethane	0.00	97	0	N.D.		
58) Toluene	13.41	91	2812	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	14.44	43	540	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	15.71	91	1605	N.D.		
67) m- & p-Xylenes	15.71	91	1605	N.D.		
68) Bromoform	0.00	173	0	N.D.		
69) Styrene	0.00	104	0	N.D.		
70) o-Xylene	16.39	91	1184	N.D.		
71) n-Nonane	16.62	43	441	N.D.		
72) 1,1,2,2-Tetrachloroethane	0.00	83	0	N.D.		
74) Cumene	17.00	105	1139	N.D.		
75) alpha-Pinene	0.00	93	0	N.D.		
76) n-Propylbenzene	17.56	91	851	N.D.		
77) 3-Ethyltoluene	17.67	105	1240	N.D.		
78) 4-Ethyltoluene	17.67	105	1240	N.D.		
79) 1,3,5-Trimethylbenzene	17.67	105	1240	N.D.		
80) alpha-Methylstyrene	0.00	118	0	N.D.		
81) 2-Ethyltoluene	17.99	105	1456	N.D.		
82) 1,2,4-Trimethylbenzene	18.22	105	662	N.D.		
83) n-Decane	0.00	57	0	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	18.49	105	1028	N.D.		
88) 4-Isopropyltoluene (p-...	18.67	119	1104	N.D.		
89) 1,2,3-Trimethylbenzene	18.67	105	675	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	0.00	57	0	N.D.		
94) 1,2,4-Trichlorobenzene	0.00	180	0	N.D.		
95) Naphthalene	20.80	128	2018	N.D.		
96) n-Dodecane	20.77	57	494	N.D.		
97) Hexachlorobutadiene	0.00	225	0	N.D.		
98) Cyclohexanone	0.00	55	0	N.D.		
99) tert-Butylbenzene	18.18	119	721	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:\MS09\Data\2016_09\14\09141603.D
Acq On : 14 Sep 2016 6:47 Operator: SC
Sample : MB R9091416_1000mL
Misc : S29-07211602/AC00463
ALS Vial : 2 Sample Multiplier: 1

Quant Time: Sep 14 09:05:56 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M



Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2016_09\13\09131605.D
Acq On : 13 Sep 2016 11:26 Operator: SC
Sample : LCS R9091316_25ng
Misc : S29-07211602/S29-09061603 (10/5)
ALS Vial : 4 Sample Multiplier: 1

9/13/16

Quant Time: Sep 13 11:55:06 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M

Internal Standards	R.T.	QIon	Response	Conc	Units		Dev(Min)
1) Bromochloromethane (IS1)	8.91	130	190331	12.500	ng		-0.02
37) 1,4-Difluorobenzene (IS2)	10.88	114	886341	12.500	ng		-0.02
56) Chlorobenzene-d5 (IS3)	15.22	82	342815	12.500	ng		0.00
System Monitoring Compounds							
33) 1,2-Dichloroethane-d4(...	9.70	65	254377	11.761	ng		-0.01
Spiked Amount 12.500	Range 70 - 130		Recovery = 94.08%				
57) Toluene-d8 (SS2)	13.31	98	922817	12.924	ng		-0.01
Spiked Amount 12.500	Range 70 - 130		Recovery = 103.36%				
73) Bromofluorobenzene (SS3)	16.84	174	272981	12.573	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 100.56%				
Target Compounds							Qvalue
2) Propene	3.67	42	569837	23.495	ng		99
3) Dichlorodifluoromethan...	3.78	85	1129004	21.353	ng		100
4) Chloromethane	3.97	50	935381	24.478	ng		100
5) 1,2-Dichloro-1,1,2,2-t...	4.13	135	652181	24.195	ng		99
6) Vinyl Chloride	4.25	62	898520	25.168	ng		100
7) 1,3-Butadiene	4.42	54	692218	28.576	ng		100
8) Bromomethane	4.72	94	574958	25.869	ng		100
9) Chloroethane	4.94	64	449827	26.158	ng		99
10) Ethanol	5.21	45	2165506	124.605	ng		100
11) Acetonitrile	5.38	41	1039360	23.383	ng		100
12) Acrolein	5.50	56	341816	24.666	ng		90
13) Acetone	5.64	58	2207004	128.371	ng		94
14) Trichlorofluoromethane	5.80	101	949953	21.984	ng		100
15) 2-Propanol (Isopropanol)	5.98	45	2981009	51.002	ng		99
16) Acrylonitrile	6.17	53	778065	25.042	ng		100
17) 1,1-Dichloroethene	6.49	96	597454	27.206	ng		95
18) 2-Methyl-2-Propanol (t...	6.62	59	3024603	52.886	ng		99
19) Methylene Chloride	6.65	84	617000	28.264	ng		96
20) 3-Chloro-1-propene (Al...	6.76	41	822551	27.020	ng		97
21) Trichlorotrifluoroethane	6.95	151	520760	26.158	ng		98
22) Carbon Disulfide	6.90	76	2031628	23.762	ng		100
23) trans-1,2-Dichloroethene	7.66	61	836700	28.506	ng		97
24) 1,1-Dichloroethane	7.88	63	1052522	24.813	ng		99
25) Methyl tert-Butyl Ether	7.94	73	1776909	25.661	ng		100
26) Vinyl Acetate	8.06	86	663343	132.677	ng	#	91
27) 2-Butanone (MEK)	8.29	72	415925	26.858	ng		92
28) cis-1,2-Dichloroethene	8.76	61	815665	27.040	ng		97
29) Diisopropyl Ether	8.99	87	488474	24.128	ng	#	93
30) Ethyl Acetate	8.99	61	437664	52.040	ng		96
31) n-Hexane	8.99	57	948109	24.361	ng		100
32) Chloroform	9.06	83	1040174	25.812	ng		100
34) Tetrahydrofuran (THF)	9.44	72	403060	26.030	ng		96
35) Ethyl tert-Butyl Ether	9.53	87	711944	25.959	ng		98
36) 1,2-Dichloroethane	9.81	62	715617	25.252	ng		99
38) 1,1,1-Trichloroethane	10.06	97	890030	24.164	ng		100
39) Isopropyl Acetate	10.44	61	749706	55.847	ng		95
40) 1-Butanol	10.46	56	1258785	58.852	ng		98
41) Benzene	10.52	78	2400481	25.041	ng		100
42) Carbon Tetrachloride	10.67	117	781072	26.400	ng		100
43) Cyclohexane	10.80	84	1819192	50.814	ng		98
44) tert-Amyl Methyl Ether	11.12	73	1691583	25.405	ng		99
45) 1,2-Dichloropropane	11.34	63	610527	25.583	ng		100
46) Bromodichloromethane	11.52	83	828292	25.942	ng		100
47) Trichloroethene	11.58	130	671379	24.144	ng		100
48) 1,4-Dioxane	11.55	88	517052	27.391	ng		98
49) 2,2,4-Trimethylpentane...	11.64	57	2492992	24.156	ng		99

Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2016_09\13\09131605.D
Acq On : 13 Sep 2016 11:26 Operator: SC
Sample : LCS R9091316_25ng
Misc : S29-07211602/S29-09061603 (10/5)
ALS Vial : 4 Sample Multiplier: 1

Quant Time: Sep 13 11:55:06 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M

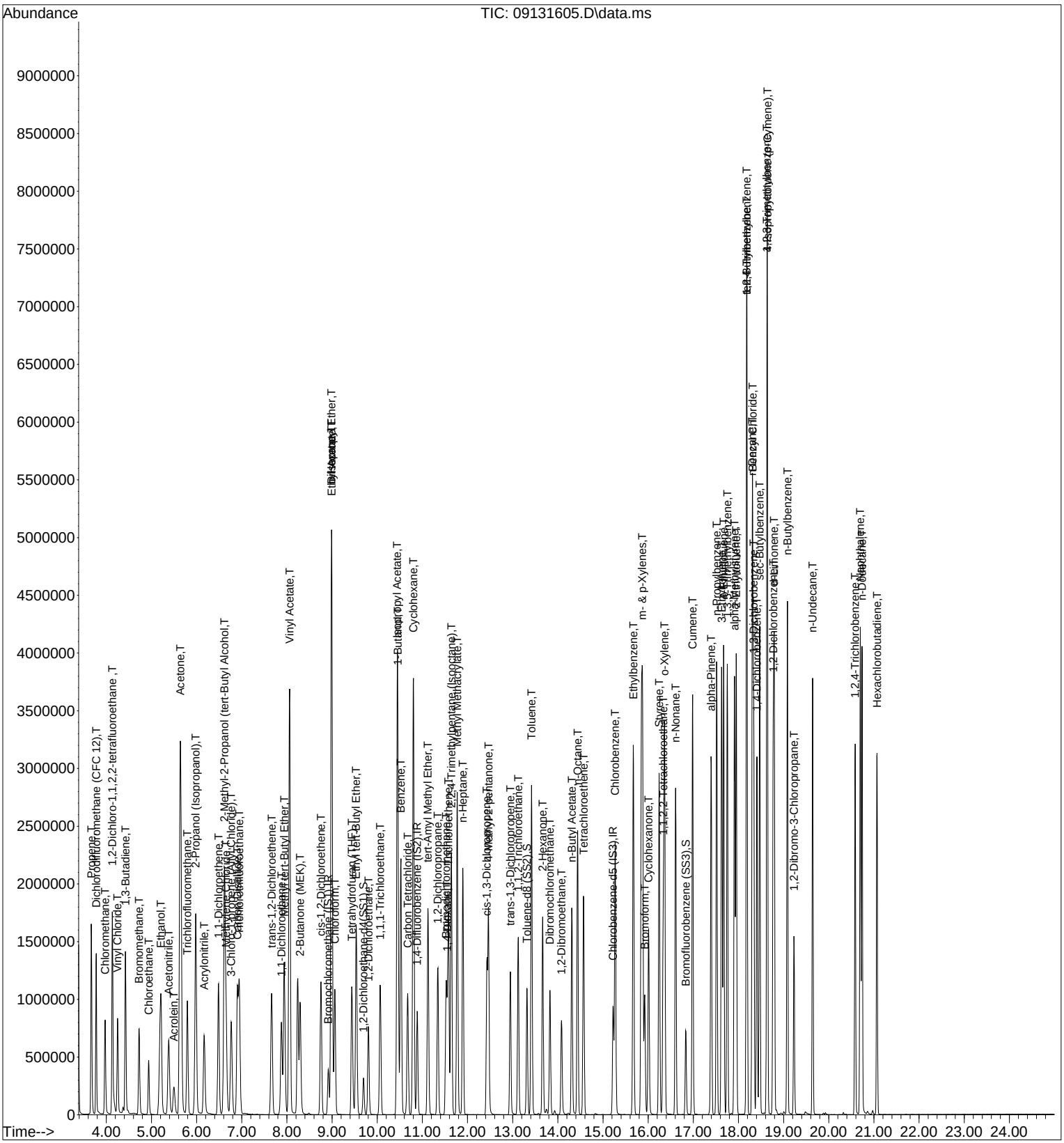
Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
50) Methyl Methacrylate	11.77	100	500465	52.670	ng	96
51) n-Heptane	11.90	71	600830	26.026	ng	99
52) cis-1,3-Dichloropropene	12.43	75	942463	25.241	ng	100
53) 4-Methyl-2-pentanone	12.46	58	571055	26.065	ng	98
54) trans-1,3-Dichloropropene	12.95	75	847624	26.498	ng	100
55) 1,1,2-Trichloroethane	13.12	97	611102	26.861	ng	100
58) Toluene	13.42	91	2544986	25.462	ng	99
59) 2-Hexanone	13.66	43	1307842	28.076	ng	98
60) Dibromochloromethane	13.82	129	724927	28.825	ng	100
61) 1,2-Dibromoethane	14.08	107	701836	27.882	ng	99
62) n-Butyl Acetate	14.31	43	1477177	28.913	ng	99
63) n-Octane	14.44	57	506610	25.531	ng	97
64) Tetrachloroethene	14.57	166	711494	24.652	ng	100
65) Chlorobenzene	15.27	112	1670023	26.339	ng	100
66) Ethylbenzene	15.67	91	2858645	27.257	ng	100
67) m- & p-Xylenes	15.87	91	4499980	53.025	ng	100
68) Bromoform	15.92	173	631649	27.349	ng	99
69) Styrene	16.24	104	1808907	28.968	ng	99
70) o-Xylene	16.36	91	2260306	25.705	ng	100
71) n-Nonane	16.61	43	1124969	24.552	ng	98
72) 1,1,2,2-Tetrachloroethane	16.34	83	1097874	28.388	ng	100
74) Cumene	16.99	105	2835658	25.278	ng	100
75) alpha-Pinene	17.39	93	1443440	26.601	ng	100
76) n-Propylbenzene	17.52	91	3454806	25.793	ng	100
77) 3-Ethyltoluene	17.63	105	2880449	27.783	ng	100
78) 4-Ethyltoluene	17.67	105	2777446	27.567	ng	100
79) 1,3,5-Trimethylbenzene	17.75	105	2364299	25.914	ng	100
80) alpha-Methylstyrene	17.91	118	1328738	27.376	ng	99
81) 2-Ethyltoluene	17.95	105	2782252	26.194	ng	100
82) 1,2,4-Trimethylbenzene	18.18	105	2436091	27.201	ng	99
83) n-Decane	18.31	57	1246130	25.579	ng	99
84) Benzyl Chloride	18.32	91	2070549	29.185	ng	100
85) 1,3-Dichlorobenzene	18.34	146	1474830	30.434	ng	100
86) 1,4-Dichlorobenzene	18.41	146	1457517	29.084	ng	100
87) sec-Butylbenzene	18.47	105	3209477	26.926	ng	100
88) 4-Isopropyltoluene (p-...	18.64	119	2933940	26.012	ng	100
89) 1,2,3-Trimethylbenzene	18.63	105	2504566	26.662	ng	100
90) 1,2-Dichlorobenzene	18.77	146	1399364	28.997	ng	100
91) d-Limonene	18.79	68	946812	27.608	ng	99
92) 1,2-Dibromo-3-Chloropr...	19.23	157	516982	28.192	ng	98
93) n-Undecane	19.64	57	1289832	25.389	ng	99
94) 1,2,4-Trichlorobenzene	20.58	180	1065558	27.264	ng	100
95) Naphthalene	20.70	128	3396374	26.243	ng	100
96) n-Dodecane	20.73	57	1311805	26.732	ng	98
97) Hexachlorobutadiene	21.07	225	634329	27.647	ng	100
98) Cyclohexanone	16.01	55	826309	26.997	ng	99
99) tert-Butylbenzene	18.18	119	2331122	26.357	ng	99
100) n-Butylbenzene	19.08	91	2618262	29.138	ng	99

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2016_09\13\09131605.D
Acq On : 13 Sep 2016 11:26 Operator: SC
Sample : LCS R9091316_25ng
Misc : S29-07211602/S29-09061603 (10/5)
ALS Vial : 4 Sample Multiplier: 1

Quant Time: Sep 13 11:55:06 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M



Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2016_09\13\09131606.D
Acq On : 13 Sep 2016 12:00 Operator: SC
Sample : LCSD R9091316_25ng
Misc : S29-07211602/S29-09061603 (10/5)
ALS Vial : 4 Sample Multiplier: 1

9/13/16

Quant Time: Sep 13 12:25:57 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M

Internal Standards	R.T.	QIon	Response	Conc	Units		Dev(Min)
1) Bromochloromethane (IS1)	8.92	130	188715	12.500	ng		-0.02
37) 1,4-Difluorobenzene (IS2)	10.88	114	881620	12.500	ng		-0.02
56) Chlorobenzene-d5 (IS3)	15.22	82	341925	12.500	ng		0.00
System Monitoring Compounds							
33) 1,2-Dichloroethane-d4(...	9.69	65	253331	11.813	ng		-0.02
Spiked Amount 12.500	Range 70 - 130		Recovery = 94.48%				
57) Toluene-d8 (SS2)	13.32	98	910412	12.784	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 102.24%				
73) Bromofluorobenzene (SS3)	16.84	174	275365	12.716	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 101.76%				
Target Compounds							Qvalue
2) Propene	3.67	42	568384	23.636	ng		99
3) Dichlorodifluoromethan...	3.78	85	1121805	21.398	ng		100
4) Chloromethane	3.97	50	908451	23.976	ng		100
5) 1,2-Dichloro-1,1,2,2-t...	4.14	135	664499	24.863	ng		100
6) Vinyl Chloride	4.25	62	909306	25.688	ng		99
7) 1,3-Butadiene	4.42	54	703659	29.297	ng		100
8) Bromomethane	4.73	94	578607	26.257	ng		99
9) Chloroethane	4.94	64	446844	26.207	ng		100
10) Ethanol	5.20	45	2172248	126.063	ng		99
11) Acetonitrile	5.38	41	1039109	23.577	ng		99
12) Acrolein	5.50	56	343168	24.975	ng		90
13) Acetone	5.64	58	2207694	129.510	ng		95
14) Trichlorofluoromethane	5.80	101	954058	22.268	ng		100
15) 2-Propanol (Isopropanol)	5.98	45	3000033	51.767	ng		99
16) Acrylonitrile	6.17	53	786073	25.516	ng		100
17) 1,1-Dichloroethene	6.49	96	600544	27.581	ng		95
18) 2-Methyl-2-Propanol (t...	6.61	59	3048639	53.763	ng		99
19) Methylene Chloride	6.65	84	621146	28.698	ng		96
20) 3-Chloro-1-propene (Al...	6.76	41	830826	27.526	ng		97
21) Trichlorotrifluoroethane	6.94	151	524132	26.552	ng		98
22) Carbon Disulfide	6.90	76	2048678	24.167	ng		100
23) trans-1,2-Dichloroethene	7.66	61	840628	28.885	ng		98
24) 1,1-Dichloroethane	7.88	63	1057570	25.146	ng		100
25) Methyl tert-Butyl Ether	7.94	73	1788379	26.048	ng		100
26) Vinyl Acetate	8.06	86	669397	135.035	ng	#	90
27) 2-Butanone (MEK)	8.29	72	414904	27.022	ng		95
28) cis-1,2-Dichloroethene	8.75	61	816886	27.312	ng		97
29) Diisopropyl Ether	8.99	87	492693	24.545	ng	#	92
30) Ethyl Acetate	8.99	61	438304	52.562	ng		95
31) n-Hexane	8.99	57	950873	24.642	ng		100
32) Chloroform	9.06	83	1041547	26.067	ng		100
34) Tetrahydrofuran (THF)	9.44	72	404296	26.333	ng		96
35) Ethyl tert-Butyl Ether	9.53	87	715717	26.320	ng		98
36) 1,2-Dichloroethane	9.80	62	715696	25.471	ng		100
38) 1,1,1-Trichloroethane	10.06	97	893823	24.397	ng		100
39) Isopropyl Acetate	10.44	61	755143	56.553	ng		95
40) 1-Butanol	10.46	56	1270501	59.718	ng		98
41) Benzene	10.52	78	2407836	25.253	ng		100
42) Carbon Tetrachloride	10.67	117	782579	26.593	ng		99
43) Cyclohexane	10.80	84	1830570	51.405	ng		98
44) tert-Amyl Methyl Ether	11.12	73	1700219	25.671	ng		99
45) 1,2-Dichloropropane	11.34	63	613362	25.839	ng		99
46) Bromodichloromethane	11.52	83	828342	26.082	ng		100
47) Trichloroethene	11.58	130	676072	24.443	ng		100
48) 1,4-Dioxane	11.55	88	519099	27.647	ng		99
49) 2,2,4-Trimethylpentane...	11.64	57	2504010	24.392	ng		99

Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2016_09\13\09131606.D
Acq On : 13 Sep 2016 12:00 Operator: SC
Sample : LCSD R9091316_25ng
Misc : S29-07211602/S29-09061603 (10/5)
ALS Vial : 4 Sample Multiplier: 1

Quant Time: Sep 13 12:25:57 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M

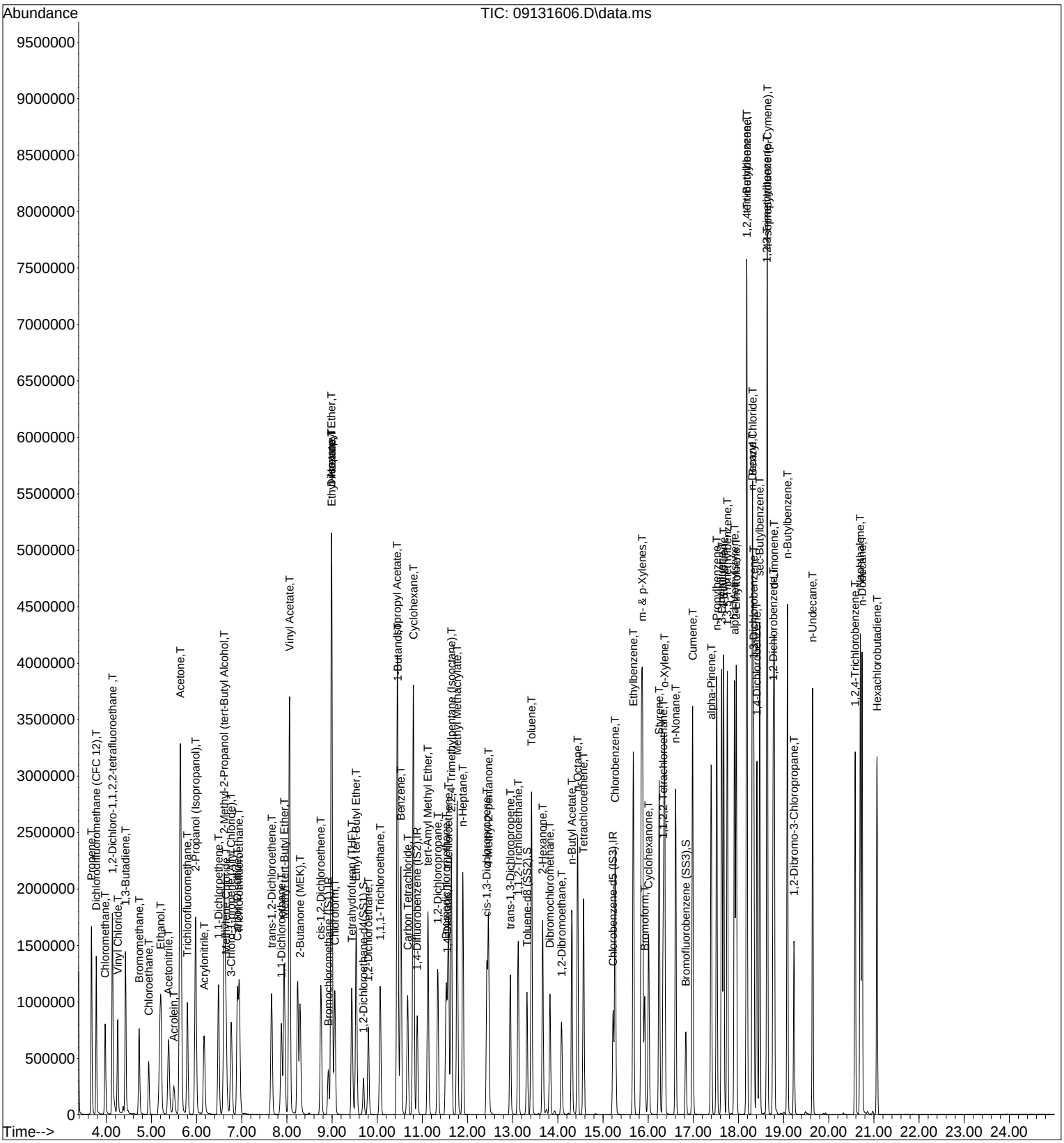
Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
50) Methyl Methacrylate	11.77	100	503660	53.290	ng	96
51) n-Heptane	11.90	71	603202	26.269	ng	99
52) cis-1,3-Dichloropropene	12.43	75	946476	25.484	ng	100
53) 4-Methyl-2-pentanone	12.46	58	570497	26.179	ng	98
54) trans-1,3-Dichloropropene	12.95	75	853879	26.837	ng	100
55) 1,1,2-Trichloroethane	13.12	97	618017	27.310	ng	99
58) Toluene	13.42	91	2554386	25.623	ng	100
59) 2-Hexanone	13.66	43	1318194	28.372	ng	98
60) Dibromochloromethane	13.82	129	727506	29.003	ng	100
61) 1,2-Dibromoethane	14.08	107	710436	28.297	ng	100
62) n-Butyl Acetate	14.31	43	1489323	29.226	ng	99
63) n-Octane	14.44	57	512975	25.919	ng	98
64) Tetrachloroethene	14.57	166	717497	24.924	ng	99
65) Chlorobenzene	15.27	112	1681989	26.597	ng	99
66) Ethylbenzene	15.67	91	2872155	27.457	ng	100
67) m- & p-Xylenes	15.87	91	4525429	53.464	ng	100
68) Bromoform	15.92	173	635327	27.580	ng	100
69) Styrene	16.24	104	1823048	29.271	ng	99
70) o-Xylene	16.36	91	2270794	25.892	ng	100
71) n-Nonane	16.61	43	1131952	24.769	ng	98
72) 1,1,2,2-Tetrachloroethane	16.34	83	1107671	28.716	ng	100
74) Cumene	16.99	105	2862334	25.582	ng	100
75) alpha-Pinene	17.40	93	1459145	26.961	ng	99
76) n-Propylbenzene	17.52	91	3472550	25.993	ng	100
77) 3-Ethyltoluene	17.63	105	2887932	27.928	ng	100
78) 4-Ethyltoluene	17.67	105	2797572	27.839	ng	100
79) 1,3,5-Trimethylbenzene	17.75	105	2385114	26.210	ng	100
80) alpha-Methylstyrene	17.91	118	1334222	27.560	ng	99
81) 2-Ethyltoluene	17.95	105	2791117	26.346	ng	100
82) 1,2,4-Trimethylbenzene	18.19	105	2456179	27.497	ng	99
83) n-Decane	18.31	57	1260294	25.937	ng	99
84) Benzyl Chloride	18.32	91	2097236	29.638	ng	100
85) 1,3-Dichlorobenzene	18.34	146	1482425	30.670	ng	100
86) 1,4-Dichlorobenzene	18.41	146	1464599	29.301	ng	100
87) sec-Butylbenzene	18.47	105	3219665	27.082	ng	100
88) 4-Isopropyltoluene (p-...	18.64	119	2963012	26.338	ng	99
89) 1,2,3-Trimethylbenzene	18.63	105	2522505	26.923	ng	100
90) 1,2-Dichlorobenzene	18.77	146	1414168	29.380	ng	100
91) d-Limonene	18.79	68	958192	28.012	ng	99
92) 1,2-Dibromo-3-Chloropr...	19.23	157	515399	28.179	ng	98
93) n-Undecane	19.64	57	1306657	25.787	ng	99
94) 1,2,4-Trichlorobenzene	20.58	180	1085470	27.846	ng	99
95) Naphthalene	20.70	128	3454548	26.762	ng	100
96) n-Dodecane	20.74	57	1337989	27.337	ng	99
97) Hexachlorobutadiene	21.07	225	636258	27.803	ng	100
98) Cyclohexanone	16.01	55	830639	27.209	ng	99
99) tert-Butylbenzene	18.18	119	2344975	26.583	ng	99
100) n-Butylbenzene	19.08	91	2643896	29.500	ng	99

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2016_09\13\09131606.D
Acq On : 13 Sep 2016 12:00 Operator: SC
Sample : LCSD R9091316_25ng
Misc : S29-07211602/S29-09061603 (10/5)
ALS Vial : 4 Sample Multiplier: 1

Quant Time: Sep 13 12:25:57 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M



Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2016_09\14\09141604.D
Acq On : 14 Sep 2016 7:20 Operator: SC
Sample : LCS R9091416_25ng
Misc : S29-07211602/S29-09061603 (10/5)
ALS Vial : 4 Sample Multiplier: 1

Quant Time: Sep 14 09:07:55 2016 9/14/16
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M

Internal Standards	R.T.	QIon	Response	Conc	Units		Dev(Min)
1) Bromochloromethane (IS1)	8.92	130	194719	12.500	ng		-0.02
37) 1,4-Difluorobenzene (IS2)	10.88	114	909591	12.500	ng		-0.02
56) Chlorobenzene-d5 (IS3)	15.22	82	353867	12.500	ng		0.00
System Monitoring Compounds							
33) 1,2-Dichloroethane-d4(...	9.69	65	259016	11.706	ng		-0.02
Spiked Amount 12.500	Range 70 - 130		Recovery = 93.68%				
57) Toluene-d8 (SS2)	13.31	98	939117	12.742	ng		-0.01
Spiked Amount 12.500	Range 70 - 130		Recovery = 101.92%				
73) Bromofluorobenzene (SS3)	16.83	174	277505	12.382	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 99.04%				
Target Compounds							Qvalue
2) Propene	3.67	42	581028	23.417	ng		99
3) Dichlorodifluoromethan...	3.77	85	1131896	20.925	ng		100
4) Chloromethane	3.97	50	950809	24.321	ng		100
5) 1,2-Dichloro-1,1,2,2-t...	4.13	135	667406	24.202	ng		100
6) Vinyl Chloride	4.25	62	932517	25.532	ng		100
7) 1,3-Butadiene	4.42	54	731692	29.525	ng		99
8) Bromomethane	4.72	94	595548	26.192	ng		100
9) Chloroethane	4.93	64	461392	26.226	ng		99
10) Ethanol	5.20	45	2203499	123.934	ng		100
11) Acetonitrile	5.38	41	1058899	23.286	ng		100
12) Acrolein	5.49	56	348511	24.582	ng		90
13) Acetone	5.64	58	2227576	126.648	ng		94
14) Trichlorofluoromethane	5.79	101	956743	21.642	ng		99
15) 2-Propanol (Isopropanol)	5.98	45	3021263	50.526	ng		99
16) Acrylonitrile	6.16	53	794092	24.982	ng		100
17) 1,1-Dichloroethene	6.48	96	602726	26.827	ng		96
18) 2-Methyl-2-Propanol (t...	6.61	59	3053033	52.180	ng		99
19) Methylene Chloride	6.65	84	629661	28.194	ng		95
20) 3-Chloro-1-propene (Al...	6.76	41	840808	26.998	ng		98
21) Trichlorotrifluoroethane	6.94	151	522041	25.631	ng		99
22) Carbon Disulfide	6.90	76	2074135	23.712	ng		100
23) trans-1,2-Dichloroethene	7.66	61	845797	28.166	ng		98
24) 1,1-Dichloroethane	7.87	63	1071514	24.691	ng		100
25) Methyl tert-Butyl Ether	7.94	73	1795454	25.345	ng		100
26) Vinyl Acetate	8.05	86	667161	130.434	ng	#	91
27) 2-Butanone (MEK)	8.29	72	417506	26.353	ng		95
28) cis-1,2-Dichloroethene	8.75	61	821189	26.609	ng		98
29) Diisopropyl Ether	8.98	87	495662	23.931	ng	#	93
30) Ethyl Acetate	8.99	61	446385	51.881	ng		96
31) n-Hexane	8.98	57	966041	24.263	ng		100
32) Chloroform	9.06	83	1046296	25.379	ng		100
34) Tetrahydrofuran (THF)	9.44	72	408487	25.786	ng		96
35) Ethyl tert-Butyl Ether	9.53	87	717665	25.578	ng		98
36) 1,2-Dichloroethane	9.80	62	718301	24.775	ng		100
38) 1,1,1-Trichloroethane	10.06	97	896471	23.717	ng		100
39) Isopropyl Acetate	10.44	61	763776	55.441	ng		94
40) 1-Butanol	10.46	56	1272687	57.981	ng		97
41) Benzene	10.52	78	2429295	24.694	ng		100
42) Carbon Tetrachloride	10.67	117	774454	25.507	ng		100
43) Cyclohexane	10.80	84	1839560	50.069	ng		98
44) tert-Amyl Methyl Ether	11.12	73	1721590	25.195	ng		99
45) 1,2-Dichloropropane	11.34	63	618428	25.251	ng		100
46) Bromodichloromethane	11.52	83	833613	25.441	ng		100
47) Trichloroethene	11.58	130	674180	23.625	ng		100
48) 1,4-Dioxane	11.55	88	526708	27.189	ng		98
49) 2,2,4-Trimethylpentane...	11.64	57	2532345	23.910	ng		99

Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2016_09\14\09141604.D
Acq On : 14 Sep 2016 7:20 Operator: SC
Sample : LCS R9091416_25ng
Misc : S29-07211602/S29-09061603 (10/5)
ALS Vial : 4 Sample Multiplier: 1

Quant Time: Sep 14 09:07:55 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M

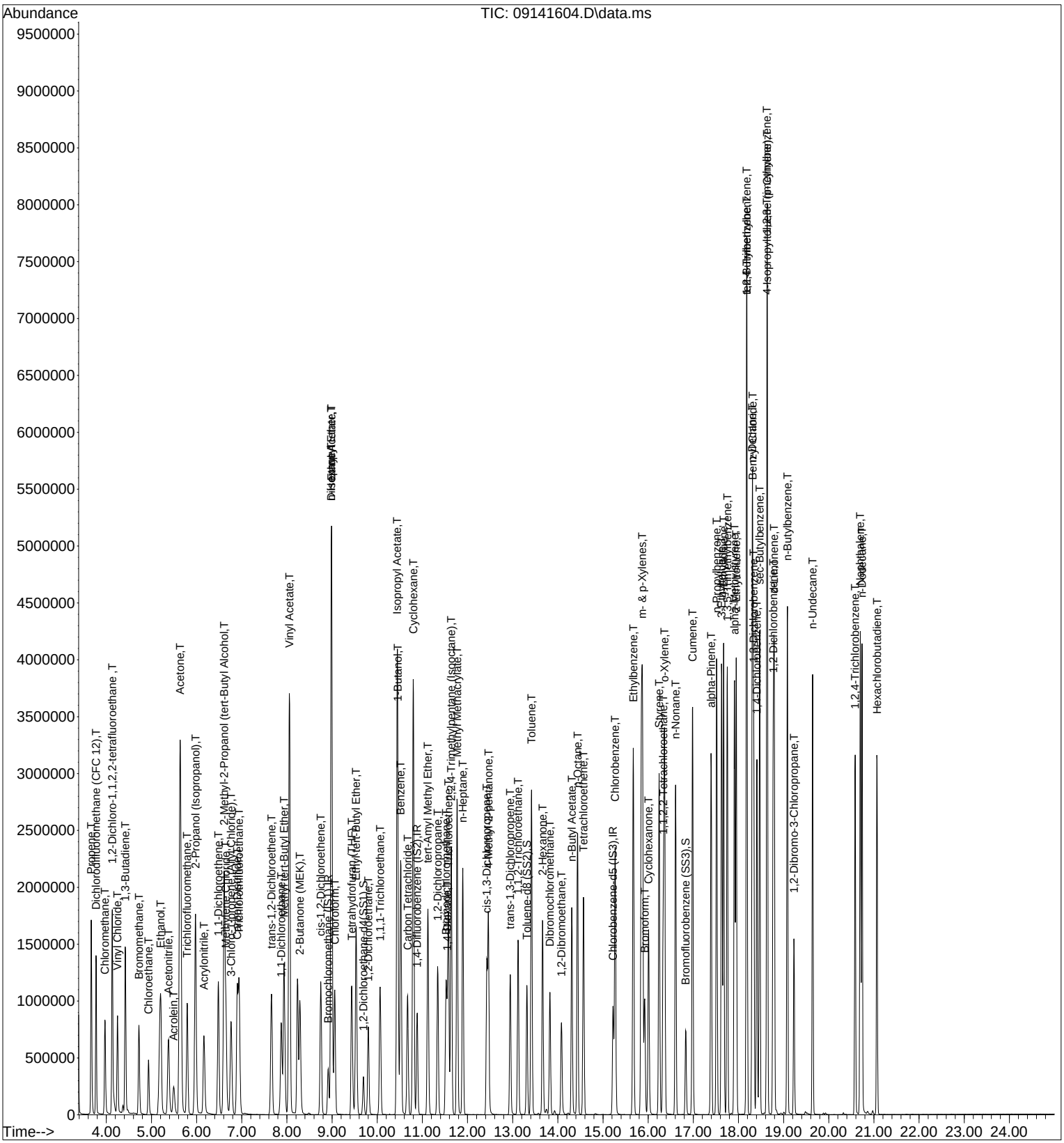
Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
50) Methyl Methacrylate	11.77	100	503444	51.629	ng	98
51) n-Heptane	11.90	71	607342	25.636	ng	99
52) cis-1,3-Dichloropropene	12.43	75	951843	24.840	ng	99
53) 4-Methyl-2-pentanone	12.46	58	582628	25.913	ng	97
54) trans-1,3-Dichloropropene	12.94	75	851935	25.952	ng	100
55) 1,1,2-Trichloroethane	13.12	97	620997	26.598	ng	99
58) Toluene	13.42	91	2579714	25.003	ng	99
59) 2-Hexanone	13.66	43	1330367	27.668	ng	98
60) Dibromochloromethane	13.82	129	725722	27.955	ng	99
61) 1,2-Dibromoethane	14.08	107	708523	27.268	ng	99
62) n-Butyl Acetate	14.31	43	1499495	28.433	ng	99
63) n-Octane	14.44	57	516394	25.212	ng	97
64) Tetrachloroethene	14.57	166	708796	23.791	ng	100
65) Chlorobenzene	15.27	112	1688628	25.800	ng	100
66) Ethylbenzene	15.67	91	2894750	26.739	ng	100
67) m- & p-Xylenes	15.87	91	4535253	51.771	ng	100
68) Bromoform	15.92	173	632071	26.513	ng	100
69) Styrene	16.24	104	1826419	28.335	ng	99
70) o-Xylene	16.36	91	2281906	25.141	ng	100
71) n-Nonane	16.61	43	1148639	24.286	ng	98
72) 1,1,2,2-Tetrachloroethane	16.34	83	1112575	27.870	ng	99
74) Cumene	16.99	105	2872765	24.809	ng	100
75) alpha-Pinene	17.39	93	1467777	26.205	ng	99
76) n-Propylbenzene	17.52	91	3502907	25.335	ng	100
77) 3-Ethyltoluene	17.62	105	2935763	27.432	ng	100
78) 4-Ethyltoluene	17.67	105	2787533	26.803	ng	100
79) 1,3,5-Trimethylbenzene	17.75	105	2399410	25.477	ng	100
80) alpha-Methylstyrene	17.91	118	1346357	26.872	ng	100
81) 2-Ethyltoluene	17.95	105	2802356	25.560	ng	100
82) 1,2,4-Trimethylbenzene	18.18	105	2456732	26.575	ng	100
83) n-Decane	18.31	57	1275935	25.372	ng	99
84) Benzyl Chloride	18.32	91	2101237	28.693	ng	100
85) 1,3-Dichlorobenzene	18.34	146	1482243	29.631	ng	100
86) 1,4-Dichlorobenzene	18.41	146	1462862	28.279	ng	100
87) sec-Butylbenzene	18.47	105	3245887	26.381	ng	100
88) 4-Isopropyltoluene (p-...	18.64	119	2965416	25.470	ng	100
89) 1,2,3-Trimethylbenzene	18.63	105	2530304	26.095	ng	100
90) 1,2-Dichlorobenzene	18.77	146	1412503	28.355	ng	100
91) d-Limonene	18.79	68	968931	27.370	ng	99
92) 1,2-Dibromo-3-Chloropr...	19.23	157	517832	27.356	ng	98
93) n-Undecane	19.64	57	1326556	25.296	ng	99
94) 1,2,4-Trichlorobenzene	20.58	180	1064135	26.377	ng	100
95) Naphthalene	20.70	128	3401066	25.459	ng	100
96) n-Dodecane	20.73	57	1341239	26.479	ng	99
97) Hexachlorobutadiene	21.07	225	636787	26.887	ng	100
98) Cyclohexanone	16.01	55	844867	26.742	ng	98
99) tert-Butylbenzene	18.18	119	2343443	25.669	ng	99
100) n-Butylbenzene	19.08	91	2663594	28.717	ng	100

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2016_09\14\09141604.D
Acq On : 14 Sep 2016 7:20 Operator: SC
Sample : LCS R9091416_25ng
Misc : S29-07211602/S29-09061603 (10/5)
ALS Vial : 4 Sample Multiplier: 1

Quant Time: Sep 14 09:07:55 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M



Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2016_09\14\09141605.D
Acq On : 14 Sep 2016 7:54 Operator: SC
Sample : LCSD R9091416_25ng
Misc : S29-07211602/S29-09061603 (10/5)
ALS Vial : 4 Sample Multiplier: 1

9/14/16

Quant Time: Sep 14 09:12:48 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M

Internal Standards	R.T.	QIon	Response	Conc	Units		Dev(Min)
1) Bromochloromethane (IS1)	8.91	130	194116	12.500	ng		-0.02
37) 1,4-Difluorobenzene (IS2)	10.88	114	907525	12.500	ng		-0.02
56) Chlorobenzene-d5 (IS3)	15.22	82	351940	12.500	ng		0.00
System Monitoring Compounds							
33) 1,2-Dichloroethane-d4(...	9.69	65	259728	11.774	ng		-0.02
Spiked Amount 12.500	Range 70 - 130		Recovery = 94.16%				
57) Toluene-d8 (SS2)	13.31	98	941723	12.847	ng		-0.01
Spiked Amount 12.500	Range 70 - 130		Recovery = 102.80%				
73) Bromofluorobenzene (SS3)	16.83	174	278115	12.477	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 99.84%				
Target Compounds							Qvalue
2) Propene	3.67	42	580333	23.461	ng		99
3) Dichlorodifluoromethan...	3.78	85	1128180	20.921	ng		100
4) Chloromethane	3.97	50	916228	23.509	ng		100
5) 1,2-Dichloro-1,1,2,2-t...	4.13	135	683649	24.868	ng		100
6) Vinyl Chloride	4.25	62	947700	26.028	ng		100
7) 1,3-Butadiene	4.42	54	740525	29.974	ng		100
8) Bromomethane	4.73	94	604253	26.657	ng		99
9) Chloroethane	4.94	64	451914	25.767	ng		100
10) Ethanol	5.20	45	2209447	124.654	ng		100
11) Acetonitrile	5.38	41	1069524	23.592	ng		99
12) Acrolein	5.50	56	350434	24.795	ng		100
13) Acetone	5.64	58	2253901	128.542	ng		94
14) Trichlorofluoromethane	5.80	101	961315	21.813	ng		100
15) 2-Propanol (Isopropanol)	5.98	45	3049520	51.157	ng		99
16) Acrylonitrile	6.17	53	800499	25.261	ng		100
17) 1,1-Dichloroethene	6.48	96	608051	27.148	ng		95
18) 2-Methyl-2-Propanol (t...	6.61	59	3035585	52.043	ng		99
19) Methylene Chloride	6.65	84	633179	28.440	ng		96
20) 3-Chloro-1-propene (Al...	6.76	41	852723	27.465	ng		97
21) Trichlorotrifluoroethane	6.94	151	528159	26.012	ng		98
22) Carbon Disulfide	6.90	76	2088149	23.947	ng		100
23) trans-1,2-Dichloroethene	7.66	61	855339	28.572	ng		98
24) 1,1-Dichloroethane	7.88	63	1071301	24.763	ng		100
25) Methyl tert-Butyl Ether	7.94	73	1819405	25.763	ng		100
26) Vinyl Acetate	8.06	86	680096	133.376	ng	#	89
27) 2-Butanone (MEK)	8.29	72	422755	26.767	ng		95
28) cis-1,2-Dichloroethene	8.75	61	832623	27.064	ng		98
29) Diisopropyl Ether	8.99	87	499774	24.205	ng	#	94
30) Ethyl Acetate	8.99	61	448264	52.261	ng		95
31) n-Hexane	8.99	57	973527	24.527	ng		99
32) Chloroform	9.06	83	1059993	25.791	ng		100
34) Tetrahydrofuran (THF)	9.44	72	412878	26.144	ng		96
35) Ethyl tert-Butyl Ether	9.53	87	728789	26.055	ng		98
36) 1,2-Dichloroethane	9.80	62	723653	25.038	ng		100
38) 1,1,1-Trichloroethane	10.06	97	901596	23.906	ng		100
39) Isopropyl Acetate	10.44	61	773241	56.255	ng		94
40) 1-Butanol	10.46	56	1293889	59.082	ng		97
41) Benzene	10.52	78	2454944	25.012	ng		100
42) Carbon Tetrachloride	10.67	117	783155	25.853	ng		100
43) Cyclohexane	10.80	84	1865278	50.885	ng		98
44) tert-Amyl Methyl Ether	11.12	73	1743469	25.573	ng		99
45) 1,2-Dichloropropane	11.34	63	625130	25.583	ng		100
46) Bromodichloromethane	11.52	83	841181	25.730	ng		100
47) Trichloroethene	11.58	130	681334	23.930	ng		99
48) 1,4-Dioxane	11.55	88	532436	27.548	ng		98
49) 2,2,4-Trimethylpentane...	11.64	57	2561996	24.245	ng		98

Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2016_09\14\09141605.D
Acq On : 14 Sep 2016 7:54 Operator: SC
Sample : LCSD R9091416_25ng
Misc : S29-07211602/S29-09061603 (10/5)
ALS Vial : 4 Sample Multiplier: 1

Quant Time: Sep 14 09:12:48 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M

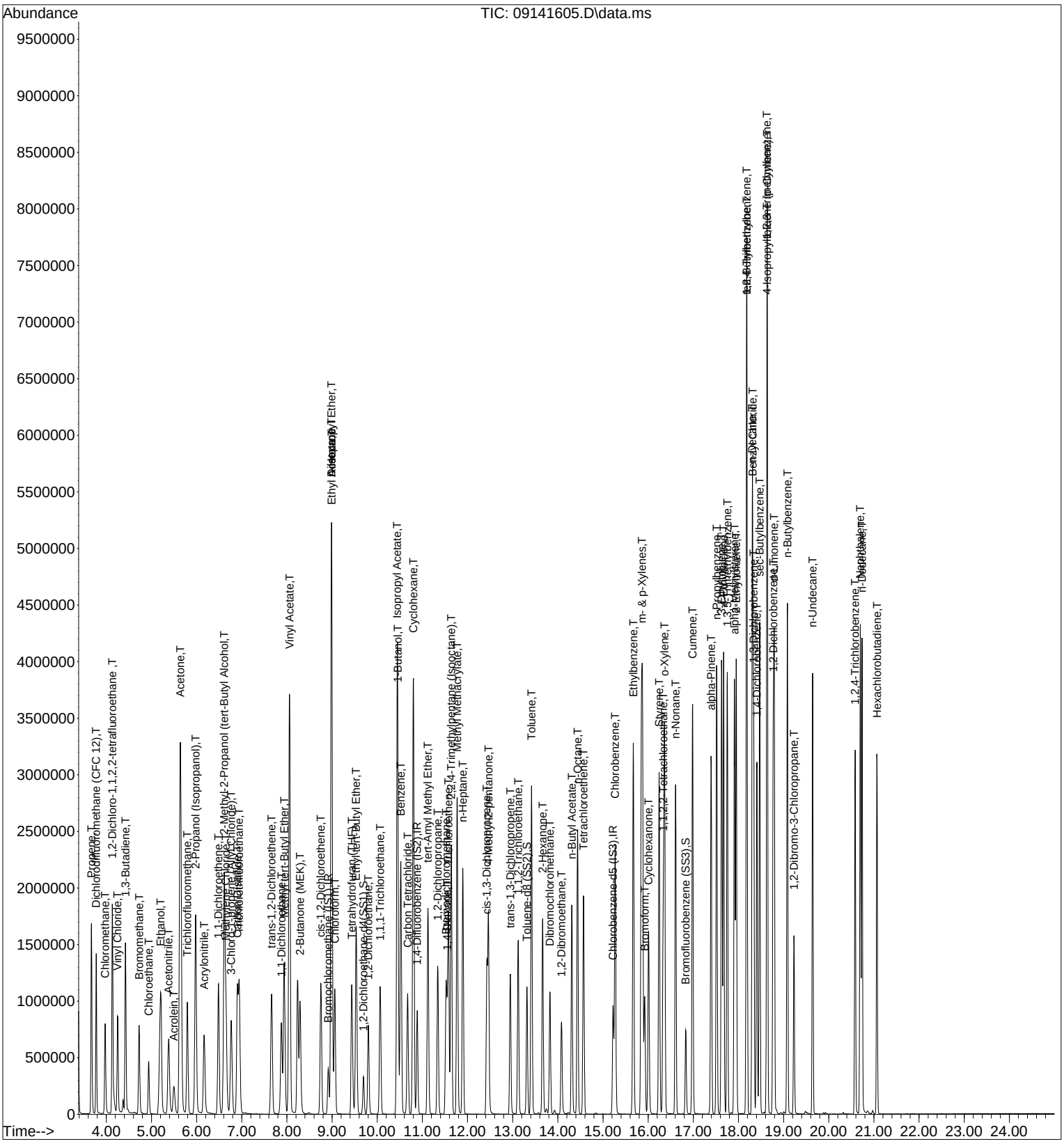
Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
50) Methyl Methacrylate	11.77	100	509886	52.409	ng	98
51) n-Heptane	11.90	71	615492	26.039	ng	99
52) cis-1,3-Dichloropropene	12.43	75	962364	25.172	ng	100
53) 4-Methyl-2-pentanone	12.46	58	589447	26.276	ng	97
54) trans-1,3-Dichloropropene	12.95	75	860155	26.262	ng	100
55) 1,1,2-Trichloroethane	13.12	97	622116	26.706	ng	100
58) Toluene	13.42	91	2590856	25.249	ng	100
59) 2-Hexanone	13.66	43	1344073	28.106	ng	98
60) Dibromochloromethane	13.82	129	728966	28.234	ng	100
61) 1,2-Dibromoethane	14.08	107	714919	27.665	ng	100
62) n-Butyl Acetate	14.31	43	1521471	29.008	ng	99
63) n-Octane	14.44	57	522561	25.652	ng	98
64) Tetrachloroethene	14.57	166	719206	24.273	ng	100
65) Chlorobenzene	15.27	112	1701595	26.141	ng	99
66) Ethylbenzene	15.67	91	2910822	27.035	ng	100
67) m- & p-Xylenes	15.86	91	4591184	52.697	ng	99
68) Bromoform	15.92	173	638082	26.911	ng	100
69) Styrene	16.24	104	1843280	28.753	ng	99
70) o-Xylene	16.36	91	2303830	25.521	ng	100
71) n-Nonane	16.61	43	1164687	24.760	ng	98
72) 1,1,2,2-Tetrachloroethane	16.34	83	1119542	28.198	ng	100
74) Cumene	16.99	105	2902072	25.200	ng	100
75) alpha-Pinene	17.39	93	1478300	26.538	ng	100
76) n-Propylbenzene	17.52	91	3522255	25.615	ng	100
77) 3-Ethyltoluene	17.62	105	2955282	27.766	ng	100
78) 4-Ethyltoluene	17.67	105	2815625	27.221	ng	100
79) 1,3,5-Trimethylbenzene	17.75	105	2409738	25.727	ng	100
80) alpha-Methylstyrene	17.91	118	1355510	27.203	ng	100
81) 2-Ethyltoluene	17.95	105	2838061	26.027	ng	99
82) 1,2,4-Trimethylbenzene	18.18	105	2474862	26.918	ng	99
83) n-Decane	18.31	57	1280697	25.607	ng	99
84) Benzyl Chloride	18.32	91	2123109	29.150	ng	100
85) 1,3-Dichlorobenzene	18.34	146	1488180	29.913	ng	100
86) 1,4-Dichlorobenzene	18.41	146	1469851	28.570	ng	100
87) sec-Butylbenzene	18.47	105	3256833	26.615	ng	100
88) 4-Isopropyltoluene (p-...	18.64	119	2977229	25.712	ng	100
89) 1,2,3-Trimethylbenzene	18.63	105	2555123	26.495	ng	99
90) 1,2-Dichlorobenzene	18.77	146	1412330	28.507	ng	99
91) d-Limonene	18.79	68	977228	27.756	ng	100
92) 1,2-Dibromo-3-Chloropr...	19.23	157	521806	27.717	ng	98
93) n-Undecane	19.64	57	1336063	25.617	ng	99
94) 1,2,4-Trichlorobenzene	20.58	180	1091559	27.205	ng	100
95) Naphthalene	20.70	128	3478473	26.181	ng	100
96) n-Dodecane	20.73	57	1361973	27.035	ng	99
97) Hexachlorobutadiene	21.07	225	636133	27.006	ng	100
98) Cyclohexanone	16.01	55	848409	27.001	ng	99
99) tert-Butylbenzene	18.18	119	2358866	25.979	ng	99
100) n-Butylbenzene	19.08	91	2670192	28.946	ng	100

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2016_09\14\09141605.D
Acq On : 14 Sep 2016 7:54 Operator: SC
Sample : LCSD R9091416_25ng
Misc : S29-07211602/S29-09061603 (10/5)
ALS Vial : 4 Sample Multiplier: 1

Quant Time: Sep 14 09:12:48 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M



Response Factor Report MS09

Method Path : I:\MS09\Methods\
Method File : R9061416.M
Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
Last Update : Wed Jun 15 09:50:01 2016
Response Via : Initial Calibration

6/15/16

Calibration Files
0.08=06141621.D 0.10=06141622.D 0.20=06141623.D 0.40=06141624.D 1.0 =06141625.D 5.0 =06141626.D 25 =06141627.D
50 =06141628.D 100 =06141629.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	1.637	1.700	1.419	1.628	1.493	1.566	1.782	1.595	1.515	1.593	6.92
3)	T	Dichlorodifluo...	3.757	3.681	3.154	3.397	3.283	3.449	3.870	3.463	3.198	3.473	7.21
4)	T	Chloromethane	2.683	2.412	2.220	2.511	2.443	2.536	2.942	2.602	2.240	2.510	8.87
5)	T	1,2-Dichloro-1...	1.707	1.786	1.500	1.753	1.713	1.767	2.028	1.895	1.784	1.770	8.07
6)	T	Vinyl Chloride	2.348	2.231	1.916	2.310	2.229	2.392	2.741	2.545	2.391	2.345	9.69
7)	T	1,3-Butadiene	1.282	1.401	1.267	1.491	1.526	1.575	2.033	1.922	1.821	1.591	17.34
8)	T	Bromomethane	1.401	1.286	1.286	1.363	1.432	1.465	1.728	1.632	1.544	1.460	10.35
9)	T	Chloroethane	1.064	0.906	1.043	1.266	1.138	1.092	1.328	1.243	1.084	1.129	11.56
10)	T	Ethanol	1.084	1.041	1.016	1.146	1.126	1.194	1.329	1.218	1.118	1.141	8.41
11)	T	Acetonitrile				2.831	2.747	2.872	3.221	3.005	2.840	2.919	5.81
12)	T	Acrolein				0.644	0.747	0.941	1.116	1.033	0.979	0.910	19.68
13)	T	Acetone	1.235	1.117	1.001	1.102	1.050	1.121	1.275	1.174	1.087	1.129	7.66
14)	T	Trichlorofluor...	3.005	2.849	2.590	2.891	2.712	2.812	3.104	2.864	2.713	2.838	5.51
15)	T	2-Propanol (Is...	3.985	3.639	3.340	3.697	3.640	3.891	4.499	4.126	3.731	3.839	8.75
16)	T	Acrylonitrile				1.703	1.842	2.020	2.358	2.214	2.106	2.041	11.79
17)	T	1,1-Dichloroet...	1.301	1.466	1.233	1.368	1.347	1.438	1.695	1.600	1.532	1.442	10.27
18)	T	2-Methyl-2-Pro...	3.880	3.547	3.218	3.646	3.660	3.891	4.572	4.092	3.298	3.756	11.04
19)	T	Methylene Chlo...	1.429	1.167	1.127	1.325	1.402	1.516	1.732	1.637	1.570	1.434	14.25
20)	T	3-Chloro-1-pro...	1.532	1.986	1.649	1.882	1.942	2.090	2.470	2.282	2.161	1.999	14.74
21)	T	Trichlorotrifl...	1.317	1.295	1.104	1.318	1.249	1.295	1.463	1.384	1.342	1.307	7.48
22)	T	Carbon Disulfide	5.438	4.562	4.991	4.830	5.139	5.794	6.905	6.610	6.267	5.615	14.74
23)	T	trans-1,2-Dich...	1.421	1.558	1.363	1.792	1.928	2.181	2.506	2.362	2.237	1.928	21.80
24)	T	1,1-Dichloroet...	2.871	2.693	2.480	2.693	2.723	2.817	3.140	2.916	2.740	2.786	6.56
25)	T	Methyl tert-Bu...	4.824	4.444	3.711	4.446	4.188	4.563	5.235	4.907	4.612	4.548	9.62
26)	T	Vinyl Acetate					0.203	0.275	0.400	0.388	0.376	0.328	26.11
27)	T	2-Butanone (MEK)				0.799	0.934	0.996	1.193	1.116	1.063	1.017	13.76
28)	T	cis-1,2-Dichlo...	2.022	1.752	1.581	1.876	1.905	2.032	2.378	2.202	2.082	1.981	11.98
29)	T	Diisopropyl Ether				1.513	1.194	1.233	1.426	1.336	1.276	1.330	9.13
30)	T	Ethyl Acetate				0.417	0.509	0.555	0.656	0.612	0.566	0.552	15.07
31)	T	n-Hexane	2.708	2.496	2.091	2.591	2.466	2.599	2.908	2.674	2.471	2.556	8.73
32)	T	Chloroform	2.666	2.681	2.340	2.504	2.563	2.630	3.013	2.782	2.640	2.647	7.02
33)	S	1,2-Dichloroet...	1.439	1.440	1.437	1.451	1.424	1.442	1.440	1.376	1.335	1.420	2.73
34)	T	Tetrahydrofura...			0.864	0.998	0.959	1.023	1.151	1.089	1.035	1.017	9.03
35)	T	Ethyl tert-But...	1.945	1.541	1.500	1.774	1.682	1.766	2.106	1.989	1.908	1.801	11.36
36)	T	1,2-Dichloroet...	1.767	1.834	1.527	1.861	1.829	1.904	2.179	1.990	1.861	1.861	9.34
37)	IR	1,4-Difluorobenzen...	----------	ISTD	----------								
38)	T	1,1,1-Trichlor...	0.526	0.521	0.455	0.509	0.498	0.514	0.590	0.546	0.515	0.519	6.96
39)	T	Isopropyl Acetate	0.179	0.160	0.156	0.179	0.186	0.195	0.231	0.217	0.200	0.189	12.93
40)	T	1-Butanol			0.190	0.238	0.280	0.322	0.385	0.361	0.336	0.302	23.03
41)	T	Benzene	1.496	1.558	1.250	1.361	1.216	1.263	1.419	1.339	1.266	1.352	8.76
42)	T	Carbon Tetrach...	0.403	0.374	0.343	0.396	0.409	0.422	0.501	0.468	0.441	0.417	11.46

Method Path : I:\MS09\Methods\
Method File : R9061416.M
Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)

43)	T	Cyclohexane	0.498	0.497	0.431	0.486	0.479	0.503	0.583	0.550	0.516	0.505	8.52
44)	T	tert-Amyl Meth...	0.957	0.889	0.791	0.887	0.876	0.928	1.103	1.040	0.979	0.939	9.99
45)	T	1,2-Dichloropr...	0.333	0.337	0.282	0.321	0.339	0.333	0.384	0.360	0.340	0.337	8.17
46)	T	Bromodichlorom...	0.451	0.411	0.387	0.432	0.427	0.450	0.532	0.496	0.467	0.450	9.75
47)	T	Trichloroethene	0.426	0.390	0.359	0.382	0.364	0.378	0.432	0.409	0.390	0.392	6.52
48)	T	1,4-Dioxane				0.206	0.241	0.259	0.312	0.297	0.282	0.266	14.66
49)	T	2,2,4-Trimethy...	1.615	1.450	1.260	1.412	1.368	1.425	1.643	1.525	1.401	1.455	8.32
50)	T	Methyl Methacr...				0.092	0.122	0.130	0.160	0.153	0.146	0.134	18.70
51)	T	n-Heptane	0.300	0.313	0.288	0.312	0.315	0.321	0.383	0.359	0.339	0.326	9.21
52)	T	cis-1,3-Dichlo...				0.421	0.454	0.514	0.626	0.591	0.553	0.527	15.07
53)	T	4-Methyl-2-pen...				0.249	0.279	0.303	0.364	0.342	0.317	0.309	13.55
54)	T	trans-1,3-Dich...				0.293	0.358	0.443	0.568	0.537	0.508	0.451	23.81
55)	T	1,1,2-Trichlor...	0.273	0.269	0.268	0.321	0.324	0.329	0.389	0.368	0.347	0.321	13.70
56)	IR	Chlorobenzene-d5 (...	----------ISTD----------										
57)	S	Toluene-d8 (SS2)	2.623	2.620	2.597	2.622	2.600	2.595	2.591	2.569	2.615	2.604	0.69
58)	T	Toluene	4.273	3.752	3.137	3.413	3.336	3.475	3.995	3.776	3.643	3.645	9.61
59)	T	2-Hexanone				1.136	1.517	1.754	2.081	1.909	1.794	1.698	19.55
60)	T	Dibromochlorom...	0.741	0.798	0.777	0.840	0.876	0.956	1.142	1.077	1.046	0.917	15.73
61)	T	1,2-Dibromoethane			0.650	0.785	0.853	0.923	1.117	1.063	1.034	0.918	18.24
62)	T	n-Butyl Acetate				1.073	1.633	1.950	2.345	2.156	2.020	1.863	24.33
63)	T	n-Octane	0.755	0.629	0.567	0.696	0.692	0.734	0.867	0.803	0.768	0.724	12.48
64)	T	Tetrachloroethene	1.084	1.050	0.862	1.023	0.961	1.013	1.200	1.147	1.130	1.052	9.77
65)	T	Chlorobenzene	2.468	2.310	2.034	2.138	2.143	2.239	2.620	2.477	2.378	2.312	8.25
66)	T	Ethylbenzene	4.079	3.463	3.004	3.412	3.600	3.850	4.576	4.307	4.125	3.824	13.00
67)	T	m- & p-Xylenes	3.222	2.844	2.467	2.733	2.909	3.129	3.691	3.485	3.370	3.094	12.63
68)	T	Bromoform			0.576	0.692	0.738	0.832	1.042	1.013	1.002	0.842	21.63
69)	T	Styrene			1.595	1.802	2.054	2.350	2.855	2.682	2.601	2.277	20.83
70)	T	o-Xylene	3.241	2.925	2.616	2.932	3.083	3.229	3.823	3.563	3.445	3.206	11.48
71)	T	n-Nonane	1.643	1.497	1.362	1.603	1.604	1.771	2.042	1.833	1.681	1.671	11.78
72)	T	1,1,2,2-Tetrac...	0.968	1.085	1.075	1.163	1.406	1.563	1.917	1.781	1.732	1.410	25.03
73)	S	Bromofluoroben...	0.775	0.782	0.774	0.781	0.788	0.810	0.817	0.793	0.805	0.792	1.96
74)	T	Cumene	4.073	3.773	3.372	3.797	3.874	4.137	4.914	4.536	4.337	4.090	11.24
75)	T	alpha-Pinene	1.903	1.846	1.589	1.737	1.783	2.047	2.438	2.272	2.191	1.979	14.06
76)	T	n-Propylbenzene	4.853	4.008	3.892	4.314	4.749	5.153	6.100	5.593	5.294	4.884	15.04
77)	T	3-Ethyltoluene	3.207	3.146	2.911	3.461	3.552	3.973	4.941	4.472	4.358	3.780	18.32
78)	T	4-Ethyltoluene	3.236	3.077	3.053	3.210	3.616	3.919	4.565	4.306	4.081	3.674	15.43
79)	T	1,3,5-Trimethy...	3.418	3.277	2.659	2.986	3.021	3.336	3.967	3.693	3.584	3.327	12.01
80)	T	alpha-Methylst...			1.189	1.448	1.615	1.864	2.211	2.062	2.000	1.770	20.71
81)	T	2-Ethyltoluene	3.737	3.452	3.155	3.602	3.695	4.007	4.682	4.354	4.170	3.873	12.28
82)	T	1,2,4-Trimethy...	2.769	2.874	2.520	2.946	3.088	3.410	4.177	3.885	3.721	3.266	17.22
83)	T	n-Decane	1.522	1.544	1.347	1.661	1.744	1.967	2.283	2.068	1.851	1.776	16.66
84)	T	Benzyl Chloride				1.116	1.685	2.407	3.563	3.401	3.350	2.587	39.45
85)	T	1,3-Dichlorobe...	1.460	1.334	1.210	1.523	1.735	1.904	2.361	2.211	2.166	1.767	23.52
86)	T	1,4-Dichlorobe...	1.422	1.584	1.335	1.463	1.763	1.995	2.417	2.261	2.206	1.827	22.15
87)	T	sec-Butylbenzene	4.042	3.854	3.456	4.031	4.124	4.586	5.403	4.932	4.689	4.346	13.88
88)	T	4-Isopropyltol...	3.639	3.524	3.260	3.682	3.942	4.374	5.256	4.819	4.518	4.113	16.20
89)	T	1,2,3-Trimethy...	3.117	2.926	2.688	3.093	3.196	3.577	4.337	4.027	3.867	3.425	16.19
90)	T	1,2-Dichlorobe...	1.383	1.452	1.303	1.540	1.731	1.916	2.297	2.134	2.082	1.760	20.60
91)	T	d-Limonene	1.083	0.989	0.960	1.108	1.199	1.375	1.628	1.500	1.414	1.250	18.99
92)	T	1,2-Dibromo-3-...				0.362	0.510	0.648	0.878	0.816	0.799	0.669	30.06
93)	T	n-Undecane	1.738	1.460	1.392	1.697	1.780	2.087	2.385	2.151	1.982	1.852	17.63
94)	T	1,2,4-Trichlor...				0.868	1.166	1.407	1.776	1.677	1.656	1.425	24.67

Method Path : I:\MS09\Methods\
Method File : R9061416.M
Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)

95)	T	Naphthalene				2.569	3.877	4.846	6.093	5.622	5.307	4.719	27.46
96)	T	n-Dodecane	1.675	1.403	1.275	1.427	1.794	2.119	2.348	2.119	1.942	1.789	20.83
97)	T	Hexachlorobuta...	0.764	0.754	0.659	0.717	0.782	0.841	1.039	0.987	0.986	0.837	16.18
98)	T	Cyclohexanone				0.766	1.002	1.138	1.343	1.255	1.193	1.116	18.47
99)	T	tert-Butylbenzene	2.955	2.907	2.599	2.952	3.050	3.332	4.001	3.710	3.519	3.225	13.90
100)	T	n-Butylbenzene	2.724	2.537	2.399	2.768	3.231	3.723	4.367	3.974	3.764	3.276	21.57

(#) = Out of Range

Primary Source Standards Concentrations (Working & Initial Calibration)

6/15/16

1ng/L Std. ID:
4ng/L Std. ID: S29-06021605
20ng/L Std. ID: S29-06021603
200ng/L Std. ID: S29-06021601

Dilution Factors:		5	50	250	1000	Working STD Conc.(ng/L):	4	4	4	4	20	20	200	200	200
	Source Std.	Primary Working Standards				Injection (L):	0.020	0.025	0.050	0.100	0.050	0.25	0.125	0.25	0.50
Compounds	mg/m³	200ng/L	20ng/L	4ng/L	1ng/L	ICAL Points:	0.08ng	0.1ng	0.2ng	0.4ng	1ng	5ng	25ng	50ng	100ng
Propene	1.03	206	20.6	4.12	1.03		0.0824	0.103	0.206	0.412	1.03	5.15	25.75	51.5	103
Dichlorodifluoromethane	1.00	200	20.0	4.00	1.00		0.0800	0.100	0.200	0.400	1.00	5.00	25.00	50.0	100
Chloromethane	0.98	196	19.6	3.92	0.98		0.0784	0.098	0.196	0.392	0.98	4.90	24.50	49.0	98
Freon-114	1.03	206	20.6	4.12	1.03		0.0824	0.103	0.206	0.412	1.03	5.15	25.75	51.5	103
Vinyl Chloride	1.00	200	20.0	4.00	1.00		0.0800	0.100	0.200	0.400	1.00	5.00	25.00	50.0	100
1,3-Butadiene	1.06	212	21.2	4.24	1.06		0.0848	0.106	0.212	0.424	1.06	5.30	26.50	53.0	106
Bromomethane	1.00	200	20.0	4.00	1.00		0.0800	0.100	0.200	0.400	1.00	5.00	25.00	50.0	100
Chloroethane	1.01	202	20.2	4.04	1.01		0.0808	0.101	0.202	0.404	1.01	5.05	25.25	50.5	101
Ethanol	5.06	1012	101.2	20.24	5.06		0.4048	0.506	1.012	2.024	5.06	25.30	126.50	253.0	506
Acetonitrile	1.02	204	20.4	4.08	1.02		0.0816	0.102	0.204	0.408	1.02	5.10	25.50	51.0	102
Acrolein	1.07	214	21.4	4.28	1.07		0.0856	0.107	0.214	0.428	1.07	5.35	26.75	53.5	107
Acetone	5.37	1074	107.4	21.48	5.37		0.4296	0.537	1.074	2.148	5.37	26.85	134.25	268.5	537
Trichlorofluoromethane	0.99	198	19.8	3.96	0.99		0.0792	0.099	0.198	0.396	0.99	4.95	24.75	49.5	99
Isopropanol	2.09	418	41.8	8.36	2.09		0.1672	0.209	0.418	0.836	2.09	10.45	52.25	104.5	209
Acrylonitrile	1.03	206	20.6	4.12	1.03		0.0824	0.103	0.206	0.412	1.03	5.15	25.75	51.5	103
1,1-Dichloroethene	1.07	214	21.4	4.28	1.07		0.0856	0.107	0.214	0.428	1.07	5.35	26.75	53.5	107
tert-Butanol	2.09	418	41.8	8.36	2.09		0.1672	0.209	0.418	0.836	2.09	10.45	52.25	104.5	209
Methylene Chloride	1.08	216	21.6	4.32	1.08		0.0864	0.108	0.216	0.432	1.08	5.40	27.00	54.0	108
Allyl Chloride	1.08	216	21.6	4.32	1.08		0.0864	0.108	0.216	0.432	1.08	5.40	27.00	54.0	108
Trichlorotrifluoroethane	1.08	216	21.6	4.32	1.08		0.0864	0.108	0.216	0.432	1.08	5.40	27.00	54.0	108
Carbon Disulfide	0.98	196	19.6	3.92	0.98		0.0784	0.098	0.196	0.392	0.98	4.90	24.50	49.0	98
trans-1,2-Dichloroethene	1.06	212	21.2	4.24	1.06		0.0848	0.106	0.212	0.424	1.06	5.30	26.50	53.0	106
1,1-Dichloroethane	1.04	208	20.8	4.16	1.04		0.0832	0.104	0.208	0.416	1.04	5.20	26.00	52.0	104
Methyl tert-Butyl Ether	1.05	210	21.0	4.20	1.05		0.0840	0.105	0.210	0.420	1.05	5.25	26.25	52.5	105
Vinyl Acetate	5.07	1014	101.4	20.28	5.07		0.4056	0.507	1.014	2.028	5.07	25.35	126.75	253.5	507
2-Butanone	1.07	214	21.4	4.28	1.07		0.0856	0.107	0.214	0.428	1.07	5.35	26.75	53.5	107
cis-1,2-Dichloroethene	1.07	214	21.4	4.28	1.07		0.0856	0.107	0.214	0.428	1.07	5.35	26.75	53.5	107
Diisopropyl Ether	1.08	216	21.6	4.32	1.08		0.0864	0.108	0.216	0.432	1.08	5.40	27.00	54.0	108
Ethyl Acetate	2.12	424	42.4	8.48	2.12		0.1696	0.212	0.424	0.848	2.12	10.60	53.00	106.0	212
n-Hexane	1.04	208	20.8	4.16	1.04		0.0832	0.104	0.208	0.416	1.04	5.20	26.00	52.0	104
Chloroform	1.07	214	21.4	4.28	1.07		0.0856	0.107	0.214	0.428	1.07	5.35	26.75	53.5	107
Tetrahydrofuran	1.02	204	20.4	4.08	1.02		0.0816	0.102	0.204	0.408	1.02	5.10	25.50	51.0	102
Ethyl tert-Butyl Ether	1.05	210	21.0	4.20	1.05		0.0840	0.105	0.210	0.420	1.05	5.25	26.25	52.5	105
1,2-Dichloroethane	1.05	210	21.0	4.20	1.05		0.0840	0.105	0.210	0.420	1.05	5.25	26.25	52.5	105
1,1,1-Trichloroethane	1.03	206	20.6	4.12	1.03		0.0824	0.103	0.206	0.412	1.03	5.15	25.75	51.5	103
Isopropyl Acetate	2.21	442	44.2	8.84	2.21		0.1768	0.221	0.442	0.884	2.21	11.05	55.25	110.5	221
1-Butanol	2.26	452	45.2	9.04	2.26		0.1808	0.226	0.452	0.904	2.26	11.30	56.50	113.0	226
Benzene	1.11	222	22.2	4.44	1.11		0.0888	0.111	0.222	0.444	1.11	5.55	27.75	55.5	111
Carbon Tetrachloride	1.08	216	21.6	4.32	1.08		0.0864	0.108	0.216	0.432	1.08	5.40	27.00	54.0	108
Cyclohexane	2.09	418	41.8	8.36	2.09		0.1672	0.209	0.418	0.836	2.09	10.45	52.25	104.5	209
tert-Amyl Methyl Ether	1.04	208	20.8	4.16	1.04		0.0832	0.104	0.208	0.416	1.04	5.20	26.00	52.0	104
1,2-Dichloropropane	1.05	210	21.0	4.20	1.05		0.0840	0.105	0.210	0.420	1.05	5.25	26.25	52.5	105
Bromodichloromethane	1.07	214	21.4	4.28	1.07		0.0856	0.107	0.214	0.428	1.07	5.35	26.75	53.5	107
Trichloroethene	1.03	206	20.6	4.12	1.03		0.0824	0.103	0.206	0.412	1.03	5.15	25.75	51.5	103
1,4-Dioxane	1.08	216	21.6	4.32	1.08		0.0864	0.108	0.216	0.432	1.08	5.40	27.00	54.0	108
Isooctane	1.03	206	20.6	4.12	1.03		0.0824	0.103	0.206	0.412	1.03	5.15	25.75	51.5	103
Methyl Methacrylate	2.08	416	41.6	8.32	2.08		0.1664	0.208	0.416	0.832	2.08	10.40	52.00	104.0	208
n-Heptane	1.07	214	21.4	4.28	1.07		0.0856	0.107	0.214	0.428	1.07	5.35	26.75	53.5	107
cis-1,3-Dichloropropene	1.12	224	22.4	4.48	1.12		0.0896	0.112	0.224	0.448	1.12	5.60	28.00	56.0	112

Q:\TO15 Std. Concentrations\MS09 Std. Conc\2016\R9061416\ICAL Conc. (Primary Source)

Primary Source Standards Concentrations (Working & Initial Calibration)

1ng/L Std. ID:
4ng/L Std. ID: S29-06021605
20ng/L Std. ID: S29-06021603
200ng/L Std. ID: S29-06021601

Dilution Factors:		5	50	250	1000	Working STD Conc.(ng/L):	4	4	4	4	20	20	200	200	200
	Source Std.	Primary Working Standards				Injection (L):	0.020	0.025	0.050	0.100	0.050	0.25	0.125	0.25	0.50
Compounds	mg/m³	200ng/L	20ng/L	4ng/L	1ng/L	ICAL Points:	0.08ng	0.1ng	0.2ng	0.4ng	1ng	5ng	25ng	50ng	100ng
4-Methyl-2-pentanone	1.08	216	21.6	4.32	1.08		0.0864	0.108	0.216	0.432	1.08	5.40	27.00	54.0	108
trans-1,3-Dichloropropene	1.07	214	21.4	4.28	1.07		0.0856	0.107	0.214	0.428	1.07	5.35	26.75	53.5	107
1,1,2-Trichloroethane	1.05	210	21.0	4.20	1.05		0.0840	0.105	0.210	0.420	1.05	5.25	26.25	52.5	105
Toluene	1.05	210	21.0	4.20	1.05		0.0840	0.105	0.210	0.420	1.05	5.25	26.25	52.5	105
2-Hexanone	1.11	222	22.2	4.44	1.11		0.0888	0.111	0.222	0.444	1.11	5.55	27.75	55.5	111
Dibromochloromethane	1.10	220	22.0	4.40	1.10		0.0880	0.110	0.220	0.440	1.10	5.50	27.50	55.0	110
1,2-Dibromoethane	1.07	214	21.4	4.28	1.07		0.0856	0.107	0.214	0.428	1.07	5.35	26.75	53.5	107
n-Butyl Acetate	1.11	222	22.2	4.44	1.11		0.0888	0.111	0.222	0.444	1.11	5.55	27.75	55.5	111
n-Octane	1.03	206	20.6	4.12	1.03		0.0824	0.103	0.206	0.412	1.03	5.15	25.75	51.5	103
Tetrachloroethene	0.99	198	19.8	3.96	0.99		0.0792	0.099	0.198	0.396	0.99	4.95	24.75	49.5	99
Chlorobenzene	1.07	214	21.4	4.28	1.07		0.0856	0.107	0.214	0.428	1.07	5.35	26.75	53.5	107
Ethylbenzene	1.05	210	21.0	4.20	1.05		0.0840	0.105	0.210	0.420	1.05	5.25	26.25	52.5	105
m-&p-Xylene	2.08	416	41.6	8.32	2.08		0.1664	0.208	0.416	0.832	2.08	10.40	52.00	104.0	208
Bromoform	1.07	214	21.4	4.28	1.07		0.0856	0.107	0.214	0.428	1.07	5.35	26.75	53.5	107
Styrene	1.08	216	21.6	4.32	1.08		0.0864	0.108	0.216	0.432	1.08	5.40	27.00	54.0	108
o-Xylene	1.02	204	20.4	4.08	1.02		0.0816	0.102	0.204	0.408	1.02	5.10	25.50	51.0	102
n-Nonane	1.01	202	20.2	4.04	1.01		0.0808	0.101	0.202	0.404	1.01	5.05	25.25	50.5	101
1,1,2,2-Tetrachloroethane	1.00	200	20.0	4.00	1.00		0.0800	0.100	0.200	0.400	1.00	5.00	25.00	50.0	100
Cumene	1.01	202	20.2	4.04	1.01		0.0808	0.101	0.202	0.404	1.01	5.05	25.25	50.5	101
alpha-Pinene	1.03	206	20.6	4.12	1.03		0.0824	0.103	0.206	0.412	1.03	5.15	25.75	51.5	103
n-Propylbenzene	1.00	200	20.0	4.00	1.00		0.0800	0.100	0.200	0.400	1.00	5.00	25.00	50.0	100
3-Ethyltoluene	1.04	208	20.8	4.16	1.04		0.0832	0.104	0.208	0.416	1.04	5.20	26.00	52.0	104
4-Ethyltoluene	1.05	210	21.0	4.20	1.05		0.0840	0.105	0.210	0.420	1.05	5.25	26.25	52.5	105
1,3,5-Trimethylbenzene	1.04	208	20.8	4.16	1.04		0.0832	0.104	0.208	0.416	1.04	5.20	26.00	52.0	104
alpha-Methylstyrene	1.03	206	20.6	4.12	1.03		0.0824	0.103	0.206	0.412	1.03	5.15	25.75	51.5	103
2-Ethyltoluene	1.04	208	20.8	4.16	1.04		0.0832	0.104	0.208	0.416	1.04	5.20	26.00	52.0	104
1,2,4-Trimethylbenzene	1.04	208	20.8	4.16	1.04		0.0832	0.104	0.208	0.416	1.04	5.20	26.00	52.0	104
n-Decane	1.01	202	20.2	4.04	1.01		0.0808	0.101	0.202	0.404	1.01	5.05	25.25	50.5	101
Benzyl Chloride	1.08	216	21.6	4.32	1.08		0.0864	0.108	0.216	0.432	1.08	5.40	27.00	54.0	108
1,3-Dichlorobenzene	1.08	216	21.6	4.32	1.08		0.0864	0.108	0.216	0.432	1.08	5.40	27.00	54.0	108
1,4-Dichlorobenzene	1.05	210	21.0	4.20	1.05		0.0840	0.105	0.210	0.420	1.05	5.25	26.25	52.5	105
sec-Butylbenzene	1.06	212	21.2	4.24	1.06		0.0848	0.106	0.212	0.424	1.06	5.30	26.50	53.0	106
p-Isopropyltoluene	1.00	200	20.0	4.00	1.00		0.0800	0.100	0.200	0.400	1.00	5.00	25.00	50.0	100
1,2,3-Trimethylbenzene	1.04	208	20.8	4.16	1.04		0.0832	0.104	0.208	0.416	1.04	5.20	26.00	52.0	104
1,2-Dichlorobenzene	1.07	214	21.4	4.28	1.07		0.0856	0.107	0.214	0.428	1.07	5.35	26.75	53.5	107
d-Limonene	1.04	208	20.8	4.16	1.04		0.0832	0.104	0.208	0.416	1.04	5.20	26.00	52.0	104
1,2-Dibromo-3-chloropropane	1.04	208	20.8	4.16	1.04		0.0832	0.104	0.208	0.416	1.04	5.20	26.00	52.0	104
n-Undecane	1.01	202	20.2	4.04	1.01		0.0808	0.101	0.202	0.404	1.01	5.05	25.25	50.5	101
1,2,4-Trichlorobenzene	1.04	208	20.8	4.16	1.04		0.0832	0.104	0.208	0.416	1.04	5.20	26.00	52.0	104
Naphthalene	1.00	200	20.0	4.00	1.00		0.0800	0.100	0.200	0.400	1.00	5.00	25.00	50.0	100
n-Dodecane	1.04	208	20.8	4.16	1.04		0.0832	0.104	0.208	0.416	1.04	5.20	26.00	52.0	104
Hexachloro-1,3-butadiene	1.07	214	21.4	4.28	1.07		0.0856	0.107	0.214	0.428	1.07	5.35	26.75	53.5	107
Methacrylonitrile	1.03	206	20.6	4.12	1.03		0.0824	0.103	0.206	0.412	1.03	5.15	25.75	51.5	103
Cyclohexanone	1.12	224	22.4	4.48	1.12		0.0896	0.112	0.224	0.448	1.12	5.60	28.00	56.0	112
tert-Butylbenzene	1.05	210	21.0	4.20	1.05		0.0840	0.105	0.210	0.420	1.05	5.25	26.25	52.5	105
n-Butylbenzene	1.08	216	21.6	4.32	1.08		0.0864	0.108	0.216	0.432	1.08	5.40	27.00	54.0	108

Calibration Status Report MS09

Method : I:\MS09\Methods\R9061416.M (RTE Integrator)
Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
Last Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration

6/15/16

#	ID	Conc	ISTD Conc	Path\File
1	0.08	0	13	I:\MS09\Data\2016_06\14\06141621.D
2	0.10	0	13	I:\MS09\Data\2016_06\14\06141622.D
3	0.20	0	13	I:\MS09\Data\2016_06\14\06141623.D
4	0.40	0	13	I:\MS09\Data\2016_06\14\06141624.D
5	1.0	1	13	I:\MS09\Data\2016_06\14\06141625.D
6	5.0	5	13	I:\MS09\Data\2016_06\14\06141626.D
7	25	26	13	I:\MS09\Data\2016_06\14\06141627.D
8	50	52	13	I:\MS09\Data\2016_06\14\06141628.D
9	100	103	13	I:\MS09\Data\2016_06\14\06141629.D

#	ID	Update Time	Quant Time	Acquisition Time
1	0.08	Jun 15 09:47 2016	Jun 15 09:41 2016	14 Jun 2016 23:33
2	0.10	Jun 15 09:47 2016	Jun 15 09:37 2016	15 Jun 2016 00:07
3	0.20	Jun 15 09:47 2016	Jun 15 09:35 2016	15 Jun 2016 00:40
4	0.40	Jun 15 09:48 2016	Jun 15 09:34 2016	15 Jun 2016 1:14
5	1.0	Jun 15 09:48 2016	Jun 15 09:33 2016	15 Jun 2016 1:48
6	5.0	Jun 15 09:48 2016	Jun 15 09:31 2016	15 Jun 2016 2:22
7	25	Jun 15 09:49 2016	Jun 15 09:29 2016	15 Jun 2016 2:56
8	50	Jun 15 09:49 2016	Jun 15 09:44 2016	15 Jun 2016 3:30
9	100	Jun 15 09:50 2016	Jun 15 09:45 2016	15 Jun 2016 4:05

R9061416.M Wed Jun 15 10:43:53 2016

Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2016_06\14\06141621.D
Acq On : 14 Jun 2016 23:33 Operator: SC
Sample : 0.08ng TO-15 ICAL STD
Misc : S29-06141607/S29-06021605 (7/1)
ALS Vial : 5 Sample Multiplier: 1

6/15/16

Quant Time: Jun 15 09:41:28 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:31:43 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M

Internal Standards	R.T.	QIon	Response	Conc	Units		Dev(Min)
1) Bromochloromethane (IS1)	8.89	130	111085	12.500	ng		-0.03
37) 1,4-Difluorobenzene (IS2)	10.87	114	521451	12.500	ng		-0.01
56) Chlorobenzene-d5 (IS3)	15.22	82	204790	12.500	ng		0.00
System Monitoring Compounds							
33) 1,2-Dichloroethane-d4(...	9.67	65	159858	11.035	ng		-0.02
Spiked Amount 12.500	Range 70 - 130		Recovery = 88.32%				
57) Toluene-d8 (SS2)	13.31	98	537261	13.939	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 111.52%				
73) Bromofluorobenzene (SS3)	16.84	174	158793	12.472	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 99.76%				
Target Compounds							Qvalue
2) Propene	3.71	42	1199	0.071	ng	#	83
3) Dichlorodifluoromethan...	3.81	85	2671	0.081	ng	#	90
4) Chloromethane	4.01	50	1869	0.067	ng		94
5) 1,2-Dichloro-1,1,2,2-t...	4.16	135	1250	0.076	ng	#	43
6) Vinyl Chloride	4.29	62	1669	0.071	ng		97
7) 1,3-Butadiene	4.46	54	966	0.081	ng	#	76
8) Bromomethane	4.75	94	996	0.072	ng		93
9) Chloroethane	4.98	64	764	0.067	ng	#	42
10) Ethanol	5.18	45	3900	0.363	ng	#	55
11) Acetonitrile	5.40	41	118	0.004	ng	#	1
12) Acrolein	5.54	56	97	0.011	ng	#	54
13) Acetone	5.66	58	4714	0.374	ng		92
14) Trichlorofluoromethane	5.81	101	2115	0.080	ng		94
15) 2-Propanol (Isopropanol)	5.99	45	5921	0.147	ng		71
16) Acrylonitrile	6.20	53	51	0.002	ng	#	8
17) 1,1-Dichloroethene	6.50	96	990	0.068	ng		91
18) 2-Methyl-2-Propanol (t...	6.66	59	5765	0.145	ng		87
19) Methylene Chloride	6.64	84	1097	0.060	ng		91
20) 3-Chloro-1-propene (Al...	6.77	41	1176	0.052	ng	#	37
21) Trichlorotrifluoroethane	6.95	151	1011	0.082	ng		98
22) Carbon Disulfide	6.93	76	3789	0.066	ng	#	74
23) trans-1,2-Dichloroethene	7.66	61	1071	0.050	ng		89
24) 1,1-Dichloroethane	7.86	63	2123	0.073	ng	#	43
25) Methyl tert-Butyl Ether	7.97	73	3601	0.077	ng		91
26) Vinyl Acetate	0.00	86	0	N.D.			
27) 2-Butanone (MEK)	8.33	72	445	0.045	ng	#	26
28) cis-1,2-Dichloroethene	8.73	61	1538	0.073	ng		84
29) Diisopropyl Ether	9.00	87	985	0.077	ng	#	85
30) Ethyl Acetate	9.02	61	426	0.076	ng	#	12
31) n-Hexane	8.99	57	2002	0.073	ng	#	91
32) Chloroform	9.03	83	2028	0.078	ng		93
34) Tetrahydrofuran (THF)	9.49	72	584	0.053	ng	#	45
35) Ethyl tert-Butyl Ether	9.54	87	1452	0.079	ng		91
36) 1,2-Dichloroethane	9.78	62	1319	0.073	ng	#	42
38) 1,1,1-Trichloroethane	10.05	97	1808	0.089	ng		95
39) Isopropyl Acetate	10.45	61	1321	0.150	ng		97
40) 1-Butanol	10.51	56	1420	0.108	ng	#	52
41) Benzene	10.51	78	5540	0.089	ng		95
42) Carbon Tetrachloride	10.67	117	1451	0.087	ng		91
43) Cyclohexane	10.79	84	3472	0.158	ng		92
44) tert-Amyl Methyl Ether	11.14	73	3323	0.080	ng		93
45) 1,2-Dichloropropane	11.33	63	1166	0.079	ng		91
46) Bromodichloromethane	11.51	83	1611	0.088	ng		84
47) Trichloroethene	11.57	130	1463	0.099	ng		91
48) 1,4-Dioxane	11.59	88	670	0.064	ng	#	19
49) 2,2,4-Trimethylpentane...	11.63	57	5551	0.085	ng		96

Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2016_06\14\06141621.D
Acq On : 14 Jun 2016 23:33 Operator: SC
Sample : 0.08ng TO-15 ICAL STD
Misc : S29-06141607/S29-06021605 (7/1)
ALS Vial : 5 Sample Multiplier: 1

Quant Time: Jun 15 09:41:28 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:31:43 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M

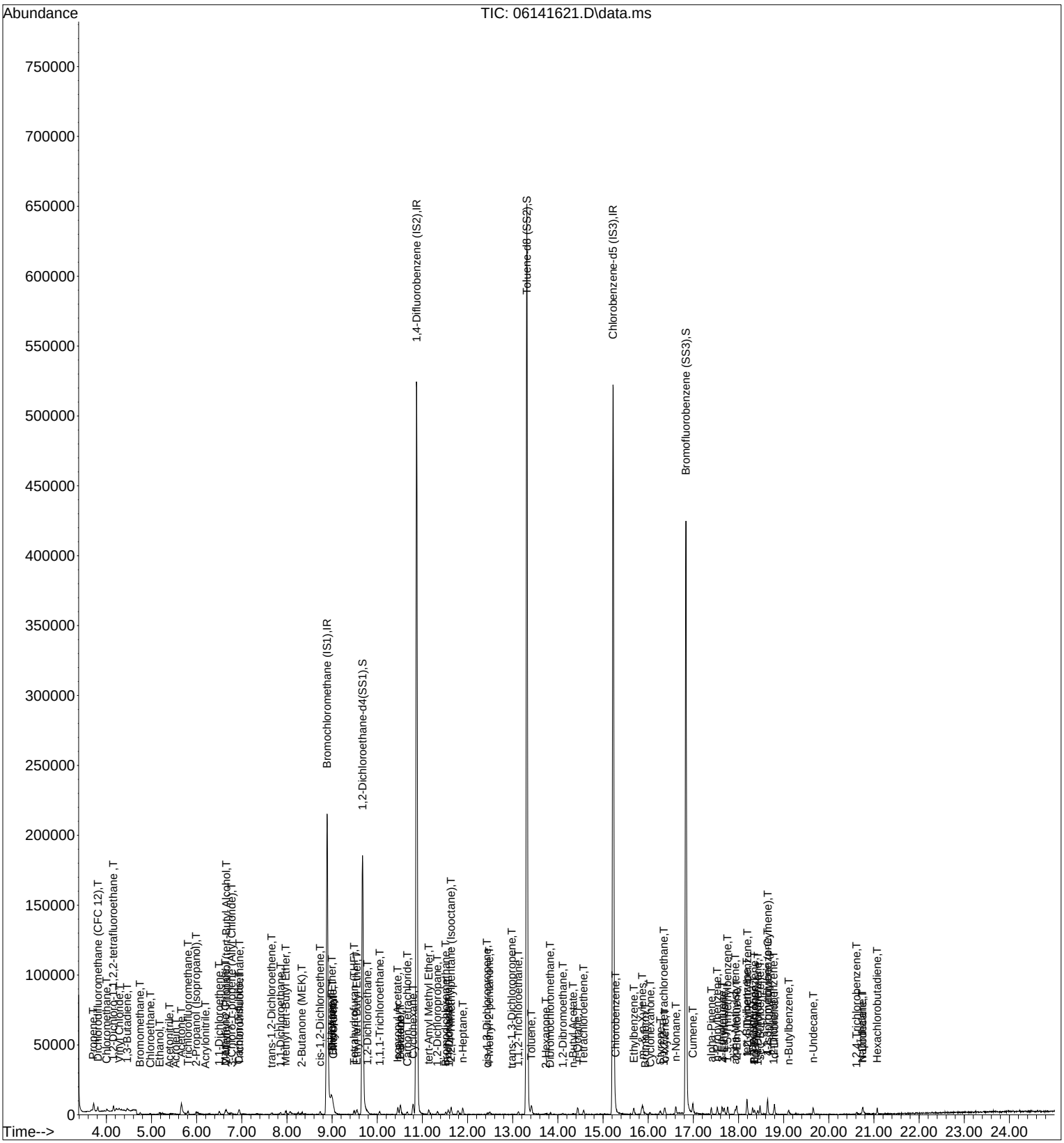
Internal Standards	R.T.	QIon	Response	Conc	Units		Dev(Min)
50) Methyl Methacrylate	0.00	100	0	N.D.			
51) n-Heptane	11.90	71	1071	0.074	ng	#	88
52) cis-1,3-Dichloropropene	12.43	75	623	0.030	ng	#	42
53) 4-Methyl-2-pentanone	12.48	58	651	0.050	ng	#	62
54) trans-1,3-Dichloropropene	12.98	75	591	0.031	ng	#	43
55) 1,1,2-Trichloroethane	13.12	97	955	0.071	ng		97
58) Toluene	13.41	91	5881	0.106	ng		91
59) 2-Hexanone	13.74	43	938	0.036	ng	#	22
60) Dibromochloromethane	13.83	129	1069	0.080	ng	#	72
61) 1,2-Dibromoethane	14.11	107	782	0.059	ng		86
62) n-Butyl Acetate	14.34	43	409	0.014	ng	#	41
63) n-Octane	14.44	57	1019	0.084	ng	#	84
64) Tetrachloroethene	14.57	166	1407	0.098	ng		94
65) Chlorobenzene	15.28	112	3461	0.103	ng		97
66) Ethylbenzene	15.69	91	5613	0.096	ng		94
67) m- & p-Xylenes	15.87	91	8784	0.188	ng		95
68) Bromoform	15.94	173	963	0.085	ng	#	28
69) Styrene	16.27	104	2385	0.071	ng		90
70) o-Xylene	16.37	91	4333	0.089	ng		92
71) n-Nonane	16.61	43	2175	0.077	ng		93
72) 1,1,2,2-Tetrachloroethane	16.35	83	1269	0.055	ng		97
74) Cumene	16.99	105	5392	0.089	ng		96
75) alpha-Pinene	17.40	93	2569	0.084	ng		98
76) n-Propylbenzene	17.53	91	6360	0.085	ng	#	89
77) 3-Ethyltoluene	17.64	105	4372	0.075	ng		98
78) 4-Ethyltoluene	17.68	105	4453	0.080	ng		93
79) 1,3,5-Trimethylbenzene	17.75	105	4659	0.097	ng		91
80) alpha-Methylstyrene	17.93	118	1694	0.069	ng	#	82
81) 2-Ethyltoluene	17.96	105	5094	0.090	ng		98
82) 1,2,4-Trimethylbenzene	18.20	105	3775	0.080	ng		95
83) n-Decane	18.32	57	2015	0.070	ng		89
84) Benzyl Chloride	18.35	91	886	0.021	ng	#	55
85) 1,3-Dichlorobenzene	18.35	146	2066	0.083	ng		85
86) 1,4-Dichlorobenzene	18.43	146	1957	0.077	ng		96
87) sec-Butylbenzene	18.48	105	5616	0.088	ng		95
88) 4-Isopropyltoluene (p-...	18.65	119	4769	0.082	ng		99
89) 1,2,3-Trimethylbenzene	18.64	105	4249	0.087	ng		88
90) 1,2-Dichlorobenzene	18.78	146	1940	0.080	ng		97
91) d-Limonene	18.79	68	1476	0.075	ng		95
92) 1,2-Dibromo-3-Chloropr...	0.00	157	0	N.D.			
93) n-Undecane	19.66	57	2301	0.082	ng		89
94) 1,2,4-Trichlorobenzene	20.61	180	884	0.046	ng	#	68
95) Naphthalene	20.74	128	2148	0.033	ng	#	71
96) n-Dodecane	20.75	57	2283	0.078	ng	#	66
97) Hexachlorobutadiene	21.07	225	1072	0.103	ng		99
98) Cyclohexanone	16.05	55	971	0.060	ng	#	59
99) tert-Butylbenzene	18.18	119	4066	0.088	ng		96
100) n-Butylbenzene	19.11	91	3856	0.078	ng		93

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2016_06\14\06141621.D
Acq On : 14 Jun 2016 23:33 Operator: SC
Sample : 0.08ng TO-15 ICAL STD
Misc : S29-06141607/S29-06021605 (7/1)
ALS Vial : 5 Sample Multiplier: 1

Quant Time: Jun 15 09:41:28 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:31:43 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M



Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2016_06\14\06141622.D
Acq On : 15 Jun 2016 00:07 Operator: SC
Sample : 0.10ng TO-15 ICAL STD
Misc : S29-06141607/S29-06021605 (7/1)
ALS Vial : 5 Sample Multiplier: 1

6/15/16

Quant Time: Jun 15 09:37:39 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:31:43 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M

Internal Standards	R.T.	QIon	Response	Conc	Units		Dev(Min)
1) Bromochloromethane (IS1)	8.89	130	110431	12.500	ng		-0.03
37) 1,4-Difluorobenzene (IS2)	10.87	114	516967	12.500	ng		-0.02
56) Chlorobenzene-d5 (IS3)	15.22	82	202049	12.500	ng		0.00
System Monitoring Compounds							
33) 1,2-Dichloroethane-d4(...	9.67	65	159040	11.044	ng		-0.02
Spiked Amount 12.500	Range 70 - 130		Recovery = 88.32%				
57) Toluene-d8 (SS2)	13.31	98	529288	13.919	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 111.36%				
73) Bromofluorobenzene (SS3)	16.84	174	157937	12.573	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 100.56%				
Target Compounds							Qvalue
2) Propene	3.72	42	1547	0.093	ng		98
3) Dichlorodifluoromethan...	3.81	85	3252	0.099	ng	#	92
4) Chloromethane	4.01	50	2088	0.076	ng		98
5) 1,2-Dichloro-1,1,2,2-t...	4.16	135	1625	0.100	ng		96
6) Vinyl Chloride	4.28	62	1971	0.085	ng		97
7) 1,3-Butadiene	4.46	54	1312	0.111	ng		92
8) Bromomethane	4.75	94	1136	0.082	ng		90
9) Chloroethane	4.96	64	808	0.072	ng	#	42
10) Ethanol	5.17	45	4654	0.436	ng	#	59
11) Acetonitrile	5.49	41	2275	0.075	ng	#	1
12) Acrolein	5.53	56	152	0.017	ng	#	16
13) Acetone	5.66	58	5301	0.423	ng		90
14) Trichlorofluoromethane	5.80	101	2492	0.095	ng		99
15) 2-Propanol (Isopropanol)	5.99	45	6719	0.167	ng		74
16) Acrylonitrile	6.19	53	106	0.005	ng	#	58
17) 1,1-Dichloroethene	6.51	96	1386	0.096	ng		100
18) 2-Methyl-2-Propanol (t...	6.65	59	6550	0.166	ng		91
19) Methylene Chloride	6.63	84	1113	0.062	ng		94
20) 3-Chloro-1-propene (Al...	6.77	41	1895	0.084	ng		73
21) Trichlorotrifluoroethane	6.94	151	1236	0.100	ng		98
22) Carbon Disulfide	6.93	76	3950	0.069	ng	#	74
23) trans-1,2-Dichloroethene	7.66	61	1459	0.069	ng		87
24) 1,1-Dichloroethane	7.85	63	2474	0.086	ng		94
25) Methyl tert-Butyl Ether	7.97	73	4122	0.088	ng		90
26) Vinyl Acetate	0.00	86	0	N.D.			
27) 2-Butanone (MEK)	0.00	72	0	N.D.			
28) cis-1,2-Dichloroethene	8.74	61	1656	0.080	ng	#	51
29) Diisopropyl Ether	9.00	87	1136	0.090	ng	#	89
30) Ethyl Acetate	9.01	61	520	0.093	ng	#	12
31) n-Hexane	8.98	57	2293	0.084	ng	#	87
32) Chloroform	9.03	83	2534	0.098	ng		98
34) Tetrahydrofuran (THF)	9.48	72	913	0.084	ng	#	91
35) Ethyl tert-Butyl Ether	9.55	87	1429	0.078	ng		93
36) 1,2-Dichloroethane	9.79	62	1701	0.095	ng		84
38) 1,1,1-Trichloroethane	10.05	97	2218	0.111	ng		96
39) Isopropyl Acetate	10.46	61	1464	0.168	ng	#	87
40) 1-Butanol	10.50	56	1850	0.141	ng	#	74
41) Benzene	10.51	78	7153	0.116	ng		100
42) Carbon Tetrachloride	10.66	117	1669	0.101	ng		90
43) Cyclohexane	10.79	84	4298	0.197	ng		99
44) tert-Amyl Methyl Ether	11.14	73	3824	0.093	ng	#	80
45) 1,2-Dichloropropane	11.33	63	1464	0.100	ng		88
46) Bromodichloromethane	11.52	83	1820	0.100	ng		98
47) Trichloroethene	11.58	130	1661	0.113	ng		98
48) 1,4-Dioxane	11.60	88	666	0.064	ng	#	19
49) 2,2,4-Trimethylpentane...	11.63	57	6176	0.095	ng		93

Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2016_06\14\06141622.D
Acq On : 15 Jun 2016 00:07 Operator: SC
Sample : 0.10ng TO-15 ICAL STD
Misc : S29-06141607/S29-06021605 (7/1)
ALS Vial : 5 Sample Multiplier: 1

Quant Time: Jun 15 09:37:39 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:31:43 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M

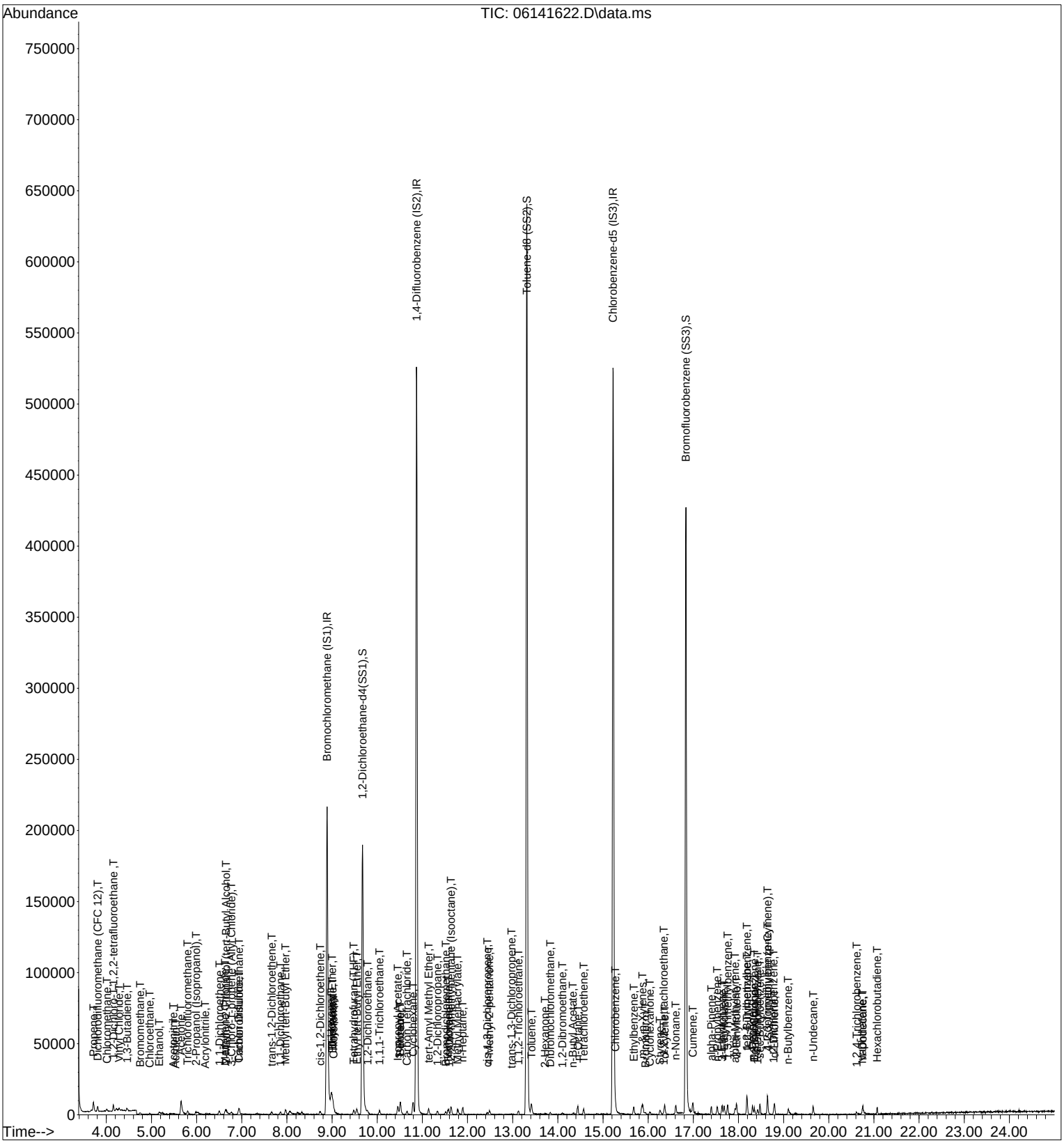
Internal Standards	R.T.	QIon	Response	Conc	Units		Dev(Min)
50) Methyl Methacrylate	11.78	100	538	0.102	ng	#	12
51) n-Heptane	11.89	71	1386	0.096	ng	#	81
52) cis-1,3-Dichloropropene	12.44	75	1472	0.071	ng	#	42
53) 4-Methyl-2-pentanone	12.48	58	829	0.064	ng	#	44
54) trans-1,3-Dichloropropene	12.97	75	495	0.026	ng	#	43
55) 1,1,2-Trichloroethane	13.13	97	1169	0.087	ng		94
58) Toluene	13.42	91	6368	0.116	ng		100
59) 2-Hexanone	13.72	43	457	0.018	ng	#	22
60) Dibromochloromethane	13.83	129	1419	0.108	ng		83
61) 1,2-Dibromoethane	14.10	107	976	0.074	ng		98
62) n-Butyl Acetate	14.33	43	833	0.028	ng	#	78
63) n-Octane	14.44	57	1047	0.087	ng	#	93
64) Tetrachloroethene	14.57	166	1681	0.119	ng		86
65) Chlorobenzene	15.27	112	3995	0.120	ng		93
66) Ethylbenzene	15.68	91	5878	0.102	ng		93
67) m- & p-Xylenes	15.87	91	9561	0.207	ng		97
68) Bromoform	15.94	173	962	0.086	ng		100
69) Styrene	16.26	104	2627	0.079	ng		96
70) o-Xylene	16.37	91	4822	0.101	ng		95
71) n-Nonane	16.61	43	2444	0.088	ng		96
72) 1,1,2,2-Tetrachloroethane	16.35	83	1753	0.078	ng		88
74) Cumene	16.99	105	6159	0.103	ng		96
75) alpha-Pinene	17.40	93	3073	0.102	ng		98
76) n-Propylbenzene	17.53	91	6479	0.088	ng		96
77) 3-Ethyltoluene	17.63	105	5289	0.092	ng		100
78) 4-Ethyltoluene	17.68	105	5223	0.095	ng		99
79) 1,3,5-Trimethylbenzene	17.76	105	5509	0.116	ng		89
80) alpha-Methylstyrene	17.92	118	1966	0.081	ng		92
81) 2-Ethyltoluene	17.95	105	5803	0.104	ng		100
82) 1,2,4-Trimethylbenzene	18.19	105	4832	0.103	ng		92
83) n-Decane	18.31	57	2521	0.089	ng		82
84) Benzyl Chloride	18.35	91	1089	0.027	ng	#	55
85) 1,3-Dichlorobenzene	18.35	146	2328	0.095	ng		93
86) 1,4-Dichlorobenzene	18.42	146	2688	0.107	ng		88
87) sec-Butylbenzene	18.48	105	6604	0.105	ng		98
88) 4-Isopropyltoluene (p-...	18.65	119	5696	0.099	ng		96
89) 1,2,3-Trimethylbenzene	18.64	105	4919	0.102	ng		96
90) 1,2-Dichlorobenzene	18.78	146	2512	0.105	ng		95
91) d-Limonene	18.80	68	1662	0.086	ng		96
92) 1,2-Dibromo-3-Chloropr...	0.00	157	0	N.D.			
93) n-Undecane	19.66	57	2383	0.086	ng		86
94) 1,2,4-Trichlorobenzene	20.62	180	1131	0.059	ng	#	74
95) Naphthalene	20.74	128	2755	0.043	ng	#	71
96) n-Dodecane	20.75	57	2359	0.082	ng	#	69
97) Hexachlorobutadiene	21.07	225	1304	0.127	ng		92
98) Cyclohexanone	16.04	55	1294	0.081	ng	#	81
99) tert-Butylbenzene	18.19	119	4933	0.108	ng		96
100) n-Butylbenzene	19.10	91	4429	0.091	ng		92

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2016_06\14\06141622.D
Acq On : 15 Jun 2016 00:07 Operator: SC
Sample : 0.10ng TO-15 ICAL STD
Misc : S29-06141607/S29-06021605 (7/1)
ALS Vial : 5 Sample Multiplier: 1

Quant Time: Jun 15 09:37:39 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:31:43 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M



Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2016_06\14\06141623.D
Acq On : 15 Jun 2016 00:40 Operator: SC
Sample : 0.20ng TO-15 ICAL STD
Misc : S29-06141607/S29-06021605 (7/1)
ALS Vial : 5 Sample Multiplier: 1

6/15/16

Quant Time: Jun 15 09:35:53 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:31:43 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M

Internal Standards	R.T.	QIon	Response	Conc	Units		Dev(Min)
1) Bromochloromethane (IS1)	8.89	130	109899	12.500	ng		-0.03
37) 1,4-Difluorobenzene (IS2)	10.87	114	516133	12.500	ng		-0.02
56) Chlorobenzene-d5 (IS3)	15.23	82	203041	12.500	ng		0.00
System Monitoring Compounds							
33) 1,2-Dichloroethane-d4(...	9.68	65	157957	11.022	ng		-0.02
Spiked Amount 12.500	Range 70 - 130		Recovery = 88.16%				
57) Toluene-d8 (SS2)	13.31	98	527232	13.797	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 110.40%				
73) Bromofluorobenzene (SS3)	16.84	174	157222	12.455	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 99.68%				
Target Compounds							Qvalue
2) Propene	3.72	42	2570	0.155	ng		93
3) Dichlorodifluoromethan...	3.81	85	5546	0.170	ng	#	95
4) Chloromethane	4.01	50	3825	0.140	ng		94
5) 1,2-Dichloro-1,1,2,2-t...	4.16	135	2716	0.168	ng		97
6) Vinyl Chloride	4.28	62	3369	0.145	ng		95
7) 1,3-Butadiene	4.45	54	2362	0.201	ng		96
8) Bromomethane	4.75	94	2261	0.165	ng		92
9) Chloroethane	4.96	64	1853	0.165	ng		85
10) Ethanol	5.18	45	9039	0.850	ng		83
11) Acetonitrile	5.46	41	4429	0.147	ng	#	25
12) Acrolein	5.52	56	645	0.072	ng	#	70
13) Acetone	5.65	58	9452	0.758	ng		97
14) Trichlorofluoromethane	5.81	101	4509	0.173	ng		97
15) 2-Propanol (Isopropanol)	5.97	45	12273	0.307	ng		99
16) Acrylonitrile	6.19	53	1465	0.070	ng	#	8
17) 1,1-Dichloroethene	6.50	96	2320	0.161	ng		92
18) 2-Methyl-2-Propanol (t...	6.65	59	11825	0.300	ng		93
19) Methylene Chloride	6.63	84	2140	0.119	ng		83
20) 3-Chloro-1-propene (Al...	6.76	41	3131	0.139	ng		86
21) Trichlorotrifluoroethane	6.94	151	2097	0.171	ng		96
22) Carbon Disulfide	6.93	76	8600	0.152	ng	#	74
23) trans-1,2-Dichloroethene	7.65	61	2541	0.120	ng		96
24) 1,1-Dichloroethane	7.85	63	4536	0.158	ng		96
25) Methyl tert-Butyl Ether	7.96	73	6852	0.147	ng		100
26) Vinyl Acetate	8.06	86	987	0.309	ng	#	29
27) 2-Butanone (MEK)	8.33	72	1292	0.131	ng	#	60
28) cis-1,2-Dichloroethene	8.73	61	2974	0.143	ng		97
29) Diisopropyl Ether	8.99	87	2271	0.180	ng	#	73
30) Ethyl Acetate	9.00	61	1190	0.213	ng		99
31) n-Hexane	8.99	57	3824	0.141	ng	#	91
32) Chloroform	9.04	83	4402	0.170	ng		94
34) Tetrahydrofuran (THF)	9.48	72	1550	0.143	ng		93
35) Ethyl tert-Butyl Ether	9.54	87	2770	0.153	ng		99
36) 1,2-Dichloroethane	9.79	62	2819	0.158	ng		99
38) 1,1,1-Trichloroethane	10.05	97	3874	0.193	ng		99
39) Isopropyl Acetate	10.46	61	2853	0.328	ng		98
40) 1-Butanol	10.50	56	3545	0.271	ng	#	78
41) Benzene	10.51	78	11457	0.187	ng		99
42) Carbon Tetrachloride	10.66	117	3056	0.186	ng		100
43) Cyclohexane	10.80	84	7441	0.342	ng		97
44) tert-Amyl Methyl Ether	11.13	73	6794	0.166	ng		94
45) 1,2-Dichloropropane	11.33	63	2449	0.167	ng		97
46) Bromodichloromethane	11.51	83	3418	0.188	ng		90
47) Trichloroethene	11.58	130	3051	0.208	ng		99
48) 1,4-Dioxane	11.58	88	1678	0.162	ng	#	19
49) 2,2,4-Trimethylpentane...	11.64	57	10721	0.166	ng		99

160188

Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2016_06\14\06141623.D
Acq On : 15 Jun 2016 00:40 Operator: SC
Sample : 0.20ng TO-15 ICAL STD
Misc : S29-06141607/S29-06021605 (7/1)
ALS Vial : 5 Sample Multiplier: 1

Quant Time: Jun 15 09:35:53 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:31:43 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M

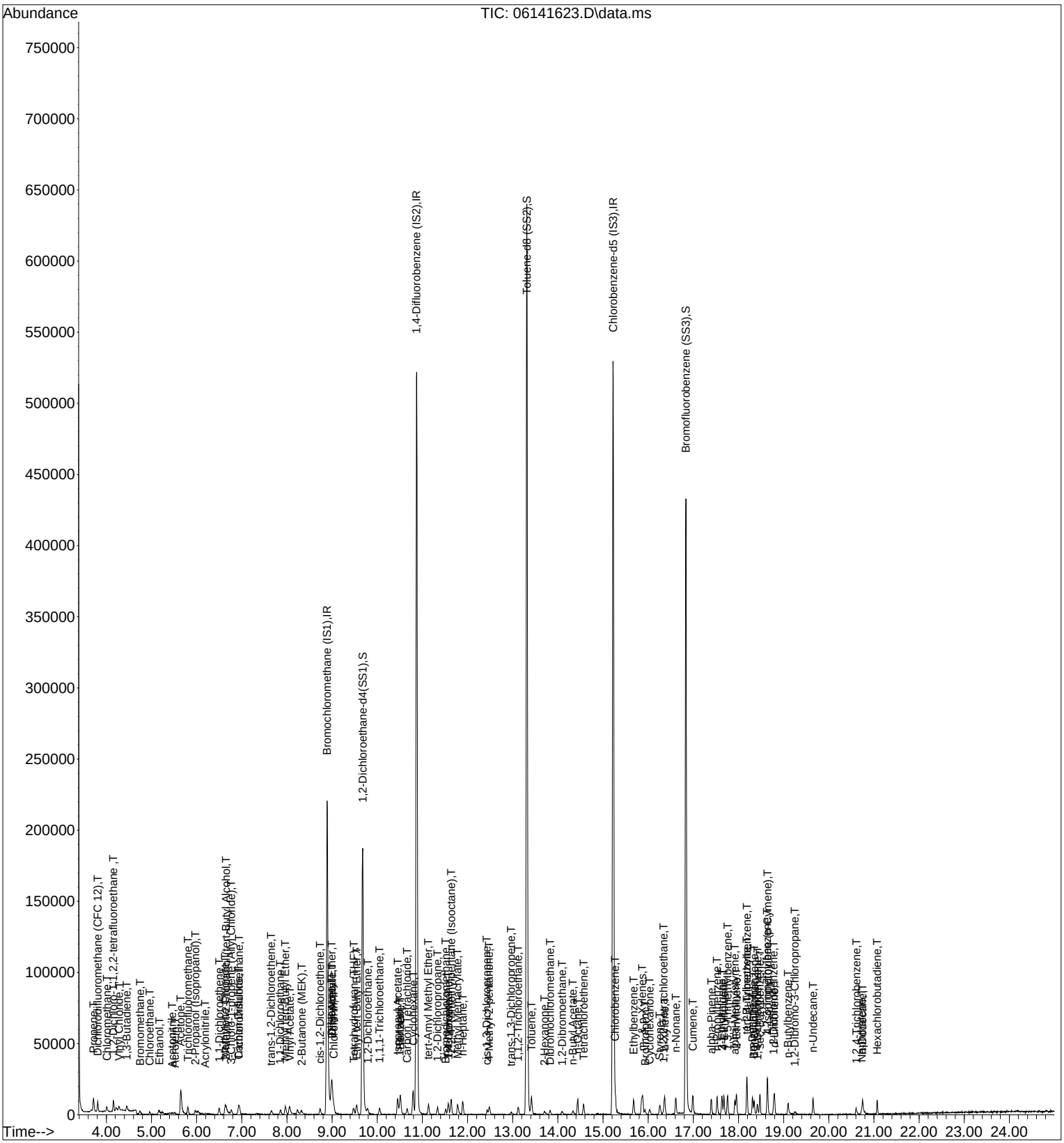
Internal Standards	R.T.	QIon	Response	Conc Units		Dev(Min)
50) Methyl Methacrylate	11.78	100	1462	0.277 ng		93
51) n-Heptane	11.90	71	2542	0.177 ng		90
52) cis-1,3-Dichloropropene	12.43	75	3167	0.152 ng		88
53) 4-Methyl-2-pentanone	12.48	58	1809	0.140 ng	#	83
54) trans-1,3-Dichloropropene	12.97	75	1986	0.105 ng	#	43
55) 1,1,2-Trichloroethane	13.12	97	2320	0.174 ng		95
58) Toluene	13.42	91	10702	0.195 ng		99
59) 2-Hexanone	13.71	43	2566	0.098 ng	#	70
60) Dibromochloromethane	13.83	129	2777	0.210 ng		88
61) 1,2-Dibromoethane	14.10	107	2258	0.171 ng		93
62) n-Butyl Acetate	14.33	43	3260	0.109 ng	#	79
63) n-Octane	14.44	57	1897	0.157 ng		87
64) Tetrachloroethene	14.58	166	2773	0.195 ng		96
65) Chlorobenzene	15.27	112	7072	0.212 ng		98
66) Ethylbenzene	15.68	91	10247	0.176 ng		99
67) m- & p-Xylenes	15.87	91	16672	0.359 ng		98
68) Bromoform	15.94	173	2002	0.179 ng		90
69) Styrene	16.25	104	5595	0.167 ng		99
70) o-Xylene	16.37	91	8667	0.180 ng		99
71) n-Nonane	16.61	43	4469	0.160 ng		92
72) 1,1,2,2-Tetrachloroethane	16.34	83	3493	0.154 ng		92
74) Cumene	16.99	105	11065	0.184 ng		99
75) alpha-Pinene	17.40	93	5317	0.175 ng		95
76) n-Propylbenzene	17.53	91	12645	0.170 ng		95
77) 3-Ethyltoluene	17.63	105	9834	0.170 ng		99
78) 4-Ethyltoluene	17.68	105	10414	0.188 ng		95
79) 1,3,5-Trimethylbenzene	17.76	105	8983	0.189 ng		97
80) alpha-Methylstyrene	17.92	118	3979	0.163 ng		96
81) 2-Ethyltoluene	17.95	105	10661	0.190 ng		97
82) 1,2,4-Trimethylbenzene	18.19	105	8513	0.181 ng		98
83) n-Decane	18.31	57	4420	0.156 ng		90
84) Benzyl Chloride	18.34	91	2693	0.066 ng	#	55
85) 1,3-Dichlorobenzene	18.35	146	4246	0.173 ng		98
86) 1,4-Dichlorobenzene	18.42	146	4554	0.181 ng		99
87) sec-Butylbenzene	18.48	105	11900	0.189 ng		98
88) 4-Isopropyltoluene (p-...	18.65	119	10589	0.183 ng		97
89) 1,2,3-Trimethylbenzene	18.64	105	9081	0.188 ng		95
90) 1,2-Dichlorobenzene	18.78	146	4528	0.188 ng		94
91) d-Limonene	18.79	68	3242	0.166 ng		96
92) 1,2-Dibromo-3-Chloropr...	19.24	157	933	0.095 ng		84
93) n-Undecane	19.65	57	4568	0.163 ng		94
94) 1,2,4-Trichlorobenzene	20.61	180	2556	0.133 ng	#	93
95) Naphthalene	20.73	128	6558	0.101 ng	#	71
96) n-Dodecane	20.75	57	4309	0.149 ng		84
97) Hexachlorobutadiene	21.07	225	2292	0.223 ng		98
98) Cyclohexanone	16.03	55	2449	0.152 ng		90
99) tert-Butylbenzene	18.18	119	8865	0.192 ng		95
100) n-Butylbenzene	19.10	91	8417	0.171 ng		94

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2016_06\14\06141623.D
Acq On : 15 Jun 2016 00:40 Operator: SC
Sample : 0.20ng TO-15 ICAL STD
Misc : S29-06141607/S29-06021605 (7/1)
ALS Vial : 5 Sample Multiplier: 1

Quant Time: Jun 15 09:35:53 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:31:43 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M



Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2016_06\14\06141624.D
Acq On : 15 Jun 2016 1:14 Operator: SC
Sample : 0.40ng TO-15 ICAL STD
Misc : S29-06141607/S29-06021605 (7/1)
ALS Vial : 5 Sample Multiplier: 1

Quant Time: Jun 15 09:34:30 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:31:43 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M

6/15/16

Internal Standards	R.T.	QIon	Response	Conc	Units		Dev(Min)
1) Bromochloromethane (IS1)	8.89	130	96230	12.500	ng		-0.03
37) 1,4-Difluorobenzene (IS2)	10.87	114	450792	12.500	ng		-0.01
56) Chlorobenzene-d5 (IS3)	15.22	82	177566	12.500	ng		0.00
System Monitoring Compounds							
33) 1,2-Dichloroethane-d4(...	9.67	65	139621	11.126	ng		-0.02
Spiked Amount 12.500	Range 70 - 130		Recovery = 89.04%				
57) Toluene-d8 (SS2)	13.31	98	465564	13.931	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 111.44%				
73) Bromofluorobenzene (SS3)	16.84	174	138686	12.563	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 100.48%				
Target Compounds							Qvalue
2) Propene	3.71	42	5163	0.354	ng		98
3) Dichlorodifluoromethan...	3.80	85	10462	0.367	ng		98
4) Chloromethane	4.00	50	7578	0.316	ng		97
5) 1,2-Dichloro-1,1,2,2-t...	4.16	135	5560	0.393	ng		99
6) Vinyl Chloride	4.28	62	7112	0.350	ng		98
7) 1,3-Butadiene	4.44	54	4867	0.474	ng		98
8) Bromomethane	4.74	94	4198	0.350	ng		97
9) Chloroethane	4.95	64	3937	0.400	ng		88
10) Ethanol	5.15	45	17857	1.918	ng		91
11) Acetonitrile	5.36	41	8891	0.337	ng		92
12) Acrolein	5.51	56	2123	0.272	ng		80
13) Acetone	5.64	58	18226	1.669	ng		97
14) Trichlorofluoromethane	5.80	101	8813	0.385	ng		98
15) 2-Propanol (Isopropanol)	5.94	45	23795	0.680	ng		93
16) Acrylonitrile	6.16	53	5401	0.295	ng		100
17) 1,1-Dichloroethene	6.50	96	4507	0.358	ng		94
18) 2-Methyl-2-Propanol (t...	6.64	59	23468	0.681	ng		97
19) Methylene Chloride	6.63	84	4405	0.280	ng		96
20) 3-Chloro-1-propene (Al...	6.77	41	6259	0.318	ng		92
21) Trichlorotrifluoroethane	6.94	151	4382	0.408	ng		98
22) Carbon Disulfide	6.91	76	14577	0.293	ng		98
23) trans-1,2-Dichloroethene	7.65	61	5849	0.316	ng		91
24) 1,1-Dichloroethane	7.85	63	8625	0.344	ng		96
25) Methyl tert-Butyl Ether	7.96	73	14376	0.353	ng		97
26) Vinyl Acetate	8.05	86	2148	0.768	ng	#	53
27) 2-Butanone (MEK)	8.30	72	2632	0.305	ng	#	65
28) cis-1,2-Dichloroethene	8.73	61	6181	0.341	ng		97
29) Diisopropyl Ether	8.99	87	5033	0.456	ng	#	53
30) Ethyl Acetate	8.99	61	2722	0.558	ng		86
31) n-Hexane	8.98	57	8299	0.349	ng		97
32) Chloroform	9.03	83	8250	0.365	ng		100
34) Tetrahydrofuran (THF)	9.47	72	3134	0.330	ng		91
35) Ethyl tert-Butyl Ether	9.54	87	5736	0.361	ng		96
36) 1,2-Dichloroethane	9.78	62	6017	0.385	ng		98
38) 1,1,1-Trichloroethane	10.05	97	7566	0.432	ng		97
39) Isopropyl Acetate	10.45	61	5713	0.752	ng		98
40) 1-Butanol	10.48	56	7768	0.681	ng	#	34
41) Benzene	10.51	78	21798	0.407	ng		99
42) Carbon Tetrachloride	10.66	117	6175	0.431	ng		99
43) Cyclohexane	10.79	84	14664	0.771	ng		97
44) tert-Amyl Methyl Ether	11.13	73	13301	0.371	ng		98
45) 1,2-Dichloropropane	11.33	63	4859	0.379	ng		96
46) Bromodichloromethane	11.51	83	6671	0.420	ng		99
47) Trichloroethene	11.58	130	5671	0.442	ng		97
48) 1,4-Dioxane	11.57	88	3203	0.353	ng		96
49) 2,2,4-Trimethylpentane...	11.64	57	20975	0.371	ng		98

Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2016_06\14\06141624.D
Acq On : 15 Jun 2016 1:14 Operator: SC
Sample : 0.40ng TO-15 ICAL STD
Misc : S29-06141607/S29-06021605 (7/1)
ALS Vial : 5 Sample Multiplier: 1

Quant Time: Jun 15 09:34:30 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:31:43 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M

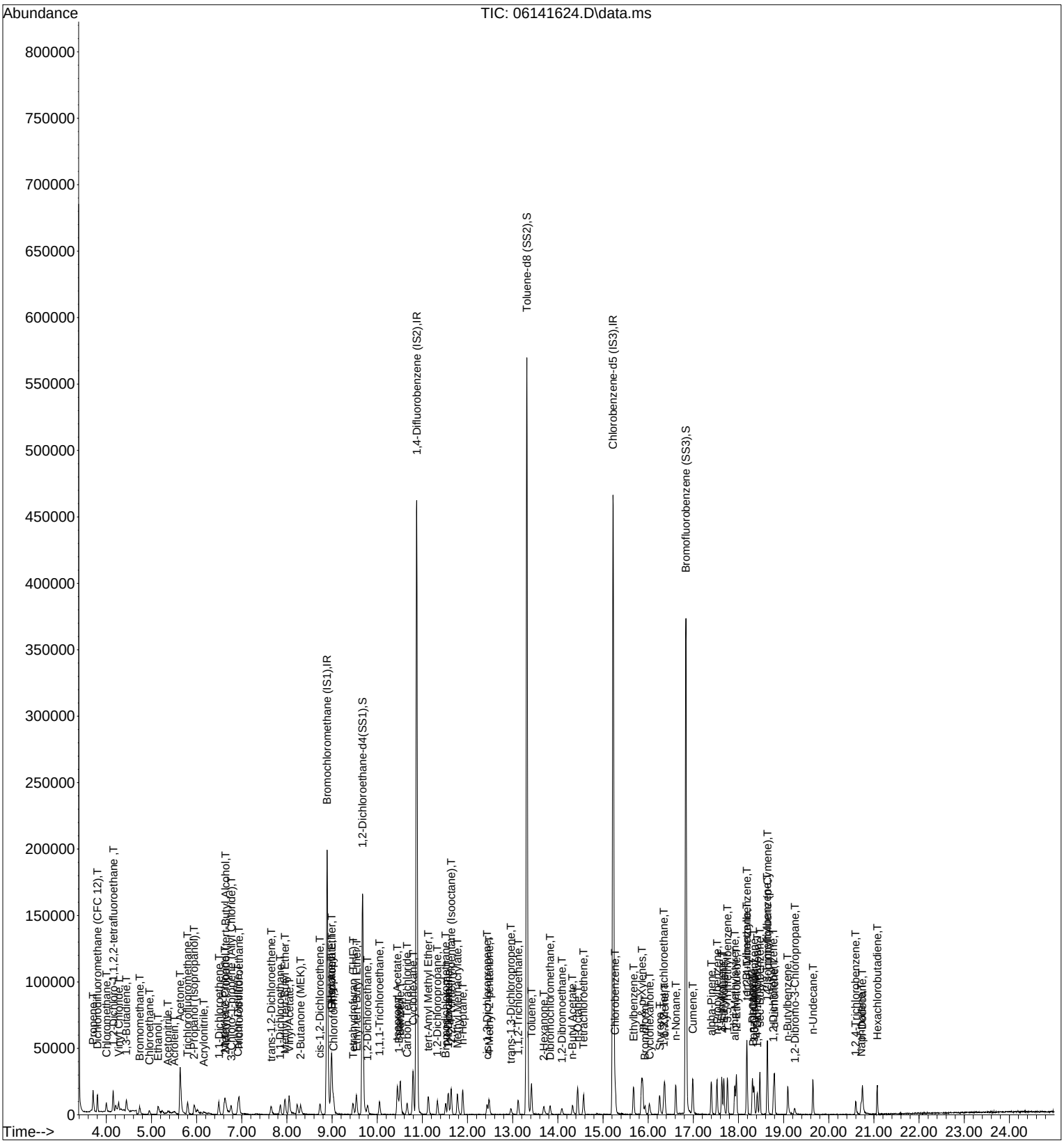
Internal Standards	R.T.	QIon	Response	Conc	Units		Dev(Min)
50) Methyl Methacrylate	11.78	100	2751	0.598	ng	#	76
51) n-Heptane	11.90	71	4816	0.383	ng		100
52) cis-1,3-Dichloropropene	12.44	75	6797	0.375	ng		89
53) 4-Methyl-2-pentanone	12.48	58	3876	0.344	ng		89
54) trans-1,3-Dichloropropene	12.96	75	4530	0.273	ng		91
55) 1,1,2-Trichloroethane	13.12	97	4867	0.417	ng		93
58) Toluene	13.42	91	20365	0.424	ng		99
59) 2-Hexanone	13.69	43	7168	0.314	ng		94
60) Dibromochloromethane	13.83	129	5248	0.454	ng		98
61) 1,2-Dibromoethane	14.09	107	4772	0.413	ng		92
62) n-Butyl Acetate	14.32	43	6768	0.258	ng		96
63) n-Octane	14.44	57	4076	0.386	ng		96
64) Tetrachloroethene	14.57	166	5756	0.462	ng		98
65) Chlorobenzene	15.27	112	13000	0.445	ng		95
66) Ethylbenzene	15.68	91	20358	0.401	ng		100
67) m- & p-Xylenes	15.87	91	32301	0.796	ng		98
68) Bromoform	15.93	173	4206	0.430	ng		94
69) Styrene	16.26	104	11058	0.377	ng		98
70) o-Xylene	16.37	91	16993	0.404	ng		100
71) n-Nonane	16.61	43	9202	0.376	ng		93
72) 1,1,2,2-Tetrachloroethane	16.35	83	6606	0.333	ng		95
74) Cumene	16.99	105	21790	0.414	ng		98
75) alpha-Pinene	17.40	93	10168	0.383	ng		80
76) n-Propylbenzene	17.53	91	24512	0.377	ng		98
77) 3-Ethyltoluene	17.63	105	20454	0.405	ng		96
78) 4-Ethyltoluene	17.68	105	19154	0.396	ng		96
79) 1,3,5-Trimethylbenzene	17.75	105	17645	0.424	ng		97
80) alpha-Methylstyrene	17.92	118	8472	0.396	ng		93
81) 2-Ethyltoluene	17.95	105	21285	0.434	ng		97
82) 1,2,4-Trimethylbenzene	18.19	105	17409	0.424	ng		99
83) n-Decane	18.31	57	9534	0.384	ng		96
84) Benzyl Chloride	18.33	91	6848	0.192	ng		88
85) 1,3-Dichlorobenzene	18.35	146	9345	0.436	ng		95
86) 1,4-Dichlorobenzene	18.42	146	8726	0.397	ng		96
87) sec-Butylbenzene	18.48	105	24276	0.440	ng		98
88) 4-Isopropyltoluene (p-...	18.64	119	20924	0.413	ng		99
89) 1,2,3-Trimethylbenzene	18.64	105	18280	0.432	ng		94
90) 1,2-Dichlorobenzene	18.77	146	9362	0.444	ng		96
91) d-Limonene	18.80	68	6548	0.384	ng		99
92) 1,2-Dibromo-3-Chloropr...	19.25	157	2139	0.250	ng		90
93) n-Undecane	19.65	57	9740	0.398	ng		95
94) 1,2,4-Trichlorobenzene	20.59	180	5129	0.306	ng		95
95) Naphthalene	20.72	128	14596	0.257	ng		96
96) n-Dodecane	20.74	57	8430	0.333	ng		92
97) Hexachlorobutadiene	21.07	225	4360	0.485	ng		98
98) Cyclohexanone	16.03	55	4876	0.346	ng		97
99) tert-Butylbenzene	18.18	119	17610	0.437	ng		99
100) n-Butylbenzene	19.09	91	16987	0.395	ng		97

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2016_06\14\06141624.D
Acq On : 15 Jun 2016 1:14 Operator: SC
Sample : 0.40ng TO-15 ICAL STD
Misc : S29-06141607/S29-06021605 (7/1)
ALS Vial : 5 Sample Multiplier: 1

Quant Time: Jun 15 09:34:30 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:31:43 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M



Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2016_06\14\06141625.D
Acq On : 15 Jun 2016 1:48 Operator: SC
Sample : 1.0ng TO-15 ICAL STD
Misc : S29-06141607/S29-06021603 (7/1)
ALS Vial : 6 Sample Multiplier: 1

6/15/16

Quant Time: Jun 15 09:33:15 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:31:43 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M

Internal Standards	R.T.	QIon	Response	Conc	Units		Dev(Min)
1) Bromochloromethane (IS1)	8.89	130	110747	12.500	ng		-0.02
37) 1,4-Difluorobenzene (IS2)	10.87	114	510746	12.500	ng		-0.01
56) Chlorobenzene-d5 (IS3)	15.22	82	203032	12.500	ng		0.00
System Monitoring Compounds							
33) 1,2-Dichloroethane-d4(...	9.68	65	157729	10.922	ng		-0.02
Spiked Amount 12.500	Range 70 - 130		Recovery = 87.36%				
57) Toluene-d8 (SS2)	13.31	98	527928	13.816	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 110.56%				
73) Bromofluorobenzene (SS3)	16.84	174	159958	12.672	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 101.36%				
Target Compounds							Qvalue
2) Propene	3.69	42	13629	0.813	ng		99
3) Dichlorodifluoromethan...	3.79	85	29086	0.887	ng		100
4) Chloromethane	3.99	50	21209	0.768	ng		100
5) 1,2-Dichloro-1,1,2,2-t...	4.14	135	15631	0.959	ng		98
6) Vinyl Chloride	4.26	62	19744	0.844	ng		99
7) 1,3-Butadiene	4.43	54	14334	1.212	ng		98
8) Bromomethane	4.73	94	12690	0.918	ng		98
9) Chloroethane	4.94	64	10184	0.899	ng		98
10) Ethanol	5.14	45	50471	4.709	ng		99
11) Acetonitrile	5.36	41	24823	0.819	ng		82
12) Acrolein	5.49	56	7081	0.790	ng		97
13) Acetone	5.62	58	49950	3.976	ng		98
14) Trichlorofluoromethane	5.80	101	23785	0.904	ng		100
15) 2-Propanol (Isopropanol)	5.93	45	67396	1.674	ng		93
16) Acrylonitrile	6.15	53	16806	0.798	ng		96
17) 1,1-Dichloroethene	6.49	96	12766	0.881	ng		95
18) 2-Methyl-2-Propanol (t...	6.57	59	67768	1.708	ng		98
19) Methylene Chloride	6.62	84	13413	0.741	ng		98
20) 3-Chloro-1-propene (Al...	6.76	41	18584	0.822	ng		94
21) Trichlorotrifluoroethane	6.94	151	11951	0.968	ng		98
22) Carbon Disulfide	6.90	76	44618	0.780	ng		100
23) trans-1,2-Dichloroethene	7.64	61	18111	0.851	ng		96
24) 1,1-Dichloroethane	7.85	63	25090	0.869	ng		99
25) Methyl tert-Butyl Ether	7.95	73	38958	0.831	ng		100
26) Vinyl Acetate	8.04	86	9140	2.838	ng	#	77
27) 2-Butanone (MEK)	8.29	72	8857	0.891	ng		94
28) cis-1,2-Dichloroethene	8.73	61	18064	0.865	ng		99
29) Diisopropyl Ether	8.98	87	11424	0.899	ng		99
30) Ethyl Acetate	8.98	61	9552	1.700	ng		96
31) n-Hexane	8.98	57	22725	0.830	ng		98
32) Chloroform	9.03	83	24301	0.933	ng		98
34) Tetrahydrofuran (THF)	9.45	72	8663	0.792	ng		95
35) Ethyl tert-Butyl Ether	9.53	87	15645	0.856	ng		98
36) 1,2-Dichloroethane	9.79	62	17012	0.946	ng		99
38) 1,1,1-Trichloroethane	10.05	97	20969	1.058	ng		98
39) Isopropyl Acetate	10.44	61	16796	1.952	ng		99
40) 1-Butanol	10.46	56	25833	1.997	ng		90
41) Benzene	10.51	78	55163	0.909	ng		100
42) Carbon Tetrachloride	10.66	117	18036	1.110	ng		99
43) Cyclohexane	10.79	84	40943	1.901	ng		99
44) tert-Amyl Methyl Ether	11.12	73	37245	0.917	ng		98
45) 1,2-Dichloropropane	11.33	63	14559	1.003	ng		99
46) Bromodichloromethane	11.51	83	18669	1.037	ng		97
47) Trichloroethene	11.57	130	15314	1.053	ng		97
48) 1,4-Dioxane	11.56	88	10653	1.036	ng		97
49) 2,2,4-Trimethylpentane...	11.64	57	57571	0.899	ng		98

Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2016_06\14\06141625.D
Acq On : 15 Jun 2016 1:48 Operator: SC
Sample : 1.0ng TO-15 ICAL STD
Misc : S29-06141607/S29-06021603 (7/1)
ALS Vial : 6 Sample Multiplier: 1

Quant Time: Jun 15 09:33:15 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:31:43 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M

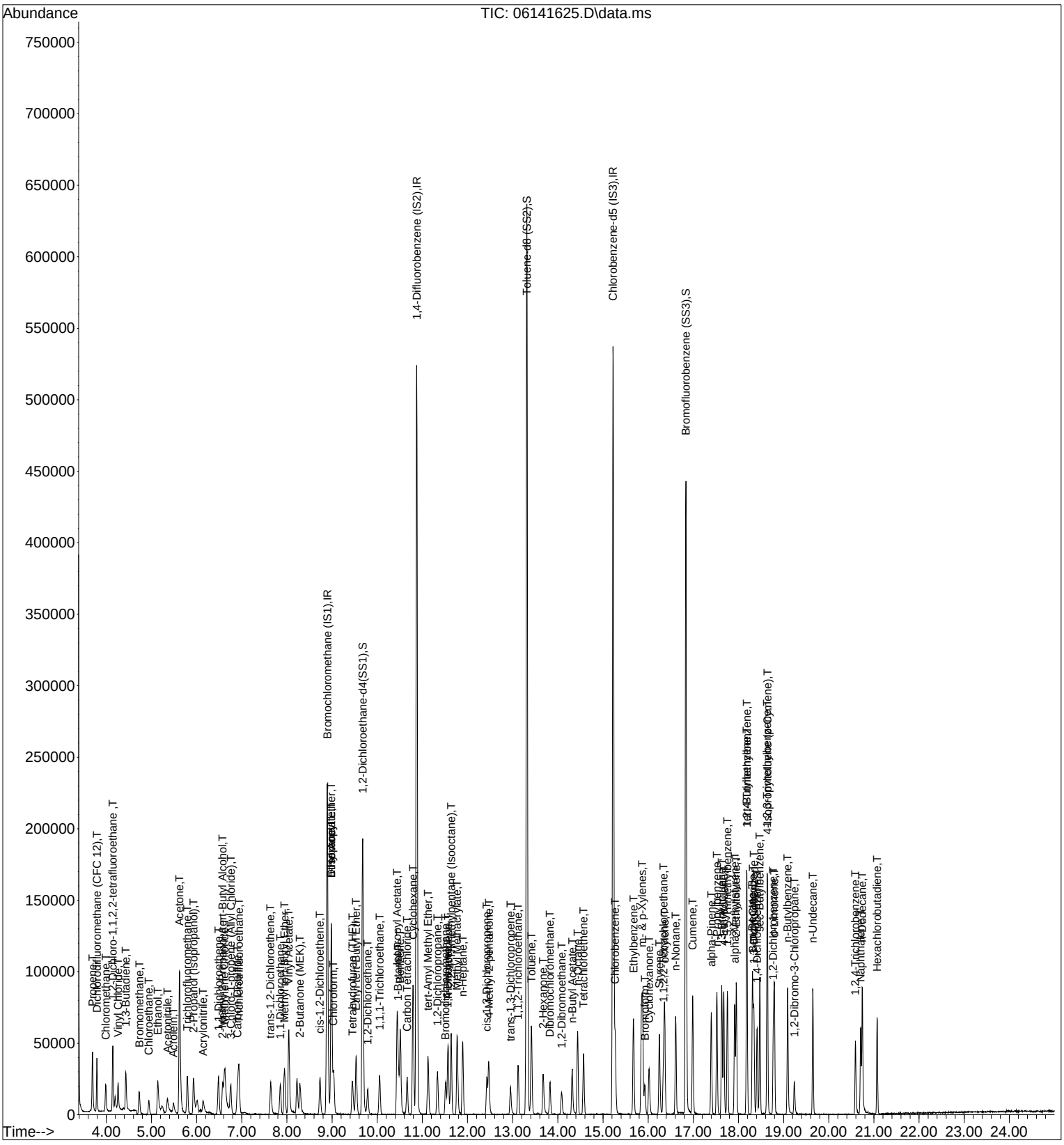
Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
50) Methyl Methacrylate	11.77	100	10407	1.995	ng	99
51) n-Heptane	11.90	71	13773	0.968	ng	100
52) cis-1,3-Dichloropropene	12.43	75	20769	1.010	ng	99
53) 4-Methyl-2-pentanone	12.47	58	12298	0.964	ng	96
54) trans-1,3-Dichloropropene	12.95	75	15661	0.833	ng	99
55) 1,1,2-Trichloroethane	13.12	97	13902	1.052	ng	99
58) Toluene	13.42	91	56892	1.035	ng	98
59) 2-Hexanone	13.67	43	27359	1.047	ng	98
60) Dibromochloromethane	13.82	129	15649	1.183	ng	97
61) 1,2-Dibromoethane	14.09	107	14821	1.123	ng	97
62) n-Butyl Acetate	14.32	43	29450	0.984	ng	98
63) n-Octane	14.44	57	11580	0.960	ng	96
64) Tetrachloroethene	14.57	166	15452	1.084	ng	96
65) Chlorobenzene	15.27	112	37251	1.116	ng	98
66) Ethylbenzene	15.68	91	61397	1.057	ng	98
67) m- & p-Xylenes	15.87	91	98274	2.118	ng	100
68) Bromoform	15.93	173	12834	1.148	ng	99
69) Styrene	16.25	104	36033	1.075	ng	99
70) o-Xylene	16.37	91	51084	1.061	ng	97
71) n-Nonane	16.61	43	26308	0.940	ng	99
72) 1,1,2,2-Tetrachloroethane	16.34	83	22845	1.007	ng	100
74) Cumene	16.99	105	63546	1.056	ng	100
75) alpha-Pinene	17.40	93	29835	0.983	ng	91
76) n-Propylbenzene	17.52	91	77131	1.039	ng	98
77) 3-Ethyltoluene	17.63	105	59999	1.039	ng	95
78) 4-Ethyltoluene	17.68	105	61662	1.115	ng	96
79) 1,3,5-Trimethylbenzene	17.75	105	51032	1.072	ng	98
80) alpha-Methylstyrene	17.92	118	27024	1.104	ng	100
81) 2-Ethyltoluene	17.95	105	62423	1.114	ng	100
82) 1,2,4-Trimethylbenzene	18.19	105	52171	1.111	ng	99
83) n-Decane	18.31	57	28605	1.007	ng	100
84) Benzyl Chloride	18.32	91	29557	0.723	ng	97
85) 1,3-Dichlorobenzene	18.34	146	30428	1.240	ng	97
86) 1,4-Dichlorobenzene	18.41	146	30067	1.197	ng	99
87) sec-Butylbenzene	18.47	105	70999	1.126	ng	99
88) 4-Isopropyltoluene (p-...	18.64	119	64034	1.105	ng	99
89) 1,2,3-Trimethylbenzene	18.64	105	53985	1.116	ng	100
90) 1,2-Dichlorobenzene	18.77	146	30078	1.248	ng	98
91) d-Limonene	18.80	68	20248	1.039	ng	98
92) 1,2-Dibromo-3-Chloropr...	19.24	157	8615	0.879	ng	92
93) n-Undecane	19.65	57	29200	1.044	ng	98
94) 1,2,4-Trichlorobenzene	20.59	180	19699	1.028	ng	99
95) Naphthalene	20.71	128	62976	0.971	ng	98
96) n-Dodecane	20.74	57	30312	1.046	ng	99
97) Hexachlorobutadiene	21.07	225	13584	1.321	ng	97
98) Cyclohexanone	16.02	55	18221	1.130	ng	98
99) tert-Butylbenzene	18.18	119	52016	1.130	ng	99
100) n-Butylbenzene	19.09	91	56683	1.153	ng	98

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2016_06\14\06141625.D
Acq On : 15 Jun 2016 1:48 Operator: SC
Sample : 1.0ng TO-15 ICAL STD
Misc : S29-06141607/S29-06021603 (7/1)
ALS Vial : 6 Sample Multiplier: 1

Quant Time: Jun 15 09:33:15 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:31:43 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M



Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2016_06\14\06141626.D
Acq On : 15 Jun 2016 2:22 Operator: SC
Sample : 5.0ng TO-15 ICAL STD
Misc : S29-06141607/S29-06021603 (7/1)
ALS Vial : 6 Sample Multiplier: 1

6/15/16

Quant Time: Jun 15 09:31:59 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:31:43 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M

Internal Standards	R.T.	QIon	Response	Conc	Units		Dev(Min)
1) Bromochloromethane (IS1)	8.90	130	97977	12.500	ng		-0.02
37) 1,4-Difluorobenzene (IS2)	10.87	114	458772	12.500	ng		-0.01
56) Chlorobenzene-d5 (IS3)	15.22	82	181534	12.500	ng		0.00
System Monitoring Compounds							
33) 1,2-Dichloroethane-d4(...	9.68	65	141234	11.054	ng		-0.01
Spiked Amount 12.500	Range 70 - 130		Recovery = 88.40%				
57) Toluene-d8 (SS2)	13.31	98	471080	13.788	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 110.32%				
73) Bromofluorobenzene (SS3)	16.84	174	146982	13.023	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 104.16%				
Target Compounds							Qvalue
2) Propene	3.67	42	63222	4.263	ng		100
3) Dichlorodifluoromethan...	3.78	85	135177	4.659	ng		100
4) Chloromethane	3.97	50	97404	3.987	ng		99
5) 1,2-Dichloro-1,1,2,2-t...	4.13	135	71326	4.947	ng		99
6) Vinyl Chloride	4.24	62	93733	4.532	ng		99
7) 1,3-Butadiene	4.42	54	65411	6.253	ng		96
8) Bromomethane	4.72	94	57409	4.696	ng		99
9) Chloroethane	4.93	64	43222	4.311	ng		99
10) Ethanol	5.15	45	236754	24.971	ng		99
11) Acetonitrile	5.35	41	114819	4.280	ng		97
12) Acrolein	5.48	56	39475	4.976	ng		99
13) Acetone	5.61	58	235898	21.223	ng		97
14) Trichlorofluoromethane	5.78	101	109110	4.686	ng		100
15) 2-Propanol (Isopropanol)	5.93	45	318717	8.948	ng		97
16) Acrylonitrile	6.14	53	81548	4.377	ng		99
17) 1,1-Dichloroethene	6.48	96	60306	4.703	ng		98
18) 2-Methyl-2-Propanol (t...	6.57	59	318720	9.080	ng		100
19) Methylene Chloride	6.62	84	64173	4.007	ng		100
20) 3-Chloro-1-propene (Al...	6.75	41	88466	4.420	ng		98
21) Trichlorotrifluoroethane	6.93	151	54826	5.017	ng		99
22) Carbon Disulfide	6.89	76	222549	4.399	ng		99
23) trans-1,2-Dichloroethene	7.64	61	90608	4.810	ng		97
24) 1,1-Dichloroethane	7.86	63	114809	4.493	ng		98
25) Methyl tert-Butyl Ether	7.93	73	187750	4.527	ng		99
26) Vinyl Acetate	8.04	86	54571	19.155	ng	#	86
27) 2-Butanone (MEK)	8.28	72	41780	4.750	ng		93
28) cis-1,2-Dichloroethene	8.73	61	85228	4.613	ng		100
29) Diisopropyl Ether	8.98	87	52168	4.643	ng	#	93
30) Ethyl Acetate	8.98	61	46106	9.276	ng		98
31) n-Hexane	8.98	57	105937	4.373	ng		99
32) Chloroform	9.04	83	110296	4.787	ng		99
34) Tetrahydrofuran (THF)	9.44	72	40901	4.226	ng		97
35) Ethyl tert-Butyl Ether	9.53	87	72691	4.494	ng		95
36) 1,2-Dichloroethane	9.79	62	78333	4.923	ng		100
38) 1,1,1-Trichloroethane	10.05	97	97110	5.453	ng		99
39) Isopropyl Acetate	10.44	61	79116	10.237	ng	#	93
40) 1-Butanol	10.45	56	133660	11.506	ng		96
41) Benzene	10.51	78	257199	4.718	ng		99
42) Carbon Tetrachloride	10.66	117	83565	5.725	ng		98
43) Cyclohexane	10.79	84	193083	9.978	ng		100
44) tert-Amyl Methyl Ether	11.12	73	177165	4.856	ng		98
45) 1,2-Dichloropropane	11.33	63	64111	4.919	ng		100
46) Bromodichloromethane	11.52	83	88275	5.460	ng		99
47) Trichloroethene	11.57	130	71440	5.471	ng		99
48) 1,4-Dioxane	11.55	88	51359	5.562	ng		100
49) 2,2,4-Trimethylpentane...	11.64	57	269301	4.680	ng		100

Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2016_06\14\06141626.D
Acq On : 15 Jun 2016 2:22 Operator: SC
Sample : 5.0ng TO-15 ICAL STD
Misc : S29-06141607/S29-06021603 (7/1)
ALS Vial : 6 Sample Multiplier: 1

Quant Time: Jun 15 09:31:59 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:31:43 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M

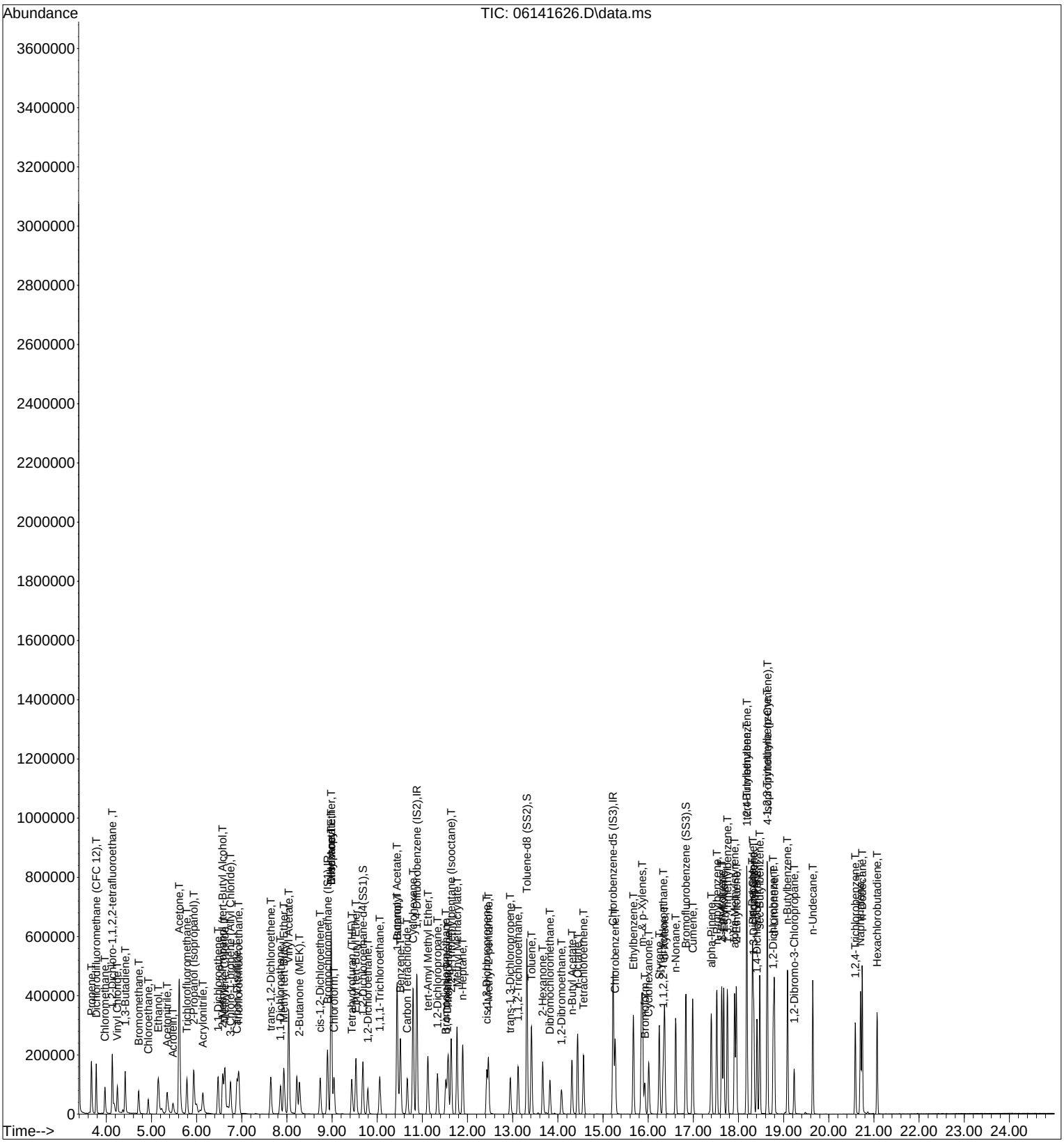
Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
50) Methyl Methacrylate	11.77	100	49752	10.619	ng	97
51) n-Heptane	11.89	71	63072	4.933	ng	98
52) cis-1,3-Dichloropropene	12.43	75	105721	5.724	ng	98
53) 4-Methyl-2-pentanone	12.46	58	60085	5.242	ng	95
54) trans-1,3-Dichloropropene	12.94	75	86933	5.148	ng	99
55) 1,1,2-Trichloroethane	13.12	97	63389	5.341	ng	98
58) Toluene	13.42	91	264943	5.392	ng	99
59) 2-Hexanone	13.66	43	141338	6.051	ng	100
60) Dibromochloromethane	13.82	129	76371	6.458	ng	99
61) 1,2-Dibromoethane	14.08	107	71743	6.080	ng	100
62) n-Butyl Acetate	14.31	43	157180	5.872	ng	99
63) n-Octane	14.44	57	54888	5.089	ng	99
64) Tetrachloroethene	14.57	166	72857	5.717	ng	98
65) Chlorobenzene	15.27	112	173969	5.831	ng	99
66) Ethylbenzene	15.67	91	293570	5.652	ng	100
67) m- & p-Xylenes	15.87	91	472621	11.391	ng	99
68) Bromoform	15.93	173	64619	6.463	ng	99
69) Styrene	16.25	104	184309	6.152	ng	99
70) o-Xylene	16.36	91	239126	5.557	ng	100
71) n-Nonane	16.61	43	129907	5.190	ng	98
72) 1,1,2,2-Tetrachloroethane	16.34	83	113531	5.597	ng	100
74) Cumene	16.98	105	303420	5.642	ng	100
75) alpha-Pinene	17.40	93	153097	5.643	ng	96
76) n-Propylbenzene	17.52	91	374163	5.635	ng	99
77) 3-Ethyltoluene	17.63	105	300057	5.810	ng	100
78) 4-Ethyltoluene	17.67	105	298835	6.042	ng	100
79) 1,3,5-Trimethylbenzene	17.75	105	251955	5.920	ng	99
80) alpha-Methylstyrene	17.91	118	139403	6.369	ng	99
81) 2-Ethyltoluene	17.95	105	302638	6.039	ng	99
82) 1,2,4-Trimethylbenzene	18.19	105	257526	6.131	ng	100
83) n-Decane	18.31	57	144231	5.681	ng	98
84) Benzyl Chloride	18.32	91	188779	5.164	ng	99
85) 1,3-Dichlorobenzene	18.34	146	149333	6.809	ng	99
86) 1,4-Dichlorobenzene	18.41	146	152108	6.770	ng	99
87) sec-Butylbenzene	18.47	105	352975	6.259	ng	99
88) 4-Isopropyltoluene (p-...	18.64	119	317596	6.132	ng	99
89) 1,2,3-Trimethylbenzene	18.64	105	270129	6.244	ng	99
90) 1,2-Dichlorobenzene	18.77	146	148855	6.906	ng	98
91) d-Limonene	18.79	68	103804	5.956	ng	99
92) 1,2-Dibromo-3-Chloropr...	19.23	157	48906	5.581	ng	97
93) n-Undecane	19.65	57	153045	6.122	ng	97
94) 1,2,4-Trichlorobenzene	20.59	180	106250	6.200	ng	99
95) Naphthalene	20.70	128	351891	6.067	ng	99
96) n-Dodecane	20.74	57	160049	6.178	ng	99
97) Hexachlorobutadiene	21.07	225	65346	7.106	ng	100
98) Cyclohexanone	16.01	55	92561	6.418	ng	99
99) tert-Butylbenzene	18.18	119	254068	6.171	ng	98
100) n-Butylbenzene	19.08	91	291939	6.642	ng	99

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2016_06\14\06141626.D
Acq On : 15 Jun 2016 2:22 Operator: SC
Sample : 5.0ng TO-15 ICAL STD
Misc : S29-06141607/S29-06021603 (7/1)
ALS Vial : 6 Sample Multiplier: 1

Quant Time: Jun 15 09:31:59 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:31:43 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M



Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2016_06\14\06141627.D
Acq On : 15 Jun 2016 2:56 Operator: SC
Sample : 25ng TO-15 ICAL STD
Misc : S29-06141607/S29-06021601 (7/1)
ALS Vial : 7 Sample Multiplier: 1

6/15/16

Quant Time: Jun 15 09:29:00 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri Apr 22 10:14:32 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M

Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
1) Bromochloromethane (IS1)	8.91	130	103722	12.500	ng	-0.03
37) 1,4-Difluorobenzene (IS2)	10.88	114	480704	12.500	ng	-0.02
56) Chlorobenzene-d5 (IS3)	15.23	82	192657	12.500	ng	0.00
System Monitoring Compounds						
33) 1,2-Dichloroethane-d4(...	9.69	65	149325	11.040	ng	-0.02
Spiked Amount 12.500	Range 70 - 130		Recovery = 88.32%			
57) Toluene-d8 (SS2)	13.32	98	499157	13.766	ng	0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 110.16%			
73) Bromofluorobenzene (SS3)	16.84	174	157319	13.135	ng	0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 105.04%			
Target Compounds						Qvalue
2) Propene	3.67	42	380744	24.252	ng	99
3) Dichlorodifluoromethan...	3.77	85	802868	26.140	ng	99
4) Chloromethane	3.97	50	597997	23.121	ng	99
5) 1,2-Dichloro-1,1,2,2-t...	4.13	135	433309	28.387	ng	100
6) Vinyl Chloride	4.24	62	568635	25.969	ng	100
7) 1,3-Butadiene	4.42	54	446948	40.359	ng	98
8) Bromomethane	4.72	94	358430	27.697	ng	99
9) Chloroethane	4.93	64	278211	26.212	ng	100
10) Ethanol	5.19	45	1394705	138.955	ng	100
11) Acetonitrile	5.37	41	681444	23.996	ng	99
12) Acrolein	5.49	56	247679	29.491	ng	98
13) Acetone	5.64	58	1420488	120.717	ng	93
14) Trichlorofluoromethane	5.79	101	637529	25.865	ng	99
15) 2-Propanol (Isopropanol)	5.97	45	1950765	51.736	ng	97
16) Acrylonitrile	6.16	53	503797	25.544	ng	99
17) 1,1-Dichloroethene	6.48	96	376168	27.709	ng	100
18) 2-Methyl-2-Propanol (t...	6.60	59	1982117	53.341	ng	100
19) Methylene Chloride	6.65	84	387936	22.880	ng	97
20) 3-Chloro-1-propene (Al...	6.76	41	553317	26.116	ng	99
21) Trichlorotrifluoroethane	6.94	151	327848	28.340	ng	99
22) Carbon Disulfide	6.90	76	1403768	26.208	ng	100
23) trans-1,2-Dichloroethene	7.66	61	550972	27.628	ng	98
24) 1,1-Dichloroethane	7.87	63	677371	25.042	ng	100
25) Methyl tert-Butyl Ether	7.94	73	1140218	25.969	ng	99
26) Vinyl Acetate	8.05	86	420806	139.528	ng	98
27) 2-Butanone (MEK)	8.29	72	264802	28.441	ng	100
28) cis-1,2-Dichloroethene	8.75	61	527826	26.985	ng	98
29) Diisopropyl Ether	8.99	87	319410	26.853	ng	98
30) Ethyl Acetate	8.99	61	288311	54.793	ng	95
31) n-Hexane	8.99	57	627322	24.463	ng	100
32) Chloroform	9.06	83	668748	27.416	ng	100
34) Tetrahydrofuran (THF)	9.44	72	243517	23.768	ng	98
35) Ethyl tert-Butyl Ether	9.53	87	458688	26.790	ng	99
36) 1,2-Dichloroethane	9.80	62	474619	28.174	ng	100
38) 1,1,1-Trichloroethane	10.06	97	584585	31.327	ng	99
39) Isopropyl Acetate	10.44	61	490523	60.577	ng	95
40) 1-Butanol	10.46	56	835906	68.673	ng	98
41) Benzene	10.52	78	1514700	26.517	ng	100
42) Carbon Tetrachloride	10.67	117	519812	33.990	ng	100
43) Cyclohexane	10.80	84	1171504	57.778	ng	98
44) tert-Amyl Methyl Ether	11.12	73	1103225	28.861	ng	100
45) 1,2-Dichloropropane	11.34	63	387951	28.410	ng	99
46) Bromodichloromethane	11.52	83	547056	32.292	ng	99
47) Trichloroethene	11.58	130	427657	31.255	ng	99
48) 1,4-Dioxane	11.55	88	323478	33.433	ng	98
49) 2,2,4-Trimethylpentane...	11.64	57	1627428	26.990	ng	99

Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2016_06\14\06141627.D
Acq On : 15 Jun 2016 2:56 Operator: SC
Sample : 25ng TO-15 ICAL STD
Misc : S29-06141607/S29-06021601 (7/1)
ALS Vial : 7 Sample Multiplier: 1

Quant Time: Jun 15 09:29:00 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri Apr 22 10:14:32 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M

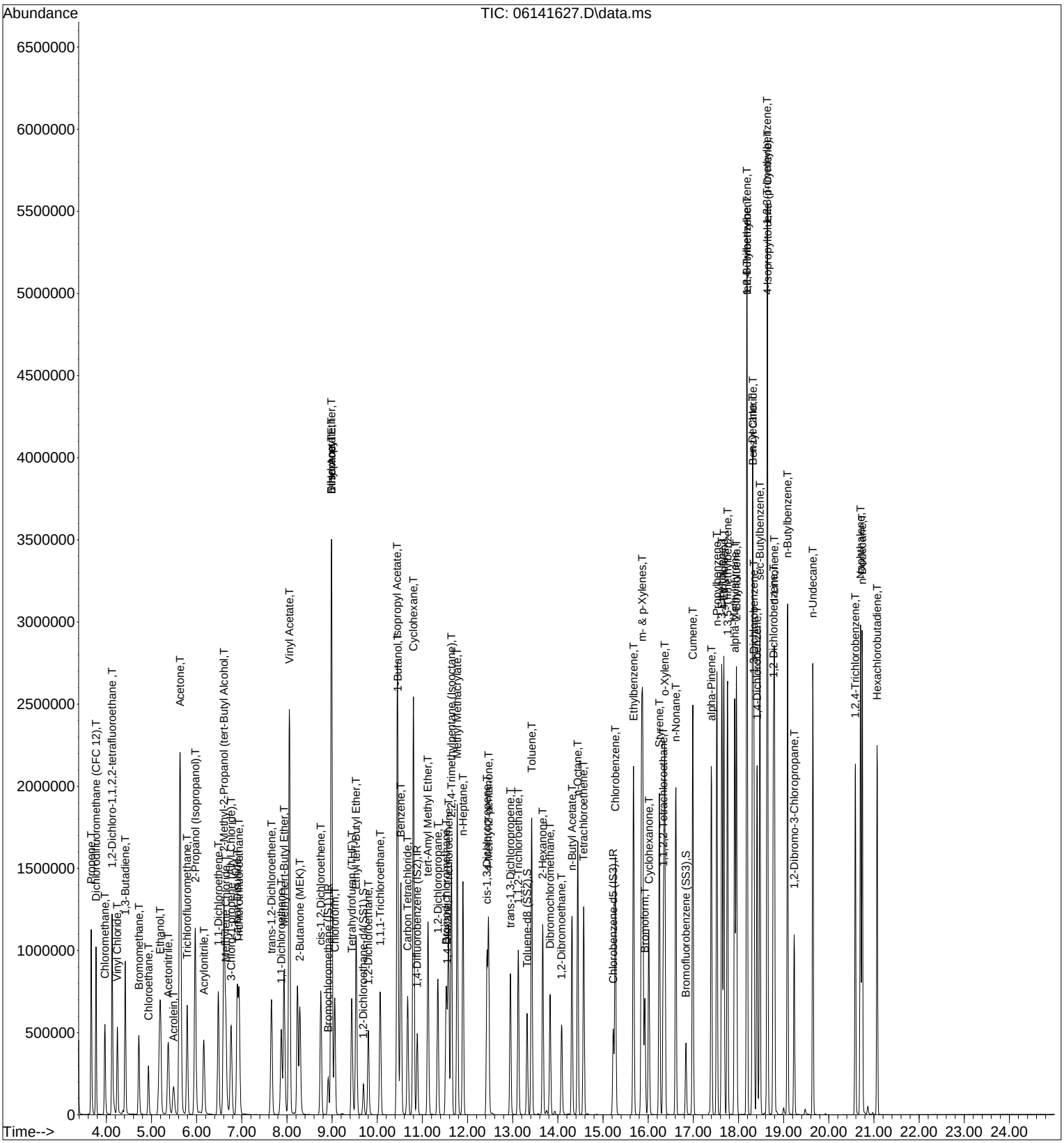
Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
50) Methyl Methacrylate	11.77	100	320244	65.235	ng	100
51) n-Heptane	11.90	71	394298	29.433	ng	99
52) cis-1,3-Dichloropropene	12.43	75	674440	34.848	ng	100
53) 4-Methyl-2-pentanone	12.46	58	378241	31.493	ng	99
54) trans-1,3-Dichloropropene	12.95	75	583910	33.002	ng	100
55) 1,1,2-Trichloroethane	13.12	97	392540	31.568	ng	99
58) Toluene	13.42	91	1616143	30.992	ng	100
59) 2-Hexanone	13.66	43	889924	35.899	ng	98
60) Dibromochloromethane	13.83	129	483947	38.558	ng	100
61) 1,2-Dibromoethane	14.08	107	460415	36.764	ng	100
62) n-Butyl Acetate	14.31	43	1002972	35.305	ng	99
63) n-Octane	14.44	57	344168	30.065	ng	99
64) Tetrachloroethene	14.57	166	457675	33.839	ng	100
65) Chlorobenzene	15.27	112	1080000	34.107	ng	100
66) Ethylbenzene	15.68	91	1851414	33.585	ng	100
67) m- & p-Xylenes	15.87	91	2957806	67.171	ng	99
68) Bromoform	15.93	173	429490	40.476	ng	100
69) Styrene	16.25	104	1188189	37.370	ng	100
70) o-Xylene	16.37	91	1502593	32.904	ng	100
71) n-Nonane	16.61	43	794675	29.918	ng	99
72) 1,1,2,2-Tetrachloroethane	16.34	83	738735	34.317	ng	99
74) Cumene	16.99	105	1912470	33.508	ng	100
75) alpha-Pinene	17.40	93	967751	33.609	ng	99
76) n-Propylbenzene	17.52	91	2350449	33.357	ng	100
77) 3-Ethyltoluene	17.63	105	1980140	36.128	ng	100
78) 4-Ethyltoluene	17.68	105	1846832	35.187	ng	100
79) 1,3,5-Trimethylbenzene	17.76	105	1589788	35.200	ng	100
80) alpha-Methylstyrene	17.92	118	877356	37.770	ng	100
81) 2-Ethyltoluene	17.95	105	1876379	35.280	ng	100
82) 1,2,4-Trimethylbenzene	18.19	105	1673640	37.546	ng	100
83) n-Decane	18.31	57	888468	32.972	ng	99
84) Benzyl Chloride	18.32	91	1482563	38.212	ng	100
85) 1,3-Dichlorobenzene	18.34	146	982708	42.218	ng	100
86) 1,4-Dichlorobenzene	18.41	146	977876	41.011	ng	100
87) sec-Butylbenzene	18.48	105	2206597	36.869	ng	100
88) 4-Isopropyltoluene (p-...	18.64	119	2025390	36.849	ng	100
89) 1,2,3-Trimethylbenzene	18.64	105	1737809	37.848	ng	99
90) 1,2-Dichlorobenzene	18.77	146	947023	41.397	ng	100
91) d-Limonene	18.79	68	652363	35.269	ng	99
92) 1,2-Dibromo-3-Chloropr...	19.23	157	351670	37.817	ng	98
93) n-Undecane	19.65	57	928188	34.986	ng	99
94) 1,2,4-Trichlorobenzene	20.59	180	711851	39.138	ng	100
95) Naphthalene	20.70	128	2347737	38.141	ng	100
96) n-Dodecane	20.74	57	941099	34.228	ng	99
97) Hexachlorobutadiene	21.07	225	428189	43.874	ng	100
98) Cyclohexanone	16.02	55	579457	37.858	ng	99
99) tert-Butylbenzene	18.19	119	1618633	37.042	ng	99
100) n-Butylbenzene	19.09	91	1817410	38.959	ng	100

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2016_06\14\06141627.D
Acq On : 15 Jun 2016 2:56 Operator: SC
Sample : 25ng TO-15 ICAL STD
Misc : S29-06141607/S29-06021601 (7/1)
ALS Vial : 7 Sample Multiplier: 1

Quant Time: Jun 15 09:29:00 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri Apr 22 10:14:32 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M



Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2016_06\14\06141628.D
Acq On : 15 Jun 2016 3:30 Operator: SC
Sample : 50ng TO-15 ICAL STD
Misc : S29-06141607/S29-06021601 (7/1)
ALS Vial : 7 Sample Multiplier: 1

6/15/16

Quant Time: Jun 15 09:44:27 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:31:43 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M

Internal Standards	R.T.	QIon	Response	Conc	Units		Dev(Min)
1) Bromochloromethane (IS1)	8.93	130	114550	12.500	ng		0.01
37) 1,4-Difluorobenzene (IS2)	10.89	114	528538	12.500	ng		0.00
56) Chlorobenzene-d5 (IS3)	15.23	82	210792	12.500	ng		0.00
System Monitoring Compounds							
33) 1,2-Dichloroethane-d4(...	9.70	65	157662	10.555	ng		0.01
Spiked Amount 12.500	Range 70 - 130		Recovery = 84.40%				
57) Toluene-d8 (SS2)	13.32	98	541612	13.652	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 109.20%				
73) Bromofluorobenzene (SS3)	16.84	174	167237	12.761	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 102.08%				
Target Compounds							Qvalue
2) Propene	3.67	42	752641	43.409	ng		100
3) Dichlorodifluoromethan...	3.78	85	1586835	46.782	ng		100
4) Chloromethane	3.98	50	1168248	40.900	ng		100
5) 1,2-Dichloro-1,1,2,2-t...	4.14	135	894151	53.040	ng		100
6) Vinyl Chloride	4.25	62	1166073	48.220	ng		100
7) 1,3-Butadiene	4.43	54	933463	76.322	ng		99
8) Bromomethane	4.73	94	747683	52.314	ng		99
9) Chloroethane	4.94	64	575398	49.087	ng		100
10) Ethanol	5.22	45	2825067	254.856	ng		100
11) Acetonitrile	5.39	41	1404246	44.774	ng		100
12) Acrolein	5.50	56	506505	54.609	ng		98
13) Acetone	5.65	58	2888417	222.263	ng		96
14) Trichlorofluoromethane	5.80	101	1299076	47.723	ng		100
15) 2-Propanol (Isopropanol)	5.99	45	3951119	94.883	ng		99
16) Acrylonitrile	6.18	53	1045109	47.981	ng		100
17) 1,1-Dichloroethene	6.49	96	784530	52.326	ng		97
18) 2-Methyl-2-Propanol (t...	6.63	59	3919018	95.496	ng		99
19) Methylene Chloride	6.66	84	810217	43.268	ng		97
20) 3-Chloro-1-propene (Al...	6.77	41	1129165	48.258	ng		98
21) Trichlorotrifluoroethane	6.95	151	684671	53.590	ng		99
22) Carbon Disulfide	6.91	76	2967956	50.174	ng		100
23) trans-1,2-Dichloroethene	7.67	61	1147347	52.094	ng		99
24) 1,1-Dichloroethane	7.88	63	1389354	46.508	ng		100
25) Methyl tert-Butyl Ether	7.95	73	2360616	48.682	ng		99
26) Vinyl Acetate	8.07	86	901104	270.540	ng	#	88
27) 2-Butanone (MEK)	8.30	72	547390	53.235	ng		97
28) cis-1,2-Dichloroethene	8.76	61	1079401	49.968	ng		99
29) Diisopropyl Ether	8.99	87	661068	50.322	ng	#	92
30) Ethyl Acetate	9.00	61	594124	102.240	ng		97
31) n-Hexane	8.99	57	1274031	44.985	ng		100
32) Chloroform	9.07	83	1364090	50.636	ng		100
34) Tetrahydrofuran (THF)	9.44	72	509131	44.996	ng		97
35) Ethyl tert-Butyl Ether	9.54	87	956984	50.609	ng		98
36) 1,2-Dichloroethane	9.81	62	957548	51.468	ng		99
38) 1,1,1-Trichloroethane	10.07	97	1188901	57.946	ng		99
39) Isopropyl Acetate	10.45	61	1013428	113.826	ng		94
40) 1-Butanol	10.47	56	1724369	128.843	ng		98
41) Benzene	10.53	78	3141142	50.014	ng		100
42) Carbon Tetrachloride	10.68	117	1067798	63.503	ng		100
43) Cyclohexane	10.81	84	2429920	108.997	ng		99
44) tert-Amyl Methyl Ether	11.13	73	2287496	54.427	ng		99
45) 1,2-Dichloropropane	11.35	63	799160	53.227	ng		99
46) Bromodichloromethane	11.53	83	1122328	60.254	ng		100
47) Trichloroethene	11.59	130	891418	59.252	ng		100
48) 1,4-Dioxane	11.56	88	678796	63.807	ng		99
49) 2,2,4-Trimethylpentane...	11.65	57	3321780	50.104	ng		100

Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2016_06\14\06141628.D
Acq On : 15 Jun 2016 3:30 Operator: SC
Sample : 50ng TO-15 ICAL STD
Misc : S29-06141607/S29-06021601 (7/1)
ALS Vial : 7 Sample Multiplier: 1

Quant Time: Jun 15 09:44:27 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:31:43 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M

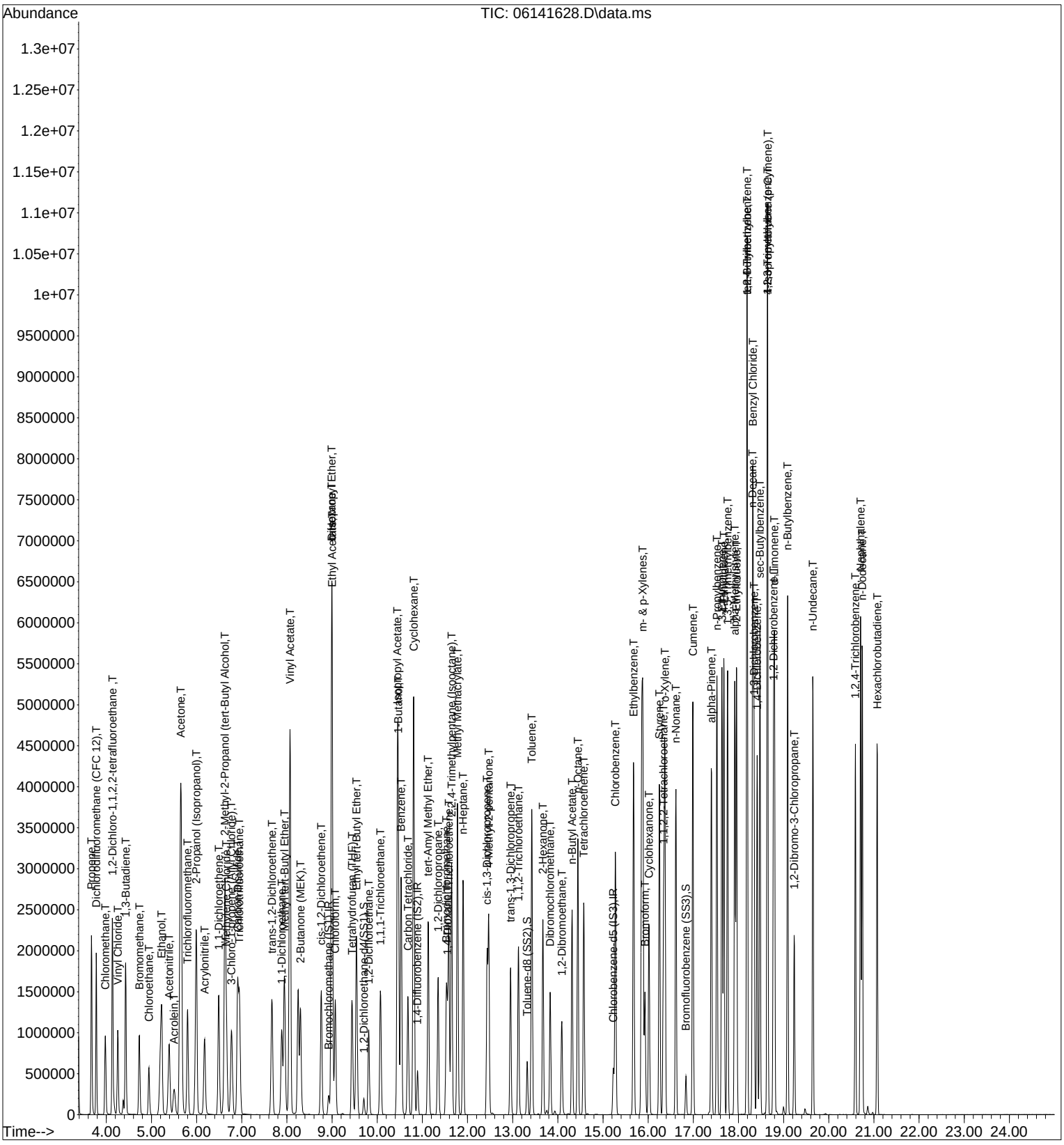
Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
50) Methyl Methacrylate	11.78	100	674190	124.906	ng	98
51) n-Heptane	11.90	71	812226	55.143	ng	99
52) cis-1,3-Dichloropropene	12.43	75	1400012	65.791	ng	100
53) 4-Methyl-2-pentanone	12.47	58	779909	59.060	ng	97
54) trans-1,3-Dichloropropene	12.95	75	1214014	62.406	ng	100
55) 1,1,2-Trichloroethane	13.13	97	816644	59.731	ng	100
58) Toluene	13.42	91	3343061	58.592	ng	100
59) 2-Hexanone	13.67	43	1786631	65.871	ng	98
60) Dibromochloromethane	13.83	129	998648	72.721	ng	100
61) 1,2-Dibromoethane	14.09	107	959269	70.008	ng	100
62) n-Butyl Acetate	14.31	43	2017840	64.919	ng	99
63) n-Octane	14.44	57	697517	55.690	ng	99
64) Tetrachloroethene	14.57	166	957194	64.683	ng	100
65) Chlorobenzene	15.27	112	2234493	64.496	ng	100
66) Ethylbenzene	15.68	91	3813056	63.219	ng	100
67) m- & p-Xylenes	15.88	91	6112620	126.874	ng	100
68) Bromoform	15.93	173	914265	78.750	ng	100
69) Styrene	16.25	104	2441952	70.195	ng	100
70) o-Xylene	16.37	91	3063899	61.322	ng	99
71) n-Nonane	16.61	43	1560937	53.710	ng	98
72) 1,1,2,2-Tetrachloroethane	16.34	83	1502017	63.771	ng	100
74) Cumene	16.99	105	3862937	61.858	ng	99
75) alpha-Pinene	17.40	93	1972920	62.622	ng	99
76) n-Propylbenzene	17.52	91	4715981	61.171	ng	99
77) 3-Ethyltoluene	17.63	105	3921632	65.395	ng	99
78) 4-Ethyltoluene	17.68	105	3811986	66.379	ng	99
79) 1,3,5-Trimethylbenzene	17.76	105	3238100	65.528	ng	100
80) alpha-Methylstyrene	17.92	118	1790512	70.450	ng	99
81) 2-Ethyltoluene	17.95	105	3818366	65.617	ng	100
82) 1,2,4-Trimethylbenzene	18.19	105	3406568	69.846	ng	100
83) n-Decane	18.31	57	1761280	59.740	ng	99
84) Benzyl Chloride	18.32	91	3096644	72.947	ng	99
85) 1,3-Dichlorobenzene	18.35	146	2013016	79.040	ng	100
86) 1,4-Dichlorobenzene	18.41	146	2001882	76.733	ng	100
87) sec-Butylbenzene	18.48	105	4407878	67.314	ng	100
88) 4-Isopropyltoluene (p-...	18.65	119	4063262	67.565	ng	99
89) 1,2,3-Trimethylbenzene	18.64	105	3530882	70.284	ng	100
90) 1,2-Dichlorobenzene	18.77	146	1925001	76.907	ng	100
91) d-Limonene	18.80	68	1315149	64.985	ng	99
92) 1,2-Dibromo-3-Chloropr...	19.23	157	715666	70.339	ng	99
93) n-Undecane	19.65	57	1831834	63.107	ng	99
94) 1,2,4-Trichlorobenzene	20.59	180	1470977	73.917	ng	100
95) Naphthalene	20.70	128	4739917	70.380	ng	100
96) n-Dodecane	20.74	57	1857950	61.760	ng	99
97) Hexachlorobutadiene	21.07	225	890844	83.426	ng	100
98) Cyclohexanone	16.02	55	1184882	70.752	ng	99
99) tert-Butylbenzene	18.19	119	3284570	68.700	ng	100
100) n-Butylbenzene	19.09	91	3619239	70.909	ng	99

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2016_06\14\06141628.D
Acq On : 15 Jun 2016 3:30 Operator: SC
Sample : 50ng TO-15 ICAL STD
Misc : S29-06141607/S29-06021601 (7/1)
ALS Vial : 7 Sample Multiplier: 1

Quant Time: Jun 15 09:44:27 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:31:43 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M



Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2016_06\14\06141629.D
Acq On : 15 Jun 2016 4:05 Operator: SC
Sample : 100ng TO-15 ICAL STD
Misc : S29-06141607/S29-06021601 (7/1)
ALS Vial : 7 Sample Multiplier: 1

6/15/16

Quant Time: Jun 15 09:45:40 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:31:43 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M

Internal Standards	R.T.	QIon	Response	Conc	Units		Dev(Min)
1) Bromochloromethane (IS1)	8.94	130	124238	12.500	ng		0.02
37) 1,4-Difluorobenzene (IS2)	10.90	114	578305	12.500	ng		0.02
56) Chlorobenzene-d5 (IS3)	15.23	82	224921	12.500	ng		0.00
System Monitoring Compounds							
33) 1,2-Dichloroethane-d4(...	9.71	65	165871	10.238	ng		0.02
Spiked Amount 12.500	Range 70 - 130		Recovery = 81.92%				
57) Toluene-d8 (SS2)	13.32	98	588119	13.893	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 111.12%				
73) Bromofluorobenzene (SS3)	16.84	174	181096	12.951	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 103.60%				
Target Compounds							Qvalue
2) Propene	3.68	42	1550926	82.476	ng		100
3) Dichlorodifluoromethan...	3.78	85	3178133	86.389	ng		100
4) Chloromethane	3.99	50	2182045	70.435	ng		100
5) 1,2-Dichloro-1,1,2,2-t...	4.14	135	1826809	99.914	ng		100
6) Vinyl Chloride	4.26	62	2376897	90.625	ng		100
7) 1,3-Butadiene	4.44	54	1918924	144.662	ng		99
8) Bromomethane	4.74	94	1534712	99.008	ng		99
9) Chloroethane	4.95	64	1088604	85.626	ng		100
10) Ethanol	5.25	45	5623566	467.756	ng		100
11) Acetonitrile	5.41	41	2879526	84.654	ng		99
12) Acrolein	5.51	56	1041297	103.513	ng		90
13) Acetone	5.67	58	5800870	411.567	ng		93
14) Trichlorofluoromethane	5.81	101	2669926	90.435	ng		100
15) 2-Propanol (Isopropanol)	6.02	45	7749951	171.596	ng		99
16) Acrylonitrile	6.19	53	2156409	91.281	ng		100
17) 1,1-Dichloroethene	6.50	96	1629370	100.201	ng		96
18) 2-Methyl-2-Propanol (t...	6.65	59	6850299	153.908	ng		99
19) Methylene Chloride	6.67	84	1684790	82.957	ng		94
20) 3-Chloro-1-propene (Al...	6.78	41	2319790	91.411	ng		98
21) Trichlorotrifluoroethane	6.96	151	1440768	103.978	ng		100
22) Carbon Disulfide	6.91	76	6104042	95.144	ng		100
23) trans-1,2-Dichloroethene	7.67	61	2357218	98.681	ng		98
24) 1,1-Dichloroethane	7.89	63	2831833	87.402	ng		100
25) Methyl tert-Butyl Ether	7.95	73	4813119	91.519	ng		100
26) Vinyl Acetate	8.08	86	1892938	524.003	ng	#	74
27) 2-Butanone (MEK)	8.31	72	1130840	101.400	ng		94
28) cis-1,2-Dichloroethene	8.77	61	2214510	94.521	ng		97
29) Diisopropyl Ether	9.00	87	1369982	96.154	ng	#	79
30) Ethyl Acetate	9.01	61	1193418	189.354	ng		94
31) n-Hexane	9.00	57	2554468	83.163	ng		99
32) Chloroform	9.09	83	2807897	96.103	ng		100
34) Tetrahydrofuran (THF)	9.45	72	1048875	85.469	ng		96
35) Ethyl tert-Butyl Ether	9.55	87	1990890	97.077	ng		97
36) 1,2-Dichloroethane	9.82	62	1941681	96.226	ng		99
38) 1,1,1-Trichloroethane	10.08	97	2456241	109.412	ng		99
39) Isopropyl Acetate	10.46	61	2047317	210.161	ng	#	90
40) 1-Butanol	10.49	56	3509502	239.660	ng		96
41) Benzene	10.53	78	6498986	94.574	ng		99
42) Carbon Tetrachloride	10.68	117	2205236	119.861	ng		100
43) Cyclohexane	10.81	84	4986876	204.441	ng		97
44) tert-Amyl Methyl Ether	11.14	73	4708853	102.398	ng		99
45) 1,2-Dichloropropane	11.35	63	1649616	100.416	ng		100
46) Bromodichloromethane	11.53	83	2310143	113.350	ng		100
47) Trichloroethene	11.59	130	1860793	113.043	ng		100
48) 1,4-Dioxane	11.56	88	1410696	121.194	ng		98
49) 2,2,4-Trimethylpentane...	11.65	57	6675977	92.031	ng		100

Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2016_06\14\06141629.D
Acq On : 15 Jun 2016 4:05 Operator: SC
Sample : 100ng TO-15 ICAL STD
Misc : S29-06141607/S29-06021601 (7/1)
ALS Vial : 7 Sample Multiplier: 1

Quant Time: Jun 15 09:45:40 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:31:43 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M

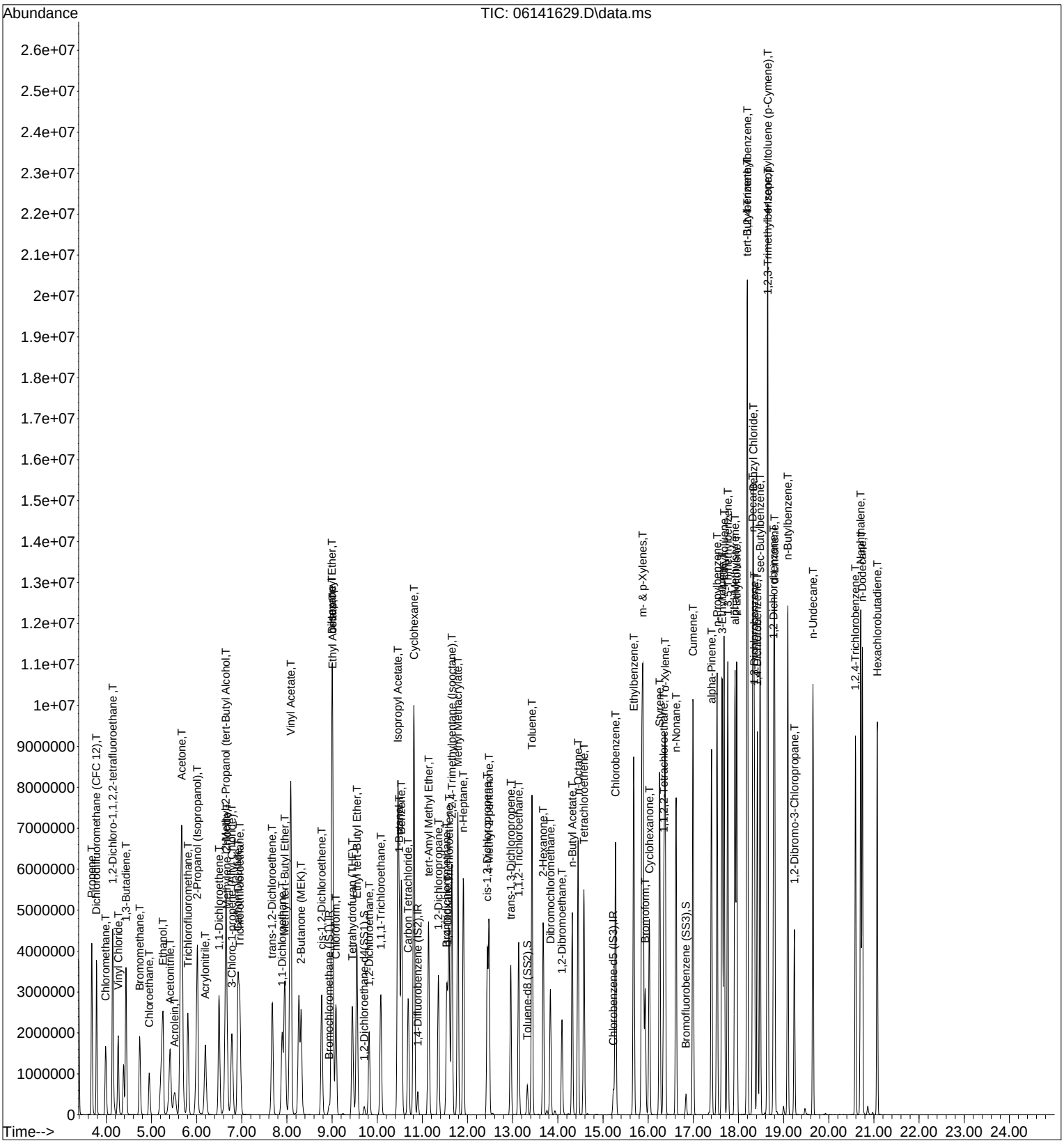
Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
50) Methyl Methacrylate	11.79	100	1405835	238.043	ng	95
51) n-Heptane	11.91	71	1677098	104.061	ng	99
52) cis-1,3-Dichloropropene	12.44	75	2865386	123.066	ng	100
53) 4-Methyl-2-pentanone	12.47	58	1585783	109.752	ng	94
54) trans-1,3-Dichloropropene	12.96	75	2514795	118.147	ng	100
55) 1,1,2-Trichloroethane	13.13	97	1687197	112.785	ng	100
58) Toluene	13.43	91	6883338	113.062	ng	99
59) 2-Hexanone	13.67	43	3582644	123.790	ng	97
60) Dibromochloromethane	13.83	129	2070855	141.327	ng	99
61) 1,2-Dibromoethane	14.09	107	1991272	136.194	ng	100
62) n-Butyl Acetate	14.32	43	4034146	121.635	ng	98
63) n-Octane	14.45	57	1423766	106.534	ng	98
64) Tetrachloroethene	14.58	166	2013468	127.514	ng	100
65) Chlorobenzene	15.28	112	4578832	123.860	ng	99
66) Ethylbenzene	15.68	91	7794032	121.105	ng	99
67) m- & p-Xylenes	15.88	91	12611960	245.330	ng	100
68) Bromoform	15.93	173	1929090	155.724	ng	100
69) Styrene	16.25	104	5053744	136.146	ng	99
70) o-Xylene	16.38	91	6322463	118.590	ng	99
71) n-Nonane	16.62	43	3055181	98.521	ng	95
72) 1,1,2,2-Tetrachloroethane	16.35	83	3116827	124.018	ng	99
74) Cumene	17.00	105	7881429	118.280	ng	98
75) alpha-Pinene	17.40	93	4061066	120.804	ng	99
76) n-Propylbenzene	17.53	91	9525945	115.799	ng	98
77) 3-Ethyltoluene	17.64	105	8156215	127.465	ng	99
78) 4-Ethyltoluene	17.68	105	7711005	125.840	ng	98
79) 1,3,5-Trimethylbenzene	17.76	105	6706432	127.189	ng	100
80) alpha-Methylstyrene	17.92	118	3707228	136.703	ng	98
81) 2-Ethyltoluene	17.96	105	7803411	125.675	ng	99
82) 1,2,4-Trimethylbenzene	18.20	105	6962336	133.785	ng	100
83) n-Decane	18.32	57	3364245	106.942	ng	95
84) Benzyl Chloride	18.33	91	6510024	143.722	ng	98
85) 1,3-Dichlorobenzene	18.35	146	4209322	154.895	ng	100
86) 1,4-Dichlorobenzene	18.42	146	4167991	149.725	ng	100
87) sec-Butylbenzene	18.48	105	8943543	127.999	ng	98
88) 4-Isopropyltoluene (p-...	18.65	119	8129430	126.687	ng	97
89) 1,2,3-Trimethylbenzene	18.65	105	7235941	134.988	ng	99
90) 1,2-Dichlorobenzene	18.78	146	4007934	150.065	ng	100
91) d-Limonene	18.80	68	2646750	122.567	ng	96
92) 1,2-Dibromo-3-Chloropr...	19.24	157	1494513	137.660	ng	97
93) n-Undecane	19.65	57	3601435	116.276	ng	97
94) 1,2,4-Trichlorobenzene	20.59	180	3098130	145.903	ng	99
95) Naphthalene	20.71	128	9549371	132.885	ng	98
96) n-Dodecane	20.74	57	3634982	113.240	ng	96
97) Hexachlorobutadiene	21.07	225	1898399	166.614	ng	99
98) Cyclohexanone	16.03	55	2403755	134.518	ng	98
99) tert-Butylbenzene	18.19	119	6649335	130.341	ng	99
100) n-Butylbenzene	19.09	91	7314068	134.297	ng	98

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2016_06\14\06141629.D
Acq On : 15 Jun 2016 4:05 Operator: SC
Sample : 100ng TO-15 ICAL STD
Misc : S29-06141607/S29-06021601 (7/1)
ALS Vial : 7 Sample Multiplier: 1

Quant Time: Jun 15 09:45:40 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:31:43 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M



Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2016_06\14\06141631.D
Acq On : 15 Jun 2016 5:12 Operator: SC
Sample : 25ng TO-15 ICV STD
Misc : S29-06141607/S29-05251604 (6/23)
ALS Vial : 3 Sample Multiplier: 1

6/15/16

Quant Time: Jun 15 10:24:30 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M

Internal Standards	R.T.	QIon	Response	Conc	Units		Dev(Min)
1) Bromochloromethane (IS1)	8.91	130	129912	12.500	ng		-0.02
37) 1,4-Difluorobenzene (IS2)	10.88	114	597257	12.500	ng		-0.02
56) Chlorobenzene-d5 (IS3)	15.23	82	233889	12.500	ng		0.00
System Monitoring Compounds							
33) 1,2-Dichloroethane-d4(...	9.70	65	169305	11.468	ng		-0.01
Spiked Amount 12.500	Range 70 - 130		Recovery = 91.76%				
57) Toluene-d8 (SS2)	13.32	98	609158	12.504	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 100.00%				
73) Bromofluorobenzene (SS3)	16.84	174	188933	12.754	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 102.00%				
Target Compounds							Qvalue
2) Propene	3.67	42	389634	23.537	ng		99
3) Dichlorodifluoromethan...	3.78	85	766767	21.246	ng		100
4) Chloromethane	3.97	50	623511	23.905	ng		100
5) 1,2-Dichloro-1,1,2,2-t...	4.13	135	456780	24.827	ng		99
6) Vinyl Chloride	4.25	62	619422	25.420	ng		99
7) 1,3-Butadiene	4.42	54	460769	27.868	ng		99
8) Bromomethane	4.72	94	418744	27.603	ng		100
9) Chloroethane	4.94	64	306024	26.072	ng		100
10) Ethanol	5.20	45	1537912	129.649	ng		100
11) Acetonitrile	5.37	41	747410	24.635	ng		100
12) Acrolein	5.49	56	242859	25.675	ng		99
13) Acetone	5.64	58	1570564	133.838	ng		92
14) Trichlorofluoromethane	5.80	101	666322	22.592	ng		100
15) 2-Propanol (Isopropanol)	5.97	45	2109031	52.865	ng		99
16) Acrylonitrile	6.16	53	559124	26.364	ng		99
17) 1,1-Dichloroethene	6.48	96	423234	28.236	ng		95
18) 2-Methyl-2-Propanol (t...	6.60	59	2098913	53.768	ng		99
19) Methylene Chloride	6.65	84	439169	29.474	ng		95
20) 3-Chloro-1-propene (Al...	6.76	41	587642	28.282	ng		98
21) Trichlorotrifluoroethane	6.94	151	368672	27.131	ng		99
22) Carbon Disulfide	6.90	76	1444818	24.758	ng		99
23) trans-1,2-Dichloroethene	7.66	61	587533	29.326	ng		97
24) 1,1-Dichloroethane	7.88	63	743040	25.664	ng		100
25) Methyl tert-Butyl Ether	7.94	73	1270173	26.874	ng		100
26) Vinyl Acetate	8.06	86	483625	141.719	ng	#	87
27) 2-Butanone (MEK)	8.29	72	295148	27.923	ng		94
28) cis-1,2-Dichloroethene	8.75	61	577340	28.040	ng		97
29) Diisopropyl Ether	8.99	87	355915	25.756	ng	#	92
30) Ethyl Acetate	8.99	61	319963	55.739	ng		98
31) n-Hexane	8.99	57	693342	26.101	ng		100
32) Chloroform	9.06	83	734787	26.714	ng		100
34) Tetrahydrofuran (THF)	9.44	72	288569	27.303	ng		96
35) Ethyl tert-Butyl Ether	9.53	87	508934	27.187	ng		98
36) 1,2-Dichloroethane	9.80	62	503379	26.024	ng		100
38) 1,1,1-Trichloroethane	10.06	97	630329	25.396	ng		99
39) Isopropyl Acetate	10.44	61	549137	60.705	ng	#	91
40) 1-Butanol	10.46	56	876258	60.797	ng		98
41) Benzene	10.52	78	1724105	26.691	ng		100
42) Carbon Tetrachloride	10.67	117	547065	27.441	ng		99
43) Cyclohexane	10.80	84	1309322	54.274	ng		98
44) tert-Amyl Methyl Ether	11.13	73	1215415	27.089	ng		99
45) 1,2-Dichloropropane	11.34	63	437552	27.209	ng		100
46) Bromodichloromethane	11.52	83	589672	27.407	ng		99
47) Trichloroethene	11.58	130	476264	25.417	ng		99
48) 1,4-Dioxane	11.55	88	373862	29.392	ng		97
49) 2,2,4-Trimethylpentane...	11.64	57	1790366	25.744	ng		99

Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2016_06\14\06141631.D
Acq On : 15 Jun 2016 5:12 Operator: SC
Sample : 25ng TO-15 ICV STD
Misc : S29-06141607/S29-05251604 (6/23)
ALS Vial : 3 Sample Multiplier: 1

Quant Time: Jun 15 10:24:30 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M

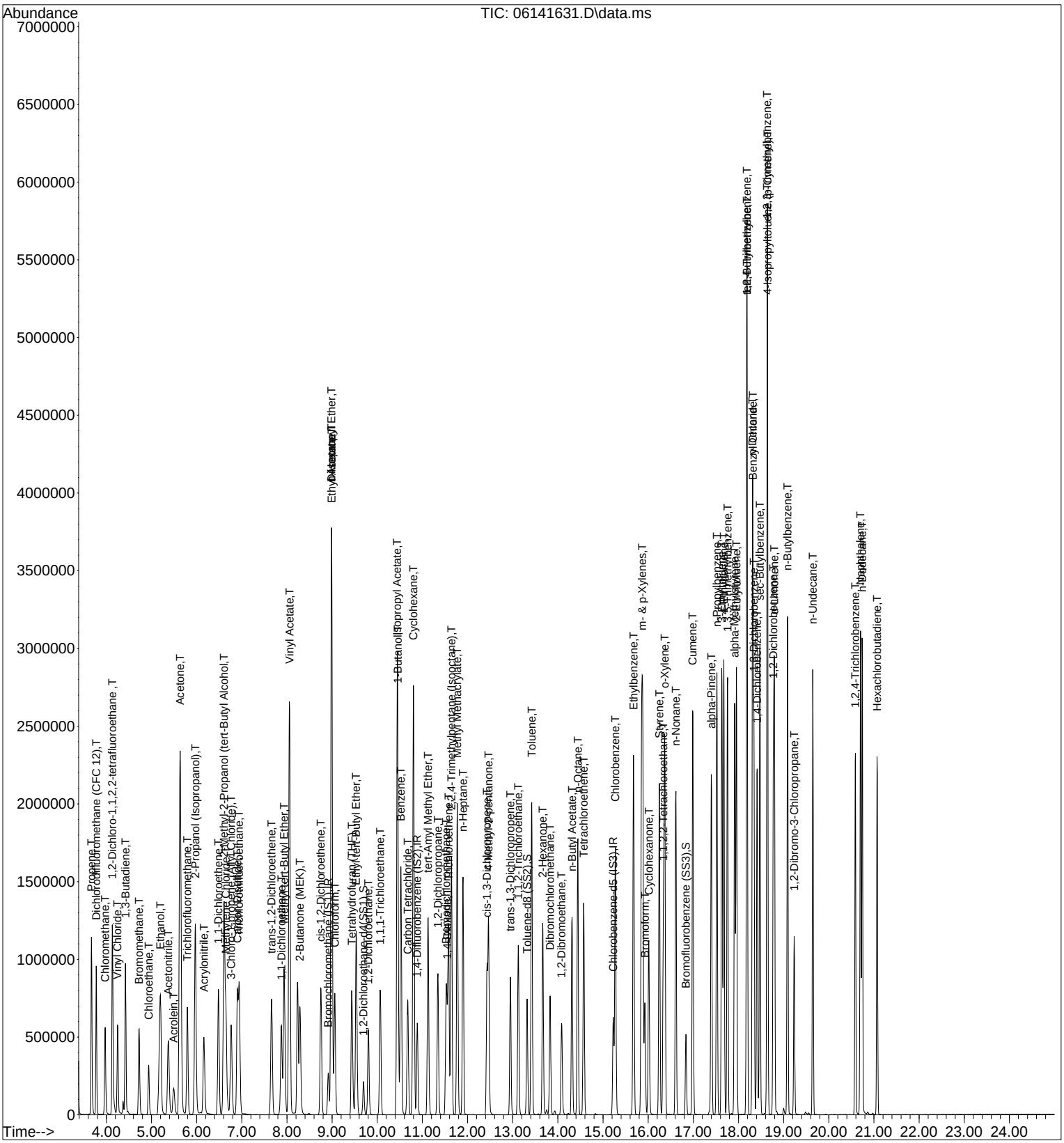
Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
50) Methyl Methacrylate	11.77	100	359840	56.200	ng	97
51) n-Heptane	11.90	71	433991	27.898	ng	99
52) cis-1,3-Dichloropropene	12.43	75	670022	26.630	ng	100
53) 4-Methyl-2-pentanone	12.46	58	411104	27.847	ng	97
54) trans-1,3-Dichloropropene	12.95	75	606193	28.123	ng	100
55) 1,1,2-Trichloroethane	13.12	97	438875	28.627	ng	100
58) Toluene	13.42	91	1827737	26.802	ng	100
59) 2-Hexanone	13.66	43	933445	29.371	ng	97
60) Dibromochloromethane	13.83	129	516278	30.089	ng	99
61) 1,2-Dibromoethane	14.08	107	505848	29.455	ng	99
62) n-Butyl Acetate	14.31	43	1055423	30.279	ng	98
63) n-Octane	14.44	57	369177	27.270	ng	97
64) Tetrachloroethene	14.57	166	510581	25.929	ng	100
65) Chlorobenzene	15.27	112	1204107	27.835	ng	99
66) Ethylbenzene	15.68	91	2064254	28.849	ng	100
67) m- & p-Xylenes	15.87	91	3258616	56.280	ng	100
68) Bromoform	15.93	173	449729	28.541	ng	100
69) Styrene	16.25	104	1298341	30.475	ng	99
70) o-Xylene	16.37	91	1639979	27.337	ng	100
71) n-Nonane	16.61	43	832999	26.646	ng	99
72) 1,1,2,2-Tetrachloroethane	16.34	83	801453	30.375	ng	100
74) Cumene	16.98	105	2057953	26.889	ng	100
75) alpha-Pinene	17.40	93	1019239	27.532	ng	99
76) n-Propylbenzene	17.52	91	2499609	27.353	ng	99
77) 3-Ethyltoluene	17.63	105	2117749	29.940	ng	100
78) 4-Ethyltoluene	17.68	105	1989913	28.949	ng	100
79) 1,3,5-Trimethylbenzene	17.76	105	1719445	27.623	ng	99
80) alpha-Methylstyrene	17.91	118	925063	27.935	ng	100
81) 2-Ethyltoluene	17.95	105	2010124	27.739	ng	100
82) 1,2,4-Trimethylbenzene	18.19	105	1786275	29.234	ng	100
83) n-Decane	18.31	57	935172	28.136	ng	100
84) Benzyl Chloride	18.32	91	1521276	31.429	ng	100
85) 1,3-Dichlorobenzene	18.34	146	1065180	32.217	ng	100
86) 1,4-Dichlorobenzene	18.41	146	1048798	30.675	ng	100
87) sec-Butylbenzene	18.48	105	2337433	28.743	ng	100
88) 4-Isopropyltoluene (p-...	18.64	119	2162345	28.100	ng	100
89) 1,2,3-Trimethylbenzene	18.64	105	1850410	28.872	ng	100
90) 1,2-Dichlorobenzene	18.77	146	1015636	30.846	ng	99
91) d-Limonene	18.79	68	674284	28.818	ng	100
92) 1,2-Dibromo-3-Chloropr...	19.23	157	374799	29.957	ng	97
93) n-Undecane	19.65	57	972527	28.058	ng	100
94) 1,2,4-Trichlorobenzene	20.59	180	788411	29.567	ng	100
95) Naphthalene	20.70	128	2513054	28.461	ng	100
96) n-Dodecane	20.74	57	998127	29.813	ng	100
97) Hexachlorobutadiene	21.07	225	457744	29.241	ng	100
98) Cyclohexanone	16.02	55	586726	28.097	ng	98
99) tert-Butylbenzene	18.19	119	1705951	28.272	ng	100
100) n-Butylbenzene	19.09	91	1917355	31.276	ng	99

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2016_06\14\06141631.D
Acq On : 15 Jun 2016 5:12 Operator: SC
Sample : 25ng TO-15 ICV STD
Misc : S29-06141607/S29-05251604 (6/23)
ALS Vial : 3 Sample Multiplier: 1

Quant Time: Jun 15 10:24:30 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M



INITIAL CALIBRATION VERIFICATION CHECK SHEET

6/15/16

Data File Name: **06141631.D** Acq. Method File: **TO15.M**

Data File Path: **I:\MS09\Data\2016_06\14** Sample Name: **25ng TO-15 ICV STD**

Operator: **SC** Misc Info: **S29-06141607/S29-05251604 (**

Date Acquired: **6/15/16** **5:12** Instrument Name: **MS09**

#	Compound Name	Ret. Time	Amt. (ng)	Spike Amt.(ng)	% Rec.	Lower Limit	Upper Limit	* OR Fail
2)	**Propene**	**3.67**	**23.5**	**24.50**	96	**70**	**130**	*
3)	**Dichlorodifluoromethane (CFC 12**	**3.78**	**21.2**	**23.50**	90	**70**	**130**	*
4)	**Chloromethane**	**3.97**	**23.9**	**25.00**	96	**70**	**130**	*
5)	**1,2-Dichloro-1,1,2,2-tetrafluoroetl**	**4.13**	**24.8**	**25.50**	97	**70**	**130**	*
6)	**Vinyl Chloride**	**4.25**	**25.4**	**25.00**	102	**70**	**130**	*
7)	**1,3-Butadiene**	**4.42**	**27.9**	**25.75**	108	**70**	**130**	*
8)	**Bromomethane**	**4.72**	**27.6**	**25.25**	109	**70**	**130**	*
9)	**Chloroethane**	**4.94**	**26.1**	**25.00**	104	**70**	**130**	*
10)	**Ethanol**	**5.20**	**130**	**124.75**	104	**70**	**130**	*
11)	**Acetonitrile**	**5.37**	**24.6**	**26.50**	93	**70**	**130**	*
12)	**Acrolein**	**5.49**	**25.7**	**26.75**	96	**70**	**130**	*
13)	**Acetone**	**5.64**	**134**	**134.75**	99	**70**	**130**	*
14)	**Trichlorofluoromethane**	**5.80**	**22.6**	**27.00**	84	**70**	**130**	*
15)	**2-Propanol (Isopropanol)**	**5.97**	**52.9**	**52.25**	101	**70**	**130**	*
16)	**Acrylonitrile**	**6.16**	**26.4**	**26.50**	100	**70**	**130**	*
17)	**1,1-Dichloroethene**	**6.48**	**28.2**	**27.00**	104	**70**	**130**	*
18)	2-Methyl-2-Propanol (tert-Butyl Alc	6.60	53.8	50.00	108	**70**	**130**	*
19)	**Methylene Chloride**	**6.65**	**29.5**	**27.75**	106	**70**	**130**	*
20)	**3-Chloro-1-propene (Allyl Chlorid**	**6.76**	**28.3**	**27.25**	104	**70**	**130**	*
21)	**Trichlorotrifluoroethane**	**6.94**	**27.1**	**27.50**	99	**70**	**130**	*
22)	**Carbon Disulfide**	**6.90**	**24.8**	**26.25**	94	**70**	**130**	*
23)	**trans-1,2-Dichloroethene**	**7.66**	**29.3**	**26.25**	112	**70**	**130**	*
24)	**1,1-Dichloroethane**	**7.88**	**25.7**	**26.50**	97	**70**	**130**	*
25)	**Methyl tert-Butyl Ether**	**7.94**	**26.9**	**27.00**	100	**70**	**130**	*
26)	**Vinyl Acetate**	**8.06**	**142**	**129.75**	109	**70**	**130**	*
27)	**2-Butanone (MEK)**	**8.29**	**27.9**	**27.50**	101	**70**	**130**	*
28)	**cis-1,2-Dichloroethene**	**8.75**	**28.0**	**27.25**	103	**70**	**130**	*
29)	Diisopropyl Ether	8.99	25.8	27.00	96	**70**	**130**	*
30)	**Ethyl Acetate**	**8.99**	**55.7**	**53.50**	104	**70**	**130**	*
31)	**n-Hexane**	**8.99**	**26.1**	**26.50**	98	**70**	**130**	*
32)	**Chloroform**	**9.06**	**26.7**	**28.00**	95	**70**	**130**	*
34)	**Tetrahydrofuran (THF)**	**9.44**	**27.3**	**27.50**	99	**70**	**130**	*
35)	Ethyl tert-Butyl Ether	9.53	27.2	26.75	102	**70**	**130**	*
36)	**1,2-Dichloroethane**	**9.80**	**26.0**	**26.75**	97	**70**	**130**	*
38)	**1,1,1-Trichloroethane**	**10.06**	**25.4**	**26.25**	97	**70**	**130**	*
39)	Isopropyl Acetate	10.44	60.7	57.25	106	**70**	**130**	*
40)	1-Butanol	10.46	60.8	51.25	119	**70**	**130**	*
41)	**Benzene**	**10.52**	**26.7**	**28.25**	95	**70**	**130**	*
42)	**Carbon Tetrachloride**	**10.67**	**27.4**	**28.75**	95	**70**	**130**	*
43)	**Cyclohexane**	**10.80**	**54.3**	**53.00**	102	**70**	**130**	*
44)	tert-Amyl Methyl Ether	11.13	27.1	26.75	101	**70**	**130**	*
45)	**1,2-Dichloropropane**	**11.34**	**27.2**	**27.00**	101	**70**	**130**	*
46)	**Bromodichloromethane**	**11.52**	**27.4**	**27.25**	101	**70**	**130**	*
47)	**Trichloroethene**	**11.58**	**25.4**	**27.00**	94	**70**	**130**	*
48)	**1,4-Dioxane**	**11.55**	**29.4**	**26.25**	112	**70**	**130**	*
49)	2,2,4-Trimethylpentane (Isooctane)	11.64	25.7	26.75	96	**70**	**130**	*

INITIAL CALIBRATION VERIFICATION CHECK SHEET

Data File Name: **06141631.D** Acq. Method File: **TO15.M**
Data File Path: **I:\MS09\Data\2016_06\14** Sample Name: **25ng TO-15 ICV STD**
Operator: **SC** Misc Info: **S29-06141607/S29-05251604 (**
Date Acquired: **6/15/16** **5:12** Instrument Name: **MS09**

#	Compound Name	Ret. Time	Amt. (ng)	Spike Amt.(ng)	% Rec.	Lower Limit	Upper Limit	* OR Fail
50)	**Methyl Methacrylate**	**11.77**	**56.2**	**52.75**	107	**70**	**130**	*
51)	**n-Heptane**	**11.90**	**27.9**	**27.00**	103	**70**	**130**	*
52)	**cis-1,3-Dichloropropene**	**12.43**	**26.6**	**26.00**	102	**70**	**130**	*
53)	**4-Methyl-2-pentanone**	**12.46**	**27.8**	**27.50**	101	**70**	**130**	*
54)	**trans-1,3-Dichloropropene**	**12.95**	**28.1**	**26.25**	107	**70**	**130**	*
55)	**1,1,2-Trichloroethane**	**13.12**	**28.6**	**27.00**	106	**70**	**130**	*
58)	**Toluene**	**13.42**	**26.8**	**27.25**	98	**70**	**130**	*
59)	**2-Hexanone**	**13.66**	**29.4**	**27.50**	107	**70**	**130**	*
60)	**Dibromochloromethane**	**13.83**	**30.1**	**27.50**	109	**70**	**130**	*
61)	**1,2-Dibromoethane**	**14.08**	**29.5**	**27.25**	108	**70**	**130**	*
62)	**n-Butyl Acetate**	**14.31**	**30.3**	**28.25**	107	**70**	**130**	*
63)	**n-Octane**	**14.44**	**27.3**	**26.25**	104	**70**	**130**	*
64)	**Tetrachloroethene**	**14.57**	**25.9**	**25.25**	103	**70**	**130**	*
65)	**Chlorobenzene**	**15.27**	**27.8**	**27.50**	101	**70**	**130**	*
66)	**Ethylbenzene**	**15.68**	**28.8**	**27.25**	106	**70**	**130**	*
67)	**m- & p-Xylenes**	**15.87**	**56.3**	**53.50**	105	**70**	**130**	*
68)	**Bromoform**	**15.93**	**28.5**	**28.50**	100	**70**	**130**	*
69)	**Styrene**	**16.25**	**30.5**	**27.75**	110	**70**	**130**	*
70)	**o-Xylene**	**16.37**	**27.3**	**26.25**	104	**70**	**130**	*
71)	**n-Nonane**	**16.61**	**26.6**	**25.50**	104	**70**	**130**	*
72)	**1,1,2,2-Tetrachloroethane**	**16.34**	**30.4**	**26.25**	116	**70**	**130**	*
74)	**Cumene**	**16.98**	**26.9**	**26.00**	103	**70**	**130**	*
75)	**alpha-Pinene**	**17.40**	**27.5**	**26.50**	104	**70**	**130**	*
76)	**n-Propylbenzene**	**17.52**	**27.4**	**25.50**	107	**70**	**130**	*
77)	3-Ethyltoluene	17.63	29.9	26.75	112	**70**	**130**	*
78)	**4-Ethyltoluene**	**17.68**	**28.9**	**26.75**	**108**	**70**	**130**	*
79)	**1,3,5-Trimethylbenzene**	**17.76**	**27.6**	**26.75**	**103**	**70**	**130**	*
80)	alpha-Methylstyrene	17.91	27.9	26.25	**106**	**70**	**130**	*
81)	2-Ethyltoluene	17.95	27.7	26.75	**104**	**70**	**130**	*
82)	**1,2,4-Trimethylbenzene**	**18.19**	**29.2**	**27.25**	**107**	**70**	**130**	*
83)	n-Decane	18.31	28.1	26.25	**107**	**70**	**130**	*
84)	**Benzyl Chloride**	**18.32**	**31.4**	**27.50**	**114**	**70**	**130**	*
85)	**1,3-Dichlorobenzene**	**18.34**	**32.2**	**28.50**	**113**	**70**	**130**	*
86)	**1,4-Dichlorobenzene**	**18.41**	**30.7**	**26.00**	**118**	**70**	**130**	*
87)	sec-Butylbenzene	18.48	28.7	27.25	**105**	**70**	**130**	*
88)	4-Isopropyltoluene (p-Cymene)	18.64	28.1	26.00	**108**	**70**	**130**	*
89)	1,2,3-Trimethylbenzene	18.64	28.9	26.50	**109**	**70**	**130**	*
90)	**1,2-Dichlorobenzene**	**18.77**	**30.8**	**27.50**	**112**	**70**	**130**	*
91)	**d-Limonene**	**18.79**	**28.8**	**26.25**	**110**	**70**	**130**	*
92)	**1,2-Dibromo-3-Chloropropane**	**19.23**	**30.0**	**27.25**	**110**	**70**	**130**	*
93)	n-Undecane	19.65	28.1	25.25	**111**	**70**	**130**	*
94)	**1,2,4-Trichlorobenzene**	**20.59**	**29.6**	**28.75**	**103**	**70**	**130**	*
95)	**Naphthalene**	**20.70**	**28.5**	**27.25**	**105**	**70**	**130**	*
96)	n-Dodecane	20.74	29.8	27.25	**109**	**70**	**130**	*
97)	**Hexachlorobutadiene**	**21.07**	**29.2**	**28.75**	**102**	**70**	**130**	*
98)	Cyclohexanone	16.02	28.1	27.50	102	**70**	**130**	*
99)	tert-Butylbenzene	18.19	28.3	26.75	106	**70**	**130**	*
100)	n-Butylbenzene	19.09	31.3	28.00	112	**70**	**130**	*

Bold = 75 Compound List
*** = Pass**

Evaluate Continuing Calibration Report

Data File: I:\MS09\Data\2016_09\13\09131602.D
Acq On : 13 Sep 2016 9:46 Operator: SC
Sample : CCV R9091316_25ng
Misc : S29-07211602/S29-08191601 (9/17)
ALS Vial : 3 Sample Multiplier: 1

9/13/16

Quant Time: Sep 13 11:05:20 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
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	179	-0.02
2	T	Propene	1.593	1.510	5.2	152	0.00
3	T	Dichlorodifluoromethane (CF	3.473	3.230	7.0	150	0.00
4	T	Chloromethane	2.510	2.525	-0.6	154	-0.01
5	T	1,2-Dichloro-1,1,2,2-tetraf	1.770	1.754	0.9	155	-0.01
6	T	Vinyl Chloride	2.345	2.419	-3.2	158	-0.02
7	T	1,3-Butadiene	1.591	1.806	-13.5	159	-0.01
8	T	Bromomethane	1.460	1.551	-6.2	161	-0.01
9	T	Chloroethane	1.129	1.190	-5.4	161	-0.01
10	T	Ethanol	1.141	1.114	2.4	150	-0.05
11	T	Acetonitrile	2.919	2.724	6.7	152	-0.03
12	T	Acrolein	0.910	0.952	-4.6	153	-0.01
13	T	Acetone	1.129	1.088	3.6	153	-0.03
14	T	Trichlorofluoromethane	2.838	2.637	7.1	152	-0.01
15	T	2-Propanol (Isopropanol)	3.839	3.772	1.7	150	-0.04
16	T	Acrylonitrile	2.041	2.010	1.5	153	-0.03
17	T	1,1-Dichloroethene	1.442	1.499	-4.0	159	-0.01
18	T	2-Methyl-2-Propanol (tert-B	3.756	3.787	-0.8	148	-0.04
19	T	Methylene Chloride	1.434	1.527	-6.5	158	-0.02
20	T	3-Chloro-1-propene (Allyl C	1.999	2.065	-3.3	150	-0.02
21	T	Trichlorotrifluoroethane	1.307	1.290	1.3	158	-0.01
22	T	Carbon Disulfide	5.615	5.964	-6.2	155	-0.01
23	T	trans-1,2-Dichloroethene	1.928	2.142	-11.1	153	-0.01
24	T	1,1-Dichloroethane	2.786	2.687	3.6	153	-0.02
25	T	Methyl tert-Butyl Ether	4.548	4.461	1.9	153	-0.02
26	T	Vinyl Acetate	0.328	0.356	-8.5	159	-0.03
27	T	2-Butanone (MEK)	1.017	1.005	1.2	151	-0.02
28	T	cis-1,2-Dichloroethene	1.981	2.002	-1.1	151	-0.02
29	T	Diisopropyl Ether	1.330	1.225	7.9	154	-0.01
30	T	Ethyl Acetate	0.552	0.552	0.0	151	-0.02
31	T	n-Hexane	2.556	2.445	4.3	151	-0.01
32	T	Chloroform	2.647	2.535	4.2	151	-0.03
33	S	1,2-Dichloroethane-d4(SS1)	1.420	1.333	6.1	166	-0.02
34	T	Tetrahydrofuran (THF)	1.017	0.984	3.2	153	-0.01
35	T	Ethyl tert-Butyl Ether	1.801	1.778	1.3	151	-0.02
36	T	1,2-Dichloroethane	1.861	1.776	4.6	146	-0.02
37	IR	1,4-Difluorobenzene (IS2)	1.000	1.000	0.0	182	-0.02
38	T	1,1,1-Trichloroethane	0.519	0.486	6.4	150	-0.02
39	T	Isopropyl Acetate	0.189	0.191	-1.1	151	-0.02
40	T	1-Butanol	0.302	0.305	-1.0	144	-0.03
41	T	Benzene	1.352	1.206	10.8	155	-0.01
42	T	Carbon Tetrachloride	0.417	0.409	1.9	149	-0.01
43	T	Cyclohexane	0.505	0.496	1.8	155	-0.02
44	T	tert-Amyl Methyl Ether	0.939	0.899	4.3	148	-0.02
45	T	1,2-Dichloropropane	0.337	0.321	4.7	152	-0.02
46	T	Bromodichloromethane	0.450	0.437	2.9	150	-0.01
47	T	Trichloroethene	0.392	0.363	7.4	153	-0.02
48	T	1,4-Dioxane	0.266	0.264	0.8	154	-0.02
49	T	2,2,4-Trimethylpentane (Iso	1.455	1.353	7.0	150	-0.02
50	T	Methyl Methacrylate	0.134	0.135	-0.7	154	-0.02
51	T	n-Heptane	0.326	0.321	1.5	152	-0.01
52	T	cis-1,3-Dichloropropene	0.527	0.520	1.3	151	-0.01
53	T	4-Methyl-2-pentanone	0.309	0.297	3.9	148	-0.01
54	T	trans-1,3-Dichloropropene	0.451	0.461	-2.2	148	-0.01

Evaluate Continuing Calibration Report

Data File: I:\MS09\Data\2016_09\13\09131602.D
Acq On : 13 Sep 2016 9:46 Operator: SC
Sample : CCV R9091316_25ng
Misc : S29-07211602/S29-08191601 (9/17)
ALS Vial : 3 Sample Multiplier: 1

Quant Time: Sep 13 11:05:20 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
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)
55	T	1,1,2-Trichloroethane	0.321	0.323	-0.6	151	-0.02
56	IR	Chlorobenzene-d5 (IS3)	1.000	1.000	0.0	176	0.00
57	S	Toluene-d8 (SS2)	2.604	2.682	-3.0	182	-0.01
58	T	Toluene	3.645	3.456	5.2	152	-0.01
59	T	2-Hexanone	1.698	1.686	0.7	142	-0.01
60	T	Dibromochloromethane	0.917	0.976	-6.4	150	0.00
61	T	1,2-Dibromoethane	0.918	0.951	-3.6	150	-0.01
62	T	n-Butyl Acetate	1.863	1.891	-1.5	142	-0.01
63	T	n-Octane	0.724	0.719	0.7	146	-0.01
64	T	Tetrachloroethene	1.052	1.041	1.0	152	-0.01
65	T	Chlorobenzene	2.312	2.244	2.9	150	-0.01
66	T	Ethylbenzene	3.824	3.880	-1.5	149	-0.01
67	T	m- & p-Xylenes	3.094	3.099	-0.2	147	-0.02
68	T	Bromoform	0.842	0.897	-6.5	151	-0.01
69	T	Styrene	2.277	2.362	-3.7	145	-0.01
70	T	o-Xylene	3.206	3.159	1.5	145	-0.02
71	T	n-Nonane	1.671	1.618	3.2	139	-0.01
72	T	1,1,2,2-Tetrachloroethane	1.410	1.579	-12.0	145	-0.01
73	S	Bromofluorobenzene (SS3)	0.792	0.814	-2.8	175	0.00
74	T	Cumene	4.090	4.068	0.5	145	-0.01
75	T	alpha-Pinene	1.979	1.915	3.2	138	-0.01
76	T	n-Propylbenzene	4.884	4.985	-2.1	143	-0.01
77	T	3-Ethyltoluene	3.780	4.020	-6.3	143	-0.02
78	T	4-Ethyltoluene	3.674	3.739	-1.8	144	-0.01
79	T	1,3,5-Trimethylbenzene	3.327	3.242	2.6	144	-0.01
80	T	alpha-Methylstyrene	1.770	1.729	2.3	137	-0.01
81	T	2-Ethyltoluene	3.873	3.821	1.3	143	-0.01
82	T	1,2,4-Trimethylbenzene	3.266	3.280	-0.4	138	-0.02
83	T	n-Decane	1.776	1.771	0.3	136	-0.01
84	T	Benzyl Chloride	2.587	2.764	-6.8	136	-0.02
85	T	1,3-Dichlorobenzene	1.767	1.895	-7.2	141	-0.02
86	T	1,4-Dichlorobenzene	1.827	1.945	-6.5	141	-0.01
87	T	sec-Butylbenzene	4.346	4.349	-0.1	141	-0.01
88	T	4-Isopropyltoluene (p-Cymen	4.113	4.168	-1.3	139	-0.02
89	T	1,2,3-Trimethylbenzene	3.425	3.403	0.6	138	-0.02
90	T	1,2-Dichlorobenzene	1.760	1.826	-3.8	140	-0.01
91	T	d-Limonene	1.250	1.223	2.2	132	-0.01
92	T	1,2-Dibromo-3-Chloropropane	0.669	0.693	-3.6	139	-0.01
93	T	n-Undecane	1.852	1.796	3.0	132	-0.01
94	T	1,2,4-Trichlorobenzene	1.425	1.269	10.9	125	0.00
95	T	Naphthalene	4.719	4.150	12.1	120	-0.01
96	T	n-Dodecane	1.789	1.622	9.3	121	-0.01
97	T	Hexachlorobutadiene	0.837	0.783	6.5	132	0.00
98	T	Cyclohexanone	1.116	1.068	4.3	140	-0.02
99	T	tert-Butylbenzene	3.225	3.188	1.1	140	-0.01
100	T	n-Butylbenzene	3.276	3.422	-4.5	138	-0.01

(#) = Out of Range SPCC's out = 0 CCC's out = 0

Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2016_09\13\09131602.D
Acq On : 13 Sep 2016 9:46 Operator: SC
Sample : CCV R9091316_25ng
Misc : S29-07211602/S29-08191601 (9/17)
ALS Vial : 3 Sample Multiplier: 1

9/13/16

Quant Time: Sep 13 11:05:20 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M

Internal Standards	R.T.	QIon	Response	Conc	Units		Dev(Min)
1) Bromochloromethane (IS1)	8.91	130	185896	12.500	ng		-0.02
37) 1,4-Difluorobenzene (IS2)	10.88	114	874653	12.500	ng		-0.02
56) Chlorobenzene-d5 (IS3)	15.22	82	338325	12.500	ng		0.00
System Monitoring Compounds							
33) 1,2-Dichloroethane-d4(...	9.69	65	247745	11.728	ng		-0.02
Spiked Amount 12.500	Range 70 - 130		Recovery = 93.84%				
57) Toluene-d8 (SS2)	13.31	98	907221	12.874	ng		-0.01
Spiked Amount 12.500	Range 70 - 130		Recovery = 102.96%				
73) Bromofluorobenzene (SS3)	16.84	174	275548	12.860	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 102.88%				
Target Compounds							Qvalue
2) Propene	3.67	42	578308	24.413	ng		99
3) Dichlorodifluoromethan...	3.78	85	1200846	23.253	ng		100
4) Chloromethane	3.97	50	920129	24.653	ng		100
5) 1,2-Dichloro-1,1,2,2-t...	4.13	135	671657	25.512	ng		100
6) Vinyl Chloride	4.25	62	899405	25.794	ng		99
7) 1,3-Butadiene	4.42	54	711829	30.087	ng		99
8) Bromomethane	4.73	94	576468	26.556	ng		100
9) Chloroethane	4.94	64	446969	26.612	ng		100
10) Ethanol	5.21	45	2095886	123.476	ng		100
11) Acetonitrile	5.38	41	1033082	23.796	ng		99
12) Acrolein	5.50	56	378543	27.968	ng		99
13) Acetone	5.64	58	2171640	129.327	ng		95
14) Trichlorofluoromethane	5.80	101	970573	22.997	ng		100
15) 2-Propanol (Isopropanol)	5.98	45	2931171	51.346	ng		99
16) Acrylonitrile	6.17	53	769656	25.362	ng		100
17) 1,1-Dichloroethene	6.49	96	596412	27.806	ng		95
18) 2-Methyl-2-Propanol (t...	6.61	59	2942999	52.687	ng		99
19) Methylene Chloride	6.65	84	613237	28.762	ng		96
20) 3-Chloro-1-propene (Al...	6.76	41	829116	27.886	ng		97
21) Trichlorotrifluoroethane	6.95	151	518089	26.644	ng		98
22) Carbon Disulfide	6.90	76	2173079	26.023	ng		100
23) trans-1,2-Dichloroethene	7.66	61	844085	29.443	ng		98
24) 1,1-Dichloroethane	7.88	63	1038788	25.073	ng		100
25) Methyl tert-Butyl Ether	7.94	73	1741624	25.752	ng		100
26) Vinyl Acetate	8.06	86	670734	137.356	ng	#	91
27) 2-Butanone (MEK)	8.29	72	399937	26.442	ng		96
28) cis-1,2-Dichloroethene	8.75	61	796376	27.030	ng		98
29) Diisopropyl Ether	8.99	87	491838	24.874	ng	#	91
30) Ethyl Acetate	8.99	61	435372	53.002	ng		96
31) n-Hexane	8.99	57	945547	24.875	ng		100
32) Chloroform	9.06	83	1008546	25.624	ng		100
34) Tetrahydrofuran (THF)	9.44	72	373139	24.672	ng		96
35) Ethyl tert-Butyl Ether	9.53	87	694179	25.915	ng		97
36) 1,2-Dichloroethane	9.80	62	693430	25.053	ng		100
38) 1,1,1-Trichloroethane	10.06	97	875845	24.096	ng		100
39) Isopropyl Acetate	10.44	61	739374	55.813	ng		94
40) 1-Butanol	10.46	56	1207505	57.209	ng		99
41) Benzene	10.52	78	2341406	24.751	ng		99
42) Carbon Tetrachloride	10.67	117	772245	26.451	ng		99
43) Cyclohexane	10.80	84	1811791	51.283	ng		98
44) tert-Amyl Methyl Ether	11.12	73	1636033	24.899	ng		99
45) 1,2-Dichloropropane	11.34	63	589217	25.020	ng		99
46) Bromodichloromethane	11.52	83	818041	25.963	ng		100
47) Trichloroethene	11.58	130	654513	23.852	ng		100
48) 1,4-Dioxane	11.54	88	498857	26.780	ng		97
49) 2,2,4-Trimethylpentane...	11.64	57	2437663	23.935	ng		99

Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2016_09\13\09131602.D
Acq On : 13 Sep 2016 9:46 Operator: SC
Sample : CCV R9091316_25ng
Misc : S29-07211602/S29-08191601 (9/17)
ALS Vial : 3 Sample Multiplier: 1

Quant Time: Sep 13 11:05:20 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M

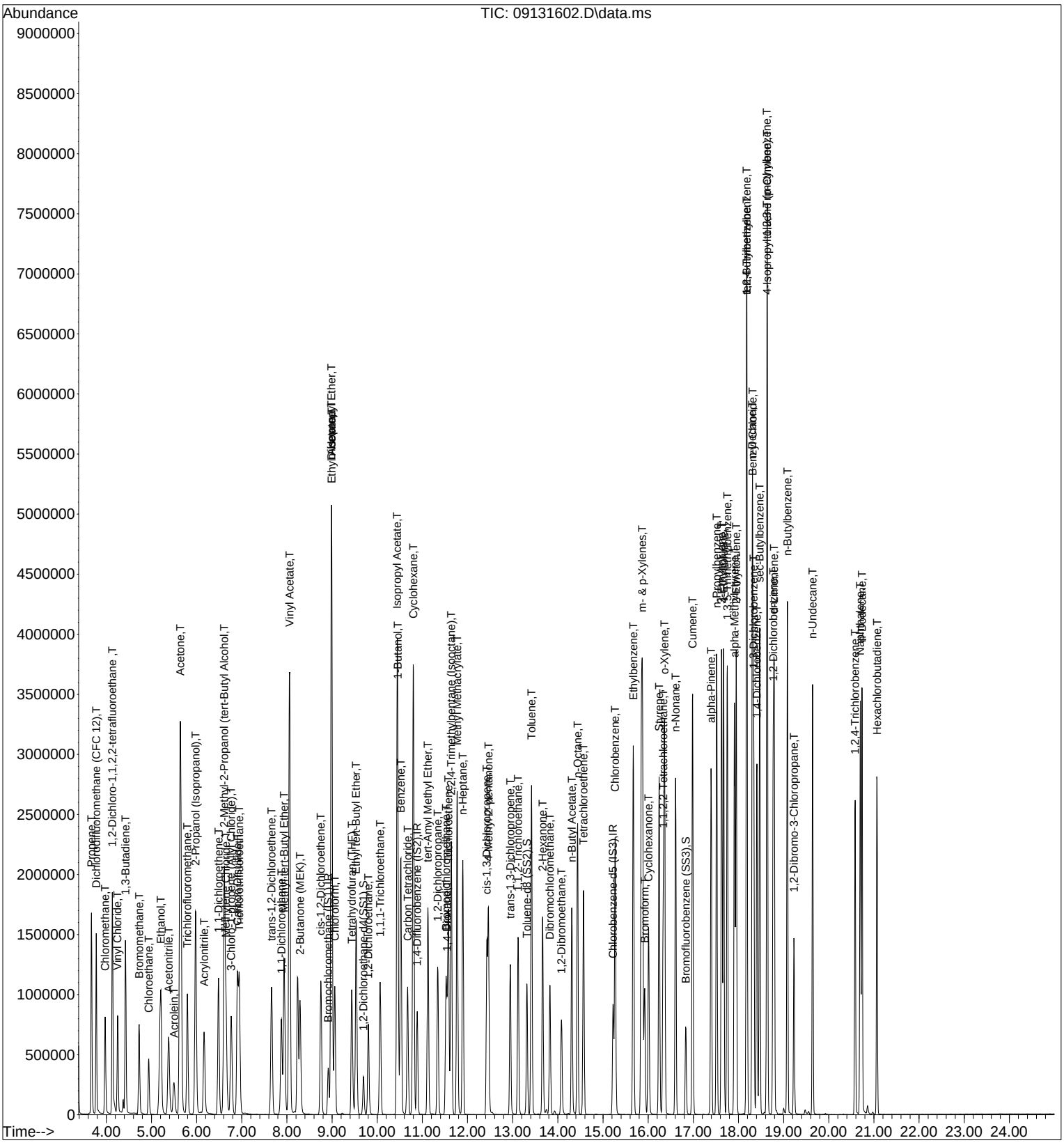
Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
50) Methyl Methacrylate	11.77	100	491896	52.460	ng	96
51) n-Heptane	11.90	71	600342	26.352	ng	99
52) cis-1,3-Dichloropropene	12.43	75	1019763	27.676	ng	100
53) 4-Methyl-2-pentanone	12.46	58	560597	25.930	ng	97
54) trans-1,3-Dichloropropene	12.95	75	863700	27.362	ng	100
55) 1,1,2-Trichloroethane	13.12	97	593985	26.457	ng	100
58) Toluene	13.42	91	2455646	24.894	ng	100
59) 2-Hexanone	13.66	43	1266584	27.552	ng	98
60) Dibromochloromethane	13.82	129	726451	29.269	ng	99
61) 1,2-Dibromoethane	14.08	107	688884	27.730	ng	99
62) n-Butyl Acetate	14.31	43	1420041	28.163	ng	99
63) n-Octane	14.44	57	500826	25.575	ng	97
64) Tetrachloroethene	14.57	166	697020	24.471	ng	100
65) Chlorobenzene	15.27	112	1624525	25.961	ng	99
66) Ethylbenzene	15.67	91	2756598	26.633	ng	100
67) m- & p-Xylenes	15.87	91	4361022	52.069	ng	100
68) Bromoform	15.92	173	649421	28.492	ng	100
69) Styrene	16.24	104	1726208	28.011	ng	99
70) o-Xylene	16.36	91	2180332	25.125	ng	100
71) n-Nonane	16.61	43	1105739	24.452	ng	98
72) 1,1,2,2-Tetrachloroethane	16.34	83	1068523	27.996	ng	100
74) Cumene	16.99	105	2780199	25.113	ng	99
75) alpha-Pinene	17.39	93	1334804	24.926	ng	99
76) n-Propylbenzene	17.52	91	3372831	25.515	ng	100
77) 3-Ethyltoluene	17.62	105	2829145	27.651	ng	100
78) 4-Ethyltoluene	17.67	105	2656444	26.716	ng	100
79) 1,3,5-Trimethylbenzene	17.75	105	2281636	25.340	ng	100
80) alpha-Methylstyrene	17.91	118	1205043	25.157	ng	99
81) 2-Ethyltoluene	17.95	105	2689244	25.655	ng	100
82) 1,2,4-Trimethylbenzene	18.18	105	2307861	26.111	ng	100
83) n-Decane	18.31	57	1210405	25.175	ng	99
84) Benzyl Chloride	18.32	91	2019616	28.845	ng	100
85) 1,3-Dichlorobenzene	18.34	146	1385073	28.961	ng	100
86) 1,4-Dichlorobenzene	18.41	146	1382107	27.945	ng	100
87) sec-Butylbenzene	18.47	105	3119175	26.516	ng	100
88) 4-Isopropyltoluene (p-...	18.64	119	2820142	25.335	ng	99
89) 1,2,3-Trimethylbenzene	18.63	105	2394564	25.829	ng	100
90) 1,2-Dichlorobenzene	18.77	146	1322362	27.765	ng	99
91) d-Limonene	18.79	68	860299	25.418	ng	98
92) 1,2-Dibromo-3-Chloropr...	19.23	157	487521	26.938	ng	98
93) n-Undecane	19.64	57	1227697	24.486	ng	99
94) 1,2,4-Trichlorobenzene	20.58	180	893345	23.161	ng	100
95) Naphthalene	20.70	128	2808243	21.987	ng	100
96) n-Dodecane	20.73	57	1141438	23.569	ng	98
97) Hexachlorobutadiene	21.07	225	566974	25.039	ng	99
98) Cyclohexanone	16.01	55	809425	26.797	ng	98
99) tert-Butylbenzene	18.18	119	2264968	25.949	ng	100
100) n-Butylbenzene	19.08	91	2500745	28.200	ng	99

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2016_09\13\09131602.D
Acq On : 13 Sep 2016 9:46 Operator: SC
Sample : CCV R9091316_25ng
Misc : S29-07211602/S29-08191601 (9/17)
ALS Vial : 3 Sample Multiplier: 1

Quant Time: Sep 13 11:05:20 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M



Evaluate Continuing Calibration Report

Data File: I:\MS09\Data\2016_09\14\09141601.D
Acq On : 14 Sep 2016 5:40 Operator: SC
Sample : CCV R9091416_25ng
Misc : S29-07211602/S29-08191601 (9/17)
ALS Vial : 3 Sample Multiplier: 1

Quant Time: Sep 14 09:03:47 2016 9/14/16
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
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	181	-0.02
2	T	Propene	1.593	1.496	6.1	152	-0.02
3	T	Dichlorodifluoromethane (CF	3.473	3.164	8.9	148	-0.01
4	T	Chloromethane	2.510	2.489	0.8	153	-0.02
5	T	1,2-Dichloro-1,1,2,2-tetraf	1.770	1.758	0.7	157	-0.02
6	T	Vinyl Chloride	2.345	2.477	-5.6	164	-0.02
7	T	1,3-Butadiene	1.591	1.885	-18.5	168	-0.02
8	T	Bromomethane	1.460	1.603	-9.8	168	-0.02
9	T	Chloroethane	1.129	1.200	-6.3	164	-0.02
10	T	Ethanol	1.141	1.118	2.0	152	-0.06
11	T	Acetonitrile	2.919	2.721	6.8	153	-0.04
12	T	Acrolein	0.910	0.954	-4.8	155	-0.03
13	T	Acetone	1.129	1.092	3.3	155	-0.04
14	T	Trichlorofluoromethane	2.838	2.603	8.3	152	-0.02
15	T	2-Propanol (Isopropanol)	3.839	3.758	2.1	151	-0.05
16	T	Acrylonitrile	2.041	2.016	1.2	155	-0.03
17	T	1,1-Dichloroethene	1.442	1.476	-2.4	158	-0.02
18	T	2-Methyl-2-Propanol (tert-B	3.756	3.775	-0.5	150	-0.04
19	T	Methylene Chloride	1.434	1.523	-6.2	159	-0.03
20	T	3-Chloro-1-propene (Allyl C	1.999	2.058	-3.0	151	-0.02
21	T	Trichlorotrifluoroethane	1.307	1.283	1.8	159	-0.02
22	T	Carbon Disulfide	5.615	5.958	-6.1	156	-0.02
23	T	trans-1,2-Dichloroethene	1.928	2.141	-11.0	155	-0.02
24	T	1,1-Dichloroethane	2.786	2.656	4.7	153	-0.02
25	T	Methyl tert-Butyl Ether	4.548	4.451	2.1	154	-0.02
26	T	Vinyl Acetate	0.328	0.354	-7.9	160	-0.03
27	T	2-Butanone (MEK)	1.017	1.022	-0.5	155	-0.03
28	T	cis-1,2-Dichloroethene	1.981	1.983	-0.1	151	-0.02
29	T	Diisopropyl Ether	1.330	1.221	8.2	155	-0.02
30	T	Ethyl Acetate	0.552	0.558	-1.1	154	-0.03
31	T	n-Hexane	2.556	2.455	4.0	153	-0.02
32	T	Chloroform	2.647	2.519	4.8	151	-0.03
33	S	1,2-Dichloroethane-d4(SS1)	1.420	1.336	5.9	168	-0.02
34	T	Tetrahydrofuran (THF)	1.017	1.003	1.4	158	-0.02
35	T	Ethyl tert-Butyl Ether	1.801	1.777	1.3	153	-0.02
36	T	1,2-Dichloroethane	1.861	1.761	5.4	146	-0.03
37	IR	1,4-Difluorobenzene (IS2)	1.000	1.000	0.0	184	-0.02
38	T	1,1,1-Trichloroethane	0.519	0.481	7.3	150	-0.02
39	T	Isopropyl Acetate	0.189	0.192	-1.6	153	-0.02
40	T	1-Butanol	0.302	0.307	-1.7	147	-0.04
41	T	Benzene	1.352	1.213	10.3	157	-0.02
42	T	Carbon Tetrachloride	0.417	0.402	3.6	148	-0.02
43	T	Cyclohexane	0.505	0.496	1.8	157	-0.02
44	T	tert-Amyl Methyl Ether	0.939	0.901	4.0	150	-0.02
45	T	1,2-Dichloropropane	0.337	0.325	3.6	156	-0.02
46	T	Bromodichloromethane	0.450	0.435	3.3	150	-0.02
47	T	Trichloroethene	0.392	0.360	8.2	153	-0.02
48	T	1,4-Dioxane	0.266	0.262	1.5	155	-0.02
49	T	2,2,4-Trimethylpentane (Iso	1.455	1.364	6.3	153	-0.02
50	T	Methyl Methacrylate	0.134	0.136	-1.5	156	-0.02
51	T	n-Heptane	0.326	0.321	1.5	154	-0.02
52	T	cis-1,3-Dichloropropene	0.527	0.521	1.1	153	-0.01
53	T	4-Methyl-2-pentanone	0.309	0.297	3.9	150	-0.02
54	T	trans-1,3-Dichloropropene	0.451	0.462	-2.4	150	-0.02

Evaluate Continuing Calibration Report

Data File: I:\MS09\Data\2016_09\14\09141601.D
Acq On : 14 Sep 2016 5:40 Operator: SC
Sample : CCV R9091416_25ng
Misc : S29-07211602/S29-08191601 (9/17)
ALS Vial : 3 Sample Multiplier: 1

Quant Time: Sep 14 09:03:47 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
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)
55	T	1,1,2-Trichloroethane	0.321	0.325	-1.2	154	-0.02
56	IR	Chlorobenzene-d5 (IS3)	1.000	1.000	0.0	178	0.00
57	S	Toluene-d8 (SS2)	2.604	2.686	-3.1	185	-0.01
58	T	Toluene	3.645	3.472	4.7	155	-0.01
59	T	2-Hexanone	1.698	1.689	0.5	144	-0.02
60	T	Dibromochloromethane	0.917	0.959	-4.6	149	0.00
61	T	1,2-Dibromoethane	0.918	0.950	-3.5	151	-0.02
62	T	n-Butyl Acetate	1.863	1.910	-2.5	145	-0.01
63	T	n-Octane	0.724	0.725	-0.1	149	-0.02
64	T	Tetrachloroethene	1.052	1.030	2.1	153	-0.01
65	T	Chlorobenzene	2.312	2.229	3.6	151	-0.01
66	T	Ethylbenzene	3.824	3.891	-1.8	151	-0.01
67	T	m- & p-Xylenes	3.094	3.109	-0.5	150	-0.02
68	T	Bromoform	0.842	0.886	-5.2	151	-0.01
69	T	Styrene	2.277	2.374	-4.3	148	-0.01
70	T	o-Xylene	3.206	3.165	1.3	147	-0.02
71	T	n-Nonane	1.671	1.629	2.5	142	-0.01
72	T	1,1,2,2-Tetrachloroethane	1.410	1.583	-12.3	147	-0.01
73	S	Bromofluorobenzene (SS3)	0.792	0.790	0.3	172	0.00
74	T	Cumene	4.090	4.075	0.4	148	-0.02
75	T	alpha-Pinene	1.979	1.922	2.9	140	-0.01
76	T	n-Propylbenzene	4.884	4.986	-2.1	145	-0.01
77	T	3-Ethyltoluene	3.780	4.069	-7.6	147	-0.02
78	T	4-Ethyltoluene	3.674	3.722	-1.3	145	-0.01
79	T	1,3,5-Trimethylbenzene	3.327	3.248	2.4	146	-0.02
80	T	alpha-Methylstyrene	1.770	1.724	2.6	139	-0.02
81	T	2-Ethyltoluene	3.873	3.818	1.4	145	-0.01
82	T	1,2,4-Trimethylbenzene	3.266	3.279	-0.4	140	-0.02
83	T	n-Decane	1.776	1.788	-0.7	139	-0.01
84	T	Benzyl Chloride	2.587	2.762	-6.8	138	-0.02
85	T	1,3-Dichlorobenzene	1.767	1.881	-6.5	142	-0.02
86	T	1,4-Dichlorobenzene	1.827	1.935	-5.9	142	-0.01
87	T	sec-Butylbenzene	4.346	4.363	-0.4	144	-0.01
88	T	4-Isopropyltoluene (p-Cymen	4.113	4.156	-1.0	141	-0.02
89	T	1,2,3-Trimethylbenzene	3.425	3.399	0.8	140	-0.02
90	T	1,2-Dichlorobenzene	1.760	1.830	-4.0	142	-0.01
91	T	d-Limonene	1.250	1.243	0.6	136	-0.01
92	T	1,2-Dibromo-3-Chloropropane	0.669	0.683	-2.1	138	-0.01
93	T	n-Undecane	1.852	1.816	1.9	136	-0.01
94	T	1,2,4-Trichlorobenzene	1.425	1.253	12.1	126	0.00
95	T	Naphthalene	4.719	4.119	12.7	120	-0.01
96	T	n-Dodecane	1.789	1.637	8.5	124	-0.01
97	T	Hexachlorobutadiene	0.837	0.779	6.9	134	-0.01
98	T	Cyclohexanone	1.116	1.076	3.6	143	-0.02
99	T	tert-Butylbenzene	3.225	3.167	1.8	141	-0.01
100	T	n-Butylbenzene	3.276	3.425	-4.5	140	-0.02

(#) = Out of Range SPCC's out = 0 CCC's out = 0

Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2016_09\14\09141601.D
Acq On : 14 Sep 2016 5:40 Operator: SC
Sample : CCV R9091416_25ng
Misc : S29-07211602/S29-08191601 (9/17)
ALS Vial : 3 Sample Multiplier: 1

9/14/16

Quant Time: Sep 14 09:03:47 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M

Internal Standards	R.T.	QIon	Response	Conc	Units		Dev(Min)
1) Bromochloromethane (IS1)	8.91	130	187795	12.500	ng		-0.02
37) 1,4-Difluorobenzene (IS2)	10.88	114	884069	12.500	ng		-0.02
56) Chlorobenzene-d5 (IS3)	15.22	82	342921	12.500	ng		0.00
System Monitoring Compounds							
33) 1,2-Dichloroethane-d4(...	9.69	65	250915	11.758	ng		-0.02
Spiked Amount 12.500	Range 70 - 130		Recovery = 94.08%				
57) Toluene-d8 (SS2)	13.31	98	921032	12.895	ng		-0.01
Spiked Amount 12.500	Range 70 - 130		Recovery = 103.20%				
73) Bromofluorobenzene (SS3)	16.84	174	270881	12.472	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 99.76%				
Target Compounds							Qvalue
2) Propene	3.66	42	578756	24.185	ng		99
3) Dichlorodifluoromethan...	3.77	85	1188493	22.781	ng		100
4) Chloromethane	3.97	50	916288	24.302	ng		100
5) 1,2-Dichloro-1,1,2,2-t...	4.13	135	680081	25.571	ng		100
6) Vinyl Chloride	4.24	62	930227	26.408	ng		99
7) 1,3-Butadiene	4.42	54	750661	31.407	ng		99
8) Bromomethane	4.72	94	602140	27.458	ng		100
9) Chloroethane	4.93	64	455321	26.835	ng		100
10) Ethanol	5.20	45	2123817	123.856	ng		100
11) Acetonitrile	5.37	41	1042404	23.768	ng		99
12) Acrolein	5.49	56	383559	28.052	ng		90
13) Acetone	5.63	58	2201497	129.780	ng		93
14) Trichlorofluoromethane	5.79	101	967860	22.701	ng		100
15) 2-Propanol (Isopropanol)	5.97	45	2949887	51.151	ng		99
16) Acrylonitrile	6.16	53	780020	25.444	ng		100
17) 1,1-Dichloroethene	6.48	96	593032	27.369	ng		95
18) 2-Methyl-2-Propanol (t...	6.60	59	2963533	52.518	ng		99
19) Methylene Chloride	6.64	84	617798	28.683	ng		95
20) 3-Chloro-1-propene (Al...	6.76	41	834795	27.793	ng		97
21) Trichlorotrifluoroethane	6.93	151	520584	26.502	ng		100
22) Carbon Disulfide	6.90	76	2193023	25.996	ng		100
23) trans-1,2-Dichloroethene	7.66	61	852505	29.436	ng		98
24) 1,1-Dichloroethane	7.87	63	1037437	24.788	ng		99
25) Methyl tert-Butyl Ether	7.94	73	1755381	25.693	ng		100
26) Vinyl Acetate	8.05	86	673751	136.579	ng	#	90
27) 2-Butanone (MEK)	8.29	72	410890	26.891	ng		94
28) cis-1,2-Dichloroethene	8.75	61	797054	26.780	ng		97
29) Diisopropyl Ether	8.98	87	495105	24.786	ng	#	91
30) Ethyl Acetate	8.99	61	444365	53.550	ng		96
31) n-Hexane	8.98	57	958928	24.972	ng		99
32) Chloroform	9.05	83	1012463	25.464	ng		100
34) Tetrahydrofuran (THF)	9.43	72	384301	25.153	ng		95
35) Ethyl tert-Butyl Ether	9.53	87	700927	25.902	ng		98
36) 1,2-Dichloroethane	9.80	62	694297	24.830	ng		100
38) 1,1,1-Trichloroethane	10.06	97	875319	23.825	ng		99
39) Isopropyl Acetate	10.44	61	752181	56.175	ng		94
40) 1-Butanol	10.45	56	1225361	57.437	ng		98
41) Benzene	10.52	78	2381005	24.902	ng		100
42) Carbon Tetrachloride	10.67	117	768361	26.037	ng		100
43) Cyclohexane	10.80	84	1834361	51.369	ng		98
44) tert-Amyl Methyl Ether	11.12	73	1656660	24.944	ng		99
45) 1,2-Dichloropropane	11.34	63	604042	25.376	ng		100
46) Bromodichloromethane	11.52	83	823242	25.850	ng		100
47) Trichloroethene	11.58	130	656417	23.667	ng		100
48) 1,4-Dioxane	11.54	88	500320	26.573	ng		98
49) 2,2,4-Trimethylpentane...	11.64	57	2484690	24.137	ng		98

Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2016_09\14\09141601.D
Acq On : 14 Sep 2016 5:40 Operator: SC
Sample : CCV R9091416_25ng
Misc : S29-07211602/S29-08191601 (9/17)
ALS Vial : 3 Sample Multiplier: 1

Quant Time: Sep 14 09:03:47 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M

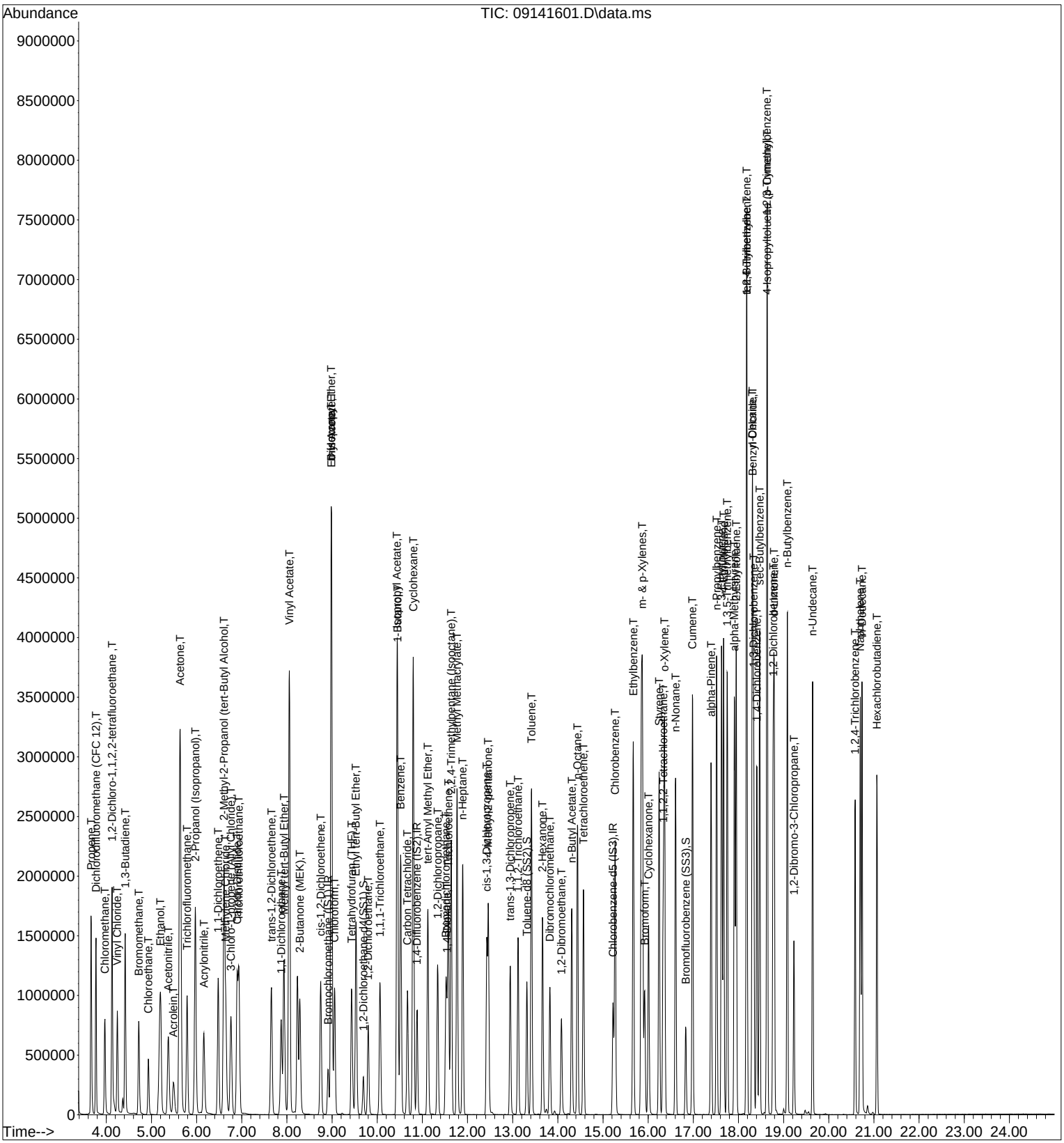
Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
50) Methyl Methacrylate	11.77	100	500275	52.785	ng	97
51) n-Heptane	11.89	71	606966	26.359	ng	99
52) cis-1,3-Dichloropropene	12.43	75	1031828	27.705	ng	99
53) 4-Methyl-2-pentanone	12.46	58	567538	25.971	ng	97
54) trans-1,3-Dichloropropene	12.94	75	873609	27.381	ng	100
55) 1,1,2-Trichloroethane	13.12	97	603799	26.608	ng	99
58) Toluene	13.42	91	2500574	25.010	ng	100
59) 2-Hexanone	13.66	43	1285618	27.591	ng	98
60) Dibromochloromethane	13.82	129	723281	28.751	ng	99
61) 1,2-Dibromoethane	14.08	107	697052	27.683	ng	100
62) n-Butyl Acetate	14.31	43	1453760	28.446	ng	99
63) n-Octane	14.43	57	512098	25.800	ng	98
64) Tetrachloroethene	14.57	166	699260	24.220	ng	100
65) Chlorobenzene	15.27	112	1636092	25.796	ng	99
66) Ethylbenzene	15.67	91	2802359	26.712	ng	100
67) m- & p-Xylenes	15.87	91	4434678	52.239	ng	99
68) Bromoform	15.92	173	650236	28.145	ng	100
69) Styrene	16.24	104	1758356	28.150	ng	99
70) o-Xylene	16.36	91	2213940	25.170	ng	100
71) n-Nonane	16.61	43	1128332	24.618	ng	98
72) 1,1,2,2-Tetrachloroethane	16.34	83	1085815	28.068	ng	99
74) Cumene	16.98	105	2822498	25.153	ng	100
75) alpha-Pinene	17.39	93	1357734	25.014	ng	100
76) n-Propylbenzene	17.52	91	3419407	25.521	ng	100
77) 3-Ethyltoluene	17.62	105	2902385	27.986	ng	100
78) 4-Ethyltoluene	17.67	105	2680225	26.594	ng	100
79) 1,3,5-Trimethylbenzene	17.75	105	2317055	25.388	ng	100
80) alpha-Methylstyrene	17.91	118	1217534	25.077	ng	99
81) 2-Ethyltoluene	17.95	105	2723039	25.629	ng	100
82) 1,2,4-Trimethylbenzene	18.18	105	2338873	26.108	ng	100
83) n-Decane	18.31	57	1238313	25.410	ng	99
84) Benzyl Chloride	18.32	91	2046021	28.830	ng	100
85) 1,3-Dichlorobenzene	18.34	146	1393515	28.747	ng	100
86) 1,4-Dichlorobenzene	18.41	146	1393381	27.796	ng	100
87) sec-Butylbenzene	18.47	105	3171931	26.603	ng	100
88) 4-Isopropyltoluene (p-...	18.64	119	2850527	25.265	ng	99
89) 1,2,3-Trimethylbenzene	18.63	105	2424671	25.803	ng	100
90) 1,2-Dichlorobenzene	18.77	146	1342707	27.814	ng	100
91) d-Limonene	18.79	68	886904	25.853	ng	100
92) 1,2-Dibromo-3-Chloropr...	19.23	157	486834	26.540	ng	98
93) n-Undecane	19.64	57	1257801	24.751	ng	100
94) 1,2,4-Trichlorobenzene	20.58	180	893481	22.854	ng	100
95) Naphthalene	20.70	128	2825040	21.822	ng	100
96) n-Dodecane	20.73	57	1167761	23.790	ng	99
97) Hexachlorobutadiene	21.06	225	571747	24.911	ng	99
98) Cyclohexanone	16.01	55	826493	26.995	ng	98
99) tert-Butylbenzene	18.18	119	2280615	25.778	ng	99
100) n-Butylbenzene	19.08	91	2536835	28.223	ng	100

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2016_09\14\09141601.D
Acq On : 14 Sep 2016 5:40 Operator: SC
Sample : CCV R9091416_25ng
Misc : S29-07211602/S29-08191601 (9/17)
ALS Vial : 3 Sample Multiplier: 1

Quant Time: Sep 14 09:03:47 2016
Quant Method : I:\MS09\Methods\R9061416.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jun 15 09:50:01 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M

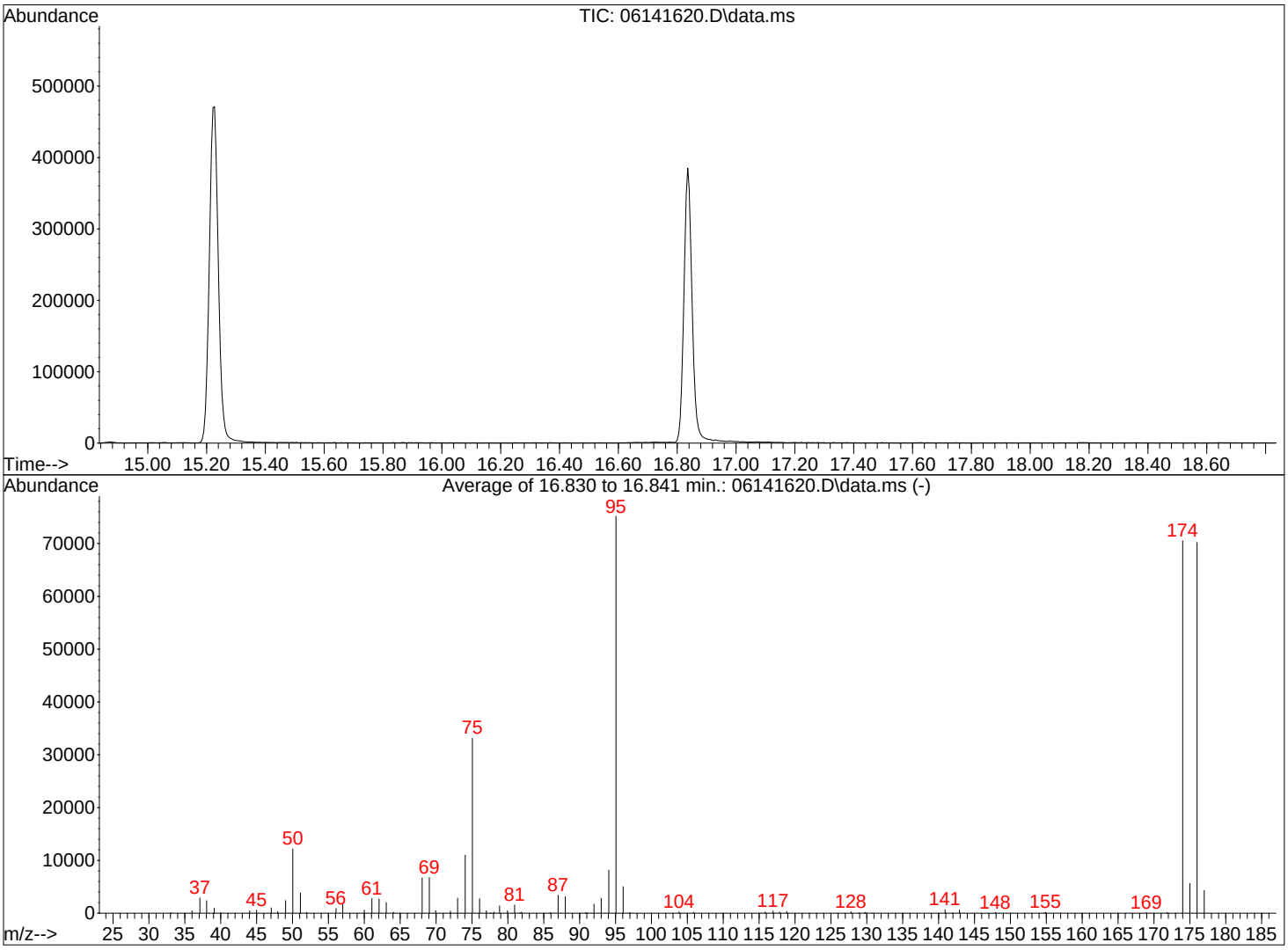


Data Path : I:\MS09\Data\2016_06\14\
Data File : 06141620.D
Acq On : 14 Jun 2016 22:59
Operator : SC
Sample : 12.5ng TO-15 BFB STD
Misc : S29-06141607(AC00463)
ALS Vial : 2 Sample Multiplier: 1

6/15/16

Integration File: LSCINT.P

Method : I:\MS09\Methods\R9061416.M
Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
Last Update : Wed Jun 15 09:31:43 2016



AutoFind: Scans 2593, 2594, 2595; Background Corrected with Scan 2585

Target Mass	Rel. to Mass	Lower Limit%	Upper Limit%	Rel. Abn%	Raw Abn	Result Pass/Fail
50	95	8	40	16.2	12167	PASS
75	95	30	66	44.1	33131	PASS
95	95	100	100	100.0	75179	PASS
96	95	5	9	6.7	5045	PASS
173	174	0.00	2	0.0	0	PASS
174	95	50	120	93.8	70528	PASS
175	174	4	9	8.0	5616	PASS
176	174	93	101	99.6	70227	PASS
177	176	5	9	6.1	4316	PASS

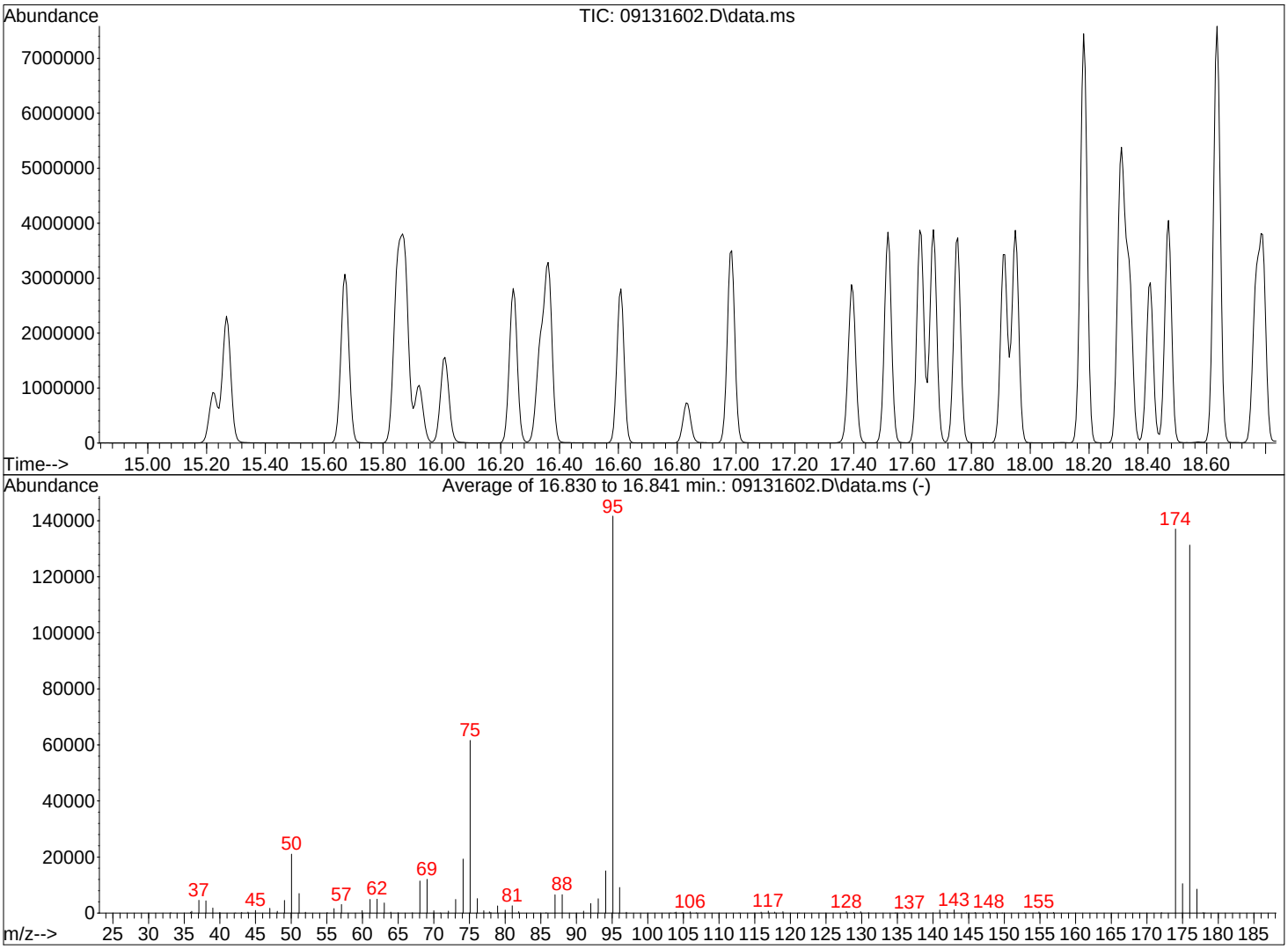
BFB

Data Path : I:\MS09\Data\2016_09\13\
Data File : 09131602.D
Acq On : 13 Sep 2016 9:46
Operator : SC
Sample : CCV R9091316_25ng
Misc : S29-07211602/S29-08191601 (9/17)
ALS Vial : 3 Sample Multiplier: 1

9/13/16

Integration File: LSCINT.P

Method : I:\MS09\Methods\R9061416.M
Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
Last Update : Wed Jun 15 09:50:01 2016



AutoFind: Scans 2593, 2594, 2595; Background Corrected with Scan 2584

Target Mass	Rel. to Mass	Lower Limit%	Upper Limit%	Rel. Abn%	Raw Abn	Result Pass/Fail
50	95	8	40	14.9	21043	PASS
75	95	30	66	43.5	61608	PASS
95	95	100	100	100.0	141635	PASS
96	95	5	9	6.5	9148	PASS
173	174	0.00	2	0.0	0	PASS
174	95	50	120	96.7	137019	PASS
175	174	4	9	7.7	10505	PASS
176	174	93	101	95.8	131275	PASS
177	176	5	9	6.5	8518	PASS

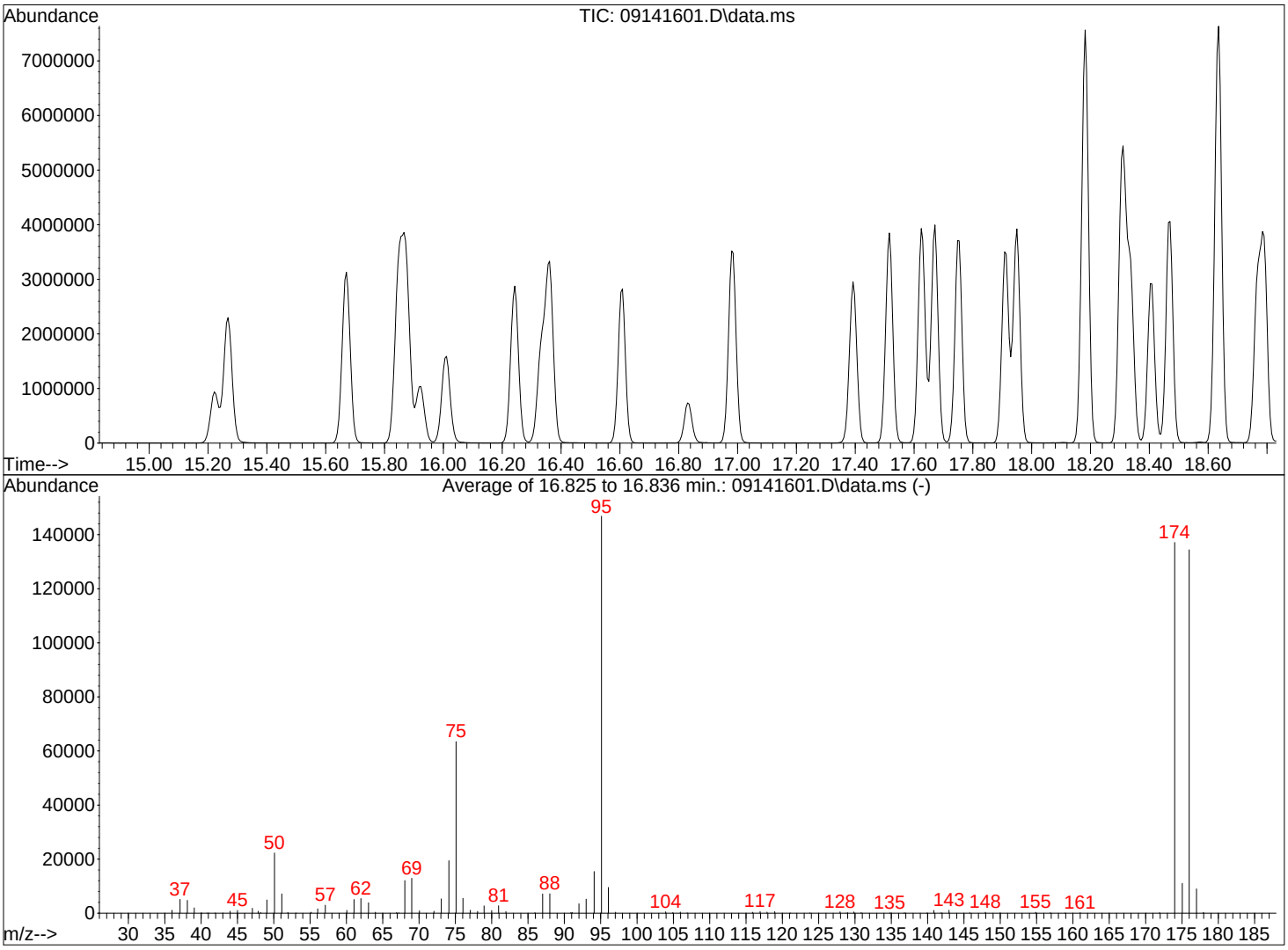
BFB

Data Path : I:\MS09\Data\2016_09\14\
Data File : 09141601.D
Acq On : 14 Sep 2016 5:40
Operator : SC
Sample : CCV R9091416_25ng
Misc : S29-07211602/S29-08191601 (9/17)
ALS Vial : 3 Sample Multiplier: 1

9/14/16

Integration File: LSCINT.P

Method : I:\MS09\Methods\R9061416.M
Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
Last Update : Wed Jun 15 09:50:01 2016



AutoFind: Scans 2592, 2593, 2594; Background Corrected with Scan 2584

Target Mass	Rel. to Mass	Lower Limit%	Upper Limit%	Rel. Abn%	Raw Abn	Result Pass/Fail
50	95	8	40	15.2	22299	PASS
75	95	30	66	43.2	63453	PASS
95	95	100	100	100.0	146837	PASS
96	95	5	9	6.5	9511	PASS
173	174	0.00	2	0.0	0	PASS
174	95	50	120	93.4	137083	PASS
175	174	4	9	8.0	11032	PASS
176	174	93	101	98.1	134424	PASS
177	176	5	9	6.7	9020	PASS

Injection Log

Directory: J:\MS09\Data\2016_06\14\

	Date/Time	File Name	Sample ID	Misc Info	Operator	Vial	Comment
1	6/14/16 10:19	06141601.D	System	S29-05061601/S29-06021602 (7/1)	SC	2	
2	6/14/16 10:53	06141602.D	CCV R9061416_5.0ng	S29-05061601/S29-06021604 (7/1)	SC	4	pass
3	6/14/16 11:27	06141603.D	Blank (100mL)	S29-05061601(AC00463)	SC	2	pass
4	6/14/16 12:01	06141604.D	MB R9061416_1000mL	S29-05061601(AC00463)	SC	2	pass
5	6/14/16 13:39	06141605.D	Blank (100mL)	S29-06141607(AC00075)	SC	2	pass
6	6/14/16 14:13	06141606.D	Blank (100mL)	S29-06141607(AC00463)	SC	2	pass
7	6/14/16 14:54	06141607.D	ALS QC CAN (1000mL)	AS00919	SC	8	pass
8	6/14/16 16:11	06141608.D	Blank (100mL)	S29-06141607(AC00463)	SC	2	
9	6/14/16 16:44	06141609.D	12.5ng TO-15 BFB STD	S29-06141607(AC00463)	SC	2	
10	6/14/16 17:19	06141610.D	0.4ng AC&F ICAL STD	S29-06141607/S29-06071604 (7/6)	SC	13	
11	6/14/16 17:53	06141611.D	1.0ng AC&F ICAL STD	S29-06141607/S29-06071604 (7/6)	SC	13	
12	6/14/16 18:27	06141612.D	2.5ng AC&F ICAL STD	S29-06141607/S29-06071604 (7/6)	SC	13	
13	6/14/16 19:01	06141613.D	5.0ng AC&F ICAL STD	S29-06141607/S29-06071604 (7/6)	SC	13	
14	6/14/16 19:35	06141614.D	25ng AC&F ICAL STD	S29-06141607/S29-06071602 (7/6)	SC	14	
15	6/14/16 20:09	06141615.D	50ng AC&F ICAL STD	S29-06141607/S29-06071602 (7/6)	SC	14	
16	6/14/16 20:43	06141616.D	100ng AC&F ICAL STD	S29-06141607/S29-06071602 (7/6)	SC	14	
17	6/14/16 21:17	06141617.D	Blank (100mL)	S29-06141607(AC00463)	SC	2	
18	6/14/16 21:51	06141618.D	25ng AC&F ICV STD	S29-06141607/S29-06071615 (7/6)	SC	15	
19	6/14/16 22:25	06141619.D	25ng AC&F ICV STD	S29-06141607/S29-06071615 (7/6)	SC	15	
20	6/14/16 22:59	06141620.D	12.5ng TO-15 BFB STD	S29-06141607(AC00463)	SC	2	
21	6/14/16 23:33	06141621.D	0.08ng TO-15 ICAL STD	S29-06141607/S29-06021605 (7/1)	SC	5	
22	6/15/16 0:07	06141622.D	0.10ng TO-15 ICAL STD	S29-06141607/S29-06021605 (7/1)	SC	5	
23	6/15/16 0:40	06141623.D	0.20ng TO-15 ICAL STD	S29-06141607/S29-06021605 (7/1)	SC	5	
24	6/15/16 1:14	06141624.D	0.40ng TO-15 ICAL STD	S29-06141607/S29-06021605 (7/1)	SC	5	
25	6/15/16 1:48	06141625.D	1.0ng TO-15 ICAL STD	S29-06141607/S29-06021603 (7/1)	SC	6	
26	6/15/16 2:22	06141626.D	5.0ng TO-15 ICAL STD	S29-06141607/S29-06021603 (7/1)	SC	6	
27	6/15/16 2:56	06141627.D	25ng TO-15 ICAL STD	S29-06141607/S29-06021601 (7/1)	SC	7	
28	6/15/16 3:30	06141628.D	50ng TO-15 ICAL STD	S29-06141607/S29-06021601 (7/1)	SC	7	
29	6/15/16 4:05	06141629.D	100ng TO-15 ICAL STD	S29-06141607/S29-06021601 (7/1)	SC	7	
30	6/15/16 4:38	06141630.D	Blank (100mL)	S29-06141607(AC00463)	SC	2	
31	6/15/16 5:12	06141631.D	25ng TO-15 ICV STD	S29-06141607/S29-05251604 (6/23)	SC	3	
32	6/15/16 5:46	06141632.D	25ng TO-15 ICV STD	S29-06141607/S29-06131604 (7/12)	SC	8	cf
33	6/15/16 6:20	06141633.D	Blank (100mL)	S29-06141607(AC00463)	SC	2	
34	6/15/16 6:54	06141634.D	12.5ng Methanol BFB STD	S29-06141607(AC00463)	SC	2	
35	6/15/16 7:27	06141635.D	10ng Methanol ICAL STD	S29-06141607/S29-05171603 (6/16)	SC	9	
36	6/15/16 8:01	06141636.D	25ng Methanol ICAL STD	S29-06141607/S29-05171603 (6/16)	SC	9	
37	6/15/16 8:34	06141637.D	50ng Methanol ICAL STD	S29-06141607/S29-05171603 (6/16)	SC	9	
38	6/15/16 9:08	06141638.D	100ng Methanol ICAL STD	S29-06141607/S29-05171603 (6/16)	SC	9	
39	6/15/16 9:42	06141639.D	250ng Methanol ICAL STD	S29-06141607/S29-05171604 (6/16)	SC	10	
40	6/15/16 10:15	06141640.D	500ng Methanol ICAL STD	S29-06141607/S29-05171604 (6/16)	SC	10	
41	6/15/16 10:49	06141641.D	1000ng Methanol ICAL STD	S29-06141607/S29-05171604 (6/16)	SC	10	
42	6/15/16 11:23	06141642.D	100ng Methanol ICV STD	S29-06141607/S29-05171605 (6/16)	SC	11	
43	6/15/16 11:57	06141643.D	100ng Methanol ICV STD	S29-06141607/S29-05171605 (6/16)	SC	11	cf
44							
45							6/16/16

46							
47							
48							
49							
50							
51							
52							
53							
54							
55							
56							
57							
58							
59							
60							
61							

Injection Log

Directory: I:\MS09\Data\2016_09\13\

	Date/Time	File Name	Sample ID	Misc Info	Operator	Vial	Comment
1	9/13/16 9:46	09131602.D	CCV R9091316_25ng	S29-07211602/S29-08191601 (9/17)	SC	3	pass
2	9/13/16 10:19	09131603.D	CCV C9091316_25ng	S29-07211602/S29-08291602 (9/27)	SC	2	pass
3	9/13/16 10:53	09131604.D	MB R9091316_1000mL	S29-07211602/AC00463	SC	2	pass
4	9/13/16 11:26	09131605.D	LCS R9091316_25ng	S29-07211602/S29-09061603 (10/5)	SC	4	pass
5	9/13/16 12:00	09131606.D	LCSD R9091316_25ng	S29-07211602/S29-09061603 (10/5)	SC	4	pass
6	9/13/16 12:34	09131607.D	Chamber QC_091316	S29-07211602 (AS00610)	SC	5	pass
7	9/13/16 13:07	09131608.D	P1604371-001 (100mL)	S29-07211602	SC	6	
8	9/13/16 13:41	09131609.D	P1604371-002 (100mL)	S29-07211602	SC	7	
9	9/13/16 14:15	09131610.D	P1604371-002dup (100mL)	S29-07211602	SC	7	pass
10	9/13/16 14:49	09131611.D	P1604343-001 (0.7mL)	S29-07211602	SC	1	
11	9/13/16 15:23	09131612.D	P1604331-001 (3.0mL)	S29-07211602	SC	1	
12	9/13/16 16:02	09131613.D	P1604302-001 (1.0mL)	S29-07211602	SC	1	
13	9/13/16 16:36	09131614.D	P1604331-001 (10mL)	S29-07211602	SC	1	
14	9/13/16 17:31	09131615.D	P1604302-001 (3.0mL)	S29-07211602	SC	1	
15	9/13/16 18:05	09131616.D	P1604352-001 (150mL)	S29-07211602	SC	5	
16	9/13/16 18:39	09131617.D	P1604352-002 (220mL)	S29-07211602	SC	6	
17	9/13/16 19:13	09131618.D	P1604352-003 (170mL)	S29-07211602	SC	7	
18	9/13/16 19:46	09131619.D	P1604352-004 (150mL)	S29-07211602	SC	8	
19	9/13/16 20:20	09131620.D	P1604352-005 (1000mL)	S29-07211602	SC	9	
20	9/13/16 20:54	09131621.D	P1604352-006 (25mL)	S29-07211602	SC	10	
21	9/13/16 21:28	09131622.D	P1604352-007 (25mL)	S29-07211602	SC	11	
22	9/13/16 22:02	09131623.D	P1604352-008 (25mL)	S29-07211602	SC	12	
23	9/13/16 22:36	09131624.D	P1604352-009 (270mL)	S29-07211602	SC	13	
24	9/13/16 23:10	09131625.D	P1604352-010 (15mL)	S29-07211602	SC	14	
25	9/13/16 23:44	09131626.D	P1604292-001 (15mL)	S29-07211602	SC	15	
							9/14/16

Injection Log

Directory: I:\MS09\Data\2016_09\14\

	Date/Time	File Name	Sample ID	Misc Info	Operator	Vial	Comment
1	9/14/16 5:40	09141601.D	CCV R9091416_25ng	S29-07211602/S29-08191601 (9/17)	SC	3	pass
2	9/14/16 6:13	09141602.D	CCV C9091416_25ng	S29-07211602/S29-08291602 (9/27)	SC	2	pass
3	9/14/16 6:47	09141603.D	MB R9091416_1000mL	S29-07211602/AC00463	SC	2	pass
4	9/14/16 7:20	09141604.D	LCS R9091416_25ng	S29-07211602/S29-09061603 (10/5)	SC	4	pass
5	9/14/16 7:54	09141605.D	LCSD R9091416_25ng	S29-07211602/S29-09061603 (10/5)	SC	4	pass
6	9/14/16 9:39	09141606.D	P1604292-001Dil (5.0mL)	S29-07211602	SC	1	
7	9/14/16 10:27	09141607.D	P1604345-001 (8.0mL)	S29-07211602	SC	1	
8	9/14/16 11:01	09141608.D	P1604345-002 (10mL)	S29-07211602	SC	1	
9	9/14/16 11:34	09141609.D	P1604345-002Dil (1.0mL)	S29-07211602	SC	1	
10	9/14/16 12:08	09141610.D	P1604392-001 (0.5mL)	S29-07211602	SC	1	
11	9/14/16 13:07	09141611.D	P1604392-002Dil (0.5mL)	S29-07211602	SC	1	
12	9/14/16 13:41	09141612.D	P1604392-001Dil (0.25mL)	S29-07211602	SC	1	
13	9/14/16 14:15	09141613.D	P1604392-002 (5.0mL)	S29-07211602	SC	1	
14	9/14/16 14:49	09141614.D	P1604352-001Dil (15mL)	S29-07211602	SC	5	
15	9/14/16 15:23	09141615.D	P1604352-009Dil (25mL)	S29-07211602	SC	13	
16	9/14/16 16:03	09141616.D	P1604352-001Dil (10mL)	S29-07211602	SC	1	
17	9/14/16 16:57	09141617.D	Blank (100mL)	S29-07211602	SC	2	
18	9/14/16 17:31	09141618.D	P1604378-001 (1000mL)	S29-07211602	SC	5	
19	9/14/16 18:07	09141619.D	P1604378-002 (1000mL)	S29-07211602	SC	6	
20	9/14/16 18:40	09141620.D	P1604378-003 (1000mL)	S29-07211602	SC	7	
21	9/14/16 19:14	09141621.D	P1604378-004 (1000mL)	S29-07211602	SC	8	
22	9/14/16 19:47	09141622.D	P1604378-005 (1000mL)	S29-07211602	SC	9	
23	9/14/16 20:21	09141623.D	P1604378-006 (1000mL)	S29-07211602	SC	10	
24	9/14/16 20:55	09141624.D	P1604378-007 (1000mL)	S29-07211602	SC	11	
25	9/14/16 21:30	09141625.D	P1604378-007dup (1000mL)	S29-07211602	SC	11	pass
							9/15/16

Quantitation Report (QT Reviewed)

Data Path : I:\MS21\DATA\2016 08\16\
Data File : 08161609.D
Acq On : 16 Aug 2016 1:59 pm
Operator : CL
Sample : 081616 SSC00283 (Sig #1); COND3 (Sig #2)
Misc : 72544 pass 0.1 plus tics (Sig #1); S29-07271601 (Sig #2)
ALS Vial : 5 Sample Multiplier: 1

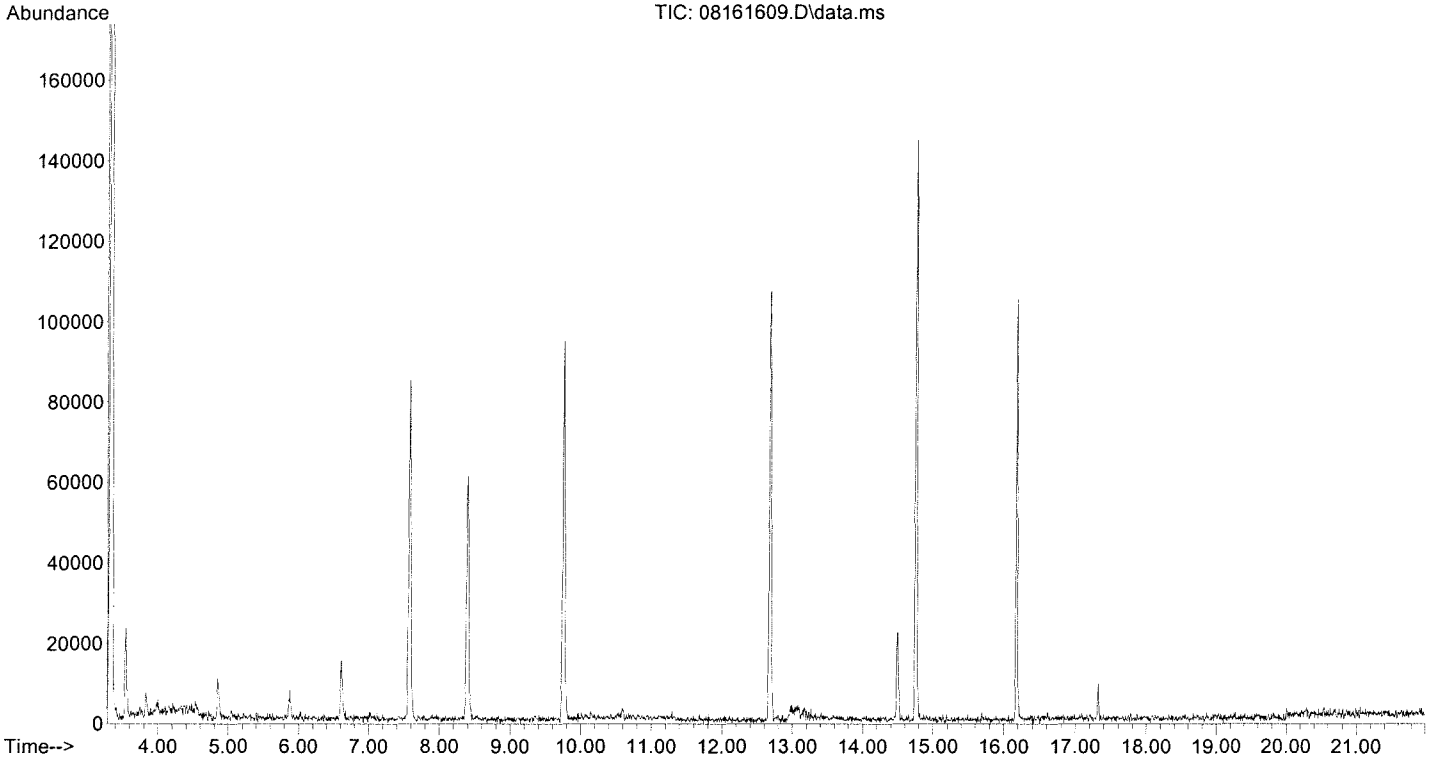
Quant Time: Aug 16 14:38:53 2016
Quant Method : I:\MS21\Methods\F21072716.M
Quant Title : EPA TO-15
QLast Update : Thu Jul 28 14:31:03 2016
Response via : Initial Calibration

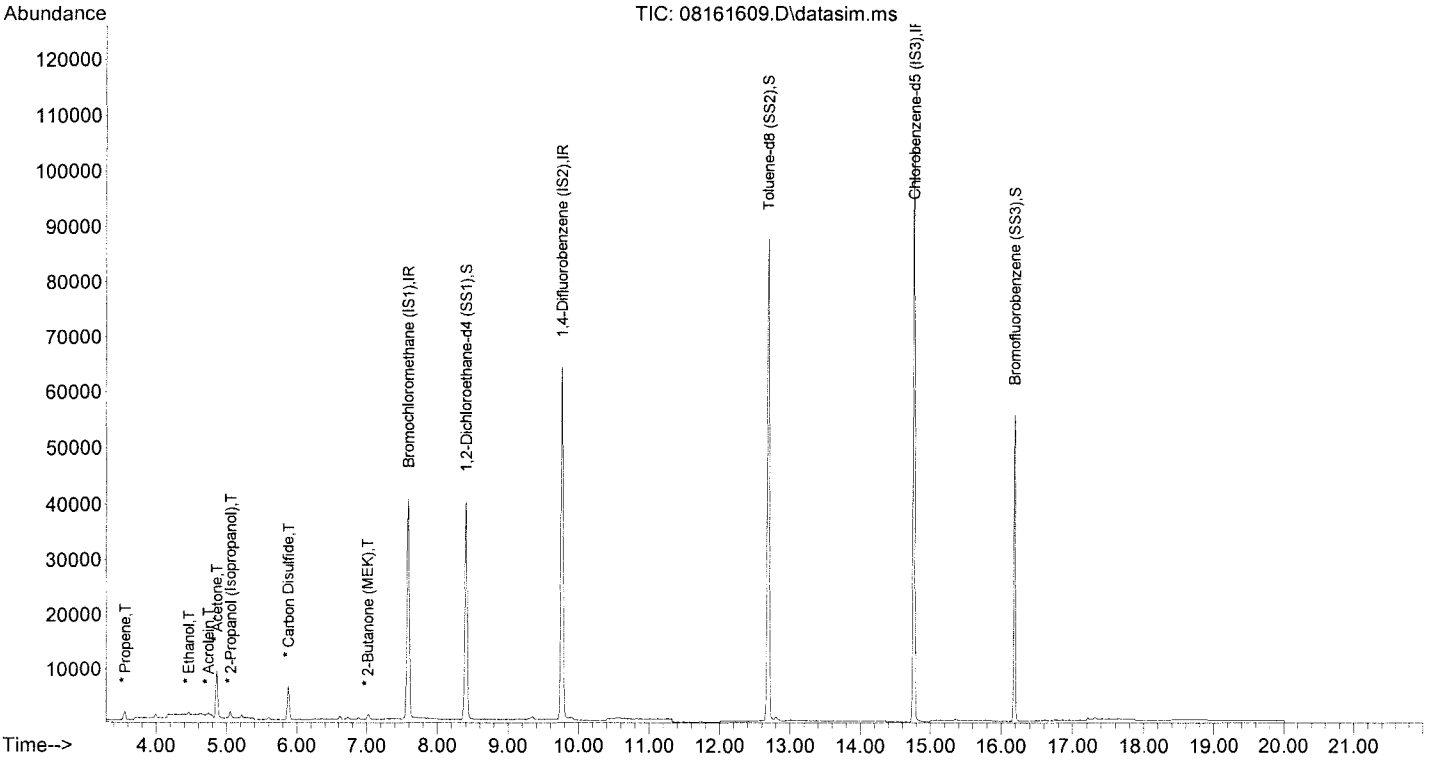
Internal Standards	R.T.	QIon	Response	Conc	Units		Dev(Min)
1) Bromochloromethane (IS1)	7.59	130	48796	1000.000	pg		0.01
37) 1,4-Difluorobenzene (IS2)	9.76	114	117063	1000.000	pg		0.00
56) Chlorobenzene-d5 (IS3)	14.76	117	109770	1000.000	pg		0.00
System Monitoring Compounds							
33) 1,2-Dichloroethane-d4 ...	8.40	65	56553	1006.887	pg		0.00
Spiked Amount 1000.000			Recovery = 100.69%				
57) Toluene-d8 (SS2)	12.68	98	101533	772.936	pg		0.00
Spiked Amount 1000.000			Recovery = 77.29%				
74) Bromofluorobenzene (SS3)	16.18	174	39373	785.324	pg		0.00
Spiked Amount 1000.000			Recovery = 78.53%				
Target Compounds							Qvalue
2) * Propene	3.56	42	672	20.728	pg	#	27
10) * Ethanol	4.46	45	596	42.357	pg		94
12) * Acrolein	4.74	56	417	16.490	pg	#	79
13) * Acetone	4.86	58	5128	161.440	pg		86
15) * 2-Propanol (Isopropa...	5.06	45	1411	17.087	pg	#	58
22) * Carbon Disulfide	5.88	76	11671	59.317	pg		96
27) * 2-Butanone (MEK)	7.02	72	478	18.783	pg		75

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Data Path : I:\MS21\DATA\2016 08\16\
Data File : 08161609.D
Acq On : 16 Aug 2016 1:59 pm
Operator : CL
Sample : 081616 SSC00283 (Sig #1); COND3 (Sig #2)
Misc : 72544 pass 0.1 plus tics (Sig #1); S29-07271601 (Sig #2)
ALS Vial : 5 Sample Multiplier: 1

Quant Time: Aug 16 14:38:53 2016
Quant Method : I:\MS21\Methods\F21072716.M
Quant Title : EPA TO-15
QLast Update : Thu Jul 28 14:31:03 2016
Response via : Initial Calibration





Quantitation Report (QT Reviewed)

Data File: I:\MS22\Data\2016 08\17\08171618.D
Acq On : 17 Aug 2016 22:20 Operator: WH
Sample : SC01498 OA01083 Inst : MS22
Misc : 72544 PASS
ALS Vial : 12 Sample Multiplier: 1

Quant Time: Aug 18 11:21:49 2016
Quant Method : I:\MS22\Methods\R22072616A.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jul 27 15:04:05 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M
Quant Results File: R22072616A.RES

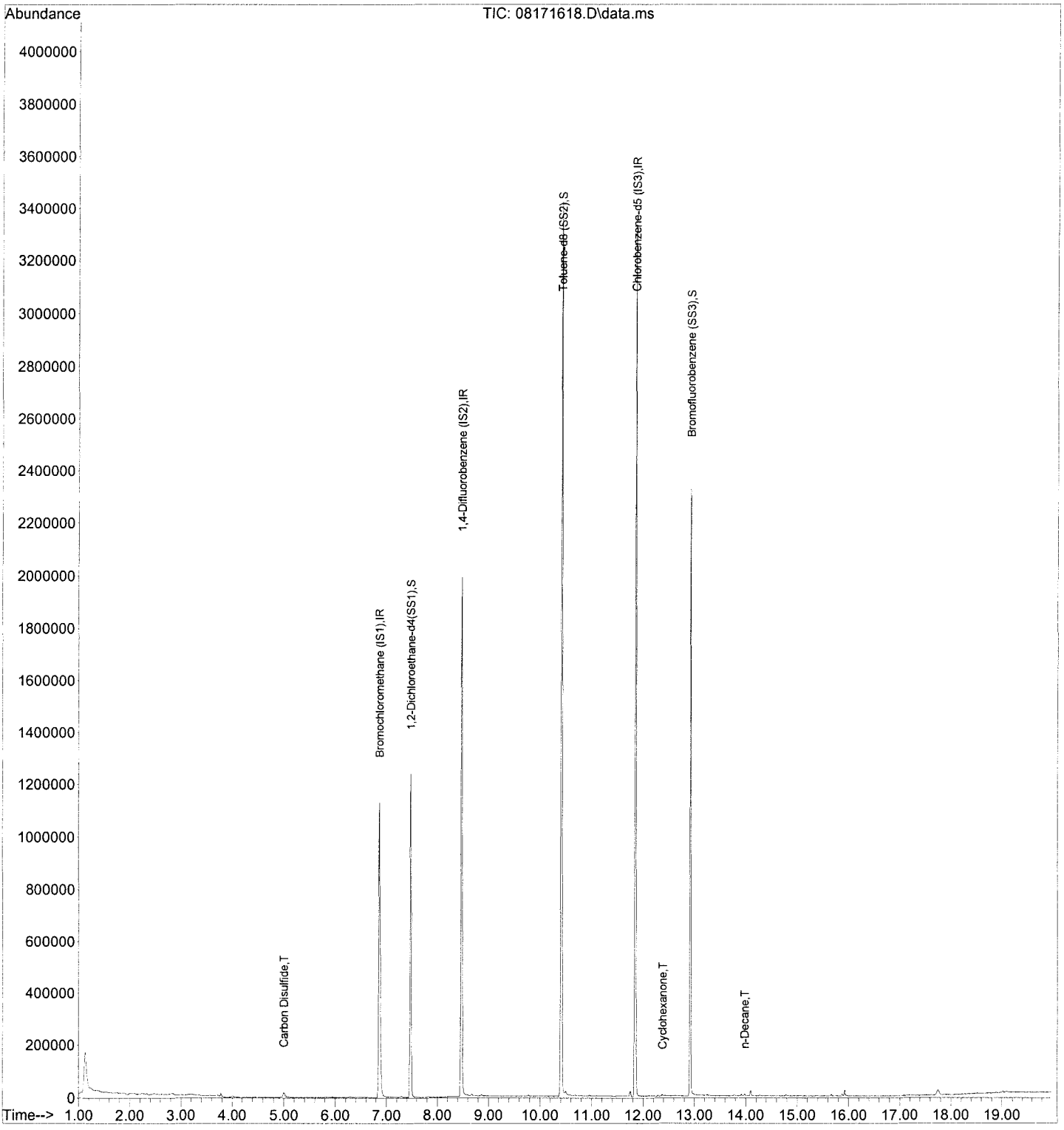
Internal Standards	R.T.	QIon	Response	Conc	Units		Dev(Min)
1) Bromochloromethane (IS1)	6.9	130	426508	12.500	ng		0.00
37) 1,4-Difluorobenzene (IS2)	8.5	114	1239134	12.500	ng		-0.01
56) Chlorobenzene-d5 (IS3)	11.8	82	863928	12.500	ng		-0.02
System Monitoring Compounds							
33) 1,2-Dichloroethane-d4(...	7.5	65	725904	10.815	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 86.56%				
57) Toluene-d8 (SS2)	10.4	98	2085346	13.176	ng		-0.01
Spiked Amount 12.500	Range 70 - 130		Recovery = 105.44%				
73) Bromofluorobenzene (SS3)	12.9	174	458516	9.762	ng		-0.01
Spiked Amount 12.500	Range 70 - 130		Recovery = 78.08%				
Target Compounds							Qvalue
22) Carbon Disulfide	5.0	76	35414	0.260	ng		99
83) n-Decane	14.0	57	3998	0.075	ng	#	40
98) Cyclohexanone	12.4	55	2153	0.063	ng	#	86

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Quantitation Report (QT Reviewed)

Data File: I:\MS22\Data\2016 08\17\08171618.D
Acq On : 17 Aug 2016 22:20 Operator: WH
Sample : SC01498 OA01083 Inst : MS22
Misc : 72544 PASS
ALS Vial : 12 Sample Multiplier: 1

Quant Time: Aug 18 11:21:49 2016
Quant Method : I:\MS22\Methods\R22072616A.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jul 27 15:04:05 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M
Quant Results File: R22072616A.RES



Quantitation Report (Not Reviewed)

Data File: I:\MS22\Data\2016 08\17\08171620.D
Acq On : 17 Aug 2016 23:14 Operator: WH
Sample : SC01674 OA02028 Inst : MS22
Misc : 72544 PASS
ALS Vial : 14 Sample Multiplier: 1

Quant Time: Aug 18 11:20:01 2016
Quant Method : I:\MS22\Methods\R22072616A.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jul 27 15:04:05 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M
Quant Results File: R22072616A.RES

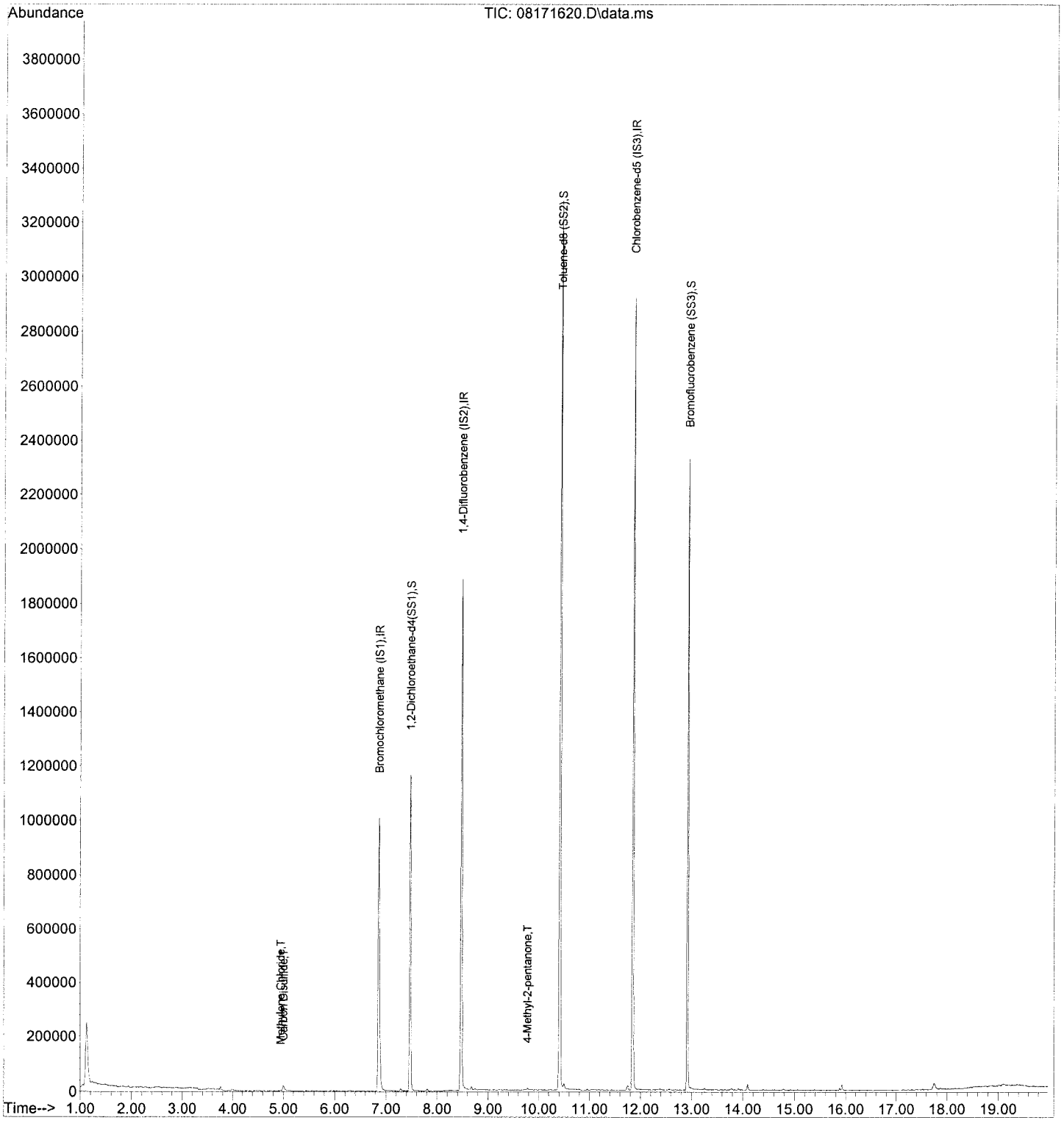
Internal Standards	R.T.	QIon	Response	Conc	Units		Dev(Min)
1) Bromochloromethane (IS1)	6.9	130	315785	12.500	ng		0.00
37) 1,4-Difluorobenzene (IS2)	8.5	114	1175442	12.500	ng		-0.01
56) Chlorobenzene-d5 (IS3)	11.8	82	766302	12.500	ng		-0.02
System Monitoring Compounds							
33) 1,2-Dichloroethane-d4(...	7.5	65	689147	13.868	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 110.96%				
57) Toluene-d8 (SS2)	10.4	98	2007525	14.300	ng		-0.01
Spiked Amount 12.500	Range 70 - 130		Recovery = 114.40%				
73) Bromofluorobenzene (SS3)	12.9	174	452121	10.853	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 86.80%				
Target Compounds							Qvalue
19) Methylene Chloride	4.9	84	1414	0.066	ng		93
22) Carbon Disulfide	5.0	76	36472	0.361	ng		99
53) 4-Methyl-2-pentanone	9.8	58	1404	0.073	ng	#	76

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Quantitation Report (Not Reviewed)

Data File: I:\MS22\Data\2016 08\17\08171620.D
Acq On : 17 Aug 2016 23:14 Operator: WH
Sample : SC01674 OA02028 Inst : MS22
Misc : 72544 PASS
ALS Vial : 14 Sample Multiplier: 1

Quant Time: Aug 18 11:20:01 2016
Quant Method : I:\MS22\Methods\R22072616A.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jul 27 15:04:05 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M
Quant Results File: R22072616A.RES



Quantitation Report (QT Reviewed)

Data File: I:\MS22\Data\2016 08\17\08171625.D
Acq On : 18 Aug 2016 01:29 Operator: WH
Sample : SC01687 OA01878 Inst : MS22
Misc : 72544 PASS
ALS Vial : 19 Sample Multiplier: 1

Quant Time: Aug 18 11:14:40 2016
Quant Method : I:\MS22\Methods\R22072616A.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jul 27 15:04:05 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M
Quant Results File: R22072616A.RES

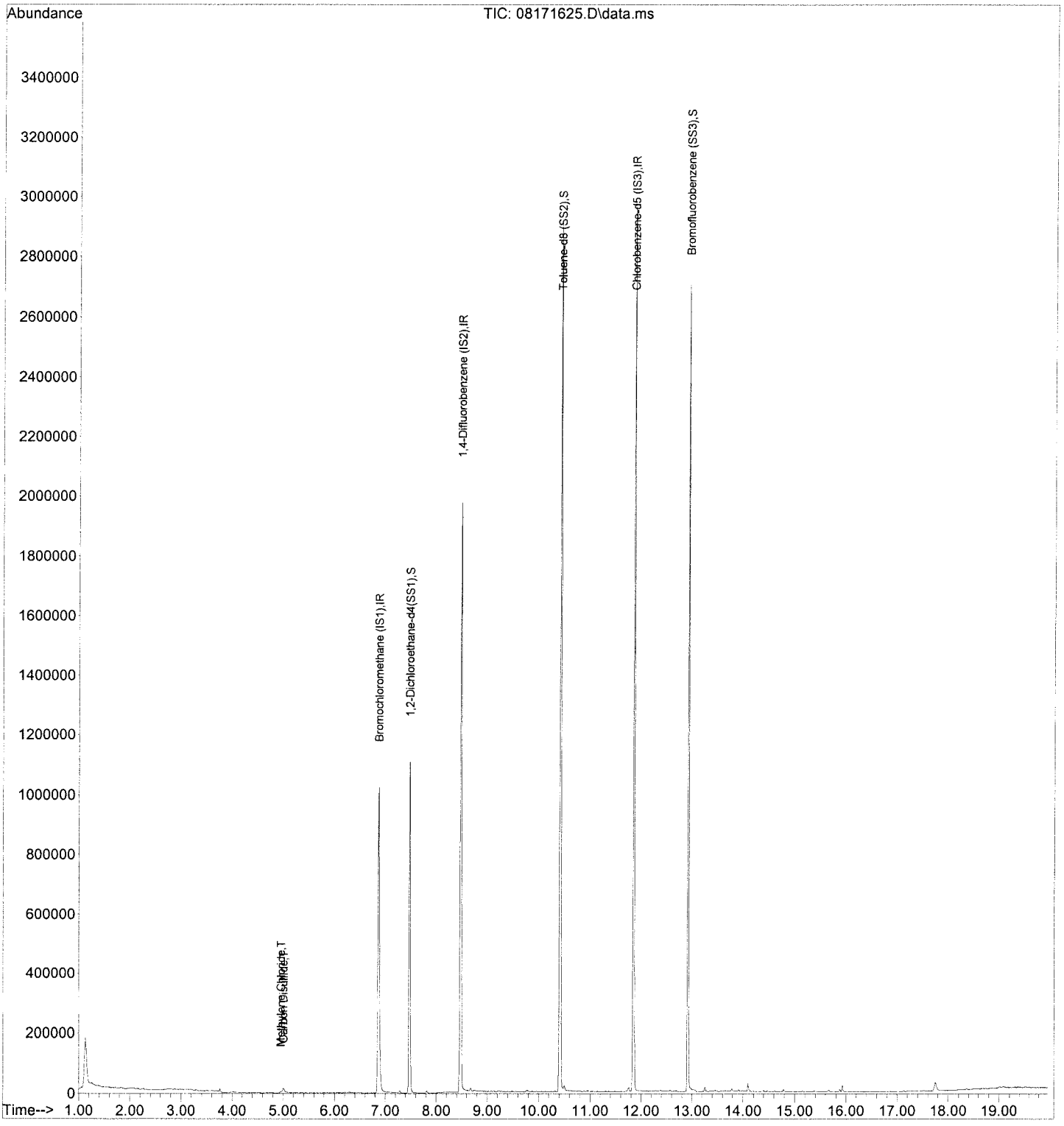
Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
1) Bromochloromethane (IS1)	6.9	130	327611	12.500	ng	0.00
37) 1,4-Difluorobenzene (IS2)	8.5	114	1221941	12.500	ng	-0.01
56) Chlorobenzene-d5 (IS3)	11.8	82	783452	12.500	ng	-0.02
System Monitoring Compounds						
33) 1,2-Dichloroethane-d4(...	7.5	65	650296	12.614	ng	0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 100.88%			
57) Toluene-d8 (SS2)	10.4	98	1734134	12.082	ng	-0.01
Spiked Amount 12.500	Range 70 - 130		Recovery = 96.64%			
73) Bromofluorobenzene (SS3)	12.9	174	550949	12.935	ng	0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 103.52%			
Target Compounds						Qvalue
19) Methylene Chloride	5.0	84	1914	0.086	ng	97
22) Carbon Disulfide	5.0	76	31684	0.303	ng	98

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Quantitation Report (QT Reviewed)

Data File: I:\MS22\Data\2016 08\17\08171625.D
Acq On : 18 Aug 2016 01:29 Operator: WH
Sample : SC01687 OA01878 Inst : MS22
Misc : 72544 PASS
ALS Vial : 19 Sample Multiplier: 1

Quant Time: Aug 18 11:14:40 2016
Quant Method : I:\MS22\Methods\R22072616A.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jul 27 15:04:05 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M
Quant Results File: R22072616A.RES



Quantitation Report (QT Reviewed)

Data File: I:\MS22\Data\2016 08\17\08171615.D
Acq On : 17 Aug 2016 21:00 Operator: WH
Sample : SSC00264 OA01157 Inst : MS22
Misc : S29-06301606
ALS Vial : 9 Sample Multiplier: 1

Quant Time: Aug 18 11:26:39 2016
Quant Method : I:\MS22\Methods\R22072616A.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jul 27 15:04:05 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M
Quant Results File: R22072616A.RES

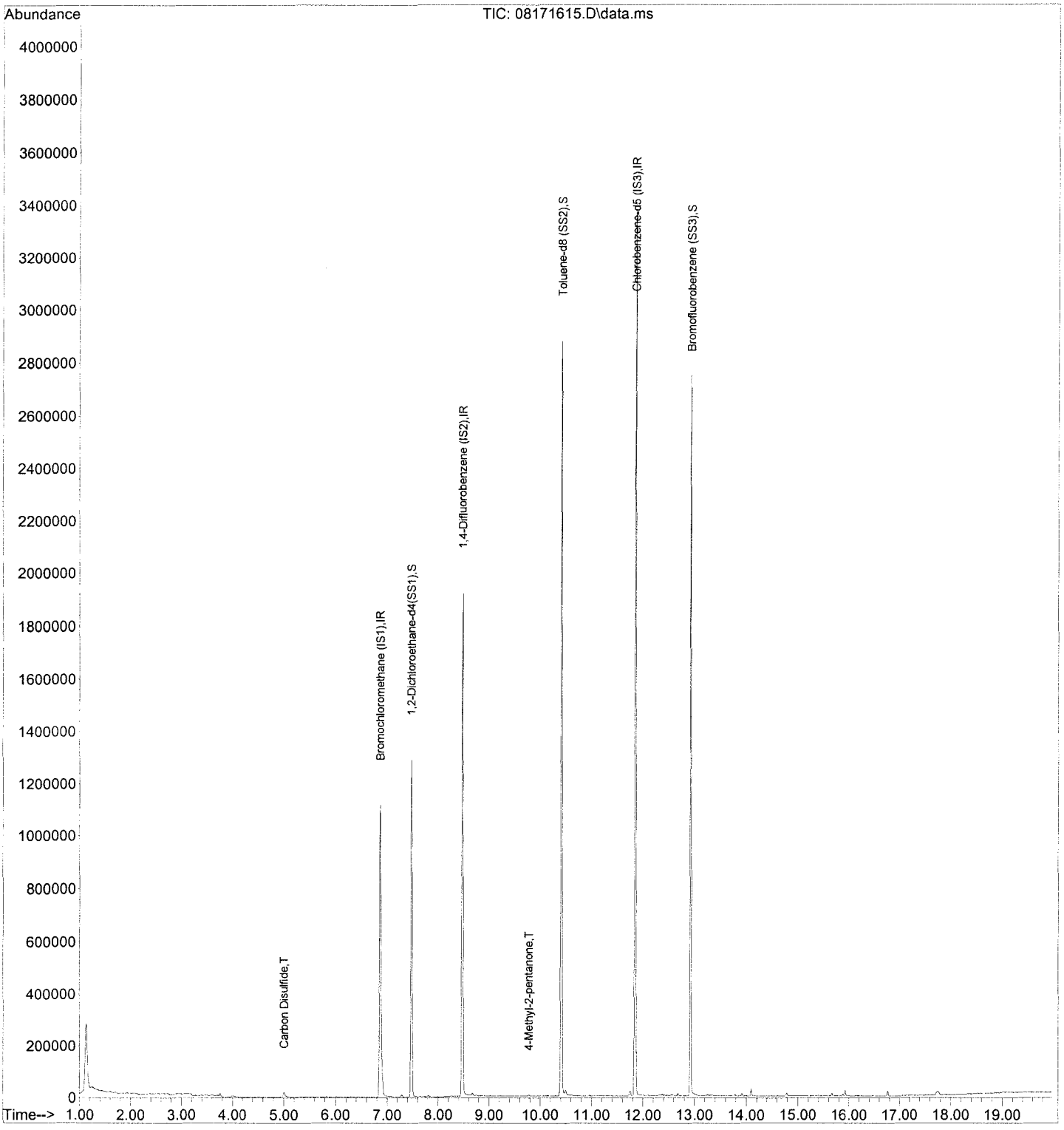
Internal Standards	R.T.	QIon	Response	Conc	Units		Dev(Min)
1) Bromochloromethane (IS1)	6.9	130	380301	12.500	ng		0.00
37) 1,4-Difluorobenzene (IS2)	8.5	114	1205975	12.500	ng		-0.01
56) Chlorobenzene-d5 (IS3)	11.8	82	904707	12.500	ng		-0.02
System Monitoring Compounds							
33) 1,2-Dichloroethane-d4(...	7.5	65	765535	12.792	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 102.32%				
57) Toluene-d8 (SS2)	10.4	98	1698739	10.249	ng		-0.01
Spiked Amount 12.500	Range 70 - 130		Recovery = 82.00%				
73) Bromofluorobenzene (SS3)	12.9	174	557246	11.330	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 90.64%				
Target Compounds							Qvalue
22) Carbon Disulfide	5.0	76	38640	0.318	ng		98
53) 4-Methyl-2-pentanone	9.8	58	1354	0.068	ng	#	69

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Quantitation Report (QT Reviewed)

Data File: I:\MS22\Data\2016 08\17\08171615.D
Acq On : 17 Aug 2016 21:00 Operator: WH
Sample : SSC00264 OA01157 Inst : MS22
Misc : S29-06301606
ALS Vial : 9 Sample Multiplier: 1

Quant Time: Aug 18 11:26:39 2016
Quant Method : I:\MS22\Methods\R22072616A.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jul 27 15:04:05 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M
Quant Results File: R22072616A.RES



Quantitation Report (QT Reviewed)

Data File: I:\MS22\Data\2016 08\17\08171622.D
Acq On : 18 Aug 2016 00:08 Operator: WH
Sample : SC02064 OA00641 Inst : MS22
Misc : 72544 PASS
ALS Vial : 16 Sample Multiplier: 1

Quant Time: Aug 18 11:17:54 2016
Quant Method : I:\MS22\Methods\R22072616A.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jul 27 15:04:05 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M
Quant Results File: R22072616A.RES

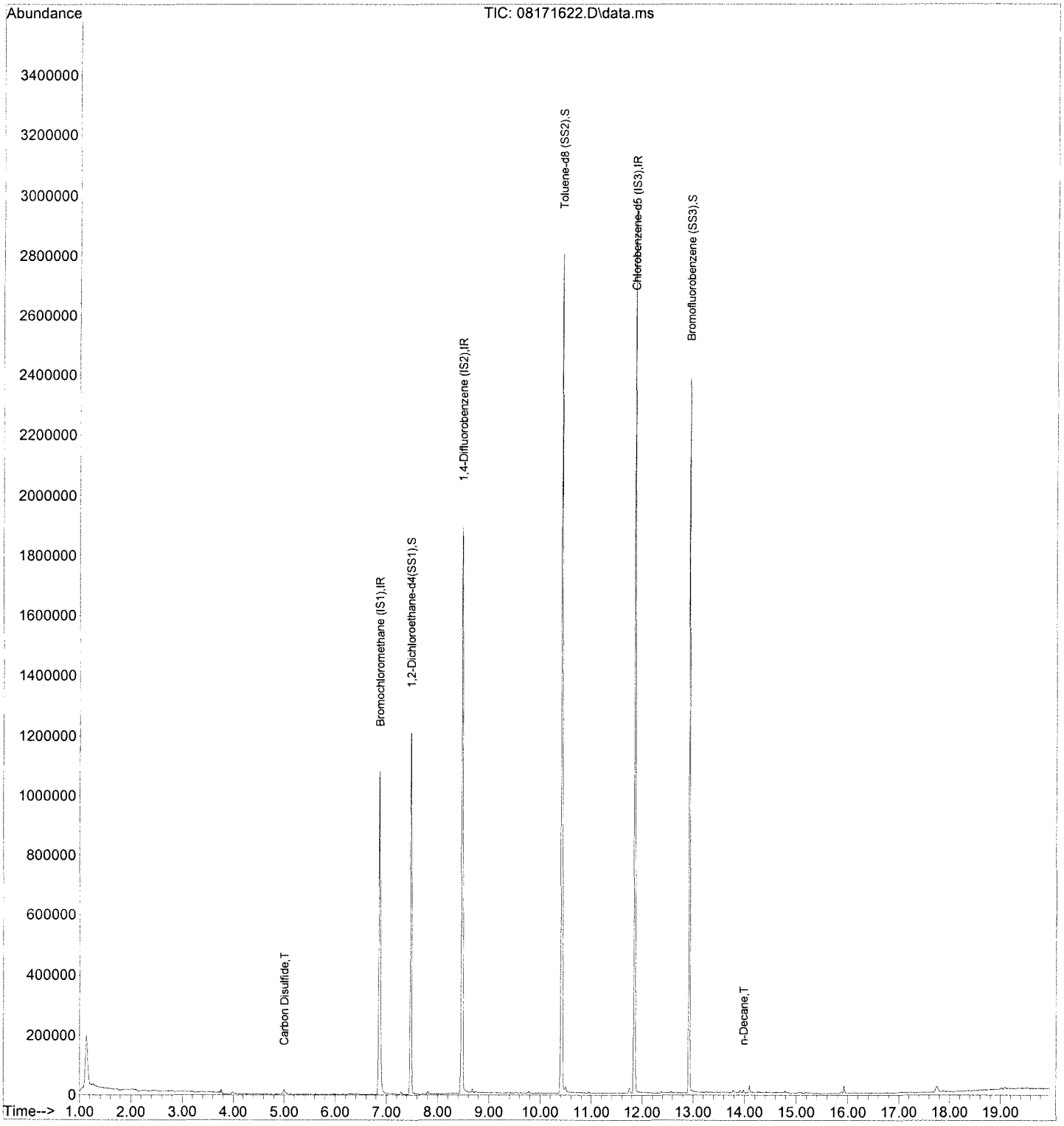
Internal Standards	R.T.	QIon	Response	Conc	Units		Dev(Min)
1) Bromochloromethane (IS1)	6.9	130	396319	12.500	ng		0.00
37) 1,4-Difluorobenzene (IS2)	8.5	114	1182504	12.500	ng		-0.01
56) Chlorobenzene-d5 (IS3)	11.8	82	779268	12.500	ng		-0.02
System Monitoring Compounds							
33) 1,2-Dichloroethane-d4(...	7.5	65	707634	11.346	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 90.80%				
57) Toluene-d8 (SS2)	10.4	98	1680866	11.774	ng		-0.01
Spiked Amount 12.500	Range 70 - 130		Recovery = 94.16%				
73) Bromofluorobenzene (SS3)	12.9	174	465579	10.990	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 87.92%				
Target Compounds							Qvalue
22) Carbon Disulfide	5.0	76	29052	0.229	ng		97
83) n-Decane	14.0	57	4470	0.093	ng	#	45

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Quantitation Report (QT Reviewed)

Data File: I:\MS22\Data\2016 08\17\08171622.D
Acq On : 18 Aug 2016 00:08 Operator: WH
Sample : SC02064 OA00641 Inst : MS22
Misc : 72544 PASS
ALS Vial : 16 Sample Multiplier: 1

Quant Time: Aug 18 11:17:54 2016
Quant Method : I:\MS22\Methods\R22072616A.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jul 27 15:04:05 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M
Quant Results File: R22072616A.RES



Quantitation Report (QT Reviewed)

Data File: I:\MS22\Data\2016 08\17\08171621.D
Acq On : 17 Aug 2016 23:41 Operator: WH
Sample : SC01508 OA00404 Inst : MS22
Misc : 72544 PASS
ALS Vial : 15 Sample Multiplier: 1

Quant Time: Aug 18 11:18:56 2016
Quant Method : I:\MS22\Methods\R22072616A.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jul 27 15:04:05 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M
Quant Results File: R22072616A.RES

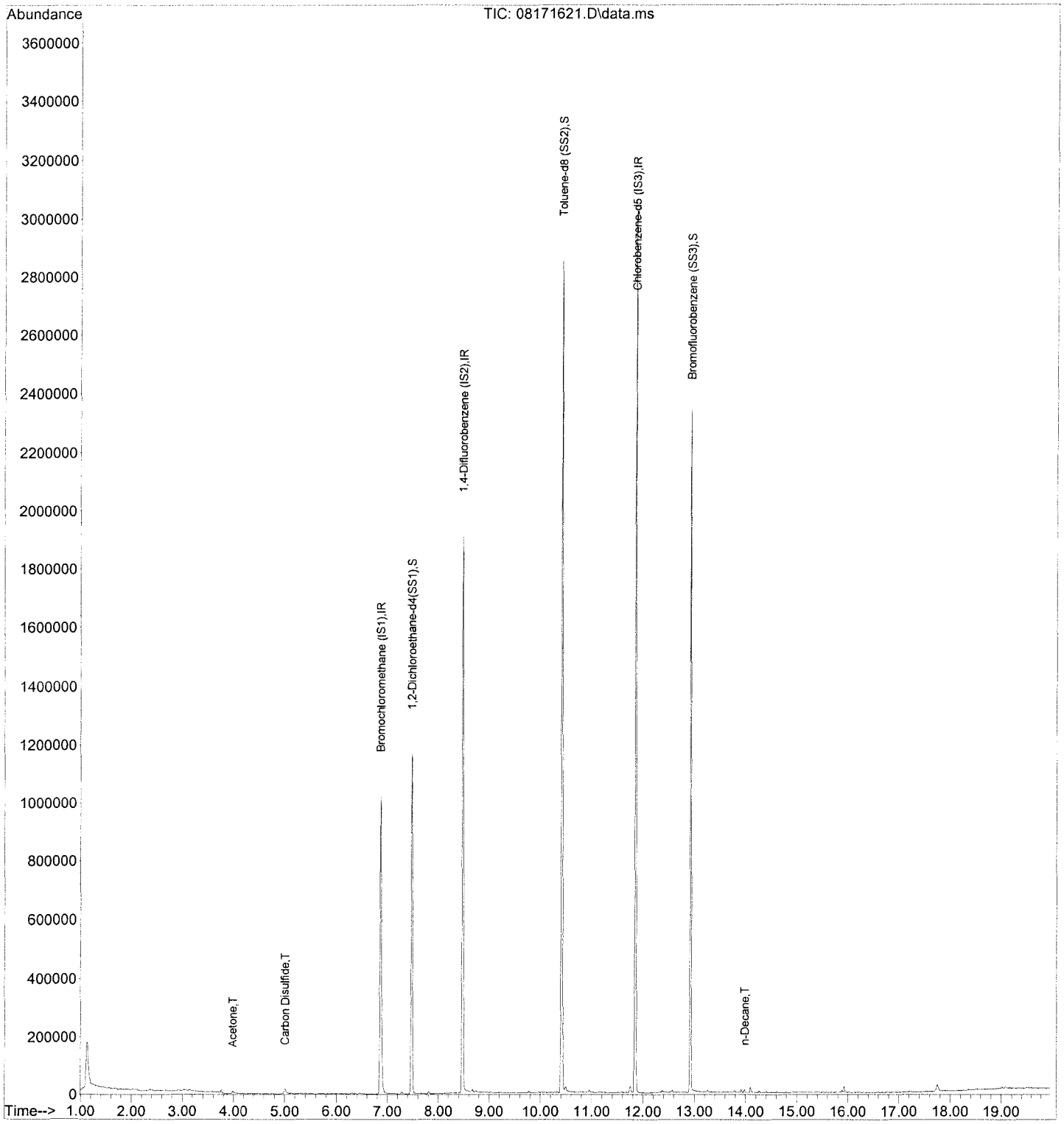
Internal Standards	R.T.	QIon	Response	Conc	Units		Dev(Min)
1) Bromochloromethane (IS1)	6.9	130	318200	12.500	ng		0.00
37) 1,4-Difluorobenzene (IS2)	8.5	114	1173189	12.500	ng		-0.01
56) Chlorobenzene-d5 (IS3)	11.8	82	806960	12.500	ng		-0.02
System Monitoring Compounds							
33) 1,2-Dichloroethane-d4(...	7.5	65	686492	13.710	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 109.68%				
57) Toluene-d8 (SS2)	10.4	98	1682849	11.383	ng		-0.01
Spiked Amount 12.500	Range 70 - 130		Recovery = 91.04%				
73) Bromofluorobenzene (SS3)	12.9	174	457401	10.426	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 83.44%				
Target Compounds							Qvalue
13) Acetone	4.0	58	5089	0.274	ng		88
22) Carbon Disulfide	5.0	76	34592	0.340	ng		99
83) n-Decane	14.0	57	4810	0.097	ng	#	46

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Quantitation Report (QT Reviewed)

Data File: I:\MS22\Data\2016 08\17\08171621.D
Acq On : 17 Aug 2016 23:41 Operator: WH
Sample : SC01508 OA00404 Inst : MS22
Misc : 72544 PASS
ALS Vial : 15 Sample Multiplier: 1

Quant Time: Aug 18 11:18:56 2016
Quant Method : I:\MS22\Methods\R22072616A.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jul 27 15:04:05 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M
Quant Results File: R22072616A.RES



Quantitation Report (QT Reviewed)

Data File: I:\MS22\Data\2016 08\17\08171614.D
Acq On : 17 Aug 2016 20:33 Operator: WH
Sample : SC00817 OA01828 Inst : MS22
Misc : 72544 PASS
ALS Vial : 8 Sample Multiplier: 1

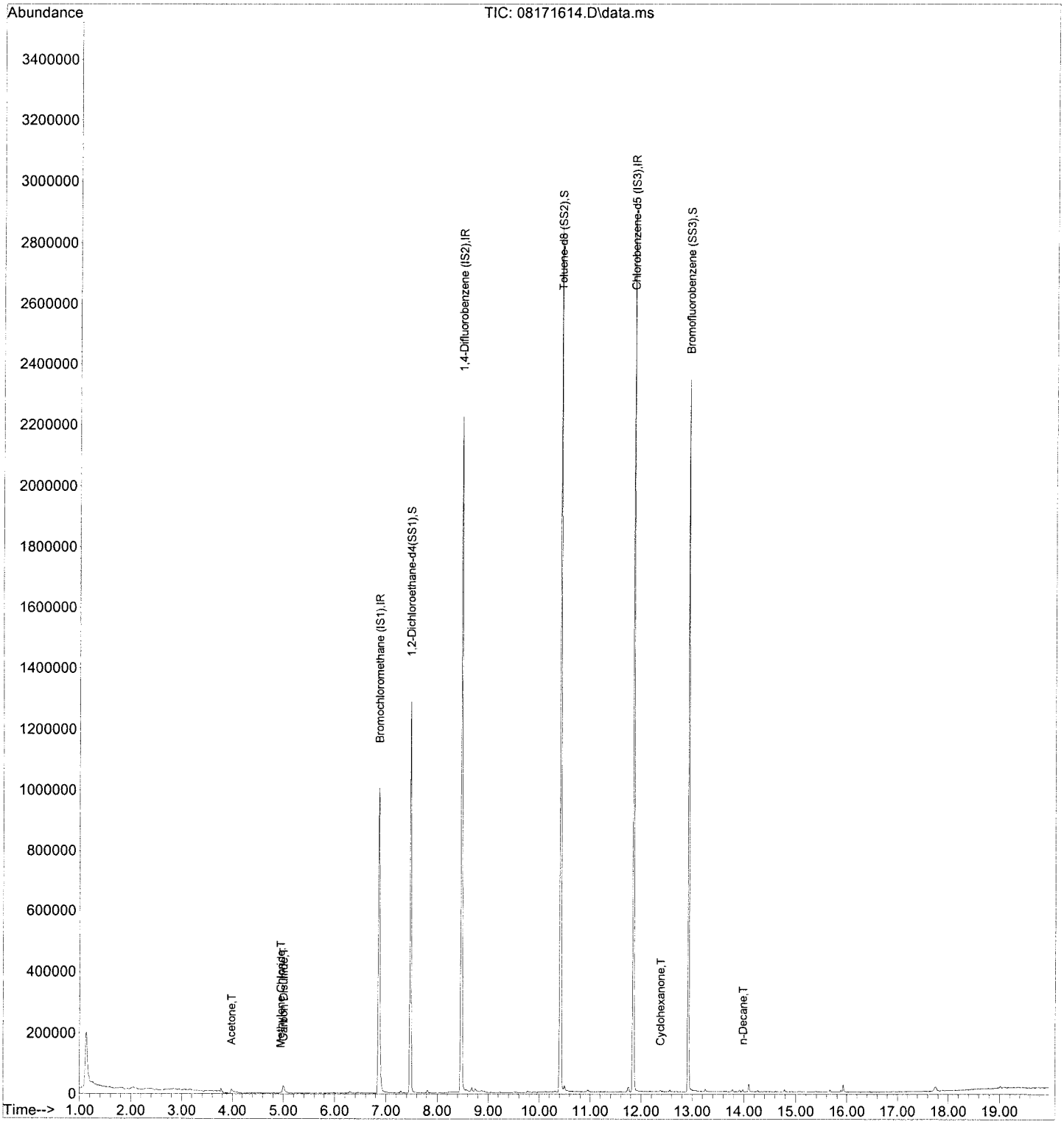
Quant Time: Aug 18 11:28:08 2016
Quant Method : I:\MS22\Methods\R22072616A.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jul 27 15:04:05 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M
Quant Results File: R22072616A.RES

Internal Standards	R.T.	QIon	Response	Conc	Units		Dev(Min)
1) Bromochloromethane (IS1)	6.9	130	321001	12.500	ng		0.00
37) 1,4-Difluorobenzene (IS2)	8.5	114	1424733	12.500	ng		-0.01
56) Chlorobenzene-d5 (IS3)	11.8	82	769426	12.500	ng		-0.02
System Monitoring Compounds							
33) 1,2-Dichloroethane-d4(...	7.5	65	760373	15.052	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 120.40%				
57) Toluene-d8 (SS2)	10.4	98	1715946	12.173	ng		-0.01
Spiked Amount 12.500	Range 70 - 130		Recovery = 97.36%				
73) Bromofluorobenzene (SS3)	12.9	174	453893	10.851	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 86.80%				
Target Compounds							Qvalue
13) Acetone	4.0	58	8985	0.479	ng		88
19) Methylene Chloride	4.9	84	1413	0.065	ng		98
22) Carbon Disulfide	5.0	76	49392	0.482	ng		100
83) n-Decane	14.0	57	3852	0.082	ng	#	49
98) Cyclohexanone	12.4	55	1848	0.060	ng	#	87

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Data File: I:\MS22\Data\2016 08\17\08171614.D
Acq On : 17 Aug 2016 20:33 Operator: WH
Sample : SC00817 OA01828 Inst : MS22
Misc : 72544 PASS
ALS Vial : 8 Sample Multiplier: 1

Quant Time: Aug 18 11:28:08 2016
Quant Method : I:\MS22\Methods\R22072616A.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jul 27 15:04:05 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M
Quant Results File: R22072616A.RES



Quantitation Report (QT Reviewed)

Data File: I:\MS22\Data\2016 08\17\08171617.D
Acq On : 17 Aug 2016 21:53 Operator: WH
Sample : SC01653 OA01812 Inst : MS22
Misc : 72544 PASS
ALS Vial : 11 Sample Multiplier: 1

Quant Time: Aug 18 11:25:01 2016
Quant Method : I:\MS22\Methods\R22072616A.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jul 27 15:04:05 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M
Quant Results File: R22072616A.RES

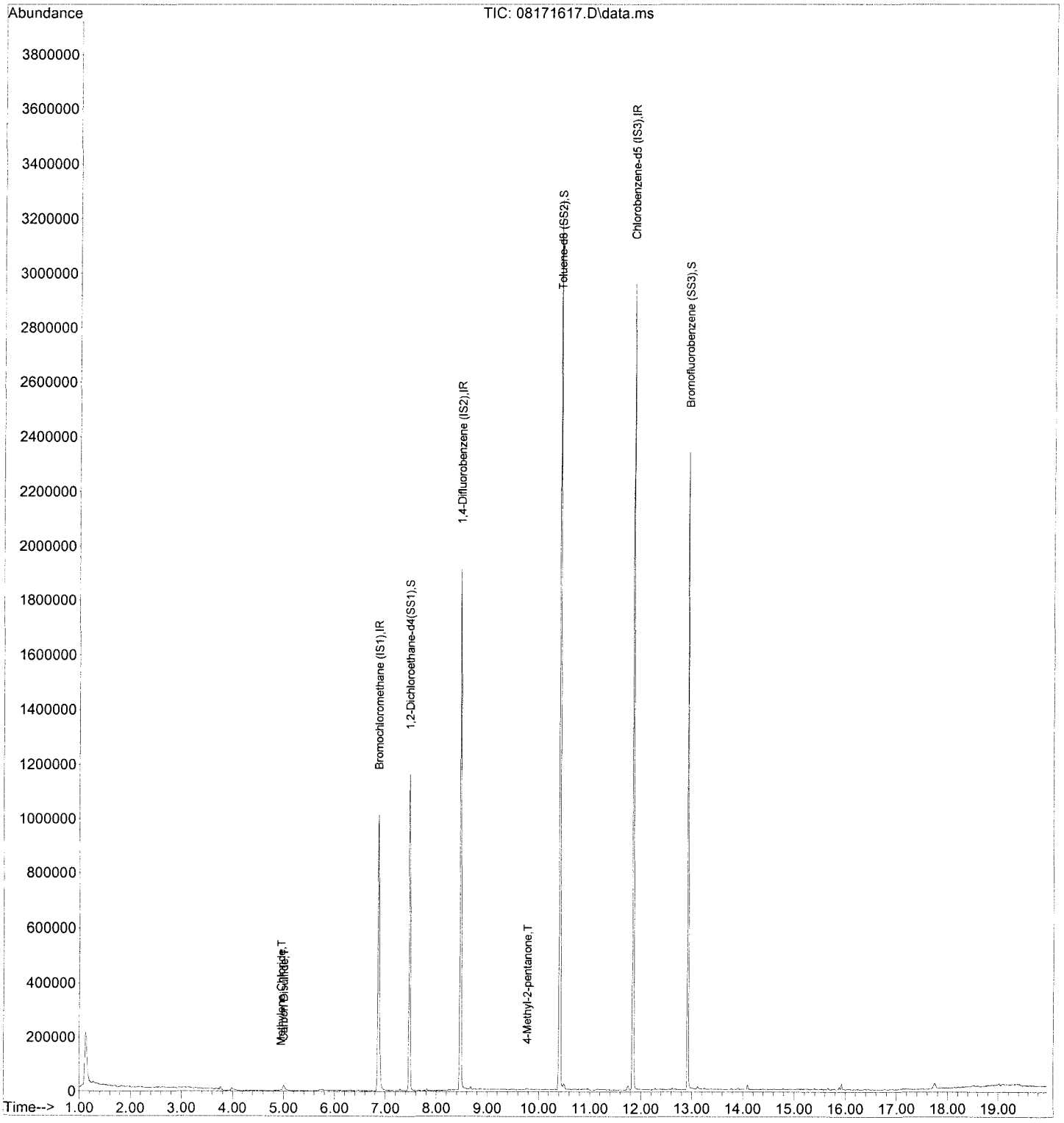
Internal Standards	R.T.	QIon	Response	Conc	Units		Dev(Min)
1) Bromochloromethane (IS1)	6.9	130	318276	12.500	ng		0.00
37) 1,4-Difluorobenzene (IS2)	8.5	114	1189562	12.500	ng		-0.01
56) Chlorobenzene-d5 (IS3)	11.8	82	768434	12.500	ng		-0.01
System Monitoring Compounds							
33) 1,2-Dichloroethane-d4(...	7.5	65	685245	13.681	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 109.44%				
57) Toluene-d8 (SS2)	10.4	98	1993717	14.162	ng		-0.01
Spiked Amount 12.500	Range 70 - 130		Recovery = 113.28%				
73) Bromofluorobenzene (SS3)	12.9	174	450473	10.783	ng		-0.01
Spiked Amount 12.500	Range 70 - 130		Recovery = 86.24%				
Target Compounds							Qvalue
19) Methylene Chloride	4.9	84	1369	0.064	ng		100
22) Carbon Disulfide	5.0	76	39946	0.393	ng		99
53) 4-Methyl-2-pentanone	9.8	58	1536	0.079	ng	#	81

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Quantitation Report (QT Reviewed)

Data File: I:\MS22\Data\2016 08\17\08171617.D
Acq On : 17 Aug 2016 21:53 Operator: WH
Sample : SC01653 OA01812 Inst : MS22
Misc : 72544 PASS
ALS Vial : 11 Sample Multiplier: 1

Quant Time: Aug 18 11:25:01 2016
Quant Method : I:\MS22\Methods\R22072616A.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jul 27 15:04:05 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M
Quant Results File: R22072616A.RES



Quantitation Report (QT Reviewed)

Data File: I:\MS22\Data\2016 08\17\08171616.D
Acq On : 17 Aug 2016 21:27 Operator: WH
Sample : SC01656 OA01148 Inst : MS22
Misc : 72544 PASS
ALS Vial : 10 Sample Multiplier: 1

Quant Time: Aug 18 11:25:53 2016
Quant Method : I:\MS22\Methods\R22072616A.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jul 27 15:04:05 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M
Quant Results File: R22072616A.RES

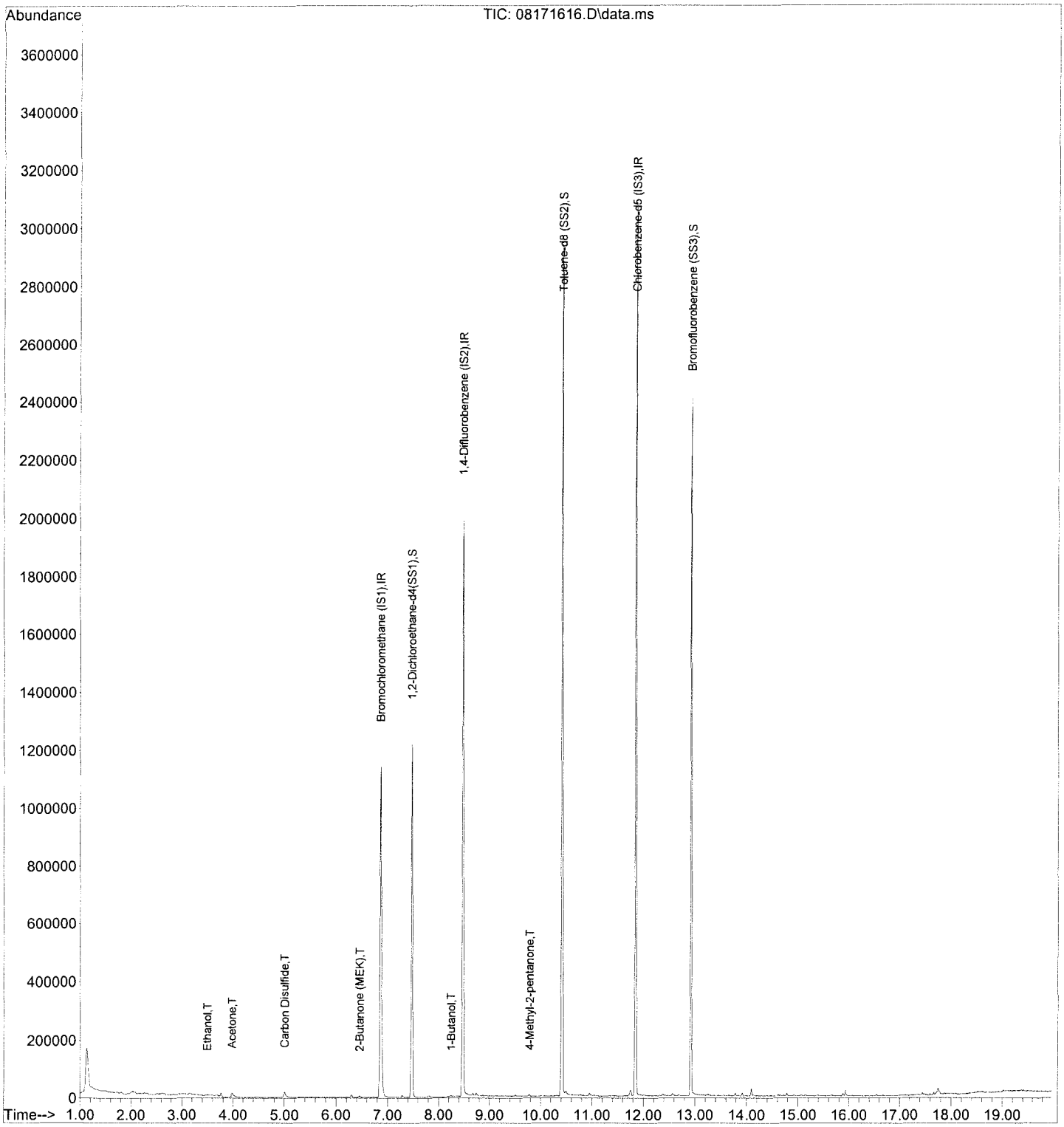
Internal Standards	R.T.	QIon	Response	Conc	Units		Dev(Min)
1) Bromochloromethane (IS1)	6.9	130	391122	12.500	ng		0.00
37) 1,4-Difluorobenzene (IS2)	8.5	114	1240912	12.500	ng		-0.01
56) Chlorobenzene-d5 (IS3)	11.8	82	804343	12.500	ng		-0.01
System Monitoring Compounds							
33) 1,2-Dichloroethane-d4(...	7.5	65	718332	11.671	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 93.36%				
57) Toluene-d8 (SS2)	10.4	98	1744624	11.840	ng		-0.01
Spiked Amount 12.500	Range 70 - 130		Recovery = 94.72%				
73) Bromofluorobenzene (SS3)	12.9	174	468866	10.722	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 85.76%				
Target Compounds							Qvalue
10) Ethanol	3.5	45	2346	0.095	ng		82
13) Acetone	4.0	58	10853	0.475	ng	#	78
22) Carbon Disulfide	5.0	76	36838	0.295	ng		98
27) 2-Butanone (MEK)	6.5	72	1263	0.073	ng	#	84
40) 1-Butanol	8.2	56	1438	0.077	ng	#	69
53) 4-Methyl-2-pentanone	9.8	58	1372	0.067	ng	#	62

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Quantitation Report (QT Reviewed)

Data File: I:\MS22\Data\2016 08\17\08171616.D
Acq On : 17 Aug 2016 21:27 Operator: WH
Sample : SC01656 OA01148 Inst : MS22
Misc : 72544 PASS
ALS Vial : 10 Sample Multiplier: 1

Quant Time: Aug 18 11:25:53 2016
Quant Method : I:\MS22\Methods\R22072616A.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Jul 27 15:04:05 2016
Response via : Initial Calibration
DataAcq Meth:TO15.M
Quant Results File: R22072616A.RES



LABORATORY DATA CONSULTANTS, INC.
2701 Loker Ave. West, Suite 220, Carlsbad, CA 92010 Bus: 760-827-1100 Fax: 760-827-1099

AECOM
250 Apollo Drive
Chelmsford, MA 01824, USA
ATTN: Ms. Constance Lapite

October 28, 2016

SUBJECT: NB Kitsap, CTO JP09, Data Validation

Dear Ms. Lapite,

Enclosed is the final validation report for the fractions listed below. This SDG was received on October 17, 2016. Attachment 1 is a summary of the samples that were reviewed for each analysis.

LDC Project #37300:

SDG #	Fraction
1609188/P1604352	Volatiles, Methane, Helium

The data validation was performed under Level IV validation guidelines. The analyses were validated using the following documents and variances, as applicable to each method:

- Sampling and Analysis Plan, Keyport OU1 Site Recharacterization, Keyport, Washington, July 2016
- U.S. Naval Facilities Engineering Command, NW SOP: Field Procedures Manual, February 2015
- U.S. Department of Defense Quality Systems Manual for Environmental Laboratories, Version 5.0, July 2013
- USEPA, National Functional Guidelines for Superfund Organic Methods Data Review, August 2014

Please feel free to contact us if you have any questions.

Sincerely,

Stella Cuenco
Operations Manager/Senior Chemist

317 pages-DL

Attachment 1

III/IV

LDC #37300 (AECOM-Glen Allen, VA / NB Kitsap, CTO JP09)

Project #N62470-11-D-8013

LDC	SDG#	DATE REC'D	(2) DATE DUE	VOA (TO-15)		Methane (TO-3)		He (3C)																							
Matrix: Air/Water/Soil				A	S	A	S	A	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
A	1609188/P1604352	10/17/16	10/31/16	10	0	10	0	4	0																						
Total	T/SC			10	0	10	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	24

Shaded cells indicate Level IV validation (all other cells are Level III validation). These sample counts do not include DLs, REs, MS/MSD, and DUPs

L:\AECOM\Kitsap\37300ST.wpd

The attached zipped file contains two files:

File	Format	Description
1) Readme_JP09_102716.docx	MS Word 2007	A "Readme" file (this document).
2) P1604352_DVA JP09 SG_dva_101316.xlsx	MS Excel 2007	A spreadsheet for the following SDGs: P1604352 37300A

LDC observed the following discrepancies between hardcopy data packages and the electronic data deliverables during verification:

Discrepancy	**LDC's approach to the discrepancy**
Method TO-3_MOD, Helium reporting_detection_limit values incorrect.	LDC updated the reporting_detection_limit values to match the form 1s.
Method TO-3_MOD, Helium. method_detection_limit values incorrect	LDC did not update the values.

Please contact Stella Cuenco or Judy Ecklund at (760) 827-1100 if you have any questions regarding this electronic data submittal.

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Naval Base Kitsap, CTO JP09

LDC Report Date: October 27, 2016

Parameters: Volatiles

Validation Level: Level IV

Laboratory: Empirical Laboratories, LLC/ALS Environmental

Sample Delivery Group (SDG): 1609188/P1604352

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
SV-01-160830	1609188-01	Air	08/30/16
SV-02-160830	1609188-02	Air	08/30/16
SV-03-160830	1609188-03	Air	08/30/16
SV-04-160830	1609188-04	Air	08/30/16
SV-05-160830	1609188-05	Air	08/30/16
SV-06-160830	1609188-06	Air	08/30/16
SV-11-160908	1609188-07	Air	09/08/16
SV-12-160908	1609188-08	Air	09/08/16
SV-13-160908	1609188-09	Air	09/08/16
SV-FD-160908	1609188-10	Air	09/08/16

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Sampling and Analysis Plan, Keyport OU1 Site Recharacterization, Keyport, Washington (July 2016), the U.S. Naval Facilities Engineering Command (NAVFAC) Northwest Standard Operating Procedure: Field Procedures Manual (February 2015), the U.S. Department of Defense (DoD) Quality Systems Manual (QSM) for Environmental Laboratories, Version 5.0 (July 2013), and a modified outline of the USEPA National Functional Guidelines (NFG) for Superfund Organic Methods Data Review (August 2014). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Volatile Organic Compounds (VOCs) by Environmental Protection Agency (EPA) Method TO-15

All sample results were subjected to Level IV data validation, which is comprised of the quality control (QC) summary forms as well as the raw data, to confirm sample quantitation and identification.

The following are definitions of the data qualifiers utilized during data validation:

J (Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.

U (Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).

UJ (Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.

R (Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.

NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Qualification Code Reference

H	Holding times were exceeded.
S	Surrogate recovery was outside QC limits.
C	Calibration %RSD, r, r^2 or %D were noncompliant
R	Calibration RRF was <0.05.
B	Presumed contamination from preparation (method blank)
L	Laboratory Control Sample/Laboratory Control Sample Duplicate %R or RPD was not within control limits
Q	MS/MSD recovery was poor
E	MS/MSD or Duplicate RPD was high.
I	Internal standard performance was unsatisfactory
M	Instrument Performance Check (BFB or DFTPP) was noncompliant
T	Presumed contamination from trip blank.
F	Presumed contamination from FB or ER.
D	The analysis with this flag should not be used because another more technically sound analysis is available.
P	Instrument performance for pesticides was poor
*#	Unusual problems found with the data. The number following the asterisk (*) will indicate the section in the validation report where a description of the problem can be found.

I. Sample Receipt and Technical Holding Times

The canisters were properly pressurized and handled.

All technical holding time requirements were met.

II. GC/MS Instrument Performance Check

A bromofluorobenzene (BFB) tune was performed at 24 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration and Initial Calibration Verification

An initial calibration was performed as required by the method.

The percent relative standard deviations (%RSD) were less than or equal to 30.0% for all compounds.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 30.0% for all compounds.

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

The percent differences (%D) were less than or equal to 30.0% for all compounds.

V. Laboratory Blanks

Laboratory blanks were analyzed as required by the method. No contaminants were found in the laboratory blanks.

Canister blank analyses were performed for every sample canister. No contaminants were found in the canister blanks.

VI. Field Blanks

No field blanks were identified in this SDG.

VII. Surrogates

Although surrogates were not required by the method, surrogate analysis was performed by the laboratory. Surrogate recoveries (%R) were within QC limits.

VIII. Duplicate Sample Analysis

The laboratory has indicated that there were no duplicate (DUP) analyses specified for the samples in this SDG, and therefore duplicate analyses were not performed for this SDG.

IX. Laboratory Control Samples

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method. Percent recoveries (%R) were within QC limits. Relative percent differences (RPD) were within QC limits.

X. Field Duplicates

Samples SV-12-160908 and SV-FD-160908 were identified as field duplicates. No results were detected in any of the samples with the following exceptions:

Compound	Concentration (ug/m3)		RPD (Limits)
	SV-12-160908	SV-FD-160908	
Vinyl chloride	82	89	8 (≤100)
cis-1,2-Dichloroethene	42	43	2 (≤100)
Trichloroethene	15	16	6 (≤100)

XI. Internal Standards

All internal standard areas and retention times were within QC limits.

XII. Compound Quantitation

All compound quantitations met validation criteria.

XIII. Target Compound Identifications

All target compound identifications met validation criteria.

XIV. System Performance

The system performance was acceptable.

XV. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

The quality control criteria reviewed were met and are considered acceptable. Based upon the data validation all results are considered valid and usable for all purposes.

Naval Base Kitsap, CTO JP09
Volatiles - Data Qualification Summary - SDG 1609188/P1604352

No Sample Data Qualified in this SDG

Naval Base Kitsap, CTO JP09
Volatiles - Laboratory Blank Data Qualification Summary - SDG 1609188/P1604352

No Sample Data Qualified in this SDG

Naval Base Kitsap, CTO JP09
Volatiles - Field Blank Data Qualification Summary - SDG 1609188/P1604352

No Sample Data Qualified in this SDG

LDC #: 37300A48 **VALIDATION COMPLETENESS WORKSHEET** Date: 10/20/16

SDG #: 1609188/P1604352 Level IV Page: 1 of 1

Laboratory: Empirical Laboratories, LLC/ALS Environmental Reviewer: [illegible]

2nd Reviewer: [illegible]

METHOD: GC/MS Volatiles (EPA Method TO-15)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A / A	
II.	GC/MS Instrument performance check	A	
III.	Initial calibration/ICV	A / A	%RSD≤30 IOV≤30
IV.	Continuing calibration	A	D≤30
V.	Laboratory Blanks/Canister Blanks	A/A	individual canisters
VI.	Field blanks	N	
VII.	Surrogate spikes	A	
VIII.	Laboratory Matrix ~~spike~~/Matrix spike duplicates	N	
IX.	Laboratory control samples	A	LCSD
X.	Field duplicates	SW	D = 8+10
XI.	Internal standards	A	
XII.	Compound quantitation RL/LOQ/LODs	A	
XIII.	Target compound identification	A	
XIV.	System performance	A	
XV.	Overall assessment of data	A	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = No compounds detected; R = Rinsate; FB = Field blank; D = Duplicate; TB = Trip blank; EB = Equipment blank; SB=Source blank; OTHER:

	Client ID	Lab ID	Matrix	Date
1 1,2	SV-01-160830	1609188-01	Air	08/30/16
2	SV-02-160830	1609188-02	Air	08/30/16
3	SV-03-160830	1609188-03	Air	08/30/16
4	SV-04-160830	1609188-04	Air	08/30/16
5	SV-05-160830	1609188-05	Air	08/30/16
6	SV-06-160830	1609188-06	Air	08/30/16
7	SV-11-160908	1609188-07	Air	09/08/16
8	SV-12-160908	1609188-08	Air	09/08/16
9 1,2	SV-13-160908	1609188-09	Air	09/08/16
10	SV-FD-160908	1609188-10	Air	09/08/16
11				
12				
13 1	P160913-MB = P160914-MB			

LDC #: 27300K48

VALIDATION FINDINGS CHECKLIST

Reviewer: YC
2nd Reviewer: Q

Method: Volatiles (EPA Method TO-15)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	✓			
Was canister pressure criteria met?	✓			
II. GC/MS Instrument performance check				
Were the BFB performance results reviewed and found to be within the specified criteria?	✓			
Were all samples analyzed within the 24 hour clock criteria?	✓			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	✓			
Were all percent relative standard deviations (%RSD) ≤ 30%?	✓			
IIIb. Initial calibration verificattion				
Was an initial calibration verification standard analyzed after every ICAL for each instrument?	✓			
Were all percent differences (%D) ≤ 30% or percent recoveries (%R) 70-130%?	✓			
IV. Continuing calibration				
Was a continuing calibration standard analyzed at least once every 24 hours for each instrument?		✓		
Were all percent differences (%D) ≤ 30% or percent recoveries (%R) 70-130%?		✓		
V. Laboratory Blanks/Canister Blanks				
Was a laboratory blank associated with every sample in this SDG?	✓			
Was a laboratory blank analyzed at least once every 24 hours for each matrix and concentration?	✓			
Was there contamination in the laboratory blanks? If yes, please see the Blanks validation completeness worksheet.		✓		
Was a canister blank analyzed for every canister?	✓			
Was there contamination in the canister blanks? If yes, please see the Canister Blanks validation completeness worksheet.		✓		
VI. Field Blanks				
Were field blanks identified in this SDG?		✓		
Were target compounds detected in the field blanks?			✓	
VII. Surrogate spikes (Optional)				
Were all surrogate percent recoveries (%R) within QC limits?	✓			
If the percent recovery (%R) for one or more surrogates was out of QC limits, was a reanalysis performed to confirm samples with %R outside of criteria?			✓	
VIII. Laboratory Duplicate				
Was a laboratory duplicate analyzed for this SDG?		✓		
Were the relative percent differences (RPD) within the QC limits?			✓	

Validation Area	Yes	No	NA	Findings/Comments
IX. Laboratory control samples				
Was an LCS analyzed for this SDG?	✓			
Was an LCS analyzed per analytical batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	✓			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?	✓			
Were target compounds detected in the field duplicates?	✓			
XI. Internal standards				
Were internal standard area counts within ± 40% from the associated calibration standard?	✓			
Were retention times within ± 20.0 seconds from the associated calibration standard?	✓			
XII. Compound quantitation				
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the compound?	✓			
Were compound quantitation and RLs adjusted to reflect all sample dilutions applicable to level IV validation?	✓			
XIII. Target compound identification				
Were relative retention times (RRT's) within ± 0.06 RRT units of the standard?	✓			
Did compound spectra meet specified EPA "Functional Guidelines" criteria?	✓			
Were chromatogram peaks verified and accounted for?	✓			
XIV. System performance				
System performance was found to be acceptable.	✓			
XV. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			

TARGET COMPOUND WORKSHEET

METHOD: VOA

A. Chloromethane	U. 1,1,2-Trichloroethane	OO. 2,2-Dichloropropane	III. n-Butylbenzene	CCCC.1-Chlorohexane
B. Bromomethane	V. Benzene	PP. Bromochloromethane	JJJ. 1,2-Dichlorobenzene	DDDD. Isopropyl alcohol
C. Vinyl choride	W. trans-1,3-Dichloropropene	QQ. 1,1-Dichloropropene	KKK. 1,2,4-Trichlorobenzene	EEEE. Acetonitrile
D. Chloroethane	X. Bromoform	RR. Dibromomethane	LLL. Hexachlorobutadiene	FFFF. Acrolein
E. Methylene chloride	Y. 4-Methyl-2-pentanone	SS. 1,3-Dichloropropane	MMM. Naphthalene	GGGG. Acrylonitrile
F. Acetone	Z. 2-Hexanone	TT. 1,2-Dibromoethane	NNN. 1,2,3-Trichlorobenzene	HHHH. 1,4-Dioxane
G. Carbon disulfide	AA. Tetrachloroethene	UU. 1,1,1,2-Tetrachloroethane	OOO. 1,3,5-Trichlorobenzene	IIII. Isobutyl alcohol
H. 1,1-Dichloroethene	BB. 1,1,2,2-Tetrachloroethane	VV. Isopropylbenzene	PPP. trans-1,2-Dichloroethene	JJJJ. Methacrylonitrile
I. 1,1-Dichloroethane	CC. Toluene	WW. Bromobenzene	QQQ. cis-1,2-Dichloroethene	KKKK. Propionitrile
J. 1,2-Dichloroethene, total	DD. Chlorobenzene	XX. 1,2,3-Trichloropropane	RRR. m,p-Xylenes	LLLL. Ethyl ether
K. Chloroform	EE. Ethylbenzene	YY. n-Propylbenzene	SSS. o-Xylene	MMMM. Benzyl chloride
L. 1,2-Dichloroethane	FF. Styrene	ZZ. 2-Chlorotoluene	TTT. 1,1,2-Trichloro-1,2,2-trifluoroethane	NNNN. Iodomethane
M. 2-Butanone	GG. Xylenes, total	AAA. 1,3,5-Trimethylbenzene	UUU. 1,2-Dichlorotetrafluoroethane	OOOO.1,1-Difluoroethane
N. 1,1,1-Trichloroethane	HH. Vinyl acetate	BBB. 4-Chlorotoluene	VVV. 4-Ethyltoluene	PPPP.
O. Carbon tetrachloride	II. 2-Chloroethylvinyl ether	CCC. tert-Butylbenzene	WWW. Ethanol	QQQQ.
P. Bromodichloromethane	JJ. Dichlorodifluoromethane	DDD. 1,2,4-Trimethylbenzene	XXX. Di-isopropyl ether	RRRR.
Q. 1,2-Dichloropropane	KK. Trichlorofluoromethane	EEE. sec-Butylbenzene	YYY. tert-Butanol	SSSS.
R. cis-1,3-Dichloropropene	LL. Methyl-tert-butyl ether	FFF. 1,3-Dichlorobenzene	ZZZ. tert-Butyl alcohol	TTTT.
S. Trichloroethene	MM. 1,2-Dibromo-3-chloropropane	GGG. p-Isopropyltoluene	AAAA. Ethyl tert-butyl ether	UUUU.
T. Dibromochloromethane	NN. Methyl ethyl ketone	HHH. 1,4-Dichlorobenzene	BBBB. tert-Amyl methyl ether	VVVV.

LDC#: 37300A48

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Reviewer: A
2nd Reviewer: Q

METHOD: GC/MS Volatiles (EPA Method TO-15)

Compound	Concentration (ug/m3)		RPD (≤ 100)
	8	10	
C	82	89	8
QQQ	42	43	2
S	15	16	6

LDC #: 37300A48

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Page: 1 of 1
Reviewer: SR
2nd Reviewer: Q

METHOD: GC/MS VOA (EPA Method TO-15)

The Relative Response Factor (RRF), average RRF, and percent relative standard deviation (%RSD) were recalculated for the compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
$\%RSD = 100 * (S/X)$

A_x = Area of compound,
C_x = Concentration of compound,
S = Standard deviation of the RRFs
X = Mean of the RRFs

A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Reported RRF (5.0 std)	Recalculated RRF (5.0 std)	Reported Average RRF (initial)	Recalculated Average RRF (initial)	Reported %RSD	Recalculated %RSD
1	10AE	6/14/16	Vinyl chloride (1st internal standard)	2.392	2.392	2.345	2.345	9.69	9.69
			Trichloroethene (2nd internal standard)	0.378	0.378	0.392	0.392	6.52	6.51
			Tetrachloroethene (3rd internal standard)	1.013	1.013	1.052	1.052	9.77	9.78
2			Vinyl chloride (1st internal standard)						
			Trichloroethene (2nd internal standard)						
			Tetrachloroethene (3rd internal standard)						
3			Vinyl chloride (1st internal standard)						
			Trichloroethene (2nd internal standard)						
			Tetrachloroethene (3rd internal standard)						
4			Vinyl chloride (1st internal standard)						
			Trichloroethene (2nd internal standard)						
			Tetrachloroethene (3rd internal standard)						

Comments: Refer to Initial Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 37300A48

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

Reviewer: BT
2nd Reviewer: [illegible]

METHOD: GC/MS VOA (EPA TO-15)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
$RRF = (A_x)(C_{is})/(A_{is})(C_x)$

Where: ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
A_x = Area of compound, A_{is} = Area of associated internal standard
C_x = Concentration of compound, C_{is} = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (Reference internal Standard)	Average RRF (initial)	Reported RRF (CC)	Recalculated RRF (CC)	Reported %D	Recalculated %D
1	09131602	9/13/16	Vinyl chloride (1st internal standard)					
			Trichloroethene (2nd internal standard)					
			Tetrachloroethene (3rd internal standard)					
2	09141601	9/14/16	Vinyl chloride (1st internal standard)					
			Trichloroethene (2nd internal standard)					
			Tetrachloroethene (3rd internal standard)					
3			Vinyl chloride (1st internal standard)					
			Trichloroethene (2nd internal standard)					
			Tetrachloroethene (3rd internal standard)					
4			Vinyl chloride (1st internal standard)					
			Trichloroethene (2nd internal standard)					
			Tetrachloroethene (3rd internal standard)					

Comments: Refer to Continuing Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 27300A48

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

Reviewer: [illegible]
2nd reviewer: [illegible]

METHOD: GC/MS Volatiles (EPA Method TO-15)

The percent recoveries (%R) of surrogates were recalculated for the compounds identified below using the following calculation:
% Recovery: SF/SS * 100 Where: SF = Surrogate Found
SS = Surrogate Spiked

Sample ID: 1

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Toluene-d8			100		
Bromofluorobenzene			99		
1,2-Dichloroethane-d4			94		

Sample ID: _____

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Toluene-d8					
Bromofluorobenzene					
1,2-Dichloroethane-d4					

Sample ID: _____

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Toluene-d8					
Bromofluorobenzene					
1,2-Dichloroethane-d4					

Sample ID: _____

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Toluene-d8					
Bromofluorobenzene					
1,2-Dichloroethane-d4					

Sample ID: _____

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Toluene-d8					
Bromofluorobenzene					
1,2-Dichloroethane-d4					

Sample ID: _____

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Toluene-d8					
Bromofluorobenzene					
1,2-Dichloroethane-d4					

LDC #: 37300A48

VALIDATION FINDINGS WORKSHEET
Laboratory Control Sample Results Verification

Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: GC/MS VOA (EPA Method TO-15)

The percent recoveries (%R) and Relative Percent Difference (RPD) of the laboratoy control sample and laboratory control sample duplicate (if applicable) were recalculated for the compounds identified below using the following calculation:

% Recovery = 100 * SSC/SA Where: SSC = Spiked sample concentration
SA = Spike added

RPD = | LCS - LCSD | * 2/(LCS + LCSD) LCS = Laboraotry control sample percent recovery LCSD = Laboratory control sample duplicate percent recovery

LCS ID: 160913-LCS/D

Compound	Spike Added (ug/m3)		Spiked Sample Concentration (ug/m3)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc	Reported	Recalc	Reported	Recalculated
1,1-Dichloroethene	216	216	218	221	101		102		1	
Trichloroethene	↓	↓	193	196	89		91		2	
Benzene										
Toluene										
Chlorobenzene										

Comments: Refer to Laboratory Control Sample findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 37300A48

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Reviewer: PE
2nd reviewer: [signature]

METHOD: GC/MS VOA (EPA Method TO-15)

Y N N/A Were all reported results recalculated and verified for all level IV samples?

Y N N/A Were all recalculated results for detected target compounds agree within 10.0% of the reported results?

Concentration = $\frac{(A_x)(I_s)(DF)}{(A_{is})(RRF)(V_o)(\%S)}$

A_x = Area of the characteristic ion (EICP) for the compound to be measured

A_{is} = Area of the characteristic ion (EICP) for the specific internal standard

I_s = Amount of internal standard added in nanograms (ng)

RRF = Relative response factor of the calibration standard.

V_o = Volume or weight of sample pruged in milliliters (ml) or grams (g).

Df = Dilution factor.

%S = Percent solids, applicable to soils and solid matrices only.

Example:

Sample I.D. 1, 11:

Conc. = $\frac{(32842)(12.5)(1.38)}{(1922232)(1.442)(0.15)(\quad)}$

= 136 ug/m3

#	Sample ID	Compound	Reported Concentration ( )	Calculated Concentration ( )	Qualification

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Naval Base Kitsap, CTO JP09

LDC Report Date: October 28, 2016

Parameters: Helium

Validation Level: Level IV

Laboratory: Empirical Laboratories, LLC/ALS Environmental

Sample Delivery Group (SDG): 1609188/P1604352

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
SV-11-160908	1609188-07	Air	09/08/16
SV-12-160908	1609188-08	Air	09/08/16
SV-13-160908	1609188-09	Air	09/08/16
SV-FD-160908	1609188-10	Air	09/08/16

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Sampling and Analysis Plan, Keyport OU1 Site Recharacterization, Keyport, Washington (July 2016), the U.S. Naval Facilities Engineering Command (NAVFAC) Northwest Standard Operating Procedure: Field Procedures Manual (February 2015), the U.S. Department of Defense (DoD) Quality Systems Manual (QSM) for Environmental Laboratories, Version 5.0 (July 2013), and a modified outline of the USEPA National Functional Guidelines (NFG) for Superfund Organic Methods Data Review (August 2014). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Helium by Environmental Protection Agency (EPA) Method 3C

All sample results were subjected to Level IV data validation, which is comprised of the quality control (QC) summary forms as well as the raw data, to confirm sample quantitation and identification.

The following are definitions of the data qualifiers utilized during data validation:

J (Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.

U (Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).

UJ (Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.

R (Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.

NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Qualification Code Reference

H Holding times were exceeded.

S Surrogate recovery was outside QC limits.

C Calibration %RSD, r, r^2 or %D were noncompliant

R Calibration RRF was <0.05.

B Presumed contamination from preparation (method blank)

L Laboratory Control Sample/Laboratory Control Sample Duplicate %R or RPD was not within control limits

Q MS/MSD recovery was poor

E MS/MSD or Duplicate RPD was high.

I Internal standard performance was unsatisfactory

M Instrument Performance Check (BFB or DFTPP) was noncompliant

T Presumed contamination from trip blank.

F Presumed contamination from FB or ER.

D The analysis with this flag should not be used because another more technically sound analysis is available.

P Instrument performance for pesticides was poor

*# Unusual problems found with the data. The number following the asterisk (*) will indicate the section in the validation report where a description of the problem can be found.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition and cooler temperatures upon receipt met validation criteria.

All technical holding time requirements were met.

II. Initial Calibration and Initial Calibration Verification

An initial calibration was performed as required by the method.

The percent relative standard deviations (%RSD) were less than or equal to 20.0%.

Retention time windows were established as required by the method.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 20.0%.

III. Continuing Calibration

Continuing calibration was performed at required frequencies.

The percent differences (%D) were less than or equal to 20.0%.

Retention times of all compounds in the calibration standards were within the established retention time windows.

IV. Laboratory Blanks

Laboratory blanks were analyzed as required by the method. No contaminants were found in the laboratory blanks.

V. Field Blanks

No field blanks were identified in this SDG.

VI. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicates (MSD) analyses were not required by the method.

VII. Laboratory Control Samples

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method. Percent recoveries (%R) were within QC limits. Relative percent differences (RPD) were within QC limits.

VIII. Field Duplicates

Samples SV-12-160908 and SV-FD-160908 were identified as field duplicates. No results were detected in any of the samples with the following exceptions:

Compound	Concentration (ug/m^3)		RPD (Limits)
	SV-12-160908	SV-FD-160908	
Helium	460,000	850,000	60 (≤100)

IX. Compound Quantitation

All compound quantitations met validation criteria.

X. Target Compound Identification

All target compound identifications met validation criteria.

XI. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

The quality control criteria reviewed were met and are considered acceptable. Based upon the data validation all results are considered valid and usable for all purposes.

Naval Base Kitsap, CTO JP09
Helium - Data Qualification Summary - SDG 1609188/P1604352

No Sample Data Qualified in this SDG

Naval Base Kitsap, CTO JP09
Helium - Laboratory Blank Data Qualification Summary - SDG 1609188/P1604352

No Sample Data Qualified in this SDG

Naval Base Kitsap, CTO JP09
Helium - Field Blank Data Qualification Summary - SDG 1609188/P1604352

No Sample Data Qualified in this SDG

LDC #: 37300A50 **VALIDATION COMPLETENESS WORKSHEET** Date: 10/20/16

SDG #: 1609188/P1604352 Level IV Page: 1 of 1

Laboratory: Empirical Laboratories, LLC/ALS Environmental Reviewer: A

2nd Reviewer: [illegible]

METHOD: GC Helium (EPA Method 3C)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A / A	
II.	Initial calibration/ICV	A / A	RSD ≤ 20 ICV ≤ 20
III.	Continuing calibration	A	D ≤ 20
IV.	Laboratory Blanks	A	
V.	Field blanks	N	
VI.	Matrix spike/Matrix spike duplicates	N	not req'd
VII.	Laboratory control samples	A	LCS/D
VIII.	Field duplicates	SW	D = 2+4
IX.	Compound quantitation RL/LOQ/LODs	A	
X.	Target compound identification	A	
XI.	Overall assessment of data	A	

Note: A = Acceptable ND = No compounds detected D = Duplicate SB=Source blank
N = Not provided/applicable R = Rinsate TB = Trip blank OTHER:
SW = See worksheet FB = Field blank EB = Equipment blank

	Client ID	Lab ID	Matrix	Date
1	SV-11-160908	1609188-07	Air	09/08/16
2	SV-12-160908	1609188-08	Air	09/08/16
3	SV-13-160908	1609188-09	Air	09/08/16
4	SV-FD-160908	1609188-10	Air	09/08/16
5				
6				
7				
8				
9				
10				
11				
12				
13				

Notes: canister

LDC #: 37300A50

VALIDATION FINDINGS CHECKLIST

Reviewer: MC
2nd Reviewer:

Method: / GC

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	/			
Was canister pressure criteria met?	/			
IIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	/			
Were all percent relative standard deviations (%RSD) ≤ 20%?	/			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥0.990?			/	
Were the RT windows properly established?	/			
IIb. Initial calibration verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	/			
Were all percent differences (%D) ≤ 20% or percent recoveries (%R) 80-120%?	/			
III. Continuing calibration				
Was a continuing calibration analyzed daily?	/			
Were all percent differences (%D) ≤ 20% or percent recoveries (%R) 80-120%?	/			
Were all the retention times within the acceptance windows?	/			
IV. Laboratory Blanks				
Was a laboratory blank associated with every sample in this SDG?	/			
Was a laboratory blank analyzed for each matrix and concentration?	/			
Was there contamination in the laboratory blanks? If yes, please see the Blanks validation completeness worksheet.		/		
V. Field Blanks				
Were field blanks identified in this SDG?		/		
Were target compounds detected in the field blanks?			/	
VI. Laboratory Duplicates				
Was a laboratory duplicate analyzed for this SDG?		/		
Were the relative percent differences (RPD) within the QC limits?			/	
VII. Laboratory control samples				
Was an LCS analyzed for this SDG?	/			
Was an LCS analyzed per extraction batch?	/			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	/			
VIII. Field duplicates				
Were field duplicate pairs identified in this SDG?		/		
Were target compounds detected in the field duplicates?			/	

Validation Area	Yes	No	NA	Findings/Comments
IX. Compound quantitation				
Were compound quantitation and RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	/			
X. Target compound identification				
Were the retention times of reported detects within the RT windows?	/			
XI. Overall assessment of data				
Overall assessment of data was found to be acceptable.	/			

LDC#: 37300A50

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Page: 1 of 1
Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: GC (EPA Method 3C)

Compound	Concentration (ug/m3)		RPD (≤ 100)
	2	4	
Helium	460,000	850,000	60

V:\FIELD DUPLICATES\37300A50.wpd

LDC #: 37300A50

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Reviewer: JC
2nd Reviewer: Q

METHOD: GC

The calibration factors (CF) and relative standard deviation (%RSD) were recalculated using the following calculations:

CF = A/C
Average CF = sum of the CF/number of standards
%RSD = 100 * (S/X)

Where: A = Area of compound
C = Concentration of compound
S = Standard deviation of calibration factors
X = Mean of calibration factors

#	Standard ID	Calibration Date	Compound	Reported CF (1000 std)	Recalculated CF (1000 std)	Reported Ave CF (initial)	Recalculated Ave CF (intial)	Reported %RSD	Recalculated %RSD
1	ICAL	9/21/15	Helium	44.13	44.13	43.73	43.73	6.31	6.31
2									
3									
4									

Comments: Refer to Initial Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 37300A50

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

Reviewer: SC
2nd Reviewer: SK

METHOD: GC

The percent difference (%D) of the initial calibration average Calibration Factors (CF) and the continuing calibration CF were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. CF -CF)/ave.CF

Where: ave. CF = initial calibration average CF
CF = continuing calibration CF
A = Area of compound
C = Concentration of compound

#	Standard ID	Calibration Date	Compound	Average CF(Ical)/ CCV Conc.	Reported CF/ Conc. CCV	Recalculated CF/ Conc. CCV	Reported %D	Recalculated %D
1	0913160	9/13/16	Helium	10000	10006.3	10006.4	0.06	0.06
2								
3								
4								
5								

Comments: Refer to Continuing Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 37300A50

VALIDATION FINDINGS WORKSHEET
Laboratory Control Sample/Laboratory Control Sample Duplicate Results Verification

Reviewer: A
2nd Reviewer: Q

METHOD: /GC __HPLC

The percent recoveries (%R) and Relative Percent difference (RPD) of the laboratory control sample and laboratory control sample duplicate were recalculated for the compounds identified below using the following calculation:

% Recovery = 100* (SSC-SC)/SA

RPD = I SSCLCS - SSCLCSD I * 2/(SSCLCS + SSCLCSD)

Where: SSC = Spiked sample concentration
SA = Spike added
LCS = Laboratory control sample percent recovery
SC = Concentration
LCSD = Laboratory control sample duplicate percent recovery

LCS/LCSD samples: P160913-LCS/D

Compound	Spike Added (ug/m3)		Spiked Sample Concentration (ug/m3)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
Hydrogen sulfide										
Helium	1640000	1640000	1660000	1680000	101	101	102	102	1.0	1.0
Methane										

Comments: Refer to Laboratory Control Sample/Laboratory Control Sample Duplicate findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 27800A5D

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Reviewer:
2nd reviewer:

METHOD: GC

Y N N/A Were all reported results recalculated and verified for all level IV samples?
Y N N/A Were all recalculated results for detected target compounds agree within 10.0% of the reported results?

Concentration = $\frac{(A_x)(V_t)(DF)}{(A_{is})(CF)(V_o)(\%S)}$

A_x = Area of the characteristic ion (EICP) for the compound to be measured

A_{is} = Area of the characteristic ion (EICP) for the specific internal standard

V_t = Volume of the concentrated extract in microliters (ul)

CF = Average calibration factor from the initial calibration

V_o = Volume or weight of sample pruged in milliliters (ml) or grams (g).

Df = Dilution factor.

%S = Percent solids, applicable to soils and solid matrices only.

Example:

Sample I.D. 1, Helium

Conc. = $\frac{(2794)(1.41)(4)}{(43.73)(1)(24.45)(\quad)}$

= 15 mg/m3

= 15000 mg/m3

#	Sample ID	Compound	Reported Concentration ( )	Calculated Concentration ( )	Qualification

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Naval Base Kitsap, CTO JP09

LDC Report Date: October 27, 2016

Parameters: Methane

Validation Level: Level IV

Laboratory: Empirical Laboratories, LLC/ALS Environmental

Sample Delivery Group (SDG): 1609188/P1604352

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
SV-01-160830	1609188-01	Air	08/30/16
SV-02-160830	1609188-02	Air	08/30/16
SV-03-160830	1609188-03	Air	08/30/16
SV-04-160830	1609188-04	Air	08/30/16
SV-05-160830	1609188-05	Air	08/30/16
SV-06-160830	1609188-06	Air	08/30/16
SV-11-160908	1609188-07	Air	09/08/16
SV-12-160908	1609188-08	Air	09/08/16
SV-13-160908	1609188-09	Air	09/08/16
SV-FD-160908	1609188-10	Air	09/08/16

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Sampling and Analysis Plan, Keyport OU1 Site Recharacterization, Keyport, Washington (July 2016), the U.S. Naval Facilities Engineering Command (NAVFAC) Northwest Standard Operating Procedure: Field Procedures Manual (February 2015), the U.S. Department of Defense (DoD) Quality Systems Manual (QSM) for Environmental Laboratories, Version 5.0 (July 2013), and a modified outline of the USEPA National Functional Guidelines (NFG) for Superfund Organic Methods Data Review (August 2014). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Methane by Environmental Protection Agency (EPA) Method TO-3 Modified

All sample results were subjected to Level IV data validation, which is comprised of the quality control (QC) summary forms as well as the raw data, to confirm sample quantitation and identification.

The following are definitions of the data qualifiers utilized during data validation:

J (Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.

U (Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).

UJ (Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.

R (Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.

NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Qualification Code Reference

H	Holding times were exceeded.
S	Surrogate recovery was outside QC limits.
C	Calibration %RSD, r, r^2 or %D were noncompliant
R	Calibration RRF was <0.05.
B	Presumed contamination from preparation (method blank)
L	Laboratory Control Sample/Laboratory Control Sample Duplicate %R or RPD was not within control limits
Q	MS/MSD recovery was poor
E	MS/MSD or Duplicate RPD was high.
I	Internal standard performance was unsatisfactory
M	Instrument Performance Check (BFB or DFTPP) was noncompliant
T	Presumed contamination from trip blank.
F	Presumed contamination from FB or ER.
D	The analysis with this flag should not be used because another more technically sound analysis is available.
P	Instrument performance for pesticides was poor
*#	Unusual problems found with the data. The number following the asterisk (*) will indicate the section in the validation report where a description of the problem can be found.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition and cooler temperatures upon receipt met validation criteria.

All technical holding time requirements were met.

II. Initial Calibration and Initial Calibration Verification

An initial calibration was performed as required by the method.

The percent relative standard deviations (%RSD) were less than or equal to 20.0%.

Retention time windows were established as required by the method.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 20.0%.

III. Continuing Calibration

Continuing calibration was performed at required frequencies.

The percent differences (%D) were less than or equal to 20.0%.

Retention times of all compounds in the calibration standards were within the established retention time windows.

IV. Laboratory Blanks

Laboratory blanks were analyzed as required by the method. No contaminants were found in the laboratory blanks.

V. Field Blanks

No field blanks were identified in this SDG.

VI. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicates (MSD) analyses were not required by the method.

VII. Laboratory Control Samples

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method. Percent recoveries (%R) were within QC limits. Relative percent differences (RPD) were within QC limits.

VIII. Field Duplicates

Samples SV-12-160908 and SV-FD-160908 were identified as field duplicates. No results were detected in any of the samples with the following exceptions:

Compound	Concentration (ug/m^3)		RPD (Limits)
	SV-12-160908	SV-FD-160908	
Methane	19,000	19,000	0 (≤100)

IX. Compound Quantitation

All compound quantitations met validation criteria.

X. Target Compound Identification

All target compound identifications met validation criteria.

XI. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

The quality control criteria reviewed were met and are considered acceptable. Based upon the data validation all results are considered valid and usable for all purposes.

Naval Base Kitsap, CTO JP09
Methane - Data Qualification Summary - SDG 1609188/P1604352

No Sample Data Qualified in this SDG

Naval Base Kitsap, CTO JP09
Methane - Laboratory Blank Data Qualification Summary - SDG 1609188/P1604352

No Sample Data Qualified in this SDG

Naval Base Kitsap, CTO JP09
Methane - Field Blank Data Qualification Summary - SDG 1609188/P1604352

No Sample Data Qualified in this SDG

LDC #: 37300A51 **VALIDATION COMPLETENESS WORKSHEET** Date: 10/20/16

SDG #: 1609188/P1604352 Level IV Page: 1 of 1

Laboratory: Empirical Laboratories, LLC/ALS Environmental Reviewer: 9

2nd Reviewer: Q

METHOD: GC Methane (EPA Method TO-3) Modified

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A/A	
II.	Initial calibration/ICV	A/A	RSD ≤ 20 ICV ≤ 20
III.	Continuing calibration	A	D ≤ 20
IV.	Laboratory Blanks	A	
V.	Field blanks	N	
VI.	Matrix spike/Matrix spike duplicates	N	not req'd
VII.	Laboratory control samples	A	LCS/D
VIII.	Field duplicates	SW	D = 8+10
IX.	Compound quantitation RL/LOQ/LODs	A	
X.	Target compound identification	A	
XI.	Overall assessment of data	A	

Note: A = Acceptable ND = No compounds detected D = Duplicate SB=Source blank
N = Not provided/applicable R = Rinsate TB = Trip blank OTHER:
SW = See worksheet FB = Field blank EB = Equipment blank

	Client ID	Lab ID	Matrix	Date
1	SV-01-160830	1609188-01	Air	08/30/16
2	SV-02-160830	1609188-02	Air	08/30/16
3	SV-03-160830	1609188-03	Air	08/30/16
4	SV-04-160830	1609188-04	Air	08/30/16
5	SV-05-160830	1609188-05	Air	08/30/16
6	SV-06-160830	1609188-06	Air	08/30/16
7	SV-11-160908	1609188-07	Air	09/08/16
8	SV-12-160908	1609188-08	Air	09/08/16
9	SV-13-160908	1609188-09	Air	09/08/16
10	SV-FD-160908	1609188-10	Air	09/08/16
11				
12				
13				
14				

Notes: Canisters

LDC #: 37300b51

VALIDATION FINDINGS CHECKLIST

Reviewer: MC
2nd Reviewer: CT

Method: / GC

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	/			
Was canister pressure criteria met?	/			
IIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	/			
Were all percent relative standard deviations (%RSD) ≤ 20%?	/			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥0.990?			/	
Were the RT windows properly established?	/			
IIb. Initial calibration verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	/			
Were all percent differences (%D) ≤ 20% or percent recoveries (%R) 80-120%?	/			
III. Continuing calibration				
Was a continuing calibration analyzed daily?	/			
Were all percent differences (%D) ≤ 20% or percent recoveries (%R) 80-120%?	/			
Were all the retention times within the acceptance windows?	/			
IV. Laboratory Blanks				
Was a laboratory blank associated with every sample in this SDG?	/			
Was a laboratory blank analyzed for each matrix and concentration?	/			
Was there contamination in the laboratory blanks? If yes, please see the Blanks validation completeness worksheet.		/		
V. Field Blanks				
Were field blanks identified in this SDG?		/		
Were target compounds detected in the field blanks?			/	
VI. Laboratory Duplicates				
Was a laboratory duplicate analyzed for this SDG?		/		
Were the relative percent differences (RPD) within the QC limits?			/	
VII. Laboratory control samples				
Was an LCS analyzed for this SDG?	/			
Was an LCS analyzed per extraction batch?	/			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	/			
VIII. Field duplicates				
Were field duplicate pairs identified in this SDG?		/		
Were target compounds detected in the field duplicates?			/	

Validation Area	Yes	No	NA	Findings/Comments
IX. Compound quantitation				
Were compound quantitation and RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	/			
X. Target compound identification				
Were the retention times of reported detects within the RT windows?	/			
XI. Overall assessment of data				
Overall assessment of data was found to be acceptable.	/			

LDC#: 37300A51

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Page: 1 of 1
Reviewer:
2nd Reviewer:

METHOD: GC (EPA Method TO-3 Modified)

Compound	Concentration (ug/m3)		RPD (≤ 100)
	8	10	
Methane	19,000	19,000	0

LDC #: 37300A51

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Page: 1 of 1
Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: GC

The calibration factors (CF) and relative standard deviation (%RSD) were recalculated using the following calculations:

CF = A/C
Average CF = sum of the CF/number of standards
%RSD = 100 * (S/X)

Where: A = Area of compound
C = Concentration of compound
S = Standard deviation of calibration factors
X = Mean of calibration factors

#	Standard ID	Calibration Date	Compound	Reported CF (50 std)	Recalculated CF (50 std)	Reported Ave CF (initial)	Recalculated Ave CF (intial)	Reported %RSD	Recalculated %RSD
1	ICAL	4/21/16	Methane	2.158 E4	2.158 E4	2.193 E4	2.193 E4	6.07	6.08
2									
3									
4									

Comments: Refer to Initial Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 37300A51

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: GC

The percent difference (%D) of the initial calibration average Calibration Factors (CF) and the continuing calibration CF were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. CF -CF)/ave.CF

Where: ave. CF = initial calibration average CF
CF = continuing calibration CF
A = Area of compound
C = Concentration of compound

#	Standard ID	Calibration Date	Compound	Average CF(Ical)/ CCV Conc.	Reported CF/ Conc. CCV	Recalculated CF/ Conc. CCV	Reported %D	Recalculated %D
1	09131601	9/13/16	Methane	1000	983.4	983.5	1.7	1.6
		↓	↓	↓				
	09131615	↓	↓	↓	-	973.3	-	2.7
2								
3								
4								
5								

Comments: Refer to Continuing Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 37320A51

VALIDATION FINDINGS WORKSHEET
Laboratory Control Sample/Laboratory Control Sample Duplicate Results Verification

Reviewer: SR
2nd Reviewer: [illegible]

METHOD: ✓ GC __HPLC

The percent recoveries (%R) and Relative Percent difference (RPD) of the laboratory control sample and laboratory control sample duplicate were recalculated for the compounds identified below using the following calculation:

% Recovery = 100* (SSC-SC)/SA

RPD = | SSCLCS - SSCLCSD | * 2/(SSCLCS + SSCLCSD)

Where: SSC = Spiked sample concentration
SA = Spike added
LCS = Laboratory control sample percent recovery
SC = Concentration
LCSD = Laboratory control sample duplicate percent recovery

LCS/LCSD samples: P160913-LCS/D

Compound	Spike Added (mg/kg)		Spiked Sample Concentration (mg/kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
Hydrogen sulfide										
Helium										
Methane	662	662	648	652	98	98	98	98	0	0.6

Comments: Refer to Laboratory Control Sample/Laboratory Control Sample Duplicate findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 37300A51

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Page: 1 of 1
Reviewer: [illegible]
2nd reviewer: [illegible]

METHOD: GC

Y N N/A Were all reported results recalculated and verified for all level IV samples?
Y N N/A Were all recalculated results for detected target compounds agree within 10.0% of the reported results?

Concentration = $\frac{(A_x)(V_t)(DF)}{(A_{is})(CF)(V_o)(\%S)}$

A_x = Area of the characteristic ion (EICP) for the compound to be measured

A_{is} = Area of the characteristic ion (EICP) for the specific internal standard

V_t = Volume of the concentrated extract in microliters (ul)

CF = Average calibration factor from the initial calibration

V_o = Volume or weight of sample pruged in milliliters (ml) or grams (g).

Df = Dilution factor.

%S = Percent solids, applicable to soils and solid matrices only.

Example:

Sample I.D. 1, Methane

Conc. = $\frac{(144052510)(1.38)(16)}{(2.193E4)(0.1)(24.45)(\quad)}$

= 59,000 mg/m3

#	Sample ID	Compound	Reported Concentration ( )	Calculated Concentration ( )	Qualification