FORMER SWIVELIER SITE

ROCKLAND COUNTY

NANUET, NEW YORK

SITE MANAGEMENT PLAN

NYSDEC Site Number: 3-44-036

Prepared for:

S.F. Properties, LLC

627 South Main Street

New City, NY 10956

Prepared by:

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Revisions to Final Approved Site Management Plan:

Revision No.	Date Submitted	Summary of Revision	NYSDEC Approval Date

JUNE 2018

CERTIFICATION STATEMENT

I, Jacob M. Strauss, certify that I am currently a NYS registered professional engineer and that this Site Management Plan was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10).

________________________ P.E.

6/27/2018 ______________ DATE

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List of Acronyms

BCA	Brownfield Cleanup Agreement
BCP	Brownfield Cleanup Program
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CAMP	Community Air Monitoring Plan
COC	Certificate of Completion
CO2	Carbon Dioxide
CP	Commissioner Policy
DER	Division of Environmental Remediation
EC	Engineering Control
ELAP	Environmental Laboratory Approval Program
ERP	Environmental Restoration Program
EWP	Excavation Work Plan
HASP	Health and Safety Plan
IC	Institutional Control
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
NYCRR	New York Codes, Rules and Regulations
O&M	Operation and Maintenance
OM&M	Operation, Maintenance and Monitoring
OSHA	Occupational Safety and Health Administration
PID	Photoionization Detector
PRP	Potentially Responsible Party
PRR	Periodic Review Report
QA/QC	Quality Assurance/Quality Control
QAPP	Quality Assurance Project Plan
RAO	Remedial Action Objective
RAWP	Remedial Action Work Plan
RCRA	Resource Conservation and Recovery Act
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RP	Remedial Party
RSO	Remedial System Optimization
SCG	Standards, Criteria and Guidelines
SCO	Soil Cleanup Objective
SMP	Site Management Plan
SOP	Standard Operating Procedures
SOW	Statement of Work
SSDS	Sub-Slab Depressurization System
SVI	Soil Vapor Intrusion
TAL	Target Analyte List
TCL	Target Compound List
USEPA	United States Environmental Protection Agency
VCA	Voluntary Cleanup Agreement
VCP	Voluntary Cleanup Program

ES EXECUTIVE SUMMARY

The following provides a brief summary of the controls implemented for the Site, as well as the inspections, monitoring, maintenance and reporting activities required by this Site Management Plan:

Site Identification: NYSDEC Site Number: 3-44-036

Former Swivelier Site, Nanuet, New York

Institutional Controls:	1. The property may be used for commercial and industrial use;
	2. Prevent future exposure to remaining contamination by controlling disturbances of the subsurface contamination;
	3. All ECs must be inspected at a frequency and in a manner defined in the SMP.
Engineering Controls:	1. Cover System
	2. Sub-Slab Depressurization System (SSDS)

Inspections:	Frequency
1. Cover inspection	Annually
2. SSDS	Annually
Monitoring:	
1. Groundwater Monitoring Wells MW-10D, MW-11D and MW-13D	Annually
Maintenance:	
1. Blower or radon fan maintenance	Annually, if needed
Reporting:	
1. Groundwater and SSDS Data	Annually
2. Periodic Review Report	Annually

Further descriptions of the above requirements are provided in detail in the latter sections of this Site Management Plan.

1.0 INTRODUCTION

1.1 General

This Site Management Plan (SMP) is a required element of the remedial program for the Former Swivelier Site located in Nanuet, New York (hereinafter referred to as the "Site"). See **Figure 1**. The Site is currently in the New York State (NYS) Voluntary Cleanup Program (VCP) Site No. V-00520-3 which is administered by New York State Department of Environmental Conservation (NYSDEC).

S.F. Properties, LLC (S.F. Properties) entered into a Voluntary Cleanup Agreement (VCA) in April 2002 with the NYSDEC to remediate the site. A figure showing the site location and boundaries of this site is provided in **Figure 2**. The boundaries of the site are more fully described in the metes and bounds site description that is part of the Deed provided in **Appendix 2**.

After completion of the remedial work, some contamination was left at this site, which is hereafter referred to as "remaining contamination". Institutional and Engineering Controls (ICs and ECs) have been incorporated into the site remedy to control exposure to remaining contamination to ensure protection of public health and the environment. An Environmental Easement granted to the NYSDEC, and recorded with the Rockland County Clerk, requires compliance with this SMP and all ECs and ICs placed on the site.

This SMP was prepared to manage remaining contamination at the site until the Environmental Easement is extinguished in accordance with ECL Article 71, Title 36. This plan has been approved by the NYSDEC, and compliance with this plan is required by the grantor of the Environmental Easement and the grantor's successors and assigns. This SMP may only be revised with the approval of the NYSDEC.

It is important to note that:

- This SMP details the site-specific implementation procedures that are required by the Environmental Easement. Failure to properly implement the SMP is a violation of the Environmental Easement, which is grounds for revocation of the Certificate of Completion (COC);

- Failure to comply with this SMP is also a violation of Environmental Conservation Law, 6NYCRR Part 375 and the VCA (Index #W3-0618-02-02; Site # V-00520-3) for the site, and thereby subject to applicable penalties.

All reports associated with the site can be viewed by contacting the NYSDEC or its successor agency managing environmental issues in New York State. A list of contacts for persons involved with the site is provided in **Appendix 9** of this SMP.

This SMP was prepared by EWMA, on behalf of S.F. Properties, in accordance with the requirements of the NYSDEC's DER-10 ("Technical Guidance for Site Investigation and Remediation"), dated May 2010, and the guidelines provided by the NYSDEC. This SMP addresses the means for implementing the ICs and/or ECs that are required by the Environmental Easement for the site.

1.2 Revisions

Revisions to this plan will be proposed in writing to the NYSDEC's project manager. Revisions will be necessary upon, but not limited to, the following occurring: a change in media monitoring requirements, upgrades to or shut-down of a remedial system, post-remedial removal of contaminated sediment or soil, or other significant change to the site conditions. In accordance with the Environmental Easement for the site, the NYSDEC will provide a notice of any approved changes to the SMP, and append these notices to the SMP that is retained in its files.

1.3 Notifications

Notifications will be submitted by the property owner to the NYSDEC, as needed, in accordance with NYSDEC's DER – 10 for the following reasons:

- 60-day advance notice of any proposed changes in site use that are required under the terms of the VCA], 6NYCRR Part 375 and/or Environmental Conservation Law.

- 7-day advance notice of any field activity associated with the remedial program.

- 15-day advance notice of any proposed ground-intrusive activity pursuant to the Excavation Work Plan.

- Notice within 48-hours of any damage or defect to the foundation, structures or EC that reduces or has the potential to reduce the effectiveness of an EC, and likewise, any action to be taken to mitigate the damage or defect.

- Verbal notice by noon of the following day of any emergency, such as a fire; flood; or earthquake that reduces or has the potential to reduce the effectiveness of ECs in place at the site, with written confirmation within 7 days that includes a summary of actions taken, or to be taken, and the potential impact to the environment and the public.

- Follow-up status reports on actions taken to respond to any emergency event requiring ongoing responsive action submitted to the NYSDEC within 45 days describing and documenting actions taken to restore the effectiveness of the ECs.

Any change in the ownership of the site or the responsibility for implementing this SMP will include the following notifications:

- At least 60 days prior to the change, the NYSDEC will be notified in writing of the proposed change. This will include a certification that the prospective purchaser/Remedial Party has been provided with a copy of the Voluntary Cleanup Agreement (VCA), and all approved work plans and reports, including this SMP.

- Within 15 days after the transfer of all or part of the site, the new owner's name, contact representative, and contact information will be confirmed in writing to the NYSDEC.

Table A on the following page includes contact information for the above notification. The information on this table will be updated as necessary to provide accurate contact information. A full listing of site-related contact information is provided in **Appendix 9**.

Table A: Notifications*

Name	**Contact Information**
Salvatore F. Priore, PE NYSDEC Project Manager	(518) 402-9665 Salvatore.priore@dec.ny.gov

* Note: Notifications are subject to change and will be updated as necessary.

2.0 SUMMARY OF PREVIOUS INVESTIGATIONS AND REMEDIAL ACTIONS

2.1 Site Location and Description

The site is located in Nanuet, Rockland County, New York and is identified as Block 1 and Lot 26 on the Village of Nanuet Tax Map. The site is an approximately 9.81-acre area and is bounded by Demarest Mill Road to the north, West Nyack Road to the south, Route 304 to the east, and commercial/industrial properties to the west (see **Figure 2** – Site Layout Map). The boundaries of the site are more fully described in **Appendix 2** – Deed. The owner(s) of the site parcel(s) at the time of issuance of this SMP is S.F. Properties, LLC.

2.2 Physical Setting

2.2.1 Land Use

The Site consists of an approximately 130,000 square foot building surrounded by paved asphalt parking areas. The Site is zoned commercial and industrial and is currently utilized for commercial and industrial uses. Site occupants include Harley Davidson Motorcycles, Ashley Furniture, Planet Fitness, Subzi Bazaar, Gymnastics, and Monster Mini Golf.

The properties adjoining the Site and in the neighborhood surrounding the Site primarily include commercial and residential properties. The properties immediately south of the Site include residential properties; the properties immediately north of the Site include commercial properties; the properties immediately east of the Site include commercial properties; and the properties to the west of the Site include commercial properties.

2.2.2 Geology

Soil investigation and soil remedial activities were conducted by Camp Dresser & McKee (CDM) under NYSDEC oversight. As documented in CDM's July 2000 Supplemental Investigation Report, CDM identified approximately 100-feet of unconsolidated deposits of recent alluvial and glacial at the site. The underlying bedrock consists of siltstone and sandstone of the Passaic Formation.

The unconsolidated material was divided into the following zones:

- 5 to 10-feet of fill material overlying a thin layer of silty clay
- 10 to 15-feet of permeable water bearing sand;
- 5-foot layer of silt and clay;
- 75 to 80-feet of glacial till (lodgment) varying considerably in grain size and texture;
- Sand units were encountered at depths of approximately 40 to 60-feet and 80 to 90-feet in borings at the site.

The upper 10 to 20-feet of the bedrock was weathered to a saprolitic texture. Competent bedrock was observed below this zone.

2.2.3 Hydrogeology

As documented in CDM's July 2000 Supplemental Investigation Report, CDM designated the first shallow permeable sands as a shallow water-bearing zone, with the S-series monitoring wells installed within this sand layer. Monitoring wells in the permeable till materials were designated as SI and DI-series wells. Bedrock wells were cased 5-feet into competent bedrock and completed as open holes and designated as either R or D-series wells. After completion of the soil excavation activities in 1996, a cluster of three additional wells, MW-9S, 9I, and 9D, was installed for post-excavation monitoring purposes.

Groundwater flow within the shallow and intermediate unconsolidated aquifer was generally towards the southwest in sampling events conducted in November 1999 and May 2000. The groundwater was heavily influenced by the drainageway through the western portion of the site at the time. With the removal of source material and subsequent installation of new drainage piping to eliminate the drainageway, sampling events have shown the flow to be to the west-northwest. The change in groundwater flow direction is most likely from the result of the removal of the drainageway which was influencing the groundwater flow.

2.3 Investigation and Remedial History

The following narrative provides a remedial history timeline and a brief summary of the available project records to document key investigative and remedial milestones for the Site. Full titles for each of the reports referenced below are provided in Section 7.0 - References.

The Swivelier Company operated in a portion of the building for the assembly, manufacture, warehousing, and distribution of lighting fixtures from 1956 to 1997. Non-contact process water and cooling water, as well as wastewater from the building floor drain system, was discharged to a drainage ditch on the western portion of the property. In 1979, the Rockland County Department of Health received a complaint citing discolored water flowing in the ditch. Samples collected by the Spring Valley Water Company in 1980 from the outfall pipe and in the surface waters indicated total volatile organic compounds (VOC) of 14,425 parts per billion (ppb) and 8,962 ppb, respectively. In 1980, Swivelier eliminated the use of the VOC compounds TCE and methylene chloride (MCl) in their processes and directed the site process, process waters, and waste waters to the municipal sewer system rather than to the on-site drainage ditch.

In 1991, the Rockland County Department of Health (RCDH) collected groundwater samples from several businesses and residential wells in this area. TCE was detected at 5,400 ppb in a sample from the L.A. Woman nightclub, located 0.4 miles to the south of the Property. Several other wells in the vicinity of L.A. Woman also contained TCE, but at lower concentrations. The RCDH identified numerous potential sources, including Swivelier, for the TCE contamination in the L.A. Woman well. The New York State Department of Environmental Conservation (NYSDEC) listed the Property on the New York State Registry of Inactive Waste Sites in July 1991 as a Class 2 site.

The NYSDEC retained Camp Dresser & McKee (CDM) to perform a Remedial Investigation/Feasibility Study (RI/FS) at the Property. The RI/FS was completed in two separate phases in 1994 and 1995. The results of the RI/FS identified VOC contaminated soils in the drainage ditch (discharge area) and VOC contamination in the underlying bedrock aquifer.

A hot spot excavation and soil removal was performed at the source area (on-site drainage ditch) in June 1999 by CDM. Soils were excavated within and adjacent to the ditch to the zone of saturation, approximately 8-feet below ground surface (bgs). All soils were transported off-site and disposed of at a licensed waste handling facility.

Post excavation sample results of 1,100 parts per million (ppm) indicated that a small area of impacted soils approximately 10 by 10-feet by the former discharge pipe location remained in the subsurface soils below the water table. No further remediation activities were carried out at this location by CDM.

In-Situ Oxidation Technologies, Inc. (ISOTEC) in-situ chemox treatment processes were conducted in November 2002 for the field pilot study, and again in May 2005 for the full-scale treatment program, to remediate subsurface contamination via injection of peroxide and proprietary catalysts, thereby oxidizing contamination using Fenton's Reaction.

In accordance with the November 2004 RAWP, an SSDS was installed in March 2008 to address concerns regarding a potential source of vapor intrusion beneath the building. The results of the diagnostic field pilot test, conducted by EWMA on August 23, 2004, provided a basis to determine the locations and number of extraction points necessary to achieve adequate depressurization underneath the entire building. Upon instructions from the property representative, all SSDS installation activities were conducted within the empty warehouse portion of the building.

Long-term monitored natural attenuation (MNA) of groundwater within the overburden aquifers is currently being utilized, relying on natural attenuation processes to achieve applicable groundwater remediation standards.

2.4 Remedial Action Objectives

The Remedial Action Objectives (RAOs) for the Site are as follows:

Groundwater

RAOs for Public Health Protection

- Prevent ingestion of groundwater with contaminant levels exceeding drinking water standards.
- Prevent contact with, or inhalation of, volatiles from contaminated groundwater.

RAOs for Environmental Protection

- Restore ground water aquifer to pre-disposal/pre-release conditions, to the extent practicable.
- Prevent the discharge of contaminants to surface water.
- Remove the source of ground or surface water contamination.

Soil Vapor

RAOs for Public Health Protection

- Mitigate impacts to public health resulting from existing, or the potential for, soil vapor intrusion into buildings at the site.

2.5 Remaining Contamination

2.5.1 Groundwater

Groundwater samples were collected during the treatment program to obtain information related to the ISOTEC treatment process of the bedrock aquifer and natural attenuation. VOCs, mainly TCE and cis-1,2-DCE, were the contaminants of concern driving the cleanup at the site. Post-treatment samples were analyzed for TCL VO+15 (EPA Method 8260C).

Frequent groundwater sampling events were conducted between September 2005 and November 2017. Initially, the groundwater sampling program consisted of samples collected biannually from wells MW-10D, 11D, 12D, and 13D. After the May 2009 sampling event, MW-12D was removed from the sampling program per NYSDEC approval via e-mail, after results were below standards for the prior eight sampling events dating back to September 2005.

During the most recent event groundwater sampling event in November 2017, twenty-three (23) wells were sampled to ascertain current contaminant levels. The analytical results for the samples collected during this sampling round revealed concentrations of MTBE, cis-1,2-DCE, benzene, TCE, toluene, acetone, and vinyl chloride. However, MTBE, benzene, and toluene are not known site contaminants of concern and are believed not to be associated with the former Swivelier facility.

Table 1 provides a historical summary of all groundwater samples that have been taken as part of remedial actions performed to remediate groundwater.

Table 2 provides a historical summary of all ISOTEC injection events performed as part of remedial actions to remediate groundwater.

2.5.2 Surface Water

The drainage ditch on the Property has been removed and all surface water discharges are carried to a small drainage ditch located to the southwest across Nyack Road. The drainage ditch flows to the Nauraushaun Creek, which flows into Lake Tappan, located 4.5 miles south-southeast of the site. Lake Tappan is utilized as a public water drinking supply for Northern Bergen County, New Jersey. Currently, there are no potential onsite sources of contamination.

2.5.3 Soil Vapor

On January 14, 2004, an inspection of the Property was conducted by representatives of EWMA, the NYSDEC, and the NYSDOH. Four sample locations were chosen for collecting sub-slab vapor and indoor air samples. A sub-slab investigation was conducted by EWMA at the site on February 3, 2004 and representatives from NYSDEC were on-site to observe the sampling protocols. One of the four sub-slab soil gas samples and its corresponding indoor air sample indicated the need for mitigation, and in March 2008, a sub-slab depressurization system (SSDS) was installed and activated at the site (see Section 4.8).

In April 2014, in accordance with the November 25, 2013 RAWP Addendum, EWMA installed seven shallow on-site temporary well points and one shallow off-site temporary well point / soil vapor point to investigate TCE detected in shallow ground water at off-site temporary well point GW-02 installed as part of NYSDOH's 2004 investigation.

Groundwater samples were obtained from all eight temporary well points and analyzed for chlorinated volatile organic compounds (CVOCs), via EPA method 8260. The soil vapor sample was analyzed for volatile organic compounds via EPA Method TO-15 by Integrated Analytical Laboratories, LLC (IAL) of Randolph, New Jersey. Results from the soil vapor sample obtained from the TW-8 location did not identify compounds of concern associated with the former Swivelier facility. No further offsite assessment of ground water or soil vapor was warranted across West Nyack Road, as documented in EWMA's August 26, 2015 Revised Supplemental RI Progress Report, submitted to NYSDEC.

During November 2017, four (4) sub-slab soil gas sampling ports were installed in the building slab to investigate the contaminated groundwater as a potential vapor intrusion source. Four (4) sub-slab soil gas samples were taken and were analyzed for volatile organic compounds via EPA Method TO-15 by IAL.

The analytical results for the samples collected during the November 2017 sampling event revealed elevated concentrations of cis-1,2-DCE and TCE. Based on the magnitude of these sub-slab concentrations, it is recommended that SSDS mitigation is needed to minimize potential exposures associated with vapor intrusion.

Table 3 provides a historical summary of all soil vapor samples that have been taken as part of actions performed to mitigate vapor intrusion.

3.0 INSTITUTIONAL AND ENGINEERING CONTROL PLAN

3.1 General

Since remaining contamination exists at the site, Institutional Controls (ICs) and Engineering Controls (ECs) are required to protect human health and the environment. This IC/EC Plan describes the procedures for the implementation and management of all IC/ECs at the site. The IC/EC Plan is one component of the SMP and is subject to revision by the NYSDEC.

This plan provides:

- A description of all IC/ECs on the site;
- The basic implementation and intended role of each IC/EC;
- A description of the key components of the ICs set forth in the Environmental Easement;

- A description of the controls to be evaluated during each required inspection and periodic review;

- A description of plans and procedures to be followed for implementation of IC/ECs, such as the implementation of the Excavation Work Plan (EWP) (as provided in **Appendix 1**) for the proper handling of remaining contamination that may be disturbed during maintenance or redevelopment work on the site; and

- Any other provisions necessary to identify or establish methods for implementing the IC/ECs required by the site remedy, as determined by the NYSDEC.

3.2 Institutional Controls

A series of ICs is required by the RAWP to: (1) implement, maintain and monitor Engineering Control systems; (2) prevent future exposure to remaining contamination; and, (3) limit the use and development of the site to commercial and industrial uses only. Adherence to these ICs on the site is required by the Environmental Easement and will be implemented under this SMP. ICs identified in the Environmental Easement may not be discontinued without an amendment to or extinguishment of the Environmental Easement. These ICs are:

- The property may be used for commercial and industrial use;

- All ECs must be operated and maintained as specified in this SMP;

- All ECs must be inspected at a frequency and in a manner defined in the SMP.

- The use of groundwater underlying the property is prohibited without necessary water quality treatment as determined by the NYSDOH or the Rockland Department of Health to render it safe for use as drinking water or for industrial purposes, and the user must first notify and obtain written approval to do so from the Department.

- Groundwater and other environmental or public health monitoring must be performed as defined in this SMP;

- Data and information pertinent to site management must be reported at the frequency and in a manner as defined in this SMP;

- All future activities that will disturb remaining contaminated material must be conducted in accordance with this SMP;

- Monitoring to assess the performance and effectiveness of the remedy must be performed as defined in this SMP;

- Operation, maintenance, monitoring, inspection, and reporting of any mechanical or physical component of the remedy shall be performed as defined in this SMP;

- Access to the site must be provided to agents, employees or other representatives of the State of New York with reasonable prior notice to the property owner to assure compliance with the restrictions identified by the Environmental Easement.

- The potential for vapor intrusion must be evaluated for any buildings developed in the area within the IC boundaries, and any potential impacts that are identified must be monitored or mitigated; and

- Vegetable gardens and farming on the site are prohibited;

3.3 Engineering Controls

3.3.1 Cover System

Exposure to remaining contamination in groundwater at the site is prevented by asphalt pavement, concrete-covered sidewalks, and concrete building slabs. **Figure 4** presents the location of the cover system. The Excavation Work Plan (EWP) provided in **Appendix 1** outlines the procedures required to be implemented in the event the cover system is breached, penetrated or temporarily removed, and any underlying remaining contamination is disturbed. Procedures for the inspection of this cover are provided in the Monitoring and Sampling Plan included in Section 4.0 of this SMP. Any work conducted pursuant to the EWP must also be conducted in accordance with the procedures defined in a Health and Safety Plan (HASP), provided in **Appendix 5,** and associated Community Air Monitoring Plan (CAMP).

3.3.2 Sub-Slab Depressurization System (SSDS)

In accordance with the November 2004 RAWP, an SSDS was installed in March 2008 to address concerns regarding a potential source of vapor intrusion beneath the building.

The results of the diagnostic field pilot test, conducted by EWMA on August 23, 2004, provided a basis to determine the locations and number of extraction points necessary to achieve adequate depressurization underneath the entire building. Upon instructions from the property representative, all SSDS installation activities were conducted within the empty warehouse portion of the building.

The following provides a summary of the SSDS design:

- Two (2) separate SSDSs are installed along the western and eastern portions of the building and connected to vacuum blower #1 and #2, respectively, which are located on the roof of the building;
- Each SSDS consists of a 4-inch PVC main header pipe installed along the ceiling in order to connect all extraction points to the header pipe, and extending to the outside of the building into the vacuum blower;
- A total of nine (9) extraction points were connected to the western SSDS and eight (8) extraction points were connected to the eastern SSDS, each via 2-inch PVC connecting pipes extending upwards from the extraction points along the walls and corner and along the ceiling to the 4-inch PVC main header pipe;
- Extraction point connecter pipes and main header inlets to the vacuum blowers were equipped with ball valves and sampling ports in order to optimize the vacuum and flow through all points, and collect flow readings and air samples, as necessary;
- The vacuum blowers are 7.5 HP Regenerative Blowers capable of providing a total flow rate of 250 to 300 CFM. However, based on recent sub-slab soil gas sampling results, taken in November 2017, the full efficiency of the blowers is not required, and it is recommended that inline radon fans with reduced flow rates be installed within the vent risers.

Procedures for operating and maintaining the sub-slab depressurization system (SSDS) are documented in the Operation and Maintenance Plan (Section 5.0 of this SMP).

3.3.3 Criteria for Completion of Remediation/Termination of Remedial Systems

Generally, remedial processes are considered completed when monitoring indicates that the remedy has achieved the remedial action objectives identified by the decision document. The framework for determining when remedial processes are complete is provided in Section 6.4 of NYSDEC DER-10.

3.3.3.1 – Cover System

The composite cover system is a permanent control and the quality and integrity of this system will be inspected at defined, regular intervals in accordance with this SMP in perpetuity.

3.3.3.2 - Sub-Slab Depressurization System (SSDS)

The active SSDS will not be discontinued unless prior written approval is granted by the NYSDEC and the NYSDOH. In the event that monitoring data indicates that the SSDS may no longer be required, a proposal to discontinue the SSDS will be submitted by the remedial party to the NYSDEC and NYSDOH.

3.3.3.3 - Monitoring Wells Associated with Monitored Natural Attenuation/Source Control

Groundwater monitoring activities to assess natural attenuation will continue, as determined by the NYSDEC with consultation with NYSDOH, until residual groundwater concentrations are found to be consistently below ambient water quality standards, the site SCGs, or have become asymptotic at an acceptable level over an extended period. If groundwater contaminant levels become asymptotic at a level above SCOs and Groundwater standards that is not acceptable to the NYSDEC, additional source(s) removal, treatment processes and/or control measures will be evaluated and implemented with concurrence/approval of NYSDEC. However, in the event that long-term monitoring data indicates that natural attenuation monitoring may no longer be necessary , a proposal to modify the system will be submitted by the remedial party to the NYSDEC for evaluation. Monitoring will continue until permission to modify such a program is granted in writing by the NYSDEC.

4.0 MONITORING AND SAMPLING PLAN

4.1 General

This Monitoring and Sampling Plan describes the measures for evaluating the overall performance and effectiveness of the remedy. This Monitoring and Sampling Plan may only be revised with the approval of the NYSDEC. Details regarding the sampling procedures, data quality usability objectives, analytical methods, etc. for all samples collected as part of site management for the site are included in the Quality Assurance Project Plan provided in **Appendix 4**.

This Monitoring and Sampling Plan describes the methods to be used for:

- Sampling and analysis of all appropriate media (e.g., groundwater, indoor air, soil vapor, soils);
- Assessing compliance with applicable NYSDEC standards, criteria and guidance (SCGs), particularly groundwater standards and Part 375 SCOs for soil; and
- Evaluating site information periodically to confirm that the remedy continues to be effective in protecting public health and the environment;

To adequately address these issues, this Monitoring and Sampling Plan provides information on:

- Sampling locations, protocol and frequency;
- Information on all designed monitoring systems;
- Analytical sampling program requirements;
- Inspection and maintenance requirements for monitoring wells;
- Monitoring well decommissioning procedures; and

- Annual inspection and periodic certification.

Reporting requirements are provided in Section 6.0 of this SMP.

4.2 Site-Wide Inspection

Site-wide inspections will be performed at a minimum of once per year. Modification to the frequency or duration of the inspections will require approval from the NYSDEC. Site-wide inspections will also be performed after all severe weather conditions that may affect ECs or monitoring devices. During these inspections, an inspection form will be completed as provided in **Appendix 6** – Site Management Forms. The form will compile sufficient information to assess the following:

- Compliance with all ICs, including site usage;
- An evaluation of the condition and continued effectiveness of ECs;
- General site conditions at the time of the inspection;
- The site management activities being conducted including, where appropriate, confirmation sampling and a health and safety inspection; and
- Confirm that site records are up to date.

Inspections of all remedial components installed at the site will be conducted. A comprehensive site-wide inspection will be conducted and documented according to the SMP schedule, regardless of the frequency of the Periodic Review Report. The inspections will determine and document the following:

- Whether ECs continue to perform as designed;
- If these controls continue to be protective of human health and the environment;
- Compliance with requirements of this SMP and the Environmental Easement;

- Achievement of remedial performance criteria; and
- If site records are complete and up to date; and

Reporting requirements are outlined in Section 6.0 of this plan.

Inspections will also be performed in the event of an emergency. If an emergency, such as a natural disaster or an unforeseen failure of any of the ECs occurs that reduces or has the potential to reduce the effectiveness of ECs in place at the site, verbal notice to the NYSDEC must be given by noon of the following day. In addition, an inspection of the site will be conducted within 5 days of the event to verify the effectiveness of the IC/ECs implemented at the site by a qualified environmental professional, as determined by the NYSDEC. Written confirmation must be provided to the NYSDEC within 7 days of the event that includes a summary of actions taken, or to be taken, and the potential impact to the environment and the public.

4.3 Sub-Slab Depressurization System (SSDS) Monitoring

Monitoring of the SSDS will be performed on a routine basis, as identified in **Table B** – SSDS Monitoring Requirements and Schedule (see below). Modification to the frequency or sampling requirements will require approval from the NYSDEC. A visual inspection of the complete system will be conducted during each monitoring event. Unscheduled inspections and/or sampling may take place when a suspected failure of the SSDS has been reported or an emergency occurs that is deemed likely to affect the operation of the system. SSDS components to be monitored include, but are not limited to, the components included in **Table B** below.

Table B – SSDS Monitoring Requirements and Schedule

Remedial System Component	Monitoring Parameter	Operating Range	Monitoring Schedule
Vacuum Blower	Flow Rate	150 – 350 CFM	Annually
SSDS Piping	Vacuum	Min. -0.004 “WC	Annually

A complete list of components to be inspected is provided in the Inspection Checklist, provided in **Appendix 6 -** Site Management Forms. If any equipment readings are not within their specified operation range, any equipment is observed to be malfunctioning or the system is not performing within specifications; maintenance and repair, as per the Operation and Maintenance Plan, is required immediately.

4.4 Post-Remediation Media Monitoring and Sampling

Samples shall be collected from the monitoring wells MW-10D, MW-11D and MW-13D on a routine basis. Sampling locations, required analytical parameters and schedule are provided in **Table C** – Post Remediation Sampling Requirements and Schedule below. Modification to the frequency or sampling requirements will require approval from the NYSDEC.

Table C – Post Remediation Sampling Requirements and Schedule

Sampling Location	**Analytical Parameters**	**Schedule**
	TCL VO+15 (EPA Method 8260C)	
Monitoring Wells MW-10D, MW-11D and MW-13D	X	Annually

All sampling will be conducted in accordance with the QAPP provided in **Appendix 4**, and all groundwater sampling will be performed in conformance with NYSDEC and USEPA sampling procedures. All monitoring well sampling activities will be recorded in a field book and in a groundwater-sampling log**.** Other observations (e.g., well integrity, etc.) will be noted on the well sampling log. The well sampling log will serve as the inspection form for the groundwater monitoring well network.

Care will be taken to prevent contamination of the sample bottles at the lab waiting to be packed for shipment, in the field waiting to be filled, and in the field waiting to be packed for shipment. To prevent contamination of the sample bottles, each bottle will be sealed until placed beneath the sampling tool for sample collection. Each sample container will have the following information recorded on it:

- Project Name
- Sample Number
- Time & Date of Sampling
- Analysis to be Performed
- Number of Samples

Sample shuttles, and clean sampling equipment will not be stored near solvents, gasoline, or other equipment that is a potential source of contamination. When under chain of custody, sample bottles will be secured in locked vehicles, custody sealed in shuttles or in the presence of authorized personnel.

Field and trip blanks must travel with sample containers and must arrive on-site within one day of their preparation in the lab. Blanks and their associated samples may be held on-site for no longer than two calendar days, and must arrive back in the lab within one day of shipment from the field. This constitutes a maximum of a four (4) day handling time. Blanks and all samples must be maintained at 4°C while stored on-site and during shipment. Sample bottles and blanks must be handled in the same manner prior to their return to the laboratory. Field and trip blanks will be collected for groundwater sampling events as indicated in the QAPP.

4.4.1 Groundwater Sampling

Groundwater monitoring will be performed annually to assess the performance of Monitored Natural Attenuation. Modification to the frequency or sampling requirements will require approval from the NYSDEC.

The network of monitoring wells has been installed to monitor upgradient, on-site and downgradient groundwater conditions at the site.

If biofouling or silt accumulation occurs in the on-site and/or off-site monitoring wells, the wells will be physically agitated/surged and redeveloped. Additionally, monitoring wells will be properly decommissioned and replaced, if an event renders the wells unusable.

Repairs and/or replacement of wells in the monitoring well network will be performed based on assessments of structural integrity and overall performance.

The NYSDEC will be notified prior to any repair or decommissioning of any monitoring well for the purpose of replacement, and the repair or decommissioning and replacement process will be documented in the subsequent Periodic Review Report. Well decommissioning without replacement will be done only with the prior approval of the NYSDEC. Well abandonment will be performed in accordance with NYSDEC's guidance entitled "CP-43: Groundwater Monitoring Well Decommissioning Procedures." Monitoring wells that are decommissioned because they have been rendered unusable will be replaced in kind in the nearest available location, unless otherwise approved by the NYSDEC.

The sampling frequency may only be modified with the approval of the NYSDEC. This SMP will be modified to reflect changes in sampling plans approved by the NYSDEC.

Deliverables for the groundwater monitoring program are specified in Section 6.0 – Reporting Requirements.

4.4.2 Monitoring and Sampling Protocol

All sampling activities will be recorded in a field book and associated sampling log as provided in **Appendix 6** - Site Management Forms. Other observations (e.g., groundwater monitoring well integrity, etc.) will be noted on the sampling log. The sampling log will serve as the inspection form for the monitoring network. Additional detail regarding monitoring and sampling protocols are provided in the site-specific QAPP provided as **Appendix 4** of this document.

5.0 OPERATION AND MAINTENANCE PLAN

5.1 General

This Operation and Maintenance Plan provides a brief description of the measures necessary to operate, monitor and maintain the mechanical components of the remedy selected for the site. This Operation and Maintenance Plan:

- Includes the procedures necessary to allow individuals unfamiliar with the site to operate and maintain the sub-slab depressurization system **(**SSDS);
- Will be updated periodically to reflect changes in site conditions or the manner in which the SSDS is operated and maintained.

Further detail regarding the Operation and Maintenance of the SSDS is provided in **Appendix 7** - Operation and Maintenance Manual. A copy of this Operation and Maintenance Manual, along with the complete SMP, is to be maintained at the site. This Operation and Maintenance Plan is not to be used as a stand-alone document, but as a component document of this SMP.

5.2 Sub-Slab Depressurization System (SSDS) Performance Criteria

The minimum operating requirements for the major components of the SSDS are as follows:

Remedial System Component	Monitoring Parameter	Operating Range	Monitoring Schedule
Vacuum Blower	Flow Rate	150 – 350 CFM	Annually
SSDS Piping	Vacuum	Min. -0.004 “WC	Annually

5.3 Operation and Maintenance of Sub-Slab Depressurization System (SSDS)

The following sections provide a description of the operations and maintenance of the SSDS. Cut-sheets and a current layout drawing for the SSDS are provided in **Appendix 7** - Operations and Maintenance Manual.

5.3.1 <u>System Start-Up and Testing</u>

In the event the SSDS needs to be re-installed or a new SSDS needs to be installed, the SSDS shall be inspected periodically during installation by the Remedial Engineer for conformance with the provisions of the SMP. In accordance with the post mitigation/confirmation testing requirements of NYSDOH's Guidance for Evaluating Soil Vapor Intrusion in the State of New York dated October 2006, the goal for operation of the active component of the SSDS will be to achieve, at a minimum, a sub-slab differential pressure (with respect to building interior ambient pressure) of –0.004 inches of water ("WC). To achieve this goal, the following actions will be performed during initial startup of the SSDS:

1. Shortly after start-up of the SSDS, and prior to building occupancy, the sub-slab pressure at each monitoring point will be measured utilizing an appropriate hand-held instrument. If necessary, sub-slab vacuum will be adjusted to achieve –0.004 inches of water at each monitoring point. The control box controlling the vacuum to the sub-slab lateral piping will be utilized to balance the sub-slab pressure.

2. Appliances relying on natural draft for exhaust of carbon monoxide and other combustion gases will be tested for back draft caused by the operation of the SSDS. Testing for back draft will entail utilizing a carbon monoxide meter to detect the presence of this compound in the air near exhausts for appliances. If necessary, any back draft caused by the SSDS will be corrected by sealing any leaks in the floor slab.

3. The operation of the warning device for exhaust fan malfunction will be confirmed. If a concern is noted, it will be addressed until the appropriate level of vacuum is achieved before the building can be certified for occupancy.

The system testing described above will be conducted if, in the course of the SSDS lifetime, the system goes down or significant changes are made to the system and the system must be restarted.

5.3.2 Routine System Operation and Maintenance

In accordance with the schedule set forth in **Section 4.3 (Table B)** of this SMP, routine maintenance and inspection will be conducted to ensure that the active components of the SSDS are operating properly and will continue until NYSDEC and NYSDOH have determined there is no need for such a system. The operation of the SSDS will not be discontinued without written approval from the NYSDEC. On a monthly basis, qualified building personnel will confirm that the blowers or suction fans are working properly. **Appendix 7** contains an Operations, Maintenance, and Monitoring (OM&M) manual for the SSDS blowers along with a routine maintenance SSDS checklist.

On an annual basis, the following will performed:

- Conduct a visual inspection of the complete system;
- Inspect the blowers or radon fans for bearing failures or signs of other abnormal operations, and repair or replace if required;
- Inspect the discharge location of the vent pipe to ensure that no air intake or operable window is located nearby;
- Determine, through discussions with building management, if any HVAC system modifications have occurred that might affect the performance of the SSDS; and
- Inspect the floor slab and foundation walls for evidence of cracks and/or holes, and repair of cracks and/or holes, if required.

5.3.3 Non-Routine Operation and Maintenance

Non-routine maintenance would typically occur when the warning device indicates the system is not working properly, or the system becomes damaged. The scope of non-routine maintenance will vary depending upon the situation. In general, the following actions will be taken as part of non-routine maintenance:

- Examine the building for structural or HVAC system changes, or other changes that may affect the performance of the SSDS (e.g., new combustion appliances or deterioration of the concrete slab);
- Examine and address the operation of the warning devices and the blowers, and measure the sub-slab pressure at monitoring points; and
- Repair or adjust the SSDS as appropriate. If necessary, the SSDS should be redesigned and restarted (see Section 5.3.1 for system startup).

Table B provides a summary and schedule of routine maintenance.

5.3.4 System Monitoring Devices and Alarms

The SSDS will be active and electrically powered. The sub-slab vacuum levels will be monitored to verify compliance with the -0.004 inches of water minimum cross slab vacuum levels.

In the event that the SSDS is not operating properly, applicable maintenance and repairs will be conducted, as specified in the Operation and Maintenance Plan, and the SSDS will be restarted. Operational problems will be noted in the Periodic Review Report to be prepared for that reporting period.

6.0 REPORTING REQUIREMENTS

6.1 Site Management Reports

All site management inspection, maintenance and monitoring events will be recorded on the appropriate site management forms provided in **Appendix 6**. These forms are subject to NYSDEC revision.

All applicable inspection forms and other records, including media sampling data and system maintenance reports, generated for the site during the reporting period will be provided in electronic format to the NYSDEC in accordance with the requirements of **Table D** and summarized in the Periodic Review Report.

Table D: Schedule of Interim Monitoring/Inspection Reports

Task/Report	Reporting Frequency*
Inspection Report	Annually
Periodic Review Report	Annually, or as otherwise determined by the Department

* The frequency of events will be conducted as specified until otherwise approved by the NYSDEC.

All interim monitoring/inspections reports will include, at a minimum:

- Date of event or reporting period;
- Name, company, and position of person(s) conducting monitoring/inspection activities;
- Description of the activities performed;
- Where appropriate, color photographs or sketches showing the approximate location of any problems or incidents noted (included either on the checklist/form or on an attached sheet);
- Type of samples collected (e.g., sub-slab vapor, indoor air, outdoor air, etc);

- Copies of all field forms completed (e.g., well sampling logs, chain-of-custody documentation, etc.);
- Sampling results in comparison to appropriate standards/criteria;
- A figure illustrating sample type and sampling locations;
- Copies of all laboratory data sheets and the required laboratory data deliverables required for all points sampled (to be submitted electronically in the NYSDEC-identified format);
- Any observations, conclusions, or recommendations; and
- A determination as to whether contaminant conditions have changed since the last reporting event.

Routine maintenance event reporting forms will include, at a minimum:

- Date of event;
- Name, company, and position of person(s) conducting maintenance activities;
- Description of maintenance activities performed;
- Any modifications to the system;
- Where appropriate, color photographs or sketches showing the approximate location of any problems or incidents noted (included either on the checklist/form or on an attached sheet); and,
- Other documentation such as copies of invoices for maintenance work, receipts for replacement equipment, etc., (attached to the checklist/form).

Non-routine maintenance event reporting forms will include, at a minimum:

- Date of event;
- Name, company, and position of person(s) conducting non-routine maintenance/repair activities;
- Description of non-routine activities performed;
- Where appropriate, color photographs or sketches showing the approximate location of any problems or incidents (included either on the form or on an attached sheet); and

- Other documentation such as copies of invoices for repair work, receipts for replacement equipment, etc. (attached to the checklist/form).

Data will be reported in digital format as determined by the NYSDEC. Currently, data is to be supplied electronically and submitted to the NYSDEC EQuIS^{TM} database in accordance with the requirements found at this link http://www.dec.ny.gov/chemical/62440.html.

6.2 Periodic Review Report

A Periodic Review Report (PRR) will be submitted to the Department beginning sixteen (16) months after the No Further Action Letter is issued. After submittal of the initial Periodic Review Report, the next PRR shall be submitted annually to the Department or at another frequency as may be required by the Department. In the event that the site is subdivided into separate parcels with different ownership, a single Periodic Review Report will be prepared that addresses the site described in **Appendix 2** - Deed. The report will be prepared in accordance with NYSDEC's DER-10 and submitted within 30 days of the end of each certification period. Media sampling results will also be incorporated into the Periodic Review Report. The report will include:

- Identification, assessment and certification of all ECs/ICs required by the remedy for the site.
- Results of the required annual site inspections and severe condition inspections, if applicable.
- All applicable site management forms and other records generated for the site during the reporting period in the NYSDEC-approved electronic format, if not previously submitted.
- A summary of any discharge monitoring data and/or information generated during the reporting period, with comments and conclusions.
- Data summary tables and graphical representations of contaminants of concern by media (groundwater, soil vapor, etc.), which include a listing of all compounds analyzed, along with the applicable standards, with all

exceedances highlighted. These will include a presentation of past data as part of an evaluation of contaminant concentration trends.

- Results of all analyses, copies of all laboratory data sheets, and the required laboratory data deliverables for all samples collected during the reporting period will be submitted in digital format as determined by the NYSDEC. Currently, data is supplied electronically and submitted to the NYSDEC EQuIS™ database in accordance with the requirements found at this link: http://www.dec.ny.gov/chemical/62440.html.

- A site evaluation, which includes the following:

  - The compliance of the remedy with the requirements of the site-specific RAWP, ROD or Decision Document;

  - The operation and the effectiveness of all treatment units, etc., including identification of any needed repairs or modifications;

  - Any new conclusions or observations regarding site contamination based on inspections or data generated by the Monitoring and Sampling Plan for the media being monitored;

  - Recommendations regarding any necessary changes to the remedy and/or Monitoring and Sampling Plan; and

  - Trends in contaminant levels in the affected media will be evaluated to determine if the remedy continues to be effective in achieving remedial goals as specified by the Decision Document.
  - The overall performance and effectiveness of the remedy.

6.2.1 Certification of Institutional and Engineering Controls

Following the last inspection of the reporting period, a qualified environmental professional or Professional Engineer licensed to practice in New York State will prepare, and include in the Periodic Review Report, the following certification as per the requirements of NYSDEC DER-10:

"*For each institutional or engineering control identified for the site, I certify that all of the following statements are true:*

- *The inspection of the site to confirm the effectiveness of the institutional and engineering controls required by the remedial program was performed under my direction;*

- *The institutional control and/or engineering control employed at this site is unchanged from the date the control was put in place, or last approved by the Department;*

- *Nothing has occurred that would impair the ability of the control to protect the public health and environment;*

- *Nothing has occurred that would constitute a violation or failure to comply with any site management plan for this control;*

- *Access to the site will continue to be provided to the Department to evaluate the remedy, including access to evaluate the continued maintenance of this control;*

- *If a financial assurance mechanism is required under the oversight document for the site, the mechanism remains valid and sufficient for the intended purpose under the document;*

- *Use of the site is compliant with the environmental easement;*

- *The engineering control systems are performing as designed and are effective;*

- *To the best of my knowledge and belief, the work and conclusions described in this certification are in accordance with the requirements of the site remedial program and generally accepted engineering practices; and*

- *The information presented in this report is accurate and complete.*

I certify that all information and statements in this certification form are true. I understand that a false statement made herein is punishable as a Class "A" misdemeanor, pursuant to Section 210.45 of the Penal Law. I, [name], of [business address], am certifying as [Owner/Remedial Party or Owner's/Remedial Party's Designated Site Representative] (and if the site consists of multiple properties): *[I have been authorized and designated by all site owners/remedial parties to sign this certification] for the site."*

The signed certification will be included in the Periodic Review Report.

The Periodic Review Report will be submitted, in electronic format, to the NYSDEC Central Office, Regional Office in which the site is located and the NYSDOH Bureau of Environmental Exposure Investigation. The Periodic Review Report may need to be submitted in hard-copy format, as requested by the NYSDEC project manager.

6.3 Corrective Measures Work Plan

If any component of the remedy is found to have failed, or if the periodic certification cannot be provided due to the failure of an institutional or engineering control, a Corrective Measures Work Plan will be submitted to the NYSDEC for approval. This plan will explain the failure and provide the details and schedule for performing work necessary to correct the failure. Unless an emergency condition exists, no work will be performed pursuant to the Corrective Measures Work Plan until it has been approved by the NYSDEC.

6.4 Remedial Site Optimization Report

In the event that an RSO is to be performed, upon completion of an RSO, an RSO report must be submitted to the Department for approval. A general outline for the RSO report is provided in **Appendix 3**. The RSO report will document the research/ investigation and data gathering that was conducted, evaluate the results and facts obtained, present a revised conceptual site model and present recommendations. RSO recommendations are to be implemented upon approval from the NYSDEC. Additional work plans, design documents, HASPs etc., may still be required to implement the recommendations, based upon the actions that need to be taken. A final engineering report and update to the SMP may also be required.

The RSO report will be submitted, in electronic format, to the NYSDEC Central Office, Regional Office in which the site is located, Site Control and the NYSDOH Bureau of Environmental Exposure Investigation.

7.0 REFERENCES

6NYCRR Part 375, Environmental Remediation Programs. December 14, 2006.

NYSDEC DER-10 – "Technical Guidance for Site Investigation and Remediation".

NYSDEC, 1998. Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations Division of Water Technical and Operational Guidance Series (TOGS) 1.1.1. June 1998 (April 2000 addendum).

Camp Dresser & McKee, Supplemental Investigation Report, July 2000.

NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York, October 2006.

EWMA, Remedial Action Workplan Report – Groundwater, November 2004, Revised December 28, 2004.

EWMA, Remedial Action Workplan, August 28, 2013.

EWMA, Remedial Action Workplan Addendum, November 25, 2013.

EWMA, Voluntary Cleanup Program (VCP) Revised RI Progress Report, May 4, 2015, and VCP Revised Supplemental RI Progress Report August 26, 2015.

APPENDIX 1 – EXCAVATION WORK PLAN (EWP)

A-1 NOTIFICATION

At least 15 days prior to the start of any activity that is anticipated to encounter remaining contamination, the site owner or their representative will notify the NYSDEC. Table 1 includes contact information for the above notification. The information on this table will be updated as necessary to provide accurate contact information. A full listing of site-related contact information is provided in **Appendix 9**.

Table 1: Notifications*

Salvatore F. Priore, PE NYSDEC Project Manager	(518) 402-9665 Salvatore.priore@dec.ny.gov

* Note: Notifications are subject to change and will be updated as necessary.

This notification will include:

- A detailed description of the work to be performed, including the location and areal extent of excavation, plans/drawings for site re-grading, intrusive elements or utilities to be installed below the soil cover, estimated volumes of contaminated soil to be excavated and any work that may impact an engineering control;
- A summary of environmental conditions anticipated to be encountered in the work areas, including the nature and concentration levels of contaminants of concern, potential presence of grossly contaminated media, and plans for any pre-construction sampling;
- A schedule for the work, detailing the start and completion of all intrusive work;
- A summary of the applicable components of this EWP;

- A statement that the work will be performed in compliance with this EWP and 29 CFR 1910.120;

- A copy of the contractor's health and safety plan (HASP), in electronic format, if it differs from the HASP provided in **Appendix 5** of this SMP;

- Identification of disposal facilities for potential waste streams; and

- Identification of sources of any anticipated backfill, along with all required chemical testing results.

A-2 SOIL SCREENING METHODS

Visual, olfactory and instrument-based (e.g. photoionization detector) soil screening will be performed by a qualified environmental professional during all excavations into known or potentially contaminated material (remaining contamination). Soil screening will be performed when invasive work is done and will include all excavation and invasive work performed during development, such as excavations for foundations and utility work, after issuance of the COC.

Soils will be segregated based on previous environmental data and screening results into material that requires off-site disposal and material that requires testing to determine if the material can be reused on-site as soil beneath a cover or if the material can be used as cover soil.

A-3 SOIL STAGING METHODS

Soil stockpiles will be continuously encircled with a berm and/or silt fence. Hay bales will be used as needed near catch basins, surface waters and other discharge points.

Stockpiles will be kept covered at all times with appropriately anchored tarps. Stockpiles will be routinely inspected and damaged tarp covers will be promptly replaced.

Stockpiles will be inspected at a minimum once each week and after every storm event. Results of inspections will be recorded in a logbook and maintained at the site and available for inspection by the NYSDEC.

A-4 MATERIALS EXCAVATION AND LOAD-OUT

A qualified environmental professional or person under their supervision will oversee all invasive work and the excavation and load-out of all excavated material.

The owner of the property and remedial party (if applicable) and its contractors are responsible for safe execution of all invasive and other work performed under this Plan.

The presence of utilities and easements on the site will be investigated by the qualified environmental professional. It will be determined whether a risk or impediment to the planned work under this SMP is posed by utilities or easements on the site.

Loaded vehicles leaving the site will be appropriately lined, tarped, securely covered, manifested, and placarded in accordance with appropriate Federal, State, local, and NYSDOT requirements (and all other applicable transportation requirements).

A truck wash will be operated on-site, as appropriate. The qualified environmental professional will be responsible for ensuring that all outbound trucks will be washed at the truck wash before leaving the site until the activities performed under this section are complete. Truck wash waters will be collected and disposed of off-site in an appropriate manner.

Locations where vehicles enter or exit the site shall be inspected daily for evidence of off-site soil tracking.

The qualified environmental professional will be responsible for ensuring that all egress points for truck and equipment transport from the site are clean of dirt and other materials derived from the site during intrusive excavation activities. Cleaning of the adjacent streets will be performed as needed to maintain a clean condition with respect to site-derived materials.

A-5 MATERIALS TRANSPORT OFF-SITE

All transport of materials will be performed by licensed haulers in accordance with appropriate local, State, and Federal regulations, including 6 NYCRR Part 364. Haulers will be appropriately licensed and trucks properly placarded.

Material transported by trucks exiting the site will be secured with tight-fitting covers. Loose-fitting canvas-type truck covers will be prohibited. If loads contain wet material capable of producing free liquid, truck liners will be used.

Truck transport routes are as follows: All trucks loaded with site materials will exit the site via Route 304 South, take the exit toward Route 59 East, turn right onto Smith Street, turn right onto Route 59 East, take the exit onto Palisades Parkway North, then take the exit for Route 287 East or West. This is the most appropriate route and takes into account: (a) limiting transport through residential areas and past sensitive sites; (b) use of city mapped truck routes; (c) prohibiting off-site queuing of trucks entering the facility; (d) limiting total distance to major highways; (e) promoting safety in access to highways; and (f) overall safety in transport;

Trucks will be prohibited from stopping and idling in the neighborhood outside the project site.

Egress points for truck and equipment transport from the site will be kept clean of dirt and other materials during site remediation and development.

Queuing of trucks will be performed on-site in order to minimize off-site disturbance. Off-site queuing will be prohibited.

A-6 MATERIALS DISPOSAL OFF-SITE

All material excavated and removed from the site will be treated as contaminated and regulated material and will be transported and disposed in accordance with all local, State (including 6NYCRR Part 360) and Federal regulations. If disposal of material from this site is proposed for unregulated off-site disposal (i.e. clean soil removed for development purposes), a formal request with an associated plan will be made to the

NYSDEC. Unregulated off-site management of materials from this site will not occur without formal NYSDEC approval.

Off-site disposal locations for excavated soils will be identified in the pre-excavation notification. This will include estimated quantities and a breakdown by class of disposal facility if appropriate, i.e. hazardous waste disposal facility, solid waste landfill, petroleum treatment facility, C/D recycling facility, etc. Actual disposal quantities and associated documentation will be reported to the NYSDEC in the Periodic Review Report. This documentation will include: waste profiles, test results, facility acceptance letters, manifests, bills of lading and facility receipts.

Non-hazardous historic fill and contaminated soils taken off-site will be handled, at minimum, as a Municipal Solid Waste per 6NYCRR Part 360-1.2. Material that does not meet Unrestricted SCOs is prohibited from being taken to a New York State recycling facility (6NYCRR Part 360-16 Registration Facility).

A-7 MATERIALS REUSE ON-SITE

There is no planned on-site reuse of materials.

A-8 FLUIDS MANAGEMENT

All liquids to be removed from the site, including but not limited to, excavation dewatering, decontamination waters and groundwater monitoring well purge and development waters, will be handled, transported and disposed in accordance with applicable local, State, and Federal regulations. Dewatering, purge and development fluids will not be recharged back to the land surface or subsurface of the site without being run through carbon control, or will be managed off-site, unless prior approval is obtained from NYSDEC.

Discharge of water generated during large-scale construction activities to surface waters (i.e. a local pond, stream or river) will be performed under a SPDES permit.

A-9 COVER SYSTEM RESTORATION

After the completion of soil removal and any other invasive activities the cover system will be restored in a manner that complies with the RAWP. A demarcation layer, consisting of orange geotextile or equivalent material should be placed to provide a visual reference to the top of the remaining contamination zone, the zone that requires adherence to special conditions for disturbance of remaining contaminated soils defined in this SMP. If the type of cover system changes from that which exists prior to the excavation (i.e., a soil cover is replaced by asphalt), this will constitute a modification of the cover element of the remedy and the upper surface of the remaining contamination. A figure showing the modified surface will be included in the subsequent Periodic Review Report and in an updated SMP.

A-10 BACKFILL FROM OFF-SITE SOURCES

All materials proposed for import onto the site will be approved by the qualified environmental professional and will be in compliance with provisions in this SMP prior to receipt at the site. A Request to Import/Reuse Fill or Soil form, which can be found at http://www.dec.ny.gov/regulations/67386.html, will be prepared and submitted to the NYSDEC project manager allowing a minimum of 5 business days for review.

Material from industrial sites, spill sites, or other environmental remediation sites or potentially contaminated sites will not be imported to the site.

All imported soils will meet the backfill and cover soil quality standards established in 6NYCRR 375-6.7(d). Soils that meet 'exempt' fill requirements under 6 NYCRR Part 360, but do not meet backfill or cover soil objectives for this site, will not be imported onto the site without prior approval by NYSDEC. Solid waste will not be imported onto the site.

Trucks entering the site with imported soils will be securely covered with tight fitting covers. Imported soils will be stockpiled separately from excavated materials and covered to prevent dust releases.

A-11 STORMWATER POLLUTION PREVENTION

A site-specific Stormwater Pollution Prevention Plan (SWPPP) must be developed and followed during all excavation work under this EWP.

Barriers and hay bale checks will be installed and inspected once a week and after every storm event. Results of inspections will be recorded in a logbook and maintained at the site and available for inspection by the NYSDEC. All necessary repairs shall be made immediately.

Accumulated sediments will be removed as required to keep the barrier and hay bale check functional.

All undercutting or erosion of the silt fence toe anchor shall be repaired immediately with appropriate backfill materials.

Manufacturer's recommendations will be followed for replacing silt fencing damaged due to weathering.

Erosion and sediment control measures identified in the SMP shall be observed to ensure that they are operating correctly. Where discharge locations or points are accessible, they shall be inspected to ascertain whether erosion control measures are effective in preventing significant impacts to receiving waters.

Silt fencing or hay bales will be installed around the entire perimeter of the construction area.

A-12 EXCAVATION CONTINGENCY PLAN

If underground tanks or other previously unidentified contaminant sources are found during post-remedial subsurface excavations or development related construction, excavation activities will be suspended until sufficient equipment is mobilized to address the condition.

Sampling will be performed on product, sediment and surrounding soils, etc. as necessary to determine the nature of the material and proper disposal method. Chemical analysis will be performed for a full list of analytes (TAL metals; TCL volatiles and semi-volatiles, TCL pesticides and PCBs), unless the site history and previous sampling results provide a sufficient justification to limit the list of analytes. In this case, a reduced list of analytes will be proposed to the NYSDEC for approval prior to sampling.

Identification of unknown or unexpected contaminated media identified by screening during invasive site work will be promptly communicated by phone to NYSDEC's Project Manager. Reportable quantities of petroleum product will also be reported to the NYSDEC spills hotline. These findings will be also included in the Periodic Review Report.

A-13 COMMUNITY AIR MONITORING PLAN

Locations of air sampling stations will be adjusted on a daily or more frequent basis based on actual wind directions to provide an upwind and at least two downwind monitoring stations. A fixed monitoring station should be located at that site perimeter across from the residential area that is adjacent to the site, regardless of wind direction. Exceedances of action levels listed in the CAMP will be reported to NYSDEC and NYSDOH Project Managers.

A-14 ODOR CONTROL PLAN

This odor control plan is capable of controlling emissions of nuisance odors off-site and on-site. Specific odor control methods to be used on a routine basis will include limiting the extent of excavation areas, limiting the extent of soil stockpiles, using soil cover, covering or shrouding with plastic sheeting, and foaming with Biosolve odor control foam. If nuisance odors are identified at the site boundary, or if odor complaints are received, work will be halted and the source of odors will be identified and corrected. Work will not resume until all nuisance odors have been abated. NYSDEC and NYSDOH will be notified of all odor events and of any other complaints about the project. Implementation of all odor controls, including the halt of work, is the responsibility of the remedial party's Remediation Engineer, and any measures that are implemented will be discussed in the Periodic Review Report.

All necessary means will be employed to prevent on- and off-site nuisances. At a minimum, these measures will include: (a) limiting the area of open excavations and size of soil stockpiles; (b) shrouding open excavations with tarps and other covers; and (c) using foams to cover exposed odorous soils; If odors develop and cannot be otherwise controlled, additional means to eliminate odor nuisances will include: (d) direct load-out of soils to trucks for off-site disposal; (e) use of chemical odorants in spray or misting systems; and, (f) use of staff to monitor odors in surrounding neighborhoods.

If nuisance odors develop during intrusive work that cannot be corrected, or where the control of nuisance odors cannot otherwise be achieved due to on-site conditions or close proximity to sensitive receptors, odor control will be achieved by sheltering the excavation and handling areas in a temporary containment structure equipped with appropriate air venting/filtering systems.

A-15 DUST CONTROL PLAN

A dust suppression plan that addresses dust management during invasive on-site work will include, at a minimum, the items listed below:

- Dust suppression will be achieved through the use of a dedicated on-site water truck for road wetting. The truck will be equipped with a water cannon capable of spraying water directly onto off-road areas including excavations and stockpiles.

- Clearing and grubbing of larger sites will be done in stages to limit the area of exposed, unvegetated soils vulnerable to dust production.

- Gravel will be used on roadways to provide a clean and dust-free road surface.

- On-site roads will be limited in total area to minimize the area required for water truck sprinkling.

A-16 OTHER NUISANCES

A plan for rodent control will be developed and utilized by the contractor prior to and during site clearing and site grubbing, and during all remedial work.

A plan will be developed and utilized by the contractor for all remedial work to ensure compliance with local noise control ordinances.

Site Management Plan

Property Known As:

Former Swivelier Site
Village of Nanuet, Rockland County, New York
NYSDEC Site Number: 3-44-036
EWMA Project No. 205548

June 2018

Table 1 - Historical Groundwater Results

Well Information (ft.)	Sampling Date	Acetone	Vinyl Chloride	Chloroethane	Chloroform	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	2-Butanone	Methyl tert-butyl ether (MTBE)	Benzene	Trichloroethene	Bromodichloromethane	Tetrachloroethene	1,4-Dichlorobenzene	1,2-Dichlorobenzene	Toluene	1,1-Dichloroethene	TOTAL VO's:	TOTAL TIC's:	TOTAL VO's & TIC's:
TOGS 1.1.1 GW STANDARDS GA CLASS		50*	2	5	7	5	5	50*	NS	1	5	50*	5	3	3	5	5	NS	NS	NS
MW-10D	9/2/2005	ND	ND	ND	ND	NA	ND	ND	NA	ND	**249**	ND	ND	ND	**2.03**	ND	ND	262	97	359
	12/21/2005	ND	ND	ND	ND	**4390**	ND	ND	ND	ND	**14500**	ND	ND	ND	ND	ND	ND	18,900	ND	18,900
	8/9/2006	ND	ND	ND	ND	ND	ND	ND	ND	ND	**131**	ND	ND	ND	1.13	ND	ND	132	44.0	176
	3/14/2007	23.4	ND	ND	ND	ND	**73**	ND	ND	ND	**10900**	ND	**32.6**	**12.9**	**95.7**	ND	ND	11,100	NA	NA
	10/16/2007	ND	ND	ND	ND	ND	ND	ND	ND	ND	**861**	ND	ND	ND	ND	ND	ND	861	232	861
	5/5/2008	ND	ND	ND	ND	ND	ND	ND	ND	ND	**330**	ND	ND	ND	ND	ND	ND	330	58.0	388
	10/29/2008	ND	ND	ND	ND	ND	ND	ND	ND	ND	**2920**	ND	ND	ND	ND	ND	ND	2,920	875	3,800
	5/14/2009	ND	ND	ND	ND	ND	ND	ND	ND	ND	**4260**	ND	ND	ND	ND	ND	ND	4,260	1,800	6,060
	11/10/2009	ND	ND	ND	ND	**2010**	ND	ND	ND	ND	**5000**	ND	ND	ND	ND	ND	ND	7,010	ND	7,010
	4/29/2014	ND	ND	ND	ND	**1720.0**	**9.6**	ND	ND	ND	**3700**	ND	ND	ND	ND	ND	ND	5,430	NA	NA
	10/16/2015	ND	ND	ND	ND	**1960.0**	ND	ND	ND	ND	**4420**	ND	ND	ND	ND	ND	ND	6,380	NA	NA
	5/18/2017	ND	ND	ND	ND	**3760.0**	**29.8**	ND	ND	ND	**7480**	ND	**24.6**	ND	ND	ND	ND	11,300	NA	NA
	11/21/2017	ND	ND	ND	ND	**3620.0**	ND	ND	ND	ND	**7210**	ND	ND	ND	ND	ND	ND	10,800	ND	10,800
MW-11D	11/19/2002	ND	ND	ND	ND	**91**	ND	ND	ND	ND	**617**	ND	4.24	2.12	**9.4**	2.66	ND	635	91	726
	9/2/2005	ND	ND	ND	ND	NA	ND	ND	NA	ND	**6.86**	ND	ND	ND	ND	ND	ND	6.86	27.8	34.7
	12/21/2005	ND	ND	ND	ND	**13.6**	ND	ND	ND	ND	**10.9**	ND	ND	ND	ND	ND	ND	24.5	6.8	31.3
	8/9/2006	ND	ND	ND	ND	ND	ND	ND	ND	ND	2.82	ND	ND	ND	ND	ND	ND	2.82	201	204
	3/14/2007	11.3	ND	ND	ND	ND	ND	13.0	ND	ND	**8.72**	ND	ND	ND	ND	ND	ND	33.0	NA	NA
	10/16/2007	ND	ND	ND	ND	ND	ND	ND	ND	ND	**25.0**	ND	ND	ND	ND	ND	ND	25.0	99.4	124
	5/5/2008	ND	ND	ND	ND	ND	ND	ND	ND	ND	**5.29**	ND	ND	ND	ND	ND	ND	5.29	ND	5.29
	10/29/2008	ND	ND	ND	ND	ND	ND	ND	ND	ND	**7.62**	ND	ND	ND	ND	ND	ND	7.62	ND	7.62
	5/14/2009	ND	ND	ND	ND	ND	ND	ND	ND	ND	**6.00**	ND	ND	ND	ND	ND	ND	6.00	ND	6.00
	11/10/2009	ND	ND	ND	ND	2.07	ND	ND	ND	ND	**17.0**	ND	ND	ND	ND	ND	ND	19.1	ND	19.1
	4/29/2014	ND	ND	ND	ND	ND	ND	ND	ND	ND	3.37	ND	ND	ND	ND	ND	ND	3.37	NA	NA
	10/16/2015	ND	ND	ND	ND	2.69	ND	ND	ND	ND	3.08	ND	ND	ND	ND	ND	ND	5.77	NA	NA
	5/18/2017	ND	ND	ND	ND	1.95	ND	ND	ND	ND	4.64	ND	ND	ND	ND	ND	ND	6.59	NA	NA
	11/21/2017	ND	ND	ND	ND	1.72	ND	ND	0.575	ND	1.84	ND	ND	ND	ND	ND	ND	4.14	ND	4.14
MW-12D	11/19/2002	ND	ND	ND	ND	**9.7**	ND	ND	**222**	ND	**9.45**	ND	ND	ND	0.35	ND	ND	9.8	232	242
	9/2/2005	ND	ND	ND	ND	NA	ND	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	23.1	23.1
	12/21/2005	ND	ND	ND	ND	1.59	ND	ND	ND	ND	2.09	ND	ND	ND	ND	ND	ND	3.68	82.2	85.9
	8/9/2006	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	21.1	21.1
	3/13/2007	8.05	ND	ND	ND	ND	ND	ND	ND	ND	1.14	ND	ND	ND	ND	ND	ND	9.19	NA	NA
	10/16/2007	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	5/2/2008	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	10/29/2008	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	5/14/2009	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.587	ND	ND	ND	ND	ND	ND	0.587	5.50	6.09
	11/21/2017	ND	ND	ND	ND	3.33	ND	ND	0.733	ND	3.90	ND	ND	ND	ND	ND	ND	7.69	ND	7.69

Table 1 - Historic Groundwater Results
Former Swivelier Site
Route 304, Nanuet NY
EWMA Project No. 205548

Well Information (ft.)	Sampling Date	Acetone	Vinyl Chloride	Chloroethane	Chloroform	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	2-Butanone	Methyl tert-butyl ether (MTBE)	Benzene	Trichloroethene	Bromodichloromethane	Tetrachloroethene	1,4-Dichlorobenzene	1,2-Dichlorobenzene	Toluene	1,1-Dichloroethene	TOTAL VO's:	TOTAL TIC's:	TOTAL VO's & TIC's:
TOGS 1.1.1 GW STANDARDS GA CLASS		50*	2	5	7	5	5	50*	NS	1	5	50*	5	3	3	5	5	NS	NS	NS
MW-13D	11/19/2002	ND	ND	ND	ND	**58.5**	ND	ND	ND	ND	**255**	ND	ND	ND	2.14	ND	ND	257	58.5	316
	9/2/2005	ND	ND	ND	ND	NA	ND	ND	NA	ND	**39.4**	ND	ND	ND	ND	ND	ND	39	5.8	45.2
	12/21/2005	ND	ND	ND	ND	1.95	ND	ND	ND	ND	**9.00**	ND	ND	ND	ND	ND	ND	11.0	ND	11.0
	8/9/2006	ND	ND	ND	ND	ND	ND	ND	ND	ND	**32.6**	ND	ND	ND	ND	ND	ND	32.6	9.00	41.6
	3/13/2007	2.12	ND	ND	ND	ND	1.75	ND	ND	ND	**208**	ND	0.722	ND	1.57	ND	ND	214	NA	NA
	10/16/2007	ND	0.637	ND	ND	ND	ND	ND	ND	ND	**130**	ND	0.827	ND	1.99	ND	ND	133	86.2	219
	5/2/2008	ND	ND	ND	ND	ND	ND	ND	ND	ND	**22.0**	ND	ND	ND	ND	ND	ND	22.0	10.6	32.6
	10/29/2008	ND	ND	ND	ND	ND	ND	ND	ND	ND	**4120**	ND	ND	ND	ND	ND	ND	4120	1130	5250
	5/14/2009	ND	ND	ND	ND	ND	ND	ND	ND	ND	**337**	ND	2	ND	ND	ND	ND	339	309	648
	11/10/2009	ND	ND	ND	ND	**24.4**	ND	ND	ND	ND	1.72	ND	ND	ND	ND	ND	ND	26.1	ND	26.1
	4/29/2014	ND	ND	ND	ND	**15.20**	ND	ND	ND	ND	**36.1**	ND	ND	ND	ND	ND	ND	51.3	NA	NA
	10/16/2015	ND	ND	ND	ND	**1750**	ND	ND	ND	ND	**4300**	ND	ND	ND	ND	ND	ND	6050	NA	NA
	5/18/2017	ND	ND	ND	ND	**1830**	ND	ND	ND	ND	**3910**	ND	**16.2**	ND	ND	ND	ND	5790	NA	NA
	11/20/2017	ND	ND	ND	ND	**517**	ND	ND	ND	ND	**1350**	ND	ND	ND	ND	ND	ND	1870	ND	1870
MW-1R	9/2/2005	ND	ND	ND	ND	NA	ND	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	12/21/2005	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	8/9/2006	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	27.2	27.2
	3/13/2007	2.76	ND	ND	ND	ND	ND	ND	ND	ND	0.770	ND	ND	ND	ND	ND	ND	3.53	NA	NA
	11/22/2017	ND	ND	ND	ND	ND	ND	ND	3.26	ND	0.531	ND	ND	ND	ND	ND	ND	3.79	ND	3.79
MW-6I	9/2/2005	ND	ND	ND	ND	NA	ND	ND	NA	ND	**54.7**	ND	ND	ND	ND	ND	ND	54.7	ND	54.7
	12/21/2005	ND	**60.6**	ND	ND	**153**	ND	ND	ND	ND	**24.5**	ND	ND	ND	ND	ND	ND	238	ND	238
	8/9/2006	ND	**15.1**	0.911	ND	ND	ND	ND	ND	ND	**33.1**	ND	ND	ND	ND	ND	ND	49.1	65.4	115
	3/14/2007	4.50	**4.04**	ND	ND	ND	ND	ND	ND	ND	1.95	ND	ND	ND	ND	ND	ND	10.5	NA	NA
	11/21/2017	ND	**121**	ND	ND	**170**	ND	ND	0.940	ND	**17.2**	ND	ND	ND	ND	ND	0.546	310	ND	310
MW-6R	9/2/2005	ND	ND	ND	ND	NA	ND	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	12/21/2005	ND	ND	ND	ND	**22.8**	ND	ND	ND	ND	**83.6**	ND	ND	ND	ND	ND	ND	106	58.5	165
	8/9/2006	ND	ND	ND	0.929	ND	ND	ND	ND	ND	**8.14**	0.33	ND	ND	ND	ND	ND	9.40	55.1	64.5
	3/13/2007	**186**	ND	ND	0.776	ND	ND	6.88	ND	**2.12**	**6.54**	ND	ND	ND	ND	ND	ND	202	NA	NA
	11/21/2017	ND	ND	ND	ND	**7.39**	ND	ND	8.29	0.544	**10.2**	ND	ND	ND	ND	1.09	ND	27.5	ND	27.5
MW-1N	11/22/2017	ND	ND	ND	ND	**5.12**	ND	ND	1.37	ND	ND	ND	ND	ND	ND	ND	ND	6.49	ND	6.49
MW-1S	11/22/2017	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-1SE	11/22/2017	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.719	ND	ND	ND	ND	ND	ND	0.719	ND	0.719
MW-2I	11/22/2017	ND	ND	ND	ND	ND	ND	ND	6.43	ND	ND	ND	ND	ND	ND	ND	ND	6.43	ND	6.43
MW-2N	11/22/2017	ND	ND	ND	ND	ND	ND	ND	0.504	ND	ND	ND	ND	ND	ND	ND	ND	0.504	39.4	39.9
MW-2S	11/22/2017	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-3N	11/22/2017	ND	**2.08**	ND	ND	**9.93**	ND	ND	2.47	ND	ND	ND	ND	ND	ND	ND	1.39	15.9	131	147
MW-4I	11/22/2017	ND	ND	ND	ND	ND	ND	ND	66.6	ND	ND	ND	ND	ND	ND	ND	ND	66.6	14.7	81.3

Well Information (ft.)	Sampling Date	Acetone	Vinyl Chloride	Chloroethane	Chloroform	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	2-Butanone	Methyl tert-butyl ether (MTBE)	Benzene	Trichloroethene	Bromodichloromethane	Tetrachloroethene	1,4-Dichlorobenzene	1,2-Dichlorobenzene	Toluene	1,1-Dichloroethene	TOTAL VO's:	TOTAL TIC's:	TOTAL VO's & TIC's:
TOGS 1.1.1 GW STANDARDS GA CLASS		50*	2	5	7	5	5	50*	NS	1	5	50*	5	3	3	5	5	NS	NS	NS
MW-4S	11/21/2017	ND	ND	ND	ND	ND	ND	ND	13.7	ND	ND	ND	ND	ND	ND	ND	ND	13.7	ND	13.7
MW-7I	11/21/2017	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.31	ND	ND	ND	ND	ND	ND	1.31	ND	1.31
MW-7SE	11/21/2017	ND	1.20	ND	ND	4.50	ND	ND	7.32	ND	ND	ND	ND	ND	ND	ND	ND	13.0	ND	13.0
MW-7SW	11/21/2018	ND	ND	ND	ND	ND	ND	ND	46.2	ND	ND	ND	ND	ND	ND	ND	ND	46.2	ND	46.2
MW-8I	11/21/2017	ND	**17.9**	ND	ND	**1660**	ND	ND	**90.8**	ND	**3780**	ND	ND	ND	ND	ND	ND	5550	ND	5550
MW-9D	11/21/2017	15.7	ND	ND	ND	**6.79**	ND	ND	ND	ND	**84.2**	ND	ND	ND	ND	ND	ND	107	ND	107
MW-9DI	11/21/2017	ND	ND	ND	ND	1.37	ND	ND	58.4	ND	**82.9**	ND	ND	ND	ND	ND	ND	143	ND	143
MW-9SI	11/21/2017	ND	ND	ND	ND	ND	ND	ND	3.53	ND	ND	ND	ND	ND	ND	ND	ND	3.53	ND	3.53
TW-1	4/29/2014	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
TW-2	4/29/2014	ND	ND	ND	ND	1.14	ND	ND	ND	ND	4.95	ND	ND	ND	ND	ND	ND	6.09	ND	ND
TW-3	4/29/2014	ND	ND	ND	ND	4.33	ND	ND	ND	ND	3.48	ND	ND	ND	ND	ND	ND	7.81	ND	ND
TW-4	4/29/2014	ND	ND	ND	ND	1.5	ND	ND	ND	ND	0.993	ND	ND	ND	ND	ND	ND	2.49	ND	ND
TW-5	4/29/2014	ND	ND	ND	ND	**5.21**	ND	ND	ND	ND	**15**	ND	ND	ND	ND	ND	ND	20.2	ND	ND
TW-6	4/29/2014	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
TW-7	4/29/2014	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
TW-8	4/29/2014	ND	ND	ND	ND	3.61	ND	ND	ND	ND	0.48	ND	ND	ND	ND	ND	ND	4.09	ND	ND

Site Management Plan

Property Known As:

Former Swivelier Site
Village of Nanuet, Rockland County, New York
NYSDEC Site Number: 3-44-036
EWMA Project No. 205548

June 2018

Table 2 - Historical ISOTEC Injection Events

Table 2: Historical ISOTEC Injection Events
Former Swivelier Site
Route 304, Nanuet NY
EWMA Job #205548

Injection Point ID	Injection Date	Catalyst Volume (gal)	Injection Time (Cat)	Oxidizer Volume (gal)	Injection Time (H2O2)	Catalyst Flow Rate (gal/min)	Oxidizer Flow Rate (gal/min)	Location Depth (feet)
ISCO-1	12-May-05	60	19	120	106	3.16	1.13	35'-48'
Total Volume		**60**		**120**		**3.16**	**1.13**	

Injection Point ID	Injection Date	Catalyst Volume (gal)	Injection Time (Cat)	Oxidizer Volume (gal)	Injection Time (H2O2)	Catalyst Flow Rate (gal/min)	Oxidizer Flow Rate (gal/min)	Location Depth (feet)
ISCO-2	13-May-05	120	24	240	48	5.00	5.00	33'-48'
	13-May-05	60	19	120	33	3.16	3.64	18'-33'
Total Volume		**180**		**360**		**4.08**	**4.32**	

Injection Point ID	Injection Date	Catalyst Volume (gal)	Injection Time (Cat)	Oxidizer Volume (gal)	Injection Time (H2O2)	Catalyst Flow Rate (gal/min)	Oxidizer Flow Rate (gal/min)	Location Depth (feet)
ISCO-3	12-May-05	20	33	35	47	0.61	0.74	26'-36'
	13-May-05	60	44	120	83	1.36	1.45	36'-46'
	13-May-05	30	9	60	15	3.33	4.00	16'-26'
Total Volume		**110**		**215**		**1.77**	**2.06**	

Injection Point ID	Injection Date	Catalyst Volume (gal)	Injection Time (Cat)	Oxidizer Volume (gal)	Injection Time (H2O2)	Catalyst Flow Rate (gal/min)	Oxidizer Flow Rate (gal/min)	Location Depth (feet)
ISCO-4	12-May-05	60	29	145	85	2.07	1.71	35'-48'
Total Volume		**60**		**145**		**2.07**	**1.71**	

Injection Point ID	Injection Date	Catalyst Volume (gal)	Injection Time (Cat)	Oxidizer Volume (gal)	Injection Time (H2O2)	Catalyst Flow Rate (gal/min)	Oxidizer Flow Rate (gal/min)	Location Depth (feet)
ISCO-5	11-May-05	60	60	120	112	1.00	1.07	28'-32'
	13-May-05	120	29	240	42	4.14	5.71	15'-25'
Total Volume		**180**		**360**		**2.57**	**3.39**	

Injection Point ID	Injection Date	Catalyst Volume (gal)	Injection Time (Cat)	Oxidizer Volume (gal)	Injection Time (H2O2)	Catalyst Flow Rate (gal/min)	Oxidizer Flow Rate (gal/min)	Location Depth (feet)
ISCO-6	13-May-05	30	19	60	46	1.58	1.30	31'-46'
	13-May-05	30	16	60	21	1.88	2.86	16'-31'
Total Volume		**60**		**120**		**1.73**	**2.08**	

NOTE: Oxidizer is 12.5% Stabilized Hydrogen Peroxide
Catalyst is ISOTEC series Cat-4260 chelated iron complex

Table 2: Historical ISOTEC Injection Events
Former Swivelier Site
Route 304, Nanuet NY
EWMA Job #205548

Injection Point ID	Injection Date	Catalyst Volume (gal)	Injection Time (Cat)	Oxidizer Volume (gal)	Injection Time (H2O2)	Catalyst Flow Rate (gal/min)	Oxidizer Flow Rate (gal/min)
MW-6R	06-Jun-05	0	0	20	9	~	2.22
	08-Jun-05	0	0	30	41	~	0.73
	09-Jun-05	0	0	35	39	~	0.90
	13-Jun-05	15	95	0	0	0.16	~
Total Volume		**15**		**85**		**0.16**	**1.28**

Injection Point ID	Injection Date	Catalyst Volume (gal)	Injection Time (Cat)	Oxidizer Volume (gal)	Injection Time (H2O2)	Catalyst Flow Rate (gal/min)	Oxidizer Flow Rate (gal/min)
MW-10D	06-Jun-05	0	0	25	18	~	1.39
	07-Jun-05	0	0	30	91	~	0.33
	08-Jun-05	0	0	60	96	~	0.63
	09-Jun-05	0	0	45	44	~	1.02
	13-Jun-05	45	50	0	0	0.90	~
Total Volume		**45**		**160**		**0.90**	**0.84**

Injection Point ID	Injection Date	Catalyst Volume (gal)	Injection Time (Cat)	Oxidizer Volume (gal)	Injection Time (H2O2)	Catalyst Flow Rate (gal/min)	Oxidizer Flow Rate (gal/min)
MW-11D	06-Jun-05	0	0	60	188	~	0.32
	07-Jun-05	0	0	135	327	~	0.41
	08-Jun-05	0	0	75	249	~	0.30
	09-Jun-05	85	219	45	29	0.39	1.55
	13-Jun-05	95	44	195	273	2.16	0.71
Total Volume		**180**		**510**		**1.27**	**0.66**

Injection Point ID	Injection Date	Catalyst Volume (gal)	Injection Time (Cat)	Oxidizer Volume (gal)	Injection Time (H2O2)	Catalyst Flow Rate (gal/min)	Oxidizer Flow Rate (gal/min)
MW-12D	07-Jun-05	0	0	60	185	~	0.32
	08-Jun-05	60	42	80	104	1.43	0.77
	09-Jun-05	0	0	35	119	~	0.29
	13-Jun-05	0	0	60	208	~	0.29
Total Volume		**60**		**235**		**1.43**	**0.42**

Injection Point ID	Injection Date	Catalyst Volume (gal)	Injection Time (Cat)	Oxidizer Volume (gal)	Injection Time (H2O2)	Catalyst Flow Rate (gal/min)	Oxidizer Flow Rate (gal/min)
MW-13D	06-Jun-05	0	0	90	35	~	2.57
	07-Jun-05	90	103	210	104	0.87	2.02
	08-Jun-05	150	49	180	89	3.06	2.02
	09-Jun-05	0	0	300	185	~	1.62
	13-Jun-05	240	97	210	99	2.47	2.12
Total Volume		**480**		**990**		**2.14**	**2.07**

NOTE: Oxidizer is 12.5% Stabilized Hydrogen Peroxide
Catalyst is ISOTEC series Cat-4260 chelated iron complex

Table 2: Historical ISOTEC Injection Events
Former Swivelier Site
Route 304, Nanuet NY
EWMA Job #205548

Injection Point ID	Injection Date	Catalyst Volume (gal)	Injection Time (Cat)	Oxidizer Volume (gal)	Injection Time (H2O2)	Catalyst Flow Rate (gal/min)	Oxidizer Flow Rate (gal/min)
MW-6R	23-Feb-06	0	0	55	28	~	1.96
	24-Feb-06	0	0	50	26	~	1.92
	01-Mar-06	30	13	0	0	2.31	~
Total Volume		**30**		**105**		**2.31**	**1.94**

Injection Point ID	Injection Date	Catalyst Volume (gal)	Injection Time (Cat)	Oxidizer Volume (gal)	Injection Time (H2O2)	Catalyst Flow Rate (gal/min)	Oxidizer Flow Rate (gal/min)
MW-10D	23-Feb-06	0	0	50	26	~	1.92
	24-Feb-06	0	0	60	26	~	2.31
	01-Mar-06	45	25	0	0	1.80	~
Total Volume		**45**		**110**		**1.80**	**2.12**

Injection Point ID	Injection Date	Catalyst Volume (gal)	Injection Time (Cat)	Oxidizer Volume (gal)	Injection Time (H2O2)	Catalyst Flow Rate (gal/min)	Oxidizer Flow Rate (gal/min)
MW-11D	23-Feb-06	0	0	80	42	~	1.90
	24-Feb-06	0	0	40	23	~	1.74
	01-Mar-06	35	20	0	0	1.75	~
Total Volume		**35**		**120**		**1.75**	**1.82**

Injection Point ID	Injection Date	Catalyst Volume (gal)	Injection Time (Cat)	Oxidizer Volume (gal)	Injection Time (H2O2)	Catalyst Flow Rate (gal/min)	Oxidizer Flow Rate (gal/min)
MW-12D	23-Feb-06	0	0	35	14	~	2.50
	24-Feb-06	0	0	20	14	~	1.43
	01-Mar-06	25	18	0	0	1.39	~
Total Volume		**25**		**55**		**1.39**	**1.96**

Injection Point ID	Injection Date	Catalyst Volume (gal)	Injection Time (Cat)	Oxidizer Volume (gal)	Injection Time (H2O2)	Catalyst Flow Rate (gal/min)	Oxidizer Flow Rate (gal/min)
MW-13D	24-Feb-06	0	0	90	37	~	2.43
	01-Mar-06	45	27	0	0	1.67	~
Total Volume		**45**		**90**		**1.67**	**2.43**

NOTE: Oxidizer is 12.5% Stabilized Hydrogen Peroxide
Catalyst is ISOTEC series Cat-4260 chelated iron complex

Table 2: Historical ISOTEC Injection Events
Former Swivelier Site
Route 304, Nanuet NY
EWMA Job #205548

Injection Point ID	Injection Date	Catalyst Volume (gal)	Injection Time (Cat)	Oxidizer Volume (gal)	Injection Time (H2O2)	Catalyst Flow Rate (gal/min)	Oxidizer Flow Rate (gal/min)
MW-6R	10-May-05	0	0	20	58	~	0.34
	11-May-05	0	0	25	73	~	0.34
	12-May-05	0	0	20	71	~	0.28
	13-May-05	30	18	10	4	1.67	2.50
Total Volume		**30**		**75**		**1.67**	**0.87**

Injection Point ID	Injection Date	Catalyst Volume (gal)	Injection Time (Cat)	Oxidizer Volume (gal)	Injection Time (H2O2)	Catalyst Flow Rate (gal/min)	Oxidizer Flow Rate (gal/min)
MW-10D	10-May-05	0	0	90	41	~	2.20
	11-May-05	0	0	20	16	~	1.25
	12-May-05	0	0	10	12	~	0.83
	13-May-05	30	218	0	0	0.14	~
Total Volume		**30**		**120**		**0.14**	**1.43**

Injection Point ID	Injection Date	Catalyst Volume (gal)	Injection Time (Cat)	Oxidizer Volume (gal)	Injection Time (H2O2)	Catalyst Flow Rate (gal/min)	Oxidizer Flow Rate (gal/min)
MW-11D	11-May-05	0	0	120	78	~	1.54
	12-May-05	40	88	0	0	0.45	~
	13-May-05	30	68	30	66	0.44	0.45
Total Volume		**70**		**150**		**0.45**	**1.00**

Injection Point ID	Injection Date	Catalyst Volume (gal)	Injection Time (Cat)	Oxidizer Volume (gal)	Injection Time (H2O2)	Catalyst Flow Rate (gal/min)	Oxidizer Flow Rate (gal/min)
MW-12D	10-May-05	40	10	120	35	4.00	3.43
	11-May-05	80	96	240	106	0.83	2.26
	12-May-05	30	146	20	14	0.21	1.43
	13-May-05	120	150	120	118	0.80	1.02
Total Volume		**270**		**500**		**1.46**	**2.03**

Injection Point ID	Injection Date	Catalyst Volume (gal)	Injection Time (Cat)	Oxidizer Volume (gal)	Injection Time (H2O2)	Catalyst Flow Rate (gal/min)	Oxidizer Flow Rate (gal/min)
MW-13D	10-May-05	120	64	240	85	1.88	2.82
	11-May-05	120	36	240	105	3.33	2.29
	12-May-05	120	49	240	262	2.45	0.92
Total Volume		**360**		**720**		**2.55**	**2.01**

Site Management Plan

Property Known As:

Former Swivelier Site
Village of Nanuet, Rockland County, New York
NYSDEC Site Number: 3-44-036
EWMA Project No. 205548

June 2018

Table 3 - Historical Soil Vapor Results

Table 3: Historical Soil Vapor Results
Former Swivelier Site
Route 304, Nanuet NY
EWMA Job #205548

	Sample Name:		SS-1			SS-2			SS-3			SS-4			SG			AIR-1			AIR-2			AIR-3			AIR-4	
	Lab:		IAL			IAL			IAL			IAL			IAL			Accutest Laboratories			Accutest Laboratories			Accutest Laboratories			Accutest Laboratories	
	Lab ID:		E17-09837-01			E17-09837-02			E17-09837-03			E17-09837-04			E14-03224-01			n58770-1			N58770-2			N58770-3			N58770-4	
	Date		11/6/17			11/6/17			11/6/17			11/6/17			5/1/14			2/4/04			2/4/04			2/4/04			2/4/04	
				RL			RL			RL			RL			RL			RL			RL			RL			RL
Compound	CAS#	Q	ug/m3	ug/m3	Q	ug/m3	ug/m3	Q	ug/m3	ug/m3	Q	ug/m3	ug/m3	Q	ug/m3	ug/m3	Q	ug/m3	ug/m3	Q	ug/m3	ug/m3	Q	ug/m3	ug/m3	Q	ug/m3	ug/m3
Acetone	67-64-1	D	260	4.8	D	130	4.8		86	0.48		45	0.48	D	180	4.8		123 b	1.9		46.8	0.48		19	0.48		625	7.6
Benzene	71-43-2		ND	0.64		ND	6.4		ND	0.64		ND	0.64	D	6.7	6.4		5.1	0.64		4.5	0.64		4.5	0.64		2.1	0.64
Benzyl chloride	100-44-7		NA	NA		NA	NA		NA	NA		NA	NA		NA	NA		ND	1		ND	1		ND	1		ND	1
Bromodichloromethane	75-27-4		ND	1.3		ND	13		ND	1.3		ND	1.3		ND	13		ND	1.3		ND	1.3		ND	1.3		ND	1.3
Bromoform	75-25-2		ND	2.1		ND	21		ND	2.1		ND	2.1		ND	21		ND	2.1		ND	2.1		ND	2.1		ND	2.1
Bromomethane	74-83-9		ND	0.78		ND	7.8		ND	0.78		ND	0.78		ND	7.8		ND	0.78		ND	0.78		ND	0.78		ND	0.78
1,3-Butadiene	106-99-0		ND	0.44		ND	4.4		ND	0.44		ND	0.44		ND	4.4		ND	0.44		ND	0.44		ND	0.44		ND	0.44
Chlorobenzene	108-90-7		ND	0.92		ND	9.2		ND	0.92		ND	0.92		ND	9.2		ND	0.92		ND	0.92		ND	0.92		ND	0.92
Chloroethane	75-00-3		ND	0.53		ND	5.3		ND	0.53		ND	0.53		ND	5.3		ND	0.53		ND	0.53		ND	0.53		ND	0.53
Chloroform	67-66-3		2.0	0.98		ND	9.8		1.8	0.98		ND	0.98		ND	9.8		ND	0.98		ND	0.98		ND	0.98		ND	0.98
Chloromethane	74-87-3		ND	0.41		ND	4.1		ND	0.41		ND	0.41		ND	4.1		ND	0.41		ND	0.41		ND	0.41		ND	0.41
Carbon disulfide	75-15-0		0.72	0.62		ND	6.2		ND	0.62		1.4	0.62	D	75	6.2		ND	0.62		1.2	0.62		ND	0.62		0.59	0.62
Carbon tetrachloride	56-23-5		0.50	0.25		ND	2.5		0.50	0.25		0.38	0.25		ND	2.5		ND	0.31		ND	0.31		0.5	0.31		ND	0.31
Cyclohexane	110-82-7		1.8	0.69		ND	6.9		1.1	0.69		ND	0.69		ND	6.9		ND	0.69		ND	0.69		ND	0.69		ND	0.69
Dibromochloromethane	124-48-1		ND	1.7		ND	17		ND	1.7		ND	1.7		ND	17		ND	1.7		ND	1.7		ND	1.7		ND	1.7
1,2-Dibromoethane	106-93-4		ND	1.5		ND	15		ND	1.5		ND	1.5		ND	15		ND	1.5		ND	1.5		ND	1.5		ND	1.5
1,2-Dichlorobenzene	95-50-1		ND	1.2		ND	12		ND	1.2		ND	1.2		ND	12		ND	1.2		ND	1.2		ND	1.2		ND	1.2
1,3-Dichlorobenzene	541-73-1		ND	1.2		ND	12		ND	1.2		ND	1.2		ND	12		ND	1.2		ND	1.2		ND	1.2		ND	1.2
1,4-Dichlorobenzene	106-46-7		ND	1.2		ND	12		ND	1.2		ND	1.2		ND	12		ND	1.2		ND	1.2		0.72	1.2		1	1.2
Dichlorodifluoromethane	75-71-8		1.2	0.99		ND	9.9		ND	0.99		ND	0.99		ND	9.9		3.4	0.99		ND	0.99		2.9	0.99		2.9	0.99
1,1-Dichloroethane	75-34-3		ND	0.81		ND	8.1		ND	0.81		ND	0.81		ND	8.1		ND	0.81		ND	0.81		2.9	0.81		ND	0.81
1,2-Dichloroethane	107-06-2		ND	0.81		ND	8.1		ND	0.81		ND	0.81		ND	8.1		0.45	0.2		ND	0.2		ND	0.2		ND	0.2
1,1-Dichloroethene	75-35-4		ND	0.79		ND	7.9		ND	0.79		ND	0.79		ND	7.9		ND	0.79		ND	0.79		ND	0.79		ND	0.79
1,2-Dichloroethene (cis)	156-59-2		ND	0.79	D	820	7.9		ND	0.79		ND	0.79		ND	7.9		ND	0.79		ND	0.79		ND	0.79		0.75	0.79
1,2-Dichloroethene (trans)	156-60-5		ND	0.79	D	57	7.9		ND	0.79		ND	0.79		ND	7.9		ND	0.79		ND	0.79		ND	0.79		ND	0.79
1,2-Dichloropropane	78-87-5		ND	0.92		ND	9.2		ND	0.92		ND	0.92		ND	9.2		ND	0.92		ND	0.92		ND	0.92		ND	0.92
1,3-Dichloropropene (cis)	10061-01-5		ND	0.91		ND	9.1		ND	0.91		ND	0.91		ND	9.1		ND	0.91		ND	0.91		ND	0.91		ND	0.91
1,3-Dichloropropene (trans)	10061-02-6		ND	0.91		ND	9.1		ND	0.91		ND	0.91		ND	9.1		ND	0.91		ND	0.91		ND	0.91		ND	0.91
1,3-Dichloropropene - TOTAL	542-75-6		ND	0.91		ND	9.1		ND	0.91		ND	0.91		ND	9.1		ND	0.91		ND	1.91		ND	1.91		ND	1.91
1,2-Dichlorotetrafluoroethane	76-14-2		ND	1.4		ND	14		ND	1.4		ND	1.4		ND	14		NA	NA		NA	NA		NA	NA		NA	NA
1,4-Dioxane	123-91-1		ND	0.72		ND	7.2		ND	0.72		ND	0.72		ND	7.2		ND	0.72		ND	0.72		ND	0.72		ND	0.72
Ethyl Acetate	141-78-6		NA	NA		NA	NA		NA	NA		NA	NA		NA	NA		ND	0.72		ND	0.72		ND	0.72		ND	0.72
Ethylbenzene	100-41-4		1.3	0.87		ND	8.7		1.0	0.87		1.0	0.87		ND	8.7		9.1	0.87		4.3	0.87		3.7	0.87		7.8	0.87
Ethanol	64-17-5		NA	NA		NA	NA		NA	NA		NA	NA		NA	NA		73	0.94		143 b	9.4		99.9	1.9		239	15
4-Ethyltoluene	622-96-8		NA	NA		NA	NA		NA	NA		NA	NA		NA	NA		5.4	0.98		5.9	0.98		2.8	0.98		1.2	0.98
Freon 113	76-13-1		NA	NA		NA	NA		NA	NA		NA	NA		NA	NA		ND	1.5		ND	1.5		ND	1.5		ND	1.5
Freon 114	76-14-2		NA	NA		NA	NA		NA	NA		NA	NA		NA	NA		ND	1.4		ND	1.4		ND	1.4		ND	1.4
n-Heptane	142-82-5		ND	0.82		ND	8.2		ND	0.82		ND	0.82		ND	8.2		3.4	0.82		3.6	0.82		3.5	0.82		3.3	0.82
1,3-Hexachlorobutadiene	87-68-3		ND	2.1		ND	21		ND	2.1		ND	2.1		ND	21		ND	2.1		ND	2.1		ND	2.1		ND	2.1
n-Hexane	110-54-3		7.5	0.71		ND	7.1		5.2	0.71		7.5	0.71	D	7.4	7.1		5.6	0.7		14	0.7		13	0.7		2.6	0.7
2-Hexanone	591-78-6		NA	NA		NA	NA		NA	NA		NA	NA		NA	NA		ND	0.82		ND	0.82		ND	0.82		ND	0.82
Isopropyl Alcohol	67-63-0		NA	NA		NA	NA		NA	NA		NA	NA		NA	NA		15	0.49		20	0.49		14	0.49		30.2	0.49
Methylene chloride	75-09-2		ND	0.70		ND	7.0		23	0.70		2.2	0.70		ND	7.0		0.94	0.69		1.3	0.69		1.3	0.69		1.1	0.69
Methyl ethyl ketone	78-93-3		98	0.59	D	17	5.9		41	0.59		30	0.59	D	6.2	5.9		11	0.59		9.7	0.59		4.7	0.59		7.7	0.59
Methyl isobutyl ketone	108-10-1		ND	0.82		ND	8.2		0.82	0.82		ND	0.82		ND	8.2		2.5	0.82		7	0.82		ND	0.82		1.7	0.82
Methyl tert-butyl ether	1634-04-4		ND	0.72		ND	7.2		ND	0.72		ND	0.72		ND	7.2		147 b	2.9		24	0.72		23	0.72		2.7	0.72
Propylene	115-07-1		NA	NA		NA	NA		NA	NA		NA	NA		NA	NA		ND	0.86		ND	0.86		ND	0.86		ND	0.86
Styrene	100-42-5		ND	0.85		ND	8.5		ND	0.85		ND	0.85		ND	8.5		2.9	0.85		0.64	0.85		ND	0.85		ND	0.85
Tert-butyl alcohol	75-65-0		ND	0.61		ND	6.1		6.4	0.61		ND	0.61		ND	6.1		NA	NA		NA	NA		NA	NA		NA	NA
1,1,2,2-Tetrachloroethane	79-34-5		ND	1.4		ND	14		ND	1.4		ND	1.4		ND	14		ND	1.4		ND	1.4		ND	1.4		ND	1.4
Tetrachloroethene	127-18-4		1.6	1.4	D	56	14		1.6	1.4		2.6	1.4		ND	14		1.8	1.4		12	1.4		1.8	1.4		57	1.4
Tetrahydrofuran	109-99-9		NA	NA		NA	NA		NA	NA		NA	NA		NA	NA		6.8	0.59		4.1	0.59		3.5	0.59		97.5	0.59
Toluene	108-88-3		46	0.75	D	31	7.5		25	0.75		39	0.75	D	9.8	7.5		40.7	0.75		42.2	0.75		42.2	0.75		12	0.75
1,2,4-Trichlorobenzene	120-82-1		ND	1.5		ND	15		ND	1.5		ND	1.5		ND	15		ND	1.5		ND	1.5		ND	1.5		ND	1.5
1,1,1-Trichloroethane	71-55-6		ND	1.1	D	13	11		ND	1.1		1.9	1.1		ND	11		0.65	1.1 J		0.93	1.1		14	1.1		7.6	1.1
1,1,2-Trichloroethane	79-00-5		ND	1.1		ND	11		ND	1.1		ND	1.1		ND	11		ND	1.1		ND	1.1		ND	1.1		ND	1.1
Trichloroethene	79-01-6		8.1	0.25	D	2700	4.9		3.2	0.25		ND	0.25		ND	2.5		2.4	0.27		29	0.27		ND	0.27		607	4.3
Trichlorofluoromethane	75-69-4		ND	1.1		ND	11		ND	1.1		2.3	1.1		ND	11		2.2	1.1		1.7	1.1		2	1.1		5.5	1.1
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1		ND	1.5		ND	15		ND	1.5		ND	1.5		ND	15		NA	NA		NA	NA		NA	NA		NA	NA
1,2,4-Trimethylbenzene	95-63-6		7.2	0.98		ND	9.8		5.1	0.98		7.0	0.98		ND	9.8		17	0.98		16	0.98		9.3	0.98		3.5	0.98
1,3,5-Trimethylbenzene	108-67-8		1.5	0.98		ND	9.8		1.0	0.98		1.5	0.98		ND	9.8		5.9	0.98		5.9	0.98		3.1	0.98		1.3	0.98
2,2,4-Trimethylpentane	540-84-1		ND	0.93		ND	9.3		ND	0.93		ND	0.93		ND	9.3		NA	NA		NA	NA		NA	NA		NA	NA
Vinyl Acetate	108-05-4		NA	NA		NA	NA		NA	NA		NA	NA		NA	NA		ND	0.7		ND	0.7		ND	0.7		ND	0.7
Vinyl bromide	593-60-2		ND	0.87		ND	8.7		ND	0.87		ND	0.87		ND	8.7		NA	NA		NA	NA		NA	NA		NA	NA
Vinyl chloride	75-01-4		ND	0.51		ND	5.1		ND	0.51		ND	0.51		ND	5.1		ND	0.51		ND	0.51		ND	0.51		ND	0.51
Xylenes (m&p)	179601-23-		5.6	0.87		ND	8.7		4.6	0.87		5.5	0.87		ND	8.7		33	0.87		16	0.87		13	0.87		23	0.87
Xylenes (o)	95-47-6		1.9	0.87		ND	8.7		1.5	0.87		1.8	0.87		ND	8.7		13	0.87		5.6	0.87		4.8	0.87		5.2	0.87
Xylenes - TOTAL	1330-20-7		7.5	0.87		ND	8.7		6.1	0.87		7.3	0.87		ND	8.7		45.6	0.87		21	0.87		17	0.87		28	0.87

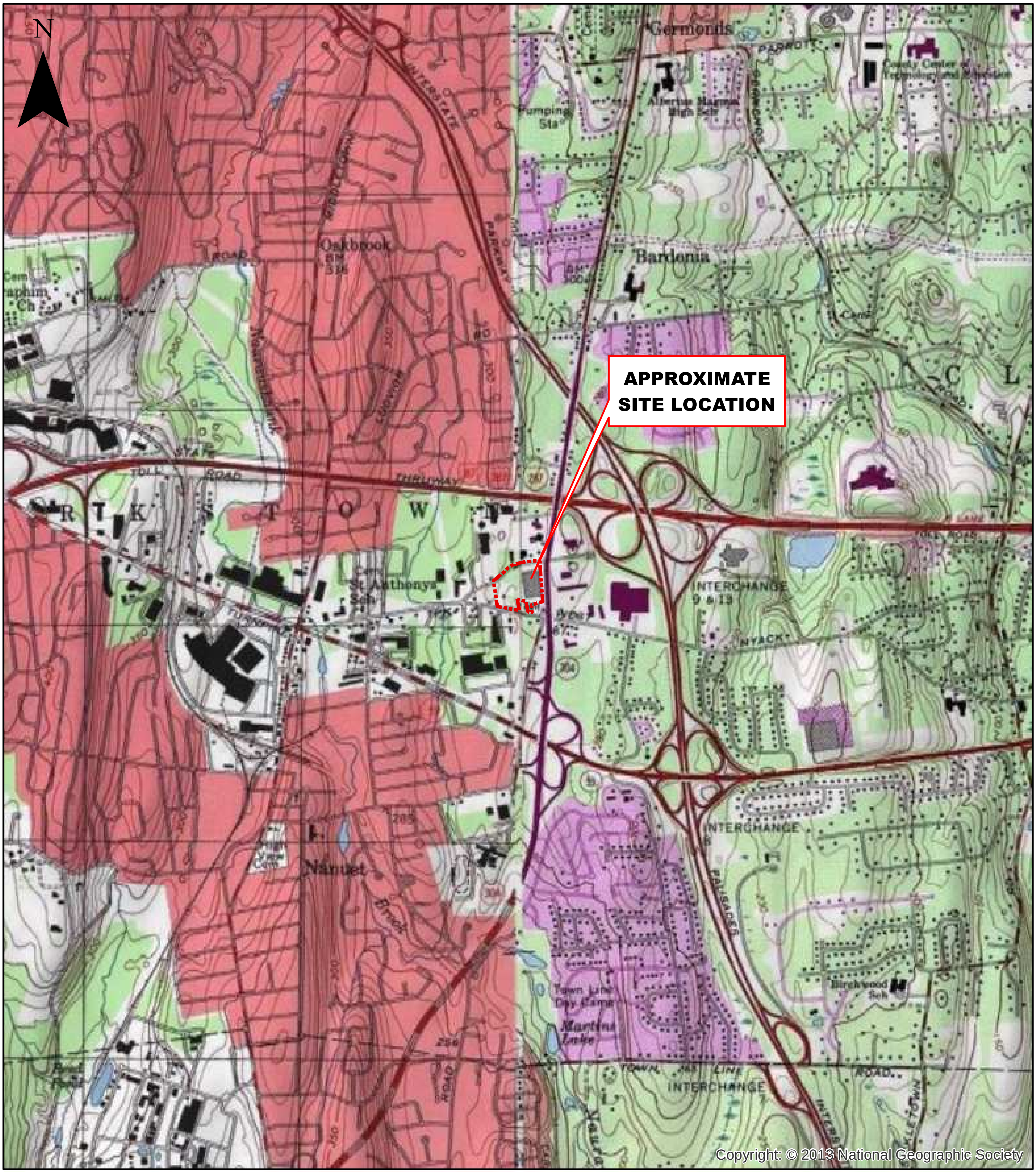
Site Management Plan

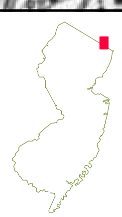
Property Known As:

Former Swivelier Site
Village of Nanuet, Rockland County, New York
NYSDEC Site Number: 3-44-036
EWMA Project No. 205548

June 2018

Figure 1 – Site Location Map





2,000 1,000 0 2,000 Feet

SOURCE: USGS PARK RIDGE, N.J.-N.Y. 7.5 MINUTE. QUADRANGLE, TOPOGRAPHIC IMAGERY OBTAINED FROM ARCGIS ONLINE

INNOVATIVE | EXPERIENCED | RESPONSIVE

100 MISTY LANE
P.O. BOX 5430
PARSIPPANY, NEW JERSEY

DATE:	PROJECT #
1/29/18	205548
DRAWN BY: RR	
CHECKED BY: JS	

Document Path: G:\Job Data\205000\205548\Drawings\205548F1 Site Location map.mxd

SITE LOCATION
FORMER SWIVELIER COMPANY SITE
33 ROUTE 304
VILLAGE OF NANUET, NEW YORK

Figure #
1

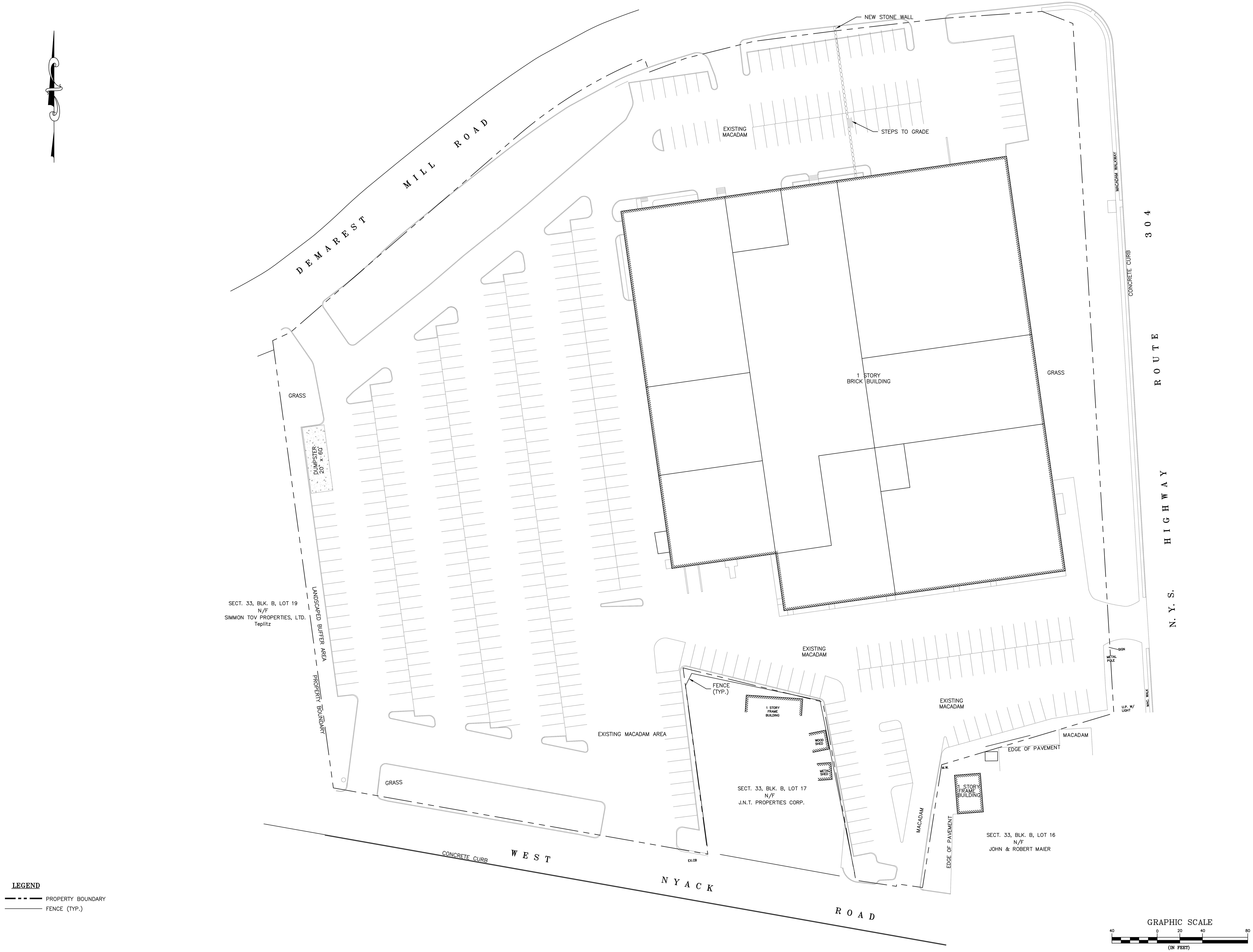
Site Management Plan

Property Known As:

Former Swivelier Site
Village of Nanuet, Rockland County, New York
NYSDEC Site Number: 3-44-036
EWMA Project No. 205548

June 2018

Figure 2 – Site Layout Map



INNOVATIVE | EXPERIENCED | RESPONSIVE

100 Misty Lane
P.O. Box 5430
Parsippany, NJ 07054

SCALE: AS SHOWN		PROJECT# 205548
DATE: 1/29/18		
DRAWN BY: RR/CL	CHECKED BY: JS	FILE: k:\drawings\205000\205548\205548f2_CL.dwg

SITE PLAN

FORMER SWIVELIER COMPANY SITE
ROUTE 304
VILLAGE OF NANUET, NEW YORK

FIGURE# 2

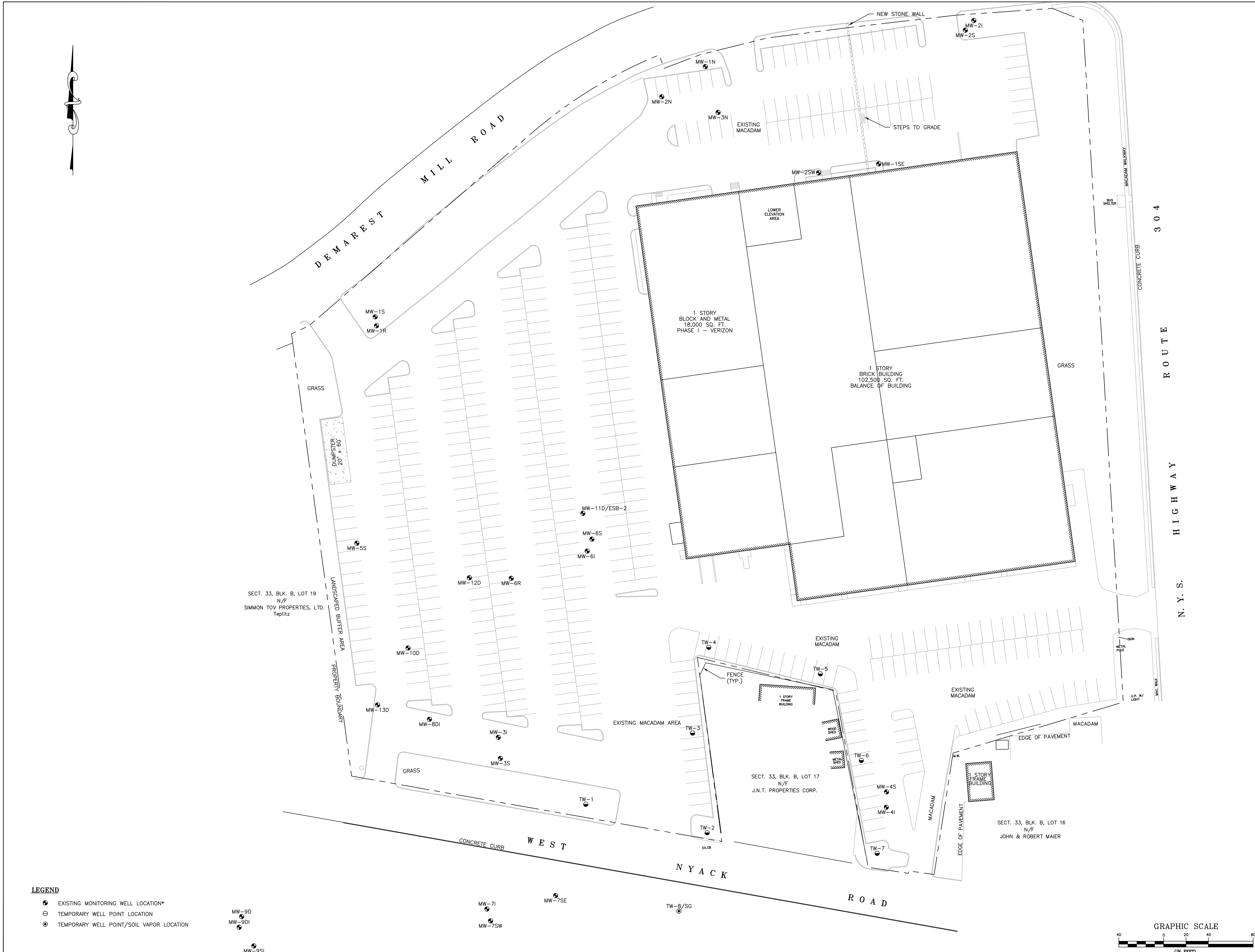
Site Management Plan

Property Known As:

Former Swivelier Site
Village of Nanuet, Rockland County, New York
NYSDEC Site Number: 3-44-036
EWMA Project No. 205548

June 2018

Figure 3 – Existing and Former Monitoring Well Locations



EWMA INNOVATIVE | EXPERIENCED | RESPONSIVE

100 Misty Lane
P.O. Box 5430
Parsippany, NJ 07054

SCALE: AS SHOWN

DATE: 2/6/18

PROJECT# 205548

DRAWN BY: RR/CL

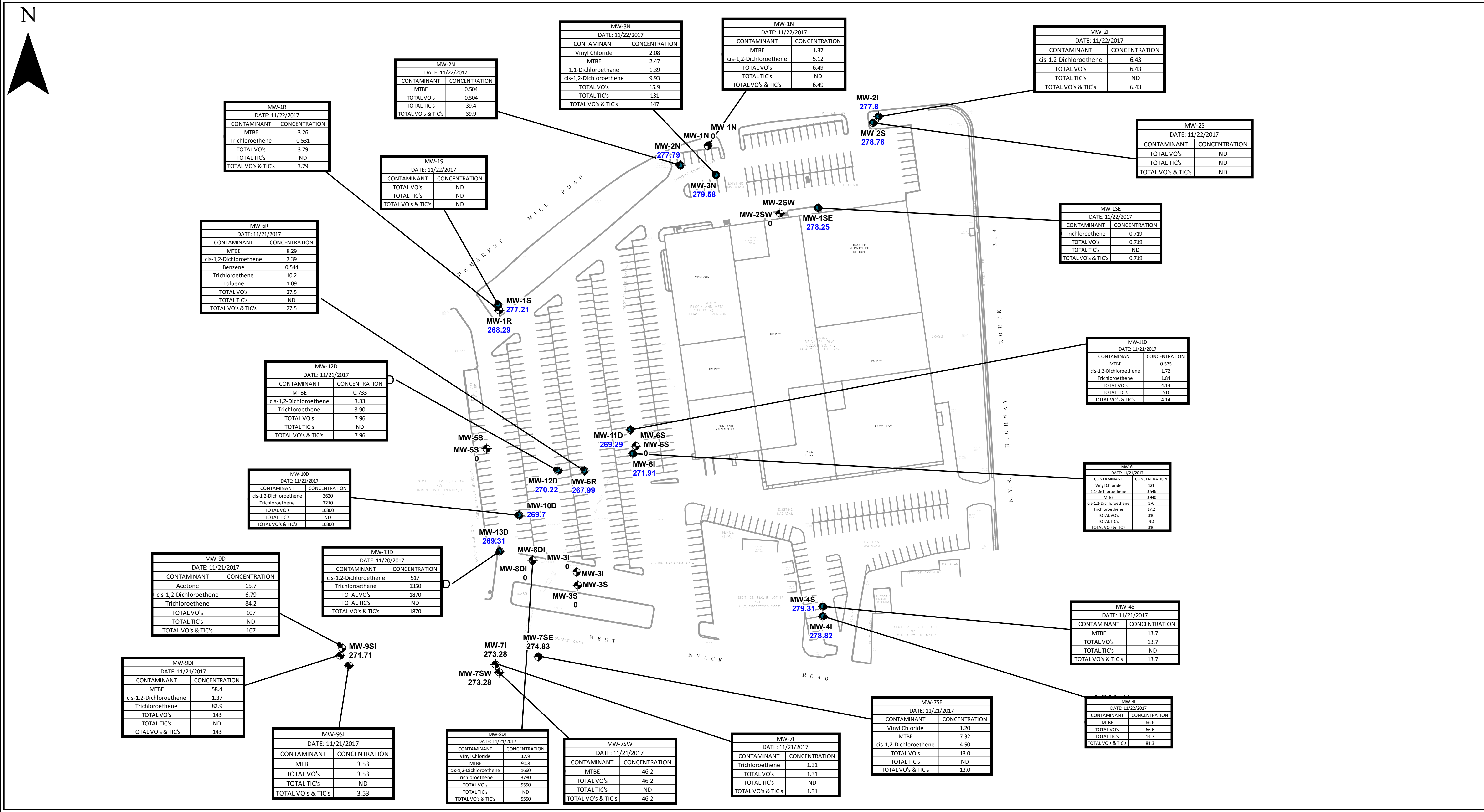
CHECKED BY: JS

FILE: k:\drawings\205000\205548\205548f3_cl.dwg

EXISTING AND FORMER MONITORING WELL LOCATIONS

FORMER SWIVELIER COMPANY SITE
ROUTE 304
VILLAGE OF NANUET, NEW YORK

FIGURE# 3



MW-1R	
DATE: 11/22/2017	
CONTAMINANT	CONCENTRATION
MTBE	3.26
Trichloroethene	0.531
TOTAL VO's	3.79
TOTAL TIC's	ND
TOTAL VO's & TIC's	3.79

MW-2N	
DATE: 11/22/2017	
CONTAMINANT	CONCENTRATION
MTBE	0.504
TOTAL VO's	0.504
TOTAL TIC's	39.4
TOTAL VO's & TIC's	39.9

MW-3N	
DATE: 11/22/2017	
CONTAMINANT	CONCENTRATION
Vinyl Chloride	2.08
MTBE	2.47
1,1-Dichloroethane	1.39
cis-1,2-Dichloroethene	9.93
TOTAL VO's	15.9
TOTAL TIC's	131
TOTAL VO's & TIC's	147

MW-1N	
DATE: 11/22/2017	
CONTAMINANT	CONCENTRATION
MTBE	1.37
cis-1,2-Dichloroethene	5.12
TOTAL VO's	6.49
TOTAL TIC's	ND
TOTAL VO's & TIC's	6.49

MW-2I	
DATE: 11/22/2017	
CONTAMINANT	CONCENTRATION
cis-1,2-Dichloroethene	6.43
TOTAL VO's	6.43
TOTAL TIC's	ND
TOTAL VO's & TIC's	6.43

MW-2S	
DATE: 11/22/2017	
CONTAMINANT	CONCENTRATION
TOTAL VO's	ND
TOTAL TIC's	ND
TOTAL VO's & TIC's	ND

MW-1S	
DATE: 11/22/2017	
CONTAMINANT	CONCENTRATION
TOTAL VO's	ND
TOTAL TIC's	ND
TOTAL VO's & TIC's	ND

MW-6R	
DATE: 11/21/2017	
CONTAMINANT	CONCENTRATION
MTBE	8.29
cis-1,2-Dichloroethene	7.39
Benzene	0.544
Trichloroethene	10.2
Toluene	1.09
TOTAL VO's	27.5
TOTAL TIC's	ND
TOTAL VO's & TIC's	27.5

MW-1SE	
DATE: 11/22/2017	
CONTAMINANT	CONCENTRATION
Trichloroethene	0.719
TOTAL VO's	0.719
TOTAL TIC's	ND
TOTAL VO's & TIC's	0.719

MW-12D	
DATE: 11/21/2017	
CONTAMINANT	CONCENTRATION
MTBE	0.733
cis-1,2-Dichloroethene	3.33
Trichloroethene	3.90
TOTAL VO's	7.96
TOTAL TIC's	ND
TOTAL VO's & TIC's	7.96

MW-11D	
DATE: 11/21/2017	
CONTAMINANT	CONCENTRATION
MTBE	0.575
cis-1,2-Dichloroethene	1.72
Trichloroethene	1.84
TOTAL VO's	4.14
TOTAL TIC's	ND
TOTAL VO's & TIC's	4.14

MW-10D	
DATE: 11/21/2017	
CONTAMINANT	CONCENTRATION
cis-1,2-Dichloroethene	3620
Trichloroethene	7210
TOTAL VO's	10800
TOTAL TIC's	ND
TOTAL VO's & TIC's	10800

MW-6I	
DATE: 11/21/2017	
CONTAMINANT	CONCENTRATION
Vinyl Chloride	121
1,1-Dichloroethene	0.546
MTBE	0.940
cis-1,2-Dichloroethene	170
Trichloroethene	17.2
TOTAL VO's	310
TOTAL TIC's	ND
TOTAL VO's & TIC's	310

MW-9D	
DATE: 11/21/2017	
CONTAMINANT	CONCENTRATION
Acetone	15.7
cis-1,2-Dichloroethene	6.79
Trichloroethene	84.2
TOTAL VO's	107
TOTAL TIC's	ND
TOTAL VO's & TIC's	107

MW-13D	
DATE: 11/20/2017	
CONTAMINANT	CONCENTRATION
cis-1,2-Dichloroethene	517
Trichloroethene	1350
TOTAL VO's	1870
TOTAL TIC's	ND
TOTAL VO's & TIC's	1870

MW-4S	
DATE: 11/21/2017	
CONTAMINANT	CONCENTRATION
MTBE	13.7
TOTAL VO's	13.7
TOTAL TIC's	ND
TOTAL VO's & TIC's	13.7

MW-9DI	
DATE: 11/21/2017	
CONTAMINANT	CONCENTRATION
MTBE	58.4
cis-1,2-Dichloroethene	1.37
Trichloroethene	82.9
TOTAL VO's	143
TOTAL TIC's	ND
TOTAL VO's & TIC's	143

MW-7SE	
DATE: 11/21/2017	
CONTAMINANT	CONCENTRATION
Vinyl Chloride	1.20
MTBE	7.32
cis-1,2-Dichloroethene	4.50
TOTAL VO's	13.0
TOTAL TIC's	ND
TOTAL VO's & TIC's	13.0

MW-4I	
DATE: 11/22/2017	
CONTAMINANT	CONCENTRATION
MTBE	66.6
TOTAL VO's	66.6
TOTAL TIC's	14.7
TOTAL VO's & TIC's	81.3

MW-9SI	
DATE: 11/21/2017	
CONTAMINANT	CONCENTRATION
MTBE	3.53
TOTAL VO's	3.53
TOTAL TIC's	ND
TOTAL VO's & TIC's	3.53

MW-8DI	
DATE: 11/21/2017	
CONTAMINANT	CONCENTRATION
Vinyl Chloride	17.9
MTBE	90.8
cis-1,2-Dichloroethene	1660
Trichloroethene	3780
TOTAL VO's	5550
TOTAL TIC's	ND
TOTAL VO's & TIC's	5550

MW-7SW	
DATE: 11/21/2017	
CONTAMINANT	CONCENTRATION
MTBE	46.2
TOTAL VO's	46.2
TOTAL TIC's	ND
TOTAL VO's & TIC's	46.2

MW-7I	
DATE: 11/21/2017	
CONTAMINANT	CONCENTRATION
Trichloroethene	1.31
TOTAL VO's	1.31
TOTAL TIC's	ND
TOTAL VO's & TIC's	1.31

Legend

- GW_ELE_NO_1S
- MONITORING WELL

NOTE: ALL RESULTS ARE IN PARTS PER BILLION (PPB)

EWMA INNOVATIVE | EXPERIENCED | RESPONSIVE

100 MISTY LANE
P.O. BOX 5430
PARSIPPANY, NEW JERSEY

DATE: 6/27/2018

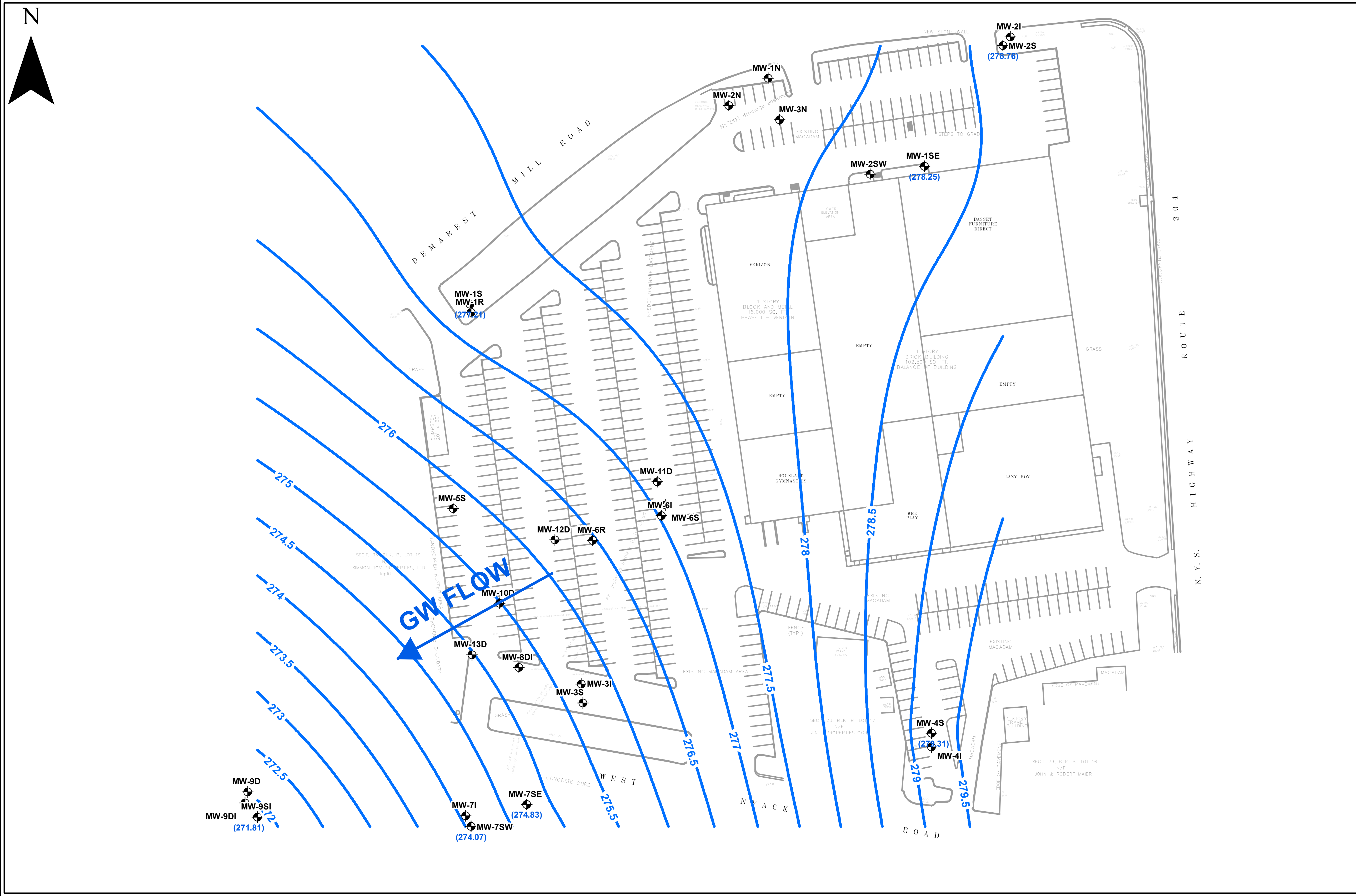
PROJECT # 205548

DRAWN BY: JS
CHECKED BY: KS

Document Path: G:\Job Data\205000\205548\Drawings\CHEM_BOX_CONTOUR.mxd

SAMPLE LOCATION PLAN
FORMER SWIVELIER COMPANY SITE
ROUTE 304
NANUET, NEW YORK

Figure# 2



WELL ID	ELEVATION
MW-1S	277.21
MW-2S	278.76
MW-4S	279.31
MW-7SE	274.83
MW-1SE	278.25
MW-9SI	271.81
MW-7SW	274.07

Legend

- Shallow Monitor Wells
- Shallow GW Contours

0 75 150 300 Feet

EWMA
INNOVATIVE | EXPERIENCED | RESPONSIVE

100 MISTY LANE
P.O. BOX 5430
PARSIPPANY, NEW JERSEY

DATE: 6/18/2018

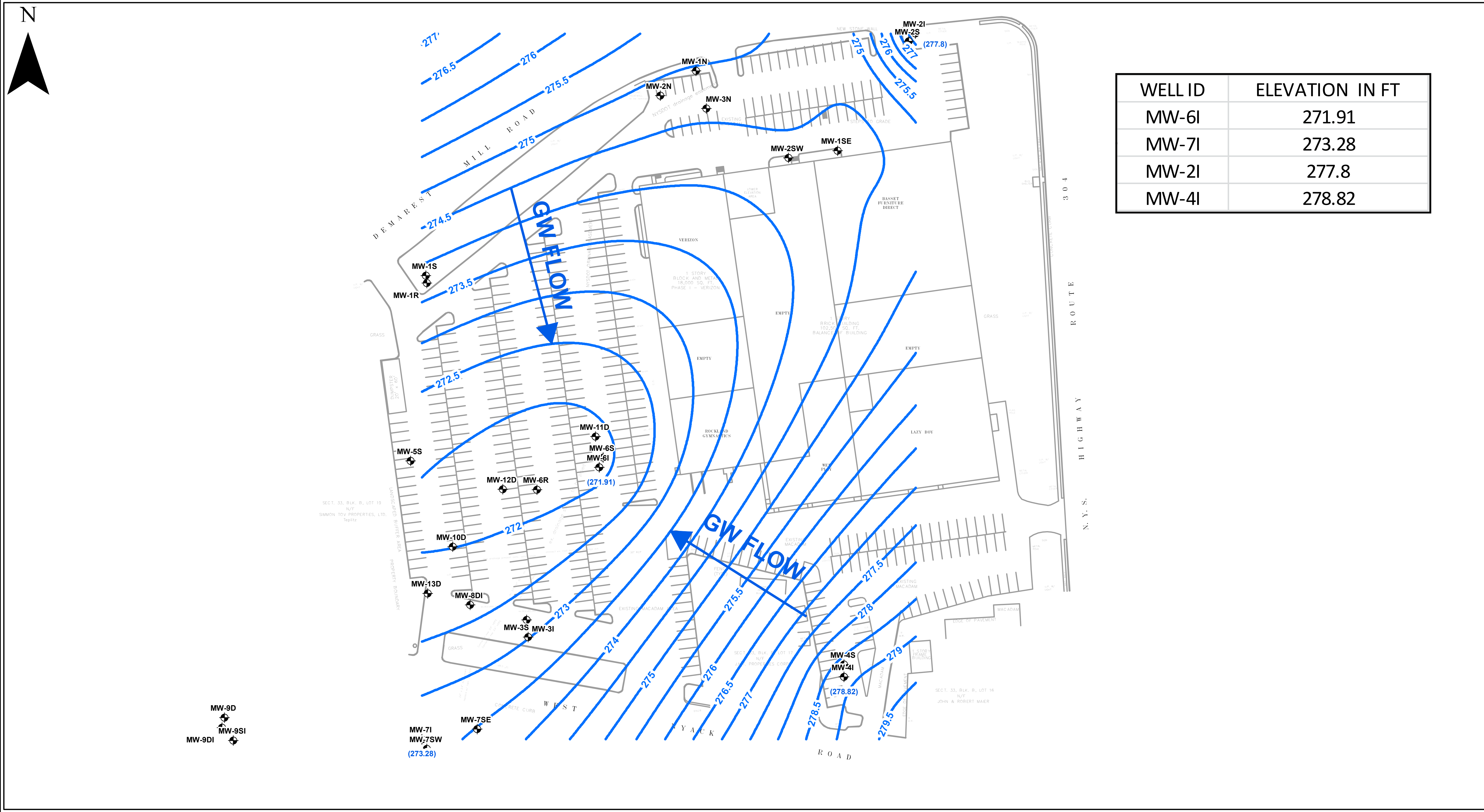
PROJECT # 205548

DRAWN BY: JS
CHECKED BY: KS

Document Path: G:\Job Data\205000\205548\Drawings\2018\SHALLOW_CONTOURS.mxd

SHALLOW WELLS GROUNDWATER CONTOURS
FORMER SWIVELIER COMPANY SITE
ROUTE 304
NANUET, NEW YORK

Figure# 1



WELL ID	ELEVATION IN FT
MW-6I	271.91
MW-7I	273.28
MW-2I	277.8
MW-4I	278.82

Legend

Intermediate Monitor Wells

Intermediate GW Contours

EWMA
INNOVATIVE | EXPERIENCED | RESPONSIVE
100 MISTY LANE
P.O. BOX 5430
PARSIPPANY, NEW JERSEY

DATE: 6/19/2018

PROJECT # 205548

DRAWN BY: JS
CHECKED BY: KS

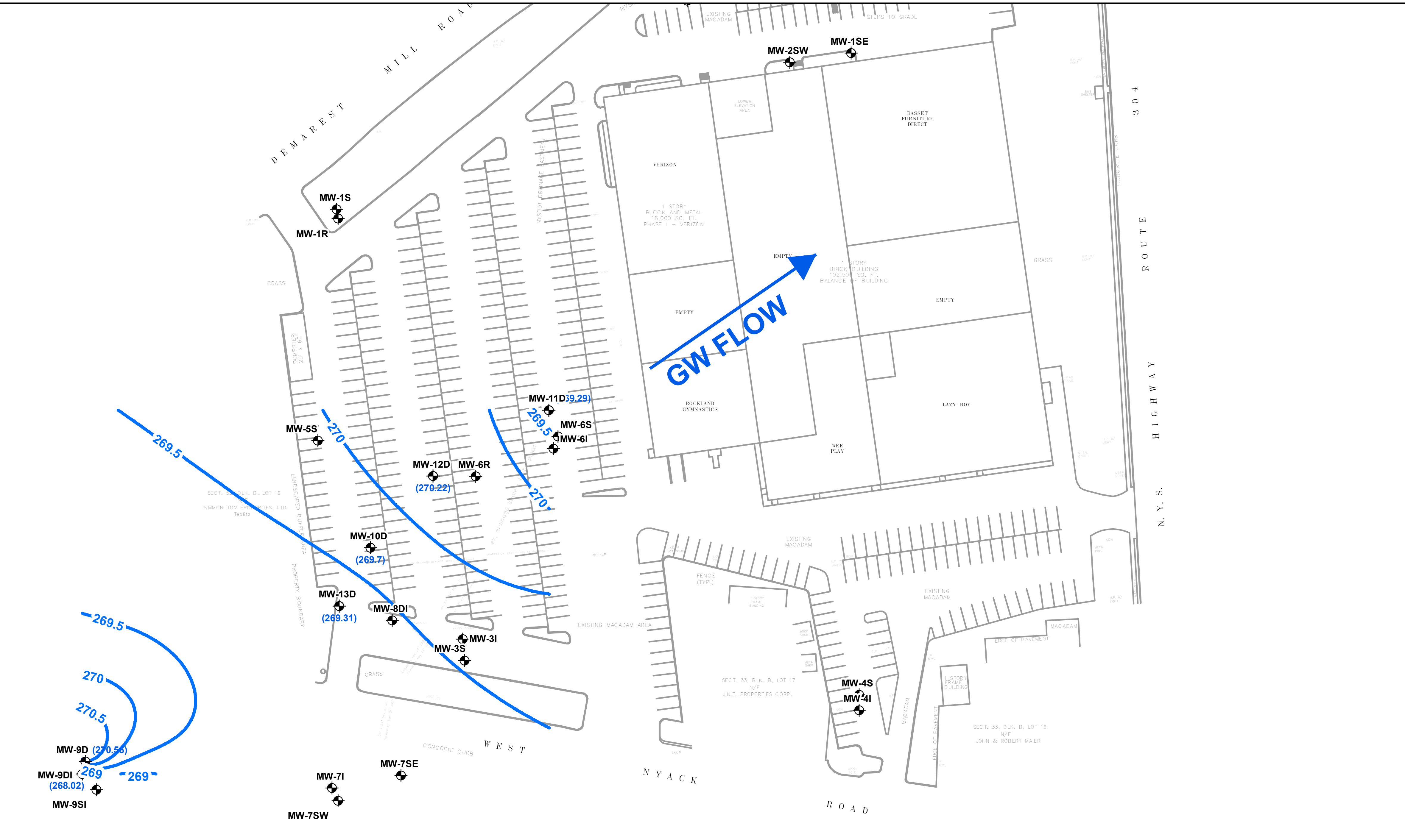
Document Path: G:\Job Data\205000\205548\Drawings\2018\INTERMEDIATE_CONTOURS.mxd

INTERMEDIATE WELLS GROUNDWATER CONTOURS
FORMER SWIVELIER COMPANY SITE
ROUTE 304
NANUET, NEW YORK

Figure# 2

N

WELL ID	ELEVATION IN FEET
MW-11D	269.29
MW-13D	269.31
MW-10D	269.7
MW-12D	270.22
MW-9D	270.56
MW-9DI	268.02



Legend

- Deep Monitor Wells
- Deep GW Contours

EWMA
INNOVATIVE | EXPERIENCED | RESPONSIVE
100 MISTY LANE
P.O. BOX 5430
PARSIPPANY, NEW JERSEY

DATE: 6/15/2018
PROJECT # 205548
DRAWN BY: JS
CHECKED BY: KS

Document Path: G:\Job Data\205000\205548\Drawings\2018\DEEP_CONTOURS.mxd

DEEP WELLS GROUNDWATER CONTOURS
FORMER SWIVELIER COMPANY SITE
ROUTE 304
NANUET, NEW YORK

Figure# 3

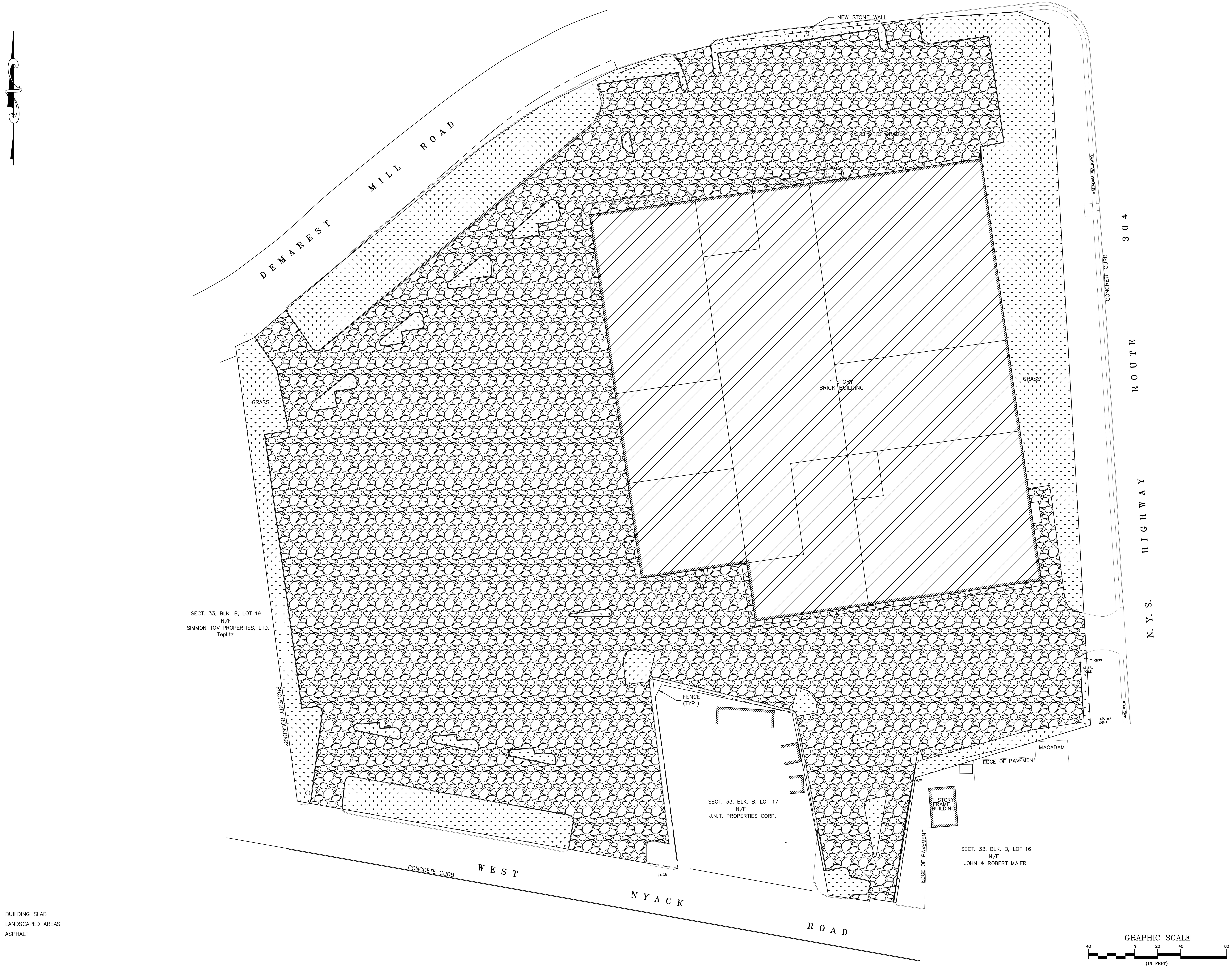
Site Management Plan

Property Known As:

Former Swivelier Site
Village of Nanuet, Rockland County, New York
NYSDEC Site Number: 3-44-036
EWMA Project No. 205548

June 2018

Figure 4 – Cover System Location Map



LEGEND

- BUILDING SLAB
- LANDSCAPED AREAS
- ASPHALT

EWMA INNOVATIVE | EXPERIENCED | RESPONSIVE 100 Misty Lane P.O. Box 5430 Parsippany, NJ 07054	SCALE: AS SHOWN DATE: 2/22/18 DRAWN BY: RR/CL CHECKED BY: JS FILE: k:\drawings\205000\205548\205548f4_CL.dwg	PROJECT# 205548
COVER SYSTEM LOCATION MAP FORMER SWIVELIER COMPANY SITE ROUTE 304 VILLAGE OF NANUET, NEW YORK		FIGURE# 4

Site Management Plan

Property Known As:

Former Swivelier Site
Village of Nanuet, Rockland County, New York
NYSDEC Site Number: 3-44-036
EWMA Project No. 205548

June 2018

Appendix 2 – Deed

ENVELOPE

ROCKLAND COUNTY, NEW YORK
Edward Gorman
RECORDING CERTIFICATE

INSTRUMENT ID: 2000-00054294

Type of Instrument: DEED

SCHWARTZ/NATHAN-EST OF
TO
SF PROPERTIES LLC

Received From: VINCENT MONTE AGENCY
67 NORTH MAIN ST
NEW CITY NY 10956-

Recording Charge: 56.00 Recording Pages: 5

** EXAMINED AND CHARGED AS FOLLOWS : **

** TRANSFER TAX **	** MTG/DEED AMOUNT **
10,600.00	2,650,000.00

RS#: 2758

Mortgage#:

Original ID#:

Town:

Received Tax on Above Mortgage

Basic:	.00
Special Addl:	.00
Additional:	.00
Mortgage Tax Total:	.00

Total Recording Fees: 10,656.00

** THIS PAGE IS PART OF THE INSTRUMENT **

I HEREBY CERTIFY THAT THE WITHIN AND FOREGOING WAS RECORDED IN THE CLERK'S OFFICE FOR ROCKLAND COUNTY, NEW YORK

INSTRUMENT ID#: 2000-00054294
ON (Recorded Date): 12/08/00
AT (Time): 09:42
Terminal ID: 248

Edward Gorman
EDWARD GORMAN
County Clerk

ROCKLAND COUNTY SEAL

EXECUTOR'S DEED (INDIVIDUAL OR CORPORATION)

STANDARD NYBTU FORM 8010

CAUTION: THIS AGREEMENT SHOULD BE PREPARED BY AN ATTORNEY AND REVIEWED BY ATTORNEYS FOR SELLER AND PURCHASER BEFORE SIGNING.

THIS INDENTURE, made the 28th day of SEPTEMBER, two thousand,

between RUTH SCHWARTZ, 21848 Cypress Circle, Boca Raton, Florida 33433, as executor of the Estate of Nathan Schwartz the last will and testament of Nathan Schwartz, late of the State of Florida who died on the 2nd day of February, nineteen hundred and ninety-eight, party of the first part, and

SF PROPERTIES, LLC, 627 South Main Street, New City, New York 10956

party of the second part,

WITNESSETH, that the party of the first part, to whom ancillary letters testamentary were issued by the Surrogate's Court, Rockland County, New York on May 25, 1999 and by virtue of the power and authority given in and by said last will and testament, and/or by Article 11 of the Estates, Powers and Trusts Law, and in consideration of TWO MILLION SIX HUNDRED FIFTY THOUSAND ($2,650,000) DOLLARS, by assuming the mortgage obligations set forth herein lawful money of the United States, paid by the party of the second part, does hereby grant and release unto the party of the second part, the distributees or successors and assigns of the party of the second part forever,

T.T.

10,600

ALL that certain plot, piece or parcel of land, with the buildings and improvements thereon erected, situate, lying and being in the Hamlet of Nanuet, Town of Clarkstown, County of Rockland, State of New York

SEE SCHEDULE "A" ANNEXED HERETO

Subject to a mortgage between NATHAN SCHWARTZ and Mortgagor and MARINE MIDLAND BANK, NA in the amount of $2,100,000 dated April 28, 1989 and recorded on May 8, 1989 and recorded in Liber 352 at Page 2378, in the Rockland County Clerk's Office, that was assigned to SNMP Corp. by Assignment dated June 4, 1997 and recorded on October 21, 1997 in Liber 860 Page 001 (Instrument ID# 1997-41940); that was assigned to KD EQUITIES, LLC by Assignment dated February 22, 2000, recorded on March 8, 2000 Instrument ID# 2000-107/8.

Subject to a mortgage between LESTER E. TOMBACK. as Mortgagor, and NATHAN SCHWARTZ, as Mortgagee recorded May 8, 1989 in Liber 03512, Page 2403 and assigned to FKF HOLDING CO., LP dated September 13, 2000.

Subject to a mortgage dated April 28, 1989 made by NATHAN R. SCHWARTZ to MARINE MIDLAND BANK, N.A., in the sum of $500,000 and recorded August 22, 1991 in Liber 474 at Page 2302 in the Office of the Rockland County Clerk and assigned to Assignor by Assignment dated June 4, 1997 and recorded on October 21, 1997 in Liber 858 at Page 001 (Instrument ID# 1997-41938) in the Office of the Clerk of Rockland County that was assigned to KD EQUITIES by Assignment dated February 22, 2000.

TOGETHER with all right, title and interest, if any, of the party of the first part in and to any streets and roads abutting the above described premises to the center lines thereof,

TOGETHER with the appurtenances, and also all the estate which the said decedent had at the time of decedent's death in said premises, and also the estate therein, which the party of the first part has or has power to convey or dispose of, whether individually, or by virtue of said will or otherwise,

TO HAVE AND TO HOLD the premises herein granted unto the party of the second part, the heirs or successors and assigns of the party of the second part forever.

11
C
4

AND the party of the first part covenants that the party of the first part has not done or suffered anything whereby the said premises have been encumbered in any way whatever, except as aforesaid.

The word "party" shall be construed as if it read "parties" whenever the sense of this indenture so requires.

IN WITNESS WHEREOF, the party of the first part has duly executed this deed the day and year first above written.

IN PRESENCE OF:

Mary Stewart

Ruth Schwartz

RUTH SCHWARTZ, as Executrix
Of the Estate of Nathan Schwartz

Acknowledgment by a Person Outside New York State (RPL § 309-b)

STATE OF FLORIDA)
) ss.:
COUNTY OF PALM BEACH)

On the 28TH day of SEPTEMBER in the year 2000before me, the undersigned, personally appeared RUTH SCHWARTZ personally known to me or proved to me on the basis of satisfactory evidence to be the individual(s) whose name(s) is (are) subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their capacity(ies), and that by his/her/their signature(s) on the instrument, the individual(s), or the person upon behalf of which the individual(s) acted, executed the instrument, and that such individual(s) made such appearance before the undersigned in BOCA RATON, FLORIDA.

Nancy Stewart

(signature and office of individual taking acknowledgment)

NOTARY PUBLIC STATE OF FLORIDA
NANCY STEWART
MY COMMISSION # CC 710439
EXPIRES: February 25, 2002
Bonded Thru Notary Public Underwriters

R. + R.

DORFMAN, LYNCH & KNOEBEL
51 NORTH BROADWAY
NYACK, N.Y. 10960
ATTN: BURTON I. DORFMAN, ESQ.

VJM 10136

SEC: 33
BLK: B
LOT: 18
COUNTY: ROCKLAND
TOWN: CLARKSTOWN

VJM 10136LT

VINCENT J. MONTE AGENCY, INC.
Title Insurance
67 NORTH MAIN STREET
NEW CITY, NEW YORK 10956
914-634-0606

Lawyers Title Insurance Corporation

SCHEDULE A

Title No. VJM10136LT

All that certain plot, piece or parcel of land, with the buildings and improvements thereon erected, situate, lying and being in the Hamlet of Nanuet, Town of Clarkstown, County of Rockland and State of New York being more particularly bounded and described as follows:

Beginning at a point on the northerly side of West Nyack Road (Route 59-A) where the same is intersected by the easterly line of lands now or formerly of P.C.S. Holding Corp.;

Running thence along said easterly line of lands now or formerly of P.C.S. Holding Corp. North 2 degrees 50' 00" East 398.75 feet to the southerly side of DeMarest Mill Road;

Thence running along the southerly side of DeMarest Mill Road the following ten (10) courses and distances:

(1) North 75 degrees 42' 00" East 17.21 feet;
(2) North 59 degrees 41' 30" East 263.22 feet to a point of curve;
(3) Northeasterly along the southerly side of DeMarest Mill Road on a curve to the right having a radius of 410.82 feet an arc length of 134.04 feet to a point;
(4) South 10 degrees 05' 34" East 12.77 feet;
(5) North 79 degrees 48' 03" East 34.18 feet;
(6) North 86 degrees 33' 38" East 61.93 feet;
(7) South 86 degrees 43' 03" East 76.05 feet;
(8) South 87 degrees 04' 15" East 66.60 feet;
(9) South 83 degrees 26' 55" East 113.59 feet and
(10) South 58 degrees 05' 38" East 29.34 feet to the westerly side of Route 304;

Running thence along the westerly side of Route 304 South 07 degrees 10' 33" West 610.35 feet to a point;

Thence running South 83 degrees 53' 57" West 158.76 feet and South 19 degrees 24' 50" West 109.81 feet to a point on the northerly side of West Nyack Road;

Running thence along the northerly side of West Nyack Road North 71 degrees 18' 04" West 23.04 feet and South 18 degrees 41' 56" West 2.22 feet to the northerly side of West Nyack Road,

Running thence along the northerly side of West Nyack Road, North 70 degrees 56' 20" West 36.23 feet to the easterly line of lands now or formerly of J.F.W.M. Realty Corp.

Thence running along said last mentioned lands North 0 degrees 03' 44" East 160.19 feet, North 65 degrees 43' 16" West 127.00 feet and South 3 degrees 00' 00" West 166.07 feet to the northerly side of West Nyack Road;

Running thence along said northerly side of West Nyack Road North 69 degrees 23' 20" West 335.98 feet to the point or place of Beginning.

DESCRIPTION

Site Management Plan

Property Known As:

Former Swivelier Site
Village of Nanuet, Rockland County, New York
NYSDEC Site Number: 3-44-036
EWMA Project No. 205548

June 2018

Appendix 3 – Remedial System Optimization Table of Contents

REMEDIAL SYSTEM OPTIMIZATION FOR FORMER SWIVELIER SITE

TABLE OF CONTENTS

4.3 RECOMMENDATIONS TO REDUCE COSTS

4.3.1 Supply Management

4.3.2 Process Improvements or Changes

4.3.3 Optimize Monitoring Program

4.3.4 Maintenance and Repairs

4.4 RECOMMENDATIONS FOR IMPLEMENTATION

Site Management Plan

Property Known As:

Former Swivelier Site
Village of Nanuet, Rockland County, New York
NYSDEC Site Number: 3-44-036
EWMA Project No. 205548

June 2018

Appendix 4 – Quality Assurance Project Plan

QUALITY ASSURANCE PROJECT PLAN

Property Known As:

Former Swivelier Site
Village of Nanuet, Rockland County, New York
NYSDEC Site No. 3-44-036

Prepared for:

S.F. Properties, LLC
627 South Main Street
New City, NY 10956

Revised February 2018

Submitted by:

EWMA, LLC
P. O. Box 5430
Parsippany, New Jersey 07054
EWMA Project No. 205548

Jacob Strauss

Prepared by: Jacob Strauss,
Senior Project Engineer

Kevin Seise

Reviewed By: Kevin Seise
Senior Project Manager

TABLE OF CONTENTS

ATTACHMENTS

1.0 INTRODUCTION

This Quality Assurance Project Plan (QAPP) is included as an Appendix to the Site Management Plan (SMP) document that was prepared for the property known as the Former Swivelier Company Site, located at Route 304 & West Nyack Road, Nanuet, Rockland County, New York (subject property and site). To achieve the goals presented in the RAWP, the QAPP details the specific policies, organizations, objectives, functional activities and quality assurance/quality control (QA/QC) activities that will be implemented.

2.0 SCOPE OF PROJECT

This QAPP document applies to the proposed delineation of contaminated groundwater at the subject property where trichloroethylene and its decay progeny were detected at levels exceeding the unrestricted groundwater standards used by the New York State Department of Environmental Conservation (NYSDEC). Groundwater samples will be collected from specific wells as described in the RAWP.

3.0 DATA QUALITY OBJECTIVES

The data collected will be consistent with the NYSDEC requirements. A Data Usability Summary Report will be generated and reviewed. Any problems with the data will be identified and resolved.

4.0 ANALYTICAL LABORATORY INFORMATION

Samples collected for analysis will be analyzed by the laboratory listed below.

Integrated Analytical Laboratories, LLC (IAL)
273 Franklin Road
Randolph, New Jersey 07869
NY Certified Lab # 11402

5.0 PROJECT COORDINATION

5.1 OVERALL PROJECT COORDINATION

Kevin Seise, Senior Project Manager
EWMA, LLC
100 Misty Lane, Parsippany, New Jersey 07054
973-560-1400
973-560-0400 (fax)

5.2 SAMPLING COORDINATION

Kevin Seise, Senior Project Manager
EWMA, LLC
100 Misty Lane, Parsippany, New Jersey 07054
973-560-1400
973-560-0400 (fax)

5.3 LABORATORY ACTIVITIES

Mike Leftin, Laboratory Director
Integrated Analytical Laboratories, LLC
273 Franklin Road, Randolph, New Jersey 07869
(973) 361-4252

6.0 ANALYTICAL METHODS/QA SUMMARY

The Analytical Methods/Quality Assurance Summary is included within the RAWP.

7.0 SITE-SPECIFIC SAMPLING METHODS

Groundwater and soil samples will be collected following EWMA's Quality Assurance/Quality Control (QAQC) Guidance Document, which is included in Attachment 1 of this document. Sampling procedures deviating from the QA/QC will be documented and justified, and will be described in a Remedial Action Report (RAR).

An overview of the sampling activities is presented below.

- Soil boring samples will be collected directly from the split spoon in 6-inch increments using dedicated disposable polyethylene scoops and placed directly into amber glass containers. Since field-sampling equipment will not be reused, a decontamination procedure is not necessary.

- Groundwater samples will be collected in accordance with the US EPA Region II Low Stress (Low Flow) Purging and Sampling. A Grundfos Redi-Flow 2-inch diameter submersible pump with a variable speed control box will be utilized to purge the wells. The pump will be equipped with dedicated poly-coated Teflon tubing with a check valve located between the tubing and the pump. The pump intake will be placed a minimum of two feet above the bottom of the well and approximately ½ the distance between the top of the open borehole or screen and the bottom of the well. Samples will be collected directly from dedicated tubing for each well.
- Pre-purge measurements will be collected prior to the start of purging. A copy of the purge guide is included as part of Attachment 1. An in-line flow-through cell will be utilized to measure groundwater quality parameters. A Horiba will be utilized to monitor pH, temperature, DO, turbidity and conductivity. Water quality measurements will be recorded every five minutes. Purging will continue until stabilization is achieved (three successive readings), with a minimum purge of twice the volume of the sampling equipment. The in-line flow through cell will be disconnected prior to sampling.
- Groundwater samples collected for VO+10 analysis do not require chemical preservation.
- All samples will be stored in coolers with ice while in the field. The samples will be delivered within 48-hours to the analytical laboratory.
- Matrix, Matrix Spike, Duplicate, Performance Evaluation, Field and Trip Blanks are not required for soil samples.
- An aqueous Trip Blank will be collected for VO+10 analysis. No other QA/QC samples will be collected.

8.0 FIELD INSTRUMENT CALIBRATION & MAINTENANCE

The Field Instrument Calibration & Maintenance procedure documents are included in Attachment 2. A copy of the equipment calibration log for the event is included in Attachment 2.

9.0 CHAIN OF CUSTODY PROCEDURES

9.1 FIELD CHAIN OF CUSTODY

The field chain of custody (COC) will be generated by the analytical laboratory preparing the sample containers. The COC will accompany the sample containers during transportation to the field, sample collection, and transportation back to the lab. It will also be carried through during analysis along with a Laboratory Custody Chronicle. The COC will also identify the final disposal of the sample container. It will be signed and dated by persons handling and transporting the containers. A final copy of the COC will be included with the analytical data report generated for the samples.

A blank copy of the Chain of Custody is included in Attachment 1.

9.2 LABORATORY CHAIN OF CUSTODY

The named analytical laboratory will generate an internal Laboratory Custody Chronicle in tracking the samples within the laboratory. As with the field COC, persons handling and transporting the samples will sign-off on the chronicle.

A final copy of the chronicle will be included with the analytical data report generated for the samples.

10.0 SAMPLE STORAGE PROCEDURES AT THE LABORATORY

The laboratory analyzing the samples will store the samples in a refrigerated and secured room.

11.0 LABORATORY DATA DELIVERABLE

In accordance with the NYSDEC ASP, Category A data deliverables will be submitted for the soil and groundwater samples collected from the sites. The deliverables will be generated by the analytical laboratory named in Section 4.0, Analytical Laboratory Information, of this document.

Attachment 1: EWMA QA/QC PROCEDURES

In order to assure the validity of the chemical test results for soil and water samples collected during the sampling program, the following QA/QC Program will be strictly adhered to:

QUALITY CONTROL

A.1 SamplingEquipment:

1. Drill Rig w stainless steel split spoons
2. PPE (disposable tyveks, gloves, etc.)
3. 6 mil. plastic sheeting, plastic bags and ties
4. Calculator, wristwatch, timer
5. Calibrated bucket for purge water measurement
6. Paper towels
7. Dedicated polyethylene tubing (submersible pump)
8. Dedicated teflon-line polyethelene tubing (for low-flow purge)
9. Plastic electrician ties or stainless steel clamps
10. Disposable fiber brushes
11. Stainless steel trays and bowls
12. Distilled and deionized water
13. Liquinox soap/tap water mixture
14. Pesticide grade acetone
15. 10% nitric acid (trace metal or higher grade HNO_3)
16. Sample containers and preservatives
17. Trip blanks
18. Cooler and ice packs
19. Bound field log book, labels and permanent markers
20. Chain of custody forms and seals
21. Grunfos Redi-Flow 2-inch diameter submersible pump with a variable speed control box
22. Stainless steel scoops or dedicated polyethylene scoops

A.2 Monitoring Equipment:

1. Rae Systems Inc. Mini RAE Plus Photoionization Detector
2. Horiba U-10 Water Quality Checker (pH, temperature, DO, turbidity, conductivity)
3. Solinst Model 121 sonic, product/water interface probe
4. Solinst Model 100/101 sonic water interface probe

A.3 General Equipment:

1. Spade shovels
2. Square shovels
3. Manual post hole digger
4. Johnson bar or breaker bar
5. Gas powered generator
6. Masonry hammer
7. DC to AC power converter (in vans)

(All general equipment with the exception of the gas generator, is decontaminated prior to field use)

B. Non-Aqueous Sampling Equipment Decontamination:

A decontamination pad will be established to conduct all cleaning. The pad will be equipped with provisions for the containment of wash solutions. All equipment such as drill rigs, backhoes and other mobile equipment will be cleaned prior to site use. The frequency of subsequent cleanings while on-site will be dependent upon how the equipment is actually used in relation to how the samples are obtained. All rinsate will either be drummed for off-site disposal or will be filtered of solids and run through the on-site ground water treatment system. All filtered solids will be containerized, classified and disposed in accordance with all applicable regulations.

All non-aqueous sampling equipment will be cleaned and decontaminated by the following procedures:

1. Oil, grit, rust and soil shall be removed with a brush.
2. Liquinox detergent and tap water scrub wash.
3. Generous tap water rinse.
4. Distilled and deionized water rinse (ASTM Type II).

All drilling, boring and excavation equipment will be steam cleaned using a portable steam wash unit. The decontamination procedure will be repeated if visual inspection indicates the initial decontamination procedure was unsuccessful in thoroughly cleaning the equipment.

In cases were visual contamination persists, or gross contamination is suspected, the sampling equipment will be cleaned and decontaminated by the following procedures:

1. Oil, grit, rust and soil shall be removed with a brush.
2. Liquinox detergent and tap water wash.
3. Generous tap water rinse.
4. Distilled and deionized water rinse (ASTM Type II).
5. 10% nitric acid rinse (trace metal or higher grade HNO_3 diluted with distilled and deionized (ASTM Type II) H_20).*
6. Distilled and deionized water rinse (ASTM Type II)*.
7. Pesticide grade acetone rinse.**
8. Total air dry.**
9. Distilled and deionized water rinse(ASTM Type II).**

* Only if sample is to be analyzed for metals.
** Only if sample is to be analyzed for organics.

C. Aqueous Sampling Equipment Decontamination

All submersible pumps will be cleaned and flushed prior to and between each use. The pump casing, hose and cables will be cleaned with laboratory grade glassware detergent wash and tap water rinse. This will be followed by a 20-gallon flush of portable water through the pump (for 4" pumps). Should the pumps be of a smaller diameter, the recommended number of gallons required for flushing will be proportionately reduced (i.e. 3" – 15 gallons, 2" – 10 gallons).

Any additional aqueous sampling equipment will be cleaned and decontaminated by the following procedures:

1. Liquinox detergent and tap water wash.
2. Generous tap water rinse.
3. Distilled and deionized water rinse (ASTM Type II).
4. 10% nitric acid rinse (trace metal or higher grade HNO_3 diluted with distilled and deionized (ASTM Type II) H_20).*
5. Distilled and deionized water rinse (ASTM Type II)*.
6. Pesticide grade acetone rinse.**
7. Total air dry.**
8. Distilled and deionized water rinse(ASTM Type II).**

* Only if sample is to be analyzed for metals.
** Only if sample is to be analyzed for organics.

D. *Sample Collection:*

The sampling containers and equipment, if practical, will be transported to the site separately from gasoline and generators. No sampling equipment shall come in contact directly with the ground surface but will be placed on 6. mil. plastic sheeting. Clean, disposable, surgical grade latex or nitrile gloves will be worn during the sampling event. Gloves will be changed between each sample point and immediately before obtaining the sample.

All field monitoring equipment will be calibrated in accordance with the manufacturer's specifications.

1. Soil: Samples will be retrieved using either a, stainless steel spatula or disposable polyethylene scoops. Samples to be analyzed for volatile organic compounds will be collected from a minimum depth of eighteen to twenty-four inches when sampling the surface soils, or will be collected from a discrete 0-6" interval from the sampling equipment.

When utilizing a split spoon sampler, the split spoon should be opened upon retrieval, its contents logged and then the samples shall be transferred into the sample containers using a decontaminated stainless steel spatula or dedecated disposaable polyethylene trowel. A field log shall be generated.

If general air monitoring of the soil core is required, a knife or spatula will be utilized to make a cross sectional slice of the soil core or to score a longitudinal line the length of the core deep enough to expose a porous surface. The probe of the monitoring device will be placed into the opened area a maximum of 1 inch from the exposed soil, but will not touch the sample.

If field screening of headspace is required to determine the appropriate interval from which to collect the sample, the sample collected for screening will be collected after all other parameters are secured. The headspace sample will be placed in an airtight container (either a clear glass sample jar or zip lock bag). The sample will be warmed to induce volatilization and the container will then be opened just enough to permit the entry of the monitoring probe.

2. Water: Ground water samples from monitoring wells, sumps or temporary points will be retrieved utilizing laboratory decontaminated dedicated disposable Teflon or polyethylene bailers. The bailers are slowly lowered into the well by hand being careful not to aerate the ground water to be sampled. The bailer is lowered using a Teflon coated stainless steel leader. Prior to sampling monitoring wells, static water levels will be measured and a minimum of three

times the volume of the well shall be purged, when possible. Slow recharge wells will be purged as conditions allow and will be allow to recover for a period not to exceed 24 hours prior to sampling. Detailed well purge guides (including field readings of DO, specific conductance, and pH) will be generated for each well. Unless specific site conditions warrant (see below), samples shall be collected no later than two hours after purging the well.

Prior to sampling, the monitoring wells will be purged. Wells less than 25' deep will be purged utilizing a peristaltic pump. Wells greater than 25' deep will be purged utilizing a submersible pump. A purge log will be kept for each well.

Purging with a peristaltic pump will be accomplished by inserting dedicated polyethylene tubing into the well. The other end of the tubing will be attached to flexible silicon tubing that has been threaded around the rotor.

Purging with a submersible pump will be accomplished by carefully lowering the pump, discharge hose, electrical cable and security cable into the well. The cables will be bundled together with plastic electrician ties or stainless steel clamps. As EWMA utilizes a control box, a gate valve at the end of the purge line is not required. If a portable generator is utilized to power the pump it will be placed downwind and at some distance from the well. The pump will be equipped with a check valve and will be decontaminated between well locations. Care will be taken not to let the dump draw from the bottom of the well to minimize the impact of silts and sands on the pump.

If a flow through cell is utilized to monitor the water quality, the wells will be purged utilizing the low-flow purging technique (< 0.5 L/min). The pump-intake will be located in the middle or slightly above the middle of the screened interval. The well will be purged until stabilization of parameters indicates that formation water has been accessed. The order of stabilization will be pH, temperature and specific conductance, followed by dissolved oxygen and turbidity. Measurements will be recorded every five minutes. Stabilization will be deemed complete after all parameters have stabilized for three successive readings. The following subset of parameters will be utilized to determines stabilization: pH, conductivity and DO. Three successive readings should be within ±0.1 for pH, ±3% for conductivity and ±10% for DO. Drawdown will not exceed 0.3'.

Upon stabilization, sampling will be initiated using the same device used for purging. Volatile and gas sensitive parameters will be sampled first. The samples will be placed into laboratory prepared sample containers. The appropriate preservatives will be placed into the sample containers prior to departure from the lab to reduce the chances of improperly preserving the sample bottles or introducing field contaminants into the sample bottles. After the container has been filled, the cap will be screwed on tightly to prevent the container from leaking. A sample label will be filled out and the samples will be stored at 4°C.

E. *Sample Handling:*

All samples shall be preserved in the field immediately after collection and submitted to the laboratory as soon as possible and no later than 48 hours after sample collection.

All samples will be preserved in accordance with the preservation requirements. Site-specific sample preservative requirements will be summarized in the Technical Overview section of the report which accompanies this document.

1. Soil: Samples will be removed from the sampling equipment with sterilized and disposable wooden, polyethylene or reusable stainless steel spatulas. In no case will the soil sample come in contact with the field personnel or any foreign objects. Samples analyzed for volatile organics will be removed from the sampling equipment using a dedicated, graduated small diameter-syringe. All samples will be transferred into glassware supplied by the testing laboratory. Upon transferal to the containers, the samples will be placed into coolers packed with ice and kept chilled at four degrees Centigrade, in dark storage until they reach the testing laboratory.

2. Water: All water samples will be transferred to laboratory supplied glassware. Care shall be taken to insure that no air bubbles are present in the VOA sample bottles after filling. Upon transfer to the appropriate containers, the samples will be placed into coolers packed with ice and kept chilled until they reach the testing laboratory.

F. *Chain of Custody:*

Chain of custody will be initiated by the field team and maintained through sample analysis and reporting of results. Each transfer of sample custody will be recorded on the custody record, and upon transfer to the laboratory the sampling team will maintain a copy.

QUALITY ASSURANCE

A. *Trip and Field Blanks (Non-Aqueous Matrix):*

Field and Trip blanks will not be generated for the non-aqueous matrix unless specifically requested.

Field blanks will be generated by passing demonstrated analyte free water provided by the laboratory through the dedicated or field decontaminated sampling device(s) and into an identical empty set of bottles.

Field blanks will be preserved in the same manner as samples. For sampling events lasting more than one day, field blanks will be generated at a rate of 10% of the total number of samples collected throughout the event. For one-day sampling events, only one field blank will be generated.

B. *Trip and Field Blanks (Aqueous Matrix):*

Trip blanks will accompany each set of laboratory supplied glassware. The trip blank sample bottles will be filled at the laboratory with laboratory demonstrate analyte free water. The trip blank samples will accompany the laboratory prepared bottles into the field and back to the laboratory. The trip blanks will not be opened and will be analyzed for volatile organic parameters (at a minimum).

Field Blanks will only be generated when specifically requested. Field blanks will be generated by passing demonstrated analyte free water provided by the laboratory through the dedicated or field decontaminated sampling device(s) and into an identical empty set of bottles.

Field blanks will be preserved in the same manner as samples. Field blanks will be analyzed for all the same parameters as samples collected that day.

C. *Duplicate Samples:*

If requested, duplicate samples will be included for each matrix at a minimum rate of one for every twenty samples (5% of total). Site specific duplicate frequencies will be addressed in the Technical Overview section of the accompanying report. The duplicate sample will be tested for all of the parameters proposed within each area of concern. Each duplicate sample will be given a unique sample number to insure that the testing laboratory is unaware of the internal check.

Aqueous matrix duplicates will be obtained by alternately filling sample containers from the same sampling device for each parameter. Samples for volatile organic analysis from monitoring wells will be filled from the same bailer full of water whenever possible and be the first set of containers filled.

Nonaqueous matrix duplicates from a soil or sediment matrix requires homogenization of the sample prior to filling the sample containers. Enough sample will be collected to facilitate the generation of two equal samples. The sample will be placed in a properly decontaminated stainless steel bowl and mixed with a decontaminated stainless steel instrument. The sample will be mixed to the point at which a consistent physical appearance is achieved. Once mixed, the sample will be divided into half and then placed into the containers by alternately scooping the material from each half. <u>Volatile organic samples must always be taken from discrete locations or intervals without compositing or mixing</u>.

D. *Sample Documentation:*

All information pertaining to the sampling event will be recorded in ink in a bound field notebook with consecutively numbered pages. This shall include, but not be limited to date and time of sampling, weather conditions, people on site, maps of sample locations and sample numbers, sampling equipment utilized, listing of any significant events.

MONITORING WELL PURGE GUIDE / LOW FLOW SAMPLING

Site Name:
Site Location:
EWMA Project No:
Client Code:
Technician:
Date / Time:
Weather:

Well Identification	Water Quality Parameters

MW		TIME	pH	Cond.	Turb.	Dis. O2	Temp.
Casing Height (feet)*							
Depth to Water (initial, feet)**							
Depth to Product (feet)**							
Product Thickness (inches)							
Depth to Water (final, feet)**							
Total Depth of Well (feet)**							
PID (initial)							
PID (final)							
Mount Type Flush/Stick-up							
Sample Depth. T (1/3) 1/2) (2/3) B							
Sampling Device							
Tubing Type							
Screen Length (feet)							
Well Diameter (inches)							
Sheen							
Odor			**Samples taken**				

Comments:

MW		TIME	pH	Cond.	Turb.	Dis. O2	Temp.
Casing Height (feet)*							
Depth to Water (initial, feet)**							
Depth to Product (feet)**							
Product Thickness (inches)							
Depth to Water (final, feet)**							
Total Depth of Well (feet)**							
PID (initial)							
PID (final)							
Mount Type Flush/Stick-up							
Sample Depth T (1/3) 1/2) (2/3) B							
Sampling Device							
Tubing Type							
Screen Length (feet)							
Well Diameter (inches)							
Sheen							
Odor			**Samples taken**				

Comments:

notes:
Samples were taken at the **bold** time interval.
* - negative casing height indicates a flush mount below ground surface.
** - measured from the top of the casing
NA - parameter not available
ND - not detected

Phone # (973) 361-4252
Fax # (973) 989-5288

INTEGRATED ANALYTICAL LABORATORIES
CHAIN OF CUSTODY

273 Franklin Rd
Randolph, NJ 07869

CLIENT & PROJECT

Name:	
Address:	
Telephone #:	
Fax #:	
Project Name:	
Project Manager:	
Reference ID#:	PO#:

REPORTING & BILLING

Fax to:	
Fax #:	
EMail to:	
Report to:	
Address:	
Invoice to:	
Address:	

Turnaround Time

Conditional / TPHC
24 hr* 48 hr 72 hr 1 wk NA Other:

Verbal/Fax
24 hr* 48 hr* 72 hr* 1 wk* 2 wk Other:

Hard Copy
72 hr* 1 wk* 2 wk* 3 wk Other:

*Prior to sample arrival, Lab notification is required.

Report Format

Results Only
Reduced
Regulatory
SRP Disk**: dbf or wk1

Special Requirements:

** Circle format required

ANALYTICAL PARAMETERS / PRESERVATIVES

1 2 3 4 5 6	1 2 3 4 5 6	1 2 3 4 5 6	1 2 3 4 5 6	1 2 3 4 5 6	1 2 3 4 5 6	1 2 3 4 5 6	1 2 3 4 5 6	1 2 3 4 5 6	1 2 3 4 5 6

Preservatives
1. HCL 3. HNO_3
2. NaOH 4. H_2SO_4
5. MeOH 6. Other

COOLER TEMP.
°C

SAMPLE MATRIX
W - Waste SL - Sludge A - Aqueous
O - Oil X - Other S - Soil
GW - Groundwater SOL - Solid

SAMPLE INFORMATION

Sample ID	Sample Depth (in Feet)	Sampling Date	Sampling Time	am	pm	Matrix	# of Containers	Lab ID											Comments/Area of Concern

Please print legibly and fill out completely. Samples cannot be processed and the turnaround time will not start until any ambiguities have been resolved.

Concentrations Expected
LOW MED HIGH

Known Hazard: yes no
Describe:

CUSTODY LOG

Signature/Company	Date	Time	Signature/Company
Relinquished by:			Received by:
Relinquished by:			Received by:
Relinquished by:			Received by:
Relinquished by:			Received by:
Relinquished by:			Received by:

Comments:

Lab Case #

PAGE: OF

LAB COPIES - WHITE & YELLOW; CLIENT COPY - PINK

Environmental Waste Management Associates, LLC
P.O. Box 5430, Parsippany, NJ 07054
Tel: (973) 560-1400 Fax: (973) 560-0400

EWMA Job #:	
Boring #:	
Installation Date:	
Boring Location:	

Site Name:			
Site Location:			
Completion Date:			
Geologist:		Drilling Co.:	
Driller:		Drill Rig:	
Bit:	Hammer Wt:	Drop:	Total Depth:
Sampler Type:		G.W. Encountered:	
		G.W. Stabilized:	

BORING LOCATION SKETCH (N.T.S.)

DEPTH (FT.)	SAMPLE ID AND DEPTH	PID/FID/OVA (METER UNITS)	BLOWS/6.0"	RECOVERY (INCHES)	SOIL TYPE	SOIL/GEOLOGIC DESCRIPTION	DEPTH (FT.)
1							1
2							2
3							3
4							4
5							5
6							6
7							7
8							8
9							9
10							10
11							11
12							12
13							13
14							14
15							15
16							16
17							17
18							18
19							19
20							20
21							21
22							22
23							23
24							24

Unified Soil Classification System (USCS)
(As modified/amended by ASTM (D2488-98) for field classification)

					Group Symbol
Fines < 50%	GRAVEL %gravel≥ %sand	≤5% fines	Well-graded		GW
			Poorly-graded		GP
		10% fines	Well-graded	fines=ML or MH	GW-GM
				fines=CL or CH	GW-GC
			Poorly-graded	fines=ML or MH	GP-GM
				fines=CL or CH	GP-GC
		≥15% fines		fines=ML or MH	GM
				fines=CL or CH	GC
	SAND %sand≥ %gravel	≤5% fines	Well-graded		SW
			Poorly-graded		SP
		10% fines	Well-graded	fines=ML or MH	SW-SM
				fines=CL or CH	SW-SC
			Poorly-graded	fines=ML or MH	SP-SM
				fines=CL or CH	SP-SC
		≥15% fines		fines=ML or MH	SM
				fines=CL or CH	SC

Note: Percentages are based on estimating amounts of fines, sand and gravel to the nearest 5%.

Fines ≥ 50%	Dry Strength – medium to high Dilatency – none to slow Toughness – medium Plasticity – medium	CL
	Dry Strength – none to low Dilatency – slow to rapid Toughness – low or thread cannot be formed Plasticity – low or non-plastic	ML
	Dry Strength – high to very high Dilatency – none Toughness – high Plasticity – high	CH
	Dry Strength – low to medium Dilatency – none to slow Toughness – low to medium Plasticity – low to medium	MH
	Soil contains enough organic particles to influence soil properties. Usually dark brown to black color, organic odor.	OL/ OH
	Fibrous texture or spongy feel – organic odor	Pt

Grain Size Chart

Classification	Range of Grain Sizes: U.S. Standard Sieve Size	Range of Grain Sizes: Grain Size In Millimeters
Boulders	> 12"	> 305
Cobbles	12" – 3"	305 –76
Gravel	3" – #4	76 – 4.75
coarse	3" – 3/4"	76 – 19.0
fine	3/4" – #4	19.0 – 4.75
Sand	#4 – #200	4.75 – 0.075
coarse	#4 – #10	4.75 – 2.00
medium	#10 – #40	2.00 – 0.425
fine	#40 – #200	0.425 – 0.075
Silt and Clay	Passes #200	< 0.075

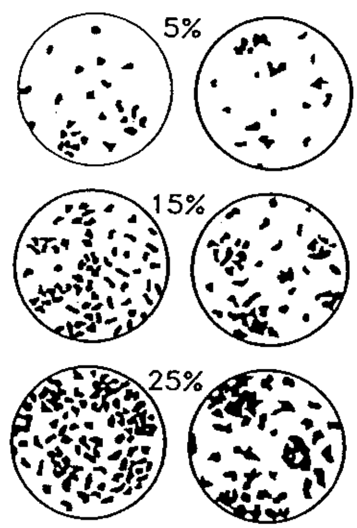
Relative Density (SPT)

Sands and Gravels	Blows/Foot
Very Loose	0-4
Loose	5-10
Medium Dense	11-30
Dense	31-50
Very Dense	> 50

Consistency (SPT)

Silts and Clays	Blows/Foot
Very Soft	0-2
Soft	3-4
Medium Stiff	5-8
Stiff	9-16
Very Stiff	17-32
Hard	> 32

Clast/Matrix Proportion



SOIL DESCRIPTIONS FORMAT

- Soil Color (matrix)
- Primary component (GRAVEL, SAND, SILT, CLAY,) with range (f, f-m, f-c, etc.)
- Secondary components, with soil fraction descriptors (in decreasing order)
- Moisture condition: dry, moist, wet.
- Relative density or consistency (by SPT blow counts "N-value" if available)
- Additional details, per NJDEP Procedures Manual:

Mottling, particle shape, structure, horizon thickness (macro-features) and other details deemed appropriate by writer. (e.g., "probable" odors, staining, debris in fill, shell fragments, cemented grains/nodules) Notes of job-specific objectives also appropriate, e.g. recognizing typical historic fill materials.

Soil Fraction Descriptors

Trace	1-15%
Some	16-35%
and	>35%

Designation: D 2488 – 00

Standard Practice for Description and Identification of Soils (Visual-Manual Procedure)[1]

This standard is issued under the fixed designation D 2488; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

This standard has been approved for use by agencies of the Department of Defense.

1. Scope *

1.1 This practice covers procedures for the description of soils for engineering purposes.

1.2 This practice also describes a procedure for identifying soils, at the option of the user, based on the classification system described in Test Method D 2487. The identification is based on visual examination and manual tests. It must be clearly stated in reporting an identification that it is based on visual-manual procedures.

1.2.1 When precise classification of soils for engineering purposes is required, the procedures prescribed in Test Method D 2487 shall be used.

1.2.2 In this practice, the identification portion assigning a group symbol and name is limited to soil particles smaller than 3 in. (75 mm).

1.2.3 The identification portion of this practice is limited to naturally occurring soils (disturbed and undisturbed).

NOTE 1—This practice may be used as a descriptive system applied to such materials as shale, claystone, shells, crushed rock, etc. (see Appendix X2).

1.3 The descriptive information in this practice may be used with other soil classification systems or for materials other than naturally occurring soils.

1.4 The values stated in inch-pound units are to be regarded as the standard.

1.5 *This standard does not purport to address all of the safety problems, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.* For specific precautionary statements see Section 8.

1.6 *This practice offers a set of instructions for performing one or more specific operations. This document cannot replace education or experience and should be used in conjunction with professional judgment. Not all aspects of this practice may be applicable in all circumstances. This ASTM standard is not intended to represent or replace the standard of care by which the adequacy of a given professional service must be judged, nor should this document be applied without consideration of a project's many unique aspects. The word "Standard" in the title of this document means only that the document has been approved through the ASTM consensus process.*

2. Referenced Documents

2.1 *ASTM Standards:*

D 653 Terminology Relating to Soil, Rock, and Contained Fluids[2]
D 1452 Practice for Soil Investigation and Sampling by Auger Borings[2]
D 1586 Test Method for Penetration Test and Split-Barrel Sampling of Soils[2]
D 1587 Practice for Thin-Walled Tube Sampling of Soils [2]
D 2113 Practice for Diamond Core Drilling for Site Investigation[2]
D 2487 Classification of Soils for Engineering Purposes (Unified Soil Classification System) [2]
D 3740 Practice for Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and rock as Used in Engineering Design and Construction [3]
D 4083 Practice for Description of Frozen Soils (Visual-Manual Procedure)[2]

3. Terminology

3.1 *Definitions*—Except as listed below, all definitions are in accordance with Terminology D 653.

NOTE 2—For particles retained on a 3-in. (75-mm) US standard sieve, the following definitions are suggested:
Cobbles—particles of rock that will pass a 12-in. (300-mm) square opening and be retained on a 3-in. (75-mm) sieve, and
Boulders—particles of rock that will not pass a 12-in. (300-mm) square opening.

3.1.1 *clay*—soil passing a No. 200 (75-μm) sieve that can be made to exhibit plasticity (putty-like properties) within a range of water contents, and that exhibits considerable strength when air-dry. For classification, a clay is a fine-grained soil, or the fine-grained portion of a soil, with a plasticity index equal to or greater than 4, and the plot of plasticity index versus liquid

[1] This practice is under the jurisdiction of ASTM Committee D-18 on Soil and Rock and is the direct responsibility of Subcommittee D18.07 on Identification and Classification of Soils.

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[2] *Annual Book of ASTM Standards*, Vol 04.08.

[3] *Annual Book of ASTM Standards*, Vol 04.09.

*A Summary of Changes section appears at the end of this standard.

limit falls on or above the "A" line (see Fig. 3 of Test Method D 2487).

3.1.2 *gravel*—particles of rock that will pass a 3-in. (75-mm) sieve and be retained on a No. 4 (4.75-mm) sieve with the following subdivisions:

coarse—passes a 3-in. (75-mm) sieve and is retained on a ¾-in. (19-mm) sieve.

fine—passes a ¾-in. (19-mm) sieve and is retained on a No. 4 (4.75-mm) sieve.

3.1.3 *organic clay*—a clay with sufficient organic content to influence the soil properties. For classification, an organic clay is a soil that would be classified as a clay, except that its liquid limit value after oven drying is less than 75 % of its liquid limit value before oven drying.

3.1.4 *organic silt*—a silt with sufficient organic content to influence the soil properties. For classification, an organic silt is a soil that would be classified as a silt except that its liquid limit value after oven drying is less than 75 % of its liquid limit value before oven drying.

3.1.5 *peat*—a soil composed primarily of vegetable tissue in various stages of decomposition usually with an organic odor, a dark brown to black color, a spongy consistency, and a texture ranging from fibrous to amorphous.

3.1.6 *sand*—particles of rock that will pass a No. 4 (4.75-mm) sieve and be retained on a No. 200 (75-μm) sieve with the following subdivisions:

coarse—passes a No. 4 (4.75-mm) sieve and is retained on a No. 10 (2.00-mm) sieve.

medium—passes a No. 10 (2.00-mm) sieve and is retained on a No. 40 (425-μm) sieve.

fine—passes a No. 40 (425-μm) sieve and is retained on a No. 200 (75-μm) sieve.

3.1.7 *silt*—soil passing a No. 200 (75-μm) sieve that is nonplastic or very slightly plastic and that exhibits little or no strength when air dry. For classification, a silt is a fine-grained soil, or the fine-grained portion of a soil, with a plasticity index less than 4, or the plot of plasticity index versus liquid limit falls below the "A" line (see Fig. 3 of Test Method D 2487).

4. Summary of Practice

4.1 Using visual examination and simple manual tests, this practice gives standardized criteria and procedures for describing and identifying soils.

4.2 The soil can be given an identification by assigning a group symbol(s) and name. The flow charts, Fig. 1a and Fig. 1b for fine-grained soils, and Fig. 2, for coarse-grained soils, can be used to assign the appropriate group symbol(s) and name. If the soil has properties which do not distinctly place it into a specific group, borderline symbols may be used, see Appendix X3.

NOTE 3—It is suggested that a distinction be made between *dual symbols* and *borderline symbols*.

Dual Symbol—A dual symbol is two symbols separated by a hyphen, for example, GP-GM, SW-SC, CL-ML used to indicate that the soil has been identified as having the properties of a classification in accordance with Test Method D 2487 where two symbols are required. Two symbols are required when the soil has between 5 and 12 % fines or when the liquid limit and plasticity index values plot in the CL-ML area of the plasticity chart.

Borderline Symbol—A borderline symbol is two symbols separated by a slash, for example, CL/CH, GM/SM, CL/ML. A borderline symbol should be used to indicate that the soil has been identified as having properties that do not distinctly place the soil into a specific group (see Appendix X3).

5. Significance and Use

5.1 The descriptive information required in this practice can be used to describe a soil to aid in the evaluation of its significant properties for engineering use.

5.2 The descriptive information required in this practice should be used to supplement the classification of a soil as determined by Test Method D 2487.

5.3 This practice may be used in identifying soils using the classification group symbols and names as prescribed in Test Method D 2487. Since the names and symbols used in this practice to identify the soils are the same as those used in Test Method D 2487, it shall be clearly stated in reports and all other appropriate documents, that the classification symbol and name are based on visual-manual procedures.

5.4 This practice is to be used not only for identification of soils in the field, but also in the office, laboratory, or wherever soil samples are inspected and described.

5.5 This practice has particular value in grouping similar soil samples so that only a minimum number of laboratory tests need be run for positive soil classification.

NOTE 4—The ability to describe and identify soils correctly is learned more readily under the guidance of experienced personnel, but it may also be acquired systematically by comparing numerical laboratory test results for typical soils of each type with their visual and manual characteristics.

5.6 When describing and identifying soil samples from a given boring, test pit, or group of borings or pits, it is not necessary to follow all of the procedures in this practice for every sample. Soils which appear to be similar can be grouped together; one sample completely described and identified with the others referred to as similar based on performing only a few of the descriptive and identification procedures described in this practice.

5.7 This practice may be used in combination with Practice D 4083 when working with frozen soils.

NOTE 5—Notwithstanding the statements on precision and bias contained in this standard: The precision of this test method is dependent on the competence of the personnel performing it and the suitability of the equipment and facilities used. Agencies that meet the criteria of Practice D 3740 are generally considered capable of competent and objective testing. Users of this test method are cautioned that compliance with Practice D 3740 does not in itself assure reliable testing. Reliable testing depends on several factors; Practice D 3740 provides a means for evaluating some of those factors.

6. Apparatus

6.1 *Required Apparatus:*

6.1.1 *Pocket Knife or Small Spatula.*

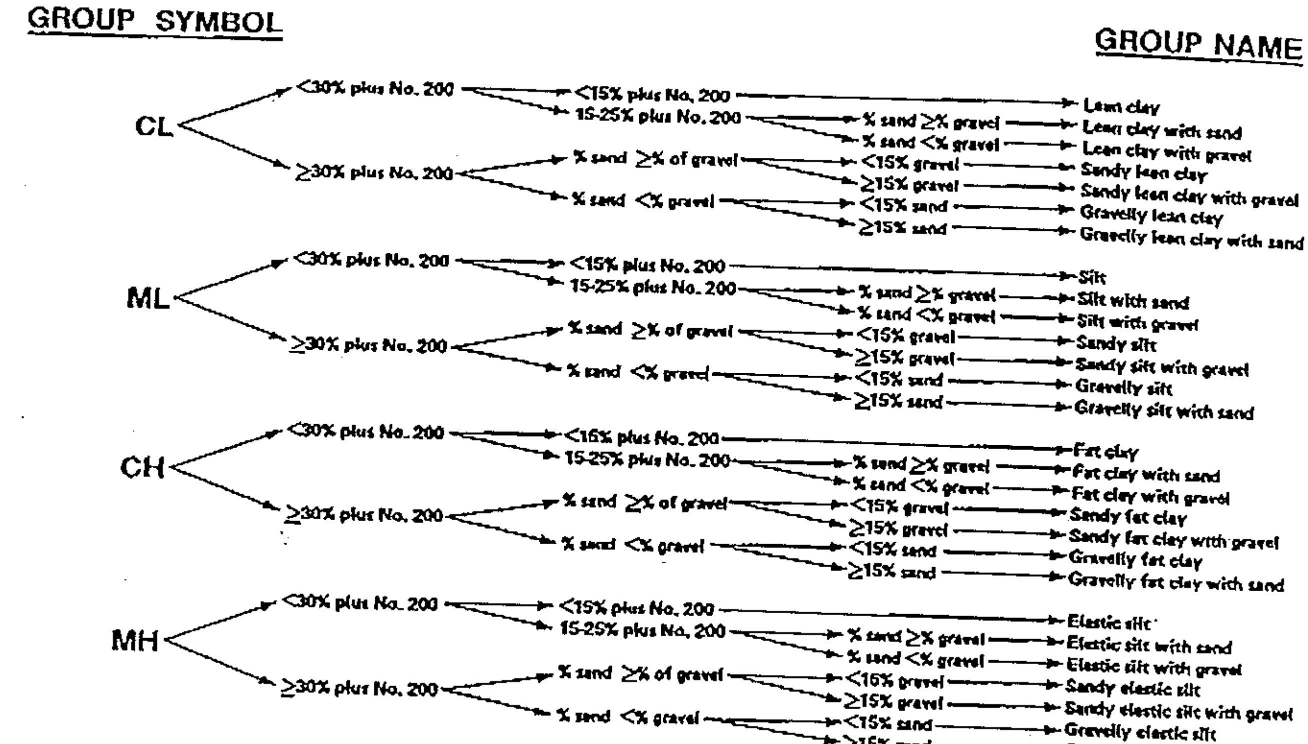
6.2 *Useful Auxiliary Apparatus:*

6.2.1 *Small Test Tube and Stopper* (or jar with a lid).

6.2.2 *Small Hand Lens.*

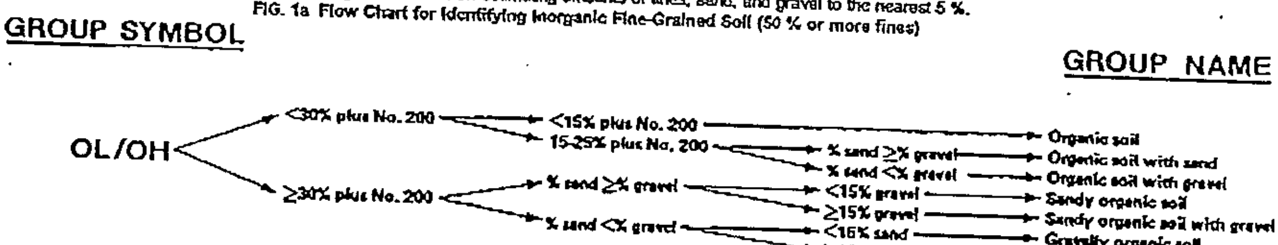
7. Reagents

7.1 *Purity of Water*—Unless otherwise indicated, references to water shall be understood to mean water from a city water



NOTE 1—Percentages are based on estimating amounts of fines, sand, and gravel to the nearest 5 %.

FIG. 1a Flow Chart for Identifying Inorganic Fine-Grained Soil (50 % or more fines)



NOTE 1—Percentages are based on estimating amounts of fines, sand, and gravel to the nearest 5 %.

FIG. 1 b Flow Chart for Identifying Organic Fine-Grained Soil (50 % or more fines)

supply or natural source, including non-potable water.

7.2 *Hydrochloric Acid*—A small bottle of dilute hydrochloric acid, HCl, one part HCl (10 *N*) to three parts water (This reagent is optional for use with this practice). See Section 8.

8. Safety Precautions

8.1 When preparing the dilute HCl solution of one part concentrated hydrochloric acid (10 *N*) to three parts of distilled water, slowly add acid into water following necessary safety precautions. Handle with caution and store safely. If solution comes into contact with the skin, rinse thoroughly with water.

8.2 **Caution**—Do not add water to acid.

9. Sampling

9.1 The sample shall be considered to be representative of the stratum from which it was obtained by an appropriate, accepted, or standard procedure.

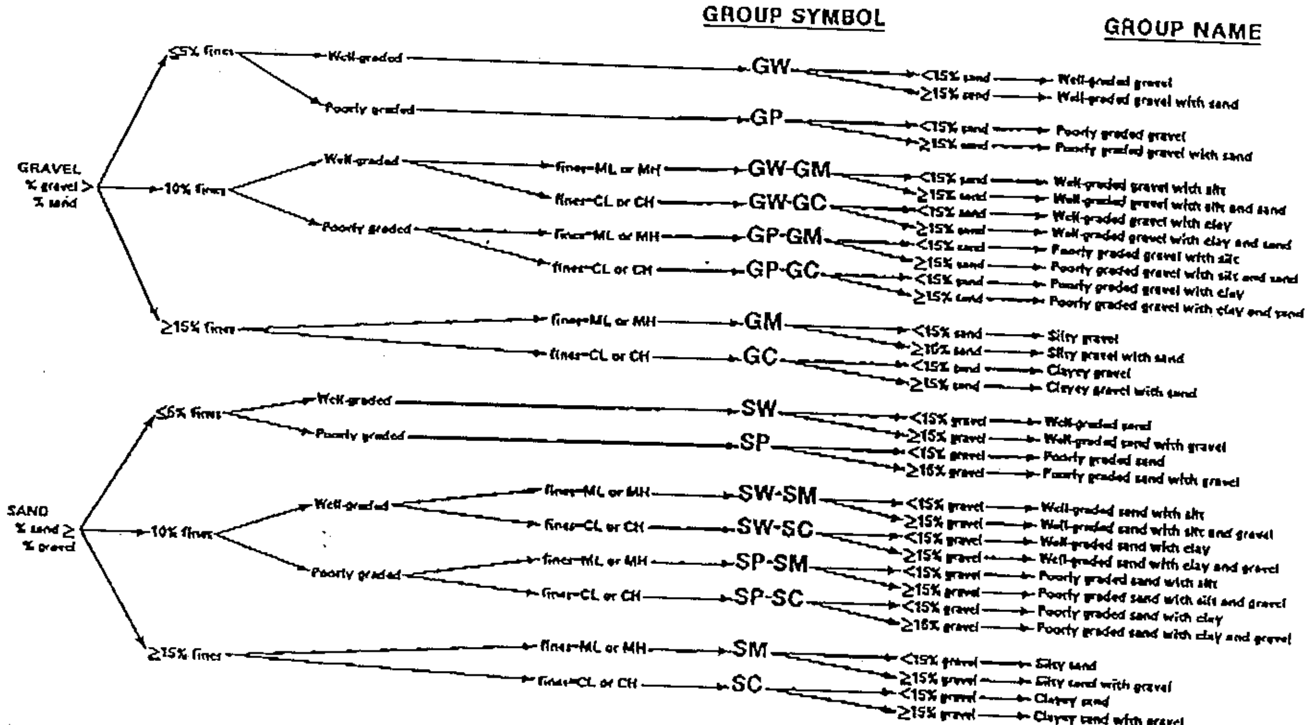
NOTE 6—Preferably, the sampling procedure should be identified as having been conducted in accordance with Practices D 1452, D 1587, or D 2113, or Test Method D 1586.

9.2 The sample shall be carefully identified as to origin.

NOTE 7—Remarks as to the origin may take the form of a boring number and sample number in conjunction with a job number, a geologic stratum, a pedologic horizon or a location description with respect to a permanent monument, a grid system or a station number and offset with respect to a stated centerline and a depth or elevation.

9.3 For accurate description and identification, the minimum amount of the specimen to be examined shall be in accordance with the following schedule:

Maximum Particle Size, Sieve Opening	Minimum Specimen Size, Dry Weight
4.75 mm (No. 4)	100 g (0.25 lb)
9.5 mm (⅜ in.)	200 g (0.5 lb)
19.0 mm (¾ in.)	1.0 kg (2.2 lb)
38.1 mm (1½ in.)	8.0 kg (18 lb)
75.0 mm (3 in.)	60.0 kg (132 lb)



NOTE 1—Percentages are based on estimating amounts of fines, sand, and gravel to the nearest 5 %.

FIG. 2 Flow Chart for Identifying Coarse-Grained Soils (less than 50 % fines)

NOTE 8—If random isolated particles are encountered that are significantly larger than the particles in the soil matrix, the soil matrix can be accurately described and identified in accordance with the preceding schedule.

9.4 If the field sample or specimen being examined is smaller than the minimum recommended amount, the report shall include an appropriate remark.

10. Descriptive Information for Soils

10.1 *Angularity*—Describe the angularity of the sand (coarse sizes only), gravel, cobbles, and boulders, as angular, subangular, subrounded, or rounded in accordance with the criteria in Table 1 and Fig. 3. A range of angularity may be stated, such as: subrounded to rounded.

10.2 *Shape*—Describe the shape of the gravel, cobbles, and boulders as flat, elongated, or flat and elongated if they meet the criteria in Table 2 and Fig. 4. Otherwise, do not mention the shape. Indicate the fraction of the particles that have the shape, such as: one-third of the gravel particles are flat.

TABLE 1 Criteria for Describing Angularity of Coarse-Grained Particles (see Fig. 3)

Description	Criteria
Angular	Particles have sharp edges and relatively plane sides with unpolished surfaces
Subangular	Particles are similar to angular description but have rounded edges
Subrounded	Particles have nearly plane sides but have well-rounded corners and edges
Rounded	Particles have smoothly curved sides and no edges

10.3 *Color*—Describe the color. Color is an important property in identifying organic soils, and within a given locality it may also be useful in identifying materials of similar geologic origin. If the sample contains layers or patches of varying colors, this shall be noted and all representative colors shall be described. The color shall be described for moist samples. If the color represents a dry condition, this shall be stated in the report.

10.4 *Odor*—Describe the odor if organic or unusual. Soils containing a significant amount of organic material usually have a distinctive odor of decaying vegetation. This is especially apparent in fresh samples, but if the samples are dried, the odor may often be revived by heating a moistened sample. If the odor is unusual (petroleum product, chemical, and the like), it shall be described.

10.5 *Moisture Condition*—Describe the moisture condition as dry, moist, or wet, in accordance with the criteria in Table 3.

10.6 *HCl Reaction*—Describe the reaction with HCl as none, weak, or strong, in accordance with the critera in Table 4. Since calcium carbonate is a common cementing agent, a report of its presence on the basis of the reaction with dilute hydrochloric acid is important.

10.7 *Consistency*—For intact fine-grained soil, describe the consistency as very soft, soft, firm, hard, or very hard, in accordance with the criteria in Table 5. This observation is inappropriate for soils with significant amounts of gravel.

10.8 *Cementation*—Describe the cementation of intact coarse-grained soils as weak, moderate, or strong, in accordance with the criteria in Table 6.

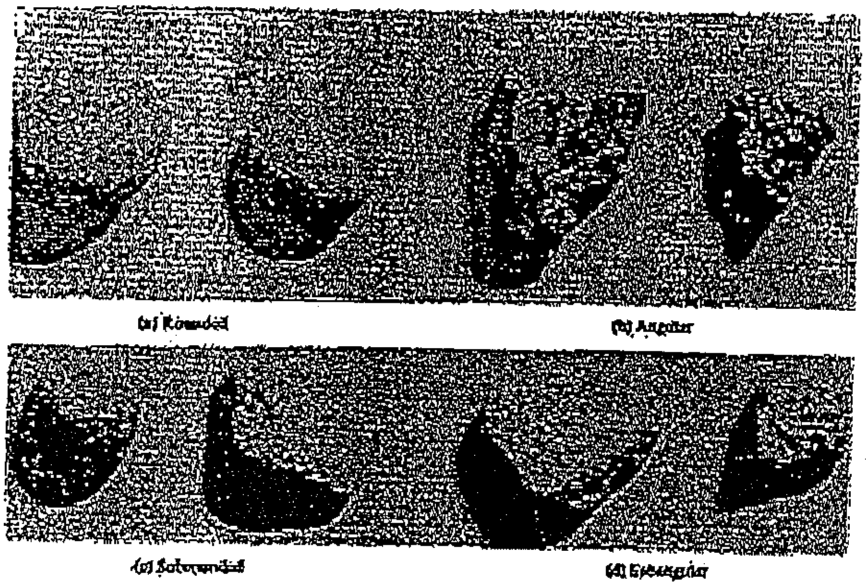


FIG. 3 Typical Angularity of Bulky Grains

TABLE 2 Criteria for Describing Particle Shape (see Fig. 4)

The particle shape shall be described as follows where length, width, and thickness refer to the greatest, intermediate, and least dimensions of a particle, respectively.

Flat	Particles with width/thickness > 3
Elongated	Particles with length/width > 3
Flat and elongated	Particles meet criteria for both flat and elongated

10.9 *Structure*—Describe the structure of intact soils in accordance with the criteria in Table 7.

10.10 *Range of Particle Sizes*—For gravel and sand components, describe the range of particle sizes within each component as defined in 3.1.2 and 3.1.6. For example, about 20 % fine to coarse gravel, about 40 % fine to coarse sand.

10.11 *Maximum Particle Size*—Describe the maximum particle size found in the sample in accordance with the following information:

10.11.1 *Sand Size*—If the maximum particle size is a sand size, describe as fine, medium, or coarse as defined in 3.1.6. For example: maximum particle size, medium sand.

10.11.2 *Gravel Size*—If the maximum particle size is a gravel size, describe the maximum particle size as the smallest sieve opening that the particle will pass. For example, maximum particle size, 1 ½ in. (will pass a 1 ½-in. square opening but not a ¾-in. square opening).

10.11.3 *Cobble or Boulder Size*—If the maximum particle size is a cobble or boulder size, describe the maximum dimension of the largest particle. For example: maximum dimension, 18 in. (450 mm).

10.12 *Hardness*—Describe the hardness of coarse sand and larger particles as hard, or state what happens when the particles are hit by a hammer, for example, gravel-size particles fracture with considerable hammer blow, some gravel-size particles crumble with hammer blow. "Hard" means particles do not crack, fracture, or crumble under a hammer blow.

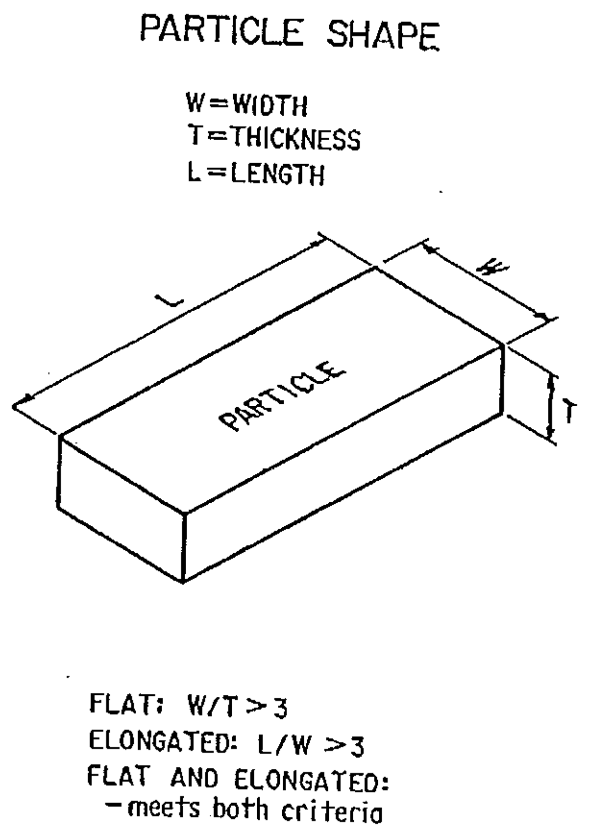


FIG. 4 Criteria for Particle Shape

10.13 Additional comments shall be noted, such as the presence of roots or root holes, difficulty in drilling or augering

TABLE 3 Criteria for Describing Moisture Condition

Description	Criteria
Dry	Absence of moisture, dusty, dry to the touch
Moist	Damp but no visible water
Wet	Visible free water, usually soil is below water table

TABLE 4 Criteria for Describing the Reaction With HCl

Description	Criteria
None	No visible reaction
Weak	Some reaction, with bubbles forming slowly
Strong	Violent reaction, with bubbles forming immediately

TABLE 5 Criteria for Describing Dilatancy

Description	Criteria
Very soft	Thumb will penetrate soil more than 1 in. (25 mm)
Soft	Thumb will penetrate soil about 1 in. (25 mm)
Firm	Thumb will indent soil about ¼in. (6 mm)
Hard	Thumb will not indent soil but readily indented with thumbnail
Very hard	Thumbnail will not indent soil

TABLE 6 Criteria for Describing Toughness

Description	Criteria
Weak	Crumbles or breaks with handling or little finger pressure
Moderate	Crumbles or breaks with considerable finger pressure
Strong	Will not crumble or break with finger pressure

TABLE 7 Criteria for Describing ~~Dilatancy~~ Structure

Description	Criteria
Stratified	Alternating layers of varying material or color with layers at least 6 mm thick; note thickness
Laminated	Alternating layers of varying material or color with the layers less than 6 mm thick; note thickness
Fissured	Breaks along definite planes of fracture with little resistance to fracturing
Slickensided	Fracture planes appear polished or glossy, sometimes striated
Blocky	Cohesive soil that can be broken down into small angular lumps which resist further breakdown
Lensed	Inclusion of small pockets of different soils, such as small lenses of sand scattered through a mass of clay; note thickness
Homogeneous	Same color and appearance throughout

hole, caving of trench or hole, or the presence of mica.

10.14 A local or commercial name or a geologic interpretation of the soil, or both, may be added if identified as such.

10.15 A classification or identification of the soil in accordance with other classification systems may be added if identified as such.

11. Identification of Peat

11.1 A sample composed primarily of vegetable tissue in various stages of decomposition that has a fibrous to amorphous texture, usually a dark brown to black color, and an organic odor, shall be designated as a highly organic soil and shall be identified as peat, PT, and not subjected to the identification procedures described hereafter.

12. Preparation for Identification

12.1 The soil identification portion of this practice is based on the portion of the soil sample that will pass a 3-in. (75-mm) sieve. The larger than 3-in. (75-mm) particles must be removed, manually, for a loose sample, or mentally, for an intact sample before classifying the soil.

12.2 Estimate and note the percentage of cobbles and the percentage of boulders. Performed visually, these estimates will be on the basis of volume percentage.

NOTE 9—Since the percentages of the particle-size distribution in Test Method D 2487 are by dry weight, and the estimates of percentages for gravel, sand, and fines in this practice are by dry weight, it is recommended that the report state that the percentages of cobbles and boulders are by volume.

12.3 Of the fraction of the soil smaller than 3 in. (75 mm), estimate and note the percentage, by dry weight, of the gravel, sand, and fines (see Appendix X4 for suggested procedures).

NOTE 10—Since the particle-size components appear visually on the basis of volume, considerable experience is required to estimate the percentages on the basis of dry weight. Frequent comparisons with laboratory particle-size analyses should be made.

12.3.1 The percentages shall be estimated to the closest 5 %. The percentages of gravel, sand, and fines must add up to 100 %.

12.3.2 If one of the components is present but not in sufficient quantity to be considered 5 % of the smaller than 3-in. (75-mm) portion, indicate its presence by the term *trace*, for example, trace of fines. A trace is not to be considered in the total of 100 % for the components.

13. Preliminary Identification

13.1 The soil is *fine grained* if it contains 50 % or more fines. Follow the procedures for identifying fine-grained soils of Section 14.

13.2 The soil is *coarse grained* if it contains less than 50 % fines. Follow the procedures for identifying coarse-grained soils of Section 15.

14. Procedure for Identifying Fine-Grained Soils

14.1 Select a representative sample of the material for examination. Remove particles larger than the No. 40 sieve (medium sand and larger) until a specimen equivalent to about a handful of material is available. Use this specimen for performing the dry strength, dilatancy, and toughness tests.

14.2 *Dry Strength:*

14.2.1 From the specimen, select enough material to mold into a ball about 1 in. (25 mm) in diameter. Mold the material until it has the consistency of putty, adding water if necessary.

14.2.2 From the molded material, make at least three test specimens. A test specimen shall be a ball of material about ½ in. (12 mm) in diameter. Allow the test specimens to dry in air, or sun, or by artificial means, as long as the temperature does not exceed 60°C.

14.2.3 If the test specimen contains natural dry lumps, those that are about ½ in. (12 mm) in diameter may be used in place of the molded balls.

NOTE 11—The process of molding and drying usually produces higher strengths than are found in natural dry lumps of soil.

14.2.4 Test the strength of the dry balls or lumps by crushing between the fingers. Note the strength as none, low, medium, high, or very high in accorance with the criteria in Table 8. If natural dry lumps are used, do not use the results of any of the lumps that are found to contain particles of coarse sand.

14.2.5 The presence of high-strength water-soluble cementing materials, such as calcium carbonate, may cause exceptionally high dry strengths. The presence of calcium carbonate can usually be detected from the intensity of the reaction with dilute hydrochloric acid (see 10.6).

14.3 *Dilatancy*:

14.3.1 From the specimen, select enough material to mold into a ball about ½ in. (12 mm) in diameter. Mold the material, adding water if necessary, until it has a soft, but not sticky, consistency.

14.3.2 Smooth the soil ball in the palm of one hand with the blade of a knife or small spatula. Shake horizontally, striking the side of the hand vigorously against the other hand several times. Note the reaction of water appearing on the surface of the soil. Squeeze the sample by closing the hand or pinching the soil between the fingers, and note the reaction as none, slow, or rapid in accordance with the criteria in Table 9. The reaction is the speed with which water appears while shaking, and disappears while squeezing.

14.4 *Toughness:*

14.4.1 Following the completion of the dilatancy test, the test specimen is shaped into an elongated pat and rolled by hand on a smooth surface or between the palms into a thread about ⅛ in. (3 mm) in diameter. (If the sample is too wet to roll easily, it should be spread into a thin layer and allowed to lose some water by evaporation.) Fold the sample threads and reroll repeatedly until the thread crumbles at a diameter of about ⅛ in. The thread will crumble at a diameter of ⅛ in. when the soil is near the plastic limit. Note the pressure required to roll the thread near the plastic limit. Also, note the strength of the thread. After the thread crumbles, the pieces should be lumped together and kneaded until the lump crumbles. Note the toughness of the material during kneading.

14.4.2 Describe the toughness of the thread and lump as low, medium, or high in accordance with the criteria in Table 10.

14.5 *Plasticity*—On the basis of observations made during the toughness test, describe the plasticity of the material in accordance with the criteria given in Table 11.

14.6 Decide whether the soil is an *inorganic* or an *organic* fine-grained soil (see 14.8). If inorganic, follow the steps given in 14.7.

TABLE 8 Criteria for Describing ~~Toughness~~ Dry Strength

Description	Criteria
None	The dry specimen crumbles into powder with mere pressure of handling
Low	The dry specimen crumbles into powder with some finger pressure
Medium	The dry specimen breaks into pieces or crumbles with considerable finger pressure
High	The dry specimen cannot be broken with finger pressure. Specimen will break into pieces between thumb and a hard surface
Very high	The dry specimen cannot be broken between the thumb and a hard surface

TABLE 9 Criteria for Describing Dilatancy

Description	Criteria
None	No visible change in the specimen
Slow	Water appears slowly on the surface of the specimen during shaking and does not disappear or disappears slowly upon squeezing
Rapid	Water appears quickly on the surface of the specimen during shaking and disappears quickly upon squeezing

TABLE 10 Criteria for Describing Toughness

Description	Criteria
Low	Only slight pressure is required to roll the thread near the plastic limit. The thread and the lump are weak and soft
Medium	Medium pressure is required to roll the thread to near the plastic limit. The thread and the lump have medium stiffness
High	Considerable pressure is required to roll the thread to near the plastic limit. The thread and the lump have very high stiffness

TABLE 11 Criteria for Describing Plasticity

Description	Criteria
Nonplastic	A ⅛-in. (3-mm) thread cannot be rolled at any water content
Low	The thread can barely be rolled and the lump cannot be formed when drier than the plastic limit
Medium	The thread is easy to roll and not much time is required to reach the plastic limit. The thread cannot be rerolled after reaching the plastic limit. The lump crumbles when drier than the plastic limit
High	It takes considerable time rolling and kneading to reach the plastic limit. The thread can be rerolled several times after reaching the plastic limit. The lump can be formed without crumbling when drier than the plastic limit

14.7 *Identification of Inorganic Fine-Grained Soils*:

14.7.1 Identify the soil as a *lean clay*, CL, if the soil has medium to high dry strength, no or slow dilatancy, and medium toughness and plasticity (see Table 12).

14.7.2 Identify the soil as a *fat clay*, CH, if the soil has high to very high dry strength, no dilatancy, and high toughness and plasticity (see Table 12).

14.7.3 Identify the soil as a *silt*, ML, if the soil has no to low dry strength, slow to rapid dilatancy, and low toughness and plasticity, or is nonplastic (see Table 12).

14.7.4 Identify the soil as an *elastic silt*, MH, if the soil has low to medium dry strength, no to slow dilatancy, and low to medium toughness and plasticity (see Table 12).

NOTE 12—These properties are similar to those for a lean clay. However, the silt will dry quickly on the hand and have a smooth, silky feel when dry. Some soils that would classify as MH in accordance with the criteria in Test Method D 2487 are visually difficult to distinguish from lean clays, CL. It may be necessary to perform laboratory testing for proper identification.

TABLE 12 Identification of Inorganic Fine-Grained Soils from Manual Tests

Soil Symbol	Dry Strength	Dilatancy	Toughness
ML	None to low	Slow to rapid	Low or thread cannot be formed
CL	Medium to high	None to slow	Medium
MH	Low to medium	None to slow	Low to medium
CH	High to very high	None	High

14.8 *Identification of Organic Fine-Grained Soils*:

14.8.1 Identify the soil as an *organic soil*, OL/OH, if the soil contains enough organic particles to influence the soil properties. Organic soils usually have a dark brown to black color and may have an organic odor. Often, organic soils will change color, for example, black to brown, when exposed to the air. Some organic soils will lighten in color significantly when air dried. Organic soils normally will not have a high toughness or plasticity. The thread for the toughness test will be spongy.

NOTE 13—In some cases, through practice and experience, it may be possible to further identify the organic soils as organic silts or organic clays, OL or OH. Correlations between the dilatancy, dry strength, toughness tests, and laboratory tests can be made to identify organic soils in certain deposits of similar materials of known geologic origin.

14.9 If the soil is estimated to have 15 to 25 % sand or gravel, or both, the words "with sand" or "with gravel" (whichever is more predominant) shall be added to the group name. For example: "lean clay with sand, CL" or "silt with gravel, ML" (see Fig. 1a and Fig. 1b). If the percentage of sand is equal to the percentage of gravel, use "with sand."

14.10 If the soil is estimated to have 30 % or more sand or gravel, or both, the words "sandy" or "gravelly" shall be added to the group name. Add the word "sandy" if there appears to be more sand than gravel. Add the word "gravelly" if there appears to be more gravel than sand. For example: "sandy lean clay, CL", "gravelly fat clay, CH", or "sandy silt, ML" (see Fig. 1a and Fig. 1b). If the percentage of sand is equal to the percent of gravel, use "sandy."

15. Procedure for Identifying Coarse-Grained Soils (Contains less than 50 % fines)

15.1 The soil is a *gravel* if the percentage of gravel is estimated to be more than the percentage of sand.

15.2 The soil is a *sand* if the percentage of gravel is estimated to be equal to or less than the percentage of sand.

15.3 The soil is a *clean gravel* or *clean sand* if the percentage of fines is estimated to be 5 % or less.

15.3.1 Identify the soil as a *well-graded gravel*, GW, or as a *well-graded sand*, SW, if it has a wide range of particle sizes and substantial amounts of the intermediate particle sizes.

15.3.2 Identify the soil as a *poorly graded gravel*, GP, or as a *poorly graded sand*, SP, if it consists predominantly of one size (uniformly graded), or it has a wide range of sizes with some intermediate sizes obviously missing (gap or skip graded).

15.4 The soil is either a *gravel with fines* or a *sand with fines* if the percentage of fines is estimated to be 15 % or more.

15.4.1 Identify the soil as a *clayey gravel*, GC, or a *clayey sand*, SC, if the fines are clayey as determined by the procedures in Section 14.

15.4.2 Identify the soil as a *silty gravel*, GM, or a *silty sand*, SM, if the fines are silty as determined by the procedures in Section 14.

15.5 If the soil is estimated to contain 10 % fines, give the soil a dual identification using two group symbols.

15.5.1 The first group symbol shall correspond to a clean gravel or sand (GW, GP, SW, SP) and the second symbol shall correspond to a gravel or sand with fines (GC, GM, SC, SM).

15.5.2 The group name shall correspond to the first group symbol plus the words "with clay" or "with silt" to indicate the plasticity characteristics of the fines. For example: "well-graded gravel with clay, GW-GC" or "poorly graded sand with silt, SP-SM" (see Fig. 2).

15.6 If the specimen is predominantly sand or gravel but contains an estimated 15 % or more of the other coarse-grained constituent, the words "with gravel" or "with sand" shall be added to the group name. For example: "poorly graded gravel with sand, GP" or "clayey sand with gravel, SC" (see Fig. 2).

15.7 If the field sample contains any cobbles or boulders, or both, the words "with cobbles" or "with cobbles and boulders" shall be added to the group name. For example: "silty gravel with cobbles, GM."

16. Report

16.1 The report shall include the information as to origin, and the items indicated in Table 13.

NOTE 14—*Example: Clayey Gravel with Sand and Cobbles, GC*—About 50 % fine to coarse, subrounded to subangular gravel; about 30 % fine to coarse, subrounded sand; about 20 % fines with medium plasticity, high dry strength, no dilatancy, medium toughness; weak reaction with HCl; original field sample had about 5 % (by volume) subrounded cobbles, maximum dimension, 150 mm.

In-Place Conditions—Firm, homogeneous, dry, brown

Geologic Interpretation—Alluvial fan

NOTE 15—Other examples of soil descriptions and identification are given in Appendix X1 and Appendix X2.

NOTE 16—If desired, the percentages of gravel, sand, and fines may be stated in terms indicating a range of percentages, as follows:

Trace—Particles are present but estimated to be less than 5 %

Few—5 to 10 %

Little—15 to 25 %

Some—30 to 45 %

Mostly—50 to 100 %

TABLE 13 Checklist for Description of Soils

1. Group name
2. Group symbol
3. Percent of cobbles or boulders, or both (by volume)
4. Percent of gravel, sand, or fines, or all three (by dry weight)
5. Particle-size range:
   Gravel—fine, coarse
   Sand—fine, medium, coarse
6. Particle angularity: angular, subangular, subrounded, rounded
7. Particle shape: (if appropriate) flat, elongated, flat and elongated
8. Maximum particle size or dimension
9. Hardness of coarse sand and larger particles
10. Plasticity of fines: nonplastic, low, medium, high
11. Dry strength: none, low, medium, high, very high
12. Dilatancy: none, slow, rapid
13. Toughness: low, medium, high
14. Color (in moist condition)
15. Odor (mention only if organic or unusual)
16. Moisture: dry, moist, wet
17. Reaction with HCl: none, weak, strong

For intact samples:

18. Consistency (fine-grained soils only): very soft, soft, firm, hard, very hard
19. Structure: stratified, laminated, fissured, slickensided, lensed, homogeneous
20. Cementation: weak, moderate, strong
21. Local name
22. Geologic interpretation
23. Additional comments: presence of roots or root holes, presence of mica, gypsum, etc., surface coatings on coarse-grained particles, caving or sloughing of auger hole or trench sides, difficulty in augering or excavating, etc.

16.2 If, in the soil description, the soil is identified using a classification group symbol and name as described in Test Method D 2487, it must be distinctly and clearly stated in log forms, summary tables, reports, and the like, that the symbol and name are based on visual-manual procedures.

17. Precision and Bias

17.1 This practice provides qualitative information only, therefore, a precision and bias statement is not applicable.

18. Keywords

18.1 classification; clay; gravel; organic soils; sand; silt; soil classification; soil description; visual classification

APPENDIXES

(Nonmandatory Information)

X1. EXAMPLES OF VISUAL SOIL DESCRIPTIONS

X1.1 The following examples show how the information required in 16.1 can be reported. The information that is included in descriptions should be based on individual circumstances and need.

X1.1.1 *Well-Graded Gravel with Sand (GW)*—About 75 % fine to coarse, hard, subangular gravel; about 25 % fine to coarse, hard, subangular sand; trace of fines; maximum size, 75 mm, brown, dry; no reaction with HCl.

X1.1.2 *Silty Sand with Gravel (SM)*—About 60 % predominantly fine sand; about 25 % silty fines with low plasticity, low dry strength, rapid dilatancy, and low toughness; about 15 % fine, hard, subrounded gravel, a few gravel-size particles fractured with hammer blow; maximum size, 25 mm; no reaction with HCl (Note—Field sample size smaller than recommended).

In-Place Conditions—Firm, stratified and contains lenses of silt 1 to 2 in. (25 to 50 mm) thick, moist, brown to gray; in-place density 106 lb/ft^3; in-place moisture 9 %.

X1.1.3 *Organic Soil (OL/OH)*—About 100 % fines with low plasticity, slow dilatancy, low dry strength, and low toughness; wet, dark brown, organic odor; weak reaction with HCl.

X1.1.4 *Silty Sand with Organic Fines (SM)*—About 75 % fine to coarse, hard, subangular reddish sand; about 25 % organic and silty dark brown nonplastic fines with no dry strength and slow dilatancy; wet; maximum size, coarse sand; weak reaction with HCl.

X1.1.5 *Poorly Graded Gravel with Silt, Sand, Cobbles and Boulders (GP-GM)*—About 75 % fine to coarse, hard, subrounded to subangular gravel; about 15 % fine, hard, subrounded to subangular sand; about 10 % silty nonplastic fines; moist, brown; no reaction with HCl; original field sample had about 5 % (by volume) hard, subrounded cobbles and a trace of hard, subrounded boulders, with a maximum dimension of 18 in. (450 mm).

X2. USING THE IDENTIFICATION PROCEDURE AS A DESCRIPTIVE SYSTEM FOR SHALE, CLAYSTONE, SHELLS, SLAG, CRUSHED ROCK, AND THE LIKE

X2.1 The identification procedure may be used as a descriptive system applied to materials that exist in-situ as shale, claystone, sandstone, siltstone, mudstone, etc., but convert to soils after field or laboratory processing (crushing, slaking, and the like).

X2.2 Materials such as shells, crushed rock, slag, and the like, should be identified as such. However, the procedures used in this practice for describing the particle size and plasticity characteristics may be used in the description of the material. If desired, an identification using a group name and symbol according to this practice may be assigned to aid in describing the material.

X2.3 The group symbol(s) and group names should be placed in quotation marks or noted with some type of distinguishing symbol. See examples.

X2.4 Examples of how group names and symbols can be incororated into a descriptive system for materials that are not naturally occurring soils are as follows:

X2.4.1 *Shale Chunks*—Retrieved as 2 to 4-in. (50 to 100-mm) pieces of shale from power auger hole, dry, brown, no reaction with HCl. After slaking in water for 24 h, material identified as "Sandy Lean Clay (CL)"; about 60 % fines with medium plasticity, high dry strength, no dilatancy, and medium toughness; about 35 % fine to medium, hard sand; about 5 % gravel-size pieces of shale.

X2.4.2 *Crushed Sandstone*—Product of commercial crushing operation; "Poorly Graded Sand with Silt (SP-SM)"; about 90 % fine to medium sand; about 10 % nonplastic fines; dry, reddish-brown, strong reaction with HCl.

X2.4.3 *Broken Shells*—About 60 % gravel-size broken shells; about 30 % sand and sand-size shell pieces; about 10 % fines; "Poorly Graded Gravel with Sand (GP)."

X2.4.4 *Crushed Rock*—Processed from gravel and cobbles in Pit No. 7; "Poorly Graded Gravel (GP)"; about 90 % fine, hard, angular gravel-size particles; about 10 % coarse, hard, angular sand-size particles; dry, tan; no reaction with HCl.

X3. SUGGESTED PROCEDURE FOR USING A BORDERLINE SYMBOL FOR SOILS WITH TWO POSSIBLE IDENTIFICATIONS.

X3.1 Since this practice is based on estimates of particle size distribution and plasticity characteristics, it may be difficult to clearly identify the soil as belonging to one category. To indicate that the soil may fall into one of two possible basic groups, a borderline symbol may be used with the two symbols separated by a slash. For example: SC/CL or CL/CH.

X3.1.1 A borderline symbol may be used when the percentage of fines is estimated to be between 45 and 55 %. One symbol should be for a coarse-grained soil with fines and the other for a fine-grained soil. For example: GM/ML or CL/SC.

X3.1.2 A borderline symbol may be used when the percentage of sand and the percentage of gravel are estimated to be about the same. For example: GP/SP, SC/GC, GM/SM. It is practically impossible to have a soil that would have a borderline symbol of GW/SW.

X3.1.3 A borderline symbol may be used when the soil could be either well graded or poorly graded. For example: GW/GP, SW/SP.

X3.1.4 A borderline symbol may be used when the soil could either be a silt or a clay. For example: CL/ML, CH/MH, SC/SM.

X3.1.5 A borderline symbol may be used when a fine-grained soil has properties that indicate that it is at the boundary between a soil of low compressibility and a soil of high compressibility. For example: CL/CH, MH/ML.

X3.2 The order of the borderline symbols should reflect similarity to surrounding or adjacent soils. For example: soils in a borrow area have been identified as CH. One sample is considered to have a borderline symbol of CL and CH. To show similarity, the borderline symbol should be CH/CL.

X3.3 The group name for a soil with a borderline symbol should be the group name for the first symbol, except for:

CL/CH lean to fat clay
ML/CL clayey silt
CL/ML silty clay

X3.4 The use of a borderline symbol should not be used indiscriminately. Every effort shall be made to first place the soil into a single group.

X4. SUGGESTED PROCEDURES FOR ESTIMATING THE PERCENTAGES OF GRAVEL, SAND, AND FINES IN A SOIL SAMPLE

X4.1 *Jar Method*—The relative percentage of coarse- and fine-grained material may be estimated by thoroughly shaking a mixture of soil and water in a test tube or jar, and then allowing the mixture to settle. The coarse particles will fall to the bottom and successively finer particles will be deposited with increasing time; the sand sizes will fall out of suspension in 20 to 30 s. The relative proportions can be estimated from the relative volume of each size separate. This method should be correlated to particle-size laboratory determinations.

X4.2 *Visual Method*—Mentally visualize the gravel size particles placed in a sack (or other container) or sacks. Then, do the same with the sand size particles and the fines. Then, mentally compare the number of sacks to estimate the percentage of plus No. 4 sieve size and minus No. 4 sieve size present. The percentages of sand and fines in the minus sieve size No. 4 material can then be estimated from the wash test (X4.3).

X4.3 *Wash Test (for relative percentages of sand and fines)*—Select and moisten enough minus No. 4 sieve size material to form a 1-in (25-mm) cube of soil. Cut the cube in half, set one-half to the side, and place the other half in a small dish. Wash and decant the fines out of the material in the dish until the wash water is clear and then compare the two samples and estimate the percentage of sand and fines. Remember that the percentage is based on weight, not volume. However, the volume comparison will provide a reasonable indication of grain size percentages.

X4.3.1 While washing, it may be necessary to break down lumps of fines with the finger to get the correct percentages.

X5. ABBREVIATED SOIL CLASSIFICATION SYMBOLS

X5.1 In some cases, because of lack of space, an abbreviated system may be useful to indicate the soil classification symbol and name. Examples of such cases would be graphical logs, databases, tables, etc.

X5.2 This abbreviated system is not a substitute for the full name and descriptive information but can be used in supplementary presentations when the complete description is referenced.

X5.3 The abbreviated system should consist of the soil classification symbol based on this standard with appropriate lower case letter prefixes and suffixes as:

Prefix: Suffix:

s = sandy	s = with sand
g = gravelly	g = with gravel
	c = with cobbles
	b = with boulders

X5.4 The soil classification symbol is to be enclosed in parenthesis. Some examples would be:

Group Symbol and Full Name	Abbreviated
CL, Sandy lean clay	s(CL)
SP-SM, Poorly graded sand with silt and gravel	(SP-SM)g
GP, poorly graded gravel with sand, cobbles, and boulders	(GP)scb
ML, gravelly silt with sand and cobbles	g(ML)sc

SUMMARY OF CHANGES

In accordance with Committee D18 policy, this section identifies the location of changes to this standard since the last edition (1993 ε1) that may impact the use of this standard.

(1) Added Practice D 3740 to Section 2.

(2) Added Note 5 under 5.7 and renumbered subsequent notes.

Attachment 2: FIELD INSTRUMENT CALIBRATION & MAINTENANCE

EQUIPMENT CALIBRATION LOG

Instrument Type:

Manufacturer:

I.D./Serial #:

Date Purchased:

Date	Initial Setting	Calibration Gas	Procedure/Adjustments	Final Setting	Calibrator Initials	Comments

Rae Systems Inc. Mini RAE 2000 Portable VOC Monitor

CAUTION : For safety reasons this equipment must be operated and serviced by qualified personnel only. Read and understand instruction manual completely before operating or servicing

ATTENTION : Pour des raisons de sécurité, cet équipment doit être utilisé, entretenu et réparé uniquement par un personnel qualifié. Étudier le manuel d'instructions en entier avant d'utiliser, d'entretenir ou de réparer l'équipement

WARNINGS:
Use only RAE Systems battery packs, part nos. 012-3050, 012-3051 or 012-3052. This instrument has not been tested in an explosive gas/air atmosphere having an oxygen concentration greater than 21%. Substitution of components may impair intrinsic safety. Recharge batteries only in non-hazardous locations.

AVERTISSEMENT:
Utiliser seulement l'ensemble de batterie RAE Systems, la reference 012-3050, 012-3051 au 012-3052. Cet instrument n'a pas été essayé dans une atmosphère de gaz/air explosive ayant une concentration d'oxygène plus élevée que 21%. La substitution de composants peut compromettre la sécurité intrinsique. Ne charger les batteries que dans emplacements désignés non dangereux.

1. GENERAL INFORMATION

MiniRAE 2000 Portable VOC Monitor (Model PGM 7600) is a compact monitor designed as a broadband VOC gas monitor and datalogger for work in hazardous environments. It monitors Volatile Organic Compounds (VOC) using a Photo-Ionization Detector (PID) with a 9.8 eV, 10.6 eV, or 11.7 eV gas discharge lamp. Features are:

- **Lightweight and Compact**
  -Compact, light weight (19 oz.) and rugged design
  -Built-in sample draw pump
- **Dependable and Accurate**
  - Up to 10 hours of continuous monitoring with rechargeable battery pack
  - Designed to continuously monitor VOC vapor at ppm levels
- **User Friendly**
  -Preset alarm thresholds for STEL, TWA, low and high level peak values. Audio buzzer and flashing LED display are activated when the limits are exceeded.
- **Datalogging Capabilities**
  -15,000 point datalogging storage capacity for data download to PC

MiniRAE 2000 consists of a PID with associated microcomputer and electronic circuit. The unit is housed in a rugged ABS + PC case with a backlit 1 line by 8

Real-time Clock:	Automatic date and time stamps on data logged information
Data logging:	15,000 points with time stamp, serial number, user ID, site ID, etc.
Communication:	Upload data to PC and download instrument setup from PC through RS-232 port
Sampling Pump:	Internally integrated. Flow rate: 450-550 cc/min.
Temperature:	0^{o} to 45^{o}C (32^{o} to 113^{o}F)
Humidity:	0 % to 95 % relative humidity (non-condensing)
Housing:	ABS + PC, conductive coating, splash and dust proof, will withstand 1 meter drop test with rubber boot
Attachment:	Wrist strap, rubber boot and belt clip

2. OPERATION OF MINIRAE 2000

The MiniRAE 2000 Portable VOC Monitor is a compact Monitor designed as a broadband VOC gas monitor and datalogger for work in a hazardous environment. It gives real time measurements and activates alarm signals whenever the exposure exceeds preset limits. Prior to factory shipment the MiniRAE 2000 is preset with default alarm limits and the sensor is pre-calibrated with standard calibration gas. After the monitor is fully charged, it is ready for immediate operation.

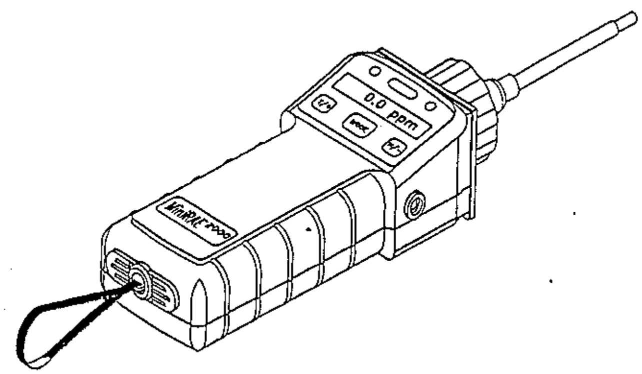


Figure 2-1 MiniRAE 2000

4.3 Entering into Programming Mode

1. Turn on the MiniRAE 2000 monitor and wait for the **"Ready.."** message or the instantaneous reading display **"0.0 ppm"** message displayed.
2. Press and hold down both an**[N/-] and [MODE]** keys for three seconds to enter programming mode. This delay is to prevent the user from entering programming mode by accident.
3. The first menu item " Calibrate/select Gas?" will be displayed.
4. Release both **[MODE]** and **[N/-]** keys simultaneously to start the programming mode
5. Press **[N/-]** key to scroll to the next menu item of the programming menu. Press **[Y/+]** key to select the displayed menu item.

The following Sections 4.4-4.7 describe the details of each menu options.

4.4 Calibrate and Select Gas

In the first menu of the programming mode, the user can perform functions such as calibration of the MiniRAE 2000 Monitor, select default cal memories, and modify cal memories. See Table 4.4.

Table 4.4

Calibrate/Select Gas Sub-Menu
Fresh Air Cal ?
Span Cal ?
Select Cal Memory ?
Change Span Value?
Modify Cal Memory ?
Change Correction Factor ?

Calibrating the MiniRAE 2000 monitor is a two-point process using "fresh air " and the standard reference gas (also known as span gas). First a "Fresh air" calibration, which contains no detectable VOC (0.0 ppm), is used to set the zero point for the sensor. Then a standard reference gas that contains a known concentration of a given gas is used to set the second point of reference.

Note: The span value must be set prior to calibrating for fresh air or span.

In addition to calibrations, the first menu allows the user to store calibrations for up to 8 different measurement gases.

The default gas selections are as follows:
Cal Memory #0......Isobutylene
Cal Memory #1......Hexane
Cal Memory #2......Xylene
Cal Memory #3......Benzene
Cal Memory #4......Styrene
Cal Memory #5......Toluene
Cal Memory #6......Vinyl Chloride
Cal Memory #7......Custom?

Memory #0 can not be modified. The other 7 cal memories may be modified to one of 102 preprogrammed chemicals or to a user-defined custom gas. In the gas library, only the gases that can be detected by the installed UV lamp will actually be displayed. If Isobutylene in memory #0 is calibrated and the selected gas in memory #1 to #7 is not calibrated, the correction factor from the library will be used automatically, so the reading for the selected gas will be correct even without calibration. If the selected gas has been calibrated, no correction factor is applied.

To change a default gas to a library or custom gas , first go to Select Cal Memory (Section 4.4.3) and then proceed to Modify Cal Memory (Section 4.4.5) to enter the desired gas.

4.4.1 Fresh Air Calibration

This procedure determines the zero point of the sensor calibration curve. To perform a fresh air calibration, use the calibration adapter to connect the MiniRAE 2000 to a "fresh" air source such as from a cylinder or Tedlar bag (option accessory). The "fresh" air is clean dry air without any organic impurities. If such an air cylinder is not available, any clean ambient air without detectable contaminant or a charcoal filter can be used.

1. The first sub-menu shows: "Fresh air Cal ?"
2. Make sure that the MiniRAE 2000 is connected to one of the "fresh" air sources described above.
3. Press the **[Y/+]** key, the display shows "zero in progress" followed by "wait.." and a countdown timer.
4. After about 15 seconds pause, the display will show the message "zeroed... reading = X.X ppm...". Press any key or wait about 20 seconds, the monitor will return back to "Fresh air Calibration?" submenu.

Note: The charcoal filter has a check box so that user can mark off a box each time the filter has been used. The charcoal filter should be replaced after 4 calibrations.

4.4.2 Span Calibration

This procedure determines the second point of the sensor calibration curve for the sensor. A cylinder of standard reference gas (span gas) fitted with a 500 cc/min. flow-limiting regulator or a flow-matching regulator is needed to perform this procedure. Choose 500 cc/min. regulator only because the flow rate matches the flow rate of the pump inside. Alternatively, the span gas can first be filled into a Tedlar Bag. Connect the calibration adapter to the inlet port of the MiniRAE 2000 Monitor, and connect the tube to the regulator or Tedlar bag.

Before executing a span calibration, make sure the span value has been set correctly (see next sub-menu).

1. Make sure the monitor is connected to one of the span gas sources described above.
2. Press the **[Y/+]** key at the "Span Cal?" to start the calibration. The display shows the gas name and the span value of the corresponding gas.
3. The display shows " Apply gas now!". Turn on the valve of the span gas supply.
4. Display shows " wait.... 30" with a count down timer showing the number of remaining seconds while the monitor performs the calibration.
5. To abort the calibration, press any key during the count down. The display shows "Aborted!" and return to "Span Cal?" sub-menu.
6. When the count down timer reaches 0, the display shows the calibrated value.

Note: The reading should be very close to the span gas value.

7. During calibration, the monitor waits for an increased signal before starting the countdown timer. If a minimal response is not obtained after 35 seconds, the monitor displays "No Gas!". Check the span gas valve is on and for lamp or sensor failure before trying again.
8. The calibration can be started manually by pressing any key while the "Apply gas now!" is displayed.
9. After a span calibration is completed, the display will show the message "Span Cal Done! Turn Off Gas"
10. Turn off the flow of gas. Disconnect the calibration adapter or Tedlar bag from the MiniRAE 2000 Monitor.
11. Press any key and it returns back to "Span Gas Cal?".

4.4.3 Select Cal Memory

This function allows the user to select one of eight different memories for gas measurement. Gas concentration reading will be automatically calculated using the correction factor inside and the calibration data in cal memory #0 if the gas is not calibrated. The user may calibrate the selected gas for that memory if no automatic conversion is wanted. The default gas selections are listed in Section 4.4

1. "Select Cal Memory?" is the third sub-menu item in the Calibration sub-menu. Pressing the **[Y/+]** key, the display will show "Gas =" gas name followed by "Mem # x?"
2. Press **[N/-]** to scroll through all the memory numbers and the gas selections respectively. Press **[Y/+]** to accept the displayed Cal Memory number.
3. After the **[Y/+]** key is pressed, the display shows "Save?". Press **[Y/+]** key to save and proceed. Press **[N/-]** to discard the entry and advance to the next sub-menu.
4. If the gas in a newly selected Cal Memory number is not calibrated, the display shows "CF= x.xx". A correction factor with the value "x.xx" will be applied.
5. If the gas of a newly selected cal memory number has been calibrated previously, the display shows "Last calibrated xx/xx/xx".

4.4.4 Change Span Value

This function allows the user to change the span values of the calibration gases.

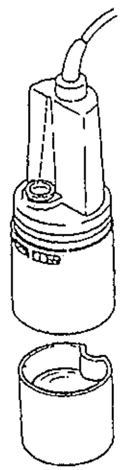
1. "Change Span Value?" is the fourth sub-menu item in the Calibration sub-menu
2. Press **[Y/+]**, display shows the gas name and the span value. A cursor will blink at the first digit of the Span value. To modify the span gas value, go to step 3. Otherwise, press and hold the **[MODE]** key for 1 second to accept the previously stored span gas value and move to the next sub-menu.
3. Starting from the left-most digit of the span gas value, use the **[Y/+]** or **[N/-]** key to change the digit value and press **[MODE]** key momentarily to advance to next digit. Repeat this process until all digits are entered. Press and hold the **[MODE]** for 1 second to exit.
4. The display shows "Save?". To accept the new value, press the **[Y/+]** key. Press the **[N/-]** key or the **[MODE]** key to discard the change and move to the next sub-menu.

Horiba U-10 Water Quality Checker

Auto-calibration procedure

Fill the calibration beaker to about 2/3 with the standard solution. Note the line on the beaker.

Fit the probe over the beaker, as illustrated. Note that the beaker is specially shaped to prevent the DO sensor from being immersed in the standard solution. This is because the DO auto-calibration is done using atmospheric air.



Calibration beaker

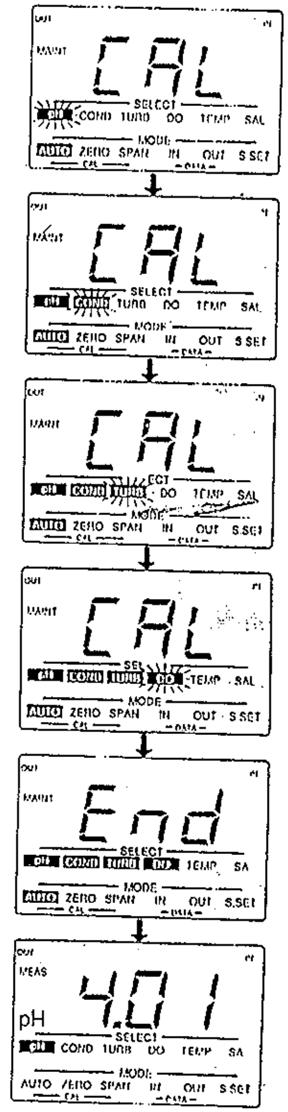
MODE

With the power on, press the MODE Key to put the unit into the MAINT mode. The lower cursor should be on the AUTO Sub-Mode; if it is not, use the MODE Key to move the lower cursor to AUTO.

ENT

With the lower cursor on AUTO, press the ENT Key. The readout will show CAL. Wait a moment, and the upper cursor will gradually move across the four auto-calibration parameters one-by-one: *pH, COND, TURB,* and *DO.* When the calibration is complete, the readout will briefly show End and then will switch to the MEAS mode.

The upper cursor will blink while the auto-calibration is being made. When the auto-calibration has stabilized, the upper cursor will stop blinking.



First, pH is being auto-calibrated

Then, COND is being auto-calibrated

Next, TURB is being auto-calibrated

Finally, DO is being auto-calibrated

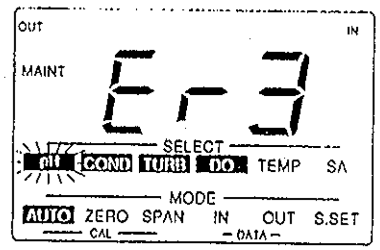
Auto-calibration now ends

And the readout switches to the MEAS mode

Note: If you wish to abort the auto-calibration for any reason, press the CLR Key. The parameters auto-calibrated so far will be stored in memory.

Auto-calibration error

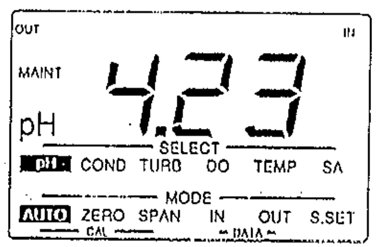
After the DO auto-calibration, if the unit does not switch to the MEAS mode as it should, and the readout shows either Er3 or Er4, an auto-calibration error has occurred. Parameters will blink where an error occurred.



pH auto-calibration error

CLR

If this happens, re-do the auto-calibration. First, press the CLR Key to cancel the error code.



ENT

Then press the ENT Key to re-start the auto-calibration. Restart the auto-calibration beginning again with pH.

Solinst Model 121 sonic, product/water interface probe

The Solinst Model 121 Interface Meter works as follows: An infra-red circuit detects the presence of a liquid. A conductivity circuit differentiates between conductive liquid (water) and non-conductive liquid (LNAPL or DNAPL product).

Product = Steady tone and two lights
Water = Intermittent tone and one light.

Main switch is toggle switch on reel faceplate.

Probe switch is knurled steel ring at top of probe.
0 = Off and 1 = On

Zero measurement point is the junction between the stainless steel body of the probe and the brown Teflon/Delrin base plug.

Equipment Check

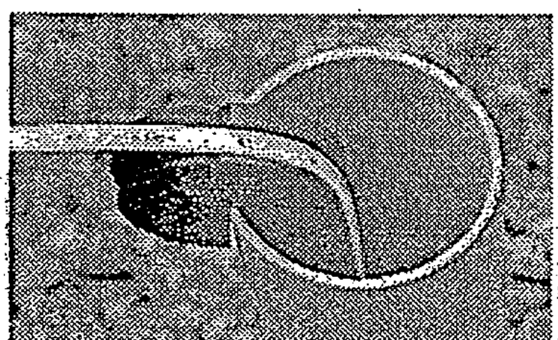
Before leaving the office, or commencing any measurements, carry out the following electronics and battery condition checks.

Battery in reel check: turn main switch on. Steady tone and two lights will be activated (as long as the probe switch is off and main switch is on).

Battery in probe check: remove probe from holder and with main switch still on, turn probe switch on. Steady tone and two lights turn off. **If only left light is on, or one light and a weak buzzer:** probe battery is very low and needs replacing immediately.

Infra-red circuit check: with both switches on, insert the cleaning brush into the base of the probe until it reaches the zero measurement point. This cuts the infra-red beam and activates the steady tone and two lights.

Conductivity circuit check: with both switches on, insert the probe into normal tap water, as far as the zero measurement point. This causes a single light and intermittent tone to activate.



Use tape guide to protect tape from damage on well lip.

Field Measurements

1. **Turn both switches on.** Place the slotted part of the tape guide/datum onto the edge of the casing. Lay the Interface Meter tape into the groove on the periphery of the tape guide, as illustrated. Measurements will be read at the apex of the V-notch on the tape guide. A compensation factor is stamped onto the side of the tape guide. Subtract this factor to obtain accurate depth measurements from the top of the casing.

2. **Lower probe slowly.**

   If there is no floating product, a single light and intermittent tone will come on. Briefly upon first entering water the steady tone and both lights will activate, but not upon subsequent insertions or removal.

   If there is a thin film of product, the steady tone and two lights will activate briefly each time the probe enters or exits the liquid.

   If there is floating product, steady tone and two lights will activate.

3. Raise and lower the probe gently to determine the exact upper level of any non-conductive floating product. Read the level of the air/product interface from the marked tape.

4. **To read the product/water interface,** lower the probe into the water until only one light and intermittent tone remain 'on'. Shake probe slightly to clear product from the conductivity sensor. Raise the probe slowly until steady tone and two lights activate. Read the level directly from the tape. **Note:** Remember to subtract the amount on the tape guide from each measurement.

5. Repeat steps 3 & 4 a number of times to confirm.

6. **To determine the thickness of product,** subtract reading in step 3 from reading in step 4.

7. **To determine if any sinking product is in the well,** continue lowering the probe slowly. If steady tone and two lights come on, determine the top of the sinking layer by reading directly from the tape. Continue lowering the probe slowly until the tape slackens when the well bottom is reached. Read the level directly from the tape. **Do not drop to bottom of well: damage to probe tip may result.**

   Note: 0.1 ft. must be added to the readings in step 7, to compensate for the difference between the measurement point and the bottom of the probe.

8. **At completion of readings:** turn the probe and reel switches 'off'; clean tape and probe; return probe to holder and follow maintenance instructions as necessary.

NOTES
- Battery will drain rapidly if probe is left 'on' and out of holder.
- Do not drop probe: damage to probe tip may result.
- O-ring seals may be affected by the use of cleaning fluids other than detergent and water.
- Check and lubricate all O-rings regularly.

If only left light is on, or left light and a weak buzzer:
- probe battery is very low and needs replacing immediately.

Cleaning and Maintenance

After each use, the tape should be wiped clean and carefully rewound onto the reel.

The probe should be cleaned as follows:
- wash probe thoroughly with detergent.
- use cleaning brush through side and base holes to remove all product from inner part of the probe.
- use steel wool to scrub bottom pin.
- rinse probe thoroughly with distilled water, wipe dry.
- return the probe to the holder, ensuring that both switches are turned off.

Other suitable cleaning methods include:
- Hexane and distilled water rinsing.
- Steam cleaning for tape only.

Battery Replacement

If incorrect signals occur, change both batteries and retest the unit. Batteries should be replaced after approximately 9-10 hours "on time" Use 9V Duracell MN1604 or Eveready 522. **Note: Always replace both batteries at the same time, and lubricate O-rings.**

To replace battery inside reel: remove three screws in faceplate and carefully lift to one side to prevent damage to wiring. Replace with specified battery, noting proper polarity. Replace faceplate and three screws, being careful to keep all wires within the hub.

To replace probe battery: remove three screws (Phillips type) at top of probe. Being careful not to damage wire connector, gently pull body apart to expose the battery holder. Remove and replace battery with type specified. Ensure correct polarity. Check O-rings for damage. Replace if necessary. Lubricate O-rings lightly prior to reassembly. **Ensure that the three wire connector is placed below the battery in the slot provided, and push probe body back together.** Replace Phillips screws but **do not over-tighten.**

TROUBLE SHOOTING	CAUSE	REMEDY
No lights operational	Reel switch not on	Turn main switch on reel to 'on' position.
	Low batteries	Replace both batteries as described above.
	Moisture in probe	Check O-rings for damage. Replace if necessary. If O-rings not at fault, return probe to Solinst for assessment and repair.
Water signal not operational	Dirty probe	Clean as described above.
	Low Batteries	Replace both batteries as described above.
	Moisture in probe	Check O-rings for damage. Replace if necessary. If O-rings not at fault, return probe to Solinst for repair.
	Damage to bottom pin	Return probe to Solinst for repair.
Product signal not operational	Probe switch not on	Turn knurled ring on probe to 'on' position.
	Dirty probe	Clean as described above.
	Low batteries	Replace both batteries as described above.
Water light stays on	Low batteries	Replace both batteries as described above.
	Dirty probe	Clean as described above.
Continuous tone and lights	Dirty probe	Clean as described above.
	Dead battery in probe	Replace both batteries as described above.
	Dirty contacts	Disconnect probe; clean contacts with steel wool and smear with vaseline.
	Allignment pin damaged	Disconnect probe; if pin damaged return probe to Solinst.
	Damaged wiring in probe	Open probe, check wires to battery; if you cannot repair damage, return probe to Solinst.
	Cannot detect any error	Return complete unit to Solinst
Probe swtich will not turn	Switch dirty	Spray ring with a little WD40 and clean thoroughly.

When Reassembling Probe:
1. Ensure battery is properly connected.
2. Small connector between probe sections must be attached.
3. Connector must be placed under battery to prevent crushing.
4. Lightly lubricate O-rings.
5. Gently push probe body over battery holder portion of probe. NB some resistance will be felt, due to the O-rings.
6. Replace three screws at top of probe.

When Reinstalling Faceplate:
1. Line up Solinst logo on faceplate over circuit board.
2. Take care not to crush wires or electronics.
3. Replace three faceplate screws.

When Reattaching Probe:
1. Make sure contacts are clean.
2. Lubricate O-rings.
3. Line up pin in female connector with hole in male connector.
4. Screw down retaining ring; snug, but not overtight.

Parts and Service

Should your Interface Meter require any spare parts, service or repairs, please contact *Solinst*.

Solinst Canada Ltd. The Williams Mill, 515 Main Street, Glen Williams, ON. L7G 3S9
FAX: (416 or 905) 873-1992 TEL: (416 or 905) 873-2255

Solinst

character dot matrix LCD and 3 keys to provide easy user interface.

General Specifications Table 1.1

Portable VOC monitor Specification	
Size:	8.2"L x 3.0"W x 2.0"H
Weight:	19.5 oz with battery pack
Detector:	Photo-ionization sensor with 9.8, 10.6, or 11.7 eV UV lamp
Battery:	A 4.8V /1250 mAH Rechargeable Nickel Metal Hydride battery pack (snap in, field replaceable)
Battery charging:	10 hours charge through built-in charger
Operating Hours:	Up to10 hours continuous operation
Display:	1 line by 8 characters 5x7 dot matrix LCD (0.4" character height) with LED back light automatically in dim light
Range, Resolution & Response time (t_{90}):	
Isobutylene (calibration gas)	
	0-99 ppm 0.1 ppm 2 sec
	100-1,999 ppm 1.0 ppm 2 sec
	2000-10,000 ppm 1.0 ppm 2 sec
Measurement accuracy (Isobutylene):	
	0 – 2000 ppm: ± 2 ppm or 10% of reading.
	> 2000 ppm: ± 20% of reading
PID Detector:	Easy access to lamp and sensor for cleaning and replacement

Correction Factors:	Built-in 102 VOC gases
Calibration:	Two-point field calibration of zero and standard reference gas
Calibration Memory:	Store up to 8 separate calibration, alarm limits and span value
Inlet probe:	Flexible 5" tubing
Keypad:	1 operation key and 2 programming keys
Direct Readout:	Instantaneous, average, STEL and peak value, battery voltage and elapsed time
Intrinsic Safety:	UL & cUL Class 1, Division I, Group A,B,C,D (US & Canada), EEx ia IIC T2 (Europe)
EM Interference:	No effect when exposed to 0.43 W/cm^2 RF interference (5 watt transmitter at 12 inches)
Alarm Setting:	Separate alarm limit settings for Low, High, STEL and TWA alarm
Operating Mode:	Survey or Hygiene mode
Alarm:	90 dB buzzer and flashing red LEDs to indicate exceeded preset limits, low battery voltage, or sensor failure.
External Alarm:	Optional plug-in pen-size vibration alarm or remote alarm
Alarm Mode:	Latching or automatic reset

Solinst Model 101 &102 sonic water interface probe

Solinst Water Level Meter: Operating Instructions

Models 101 & 102

Upon receipt of meter the following operational checks should be performed:

1. Set toggle switch to "on" or turn rotary dial fully clockwise.
2. Submerse the electrode (probe) in tap water. This completes the circuit and activates the buzzer.
3. Depress button to test the battery and circuitry (excluding the probe).

Water Level Measurement

The zero measurement point is:

Model 101 tip of the inner electrode visible near the centre of the probe
Model 102 base of the outer body electrode

- clockwise rotation of rotary dial turns meter on and increases sensitivity.
- always set switch to the highest sensitivity position, then decrease if necessary.

Note: The P4 Probe has been designed to allow substanial submergence. Use of the P1, P2 or P3 probes to sound the bottom of the well may cause water ot enter the probe.

Routine Care of the Water Level Meter

1. After the depth of water has been recorded the cable should be carefully rewound onto the reel, the probe wiped dry and replaced into the probe holder.
2. The probe, cable and reel can all be cleaned with soap or detergent and water.
3. Use of a Water Level Meter Carrying Bag adds to the service life of the meter.
4. Use of a Tape Guide adds to the life of the tape.

Care of P4 Probe

Note: Do not remove or twist the strain relief pieces at the back of the probe as this will cause damage to the pressure seal. If the pressure seal integrity is in question, please call Solinst for the authorized repair centre nearest you.

1. While holding firmly onto the black Delrin section on the top of the probe, turn clockwise slightly and pull the P4 sleeve body down.
2. Remove any dirt and water from inside the sleeve body, the centre electrode and the Teflon pieces.
3. Remove and clean the O-rings. Clean the recessed areas and check the O-rings for damage. Lightly lubricate and replace the O-rings.
4. Carefully pull the coil spring from its recessed area and onto the centre electrode. **The coils of the coil spring must curve clockwise.**
5. Clean the recessed area where the coil spring rests and check to see that the exposed wire is in place and clean.
6. Push the coil spring back into place.
7. Turning clockwise, push the sleeve body over the electrode to the black Delrin piece.
8. To test, turn the unit on and lower the probe into a glass of water. When the probe touches water, the buzzer will sound and the light will come on.

Troubleshooting

SYMPTOM	CAUSE	REMEDY
No sound when probe immersed in water.	Dead battery.	Replace with 9v Alkaline.
	Water conductivity is very low.	Increase sensitivity switch setting (turn clockwise) or call Solinst for assistance.
	Disconnected wires on circuit board.	Check all connections inside hub of reel for loose/disconnected wires - solder or reconnect.
	Broken wire in tape.	Locate break in tape - splice and seal.
	Disconnected wire inside probe.	Contact Solinst to obtain parts / repair instructions.
Continuous sound after probe is removed from water.	Water conductivity is very high.	Decrease sensitivity switch setting (turn counter-clockwise).
	Damaged components or improper wiring on circuit board.	Contact Solinst to obtain parts / repair instructions.

Battery Replacement

- battery type - alkaline, 9 volt.

1. The battery is housed in the reel hub and is replaced by removing the front plate of the reel.
2. To remove front plate, unscrew three faceplate screws and carefully lift off to the side to avoid damage to wiring.
3. Remove battery and put in new one, making sure the polarity is correct.
4. Replace faceplate of the reel and screws, making sure the wires are fully inside.

Water Level Meter Replacement Parts

The following parts can be provided should they become lost or damaged.

- probes and probe tips
- tapes and cables
- cable reels
- lights, switches, etc.

For further operating information or for repair information,
please call Solinst:
(905) 873-2255 or (800) 661-2023
fax: (905) 873-1992

Site Management Plan

Property Known As:

Former Swivelier Site
Village of Nanuet, Rockland County, New York
NYSDEC Site Number: 3-44-036
EWMA Project No. 205548

June 2018

Appendix 5 – Health and Safety Plan

Swivelier
33 Route 304
Nanuet, NY
Job # 205548

Health & Safety Plan

Scope of Service:	**Install temporary well points** **Ground water sampling** **Soil vapor sampling**
Contaminants of Concern:	**Chlorinated VOCs, (trichloroethene, tetrachloroethylene, methylene chloride)** **Hydrogen peroxide**
Approved On:	February 14, 2014
REVISED ON:	February 21, 2018

Prepared by

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Parsippany, NJ West Windsor, NJ New York, NY

Environmental Consulting & Remediation Firm

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ATTACHMENTS

20SECTION 1.0
PROJECT IDENTIFICATION

CLIENT NAME:	Patrick Magee SF Properties, LLC
CLIENT ADDRESS:	P.O. Box 54 Stony Point, NY
CLIENT CODE:	
EWMA PROJECT No.:	205548
PROJECT NAME:	Former Swivelier Company
LOCATION/ADDRESS:	33 Route 304 Nanuet, NY
EWMA PROJECT MANAGER:	Alfred Moffit
EWMA SITE MANAGER:	Joe Bukowski
EWMA SITE SAFETY OFFICER:	Joe Bukowski
PLAN VALID FROM:	May 1, 2003
REVISED:	**October 4, 2008** **February 14, 2014** **February 21, 2018**
PLAN EXPIRES:	**Plan shall be revised periodically upon discovery of new contaminants of concern or significant increases in health or safety hazards**

- End of Section -

SECTION 2.0
INTRODUCTION

The purpose of this Health and Safety Plan (HASP) is to identify, evaluate and control health and safety hazards, and to provide for emergency response during field activities. All employees of Environmental Waste Management Associates, LLC (EWMA), as well as its contractors and subcontractors who have agreed to abide by this HASP and who are involved in field activities on this project, will be bound by these provisions. Contractors and subcontractors who abide by this HASP, but whose work activities are not covered by this HASP must develop and follow their own site specific HASP. As an example, tank removal and cleaning as well as confined space entry work will be performed by subcontractors. As such, these tasks are not specifically covered by this HASP, and the subcontractors performing these tasks must develop and follow their own site specific HASP

This site-specific HASP is based on a review and evaluation of the potential hazards and risks associated with this project. It outlines the health and safety procedures, and the equipment required, needed to minimize the potential for harm to field personnel and site visitors. Since work activities, site conditions and exposures to various combinations of contaminants which may be present are variable, the potential for adverse health effects associated with field activities on this site cannot be predicted with confidence.

2.1 SITE DESCRIPTION & HISTORY

Swivelier utilizes a portion of the site building for the assembly, manufacture, warehousing, and distribution of lighting fixtures. It has been an active manufacturing site since 1956. Currently, site cooling and process water is recycled. In the past, all non-contact process wash and cooling waters, as well as waste-waters from the building floor drain system were discharged through an underground pipe to a drainage ditch at the site. Analytical results for the out-fall pipe and surface water samples indicated a total Volatile Organic Compound (VOC) level of 14,425 and 8,962 parts per billion (ppb), including detected concentrations of Trichloroethene (TCE), Tetrachloroethene (PCE) and Methylene Chloride.

See the List of Attachments for a site location map, and a street map identifying the location and possible routes to the nearest hospital.

2.2 KEY PERSONNEL

2.2.1 EWMA Project Manager: Alfred Moffit

The EWMA Project Manager has the following responsibilities:

- To provide the EWMA Health and Safety Officer with project-related health and safety information.
- To have a site-specific Health & Safety Plan (HASP) prepared.
- To implement the HASP.
- To see that the project is performed in a manner consistent with applicable local, state and federal regulations..
- To monitor compliance with the HASP.

The EWMA Project Manager has the authority to take the following actions:

- To suspend field activities, if the health and safety of field personnel are endangered, pending further consideration by the EWMA Health and Safety Officer.
- To suspend an individual from field activities for infractions of the HASP, pending further consultation with the EWMA Health and Safety Officer.

2.2.2 EWMA Health and Safety Officer: Margaret Halasnik

The EWMA Health and Safety Officer has the following responsibilities:

- To consult with the EWMA Project Manager in project-related matters of health and safety.
- To monitor compliance with the HASP (when on site).
- To assist the EWMA Project Manager in complying with the terms of this HASP, and applicable regulations.
- To verify that on-site personnel are properly trained and medically qualified to carry out their duties.

The EWMA Health and Safety Officer has the authority (when on site or through consultation) to take the following actions:

- To suspend work or otherwise limit personnel exposure if the HASP does not adequately address perceived or newly identified hazards.

.

- To direct personnel to modify any work practices that may be deemed to be hazardous to health and safety.
- To remove field personnel from the project if their physical actions or mental condition endangers their own health and safety, or that of their coworkers, in consultation with the PM.

2.2.3 EWMA Site Safety Officer: Joe Bukowski

The EWMA Site Safety Officer (EWMA SSO) and EWMA Alternate Site Safety Officer(s) (Alternate EWMA SSO) have the following responsibilities:

- To direct on-site health and safety activities.
- To report safety-related incidents to the EWMA Project Manager and EWMA Health and Safety Officer.
- To assist the EWMA Project Manager in all aspects of implementing the HASP.
- To maintain an adequate supply of health and safety equipment on-site, as specified in the HASP.
- To observe on-site health and safety activities, as specified in the HASP, and report results to the EWMA Project Manager and the EWMA Health and Safety Officer.

The EWMA SSO has the authority to take the following actions:

- To suspend field activities, if the health and safety of field personnel are endangered, pending further consultation with the EWMA Health and Safety Officer and PM.

- To suspend an individual from field activities for infractions of the HASP, pending further consultation with the EWMA Health and Safety Officer and PM.

- End of Section -

3.1 PERSONNEL MEDICAL CLEARANCE

Prior to working at this site, EWMA assigned employees must: 1) have been certified by a licensed, EWMA-approved physician as being physically able to perform their assigned field work, and to use the Personal Protective Equipment (PPE) which will be required for this project, in accordance with the provisions of OSHA Regulation 29 CFR 1910.120(f)(2), 2) have successfully completed an EWMA 40-hour basic health and safety training course (Level C) for field personnel or its equivalent, and 3) passed a Qualitative Respirator Fit Test. Site managers and supervisors must have successfully completed an 8-hour managers' health and safety course, in addition to the other clearance requirements.

EWMA subcontractor employees must also have similar medical, training, and respirator fit clearances and they will be required to provide proof of training and medical clearance before beginning work.

3.2 HAZARD TRAINING

All personnel working on-site who have potential exposures to health or safety hazards shall be thoroughly trained as specified in OSHA Regulations 29 CFR 1910.120(e). This training will include: (1) Attendance at an initial 40-hour basic health and safety training course off the Site; (2) At least three days of actual field experience under the direct supervision of a trained, experienced supervisor; (3) On-site, site-specific training; and (4) an 8-hour annual update in the basic health and safety training course. EWMA personnel may also receive specific topic training throughout the year. This training may include blood-borne pathogen training, low-level radioactivity safety, ergonomics updates, and newsletters/bulletins with pertinent or applicable information.

In addition to the above, on-site Managers and supervisors who are directly responsible for, or who supervise employees engaged in hazardous waste operations must also receive: (1) 8-hours of site supervisor training; and (2) additional training at the time of job assignment on such topics as, but not limited to, the company's safety and health program and the associated employee training program; personal protective equipment program; spill containment program; air quality monitoring; emergency response; monitoring equipment usage and calibration; and, health hazard monitoring procedures and techniques.

At the time of job assignment, special training will be provided to on-site personnel who may be exposed to unique or special hazards not covered by the initial 40-hour basic health and safety course. If unique or special hazards are unexpectedly encountered, specialized training will be provided before work proceeds.

3.3 INCIDENT REPORTING

An EWMA Health & Safety Incident Report will be filed for any incident involving personnel working at this Site. Situations covered by this policy include, but are not limited to, fires, explosions, illnesses, injuries and motor vehicle collisions. These reports must be sent to the EWMA Health and Safety Officer within 24 hours of the incident. Worker's Compensation Insurance reports for EWMA employees must be filed within 48 hours of each incident or illness which results from work-related activities and requires medical attention. See the Attachment List for a copy of the EWMA Health & Safety Incident Report. The EWMA SSO or Project Manager will complete this form if needed.

3.4 ILLUMINATION, SANITATION AND CONFINED SPACE ENTRY

3.4.1 Illumination

All major work tasks are expected to occur during daylight hours. The illumination requirements set forth by OSHA Regulations 29 CFR 1910.120 (m) will be met if work must proceed beyond daylight hours..

3.4.2 Sanitation

The sanitation requirements regarding potable and non-potable waters, toilet facilities and washing facilities will be followed as set forth in OSHA Regulations 29 CFR 1910.120(n).

3.4.3 Confined Space Entry

Confined Space Entries are not anticipated.

3.5 RESPIRATOR MAINTENANCE, FITTING AND DECONTAMINATION

Respirators, if used, will be cleaned daily according to procedures described below. Cartridges will be replaced either daily or if breakthrough is detected at any time while in use. The following checks will be performed daily, in addition to the above:

- Exhalation valve - pull off plastic cover and check valve for debris or for tears in the neoprene valve, which could cause leakage.
- Inhalation valves - screw off both cartridges and visually inspect neoprene valves for tears. Make sure that the inhalation valves and cartridge receptacle gaskets are in place.
- Make sure a protective lens cover is in place.
- Make sure you have the correct cartridges.
- Make sure that the facepiece harness is not damaged. The serrated portion of the harness can fragment which will prevent proper face seal adjustment.
- Make sure the speaking diaphragm retainer ring is hand tight.

NOTE: The respirator MUST be Leak-Tested before each use.

Test the respirator for leakage by using both the positive- and the negative-pressure method. Lightly place your palm over the exhalation valve cover. Exhale gently. The body of the respirator should bulge slightly outward from your face. If any leakage is detected around the face seal, readjust the head harness straps and repeat the test until there is no leakage. If leakage is detected other than in the face seal, the condition must be investigated and corrected before another test is made. The negative pressure test must also be made. Lightly place your palms or some impervious material, like Saran Wrap® over the cartridges or filter holders. Inhale gently. The face-piece should collapse against the face. The respirator must pass these two tightness tests before the respirator is used. The respirator will not furnish protection unless all inhaled air is drawn through suitable cartridges or filters. **NOTE: Respirators provide no protection in oxygen-deficient atmospheres!**

After use, follow these steps to clean your respirator:

- Wash with Alconox® solution and brush gently. (This step will remove any soil/solid particulate matter that may have been collected on the respirator during field activities.)
- Rinse with distilled/de-ionized water, making sure that the inhalation and exhalation valves are clean and unobstructed.
- Rinse with distilled/de-ionized water.
- Wipe with sanitizing solution. (This step will assure the sterility of the respirator.)
- Allow your respirator to air dry.
- Place the respirator inside a sealed bag or a clean area away from extreme heat or extreme cold.

3.6 EWMA PROJECT MANAGER NOTIFICATION

All field personnel must inform the EWMA SSO or the Alternate EWMA SSO before entering the Site.

IF ANY PREVIOUSLY UNIDENTIFIED POTENTIAL HAZARDS ARE DISCOVERED DURING ANY FIELD WORK, LEAVE THAT AREA OF THE SITE IMMEDIATELY AND CONTACT THE EWMA SSO FOR FURTHER INSTRUCTIONS.

3.7 OSHA INFORMATION POSTER

In accordance with the Occupational Safety and Health Act of 1970, a copy of the OSHA information poster must be present at the Site. It will be posted at full size (11" x 17") in a permanent structure or temporary field office, or will be communicated to on-site personnel via Attachment E.

3.8 PROHIBITIONS

Smoking, eating, drinking, chewing tobacco or toothpicks, applying cosmetics, storing food or food containers, and having open fires will be permitted only in designated areas that will be established by the EWMA SSO. Under no circumstances will any of the above activities be permitted within the Exclusion or Contamination Reduction Zones. Good personal hygiene should be practiced by field personnel to avoid ingesting contaminants.

3.9 INITIAL SITE SAFETY MEETING AND SIGNING THE HEALTH AND SAFETY PLAN COMPLIANCE AGREEMENT

The EWMA SSO will hold an initial site safety meeting with EWMA, subcontractor and contractor field personnel before work activities begin at the Site. At this meeting, it will be verified that all personnel have been provided with or have reviewed a HASP for the work activities to be performed at this Site. For EWMA personnel, its subcontractor's personnel, and contractor personnel whose employer(s) have adopted this HASP, the HASP shall be reviewed, discussed and questions will be answered. Signed Health and Safety Plan Compliance Agreement Forms of personnel who will be following this HASP will be collected by the EWMA SSO and filed. Individuals refusing to sign the Form will not be allowed to work on the Site.

3.10 DAILY SITE SAFETY BRIEFINGS

During field operations, site safety briefings will be held at the start of each day by the EWMA SSO to review and plan specific health and safety aspects of scheduled work. All field personnel who are following this HASP are required to attend these briefings. These meetings and their content shall be documented by the EWMA SSO or Project Manager. Potential subjects that may be discussed are presented below:

1. Preliminary
   - Medical clearances.
   - Training requirements.
   - Written HASP availability.
   - Designation of responsibilities for on-site personnel.
   - Identification of on-site personnel trained and certified to administer First Aid.
2. Training topics

   Review of HASP including: types of hazards; pathways of exposure; levels of protection; contamination avoidance; prohibitions; work procedures; confined space entry; work zones; emergency response procedures; and, specific on-site area/work tasks of concern.

   Decontamination.

   Personnel Protective Equipment.

   Air Quality Monitoring Program.
3. Questions and Answers

3.11 UNDERGROUND STRUCTURES

Caution will be exercised whenever the possibility of encountering subsurface obstructions exists. Before beginning intrusive activities, all available sources of information (such as site utility drawings, public utility drawings, construction drawings, and discussions with former employees) will be reviewed. If underground obstructions are unexpectedly encountered, the area will be excavated using manual equipment until the nature of the obstruction is discerned.

- End of Section -

SECTION 4.0
HAZARD ASSESSMENT

An assessment of the known or suspected chemical, physical and biological hazards have been made for each of the activities specified below.

4.1 APPROVED WORK ACTIVITIES

Work activities which may be performed under this HASP are limited to the following:

1. **Install temporary well points**
2. **Ground water sampling**
3. **Soil vapor sampling**

This HASP does not cover any site activities beyond those specifically listed above. Work activities not described above may be conducted only after an appropriate Addendum to this HASP has been issued by the EWMA Health and Safety Officer.

4.2 HAZARDS

4.2.1 Chemical Agents

The following chemical hazards have been identified, based on documented prior site uses and/or initial site investigations, and/or will be used as part of the remediation process.

Chlorinated VOCs, (trichloroethene, tetrachloroethylene, methylene chloride)
Hydrogen peroxide

4.2.1.1 Chemical Exposure Controls

Contaminants usually enter the body through the mouth (ingestion), the lung (inhalation) or by absorption through the skin and mucous membranes. Chemical exposure through these routes will be controlled by limiting eating, drinking, and smoking to uncontaminated areas; through the use of hygiene practices and decontamination procedures; and by the use of appropriate engineering controls and personal protective equipment (PPE). There are four levels of personal protection (Levels A, B, C, and D), according to the degree of protection they afford, with Level A providing the greatest degree of protection. The initial level of personal protective equipment to be used while performing activities at the Site will be based on the hazard assessment performed for this project.

Initially, Level D will be used while sampling the environment to determine what hazards are present, and in what quantities, EWMA employees will need to upgrade to Level C if the results of initial sampling (first few minutes of direct read measurements) suggests it is appropriate to do so.

4.2.2 Physical Agents

Physical agents include noise, electro-magnetic fields, ionizing and non-ionizing radiation, and thermal stress. There is also a risk of physical injury when working in the field with sampling tools, and when near heavy equipment, operating machinery and vehicular traffic. Field personnel should be able to recognize these hazards and take steps to avoid injurious contact with them.

Noise Exposure

Work at the site may be conducted with high noise levels from equipment such as excavators, pumps and drill rigs. EWMA standards require that hearing protection be used when noise levels exceed 85 dBA, averaged over an 8-hour day. Hearing protection will be required at this site for noise exposures greater than 85 dBA for **any** length of time. In the absence of a noise meter, an appropriate rule of thumb is that when normal conversation is difficult to hear or understand at a distance of three feet, hearing protection is required. EWMA and subcontractor personnel shall have hearing protection on-site and available for use at all times.

Thermal Stress

Depending on the altitude, geographic location and the season, the use of required PPE may cause heat or cold related stress on the wearer. The Heat Stress Casualty Prevention Plan as specified in Attachment-F will be referred to for dealing with this health hazard during warm weather. The Plan outlines heat stress identification, treatment, prevention and monitoring. Fluids will be provided at all times during work periods, in order to maintain adequate body fluid levels for field personnel. Attachment-F also contains the Cold Exposure Casualty Prevention Plan for this project.

4.2.2.1 Controls for Physical Agents

No physical hazards known or believed to be present.

4.2.3 Biological Agents

Biological agents may be viral, fungal, bacterial, or of higher orders: insects (including ticks and stinging insects), wild animals (especially snakes) and domesticated animals. Any mammal encountered on-site should be considered potentially rabid. In many parts of the northeast United States, tick-borne diseases pose a significant health risk during warm months. (see Attachment-J, Ticks and Tick-Borne Diseases). Field personnel are encouraged to use insect repellents before donning PPE. To avoid snake bites, check for snakes while walking through grassy or debris strewn areas if they are suspected in the work area. The presence of medical waste suggests the possibility that pathogenic micro-organisms may be present. A fully-stocked first aid kit, insect and tick repellent must be available for use in the field.

Biological Agent Controls

No Biological Agent controls to be used.

4.2.4 Safety Hazards

The hazards and appropriate safety procedures associated with drilling and excavation activities are discussed in Attachment-I, Safety Guidelines for Excavations. The physical hazards associated with performing field sampling are described in the safety procedures listed in Attachment-H.

Use of steel-toed work boots, safety glasses or goggles, and hard hats will be required when in an Exclusion Zone. Personnel should be aware that when PPE such as respirators, gloves, and protective clothing are worn, visibility, hearing, and manual dexterity may be impaired.

4.2.4.1 Drilling, Pile Driving and Excavation

The hazards involved with the use of drill rigs and excavation equipment are significant and include pinch points, entrapment in machinery, impact from moving parts, electrocution from contact with overhead wires or buried utilities, and improper operations. Use of hand tools, moving the rigs/equipment, and conducting required repairs can increase physical risks. Working with and around a drill rig can involve a high risk of serious injury or death. In order to reduce the risk, proper safety precautions must be observed at all times. Safety procedures are included in Attachment-H.

4.2.4.2 Excavated Drums

a. During the course of excavation activities, a potential exists for buried drums or other types of containers to be uncovered. If, because of labels, the appearance of chemical materials, the size and shape of the container, or for any other reason, there is a likelihood that a hazardous material container has been uncovered, immediately cease operations in the area and inform the Site Safety Officer.

b. Activities may not resume until the container’s contents have been sufficiently identified to determine the hazard it poses and to provide the controls necessary to remove or significantly reduce the identified risks.

4.2.4.3 Odors

During the course of excavation, odorous gases may escape from the ground. Most hazardous and/or foul-smelling gases can be controlled or eliminated with an enzyme product available from Nature Plus, 555

Lordship Blvd., Stratford, CT 06497 (203/380-0316): Don Mitchell. The Site Safety Officer will determine the most effective means of applying this material, when needed. An initial supply shall be on hand whenever a project may entail the probable release of noxious gases. (Just a question, do these products prevent the compounds from becoming airborne or do they just mask their odor?)

4.2.5 Contaminated Dust

Contaminated surface soils may become a source of dust. Inhaling contaminated dust may result in adverse health effects from exposure to the contaminant(s) on the dust particles.

The M.I.E. company's miniRAM dust monitor may be used to estimate the contaminant concentration in air, by measuring the total dust level.

Soil samples are reported as mg contaminant per kilogram of soil. The mini RAM reads mg of dust per cubic meter of air. To convert from kilograms of soil (dust) to milligrams of dust (from soil), divide kilograms by 1 million (1,000,000 or 10^{-6}). In order to maintain proportions, milligrams of contaminant must also be divided by 1 million (resulting in milligrams of contaminant times 10^{-6} per mg soil (dust)).

As an example, assume that soil sampling shows 750 mg lead per kilogram of soil. Dust, generated from this soil, was measured to be 3 mg dust (total) per cubic meter of air. Dividing by 1 million, we have 0.00075 mg lead for each milligram of dust. Since we have 3 mg dust in each cubic meter of air, we have 3 x 0.00075 mg or 0.00225 mg lead per cubic meter of air. The OSHA Time-Weighted Average, Permissible Exposure Limit is 50 micrograms of lead per cubic meter of air. Therefore, a sustained, full-shift exposure to this lead-contaminated soil will not produce an unacceptable exposure to lead.

Appendix I (attached) provides relevant information concerning dust contaminants.

4.2.6 Remediation Process

The patented ISOTEC process combines proprietary catalysts[1], mobility control agents, oxidizers, and stabilizers in an optimal, chemical formulation, and employs site-specific delivery systems to ensure complete destruction of the targeted contaminants of concern. ISOTEC compounds are injected through a site-specific delivery system providing sufficient distribution to treat the contaminants in the area of concern.

- End of Section -

SECTION 5.0
AIR QUALITY MONITORING AND MEASURES FOR THE CONTROL OF EMISSIONS

5.1 AIR QUALITY MONITORING INSTRUMENTATION

Air quality will be measured to determine exposure potentials prior to the start of work, and at various times during the course of the project. Instruments which may be used to monitor air quality are discussed below:

- **Photoionization Detector**

  The HNu Systems Model PI-101 Photoionization Detector (PID) or equivalent will be used to detect trace concentrations of certain organic gases and a few inorganic gases in the air. Methane, ethane, and the major components of air are not detected by the HNu PID. PID readings reflect total (readable) vapors in the air. PID readings must be given as "PID units", rather than "ppm". The PID detects mixtures of compounds simultaneously. PID readings do not measure concentrations of any individual compound when a mixture of compounds is present.

  The PID will be calibrated twice each day (before start of work and after the conclusion of work) using an isobutylene standard (molecular weight = 56.2) for calibration. Calibrations will be logged. PID readings should be measured in the breathing zone of the worker with the highest exposure potential (i.e., the person who is closest to the source of known or suspected contamination) at least hourly.

  The response factor for the PID will be set to 0.54, to be sensitive to the contaminants of concern.

- **Combustible Gas Indicator/Oxygen/Hydrogen Sulfide Meter**

  An approved Combustible Gas Indicator/Oxygen Meter, which may have a separate hydrogen sulfide detector, may be used, at the discretion of the EWMA SSO, to measure the concentration of flammable vapors and gases, oxygen, and hydrogen sulfide in the air during field activities. Flammable gas concentrations are measured as percentages of the Lower Explosive Limit (LEL). Oxygen content is measured as a percentage of air. Hydrogen sulfide concentration (which includes sulfur dioxide) is measured in parts per million.

- **Multigas Detector Tubes**

  Draeger Multigas Detector Tubes may be used at the discretion of the EWMA SSO to detect and semi-quantify the concentration of selected contaminants in the air. The tubes must be able to detect concentrations at or below the OSHA Permissible Exposure Limit (PEL) for the contaminant in question. It should be realized that most detector tubes will also respond to chemically similar organic vapors.

  Detector tubes for trichloroethene tetrachloroethylene and methylene chloride will be available and used on site to periodically monitor for the presence of these compounds in air.

- **Personal Monitor for Aerosol and Dust**

  The MIE, Inc. Model PDM-3 MiniRAM Personal Monitor for Aerosol and Dust (MiniRAM Monitor), or equivalent, will be used at the discretion of the EWMA SSO to detect and quantify the concentration of fugitive respirable dust that may be created during ground-disrupting operations. The instrument is capable of measuring fugitive respirable dust at concentrations as low as 0.1 mg/m^3. The miniRAM may be used to estimate the concentration of metals or other non-gaseous contaminants, if their soil concentrations are known. Soil levels are normally reported as milligrams per kilogram of soil (mg/kg). This is equivalent to 10^{-6} mg of contaminant per mg of soil. Since the miniRAM readout is milligrams of total (soil) dust per cubic Meter of air (M^3), the soil analysis concentration can be divided by 'one million' and multiplied by the miniRAM reading in order to estimate the contaminant concentration in air.

5.2 AIR QUALITY RESPONSE LEVELS

The Site Safety Officer will decide when to change protection levels in response to air monitoring results. The EWMA Health and Safety Officer will be notified of any upgrades from initial protection levels, as soon as is practical. EWMA Action Levels for this project are described in detail in Table 5-1, at the end of this Section. These Action (Response) Levels apply to the work activities covered by this HASP.

5.3 MONITORING GUIDELINES

The Monitoring Guidelines Plan has been prepared in accordance with the guidelines published by the New York State Department of Environmental Conservation including the requirements for a Community Air Monitoring Plan (CAMP).

5.3.1 Background Organic Vapor Monitoring

Background organic vapor and combustible gas readings (when applicable) will be taken at least twice daily: before the start, and after the conclusion of, work activities. Background levels will be taken at a location which is unaffected by on-site work. Once work at the Site begins, reselection of the original background location may be required.

5.3.2 Air Monitoring Protocol

Periodic monitoring of organic vapors during non-intrusive work activities will be performed utilizing a MiniRae 2000 PID in the hygenic mode. All readings will be collected in a downwind direction from work activities. The PID will be programmed to calculate 15-minute running average concentrations in the work zone. This will be in addition to the background monitoring described in the previous section. If average concentration readings exceed 5 ppm in the exclusion zone, activities will be halted, and additional readings will be taken at a distance of approximately 20-feet downwind of the exclusion zone.

5.3.3 Documenting Monitoring Results

A calibration log will be kept for each of the monitoring instruments used, which describes the calibration method(s) used, and the readouts obtained. The 15-minute average concentrations of Organic Vapor readings will be recorded on the project safety log (Appendix D). Should work at the Site require respiratory protection, the need for a personal exposure monitoring program will be evaluated by the EWMA Health and Safety Officer. Details of this program and any monitoring equipment required for its implementation will be specified in an Addendum to this HASP prepared by the EWMA Health and Safety Officer. Records of exposure measurements will be maintained in the Health and Safety file for this project.

5.4 EMISSION CONTROL MEASURES

Vapor or dust emissions resulting from field operations do not usually exceed either regulatory or EWMA action levels. If the action levels are significantly exceeded, measures to suppress the responsible emissions should be investigated. Appropriate measures would include cessation of operations until the exact cause of the emission is identified and corrected. Vapor control may include the use of vapor suppression foams, covering exposed soil piles with plastic sheeting and/or spraying exposed soil piles and drilling sites with water or enzyme solutions. Fugitive dust emission control may require water spraying. In addition, calcium chloride may be needed.

TABLE 5-1

EWMA RESPONSE ACTIONS

EWMA Air Quality Measurements and PPE Response Actions

Air Quality Measurement[1,2,3,4,5] The primary toxicants of concern are Chlorinated VOCs, (trichloroethene, tetrachloroethylene, methylene chloride) & Hydrogen peroxide during installation of soil borings/monitoring wells , collect soil/groundwater samples; collect soil gas samples. Use less than or equal to 5 mg/m3 per ACGIH dust level. Use less than or equal to 5 ppm PID equivalents for methylene chloride. **Note: ppm equivalents already calculated in this table.** CGI LEL reading less than 10%. Oxygen meter reading in range of 19.5% to 23.5%.	Level D Protection ensemble or Modified above background (averaged over 15 minutes and/or 8 Hr. TWA) No respirator needed if levels below the air quality values.
PID reading greater than background (averaged over one minute) but greater than 5 ppm CGI reading less than 10% LEL Oxygen meter reading in range 19.5% to 23.5% Greater than 3 mg/m3 of soil dust	Level C Protection level ensemble, ½ face-piece up to 5 ppm for the VOCs and 5 mg/m^3 for dust, then full face-piece with a combination OVA/P100 up to 50 ppm PID equivalents, and 15 mg/m^3 for dust . One-half respirator has an OSHA assigned protection factor of 10 and full face piece is 50. *If LEL is greater than 10%, evacuate the immediate work area, ensure ignition sources are not present and contact the EWMA Project Mgr. for next action steps.
PID reading is greater than 50 ppm PID equivalents maximum use concentration for using full face respirator, and/or CGI reading greater than 10% LEL* and/or Oxygen meter reading less than 19.5% to 23.5% and/or Dust greater than 15 mg/m^3 maximum use concentration when using full face respirator.	Suspend all work activities in immediate work zone and notify EWMA Project Manager **especially for low oxygen levels and elevated LELs.** Continue air monitoring until readings indicate that work may resume.

Footnotes: (1) All Air Quality Measurements, with the exception of CGI measurements for flammable vapors and gases, should be made in the breathing zone of personnel who, in the opinion of the EWMA SSO, are most exposed to airborne contaminants. Measurements of flammable vapor and gas levels should be made in the vicinity of the nearest ignition source. (2) ACGIH denotes American Conference of Governmental Industrial Hygienists (ACGIH) which serves to characterize 8 hour time weighted averages as a threshold level value, short term exposure limits and ceiling limits. The values are based on the most current edition of the ACGIH TLV booklet and OSHA PELs. (3) Be aware that these airborne concentration guidelines are based on assuming that the soil or ground water contaminants are at high concentrations. This is the case unless it is known about the soil concentration profile in advance. (4) Multiply the reading of the PID by 0.57 to convert the reading to PPM when the PID was calibrated with 100 PPM isobutylene. Record the readings as "PPM equivalents. (5) There is no certainty of contaminants levels in the soils, however it does contain suspect compounds of toxic nature. This is why the particulate levels were lowered to 3 mg/m^3 for particulates**. NOTE: CGI readings are unreliable in atmospheres with less than 19.5% oxygen!! Ensure your hands and face are clean prior to leaving the clean or cold zone when entering your vehicle or taking a break.**

6.1 DESCRIPTION OF LEVELS OF PROTECTION

The personal protection equipment specified in this HASP will be available to all field personnel. EWMA contractors and sub-contractors are required to provide the specified equipment (or its equivalent) to all of their exposed employees. The following requirements will also be met, in accordance with OSHA regulations:

1. Facial hair may not interfere with the proper fit of respirators;
2. Contact lenses will not be worn on-site; without exception.
3. Eyeglasses that interfere with the proper fit of full-face respirators will not be worn; and,
4. No eating, drinking or smoking will be allowed in any area where respiratory protection is required.

Level D Personal Protective Equipment

- Hard hat
- Safety glasses with side shields or goggles with face shield when handling hydrogen peroxide
- ANSI-rates steel-toed leather or rubber work boots
- Nitrile surgical gloves

Modified Level D Personal Protective Equipment

- Hard hat
- Safety glasses with side shields or goggles with face shield when handling hydrogen peroxide
- ANSI-rated steel-toed leather work boots
- Rubber overboots, steel-toed rubber boots, or disposable "booties"(1)
- Nitrile rubber outer gloves(1)
- Polyethylene coated or Saranex impregnated Tyvek coveralls(1) (taped at cuffs)

  (1) Optional, at the discretion of EWMA SSO.

Level C Personal Protective Equipment

- Hard hat
- Full face Air-Purifying Respirator with acid gas/organic vapor chemical cartridges combined with a P-100 filter
- Safety glasses with side shields or goggles with face shield when handling hydrogen peroxide, or use a full-face piece respirator
- ANI-rated steel-toed leather work boots
- Rubber overboots, steel-toed rubber boots, or disposable "booties"
- Nitrile rubber outer gloves
- Nitrile surgical gloves (to be worn underneath outer gloves)

- Polyethylene coated or Saranex impregnated Tyvek coveralls (taped at cuffs)

A first aid kit, multi-purpose dry chemical UL Class 10A-10B-C fire extinguisher, eye wash station, appropriate barricades and alarm horns will be present and maintained at the Site.

Selection of the PPE specified for this project is based on a review of known or suspected hazards, routes of potential exposure (inhalation, skin absorption, ingestion, and skin or eye contact) and the effectiveness of personal protective equipment in providing a barrier to these hazards. In addition, PPE has been selected to match the work requirements and task-specific conditions of the job, and to provide adequate protection without causing unnecessary discomfort or physical impairment to the worker.

6.2 INITIAL PPE LEVELS FOR SPECIFIC WORK TASKS

The selection of Initial Levels-of-Protection takes into consideration the physical, biological and chemical hazards posed by the site as well as those posed by the various pieces of personnel protective clothing. Initial Levels-of-Protection are established so as to obtain acceptable levels of protection while not imposing an unacceptable level of physical stress on the wearer.

The following initial PPE levels have been established for the tasks described in Section 4.1, Approved Work Activities:

Work Activity	Level of Protection
Install temporary well points	
Ground water sampling	
Soil vapor sampling	**Level-D***

* Once initial air-monitoring has been performed and the readings indicate airborne levels of flammables, toxins and oxygen to be within acceptable limits as described in Table 5-1, personnel may downgrade from a higher initial Level-of-Protection to Level-D, at the discretion of the EWMA-SSO.

- End of Section -

SECTION 7.0
DESIGNATION OF WORK ZONES

This section of the Health & Safety Plan applies to excavation projects where contaminated soils are exposed and may release their contaminants to the air, or come in contact with field personnel. To minimize the migration of contaminant from the Site to uncontaminated areas, three work zones will be set up:

Zone 1: Exclusion Zone
Zone 2: Contamination Reduction Zone
Zone 3: Support Zone

The Exclusion Zone is the area where contamination occurs or could occur. Initially, the Exclusion Zone should extend a distance of 25 ft from the edge of intrusive activity unless conditions at the Site warrant either a larger or smaller distance as determined by the EWMA SSO. All persons entering the Exclusion Zone must wear the applicable level of protection as set forth in Section 6.1, Personal Protective Equipment and Section 6.2, Initial PPE Levels for Specific Work Tasks. It is anticipated that work zones will be established at each individual area of intrusive work rather than encompass the entire Site.

The Support Zone is the area of the Site where significant exposure to contamination is not expected to occur during non-intrusive activities. The Support Zone is considered to be the "clean area" of the Site.

Between the Exclusion Zone and Support Zone is the Contamination Reduction Zone, which provides a transition zone between the contaminated and clean areas of the Site. The Contamination Reduction Zone will be located directly outside of the Exclusion Zone. All personnel must decontaminate when leaving the Exclusion Zone. A Contamination Reduction Zone (decontamination area) will be established adjacent to each individual area of intrusive work.

For a detailed map identifying the various work zones, see Attachment A.

- End of Section -

Personnel who have been in contact with contaminated materials will decontaminate themselves in the following manner:

- Deposit contaminated equipment on plastic drop cloths.
- Stand in wash tub containing Alconox® and water, wash boots and outer gloves with long handled brush.
- Rinse boots and outer gloves with long handled brush in a wash tub containing clear water or use a sprayer to rinse off boots and gloves.
- Remove ankle and wrist tapes; place in disposal drum.
- Remove outer gloves and place in disposal drum.
- Remove Tyvek® suit and place in disposal drum.
- Remove respirator and place on table to be decontaminated.
- Remove inner gloves and place in disposal drum.
- Wash hands and face.

All tools or equipment which have been in contact with contaminated materials, must be decontaminated after leaving the Exclusion Zone. This decontamination is to be performed using a high pressure/hot water "steam type" cleaner or a spray/rinse decontamination sequence as described in Section 3.6, Respirator Maintenance, Fitting and Decontamination, as appropriate.

Contaminated liquids from the decontamination area and contaminated clothing should be disposed of in accordance with site protocols.

- End of Section -

9.0 EMERGENCY RESPONSE

Emergencies addressed by this plan include:
- Fire;
- Chemical over-exposures; and,
- Physical injuries to site personnel.

The EWMA Health & Safety Officer and Project Manager must be notified as soon as possible of any on-site emergency or potential emergency including fire, explosive conditions or OSHA-recordable physical injury.

9.1 EMERGENCY RECOGNITION AND PREVENTION

9.1.1 Fires

Fires are possible whenever oxygen and flammable gases or vapors are mixed together in proper proportions and an ignition source is present. Construction equipment provides an ignition source. To prevent fires and explosions, a CGI as specified in Section 5.0 will be used to detect flammable or explosive atmospheres. Ignition and other sources which produce electrical sparks will be turned off and the area evacuated if vapors or gases reach 10% of the Lower Explosion Limit (LEL) as measured by the CGI. Work will not resume until the EWMA SSO observes CGI readings below 10% of the LEL for at least 5 consecutive minutes.

9.1.2 Chemical Exposures

Work should always be performed in a manner that minimizes exposure to contaminants through skin or eye contact, inhalation or ingestion. Work practices to reduce the risk of chemical exposure include:

- PPE, as specified in Section 6.0, will be used by all field personnel covered by this HASP. A formal revision to the HASP must be made by the EWMA Health and Safety Officer to modify the PPE specifications.
- Keep hands away from face during work activities.
- Minimize all skin and eye contact with contaminants.

Early recognition of the signs and symptoms of chemical exposure is essential for the prevention of serious chemical exposure incidents. Symptoms of exposure to the compounds present at the Site include the following: irritation eyes, skin, nose, throat, respiratory system; nausea, vomiting; flush face, neck; dizziness, lassitude (weakness, exhaustion), tremor, incoordination; slurred speech, convulsions; headache, drowsiness; dermatitis, skin erythema (skin redness); cardiac arrhythmias, paresthesia; liver, kidney damage. If a person experiences any of these symptoms, or recognizes any of them in a fellow worker, the person experiencing the symptoms will stop work immediately and report to the EWMA SSO. If the symptoms persist or affect performance in any way, the EWMA SSO will arrange for medical treatment. If the symptoms are serious, or affect several people, work activities in the exposure area will be discontinued until more is known about the cause(s). Incident reporting procedures as specified in Section 3.3 will be initiated.

9.1.3 Physical Injuries

Site personnel should be on the lookout for potential safety hazards such as holes or ditches; improperly positioned objects, such as drums or equipment that may fall; sharp objects, such as nails, metal shards, and broken glass; protruding objects at eye or head level; slippery surfaces; steep grades; unshored steep entrenchments, uneven terrain or unstable surfaces, such as walls that may cave in or flooring that may give way. Site personnel should inform the EWMA SSO of any potential hazards observed so that corrective action can be taken.

9.2 EMERGENCY ALERTING PROCEDURES

The EWMA SSO will alert the appropriate work groups when an emergency occurs. The communication method(s) will be established by the SSO with the approval of the Project Manager. The EWMA SSO and any isolated work group will carry radios if direct contact cannot be maintained. If direct contact cannot be maintained, an air horn will be used to signal workers to stop work and assemble in the Contamination Reduction Zone. If evacuation of the Site is necessary, a pre-arranged signal from the air horn will be sounded.

9.3 EVACUATION PROCEDURES AND ROUTES

Normally, personnel should evacuate through the Contamination Reduction Zone, and from there, to the Support Zone. Evacuation from the Contamination Reduction Zone will proceed in an upwind direction from the emergency. If evacuation to the Support Zone does not provide sufficient protection from the emergency, personnel will be advised to evacuate the Site proper.

9.4 TELEPHONE NUMBERS FOR EMERGENCY SERVICES

The telephone numbers of local emergency services are given below:

Emergency Service	**Telephone Number**
Ambulance	911
Nanuet Fire Department	**911 or 845-623-9690**
Police Department	**911 or 845-353-1100**
Nyack Hospital **160 No. Midland Avenue, Nyack, NY 10960**	**911 (914) 348-2000**
Poison Control Center	(800) 962-1253
USEPA National Response Center	(800) 438-2427
EWMA Project Manager/Al Moffit	**973-703-6658**

These telephone numbers must be verified by the EWMA SSO before the start of field work.

9.5 EMERGENCY RESPONSE PERSONNEL

The EWMA SSO will have the primary role in responding to all emergencies at the Site. The EWMA SSO, or the Alternate EWMA SSO, will be present at the Site during all work activities. If any emergency such as a fire, chemical exposure, or physical injury occurs, the EWMA SSO shall be notified immediately. The EWMA SSO will direct all site personnel in cases of emergency.

After an emergency has occurred at the Site, the causes and responses to that emergency shall be thoroughly investigated, reviewed and documented by the EWMA Project Manager and EWMA SSO; this documentation is to be submitted to the EWMA Health and Safety Officer within 48 hours of the incident.

9.6 DECONTAMINATION PROCEDURES DURING AN EMERGENCY

Decontamination of an injured or exposed worker or during a site emergency shall be performed only if decontamination does not interfere with essential treatment or evacuation.

If a worker has been injured or exposed and decontamination can be done: Wash, rinse, and/or cut off protective clothing and equipment.

If a worker has been injured or exposed and cannot be decontaminated:

- Wrap the victim in blankets, plastic or rubber to reduce contamination of other personnel;
- Alert emergency and off-site medical personnel to potential contamination; and,
- Have the EWMA SSO or other personnel familiar with the incident and contaminants at the Site accompany the victim to the hospital. If possible, send a copy of the appropriate MSDS(s) with the victim.

9.7 EMERGENCY MEDICAL TREATMENT AND FIRST AID PROCEDURES

Emergency medical treatment or First Aid may be administered at the Site by the EWMA SSO or other personnel who have been certified in First Aid.

General emergency medical and First Aid procedures are as follows:

- Remove the injured or exposed person(s) from immediate danger.

- Render First Aid as needed; decontaminate affected personnel, if necessary.

- Call an ambulance for transport to local hospital immediately. <u>This procedure shall be followed even if there is no apparent serious injury.</u>

- Evacuate other personnel at the Site to safe places until the EWMA SSO determines that it is safe for work to resume.

- Report the accident to the EWMA Health and Safety Officer immediately.

Emergency Medical Treatment and First Aid Procedures are presented in Attachment-G.

9.8 DIRECTIONS TO THE HOSPITAL FROM SITE

The route and/or directions to the hospital from the Site are in Attachment-B.

The directions to the hospital from the Site must be verified by the EWMA SSO prior to the start of field work.

- End of Section -

10.1 PROJECT PERSONNEL

EWMA personnel authorized to enter the Site and work on this project, subject to compliance with provisions of the HASP, are:

EWMA Project Manager	Alfred Moffit 973-703-6658
EWMA Site Manager	Joe Bukowski 973-703-6574
EWMA Site Safety Officer	Joe Bukowski
EWMA Health and Safety Officer	Margaret Halasnik, PARS Environmental 732-343-2150

Other personnel who meet HASP requirements, including training and participation in a medical surveillance program, may enter and work on the Site subject to compliance with provisions of the HASP.

10.2 PROJECT SAFETY RESPONSIBILITIES

Personnel responsible for implementing this Health and Safety Plan are the EWMA Project Manager and the EWMA Site Safety Officer. Their specific responsibilities and authority are described in the EWMA Health and Safety Manual.

- End of Section -

SECTION 11.0

HEALTH AND SAFETY PLAN APPROVALS

The authorized signatures below verify that this Health and Safety Plan has been read and approved for the work to be performed at the subject site:

EWMA Case Name: Former Swivelier/Nanuet, NY

EWMA Case Number: 205548

Alfred Moffit

February 14, 2014

Alfred Moffit — Date

EWMA Project Manager

Margaret Halasnik

February 14, 2014

Margaret Halasnik — Date

EWMA Health and Safety Officer

HEALTH AND SAFETY PLAN COMPLIANCE AGREEMENT

I have reviewed a copy of the Health and Safety Plan for Former Swivelier/Nanuet, NY, dated February 21, 2018. I have read the HASP, understand it, and agree to comply with all of its provisions. I understand that I could be prohibited from working on the project for violating any of the safety requirements specified in the Health and Safety Plan.

Name	Company
Signature	Date

Name	Company
Signature	Date

Name	Company
Signature	Date

Name	Company
Signature	Date

Name	Company
Signature	Date

APPENDIX I

DETERMINING EXPOSURE TO AIRBORNE DUST CONTAMINANTS FROM SOIL DATA

1. Assume the following hypothetical:

   a) Lead (Pb) is found in soil samples to be 18,000 ppm (mg Pb/kg soil).

   b) Dusty conditions will prevail.

   c) 18,000 mg Pb/kg soil = 0.018 mg Pb

   d) The miniRAM reads mg (soil/dust)/m^3 air. Each mg of soil/dust detected will contain 0.018 mg Pb/m^3 air

   Thus, 1mg/m^3 total dust as read by miniRAM represents 0.018 mg Pb/m^3

   The current OSHA PEL is 0.050 mg Pb/m^3 air, as an 8-HR TIME WEIGHTED AVERAGE (TWA-8)

2. Example: 18,000 mg Pb per kilogram of soil

   a) 18,000 mg Pb/kg soil = 0.018 mg Pb/mg soil

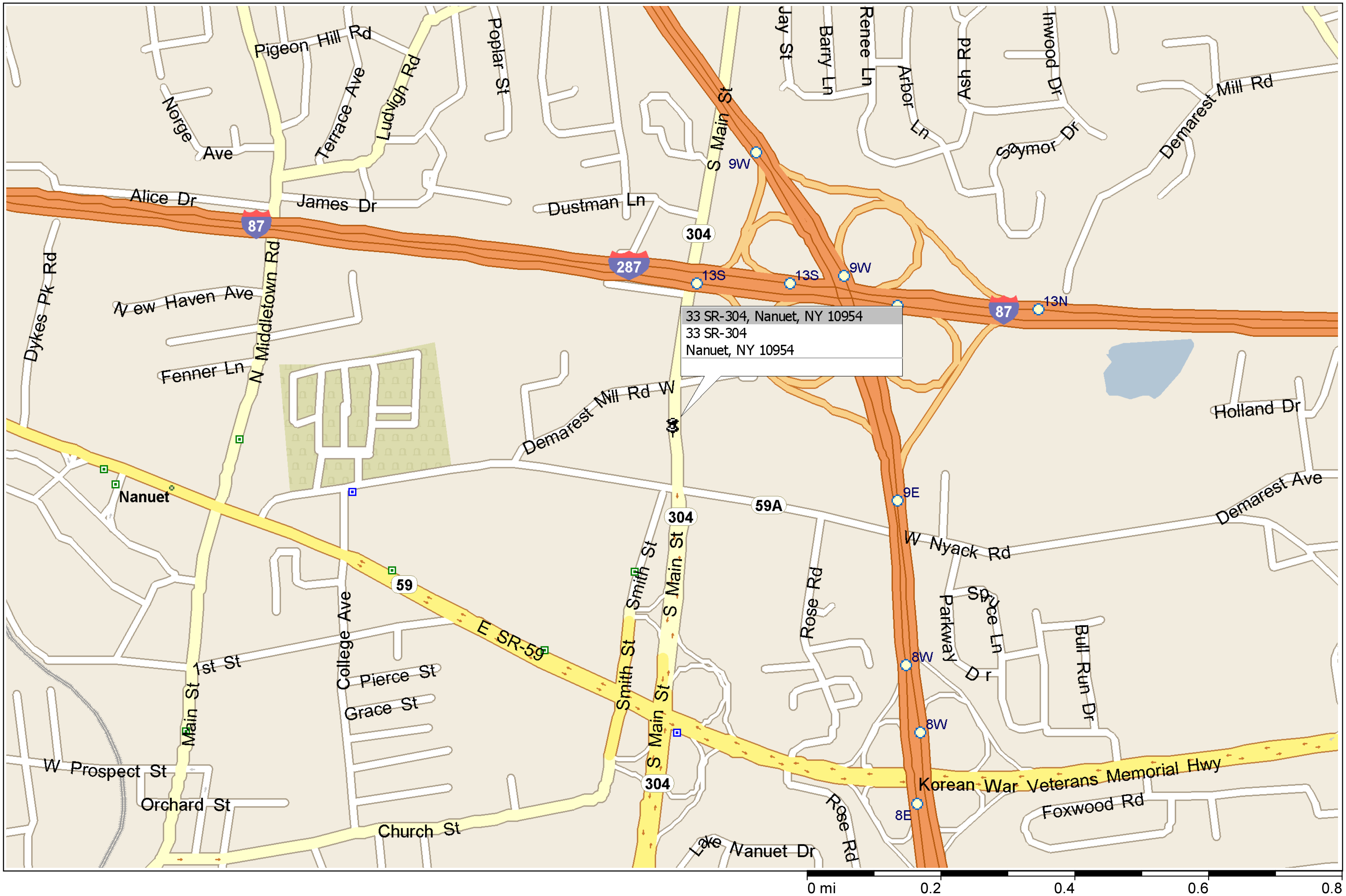
   b) miniRAM reads 4.0 mg dust (soil)/m^3 air

   c) $$\frac{0.018 \text{ mg Pb}}{\text{mg soil}} \times \frac{4.0 \text{ mg dust (soil)}}{m^3 \text{ air}} = \frac{0.072 \text{ mg Pb}}{m^3 \text{ air}}$$

ATTACHMENT A

SITE LOCATION MAP

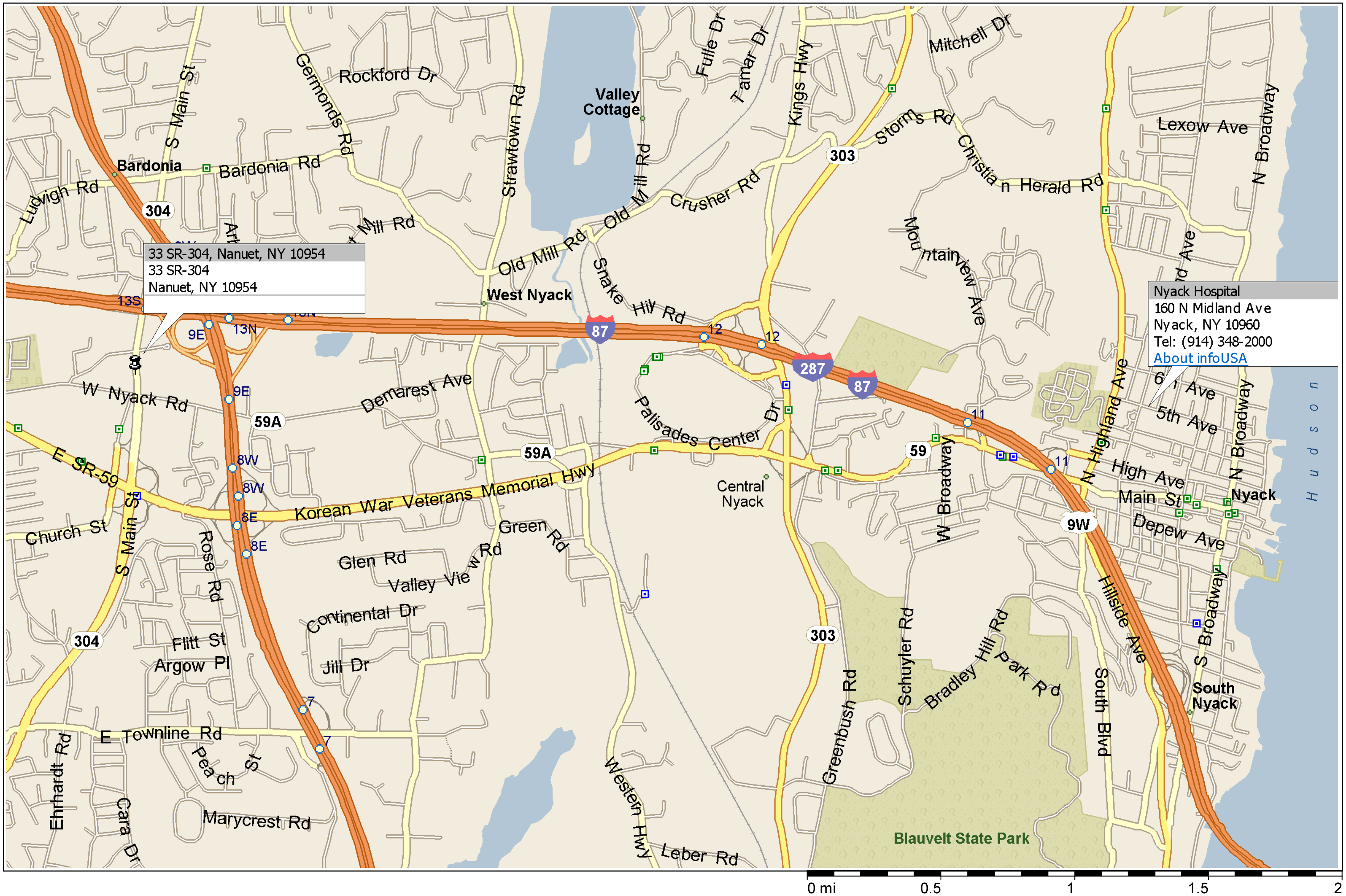
Site



33 SR-304, Nanuet, NY 10954
33 SR-304
Nanuet, NY 10954
Pigeon Hill Rd
Norge Ave
Terrace Ave
Ludvigh Rd
Poplar St
Alice Dr
James Dr
Dustman Ln
S Main St
Jay St
Barry Ln
Renee Ln
Arbor Ln
Ash Rd
Inwood Dr
Saymor Dr
Demarest Mill Rd
87
287
304
59A
59
9W
13S
13N
9E
8W
8E
Dykes Pk Rd
New Haven Ave
N Middletown Rd
Fenner Ln
Demarest Mill Rd W
Holland Dr
Demarest Ave
W Nyack Rd
Nanuet
Smith St
E SR-59
College Ave
Pierce St
Grace St
1st St
Main St
Rose Rd
Parkway Dr
Spruce Ln
Bull Run Dr
Korean War Veterans Memorial Hwy
Foxwood Rd
W Prospect St
Orchard St
Church St
Lake Nanuet Dr
0 mi
0.2
0.4
0.6
0.8

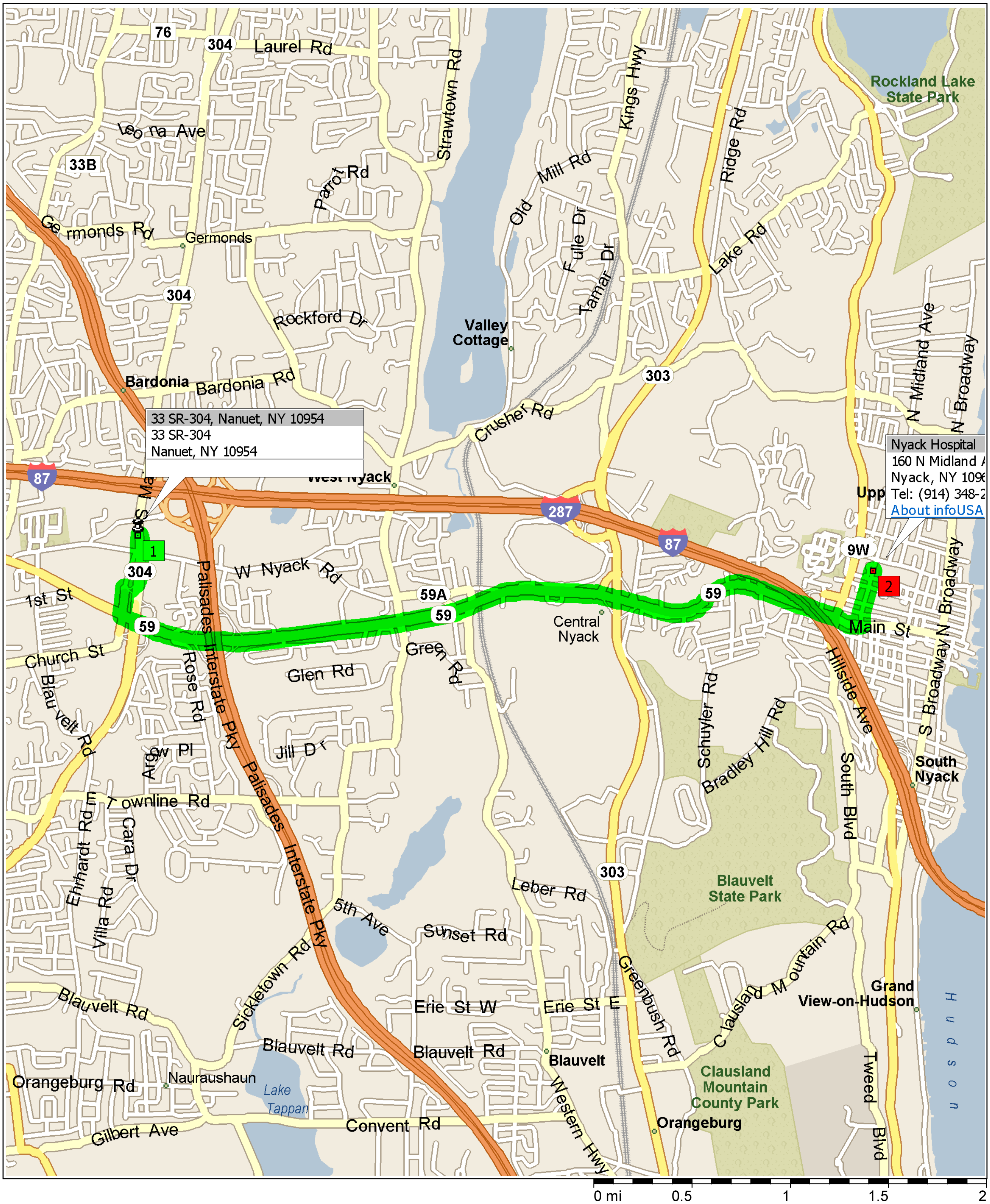
EMERGENCY ROUTE MAP

Hospital


33 SR-304, Nanuet, NY 10954
33 SR-304
Nanuet, NY 10954
Nyack Hospital
160 N Midland Ave
Nyack, NY 10960
Tel: (914) 348-2000
About infoUSA
Bardonia
Valley Cottage
West Nyack
Central Nyack
Nyack
South Nyack
Blauvelt State Park
Hudson
Rockford Dr
Germonds Rd
Strawtown Rd
Bardonia Rd
Ludwigh Rd
S Main St
Old Mill Rd
Crusher Rd
Kings Hwy
Mitchell Dr
Storms Rd
Christian Herald Rd
Lexow Ave
N Broadway
Snake Hill Rd
Mountainview Ave
W Nyack Rd
Demarest Ave
Palisades Center Dr
Korean War Veterans Memorial Hwy
E SR-59
Church St
Rose Rd
Glen Rd
Valley View Rd
Green Rd
Continental Dr
Flitt St
Argow Pl
Jill Dr
E Townline Rd
Peach St
Marycrest Rd
Ehrhardt Rd
Cara Dr
Western Hwy
Leber Rd
Greenbush Rd
Schuyler Rd
W Broadway
Bradley Hill Rd
Park Rd
South Blvd
Hillside Ave
S Broadway
N Highland Ave
High Ave
Main St
Depew Ave
5th Ave
304
59A
59
303
87
287
9W
0 mi
0.5
1
1.5
2

Site-hospital

4.7 miles; 7 minutes



9:00 AM	0.0 mi	1 Depart 33 SR-304, Nanuet, NY 10954 on SR-304 [S Main St] (South) for 0.2 mi
9:00 AM	0.2 mi	Turn RIGHT onto Ramp for 164 yds
9:00 AM	0.3 mi	Turn LEFT (South) onto Smith St for 0.1 mi
9:00 AM	0.5 mi	Turn LEFT (East) onto SR-59 [Korean War Veterans Memorial Hwy] for 3.8 mi
9:05 AM	4.2 mi	Road name changes to Main St for 0.2 mi
9:05 AM	4.5 mi	Turn LEFT (North) onto N Midland Ave for 0.3 mi
9:07 AM	4.7 mi	2 Arrive Nyack Hospital

ATTACHMENT C

EWMA HEALTH & SAFETY INCIDENT REPORT

HEALTH AND SAFETY INCIDENT REPORT

Pa□e 1 o□□□

Date o□In□ident□ ____□____□____ Ti□e o□In□ident□ □rs

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Reported □y□	____________________ Site Sa□ety O□i□er	____________________ Si□nat□re	__________ Date
Re□ie□ed □y□	____________________ □ie□d S□per□isor	____________________ Si□nat□re	__________ Date

Distribution:

____	Project Manager	____________________
____	Superintendent	____________________
____	Project CIH	____________________
____	Owner Representative	____________________

HEALTH AND SAFETY INCIDENT REPORT

DESCRIPTION OF INCIDENT (continued):

Anyone Injured? If yes, give names, address and social security #s of all individuals below:

Name	Address	Phone	SS#

Of the above, anyone taken to hospital? If yes, where? Who? Diagnosis?

Actions Taken:

What follow-up actions are recommended?

What will be done to prevent this type of incident from happening again (if possible)?

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EWMA PROJECT SAFETY LOG

EWMA

PROJECT SAFETY LOG

Form HS-106

EWMA SSO: ______________________________ **Date**: __________

Weather: ______________________________

Personnel:

Personnel Present	Affiliation:

Work Activities	Level of Protection

PID (ppm)

reading	time	reading	time	reading	time	reading	time

CGI/O_2 (%LEL)

reading	time	reading	time	reading	time	reading	time

CGI/O_2 (O_2%)

reading	time	reading	time	reading	time	reading	time

Colormetric Tubes (ppm)

reading	time	reading	time	reading	time	reading	time

MiniRam (mg/m^3)

reading	time	reading	time	reading	time	reading	time

Notes and Comments: ______________________________

ATTACHMENT E

OSHA POSTER

U.S. Department of Labor

OSHA®
Occupational Safety and Health Administration

Job Safety and Health
IT'S THE LAW!

All workers have the right to:

- A safe workplace.
- Raise a safety or health concern with your employer or OSHA, or report a work-related injury or illness, without being retaliated against.
- Receive information and training on job hazards, including all hazardous substances in your workplace.
- Request an OSHA inspection of your workplace if you believe there are unsafe or unhealthy conditions. OSHA will keep your name confidential. You have the right to have a representative contact OSHA on your behalf.
- Participate (or have your representative participate) in an OSHA inspection and speak in private to the inspector.
- File a complaint with OSHA within 30 days (by phone, online or by mail) if you have been retaliated against for using your rights.
- See any OSHA citations issued to your employer.
- Request copies of your medical records, tests that measure hazards in the workplace, and the workplace injury and illness log.

This poster is available free from OSHA.

Employers must:

- Provide employees a workplace free from recognized hazards. It is illegal to retaliate against an employee for using any of their rights under the law, including raising a health and safety concern with you or with OSHA, or reporting a work-related injury or illness.
- Comply with all applicable OSHA standards.
- Report to OSHA all work-related fatalities within 8 hours, and all inpatient hospitalizations, amputations and losses of an eye within 24 hours.
- Provide required training to all workers in a language and vocabulary they can understand.
- Prominently display this poster in the workplace.
- Post OSHA citations at or near the place of the alleged violations.

FREE ASSISTANCE to identify and correct hazards is available to small and medium-sized employers, without citation or penalty, through OSHA-supported consultation programs in every state.

Contact OSHA. We can help.

1-800-321-OSHA (6742) • TTY 1-877-889-5627 • www.osha.gov

OSHA 3165-04R 2015

Departamento de Trabajo de los EE. UU.

OSHA®

Administración de Seguridad y Salud Ocupacional

Seguridad y Salud en el Trabajo
¡ES LA LEY!

Todos los trabajadores tienen el derecho a:

- Un lugar de trabajo seguro.
- Decir algo a su empleador o la OSHA sobre preocupaciones de seguridad o salud, o reportar una lesión o enfermedad en el trabajo, sin sufrir represalias.
- Recibir información y entrenamiento sobre los peligros del trabajo, incluyendo sustancias toxicas en su sitio de trabajo.
- Pedirle a la OSHA inspeccionar su lugar de trabajo si usted cree que hay condiciones peligrosas o insalubres. Su información es confidencial. Algún representante suyo puede comunicarse con OSHA a su nombre.
- Participar (o su representante puede participar) en la inspección de OSHA y hablar en privado con el inspector.
- Presentar una queja con la OSHA dentro de 30 días (por teléfono, por internet, o por correo) si usted ha sufrido represalias por ejercer sus derechos.
- Ver cualquieras citaciones de la OSHA emitidas a su empleador.
- Pedir copias de sus registros médicos, pruebas que miden los peligros en el trabajo, y registros de lesiones y enfermedades relacionadas con el trabajo.

Este cartel está disponible de la OSHA para gratis.

Llame OSHA. Podemos ayudar.

Los empleadores deben:

- Proveer a los trabajadores un lugar de trabajo libre de peligros reconocidos. Es ilegal discriminar contra un empleado quien ha ejercido sus derechos bajo la ley, incluyendo hablando sobre preocupaciones de seguridad o salud a usted o con la OSHA, o por reportar una lesión o enfermedad relacionada con el trabajo.
- Cumplir con todas las normas aplicables de la OSHA.
- Reportar a la OSHA todas las fatalidades relacionadas con el trabajo dentro de 8 horas, y todas hospitalizaciones, amputaciones y perdidos de un ojo dentro de 24 horas.
- Proporcionar el entrenamiento requerido a todos los trabajadores en un idioma y vocabulario que pueden entender.
- Mostrar claramente este cartel en el lugar de trabajo.
- Mostrar las citaciones de la OSHA acerca del lugar de la violación alegada.

Los empleadores de tamaño pequeño y mediano pueden recibir ASISTENCIA GRATIS para identificar y corregir los peligros sin citación o multa, a través de los programas de consultación apoyados por la OSHA en cada estado.

1-800-321-OSHA (6742) • TTY 1-877-889-5627 • www.osha.gov/espanol

OSHA 3167-04R 2015

ATTACHMENT F

THERMAL STRESS GUIDELINES

COLD EXPOSURE CASUALTY PREVENTION PLAN

Persons working outdoors in temperatures at or below freezing may be frostbitten. Extreme cold for a short time may cause severe injury to the surface of the body, or result in profound generalized cooling, causing death. Areas of the body which have high surface area-to-volume ratio such as fingers, toes, and ear, are the most susceptible.

EFFECTS OF COLD EXPOSURE

Two factors influence the development of a cold injury: ambient temperature and the velocity of the wind. Wind chill is used to describe the chilling effect of moving air in combination with low temperature. For instance, 10 degrees Fahrenheit with a wind of 15 mile per hour (mph) is equivalent in chilling effect to still air at -18 degrees Fahrenheit.

As a general rule, the greatest incremental increase in wind chill occurs when a wind of 5 mph increases to 10 mph. Additionally, water conducts heat 240 times faster than air. Thus, the body cools suddenly when chemical-protective equipment is removed if the clothing underneath is perspiration soaked.

Local injury resulting from cold is included in the generic term frostbite. There are severe degrees of damage. Frostbite of the extremities can be categorized into:

- **Frost nip or incipient frostbite:** characterized by suddenly blanching or whitening of skin.
- **Superficial frostbite:** skin has a waxy or white appearance and is firm to the touch, but tissue beneath is resilient.
- **Deep Frostbite:** tissues are cold, pale, and solid; extremely serious injury.

To administer first aid for frostbite, bring the victim indoors and rewarm the areas <u>quickly</u> in water between 102 degrees Fahrenheit and 105 degrees Fahrenheit. Give a warm drink not coffee, tea or alcohol. The victim should not smoke. Keep the frozen parts in warm water or covered with warm clothes for 30 minutes, even though the tissue will be very painful as it thaws. Then elevate the injured area and protect it from injury. Do not allow blisters to be broken. Use sterile, soft, dry material to cover the injured areas. Keep victim warm and get immediate medical care.

After thawing, the victim should try to move the injured areas a little, but no more than can be done alone, without help.

- Do not rub the frostbitten part (this may cause gangrene).
- Do not use ice, snow, gasoline or anything cold on frostbite.

- Do not use heat lamps or hot water bottles to rewarm the part.

- Do not place the part near a hot stove.

Systemic hypothermia is caused by exposure to freezing or rapidly dropping temperature, it symptoms are usually exhibited in five stages; 1) shivering; 2) apathy, listlessness, sleepiness, and (sometimes) rapid cooling of the body to less than 95 degrees Fahrenheit; 3) unconsciousness, glassy stare, slow pulse, and slow respiratory rate; 4) freezing of the extremities; and, finally, 5) death.

As a general rule, field activities should be curtailed if equivalent chill temperature (degrees Fahrenheit) is below zero unless the activity is of an emergency nature. The ultimate responsibility for proposing on delaying work at a site due to inclement weather rests with the EWMA Site Safety Officer.

HEAT STRESS CASUALTY PREVENTION PLAN

Due to the increase in ambient air temperatures and the effects of protective outer wear decreasing body ventilation, there exists an increase in the potential for injury, specifically, heat casualties. Site personnel will be instructed in the identification of a heat stress victim, the first-aid treatment procedures for the victim and the prevention of heat stress casualties.

IDENTIFICATION AND TREATMENT

- **Heat Exhaustion**

  Symptoms: Usually begins with muscular weakness, dizziness, nausea, and a staggering gait. Vomiting is frequent. The bowels may move involuntarily. The victim is very pale, skin is clammy, and may perspire profusely. The pulse is weak and fast, breathing is shallow. The victim may faint unless victim lies down. This may pass, but sometimes it remains and death could occur.

  First Aid: Immediately remove the victim to the Contamination Reduction Zone in a shady or cool area with good air circulation. Remove all protective outer wear. Call a physician. Treat the victim for shock. (Make victim lie down, raise feet 6 to 12 inches and keep victim warm but loosen all clothing). If the victim is conscious, it may be helpful to ingest sips of a salt water solution (1 teaspoon of salt to 1 glass of water). Transport victim to a medical facility as soon as possible.

- **Heat Stroke**

  Symptoms: This is the most serious of heat casualties due to the fact that the body excessively overheats. Body temperatures often are between 107 degrees Fahrenheit to 110 degrees Fahrenheit. First there is often pain in the head, dizziness, nausea, oppression, and the skin is dry, red and hot. Unconsciousness follows quickly and death is imminent if exposure continues. The attack will usually occur suddenly.

  First Aid: Immediately evacuate the victim to a cool and shady area in the Contamination Reduction Zone. Remove all protective outer wear and all personal clothing. Lay victim on back with the head and shoulders slightly elevated. It is imperative that the body temperature be lowered immediately. This can be accomplished by applying cold wet towels, ice bags, etc., to the head. Sponge off the bare skin with cool water or rubbing alcohol, if available, or even place victim in a tub of cool water. The main objective is to cool victim without chilling. Give no stimulants. Transport the victim to a medical facility as soon as possible.

PREVENTION OF HEAT STRESS

- One of the major causes of heat casualties is the depletion of body fluids. On the site there will be plenty of fluids available. Personnel should replace water and salts loss from sweating. Salts can be replaced by either a 0.1% salt solution, more heavily salted foods, or commercial mixes such as Gatorade. The commercial mixes are advised for personnel on low sodium diets.

- A work schedule should be established so that the majority of the work day will be during the morning hours of the day before ambient air temperature levels reach their highs.

- A work/rest guideline will be implemented for personnel required to wear Level B protection. This guideline is as follows:

Ambient Temperatures	Maximum Wearing Time
Above 90°F	1/2 hour
80° to 90°F	1 hour
70° to 80°F	2 hours
60° to 70°F	3 hours
<60°F	4 hours

A sufficient period will be allowed for personnel to "cool down." This may require shifts of workers during operations.

HEAT STRESS MONITORING

For monitoring the body's recuperative ability to excess heat, one or more of the following techniques should be used as a screening mechanism. Monitoring of personnel wearing protective clothing should commence when the ambient temperature is 70 degrees Fahrenheit or above. Frequency of monitoring should increase as the ambient temperature increases or if slow recovery rates are indicated. When temperatures exceed 80 degrees Fahrenheit, workers must be monitored for heat stress after every work period.

- Heart rate (HR) should be measured by the radial pulse for 30 seconds as early as possible in the resting period. The HR at the beginning of the rest period should not exceed 110 beats per minute. If the HR is higher, the next work period should be shortened by 10 minutes (or 33%), while the length of the rest period stays the same. If the pulse rate is 100 beats per minute at the beginning of the next rest period, the following work cycle should be shortened by 33%.

- Body temperature should be measured orally with a clinical thermometer as early as possible in the resting period. Oral temperature (OT) at the beginning of the rest period should not exceed 99 degrees Fahrenheit. If it does, the next work period should be shortened by 10 minutes (or 33%), while the length of the rest period stays the same. However, if the OT exceeds 99.7 degrees Fahrenheit at the beginning of the next period, the following work cycle should be further shortened by 33%. OT should be measured again at the end of the rest period to make sure that it has dropped below 99 degrees Fahrenheit.

- Body water loss (BWL) due to sweating should be measured by weighing the worker in the morning and in the evening. The clothing worn should be similar at both weighings; preferably the worker should be nude. The scale should be accurate to plus or minus 1/4 pound. BWL should not exceed 1.5% of the total body weight. If it does, workers should be instructed to increase their daily intake of fluids by the weight lost.

Ideally, body fluids should be maintained at a constant level during the work day. This requires replacement of salt lost in sweat as well.

Good hygienic standards must be maintained by frequent change of clothing and daily showering. Clothing should be permitted to dry during rest periods. Persons who notice skin problems should immediately consult medical personnel.

TABLE 202-1

WINDCHILL INDEX[1]

Wind Speed in MPH	**ACTUAL THERMOMETER READING (degrees F)**									
	50	40	30	20	10	0	-10	-20	-30	-40
	EQUIVALENT TEMPERATURE (degrees F)									
calm	50	40	30	20	10	0	-10	-20	-30	-40
5	48	37	27	16	6	-5	-15	-26	-36	-47
10	40	28	16	4	-9	-21	-33	-46	-58	-70
15	36	22	9	-5	-18	-36	-45	-58	-72	-85
20	32	18	4	-10	-25	-39	-53	-67	-82	-96
25	30	16	0	-15	-29	-44	-59	-74	-88	-104
30	28	13	-2	-18	-33	-48	-63	-79	-94	-109
35	27	11	-4	-20	-35	-49	-67	-82	-98	-113
40	26	10	-6	-21	-37	-53	-69	-85	-100	-116
over 40 (little added effect)	Little Danger (for properly clothed person)				Increasing Danger (Danger from freezing of exposed flesh)			Great Danger		

[1] Source: Fundementals of Industrial Hygiene, Third Edition, National Safety Council

ATTACHMENT G

EMERGENCY PROCEDURES

EMERGENCY MEDICAL TREATMENT AND FIRST AID PROCEDURES

If an employee working at the Site is physically injured, emergency medical treatment and/or First Aid procedures will be followed. Depending on the severity of the injury, emergency medical response may be sought. If the employee can be moved, they will be taken to the edge of the work area (on a stretcher, if needed) where contaminated clothing will be removed (if possible), emergency first aid administered, and transportation to local emergency medical facility awaited.

If the injury to the worker is chemical in nature (e.g., overexposure), the following procedures are to be instituted as soon as possible:

- Eye Exposure - If contaminated solid or liquid gets into the eyes, wash eyes immediately at the emergency eyewash stations using large amounts of water and lifting the lower and upper lids occasionally. Obtain medical attention immediately. (Contact lenses are not permitted in the Exclusion Areas.)

- Skin Exposure - If contaminated solid or liquid gets on the skin, promptly wash contaminated skin using soap or mild detergent and water. If solids or liquid penetrate through the clothing, remove the clothing immediately and wash the skin using soap or mild detergent and water. Obtain medical attention immediately if symptoms warrant.

- Breathing - If a person breathes in large amounts of organic vapor, move the exposed person to fresh air at once. If breathing has stopped, perform artificial respiration. Keep the affected person warm and at rest. Obtain medical attention as soon as possible.

- Swallowing - If contaminated solid or liquid has been swallowed and the person is conscious, feed the person large quantities of salt water immediately and induce vomiting (unless the person is unconscious). Obtain medical attention immediately.

<u>First Aid Procedures</u>

- Remove the injured or exposed person(s) from immediate danger.

- Render first aid if necessary, decontaminate affected personnel, if necessary.

- Call an ambulance for transport to local hospital immediately. <u>This procedure should be followed even if there is no apparent serious injury</u>.

- Evacuate other personnel on-site to a safe place until the EWMA Site Safety Officer determines that it is safe for work to resume.

- Report the accident to the EWMA Director of Health and Safety immediately.

ATTACHMENT H

SAFETY GUIDELINES FOR DRILLING

ATTACHMENT H

SAFETY GUIDELINES FOR DRILLING

Drill rig maintenance and safety is the responsibility of the drill rig operator. The following is provided as a general guideline for safe drilling practices on-site.

OFF-ROAD MOVEMENT OF DRILL RIGS

The following safety guidelines related to off-road movement:

- Before moving a drill rig, first walk the route of travel, inspecting for depressions, slumps, gullys, ruts and similar obstacles.
- Always check the brakes of a drill rig carrier before traveling, particularly on rough, uneven or hilly ground.
- Discharge all passengers before moving a drill rig on rough or hilly terrain.
- Engage the front axle (for 4x4, 6x6, etc., vehicles or carriers) when traveling off highway on hilly terrain.
- Use caution when traveling side-hill. Conservatively evaluate side-hill capability of drill rigs, because the arbitrary addition of drilling tools may raise the center of mass. When possible, travel directly uphill or downhill.
- Attempt to cross obstacles such as small logs and small erosion channel or ditches squarely, not at an angle.
- Use the assistance of someone on the ground as a guide when lateral or overhead clearance is close.
- After the drill rig has been moved to a new drilling site, set all brakes and/or locks. When grades are steep, block the wheels.
- Never travel off-road with the mast (derrick) of the drill rig in the raised or partially raised position.
- Tie down loads on the drill rig and support trucks during transport.

OVERHEAD AND BURIED UTILITIES

The use of a drill rig near electrical power lines and other utilities requires that special precautions be taken by both supervisors and members of the exploration crew. electricity can shock, it can burn, and it can cause death.

Overhead and buried utilities should be located, noted and emphasized on all boring location plans and boring assignment sheets.

Before raising the drill rig mast (derrick) on a site in the vicinity of power lines, walk completely around the drill rig. Determine what the minimum distance from any point on the drill rig to the nearest power line will be when the mast is raised and/or being raised. In general, the distance between the overhead power line and the boom should be no less than the height of the boom.

Keep in mind that both hoist and overhead power lines can be moved toward each other by the wind.
Keep in mind that electricity from high-voltage lines can “arc” to the rig, completing a circuit.
Keep in mind that rubber tires may not fully insulate the rig.
Keep in mind that the drill itself, and the metal outriggers used to balance the truck, may complete a circuit.

Drilling personnel should double-check any side underground electrical and piping drawings prior to initiating drilling. If an obstruction is encountered during drilling, proceed with extreme caution until the possibility of an exposed electrical line or combustible product pipeline is excluded.

CLEARING THE WORK AREA

Prior to drilling, adequate site cleaning and leveling should be performed to accommodate the drill rig and supplies and provide a safe working area. Drilling should not be commenced when tree limbs, protruding objects, unstable ground or site obstructions or debris cause unsafe tool handling conditions and/or limited, awkward work spaces. An area clear of obstructions or debris should be maintained 180 degrees around the drilling or sampling activities, where practical.

NOTE: In coordination with the drilling crew, the Site Safety Officer will review the precautions taken to insure that the drill rig is leveled and stabilized.

HOUSEKEEPING ON AND AROUND THE DRILL RIG

The first requirement for safe field operations is that the drilling crew safety supervisor understands and fulfills the responsibility for maintenance and "housekeeping" on and the drill rig.

Suitable storage locations should be provided for all tools, materials and supplies so that they can be conveniently and safety handled without hitting or falling on a member of the drill crew or a visitor, without creating tripping hazards, and without protruding at eye or head level.

Avoid storing or transporting tools, materials or supplies within or on the mast (derrick) of the drill rig.

Pipe, drill rods, bit casings, augers and similar drilling tools should be orderly stacked on racks or sills to prevent spreading, rolling or sliding.

Penetration of other driving hammers should be placed at a safe location on the ground or be secured to prevent movement when not in use.

Work areas, platforms, walkways, scaffolding and other access ways should be kept free of materials, obstructions and substances such as ice, excess grease or oil that could cause a surface to become slick or otherwise hazardous.

Keep all controls, control linkages, warning and operation lights and lenses free of oil, grease and/or ice.
Do not store gasoline in any portable container other than a non-sparking, red container with a flame arrester in the fill spout and having the word "gasoline" easily visible.

Welding gas cylinders should be stored in an upright position to avoid gas leaks.

SAFE USE OF HAND TOOLS

There are almost an infinite number of hand tools that can be used on or around a drill rig. "Use the tool for its intended purpose" is the most important rule. The following are a few specific and some general suggestions which apply to safe use of several hand tools that are often used on and around drill rigs.

- When a tool becomes damaged, either repair it before using it again or get rid of it.

- When using a hammer, any kind of hammer, for any purpose, wear safety glasses and require all others near you to wear safety glasses.

- When using a chisel, any kind of chisel, for any purpose, wear safety glasses and require all others around you to wear safety glasses.

- Keep all tools cleaned and orderly stored when not in use.

- Replace hook and heel jaws when they become visibly worn.

- When breaking tool joints on the ground or on a drilling platform, position your hands so that your fingers will not be smashed between the wrench handle and the ground or the platform, should the wrench slip or the joint suddenly let go.

SAFE USE OF WIRE LINE HOISTS, WIRE ROPE AND HOISTING HARDWARE

The use of wire line hoists, wire rope and hoisting hardware should be as stipulated by the American Iron and Steel Institute's Wire Rope User's Manual.

All wire ropes and fittings should be visually inspected during use and thoroughly inspected at least once a week for: abrasion, broken wires, wear, reduction in rope diameter, reduction in wire diameter, fatigue, corrosion, damage from heat, improper weaving, jamming, crushing, bird caging, kinking, core protrusion and damage to lifting hardware and any other feature that would lead to failure. Wire ropes should be replaced when inspection indicates excessive damage according to the wire rope users manual.

If a ball-bearing type hoisting swivel is used to hoist drill rods, swivel bearings should be inspected and lubricated daily to assure that the swivel freely rotates under load.

If a rod slipping device is used to hoist drill rods, do not drill through or rotate drill rods through the slipping device, do not hoist more than 1 ft of the drill rod column above the top of the mast (derrick), do not hoist a rod column with loose tool joints and do not make up, tighten or loosen tool joints while the rod column is being supported by a slipping device. If drill rods should slip back into the borehole, do not attempt to brake the fall of the rods with your hands.

Most sheaves on drill rigs are stationary with a single part line. The number of parts of line should not ever be increased without first consulting with the manufacturer of the drill rig. Wire ropes must be properly matched with each sheave.

The following procedures and precautions must be understood and implemented for safe use of wire ropes and rigging hardware.

Use tool handling hoists only for vertical lifting of tools (except when angle hole drilling). Do not use tool handling hoists to pull on objects away from the drill rig; however, drills may be moved using the main hoist as the wire rope is pulled through proper sheaves according to the manufacturer's recommendations.

When stuck tools or similar loads cannot be raised with a hoist, disconnect the hoist line and connect the stuck tools directly to the feed mechanisms of the drill. Do not use hydraulic leveling jacks for added pull to the hoist line or the feed mechanisms of the drill.
When attempting to pull out a mired down vehicle or drill rig carrier, only use a winch or the front or rear of the vehicle or drill rig carrier and stay as far as possible away from the wire rope. Do not attempt to use tool hoists to pull out a mired down vehicle or drill rig carrier.

Minimize shock loading of a wire rope - apply loads smoothly and steadily.

- Protect wire rope from sharp corners or edges.

- Replace faulty guides and rollers.
- Replace worn sheaves or worn sheave bearings.
- Replace damaged safety latches on safety hooks before using.
- Know the safe working load of the equipment and tackle being used. Never exceed this limit.
- Clutches and brakes of hoists should be periodically inspected and tested.
- Know and do not exceed the rated capacity of hooks, rings, links, swivels, shackles and other lifting aids.
- Always wear gloves when handling wire ropes.
- Do not guide wire ropes or hoist drums with your hands.
- Follow the installation of a new wire rope, first lift a light load to allow the wire rope to adjust.
- Never carry out any hoisting operations when the weather conditions are such that hazards to personnel, the public, or property are created.
- Never leave a load suspended in the air when the hoist is unattended.
- Keep your hands away from hoists, wire rope, hoisting hooks, sheaves and pinch points as slack is being taken up and when the load is being hoisted.
- Safety rules described in OSHA Regulations 29 CFR 1926.552 and guidelines contained in the Wire Rope User's Manual published by the American Iron and Steel Institute shall be used whenever wire line hoists, wire rope, or hoisting hardware are used.
- Never hoist loads over anyone's head.
- The operator and tool handler should establish a system of responsibility for the series of various activities required for auger drilling, such as connecting and disconnecting auger sections, and inserting and removing the auger fork. The operator must insure that the tool handler is well away from the auger column and that the auger fork is removed before starting rotation.
- Only use the manufacturer's recommended method of securing the auger to the power coupling. Do not touch the coupling or the auger with your hands, a wrench or any other tool during rotation.
- Whenever possible, use tool hoists to handle auger sections.
- Never place hands or fingers under the bottom of an auger section when hoisting the auger over the top of the auger section in the ground or other hard surfaces such as the drill rig platform.
- Never allow feet to get under the auger section that is being hoisted.
- When rotating augers, stay clear of the rotating auger and other rotating components of the drill rig. Never reach behind or around a rotating auger for any reason whatsoever.
- Never place your hands between the drill rig and an auger, even when attempting to free a damaged or bound Shelby tube from the auger.

- Never use your hands or feet to move cuttings away from the auger.

- Augers should be cleaned only when the drill rig is in neutral and the augers are stopped from rotating.

SAFETY DURING ROTARY AND CORE DRILLING

Rotary drilling tools should be safety checked prior to drilling:

- Water swivels and hoisting plugs should be lubricated and checked for "frozen" bearings before use.

- Drill rod chuck jaws should be checked periodically and replaced when necessary.

- The capacities of hoists and sheaves should be checked against the anticipated weight of the drill rod string plus other expected hoisting loads. All cables should be inspected daily.

Special precautions that should be taken for safety rotary or core drilling involve chucking, joint break, hoisting and lowering of drill rods:

- Drill rods should not be braked during lowering into the hole with drill rod chuck jaws.

- Drill rods should not be held or lowered into the hole with pipe wrenches.

- If a string of drill rods are accidentally or inadvertently released into the hole, do not attempt to grab the falling rods with your hands or a wrench.

- In the event of a plugged bit or other circulations blockage, the high pressure in the piping and hose between the pump and the obstruction should be relieved or bled down before breaking the first tool joint.

- When drill rods are hoisted from the hole, they should be cleaned for safe handling with a rubber or other suitable rod wiper. Do not use your hands to clean drilling fluids from drill rods.

- If work must progress over a portable drilling fluid (mud) pit, do not attempt to stand on narrow sides or cross members. The mud pit should be equipped with a rough surface, fitted cover panels of adequate strength to hold drill rig personnel.

- Drill rods should not be lifted and leaned unsecured against the mast. Either provide some method of securing the upper ends of the drill rod sections for safe vertical storage or lay the rods down.

- All hydraulic lines should be periodically inspected for integrity and replaced as needed.

START UP

All drill rig personnel and visitors should be instructed to "stand clear" of the drill rig immediately prior to and during starting of an engine.

Make sure all gear boxes are in neutral, all hoist levers are disengaged, all hydraulic levers are in the correct non-actuating positions and the cathead rope is not on the cathead before starting a drill rig engine.

GENERAL SAFETY DURING DRILLING OPERATIONS

Safety requires the attention and cooperation of every worker and site visitor.

Do not drive the drill rig from hole to hole with the mast (derrick) in the raised position.

Before raising the mast (derrick) look up to check for overhead obstructions. (Refer to previous Section on overhead and buried utilities).

Before raising the mast (derrick), all drill rig personnel and visitors (with exception of the operator) should be cleared from the areas immediately to the rear and the sides of the mast. All drill rig personnel and visitors should be informed that the mast is being raised prior to raising it.

Before the mast (derrick) of a drill rig is raised and drilling is commenced, the drill rig must be first leveled and stabilized with leveling jacks and/or solid cribbing. The drill rig should be re-leveled if it settles after initial set up. Lower the mast (derrick) only when leveling jacks are down and do not raise the leveling jack pads until the mast (derrick) is lowered completely.

Before starting drilling operations, secure and/or lock the mast (derrick) if required according to the drill manufacturer's recommendations.

The operator of a drill rig should only operate a drill rig from the position of the controls. The operator should shut down the drill engine before leaving the vicinity of the drill rig.

Do not consume alcoholic beverages or other depressants or chemical stimulants prior to starting work on a drill rig or while on the job.

Watch for slippery ground when mounting and dismounting from the platform.

All unattended boreholes must be adequately covered or otherwise protected to prevent drill rig personnel, site visitors or animals from stepping or falling into the hole. All open boreholes should be covered, protected or backfilled adequately and according to local or state regulations on completion of the drilling project.

"Horsing around" within the vicinity of the drill rig and tool and supply storage areas should never be allowed, even when the drill rig is shut down.

Be careful when lifting heavy objects. Before lifting a relatively heavy object, approach the object by bending at the knees, keeping your back vertical and unarched while obtaining a firm footing. Grasp the object firmly with both hands and stand slowly and squarely while keeping your back vertical and unarched. In other words, perform the lifting with the muscles in your legs, not the muscles in your lower back.

Drilling operations should be terminated during an electrical storm.

The minimum number of personnel necessary to achieve the objectives shall be within 25 ft of the drilling or sampling activity. Back-up personnel should remain at least 25 ft from the drilling or sampling activity, where practical.

Hardhats and steel boots are to be worn by all personnel in the vicinity of the drilling activities. Drilling personnel should not wear loose-fitting or baggy clothing which may be awkward or get caught on equipment. Jewelry, including rings and necklaces, should not be worn around electrical wires or rotating equipment.

ATTACHMENT I

SAFETY GUIDELINES FOR EXCAVATIONS

SAFETY GUIDELINES FOR EXCAVATIONS

This procedure contains general safety requirements for excavating and trenching operations and work performed therein. The requirements are consistent with standards established by the Occupational Safety and Health Administration (OSHA) and described in OSHA Regulations 29 CFR 1926, Subpart P. The latter should be consulted for additional information.

RESPONSIBILITY AND APPLICABILITY

The EWMA Project Manager is responsible for ensuring that employees of EWMA and of firms contracted by EWMA comply with these requirements.

These procedures are applicable to all EWMA projects in which trenching or other excavating operations, exclusive of borings, are performed by firms under contract to EWMA. It is also applicable to EWMA projects requiring EWMA personnel or firms under contract to EWMA to enter trenches and other types of excavations.

REQUIREMENTS

When planning any excavating operation, obtain a permit, if required, from the proper authority.

Before digging, determine if underground installations, such as sewer, water, fuel, or electrical lines may be encountered and, if so, determine the exact locations of the lines. Information can be obtained by contacting Underground Service Alert (consult local telephone directory for toll-free number), local utility companies and the owner of the property on which the excavating operations are planned.

Trees, boulders, and other surface encumbrances, located so as to pose a potential hazard to employees must be removed or made safe before the operation begins.

Excavated materials must be placed at least 2 ft from the edge of the excavation and precautions must be taken to prevent the materials from falling into the excavation.

SHORING AND SLOPING

Excavations in which personnel are required to work must be shored or sloped to an angle of repose if the depth of the excavation is 5 ft or more. When a shoring system is used, it shall consist of hydraulic shores or the equivalent, with sheathing or sheet piling as needed. The shoring system must be properly designed and installed to sustain all existing and expected loads. For details on shoring and sloping, consult OSHA Regulations 29 CFR, Subpart P, Section 1926.650 to 1926.653.

ACCESS

When work is to be performed in an excavation, safe access to the excavation must be provided by means of ladders, stairs, or ramps. Trenches greater than 4 ft in depth must have ladders spaced no less than 25 ft apart, and the ladders must extend at least 3 ft above the ground surface.

HAZARDOUS ATMOSPHERES

At sites where oxygen deficiency or hazardous concentrations of flammable or toxic vapors or gases may be encountered in excavations, the atmosphere in the excavations must be tested by the EWMA Site Safety Officer or other qualified person before work in the excavation begins and at appropriate intervals afterward.

INSPECTION OF EXCAVATIONS

Excavations must be inspected daily by the EWMA Site Manager or EWMA Site Safety Officer. If evidence of potential caveins or slides is observed, all work in the excavation must be suspended until necessary steps have been taken to safeguard employees.

OPERATION OF VEHICLES NEAR EXCAVATIONS

When vehicles or heavy equipment must operate near an excavation, the sides of the excavation must be shored or braced as necessary to withstand forces exerted by the superimposed load. Stop logs or other types of secure barriers must be installed at the edges of the excavations.

BARRICADES AND FENCES

Excavated areas must be completely guarded on all sides with barricades or fences, as appropriate. If barricades are used, they must be spaced no more than 20 ft apart and shall not be less than 3 ft high when erected. A yellow or yellow and black tape, at least 1 inch wide, shall be stretched between the barricades.

BACKFILLING

Excavated areas must be backfilled and all associated equipment must be removed from the area as soon as practical after work is completed.

ATTACHMENT J

TICKS AND TICK-BORNE DISEASES

TICKS AND TICK-BORNE DISEASES

Field personnel should be aware of an increased occurrence of tick-borne disease in the United States. In the northeast, the most likely carriers are the whitefooted mouse and the white-tailed deer. These animals are most prevalent in areas where suburban environments about open fields or woodlands. Although exposure is increased in these areas, other carriers, such as dogs and horses, can be found in a variety of environments.

All field personnel should take proper precautions to limit exposure to ticks and tick-borne diseases. These include:

- Cinching and taping clothing at the ankles and wrists, especially the ankles. Ticks lie low on grass blades and shrubs. They encounter your feet, ankles or lower legs and then crawl upward.

- Wear light-colored clothing to facilitate spotting the ticks, and check your clothing periodically. Be especially careful in terrain with tall grass, bushes or woods.

- Use a tick repellant on skin or clothing. Always read the labels before using. Clothing repellents should never be used on the skin.

- Recognize the signs of a bite or an infection. It takes several hours for a tick to attach and feed; removing it promptly lessens the chance of being infected.

Pregnant women should be particularly careful since the effects of the most common tick-borne disease in the northeast, Lyme disease, upon the fetus is unknown.

If a tick is discovered on the skin, it is important to remove the entire insect as soon as possible. The most effective method is to grasp the tick as close as possible to the mouth with tweezers or thin, curved forceps. Then, without jerking, pull it upward steadily (a small amount of skin may be removed in the process).

After removing the tick, disinfect the bite with rubbing alcohol or povidone iodine (Betadine). Don't handle the tick; spirochetes could enter the body through breaks in the skin. Dispose of it in alcohol or flush it down the drain. And check the bite occasionally for at least two weeks to see if a rash forms. If it does, you've been infected and should seek treatment promptly.

The rash appears at the bite location from two days to a few weeks after the bite. It usually starts as a small red spot that expands as the spirochetes spread beyond the bite. Most commonly, the rash develops into a reddish circle or oval about two to three inches in diameter. It fades with or without treatment after a few weeks.

Much larger rashes - anywhere from 6 to 20 inches in diameter - may also occur, especially on the back. Despite their size, large rashes may be easy to miss because they're often very faint.

Other variants include a rash with a red perimeter and a clear center and the so-called bull's-eye rash, which consists of several concentric red rings. Rashes may vary in shape, depending on where they occur on the body. Frequent sites are the thigh, groin, and armpits. People often develop a rash in more than one place.

Early symptoms may include profound fatigue, a stiff neck, and flu-like symptoms such as headache, chills, fever, and muscle aches. Since tick bites don't always produce a rash, those symptoms alone may warrant a medical check for possible Lyme infection - especially if they occur in summer and you live in an area that is endemic for Lyme disease.

Without treatment, the spirochetes usually multiply and the disease progressively worsens. The second stage, occurring within weeks to months of the bite, may affect the heart and nervous system. Third is the chronic arthritic stage, which begins up to a year or more after the bite.

ATTACHMENT K

MATERIAL SAFETY DATA SHEETS

ALCONOX

ALCONOX

Section 1 : PRODUCT AND COMPANY IDENTIFICATION

Chemical family: Detergent.

Product name: Alconox.

Manufacturer: Alconox, Inc.
30 Glenn St. Suite 309
White Plains, NY 10603.

Manufacturer emergency phone number: 800-255-3924.
813-248-0573 (outside of the United States).

Supplier: Same as manufacturer.

Section 2 : INGREDIENT INFORMATION

C.A.S.	CONCENTRATION %	Ingredient Name	T.L.V.	LD/50	LC/50
25155-30-0	10-30	SODIUM DODECYLBENZENESULFONATE	NOT AVAILABLE	438 MG/KG RAT ORAL 1330 MG/KG MOUSE ORAL	NOT AVAILABLE
497-19-8	7-13	SODIUM CARBONATE	NOT AVAILABLE	4090 MG/KG RAT ORAL 6600 MG/KG MOUSE ORAL	2300 MG/M3/2H RAT INHALATION 1200 MG/M3/2H MOUSE INHALATION
7722-88-5	10-30	TETRASODIUM PYROPHOSPHATE	5 MG/M3	4000 MG/KG RAT ORAL 2980 MG/KG MOUSE ORAL	NOT AVAILABLE
7758-29-4	10-30	SODIUM PHOSPHATE	NOT AVAILABLE	3120 MG/KG RAT ORAL 3100 MG/KG MOUSE ORAL >4640 MG/KG RABBIT DERMAL	NOT AVAILABLE

Section 2A : ADDITIONAL INGREDIENT INFORMATION

Note: (supplier).
CAS# 497-19-8: LD50 4020 mg/kg – rat oral.
CAS# 7758-29-4: LD50 3100 mg/kg – rat oral.

Section 3 : HAZARD IDENTIFICATION

Route of entry:	Skin contact, eye contact, inhalation and ingestion.
Effects of acute exposure	
Eye contact:	May cause irritation.
Skin contact:	Prolonged contact may cause irritation.
Inhalation:	Airborne particles may cause irritation.
Ingestion:	May cause vomiting and diarrhea. May cause abdominal pain. May cause gastric distress.
Effects of chronic exposure:	Contains an ingredient which may be corrosive.

Section 4 : FIRST AID MEASURES

Skin contact:	Remove contaminated clothing. Wash thoroughly with soap and water. Seek medical attention if irritation persists.
Eye contact:	Check for and remove contact lenses. Flush eyes with clear, running water for 15 minutes while holding eyelids open: if irritation persists, consult a physician.
Inhalation:	Remove victim to fresh air. Seek medical attention if symptoms persist.
Ingestion:	Dilute with two glasses of water. Never give anything by mouth to an unconscious person. Do not induce vomiting, seek immediate medical attention.
Additional information:	The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. This company shall not be held liable for any inaccuracies.

Section 5 : FIRE FIGHTING MEASURES

Flammability:	Not flammable.
Conditions of flammability:	Surrounding fire.
Extinguishing media:	Carbon dioxide, dry chemical, foam. Water Water fog.
Special procedures:	Self-contained breathing apparatus required. Firefighters should wear the usual protective gear.
Auto–ignition temperature:	Not available.
Flash point (°C), method:	None
Lower flammability limit (% vol):	Not applicable.
Upper flammability limit (% vol):	Not applicable.
<u>Explosion Data</u>	
Sensitivity to static discharge:	Not available.

Sensitivity to mechanical impact: Not applicable.

Hazardous combustion products: Oxides of carbon (COx).
Hydrocarbons.

Rate of burning: Not available.

Explosive power: None

Section 6 : ACCIDENTAL RELEASE MEASURES

Leak/Spill: Contain the spill.
Recover uncontaminated material for re–use.
Wear appropriate protective equipment.
Contaminated material should be swept or shoveled into appropriate waste container for disposal.

Section 7 : HANDLING AND STORAGE

Handling procedures and equipment: Protect against physical damage.
Avoid breathing dust.
Wash thoroughly after handling.
Keep out of reach of children.
Avoid contact with skin, eyes and clothing.
Launder contaminated clothing prior to reuse.

Storage requirements: Keep containers closed when not in use.
Store away from strong acids or oxidizers.
Store in a cool, dry and well ventilated area.

Section 8 : EXPOSURE CONTROLS / PERSONAL PROTECTION

Precautionary Measures

Gloves/Type:

Neoprene or rubber gloves.

Respiratory/Type:

If exposure limit is exceeded, wear a NIOSH approved respirator.

Eye/Type:

Safety glasses with side–shields.

Footwear/Type: Safety shoes per local regulations.

Clothing/Type: As required to prevent skin contact.

Other/Type: Eye wash facility should be in close proximity.
Emergency shower should be in close proximity.

Ventilation requirements: Local exhaust at points of emission.

Exposure limit of material: Not available for mixture, see the ingredients section.

Section 9 : PHYSICAL AND CHEMICAL PROPERTIES

Physical state:	Solid
Appearance & odor:	Almost odourless. White granular powder.
Odor threshold (ppm):	Not available.
Vapour pressure (mmHg):	Not applicable.
Vapour density (air=1):	Not applicable.
By weight:	Not available.
Evaporation rate (butyl acetate = 1):	Not applicable.
Boiling point (°C):	Not applicable.
Freezing point (°C):	Not applicable.
pH:	(1% aqueous solution). 9.5
Specific gravity @ 20 °C:	(water = 1). 0.85 – 1.10
Solubility in water (%):	100 – > 10% w/w
Coefficient of water\oil dist.:	Not available.
VOC:	None
Chemical family:	Detergent.

Section 10 : STABILITY AND REACTIVITY

Chemical stability:	Stable under normal conditions.
Conditions of instability:	None known.
Hazardous polymerization:	Will not occur.
Incompatible substances:	Strong acids. Strong oxidizers.
Hazardous decomposition products:	See hazardous combustion products.

Section 11 : TOXICOLOGICAL INFORMATION

LD50 of product, species & route:	> 5000 mg/kg – rat oral.
LC50 of product, species & route:	Not available for mixture, see the ingredients section.
Sensitization to product:	Not available.
Carcinogenic effects:	Not listed as a carcinogen.
Reproductive effects:	Not available.
Teratogenicity:	Not available.
Mutagenicity:	Not available.

Synergistic materials: Not available.

Section 12 : ECOLOGICAL INFORMATION

Environmental toxicity: No data at this time.

Environmental fate: No data at this time.

Section 13 : DISPOSAL CONSIDERATIONS

Waste disposal: In accordance with municipal, provincial and federal regulations.

Section 14 : TRANSPORT INFORMATION

D.O.T. CLASSIFICATION:

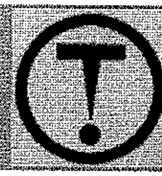
Not regulated.

Special shipping information: Not regulated.

Section 15 : REGULATORY INFORMATION

Canadian Regulatory Information

WHMIS classification: D2B



DSL status: The supplier has certified that all substances in this product appear on the domestic substances list.

USA Regulatory Information

SARA hazard catagories sections 311/312:
Immediate (Acute) Health Hazard: Yes.
Delayed (Chronic) Health Hazard: No.
Fire Hazard: No.
Sudden Release of Pressure: No.
Reactive: No.

SARA Section 313: None

TSCA inventory: All components of this product are listed on the TSCA inventory.

NFPA

Health Hazard: 1

Flammability: 0

Reactivity: 0

Section 16 : OTHER INFORMATION

Supplier MSDS date: 2008/01/07

Data prepared by:
Conform-Action Data Systems
A division of 2843471 Canada inc.
1975 Hymus Blvd. suite 230
Dorval, QC H9P 1J8
Tel: (514) 683-2060 Fax: (514) 683-1445
24 hr. 1-800-990-5093 support@netmsds.com

General note: This material safety data sheet was prepared from information obtained from various sources, including product suppliers and the Canadian Center for Occupational Health and Safety.

SIGMA-ALDRICH

Material Safety Data Sheet

Version 3.0
Revision Date 07/13/2007
Print Date 02/11/2008

1. PRODUCT AND COMPANY IDENTIFICATION

Product name : **L-Ascorbic acid**

Product Number : 255564
Brand : Sigma-Aldrich

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA
Telephone : +1 800-325-5832
Fax : +1 800-325-5052
Emergency Phone # : (314) 776-6555

2. COMPOSITION/INFORMATION ON INGREDIENTS

Synonyms : L-Threoascorbic acid
Antiscorbutic factor
Ascorbic acid
Vitamin C

Formula : C6H8O6
Molecular Weight : 176.12 g/mol

CAS-No.	EC-No.	Index-No.	Concentration [%]
Ascorbic acid			
50-81-7	200-066-2	-	-

3. HAZARDS IDENTIFICATION

Emergency Overview
OSHA Hazards
No OSHA Hazards

HMIS Classification
Health Hazard: 0
Flammability: 0
Physical hazards: 0

NFPA Rating
Health Hazard: 0
Fire: 0
Reactivity Hazard 0

Potential Health Effects

Inhalation	May be harmful if inhaled. May cause respiratory tract irritation.
Skin	May be harmful if absorbed through skin. May cause skin irritation.
Eyes	May cause eye irritation.
Ingestion	May be harmful if swallowed.

4. FIRST AID MEASURES

If inhaled
If breathed in, move person into fresh air. If not breathing give artificial respiration

In case of skin contact
Wash off with soap and plenty of water.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water.

5. FIRE-FIGHTING MEASURES

Flammable properties
Flash point no data available

Ignition temperature no data available

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

Special protective equipment for fire-fighters
Wear self contained breathing apparatus for fire fighting if necessary.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions
Avoid dust formation.

Environmental precautions
Do not let product enter drains

Methods for cleaning up
Sweep up and shovel. Keep in suitable, closed containers for disposal.

7. HANDLING AND STORAGE

Handling
Provide appropriate exhaust ventilation at places where dust is formed. Normal measures for preventive fire protection

Storage
Keep container tightly closed in a dry and well-ventilated place.

Light sensitive.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Contains no substances with occupational exposure limit values.

Personal protective equipment

Respiratory protection
Respiratory protection is not required. Where protection from nuisance levels of dusts are desired, use type N95 (US) or type P1 (EN 143) dust masks. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

00001083

SARA 313 Components
SARA 313: This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
No SARA Hazards

Massachusetts Right To Know Components
No Components Listed

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Ascorbic acid	50-81-7	

New Jersey Right To Know Components

	CAS-No.	Revision Date
Ascorbic acid	50-81-7	

California Prop. 65 Components
This product does not contain any chemicals known to State of California to cause cancer, birth, or any other reproductive defects.

16. OTHER INFORMATION

Further information
 The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Co., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.

Bio-Dechlor INOCULUM™
MATERIAL SAFETY DATA SHEET (MSDS)

Last Revised: February 10, 2004

Section 1 - Material Identification

Supplier:

REGENESIS

1011 Calle Sombra
San Clemente, CA 92673

Phone:	**949.366.8000**
Fax:	**949.366.8090**
E-mail:	**info@regenesis.com**

Chemical Name:	**Soil Born Bacteria Extract Solution**
Chemical Family:	**Organic Chemical**
Trade Name:	**Bio-Dechlor INOCULUM™**
Product Use:	**Used in the remediation of contaminated groundwater (environmental applications)**

Section 2 – Chemical Information

CAS#	Chemical
Not Available (NA)	Soil Bacteria
50-21-5	Lactic Acid
8013-01-2	Yeast Extract

Section 3 - Physical Data

Physcial State:	**Liquid**
Boiling Point:	**Not Determined (ND)**
Flash Point:	**ND**
Density:	**1.0-1.1 g/cc**
Solubility:	**Water**
Appearance:	**Yellow Liquid**
Odor:	**Very Strong Rancid Odor**

Section 4 - Fire and Explosion Hazard Data

Extinguishing Media: **Carbon Dioxide, Dry Chemical Powder or Appropriate Foam.**

Water may be used to keep exposed containers cool.

For large quantities involved in a fire, one should wear full protective clothing and a NIOSH approved self contained breathing apparatus with full face piece operated in the pressure demand or positive pressure mode as for a situation where lack of oxygen and excess heat are present.

Section 5 - Health Hazard Data

Handling: **Avoid contact with skin. Avoid contact with eyes.**

In any case of any exposure which elicits a response, a physician should be consulted immediately.

First Aid Procedures

Inhalation: **Remove to fresh air. If not breathing give artificial respiration. In case of labored breathing give oxygen. Call a physician.**

Section 5 - Health Hazard Data (cont)

Ingestion:	**No effects expected. Do not give anything to an unconscious person. Call a physician immediately.**
Skin Contact:	**Flush with plenty of water. Contaminated clothing may be washed or dry cleaned normally.**
Eye contact:	**Wash eyes with plenty of water for at least 15 minutes, lifting both upper and lower lids. Call a physician.**

Section 6 - Toxicological Information

Acute Effects:	**May be harmful by inhalation, ingestion, or skin absorption. May cause irritation. To the best of our knowledge, the chemical, physical, and toxicological properties of Bio-Dechlor INOCULUM have not been investigated.**

Section 7 - Reactivity Data

Conditions to Avoid:	**Strong oxidizing agents, bases and acids**
Hazardous Polymerization:	**None known**

Section 8 - Spill, Leak or Accident Procedures

After Spillage or Leakage:	**Neutralization is not required. The area should be disinfected with a 5% bleach solution**
Disposal:	**Laws and regulations for disposal vary widely by locality. Observe all applicable regulations and laws. This material, may be disposed of in a solid waste landfill. Material is readily degradable and hydrolyses in several hours.**

No requirement for a reportable quantity (CERCLA) of a spill is known.

Section 9 - Special Protection or Handling

Should be stored in plastic lined steel, plastic, glass, aluminum, stainless steel, or reinforced fiberglass containers.

Protective Gloves:	**Vinyl or Rubber**
Eyes:	**Splash Goggles or Full Face Shield. Area should have approved means of washing eyes.**
Ventilation:	**General exhaust.**
Storage:	**Store in cool, dry, ventilated area. Protect from incompatible materials.**

Section 10 - Shipping Information

D.O.T Shipping Name	**No limitations on shipping this material.**

Section 11 - Other Information

This material will degrade in the environment. Materials containing reactive chemicals should be used only by personnel with appropriate chemical training.

The information contained in this document is the best available to the supplier as of the time of writing. Some possible hazards have been determined by analogy to similar classes of material. No separate tests have been performed on the toxicity of this material. The items in this document are subject to change and clarification as more information becomes available.

BOC GASES

MATERIAL SAFETY DATA SHEET

PRODUCT NAME: HELIUM, GAS

1. Chemical Product and Company Identification

BOC Gases,
Division of,
The BOC Group, Inc
575 Mountain Avenue
Murray Hill, NJ 07974

TELEPHONE NUMBER: (908) 464-8100
24-HOUR EMERGENCY TELEPHONE NUMBER: CHEMTREC (800) 424-9300

BOC Gases
Division of
BOC Canada Limited
5975 Falbourne Street, Unit 2
Mississauga, Ontario L5R 3W6

TELEPHONE NUMBER: (905) 501-1700
24-HOUR EMERGENCY TELEPHONE NUMBER: (905) 501-0802
EMERGENCY RESPONSE PLAN NO: 2-0101

PRODUCT NAME: HELIUM, GAS
CHEMICAL NAME: Helium
COMMON NAMES/SYNONYMS: Helium; Helium, compressed; Helium-4
TDG (Canada) CLASSIFICATION: 2.2
WHMIS CLASSIFICATION: A

PREPARED BY: Loss Control (908)464-8100/(905)501-1700
PREPARATION DATE: 6/1/95
REVIEW DATES: 6/1/99

2. Composition, Information on Ingredients

EXPOSURE LIMITS[1]:

INGREDIENT	% VOLUME	PEL-OSHA[2]	TLV-ACGIH[3]	LD_{50} or LC_{50} Route/Species
Helium FORMULA: He CAS: 7440-59-7 RTECS #: MH6520000	99.995 to 99.9999	None Established	Simple Asphyxiant	Not Available

[1] Refer to individual state of provincial regulations, as applicable, for limits which may be more stringent than those listed here.
[2] As stated in 29 CFR 1910, Subpart Z (revised July 1, 1993)
[3] As stated in the ACGIH 1998-1999 Threshold Limit Values for Chemical Substances and Physical Agents.

OSHA Regulatory Status: This material is classified as hazardous under OSHA regulations.

3. Hazards Identification

EMERGENCY OVERVIEW

Odorless, colorless, non-flammable gas. Simple Asphyxiant - This product does not contain oxygen and may cause asphyxia if released in a confined area. Intentional misuse of this product can cause serious lung damage or death. Maintain oxygen levels above 19.5%. Contents under pressure. Use and store below 125 °F.

ROUTE OF ENTRY:

Skin Contact	Skin Absorption	Eye Contact	Inhalation	Ingestion
No	No	No	Yes	No

HEALTH EFFECTS:

Exposure Limits	Irritant	Sensitization
No	No	No
Teratogen No	Reproductive Hazard No	Mutagen No
Synergistic Effects None reported		

Carcinogenicity: -- NTP: No IARC: No OSHA: No

EYE EFFECTS:
No adverse effects anticipated.

SKIN EFFECTS:
No adverse effects anticipated.

INGESTION EFFECTS:
No adverse effects anticipated.

INHALATION EFFECTS:
Product is a non-toxic simple asphyxiant. Effects of oxygen deficiency resulting from simple asphyxiants may include: rapid breathing, diminished mental alertness, impaired muscular coordination, faulty judgement, depression of all sensations, emotional instability, and fatigue. As asphyxiation progresses, nausea, vomiting, prostration, and loss of consciousness may result, eventually leading to convulsions, coma, and death.

Intentional inhalation of helium balloon gas can cause asphyxiation, lung damage, and death.

Oxygen deficiency during pregnancy has produced developmental abnormalities in humans and experimental animals.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: None known.

NFPA HAZARD CODES

Health: 0
Flammability: 0
Instability: 0

HMIS HAZARD CODES

Health: 0
Flammability: 0
Reactivity: 0

RATINGS SYSTEM

0 = No Hazard
1 = Slight Hazard
2 = Moderate Hazard
3 = Serious Hazard
4 = Severe Hazard

4. First Aid Measures

EYES:
None required.

SKIN:
None required.

INGESTION:
Ingestion is not anticipated.

INHALATION:
PROMPT MEDICAL ATTENTION IS MANDATORY IN ALL CASES OF OVEREXPOSURE. RESCUE PERSONNEL SHOULD BE EQUIPPED WITH SELF-CONTAINED BREATHING APPARATUS. Victims should be assisted to an uncontaminated area and inhale fresh air. Quick removal from the contaminated area is most important. Unconscious persons should be moved to an uncontaminated area, and if breathing has stopped, administer artificial resuscitation and supplemental oxygen. Further treatment should be symptomatic and supportive.

5. Fire Fighting Measures

Conditions of Flammability: Nonflammable		
Flash point: None	Method: Not Applicable	Autoignition Temperature: None
LEL(%): None	UEL(%): None	
Hazardous combustion products: None		
Sensitivity to mechanical shock: None		
Sensitivity to static discharge: None		

FIRE AND EXPLOSION HAZARDS:
Nonflammable. Cylinder may rupture violently from pressure when involved in a fire situation.

EXTINGUISHING MEDIA:
None required. Use as appropriate for surrounding materials.

FIRE FIGHTING INSTRUCTIONS: Firefighters should wear respiratory protection (SCBA) and full turnout or Bunker gear. Continue to cool fire-exposed containers until well after flames are extinguished.

6. Accidental Release Measures

Evacuate all personnel from affected area. Use appropriate protective equipment. If leak is in container or container valve, contact the appropriate emergency telephone number listed in Section 1 or call your closest BOC location.

7. Handling and Storage

Electrical classification:
Non-hazardous.

This gas mixture is noncorrosive and may be used with all common structural materials.

Use only in well-ventilated areas. Valve protection caps must remain in place unless container is secured with valve protection outlet piped to use point. Do not drag, slide or roll cylinders. Use a suitable hand truck for cylinder movement. Use a pressure reducing regulator when connecting cylinder to lower pressure (<3000 psig) piping or systems. Do not heat cylinder by any means to increase the discharge rate of product from the cylinder. Use a check valve or trap in the discharge line to prevent hazardous back flow into the cylinder.

Protect cylinders from physical damage. Store in cool, dry, well-ventilated area of non-combustible construction away from heavily trafficked areas and emergency exits. Do not allow the temperature where cylinders are stored to exceed 125 °F (52 °C). Cylinders should be stored upright and firmly secured to prevent falling or being knocked over. Use a "first in-first out" inventory system to prevent full cylinders being stored for excessive periods of time.

Proper handling, storage and operation of regulating equipment and cylinders is required to safely fill helium balloons. DO NOT ALLOW CHILDREN or unqualified people to operate balloon filling equipment. INTENTIONAL INHALATION OF HELIUM CAN CAUSE SERIOUS LUNG DAMAGE OR DEATH. A balloon filling helium regulator must be attached to the valve before it is opened. Close cylinder valve after each use and when empty. Do not use in poorly ventilated area or attempt to remove stuck or jammed protective caps. Check for leaks and do not use leaky equipment. Do not use helium unless cylinder is properly labeled. Do not attempt to transfer helium from cylinder into any other container. Do not substitute hydrogen (a highly flammable gas) for helium.

For additional recommendations, consult Compressed Gas Association Pamphlets P-1, P-9, P-9.1, P-18, SB-14, and Safety Bulletin SB-2.

Never carry a compressed gas cylinder or a container of a gas in cryogenic liquid form in an enclosed space such as a car trunk, van or station wagon. A leak can result in a fire, explosion, asphyxiation or a toxic exposure.

8. Exposure Controls, Personal Protection

ENGINEERING CONTROLS:
Local exhaust to prevent accumulation of high concentrations and maintain air oxygen levels at or above 19.5%.

EYE/FACE PROTECTION:
Safety goggles or glasses as appropriate for the job.

SKIN PROTECTION:
Protective gloves of material appropriate for the job.

RESPIRATORY PROTECTION:
Positive pressure air line with full-face mask and escape bottle or self-contained breathing apparatus should be available for emergency use.

OTHER/GENERAL PROTECTION:
Safety shoes or other footwear as appropriate for the job.

9. Physical and Chemical Properties

PARAMETER	VALUE	UNITS
Physical state (gas, liquid, solid)	: Gas	
Vapor pressure	: Not Available	
Vapor density (Air = 1)	: 0.14 (Gas)	
Evaporation point	: Not Available	
Boiling point	: -452.1	°F
	: -268.9	°C
Freezing point	: Not Available	
	: Not Available	
PH	: Not Applicable	
Specific gravity	: Not Available	
Oil/water partition coefficient	: Not Available	
Solubility (H_20)	: Negligible	
Odor threshold	: Not Applicable	
Odor and appearance	: Colorless, odorless gas	

10. Stability and Reactivity

STABILITY:
Stable

INCOMPATIBLE MATERIALS:
None

HAZARDOUS POLYMERIZATION:
Does not occur.

11. Toxicological Information

Oxygen deficiency during pregnancy has produced developmental abnormalities in humans and experimental animals.

No data given in the Registry of Toxic Effects of Chemical Substances (RTECS) or Sax, Dangerous Properties of Industrial Materials, 7th ed.

12. Ecological Information

No data given.

13. Disposal Considerations

Do not attempt to dispose of residual waste or unused quantities. Return in the shipping container PROPERLY LABELED, WITH ANY VALVE OUTLET PLUGS OR CAPS SECURED AND VALVE PROTECTION CAP IN PLACE to BOC Gases or authorized distributor for proper disposal.

14. Transport Information

PARAMETER	United States DOT	Canada TDG
PROPER SHIPPING NAME:	Helium, compressed	Helium, compressed
HAZARD CLASS:	2.2	2.2
IDENTIFICATION NUMBER:	UN 1046	UN 1046
SHIPPING LABEL:	NONFLAMMABLE GAS	NONFLAMMABLE GAS

15. Regulatory Information

SARA TITLE III NOTIFICATIONS AND INFORMATION

SARA TITLE III - HAZARD CLASSES:
Sudden Release of Pressure Hazard

16. Other Information

ACGIH	American Conference of Governmental Industrial Hygienists
DOT	Department of Transportation
IARC	International Agency for Research on Cancer
NTP	National Toxicology Program
OSHA	Occupational Safety and Health Administration
PEL	Permissible Exposure Limit
SARA	Superfund Amendments and Reauthorization Act
STEL	Short Term Exposure Limit
TDG	Transportation of Dangerous Goods
TLV	Threshold Limit Value
WHMIS	Workplace Hazardous Materials Information System

Compressed gas cylinders shall not be refilled without the express written permission of the owner. Shipment of a compressed gas cylinder which has not been filled by the owner or with his/her (written) consent is a violation of transportation regulations.

DISCLAIMER OF EXPRESSED AND IMPLIED WARRANTIES:
Although reasonable care has been taken in the preparation of this document, we extend no warranties and make no representations as to the accuracy or completeness of the information contained herein, and assume no responsibility regarding the suitability of this information for the user's intended purposes or for the consequences of its use. Each individual should make a determination as to the suitability of the information for their particular purpose(s).

Hydrogen Release Compound (HRC®)
MATERIAL SAFETY DATA SHEET (MSDS)

Last Revised: February 10, 2004

Section 1 - Material Identification

Supplier:

REGENESIS
1011 Calle Sombra
San Clemente, CA 92673

Phone: 949.366.8000
Fax: 949.366.8090
E-mail: info@regenesis.com

Chemical Name:	Propanoic acid, 2-[2-[2-(2-hydroxy-1-oxopropoxy)-1-oxopropoxy]-1-oxopropoxy]-1,2,3-propanetriyl ester
Chemical Family:	Organic Chemical
Trade Name:	Hydrogen Release Compound® (HRC®) Glycerol tripolylactate and Glycerol
Product Use:	Used to remediate contaminated soil and groundwater (environmental applications)

Section 2 – Chemical Identification

CAS#	Chemical
201167-72-8	Glycerol Tripolylactate
56-81-5	Glycerol
50-21-5	Lactic Acid

Section 3 - Physical Data

Melting Point:	Not Available (NA)
Boiling Point:	Not Determined (ND)
Flash Point:	ND
Density:	1.3 g/cc

Section 3 – Physical Data (cont)

Solubility:	**Acetone and DMSO**
Appearance:	**Viscous amber gel/liquid**
Odor:	**Not detectable**
Vapor Pressure:	**None**

Section 4 - Fire and Explosion Hazard Data

Extinguishing Media: **Carbon Dioxide, Dry Chemical Powder or Appropriate Foam.**

Water may be used to keep exposed containers cool.

For large quantities involved in a fire, one should wear full protective clothing and a NIOSH approved self contained breathing apparatus with full face piece operated in the pressure demand or positive pressure mode as for a situation where lack of oxygen and excess heat are present.

Section 5 - Toxicological Information

Acute Effects:	**May be harmful by inhalation, ingestion, or skin absorption. May cause irritation. To the best of our knowledge, the chemical, physical, and toxicological properties of the glycerol tripolylactate have not been investigated. Listed below are the toxicological information for glycerol and lactic acid.**	
RTECS#:	**MA8050000** **Glycerol**	
Irritation data:	**SKN-RBT 500 MG/24H MLD**	**BIOFX* 9-4/1970**
	85JCAE-,207,1986	**85JCAE-,207,1986**
	EYE-RBT 126 MG MLD	**85JCAE -,656,86**
	EYE-RBT 500 MG/24H MLD	**AJOPAA 29,1363,46**
	SKN-RBT 5MG/24H SEV	
	EYE-RBT 750 UG SEV	

Section 5 – Toxicological Information (cont)

Toxicity data:	ORL-MUS LD50:4090 MG/KG	NIIRDN 6,215,1982
	FRZKAP (6),56,1977	FEPRA7 4,142,1945
	SCU-RBT LD50:100 MG/KG	RCOCB8 56,125,1987
	ORL-RAT LD50:12600 MG/KG	ARZNAD 26,1581,1976
	IHL-	ARZNAD 26,1579,1978
	RATLC50:>570MG/M3/1HBIO	NIIRDN 6,215,1982
	FX*9-4/1970 IPR-RAT LD50:	JAPMA8 39,583,1950
	4420 MG/KG	DMDJAP 31,276,1959
	IVN-RAT LD50: 5566 MG/KG	BIOFX* 9-4/1970
	IPR-MUS LD50: 8700 MG/KG	NIIRDN 6,215,1982
	SCU-MUS LD50: 91 MG/KG	FMCHA2-,C252,91
	IVN-MUS LD50: 4250 MG/KG	FMCHA2-,C252,91
	ORL-RBT LD50: 27 GM/KG	FAONAU 40,144,67
	SKN-RBT LD50:>10GM/KG	JIHTAB 23,259,41
	IVN-RBT LD50: 53 GM/KG	FMCHA2-,C252,91
	ORL-GPG LD50: 7750 MG/KG	JIHTAB 23,259,1941
	ORL-RAT LD50:3543 MG/KG	
	SKN-RBT LD50:>2 GM/KG	
	ORL-MUS LD50: 4875 MG/KG	
	ORL-GPG LD50: 1810 MG/KG	
	ORL-QAL LD50: >2250 MG/KG	
Target Organ data:	Behavioral (headache), gastrointestinal (nausea or vomiting), Paternal effects (spermatogenesis, testes, epididymis, sperm duct), effects of fertility (male fertility index, post-implantation mortality).	
RTECS#:	OD2800000 Lactic acid	

Only selected registry of toxic effects of chemical substances (RTECS) data is presented here. See actual entry in RTECS for complete information on lactic acid and glycerol.

Section 6 - Health Hazard Data

Handling:	**Avoid continued contact with skin. Avoid contact with eyes.**

In any case of any exposure which elicits a response, a physician should be consulted immediately.

First Aid Procedures

Inhalation:	**Remove to fresh air. If not breathing give artificial respiration. In case of labored breathing give oxygen. Call a physician.**
Ingestion:	**No effects expected. Do not give anything to an unconscious person. Call a physician immediately.**
Skin Contact:	**Flush with plenty of water. Contaminated clothing may be washed or dry cleaned normally.**
Eye contact:	**Wash eyes with plenty of water for at least 15 minutes lifting both upper and lower lids. Call a physician.**

Section 7 - Reactivity Data

Conditions to Avoid:	**Strong oxidizing agents, bases and acids**
Hazardous Polymerization:	**None known**
Further Information:	**Hydrolyses in water to form Lactic Acid and Glycerol.**

Section 8 - Spill, Leak or Accident Procedures

After Spillage or Leakage:	**Neutralization is not required. This material may be burned in a chemical incinerator equipped with an afterburner and scrubber.**
Disposal:	**Laws and regulations for disposal vary widely by locality. Observe all applicable regulations and laws. This material, may be disposed of in solid waste. Material is readily degradable and hydrolyses in several hours.**

No requirement for a reportable quantity (CERCLA) of a spill is known.

Section 9 - Special Protection or Handling

Should be stored in plastic lined, steel, plastic, glass, aluminum, stainless steel, or reinforced fiberglass containers.

Protective Gloves:	**Vinyl or Rubber**
Eyes:	**Splash Goggles or Full Face Shield** **Area should have approved means of washing eyes.**
Ventilation:	**General exhaust.**
Storage:	**Store in cool, dry, ventilated area. Protect from incompatible materials.**

Section 10 - Other Information

This material will degrade in the environment by hydrolysis to lactic acid and glycerol. Materials containing reactive chemicals should be used only by personnel with appropriate chemical training.

The information contained in this document is the best available to the supplier as of the time of writing. Some possible hazards have been determined by analogy to similar classes of material. No separate tests have been performed on the toxicity of this material. The items in this document are subject to change and clarification as more information becomes available.

eXtended release formula Hydrogen Release Compound (HRC-X™)
MATERIAL SAFETY DATA SHEET (MSDS)

Last Revised: March 24, 2004

Section 1 - Material Identification

Supplier:

REGENESIS

1011 Calle Sombra
San Clemente, CA 92673

Phone: 949.366.8000

Fax: 949.366.8090

E-mail: info@regenesis.com

Chemical Name:	Propanoic acid, 2-[2-[2-(2-hydroxy-1-oxopropoxy)-1-oxopropoxy]-1-oxopropoxy]-1,2,3-propanetriyl ester
Chemical Family:	Organic Chemical
Trade Name:	*eXtended release formula* Hydrogen Release Compound (HRC-X™), Glycerol tripolylactate and Glycerol
Product Use:	Used to remediate contaminated soil and groundwater (environmental applications)

Section 2 – Chemical Identification

CAS#	Chemical
201167-72-8	Glycerol Tripolylactate
56-81-5	Glycerol
50-21-5	Lactic Acid

Section 3 - Physical Data

Melting Point:	**Not Available (NA)**
Boiling Point:	**Not Determined (ND)**
Flash Point:	**ND**
Density:	**1.3 g/cc**
Solubility:	**Acetone and DMSO**
Appearance:	**Viscous amber gel/liquid**
Odor:	**Not detectable**
Vapor Pressure:	**None**

Section 4 - Fire and Explosion Hazard Data

Extinguishing Media: **Carbon Dioxide, Dry Chemical Powder or Appropriate Foam.**

Water may be used to keep exposed containers cool.

For large quantities involved in a fire, one should wear full protective clothing and a NIOSH approved self contained breathing apparatus with full face piece operated in the pressure demand or positive pressure mode as for a situation where lack of oxygen and excess heat are present.

Section 5 - Toxicological Information

Acute Effects:	**May be harmful by inhalation, ingestion, or skin absorption. May cause irritation. To the best of our knowledge, the chemical, physical, and toxicological properties of the glycerol tripolylactate have not been investigated. Listed below are the toxicological information for glycerol and lactic acid.**
RTECS#:	MA8050000 Glycerol

Section 5 - Toxicological Information (cont)

Irritation data:	**SKN-RBT 500 MG/24H MLD** **85JCAE-,207,1986** **EYE-RBT 126 MG MLD** **EYE-RBT 500 MG/24H MLD** **SKN-RBT 5MG/24H SEV** **EYE-RBT 750 UG SEV**	**BIOFX* 9-4/1970** **85JCAE-,207,1986** **85JCAE -,656,86** **AJOPAA 29,1363,46**
Toxicity data:	**ORL-MUS LD50:4090 MG/KG** **FRZKAP (6),56,1977** **SCU-RBT LD50:100 MG/KG** **ORL-RAT LD50:12600 MG/KG** **IHL-** **RATLC50:>570MG/M3/1HBIOFX*9-** **4/1970 IPR-RAT LD50: 4420 MG/KG** **IVN-RAT LD50: 5566 MG/KG** **SCU-MUS LD50: 91 MG/KG** **IPR-MUS LD50: 8700 MG/KG** **IVN-MUS LD50: 4250 MG/KG** **ORL-RBT LD50: 27 GM/KG** **SKN-RBT LD50:>10GM/KG** **IVN-RBT LD50: 53 GM/KG** **ORL-GPG LD50: 7750 MG/KG** **ORL-RAT LD50:3543 MG/KG** **SKN-RBT LD50:>2 GM/KG** **ORL-MUS LD50: 4875 MG/KG** **ORL-GPG LD50: 1810 MG/KG** **ORL-QAL LD50: >2250 MG/KG**	**NIIRDN 6,215,1982** **FEPRA7 4,142,1945** **RCOCB8 56,125,1987** **ARZNAD 26,1581,1976** **NIIRDN 6,215,1982** **ARZNAD 26,1579,1978** **JAPMA8 39,583,1950** **DMDJAP 31,276,1959** **BIOFX* 9-4/1970** **NIIRDN 6,215,1982** **JIHTAB 23,259,1941** **FMCHA2-,C252,91** **FMCHA2-,C252,91** **FAONAU 40,144,67** **JIHTAB 23,259,41** **FMCHA2-,C252,91**
Target Organ data:	**Behavioral (headache), gastrointestinal (nausea or vomiting), Paternal effects (spermatogenesis, testes, epididymis, sperm duct), effects of fertility (male fertility index, post-implantation mortality).**	
RTECS#:	**OD2800000** **Lactic acid**	

Only selected registry of toxic effects of chemical substances (RTECS) data is presented here. See actual entry in RTECS for complete information on lactic acid and glycerol.

Section 6 - Health Hazard Data

Handling: Avoid continued contact with skin. Avoid contact with eyes.

In any case of any exposure which elicits a response, a physician should be consulted immediately.

First Aid Procedures

Inhalation: Remove to fresh air. If not breathing give artificial respiration. In case of labored breathing give oxygen. Call a physician.

Ingestion: No effects expected. Do not give anything to an unconscious person. Call a physician immediately.

Skin Contact: Flush with plenty of water. Contaminated clothing may be washed or dry cleaned normally.

Eye contact: Wash eyes with plenty of water for at least 15 minutes lifting both upper and lower lids. Call a physician.

Section 7 - Reactivity Data

Conditions to Avoid: Strong oxidizing agents, bases and acids

Hazardous Polymerization: None known

Further Information: Hydrolyses in water to form Lactic Acid and Glycerol.

Section 8 - Spill, Leak or Accident Procedures

After Spillage or Leakage: Neutralization is not required. This material may be burned in a chemical incinerator equipped with an afterburner and scrubber.

Disposal: Laws and regulations for disposal vary widely by locality. Observe all applicable regulations and laws. This material, may be disposed of in solid waste. Material is readily degradable and hydrolyses in several hours.

No requirement for a reportable quantity (CERCLA) of a spill is known.

Section 9 - Special Protection or Handling

Should be stored in plastic lined steel, plastic, glass, aluminum, stainless steel, or reinforced fiberglass containers.

Protective Gloves:	**Vinyl or Rubber**
Eyes:	**Splash Goggles or Full Face Shield** **Area should have approved means of washing eyes.**
Ventilation:	**General exhaust.**
Storage:	**Store in cool, dry, ventilated area. Protect from incompatible materials.**

Section 10 - Other Information

This material will degrade in the environment by hydrolysis to lactic acid and glycerol. Materials containing reactive chemicals should be used only by personnel with appropriate chemical training.

The information contained in this document is the best available to the supplier as of the time of writing. Some possible hazards have been determined by analogy to similar classes of material. No separate tests have been performed on the toxicity of this material. The items in this document are subject to change and clarification as more information becomes available.

Sigma Chemical Co.
P.O. Box 14508
St. Louis, MO 63178 USA
Tel: 314-771-5765

MATERIAL SAFETY DATA SHEET

SECTION 1. - - - - - - - - - - CHEMICAL IDENTIFICATION- - - - - - - - - -
CATALOG #: H1758
NAME: HYDROCHLORIC ACID

SECTION 2. - - - - - - COMPOSITION/INFORMATION ON INGREDIENTS - - - - - -
CAS #: 7647-01-0
MF: HCL
EC NO: 231-595-7
SYNONYMS
ACIDE CHLORHYDRIQUE (FRENCH) * ACIDO CLORIDRICO (ITALIAN) * ANHYDROUS HYDROCHLORIC ACID * CHLOORWATERSTOF (DUTCH) * CHLOROHYDRIC ACID * CHLOROWODOR (POLISH) * CHLORWASSERSTOFF (GERMAN) * HYDROCHLORIDE * HYDROGEN CHLORIDE (ACGIH:OSHA) * MURIATIC ACID * SPIRITS OF SALT *

SECTION 3. - - - - - - - - - - - - HAZARDS IDENTIFICATION - - - - - - - - - -
LABEL PRECAUTIONARY STATEMENTS
CORROSIVE
CAUSES BURNS.
TOXIC BY INHALATION AND IF SWALLOWED.
REACTS VIOLENTLY WITH WATER.
IN CASE OF CONTACT WITH EYES, RINSE IMMEDIATELY WITH PLENTY OF WATER AND SEEK MEDICAL ADVICE.
TAKE OFF IMMEDIATELY ALL CONTAMINATED CLOTHING.
WEAR SUITABLE PROTECTIVE CLOTHING, GLOVES AND EYE/FACE PROTECTION.
DO NOT BREATHE VAPOR.

SECTION 4. - - - - - - - - - - - - FIRST-AID MEASURES- - - - - - - - - - - -
IF SWALLOWED, WASH OUT MOUTH WITH WATER PROVIDED PERSON IS CONSCIOUS. CALL A PHYSICIAN.
DO NOT INDUCE VOMITING.
IF INHALED, REMOVE TO FRESH AIR. IF NOT BREATHING GIVE ARTIFICIAL RESPIRATION. IF BREATHING IS DIFFICULT, GIVE OXYGEN.
IN CASE OF SKIN CONTACT, FLUSH WITH COPIOUS AMOUNTS OF WATER FOR AT LEAST 15 MINUTES. REMOVE CONTAMINATED CLOTHING AND SHOES. CALL A PHYSICIAN.
IN CASE OF CONTACT WITH EYES, FLUSH WITH COPIOUS AMOUNTS OF WATER FOR AT LEAST 15 MINUTES. ASSURE ADEQUATE FLUSHING BY SEPARATING THE EYELIDS WITH FINGERS. CALL A PHYSICIAN.

SECTION 5. - - - - - - - - - - - FIRE FIGHTING MEASURES - - - - - - - - - - -
EXTINGUISHING MEDIA
CARBON DIOXIDE, DRY CHEMICAL POWDER OR APPROPRIATE FOAM.
SPECIAL FIREFIGHTING PROCEDURES
WEAR SELF-CONTAINED BREATHING APPARATUS AND PROTECTIVE CLOTHING TO PREVENT CONTACT WITH SKIN AND EYES.
USE WATER SPRAY TO COOL FIRE-EXPOSED CONTAINERS.
UNUSUAL FIRE AND EXPLOSIONS HAZARDS
EMITS TOXIC FUMES UNDER FIRE CONDITIONS.

SECTION 6. - - - - - - - - - ACCIDENTAL RELEASE MEASURES- - - - - - - - - -
WEAR SELF-CONTAINED BREATHING APPARATUS, RUBBER BOOTS AND HEAVY RUBBER GLOVES.
COVER WITH DRY LIME OR SODA ASH, PICK UP, KEEP IN A CLOSED CONTAINER AND HOLD FOR WASTE DISPOSAL.

VENTILATE AREA AND WASH SPILL SITE AFTER MATERIAL PICKUP IS COMPLETE.
EVACUATE AREA.

SECTION 7. - - - - - - - - - - - HANDLING AND STORAGE- - - - - - - - - - -

REFER TO SECTION 8.

SECTION 8. - - - - - - - EXPOSURE CONTROLS/PERSONAL PROTECTION- - - - - -

SAFETY SHOWER AND EYE BATH.
USE ONLY IN A CHEMICAL FUME HOOD.
WASH CONTAMINATED CLOTHING BEFORE REUSE.
DISCARD CONTAMINATED SHOES.
WASH THOROUGHLY AFTER HANDLING.
DO NOT BREATHE VAPOR.
DO NOT GET IN EYES, ON SKIN, ON CLOTHING.
AVOID PROLONGED OR REPEATED EXPOSURE.
NIOSH/MSHA-APPROVED RESPIRATOR.
COMPATIBLE CHEMICAL-RESISTANT GLOVES.
CHEMICAL SAFETY GOGGLES.
FACESHIELD (8-INCH MINIMUM).
KEEP TIGHTLY CLOSED.
STORE IN A COOL DRY PLACE.
REACTS VIOLENTLY WITH WATER.
MAY DEVELOP PRESSURE.

SECTION 9. - - - - - - - - PHYSICAL AND CHEMICAL PROPERTIES - - - - - - - -

APPEARANCE AND ODOR
LIQUID.
PHYSICAL PROPERTIES
VAPOR PRESSURE: 409.981 MMHG
SPECIFIC GRAVITY: 1.19
VAPOR DENSITY: 1.3 G/L

SECTION 10. - - - - - - - - - - -STABILITY AND REACTIVITY - - - - - - - - - -

STABILITY
STABLE.
INCOMPATIBILITIES
DO NOT ALLOW WATER TO ENTER CONTAINER BECAUSE OF VIOLENT REACTION.
BASES
AMINES
ALKALI METALS
COPPER, COPPER ALLOYS
ALUMINUM
HAZARDOUS COMBUSTION OR DECOMPOSITION PRODUCTS
HYDROGEN CHLORIDE GAS
HAZARDOUS POLYMERIZATION
WILL NOT OCCUR.

SECTION 11. - - - - - - - - - - - TOXICOLOGICAL INFORMATION - - - - - - - - -

ACUTE EFFECTS
MAY BE HARMFUL IF ABSORBED THROUGH THE SKIN.
MAY BE HARMFUL IF SWALLOWED.
MATERIAL IS EXTREMELY DESTRUCTIVE TO TISSUE OF THE MUCOUS MEMBRANES AND UPPER RESPIRATORY TRACT, EYES AND SKIN.
INHALATION MAY RESULT IN SPASM, INFLAMMATION AND EDEMA OF THE LARYNX AND BRONCHI, CHEMICAL PNEUMONITIS AND PULMONARY EDEMA.
SYMPTOMS OF EXPOSURE MAY INCLUDE BURNING SENSATION, COUGHING, WHEEZING, LARYNGITIS, SHORTNESS OF BREATH, HEADACHE, NAUSEA AND VOMITING.
CAUSES BURNS.
MATERIAL IS EXTREMELY DESTRUCTIVE TO THE TISSUE OF THE MUCOUS MEMBRANES AND UPPER RESPIRATORY TRACT.
MAY BE FATAL IF INHALED, SWALLOWED, OR ABSORBED THROUGH SKIN.
RTECS #: MW4025000
HYDROCHLORIC ACID
IRRITATION DATA
EYE-RBT 5 MG/30S RINSE MLD — TXCYAC 23,281,1982
TOXICITY DATA
ORL-MAN LDLO:2857 UG/KG — MJAUAJ 158,28,1993
ORL-WMN LDLO:420 UL/KG — JJTOEX 9,351,1996

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  IHL-HMN LCLO:1300 PPM/30M                       29ZWAE -,207,1968
  IHL-HMN LCLO:3000 PPM/5M                        TABIA2 3,231,1933
  UNR-MAN LDLO:81 MG/KG                           85DCAI 2,73,1970
  IHL-RAT LC50:3124 PPM/1H                        AMRL** TR-74-78,1974
  IHL-MUS LC50:1108 PPM/1H                        JCTODH 3,61,1976
  IPR-MUS LD50:40142 UG/KG                        COREAF 256,1043,1963
  ORL-RBT LD50:900 MG/KG                          BIZEA2 134,437,1923
 TARGET ORGAN DATA
  SENSE ORGANS AND SPECIAL SENSES (OTHER EYE EFFECTS)
  VASCULAR (BP LOWERING NOT CHARACTERIZED IN AUTONOMIC SECTION)
  LUNGS, THORAX OR RESPIRATION (RESPIRATORY DEPRESSION)
  LUNGS, THORAX OR RESPIRATION (RESPIRATORY STIMULATION)
  GASTROINTESTINAL (CHANGES IN STRUCTURE OR FUNCTION OF ESOPHAGUS)
  SKIN AND APPENDAGES (AFTER SYSTEMIC EXPOSURE: DERMATITIS, OTHER)
  ONLY SELECTED REGISTRY OF TOXIC EFFECTS OF CHEMICAL SUBSTANCES
  (RTECS) DATA IS PRESENTED HERE. SEE ACTUAL ENTRY IN RTECS FOR
  COMPLETE INFORMATION.
SECTION 12. - - - - - - - - - - ECOLOGICAL INFORMATION - - - - - - - - - -
  DATA NOT YET AVAILABLE.
SECTION 13. - - - - - - - - - - DISPOSAL CONSIDERATIONS - - - - - - - - - -
  CONTACT A LICENSED PROFESSIONAL WASTE DISPOSAL SERVICE TO DISPOSE OF
  THIS MATERIAL.
  OBSERVE ALL FEDERAL, STATE AND LOCAL ENVIRONMENTAL REGULATIONS.
SECTION 14. - - - - - - - - - - TRANSPORT INFORMATION - - - - - - - - - -
  CONTACT SIGMA CHEMICAL COMPANY FOR TRANSPORTATION INFORMATION.
SECTION 15. - - - - - - - - - - REGULATORY INFORMATION - - - - - - - - - -
 EUROPEAN INFORMATION
  EC INDEX NO:     017-002-00-2
  CORROSIVE
  R 23
  TOXIC BY INHALATION.
  R 35
  CAUSES SEVERE BURNS.
  S 9
  KEEP CONTAINER IN A WELL-VENTILATED PLACE.
  S 26
  IN CASE OF CONTACT WITH EYES, RINSE IMMEDIATELY WITH PLENTY OF
  WATER AND SEEK MEDICAL ADVICE.
  S 36/37/39
  WEAR SUITABLE PROTECTIVE CLOTHING, GLOVES AND EYE/FACE
  PROTECTION.
  S 45
  IN CASE OF ACCIDENT OR IF YOU FEEL UNWELL, SEEK MEDICAL ADVICE
  IMMEDIATELY (SHOW THE LABEL WHERE POSSIBLE).
 REVIEWS, STANDARDS, AND REGULATIONS
  OEL=MAK
  ACGIH TLV-CL 5 PPM                                 DTLVS* TLV/BEI,1999
  IARC CANCER REVIEW:HUMAN INADEQUATE EVIDENCE       IMEMDT 54,189,1992
  IARC CANCER REVIEW:ANIMAL INADEQUATE EVIDENCE      IMEMDT 54,189,1992
  IARC CANCER REVIEW:GROUP 3                         IMEMDT 54,189,1992
  EPA FIFRA 1988 PESTICIDE SUBJECT TO REGISTRATION OR RE-REGISTRATION
   FEREAC 54,7740,1989
  MSHA STANDARD:AIR-CL 5 PPM (7 MG/M3)
   DTLVS* 3,129,1971
  OSHA PEL (GEN INDU):CL 5 PPM (7 MG/M3)
   CFRGBR 29,1910.1000,1994
  OSHA PEL (CONSTRUC):CL 5 PPM (7 MG/M3)
   CFRGBR 29,1926.55,1994
  OSHA PEL (SHIPYARD):CL 5 PPM (7 MG/M3)
   CFRGBR 29,1915.1000,1993
  OSHA PEL (FED CONT):CL 5 PPM (7 MG/M3)
   CFRGBR 41,50-204.50,1994
  OEL-AUSTRALIA: TWA 5 PPM (7 MG/M3), JAN1993
  OEL-AUSTRIA: MAK 5 PPM (7 MG/M3), JAN1999
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OEL-BELGIUM: STEL 5 PPM (7.7 MG/M3), JAN1993
OEL-DENMARK: TWA 5 PPM (7 MG/M3), JAN1999
OEL-FINLAND: STEL 5 PPM (7 MG/M3), SKIN, JAN1999
OEL-FRANCE: VLE 5 PPM (7.5 MG/M3), JAN1999
OEL-GERMANY: MAK 5 PPM (7 MG/M3), JAN1999
OEL-HUNGARY: STEL 5 MG/M3, JAN1993
OEL-JAPAN: STEL 5 PPM (7.5 MG/M3), JAN1999
OEL-NORWAY: TWA 5 PPM (7 MG/M3), JAN1999
OEL-THE PHILIPPINES: TWA 5 PPM (7 MG/M3), JAN1993
OEL-POLAND: MAC(TWA) 5 MG/M3, CEILING 7 MG/M3, JAN1999
OEL-RUSSIA: STEL 5 PPM (5 MG/M3), JAN1993
OEL-SWEDEN: STEL 5 PPM (8 MG/M3) JAN1999
OEL-SWITZERLAND: MAK-W 5 PPM (7.5 MG/M3), KZG-W 10 PPM (15 MG/M3), JAN1999
OEL-THAILAND: TWA 5 PPM (7 MG/M3), JAN1993
OEL-TURKEY: TWA 5 PPM (7 MG/M3), JAN1993
OEL-UNITED KINGDOM: LTEL 5 PPM (7 MG/M3), STEL 5 PPM (7 MG/M3), JAN1993
OEL IN ARGENTINA, BULGARIA, COLOMBIA, JORDAN, KOREA CHECK ACGIH TLV;
OEL IN NEW ZEALAND, SINGAPORE, VIETNAM CHECK ACGIH TLV
NIOSH REL TO HYDROGEN CHLORIDE-AIR:CL 5 PPM
NIOSH* DHHS #92-100,1992
NOHS 1974: HZD 38580; NIS 360; TNF 87434; NOS 156; TNE 824985
NOES 1983: HZD 38580; NIS 321; TNF 60309; NOS 183; TNE 1238572; TFE 388130
EPA GENETOX PROGRAM 1988, NEGATIVE: CELL TRANSFORM.-SA7/SHE
EPA TSCA SECTION 8(B) CHEMICAL INVENTORY
EPA TSCA SECTION 8(D) UNPUBLISHED HEALTH/SAFETY STUDIES
EPA TSCA SECTION 8(E) RISK NOTIFICATION, 8EHQ-0892-9246
ON EPA IRIS DATABASE
EPA TSCA TEST SUBMISSION (TSCATS) DATA BASE, OCTOBER 2000
NIOSH ANALYTICAL METHOD, 1994: ACIDS, INORGANIC, 7903

U.S. INFORMATION

THIS PRODUCT IS SUBJECT TO SARA SECTION 313 REPORTING REQUIREMENTS.

SECTION 16. - - - - - - - - - - - OTHER INFORMATION- - - - - - - - - - - -

THE ABOVE INFORMATION IS BELIEVED TO BE CORRECT BUT DOES NOT PURPORT TO BE ALL INCLUSIVE AND SHALL BE USED ONLY AS A GUIDE. SIGMA, ALDRICH, FLUKA SHALL NOT BE HELD LIABLE FOR ANY DAMAGE RESULTING FROM HANDLING OR FROM CONTACT WITH THE ABOVE PRODUCT. SEE REVERSE SIDE OF INVOICE OR PACKING SLIP FOR ADDITIONAL TERMS AND CONDITIONS OF SALE.

Material Safety Data Sheet

Isobutylene

Section 1. Chemical product and company identification

Product Name : Isobutylene

Supplier : AIRGAS INC., on behalf of its subsidiaries
259 North Radnor-Chester Road
Suite 100
Radnor, PA 19087-5283
1-610-687-5253

Product use : Synthetic/Analytical chemistry.

MSDS# : 001031

Date of Preparation/Revision : **4/3/2007.**

In case of emergency : 1-866-734-3438

Section 2. Hazards identification

Physical state : Gas. (COLORLESS LIQUEFIED COMPRESSED GAS WITH A SWEET GASOLINE-LIKE ODOR)

Emergency overview : Warning!

FLAMMABLE GAS.
CONTENTS UNDER PRESSURE.
VAPOR MAY CAUSE FLASH FIRE.

Keep away from heat, sparks and flame. Do not puncture or incinerate container. Keep container closed. Use only with adequate ventilation.

Contact with rapidly expanding gases can cause frostbite.

Routes of entry : Inhalation

Potential acute health effects

Eyes : No known significant effects or critical hazards.

Skin : No known significant effects or critical hazards.

Inhalation : Acts as a simple asphyxiant.

Ingestion : Ingestion is not a normal route of exposure for gases

Potential chronic health effects : **CARCINOGENIC EFFECTS** Not available.
MUTAGENIC EFFECTS Not available.
TERATOGENIC EFFECTS Not available.

Medical conditions aggravated by overexposure : Acute or chronic respiratory conditions may be aggravated by overexposure to this gas.

See toxicological Information (section 11)

Section 3. Composition, Information on Ingredients

Name	CAS number	% Volume	Exposure limits
Isobutylene	115-11-7	100	**Del Lietuvos Higienos Normos (Lithuania, 12/2001).** TWA: 100 mg/m³ 8 hour(s). Form: All forms

Section 4. First aid measures

No action shall be taken involving any personal risk or without suitable training.If fumes are still suspected to be present, the rescuer should wear an appropriate mask or a self-contained breathing apparatus.It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.

Eye contact : In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention if irritation occurs.

Skin contact : In case of contact, immediately flush skin with plenty of water. Remove contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.

Frostbite	: Try to warm up the frozen tissues and seek medical attention.
Inhalation	: If inhaled, remove to fresh air. If breathing is difficult, give oxygen. If not breathing, give artificial respiration. Get medical attention.
Ingestion	: Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Get medical attention if symptoms appear.

Section 5. Fire fighting measures

Flammability of the product	: Flammable.
Auto-ignition temperature	: 465°C (869°F)
Flammable limits	: Lower: 1.8% Upper: 9.6%
Products of combustion	: These products are carbon oxides (CO, CO_2).
Fire hazards in presence of various substances	: Extremely flammable in presence of open flames, sparks and static discharge, of oxidizing materials.
Fire fighting media and instructions	: In case of fire, use water spray (fog), foam, dry chemicals, or CO_2. If involved in fire, shut off flow immediately if it can be done without risk. Apply water from a safe distance to cool container and protect surrounding area. Extremely flammable. Gas may accumulate in confined areas, travel considerable distance to source of ignition and flash back causing fire or explosion.
Special protective equipment for fire-fighters	: Fire fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full facepiece operated in positive pressure mode.

Section 6. Accidental release measures

Personal precautions	: Immediately contact emergency personnel. Keep unnecessary personnel away. Use suitable protective equipment (Section 8). Shut off gas supply if this can be done safely. Isolate area until gas has dispersed.
Environmental precautions	: Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

Section 7. Handling and storage

Handling	: Keep container closed. Use only with adequate ventilation. Keep away from heat, sparks and flame. To avoid fire, minimize ignition sources. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Do not puncture or incinerate container. High pressure gas. Use equipment rated for cylinder pressure. Close valve after each use and when empty. Protect cylinders from physical damage; do not drag, roll, slide, or drop. Use a suitable hand truck for cylinder movement.
Storage	: Keep container tightly closed. Keep container in a cool, well-ventilated area. Cylinders should be stored upright, with valve protection cap in place, and firmly secured to prevent falling or being knocked over. Cylinder temperatures should not exceed 52 °C (125 °F).

Section 8. Exposure Controls, Personal Protection

Engineering controls	: Use only with adequate ventilation. Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. The engineering controls also need to keep gas, vapor or dust concentrations below any explosive limits. Use explosion-proof ventilation equipment.

<u>**Personal protection**</u>

Eyes	: Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists or dusts.
Skin	: Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Respiratory	: Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary.Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.
	The applicable standards are (US) 29 CFR 1910.134 and (Canada) Z94.4-93
Hands	: Chemical-resistant, impervious gloves or gauntlets complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary.
Personal protection in case of a large spill	: A self-contained breathing apparatus should be used to avoid inhalation of the product.

Consult local authorities for acceptable exposure limits.

Section 9. Physical and chemical properties

Molecular weight	: 56.12 g/mole
Molecular formula	: C4-H8
Boiling/condensation point	: -6.89°C (19.6°F)
Melting/freezing point	: -139.99°C (-220°F)
Critical temperature	: 144.8°C (292.6°F)
Vapor pressure	: 24.3 psig
Vapor density	: 1.9 (Air = 1)
Specific Volume (ft^3/lb)	: 6.68449
Gas Density (lb/ft^3)	: 0.1496

Section 10. Stability and reactivity

Stability and reactivity	: The product is stable.
Incompatibility with various substances	: Extremely reactive or incompatible with oxidizing agents.

Section 11. Toxicological information

Other toxic effects on humans	: No specific information is available in our database regarding the other toxic effects of this material for humans.

<u>Specific effects</u>

Carcinogenic effects	: No known significant effects or critical hazards.
Mutagenic effects	: No known significant effects or critical hazards.
Reproduction toxicity	: No known significant effects or critical hazards.

Section 12. Ecological information

Products of degradation	: These products are carbon oxides (CO, CO_2) and water.
Toxicity of the products of biodegradation	: The product itself and its products of degradation are not toxic.
Environmental fate	: Not available.
Environmental hazards	: No known significant effects or critical hazards.
Toxicity to the environment	: Not available.

Section 13. Disposal considerations

Product removed from the cylinder must be disposed of in accordance with appropriate Federal, State, local regulation.Return cylinders with residual product to Airgas, Inc.Do not dispose of locally.

Section 14. Transport information

Regulatory information	UN number	Proper shipping name	Class	Packing group	Label	Additional information
DOT Classification	UN1055	ISOBUTYLENE SEE ALSO PETROLEUM GASES, LIQUEFIED	2.1	Not applicable (gas).		**Limited quantity** Yes. **Packaging instruction** **Passenger Aircraft** Quantity limitation: Forbidden. **Cargo Aircraft** Quantity limitation: 150 kg **Special provisions** 19, T50
TDG Classification	UN1055	ISOBUTYLENE	2.1	Not applicable (gas).		**Explosive Limit and Limited Quantity Index** 0.125 **ERAP Index** 3000 **Passenger Carrying Ship Index** Forbidden **Passenger Carrying Road or Rail Index** Forbidden **Special provisions** 29
Mexico Classification	UN1055	ISOBUTYLENE SEE ALSO PETROLEUM GASES, LIQUEFIED	2.1	Not applicable (gas).		-

Section 15. Regulatory information

United States

U.S. Federal regulations : TSCA 8(b) inventory: 2-Methylpropene(Isobutylene)

SARA 302/304/311/312 extremely hazardous substances: No products were found.
SARA 302/304 emergency planning and notification: No products were found.
SARA 302/304/311/312 hazardous chemicals: 2-Methylpropene(Isobutylene)
SARA 311/312 MSDS distribution - chemical inventory - hazard identification:
2-Methylpropene(Isobutylene): Fire hazard, Sudden Release of Pressure

Clean Water Act (CWA) 307: No products were found.

Clean Water Act (CWA) 311: No products were found.

Clean air act (CAA) 112 accidental release prevention: 2-Methylpropene(Isobutylene)

Clean air act (CAA) 112 regulated flammable substances: 2-Methylpropene(Isobutylene)

Clean air act (CAA) 112 regulated toxic substances: No products were found.

State regulations : Pennsylvania RTK: 2-Methylpropene(Isobutylene): (generic environmental hazard)
Massachusetts RTK: 2-Methylpropene(Isobutylene)
New Jersey: 2-Methylpropene(Isobutylene)

Canada

WHMIS (Canada) : Class A: Compressed gas.
Class B-1: Flammable gas.

CEPA DSL: 2-Methylpropene(Isobutylene)

Section 16. Other information

United States

Label Requirements : FLAMMABLE GAS.
CONTENTS UNDER PRESSURE.
VAPOR MAY CAUSE FLASH FIRE.

Canada

Label Requirements : Class A: Compressed gas.
Class B-1: Flammable gas.

Hazardous Material Information System (U.S.A.) :

Health	1
Fire hazard	4
Reactivity	0
Personal protection	C

National Fire Protection Association (U.S.A.) :

Notice to reader

To the best of our knowledge, the information contained herein is accurate. However, neither the above named supplier nor any of its subsidiaries assumes any liability whatsoever for the accuracy or completeness of the information contained herein.
Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

LIQUINOX MSDS

Section 1 : PRODUCT AND COMPANY IDENTIFICATION

Chemical family: Detergent.

Manufacturer: Alconox, Inc.
30 Glenn St.
Suite 309
White Plains, NY 10603.

Manufacturer emergency phone number: 800-255-3924.
813-248-0585 (outside of the United States).

Supplier: Same as manufacturer.

Product name: Liquinox

Section 2 : INGREDIENT INFORMATION

C.A.S.	CONCENTRATION %	Ingredient Name	T.L.V.	LD/50	LC/50
25155-30-0	10-30	SODIUM DODECYLBENZENESULFONATE	NOT AVAILABLE	438 MG/KG RAT ORAL 1330 MG/KG MOUSE ORAL	NOT AVAILABLE

Section 3 : HAZARD IDENTIFICATION

Route of entry: Skin contact, eye contact, inhalation and ingestion.

Effects of acute exposure

Eye contact: May cause irritation.

Skin contact: Prolonged and repeated contact may cause irritation.

Inhalation: May cause headache and nausea.

Ingestion: May cause vomiting and diarrhea.
May cause gastric distress.

Effects of chronic exposure: See effects of acute exposure.

Section 4 : FIRST AID MEASURES

Skin contact: Remove contaminated clothing.
Wash thoroughly with soap and water.
Seek medical attention if irritation persists.

Eye contact: Check for and remove contact lenses.
Flush eyes with clear, running water for 15 minutes while holding eyelids open: if irritation persists, consult a physician.

Inhalation: Remove victim to fresh air.
If irritation persists, seek medical attention.

Ingestion: Do not induce vomiting, seek medical attention.
Dilute with two glasses of water.
Never give anything by mouth to an unconscious person.

Section 5 : FIRE FIGHTING MEASURES

Flammability: Not flammable.

Conditions of flammability: Surrounding fire.

Extinguishing media: Carbon dioxide, dry chemical, foam.
Water
Water fog.

Special procedures: Self-contained breathing apparatus required.
Firefighters should wear the usual protective gear.
Use water spray to cool fire exposed containers.

Auto-ignition temperature: Not available.

Flash point (°C), method: None

Lower flammability limit (% vol): Not applicable.

Upper flammability limit (% vol): Not applicable.

Explosion Data

Sensitivity to static discharge: Not available.

Sensitivity to mechanical impact: Not available.

Hazardous combustion products: Oxides of carbon (COx).
Hydrocarbons.

Rate of burning: Not available.

Explosive power: Containers may rupture if exposed to heat or fire.

Section 6 : ACCIDENTAL RELEASE MEASURES

Leak/Spill: Contain the spill.
Prevent entry into drains, sewers, and other waterways.
Wear appropriate protective equipment.
Small amounts may be flushed to sewer with water.
Soak up with an absorbent material.
Place in appropriate container for disposal.
Notify the appropriate authorities as required.

Section 7 : HANDLING AND STORAGE

Handling procedures and equipment: Protect against physical damage.
Avoid breathing vapors/mists.
Wear personal protective equipment appropriate to task.
Wash thoroughly after handling.
Keep out of reach of children.
Avoid contact with skin, eyes and clothing.
Avoid extreme temperatures.
Launder contaminated clothing prior to reuse.

Storage requirements: Store away from incompatible materials.
Keep containers closed when not in use.

Section 8 : EXPOSURE CONTROLS / PERSONAL PROTECTION

Precautionary Measures

Gloves/Type: 

Wear appropriate gloves.

Respiratory/Type: None required under normal use.

Eye/Type: 

Safety glasses recommended.

Footwear/Type: Safety shoes per local regulations.

Clothing/Type: As required to prevent skin contact.

Other/Type: Eye wash facility should be in close proximity.
Emergency shower should be in close proximity.

Ventilation requirements: Local exhaust at points of emission.

Exposure limit of material: Not available.

Section 9 : PHYSICAL AND CHEMICAL PROPERTIES

Physical state: Liquid.

Appearance & odor: Odourless.
Pale yellow.

Odor threshold (ppm): Not available.

Vapour pressure (mmHg): @ 20°C (68°F).
17

Vapour density (air=1): >1

Volatiles (%)

By volume: Not available.

Evaporation rate (butyl acetate = 1): < 1.

Boiling point (°C): 100 (212F)

Freezing point (°C): Not available.

pH: 8.5

Specific gravity @ 20 °C: (water = 1).
1.083

Solubility in water (%): Complete.

Coefficient of water\oil dist.: Not available.

VOC: None

Chemical family: Detergent.

Section 10 : STABILITY AND REACTIVITY

Chemical stability: Product is stable under normal handling and storage conditions.

Conditions of instability: Extreme temperatures.

Hazardous polymerization: Will not occur.

Incompatible substances: Strong acids.
Strong oxidizing agents.

Hazardous decomposition products: See hazardous combustion products.

Section 11 : TOXICOLOGICAL INFORMATION

LD50 of product, species & route: > 5000 mg/kg rat oral.

LC50 of product, species & route: Not available.

Sensitization to product: Not available.

Carcinogenic effects: Not listed as a carcinogen.

Reproductive effects: Not available.

Teratogenicity: Not available.

Mutagenicity: Not available.

Synergistic materials: Not available.

Section 12 : ECOLOGICAL INFORMATION

Environmental toxicity: No data at this time.

Environmental fate: No data at this time.

Section 13 : DISPOSAL CONSIDERATIONS

Waste disposal: In accordance with local and federal regulations.

Section 14 : TRANSPORT INFORMATION

D.O.T. CLASSIFICATION: Not regulated.

Special shipping information: Not regulated.

Section 15 : REGULATORY INFORMATION

Canadian Regulatory Information

WHMIS classification: Not controlled.

DSL status: Not available.

USA Regulatory Information

SARA hazard catagories sections 311/312: Immediate (Acute) Health Hazard: No.
Delayed (Chronic) Health Hazard: No.
Fire Hazard: No.
Sudden Release of Pressure: No.
Reactive: No.

SARA Section 313: None

TSCA inventory: All components of this product are listed on the TSCA inventory.

NFPA

Health Hazard: 1
Flammability: 0
Reactivity: 0

HMIS

Health Hazard: 1
Flammability: 0
Physical hazard: 0
PPE: A

Section 16 : OTHER INFORMATION

Supplier MSDS date: 2006/07/14

Data prepared by: Global Safety Management
3340 Peachtree Road, #1800
Atlanta, GA 30326

Phone: 877-683-7460
Fax: (877) 683-7462

Web: www.globalsafetynet.com
Email: info@globalsafetynet.com.

General note: This material safety data sheet was prepared from information obtained from various sources, including product suppliers and the Canadian Center for Occupational Health and Safety.

SIGMA-ALDRICH

Material Safety Data Sheet

Date Printed: 01/18/2001
Date Updated: 08/15/2000
Version 1.30

Section 1 - Product and Company Information

Product Name	METHYL ALCOHOL, ANHYDROUS, 99.8%
Product Number	322415
Brand	Aldrich Chemical

Company	Sigma-Aldrich		
Street Address	3050 Spruce Street		
City, State, Zip, Country	St. Louis, MO 63103 US		
Technical Phone:	314 771 5765	**Emergency Phone:**	414 273 3850 Ext.5996
Fax:	800 325 5052		

Section 2 - Composition/Information on Ingredient

Substance Name	CAS #	SARA 313
METHANOL	67-56-1	Yes

Formula CH_4O

Synonyms Alcool methylique (French), Alcool metilico (Italian), Bieleski's solution, Carbinol, Colonial Spirit, Columbian Spirit, Metanolo (Italian), Methanol (ACGIH), Methyl alcohol (DOT:OSHA), Methylol, Methylalkohol (German), Methyl hydrate, Methyl hydroxide, Metylowy alkohol (Polish), Monohydroxymethane, Pyroxylic Spirit, RCRA waste number U154, Wood alcohol, Wood naphtha, Wood Spirit

Section 3 - Hazards Identification

Emergency Overview
Flammable (USA) Highly Flammable (EU). Toxic.
Toxic by inhalation and if swallowed. Irritating to eyes and skin.
Target organ(s): Eyes. Kidneys.

HMIS Rating
Health: 2* Flammability: 3 Reactivity: 0

NFPA Ratings
Health: 2 Flammability: 3 Reactivity: 0

*Chronic hazards present. For additional information on toxicity, please refer to Section 1·..

Section 4 - First Aid Measures

Oral Exposure
If swallowed, wash out mouth with water provided person is conscious. Call a physician immediately.

Inhalation Exposure
If inhaled, remove to fresh air. If not breathing give artificial respiration. If breathing is difficult, give oxygen.

Dermal Exposure
In case of skin contact, flush with copious amounts of water for at least 15 minutes. Remove contaminated clothing and shoes. Call a physician.

Eye
Chemical safety goggles.

General Hygiene Measures
Wash contaminated clothing before reuse. Wash thoroughly after handling.

Exposure Limits, RTECS

Country	Source	Type	Value	Remarks
USA	ACGIH	STEL	328 MG/M3 (250 PPM)	Skin
USA	ACGIH	TWA	262 MG/M3 (200 PPM)	
USA	MSHA Standard-air	TWA	200 PPM (260 MG/M3) (SKIN)	
USA	OSHA	PEL	8H TWA 200 PPM (260 MG/M3)	
New Zealand	OEL			check ACGIH TLV
USA	NIOSH	TWA STEL	200 PPM (SK) 250 PPM (SK)	

Section 9 - Physical/Chemical Properties

Appearance
Physical State
Liquid

Molecular Weight: 32.04 AMU

Property	Value	At Temperature or Pressure
pH	N/A	
BP/BP Range	64.6 - 64.7 °C	760 mmHg
MP/MP Range	-98 °C	
Freezing Point	N/A	
Vapor Pressure	97.68 mmHg	20 °C
Vapor Density	1.1 g/l	
Saturated Vapor Conc.	N/A	
SG/Density	0.791 g/cm3	
Bulk Density	N/A	
Odor Threshold	N/A	
Volatile%	N/A	
VOC Content	N/A	
Water Content	N/A	
Solvent Content	N/A	
Evaporation Rate	N/A	
Viscosity	N/A	
Partition Coefficient	N/A	
Decomposition Temp.	N/A	
Flash Point °F	52 °F	
Flash Point °C	11 °C	
Explosion Limits	Lower: 6 % Upper: 36 %	
Autoignition Temp	385 °C	
Refractive Index	1.329	
Solubility	N/A	

Section 10 - Stability and Reactivity

Stability
Stable
Stable.
Conditions to Avoid
Protect from moisture.

Behavioral:Ataxia.
Behavioral:Coma.

Oral - Rabbit: 14,200 mg/kg (LD50)

Skin - Rabbit: 15,800 mg/kg (LD50)

Intraperitoneal - Rabbit: 1826 MG/KG (LD50)

Intravenous - Rabbit: 8907 MG/KG (LD50)

Intraperitoneal - Guinea pig: 3556 MG/KG (LD50)

Intraperitoneal - Hamster: 8555 MG/KG (LD50)

Irritation Data

Skin - Rabbit: 20 mg 24H
Remarks: Moderate irritation effect

Eyes - Rabbit: 40 mg
Remarks: Moderate irritation effect

Eyes - Rabbit: 100 mg 24H
Remarks: Moderate irritation effect

Chronic Exposure - Teratogen

Species	*Dose*	*Route of Application*	*Exposure Time*
Rat	35295 MG/KG	Oral	(1-15D PREG)
Result:Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus). Effects on Newborn: Biochemical and metabolic.			
Rat	20000 PPM/7H	Inhalation	(1-22D PREG)
Result:Specific Developmental Abnormalities: Musculoskeletal system. Specific Developmental Abnormalities: Cardiovascular (circulatory) system. Specific Developmental Abnormalities: Urogenital system.			
Rat	20000 PPM/7H	Inhalation	(7-15D PREG)
Result:Specific Developmental Abnormalities: Musculoskeletal system. Specific Developmental Abnormalities: Endocrine system.			
Rat	10000 PPM/7H	Inhalation	(7-15D PREG)
Result:Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus).			
Rat	5200 UL/KG	Oral	(10D PREG)
Result:Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus). Specific Developmental Abnormalities: Eye, ear. Specific Developmental Abnormalities: Urogenital system.			
Mouse	40 GM/KG	Oral	(6-15D PREG)
Result:Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus). Specific Developmental Abnormalities: Craniofacial (including nose and tongue).			
Mouse	4 GM/KG	Oral	(7D PREG)
Result:Specific Developmental Abnormalities: Craniofacial (including nose and tongue). Specific Developmental Abnormalities: Musculoskeletal system.			
Mouse	1500 PPM/6H	Inhalation	(7-9D PREG)
Result:Specific Developmental Abnormalities: Central nervous system.			
Mouse	5000 PPM/7H	Inhalation	(6-15D PREG)
Result:Specific Developmental Abnormalities: Central nervous system. Specific Developmental Abnormalities: Craniofacial (including nose and tongue).			
Mouse	2000 PPM/7H	Inhalation	(6-15D PREG)
Result:Specific Developmental Abnormalities: Musculoskeletal system.			

Chronic Exposure - Mutagen

Species	*Dose*	*Route*	*Cell Type*	*Mutation test*
Human	300 MMOL/L		lymphocyte	DNA inhibition
Rat	10 UMOL/KG	Oral		DNA damage
Mouse	7900 MG/L (+S9)		lymphocyte	Mutation in microorganisms
Mouse	1 GM/KG	Oral		Cytogenetic analysis
Mouse	75 MG/KG	Intraperitoneal		Cytogenetic analysis

US Classification and Label Text

Indication of Danger

Flammable (USA) Highly Flammable (EU). Toxic.

Risk Statements

Toxic by inhalation and if swallowed. Irritating to eyes and skin.

Safety Statements

Keep container tightly closed. Keep away from sources of ignition - no smoking. Take precautionary measures against static discharges. Avoid contact with skin. In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

US Statements

Target organ(s): Eyes. Kidneys.

United States Regulatory Information

SARA 313 Listed: Yes

Deminimis: 1 %

Notes: This product is subject to SARA section 313 reporting requirements.

TSCA Inventory Item: Yes

Section 16 - Other Information

Warranty

The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. Sigma-Aldrich Inc., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.

Riedel-de Haen
3050 Spruce St.
St. Louis, MO 63178 USA
Tel: 314-289-6000

MATERIAL SAFETY DATA SHEET

SECTION 1. - - - - - - - - - - CHEMICAL IDENTIFICATION- - - - - - - - - -
CATALOG #: 07006
NAME: NITRIC ACID 65%, EXTRA PURE
ASSAY: 64-66%

SECTION 2. - - - - - COMPOSITION/INFORMATION ON INGREDIENTS - - - - - -
CAS #: 7697-37-2
EC NO: 231-714-2
SYNONYMS
ACIDE NITRIQUE (FRENCH) * ACIDO NITRICO (ITALIAN) * AQUA FORTIS * AZOTIC ACID * AZOTOWY KWAS (POLISH) * HYDROGEN NITRATE * KYSELINA DUSICNE (CZECH) * NITRIC ACID (ACGIH:OSHA) * SALPETERSAURE (GERMAN) * SALPETERZUUROPLOSSINGEN (DUTCH) *

SECTION 3. - - - - - - - - - - - HAZARDS IDENTIFICATION - - - - - - - - - -
LABEL PRECAUTIONARY STATEMENTS
OXIDIZING
CORROSIVE
CONTACT WITH COMBUSTIBLE MATERIAL MAY CAUSE FIRE.
TOXIC IF SWALLOWED.
VERY TOXIC BY INHALATION.
CAUSES SEVERE BURNS.
TARGET ORGAN(S):
LUNGS
TEETH
DO NOT BREATHE VAPOR.
IN CASE OF CONTACT WITH EYES, RINSE IMMEDIATELY WITH PLENTY OF WATER AND SEEK MEDICAL ADVICE.
WEAR SUITABLE PROTECTIVE CLOTHING.
IN CASE OF ACCIDENT OR IF YOU FEEL UNWELL, SEEK MEDICAL ADVICE IMMEDIATELY (SHOW THE LABEL WHERE POSSIBLE).

SECTION 4. - - - - - - - - - - - FIRST-AID MEASURES- - - - - - - - - - -
IN CASE OF CONTACT, IMMEDIATELY FLUSH EYES OR SKIN WITH COPIOUS AMOUNTS OF WATER FOR AT LEAST 15 MINUTES WHILE REMOVING CONTAMINATED CLOTHING AND SHOES.
ASSURE ADEQUATE FLUSHING OF THE EYES BY SEPARATING THE EYELIDS WITH FINGERS.
IF INHALED, REMOVE TO FRESH AIR. IF NOT BREATHING GIVE ARTIFICIAL RESPIRATION. IF BREATHING IS DIFFICULT, GIVE OXYGEN.
IF SWALLOWED, WASH OUT MOUTH WITH WATER PROVIDED PERSON IS CONSCIOUS. CALL A PHYSICIAN IMMEDIATELY.
WASH CONTAMINATED CLOTHING BEFORE REUSE.
DISCARD CONTAMINATED SHOES.

SECTION 5. - - - - - - - - - - FIRE FIGHTING MEASURES - - - - - - - - - - -
EXTINGUISHING MEDIA
NONCOMBUSTIBLE.
USE EXTINGUISHING MEDIA APPROPRIATE TO SURROUNDING FIRE CONDITIONS.
SPECIAL FIREFIGHTING PROCEDURES
WEAR SELF-CONTAINED BREATHING APPARATUS AND PROTECTIVE CLOTHING TO PREVENT CONTACT WITH SKIN AND EYES.
UNUSUAL FIRE AND EXPLOSIONS HAZARDS
EMITS TOXIC FUMES UNDER FIRE CONDITIONS.

SECTION 6. - - - - - - - - - ACCIDENTAL RELEASE MEASURES- - - - - - - - -
EVACUATE AREA.
WEAR SELF-CONTAINED BREATHING APPARATUS, RUBBER BOOTS AND HEAVY RUBBER GLOVES.
COVER WITH DRY-LIME, SAND, OR SODA ASH. PLACE IN COVERED CONTAINERS USING NON-SPARKING TOOLS AND TRANSPORT OUTDOORS.
VENTILATE AREA AND WASH SPILL SITE AFTER MATERIAL PICKUP IS COMPLETE.
SECTION 7. - - - - - - - - - - HANDLING AND STORAGE- - - - - - - - - - -
REFER TO SECTION 8.
SECTION 8. - - - - - - - EXPOSURE CONTROLS/PERSONAL PROTECTION- - - - - -
CHEMICAL SAFETY GOGGLES.
SAFETY SHOWER AND EYE BATH.
NIOSH/MSHA-APPROVED RESPIRATOR IN NONVENTILATED AREAS AND/OR FOR EXPOSURE ABOVE THE ACGIH TLV.
MECHANICAL EXHAUST REQUIRED.
RUBBER GLOVES.
AVOID BREATHING VAPOR.
DO NOT GET IN EYES, ON SKIN, ON CLOTHING.
AVOID PROLONGED OR REPEATED EXPOSURE.
WASH THOROUGHLY AFTER HANDLING.
CORROSIVE.
TOXIC.
KEEP TIGHTLY CLOSED.
PROTECT FROM LIGHT.
STORE IN A COOL DRY PLACE.
SECTION 9. - - - - - - - PHYSICAL AND CHEMICAL PROPERTIES - - - - - - -
APPEARANCE AND ODOR
LIQUID.
SECTION 10. - - - - - - - - - -STABILITY AND REACTIVITY - - - - - - - - -
INCOMPATIBILITIES
BASES
AMINES
ALKALI METALS
COPPER, COPPER ALLOYS
ALUMINUM
CORRODES STEEL
SENSITIVE TO LIGHT
HAZARDOUS COMBUSTION OR DECOMPOSITION PRODUCTS
TOXIC FUMES OF:
NITROGEN OXIDES
SECTION 11. - - - - - - - - - - TOXICOLOGICAL INFORMATION - - - - - - - -
ACUTE EFFECTS
HARMFUL IF SWALLOWED, INHALED, OR ABSORBED THROUGH SKIN.
CAUSES BURNS.
MATERIAL IS EXTREMELY DESTRUCTIVE TO TISSUE OF THE MUCOUS MEMBRANES AND UPPER RESPIRATORY TRACT, EYES AND SKIN.
INHALATION MAY RESULT IN SPASM, INFLAMMATION AND EDEMA OF THE LARYNX AND BRONCHI, CHEMICAL PNEUMONITIS AND PULMONARY EDEMA.
SYMPTOMS OF EXPOSURE MAY INCLUDE BURNING SENSATION, COUGHING, WHEEZING, LARYNGITIS, SHORTNESS OF BREATH, HEADACHE, NAUSEA AND VOMITING.
RTECS #: QU5775000
NITRIC ACID
TOXICITY DATA

ORL-HMN LDLO:430 MG/KG	YAKUDS 22,651,1980
UNR-MAN LDLO:110 MG/KG	85DCAI 2,73,1970

ONLY SELECTED REGISTRY OF TOXIC EFFECTS OF CHEMICAL SUBSTANCES (RTECS) DATA IS PRESENTED HERE. SEE ACTUAL ENTRY IN RTECS FOR COMPLETE INFORMATION.
SECTION 12. - - - - - - - - - - ECOLOGICAL INFORMATION - - - - - - - - - -
DATA NOT YET AVAILABLE.
SECTION 13. - - - - - - - - - - DISPOSAL CONSIDERATIONS - - - - - - - - -
FOR SMALL QUANTITIES: CAUTIOUSLY ADD TO A LARGE STIRRED EXCESS OF WATER. ADJUST THE PH TO NEUTRAL, SEPARATE ANY INSOLUBLE SOLIDS OR

LIQUIDS AND PACKAGE THEM FOR HAZARDOUS-WASTE DISPOSAL. FLUSH THE AQUEOUS SOLUTION DOWN THE DRAIN WITH PLENTY OF WATER. THE HYDROLYSIS AND NEUTRALIZATION REACTIONS MAY GENERATE HEAT AND FUMES WHICH CAN BE CONTROLLED BY THE RATE OF ADDITION.
OBSERVE ALL FEDERAL, STATE AND LOCAL ENVIRONMENTAL REGULATIONS.

SECTION 14. - - - - - - - - - - TRANSPORT INFORMATION - - - - - - - - -
CONTACT SIGMA CHEMICAL COMPANY FOR TRANSPORTATION INFORMATION.

SECTION 15. - - - - - - - - - REGULATORY INFORMATION - - - - - - - - - -
EUROPEAN INFORMATION
EC INDEX NO: 007-004-00-1
OXIDIZING
CORROSIVE
R 35
CAUSES SEVERE BURNS.
S 23
DO NOT BREATHE VAPOR.
S 26
IN CASE OF CONTACT WITH EYES, RINSE IMMEDIATELY WITH PLENTY OF WATER AND SEEK MEDICAL ADVICE.
S 36
WEAR SUITABLE PROTECTIVE CLOTHING.
S 45
IN CASE OF ACCIDENT OR IF YOU FEEL UNWELL, SEEK MEDICAL ADVICE IMMEDIATELY (SHOW THE LABEL WHERE POSSIBLE).
REVIEWS, STANDARDS, AND REGULATIONS
OEL=MAK
ACGIH TLV-STEL 4 PPM DTLVS* TLV/BEI,1999
ACGIH TLV-TWA 2 PPM DTLVS* TLV/BEI,1999
MSHA STANDARD-AIR:TWA 2 PPM (5 MG/M3)
DTLVS* 3,181,1971
OSHA PEL (GEN INDU):8H TWA 2 PPM (5 MG/M3)
CFRGBR 29,1910.1000,1994
OSHA PEL (CONSTRUC):8H TWA 2 PPM (5 MG/M3)
CFRGBR 29,1926.55,1994
OSHA PEL (SHIPYARD):8H TWA 2 PPM (5 MG/M3)
CFRGBR 29,1915.1000,1993
OSHA PEL (FED CONT):8H TWA 2 PPM (5 MG/M3)
CFRGBR 41,50-204.50,1994
OEL-ARAB REPUBLIC OF EGYPT: TWA 2 PPM (5 MG/M3), JAN1993
OEL-AUSTRALIA: TWA 2 PPM (5 MG/M3), STEL 4 PPM, JAN1993
OEL-AUSTRIA: MAK 2 PPM (5 MG/M3), JAN1999
OEL-BELGIUM: TWA 2 PPM (5.2 MG/M3), STEL 4 PPM (10 MG/M3), JAN1993
OEL-DENMARK: TWA 2 PPM (5 MG/M3), JAN1999
OEL-FINLAND: TWA 2 PPM (5 MG/M3), STEL 5 PPM (13 MG/M3), SKIN, JAN1999
OEL-FRANCE: VME 2 PPM (5 MG/M3), VLE 5 PPM (10 MG/M3), JAN1999
OEL-GERMANY: MAK 2 PPM (5 MG/M3), JAN1999
OEL-HUNGARY: STEL 5 MG/M3, JAN1993
OEL-JAPAN: OEL 2 PPM (5.2 MG/M3), JAN1999
OEL-NORWAY: TWA 2 PPM (5 MG/M3), JAN1999
OEL-THE PHILIPPINES: TWA 2 PPM (5 MG/M3), JAN1993
OEL-POLAND: MAC(TWA) 5 MG/M3, MAC(STEL) 10 MG/M3, JAN1999
OEL-RUSSIA: TWA 2 PPM, STEL 2 MG/M3, SKIN, JAN1993
OEL-SWEDEN: NGV 2 PPM (5 MG/M3), KTV 5 PPM (13 MG/M3), JAN1999
OEL-THAILAND: TWA 2 PPM (5 MG/M3), JAN1993
OEL-TURKEY: TWA 2 PPM (5 MG/M3), JAN1993
OEL-UNITED KINGDOM: LTEL 2 PPM (5 MG/M3), STEL 4 PPM (10 MG/M3), JAN1993
OEL IN ARGENTINA, BULGARIA, COLOMBIA, JORDAN, KOREA CHECK ACGIH TLV;
OEL IN NEW ZEALAND, SINGAPORE, VIETNAM CHECK ACGIH TLV
NIOSH REL TO NITRIC ACID-AIR:10H TWA 2 PPM;STEL 4 PPM
NIOSH* DHHS #92-100,1992
NOHS 1974: HZD 50742; NIS 197; TNF 18088; NOS 101; TNE 132401
NOES 1983: HZD 50742; NIS 201; TNF 18239; NOS 120; TNE 297627; TFE 76316

EPA GENETOX PROGRAM 1988, NEGATIVE: CELL TRANSFORM.-SA7/SHE
EPA TSCA SECTION 8(B) CHEMICAL INVENTORY
EPA TSCA SECTION 8(D) UNPUBLISHED HEALTH/SAFETY STUDIES
EPA TSCA TEST SUBMISSION (TSCATS) DATA BASE, OCTOBER 2000
NIOSH ANALYTICAL METHOD, 1994: ACIDS, INORGANIC, 7903
OSHA ANALYTICAL METHOD #ID-127

U.S. INFORMATION

THIS PRODUCT IS OR CONTAINS A COMPONENT THAT IS SUBJECT TO SARA313 REPORTING REQUIREMENTS.

SECTION 16. - - - - - - - - - - - OTHER INFORMATION- - - - - - - - - - - -

THE ABOVE INFORMATION IS BELIEVED TO BE CORRECT BUT DOES NOT PURPORT TO BE ALL INCLUSIVE AND SHALL BE USED ONLY AS A GUIDE. SIGMA, ALDRICH, FLUKA SHALL NOT BE HELD LIABLE FOR ANY DAMAGE RESULTING FROM HANDLING OR FROM CONTACT WITH THE ABOVE PRODUCT. SEE REVERSE SIDE OF INVOICE OR PACKING SLIP FOR ADDITIONAL TERMS AND CONDITIONS OF SALE.

Oxygen Release Compound – Advanced (ORC *Advanced*™)
MATERIAL SAFETY DATA SHEET (MSDS)

Last Revised: March 13, 2007

Section 1 - Material Identification

Supplier:

REGENESIS

1011 Calle Sombra
San Clemente, CA 92673

Phone:	**949.366.8000**
Fax:	**949.366.8090**
E-mail:	**info@regenesis.com**

Chemical Description:	A mixture of Calcium OxyHydroxide [$CaO(OH)_2$] and Calcium Hydroxide [$Ca(OH)_2$].
Chemical Family:	Inorganic Chemical
Trade Name:	Advanced Formula Oxygen Release Compound (ORC *Advanced*™)
Chemical Synonyms	Calcium Hydroxide Oxide; Calcium Oxide Peroxide
Product Use:	Used to remediate contaminated soil and groundwater (environmental applications)

Section 2 – Composition

CAS No.	Chemical
682334-66-3	**Calcium Hydroxide Oxide [$CaO(OH)_2$]**
1305-62-0	**Calcium Hydroxide [$Ca(OH)_2$]**
7758-11-4	**Dipotassium Phosphate (HK_2O_4P)**
7778-77-0	**Monopotassium Phosphate (H_2KO_4P)**

Section 3 – Physical Data

Form:	Powder
Color:	White to Pale Yellow
Odor:	Odorless
Melting Point:	527 °F (275 °C) – Decomposes
Boiling Point:	Not Applicable (NA)
Flammability/Flash Point:	NA
Auto- Flammability:	NA
Vapor Pressure:	NA
Self-Ignition Temperature:	NA
Thermal Decomposition:	527 °F (275 °C) – Decomposes
Bulk Density:	0.5 – 0.65 g/ml (Loose Method)
Solubility:	1.65 g/L @ 68° F (20° C) for calcium hydroxide.
Viscosity:	NA
pH:	11-13 (saturated solution)
Explosion Limits % by Volume:	Non-explosive
Hazardous Decomposition Products:	Oxygen, Hydrogen Peroxide, Steam, and Heat
Hazardous Reactions:	None

Section 4 – Reactivity Data

Stability:	Stable under certain conditions (see below).
Conditions to Avoid:	Heat and moisture.
Incompatibility:	Acids, bases, salts of heavy metals, reducing agents, and flammable substances.
Hazardous Polymerization:	Does not occur.

Section 5 – Regulations

TSCA Inventory List:	Listed

CERCLA Hazardous Substance (40 CFR Part 302)

Listed Substance:	No
Unlisted Substance:	Yes
Reportable Quantity (RQ):	100 pounds
Characteristic(s):	Ignitibility
RCRA Waste Number:	D001

SARA, Title III, Sections 302/303 (40 CFR Part 355 – Emergency Planning and Notification)

Extremely Hazardous Substance:	No

SARA, Title III, Sections 311/312 (40 CFR Part 370 – Hazardous Chemical Reporting: Community Right-To-Know

Hazard Category:	Immediate Health Hazard Fire Hazard
Threshold Planning Quantity:	10,000 pounds

Section 5 – Regulations (cont)

SARA, Title III, Section 313 (40 CFR Part 372 – Toxic Chemical Release Reporting: Community Right-To-Know

Extremely Hazardous Substance:	No	
WHMIS Classification:	C	Oxidizing Material Poisonous and Infectious Material
	D	Material Causing Other Toxic Effects – Eye and Skin Irritant
Canadian Domestic Substance List:	Not Listed	

Section 6 – Protective Measures, Storage and Handling

Technical Protective Measures

Storage:	Keep in tightly closed container. Store in dry area, protected from heat sources and direct sunlight.
Handling:	Clean and dry processing pipes and equipment before operation. Never return unused product to the storage container. Keep away from incompatible products. Containers and equipment used to handle this product should be used exclusively for this material. Avoid contact with water or humidity.

Section 6 – Protective Measures, Storage and Handling (cont)

Personal Protective Equipment (PPE)

Engineering Controls:

Calcium Hydroxide

ACGIH® TLV® (2000)

5 mg/m^3 TWA

OSHA PEL

Total dust–15 mg/m^3 TWA

Respirable fraction–

5 mg/m^3 TWA

NIOSH REL (1994)

5 mg/m^3

Respiratory Protection: For many conditions, no respiratory protection may be needed; however, in dusty or unknown atmospheres use a NIOSH approved dust respirator.

Hand Protection: Impervious protective gloves made of nitrile, natural rubbber or neoprene.

Eye Protection: Use chemical safety goggles (dust proof).

Skin Protection: For brief contact, few precautions other than clean clothing are needed. Full body clothing impervious to this material should be used during prolonged exposure.

Other: Safety shower and eyewash stations should be present. Consultation with an industrial hygienist or safety manager for the selection of PPE suitable for working conditions is suggested.

Industrial Hygiene: Avoid contact with skin and eyes.

Protection Against Fire & Explosion: NA

Section 7 – Hazards Identification

Emergency Overview: Oxidizer – Contact with combustibles may cause a fire. This material decomposes and releases oxygen in a fire. The additional oxygen may intensify the fire.

Potential Health Effects: Irritating to the mucous membrane and eyes. If the product splashes in ones face and eyes, treat the eyes first. Do not dry soiled clothing close to an open flame or heat source. Any

	clothing that has been contaminated with this product should be submerged in water prior to drying.
Inhalation:	High concentrations may cause slight nose and throat irritation with a cough. There is risk of sore throat and nose bleeds if one is exposed to this material for an extended period of time.
Eye Contact:	Severe eye irritation with watering and redness. There is also the risk of serious and/or permanent eye lesions.
Skin Contact:	Irritation may occur if one is exposed to this material for extended periods.
Ingestion:	Irritation of the mouth and throat with nausea and vomiting.

Section 8 – Measures in Case of Accidents and Fire

After Spillage/Leakage/Gas Leakage:	Collect in suitable containers. Wash remainder with copious quantities of water.
Extinguishing Media:	See next.
Suitable:	Large quantities of water or water spray. In case of fire in close proximity, all means of extinguishing are acceptable.
Further Information:	Self contained breathing apparatus or approved gas mask should be worn due to small particle size. Use extinguishing media appropriate for surrounding fire. Apply cooling water to sides of transport or storage vessels that are exposed to flames until the fire is extinguished. Do not approach hot vessels that contain this product.
First Aid:	After contact with skin, wash immediately with plenty of water and soap. In case of contact with eyes, rinse immediately with plenty of water and seek medical attention. Consult an opthalmologist in all cases.

Section 8 – Measures in Case of Accidents and Fire

Eye Contact:	Flush eyes with running water for 15 minutes, while keeping the eyelids wide open. Consult with an ophthalmologist in all cases.
Inhalation:	Remove subject from dusty environment. Consult with a physician in case of respiratory symptoms.

Ingestion:	If the victim is conscious, rinse mouth and admnister fresh water. DO NOT induce vomiting. Consult a physician in all cases.
Skin Contact:	Wash affected skin with running water. Remove and clean clothing. Consult with a physician in case of persistent pain or redness.
Special Precautions:	Evacuate all non-essential personnel. Intervention should only be done by capable personnel that are trained and aware of the hazards associated with this product. When it is safe, unaffected product should be moved to safe area.
Specific Hazards:	<u>Oxidizing substance</u>. Oxygen released on exothermic decomposition may support combustion. Confined spaces and/or containers may be subject to increased pressure. If product comes into contact with flammables, fire or explosion may occur.

Section 9 – Accidental Release Measures

Precautions:	Observe the protection methods cited in Section 3. Avoid materials and products that are incompatible with product. Immediately notify the appropriate authorities in case of reportable discharge (> 100 lbs).
Cleanup Methods:	Collect the product with a suitable means of avoiding dust formation. All receiving equipment should be clean, vented, dry, labeled and made of material that this product is compatible with. Because of the contamination risk, the collected material should be kept in a safe isolated place. Use large quantities of water to clean the impacted area. See Section 12 for disposal methods.

Section 10 – Information on Toxicology

Toxicity Data

Acute Toxicity:	Oral Route, LD_{50}, rat, > 2,000 mg/kg (powder 50%) Dermal Route, LD_{50}, rat, > 2,000 mg/kg (powder 50%) Inhalation, LD_{50}, rat, > 5,000 mg/m^3 (powder 35%)
Irritation:	Rabbit (eyes), severe irritant

Sensitization:	No data
Chronic Toxicity:	In vitro, no mutagenic effect (Powder 50%)
Target Organ Effects:	Eyes and respiratory passages.

Section 11 – Information on Ecology

Ecology Data	
	10 mg $Ca(OH)_2$/L: pH = 9.0 100 mg $Ca(OH)_2$/L: pH = 10.6
Acute Exotoxicity:	Fishes, Cyprinus carpio, LC_{50}, 48 hrs, 160 mg/L Crustaceans, Daphnia sp., EC_{50}, 24 hours, 25.6 mg/L (Powder 16%)
Mobility:	Low Solubility and Mobility
Abiotic Degradation:	Water – Slow Hydrolysis. Degradation Products: Calcium Hydroxide Water/soil – complexation/precipitation. Carbonates/sulfates present at environmental concentrations. Degradation products: carbonates/sulfates sparingly soluble
Biotic Degradation:	NA (inorganic compound)
Potential for Bioaccumulation:	NA (ionizable inorganic compound)

Section 11 – Information on Ecology (cont)

Comments:

Observed effects are related to alkaline properties of the product. Hazard for the environment is limited due to the product properties of:

- No bioaccumulation
- Weak solubility and precipatation as carbonate or sulfate in an aquatic environment.

Diluted product is rapidly neutralized at environmental pH.

Further Information: NA

Section 12 – Disposal Considerations

Waste Disposal Method:	Consult current federal, state and local regulations regarding the proper disposal of this material and its emptied containers.

Section 13 – Shipping/Transport Information

D.O.T Shipping Name:	Oxidizing Solid, N.O.S [A mixture of Calcium OxyHydroxide [$CaO(OH)_2$] and Calcium Hydroxide [$Ca(OH)_2$].
UN Number:	1479
Hazard Class:	5.1
Label(s):	5.1 (Oxidizer)
Packaging Group:	II
STCC Number:	4918717

Section 14 – Other Information

HMIS® Rating	Health – 2 Flammability – 0	Reactivity – 1 PPE - Required

HMIS® is a registered trademark of the National Painting and Coating Association.

NFPA® Rating	Health – 2 Flammability – 0	Reactivity – 1 OX

NFPA® is a registered trademark of the National Fire Protection Association.

Reason for Issue: Update toxicological and ecological data

Section 15 – Further Information

The information contained in this document is the best available to the supplier at the time of writing, but is provided without warranty of any kind. Some possible hazards have been determined by analogy to similar classes of material. The items in this document are subject to change and clarification as more information become available.

Oxygen Release Compound (ORC®)
MATERIAL SAFETY DATA SHEET (MSDS)

Last Revised: **October 18, 2005**

Section 1 - Material Identification

Supplier:

REGENESIS

1011 Calle Sombra
San Clemente, CA 92673

Phone:	**949.366.8000**
Fax:	**949.366.8090**
E-mail:	**info@regenesis.com**

Chemical Description:	**A mixture of Magnesium Peroxide (MgO_2), Magnesium Oxide (MgO), and Magnesium Hydroxide [$Mg(OH)_2$]**
Chemical Family:	**Inorganic Chemical**
Trade Name:	**Oxygen Release Compound (ORC®)**
Product Use:	**Used to remediate contaminated soil and groundwater (environmental applications)**

Section 2 – Chemical Identification

CAS#	**Chemical**
14452-57-4	**Magnesium Peroxide (MgO_2)**
1309-48-4	**Magnesium Oxide (MgO)**
1309-42-8	**Magnesium Hydroxide [$Mg(OH)_2$]**
7758-11-4	**Dipotassium Phosphate (HK_2O_4P)**
7778-77-0	**Monopotassium Phosphate (H_2KO_4P)**
Assay:	**25-35% Magnesium Peroxide (MgO_2)**

Section 3 - Physical Data

Melting Point:	**Not Determined (ND)**
Boiling Point:	**ND**
Flash Point:	**Not Applicable (NA)**
Self-Ignition Temperature:	**NA**
Thermal Decomposition:	**Spontaneous Combustion possible at ≈ 150°C**
Density:	**0.6 – 0.8 g/cc**
Solubility:	**Reacts with Water**
pH:	**Approximately 10 in saturated solution**
Appearance:	**White Powder**
Odor:	**None**
Vapor Pressure:	**None**
Hazardous Decomposition Products:	**Not Known**
Hazardous Reactions:	**Hazardous Polymerization will not occur**
Further Information:	**Non-combustible, but will support combustion**

Section 4 – Reactivity Data

Stability:	**Product is stable unless heated above 150 °C. Magnesium Peroxide reacts with water to slowly release oxygen. Reaction by product is Magnesium Hydroxide**
Conditions to Avoid:	**Heat above 150 °C. Open Flames.**
Incompatibility:	**Strong Acids. Strong Chemical Agents.**
Hazardous Polymerization:	**None known.**

Section 5 - Regulations

Permissible Exposure Limits in Air	**Not Established. Should be treated as a nuisance dust.**

Section 6 – Protective Measures, Storage and Handling

Technical Protective Measures

Storage:	**Keep in tightly closed container. Keep away from combustible material.**
Handling:	**Use only in well ventilated areas.**

Personal Protective Equipment (PPE)

Respiratory Protection:	**Recommended (HEPA Filters)**
Hand Protection:	**Wear suitable gloves.**
Eye Protection:	**Use chemical safety goggles.**
Other:	**NA**
Industrial Hygiene:	**Avoid contact with skin and eyes**
Protection Against Fire & Explosion:	**NA**
Disposal:	**Dispose via sanitary landfill per state/local authority**
Further Information:	**Not flammable, but may intensify a fire**
After Spillage/Leakage/Gas Leakage:	**Collect in suitable containers. Wash remainder with copious quantities of water.**
Extinguishing Media:	**NA**
Suitable:	**Carbon Dioxide, dry chemicals, foam**
Further Information:	**Self contained breathing apparatus or approved gas mask should be worn due to small particle size. Use extinguishing media appropriate for surrounding fire.**
First Aid:	**After contact with skin, wash immediately with plenty of water and soap. In case of contact with eyes, rinse immediately with plenty of water and seek medical attention.**

Section 7 – Information on Toxicology

Toxicity Data:	**Not Available**

Section 8 – Information on Ecology

Water Pollution Hazard Raging (WGK):	**0**

Section 9 – Further Information

After the reaction of magnesium peroxide with water to form oxygen, the resulting material, magnesium hydroxide, is mildly basic. The amounts of magnesium oxide (magnesia) and magnesium hydroxide in the initial product have an effect similar to lime, but with lower alkalinity.

The information contained in this document is the best available to the supplier at the time of writing, but is provided without warranty of any kind. Some possible hazards have been determined by analogy to similar classes of material. The items in this document are subject to change and clarification as more information become available.

Regen OX – Part A (Oxidizer Complex)

Material Safety Data Sheet (MSDS)

Last Revised: November 7, 2005

Section 1 – Supplier Information and Material Identification

Supplier:

REGENESIS
1011 Calle Sombra
San Clemente, CA 92673
Telephone: 949.366.8000
Fax: 949.366.8090
E-mail: info@regenesis.com

Chemical Description:	A mixture of sodium percarbonate [$2Na_2CO_3 \cdot 3H_2O_2$], sodium carbonate [Na_2CO_3], sodium silicate and silica gel.
Chemical Family:	Inorganic Chemicals
Trade Name:	Regen Ox – Part A (Oxidizer Complex)
Product Use:	Used to remediate contaminated soil and groundwater (environmental applications)

Section 2 – Chemical Information/Other Designations

CAS No.	Chemical
15630-89-4	Sodium Percarbonate
5968-11-6	Sodium Carbonate Monohydrate
1344-09-8	Silicic Acid, Sodium Salt, Sodium Silicate
63231-67-4	Silica Gel

Section 3 – Physical Data

Form:	Powder
Color:	White
Odor:	Odorless
Melting Point:	NA
Boiling Point:	NA

Section 3 – Physical Data (cont)

Flammability/Flash Point:	NA
Vapor Pressure:	NA
Bulk Density:	0.9 – 1.2 g/cm^3
Solubility:	Min 14.5g/100g water @ 20 °C
Viscosity:	NA
pH (3% solution):	~ 10.5
Decomposition Temperature:	Self-accelerating decomposition with oxygen release starts at 50 °C.

Section 4 – Reactivity Data

Stability:	Stable under normal conditions
Conditions to Avoid/Incompatibility:	Acids, bases, salts of heavy metals, reducing agents, and flammable substances
Hazardous Decomposition Products:	Oxygen. Contamination with many substances will cause decomposition. The rate of decomposition increases with increasing temperature and may be very vigorous with rapid generation of oxygen and steam.

Section 5 – Regulations

TSCA Inventory Listed: Yes

CERCLA Hazardous Substance (40 CFR Part 302)

Listed Substance: *No*

Unlisted Substance: *Yes*

SARA, Title III, Sections 313 (40 CFR Part 372) – Toxic Chemical Release Reporting: Community Right-To-Know

Extremely Hazardous Substance: No

WHMIS Classification: C, D2B

Canadian Domestic Substance List: Appears

Section 6 – Protective Measures, Storage and Handling

Technical Protective Measures

Storage:	Oxidizer. Store in a cool, well ventilated area away from all sources of ignition and out of the direct sunlight. Store in a dry location away from heat and in temperatures less than 40 ?C. Keep away from incompatible materials and keep lids tightly closed. Do not store in improperly labeled containers. Protect from moisture. Do not store near combustible materials. Keep containers well sealed. Store separately from reducing materials. Avoid contamination which may lead to decomposition.
Handling:	Avoid contact with eyes, skin and clothing. Use with adequate ventilation. Do not swallow. Avoid breathing vapors, mists or dust. Do not eat, drink or smoke in the work area. Label containers and keep them tightly closed when not in use. Wash hands thoroughly after handling.

Personal Protective Equipment (PPE)

Engineering Controls:	General room ventilation is required if used indoors. Local exhaust ventilation, process enclosures or other engineering controls may be needed to maintain airborne levels below recommended exposure limits. Avoid creating dust or mists. Maintain adequate ventilation at all times. Do not use in confined areas. Keep levels below recommended exposure limits. To determine actual exposure limits, monitoring should be performed on a routine basis.
Respiratory Protection:	For many conditions, no respiratory protection is necessary; however, in dusty or unknown conditions or when exposures exceed limit values a NIOSH approved respirator should be used.
Hand Protection:	Wear chemical resistant gloves (neoprene, rubber, or PVC).

Section 6 – Protective Measures, Storage and Handling (cont)

Eye Protection:	Wear chemical safety goggles. A full face shield may be worn in lieu of safety goggles.
Skin Protection:	Try to avoid skin contact with this product. Chemical resistant gloves (neoprene, PVC or rubber) and protective clothing should be worn during use.
Other:	Eye wash station.
Protection Against Fire & Explosion:	Product is non-explosive. In case of fire, evacuate all non-essential personnel, wear protective clothing and a self-contained breathing apparatus, stay upwind of fire, and use water to spray cool fire-exposed containers.

Section 7 – Hazards Identification

Potential Health Effects	
Inhalation:	Causes irritation to the respiratory tract. Symptoms may include coughing, shortness of breath, and irritations to mucous membranes, nose and throat.
Eye Contact:	Causes irritation, redness and pain.
Skin Contact:	Causes slight irritation.
Ingestion:	May be harmful if swallowed (vomiting and diarrhea).

Section 8 – Measures in Case of Accidents and Fire

After Spillage/Leakage:	Eliminate all ignition sources. Evacuate unprotected personnel and never exceed any occupational exposure limit. Shovel or sweep spilt material into plastic bags or vented containers for disposal. Do not return spilled or contaminated material to the inventory.
Extinguishing Media:	Water
First Aid	
Eye Contact:	Flush eyes with running water for at least 15 minutes with eyelids held open. Seek a specialist.
Inhalation:	Remove affected person to fresh air. Seek medical attention if the effects persist.
Ingestion:	If the individual is conscious and not convulsing, give two-four cups of water to dilute the chemical and seek medical attention immediately. **Do Not** induce vomiting.

Section 8 – Measures in Case of Accidents and Fire (cont)

Skin Contact:	Wash affected areas with soap and a mild detergent and large amounts of water.

Section 9 – Accidental Release Measures

Precautions:	
Cleanup Methods:	Shovel or sweep spilt material into plastic bags or vented containers for disposal. Do not return spilled or contaminated material to the inventory.

Section 10 – Information on Toxicology

Toxicity Data	
LD50 Oral (rat):	2,400 mg/kg
LD50 Dermal (rabbit):	Min 2,000 mg/kg
LD50 Inhalation (rat):	Min 4,580 mg/kg

Section 11 – Information on Ecology

Ecology Data	
Ecotoxicological Information:	NA

Section 12 – Disposal Considerations

Waste Disposal Method	
Waste Treatment:	Dispose of in an approved waste facility operated by an authorized contactor in compliance with local regulations.
Package (Pail) Treatment:	The empty and clean containers are to be recycled or disposed of in conformity with local regulations.

Section 13 – Shipping/Transport Information

D.O.T. Shipping Name:	Oxidizing Solid, N.O.S. [A mixture of sodium percarbonate [$2Na_2CO_3 \cdot 3H2O_2$], sodium carbonate [Na_2CO_3], sodium silicate and silica gel.]
UN Number:	1479
Hazard Class:	5.1
Labels:	5.1 (Oxidizer)
Packaging Group:	III

Section 14 – Other Information

HMIS® Rating	Health – 1 (slight)	Reactivity – 1 (slight)
	Flammability – 0 (none)	Lab PPE – goggles, gloves, and lab coat

HMIS® is a registered trademark of the National Painting and Coating Association.

Section 15 – Further Information

The information contained in this document is the best available to the supplier at the time of writing, but is provided without warranty of any kind. Some possible hazards have been determined by analogy to similar classes of material. The items in this document are subject to change and clarification as more information become available. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person. Individuals receiving this information must exercise their independent judgment in determining its appropriateness for a particular purpose.

Regen OX – Part B (Activator Complex)

Material Safety Data Sheet (MSDS)

Last Revised: November 7, 2005

Section 1 – Supplier Information and Material Identification

Supplier:

REGENESIS

1011 Calle Sombra
San Clemente, CA 92673
Telephone: 949.366.8000
Fax: 949.366.8090
E-mail: info@regenesis.com

Chemical Description:	A mixture of sodium silicate solution, silica gel and ferrous sulfate
Chemical Family:	Inorganic Chemicals
Trade Name:	Regen Ox – Part B (Activator Complex)
Product Use:	Used for environmental remediation of contaminated soils and groundwater

Section 2 – Chemical Information/Other Designations

CAS No.	Chemical
1344-09-8	Silicic Acid, Sodium Salt, Sodium Silicate
63231-67-4	Silica Gel
7720-78-7	Ferrous Sulfate
7732-18-5	Water

Section 3 – Physical Data

Form:	Liquid
Color:	Blue/Green
Odor:	Odorless
Melting Point:	NA
Boiling Point:	NA
Flammability/Flash Point:	NA
Vapor Pressure:	NA

Section 3 – Physical Data (cont)

Specific Gravity	1.39 g/cm^3
Solubility:	Miscible
Viscosity:	NA
pH (3% solution):	11
Hazardous Decomposition Products:	Oxides of carbon and silicon may be formed when heated to decomposition.

Section 4 – Reactivity Data

Stability:	Stable under normal conditions.
Conditions to Avoid:	None.
Incompatibility:	Avoid hydrogen fluoride, fluorine, oxygen difluoride, chlorine trifluoride, strong acids, strong bases, oxidizers, aluminum, fiberglass, copper, brass, zinc, and galvanized containers.

Section 5 – Regulations

TSCA Inventory Listed: Yes

CERCLA Hazardous Substance (40 CFR Part 302)

Listed Substance: *No*

Unlisted Substance: *Yes*

SARA, Title III, Sections 302/303 (40 CFR Part 355) – Emergency Planning and Notification

Extremely Hazardous Substance: No

SARA, Title III, Sections 311/312 (40 CFR Part 370) – Hazardous Chemical Reporting: Community Right-To-Know

Hazard Category: Acute

SARA, Title III, Sections 313 (40 CFR Part 372) – Toxic Chemical Release Reporting: Community Right-To-Know

Extremely Hazardous Substance: No

Section 6 – Protective Measures, Storage and Handling

Technical Protective Measures

Storage: Keep in a tightly closed container (steel or plastic) and store in a cool, well ventilated area away from all incompatible materials (acids, reactive metals, and ammonium salts). Store in a dry location away from heat and in temperatures less than 24 °C. Do not store in aluminum, fiberglass, copper, brass, zinc or galvanized containers.

Handling: Avoid contact with eyes, skin and clothing. Avoid breathing spray mist. Use with adequate ventilation.

Do not use product if it is brownish-yellow in color.

Personal Protective Equipment (PPE)

Engineering Controls: General room ventilation is required if used indoors. Local exhaust ventilation, process enclosures or other engineering controls may be needed to maintain airborne levels below recommended exposure limits. Safety shower and eyewash station should be within direct access.

Respiratory Protection: Use NIOSH-approved dust and mist respirator where spray mist exists. Respirators should be used in accordance with 29 CFR 1910.134.

Hand Protection: Wear chemical resistant gloves.

Eye Protection: Wear chemical safety goggles. A full face shield may be worn in lieu of safety goggles.

Skin Protection: Try to avoid skin contact with this product. Gloves and protective clothing should be worn during use.

Other:

Protection Against Fire & Explosion: Product is non-explosive and non-combustible.

Section 7 – Hazards Identification

Potential Health Effects	
Inhalation:	Causes irritation to the respiratory tract. Symptoms may include coughing, shortness of breath, and irritations to mucous membranes, nose and throat.
Eye Contact:	Causes irritation, redness and pain.
Skin Contact:	Causes irritation. Symptoms include redness, itching and pain.
Ingestion:	May cause irritation to mouth, esophagus, and stomach.

Section 8 – Measures in Case of Accidents and Fire

After Spillage/Leakage (small):	Mop up and neutralize liquid, then discharge to sewer in accordance with local, state and federal regulations.
After Spillage/Leakage (large):	Keep unnecessary personnel away; isolate hazard area and do not allow entrance into the affected area. Do not touch or walk through spilled material. Stop leak if possible without risking injury. Prevent runoff from entering into storm sewers and ditches that lead to natural waterways. Isolate the material if at all possible. Sand or earth may be used to contain the spill. If containment is not possible, neutralize the contaminated area and flush with large quantities of water.
Extinguishing Media:	Material is compatible with all extinguishing media.
Further Information:	
First Aid	
Eye Contact:	Flush eyes with running water for at least 15 minutes with eyelids held open. Seek a specialist.
Inhalation:	Remove affected person to fresh air. Give artificial respiration if individual is not breathing. If breathing is difficult, give oxygen. Seek medical attention if the effects persist.
Ingestion:	If the individual is conscious and not convulsing, give two-four cups of water to dilute the chemical and seek medical attention immediately. **<u>DO NOT</u>** induce vomiting.
Skin Contact:	Wash affected areas with soap and a mild detergent and large amounts of water. Remove contaminated clothing and shoes.

Section 9 – Accidental Release Measures

Precautions:

PPE: Wear chemical goggles, body-covering protective clothing, chemical resistant gloves, and rubber boots (see Section 6).

Environmental Hazards: Sinks and mixes with water. High pH of this material may be harmful to aquatic life. Only water will evaporate from a spill of this material.

Cleanup Methods: Pick-up and place in an appropriate container for reclamation or disposal. US regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities.

Section 10 – Information on Toxicology

Toxicity Data

Sodium Silicate: When tested for primary eye irritation potential according to OECD Guidelines, Section 405, a similar sodium silicate solution produced corneal, iridal and conjunctival irritation. Some eye irritation was still present 14 days after treatment, although the average primary irritation score has declined from 29.7 after 1 day to 4.0 after 14 days. When tested for primary skin irritation potential, a similar sodium silicate solution produced irritation with a primary irritation index of 3 to abraded skin and 0 to intact skin. Human experience confirms that irritation occurs when sodium silicates get on clothes at the collar, cuffs, or other areas where abrasion may exist.

The acute oral toxicity of this product has not been tested.

Ferrous Sulfate: LD50 Oral (rat): 319 mg/kg not a suspected carcinogen.

Section 11 – Information on Ecology

Ecology Data

Ecotoxicological Information:	Based on 100% solid sodium silicate, a 96 hour median tolerance for fish of 2,320 mg/l; a 96 hour median tolerance for water fleas of 247 mg/L; a 96 hour median tolerance for snail eggs of 632 mg/L; and a 96 hour median tolerance for Amphipoda of 160 mg/L.

Section 12 – Disposal Considerations

Waste Disposal Method

Waste Treatment:	Neutralize and landfill solids in an approved waste facility operated by an authorized contactor in compliance with local regulations.
Package (Pail) Treatment:	The empty and clean containers are to be recycled or disposed of in conformity with local regulations.

Section 13 – Shipping/Transport Information

D.O.T.	This product is not regulated as a hazardous material so there are no restrictions.

Section 14 – Other Information

HMIS® Rating	Health – 2 (moderate)	Reactivity – 0 (none)
	Flammability – 0 (none)	Lab PPE – goggles, gloves, and lab coat
	Contact – 1 (slight)	

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Section 15 – Further Information

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Material Safety Data Sheet

Sodium Hydroxide Solution 0.4 - 0.04%
MSDS# 02032

Section 1 - Chemical Product and Company Identification

MSDS Name:
Sodium Hydroxide Solution 0.4 - 0.04%
Catalog Numbers:
AC124190000, AC124190010, SS278-1, SS282-1, SS282-4, SS284-1, SS284-4
Synonyms:
Caustic soda; Lye; Soda lye; Sodium hydrate.
Company Identification:
Fisher Scientific
One Reagent Lane
Fair Lawn, NJ 07410
For information in the US, call:
201-796-7100
Emergency Number US:201-796-7100
CHEMTREC Phone Number, US:
800-424-9300

Section 2 - Composition, Information on Ingredients

CAS#: 1310-73-2
Chemical Name: Sodium hydroxide
%: .04-0.4
EINECS#: 215-185-5
Hazard Symbols: C
Risk Phrases: 35

CAS#: 7732-18-5
Chemical Name: Water
%: >99.6
EINECS#: 231-791-2
Hazard Symbols:
Risk Phrases:

Text for R-phrases: see Section 16
Hazard Symbols:
None listed
Risk Phrases:
None listed

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Caution! Corrosive to metal. May cause eye, skin, and respiratory tract irritation.
Target Organs: No data found.
Potential Health Effects
Eye:
May cause eye irritation.
Skin:
May cause skin irritation.
Ingestion:
May cause irritation of the digestive tract.
Inhalation:
May cause respiratory tract irritation.
Chronic:
Prolonged or repeated skin contact may cause dermatitis. Effects may be delayed.

Section 4 - First Aid Measures

Eyes:
Get medical aid. Immediately flush eyes with plenty of water for at least 15 minutes.
Skin:
Get medical aid. Flush skin with plenty of soap and water.
Ingestion:
Get medical aid. Do NOT induce vomiting. If conscious and alert, rinse mouth and drink 2-4 cupfuls of milk or water.
Inhalation:
Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.
Notes to Physician:
Treat symptomatically and supportively.

Section 5 - Fire Fighting Measures

General Information:
As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Use water spray to keep fire-exposed containers cool. Use water with caution and in flooding amounts. Vapors may be heavier than air. They can spread along the ground and collect in low or confined areas. Contact with metals may evolve flammable hydrogen gas. Containers may explode when heated. Non-combustible, substance itself does not burn but may decompose upon heating to produce irritating, corrosive and/or toxic fumes.
Extinguishing Media:
Substance is noncombustible; use agent most appropriate to extinguish surrounding fire. Cool containers with flooding quantities

of water until well after fire is out.
Autoignition Temperature:Not applicable.
Flash Point:Not applicable.
Explosion Limits: Lower:Not available
Explosion Limits: Upper:Not available
NFPA Rating:
health: 2; flammability: 0; instability: 0;

Section 6 - Accidental Release Measures

General Information:
Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks:
Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Avoid runoff into storm sewers and ditches which lead to waterways. Clean up spills immediately, observing precautions in the Protective Equipment section. Provide ventilation.

Section 7 - Handling and Storage

Handling:
Wash thoroughly after handling. Use only in a well-ventilated area. Do not breathe dust, mist, or vapor. Do not get in eyes, on skin, or on clothing. Keep container tightly closed. Do not ingest or inhale. Discard contaminated shoes.
Storage:
Keep container closed when not in use. Store in a cool, dry, well-ventilated area away from incompatible substances. Keep away from strong acids. Keep away from metals. Keep away from flammable liquids. Keep away from organic halogens.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls:
Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate ventilation to keep airborne concentrations low.
Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Sodium hydroxide	2 mg/m3 Ceiling	10 mg/m3 IDLH	2 mg/m3 TWA
Water	none listed	none listed	none listed

OSHA Vacated PELs:
Sodium hydroxide:
None listed
Water:
None listed
Personal Protective Equipment:
Eyes:
Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.
Skin:
Wear appropriate protective gloves to prevent skin exposure.
Clothing:
Wear appropriate protective clothing to prevent skin exposure.
Respirators:
A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant respirator use.

Section 9 - Physical and Chemical Properties

Physical State:	Liquid
Color:	colorless
Odor:	practically odorless
pH:	Not available
Vapor Pressure:	Not available
Vapor Density:	>1.0
Evaporation Rate:	Not available
Viscosity:	Not available
Boiling Point:	> 100 deg C (> 212.00F)
Freezing/Melting Point:	> 0 deg C (> 32.00F)
Decomposition Temperature:	Not available
Solubility in water:	Slightly soluble
Specific Gravity/Density:	>1.0
Molecular Formula:	Solution
Molecular Weight:	0

Section 10 - Stability and Reactivity

Chemical Stability:
Stable.
Conditions to Avoid:
Prolonged exposure to air.
Incompatibilities with Other Materials
Metals, acids.
Hazardous Decomposition Products
Toxic fumes of sodium oxide.
Hazardous Polymerization
Will not occur.

Section 11 - Toxicological Information

RTECS#:
CAS# 1310-73-2: WB4900000
CAS# 7732-18-5: ZC0110000
LD50/LC50:
RTECS: CAS# 1310-73-2: Draize test, rabbit, eye: 400 ug Mild; Draize test, rabbit, eye: 1% Severe; Draize test, rabbit, eye: 50 ug/24H Severe; Draize test, rabbit, eye: 1 mg/24H Severe; Draize test, rabbit, skin: 500 mg/24H Severe;.
RTECS: CAS# 7732-18-5: Oral, rat: LD50 = >90 mL/kg;.
Carcinogenicity:
Sodium hydroxide -
Not listed as a carcinogen by ACGIH, IARC, NTP, or CA Prop 65.
Water -
Not listed as a carcinogen by ACGIH, IARC, NTP, or CA Prop 65.
Epidemiology:
No information found
Teratogenicity:
No information found
Reproductive:
No information found
Neurotoxicity:
No information found
Mutagenicity:
No information found
Other:
See actual entry in RTECS for complete information.

Section 12 - Ecological Information

Ecotoxicity:
Fish: Carp: 180ppm (LC100); 24H
Other:
For more information, see "HANDBOOK OF ENVIRONMENTAL FATE AND EXPOSURE DATA."

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste.
US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series: None listed.

Section 14 - Transport Information

US DOT

Shipping Name:	SODIUM HYDROXIDE SOLUTION
Hazard Class:	8
UN Number:	UN1824
Packing Group:	II

Canada TDG

Shipping Name:	SODIUM HYDROXIDE SOLUTION
Hazard Class:	8
UN Number:	UN1824
Packing Group:	II

USA RQ: CAS# 1310-73-2: 1000 lb final RQ; 454 kg final RQ

Section 15 - Regulatory Information

US Federal
TSCA
CAS# 1310-73-2 is listed on the TSCA Inventory.
CAS# 7732-18-5 is listed on the TSCA Inventory.
Health & Safety Reporting List
None of the chemicals are on the Health & Safety Reporting List.
Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.
Section 12b
None of the chemicals are listed under TSCA Section 12b.
TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.
CERCLA Hazardous Substances and corresponding RQs
CAS# 1310-73-2: 1000 lb final RQ; 454 kg final RQ
SARA Section 302 Extremely Hazardous Substances
None of the chemicals in this product have a TPQ.
SARA Codes
CAS # 1310-73-2: acute, reactive.
Section 313
No chemicals are reportable under Section 313.
Clean Air Act:
This material does not contain any hazardous air pollutants.
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.
Clean Water Act:
CAS# 1310-73-2 is listed as a Hazardous Substance under the CWA.
None of the chemicals in this product are listed as Priority Pollutants under the CWA.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.
OSHA:
STATE

1.351

Sodium hydroxide can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.
Water is not present on state lists from CA, PA, MN, MA, FL, or NJ.
California Prop 65
California No Significant Risk Level:
None of the chemicals in this product are listed.
European/International Regulations
European Labeling in Accordance with EC Directives
Hazard Symbols:Not available
Risk Phrases:
Safety Phrases:
S 24/25 Avoid contact with skin and eyes.
WGK (Water Danger/Protection)
CAS# 1310-73-2: 1
CAS# 7732-18-5: Not available
Canada
CAS# 1310-73-2 is listed on Canada's DSL List
CAS# 7732-18-5 is listed on Canada's DSL List
Canadian WHMIS Classifications: E
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.
CAS# 1310-73-2 is listed on Canada's Ingredient Disclosure List
CAS# 7732-18-5 is not listed on Canada's Ingredient Disclosure List.

Section 16 - Other Information

MSDS Creation Date:
9/02/1997
Revision #6 Date
3/05/2007
Revisions were made in Sections:
3, 4
The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall the company be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential, or exemplary damages howsoever arising, even if the company has been advised of the possibility of such damages.

SIGMA-ALDRICH

ALDRICH CHEMICAL COMPANY, INC.
P.O. BOX 355
MILWAUKEE, WISCONSIN 53201, USA

ATTN: SAFETY DIRECTOR
INTEGRATED ANALYTICAL LABS INC
P.O. BOX 8026
PARSIPPANY NJ 07054

EMERGENCY PHONE 1-414-273-3850

DATE 01/18/00
CUST#: 049498329
PO#: 4206

MATERIAL SAFETY DATA SHEET

SECTION 1. - - - - - - - - - - CHEMICAL IDENTIFICATION- - - - - - - - - - -

CATALOG #: 25555-6
NAME: SODIUM METABISULFITE, 97+%, A.C.S. REAGENT

SECTION 2. - - - - - - COMPOSITION/INFORMATION ON INGREDIENTS - - - - - - -

CAS #: 7681-57-4
MF: NA2O5S2
EC NO: 231-673-0

SYNONYMS
DISODIUM DISULFITE * DISODIUM METABISULFITE * DISODIUM PYROSULFITE *
DISULFUROUS ACID, DISODIUM SALT * SODIUM DISULFITE * SODIUM
METABISULFITE (ACGIH) * SODIUM METABISULPHITE * SODIUM PYROSULFITE *

SECTION 3. - - - - - - - - - - - - HAZARDS IDENTIFICATION - - - - - - - - - -

LABEL PRECAUTIONARY STATEMENTS
TOXIC (USA)
HARMFUL (EU)
HARMFUL BY INHALATION, IN CONTACT WITH SKIN AND IF SWALLOWED.
CAUSES SEVERE IRRITATION.
POSSIBLE SENSITIZER.
IN CASE OF CONTACT WITH EYES, RINSE IMMEDIATELY WITH PLENTY OF
WATER AND SEEK MEDICAL ADVICE.
WEAR SUITABLE PROTECTIVE CLOTHING.

SECTION 4. - - - - - - - - - - - - - FIRST AID MEASURES- - - - - - - - - - - -

IF SWALLOWED, WASH OUT MOUTH WITH WATER PROVIDED PERSON IS CONSCIOUS.
CALL A PHYSICIAN.
IF INHALED, REMOVE TO FRESH AIR. IF NOT BREATHING GIVE ARTIFICIAL
RESPIRATION. IF BREATHING IS DIFFICULT, GIVE OXYGEN.
IN CASE OF SKIN CONTACT, FLUSH WITH COPIOUS AMOUNTS OF WATER
FOR AT LEAST 15 MINUTES. REMOVE CONTAMINATED CLOTHING AND
SHOES. CALL A PHYSICIAN.
IN CASE OF CONTACT WITH EYES, FLUSH WITH COPIOUS AMOUNTS OF WATER
FOR AT LEAST 15 MINUTES. ASSURE ADEQUATE FLUSHING BY SEPARATING
THE EYELIDS WITH FINGERS. CALL A PHYSICIAN.

SECTION 5. - - - - - - - - - - - FIRE FIGHTING MEASURES- - - - - - - - - - - -

EXTINGUISHING MEDIA
DRY CHEMICAL POWDER.

SPECIAL FIREFIGHTING PROCEDURES
WEAR SELF-CONTAINED BREATHING APPARATUS AND PROTECTIVE CLOTHING TO
PREVENT CONTACT WITH SKIN AND EYES.

UNUSUAL FIRE AND EXPLOSIONS HAZARDS

CONTINUED ON NEXT PAGE

ALDRICH CHEMICAL COMPANY, INC.
P.O. BOX 355
MILWAUKEE, WISCONSIN 53201, USA

CUST#: 049498329
PO#: 4206

MATERIAL SAFETY DATA SHEET

CATALOG #: 25555-6
NAME: SODIUM METABISULFITE, 97+%, A.C.S. REAGENT

EMITS TOXIC FUMES UNDER FIRE CONDITIONS.

SECTION 6. - - - - - - - - - ACCIDENTAL RELEASE MEASURES- - - - - - - - - -

WEAR SELF-CONTAINED BREATHING APPARATUS, RUBBER BOOTS AND HEAVY RUBBER GLOVES.
SWEEP UP, PLACE IN A BAG AND HOLD FOR WASTE DISPOSAL.
AVOID RAISING DUST.
VENTILATE AREA AND WASH SPILL SITE AFTER MATERIAL PICKUP IS COMPLETE.
EVACUATE AREA.

SECTION 7. - - - - - - - - - - - HANDLING AND STORAGE- - - - - - - - - - - -

REFER TO SECTION 8.

SECTION 8. - - - - - - - EXPOSURE CONTROLS/PERSONAL PROTECTION- - - - - - -

MECHANICAL EXHAUST REQUIRED.
SAFETY SHOWER AND EYE BATH.
WASH THOROUGHLY AFTER HANDLING.
DO NOT BREATHE DUST.
AVOID CONTACT WITH EYES, SKIN AND CLOTHING.
AVOID PROLONGED OR REPEATED EXPOSURE.
NIOSH/MSHA-APPROVED RESPIRATOR.
COMPATIBLE CHEMICAL-RESISTANT GLOVES.
CHEMICAL SAFETY GOGGLES.
STORE IN A COOL DRY PLACE.
KEEP TIGHTLY CLOSED.
AIR AND MOISTURE SENSITIVE

SECTION 9. - - - - - - - - PHYSICAL AND CHEMICAL PROPERTIES - - - - - - - - -

APPEARANCE AND ODOR
WHITE CRYSTALLINE POWDER

PHYSICAL PROPERTIES
SPECIFIC GRAVITY: 1.480

SECTION 10. - - - - - - - - - - - -STABILITY AND REACTIVITY - - - - - - - - - -

STABILITY
STABLE.

CONDITIONS TO AVOID
MOISTURE SENSITIVE

INCOMPATIBILITIES
AIR SENSITIVE
STRONG ACIDS
STRONG OXIDIZING AGENTS

HAZARDOUS COMBUSTION OR DECOMPOSITION PRODUCTS

CONTINUED ON NEXT PAGE

SIGMA-ALDRICH

ALDRICH CHEMICAL COMPANY, INC.
P.O. BOX 355
MILWAUKEE, WISCONSIN 53201, USA

CUST#: 049498329
PO#: 4206

MATERIAL SAFETY DATA SHEET

CATALOG #: 25555-6
NAME: SODIUM METABISULFITE, 97+%, A.C.S. REAGENT

SULFUR OXIDES

HAZARDOUS POLYMERIZATION
WILL NOT OCCUR.

SECTION 11. - - - - - - - - - - TOXICOLOGICAL INFORMATION - - - - - - - - -

ACUTE EFFECTS
MAY CAUSE SKIN IRRITATION.
MAY CAUSE EYE IRRITATION.
HARMFUL IF SWALLOWED, INHALED, OR ABSORBED THROUGH SKIN.
HIGH CONCENTRATIONS ARE EXTREMELY DESTRUCTIVE TO TISSUES OF THE MUCOUS MEMBRANES AND UPPER RESPIRATORY TRACT, EYES AND SKIN.
SYMPTOMS OF EXPOSURE MAY INCLUDE BURNING SENSATION, COUGHING, WHEEZING, LARYNGITIS, SHORTNESS OF BREATH, HEADACHE, NAUSEA AND VOMITING.
EXPOSURE CAN CAUSE:
COUGHING, CHEST PAINS, DIFFICULTY IN BREATHING.
STOMACH PAINS, VOMITING, DIARRHEA.
PROLONGED OR REPEATED EXPOSURE MAY CAUSE ALLERGIC REACTIONS IN CERTAIN SENSITIVE INDIVIDUALS.
WARNING: CERTAIN INDIVIDUALS WITH PREEXISTING RESPIRATORY CONDITIONS SUCH AS ASTHMA MAY EXPERIENCE HYPERSENSITIVITY TO SULFITES AND SULFUR DIOXIDE. THE SYMPTOMS INCLUDE BRONCHOCONSTRICTION, BRONCHOSPASM, GASTROINTESTINAL DISTURBANCES, FLUSHING, HYPOTENSION, TINGLING SENSATION, URTICARIA/ANGIOEDEMA AND SHOCK.

RTECS #: UX8225000
PYROSULFUROUS ACID, DISODIUM SALT

IRRITATION DATA
SKN-RBT 500 MG NTIS** OTS0557608

TOXICITY DATA

ORL-RAT	LD50:>2 GM/KG	NTIS** OTS0557608
SKN-RAT	LD50:>2 GM/KG	NTIS** OTS0557608
IVN-RAT	LD50:115 MG/KG	85INA8 6,1418,1991
PAR-MUS	LD50:910 MG/KG	RPTOAN 31,120,1968

ADDITIONAL INFORMATION
ORL-RAT LD50: 500 MG/KG
ONLY SELECTED REGISTRY OF TOXIC EFFECTS OF CHEMICAL SUBSTANCES (RTECS) DATA IS PRESENTED HERE. SEE ACTUAL ENTRY IN RTECS FOR COMPLETE INFORMATION.

SECTION 12. - - - - - - - - - - ECOLOGICAL INFORMATION - - - - - - - - - -

DATA NOT YET AVAILABLE.

SECTION 13. - - - - - - - - - - DISPOSAL CONSIDERATIONS - - - - - - - - - -

CONTACT A LICENSED PROFESSIONAL WASTE DISPOSAL SERVICE TO DISPOSE OF

CONTINUED ON NEXT PAGE

ALDRICH CHEMICAL COMPANY, INC.
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CUST#: 049498329
PO#: 4206

MATERIAL SAFETY DATA SHEET

CATALOG #: 25555-6
NAME: SODIUM METABISULFITE, 97+%, A.C.S. REAGENT

THIS MATERIAL.
OBSERVE ALL FEDERAL, STATE AND LOCAL ENVIRONMENTAL REGULATIONS.

SECTION 14. - - - - - - - - - - - TRANSPORT INFORMATION - - - - - - - - -

CONTACT ALDRICH CHEMICAL COMPANY FOR TRANSPORTATION INFORMATION.

SECTION 15. - - - - - - - - - - - REGULATORY INFORMATION - - - - - - - - - -

EUROPEAN INFORMATION
HARMFUL
R 20/21/22
HARMFUL BY INHALATION, IN CONTACT WITH SKIN AND IF SWALLOWED.
S 26
IN CASE OF CONTACT WITH EYES, RINSE IMMEDIATELY WITH PLENTY OF WATER AND SEEK MEDICAL ADVICE.
S 36
WEAR SUITABLE PROTECTIVE CLOTHING.

REVIEWS, STANDARDS, AND REGULATIONS

OEL=MAK
ACGIH TLV-NOT CLASSIFIABLE AS A HUMAN CARCINOGEN DTLVS* TLV/BEI,1997
ACGIH TLV-TWA 5 MG/M3 DTLVS* TLV/BEI,1997
IARC CANCER REVIEW:HUMAN INADEQUATE EVIDENCE IMEMDT 54,131,1992
IARC CANCER REVIEW:ANIMAL INADEQUATE EVIDENCE IMEMDT 54,131,1992
IARC CANCER REVIEW:GROUP 3 IMEMDT 54,131,1992
OEL-AUSTRALIA:TWA 5 MG/M3 JAN 1993
OEL-BELGIUM:TWA 5 MG/M3 JAN 1993
OEL-THE NETHERLANDS:TWA 5 MG/M3 JAN 1993
OEL-SWITZERLAND:TWA 5 MG/M3 JAN 1993
OEL-UNITED KINGDOM:TWA 5 MG/M3 JAN 1993
OEL IN BULGARIA, COLOMBIA, JORDAN, KOREA CHECK ACGIH TLV
OEL IN NEW ZEALAND, SINGAPORE, VIETNAM CHECK ACGIH TLV
NIOSH REL TO SODIUM METABISULFITE-AIR:10H TWA 5 MG/M3
NIOSH* DHHS #92-100,1992
NOES 1983: HZD X4004; NIS 73; TNF 8367; NOS 68; TNE 88236; TFE 28696
EPA GENETOX PROGRAM 1988, NEGATIVE: TRP REVERSION
EPA TSCA SECTION 8(B) CHEMICAL INVENTORY
EPA TSCA SECTION 8(D) UNPUBLISHED HEALTH/SAFETY STUDIES
EPA TSCA TEST SUBMISSION (TSCATS) DATA BASE, SEPTEMBER 1999

SECTION 16. - - - - - - - - - - - - OTHER INFORMATION- - - - - - - - - - - -

THE ABOVE INFORMATION IS BELIEVED TO BE CORRECT BUT DOES NOT PURPORT TO BE ALL INCLUSIVE AND SHALL BE USED ONLY AS A GUIDE. ALDRICH SHALL NOT BE HELD LIABLE FOR ANY DAMAGE RESULTING FROM HANDLING OR FROM CONTACT WITH THE ABOVE PRODUCT. SEE REVERSE SIDE OF INVOICE OR PACKING SLIP FOR ADDITIONAL TERMS AND CONDITIONS OF SALE.

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SIGMA-ALDRICH

ALDRICH CHEMICAL COMPANY, INC.
P.O. BOX 355
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CUST#: 049498329
PO#: 4206

MATERIAL SAFETY DATA SHEET

CATALOG #: 25555-6
NAME: SODIUM METABISULFITE, 97+%, A.C.S. REAGENT

980 SOUTH SECOND STREET
RONKONKOMA, NEW YORK 11779-7238, USA

SIGMA-ALDRICH

Material Safety Data Sheet

Date Printed: 12/09/2003
Date Updated: 03/04/2003
Version 1.20

Section 1 - Product and Company Information

Product Name	SODIUM THIOSULFATE, VOLUMETRIC STANDARD, 0.1N SOLUTION IN WATER		
Product Number	319546		
Brand	Aldrich Chemical		
Company	Sigma-Aldrich		
Street Address	3050 Spruce Street		
City, State, Zip, Country	SAINT LOUIS, MO 63103 US		
Technical Phone:	314 771 5765	Emergency Phone:	414 273 3850 Ext. 5996
Fax:	800 325 5052		

Section 2 - Composition/Information on Ingredient

Substance Name	CAS #		SARA 313
SODIUM THIOSULFATE STANDARD SOLUTION, 0.1 M (0.1 N)	None		No

Ingredient Name	CAS #	Percent	SARA 313
SODIUM THIOSULFATE	7772-98-7	>= 1.500 % <= 2.000 %	
WATER	7732-18-5	>= 98.000 %	No

Formula
Synonyms

Section 3 - Hazards Identification

HMIS Rating
Health: 0 Flammability: 0 Reactivity: 0

NFPA Rating
Health: 0 Flammability: 0 Reactivity: 0

For additional information on toxicity, please refer to Section 11.

Section 4 - First Aid Measures

Oral Exposure
If swallowed, wash out mouth with water provided person is conscious. Call a physician.

Inhalation Exposure
If inhaled, remove to fresh air. If breathing becomes difficult, call a physician.

Dermal Exposure
In case of contact, immediately wash skin with soap and copious amounts of water.

Eye Exposure
In case of contact with eyes, flush with copious amounts of water for at least 15 minutes. Assure adequate flushing by separating the eyelids with fingers. Call a physician.

Section 5 - Fire Fighting Measures

Autoignition Temp: N/A

Extinguishing Media
Suitable
Water spray. Carbon dioxide, dry chemical powder, or appropriate foam.

Firefighting
Protective Equipment
Wear self-contained breathing apparatus and protective clothing to prevent contact with skin and eyes.

Section 6 - Accidental Release Measures

Procedure(s) of Personal Precaution(s)
Wear respirator, chemical safety goggles, rubber boots, and heavy rubber gloves.

Methods for Cleaning Up
Absorb on sand or vermiculite and place in closed containers for disposal. Flush spill area with copious amounts of water.

Section 7 - Handling and Storage

Handling
User Exposure
Avoid inhalation. Avoid contact with eyes, skin, and clothing. Avoid prolonged or repeated exposure.

Storage
Suitable
Keep tightly closed.

Section 8 - Exposure Controls / PPE

Engineering Controls
Safety shower and eye bath. Mechanical exhaust required.

Personal Protective Equipment
Eye
Chemical safety goggles.

General Hygiene Measures
Wash thoroughly after handling.

Section 9 - Physical/Chemical Properties

Appearance
Physical State Color
Clear liquid Colorless

Molecular Weight N/A

pH N/A
BP/BP Range N/A

MP/MP Range	N/A
Freezing Point	N/A
Vapor Pressure	N/A
Vapor Density	N/A
Saturated Vapor Conc.	N/A
SG/Density	1.01 g/cm3
Bulk Density	N/A
Odor Threshold	N/A
Volatile%	N/A
VOC Content	N/A
Water Content	N/A
Solvent Content	N/A
Evaporation Rate	N/A
Viscosity	N/A
Partition Coefficient	N/A
Decomposition Temp.	N/A
Flash Point °F	N/A
Flash Point °C	N/A
Explosion Limits	N/A
Flammability	N/A
Autoignition Temp	N/A
Solubility	N/A

N/A = not available

Section 10 - Stability and Reactivity

Stability
Stable
Stable.
Materials to Avoid
Strong oxidizing agents.

Hazardous Decomposition Products
Hazardous Decomposition Products
Carbon monoxide, Carbon dioxide.

Hazardous Exothermic Reactions
Hazardous Exothermic Reactions
Will not occur.

Hazardous Polymerization
Hazardous Polymerization
Will not occur.

Section 11 - Toxicological Information

Route of Exposure
Skin Contact
May cause skin irritation.
Skin Absorption
May be harmful if absorbed through the skin.
Eye Contact
May cause eye irritation.
Inhalation
May be harmful if inhaled. Material may be irritating to mucous membranes and upper respiratory tract.
Ingestion
May be harmful if swallowed.

Signs and Symptoms of Exposure
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

RTECS Number: N/A

Section 12 - Ecological Information

No data available.

Section 13 - Disposal Considerations

Appropriate Method of Disposal of Substance or Preparation
Small amounts may be washed down the drain with excess water.
Observe all federal, state, and local environmental regulations.

Section 14 - Transport Information

DOT
Proper Shipping Name: None
Non-Hazardous for Transport: This substance is considered to be non-hazardous for transport.

IATA
Non-Hazardous for Air Transport: Non-hazardous for air transport.

Section 15 - Regulatory Information

United States Regulatory Information
SARA Listed: No

Canada Regulatory Information
WHMIS Classification
This product has been classified in accordance with the hazard criteria of the CPR, and the MSDS contains all the information required by the CPR.
DSL: No
NDSL: No

Section 16 - Other Information

Disclaimer
For R&D use only. Not for drug, household or other uses.

Warranty

Sigma Chemical Co.
P.O. Box 14508
St. Louis, MO 63178 USA
Tel: 314-771-5765

MATERIAL SAFETY DATA SHEET

SECTION 1. - - - - - - - - - - CHEMICAL IDENTIFICATION- - - - - - - - - -
CATALOG #: S1526
NAME: SULFURIC ACID ACS REAGENT

SECTION 2. - - - - - - COMPOSITION/INFORMATION ON INGREDIENTS - - - - - -
CAS #: 7664-93-9
MF: H2O4S
EC NO: 231-639-5

SYNONYMS
ACIDE SULFURIQUE (FRENCH) * ACIDO SOLFORICO (ITALIAN) * BATTERY ACID * BOV * DIHYDROGEN SULFATE * DIPPING ACID * ELECTROLYTE ACID * MATTLING ACID * OIL OF VITRIOL * SCHWEFELSAEURELOESUNGEN (GERMAN) * STRONG INORGANIC ACID MISTS CONTAINING SULFURIC ACID * SULFURIC ACID (ACGIH:OSHA) * SULPHURIC ACID * VITRIOL BROWN OIL * ZWAVELZUUROPLOSSINGEN (DUTCH) *

SECTION 3. - - - - - - - - - - - HAZARDS IDENTIFICATION - - - - - - - - -
LABEL PRECAUTIONARY STATEMENTS
HIGHLY TOXIC (USA)
TOXIC (EU)
MAY CAUSE CANCER BY INHALATION.
TOXIC BY INHALATION.
HARMFUL IN CONTACT WITH SKIN AND IF SWALLOWED.
CAUSES BURNS.
TARGET ORGAN(S):
TEETH
CARDIOVASCULAR SYSTEM
IN CASE OF ACCIDENT OR IF YOU FEEL UNWELL, SEEK MEDICAL ADVICE IMMEDIATELY (SHOW THE LABEL WHERE POSSIBLE).
WEAR SUITABLE PROTECTIVE CLOTHING, GLOVES AND EYE/FACE PROTECTION.
DO NOT BREATHE VAPOR.

SECTION 4. - - - - - - - - - - - FIRST-AID MEASURES- - - - - - - - - - -
IF SWALLOWED, WASH OUT MOUTH WITH WATER PROVIDED PERSON IS CONSCIOUS. CALL A PHYSICIAN IMMEDIATELY.
IF INHALED, REMOVE TO FRESH AIR. IF NOT BREATHING GIVE ARTIFICIAL RESPIRATION. IF BREATHING IS DIFFICULT, GIVE OXYGEN.
IN CASE OF SKIN CONTACT, FLUSH WITH COPIOUS AMOUNTS OF WATER FOR AT LEAST 15 MINUTES. REMOVE CONTAMINATED CLOTHING AND SHOES. CALL A PHYSICIAN.
IN CASE OF CONTACT WITH EYES, FLUSH WITH COPIOUS AMOUNTS OF WATER FOR AT LEAST 15 MINUTES. ASSURE ADEQUATE FLUSHING BY SEPARATING THE EYELIDS WITH FINGERS. CALL A PHYSICIAN.

SECTION 5. - - - - - - - - - - FIRE FIGHTING MEASURES - - - - - - - - - -
EXTINGUISHING MEDIA
NONCOMBUSTIBLE.
USE EXTINGUISHING MEDIA APPROPRIATE TO SURROUNDING FIRE CONDITIONS.
DO NOT USE WATER.
SPECIAL FIREFIGHTING PROCEDURES
WEAR SELF-CONTAINED BREATHING APPARATUS AND PROTECTIVE CLOTHING TO PREVENT CONTACT WITH SKIN AND EYES.
UNUSUAL FIRE AND EXPLOSIONS HAZARDS

EMITS TOXIC FUMES UNDER FIRE CONDITIONS.
CONTACT WITH OTHER MATERIAL MAY CAUSE FIRE.
STRONG DEHYDRATING AGENT WHICH MAY CAUSE IGNITION OF FINELY DIVIDED MATERIALS ON CONTACT.

SECTION 6. - - - - - - - - - - ACCIDENTAL RELEASE MEASURES- - - - - - - - - -

WEAR SELF-CONTAINED BREATHING APPARATUS, RUBBER BOOTS AND HEAVY RUBBER GLOVES.
COVER WITH DRY-LIME, SAND, OR SODA ASH. PLACE IN COVERED CONTAINERS USING NON-SPARKING TOOLS AND TRANSPORT OUTDOORS.
VENTILATE AREA AND WASH SPILL SITE AFTER MATERIAL PICKUP IS COMPLETE.
EVACUATE AREA.

SECTION 7. - - - - - - - - - - - - HANDLING AND STORAGE- - - - - - - - - - -

REFER TO SECTION 8.

SECTION 8. - - - - - - - EXPOSURE CONTROLS/PERSONAL PROTECTION- - - - - -

WASH CONTAMINATED CLOTHING BEFORE REUSE.
WASH THOROUGHLY AFTER HANDLING.
DO NOT BREATHE VAPOR.
DO NOT GET IN EYES, ON SKIN, ON CLOTHING.
AVOID PROLONGED OR REPEATED EXPOSURE.
NIOSH/MSHA-APPROVED RESPIRATOR.
COMPATIBLE CHEMICAL-RESISTANT GLOVES.
CHEMICAL SAFETY GOGGLES.
WEAR APPROPRIATE NIOSH/MSHA-APPROVED RESPIRATOR, CHEMICAL-RESISTANT GLOVES, SAFETY GOGGLES, OTHER PROTECTIVE CLOTHING.
FACESHIELD (8-INCH MINIMUM).
SAFETY SHOWER AND EYE BATH.
USE ONLY IN A CHEMICAL FUME HOOD.
KEEP TIGHTLY CLOSED.
STORE IN A COOL DRY PLACE.
DO NOT ALLOW CONTACT WITH WATER.

SECTION 9. - - - - - - - - PHYSICAL AND CHEMICAL PROPERTIES - - - - - - - -

APPEARANCE AND ODOR
LIQUID.
PHYSICAL PROPERTIES

BOILING POINT:	100 C
VAPOR PRESSURE:	1 MMHG
SPECIFIC GRAVITY:	1.84
VAPOR DENSITY:	$\leq$ 0.3 G/L

SECTION 10. - - - - - - - - - - -STABILITY AND REACTIVITY - - - - - - - - - -

STABILITY
STABLE.
INCOMPATIBILITIES
PROTECT FROM MOISTURE.
DO NOT ALLOW WATER TO ENTER CONTAINER.
BASES
HALIDES
ORGANIC MATERIALS
INCOMPATIBLE WITH CARBIDES, CHLORATES, FULMINATES, NITRATES, PICRATES, CYANIDES, ALKALI HALIDES, ZINC IODIDE, PERMANGANATES, HYDROGEN PEROXIDE, AZIDES, PERCHLORATES, NITROMETHANE, PHOSPHOROUS, NITRITES. VIOLENT REACTION WITH: CYCLOPENTADIENE, CYCLOPENTANONE OXIME, NITROARYL AMINES, HEXALITHIUM DISILICIDE, PHOSPHOROUS (III) OXIDE.
FINELY POWDERED METALS
HAZARDOUS COMBUSTION OR DECOMPOSITION PRODUCTS
SULFURIC ACID
SULFUR OXIDES
HYDROGEN SULFIDE GAS
HAZARDOUS POLYMERIZATION
WILL NOT OCCUR.

SECTION 11. - - - - - - - - - - - TOXICOLOGICAL INFORMATION - - - - - - - -

ACUTE EFFECTS
MATERIAL IS EXTREMELY DESTRUCTIVE TO TISSUE OF THE MUCOUS MEMBRANES AND UPPER RESPIRATORY TRACT, EYES AND SKIN.
INHALATION MAY RESULT IN SPASM, INFLAMMATION AND EDEMA OF THE

LARYNX AND BRONCHI, CHEMICAL PNEUMONITIS AND PULMONARY EDEMA.
SYMPTOMS OF EXPOSURE MAY INCLUDE BURNING SENSATION, COUGHING, WHEEZING, LARYNGITIS, SHORTNESS OF BREATH, HEADACHE, NAUSEA AND VOMITING.
CAUSES BURNS.
HARMFUL IF ABSORBED THROUGH SKIN.
TOXIC IF INHALED.
HARMFUL IF SWALLOWED.
CHRONIC EFFECTS
TARGET ORGAN(S):
TEETH
CARDIOVASCULAR SYSTEM
THE INTERNATIONAL AGENCY FOR RESEARCH ON CANCER (IARC) HAS DETERMINED THAT OCCUPATIONAL EXPOSURE TO STRONG-INORGANIC-ACID MISTS CONTAINING SULFURIC ACID IS CARCINOGENIC TO HUMANS (GROUP 1).
RTECS #: WS5600000
SULFURIC ACID
IRRITATION DATA

EYE-RBT 250 UG SEV	AJOPAA 29,1363,1946
EYE-RBT 5 MG/30S RINSE SEV	TXCYAC 23,281,1982

TOXICITY DATA

UNR-MAN LDLO:135 MG/KG	85DCAI 2,73,1970
ORL-RAT LD50:2140 MG/KG	AIHAAP 30,470,1969
IHL-RAT LC50:510 MG/M3/2H	85GMAT -,107,1982
IHL-MUS LC50:320 MG/M3/2H	85GMAT -,107,1982
IHL-GPG LC50:18 MG/M3	MELAAD 45,590,1954

ONLY SELECTED REGISTRY OF TOXIC EFFECTS OF CHEMICAL SUBSTANCES (RTECS) DATA IS PRESENTED HERE. SEE ACTUAL ENTRY IN RTECS FOR COMPLETE INFORMATION.

SECTION 12. - - - - - - - - - - ECOLOGICAL INFORMATION - - - - - - - - - -
DATA NOT YET AVAILABLE.

SECTION 13. - - - - - - - - - - DISPOSAL CONSIDERATIONS - - - - - - - - - -
CONTACT A LICENSED PROFESSIONAL WASTE DISPOSAL SERVICE TO DISPOSE OF THIS MATERIAL.
OBSERVE ALL FEDERAL, STATE AND LOCAL ENVIRONMENTAL REGULATIONS.

SECTION 14. - - - - - - - - - - TRANSPORT INFORMATION - - - - - - - - - -
CONTACT SIGMA CHEMICAL COMPANY FOR TRANSPORTATION INFORMATION.

SECTION 15. - - - - - - - - - - REGULATORY INFORMATION - - - - - - - - - -
EUROPEAN INFORMATION
EC INDEX NO: 016-020-00-8
TOXIC
R 35
CAUSES SEVERE BURNS.
S 26
IN CASE OF CONTACT WITH EYES, RINSE IMMEDIATELY WITH PLENTY OF WATER AND SEEK MEDICAL ADVICE.
S 30
NEVER ADD WATER TO THIS PRODUCT.
S 45
IN CASE OF ACCIDENT OR IF YOU FEEL UNWELL, SEEK MEDICAL ADVICE IMMEDIATELY (SHOW THE LABEL WHERE POSSIBLE).
REVIEWS, STANDARDS, AND REGULATIONS
OEL=MAK

ACGIH TLV-SUSPECTED HUMAN CARCINOGEN	DTLVS* TLV/BEI,1999
ACGIH TLV-STEL 3 MG/M3	DTLVS* TLV/BEI,1999
ACGIH TLV-TWA 1 MG/M3	DTLVS* TLV/BEI,1999
IARC CANCER REVIEW:HUMAN SUFFICIENT EVIDENCE	IMEMDT 54,41,1992
IARC CANCER REVIEW:GROUP 1	IMEMDT 54,41,1992

EPA FIFRA 1988 PESTICIDE SUBJECT TO REGISTRATION OR RE-REGISTRATION
FEREAC 54,7740,1989
MSHA STANDARD-AIR:TWA 1 MG/M3
DTLVS* 3,239,1971
OSHA PEL (GEN INDU):8H TWA 1 MG/M3
CFRGBR 29,1910.1000,1994

OSHA PEL (CONSTRUC):8H TWA 1 MG/M3
CFRGBR 29,1926.55,1994
OSHA PEL (SHIPYARD):8H TWA 1 MG/M3
CFRGBR 29,1915.1000,1993
OSHA PEL (FED CONT):8H TWA 1 MG/M3
CFRGBR 41,50-204.50,1994
OEL-ARAB REPUBLIC OF EGYPT: TWA 1 MG/M3, JAN1993
OEL-AUSTRALIA: TWA 1 MG/M3, JAN1993
OEL-AUSTRIA: MAK 1 MG/M3, JAN1999
OEL-BELGIUM: TWA 1 MG/M3, STEL 3 MG/M3, JAN1993
OEL-DENMARK: TWA 1 MG/M3, JAN1999
OEL-FINLAND: TWA 1 MG/M3, STEL 3 MG/M3, SKIN, JAN1999
OEL-FRANCE: VME 1 MG/M3, VLE 3 MG/M3, JAN1999
OEL-GERMANY: MAK 1 MG/M3, JAN1999
OEL-HUNGARY: STEL 1 MG/M3, JAN1993
OEL-JAPAN: OEL 1 MG/M3, JAN1999
OEL-THE NETHERLANDS: MAC-TGG 1 MG/M3, JAN1999
OEL-NORWAY: TWA 1 MG/M3, JAN1999
OEL-POLAND: MAC(TWA) 1 MG/M3, MAC(STEL) 3 MG/M3, JAN1999
OEL-RUSSIA: STEL 1 MG/M3, SKIN, JAN1993
OEL-SWEDEN: NGV 1 MG/M3, TKV 3 MG/M3, JAN1999
OEL-SWITZERLAND: MAK-W 1 MG/M3, KZG-W 2 MG/M3, JAN1999
OEL-THAILAND: TWA 1 MG/M3, JAN1993
OEL-TURKEY: TWA 1 MG/M3, JAN1993
OEL-UNITED KINGDOM: LTEL 1 MG/M3, JAN1993
OEL IN ARGENTINA, BULGARIA, COLOMBIA, JORDAN, KOREA CHECK ACGIH TLV;
OEL IN NEW ZEALAND, SINGAPORE, VIETNAM CHECK ACGIH TLV
NIOSH REL TO SULFURIC ACID-AIR:10H TWA 1 MG/M3
NIOSH* DHHS #92-100,1992
NOHS 1974: HZD 70870; NIS 313; TNF 54746; NOS 143; TNE 499446
NOES 1983: HZD 70870; NIS 300; TNF 54516; NOS 182; TNE 775587; TFE 173653
EPA TSCA SECTION 8(B) CHEMICAL INVENTORY
EPA TSCA SECTION 8(D) UNPUBLISHED HEALTH/SAFETY STUDIES
EPA TSCA SECTION 8(E) RISK NOTIFICATION, 8EHQ-0892-9247;8EHQ-0892-9248
EPA TSCA TEST SUBMISSION (TSCATS) DATA BASE, OCTOBER 2000
NIOSH ANALYTICAL METHOD, 1994: ACIDS, INORGANIC, 7903
NTP 9TH REPORT ON CARCINOGENS, 2000:KNOWN TO BE HUMAN CARCINOGEN
OSHA ANALYTICAL METHOD #ID-113

U.S. INFORMATION

THIS PRODUCT IS SUBJECT TO SARA SECTION 313 REPORTING REQUIREMENTS.

SECTION 16. - - - - - - - - - - - OTHER INFORMATION- - - - - - - - - - -

THE ABOVE INFORMATION IS BELIEVED TO BE CORRECT BUT DOES NOT PURPORT TO BE ALL INCLUSIVE AND SHALL BE USED ONLY AS A GUIDE. SIGMA, ALDRICH, FLUKA SHALL NOT BE HELD LIABLE FOR ANY DAMAGE RESULTING FROM HANDLING OR FROM CONTACT WITH THE ABOVE PRODUCT. SEE REVERSE SIDE OF INVOICE OR PACKING SLIP FOR ADDITIONAL TERMS AND CONDITIONS OF SALE.

MSDS# 6123

MATERIAL SAFETY DATA SHEET

Hydrogen Peroxide (20 to 40%)

FMC

MSDS Ref. No.: 7722-84-1-3
Date Approved: 02/02/2004
Revision No.: 7

This document has been prepared to meet the requirements of the U.S. OSHA Hazard Communication Standard, 29 CFR 1910.1200; the Canada's Workplace Hazardous Materials Information System (WHMIS) and, the EC Directive, 2001/58/EC.

1. PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: Hydrogen Peroxide (20 to 40%)

ALTERNATE PRODUCT NAME(S): Durox® Reg. & LR 35%, Oxypure® 35%, Standard 27.5 & 35%, Super D® 25 & 35, Technical 35%, Chlorate Grade, 20%, Semiconductor Reg, Seg, RGS, RGS 2, RGS 3, 31%

GENERAL USE: Durox® 35% Reg. & LR - meets the Food Chemical Codex requirements for aseptic packaging and other food related applications.

Oxypure® 35% - certified by NSF to meet NSF/ANSI Standard 60 requirements for drinking water treatment.

Standard 27.5 and 35% - most suitable grade for industrial bleaching, processing, pollution abatement and general oxidation reactions.

Semiconductor Reg, Seg, RGS, RGS 2, RGS 3, 31% - conform to ACS and Semi Specs. for wafer etching and cleaning, and applications requiring low residues.

Super D® 25 and 35% - meets US Pharmacopoeia specifications for 3% topical solutions when diluted with proper quality water. While manufactured to the USP standards for purity and to FMC's demanding ISO 9002 quality standards, FMC does not claim that it's Hydrogen Peroxide is manufactured in accordance with all pharmaceutical cGMP conditions.

Technical 35% - essentially free of inorganic metals suitable for chemical synthesis.

Chlorate Grade 20% - specially formulated for use in chlorate manufacture or processing.

MANUFACTURER

FMC CORPORATION
Hydrogen Peroxide Division
1735 Market Street
Philadelphia, PA 19103
(215) 299-6000 (General Information)

FMC of Canada Ltd.
Hydrogen Peroxide Division
PG Pulp Mill Road
Prince George, BC V2N2S6
(250) 561-4200 (General Information)

EMERGENCY TELEPHONE NUMBERS

(800) 424-9300 (CHEMTREC - U.S.)
(613) 996-6666 (CANUTEC)
(303) 595-9048 (Medical - U.S. - Call Collect)

(281) 474-8750 (Plant: Pasadena, TX, US - Call Collect)
(250) 561-4221 (Plant: Prince George, BC, Canada - Call Collect)

2. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW:

- Clear, colorless, odorless liquid
- Oxidizer.
- Contact with combustibles may cause fire.
- Decomposes yielding oxygen that supports combustion of organic matters and can cause overpressure if confined.
- Corrosive to eyes, nose, throat, lungs and gastrointestinal tract.

POTENTIAL HEALTH EFFECTS: Corrosive to eyes, nose, throat and lungs. May cause irreversible tissue damage to the eyes including blindness. May cause skin irritation.

3. COMPOSITION / INFORMATION ON INGREDIENTS

Chemical Name	CAS#	Wt.%	EC No.	EC Class
Hydrogen Peroxide	7722-84-1	20 - 40	231-765-0	C, R34
Water	7732-18-5	60 - 80	231-791-2	Not classified as hazardous

4. FIRST AID MEASURES

EYES: Immediately flush with water for at least 15 minutes, lifting the upper and lower eyelids intermittently. See a medical doctor or ophthalmologist immediately.

SKIN: Wash with plenty of soap and water. Get medical attention if irritation occurs and persists.

INGESTION: Rinse mouth with water. Dilute by giving 1 or 2 glasses of water. Do not induce vomiting. Never give anything by mouth to an unconscious person. See a medical doctor immediately.

INHALATION: Remove to fresh air. If breathing difficulty or discomfort occurs and persists, contact a medical doctor.

NOTES TO MEDICAL DOCTOR: Hydrogen peroxide at these concentrations is a strong oxidant. Direct contact with the eye is likely to cause corneal damage especially if not washed immediately. Careful ophthalmologic evaluation is recommended and the possibility of local corticosteroid therapy should be considered. Because of the likelihood of corrosive effects on the gastrointestinal tract after ingestion, and the unlikelihood of systemic effects, attempts at evacuating the stomach via emesis induction or gastric lavage should be avoided. There is a remote possibility, however, that a nasogastric or orogastric tube may be required for the reduction of severe distension due to gas formation.

5. FIRE FIGHTING MEASURES

EXTINGUISHING MEDIA: Flood with water.

FIRE / EXPLOSION HAZARDS: Product is non-combustible. On decomposition releases oxygen which may intensify fire.

FIRE FIGHTING PROCEDURES: Any tank or container surrounded by fire should be flooded with water for cooling. Wear full protective clothing and self-contained breathing apparatus.

FLAMMABLE LIMITS: Non-combustible

SENSITIVITY TO IMPACT: No data available

SENSITIVITY TO STATIC DISCHARGE: No data available

6. ACCIDENTAL RELEASE MEASURES

RELEASE NOTES: Dilute with a large volume of water and hold in a pond or diked area until hydrogen peroxide decomposes. Hydrogen peroxide may be decomposed by adding sodium metabisulfite or sodium sulfite after diluting to about 5%. Dispose according to methods outlined for waste disposal.

Combustible materials exposed to hydrogen peroxide should be immediately submerged in or rinsed with large amounts of water to ensure that all hydrogen peroxide is removed. Residual hydrogen peroxide that is allowed to dry (upon evaporation hydrogen peroxide can concentrate) on organic materials such as paper, fabrics, cotton, leather, wood or other combustibles can cause the material to ignite and result in a fire.

7. HANDLING AND STORAGE

HANDLING: Wear chemical splash-type monogoggles and full-face shield, impervious clothing, such as rubber, PVC, etc., and rubber or neoprene gloves and shoes. Avoid cotton, wool and leather. Avoid excessive heat and contamination. Contamination may cause decomposition and generation of oxygen gas which could result in high pressures and possible container rupture. Hydrogen peroxide should be stored only in vented containers and transferred only in a prescribed manner (see FMC Technical Bulletins). Never return unused hydrogen peroxide to original container, empty drums should be triple rinsed with water before discarding. Utensils used for handling hydrogen peroxide should only be made of glass, stainless steel, aluminum or plastic.

STORAGE: Store drums in cool areas out of direct sunlight and away from combustibles. For bulk storage refer to FMC Technical Bulletins.

COMMENTS: VENTILATION: Provide mechanical general and/or local exhaust ventilation to prevent release of vapor or mist into the work environment.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE LIMITS

Chemical Name	ACGIH	OSHA	Supplier
Hydrogen Peroxide	1 ppm (TWA)	1 ppm (PEL)	

ENGINEERING CONTROLS: Ventilation should be provided to minimize the release of hydrogen peroxide vapors and mists into the work environment. Spills should be minimized or confined immediately to prevent release into the work area. Remove contaminated clothing immediately and wash before reuse.

PERSONAL PROTECTIVE EQUIPMENT

EYES AND FACE: Use chemical splash-type monogoggles and a full-face shield made of polycarbonate, acetate, polycarbonate/acetate, PETG or thermoplastic.

RESPIRATORY: If concentrations in excess of 10 ppm are expected, use NIOSH/DHHS approved self-contained breathing apparatus (SCBA), or other approved atmospheric-supplied respirator (ASR) equipment (e.g., a full-face airline respirator (ALR)). DO NOT use any form of air-purifying respirator (APR) or filtering facepiece (AKA dust mask), especially those containing oxidizable sorbants such as activated carbon.

PROTECTIVE CLOTHING: For body protection wear impervious clothing such as an approved splash protective suit made of SBR Rubber, PVC (PVC Outershell w/Polyester Substrate), Gore-Tex (Polyester trilaminate w/Gore-Tex), or a specialized HAZMAT Splash or Protective Suite (Level A, B, or C). For foot protection, wear approved boots made of NBR, PVC, Polyurethane, or neoprene. Overboots made of Latex or PVC, as well as firefighter boots or specialized HAZMAT boots are also permitted. DO NOT wear any form of boot or overboots made of nylon or nylon blends. DO NOT use cotton, wool or leather, as these materials react RAPIDLY with higher concentrations of hydrogen peroxide. Completely submerge hydrogen peroxide contaminated clothing or other materials in water prior to drying. Residual hydrogen peroxide, if allowed to dry on materials such as paper, fabrics, cotton, leather, wood or other combustibles can cause the material to ignite and result in a fire.

GLOVES: For hand protection, wear approved gloves made of nitrile, PVC, or neoprene. DO NOT use cotton, wool or leather for these materials react RAPIDLY with higher concentrations of hydrogen peroxide. Thoroughly rinse the outside of gloves with water prior to removal. Inspect regularly for leaks.

9. PHYSICAL AND CHEMICAL PROPERTIES

ODOR:	Odorless
APPEARANCE:	Clear, colorless liquid
AUTOIGNITION TEMPERATURE:	Non-combustible
BOILING POINT:	103°C/218°F (20%); 107°C/225°F (31%); 108°C/226°F (35%)
COEFFICIENT OF OIL / WATER:	Not available
DENSITY / WEIGHT PER VOLUME:	Not available
EVAPORATION RATE:	Above 1 (Butyl Acetate = 1)
FLASH POINT:	Non-combustible
FREEZING POINT:	-15°C/6°F (20%); -26°C/-15°F (31%); -33°C/-27°F (35%)
ODOR THRESHOLD:	Not available
OXIDIZING PROPERTIES:	Strong oxidizer
PERCENT VOLATILE:	100%
pH:	(as is) 2.0 to 3.7
SOLUBILITY IN WATER:	(in H_2O % by wt) 100%
SPECIFIC GRAVITY:	1.07 @ 20°C/4°C (20%); 1.11 @ 20°C/4°C (31%); 1.13 @ 20°C/4°C (35%)
VAPOR DENSITY:	(Air = 1): Not available
VAPOR PRESSURE:	28 mmHg @ 30°C (20%); 24 mmHg @ 30°C (31%); 23 mmHg @ 30°C (35%)

COMMENTS:

pH (1% solution) @ 25°C: 5.0 - 6.0

10. STABILITY AND REACTIVITY

CONDITIONS TO AVOID:	Excessive heat or contamination could cause product to become unstable.
STABILITY:	Stable (heat and contamination could cause decomposition)
POLYMERIZATION:	Will not occur
INCOMPATIBLE MATERIALS:	Reducing agents, wood, paper and other combustibles, iron and other heavy metals, copper alloys and caustic.
HAZARDOUS DECOMPOSITION PRODUCTS:	Oxygen which supports combustion.

COMMENTS: Materials to Avoid : Dirt, organics, cyanides and combustibles such as wood, paper, oils, etc.

11. TOXICOLOGICAL INFORMATION

EYE EFFECTS: 35% hydrogen peroxide: Extremely irritating/corrosive (rabbit) [FMC Study Number: I83-748]

SKIN EFFECTS: 35% hydrogen peroxide: Mildly irritating after 4-hour exposure (rabbit) [FMC Study Number: I83-747]

DERMAL LD_{50}: 35% hydrogen peroxide: > 2,000 mg/kg (rabbit) [FMC Study Number: I83-746]

ORAL LD_{50}: 35% hydrogen peroxide: 1,193 mg/kg (rat) [FMC Study Number: I83-745]

INHALATION LC_{50}: 50% hydrogen peroxide: > 0.17 mg/l (rat) [FMC Study Number: I89-1080]

TARGET ORGANS: Eyes, nose, throat and lungs

ACUTE EFFECTS FROM OVEREXPOSURE: Extremely irritating/corrosive to eyes and gastrointestinal tract. May cause irreversible tissue damage to the eyes including blindness. Inhalation of mist or vapors may be severely irritating to nose, throat and lungs. May cause skin irritation.

CHRONIC EFFECTS FROM OVEREXPOSURE: The International Agency for Research on Cancer (IARC) has concluded that there is inadequate evidence for carcinogenicity of hydrogen peroxide in humans, but limited evidence in experimental animals (Group 3 - not classifiable as to its carcinogenicity to humans). The American Conference of Governmental Industrial Hygienists (ACGIH) has concluded that hydrogen peroxide is a 'Confirmed Animal Carcinogen with Unknown Relevance to Humans' (A3).

CARCINOGENICITY:

Chemical Name	IARC	NTP	OSHA	Other
Hydrogen Peroxide	Listed	Not listed	Not listed	(ACGIH) Listed (A3, Animal Carcinogen)

12. ECOLOGICAL INFORMATION

ECOTOXICOLOGICAL INFORMATION: Channel catfish 96-hour LC_{50} = 37.4 mg/L
Fathead minnow 96-hour LC_{50} = 16.4 mg/L
Daphnia magna 24-hour EC_{50} = 7.7 mg/L
Daphnia pulex 48-hour LC_{50} = 2.4 mg/L
Freshwater snail 96-hour LC_{50} = 17.7 mg/L
For more information refer to ECETOC "Joint Assessment of Commodity Chemicals No. 22, Hydrogen Peroxide." ISSN-0773-6339, January 1993

CHEMICAL FATE INFORMATION: Hydrogen peroxide in the aquatic environment is subject to various reduction or oxidation processes and decomposes into water and oxygen. Hydrogen peroxide half-life in freshwater ranged from 8 hours to 20 days, in air from 10-20 hrs. and in soils from minutes to hours depending upon microbiological activity and metal contaminants.

13. DISPOSAL CONSIDERATIONS

DISPOSAL METHOD: An acceptable method of disposal is to dilute with a large amount of water and allow the hydrogen peroxide to decompose followed by discharge into a suitable treatment system in accordance with all regulatory agencies. The appropriate regulatory agencies should be contacted prior to disposal.

14. TRANSPORT INFORMATION

U.S. DEPARTMENT OF TRANSPORTATION (DOT)

PROPER SHIPPING NAME:	Hydrogen peroxide, aqueous solutions with not less than 20% but not more than 40% hydrogen peroxide
PRIMARY HAZARD CLASS / DIVISION:	5.1 (Oxidizer)
UN/NA NUMBER:	UN 2014
PACKING GROUP:	II
LABEL(S):	Oxidizer, Corrosive
PLACARD(S):	5.1 (Oxidizer)

ADDITIONAL INFORMATION:

DOT Marking: Hydrogen Peroxide, aqueous solution with not less than 20%, but not more than 40% Hydrogen Peroxide, UN 2014

Hazardous Substance/RQ: Not applicable

49 STCC Number: 4918775

DOT Spec: stainless steel/high purity aluminum cargo tanks and rail cars. UN Spec: HDPE drums. Contact FMC for specific details.

INTERNATIONAL MARITIME DANGEROUS GOODS (IMDG)

PROPER SHIPPING NAME:

Hydrogen peroxide, aqueous solutions with not less than 20%, but not more than 60% hydrogen peroxide.

INTERNATIONAL CIVIL AVIATION ORGANIZATION (ICAO) / INTERNATIONAL AIR TRANSPORT ASSOCIATION (IATA)

PROPER SHIPPING NAME:

Hydrogen peroxide, aqueous solutions with not less than 20%, but not more than 40% hydrogen peroxide (*).

OTHER INFORMATION:

(*) Air regulations permit shipment of Hydrogen Peroxide (20 - 40%) in non-vented containers for Air Cargo Only aircraft, as well as for Passenger and Cargo aircraft. HOWEVER, all FMC Hydrogen Peroxide containers are vented and therefore, air shipments of FMC H_2O_2 is not permitted. IATA air regulations state that venting of packages containing oxidizing substances is not permitted for air transport.

Protect from physical damage. Keep drums in upright position. Drums should not be stacked in transit. Do not store drum on wooden pallets.

15. REGULATORY INFORMATION

UNITED STATES

SARA TITLE III (SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT)

SECTION 302 EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355, APPENDIX A):
Not listed

SECTION 311 HAZARD CATEGORIES (40 CFR 370):
Fire Hazard, Immediate (Acute) Health Hazard

SECTION 312 THRESHOLD PLANNING QUANTITY (40 CFR 370):
The Threshold Planning Quantity (TPQ) for this product, if treated as a mixture, is 10,000 lbs; however, this product contains the following ingredients with a TPQ of less than 10,000 lbs.: None, (conc. <52%)

SECTION 313 REPORTABLE INGREDIENTS (40 CFR 372):
Not listed

CERCLA (COMPREHENSIVE ENVIRONMENTAL RESPONSE COMPENSATION AND LIABILITY ACT)

CERCLA DESIGNATION & REPORTABLE QUANTITIES (RQ) (40 CFR 302.4):
Unlisted (Hydrogen Peroxide 20-40%); RQ = 100 lbs.; Ignitability, Corrosivity

TSCA (TOXIC SUBSTANCE CONTROL ACT)

TSCA INVENTORY STATUS (40 CFR 710):
Listed

RESOURCE CONSERVATION AND RECOVERY ACT (RCRA)
RCRA IDENTIFICATION OF HAZARDOUS WASTE (40 CFR 261):
Waste Number: D001, D002

CANADA

WHMIS (WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM):

Product Identification Number:	2014
Hazard Classification / Division:	Class C (Oxidizer), Class D, Div. 2, Subdiv. B. (Toxic), Class E (Corrosive)
Ingredient Disclosure List:	Listed

EU EINECS NUMBERS:

008-003-00-9 (hydrogen peroxide)

INTERNATIONAL LISTINGS

Hydrogen peroxide:

China: Listed
Japan (ENCS): (1)-419
Korea: KE-20204
Philippines (PICCS): Listed

16. OTHER INFORMATION

HAZARD, RISK AND SAFETY PHRASE DESCRIPTIONS:

Hydrogen Peroxide:

Site Management Plan

Property Known As:

Former Swivelier Site
Village of Nanuet, Rockland County, New York
NYSDEC Site Number: 3-44-036
EWMA Project No. 205548

June 2018

Appendix 6 – Site Management Forms

APPENDIX 6

FORMER SWIVELIER SITE

ANNUAL SITE INSPECTION REPORT/CHECKLIST

Date:	[Date of Inspection]
Inspector:	[Inspector, Company, Title]
Reason for Inspection:	[Year] Annual Site Inspection Per Inspection Checklist

1. *Is the Site compliant with all Institutional Controls, including Site usage (yes/no)? If no, describe:*

2. *Provide a general evaluation of Site conditions:*

3. *Provide a general evaluation of the condition and effectiveness of composite cover systems:*

4. *Provide a general evaluation of the condition and effectiveness of Vapor Intrusion Controls:*

5. *Provide a general evaluation of the condition of monitoring wells:*

6. *Are Site management activities being conducted according to Site Management Plan (yes/no)?*
   If no, describe:

7. *Is Site documentation as required by the Site Management Plan up to date (yes/no)?*
   If no, describe:

8. *Are any changes to the monitoring program recommended (yes/no)?*
   If yes, describe:

Site Management Plan

Property Known As:

Former Swivelier Site
Village of Nanuet, Rockland County, New York
NYSDEC Site Number: 3-44-036
EWMA Project No. 205548

June 2018

Appendix 7 – O&M Manual

INNOVATIVE | EXPERIENCED | RESPONSIVE

Sub-Slab Depressurization System - Operation, Maintenance, & Monitoring (OMM) Plan

Former Swivelier Site, Nanuet, New York

NYSDEC Site Number: 3-44-036

Prepared for:
S.F. Properties
627 South Main Street
New City, NY 10956

Submitted by:
EWMA
100 Misty Lane
Parsippany, NJ 07054-2741
973-560-1400

February 2018

EWMA Project No. 205548

Prepared by Jacob M. Strauss, PE
Senior Project Engineer

Reviewed by Kevin Seise
Senior Project Manager

Table of Contents

1. General Site Information

1.1 Introduction

EWMA has prepared this Operation, Maintenance, & Monitoring (OMM) Plan in support of the Site Management Plan (SMP). This OMM Plan has been prepared for the Sub-Slab Depressurization System (SSDS) installed at the Former Swivelier Site (Swivelier) located in Nanuet, New York. The SSDS was installed within in March 2008 to address concerns regarding a potential source of vapor intrusion beneath the building.

1.2 Background

The results of the diagnostic field pilot test, conducted by EWMA on August 23, 2004, provided a basis to determine the locations and number of extraction points necessary to achieve adequate depressurization underneath the entire building. Upon instructions from the property representative, all SSDS installation activities were conducted within the empty warehouse portion of the building. As such, two standalone systems were installed, one SSDS each in the western and eastern portions of the building and connected to vacuum blower #1 and #2, respectively, which are located on the roof of the building.

The SSDS utilizes sub-slab ventilation de-pressurization techniques to mitigate the migration of vapors from the subgrade to the interior of the new facilities. In accordance with the November 2004 Remedial Action Work Plan (RAWP), S.F. Properties retained EWMA to design and install the SSDS. Details of the SSDS's components, construction, testing and maintenance are included herein.

1.3 Objectives

The primary objective of the active SSDS is to apply a negative pressure field or vacuum beneath the building slab, thereby preventing vapor intrusion from sub-slab soils into the building. The SSDS is an active system utilizing blowers to create a continuous negative pressure field below the slab. Installation of the SSDS was conducted in accordance with the NYSDOH *Guidance for Evaluating Soil Vapor Intrusion in the State of New York*, dated October 2006. An active SSDS should achieve a minimum negative sub-slab pressure of at least 0.004 inches of water (1 Pascal) across the slab for the mitigation of vapor intrusion.

2. SSDS Design & Installation

2.1 SSDS Description

The SSDS was installed by MBC Contractors in March 2008, in accordance with the November 2004 RAWP. Two standalone systems were installed, one SSDS in the western portion of the building and one SSDS in the eastern portion of the building, and are isolated from one another.

2.2 SSDS Components

The installation was performed and generally sequenced as listed below and as described in subsequent portions of this report section (see **Figure 1** – SSDS Layout Drawing):

- PVC solid piping installed through the slab and up through the building and roof; and
- Baldor 10 hp regenerative blowers.

2.2.1 PVC Solid Piping

Soild 2-inch and 4-inch dia. PVC pipes were installed through the slab and connected to sub-slab extraction ports. Vent riser pips were fastened to the interior surface of the building walls and up through the roof. All piping was designed to tolerate the anticipated live and dead loads within the building.

2.2.2 Baldor Regenerative Blowers

Baldor J12108 regenerative blowers (10 hp) were installed on top of the building roof, one blower for the western portion of the building and one blower for the eastern portion of the building. The function of the blowers, as active ventilation devices, are to extract air from beneath the ground floor slab, creating a continuous negative pressure field below the slab.

3. SSDS Operation, Maintenance, and Monitoring

3.1 SSDS Installation Inspection

EWMA conducted an inspection of the SSDS on November 16, 2007. A Licensed Professional Engineer inspected all blowers, vent riser roof penetrations, and connections to extraction points.

3.2 System Commissioning

Commissioning of the SSDS is required to verify that it is functioning consistent with the mandated performance specifications and to establish an operational baseline. SSDS commissioning is comprised of indoor air samples, sub-slab negative pressure field measurements, system air flow and pressure measurements. This includes a visual inspection of the system, establishment of an operational baseline from appropriate commissioning parameters, determination as to whether alterations or augmentation of the system are required, and identification of any problems (noise, vibration, condensate generation, complaints, etc.).

Measurements can include but are not limited to vacuum, amperage, temperature, DRI-VOC, methane and non-methane concentrations, oxygen, air flow, and any system specific measurements that will aid in determining the system performance.

Additionally, verification sampling is required to confirm the performance of the mitigation action in effectively reducing contaminant levels in the indoor air. Verification sampling should be implemented on the same day as the commissioning of the system.

3.3 Maintenance and Monitoring

Routine maintenance and monitoring of the system will be conducted as necessary to maintain the effectiveness of the SSDS. This consists of inspections, diagnostic measurements, and indoor air sampling (if applicable) to verify the proper operation and continued system effectiveness in the mitigation of vapor intrusion.

The concrete floor slab will be routinely inspected for any cracks or damage that would affect the protectiveness of the system. Inspections and monitoring tests of the system will be performed annually.

Measurements will be taken from the monitoring points and vent riser ports to verify that the system is working properly and as intended. The results of all inspections, maintenance and any disturbances to the system will be recorded and documented in an annual Periodic Review Report (PRR).

3.4 Troubleshooting

By design, the SSDS has relatively few components that could fail and affect operation. The blowers are designed by the manufacturer for a long operational lifespan. At the end of this lifespan, or sooner, the blowers should be replaced as necessary with lower-flow radon fans.

The radon fans should be fitted with a RadonAway Checkpoint IIa alarm to monitor the systems. The alarm has green and red LED lights, as well as an audible alarm. Green light is normal, a red light and/or audible alarm indicates a loss of vacuum pressure.

In the event of failure of the SSDS electrical components (alarm, breakers, switches, etc.), the component should be repaired or replaced by a licensed electrical contractor. Other SSDS contacts, if necessary, are provided in Section 3.5.

3.5 Contact Information

The following is a list of contacts for use regarding the SSDS operation, maintenance, and monitoring:

SSDS Design Engineer & Environmental Consultant
EWMA
100 Misty Lane
Parsippany, NJ 07054
(973) 560-1400

Site Management Plan

Property Known As:

Former Swivelier Site
Village of Nanuet, Rockland County, New York
NYSDEC Site Number: 3-44-036
EWMA Project No. 205548

June 2018

Appendix 8 – Permits and/or Permit Equivalent

New York State Department of Environmental Conservation
Division of Environmental Remediation
625 Broadway, Albany, New York 12233-7016
Phone: (518) 402-9768 • FAX: (518) 402-9773
Website: www.dec.state.ny.us

Erin M. Crotty
Commissioner

July 22, 2004

Mr. Alfred Moffit
Environmental Waste Management Associates, LLC
100 Misty Lane
P.O. Box 5430
Parsippany, NJ 07054

Re: Swivelier Company Site
Village of Nanuet, Rockland County
VCP # V00520-3
Sub-Slab Depressurization System

Dear Mr. Moffit:

The New York State Department of Environmental Conservation (NYSDEC) and the New York State Department of Health (NYSDOH) have reviewed Environmental Waste Management Associates, LLC (EWMA) July 15, 2004 letter. This letter is in response to the Departments July 8, 2004 comment letter based on EWMA's Sub-Slab Depressurization System (SSDS) design and installation strategy for the Swivelier site, submitted to NYSDEC in a letter dated June 29, 2004.

This letter addresses the Department's concerns. As such, EWMA may proceed with the collection of the field data outlined in this work plan, as modified by the July 15, 2004 submittal. Please submit a final Sub-Slab Depressurization System (SSDS) design and installation strategy which incorporates your July 15, 2004 responses. Based on the schedule included in this submittal, fieldwork is expected to be initiated on August 6, 2004. Please confirm this date as soon in advance of fieldwork as possible so that I may arrange my schedule accordingly. If you have any questions, don't hesitate to call me at (518) 402-9768.

Sincerely,

Thomas Gibbons
Project Manager
Remedial Bureau B, Section D
Division of Environmental Remediation

cc: R. Cozzy/File
T. Gibbons
C. Quinn/ D. Miller (RCHD)
B. Callaghan (DOH)
B. Dorfman (Dorfman, Lynch & Knoebel)

ec: R. Rusinko (Tarrytown)

New York State Department of Environmental Conservation
Division of Environmental Remediation
Remedial Bureau B
625 Broadway, Albany, New York 12233-7016
Phone: (518) 402-9768 • **FAX:** (518) 402-9773
Website: www.dec.state.ny.us

Denise M. Sheehan
Acting
Commissioner

March 24, 2005

Mr. Ajay Kathuria, P.E.
Environmental Waste Management Associates, LLC
100 Misty Lane
P.O. Box 5430
Parsippany, NJ 07054

Re: Swivelier Company Site
Village of Nanuet, Rockland County
VCP # V00520-3
Remedial Action Work Plan

Dear Mr. Kathuria:

The Department has completed its review of the Remedial Action Work Plan (RAWP) for the subject site titled "Voluntary Cleanup Program Remedial Action Work Plan - Groundwater, Former Swivelier Company Site, Village of Nanuet, Rockland County, NY", dated November 2004. In addition, this work plan was posted in the Environmental Notice Bulletin (ENB) for a period of 30 days (from February 9, 2005 through March 10, 2005) to allow for public comment as required under the Voluntary Cleanup Program. No comments were received during the 30-day comment period. Based upon this and the information and representations given in the RAWP, the RAWP is hereby approved.

Please contact Thomas Gibbons, project manager, at your earliest convenience to discuss scheduling of the various tasks. If you have any questions, don't hesitate to call me or Tom at (518) 402-9768.

Sincerely,

Robert Cozzy
Remedial Bureau B, Section D
Division of Environmental Remediation

cc: R. Cozzy/File
T. Gibbons
B. Callahan (DOH)
M. Klein (SF Properties, LLC)

New York State Department of Environmental Conservation
Division of Environmental Remediation
Remedial Bureau B
625 Broadway, Albany, New York 12233-7016
Phone: (518) 402-9768 • **FAX:** (518) 402-9773
Website: www.dec.state.ny.us

Denise M. Sheehan
Commissioner

November 3, 2006

Burton I. Dorfman, Esq.
Dorfman, Knoebel and Conway, LLP
Attorney's at Law
51 North Broadway
Nyack, New York 10960

Re: Swivelier Company Site
Village of Nanuet, Rockland County
VCP # V00520-3
Voluntary Cleanup Agreement

Dear Mr. Dorfman:

The New York State Department of Environmental Conservation (NYSDEC) is in receipt of your letter dated November 3, 2006 which responds to the NYSDEC's September 29, 2006 request to implement the Department-approved Remedial Action Work Plan (RAWP) for this site titled "Voluntary Cleanup Program Remedial Action Work Plan (RAWP) - Groundwater, Former Swivelier Company Site, Village of Nanuet, Rockland County, NY", dated November 2004. This work plan, approved by NYSDEC in a letter dated March 24, 2005, called for the implementation of a sub-slab depressurization system (SSDS) beneath the footprint of the former Swivelier Company building.

A SSDS work plan titled "Sub-Slab Depressurization System (SSDS) Design and Installation Strategy" was submitted to the Department on June 23, 2004 and approved in a letter dated July 22, 2004. This work plan was carried out and the results were incorporated into a SSDS Design document which is part of the approved RAWP.

Based on our phone conversation of November 2, 2006 and your November 3, 2006 letter, you indicate that a copy of this letter was sent to Environmental Waste Management Associates, LLC (EWMA), attention Mr. Ajay Kathuria, requesting EWMA's assistance in implementing the above-mentioned SSDS Design work plan. You have also requested, on behalf of SF Properties, LLC, that they be granted a 30-day extension to commence construction of the SSDS, followed by a 90-day completion period.

The NYSDEC will grant SF Properties, LLC a 30-day extension (to December 4, 2006) to begin implementation of the approved SSDS Design, which is part of the approved RAWP dated November 2004. Further, the NYSDEC also approves a 90-day completion period for installation and start-up of the SSDS.

If you have any questions, don't hesitate to call me or Thomas Gibbons at (518) 402-9768.

Sincerely,

Robert Cozzy
Remedial Bureau B, Section D
Division of Environmental Remediation

cc: R. Cozzy/File
T. Gibbons
M. Klein (SF Properties, LLC)
A. Kathuria (EWMA)

ec: R. Rusinko
A. Parretta (DOH)

New York State Department of Environmental Conservation
Division of Environmental Remediation
Remedial Bureau B
625 Broadway, Albany, New York 12233-7016
Phone: (518) 402-9768 • **FAX:** (518) 402-9773
Website: www.dec.state.ny.us

Alexander B. Grannis
Commissioner

November 13, 2009

Burton I. Dorfman, Esq.
Dorfman, Knoebel and Conway, LLP
Attorney's at Law
51 North Broadway
Nyack, New York 10960

Re: Swivelier Company Site
Village of Nanuet, Rockland County
VCP # V00520-3
Project Status

Dear Mr. Dorfman:

The New York State Department of Environmental Conservation (NYSDEC) has prepared this letter to update you on the current environmental status of the former Swivelier Company Site, Village of Nanuet, Rockland County, NY (VCP# V00520-3). At this time, all soil activities (investigation and remediation) have been completed and no further work is proposed for soils. All indoor air investigation and remediation activities have also been completed to the satisfaction of NYSDEC. The on-site sub-slab depressurization system is periodically maintained and monitored to insure that its performance is consistent with its design requirements.

Ground water remediation activities (in situ chemical oxidation) have been performed and, at this time, only long-term ground water monitoring is being performed by Environmental Waste Management Associates, LLC on a semi-annual basis.

If you have any questions, don't hesitate to call me at (518) 402-9768.

Sincerely,

Thomas Gibbons
Project Manager
Remedial Bureau B, Section D
Division of Environmental Remediation

ec: S. Dewes/File
T. Gibbons
A. Moffit (EWMA)
R. Rusinko
A. Perretta (DOH)
eDOCs: letter.hwV00520.2009-11-13.Environmental_Status_Update_Dorfman.pdf

New York State Department of Environmental Conservation
Division of Environmental Remediation
Remedial Bureau C, 11th Floor
625 Broadway, Albany, New York 12233-7014
Phone: (518) 402-9662 • **Fax:** (518) 402-9679
Website: www.dec.ny.gov

Joe Martens
Commissioner

November 21, 2013

Via Certified Mail & E-Mail

Mr. Patrick, MaGee Partner.
MBC Contractors Inc.
P.O. Box 54
Stony Point, New York 10980

Mr. Alfred Moffit, Project Manager
Environmental Waste Management Associates, LLC
100 Misty Lane
P.O. Box 5430
Parsippany, New Jersey 07054

RE: Former Swivelier Company Site, Site # V00520-3
33 Route 304, Village of Nanuet, Rockland County
Long Term Groundwater Monitoring Program and Work Plan

Dear Mr. MaGee and Mr. Moffit:

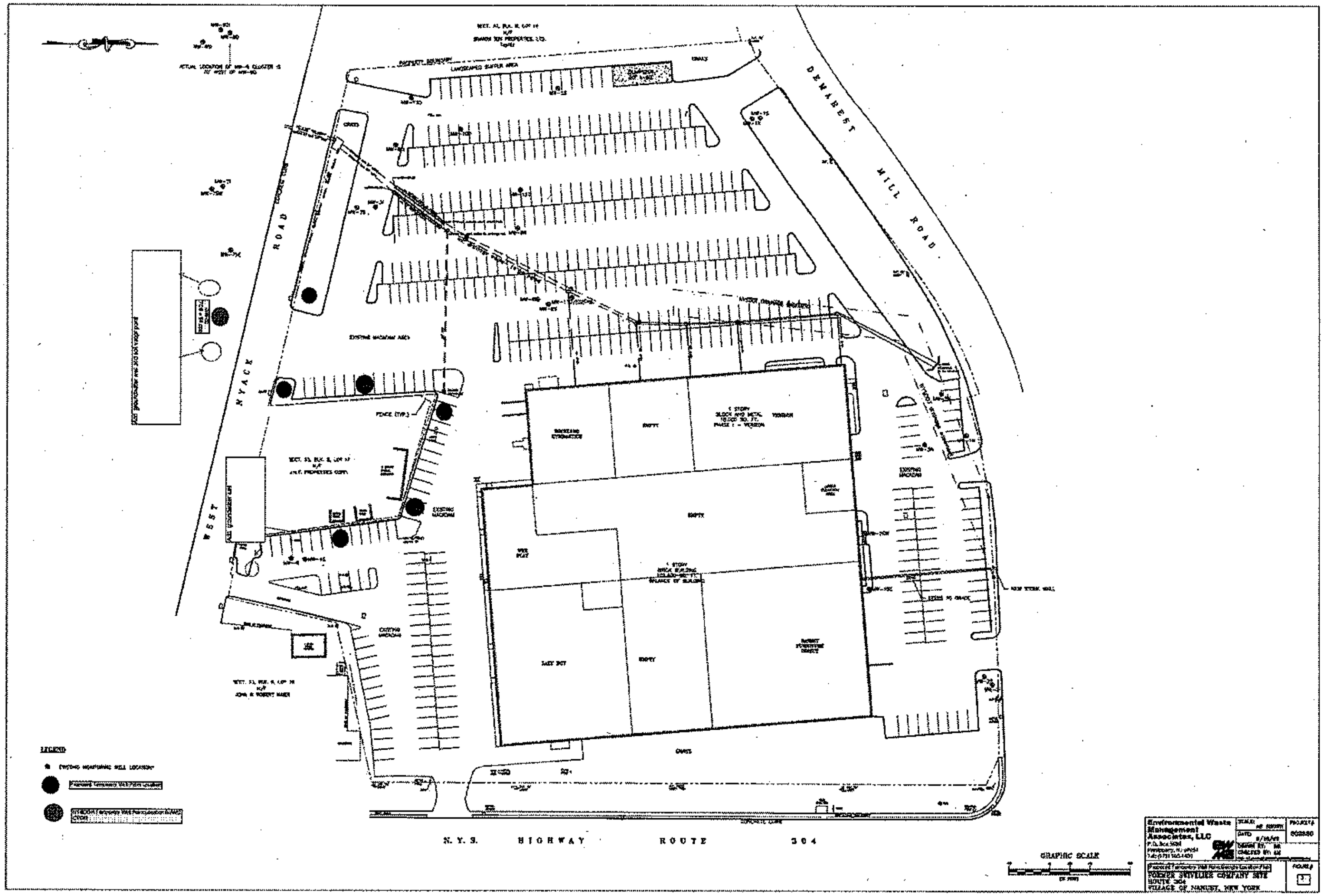
The New York State Department of Environmental Conservation (Department) in consultation with the New York State Department of Health has reviewed the above referenced work plan dated August 28, 2013, submitted in response to the Department's June 13, 2013 letter. As was discussed with Mr. Alfed Moffit on November 19, 2013, the Department is hereby approving this work plan with the following modifications:
1) As detailed in the following attached figure (Figure 3 from the original work plan) is that a new groundwater monitoring well will be installed at the eastern corner of the J.N.T. Properties, and
2) That an additional groundwater monitoring well and a soil vapor sampling point adjacent to the previous installed GW-02 well across West Nyack Road will be installed and sampled.

Pursuant to Part 375-1.7(d), should you elect to modify the work plan, please incorporate this letter into the work plan. The Department requires that this program be implemented within thirty (30) days of the approval date of this work plan. If you have any questions or concerns, please contact me at (518) 402-9662 or by e-mail at sfpriore@gw.dec.state.ny.us.

Sincerely,

Salvatore F. Priore, P.E.
Project Manager
Remedial Bureau C
Division of Environmental Remediation

Ec: Maureen Schuck, NYSDOH
Anthony Perretta, NYSDOH
David Crosby, NYSDEC


DEMAREST MILL ROAD
WEST NYACK ROAD
N. Y. S. HIGHWAY ROUTE 304
EXISTING MACADAM AREA
FENCE (TYP.)
EXISTING MACADAM
EMPTY
LEGEND
EXISTING MONITORING WELL LOCATION
GRAPHIC SCALE
Environmental Waste Management Associates, LLC
FORMER SUTLIFFE COMPANY SITE
ROUTE 304
VILLAGE OF NANUET, NEW YORK

Additional Monitoring wells and Soil Vapor sampling Point (11/21/13sfp)

New York State Department of Environmental Conservation
Division of Environmental Remediation
Remedial Bureau C, 11th Floor
625 Broadway, Albany, New York 12233-7014
Phone: (518) 402-9662 • **Fax:** (518) 402-9679
Website: www.dec.ny.gov

Joe Martens
Commissioner

November 25, 2013

Via Certified Mail & E-Mail

Mr. Patrick, MaGee Partner
MBC Contractors Inc.
P.O. Box 54
Stony Point, New York 10980

Mr. Alfred Moffit, Project Manager
Environmental Waste Management Associates, LLC
100 Misty Lane
P.O. Box 5430
Parsippany, New Jersey 07054

RE: Former Swivelier Company Site, Site # V00520-3
33 Route 304, Village of Nanuet, Rockland County
Long Term Groundwater Monitoring Program and Revised Work Plan

Dear Mr. MaGee and Mr. Moffit:

The New York State Department of Environmental Conservation (Department) in consultation with the New York State Department of Health has reviewed the above referenced work plan addendum dated November 25, 2013, submitted in response to the Department's November 21st 2013 letter. As was discussed with Mr. Alfed Moffit on November 21, 2013, and in receipt of the revised modifications requested, the Department is hereby approving this work plan for implementation. The Department requires that this program be implemented within thirty (30) days of the approval date of this work plan. If you have any questions or concerns, please contact me at (518) 402-9662 or by e-mail at sfpriore@gw.dec.state.ny.us.

Sincerely,

Salvatore F. Priore, P.E.
Project Manager
Remedial Bureau C
Division of Environmental Remediation

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Division of Environmental Remediation, Remedial Bureau C
625 Broadway, 11th Floor, Albany, NY 12233-7014
P: (518) 402-9662 I F: (518) 402-9679
www.dec.ny.gov

December 9, 2015

Mr. Alan Arico, Project Manager
Environmental Waste Management Associates, LLC
100 Misty Lane, PO Box 5430
Parsippany, New Jersey, 07054

RE: Former Swivelier Site,
Site No. 3-44-036
Village of Nanuet, Rockland County

Dear Mr. Arico:

The New York State Department of Environmental Conservation (Department) in consultation with the New York State Department of Health (NYSDOH) has reviewed and hereby approve the submittal entitled "Voluntary Cleanup Program Revised Supplemental RI Progress Report for the Former Swivelier Facility, 33 Route 304, Village of Nanuet, New York" prepared for S.F. Properties LLC by Environmental Waste Management Associates (EWMA), LLC, dated August 26, 2015 for the above-referenced site.

The Department and the NYSDOH concur with the following conclusions and recommendations of the Report which consist of the following:

1. Evaluate the need to continue operation of the on-site Sub-Slab Depressurization System (SSDS) system based on the following:

   - Concentrations of TCE detected in ground water have reduced significantly since 2004;
   - The SSDSs have been in operation for approximately 7 years;
   - Only one location exhibited TCE in sub-slab that required mitigation; and
   - Concentrations in the initial indoor air samples were negligible.

2. Conduct annual groundwater monitoring from on-site monitoring wells MW-10D, MW-11D, and MW-13D for VO+10 analysis.

3. No further offsite assessment of ground water or soil vapor is warranted across West Nyack Road based on the following:

   - Ground water results obtained from the temporary well point (TP-8) installed across West Nyack Road (near NYSDOH ground water sample location GW-02) indicated compliance with New York State Ambient Water Quality Standards (AWQS);
   - Ground water results from temporary well points TW-1 and TW-2 installed immediately up-gradient of NYSDOH sample location GW-02 also indicated compliance with New York State AWQS; and
   - Soil vapor sample obtained from the TW-8 location did not identify contaminants of concern associated with the former Swivelier facility or above NYSDOH Soil Vapor Intrusion Guidance.

Please send a schedule for the planned field activities within thirty days of this approval. If you have any questions regarding this approval, please contact me at 518-402-9665 or by e-mail @ salvatore.priore@dec.ny.gov.

Sincerely,

Salvatore E. Priore, P.E.
Project Manager, Bureau C
Division of Environmental Remediation

ec: Dawn Hettrick, NYSDOH- Albany
Maureen Schuck, NYSDOH- Albany
Patrick MaGee, MBC Contractors Inc.
G. Heitzman
D. Crosby
S. Priore
E. Moore-Region 3

Site Management Plan

Property Known As:

Former Swivelier Site
Village of Nanuet, Rockland County, New York
NYSDEC Site Number: 3-44-036
EWMA Project No. 205548

June 2018

Appendix 9 – List of Site Contacts

APPENDIX 9 – LIST OF SITE CONTACTS

Property Owner
S.F. Properties, LLC
Attn: Patrick Magee
(845) 429-8231
lukemcglk@aol.com

Kevin Seise
EWMA, Qualified Environmental Professional
(973) 560-1400
Kevin.Seise@ewma.com

Salvatore F. Priore, PE
NYSDEC DER Project Manager
(518) 402-9665
Salvatore.Priore@dec.ny.gov

EWMA
INNOVATIVE | EXPERIENCED | RESPONSIVE
www.ewma.com

Toll Free: (800) 969-3159
Phone: (973) 560-1400
Fax: (973) 560-0400

Sent via E-Mail (salvatore.priore@dec.ny.gov)

June 20, 2018

Salvatore F. Priore, PE
Project Manager
NYSDEC
625 Broadway,11th Floor
Albany, New York 12233-7017

Re: **Summary of Sub-Slab Soil Vapor Sampling Results – November 2017**
Former Swivelier Site
33 Route 304
Village of Nanuet, Rockland County, New York
EWMA Project No. 205548

Dear Mr. Priore,

Per your request, EWMA is providing the following supplemental information summarizing our most recent sub-slab soil vapor sampling event, conducted in November 2017.

During November 2017, four (4) sub-slab soil vapor sampling ports were installed within the building slab to investigate contaminated groundwater as a potential vapor intrusion source. Four (4) sub-slab soil vapor samples were taken (SS-1 thru SS-4) and were analyzed for volatile organic compounds via EPA Method TO-15 by Integrated Analytical Laboratories, LLC (IAL) of Randolph, New Jersey, a New York certified laboratory (Certified Lab ID No. 11402). A results summary is included as **Table 1** and the full analytical lab data is included as **Attachment 1**.

The analytical results for the samples collected during the November 2017 event revealed elevated concentrations of cis-1,2-Dichloroethene (cis-1,2-DCE) and trichloroethene (TCE) in one of the four samples (SS-2) at 820 and 2,700 ug/m^3, respectively. When evaluating the sub-slab vapor concentrations of cis-1,2-DCE and TCE in these results using NYSDEC's Revised *Soil Vapor/Indoor Air Matrix A from Guidance for Evaluating Soil Vapor Intrusion in the State of New York (May 2017)*, the recommended action is to mitigate, regardless of indoor air concentrations.

EWMA recommends that the existing sub-slab depressurization system (SSDS), installed beneath the building slab, continue to operate per the March 2018 Site Management Plan (SMP) to minimize current and potential exposures associated with vapor intrusion.

Should you have questions, please do not hesitate to contact me at (973) 560-1400, ext. 177 or at Kevin.Seise@ewma.com.

Sincerely,
EWMA

Kevin Seise
Senior Project Manager

Att: Table 1 – November 2017 Sub-Slab Vapor Results Summary Table
Attachment 1 – Analytical Lab Data

cc: Jacob Strauss, EWMA

TABLE 1

November 2017 Sub-Slab Vapor Results Summary Table

Table 1
Sub-Slab Vapor Results Summary
November 2017
Former Swivelier Site
EWMA Project No. 205548

Compound	Sample Name: / IAL ID: / CAS#	SS-1 E17-09837-01 11/15/2017 ug/m3	SS-2 E17-09837-02 11/15/2017 ug/m3	SS-3 E17-09837-03 11/15/2017 ug/m3	SS-4 E17-09837-04 11/15/2017 ug/m3	Ambient E17-09837-05 11/15/2017 ug/m3
Acetone	67-64-1	260	130	86	45	1.9
Benzene	71-43-2	ND	ND	ND	ND	ND
Bromodichloromethane	75-27-4	ND	ND	ND	ND	ND
Bromoform	75-25-2	ND	ND	ND	ND	ND
Bromomethane	74-83-9	ND	ND	ND	ND	ND
1,3-Butadiene	106-99-0	ND	ND	ND	ND	ND
Chlorobenzene	108-90-7	ND	ND	ND	ND	ND
Chloroethane	75-00-3	ND	ND	ND	ND	ND
Chloroform	67-66-3	2.0	ND	1.8	ND	ND
Chloromethane	74-87-3	ND	ND	ND	ND	ND
Carbon disulfide	75-15-0	0.72	ND	ND	1.4	ND
Carbon tetrachloride	56-23-5	0.50	ND	0.50	0.38	0.57
Cyclohexane	110-82-7	1.8	ND	1.1	ND	ND
Dibromochloromethane	124-48-1	ND	ND	ND	ND	ND
1,2-Dibromoethane	106-93-4	ND	ND	ND	ND	ND
1,2-Dichlorobenzene	95-50-1	ND	ND	ND	ND	ND
1,3-Dichlorobenzene	541-73-1	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	106-46-7	ND	ND	ND	ND	ND
Dichlorodifluoromethane	75-71-8	1.2	ND	ND	ND	ND
1,1-Dichloroethane	75-34-3	ND	ND	ND	ND	ND
1,2-Dichloroethane	107-06-2	ND	ND	ND	ND	ND
1,1-Dichloroethene	75-35-4	ND	ND	ND	ND	ND
1,2-Dichloroethene (cis)	156-59-2	ND	820	ND	ND	ND
1,2-Dichloroethene (trans)	156-60-5	ND	57	ND	ND	ND
1,2-Dichloropropane	78-87-5	ND	ND	ND	ND	ND
1,3-Dichloropropene (cis)	10061-01-5	ND	ND	ND	ND	ND
1,3-Dichloropropene (trans)	10061-02-6	ND	ND	ND	ND	ND
1,3-Dichloropropene - TOTAL	542-75-6	ND	ND	ND	ND	ND
1,2-Dichlorotetrafluoroethane	76-14-2	ND	ND	ND	ND	ND
1,4-Dioxane	123-91-1	ND	ND	ND	ND	ND
Ethylbenzene	100-41-4	1.3	ND	1.0	1.0	ND
n-Heptane	142-82-5	ND	ND	ND	ND	ND
1,3-Hexachlorobutadiene	87-68-3	ND	ND	ND	ND	ND
n-Hexane	110-54-3	7.5	ND	5.2	7.5	ND
Methylene chloride	75-09-2	ND	ND	23	2.2	ND
Methyl ethyl ketone	78-93-3	98	17	41	30	2.7
Methyl isobutyl ketone	108-10-1	ND	ND	0.82	ND	ND
Methyl tert-butyl ether	1634-04-4	ND	ND	ND	ND	ND
Styrene	100-42-5	ND	ND	ND	ND	ND
Tert-butyl alcohol	75-65-0	ND	ND	6.4	ND	ND
1,1,2,2-Tetrachloroethane	79-34-5	ND	ND	ND	ND	ND
Tetrachloroethene	127-18-4	1.6	56	1.6	2.6	ND
Toluene	108-88-3	46	31	25	39	ND
1,2,4-Trichlorobenzene	120-82-1	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	71-55-6	ND	13	ND	1.9	ND
1,1,2-Trichloroethane	79-00-5	ND	ND	ND	ND	ND
Trichloroethene	79-01-6	8.1	2700	3.2	ND	ND
Trichlorofluoromethane	75-69-4	ND	ND	ND	2.3	ND
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	ND	ND	ND	ND	ND
1,2,4-Trimethylbenzene	95-63-6	7.2	ND	5.1	7.0	ND
1,3,5-Trimethylbenzene	108-67-8	1.5	ND	1.0	1.5	ND
2,2,4-Trimethylpentane	540-84-1	ND	ND	ND	ND	ND
Vinyl bromide	593-60-2	ND	ND	ND	ND	ND
Vinyl chloride	75-01-4	ND	ND	ND	ND	ND
Xylenes (m&p)	179601-23-1	5.6	ND	4.6	5.5	ND
Xylenes (o)	95-47-6	1.9	ND	1.5	1.8	ND
Xylenes - TOTAL	1330-20-7	7.5	ND	6.1	7.3	ND

ATTACHMENT 1

Analytical Lab Data

EPA TO-15 DATA PACKAGE

ANALYTICAL DATA PACKAGE FOR THE
NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
ALBANY NEW YORK 12233

Integrated Analytical Laboratories, LLC
Project#: Swivilier/175 W Nyack Rd
SDG #: E17-09837
Date of first sample receipt: 11/16/2017

Randolph, NJ 07869
NY ELAP Certification#: 11402
NJDEP (Primary AB) Certification#: 14751
Date of last sample receipt: 11/16/2017

Client: Environmental Waste Management Associates

Project/Site: Swivilier/175 W Nyack Rd/NY

Client Sample Number	Laboratory Sample	Sample Location	Date/Time of Collection
SS-1	E17-09837-01	NA	11/15/2017 11:38
SS-2	E17-09837-02	NA	11/15/2017 13:12
SS-3	E17-09837-03	NA	11/15/2017 15:00
SS-4	E17-09837-04	NA	11/15/2017 16:35
Ambient	E17-09837-05	NA	11/15/2017 13:20

I certify that this data package is in compliance with the terms and conditions of this contract, both technically and for completeness, for other than the conditions detailed above. Release of data contained in this hardcopy data package and in the computer-readable data submitted on CD/diskette and by electronic mail has been authorized by the laboratory manager or his designee, as verified by the following signature.

Michael Leftin

Michael H. Leftin, Ph.D.
Laboratory Director

Date: December 04, 2017

Lauren Jenkins

Lauren Jenkins
Air Division Quality Assurance Officer

Date: December 04, 2017

Integrated Analytical Laboratories LLC

EPA Method TO-15 Table of Contents

Laboratory Acronyms

The following is a list of laboratory acronyms commonly used in EPA Method TO-15 testing:

Acronym	Definition
BL□	B□an□Met□od B□an□
B□B	4□Bro□o□□oro□en□ene □T□nin□Standard□
□□S N□□□er	□□e□i□a□□□stra□t Ser□i□e Re□istry N□□□er
□□	□□□i□ □enti□ eters
□□□□S	□osin□ □a□i□ration □□e□□ □eri□i□ation Standard
□O□	□□ain o□□□stody
D□□S	Dai□y □a□i□ration □eri□i□ation Standard
D□	Di□□tion □a□tor
□P□	□. S. □n□iron□enta□Prote□tion □□en□y □a□a □S□P□□
"□□	In□□es o□Mer□□ry
I□	Indoor □ir
I□SL	Indoor □ir S□reenin□ Le□e□
I□□L	Initia□□a□i□ration
I□□SS	Initia□□a□i□ration □eri□i□ation Standard
ISTD	Interna□Standard
□□	□as □□ro□ato□rap□y
□□□MS	□as □□ro□ato□rap□y□Mass Spe□tro□etry
L□S	La□oratory □ontro□Sa□p□e□Spi□e
LLTO□15	Lo□ Le□e□TO□15
MDL	Met□od Dete□tion Li□it
MDL□	Met□od Dete□tion Li□it □eri□i□ation
□□	□i□i□iters
ND	Not Dete□ted □at or a□o□e RL□
NJD□P	Ne□ Jersey Depart□ent o□□n□iron□enta□Prote□tion
PM	Pro□e□t Mana□er
pp□□	parts per □i□□ion, □o□□□e to □o□□□e ratio
P□L	Pra□ti□a□□□antitation Li□it □MDLx3
□□	□□a□ity □ss□ran□e
□□	□□a□ity □ontro□
R□L	Rapid □□tion Li□it
RL	Reportin□ Li□it
RLL□S	Reportin□ Li□it La□oratory □ontro□Sa□p□e
RPD	Re□ati□e Per□ent Di□□eren□e
RR□	Re□ati□e Response □a□tor
RSD	Re□ati□e Standard De□iation
SD□	Sa□p□e De□i□ery □ro□p
S□SL	Soi□□as S□reenin□ Le□e□s
SS	S□□ S□a□
T□T	T□rnaro□nd Ti□e
TI□	Tentati□e□y Identi□ied □o□po□nd
□□□□3	□i□ro□ra□s per □□□i□ □eter

Section I: Chain of Custody

Integrated Analytical Labs
273 Franklin Road
Randolph, NJ 07869

External Chain of Custody Record/ Field Test Data Sheet USEPA Method TO-15

Contact Us: 973-361-4252
Fax: 973-366-5613
Web: www.ialonline.com

Carrier (check one): ____ IAL Courier ____ Client Courier ____ FedEx/UPS | pg ____ of ____

Client Contact Information		Project Information		Invoice Information	
Company:	EWMA	Project Name:	Swivilier/175 W Nyack Rd	Attn:	
Address:	100 Misty Lane, Parsippany NJ 07054	Project Location (State):	NY	Address:	
Phone:	973-560-1400	Project Manager:	Kevin Seise		
		PM Signature:			
Fax:	973-560-0400	PM E-Mail:	Kevin.Seise@ewma.com	PO #:	
~~Report to:~~	Proj # 205548	Sampler:	Joe Bukowski	Quote #:	

Analysis Turnaround Time - IF NO TAT IS SPECIFIED, 2 WEEK TAT IS ASSUMED

IAL Standard: 2 weeks (10 business days)

Rush (**pre-approved by lab): 24hr** 48hr** 72hr** 96hr** 1wk**

Barometric Pressure

Start		Stop	

Sample Identification	Start DATE & TIME (24hr Clock)	End DATE & TIME (24hr Clock)	Starting Vacuum ("Hg)	Ending Vacuum ("Hg)	Starting Temp. (°F)	Ending Temp. (°F)	Outgoing Vacuum - Lab ("Hg)	Incoming Vacuum - Lab ("Hg)	Flow Regulator ID	Canister ID	Canister Size (1L or 6L)	Flow Controller Readout (cc/min)	Analysis: EPA TO-15	Analysis: NJDEP LLTO-15 (Includes 30 TICs)	Analysis: Library Search (10, 20, or 30 TICs)	Analysis: Other (Explain in Comments)	Report: Regulatory/ NY Cat B / Full (NJ Required)	Report: Reduced / NY Cat A Data Package	Report: Results Only	Matrix: Indoor Air	Matrix: Ambient / Outdoor Air	Matrix: Sub Slab / Soil Gas / Near Slab (Circle One)	Matrix: Stack Emission / SVE System	High Concentrations Expected
SS-1	11/15/17 / 1138	11/15/17 / 1226	30↑	5	68	68	-29.0	-5.0	7316795	3027	6	99.5				X	X					X		
SS-2	11/15/17 / 1312	11/15/17 / 1358	28↑	5	72	72	-29.0	-5.0	A0160003-9	3814	6	96.5				X	X					X		
SS-3	11/15/17 / 1500	11/15/17 / 1542	27↑	5	72	72	-29.0	-5.0	A0160003-1	4871	6	100.1				X	X					X		
SS-4	11/15/17 / 1635	11/15/17 / 1728	30↑	5	68	68	-29.0	-5.0	7340542	2753	6	105.0				X	X					X		
Ambient	11/15/17 / 1320	11/15/17 / 1405	28↑	4	45	45	-29.0	-4.0	A0160009-6	2892	6	98.2				X	X				X			

Comments/ Special Analysis Instructions / QC Requirements:

NY State TO-15 Any Questions Please Call Kevin Seise

Log-In For TO-15 Analysis
09291701 100417AA 2162

Note: Hold or contingent samples may be designated by writing an "H" or "C" in the appropriate analysis box.

ALL FIELDS IN RED ARE REQUIRED

Shipping Information / Canister Preparation (for laboratory use only)

Individual Preparing Canisters / Title: P. Jenkins J. Walukiewicz / Air Department Sample Custodians
Lab Affixed Seal Number(s): IAL20170320-321
Date/Time Shipping Container Sealed: 11/13/17 1330

Laboratory Canister Certification

GC/MS Analyst Signature

IAL SDG#: 09837

External Chain of Custody

Relinquished	*Received*	*Date / Time*	*Reason for Change of External Custody*
		11/13/17 1330	shipment from laboratory to client
		11/16/17 1500	
	Joseph J Walukiewicz III	11-16-17 16:00	Rec'd at ASR lab

Name/Title Resealing Shipping Container Name: ____ NJDEP Affixed Seal Number: ____
Date/Time Sample Shipping Container Resealed: ____ Individual Opening Sample Shipping Container: Padraic Jenkins / Joseph Walukiewicz
Date/Time Sample Shipping Container Opened: ____ Date/Time Internal Chain of Custody Initiated: ____

White and yellow - lab copies; Pink - client copy

Integrated Analytical Laboratories LLC

PROJECT INFORMATION

E17-09837: SWIVILIER/175 W NYACK RD

To: Kevin Seise
EWMA - HQ
Fax:
EMail: kevin.seise@ewma.com

Report To	**Bill To**
EWMA - HQ Lanidex Center 100 Misty Lane Parsippany, NJ 07054 Attn: Kevin Seise	EWMA - HQ Lanidex Center 100 Misty Lane Parsippany, NJ 07054 Attn: Kevin Seise

Report Format	P.O. #	Received At Lab	TPHC Due	Verbal Due	Hardcopy Due
Air Regulatory		Nov 16, 2017 @ 16:00	NA	Dec 04, 2017	Dec 11, 2017 *

* Any ***Conditional or Hold*** status will delay final hardcopy report sent date.

Diskette Req. Not Required

Lab ID	Client Sample ID	Depth	Sampling Time	Matrix	Unit	Field pH/Temp
09837-001	SS-1	NA	11/15/17@12:26	Air-Sub Slab	ppbV	
09837-002	SS-2	NA	11/15/17@13:58	Air-Sub Slab	ppbV	
09837-003	SS-3	NA	11/15/17@15:42	Air-Sub Slab	ppbV	
09837-004	SS-4	NA	11/15/17@17:28	Air-Sub Slab	ppbV	
09837-005	AMBIENT	NA	11/15/17@14:05	Air-Sub Slab	ppbV	

Sample #	Test	Status	QA Method	TAT	Holding Time Expires
001	TO-15 analysis	Analyze	TO-15	STD/2 WKS	12/15/2017
002	TO-15 analysis	Analyze	TO-15	STD/2 WKS	12/15/2017
003	TO-15 analysis	Analyze	TO-15	STD/2 WKS	12/15/2017
004	TO-15 analysis	Analyze	TO-15	STD/2 WKS	12/15/2017
005	TO-15 analysis	Analyze	TO-15	STD/2 WKS	12/15/2017

273 Franklin Road
Randolph, NJ 07869
Phone: 973 361 4252
Fax: 973 989 5288

Integrated Analytical Laboratories LLC

Integrated Analytical Laboratories

Internal Chain of Custody

Instructions: Use 1 form for each 20 samples of aliquot.

Laboratory Person Accepting Responsibility for Sample(s)

Laboratory: Integrated Analytical Laboratories
Location: 273 Franklin Rd Randolph, NJ 07869
Name: Joseph Walukiewicz
Title: Air Department Receiving
Case No.: E17-09837
Analytical Parameter/Fraction: (check one) ____ NJDEP LLTO-15
X EPA TO-15

Sample No.	Aliquot/Extract No.	Sample No.	Aliquot/Extract No.
SS-1	E17-09837-01		E17-
-2	E17- -02		E17-
-3	E17- -03		E17-
-4	E17- -04		E17-
Ambient	E17- -05		E17-
	E17-		E17-
	E17-		E17-
	E17-		E17-
	E17-		E17-
	E17-		E17-

Date	Time	Relinquished By	Received By	Purpose of Change of Custody
11 16 17	1600	SIGNATURE PRINTED NAME	SIGNATURE Joseph Walukiewicz PRINTED NAME JOSEPH WALUKIEWICZ	1. Sample log-in 2. Pressure Check 3. Pre-analysis storage
11 16 17	1630	SIGNATURE Joseph Walukiewicz PRINTED NAME JOSEPH WALUKIEWICZ	SIGNATURE PRINTED NAME	Placement in TO-15 sample storage area until ready for analysis
11 28 17	1400	SIGNATURE PRINTED NAME	SIGNATURE Jeff Schmitt PRINTED NAME JEFF SCHMITT	TO-15/LLTO-15 analysis on: 09837-01, 02, 03, 04, -05
		SIGNATURE PRINTED NAME	SIGNATURE PRINTED NAME	
		SIGNATURE PRINTED NAME	SIGNATURE PRINTED NAME	
		SIGNATURE PRINTED NAME	SIGNATURE PRINTED NAME	
		SIGNATURE PRINTED NAME	SIGNATURE PRINTED NAME	
		SIGNATURE PRINTED NAME	SIGNATURE PRINTED NAME	
		SIGNATURE PRINTED NAME	SIGNATURE PRINTED NAME	

Section II: Methodology Review

Methodology Summary for Air Collected from Hazardous Waste Site Contract

Laboratory:	**Integrated Analytical Lab, LLC**	**Project No:**	**Swivilier/175 W Nyack Rd**
Location:	**Randolph, NJ**	**SDG No:**	**E17-09837**

Name	Required Methodology	Indicate Method
Volatile Organics	US EPA TO-15	US EPA Method TO-15

Section III: Case Narrative

CASE NARRATIVE

ANALYTICAL DATA PACKAGE FOR THE
NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
ALBANY NEW YORK 12233

Integrated Analytical Laboratories, LLC **Randolph, NJ 07869**
Project #: Swivilier/175 W Nyack Rd **NY ELAP Certification #: 11402**
SDG #: E17-09837 **NJDEP (Primary AB) Certification#: 14751**
Date of first sample receipt: 11/16/2017 **Date of last sample receipt: 11/16/2017**

Client: Environmental Waste Management Associates
Project/Site: Swivilier/175 W Nyack Rd / NY

Client ID	Lab ID	Receipt Date	Analysis Date	DF	Diluted For
SS-1	E17-09837-01	11/16/2017	11/28/2017	10.0	Acetone
SS-1	E17-09837-01	11/16/2017	11/29/2017	1.0	NA
SS-2	E17-09837-02	11/16/2017	11/29/2017	20.0	Trichloroethene
SS-2	E17-09837-02	11/16/2017	11/28/2017	10.0	Screening Data
SS-3	E17-09837-03	11/16/2017	11/29/2017	1.0	NA
SS-4	E17-09837-04	11/16/2017	11/29/2017	1.0	NA
Ambient	E17-09837-05	11/16/2017	11/28/2017	1.0	NA

IAL Sample ID	Canister ID	Outgoing Pressure ("Hg)	Incoming Pressure ("Hg)	Flow Controller ID	Outgoing Flow Rate (cc/min)	Incoming Flow Rate (cc/min)	Flow Rate RPD*
E17-09837-01	3027	-29	-5.0	7316795	99.50	100.20	0.70
E17-09837-02	3814	-29	-5.0	A0160003-9	96.50	101.00	4.56
E17-09837-03	4871	-29	-5.0	A0160003-1	100.10	106.10	5.82
E17-09837-04	2753	-29	-5.0	7340542	105.00	104.30	0.67
E17-09837-05	2892	-29	-4.0	A0160009-6	98.20	101.30	3.11

*Pre-sampling and Post-sampling Flow Controller calibration check RPD ≤ 20%

Flow Controller Note: none

Sample Receipt: Samples were received in good condition. Documentation was in order.
Samples were received at IAL by: Joseph Walukiewicz

Sample Preparation: None required.

Sample Analysis:
Hold Time: All within recommended hold times.
Instrument Calibration: Meets method criteria.
Analysis performed by: Jeff Schmitt *SDG*
Non-Conformances: Sample E17-09837-05 was manually integrated for Carbon tetrachloride due to matrix interferences.
Tentatively Identified Compounds: Tentatively Identified Compounds (TICs) are determined using a NIST library search. TICs are reported at 10% of the applicable internal standard. Dilution factors are calculated into the final reported result. Since the compounds found are tentatively identified, the conversion from ppbv to ug/m3 may not be made.

Canister-to-Canister dilutions: none

CASE NARRATIVE

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Project #: Swivilier/175 W Nyack Rd **NY ELAP Certification #: 11402**
SDG #: E17-09837 **NJDEP (Primary AB) Certification#: 14751**
Date of first sample receipt: 11/16/2017 **Date of last sample receipt: 11/16/2017**

Client: Environmental Waste Management Associates
Project/Site: Swivilier/175 W Nyack Rd / NY

Dilutions: Dilutions, if necessary, will be conducted directly on the instrument up to a 500x dilution. When dilutions of 1000x or higher are necessary, the laboratory must inject a volume of sample into another certified clean canister and add humidified Z-1 zero air to the remainder of the canister volume. Tedlar bags are not used for dilutions.

If a sample is received with historically high levels of analytes, a 100x can-to-can dilution my be used from the start. A 100x canister-to-canister dilution may be also be used at the analyst's discretion.

On-instrument dilutions are conducted as follows:

Dilution Factor	Sample Volume Injected (cc)
1	500
2.5	200
5	100
10	50
20	25
25	20
50	10
100	5
200	2.5
250	2
500	1

Canister-to-canister dilutions are conducted as follows:

A certified clean canister is obtained and evacuated to approximately -30"Hg. Both the clean/dilution canister and sample canister are fitted with a ¼" Swagelok® nut fitting equipped with septa. Depending on dilution factor necessary, a sample aliquot is removed from the canister and injected into the clean canister using 30cc Multifit gas-tight syringe. Once the correct sample aliquot has been transferred, the dilution canister should be connected to the humidified Z-1 zero air supply and filled to ambient pressure (0"Hg).

Dilution Factor	Sample Aliquot	Z-1 Make-up Added
100	60ml	5940ml
1000	6ml	5994ml

If further dilutions need to be made from the dilution canister, they may be made on-instrument. Using a 100x dilution canister, the following on-instrument dilutions can be produced:

CASE NARRATIVE

ANALYTICAL DATA PACKAGE FOR THE
NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
ALBANY NEW YORK 12233

Integrated Analytical Laboratories, LLC **Randolph, NJ 07869**
Project #: Swivilier/175 W Nyack Rd **NY ELAP Certification #: 11402**
SDG #: E17-09837 **NJDEP (Primary AB) Certification#: 14751**
Date of first sample receipt: 11/16/2017 **Date of last sample receipt: 11/16/2017**

Client: Environmental Waste Management Associates
Project/Site: Swivilier/175 W Nyack Rd / NY

Dilution Factor	Sample Volume Injected
100	500ml
250	200ml
500	100ml
1000	50ml
2000	25ml
2500	20ml
5000	10ml

Using a 1000x dilution canister, the following on-instrument dilutions can be produced:

Dilution Factor	Sample Volume Injected
1000	500ml
2500	200ml
5000	100ml
10,000	50ml
20,000	25ml
25,000	20ml
50,000	10ml

If further dilutions need to be made from the dilution canister, beyond 50,000x, a subsequent canister-to-canister dilution must be made using the above prescribed protocol.

GC Column and ID: RTX-1 SN 1119138 or equivalent

Calibration Standards: Only gas phase standards were used. Primary and second-source standards provided by Scott Specialty Gases or Airgas Specialty Gases / Air Liquide

Working Standards: Primary source standards* are created from:
- Scott Gas Cylinder #AAL071156, valid 3/9/15 through 2/25/17
- Airgas Specialty Gases Cylinder #CC483586, valid 3/6/17 through 3/6/18

@ 100ppb per compound, with exception of m&p-xylenes @ 200ppb. Standard is directly introduced into the instrument for all calibration standard concentrations. Dilutions are made accordingly, on instrument, with humidified clean air. The 10ppbv standard is also used for the Daily Calibration Verification Standard (DCVS) and Closing Calibration Verification Standard (CCCVS).

The second source standard*, used as the Initial Calibration Verification Standard (ICVSS) and Laboratory Control Sample (LCS), is introduced into the instrument in the same manner as the primary source standard, using:
- Scott Gas Cylinder #AAL07303, valid 6/11/15 through 5/14/17
- Airgas Specialty Gases Cylinder #CC483422, valid 5/4/17 through 5/4/18

CASE NARRATIVE

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Integrated Analytical Laboratories, LLC	**Randolph, NJ 07869**
Project #: Swivilier/175 W Nyack Rd	**NY ELAP Certification #: 11402**
SDG #: E17-09837	**NJDEP (Primary AB) Certification#: 14751**
Date of first sample receipt: 11/16/2017	**Date of last sample receipt: 11/16/2017**

Client: Environmental Waste Management Associates
Project/Site: Swivilier/175 W Nyack Rd / NY

@ 100ppb per compound, with exception of m&p-xylenes @ 200ppb.

Internal standards* are created from:
- Scott Gas, Cylinder #ALM029426, valid 5/11/2016 through 5/12/2019
@ 5ppm per compound. Standard is directly introduced into the instrument to reach the 10ppbv concentrations. 1:500 Dilutions are made on instrument with humidified clean air. 1cc of internal standard is added to every standard, method blank, instrument blank, and sample run.

*Standard may be used past its expiration date provided that concentrations are verified by a current/unexpired second source standard.

09/12/2017
100 ppbv internal standard mix - prepared in cylinder #ALM029426
10 ppbv per standard/sample - 50 ml injected
100 ppbv calibration standard - prepared in cylinder #CC483586
40 ppbv standard - 200 ml injected
20 ppbv standard - 100 ml injected
10 ppbv standard* - 50 ml injected
*Standard also used for CCCVS
2 ppbv standard - 10 ml injected
0.20 ppbv standard* - 1 ml injected
*Standard also used for RLLCS

10/04/2017
100 ppbv internal standard mix - prepared in cylinder #ALM029426
10 ppbv per standard/sample - 50 ml injected
100 ppbv calibration standard - prepared in cylinder #CC483586
10 ppbv standard* - 50 ml injected
*Standard also used for DCVS & CCCVS
0.20 ppbv standard* - 1 ml injected
*Standard also used for RLLCS
Method Blank - prepared in canister #1127
500 ml injected

11/28/2017
100 ppbv internal standard mix - prepared in cylinder #ALM029426
10 ppbv per standard/sample - 50 ml injected
100 ppbv calibration standard - prepared in cylinder #CC483586
10 ppbv standard* - 50 ml injected
*Standard also used for DCVS & CCCVS
0.20 ppbv standard* - 1 ml injected
*Standard also used for RLLCS
Method Blank - prepared in canister #1127

CASE NARRATIVE

ANALYTICAL DATA PACKAGE FOR THE
NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
ALBANY NEW YORK 12233

Integrated Analytical Laboratories, LLC | **Randolph, NJ 07869**
Project #: Swivilier/175 W Nyack Rd | **NY ELAP Certification #: 11402**
SDG #: E17-09837 | **NJDEP (Primary AB) Certification#: 14751**
Date of first sample receipt: 11/16/2017 | **Date of last sample receipt: 11/16/2017**

Client: Environmental Waste Management Associates
Project/Site: Swivilier/175 W Nyack Rd / NY

500 ml injected
Sample E17-09837-01 - sample taken in canister #3027
50 ml sample volume injected, 10x dilution
Sample E17-09837-02 - sample taken in canister #3814
50 ml sample volume injected, 10x dilution
Sample E17-09837-05 - sample taken in canister #2892
500 ml sample volume injected, 1x dilution

11/29/2017
100 ppbv internal standard mix - prepared in cylinder #ALM029426
10 ppbv per standard/sample - 50 ml injected
100 ppbv calibration standard - prepared in cylinder #CC483586
10 ppbv standard* - 50 ml injected
*Standard also used for DCVS & CCCVS
0.20 ppbv standard* - 1 ml injected
*Standard also used for RLLCS
Method Blank - prepared in canister #1127
500 ml injected
Sample E17-09837-01 - sample taken in canister #3027
500 ml sample volume injected, 1x dilution
Sample E17-09837-02 - sample taken in canister #3814
25 ml sample volume injected, 20x dilution
Sample E17-09837-03 - sample taken in canister #4871
500 ml sample volume injected, 1x dilution
Sample E17-09837-04 - sample taken in canister #2753
500 ml sample volume injected, 1x dilution

CASE NARRATIVE

ANALYTICAL DATA PACKAGE FOR THE
NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
ALBANY NEW YORK 12233

Integrated Analytical Laboratories, LLC **Randolph, NJ 07869**
Project #: Swivilier/175 W Nyack Rd **NY ELAP Certification #: 11402**
SDG #: E17-09837 **NJDEP (Primary AB) Certification#: 14751**
Date of first sample receipt: 11/16/2017 **Date of last sample receipt: 11/16/2017**

Client: Environmental Waste Management Associates
Project/Site: Swivilier/175 W Nyack Rd / NY

All work recorded herein has been done in accordance with normal professional standards using accepted testing methodologies, quality assurance and quality control procedures except where otherwise agreed to by the client and testing company in writing. All conversions are based upon a room temperature of 77°F(25°C) and room pressure of 101.325 kPa (1atm).

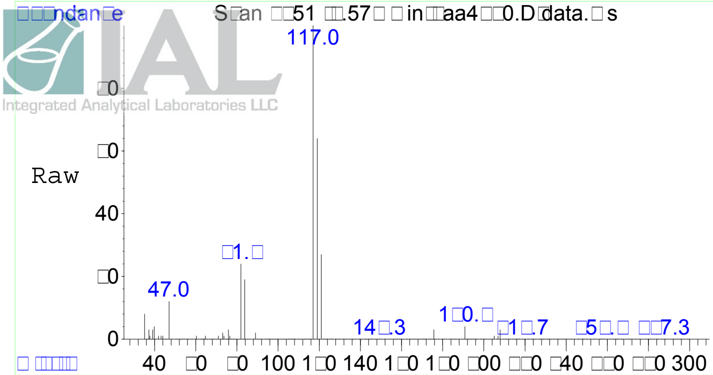
I certify that this data package is in compliance with the terms and conditions of this contract, both technically and for completeness, for other than the conditions detailed above. Release of data contained in this hardcopy data package and in the computer-readable data submitted on CD/diskette and by electronic mail has been authorized by the laboratory manager or his designee, as verified by the following signature.

Michael H. Leftin

Michael H. Leftin, Ph.D.
Laboratory Director

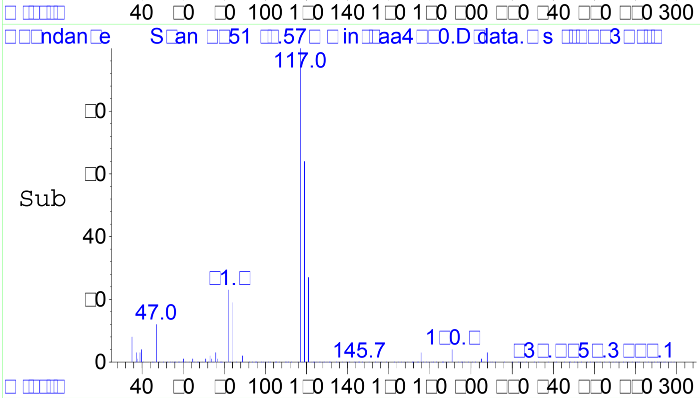
December 04, 2017
Date

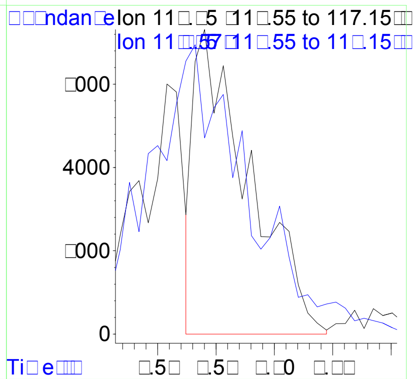
Integrated Analytical Laboratories LLC



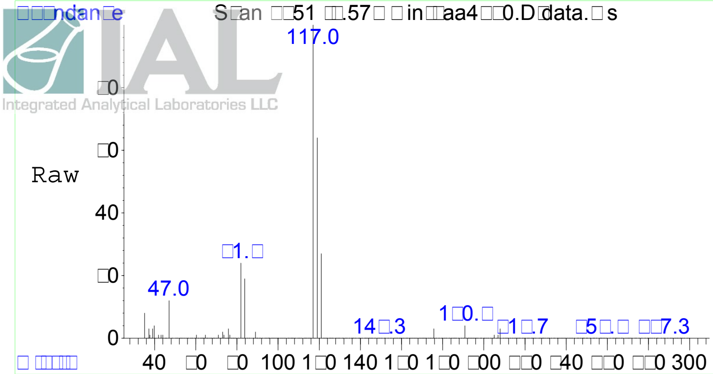
#36
Carbon tetrachloride
Concen: 0.05 ppbV
RT: 9.576 min   Scan# 2951
Delta R.T.   -0.010 min
Lab File: aa4290.D
Acq: 28 Nov 2017   10:48 pm

Tgt Ion:117 Resp: 9624
Ion   Ratio   Lower   Upper
117   100
119   174.2   77.0   115.4#





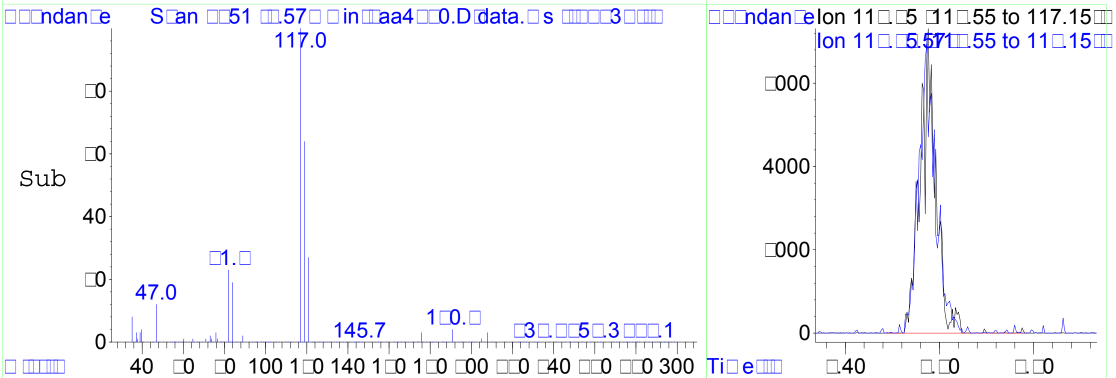
Before manual integration for Carbon tetrachloride.



#36
Carbon tetrachloride
Concen: 0.09 ppbV m
RT: 9.576 min Scan# 2951
Delta R.T. -0.010 min
Lab File: aa4290.D
Acq: 28 Nov 2017 10:48 pm

Tgt Ion:117 Resp: 17055

Ion	Ratio	Lower	Upper
117	100		
119	98.3	77.0	115.4



After manual integration for Carbon tetrachloride.

Integrated Analytical Laboratories LLC

Section IV: Method Detection Limit Summary

Integrated Analytical Laboratories LLC

METHOD DETECTION LIMIT (MDL) REPORT

Inte□rated □na□yti□a□La□oratories □Rando□p□, NJ

Matrix□□ir
□o□□n ID□Reste□Rtx□1, □0 □eter, 0.3□□ □ ID, 1 □□
Instr□□ent ID□□□ □□□i□ent 7□□0□ □MS □□□i□ent 5□75□ □I□L ID□*Instrument AA*□
Report Prepared □y□Je□□S□□□itt
Preparation Date□□□7□17

MDL □□e□ti□e Date□□□7□017
MDL □xpiration Date□□□7□01□
MDL □na□ysis Date□□□7□017
□na□yst□Je□□S□□□itt

Filename	Run #	Date	Time	Filename	Run #	Date	Time
aa□53□	R□n 1	□□□7□017	11□54	aa□544	R□n □	□□□7□017	14□44
aa□540	R□n □	□□□7□017	1□□□□	aa□545	R□n 7	□□□7□017	15□1□
aa□541	R□n 3	□□□7□017	13□0□				
aa□54□	R□n 4	□□□7□017	13□3□				
aa□543	R□n 5	□□□7□017	14□10				

Compound Name	Run 1*	Run 2*	Run 3*	Run 4*	Run 5*	Run 6*	Run 7*	M□□N □a□□e	TR□□ □a□□e	Per□ent Re□o□ery	Std De□ □on□	MDL ppbv	PQL ppbv	NY□LLTO□ 15□P□ RL pp□□	NY□LLTO□ 15□P□ RL µ□□□³	NJ TO□15 RL pp□□	NJ TO□15 RL µ□□□³	Tr□e □a□□e□ MDL
Propene	0.1□	0.15	0.10	0.0□	0.15	0.05	0.13	0.1□	0.□0	□1	0.045	0.14	0.43	0.□0	0.34	0.40	0.□□	1.4
Di□□orodi□□oro□et□ane	0.1□	0.□0	0.1□	0.1□	0.□1	0.□1	0.1□	0.1□	0.□0	□4	0.01□	0.050	0.15	0.□0	0.□□	0.40	□.0	4.0
□□oro□et□ane	0.0□	0.17	0.1□	0.0□	0.13	0.10	0.17	0.1□	0.□0	□1	0.03□	0.1□	0.3□	0.□0	0.41	0.40	0.□3	1.7
1,□Di□□orotetra□□oroet□ane	0.31	0.3□	0.31	0.□□	0.34	0.34	0.3□	0.3□	0.□0	15□	0.01□	0.05□	0.1□	0.□0	1.4	0.40	□.□	3.4
□iny□□□oride	0.1□	0.14	0.13	0.11	0.15	0.14	0.1□	0.13	0.□0	□5	0.015	0.04□	0.14	0.□0	0.51	0.40	1.0	4.3
1,3□B□tadiene	0.1□	0.□1	0.1□	0.15	0.□1	0.□0	0.1□	0.1□	0.□0	□□	0.0□□	0.0□□	0.□1	0.□0	0.44	0.40	0.□□	□.□
n□B□tane	0.□□	0.□□	0.□7	0.□4	0.30	0.□□	0.□□	0.□□	0.□0	13□	0.0□□	0.0□□	0.□0	0.□0	0.47	0.40	0.□5	3.0
Bro□o□et□ane	0.1□	0.1□	0.1□	0.0□	0.1□	0.0□	0.11	0.11	0.□0	53	0.0□3	0.073	0.□□	0.□0	0.7□	0.40	1.□	□.7
□□oroet□ane	0.0□	0.1□	0.0□	0.1□	0.□4	0.□0	0.17	0.15	0.□0	77	0.05□	0.1□	0.54	0.□0	0.53	0.40	1.1	1.1
□t□ano□	0.□4	0.11	0.17	0.□0	0.□7	0.□□	0.□□	0.□1	0.□0	107	0.0□1	0.1□	0.57	0.□0	0.3□	0.40	0.75	1.0
□iny□□ro□ide	0.14	0.14	0.14	0.1□	0.1□	0.17	0.14	0.14	0.□0	7□	0.015	0.047	0.14	0.□0	0.□7	0.40	1.7	4.3
□□ro□ein	0.□0	0.□4	0.□1	0.1□	0.10	0.□□	0.□0	0.1□	0.□0	□7	0.043	0.14	0.41	0.□0	0.4□	0.40	0.□□	1.5
□□etone	0.□□	0.□□	0.□5	0.□3	0.□□	0.1□	0.□4	0.□4	0.□0	1□□	0.0□□	0.0□□	0.□□	0.□0	0.4□	0.40	0.□5	□.3
Tri□□oro□□oro□et□ane	0.33	0.35	0.35	0.3□	0.3□	0.3□	0.35	0.35	0.□0	17□	0.0□3	0.07□	0.□□	0.□0	1.1	0.40	□.□	3
Isopropano□	0.34	0.35	0.33	0.30	0.40	0.34	0.3□	0.34	0.□0	170	0.03□	0.10	0.30	0.□0	0.4□	0.40	0.□□	□.0
n□Pentane	0.31	0.33	0.3□	0.□□	0.31	0.3□	0.30	0.31	0.□0	155	0.015	0.04□	0.14	0.□0	0.5□	0.40	1.□	4.3
1,1□Di□□oroet□ene	0.□1	0.□3	0.□□	0.□0	0.□5	0.□5	0.□□	0.□3	0.□0	113	0.017	0.054	0.1□	0.□0	0.7□	0.40	1.□	3.7
Met□y□ene □□oride	0.□7	0.□7	0.□□	0.□5	0.□□	0.□□	0.□□	0.□7	0.□0	137	0.014	0.045	0.13	0.□0	0.□□	0.40	1.4	4.5
Tert□□□ty□a□□o□o□	0.3□	0.3□	0.35	0.30	0.34	0.3□	0.31	0.34	0.□0	17□	0.030	0.0□3	0.□□	0.□0	0.□1	0.40	1.□	□.□
□□y□□□oride	0.□□	0.□□	0.□1	0.1□	0.□□	0.□3	0.1□	0.□1	0.□0	105	0.017	0.054	0.1□	0.□0	0.□3	0.40	1.3	3.7
1,1,□□Tri□□oro□1,□,□□tri□□oroet□ane	0.34	0.3□	0.35	0.31	0.37	0.3□	0.35	0.35	0.□0	175	0.0□□	0.0□□	0.□0	0.□0	1.5	0.40	3.1	□.□
□ar□on dis□□ide	0.17	0.1□	0.1□	0.15	0.□0	0.1□	0.17	0.1□	0.□0	□□	0.017	0.05□	0.1□	0.□0	0.□□	0.40	1.□	3.□
1,□□Di□□oroet□ene □trans□	0.□1	0.□4	0.□□	0.□0	0.□4	0.□4	0.□1	0.□□	0.□0	11□	0.01□	0.057	0.17	0.□0	0.7□	0.40	1.□	3.5
1,1□Di□□oroet□ane	0.□□	0.3□	0.□□	0.□□	0.33	0.34	0.30	0.31	0.□0	155	0.0□□	0.0□□	0.□1	0.□0	0.□1	0.40	1.□	□.□
Met□y□tert□□□ty□et□er	0.□□	0.□□	0.□5	0.□□	0.□7	0.□7	0.□4	0.□□	0.□0	1□□	0.0□0	0.0□4	0.1□	0.□0	0.7□	0.40	1.4	3.1
Met□y□et□y□□etone	0.35	0.37	0.34	0.31	0.3□	0.37	0.34	0.35	0.□0	17□	0.0□4	0.077	0.□3	0.□0	0.5□	0.40	1.□	□.□
1,□□Di□□oroet□ene □□is□	0.□5	0.□7	0.□5	0.□□	0.□7	0.□7	0.□4	0.□5	0.□0	1□7	0.01□	0.05□	0.17	0.□0	0.7□	0.40	1.□	3.4
□t□y□a□etate	0.4□	0.4□	0.4□	0.44	0.51	0.54	0.45	0.4□	0.□0	□41	0.035	0.11	0.33	0.□0	0.7□	0.40	1.4	1.□
n□□exane	0.33	0.35	0.34	0.31	0.3□	0.35	0.3□	0.34	0.□0	170	0.0□□	0.0□□	0.□1	0.□0	0.70	0.40	1.4	□.□
□□oro□or□	0.□□	0.33	0.31	0.□□	0.34	0.34	0.31	0.31	0.□0	157	0.0□□	0.0□□	0.□0	0.□0	0.□□	0.40	□.0	□.□
Tetra□ydro□□ran	0.3□	0.41	0.41	0.35	0.43	0.43	0.3□	0.40	0.□0	□00	0.0□□	0.0□□	0.□4	0.□0	0.5□	0.40	1.□	□.5
1,□□Di□□oroet□ane	0.3□	0.34	0.33	0.30	0.37	0.37	0.34	0.34	0.□0	170	0.0□□	0.0□□	0.□5	0.□0	0.□1	0.40	1.□	□.4
1,1,1□Tri□□oroet□ane	0.31	0.33	0.31	0.□□	0.34	0.34	0.31	0.3□	0.□0	15□	0.0□0	0.0□4	0.1□	0.□0	1.1	0.40	□.□	3.1
Ben□ene	0.33	0.35	0.33	0.30	0.35	0.3□	0.3□	0.33	0.□0	1□7	0.0□1	0.0□5	0.□0	0.□0	0.□4	0.40	1.3	3
□ar□on tetra□□oride	0.□5	0.□7	0.□4	0.□□	0.□□	0.□7	0.□5	0.□5	0.□0	1□□	0.01□	0.050	0.15	0.□0	1.3	0.40	□.5	4.0
□y□o□exane	0.□7	0.□□	0.□7	0.□4	0.□□	0.□□	0.□5	0.□7	0.□0	134	0.01□	0.0□1	0.1□	0.□0	0.□□	0.40	1.4	3.3
1,□□Di□□oropropane	0.40	0.41	0.41	0.3□	0.44	0.44	0.40	0.41	0.□0	□0□	0.0□3	0.071	0.□1	0.□0	0.□□	0.40	1.□	□.□
Bro□odi□□oro□et□ane	0.3□	0.34	0.33	0.30	0.3□	0.35	0.3□	0.33	0.□0	1□5	0.0□1	0.0□□	0.□0	0.□0	1.3	0.40	□.7	3.0
□,□,4□Tri□et□y□pentane	0.□□	0.□5	0.□4	0.□0	0.□5	0.□□	0.□□	0.□3	0.□0	117	0.0□1	0.0□5	0.□0	0.□0	0.□3	0.40	1.□	3.1
Tri□□oroet□ene	0.3□	0.3□	0.37	0.3□	0.3□	0.3□	0.35	0.37	0.□0	1□3	0.0□□	0.0□0	0.□4	0.□0	1.1	0.40	□.1	□.5
1,4□Dioxane	0.3□	0.41	0.3□	0.35	0.41	0.41	0.3□	0.3□	0.□0	1□4	0.0□4	0.07□	0.□3	0.□0	0.7□	0.40	1.4	□.□
Met□y□□et□a□ry□ate	0.3□	0.4□	0.3□	0.37	0.4□	0.41	0.3□	0.40	0.□0	1□□	0.0□3	0.071	0.□1	0.□0	0.□□	0.40	1.□	□.□
n□□eptane	0.35	0.37	0.35	0.31	0.37	0.3□	0.34	0.35	0.□0	175	0.0□□	0.0□□	0.□0	0.□0	0.□□	0.40	1.□	3.0
1,3□Di□□oropropene □□is□	0.33	0.35	0.33	0.31	0.3□	0.3□	0.3□	0.34	0.□0	1□□	0.0□0	0.0□3	0.1□	0.□0	0.□1	0.40	1.□	3.□
Met□y□iso□□ty□□etone	0.44	0.4□	0.45	0.4□	0.51	0.50	0.44	0.4□	0.□0	□3□	0.034	0.11	0.3□	0.□0	0.□□	0.40	1.□	1.□
1,3□Di□□oropropene □trans□	0.37	0.3□	0.3□	0.34	0.40	0.3□	0.35	0.37	0.□0	1□□	0.0□0	0.0□3	0.1□	0.□0	0.□1	0.40	1.□	3.□
1,1,□□Tri□□oroet□ane	0.40	0.4□	0.3□	0.3□	0.4□	0.45	0.41	0.41	0.□0	□03	0.0□7	0.0□5	0.□□	0.□0	1.1	0.40	□.□	□.4

Integrated Analytical Laboratories LLC

METHOD DETECTION LIMIT (MDL) REPORT

Inte□rated □na□yti□a□La□oratories □Rando□p□, NJ

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□o□□n ID□Reste□Rtx□1, □0 □eter, 0.3□□ □ ID, 1 □□
Instr□□ent ID□□ □ □□□i□ent 7□□0□ □MS □□□i□ent 5□75□ □I□L ID□*Instrument AA* □
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Filename	Run #	Date	Time	Filename	Run #	Date	Time
aa□53□	R□n 1	□□□7□017	11□54	aa□544	R□n □	□□□7□017	14□44
aa□540	R□n □	□□□7□017	1□□□□	aa□545	R□n 7	□□□7□017	15□1□
aa□541	R□n 3	□□□7□017	13□0□				
aa□54□	R□n 4	□□□7□017	13□3□				
aa□543	R□n 5	□□□7□017	14□10				

Compound Name	Run 1*	Run 2*	Run 3*	Run 4*	Run 5*	Run 6*	Run 7*	M□□N □a□e	TR□□ □a□e	Per□ent Re□o□ery	Std De□ □on□	MDL ppbv	PQL ppbv	NY□LLTO□ 15□P□ RL pp□□	NY□LLTO□ 15□P□ RL µ□□³	NJ TO□15 RL pp□□	NJ TO□15 RL µ□□³	Tr□e □a□e□ MDL
To□□ene	0.43	0.45	0.43	0.3□	0.45	0.44	0.4□	0.43	0.□0	□14	0.0□5	0.077	0.□3	0.□0	0.75	0.40	1.5	□.□
Met□y□n□□□ty□□etone	0.4□	0.50	0.47	0.43	0.51	0.5□	0.4□	0.4□	0.□0	□40	0.031	0.10	0.30	0.□0	0.□□	0.40	1.□	□.0
Di□ro□o□□□oro□et□ane	0.□7	0.□□	0.□7	0.□4	0.□□	0.□□	0.□7	0.□7	0.□0	13□	0.01□	0.051	0.15	0.□0	1.7	0.40	3.4	4
1,□□Di□ro□□oet□ane	0.3□	0.40	0.3□	0.34	0.41	0.41	0.3□	0.3□	0.□0	1□□	0.0□5	0.07□	0.□3	0.□0	1.5	0.40	3.1	□.□
Tetra□□□oroet□ene	0.41	0.43	0.43	0.3□	0.4□	0.4□	0.41	0.43	0.□0	□13	0.0□5	0.07□	0.□4	0.□0	1.4	0.40	□.7	□.5
□□□oro□en□ene	0.3□	0.41	0.40	0.3□	0.43	0.43	0.3□	0.40	0.□0	□00	0.0□□	0.0□0	0.□4	0.□0	0.□□	0.40	1.□	□.5
□t□y□□en□ene	0.3□	0.3□	0.35	0.3□	0.3□	0.37	0.34	0.3□	0.□0	17□	0.0□3	0.071	0.□1	0.□0	0.□7	0.40	1.7	3
Xy□enes □□ □p□	0.75	0.7□	0.7□	0.□7	0.77	0.7□	0.□□	0.73	0.40	1□□	0.040	0.13	0.3□	0.40	1.7	0.40	1.7	1.□
Bro□□o□or□	0.□□	0.□3	0.□□	0.□0	0.□4	0.□4	0.□□	0.□3	0.□0	113	0.014	0.045	0.13	0.□0	□.1	0.40	4.1	4
Styrene	0.33	0.34	0.3□	0.□□	0.35	0.33	0.30	0.3□	0.□0	1□1	0.0□□	0.0□□	0.□1	0.□0	0.□5	0.40	1.7	3
1,1,□,□Tetra□□□oroet□ane	0.37	0.3□	0.37	0.3□	0.3□	0.3□	0.34	0.3□	0.□0	1□□	0.0□3	0.073	0.□□	0.□0	1.4	0.40	□.7	□.□
Xy□ene □o□	0.40	0.41	0.3□	0.35	0.43	0.43	0.3□	0.40	0.□0	1□□	0.0□□	0.0□3	0.□5	0.□0	0.□7	0.40	1.7	□.4
n□Nonane	0.34	0.35	0.3□	0.30	0.3□	0.3□	0.31	0.33	0.□0	1□7	0.0□3	0.07□	0.□□	0.□0	1.4	0.40	□.1	3
□□□□ene	0.34	0.3□	0.34	0.31	0.37	0.37	0.33	0.35	0.□0	173	0.0□4	0.075	0.□3	0.□0	1.0	0.40	□.0	3
□□□□oroto□□ene	0.3□	0.3□	0.34	0.3□	0.37	0.37	0.34	0.35	0.□0	175	0.01□	0.05□	0.1□	0.□0	0.□□	0.40	□.1	3.4
n□Propy□□en□ene	0.35	0.37	0.34	0.31	0.37	0.3□	0.33	0.35	0.□0	173	0.0□3	0.07□	0.□□	0.□0	1.0	0.40	□.0	□.□
4□□t□y□to□□ene	0.3□	0.34	0.3□	0.□□	0.34	0.34	0.30	0.3□	0.□0	1□1	0.0□0	0.0□□	0.1□	0.□0	0.□□	0.40	□.0	3.□
1,3,5□Tri□et□y□□en□ene	0.3□	0.34	0.3□	0.□□	0.34	0.34	0.30	0.3□	0.□0	1□0	0.0□□	0.0□□	0.□1	0.□0	0.□□	0.40	□.0	□.□
1,□,4□Tri□et□y□□en□ene	0.31	0.3□	0.30	0.□7	0.3□	0.31	0.□□	0.30	0.□0	151	0.0□□	0.0□□	0.□1	0.□0	0.□□	0.40	□.0	3
Ben□y□□□□oride	0.□7	0.□7	0.□5	0.□3	0.□7	0.□7	0.□4	0.□□	0.□0	1□□	0.01□	0.05□	0.17	0.□0	1.0	0.40	□.1	3.□
1,3□Di□□□oro□en□ene	0.3□	0.3□	0.37	0.34	0.40	0.40	0.3□	0.3□	0.□0	1□□	0.0□3	0.07□	0.□□	0.□0	1.□	0.40	□.4	□.□
1,4□Di□□□oro□en□ene	0.3□	0.3□	0.35	0.3□	0.3□	0.3□	0.34	0.3□	0.□0	17□	0.0□4	0.07□	0.□3	0.□0	1.□	0.40	□.4	□.□
1,□□Di□□□oro□en□ene	0.3□	0.37	0.3□	0.33	0.3□	0.3□	0.34	0.3□	0.□0	17□	0.0□0	0.0□3	0.1□	0.□0	1.□	0.40	□.4	3.□
1,□,4□Tri□□□oro□en□ene	0.41	0.41	0.3□	0.35	0.41	0.41	0.3□	0.40	0.□0	1□□	0.0□4	0.077	0.□3	0.□0	1.5	0.40	3.0	3
Nap□t□a□ene	0.41	0.41	0.3□	0.3□	0.41	0.40	0.35	0.3□	0.□0	1□4	0.0□5	0.07□	0.□4	0.□0	1.0	0.40	□.1	□.5
1,3□□exa□□□oro□□□tadiene	0.40	0.4□	0.40	0.3□	0.43	0.45	0.40	0.41	0.□0	□0□	0.0□4	0.075	0.□□	0.□0	□.1	0.40	4.3	□.7

Pro□essin□ Met□od□ □□MSD□□□M□1□M□T□ODS□□□0□1□.M
Initia□□a□i□ration□□□MSD□□□M□1□M□T□ODS□□□0□1□.M
Lo□ation o□t□is □i□e□P□P□L Reports□□015□LLTO□15 and TO□15 □o□ □on □ies□□□i□ent MDL

Instr□□ent □sed □or □□ean □anister □erti□i□ation □na□ysis□ Y□S

Mi□□ae□Le□tin, P□.D.
La□oratory Dire□tor

Date□ J□□y 5, □017

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□ir Di□ision □□a□ity □ss□ran□e O□□i□er

Date□ J□□y 5, □017

Section V: Quality Control Data Summary

BFB Tune Summary

Method Blank

Laboratory Control Sample

Laboratory Sample Duplicate

Internal Standard Area Summary

BFB

Data Path: C:\DATA\09-12-17\

Data File: AA3441BFB.D

Acq On: 9/12/2017 8:18:00AM

Operator: jls

Sample: BFB

Misc: ALM029426

ALS Vial: 1 **Multiplier:** 1

Integration File: rteint.p

Method: C:\msdchem\1\METHODS\0816.M

Last Update: Thu Aug 17 08:51:27 2017

Spectrum Information:

PassFail	Target Mass	Rel. to Mass	Lower Limit %	Higher Limit %	Raw Abundance	% Relative Abundance
PASS	50	95	8	40	77682	13.2
PASS	75	95	30	66	348928	59.5
PASS	95	95	100	100	586303	100.0
PASS	96	95	5	9	39699	6.8
PASS	173	174	0.00	2	3809	0.9
PASS	174	95	50	100	410368	70.0
PASS	175	174	4	9	30821	7.5
PASS	176	174	93	101	385131	93.9
PASS	177	176	5	9	25240	6.6

Runs with this BFB:

Lab Sample Number	Date File	Field Sample	Date/Time of Sample/Standard Analysis
BFB	AA3441BFB	NA	9/12/2017 8:18:00 AM
40 PPBV STD	AA3443STD01	NA	9/12/2017 9:44:00 AM
20 PPBV STD	AA3444STD02	NA	9/12/2017 10:17:00 AM
10 PPBV STD	AA3445STD03	NA	9/12/2017 10:51:00 AM
2 PPBV STD	AA3446STD04	NA	9/12/2017 11:24:00 AM
0.2 PPBV STD	AA3447STD05	NA	9/12/2017 12:06:00 PM
10 PPBV ICVSS	AA3448ICVSS	NA	9/12/2017 1:28:00 PM

Integrated Analytical Laboratories LLC

BFB

Data Path: C:\DATA\10-04-17\

Data File: AA3701BFB.D

Acq On: 10/4/2017 8:23:00AM

Operator: jls

Sample: BFB

Misc: ALM029426

ALS Vial: 1 **Multiplier:** 1

Integration File: rteint.p

Method: C:\msdchem\1\METHODS\0912.M

Last Update: Tue Sep 12 13:00:02 2017

Spectrum Information:

PassFail	Target Mass	Rel. to Mass	Lower Limit %	Higher Limit %	Raw Abundance	% Relative Abundance
PASS	50	95	8	40	72509	13.5
PASS	75	95	30	66	338679	62.9
PASS	95	95	100	100	538731	100.0
PASS	96	95	5	9	36859	6.8
PASS	173	174	0.00	2	2769	0.7
PASS	174	95	50	100	379947	70.5
PASS	175	174	4	9	27965	7.4
PASS	176	174	93	101	366379	96.4
PASS	177	176	5	9	22832	6.2

Runs with this BFB:

Lab Sample Number	Date File	Field Sample	Date/Time of Sample/Standard Analysis
BFB	AA3701BFB	NA	10/4/2017 8:23:00 AM
10 PPBV DCVS	AA3702DCVS	NA	10/4/2017 9:02:00 AM
10 PPBV LCS	AA3703LCS	NA	10/4/2017 9:55:00 AM
METHOD BLANK	AA3704BLK	NA	10/4/2017 10:33:00 AM
02 PPBV RLLCS	AA3705RLLCS	NA	10/4/2017 11:14:00 AM
2162	AA3717	NA	10/4/2017 6:34:00 PM
10 PPBV CCCVS	AA3728CCCVS	NA	10/4/2017 7:08:00 PM

Integrated Analytical Laboratories LLC

BFB

Data Path: C:\DATA\11-28-17\

Data File: AA4271BFB.D

Acq On: 11/28/2017 8:37:00AM

Operator: jls

Sample: BFB

Misc: ALM029426

ALS Vial: 1 **Multiplier:** 1

Integration File: rteint.p

Method: C:\msdchem\1\METHODS\0912.M

Last Update: Tue Sep 12 13:00:02 2017

Spectrum Information:

PassFail	Target Mass	Rel. to Mass	Lower Limit %	Higher Limit %	Raw Abundance	% Relative Abundance
PASS	50	95	8	40	97275	13.9
PASS	75	95	30	66	399829	57.1
PASS	95	95	100	100	700502	100.0
PASS	96	95	5	9	45515	6.5
PASS	173	174	0.00	2	4963	0.9
PASS	174	95	50	100	541242	77.3
PASS	175	174	4	9	39455	7.3
PASS	176	174	93	101	523454	96.7
PASS	177	176	5	9	33592	6.4

Runs with this BFB:

Lab Sample Number	Date File	Field Sample	Date/Time of Sample/Standard Analysis
BFB	AA4271BFB	NA	11/28/2017 8:37:00 AM
10 PPBV DCVS	AA4272DCVS	NA	11/28/2017 9:29:00 AM
10 PPBV LCS	AA4273LCS	NA	11/28/2017 10:09:00 AM
METHOD BLANK	AA4274BLK	NA	11/28/2017 1:04:00 PM
02 PPBV RLLCS	AA4275RLLCS	NA	11/28/2017 1:44:00 PM
E17-09837-01	AA4286	SS-1	11/28/2017 8:34:00 PM
E17-09837-02	AA4287	SS-2	11/28/2017 9:07:00 PM
E17-09837-05	AA4290	Ambient	11/28/2017 10:48:00 PM
10 PPBV CCCVS	AA4292CCCVS	NA	11/28/2017 11:56:00 PM

IAL
Integrated Analytical Laboratories LLC

BFB

Data Path:	**C:\DATA\11-29-17**
Data File:	**AA4301BFB.D**
Acq On:	**11/29/2017 8:42:00AM**
Operator:	**jls**
Sample:	**BFB**
Misc:	**ALM029426**
ALS Vial:	**1** **Multiplier:** **1**
Integration File:	**rteint.p**
Method:	**C:\msdchem\1\METHODS\0912.M**
Last Update:	**Tue Sep 12 13:00:02 2017**
Spectrum Information:	

PassFail	Target Mass	Rel. to Mass	Lower Limit %	Higher Limit %	Raw Abundance	% Relative Abundance
PASS	50	95	8	40	97565	15.2
PASS	75	95	30	66	400064	62.3
PASS	95	95	100	100	641984	100.0
PASS	96	95	5	9	39141	6.1
PASS	173	174	0.00	2	5077	1.1
PASS	174	95	50	100	482837	75.2
PASS	175	174	4	9	36367	7.5
PASS	176	174	93	101	469473	97.2
PASS	177	176	5	9	28931	6.2

Runs with this BFB:

Lab Sample Number	Date File	Field Sample	Date/Time of Sample/Standard Analysis
BFB	AA4301BFB	NA	11/29/2017 8:42:00 AM
10 PPBV DCVS	AA4302DCVS	NA	11/29/2017 10:04:00 AM
10 PPBV LCS	AA4303LCS	NA	11/29/2017 10:45:00 AM
METHOD BLANK	AA4304BLK	NA	11/29/2017 11:19:00 AM
02 PPBV RLLCS	AA4305RLLCS	NA	11/29/2017 11:59:00 AM
3059	AA4306	NA	11/29/2017 2:35:00 PM
E17-09837-01	AA4307	SS-1	11/29/2017 3:08:00 PM
E17-09837-02	AA4308	SS-2	11/29/2017 3:55:00 PM
E17-09837-03	AA4309	SS-3	11/29/2017 4:29:00 PM
E17-09837-04	AA4310	SS-4	11/29/2017 5:03:00 PM
10 PPBV CCCVS	AA4319CCCVS	NA	11/29/2017 10:05:00 PM

Integrated Analytical Laboratories LLC

Method Blank Report

Lab Sample Name:	**METHOD BLANK**	**Data File:**	**AA3704BLK**
Field Sample Name:	**METHOD BLANK**	**Date Analyzed:**	**10/4/2017**
Matrix:	**Air**	**Sample Volume:**	**500ml**
Dilution Factor:	**1**	**GC/MS Column:**	**RTX-1, 0.32 mmID**

Runs with this Method Blank:

Standard/Sample Run	Date/Time of Sample/Standard Injection
BFB [AA3701BFB]	10/04/2017 8:23
10 PPBV DCVS [AA3702DCVS]	10/04/2017 9:02
10 PPBV LCS [AA3703LCS]	10/04/2017 9:55
METHOD BLANK [AA3704BLK]	10/04/2017 10:33
02 PPBV RLLCS [AA3705RLLCS]	10/04/2017 11:14
2162 [AA3717]	10/04/2017 18:34
10 PPBV CCCVS [AA3728CCCVS]	10/04/2017 19:08

Compound	CAS #	Reporting Limit (ppbv)	Concentration (ppbv)
Acetone	67-64-1	0.20	ND
Benzene	71-43-2	0.20	ND
Bromodichloromethane	75-27-4	0.20	ND
Bromoform	75-25-2	0.14	ND
Bromomethane	74-83-9	0.20	ND
1,3-Butadiene	106-99-0	0.20	ND
Chlorobenzene	108-90-7	0.20	ND
Chloroethane	75-00-3	0.20	ND
Chloroform	67-66-3	0.20	ND
Chloromethane	74-87-3	0.20	ND
Carbon disulfide	75-15-0	0.16	ND
Carbon tetrachloride	56-23-5	0.15	ND
Cyclohexane	110-82-7	0.18	ND
Dibromochloromethane	124-48-1	0.15	ND
1,2-Dibromoethane	106-93-4	0.20	ND
1,2-Dichlorobenzene	95-50-1	0.19	ND
1,3-Dichlorobenzene	541-73-1	0.20	ND
1,4-Dichlorobenzene	106-46-7	0.20	ND
Dichlorodifluoromethane	75-71-8	0.15	ND
1,1-Dichloroethane	75-34-3	0.20	ND
1,2-Dichloroethane	107-06-2	0.20	ND
1,1-Dichloroethene	75-35-4	0.16	ND
1,2-Dichloroethene (cis)	156-59-2	0.17	ND
1,2-Dichloroethene (trans)	156-60-5	0.17	ND
1,2-Dichloropropane	78-87-5	0.20	ND
1,3-Dichloropropene (cis)	10061-01-5	0.19	ND
1,3-Dichloropropene (trans)	10061-02-6	0.19	ND
1,2-Dichlorotetrafluoroethane	76-14-2	0.18	ND
1,4-Dioxane	123-91-1	0.20	ND
Ethylbenzene	100-41-4	0.20	ND
n-Heptane	142-82-5	0.20	ND
1,3-Hexachlorobutadiene	87-68-3	0.20	ND
n-Hexane	110-54-3	0.20	ND
Methylene chloride	75-09-2	0.14	ND
Methyl ethyl ketone	78-93-3	0.20	ND

Method Blank must be less than the Practical Quantitation Limit (PQL).

Integrated Analytical Laboratories LLC

Method Blank Report

Lab Sample Name:	**METHOD BLANK**	**Data File:**	**AA3704BLK**
Field Sample Name:	**METHOD BLANK**	**Date Analyzed:**	**10/4/2017**
Matrix:	**Air**	**Sample Volume:**	**500ml**
Dilution Factor:	**1**	**GC/MS Column:**	**RTX-1, 0.32 mmID**

Runs with this Method Blank:

Standard/Sample Run	**Date/Time of Sample/Standard Injection**
BFB [AA3701BFB]	10/04/2017 8:23
10 PPBV DCVS [AA3702DCVS]	10/04/2017 9:02
10 PPBV LCS [AA3703LCS]	10/04/2017 9:55
METHOD BLANK [AA3704BLK]	10/04/2017 10:33
02 PPBV RLLCS [AA3705RLLCS]	10/04/2017 11:14
2162 [AA3717]	10/04/2017 18:34
10 PPBV CCCVS [AA3728CCCVS]	10/04/2017 19:08

Compound	**CAS #**	**Reporting Limit (ppbv)**	**Concentration (ppbv)**
Methyl isobutyl ketone	108-10-1	0.20	ND
Methyl tert-butyl ether	1634-04-4	0.19	ND
Styrene	100-42-5	0.20	ND
Tert-butyl alcohol	75-65-0	0.20	ND
1,1,2,2-Tetrachloroethane	79-34-5	0.20	ND
Tetrachloroethene	127-18-4	0.20	ND
Toluene	108-88-3	0.20	ND
1,2,4-Trichlorobenzene	120-82-1	0.20	ND
1,1,1-Trichloroethane	71-55-6	0.19	ND
1,1,2-Trichloroethane	79-00-5	0.20	ND
Trichloroethene	79-01-6	0.20	ND
Trichlorofluoromethane	75-69-4	0.20	ND
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	0.20	ND
1,2,4-Trimethylbenzene	95-63-6	0.20	ND
1,3,5-Trimethylbenzene	108-67-8	0.20	ND
2,2,4-Trimethylpentane	540-84-1	0.20	ND
Vinyl bromide	593-60-2	0.14	ND
Vinyl chloride	75-01-4	0.14	ND
Xylenes (m&p)	179601-23-1	0.20	ND
Xylenes (o)	95-47-6	0.20	ND

Method Blank must be less than the Practical Quantitation Limit (PQL).

Integrated Analytical Laboratories LLC

Method Blank Report

Lab Sample Name:	**METHOD BLANK**	**Data File:**	**AA4274BLK**
Field Sample Name:	**METHOD BLANK**	**Date Analyzed:**	**11/28/2017**
Matrix:	**Air**	**Sample Volume:**	**500ml**
Dilution Factor:	**1**	**GC/MS Column:**	**RTX-1, 0.32 mmID**

Runs with this Method Blank:

Standard/Sample Run	**Date/Time of Sample/Standard Injection**
BFB [AA4271BFB]	11/28/2017 8:37
10 PPBV DCVS [AA4272DCVS]	11/28/2017 9:29
10 PPBV LCS [AA4273LCS]	11/28/2017 10:09
METHOD BLANK [AA4274BLK]	11/28/2017 13:04
02 PPBV RLLCS [AA4275RLLCS]	11/28/2017 13:44
E17-09837-01 [AA4286]	11/28/2017 20:34
E17-09837-02 [AA4287]	11/28/2017 21:07
E17-09837-05 [AA4290]	11/28/2017 22:48
10 PPBV CCCVS [AA4292CCCVS]	11/28/2017 23:56

Compound	**CAS #**	**Reporting Limit (ppbv)**	**Concentration (ppbv)**
Acetone	67-64-1	0.20	ND
Benzene	71-43-2	0.20	ND
Bromodichloromethane	75-27-4	0.20	ND
Bromoform	75-25-2	0.14	ND
Bromomethane	74-83-9	0.20	ND
1,3-Butadiene	106-99-0	0.20	ND
Chlorobenzene	108-90-7	0.20	ND
Chloroethane	75-00-3	0.20	ND
Chloroform	67-66-3	0.20	ND
Chloromethane	74-87-3	0.20	ND
Carbon disulfide	75-15-0	0.16	ND
Carbon tetrachloride	56-23-5	0.15	ND
Cyclohexane	110-82-7	0.18	ND
Dibromochloromethane	124-48-1	0.15	ND
1,2-Dibromoethane	106-93-4	0.20	ND
1,2-Dichlorobenzene	95-50-1	0.19	ND
1,3-Dichlorobenzene	541-73-1	0.20	ND
1,4-Dichlorobenzene	106-46-7	0.20	ND
Dichlorodifluoromethane	75-71-8	0.15	ND
1,1-Dichloroethane	75-34-3	0.20	ND
1,2-Dichloroethane	107-06-2	0.20	ND
1,1-Dichloroethene	75-35-4	0.16	ND
1,2-Dichloroethene (cis)	156-59-2	0.17	ND
1,2-Dichloroethene (trans)	156-60-5	0.17	ND
1,2-Dichloropropane	78-87-5	0.20	ND
1,3-Dichloropropene (cis)	10061-01-5	0.19	ND
1,3-Dichloropropene (trans)	10061-02-6	0.19	ND
1,2-Dichlorotetrafluoroethane	76-14-2	0.18	ND
1,4-Dioxane	123-91-1	0.20	ND
Ethylbenzene	100-41-4	0.20	ND
n-Heptane	142-82-5	0.20	ND
1,3-Hexachlorobutadiene	87-68-3	0.20	ND
n-Hexane	110-54-3	0.20	ND

Method Blank must be less than the Practical Quantitation Limit (PQL).

Integrated Analytical Laboratories LLC

Method Blank Report

Lab Sample Name:	**METHOD BLANK**	**Data File:**	**AA4274BLK**
Field Sample Name:	**METHOD BLANK**	**Date Analyzed:**	**11/28/2017**
Matrix:	**Air**	**Sample Volume:**	**500ml**
Dilution Factor:	**1**	**GC/MS Column:**	**RTX-1, 0.32 mmID**

Runs with this Method Blank:

Standard/Sample Run	Date/Time of Sample/Standard Injection
BFB [AA4271BFB]	11/28/2017 8:37
10 PPBV DCVS [AA4272DCVS]	11/28/2017 9:29
10 PPBV LCS [AA4273LCS]	11/28/2017 10:09
METHOD BLANK [AA4274BLK]	11/28/2017 13:04
02 PPBV RLLCS [AA4275RLLCS]	11/28/2017 13:44
E17-09837-01 [AA4286]	11/28/2017 20:34
E17-09837-02 [AA4287]	11/28/2017 21:07
E17-09837-05 [AA4290]	11/28/2017 22:48
10 PPBV CCCVS [AA4292CCCVS]	11/28/2017 23:56

Compound	CAS #	Reporting Limit (ppbv)	Concentration (ppbv)
Methylene chloride	75-09-2	0.14	ND
Methyl ethyl ketone	78-93-3	0.20	ND
Methyl isobutyl ketone	108-10-1	0.20	ND
Methyl tert-butyl ether	1634-04-4	0.19	ND
Styrene	100-42-5	0.20	ND
Tert-butyl alcohol	75-65-0	0.20	ND
1,1,2,2-Tetrachloroethane	79-34-5	0.20	ND
Tetrachloroethene	127-18-4	0.20	ND
Toluene	108-88-3	0.20	ND
1,2,4-Trichlorobenzene	120-82-1	0.20	ND
1,1,1-Trichloroethane	71-55-6	0.19	ND
1,1,2-Trichloroethane	79-00-5	0.20	ND
Trichloroethene	79-01-6	0.20	ND
Trichlorofluoromethane	75-69-4	0.20	ND
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	0.20	ND
1,2,4-Trimethylbenzene	95-63-6	0.20	ND
1,3,5-Trimethylbenzene	108-67-8	0.20	ND
2,2,4-Trimethylpentane	540-84-1	0.20	ND
Vinyl bromide	593-60-2	0.14	ND
Vinyl chloride	75-01-4	0.14	ND
Xylenes (m&p)	179601-23-1	0.20	ND
Xylenes (o)	95-47-6	0.20	ND

Method Blank must be less than the Practical Quantitation Limit (PQL).

Integrated Analytical Laboratories LLC

Method Blank Report

Lab Sample Name:	**METHOD BLANK**	**Data File:**	**AA4304BLK**
Field Sample Name:	**METHOD BLANK**	**Date Analyzed:**	**11/29/2017**
Matrix:	**Air**	**Sample Volume:**	**500ml**
Dilution Factor:	**1**	**GC/MS Column:**	**RTX-1, 0.32 mmID**

Runs with this Method Blank:

Standard/Sample Run	Date/Time of Sample/Standard Injection
BFB [AA4301BFB]	11/29/2017 8:42
10 PPBV DCVS [AA4302DCVS]	11/29/2017 10:04
10 PPBV LCS [AA4303LCS]	11/29/2017 10:45
METHOD BLANK [AA4304BLK]	11/29/2017 11:19
02 PPBV RLLCS [AA4305RLLCS]	11/29/2017 11:59
3059 [AA4306]	11/29/2017 14:35
E17-09837-01 [AA4307]	11/29/2017 15:08
E17-09837-02 [AA4308]	11/29/2017 15:55
E17-09837-03 [AA4309]	11/29/2017 16:29
E17-09837-04 [AA4310]	11/29/2017 17:03
10 PPBV CCCVS [AA4319CCCVS]	11/29/2017 22:05

Compound	CAS #	Reporting Limit (ppbv)	Concentration (ppbv)
Acetone	67-64-1	0.20	ND
Benzene	71-43-2	0.20	ND
Bromodichloromethane	75-27-4	0.20	ND
Bromoform	75-25-2	0.14	ND
Bromomethane	74-83-9	0.20	ND
1,3-Butadiene	106-99-0	0.20	ND
Chlorobenzene	108-90-7	0.20	ND
Chloroethane	75-00-3	0.20	ND
Chloroform	67-66-3	0.20	ND
Chloromethane	74-87-3	0.20	ND
Carbon disulfide	75-15-0	0.16	ND
Carbon tetrachloride	56-23-5	0.15	ND
Cyclohexane	110-82-7	0.18	ND
Dibromochloromethane	124-48-1	0.15	ND
1,2-Dibromoethane	106-93-4	0.20	ND
1,2-Dichlorobenzene	95-50-1	0.19	ND
1,3-Dichlorobenzene	541-73-1	0.20	ND
1,4-Dichlorobenzene	106-46-7	0.20	ND
Dichlorodifluoromethane	75-71-8	0.15	ND
1,1-Dichloroethane	75-34-3	0.20	ND
1,2-Dichloroethane	107-06-2	0.20	ND
1,1-Dichloroethene	75-35-4	0.16	ND
1,2-Dichloroethene (cis)	156-59-2	0.17	ND
1,2-Dichloroethene (trans)	156-60-5	0.17	ND
1,2-Dichloropropane	78-87-5	0.20	ND
1,3-Dichloropropene (cis)	10061-01-5	0.19	ND
1,3-Dichloropropene (trans)	10061-02-6	0.19	ND
1,2-Dichlorotetrafluoroethane	76-14-2	0.18	ND
1,4-Dioxane	123-91-1	0.20	ND
Ethylbenzene	100-41-4	0.20	ND

Method Blank must be less than the Practical Quantitation Limit (PQL).

Integrated Analytical Laboratories LLC

Method Blank Report

Lab Sample Name:	**METHOD BLANK**	**Data File:**	**AA4304BLK**
Field Sample Name:	**METHOD BLANK**	**Date Analyzed:**	**11/29/2017**
Matrix:	**Air**	**Sample Volume:**	**500ml**
Dilution Factor:	**1**	**GC/MS Column:**	**RTX-1, 0.32 mmID**

Runs with this Method Blank:

Standard/Sample Run	Date/Time of Sample/Standard Injection
BFB [AA4301BFB]	11/29/2017 8:42
10 PPBV DCVS [AA4302DCVS]	11/29/2017 10:04
10 PPBV LCS [AA4303LCS]	11/29/2017 10:45
METHOD BLANK [AA4304BLK]	11/29/2017 11:19
02 PPBV RLLCS [AA4305RLLCS]	11/29/2017 11:59
3059 [AA4306]	11/29/2017 14:35
E17-09837-01 [AA4307]	11/29/2017 15:08
E17-09837-02 [AA4308]	11/29/2017 15:55
E17-09837-03 [AA4309]	11/29/2017 16:29
E17-09837-04 [AA4310]	11/29/2017 17:03
10 PPBV CCCVS [AA4319CCCVS]	11/29/2017 22:05

Compound	CAS #	Reporting Limit (ppbv)	Concentration (ppbv)
n-Heptane	142-82-5	0.20	ND
1,3-Hexachlorobutadiene	87-68-3	0.20	ND
n-Hexane	110-54-3	0.20	ND
Methylene chloride	75-09-2	0.14	ND
Methyl ethyl ketone	78-93-3	0.20	ND
Methyl isobutyl ketone	108-10-1	0.20	ND
Methyl tert-butyl ether	1634-04-4	0.19	ND
Styrene	100-42-5	0.20	ND
Tert-butyl alcohol	75-65-0	0.20	ND
1,1,2,2-Tetrachloroethane	79-34-5	0.20	ND
Tetrachloroethene	127-18-4	0.20	ND
Toluene	108-88-3	0.20	ND
1,2,4-Trichlorobenzene	120-82-1	0.20	ND
1,1,1-Trichloroethane	71-55-6	0.19	ND
1,1,2-Trichloroethane	79-00-5	0.20	ND
Trichloroethene	79-01-6	0.20	ND
Trichlorofluoromethane	75-69-4	0.20	ND
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	0.20	ND
1,2,4-Trimethylbenzene	95-63-6	0.20	ND
1,3,5-Trimethylbenzene	108-67-8	0.20	ND
2,2,4-Trimethylpentane	540-84-1	0.20	ND
Vinyl bromide	593-60-2	0.14	ND
Vinyl chloride	75-01-4	0.14	ND
Xylenes (m&p)	179601-23-1	0.20	ND
Xylenes (o)	95-47-6	0.20	ND

Method Blank must be less than the Practical Quantitation Limit (PQL).

Integrated Analytical Laboratories LLC

Laboratory Control Spike

Lab Sample Name: **10 PPBV LCS** **Data File:** **AA3703LCS**
Spike Amount: **10 ppbv, except m&p-Xylenes at 20 ppbv** **Date Analyzed:** **10/4/2017**

Runs with this LCS:

Standard/Sample Run	Date/Time of Sample/Standard Injection
BFB [AA3701BFB]	10/04/2017 8:23
10 PPBV DCVS [AA3702DCVS]	10/04/2017 9:02
10 PPBV LCS [AA3703LCS]	10/04/2017 9:55
METHOD BLANK [AA3704BLK]	10/04/2017 10:33
02 PPBV RLLCS [AA3705RLLCS]	10/04/2017 11:14
2162 [AA3717]	10/04/2017 18:34
10 PPBV CCCVS [AA3728CCCVS]	10/04/2017 19:08

Compound	CAS #	Calculated Amount (ppbv)	% Recovery
Acetone	67-64-1	10	100
Benzene	71-43-2	9.0	90
Bromodichloromethane	75-27-4	9.9	99
Bromoform	75-25-2	9.8	98
Bromomethane	74-83-9	11	110
1,3-Butadiene	106-99-0	9.8	98
Chlorobenzene	108-90-7	8.9	89
Chloroethane	75-00-3	10	100
Chloroform	67-66-3	9.8	98
Chloromethane	74-87-3	11	110
Carbon disulfide	75-15-0	9.5	95
Carbon tetrachloride	56-23-5	9.7	97
Cyclohexane	110-82-7	9.5	95
Dibromochloromethane	124-48-1	9.8	98
1,2-Dibromoethane	106-93-4	9.3	93
1,2-Dichlorobenzene	95-50-1	9.3	93
1,3-Dichlorobenzene	541-73-1	9.4	94
1,4-Dichlorobenzene	106-46-7	9.4	94
Dichlorodifluoromethane	75-71-8	10	100
1,1-Dichloroethane	75-34-3	9.1	91
1,2-Dichloroethane	107-06-2	9.8	98
1,1-Dichloroethene	75-35-4	10	100
1,2-Dichloroethene (cis)	156-59-2	9.6	96
1,2-Dichloroethene (trans)	156-60-5	9.6	96
1,2-Dichloropropane	78-87-5	8.5	85
1,3-Dichloropropene (cis)	10061-01-5	9.6	96
1,3-Dichloropropene (trans)	10061-02-6	9.8	98
1,2-Dichlorotetrafluoroethane	76-14-2	9.5	95
1,4-Dioxane	123-91-1	8.4	84
Ethylbenzene	100-41-4	9.7	97
n-Heptane	142-82-5	11	110
1,3-Hexachlorobutadiene	87-68-3	8.8	88
n-Hexane	110-54-3	8.9	89

LCS recovery must be within 70-130% of the spiked value for all compounds except Acetone, Dioxane (1,4-), Hexachlorobutadiene, Naphthalene, and 1,2,4-Trichlorobenzene. These compounds must be within 40-160%.
*** Values outside of QC limits* Values outside of 70-130% QC limits**

Integrated Analytical Laboratories LLC

Laboratory Control Spike

Lab Sample Name: **10 PPBV LCS** **Data File:** **AA3703LCS**
Spike Amount: **10 ppbv, except m&p-Xylenes at 20 ppbv** **Date Analyzed:** **10/4/2017**

Runs with this LCS:

Standard/Sample Run	Date/Time of Sample/Standard Injection
BFB [AA3701BFB]	10/04/2017 8:23
10 PPBV DCVS [AA3702DCVS]	10/04/2017 9:02
10 PPBV LCS [AA3703LCS]	10/04/2017 9:55
METHOD BLANK [AA3704BLK]	10/04/2017 10:33
02 PPBV RLLCS [AA3705RLLCS]	10/04/2017 11:14
2162 [AA3717]	10/04/2017 18:34
10 PPBV CCCVS [AA3728CCCVS]	10/04/2017 19:08

Compound	CAS #	Calculated Amount (ppbv)	% Recovery
Methylene chloride	75-09-2	8.8	88
Methyl ethyl ketone	78-93-3	11	110
Methyl isobutyl ketone	108-10-1	9.1	91
Methyl tert-butyl ether	1634-04-4	9.4	94
Styrene	100-42-5	10	100
Tert-butyl alcohol	75-65-0	9.1	91
1,1,2,2-Tetrachloroethane	79-34-5	8.9	89
Tetrachloroethene	127-18-4	9.1	91
Toluene	108-88-3	9.6	96
1,2,4-Trichlorobenzene	120-82-1	9.0	90
1,1,1-Trichloroethane	71-55-6	9.5	95
1,1,2-Trichloroethane	79-00-5	9.0	90
Trichloroethene	79-01-6	9.6	96
Trichlorofluoromethane	75-69-4	10.0	100
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	8.9	89
1,2,4-Trimethylbenzene	95-63-6	11	110
1,3,5-Trimethylbenzene	108-67-8	10	100
2,2,4-Trimethylpentane	540-84-1	9.4	94
Vinyl bromide	593-60-2	10	100
Vinyl chloride	75-01-4	10	100
Xylenes (m&p)	179601-23-1	20	99
Xylenes (o)	95-47-6	10.0	100

LCS recovery must be within 70-130% of the spiked value for all compounds except Acetone, Dioxane (1,4-), Hexachlorobutadiene, Naphthalene, and 1,2,4-Trichlorobenzene. These compounds must be within 40-160%.
*** Values outside of QC limits* Values outside of 70-130% QC limits**

Integrated Analytical Laboratories LLC

Laboratory Control Spike

Lab Sample Name: **10 PPBV LCS** **Data File:** **AA4273LCS**
Spike Amount: **10 ppbv, except m&p-Xylenes at 20 ppbv** **Date Analyzed:** **11/28/2017**

Runs with this LCS:

Standard/Sample Run	**Date/Time of Sample/Standard Injection**
BFB [AA4271BFB]	11/28/2017 8:37
10 PPBV DCVS [AA4272DCVS]	11/28/2017 9:29
10 PPBV LCS [AA4273LCS]	11/28/2017 10:09
METHOD BLANK [AA4274BLK]	11/28/2017 13:04
02 PPBV RLLCS [AA4275RLLCS]	11/28/2017 13:44
E17-09837-01 [AA4286]	11/28/2017 20:34
E17-09837-02 [AA4287]	11/28/2017 21:07
E17-09837-05 [AA4290]	11/28/2017 22:48
10 PPBV CCCVS [AA4292CCCVS]	11/28/2017 23:56

Compound	**CAS #**	**Calculated Amount (ppbv)**	**% Recovery**
Acetone	67-64-1	11	110
Benzene	71-43-2	9.7	97
Bromodichloromethane	75-27-4	9.4	94
Bromoform	75-25-2	9.4	94
Bromomethane	74-83-9	13	130
1,3-Butadiene	106-99-0	11	110
Chlorobenzene	108-90-7	8.5	85
Chloroethane	75-00-3	10	100
Chloroform	67-66-3	9.4	94
Chloromethane	74-87-3	12	120
Carbon disulfide	75-15-0	9.3	93
Carbon tetrachloride	56-23-5	10	100
Cyclohexane	110-82-7	9.6	96
Dibromochloromethane	124-48-1	10	100
1,2-Dibromoethane	106-93-4	9.6	96
1,2-Dichlorobenzene	95-50-1	8.9	89
1,3-Dichlorobenzene	541-73-1	8.6	86
1,4-Dichlorobenzene	106-46-7	8.7	87
Dichlorodifluoromethane	75-71-8	10	100
1,1-Dichloroethane	75-34-3	9.3	93
1,2-Dichloroethane	107-06-2	10	100
1,1-Dichloroethene	75-35-4	10	100
1,2-Dichloroethene (cis)	156-59-2	10.0	100
1,2-Dichloroethene (trans)	156-60-5	10	100
1,2-Dichloropropane	78-87-5	8.7	87
1,3-Dichloropropene (cis)	10061-01-5	9.6	96
1,3-Dichloropropene (trans)	10061-02-6	9.8	98
1,2-Dichlorotetrafluoroethane	76-14-2	9.8	98
1,4-Dioxane	123-91-1	9.3	93
Ethylbenzene	100-41-4	9.0	90
n-Heptane	142-82-5	11	110

LCS recovery must be within 70-130% of the spiked value for all compounds except Acetone, Dioxane (1,4-), Hexachlorobutadiene, Naphthalene, and 1,2,4-Trichlorobenzene. These compounds must be within 40-160%.
*** Values outside of QC limits* Values outside of 70-130% QC limits**

Laboratory Control Spike

Lab Sample Name: **10 PPBV LCS** **Data File:** **AA4273LCS**

Spike Amount: **10 ppbv, except m&p-Xylenes at 20 ppbv** **Date Analyzed:** **11/28/2017**

Runs with this LCS:

Standard/Sample Run	Date/Time of Sample/Standard Injection
BFB [AA4271BFB]	11/28/2017 8:37
10 PPBV DCVS [AA4272DCVS]	11/28/2017 9:29
10 PPBV LCS [AA4273LCS]	11/28/2017 10:09
METHOD BLANK [AA4274BLK]	11/28/2017 13:04
02 PPBV RLLCS [AA4275RLLCS]	11/28/2017 13:44
E17-09837-01 [AA4286]	11/28/2017 20:34
E17-09837-02 [AA4287]	11/28/2017 21:07
E17-09837-05 [AA4290]	11/28/2017 22:48
10 PPBV CCCVS [AA4292CCCVS]	11/28/2017 23:56

Compound	CAS #	Calculated Amount (ppbv)	% Recovery
1,3-Hexachlorobutadiene	87-68-3	9.2	92
n-Hexane	110-54-3	10	100
Methylene chloride	75-09-2	8.6	86
Methyl ethyl ketone	78-93-3	10	100
Methyl isobutyl ketone	108-10-1	11	110
Methyl tert-butyl ether	1634-04-4	9.8	98
Styrene	100-42-5	9.2	92
Tert-butyl alcohol	75-65-0	9.9	99
1,1,2,2-Tetrachloroethane	79-34-5	7.5	75
Tetrachloroethene	127-18-4	11	110
Toluene	108-88-3	9.7	97
1,2,4-Trichlorobenzene	120-82-1	9.3	93
1,1,1-Trichloroethane	71-55-6	9.7	97
1,1,2-Trichloroethane	79-00-5	9.4	94
Trichloroethene	79-01-6	10	100
Trichlorofluoromethane	75-69-4	9.9	99
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	9.1	91
1,2,4-Trimethylbenzene	95-63-6	9.6	96
1,3,5-Trimethylbenzene	108-67-8	9.3	93
2,2,4-Trimethylpentane	540-84-1	11	110
Vinyl bromide	593-60-2	11	110
Vinyl chloride	75-01-4	11	110
Xylenes (m&p)	179601-23-1	17	86
Xylenes (o)	95-47-6	8.7	87

LCS recovery must be within 70-130% of the spiked value for all compounds except Acetone, Dioxane (1,4-), Hexachlorobutadiene, Naphthalene, and 1,2,4-Trichlorobenzene. These compounds must be within 40-160%.

*** Values outside of QC limits* Values outside of 70-130% QC limits**

Laboratory Control Spike

Lab Sample Name:	**10 PPBV LCS**	**Data File:**	**AA4303LCS**
Spike Amount:	**10 ppbv, except m&p-Xylenes at 20 ppbv**	**Date Analyzed:**	**11/29/2017**

Runs with this LCS:

Standard/Sample Run	**Date/Time of Sample/Standard Injection**
BFB [AA4301BFB]	11/29/2017 8:42
10 PPBV DCVS [AA4302DCVS]	11/29/2017 10:04
10 PPBV LCS [AA4303LCS]	11/29/2017 10:45
METHOD BLANK [AA4304BLK]	11/29/2017 11:19
02 PPBV RLLCS [AA4305RLLCS]	11/29/2017 11:59
3059 [AA4306]	11/29/2017 14:35
E17-09837-01 [AA4307]	11/29/2017 15:08
E17-09837-02 [AA4308]	11/29/2017 15:55
E17-09837-03 [AA4309]	11/29/2017 16:29
E17-09837-04 [AA4310]	11/29/2017 17:03
10 PPBV CCCVS [AA4319CCCVS]	11/29/2017 22:05

Compound	**CAS #**	**Calculated Amount (ppbv)**	**% Recovery**
Acetone	67-64-1	9.3	93
Benzene	71-43-2	9.5	95
Bromodichloromethane	75-27-4	11	110
Bromoform	75-25-2	12	120
Bromomethane	74-83-9	12	120
1,3-Butadiene	106-99-0	8.9	89
Chlorobenzene	108-90-7	9.5	95
Chloroethane	75-00-3	9.2	92
Chloroform	67-66-3	10	100
Chloromethane	74-87-3	10	100
Carbon disulfide	75-15-0	8.9	89
Carbon tetrachloride	56-23-5	12	120
Cyclohexane	110-82-7	9.4	94
Dibromochloromethane	124-48-1	12	120
1,2-Dibromoethane	106-93-4	11	110
1,2-Dichlorobenzene	95-50-1	10	100
1,3-Dichlorobenzene	541-73-1	10	100
1,4-Dichlorobenzene	106-46-7	10	100
Dichlorodifluoromethane	75-71-8	12	120
1,1-Dichloroethane	75-34-3	9.1	91
1,2-Dichloroethane	107-06-2	11	110
1,1-Dichloroethene	75-35-4	11	110
1,2-Dichloroethene (cis)	156-59-2	9.7	97
1,2-Dichloroethene (trans)	156-60-5	9.7	97
1,2-Dichloropropane	78-87-5	9.0	90
1,3-Dichloropropene (cis)	10061-01-5	10	100
1,3-Dichloropropene (trans)	10061-02-6	11	110
1,2-Dichlorotetrafluoroethane	76-14-2	10	100
1,4-Dioxane	123-91-1	9.5	95

LCS recovery must be within 70-130% of the spiked value for all compounds except Acetone, Dioxane (1,4-), Hexachlorobutadiene, Naphthalene, and 1,2,4-Trichlorobenzene. These compounds must be within 40-160%.
*** Values outside of QC limits* Values outside of 70-130% QC limits**

Integrated Analytical Laboratories LLC

Laboratory Control Spike

Lab Sample Name: **10 PPBV LCS** **Data File:** **AA4303LCS**

Spike Amount: **10 ppbv, except m&p-Xylenes at 20 ppbv** **Date Analyzed:** **11/29/2017**

Runs with this LCS:

Standard/Sample Run	Date/Time of Sample/Standard Injection
BFB [AA4301BFB]	11/29/2017 8:42
10 PPBV DCVS [AA4302DCVS]	11/29/2017 10:04
10 PPBV LCS [AA4303LCS]	11/29/2017 10:45
METHOD BLANK [AA4304BLK]	11/29/2017 11:19
02 PPBV RLLCS [AA4305RLLCS]	11/29/2017 11:59
3059 [AA4306]	11/29/2017 14:35
E17-09837-01 [AA4307]	11/29/2017 15:08
E17-09837-02 [AA4308]	11/29/2017 15:55
E17-09837-03 [AA4309]	11/29/2017 16:29
E17-09837-04 [AA4310]	11/29/2017 17:03
10 PPBV CCCVS [AA4319CCCVS]	11/29/2017 22:05

Compound	CAS #	Calculated Amount (ppbv)	% Recovery
Ethylbenzene	100-41-4	9.9	99
n-Heptane	142-82-5	11	110
1,3-Hexachlorobutadiene	87-68-3	11	110
n-Hexane	110-54-3	9.5	95
Methylene chloride	75-09-2	8.1	81
Methyl ethyl ketone	78-93-3	10	100
Methyl isobutyl ketone	108-10-1	11	110
Methyl tert-butyl ether	1634-04-4	9.8	98
Styrene	100-42-5	11	110
Tert-butyl alcohol	75-65-0	9.7	97
1,1,2,2-Tetrachloroethane	79-34-5	9.0	90
Tetrachloroethene	127-18-4	12	120
Toluene	108-88-3	10	100
1,2,4-Trichlorobenzene	120-82-1	10	100
1,1,1-Trichloroethane	71-55-6	11	110
1,1,2-Trichloroethane	79-00-5	10	100
Trichloroethene	79-01-6	11	110
Trichlorofluoromethane	75-69-4	11	110
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	9.6	96
1,2,4-Trimethylbenzene	95-63-6	11	110
1,3,5-Trimethylbenzene	108-67-8	11	110
2,2,4-Trimethylpentane	540-84-1	11	110
Vinyl bromide	593-60-2	11	110
Vinyl chloride	75-01-4	9.6	96
Xylenes (m&p)	179601-23-1	21	100
Xylenes (o)	95-47-6	10	100

LCS recovery must be within 70-130% of the spiked value for all compounds except Acetone, Dioxane (1,4-), Hexachlorobutadiene, Naphthalene, and 1,2,4-Trichlorobenzene. These compounds must be within 40-160%.

*** Values outside of QC limits* Values outside of 70-130% QC limits**

Integrated Analytical Laboratories LLC

Integrated Analytical Laboratories, LLC

Volatile Organic Compounds by EPA Method TO-15

Laboratory Sample Duplicate Report

SDG Number:	E17-08248		Date Received: 10/4/17
IAL Sample ID:	E17-08248-01		Date Analyzed: 10/4/17, 10/4/17
Matrix:	Air		Lab Data File: [illegible]3711, [illegible]371[illegible]
Summa ID:	4[illegible]5[illegible]		Dilution Factor: 1
			Injection Volume: 500 mL
			GC/MS Column: RTX-1, 0.32 mm ID

Compound	CAS #	Sample E17-08248-01 Concentration Reported ppbv	Q	Sample Dup E17-08248-21 Concentration Reported ppbv	Q	Reporting Limits ppbv	RPD
Acetone	67-64-1	**8.8**		**8.5**		0.40	**3.47%**
Allyl chloride	107-05-1	0.40	U	0.40	U	0.40	0.00%
Benzene	71-43-2	0.40	U	0.40	U	0.40	0.00%
Bromodichloromethane	75-27-4	0.40	U	0.40	U	0.40	0.00%
Bromoform	75-25-2	0.40	U	0.40	U	0.40	0.00%
Bromomethane	74-83-9	0.40	U	0.40	U	0.40	0.00%
1,3-Butadiene	106-99-0	0.40	U	0.40	U	0.40	0.00%
Chlorobenzene	108-90-7	0.40	U	0.40	U	0.40	0.00%
Chloroethane	75-00-3	0.40	U	0.40	U	0.40	0.00%
Chloroform	67-66-3	0.40	U	0.40	U	0.40	0.00%
Chloromethane	74-87-3	0.40	U	0.40	U	0.40	0.00%
Carbon disulfide	75-15-0	0.40	U	0.40	U	0.40	0.00%
Carbon tetrachloride	56-23-5	0.40	U	0.40	U	0.40	0.00%
2-Chlorotoluene	95-49-8	0.40	U	0.40	U	0.40	0.00%
Cyclohexane	110-82-7	0.40	U	0.40	U	0.40	0.00%
Dibromochloromethane	124-48-1	0.40	U	0.40	U	0.40	0.00%
1,2-Dibromoethane	106-93-4	0.40	U	0.40	U	0.40	0.00%
1,2-Dichlorobenzene	95-50-1	0.40	U	0.40	U	0.40	0.00%
1,3-Dichlorobenzene	541-73-1	0.40	U	0.40	U	0.40	0.00%
1,4-Dichlorobenzene	106-46-7	0.40	U	0.40	U	0.40	0.00%
Dichlorodifluoromethane	75-71-8	0.40	U	0.40	U	0.40	0.00%
1,1-Dichloroethane	75-34-3	0.40	U	0.40	U	0.40	0.00%
1,2-Dichloroethane	107-06-2	0.40	U	0.40	U	0.40	0.00%
1,1-Dichloroethene	75-35-4	0.40	U	0.40	U	0.40	0.00%
1,2-Dichloroethene (cis)	156-59-2	0.40	U	0.40	U	0.40	0.00%
1,2-Dichloroethene (trans)	156-60-5	0.40	U	0.40	U	0.40	0.00%
1,2-Dichloropropane	78-87-5	0.40	U	0.40	U	0.40	0.00%
1,3-Dichloropropene (cis)	10061-01-5	0.40	U	0.40	U	0.40	0.00%
1,3-Dichloropropene (trans)	10061-02-6	0.40	U	0.40	U	0.40	0.00%
1,2-Dichlorotetrafluoroethane	76-14-2	0.40	U	0.40	U	0.40	0.00%
Ethylbenzene	100-41-4	0.40	U	0.40	U	0.40	0.00%
4-Ethyltoluene	622-96-8	0.40	U	0.40	U	0.40	0.00%
n-Heptane	142-82-5	0.40	U	0.40	U	0.40	0.00%
1,3-Hexachlorobutadiene	87-68-3	0.40	U	0.40	U	0.40	0.00%
n-Hexane	110-54-3	**0.42**		0.40	U	0.40	**NC**
Methylene chloride	75-09-2	**1.5**		**1.4**		0.40	**6.90%**
Methyl ethyl ketone	78-93-3	**0.76**		**0.71**		0.40	**6.80%**
Methyl isobutyl ketone	108-10-1	0.40	U	0.40	U	0.40	0.00%

Qualifiers:
E = Concentration exceeds upper level of calibration range for instrument.
D = Extra dilution required for this compound. J = Duplicate samples do not meet RPD criteria.
U = Compound ND or under reporting limit.

Integrated Analytical Laboratories, LLC

Volatile Organic Compounds by EPA Method TO-15

Laboratory Sample Duplicate Report

Date Received: 10/4/17

SDG Number: E17-08248 Date Analyzed: 10/4/17, 10/4/17

IAL Sample ID: E17-08248-01 Lab Data File: [illegible]3711, [illegible]371[illegible]

Matrix: Air Dilution Factor: 1

Summa ID: 4[illegible]5[illegible] Injection Volume: 500 mL

GC/MS Column: RTX-1, 0.32 mm ID

Compound	CAS #	Sample E17-08248-01 Concentration Reported ppbv	Q	Sample Dup E17-08248-21 Concentration Reported ppbv	Q	Reporting Limits ppbv	RPD
Methyl tert-butyl ether	1634-04-4	0.40	U	0.40	U	0.40	0.00%
Styrene	100-42-5	0.40	U	0.40	U	0.40	0.00%
Tert-butyl alcohol	75-65-0	0.40	U	0.40	U	0.40	0.00%
1,1,2,2-Tetrachloroethane	79-34-5	0.40	U	0.40	U	0.40	0.00%
Tetrachloroethene	127-18-4	0.40	U	0.40	U	0.40	0.00%
Toluene	108-88-3	**1.3**		**1.2**		0.40	**8.00%**
1,2,4-Trichlorobenzene	120-82-1	0.40	U	0.40	U	0.40	0.00%
1,1,1-Trichloroethane	71-55-6	0.40	U	0.40	U	0.40	0.00%
1,1,2-Trichloroethane	79-00-5	0.40	U	0.40	U	0.40	0.00%
Trichloroethene	79-01-6	0.40	U	0.40	U	0.40	0.00%
Trichlorofluoromethane	75-69-4	0.40	U	0.40	U	0.40	0.00%
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	0.40	U	0.40	U	0.40	0.00%
1,2,4-Trimethylbenzene	95-63-6	0.40	U	0.40	U	0.40	0.00%
1,3,5-Trimethylbenzene	108-67-8	0.40	U	0.40	U	0.40	0.00%
2,2,4-Trimethylpentane	540-84-1	0.40	U	0.40	U	0.40	0.00%
Vinyl bromide	593-60-2	0.40	U	0.40	U	0.40	0.00%
Vinyl chloride	75-01-4	0.40	U	0.40	U	0.40	0.00%
Xylenes (m&p)	179601-23-1	0.40	U	0.40	U	0.40	0.00%
Xylenes (o)	95-47-6	0.40	U	0.40	U	0.40	0.00%

RPD must be <25% for all laboratory duplicate samples. Laboratory duplicate samples are run once daily.

NC = The RPD could not be calculated since the compound was only detected in either the parent or duplicate sample.

Qualifiers:
E = Concentration exceeds upper level of calibration range for instrument.
D = Extra dilution required for this compound. J = Duplicate samples do not meet RPD criteria.
U = Compound ND or under reporting limit.

Integrated Analytical Laboratories, LLC

Volatile Organic Compounds by EPA Method TO-15

Laboratory Sample Duplicate Report

		Date Re□ei□ed□11□1□□17	
SD□ N□□ □er□	□17□0□□3□	Date □na□y□ed□11□□□17,11□□□17	
I□L Sa□p□e ID□	□17□0□□3□□0□	La□ Data □i□e□□□□4□□0,□□4□□1	
Matrix□	□ir	Di□□tion □a□tor□10	
S□□ □a ID□	□0□□	In□e□tion □o□□□e□50□ □	
		□ □MS □o□□□n□RTX□1, 0.3□ □ □ID	

Compound	CAS #	Sa□p□e E17-09836-02 Concentration Reported ppbv	Q	Sa□p□e D□p E17-09836-22 Concentration Reported ppbv	Q	Reporting Limits ppbv	RPD
□□etone	□7□□4□1	**230**	D	**230**	D	4.0	**0.00%**
□□y□□ □□oride	107□05□1	4.0	□	4.0	□	4.0	0.00□
Ben□ene	71□43□□	4.0	□	4.0	□	4.0	0.00□
Bro□odi□□oro□et□ane	75□□7□4	4.0	□	4.0	□	4.0	0.00□
Bro□o□or□	75□□5□□	4.0	□	4.0	□	4.0	0.00□
Bro□o□et□ane	74□□3□□	4.0	□	4.0	□	4.0	0.00□
1,3□B□tadiene	10□□□□□0	4.0	□	4.0	□	4.0	0.00□
□□oro□en□ene	10□□□0□7	4.0	□	4.0	□	4.0	0.00□
□□oroet□ane	75□00□3	4.0	□	4.0	□	4.0	0.00□
□□oro□or□	□7□□□□3	4.0	□	4.0	□	4.0	0.00□
□□oro□et□ane	74□□7□3	4.0	□	4.0	□	4.0	0.00□
□ar□on dis□□□ide	75□15□0	4.0	□	4.0	□	4.0	0.00□
□ar□on tetra□□□oride	5□□□3□5	4.0	□	4.0	□	4.0	0.00□
□□□ □□oroto□□ene	□5□4□□□□	4.0	□	4.0	□	4.0	0.00□
□y□□o□exane	110□□□□7	4.0	□	4.0	□	4.0	0.00□
Di□ro□o□□□oro□et□ane	1□4□4□□1	4.0	□	4.0	□	4.0	0.00□
1,□□Di□ro□oet□ane	10□□□3□4	4.0	□	4.0	□	4.0	0.00□
1,□□Di□□□oro□en□ene	□5□50□1	4.0	□	4.0	□	4.0	0.00□
1,3□Di□□□oro□en□ene	541□73□1	4.0	□	4.0	□	4.0	0.00□
1,4□Di□□□oro□en□ene	10□□4□□7	4.0	□	4.0	□	4.0	0.00□
Di□□□orodi□□□oro□et□ane	75□71□□	4.0	□	4.0	□	4.0	0.00□
1,1□Di□□□oroet□ane	75□34□3	4.0	□	4.0	□	4.0	0.00□
1,□□Di□□□oroet□ane	107□□0□□□	4.0	□	4.0	□	4.0	0.00□
1,1□Di□□□oroet□ene	75□35□4	4.0	□	4.0	□	4.0	0.00□
1,□□Di□□□oroet□ene □□is□	15□□5□□□	4.0	□	4.0	□	4.0	0.00□
1,□□Di□□□oroet□ene □trans□	15□□□0□5	4.0	□	4.0	□	4.0	0.00□
1,□□Di□□□oropropane	7□□□7□5	4.0	□	4.0	□	4.0	0.00□
1,3□Di□□□oropropene □□is□	100□1□01□5	4.0	□	4.0	□	4.0	0.00□
1,3□Di□□□oropropene □trans□	100□1□0□□□	4.0	□	4.0	□	4.0	0.00□
1,□□Di□□□orotetra□□□oroet□ane	7□□14□□	4.0	□	4.0	□	4.0	0.00□
□t□y□□en□ene	100□41□4	4.0	□	4.0	□	4.0	0.00□
4□□t□y□to□□ene	□□□□□□□□	4.0	□	4.0	□	4.0	0.00□
n□□eptane	14□□□□□5	4.0	□	4.0	□	4.0	0.00□
1,3□□exa□□□oro□□tadiene	□7□□□□3	4.0	□	4.0	□	4.0	0.00□
n□□exane	110□54□3	4.0	□	4.0	□	4.0	0.00□
Met□y□ene □□□oride	75□0□□□	4.0	□	4.0	□	4.0	0.00□
Met□y□et□y□□etone	7□□□3□3	**130**	D	**130**	D	4.0	**0.00%**
Met□y□iso□□ty□□etone	10□□10□1	4.0	□	4.0	□	4.0	0.00□

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□□□on□entration ex□eeds □pper □e□e□o□□a□i□ration ran□e □or instr□□ent.

D□□xtra di□□tion re□□ired □or t□is □o□po□nd. J□D□p□i□ate sa□p□es do not □et RPD □riteria.

□□□o□po□nd ND or □nder reportin□ □i□it.

Integrated Analytical Laboratories, LLC

Volatile Organic Compounds by EPA Method TO-15

Laboratory Sample Duplicate Report

SDG Number: E17-09837		Date Received: 11/1[illegible]/17
IAL Sample ID: E17-0983[illegible]-02		Date Analyzed: 11/[illegible]/17, 11/[illegible]/17
Matrix: Air		Lab Data File: [illegible]4[illegible]0, [illegible]4[illegible]1
SUMMA ID: [illegible]0[illegible]		Dilution Factor: 10
		Injection Volume: 50 mL
		GC/MS Column: RTX-1, 0.32 mm ID

Compound	CAS #	Sample E17-09836-02 Concentration Reported ppbv	Q	Sample Dup E17-09836-22 Concentration Reported ppbv	Q	Reporting Limits ppbv	RPD
Methyl tert-butyl ether	1634-04-4	4.0	U	4.0	U	4.0	0.00%
Styrene	100-42-5	4.0	U	4.0	U	4.0	0.00%
Tert-butyl alcohol	75-65-0	4.0	U	4.0	U	4.0	0.00%
1,1,2,2-Tetrachloroethane	79-34-5	4.0	U	4.0	U	4.0	0.00%
Tetrachloroethene	127-18-4	4.0	U	4.0	U	4.0	0.00%
Toluene	108-88-3	4.0	U	4.0	U	4.0	0.00%
1,2,4-Trichlorobenzene	120-82-1	4.0	U	4.0	U	4.0	0.00%
1,1,1-Trichloroethane	71-55-6	4.0	U	4.0	U	4.0	0.00%
1,1,2-Trichloroethane	79-00-5	4.0	U	4.0	U	4.0	0.00%
Trichloroethene	79-01-6	4.0	U	4.0	U	4.0	0.00%
Trichlorofluoromethane	75-69-4	4.0	U	4.0	U	4.0	0.00%
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	4.0	U	4.0	U	4.0	0.00%
1,2,4-Trimethylbenzene	95-63-6	4.0	U	4.0	U	4.0	0.00%
1,3,5-Trimethylbenzene	108-67-8	4.0	U	4.0	U	4.0	0.00%
2,2,4-Trimethylpentane	540-84-1	4.0	U	4.0	U	4.0	0.00%
Vinyl bromide	593-60-2	4.0	U	4.0	U	4.0	0.00%
Vinyl chloride	75-01-4	4.0	U	4.0	U	4.0	0.00%
Xylenes (m&p)	179601-23-1	4.0	U	4.0	U	4.0	0.00%
Xylenes (o)	95-47-6	4.0	U	4.0	U	4.0	0.00%

RPD must be <25% for all laboratory duplicate samples. Laboratory duplicate samples are run once daily.

NC = The RPD could not be calculated since the compound was only detected in either the parent or duplicate sample.

Qualifiers:
E = Concentration exceeds upper level of calibration range for instrument.
D = Extra dilution required for this compound. J = Duplicate samples do not meet RPD criteria.
U = Compound ND or under reporting limit.

Integrated Analytical Laboratories LLC

Internal Standard Area and Retention Time Summary

Lab File ID (Standard): AA3702DCVS **Date Analyzed:** 10/4/2017

Instrument: AA **ICAL Date:** 9/12/2017

			BROMOCHLOROMETHANE				1,4-DIFLUOROBENZENE				D-5 CHLOROBENZENE			
			Area #		RT		Area #		RT		Area #		RT	
	CALIBRATION STANDARD		481943		7.746		1664213		9.804		1491654		15.138	
	UPPER LIMIT		674720		8.08		2329898		10.13		2088316		15.47	
	LOWER LIMIT		289166		7.42		998528		9.47		894992		14.81	
Lab ID		DF	Area #	%	RT	+/-	Area #	%	RT	+/-	Area #	%	RT	+/-
Method Blank	AA3704BLK	1.0	499560	3.66	7.746	0.00	1674182	0.60	9.804	0.00	1477054	-0.98	15.141	0.00
Reporting Limit Laboratory Control Standard	AA3705RLLCS	1.0	469540	-2.57	7.743	0.00	1562685	-6.10	9.801	0.00	1424219	-4.52	15.142	0.00
2162	AA3717	1.0	446352	-7.38	7.746	0.00	1451786	-12.76	9.801	0.00	1314300	-11.89	15.141	0.00
Closing Calibration	AA3728CCCVS	1.0	477397	-0.94	7.747	0.00	1693033	1.73	9.804	0.00	1487017	-0.31	15.139	0.00

Difference of Internal Area must be within +/- 40%; Retention Times must be within +/- 0.33 minute.
* Values outsite QC limits.

IAL
Integrated Analytical Laboratories LLC

Internal Standard Area and Retention Time Summary

Lab File ID (Standard): **AA4272DCVS** | **Date Analyzed:** **11/28/2017**

Instrument: **AA** | **ICAL Date:** **9/12/2017**

			BROMOCHLOROMETHANE				1,4-DIFLUOROBENZENE				D-5 CHLOROBENZENE			
			Area #		RT		Area #		RT		Area #		RT	
CALIBRATION STANDARD			540836		7.743		1834939		9.801		1780782		15.135	
UPPER LIMIT			757170		8.07		2568915		10.13		2493095		15.47	
LOWER LIMIT			324502		7.41		1100963		9.47		1068469		14.81	
Lab ID		**DF**	**Area #**	**%**	**RT**	**+/-**	**Area #**	**%**	**RT**	**+/-**	**Area #**	**%**	**RT**	**+/-**
Method Blank	AA4274BLK	1.0	523990	-3.11	7.743	0.00	1666080	-9.20	9.804	0.00	1556624	-12.59	15.135	0.00
Reporting Limit Laboratory Control Standard	AA4275RLLCS	1.0	396771	-26.64	7.737	-0.01	1769626	-3.56	9.798	0.00	1780715	0.00	15.138	0.00
E17-09837-01	AA4286	10	487854	-9.80	7.750	0.01	1627288	-11.32	9.804	0.00	1563073	-12.23	15.135	0.00
E17-09837-02	AA4287	10	508077	-6.06	7.743	0.00	1632670	-11.02	9.804	0.00	1591956	-10.60	15.135	0.00
E17-09837-05	AA4290	1.0	421726	-22.02	7.753	0.01	1509290	-17.75	9.795	-0.01	1458218	-18.11	15.139	0.00
Closing Calibration	AA4292CCCVS	1.0	533618	-1.33	7.743	0.00	1727599	-5.85	9.798	0.00	1683052	-5.49	15.135	0.00

Difference of Internal Area must be within +/- 40%; Retention Times must be within +/- 0.33 minute.
* Values outsite QC limits.

IAL
Integrated Analytical Laboratories LLC

Internal Standard Area and Retention Time Summary

Lab File ID (Standard): **AA4302DCVS** | **Date Analyzed:** **11/29/2017**

Instrument: **AA** | **ICAL Date:** **9/12/2017**

			BROMOCHLOROMETHANE				1,4-DIFLUOROBENZENE				D-5 CHLOROBENZENE			
			Area #		RT		Area #		RT		Area #		RT	
CALIBRATION STANDARD			565734		7.746		1860863		9.801		1814288		15.138	
UPPER LIMIT			792028		8.08		2605208		10.13		2540003		15.47	
LOWER LIMIT			339440		7.42		1116518		9.47		1088573		14.81	
Lab ID		**DF**	**Area #**	**%**	**RT**	**+/-**	**Area #**	**%**	**RT**	**+/-**	**Area #**	**%**	**RT**	**+/-**
Method Blank	AA4304BLK	1.0	573088	1.30	7.740	-0.01	1791275	-3.74	9.798	0.00	1711339	-5.67	15.135	0.00
Reporting Limit Laboratory Control Standard	AA4305RLLCS	1.0	498695	-11.85	7.740	-0.01	1665280	-10.51	9.798	0.00	1718165	-5.30	15.138	0.00
3059	AA4306	1.0	501677	-11.32	7.743	0.00	1558445	-16.25	9.804	0.00	1508649	-16.85	15.138	0.00
E17-09837-01	AA4307	1.0	437131	-22.73	7.766	0.02	1672111	-10.14	9.808	0.01	1680778	-7.36	15.145	0.01
E17-09837-02	AA4308	20	595493	5.26	7.746	0.00	1864530	0.20	9.807	0.01	1801295	-0.72	15.135	0.00
E17-09837-03	AA4309	1.0	479904	-15.17	7.772	0.03	1785995	-4.02	9.804	0.00	1723154	-5.02	15.142	0.00
E17-09837-04	AA4310	1.0	520418	-8.01	7.766	0.02	1944157	4.48	9.807	0.01	1912210	5.40	15.145	0.01
Closing Calibration	AA4319CCCVS	1.0	511202	-9.64	7.743	0.00	1724864	-7.31	9.801	0.00	1634373	-9.92	15.135	0.00

Difference of Internal Area must be within +/- 40%; Retention Times must be within +/- 0.33 minute.
* Values outsite QC limits.

Integrated Analytical Laboratories LLC

Section VI: Sample Data Summary

Certificate of Analysis

Summary of Results

Quantitation Reports, Chromatograms, and Peak Integration Reports

CERTIFICATE OF ANALYSIS

ANALYTICAL DATA PACKAGE FOR THE
NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
ALBANY NEW YORK 12233

Integrated Analytical Laboratories, LLC
Project#: Swivilier/175 W Nyack Rd
SDG #: E17-09837
Date of first sample receipt: 11/16/2017

Randolph, NJ 07869
NY ELAP Certification#: 11402
NJDEP (Primary AB) Certification#: 14751
Date of last sample receipt: 11/16/2017

Client: Environmental Waste Management Associates
100 Misty Lane
Parsippany, NJ 07054

Attention: Attention: Kevin Seise

Project/Site: Swivilier/175 W Nyack Rd/NY

Analysis conducted at: Integrated Analytical Laboratories, LLC
273 Franklin Road
Randolph, NJ 07869

Contact: Michael H. Leftin, Ph.D.

Sample(s):
E17-09837-01
E17-09837-02
E17-09837-03
E17-09837-04
E17-09837-05

Samples for this analysis were received in good condition with a chain of custody.

All work recorded herein has been done in accordance with normal professional standards using accepted testing methodologies, quality assurance and quality control procedures except where otherwise agreed to by the client and testing company in writing. Once analysis has been performed on canisters that meets regulatory criteria, samples are recycled for future use, unless other provisions have been made by the client.

Michael Leftin

Michael H. Leftin, Ph.D.
Laboratory Director

Date: December 04, 2017

Integrated Analytical Laboratories LLC
Summary of Results

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100 Misty Lane
Parsippany, NJ 07054
□ttn□□e□in Seise
Pro□e□t□S□i□i□ier□175 □ Nya□□Rd
Site□NY

Report Date□11□30□17
SD□ N□□ □er□□17□0□□37
Date Sa□ p□ed□11□15□17
Date Re□ei□ed□11□1□□17
Date □na□y□ed□11□□□17, 11□□□17
Data □i□e□□□4307, □□4□□□
S□□ □a ID□30□7
D□□1, 10

<u>□na□ysis□ □o□ati□e Or□ani□ □o□po□nds □y □P□ Met□od TO□15</u>

	Sample Name:		SS-1		Reporting Limits	
	IAL ID:		E17-09837-01			
Compound	**CAS #**		**ppbv**	**ug/m3**	**ppbv**	**ug/m3**
□□etone	□7□□4□1	D	110	□□0	□.0	4.□
Ben□ene	71□43□□		ND	ND	0.□0	0.□4
Bro□odi□□oro□et□ane	75□□7□4		ND	ND	0.□0	1.3
Bro□o□or□	75□□5□□		ND	ND	0.□0	□.1
Bro□o□et□ane	74□□3□□		ND	ND	0.□0	0.7□
1,3□B□tadiene	10□□□□□0		ND	ND	0.□0	0.44
□□□oro□en□ene	10□□□0□7		ND	ND	0.□0	0.□□
□□□oroet□ane	75□00□3		ND	ND	0.□0	0.53
□□□oro□or□	□7□□□3		0.40	□.0	0.□0	0.□□
□□□oro□et□ane	74□□7□3		ND	ND	0.□0	0.41
□ar□on dis□□ide	75□15□0		0.□3	0.7□	0.□0	0.□□
□ar□on tetra□□□oride	5□□□3□5		0.0□	0.50	0.04	0.□5
□y□□o□exane	110□□□7		0.5□	1.□	0.□0	0.□□
Di□ro□o□□□oro□et□ane	1□4□4□□1		ND	ND	0.□0	1.7
1,□□Di□ro□oet□ane	10□□□3□4		ND	ND	0.□0	1.5
1,□□Di□□□oro□en□ene	□5□50□1		ND	ND	0.□0	1.□
1,3□Di□□□oro□en□ene	541□73□1		ND	ND	0.□0	1.□
1,4□Di□□□oro□en□ene	10□□4□□7		ND	ND	0.□0	1.□
Di□□□orodi□□oro□et□ane	75□71□□		0.□5	1.□	0.□0	0.□□
1,1□Di□□□oroet□ane	75□34□3		ND	ND	0.□0	0.□1
1,□□Di□□□oroet□ane	107□0□□□		ND	ND	0.□0	0.□1
1,1□Di□□□oroet□ene	75□35□4		ND	ND	0.□0	0.7□
1,□□Di□□□oroet□ene □□is□	15□□5□□□		ND	ND	0.□0	0.7□
1,□□Di□□□oroet□ene □trans□	15□□□0□5		ND	ND	0.□0	0.7□
1,□□Di□□□oropropane	7□□□7□5		ND	ND	0.□0	0.□□
1,3□Di□□□oropropene □□is□	100□1□01□5		ND	ND	0.□0	0.□1
1,3□Di□□□oropropene □trans□	100□1□0□□□		ND	ND	0.□0	0.□1
1,□□Di□□□orotetra□□□oroet□ane	7□□14□□		ND	ND	0.□0	1.4
1,4□Dioxane	1□3□□1□1		ND	ND	0.□0	0.7□
□t□y□□en□ene	100□41□4		0.□□	1.3	0.□0	0.□7
n□□eptane	14□□□□5		ND	ND	0.□0	0.□□
1,3□□exa□□□oro□□tadiene	□7□□□3		ND	ND	0.□0	□.1
n□□exane	110□54□3		□.1	7.5	0.□0	0.71
Met□y□ene □□□oride	75□0□□□		ND	ND	0.□0	0.70
Met□y□et□y□□etone	7□□□3□3		33	□□	0.□0	0.5□
Met□y□iso□□ty□□etone	10□□10□1		ND	ND	0.□0	0.□□
Met□y□tert□□□ty□et□er	1□34□04□4		ND	ND	0.□0	0.7□
Styrene	100□4□□5		ND	ND	0.□0	0.□5
Tert□□□ty□a□□o□o□	75□□5□0		ND	ND	0.□0	0.□1
1,1,□,□Tetra□□□oroet□ane	7□□34□5		ND	ND	0.□0	1.4
Tetra□□□oroet□ene	1□7□1□□4		0.□4	1.□	0.□0	1.4
To□□ene	10□□□□3		1□	4□	0.□0	0.75
1,□,4□Tri□□□oro□en□ene	1□0□□□□1		ND	ND	0.□0	1.5
1,1,1□Tri□□□oroet□ane	71□55□□		ND	ND	0.□0	1.1
1,1,□□Tri□□□oroet□ane	7□□00□5		ND	ND	0.□0	1.1
Tri□□□oroet□ene	7□□01□□		1.5	□.1	0.05	0.□5

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Date Sa□p□ed□11□15□17
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	Sample Name: / IAL ID:	SS-1 / E17-09837-01		Reporting Limits	
Tri□□oro□□oro□et□ane	75□□□4	ND	ND	0.□0	1.1
1,1,□□Tri□□oro□1,□,□tri□□oroet□ane	7□□13□1	ND	ND	0.□0	1.5
1,□,4□Tri□et□y□en□ene	□5□□3□□	1.5	7.□	0.□0	0.□□
1,3,5□Tri□et□y□en□ene	10□□□7□□	0.31	1.5	0.□0	0.□□
□,□,4□Tri□et□y□pentane	540□□4□1	ND	ND	0.□0	0.□3
□iny□□ro□ide	5□3□□0□□	ND	ND	0.□0	0.□7
□iny□□□□oride	75□01□4	ND	ND	0.□0	0.51
Xy□enes □□ □p□	17□□01□□3□1	1.3	5.□	0.□0	0.□7
Xy□enes □o□	□5□47□□	0.43	1.□	0.□0	0.□7

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Data Path : C:\DATA\11-29-17\
Data File : aa4307.D
Acq On : 29 Nov 2017 3:08 pm
Operator : jls
Sample : E17-09837-01
Misc : 3027, 500cc
ALS Vial : 7 Sample Multiplier: 1

Quant Time: Nov 30 10:00:09 2017
Quant Method : C:\msdchem\1\METHODS\0912.M
Quant Title : TO-15 on the Agilent 7890A / 5975C
QLast Update : Tue Sep 12 13:00:02 2017
Response via : Initial Calibration

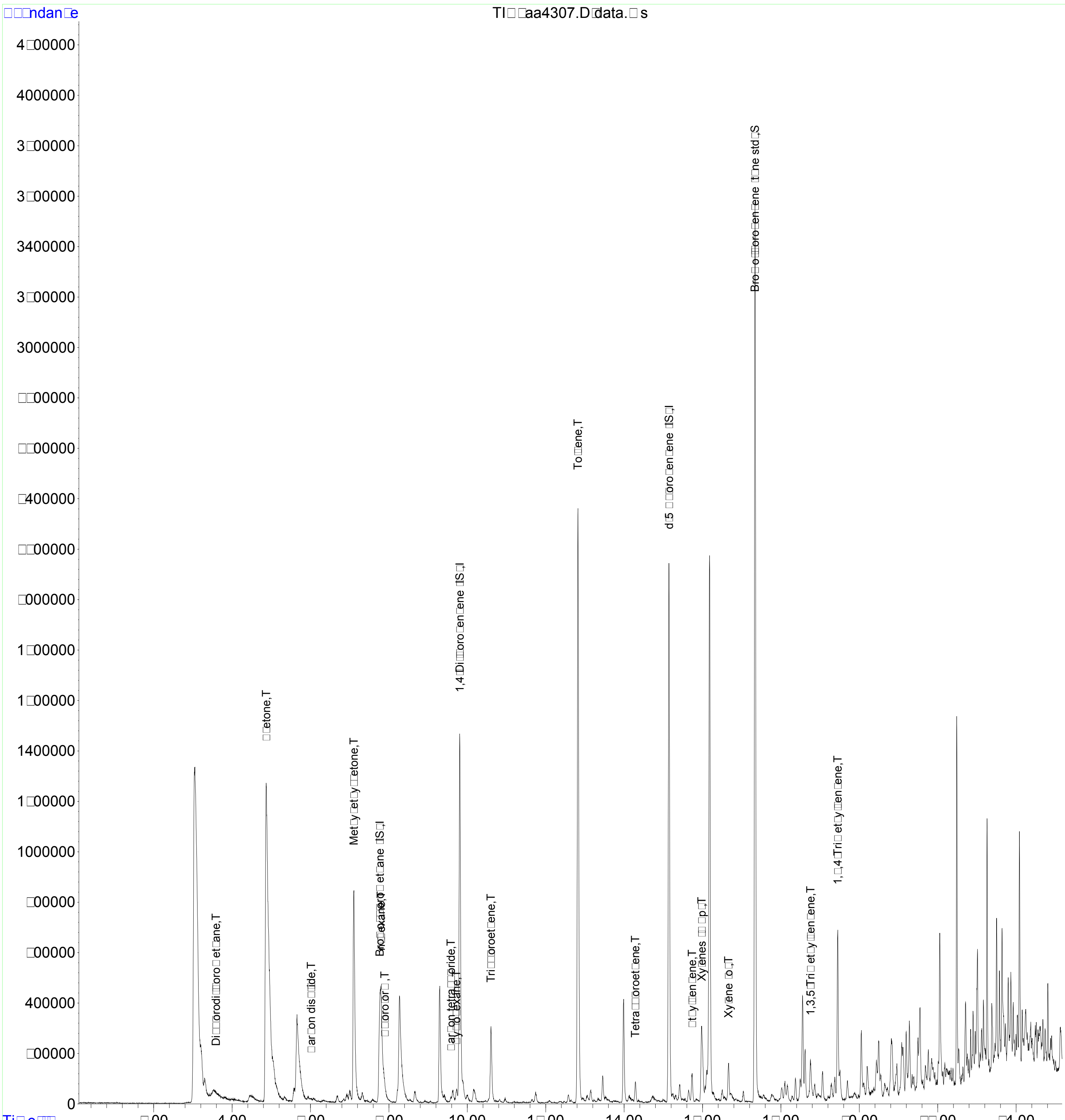
Compound	R.T.	QIon	Response	Conc Units	Dev(Min)
Internal Standards					
1) Bromochloromethane (IS)	7.766	130	437131	10.00 ppbV	0.02
38) 1,4-Difluorobenzene (IS)	9.808	114	1672111	10.00 ppbV	0.00
55) d-5 Chlorobenzene (IS)	15.145	117	1680778	10.00 ppbV	0.00
System Monitoring Compounds					
64) Bromofluorobenzene (tu...	17.338	95	1506029	10.23 ppbV	0.00
Target Compounds					Qvalue
3) Dichlorodifluoromethane	3.589	85	40555	0.25 ppbV #	55
14) Acetone	4.872	58	1152516	106.55 ppbV #	31
23) Carbon disulfide	6.017	76	26712	0.23 ppbV #	74
27) Methyl ethyl ketone	7.107	72	568057	33.11 ppbV	86
30) n-Hexane	7.798	57	75717	2.13 ppbV	82
31) Chloroform	7.894	83	53239	0.40 ppbV	100
36) Carbon tetrachloride	9.582	117	15288	0.08 ppbV	90
37) Cyclohexane	9.721	84	27558	0.52 ppbV	89
42) Trichloroethene	10.602	130	132158	1.51 ppbV	100
50) Toluene	12.820	91	2332000	12.14 ppbV	100
54) Tetrachloroethene	14.283	166	25701	0.24 ppbV	93
57) Ethylbenzene	15.737	91	91382	0.29 ppbV	96
58) Xylenes (m&p)	15.981	91	338199	1.29 ppbV	99
61) Xylene (o)	16.666	91	118320	0.43 ppbV	90
69) 1,3,5-Trimethylbenzene	18.756	105	104033	0.31 ppbV #	82
70) 1,2,4-Trimethylbenzene	19.450	105	481403	1.47 ppbV	97

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Quantitation Report (QT Reviewed)

Data Path : C:\DATA\11-29-17\
Data File : aa4307.D
Acq On : 29 Nov 2017 3:08 pm
Operator : jls
Sample : E17-09837-01
Misc : 3027, 500cc
ALS Vial : 7 Sample Multiplier: 1

Quant Time: Nov 30 10:00:09 2017
Quant Method : C:\msdchem\1\METHODS\0912.M
Quant Title : TO-15 on the Agilent 7890A / 5975C
QLast Update : Tue Sep 12 13:00:02 2017
Response via : Initial Calibration



IAL SDG #E17-09837

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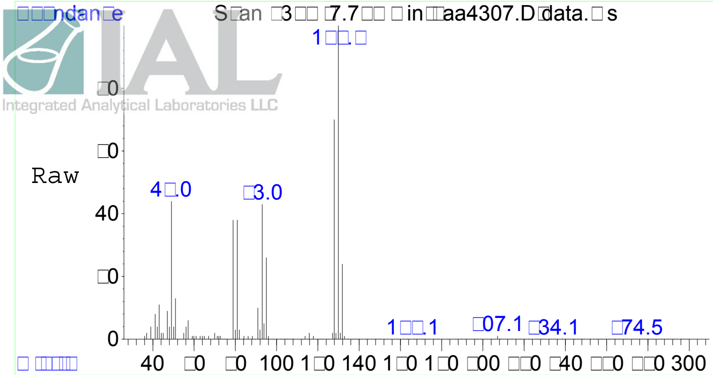
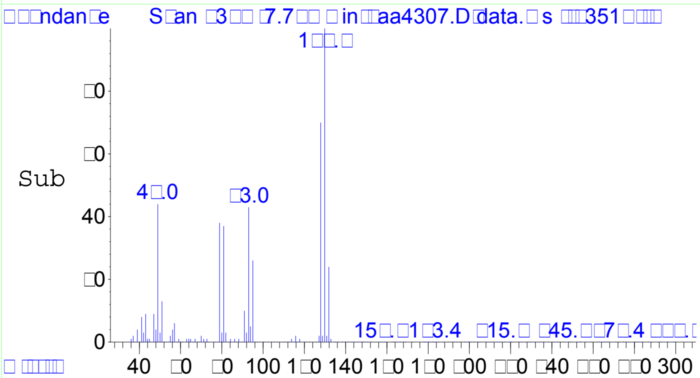
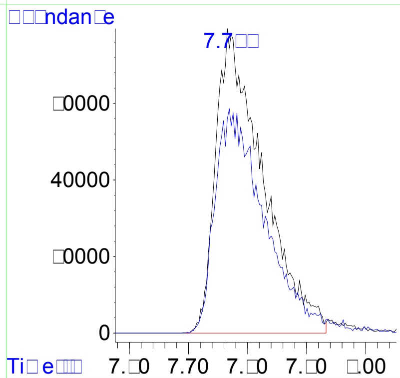


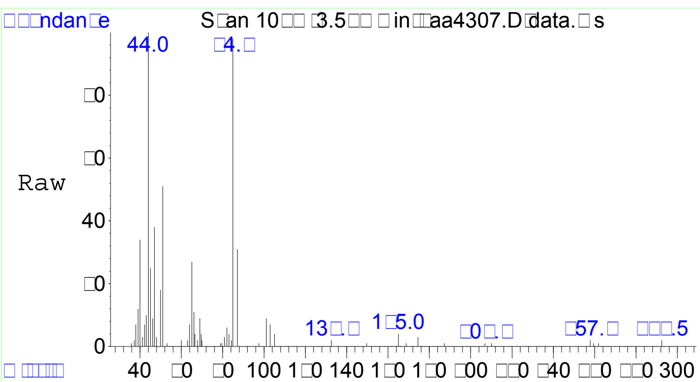
#1
Bromochloromethane (IS)
Concen: 10.00 ppbV
RT: 7.766 min   Scan# 2388
Delta R.T.   0.019 min
Lab File: aa4307.D
Acq: 29 Nov 2017   3:08 pm

Tgt Ion:130 Resp: 437131

Ion	Ratio	Lower	Upper
130	100		
128	77.3	62.6	94.0



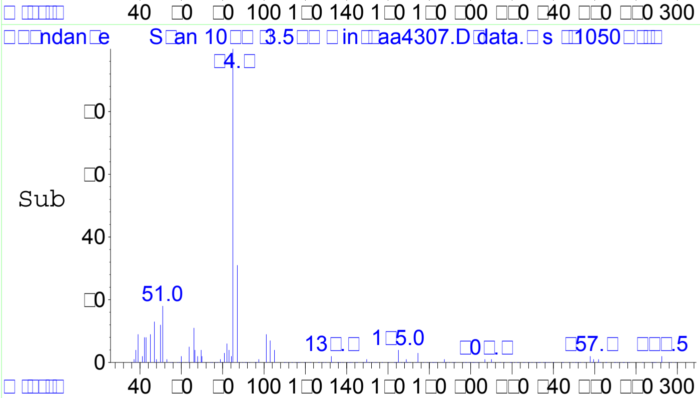


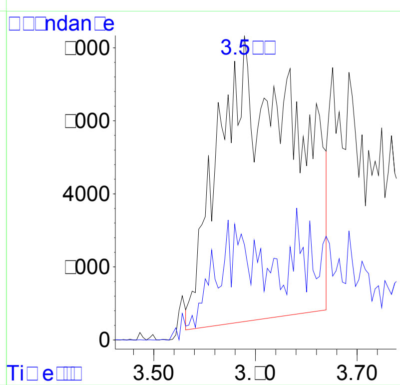


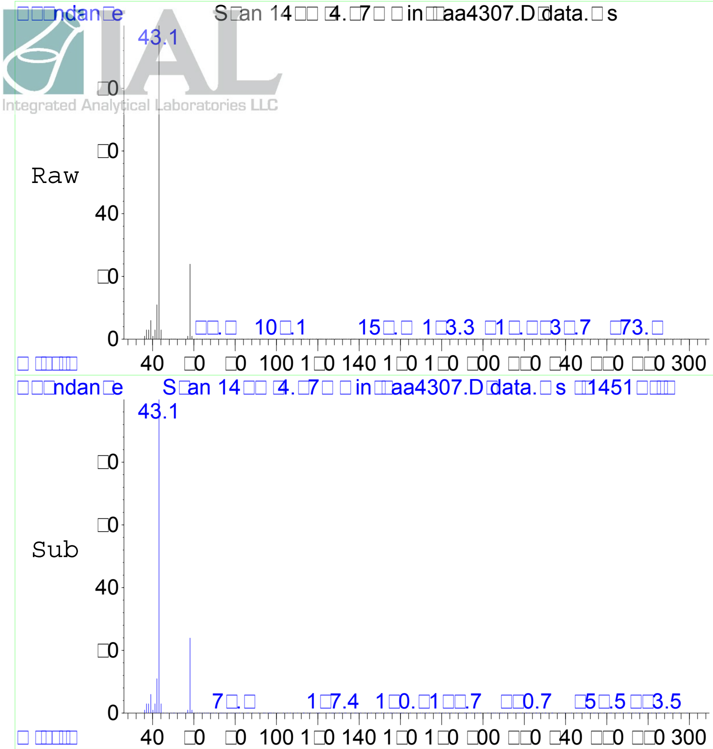
#3
Dichlorodifluoromethane
Concen: 0.25 ppbV
RT: 3.589 min   Scan# 1089
Delta R.T.   0.026 min
Lab File: aa4307.D
Acq: 29 Nov 2017   3:08 pm

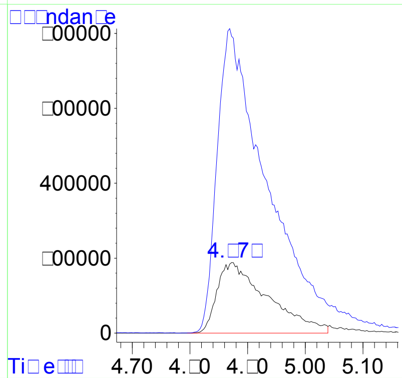
Tgt Ion: 85 Resp: 40555

Ion	Ratio	Lower	Upper
85	100		
87	8.2	27.4	41.0#





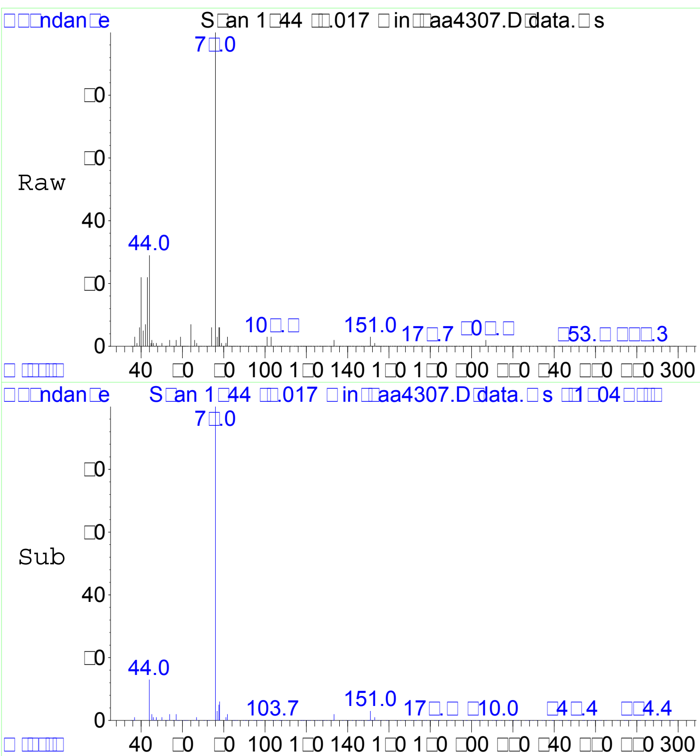


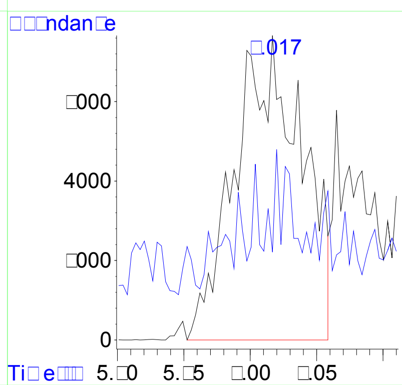


#14
Acetone
Concen: 106.55 ppbV
RT: 4.872 min   Scan# 1488
Delta R.T.   0.019 min
Lab File: aa4307.D
Acq: 29 Nov 2017   3:08 pm

Tgt Ion: 58 Resp: 1152516

Ion	Ratio	Lower	Upper
58	100		
43	419.3	229.6	344.4#

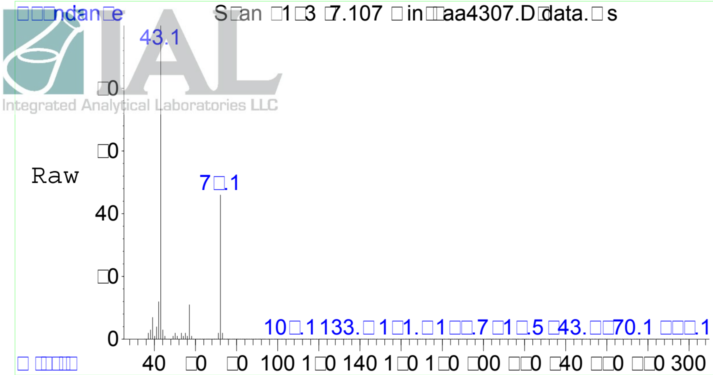




#23
Carbon disulfide
Concen: 0.23 ppbV
RT: 6.017 min   Scan# 1844
Delta R.T.   0.029 min
Lab File: aa4307.D
Acq: 29 Nov 2017   3:08 pm

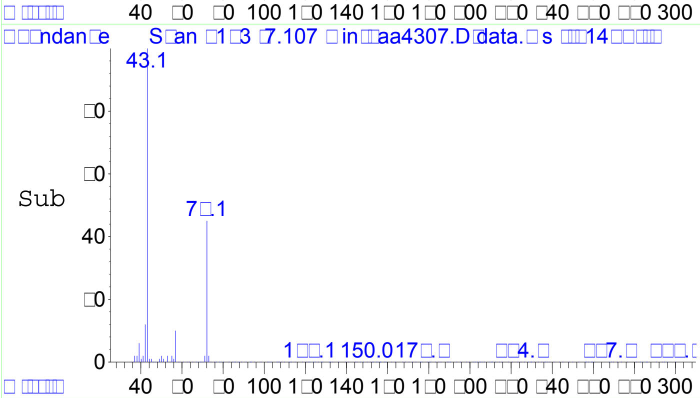
Tgt Ion: 76 Resp: 26712

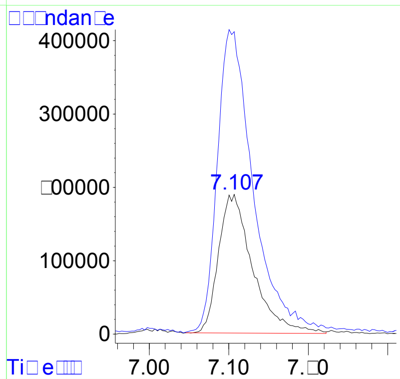
Ion	Ratio	Lower	Upper
76	100		
44	2.7	10.4	15.6#

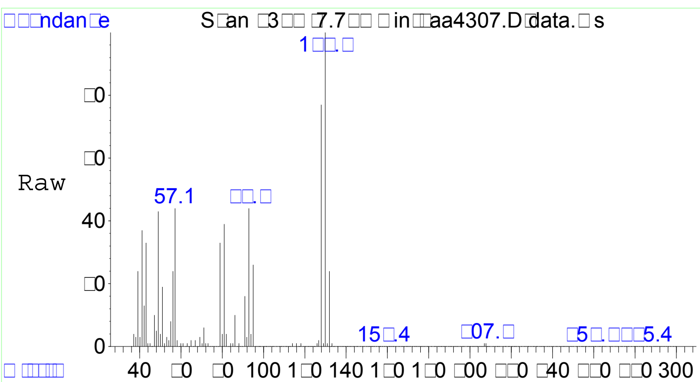


#27
Methyl ethyl ketone
Concen: 33.11 ppbV
RT: 7.107 min   Scan# 2183
Delta R.T.   0.013 min
Lab File: aa4307.D
Acq: 29 Nov 2017   3:08 pm

Tgt Ion: 72 Resp: 568057
Ion   Ratio   Lower   Upper
72   100
43   231.9   168.0   252.0

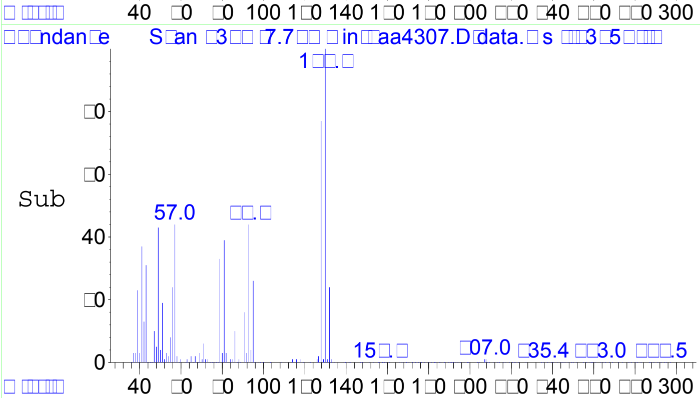


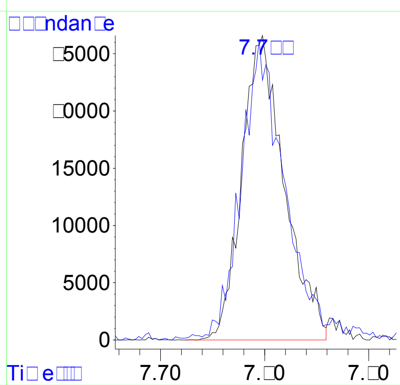


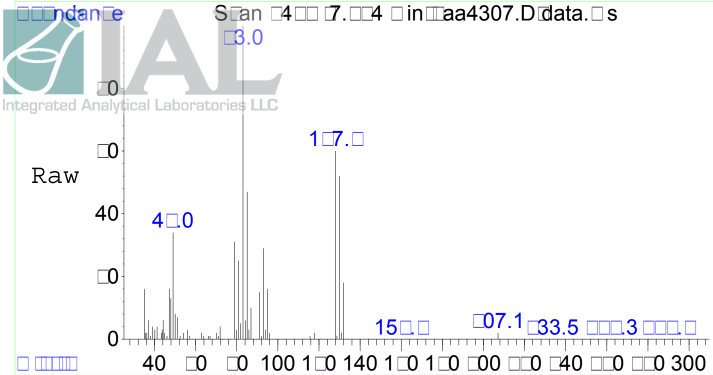


#30
n-Hexane
Concen: 2.13 ppbV
RT: 7.798 min   Scan# 2398
Delta R.T.   0.006 min
Lab File: aa4307.D
Acq: 29 Nov 2017   3:08 pm

Tgt Ion: 57 Resp: 75717
Ion   Ratio   Lower   Upper
57   100
41   96.9   64.8   97.2



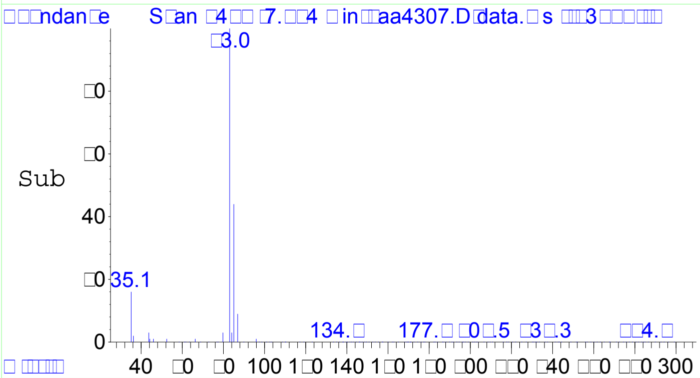


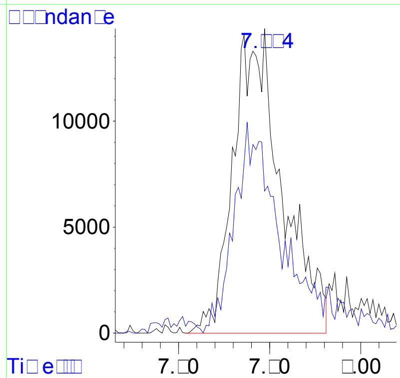


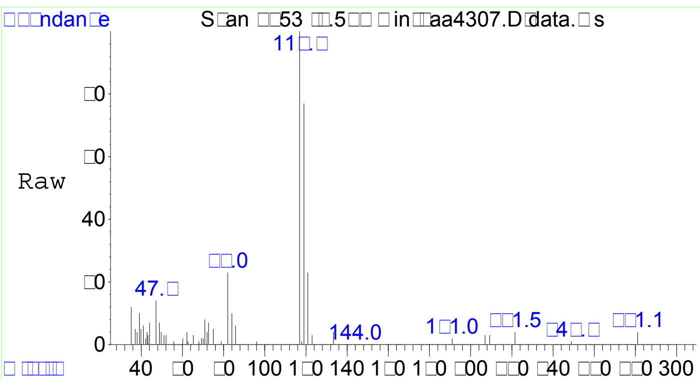
#31
Chloroform
Concen: 0.40 ppbV
RT: 7.894 min   Scan# 2428
Delta R.T.   0.026 min
Lab File: aa4307.D
Acq: 29 Nov 2017   3:08 pm

Tgt Ion: 83 Resp: 53239

Ion	Ratio	Lower	Upper
83	100		
85	63.7	51.0	76.6



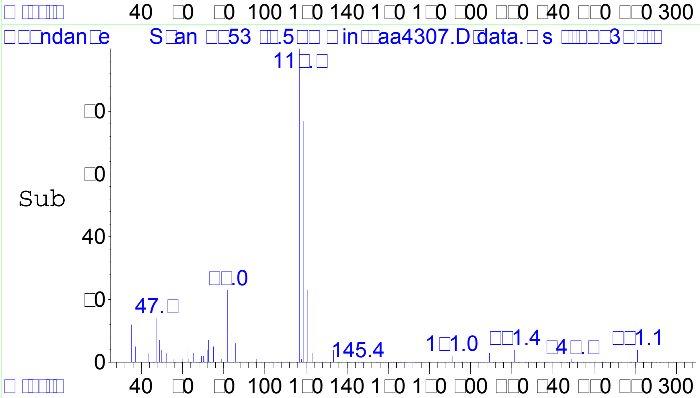


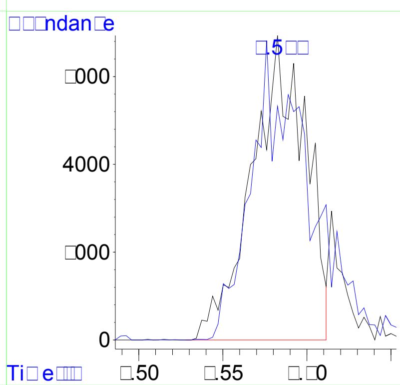


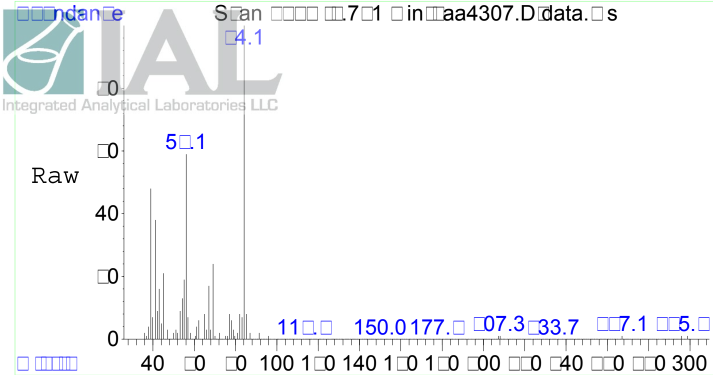
#36
Carbon tetrachloride
Concen: 0.08 ppbV
RT: 9.582 min   Scan# 2953
Delta R.T.   -0.003 min
Lab File: aa4307.D
Acq: 29 Nov 2017   3:08 pm

Tgt Ion:117 Resp: 15288

Ion	Ratio	Lower	Upper
117	100		
119	105.6	77.0	115.4



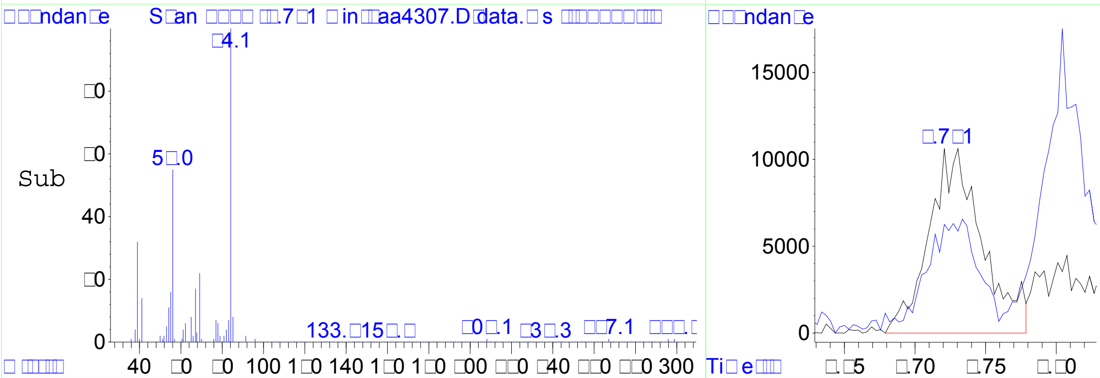


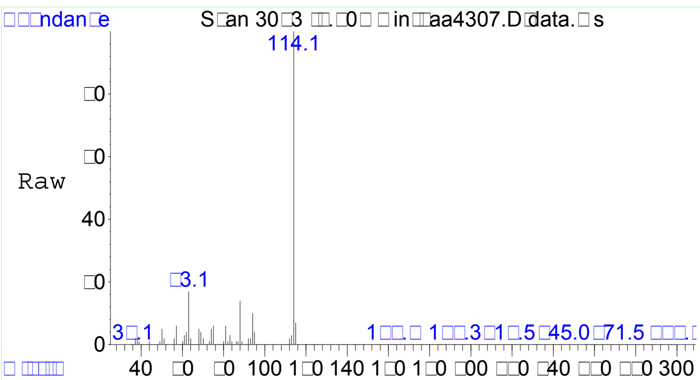


#37
Cyclohexane
Concen: 0.52 ppbV
RT: 9.721 min Scan# 2996
Delta R.T. -0.003 min
Lab File: aa4307.D
Acq: 29 Nov 2017 3:08 pm

Tgt Ion: 84 Resp: 27558

Ion	Ratio	Lower	Upper
84	100		
56	50.6	47.2	70.8

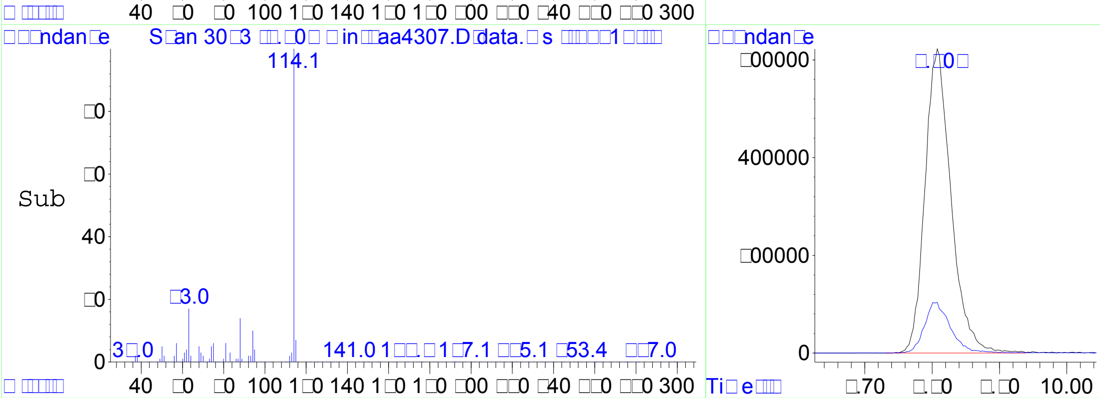


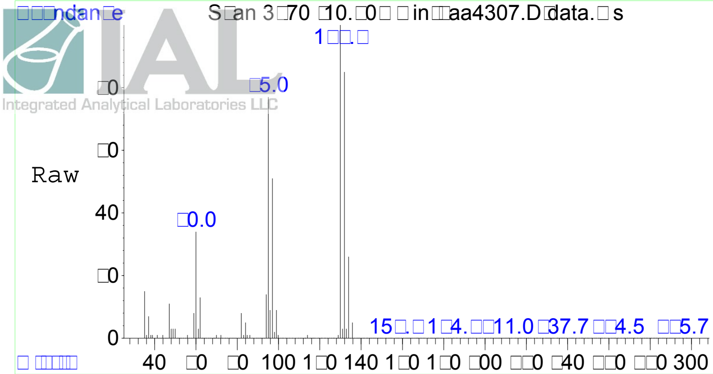


#38
1,4-Difluorobenzene (IS)
Concen: 10.00 ppbV
RT: 9.808 min Scan# 3023
Delta R.T. 0.003 min
Lab File: aa4307.D
Acq: 29 Nov 2017 3:08 pm

Tgt Ion:114 Resp: 1672111

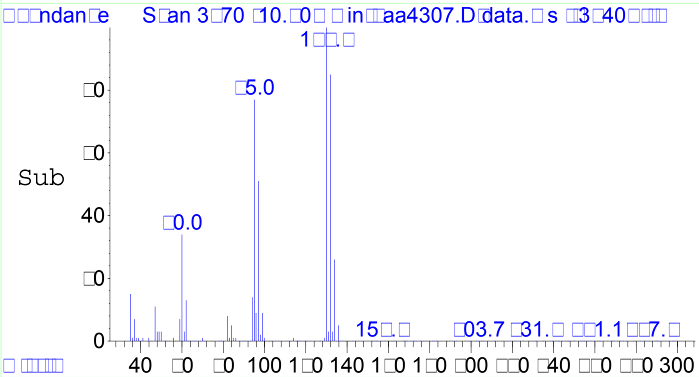
Ion	Ratio	Lower	Upper
114	100		
63	16.7	14.4	21.6

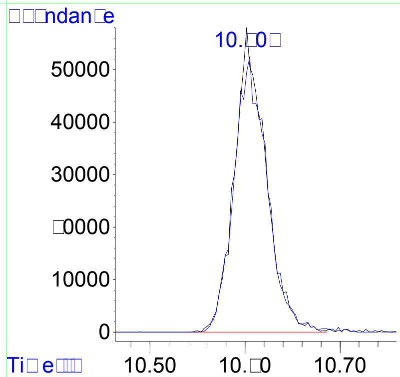


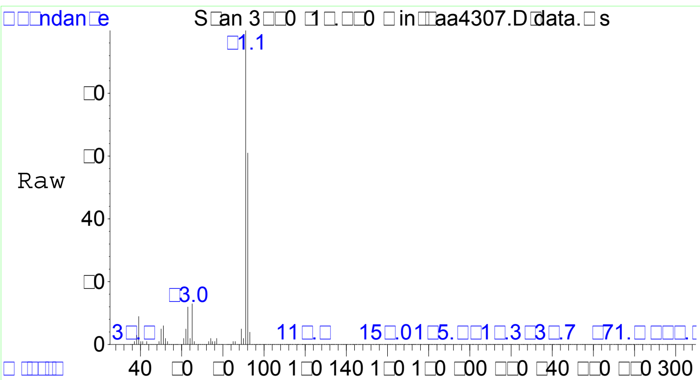


#42
Trichloroethene
Concen: 1.51 ppbV
RT: 10.602 min Scan# 3270
Delta R.T. -0.003 min
Lab File: aa4307.D
Acq: 29 Nov 2017 3:08 pm

Tgt Ion:130	Resp:	132158	
Ion	Ratio	Lower	Upper
130	100		
132	97.4	77.8	116.6

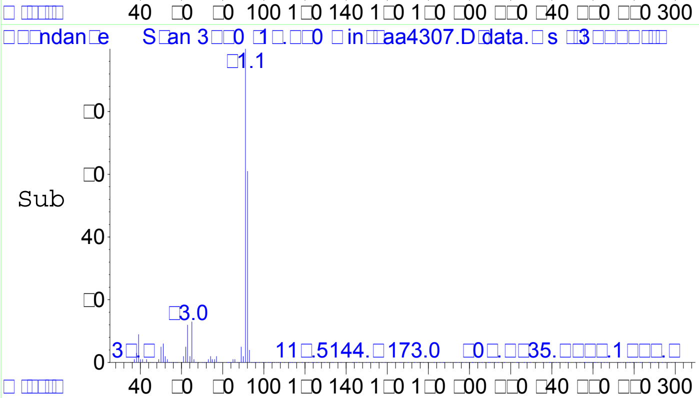


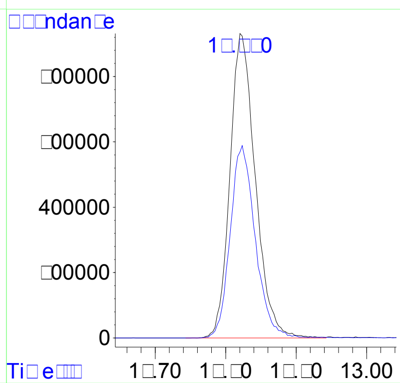


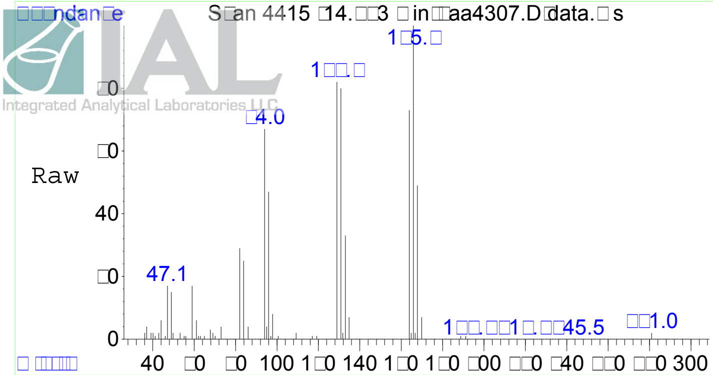


#50
Toluene
Concen: 12.14 ppbV
RT: 12.820 min Scan# 3960
Delta R.T. 0.003 min
Lab File: aa4307.D
Acq: 29 Nov 2017 3:08 pm

Tgt Ion: 91	Resp:	2332000	
Ion	Ratio	Lower	Upper
91	100		
92	62.4	50.0	75.0

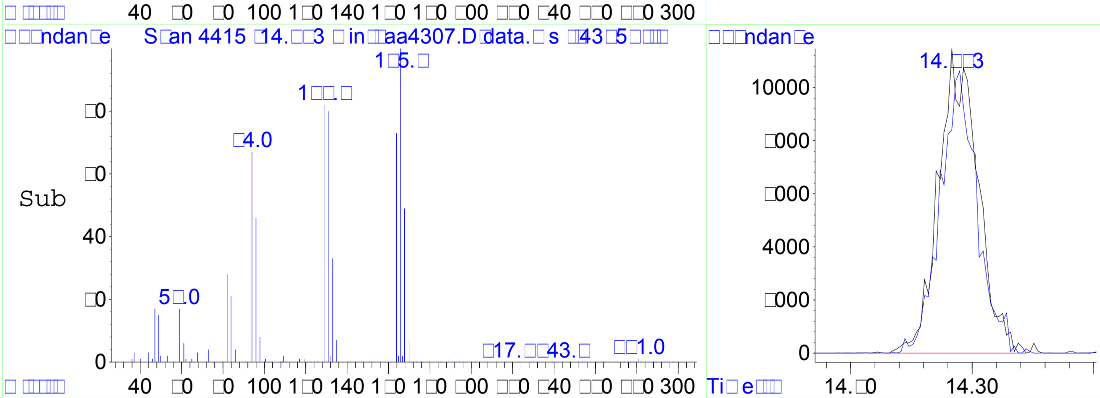


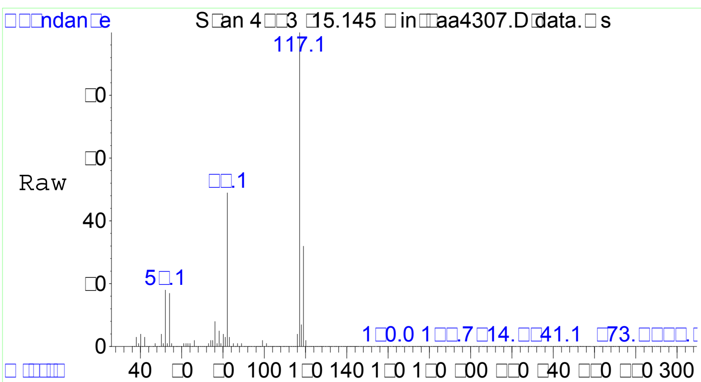




#54
Tetrachloroethene
Concen: 0.24 ppbV
RT: 14.283 min Scan# 4415
Delta R.T. -0.003 min
Lab File: aa4307.D
Acq: 29 Nov 2017 3:08 pm

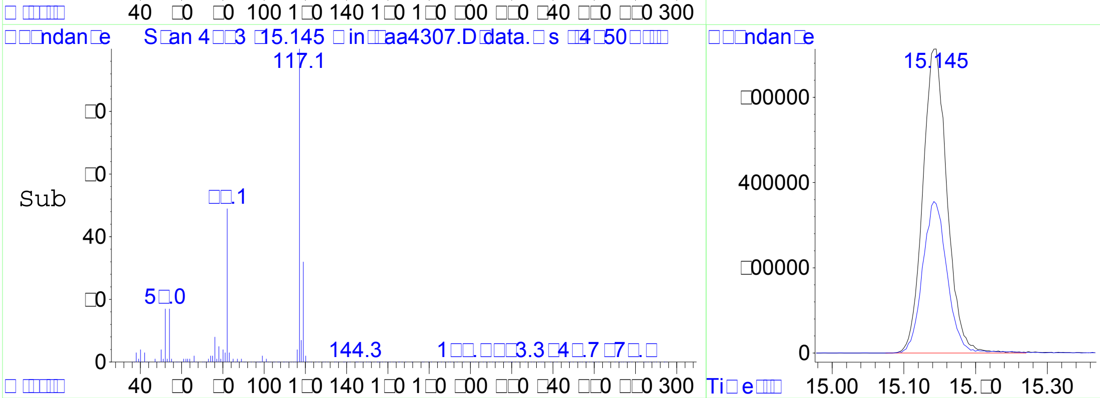
Tgt Ion:166	Resp:	25701	
Ion	Ratio	Lower	Upper
166	100		
164	86.5	64.6	96.8

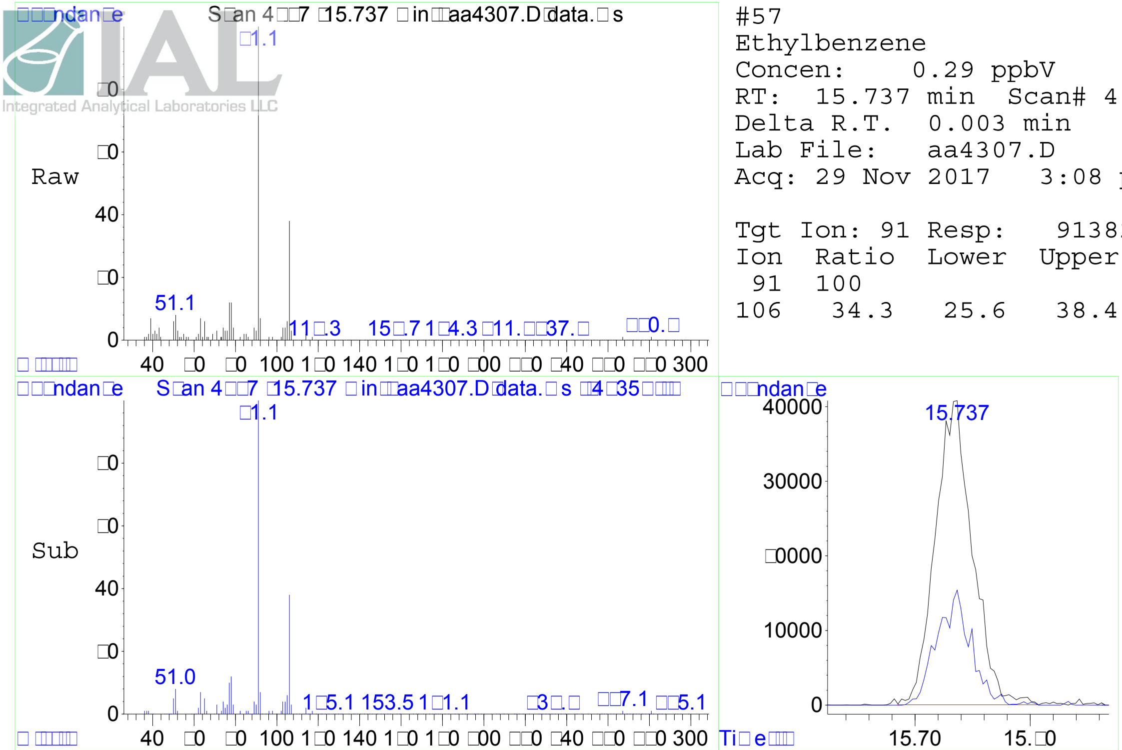




#55
d-5 Chlorobenzene (IS)
Concen: 10.00 ppbV
RT: 15.145 min Scan# 4683
Delta R.T. 0.006 min
Lab File: aa4307.D
Acq: 29 Nov 2017 3:08 pm

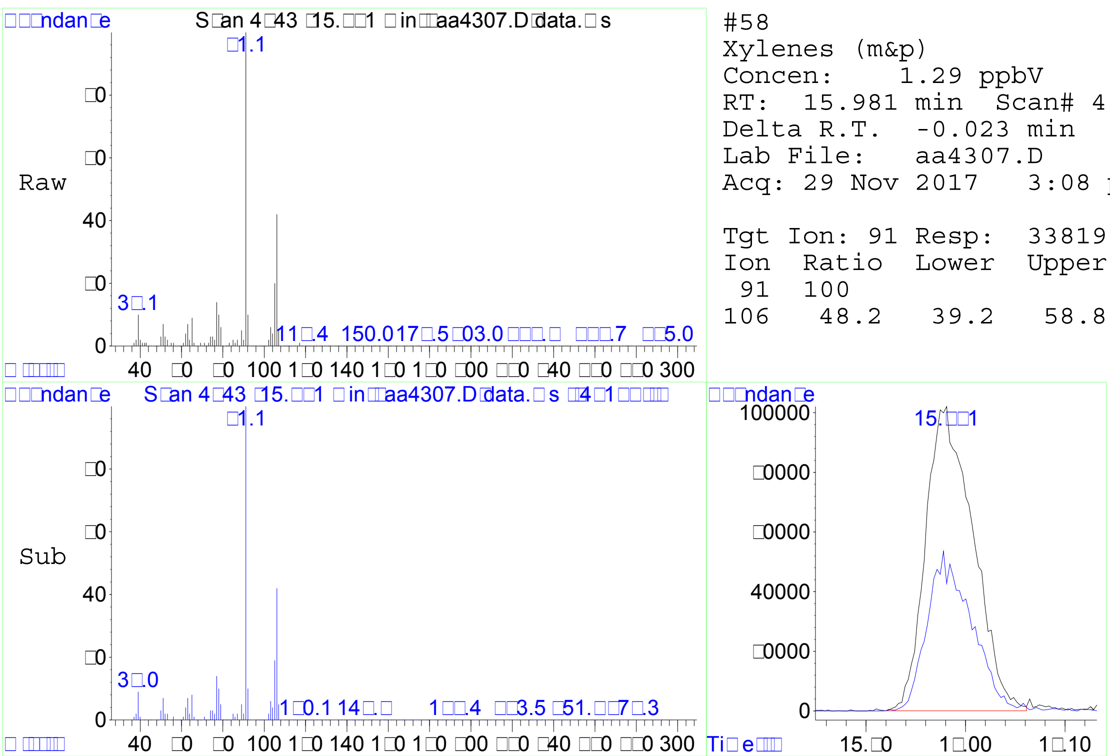
Tgt Ion:117	Resp:	1680778	
Ion	Ratio	Lower	Upper
117	100		
82	49.9	44.8	67.2





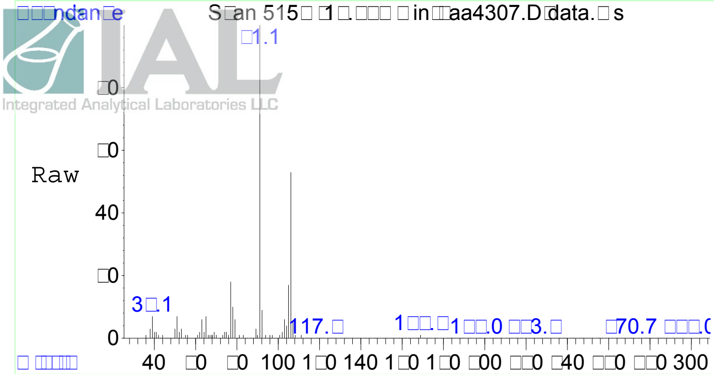
#57
Ethylbenzene
Concen: 0.29 ppbV
RT: 15.737 min   Scan# 4867
Delta R.T.   0.003 min
Lab File: aa4307.D
Acq: 29 Nov 2017   3:08 pm

Tgt Ion: 91 Resp: 91382
Ion   Ratio   Lower   Upper
91   100
106   34.3   25.6   38.4



#58
Xylenes (m&p)
Concen: 1.29 ppbV
RT: 15.981 min   Scan# 4943
Delta R.T.   -0.023 min
Lab File: aa4307.D
Acq: 29 Nov 2017   3:08 pm

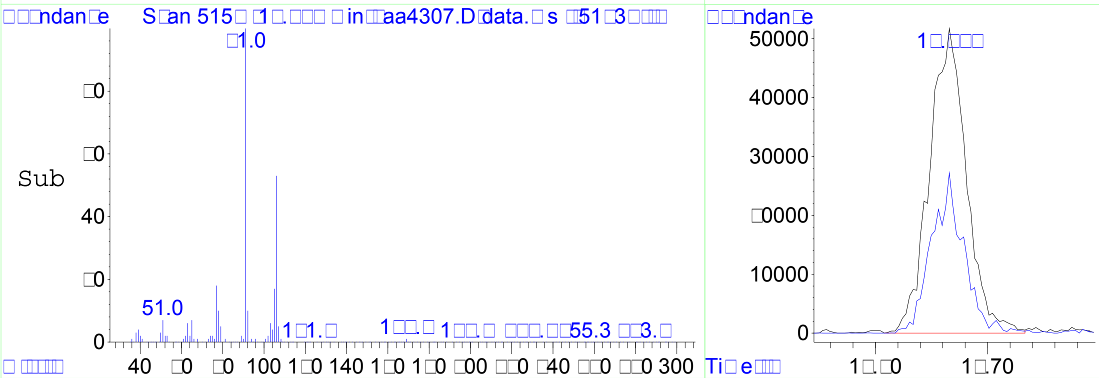
Tgt Ion: 91 Resp: 338199
Ion   Ratio   Lower   Upper
91   100
106   48.2   39.2   58.8

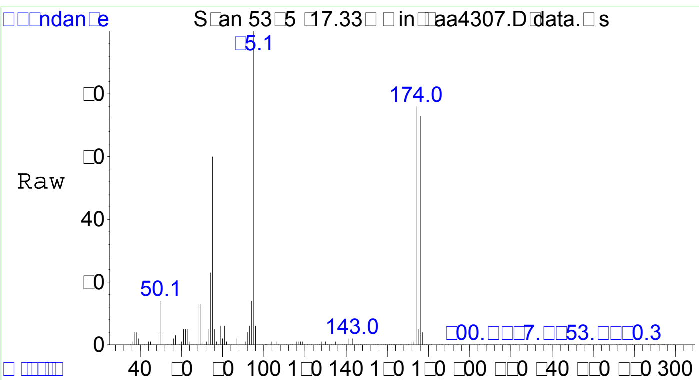


#61
Xylene (o)
Concen: 0.43 ppbV
RT: 16.666 min Scan# 5156
Delta R.T. 0.006 min
Lab File: aa4307.D
Acq: 29 Nov 2017   3:08 pm

Tgt Ion: 91 Resp: 118320

Ion	Ratio	Lower	Upper
91	100		
106	44.0	30.4	45.6

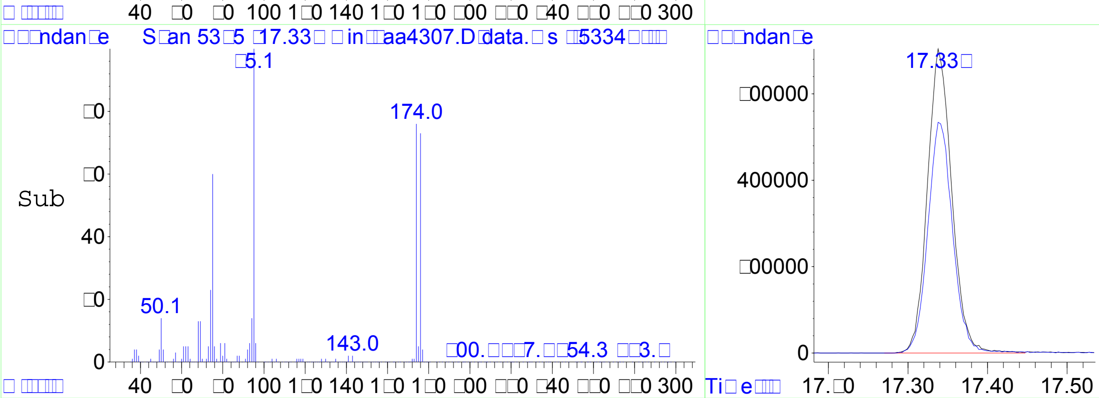


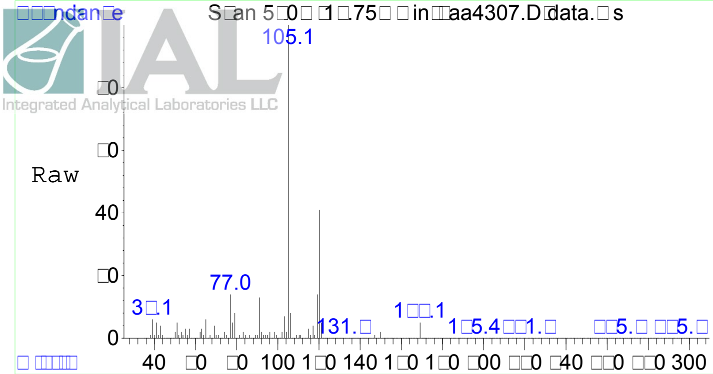


#64
Bromofluorobenzene (tune std)
Concen: 10.23 ppbV
RT: 17.338 min Scan# 5365
Delta R.T. 0.000 min
Lab File: aa4307.D
Acq: 29 Nov 2017   3:08 pm

Tgt Ion: 95 Resp: 1506029

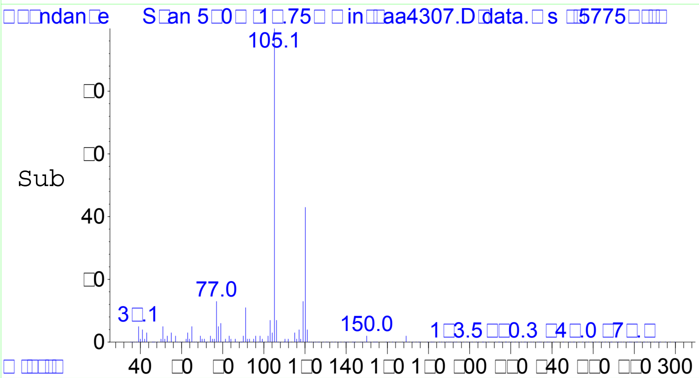
Ion	Ratio	Lower	Upper
95	100		
174	77.2	61.5	92.3

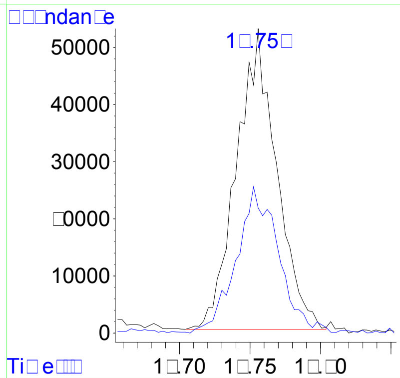


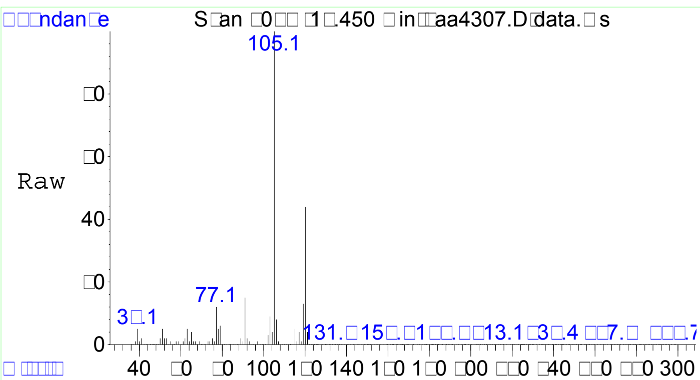


#69
1,3,5-Trimethylbenzene
Concen: 0.31 ppbV
RT: 18.756 min Scan# 5806
Delta R.T. 0.000 min
Lab File: aa4307.D
Acq: 29 Nov 2017 3:08 pm

Tgt Ion:105	Resp:	104033	
Ion	Ratio	Lower	Upper
105	100		
120	50.2	31.2	46.8#

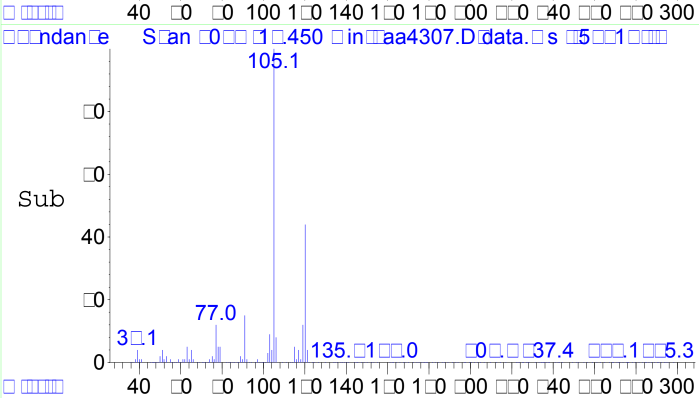


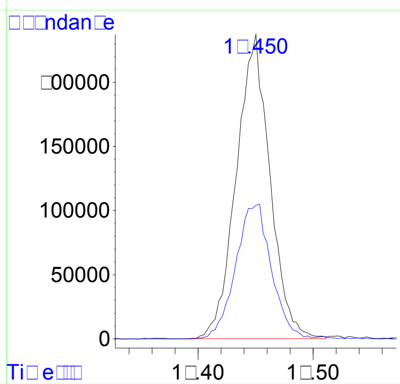




#70
1,2,4-Trimethylbenzene
Concen: 1.47 ppbV
RT: 19.450 min Scan# 6022
Delta R.T. 0.000 min
Lab File: aa4307.D
Acq: 29 Nov 2017 3:08 pm

Tgt Ion:105	Resp:	481403	
Ion	Ratio	Lower	Upper
105	100		
120	47.2	36.0	54.0





Data Path : C:\DATA\11-28-17\
Data File : aa4286.D
Acq On : 28 Nov 2017 8:34 pm
Operator : jls
Sample : E17-09837-01 x 10 dil
Misc : 3027, 50cc
ALS Vial : 16 Sample Multiplier: 1

Quant Time: Nov 29 11:33:54 2017
Quant Method : C:\msdchem\1\METHODS\0912.M
Quant Title : TO-15 on the Agilent 7890A / 5975C
QLast Update : Tue Sep 12 13:00:02 2017
Response via : Initial Calibration

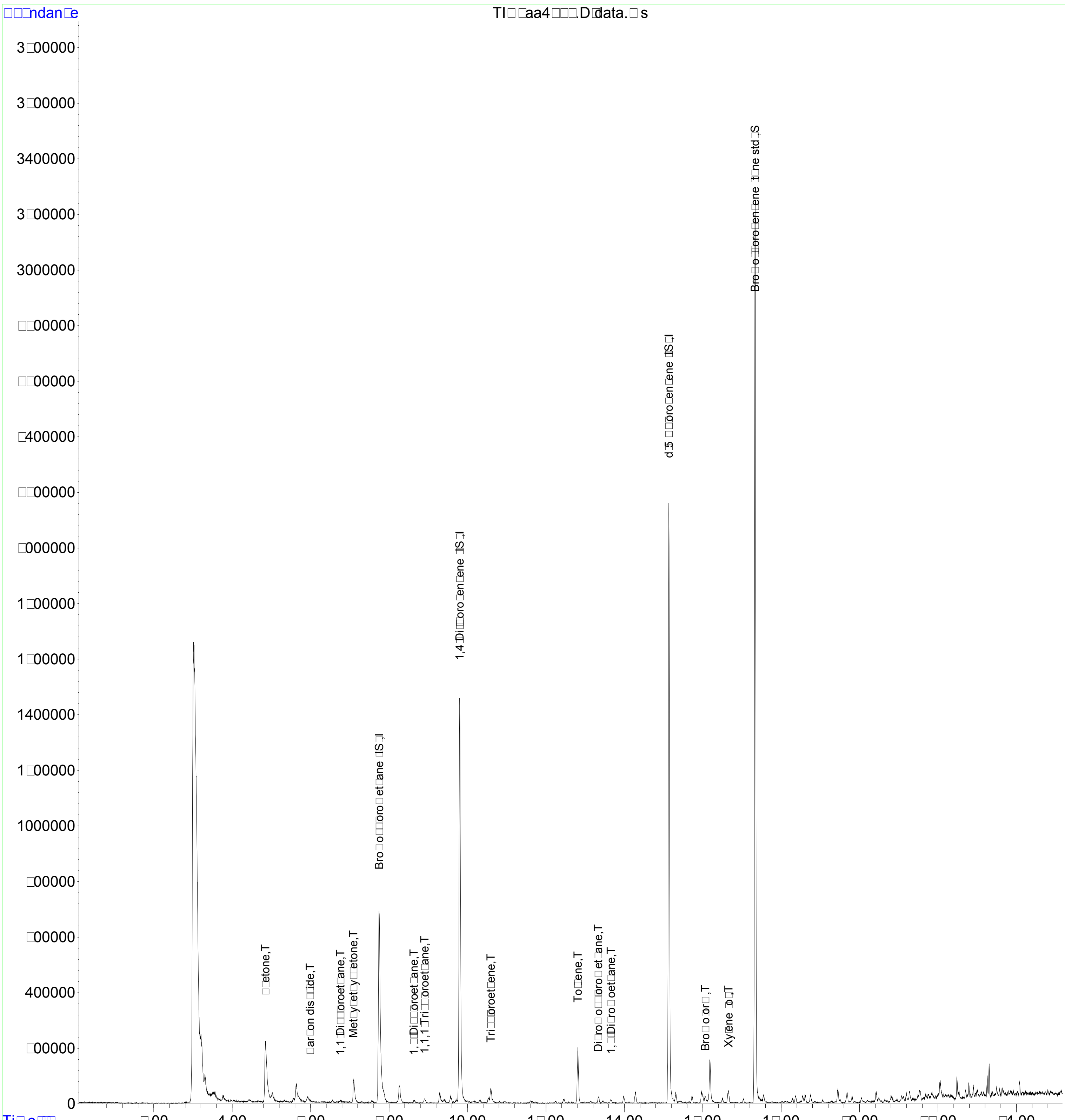
Compound	R.T.	QIon	Response	Conc	Units	Dev(Min)
Internal Standards						
1) Bromochloromethane (IS)	7.750	130	487854	10.00	ppbV	0.00
38) 1,4-Difluorobenzene (IS)	9.804	114	1627288	10.00	ppbV	0.00
55) d-5 Chlorobenzene (IS)	15.135	117	1563073	10.00	ppbV	0.00
System Monitoring Compounds						
64) Bromofluorobenzene (tu...	17.334	95	1308831	9.56	ppbV	0.00
Target Compounds						Qvalue
14) Acetone	4.849	58	130093	10.78	ppbV #	26
23) Carbon disulfide	5.984	76	10703	0.08	ppbV	94
25) 1,1-Dichloroethane	6.759	63	5488	0.07	ppbV #	61
27) Methyl ethyl ketone	7.090	72	51973	2.71	ppbV	91
33) 1,2-Dichloroethane	8.634	62	7450	0.08	ppbV	90
34) 1,1,1-Trichloroethane	8.907	97	13356	0.07	ppbV	95
42) Trichloroethene	10.595	130	22040	0.26	ppbV	98
50) Toluene	12.817	91	171694	0.92	ppbV	99
52) Dibromochloromethane	13.335	129	14813	0.08	ppbV	97
53) 1,2-Dibromoethane	13.663	107	9021	0.07	ppbV	94
59) Bromoform	16.064	173	11232	0.07	ppbV	99
61) Xylene (o)	16.662	91	19895	0.08	ppbV	89

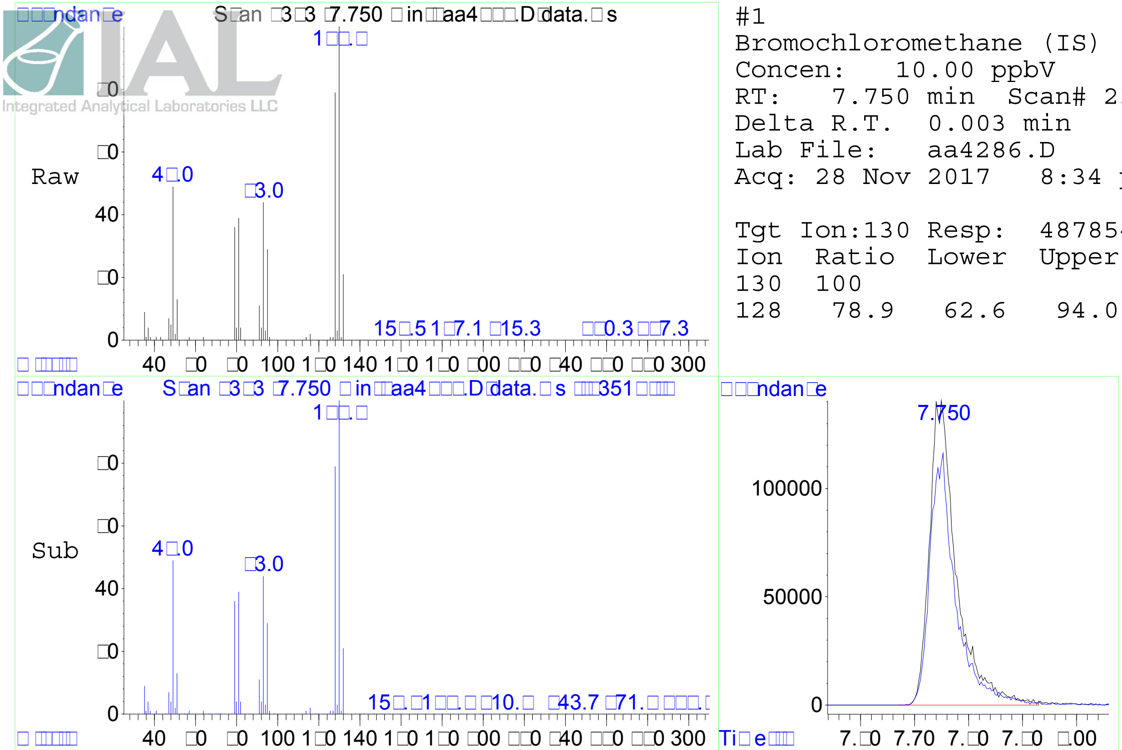
(#) = qualifier out of range (m) = manual integration (+) = signals summed

Quantitation Report (QT Reviewed)

Data Path : C:\DATA\11-28-17\
Data File : aa4286.D
Acq On : 28 Nov 2017 8:34 pm
Operator : jls
Sample : E17-09837-01 x 10 dil
Misc : 3027, 50cc
ALS Vial : 16 Sample Multiplier: 1

Quant Time: Nov 29 11:33:54 2017
Quant Method : C:\msdchem\1\METHODS\0912.M
Quant Title : TO-15 on the Agilent 7890A / 5975C
QLast Update : Tue Sep 12 13:00:02 2017
Response via : Initial Calibration

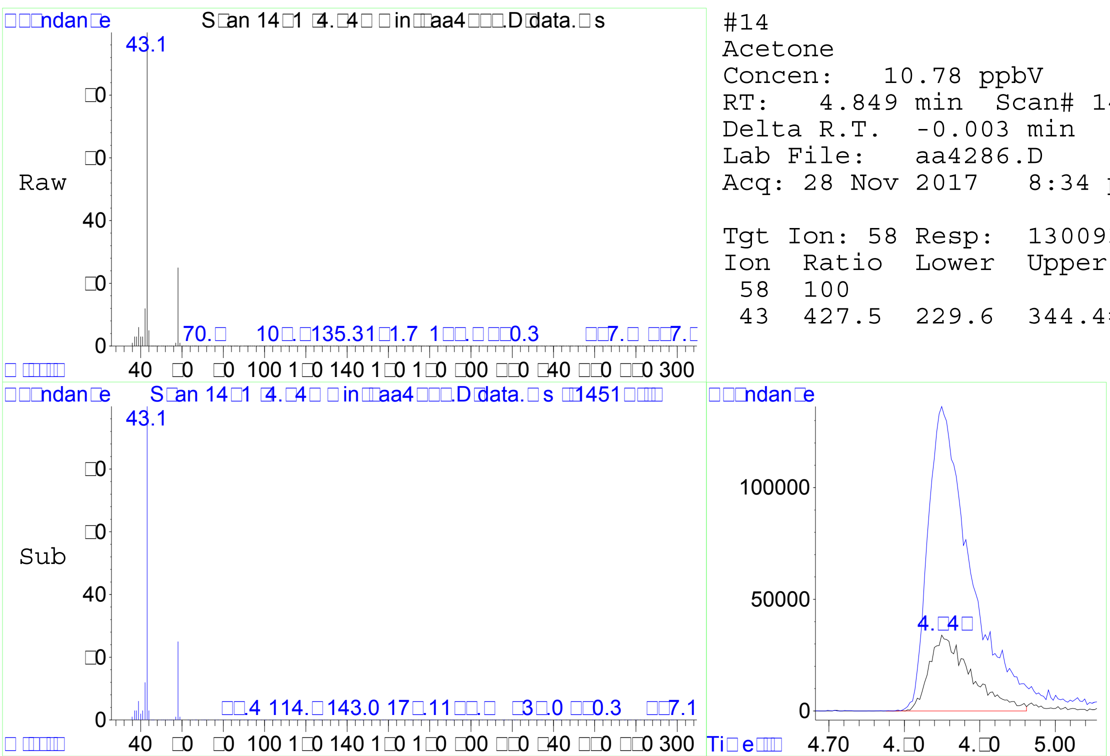




#1
Bromochloromethane (IS)
Concen: 10.00 ppbV
RT: 7.750 min Scan# 2383
Delta R.T. 0.003 min
Lab File: aa4286.D
Acq: 28 Nov 2017 8:34 pm

Tgt Ion:130 Resp: 487854

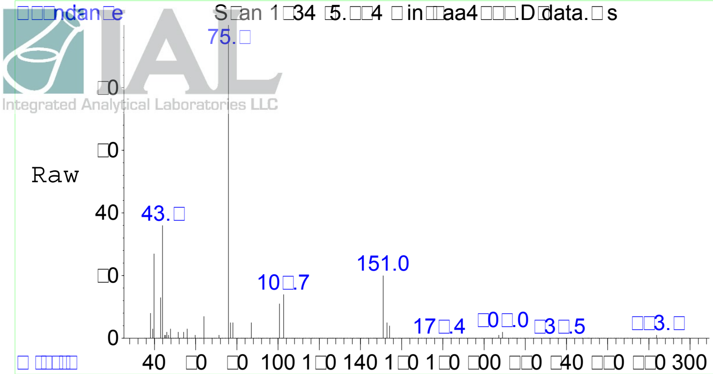
Ion	Ratio	Lower	Upper
130	100		
128	78.9	62.6	94.0



#14
Acetone
Concen: 10.78 ppbV
RT: 4.849 min Scan# 1481
Delta R.T. -0.003 min
Lab File: aa4286.D
Acq: 28 Nov 2017 8:34 pm

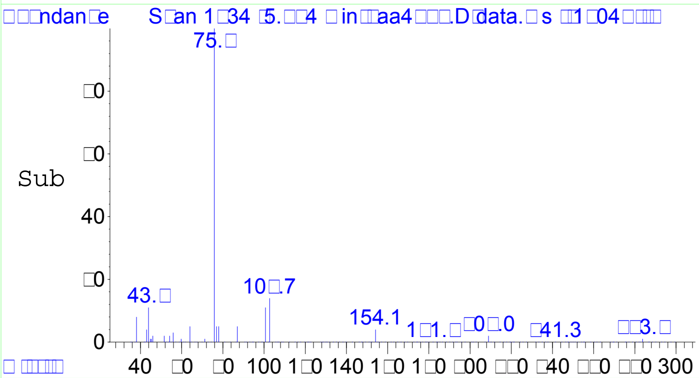
Tgt Ion: 58 Resp: 130093

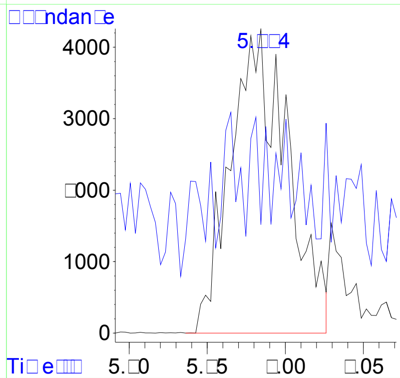
Ion	Ratio	Lower	Upper
58	100		
43	427.5	229.6	344.4#

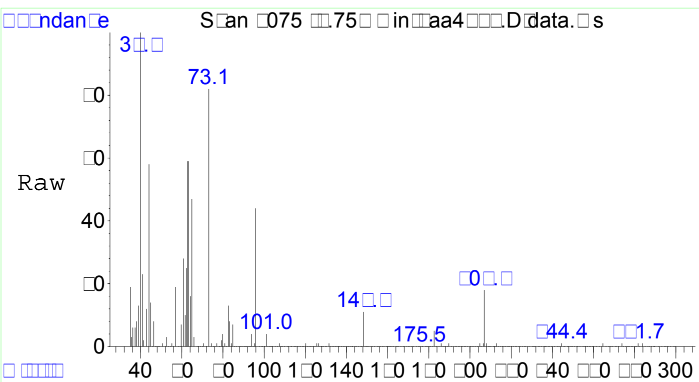


#23
Carbon disulfide
Concen: 0.08 ppbV
RT: 5.984 min Scan# 1834
Delta R.T.   -0.003 min
Lab File: aa4286.D
Acq: 28 Nov 2017   8:34 pm

Tgt Ion: 76	Resp:		10703
Ion	Ratio	Lower	Upper
76	100		
44	10.6	10.4	15.6

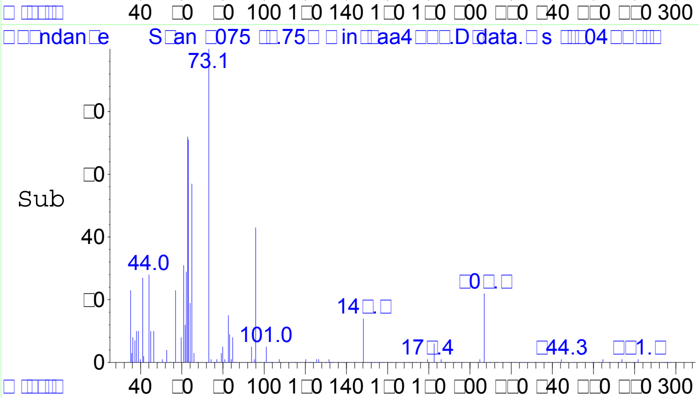


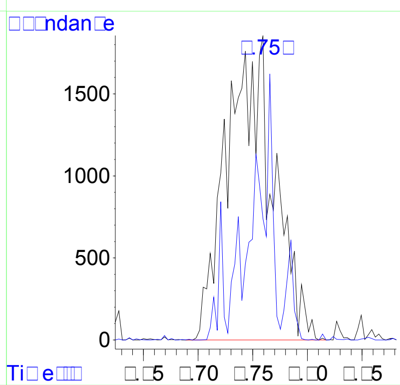


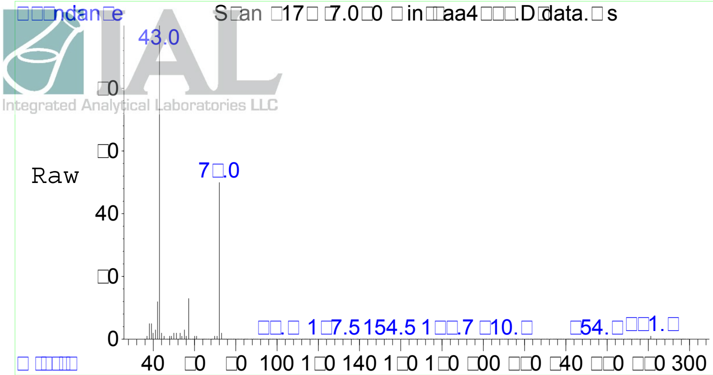


#25
1,1-Dichloroethane
Concen: 0.07 ppbV
RT: 6.759 min Scan# 2075
Delta R.T.   0.006 min
Lab File: aa4286.D
Acq: 28 Nov 2017   8:34 pm

Tgt Ion: 63	Resp:		5488
Ion	Ratio	Lower	Upper
63	100		
65	9.1	24.4	36.6#



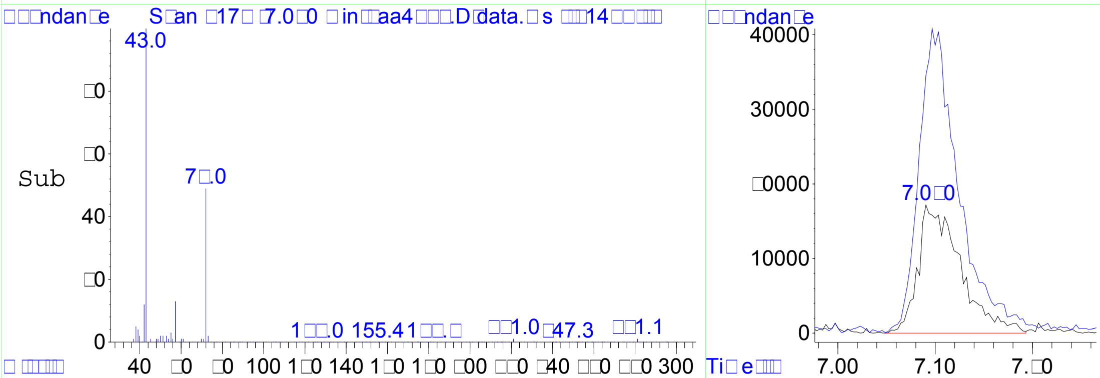


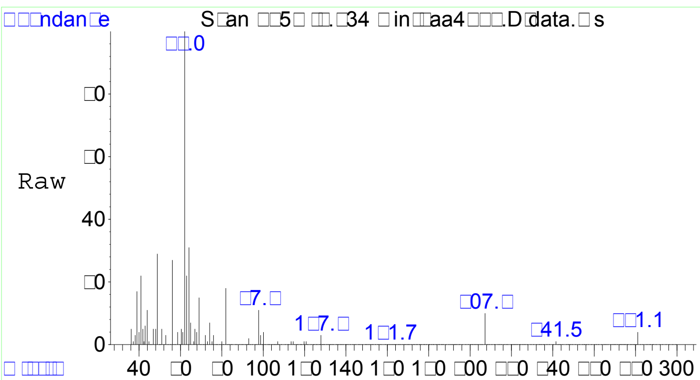


#27
Methyl ethyl ketone
Concen: 2.71 ppbV
RT: 7.090 min Scan# 2178
Delta R.T. -0.004 min
Lab File: aa4286.D
Acq: 28 Nov 2017 8:34 pm

Tgt Ion: 72 Resp: 51973

Ion	Ratio	Lower	Upper
72	100		
43	223.8	168.0	252.0

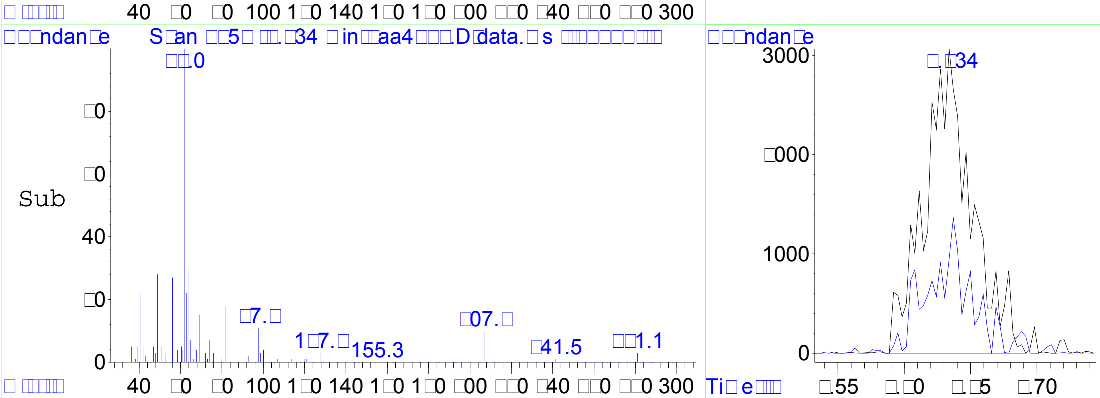


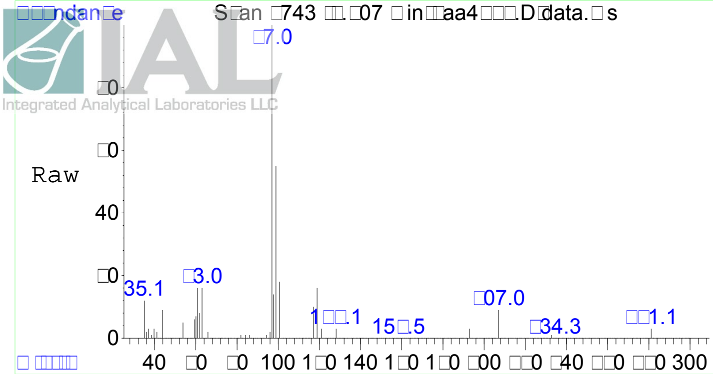


#33
1,2-Dichloroethane
Concen: 0.08 ppbV
RT: 8.634 min Scan# 2658
Delta R.T. -0.007 min
Lab File: aa4286.D
Acq: 28 Nov 2017 8:34 pm

Tgt Ion: 62 Resp: 7450

Ion	Ratio	Lower	Upper
62	100		
64	25.9	25.1	37.7

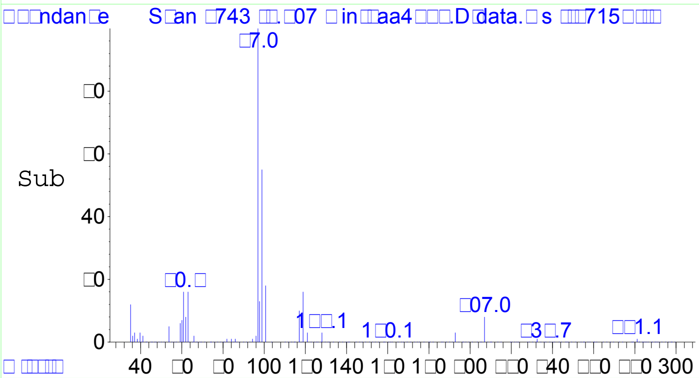


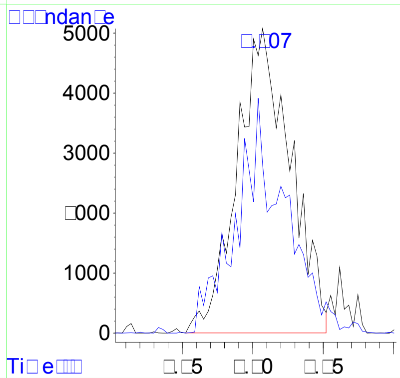


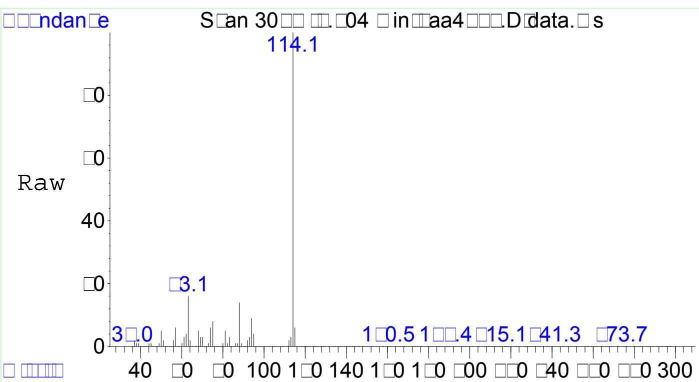
#34
1,1,1-Trichloroethane
Concen: 0.07 ppbV
RT: 8.907 min Scan# 2743
Delta R.T. -0.010 min
Lab File: aa4286.D
Acq: 28 Nov 2017 8:34 pm

Tgt Ion: 97 Resp: 13356

Ion	Ratio	Lower	Upper
97	100		
99	68.9	51.9	77.9



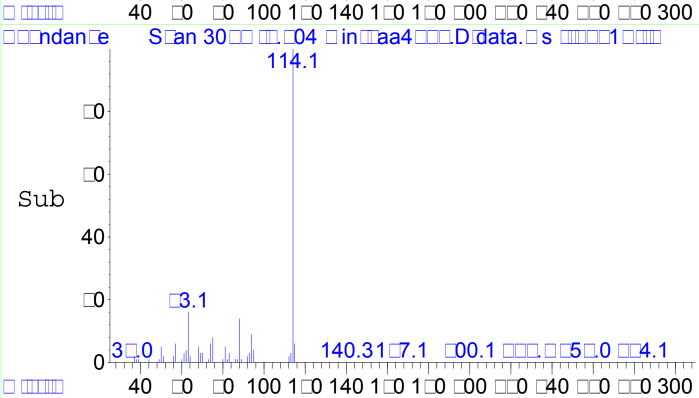


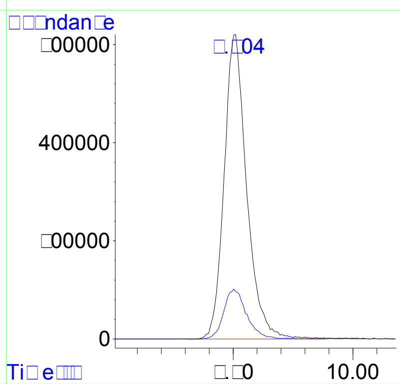


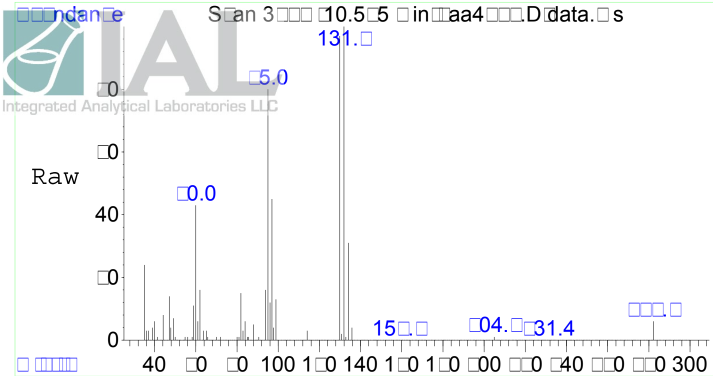
#38
1,4-Difluorobenzene (IS)
Concen: 10.00 ppbV
RT: 9.804 min Scan# 3022
Delta R.T. -0.000 min
Lab File: aa4286.D
Acq: 28 Nov 2017 8:34 pm

Tgt Ion:114 Resp: 1627288

Ion	Ratio	Lower	Upper
114	100		
63	16.5	14.4	21.6



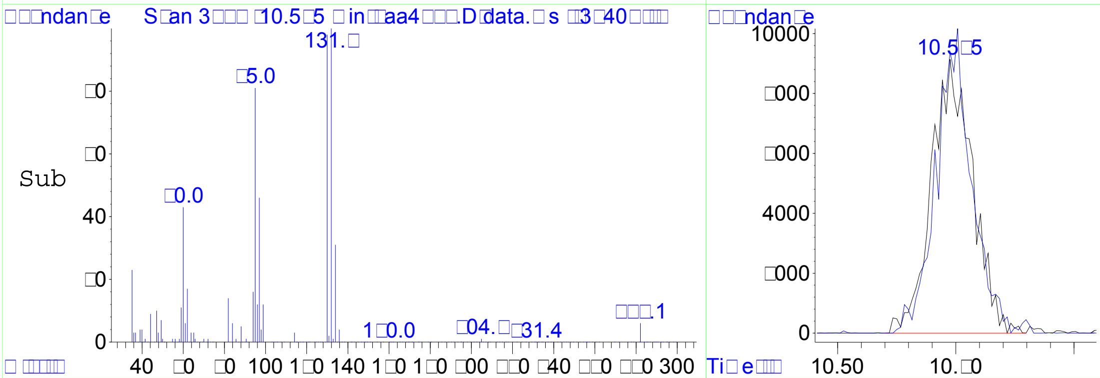


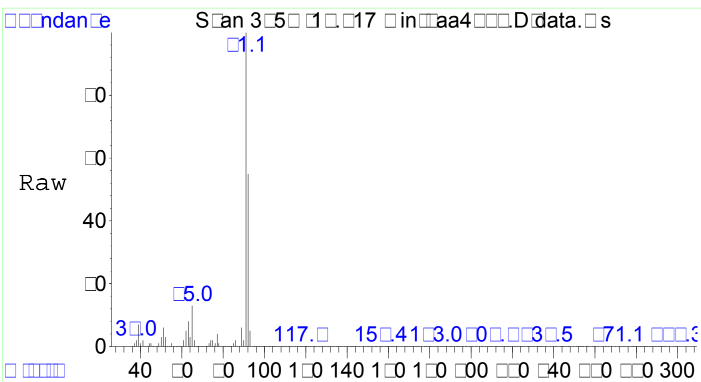


#42
Trichloroethene
Concen: 0.26 ppbV
RT: 10.595 min Scan# 3268
Delta R.T. -0.010 min
Lab File: aa4286.D
Acq: 28 Nov 2017 8:34 pm

Tgt Ion:130 Resp: 22040

Ion	Ratio	Lower	Upper
130	100		
132	95.6	77.8	116.6

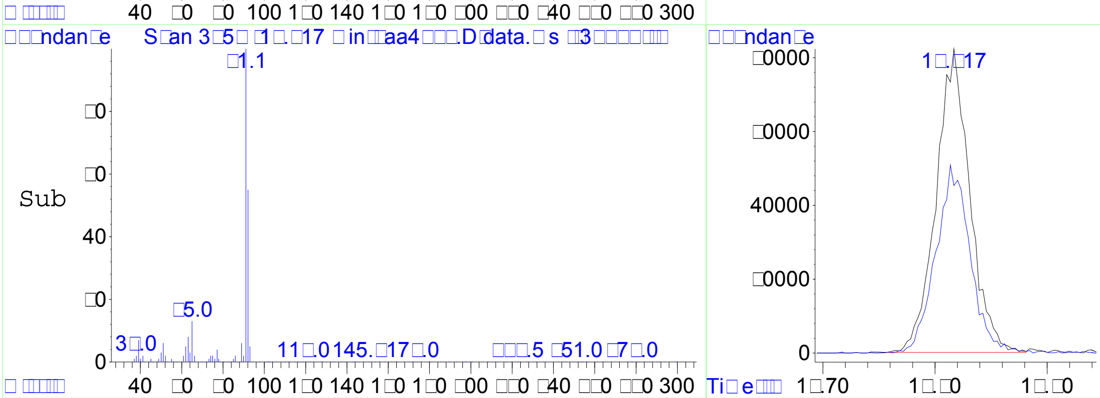


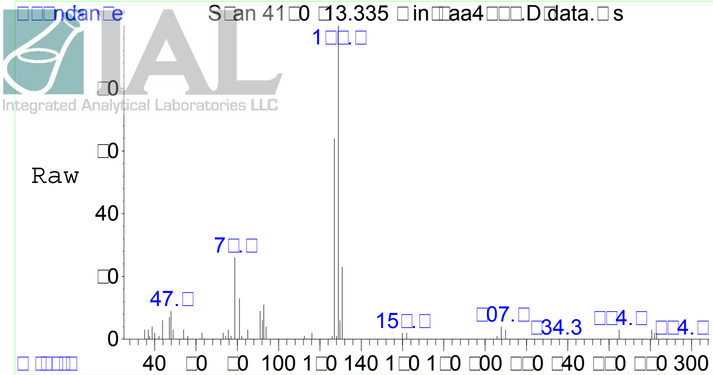


#50
Toluene
Concen: 0.92 ppbV
RT: 12.817 min Scan# 3959
Delta R.T. -0.000 min
Lab File: aa4286.D
Acq: 28 Nov 2017 8:34 pm

Tgt Ion: 91 Resp: 171694

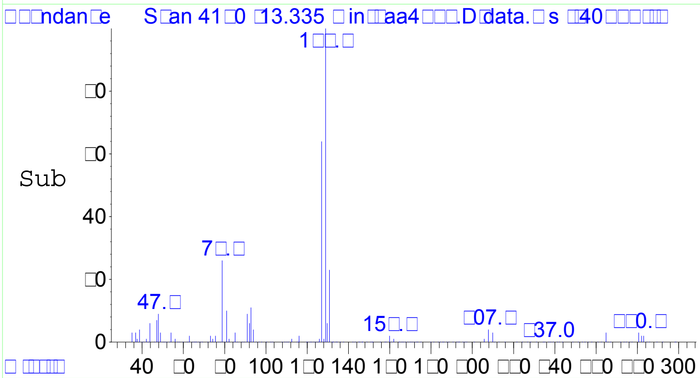
Ion	Ratio	Lower	Upper
91	100		
92	63.0	50.0	75.0

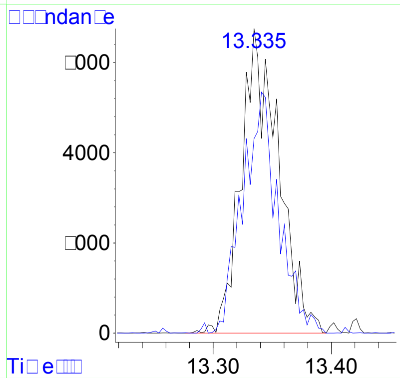


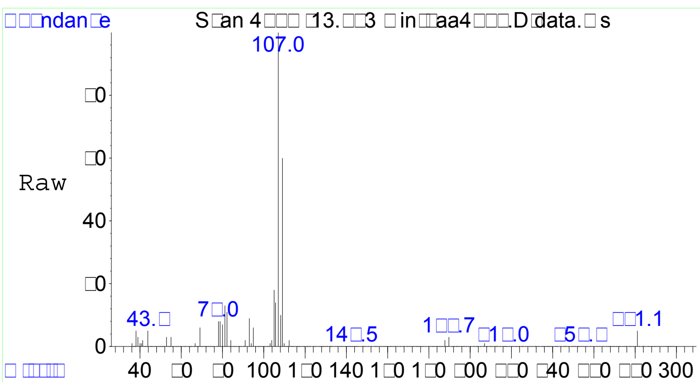


#52
Dibromochloromethane
Concen: 0.08 ppbV
RT: 13.335 min Scan# 4120
Delta R.T. -0.010 min
Lab File: aa4286.D
Acq: 28 Nov 2017 8:34 pm

Tgt Ion:129	Resp:	14813	
Ion	Ratio	Lower	Upper
129	100		
127	75.8	62.6	93.8

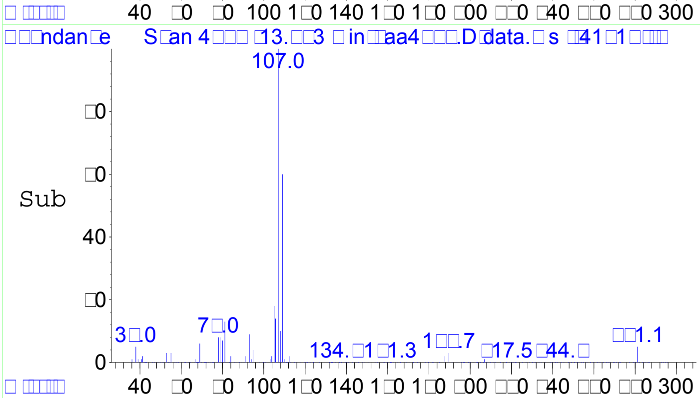


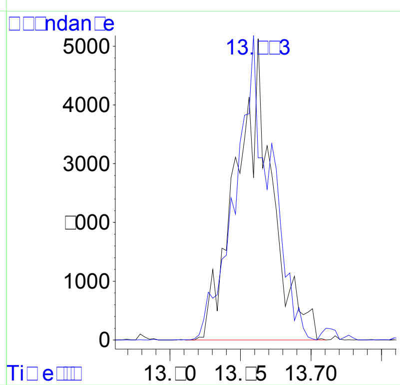


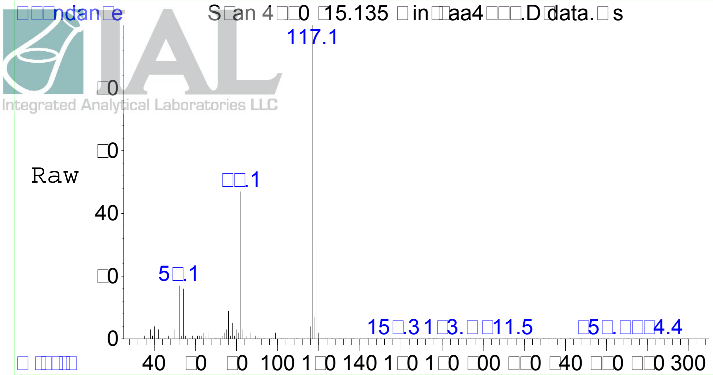


#53
1,2-Dibromoethane
Concen: 0.07 ppbV
RT: 13.663 min Scan# 4222
Delta R.T. -0.000 min
Lab File: aa4286.D
Acq: 28 Nov 2017 8:34 pm

Tgt Ion:107	Resp:	9021	
Ion	Ratio	Lower	Upper
107	100		
109	99.7	75.0	112.6



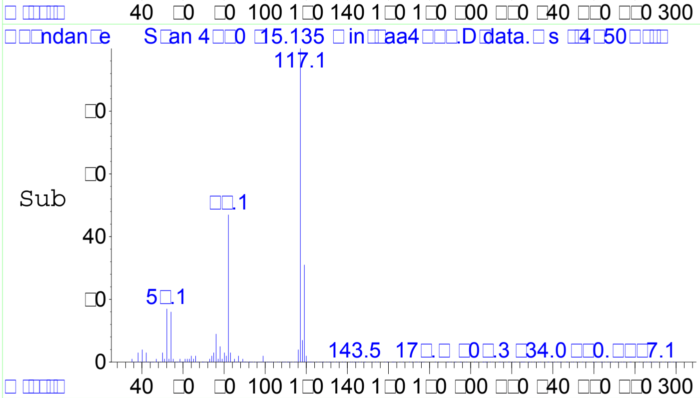


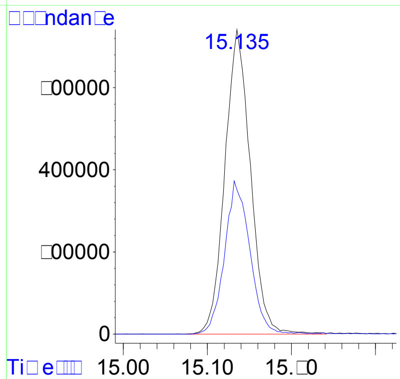


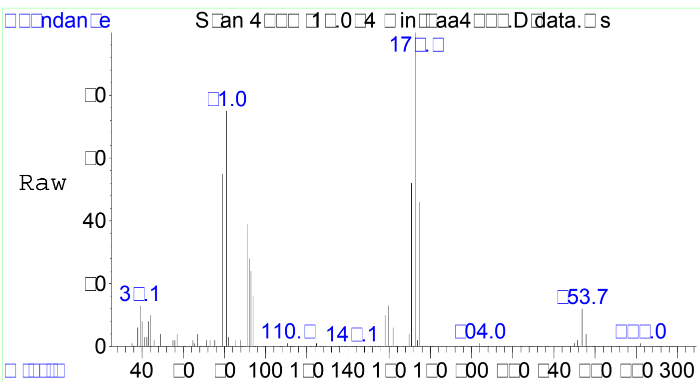
#55
d-5 Chlorobenzene (IS)
Concen: 10.00 ppbV
RT: 15.135 min Scan# 4680
Delta R.T. -0.003 min
Lab File: aa4286.D
Acq: 28 Nov 2017 8:34 pm

Tgt Ion:117 Resp: 1563073

Ion	Ratio	Lower	Upper
117	100		
82	49.8	44.8	67.2



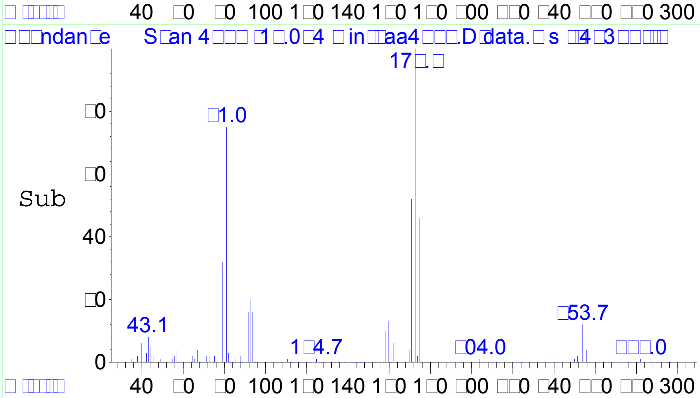


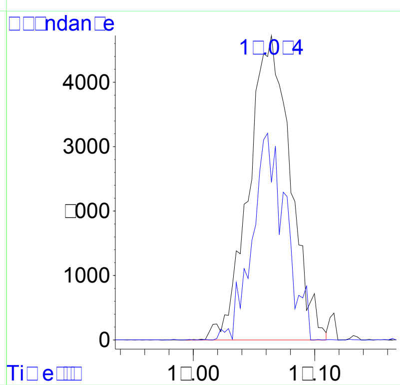


#59
Bromoform
Concen: 0.07 ppbV
RT: 16.064 min Scan# 4969
Delta R.T. -0.003 min
Lab File: aa4286.D
Acq: 28 Nov 2017 8:34 pm

Tgt Ion:173 Resp: 11232

Ion	Ratio	Lower	Upper
173	100		
171	54.9	43.1	64.7





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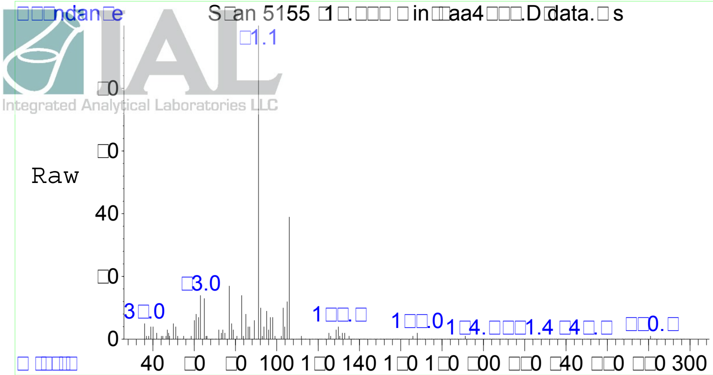
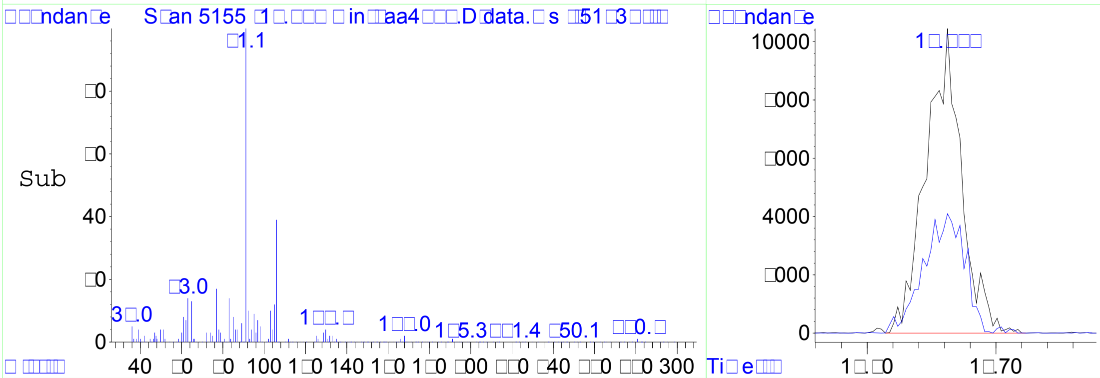
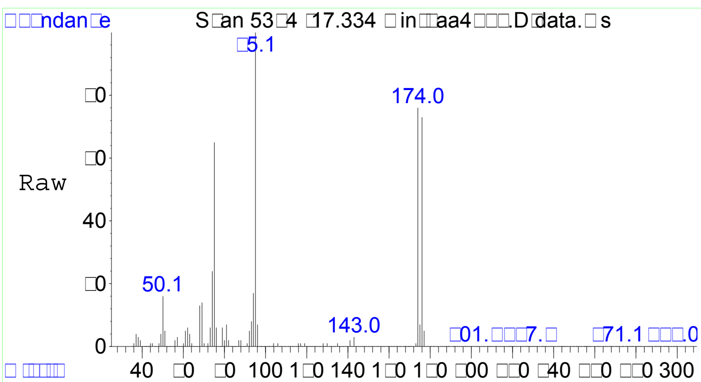


#61
Xylene (o)
Concen: 0.08 ppbV
RT: 16.662 min Scan# 5155
Delta R.T. 0.003 min
Lab File: aa4286.D
Acq: 28 Nov 2017 8:34 pm

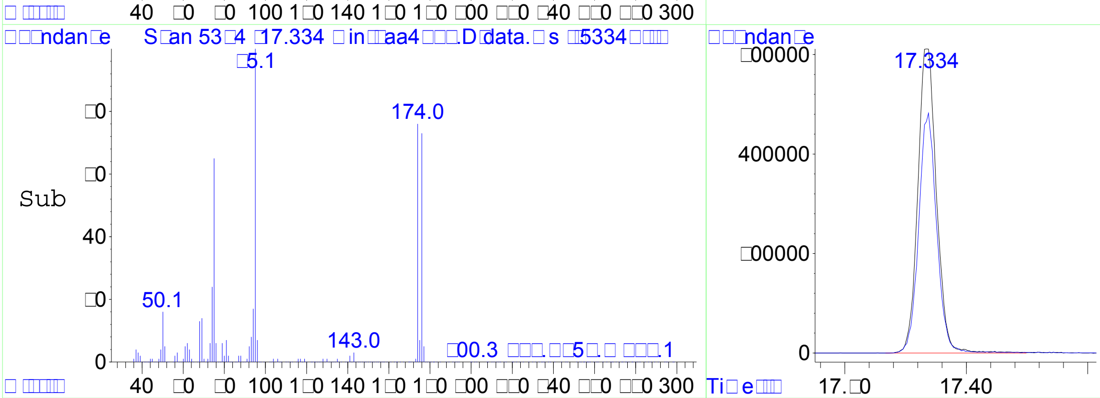
Tgt Ion: 91	Resp:	19895	
Ion	Ratio	Lower	Upper
91	100		
106	44.6	30.4	45.6





#64
Bromofluorobenzene (tune std)
Concen: 9.56 ppbV
RT: 17.334 min Scan# 5364
Delta R.T. -0.003 min
Lab File: aa4286.D
Acq: 28 Nov 2017 8:34 pm

Tgt Ion: 95	Resp:	1308831	
Ion	Ratio	Lower	Upper
95	100		
174	76.0	61.5	92.3



Summary of Results

□n□iron□enta□□ aste Mana□e□ent □sso□iates	Report Date□11□30□17
100 Misty Lane	SD□ N□□ □er□□17□0□□37
Parsippany, NJ 07054	Date Sa□p□ed□11□15□17
□ttn□□e□in Seise	Date Re□ei□ed□11□1□17
Pro□e□t□S□i□i□ier□175 □ Nya□□Rd	Date □na□y□ed□11□□□17, 11□□□17
Site□NY	Data □i□e□□□4□□7, □□430□
	S□□ □a ID□3□14
	D□□10, □0

□na□ysis□ □o□ati□e Or□ani□ □o□po□nds □y □P□ Met□od TO□15

	Sample Name:		SS-2		Reporting Limits	
	IAL ID:		E17-09837-02			
Compound	**CAS #**		**ppbv**	**ug/m3**	**ppbv**	**ug/m3**
□□etone	□7□□4□1	D	54	130	□.0	4.□
Ben□ene	71□43□□		ND	ND	□.0	□.4
Bro□odi□□oro□et□ane	75□□7□4		ND	ND	□.0	13
Bro□o□or□	75□□5□□		ND	ND	□.0	□1
Bro□o□et□ane	74□□3□□		ND	ND	□.0	7.□
1,3□B□tadiene	10□□□□0		ND	ND	□.0	4.4
□□□oro□en□ene	10□□□0□7		ND	ND	□.0	□.□
□□□oroet□ane	75□00□3		ND	ND	□.0	5.3
□□□oro□or□	□7□□□3		ND	ND	□.0	□.□
□□□oro□et□ane	74□□7□3		ND	ND	□.0	4.1
□ar□on dis□□ide	75□15□0		ND	ND	□.0	□.□
□ar□on tetra□□□oride	5□□□3□5		ND	ND	0.40	□.5
□y□□o□exane	110□□□7		ND	ND	□.0	□.□
Di□ro□o□□□oro□et□ane	1□4□4□□1		ND	ND	□.0	17
1,□□Di□ro□oet□ane	10□□□3□4		ND	ND	□.0	15
1,□□Di□□□oro□en□ene	□5□50□1		ND	ND	□.0	1□
1,3□Di□□□oro□en□ene	541□73□1		ND	ND	□.0	1□
1,4□Di□□□oro□en□ene	10□□4□□7		ND	ND	□.0	1□
Di□□□orodi□□oro□et□ane	75□71□□		ND	ND	□.0	□.□
1,1□Di□□□oroet□ane	75□34□3		ND	ND	□.0	□.1
1,□□Di□□□oroet□ane	107□0□□□		ND	ND	□.0	□.1
1,1□Di□□□oroet□ene	75□35□4		ND	ND	□.0	7.□
1,□□Di□□□oroet□ene □□is□	15□□5□□□	D	□10	□□0	□.0	7.□
1,□□Di□□□oroet□ene □trans□	15□□□0□5	D	15	57	□.0	7.□
1,□□Di□□□oropropane	7□□□7□5		ND	ND	□.0	□.□
1,3□Di□□□oropropene □□is□	100□1□01□5		ND	ND	□.0	□.1
1,3□Di□□□oropropene □trans□	100□1□0□□□		ND	ND	□.0	□.1
1,□□Di□□□orotetra□□□oroet□ane	7□□14□□		ND	ND	□.0	14
1,4□Dioxane	1□3□□1□1		ND	ND	□.0	7.□
□t□y□□en□ene	100□41□4		ND	ND	□.0	□.7
n□□eptane	14□□□□5		ND	ND	□.0	□.□
1,3□□exa□□□oro□□tadiene	□7□□□3		ND	ND	□.0	□1
n□□exane	110□54□3		ND	ND	□.0	7.1
Met□y□ene □□□oride	75□0□□□		ND	ND	□.0	7.0
Met□y□et□y□□etone	7□□□3□3	D	5.□	17	□.0	5.□
Met□y□iso□□ty□□etone	10□□10□1		ND	ND	□.0	□.□
Met□y□tert□□□ty□et□er	1□34□04□4		ND	ND	□.0	7.□
Styrene	100□4□□5		ND	ND	□.0	□.5
Tert□□□ty□a□□o□o□	75□□5□0		ND	ND	□.0	□.1
1,1,□,□□Tetra□□□oroet□ane	7□□34□5		ND	ND	□.0	14
Tetra□□□oroet□ene	1□7□1□4	D	□.□	5□	□.0	14
To□□ene	10□□□□3	D	□.□	31	□.0	7.5
1,□,4□Tri□□□oro□en□ene	1□0□□□1		ND	ND	□.0	15
1,1,1□Tri□□□oroet□ane	71□55□□	D	□.4	13	□.0	11
1,1,□□Tri□□□oroet□ane	7□□00□5		ND	ND	□.0	11
Tri□□□oroet□ene	7□□01□□	D	500	□700	0.□□	4.□

D □ □xtra di□□tion re□□ired □or t□is □o□po□nd

□na□yst□J. S□□□itt

Integrated Analytical Laboratories LLC

Summary of Results

□n□iron□enta□□ aste Mana□e□ent □sso□iates	Report Date□11□30□17
100 Misty Lane	SD□ N□□ □er□□17□0□□37
Parsippany, NJ 07054	Date Sa□p□ed□11□15□17
□ttn□□e□in Seise	Date Re□ei□ed□11□1□17
Pro□e□t□S□i□i□ier□175 □ Nya□□Rd	Date □na□y□ed□11□□□17, 11□□□□17
Site□NY	Data □i□e□□□4□□7, □□430□
	S□□ □a ID□3□14
	D□□10, □0

□na□ysis□ □o□ati□e Or□ani□ □o□po□nds □y □P□ Met□od TO□15

Sample Name: / IAL ID:		SS-2 / E17-09837-02			Reporting Limits
Tri□□□oro□□□oro□et□ane	75□□□4	ND	ND	□.0	11
1,1,□□Tri□□□oro□1,□,□tri□□oroet□ane	7□□13□1	ND	ND	□.0	15
1,□,4□Tri□et□y□□en□ene	□5□□3□□	ND	ND	□.0	□.□
1,3,5□Tri□et□y□□en□ene	10□□□7□□	ND	ND	□.0	□.□
□,□,4□Tri□et□y□pentane	540□□4□1	ND	ND	□.0	□.3
□iny□□ro□ide	5□3□□0□□	ND	ND	□.0	□.7
□iny□□□□oride	75□01□4	ND	ND	□.0	5.1
Xy□enes □□ □p□	17□□01□□3□1	ND	ND	□.0	□.7
Xy□enes □o□	□5□47□□	ND	ND	□.0	□.7

D □ □xtra di□□tion re□□ired □or t□is □o□po□nd

□na□yst□J. S□□□itt

Data Path : C:\DATA\11-28-17\
Data File : aa4287.D
Acq On : 28 Nov 2017 9:07 pm
Operator : jls
Sample : E17-09837-02 x 10 dil
Misc : 3814, 50cc
ALS Vial : 17 Sample Multiplier: 1

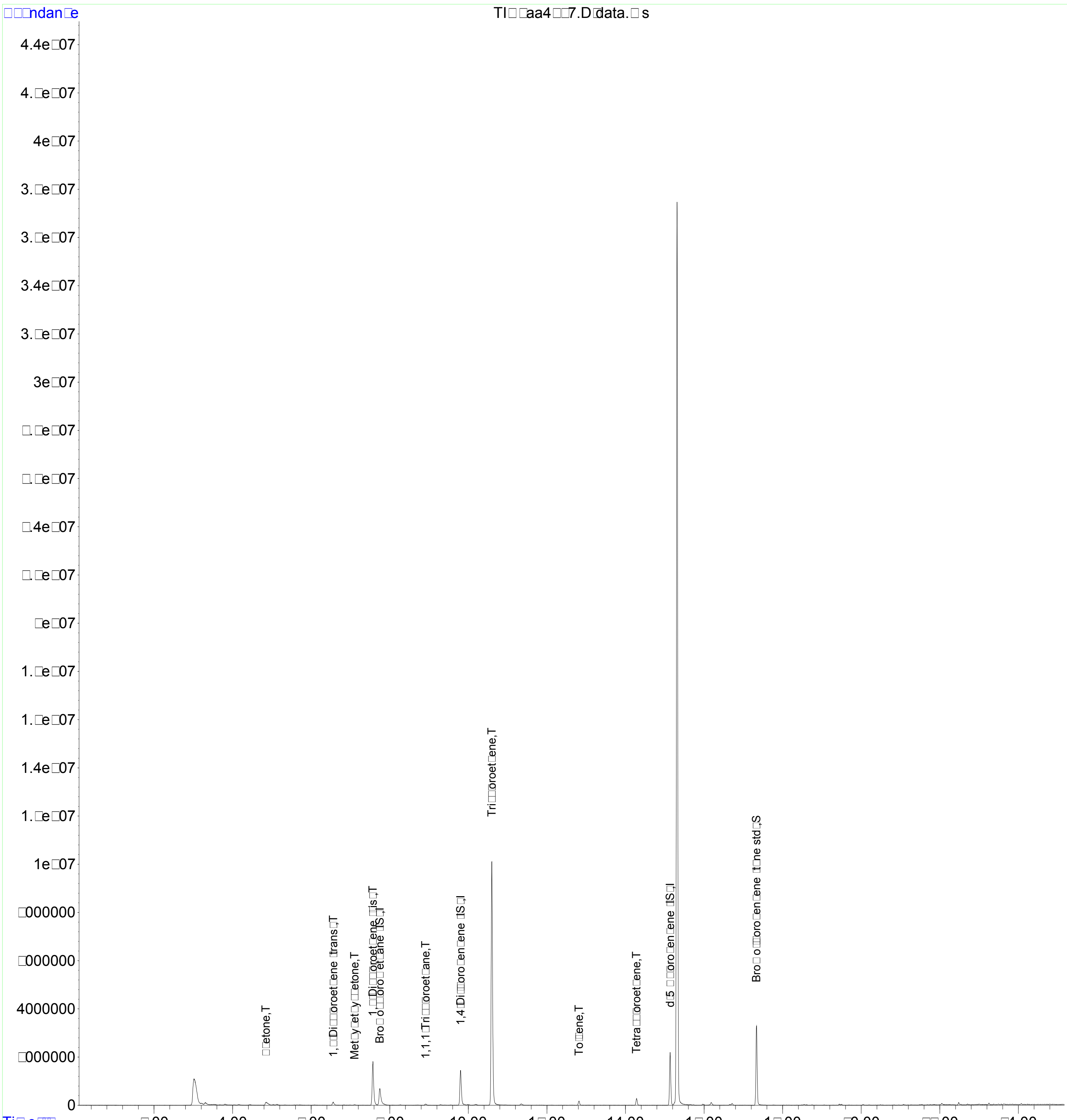
Quant Time: Nov 29 11:36:15 2017
Quant Method : C:\msdchem\1\METHODS\0912.M
Quant Title : TO-15 on the Agilent 7890A / 5975C
QLast Update : Tue Sep 12 13:00:02 2017
Response via : Initial Calibration

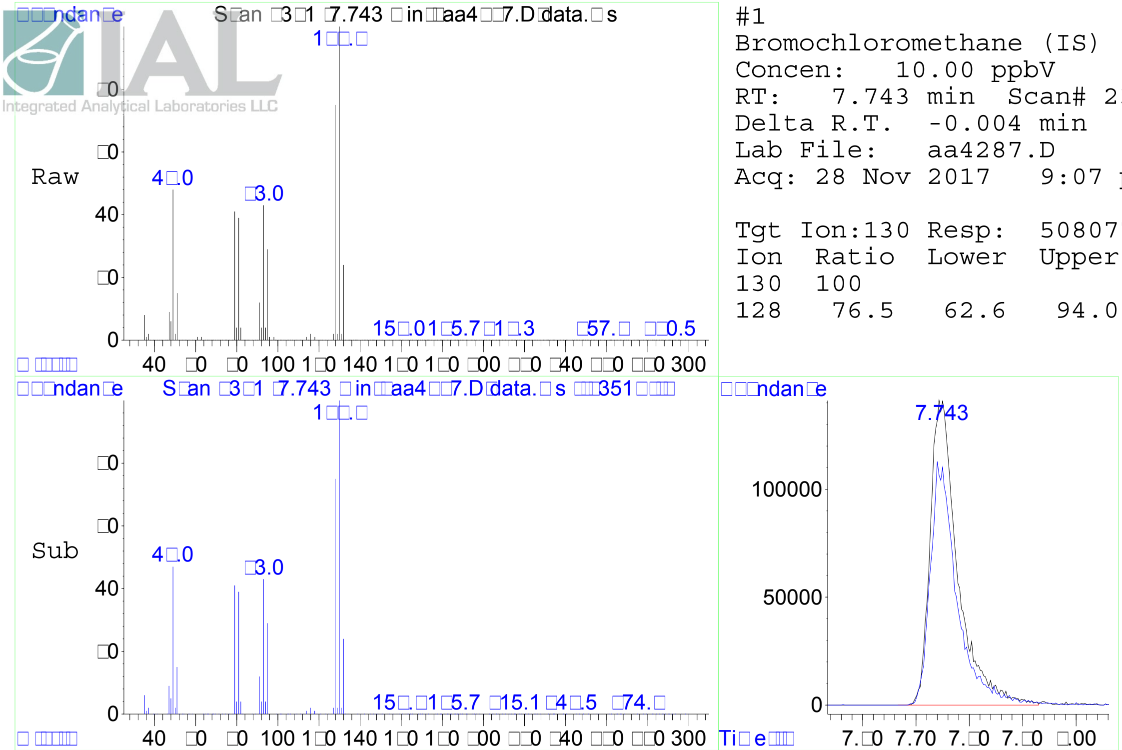
Compound	R.T.	QIon	Response	Conc	Units	Dev(Min)
Internal Standards						
1) Bromochloromethane (IS)	7.743	130	508077	10.00	ppbV	0.00
38) 1,4-Difluorobenzene (IS)	9.804	114	1632670	10.00	ppbV	0.00
55) d-5 Chlorobenzene (IS)	15.135	117	1591956	10.00	ppbV	0.00
System Monitoring Compounds						
64) Bromofluorobenzene (tu...	17.331	95	1337889	9.60	ppbV	0.00
Target Compounds						Qvalue
14) Acetone	4.846	58	68248	5.43	ppbV #	1
24) 1,2-Dichloroethene (tr...	6.563	61	83647	1.45	ppbV	97
27) Methyl ethyl ketone	7.103	72	11715	0.59	ppbV	80
28) 1,2-Dichloroethene (cis)	7.570	61	1185871	20.79	ppbV	98
34) 1,1,1-Trichloroethane	8.910	97	44902	0.24	ppbV	92
42) Trichloroethene	10.595	130	4399880	51.52	ppbV	99
50) Toluene	12.817	91	153199	0.82	ppbV	99
54) Tetrachloroethene	14.277	166	87030	0.82	ppbV	97

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Data Path : C:\DATA\11-28-17\
Data File : aa4287.D
Acq On : 28 Nov 2017 9:07 pm
Operator : jls
Sample : E17-09837-02 x 10 dil
Misc : 3814, 50cc
ALS Vial : 17 Sample Multiplier: 1

Quant Time: Nov 29 11:36:15 2017
Quant Method : C:\msdchem\1\METHODS\0912.M
Quant Title : TO-15 on the Agilent 7890A / 5975C
QLast Update : Tue Sep 12 13:00:02 2017
Response via : Initial Calibration

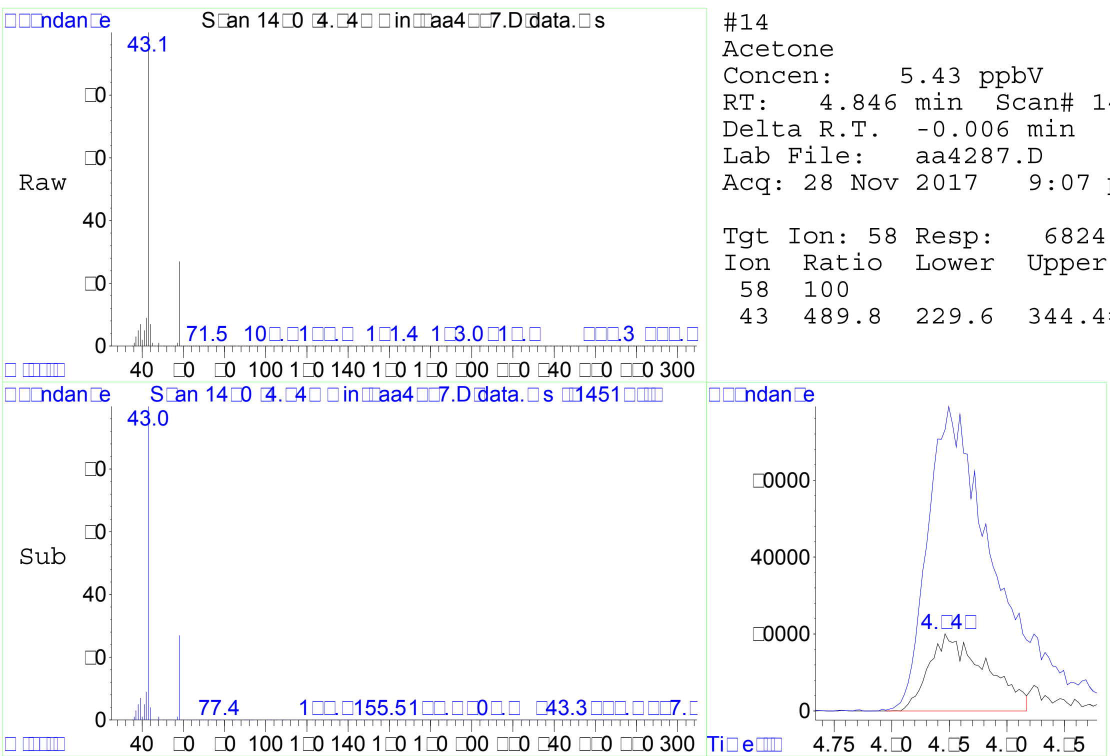




#1
Bromochloromethane (IS)
Concen: 10.00 ppbV
RT: 7.743 min Scan# 2381
Delta R.T. -0.004 min
Lab File: aa4287.D
Acq: 28 Nov 2017 9:07 pm

Tgt Ion:130 Resp: 508077

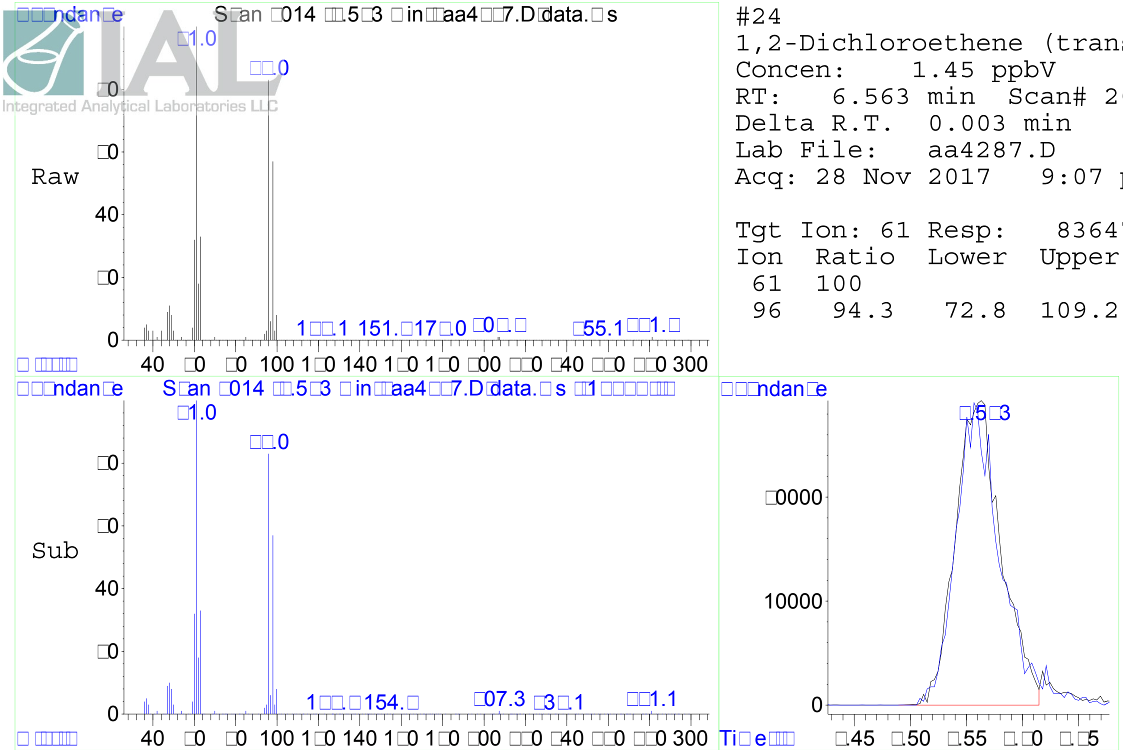
Ion	Ratio	Lower	Upper
130	100		
128	76.5	62.6	94.0



#14
Acetone
Concen: 5.43 ppbV
RT: 4.846 min Scan# 1480
Delta R.T. -0.006 min
Lab File: aa4287.D
Acq: 28 Nov 2017 9:07 pm

Tgt Ion: 58 Resp: 68248

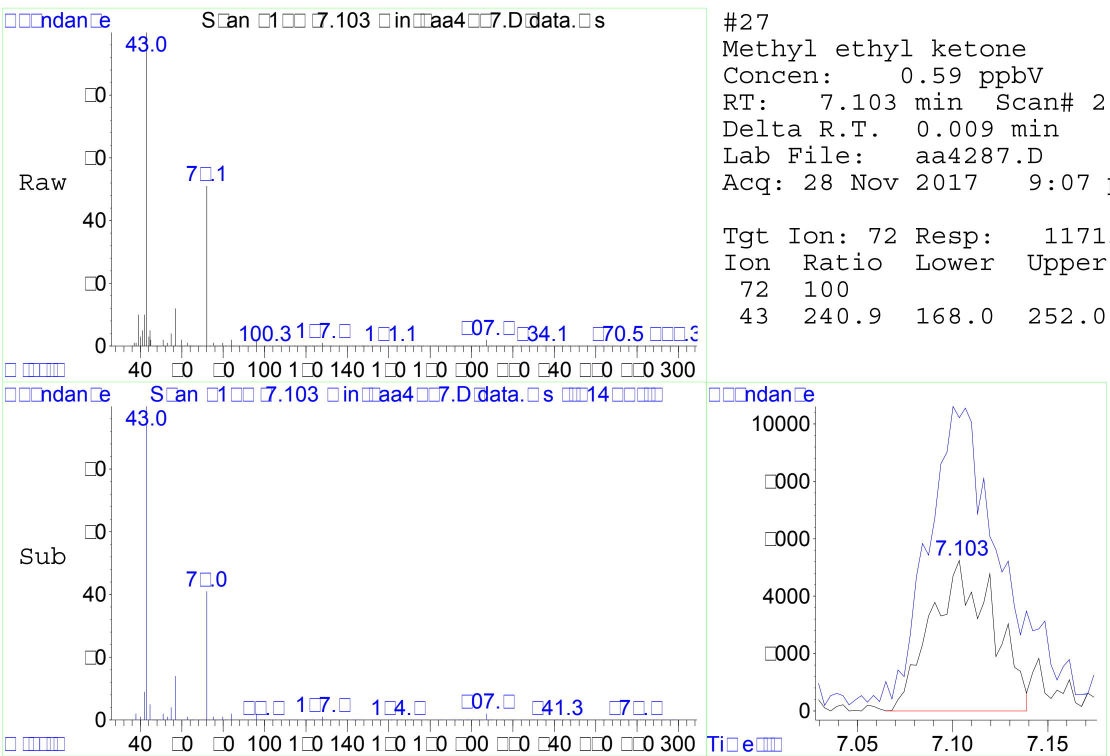
Ion	Ratio	Lower	Upper
58	100		
43	489.8	229.6	344.4#



#24
1,2-Dichloroethene (trans)
Concen: 1.45 ppbV
RT: 6.563 min Scan# 2014
Delta R.T. 0.003 min
Lab File: aa4287.D
Acq: 28 Nov 2017 9:07 pm

Tgt Ion: 61 Resp: 83647

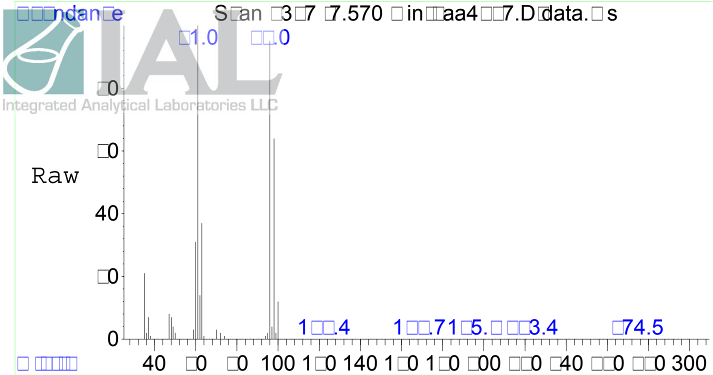
Ion	Ratio	Lower	Upper
61	100		
96	94.3	72.8	109.2



#27
Methyl ethyl ketone
Concen: 0.59 ppbV
RT: 7.103 min Scan# 2182
Delta R.T. 0.009 min
Lab File: aa4287.D
Acq: 28 Nov 2017 9:07 pm

Tgt Ion: 72 Resp: 11715

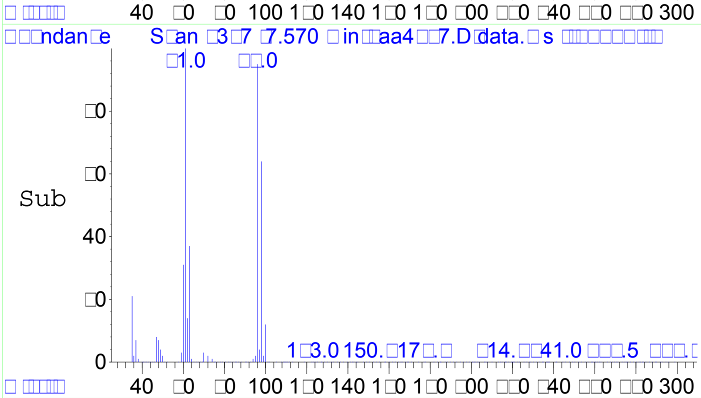
Ion	Ratio	Lower	Upper
72	100		
43	240.9	168.0	252.0

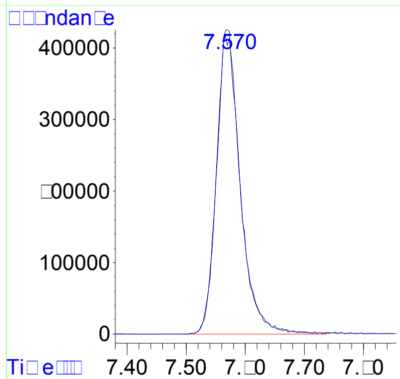


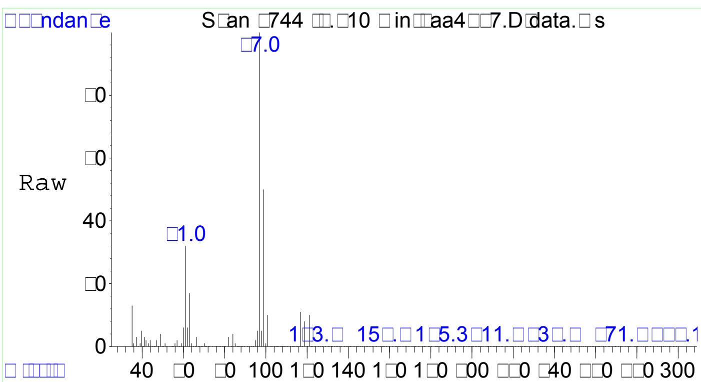
#28
1,2-Dichloroethene (cis)
Concen: 20.79 ppbV
RT: 7.570 min Scan# 2327
Delta R.T. -0.000 min
Lab File: aa4287.D
Acq: 28 Nov 2017 9:07 pm

Tgt Ion: 61 Resp: 1185871

Ion	Ratio	Lower	Upper
61	100		
96	99.5	78.4	117.6



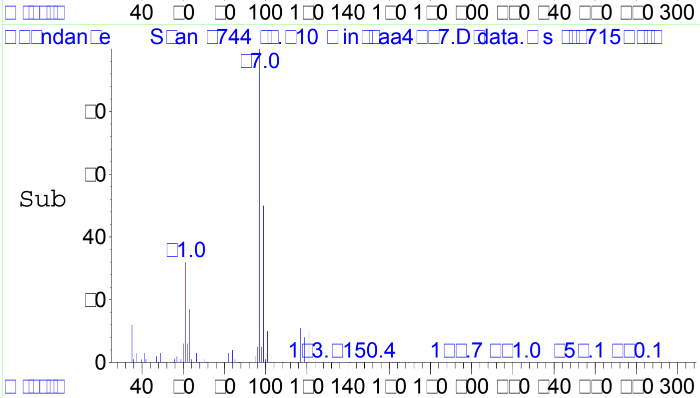


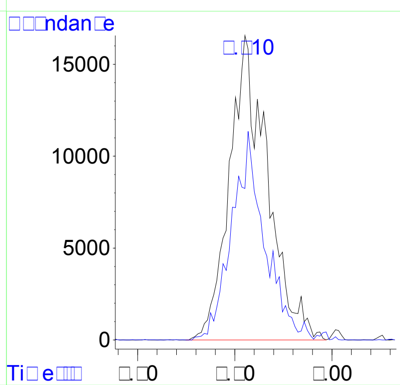


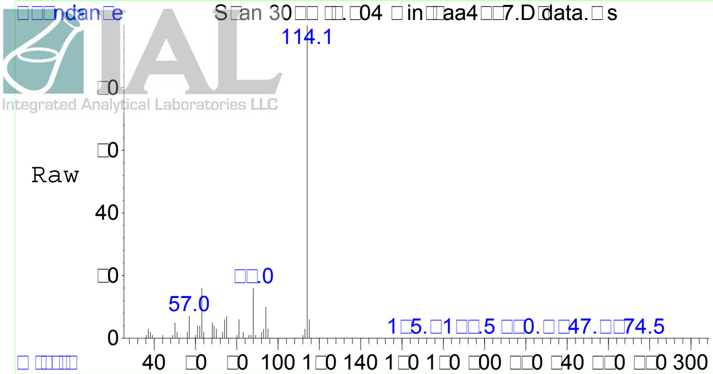
#34
1,1,1-Trichloroethane
Concen: 0.24 ppbV
RT: 8.910 min Scan# 2744
Delta R.T. -0.006 min
Lab File: aa4287.D
Acq: 28 Nov 2017 9:07 pm

Tgt Ion: 97 Resp: 44902

Ion	Ratio	Lower	Upper
97	100		
99	58.2	51.9	77.9



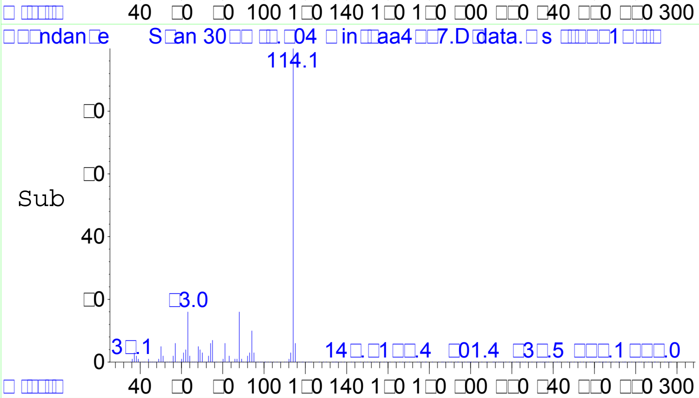


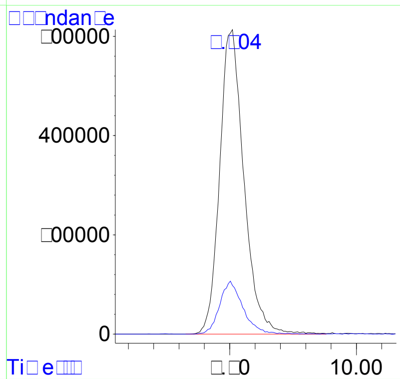


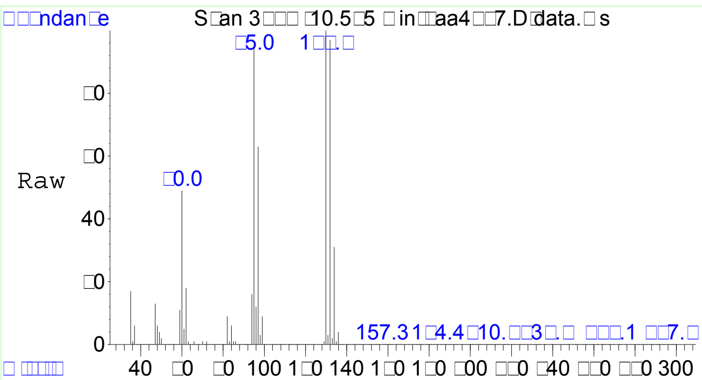
#38
1,4-Difluorobenzene (IS)
Concen: 10.00 ppbV
RT: 9.804 min   Scan# 3022
Delta R.T.   -0.000 min
Lab File: aa4287.D
Acq: 28 Nov 2017   9:07 pm

Tgt Ion:114 Resp: 1632670

Ion	Ratio	Lower	Upper
114	100		
63	16.7	14.4	21.6



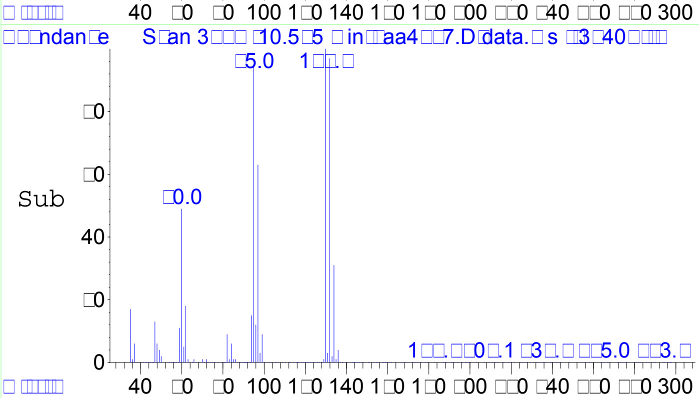


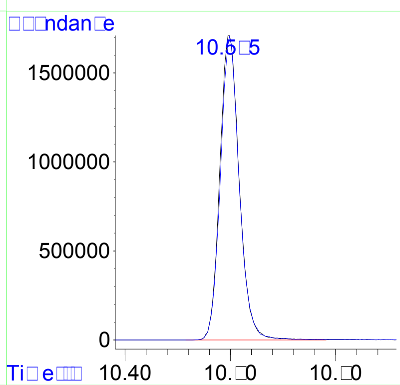


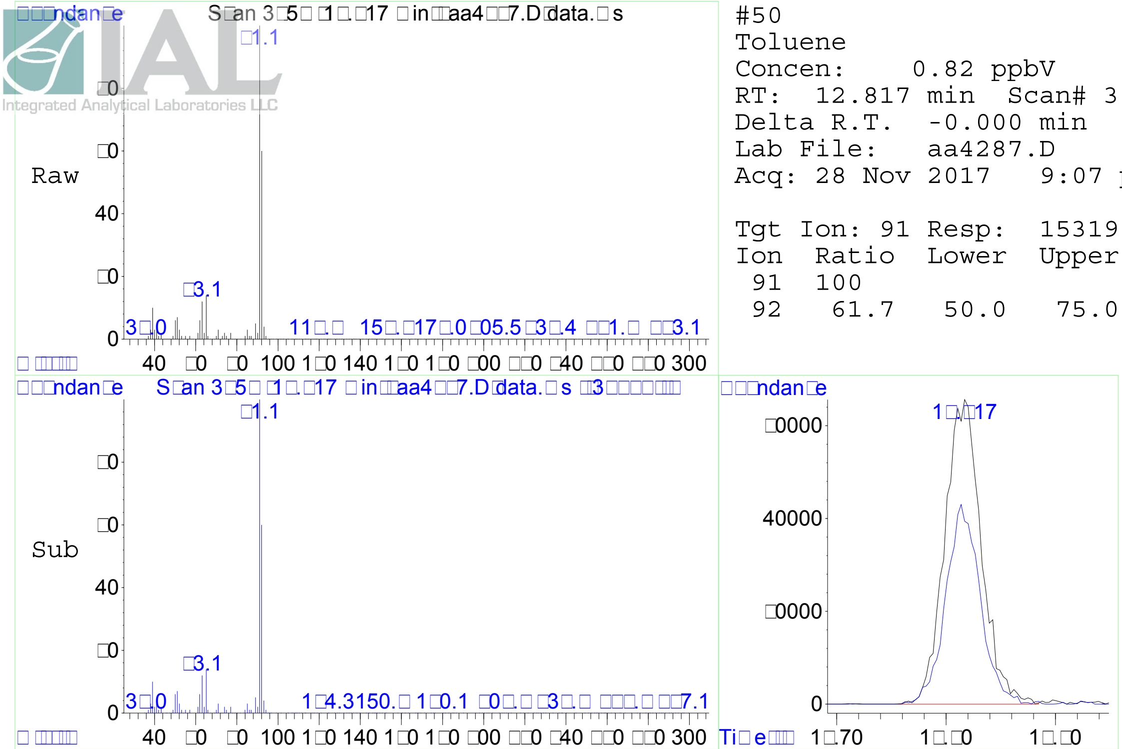
#42
Trichloroethene
Concen: 51.52 ppbV
RT: 10.595 min   Scan# 3268
Delta R.T.   -0.010 min
Lab File: aa4287.D
Acq: 28 Nov 2017   9:07 pm

Tgt Ion:130 Resp: 4399880

Ion	Ratio	Lower	Upper
130	100		
132	96.6	77.8	116.6



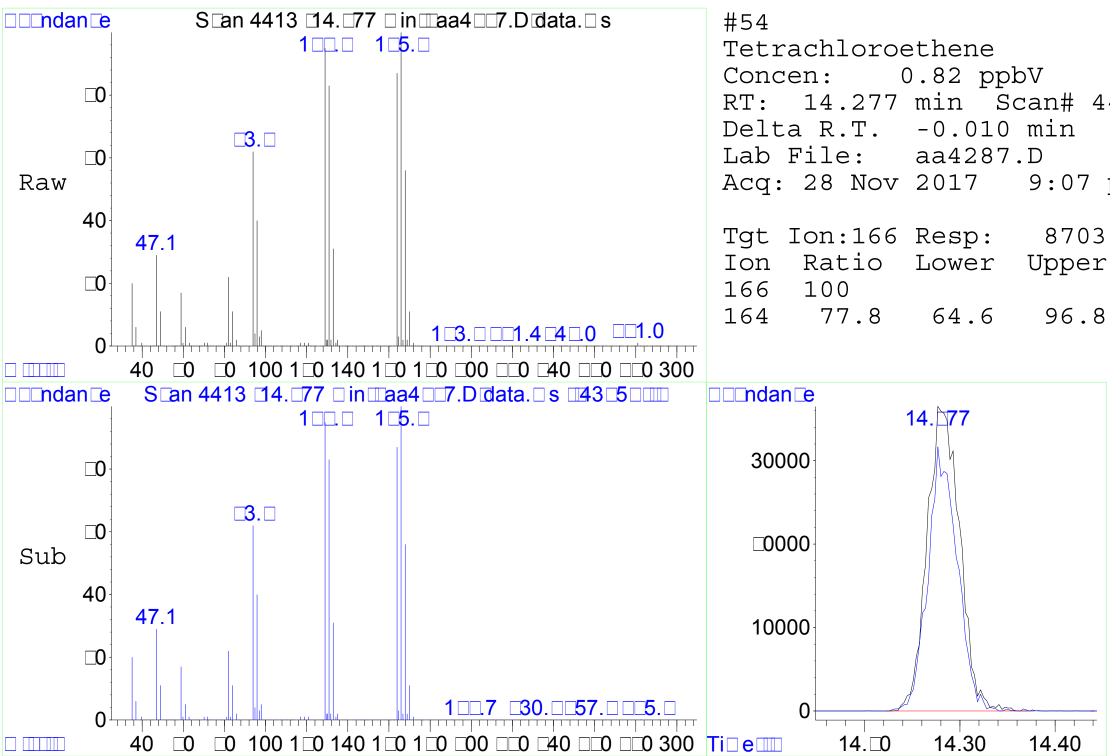




#50
Toluene
Concen: 0.82 ppbV
RT: 12.817 min Scan# 3959
Delta R.T. -0.000 min
Lab File: aa4287.D
Acq: 28 Nov 2017 9:07 pm

Tgt Ion: 91 Resp: 153199

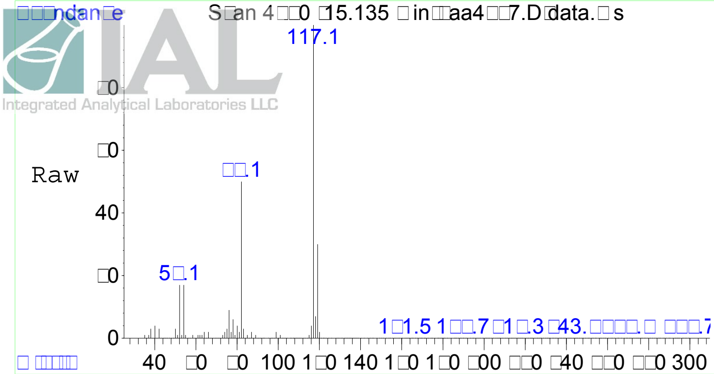
Ion	Ratio	Lower	Upper
91	100		
92	61.7	50.0	75.0



#54
Tetrachloroethene
Concen: 0.82 ppbV
RT: 14.277 min Scan# 4413
Delta R.T. -0.010 min
Lab File: aa4287.D
Acq: 28 Nov 2017 9:07 pm

Tgt Ion:166 Resp: 87030

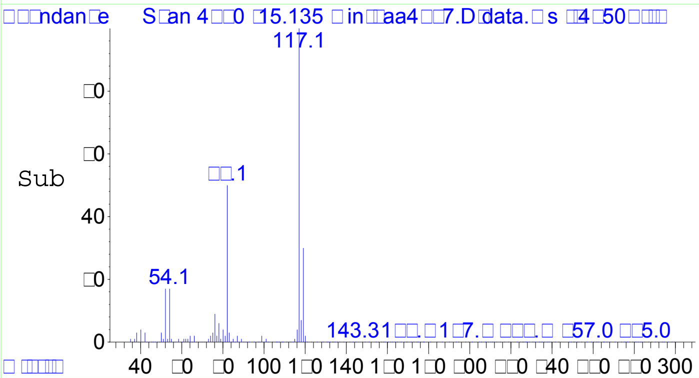
Ion	Ratio	Lower	Upper
166	100		
164	77.8	64.6	96.8

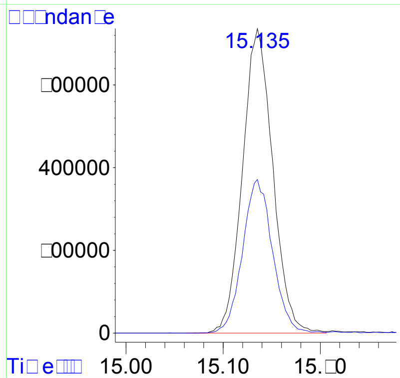


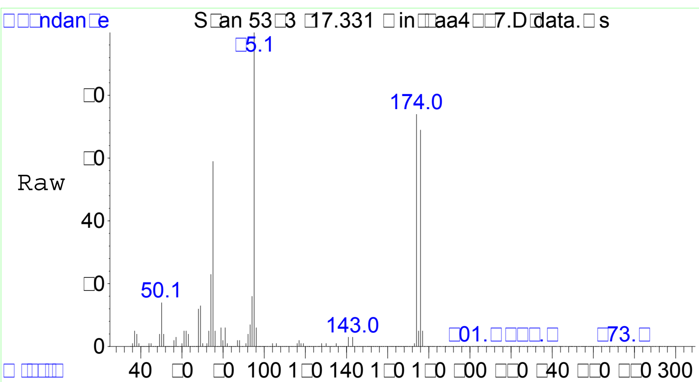
#55
d-5 Chlorobenzene (IS)
Concen: 10.00 ppbV
RT: 15.135 min Scan# 4680
Delta R.T. -0.003 min
Lab File: aa4287.D
Acq: 28 Nov 2017 9:07 pm

Tgt Ion:117 Resp: 1591956

Ion	Ratio	Lower	Upper
117	100		
82	50.0	44.8	67.2



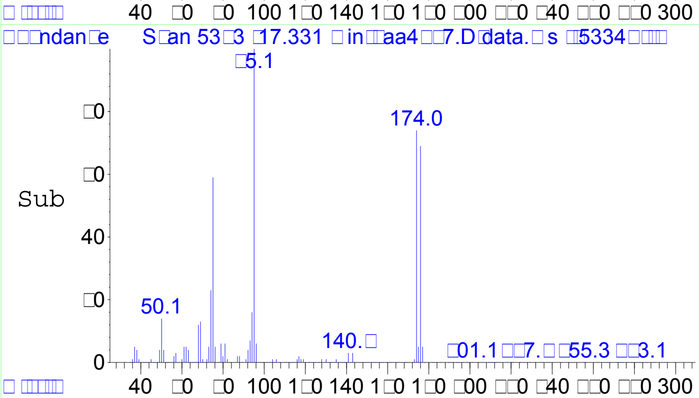


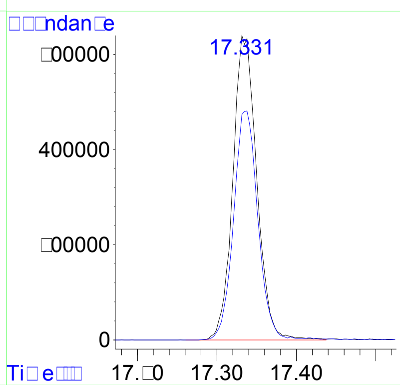


#64
Bromofluorobenzene (tune std)
Concen: 9.60 ppbV
RT: 17.331 min Scan# 5363
Delta R.T. -0.006 min
Lab File: aa4287.D
Acq: 28 Nov 2017 9:07 pm

Tgt Ion: 95 Resp: 1337889

Ion	Ratio	Lower	Upper
95	100		
174	76.9	61.5	92.3





Data Path : C:\DATA\11-29-17\
Data File : aa4308.D
Acq On : 29 Nov 2017 3:55 pm
Operator : jls
Sample : E17-09837-02 x 20 dil
Misc : 3814, 25cc
ALS Vial : 8 Sample Multiplier: 1

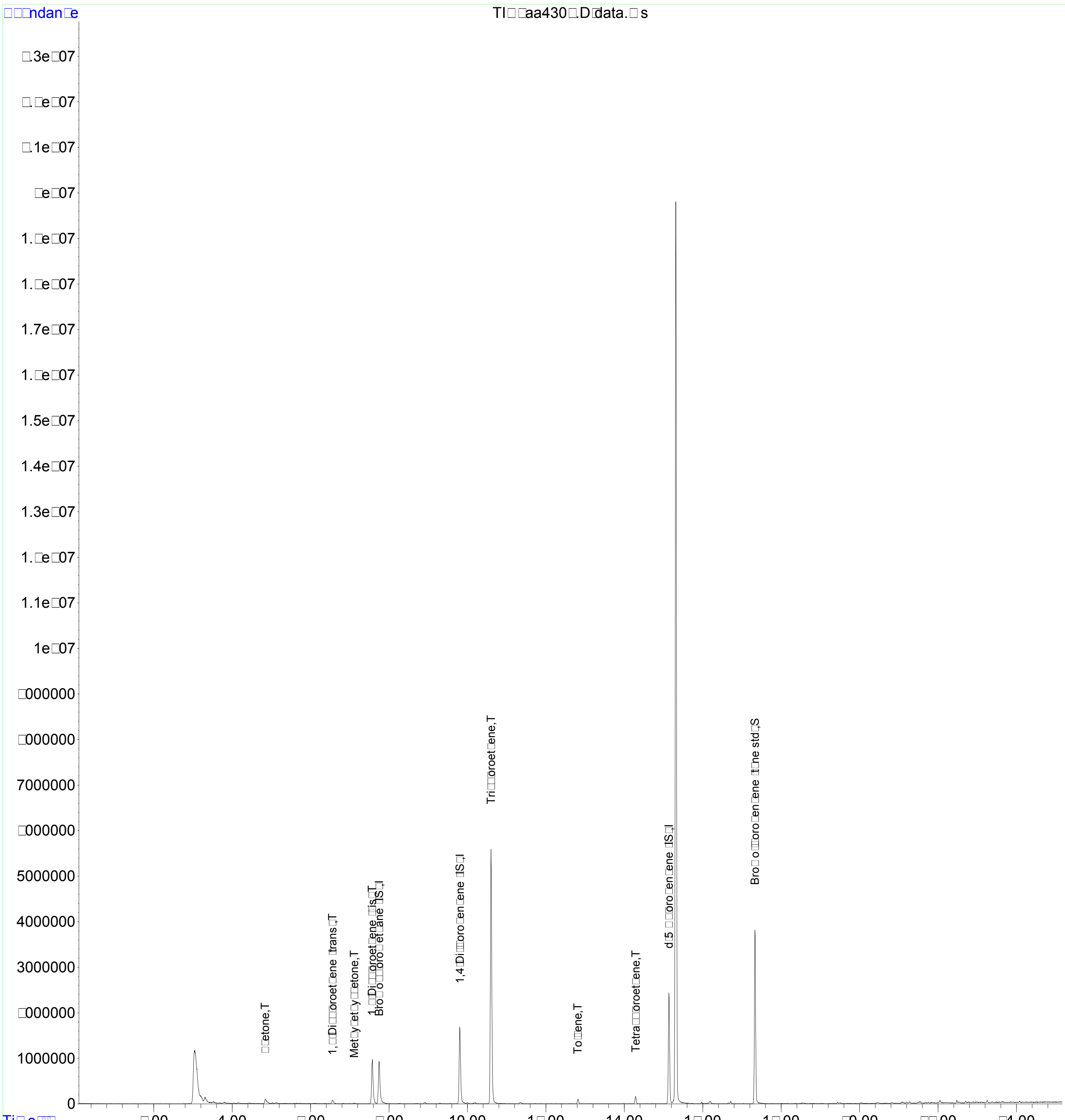
Quant Time: Nov 30 10:06:08 2017
Quant Method : C:\msdchem\1\METHODS\0912.M
Quant Title : TO-15 on the Agilent 7890A / 5975C
QLast Update : Tue Sep 12 13:00:02 2017
Response via : Initial Calibration

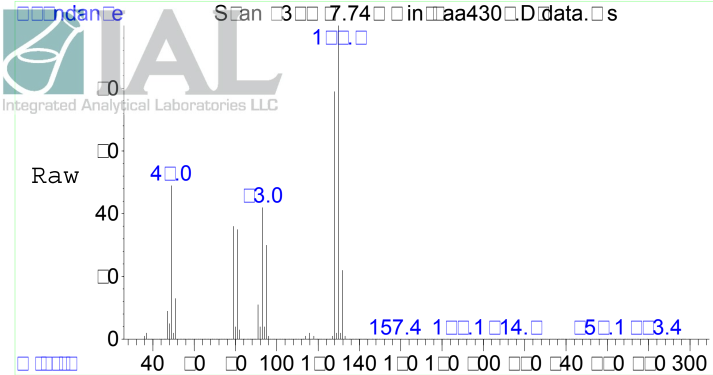
Compound	R.T.	QIon	Response	Conc Units	Dev(Min)
Internal Standards					
1) Bromochloromethane (IS)	7.746	130	595493	10.00 ppbV	0.00
38) 1,4-Difluorobenzene (IS)	9.807	114	1864530	10.00 ppbV	0.00
55) d-5 Chlorobenzene (IS)	15.135	117	1801295	10.00 ppbV	0.00
System Monitoring Compounds					
64) Bromofluorobenzene (tu...	17.331	95	1568758	9.94 ppbV	0.00
Target Compounds					Qvalue
14) Acetone	4.840	58	50956	3.46 ppbV #	33
24) 1,2-Dichloroethene (tr...	6.560	61	52552	0.78 ppbV	99
27) Methyl ethyl ketone	7.110	72	5122	0.22 ppbV #	17
28) 1,2-Dichloroethene (cis)	7.570	61	670601	10.03 ppbV	98
42) Trichloroethene	10.602	130	2447850	25.10 ppbV	100
50) Toluene	12.814	91	84059	0.39 ppbV	99
54) Tetrachloroethene	14.293	166	50501	0.42 ppbV	97

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Data Path : C:\DATA\11-29-17\
Data File : aa4308.D
Acq On : 29 Nov 2017 3:55 pm
Operator : jls
Sample : E17-09837-02 x 20 dil
Misc : 3814, 25cc
ALS Vial : 8 Sample Multiplier: 1

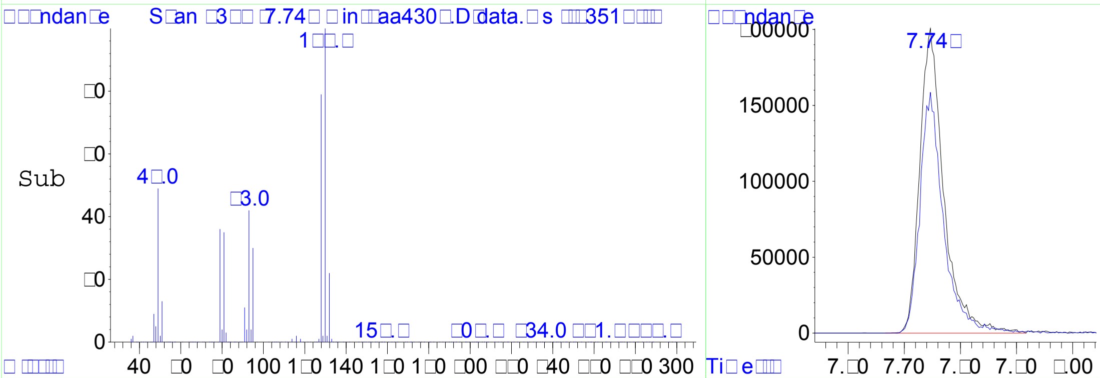
Quant Time: Nov 30 10:06:08 2017
Quant Method : C:\msdchem\1\METHODS\0912.M
Quant Title : TO-15 on the Agilent 7890A / 5975C
QLast Update : Tue Sep 12 13:00:02 2017
Response via : Initial Calibration

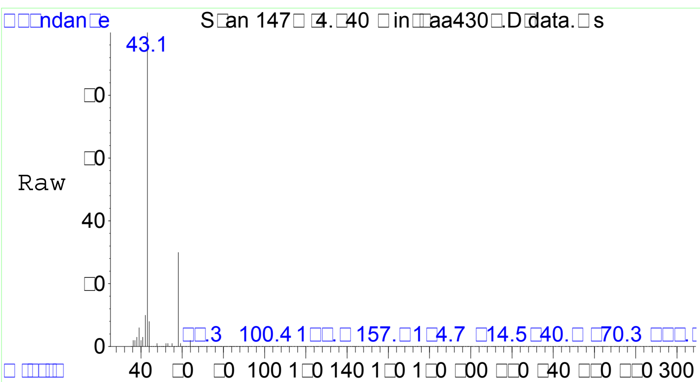




#1
Bromochloromethane (IS)
Concen: 10.00 ppbV
RT: 7.746 min   Scan# 2382
Delta R.T.   -0.001 min
Lab File: aa4308.D
Acq: 29 Nov 2017   3:55 pm

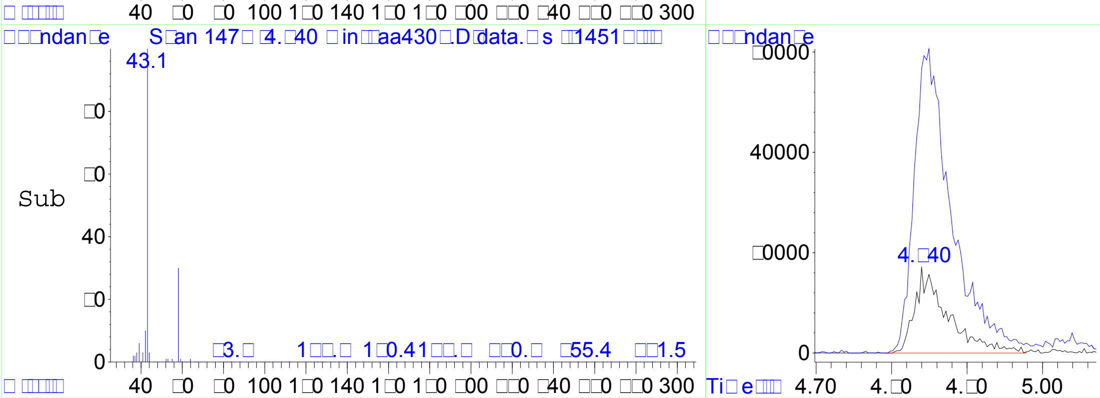
Tgt Ion:130	Resp:	595493	
Ion	Ratio	Lower	Upper
130	100		
128	77.6	62.6	94.0

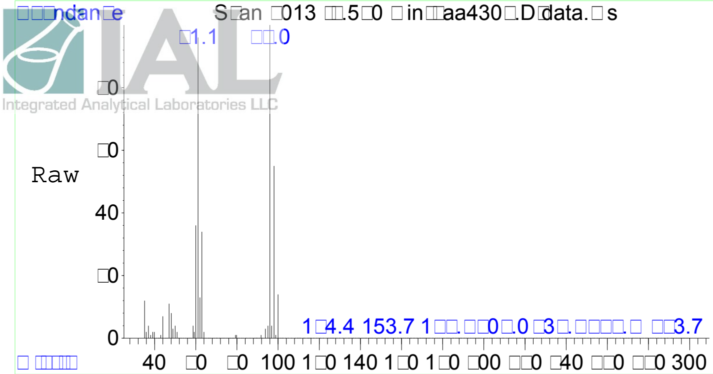




#14
Acetone
Concen: 3.46 ppbV
RT: 4.840 min   Scan# 1478
Delta R.T.   -0.013 min
Lab File: aa4308.D
Acq: 29 Nov 2017   3:55 pm

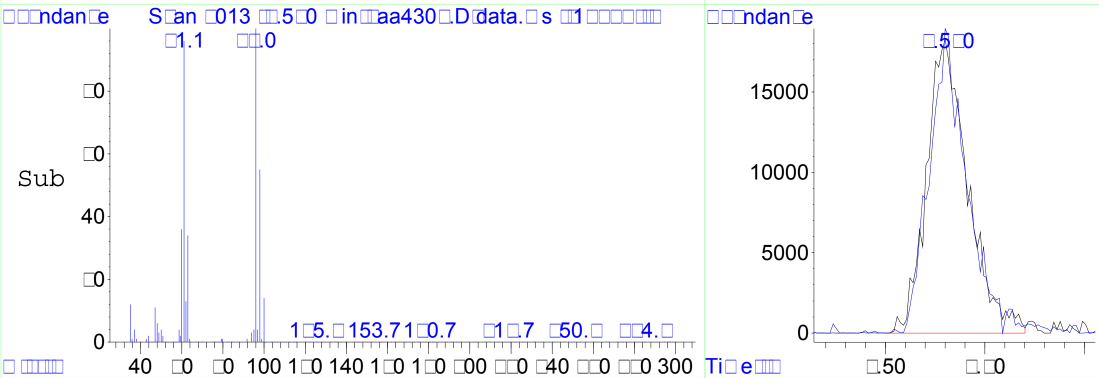
Tgt Ion: 58	Resp:	50956	
Ion	Ratio	Lower	Upper
58	100		
43	414.8	229.6	344.4#

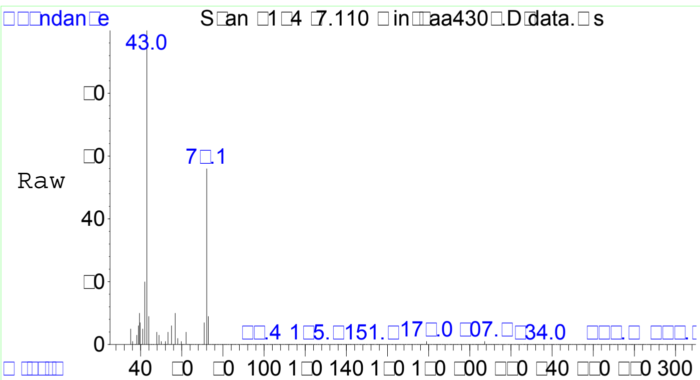




```
#24
1,2-Dichloroethene (trans)
Concen:     0.78 ppbV
RT:     6.560 min   Scan# 2013
Delta R.T.   -0.000 min
Lab File:    aa4308.D
Acq: 29 Nov 2017    3:55 pm

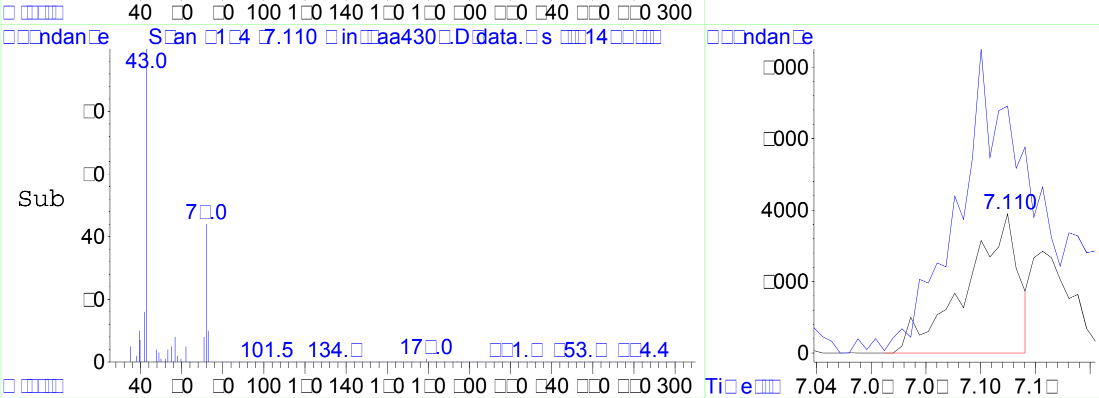
Tgt Ion: 61 Resp:    52552
Ion   Ratio  Lower   Upper
 61   100
 96    91.6    72.8   109.2
```

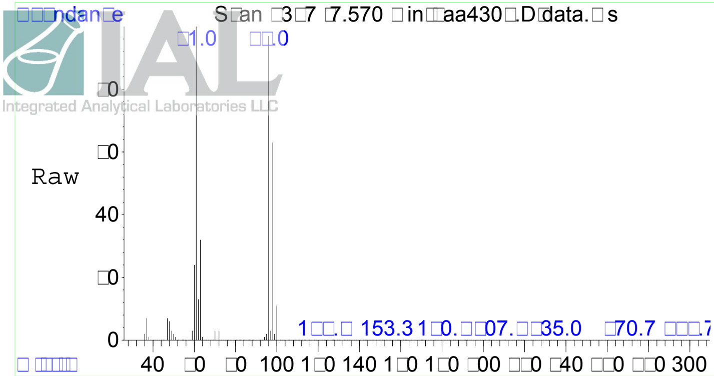




```
#27
Methyl ethyl ketone
Concen:     0.22 ppbV
RT:     7.110 min   Scan# 2184
Delta R.T.   0.016 min
Lab File:    aa4308.D
Acq: 29 Nov 2017    3:55 pm

Tgt Ion: 72 Resp:     5122
Ion   Ratio  Lower   Upper
 72   100
 43   339.2   168.0   252.0#
```

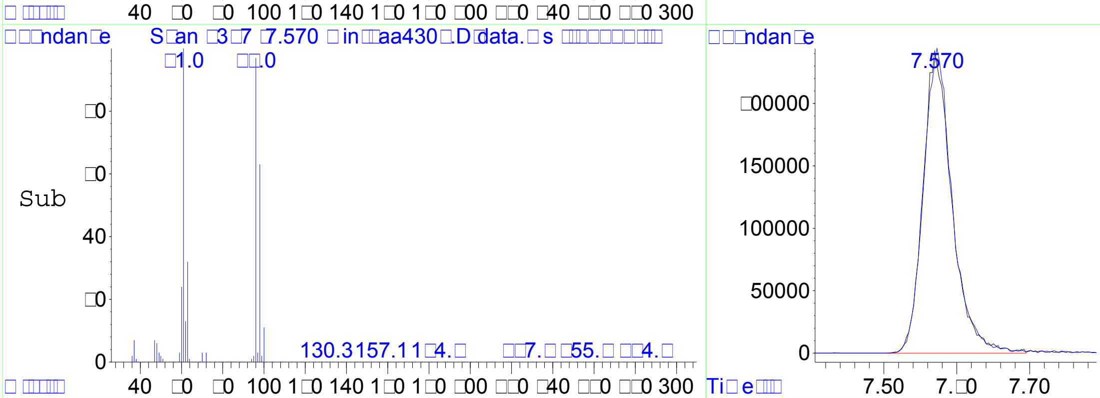


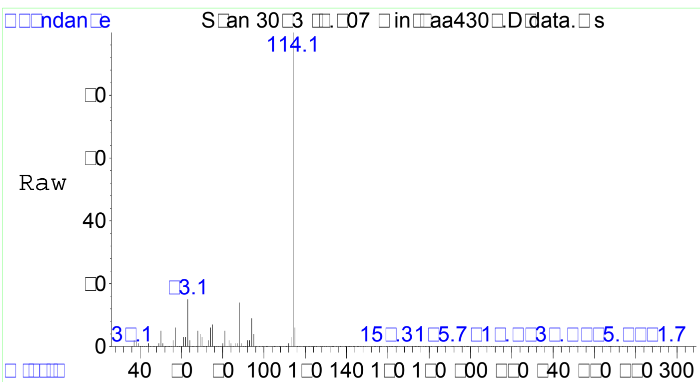


#28
1,2-Dichloroethene (cis)
Concen: 10.03 ppbV
RT: 7.570 min Scan# 2327
Delta R.T. -0.000 min
Lab File: aa4308.D
Acq: 29 Nov 2017 3:55 pm

Tgt Ion: 61 Resp: 670601

Ion	Ratio	Lower	Upper
61	100		
96	99.7	78.4	117.6

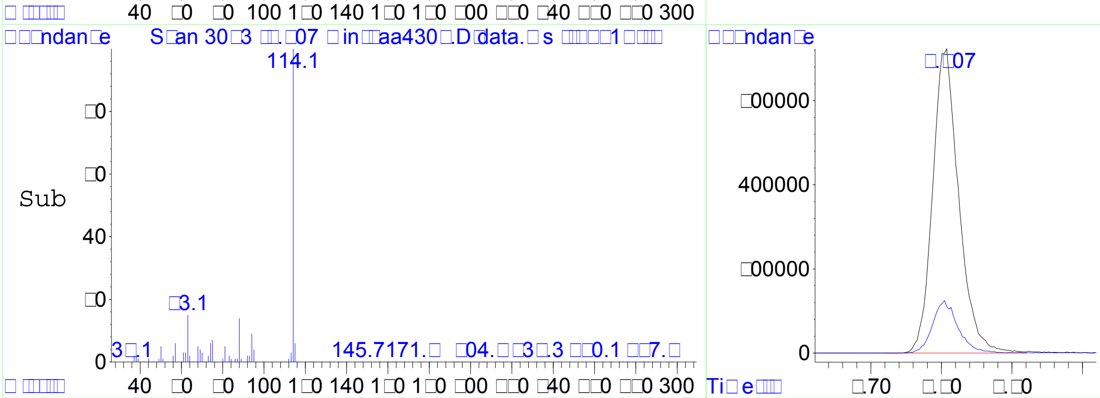


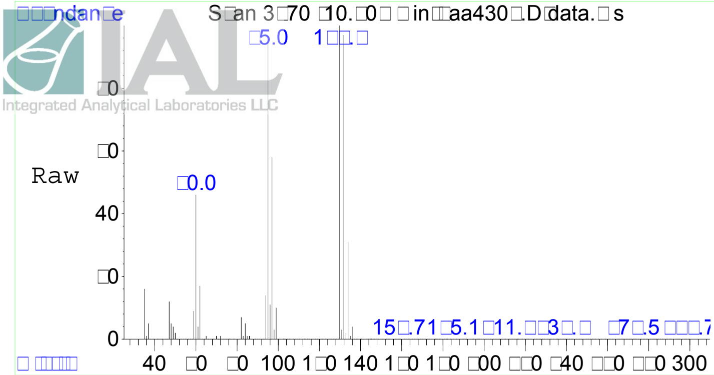


#38
1,4-Difluorobenzene (IS)
Concen: 10.00 ppbV
RT: 9.807 min Scan# 3023
Delta R.T. 0.003 min
Lab File: aa4308.D
Acq: 29 Nov 2017 3:55 pm

Tgt Ion:114 Resp: 1864530

Ion	Ratio	Lower	Upper
114	100		
63	16.6	14.4	21.6

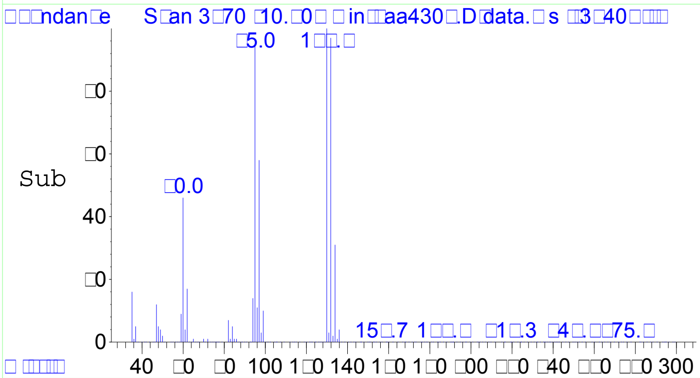


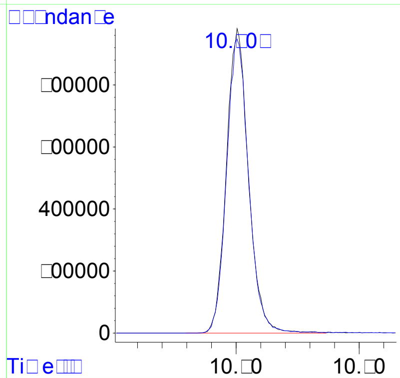


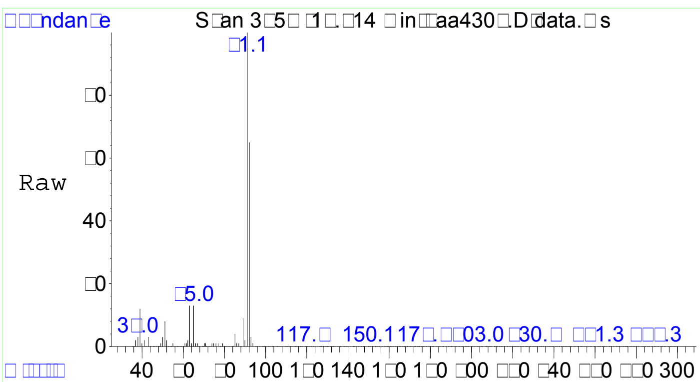
#42
Trichloroethene
Concen: 25.10 ppbV
RT: 10.602 min Scan# 3270
Delta R.T. -0.003 min
Lab File: aa4308.D
Acq: 29 Nov 2017 3:55 pm

Tgt Ion:130 Resp: 2447850

Ion	Ratio	Lower	Upper
130	100		
132	97.0	77.8	116.6



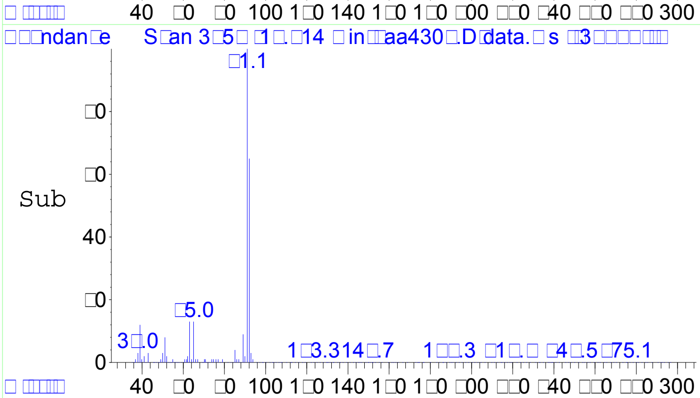


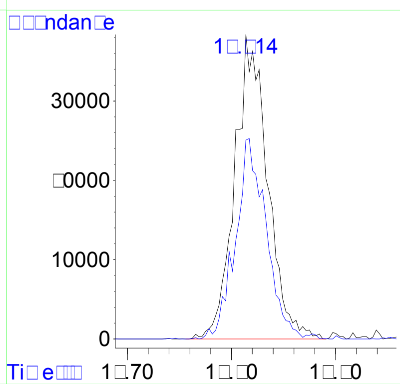


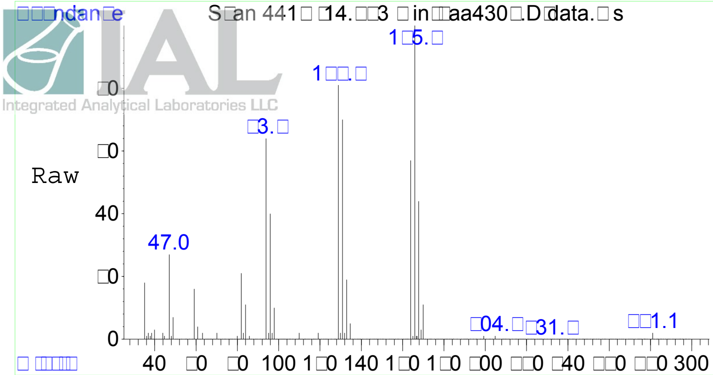
#50
Toluene
Concen: 0.39 ppbV
RT: 12.814 min Scan# 3958
Delta R.T. -0.003 min
Lab File: aa4308.D
Acq: 29 Nov 2017 3:55 pm

Tgt Ion: 91 Resp: 84059

Ion	Ratio	Lower	Upper
91	100		
92	61.4	50.0	75.0

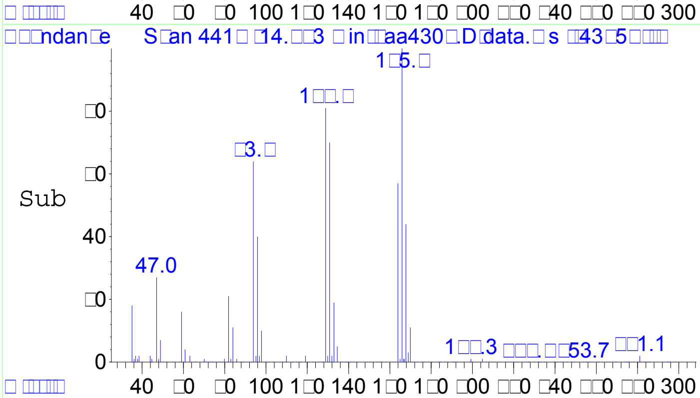


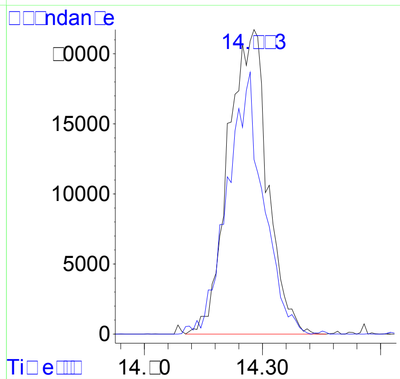


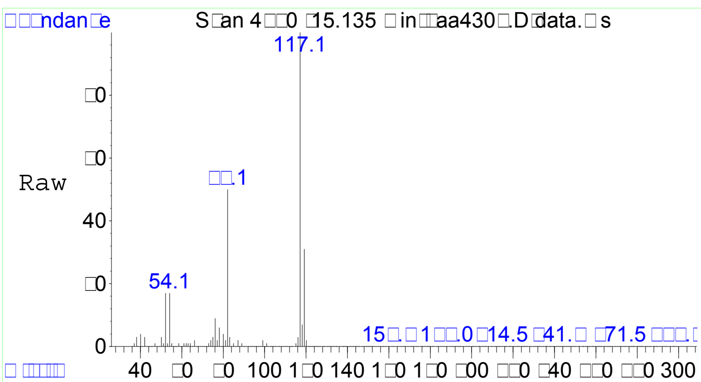


#54
Tetrachloroethene
Concen: 0.42 ppbV
RT: 14.293 min Scan# 4418
Delta R.T. 0.006 min
Lab File: aa4308.D
Acq: 29 Nov 2017 3:55 pm

Tgt Ion:166	Resp:	50501	
Ion	Ratio	Lower	Upper
166	100		
164	78.0	64.6	96.8

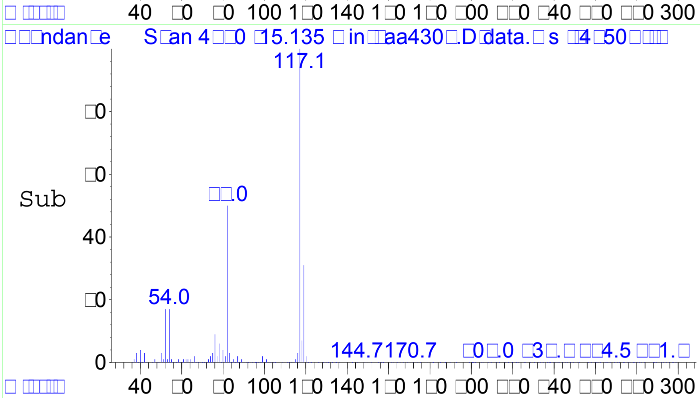


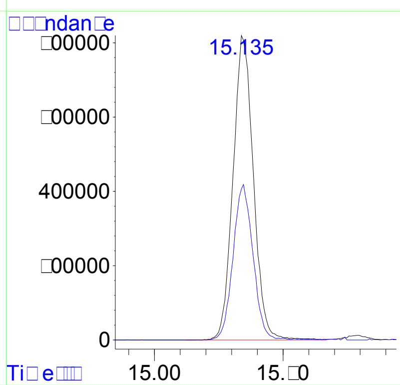


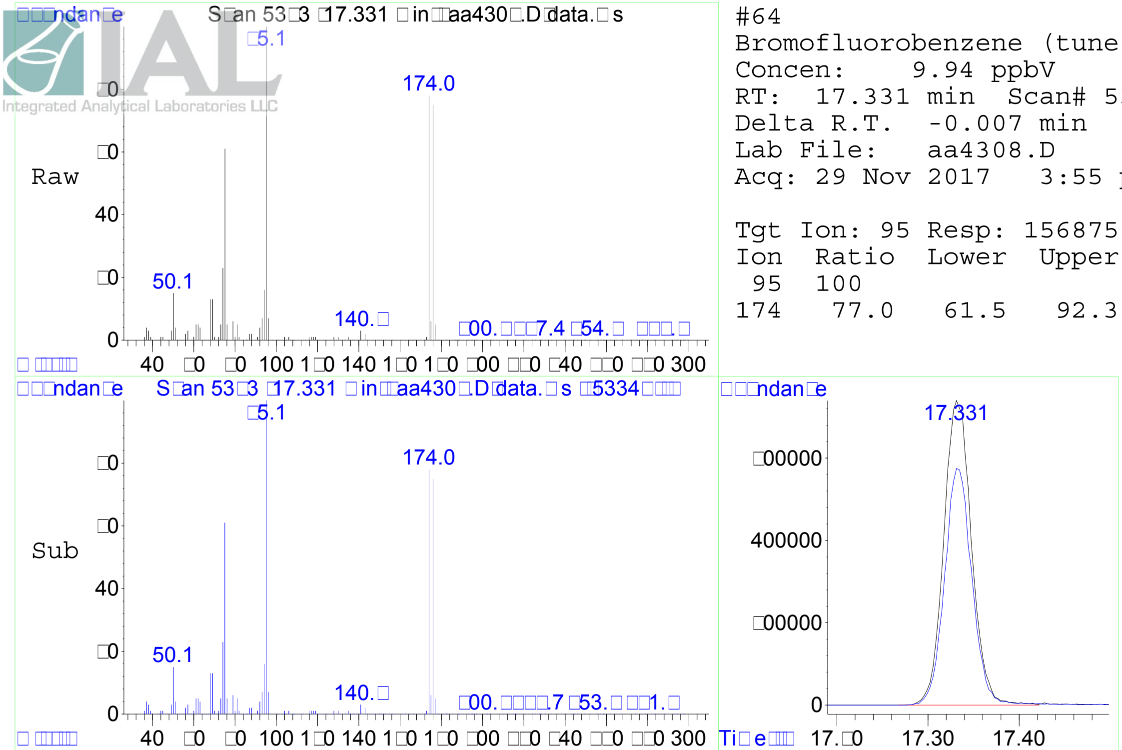


#55
d-5 Chlorobenzene (IS)
Concen: 10.00 ppbV
RT: 15.135 min Scan# 4680
Delta R.T. -0.003 min
Lab File: aa4308.D
Acq: 29 Nov 2017 3:55 pm

Tgt Ion:117	Resp:	1801295	
Ion	Ratio	Lower	Upper
117	100		
82	50.0	44.8	67.2







#64
Bromofluorobenzene (tune std)
Concen: 9.94 ppbV
RT: 17.331 min   Scan# 5363
Delta R.T.   -0.007 min
Lab File: aa4308.D
Acq: 29 Nov 2017   3:55 pm

Tgt Ion: 95 Resp: 1568758

Ion	Ratio	Lower	Upper
95	100		
174	77.0	61.5	92.3

Summary of Results

□n□iron□enta□□ aste Mana□e□ent □sso□iates	Report Date□11□30□17
100 Misty Lane	SD□ N□□ □er□□17□0□□37
Parsippany, NJ 07054	Date Sa□ p□ed□11□15□17
□ttn□□e□in Seise	Date Re□ei□ed□11□1□17
Pro□e□t□S□i□i□ier□175 □ Nya□□Rd	Date □na□y□ed□11□□□17
Site□NY	Data □i□e□□□430□
	S□□ □a ID□4□71
	D□□1

□na□ysis□ □o□ati□e Or□ani□ □o□po□nds □y □P□ Met□od TO□15

	Sample Name:	SS-3		Reporting	
	IAL ID:	E17-09837-03		Limits	
Compound	**CAS #**	**ppbv**	**ug/m3**	**ppbv**	**ug/m3**
□□etone	□7□□4□1	3□	□□	0.□0	0.4□
Ben□ene	71□43□□	ND	ND	0.□0	0.□4
Bro□odi□□oro□et□ane	75□□7□4	ND	ND	0.□0	1.3
Bro□o□or□	75□□5□□	ND	ND	0.□0	□.1
Bro□o□et□ane	74□□3□□	ND	ND	0.□0	0.7□
1,3□B□tadiene	10□□□□0	ND	ND	0.□0	0.44
□□□oro□en□ene	10□□□0□7	ND	ND	0.□0	0.□□
□□□oroet□ane	75□00□3	ND	ND	0.□0	0.53
□□□oro□or□	□7□□□□3	0.3□	1.□	0.□0	0.□□
□□□oro□et□ane	74□□7□3	ND	ND	0.□0	0.41
□ar□on dis□□ide	75□15□0	ND	ND	0.□0	0.□□
□ar□on tetra□□□oride	5□□□3□5	0.0□	0.50	0.04	0.□5
□y□□o□exane	110□□□7	0.31	1.1	0.□0	0.□□
Di□ro□o□□□oro□et□ane	1□4□4□□1	ND	ND	0.□0	1.7
1,□□Di□ro□oet□ane	10□□□3□4	ND	ND	0.□0	1.5
1,□□Di□□□oro□en□ene	□5□50□1	ND	ND	0.□0	1.□
1,3□Di□□□oro□en□ene	541□73□1	ND	ND	0.□0	1.□
1,4□Di□□□oro□en□ene	10□□4□□7	ND	ND	0.□0	1.□
Di□□□orodi□□oro□et□ane	75□71□□	ND	ND	0.□0	0.□□
1,1□Di□□□oroet□ane	75□34□3	ND	ND	0.□0	0.□1
1,□□Di□□□oroet□ane	107□0□□□	ND	ND	0.□0	0.□1
1,1□Di□□□oroet□ene	75□35□4	ND	ND	0.□0	0.7□
1,□□Di□□□oroet□ene □□is□	15□□5□□□	ND	ND	0.□0	0.7□
1,□□Di□□□oroet□ene □trans□	15□□□0□5	ND	ND	0.□0	0.7□
1,□□Di□□□oropropane	7□□□7□5	ND	ND	0.□0	0.□□
1,3□Di□□□oropropene □□is□	100□1□01□5	ND	ND	0.□0	0.□1
1,3□Di□□□oropropene □trans□	100□1□0□□□	ND	ND	0.□0	0.□1
1,□□Di□□□orotetra□□□oroet□ane	7□□14□□	ND	ND	0.□0	1.4
1,4□Dioxane	1□3□□1□1	ND	ND	0.□0	0.7□
□t□y□□en□ene	100□41□4	0.□4	1.0	0.□0	0.□7
n□□eptane	14□□□□5	ND	ND	0.□0	0.□□
1,3□□exa□□□oro□□tadiene	□7□□□□3	ND	ND	0.□0	□.1
n□□exane	110□54□3	1.5	5.□	0.□0	0.71
Met□y□ene □□□oride	75□0□□□	□.□	□3	0.□0	0.70
Met□y□et□y□□etone	7□□□3□3	14	41	0.□0	0.5□
Met□y□iso□□ty□□etone	10□□10□1	0.□0	0.□□	0.□0	0.□□
Met□y□tert□□□ty□et□er	1□34□04□4	ND	ND	0.□0	0.7□
Styrene	100□4□□5	ND	ND	0.□0	0.□5
Tert□□□ty□a□□o□o□	75□□5□0	□1	□4	0.□0	0.□1
1,1,□,□Tetra□□□oroet□ane	7□□34□5	ND	ND	0.□0	1.4
Tetra□□□oroet□ene	1□7□1□4	0.□3	1.□	0.□0	1.4
To□□ene	10□□□□3	□.7	□5	0.□0	0.75
1,□,4□Tri□□□oro□en□ene	1□0□□□1	ND	ND	0.□0	1.5
1,1,1□Tri□□□oroet□ane	71□55□□	ND	ND	0.□0	1.1
1,1,□□Tri□□□oroet□ane	7□□00□5	ND	ND	0.□0	1.1
Tri□□□oroet□ene	7□□01□□	0.5□	3.□	0.05	0.□5

D □ □xtra di□□tion re□□ired □or t□is □o□po□nd

□na□yst□J. S□□□itt

Integrated Analytical Laboratories LLC

Summary of Results

□n□iron□enta□□ aste Mana□e□ent □sso□iates
100 Misty Lane
Parsippany, NJ 07054
□ttn□□e□in Seise
Pro□e□t□S□i□i□ier□175 □ Nya□□Rd
Site□NY

Report Date□11□30□17
SD□ N□□ □er□□17□0□□37
Date Sa□ p□ed□11□15□17
Date Re□ei□ed□11□1□□17
Date □na□y□ed□11□□□□17
Data □i□e□□□430□
S□□ □a ID□4□71
D□□1

□na□ysis□ □o□ati□e Or□ani□ □o□po□nds □y □P□ Met□od TO□15

	Sample Name: IAL ID:	SS-3 E17-09837-03		Reporting Limits	
Tri□□oro□□oro□et□ane	75□□□4	ND	ND	0.□0	1.1
1,1,□□Tri□□oro□1,□,□tri□□oroet□ane	7□□13□1	ND	ND	0.□0	1.5
1,□,4□Tri□et□y□□en□ene	□5□□3□□	1.0	5.1	0.□0	0.□□
1,3,5□Tri□et□y□□en□ene	10□□□7□□	0.□1	1.0	0.□0	0.□□
□,□,4□Tri□et□y□pentane	540□□4□1	ND	ND	0.□0	0.□3
□iny□□ro□ide	5□3□□0□□	ND	ND	0.□0	0.□7
□iny□□□□oride	75□01□4	ND	ND	0.□0	0.51
Xy□enes □□ □p□	17□□01□□3□1	1.1	4.□	0.□0	0.□7
Xy□enes □o□	□5□47□□	0.34	1.5	0.□0	0.□7

D □ □xtra di□□tion re□□ired □or t□is □o□po□nd

□na□yst□J. S□□□itt

Data Path : C:\DATA\11-29-17\
Data File : aa4309.D
Acq On : 29 Nov 2017 4:29 pm
Operator : jls
Sample : E17-09837-03
Misc : 4871, 500cc
ALS Vial : 9 Sample Multiplier: 1

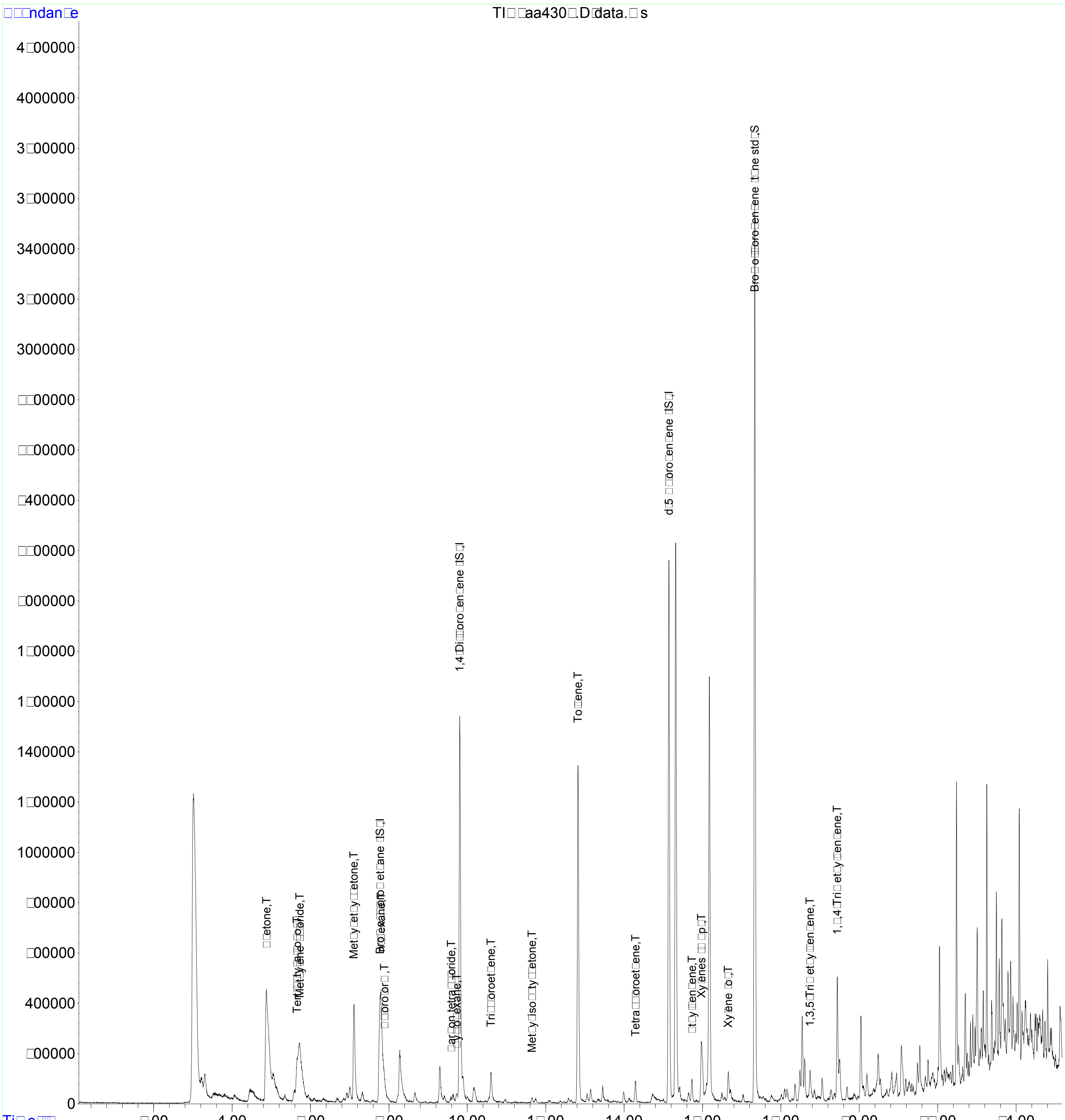
Quant Time: Nov 30 10:09:01 2017
Quant Method : C:\msdchem\1\METHODS\0912.M
Quant Title : TO-15 on the Agilent 7890A / 5975C
QLast Update : Tue Sep 12 13:00:02 2017
Response via : Initial Calibration

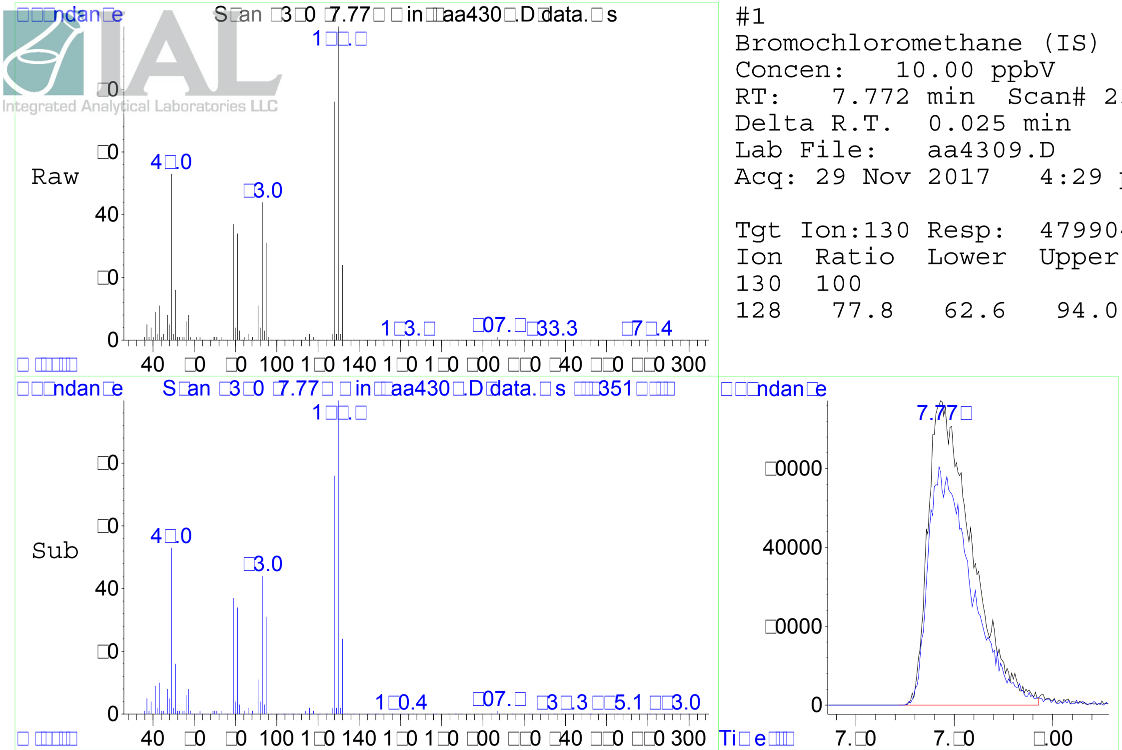
Compound	R.T.	QIon	Response	Conc Units	Dev(Min)
Internal Standards					
1) Bromochloromethane (IS)	7.772	130	479904	10.00 ppbV	0.03
38) 1,4-Difluorobenzene (IS)	9.804	114	1785995	10.00 ppbV	0.00
55) d-5 Chlorobenzene (IS)	15.142	117	1723154	10.00 ppbV	0.00
System Monitoring Compounds					
64) Bromofluorobenzene (tu...	17.331	95	1542691	10.22 ppbV	0.00
Target Compounds					Qvalue
14) Acetone	4.878	58	428191	36.06 ppbV #	35
19) Methylene chloride	5.724	84	279552	6.57 ppbV	86
20) Tert-butyl alcohol	5.656	59	166125	2.10 ppbV	100
27) Methyl ethyl ketone	7.103	72	263608	13.99 ppbV	84
30) n-Hexane	7.798	57	57186	1.46 ppbV #	78
31) Chloroform	7.885	83	52330	0.36 ppbV	99
36) Carbon tetrachloride	9.592	117	16915	0.08 ppbV	97
37) Cyclohexane	9.727	84	18199	0.31 ppbV	93
42) Trichloroethene	10.602	130	55061	0.59 ppbV	96
47) Methyl isobutyl ketone	11.650	43	12556	0.20 ppbV #	60
50) Toluene	12.820	91	1373848	6.70 ppbV	100
54) Tetrachloroethene	14.293	166	26823	0.23 ppbV	97
57) Ethylbenzene	15.733	91	78403	0.24 ppbV	100
58) Xylenes (m&p)	15.971	91	281285	1.05 ppbV	99
61) Xylene (o)	16.656	91	94709	0.34 ppbV #	82
69) 1,3,5-Trimethylbenzene	18.740	105	74382	0.21 ppbV #	79
70) 1,2,4-Trimethylbenzene	19.434	105	350718	1.04 ppbV	94

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Data Path : C:\DATA\11-29-17\
Data File : aa4309.D
Acq On : 29 Nov 2017 4:29 pm
Operator : jls
Sample : E17-09837-03
Misc : 4871, 500cc
ALS Vial : 9 Sample Multiplier: 1

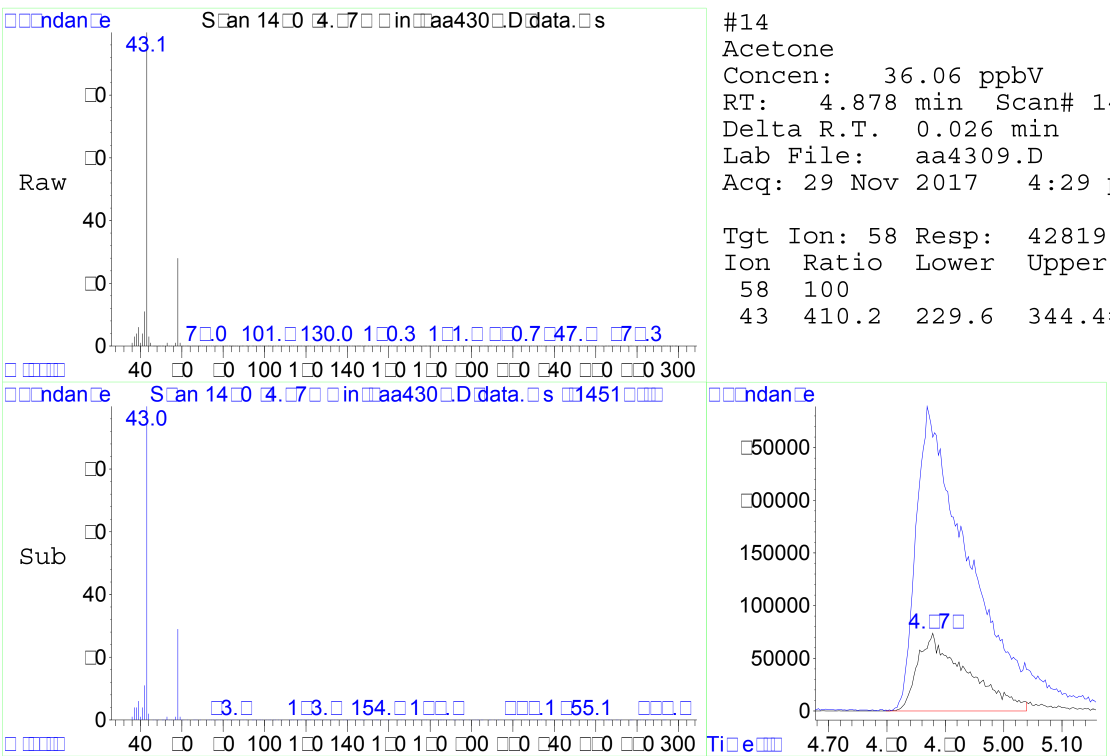
Quant Time: Nov 30 10:09:01 2017
Quant Method : C:\msdchem\1\METHODS\0912.M
Quant Title : TO-15 on the Agilent 7890A / 5975C
QLast Update : Tue Sep 12 13:00:02 2017
Response via : Initial Calibration





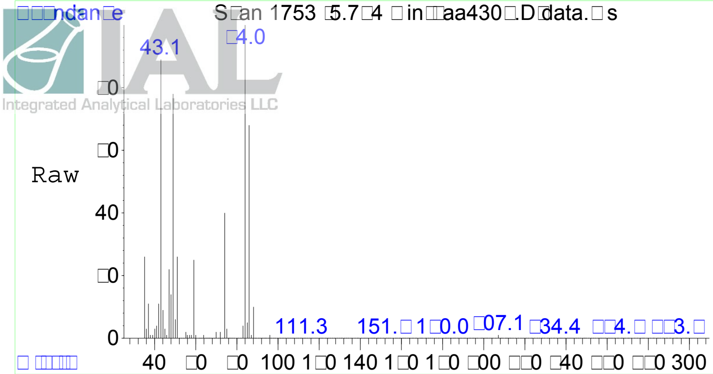
#1
Bromochloromethane (IS)
Concen: 10.00 ppbV
RT: 7.772 min Scan# 2390
Delta R.T. 0.025 min
Lab File: aa4309.D
Acq: 29 Nov 2017 4:29 pm

Tgt Ion:130	Resp:	479904	
Ion	Ratio	Lower	Upper
130	100		
128	77.8	62.6	94.0



#14
Acetone
Concen: 36.06 ppbV
RT: 4.878 min Scan# 1490
Delta R.T. 0.026 min
Lab File: aa4309.D
Acq: 29 Nov 2017 4:29 pm

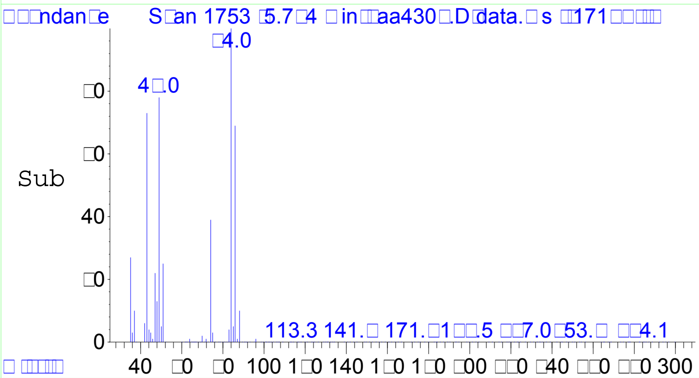
Tgt Ion: 58	Resp:	428191	
Ion	Ratio	Lower	Upper
58	100		
43	410.2	229.6	344.4#

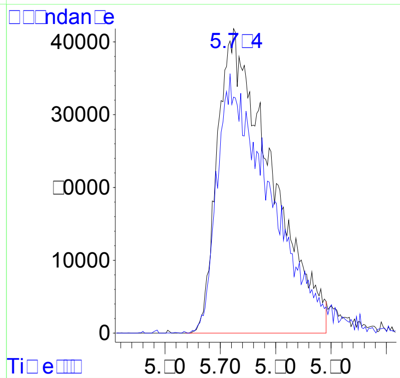


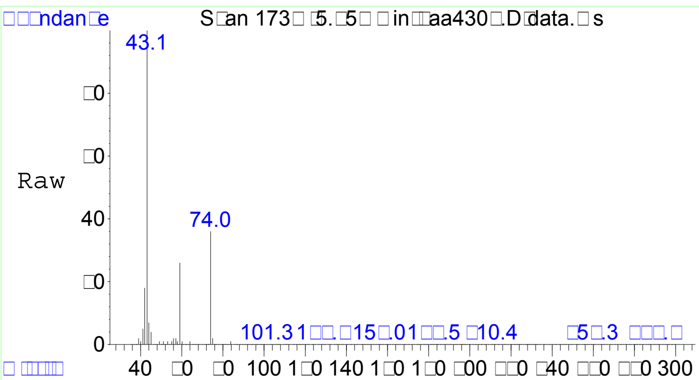
#19
Methylene chloride
Concen: 6.57 ppbV
RT: 5.724 min   Scan# 1753
Delta R.T.   0.019 min
Lab File: aa4309.D
Acq: 29 Nov 2017   4:29 pm

Tgt Ion: 84 Resp: 279552

Ion	Ratio	Lower	Upper
84	100		
49	83.4	57.6	86.4

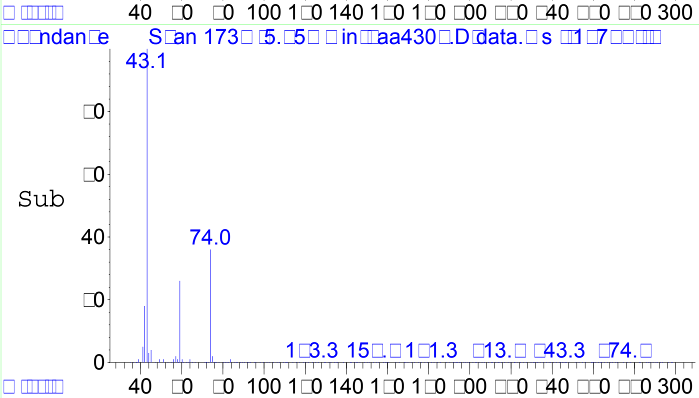


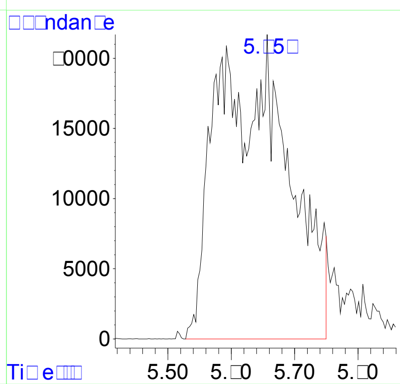


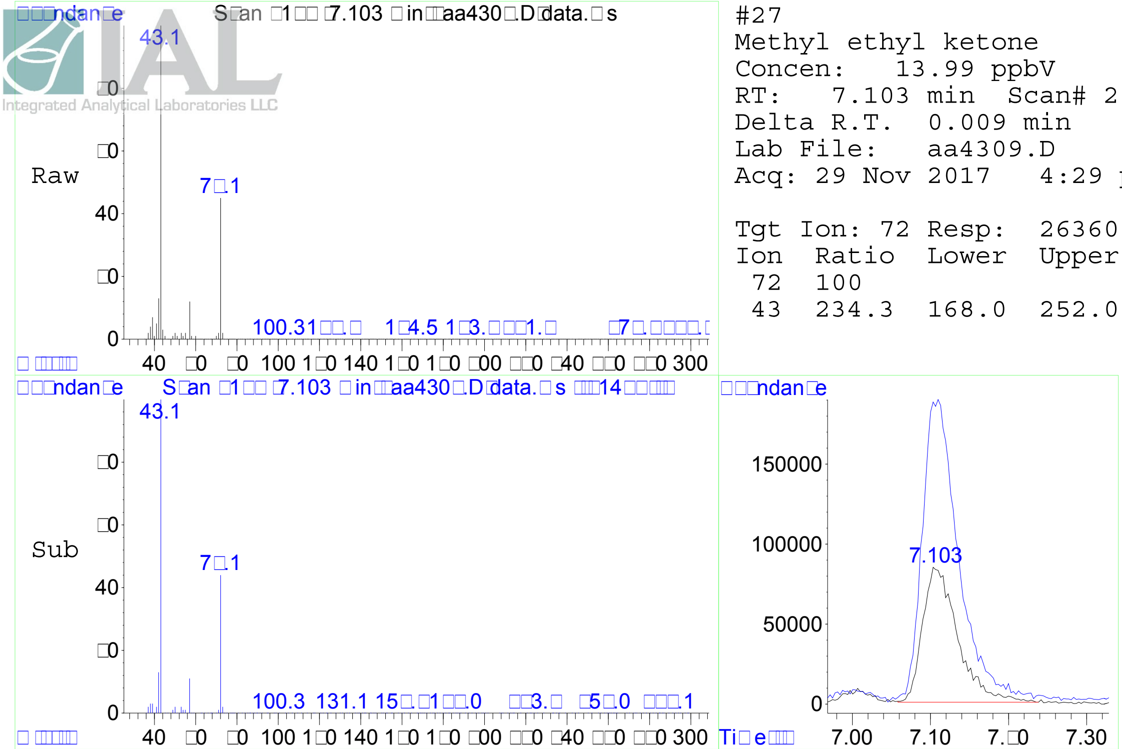


#20
Tert-butyl alcohol
Concen: 2.10 ppbV
RT: 5.656 min   Scan# 1732
Delta R.T.   0.093 min
Lab File: aa4309.D
Acq: 29 Nov 2017   4:29 pm

Tgt Ion: 59 Resp: 166125



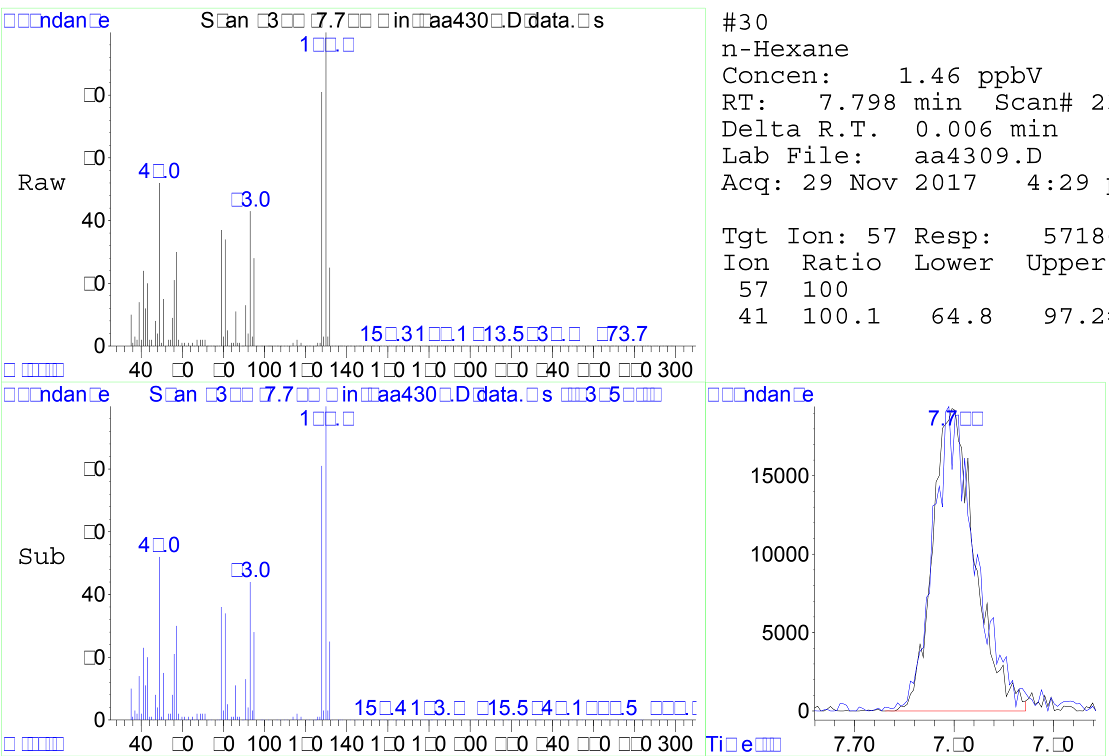




#27
Methyl ethyl ketone
Concen: 13.99 ppbV
RT: 7.103 min Scan# 2182
Delta R.T. 0.009 min
Lab File: aa4309.D
Acq: 29 Nov 2017 4:29 pm

Tgt Ion: 72 Resp: 263608

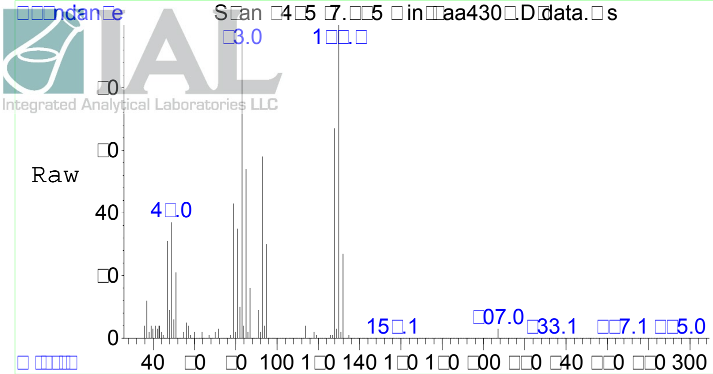
Ion	Ratio	Lower	Upper
72	100		
43	234.3	168.0	252.0



#30
n-Hexane
Concen: 1.46 ppbV
RT: 7.798 min Scan# 2398
Delta R.T. 0.006 min
Lab File: aa4309.D
Acq: 29 Nov 2017 4:29 pm

Tgt Ion: 57 Resp: 57186

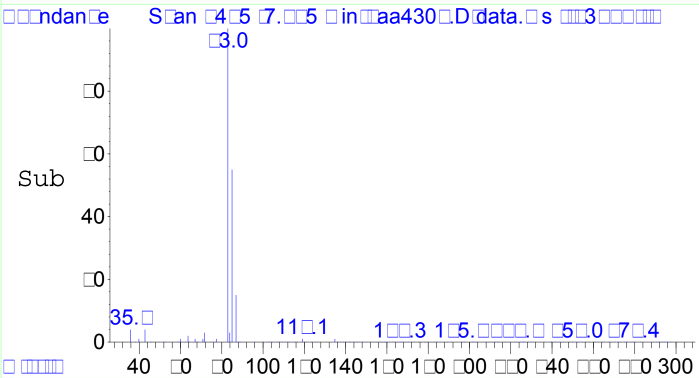
Ion	Ratio	Lower	Upper
57	100		
41	100.1	64.8	97.2#

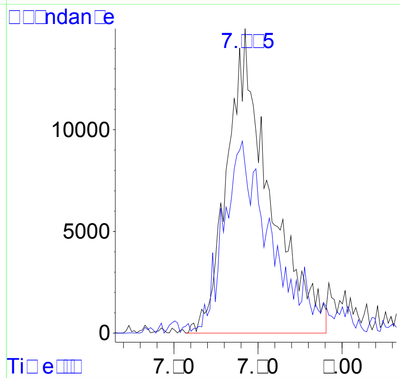


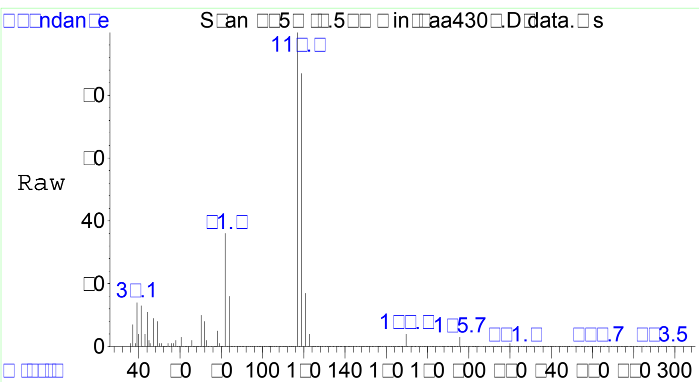
#31
Chloroform
Concen: 0.36 ppbV
RT: 7.885 min Scan# 2425
Delta R.T. 0.016 min
Lab File: aa4309.D
Acq: 29 Nov 2017 4:29 pm

Tgt Ion: 83 Resp: 52330

Ion	Ratio	Lower	Upper
83	100		
85	62.7	51.0	76.6



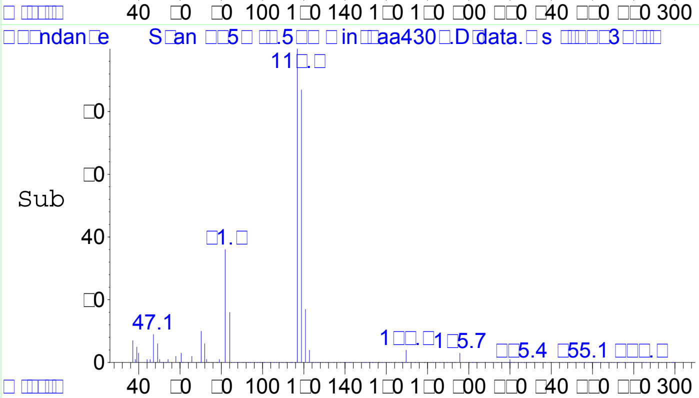


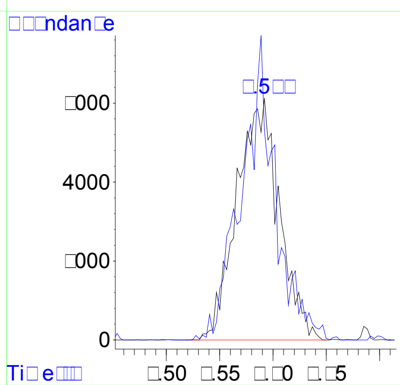


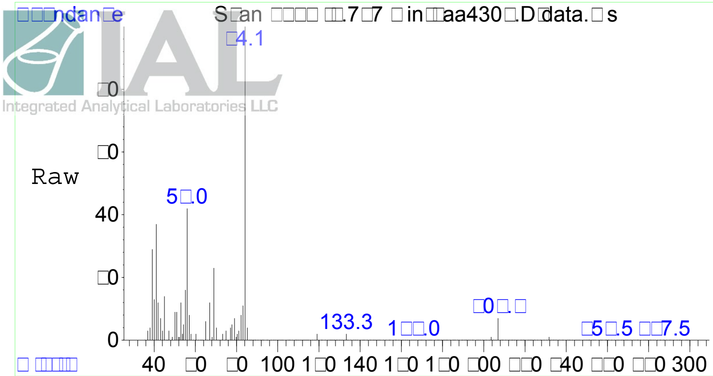
#36
Carbon tetrachloride
Concen: 0.08 ppbV
RT: 9.592 min Scan# 2956
Delta R.T. 0.006 min
Lab File: aa4309.D
Acq: 29 Nov 2017 4:29 pm

Tgt Ion:117 Resp: 16915

Ion	Ratio	Lower	Upper
117	100		
119	98.8	77.0	115.4



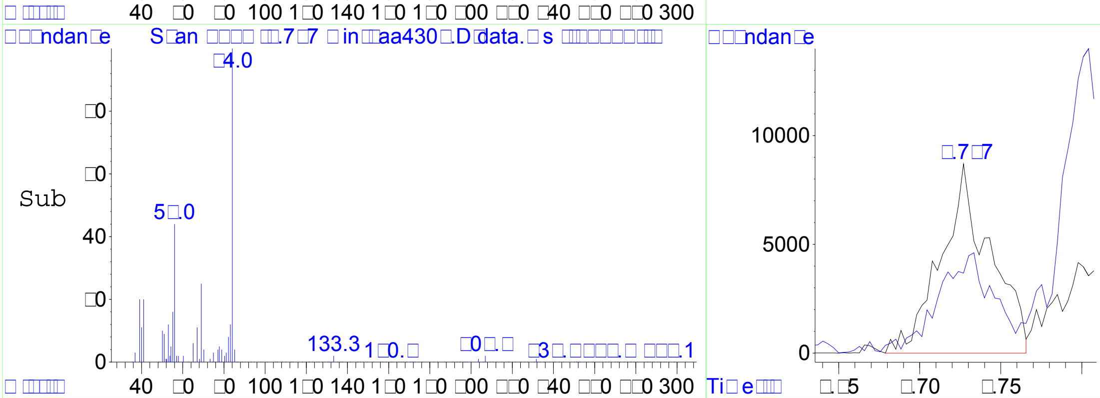


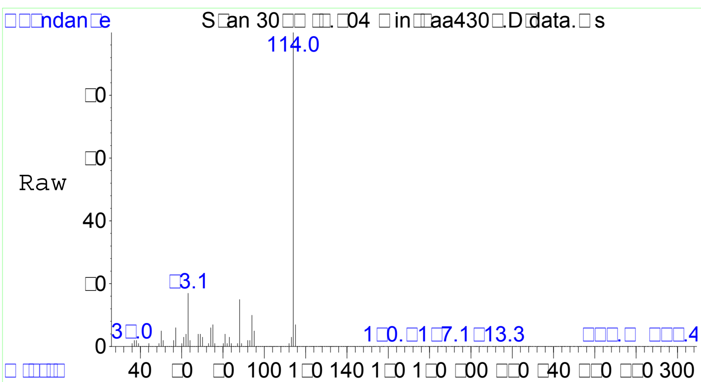


#37
Cyclohexane
Concen: 0.31 ppbV
RT: 9.727 min Scan# 2998
Delta R.T. 0.003 min
Lab File: aa4309.D
Acq: 29 Nov 2017 4:29 pm

Tgt Ion: 84 Resp: 18199

Ion	Ratio	Lower	Upper
84	100		
56	53.5	47.2	70.8

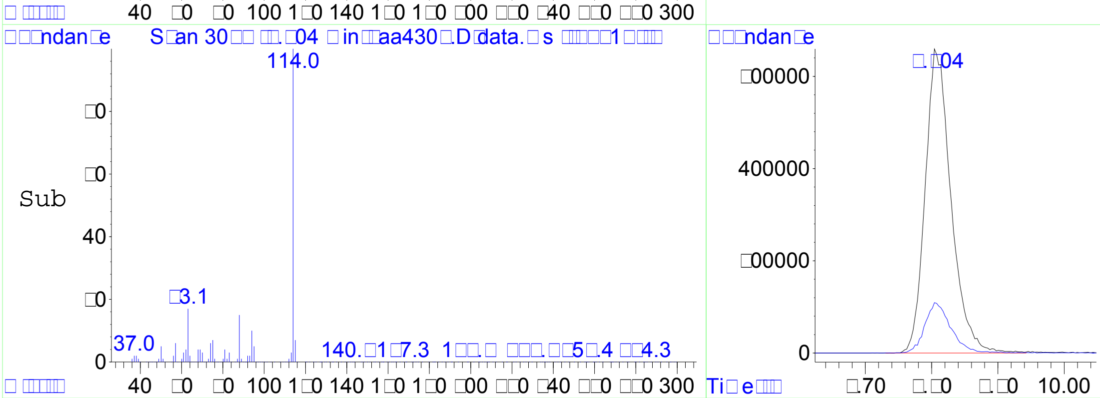


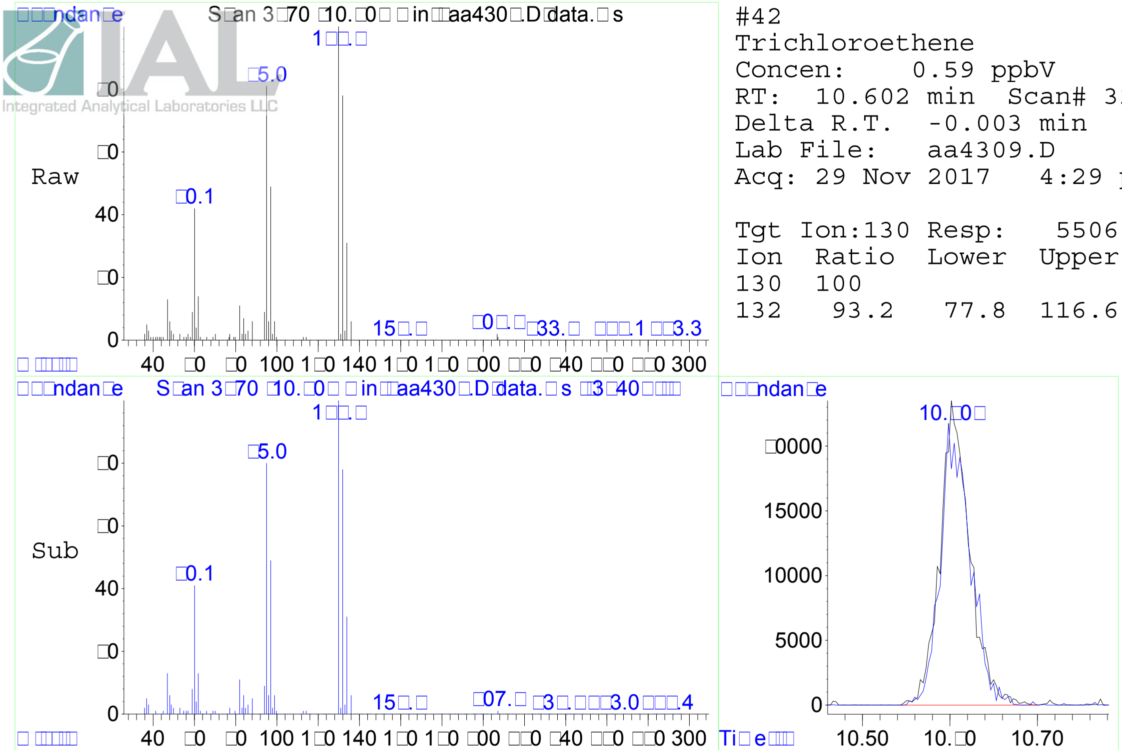


#38
1,4-Difluorobenzene (IS)
Concen: 10.00 ppbV
RT: 9.804 min Scan# 3022
Delta R.T. -0.000 min
Lab File: aa4309.D
Acq: 29 Nov 2017 4:29 pm

Tgt Ion:114 Resp: 1785995

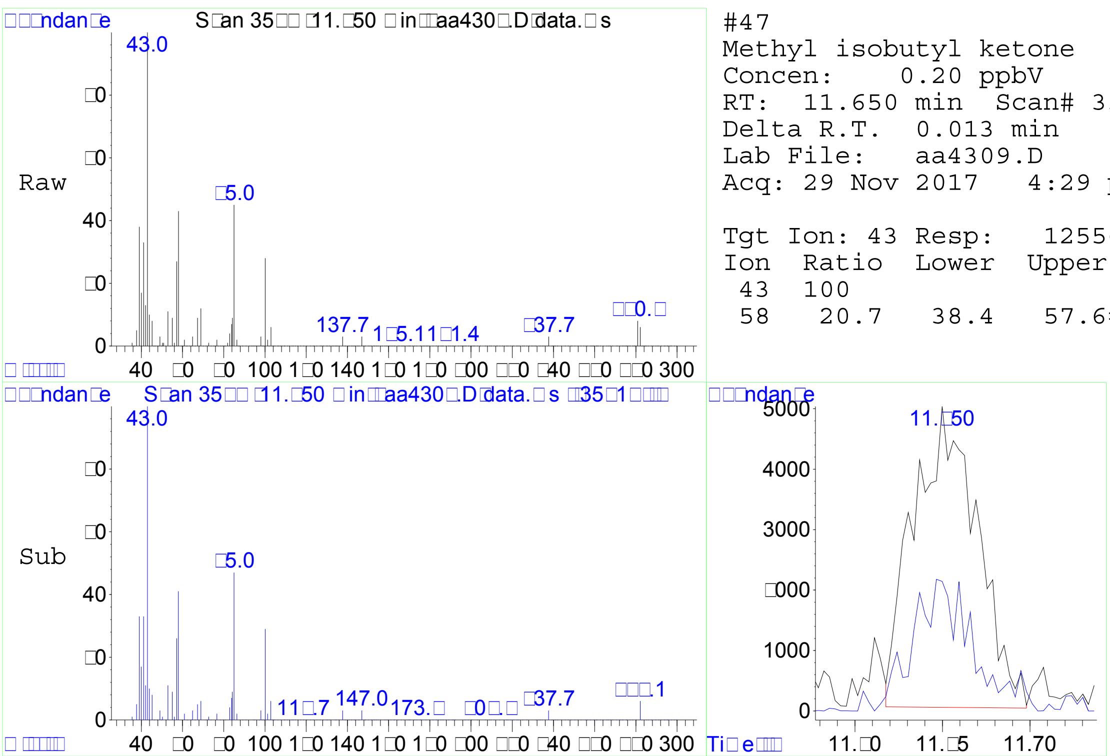
Ion	Ratio	Lower	Upper
114	100		
63	16.8	14.4	21.6





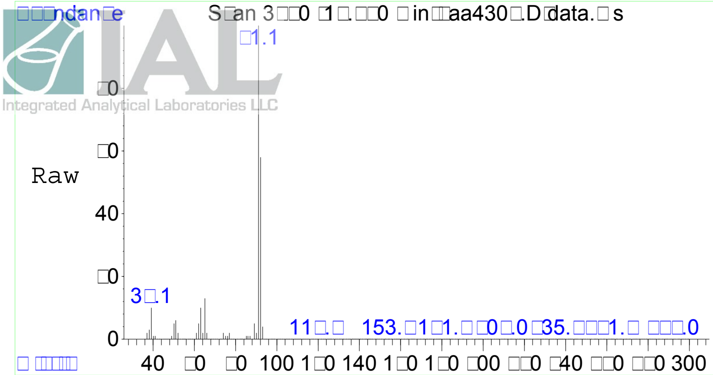
#42
Trichloroethene
Concen: 0.59 ppbV
RT: 10.602 min Scan# 3270
Delta R.T. -0.003 min
Lab File: aa4309.D
Acq: 29 Nov 2017 4:29 pm

Tgt Ion:130	Resp:	55061	
Ion	Ratio	Lower	Upper
130	100		
132	93.2	77.8	116.6



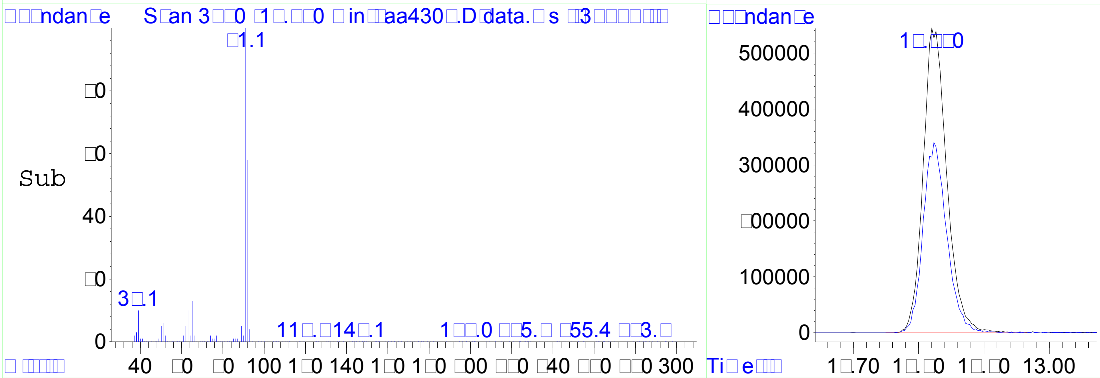
#47
Methyl isobutyl ketone
Concen: 0.20 ppbV
RT: 11.650 min Scan# 3596
Delta R.T. 0.013 min
Lab File: aa4309.D
Acq: 29 Nov 2017 4:29 pm

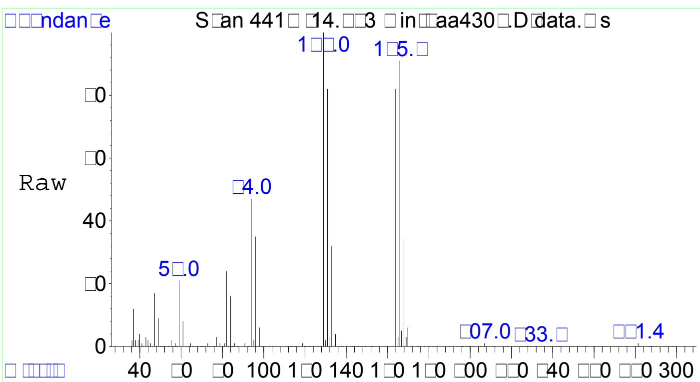
Tgt Ion: 43	Resp:	12556	
Ion	Ratio	Lower	Upper
43	100		
58	20.7	38.4	57.6#



#50
Toluene
Concen: 6.70 ppbV
RT: 12.820 min Scan# 3960
Delta R.T. 0.003 min
Lab File: aa4309.D
Acq: 29 Nov 2017 4:29 pm

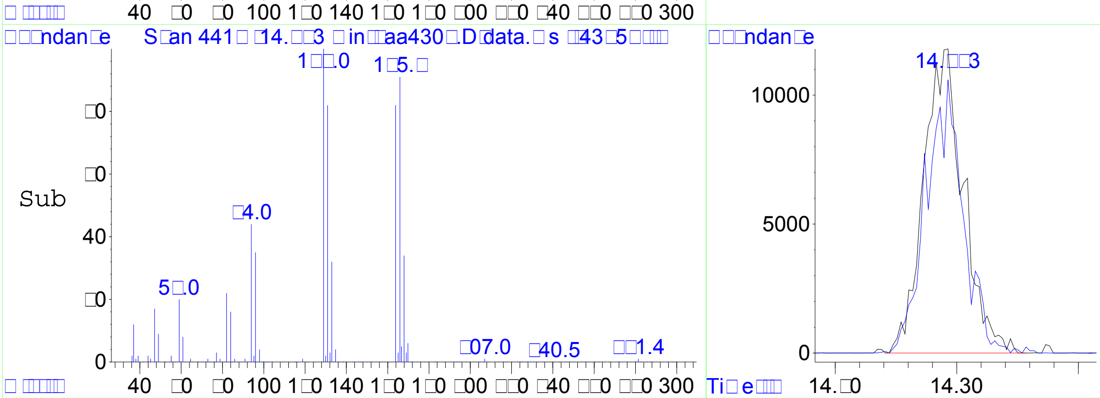
Tgt Ion: 91 Resp: 1373848
Ion Ratio Lower Upper
91 100
92 62.5 50.0 75.0

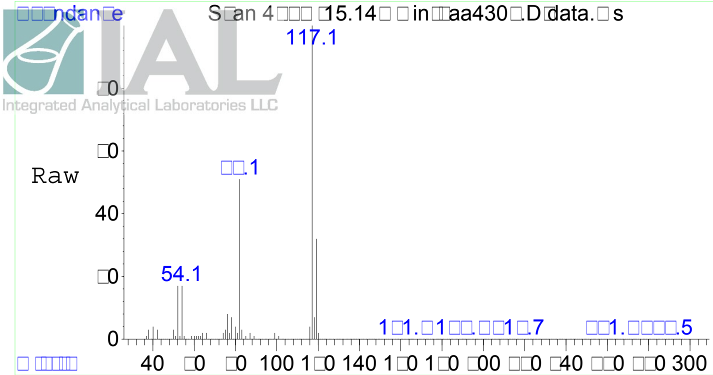


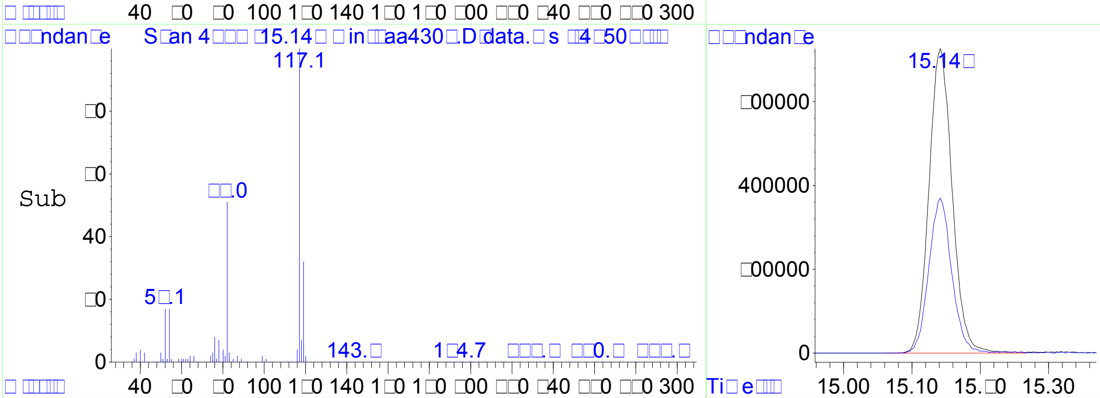


#54
Tetrachloroethene
Concen: 0.23 ppbV
RT: 14.293 min Scan# 4418
Delta R.T. 0.006 min
Lab File: aa4309.D
Acq: 29 Nov 2017 4:29 pm

Tgt Ion:166 Resp: 26823
Ion Ratio Lower Upper
166 100
164 83.4 64.6 96.8

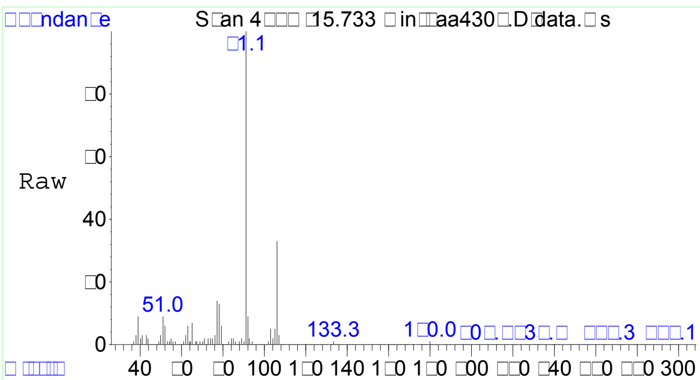


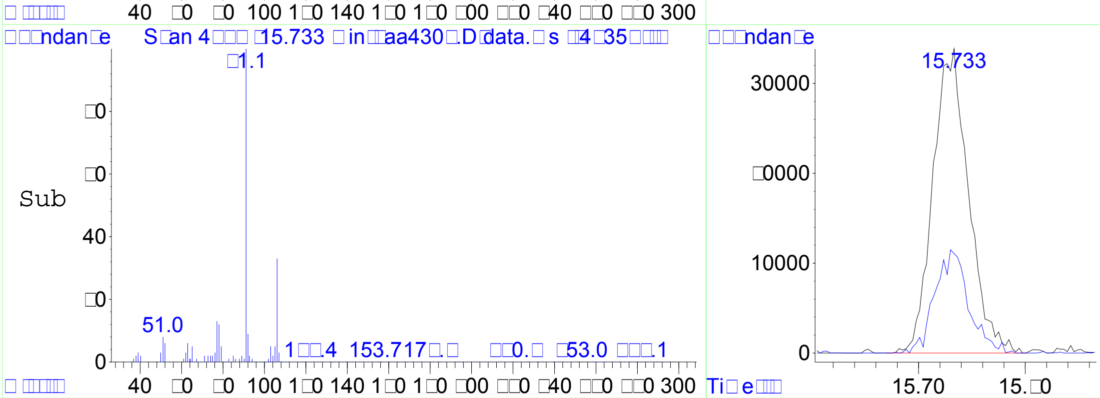




#55
d-5 Chlorobenzene (IS)
Concen: 10.00 ppbV
RT: 15.142 min Scan# 4682
Delta R.T. 0.003 min
Lab File: aa4309.D
Acq: 29 Nov 2017 4:29 pm

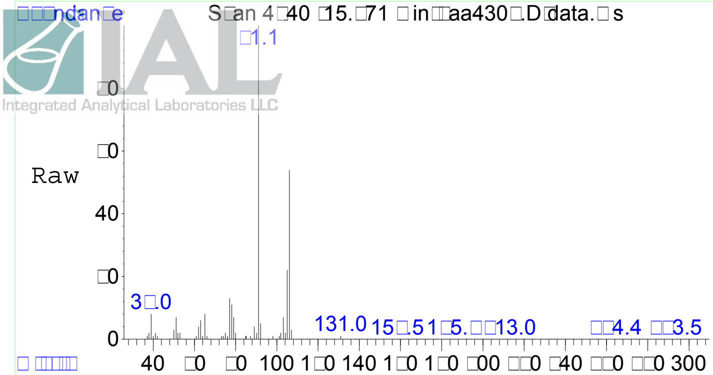
Tgt Ion:117	Resp: 1723154		
Ion	Ratio	Lower	Upper
117	100		
82	50.0	44.8	67.2





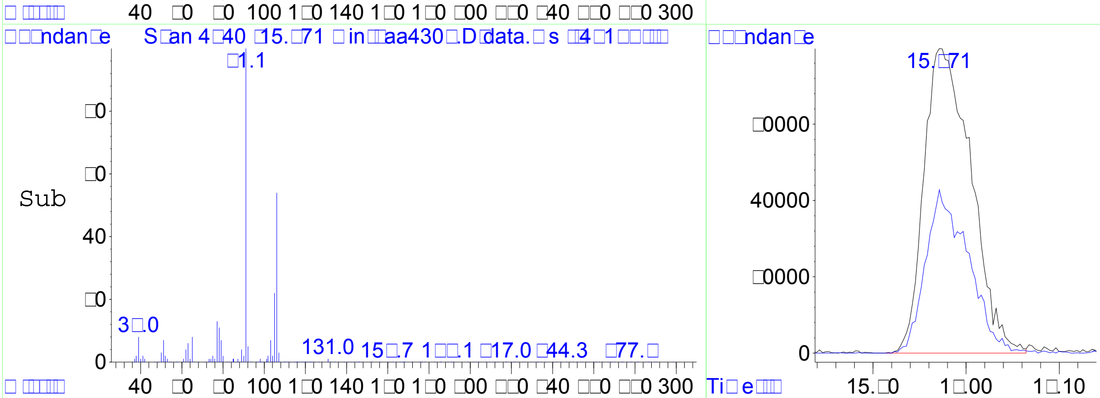
#57
Ethylbenzene
Concen: 0.24 ppbV
RT: 15.733 min Scan# 4866
Delta R.T. -0.000 min
Lab File: aa4309.D
Acq: 29 Nov 2017 4:29 pm

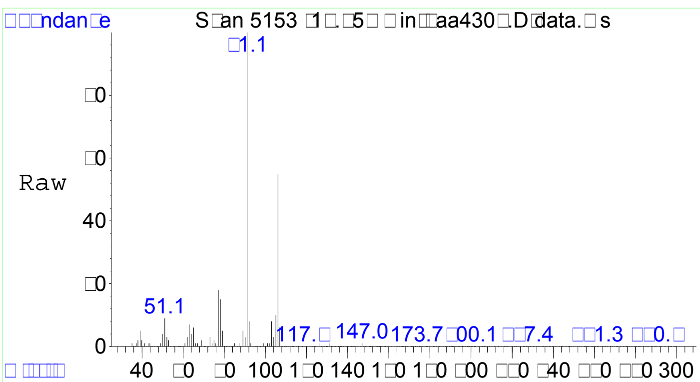
Tgt Ion: 91	Resp: 78403		
Ion	Ratio	Lower	Upper
91	100		
106	32.1	25.6	38.4



#58
Xylenes (m&p)
Concen: 1.05 ppbV
RT: 15.971 min   Scan# 4940
Delta R.T.   -0.032 min
Lab File: aa4309.D
Acq: 29 Nov 2017   4:29 pm

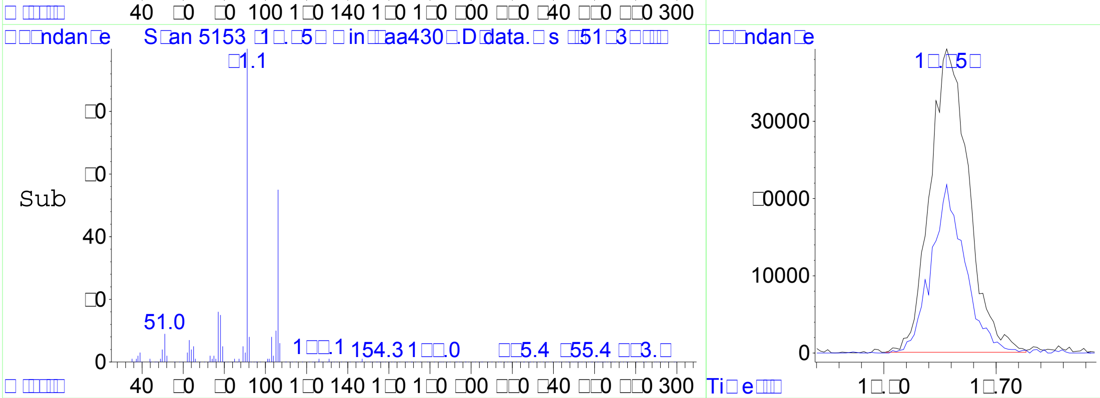
Tgt Ion: 91	Resp:	281285	
Ion	Ratio	Lower	Upper
91	100		
106	48.4	39.2	58.8

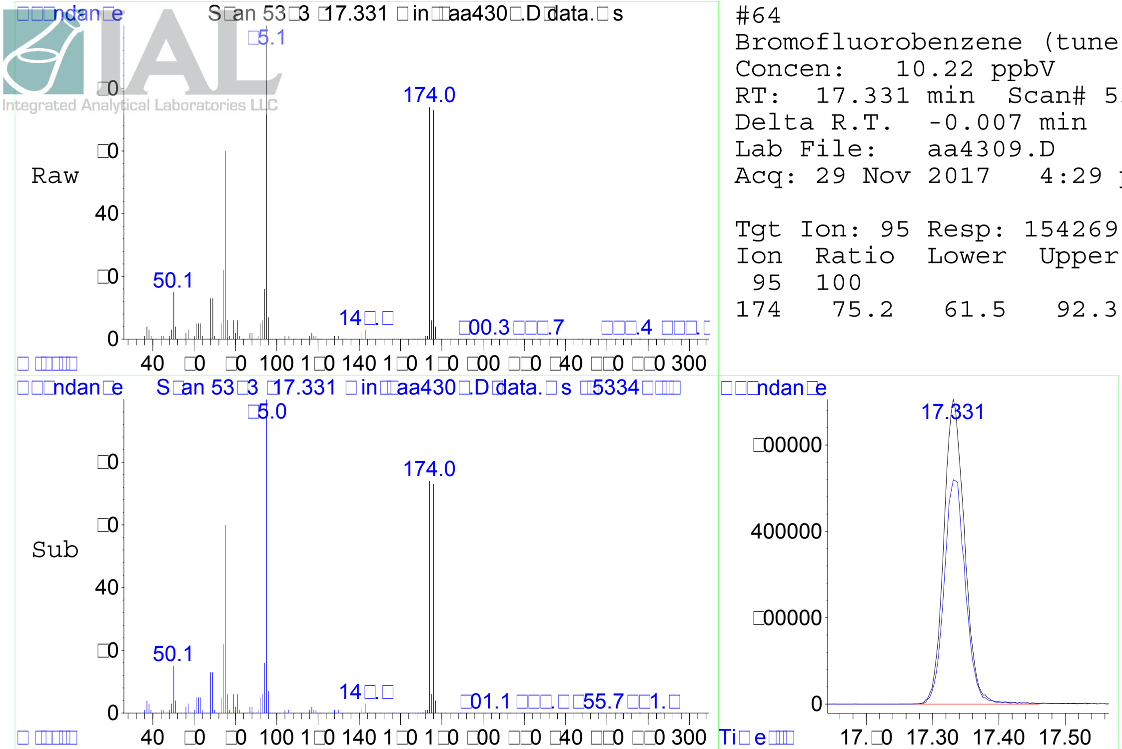




#61
Xylene (o)
Concen: 0.34 ppbV
RT: 16.656 min   Scan# 5153
Delta R.T.   -0.003 min
Lab File: aa4309.D
Acq: 29 Nov 2017   4:29 pm

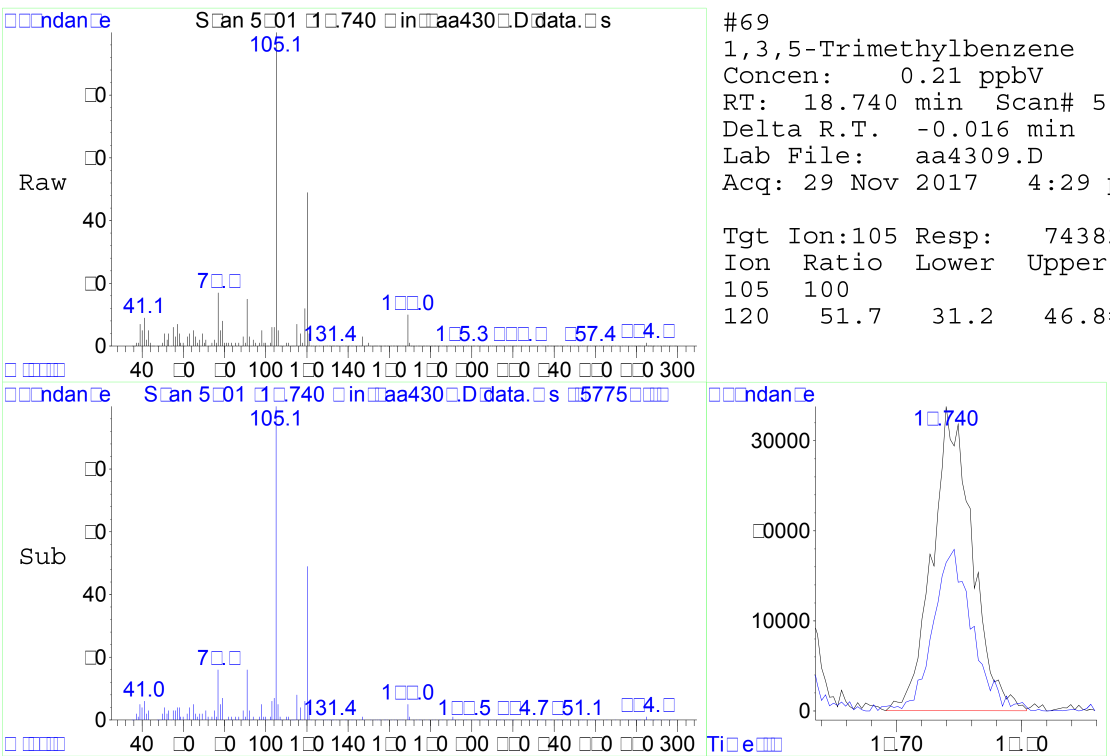
Tgt Ion: 91	Resp:	94709	
Ion	Ratio	Lower	Upper
91	100		
106	48.7	30.4	45.6#





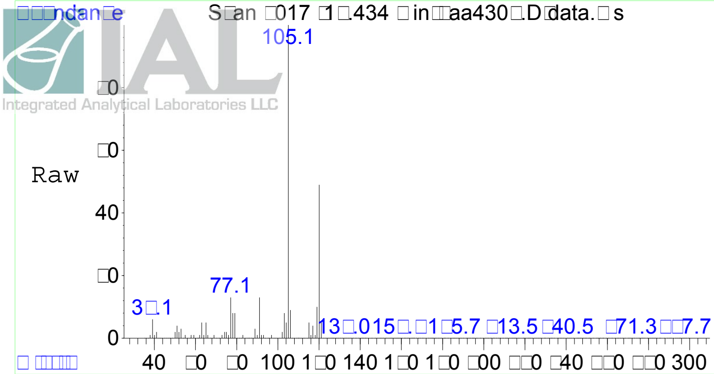
#64
Bromofluorobenzene (tune std)
Concen: 10.22 ppbV
RT: 17.331 min Scan# 5363
Delta R.T. -0.007 min
Lab File: aa4309.D
Acq: 29 Nov 2017 4:29 pm

Tgt Ion: 95	Resp: 1542691		
Ion	Ratio	Lower	Upper
95	100		
174	75.2	61.5	92.3



#69
1,3,5-Trimethylbenzene
Concen: 0.21 ppbV
RT: 18.740 min Scan# 5801
Delta R.T. -0.016 min
Lab File: aa4309.D
Acq: 29 Nov 2017 4:29 pm

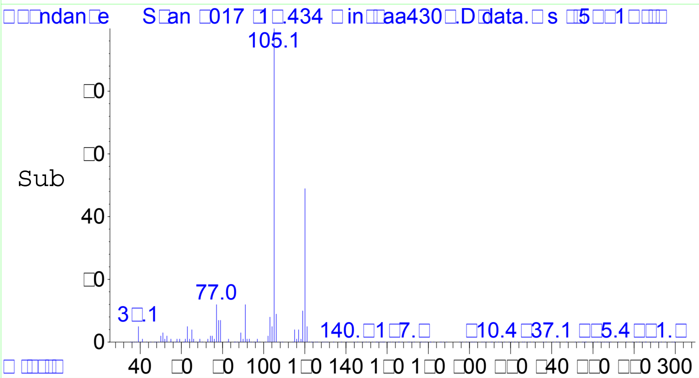
Tgt Ion:105	Resp: 74382		
Ion	Ratio	Lower	Upper
105	100		
120	51.7	31.2	46.8#

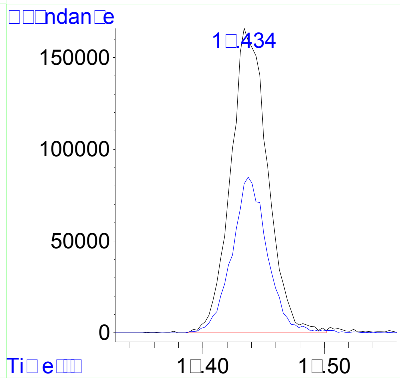


#70
1,2,4-Trimethylbenzene
Concen: 1.04 ppbV
RT: 19.434 min Scan# 6017
Delta R.T. -0.016 min
Lab File: aa4309.D
Acq: 29 Nov 2017 4:29 pm

Tgt Ion:105 Resp: 350718

Ion	Ratio	Lower	Upper
105	100		
120	49.2	36.0	54.0





Integrated Analytical Laboratories LLC

Summary of Results

□n□iron□enta□□ aste Mana□e□ent □sso□iates
100 Misty Lane
Parsippany, NJ 07054
□ttn□□e□in Seise
Pro□e□t□S□i□i□ier□175 □ Nya□□Rd
Site□NY

Report Date□11□30□17
SD□ N□□ □er□□17□0□□37
Date Sa□ p□ed□11□15□17
Date Re□ei□ed□11□1□□17
Date □na□y□ed□11□□□□17
Data □i□e□□□4310
S□□ □a ID□□753
D□□1

□na□ysis□ □o□ati□e Or□ani□ □o□po□nds □y □P□ Met□od TO□15

	Sample Name:	SS-4		Reporting	Limits
	IAL ID:	E17-09837-04			
Compound	**CAS #**	**ppbv**	**ug/m3**	**ppbv**	**ug/m3**
□□etone	□7□□4□1	1□	45	0.□0	0.4□
Ben□ene	71□43□□	ND	ND	0.□0	0.□4
Bro□odi□□□oro□et□ane	75□□7□4	ND	ND	0.□0	1.3
Bro□o□or□	75□□5□□	ND	ND	0.□0	□.1
Bro□o□et□ane	74□□3□□	ND	ND	0.□0	0.7□
1,3□B□tadiene	10□□□□□0	ND	ND	0.□0	0.44
□□□oro□en□ene	10□□□0□7	ND	ND	0.□0	0.□□
□□□oroet□ane	75□00□3	ND	ND	0.□0	0.53
□□□oro□or□	□7□□□□3	ND	ND	0.□0	0.□□
□□□oro□et□ane	74□□7□3	ND	ND	0.□0	0.41
□ar□on dis□□□ide	75□15□0	0.45	1.4	0.□0	0.□□
□ar□on tetra□□□oride	5□□□3□5	0.0□	0.3□	0.04	0.□5
□y□□o□exane	110□□□□7	ND	ND	0.□0	0.□□
Di□ro□o□□□oro□et□ane	1□4□4□□1	ND	ND	0.□0	1.7
1,□□Di□ro□oet□ane	10□□□3□4	ND	ND	0.□0	1.5
1,□□Di□□□oro□en□ene	□5□50□1	ND	ND	0.□0	1.□
1,3□Di□□□oro□en□ene	541□73□1	ND	ND	0.□0	1.□
1,4□Di□□□oro□en□ene	10□□4□□7	ND	ND	0.□0	1.□
Di□□□orodi□□□oro□et□ane	75□71□□	ND	ND	0.□0	0.□□
1,1□Di□□□oroet□ane	75□34□3	ND	ND	0.□0	0.□1
1,□□Di□□□oroet□ane	107□0□□□	ND	ND	0.□0	0.□1
1,1□Di□□□oroet□ene	75□35□4	ND	ND	0.□0	0.7□
1,□□Di□□□oroet□ene □□is□	15□□5□□□	ND	ND	0.□0	0.7□
1,□□Di□□□oroet□ene □trans□	15□□□0□5	ND	ND	0.□0	0.7□
1,□□Di□□□oropropane	7□□□7□5	ND	ND	0.□0	0.□□
1,3□Di□□□oropropene □□is□	100□1□01□5	ND	ND	0.□0	0.□1
1,3□Di□□□oropropene □trans□	100□1□0□□□	ND	ND	0.□0	0.□1
1,□□Di□□□orotetra□□□oroet□ane	7□□14□□	ND	ND	0.□0	1.4
1,4□Dioxane	1□3□□1□1	ND	ND	0.□0	0.7□
□t□y□□en□ene	100□41□4	0.□4	1.0	0.□0	0.□7
n□□eptane	14□□□□□5	ND	ND	0.□0	0.□□
1,3□□exa□□□oro□□□tadiene	□7□□□□3	ND	ND	0.□0	□.1
n□□exane	110□54□3	□.1	7.5	0.□0	0.71
Met□y□ene □□□oride	75□0□□□	0.□4	□.□	0.□0	0.70
Met□y□et□y□□etone	7□□□3□3	10	30	0.□0	0.5□
Met□y□iso□□ty□□etone	10□□10□1	ND	ND	0.□0	0.□□
Met□y□tert□□□ty□et□er	1□34□04□4	ND	ND	0.□0	0.7□
Styrene	100□4□□5	ND	ND	0.□0	0.□5
Tert□□□ty□a□□o□o□	75□□5□0	ND	ND	0.□0	0.□1
1,1,□,□□Tetra□□□oroet□ane	7□□34□5	ND	ND	0.□0	1.4
Tetra□□□oroet□ene	1□7□1□□4	0.3□	□.□	0.□0	1.4
To□□ene	10□□□□□3	10	3□	0.□0	0.75
1,□,4□Tri□□□oro□en□ene	1□0□□□□1	ND	ND	0.□0	1.5
1,1,1□Tri□□□oroet□ane	71□55□□	0.35	1.□	0.□0	1.1
1,1,□□Tri□□□oroet□ane	7□□00□5	ND	ND	0.□0	1.1
Tri□□□oroet□ene	7□□01□□	ND	ND	0.05	0.□5

D □ □xtra di□□tion re□□ired □or t□is □o□po□nd

□na□yst□J. S□□□itt

Summary of Results

Environmental Waste Management Associates
100 Misty Lane
Parsippany, NJ 07054
Attn: Kevin Seise
Project [illegible]: 175 [illegible] Nya[illegible] Rd
Site: NY

Report Date: 11/30/17
SDG Number: E17-09837
Date Sampled: 11/15/17
Date Received: 11/1[illegible]/17
Date Analyzed: 11/[illegible]/17
Data File: [illegible]4310
Summa ID: [illegible]753
DF: 1

Analysis: Volatile Organic Compounds by EPA Method TO-15

	Sample Name: / IAL ID:	SS-4 / E17-09837-04			Reporting Limits	
Trichlorofluoromethane	75-69-4	0.41	[illegible].3		0.[illegible]0	1.1
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	ND		ND	0.[illegible]0	1.5
1,2,4-Trimethylbenzene	95-63-6	1.4	7.0		0.[illegible]0	0.[illegible]
1,3,5-Trimethylbenzene	108-67-8	0.30	1.5		0.[illegible]0	0.[illegible]
2,2,4-Trimethylpentane	540-84-1	ND		ND	0.[illegible]0	0.[illegible]3
Vinyl bromide	593-60-2	ND		ND	0.[illegible]0	0.[illegible]7
Vinyl chloride	75-01-4	ND		ND	0.[illegible]0	0.51
Xylenes (m&p)	179601-23-1	1.3	5.5		0.[illegible]0	0.[illegible]7
Xylenes (o)	95-47-6	0.41	1.[illegible]		0.[illegible]0	0.[illegible]7

DF: Extra dilution required for this compound

Analyst: J. Schmitt

Data Path : C:\DATA\11-29-17\
Data File : aa4310.D
Acq On : 29 Nov 2017 5:03 pm
Operator : jls
Sample : E17-09837-04
Misc : 2753, 500cc
ALS Vial : 10 Sample Multiplier: 1

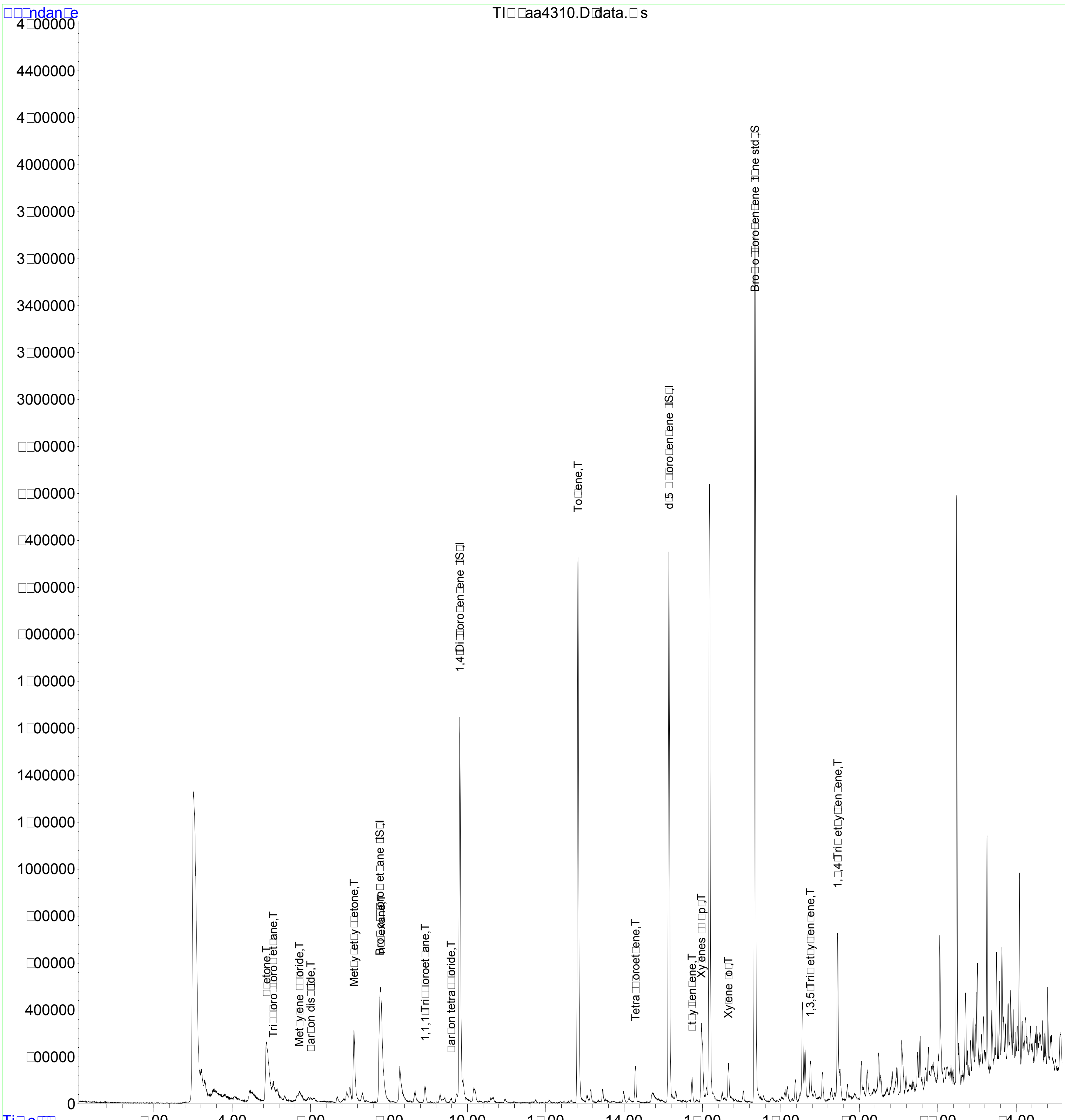
Quant Time: Nov 30 10:11:55 2017
Quant Method : C:\msdchem\1\METHODS\0912.M
Quant Title : TO-15 on the Agilent 7890A / 5975C
QLast Update : Tue Sep 12 13:00:02 2017
Response via : Initial Calibration

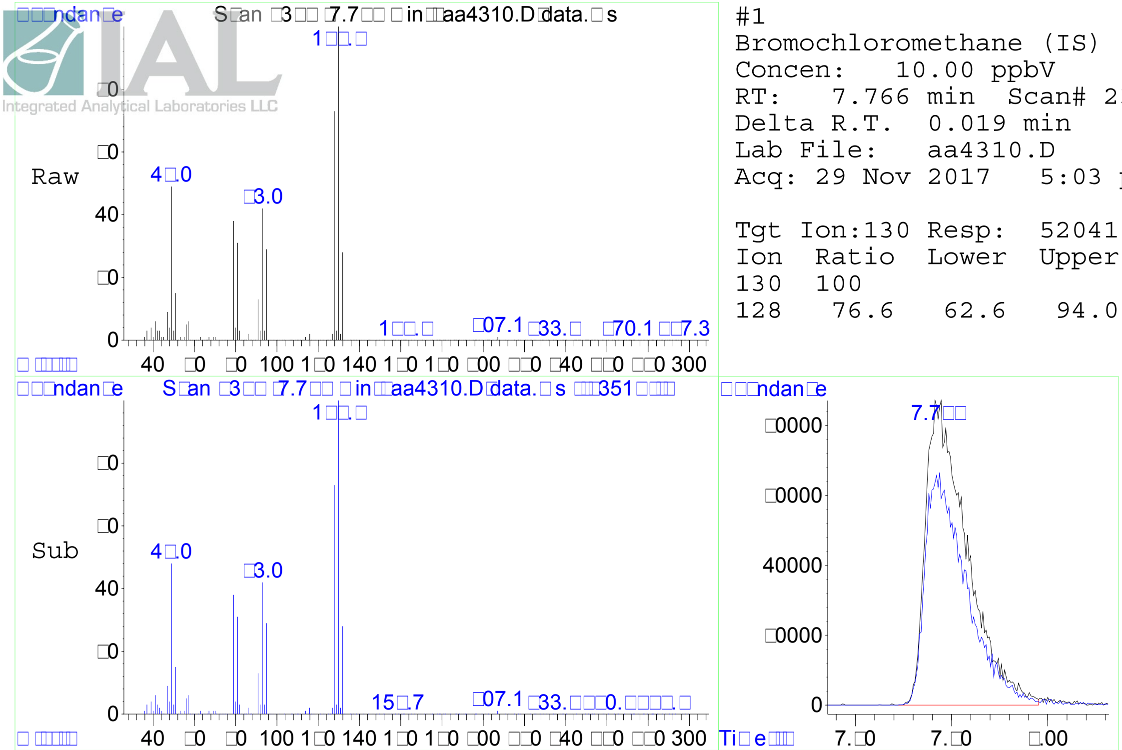
Compound	R.T.	QIon	Response	Conc	Units	Dev(Min)
Internal Standards						
1) Bromochloromethane (IS)	7.766	130	520418	10.00	ppbV	0.02
38) 1,4-Difluorobenzene (IS)	9.807	114	1944157	10.00	ppbV	0.00
55) d-5 Chlorobenzene (IS)	15.145	117	1912210	10.00	ppbV	0.00
System Monitoring Compounds						
64) Bromofluorobenzene (tu...	17.338	95	1699842	10.15	ppbV	0.00
Target Compounds						Qvalue
14) Acetone	4.875	58	243874	18.94	ppbV #	42
15) Trichlorofluoromethane	5.045	101	104374	0.41	ppbV	88
19) Methylene chloride	5.717	84	29676	0.64	ppbV #	39
23) Carbon disulfide	6.007	76	62240	0.45	ppbV #	74
27) Methyl ethyl ketone	7.110	72	210162	10.29	ppbV	90
30) n-Hexane	7.801	57	90567	2.14	ppbV	92
34) 1,1,1-Trichloroethane	8.923	97	67601	0.35	ppbV	97
36) Carbon tetrachloride	9.589	117	14665	0.06	ppbV	94
50) Toluene	12.823	91	2319745	10.39	ppbV	100
54) Tetrachloroethene	14.289	166	49860	0.39	ppbV	99
57) Ethylbenzene	15.733	91	87580	0.24	ppbV	97
58) Xylenes (m&p)	15.971	91	375687	1.26	ppbV	97
61) Xylene (o)	16.662	91	127211	0.41	ppbV #	87
69) 1,3,5-Trimethylbenzene	18.752	105	115763	0.30	ppbV #	81
70) 1,2,4-Trimethylbenzene	19.447	105	528126	1.42	ppbV	100

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Data Path : C:\DATA\11-29-17\
Data File : aa4310.D
Acq On   : 29 Nov 2017   5:03 pm
Operator : jls
Sample   : E17-09837-04
Misc   : 2753, 500cc
ALS Vial : 10   Sample Multiplier: 1

Quant Time: Nov 30 10:11:55 2017
Quant Method : C:\msdchem\1\METHODS\0912.M
Quant Title : TO-15 on the Agilent 7890A / 5975C
QLast Update : Tue Sep 12 13:00:02 2017
Response via : Initial Calibration

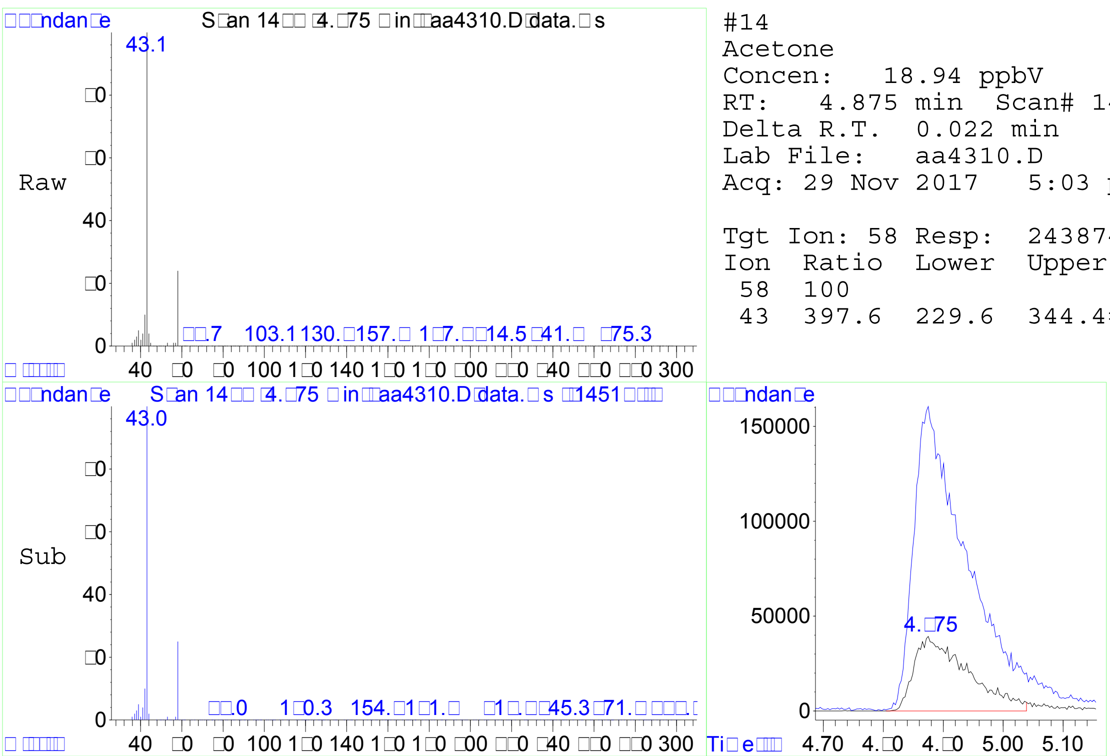




#1
Bromochloromethane (IS)
Concen: 10.00 ppbV
RT: 7.766 min Scan# 2388
Delta R.T. 0.019 min
Lab File: aa4310.D
Acq: 29 Nov 2017 5:03 pm

Tgt Ion:130 Resp: 520418

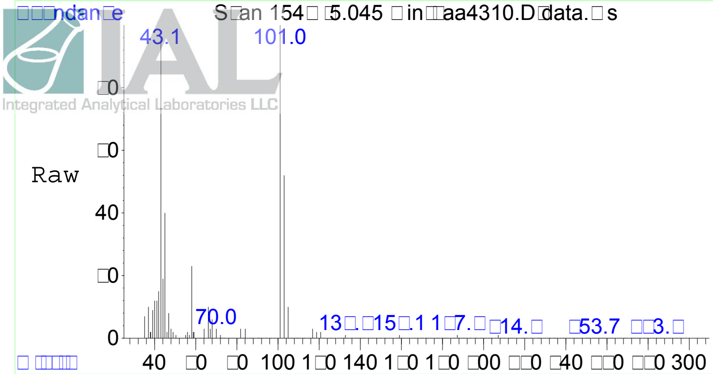
Ion	Ratio	Lower	Upper
130	100		
128	76.6	62.6	94.0



#14
Acetone
Concen: 18.94 ppbV
RT: 4.875 min Scan# 1489
Delta R.T. 0.022 min
Lab File: aa4310.D
Acq: 29 Nov 2017 5:03 pm

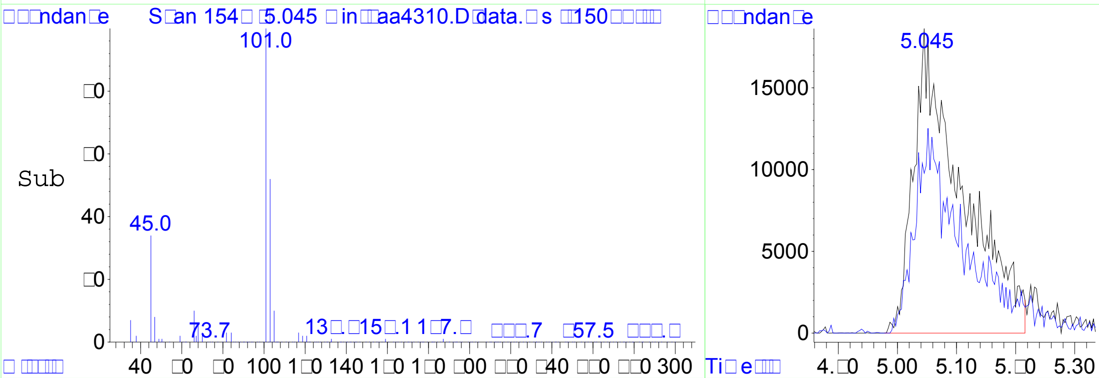
Tgt Ion: 58 Resp: 243874

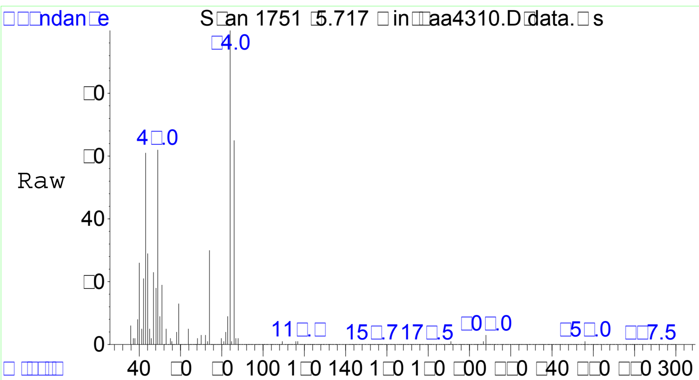
Ion	Ratio	Lower	Upper
58	100		
43	397.6	229.6	344.4#



#15
Trichlorofluoromethane
Concen: 0.41 ppbV
RT: 5.045 min   Scan# 1542
Delta R.T.   0.016 min
Lab File: aa4310.D
Acq: 29 Nov 2017   5:03 pm

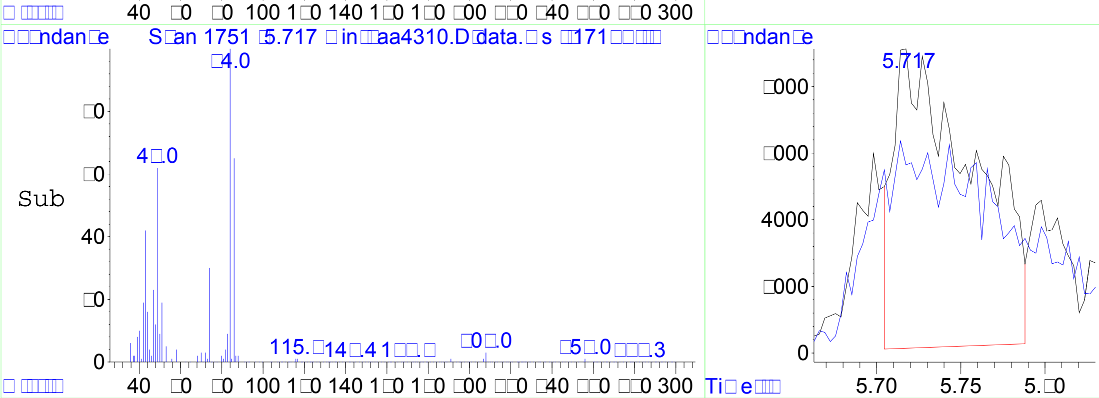
Tgt Ion:101 Resp: 104374
Ion   Ratio Lower Upper
101   100
103   55.7   52.0   78.0

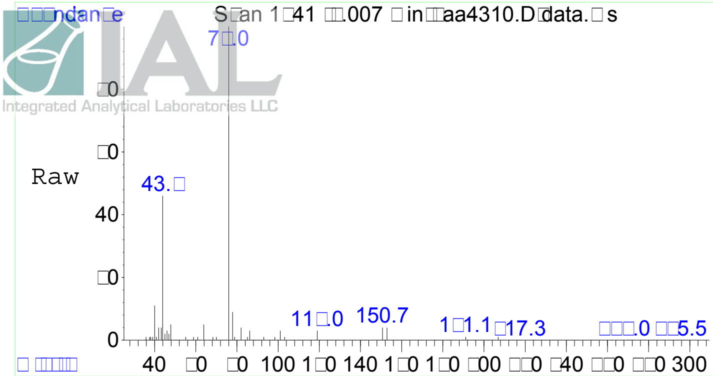




#19
Methylene chloride
Concen: 0.64 ppbV
RT: 5.717 min   Scan# 1751
Delta R.T.   0.012 min
Lab File: aa4310.D
Acq: 29 Nov 2017   5:03 pm

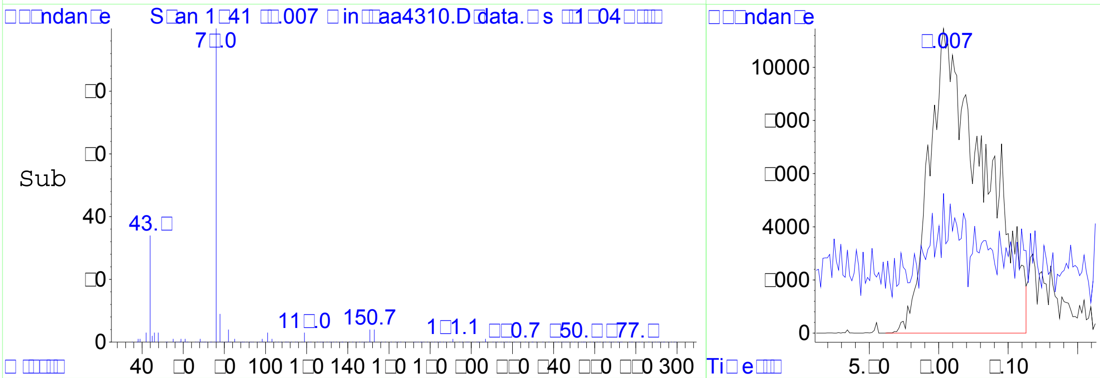
Tgt Ion: 84 Resp: 29676
Ion   Ratio Lower Upper
 84   100
 49   122.5   57.6   86.4#

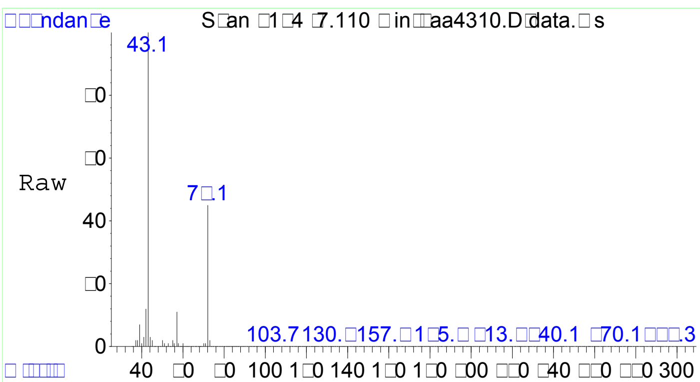




#23
Carbon disulfide
Concen: 0.45 ppbV
RT: 6.007 min Scan# 1841
Delta R.T. 0.019 min
Lab File: aa4310.D
Acq: 29 Nov 2017 5:03 pm

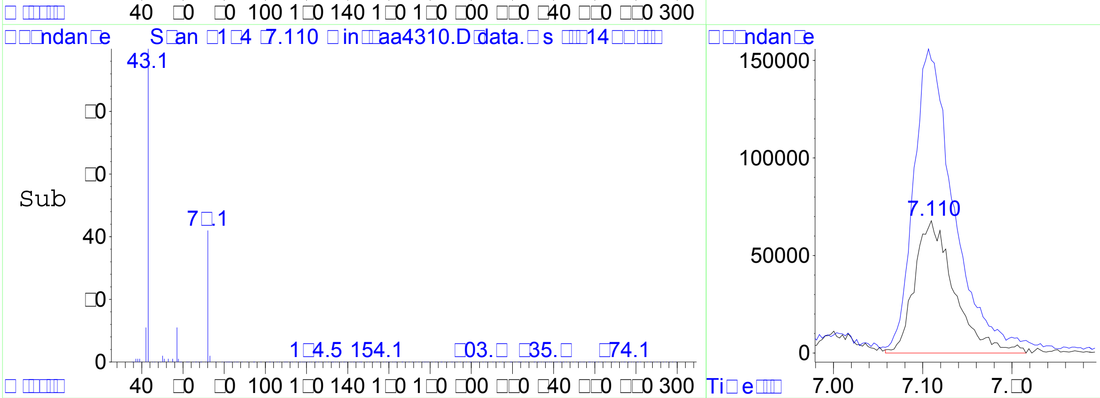
Tgt Ion: 76	Resp:	62240	
Ion	Ratio	Lower	Upper
76	100		
44	2.8	10.4	15.6#

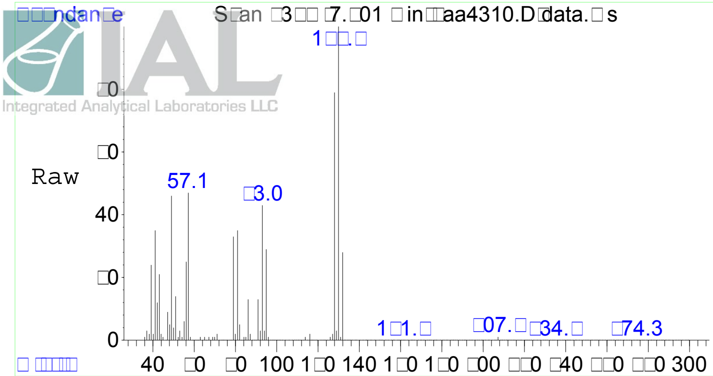




#27
Methyl ethyl ketone
Concen: 10.29 ppbV
RT: 7.110 min Scan# 2184
Delta R.T. 0.016 min
Lab File: aa4310.D
Acq: 29 Nov 2017 5:03 pm

Tgt Ion: 72	Resp:	210162	
Ion	Ratio	Lower	Upper
72	100		
43	225.7	168.0	252.0

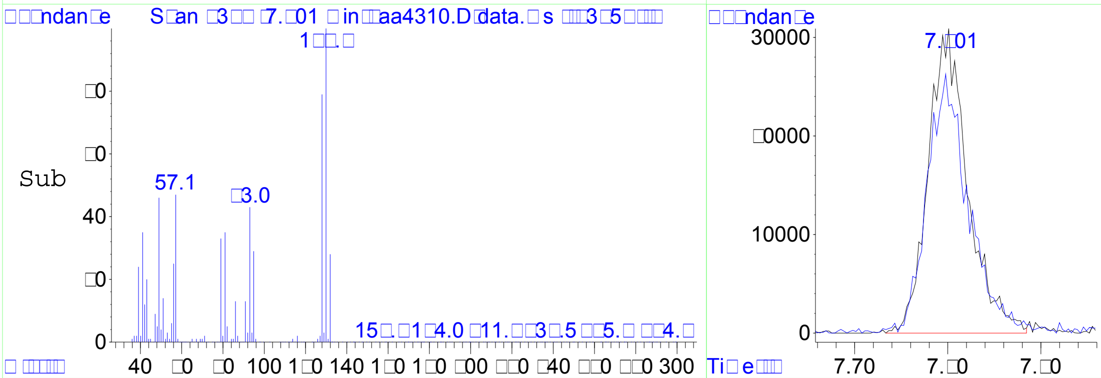


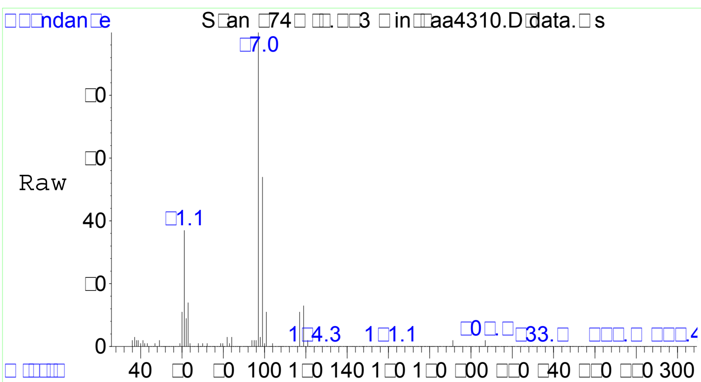


#30
n-Hexane
Concen: 2.14 ppbV
RT: 7.801 min Scan# 2399
Delta R.T. 0.009 min
Lab File: aa4310.D
Acq: 29 Nov 2017 5:03 pm

Tgt Ion: 57 Resp: 90567

Ion	Ratio	Lower	Upper
57	100		
41	88.3	64.8	97.2

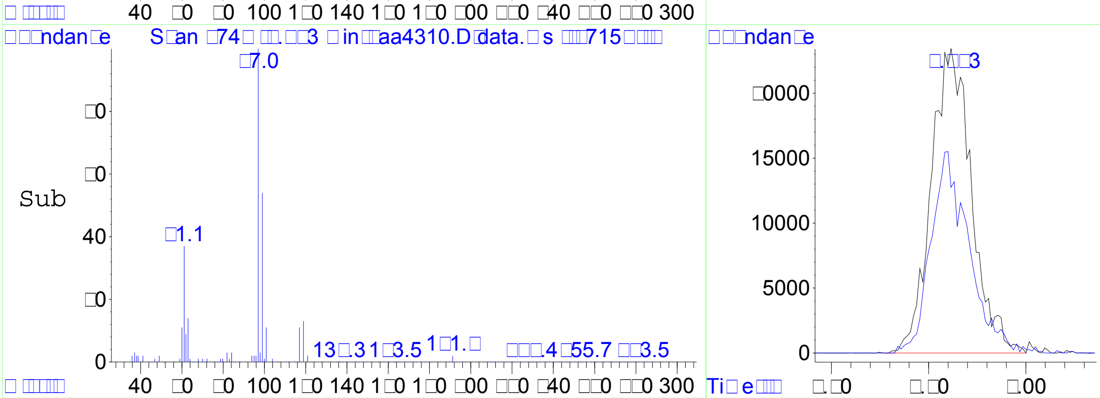


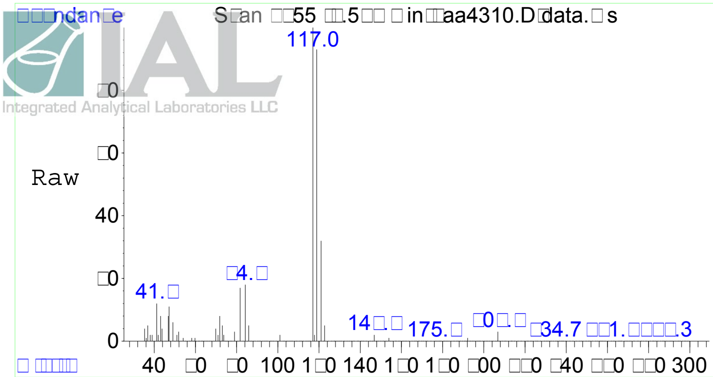


#34
1,1,1-Trichloroethane
Concen: 0.35 ppbV
RT: 8.923 min Scan# 2748
Delta R.T. 0.006 min
Lab File: aa4310.D
Acq: 29 Nov 2017 5:03 pm

Tgt Ion: 97 Resp: 67601

Ion	Ratio	Lower	Upper
97	100		
99	62.2	51.9	77.9

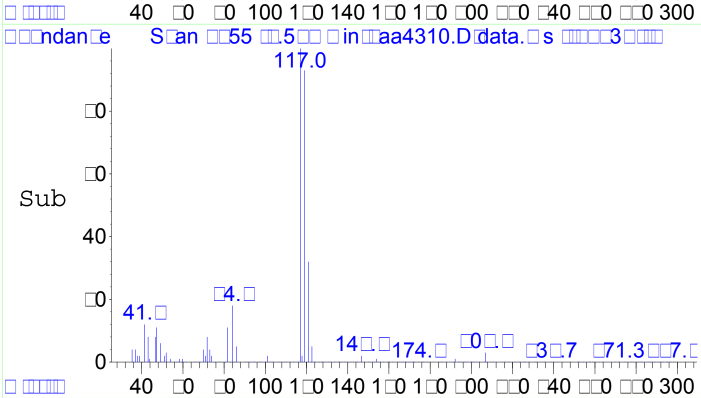


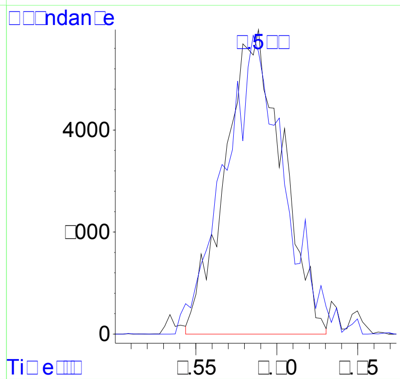


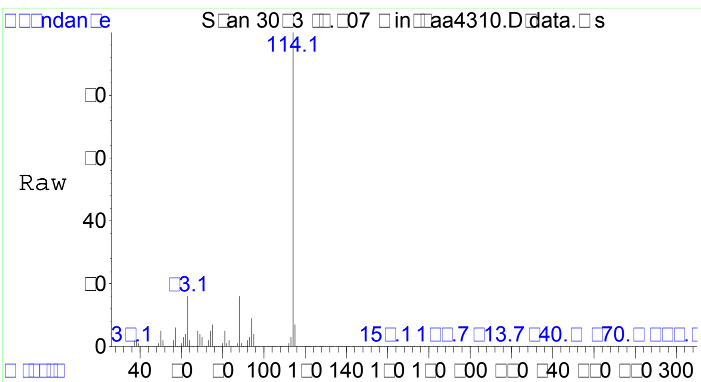
#36
Carbon tetrachloride
Concen: 0.06 ppbV
RT: 9.589 min Scan# 2955
Delta R.T. 0.003 min
Lab File: aa4310.D
Acq: 29 Nov 2017 5:03 pm

Tgt Ion:117 Resp: 14665

Ion	Ratio	Lower	Upper
117	100		
119	102.2	77.0	115.4



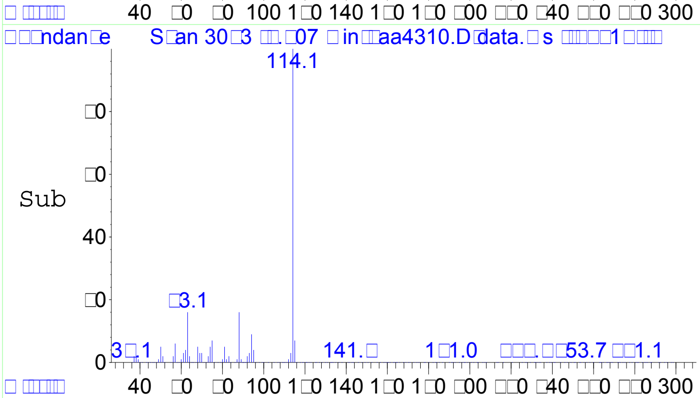


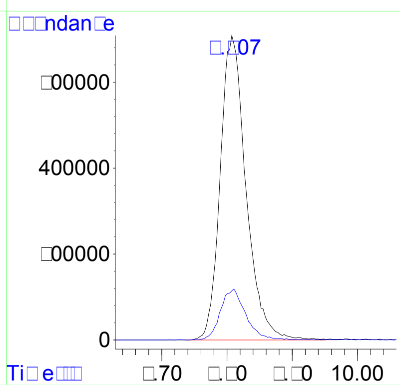


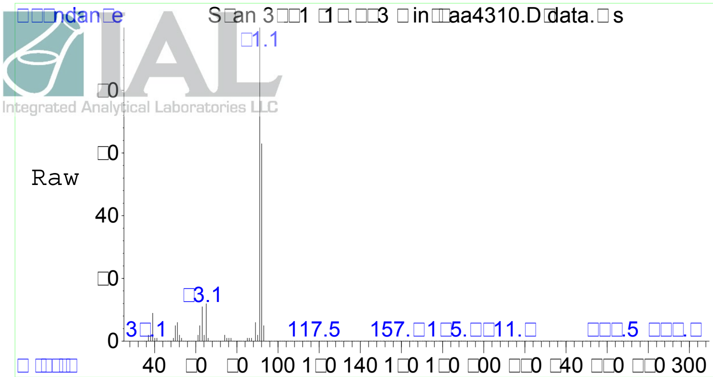
#38
1,4-Difluorobenzene (IS)
Concen: 10.00 ppbV
RT: 9.807 min Scan# 3023
Delta R.T. 0.003 min
Lab File: aa4310.D
Acq: 29 Nov 2017 5:03 pm

Tgt Ion:114 Resp: 1944157

Ion	Ratio	Lower	Upper
114	100		
63	16.3	14.4	21.6



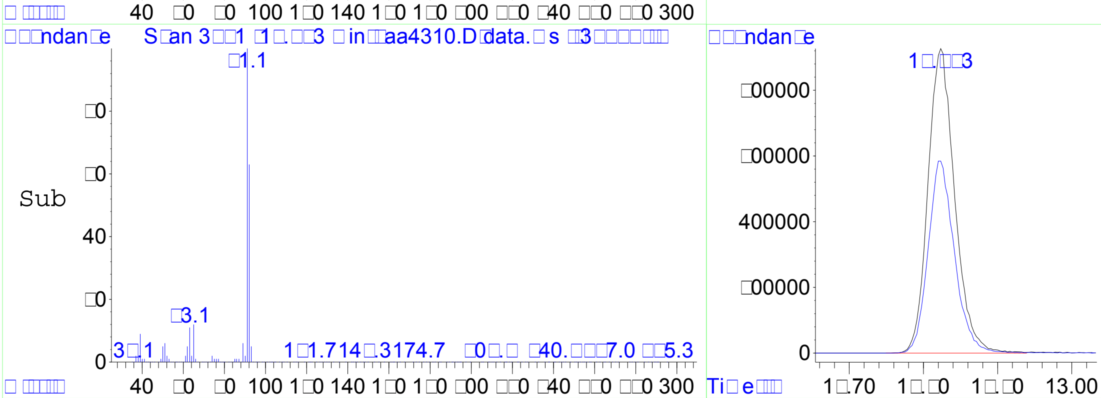


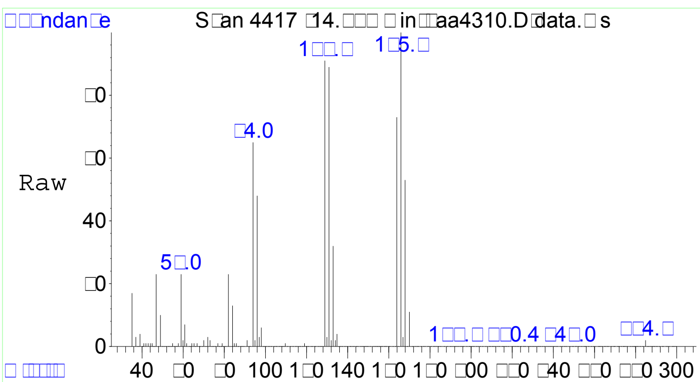


#50
Toluene
Concen: 10.39 ppbV
RT: 12.823 min Scan# 3961
Delta R.T. 0.006 min
Lab File: aa4310.D
Acq: 29 Nov 2017 5:03 pm

Tgt Ion: 91 Resp: 2319745

Ion	Ratio	Lower	Upper
91	100		
92	62.4	50.0	75.0

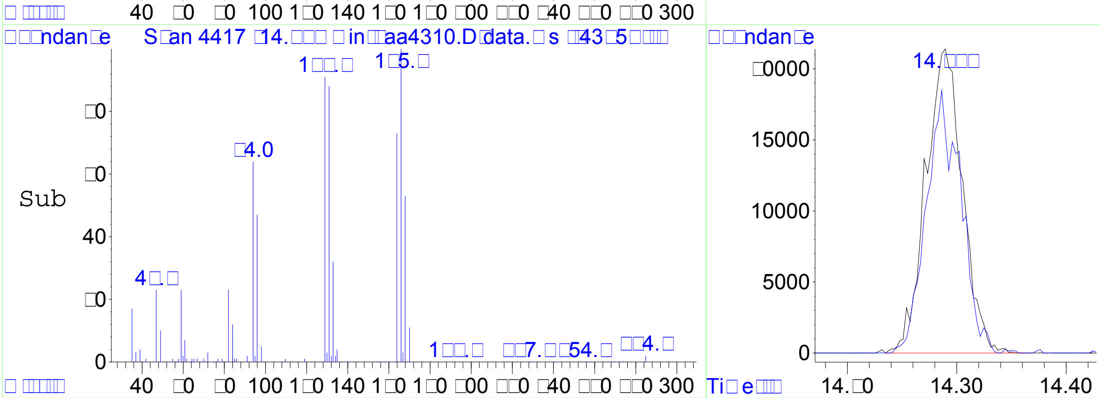


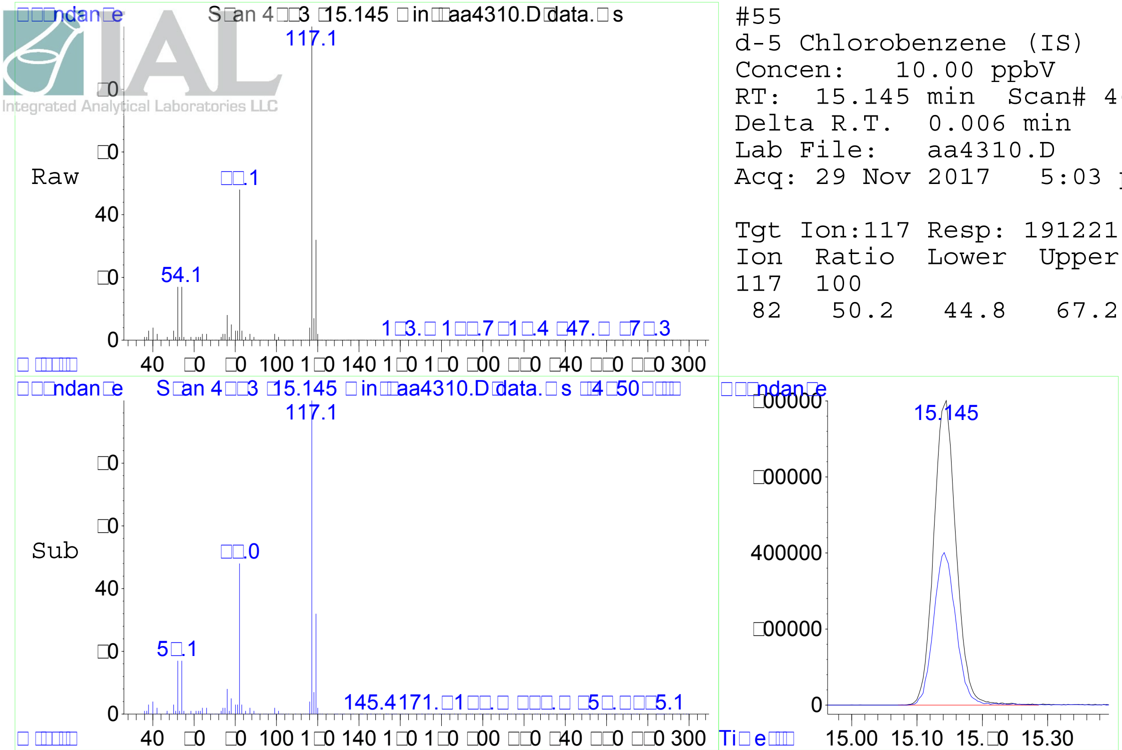


#54
Tetrachloroethene
Concen: 0.39 ppbV
RT: 14.289 min Scan# 4417
Delta R.T. 0.003 min
Lab File: aa4310.D
Acq: 29 Nov 2017 5:03 pm

Tgt Ion:166 Resp: 49860

Ion	Ratio	Lower	Upper
166	100		
164	81.5	64.6	96.8

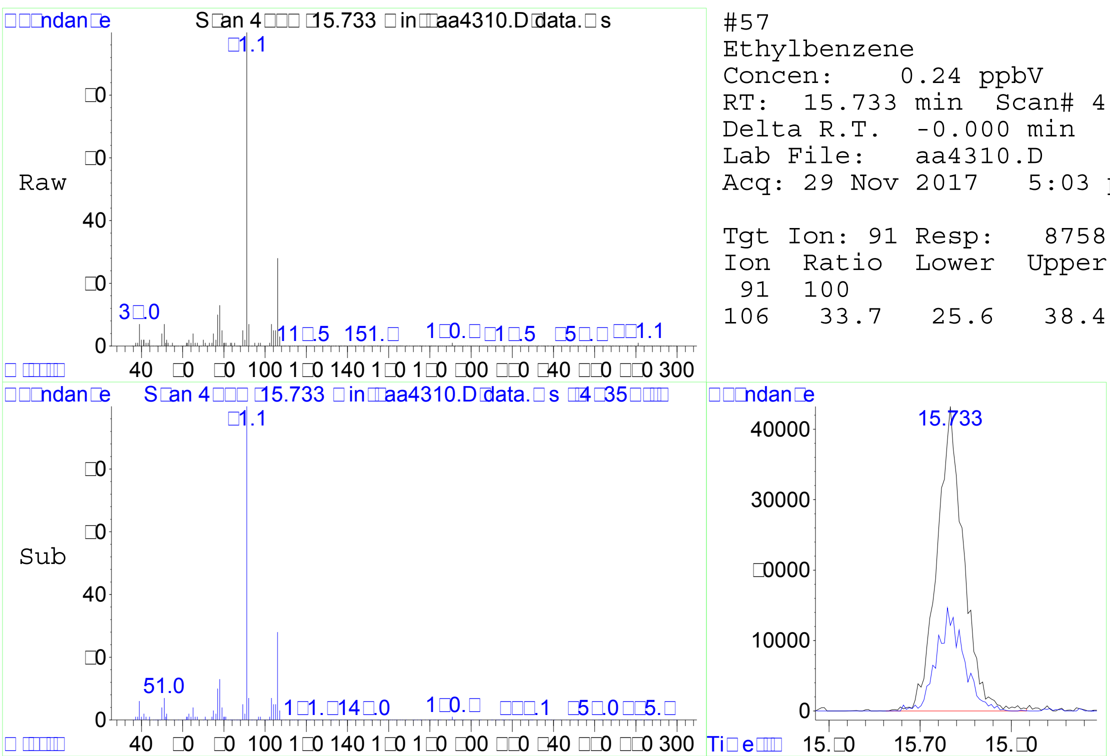




#55
d-5 Chlorobenzene (IS)
Concen: 10.00 ppbV
RT: 15.145 min Scan# 4683
Delta R.T. 0.006 min
Lab File: aa4310.D
Acq: 29 Nov 2017 5:03 pm

Tgt Ion:117 Resp: 1912210

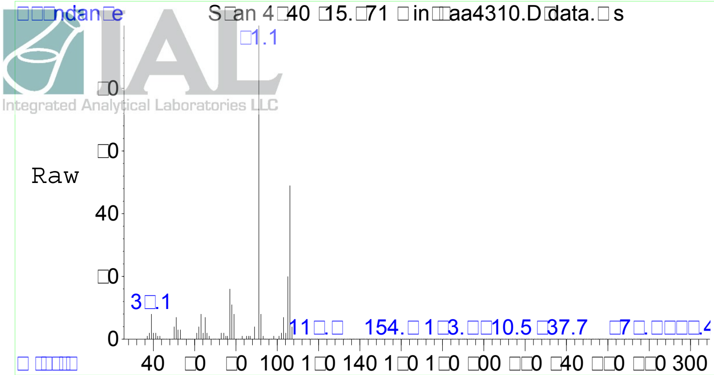
Ion	Ratio	Lower	Upper
117	100		
82	50.2	44.8	67.2



#57
Ethylbenzene
Concen: 0.24 ppbV
RT: 15.733 min Scan# 4866
Delta R.T. -0.000 min
Lab File: aa4310.D
Acq: 29 Nov 2017 5:03 pm

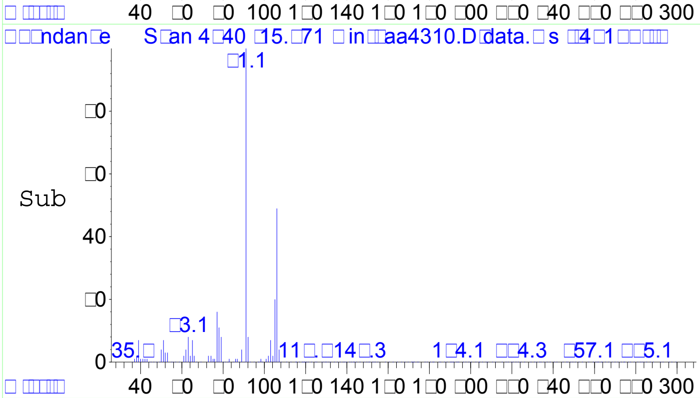
Tgt Ion: 91 Resp: 87580

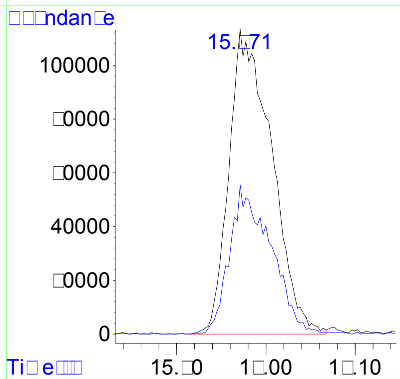
Ion	Ratio	Lower	Upper
91	100		
106	33.7	25.6	38.4

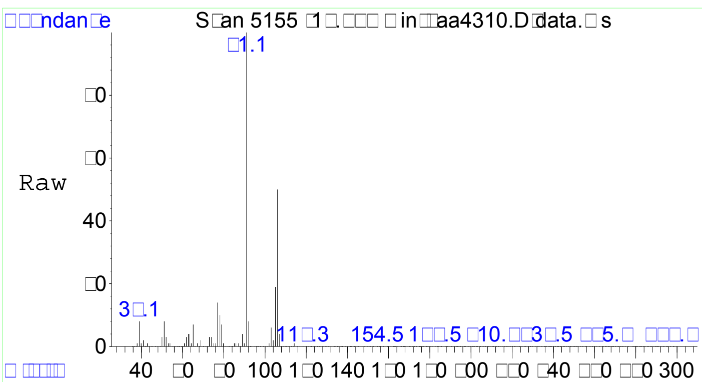


#58
Xylenes (m&p)
Concen: 1.26 ppbV
RT: 15.971 min Scan# 4940
Delta R.T. -0.032 min
Lab File: aa4310.D
Acq: 29 Nov 2017 5:03 pm

Tgt Ion: 91	Resp:	375687	
Ion	Ratio	Lower	Upper
91	100		
106	47.1	39.2	58.8

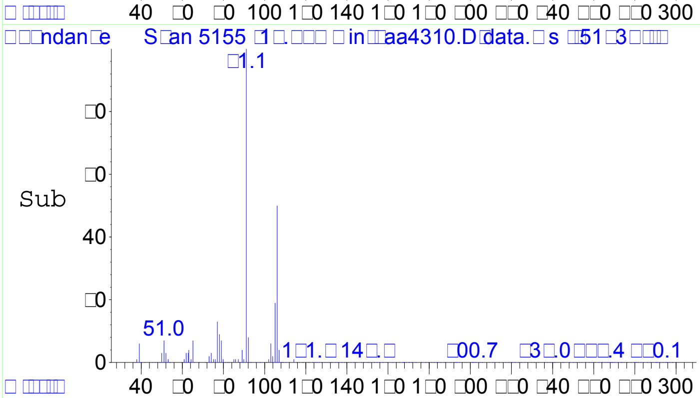


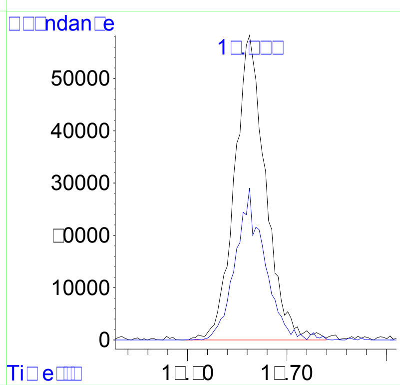


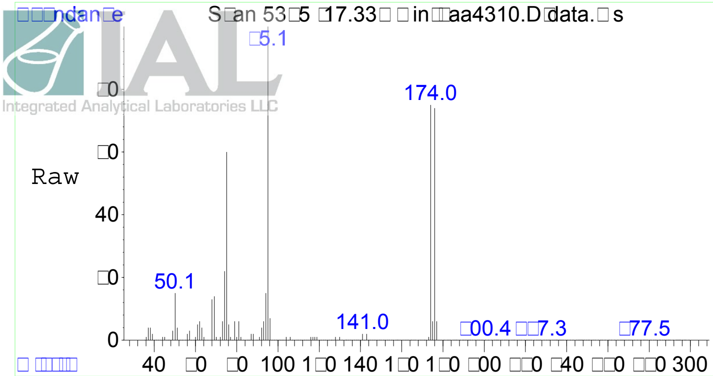


#61
Xylene (o)
Concen: 0.41 ppbV
RT: 16.662 min Scan# 5155
Delta R.T. 0.003 min
Lab File: aa4310.D
Acq: 29 Nov 2017 5:03 pm

Tgt Ion: 91	Resp:	127211	
Ion	Ratio	Lower	Upper
91	100		
106	46.0	30.4	45.6#



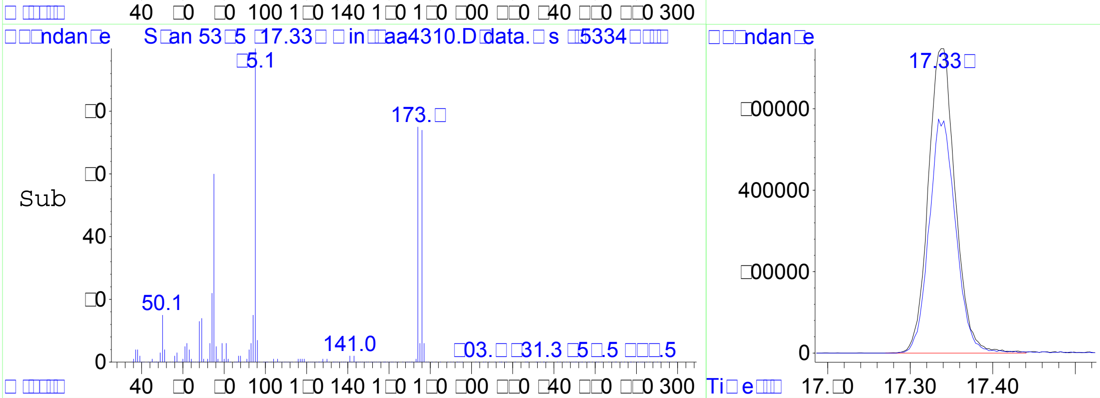


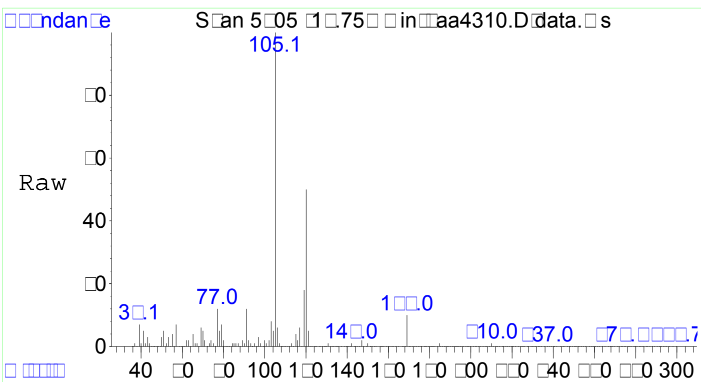


#64
Bromofluorobenzene (tune std)
Concen: 10.15 ppbV
RT: 17.338 min Scan# 5365
Delta R.T. -0.000 min
Lab File: aa4310.D
Acq: 29 Nov 2017 5:03 pm

Tgt Ion: 95 Resp: 1699842

Ion	Ratio	Lower	Upper
95	100		
174	75.7	61.5	92.3

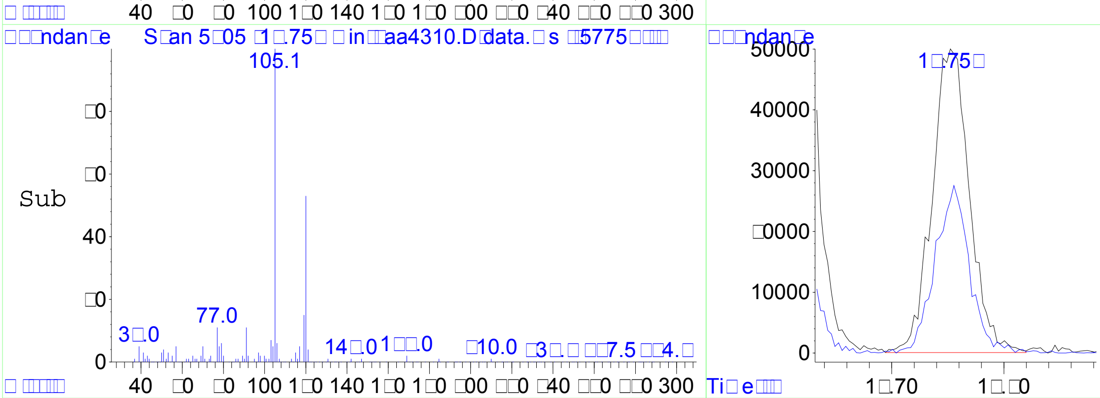


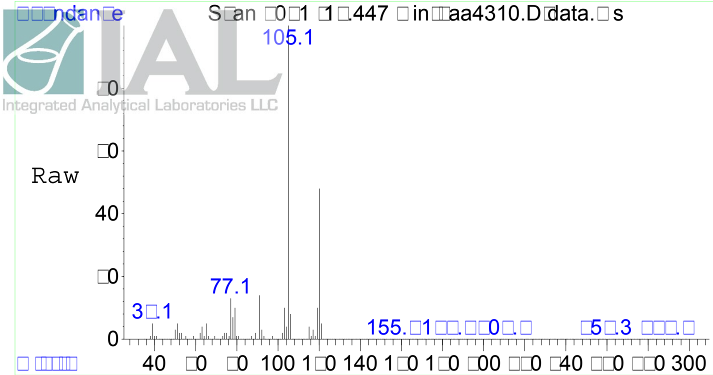


#69
1,3,5-Trimethylbenzene
Concen: 0.30 ppbV
RT: 18.752 min Scan# 5805
Delta R.T. -0.003 min
Lab File: aa4310.D
Acq: 29 Nov 2017 5:03 pm

Tgt Ion:105 Resp: 115763

Ion	Ratio	Lower	Upper
105	100		
120	50.6	31.2	46.8#

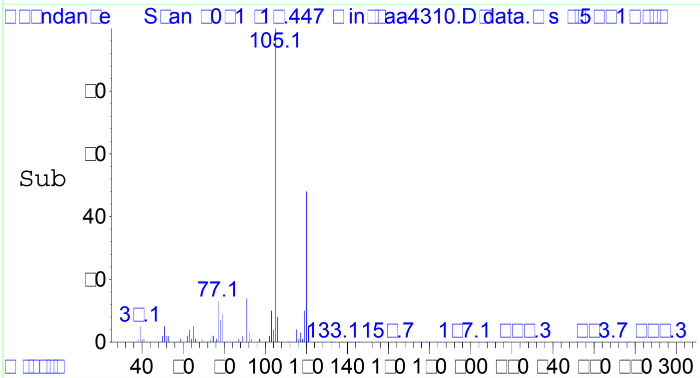


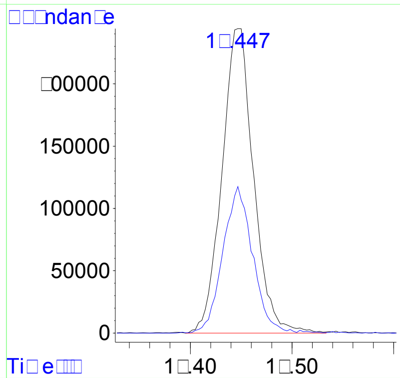


#70
1,2,4-Trimethylbenzene
Concen: 1.42 ppbV
RT: 19.447 min Scan# 6021
Delta R.T. -0.003 min
Lab File: aa4310.D
Acq: 29 Nov 2017 5:03 pm

Tgt Ion:105 Resp: 528126

Ion	Ratio	Lower	Upper
105	100		
120	45.1	36.0	54.0





Integrated Analytical Laboratories LLC

Summary of Results

□n□iron□enta□□ aste Mana□e□ent □sso□iates
100 Misty Lane
Parsippany, NJ 07054
□ttn□□e□in Seise
Pro□e□t□S□i□ier□175 □ Nya□□Rd
Site□NY

Report Date□11□30□17
SD□ N□□ □er□□17□0□□37
Date Sa□ p□ed□11□15□17
Date Re□ei□ed□11□1□□17
Date □na□y□ed□11□□□□17
Data □i□e□□□4□□0
S□□ □a ID□□□□□
D□□1

<u>□na□ysis□ □o□ati□e Or□ani□ □o□ po□nds □y □P□ Met□od TO□15</u>

Compound	CAS #	Ambient ppbv	Ambient ug/m3	Reporting Limits ppbv	Reporting Limits ug/m3
	Sample Name: / IAL ID:	E17-09837-05			
□□etone	□7□□4□1	0.7□	1.□	0.□0	0.4□
Ben□ene	71□43□□	ND	ND	0.□0	0.□4
Bro□odi□□oro□et□ane	75□□7□4	ND	ND	0.□0	1.3
Bro□o□or□	75□□5□□	ND	ND	0.□0	□.1
Bro□o□et□ane	74□□3□□	ND	ND	0.□0	0.7□
1,3□B□tadiene	10□□□□□0	ND	ND	0.□0	0.44
□□□oro□en□ene	10□□□0□7	ND	ND	0.□0	0.□□
□□□oroet□ane	75□00□3	ND	ND	0.□0	0.53
□□□oro□or□	□7□□□□3	ND	ND	0.□0	0.□□
□□□oro□et□ane	74□□7□3	ND	ND	0.□0	0.41
□ar□on dis□□□ide	75□15□0	ND	ND	0.□0	0.□□
□ar□on tetra□□□oride	5□□□3□5	0.0□	0.57	0.04	0.□5
□y□□o□exane	110□□□□7	ND	ND	0.□0	0.□□
Di□ro□o□□□oro□et□ane	1□4□4□□1	ND	ND	0.□0	1.7
1,□□Di□ro□oet□ane	10□□□3□4	ND	ND	0.□0	1.5
1,□□Di□□□oro□en□ene	□5□50□1	ND	ND	0.□0	1.□
1,3□Di□□□oro□en□ene	541□73□1	ND	ND	0.□0	1.□
1,4□Di□□□oro□en□ene	10□□4□□7	ND	ND	0.□0	1.□
Di□□□orodi□□□oro□et□ane	75□71□□	ND	ND	0.□0	0.□□
1,1□Di□□□oroet□ane	75□34□3	ND	ND	0.□0	0.□1
1,□□Di□□□oroet□ane	107□0□□□	ND	ND	0.□0	0.□1
1,1□Di□□□oroet□ene	75□35□4	ND	ND	0.□0	0.7□
1,□□Di□□□oroet□ene □□is□	15□□5□□□	ND	ND	0.□0	0.7□
1,□□Di□□□oroet□ene □trans□	15□□□0□5	ND	ND	0.□0	0.7□
1,□□Di□□□oropropane	7□□□7□5	ND	ND	0.□0	0.□□
1,3□Di□□□oropropene □□is□	100□1□01□5	ND	ND	0.□0	0.□1
1,3□Di□□□oropropene □trans□	100□1□0□□□	ND	ND	0.□0	0.□1
1,□□Di□□□orotetra□□□oroet□ane	7□□14□□	ND	ND	0.□0	1.4
1,4□Dioxane	1□3□□1□1	ND	ND	0.□0	0.7□
□t□y□□en□ene	100□41□4	ND	ND	0.□0	0.□7
n□□eptane	14□□□□□5	ND	ND	0.□0	0.□□
1,3□□exa□□□oro□□tadiene	□7□□□□3	ND	ND	0.□0	□.1
n□□exane	110□54□3	ND	ND	0.□0	0.71
Met□y□ene □□□oride	75□0□□□	ND	ND	0.□0	0.70
Met□y□et□y□□etone	7□□□3□3	0.□1	□.7	0.□0	0.5□
Met□y□iso□□ty□□etone	10□□10□1	ND	ND	0.□0	0.□□
Met□y□tert□□□ty□et□er	1□34□04□4	ND	ND	0.□0	0.7□
Styrene	100□4□□5	ND	ND	0.□0	0.□5
Tert□□□ty□a□□o□o□	75□□5□0	ND	ND	0.□0	0.□1
1,1,□,□□Tetra□□□oroet□ane	7□□34□5	ND	ND	0.□0	1.4
Tetra□□□oroet□ene	1□7□1□□4	ND	ND	0.□0	1.4
To□□ene	10□□□□□3	ND	ND	0.□0	0.75
1,□,4□Tri□□□oro□en□ene	1□0□□□□1	ND	ND	0.□0	1.5
1,1,1□Tri□□□oroet□ane	71□55□□	ND	ND	0.□0	1.1
1,1,□□Tri□□□oroet□ane	7□□00□5	ND	ND	0.□0	1.1
Tri□□□oroet□ene	7□□01□□	ND	ND	0.05	0.□5

Summary of Results

□n□iron□enta□□ aste Mana□e□ent □sso□iates
100 Misty Lane
Parsippany, NJ 07054
□ttn□□e□in Seise
Pro□e□t□S□i□i□ier□175 □ Nya□□Rd
Site□NY

Report Date□11□30□17
SD□ N□□ □er□□17□0□□37
Date Sa□p□ed□11□15□17
Date Re□ei□ed□11□1□□17
Date □na□y□ed□11□□□□17
Data □i□e□□□□4□□0
S□□ □a ID□□□□□
D□□1

□na□ysis□ □o□ati□e Or□ani□ □o□po□nds □y □P□ Met□od TO□15

	Sample Name: IAL ID:	Ambient E17-09837-05			Reporting Limits
Tri□□oro□□oro□et□ane	75□□□4	ND	ND	0.□0	1.1
1,1,□□Tri□□oro□1,□,□tri□□oroet□ane	7□□13□1	ND	ND	0.□0	1.5
1,□,4□Tri□et□y□□en□ene	□5□□3□□	ND	ND	0.□0	0.□□
1,3,5□Tri□et□y□□en□ene	10□□□7□□	ND	ND	0.□0	0.□□
□,□,4□Tri□et□y□pentane	540□□4□1	ND	ND	0.□0	0.□3
□iny□□ro□ide	5□3□□0□□	ND	ND	0.□0	0.□7
□iny□□□□oride	75□01□4	ND	ND	0.□0	0.51
Xy□enes □□ □p□	17□□01□□3□1	ND	ND	0.□0	0.□7
Xy□enes □o□	□5□47□□	ND	ND	0.□0	0.□7

D □ □xtra di□□tion re□□ired □or t□is □o□po□nd

□na□yst□J. S□□□itt

Data Path : C:\DATA\11-28-17\
Data File : aa4290.D
Acq On : 28 Nov 2017 10:48 pm
Operator : jls
Sample : E17-09837-05
Misc : 2892, 500cc
ALS Vial : 20 Sample Multiplier: 1

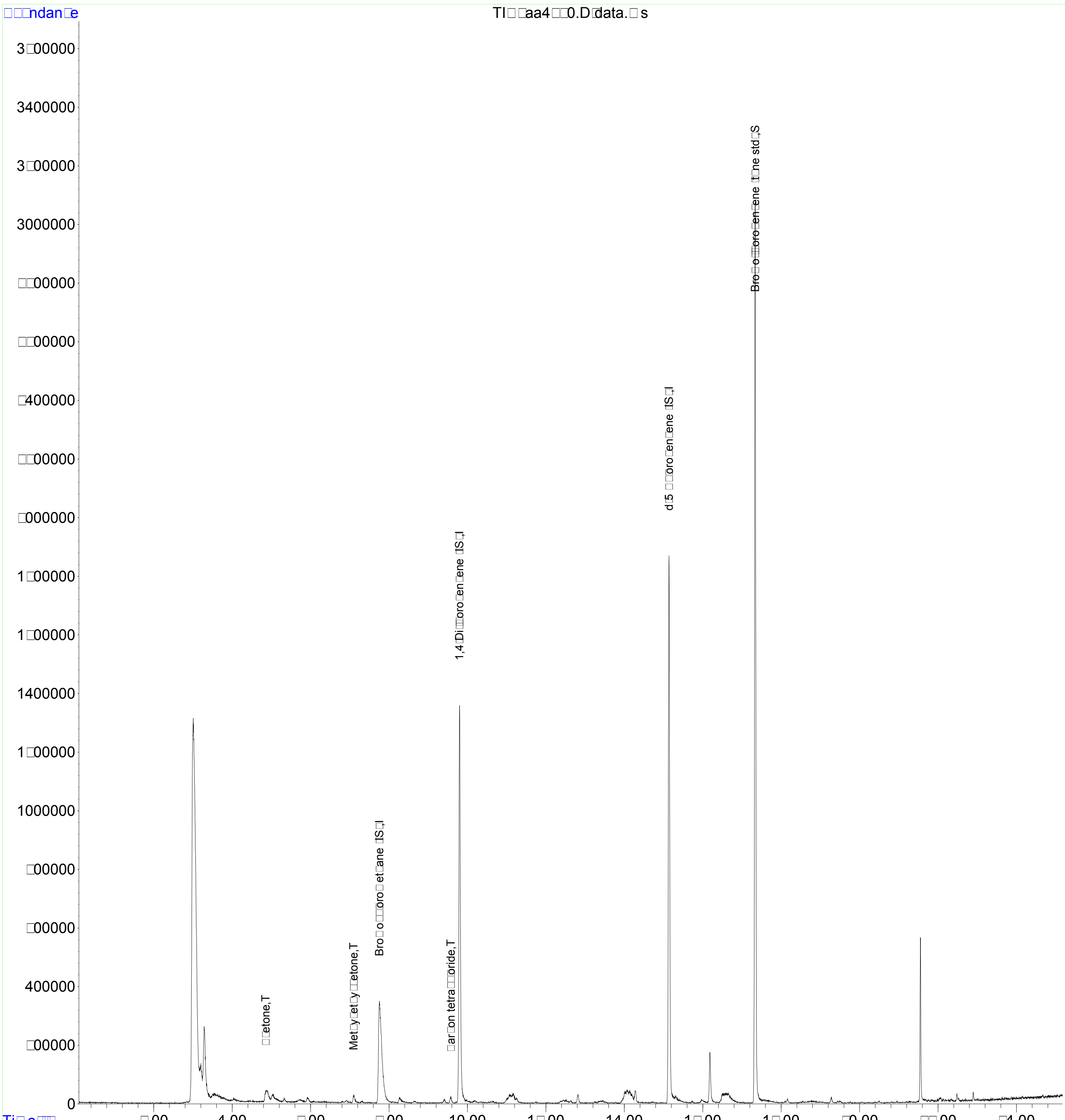
Quant Time: Nov 29 11:39:50 2017
Quant Method : C:\msdchem\1\METHODS\0912.M
Quant Title : TO-15 on the Agilent 7890A / 5975C
QLast Update : Tue Sep 12 13:00:02 2017
Response via : Initial Calibration

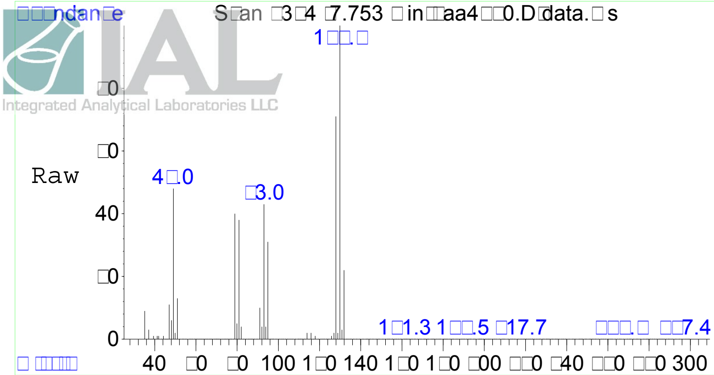
Compound	R.T.	QIon	Response	Conc Units	Dev(Min)
Internal Standards					
1) Bromochloromethane (IS)	7.753	130	421726	10.00 ppbV	0.00
38) 1,4-Difluorobenzene (IS)	9.795	114	1509290	10.00 ppbV	0.00
55) d-5 Chlorobenzene (IS)	15.139	117	1458218	10.00 ppbV	0.00
System Monitoring Compounds					
64) Bromofluorobenzene (tu...	17.338	95	1257889	9.85 ppbV	0.00
Target Compounds					Qvalue
14) Acetone	4.853	58	8219	0.79 ppbV #	1
27) Methyl ethyl ketone	7.097	72	15052	0.91 ppbV	74
36) Carbon tetrachloride	9.576	117	17055m	0.09 ppbV	

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Data Path : C:\DATA\11-28-17\
Data File : aa4290.D
Acq On : 28 Nov 2017 10:48 pm
Operator : jls
Sample : E17-09837-05
Misc : 2892, 500cc
ALS Vial : 20 Sample Multiplier: 1

Quant Time: Nov 29 11:39:50 2017
Quant Method : C:\msdchem\1\METHODS\0912.M
Quant Title : TO-15 on the Agilent 7890A / 5975C
QLast Update : Tue Sep 12 13:00:02 2017
Response via : Initial Calibration

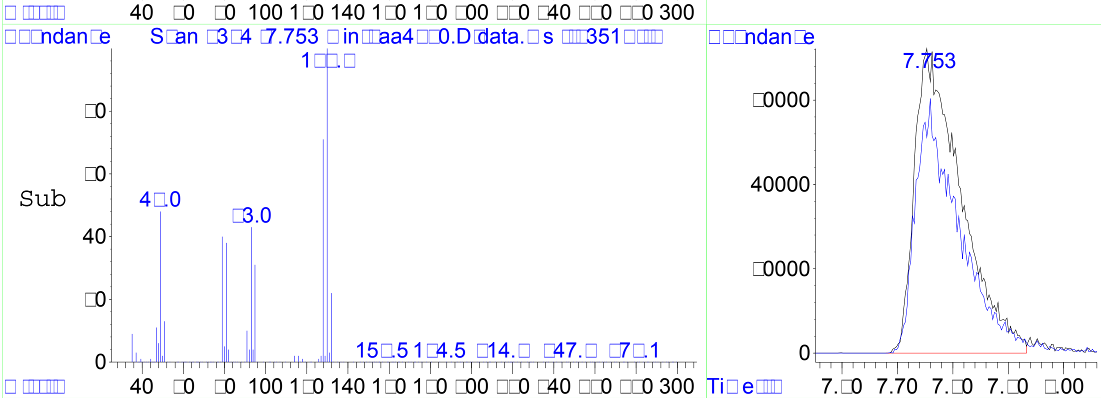


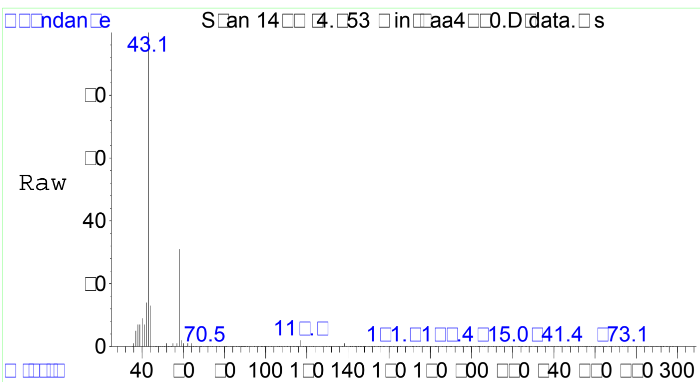


#1
Bromochloromethane (IS)
Concen: 10.00 ppbV
RT: 7.753 min Scan# 2384
Delta R.T. 0.006 min
Lab File: aa4290.D
Acq: 28 Nov 2017 10:48 pm

Tgt Ion:130 Resp: 421726

Ion	Ratio	Lower	Upper
130	100		
128	77.3	62.6	94.0

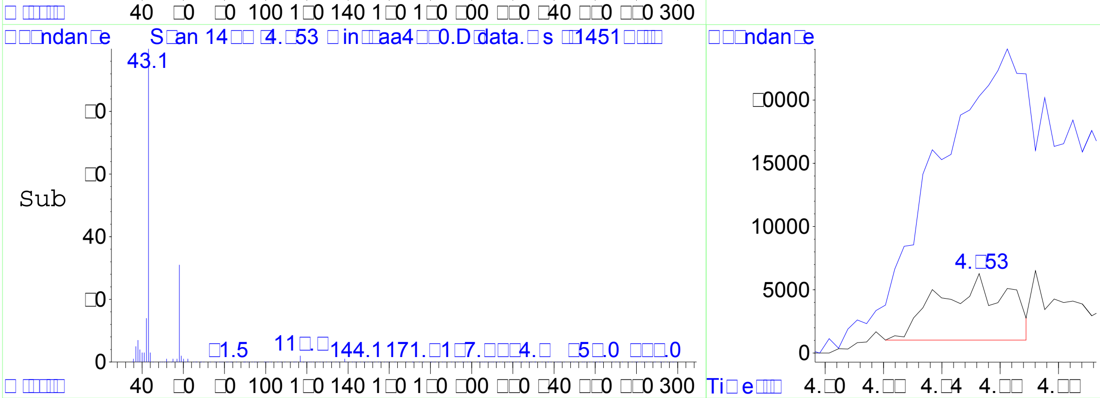


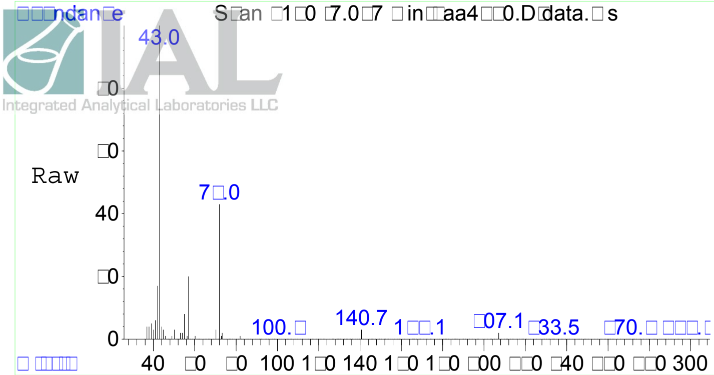


#14
Acetone
Concen: 0.79 ppbV
RT: 4.853 min Scan# 1482
Delta R.T. 0.000 min
Lab File: aa4290.D
Acq: 28 Nov 2017 10:48 pm

Tgt Ion: 58 Resp: 8219

Ion	Ratio	Lower	Upper
58	100		
43	1604.5	229.6	344.4#

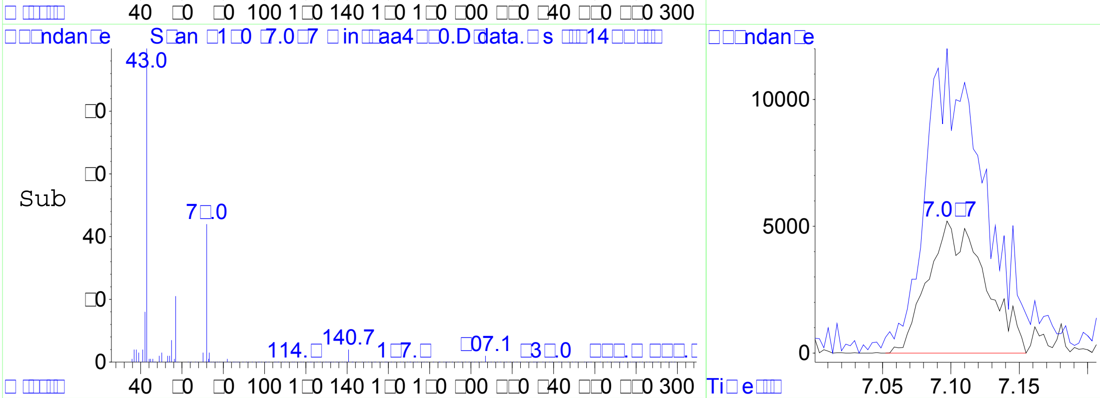


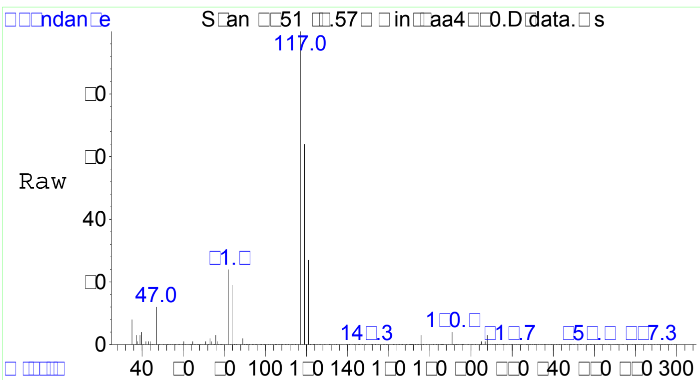


#27
Methyl ethyl ketone
Concen: 0.91 ppbV
RT: 7.097 min Scan# 2180
Delta R.T. 0.003 min
Lab File: aa4290.D
Acq: 28 Nov 2017 10:48 pm

Tgt Ion: 72 Resp: 15052

Ion	Ratio	Lower	Upper
72	100		
43	250.9	168.0	252.0

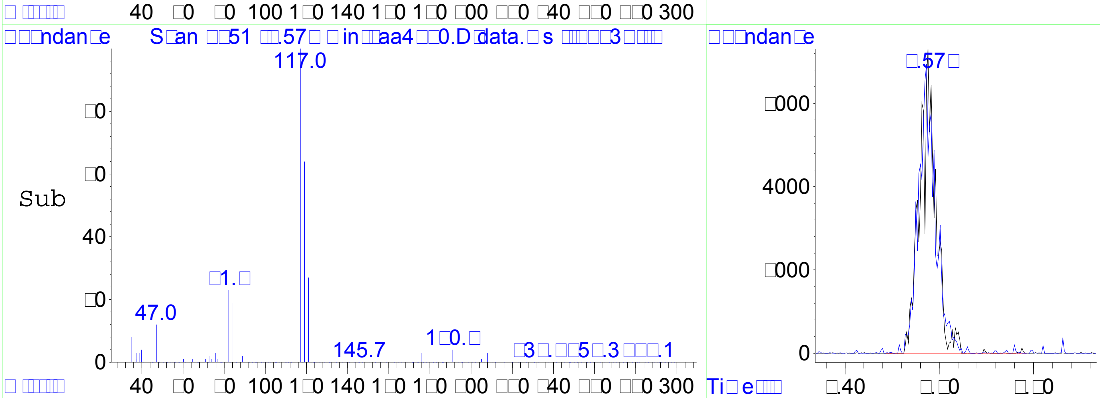


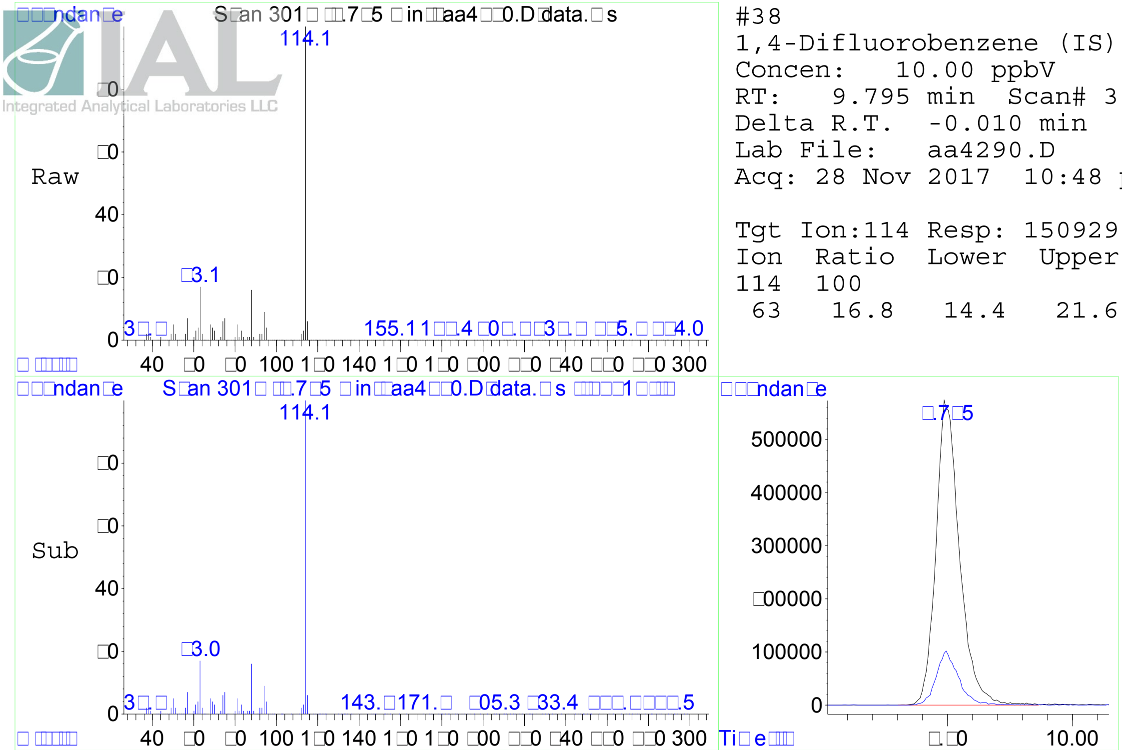


#36
Carbon tetrachloride
Concen: 0.09 ppbV m
RT: 9.576 min Scan# 2951
Delta R.T. -0.010 min
Lab File: aa4290.D
Acq: 28 Nov 2017 10:48 pm

Tgt Ion:117 Resp: 17055

Ion	Ratio	Lower	Upper
117	100		
119	98.3	77.0	115.4

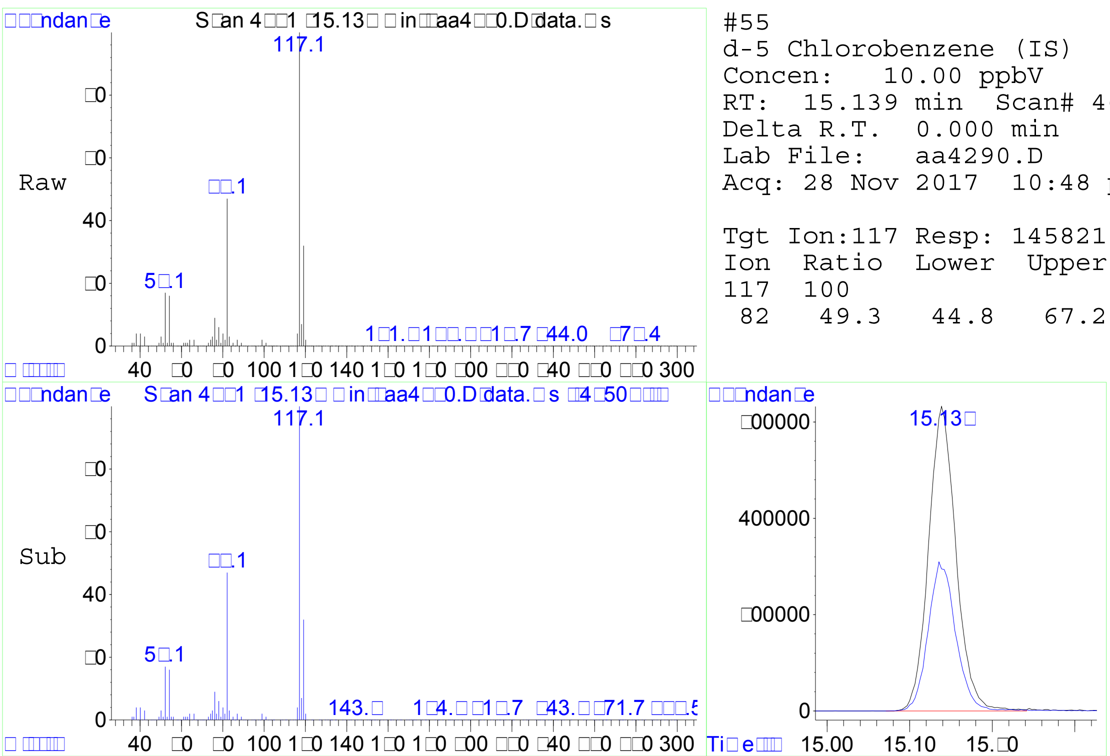




#38
1,4-Difluorobenzene (IS)
Concen: 10.00 ppbV
RT: 9.795 min Scan# 3019
Delta R.T. -0.010 min
Lab File: aa4290.D
Acq: 28 Nov 2017 10:48 pm

Tgt Ion:114 Resp: 1509290

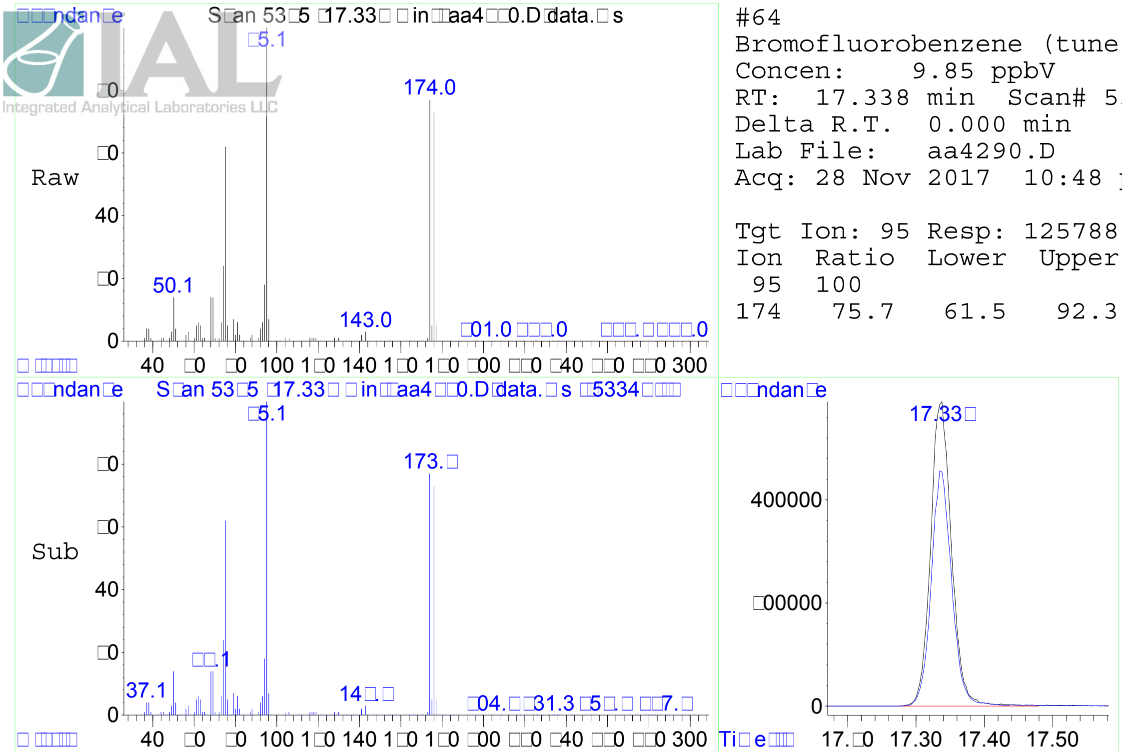
Ion	Ratio	Lower	Upper
114	100		
63	16.8	14.4	21.6



#55
d-5 Chlorobenzene (IS)
Concen: 10.00 ppbV
RT: 15.139 min Scan# 4681
Delta R.T. 0.000 min
Lab File: aa4290.D
Acq: 28 Nov 2017 10:48 pm

Tgt Ion:117 Resp: 1458218

Ion	Ratio	Lower	Upper
117	100		
82	49.3	44.8	67.2



#64
Bromofluorobenzene (tune std)
Concen: 9.85 ppbV
RT: 17.338 min Scan# 5365
Delta R.T. 0.000 min
Lab File: aa4290.D
Acq: 28 Nov 2017 10:48 pm

Tgt Ion: 95 Resp: 1257889

Ion	Ratio	Lower	Upper
95	100		
174	75.7	61.5	92.3

Section VII: Standards Data

Initial Calibration Data

Continuing Calibration Data

Initial Calibration Data Summary Report

Initial Calibration Curve: 9/12/2017 **Method ID:** 0912.M
Instrument: AA

Standard/Sample Run	Date/Time of Sample/Standard Injection
BFB [AA3441BFB]	09/12/2017 08:18
40 PPBV STD [AA3443STD01]	09/12/2017 09:44
20 PPBV STD [AA3444STD02]	09/12/2017 10:17
10 PPBV STD [AA3445STD03]	09/12/2017 10:51
2 PPBV STD [AA3446STD04]	09/12/2017 11:24
0.2 PPBV STD [AA3447STD05]	09/12/2017 12:06
10 PPBV ICVSS [AA3448ICVSS]	09/12/2017 13:28

RParameter	RRF 0.2ppbv	RRF 2ppbv	RRF 10ppbv	RRF 20ppbv	RRF 40ppbv	Avg ppbv	% RSD
Bromochloromethane	ISTD						
1,4-Difluorobenzene	ISTD						
d-5 Chlorobenzene	ISTD						
Acetone	0.13	0.27	0.28	0.28	0.28	0.25	27
Acrolein	0.085	0.17	0.18	0.20	0.19	0.17	28
Allyl Chloride	0.39	0.36	0.41	0.42	0.37	0.39	6.2
Benzene	3.4	2.6	2.8	3.0	3.0	2.9	9.5
Benzyl chloride	1.5	1.6	1.7	1.7	1.7	1.6	6.0
Bromodichloromethane	1.2	0.85	0.86	0.89	0.90	0.94	15
Bromoform	1.2	1.0	0.96	0.95	0.96	1.0	11
Bromomethane	0.49	0.65	0.66	0.61	0.51	0.58	14
1,3-Butadiene	0.24	0.32	0.34	0.34	0.33	0.31	14
Chlorobenzene	1.7	1.3	1.2	1.1	1.1	1.3	20
Chloroethane	0.16	0.33	0.33	0.34	0.33	0.30	26
Chloroform	3.5	2.8	2.9	3.0	3.1	3.0	9.9
Chloromethane	0.050	0.083	0.10	0.098	0.087	0.084	25
Carbon disulfide	2.9	2.6	2.6	2.6	2.7	2.7	5.1
Carbon tetrachloride	5.5	4.1	3.9	4.1	4.3	4.4	15
2-Chlorotoluene	1.8	1.7	1.6	1.6	1.6	1.7	4.9
Cumene	2.5	2.3	2.2	2.1	2.0	2.2	9.1
Cyclohexane	1.2	1.1	1.2	1.3	1.3	1.2	5.0
Dibromochloromethane	1.4	1.0	1.0	1.0	1.0	1.1	15
1,2-Dibromoethane	0.96	0.75	0.74	0.74	0.75	0.79	12
1,2-Dichlorobenzene	1.7	1.4	1.4	1.3	1.3	1.4	11
1,3-Dichlorobenzene	1.9	1.6	1.4	1.3	1.3	1.5	16
1,4-Dichlorobenzene	1.8	1.6	1.4	1.4	1.4	1.5	12
Dichlorodifluoromethane	4.3	3.5	3.5	3.6	3.7	3.7	8.8
1,1-Dichloroethane	2.0	1.4	1.5	1.5	1.6	1.6	15
1,2-Dichloroethane	2.2	1.8	1.8	1.9	2.0	1.9	9.4
1,1-Dichloroethene	1.4	1.3	1.4	1.4	1.4	1.4	4.2
1,2-Dichloroethene (trans)	1.1	1.0	1.1	1.2	1.2	1.1	6.1
1,2-Dichloroethene (trans)	1.1	1.0	1.1	1.2	1.2	1.1	5.6
1,2-Dichloropropane	0.35	0.24	0.23	0.24	0.24	0.26	20
1,3-Dichloropropene (cis)	0.63	0.51	0.56	0.57	0.58	0.57	7.1
1,3-Dichloropropene (trans)	0.62	0.54	0.60	0.62	0.63	0.60	6.1
1,2-Dichlorotetrafluoroethane	3.9	2.7	2.7	2.7	2.6	2.9	19
1,4-Dioxane	0.26	0.16	0.16	0.17	0.17	0.18	25
Ethanol	0.045	0.14	0.13	0.14	0.14	0.12	34
Ethylbenzene	2.1	1.9	1.8	1.8	1.8	1.9	7.0
4-Ethyltoluene	2.2	2.3	2.2	2.1	2.1	2.2	4.3
n-Heptane	0.15	0.26	0.27	0.27	0.27	0.24	22
1,3-Hexachlorobutadiene	1.6	1.1	0.94	0.94	0.93	1.1	26

***% RSD (Relative Standard Deviation) must be within 30%**
****An exception is made for 2 compounds that must be within 40%**
RRF - Relative Response Factor

Initial Calibration Data Summary Report

Initial Calibration Curve: 9/12/2017 **Method ID:** 0912.M
Instrument: AA

Standard/Sample Run	Date/Time of Sample/Standard Injection
BFB [AA3441BFB]	09/12/2017 08:18
40 PPBV STD [AA3443STD01]	09/12/2017 09:44
20 PPBV STD [AA3444STD02]	09/12/2017 10:17
10 PPBV STD [AA3445STD03]	09/12/2017 10:51
2 PPBV STD [AA3446STD04]	09/12/2017 11:24
0.2 PPBV STD [AA3447STD05]	09/12/2017 12:06
10 PPBV ICVSS [AA3448ICVSS]	09/12/2017 13:28

RParameter	RRF 0.2ppbv	RRF 2ppbv	RRF 10ppbv	RRF 20ppbv	RRF 40ppbv	Avg ppbv	% RSD
n-Hexane	0.90	0.73	0.77	0.83	0.84	0.82	7.9
Isopropanol	0.51	0.67	0.72	0.74	0.71	0.67	14
Methylene chloride	1.2	0.77	0.80	0.82	0.83	0.89	21
Methyl ethyl ketone	0.18	0.38	0.43	0.48	0.49	0.39	32
Methyl isobutyl ketone	0.39	0.35	0.34	0.35	0.35	0.36	6.0
Methyl methacrylate	0.34	0.28	0.31	0.32	0.32	0.32	6.5
Methyl n-butyl ketone	0.36	0.31	0.34	0.35	0.36	0.35	5.4
Methyl tert-butyl ether	3.4	2.9	3.1	3.2	3.2	3.2	6.4
Naphthalene	0.25	0.47	0.45	0.44	0.43	0.41	22
Propene	0.23	0.25	0.26	0.27	0.24	0.25	5.0
Styrene	0.96	1.0	1.1	1.1	1.1	1.0	4.8
Tert-butyl alcohol	1.7	1.5	1.6	1.7	1.7	1.6	6.5
1,1,2,2-Tetrachloroethane	1.6	1.2	1.0	0.98	0.98	1.1	23
Tetrachloroethene	0.86	0.62	0.59	0.59	0.59	0.65	18
Tetrahydrofuran	0.28	0.39	0.44	0.48	0.48	0.41	20
Toluene	1.3	1.1	1.1	1.1	1.1	1.1	6.0
1,2,4-Trichlorobenzene	1.6	1.3	1.3	1.2	1.2	1.3	12
1,1,1-Trichloroethane	4.6	3.4	3.3	3.5	3.6	3.7	15
1,1,2-Trichloroethane	0.60	0.44	0.42	0.42	0.42	0.46	18
Trichloroethene	0.64	0.50	0.49	0.50	0.49	0.52	13
Trichlorofluoromethane	6.2	4.6	4.5	4.6	4.7	4.9	14
1,1,2-Trichloro-1,2,2-trifluoroethane	4.1	2.9	2.6	2.7	2.7	3.0	21
1,2,4-Trimethylbenzene	1.7	2.0	2.0	2.0	2.0	1.9	6.2
1,3,5-Trimethylbenzene	2.0	2.1	2.0	2.0	1.9	2.0	4.2
2,2,4-Trimethylpentane	0.72	0.72	0.75	0.74	0.74	0.73	2.0
Vinyl bromide	0.69	0.92	1.0	1.0	1.0	0.94	16
Vinyl chloride	0.41	0.58	0.61	0.62	0.62	0.57	16
Xylenes (m&p)	1.7	1.7	1.5	1.5	1.4	1.6	6.7
Xylenes (o)	1.7	1.7	1.6	1.5	1.5	1.6	5.9

***% RSD (Relative Standard Deviation) must be within 30%**
****An exception is made for 2 compounds that must be within 40%**
RRF - Relative Response Factor

Method Path : C:\msdchem\1\METHODS\
Method File : 0912.M
Title : TO-15 on the Agilent 7890A / 5975C
Last Update : Tue Sep 12 13:00:02 2017
Response Via : Initial Calibration

Calibration Files
0.2 =aa3447std05.D 2 =aa3446std04.D 10 =aa3445std03.D 20 =aa3444std02.D 40 =aa3443std01.D

		Compound	0.2	2	10	20	40	Avg	%RSD
1)	I	Bromochloromethane...	----------------ISTD--------------------						
2)	T	Propene	0.232	0.249	0.258	0.265	0.242	0.249	5.09
3)	T	Dichlorodifluoro...	4.313	3.527	3.518	3.632	3.674	3.733	8.87
4)	T	Chloromethane	0.050	0.083	0.103	0.098	0.087	0.084	24.63
5)	T	1,2-Dichlorotetr...	3.891	2.711	2.713	2.686	2.554	2.911	18.96
6)	T	Vinyl chloride	0.406	0.582	0.606	0.619	0.621	0.567	16.10
7)	T	1,3-Butadiene	0.235	0.320	0.342	0.344	0.331	0.314	14.43
8)	T	n-Butane	0.299	0.552	0.585	0.589	0.570	0.519	23.84
9)	T	Bromomethane	0.487	0.645	0.659	0.605	0.508	0.581	13.63
10)	T	Chloroethane	0.158	0.334	0.329	0.340	0.332	0.298	26.36
11)	T	Ethanol	0.045	0.138	0.130	0.136	0.137	0.117	34.45
12)	T	Vinyl bromide	0.691	0.922	1.001	1.044	1.047	0.941	15.81
13)	T	Acrolein	0.085	0.174	0.178	0.196	0.194	0.165	27.70
14)	T	Acetone	0.129	0.266	0.281	0.279	0.282	0.247	26.85
15)	T	Trichlorofluorom...	6.192	4.572	4.536	4.648	4.657	4.921	14.48
16)	T	Isopropanol	0.506	0.665	0.720	0.739	0.709	0.668	14.14
17)	T	n-Pentane	0.498	0.565	0.639	0.671	0.677	0.610	12.61
18)	T	1,1-Dichloroethene	1.401	1.289	1.406	1.441	1.418	1.391	4.26
19)	T	Methylene chloride	1.213	0.774	0.804	0.816	0.828	0.887	20.69
20)	T	Tert-butyl alcohol	1.702	1.480	1.596	1.719	1.736	1.646	6.54
21)	T	Allyl chloride	0.390	0.362	0.408	0.416	0.366	0.388	6.21
22)	T	1,1,2-Trichloro-...	4.098	2.869	2.572	2.662	2.714	2.983	21.21
23)	T	Carbon disulfide	2.916	2.566	2.603	2.630	2.662	2.675	5.19
24)	T	1,2-Dichloroethe...	1.124	1.039	1.114	1.180	1.204	1.132	5.69
25)	T	1,1-Dichloroethane	1.994	1.389	1.491	1.547	1.556	1.595	14.58
26)	T	Methyl tert-buty...	3.383	2.853	3.062	3.235	3.245	3.156	6.46
27)	T	Methyl ethyl ketone	0.182	0.383	0.431	0.475	0.492	0.393	31.82
28)	T	1,2-Dichloroethe...	1.141	1.010	1.110	1.168	1.185	1.123	6.18
29)	T	Ethyl acetate	0.078	0.131	0.145	0.150	0.151	0.131	23.56
30)	T	n-Hexane	0.901	0.734	0.772	0.830	0.839	0.815	7.90
31)	T	Chloroform	3.534	2.757	2.852	2.979	3.051	3.034	9.93
32)	T	Tetrahydrofuran	0.279	0.385	0.436	0.476	0.476	0.411	20.05
33)	T	1,2-Dichloroethane	2.240	1.761	1.830	1.923	1.988	1.948	9.46
34)	T	1,1,1-Trichloroe...	4.621	3.447	3.308	3.460	3.561	3.679	14.51
35)	T	Benzene	3.385	2.639	2.773	2.959	2.976	2.946	9.58
36)	T	Carbon tetrachlo...	5.534	4.090	3.942	4.139	4.288	4.399	14.70
37)	T	Cyclohexane	1.208	1.117	1.189	1.259	1.269	1.208	5.08
38)	I	1,4-Difluorobenzen...	----------------ISTD--------------------						
39)	T	1,2-Dichloropropane	0.349	0.240	0.231	0.235	0.237	0.258	19.57
40)	T	Bromodichloromet...	1.185	0.853	0.864	0.888	0.901	0.938	14.85
41)	T	2,2,4-Trimethylp...	0.723	0.716	0.753	0.736	0.744	0.734	2.02
42)	T	Trichloroethene	0.640	0.495	0.491	0.498	0.491	0.523	12.50
43)	T	1,4-Dioxane	0.264	0.156	0.164	0.168	0.166	0.183	24.64
44)	T	Methyl methacrylate	0.340	0.284	0.314	0.321	0.323	0.317	6.53
45)	T	n-Heptane	0.149	0.259	0.267	0.269	0.270	0.243	21.71
46)	T	cis-1,3-Dichloro...	0.626	0.513	0.558	0.572	0.578	0.569	7.12
47)	T	Methyl isobutyl ...	0.394	0.347	0.344	0.346	0.348	0.356	6.08
48)	T	trans-1,3-Dichlo...	0.624	0.540	0.596	0.617	0.630	0.601	6.10
49)	T	1,1,2-Trichloroe...	0.603	0.436	0.415	0.415	0.422	0.458	17.79
50)	T	Toluene	1.268	1.091	1.120	1.133	1.131	1.148	6.00
51)	T	Methyl n-butyl k...	0.363	0.314	0.342	0.351	0.355	0.345	5.48
52)	T	Dibromochloromet...	1.381	1.020	1.005	1.021	1.036	1.092	14.79
53)	T	1,2-Dibromoethane	0.956	0.753	0.737	0.742	0.748	0.787	12.00
54)	T	Tetrachloroethene	0.858	0.621	0.593	0.594	0.594	0.652	17.77
55)	I	d-5 Chlorobenzene ...	----------------ISTD--------------------						
56)	T	Chlorobenzene	1.747	1.280	1.152	1.136	1.130	1.289	20.42
57)	T	Ethylbenzene	2.119	1.929	1.839	1.820	1.789	1.899	7.02
58)	T	Xylenes (m&p)	1.674	1.657	1.524	1.476	1.443	1.555	6.77
59)	T	Bromoform	1.215	1.002	0.957	0.947	0.964	1.017	11.08
60)	T	Styrene	0.963	1.035	1.079	1.080	1.076	1.047	4.80

Method Path : C:\msdchem\1\METHODS\
Method File : 0912.M

61)	T	Xylene (o)	1.739	1.721	1.597	1.543	1.536	1.627	5.95
62)	T	1,1,2,2-Tetrachl...	1.580	1.164	1.000	0.979	0.978	1.140	22.60
63)	T	n-Nonane	0.430	0.454	0.447	0.441	0.441	0.443	2.02
64)	S	Bromofluorobenze...	0.879	0.874	0.868	0.869	0.889	0.876	1.01
65)	T	Cumene	2.544	2.295	2.158	2.080	2.041	2.224	9.17
66)	T	2-Chlorotoluene	1.806	1.704	1.632	1.627	1.603	1.674	4.94
67)	T	n-Propyl benzene	0.676	0.684	0.626	0.610	0.601	0.639	5.99
68)	T	4-Ethyltoluene	2.155	2.311	2.172	2.116	2.057	2.162	4.37
69)	T	1,3,5-Trimethylb...	2.023	2.149	2.028	1.956	1.925	2.016	4.29
70)	T	1,2,4-Trimethylb...	1.736	2.011	2.036	2.003	1.960	1.949	6.28
71)	T	Benzyl chloride	1.526	1.561	1.663	1.732	1.749	1.646	6.08
72)	T	1,3-Dichlorobenzene	1.874	1.561	1.379	1.328	1.281	1.485	16.31
73)	T	1,4-Dichlorobenzene	1.804	1.560	1.429	1.397	1.362	1.510	11.95
74)	T	1,2-Dichlorobenzene	1.672	1.446	1.351	1.332	1.301	1.420	10.62
75)	T	1,2,4-Trichlorob...	1.596	1.317	1.257	1.237	1.187	1.319	12.29
76)	T	Naphthalene	0.245	0.467	0.445	0.443	0.429	0.406	22.36
77)	T	1,3-Hexachlorobu...	1.591	1.066	0.943	0.935	0.930	1.093	25.99

(#) = Out of Range

Data Path : C:\DATA\09-12-17\
Data File : aa3443std01.D
Acq On : 12 Sep 2017 9:44 am
Operator : jls
Sample : 40 ppbv Std
Misc : CC483586
ALS Vial : 3 Sample Multiplier: 1

Quant Time: Sep 12 11:51:51 2017
Quant Method : C:\msdchem\1\METHODS\0912.M
Quant Title : TO-15 on the Agilent 7890A / 5975C
QLast Update : Tue Sep 12 11:51:33 2017
Response via : Initial Calibration

Compound	R.T.	QIon	Response	Conc Units	Dev(Min)
Internal Standards					
1) Bromochloromethane (IS)	7.762	130	507733	10.00 ppbV	0.02
38) 1,4-Difluorobenzene (IS)	9.811	114	1906808	10.00 ppbV	0.00
55) d-5 Chlorobenzene (IS)	15.145	117	1755772	10.00 ppbV	0.00
System Monitoring Compounds					
64) Bromofluorobenzene (tu...	17.341	95	1561727	10.24 ppbV	0.00
Target Compounds					Qvalue
2) Propene	3.518	41	492432	37.12 ppbV	91
3) Dichlorodifluoromethane	3.573	85	7460967	41.10 ppbV	97
4) Chloromethane	3.801	52	176957	34.74 ppbV #	1
5) 1,2-Dichlorotetrafluor...	3.788	85	5186871	37.84 ppbV	94
6) Vinyl chloride	3.904	62	1261033	40.53 ppbV	87
7) 1,3-Butadiene	4.007	54	671693	38.57 ppbV	88
8) n-Butane	4.052	43	1158072	38.85 ppbV	98
9) Bromomethane	4.255	94	1031392	32.15 ppbV	99
10) Chloroethane	4.396	64	673911	39.68 ppbV	100
11) Ethanol	4.438	45	278522	41.26 ppbV	96
12) Vinyl bromide	4.695	106	2125768	40.94 ppbV	100
13) Acrolein	4.766	56	393474	41.39 ppbV	98
14) Acetone	4.862	58	573042	40.29 ppbV	79
15) Trichlorofluoromethane	5.039	101	9457088	40.56 ppbV	99
16) Isopropanol	5.042	45	1440637	38.88 ppbV	99
17) n-Pentane	5.338	43	1374915	41.34 ppbV	92
18) 1,1-Dichloroethene	5.602	61	2880621	39.86 ppbV	97
19) Methylene chloride	5.714	84	1682116	40.92 ppbV	99
20) Tert-butyl alcohol	5.563	59	3524873	41.88 ppbV	100
21) Allyl chloride	5.811	76	742595	35.52 ppbV	100
22) 1,1,2-Trichloro-1,2,2-...	5.936	101	5510941	41.48 ppbV	97
23) Carbon disulfide	6.000	76	5405476	40.68 ppbV	100
24) 1,2-Dichloroethene (tr...	6.570	61	2446220	42.01 ppbV	100
25) 1,1-Dichloroethane	6.759	63	3160526	40.99 ppbV	93
26) Methyl tert-butyl ether	6.785	73	6590613	41.22 ppbV	99
27) Methyl ethyl ketone	7.100	72	998273	43.42 ppbV	97
28) 1,2-Dichloroethene (cis)	7.576	61	2407103	41.63 ppbV	100
29) Ethyl acetate	7.766	45	307654	41.07 ppbV	100
30) n-Hexane	7.798	57	1703258	41.90 ppbV	96
31) Chloroform	7.875	83	6196559	41.86 ppbV	100
32) Tetrahydrofuran	8.264	42	967589	41.77 ppbV	84
33) 1,2-Dichloroethane	8.643	62	4037399	42.37 ppbV	96
34) 1,1,1-Trichloroethane	8.923	97	7233141	42.10 ppbV	99
35) Benzene	9.418	78	6043342	41.53 ppbV	98
36) Carbon tetrachloride	9.586	117	8708585	42.45 ppbV	100
37) Cyclohexane	9.730	84	2578071	41.47 ppbV	89
39) 1,2-Dichloropropane	10.328	63	1805213	40.61 ppbV	96
40) Bromodichloromethane	10.553	83	6868949	41.14 ppbV	100
41) 2,2,4-Trimethylpentane	10.656	57	5675000	39.99 ppbV	94
42) Trichloroethene	10.608	130	3743603	39.68 ppbV	99
43) 1,4-Dioxane	10.573	88	1263305	39.99 ppbV	95
44) Methyl methacrylate	10.823	69	2461365	40.60 ppbV	99
45) n-Heptane	10.962	71	2055547	40.22 ppbV	99
46) cis-1,3-Dichloropropene	11.618	75	4412336	40.96 ppbV	100
47) Methyl isobutyl ketone	11.640	43	2651290	40.33 ppbV	99
48) trans-1,3-Dichloropropene	12.257	75	4804821	41.55 ppbV	99
49) 1,1,2-Trichloroethane	12.466	97	3219746	40.69 ppbV	97
50) Toluene	12.827	91	8622801	40.14 ppbV	97
51) Methyl n-butyl ketone	13.142	43	2711307	41.05 ppbV	99

Data Path : C:\DATA\09-12-17\
Data File : aa3443std01.D
Acq On : 12 Sep 2017 9:44 am
Operator : jls
Sample : 40 ppbv Std
Misc : CC483586
ALS Vial : 3 Sample Multiplier: 1

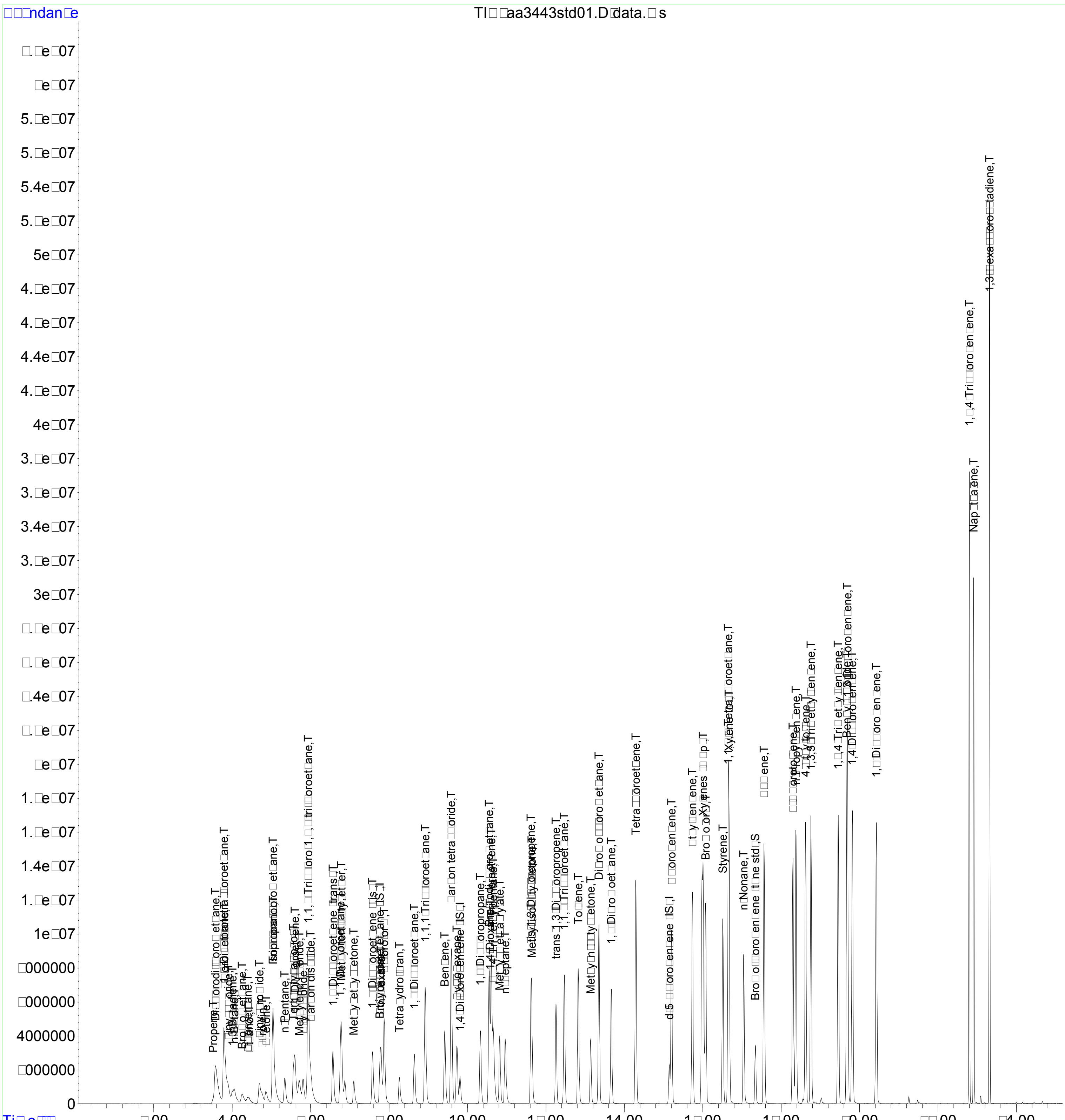
Quant Time: Sep 12 11:51:51 2017
Quant Method : C:\msdchem\1\METHODS\0912.M
Quant Title : TO-15 on the Agilent 7890A / 5975C
QLast Update : Tue Sep 12 11:51:33 2017
Response via : Initial Calibration

Compound	R.T.	QIon	Response	Conc	Units	Dev(Min)
52) Dibromochloromethane	13.351	129	7900815	40.91	ppbV	100
53) 1,2-Dibromoethane	13.669	107	5702953	40.44	ppbV	100
54) Tetrachloroethene	14.293	166	4530332	40.01	ppbV	98
56) Chlorobenzene	15.203	112	7933943	39.49	ppbV	99
57) Ethylbenzene	15.736	91	12566983	39.12	ppbV	99
58) Xylenes (m&p)	16.007	91	20265038	76.94	ppbV	98
59) Bromoform	16.074	173	6772595	40.54	ppbV	98
60) Styrene	16.511	104	7555611	39.87	ppbV	100
61) Xylene (o)	16.669	91	10787232	39.12	ppbV	89
62) 1,1,2,2-Tetrachloroethane	16.650	83	6871754	39.55	ppbV	99
63) n-Nonane	17.042	57	3100414	39.74	ppbV	98
65) Cumene	17.563	105	14336619	38.54	ppbV	93
66) 2-Chlorotoluene	18.299	91	11254947	39.34	ppbV	90
67) n-Propyl benzene	18.376	120	4220680	38.92	ppbV	78
68) 4-Ethyltoluene	18.624	105	14443758	38.37	ppbV	90
69) 1,3,5-Trimethylbenzene	18.759	105	13516198	38.64	ppbV	89
70) 1,2,4-Trimethylbenzene	19.453	105	13763803	38.82	ppbV	97
71) Benzyl chloride	19.672	91	12286327	41.21	ppbV	98
72) 1,3-Dichlorobenzene	19.691	146	8998162	37.86	ppbV	99
73) 1,4-Dichlorobenzene	19.813	146	9562690	38.55	ppbV	98
74) 1,2-Dichlorobenzene	20.428	146	9139233	38.81	ppbV	99
75) 1,2,4-Trichlorobenzene	22.797	180	8334126	38.07	ppbV	99
76) Naphthalene	22.910	127	3010750	38.64	ppbV	100
77) 1,3-Hexachlorobutadiene	23.315	225	6529476	39.61	ppbV	94

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Data Path : C:\DATA\09-12-17\
Data File : aa3443std01.D
Acq On : 12 Sep 2017 9:44 am
Operator : jls
Sample : 40 ppbv Std
Misc : CC483586
ALS Vial : 3 Sample Multiplier: 1

Quant Time: Sep 12 11:51:51 2017
Quant Method : C:\msdchem\1\METHODS\0912.M
Quant Title : TO-15 on the Agilent 7890A / 5975C
QLast Update : Tue Sep 12 11:51:33 2017
Response via : Initial Calibration



Data Path : C:\DATA\09-12-17\
Data File : aa3444std02.D
Acq On : 12 Sep 2017 10:17 am
Operator : jls
Sample : 20 ppbv Std
Misc : CC483586
ALS Vial : 4 Sample Multiplier: 1

Quant Time: Sep 12 11:51:12 2017
Quant Method : C:\msdchem\1\METHODS\0912.M
Quant Title : TO-15 on the Agilent 7890A / 5975C
QLast Update : Tue Sep 12 11:51:02 2017
Response via : Initial Calibration

Compound	R.T.	QIon	Response	Conc	Units	Dev(Min)
Internal Standards						
1) Bromochloromethane (IS)	7.756	130	536726	10.00	ppbV	0.00
38) 1,4-Difluorobenzene (IS)	9.804	114	1995834	10.00	ppbV	0.00
55) d-5 Chlorobenzene (IS)	15.141	117	1812496	10.00	ppbV	0.00
System Monitoring Compounds						
64) Bromofluorobenzene (tu...	17.341	95	1575408	10.02	ppbV	0.00
Target Compounds						Qvalue
2) Propene	3.512	41	284157	20.53	ppbV	91
3) Dichlorodifluoromethane	3.573	85	3898861	20.65	ppbV	97
4) Chloromethane	3.740	52	105038	19.04	ppbV #	37
5) 1,2-Dichlorotetrafluor...	3.785	85	2883051	19.80	ppbV	97
6) Vinyl chloride	3.901	62	664979	20.45	ppbV	87
7) 1,3-Butadiene	3.994	54	369678	20.17	ppbV	86
8) n-Butane	4.045	43	632383	20.13	ppbV	99
9) Bromomethane	4.248	94	648986	18.34	ppbV	97
10) Chloroethane	4.389	64	365222	20.70	ppbV	96
11) Ethanol	4.428	45	145944	20.93	ppbV	90
12) Vinyl bromide	4.692	106	1121183	20.88	ppbV	100
13) Acrolein	4.756	56	210610	22.01	ppbV	97
14) Acetone	4.849	58	299330	19.82	ppbV	74
15) Trichlorofluoromethane	5.032	101	4989557	20.49	ppbV	99
16) Isopropanol	5.026	45	793737	20.53	ppbV	97
17) n-Pentane	5.341	43	720477	21.01	ppbV	92
18) 1,1-Dichloroethene	5.592	61	1546934	20.50	ppbV	98
19) Methylene chloride	5.708	84	875809	20.31	ppbV	99
20) Tert-butyl alcohol	5.563	59	1845060	21.54	ppbV	100
21) Allyl chloride	5.807	76	446165	20.39	ppbV	100
22) 1,1,2-Trichloro-1,2,2-...	5.936	101	2857551	20.70	ppbV	96
23) Carbon disulfide	5.994	76	2823312	20.20	ppbV	100
24) 1,2-Dichloroethene (tr...	6.566	61	1266294	21.17	ppbV	99
25) 1,1-Dichloroethane	6.756	63	1660587	20.76	ppbV	93
26) Methyl tert-butyl ether	6.782	73	3472754	21.13	ppbV	99
27) Methyl ethyl ketone	7.097	72	509854	22.06	ppbV	98
28) 1,2-Dichloroethene (cis)	7.572	61	1253582	21.05	ppbV	100
29) Ethyl acetate	7.765	45	160817	20.63	ppbV	100
30) n-Hexane	7.794	57	890645	21.51	ppbV	97
31) Chloroform	7.871	83	3197684	20.89	ppbV	100
32) Tetrahydrofuran	8.257	42	511090	21.82	ppbV	85
33) 1,2-Dichloroethane	8.640	62	2064604	21.02	ppbV	95
34) 1,1,1-Trichloroethane	8.920	97	3713894	20.92	ppbV	99
35) Benzene	9.415	78	3176455	21.35	ppbV	98
36) Carbon tetrachloride	9.582	117	4442760	21.00	ppbV	99
37) Cyclohexane	9.727	84	1351600	21.17	ppbV	89
39) 1,2-Dichloropropane	10.328	63	939339	20.38	ppbV	96
40) Bromodichloromethane	10.547	83	3543255	20.55	ppbV	100
41) 2,2,4-Trimethylpentane	10.656	57	2936211	19.54	ppbV	93
42) Trichloroethene	10.605	130	1988500	20.27	ppbV	98
43) 1,4-Dioxane	10.569	88	668684	20.45	ppbV	94
44) Methyl methacrylate	10.820	69	1283086	20.44	ppbV	99
45) n-Heptane	10.961	71	1075322	20.21	ppbV	99
46) cis-1,3-Dichloropropene	11.614	75	2283836	20.52	ppbV	99
47) Methyl isobutyl ketone	11.640	43	1380338	20.12	ppbV	99
48) trans-1,3-Dichloropropene	12.254	75	2463442	20.72	ppbV	100
49) 1,1,2-Trichloroethane	12.466	97	1655459	19.98	ppbV	98
50) Toluene	12.820	91	4522808	20.23	ppbV	96
51) Methyl n-butyl ketone	13.138	43	1400833	20.54	ppbV	99

Data Path : C:\DATA\09-12-17\
Data File : aa3444std02.D
Acq On : 12 Sep 2017 10:17 am
Operator : jls
Sample : 20 ppbv Std
Misc : CC483586
ALS Vial : 4 Sample Multiplier: 1

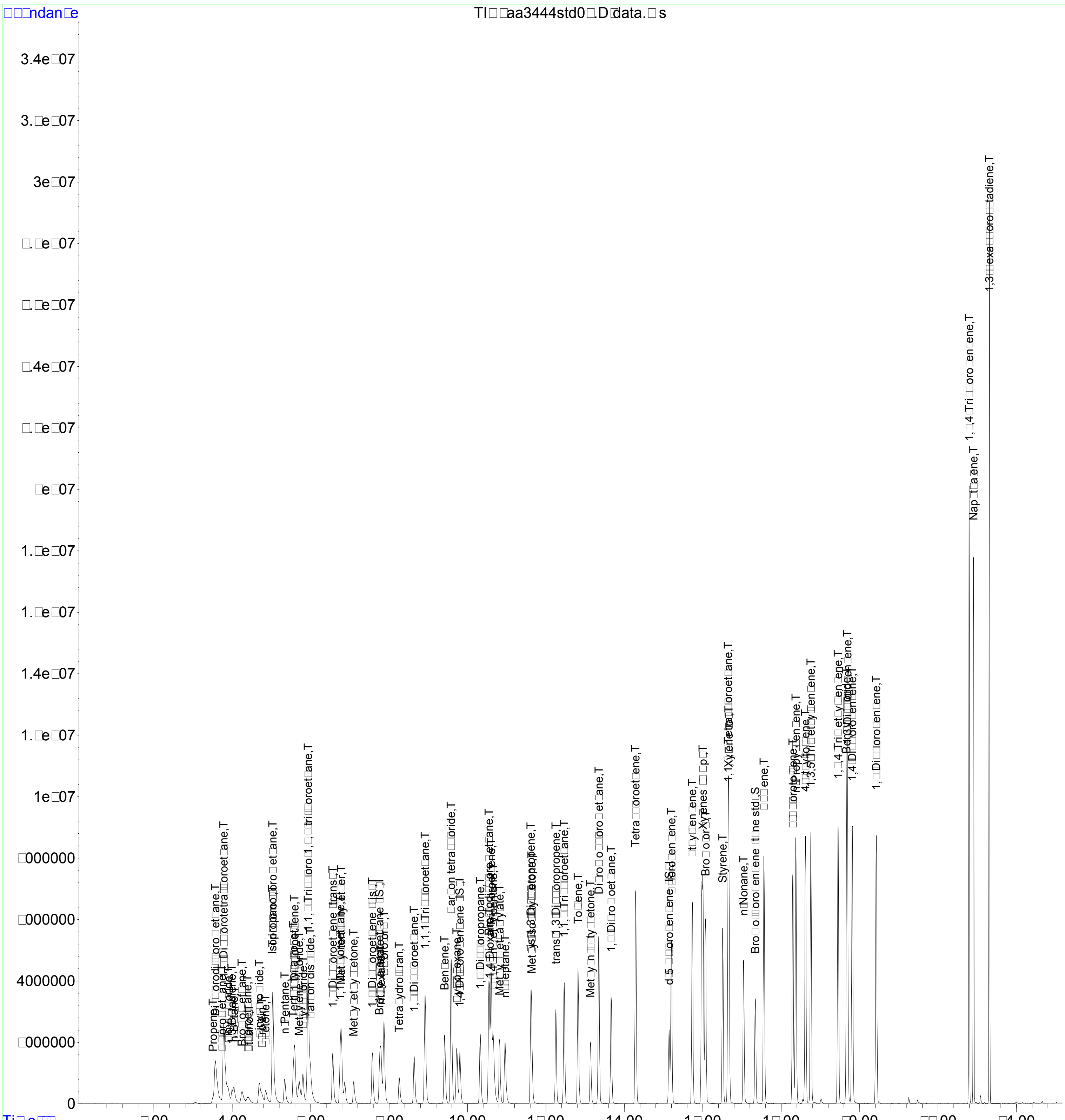
Quant Time: Sep 12 11:51:12 2017
Quant Method : C:\msdchem\1\METHODS\0912.M
Quant Title : TO-15 on the Agilent 7890A / 5975C
QLast Update : Tue Sep 12 11:51:02 2017
Response via : Initial Calibration

	Compound	R.T.	QIon	Response	Conc	Units	Dev(Min)
52)	Dibromochloromethane	13.350	129	4074164	20.31	ppbV	99
53)	1,2-Dibromoethane	13.665	107	2962274	20.14	ppbV	100
54)	Tetrachloroethene	14.286	166	2371415	20.02	ppbV	97
56)	Chlorobenzene	15.199	112	4119514	19.73	ppbV	98
57)	Ethylbenzene	15.733	91	6596793	19.79	ppbV	98
58)	Xylenes (m&p)	16.003	91	10704404	38.76	ppbV	97
59)	Bromoform	16.071	173	3431127	19.79	ppbV	97
60)	Styrene	16.505	104	3914430	20.02	ppbV	99
61)	Xylene (o)	16.665	91	5595101	19.33	ppbV	90
62)	1,1,2,2-Tetrachloroethane	16.646	83	3550423	19.60	ppbV	99
63)	n-Nonane	17.042	57	1600156	19.74	ppbV	100
65)	Cumene	17.559	105	7538238	19.28	ppbV	93
66)	2-Chlorotoluene	18.296	91	5898107	19.94	ppbV	90
67)	n-Propyl benzene	18.373	120	2209626	19.49	ppbV	80
68)	4-Ethyltoluene	18.617	105	7669686	19.48	ppbV	91
69)	1,3,5-Trimethylbenzene	18.755	105	7091872	19.29	ppbV	88
70)	1,2,4-Trimethylbenzene	19.450	105	7260050	19.67	ppbV	98
71)	Benzyl chloride	19.668	91	6279617	20.83	ppbV	99
72)	1,3-Dichlorobenzene	19.691	146	4815398	19.26	ppbV	98
73)	1,4-Dichlorobenzene	19.813	146	5063095	19.55	ppbV	97
74)	1,2-Dichlorobenzene	20.424	146	4827586	19.72	ppbV	99
75)	1,2,4-Trichlorobenzene	22.794	180	4482857	19.68	ppbV	99
76)	Naphthalene	22.906	127	1604537	19.90	ppbV	100
77)	1,3-Hexachlorobutadiene	23.308	225	3389411	19.84	ppbV	95

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Data Path : C:\DATA\09-12-17\
Data File : aa3444std02.D
Acq On : 12 Sep 2017 10:17 am
Operator : jls
Sample : 20 ppbv Std
Misc : CC483586
ALS Vial : 4 Sample Multiplier: 1

Quant Time: Sep 12 11:51:12 2017
Quant Method : C:\msdchem\1\METHODS\0912.M
Quant Title : TO-15 on the Agilent 7890A / 5975C
QLast Update : Tue Sep 12 11:51:02 2017
Response via : Initial Calibration



Data Path : C:\DATA\09-12-17\
Data File : aa3445std03.D
Acq On : 12 Sep 2017 10:51 am
Operator : jls
Sample : 10 ppbv Std
Misc : CC483586
ALS Vial : 5 Sample Multiplier: 1

Quant Time: Sep 12 11:50:40 2017
Quant Method : C:\msdchem\1\METHODS\0912.M
Quant Title : TO-15 on the Agilent 7890A / 5975C
QLast Update : Tue Sep 12 11:50:23 2017
Response via : Initial Calibration

Compound	R.T.	QIon	Response	Conc	Units	Dev(Min)
Internal Standards						
1) Bromochloromethane (IS)	7.747	130	570548	10.00	ppbV	0.00
38) 1,4-Difluorobenzene (IS)	9.804	114	2010687	10.00	ppbV	0.00
55) d-5 Chlorobenzene (IS)	15.139	117	1794220	10.00	ppbV	0.00
System Monitoring Compounds						
64) Bromofluorobenzene (tu...	17.338	95	1556791	10.00	ppbV	0.00
Target Compounds						Qvalue
2) Propene	3.506	41	147143	10.00	ppbV	91
3) Dichlorodifluoromethane	3.563	85	2007436	10.00	ppbV	97
4) Chloromethane	3.731	52	58646	10.00	ppbV #	1
5) 1,2-Dichlorotetrafluor...	3.776	85	1547891	10.00	ppbV	99
6) Vinyl chloride	3.891	62	345730	10.00	ppbV	91
7) 1,3-Butadiene	3.994	54	194863	10.00	ppbV	85
8) n-Butane	4.043	43	333874	10.00	ppbV	99
9) Bromomethane	4.248	94	376116	10.00	ppbV	100
10) Chloroethane	4.387	64	187557	10.00	ppbV	97
11) Ethanol	4.422	45	74127	10.00	ppbV	98
12) Vinyl bromide	4.686	106	570899	10.00	ppbV	99
13) Acrolein	4.753	56	101704	10.00	ppbV	93
14) Acetone	4.853	58	160554	10.00	ppbV	76
15) Trichlorofluoromethane	5.030	101	2588011	10.00	ppbV	98
16) Isopropanol	5.023	45	410895	10.00	ppbV	98
17) n-Pentane	5.335	43	364542	10.00	ppbV	93
18) 1,1-Dichloroethene	5.589	61	802065	10.00	ppbV	98
19) Methylene chloride	5.705	84	458466	10.00	ppbV	100
20) Tert-butyl alcohol	5.563	59	910734	10.00	ppbV	100
21) Allyl chloride	5.801	76	232657	10.00	ppbV	100
22) 1,1,2-Trichloro-1,2,2-...	5.933	101	1467207	10.00	ppbV	94
23) Carbon disulfide	5.988	76	1485399	10.00	ppbV	99
24) 1,2-Dichloroethene (tr...	6.560	61	635713	10.00	ppbV	99
25) 1,1-Dichloroethane	6.753	63	850442	10.00	ppbV	92
26) Methyl tert-butyl ether	6.785	73	1747277	10.00	ppbV	99
27) Methyl ethyl ketone	7.094	72	245732	10.00	ppbV	99
28) 1,2-Dichloroethene (cis)	7.570	61	633188	10.00	ppbV	99
29) Ethyl acetate	7.769	45	82877	10.00	ppbV	100
30) n-Hexane	7.792	57	440238	10.00	ppbV	98
31) Chloroform	7.869	83	1627065	10.00	ppbV	99
32) Tetrahydrofuran	8.258	42	248981	10.00	ppbV	84
33) 1,2-Dichloroethane	8.640	62	1044255	10.00	ppbV	95
34) 1,1,1-Trichloroethane	8.917	97	1887264	10.00	ppbV	98
35) Benzene	9.415	78	1581888	10.00	ppbV	98
36) Carbon tetrachloride	9.586	117	2249151	10.00	ppbV	100
37) Cyclohexane	9.724	84	678629	10.00	ppbV	89
39) 1,2-Dichloropropane	10.325	63	464264	10.00	ppbV	96
40) Bromodichloromethane	10.547	83	1736726	10.00	ppbV	99
41) 2,2,4-Trimethylpentane	10.653	57	1513568	10.00	ppbV	95
42) Trichloroethene	10.605	130	988236	10.00	ppbV	100
43) 1,4-Dioxane	10.563	88	329465	10.00	ppbV	93
44) Methyl methacrylate	10.817	69	632275	10.00	ppbV	99
45) n-Heptane	10.952	71	536121	10.00	ppbV	100
46) cis-1,3-Dichloropropene	11.611	75	1121341	10.00	ppbV	99
47) Methyl isobutyl ketone	11.637	43	691185	10.00	ppbV	99
48) trans-1,3-Dichloropropene	12.251	75	1197976	10.00	ppbV	100
49) 1,1,2-Trichloroethane	12.463	97	834801	10.00	ppbV	97
50) Toluene	12.817	91	2252121	10.00	ppbV	96
51) Methyl n-butyl ketone	13.139	43	687207	10.00	ppbV	98

Data Path : C:\DATA\09-12-17\
Data File : aa3445std03.D
Acq On : 12 Sep 2017 10:51 am
Operator : jls
Sample : 10 ppbv Std
Misc : CC483586
ALS Vial : 5 Sample Multiplier: 1

Quant Time: Sep 12 11:50:40 2017
Quant Method : C:\msdchem\1\METHODS\0912.M
Quant Title : TO-15 on the Agilent 7890A / 5975C
QLast Update : Tue Sep 12 11:50:23 2017
Response via : Initial Calibration

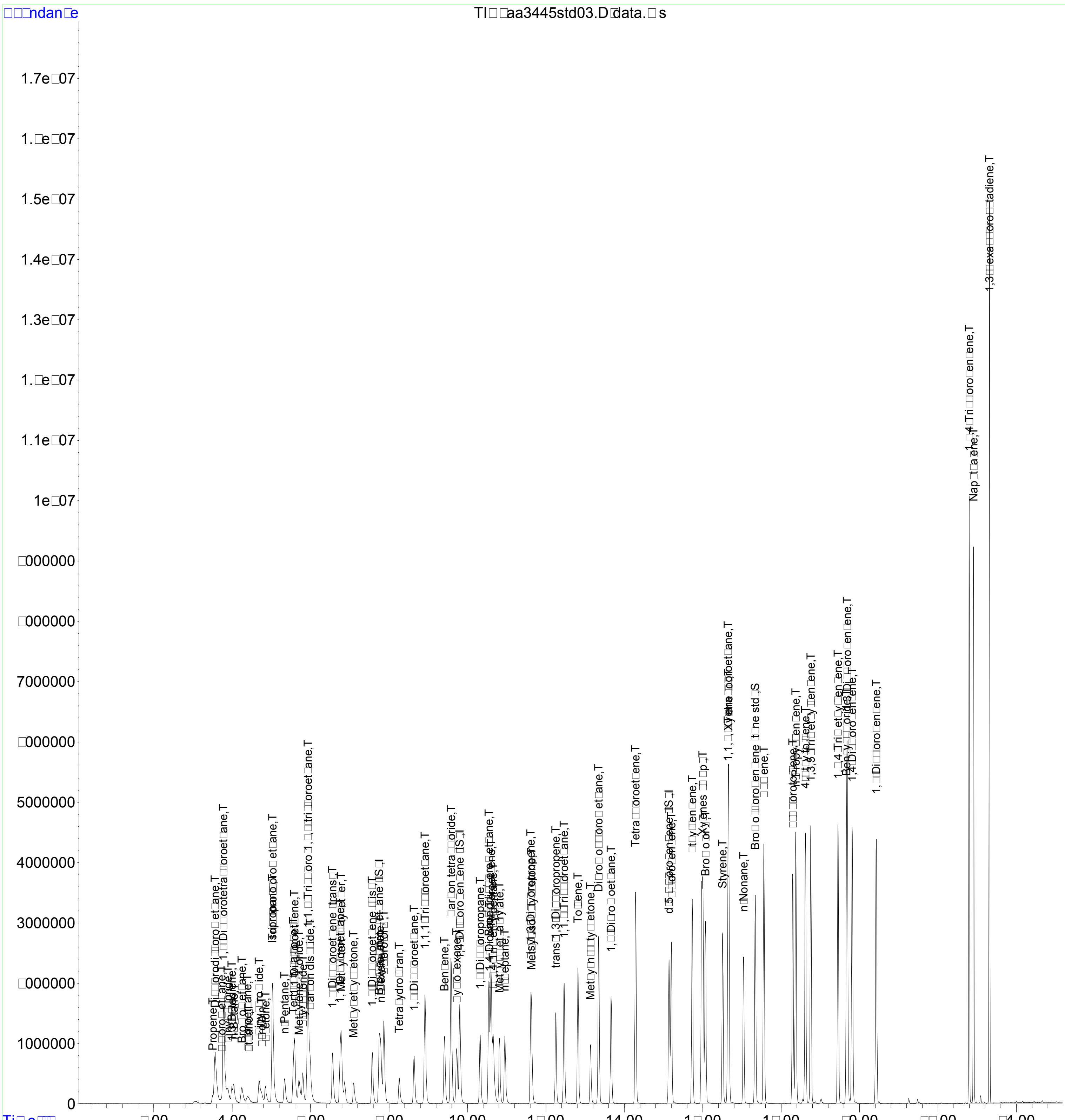
Compound	R.T.	QIon	Response	Conc	Units	Dev(Min)
52) Dibromochloromethane	13.344	129	2021003	10.00	ppbV	100
53) 1,2-Dibromoethane	13.663	107	1481958	10.00	ppbV	99
54) Tetrachloroethene	14.286	166	1193178	10.00	ppbV	97
56) Chlorobenzene	15.200	112	2067104	10.00	ppbV	99
57) Ethylbenzene	15.733	91	3300022	10.00	ppbV	98
58) Xylenes (m&p)	16.003	91	5468436	20.00	ppbV	97
59) Bromoform	16.068	173	1716257	10.00	ppbV	96
60) Styrene	16.505	104	1935850	10.00	ppbV	99
61) Xylene (o)	16.659	91	2865975	10.00	ppbV	90
62) 1,1,2,2-Tetrachloroethane	16.647	83	1793518	10.00	ppbV	99
63) n-Nonane	17.042	57	802552	10.00	ppbV	99
65) Cumene	17.560	105	3871150	10.00	ppbV	94
66) 2-Chlorotoluene	18.293	91	2928043	10.00	ppbV	91
67) n-Propyl benzene	18.373	120	1122548	10.00	ppbV	82
68) 4-Ethyltoluene	18.617	105	3897621	10.00	ppbV	92
69) 1,3,5-Trimethylbenzene	18.756	105	3638674	10.00	ppbV	89
70) 1,2,4-Trimethylbenzene	19.450	105	3653697	10.00	ppbV	97
71) Benzyl chloride	19.666	91	2984625	10.00	ppbV	98
72) 1,3-Dichlorobenzene	19.685	146	2474639	10.00	ppbV	99
73) 1,4-Dichlorobenzene	19.810	146	2563799	10.00	ppbV	97
74) 1,2-Dichlorobenzene	20.424	146	2423252	10.00	ppbV	99
75) 1,2,4-Trichlorobenzene	22.794	180	2255037	10.00	ppbV	99
76) Naphthalene	22.907	127	798205	10.00	ppbV	100
77) 1,3-Hexachlorobutadiene	23.312	225	1691282	10.00	ppbV	94

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Quantitation Report (QT Reviewed)

Data Path : C:\DATA\09-12-17\
Data File : aa3445std03.D
Acq On : 12 Sep 2017 10:51 am
Operator : jls
Sample : 10 ppbv Std
Misc : CC483586
ALS Vial : 5 Sample Multiplier: 1

Quant Time: Sep 12 11:50:40 2017
Quant Method : C:\msdchem\1\METHODS\0912.M
Quant Title : TO-15 on the Agilent 7890A / 5975C
QLast Update : Tue Sep 12 11:50:23 2017
Response via : Initial Calibration



Data Path : C:\DATA\09-12-17\
Data File : aa3446std04.D
Acq On : 12 Sep 2017 11:24 am
Operator : jls
Sample : 2 ppbv Std
Misc : CC483586
ALS Vial : 6 Sample Multiplier: 1

Quant Time: Sep 12 11:52:39 2017
Quant Method : C:\msdchem\1\METHODS\0912.M
Quant Title : TO-15 on the Agilent 7890A / 5975C
QLast Update : Tue Sep 12 11:52:15 2017
Response via : Initial Calibration

Compound	R.T.	QIon	Response	Conc Units	Dev(Min)
Internal Standards					
1) Bromochloromethane (IS)	7.740	130	558591	10.00 ppbV	0.00
38) 1,4-Difluorobenzene (IS)	9.801	114	1941470	10.00 ppbV	0.00
55) d-5 Chlorobenzene (IS)	15.138	117	1681997	10.00 ppbV	0.00
System Monitoring Compounds					
64) Bromofluorobenzene (tu...	17.337	95	1469868	9.98 ppbV	0.00
Target Compounds					Qvalue
2) Propene	3.505	41	27834	1.95 ppbV	84
3) Dichlorodifluoromethane	3.563	85	394053	1.96 ppbV	96
4) Chloromethane	3.724	52	9280	1.73 ppbV	81
5) 1,2-Dichlorotetrafluor...	3.769	85	302888	2.05 ppbV	96
6) Vinyl chloride	3.891	62	64970	1.89 ppbV	85
7) 1,3-Butadiene	3.984	54	35718	1.89 ppbV	87
8) n-Butane	4.033	43	61720	1.90 ppbV	93
9) Bromomethane	4.245	94	72076	2.18 ppbV	97
10) Chloroethane	4.373	64	37286	2.00 ppbV	90
11) Ethanol	4.415	45	15408	2.05 ppbV	98
12) Vinyl bromide	4.679	106	102959	1.79 ppbV	95
13) Acrolein	4.750	56	19384	1.83 ppbV	91
14) Acetone	4.849	58	29669	1.89 ppbV	75
15) Trichlorofluoromethane	5.023	101	510797	1.98 ppbV	99
16) Isopropanol	5.020	45	74323	1.84 ppbV	92
17) n-Pentane	5.338	43	63142	1.71 ppbV	93
18) 1,1-Dichloroethene	5.589	61	143956	1.81 ppbV	97
19) Methylene chloride	5.698	84	86495	1.90 ppbV	95
20) Tert-butyl alcohol	5.553	59	165357	1.76 ppbV	100
21) Allyl chloride	5.798	76	40464	1.83 ppbV	100
22) 1,1,2-Trichloro-1,2,2-...	5.926	101	320550	2.17 ppbV	97
23) Carbon disulfide	5.981	76	286701	1.95 ppbV	98
24) 1,2-Dichloroethene (tr...	6.563	61	116060	1.78 ppbV	100
25) 1,1-Dichloroethane	6.753	63	155224	1.81 ppbV	90
26) Methyl tert-butyl ether	6.782	73	318717	1.79 ppbV	99
27) Methyl ethyl ketone	7.094	72	42822	1.65 ppbV	99
28) 1,2-Dichloroethene (cis)	7.576	61	112786	1.75 ppbV	98
29) Ethyl acetate	7.778	45	14639	1.76 ppbV	100
30) n-Hexane	7.788	57	82043	1.81 ppbV	96
31) Chloroform	7.865	83	307969	1.86 ppbV	100
32) Tetrahydrofuran	8.277	42	43025	1.66 ppbV #	77
33) 1,2-Dichloroethane	8.634	62	196757	1.84 ppbV	95
34) 1,1,1-Trichloroethane	8.920	97	385057	2.00 ppbV	98
35) Benzene	9.415	78	294781	1.82 ppbV	97
36) Carbon tetrachloride	9.582	117	456955	1.98 ppbV	100
37) Cyclohexane	9.720	84	124758	1.80 ppbV	91
39) 1,2-Dichloropropane	10.325	63	93202	2.05 ppbV	93
40) Bromodichloromethane	10.544	83	331208	1.93 ppbV	98
41) 2,2,4-Trimethylpentane	10.656	57	278128	1.93 ppbV	95
42) Trichloroethene	10.601	130	192180	2.01 ppbV	98
43) 1,4-Dioxane	10.566	88	60551	1.88 ppbV	95
44) Methyl methacrylate	10.817	69	110169	1.78 ppbV	93
45) n-Heptane	10.952	71	100545	1.93 ppbV	99
46) cis-1,3-Dichloropropene	11.611	75	199150	1.80 ppbV	98
47) Methyl isobutyl ketone	11.643	43	134611	2.01 ppbV	96
48) trans-1,3-Dichloropropene	12.248	75	209618	1.76 ppbV	99
49) 1,1,2-Trichloroethane	12.463	97	169444	2.09 ppbV	98
50) Toluene	12.820	91	423556	1.93 ppbV	97
51) Methyl n-butyl ketone	13.142	43	121934	1.80 ppbV	96

Data Path : C:\DATA\09-12-17\
Data File : aa3446std04.D
Acq On : 12 Sep 2017 11:24 am
Operator : jls
Sample : 2 ppbv Std
Misc : CC483586
ALS Vial : 6 Sample Multiplier: 1

Quant Time: Sep 12 11:52:39 2017
Quant Method : C:\msdchem\1\METHODS\0912.M
Quant Title : TO-15 on the Agilent 7890A / 5975C
QLast Update : Tue Sep 12 11:52:15 2017
Response via : Initial Calibration

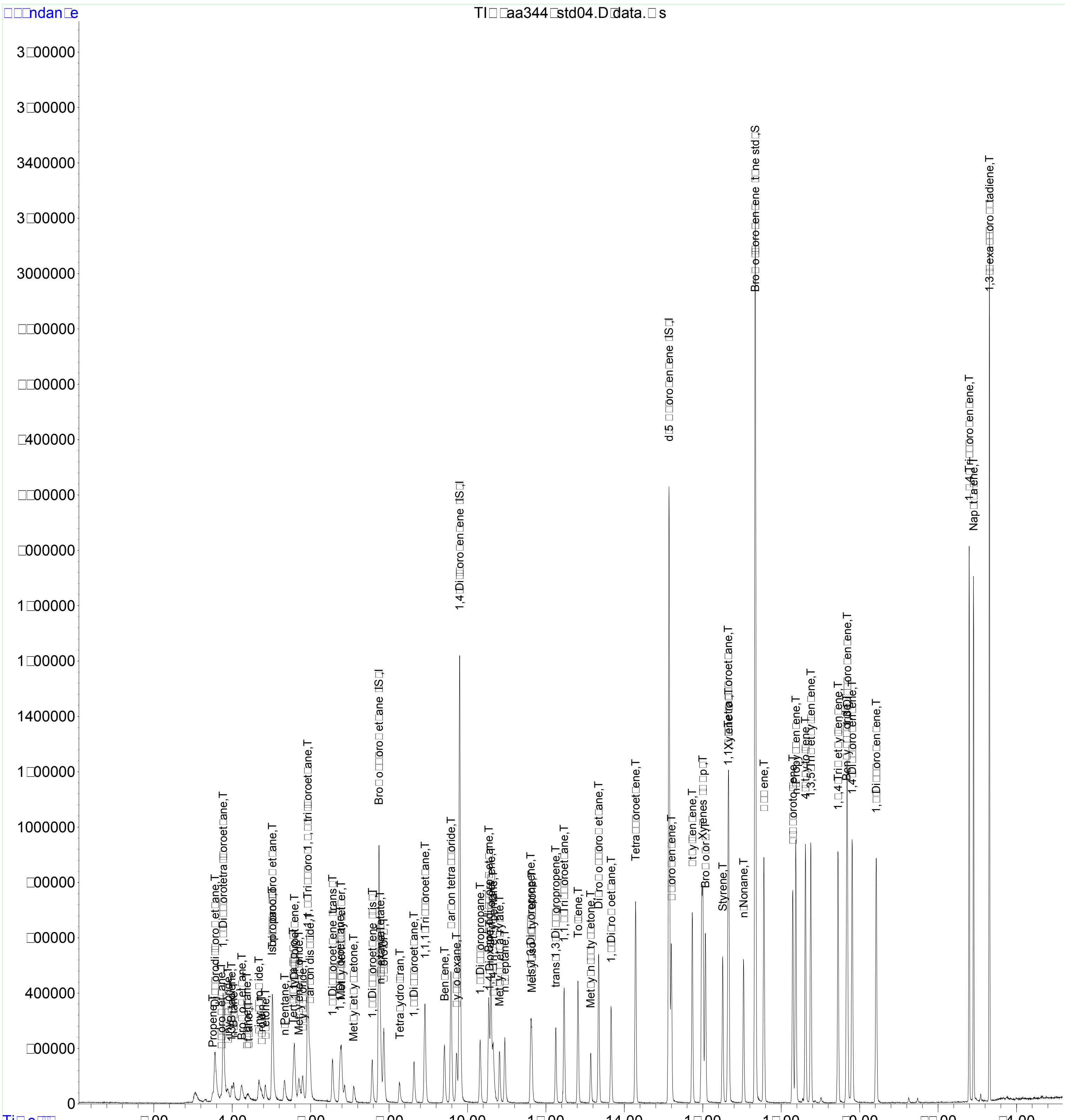
	Compound	R.T.	QIon	Response	Conc	Units	Dev(Min)
52)	Dibromochloromethane	13.341	129	396000	2.00	ppbV	99
53)	1,2-Dibromoethane	13.666	107	292260	2.03	ppbV	99
54)	Tetrachloroethene	14.289	166	241029	2.09	ppbV	97
56)	Chlorobenzene	15.199	112	430581	2.25	ppbV	98
57)	Ethylbenzene	15.733	91	648836	2.12	ppbV	97
58)	Xylenes (m&p)	16.000	91	1114763	4.47	ppbV	97
59)	Bromoform	16.064	173	337047	2.10	ppbV	98
60)	Styrene	16.508	104	348108	1.92	ppbV	99
61)	Xylene (o)	16.662	91	578894	2.21	ppbV	89
62)	1,1,2,2-Tetrachloroethane	16.646	83	391692	2.36	ppbV	100
63)	n-Nonane	17.042	57	152751	2.05	ppbV	99
65)	Cumene	17.559	105	772189	2.19	ppbV	94
66)	2-Chlorotoluene	18.296	91	573326	2.10	ppbV	89
67)	n-Propyl benzene	18.373	120	229992	2.23	ppbV	82
68)	4-Ethyltoluene	18.617	105	777516	2.19	ppbV	92
69)	1,3,5-Trimethylbenzene	18.755	105	723062	2.18	ppbV	89
70)	1,2,4-Trimethylbenzene	19.450	105	676515	2.01	ppbV	98
71)	Benzyl chloride	19.669	91	525084	1.82	ppbV	99
72)	1,3-Dichlorobenzene	19.685	146	525042	2.35	ppbV	98
73)	1,4-Dichlorobenzene	19.810	146	524634	2.23	ppbV	96
74)	1,2-Dichlorobenzene	20.424	146	486418	2.18	ppbV	98
75)	1,2,4-Trichlorobenzene	22.794	180	442983	2.15	ppbV	99
76)	Naphthalene	22.906	127	157227	2.13	ppbV	100
77)	1,3-Hexachlorobutadiene	23.312	225	358706	2.28	ppbV	95

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Quantitation Report (QT Reviewed)

Data Path : C:\DATA\09-12-17\
Data File : aa3446std04.D
Acq On : 12 Sep 2017 11:24 am
Operator : jls
Sample : 2 ppbv Std
Misc : CC483586
ALS Vial : 6 Sample Multiplier: 1

Quant Time: Sep 12 11:52:39 2017
Quant Method : C:\msdchem\1\METHODS\0912.M
Quant Title : TO-15 on the Agilent 7890A / 5975C
QLast Update : Tue Sep 12 11:52:15 2017
Response via : Initial Calibration



IAL SDG #E17-09837

Data Path : C:\DATA\09-12-17\
Data File : aa3447std05.D
Acq On : 12 Sep 2017 12:06 pm
Operator : jls
Sample : 0.2 ppbv Std
Misc : CC483586
ALS Vial : 7 Sample Multiplier: 1

Quant Time: Sep 12 12:55:11 2017
Quant Method : C:\msdchem\1\METHODS\0912.M
Quant Title : TO-15 on the Agilent 7890A / 5975C
QLast Update : Tue Sep 12 12:52:29 2017
Response via : Initial Calibration

Compound	R.T.	QIon	Response	Conc Units	Dev(Min)
Internal Standards					
1) Bromochloromethane (IS)	7.743	130	540977	10.00 ppbV	0.00
38) 1,4-Difluorobenzene (IS)	9.801	114	1832450	10.00 ppbV	0.00
55) d-5 Chlorobenzene (IS)	15.141	117	1639395	10.00 ppbV	0.00
System Monitoring Compounds					
64) Bromofluorobenzene (tu...	17.341	95	1441128	10.04 ppbV	0.00
Target Compounds					Qvalue
2) Propene	3.502	41	2514	0.19 ppbV #	41
3) Dichlorodifluoromethane	3.563	85	46664	0.23 ppbV	98
4) Chloromethane	3.711	52	540	0.12 ppbV #	62
5) 1,2-Dichlorotetrafluor...	3.772	85	42103	0.27 ppbV	98
6) Vinyl chloride	3.897	62	4393	0.14 ppbV	86
7) 1,3-Butadiene	3.991	54	2543	0.15 ppbV	84
8) n-Butane	4.026	43	3238	0.12 ppbV #	62
9) Bromomethane	4.238	94	5265	0.17 ppbV	89
10) Chloroethane	4.367	64	1709	0.11 ppbV #	82
11) Ethanol	4.399	45	489	0.08 ppbV	100
12) Vinyl bromide	4.679	106	7473	0.16 ppbV	69
13) Acrolein	4.730	56	923	0.10 ppbV	84
14) Acetone	4.833	58	1398	0.10 ppbV #	1
15) Trichlorofluoromethane	5.029	101	66999	0.25 ppbV	96
16) Isopropanol	5.020	45	5477	0.16 ppbV	73
17) n-Pentane	5.335	43	5385	0.16 ppbV #	28
18) 1,1-Dichloroethene	5.585	61	15158	0.20 ppbV	95
19) Methylene chloride	5.695	84	13128	0.37 ppbV #	46
20) Tert-butyl alcohol	5.566	59	18411	0.21 ppbV	100
21) Allyl chloride	5.788	76	4219	0.20 ppbV	100
22) 1,1,2-Trichloro-1,2,2-...	5.926	101	44337	0.27 ppbV	99
23) Carbon disulfide	5.981	76	31545	0.22 ppbV	100
24) 1,2-Dichloroethene (tr...	6.556	61	12162	0.20 ppbV	86
25) 1,1-Dichloroethane	6.740	63	21576	0.25 ppbV #	80
26) Methyl tert-butyl ether	6.791	73	36602	0.21 ppbV	94
27) Methyl ethyl ketone	7.116	72	1971	0.09 ppbV #	37
28) 1,2-Dichloroethene (cis)	7.573	61	12342	0.20 ppbV	96
29) Ethyl acetate	7.765	45	841	0.12 ppbV	100
30) n-Hexane	7.791	57	9749	0.22 ppbV #	64
31) Chloroform	7.872	83	38234	0.23 ppbV	99
32) Tetrahydrofuran	8.277	42	3024	0.14 ppbV #	13
33) 1,2-Dichloroethane	8.643	62	24232	0.23 ppbV #	88
34) 1,1,1-Trichloroethane	8.910	97	49996	0.25 ppbV	100
35) Benzene	9.408	78	36629	0.23 ppbV	96
36) Carbon tetrachloride	9.576	117	59878	0.25 ppbV	99
37) Cyclohexane	9.714	84	13068	0.20 ppbV	85
39) 1,2-Dichloropropane	10.334	63	12774	0.27 ppbV	86
40) Bromodichloromethane	10.537	83	43420	0.25 ppbV	97
41) 2,2,4-Trimethylpentane	10.653	57	26508	0.20 ppbV	98
42) Trichloroethene	10.605	130	23453	0.24 ppbV	98
43) 1,4-Dioxane	10.582	88	9667	0.29 ppbV	91
44) Methyl methacrylate	10.823	69	12474	0.22 ppbV #	63
45) n-Heptane	10.955	71	5450	0.12 ppbV #	70
46) cis-1,3-Dichloropropene	11.614	75	22926	0.22 ppbV	98
47) Methyl isobutyl ketone	11.650	43	14448	0.22 ppbV	95
48) trans-1,3-Dichloropropene	12.257	75	22856	0.21 ppbV	89
49) 1,1,2-Trichloroethane	12.466	97	22115	0.26 ppbV	95
50) Toluene	12.820	91	46471	0.22 ppbV	96
51) Methyl n-butyl ketone	13.154	43	13295	0.21 ppbV	95

Data Path : C:\DATA\09-12-17\
Data File : aa3447std05.D
Acq On : 12 Sep 2017 12:06 pm
Operator : jls
Sample : 0.2 ppbv Std
Misc : CC483586
ALS Vial : 7 Sample Multiplier: 1

Quant Time: Sep 12 12:55:11 2017
Quant Method : C:\msdchem\1\METHODS\0912.M
Quant Title : TO-15 on the Agilent 7890A / 5975C
QLast Update : Tue Sep 12 12:52:29 2017
Response via : Initial Calibration

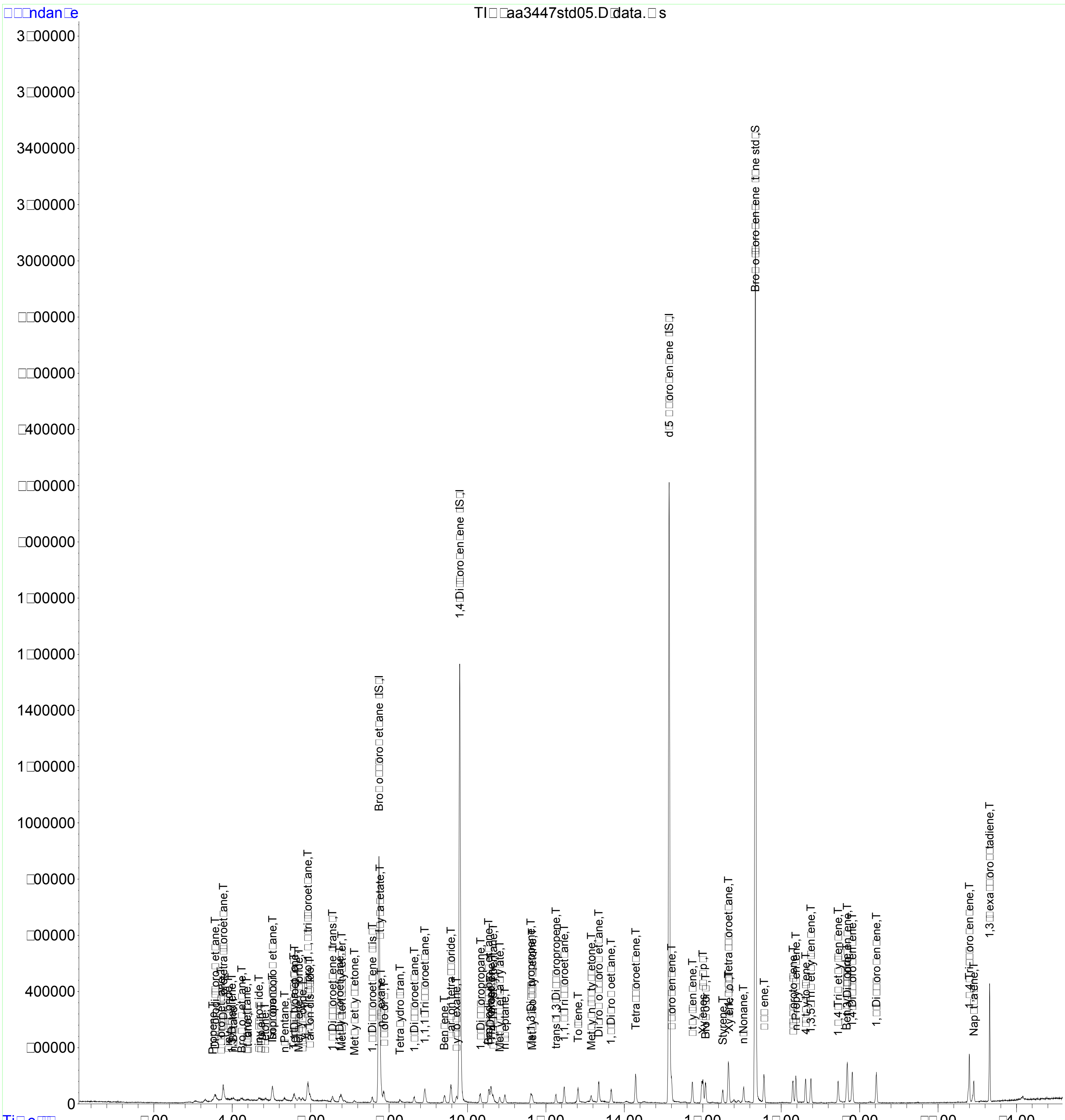
	Compound	R.T.	QIon	Response	Conc	Units		Dev(Min)
52)	Dibromochloromethane	13.344	129	50607	0.25	ppbV		99
53)	1,2-Dibromoethane	13.659	107	35027	0.24	ppbV		95
54)	Tetrachloroethene	14.289	166	31459	0.26	ppbV		99
56)	Chlorobenzene	15.202	112	57275	0.27	ppbV		99
57)	Ethylbenzene	15.739	91	69474	0.22	ppbV		100
58)	Xylenes (m&p)	16.003	91	109780	0.43	ppbV	#	28
59)	Bromoform	16.071	173	39834	0.24	ppbV		100
60)	Styrene	16.508	104	31584	0.18	ppbV		96
61)	Xylene (o)	16.672	91	57018	0.21	ppbV		90
62)	1,1,2,2-Tetrachloroethane	16.653	83	51800	0.28	ppbV		99
63)	n-Nonane	17.035	57	14093	0.19	ppbV		99
65)	Cumene	17.566	105	83411	0.23	ppbV		93
66)	2-Chlorotoluene	18.302	91	59214	0.22	ppbV		90
67)	n-Propyl benzene	18.373	120	22169	0.21	ppbV		79
68)	4-Ethyltoluene	18.627	105	70651	0.20	ppbV	#	89
69)	1,3,5-Trimethylbenzene	18.755	105	66346	0.20	ppbV		88
70)	1,2,4-Trimethylbenzene	19.453	105	56911	0.18	ppbV		98
71)	Benzyl chloride	19.669	91	50044	0.19	ppbV	#	80
72)	1,3-Dichlorobenzene	19.685	146	61456	0.25	ppbV		98
73)	1,4-Dichlorobenzene	19.813	146	59144	0.24	ppbV		94
74)	1,2-Dichlorobenzene	20.427	146	54832	0.24	ppbV		98
75)	1,2,4-Trichlorobenzene	22.797	180	52344	0.24	ppbV		99
76)	Naphthalene	22.913	127	8045	0.12	ppbV		100
77)	1,3-Hexachlorobutadiene	23.315	225	52156	0.29	ppbV		95

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Quantitation Report (QT Reviewed)

Data Path : C:\DATA\09-12-17\
Data File : aa3447std05.D
Acq On : 12 Sep 2017 12:06 pm
Operator : jls
Sample : 0.2 ppbv Std
Misc : CC483586
ALS Vial : 7 Sample Multiplier: 1

Quant Time: Sep 12 12:55:11 2017
Quant Method : C:\msdchem\1\METHODS\0912.M
Quant Title : TO-15 on the Agilent 7890A / 5975C
QLast Update : Tue Sep 12 12:52:29 2017
Response via : Initial Calibration



Integrated Analytical Laboratories LLC

Continuing Calibration Data Summary Report

Initial Calibration Curve:	**9/12/2017**	**Date/Time of Calibration:**	**10/4/2017 09:02**
Instrument:	**AA**	**Sample ID:**	**DCS**
Amount of standard injected (ml):	**50**	**Laboratory ID:**	**AA3702DCVS**

Standard/Sample Run	Date/Time of Sample/Standard Injection
BFB [AA3701BFB]	10/04/2017 08:23
10 PPBV DCVS [AA3702DCVS]	10/04/2017 09:02
10 PPBV LCS [AA3703LCS]	10/04/2017 09:55
METHOD BLANK [AA3704BLK]	10/04/2017 10:33
02 PPBV RLLCS [AA3705RLLCS]	10/04/2017 11:14
CLEAN CAN CERTIFICATION, BATCH MASTER 2162 [AA3717]	10/04/2017 18:34
10 PPBV CCCVS [AA3728CCCVS]	10/04/2017 19:08

Compound Name	Average RRF	Standard RRF	% Difference	PassFail	*
Acetone	0.25	0.24	4.9	PASS	
Benzene	2.9	2.6	12	PASS	
Bromodichloromethane	0.94	0.92	1.5	PASS	
Bromoform	1.0	1.0	-0.90	PASS	
Bromomethane	0.58	0.61	-4.5	PASS	
1,3-Butadiene	0.31	0.30	6.1	PASS	
Chlorobenzene	1.3	1.2	9.9	PASS	
Chloroethane	0.30	0.29	3.7	PASS	
Chloroform	3.0	3.0	2.6	PASS	
Chloromethane	0.084	0.084	0.00	PASS	
Carbon disulfide	2.7	2.5	7.8	PASS	
Carbon tetrachloride	4.4	4.2	3.4	PASS	
Cyclohexane	1.2	1.1	8.8	PASS	
Dibromochloromethane	1.1	1.1	0.30	PASS	
1,2-Dibromoethane	0.79	0.74	5.6	PASS	
1,2-Dichlorobenzene	1.4	1.3	6.0	PASS	
1,3-Dichlorobenzene	1.5	1.4	6.0	PASS	
1,4-Dichlorobenzene	1.5	1.4	5.4	PASS	
Dichlorodifluoromethane	3.7	3.7	-0.20	PASS	
1,1-Dichloroethane	1.6	1.4	11	PASS	
1,2-Dichloroethane	1.9	1.9	2.4	PASS	
1,1-Dichloroethene	1.4	1.4	1.6	PASS	
1,2-Dichloroethene (cis)	1.1	1.0	8.1	PASS	
1,2-Dichloroethene (trans)	1.1	1.0	8.5	PASS	
1,2-Dichloropropane	0.26	0.22	17	PASS	
1,3-Dichloropropene (cis)	0.57	0.55	3.5	PASS	
1,3-Dichloropropene (trans)	0.60	0.59	2.0	PASS	
1,2-Dichlorotetrafluoroethane	2.9	2.7	8.6	PASS	
1,4-Dioxane	0.18	0.16	14	PASS	
Ethylbenzene	1.9	1.9	1.8	PASS	
n-Heptane	0.24	0.26	-8.6	PASS	
1,3-Hexachlorobutadiene	1.1	0.95	13	PASS	
n-Hexane	0.82	0.68	16	PASS	
Methylene chloride	0.89	0.77	13	PASS	
Methyl ethyl ketone	0.39	0.40	-2.5	PASS	
Methyl isobutyl ketone	0.36	0.32	9.6	PASS	
Methyl tert-butyl ether	3.2	2.8	11	PASS	
Styrene	1.0	1.1	-1.5	PASS	
Tert-butyl alcohol	1.6	1.4	16	PASS	
1,1,2,2-Tetrachloroethane	1.1	1.0	9.7	PASS	
Tetrachloroethene	0.65	0.59	9.2	PASS	
Toluene	1.1	1.1	4.2	PASS	
1,2,4-Trichlorobenzene	1.3	1.2	12	PASS	

***%Difference must be within +/- 30%**

RRF - Relative Response Factor

IAL
Integrated Analytical Laboratories LLC

Continuing Calibration Data Summary Report

Initial Calibration Curve:	**9/12/2017**	**Date/Time of Calibration:**	**10/4/2017 09:02**
Instrument:	**AA**	**Sample ID:**	**DCS**
Amount of standard injected (ml):	**50**	**Laboratory ID:**	**AA3702DCVS**

Standard/Sample Run	**Date/Time of Sample/Standard Injection**
BFB [AA3701BFB]	10/04/2017 08:23
10 PPBV DCVS [AA3702DCVS]	10/04/2017 09:02
10 PPBV LCS [AA3703LCS]	10/04/2017 09:55
METHOD BLANK [AA3704BLK]	10/04/2017 10:33
02 PPBV RLLCS [AA3705RLLCS]	10/04/2017 11:14
CLEAN CAN CERTIFICATION, BATCH MASTER 2162 [AA3717]	10/04/2017 18:34
10 PPBV CCCVS [AA3728CCCVS]	10/04/2017 19:08

Compound Name	**Average RRF**	**Standard RRF**	**% Difference**	**PassFail**	*****
1,1,1-Trichloroethane	3.7	3.4	6.4	PASS	
1,1,2-Trichloroethane	0.46	0.42	9.2	PASS	
Trichloroethene	0.52	0.51	2.9	PASS	
Trichlorofluoromethane	4.9	4.9	0.70	PASS	
1,1,2-Trichloro-1,2,2-trifluoroethane	3.0	2.6	12	PASS	
1,2,4-Trimethylbenzene	1.9	2.1	-6.6	PASS	
1,3,5-Trimethylbenzene	2.0	2.1	-4.2	PASS	
2,2,4-Trimethylpentane	0.73	0.69	6.0	PASS	
Vinyl bromide	0.94	0.93	0.70	PASS	
Vinyl chloride	0.57	0.51	9.9	PASS	
Xylenes (m&p)	1.6	1.6	-0.60	PASS	
Xylenes (o)	1.6	1.6	-0.90	PASS	

***%Difference must be within +/- 30%**

RRF - Relative Response Factor

Data Path : C:\DATA\10-04-17\
Data File : aa3702dcvs.D
Acq On : 4 Oct 2017 9:02 am
Operator : jls
Sample : 10 ppbv DCVS
Misc : CC483586
ALS Vial : 2 Sample Multiplier: 1

Quant Time: Oct 04 09:42:45 2017
Quant Method : C:\msdchem\1\METHODS\0912.M
Quant Title : TO-15 on the Agilent 7890A / 5975C
QLast Update : Tue Sep 12 13:00:02 2017
Response via : Initial Calibration

Min. RRF : 0.000 Min. Rel. Area : 0% Max. R.T. Dev 0.40min
Max. RRF Dev : 30% Max. Rel. Area : 500%

		Compound	AvgRF	CCRF	%Dev	Area%	Dev(min)
1	I	Bromochloromethane (IS)	1.000	1.000	0.0	84	0.00
2	T	Propene	0.249	0.196	21.3	64	0.00
3	T	Dichlorodifluoromethane	3.733	3.741	-0.2	90	0.00
4	T	Chloromethane	0.084	0.084	0.0	69	0.00
5	T	1,2-Dichlorotetrafluoroetha	2.911	2.661	8.6	83	0.00
6	T	Vinyl chloride	0.567	0.511	9.9	71	0.00
7	T	1,3-Butadiene	0.314	0.295	6.1	73	0.00
8	T	n-Butane	0.519	0.491	5.4	71	0.00
9	T	Bromomethane	0.581	0.607	-4.5	78	0.00
10	T	Chloroethane	0.298	0.287	3.7	74	0.01
11	T	Ethanol	0.117	0.087	25.6	57	0.00
12	T	Vinyl bromide	0.941	0.934	0.7	79	0.00
13	T	Acrolein	0.165	0.155	6.1	73	0.00
14	T	Acetone	0.247	0.235	4.9	70	0.00
15	T	Trichlorofluoromethane	4.921	4.887	0.7	91	0.00
16	T	Isopropanol	0.668	0.567	15.1	67	0.00
17	T	n-Pentane	0.610	0.531	13.0	70	0.00
18	T	1,1-Dichloroethene	1.391	1.369	1.6	82	0.00
19	T	Methylene chloride	0.887	0.769	13.3	81	0.00
20	T	Tert-butyl alcohol	1.646	1.380	16.2	73	0.00
21	T	Allyl chloride	0.388	0.368	5.2	76	0.00
22	T	1,1,2-Trichloro-1,2,2-trifl	2.983	2.625	12.0	86	0.00
23	T	Carbon disulfide	2.675	2.466	7.8	80	0.00
24	T	1,2-Dichloroethene (trans)	1.132	1.036	8.5	79	0.00
25	T	1,1-Dichloroethane	1.595	1.416	11.2	80	0.00
26	T	Methyl tert-butyl ether	3.156	2.811	10.9	78	0.00
27	T	Methyl ethyl ketone	0.393	0.403	-2.5	79	0.00
28	T	1,2-Dichloroethene (cis)	1.123	1.032	8.1	79	0.00
29	T	Ethyl acetate	0.131	0.121	7.6	71	0.00
30	T	n-Hexane	0.815	0.683	16.2	75	0.00
31	T	Chloroform	3.034	2.956	2.6	88	0.00
32	T	Tetrahydrofuran	0.411	0.369	10.2	72	0.00
33	T	1,2-Dichloroethane	1.948	1.901	2.4	88	0.00
34	T	1,1,1-Trichloroethane	3.679	3.443	6.4	88	0.00
35	T	Benzene	2.946	2.584	12.3	79	0.00
36	T	Carbon tetrachloride	4.399	4.249	3.4	91	0.00
37	T	Cyclohexane	1.208	1.102	8.8	78	0.00
38	I	1,4-Difluorobenzene (IS)	1.000	1.000	0.0	83	0.00
39	T	1,2-Dichloropropane	0.258	0.215	16.7	77	0.00
40	T	Bromodichloromethane	0.938	0.924	1.5	89	0.00
41	T	2,2,4-Trimethylpentane	0.734	0.690	6.0	76	0.00
42	T	Trichloroethene	0.523	0.508	2.9	86	0.00
43	T	1,4-Dioxane	0.183	0.158	13.7	80	0.00
44	T	Methyl methacrylate	0.317	0.299	5.7	79	0.00
45	T	n-Heptane	0.243	0.264	-8.6	82	0.00
46	T	cis-1,3-Dichloropropene	0.569	0.549	3.5	81	0.00
47	T	Methyl isobutyl ketone	0.356	0.322	9.6	78	0.00
48	T	trans-1,3-Dichloropropene	0.601	0.589	2.0	82	0.00
49	T	1,1,2-Trichloroethane	0.458	0.416	9.2	83	0.00
50	T	Toluene	1.148	1.100	4.2	81	0.00
51	T	Methyl n-butyl ketone	0.345	0.314	9.0	76	0.00
52	T	Dibromochloromethane	1.092	1.089	0.3	90	0.00
53	T	1,2-Dibromoethane	0.787	0.743	5.6	83	0.00

Data Path : C:\DATA\10-04-17\
Data File : aa3702dcvs.D
Acq On : 4 Oct 2017 9:02 am
Operator : jls
Sample : 10 ppbv DCVS
Misc : CC483586
ALS Vial : 2 Sample Multiplier: 1

Quant Time: Oct 04 09:42:45 2017
Quant Method : C:\msdchem\1\METHODS\0912.M
Quant Title : TO-15 on the Agilent 7890A / 5975C
QLast Update : Tue Sep 12 13:00:02 2017
Response via : Initial Calibration

Min. RRF : 0.000 Min. Rel. Area : 0% Max. R.T. Dev 0.40min
Max. RRF Dev : 30% Max. Rel. Area : 500%

		Compound	AvgRF	CCRF	%Dev	Area%	Dev(min)
54	T	Tetrachloroethene	0.652	0.592	9.2	83	0.00
55	I	d-5 Chlorobenzene (IS)	1.000	1.000	0.0	83	0.00
56	T	Chlorobenzene	1.289	1.161	9.9	84	0.00
57	T	Ethylbenzene	1.899	1.865	1.8	84	0.00
58	T	Xylenes (m&p)	1.555	1.564	-0.6	85	0.00
59	T	Bromoform	1.017	1.026	-0.9	89	0.00
60	T	Styrene	1.047	1.063	-1.5	82	0.00
61	T	Xylene (o)	1.627	1.641	-0.9	85	0.00
62	T	1,1,2,2-Tetrachloroethane	1.140	1.029	9.7	86	0.00
63	T	n-Nonane	0.443	0.422	4.7	79	0.00
64	S	Bromofluorobenzene (tune st	0.876	0.905	-3.3	87	0.00
65	T	Cumene	2.224	2.209	0.7	85	0.00
66	T	2-Chlorotoluene	1.674	1.670	0.2	85	0.00
67	T	n-Propyl benzene	0.639	0.638	0.2	85	0.00
68	T	4-Ethyltoluene	2.162	2.223	-2.8	85	0.00
69	T	1,3,5-Trimethylbenzene	2.016	2.100	-4.2	86	0.00
70	T	1,2,4-Trimethylbenzene	1.949	2.077	-6.6	85	0.00
71	T	Benzyl chloride	1.646	1.699	-3.2	85	0.00
72	T	1,3-Dichlorobenzene	1.485	1.396	6.0	84	0.00
73	T	1,4-Dichlorobenzene	1.510	1.429	5.4	83	0.00
74	T	1,2-Dichlorobenzene	1.420	1.335	6.0	82	0.00
75	T	1,2,4-Trichlorobenzene	1.319	1.156	12.4	76	0.00
76	T	Naphthalene	0.406	0.406	0.0	76	0.00
77	T	1,3-Hexachlorobutadiene	1.093	0.946	13.4	83	0.00

(#) = Out of Range SPCC's out = 0 CCC's out = 0

```
Data Path : C:\DATA\10-04-17\
Data File : aa3702dcvs.D
Acq On    :  4 Oct 2017   9:02 am
Operator  : jls
Sample    : 10 ppbv DCVS
Misc      : CC483586
ALS Vial  : 2   Sample Multiplier: 1

Quant Time: Oct 04 09:42:45 2017
Quant Method : C:\msdchem\1\METHODS\0912.M
Quant Title  : TO-15 on the Agilent 7890A / 5975C
QLast Update : Tue Sep 12 13:00:02 2017
Response via : Initial Calibration
```

Compound	R.T.	QIon	Response	Conc Units	Dev(Min)
Internal Standards					
1) Bromochloromethane (IS)	7.746	130	481943	10.00 ppbV	0.00
38) 1,4-Difluorobenzene (IS)	9.804	114	1664213	10.00 ppbV	0.00
55) d-5 Chlorobenzene (IS)	15.138	117	1491654	10.00 ppbV	0.00
System Monitoring Compounds					
64) Bromofluorobenzene (tu...	17.341	95	1349754	10.33 ppbV	0.00
Target Compounds					Qvalue
2) Propene	3.508	41	94276	7.85 ppbV #	80
3) Dichlorodifluoromethane	3.563	85	1802889	10.02 ppbV	96
4) Chloromethane	3.724	52	40589	10.01 ppbV #	1
5) 1,2-Dichlorotetrafluor...	3.775	85	1282502	9.14 ppbV	100
6) Vinyl chloride	3.897	62	246364	9.02 ppbV	90
7) 1,3-Butadiene	3.997	54	142341	9.40 ppbV	78
8) n-Butane	4.042	43	236807	9.46 ppbV	92
9) Bromomethane	4.245	94	292681	10.46 ppbV	99
10) Chloroethane	4.399	64	138236	9.61 ppbV	95
11) Ethanol	4.428	45	42017	7.44 ppbV	97
12) Vinyl bromide	4.688	106	449932	9.92 ppbV	100
13) Acrolein	4.753	56	74481	9.34 ppbV	97
14) Acetone	4.846	58	113026	9.48 ppbV #	55
15) Trichlorofluoromethane	5.029	101	2355485	9.93 ppbV	99
16) Isopropanol	5.026	45	273384	8.49 ppbV #	89
17) n-Pentane	5.335	43	255824	8.70 ppbV	94
18) 1,1-Dichloroethene	5.589	61	659833	9.84 ppbV	95
19) Methylene chloride	5.704	84	370640	8.67 ppbV	99
20) Tert-butyl alcohol	5.560	59	664874	8.38 ppbV	100
21) Allyl chloride	5.801	76	177119	9.47 ppbV	100
22) 1,1,2-Trichloro-1,2,2-...	5.933	101	1264930	8.80 ppbV	97
23) Carbon disulfide	5.987	76	1188567	9.22 ppbV	97
24) 1,2-Dichloroethene (tr...	6.560	61	499237	9.15 ppbV	99
25) 1,1-Dichloroethane	6.753	63	682267	8.87 ppbV	93
26) Methyl tert-butyl ether	6.782	73	1354616	8.91 ppbV	100
27) Methyl ethyl ketone	7.100	72	194118	10.26 ppbV	97
28) 1,2-Dichloroethene (cis)	7.569	61	497567	9.20 ppbV	100
29) Ethyl acetate	7.765	45	58499	9.26 ppbV	100
30) n-Hexane	7.794	57	329337	8.38 ppbV	91
31) Chloroform	7.868	83	1424801	9.74 ppbV	99
32) Tetrahydrofuran	8.261	42	178047	9.00 ppbV #	74
33) 1,2-Dichloroethane	8.637	62	916014	9.75 ppbV	96
34) 1,1,1-Trichloroethane	8.916	97	1659473	9.36 ppbV	99
35) Benzene	9.415	78	1245256	8.77 ppbV	97
36) Carbon tetrachloride	9.582	117	2047727	9.66 ppbV	99
37) Cyclohexane	9.723	84	531148	9.12 ppbV	93
39) 1,2-Dichloropropane	10.328	63	358470	8.34 ppbV	98
40) Bromodichloromethane	10.543	83	1538094	9.85 ppbV	99
41) 2,2,4-Trimethylpentane	10.656	57	1148546	9.40 ppbV	94
42) Trichloroethene	10.605	130	844998	9.71 ppbV	98
43) 1,4-Dioxane	10.566	88	262807	8.61 ppbV	96
44) Methyl methacrylate	10.817	69	497729	9.45 ppbV	97
45) n-Heptane	10.955	71	438545	10.86 ppbV	91
46) cis-1,3-Dichloropropene	11.614	75	913482	9.64 ppbV	99
47) Methyl isobutyl ketone	11.640	43	535768	9.05 ppbV	98
48) trans-1,3-Dichloropropene	12.254	75	980764	9.80 ppbV	98
49) 1,1,2-Trichloroethane	12.463	97	692552	9.08 ppbV	98
50) Toluene	12.820	91	1830741	9.58 ppbV	97
51) Methyl n-butyl ketone	13.138	43	521956	9.09 ppbV	97

Data Path : C:\DATA\10-04-17\
Data File : aa3702dcvs.D
Acq On : 4 Oct 2017 9:02 am
Operator : jls
Sample : 10 ppbv DCVS
Misc : CC483586
ALS Vial : 2 Sample Multiplier: 1

Quant Time: Oct 04 09:42:45 2017
Quant Method : C:\msdchem\1\METHODS\0912.M
Quant Title : TO-15 on the Agilent 7890A / 5975C
QLast Update : Tue Sep 12 13:00:02 2017
Response via : Initial Calibration

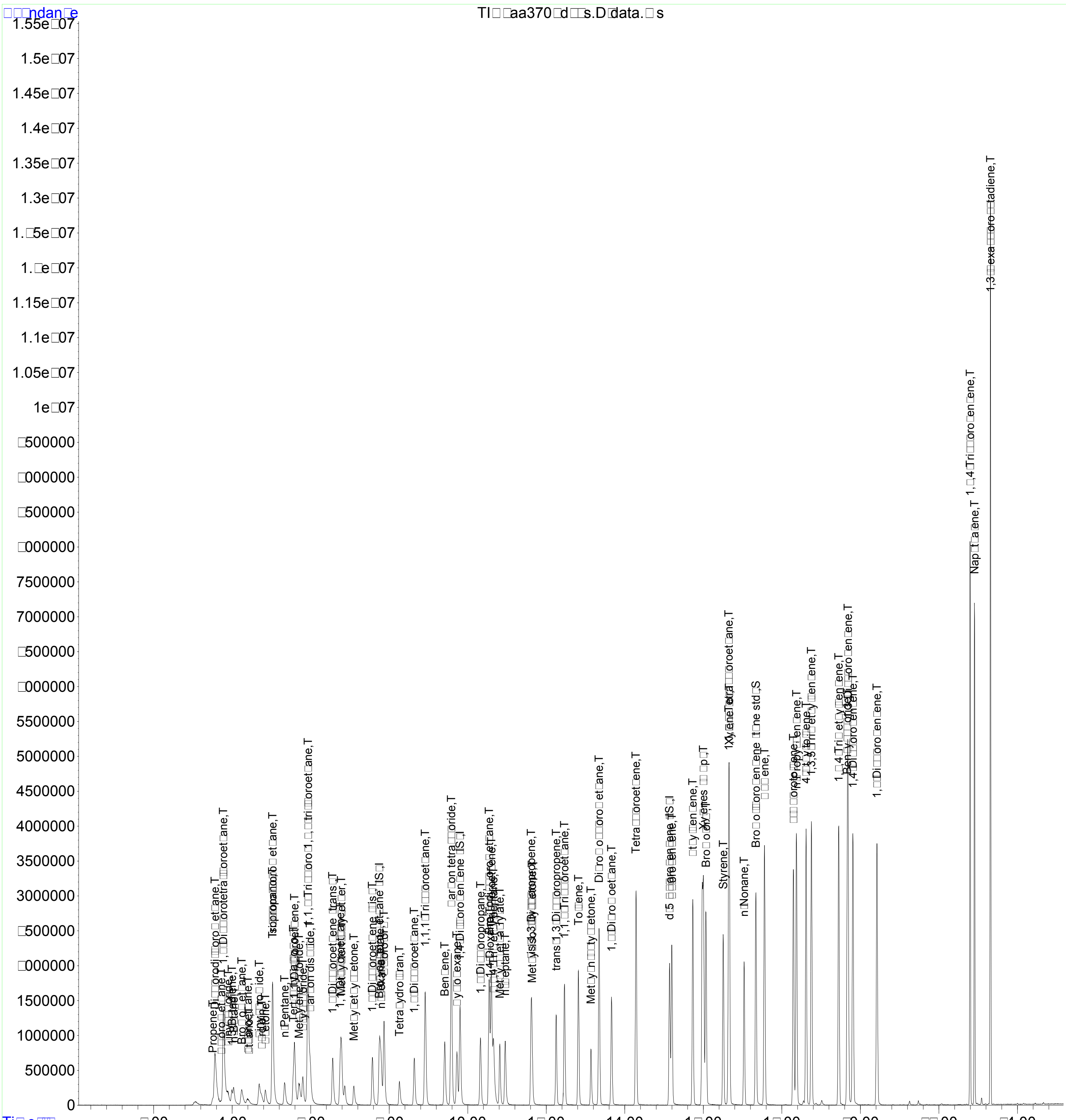
	Compound	R.T.	QIon	Response	Conc	Units	Dev(Min)
52)	Dibromochloromethane	13.344	129	1811760	9.97	ppbV	99
53)	1,2-Dibromoethane	13.662	107	1235791	9.43	ppbV	100
54)	Tetrachloroethene	14.283	166	984654	9.07	ppbV	98
56)	Chlorobenzene	15.199	112	1732288	9.01	ppbV	99
57)	Ethylbenzene	15.730	91	2781959	9.82	ppbV	97
58)	Xylenes (m&p)	16.000	91	4665123	20.11	ppbV	95
59)	Bromoform	16.067	173	1530894	10.09	ppbV	97
60)	Styrene	16.505	104	1585795	10.16	ppbV	99
61)	Xylene (o)	16.662	91	2447073	10.08	ppbV	90
62)	1,1,2,2-Tetrachloroethane	16.646	83	1534917	9.02	ppbV	99
63)	n-Nonane	17.038	57	630147	9.54	ppbV	100
65)	Cumene	17.559	105	3295320	9.94	ppbV	95
66)	2-Chlorotoluene	18.292	91	2491313	9.97	ppbV	91
67)	n-Propyl benzene	18.373	120	951874	9.98	ppbV	84
68)	4-Ethyltoluene	18.617	105	3316608	10.28	ppbV	92
69)	1,3,5-Trimethylbenzene	18.752	105	3132028	10.41	ppbV	90
70)	1,2,4-Trimethylbenzene	19.447	105	3098552	10.66	ppbV	96
71)	Benzyl chloride	19.665	91	2533645	10.32	ppbV	100
72)	1,3-Dichlorobenzene	19.685	146	2081693	9.40	ppbV	98
73)	1,4-Dichlorobenzene	19.810	146	2131803	9.46	ppbV	96
74)	1,2-Dichlorobenzene	20.421	146	1990665	9.40	ppbV	99
75)	1,2,4-Trichlorobenzene	22.794	180	1723668	8.76	ppbV	99
76)	Naphthalene	22.909	127	606303	10.02	ppbV	100
77)	1,3-Hexachlorobutadiene	23.315	225	1411768	8.66	ppbV	95

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Quantitation Report (QT Reviewed)

Data Path : C:\DATA\10-04-17\
Data File : aa3702dcvs.D
Acq On : 4 Oct 2017 9:02 am
Operator : jls
Sample : 10 ppbv DCVS
Misc : CC483586
ALS Vial : 2 Sample Multiplier: 1

Quant Time: Oct 04 09:42:45 2017
Quant Method : C:\msdchem\1\METHODS\0912.M
Quant Title : TO-15 on the Agilent 7890A / 5975C
QLast Update : Tue Sep 12 13:00:02 2017
Response via : Initial Calibration



IAL SDG #E17-09837

IAL Integrated Analytical Laboratories LLC

Continuing Calibration Data Summary Report

Initial Calibration Curve:	**9/12/2017**	**Date/Time of Calibration:**	**11/28/2017 09:29**
Instrument:	**AA**	**Sample ID:**	**DCS**
Amount of standard injected (ml):	**50**	**Laboratory ID:**	**AA4272DCVS**

Standard/Sample Run	Date/Time of Sample/Standard Injection
BFB [AA4271BFB]	11/28/2017 08:37
10 PPBV DCVS [AA4272DCVS]	11/28/2017 09:29
10 PPBV LCS [AA4273LCS]	11/28/2017 10:09
METHOD BLANK [AA4274BLK]	11/28/2017 13:04
02 PPBV RLLCS [AA4275RLLCS]	11/28/2017 13:44
E17-09837-01 [AA4286]	11/28/2017 20:34
E17-09837-02 [AA4287]	11/28/2017 21:07
E17-09837-05 [AA4290]	11/28/2017 22:48
10 PPBV CCCVS [AA4292CCCVS]	11/28/2017 23:56

Compound Name	Average RRF	Standard RRF	% Difference	PassFail	*
Acetone	0.25	0.26	-5.7	PASS	
Benzene	2.9	2.9	0.40	PASS	
Bromodichloromethane	0.94	0.97	-2.9	PASS	
Bromoform	1.0	1.1	-5.9	PASS	
Bromomethane	0.58	0.76	-30	PASS	
1,3-Butadiene	0.31	0.33	-4.1	PASS	
Chlorobenzene	1.3	1.2	9.1	PASS	
Chloroethane	0.30	0.32	-6.7	PASS	
Chloroform	3.0	3.0	1.5	PASS	
Chloromethane	0.084	0.097	-16	PASS	
Carbon disulfide	2.7	2.5	4.9	PASS	
Carbon tetrachloride	4.4	4.7	-7.7	PASS	
Cyclohexane	1.2	1.2	2.8	PASS	
Dibromochloromethane	1.1	1.2	-9.3	PASS	
1,2-Dibromoethane	0.79	0.80	-2.2	PASS	
1,2-Dichlorobenzene	1.4	1.4	-1.5	PASS	
1,3-Dichlorobenzene	1.5	1.5	2.0	PASS	
1,4-Dichlorobenzene	1.5	1.5	1.1	PASS	
Dichlorodifluoromethane	3.7	4.0	-8.2	PASS	
1,1-Dichloroethane	1.6	1.5	3.3	PASS	
1,2-Dichloroethane	1.9	2.0	-4.7	PASS	
1,1-Dichloroethene	1.4	1.5	-7.5	PASS	
1,2-Dichloroethene (cis)	1.1	1.2	-2.7	PASS	
1,2-Dichloroethene (trans)	1.1	1.2	-2.0	PASS	
1,2-Dichloropropane	0.26	0.24	8.1	PASS	
1,3-Dichloropropene (cis)	0.57	0.58	-2.1	PASS	
1,3-Dichloropropene (trans)	0.60	0.62	-3.0	PASS	
1,2-Dichlorotetrafluoroethane	2.9	2.9	-1.0	PASS	
1,4-Dioxane	0.18	0.18	2.2	PASS	
Ethylbenzene	1.9	1.8	2.7	PASS	
n-Heptane	0.24	0.28	-16	PASS	
1,3-Hexachlorobutadiene	1.1	1.1	-4.8	PASS	
n-Hexane	0.82	0.86	-5.3	PASS	
Methylene chloride	0.89	0.77	13	PASS	
Methyl ethyl ketone	0.39	0.43	-8.4	PASS	
Methyl isobutyl ketone	0.36	0.40	-13	PASS	
Methyl tert-butyl ether	3.2	3.2	-0.10	PASS	
Styrene	1.0	1.1	-5.2	PASS	
Tert-butyl alcohol	1.6	1.7	-1.8	PASS	
1,1,2,2-Tetrachloroethane	1.1	0.97	15	PASS	
Tetrachloroethene	0.65	0.71	-8.1	PASS	

***%Difference must be within +/- 30%**

RRF - Relative Response Factor

Continuing Calibration Data Summary Report

Initial Calibration Curve:	**9/12/2017**	**Date/Time of Calibration:**	**11/28/2017 09:29**
Instrument:	**AA**	**Sample ID:**	**DCS**
Amount of standard injected (ml):	**50**	**Laboratory ID:**	**AA4272DCVS**

Standard/Sample Run	Date/Time of Sample/Standard Injection
BFB [AA4271BFB]	11/28/2017 08:37
10 PPBV DCVS [AA4272DCVS]	11/28/2017 09:29
10 PPBV LCS [AA4273LCS]	11/28/2017 10:09
METHOD BLANK [AA4274BLK]	11/28/2017 13:04
02 PPBV RLLCS [AA4275RLLCS]	11/28/2017 13:44
E17-09837-01 [AA4286]	11/28/2017 20:34
E17-09837-02 [AA4287]	11/28/2017 21:07
E17-09837-05 [AA4290]	11/28/2017 22:48
10 PPBV CCCVS [AA4292CCCVS]	11/28/2017 23:56

Compound Name	Average RRF	Standard RRF	% Difference	PassFail	*
Toluene	1.1	1.2	-2.6	PASS	
1,2,4-Trichlorobenzene	1.3	1.4	-4.9	PASS	
1,1,1-Trichloroethane	3.7	3.7	-1.2	PASS	
1,1,2-Trichloroethane	0.46	0.46	-0.70	PASS	
Trichloroethene	0.52	0.58	-10	PASS	
Trichlorofluoromethane	4.9	5.1	-3.5	PASS	
1,1,2-Trichloro-1,2,2-trifluoroethane	3.0	2.8	5.3	PASS	
1,2,4-Trimethylbenzene	1.9	2.1	-8.8	PASS	
1,3,5-Trimethylbenzene	2.0	2.1	-5.5	PASS	
2,2,4-Trimethylpentane	0.73	0.86	-17	PASS	
Vinyl bromide	0.94	1.1	-13	PASS	
Vinyl chloride	0.57	0.62	-9.7	PASS	
Xylenes (m&p)	1.6	1.5	1.8	PASS	
Xylenes (o)	1.6	1.6	1.1	PASS	

***%Difference must be within +/- 30%**

RRF - Relative Response Factor

Data Path : C:\DATA\11-28-17\
Data File : aa4272dcvs.D
Acq On : 28 Nov 2017 9:29 am
Operator : jls
Sample : 10 ppbv DCVS
Misc : CC483586
ALS Vial : 2 Sample Multiplier: 1

Quant Time: Nov 28 09:56:39 2017
Quant Method : C:\msdchem\1\METHODS\0912.M
Quant Title : TO-15 on the Agilent 7890A / 5975C
QLast Update : Tue Sep 12 13:00:02 2017
Response via : Initial Calibration

Min. RRF : 0.000 Min. Rel. Area : 0% Max. R.T. Dev 0.40min
Max. RRF Dev : 30% Max. Rel. Area : 500%

		Compound	AvgRF	CCRF	%Dev	Area%	Dev(min)
1	I	Bromochloromethane (IS)	1.000	1.000	0.0	95	0.00
2	T	Propene	0.249	0.296	-18.9	109	0.00
3	T	Dichlorodifluoromethane	3.733	4.040	-8.2	109	0.00
4	T	Chloromethane	0.084	0.097	-15.5	89	0.00
5	T	1,2-Dichlorotetrafluoroetha	2.911	2.939	-1.0	103	0.00
6	T	Vinyl chloride	0.567	0.622	-9.7	97	0.00
7	T	1,3-Butadiene	0.314	0.327	-4.1	91	0.00
8	T	n-Butane	0.519	0.626	-20.6	101	0.00
9	T	Bromomethane	0.581	0.755	-29.9	109	0.00
10	T	Chloroethane	0.298	0.318	-6.7	92	0.00
11	T	Ethanol	0.117	0.122	-4.3	89	0.00
12	T	Vinyl bromide	0.941	1.067	-13.4	101	0.00
13	T	Acrolein	0.165	0.176	-6.7	94	0.00
14	T	Acetone	0.247	0.261	-5.7	88	-0.01
15	T	Trichlorofluoromethane	4.921	5.095	-3.5	106	0.00
16	T	Isopropanol	0.668	0.765	-14.5	101	0.00
17	T	n-Pentane	0.610	0.692	-13.4	103	0.00
18	T	1,1-Dichloroethene	1.391	1.495	-7.5	101	0.00
19	T	Methylene chloride	0.887	0.768	13.4	91	0.00
20	T	Tert-butyl alcohol	1.646	1.676	-1.8	100	0.00
21	T	Allyl chloride	0.388	0.384	1.0	89	0.00
22	T	1,1,2-Trichloro-1,2,2-trifl	2.983	2.825	5.3	104	0.00
23	T	Carbon disulfide	2.675	2.544	4.9	93	0.00
24	T	1,2-Dichloroethene (trans)	1.132	1.155	-2.0	98	0.00
25	T	1,1-Dichloroethane	1.595	1.542	3.3	98	0.00
26	T	Methyl tert-butyl ether	3.156	3.160	-0.1	98	0.00
27	T	Methyl ethyl ketone	0.393	0.426	-8.4	94	0.00
28	T	1,2-Dichloroethene (cis)	1.123	1.153	-2.7	98	0.00
29	T	Ethyl acetate	0.131	0.151	-15.3	99	0.00
30	T	n-Hexane	0.815	0.858	-5.3	105	0.00
31	T	Chloroform	3.034	2.989	1.5	99	0.00
32	T	Tetrahydrofuran	0.411	0.471	-14.6	102	0.00
33	T	1,2-Dichloroethane	1.948	2.039	-4.7	106	0.00
34	T	1,1,1-Trichloroethane	3.679	3.724	-1.2	107	0.00
35	T	Benzene	2.946	2.934	0.4	100	0.00
36	T	Carbon tetrachloride	4.399	4.736	-7.7	114	0.00
37	T	Cyclohexane	1.208	1.174	2.8	94	0.00
38	I	1,4-Difluorobenzene (IS)	1.000	1.000	0.0	91	0.00
39	T	1,2-Dichloropropane	0.258	0.237	8.1	94	0.00
40	T	Bromodichloromethane	0.938	0.965	-2.9	102	0.00
41	T	2,2,4-Trimethylpentane	0.734	0.860	-17.2	104	0.00
42	T	Trichloroethene	0.523	0.577	-10.3	107	0.00
43	T	1,4-Dioxane	0.183	0.179	2.2	100	0.00
44	T	Methyl methacrylate	0.317	0.323	-1.9	94	0.00
45	T	n-Heptane	0.243	0.282	-16.0	96	0.00
46	T	cis-1,3-Dichloropropene	0.569	0.581	-2.1	95	0.00
47	T	Methyl isobutyl ketone	0.356	0.401	-12.6	107	0.00
48	T	trans-1,3-Dichloropropene	0.601	0.619	-3.0	95	0.00
49	T	1,1,2-Trichloroethane	0.458	0.461	-0.7	101	0.00
50	T	Toluene	1.148	1.178	-2.6	96	0.00
51	T	Methyl n-butyl ketone	0.345	0.392	-13.6	105	0.00
52	T	Dibromochloromethane	1.092	1.194	-9.3	108	0.00
53	T	1,2-Dibromoethane	0.787	0.804	-2.2	100	0.00

Data Path : C:\DATA\11-28-17\
Data File : aa4272dcvs.D
Acq On : 28 Nov 2017 9:29 am
Operator : jls
Sample : 10 ppbv DCVS
Misc : CC483586
ALS Vial : 2 Sample Multiplier: 1

Quant Time: Nov 28 09:56:39 2017
Quant Method : C:\msdchem\1\METHODS\0912.M
Quant Title : TO-15 on the Agilent 7890A / 5975C
QLast Update : Tue Sep 12 13:00:02 2017
Response via : Initial Calibration

Min. RRF : 0.000 Min. Rel. Area : 0% Max. R.T. Dev 0.40min
Max. RRF Dev : 30% Max. Rel. Area : 500%

		Compound	AvgRF	CCRF	%Dev	Area%	Dev(min)
54	T	Tetrachloroethene	0.652	0.705	-8.1	108	0.00
55	I	d-5 Chlorobenzene (IS)	1.000	1.000	0.0	99	0.00
56	T	Chlorobenzene	1.289	1.172	9.1	101	0.00
57	T	Ethylbenzene	1.899	1.847	2.7	100	0.00
58	T	Xylenes (m&p)	1.555	1.527	1.8	99	-0.03
59	T	Bromoform	1.017	1.077	-5.9	112	0.00
60	T	Styrene	1.047	1.101	-5.2	101	0.00
61	T	Xylene (o)	1.627	1.609	1.1	100	0.00
62	T	1,1,2,2-Tetrachloroethane	1.140	0.973	14.6	97	0.00
63	T	n-Nonane	0.443	0.483	-9.0	107	0.00
64	S	Bromofluorobenzene (tune st	0.876	0.804	8.2	92	0.00
65	T	Cumene	2.224	2.306	-3.7	106	0.00
66	T	2-Chlorotoluene	1.674	1.640	2.0	100	0.00
67	T	n-Propyl benzene	0.639	0.690	-8.0	109	0.00
68	T	4-Ethyltoluene	2.162	2.269	-4.9	104	0.00
69	T	1,3,5-Trimethylbenzene	2.016	2.126	-5.5	104	0.00
70	T	1,2,4-Trimethylbenzene	1.949	2.121	-8.8	103	0.00
71	T	Benzyl chloride	1.646	1.690	-2.7	101	0.00
72	T	1,3-Dichlorobenzene	1.485	1.456	2.0	105	0.00
73	T	1,4-Dichlorobenzene	1.510	1.493	1.1	104	0.00
74	T	1,2-Dichlorobenzene	1.420	1.441	-1.5	106	0.00
75	T	1,2,4-Trichlorobenzene	1.319	1.383	-4.9	109	0.00
76	T	Naphthalene	0.406	0.460	-13.3	103	0.00
77	T	1,3-Hexachlorobutadiene	1.093	1.145	-4.8	121	0.00

(#) = Out of Range SPCC's out = 0 CCC's out = 0

Data Path : C:\DATA\11-28-17\
Data File : aa4272dcvs.D
Acq On : 28 Nov 2017 9:29 am
Operator : jls
Sample : 10 ppbv DCVS
Misc : CC483586
ALS Vial : 2 Sample Multiplier: 1

Quant Time: Nov 28 09:56:39 2017
Quant Method : C:\msdchem\1\METHODS\0912.M
Quant Title : TO-15 on the Agilent 7890A / 5975C
QLast Update : Tue Sep 12 13:00:02 2017
Response via : Initial Calibration

Compound	R.T.	QIon	Response	Conc Units	Dev(Min)
Internal Standards					
1) Bromochloromethane (IS)	7.743	130	540836	10.00 ppbV	0.00
38) 1,4-Difluorobenzene (IS)	9.801	114	1834939	10.00 ppbV	0.00
55) d-5 Chlorobenzene (IS)	15.135	117	1780782	10.00 ppbV	0.00
System Monitoring Compounds					
64) Bromofluorobenzene (tu...	17.338	95	1431677	9.18 ppbV	0.00
Target Compounds					Qvalue
2) Propene	3.512	41	160297	11.89 ppbV	85
3) Dichlorodifluoromethane	3.557	85	2185186	10.82 ppbV	96
4) Chloromethane	3.727	52	52397	11.51 ppbV	89
5) 1,2-Dichlorotetrafluor...	3.776	85	1589559	10.10 ppbV	94
6) Vinyl chloride	3.888	62	336467	10.98 ppbV	84
7) 1,3-Butadiene	3.991	54	176944	10.41 ppbV #	58
8) n-Butane	4.033	43	338343	12.05 ppbV	91
9) Bromomethane	4.242	94	408496	13.01 ppbV	98
10) Chloroethane	4.386	64	172255	10.67 ppbV	93
11) Ethanol	4.422	45	65790	10.38 ppbV #	87
12) Vinyl bromide	4.682	106	577122	11.34 ppbV	93
13) Acrolein	4.747	56	95173	10.64 ppbV	96
14) Acetone	4.840	58	141160	10.55 ppbV #	31
15) Trichlorofluoromethane	5.030	101	2755748	10.35 ppbV	99
16) Isopropanol	5.026	45	413759	11.45 ppbV	97
17) n-Pentane	5.338	43	374233	11.34 ppbV	92
18) 1,1-Dichloroethene	5.589	61	808304	10.74 ppbV	97
19) Methylene chloride	5.698	84	415397	8.66 ppbV	86
20) Tert-butyl alcohol	5.554	59	906288	10.18 ppbV	100
21) Allyl chloride	5.798	76	207890	9.90 ppbV	100
22) 1,1,2-Trichloro-1,2,2-...	5.933	101	1527915	9.47 ppbV	89
23) Carbon disulfide	5.981	76	1375791	9.51 ppbV #	93
24) 1,2-Dichloroethene (tr...	6.560	61	624631	10.20 ppbV	99
25) 1,1-Dichloroethane	6.747	63	833802	9.66 ppbV	94
26) Methyl tert-butyl ether	6.779	73	1709271	10.01 ppbV	96
27) Methyl ethyl ketone	7.097	72	230327	10.85 ppbV	80
28) 1,2-Dichloroethene (cis)	7.566	61	623425	10.27 ppbV	99
29) Ethyl acetate	7.759	45	81678	11.52 ppbV	100
30) n-Hexane	7.795	57	463846	10.52 ppbV	92
31) Chloroform	7.869	83	1616554	9.85 ppbV	94
32) Tetrahydrofuran	8.258	42	254666	11.46 ppbV #	78
33) 1,2-Dichloroethane	8.637	62	1102853	10.47 ppbV	98
34) 1,1,1-Trichloroethane	8.914	97	2013928	10.12 ppbV	99
35) Benzene	9.412	78	1586585	9.96 ppbV #	94
36) Carbon tetrachloride	9.579	117	2561231	10.77 ppbV	98
37) Cyclohexane	9.724	84	634989	9.72 ppbV	86
39) 1,2-Dichloropropane	10.322	63	434193	9.16 ppbV	97
40) Bromodichloromethane	10.544	83	1771293	10.29 ppbV	95
41) 2,2,4-Trimethylpentane	10.656	57	1578391	11.71 ppbV	99
42) Trichloroethene	10.598	130	1058721	11.03 ppbV	100
43) 1,4-Dioxane	10.563	88	328907	9.78 ppbV	94
44) Methyl methacrylate	10.814	69	592180	10.20 ppbV	87
45) n-Heptane	10.955	71	516795	11.61 ppbV	91
46) cis-1,3-Dichloropropene	11.611	75	1066923	10.21 ppbV	98
47) Methyl isobutyl ketone	11.637	43	736255	11.28 ppbV	93
48) trans-1,3-Dichloropropene	12.251	75	1135038	10.29 ppbV #	87
49) 1,1,2-Trichloroethane	12.460	97	846789	10.07 ppbV	92
50) Toluene	12.814	91	2162395	10.26 ppbV	99
51) Methyl n-butyl ketone	13.135	43	719173	11.36 ppbV	90

Data Path : C:\DATA\11-28-17\
Data File : aa4272dcvs.D
Acq On   : 28 Nov 2017   9:29 am
Operator : jls
Sample   : 10 ppbv DCVS
Misc   : CC483586
ALS Vial : 2   Sample Multiplier: 1

Quant Time: Nov 28 09:56:39 2017
Quant Method : C:\msdchem\1\METHODS\0912.M
Quant Title : TO-15 on the Agilent 7890A / 5975C
QLast Update : Tue Sep 12 13:00:02 2017
Response via : Initial Calibration

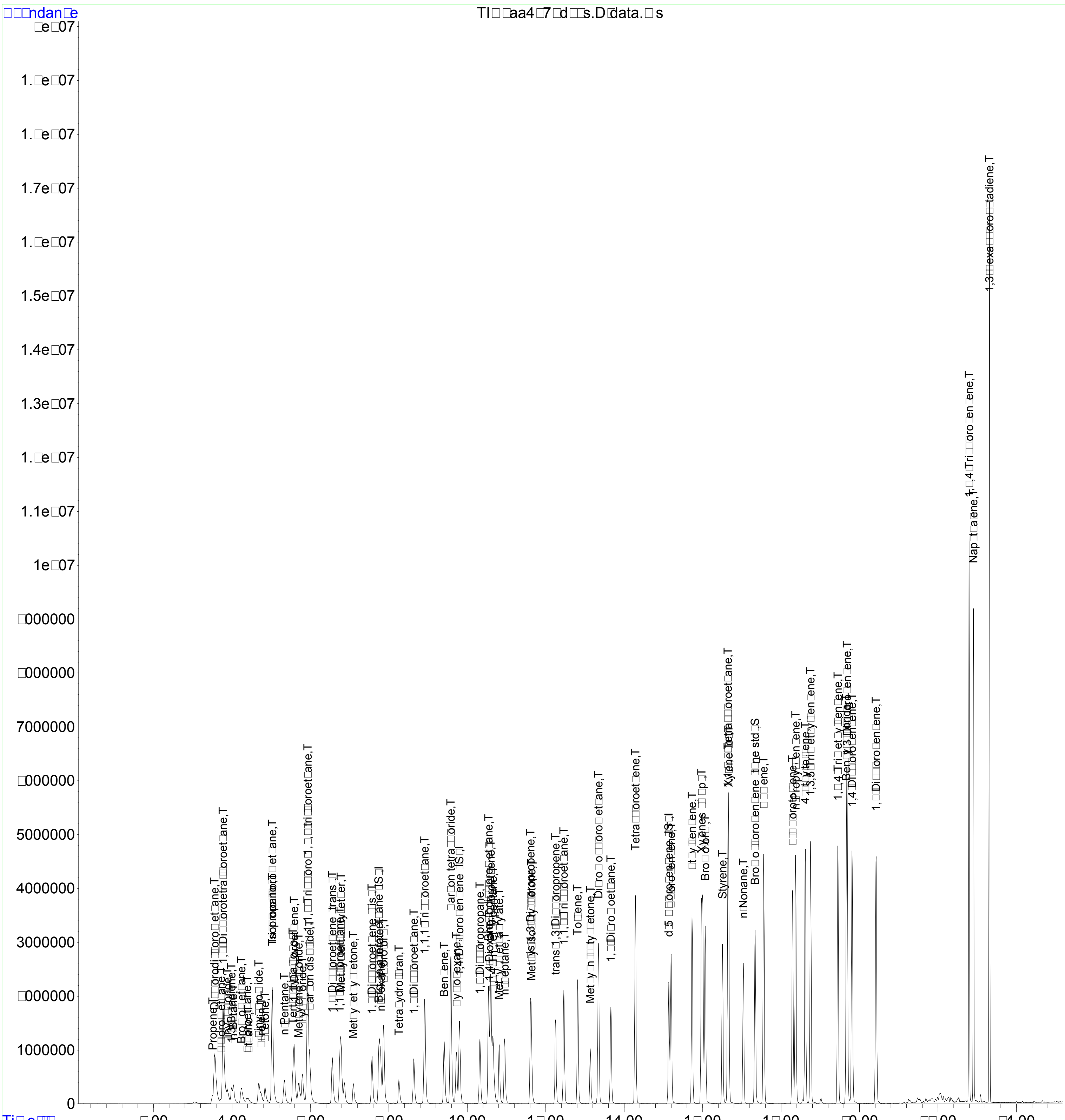
	Compound	R.T.	QIon	Response	Conc	Units	Dev(Min)
52)	Dibromochloromethane	13.344	129	2191620	10.93	ppbV	100
53)	1,2-Dibromoethane	13.659	107	1475575	10.22	ppbV	94
54)	Tetrachloroethene	14.286	166	1292995	10.81	ppbV	98
56)	Chlorobenzene	15.196	112	2087168	9.09	ppbV	98
57)	Ethylbenzene	15.730	91	3289781	9.73	ppbV	100
58)	Xylenes (m&p)	15.974	91	5437451	19.64	ppbV #	28
59)	Bromoform	16.064	173	1917933	10.59	ppbV	97
60)	Styrene	16.505	104	1960414	10.52	ppbV	99
61)	Xylene (o)	16.663	91	2864437	9.88	ppbV	88
62)	1,1,2,2-Tetrachloroethane	16.643	83	1732588	8.53	ppbV	94
63)	n-Nonane	17.039	57	860149	10.91	ppbV	99
65)	Cumene	17.556	105	4106373	10.37	ppbV	92
66)	2-Chlorotoluene	18.289	91	2920101	9.79	ppbV #	85
67)	n-Propyl benzene	18.370	120	1228457	10.79	ppbV	66
68)	4-Ethyltoluene	18.617	105	4039955	10.49	ppbV #	89
69)	1,3,5-Trimethylbenzene	18.752	105	3785592	10.54	ppbV #	85
70)	1,2,4-Trimethylbenzene	19.447	105	3777023	10.88	ppbV	100
71)	Benzyl chloride	19.666	91	3009381	10.26	ppbV	94
72)	1,3-Dichlorobenzene	19.685	146	2592244	9.80	ppbV	98
73)	1,4-Dichlorobenzene	19.810	146	2659558	9.89	ppbV	99
74)	1,2-Dichlorobenzene	20.421	146	2566429	10.15	ppbV	99
75)	1,2,4-Trichlorobenzene	22.794	180	2462854	10.49	ppbV	99
76)	Naphthalene	22.903	127	818472	11.33	ppbV	100
77)	1,3-Hexachlorobutadiene	23.312	225	2039432	10.48	ppbV	96

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Quantitation Report (QT Reviewed)

Data Path : C:\DATA\11-28-17\
Data File : aa4272dcvs.D
Acq On : 28 Nov 2017 9:29 am
Operator : jls
Sample : 10 ppbv DCVS
Misc : CC483586
ALS Vial : 2 Sample Multiplier: 1

Quant Time: Nov 28 09:56:39 2017
Quant Method : C:\msdchem\1\METHODS\0912.M
Quant Title : TO-15 on the Agilent 7890A / 5975C
QLast Update : Tue Sep 12 13:00:02 2017
Response via : Initial Calibration



Continuing Calibration Data Summary Report

Initial Calibration Curve:	**9/12/2017**	**Date/Time of Calibration:**	**11/29/2017 10:04**
Instrument:	**AA**	**Sample ID:**	**DCS**
Amount of standard injected (ml):	**50**	**Laboratory ID:**	**AA4302DCVS**

Standard/Sample Run	Date/Time of Sample/Standard Injection
BFB [AA4301BFB]	11/29/2017 08:42
10 PPBV DCVS [AA4302DCVS]	11/29/2017 10:04
10 PPBV LCS [AA4303LCS]	11/29/2017 10:45
METHOD BLANK [AA4304BLK]	11/29/2017 11:19
02 PPBV RLLCS [AA4305RLLCS]	11/29/2017 11:59
CLEAN CAN CERTIFICATION, BATCH MASTER 3059 [AA4306]	11/29/2017 14:35
E17-09837-01 [AA4307]	11/29/2017 15:08
E17-09837-02 [AA4308]	11/29/2017 15:55
E17-09837-03 [AA4309]	11/29/2017 16:29
E17-09837-04 [AA4310]	11/29/2017 17:03
10 PPBV CCCVS [AA4319CCCVS]	11/29/2017 22:05

Compound Name	Average RRF	Standard RRF	% Difference	PassFail	*
Acetone	0.25	0.23	5.7	PASS	
Benzene	2.9	2.7	7.4	PASS	
Bromodichloromethane	0.94	1.0	-12	PASS	
Bromoform	1.0	1.3	-24	PASS	
Bromomethane	0.58	0.69	-19	PASS	
1,3-Butadiene	0.31	0.28	12	PASS	
Chlorobenzene	1.3	1.2	5.1	PASS	
Chloroethane	0.30	0.26	12	PASS	
Chloroform	3.0	3.1	-1.3	PASS	
Chloromethane	0.084	0.081	3.6	PASS	
Carbon disulfide	2.7	2.3	13	PASS	
Carbon tetrachloride	4.4	5.3	-22	PASS	
Cyclohexane	1.2	1.1	10	PASS	
Dibromochloromethane	1.1	1.3	-22	PASS	
1,2-Dibromoethane	0.79	0.83	-5.0	PASS	
1,2-Dichlorobenzene	1.4	1.6	-10	PASS	
1,3-Dichlorobenzene	1.5	1.7	-11	PASS	
1,4-Dichlorobenzene	1.5	1.7	-11	PASS	
Dichlorodifluoromethane	3.7	4.5	-19	PASS	
1,1-Dichloroethane	1.6	1.4	9.7	PASS	
1,2-Dichloroethane	1.9	2.1	-8.7	PASS	
1,1-Dichloroethene	1.4	1.5	-4.7	PASS	
1,2-Dichloroethene (cis)	1.1	1.1	4.3	PASS	
1,2-Dichloroethene (trans)	1.1	1.1	4.7	PASS	
1,2-Dichloropropane	0.26	0.22	13	PASS	
1,3-Dichloropropene (cis)	0.57	0.58	-1.9	PASS	
1,3-Dichloropropene (trans)	0.60	0.64	-6.3	PASS	
1,2-Dichlorotetrafluoroethane	2.9	3.0	-3.2	PASS	
1,4-Dioxane	0.18	0.17	5.5	PASS	
Ethylbenzene	1.9	1.9	1.0	PASS	
n-Heptane	0.24	0.27	-9.9	PASS	
1,3-Hexachlorobutadiene	1.1	1.3	-16	PASS	
n-Hexane	0.82	0.75	8.3	PASS	
Methylene chloride	0.89	0.72	18	PASS	
Methyl ethyl ketone	0.39	0.38	3.6	PASS	
Methyl isobutyl ketone	0.36	0.38	-6.5	PASS	
Methyl tert-butyl ether	3.2	3.1	3.0	PASS	
Styrene	1.0	1.2	-15	PASS	
Tert-butyl alcohol	1.6	1.6	5.3	PASS	

***%Difference must be within +/- 30%**

RRF - Relative Response Factor

Continuing Calibration Data Summary Report

Integrated Analytical Laboratories LLC

Initial Calibration Curve:	**9/12/2017**	**Date/Time of Calibration:**	**11/29/2017 10:04**
Instrument:	**AA**	**Sample ID:**	**DCS**
Amount of standard injected (ml):	**50**	**Laboratory ID:**	**AA4302DCVS**

Standard/Sample Run	Date/Time of Sample/Standard Injection
BFB [AA4301BFB]	11/29/2017 08:42
10 PPBV DCVS [AA4302DCVS]	11/29/2017 10:04
10 PPBV LCS [AA4303LCS]	11/29/2017 10:45
METHOD BLANK [AA4304BLK]	11/29/2017 11:19
02 PPBV RLLCS [AA4305RLLCS]	11/29/2017 11:59
CLEAN CAN CERTIFICATION, BATCH MASTER 3059 [AA4306]	11/29/2017 14:35
E17-09837-01 [AA4307]	11/29/2017 15:08
E17-09837-02 [AA4308]	11/29/2017 15:55
E17-09837-03 [AA4309]	11/29/2017 16:29
E17-09837-04 [AA4310]	11/29/2017 17:03
10 PPBV CCCVS [AA4319CCCVS]	11/29/2017 22:05

Compound Name	Average RRF	Standard RRF	% Difference	PassFail	*
1,1,2,2-Tetrachloroethane	1.1	1.1	4.6	PASS	
Tetrachloroethene	0.65	0.74	-14	PASS	
Toluene	1.1	1.2	-2.5	PASS	
1,2,4-Trichlorobenzene	1.3	1.5	-13	PASS	
1,1,1-Trichloroethane	3.7	4.0	-8.3	PASS	
1,1,2-Trichloroethane	0.46	0.47	-1.7	PASS	
Trichloroethene	0.52	0.61	-16	PASS	
Trichlorofluoromethane	4.9	5.7	-15	PASS	
1,1,2-Trichloro-1,2,2-trifluoroethane	3.0	2.9	3.0	PASS	
1,2,4-Trimethylbenzene	1.9	2.3	-19	PASS	
1,3,5-Trimethylbenzene	2.0	2.4	-17	PASS	
2,2,4-Trimethylpentane	0.73	0.78	-6.3	PASS	
Vinyl bromide	0.94	1.0	-6.8	PASS	
Vinyl chloride	0.57	0.54	4.1	PASS	
Xylenes (m&p)	1.6	1.6	-5.3	PASS	
Xylenes (o)	1.6	1.8	-10	PASS	

***%Difference must be within +/- 30%**

RRF - Relative Response Factor

Data Path : C:\DATA\11-29-17\
Data File : aa4302dcvs.D
Acq On : 29 Nov 2017 10:04 am
Operator : jls
Sample : 10 ppbv DCVS
Misc : CC483586
ALS Vial : 2 Sample Multiplier: 1

Quant Time: Nov 29 10:33:00 2017
Quant Method : C:\msdchem\1\METHODS\0912.M
Quant Title : TO-15 on the Agilent 7890A / 5975C
QLast Update : Tue Sep 12 13:00:02 2017
Response via : Initial Calibration

Min. RRF : 0.000 Min. Rel. Area : 0% Max. R.T. Dev 0.40min
Max. RRF Dev : 30% Max. Rel. Area : 500%

		Compound	AvgRF	CCRF	%Dev	Area%	Dev(min)
1	I	Bromochloromethane (IS)	1.000	1.000	0.0	99	0.00
2	T	Propene	0.249	0.255	-2.4	98	0.00
3	T	Dichlorodifluoromethane	3.733	4.450	-19.2	125	0.00
4	T	Chloromethane	0.084	0.081	3.6	78	-0.01
5	T	1,2-Dichlorotetrafluoroetha	2.911	3.003	-3.2	110	0.00
6	T	Vinyl chloride	0.567	0.544	4.1	89	0.00
7	T	1,3-Butadiene	0.314	0.278	11.5	81	0.00
8	T	n-Butane	0.519	0.509	1.9	86	0.00
9	T	Bromomethane	0.581	0.690	-18.8	104	0.00
10	T	Chloroethane	0.298	0.262	12.1	79	-0.01
11	T	Ethanol	0.117	0.094	19.7	71	0.00
12	T	Vinyl bromide	0.941	1.005	-6.8	100	0.00
13	T	Acrolein	0.165	0.141	14.5	78	0.00
14	T	Acetone	0.247	0.233	5.7	82	0.00
15	T	Trichlorofluoromethane	4.921	5.669	-15.2	124	0.00
16	T	Isopropanol	0.668	0.646	3.3	89	0.00
17	T	n-Pentane	0.610	0.562	7.9	87	0.00
18	T	1,1-Dichloroethene	1.391	1.456	-4.7	103	0.00
19	T	Methylene chloride	0.887	0.724	18.4	89	0.00
20	T	Tert-butyl alcohol	1.646	1.559	5.3	97	0.00
21	T	Allyl chloride	0.388	0.352	9.3	86	0.00
22	T	1,1,2-Trichloro-1,2,2-trifl	2.983	2.894	3.0	112	0.00
23	T	Carbon disulfide	2.675	2.322	13.2	88	0.00
24	T	1,2-Dichloroethene (trans)	1.132	1.079	4.7	96	0.00
25	T	1,1-Dichloroethane	1.595	1.440	9.7	96	0.00
26	T	Methyl tert-butyl ether	3.156	3.060	3.0	99	0.00
27	T	Methyl ethyl ketone	0.393	0.379	3.6	87	0.00
28	T	1,2-Dichloroethene (cis)	1.123	1.075	4.3	96	0.00
29	T	Ethyl acetate	0.131	0.130	0.8	89	0.00
30	T	n-Hexane	0.815	0.747	8.3	96	0.00
31	T	Chloroform	3.034	3.072	-1.3	107	0.00
32	T	Tetrahydrofuran	0.411	0.401	2.4	91	0.00
33	T	1,2-Dichloroethane	1.948	2.117	-8.7	115	0.00
34	T	1,1,1-Trichloroethane	3.679	3.986	-8.3	119	0.00
35	T	Benzene	2.946	2.728	7.4	98	0.00
36	T	Carbon tetrachloride	4.399	5.343	-21.5	134	0.00
37	T	Cyclohexane	1.208	1.085	10.2	90	0.00
38	I	1,4-Difluorobenzene (IS)	1.000	1.000	0.0	93	0.00
39	T	1,2-Dichloropropane	0.258	0.224	13.2	90	0.00
40	T	Bromodichloromethane	0.938	1.048	-11.7	112	0.00
41	T	2,2,4-Trimethylpentane	0.734	0.780	-6.3	96	0.00
42	T	Trichloroethene	0.523	0.607	-16.1	114	0.00
43	T	1,4-Dioxane	0.183	0.173	5.5	98	0.00
44	T	Methyl methacrylate	0.317	0.311	1.9	92	0.00
45	T	n-Heptane	0.243	0.267	-9.9	93	0.00
46	T	cis-1,3-Dichloropropene	0.569	0.580	-1.9	96	0.00
47	T	Methyl isobutyl ketone	0.356	0.379	-6.5	102	0.00
48	T	trans-1,3-Dichloropropene	0.601	0.639	-6.3	99	0.00
49	T	1,1,2-Trichloroethane	0.458	0.466	-1.7	104	0.00
50	T	Toluene	1.148	1.177	-2.5	97	0.00
51	T	Methyl n-butyl ketone	0.345	0.371	-7.5	101	0.00
52	T	Dibromochloromethane	1.092	1.329	-21.7	122	0.00
53	T	1,2-Dibromoethane	0.787	0.826	-5.0	104	0.00

Evaluate Continuing Calibration Report

Data Path : C:\DATA\11-29-17\
Data File : aa4302dcvs.D
Acq On : 29 Nov 2017 10:04 am
Operator : jls
Sample : 10 ppbv DCVS
Misc : CC483586
ALS Vial : 2 Sample Multiplier: 1

Quant Time: Nov 29 10:33:00 2017
Quant Method : C:\msdchem\1\METHODS\0912.M
Quant Title : TO-15 on the Agilent 7890A / 5975C
QLast Update : Tue Sep 12 13:00:02 2017
Response via : Initial Calibration

Min. RRF : 0.000 Min. Rel. Area : 0% Max. R.T. Dev 0.40min
Max. RRF Dev : 30% Max. Rel. Area : 500%

		Compound	AvgRF	CCRF	%Dev	Area%	Dev(min)
54	T	Tetrachloroethene	0.652	0.742	-13.8	116	0.00
55	I	d-5 Chlorobenzene (IS)	1.000	1.000	0.0	101	0.00
56	T	Chlorobenzene	1.289	1.223	5.1	107	0.00
57	T	Ethylbenzene	1.899	1.880	1.0	103	0.00
58	T	Xylenes (m&p)	1.555	1.637	-5.3	109	0.00
59	T	Bromoform	1.017	1.257	-23.6	133	0.00
60	T	Styrene	1.047	1.199	-14.5	112	0.00
61	T	Xylene (o)	1.627	1.794	-10.3	114	0.00
62	T	1,1,2,2-Tetrachloroethane	1.140	1.088	4.6	110	0.00
63	T	n-Nonane	0.443	0.486	-9.7	110	0.00
64	S	Bromofluorobenzene (tune st	0.876	0.934	-6.6	109	0.00
65	T	Cumene	2.224	2.416	-8.6	113	0.00
66	T	2-Chlorotoluene	1.674	1.714	-2.4	106	0.00
67	T	n-Propyl benzene	0.639	0.758	-18.6	122	0.00
68	T	4-Ethyltoluene	2.162	2.461	-13.8	115	0.00
69	T	1,3,5-Trimethylbenzene	2.016	2.356	-16.9	117	0.00
70	T	1,2,4-Trimethylbenzene	1.949	2.315	-18.8	115	0.00
71	T	Benzyl chloride	1.646	1.867	-13.4	113	0.00
72	T	1,3-Dichlorobenzene	1.485	1.653	-11.3	121	0.00
73	T	1,4-Dichlorobenzene	1.510	1.680	-11.3	119	0.00
74	T	1,2-Dichlorobenzene	1.420	1.565	-10.2	117	0.00
75	T	1,2,4-Trichlorobenzene	1.319	1.490	-13.0	120	0.00
76	T	Naphthalene	0.406	0.510	-25.6	116	0.00
77	T	1,3-Hexachlorobutadiene	1.093	1.266	-15.8	136	0.00

(#) = Out of Range SPCC's out = 0 CCC's out = 0

Data Path : C:\DATA\11-29-17\
Data File : aa4302dcvs.D
Acq On : 29 Nov 2017 10:04 am
Operator : jls
Sample : 10 ppbv DCVS
Misc : CC483586
ALS Vial : 2 Sample Multiplier: 1

Quant Time: Nov 29 10:33:00 2017
Quant Method : C:\msdchem\1\METHODS\0912.M
Quant Title : TO-15 on the Agilent 7890A / 5975C
QLast Update : Tue Sep 12 13:00:02 2017
Response via : Initial Calibration

Compound	R.T.	QIon	Response	Conc	Units		Dev(Min)
Internal Standards							
1) Bromochloromethane (IS)	7.746	130	565734	10.00	ppbV		0.00
38) 1,4-Difluorobenzene (IS)	9.801	114	1860863	10.00	ppbV		0.00
55) d-5 Chlorobenzene (IS)	15.138	117	1814288	10.00	ppbV		0.00
System Monitoring Compounds							
64) Bromofluorobenzene (tu...	17.337	95	1695438	10.67	ppbV		0.00
Target Compounds							Qvalue
2) Propene	3.499	41	144478	10.24	ppbV	#	79
3) Dichlorodifluoromethane	3.563	85	2517460	11.92	ppbV		97
4) Chloromethane	3.717	52	45884	9.64	ppbV	#	59
5) 1,2-Dichlorotetrafluor...	3.772	85	1698647	10.31	ppbV		95
6) Vinyl chloride	3.888	62	307906	9.60	ppbV		81
7) 1,3-Butadiene	3.994	54	157111	8.84	ppbV	#	44
8) n-Butane	4.039	43	287831	9.80	ppbV		88
9) Bromomethane	4.241	94	390111	11.88	ppbV		98
10) Chloroethane	4.377	64	148403	8.79	ppbV		93
11) Ethanol	4.425	45	52946	7.98	ppbV	#	76
12) Vinyl bromide	4.685	106	568500	10.68	ppbV		94
13) Acrolein	4.759	56	79698	8.52	ppbV		96
14) Acetone	4.846	58	131702	9.41	ppbV	#	33
15) Trichlorofluoromethane	5.029	101	3207217	11.52	ppbV		98
16) Isopropanol	5.026	45	365659	9.67	ppbV	#	84
17) n-Pentane	5.338	43	318186	9.22	ppbV		95
18) 1,1-Dichloroethene	5.592	61	823898	10.47	ppbV		95
19) Methylene chloride	5.704	84	409715	8.16	ppbV	#	81
20) Tert-butyl alcohol	5.557	59	881871	9.47	ppbV		100
21) Allyl chloride	5.798	76	199144	9.07	ppbV		100
22) 1,1,2-Trichloro-1,2,2-...	5.930	101	1637408	9.70	ppbV		90
23) Carbon disulfide	5.984	76	1313769	8.68	ppbV	#	85
24) 1,2-Dichloroethene (tr...	6.556	61	610301	9.53	ppbV		98
25) 1,1-Dichloroethane	6.756	63	814841	9.03	ppbV		93
26) Methyl tert-butyl ether	6.778	73	1731229	9.70	ppbV		99
27) Methyl ethyl ketone	7.093	72	214666	9.67	ppbV		86
28) 1,2-Dichloroethene (cis)	7.569	61	608443	9.58	ppbV		98
29) Ethyl acetate	7.765	45	73823	9.96	ppbV		100
30) n-Hexane	7.788	57	422607	9.16	ppbV		85
31) Chloroform	7.865	83	1737762	10.12	ppbV		95
32) Tetrahydrofuran	8.261	42	226892	9.76	ppbV	#	75
33) 1,2-Dichloroethane	8.640	62	1197410	10.86	ppbV		98
34) 1,1,1-Trichloroethane	8.913	97	2255003	10.83	ppbV		99
35) Benzene	9.412	78	1543534	9.26	ppbV	#	93
36) Carbon tetrachloride	9.579	117	3022835	12.15	ppbV		99
37) Cyclohexane	9.720	84	613620	8.98	ppbV		90
39) 1,2-Dichloropropane	10.322	63	417456	8.69	ppbV		97
40) Bromodichloromethane	10.540	83	1949638	11.17	ppbV		96
41) 2,2,4-Trimethylpentane	10.656	57	1452148	10.63	ppbV		97
42) Trichloroethene	10.601	130	1130269	11.61	ppbV		99
43) 1,4-Dioxane	10.563	88	321798	9.43	ppbV		98
44) Methyl methacrylate	10.817	69	578932	9.83	ppbV		92
45) n-Heptane	10.952	71	496945	11.01	ppbV		98
46) cis-1,3-Dichloropropene	11.611	75	1079631	10.19	ppbV		97
47) Methyl isobutyl ketone	11.637	43	705896	10.67	ppbV		91
48) trans-1,3-Dichloropropene	12.254	75	1189863	10.63	ppbV	#	84
49) 1,1,2-Trichloroethane	12.463	97	867140	10.17	ppbV		91
50) Toluene	12.817	91	2191044	10.25	ppbV		100
51) Methyl n-butyl ketone	13.138	43	691112	10.77	ppbV		89

Data Path : C:\DATA\11-29-17\
Data File : aa4302dcvs.D
Acq On : 29 Nov 2017 10:04 am
Operator : jls
Sample : 10 ppbv DCVS
Misc : CC483586
ALS Vial : 2 Sample Multiplier: 1

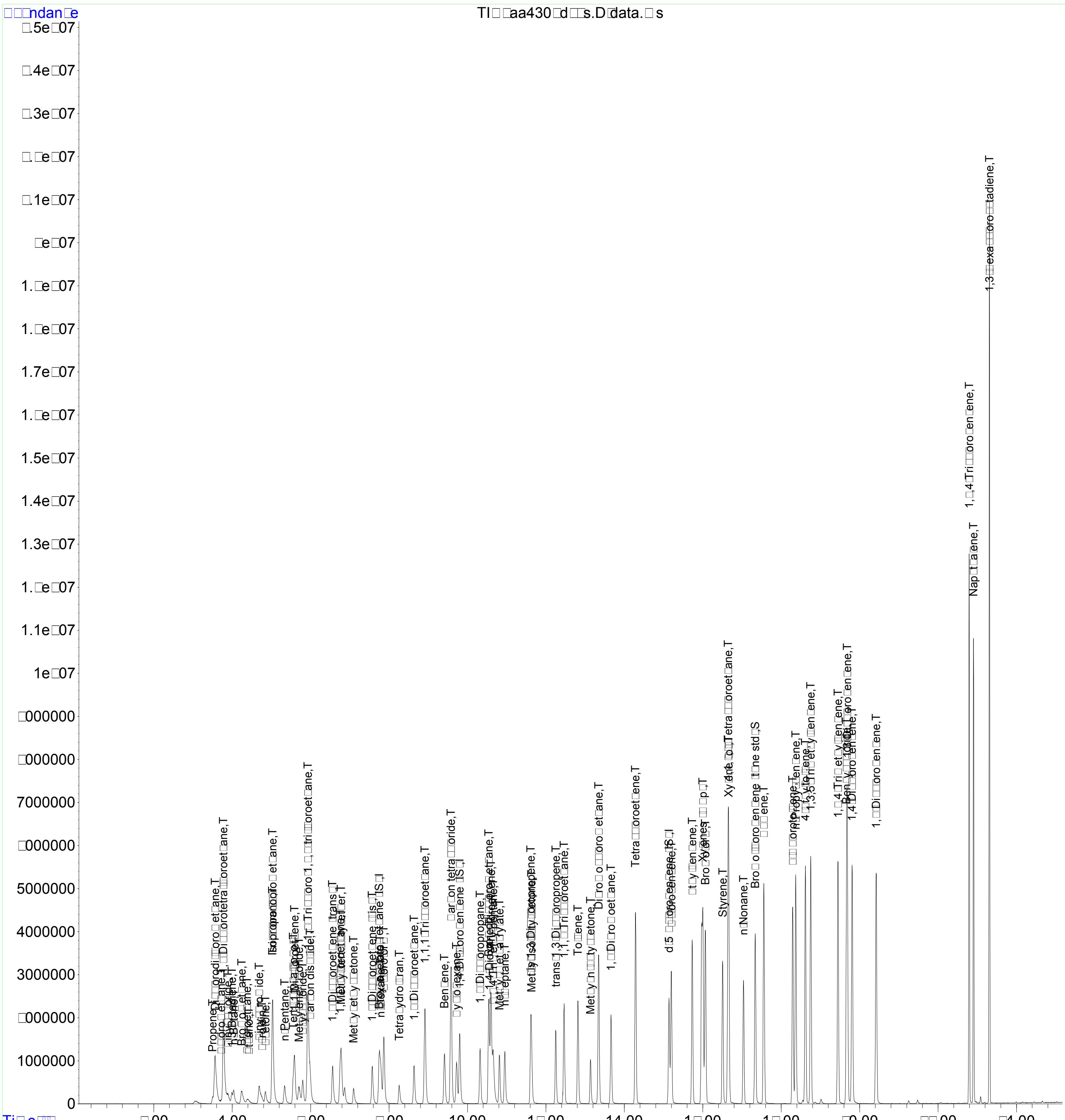
Quant Time: Nov 29 10:33:00 2017
Quant Method : C:\msdchem\1\METHODS\0912.M
Quant Title : TO-15 on the Agilent 7890A / 5975C
QLast Update : Tue Sep 12 13:00:02 2017
Response via : Initial Calibration

	Compound	R.T.	QIon	Response	Conc Units	Dev(Min)
52)	Dibromochloromethane	13.344	129	2473606	12.17 ppbV	100
53)	1,2-Dibromoethane	13.659	107	1536176	10.49 ppbV	92
54)	Tetrachloroethene	14.283	166	1380186	11.37 ppbV	99
56)	Chlorobenzene	15.199	112	2219699	9.49 ppbV	100
57)	Ethylbenzene	15.733	91	3410484	9.90 ppbV	99
58)	Xylenes (m&p)	16.000	91	5940512	21.06 ppbV	98
59)	Bromoform	16.064	173	2281043	12.36 ppbV	97
60)	Styrene	16.508	104	2175463	11.46 ppbV	99
61)	Xylene (o)	16.662	91	3255184	11.03 ppbV	88
62)	1,1,2,2-Tetrachloroethane	16.646	83	1973958	9.54 ppbV	94
63)	n-Nonane	17.038	57	881851	10.98 ppbV	100
65)	Cumene	17.556	105	4383477	10.87 ppbV	91
66)	2-Chlorotoluene	18.289	91	3110467	10.24 ppbV #	82
67)	n-Propyl benzene	18.370	120	1374419	11.85 ppbV #	64
68)	4-Ethyltoluene	18.617	105	4464188	11.38 ppbV #	88
69)	1,3,5-Trimethylbenzene	18.752	105	4274027	11.68 ppbV #	85
70)	1,2,4-Trimethylbenzene	19.450	105	4199983	11.88 ppbV	100
71)	Benzyl chloride	19.665	91	3386553	11.34 ppbV	95
72)	1,3-Dichlorobenzene	19.685	146	2999728	11.14 ppbV	98
73)	1,4-Dichlorobenzene	19.807	146	3047623	11.12 ppbV	98
74)	1,2-Dichlorobenzene	20.421	146	2838989	11.02 ppbV	100
75)	1,2,4-Trichlorobenzene	22.794	180	2703810	11.30 ppbV	98
76)	Naphthalene	22.903	127	924912	12.56 ppbV	100
77)	1,3-Hexachlorobutadiene	23.311	225	2295999	11.58 ppbV	95

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Data Path : C:\DATA\11-29-17\
Data File : aa4302dcvs.D
Acq On : 29 Nov 2017 10:04 am
Operator : jls
Sample : 10 ppbv DCVS
Misc : CC483586
ALS Vial : 2 Sample Multiplier: 1

Quant Time: Nov 29 10:33:00 2017
Quant Method : C:\msdchem\1\METHODS\0912.M
Quant Title : TO-15 on the Agilent 7890A / 5975C
QLast Update : Tue Sep 12 13:00:02 2017
Response via : Initial Calibration



Section VIII: Raw Quality Control Data Package

BFB Tune Spectra

Method Blank

Laboratory Control Sample

Laboratory Sample Duplicate

Instrument Run Logs

Pressure Gauge Readings (initial and final)

Example Calculations

Screening Data

Clean Canister Certification

Integrated Analytical Laboratories LLC

BFB

Data Path: C:\DATA\09-12-17\

Data File: AA3441BFB.D

Acq On: 9/12/2017 8:18:00AM

Operator: jls

Sample: BFB

Misc: ALM029426

ALS Vial: 1 **Multiplier:** 1

Integration File: rteint.p

Method: C:\msdchem\1\METHODS\0816.M

Last Update: Thu Aug 17 08:51:27 2017

Spectrum Information:

PassFail	Target Mass	Rel. to Mass	Lower Limit %	Higher Limit %	Raw Abundance	% Relative Abundance
PASS	50	95	8	40	77682	13.2
PASS	75	95	30	66	348928	59.5
PASS	95	95	100	100	586303	100.0
PASS	96	95	5	9	39699	6.8
PASS	173	174	0.00	2	3809	0.9
PASS	174	95	50	100	410368	70.0
PASS	175	174	4	9	30821	7.5
PASS	176	174	93	101	385131	93.9
PASS	177	176	5	9	25240	6.6

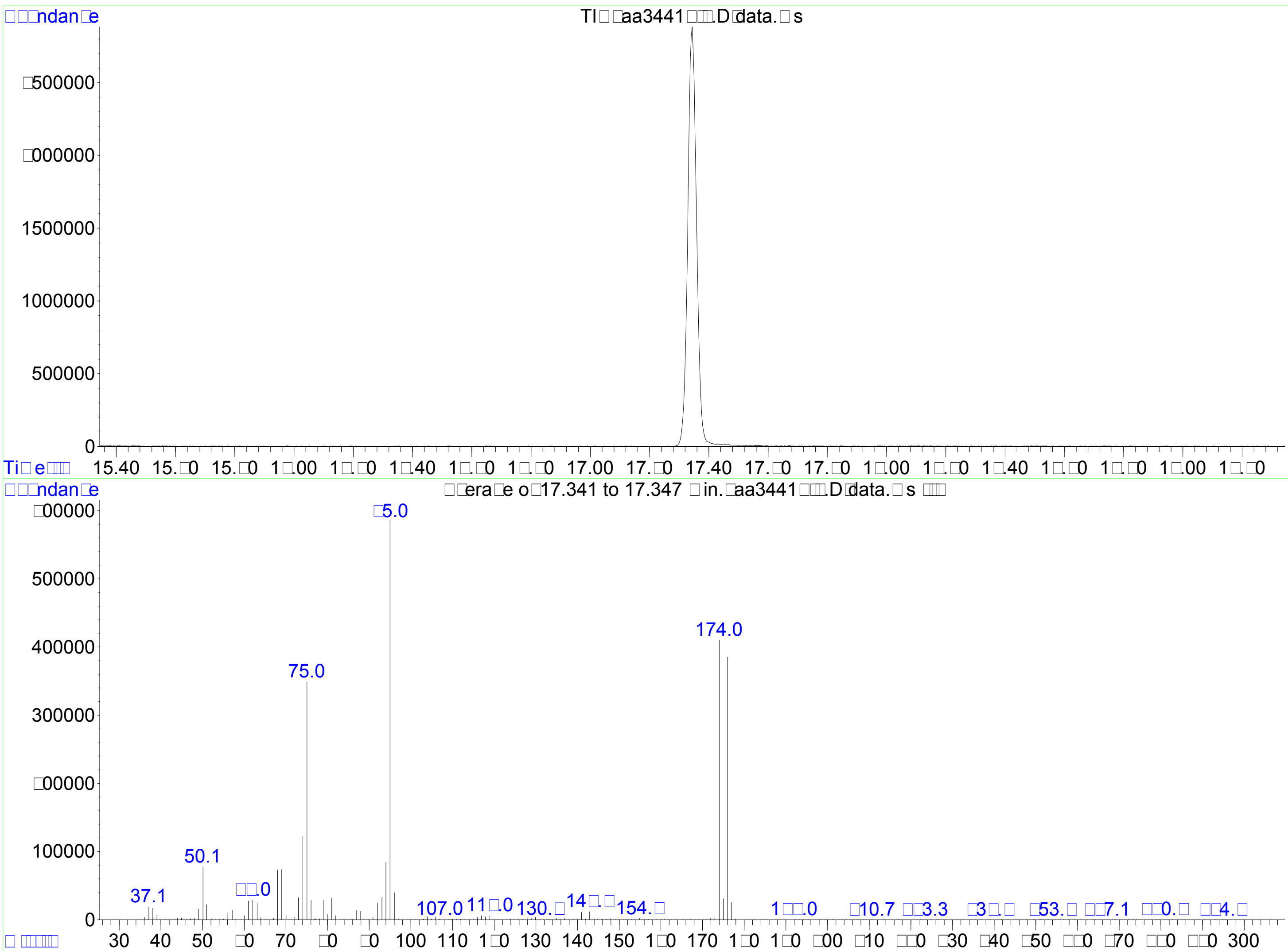
Runs with this BFB:

Lab Sample Number	Date File	Field Sample	Date/Time of Sample/Standard Analysis
BFB	AA3441BFB	NA	9/12/2017 8:18:00 AM
40 PPBV STD	AA3443STD01	NA	9/12/2017 9:44:00 AM
20 PPBV STD	AA3444STD02	NA	9/12/2017 10:17:00 AM
10 PPBV STD	AA3445STD03	NA	9/12/2017 10:51:00 AM
2 PPBV STD	AA3446STD04	NA	9/12/2017 11:24:00 AM
0.2 PPBV STD	AA3447STD05	NA	9/12/2017 12:06:00 PM
10 PPBV ICVSS	AA3448ICVSS	NA	9/12/2017 1:28:00 PM

Data Path : C:\DATA\09-12-17\
Data File : aa3441bfb.D
Acq On : 12 Sep 2017 8:18 am
Operator : jls
Sample : BFB
Misc : ALM029426
ALS Vial : 1 Sample Multiplier: 1

Integration File: rteint.p

Method : C:\msdchem\1\METHODS\0912.M
Title : TO-15 on the Agilent 7890A / 5975C
Last Update : Tue Sep 12 13:00:02 2017



AutoFind: Scans 5366, 5367, 5368; Background Corrected with Scan 5345

Target Mass	Rel. to Mass	Lower Limit%	Upper Limit%	Rel. Abn%	Raw Abn	Result Pass/Fail
50	95	8	40	13.2	77682	PASS
75	95	30	66	59.5	348928	PASS
95	95	100	100	100.0	586303	PASS
96	95	5	9	6.8	39699	PASS
173	174	0.00	2	0.9	3809	PASS
174	95	50	100	70.0	410368	PASS
175	174	4	9	7.5	30821	PASS
176	174	93	101	93.9	385131	PASS
177	176	5	9	6.6	25240	PASS

BFB

Data Path: C:\DATA\10-04-17\

Data File: AA3701BFB.D

Acq On: 10/4/2017 8:23:00AM

Operator: jls

Sample: BFB

Misc: ALM029426

ALS Vial: 1 **Multiplier:** 1

Integration File: rteint.p

Method: C:\msdchem\1\METHODS\0912.M

Last Update: Tue Sep 12 13:00:02 2017

Spectrum Information:

PassFail	Target Mass	Rel. to Mass	Lower Limit %	Higher Limit %	Raw Abundance	% Relative Abundance
PASS	50	95	8	40	72509	13.5
PASS	75	95	30	66	338679	62.9
PASS	95	95	100	100	538731	100.0
PASS	96	95	5	9	36859	6.8
PASS	173	174	0.00	2	2769	0.7
PASS	174	95	50	100	379947	70.5
PASS	175	174	4	9	27965	7.4
PASS	176	174	93	101	366379	96.4
PASS	177	176	5	9	22832	6.2

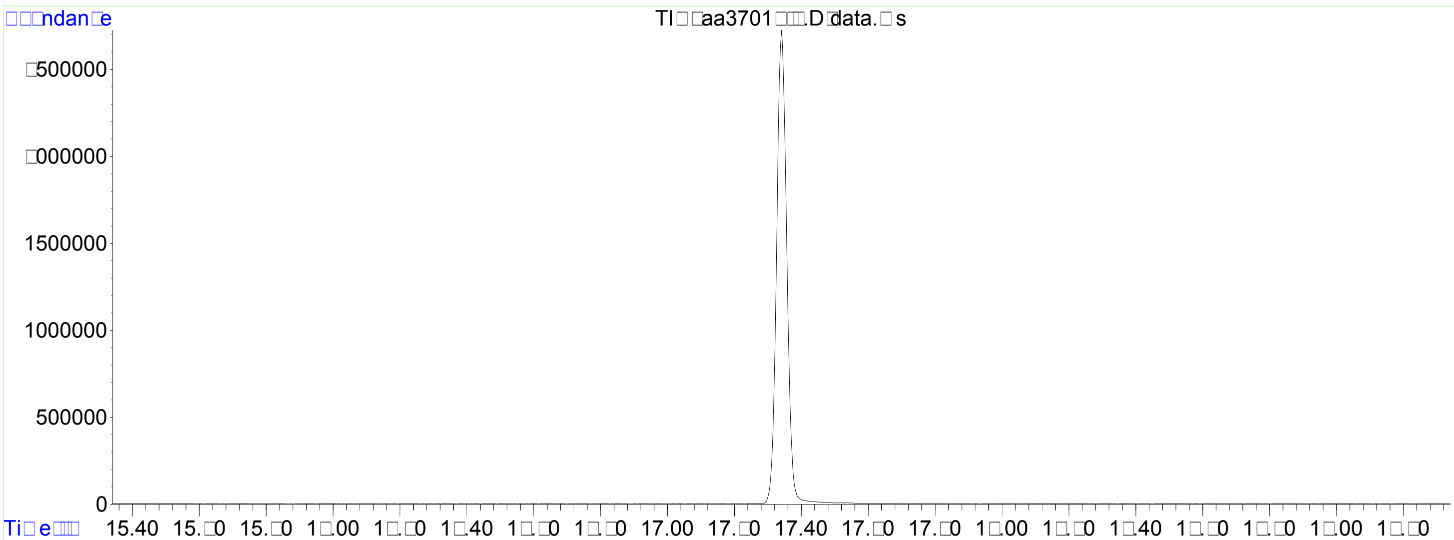
Runs with this BFB:

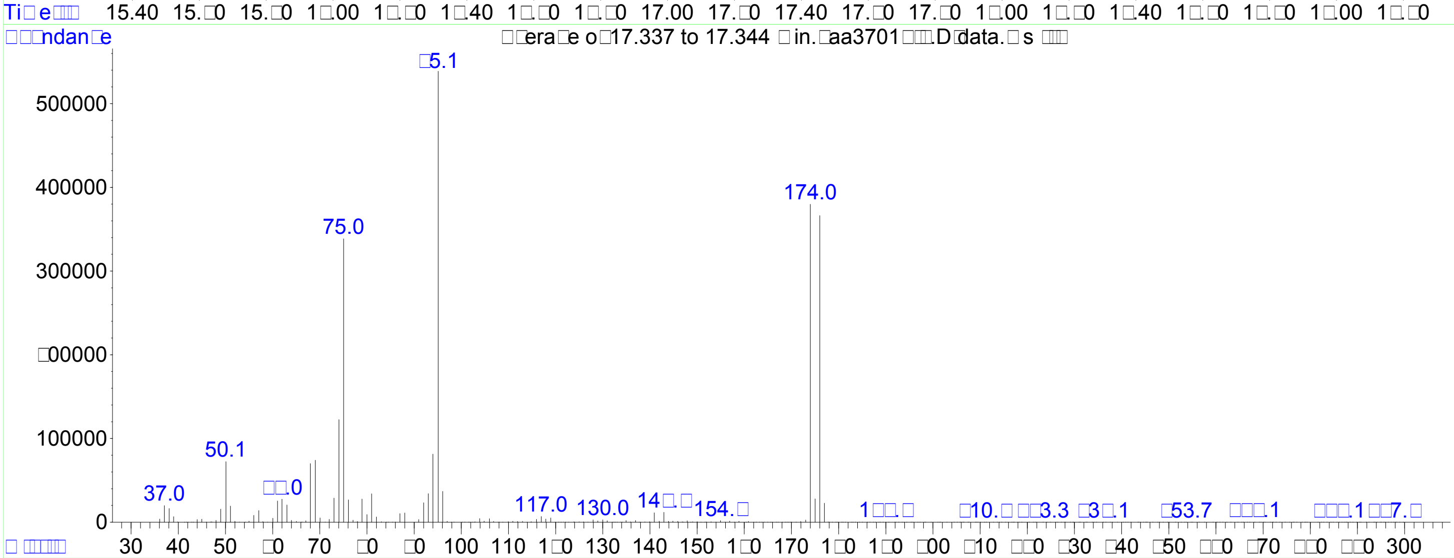
Lab Sample Number	Date File	Field Sample	Date/Time of Sample/Standard Analysis
BFB	AA3701BFB	NA	10/4/2017 8:23:00 AM
10 PPBV DCVS	AA3702DCVS	NA	10/4/2017 9:02:00 AM
10 PPBV LCS	AA3703LCS	NA	10/4/2017 9:55:00 AM
METHOD BLANK	AA3704BLK	NA	10/4/2017 10:33:00 AM
02 PPBV RLLCS	AA3705RLLCS	NA	10/4/2017 11:14:00 AM
2162	AA3717	NA	10/4/2017 6:34:00 PM
10 PPBV CCCVS	AA3728CCCVS	NA	10/4/2017 7:08:00 PM

```
Data Path : C:\DATA\10-04-17\
Data File : aa3701bfb.D
Acq On    :  4 Oct 2017   8:23 am
Operator  : jls
Sample    : BFB
Misc      : ALM029426
ALS Vial  : 1   Sample Multiplier: 1

Integration File: rteint.p

Method    : C:\msdchem\1\METHODS\0912.M
Title     : TO-15 on the Agilent 7890A / 5975C
Last Update  : Tue Sep 12 13:00:02 2017
```





AutoFind: Scans 5365, 5366, 5367; Background Corrected with Scan 5340

Target Mass	Rel. to Mass	Lower Limit%	Upper Limit%	Rel. Abn%	Raw Abn	Result Pass/Fail
50	95	8	40	13.5	72509	PASS
75	95	30	66	62.9	338679	PASS
95	95	100	100	100.0	538731	PASS
96	95	5	9	6.8	36859	PASS
173	174	0.00	2	0.7	2769	PASS
174	95	50	100	70.5	379947	PASS
175	174	4	9	7.4	27965	PASS
176	174	93	101	96.4	366379	PASS
177	176	5	9	6.2	22832	PASS

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BFB

Data Path: C:\DATA\11-28-17\
Data File: AA4271BFB.D
Acq On: 11/28/2017 8:37:00AM
Operator: jls
Sample: BFB
Misc: ALM029426
ALS Vial: 1 **Multiplier:** 1
Integration File: rteint.p
Method: C:\msdchem\1\METHODS\0912.M
Last Update: Tue Sep 12 13:00:02 2017
Spectrum Information:

PassFail	Target Mass	Rel. to Mass	Lower Limit %	Higher Limit %	Raw Abundance	% Relative Abundance
PASS	50	95	8	40	97275	13.9
PASS	75	95	30	66	399829	57.1
PASS	95	95	100	100	700502	100.0
PASS	96	95	5	9	45515	6.5
PASS	173	174	0.00	2	4963	0.9
PASS	174	95	50	100	541242	77.3
PASS	175	174	4	9	39455	7.3
PASS	176	174	93	101	523454	96.7
PASS	177	176	5	9	33592	6.4

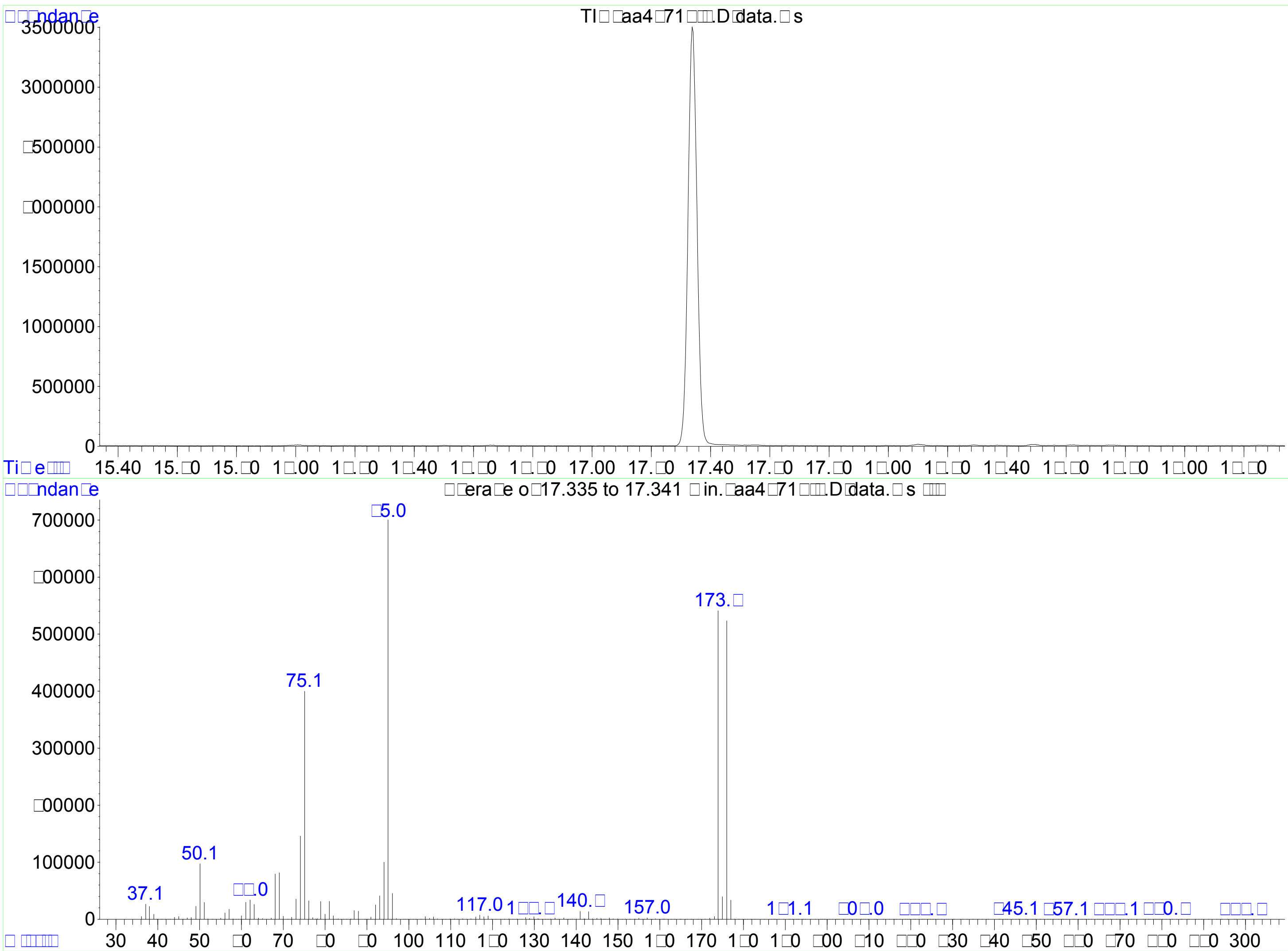
Runs with this BFB:

Lab Sample Number	Date File	Field Sample	Date/Time of Sample/Standard Analysis
BFB	AA4271BFB	NA	11/28/2017 8:37:00 AM
10 PPBV DCVS	AA4272DCVS	NA	11/28/2017 9:29:00 AM
10 PPBV LCS	AA4273LCS	NA	11/28/2017 10:09:00 AM
METHOD BLANK	AA4274BLK	NA	11/28/2017 1:04:00 PM
02 PPBV RLLCS	AA4275RLLCS	NA	11/28/2017 1:44:00 PM
E17-09837-01	AA4286	SS-1	11/28/2017 8:34:00 PM
E17-09837-02	AA4287	SS-2	11/28/2017 9:07:00 PM
E17-09837-05	AA4290	Ambient	11/28/2017 10:48:00 PM
10 PPBV CCCVS	AA4292CCCVS	NA	11/28/2017 11:56:00 PM

Data Path : C:\DATA\11-28-17\
Data File : aa4271bfb.D
Acq On : 28 Nov 2017 8:37 am
Operator : jls
Sample : BFB
Misc : ALM029426
ALS Vial : 1 Sample Multiplier: 1

Integration File: rteint.p

Method : C:\msdchem\1\METHODS\0912.M
Title : TO-15 on the Agilent 7890A / 5975C
Last Update : Tue Sep 12 13:00:02 2017



AutoFind: Scans 5364, 5365, 5366; Background Corrected with Scan 5343

Target Mass	Rel. to Mass	Lower Limit%	Upper Limit%	Rel. Abn%	Raw Abn	Result Pass/Fail
50	95	8	40	13.9	97275	PASS
75	95	30	66	57.1	399829	PASS
95	95	100	100	100.0	700502	PASS
96	95	5	9	6.5	45515	PASS
173	174	0.00	2	0.9	4963	PASS
174	95	50	100	77.3	541242	PASS
175	174	4	9	7.3	39455	PASS
176	174	93	101	96.7	523454	PASS
177	176	5	9	6.4	33592	PASS

BFB

Data Path: C:\DATA\11-29-17\
Data File: AA4301BFB.D
Acq On: 11/29/2017 8:42:00AM
Operator: jls
Sample: BFB
Misc: ALM029426
ALS Vial: 1 **Multiplier:** 1
Integration File: rteint.p
Method: C:\msdchem\1\METHODS\0912.M
Last Update: Tue Sep 12 13:00:02 2017
Spectrum Information:

PassFail	Target Mass	Rel. to Mass	Lower Limit %	Higher Limit %	Raw Abundance	% Relative Abundance
PASS	50	95	8	40	97565	15.2
PASS	75	95	30	66	400064	62.3
PASS	95	95	100	100	641984	100.0
PASS	96	95	5	9	39141	6.1
PASS	173	174	0.00	2	5077	1.1
PASS	174	95	50	100	482837	75.2
PASS	175	174	4	9	36367	7.5
PASS	176	174	93	101	469473	97.2
PASS	177	176	5	9	28931	6.2

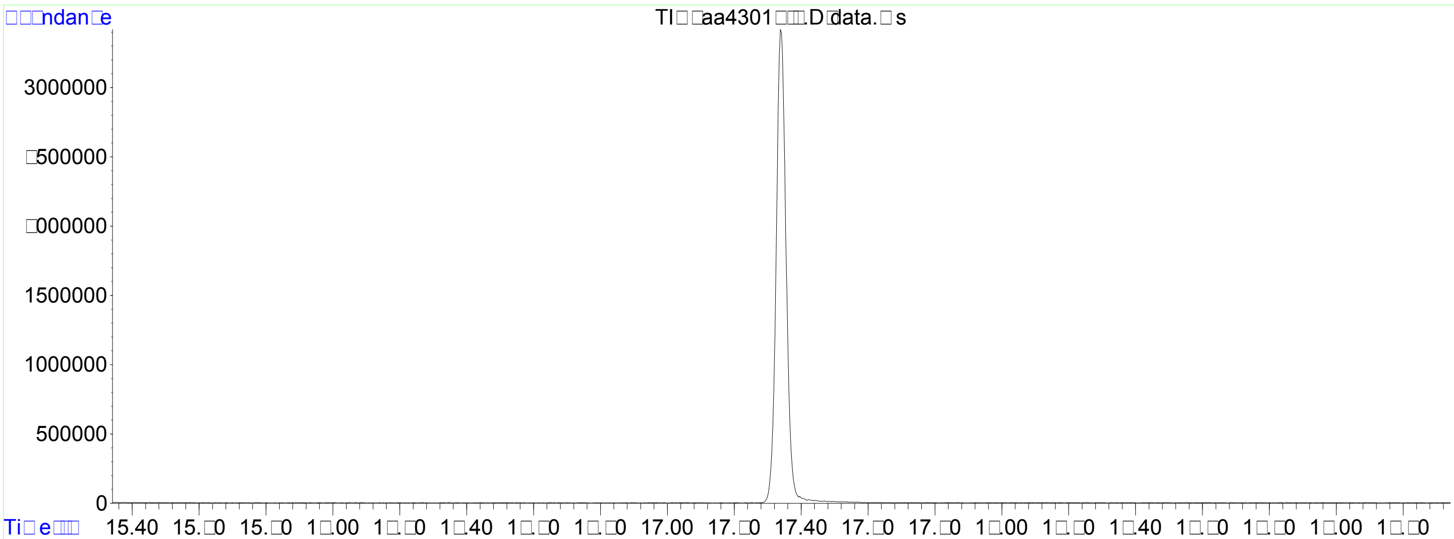
Runs with this BFB:

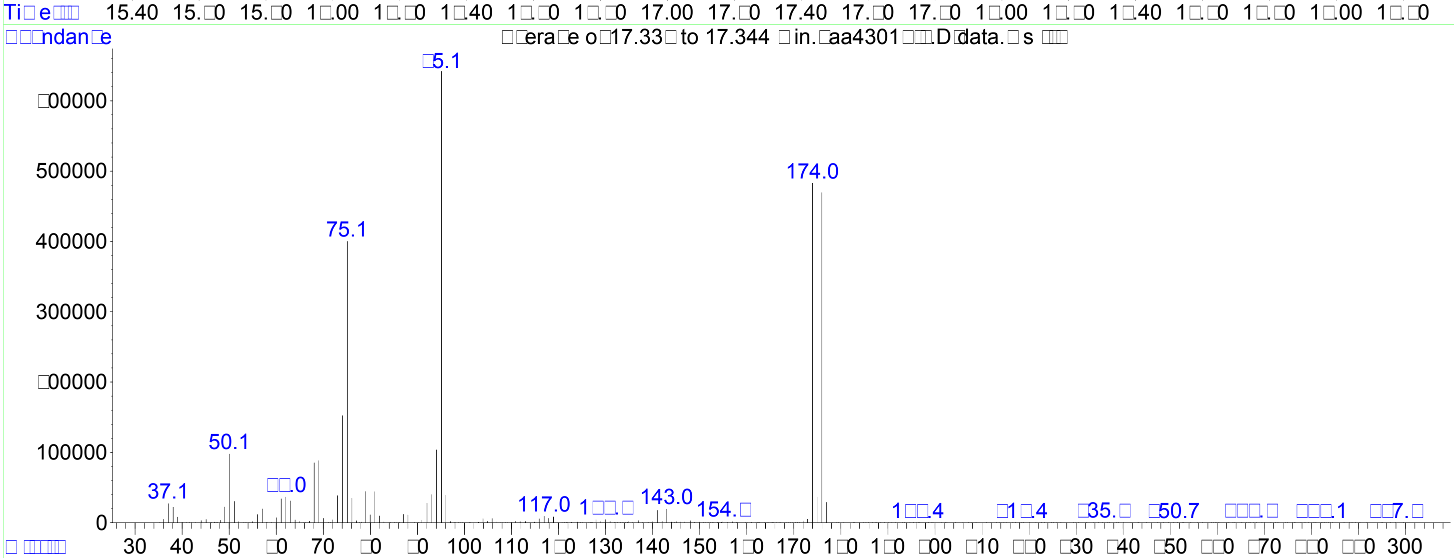
Lab Sample Number	Date File	Field Sample	Date/Time of Sample/Standard Analysis
BFB	AA4301BFB	NA	11/29/2017 8:42:00 AM
10 PPBV DCVS	AA4302DCVS	NA	11/29/2017 10:04:00 AM
10 PPBV LCS	AA4303LCS	NA	11/29/2017 10:45:00 AM
METHOD BLANK	AA4304BLK	NA	11/29/2017 11:19:00 AM
02 PPBV RLLCS	AA4305RLLCS	NA	11/29/2017 11:59:00 AM
3059	AA4306	NA	11/29/2017 2:35:00 PM
E17-09837-01	AA4307	SS-1	11/29/2017 3:08:00 PM
E17-09837-02	AA4308	SS-2	11/29/2017 3:55:00 PM
E17-09837-03	AA4309	SS-3	11/29/2017 4:29:00 PM
E17-09837-04	AA4310	SS-4	11/29/2017 5:03:00 PM
10 PPBV CCCVS	AA4319CCCVS	NA	11/29/2017 10:05:00 PM

Data Path : C:\DATA\11-29-17\
Data File : aa4301bfb.D
Acq On : 29 Nov 2017 8:42 am
Operator : jls
Sample : BFB
Misc : ALM029426
ALS Vial : 1 Sample Multiplier: 1

Integration File: rteint.p

Method : C:\msdchem\1\METHODS\0912.M
Title : TO-15 on the Agilent 7890A / 5975C
Last Update : Tue Sep 12 13:00:02 2017





AutoFind: Scans 5365, 5366, 5367; Background Corrected with Scan 5343

Target Mass	Rel. to Mass	Lower Limit%	Upper Limit%	Rel. Abn%	Raw Abn	Result Pass/Fail
50	95	8	40	15.2	97565	PASS
75	95	30	66	62.3	400064	PASS
95	95	100	100	100.0	641984	PASS
96	95	5	9	6.1	39141	PASS
173	174	0.00	2	1.1	5077	PASS
174	95	50	100	75.2	482837	PASS
175	174	4	9	7.5	36367	PASS
176	174	93	101	97.2	469473	PASS
177	176	5	9	6.2	28931	PASS

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Method Blank Report

Lab Sample Name:	**METHOD BLANK**	**Data File:**	**AA3704BLK**
Field Sample Name:	**METHOD BLANK**	**Date Analyzed:**	**10/4/2017**
Matrix:	**Air**	**Sample Volume:**	**500ml**
Dilution Factor:	**1**	**GC/MS Column:**	**RTX-1, 0.32 mmID**

Runs with this Method Blank:

Standard/Sample Run	**Date/Time of Sample/Standard Injection**
BFB [AA3701BFB]	10/04/2017 8:23
10 PPBV DCVS [AA3702DCVS]	10/04/2017 9:02
10 PPBV LCS [AA3703LCS]	10/04/2017 9:55
METHOD BLANK [AA3704BLK]	10/04/2017 10:33
02 PPBV RLLCS [AA3705RLLCS]	10/04/2017 11:14
2162 [AA3717]	10/04/2017 18:34
10 PPBV CCCVS [AA3728CCCVS]	10/04/2017 19:08

Compound	**CAS #**	**Reporting Limit (ppbv)**	**Concentration (ppbv)**
Acetone	67-64-1	0.20	ND
Benzene	71-43-2	0.20	ND
Bromodichloromethane	75-27-4	0.20	ND
Bromoform	75-25-2	0.14	ND
Bromomethane	74-83-9	0.20	ND
1,3-Butadiene	106-99-0	0.20	ND
Chlorobenzene	108-90-7	0.20	ND
Chloroethane	75-00-3	0.20	ND
Chloroform	67-66-3	0.20	ND
Chloromethane	74-87-3	0.20	ND
Carbon disulfide	75-15-0	0.16	ND
Carbon tetrachloride	56-23-5	0.15	ND
Cyclohexane	110-82-7	0.18	ND
Dibromochloromethane	124-48-1	0.15	ND
1,2-Dibromoethane	106-93-4	0.20	ND
1,2-Dichlorobenzene	95-50-1	0.19	ND
1,3-Dichlorobenzene	541-73-1	0.20	ND
1,4-Dichlorobenzene	106-46-7	0.20	ND
Dichlorodifluoromethane	75-71-8	0.15	ND
1,1-Dichloroethane	75-34-3	0.20	ND
1,2-Dichloroethane	107-06-2	0.20	ND
1,1-Dichloroethene	75-35-4	0.16	ND
1,2-Dichloroethene (cis)	156-59-2	0.17	ND
1,2-Dichloroethene (trans)	156-60-5	0.17	ND
1,2-Dichloropropane	78-87-5	0.20	ND
1,3-Dichloropropene (cis)	10061-01-5	0.19	ND
1,3-Dichloropropene (trans)	10061-02-6	0.19	ND
1,2-Dichlorotetrafluoroethane	76-14-2	0.18	ND
1,4-Dioxane	123-91-1	0.20	ND
Ethylbenzene	100-41-4	0.20	ND
n-Heptane	142-82-5	0.20	ND
1,3-Hexachlorobutadiene	87-68-3	0.20	ND
n-Hexane	110-54-3	0.20	ND
Methylene chloride	75-09-2	0.14	ND
Methyl ethyl ketone	78-93-3	0.20	ND

Method Blank must be less than the Practical Quantitation Limit (PQL).

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Method Blank Report

Lab Sample Name:	**METHOD BLANK**	**Data File:**	**AA3704BLK**
Field Sample Name:	**METHOD BLANK**	**Date Analyzed:**	**10/4/2017**
Matrix:	**Air**	**Sample Volume:**	**500ml**
Dilution Factor:	**1**	**GC/MS Column:**	**RTX-1, 0.32 mmID**

Runs with this Method Blank:

Standard/Sample Run	Date/Time of Sample/Standard Injection
BFB [AA3701BFB]	10/04/2017 8:23
10 PPBV DCVS [AA3702DCVS]	10/04/2017 9:02
10 PPBV LCS [AA3703LCS]	10/04/2017 9:55
METHOD BLANK [AA3704BLK]	10/04/2017 10:33
02 PPBV RLLCS [AA3705RLLCS]	10/04/2017 11:14
2162 [AA3717]	10/04/2017 18:34
10 PPBV CCCVS [AA3728CCCVS]	10/04/2017 19:08

Compound	CAS #	Reporting Limit (ppbv)	Concentration (ppbv)
Methyl isobutyl ketone	108-10-1	0.20	ND
Methyl tert-butyl ether	1634-04-4	0.19	ND
Styrene	100-42-5	0.20	ND
Tert-butyl alcohol	75-65-0	0.20	ND
1,1,2,2-Tetrachloroethane	79-34-5	0.20	ND
Tetrachloroethene	127-18-4	0.20	ND
Toluene	108-88-3	0.20	ND
1,2,4-Trichlorobenzene	120-82-1	0.20	ND
1,1,1-Trichloroethane	71-55-6	0.19	ND
1,1,2-Trichloroethane	79-00-5	0.20	ND
Trichloroethene	79-01-6	0.20	ND
Trichlorofluoromethane	75-69-4	0.20	ND
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	0.20	ND
1,2,4-Trimethylbenzene	95-63-6	0.20	ND
1,3,5-Trimethylbenzene	108-67-8	0.20	ND
2,2,4-Trimethylpentane	540-84-1	0.20	ND
Vinyl bromide	593-60-2	0.14	ND
Vinyl chloride	75-01-4	0.14	ND
Xylenes (m&p)	179601-23-1	0.20	ND
Xylenes (o)	95-47-6	0.20	ND

Method Blank must be less than the Practical Quantitation Limit (PQL).

Data Path : C:\DATA\10-04-17\
Data File : aa3704blk.D
Acq On : 4 Oct 2017 10:33 am
Operator : jls
Sample : Method Blank
Misc : 1127, 500cc
ALS Vial : 4 Sample Multiplier: 1

Quant Time: Oct 05 10:51:39 2017
Quant Method : C:\msdchem\1\METHODS\0912.M
Quant Title : TO-15 on the Agilent 7890A / 5975C
QLast Update : Tue Sep 12 13:00:02 2017
Response via : Initial Calibration

Compound	R.T.	QIon	Response	Conc	Units	Dev(Min)
Internal Standards						
1) Bromochloromethane (IS)	7.746	130	499560	10.00	ppbV	0.00
38) 1,4-Difluorobenzene (IS)	9.804	114	1674182	10.00	ppbV	0.00
55) d-5 Chlorobenzene (IS)	15.141	117	1477054	10.00	ppbV	0.00
System Monitoring Compounds						
64) Bromofluorobenzene (tu...	17.341	95	1252212	9.68	ppbV	0.00

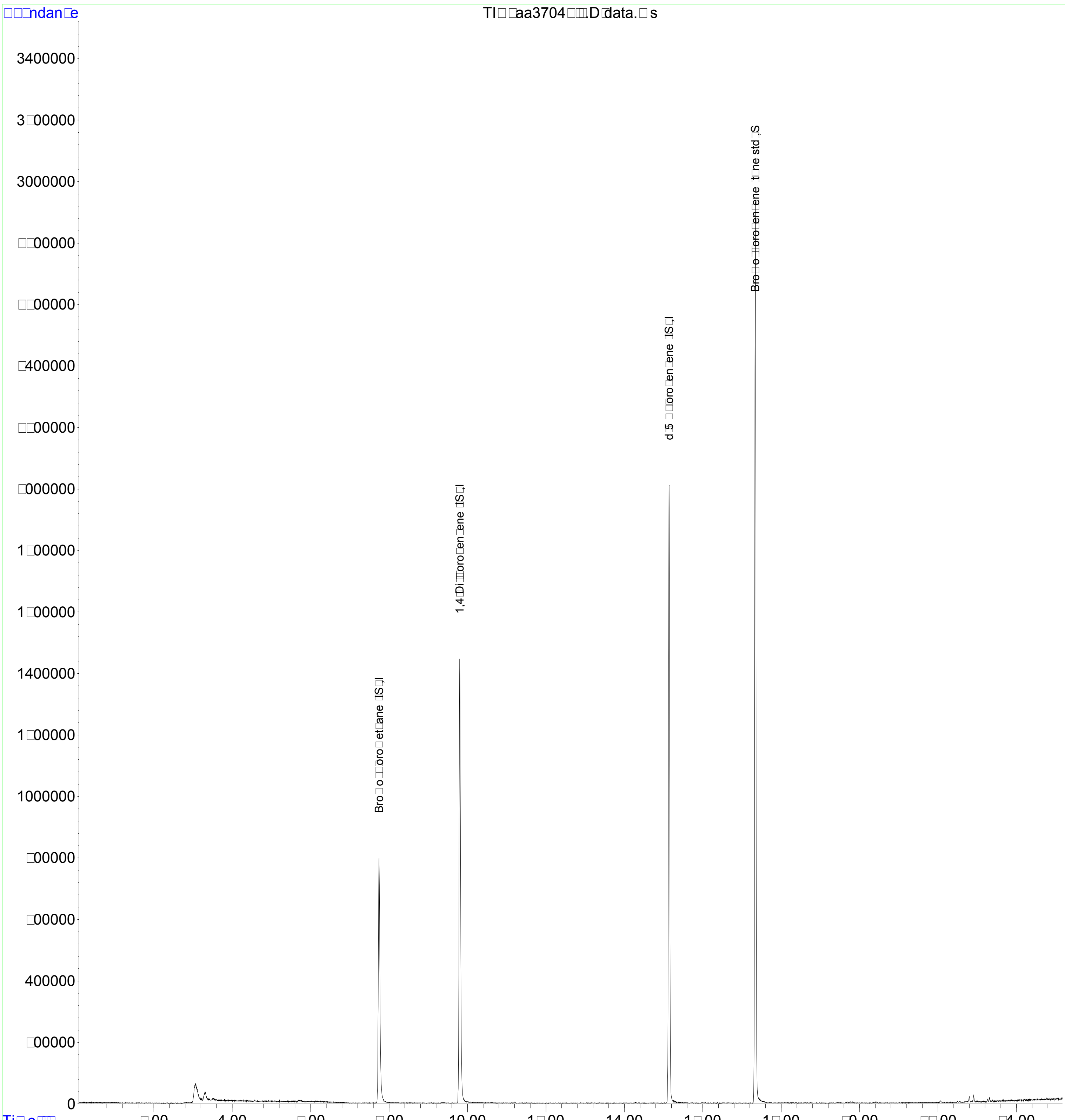
Target Compounds	Qvalue

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Quantitation Report (QT Reviewed)

Data Path : C:\DATA\10-04-17\
Data File : aa3704blk.D
Acq On : 4 Oct 2017 10:33 am
Operator : jls
Sample : Method Blank
Misc : 1127, 500cc
ALS Vial : 4 Sample Multiplier: 1

Quant Time: Oct 05 10:51:39 2017
Quant Method : C:\msdchem\1\METHODS\0912.M
Quant Title : TO-15 on the Agilent 7890A / 5975C
QLast Update : Tue Sep 12 13:00:02 2017
Response via : Initial Calibration



Method Blank Report

Lab Sample Name:	**METHOD BLANK**	**Data File:**	**AA4274BLK**
Field Sample Name:	**METHOD BLANK**	**Date Analyzed:**	**11/28/2017**
Matrix:	**Air**	**Sample Volume:**	**500ml**
Dilution Factor:	**1**	**GC/MS Column:**	**RTX-1, 0.32 mmID**

Runs with this Method Blank:

Standard/Sample Run	Date/Time of Sample/Standard Injection
BFB [AA4271BFB]	11/28/2017 8:37
10 PPBV DCVS [AA4272DCVS]	11/28/2017 9:29
10 PPBV LCS [AA4273LCS]	11/28/2017 10:09
METHOD BLANK [AA4274BLK]	11/28/2017 13:04
02 PPBV RLLCS [AA4275RLLCS]	11/28/2017 13:44
E17-09837-01 [AA4286]	11/28/2017 20:34
E17-09837-02 [AA4287]	11/28/2017 21:07
E17-09837-05 [AA4290]	11/28/2017 22:48
10 PPBV CCCVS [AA4292CCCVS]	11/28/2017 23:56

Compound	CAS #	Reporting Limit (ppbv)	Concentration (ppbv)
Acetone	67-64-1	0.20	ND
Benzene	71-43-2	0.20	ND
Bromodichloromethane	75-27-4	0.20	ND
Bromoform	75-25-2	0.14	ND
Bromomethane	74-83-9	0.20	ND
1,3-Butadiene	106-99-0	0.20	ND
Chlorobenzene	108-90-7	0.20	ND
Chloroethane	75-00-3	0.20	ND
Chloroform	67-66-3	0.20	ND
Chloromethane	74-87-3	0.20	ND
Carbon disulfide	75-15-0	0.16	ND
Carbon tetrachloride	56-23-5	0.15	ND
Cyclohexane	110-82-7	0.18	ND
Dibromochloromethane	124-48-1	0.15	ND
1,2-Dibromoethane	106-93-4	0.20	ND
1,2-Dichlorobenzene	95-50-1	0.19	ND
1,3-Dichlorobenzene	541-73-1	0.20	ND
1,4-Dichlorobenzene	106-46-7	0.20	ND
Dichlorodifluoromethane	75-71-8	0.15	ND
1,1-Dichloroethane	75-34-3	0.20	ND
1,2-Dichloroethane	107-06-2	0.20	ND
1,1-Dichloroethene	75-35-4	0.16	ND
1,2-Dichloroethene (cis)	156-59-2	0.17	ND
1,2-Dichloroethene (trans)	156-60-5	0.17	ND
1,2-Dichloropropane	78-87-5	0.20	ND
1,3-Dichloropropene (cis)	10061-01-5	0.19	ND
1,3-Dichloropropene (trans)	10061-02-6	0.19	ND
1,2-Dichlorotetrafluoroethane	76-14-2	0.18	ND
1,4-Dioxane	123-91-1	0.20	ND
Ethylbenzene	100-41-4	0.20	ND
n-Heptane	142-82-5	0.20	ND
1,3-Hexachlorobutadiene	87-68-3	0.20	ND
n-Hexane	110-54-3	0.20	ND

Method Blank must be less than the Practical Quantitation Limit (PQL).

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Method Blank Report

Lab Sample Name:	**METHOD BLANK**	**Data File:**	**AA4274BLK**
Field Sample Name:	**METHOD BLANK**	**Date Analyzed:**	**11/28/2017**
Matrix:	**Air**	**Sample Volume:**	**500ml**
Dilution Factor:	**1**	**GC/MS Column:**	**RTX-1, 0.32 mmID**

Runs with this Method Blank:

Standard/Sample Run	Date/Time of Sample/Standard Injection
BFB [AA4271BFB]	11/28/2017 8:37
10 PPBV DCVS [AA4272DCVS]	11/28/2017 9:29
10 PPBV LCS [AA4273LCS]	11/28/2017 10:09
METHOD BLANK [AA4274BLK]	11/28/2017 13:04
02 PPBV RLLCS [AA4275RLLCS]	11/28/2017 13:44
E17-09837-01 [AA4286]	11/28/2017 20:34
E17-09837-02 [AA4287]	11/28/2017 21:07
E17-09837-05 [AA4290]	11/28/2017 22:48
10 PPBV CCCVS [AA4292CCCVS]	11/28/2017 23:56

Compound	CAS #	Reporting Limit (ppbv)	Concentration (ppbv)
Methylene chloride	75-09-2	0.14	ND
Methyl ethyl ketone	78-93-3	0.20	ND
Methyl isobutyl ketone	108-10-1	0.20	ND
Methyl tert-butyl ether	1634-04-4	0.19	ND
Styrene	100-42-5	0.20	ND
Tert-butyl alcohol	75-65-0	0.20	ND
1,1,2,2-Tetrachloroethane	79-34-5	0.20	ND
Tetrachloroethene	127-18-4	0.20	ND
Toluene	108-88-3	0.20	ND
1,2,4-Trichlorobenzene	120-82-1	0.20	ND
1,1,1-Trichloroethane	71-55-6	0.19	ND
1,1,2-Trichloroethane	79-00-5	0.20	ND
Trichloroethene	79-01-6	0.20	ND
Trichlorofluoromethane	75-69-4	0.20	ND
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	0.20	ND
1,2,4-Trimethylbenzene	95-63-6	0.20	ND
1,3,5-Trimethylbenzene	108-67-8	0.20	ND
2,2,4-Trimethylpentane	540-84-1	0.20	ND
Vinyl bromide	593-60-2	0.14	ND
Vinyl chloride	75-01-4	0.14	ND
Xylenes (m&p)	179601-23-1	0.20	ND
Xylenes (o)	95-47-6	0.20	ND

Method Blank must be less than the Practical Quantitation Limit (PQL).

Data Path : C:\DATA\11-28-17\
Data File : aa4274blk.D
Acq On : 28 Nov 2017 1:04 pm
Operator : jls
Sample : Method Blank
Misc : 1127, 500cc
ALS Vial : 4 Sample Multiplier: 1

Quant Time: Nov 30 11:35:55 2017
Quant Method : C:\msdchem\1\METHODS\0912.M
Quant Title : TO-15 on the Agilent 7890A / 5975C
QLast Update : Tue Sep 12 13:00:02 2017
Response via : Initial Calibration

Compound	R.T.	QIon	Response	Conc	Units	Dev(Min)
Internal Standards						
1) Bromochloromethane (IS)	7.743	130	523990	10.00	ppbV	0.00
38) 1,4-Difluorobenzene (IS)	9.804	114	1666080	10.00	ppbV	0.00
55) d-5 Chlorobenzene (IS)	15.135	117	1556624	10.00	ppbV	0.00
System Monitoring Compounds						
64) Bromofluorobenzene (tu...	17.338	95	1276322	9.36	ppbV	0.00

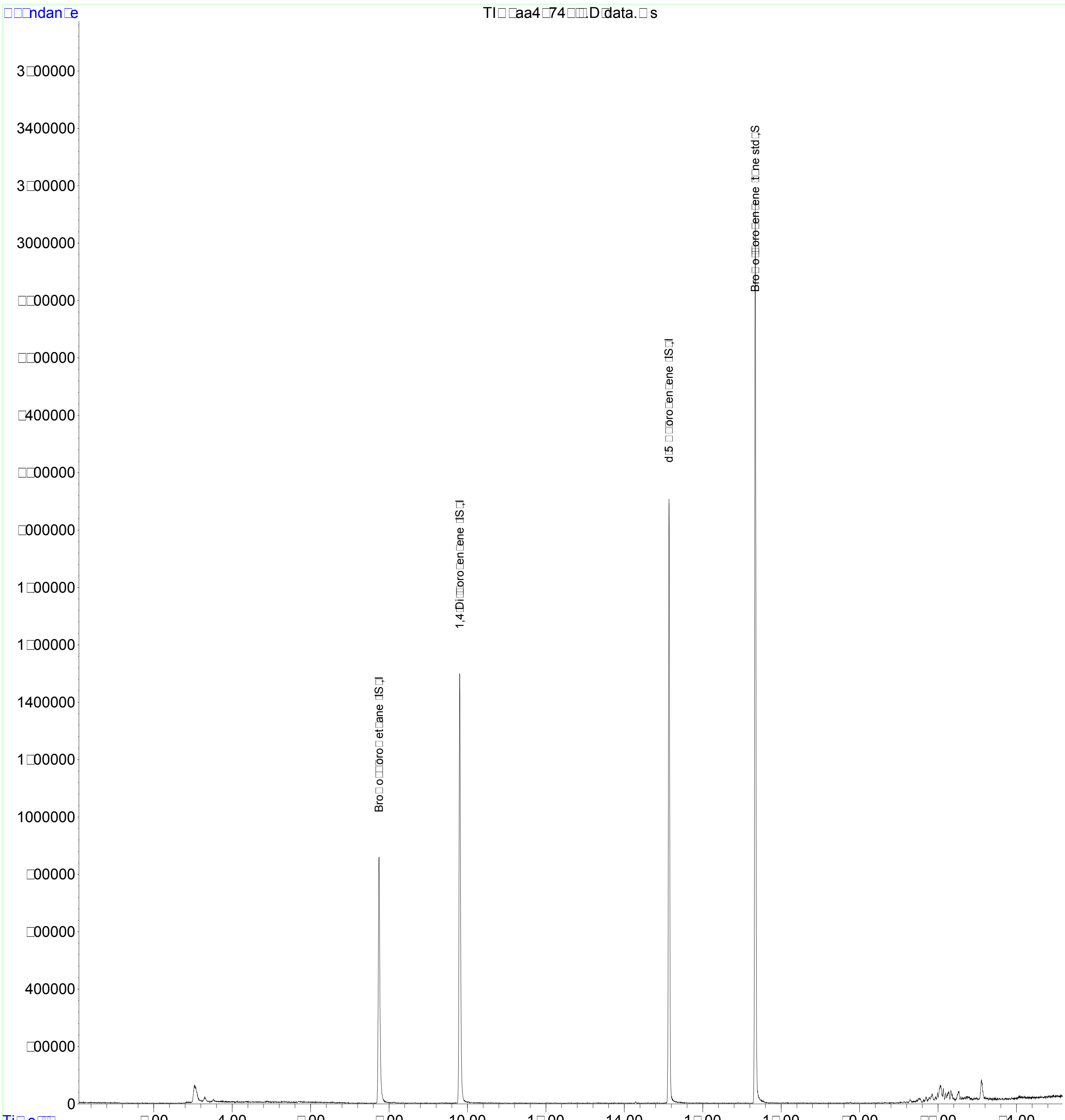
Target Compounds	Qvalue

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Quantitation Report (QT Reviewed)

Data Path : C:\DATA\11-28-17\
Data File : aa4274blk.D
Acq On : 28 Nov 2017 1:04 pm
Operator : jls
Sample : Method Blank
Misc : 1127, 500cc
ALS Vial : 4 Sample Multiplier: 1

Quant Time: Nov 30 11:35:55 2017
Quant Method : C:\msdchem\1\METHODS\0912.M
Quant Title : TO-15 on the Agilent 7890A / 5975C
QLast Update : Tue Sep 12 13:00:02 2017
Response via : Initial Calibration



Method Blank Report

Lab Sample Name:	**METHOD BLANK**	**Data File:**	**AA4304BLK**
Field Sample Name:	**METHOD BLANK**	**Date Analyzed:**	**11/29/2017**
Matrix:	**Air**	**Sample Volume:**	**500ml**
Dilution Factor:	**1**	**GC/MS Column:**	**RTX-1, 0.32 mmID**

Runs with this Method Blank:

Standard/Sample Run	Date/Time of Sample/Standard Injection
BFB [AA4301BFB]	11/29/2017 8:42
10 PPBV DCVS [AA4302DCVS]	11/29/2017 10:04
10 PPBV LCS [AA4303LCS]	11/29/2017 10:45
METHOD BLANK [AA4304BLK]	11/29/2017 11:19
02 PPBV RLLCS [AA4305RLLCS]	11/29/2017 11:59
3059 [AA4306]	11/29/2017 14:35
E17-09837-01 [AA4307]	11/29/2017 15:08
E17-09837-02 [AA4308]	11/29/2017 15:55
E17-09837-03 [AA4309]	11/29/2017 16:29
E17-09837-04 [AA4310]	11/29/2017 17:03
10 PPBV CCCVS [AA4319CCCVS]	11/29/2017 22:05

Compound	CAS #	Reporting Limit (ppbv)	Concentration (ppbv)
Acetone	67-64-1	0.20	ND
Benzene	71-43-2	0.20	ND
Bromodichloromethane	75-27-4	0.20	ND
Bromoform	75-25-2	0.14	ND
Bromomethane	74-83-9	0.20	ND
1,3-Butadiene	106-99-0	0.20	ND
Chlorobenzene	108-90-7	0.20	ND
Chloroethane	75-00-3	0.20	ND
Chloroform	67-66-3	0.20	ND
Chloromethane	74-87-3	0.20	ND
Carbon disulfide	75-15-0	0.16	ND
Carbon tetrachloride	56-23-5	0.15	ND
Cyclohexane	110-82-7	0.18	ND
Dibromochloromethane	124-48-1	0.15	ND
1,2-Dibromoethane	106-93-4	0.20	ND
1,2-Dichlorobenzene	95-50-1	0.19	ND
1,3-Dichlorobenzene	541-73-1	0.20	ND
1,4-Dichlorobenzene	106-46-7	0.20	ND
Dichlorodifluoromethane	75-71-8	0.15	ND
1,1-Dichloroethane	75-34-3	0.20	ND
1,2-Dichloroethane	107-06-2	0.20	ND
1,1-Dichloroethene	75-35-4	0.16	ND
1,2-Dichloroethene (cis)	156-59-2	0.17	ND
1,2-Dichloroethene (trans)	156-60-5	0.17	ND
1,2-Dichloropropane	78-87-5	0.20	ND
1,3-Dichloropropene (cis)	10061-01-5	0.19	ND
1,3-Dichloropropene (trans)	10061-02-6	0.19	ND
1,2-Dichlorotetrafluoroethane	76-14-2	0.18	ND
1,4-Dioxane	123-91-1	0.20	ND
Ethylbenzene	100-41-4	0.20	ND

Method Blank must be less than the Practical Quantitation Limit (PQL).

Integrated Analytical Laboratories LLC

Method Blank Report

Lab Sample Name:	**METHOD BLANK**	**Data File:**	**AA4304BLK**
Field Sample Name:	**METHOD BLANK**	**Date Analyzed:**	**11/29/2017**
Matrix:	**Air**	**Sample Volume:**	**500ml**
Dilution Factor:	**1**	**GC/MS Column:**	**RTX-1, 0.32 mmID**

Runs with this Method Blank:

Standard/Sample Run	Date/Time of Sample/Standard Injection
BFB [AA4301BFB]	11/29/2017 8:42
10 PPBV DCVS [AA4302DCVS]	11/29/2017 10:04
10 PPBV LCS [AA4303LCS]	11/29/2017 10:45
METHOD BLANK [AA4304BLK]	11/29/2017 11:19
02 PPBV RLLCS [AA4305RLLCS]	11/29/2017 11:59
3059 [AA4306]	11/29/2017 14:35
E17-09837-01 [AA4307]	11/29/2017 15:08
E17-09837-02 [AA4308]	11/29/2017 15:55
E17-09837-03 [AA4309]	11/29/2017 16:29
E17-09837-04 [AA4310]	11/29/2017 17:03
10 PPBV CCCVS [AA4319CCCVS]	11/29/2017 22:05

Compound	CAS #	Reporting Limit (ppbv)	Concentration (ppbv)
n-Heptane	142-82-5	0.20	ND
1,3-Hexachlorobutadiene	87-68-3	0.20	ND
n-Hexane	110-54-3	0.20	ND
Methylene chloride	75-09-2	0.14	ND
Methyl ethyl ketone	78-93-3	0.20	ND
Methyl isobutyl ketone	108-10-1	0.20	ND
Methyl tert-butyl ether	1634-04-4	0.19	ND
Styrene	100-42-5	0.20	ND
Tert-butyl alcohol	75-65-0	0.20	ND
1,1,2,2-Tetrachloroethane	79-34-5	0.20	ND
Tetrachloroethene	127-18-4	0.20	ND
Toluene	108-88-3	0.20	ND
1,2,4-Trichlorobenzene	120-82-1	0.20	ND
1,1,1-Trichloroethane	71-55-6	0.19	ND
1,1,2-Trichloroethane	79-00-5	0.20	ND
Trichloroethene	79-01-6	0.20	ND
Trichlorofluoromethane	75-69-4	0.20	ND
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	0.20	ND
1,2,4-Trimethylbenzene	95-63-6	0.20	ND
1,3,5-Trimethylbenzene	108-67-8	0.20	ND
2,2,4-Trimethylpentane	540-84-1	0.20	ND
Vinyl bromide	593-60-2	0.14	ND
Vinyl chloride	75-01-4	0.14	ND
Xylenes (m&p)	179601-23-1	0.20	ND
Xylenes (o)	95-47-6	0.20	ND

Method Blank must be less than the Practical Quantitation Limit (PQL).

Data Path : C:\DATA\11-29-17\
Data File : aa4304blk.D
Acq On : 29 Nov 2017 11:19 am
Operator : jls
Sample : Method Blank
Misc : 1127, 500cc
ALS Vial : 4 Sample Multiplier: 1

Quant Time: Dec 04 10:34:57 2017
Quant Method : C:\msdchem\1\METHODS\0912.M
Quant Title : TO-15 on the Agilent 7890A / 5975C
QLast Update : Tue Sep 12 13:00:02 2017
Response via : Initial Calibration

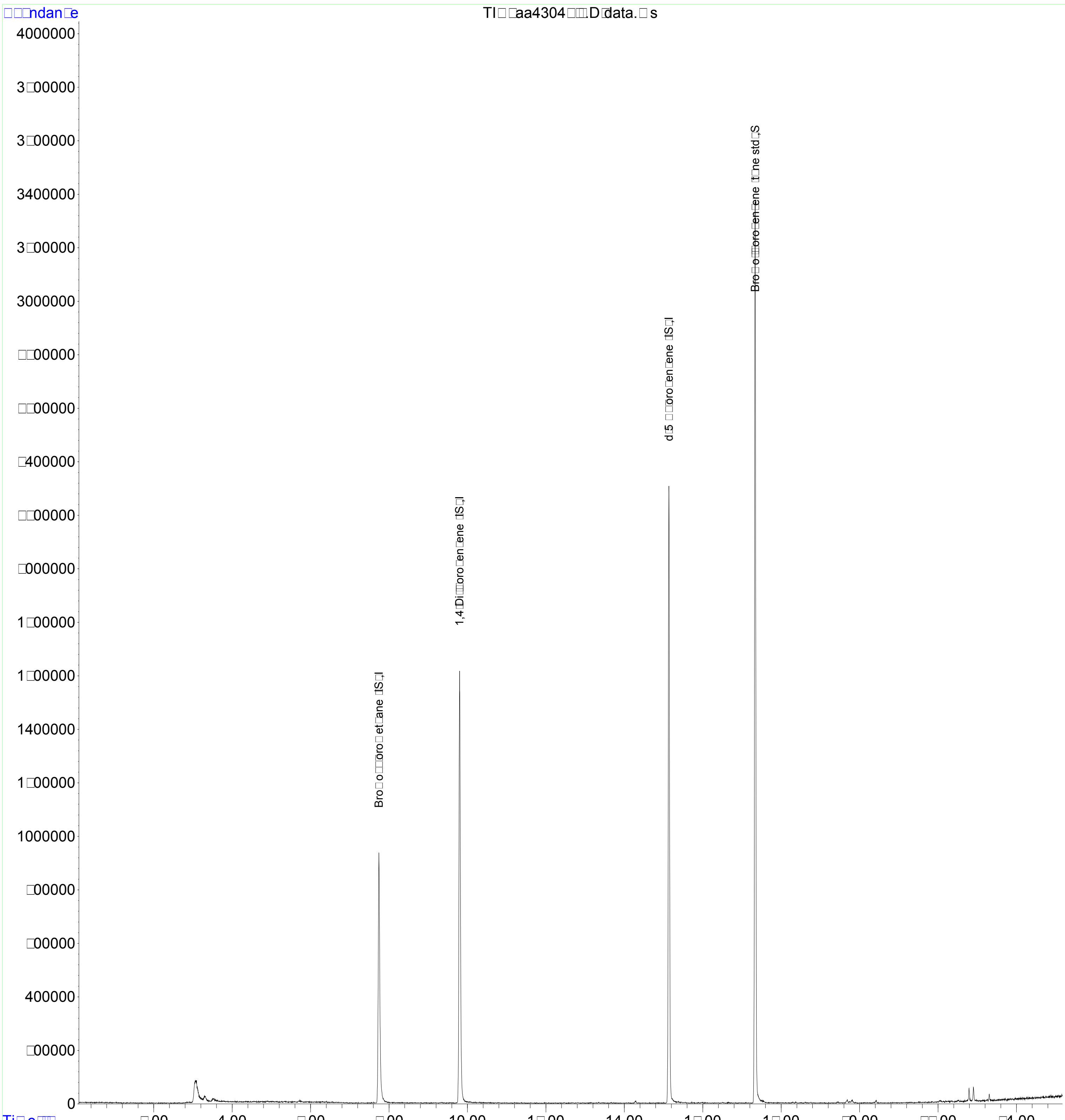
Compound	R.T.	QIon	Response	Conc	Units	Dev(Min)
Internal Standards						
1) Bromochloromethane (IS)	7.740	130	573088	10.00	ppbV	0.00
38) 1,4-Difluorobenzene (IS)	9.798	114	1791275	10.00	ppbV	0.00
55) d-5 Chlorobenzene (IS)	15.135	117	1711339	10.00	ppbV	0.00
System Monitoring Compounds						
64) Bromofluorobenzene (tu...	17.338	95	1397735	9.33	ppbV	0.00

Target Compounds Qvalue

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Data Path : C:\DATA\11-29-17\
Data File : aa4304blk.D
Acq On : 29 Nov 2017 11:19 am
Operator : jls
Sample : Method Blank
Misc : 1127, 500cc
ALS Vial : 4 Sample Multiplier: 1

Quant Time: Dec 04 10:34:57 2017
Quant Method : C:\msdchem\1\METHODS\0912.M
Quant Title : TO-15 on the Agilent 7890A / 5975C
QLast Update : Tue Sep 12 13:00:02 2017
Response via : Initial Calibration



Integrated Analytical Laboratories LLC

Laboratory Control Spike

Lab Sample Name: **10 PPBV LCS** **Data File:** **AA3703LCS**
Spike Amount: **10 ppbv, except m&p-Xylenes at 20 ppbv** **Date Analyzed:** **10/4/2017**

Runs with this LCS:

Standard/Sample Run	Date/Time of Sample/Standard Injection
BFB [AA3701BFB]	10/04/2017 8:23
10 PPBV DCVS [AA3702DCVS]	10/04/2017 9:02
10 PPBV LCS [AA3703LCS]	10/04/2017 9:55
METHOD BLANK [AA3704BLK]	10/04/2017 10:33
02 PPBV RLLCS [AA3705RLLCS]	10/04/2017 11:14
2162 [AA3717]	10/04/2017 18:34
10 PPBV CCCVS [AA3728CCCVS]	10/04/2017 19:08

Compound	CAS #	Calculated Amount (ppbv)	% Recovery
Acetone	67-64-1	10	100
Benzene	71-43-2	9.0	90
Bromodichloromethane	75-27-4	9.9	99
Bromoform	75-25-2	9.8	98
Bromomethane	74-83-9	11	110
1,3-Butadiene	106-99-0	9.8	98
Chlorobenzene	108-90-7	8.9	89
Chloroethane	75-00-3	10	100
Chloroform	67-66-3	9.8	98
Chloromethane	74-87-3	11	110
Carbon disulfide	75-15-0	9.5	95
Carbon tetrachloride	56-23-5	9.7	97
Cyclohexane	110-82-7	9.5	95
Dibromochloromethane	124-48-1	9.8	98
1,2-Dibromoethane	106-93-4	9.3	93
1,2-Dichlorobenzene	95-50-1	9.3	93
1,3-Dichlorobenzene	541-73-1	9.4	94
1,4-Dichlorobenzene	106-46-7	9.4	94
Dichlorodifluoromethane	75-71-8	10	100
1,1-Dichloroethane	75-34-3	9.1	91
1,2-Dichloroethane	107-06-2	9.8	98
1,1-Dichloroethene	75-35-4	10	100
1,2-Dichloroethene (cis)	156-59-2	9.6	96
1,2-Dichloroethene (trans)	156-60-5	9.6	96
1,2-Dichloropropane	78-87-5	8.5	85
1,3-Dichloropropene (cis)	10061-01-5	9.6	96
1,3-Dichloropropene (trans)	10061-02-6	9.8	98
1,2-Dichlorotetrafluoroethane	76-14-2	9.5	95
1,4-Dioxane	123-91-1	8.4	84
Ethylbenzene	100-41-4	9.7	97
n-Heptane	142-82-5	11	110
1,3-Hexachlorobutadiene	87-68-3	8.8	88
n-Hexane	110-54-3	8.9	89

LCS recovery must be within 70-130% of the spiked value for all compounds except Acetone, Dioxane (1,4-), Hexachlorobutadiene, Naphthalene, and 1,2,4-Trichlorobenzene. These compounds must be within 40-160%.
*** Values outside of QC limits* Values outside of 70-130% QC limits**

Integrated Analytical Laboratories LLC

Laboratory Control Spike

Lab Sample Name: **10 PPBV LCS** **Data File:** **AA3703LCS**

Spike Amount: **10 ppbv, except m&p-Xylenes at 20 ppbv** **Date Analyzed:** **10/4/2017**

Runs with this LCS:

Standard/Sample Run	Date/Time of Sample/Standard Injection
BFB [AA3701BFB]	10/04/2017 8:23
10 PPBV DCVS [AA3702DCVS]	10/04/2017 9:02
10 PPBV LCS [AA3703LCS]	10/04/2017 9:55
METHOD BLANK [AA3704BLK]	10/04/2017 10:33
02 PPBV RLLCS [AA3705RLLCS]	10/04/2017 11:14
2162 [AA3717]	10/04/2017 18:34
10 PPBV CCCVS [AA3728CCCVS]	10/04/2017 19:08

Compound	CAS #	Calculated Amount (ppbv)	% Recovery
Methylene chloride	75-09-2	8.8	88
Methyl ethyl ketone	78-93-3	11	110
Methyl isobutyl ketone	108-10-1	9.1	91
Methyl tert-butyl ether	1634-04-4	9.4	94
Styrene	100-42-5	10	100
Tert-butyl alcohol	75-65-0	9.1	91
1,1,2,2-Tetrachloroethane	79-34-5	8.9	89
Tetrachloroethene	127-18-4	9.1	91
Toluene	108-88-3	9.6	96
1,2,4-Trichlorobenzene	120-82-1	9.0	90
1,1,1-Trichloroethane	71-55-6	9.5	95
1,1,2-Trichloroethane	79-00-5	9.0	90
Trichloroethene	79-01-6	9.6	96
Trichlorofluoromethane	75-69-4	10.0	100
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	8.9	89
1,2,4-Trimethylbenzene	95-63-6	11	110
1,3,5-Trimethylbenzene	108-67-8	10	100
2,2,4-Trimethylpentane	540-84-1	9.4	94
Vinyl bromide	593-60-2	10	100
Vinyl chloride	75-01-4	10	100
Xylenes (m&p)	179601-23-1	20	99
Xylenes (o)	95-47-6	10.0	100

LCS recovery must be within 70-130% of the spiked value for all compounds except Acetone, Dioxane (1,4-), Hexachlorobutadiene, Naphthalene, and 1,2,4-Trichlorobenzene. These compounds must be within 40-160%.

*** Values outside of QC limits* Values outside of 70-130% QC limits**

```
Data Path : C:\DATA\10-04-17\
Data File : aa3703lcs.D
Acq On    :  4 Oct 2017   9:55 am
Operator  : jls
Sample    : 10 ppbv LCS
Misc      : AAL073030
ALS Vial  : 3   Sample Multiplier: 1

Quant Time: Oct 05 10:50:05 2017
Quant Method : C:\msdchem\1\METHODS\0912.M
Quant Title  : TO-15 on the Agilent 7890A / 5975C
QLast Update : Tue Sep 12 13:00:02 2017
Response via : Initial Calibration

        Compound                     R.T. QIon  Response  Conc Units Dev(Min)
--------------------------------------------------------------------------
 Internal Standards
  1) Bromochloromethane (IS)       7.753  130    494372    10.00 ppbV     0.00
 38) 1,4-Difluorobenzene (IS)      9.807  114   1754044    10.00 ppbV     0.00
 55) d-5 Chlorobenzene (IS)       15.141  117   1574064    10.00 ppbV     0.00

 System Monitoring Compounds
 64) Bromofluorobenzene (tu...   17.341   95   1400636    10.16 ppbV    0.00

 Target Compounds                                                     Qvalue
  2) Propene                      3.505   41    107432     8.72 ppbV       83
  3) Dichlorodifluoromethane      3.566   85   1861633    10.09 ppbV       97
  4) Chloromethane                3.727   52     46867    11.27 ppbV #      1
  5) 1,2-Dichlorotetrafluor...    3.772   85   1372675     9.54 ppbV       98
  6) Vinyl chloride               3.888   62    282344    10.08 ppbV       87
  7) 1,3-Butadiene                3.994   54    151456     9.75 ppbV #     73
  8) n-Butane                     4.039   43    260945    10.17 ppbV       95
  9) Bromomethane                 4.245   94    311146    10.84 ppbV       97
 10) Chloroethane                 4.386   64    152459    10.33 ppbV #     82
 11) Ethanol                      4.425   45     49817     8.60 ppbV       88
 12) Vinyl bromide                4.692  106    482362    10.37 ppbV       99
 13) Acrolein                     4.750   56     79776     9.76 ppbV       98
 14) Acetone                      4.843   58    126321    10.33 ppbV #     65
 15) Trichlorofluoromethane       5.032  101   2425917     9.97 ppbV       99
 16) Isopropanol                  5.026   45    310741     9.41 ppbV #     87
 17) n-Pentane                    5.332   43    278054     9.22 ppbV       92
 18) 1,1-Dichloroethene           5.595   61    692791    10.07 ppbV       96
 19) Methylene chloride           5.708   84    384384     8.77 ppbV       97
 20) Tert-butyl alcohol           5.563   59    739718     9.09 ppbV      100
 21) Allyl chloride               5.798   76    191274     9.97 ppbV      100
 22) 1,1,2-Trichloro-1,2,2-...    5.930  101   1308883     8.88 ppbV       96
 23) Carbon disulfide             5.987   76   1256124     9.50 ppbV       98
 24) 1,2-Dichloroethene (tr...    6.563   61    537073     9.59 ppbV      100
 25) 1,1-Dichloroethane           6.749   63    720820     9.14 ppbV       92
 26) Methyl tert-butyl ether      6.785   73   1467123     9.40 ppbV       99
 27) Methyl ethyl ketone          7.097   72    204796    10.55 ppbV       96
 28) 1,2-Dichloroethene (cis)     7.576   61    532320     9.59 ppbV      100
 29) Ethyl acetate                7.765   45     63285     9.77 ppbV      100
 30) n-Hexane                     7.794   57    356418     8.85 ppbV       93
 31) Chloroform                   7.868   83   1474006     9.83 ppbV      100
 32) Tetrahydrofuran              8.264   42    189588     9.34 ppbV #     78
 33) 1,2-Dichloroethane           8.640   62    944041     9.80 ppbV       96
 34) 1,1,1-Trichloroethane        8.917   97   1723943     9.48 ppbV       99
 35) Benzene                      9.418   78   1316298     9.04 ppbV       97
 36) Carbon tetrachloride         9.582  117   2099030     9.65 ppbV      100
 37) Cyclohexane                  9.727   84    565103     9.46 ppbV       92
 39) 1,2-Dichloropropane         10.325   63    383969     8.47 ppbV       95
 40) Bromodichloromethane        10.547   83   1625112     9.88 ppbV       99
 41) 2,2,4-Trimethylpentane      10.656   57   1214983     9.43 ppbV       94
 42) Trichloroethene             10.605  130    884009     9.64 ppbV       97
 43) 1,4-Dioxane                 10.566   88    271020     8.43 ppbV       95
 44) Methyl methacrylate         10.817   69    521849     9.40 ppbV       98
 45) n-Heptane                   10.958   71    455600    10.71 ppbV       94
 46) cis-1,3-Dichloropropene     11.614   75    961691     9.63 ppbV      100
 47) Methyl isobutyl ketone      11.640   43    565499     9.07 ppbV       98
 48) trans-1,3-Dichloropropene   12.254   75   1032608     9.79 ppbV       98
 49) 1,1,2-Trichloroethane       12.466   97    724017     9.01 ppbV       98
 50) Toluene                     12.820   91   1936834     9.61 ppbV       95
 51) Methyl n-butyl ketone       13.141   43    558008     9.22 ppbV       98
```

Data Path : C:\DATA\10-04-17\
Data File : aa3703lcs.D
Acq On : 4 Oct 2017 9:55 am
Operator : jls
Sample : 10 ppbv LCS
Misc : AAL073030
ALS Vial : 3 Sample Multiplier: 1

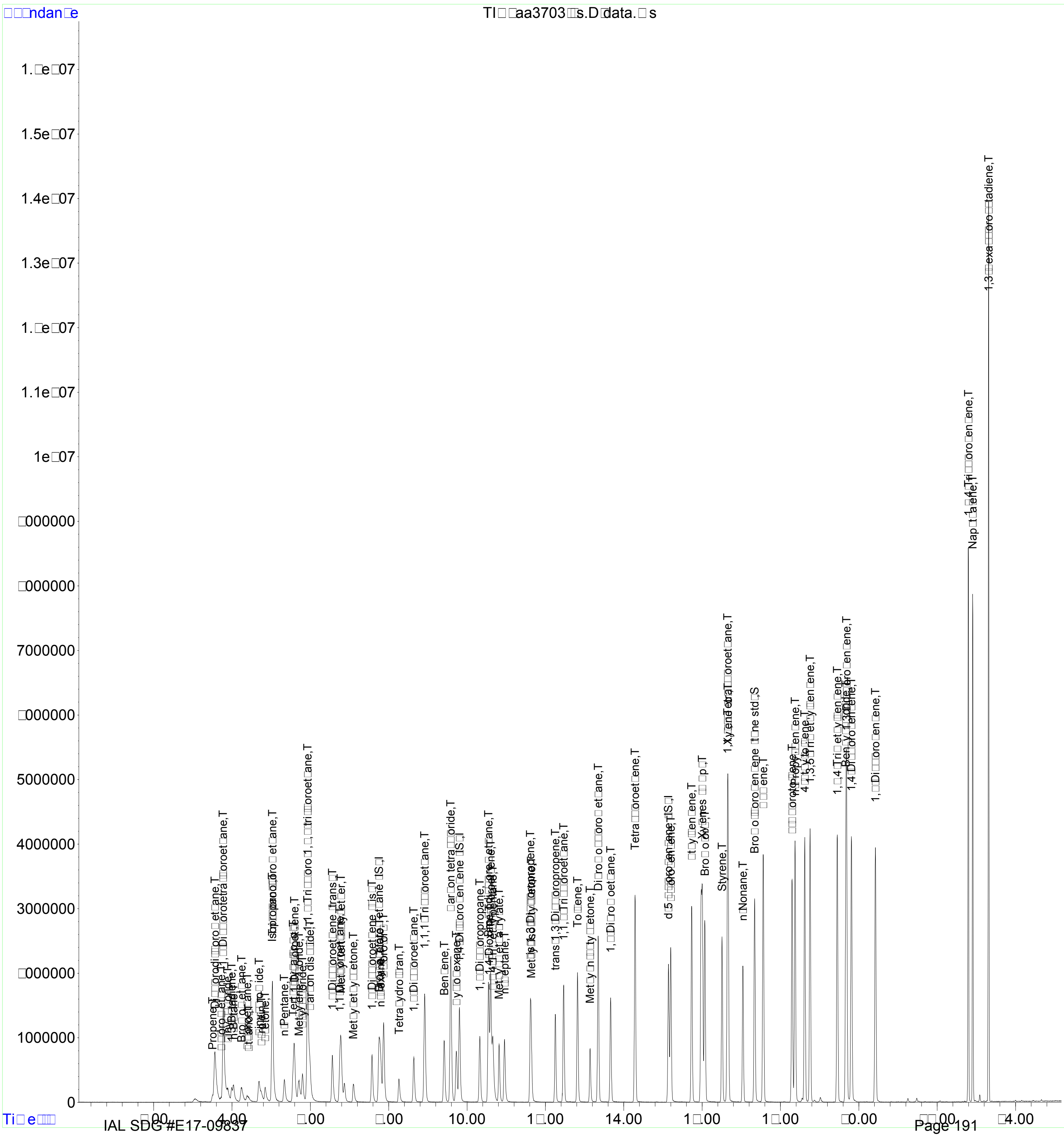
Quant Time: Oct 05 10:50:05 2017
Quant Method : C:\msdchem\1\METHODS\0912.M
Quant Title : TO-15 on the Agilent 7890A / 5975C
QLast Update : Tue Sep 12 13:00:02 2017
Response via : Initial Calibration

Compound	R.T.	QIon	Response	Conc	Units	Dev(Min)
52) Dibromochloromethane	13.347	129	1868366	9.75	ppbV	99
53) 1,2-Dibromoethane	13.666	107	1286230	9.32	ppbV	100
54) Tetrachloroethene	14.289	166	1042157	9.11	ppbV	98
56) Chlorobenzene	15.199	112	1797234	8.86	ppbV	99
57) Ethylbenzene	15.733	91	2903146	9.71	ppbV	98
58) Xylenes (m&p)	16.003	91	4837359	19.77	ppbV	96
59) Bromoform	16.071	173	1573344	9.83	ppbV	98
60) Styrene	16.508	104	1663905	10.10	ppbV	99
61) Xylene (o)	16.662	91	2559574	9.99	ppbV	92
62) 1,1,2,2-Tetrachloroethane	16.649	83	1594285	8.88	ppbV	100
63) n-Nonane	17.042	57	660128	9.47	ppbV	99
65) Cumene	17.559	105	3418857	9.77	ppbV	95
66) 2-Chlorotoluene	18.296	91	2595916	9.85	ppbV	90
67) n-Propyl benzene	18.373	120	990975	9.85	ppbV	84
68) 4-Ethyltoluene	18.620	105	3466731	10.19	ppbV	92
69) 1,3,5-Trimethylbenzene	18.755	105	3242923	10.22	ppbV	90
70) 1,2,4-Trimethylbenzene	19.453	105	3229560	10.53	ppbV	96
71) Benzyl chloride	19.669	91	2663332	10.28	ppbV	99
72) 1,3-Dichlorobenzene	19.688	146	2191350	9.38	ppbV	98
73) 1,4-Dichlorobenzene	19.810	146	2230320	9.38	ppbV	99
74) 1,2-Dichlorobenzene	20.424	146	2088837	9.34	ppbV	99
75) 1,2,4-Trichlorobenzene	22.797	180	1865890	8.99	ppbV	99
76) Naphthalene	22.906	127	647100	10.13	ppbV	100
77) 1,3-Hexachlorobutadiene	23.315	225	1511265	8.79	ppbV	94

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Data Path : C:\DATA\10-04-17\
Data File : aa3703lcs.D
Acq On : 4 Oct 2017 9:55 am
Operator : jls
Sample : 10 ppbv LCS
Misc : AAL073030
ALS Vial : 3 Sample Multiplier: 1

Quant Time: Oct 05 10:50:05 2017
Quant Method : C:\msdchem\1\METHODS\0912.M
Quant Title : TO-15 on the Agilent 7890A / 5975C
QLast Update : Tue Sep 12 13:00:02 2017
Response via : Initial Calibration



Integrated Analytical Laboratories LLC

Laboratory Control Spike

Lab Sample Name: **10 PPBV LCS** **Data File:** **AA4273LCS**
Spike Amount: **10 ppbv, except m&p-Xylenes at 20 ppbv** **Date Analyzed:** **11/28/2017**

Runs with this LCS:

Standard/Sample Run	Date/Time of Sample/Standard Injection
BFB [AA4271BFB]	11/28/2017 8:37
10 PPBV DCVS [AA4272DCVS]	11/28/2017 9:29
10 PPBV LCS [AA4273LCS]	11/28/2017 10:09
METHOD BLANK [AA4274BLK]	11/28/2017 13:04
02 PPBV RLLCS [AA4275RLLCS]	11/28/2017 13:44
E17-09837-01 [AA4286]	11/28/2017 20:34
E17-09837-02 [AA4287]	11/28/2017 21:07
E17-09837-05 [AA4290]	11/28/2017 22:48
10 PPBV CCCVS [AA4292CCCVS]	11/28/2017 23:56

Compound	CAS #	Calculated Amount (ppbv)	% Recovery
Acetone	67-64-1	11	110
Benzene	71-43-2	9.7	97
Bromodichloromethane	75-27-4	9.4	94
Bromoform	75-25-2	9.4	94
Bromomethane	74-83-9	13	130
1,3-Butadiene	106-99-0	11	110
Chlorobenzene	108-90-7	8.5	85
Chloroethane	75-00-3	10	100
Chloroform	67-66-3	9.4	94
Chloromethane	74-87-3	12	120
Carbon disulfide	75-15-0	9.3	93
Carbon tetrachloride	56-23-5	10	100
Cyclohexane	110-82-7	9.6	96
Dibromochloromethane	124-48-1	10	100
1,2-Dibromoethane	106-93-4	9.6	96
1,2-Dichlorobenzene	95-50-1	8.9	89
1,3-Dichlorobenzene	541-73-1	8.6	86
1,4-Dichlorobenzene	106-46-7	8.7	87
Dichlorodifluoromethane	75-71-8	10	100
1,1-Dichloroethane	75-34-3	9.3	93
1,2-Dichloroethane	107-06-2	10	100
1,1-Dichloroethene	75-35-4	10	100
1,2-Dichloroethene (cis)	156-59-2	10.0	100
1,2-Dichloroethene (trans)	156-60-5	10	100
1,2-Dichloropropane	78-87-5	8.7	87
1,3-Dichloropropene (cis)	10061-01-5	9.6	96
1,3-Dichloropropene (trans)	10061-02-6	9.8	98
1,2-Dichlorotetrafluoroethane	76-14-2	9.8	98
1,4-Dioxane	123-91-1	9.3	93
Ethylbenzene	100-41-4	9.0	90
n-Heptane	142-82-5	11	110

LCS recovery must be within 70-130% of the spiked value for all compounds except Acetone, Dioxane (1,4-), Hexachlorobutadiene, Naphthalene, and 1,2,4-Trichlorobenzene. These compounds must be within 40-160%.
*** Values outside of QC limits* Values outside of 70-130% QC limits**

Integrated Analytical Laboratories LLC

Laboratory Control Spike

Lab Sample Name: **10 PPBV LCS** **Data File:** **AA4273LCS**

Spike Amount: **10 ppbv, except m&p-Xylenes at 20 ppbv** **Date Analyzed:** **11/28/2017**

Runs with this LCS:

Standard/Sample Run	**Date/Time of Sample/Standard Injection**
BFB [AA4271BFB]	11/28/2017 8:37
10 PPBV DCVS [AA4272DCVS]	11/28/2017 9:29
10 PPBV LCS [AA4273LCS]	11/28/2017 10:09
METHOD BLANK [AA4274BLK]	11/28/2017 13:04
02 PPBV RLLCS [AA4275RLLCS]	11/28/2017 13:44
E17-09837-01 [AA4286]	11/28/2017 20:34
E17-09837-02 [AA4287]	11/28/2017 21:07
E17-09837-05 [AA4290]	11/28/2017 22:48
10 PPBV CCCVS [AA4292CCCVS]	11/28/2017 23:56

Compound	**CAS #**	**Calculated Amount (ppbv)**	**% Recovery**
1,3-Hexachlorobutadiene	87-68-3	9.2	92
n-Hexane	110-54-3	10	100
Methylene chloride	75-09-2	8.6	86
Methyl ethyl ketone	78-93-3	10	100
Methyl isobutyl ketone	108-10-1	11	110
Methyl tert-butyl ether	1634-04-4	9.8	98
Styrene	100-42-5	9.2	92
Tert-butyl alcohol	75-65-0	9.9	99
1,1,2,2-Tetrachloroethane	79-34-5	7.5	75
Tetrachloroethene	127-18-4	11	110
Toluene	108-88-3	9.7	97
1,2,4-Trichlorobenzene	120-82-1	9.3	93
1,1,1-Trichloroethane	71-55-6	9.7	97
1,1,2-Trichloroethane	79-00-5	9.4	94
Trichloroethene	79-01-6	10	100
Trichlorofluoromethane	75-69-4	9.9	99
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	9.1	91
1,2,4-Trimethylbenzene	95-63-6	9.6	96
1,3,5-Trimethylbenzene	108-67-8	9.3	93
2,2,4-Trimethylpentane	540-84-1	11	110
Vinyl bromide	593-60-2	11	110
Vinyl chloride	75-01-4	11	110
Xylenes (m&p)	179601-23-1	17	86
Xylenes (o)	95-47-6	8.7	87

LCS recovery must be within 70-130% of the spiked value for all compounds except Acetone, Dioxane (1,4-), Hexachlorobutadiene, Naphthalene, and 1,2,4-Trichlorobenzene. These compounds must be within 40-160%.

*** Values outside of QC limits* Values outside of 70-130% QC limits**

Data Path : C:\DATA\11-28-17\
Data File : aa4273lcs.D
Acq On : 28 Nov 2017 10:09 am
Operator : jls
Sample : 10 ppbv LCS
Misc : AAL073030
ALS Vial : 3 Sample Multiplier: 1

Quant Time: Nov 30 11:35:13 2017
Quant Method : C:\msdchem\1\METHODS\0912.M
Quant Title : TO-15 on the Agilent 7890A / 5975C
QLast Update : Tue Sep 12 13:00:02 2017
Response via : Initial Calibration

Compound	R.T.	QIon	Response	Conc	Units		Dev(Min)
Internal Standards							
1) Bromochloromethane (IS)	7.740	130	554286	10.00	ppbV		0.00
38) 1,4-Difluorobenzene (IS)	9.801	114	1924406	10.00	ppbV		0.00
55) d-5 Chlorobenzene (IS)	15.135	117	1969221	10.00	ppbV		0.00
System Monitoring Compounds							
64) Bromofluorobenzene (tu...	17.338	95	1523248	8.83	ppbV		0.00
Target Compounds							Qvalue
2) Propene	3.496	41	162371	11.75	ppbV		89
3) Dichlorodifluoromethane	3.560	85	2120837	10.25	ppbV		96
4) Chloromethane	3.708	52	53960	11.57	ppbV	#	1
5) 1,2-Dichlorotetrafluor...	3.769	85	1577341	9.78	ppbV		95
6) Vinyl chloride	3.888	62	335451	10.68	ppbV		82
7) 1,3-Butadiene	3.991	54	182997	10.50	ppbV	#	63
8) n-Butane	4.039	43	342375	11.90	ppbV		96
9) Bromomethane	4.239	94	404974	12.58	ppbV		97
10) Chloroethane	4.383	64	169336	10.23	ppbV		94
11) Ethanol	4.422	45	66769	10.28	ppbV	#	84
12) Vinyl bromide	4.682	106	574915	11.02	ppbV		94
13) Acrolein	4.743	56	95370	10.40	ppbV		93
14) Acetone	4.846	58	148083	10.80	ppbV	#	45
15) Trichlorofluoromethane	5.026	101	2706249	9.92	ppbV		99
16) Isopropanol	5.026	45	408237	11.02	ppbV		90
17) n-Pentane	5.332	43	377540	11.17	ppbV		92
18) 1,1-Dichloroethene	5.589	61	798701	10.36	ppbV		96
19) Methylene chloride	5.701	84	420773	8.56	ppbV		86
20) Tert-butyl alcohol	5.557	59	902436	9.89	ppbV		100
21) Allyl chloride	5.795	76	208834	9.70	ppbV		100
22) 1,1,2-Trichloro-1,2,2-...	5.930	101	1510851	9.14	ppbV		89
23) Carbon disulfide	5.984	76	1373728	9.26	ppbV		95
24) 1,2-Dichloroethene (tr...	6.554	61	632566	10.08	ppbV		99
25) 1,1-Dichloroethane	6.753	63	825906	9.34	ppbV		95
26) Methyl tert-butyl ether	6.775	73	1718693	9.83	ppbV		97
27) Methyl ethyl ketone	7.097	72	225702	10.37	ppbV		81
28) 1,2-Dichloroethene (cis)	7.566	61	619236	9.95	ppbV		99
29) Ethyl acetate	7.762	45	80184	11.04	ppbV		100
30) n-Hexane	7.791	57	465342	10.30	ppbV		93
31) Chloroform	7.869	83	1572955	9.35	ppbV		94
32) Tetrahydrofuran	8.254	42	254890	11.20	ppbV	#	79
33) 1,2-Dichloroethane	8.634	62	1085012	10.05	ppbV		98
34) 1,1,1-Trichloroethane	8.914	97	1979989	9.71	ppbV		99
35) Benzene	9.409	78	1579239	9.67	ppbV		94
36) Carbon tetrachloride	9.579	117	2487401	10.20	ppbV		99
37) Cyclohexane	9.724	84	645925	9.64	ppbV		87
39) 1,2-Dichloropropane	10.322	63	433987	8.73	ppbV		96
40) Bromodichloromethane	10.541	83	1700754	9.42	ppbV		93
41) 2,2,4-Trimethylpentane	10.647	57	1575843	11.15	ppbV		100
42) Trichloroethene	10.595	130	1050921	10.44	ppbV		97
43) 1,4-Dioxane	10.563	88	327830	9.29	ppbV		96
44) Methyl methacrylate	10.814	69	583664	9.58	ppbV		87
45) n-Heptane	10.952	71	507297	10.86	ppbV		89
46) cis-1,3-Dichloropropene	11.611	75	1053678	9.62	ppbV		97
47) Methyl isobutyl ketone	11.634	43	726570	10.62	ppbV		92
48) trans-1,3-Dichloropropene	12.248	75	1133500	9.80	ppbV	#	88
49) 1,1,2-Trichloroethane	12.457	97	830061	9.41	ppbV		92
50) Toluene	12.814	91	2135418	9.66	ppbV		99
51) Methyl n-butyl ketone	13.135	43	704579	10.61	ppbV		91

Data Path : C:\DATA\11-28-17\
Data File : aa4273lcs.D
Acq On : 28 Nov 2017 10:09 am
Operator : jls
Sample : 10 ppbv LCS
Misc : AAL073030
ALS Vial : 3 Sample Multiplier: 1

Quant Time: Nov 30 11:35:13 2017
Quant Method : C:\msdchem\1\METHODS\0912.M
Quant Title : TO-15 on the Agilent 7890A / 5975C
QLast Update : Tue Sep 12 13:00:02 2017
Response via : Initial Calibration

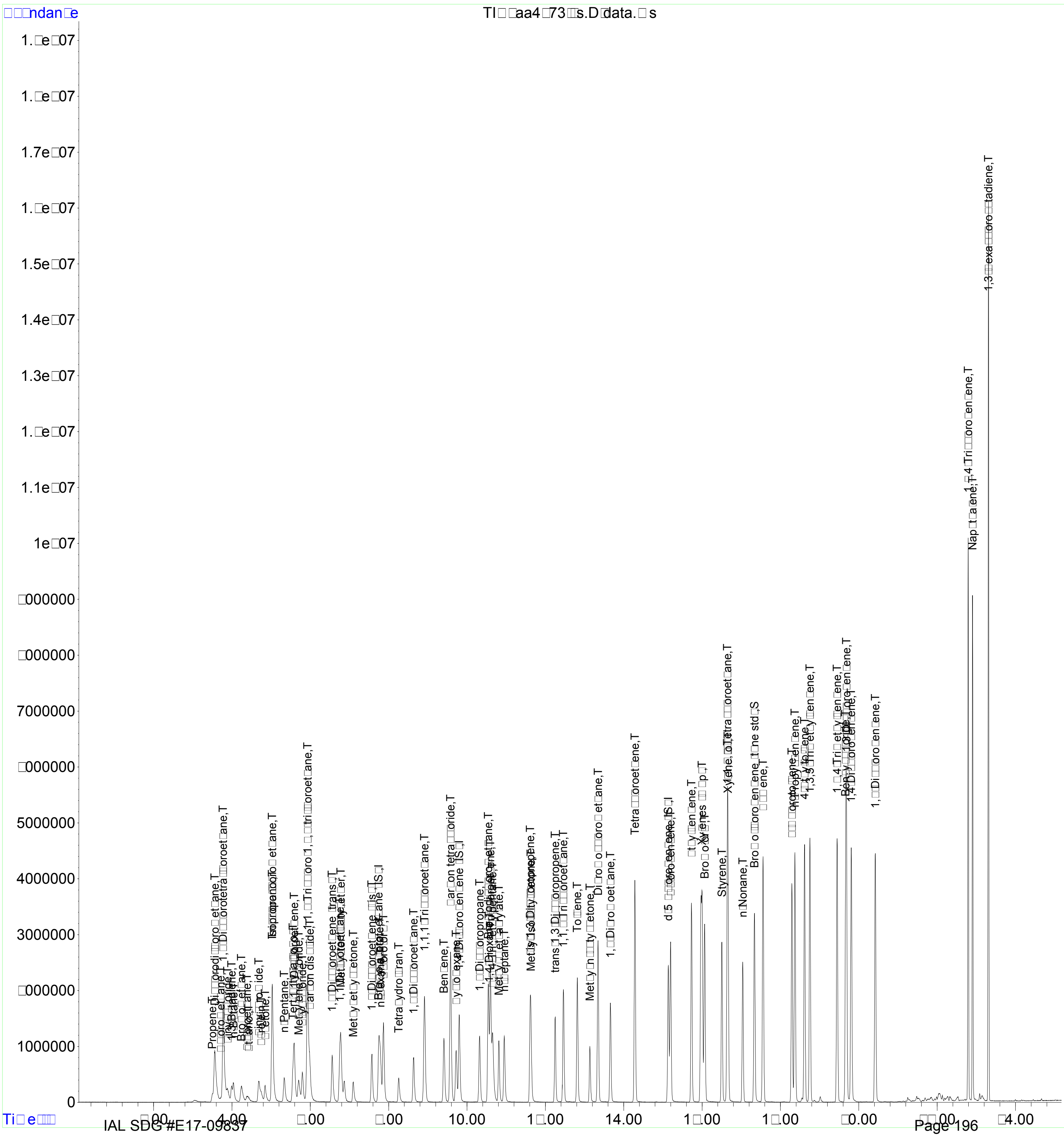
Compound	R.T.	QIon	Response	Conc Units	Dev(Min)
52) Dibromochloromethane	13.344	129	2149513	10.22 ppbV	99
53) 1,2-Dibromoethane	13.659	107	1448328	9.56 ppbV	93
54) Tetrachloroethene	14.283	166	1320234	10.52 ppbV	97
56) Chlorobenzene	15.196	112	2146422	8.46 ppbV	99
57) Ethylbenzene	15.730	91	3353728	8.97 ppbV	100
58) Xylenes (m&p)	15.997	91	5266917	17.20 ppbV	99
59) Bromoform	16.064	173	1885375	9.42 ppbV	97
60) Styrene	16.505	104	1894217	9.19 ppbV	100
61) Xylene (o)	16.662	91	2783075	8.68 ppbV	88
62) 1,1,2,2-Tetrachloroethane	16.643	83	1681055	7.49 ppbV	94
63) n-Nonane	17.039	57	832692	9.55 ppbV	99
65) Cumene	17.556	105	3927113	8.97 ppbV	92
66) 2-Chlorotoluene	18.289	91	2838461	8.61 ppbV #	84
67) n-Propyl benzene	18.370	120	1180916	9.38 ppbV	68
68) 4-Ethyltoluene	18.614	105	3899139	9.16 ppbV #	89
69) 1,3,5-Trimethylbenzene	18.752	105	3681063	9.27 ppbV #	86
70) 1,2,4-Trimethylbenzene	19.447	105	3686425	9.60 ppbV	99
71) Benzyl chloride	19.662	91	2930807	9.04 ppbV	94
72) 1,3-Dichlorobenzene	19.685	146	2526089	8.64 ppbV	99
73) 1,4-Dichlorobenzene	19.807	146	2591531	8.71 ppbV	98
74) 1,2-Dichlorobenzene	20.421	146	2493708	8.92 ppbV	99
75) 1,2,4-Trichlorobenzene	22.791	180	2404076	9.26 ppbV	99
76) Naphthalene	22.903	127	794028	9.94 ppbV	100
77) 1,3-Hexachlorobutadiene	23.308	225	1981223	9.21 ppbV	95

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Quantitation Report (QT Reviewed)

Data Path : C:\DATA\11-28-17\
Data File : aa4273lcs.D
Acq On : 28 Nov 2017 10:09 am
Operator : jls
Sample : 10 ppbv LCS
Misc : AAL073030
ALS Vial : 3 Sample Multiplier: 1

Quant Time: Nov 30 11:35:13 2017
Quant Method : C:\msdchem\1\METHODS\0912.M
Quant Title : TO-15 on the Agilent 7890A / 5975C
QLast Update : Tue Sep 12 13:00:02 2017
Response via : Initial Calibration



Integrated Analytical Laboratories LLC

Laboratory Control Spike

Lab Sample Name: **10 PPBV LCS** **Data File:** **AA4303LCS**

Spike Amount: **10 ppbv, except m&p-Xylenes at 20 ppbv** **Date Analyzed:** **11/29/2017**

Runs with this LCS:

Standard/Sample Run	Date/Time of Sample/Standard Injection
BFB [AA4301BFB]	11/29/2017 8:42
10 PPBV DCVS [AA4302DCVS]	11/29/2017 10:04
10 PPBV LCS [AA4303LCS]	11/29/2017 10:45
METHOD BLANK [AA4304BLK]	11/29/2017 11:19
02 PPBV RLLCS [AA4305RLLCS]	11/29/2017 11:59
3059 [AA4306]	11/29/2017 14:35
E17-09837-01 [AA4307]	11/29/2017 15:08
E17-09837-02 [AA4308]	11/29/2017 15:55
E17-09837-03 [AA4309]	11/29/2017 16:29
E17-09837-04 [AA4310]	11/29/2017 17:03
10 PPBV CCCVS [AA4319CCCVS]	11/29/2017 22:05

Compound	CAS #	Calculated Amount (ppbv)	% Recovery
Acetone	67-64-1	9.3	93
Benzene	71-43-2	9.5	95
Bromodichloromethane	75-27-4	11	110
Bromoform	75-25-2	12	120
Bromomethane	74-83-9	12	120
1,3-Butadiene	106-99-0	8.9	89
Chlorobenzene	108-90-7	9.5	95
Chloroethane	75-00-3	9.2	92
Chloroform	67-66-3	10	100
Chloromethane	74-87-3	10	100
Carbon disulfide	75-15-0	8.9	89
Carbon tetrachloride	56-23-5	12	120
Cyclohexane	110-82-7	9.4	94
Dibromochloromethane	124-48-1	12	120
1,2-Dibromoethane	106-93-4	11	110
1,2-Dichlorobenzene	95-50-1	10	100
1,3-Dichlorobenzene	541-73-1	10	100
1,4-Dichlorobenzene	106-46-7	10	100
Dichlorodifluoromethane	75-71-8	12	120
1,1-Dichloroethane	75-34-3	9.1	91
1,2-Dichloroethane	107-06-2	11	110
1,1-Dichloroethene	75-35-4	11	110
1,2-Dichloroethene (cis)	156-59-2	9.7	97
1,2-Dichloroethene (trans)	156-60-5	9.7	97
1,2-Dichloropropane	78-87-5	9.0	90
1,3-Dichloropropene (cis)	10061-01-5	10	100
1,3-Dichloropropene (trans)	10061-02-6	11	110
1,2-Dichlorotetrafluoroethane	76-14-2	10	100
1,4-Dioxane	123-91-1	9.5	95

LCS recovery must be within 70-130% of the spiked value for all compounds except Acetone, Dioxane (1,4-), Hexachlorobutadiene, Naphthalene, and 1,2,4-Trichlorobenzene. These compounds must be within 40-160%.

*** Values outside of QC limits* Values outside of 70-130% QC limits**

IAL Integrated Analytical Laboratories LLC

Laboratory Control Spike

Lab Sample Name:	**10 PPBV LCS**	**Data File:**	**AA4303LCS**
Spike Amount:	**10 ppbv, except m&p-Xylenes at 20 ppbv**	**Date Analyzed:**	**11/29/2017**

Runs with this LCS:

Standard/Sample Run	Date/Time of Sample/Standard Injection
BFB [AA4301BFB]	11/29/2017 8:42
10 PPBV DCVS [AA4302DCVS]	11/29/2017 10:04
10 PPBV LCS [AA4303LCS]	11/29/2017 10:45
METHOD BLANK [AA4304BLK]	11/29/2017 11:19
02 PPBV RLLCS [AA4305RLLCS]	11/29/2017 11:59
3059 [AA4306]	11/29/2017 14:35
E17-09837-01 [AA4307]	11/29/2017 15:08
E17-09837-02 [AA4308]	11/29/2017 15:55
E17-09837-03 [AA4309]	11/29/2017 16:29
E17-09837-04 [AA4310]	11/29/2017 17:03
10 PPBV CCCVS [AA4319CCCVS]	11/29/2017 22:05

Compound	CAS #	Calculated Amount (ppbv)	% Recovery
Ethylbenzene	100-41-4	9.9	99
n-Heptane	142-82-5	11	110
1,3-Hexachlorobutadiene	87-68-3	11	110
n-Hexane	110-54-3	9.5	95
Methylene chloride	75-09-2	8.1	81
Methyl ethyl ketone	78-93-3	10	100
Methyl isobutyl ketone	108-10-1	11	110
Methyl tert-butyl ether	1634-04-4	9.8	98
Styrene	100-42-5	11	110
Tert-butyl alcohol	75-65-0	9.7	97
1,1,2,2-Tetrachloroethane	79-34-5	9.0	90
Tetrachloroethene	127-18-4	12	120
Toluene	108-88-3	10	100
1,2,4-Trichlorobenzene	120-82-1	10	100
1,1,1-Trichloroethane	71-55-6	11	110
1,1,2-Trichloroethane	79-00-5	10	100
Trichloroethene	79-01-6	11	110
Trichlorofluoromethane	75-69-4	11	110
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	9.6	96
1,2,4-Trimethylbenzene	95-63-6	11	110
1,3,5-Trimethylbenzene	108-67-8	11	110
2,2,4-Trimethylpentane	540-84-1	11	110
Vinyl bromide	593-60-2	11	110
Vinyl chloride	75-01-4	9.6	96
Xylenes (m&p)	179601-23-1	21	100
Xylenes (o)	95-47-6	10	100

LCS recovery must be within 70-130% of the spiked value for all compounds except Acetone, Dioxane (1,4-), Hexachlorobutadiene, Naphthalene, and 1,2,4-Trichlorobenzene. These compounds must be within 40-160%.
*** Values outside of QC limits* Values outside of 70-130% QC limits**

Data Path : C:\DATA\11-29-17\
Data File : aa4303lcs.D
Acq On : 29 Nov 2017 10:45 am
Operator : jls
Sample : 10 ppbv LCS
Misc : AAL073030
ALS Vial : 3 Sample Multiplier: 1

Quant Time: Dec 04 10:34:13 2017
Quant Method : C:\msdchem\1\METHODS\0912.M
Quant Title : TO-15 on the Agilent 7890A / 5975C
QLast Update : Tue Sep 12 13:00:02 2017
Response via : Initial Calibration

Compound	R.T.	QIon	Response	Conc Units		Dev(Min)
Internal Standards						
1) Bromochloromethane (IS)	7.743	130	586373	10.00 ppbV		0.00
38) 1,4-Difluorobenzene (IS)	9.801	114	1943560	10.00 ppbV		0.00
55) d-5 Chlorobenzene (IS)	15.135	117	2047984	10.00 ppbV		0.00
System Monitoring Compounds						
64) Bromofluorobenzene (tu...	17.338	95	1814847	10.12 ppbV		0.00
Target Compounds						Qvalue
2) Propene	3.496	41	157593	10.78 ppbV		83
3) Dichlorodifluoromethane	3.567	85	2584458	11.81 ppbV		96
4) Chloromethane	3.711	52	49886	10.11 ppbV	#	49
5) 1,2-Dichlorotetrafluor...	3.776	85	1721452	10.08 ppbV		94
6) Vinyl chloride	3.891	62	317607	9.56 ppbV		83
7) 1,3-Butadiene	3.994	54	163764	8.89 ppbV	#	39
8) n-Butane	4.033	43	300415	9.87 ppbV		88
9) Bromomethane	4.242	94	408128	11.99 ppbV		99
10) Chloroethane	4.380	64	161203	9.21 ppbV		98
11) Ethanol	4.422	45	59233	8.62 ppbV	#	66
12) Vinyl bromide	4.689	106	593389	10.76 ppbV		94
13) Acrolein	4.750	56	85661	8.83 ppbV		99
14) Acetone	4.846	58	135181	9.32 ppbV	#	25
15) Trichlorofluoromethane	5.030	101	3255900	11.28 ppbV		99
16) Isopropanol	5.026	45	400990	10.24 ppbV		94
17) n-Pentane	5.335	43	336307	9.40 ppbV		96
18) 1,1-Dichloroethene	5.586	61	870819	10.68 ppbV		94
19) Methylene chloride	5.702	84	423605	8.14 ppbV	#	80
20) Tert-butyl alcohol	5.560	59	939028	9.73 ppbV		100
21) Allyl chloride	5.798	76	211315	9.28 ppbV		100
22) 1,1,2-Trichloro-1,2,2-...	5.930	101	1679547	9.60 ppbV		89
23) Carbon disulfide	5.988	76	1388517	8.85 ppbV	#	86
24) 1,2-Dichloroethene (tr...	6.557	61	646350	9.74 ppbV		98
25) 1,1-Dichloroethane	6.753	63	850333	9.09 ppbV		94
26) Methyl tert-butyl ether	6.782	73	1815931	9.81 ppbV		98
27) Methyl ethyl ketone	7.094	72	234582	10.19 ppbV		93
28) 1,2-Dichloroethene (cis)	7.570	61	641385	9.74 ppbV		98
29) Ethyl acetate	7.756	45	78063	10.16 ppbV		100
30) n-Hexane	7.792	57	451937	9.46 ppbV		87
31) Chloroform	7.866	83	1799762	10.11 ppbV		95
32) Tetrahydrofuran	8.258	42	241684	10.04 ppbV	#	73
33) 1,2-Dichloroethane	8.634	62	1260254	11.03 ppbV		99
34) 1,1,1-Trichloroethane	8.914	97	2340537	10.85 ppbV		99
35) Benzene	9.412	78	1632037	9.45 ppbV	#	93
36) Carbon tetrachloride	9.579	117	3082716	11.95 ppbV		99
37) Cyclohexane	9.727	84	669016	9.44 ppbV		93
39) 1,2-Dichloropropane	10.322	63	449675	8.96 ppbV		96
40) Bromodichloromethane	10.544	83	2017557	11.07 ppbV		96
41) 2,2,4-Trimethylpentane	10.653	57	1552155	10.87 ppbV		98
42) Trichloroethene	10.595	130	1168237	11.49 ppbV		99
43) 1,4-Dioxane	10.563	88	336916	9.45 ppbV		96
44) Methyl methacrylate	10.811	69	609690	9.91 ppbV		89
45) n-Heptane	10.952	71	520303	11.03 ppbV		96
46) cis-1,3-Dichloropropene	11.611	75	1142633	10.33 ppbV		97
47) Methyl isobutyl ketone	11.634	43	754372	10.91 ppbV		90
48) trans-1,3-Dichloropropene	12.248	75	1245909	10.66 ppbV	#	83
49) 1,1,2-Trichloroethane	12.460	97	904366	10.15 ppbV		92
50) Toluene	12.817	91	2300990	10.31 ppbV		100
51) Methyl n-butyl ketone	13.139	43	735341	10.97 ppbV		89

Data Path : C:\DATA\11-29-17\
Data File : aa4303lcs.D
Acq On : 29 Nov 2017 10:45 am
Operator : jls
Sample : 10 ppbv LCS
Misc : AAL073030
ALS Vial : 3 Sample Multiplier: 1

Quant Time: Dec 04 10:34:13 2017
Quant Method : C:\msdchem\1\METHODS\0912.M
Quant Title : TO-15 on the Agilent 7890A / 5975C
QLast Update : Tue Sep 12 13:00:02 2017
Response via : Initial Calibration

Compound	R.T.	QIon	Response	Conc Units	Dev(Min)
52) Dibromochloromethane	13.344	129	2558584	12.05 ppbV	100
53) 1,2-Dibromoethane	13.663	107	1633141	10.68 ppbV	93
54) Tetrachloroethene	14.287	166	1528758	12.06 ppbV	98
56) Chlorobenzene	15.196	112	2517090	9.53 ppbV	100
57) Ethylbenzene	15.730	91	3846289	9.89 ppbV	99
58) Xylenes (m&p)	16.000	91	6570137	20.63 ppbV	99
59) Bromoform	16.065	173	2430509	11.67 ppbV	97
60) Styrene	16.505	104	2324367	10.84 ppbV	100
61) Xylene (o)	16.659	91	3448473	10.35 ppbV #	87
62) 1,1,2,2-Tetrachloroethane	16.647	83	2094442	8.97 ppbV	94
63) n-Nonane	17.039	57	960106	10.59 ppbV	99
65) Cumene	17.556	105	4890998	10.74 ppbV	91
66) 2-Chlorotoluene	18.293	91	3458555	10.09 ppbV #	83
67) n-Propyl benzene	18.367	120	1505558	11.50 ppbV	66
68) 4-Ethyltoluene	18.618	105	4932392	11.14 ppbV #	87
69) 1,3,5-Trimethylbenzene	18.753	105	4707551	11.40 ppbV #	85
70) 1,2,4-Trimethylbenzene	19.447	105	4448595	11.14 ppbV	100
71) Benzyl chloride	19.666	91	3489451	10.35 ppbV	94
72) 1,3-Dichlorobenzene	19.685	146	3086301	10.15 ppbV	98
73) 1,4-Dichlorobenzene	19.810	146	3137651	10.15 ppbV	98
74) 1,2-Dichlorobenzene	20.421	146	2960655	10.18 ppbV	99
75) 1,2,4-Trichlorobenzene	22.794	180	2832483	10.49 ppbV	100
76) Naphthalene	22.907	127	956285	11.51 ppbV	100
77) 1,3-Hexachlorobutadiene	23.315	225	2370715	10.59 ppbV	96

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Quantitation Report (QT Reviewed)

```
Data Path : C:\DATA\11-29-17\
Data File : aa4303lcs.D
Acq On    : 29 Nov 2017  10:45 am
Operator  : jls
Sample    : 10 ppbv LCS
Misc      : AAL073030
ALS Vial  : 3   Sample Multiplier: 1

Quant Time: Dec 04 10:34:13 2017
Quant Method : C:\msdchem\1\METHODS\0912.M
Quant Title  : TO-15 on the Agilent 7890A / 5975C
QLast Update : Tue Sep 12 13:00:02 2017
Response via : Initial Calibration
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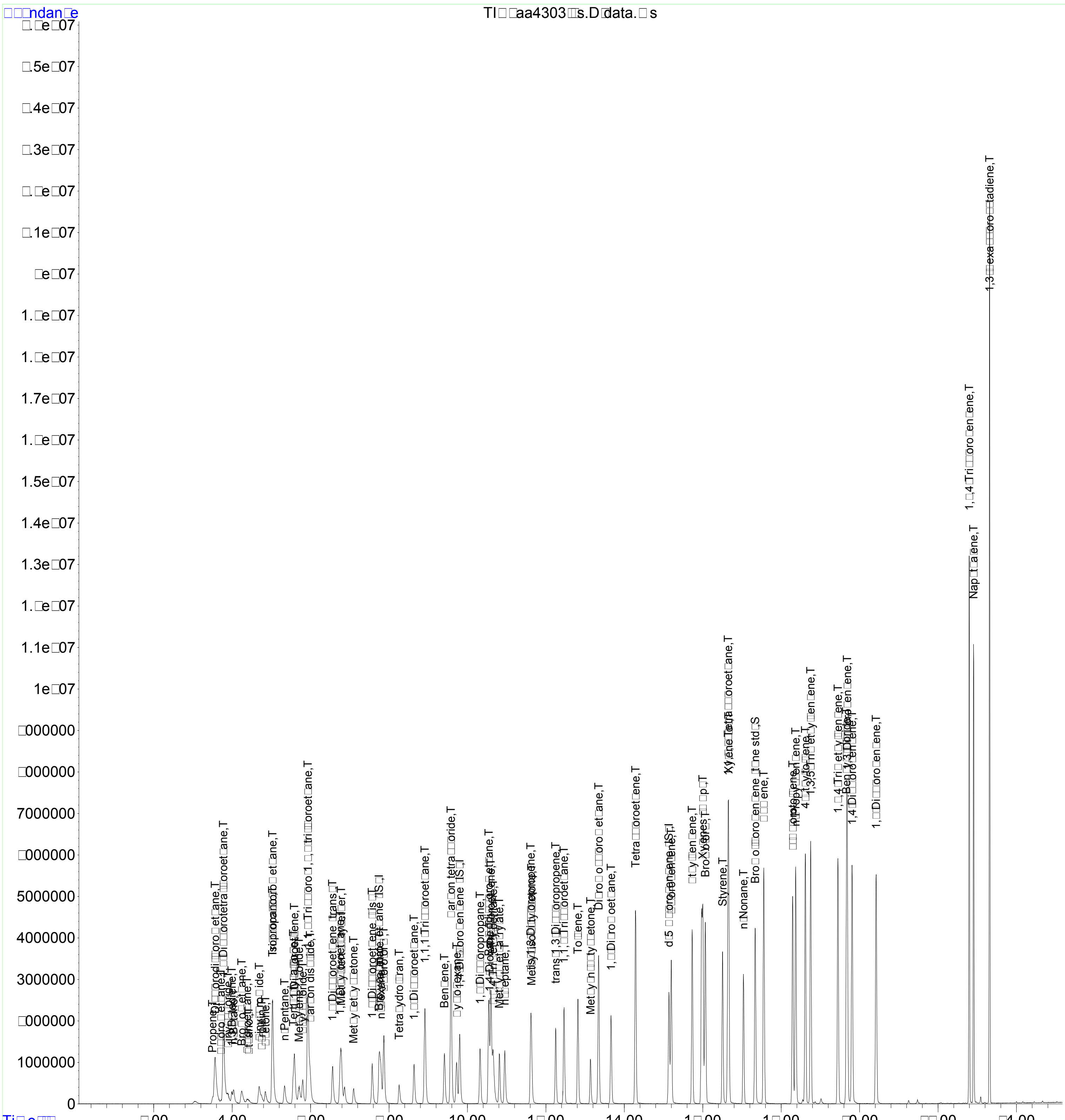


Integrated Analytical Laboratories, LLC

Volatile Organic Compounds by EPA Method TO-15

Laboratory Sample Duplicate Report

		Date Re□ei□ed□	10□4□17
SD□ N□□ □er□	□17□0□□4□	Date □na□y□ed□	10□4□17,10□4□17
I□L Sa□p□e ID□	□17□0□□4□01	La□ Data □i□e□□□	□3711,□□371□
Matrix□	□ir	Di□□tion □a□tor□	1
S□□ □a ID□	4□5□	In□e□tion □o□□□e□	500□ □
		□ □MS □o□□ n□	RTX□1, 0.3□ □ □ID

Compound	CAS #	Sa□p□e E17-08248-01 Concentration Reported ppbv	Q	Sa□p□e D□p E17-08248-21 Concentration Reported ppbv	Q	Reporting Limits ppbv	RPD
□□etone	□7□4□1	**8.8**		**8.5**		0.40	**3.47%**
□□y□□□oride	107□05□1	0.40	□	0.40	□	0.40	0.00□
Ben□ene	71□43□□	0.40	□	0.40	□	0.40	0.00□
Bro□odi□□oro□et□ane	75□□7□4	0.40	□	0.40	□	0.40	0.00□
Bro□o□or□	75□□5□□	0.40	□	0.40	□	0.40	0.00□
Bro□o□et□ane	74□□3□□	0.40	□	0.40	□	0.40	0.00□
1,3□B□tadiene	10□□□□□0	0.40	□	0.40	□	0.40	0.00□
□□oro□en□ene	10□□□0□7	0.40	□	0.40	□	0.40	0.00□
□□oroet□ane	75□00□3	0.40	□	0.40	□	0.40	0.00□
□□oro□or□	□7□□□3	0.40	□	0.40	□	0.40	0.00□
□□oro□et□ane	74□□7□3	0.40	□	0.40	□	0.40	0.00□
□ar□on dis□□ide	75□15□0	0.40	□	0.40	□	0.40	0.00□
□ar□on tetra□□oride	5□□□3□5	0.40	□	0.40	□	0.40	0.00□
□□□□oroto□□ene	□5□4□□□	0.40	□	0.40	□	0.40	0.00□
□y□□o□exane	110□□□7	0.40	□	0.40	□	0.40	0.00□
Di□ro□o□□oro□et□ane	1□4□4□□1	0.40	□	0.40	□	0.40	0.00□
1,□Di□ro□oet□ane	10□□□3□4	0.40	□	0.40	□	0.40	0.00□
1,□Di□□oro□en□ene	□5□50□1	0.40	□	0.40	□	0.40	0.00□
1,3□Di□□oro□en□ene	541□73□1	0.40	□	0.40	□	0.40	0.00□
1,4□Di□□oro□en□ene	10□□4□□7	0.40	□	0.40	□	0.40	0.00□
Di□□orodi□□oro□et□ane	75□71□□	0.40	□	0.40	□	0.40	0.00□
1,1□Di□□oroet□ane	75□34□3	0.40	□	0.40	□	0.40	0.00□
1,□Di□□oroet□ane	107□0□□□	0.40	□	0.40	□	0.40	0.00□
1,1□Di□□oroet□ene	75□35□4	0.40	□	0.40	□	0.40	0.00□
1,□Di□□oroet□ene □□is□	15□□5□□□	0.40	□	0.40	□	0.40	0.00□
1,□Di□□oroet□ene □trans□	15□□□0□5	0.40	□	0.40	□	0.40	0.00□
1,□Di□□oropropane	7□□□7□5	0.40	□	0.40	□	0.40	0.00□
1,3□Di□□oropropene □□is□	100□1□01□5	0.40	□	0.40	□	0.40	0.00□
1,3□Di□□oropropene □trans□	100□1□0□□□	0.40	□	0.40	□	0.40	0.00□
1,□Di□□orotetra□□oroet□ane	7□□14□□	0.40	□	0.40	□	0.40	0.00□
□t□y□□en□ene	100□41□4	0.40	□	0.40	□	0.40	0.00□
4□□t□y□to□□ene	□□□□□□□□	0.40	□	0.40	□	0.40	0.00□
n□□eptane	14□□□□□5	0.40	□	0.40	□	0.40	0.00□
1,3□□exa□□oro□□tadiene	□7□□□3	0.40	□	0.40	□	0.40	0.00□
n□□exane	110□54□3	**0.42**		0.40	□	0.40	**NC**
Met□y□ene □□oride	75□0□□□	**1.5**		**1.4**		0.40	**6.90%**
Met□y□et□y□□etone	7□□□3□3	**0.76**		**0.71**		0.40	**6.80%**
Met□y□iso□□ty□□etone	10□□10□1	0.40	□	0.40	□	0.40	0.00□

□□a□i□r□
□□□on□entration ex□eeds □pper □e□e□o□□a□i□ration ran□e □or instr□□ent.
D□□xtra di□□tion re□□ired □or t□is □o□po□nd. J□D□p□i□ate sa□p□es do not □et RPD □riteria.
□□□o□po□nd ND or □nder reportin□ □i□it.

Integrated Analytical Laboratories, LLC

Volatile Organic Compounds by EPA Method TO-15

Laboratory Sample Duplicate Report

Date Received: 10/24/17

SDG Number: E17-08248 — Date Analyzed: 10/24/17,10/24/17

IAL Sample ID: E17-08248-01 — Lab Data File: [illegible]3711, [illegible]371[illegible]

Matrix: Air — Dilution Factor: 1

Summa ID: 4[illegible]5[illegible] — Injection Volume: 500 mL

GC/MS Column: RTX-1, 0.32 mm ID

Compound	CAS #	Sample E17-08248-01 Concentration Reported ppbv	Q	Sample Dup E17-08248-21 Concentration Reported ppbv	Q	Reporting Limits ppbv	RPD
Methyl tert-butyl ether	1634-04-4	0.40	U	0.40	U	0.40	0.00%
Styrene	100-42-5	0.40	U	0.40	U	0.40	0.00%
Tertiary butyl alcohol	75-65-0	0.40	U	0.40	U	0.40	0.00%
1,1,2,2-Tetrachloroethane	79-34-5	0.40	U	0.40	U	0.40	0.00%
Tetrachloroethene	127-18-4	0.40	U	0.40	U	0.40	0.00%
Toluene	108-88-3	**1.3**		**1.2**		0.40	**8.00%**
1,2,4-Trichlorobenzene	120-82-1	0.40	U	0.40	U	0.40	0.00%
1,1,1-Trichloroethane	71-55-6	0.40	U	0.40	U	0.40	0.00%
1,1,2-Trichloroethane	79-00-5	0.40	U	0.40	U	0.40	0.00%
Trichloroethene	79-01-6	0.40	U	0.40	U	0.40	0.00%
Trichlorofluoromethane	75-69-4	0.40	U	0.40	U	0.40	0.00%
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	0.40	U	0.40	U	0.40	0.00%
1,2,4-Trimethylbenzene	95-63-6	0.40	U	0.40	U	0.40	0.00%
1,3,5-Trimethylbenzene	108-67-8	0.40	U	0.40	U	0.40	0.00%
2,2,4-Trimethylpentane	540-84-1	0.40	U	0.40	U	0.40	0.00%
Vinyl bromide	593-60-2	0.40	U	0.40	U	0.40	0.00%
Vinyl chloride	75-01-4	0.40	U	0.40	U	0.40	0.00%
Xylenes (m&p)	179601-23-1	0.40	U	0.40	U	0.40	0.00%
Xylenes (o)	95-47-6	0.40	U	0.40	U	0.40	0.00%

RPD must be <25% for all laboratory duplicate samples. Laboratory duplicate samples are run once daily.

NC = The RPD could not be calculated since the compound was only detected in either the parent or duplicate sample.

Qualifiers:
E = Concentration exceeds upper level of calibration range for instrument.
D = Extra dilution required for this compound. J = Duplicate samples do not meet RPD criteria.
U = Compound ND or under reporting limit.

Data Path : C:\DATA\10-04-17\
Data File : aa3711.D
Acq On : 4 Oct 2017 3:12 pm
Operator : jls
Sample : E17-08248-01
Misc : 4859, 500cc
ALS Vial : 11 Sample Multiplier: 1

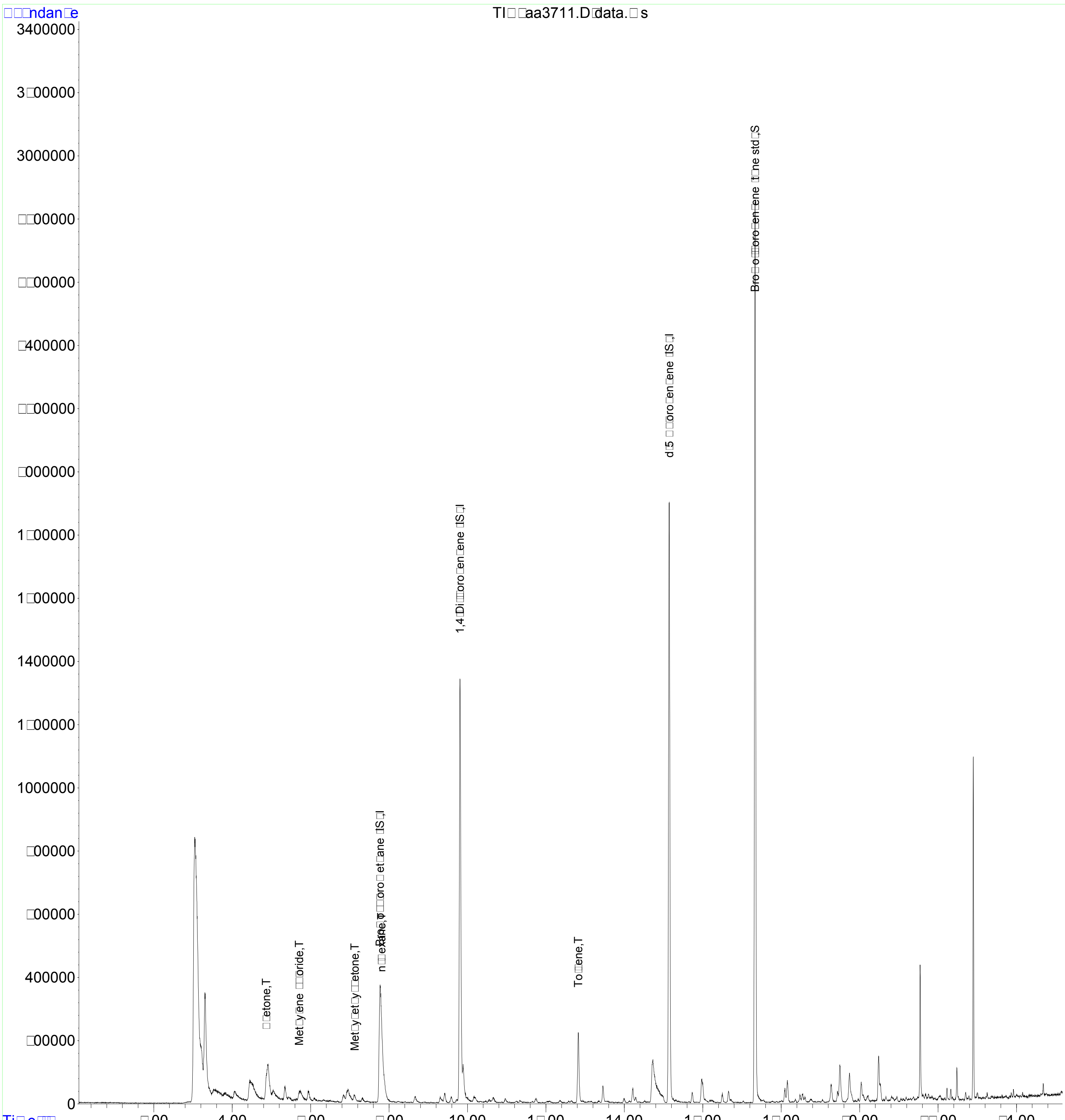
Quant Time: Oct 05 09:10:54 2017
Quant Method : C:\msdchem\1\METHODS\0912.M
Quant Title : TO-15 on the Agilent 7890A / 5975C
QLast Update : Tue Sep 12 13:00:02 2017
Response via : Initial Calibration

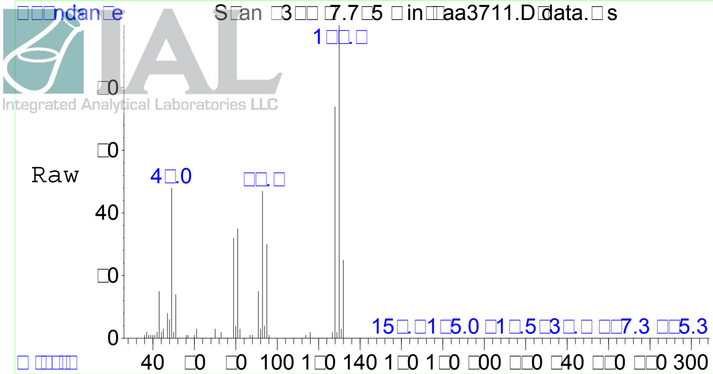
Compound	R.T.	QIon	Response	Conc Units	Dev(Min)
Internal Standards					
1) Bromochloromethane (IS)	7.765	130	403835	10.00 ppbV	0.02
38) 1,4-Difluorobenzene (IS)	9.807	114	1598651	10.00 ppbV	0.00
55) d-5 Chlorobenzene (IS)	15.145	117	1484107	10.00 ppbV	0.00
System Monitoring Compounds					
64) Bromofluorobenzene (tu...	17.334	95	1276249	9.82 ppbV	0.00
Target Compounds					Qvalue
14) Acetone	4.868	58	87665	8.77 ppbV #	60
19) Methylene chloride	5.711	84	52875	1.48 ppbV #	29
27) Methyl ethyl ketone	7.129	72	12093	0.76 ppbV	83
30) n-Hexane	7.807	57	13953	0.42 ppbV #	75
50) Toluene	12.826	91	231658	1.26 ppbV	94

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Data Path : C:\DATA\10-04-17\
Data File : aa3711.D
Acq On : 4 Oct 2017 3:12 pm
Operator : jls
Sample : E17-08248-01
Misc : 4859, 500cc
ALS Vial : 11 Sample Multiplier: 1

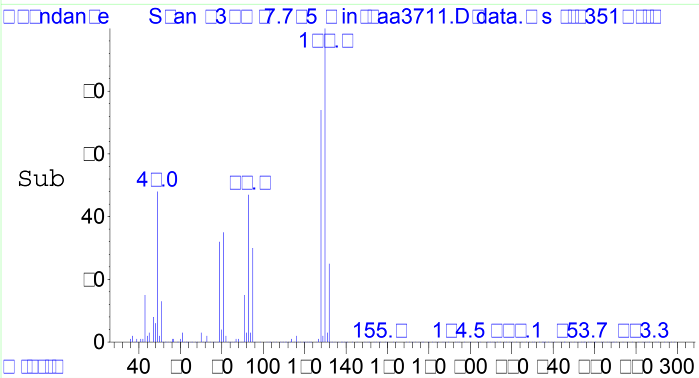
Quant Time: Oct 05 09:10:54 2017
Quant Method : C:\msdchem\1\METHODS\0912.M
Quant Title : TO-15 on the Agilent 7890A / 5975C
QLast Update : Tue Sep 12 13:00:02 2017
Response via : Initial Calibration

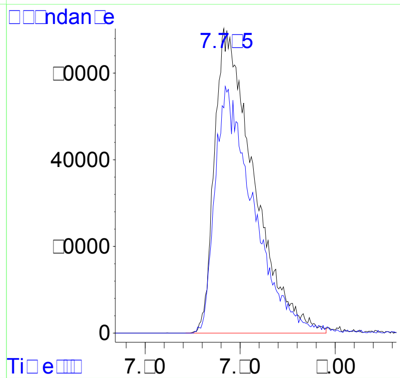


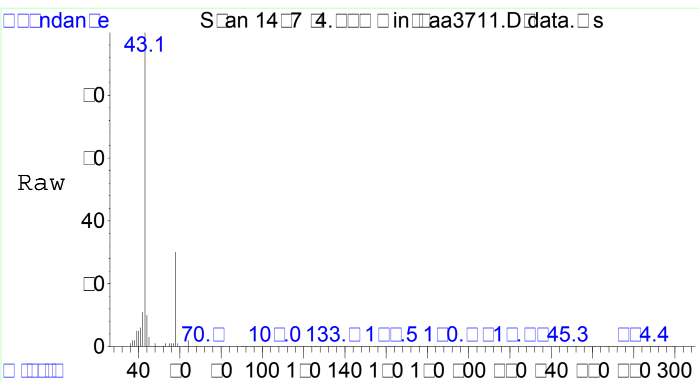


#1
Bromochloromethane (IS)
Concen: 10.00 ppbV
RT: 7.765 min   Scan# 2388
Delta R.T.   0.018 min
Lab File: aa3711.D
Acq: 4 Oct 2017   3:12 pm

Tgt Ion:130 Resp: 403835
Ion   Ratio Lower   Upper
130   100
128   79.2   62.6   94.0

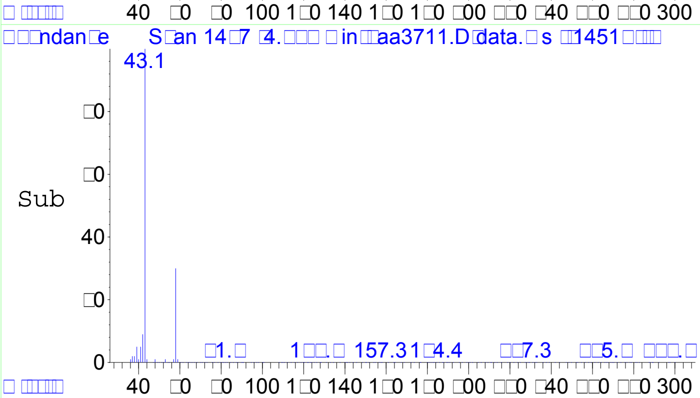


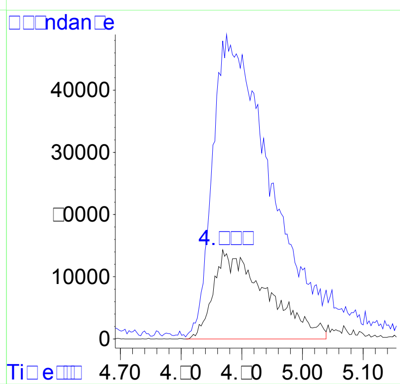


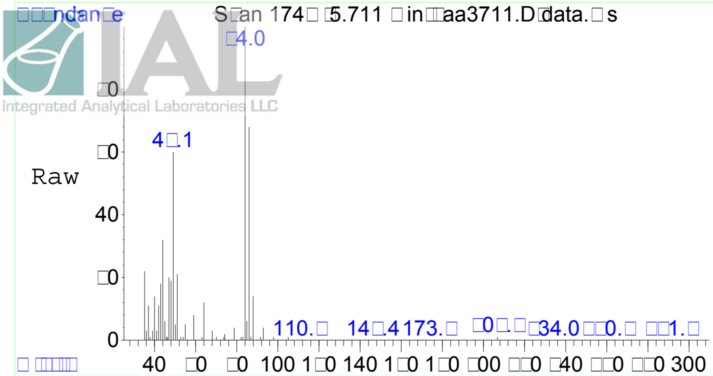


#14
Acetone
Concen: 8.77 ppbV
RT: 4.868 min   Scan# 1487
Delta R.T.   0.016 min
Lab File: aa3711.D
Acq: 4 Oct 2017   3:12 pm

Tgt Ion: 58 Resp: 87665
Ion   Ratio Lower   Upper
 58   100
 43   363.7   229.6   344.4#



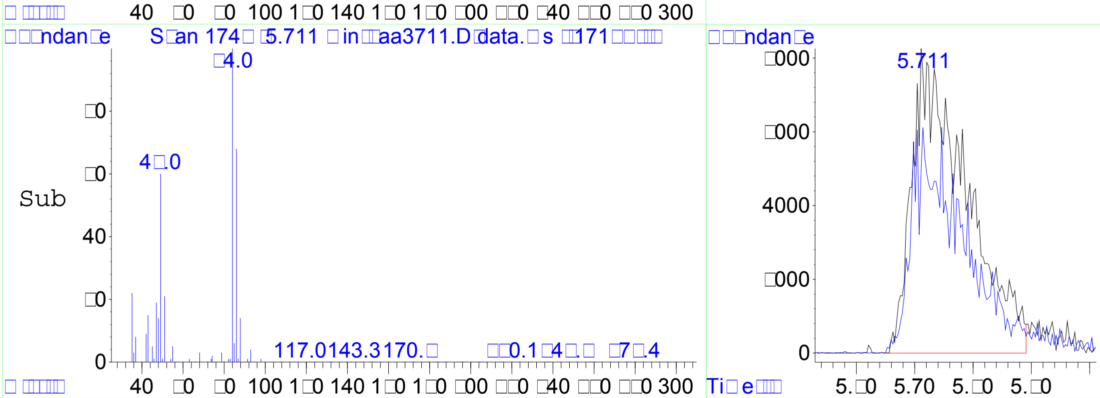


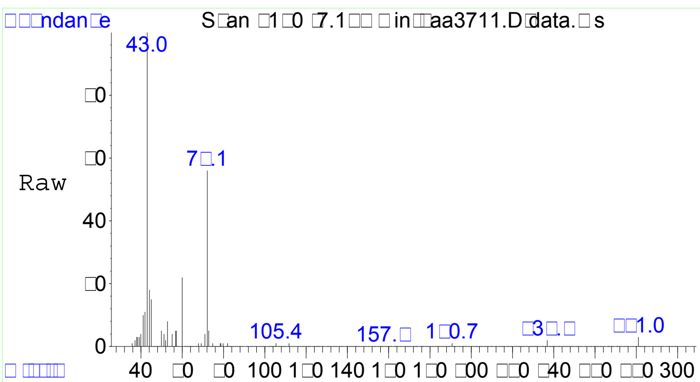


#19
Methylene chloride
Concen: 1.48 ppbV
RT: 5.711 min Scan# 1749
Delta R.T. 0.006 min
Lab File: aa3711.D
Acq: 4 Oct 2017 3:12 pm

Tgt Ion: 84 Resp: 52875

Ion	Ratio	Lower	Upper
84	100		
49	13.2	57.6	86.4#

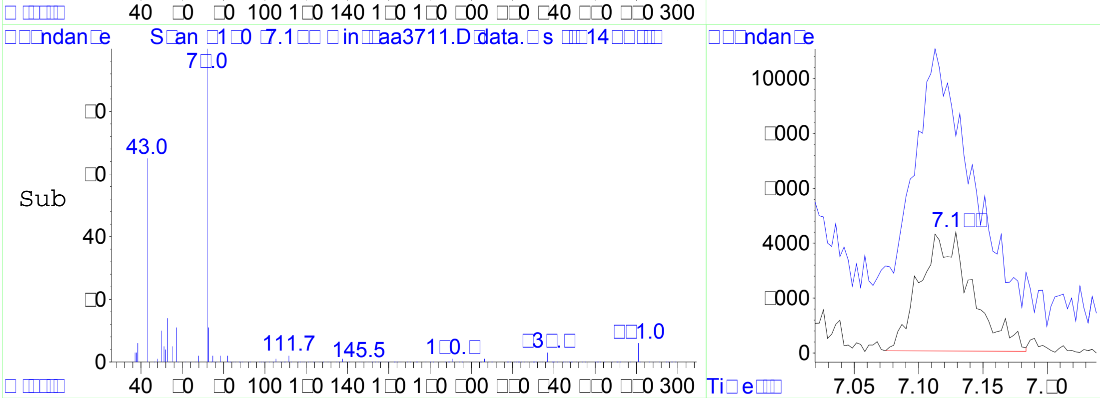


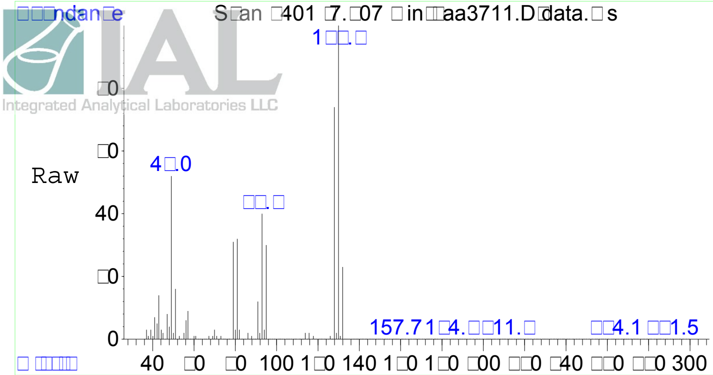


#27
Methyl ethyl ketone
Concen: 0.76 ppbV
RT: 7.129 min Scan# 2190
Delta R.T. 0.035 min
Lab File: aa3711.D
Acq: 4 Oct 2017 3:12 pm

Tgt Ion: 72 Resp: 12093

Ion	Ratio	Lower	Upper
72	100		
43	236.5	168.0	252.0

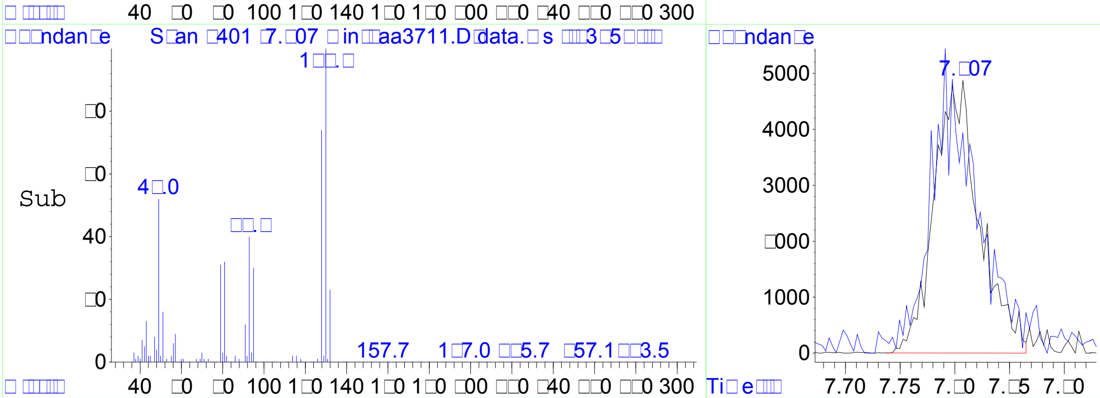


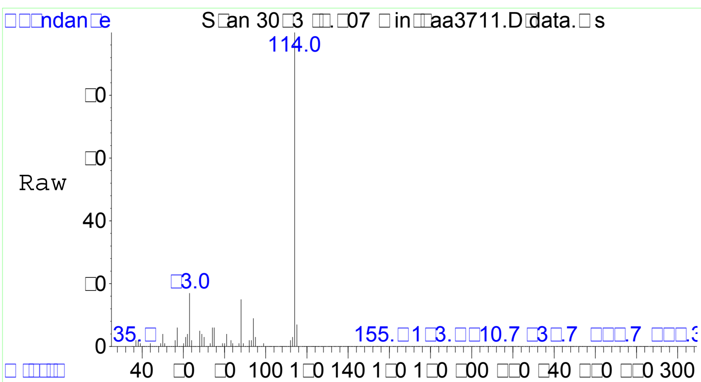


#30
n-Hexane
Concen: 0.42 ppbV
RT: 7.807 min Scan# 2401
Delta R.T. 0.016 min
Lab File: aa3711.D
Acq: 4 Oct 2017 3:12 pm

Tgt Ion: 57 Resp: 13953

Ion	Ratio	Lower	Upper
57	100		
41	103.6	64.8	97.2#

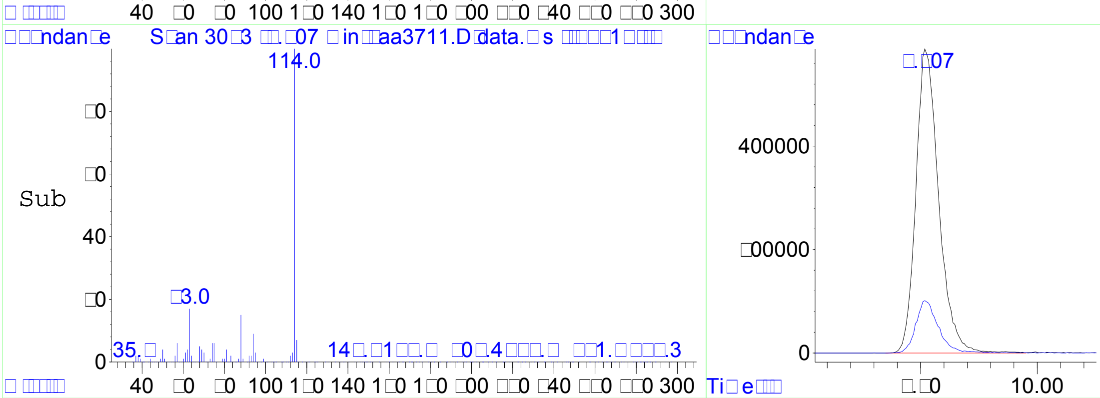


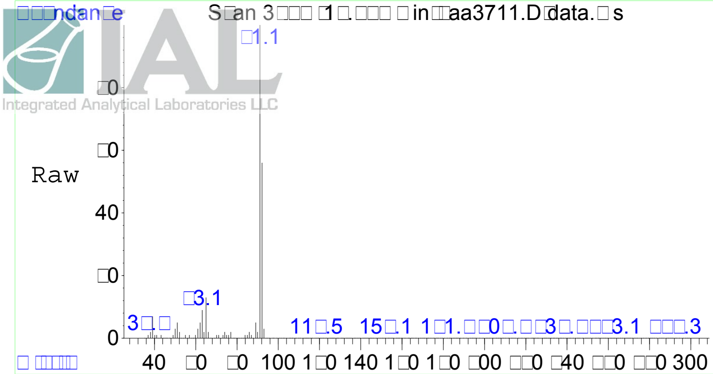


#38
1,4-Difluorobenzene (IS)
Concen: 10.00 ppbV
RT: 9.807 min Scan# 3023
Delta R.T. 0.003 min
Lab File: aa3711.D
Acq: 4 Oct 2017 3:12 pm

Tgt Ion:114 Resp: 1598651

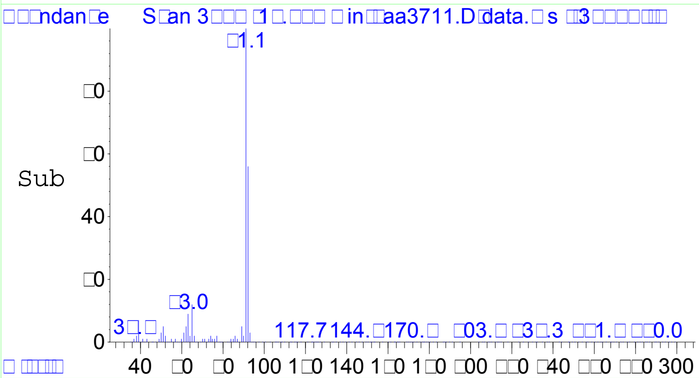
Ion	Ratio	Lower	Upper
114	100		
63	17.0	14.4	21.6

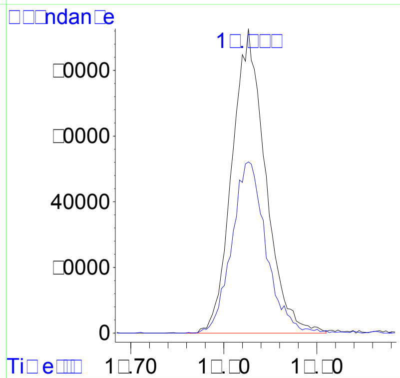


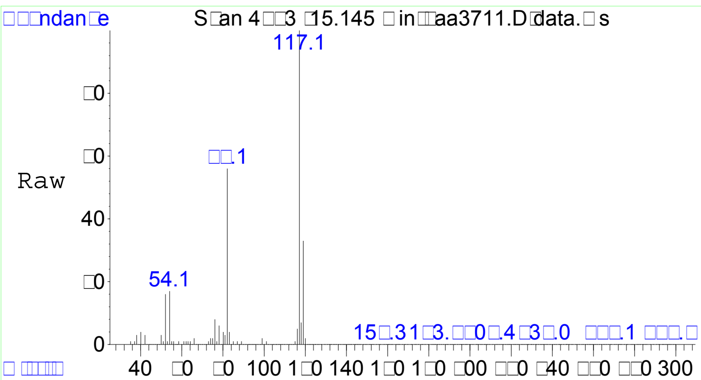


#50
Toluene
Concen: 1.26 ppbV
RT: 12.826 min Scan# 3962
Delta R.T. 0.009 min
Lab File: aa3711.D
Acq: 4 Oct 2017 3:12 pm

Tgt Ion: 91	Resp:	231658	
Ion	Ratio	Lower	Upper
91	100		
92	58.0	50.0	75.0

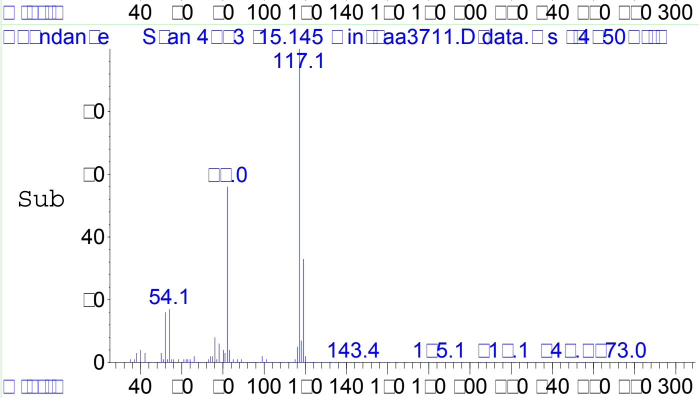


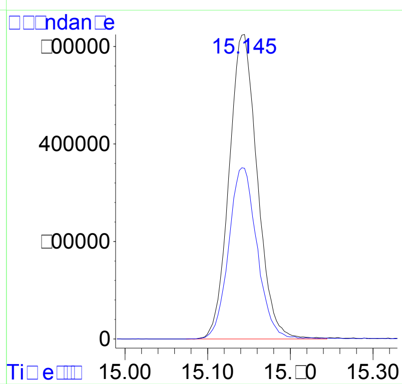


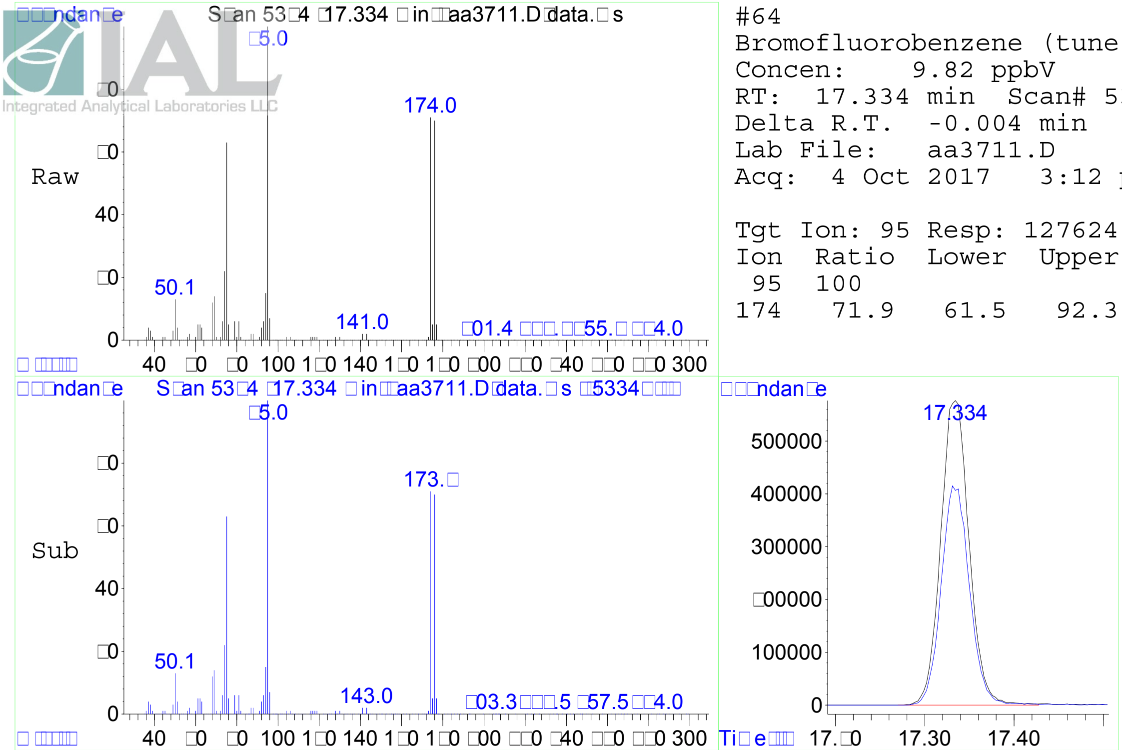


#55
d-5 Chlorobenzene (IS)
Concen: 10.00 ppbV
RT: 15.145 min Scan# 4683
Delta R.T. 0.006 min
Lab File: aa3711.D
Acq: 4 Oct 2017 3:12 pm

Tgt Ion:117	Resp:	1484107	
Ion	Ratio	Lower	Upper
117	100		
82	56.6	44.8	67.2







#64
Bromofluorobenzene (tune std)
Concen: 9.82 ppbV
RT: 17.334 min Scan# 5364
Delta R.T. -0.004 min
Lab File: aa3711.D
Acq: 4 Oct 2017 3:12 pm

Tgt Ion: 95 Resp: 1276249

Ion	Ratio	Lower	Upper
95	100		
174	71.9	61.5	92.3

Data Path : C:\DATA\10-04-17\
Data File : aa3712.D
Acq On : 4 Oct 2017 3:46 pm
Operator : jls
Sample : E17-08248-21
Misc : dup of E17-08248-01, can 4859
ALS Vial : 14 Sample Multiplier: 1

Quant Time: Oct 05 09:13:31 2017
Quant Method : C:\msdchem\1\METHODS\0912.M
Quant Title : TO-15 on the Agilent 7890A / 5975C
QLast Update : Tue Sep 12 13:00:02 2017
Response via : Initial Calibration

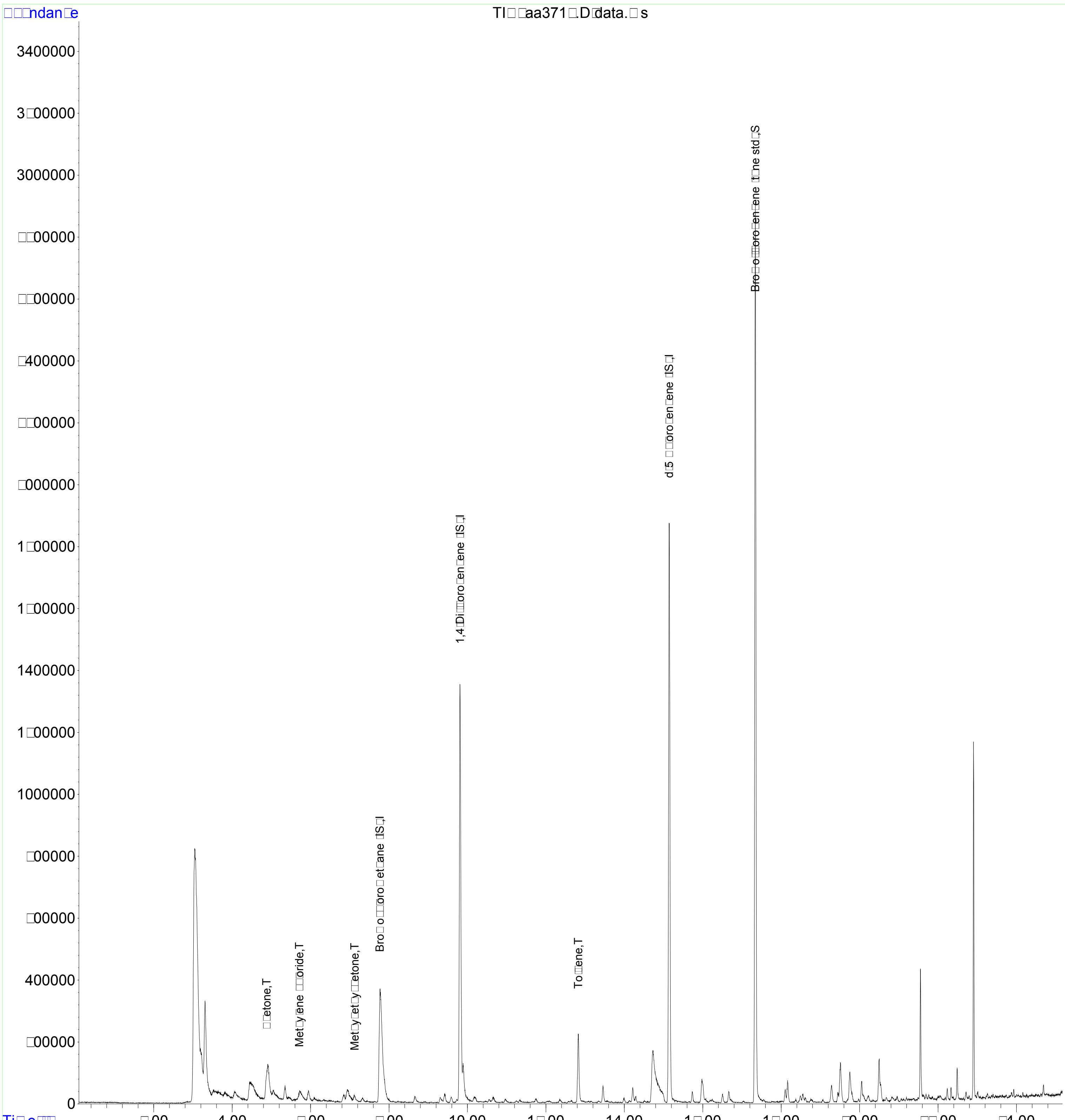
Compound	R.T.	QIon	Response	Conc	Units		Dev(Min)
Internal Standards							
1) Bromochloromethane (IS)	7.762	130	412526	10.00	ppbV		0.02
38) 1,4-Difluorobenzene (IS)	9.811	114	1601828	10.00	ppbV		0.00
55) d-5 Chlorobenzene (IS)	15.142	117	1483379	10.00	ppbV		0.00
System Monitoring Compounds							
64) Bromofluorobenzene (tu...	17.341	95	1281382	9.86	ppbV		0.00
Target Compounds							Qvalue
14) Acetone	4.878	58	86591	8.48	ppbV	#	55
19) Methylene chloride	5.714	84	50003	1.37	ppbV		97
27) Methyl ethyl ketone	7.123	72	11566	0.71	ppbV	#	60
50) Toluene	12.827	91	226379	1.23	ppbV		97

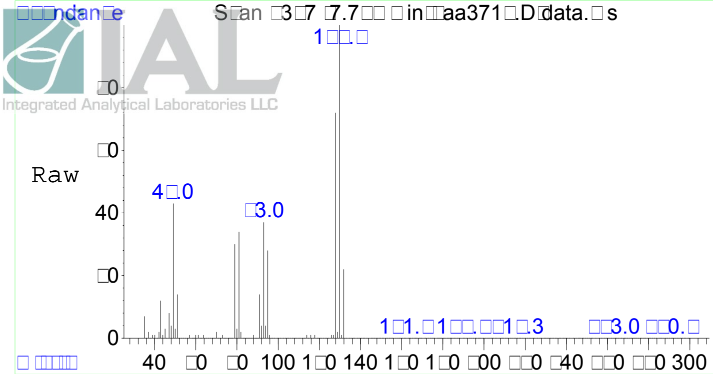
(#) = qualifier out of range (m) = manual integration (+) = signals summed

Quantitation Report (QT Reviewed)

Data Path : C:\DATA\10-04-17\
Data File : aa3712.D
Acq On : 4 Oct 2017 3:46 pm
Operator : jls
Sample : E17-08248-21
Misc : dup of E17-08248-01, can 4859
ALS Vial : 14 Sample Multiplier: 1

Quant Time: Oct 05 09:13:31 2017
Quant Method : C:\msdchem\1\METHODS\0912.M
Quant Title : TO-15 on the Agilent 7890A / 5975C
QLast Update : Tue Sep 12 13:00:02 2017
Response via : Initial Calibration

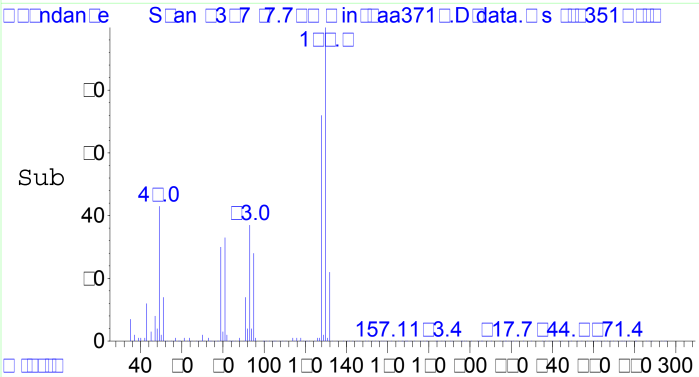


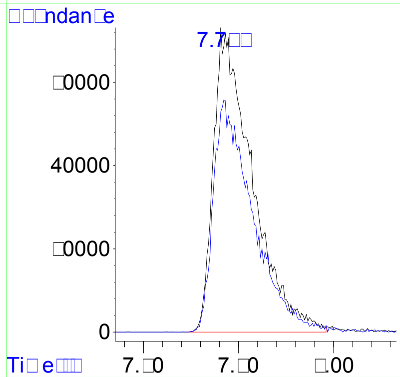


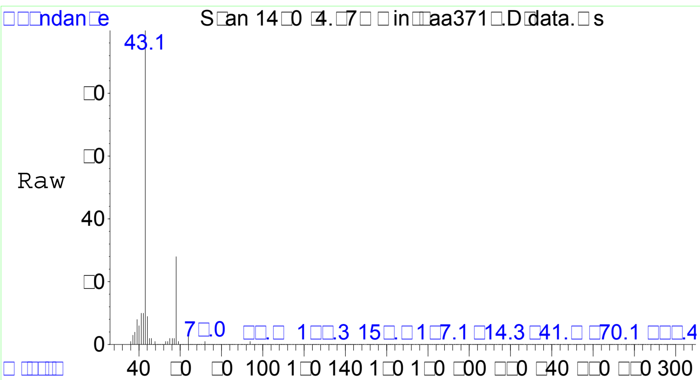
#1
Bromochloromethane (IS)
Concen: 10.00 ppbV
RT: 7.762 min Scan# 2387
Delta R.T. 0.015 min
Lab File: aa3712.D
Acq: 4 Oct 2017 3:46 pm

Tgt Ion:130 Resp: 412526

Ion	Ratio	Lower	Upper
130	100		
128	77.7	62.6	94.0



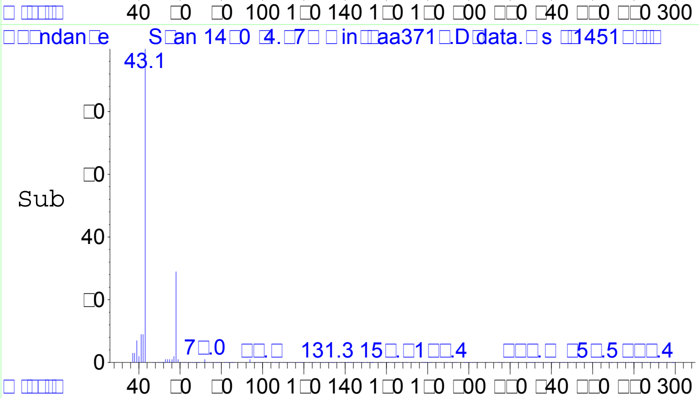


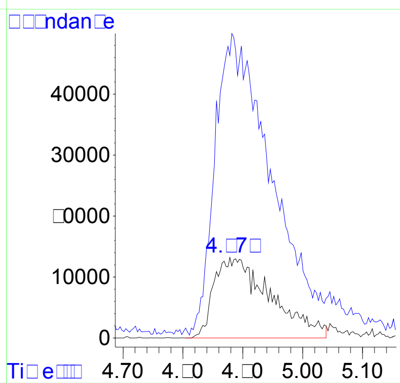


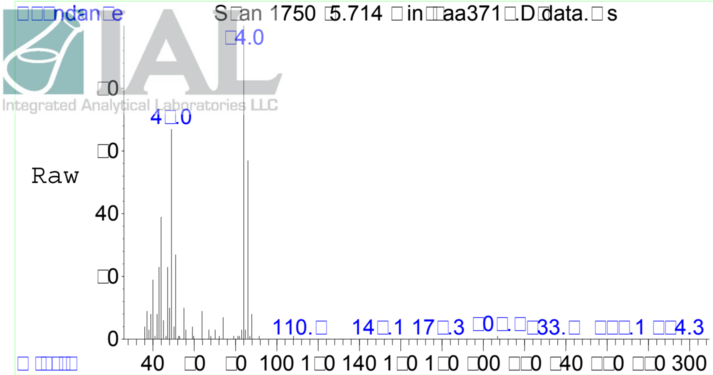
#14
Acetone
Concen: 8.48 ppbV
RT: 4.878 min Scan# 1490
Delta R.T. 0.026 min
Lab File: aa3712.D
Acq: 4 Oct 2017 3:46 pm

Tgt Ion: 58 Resp: 86591

Ion	Ratio	Lower	Upper
58	100		
43	373.1	229.6	344.4#

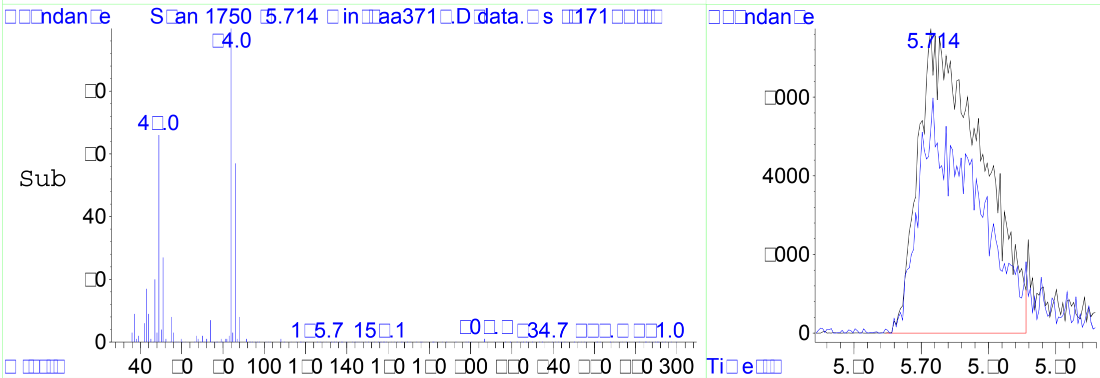


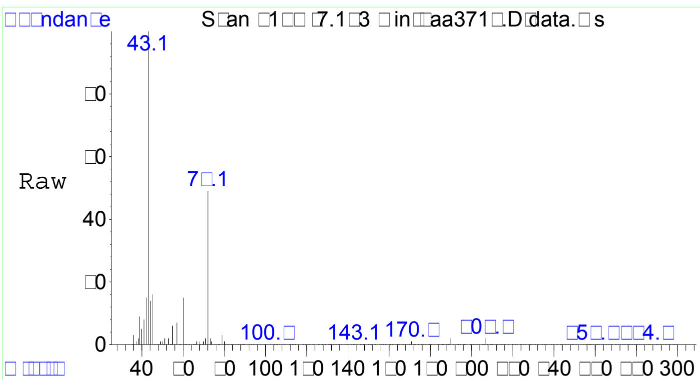




#19
Methylene chloride
Concen: 1.37 ppbV
RT: 5.714 min   Scan# 1750
Delta R.T.   0.009 min
Lab File: aa3712.D
Acq: 4 Oct 2017   3:46 pm

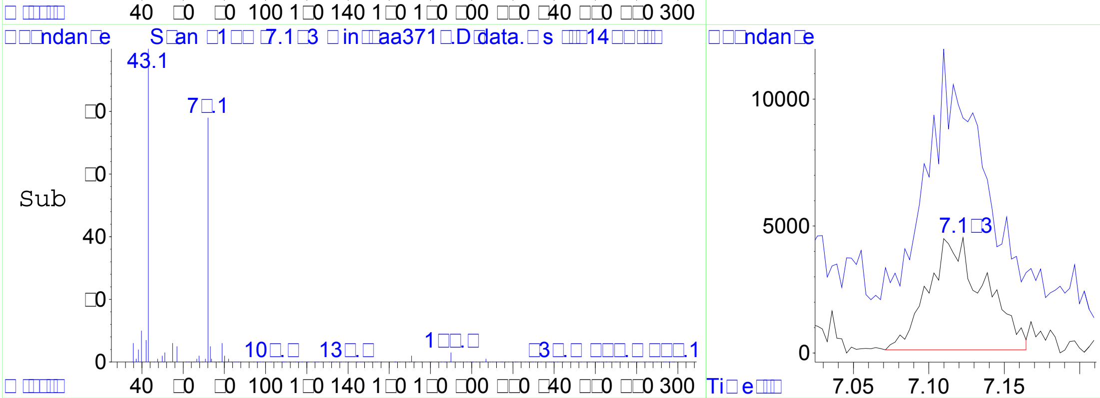
Tgt Ion: 84 Resp: 50003
Ion   Ratio Lower Upper
 84   100
 49   69.5   57.6   86.4

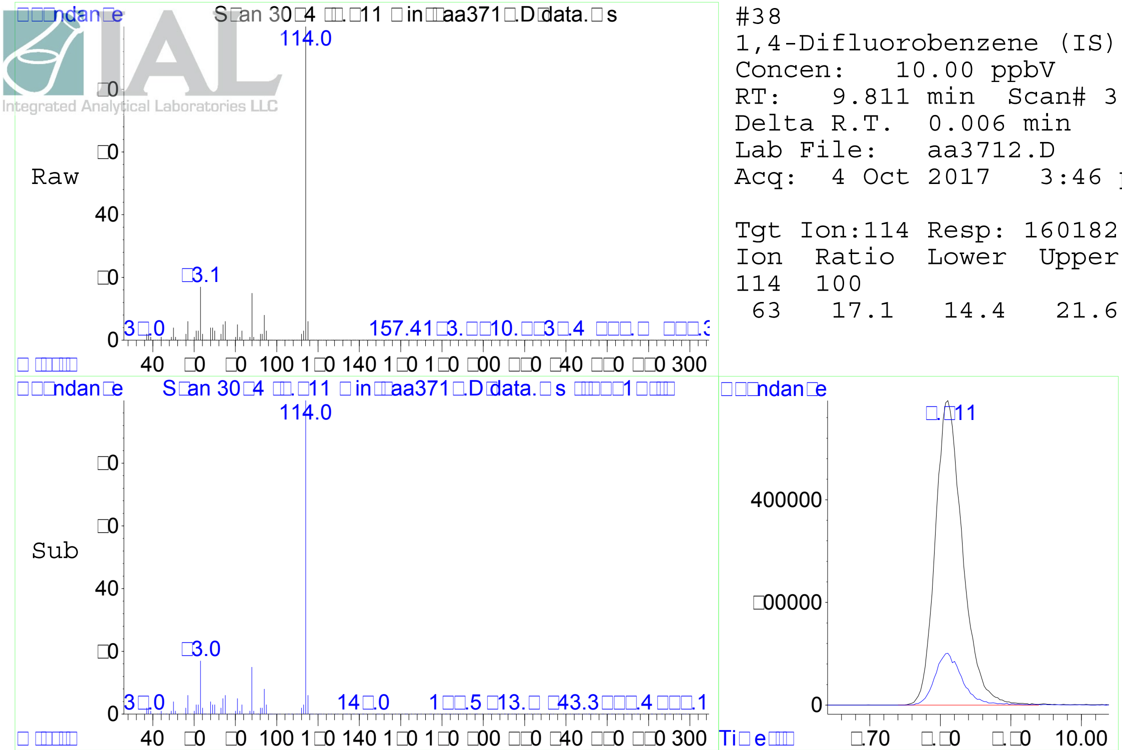




#27
Methyl ethyl ketone
Concen: 0.71 ppbV
RT: 7.123 min   Scan# 2188
Delta R.T.   0.029 min
Lab File: aa3712.D
Acq: 4 Oct 2017   3:46 pm

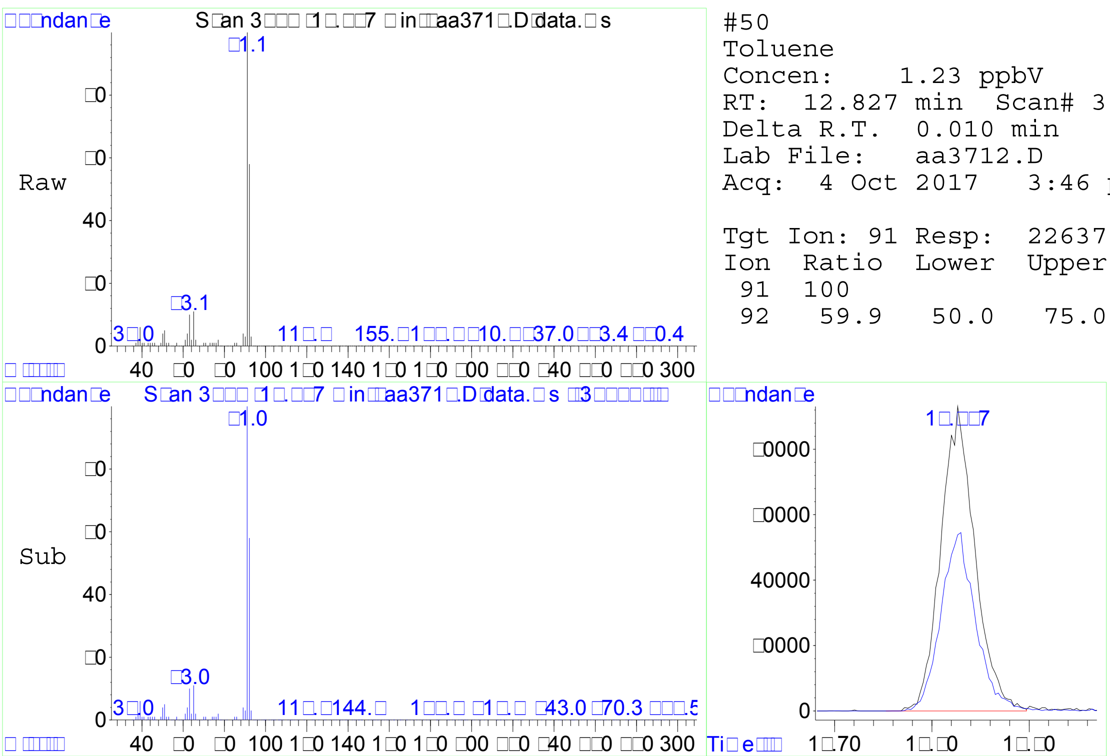
Tgt Ion: 72 Resp: 11566
Ion   Ratio Lower Upper
 72   100
 43   272.7   168.0   252.0#





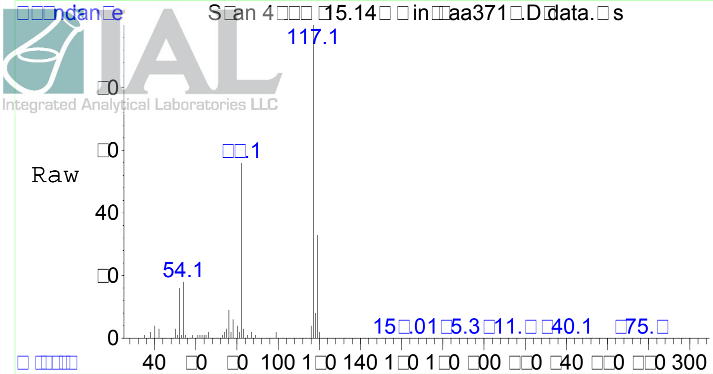
#38
1,4-Difluorobenzene (IS)
Concen: 10.00 ppbV
RT: 9.811 min Scan# 3024
Delta R.T. 0.006 min
Lab File: aa3712.D
Acq: 4 Oct 2017 3:46 pm

Tgt Ion:114	Resp: 1601828		
Ion	Ratio	Lower	Upper
114	100		
63	17.1	14.4	21.6



#50
Toluene
Concen: 1.23 ppbV
RT: 12.827 min Scan# 3962
Delta R.T. 0.010 min
Lab File: aa3712.D
Acq: 4 Oct 2017 3:46 pm

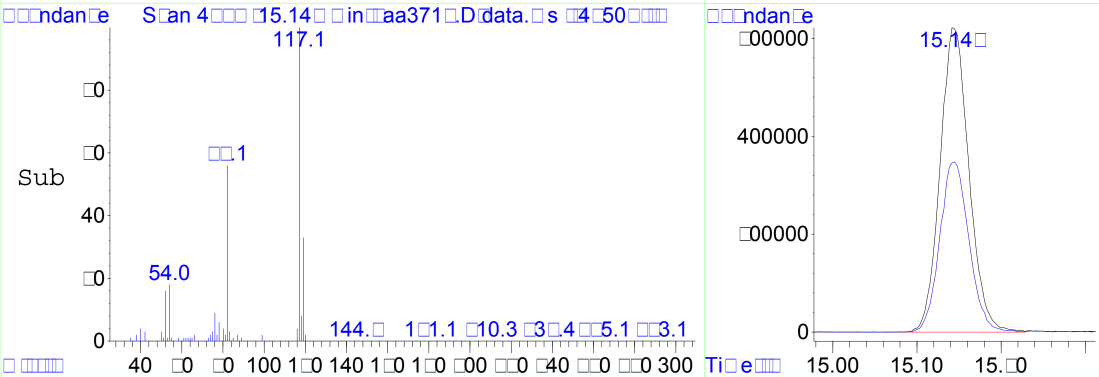
Tgt Ion: 91	Resp: 226379		
Ion	Ratio	Lower	Upper
91	100		
92	59.9	50.0	75.0

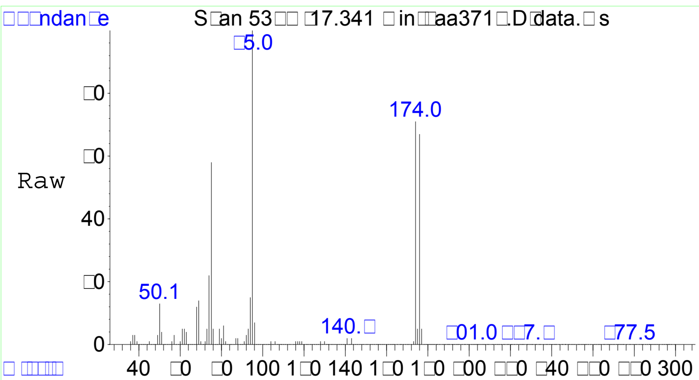


#55
d-5 Chlorobenzene (IS)
Concen: 10.00 ppbV
RT: 15.142 min   Scan# 4682
Delta R.T.   0.003 min
Lab File: aa3712.D
Acq: 4 Oct 2017   3:46 pm

Tgt Ion:117 Resp: 1483379

Ion	Ratio	Lower	Upper
117	100		
82	56.7	44.8	67.2

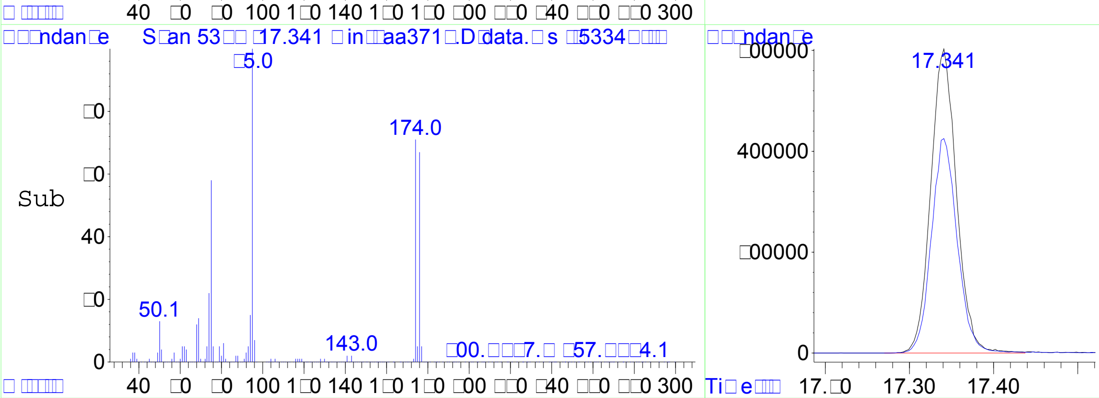




#64
Bromofluorobenzene (tune std)
Concen: 9.86 ppbV
RT: 17.341 min   Scan# 5366
Delta R.T.   0.003 min
Lab File: aa3712.D
Acq: 4 Oct 2017   3:46 pm

Tgt Ion: 95 Resp: 1281382

Ion	Ratio	Lower	Upper
95	100		
174	71.0	61.5	92.3



Integrated Analytical Laboratories, LLC

Volatile Organic Compounds by EPA Method TO-15

Laboratory Sample Duplicate Report

SD□ N□□ □er□	□17□0□□3□	Date Re□ei□ed□	11□1□□17
I□L Sa□ p□e ID□	□17□0□□3□□0□	Date □na□y□ed□	11□□□17,11□□□17
Matrix□	□ir	La□ Data □i□e□	□□□4□□0,□□4□□1
S□□ □a ID□	□0□□	Di□□tion □a□tor□	10
		In□e□tion □o□□□ e□	50□ □
		□ □MS □o□□ n□	RTX□1, 0.3□ □ □ID

Compound	CAS #	Sa□ p□e E17-09836-02 Concentration Reported ppbv	Q	Sa□ p□e D□p E17-09836-22 Concentration Reported ppbv	Q	Reporting Limits ppbv	RPD
□□etone	□7□□4□1	**230**	D	**230**	D	4.0	**0.00%**
□□y□□ □□oride	107□05□1	4.0	□	4.0	□	4.0	0.00□
Ben□ene	71□43□□	4.0	□	4.0	□	4.0	0.00□
Bro□ odi□□□oro□ et□ane	75□□7□4	4.0	□	4.0	□	4.0	0.00□
Bro□ o□or□	75□□5□□	4.0	□	4.0	□	4.0	0.00□
Bro□ o□ et□ane	74□□3□□	4.0	□	4.0	□	4.0	0.00□
1,3□B□tadiene	10□□□□□0	4.0	□	4.0	□	4.0	0.00□
□ □□oro□en□ene	10□□□0□7	4.0	□	4.0	□	4.0	0.00□
□ □□oroet□ane	75□00□3	4.0	□	4.0	□	4.0	0.00□
□ □□oro□or□	□7□□□□3	4.0	□	4.0	□	4.0	0.00□
□ □□oro□ et□ane	74□□7□3	4.0	□	4.0	□	4.0	0.00□
□ar□on dis□□□ide	75□15□0	4.0	□	4.0	□	4.0	0.00□
□ar□on tetra□□□oride	5□□□3□5	4.0	□	4.0	□	4.0	0.00□
□□□ □□oroto□□ene	□5□4□□□	4.0	□	4.0	□	4.0	0.00□
□y□□o□exane	110□□□7	4.0	□	4.0	□	4.0	0.00□
Di□ro□ o□□□oro□ et□ane	1□4□4□□1	4.0	□	4.0	□	4.0	0.00□
1,□□Di□ro□ oet□ane	10□□□3□4	4.0	□	4.0	□	4.0	0.00□
1,□□Di□□□oro□en□ene	□5□50□1	4.0	□	4.0	□	4.0	0.00□
1,3□Di□□□oro□en□ene	541□73□1	4.0	□	4.0	□	4.0	0.00□
1,4□Di□□□oro□en□ene	10□□4□□7	4.0	□	4.0	□	4.0	0.00□
Di□□□orodi□□□oro□ et□ane	75□71□□	4.0	□	4.0	□	4.0	0.00□
1,1□Di□□□oroet□ane	75□34□3	4.0	□	4.0	□	4.0	0.00□
1,□□Di□□□oroet□ane	107□0□□□	4.0	□	4.0	□	4.0	0.00□
1,1□Di□□□oroet□ene	75□35□4	4.0	□	4.0	□	4.0	0.00□
1,□□Di□□□oroet□ene □□is□	15□□5□□□	4.0	□	4.0	□	4.0	0.00□
1,□□Di□□□oroet□ene □trans□	15□□□0□5	4.0	□	4.0	□	4.0	0.00□
1,□□Di□□□oropropane	7□□□7□5	4.0	□	4.0	□	4.0	0.00□
1,3□Di□□□oropropene □□is□	100□1□01□5	4.0	□	4.0	□	4.0	0.00□
1,3□Di□□□oropropene □trans□	100□1□0□□□	4.0	□	4.0	□	4.0	0.00□
1,□□Di□□□orotetra□□□oroet□ane	7□□14□□	4.0	□	4.0	□	4.0	0.00□
□t□y□□en□ene	100□41□4	4.0	□	4.0	□	4.0	0.00□
4□□t□y□to□□ene	□□□□□□□	4.0	□	4.0	□	4.0	0.00□
n□□eptane	14□□□□5	4.0	□	4.0	□	4.0	0.00□
1,3□□exa□□□oro□□tadiene	□7□□□□3	4.0	□	4.0	□	4.0	0.00□
n□□exane	110□54□3	4.0	□	4.0	□	4.0	0.00□
Met□y□ene □□□oride	75□0□□□	4.0	□	4.0	□	4.0	0.00□
Met□y□et□y□□etone	7□□□3□3	**130**	D	**130**	D	4.0	**0.00%**
Met□y□iso□□ty□□etone	10□□10□1	4.0	□	4.0	□	4.0	0.00□

□ □a□i□r□
□ □□on□entration ex□eeds □pper □e□e□o□□a□i□ration ran□e □or instr□□ent.
D□□□xtra di□□tion re□□ired □or t□is □o□po□nd. J□D□p□i□ate sa□p□es do not □et RPD □riteria.
□ □□o□po□nd ND or □nder reportin□ □i□it.

Integrated Analytical Laboratories, LLC

Volatile Organic Compounds by EPA Method TO-15

Laboratory Sample Duplicate Report

SDG Number: E17-09837		Date Received: 11/[illegible]/17
IAL Sample ID: E17-09836-02		Date Analyzed: 11/[illegible]/17, 11/[illegible]/17
Matrix: Air		Lab Data File: [illegible]
Summa ID: [illegible]		Dilution Factor: 10
		Injection Volume: 50 [illegible]
		GC/MS Column: RTX-1, 0.3[illegible] ID

Compound	CAS #	Sample E17-09836-02 Concentration Reported ppbv	Q	Sample Dup E17-09836-22 Concentration Reported ppbv	Q	Reporting Limits ppbv	RPD
Methyl tert-butyl ether	1634-04-4	4.0	U	4.0	U	4.0	0.00%
Styrene	100-42-5	4.0	U	4.0	U	4.0	0.00%
Tert-butyl alcohol	75-65-0	4.0	U	4.0	U	4.0	0.00%
1,1,2,2-Tetrachloroethane	79-34-5	4.0	U	4.0	U	4.0	0.00%
Tetrachloroethene	127-18-4	4.0	U	4.0	U	4.0	0.00%
Toluene	108-88-3	4.0	U	4.0	U	4.0	0.00%
1,2,4-Trichlorobenzene	120-82-1	4.0	U	4.0	U	4.0	0.00%
1,1,1-Trichloroethane	71-55-6	4.0	U	4.0	U	4.0	0.00%
1,1,2-Trichloroethane	79-00-5	4.0	U	4.0	U	4.0	0.00%
Trichloroethene	79-01-6	4.0	U	4.0	U	4.0	0.00%
Trichlorofluoromethane	75-69-4	4.0	U	4.0	U	4.0	0.00%
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	4.0	U	4.0	U	4.0	0.00%
1,2,4-Trimethylbenzene	95-63-6	4.0	U	4.0	U	4.0	0.00%
1,3,5-Trimethylbenzene	108-67-8	4.0	U	4.0	U	4.0	0.00%
2,2,4-Trimethylpentane	540-84-1	4.0	U	4.0	U	4.0	0.00%
Vinyl bromide	593-60-2	4.0	U	4.0	U	4.0	0.00%
Vinyl chloride	75-01-4	4.0	U	4.0	U	4.0	0.00%
Xylenes (m&p)	179601-23-1	4.0	U	4.0	U	4.0	0.00%
Xylenes (o)	95-47-6	4.0	U	4.0	U	4.0	0.00%

RPD must be <25% for all laboratory duplicate samples. Laboratory duplicate samples are run once daily.

NC = The RPD could not be calculated since the compound was only detected in either the parent or duplicate sample.

Qualifiers:
E = Concentration exceeds upper level of calibration range for instrument.
D = Extra dilution required for this compound. J = Duplicate samples do not meet RPD criteria.
U = Compound ND or under reporting limit.

Data Path : C:\DATA\11-28-17\
Data File : aa4280.D
Acq On : 28 Nov 2017 5:06 pm
Operator : jls
Sample : E17-09836-02 x 10 dil
Misc : 2029, 50cc
ALS Vial : 10 Sample Multiplier: 1

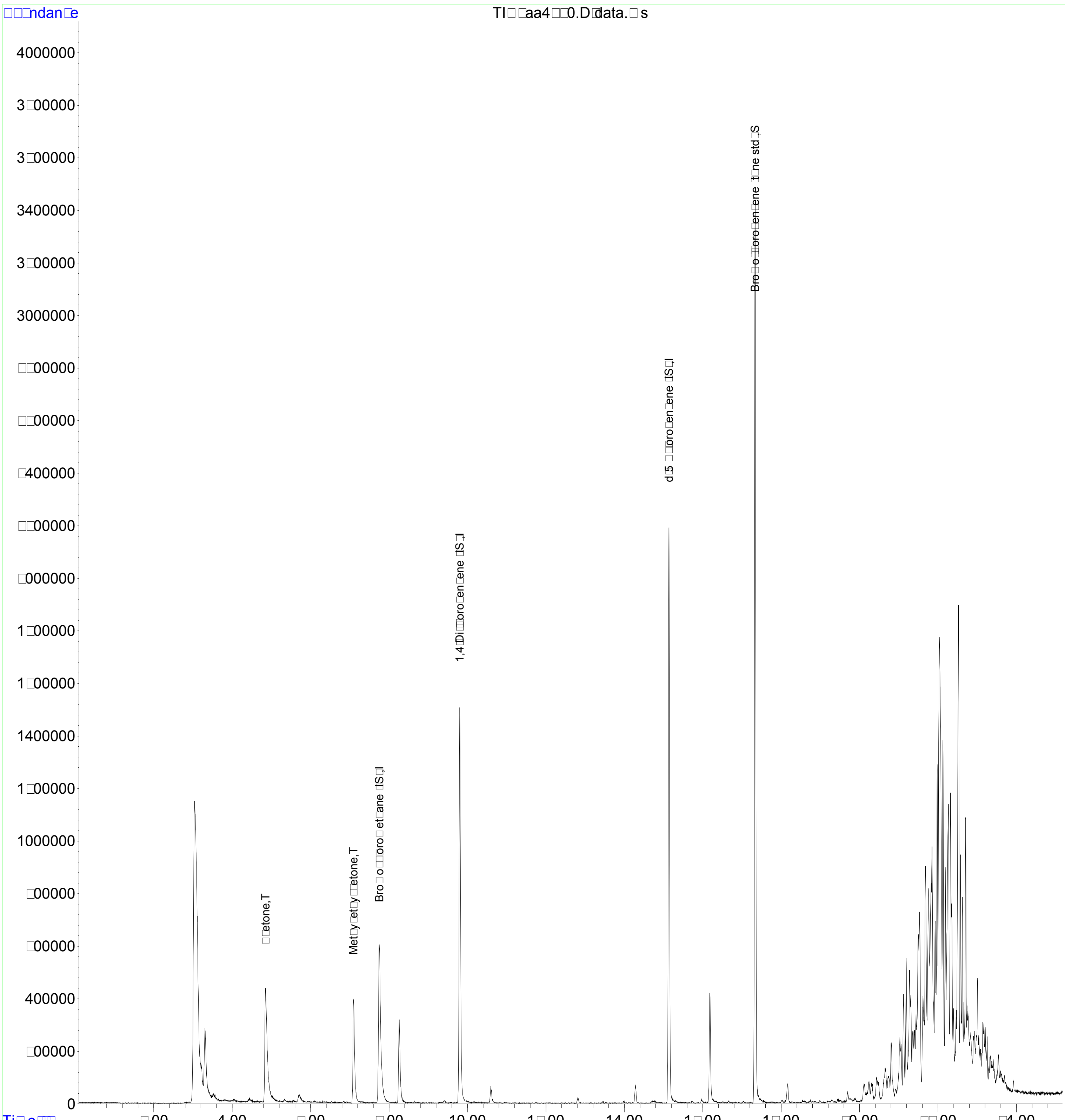
Quant Time: Nov 29 10:50:27 2017
Quant Method : C:\msdchem\1\METHODS\0912.M
Quant Title : TO-15 on the Agilent 7890A / 5975C
QLast Update : Tue Sep 12 13:00:02 2017
Response via : Initial Calibration

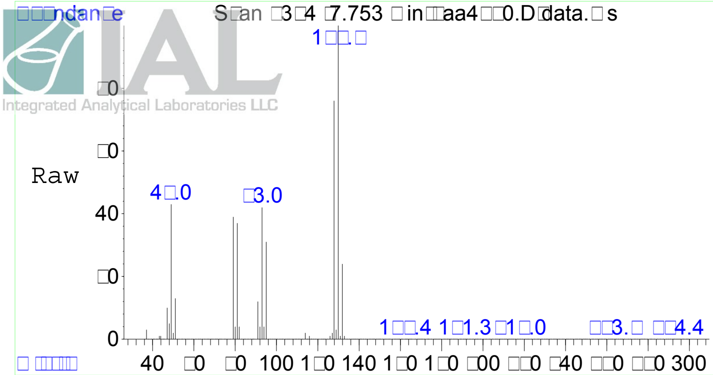
Compound	R.T.	QIon	Response	Conc	Units	Dev(Min)
Internal Standards						
1) Bromochloromethane (IS)	7.753	130	489669	10.00	ppbV	0.00
38) 1,4-Difluorobenzene (IS)	9.804	114	1649850	10.00	ppbV	0.00
55) d-5 Chlorobenzene (IS)	15.139	117	1633211	10.00	ppbV	0.00
System Monitoring Compounds						
64) Bromofluorobenzene (tu...	17.335	95	1395181	9.75	ppbV	0.00
Target Compounds						Qvalue
14) Acetone	4.850	58	277574	22.91	ppbV #	22
27) Methyl ethyl ketone	7.094	72	241284	12.55	ppbV	83

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Data Path : C:\DATA\11-28-17\
Data File : aa4280.D
Acq On   : 28 Nov 2017   5:06 pm
Operator : jls
Sample   : E17-09836-02 x 10 dil
Misc   : 2029, 50cc
ALS Vial : 10   Sample Multiplier: 1

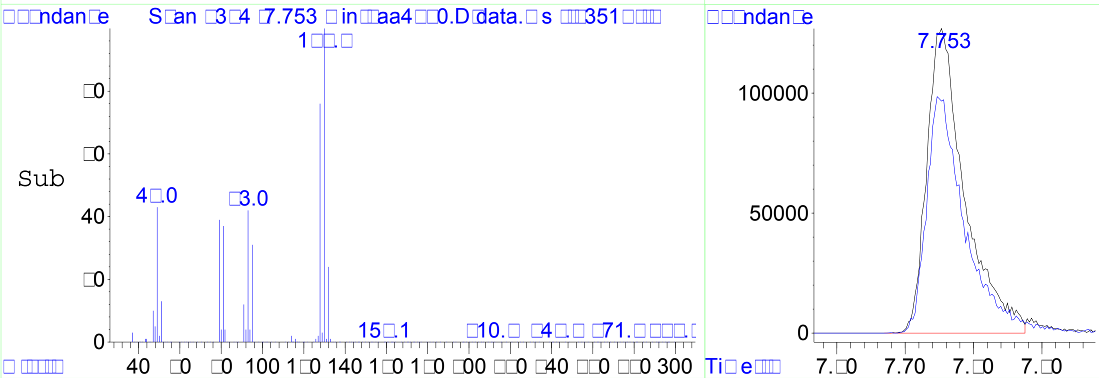
Quant Time: Nov 29 10:50:27 2017
Quant Method : C:\msdchem\1\METHODS\0912.M
Quant Title : TO-15 on the Agilent 7890A / 5975C
QLast Update : Tue Sep 12 13:00:02 2017
Response via : Initial Calibration

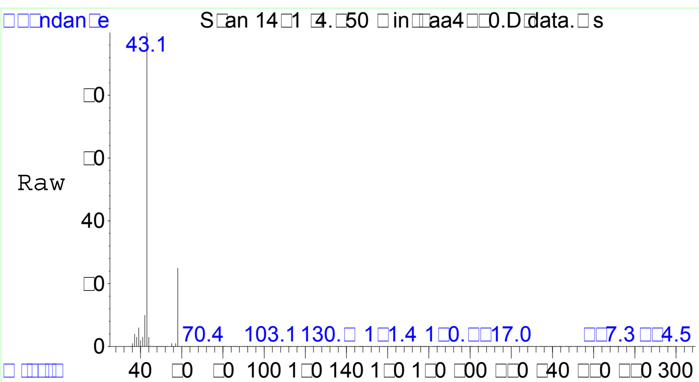




#1
Bromochloromethane (IS)
Concen: 10.00 ppbV
RT: 7.753 min   Scan# 2384
Delta R.T.   0.006 min
Lab File: aa4280.D
Acq: 28 Nov 2017   5:06 pm

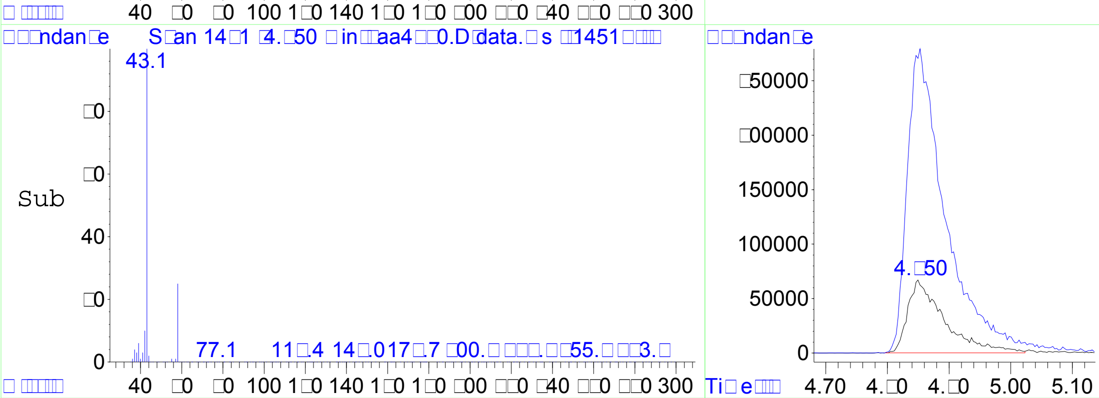
Tgt Ion:130	Resp:	489669	
Ion	Ratio	Lower	Upper
130	100		
128	79.5	62.6	94.0

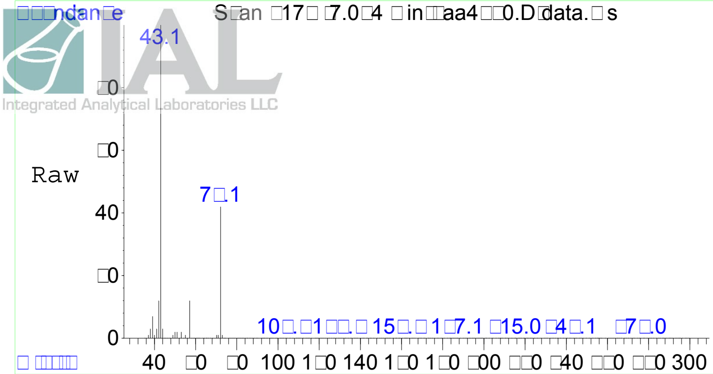




#14
Acetone
Concen: 22.91 ppbV
RT: 4.850 min   Scan# 1481
Delta R.T.   -0.003 min
Lab File: aa4280.D
Acq: 28 Nov 2017   5:06 pm

Tgt Ion: 58	Resp:	277574	
Ion	Ratio	Lower	Upper
58	100		
43	435.3	229.6	344.4#

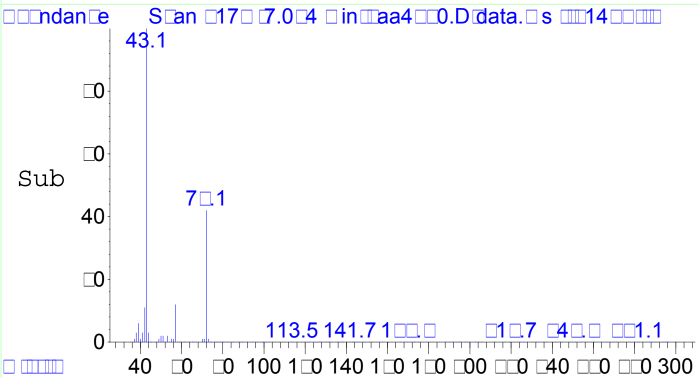


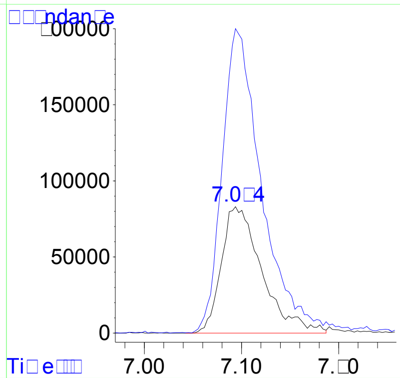


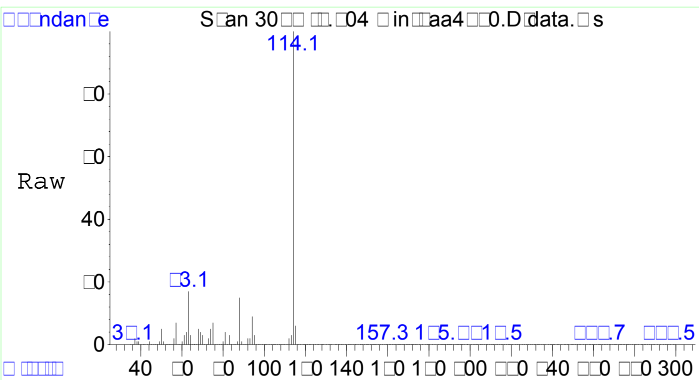
#27
Methyl ethyl ketone
Concen: 12.55 ppbV
RT: 7.094 min Scan# 2179
Delta R.T. -0.000 min
Lab File: aa4280.D
Acq: 28 Nov 2017 5:06 pm

Tgt Ion: 72 Resp: 241284

Ion	Ratio	Lower	Upper
72	100		
43	236.6	168.0	252.0



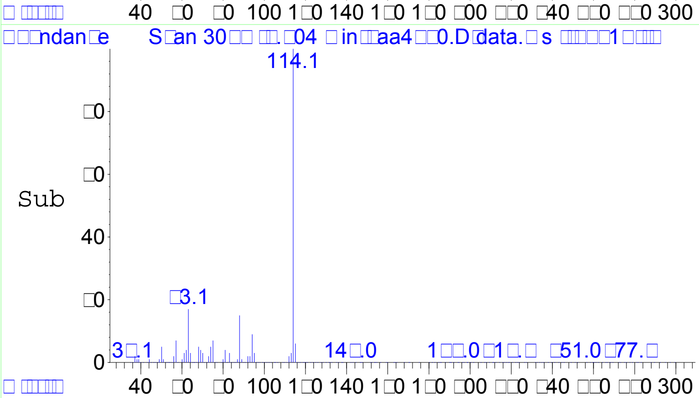


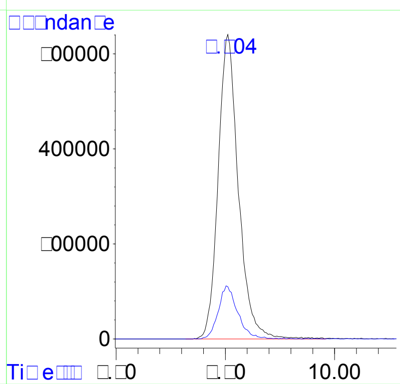


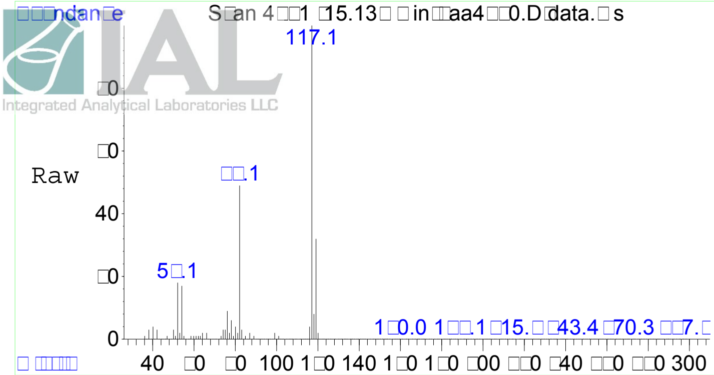
#38
1,4-Difluorobenzene (IS)
Concen: 10.00 ppbV
RT: 9.804 min Scan# 3022
Delta R.T. 0.000 min
Lab File: aa4280.D
Acq: 28 Nov 2017 5:06 pm

Tgt Ion:114 Resp: 1649850

Ion	Ratio	Lower	Upper
114	100		
63	16.6	14.4	21.6



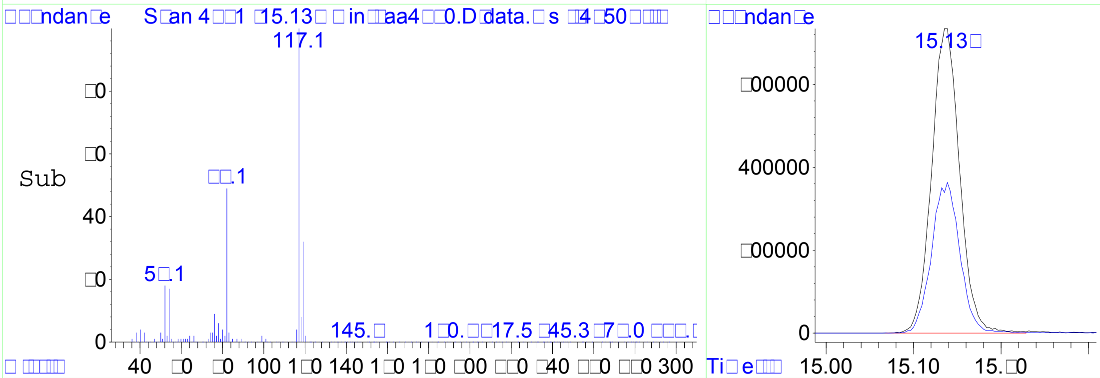


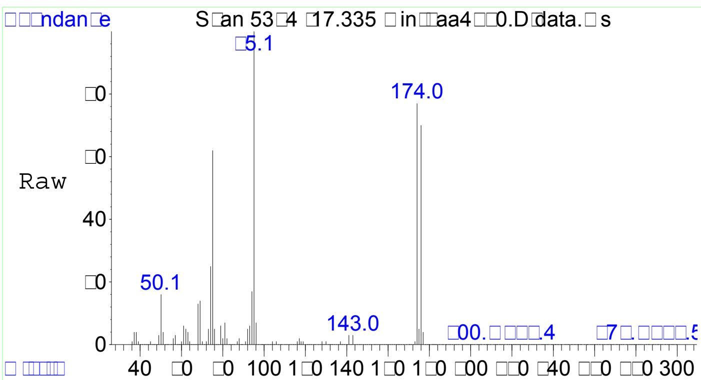


#55
d-5 Chlorobenzene (IS)
Concen: 10.00 ppbV
RT: 15.139 min   Scan# 4681
Delta R.T.   0.000 min
Lab File: aa4280.D
Acq: 28 Nov 2017   5:06 pm

Tgt Ion:117 Resp: 1633211

Ion	Ratio	Lower	Upper
117	100		
82	50.2	44.8	67.2

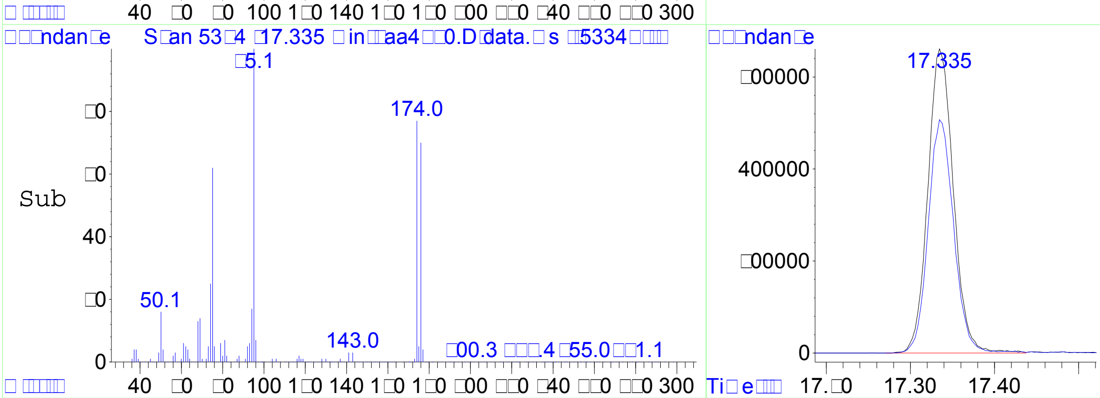




#64
Bromofluorobenzene (tune std)
Concen: 9.75 ppbV
RT: 17.335 min   Scan# 5364
Delta R.T.   -0.003 min
Lab File: aa4280.D
Acq: 28 Nov 2017   5:06 pm

Tgt Ion: 95 Resp: 1395181

Ion	Ratio	Lower	Upper
95	100		
174	76.8	61.5	92.3



Quantitation Report (QT Reviewed)

Data Path : C:\DATA\11-28-17\
Data File : aa4281.D
Acq On : 28 Nov 2017 5:40 pm
Operator : jls
Sample : E17-09836-22 x 10 dil
Misc : dup of E17-09836-02 x 10 dil, can 2029
ALS Vial : 11 Sample Multiplier: 1

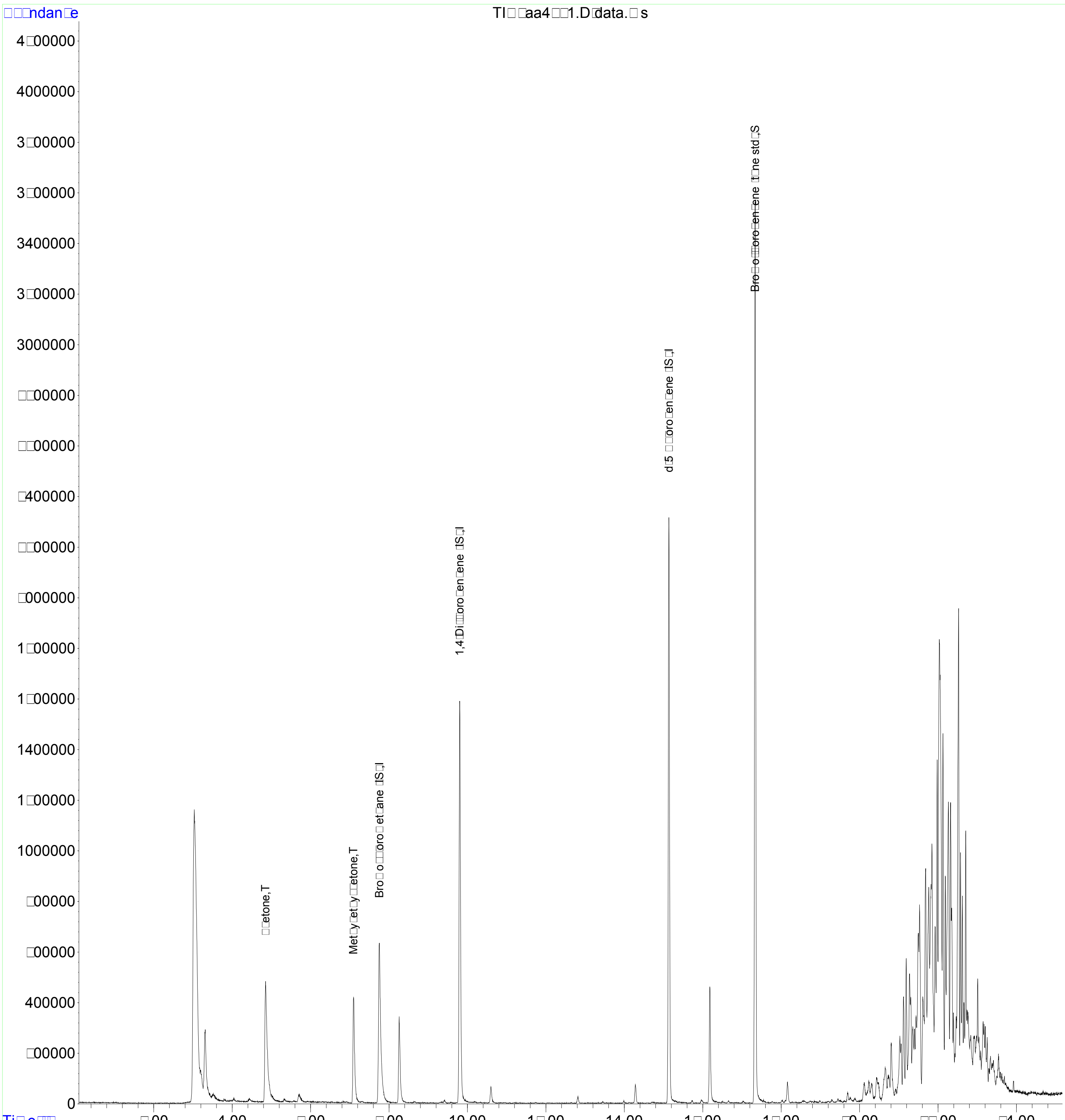
Quant Time: Nov 29 10:51:39 2017
Quant Method : C:\msdchem\1\METHODS\0912.M
Quant Title : TO-15 on the Agilent 7890A / 5975C
QLast Update : Tue Sep 12 13:00:02 2017
Response via : Initial Calibration

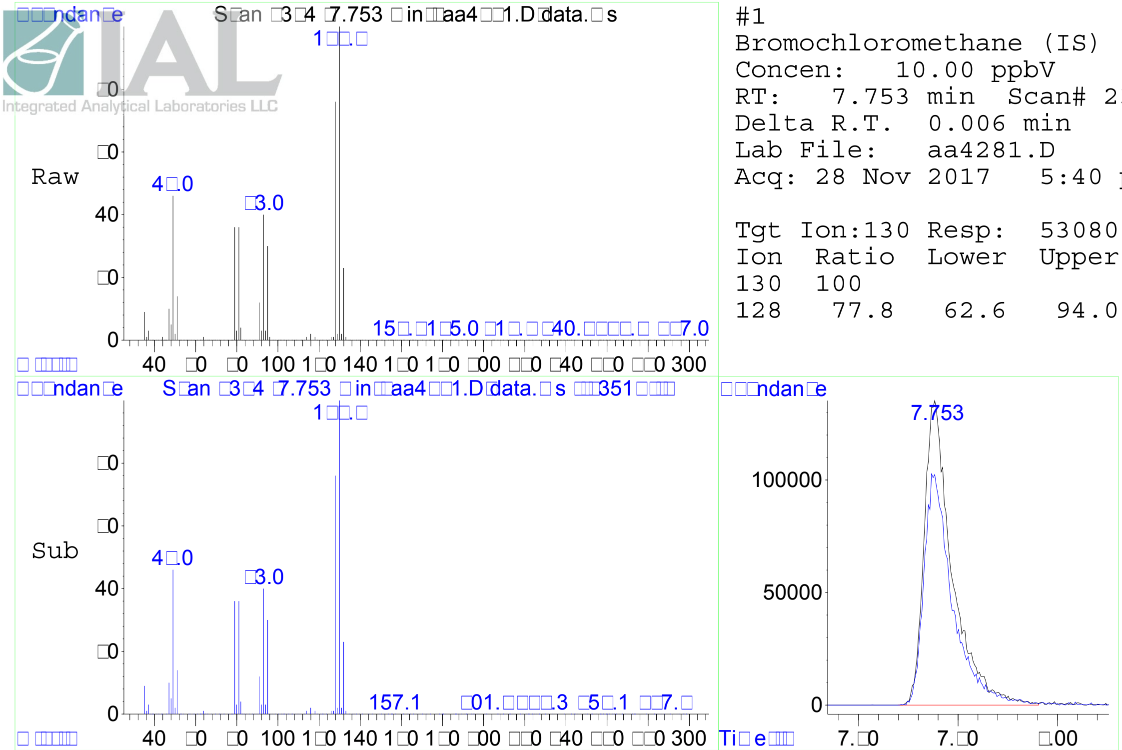
Compound	R.T.	QIon	Response	Conc	Units	Dev(Min)
Internal Standards						
1) Bromochloromethane (IS)	7.753	130	530808	10.00	ppbV	0.00
38) 1,4-Difluorobenzene (IS)	9.801	114	1755311	10.00	ppbV	0.00
55) d-5 Chlorobenzene (IS)	15.135	117	1722256	10.00	ppbV	0.00
System Monitoring Compounds						
64) Bromofluorobenzene (tu...	17.335	95	1467924	9.73	ppbV	0.00
Target Compounds						Qvalue
14) Acetone	4.850	58	308242	23.47	ppbV #	27
27) Methyl ethyl ketone	7.091	72	265138	12.72	ppbV	84

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Data Path : C:\DATA\11-28-17\
Data File : aa4281.D
Acq On : 28 Nov 2017 5:40 pm
Operator : jls
Sample : E17-09836-22 x 10 dil
Misc : dup of E17-09836-02 x 10 dil, can 2029
ALS Vial : 11 Sample Multiplier: 1

Quant Time: Nov 29 10:51:39 2017
Quant Method : C:\msdchem\1\METHODS\0912.M
Quant Title : TO-15 on the Agilent 7890A / 5975C
QLast Update : Tue Sep 12 13:00:02 2017
Response via : Initial Calibration

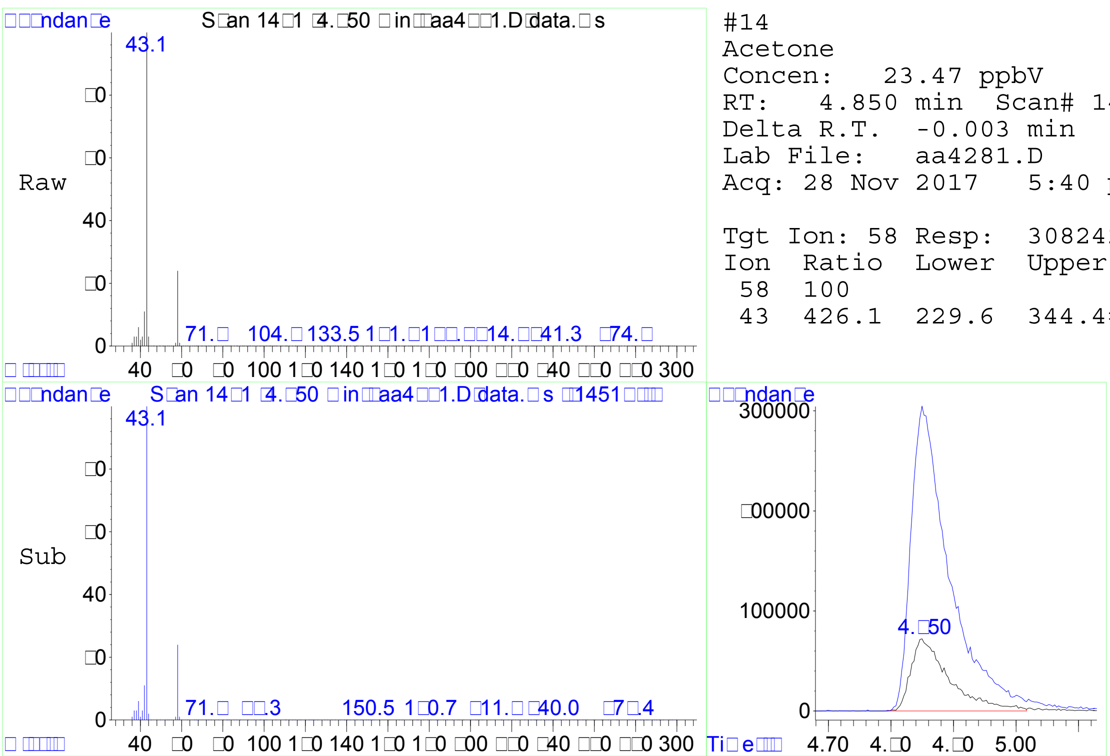




#1
Bromochloromethane (IS)
Concen: 10.00 ppbV
RT: 7.753 min   Scan# 2384
Delta R.T.   0.006 min
Lab File: aa4281.D
Acq: 28 Nov 2017   5:40 pm

Tgt Ion:130 Resp: 530808

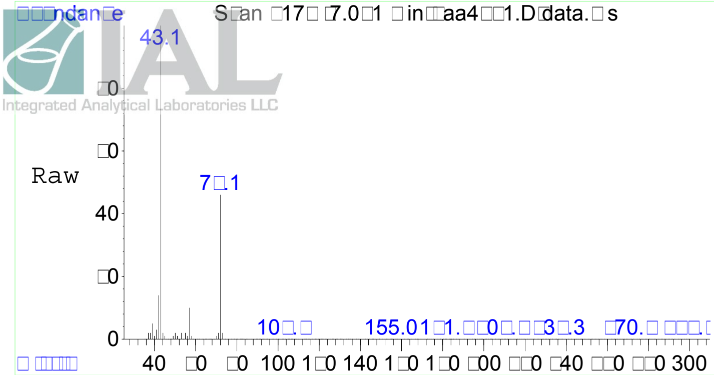
Ion	Ratio	Lower	Upper
130	100		
128	77.8	62.6	94.0

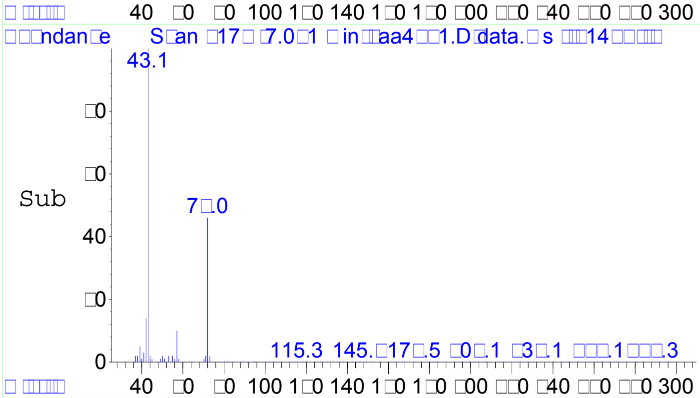


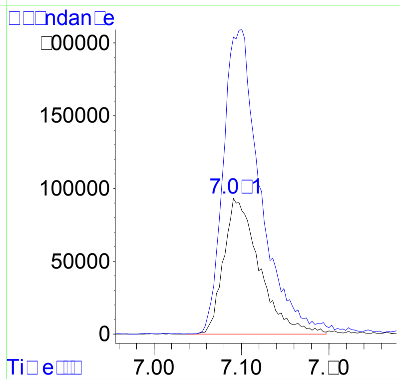
#14
Acetone
Concen: 23.47 ppbV
RT: 4.850 min   Scan# 1481
Delta R.T.   -0.003 min
Lab File: aa4281.D
Acq: 28 Nov 2017   5:40 pm

Tgt Ion: 58 Resp: 308242

Ion	Ratio	Lower	Upper
58	100		
43	426.1	229.6	344.4#



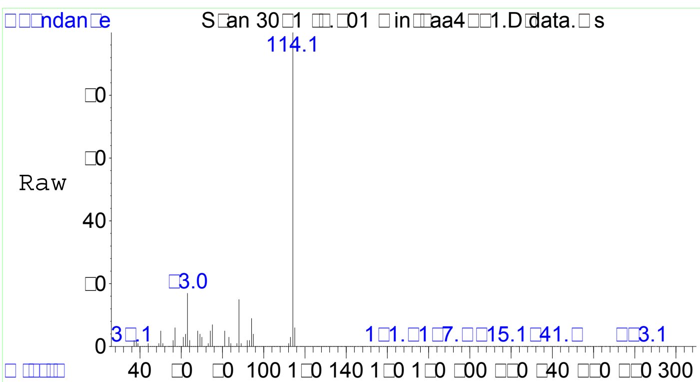


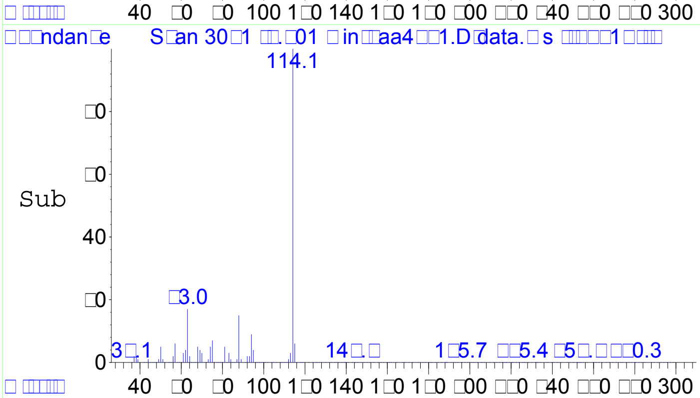


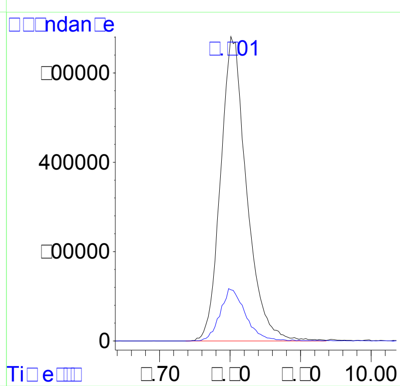
#27
Methyl ethyl ketone
Concen: 12.72 ppbV
RT: 7.091 min Scan# 2178
Delta R.T. -0.003 min
Lab File: aa4281.D
Acq: 28 Nov 2017 5:40 pm

Tgt Ion: 72 Resp: 265138

Ion	Ratio	Lower	Upper
72	100		
43	235.3	168.0	252.0



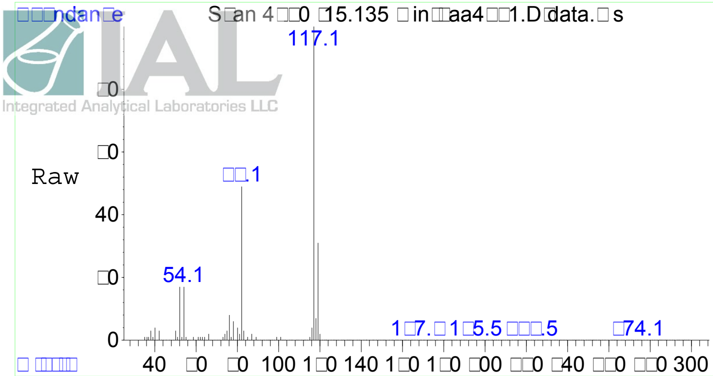




#38
1,4-Difluorobenzene (IS)
Concen: 10.00 ppbV
RT: 9.801 min Scan# 3021
Delta R.T. -0.003 min
Lab File: aa4281.D
Acq: 28 Nov 2017 5:40 pm

Tgt Ion:114 Resp: 1755311

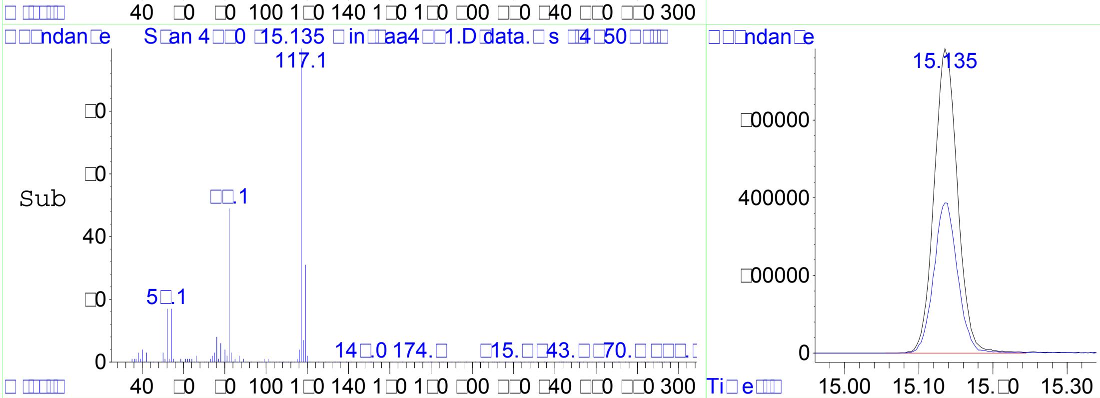
Ion	Ratio	Lower	Upper
114	100		
63	16.6	14.4	21.6

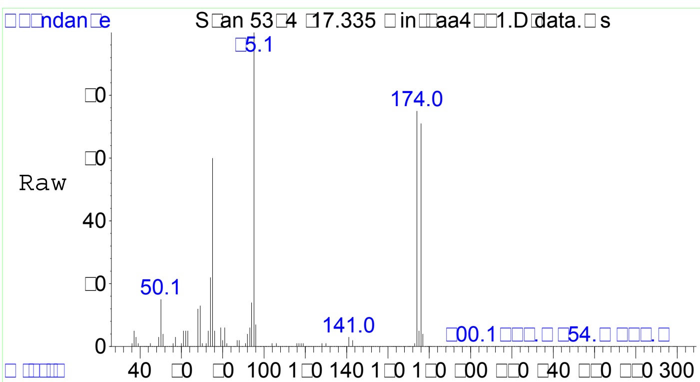


#55
d-5 Chlorobenzene (IS)
Concen: 10.00 ppbV
RT: 15.135 min Scan# 4680
Delta R.T. -0.003 min
Lab File: aa4281.D
Acq: 28 Nov 2017 5:40 pm

Tgt Ion:117 Resp: 1722256

Ion	Ratio	Lower	Upper
117	100		
82	50.2	44.8	67.2

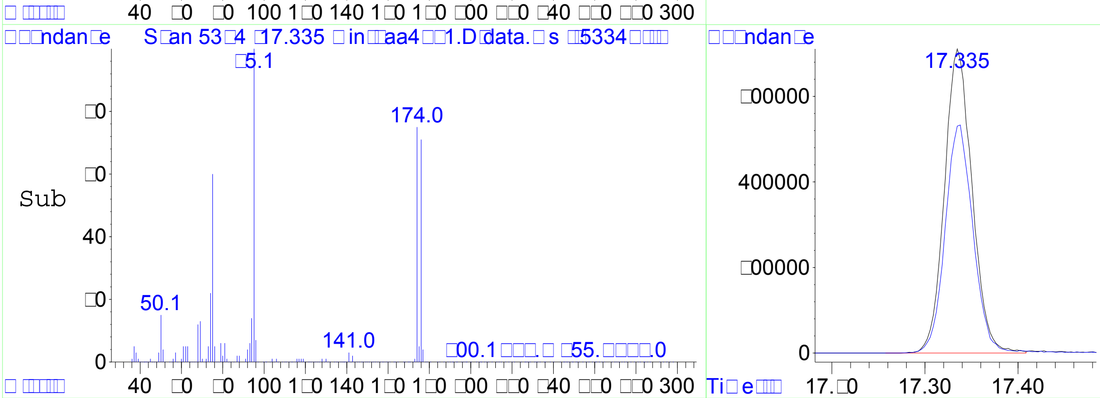




#64
Bromofluorobenzene (tune std)
Concen: 9.73 ppbV
RT: 17.335 min Scan# 5364
Delta R.T. -0.003 min
Lab File: aa4281.D
Acq: 28 Nov 2017 5:40 pm

Tgt Ion: 95 Resp: 1467924

Ion	Ratio	Lower	Upper
95	100		
174	75.3	61.5	92.3



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GC/MS Run Log

Instr□□ent ID□□□i□ent 7□□0□ □5□75□
□o□□ n□Reste□RTX□1 SN □□□5□7

Tar□et Dire□tory□D□□□i□ent □□MS□

Date of Analysis: 11□□□□□□□017
Date of Initial Calibration: □□1□□□017
SDG #: □17□0□□37

File #	Laboratory Sample ID	QC Check	Dilution Factor	Can #	Analyst	Injection Volume (cc)	Comments	*Make-up Air* Added to canister (cc)	Added for dilution (cc)	*Acquisition* Date	Time	*Room* Temp	BP "Hg	*TO-15 Standard* Working ID	Vendor ID (Lot#)
aa3441□□□	B□B	✓		□LM0□□4□□	JLS	50				**9/12/2017**	□□1□	74	30.07		403□40□□□3
aa344□d□□s	10 pp□□D□□S	✓		□□L07115□	JLS	50	not □sed							□□1□□□017	1□0□400□53□7□□1
aa3443std01	40 pp□□Std	✓		□□4□35□□	JLS	□00								□□1□□□017	1□0□400□53□7□□1
aa3444std0□	□0 pp□□Std	✓		□□4□35□□	JLS	100								□□1□□□017	1□0□400□53□7□□1
aa3445std03	10 pp□□Std	✓		□□4□35□□	JLS	50								□□1□□□017	1□0□400□53□7□□1
aa344□std04	□pp□□Std	✓		□□4□35□□	JLS	10								□□1□□□017	1□0□400□53□7□□1
aa3447std05	0.□pp□□Std	✓		□□4□35□□	JLS	1								□□1□□□017	1□0□400□53□7□□1
aa344□i□□ss	10 pp□□I□□SS	✓		□□L073030	JLS	50									403□40□□□□

□na□yst Na□e□Je□□S□□□itt
Si□nat□re□ Jeff Schmitt

S□per□isor Na□e□La□ren Jen□ins
Si□nat□re□

Integrated Analytical Laboratories
GC/MS Run Log

Instr□□ent ID□□□i□ent 7□□0□ □5□75□
□o□□ n□Reste□RTX□1 SN □□□5□7

Tar□et Dire□tory□D□□□i□ent □□MS□

Date of Analysis: 11□□□□□□□017
Date of Initial Calibration: □□1□□□017
SDG #: □17□0□□37

File #	Laboratory Sample ID	QC Check	Dilution Factor	Can #	Analyst	Injection Volume (cc)	Comments	Make-up Air: Added to canister (cc)	Make-up Air: Added for dilution (cc)	Acquisition: Date	Acquisition: Time	Room: Temp	Room: BP "Hg	TO-15 Standard: Working ID	TO-15 Standard: Vendor ID (Lot#)
aa3701□□□	B□B	✓		□LM0□□4□□	JLS	50				**10/42017**	□□□3	74	30.14		403□40□□□3
aa370□d□□s	10 pp□□D□□S	✓		□□L07115□	JLS	50								□□1□□□017	1□0□400□53□7□□1
aa3703□□s	10 pp□□L□S	✓		□□L073030	JLS	50									1□0□400□□5415□1
aa3704□□□	Met□od B□an□	✓		11□7	JLS	500									
aa3705r□□s	0.□pp□□RLL□S	✓		□□L07115□	JLS	1								□□1□□□017	1□0□400□53□7□□1
aa370□	□17□0□□47□01 x 100	✓	100	15□□	JLS	5	not □sed								
aa3707	□17□0□□47□01 x 10	✓	10	15□□	JLS	50									
aa370□	□17□0□□47□0□x 10	✓	10	1351	JLS	50									
aa370□	□17□0□□47□03 x 10	✓	10	1543	JLS	50									
aa3710	□□□	✓			JLS	500									
aa3711	□17□0□□4□□01	✓		4□5□	JLS	500									
aa371□	□17□0□□4□□□1	✓	d□p o□□17□0□□4□□01, □		JLS	500									
aa3713	□□□	✓			JLS	500									
aa3714	□17□0□□4□□01 x 100	✓	100	13□4	JLS	5									
aa3715	□17□0□□4□0□x 100	✓	100	155□	JLS	5	not □sed								
aa371□	□□□	✓			JLS	500									
aa3717	□1□□	✓			JLS	500									
aa37□□□□□□s	10 pp□□□□□□S	✓		□□4□35□□	JLS	50				10□4□□017	1□□0□			□□1□□□017	1□0□400□53□7□□1

□na□yst Na□e□Je□□S□□□itt
Si□nat□re□ Jeff Schmitt

S□per□isor Na□e□La□ren Jen□ins
Si□nat□re□

Integrated Analytical Laboratories LLC

Integrated Analytical Laboratories
GC/MS Run Log

Instr□□ent ID□□□i□ent 7□□0□ □5□75□
□o□□ n□Reste□RTX□1 SN □□□5□7

Tar□et Dire□tory□D□□□i□ent □□MS□

Date of Analysis: 11□□□10, 13, □□□□017
Date of Initial Calibration: □□1□□□017
SDG #: □17□0□5□5

File #	Laboratory Sample ID	QC Check	Dilution Factor	Can #	Analyst	Injection Volume (cc)	Comments	*Make-up Air* Added to canister (cc)	*Make-up Air* Added for dilution (cc)	*Acquisition* Date	*Acquisition* Time	*Room* Temp	*Room* BP "Hg	*TO-15 Standard* Working ID	*TO-15 Standard* Vendor ID (Lot#)
aa4□71□□□	B□B	✓		□LM0□□4□□	JLS	50				**11/28/2017**	□37	73	30.00		403□40□□□3
aa4□7□d□□s	10 pp□□D□□S	✓		□□L07115□	JLS	50								□□1□□□017	1□0□400□53□7□□1
aa4□73□□s	10 pp□□L□S	✓		□□L073030	JLS	50									1□0□400□□5415□1
aa4□74□□□	Met□od B□an□	✓		11□7	JLS	500									
aa4□75r□□s	0.□pp□□RLL□S	✓		□□L07115□	JLS	1								□□1□□□017	1□0□400□53□7□□1
aa4□7□	□17□0□□3□□01 x 5	✓	5	3□1□	JLS	100									
aa4□77	□17□0□5□5□01	✓		3□□3	JLS	500									
aa4□7□	□17□0□5□5□0□	✓		3014□	JLS	500									
aa4□7□	□17□0□5□5□03	✓		□0□4	JLS	500									
aa4□□0	□17□0□□3□□0□x 10	✓	10	□0□□	JLS	50									
aa4□□1	□17□0□□3□□□□x 10	✓	10	0□□3□□0□x 10	JLS	50									
aa4□□□	□□□	✓			JLS	500									
aa4□□3	□17□0□□3□□03	✓		□0□5	JLS	500									
aa4□□4	□□□	✓			JLS	500									
aa4□□5	□17□0□□3□□04	✓		□037	JLS	500									
aa4□□□	□17□0□□37□01 x 10	✓	10	30□7	JLS	50									
aa4□□7	□17□0□□37□0□x 10	✓	10	3□14	JLS	50									
aa4□□□	□17□0□□37□03 x 10	✓	10	4□71	JLS	50									
aa4□□□	□17□0□□37□04 x 10	✓	10	□753	JLS	50									
aa4□□0	□17□0□□37□05	✓		□□□□	JLS	500									
aa4□□1	□□□	✓			JLS	500									
aa4□□□□□□□s	10 pp□□ □□□□S	✓		□□4□35□□	JLS	50				11□□□□□017	□3□5□			□□1□□□017	1□0□400□53□7□□1
aa4301□□□	B□B	✓		□LM0□□4□□	JLS	50				**11/29/2017**	□□4□	73	□□.77		403□40□□□3
aa430□d□□s	10 pp□□D□□S	✓		□□L07115□	JLS	50								□□1□□□017	1□0□400□53□7□□1
aa4303□□s	10 pp□□L□S	✓		□□L073030	JLS	50									1□0□400□□5415□1
aa4304□□□	Met□od B□an□	✓		11□7	JLS	500									
aa4305r□□s	0.□pp□□RLL□S	✓		□□L07115□	JLS	1								□□1□□□017	1□0□400□53□7□□1
aa430□	305□	✓			JLS	500									
aa4307	□17□0□□37□01	✓		30□7	JLS	500									
aa430□	□17□0□□37□0□ x □0	✓	□0	3□14	JLS	□5									
aa430□	□17□0□□37□03	✓		4□71	JLS	500									
aa4310	□17□0□□37□04	✓		□753	JLS	500									
aa4311	□17□0□□3□□01 x 100	✓	100	50□□	JLS	5									
aa431□	□17□0□□3□□□1 x 100	✓	100	0□□3□□01 x 100	JLS	5									
aa4313	□17□0□□3□□0□x 100	✓	100	50□□	JLS	5									
aa4314	□17□0□□3□□03 x 100	✓	100	□035	JLS	5									
aa4315	□17□0□□3□□04 x 100	✓	100	□0□□	JLS	5									
aa431□	□17□0□□3□□05 x 100	✓	100	□□□□B	JLS	5									
aa4317	□17□0□□3□□0□x 100	✓	100	50□□	JLS	5									
aa431□	□□□	✓			JLS	500									
aa431□□□□□s	10 pp□□ □□□□S	✓		□□4□35□□	JLS	50				11□□□□□017	□□□05			□□1□□□017	1□0□400□53□7□□1

□na□yst Na□e□Je□□S□□□itt
Si□nat□re□ Jeff Schmitt

S□per□isor Na□e□La□ren Jen□ins
Si□nat□re□

IAL
Integrated Analytical Labs
273 Franklin Road
Randolph, NJ 07869

External Chain of Custody Record/
Field Test Data Sheet
USEPA Method TO-15

Contact Us: 973-361-4252
Fax: 973-366-5613
Web: www.ialonline.com

Carrier (check one): ____ IAL Courier ____ Client Courier ____ FedEx/UPS   pg ____ of ____

Client Contact Information	Project Information	Invoice Information
Company: EWMA	Project Name: Swivilier / 175 W Nyack Rd	Attn:
Address: 100 Misty Lane	Project Location (State): NY	Address:
Parsippany NJ 07054	Project Manager: Kevin Seise	
Phone: 973-560-1400	PM Signature:	
Fax: 973-560-0400	PM E-Mail: Kevin.Seise@ewma.com	PO #:
~~Report to:~~ Proj # 205548	Sampler: Joe Bukowski	Quote #:

Analysis Turnaround Time - IF NO TAT IS SPECIFIED, 2 WEEK TAT IS ASSUMED

IAL Standard: 2 weeks (10 business days)
Rush (**pre-approved by lab): 24hr** 48hr** 72hr** 96hr** 1wk**

Barometric Pressure Start ____ Stop ____

Sample Identification	Start DATE & TIME (24hr Clock)	End DATE & TIME (24hr Clock)	Starting Vacuum ("Hg)	Ending Vacuum ("Hg)	Starting Temp. (°F)	Ending Temp. (°F)	Outgoing Vacuum - Lab ("Hg)	Incoming Vacuum - Lab ("Hg)	Flow Regulator ID	Canister ID	Canister Size (1L or 6L)	Flow Controller Readout (cc/min)	EPA TO-15	NJDEP LLTO-15 (Includes 30 TICs)	Library Search (10, 20, or 30 TICs)	Other (Explain in Comments)	Regulatory/ NY Cat B / Full (NJ Required)	Reduced / NY Cat A Data Package	Results Only	Indoor Air	Ambient / Outdoor Air	Sub Slab / Soil Gas / Near Slab (Circle One)	Stack Emission / SVE System	High Concentrations Expected
SS-1	11/15/17 / 1138	11/15/17 / 1226	30↑	5	68	68	-29.0	-5.0	7316795	3027	6	99.5				X	X					X		
SS-2	11/15/17 / 1312	11/15/17 / 1358	28↑	5	72	72	-29.0	-5.0	A01600039	3814	6	96.5				X	X					X		
SS-3	11/15/17 / 1500	11/15/17 / 1542	27↑	5	72	72	-29.0	-5.0	A0160003-1	4871	6	100.1				X	X					X		
SS-4	11/15/17 / 1635	11/15/17 / 1728	30↑	5	68	68	-29.0	-5.0	7340542	2753	6	105.0				X	X					X		
Ambient	11/15/17 / 1320	11/15/17 / 1405	28↑	4	45	45	-29.0	-4.0	A0160009-6	3892	6	98.2				X	X			X			

Comments/ Special Analysis Instructions / QC Requirements:

NY State TO-15   Any Questions Please Call Kevin Seise   Log-In For TO-15 Analysis 09291701 100417AA 2162

Note: Hold or contingent samples may be designated by writing an "H" or "C" in the appropriate analysis box.

ALL FIELDS IN RED ARE REQUIRED

Shipping Information / Canister Preparation (for laboratory use only)

Individual Preparing Canisters / Title: P. Jenkins J. Walukiewicz / Air Department Sample Custodians
Lab Affixed Seal Number(s): IAL20170320-321
Date/Time Shipping Container Sealed: 11/13/17 1330

Laboratory Canister Certification
GC/MS Analyst Signature [signature]

IAL SDG#: 09837

External Chain of Custody

Relinquished	Received	Date / Time	Reason for Change of External Custody
[signature]	[signature]	11/13/17 1330	shipment from laboratory to client
[signature]		11/16/17 1500	
	Joseph J Walukiewicz III	11-16-17 16:00	Rec'd at aLL lab

Name/Title Resealing Shipping Container Name: ____   NJDEP Affixed Seal Number: ____
Date/Time Sample Shipping Container Resealed: ____   Individual Opening Sample Shipping Container: Padraic Jenkins / Joseph Walukiewicz
Date/Time Sample Shipping Container Opened: ____   Date/Time Internal Chain of Custody Initiated: ____

White and yellow - lab copies; Pink - client copy

Use appropriate care with IAL sampling equipment when sampling and packing for shipment. The client is responsible for all damage incurred to IAL equipment. Notify IAL if equipment is damaged upon receipt. Holding time before sampling is 15 days, after sampling is 30 days; failure to follow these times may result in data rejection by regulatory agencies. The lab will contact you if your COC is not clear, incomplete, or if discrepancies exist. The use of initials is not permitted on the COC except when correcting errors. 06/2014

Example Calculation (EPA TO-15)

$$\frac{\text{Area of Sample}}{\text{Area of Internal Standard}} \times \frac{\text{Concentration of Internal Standard (10 ppbv)}}{\text{Response Factor}} = \text{Concentration of Sample (ppbv)}$$

Conversion from ppbv to µg/m 3

$$\frac{\text{Concentration of Compound (ppbv)} \times \text{Molecular Weight of Compound}}{24.45} = \text{Concentration of Compound (µg/m3)}$$

Clean Canister Certification Report

Lab Sample Name:	**Clean Canister, Batch Master 2162**	**Data File:**	**AA3717**
Field Sample Name:	**Canister 2162**	**Date Analyzed:**	**10/4/2017**
Sample Volume:	**500ml**	**Matrix:**	**Air**

Canisters associated with this run: 2162,2753(used for E17-09837-04),2768,2892(used for E17-09837-05),3027(used for E17-09837-01),3814(used for E17-09837-02),4871(used for E17-09837-03),5079

Runs with this Clean Canister Certification:

Standard/Sample Run	Date/Time of Sample/Standard Injection
BFB [AA3701BFB]	10/04/2017 08:23
10 PPBV DCVS [AA3702DCVS]	10/04/2017 09:02
10 PPBV LCS [AA3703LCS]	10/04/2017 09:55
METHOD BLANK [AA3704BLK]	10/04/2017 10:33
02 PPBV RLLCS [AA3705RLLCS]	10/04/2017 11:14
CLEAN CAN CERTIFICATION, BATCH MASTER 2162 [AA3717]	10/04/2017 18:34
10 PPBV CCCVS [AA3728CCCVS]	10/04/2017 19:08

This canister has been certified clean, all compounds are below 0.2 ppbv.

Compound	CAS #	RL (ppbv)	Calculated Amount (ppbv)
Acetone	67-64-1	0.20	ND
Benzene	71-43-2	0.20	ND
Bromodichloromethane	75-27-4	0.20	ND
Bromoform	75-25-2	0.20	ND
Bromomethane	74-83-9	0.20	ND
1,3-Butadiene	106-99-0	0.20	ND
Chlorobenzene	108-90-7	0.20	ND
Chloroethane	75-00-3	0.20	ND
Chloroform	67-66-3	0.20	ND
Chloromethane	74-87-3	0.20	ND
Carbon disulfide	75-15-0	0.20	ND
Carbon tetrachloride	56-23-5	0.20	ND
Cyclohexane	110-82-7	0.20	ND
Dibromochloromethane	124-48-1	0.20	ND
1,2-Dibromoethane	106-93-4	0.20	ND
1,2-Dichlorobenzene	95-50-1	0.20	ND
1,3-Dichlorobenzene	541-73-1	0.20	ND
1,4-Dichlorobenzene	106-46-7	0.20	ND
Dichlorodifluoromethane	75-71-8	0.20	ND
1,1-Dichloroethane	75-34-3	0.20	ND
1,2-Dichloroethane	107-06-2	0.20	ND
1,1-Dichloroethene	75-35-4	0.20	ND
1,2-Dichloroethene (cis)	156-59-2	0.20	ND
1,2-Dichloroethene (trans)	156-60-5	0.20	ND
1,2-Dichloropropane	78-87-5	0.20	ND
1,3-Dichloropropene (cis)	10061-01-5	0.20	ND
1,3-Dichloropropene (trans)	10061-02-6	0.20	ND
1,2-Dichlorotetrafluoroethane	76-14-2	0.20	ND
1,4-Dioxane	123-91-1	0.20	ND
Ethylbenzene	100-41-4	0.20	ND
n-Heptane	142-82-5	0.20	ND
1,3-Hexachlorobutadiene	87-68-3	0.20	ND
n-Hexane	110-54-3	0.20	ND
Methylene chloride	75-09-2	0.20	ND

Clean Canister Certification Report

Lab Sample Name:	**Clean Canister, Batch Master 2162**	**Data File:**	**AA3717**
Field Sample Name:	**Canister 2162**	**Date Analyzed:**	**10/4/2017**
Sample Volume:	**500ml**	**Matrix:**	**Air**

Canisters associated with this run: 2162,2753(used for E17-09837-04),2768,2892(used for E17-09837-05),3027(used for E17-09837-01),3814(used for E17-09837-02),4871(used for E17-09837-03),5079

Runs with this Clean Canister Certification:

Standard/Sample Run	Date/Time of Sample/Standard Injection
BFB [AA3701BFB]	10/04/2017 08:23
10 PPBV DCVS [AA3702DCVS]	10/04/2017 09:02
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METHOD BLANK [AA3704BLK]	10/04/2017 10:33
02 PPBV RLLCS [AA3705RLLCS]	10/04/2017 11:14
CLEAN CAN CERTIFICATION, BATCH MASTER 2162 [AA3717]	10/04/2017 18:34
10 PPBV CCCVS [AA3728CCCVS]	10/04/2017 19:08

This canister has been certified clean, all compounds are below 0.2 ppbv.

Compound	CAS #	RL (ppbv)	Calculated Amount (ppbv)
Methyl ethyl ketone	78-93-3	0.20	ND
Methyl isobutyl ketone	108-10-1	0.20	ND
Methyl tert-butyl ether	1634-04-4	0.20	ND
Styrene	100-42-5	0.20	ND
Tert-butyl alcohol	75-65-0	0.20	ND
1,1,2,2-Tetrachloroethane	79-34-5	0.20	ND
Tetrachloroethene	127-18-4	0.20	ND
Toluene	108-88-3	0.20	ND
1,2,4-Trichlorobenzene	120-82-1	0.20	ND
1,1,1-Trichloroethane	71-55-6	0.20	ND
1,1,2-Trichloroethane	79-00-5	0.20	ND
Trichloroethene	79-01-6	0.20	ND
Trichlorofluoromethane	75-69-4	0.20	ND
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	0.20	ND
1,2,4-Trimethylbenzene	95-63-6	0.20	ND
1,3,5-Trimethylbenzene	108-67-8	0.20	ND
2,2,4-Trimethylpentane	540-84-1	0.20	ND
Vinyl bromide	593-60-2	0.20	ND
Vinyl chloride	75-01-4	0.20	ND
Xylenes (m&p)	179601-23-1	0.40	ND
Xylenes (o)	95-47-6	0.20	ND

```
Data Path : C:\DATA\10-04-17\
Data File : aa3717.D
Acq On    :  4 Oct 2017   6:34 pm
Operator  : jls
Sample    : 2162
Misc      : 2753, 2768, 2892, 3027, 3814, 4871, 5079
ALS Vial  : 19   Sample Multiplier: 1

Quant Time: Oct 13 09:42:38 2017
Quant Method : C:\msdchem\1\METHODS\0912.M
Quant Title  : TO-15 on the Agilent 7890A / 5975C
QLast Update : Tue Sep 12 13:00:02 2017
Response via : Initial Calibration
```

Compound	R.T.	QIon	Response	Conc Units	Dev(Min)
Internal Standards					
1) Bromochloromethane (IS)	7.746	130	446352	10.00 ppbV	0.00
38) 1,4-Difluorobenzene (IS)	9.801	114	1451786	10.00 ppbV	0.00
55) d-5 Chlorobenzene (IS)	15.141	117	1314300	10.00 ppbV	0.00
System Monitoring Compounds					
64) Bromofluorobenzene (tu...	17.337	95	1150688	10.00 ppbV	0.00

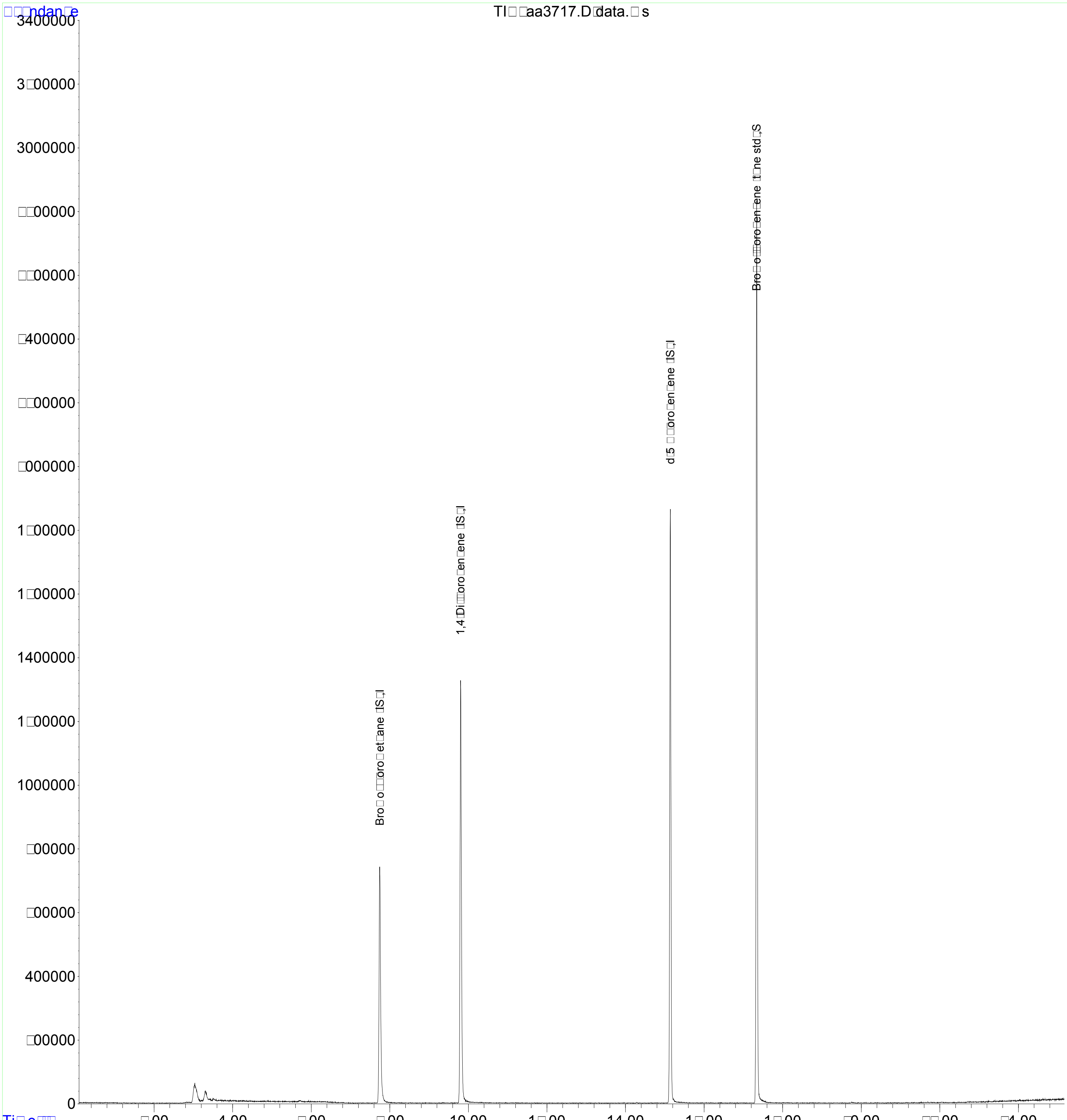
Target Compounds	Qvalue

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Quantitation Report (QT Reviewed)

Data Path : C:\DATA\10-04-17\
Data File : aa3717.D
Acq On : 4 Oct 2017 6:34 pm
Operator : jls
Sample : 2162
Misc : 2753, 2768, 2892, 3027, 3814, 4871, 5079
ALS Vial : 19 Sample Multiplier: 1

Quant Time: Oct 13 09:42:38 2017
Quant Method : C:\msdchem\1\METHODS\0912.M
Quant Title : TO-15 on the Agilent 7890A / 5975C
QLast Update : Tue Sep 12 13:00:02 2017
Response via : Initial Calibration



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