

PACIFIC groundwater GROUP

**DATA GAPS INVESTIGATION
DATA SUMMARY REPORT
CASCADE NATURAL GAS SITE
SUNNYSIDE, WASHINGTON**

June 2017

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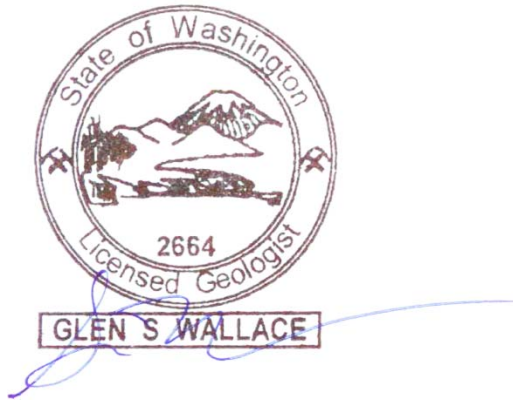
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SIGNATURE

This report, and Pacific Groundwater Group's work contributing to this report, were reviewed by the undersigned and approved for release.



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1.0 INTRODUCTION

This report describes a data gaps investigation conducted at the Cascade Natural Gas (CNG) site in Sunnyside, Washington. This work was completed consistent with the Data Gaps Sampling and Analysis Plan (SAP) approved by Ecology under the site Consent Decree (PGG, 2016). Data gaps work was conducted in part to assist in the evaluation of remedial alternatives for the site, which will be discussed in a future report.

PGG's work was performed using generally accepted hydrogeologic practices used at this time and in this vicinity, for exclusive application to the CNG site, and for the exclusive use by Yakima County and its legal counsel. This is in lieu of other warranties, express or implied.

1.1 GENERAL SITE INFORMATION

Site Name:	Cascade Natural Gas
Site Address:	512 East Decatur Avenue, Sunnyside, WA
Parcel Number:	23102924003
Facility/Site ID:	492
Cleanup Site ID:	4925
Consent Decree Number:	98-2-01173-3 (effective April 2, 1998)

2.0 FIELD INVESTIGATION

Field work conducted for the data gaps investigation consisted of soil and/or groundwater sampling by direct push at locations B-3 through B-17 on February 27, 2017, and a slug test at monitoring well CNGMW-12 on February 28, 2017. Monitoring well CNGMW-12 and borings B-1 and B-2 were completed during a 2013 investigation (PGG, 2015).

2.1 DIRECT PUSH SAMPLING

A direct push drill rig was used to collect soil cores in 5-foot intervals, and to set temporary wells for groundwater sampling. Direct push sampling was conducted consistent with the QAPP and standard EPA methods (EPA, 2005). Sampling began with a set of borings around the perimeter of the UST excavation at the locations shown in Figure 1. Analytical results are discussed in Section 3 and summarized in Tables 1 and 2. Additional step-out borings were advanced based on field screening results. Boring logs are in Appendix A.

2.1.1 Soil Sampling

Soil cores were advanced to between 15 and 20 feet below ground surface (bgs) and below the bottom of observed petroleum contamination at each location. Soil cores were field screened for odor and visual evidence of petroleum staining. Indigo-blue dye test kits were used on petroleum-impacted intervals of soil cores to field screen for the pres-

ence of LNAPL¹. Select field photos of cores and field test kits are included in Appendix B. Soil samples were collected directly from soil cores using clean gloved hands, and clean stainless steel spoons. Samples for volatile organic compound (VOC) and TPH-G analyses were collected consistent with EPA Method 5035.

Soil samples were collected directly into laboratory-provided containers and placed in coolers with ice. Chain of custody was maintained until samples were delivered to the analytical laboratory.

Soil recovery was poor at the water table in a number of borings (Appendix A). Due to poor soil core recovery it is not clear if LNAPL was present or not at some sampling locations. Soil analytical results may not reflect the maximum petroleum compound concentrations at those locations because lateral migration of product or a dissolved plume near a source are most likely to occur at and near the water table. At these locations, groundwater results are more indicative of the presence or absence of contamination.

2.1.2 Groundwater Sampling

Groundwater samples were collected at locations B-3, B-4, B-5, B-15, and B-17 (Figure 1). Temporary well screens were set from 10 to 15 feet bgs (9 to 14 feet bgs at B-17). The water table was approximately 8 feet bgs with approximately 1 foot of variation depending on location at the site. Disposable tubing was set to approximately 1 foot from the bottom of the temporary screen and purged with a peristaltic pump until turbidity stabilized. Flow rates of less than 100 mL/minute were used during collection of TPH-Gx and BTEX sample containers to minimize volatile loss during container filling. Groundwater samples were collected directly into laboratory-provided containers and placed in coolers with ice. Chain of custody was maintained until samples were delivered to the analytical laboratory.

Significant turbidity was present when collecting samples. Most screen intervals produced significant silt even after purging, letting turbidity stabilize, and purging at a low flow rate. This is common with direct push groundwater sampling. The inclusion of silt in groundwater sample containers may bias groundwater results high if residual LNAPL is present in the surrounding aquifer.

2.1.3 Utility Locate

A utility locate request was submitted to the ITIC Washington One Call service prior to beginning field work in both January and then remarked in March following delays due to snow and ice at the site. The public locate marked out water entering the CNG building from the south, a natural gas line entering the building from the west, a sanitary sewer line running up the centerline of the alley east of the building, an additional gas line in the western half of the alleyway with service tees to the Commercial Tire building, and the storm, sanitary and irrigation drain/sewer lines in Decatur Avenue. A private utility locate was conducted on February 27, which marked out a private electrical line running from the rear entrance door to two electrical outlets in the fenced service yard north of the

¹ Indigo blue dye field test kits include an indicator white ball that is white when diesel and gasoline range petroleum is not present (or below field testing limits of approximately 500 ug/L) and dyes blue when present. If LNAPL is present, blebs of product dye dark blue when the test kit is shaken.

building (not a direct path from building to outlets), the approximate location of the drain lines from the oil-water separator towards curb, and what appears to be an abandoned water line between the west side of the CNG building and 5th St. Due to the proximity, boring locations in the alley were confirmed as clear of the city sewer by Sunnyside Public Works personnel.

2.2 MONITORING WELL SAMPLING

On-site monitoring wells were sampled during the 2017 Q1 monitoring event on March 7, 2017. Data from that sampling event is interpreted along with the direct push samples in this report. Sampling conducted as part of the quarterly monitoring event is further discussed in the 2017 Q1 quarterly report.

3.0 ANALYTICAL RESULTS

Soil and groundwater samples were analyzed for the site constituents of concern (COCs) listed in the Consent Decree, including (Tables 1 and 2):

- TPH-Diesel Range Hydrocarbons (including motor-oil range in the TPH-Dx analysis)
- TPH-Gasoline Range Hydrocarbons
- BTEX: Benzene, Toluene, Ethylbenzene, Xylenes
- 1,2 dichloroethane (1,2 DCA)

Laboratory data reports are included in Appendix C. Direct push soil and groundwater samples were delivered to Analytical Resources, Inc. (ARI) in Tukwila, Washington for analysis on March 3, 2017. ARI is a Washington accredited laboratory for the selected methods.

Tables 1 and 2 also include groundwater data from the 2017 Q1 monitoring event for context, and the 2013 borings.

3.1 CLEANUP AND SCREENING LEVELS

Cleanup levels for site COCs are included in the 1998 Consent Decree for the site. Standard MTCA Clarc table values for site COCs have been revised since the signing of the Consent Decree. Given the likely presence of an upgradient source that is not a party to the Consent Decree, 2017 MTCA Method A standard table values are included in Tables 1 and 2 as screening levels.

3.2 SOIL RESULTS

Soil results from the data gaps investigation and earlier sampling conducted in 2013 are summarized in Table 1. Key results include:

- Gasoline-range petroleum hydrocarbon detections ranged up to 4,760 mg/kg with 13 of 16 samples exceeding the 2017 MTCA Method A screening level (100 mg/kg).

- Diesel-range petroleum hydrocarbon detections ranged up to 1,100 mg/kg with no samples exceeding the 2017 MTCA Method A screening level (2,000 mg/kg).
- Motor oil-range petroleum hydrocarbon detections ranged up to 321 mg/kg with no samples exceeding the 2017 MTCA Method A screening level (2,000 mg/kg).
- At least one BTEX compound exceeded MTCA Method A screening levels in 5 of 14 samples, all of which also had gasoline-range exceedances. Reporting limits were elevated above screening levels for a number of samples due to analytical interference from elevated concentrations of other petroleum compounds.
- 1,2 DCA did not exceed the 2017 MTCA Method A screening level in any analyzed soil samples.

Field test kits indicated the potential presence of residual non-aqueous liquid (NAPL) in soil samples near the former UST pit (Appendix B).

3.3 GROUNDWATER RESULTS

Groundwater results from the data gaps investigation and the 2017 Q1 quarterly monitoring event, plus one sample from 2013, are summarized in Table 2. Key results include:

- Gasoline-range petroleum hydrocarbon detections ranged up to 27.5 mg/L with 8 of 13 samples exceeding the 2017 MTCA Method A screening level (0.8 mg/L).
- Diesel-range petroleum hydrocarbon detections ranged up to 546 mg/L with 8 of 13 samples exceeding the 2017 MTCA Method A screening level (0.5 mg/L).
- Motor oil-range petroleum hydrocarbon detections ranged up to 30.3 mg/L with 5 of 13 samples exceeding the 2017 MTCA Method A screening level (0.5 mg/L).
- Benzene detections ranged up to 145 ug/L with 7 of 13 samples exceeding the 2017 MTCA Method A screening level (5 ug/L).
- Toluene and ethylbenzene did not exceed the 2017 MTCA Method A screening levels (1,600 ug/L and 800 ug/L) in any samples.
- Xylenes exceeded the 2017 MTCA Method A screening level in sampled B-4-W (1,450 ug/L).
- 1,2 DCA exceeded the 2017 MTCA Method A screening level (5 ug/L) in sample B-5-W (24.4 ug/L).

Samples B-17-W, CNGMW-1, CNGMW-6, and CNGMW-8 did not have any exceedances of the 1998 cleanup levels or 2017 screening levels. All other samples had an exceedance for at least two constituents. As discussed in Section 2, direct push groundwater samples may be biased high by artifactual turbidity during sampling.

3.4 QUALITY ASSURANCE / QUALITY CONTROL

Samples were received by Analytical Resources Inc. (ARI) on March 1, 2017. Quality Assurance/Quality Control (QA/QC) data were reviewed to assess the validity of the ana-

lytical results and the data were determined to be generally acceptable following the limits and guidelines set out in the Contract Laboratory Program (CLP) (USEPA, 2008; USEPA, 2010). BTEX and TPH samples were analyzed within holding times using acceptable EPA and standard methods. Some samples were diluted and reanalyzed resulting in raised reporting limits. Trip blanks were run for BTEX and TPH-G analyses and no contamination was found. Laboratory control samples were run for all analytes, and recoveries were within acceptable ranges for all samples.

The QA/QC data generally support the sample analytical results.

4.0 SLUG HYDRUALIC TESTING

Slug tests were conducted at CNGMW-12 to estimate hydraulic conductivity (Table 3; Appendix D). Slug tests were conducted by displacing water in wells, using a 7-foot, 1.315-inch diameter displacement rod. A Schlumberger micro-diver was placed at the bottom of the well to record changes in water level. Manual water level measurements were also collected during the test in case of transducer failure.

Water level data were analyzed using standard analytical solutions for hydraulic conductivity (Halford and Kunansky, 2002). Water level drawdown and recovery curves show an initial steep segment reflecting the sand pack influence and a later lower rate-of-change interval reflecting aquifer influence; aquifer hydraulic conductivity estimates are based on the later portions of the curve. Hydraulic conductivity estimates range from 0.29 to 0.9 ft/day with a median value of 0.39 ft/day (1.4×10^{-4} cm/second), consistent with observations of silty sand in soil cores (Appendix A)(Freeze and Cherry, 1979).

5.0 DISCUSSION

Data collected during the data gaps investigation and long-term monitoring at the site support a conceptual model including both the presence of an upgradient source likely located upgradient of B-4 and B-5, and the remaining source near the CNG UST excavation.

Groundwater exceedances at direct push borings B-4 and B-5 suggest that an additional source is located upgradient of those boring locations. Low concentrations in soil samples likely reflect poor recovery at the water table during sampling. The 1994 Remedial Investigation report (SECOR, 1994) indicated that the upgradient Tom Denchel Ford County [sic] automobile dealership (now Commercial Tire) could be a potential upgradient source based on observations of above ground features consistent with the presence of USTs. The property is not listed in current Ecology registered UST databases as of April 2017².

The upgradient source and associated groundwater plume from the upgradient source may have impacted the monitored natural attenuation (MNA) remedy implemented at the CNG site. The plume from the upgradient source has not been fully characterized at this point, but appears to contribute contaminant mass to the CNG source area. Geochemical

² <https://fortress.wa.gov/ecy/tcpwebreporting/report.aspx>

conditions likely created by the presence of petroleum impacts at the upgradient source and plume also likely reduce the assimilative capacity of natural attenuation at the CNG site, extending the monitored natural attenuation remediation timeframe.

The silt layer observed at approximately 13 feet bgs throughout the site appears to provide a lower boundary for petroleum contamination³. Qualitative observation of the silt unit and surrounding silty sands suggest that hydraulic conductivities of the silt unit are lower than surrounding silty sands suggest that hydraulic conductivities of the silt unit are lower than surrounding aquifer materials. With a typical depth to water of between 7 and 8 feet bgs, this leaves 5 to 6 feet of saturated aquifer between the water table and top of the silt unit.

5.1 IMPLICATIONS FOR CNG REMEDIAL ACTION

The upgradient source will likely need to be characterized before completing remedial design for the CNG site. An upgradient source with a likely commingled dissolved phase groundwater plume will decrease the effectiveness of remedial actions conducted at the CNG site, could recontaminate the CNG site, or otherwise increase the loading required for active remedies implemented at the CNG site.

6.0 REFERENCES

- Ecology, 2016. Letter from Mary Monahan to Don Anderson Re: Ecology Comments on Exceedance Report and Technical Memorandum. July 1, 2016.
- Environmental Protection Agency (EPA), 2005. Groundwater Sampling and Monitoring with Direct Push Technologies. OSWER No. 9200.1-51. EPA 540/R-04/005. August 2005.
- Halford, K., and Kuniandy, E., 2002. Documentation of Spreadsheets for the Analysis of Aquifer-Test and Slug-Test Data. U.S. Geological Survey Open-File Report 02-197.
- Pacific Groundwater Group [PGG], 2015. Cascade Natural Gas Site Revised Remedial Options, Sunnyside, Washington. April 24, 2015.
- SECOR, 1994. Remedial Investigation and Assessment of Groundwater Remedial Alternatives, Cascade Natural Gas Corporation, Sunnyside, Washington. November 3, 1994.

³ The absence of the silt layer in some boring logs is likely due to poor recovery.

Table 1. Soil Analytical Results

Cascade Natural Gas, Sunnyside, Washington

Sample ID	Depth	TPH-Gasoline	TPH-Diesel	TPH-Motor Oil	Benzene	Toluene	Ethylbenzene	Xylene-O	Xylene-M+P	1,2 DCA
<i>Units</i>	<i>feet</i>	<i>mg/kg</i>	<i>mg/kg</i>	<i>mg/kg</i>	<i>ug/kg</i>	<i>ug/kg</i>	<i>ug/kg</i>	<i>ug/kg</i>	<i>ug/kg</i>	<i>ug/kg</i>
B-1-13	13	3,000	1,100	48	--	--	--	--	--	--
B-2-12	12	2,900	640	20	--	--	--	--	--	--
B-3-13	13	932	558	31.9	67.9 U	67.9 U	1,820	67.9 U	1,330	67.9 U
B-4-14	14	7.36 U	6.82 U	13.6 U	1.45 U	1.45 U	1.45 U	1.45 U	1.45 U	1.45 U
B-5-13	13	8.73 U	6.73 U	13.5 U	1.27	1.1 U	1.39	1.1 U	1.62	5.07
B-6-15	15	4,760	385	25.4	99.7 U	99.7 U	2,260	99.7 U	288	99.7 U
B-7-12	12	2,190	125	17.8	770 U	5,510	15,500	13,600	22,900	770 U
B-8-11	11	2,030	198	14.1 U	850 U	904	13,200	850 U	24,700	850 U
B-9-11	11	1,240	58.6	16.7	78.8 U	78.8 U	1,160	98.7	642	78.8 U
B-10-9	9	2,700	336	20.5	101 U	101 U	907	101 U	343	101 U
B-11-10	10	576	58.4	13.8 U	2.05	2.39	22.6	1.76	2.95	1.28 U
B-12-11	11	9.76 U	6.85 U	13.7 U	1.29 U	1.29 U	1.29 U	1.29 U	1.29 U	1.29 U
B-13-9	9	251	635	27.5	1.87	3.7	4,400	36	213	1.59 U
B-14-12	12	1,410	715	29.4	9,270	1,550	17,600	594	29,700	266 U
B-15-10	10	916	122	14.5 U	96.2	282	3,770	175	2,870	72.1 U
B-16-11	11	304	221	321	141 U	175	5,510	1,250	11,200	141 U
1998 CUL	--	100	200	--	500	160,000	80,000	1,600,000	1,600,000	5
2017 SL	--	30/100*	2,000	2,000	30	7,000	6,000	9,000	9,000	10,990

2017 SL is MTCA Method A from CLARC Table

Bold indicates exceedance of 2017 criteria including detections and elevated reporting limits

Gray value indicates non-detect result

U: Constituent not detected at the reporting limit shown

Sample ID: <Borehole #> - <Depth> where the depth is approximate depth in feet bgs

* The lower CUL is applicable when benzene is present

1,2 DCA: 1,2 Dichloroethane

Locations B-1 and B-2 were sampled on August 7, 2013.

Table 2. Groundwater Analytical Results

Cascade Natural Gas, Sunnyside, Washington

Sample ID	Sample Date	Screen Interval	TPH-Gasoline	TPH-Diesel	TPH-Motor Oil	Benzene	Toluene	Ethylbenzene	Xylene-M+P	Xylene-O	1,2 DCA
<i>Units</i>		<i>ft bgs</i>	<i>mg/L</i>	<i>mg/L</i>	<i>mg/L</i>	<i>ug/L</i>	<i>ug/L</i>	<i>ug/L</i>	<i>ug/L</i>	<i>ug/L</i>	<i>ug/L</i>
<u>Direct Push Samples</u>											
B-3-W	2/27/2017	10-15	11.2	88.3	4.46	2.0 U	2.0 U	118	75.4	3.2	2.0 U
B-4-W	2/27/2017	10-15	27.1	1.04	0.543	29	59.3	462	1,450	245	0.2 U
B-5-W	2/27/2017	10-15	5.54	1.62	0.388	14	5.76	103	75.6	1.52	24.4
B-15-W	2/27/2017	10-15	27.5	546	30.3	44.2	53.9	452	231	12.9	2.54
B-17-W	2/27/2017	9-14	0.1 U	0.356	0.2 U	0.2 U	0.2 U	0.2 U	0.4 U	0.2 U	1.77
<u>2017 Q1 Monitoring Event</u>											
CNGMW-1	3/7/2017	5-15	0.1U	0.18	0.2U	0.2U	0.2U	0.2U	0.4U	0.2U	0.8
CNGMW-3	3/7/2017	5-15	1.24	0.724	0.222	145E	9.37	43.3	15.5	1.37	1.0U
CNGMW-4	3/7/2017	5-15	2.7	3.56	1.08	7.69	1.39	5.43	7.93	1.38	0.2U
CNGMW-5	3/7/2017	5-15	2.33	0.512	0.2U	9.47	3.8	45.4	40.7	3.11	0.68
CNGMW-6	3/7/2017	5-15	0.1U	0.1U	0.2U	0.2U	0.2U	0.2U	0.4U	0.2U	0.2U
CNGMW-8	3/7/2017	5-15	0.1U	0.1U	0.2U	0.2U	0.2U	0.2U	0.4U	0.2U	0.2U
CNGMW-9	3/7/2017	5-15	0.1U	0.807	0.318	0.2U	0.2U	0.2U	0.4U	0.2U	0.2U
<u>2013 Q2.5 Monitoring Event</u>											
CNGMW-12	8/7/2013	7-17	4.2	0.4	0.2U	82	14	120	74	3.8	1.0U
1998 CUL			1	1	--	5	1,600	800	16,000	16,000	5
2017 SL			0.8	0.5	0.5	5	1,000	700	1,000	1,000	5

CD CUL: Cleanup Level in 1998 Consent Decree Table 1; motor oil value from 2017 CLARC table

Bold indicates exceedance of 2017 criteria including detections and elevated reporting limits

Gray value indicates non-detect result.

U: Constituent not detected at the reporting limit shown

Sample ID: <Borehole #> - <W> where "W" indicates a water sample

1,2 DCA: 1,2 Dichloroethane

Table 3. Slug Hydraulic Test Results

Cascade Natural Gas, Sunnyside, Washington

Test	Slug	K-Value	K-value	Notes
<i>Units</i>	--	<i>ft/day</i>	<i>cm/s</i>	
Slug IN 1	In	0.29	1.0E-04	
Slug OUT 1	Out	0.39	1.4E-04	
Slug IN 2	In	0.38	1.3E-04	
Slug OUT 2	Out	0.9	3.2E-04	Poor data fit
	<i>Median</i>	<i>0.39</i>	<i>1.4E-04</i>	
	<i>Mean</i>	<i>0.49</i>	<i>1.7E-04</i>	

Tests conducted using 7-foot long 1.315-inch diameter slug.

Cleanup Levels: (1998 / 2017)
 (G) TPH- G: 1 / 0.8 mg/L
 (D) TPH-D: 1 / 0.5 mg/L

See Table 2 for Groundwater Analytical Results

Groundwater Flow Direction

Commercial Tire
 (Former Tom
 Denchel Ford)

B4 G 27.1 mg/L
 D 1.04 mg/L
 B5 G 5.54 mg/L
 D 1.62 mg/L

B17 G 0.1 U mg/L
 D 0.356 mg/L
 G 0.1 U mg/L
 D 0.81 mg/L

B6 G 11.2 mg/L
 D 88.3 mg/L

B2 G 4.2 mg/L
 D 0.4 mg/L

MW-1 G 0.1 U mg/L
 D 0.18 mg/L

B15 G 27.5 mg/L
 D 546 mg/L

MW-4 G 2.7 mg/L
 D 3.6 mg/L

MW-3 G 1.2 mg/L
 D 0.72 mg/L

MW-5 G 2.3 mg/L
 D 0.51 mg/L

MW-6 G 0.1 U mg/L
 D 0.1 U mg/L

MW-8 G 0.1 U mg/L
 D 0.1 U mg/L

Source: Esri, DigitalGlobe, GeoEye, i-cubed, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

K:\PONYAKIMA\CNG\GIS\InvestigationLocations.mxd 3/16/2017

- Monitoring Well
- Boring
- Manhole/Catch Basin
- Former USTs
- CNG Parcel
- Onsite Drain
- SVID Irrigation Drain
- Assumed Sanitary Sewer Line
- Assumed Storm Drain
- UST Excavation Extent

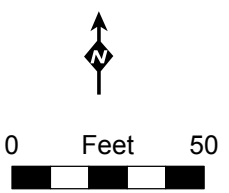




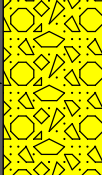

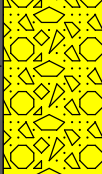
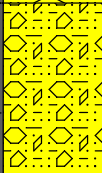
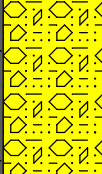
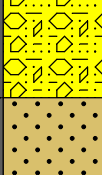


Figure 1
 Investigation
 Locations

**APPENDIX A
BORING LOGS**

Depth (ft)	Graphic Log	Samples		Description	Well Construction
		Sample ID	Type		
0				Asphalt	Asphalt Patch
2				Pit-run gravel FILL; multi-colored quartzite gravel up to 1.5 inches in sandy, silty matrix; poor core recovery due to cobbles clogging core shoe; no petroleum odor or staining in recovered materials	
4					Hydrated bentonite chips
6					
8					
10				Gray-brown, wet, silty SAND; petroleum staining and odor	
12					
14					
		B-3-13			
		B-3-W		Brown, wet, silty SAND	0.75-inch temporary PVC screen 10 to 15 ft bgs



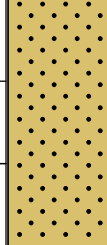
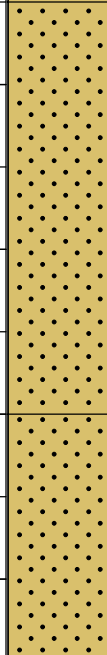



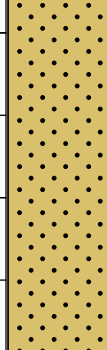
Address: 512 E Decatur Ave
City, State: Sunnyside, WA
Client: Yakima County
TRS: T10N R22E S25; SE1/4 of NW1/4
Horizontal Loc.: Not Surveyed
Consulting Firm: Pacific Groundwater Group
Logged by: Glen Wallace

Drilling Firm: ESN Northwest
Drilling Method: Direct Push
Well Tag ID: NA
DTW: NR
MP Elevation: 744 ft
Datum: NAVD 88
Date: 2/27/17

Figure
Boring Log and Abandonment
B-3

CNG
Data Gaps Investigation
JE1302.CNG



Depth (ft)	Graphic Log	Samples		Description	Well Construction
		Sample ID	Type		
0				Asphalt	Asphalt Patch
0 - 1				Gray, gravelly FILL; no petroleum staining or odor	
1 - 5				Brown, moist, silty SAND; no petroleum staining or odor	Hydrated bentonite chips
5 - 13		B-4-W		Brown, moist, silty SAND; poor recovery at water table interval; no petroleum staining or odor	
13 - 14		B-4-13		Dark brown, wet, silty SAND; no petroleum staining or odor	0.75-inch temporary PVC screen 10 to 15 ft bgs
14 - 15				Gray, wet, sandy SILT; faint petroleum solvent odor; gray color similar to petroleum staining, but may be natural color	
15 - 20				Brown, wet, silty SAND; no petroleum odor or staining	




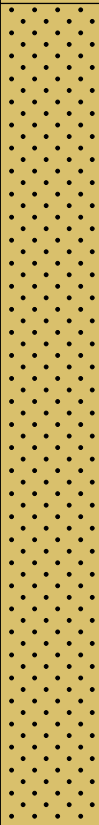
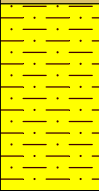

Address: 512 E Decatur Ave
City, State: Sunnyside, WA
Client: Yakima County
TRS: T10N R22E S25; SE1/4 of NW1/4
Horizontal Loc.: Not Surveyed
Consulting Firm: Pacific Groundwater Group
Logged by: Glen Wallace

Drilling Firm: ESN Northwest
Drilling Method: Direct Push
Well Tag ID: NA
DTW: NR
MP Elevation: 744 ft
Datum: NAVD 88
Date: 2/27/17

Figure
Boring Log and Abandonment
B-4

CNG
Data Gaps Investigation
JE1302.CNG



Depth (ft)	Graphic Log	Samples		Description	Well Construction
		Sample ID	Type		
0				Asphalt	Asphalt Patch
				Gray, gravelly FILL; no petroleum staining or odor	
2				Brown, moist, silty SAND; no petroleum staining or odor	Hydrated bentonite chips
6				Brown, moist to wet, silty SAND; no petroleum staining or odor; poor/no recovery at water table interval (assumed at 7 to 8 feet bgs)	
13		B-5-13		Gray, wet, sandy SILT; no petroleum odor, gray color similar to petroleum staining, but may be natural color.	
14		B-5-W		Brown, moist, silty SAND; no petroleum staining or odor	0.75-inch temporary PVC screen 10 to 15 ft bgs



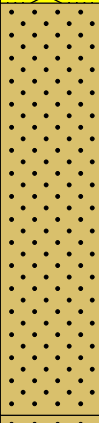

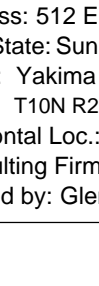

Address: 512 E Decatur Ave
City, State: Sunnyside, WA
Client: Yakima County
TRS: T10N R22E S25; SE1/4 of NW1/4
Horizontal Loc.: Not Surveyed
Consulting Firm: Pacific Groundwater Group
Logged by: Glen Wallace

Drilling Firm: ESN Northwest
Drilling Method: Direct Push
Well Tag ID: NA
DTW: NR
MP Elevation: 744 ft
Datum: NAVD 88
Date: 2/27/17

Figure
Boring Log and Abandonment
B-5

CNG
Data Gaps Investigation
JE1302.CNG



Depth (ft)	Graphic Log	Samples		Description	Well Construction
		Sample ID	Type		
0				Asphalt	Asphalt Patch
2				Pit-run gravel FILL; multi-colored quartzite gravel up to 1.5 inches in sandy, silty matrix; poor core recovery due to cobbles clogging core shoe; no petroleum odor or staining in recovered materials	
4					Hydrated bentonite chips
6					
8					
10				Gray-brown, wet, silty SAND; gray petroleum staining and odor; poor recovery with gravel lodged in shoe from pit run fill	
12					
14					
16		B-6-15		Brown, wet, silty SAND; very poor recovery with no petroleum odor or staining	
18					
20					





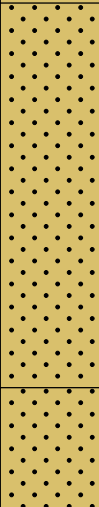


Address: 512 E Decatur Ave
City, State: Sunnyside, WA
Client: Yakima County
TRS: T10N R22E S25; SE1/4 of NW1/4
Horizontal Loc.: Not Surveyed
Consulting Firm: Pacific Groundwater Group
Logged by: Glen Wallace


Drilling Firm: ESN Northwest
Drilling Method: Direct Push
Well Tag ID: NA
DTW: NR
MP Elevation: 744 ft
Datum: NAVD 88
Date: 2/27/17

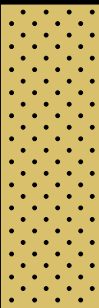
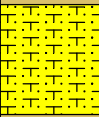
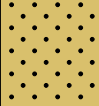
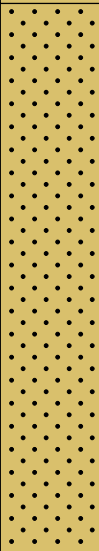
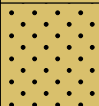
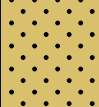
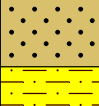
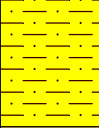

**Figure
Boring Log and Abandonment
B-6**

CNG
Data Gaps Investigation
JE1302.CNG



Depth (ft)	Graphic Log	Samples		Description	Well Construction
		Sample ID	Type		
0				Asphalt	Asphalt Patch
0 - 5.5				Brown, moist, silty SAND	
5.5 - 6.0					Hydrated bentonite chips
6.0 - 10.0				Brown to gray, wet, silty SAND; very poor recovery with strong petroleum odor and staining	
10.0 - 12.0				Gray, wet, silty SAND; strong petroleum odor and staining	
12.0 - 12.5					
12.5 - 14.0				Brown, wet, silty SAND; no petroleum odor or staining	

<p>Address: 512 E Decatur Ave City, State: Sunnyside, WA Client: Yakima County TRS: T10N R22E S25; SE1/4 of NW1/4 Horizontal Loc.: Not Surveyed Consulting Firm: Pacific Groundwater Group Logged by: Glen Wallace</p>	<p>Drilling Firm: ESN Northwest Drilling Method: Direct Push Well Tag ID: NA DTW: NR MP Elevation: 744 ft Datum: NAVD 88 Date: 2/27/17</p>	<p>Figure Boring Log and Abandonment B-7</p> <p>CNG Data Gaps Investigation JE1302.CNG</p> 
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Depth (ft)	Graphic Log	Samples		Description	Well Construction
		Sample ID	Type		
0				Asphalt	Asphalt Patch
0 - 3.5				Brown, moist, silty SAND; no petroleum stain or odor	
3.5 - 4				Wet, brown, silty interval; no petroleum stain or odor	Hydrated bentonite chips
4 - 5.5				Brown, moist, silty SAND; no petroleum stain or odor	
5.5 - 10				Brown, moist to wet, silty SAND; no petroleum stain or odor	
10 - 11.5				Brown, wet, silty SAND; sheen on core, strong diesel-like odor	
11.5 - 12.5					
12.5 - 13.5				Gray, wet, SILT; no petroleum odor	
13.5 - 14				Brown, wet, silty SAND; no petroleum stain or odor	
14 - 14.5				Brown, wet, silty SAND; no petroleum stain or odor	

B-8-11

Address: 512 E Decatur Ave
City, State: Sunnyside, WA
Client: Yakima County
TRS: T10N R22E S25; SE1/4 of NW1/4
Horizontal Loc.: Not Surveyed
Consulting Firm: Pacific Groundwater Group
Logged by: Glen Wallace


Drilling Firm: ESN Northwest
Drilling Method: Direct Push
Well Tag ID: NA
DTW: NR
MP Elevation: 744 ft
Datum: NAVD 88
Date: 2/27/17

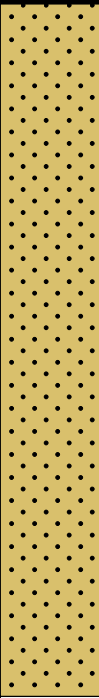
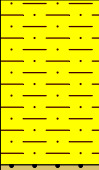
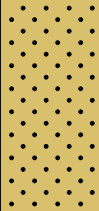
**Figure
Boring Log and Abandonment
B-8**


CNG
Data Gaps Investigation
JE1302.CNG



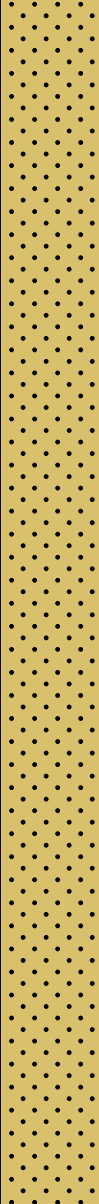









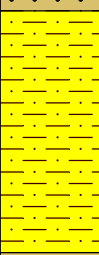

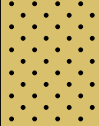



Depth (ft)	Graphic Log	Samples		Description	Well Construction
		Sample ID	Type		
0				Asphalt	Asphalt Patch
2				Brown, moist, silty SAND; no petroleum stain or odor	
4					Hydrated bentonite chips
6					
8					
10		B-10-9		Black, wet, silty SAND; black petroleum stained and odor	
12				Brown, wet silty SAND	
14				Gray, wet, sandy SILT; no petroleum odor	
14				Brown, wet, silty SAND; no petroleum odor or staining	

<p>Address: 512 E Decatur Ave City, State: Sunnyside, WA Client: Yakima County TRS: T10N R22E S25; SE1/4 of NW1/4 Horizontal Loc.: Not Surveyed Consulting Firm: Pacific Groundwater Group Logged by: Glen Wallace</p>	<p>Drilling Firm: ESN Northwest Drilling Method: Direct Push Well Tag ID: NA DTW: NR MP Elevation: 744 ft Datum: NAVD 88 Date: 2/27/17</p>	<p>Figure Boring Log and Abandonment B-10</p> <p>CNG Data Gaps Investigation JE1302.CNG</p> 
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Depth (ft)	Graphic Log	Samples		Description	Well Construction
		Sample ID	Type		
0				Asphalt	Asphalt Patch
0 - 6.5				Brown, moist, silty SAND; no petroleum stain or odor	
6.5 - 10				No Recovery	
10 - 10.5		B-11-10		Brown, wet, silty SAND; sheen on core	
10.5 - 13				Gray, wet, sandy SILT; no petroleum odor	
13 - 14				Brown, wet, silty SAND; no petroleum odor or staining	

<p>Address: 512 E Decatur Ave City, State: Sunnyside, WA Client: Yakima County TRS: T10N R22E S25; SE1/4 of NW1/4 Horizontal Loc.: Not Surveyed Consulting Firm: Pacific Groundwater Group Logged by: Glen Wallace</p>	<p>Drilling Firm: ESN Northwest Drilling Method: Direct Push Well Tag ID: NA DTW: NR MP Elevation: 744 ft Datum: NAVD 88 Date: 2/27/17</p>	<p>Figure Boring Log and Abandonment B-11</p> <p>CNG Data Gaps Investigation JE1302.CNG</p> 
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Depth (ft)	Graphic Log	Samples		Description	Well Construction	
		Sample ID	Type			
0				Asphalt		Asphalt Patch
2				Brown, moist to wet, silty SAND; no petroleum stain or odor		
4						
6						
8						Hydrated bentonite chips
10						
12		B-12-11		Gray, wet, sandy SILT; no petroleum odor		
14				Brown, wet, silty SAND; no petroleum odor or staining		



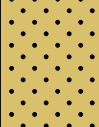
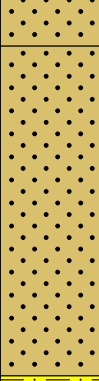
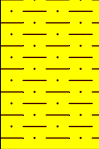

Address: 512 E Decatur Ave
City, State: Sunnyside, WA
Client: Yakima County
TRS: T10N R22E S25; SE1/4 of NW1/4
Horizontal Loc.: Not Surveyed
Consulting Firm: Pacific Groundwater Group
Logged by: Glen Wallace

Drilling Firm: ESN Northwest
Drilling Method: Direct Push
Well Tag ID: NA
DTW: NR
MP Elevation: 744 ft
Datum: NAVD 88
Date: 2/27/17

**Figure
Boring Log and Abandonment
B-12**


CNG
Data Gaps Investigation
JE1302.CNG

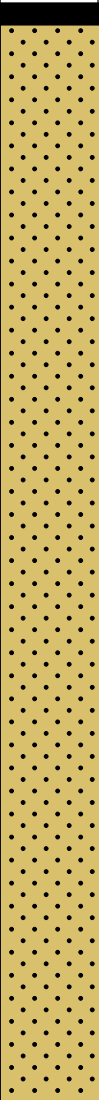

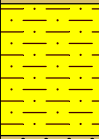
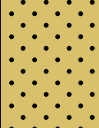


Depth (ft)	Graphic Log	Samples		Description	Well Construction	
		Sample ID	Type			
0				Asphalt		Asphalt Patch
0 - 5.5				Brown, moist, silty SAND; no petroleum stain or odor		
5.5 - 9.5				Brown, moist, silty SAND; light petroleum staining and odor; poor recovery this interval		
9.5 - 10.5						
10.5 - 13.5				Brown, wet, silty SAND; no petroleum staining or odor		
13.5 - 14.5				Gray, wet, sandy SILT; no petroleum odor		
14.5 - 15.5				Brown, wet, silty SAND; no petroleum odor or staining		

B-13-9

Hydrated bentonite chips

<p>Address: 512 E Decatur Ave City, State: Sunnyside, WA Client: Yakima County TRS: T10N R22E S25; SE1/4 of NW1/4 Horizontal Loc.: Not Surveyed Consulting Firm: Pacific Groundwater Group Logged by: Glen Wallace</p>	<p>Drilling Firm: ESN Northwest Drilling Method: Direct Push Well Tag ID: NA DTW: NR MP Elevation: 744 ft Datum: NAVD 88 Date: 2/27/17</p>	<p>Figure Boring Log and Abandonment B-13</p> <p>CNG Data Gaps Investigation JE1302.CNG</p> 
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Depth (ft)	Graphic Log	Samples		Description	Well Construction
		Sample ID	Type		
0				Asphalt	Asphalt Patch
0 - 10				Brown, moist to wet, silty SAND; no petroleum stain or odor	
10 - 12				Brown, wet, silty SAND; sheen on core, petroleum odor; TPH field test kit indicates possible product blebs and residual LNAPL	
12 - 13.5				Gray, wet, sandy SILT	
13.5 - 14				Brown, wet, silty SAND; no petroleum odor or staining	

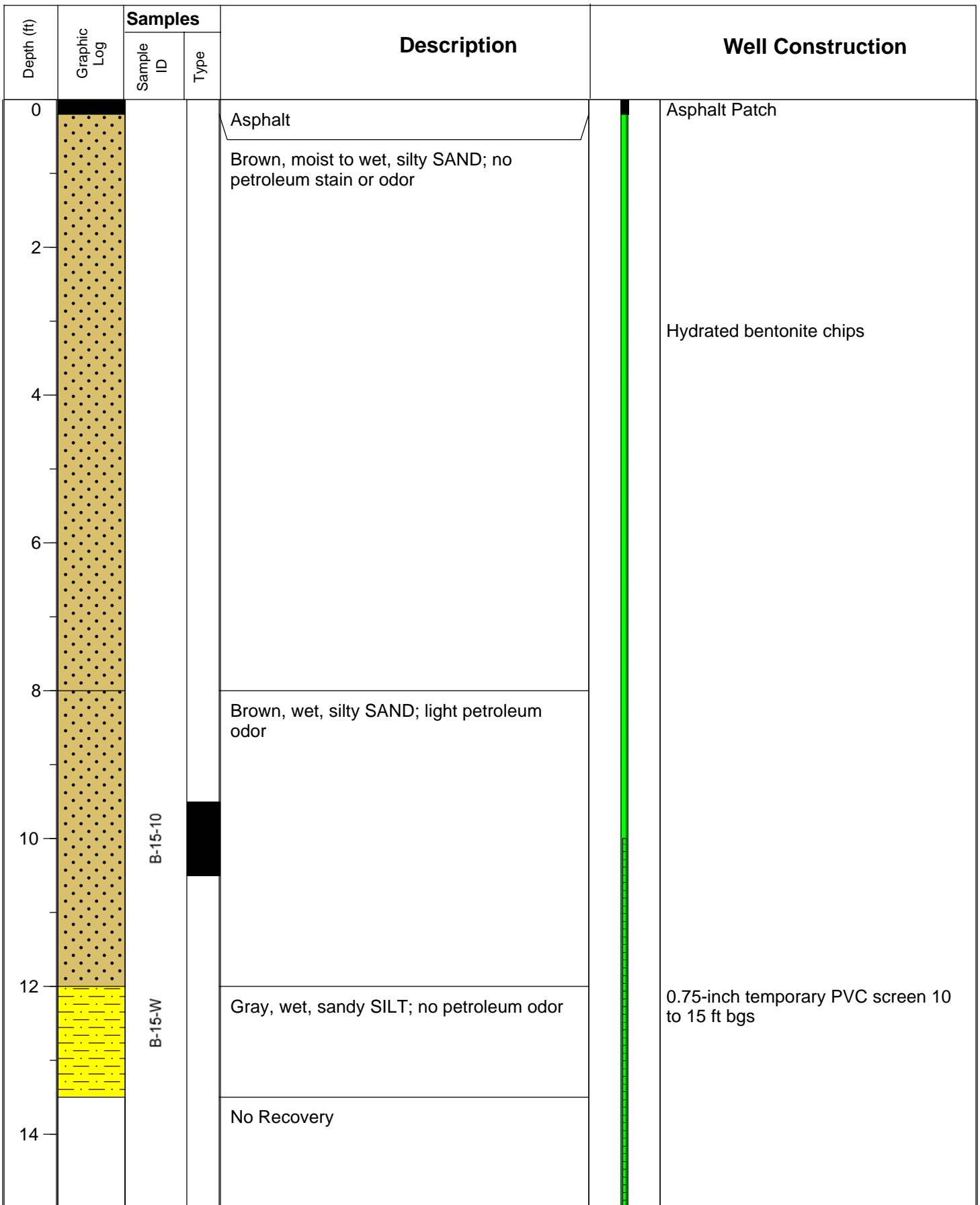
B-14-12


Address: 512 E Decatur Ave
City, State: Sunnyside, WA
Client: Yakima County
TRS: T10N R22E S25; SE1/4 of NW1/4
Horizontal Loc.: Not Surveyed
Consulting Firm: Pacific Groundwater Group
Logged by: Glen Wallace

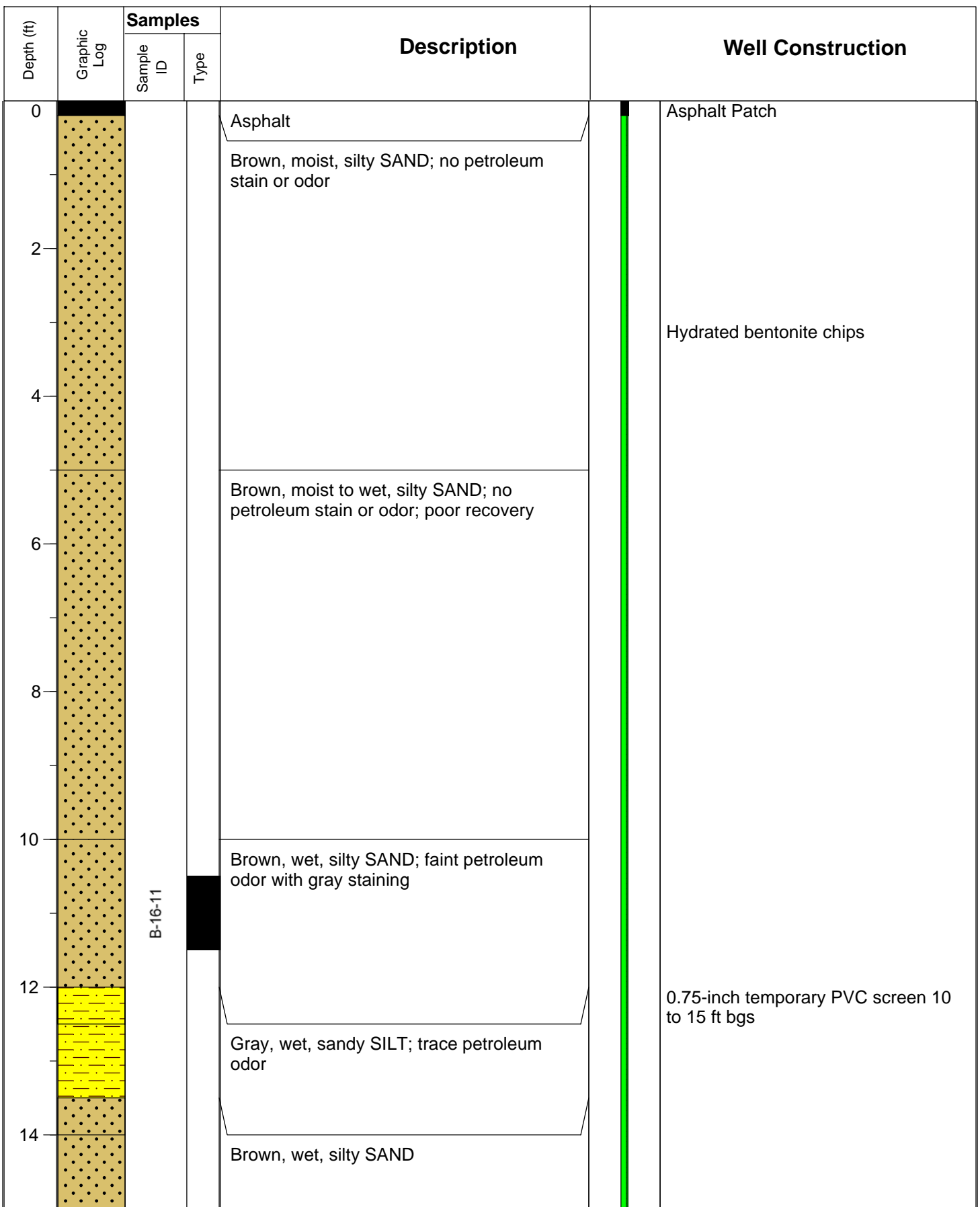
Drilling Firm: ESN Northwest
Drilling Method: Direct Push
Well Tag ID: NA
DTW: NR
MP Elevation: 744 ft
Datum: NAVD 88
Date: 2/27/17


Figure
Boring Log and Abandonment
B-14
CNG
Data Gaps Investigation
JE1302.CNG

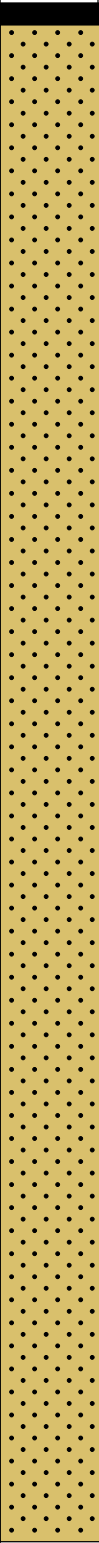





<p>Address: 512 E Decatur Ave City, State: Sunnyside, WA Client: Yakima County TRS: T10N R22E S25; SE1/4 of NW1/4 Horizontal Loc.: Not Surveyed Consulting Firm: Pacific Groundwater Group Logged by: Glen Wallace</p>	<p>Drilling Firm: ESN Northwest Drilling Method: Direct Push Well Tag ID: NA DTW: NR MP Elevation: 744 ft Datum: NAVD 88 Date: 2/27/17</p>	<p>Figure Boring Log and Abandonment B-15</p> <p>CNG Data Gaps Investigation JE1302.CNG</p> 
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<p>Address: 512 E Decatur Ave City, State: Sunnyside, WA Client: Yakima County TRS: T10N R22E S25; SE1/4 of NW1/4 Horizontal Loc.: Not Surveyed Consulting Firm: Pacific Groundwater Group Logged by: Glen Wallace</p>	<p>Drilling Firm: ESN Northwest Drilling Method: Direct Push Well Tag ID: NA DTW: NR MP Elevation: 744 ft Datum: NAVD 88 Date: 2/27/17</p>	<p>Figure Boring Log and Abandonment B-16</p> <p>CNG Data Gaps Investigation JE1302.CNG</p> 
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Depth (ft)	Graphic Log	Samples		Description	Well Construction
		Sample ID	Type		
0				Asphalt No soil core collected	Asphalt Patch
2					
4					Hydrated bentonite chips
6					
8					
10					
12					0.75-inch temporary PVC screen 9 to 14 ft bgs
14					

B-17-W

<p>Address: 512 E Decatur Ave City, State: Sunnyside, WA Client: Yakima County TRS: T10N R22E S25; SE1/4 of NW1/4 Horizontal Loc.: Not Surveyed Consulting Firm: Pacific Groundwater Group Logged by: Glen Wallace</p>	<p>Drilling Firm: ESN Northwest Drilling Method: Direct Push Well Tag ID: NA DTW: NR MP Elevation: 744 ft Datum: NAVD 88 Date: 2/27/17</p>	<p>Figure Boring Log and Abandonment B-17</p> <p>CNG Data Gaps Investigation JE1302.CNG</p> 
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APPENDIX B
SITE PHOTOGRAPHS



B-6 at 15ft bgs: Note lack of dye coloration on indicator bead indicating that petroleum concentrations at 15 ft bgs, below silt layer at 13-14 ft bgs, are not sufficient to be detected in the field test kit.



B-3 near water table: note blue dye on indicator bead and blue LNAPL blebs in suspension



Boring B-4: note light gray silty interval in far right core (10-15 ft bgs), and poor recovery in middle core (5 to 10 ft bgs), which would span the water table interval. The top of each core interval is at the far end of the table. The light gray silt interval did not exhibit obvious petroleum odor, and the coloration appears to be natural, and consistent in all locations/borings it is observed in at the site.



Drilling at location B-5. For reference, monitoring well CNGMW-9 is the white flush mount monument in the foreground approximately 10 feet left of the dumpster.



Boring B-8. Note blue dye staining on indicator bead and blue LNAPL blebs in suspension.



Boring B-10. Heavily petroleum-stained interval is at base of recovered core from 5-10 foot core interval, and the top of the impacted interval is likely located near the water table (approximately 8 ft bgs).



Boring B-11. Note lack of staining on indicator bead.



Boring B-14 with blue on indicator bead, but no suspended LNAPL blebs.

APPENDIX C
LABORATORY DATA REPORTS



Analytical Resources, Incorporated
Analytical Chemists and Consultants

15 March 2017

Glen Wallace
Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle, WA 98102

RE: Cascade Natural Gas

Please find enclosed sample receipt documentation and analytical results for samples from the project referenced above.

Sample analyses were performed according to ARI's Quality Assurance Plan and any provided project specific Quality Assurance Plan. Each analytical section of this report has been approved and reviewed by an analytical peer, the appropriate Laboratory Supervisor or qualified substitute, and a technical reviewer.

Should you have any questions or problems, please feel free to contact us at your convenience.

Associated Work Order(s)
17C0009

Associated SDG ID(s)
N/A

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed in the enclosed Narrative. ARI, an accredited laboratory, certifies that the report results for which ARI is accredited meets all the requirements of the accrediting body. A list of certified analyses, accreditations, and expiration dates is included in this report.

Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or his/her designee, as verified by the following signature.

Analytical Resources, Inc.

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Kelly Bottem, Client Services Manager



Chain of Custody Record & Laboratory Analysis Request

ARI Assigned Number: **17C0009** Turn-around Requested: **SFA** Page: **2** of **2**

ARI Client Company: **P6G** Phone: **(206) 329-0141** Date: **3/27/17** Ice Present?

Client Contact: **Glen Wallace** No. of Coolers: **TPH-6** Cooler Temps: **TPH-DX**



Analytical Resources, Incorporated
Analytical Chemists and Consultants
4611 South 134th Place, Suite 100
Tukwila, WA 98168
206-695-6200 206-695-6201 (fax)
www.arilabs.com

Sample ID	Date	Time	Matrix	No. Containers	Analysis Requested				Notes/Comments
					TPH-DX	TPH-6	1,2,4-CA	BTEX	
B-11-10	3/27/17	1420	S	6	X	X	X	X	
B-10-9		1440	S	6	X	X	X	X	
B-12-11		1500	S	6	X	X	X	X	
B-13-9		1520	S	6	X	X	X	X	
B-15-10		1545	S	6	X	X	X	X	
B-14-12		1640	S	6	X	X	X	X	
B-15-L		1600	LW	6	X	X	X	X	1x Amber only
B-16-11		1700	S	6	X	X	X	X	
B-17-LW		1730	LW	24	X	X	X	X	MS/MSD
Comments/Special Instructions	Relinquished by: (Signature) <i>[Signature]</i> Received by: (Signature) <i>[Signature]</i> Printed Name: Brian Warner Printed Name: Company: ARI Company:				Relinquished by: (Signature) Received by: (Signature) Printed Name: Company: Date & Time: 3/17 1105				
Soil TPH-DX with Silicagel Cleanup, please.									

Limits of Liability: ARI will perform all requested services in accordance with appropriate methodology following ARI Standard Operating Procedures and the ARI Quality Assurance Program. This program meets standards for the industry. The total liability of ARI, its officers, agents, employees, or successors, arising out of or in connection with the requested services, shall not exceed the invoiced amount for said services. The acceptance by the client of a proposal for services by ARI release ARI from any liability in excess thereof, not withstanding any provision to the contrary in any contract, purchase order or co-signed agreement between ARI and the Client.

Sample Retention Policy: All samples submitted to ARI will be appropriately discarded no sooner than 90 days after receipt or 60 days after submission of hardcopy data, whichever is longer, unless alternate retention schedules have been established by work-order or contract.

Chain of Custody Record & Laboratory Analysis Request

ARI Assigned Number: _____ Turn-around Requested: Std Page: 1 of _____
 ARI Client Company: PGC Phone: 206325-0141 Date: 2/27/17 Ice Present? _____
 Client Contact: Orlen Wellace Cooler Temps: _____
 Client Project Name: CNG No. of Coolers: _____

Analytical Resources, Incorporated
 Analytical Chemists and Consultants
 4611 South 134th Place, Suite 100
 Tukwila, WA 98168
 206-695-6200 206-695-6201 (fax)
 www.arilabs.com



Sample ID	Date	Time	Matrix	No. Containers	Analysis Requested				Notes/Comments
					TPH-D	TPH-C	BTEX	VOC	
B-3-13	2/27/17	1045	S	6	X	X	X	X	Pass. b.c. LUNAPL
B-3-14		1050	W	7	X	X	X	X	"
B-7-		1140	S	6	X	X	X	X	
B-6-15		1020	S	6	X	X	X	X	
B-4-14		1215	S	6	X	X	X	X	
B-4-14		1220	W	7	X	X	X	X	
B-5-		1305	S	6	X	X	X	X	
B-5-W		1310	W	7	X	X	X	X	
B-9-11		1340	S	6	X	X	X	X	
B-9-		1400	S	6	X	X	X	X	
Comments/Special Instructions	Relinquished by: (Signature) <u>[Signature]</u> Received by: (Signature) <u>[Signature]</u> Printed Name: <u>Orlen Wellace</u> Printed Name: <u>Brian Warner</u> Company: <u>PGC</u> Company: <u>ARI</u> Date & Time: <u>2/1/17 1105</u> Date & Time: <u>2/1/17 1105</u>								

Limits of Liability: ARI will perform all requested services in accordance with appropriate methodology following ARI Standard Operating Procedures and the ARI Quality Assurance Program. This program meets standards for the industry. The total liability of ARI, its officers, agents, employees, or successors, arising out of or in connection with the requested services, shall not exceed the invoiced amount for said services. The acceptance by the client of a proposal for services by ARI release ARI from any liability in excess thereof, not withstanding any provision to the contrary in any contract, purchase order or co-signed agreement between ARI and the Client.

Sample Retention Policy: All samples submitted to ARI will be appropriately discarded no sooner than 90 days after receipt or 60 days after submission of hardcopy data, whichever is longer, unless alternate retention schedules have been established by work-order or contract.



Cooler Receipt Form

ARI Client: PGG

Project Name: _____

COC No(s): _____ NA

Delivered by: Fed-Ex UPS Courier Hand Delivered Other: _____

Assigned ARI Job No: 17C0009

Tracking No: _____ NA

Preliminary Examination Phase:

Were intact, properly signed and dated custody seals attached to the outside of to cooler? YES NO

Were custody papers included with the cooler? YES NO

Were custody papers properly filled out (ink, signed, etc.) YES NO

Temperature of Cooler(s) (°C) (recommended 2.0-6.0 °C for chemistry) 2.8 1.9

Time: 1205

PM
3/1/2017

If cooler temperature is out of compliance fill out form 00070F

Temp Gun ID#: 0005276

Cooler Accepted by: [Signature]

Date: 3-1-17

Time: 1105

Complete custody forms and attach all shipping documents

Log-In Phase:

Was a temperature blank included in the cooler? YES NO

What kind of packing material was used? ... Bubble Wrap Wet Ice Gel Packs Baggies Foam Block Paper Other: _____

Was sufficient ice used (if appropriate)? NA YES NO

Were all bottles sealed in individual plastic bags? YES NO

Did all bottles arrive in good condition (unbroken)? YES NO

Were all bottle labels complete and legible? YES NO

Did the number of containers listed on COC match with the number of containers received? YES NO PM 3/1/2017

Did all bottle labels and tags agree with custody papers? YES NO

Were all bottles used correct for the requested analyses? YES NO

Do any of the analyses (bottles) require preservation? (attach preservation sheet, excluding VOCs)... NA YES NO

Were all VOC vials free of air bubbles? NA YES NO

Was sufficient amount of sample sent in each bottle? YES NO

Date VOC Trip Blank was made at ARI NA

Was Sample Split by ARI : NA YES Date/Time: _____ Equipment: _____ Split by: _____

Samples Logged by: PM Date: 3/1/2017 Time: 12:45

**** Notify Project Manager of discrepancies or concerns ****

Sample ID on Bottle	Sample ID on COC	Sample ID on Bottle	Sample ID on COC
<u>B7-12 B-7-12</u>	<u>B-7-</u>	<u>B-13-</u>	<u>B-13-9</u>
<u>B-5-13</u>	<u>B-5-</u>		
<u>B-9-11</u>	<u>B-9-</u>		
<u>B-12-</u>	<u>B-12-11</u>		

Additional Notes, Discrepancies, & Resolutions:
~~COC does not include an entry for two amber 500ML bottles labeled as~~
 Client did not fill out relinquishing form on the ~~COC~~ second page of the COC.
 PM 3/1/17

By: PM Date: 3/1/2017

Small Air Bubbles = 2mm	Peabubbles 2-4 mm	LARGE Air Bubbles > 4 mm	Small → "sm" (< 2 mm)
			Peabubbles → "pb" (2 to < 4 mm)
			Large → "lg" (4 to < 6 mm)
			Headspace → "hs" (> 6 mm)



Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
B-3-13	17C0009-01	Solid	27-Feb-2017 10:45	01-Mar-2017 11:05
B-3-W	17C0009-02	Water	27-Feb-2017 10:50	01-Mar-2017 11:05
B-7-12	17C0009-03	Solid	27-Feb-2017 11:40	01-Mar-2017 11:05
B-6-15	17C0009-04	Solid	27-Feb-2017 10:20	01-Mar-2017 11:05
B-4-14	17C0009-05	Solid	27-Feb-2017 12:15	01-Mar-2017 11:05
B-4-W	17C0009-06	Water	27-Feb-2017 12:20	01-Mar-2017 11:05
B-5-13	17C0009-07	Solid	27-Feb-2017 13:05	01-Mar-2017 11:05
B-5-W	17C0009-08	Water	27-Feb-2017 13:10	01-Mar-2017 11:05
B-8-11	17C0009-09	Solid	27-Feb-2017 13:40	01-Mar-2017 11:05
B-9-11	17C0009-10	Solid	27-Feb-2017 14:00	01-Mar-2017 11:05
B-11-10	17C0009-11	Solid	27-Feb-2017 14:20	01-Mar-2017 11:05
B-10-9	17C0009-12	Solid	27-Feb-2017 14:40	01-Mar-2017 11:05
B-12-11	17C0009-13	Solid	27-Feb-2017 15:00	01-Mar-2017 11:05
B-13-9	17C0009-14	Solid	27-Feb-2017 15:20	01-Mar-2017 11:05
B-15-10	17C0009-15	Solid	27-Feb-2017 15:45	01-Mar-2017 11:05
B-14-12	17C0009-16	Solid	27-Feb-2017 16:40	01-Mar-2017 11:05
B-15-W	17C0009-17	Water	27-Feb-2017 16:00	01-Mar-2017 11:05
B-16-11	17C0009-18	Solid	27-Feb-2017 17:00	01-Mar-2017 11:05
B-17-W	17C0009-19	Water	27-Feb-2017 17:30	01-Mar-2017 11:05



Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

Case Narrative

Volatiles - EPA Method SW8260C

The sample(s) were run within the recommended holding times.

Initial and continuing calibrations were within method requirements with the exception of the 3/9/17 CCAL which is out of control low for 1,2-Dichloroethane. All associated samples for the 3/9/17 analysis that contain 1,2-Dichloroethane have been flagged with a "Q" qualifier.

Internal standard areas were within limits.

The surrogate percent recoveries were within control limits with the exception of 1,2-Dichlorobenzene-d4 which is out of control and flagged as such for sample 17C0009-14.

The method blank(s) were clean at the reporting limits.

The LCS/LCSD percent recoveries and RPD were within control limits.

Diesel Range Organics - WA-Ecology Method NW-TPHD

The sample(s) were extracted and analyzed within the recommended holding times.

Initial and continuing calibrations were within method requirements.

The surrogate percent recoveries were within control limits.

The method blank(s) were clean at the reporting limits.

The LCS percent recoveries were within control limits.

Gasoline Range Organics - WA-Ecology Method NW-TPHG

The sample(s) were run within the recommended holding times.

Initial and continuing calibrations were within method requirements.

The surrogate percent recoveries were within control limits.

The method blank(s) were clean at the reporting limits.



Pacific Groundwater Group
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Reported:
15-Mar-2017 15:28

The LCS percent recoveries were within control limits.



Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

B-3-13
17C0009-01 (Solid)

Volatile Organic Compounds

Method: EPA 8260C

Sampled: 02/27/2017 10:45

Instrument: NT5

Analyzed: 06-Mar-2017 20:54

Sample Preparation:

Preparation Method: EPA 5035 (Methanol Extraction)

Preparation Batch: BFC0220

Sample Size: 6.794 g (wet)

Dry Weight: 5.00 g

Prepared: 06-Mar-2017

Final Volume: 5 mL

% Solids: 73.60

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
1,2-Dichloroethane	107-06-2	50	67.9	ND	ug/kg	U
Benzene	71-43-2	50	67.9	ND	ug/kg	U
Toluene	108-88-3	50	67.9	ND	ug/kg	U
Ethylbenzene	100-41-4	50	67.9	1820	ug/kg	
m,p-Xylene	179601-23-1	50	67.9	1330	ug/kg	
o-Xylene	95-47-6	50	67.9	ND	ug/kg	U
<i>Surrogate: Dibromofluoromethane</i>			30-160 %	86.5	%	
<i>Surrogate: 1,2-Dichloroethane-d4</i>			80-124 %	97.9	%	
<i>Surrogate: Toluene-d8</i>			80-120 %	111	%	
<i>Surrogate: 4-Bromofluorobenzene</i>			80-120 %	106	%	
<i>Surrogate: 1,2-Dichlorobenzene-d4</i>			80-120 %	104	%	



Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

B-3-13
17C0009-01 (Solid)

Volatile Organic Compounds

Method: NWTPhg Sampled: 02/27/2017 10:45
Instrument: NT3 Analyzed: 06-Mar-2017 13:05

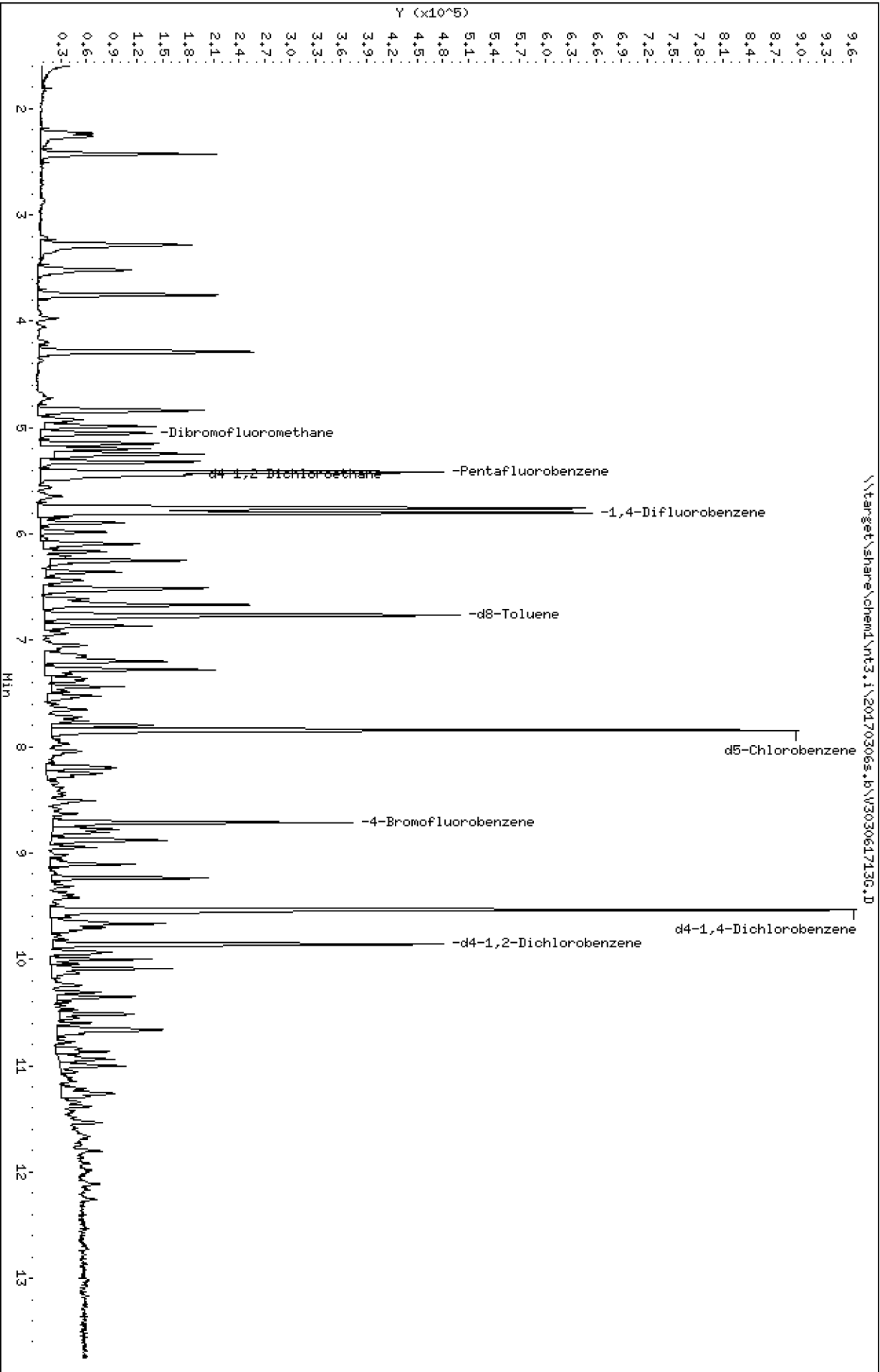
Sample Preparation: Preparation Method: EPA 5035 (Methanol Extraction) Dry Weight: 5.00 g
Preparation Batch: BFC0131 Sample Size: 6.794 g (wet)
Prepared: 06-Mar-2017 Final Volume: 5 mL % Solids: 73.60

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Gasoline Range Organics (Tol-Nap)		5000	679000	932000	ug/kg	D
HC ID: GRO						
Surrogate: Toluene-d8			80-120 %	101	%	
Surrogate: 4-Bromofluorobenzene			78-123 %	99.9	%	

Data File: \\target\share\chend\nt3,1\20170306s,b\303061713G.D
Date : 06-HRR-2017 13:05
Client ID:
Sample Info: 17C0009-01

Column phase: RTXWMS

Instrument: nt3,1
Operator: PC
Column diameter: 0.18



ARI Labs, Inc.

8260C 10 ml purge

Data file : \\target\share\chem1\nt3.i\20170306s.b\V303061713G.D
 Lab Smp Id: 17C0009-01
 Inj Date : 06-MAR-2017 13:05
 Operator : PC Inst ID: nt3.i
 Smp Info : 17C0009-01
 Misc Info : 15-
 Comment :
 Method : \\target\share\chem1\nt3.i\20170306s.b\8260C022417.m
 Meth Date : 06-Mar-2017 07:32 Paul Quant Type: ISTD
 Cal Date : 14-FEB-2017 18:50 Cal File: V302141718.D
 Als bottle: 12
 Dil Factor: 1.00000
 Integrator: HP RTE Compound Sublist: gsurr.sub
 Target Version: 4.14
 Processing Host: ORGDATA11

Concentration Formula: Amt * DF * Pv / Sa * CpndVariable

Name	Value	Description
DF	1.000	Dilution Factor
Pv	10.000	Purge Volume (mL)
Sa	10.000	Sample Amount (mL)
Cpnd Variable		Local Compound Variable

Compounds	QUANT	SIG	RT	EXP RT	REL RT	RESPONSE	CONCENTRATIONS	
							ON-COLUMN (ug/L)	FINAL (ug/L)
\$ 27 Dibromofluoromethane	111		5.052	5.053	(0.932)	58236	5.05842	5.058
* 32 Pentafluorobenzene	168		5.419	5.420	(1.000)	245054	10.0000	
\$ 33 d4-1,2-Dichloroethane	65		5.446	5.446	(1.005)	69366	5.32544	5.325
* 37 1,4-Difluorobenzene	114		5.802	5.803	(1.000)	393790	10.0000	
\$ 43 d8-Toluene	98		6.764	6.765	(1.166)	241278	5.04712	5.047
* 53 d5-Chlorobenzene	117		7.843	7.844	(1.000)	391594	10.0000	
\$ 62 4-Bromofluorobenzene	174		8.715	8.715	(1.111)	82372	4.99667	4.997
* 76 d4-1,4-Dichlorobenzene	152		9.533	9.534	(1.000)	209415	10.0000	
\$ 79 d4-1,2-Dichlorobenzene	152		9.858	9.858	(1.034)	103698	5.27570	5.276

ARI Labs, Inc.

INTERNAL STANDARD COMPOUNDS
 AREA AND RT SUMMARY

Instrument ID: nt3.i Calibration Date: 03-MAR-2017
 Lab File ID: V303061713G.D Calibration Time: 21:57
 Lab Smp Id: 17C0009-01
 Analysis Type: VOA Level: LOW
 Quant Type: ISTD Sample Type: WATER
 Operator: PC
 Method File: \\target\share\chem1\nt3.i\20170306s.b\8260C022417.m
 Misc Info: 15-

Test Mode:

Use Initial Calibration Level 5.
 If Continuing Cal. use Initial Cal. Level 5

COMPOUND	STANDARD	AREA LIMIT		SAMPLE	%DIFF
		LOWER	UPPER		
32 Pentafluorobenzon	317912	158956	635824	245054	-22.92
37 1,4-Difluorobenze	512039	256020	1024078	393790	-23.09
53 d5-Chlorobenzene	494052	247026	988104	391594	-20.74
76 d4-1,4-Dichlorobe	282154	141077	564308	209415	-25.78

COMPOUND	STANDARD	RT LIMIT		SAMPLE	%DIFF
		LOWER	UPPER		
32 Pentafluorobenzon	5.42	4.92	5.92	5.42	-0.01
37 1,4-Difluorobenze	5.80	5.30	6.30	5.80	-0.01
53 d5-Chlorobenzene	7.84	7.34	8.34	7.84	-0.01
76 d4-1,4-Dichlorobe	9.53	9.03	10.03	9.53	-0.01

AREA UPPER LIMIT = +100% of internal standard area.
 AREA LOWER LIMIT = - 50% of internal standard area.
 RT UPPER LIMIT = + 0.50 minutes of internal standard RT.
 RT LOWER LIMIT = - 0.50 minutes of internal standard RT.

ARI Labs, Inc.

RECOVERY REPORT

Client Name: Client SDG: 20151005
Sample Matrix: LIQUID Fraction: VOA
Lab Smp Id: 17C0009-01
Level: LOW Operator: PC
Data Type: MS DATA SampleType: SAMPLE
SpikeList File: allspike.spk Quant Type: ISTD
Sublist File: gsurr.sub
Method File: \\target\share\chem1\nt3.i\20170306s.b\8260C022417.m
Misc Info: 15-

SURROGATE COMPOUND	AMOUNT ADDED ug/L	AMOUNT RECOVERED ug/L	% RECOVERED	LIMITS
\$ 27 Dibromofluorometha	5.000	5.058	101.17	80-120
\$ 33 d4-1,2-Dichloroeth	5.000	5.325	106.51	80-128
\$ 43 d8-Toluene	5.000	5.047	100.94	80-120
\$ 62 4-Bromofluorobenze	5.000	4.997	99.93	80-120
\$ 79 d4-1,2-Dichloroben	5.000	5.276	105.51	80-120

REVIEW SUMMARY FOR FILE - V303061713G.D

Lab ID: 17C0009-01

nt3.i, 20170306s.b\8260C022417.m, 06-MAR-2017 13:05

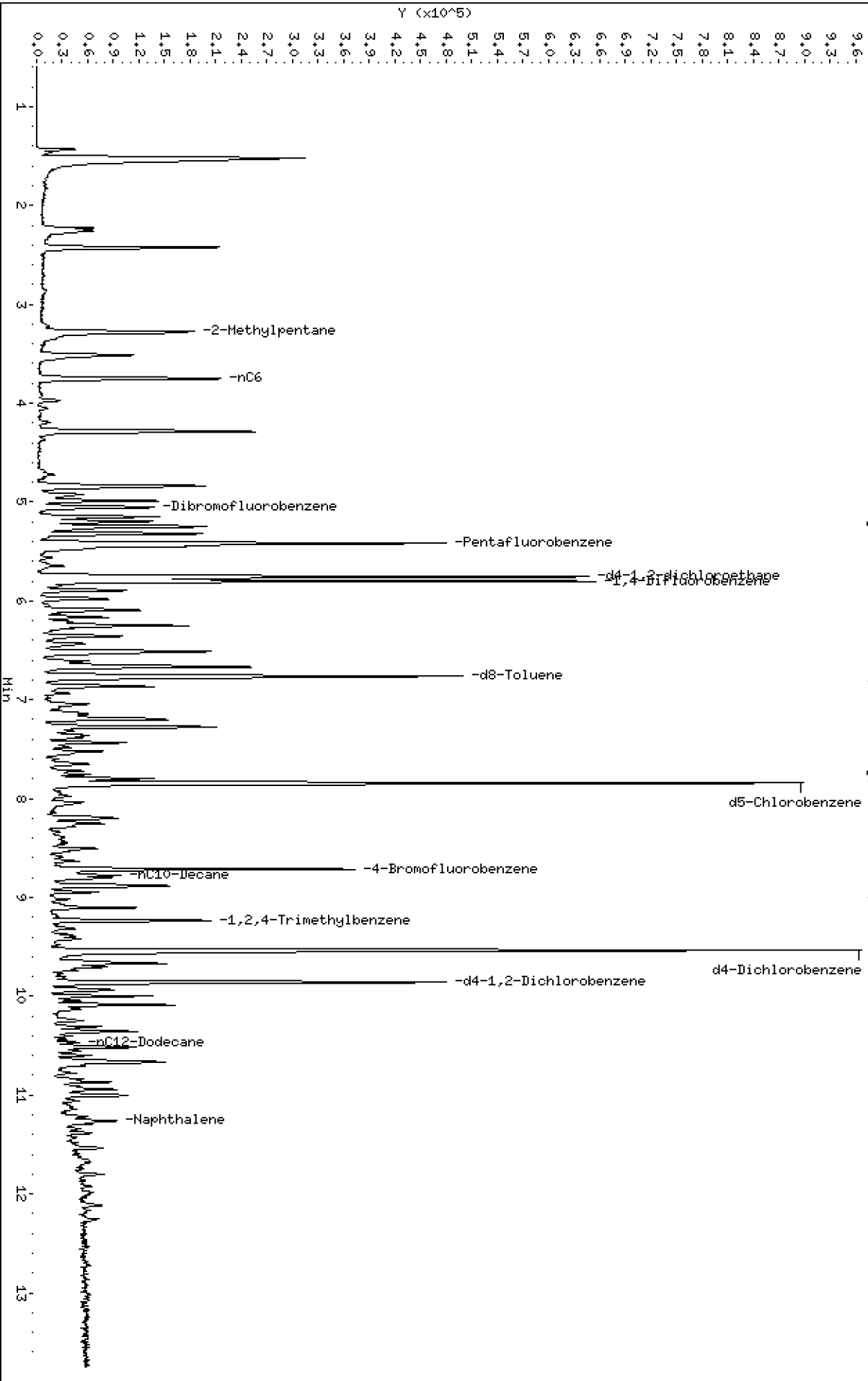
RT CO-ELUTION COMPOUNDS

Data File: \\target\share\chend\nt3.1\20170306g.b\303061713G.D
Date : 06-MAR-2017 13:05
Client ID:
Sample Info: 17C0009-01

Column phase: RTXWMS

Instrument: nt3.1
Operator: PC
Column diameter: 0.18

\\target\share\chend\nt3.1\20170306g.b\303061713G.D



Analytical Resources Inc.
GC/MS Gas Quantitation Report

Data file: 20170306g.b/V303061713G.D
Method: \20170306g.b\NWTPHG.m
Instrument: nt3.i
Gas Ical Date: 14-Feb-2017
Injection Date: 06-MAR-2017 13:05

ARI ID: 17C0009-01
Client ID:
Matrix: WATER
Dilution Factor: 1.000
Operator: PC

=====

GASOLINE HYDROCARBONS

Range	RF	Total Area*	Amount (ug/mL)
-----	----	-----	-----
WAGas Tol-C12 (6.70 to 10.57)	52141375	6198566	0.119
8015C 2MP-TMB (3.17 to 9.34)	87713511	10638772	0.121
AK101 nC6-nC10 (3.65 to 8.68)	61260787	8728760	0.142
NWTPHG Tol-Nap (6.70 to 11.36)	54123058	7425900	0.137

M Indicates manual integration within range

* Surrogate areas are subtracted from Total Area

NW Gas Range Subtracted Peaks

6.765	941338	d8-Toluene
8.715	531692	4-Bromofluorobenzene
9.534	1543685	d4-Dichlorobenzene
7.844	1376881	d5-Chlorobenzene
9.858	676722	d4-1,2-Dichlorobenzene



Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

B-3-13
17C0009-01 (Solid)

Petroleum Hydrocarbons

Method: NWTPH-Dx

Sampled: 02/27/2017 10:45

Instrument: FID3

Analyzed: 03-Mar-2017 13:23

Sample Preparation:

Preparation Method: EPA 3546 (Microwave)

Preparation Batch: BFC0023

Sample Size: 10.26 g (wet)

Dry Weight: 7.55 g

Prepared: 02-Mar-2017

Final Volume: 1 mL

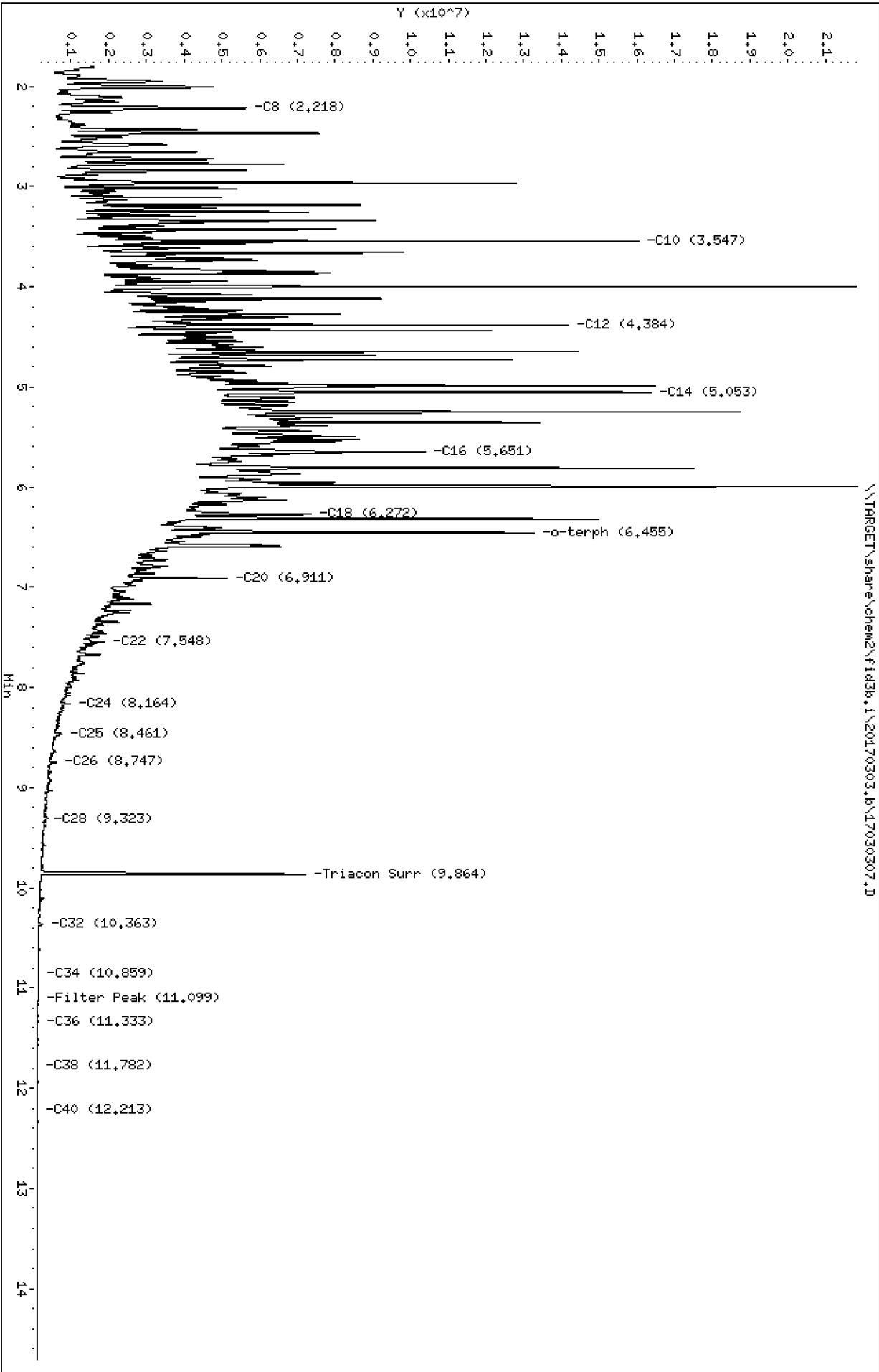
% Solids: 73.60

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Diesel Range Organics (C12-C24)		1	6.62	781	mg/kg	E
HC ID: DIESEL						
Motor Oil Range Organics (C24-C38)		1	13.2	31.9	mg/kg	
HC ID: RRO						
Surrogate: <i>o</i> -Terphenyl			50-150 %	88.0	%	

Data File: \\TARGET\share\chem2\fid3b,1\20170303,b\17030307.D
Date: 03-HR-2017 13:23
Client ID:
Sample Info: 17C0009-01

Column phase: RTX-1

Instrument: fid3b,1
Operator: ML
Column diameter: 0.25



Analytical Resources Inc.
TPH Quantitation Report

Data file: 20170303.b/17030307.D
Method: 20170303.b\FID3TPH.m
Instrument: fid3b.i
Operator: ML
Report Date: 03/06/2017
Macro: FID3_022817

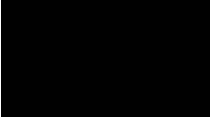
ARI ID: 17C0009-01
Client ID:
Injection: 03-MAR-2017 13:23
Dilution Factor: 1

FID:3B RESULTS

Compound	RT	Shift	Height	Area	Method	Range	Total Area	Conc
Toluene	1.890	0.009	1129973	3011894	WATPHG	(Tol-C12)	440625127	20260.8
C8	2.218	0.005	5558532	10238304	WATPHD	(C12-C24)	917030202	5897.6
C10	3.547	0.014	15950546	11783937	WATPHM	(C24-C38)	33004169	240.8
C12	4.384	0.013	14066206	14461751				
C14	5.053	0.015	16265135	27115788				
C16	5.651	0.016	10272493	20870355				
C18	6.272	0.018	7270237	15772449				
C20	6.911	0.011	5042234	5730316				
C22	7.548	0.002	1800482	2511322				
C24	8.164	-0.004	857594	1249714				
C25	8.461	-0.005	642521	2090718				
C26	8.747	-0.007	503703	754456				
C28	9.323	0.008	207620	127057				
C32	10.363	-0.012	161710	192860				
C34	10.859	-0.012	49500	139138				
Filter Peak	11.099	-0.000	34728	74333				
C36	11.333	-0.011	21802	40885				
o-terph	6.455	0.015	9602467	8702907				
Triacon Surr	9.864	-0.004	7028038	7039935				

Range Times: NW Diesel(4.422 - 8.218) NW Gas(1.831 - 4.422) NW M.Oil(8.218 - 11.845)
AK102(3.483 - 8.416) AK103(8.416 - 11.394) Jet A(3.483 - 6.304)

Surrogate	Area	Amount	%Rec
o-Terphenyl	8702907	39.6	88.0
Triacontane	7039935	36.8	81.9



Analyte	RF	Curve Date
o-Terph Surr	219872.3	28-FEB-2017
Triacon Surr	191068.8	28-FEB-2017
Gas	21747.6	xx-xx-xxxx
Diesel	155491.0	28-FEB-2017
Motor Oil	137039.0	28-FEB-2017



Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

B-3-13
17C0009-01RE1 (Solid)

Petroleum Hydrocarbons

Method: NWTPH-Dx

Sampled: 02/27/2017 10:45

Instrument: FID3

Analyzed: 04-Mar-2017 02:13

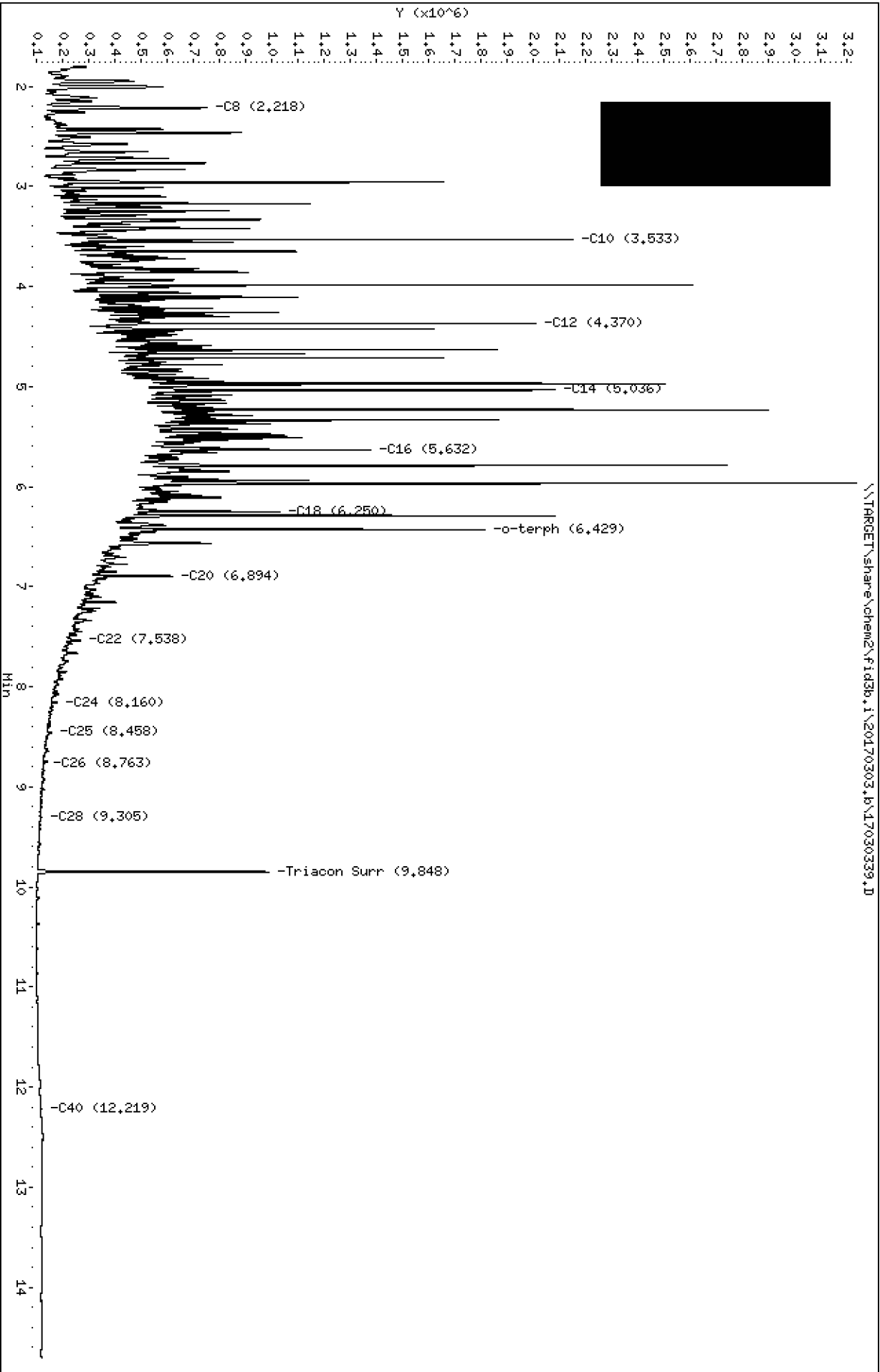
Sample Preparation: Preparation Method: EPA 3546 (Microwave)
Preparation Batch: BFC0023 Sample Size: 10.26 g (wet)
Prepared: 02-Mar-2017 Final Volume: 1 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Diesel Range Organics (C12-C24)		10	48.7	558	mg/kg	D
HC ID: DIESEL						
Motor Oil Range Organics (C24-C38)		10	97.5	ND	mg/kg	U
Surrogate: <i>o</i> -Terphenyl			50-150 %	82.2	%	

Data File: \\TARGET\share\chem2\fid3b,1\20170303,b\17030339.D
Date : 04-MAR-2017 02:13
Client ID:
Sample Info: 17C0009-01REL,10

Column phase: RTX-1

Instrument: fid3b,1
Operator: ML
Column diameter: 0.25



Analytical Resources Inc.
TPH Quantitation Report

Data file: 20170303.b/17030339.D
Method: 20170303.b\FID3TPH.m
Instrument: fid3b.i
Operator: ML
Report Date: 03/06/2017
Macro: FID3_022817

ARI ID: 17C0009-01RE1
Client ID:
Injection: 04-MAR-2017 02:13
Dilution Factor: 10

FID:3B RESULTS

Compound	RT	Shift	Height	Area	Method	Range	Total Area	Conc
Toluene	1.898	0.017	123754	277084	WATPHG	(Tol-C12)	41581265	1912.0
C8	2.218	0.005	655852	964842	WATPHD	(C12-C24)	89068100	572.8
C10	3.533	-0.000	2057159	1183246	WATPHM	(C24-C38)	1946358	14.2
C12	4.370	-0.002	1912258	1193300				
C14	5.036	-0.002	1986405	1800930				
C16	5.632	-0.003	1281761	990326				
C18	6.250	-0.005	932600	813564				
C20	6.894	-0.006	524266	729101				
C22	7.538	-0.008	167610	268072				
C24	8.160	-0.008	79822	114895				
C25	8.458	-0.008	58392	198127				
C26	8.763	0.009	30435	47776				
C28	9.305	-0.010	22265	36685				
C32	----							
C34	----							
Filter Peak	----							
C36	----							
o-terph	6.429	-0.011	1371887	814890				
Triacon Surr	9.848	-0.019	889262	713047				

Range Times: NW Diesel(4.422 - 8.218) NW Gas(1.831 - 4.422) NW M.Oil(8.218 - 11.845)
AK102(3.483 - 8.416) AK103(8.416 - 11.394) Jet A(3.483 - 6.304)

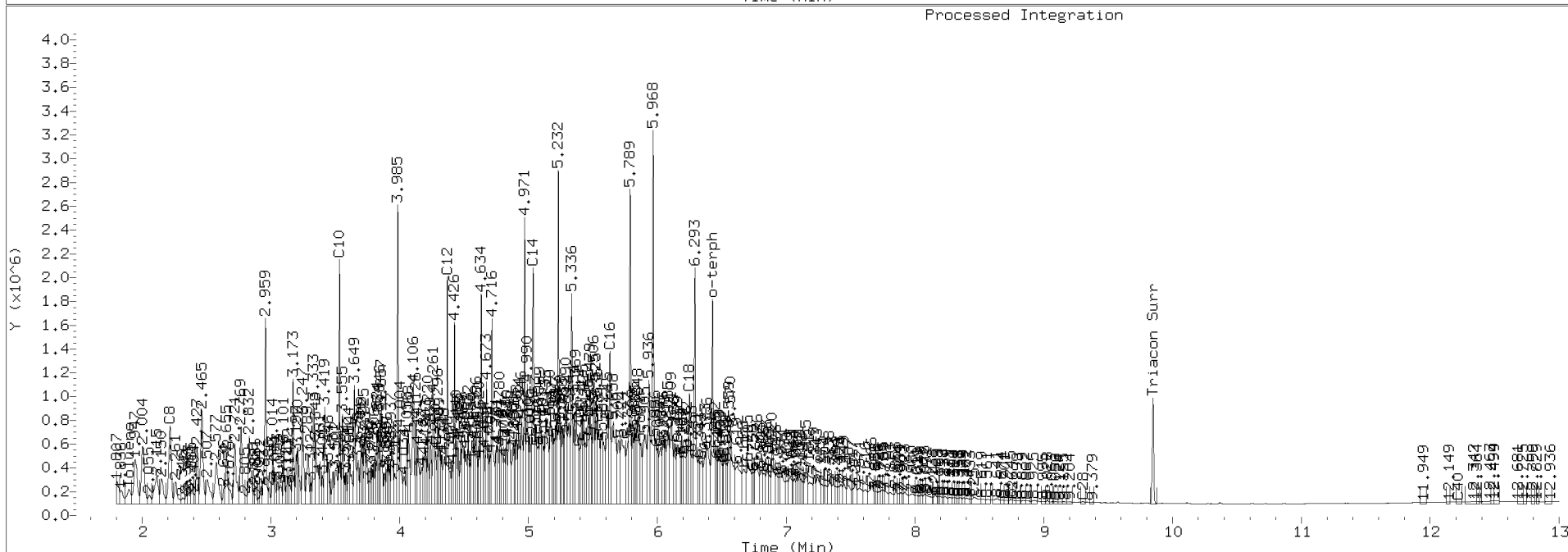
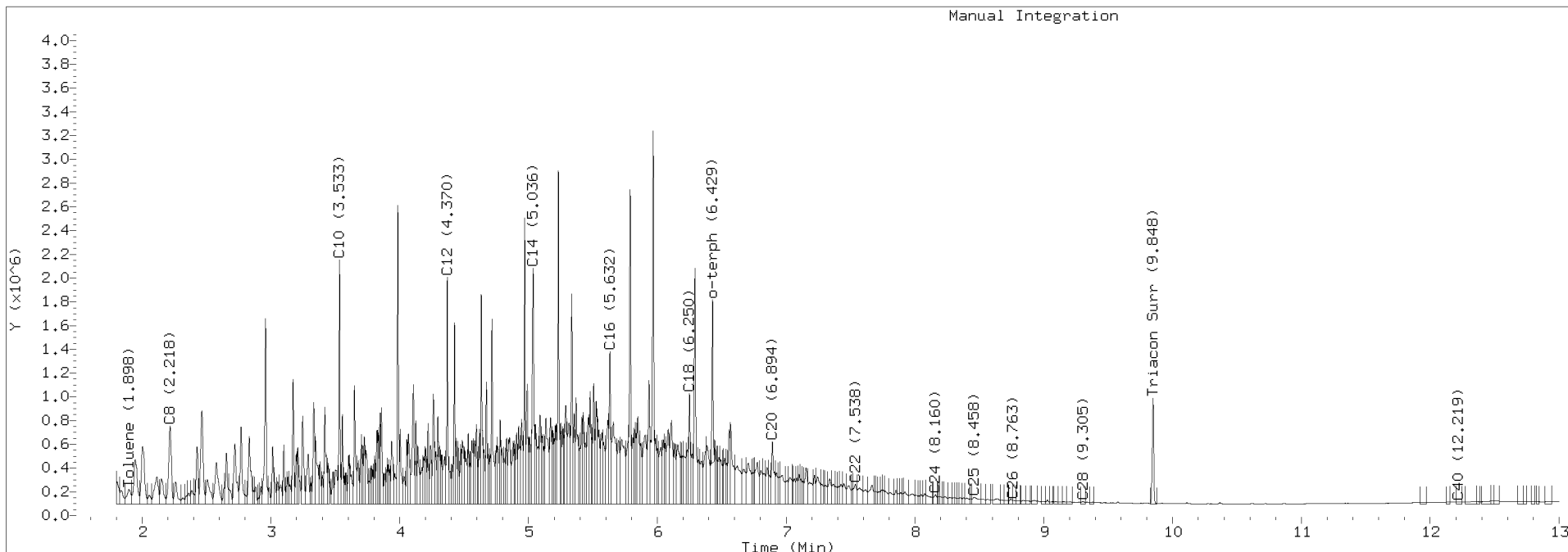
Surrogate	Area	Amount	%Rec
o-Terphenyl	814890	3.7	82.4
Triaconthane	713047	3.7	82.9

Analyte	RF	Curve Date
o-Terph Surr	219872.3	28-FEB-2017
Triacon Surr	191068.8	28-FEB-2017
Gas	21747.6	xx-xx-xxxx
Diesel	155491.0	28-FEB-2017
Motor Oil	137039.0	28-FEB-2017

TPH Manual Integrations Report

Datafile: FID3B, 20170303.b/17030339.D Injection: 04-MAR-2017 02:13

Lab ID:17C0009-01RE1





Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

B-3-W
17C0009-02 (Water)

Volatile Organic Compounds

Method: EPA 8260C

Sampled: 02/27/2017 10:50

Instrument: NT3

Analyzed: 02-Mar-2017 12:39

Sample Preparation: Preparation Method: EPA 5030 (Purge and Trap)
Preparation Batch: BFC0055 Sample Size: 1 mL
Prepared: 02-Mar-2017 Final Volume: 10 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
1,2-Dichloroethane	107-06-2	1	2.00	ND	ug/L	U
Benzene	71-43-2	1	2.00	ND	ug/L	U
Toluene	108-88-3	1	2.00	ND	ug/L	U
Ethylbenzene	100-41-4	1	2.00	118	ug/L	
m,p-Xylene	179601-23-1	1	4.00	75.4	ug/L	
o-Xylene	95-47-6	1	2.00	3.20	ug/L	
<i>Surrogate: 1,2-Dichloroethane-d4</i>			80-129 %	96.5	%	
<i>Surrogate: Toluene-d8</i>			80-120 %	103	%	
<i>Surrogate: 4-Bromofluorobenzene</i>			80-120 %	101	%	



Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

B-3-W
17C0009-02 (Water)

Volatile Organic Compounds

Method: NWTPHg

Sampled: 02/27/2017 10:50

Instrument: NT3

Analyzed: 02-Mar-2017 12:39

Sample Preparation:

Preparation Method: EPA 5030 (Purge and Trap)

Preparation Batch: BFC0055

Sample Size: 1 mL

Prepared: 02-Mar-2017

Final Volume: 10 mL

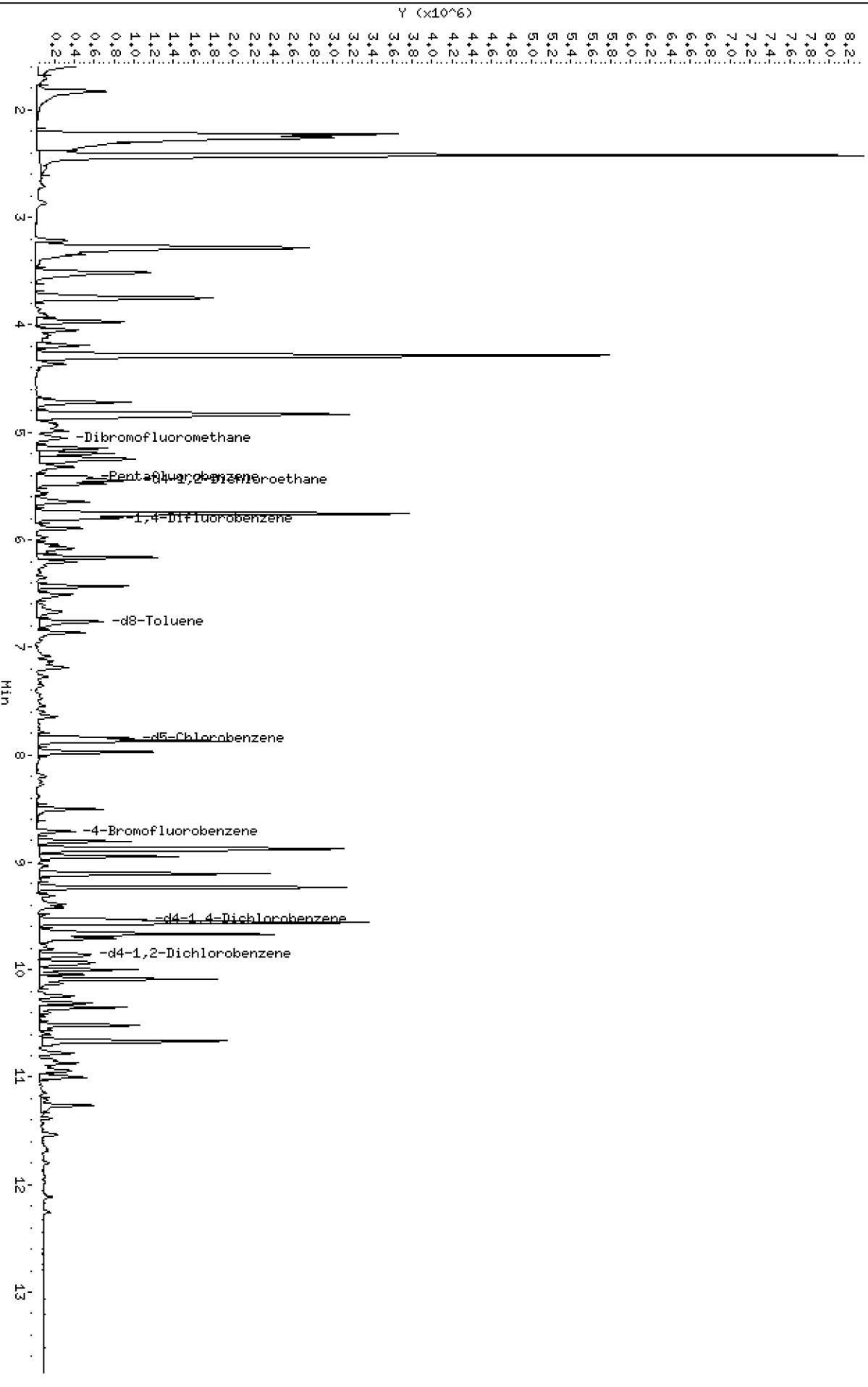
Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Gasoline Range Organics (Tol-Nap)		1	1000	11200	ug/L	
HC ID: GAS						
Surrogate: Toluene-d8			80-120 %	103	%	
Surrogate: 4-Bromofluorobenzene			80-120 %	101	%	

Data File: \\target\share\chend\nt3,1\20170302s,16\303021710G.D
Date: 02-MAR-2017 12:39
Client ID: 10x - Fuel odor
Sample Info: 17C0009-02

Column phase: RTXWMS

Instrument: nt3,1
Operator: PC
Column diameter: 0.18

\\target\share\chend\nt3,1\20170302s,16\303021710G.D



ARI Labs, Inc.

8260C 10 ml purge
Data file : \\target\share\chem1\nt3.i\20170302s.b\V303021710G.D
Lab Smp Id: 17C0009-02 Client Smp ID: 10x - fuel odor
Inj Date : 02-MAR-2017 12:39
Operator : PC Inst ID: nt3.i
Smp Info : 17C0009-02
Misc Info : 16-
Comment :
Method : \\target\share\chem1\nt3.i\20170302s.b\8260C022417.m
Meth Date : 03-Mar-2017 15:16 nt3.i Quant Type: ISTD
Cal Date : 14-FEB-2017 18:50 Cal File: V302141718.D
Als bottle: 12
Dil Factor: 1.00000
Integrator: HP RTE Compound Sublist: gsurr.sub
Target Version: 4.14
Processing Host: ORGDATA20

Compounds	QUANT	SIG	CONCENTRATIONS					
			RT	EXP RT	REL RT	RESPONSE	ON-COLUMN (ug/L)	FINAL (ug/L)
\$ 27 Dibromofluoromethane	111	====	5.053	5.053	(0.933)	65759	4.78511	4.785(R)
* 32 Pentafluorobenzene	168		5.415	5.419	(1.000)	292515	10.0000	
\$ 33 d4-1,2-Dichloroethane	65		5.447	5.446	(1.006)	112201	7.21638	7.216(R)
* 37 1,4-Difluorobenzene	114		5.803	5.802	(1.000)	460417	10.0000	
\$ 43 d8-Toluene	98		6.760	6.759	(1.165)	287398	5.14189	5.142(R)
* 53 d5-Chlorobenzene	117		7.844	7.843	(1.000)	443727	10.0000	
\$ 62 4-Bromofluorobenzene	174		8.716	8.715	(1.111)	94399	5.05346	5.053(R)
* 76 d4-1,4-Dichlorobenzene	152		9.534	9.533	(1.000)	243364	10.0000	
\$ 79 d4-1,2-Dichlorobenzene	152		9.859	9.858	(1.034)	114636	5.01860	5.019(R)

QC Flag Legend

R - Spike/Surrogate failed recovery limits.

ARI Labs, Inc.

INTERNAL STANDARD COMPOUNDS
 AREA AND RT SUMMARY

Instrument ID: nt3.i Calibration Date: 02-MAR-2017
 Lab File ID: V303021710G.D Calibration Time: 21:37
 Lab Smp Id: 17C0009-02 Client Smp ID: 10x - fuel odor
 Analysis Type: VOA Level:
 Quant Type: ISTD Sample Type:
 Operator: PC
 Method File: \\target\share\chem1\nt3.i\20170302s.b\8260C022417.m
 Misc Info: 16-

Test Mode:

Use Initial Calibration Level 5.
 If Continuing Cal. use Initial Cal. Level 5

COMPOUND	STANDARD	AREA LIMIT		SAMPLE	%DIFF
		LOWER	UPPER		
32 Pentafluorobenzon	317912	158956	635824	292515	-7.99
37 1,4-Difluorobenze	512039	256020	1024078	460417	-10.08
53 d5-Chlorobenzene	494052	247026	988104	443727	-10.19
76 d4-1,4-Dichlorobe	282154	141077	564308	243364	-13.75

COMPOUND	STANDARD	RT LIMIT		SAMPLE	%DIFF
		LOWER	UPPER		
32 Pentafluorobenzon	5.42	4.92	5.92	5.42	-0.08
37 1,4-Difluorobenze	5.80	5.30	6.30	5.80	0.01
53 d5-Chlorobenzene	7.84	7.34	8.34	7.84	0.01
76 d4-1,4-Dichlorobe	9.53	9.03	10.03	9.53	0.01

AREA UPPER LIMIT = +100% of internal standard area.
 AREA LOWER LIMIT = - 50% of internal standard area.
 RT UPPER LIMIT = + 0.50 minutes of internal standard RT.
 RT LOWER LIMIT = - 0.50 minutes of internal standard RT.

ARI Labs, Inc.

RECOVERY REPORT

Client Name: Client SDG: 20150930a
Sample Matrix: NONE Fraction: VOA
Lab Smp Id: 17C0009-02 Client Smp ID: 10x - fuel odor
Level: Operator: PC
Data Type: MS DATA SampleType: SAMPLE
SpikeList File: allspike.spk Quant Type: ISTD
Sublist File: gsurr.sub
Method File: \\target\share\chem1\nt3.i\20170302s.b\8260C022417.m
Misc Info: 16-

SURROGATE COMPOUND	AMOUNT ADDED ug/L	AMOUNT RECOVERED ug/L	% RECOVERED	LIMITS
\$ 27 Dibromofluorometha	5.000	4.785	95.70	
\$ 33 d4-1,2-Dichloroeth	5.000	7.216	144.33	
\$ 43 d8-Toluene	5.000	5.142	102.84	
\$ 62 4-Bromofluorobenze	5.000	5.053	101.07	
\$ 79 d4-1,2-Dichloroben	5.000	5.019	100.37	

REVIEW SUMMARY FOR FILE - V303021710G.D

Lab ID: 17C0009-02

nt3.i, 20170302s.b\8260C022417.m, 02-MAR-2017 12:39

RT CO-ELUTION COMPOUNDS

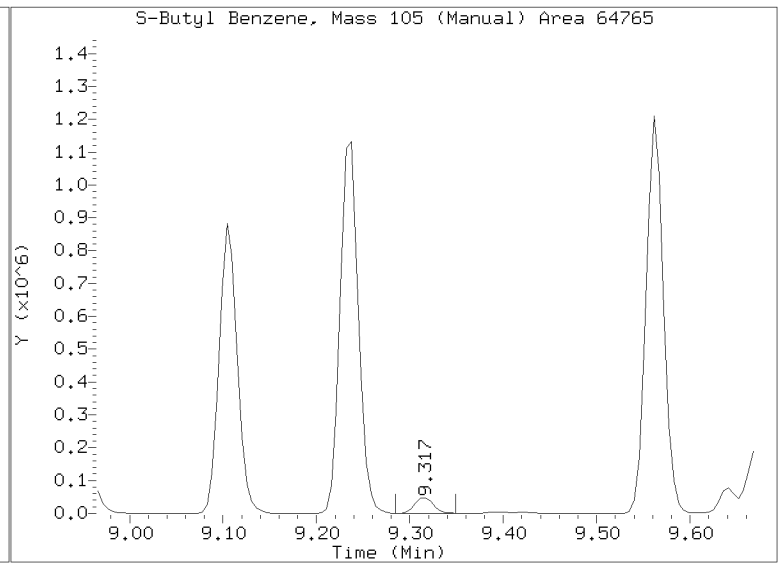
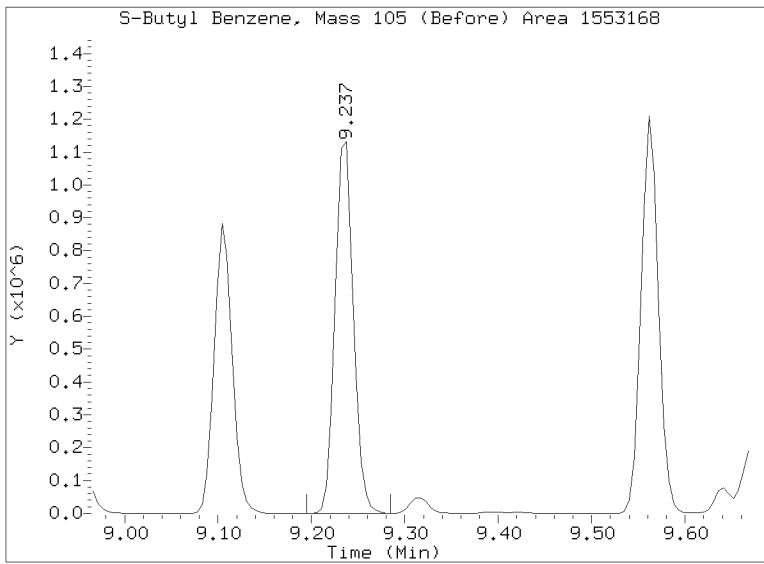
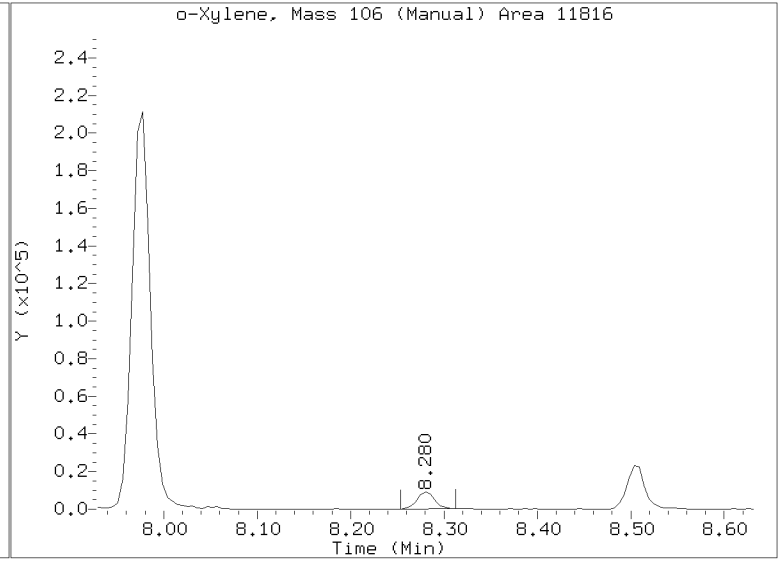
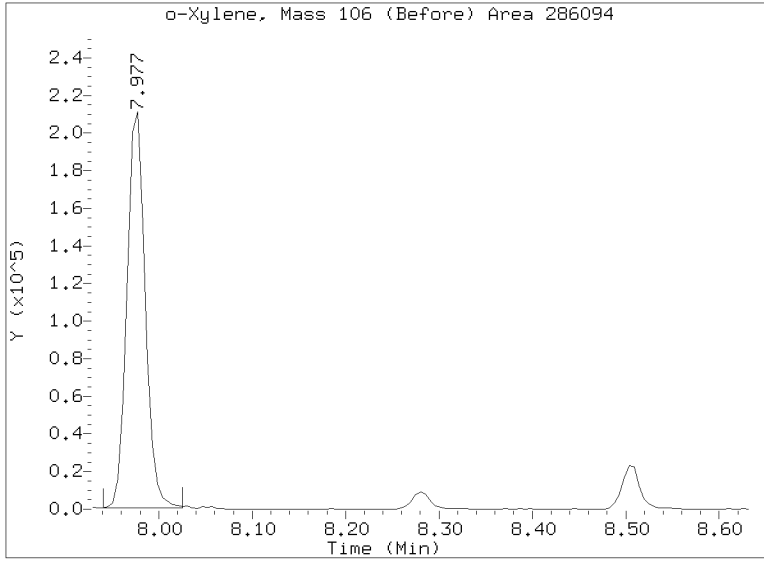
Quant Ion Manual Peak Adjustment Report

Datafile: //target/share/chem1/nt3.i/20170302.b/V303021710.D

Injection Date: 02-MAR-2017 12:39

Lab ID:17C0009-02 Client ID:10x - fuel odor

Report Date: 03/03/2017 15:15

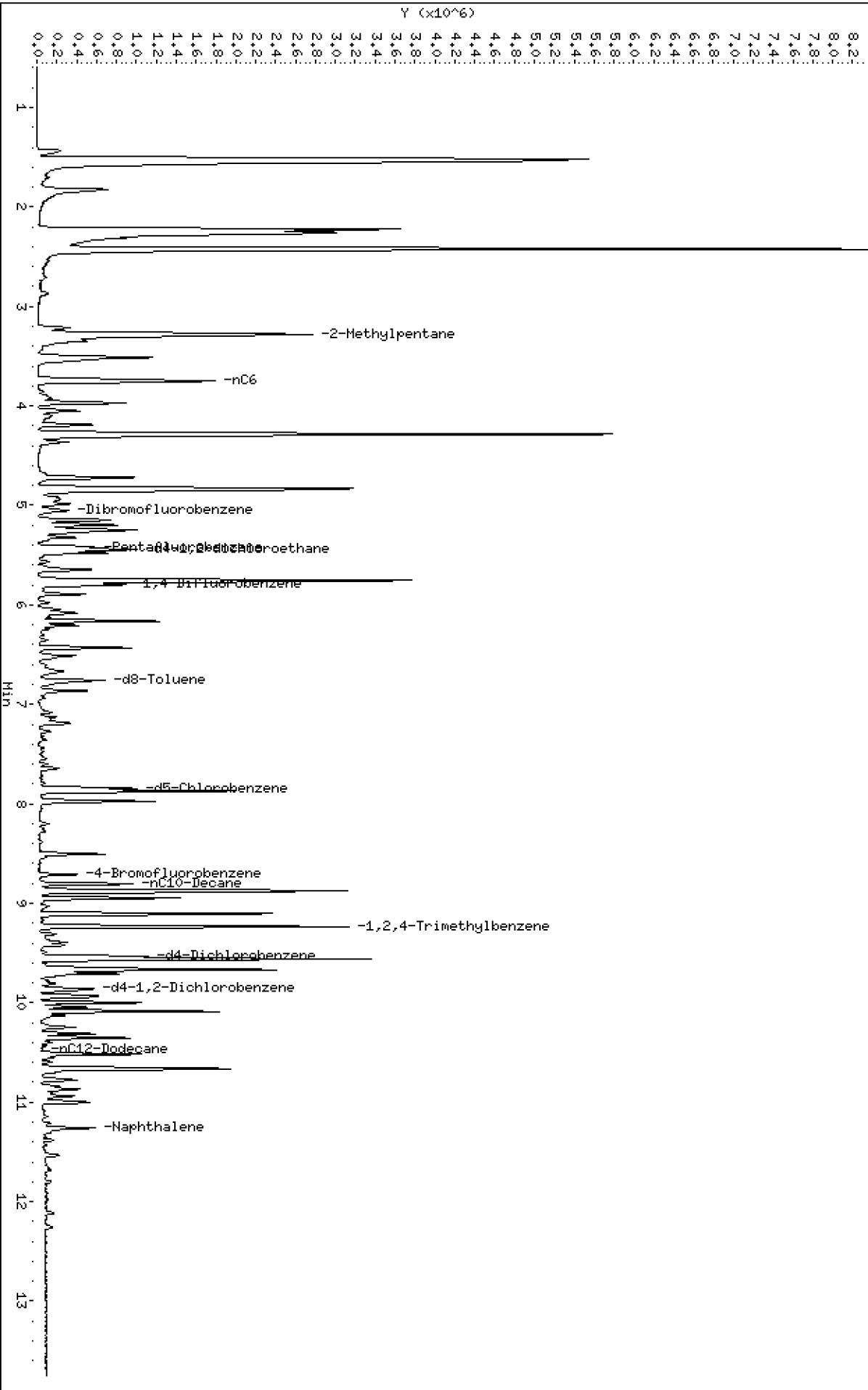


Data File: \\target\share\chend\nt3.1\20170302g.b\303021710G.D
Date: 02-HR-2017 12:39
Client ID: 10x - Fuel odor
Sample Info: 17C0009-02

Column phase: RTXWMS

Instrument: nt3.1
Operator: PC
Column diameter: 0.18

\\target\share\chend\nt3.1\20170302g.b\303021710G.D



Analytical Resources Inc.
GC/MS Gas Quantitation Report

Data file: 20170302g.b/V303021710G.D
Method: \20170302g.b\NWTPHG.m
Instrument: nt3.i
Gas Ical Date: 14-Feb-2017
Injection Date: 02-MAR-2017 12:39

ARI ID: 17C0009-02
Client ID: 10x - fuel odor
Matrix: NONE
Dilution Factor: 1.000
Operator: PC

=====

GASOLINE HYDROCARBONS

Range	RF	Total Area*	Amount (ug/mL)
-----	----	-----	-----
WAGas Tol-C12 (6.70 to 10.57)	52141375	51234478	0.983
8015C 2MP-TMB (3.16 to 9.33)	87713511	94053638	1.072
AK101 nC6-nC10 (3.65 to 8.68)	61260787	64659976	1.055
NWTPHG Tol-Nap (6.70 to 11.36)	54123058	60775858	1.123

M Indicates manual integration within range

* Surrogate areas are subtracted from Total Area

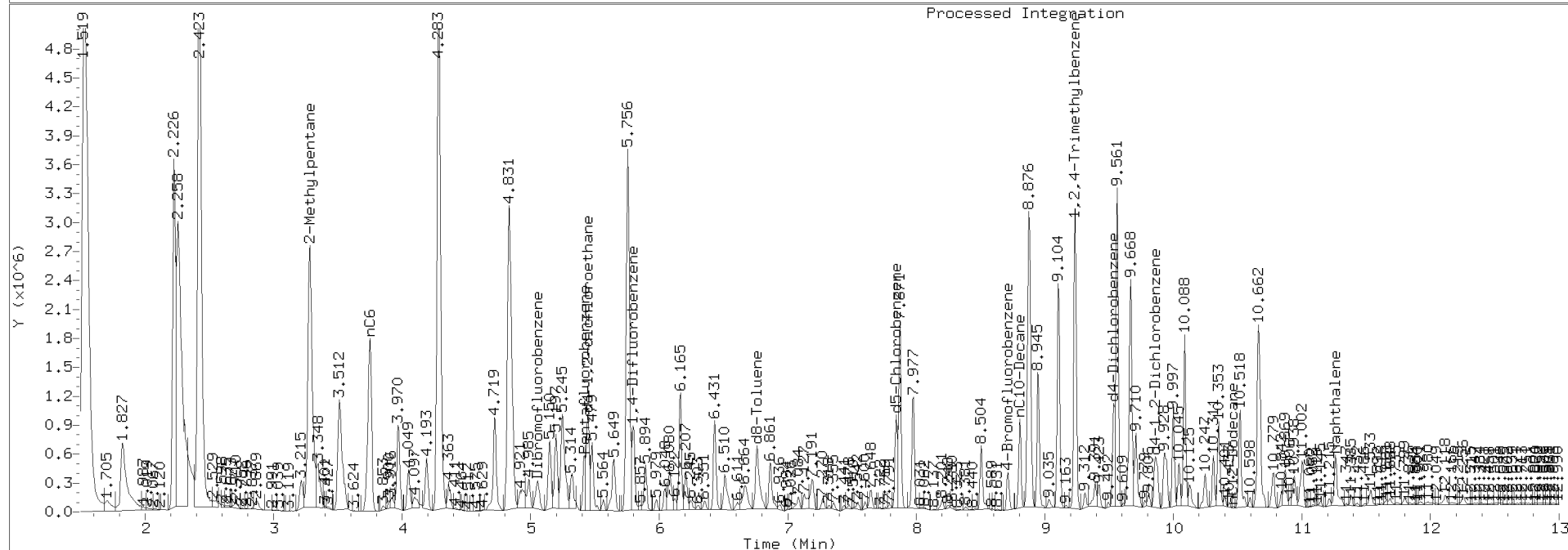
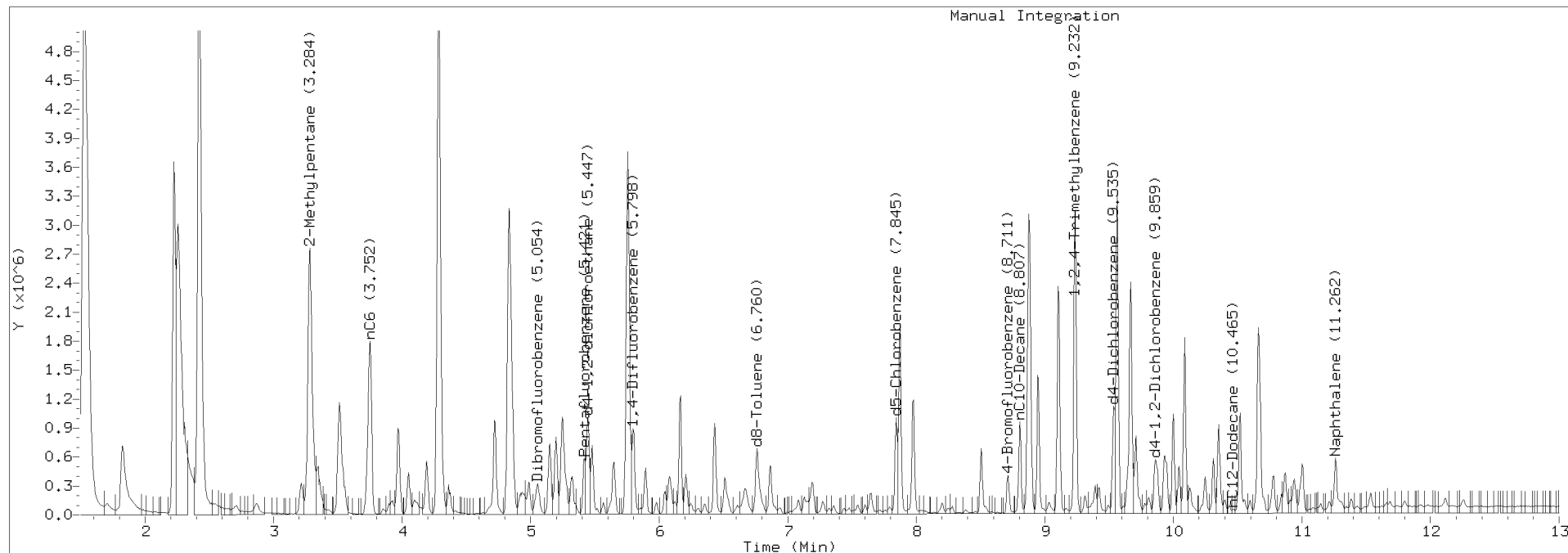
NW Gas Range Subtracted Peaks

6.760	1504837	d8-Toluene
8.711	601865	4-Bromofluorobenzene
9.535	1588586	d4-Dichlorobenzene
7.845	1422660	d5-Chlorobenzene
9.859	1224196	d4-1,2-Dichlorobenzene

TPHG Manual Integrations Report

Datafile: NT3, 20170302g.b/V303021710G.D Injection: 02-MAR-2017 12:39

Lab ID:17C0009-02





Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

B-3-W
17C0009-02 (Water)

Petroleum Hydrocarbons

Method: NWTPH-Dx

Sampled: 02/27/2017 10:50

Instrument: FID3

Analyzed: 03-Mar-2017 21:27

Sample Preparation:

Preparation Method: EPA 3510C SepF

Sample Size: 500 mL

Preparation Batch: BFC0024

Final Volume: 1 mL

Prepared: 02-Mar-2017

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Diesel Range Organics (C12-C24)		1	0.100	95.0	mg/L	E
HC ID: DIESEL						
Motor Oil Range Organics (C24-C38)		1	0.200	4.46	mg/L	
HC ID: RRO						
Surrogate: <i>o</i> -Terphenyl			50-150 %		NRS	NRS

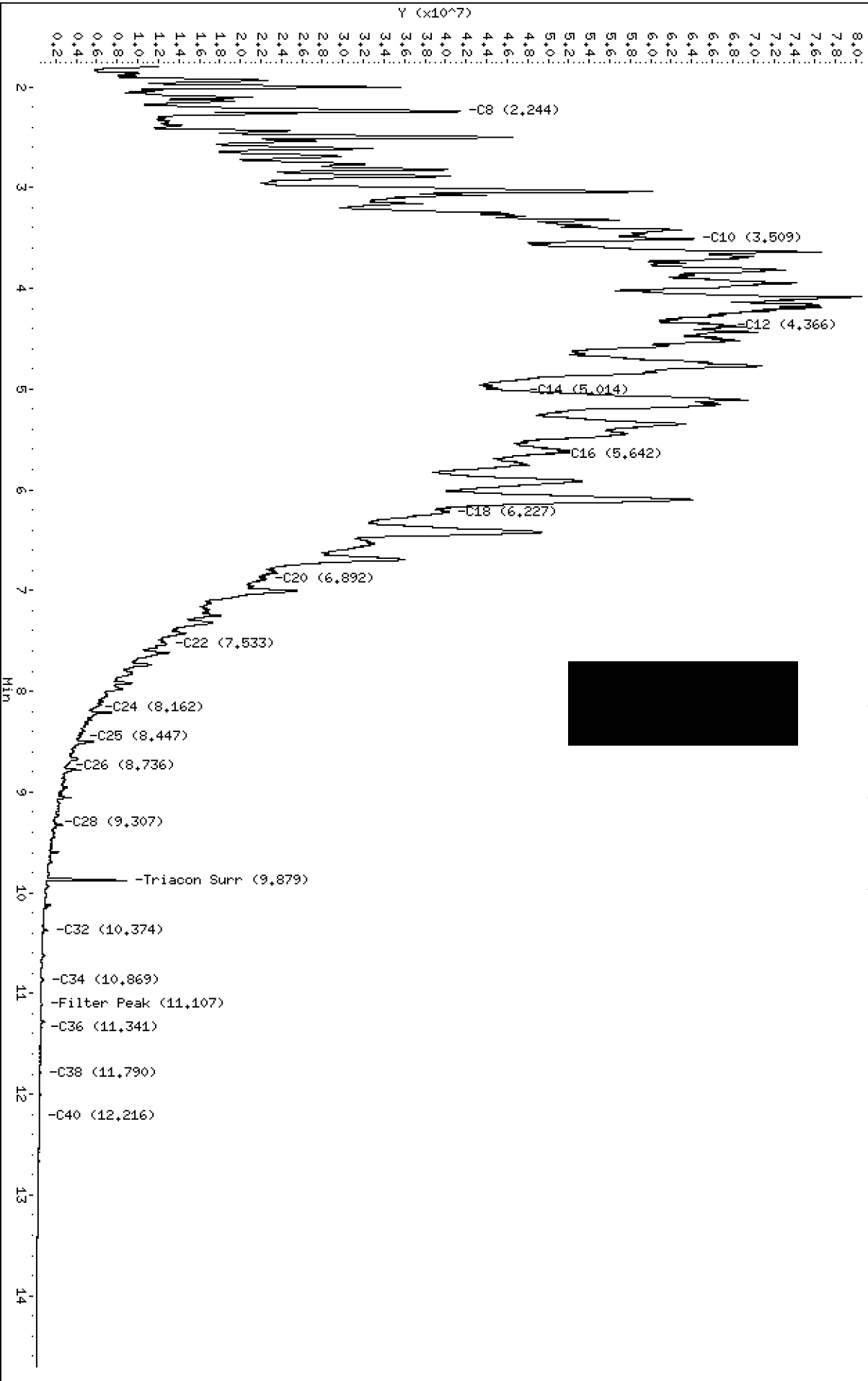
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Date: 03-HR-2017 21:27
Client ID:
Sample Info: 17C0009-02

Instrument: fid3b,1

Column phase: RTX-1

Operator: ML
Column diameter: 0.25

\\TARGET\share\chem2\fid3b,1\20170303,b\17030327.D



Analytical Resources Inc.
TPH Quantitation Report

Data file: 20170303.b/17030327.D
Method: 20170303.b\FID3TPH.m
Instrument: fid3b.i
Operator: ML
Report Date: 03/06/2017
Macro: FID3_022817

ARI ID: 17C0009-02
Client ID:
Injection: 03-MAR-2017 21:27
Dilution Factor: 1

FID:3B RESULTS

Compound	RT	Shift	Height	Area	Method	Range	Total Area	Conc
Toluene	1.891	0.010	9725199	10739566	WATPHG	(Tol-C12)	6444572417	296334.3
C8	2.244	0.031	41329398	116074034	WATPHD	(C12-C24)	7384395901	47490.8
C10	3.509	-0.024	64050984	227160484	WATPHM	(C24-C38)	305329754	2228.1
C12	4.366	-0.006	67495970	60991511				
C14	5.014	-0.024	47171905	41162296				
C16	5.642	0.007	50426788	113136516				
C18	6.227	-0.027	40247764	112067466				
C20	6.892	-0.008	22343586	32397929				
C22	7.533	-0.013	12712668	19617020				
C24	8.162	-0.006	5850360	9279826				
C25	8.447	-0.019	4284658	10112060				
C26	8.736	-0.018	3006011	5125471				
C28	9.307	-0.008	1888993	3363198				
C32	10.374	-0.000	1033957	1582066				
C34	10.869	-0.001	688766	1956135				
Filter Peak	11.107	0.008	578793	1717583				
C36	11.341	-0.003	488523	1295716				
o-terph	----							
Triacon Surr	9.879	0.011	7748041	8071076				

Range Times: NW Diesel(4.422 - 8.218) NW Gas(1.831 - 4.422) NW M.Oil(8.218 - 11.845)
AK102(3.483 - 8.416) AK103(8.416 - 11.394) Jet A(3.483 - 6.304)

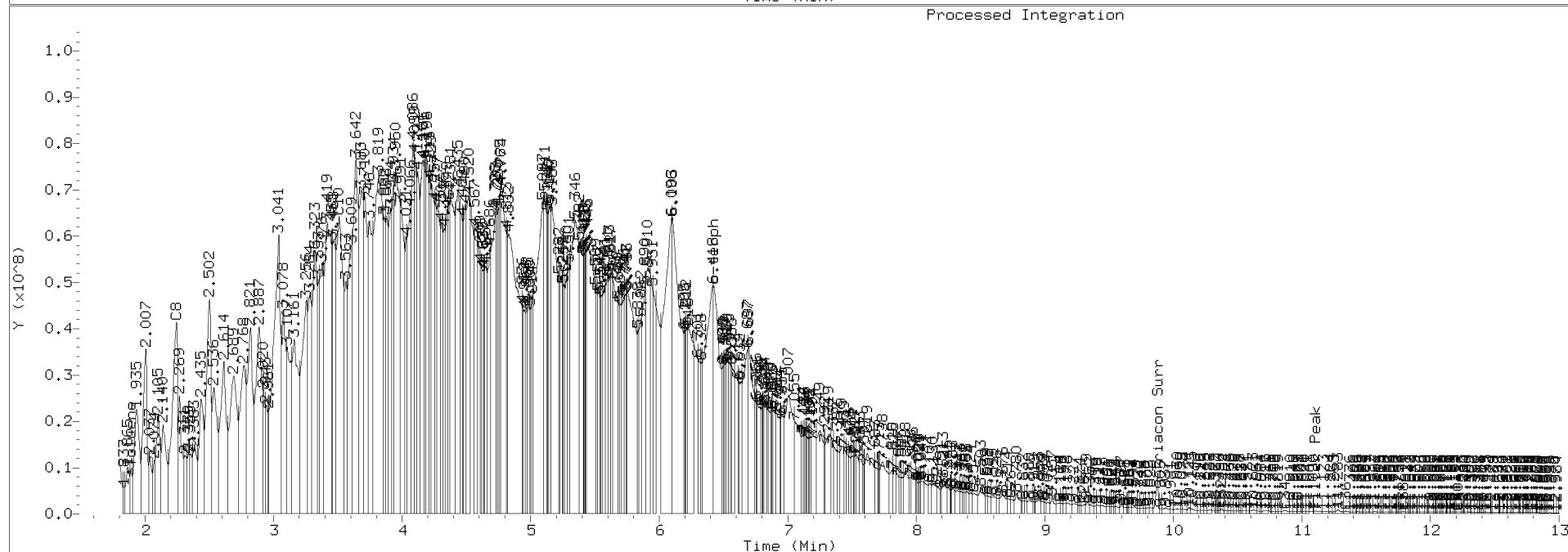
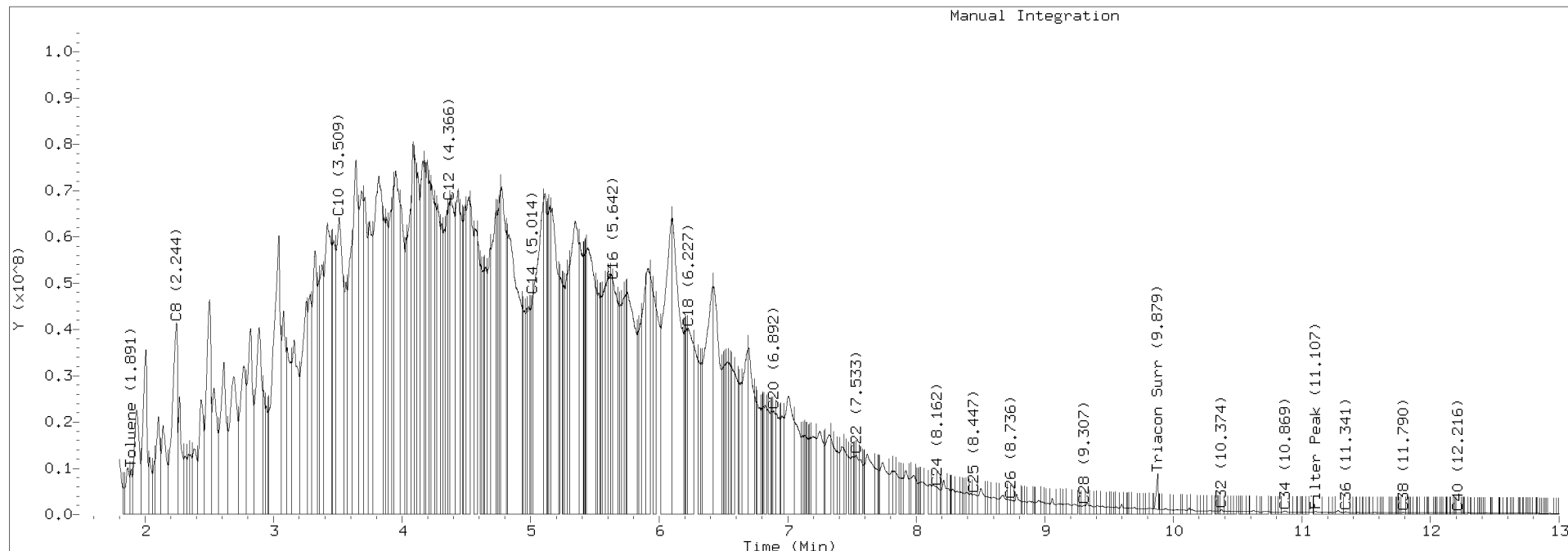
Surrogate	Area	Amount	%Rec
o-Terphenyl	0	0.0	0.0
Triaconthane	8071076	42.2	93.9

Analyte	RF	Curve Date
o-Terph Surr	219872.3	28-FEB-2017
Triacon Surr	191068.8	28-FEB-2017
Gas	21747.6	xx-xx-xxxx
Diesel	155491.0	28-FEB-2017
Motor Oil	137039.0	28-FEB-2017

TPH Manual Integrations Report

Datafile: FID3B, 20170303.b/17030327.D Injection: 03-MAR-2017 21:27

Lab ID:17C0009-02





Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

B-3-W
17C0009-02RE1 (Water)

Petroleum Hydrocarbons

Method: NWTPH-Dx

Sampled: 02/27/2017 10:50

Instrument: FID3

Analyzed: 06-Mar-2017 16:58

Sample Preparation: Preparation Method: EPA 3510C SepF
Preparation Batch: BFC0024
Prepared: 02-Mar-2017

Sample Size: 500 mL
Final Volume: 1 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Diesel Range Organics (C12-C24)		50	5.00	88.3	mg/L	D
HC ID: DIESEL						
Motor Oil Range Organics (C24-C38)		50	10.0	ND	mg/L	U
Surrogate: <i>o</i> -Terphenyl			50-150 %		DI	D1

Data File: \\TARGET\share\chem2\fid3b,1\20170306,8\17030608.D

Date : 06-MAR-2017 16:58

Client ID:

Sample Info: 17C0009-02REL,50

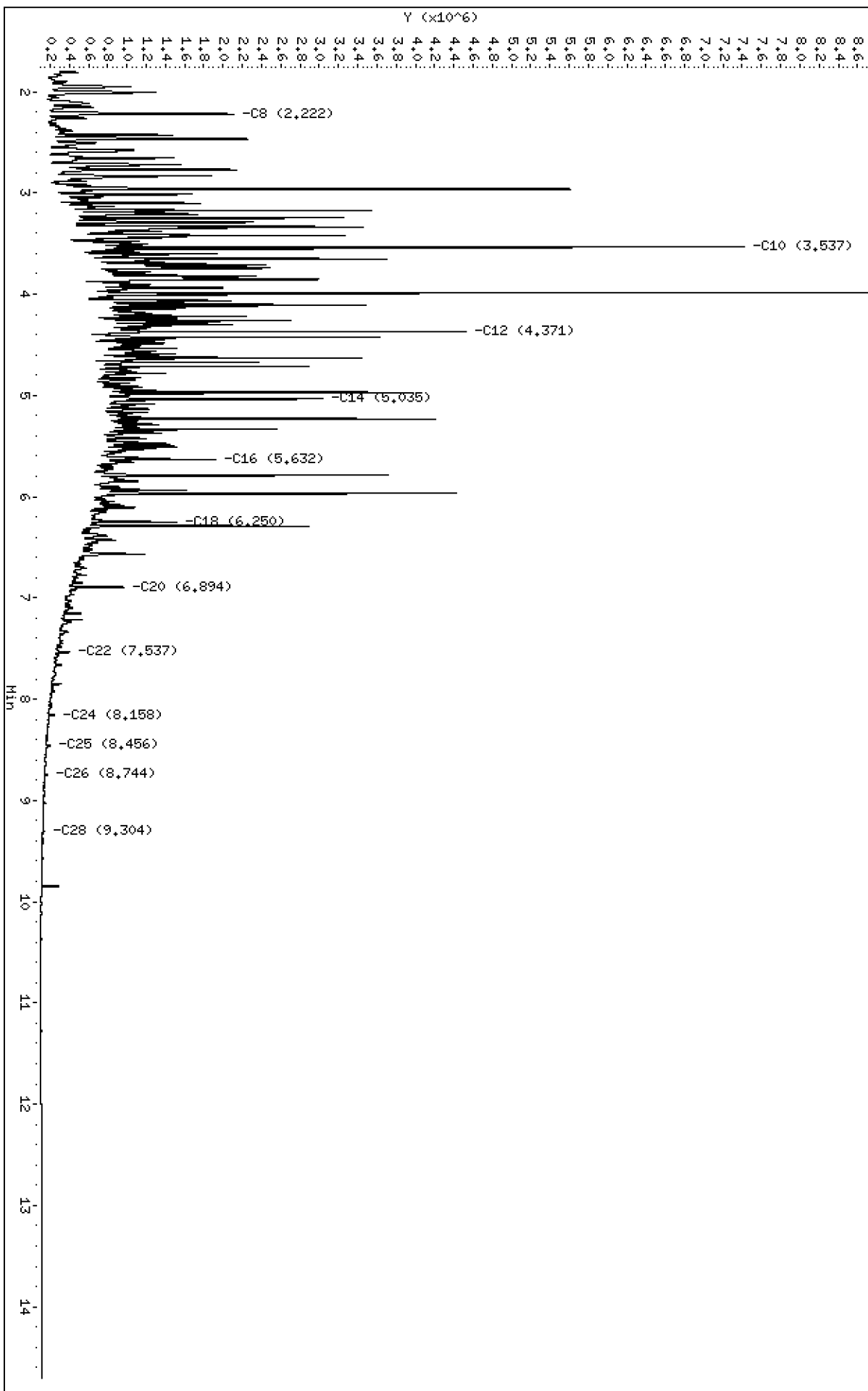
Column phase: RTX-1

Instrument: fid3b,1

Operator: ML

Column diameter: 0.25

\\TARGET\share\chem2\fid3b,1\20170306,8\17030608.D



Analytical Resources Inc.
TPH Quantitation Report

Data file: 20170306.b/17030608.D
Method: 20170306.b\FID3TPH.m
Instrument: fid3b.i
Operator: ML
Report Date: 03/07/2017
Macro: FID3_022817

ARI ID: 17C0009-02RE1
Client ID:
Injection: 06-MAR-2017 16:58
Dilution Factor: 50

FID:3B RESULTS

Compound	RT	Shift	Height	Area	Method	Range	Total Area	Conc
Toluene	1.879	-0.007	117344	123928	WATPHG	(Tol-C12)	132578034	6096.2
C8	2.222	0.004	2017266	2554938	WATPHD	(C12-C24)	137264568	882.8
C10	3.537	0.005	7328198	4244714	WATPHM	(C24-C38)	3464964	25.3
C12	4.371	0.002	4431128	3272682				
C14	5.035	-0.001	2937317	3251456				
C16	5.632	-0.001	1830479	1383406				
C18	6.250	-0.002	1416969	1136130				
C20	6.894	-0.004	865615	1110825				
C22	7.537	-0.007	298620	399480				
C24	8.158	-0.007	150653	218654				
C25	8.456	-0.008	103937	289971				
C26	8.744	-0.008	77265	95928				
C28	9.304	-0.009	37663	93336				
C32	----							
C34	----							
Filter Peak	----							
C36	----							
o-terph	----							
Triacon Surr	----							

Range Times: NW Diesel(4.419 - 8.215) NW Gas(1.836 - 4.419) NW M.Oil(8.215 - 11.846)
AK102(3.482 - 8.414) AK103(8.414 - 11.395) Jet A(3.482 - 6.302)

Surrogate	Area	Amount	%Rec
o-Terphenyl	0	0.0	0.0
Triacontane	0	0.0	0.0

Analyte	RF	Curve Date
o-Terph Surr	219872.3	28-FEB-2017
Triacon Surr	191068.8	28-FEB-2017
Gas	21747.6	xx-xx-xxxx
Diesel	155491.0	28-FEB-2017
Motor Oil	137039.0	28-FEB-2017



Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

B-7-12
17C0009-03 (Solid)

Volatile Organic Compounds

Method: EPA 8260C

Sampled: 02/27/2017 11:40

Instrument: NT5

Analyzed: 06-Mar-2017 16:00

Sample Preparation: Preparation Method: EPA 5035 (Methanol Extraction)
Preparation Batch: BFC0220 Sample Size: 5.959 g (wet) Dry Weight: 4.32 g
Prepared: 06-Mar-2017 Final Volume: 5 mL % Solids: 72.42

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
1,2-Dichloroethane	107-06-2	500	770	ND	ug/kg	U
Benzene	71-43-2	500	770	ND	ug/kg	U
Toluene	108-88-3	500	770	5510	ug/kg	D
Ethylbenzene	100-41-4	500	770	15500	ug/kg	D
m,p-Xylene	179601-23-1	500	770	22900	ug/kg	D
o-Xylene	95-47-6	500	770	13600	ug/kg	D
<i>Surrogate: Dibromofluoromethane</i>			30-160 %	95.0	%	
<i>Surrogate: 1,2-Dichloroethane-d4</i>			80-124 %	85.3	%	
<i>Surrogate: Toluene-d8</i>			80-120 %	100	%	
<i>Surrogate: 4-Bromofluorobenzene</i>			80-120 %	104	%	
<i>Surrogate: 1,2-Dichlorobenzene-d4</i>			80-120 %	101	%	



Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

B-7-12
17C0009-03 (Solid)

Volatile Organic Compounds

Method: NWTPHg

Sampled: 02/27/2017 11:40

Instrument: NT3

Analyzed: 06-Mar-2017 13:30

Sample Preparation:

Preparation Method: EPA 5035 (Methanol Extraction)

Preparation Batch: BFC0131

Sample Size: 5.959 g (wet)

Dry Weight: 4.32 g

Prepared: 06-Mar-2017

Final Volume: 5 mL

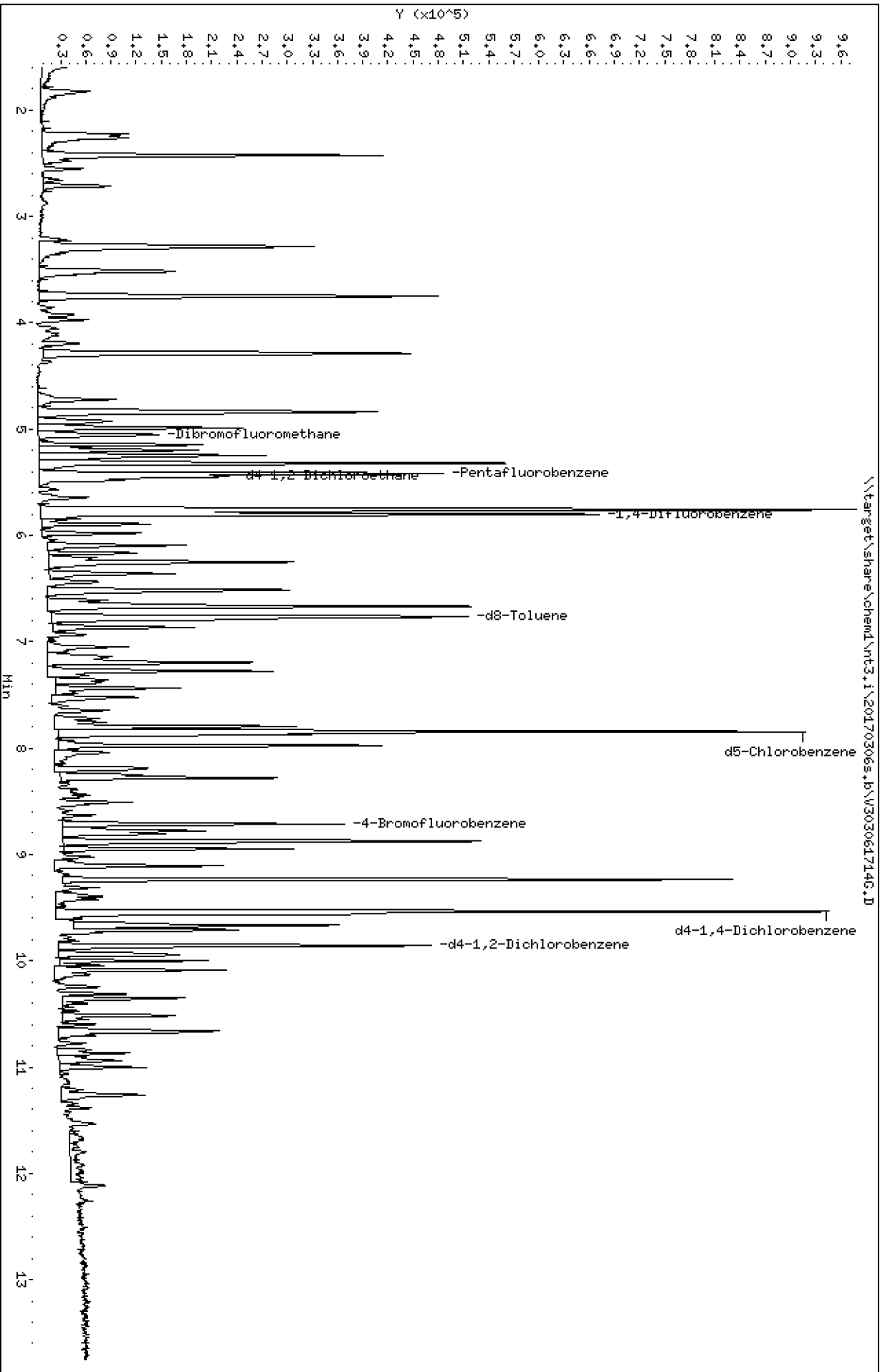
% Solids: 72.42

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Gasoline Range Organics (Tol-Nap)		5000	770000	2190000	ug/kg	D
HC ID: GRO						
Surrogate: Toluene-d8			80-120 %	102	%	
Surrogate: 4-Bromofluorobenzene			78-123 %	97.6	%	

Data File: \\target\share\chend\nt3.1\20170306s.16\303061714G.D
Date : 06-HRR-2017 13:30
Client ID:
Sample Info: 17C0009-03

Column phase: RTXWMS

Instrument: nt3.1
Operator: PC
Column diameter: 0.18



ARI Labs, Inc.

8260C 10 ml purge

Data file : \\target\share\chem1\nt3.i\20170306s.b\V303061714G.D
 Lab Smp Id: 17C0009-03
 Inj Date : 06-MAR-2017 13:30
 Operator : PC Inst ID: nt3.i
 Smp Info : 17C0009-03
 Misc Info : 15-
 Comment :
 Method : \\target\share\chem1\nt3.i\20170306s.b\8260C022417.m
 Meth Date : 06-Mar-2017 07:32 Paul Quant Type: ISTD
 Cal Date : 14-FEB-2017 18:50 Cal File: V302141718.D
 Als bottle: 12
 Dil Factor: 1.00000
 Integrator: HP RTE Compound Sublist: gsurr.sub
 Target Version: 4.14
 Processing Host: ORGDATA11

Concentration Formula: Amt * DF * Pv / Sa * CpndVariable

Name	Value	Description
DF	1.000	Dilution Factor
Pv	10.000	Purge Volume (mL)
Sa	10.000	Sample Amount (mL)
Cpnd Variable		Local Compound Variable

Compounds	QUANT	SIG	RT	EXP RT	REL RT	RESPONSE	CONCENTRATIONS	
							ON-COLUMN (ug/L)	FINAL (ug/L)
\$ 27 Dibromofluoromethane	111		5.052	5.053	(0.932)	56160	4.82653	4.827
* 32 Pentafluorobenzene	168		5.419	5.420	(1.000)	247672	10.0000	
\$ 33 d4-1,2-Dichloroethane	65		5.446	5.446	(1.005)	71481	5.42981	5.430
* 37 1,4-Difluorobenzene	114		5.802	5.803	(1.000)	393902	10.0000	
\$ 43 d8-Toluene	98		6.764	6.765	(1.166)	243213	5.08615	5.086
* 53 d5-Chlorobenzene	117		7.843	7.844	(1.000)	389734	10.0000	
\$ 62 4-Bromofluorobenzene	174		8.715	8.715	(1.111)	80079	4.88076	4.881
* 76 d4-1,4-Dichlorobenzene	152		9.539	9.534	(1.000)	211026	10.0000	
\$ 79 d4-1,2-Dichlorobenzene	152		9.857	9.858	(1.033)	99078	5.00218	5.002

ARI Labs, Inc.

INTERNAL STANDARD COMPOUNDS
 AREA AND RT SUMMARY

Instrument ID: nt3.i Calibration Date: 03-MAR-2017
 Lab File ID: V303061714G.D Calibration Time: 21:57
 Lab Smp Id: 17C0009-03
 Analysis Type: VOA Level: LOW
 Quant Type: ISTD Sample Type: WATER
 Operator: PC
 Method File: \\target\share\chem1\nt3.i\20170306s.b\8260C022417.m
 Misc Info: 15-

Test Mode:

Use Initial Calibration Level 5.
 If Continuing Cal. use Initial Cal. Level 5

COMPOUND	STANDARD	AREA LIMIT		SAMPLE	%DIFF
		LOWER	UPPER		
32 Pentafluorobenzon	317912	158956	635824	247672	-22.09
37 1,4-Difluorobenze	512039	256020	1024078	393902	-23.07
53 d5-Chlorobenzene	494052	247026	988104	389734	-21.11
76 d4-1,4-Dichlorobe	282154	141077	564308	211026	-25.21

COMPOUND	STANDARD	RT LIMIT		SAMPLE	%DIFF
		LOWER	UPPER		
32 Pentafluorobenzon	5.42	4.92	5.92	5.42	-0.02
37 1,4-Difluorobenze	5.80	5.30	6.30	5.80	-0.01
53 d5-Chlorobenzene	7.84	7.34	8.34	7.84	-0.01
76 d4-1,4-Dichlorobe	9.53	9.03	10.03	9.54	0.05

AREA UPPER LIMIT = +100% of internal standard area.
 AREA LOWER LIMIT = - 50% of internal standard area.
 RT UPPER LIMIT = + 0.50 minutes of internal standard RT.
 RT LOWER LIMIT = - 0.50 minutes of internal standard RT.

ARI Labs, Inc.

RECOVERY REPORT

Client Name: Client SDG: 20151005
Sample Matrix: LIQUID Fraction: VOA
Lab Smp Id: 17C0009-03
Level: LOW Operator: PC
Data Type: MS DATA SampleType: SAMPLE
SpikeList File: allspike.spk Quant Type: ISTD
Sublist File: gsurr.sub
Method File: \\target\share\chem1\nt3.i\20170306s.b\8260C022417.m
Misc Info: 15-

SURROGATE COMPOUND	AMOUNT ADDED ug/L	AMOUNT RECOVERED ug/L	% RECOVERED	LIMITS
\$ 27 Dibromofluorometha	5.000	4.827	96.53	80-120
\$ 33 d4-1,2-Dichloroeth	5.000	5.430	108.60	80-128
\$ 43 d8-Toluene	5.000	5.086	101.72	80-120
\$ 62 4-Bromofluorobenze	5.000	4.881	97.62	80-120
\$ 79 d4-1,2-Dichloroben	5.000	5.002	100.04	80-120

REVIEW SUMMARY FOR FILE - V303061714G.D

Lab ID: 17C0009-03

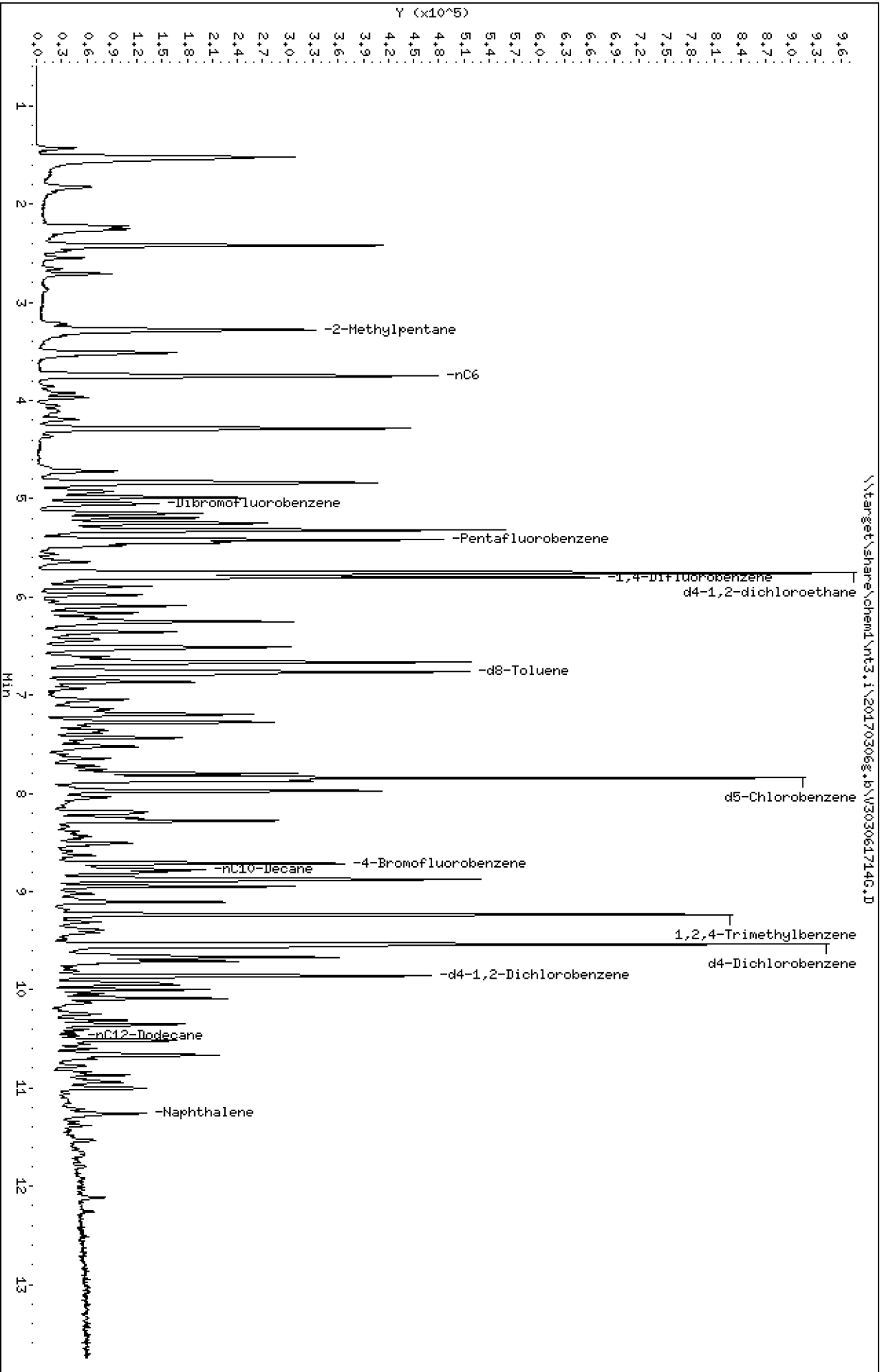
nt3.i, 20170306s.b\8260C022417.m, 06-MAR-2017 13:30

RT CO-ELUTION COMPOUNDS

Data File: \\target\share\chend\nt3.1\20170306g.b\303061714G.D
Date: 06-HRR-2017 13:30
Client ID:
Sample Info: 17C0009-03

Column phase: RTXWMS

Instrument: nt3.1
Operator: PC
Column diameter: 0.18



Analytical Resources Inc.
GC/MS Gas Quantitation Report

Data file: 20170306g.b/V303061714G.D
Method: \20170306g.b\NWTPHG.m
Instrument: nt3.i
Gas Ical Date: 14-Feb-2017
Injection Date: 06-MAR-2017 13:30

ARI ID: 17C0009-03
Client ID:
Matrix: WATER
Dilution Factor: 1.000
Operator: PC

=====

GASOLINE HYDROCARBONS

Range	RF	Total Area*	Amount (ug/mL)
WAGas Tol-C12 (6.70 to 10.57)	52141375	13936668	0.267
8015C 2MP-TMB (3.17 to 9.34)	87713511	22236230	0.254
AK101 nC6-nC10 (3.65 to 8.68)	61260787	17267358	0.282
NWTPHG Tol-Nap (6.70 to 11.36)	54123058	15412890	0.285

M Indicates manual integration within range

* Surrogate areas are subtracted from Total Area

NW Gas Range Subtracted Peaks

6.764	1212119	d8-Toluene
8.715	558117	4-Bromofluorobenzene
9.534	1766928	d4-Dichlorobenzene
7.843	1416301	d5-Chlorobenzene
9.858	721290	d4-1,2-Dichlorobenzene



Pacific Groundwater Group 2377 Eastlake Ave. E. Suite 200 Seattle WA, 98102	Project: Cascade Natural Gas Project Number: Cascade Natural Gas Project Manager: Glen Wallace	Reported: 15-Mar-2017 15:28
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B-7-12
17C0009-03 (Solid)

Petroleum Hydrocarbons

Method: NWTPH-Dx Sampled: 02/27/2017 11:40
Instrument: FID3 Analyzed: 03-Mar-2017 13:48

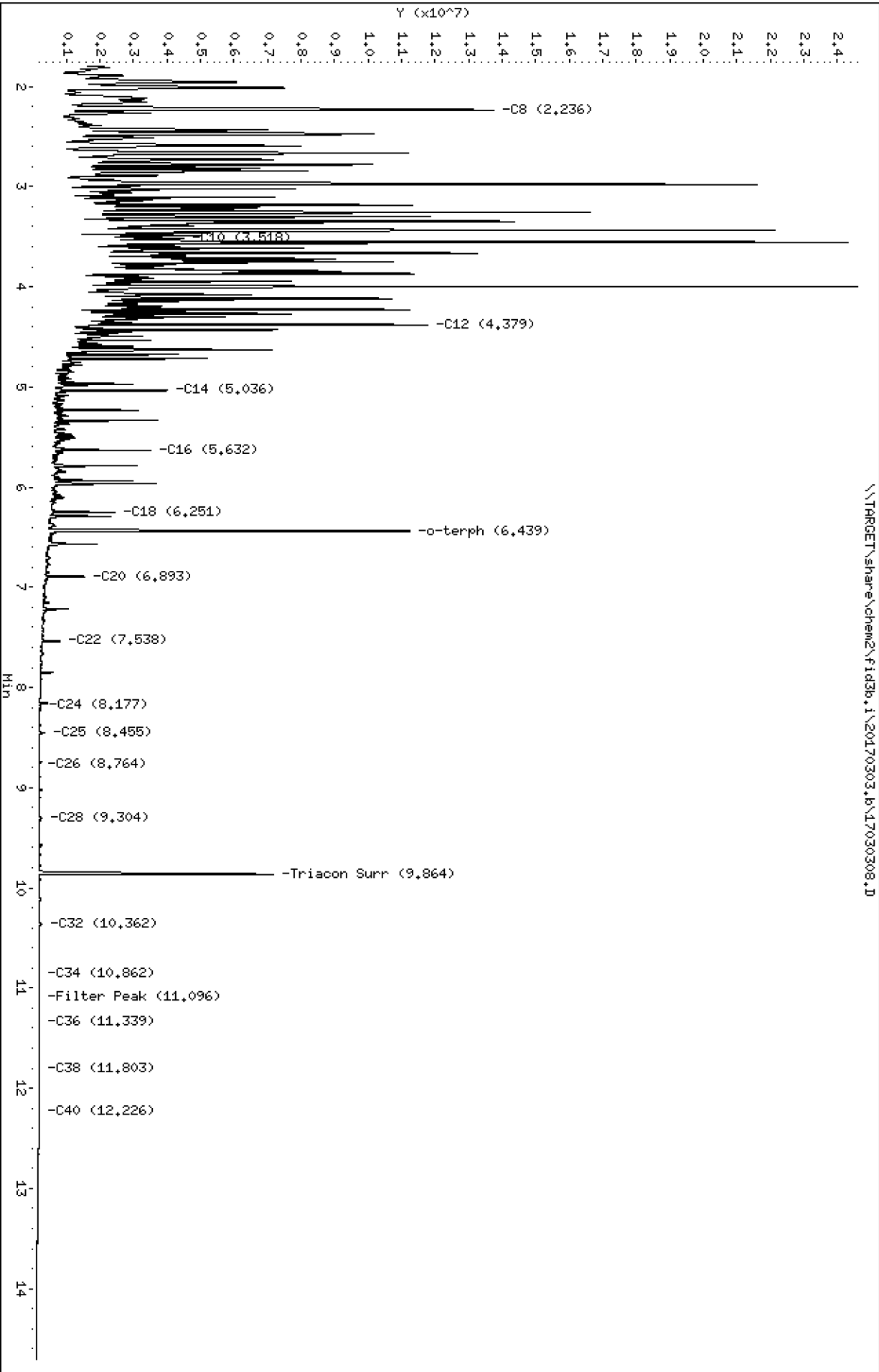
Sample Preparation: Preparation Method: EPA 3546 (Microwave) Dry Weight: 7.31 g
Preparation Batch: BFC0023 % Solids: 72.42
Prepared: 02-Mar-2017 Sample Size: 10.09 g (wet)
Final Volume: 1 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Diesel Range Organics (C12-C24)		1	6.84	125	mg/kg	
HC ID: DIESEL						
Motor Oil Range Organics (C24-C38)		1	13.7	17.8	mg/kg	
HC ID: MOTOR OIL						
Surrogate: <i>o</i> -Terphenyl			50-150 %	83.3	%	

Data File: \\TARGET\share\chem2\fid3b,1\20170303,b\17030308.D
Date: 03-MAR-2017 13:48
Client ID:
Sample Info: 17C0009-03

Column phase: RTX-1

Instrument: fid3b,1
Operator: ML
Column diameter: 0.25



Analytical Resources Inc.
TPH Quantitation Report

Data file: 20170303.b/17030308.D
Method: 20170303.b\FID3TPH.m
Instrument: fid3b.i
Operator: ML
Report Date: 03/06/2017
Macro: FID3_022817

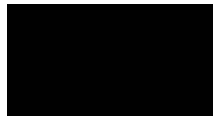
ARI ID: 17C0009-03
Client ID:
Injection: 03-MAR-2017 13:48
Dilution Factor: 1

FID:3B RESULTS

Compound	RT	Shift	Height	Area	Method	Range	Total Area	Conc
Toluene	1.891	0.010	2581118	5899291	WATPHG	(Tol-C12)	607575915	27937.6
C8	2.236	0.023	13659345	22039178	WATPHD	(C12-C24)	142098193	913.9
C10	3.518	-0.015	4411770	6058526	WATPHM	(C24-C38)	17848472	130.2
C12	4.379	0.007	11681564	8397826				
C14	5.036	-0.002	3920243	3334824				
C16	5.632	-0.002	3428121	2123770				
C18	6.251	-0.004	2338321	1762185				
C20	6.893	-0.006	1447507	1401663				
C22	7.538	-0.008	706365	675686				
C24	8.177	0.009	104033	45249				
C25	8.455	-0.011	236560	315134				
C26	8.764	0.009	86824	97462				
C28	9.304	-0.011	146734	282895				
C32	10.362	-0.012	170280	267940				
C34	10.862	-0.009	85712	178278				
Filter Peak	11.096	-0.003	88435	120703				
C36	11.339	-0.005	91002	136897				
o-terph	6.439	-0.001	10732820	8241911				
Triacon Surr	9.864	-0.004	6975394	7143203				

Range Times: NW Diesel(4.422 - 8.218) NW Gas(1.831 - 4.422) NW M.Oil(8.218 - 11.845)
AK102(3.483 - 8.416) AK103(8.416 - 11.394) Jet A(3.483 - 6.304)

Surrogate	Area	Amount	%Rec
o-Terphenyl	8241911	37.5	83.3
Triacontane	7143203	37.4	83.1

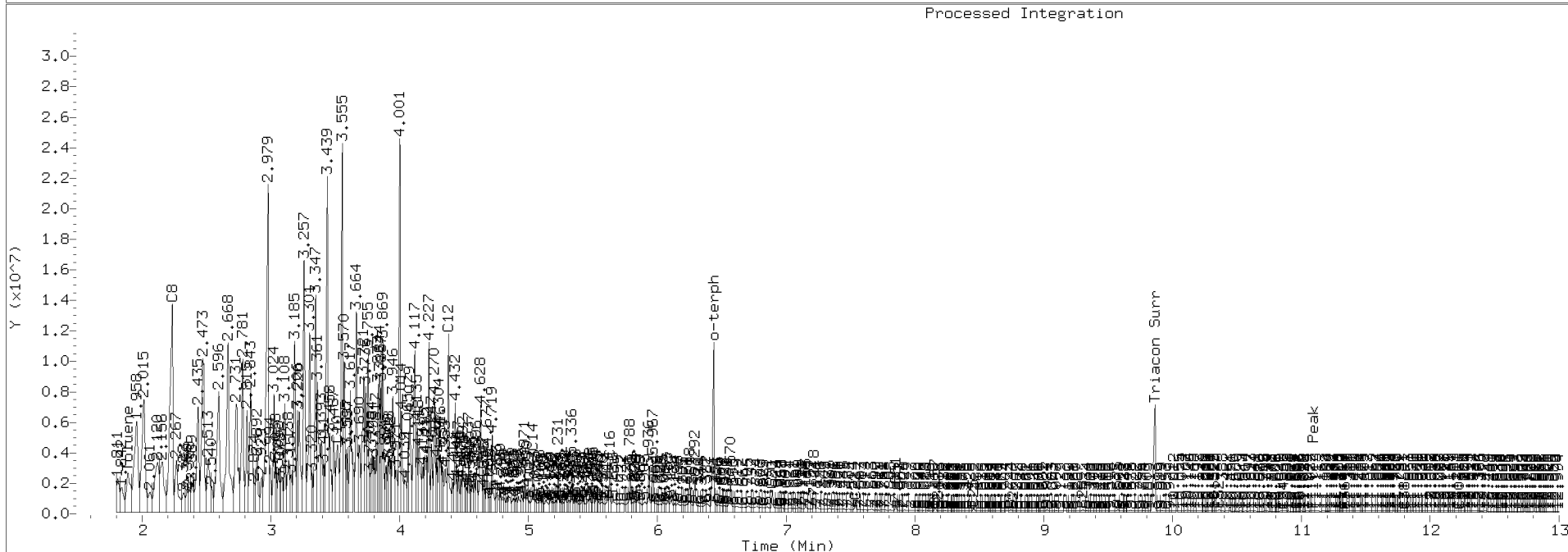
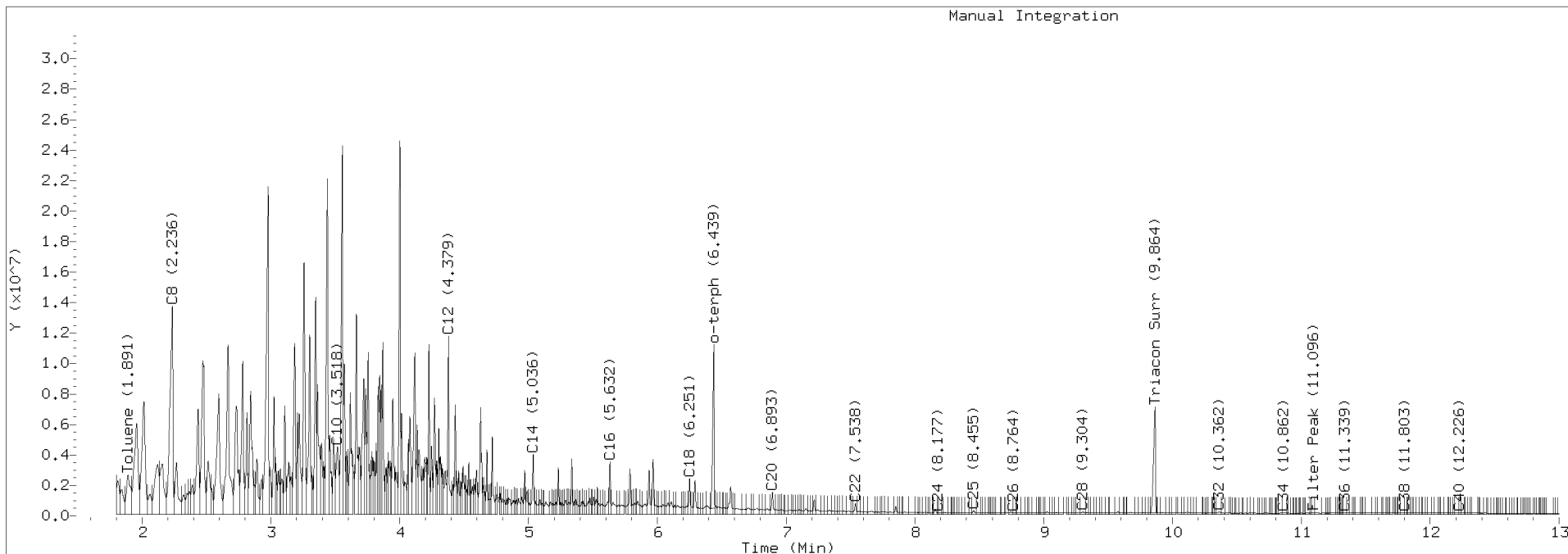


Analyte	RF	Curve Date
o-Terph Surr	219872.3	28-FEB-2017
Triacon Surr	191068.8	28-FEB-2017
Gas	21747.6	xx-xx-xxxx
Diesel	155491.0	28-FEB-2017
Motor Oil	137039.0	28-FEB-2017

TPH Manual Integrations Report

Datafile: FID3B, 20170303.b/17030308.D Injection: 03-MAR-2017 13:48

Lab ID:17C0009-03





Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

B-6-15
17C0009-04 (Solid)

Volatile Organic Compounds

Method: EPA 8260C

Sampled: 02/27/2017 10:20

Instrument: NT5

Analyzed: 06-Mar-2017 16:23

Sample Preparation: Preparation Method: EPA 5035 (Methanol Extraction)
Preparation Batch: BFC0220 Sample Size: 3.762 g (wet) Dry Weight: 2.93 g
Prepared: 06-Mar-2017 Final Volume: 5 mL % Solids: 77.81

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
1,2-Dichloroethane	107-06-2	50	99.7	ND	ug/kg	U
Benzene	71-43-2	50	99.7	ND	ug/kg	U
Toluene	108-88-3	50	99.7	ND	ug/kg	U
Ethylbenzene	100-41-4	50	99.7	2260	ug/kg	
m,p-Xylene	179601-23-1	50	99.7	288	ug/kg	
o-Xylene	95-47-6	50	99.7	ND	ug/kg	U
<i>Surrogate: Dibromofluoromethane</i>			30-160 %	98.1	%	
<i>Surrogate: 1,2-Dichloroethane-d4</i>			80-124 %	113	%	
<i>Surrogate: Toluene-d8</i>			80-120 %	98.9	%	
<i>Surrogate: 4-Bromofluorobenzene</i>			80-120 %	104	%	
<i>Surrogate: 1,2-Dichlorobenzene-d4</i>			80-120 %	103	%	



Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

B-6-15
17C0009-04 (Solid)

Volatile Organic Compounds

Method: NWTPhg

Sampled: 02/27/2017 10:20

Instrument: NT3

Analyzed: 06-Mar-2017 13:56

Sample Preparation:

Preparation Method: EPA 5035 (Methanol Extraction)

Preparation Batch: BFC0131

Sample Size: 3.762 g (wet)

Dry Weight: 2.93 g

Prepared: 06-Mar-2017

Final Volume: 5 mL

% Solids: 77.81

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Gasoline Range Organics (Tol-Nap)		500	99700	4760000	ug/kg	D
HC ID: GRO						
Surrogate: Toluene-d8			80-120 %	102	%	
Surrogate: 4-Bromofluorobenzene			78-123 %	101	%	

Data File: \\target\share\chend\nt3.1\20170306s.1b\303061715G.D

Date : 06-HRR-2017 13:56

Client ID:

Sample Info: 17C0009-04

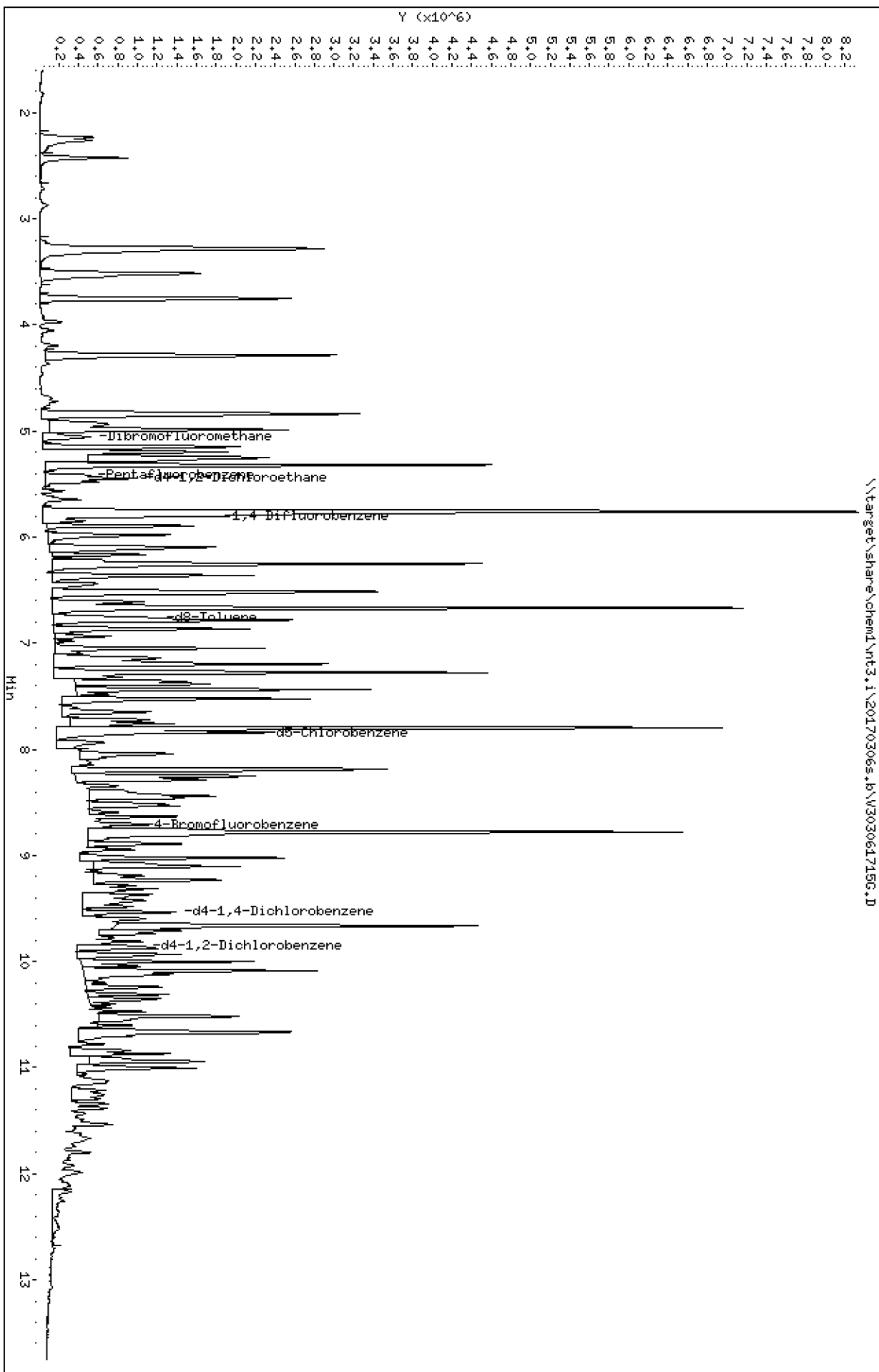
Column phase: RTXWMS

Instrument: nt3.1

Operator: PC

Column diameter: 0.18

Page 1



ARI Labs, Inc.

8260C 10 ml purge

Data file : \\target\share\chem1\nt3.i\20170306s.b\V303061715G.D
 Lab Smp Id: 17C0009-04
 Inj Date : 06-MAR-2017 13:56
 Operator : PC
 Smp Info : 17C0009-04
 Misc Info : 15-
 Comment :
 Method : \\target\share\chem1\nt3.i\20170306s.b\8260C022417.m
 Meth Date : 06-Mar-2017 07:32 Paul
 Cal Date : 14-FEB-2017 18:50
 Als bottle: 12
 Dil Factor: 1.00000
 Integrator: HP RTE
 Target Version: 4.14
 Processing Host: ORGDATA11

Inst ID: nt3.i

Quant Type: ISTD

Cal File: V302141718.D

Compound Sublist: gsurr.sub

Concentration Formula: Amt * DF * Pv / Sa * CpndVariable

Name	Value	Description
DF	1.000	Dilution Factor
Pv	10.000	Purge Volume (mL)
Sa	10.000	Sample Amount (mL)
Cpnd Variable		Local Compound Variable

Compounds	QUANT	SIG	RT	EXP RT	REL RT	RESPONSE	CONCENTRATIONS	
							ON-COLUMN (ug/L)	FINAL (ug/L)
\$ 27 Dibromofluoromethane	111		5.053	5.053	(0.933)	58131	4.87716	4.877
* 32 Pentafluorobenzene	168		5.415	5.420	(1.000)	253703	10.0000	
\$ 33 d4-1,2-Dichloroethane	65		5.447	5.446	(1.006)	94460	7.00476	7.005(R)
* 37 1,4-Difluorobenzene	114		5.803	5.803	(1.000)	404754	10.0000	
\$ 43 d8-Toluene	98		6.765	6.765	(1.166)	306697	6.24178	6.242(R)
* 53 d5-Chlorobenzene	117		7.844	7.844	(1.000)	404143	10.0000	
\$ 62 4-Bromofluorobenzene	174		8.716	8.715	(1.111)	85722	5.03842	5.038
* 76 d4-1,4-Dichlorobenzene	152		9.534	9.534	(1.000)	222541	10.0000	
\$ 79 d4-1,2-Dichlorobenzene	152		9.858	9.858	(1.034)	105289	5.04070	5.041

QC Flag Legend

R - Spike/Surrogate failed recovery limits.

ARI Labs, Inc.

INTERNAL STANDARD COMPOUNDS
 AREA AND RT SUMMARY

Instrument ID: nt3.i Calibration Date: 03-MAR-2017
 Lab File ID: V303061715G.D Calibration Time: 21:57
 Lab Smp Id: 17C0009-04
 Analysis Type: VOA Level: LOW
 Quant Type: ISTD Sample Type: WATER
 Operator: PC
 Method File: \\target\share\chem1\nt3.i\20170306s.b\8260C022417.m
 Misc Info: 15-

Test Mode:

Use Initial Calibration Level 5.
 If Continuing Cal. use Initial Cal. Level 5

COMPOUND	STANDARD	AREA LIMIT		SAMPLE	%DIFF
		LOWER	UPPER		
32 Pentafluorobenzon	317912	158956	635824	253703	-20.20
37 1,4-Difluorobenze	512039	256020	1024078	404754	-20.95
53 d5-Chlorobenzene	494052	247026	988104	404143	-18.20
76 d4-1,4-Dichlorobe	282154	141077	564308	222541	-21.13

COMPOUND	STANDARD	RT LIMIT		SAMPLE	%DIFF
		LOWER	UPPER		
32 Pentafluorobenzon	5.42	4.92	5.92	5.42	-0.09
37 1,4-Difluorobenze	5.80	5.30	6.30	5.80	0.00
53 d5-Chlorobenzene	7.84	7.34	8.34	7.84	0.00
76 d4-1,4-Dichlorobe	9.53	9.03	10.03	9.53	0.00

AREA UPPER LIMIT = +100% of internal standard area.
 AREA LOWER LIMIT = - 50% of internal standard area.
 RT UPPER LIMIT = + 0.50 minutes of internal standard RT.
 RT LOWER LIMIT = - 0.50 minutes of internal standard RT.

ARI Labs, Inc.

RECOVERY REPORT

Client Name: Client SDG: 20151005
Sample Matrix: LIQUID Fraction: VOA
Lab Smp Id: 17C0009-04
Level: LOW Operator: PC
Data Type: MS DATA SampleType: SAMPLE
SpikeList File: allspike.spk Quant Type: ISTD
Sublist File: gsurr.sub
Method File: \\target\share\chem1\nt3.i\20170306s.b\8260C022417.m
Misc Info: 15-

SURROGATE COMPOUND	AMOUNT ADDED ug/L	AMOUNT RECOVERED ug/L	% RECOVERED	LIMITS
\$ 27 Dibromofluorometha	5.000	4.877	97.54	80-120
\$ 33 d4-1,2-Dichloroeth	5.000	7.005	140.10*	80-128
\$ 43 d8-Toluene	5.000	6.242	124.84*	80-120
\$ 62 4-Bromofluorobenze	5.000	5.038	100.77	80-120
\$ 79 d4-1,2-Dichloroben	5.000	5.041	100.81	80-120

REVIEW SUMMARY FOR FILE - V303061715G.D

Lab ID: 17C0009-04

nt3.i, 20170306s.b\8260C022417.m, 06-MAR-2017 13:56

RT CO-ELUTION COMPOUNDS

Data File: \\target\share\chend\nt3.1\20170306g.b\303061715G.D

Date: 06-HRR-2017 13:56

Client ID:

Sample Info: 17C0009-04

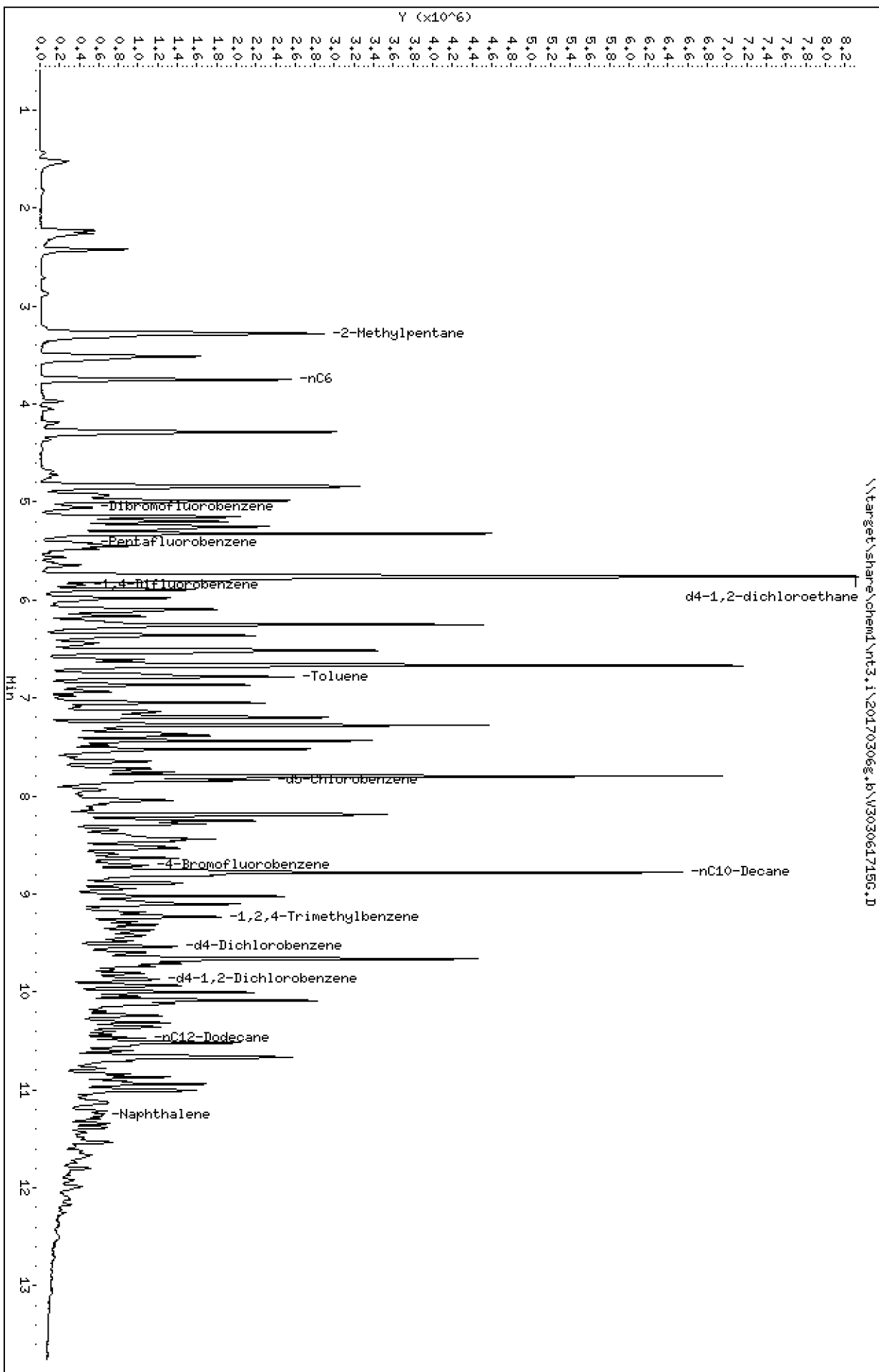
Column phase: RTXWMS

Instrument: nt3.1

Operator: PC

Column diameter: 0.18

Page 1



Analytical Resources Inc.
GC/MS Gas Quantitation Report

Data file: 20170306g.b/V303061715G.D
Method: \20170306g.b\NWTPHG.m
Instrument: nt3.i
Gas Ical Date: 14-Feb-2017
Injection Date: 06-MAR-2017 13:56

ARI ID: 17C0009-04
Client ID:
Matrix: WATER
Dilution Factor: 1.000
Operator: PC

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GASOLINE HYDROCARBONS

Range	RF	Total Area*	Amount (ug/mL)
-----	----	-----	-----
WAGas Tol-C12 (6.70 to 10.57)	52141375	223674998	4.290
8015C 2MP-TMB (3.17 to 9.34)	87713511	269645583	3.074
AK101 nC6-nC10 (3.65 to 8.68)	61260787	214453366	3.501
NWTPHG Tol-Nap (6.70 to 11.36)	54123058	258266072	4.772

M Indicates manual integration within range

* Surrogate areas are subtracted from Total Area

NW Gas Range Subtracted Peaks

8.711	2569397	4-Bromofluorobenzene
9.535	3263705	d4-Dichlorobenzene
7.839	5114067	d5-Chlorobenzene
9.875	3526547	d4-1,2-Dichlorobenzene



Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

B-6-15
17C0009-04 (Solid)

Petroleum Hydrocarbons

Method: NWTPH-Dx

Sampled: 02/27/2017 10:20

Instrument: FID3

Analyzed: 03-Mar-2017 14:12

Sample Preparation:

Preparation Method: EPA 3546 (Microwave)

Preparation Batch: BFC0023

Sample Size: 10.07 g (wet)

Dry Weight: 7.84 g

Prepared: 02-Mar-2017

Final Volume: 1 mL

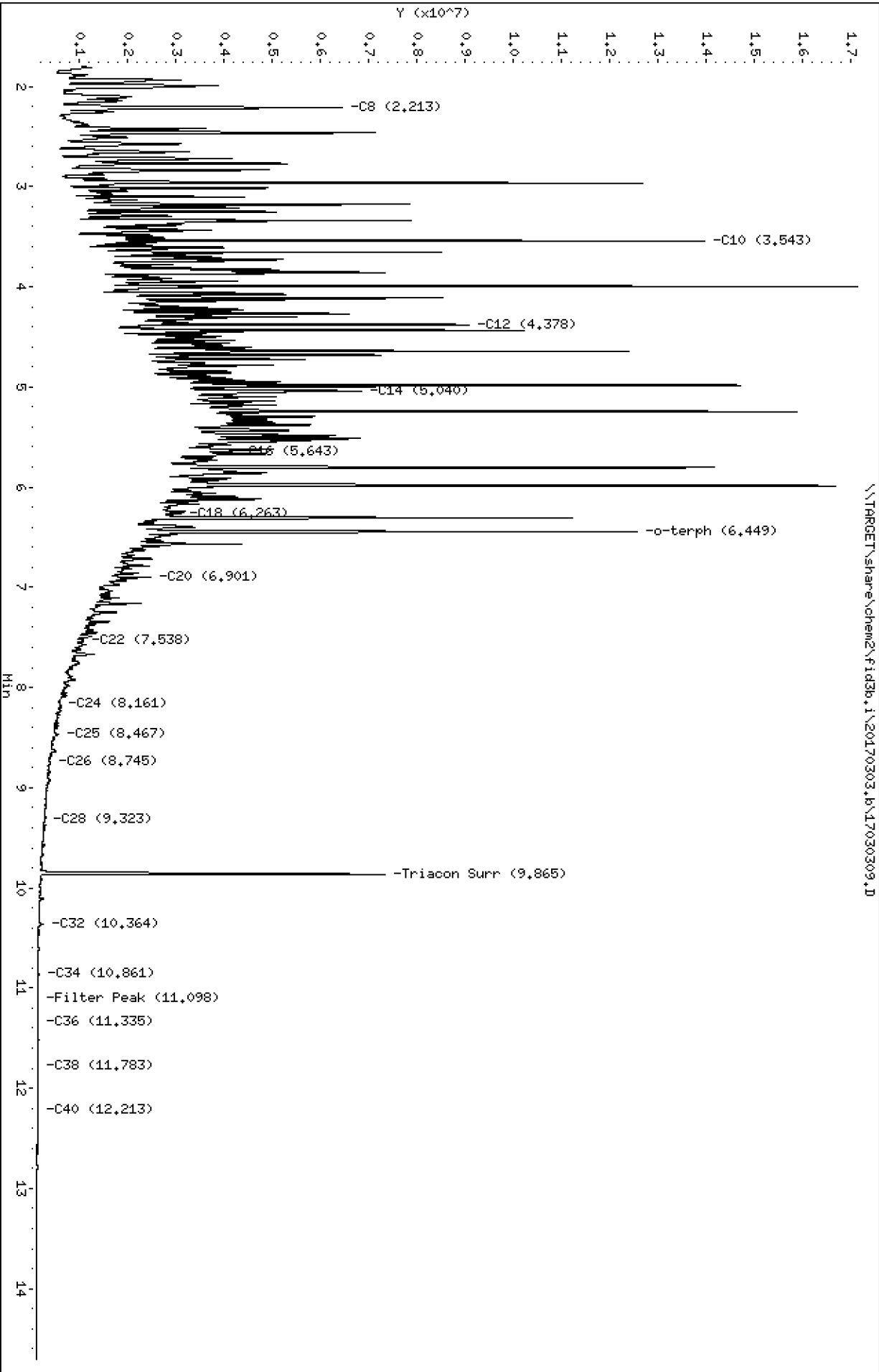
% Solids: 77.81

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Diesel Range Organics (C12-C24)		1	6.38	503	mg/kg	E
HC ID: DIESEL						
Motor Oil Range Organics (C24-C38)		1	12.8	25.4	mg/kg	
HC ID: RRO						
Surrogate: <i>o</i> -Terphenyl			50-150 %	89.8	%	

Data File: \\TARGET\share\chem2\fid3b,1\20170303,b\17030309.D
Date : 03-MAR-2017 14:12
Client ID:
Sample Info: 17C0009-04

Column phase: RTX-1

Instrument: fid3b,1
Operator: ML
Column diameter: 0.25



Analytical Resources Inc.
TPH Quantitation Report

Data file: 20170303.b/17030309.D
Method: 20170303.b\FID3TPH.m
Instrument: fid3b.i
Operator: ML
Report Date: 03/06/2017
Macro: FID3_022817

ARI ID: 17C0009-04
Client ID:
Injection: 03-MAR-2017 14:12
Dilution Factor: 1

FID:3B RESULTS

Compound	RT	Shift	Height	Area	Method	Range	Total Area	Conc
Toluene	1.886	0.005	1061250	1780797	WATPHG	(Tol-C12)	363147493	16698.2
C8	2.213	0.000	6344121	10514392	WATPHD	(C12-C24)	612314149	3937.9
C10	3.543	0.010	13853267	9867988	WATPHM	(C24-C38)	27330013	199.4
C12	4.378	0.007	8969900	8633537				
C14	5.040	0.002	6757165	7042320				
C16	5.643	0.008	4052724	2896464				
C18	6.263	0.009	3003352	2815071				
C20	6.901	0.002	2374561	2747295				
C22	7.538	-0.008	983489	1143595				
C24	8.161	-0.007	491702	748845				
C25	8.467	0.001	451894	1250593				
C26	8.745	-0.009	289455	470787				
C28	9.323	0.008	173454	166712				
C32	10.364	-0.011	153184	184878				
C34	10.861	-0.010	49894	132178				
Filter Peak	11.098	-0.001	37760	81801				
C36	11.335	-0.009	26888	56039				
o-terph	6.449	0.009	10172385	8890214				
Triacon Surr	9.865	-0.003	7150034	7363999				

Range Times: NW Diesel(4.422 - 8.218) NW Gas(1.831 - 4.422) NW M.Oil(8.218 - 11.845)
AK102(3.483 - 8.416) AK103(8.416 - 11.394) Jet A(3.483 - 6.304)

Surrogate	Area	Amount	%Rec
o-Terphenyl	8890214	40.4	89.9
Triacontane	7363999	38.5	85.6

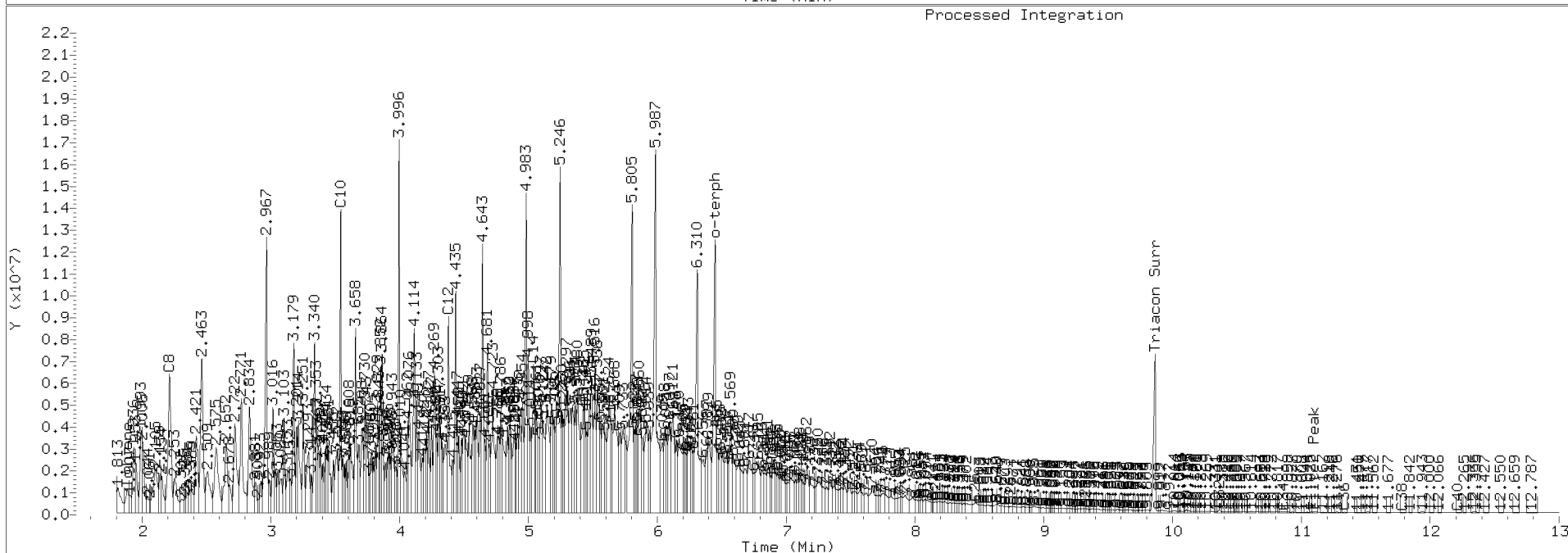
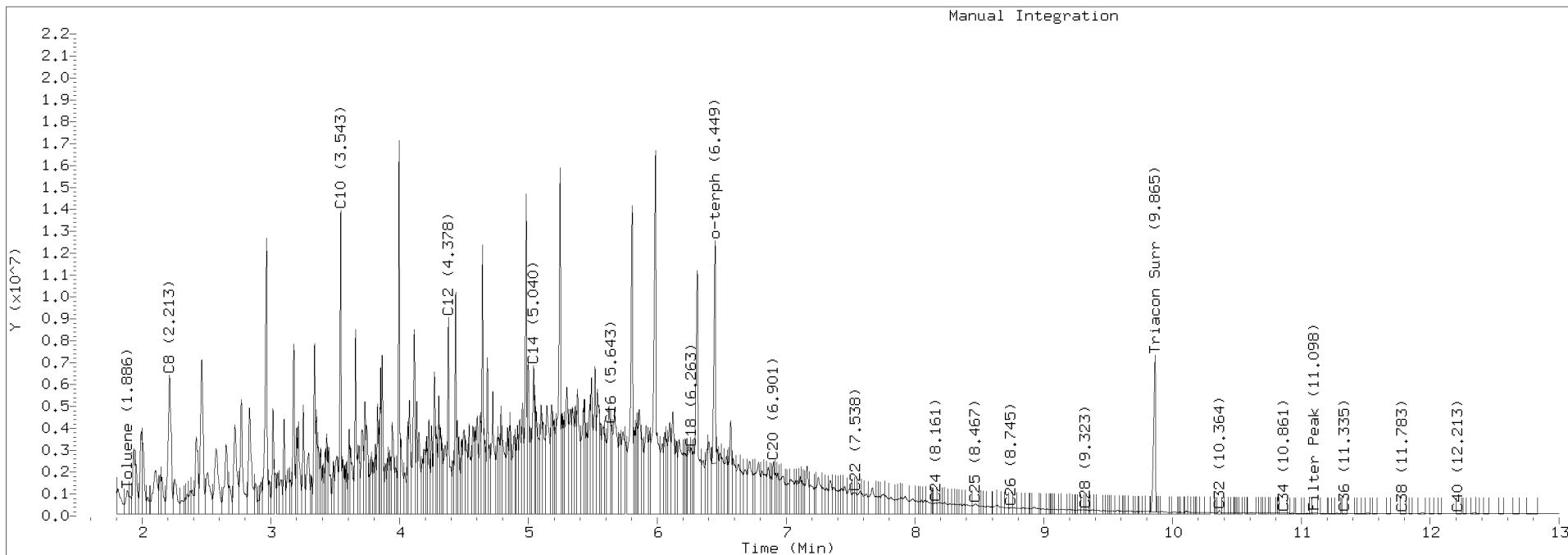


Analyte	RF	Curve Date
o-Terph Surr	219872.3	28-FEB-2017
Triacon Surr	191068.8	28-FEB-2017
Gas	21747.6	xx-xx-xxxx
Diesel	155491.0	28-FEB-2017
Motor Oil	137039.0	28-FEB-2017

TPH Manual Integrations Report

Datafile: FID3B, 20170303.b/17030309.D Injection: 03-MAR-2017 14:12

Lab ID:17C0009-04





Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

B-6-15
17C0009-04RE1 (Solid)

Petroleum Hydrocarbons

Method: NWTPH-Dx

Sampled: 02/27/2017 10:20

Instrument: FID3

Analyzed: 04-Mar-2017 02:37

Sample Preparation:

Preparation Method: EPA 3546 (Microwave)

Preparation Batch: BFC0023

Sample Size: 10.07 g (wet)

Prepared: 02-Mar-2017

Final Volume: 1 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Diesel Range Organics (C12-C24)		5	24.8	385	mg/kg	D
HC ID: DIESEL						
Motor Oil Range Organics (C24-C38)		5	49.7	ND	mg/kg	U
<i>Surrogate: o-Terphenyl</i>			<i>50-150 %</i>	<i>88.9</i>	<i>%</i>	

Data File: \\TARGET\share\chem2\fid3b,1\20170303,b\17030340.D

Date : 04-MAR-2017 02:37

Client ID:

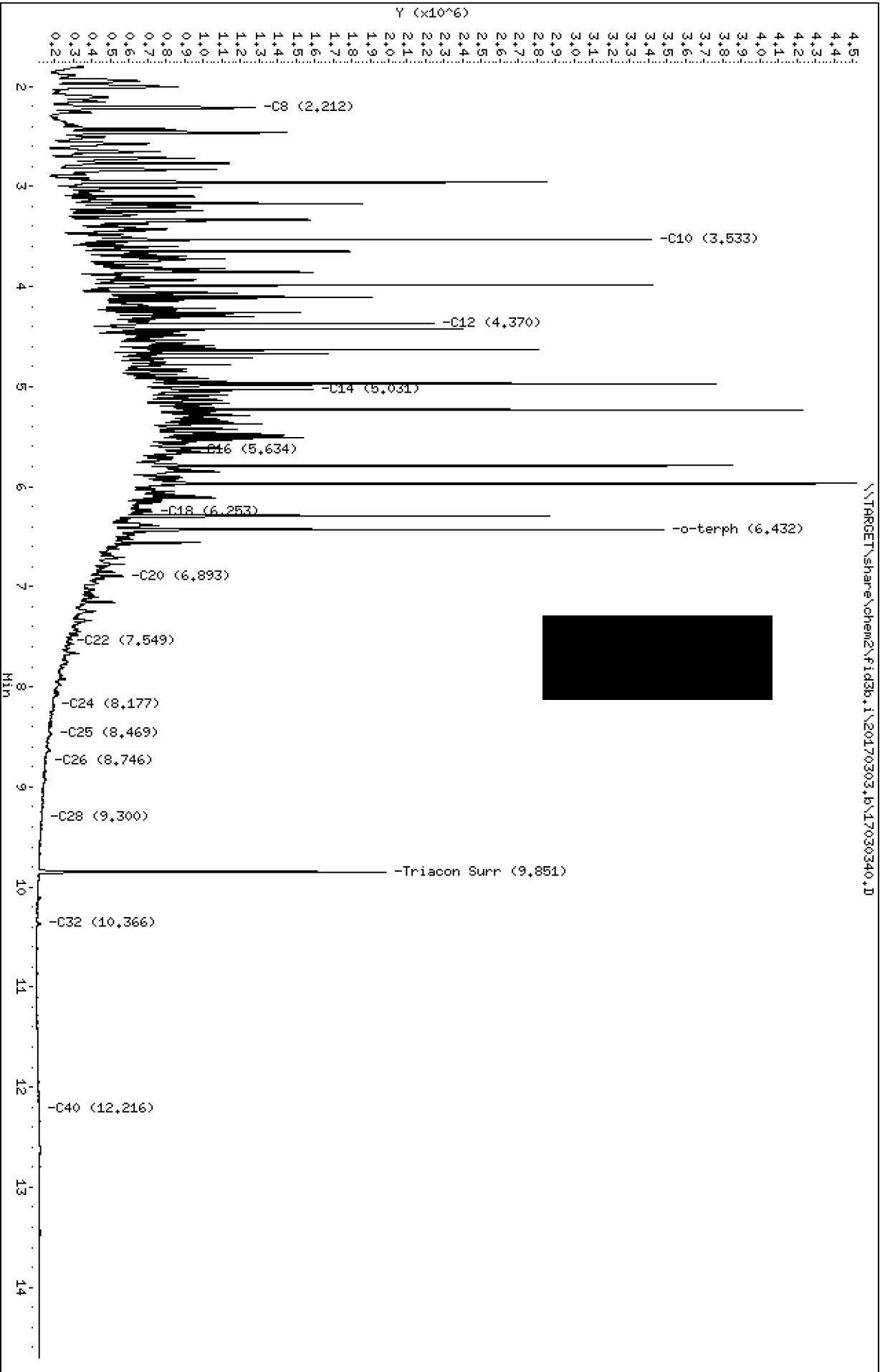
Sample Info: 17C0009-04REL,5

Column phase: RTX-1

Instrument: fid3b,1

Operator: ML

Column diameter: 0.25



Analytical Resources Inc.
TPH Quantitation Report

Data file: 20170303.b/17030340.D
Method: 20170303.b\FID3TPH.m
Instrument: fid3b.i
Operator: ML
Report Date: 03/06/2017
Macro: FID3_022817

ARI ID: 17C0009-04RE1
Client ID:
Injection: 04-MAR-2017 02:37
Dilution Factor: 5

FID:3B RESULTS

Compound	RT	Shift	Height	Area	Method	Range	Total Area	Conc
Toluene	1.890	0.009	204233	323838	WATPHG	(Tol-C12)	71228678	3275.2
C8	2.212	-0.001	1179847	2072720	WATPHD	(C12-C24)	120525423	775.1
C10	3.533	-0.000	3316433	2031706	WATPHM	(C24-C38)	3793781	27.7
C12	4.370	-0.002	2144466	1486319				
C14	5.031	-0.007	1493247	2008073				
C16	5.634	-0.001	829539	558258				
C18	6.253	-0.001	625563	537800				
C20	6.893	-0.007	463928	562489				
C22	7.549	0.003	169188	90290				
C24	8.177	0.009	91792	66612				
C25	8.469	0.003	82770	226421				
C26	8.746	-0.008	52686	73427				
C28	9.300	-0.015	30913	50288				
C32	10.366	-0.009	23381	28197				
C34	----							
Filter Peak	----							
C36	----							
o-terph	6.432	-0.008	2940378	1760292				
Triacon Surr	9.851	-0.016	1886048	1524606				

Range Times: NW Diesel(4.422 - 8.218) NW Gas(1.831 - 4.422) NW M.Oil(8.218 - 11.845)
AK102(3.483 - 8.416) AK103(8.416 - 11.394) Jet A(3.483 - 6.304)

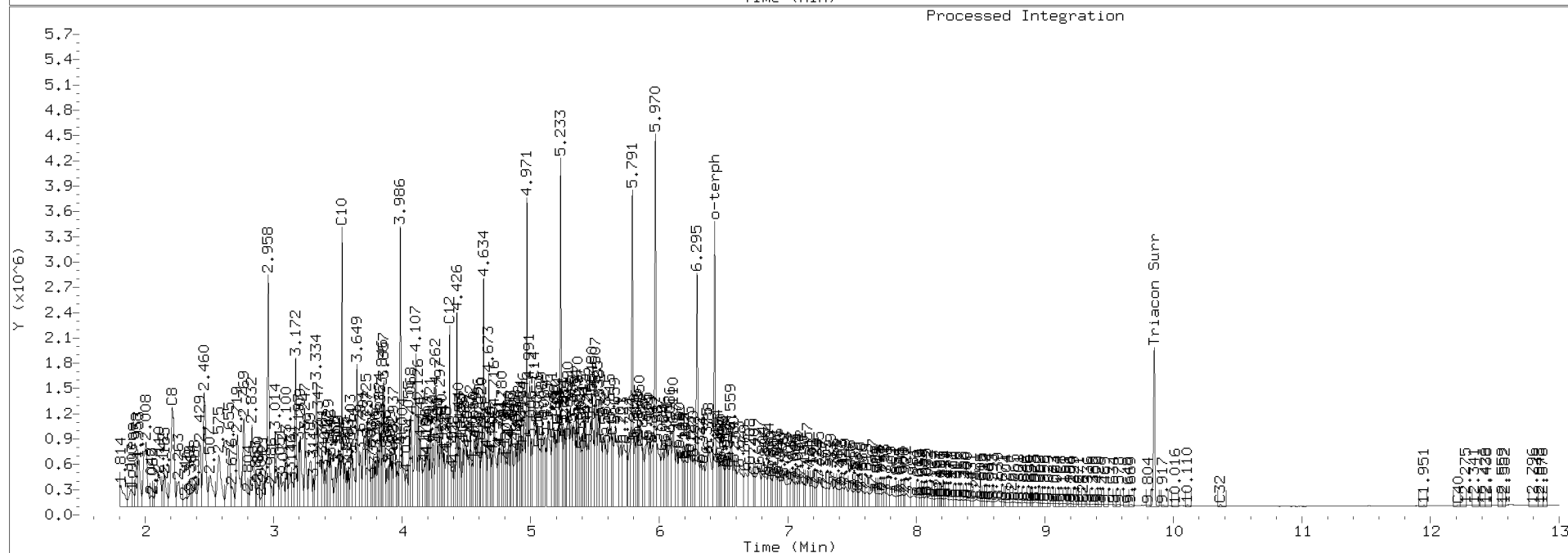
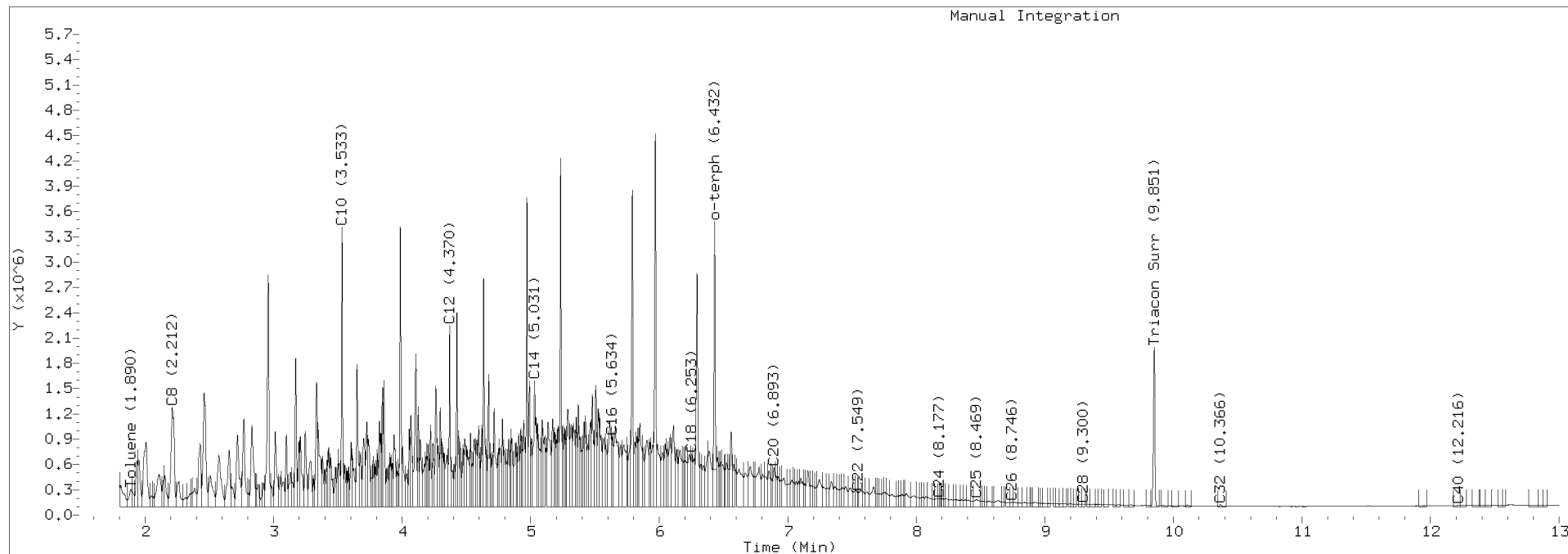
Surrogate	Area	Amount	%Rec
o-Terphenyl	1760292	8.0	89.0
Triacontane	1524606	8.0	88.7

Analyte	RF	Curve Date
o-Terph Surr	219872.3	28-FEB-2017
Triacon Surr	191068.8	28-FEB-2017
Gas	21747.6	xx-xx-xxxx
Diesel	155491.0	28-FEB-2017
Motor Oil	137039.0	28-FEB-2017

TPH Manual Integrations Report

Datafile: FID3B, 20170303.b/17030340.D Injection: 04-MAR-2017 02:37

Lab ID:17C0009-04RE1





Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

B-4-14
17C0009-05 (Solid)

Volatile Organic Compounds

Method: EPA 8260C

Sampled: 02/27/2017 12:15

Instrument: NT5

Analyzed: 06-Mar-2017 16:45

Sample Preparation:

Preparation Method: EPA 5035 (Sodium Bisulfate)

Preparation Batch: BFC0031

Sample Size: 4.72 g (wet)

Dry Weight: 3.44 g

Prepared: 01-Mar-2017

Final Volume: 5 mL

% Solids: 72.90

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
1,2-Dichloroethane	107-06-2	1	1.45	ND	ug/kg	U
Benzene	71-43-2	1	1.45	ND	ug/kg	U
Toluene	108-88-3	1	1.45	ND	ug/kg	U
Ethylbenzene	100-41-4	1	1.45	ND	ug/kg	U
m,p-Xylene	179601-23-1	1	1.45	ND	ug/kg	U
o-Xylene	95-47-6	1	1.45	ND	ug/kg	U
<i>Surrogate: Dibromofluoromethane</i>			80-120 %	94.1	%	
<i>Surrogate: 1,2-Dichloroethane-d4</i>			80-149 %	81.1	%	
<i>Surrogate: Toluene-d8</i>			77-120 %	97.4	%	
<i>Surrogate: 4-Bromofluorobenzene</i>			80-120 %	104	%	
<i>Surrogate: 1,2-Dichlorobenzene-d4</i>			80-120 %	103	%	



Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

B-4-14
17C0009-05 (Solid)

Volatile Organic Compounds

Method: NWTPhg Sampled: 02/27/2017 12:15
Instrument: NT3 Analyzed: 06-Mar-2017 14:22

Sample Preparation: Preparation Method: EPA 5035 (Methanol Extraction) Dry Weight: 4.55 g
Preparation Batch: BFC0131 Sample Size: 6.239 g (wet)
Prepared: 06-Mar-2017 Final Volume: 5 mL % Solids: 72.90

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Gasoline Range Organics (Tol-Nap)		50	7360	ND	ug/kg	U
HC ID: GRO						
Surrogate: Toluene-d8			80-120 %	98.0	%	
Surrogate: 4-Bromofluorobenzene			78-123 %	99.3	%	

Data File: \\target\share\chend\nt3,1\20170306s.b\303061716G.D

Date : 06-HRR-2017 14:22

Client ID:

Sample Info: 17C0009-05

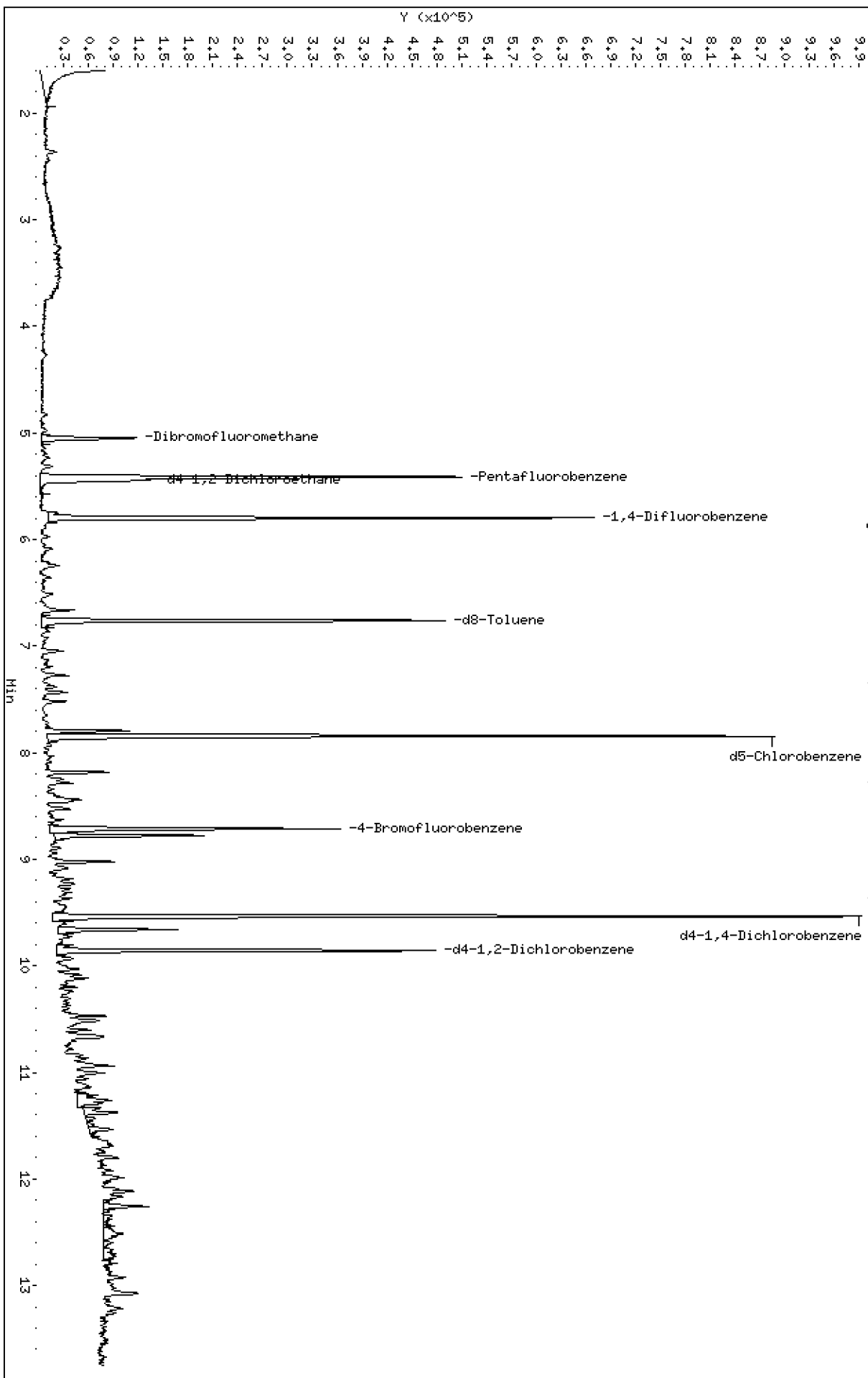
Column phase: RTXWMS

Instrument: nt3,1

Operator: PC

Column diameter: 0.18

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ARI Labs, Inc.

8260C 10 ml purge

Data file : \\target\share\chem1\nt3.i\20170306s.b\V303061716G.D
 Lab Smp Id: 17C0009-05
 Inj Date : 06-MAR-2017 14:22
 Operator : PC
 Smp Info : 17C0009-05
 Misc Info : 15-
 Comment :
 Method : \\target\share\chem1\nt3.i\20170306s.b\8260C022417.m
 Meth Date : 06-Mar-2017 07:32 Paul
 Cal Date : 14-FEB-2017 18:50
 Als bottle: 12
 Dil Factor: 1.00000
 Integrator: HP RTE
 Target Version: 4.14
 Processing Host: ORGDATA11

Inst ID: nt3.i

Quant Type: ISTD

Cal File: V302141718.D

Compound Sublist: gsurr.sub

Concentration Formula: Amt * DF * Pv / Sa * CpndVariable

Name	Value	Description
DF	1.000	Dilution Factor
Pv	10.000	Purge Volume (mL)
Sa	10.000	Sample Amount (mL)
Cpnd Variable		Local Compound Variable

Compounds	QUANT	SIG	RT	EXP RT	REL RT	RESPONSE	CONCENTRATIONS	
							ON-COLUMN (ug/L)	FINAL (ug/L)
\$ 27 Dibromofluoromethane	111		5.047	5.053	(0.932)	58779	4.77578	4.776
* 32 Pentafluorobenzene	168		5.414	5.420	(1.000)	261977	10.0000	
\$ 33 d4-1,2-Dichloroethane	65		5.440	5.446	(1.005)	66366	4.76599	4.766
* 37 1,4-Difluorobenzene	114		5.796	5.803	(1.000)	422048	10.0000	
\$ 43 d8-Toluene	98		6.759	6.765	(1.166)	250937	4.89771	4.898
* 53 d5-Chlorobenzene	117		7.843	7.844	(1.000)	408500	10.0000	
\$ 62 4-Bromofluorobenzene	174		8.715	8.715	(1.111)	85363	4.96381	4.964
* 76 d4-1,4-Dichlorobenzene	152		9.533	9.534	(1.000)	220033	10.0000	
\$ 79 d4-1,2-Dichlorobenzene	152		9.857	9.858	(1.034)	103024	4.98848	4.988

ARI Labs, Inc.

INTERNAL STANDARD COMPOUNDS
 AREA AND RT SUMMARY

Instrument ID: nt3.i Calibration Date: 03-MAR-2017
 Lab File ID: V303061716G.D Calibration Time: 21:57
 Lab Smp Id: 17C0009-05
 Analysis Type: VOA Level: LOW
 Quant Type: ISTD Sample Type: WATER
 Operator: PC
 Method File: \\target\share\chem1\nt3.i\20170306s.b\8260C022417.m
 Misc Info: 15-

Test Mode:

Use Initial Calibration Level 5.
 If Continuing Cal. use Initial Cal. Level 5

COMPOUND	STANDARD	AREA LIMIT		SAMPLE	%DIFF
		LOWER	UPPER		
32 Pentafluorobenzon	317912	158956	635824	261977	-17.59
37 1,4-Difluorobenze	512039	256020	1024078	422048	-17.58
53 d5-Chlorobenzene	494052	247026	988104	408500	-17.32
76 d4-1,4-Dichlorobe	282154	141077	564308	220033	-22.02

COMPOUND	STANDARD	RT LIMIT		SAMPLE	%DIFF
		LOWER	UPPER		
32 Pentafluorobenzon	5.42	4.92	5.92	5.41	-0.11
37 1,4-Difluorobenze	5.80	5.30	6.30	5.80	-0.11
53 d5-Chlorobenzene	7.84	7.34	8.34	7.84	-0.01
76 d4-1,4-Dichlorobe	9.53	9.03	10.03	9.53	-0.01

AREA UPPER LIMIT = +100% of internal standard area.
 AREA LOWER LIMIT = - 50% of internal standard area.
 RT UPPER LIMIT = + 0.50 minutes of internal standard RT.
 RT LOWER LIMIT = - 0.50 minutes of internal standard RT.

ARI Labs, Inc.

RECOVERY REPORT

Client Name: Client SDG: 20151005
Sample Matrix: LIQUID Fraction: VOA
Lab Smp Id: 17C0009-05
Level: LOW Operator: PC
Data Type: MS DATA SampleType: SAMPLE
SpikeList File: allspike.spk Quant Type: ISTD
Sublist File: gsurr.sub
Method File: \\target\share\chem1\nt3.i\20170306s.b\8260C022417.m
Misc Info: 15-

SURROGATE COMPOUND	AMOUNT ADDED ug/L	AMOUNT RECOVERED ug/L	% RECOVERED	LIMITS
\$ 27 Dibromofluorometha	5.000	4.776	95.52	80-120
\$ 33 d4-1,2-Dichloroeth	5.000	4.766	95.32	80-128
\$ 43 d8-Toluene	5.000	4.898	97.95	80-120
\$ 62 4-Bromofluorobenze	5.000	4.964	99.28	80-120
\$ 79 d4-1,2-Dichloroben	5.000	4.988	99.77	80-120

REVIEW SUMMARY FOR FILE - V303061716G.D

Lab ID: 17C0009-05

nt3.i, 20170306s.b\8260C022417.m, 06-MAR-2017 14:22

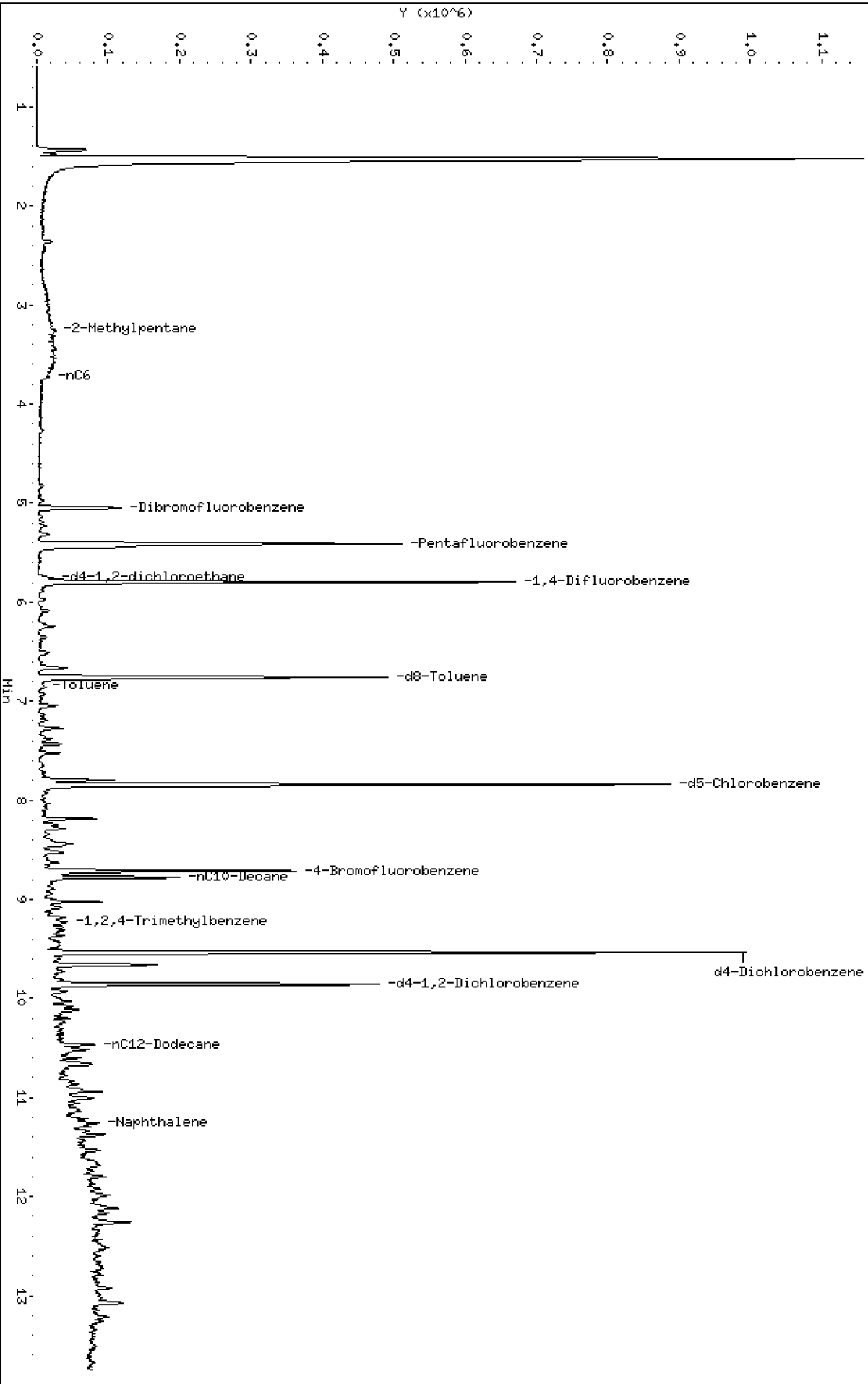
RT CO-ELUTION COMPOUNDS

Data File: \\target\share\chend\nt3.1\20170306g.b\303061716g.D
Date: 06-HR-2017 14:22
Client ID:
Sample Info: 17C0009-05

Column phase: RTXWMS

Instrument: nt3.1
Operator: PC
Column diameter: 0.18

\\target\share\chend\nt3.1\20170306g.b\303061716g.D



Analytical Resources Inc.
GC/MS Gas Quantitation Report

Data file: 20170306g.b/V303061716G.D
Method: \20170306g.b\NWTPHG.m
Instrument: nt3.i
Gas Ical Date: 14-Feb-2017
Injection Date: 06-MAR-2017 14:22

ARI ID: 17C0009-05
Client ID:
Matrix: WATER
Dilution Factor: 1.000
Operator: PC

=====

GASOLINE HYDROCARBONS

Range	RF	Total Area*	Amount (ug/mL)
-----	----	-----	-----
WAGas Tol-C12 (6.70 to 10.57)	52141375	2332748	0.045
8015C 2MP-TMB (3.17 to 9.34)	87713511	2352410	0.027
AK101 nC6-nC10 (3.65 to 8.68)	61260787	1314427	0.021
NWTPHG Tol-Nap (6.70 to 11.36)	54123058	2943880	0.054

M Indicates manual integration within range

* Surrogate areas are subtracted from Total Area

NW Gas Range Subtracted Peaks

6.759	744695	d8-Toluene
8.715	538662	4-Bromofluorobenzene
9.534	1414944	d4-Dichlorobenzene
7.843	1325749	d5-Chlorobenzene
9.858	669882	d4-1,2-Dichlorobenzene



Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

B-4-14
17C0009-05 (Solid)

Petroleum Hydrocarbons

Method: NWTPH-Dx

Sampled: 02/27/2017 12:15

Instrument: FID3

Analyzed: 03-Mar-2017 14:36

Sample Preparation:

Preparation Method: EPA 3546 (Microwave)

Preparation Batch: BFC0023

Prepared: 02-Mar-2017

Sample Size: 10.06 g (wet)

Final Volume: 1 mL

Dry Weight: 7.33 g

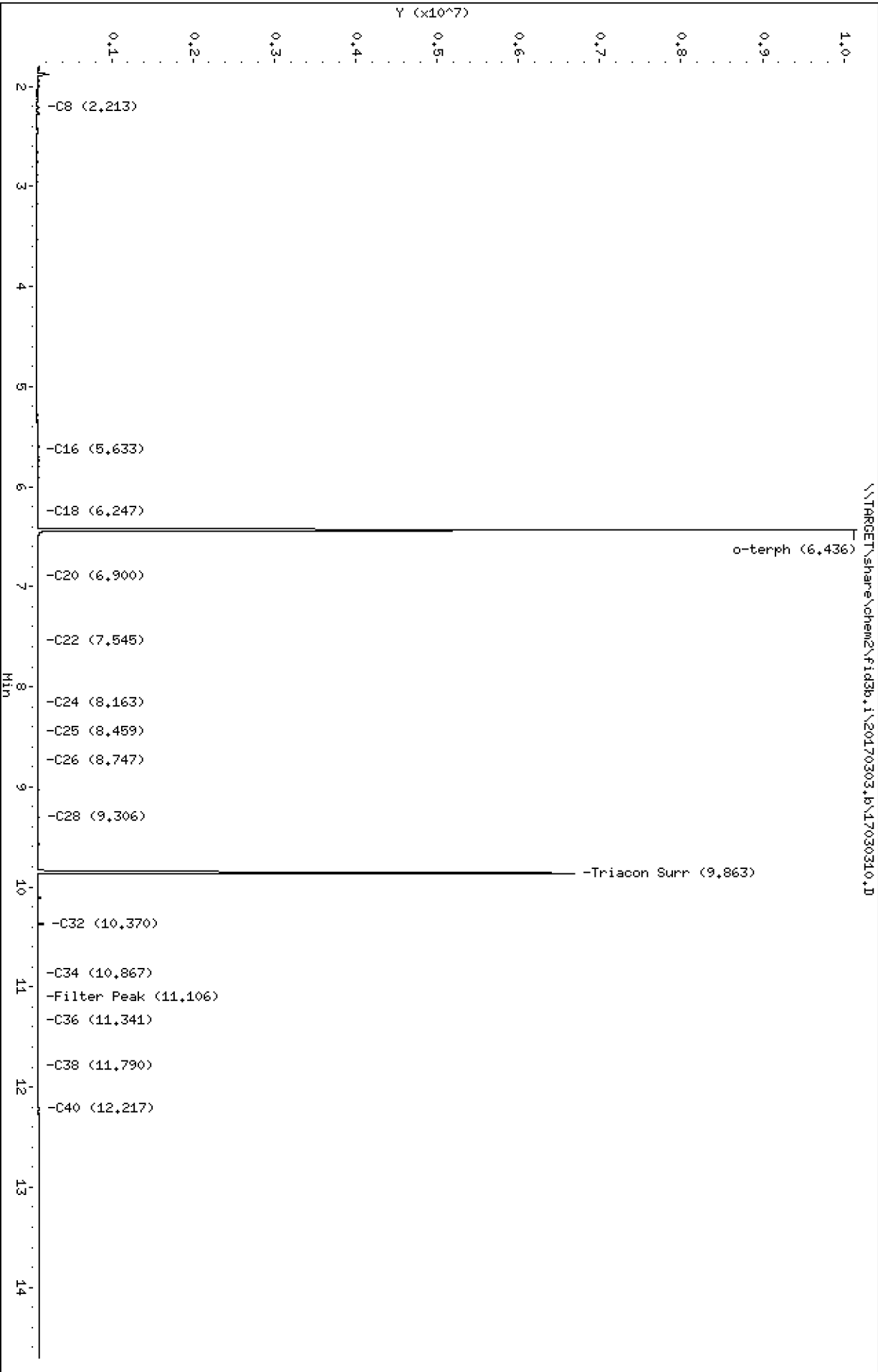
% Solids: 72.90

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Diesel Range Organics (C12-C24)		1	6.82	ND	mg/kg	U
Motor Oil Range Organics (C24-C38)		1	13.6	ND	mg/kg	U
<i>Surrogate: o-Terphenyl</i>			50-150 %	75.6	%	

Data File: \\TARGET\share\chem2\fid3b.1\20170303.b\17030310.D
Date: 03-MAR-2017 14:36
Client ID:
Sample Info: 17C0009-05

Column phase: RTX-1

Instrument: fid3b.1
Operator: ML
Column diameter: 0.25



Analytical Resources Inc.
TPH Quantitation Report

Data file: 20170303.b/17030310.D
Method: 20170303.b\FID3TPH.m
Instrument: fid3b.i
Operator: ML
Report Date: 03/06/2017
Macro: FID3_022817

ARI ID: 17C0009-05
Client ID:
Injection: 03-MAR-2017 14:36
Dilution Factor: 1

FID:3B RESULTS

Compound	RT	Shift	Height	Area	Method	Range	Total Area	Conc
Toluene	1.881	-0.000	146172	177717	WATPHG	(Tol-C12)	447338	20.6
C8	2.213	0.000	27231	33603	WATPHD	(C12-C24)	1228177	7.9
C10	----				WATPHM	(C24-C38)	1576229	11.5
C12	----							
C14	----							
C16	5.633	-0.001	18853	40091				
C18	6.247	-0.008	19694	36607				
C20	6.900	0.000	17248	42467				
C22	7.545	-0.001	16250	30888				
C24	8.163	-0.005	18460	28971				
C25	8.459	-0.008	21656	27520				
C26	8.747	-0.007	21271	37997				
C28	9.306	-0.009	27376	33001				
C32	10.370	-0.005	80616	122895				
C34	10.867	-0.003	16208	28253				
Filter Peak	11.106	0.007	16954	25881				
C36	11.341	-0.003	17364	26716				
o-terph	6.436	-0.004	10077959	7474590				
Triacon Surr	9.863	-0.005	6616710	6642305				

Range Times: NW Diesel(4.422 - 8.218) NW Gas(1.831 - 4.422) NW M.Oil(8.218 - 11.845)
AK102(3.483 - 8.416) AK103(8.416 - 11.394) Jet A(3.483 - 6.304)

Surrogate	Area	Amount	%Rec
o-Terphenyl	7474590	34.0	75.5
Triaconthane	6642305	34.8	77.3



Analyte	RF	Curve Date
o-Terph Surr	219872.3	28-FEB-2017
Triacon Surr	191068.8	28-FEB-2017
Gas	21747.6	xx-xx-xxxx
Diesel	155491.0	28-FEB-2017
Motor Oil	137039.0	28-FEB-2017



Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

B-4-W
17C0009-06 (Water)

Volatile Organic Compounds

Method: EPA 8260C

Sampled: 02/27/2017 12:20

Instrument: NT3

Analyzed: 02-Mar-2017 13:05

Sample Preparation: Preparation Method: EPA 5030 (Purge and Trap)
Preparation Batch: BFC0055 Sample Size: 10 mL
Prepared: 02-Mar-2017 Final Volume: 10 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
1,2-Dichloroethane	107-06-2	1	0.20	ND	ug/L	U
Benzene	71-43-2	1	0.20	29.0	ug/L	
Toluene	108-88-3	1	0.20	59.3	ug/L	
Ethylbenzene	100-41-4	1	0.20	289	ug/L	E
m,p-Xylene	179601-23-1	1	0.40	458	ug/L	E
o-Xylene	95-47-6	1	0.20	172	ug/L	E
<i>Surrogate: 1,2-Dichloroethane-d4</i>			80-129 %	102	%	
<i>Surrogate: Toluene-d8</i>			80-120 %	100	%	
<i>Surrogate: 4-Bromofluorobenzene</i>			80-120 %	102	%	



Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

B-4-W
17C0009-06 (Water)

Volatile Organic Compounds

Method: NWTPHg Sampled: 02/27/2017 12:20
Instrument: NT3 Analyzed: 02-Mar-2017 13:05

Sample Preparation: Preparation Method: EPA 5030 (Purge and Trap)
Preparation Batch: BFC0055 Sample Size: 10 mL
Prepared: 02-Mar-2017 Final Volume: 10 mL

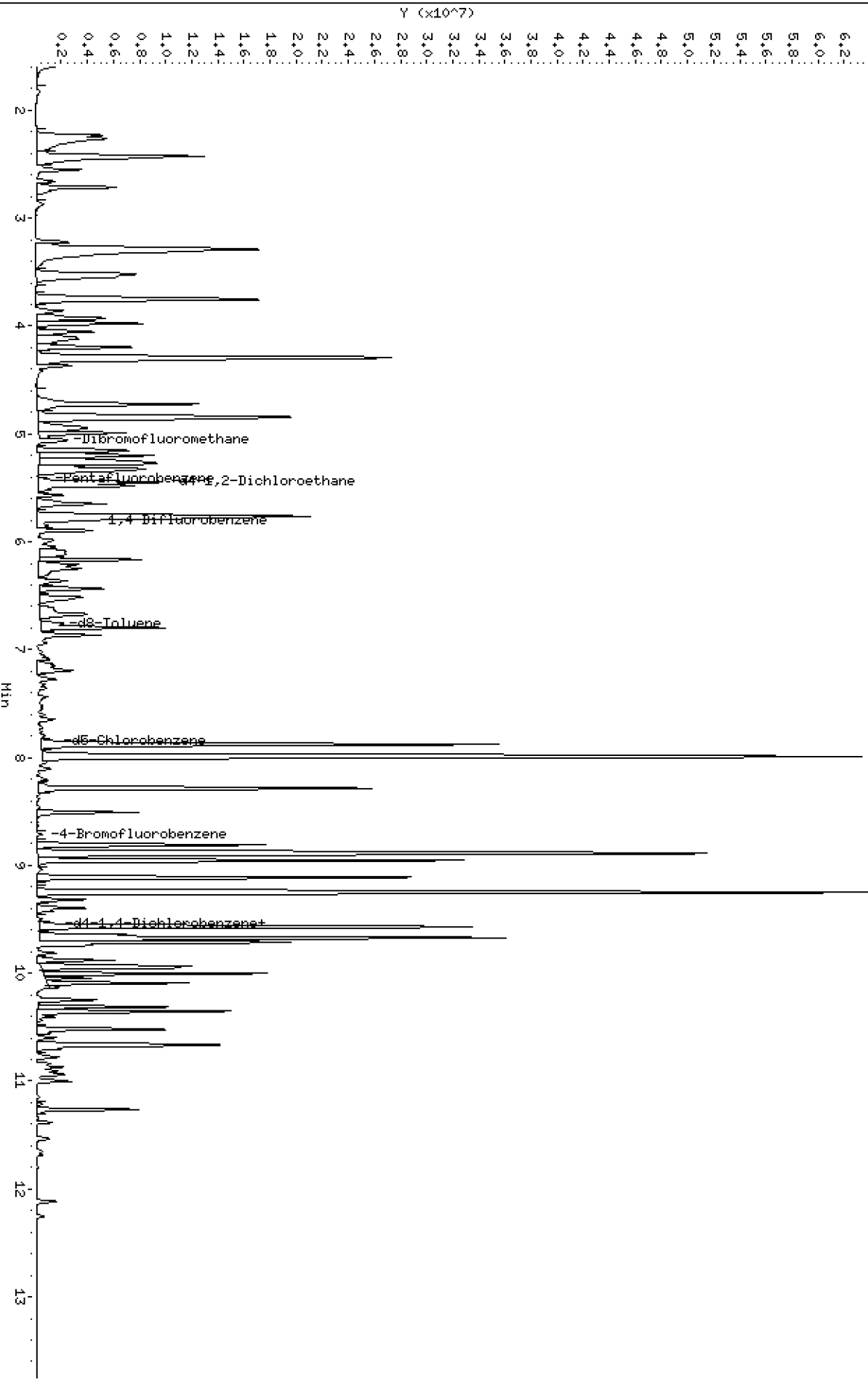
Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Gasoline Range Organics (Tol-Nap)		1	100	16900	ug/L	E
HC ID: GAS						
Surrogate: Toluene-d8			80-120 %	100	%	
Surrogate: 4-Bromofluorobenzene			80-120 %	102	%	

Data File: \\target\share\chend\nt3.1\20170302s.16\303021711G.D
Date : 02-MAR-2017 13:05
Client ID:
Sample Info: 17C0009-06

Column phase: RTXWMS

Instrument: nt3.1
Operator: PC
Column diameter: 0.18

\\target\share\chend\nt3.1\20170302s.16\303021711G.D



ARI Labs, Inc.

8260C 10 ml purge

Data file : \\target\share\chem1\nt3.i\20170302s.b\V303021711G.D
 Lab Smp Id: 17C0009-06
 Inj Date : 02-MAR-2017 13:05
 Operator : PC
 Smp Info : 17C0009-06
 Misc Info : 16-
 Comment :
 Method : \\target\share\chem1\nt3.i\20170302s.b\8260C022417.m
 Meth Date : 03-Mar-2017 15:16 nt3.i
 Cal Date : 14-FEB-2017 18:50
 Als bottle: 12
 Dil Factor: 1.00000
 Integrator: HP RTE
 Target Version: 4.14
 Processing Host: ORGDATA20

Inst ID: nt3.i

Quant Type: ISTD

Cal File: V302141718.D

Compound Sublist: gsurr.sub

Compounds	QUANT	SIG	RT	EXP RT	REL RT	RESPONSE	CONCENTRATIONS	
							ON-COLUMN (ug/L)	FINAL (ug/L)
\$ 27 Dibromofluoromethane	111		5.053	5.053	(0.932)	68566	4.81885	4.819(R)
* 32 Pentafluorobenzene	168		5.420	5.419	(1.000)	302866	10.0000	
\$ 33 d4-1,2-Dichloroethane	65		5.446	5.446	(1.005)	267533	16.6187	16.619(R)
* 37 1,4-Difluorobenzene	114		5.802	5.802	(1.000)	491586	10.0000	
\$ 43 d8-Toluene	98		6.765	6.759	(1.166)	384898	6.44965	6.450(R)
* 53 d5-Chlorobenzene	117		7.844	7.843	(1.000)	471111	10.0000	
\$ 62 4-Bromofluorobenzene	174		8.715	8.715	(1.111)	101552	5.12039	5.120(R)
* 76 d4-1,4-Dichlorobenzene	152		9.539	9.533	(1.000)	267776	10.0000	
\$ 79 d4-1,2-Dichlorobenzene	152		9.539	9.858	(1.000)	262407	10.4405	10.441(R)

QC Flag Legend

R - Spike/Surrogate failed recovery limits.

ARI Labs, Inc.

INTERNAL STANDARD COMPOUNDS
 AREA AND RT SUMMARY

Instrument ID: nt3.i Calibration Date: 02-MAR-2017
 Lab File ID: V303021711G.D Calibration Time: 21:37
 Lab Smp Id: 17C0009-06
 Analysis Type: VOA Level:
 Quant Type: ISTD Sample Type:
 Operator: PC
 Method File: \\target\share\chem1\nt3.i\20170302s.b\8260C022417.m
 Misc Info: 16-

Test Mode:

Use Initial Calibration Level 5.
 If Continuing Cal. use Initial Cal. Level 5

COMPOUND	STANDARD	AREA LIMIT		SAMPLE	%DIFF
		LOWER	UPPER		
32 Pentafluorobenzon	317912	158956	635824	302866	-4.73
37 1,4-Difluorobenze	512039	256020	1024078	491586	-3.99
53 d5-Chlorobenzene	494052	247026	988104	471111	-4.64
76 d4-1,4-Dichlorobe	282154	141077	564308	267776	-5.10

COMPOUND	STANDARD	RT LIMIT		SAMPLE	%DIFF
		LOWER	UPPER		
32 Pentafluorobenzon	5.42	4.92	5.92	5.42	0.01
37 1,4-Difluorobenze	5.80	5.30	6.30	5.80	0.01
53 d5-Chlorobenzene	7.84	7.34	8.34	7.84	0.01
76 d4-1,4-Dichlorobe	9.53	9.03	10.03	9.54	0.06

AREA UPPER LIMIT = +100% of internal standard area.
 AREA LOWER LIMIT = - 50% of internal standard area.
 RT UPPER LIMIT = + 0.50 minutes of internal standard RT.
 RT LOWER LIMIT = - 0.50 minutes of internal standard RT.

ARI Labs, Inc.

RECOVERY REPORT

Client Name: Client SDG: 20150930a
Sample Matrix: NONE Fraction: VOA
Lab Smp Id: 17C0009-06
Level: Operator: PC
Data Type: MS DATA SampleType: SAMPLE
SpikeList File: allspike.spk Quant Type: ISTD
Sublist File: gsurr.sub
Method File: \\target\share\chem1\nt3.i\20170302s.b\8260C022417.m
Misc Info: 16-

SURROGATE COMPOUND	AMOUNT ADDED ug/L	AMOUNT RECOVERED ug/L	% RECOVERED	LIMITS
\$ 27 Dibromofluorometha	5.000	4.819	96.38	
\$ 33 d4-1,2-Dichloroeth	5.000	16.619	332.37	
\$ 43 d8-Toluene	5.000	6.450	128.99	
\$ 62 4-Bromofluorobenze	5.000	5.120	102.41	
\$ 79 d4-1,2-Dichloroben	5.000	10.441	208.81	

REVIEW SUMMARY FOR FILE - V303021711G.D

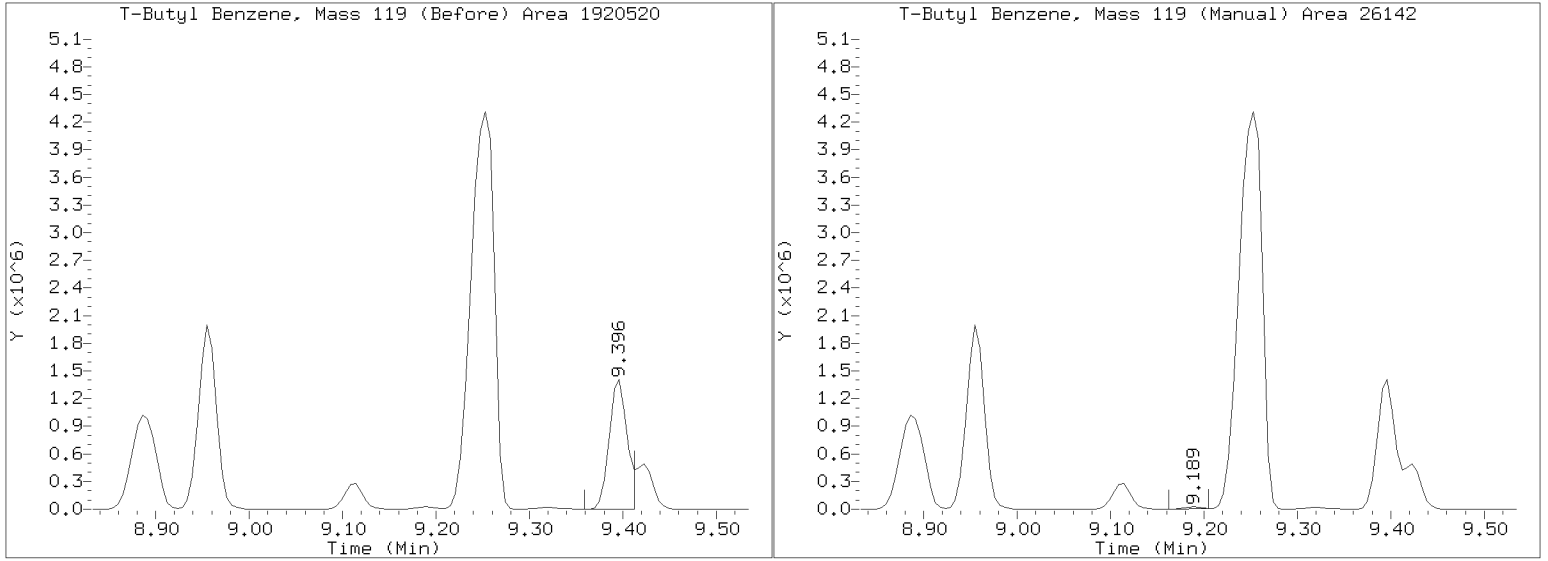
Lab ID: 17C0009-06

nt3.i, 20170302s.b\8260C022417.m, 02-MAR-2017 13:05

RT CO-ELUTION COMPOUNDS

Quant Ion Manual Peak Adjustment Report

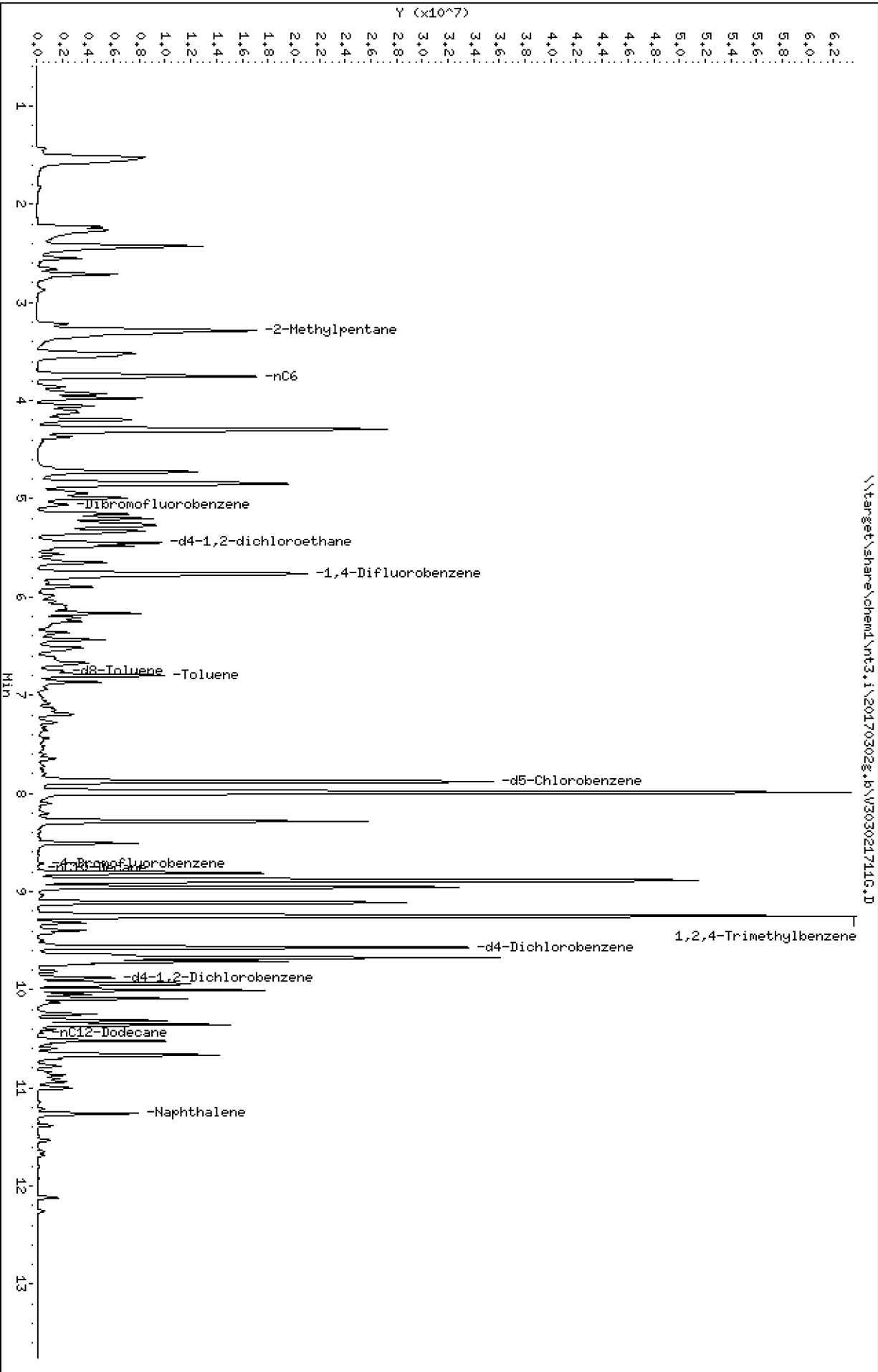
Datafile: //target/share/chem1/nt3.i/20170302.b/V303021711.D
Injection Date: 02-MAR-2017 13:05
Lab ID:17C0009-06 Client ID:
Report Date: 03/03/2017 15:15



Data File: \\target\share\chend\nt3,1\20170302g.jb\303021711G.D
Date : 02-MAR-2017 13:05
Client ID:
Sample Info: 17C0009-06

Column phase: RTXWMS

Instrument: nt3,1
Operator: PC
Column diameter: 0.18



Analytical Resources Inc.
GC/MS Gas Quantitation Report

Data file: 20170302g.b/V303021711G.D
Method: \20170302g.b\NWTPHG.m
Instrument: nt3.i
Gas Ical Date: 14-Feb-2017
Injection Date: 02-MAR-2017 13:05

ARI ID: 17C0009-06
Client ID:
Matrix: NONE
Dilution Factor: 1.000
Operator: PC

=====

GASOLINE HYDROCARBONS

Range	RF	Total Area*	Amount (ug/mL)
-----	----	-----	-----
WAGas Tol-C12 (6.70 to 10.57)	52141375	851647473	16.333
8015C 2MP-TMB (3.16 to 9.33)	87713511	1197618626	13.654
AK101 nC6-nC10 (3.65 to 8.68)	61260787	750357176	12.249
NWTPHG Tol-Nap (6.70 to 11.36)	54123058	913834458	16.884

M Indicates manual integration within range

* Surrogate areas are subtracted from Total Area

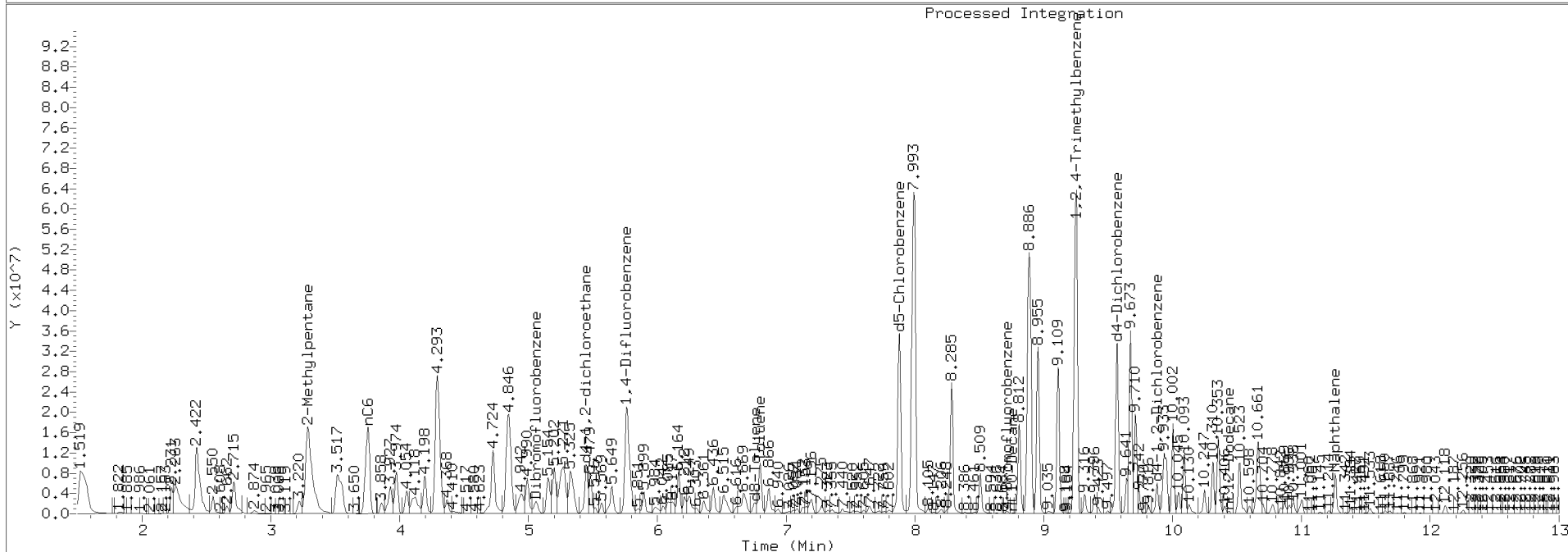
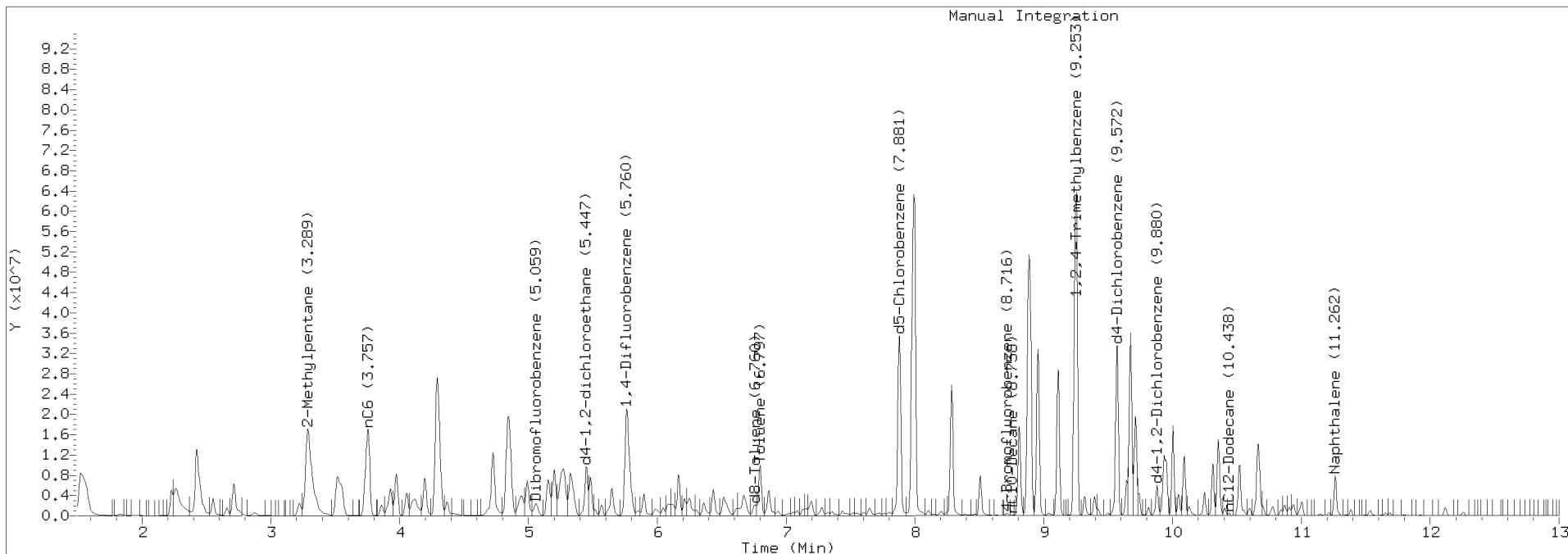
NW Gas Range Subtracted Peaks

6.760	4269079	d8-Toluene
8.716	758670	4-Bromofluorobenzene
9.572	53164654	d4-Dichlorobenzene
7.881	61552185	d5-Chlorobenzene
9.880	8642345	d4-1,2-Dichlorobenzene

TPHG Manual Integrations Report

Datafile: NT3, 20170302g.b/V303021711G.D Injection: 02-MAR-2017 13:05

Lab ID:17C0009-06





Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

B-4-W
17C0009-06 (Water)

Petroleum Hydrocarbons

Method: NWTPH-Dx

Sampled: 02/27/2017 12:20

Instrument: FID3

Analyzed: 03-Mar-2017 21:51

Sample Preparation:

Preparation Method: EPA 3510C SepF

Sample Size: 500 mL

Preparation Batch: BFC0024

Final Volume: 1 mL

Prepared: 02-Mar-2017

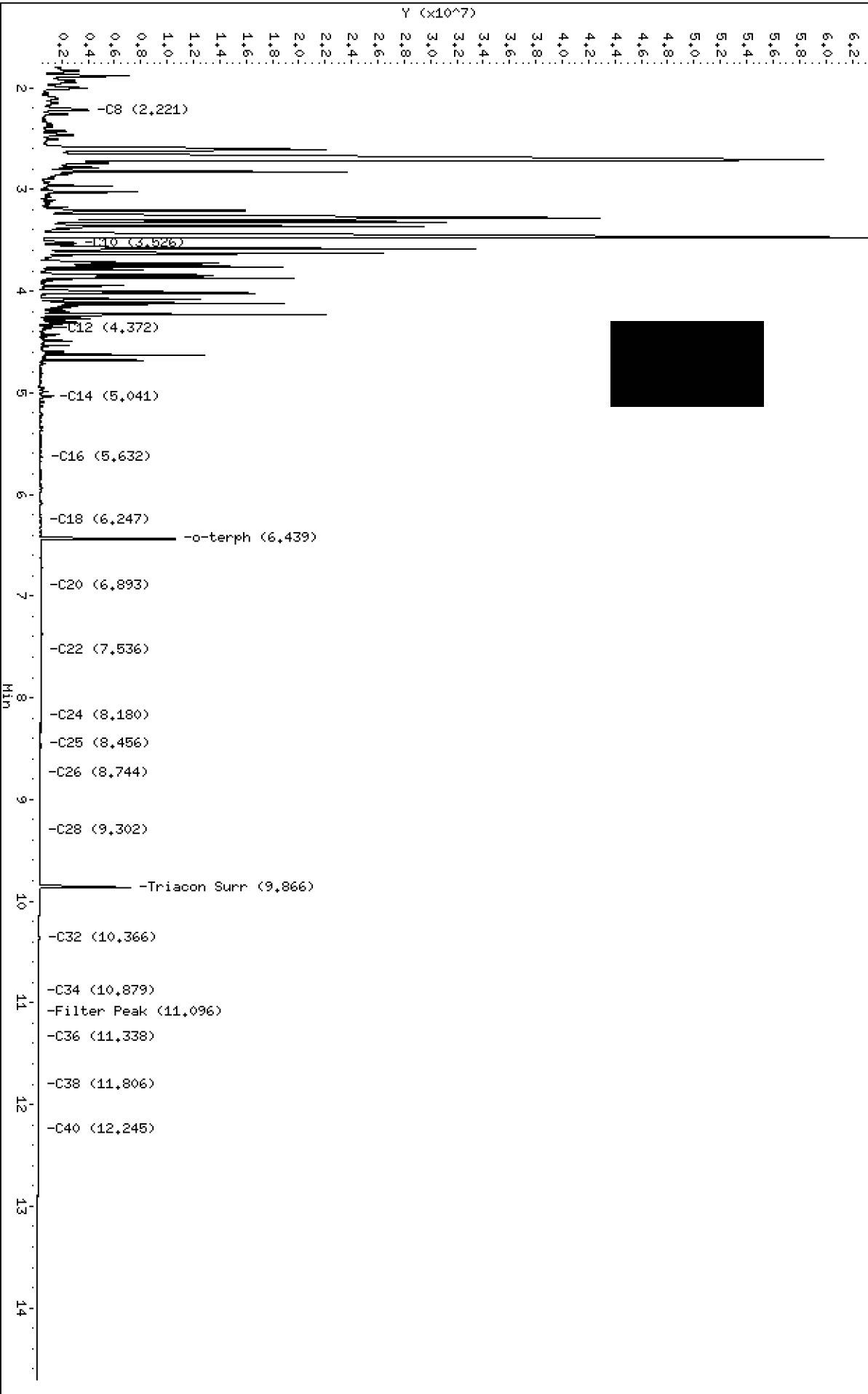
Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Diesel Range Organics (C12-C24)		1	0.100	1.04	mg/L	
HC ID: DRO						
Motor Oil Range Organics (C24-C38)		1	0.200	0.543	mg/L	
HC ID: RRO						
Surrogate: <i>o</i> -Terphenyl			50-150 %	77.3	%	

Data File: \\TARGET\share\chem2\fid3b,1\20170303,b\17030328.D
Date : 03-MAR-2017 21:51
Client ID:
Sample Info: 17C0009-06

Column phase: RTX-1

Instrument: fid3b,1
Operator: ML
Column diameter: 0.25

\\TARGET\share\chem2\fid3b,1\20170303,b\17030328.D



Analytical Resources Inc.
TPH Quantitation Report

Data file: 20170303.b/17030328.D
Method: 20170303.b\FID3TPH.m
Instrument: fid3b.i
Operator: ML
Report Date: 03/06/2017
Macro: FID3_022817

ARI ID: 17C0009-06
Client ID:
Injection: 03-MAR-2017 21:51
Dilution Factor: 1

FID:3B RESULTS

Compound	RT	Shift	Height	Area	Method	Range	Total Area	Conc
Toluene	1.886	0.005	6984291	8432374	WATPHG	(Tol-C12)	765827700	35214.3
C8	2.221	0.008	3870940	6805753	WATPHD	(C12-C24)	80762068	519.4
C10	3.526	-0.007	3007438	1737320	WATPHM	(C24-C38)	37225281	271.6
C12	4.372	0.000	1111675	825669				
C14	5.041	0.003	1075911	832697				
C16	5.632	-0.003	414635	697890				
C18	6.247	-0.007	347329	428397				
C20	6.893	-0.007	332245	598303				
C22	7.536	-0.010	316017	490871				
C24	8.180	0.012	271708	91805				
C25	8.456	-0.010	277125	431745				
C26	8.744	-0.011	255965	303240				
C28	9.302	-0.013	241840	544643				
C32	10.366	-0.009	241946	405661				
C34	10.879	0.008	124366	71357				
Filter Peak	11.096	-0.003	126261	244547				
C36	11.338	-0.006	121921	181311				
o-terph	6.439	-0.001	10202981	7659181				
Triacon Surr	9.866	-0.002	6965373	7110357				

Range Times: NW Diesel(4.422 - 8.218) NW Gas(1.831 - 4.422) NW M.Oil(8.218 - 11.845)
AK102(3.483 - 8.416) AK103(8.416 - 11.394) Jet A(3.483 - 6.304)

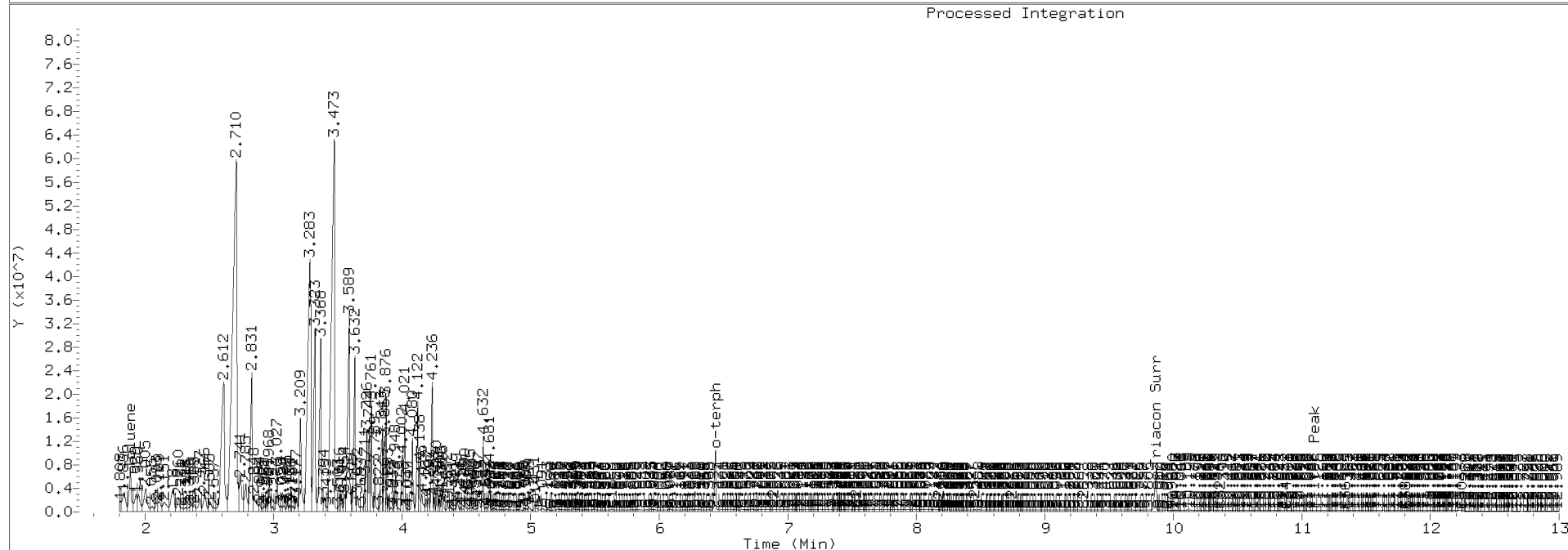
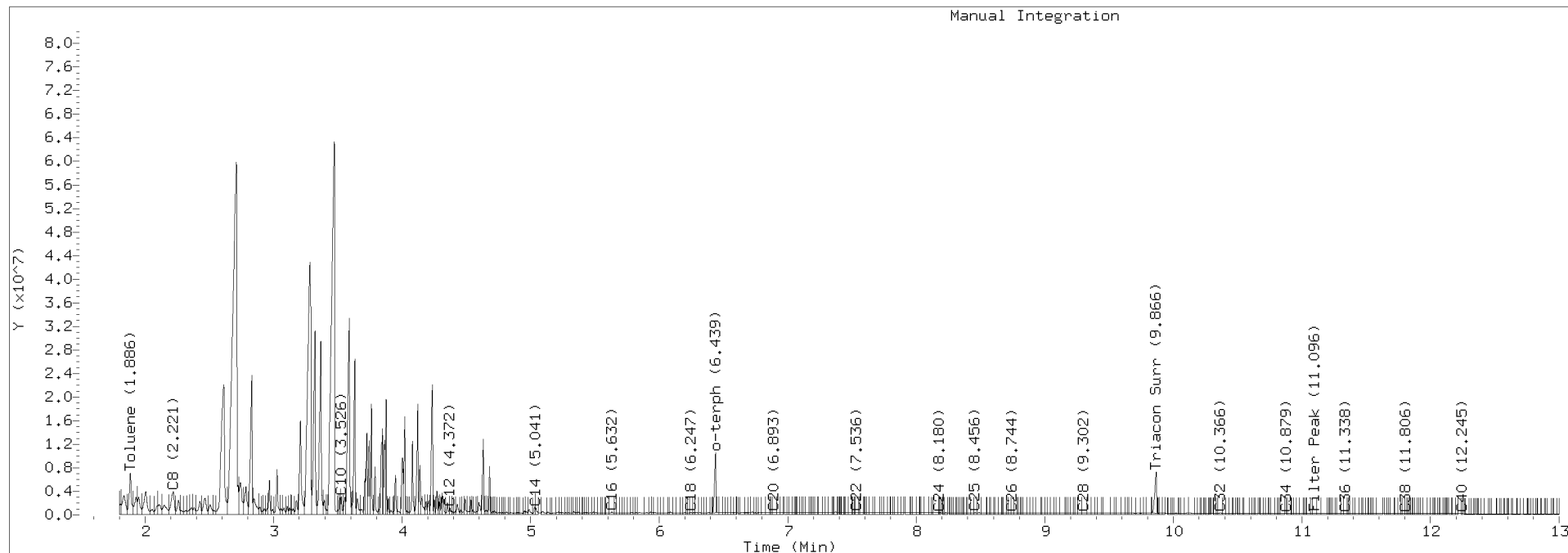
Surrogate	Area	Amount	%Rec
o-Terphenyl	7659181	34.8	77.4
Triacontane	7110357	37.2	82.7

Analyte	RF	Curve Date
o-Terph Surr	219872.3	28-FEB-2017
Triacon Surr	191068.8	28-FEB-2017
Gas	21747.6	xx-xx-xxxx
Diesel	155491.0	28-FEB-2017
Motor Oil	137039.0	28-FEB-2017

TPH Manual Integrations Report

Datafile: FID3B, 20170303.b/17030328.D Injection: 03-MAR-2017 21:51

Lab ID:17C0009-06





Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

B-4-W
17C0009-06RE1 (Water)

Volatile Organic Compounds

Method: EPA 8260C

Sampled: 02/27/2017 12:20

Instrument: NT3

Analyzed: 03-Mar-2017 15:01

Sample Preparation: Preparation Method: EPA 5030 (Purge and Trap)
Preparation Batch: BFC0084 Sample Size: 1 mL
Prepared: 03-Mar-2017 Final Volume: 10 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
1,2-Dichloroethane	107-06-2	1	2.00	ND	ug/L	U
Benzene	71-43-2	1	2.00	42.6	ug/L	
Toluene	108-88-3	1	2.00	81.8	ug/L	
Ethylbenzene	100-41-4	1	2.00	462	ug/L	
m,p-Xylene	179601-23-1	1	4.00	1450	ug/L	
o-Xylene	95-47-6	1	2.00	245	ug/L	
<i>Surrogate: 1,2-Dichloroethane-d4</i>			80-129 %	106	%	
<i>Surrogate: Toluene-d8</i>			80-120 %	104	%	
<i>Surrogate: 4-Bromofluorobenzene</i>			80-120 %	97.6	%	



Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

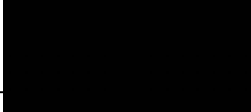
B-4-W
17C0009-06RE1 (Water)

Volatile Organic Compounds

Method: NWTPHg Sampled: 02/27/2017 12:20
Instrument: NT3 Analyzed: 03-Mar-2017 15:01

Sample Preparation: Preparation Method: EPA 5030 (Purge and Trap)
Preparation Batch: BFC0084 Sample Size: 1 mL
Prepared: 02-Mar-2017 Final Volume: 10 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Gasoline Range Organics (Tol-Nap)		1	1000	27100	ug/L	
HC ID: GAS						
Surrogate: Toluene-d8			80-120 %	104	%	
Surrogate: 4-Bromofluorobenzene			80-120 %	97.6	%	

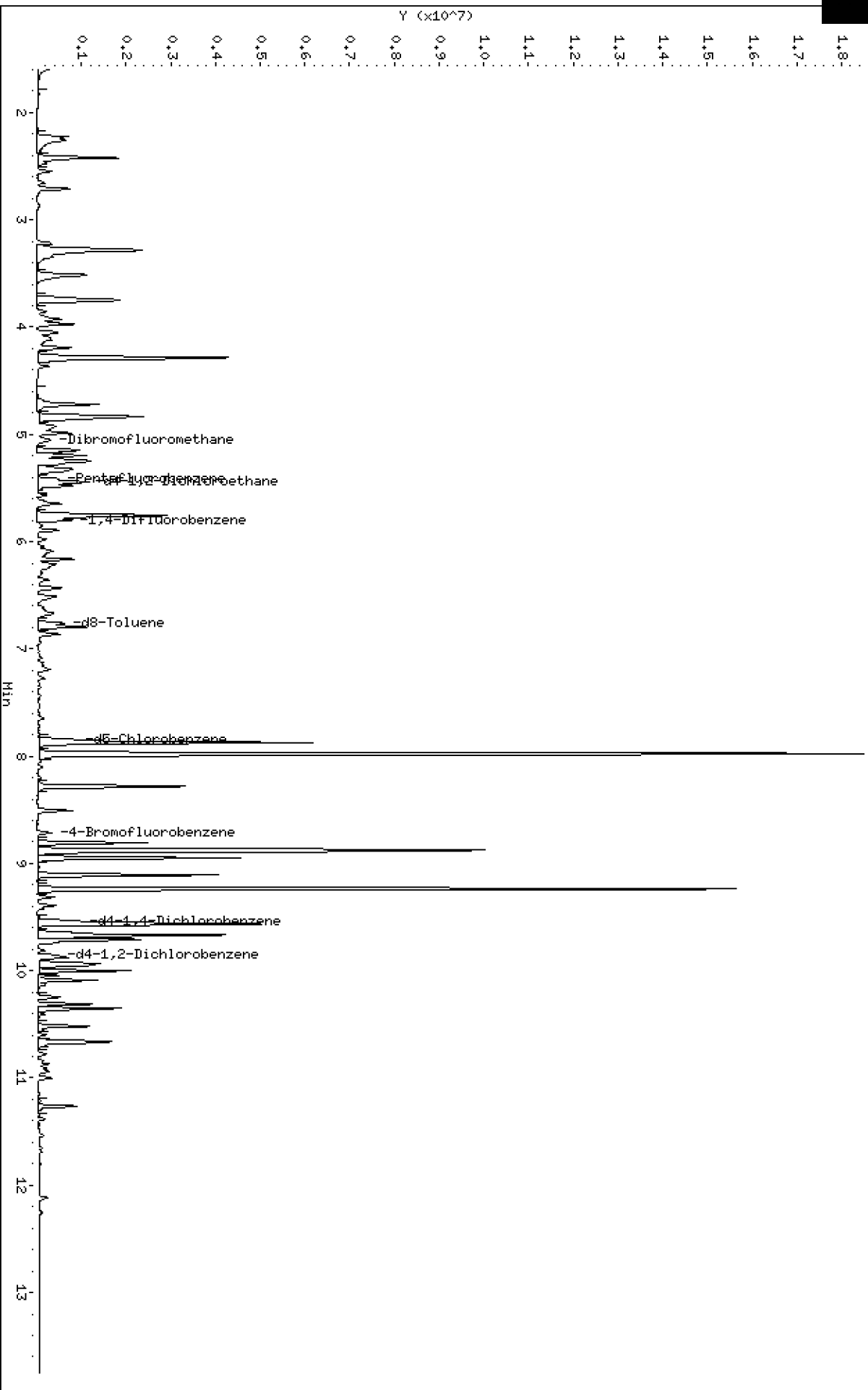


Data File: \\target\share\chend\nt3,1\20170303s.b\303031714G.D
Date: 03-HR-2017 15:01
Client ID:
Sample Info: 17C0009-06RE1

Column phase: RTXWMS

Instrument: nt3,1
Operator: PC
Column diameter: 0.18

\\target\share\chend\nt3,1\20170303s.b\303031714G.D



ARI Labs, Inc.

8260C 10 ml purge

Data file : \\target\share\chem1\nt3.i\20170303s.b\V303031714G.D
Lab Smp Id: 17C0009-06RE1
Inj Date : 03-MAR-2017 15:01
Operator : PC Inst ID: nt3.i
Smp Info : 17C0009-06RE1
Misc Info : 16-
Comment :
Method : \\target\share\chem1\nt3.i\20170303s.b\8260C022417.m
Meth Date : 06-Mar-2017 07:32 Paul Quant Type: ISTD
Cal Date : 14-FEB-2017 18:50 Cal File: V302141718.D
Als bottle: 12
Dil Factor: 1.00000
Integrator: HP RTE Compound Sublist: gsurr.sub
Target Version: 4.14
Processing Host: ORGDATA20

Compounds	QUANT	SIG	CONCENTRATIONS					
			RT	EXP RT	REL RT	RESPONSE	ON-COLUMN (ug/L)	FINAL (ug/L)
\$ 27 Dibromofluoromethane	111	====	5.053	5.053	(0.933)	55799	4.84528	4.845(R)
* 32 Pentafluorobenzene	168		5.415	5.420	(1.000)	245128	10.0000	
\$ 33 d4-1,2-Dichloroethane	65		5.446	5.446	(1.006)	102443	7.86249	7.862(R)
* 37 1,4-Difluorobenzene	114		5.803	5.803	(1.000)	392774	10.0000	
\$ 43 d8-Toluene	98		6.759	6.765	(1.165)	248044	5.20207	5.202(R)
* 53 d5-Chlorobenzene	117		7.844	7.844	(1.000)	383360	10.0000	
\$ 62 4-Bromofluorobenzene	174		8.716	8.715	(1.111)	78735	4.87864	4.879(R)
* 76 d4-1,4-Dichlorobenzene	152		9.539	9.534	(1.000)	205523	10.0000	
\$ 79 d4-1,2-Dichlorobenzene	152		9.858	9.858	(1.033)	97514	5.05504	5.055(R)

QC Flag Legend

R - Spike/Surrogate failed recovery limits.

ARI Labs, Inc.

INTERNAL STANDARD COMPOUNDS
 AREA AND RT SUMMARY

Instrument ID: nt3.i Calibration Date: 03-MAR-2017
 Lab File ID: V303031714G.D Calibration Time: 21:57
 Lab Smp Id: 17C0009-06RE1
 Analysis Type: VOA Level:
 Quant Type: ISTD Sample Type:
 Operator: PC
 Method File: \\target\share\chem1\nt3.i\20170303s.b\8260C022417.m
 Misc Info: 16-

Test Mode:

Use Initial Calibration Level 5.
 If Continuing Cal. use Initial Cal. Level 5

COMPOUND	STANDARD	AREA LIMIT		SAMPLE	%DIFF
		LOWER	UPPER		
32 Pentafluorobenzen	317912	158956	635824	245128	-22.89
37 1,4-Difluorobenze	512039	256020	1024078	392774	-23.29
53 d5-Chlorobenzene	494052	247026	988104	383360	-22.40
76 d4-1,4-Dichlorobe	282154	141077	564308	205523	-27.16

COMPOUND	STANDARD	RT LIMIT		SAMPLE	%DIFF
		LOWER	UPPER		
32 Pentafluorobenzen	5.42	4.92	5.92	5.42	-0.10
37 1,4-Difluorobenze	5.80	5.30	6.30	5.80	0.00
53 d5-Chlorobenzene	7.84	7.34	8.34	7.84	0.00
76 d4-1,4-Dichlorobe	9.53	9.03	10.03	9.54	0.06

AREA UPPER LIMIT = +100% of internal standard area.
 AREA LOWER LIMIT = - 50% of internal standard area.
 RT UPPER LIMIT = + 0.50 minutes of internal standard RT.
 RT LOWER LIMIT = - 0.50 minutes of internal standard RT.

ARI Labs, Inc.

RECOVERY REPORT

Client Name: Client SDG: 20150930a
Sample Matrix: NONE Fraction: VOA
Lab Smp Id: 17C0009-06RE1
Level: Operator: PC
Data Type: MS DATA SampleType: SAMPLE
SpikeList File: allspike.spk Quant Type: ISTD
Sublist File: gsurr.sub
Method File: \\target\share\chem1\nt3.i\20170303s.b\8260C022417.m
Misc Info: 16-

SURROGATE COMPOUND	AMOUNT ADDED ug/L	AMOUNT RECOVERED ug/L	% RECOVERED	LIMITS
\$ 27 Dibromofluorometha	5.000	4.845	96.91	
\$ 33 d4-1,2-Dichloroeth	5.000	7.862	157.25	
\$ 43 d8-Toluene	5.000	5.202	104.04	
\$ 62 4-Bromofluorobenze	5.000	4.879	97.57	
\$ 79 d4-1,2-Dichloroben	5.000	5.055	101.10	

REVIEW SUMMARY FOR FILE - V303031714G.D

Lab ID: 17C0009-06RE1

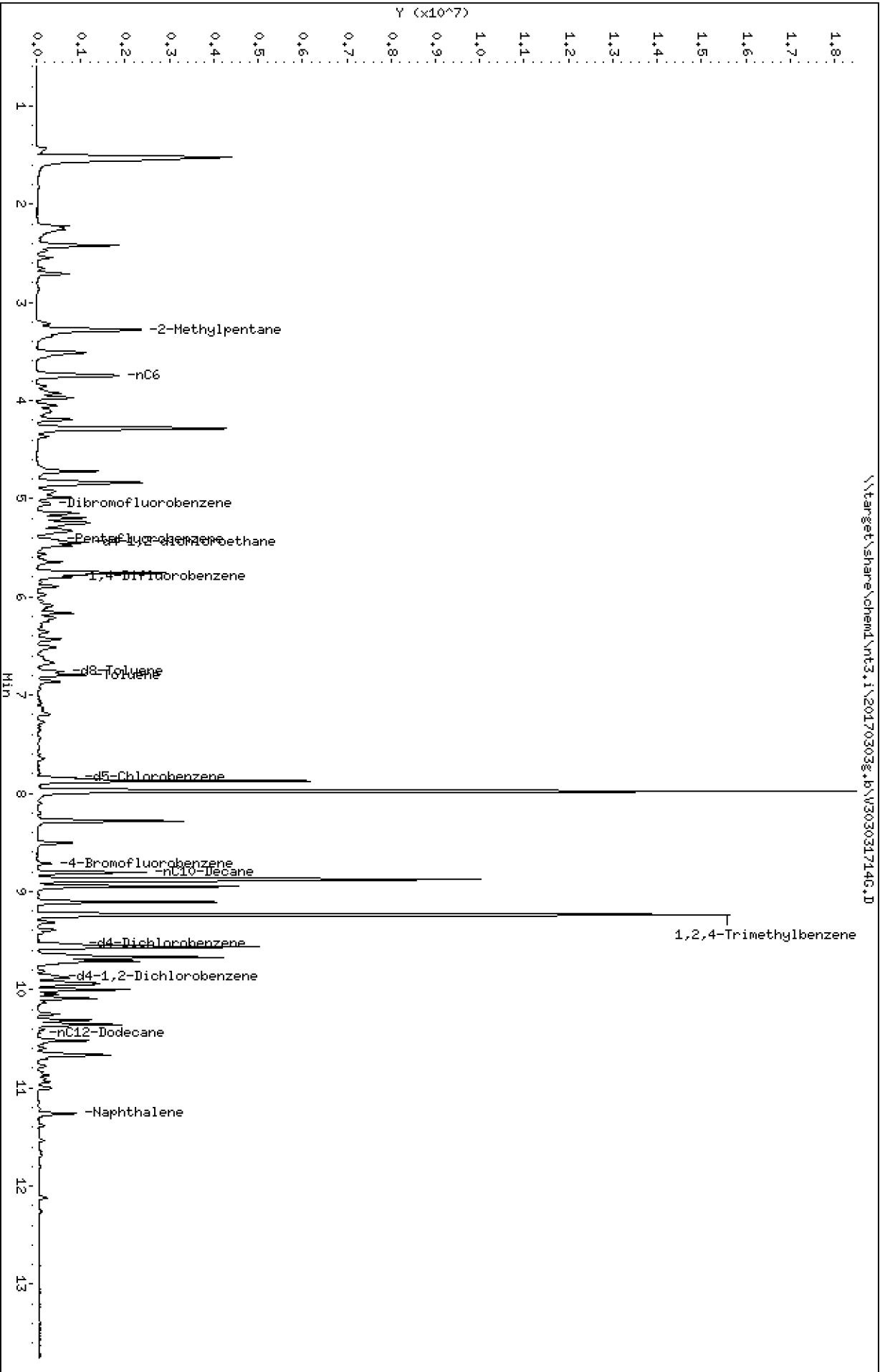
nt3.i, 20170303s.b\8260C022417.m, 03-MAR-2017 15:01

RT CO-ELUTION COMPOUNDS

Data File: \\target\share\chend\nt3.1\20170303g.b\303031714G.D
Date: 03-MAR-2017 15:01
Client ID:
Sample Info: 17C0009-06RE1

Column phase: RTXWMS

Instrument: nt3.1
Operator: PC
Column diameter: 0.18



Analytical Resources Inc.
GC/MS Gas Quantitation Report

Data file: 20170303g.b/V303031714G.D
Method: \20170303g.b\NWTPHG.m
Instrument: nt3.i
Gas Ical Date: 14-Feb-2017
Injection Date: 03-MAR-2017 15:01

ARI ID: 17C0009-06RE1
Client ID:
Matrix: NONE
Dilution Factor: 1.000
Operator: PC

=====

GASOLINE HYDROCARBONS

Range	RF	Total Area*	Amount (ug/mL)
WAGas Tol-C12 (6.70 to 10.57)	52141375	138846441	2.663 M
8015C 2MP-TMB (3.18 to 9.34)	87713511	170450373	1.943
AK101 nC6-nC10 (3.65 to 8.68)	61260787	106174143	1.733
NWTPHG Tol-Nap (6.70 to 11.36)	54123058	146736627	2.711 M

M Indicates manual integration within range

* Surrogate areas are subtracted from Total Area

NW Gas Range Subtracted Peaks

6.760	1100573	d8-Toluene
8.716	490120	4-Bromofluorobenzene
9.540	974296	d4-Dichlorobenzene
7.844	1024953	d5-Chlorobenzene
9.864	549713	d4-1,2-Dichlorobenzene



Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

B-5-13
17C0009-07 (Solid)

Volatile Organic Compounds

Method: EPA 8260C

Sampled: 02/27/2017 13:05

Instrument: NT5

Analyzed: 06-Mar-2017 17:08

Sample Preparation:

Preparation Method: EPA 5035 (Sodium Bisulfate)

Preparation Batch: BFC0031

Sample Size: 6.23 g (wet)

Dry Weight: 4.55 g

Prepared: 01-Mar-2017

Final Volume: 5 mL

% Solids: 73.02

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
1,2-Dichloroethane	107-06-2	1	1.10	5.07	ug/kg	
Benzene	71-43-2	1	1.10	1.27	ug/kg	
Toluene	108-88-3	1	1.10	ND	ug/kg	U
Ethylbenzene	100-41-4	1	1.10	1.39	ug/kg	
m,p-Xylene	179601-23-1	1	1.10	1.62	ug/kg	
o-Xylene	95-47-6	1	1.10	ND	ug/kg	U
<i>Surrogate: Dibromofluoromethane</i>			80-120 %	96.5	%	
<i>Surrogate: 1,2-Dichloroethane-d4</i>			80-149 %	87.1	%	
<i>Surrogate: Toluene-d8</i>			77-120 %	99.0	%	
<i>Surrogate: 4-Bromofluorobenzene</i>			80-120 %	107	%	
<i>Surrogate: 1,2-Dichlorobenzene-d4</i>			80-120 %	103	%	



Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

B-5-13
17C0009-07 (Solid)

Volatile Organic Compounds

Method: NWTPhg

Sampled: 02/27/2017 13:05

Instrument: NT3

Analyzed: 06-Mar-2017 14:47

Sample Preparation:

Preparation Method: EPA 5035 (Methanol Extraction)

Preparation Batch: BFC0131

Sample Size: 4.974 g (wet)

Dry Weight: 3.63 g

Prepared: 06-Mar-2017

Final Volume: 5 mL

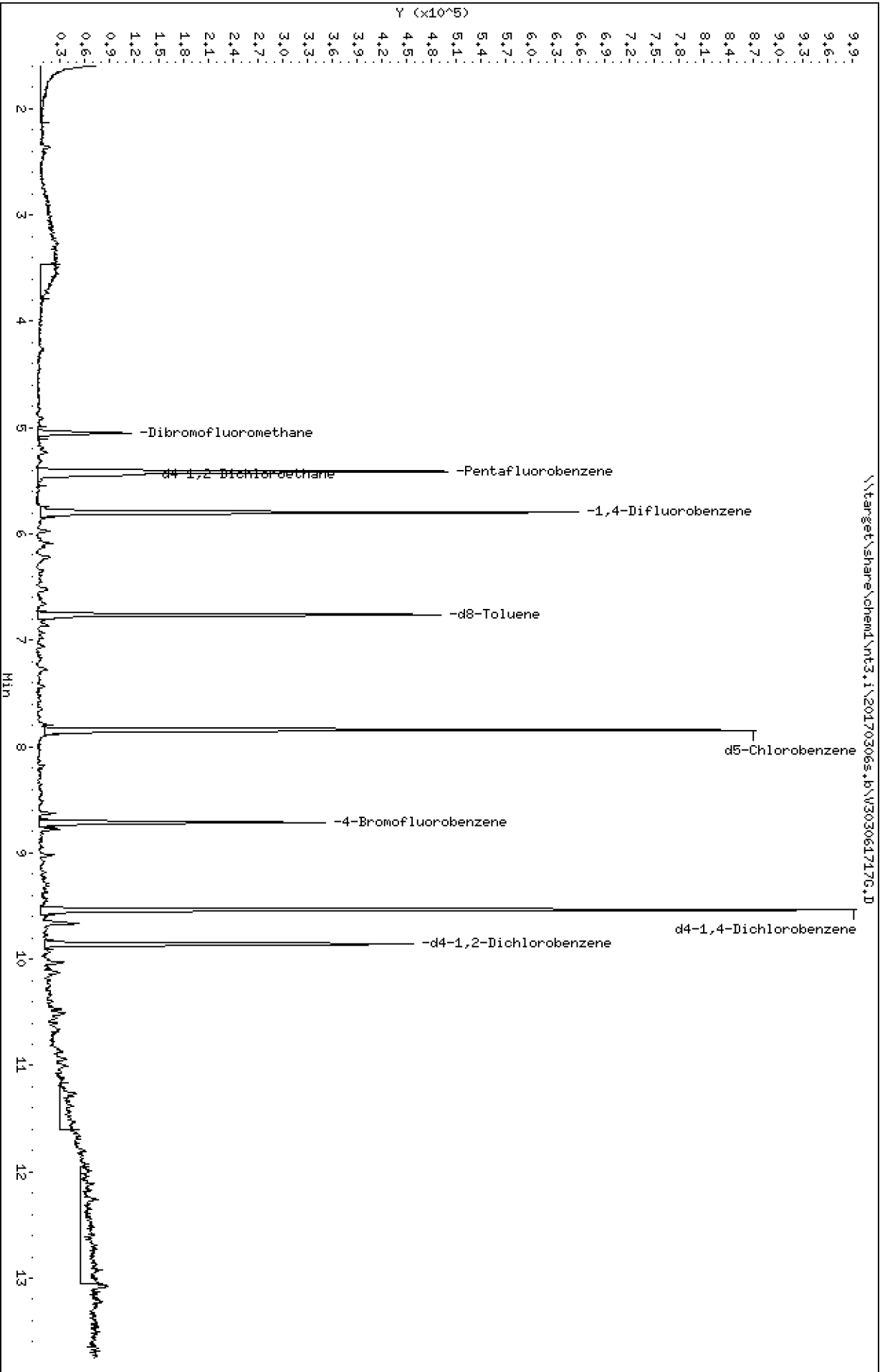
% Solids: 73.02

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Gasoline Range Organics (Tol-Nap)		50	8730	ND	ug/kg	U
HC ID: GRO						
Surrogate: Toluene-d8			80-120 %	99.9	%	
Surrogate: 4-Bromofluorobenzene			78-123 %	98.3	%	

Data File: \\target\share\chend\nt3,1\20170306s,b\303061717G.D
Date : 06-HRR-2017 14:47
Client ID:
Sample Info: 17C0009-07

Column phase: RTXWMS

Instrument: nt3,1
Operator: PC
Column diameter: 0.18



ARI Labs, Inc.

8260C 10 ml purge

Data file : \\target\share\chem1\nt3.i\20170306s.b\V303061717G.D
 Lab Smp Id: 17C0009-07
 Inj Date : 06-MAR-2017 14:47
 Operator : PC
 Smp Info : 17C0009-07
 Misc Info : 15-
 Comment :
 Method : \\target\share\chem1\nt3.i\20170306s.b\8260C022417.m
 Meth Date : 06-Mar-2017 07:32 Paul
 Cal Date : 14-FEB-2017 18:50
 Als bottle: 12
 Dil Factor: 1.00000
 Integrator: HP RTE
 Target Version: 4.14
 Processing Host: ORGDATA11

Inst ID: nt3.i

Quant Type: ISTD

Cal File: V302141718.D

Compound Sublist: gsurr.sub

Concentration Formula: Amt * DF * Pv / Sa * CpndVariable

Name	Value	Description
DF	1.000	Dilution Factor
Pv	10.000	Purge Volume (mL)
Sa	10.000	Sample Amount (mL)
Cpnd Variable		Local Compound Variable

Compounds	QUANT	SIG	RT	EXP RT	REL RT	RESPONSE	CONCENTRATIONS	
							ON-COLUMN (ug/L)	FINAL (ug/L)
\$ 27 Dibromofluoromethane	111		5.048	5.053	(0.932)	56725	4.68693	4.687
* 32 Pentafluorobenzene	168		5.415	5.420	(1.000)	257615	10.0000	
\$ 33 d4-1,2-Dichloroethane	65		5.442	5.446	(1.005)	66866	4.88320	4.883
* 37 1,4-Difluorobenzene	114		5.798	5.803	(1.000)	416568	10.0000	
\$ 43 d8-Toluene	98		6.760	6.765	(1.166)	252703	4.99706	4.997
* 53 d5-Chlorobenzene	117		7.844	7.844	(1.000)	405583	10.0000	
\$ 62 4-Bromofluorobenzene	174		8.716	8.715	(1.111)	83904	4.91406	4.914
* 76 d4-1,4-Dichlorobenzene	152		9.535	9.534	(1.000)	218052	10.0000	
\$ 79 d4-1,2-Dichlorobenzene	152		9.859	9.858	(1.034)	102723	5.01910	5.019

ARI Labs, Inc.

INTERNAL STANDARD COMPOUNDS
 AREA AND RT SUMMARY

Instrument ID: nt3.i Calibration Date: 03-MAR-2017
 Lab File ID: V303061717G.D Calibration Time: 21:57
 Lab Smp Id: 17C0009-07
 Analysis Type: VOA Level: LOW
 Quant Type: ISTD Sample Type: WATER
 Operator: PC
 Method File: \\target\share\chem1\nt3.i\20170306s.b\8260C022417.m
 Misc Info: 15-

Test Mode:

Use Initial Calibration Level 5.
 If Continuing Cal. use Initial Cal. Level 5

COMPOUND	STANDARD	AREA LIMIT		SAMPLE	%DIFF
		LOWER	UPPER		
32 Pentafluorobenzon	317912	158956	635824	257615	-18.97
37 1,4-Difluorobenze	512039	256020	1024078	416568	-18.65
53 d5-Chlorobenzene	494052	247026	988104	405583	-17.91
76 d4-1,4-Dichlorobe	282154	141077	564308	218052	-22.72

COMPOUND	STANDARD	RT LIMIT		SAMPLE	%DIFF
		LOWER	UPPER		
32 Pentafluorobenzon	5.42	4.92	5.92	5.42	-0.09
37 1,4-Difluorobenze	5.80	5.30	6.30	5.80	-0.08
53 d5-Chlorobenzene	7.84	7.34	8.34	7.84	0.01
76 d4-1,4-Dichlorobe	9.53	9.03	10.03	9.54	0.01

AREA UPPER LIMIT = +100% of internal standard area.
 AREA LOWER LIMIT = - 50% of internal standard area.
 RT UPPER LIMIT = + 0.50 minutes of internal standard RT.
 RT LOWER LIMIT = - 0.50 minutes of internal standard RT.

ARI Labs, Inc.

RECOVERY REPORT

Client Name: Client SDG: 20151005
Sample Matrix: LIQUID Fraction: VOA
Lab Smp Id: 17C0009-07
Level: LOW Operator: PC
Data Type: MS DATA SampleType: SAMPLE
SpikeList File: allspike.spk Quant Type: ISTD
Sublist File: gsurr.sub
Method File: \\target\share\chem1\nt3.i\20170306s.b\8260C022417.m
Misc Info: 15-

SURROGATE COMPOUND	AMOUNT ADDED ug/L	AMOUNT RECOVERED ug/L	% RECOVERED	LIMITS
\$ 27 Dibromofluorometha	5.000	4.687	93.74	80-120
\$ 33 d4-1,2-Dichloroeth	5.000	4.883	97.66	80-128
\$ 43 d8-Toluene	5.000	4.997	99.94	80-120
\$ 62 4-Bromofluorobenze	5.000	4.914	98.28	80-120
\$ 79 d4-1,2-Dichloroben	5.000	5.019	100.38	80-120

REVIEW SUMMARY FOR FILE - V303061717G.D

Lab ID: 17C0009-07

nt3.i, 20170306s.b\8260C022417.m, 06-MAR-2017 14:47

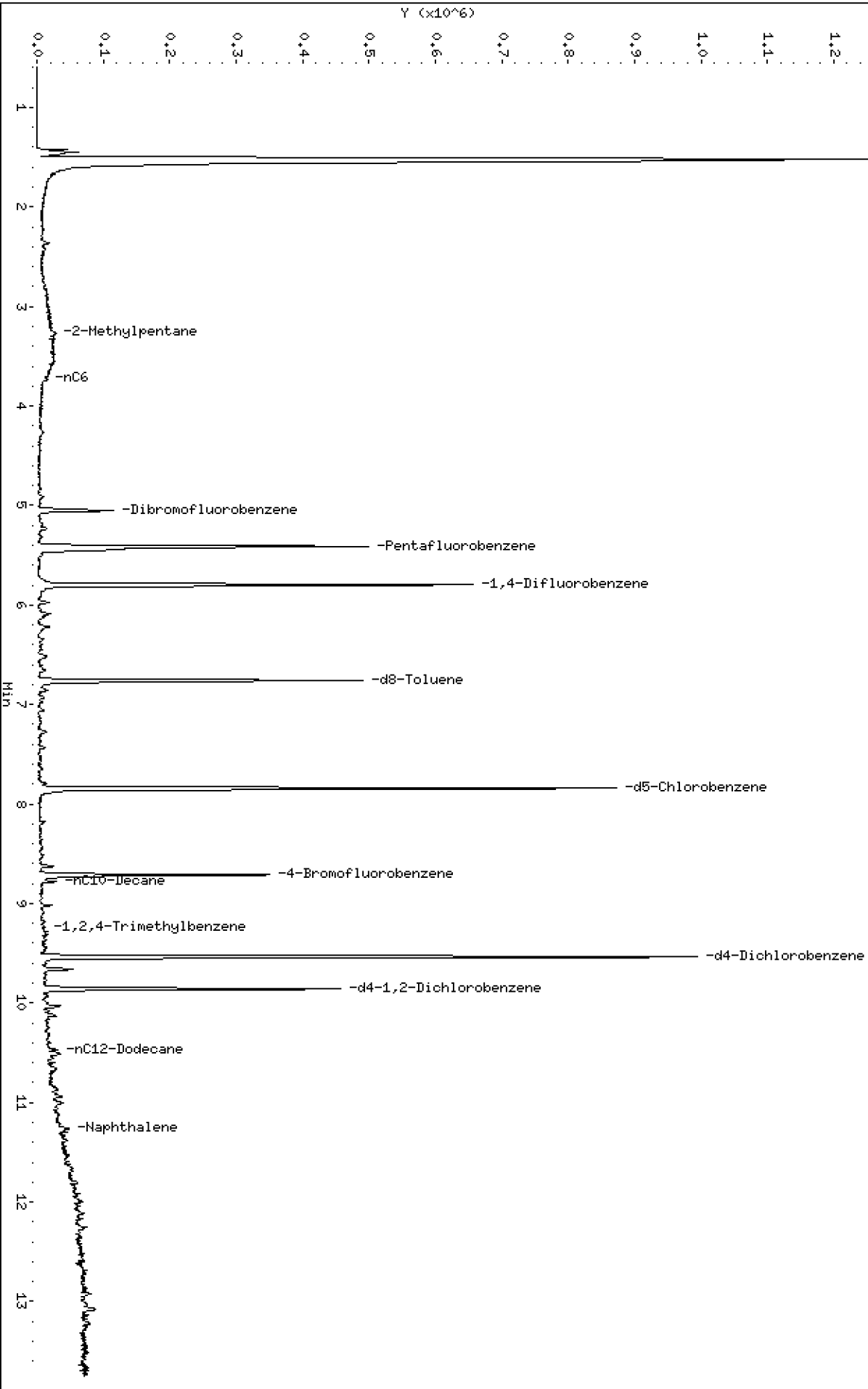
RT CO-ELUTION COMPOUNDS

Data File: \\target\share\chend\nt3.1\20170306g.b\303061717G.D
Date: 06-HRR-2017 14:47
Client ID:
Sample Info: 17C0009-07

Column phase: RTXWMS

Instrument: nt3.1
Operator: PC
Column diameter: 0.18

\\target\share\chend\nt3.1\20170306g.b\303061717G.D



Analytical Resources Inc.
GC/MS Gas Quantitation Report

Data file: 20170306g.b/V303061717G.D
Method: \20170306g.b\NWTPHG.m
Instrument: nt3.i
Gas Ical Date: 14-Feb-2017
Injection Date: 06-MAR-2017 14:47

ARI ID: 17C0009-07
Client ID:
Matrix: WATER
Dilution Factor: 1.000
Operator: PC

=====

GASOLINE HYDROCARBONS

Range	RF	Total Area*	Amount (ug/mL)
WAGas Tol-C12 (6.70 to 10.57)	52141375	642509	0.012
8015C 2MP-TMB (3.17 to 9.34)	87713511	1101446	0.013
AK101 nC6-nC10 (3.65 to 8.68)	61260787	525058	0.009
NWTPHG Tol-Nap (6.70 to 11.36)	54123058	830992	0.015

M Indicates manual integration within range

* Surrogate areas are subtracted from Total Area

NW Gas Range Subtracted Peaks

6.760	741061	d8-Toluene
8.711	525250	4-Bromofluorobenzene
9.535	1411274	d4-Dichlorobenzene
7.845	1309069	d5-Chlorobenzene
9.859	659137	d4-1,2-Dichlorobenzene



Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

B-5-13
17C0009-07 (Solid)

Petroleum Hydrocarbons

Method: NWTPH-Dx

Sampled: 02/27/2017 13:05

Instrument: FID3

Analyzed: 03-Mar-2017 15:01

Sample Preparation:

Preparation Method: EPA 3546 (Microwave)

Preparation Batch: BFC0023

Prepared: 02-Mar-2017

Sample Size: 10.18 g (wet)

Final Volume: 1 mL

Dry Weight: 7.43 g

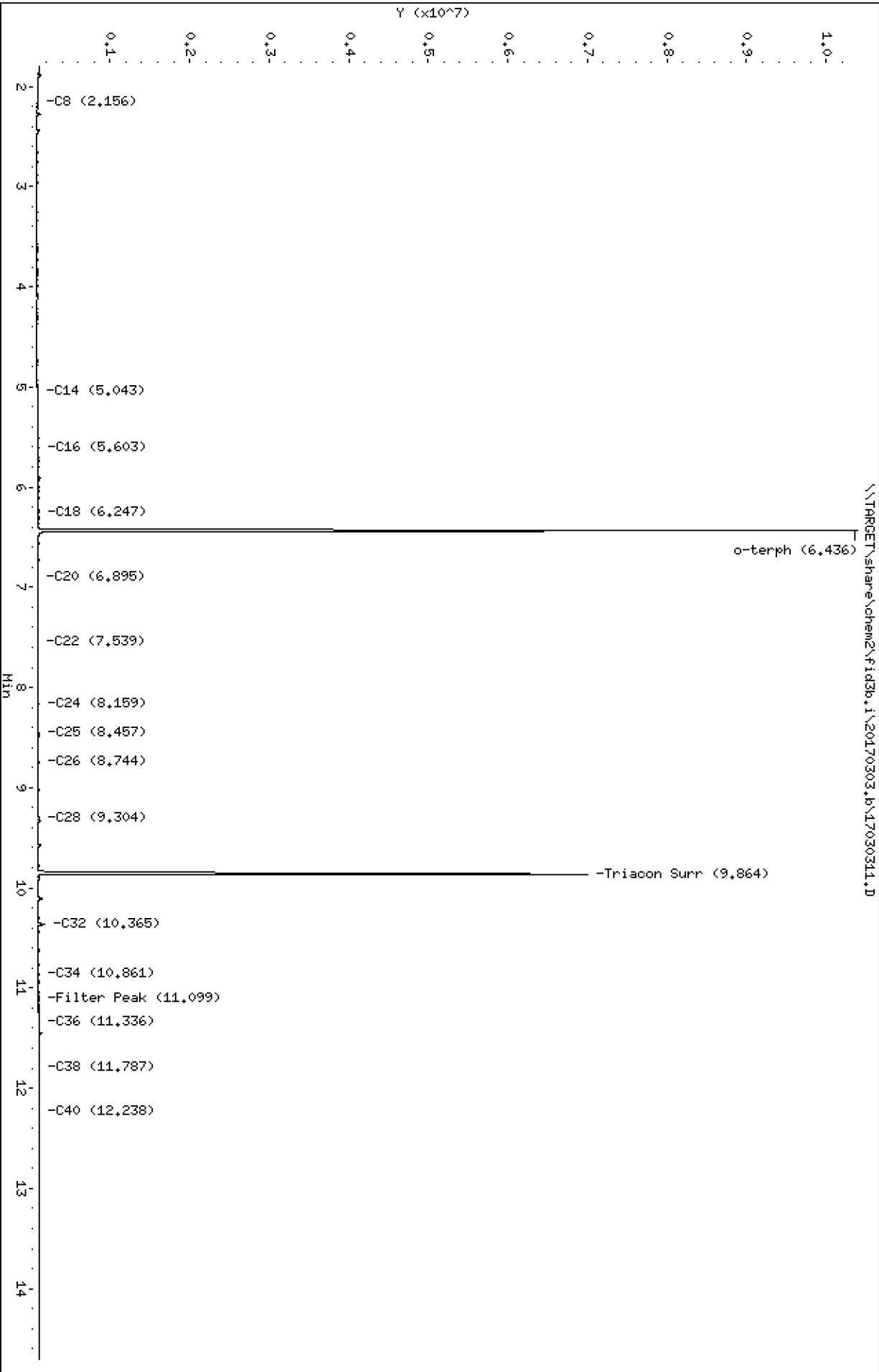
% Solids: 73.02

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Diesel Range Organics (C12-C24)		1	6.73	ND	mg/kg	U
Motor Oil Range Organics (C24-C38)		1	13.5	ND	mg/kg	U
<i>Surrogate: o-Terphenyl</i>			50-150 %	78.7	%	

Data File: \\TARGET\share\chem2\FID3b,1\20170303,b\17030311.D
Date : 03-MAR-2017 15:01
Client ID:
Sample Info: 17C0009-07

Column phase: RTX-1

Instrument: FID3b,1
Operator: ML
Column diameter: 0.25



Analytical Resources Inc.
TPH Quantitation Report

Data file: 20170303.b/17030311.D
Method: 20170303.b\FID3TPH.m
Instrument: fid3b.i
Operator: ML
Report Date: 03/06/2017
Macro: FID3_022817

ARI ID: 17C0009-07
Client ID:
Injection: 03-MAR-2017 15:01
Dilution Factor: 1

FID:3B RESULTS

Compound	RT	Shift	Height	Area	Method	Range	Total Area	Conc
Toluene	1.893	0.012	55204	103798	WATPHG	(Tol-C12)	385426	17.7
C8	2.156	-0.057	14752	27372	WATPHD	(C12-C24)	2838688	18.3
C10	----				WATPHM	(C24-C38)	4416935	32.2
C12	----							
C14	5.043	0.005	18198	33126				
C16	5.603	-0.031	28128	26356				
C18	6.247	-0.007	28136	32456				
C20	6.895	-0.005	22858	46353				
C22	7.539	-0.007	23183	37564				
C24	8.159	-0.009	26390	53043				
C25	8.457	-0.009	31502	43847				
C26	8.744	-0.010	31630	68747				
C28	9.304	-0.011	38425	54036				
C32	10.365	-0.010	107566	162320				
C34	10.861	-0.009	26890	42956				
Filter Peak	11.099	0.000	27231	39572				
C36	11.336	-0.008	28231	49388				
o-terph	6.436	-0.004	10290968	7788920				
Triacon Surr	9.864	-0.003	6893422	6916820				

Range Times: NW Diesel(4.422 - 8.218) NW Gas(1.831 - 4.422) NW M.Oil(8.218 - 11.845)
AK102(3.483 - 8.416) AK103(8.416 - 11.394) Jet A(3.483 - 6.304)

Surrogate	Area	Amount	%Rec
o-Terphenyl	7788920	35.4	78.7
Triacontane	6916820	36.2	80.4

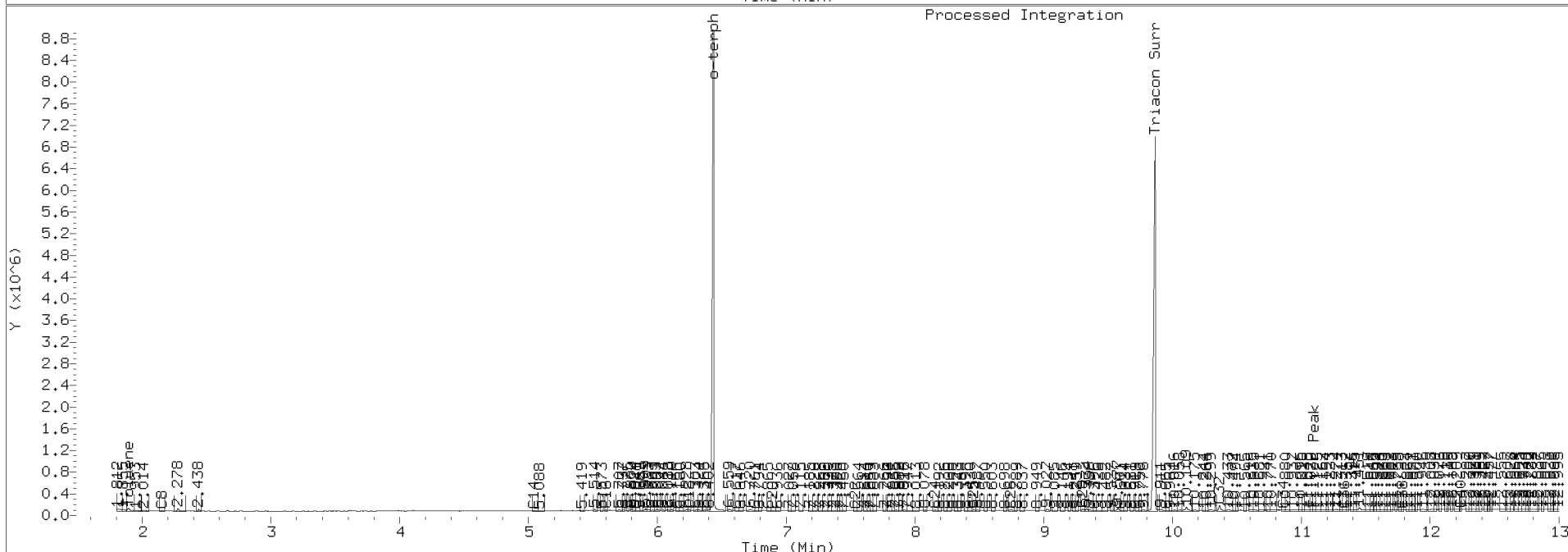
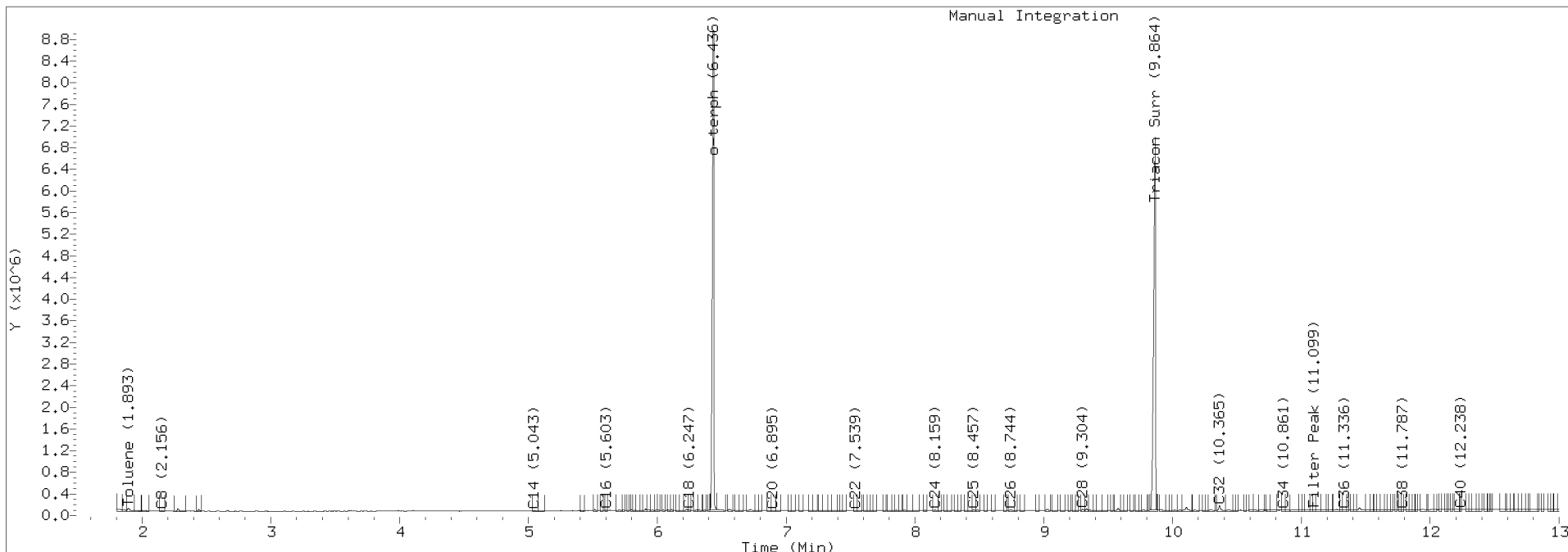


Analyte	RF	Curve Date
o-Terph Surr	219872.3	28-FEB-2017
Triacon Surr	191068.8	28-FEB-2017
Gas	21747.6	xx-xx-xxxx
Diesel	155491.0	28-FEB-2017
Motor Oil	137039.0	28-FEB-2017

TPH Manual Integrations Report

Datafile: FID3B, 20170303.b/17030311.D Injection: 03-MAR-2017 15:01

Lab ID:17C0009-07





Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

B-5-W
17C0009-08 (Water)

Volatile Organic Compounds

Method: EPA 8260C

Sampled: 02/27/2017 13:10

Instrument: NT3

Analyzed: 02-Mar-2017 13:31

Sample Preparation: Preparation Method: EPA 5030 (Purge and Trap)
Preparation Batch: BFC0055 Sample Size: 10 mL
Prepared: 02-Mar-2017 Final Volume: 10 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
1,2-Dichloroethane	107-06-2	1	0.20	24.4	ug/L	
Benzene	71-43-2	1	0.20	14.0	ug/L	
Toluene	108-88-3	1	0.20	5.76	ug/L	
Ethylbenzene	100-41-4	1	0.20	82.0	ug/L	E
m,p-Xylene	179601-23-1	1	0.40	75.6	ug/L	
o-Xylene	95-47-6	1	0.20	1.52	ug/L	
<i>Surrogate: 1,2-Dichloroethane-d4</i>			80-129 %	104	%	
<i>Surrogate: Toluene-d8</i>			80-120 %	107	%	
<i>Surrogate: 4-Bromofluorobenzene</i>			80-120 %	102	%	



Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

B-5-W
17C0009-08 (Water)

Volatile Organic Compounds

Method: NWTPHg

Sampled: 02/27/2017 13:10

Instrument: NT3

Analyzed: 02-Mar-2017 13:31

Sample Preparation:

Preparation Method: EPA 5030 (Purge and Trap)

Preparation Batch: BFC0055

Sample Size: 10 mL

Prepared: 02-Mar-2017

Final Volume: 10 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Gasoline Range Organics (Tol-Nap)		1	100	5760	ug/L	E
HC ID: GAS						
Surrogate: Toluene-d8			80-120 %	107	%	
Surrogate: 4-Bromofluorobenzene			80-120 %	102	%	

Data File: \\target\share\chend\nt3,1\20170302s,16\303021712G.D

Date : 02-MAR-2017 13:31

Client ID:

Sample Info: 17C0009-08

Page 1

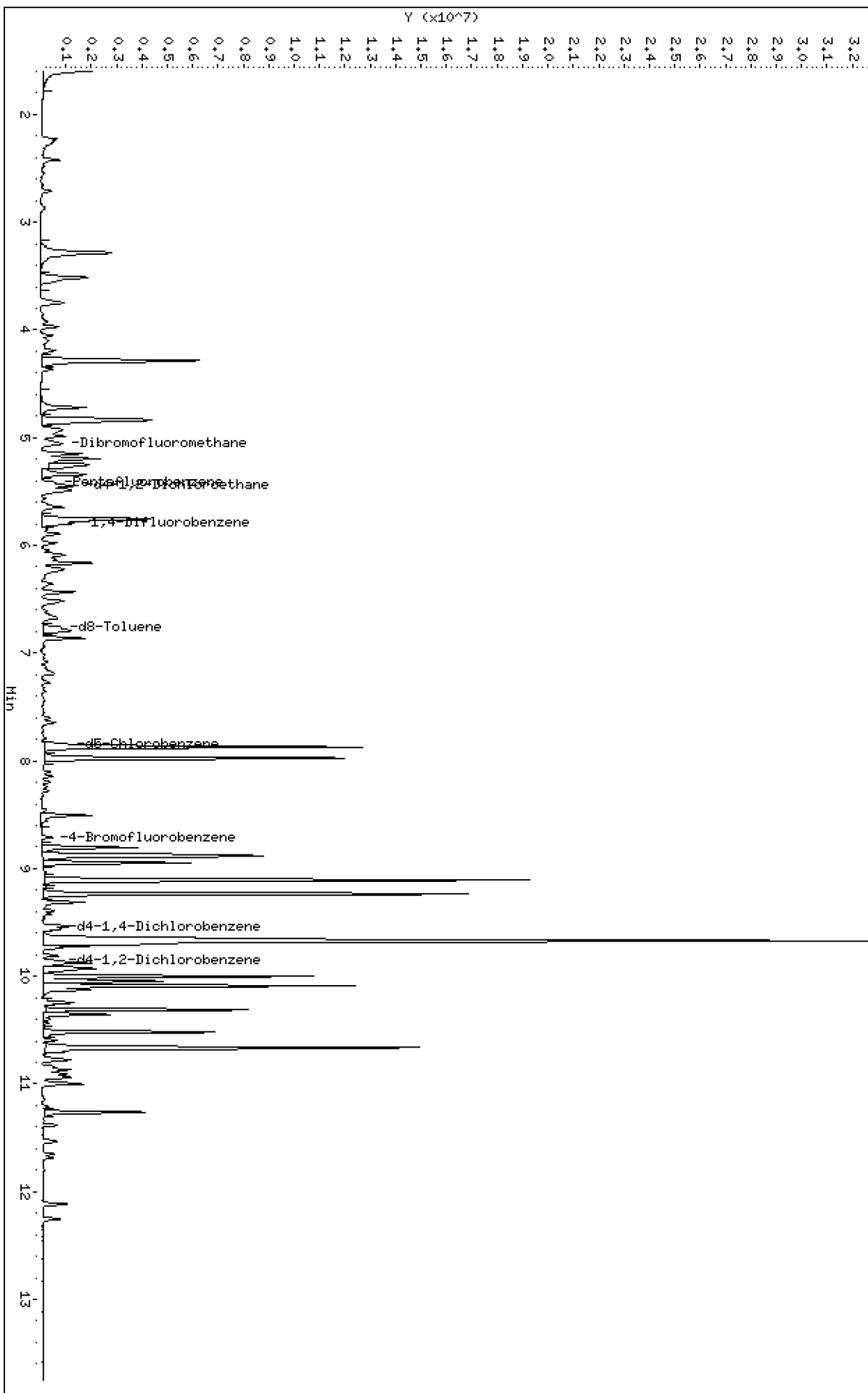
Instrument: nt3,1

Operator: PC

Column diameter: 0.18

Column phase: RTXWMS

\\target\share\chend\nt3,1\20170302s,16\303021712G.D



ARI Labs, Inc.

8260C 10 ml purge

Data file : \\target\share\chem1\nt3.i\20170302s.b\V303021712G.D
 Lab Smp Id: 17C0009-08
 Inj Date : 02-MAR-2017 13:31
 Operator : PC
 Smp Info : 17C0009-08
 Misc Info : 16-
 Comment :
 Method : \\target\share\chem1\nt3.i\20170302s.b\8260C022417.m
 Meth Date : 03-Mar-2017 15:16 nt3.i
 Cal Date : 14-FEB-2017 18:50
 Als bottle: 12
 Dil Factor: 1.00000
 Integrator: HP RTE
 Target Version: 4.14
 Processing Host: ORGDATA20

Inst ID: nt3.i

Quant Type: ISTD

Cal File: V302141718.D

Compound Sublist: gsurr.sub

Compounds	QUANT	SIG	RT	EXP RT	REL RT	RESPONSE	CONCENTRATIONS	
							ON-COLUMN (ug/L)	FINAL (ug/L)
\$ 27 Dibromofluoromethane	111		5.054	5.053	(0.933)	67415	5.00354	5.004 (R)
* 32 Pentafluorobenzene	168		5.415	5.419	(1.000)	286790	10.0000	
\$ 33 d4-1,2-Dichloroethane	65		5.447	5.446	(1.006)	107886	7.07737	7.077 (RM)
* 37 1,4-Difluorobenzene	114		5.798	5.802	(1.000)	468483	10.0000	
\$ 43 d8-Toluene	98		6.760	6.759	(1.166)	304422	5.35269	5.353 (R)
* 53 d5-Chlorobenzene	117		7.845	7.843	(1.000)	457098	10.0000	
\$ 62 4-Bromofluorobenzene	174		8.716	8.715	(1.111)	98135	5.09979	5.100 (R)
* 76 d4-1,4-Dichlorobenzene	152		9.535	9.533	(1.000)	249509	10.0000	(M)
\$ 79 d4-1,2-Dichlorobenzene	152		9.859	9.858	(1.034)	122178	5.21705	5.217 (RM)

QC Flag Legend

- R - Spike/Surrogate failed recovery limits.
- M - Compound response manually integrated.

ARI Labs, Inc.

INTERNAL STANDARD COMPOUNDS
AREA AND RT SUMMARY

Instrument ID: nt3.i Calibration Date: 02-MAR-2017
Lab File ID: V303021712G.D Calibration Time: 21:37
Lab Smp Id: 17C0009-08
Analysis Type: VOA Level:
Quant Type: ISTD Sample Type:
Operator: PC
Method File: \\target\share\chem1\nt3.i\20170302s.b\8260C022417.m
Misc Info: 16-

Test Mode:

Use Initial Calibration Level 5.
If Continuing Cal. use Initial Cal. Level 5

COMPOUND	STANDARD	AREA LIMIT		SAMPLE	%DIFF
		LOWER	UPPER		
32 Pentafluorobenzen	317912	158956	635824	286790	-9.79
37 1,4-Difluorobenze	512039	256020	1024078	468483	-8.51
53 d5-Chlorobenzene	494052	247026	988104	457098	-7.48
76 d4-1,4-Dichlorobe	282154	141077	564308	249509	-11.57

COMPOUND	STANDARD	RT LIMIT		SAMPLE	%DIFF
		LOWER	UPPER		
32 Pentafluorobenzen	5.42	4.92	5.92	5.42	-0.07
37 1,4-Difluorobenze	5.80	5.30	6.30	5.80	-0.07
53 d5-Chlorobenzene	7.84	7.34	8.34	7.85	0.02
76 d4-1,4-Dichlorobe	9.53	9.03	10.03	9.54	0.02

AREA UPPER LIMIT = +100% of internal standard area.
AREA LOWER LIMIT = - 50% of internal standard area.
RT UPPER LIMIT = + 0.50 minutes of internal standard RT.
RT LOWER LIMIT = - 0.50 minutes of internal standard RT.

ARI Labs, Inc.

RECOVERY REPORT

Client Name: Client SDG: 20150930a
Sample Matrix: NONE Fraction: VOA
Lab Smp Id: 17C0009-08
Level: Operator: PC
Data Type: MS DATA SampleType: SAMPLE
SpikeList File: allspike.spk Quant Type: ISTD
Sublist File: gsurr.sub
Method File: \\target\share\chem1\nt3.i\20170302s.b\8260C022417.m
Misc Info: 16-

SURROGATE COMPOUND	AMOUNT ADDED ug/L	AMOUNT RECOVERED ug/L	% RECOVERED	LIMITS
\$ 27 Dibromofluorometha	5.000	5.004	100.07	
\$ 33 d4-1,2-Dichloroeth	5.000	7.077	141.55	
\$ 43 d8-Toluene	5.000	5.353	107.05	
\$ 62 4-Bromofluorobenze	5.000	5.100	102.00	
\$ 79 d4-1,2-Dichloroben	5.000	5.217	104.34	

REVIEW SUMMARY FOR FILE - V303021712G.D

Lab ID: 17C0009-08

nt3.i, 20170302s.b\8260C022417.m, 02-MAR-2017 13:31

RT CO-ELUTION COMPOUNDS

Data File: \\target\share\chend\nt3.1\20170302g.jb\303021712G.D

Date : 02-MAR-2017 13:31

Client ID:

Sample Info: 17C0009-08

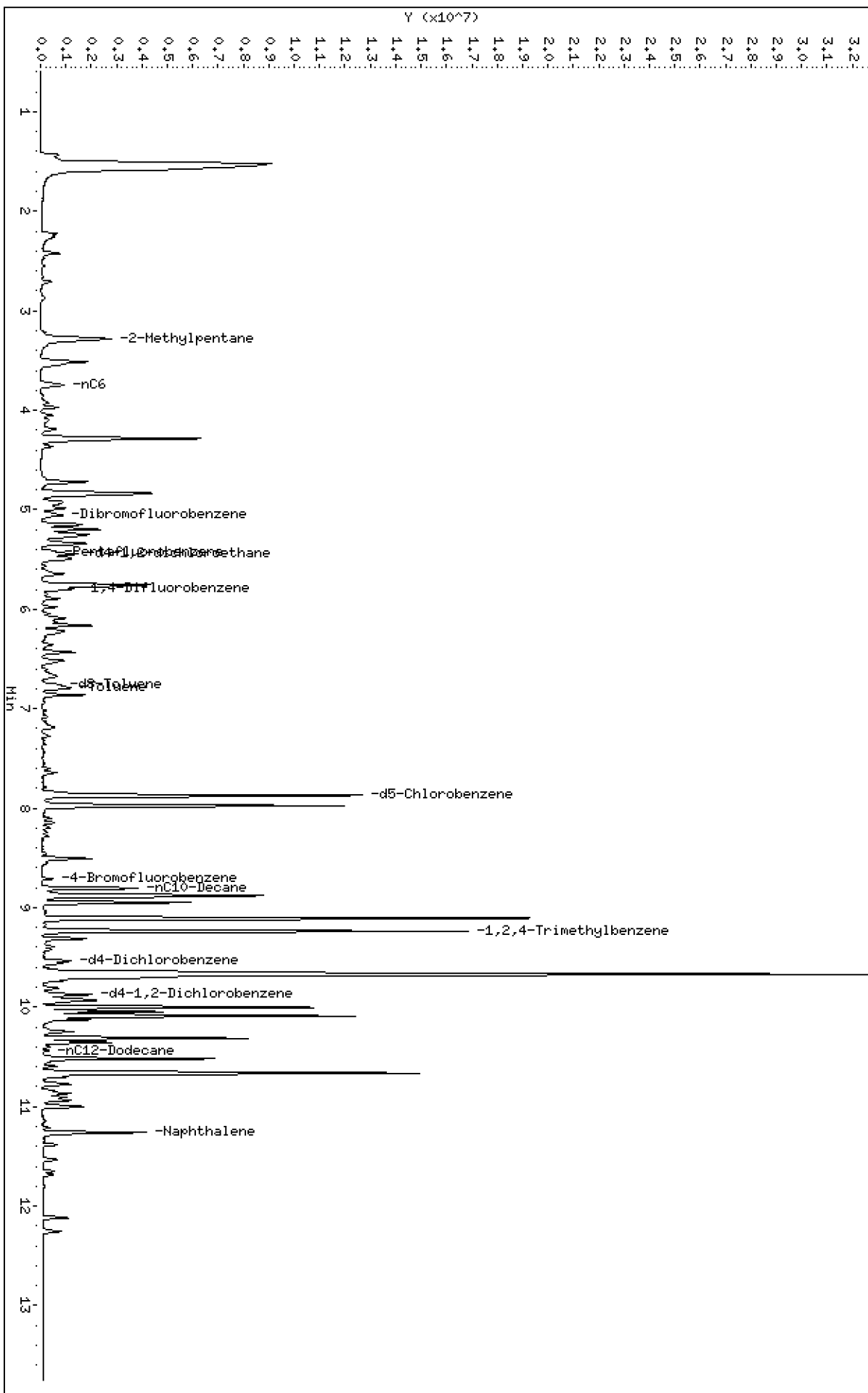
Instrument: nt3.1

Operator: PC

Column diameter: 0.18

Column phase: RTXWMS

\\target\share\chend\nt3.1\20170302g.jb\303021712G.D



Analytical Resources Inc.
GC/MS Gas Quantitation Report

Data file: 20170302g.b/V303021712G.D
Method: \20170302g.b\NWTPHG.m
Instrument: nt3.i
Gas Ical Date: 14-Feb-2017
Injection Date: 02-MAR-2017 13:31

ARI ID: 17C0009-08
Client ID:
Matrix: NONE
Dilution Factor: 1.000
Operator: PC

=====

GASOLINE HYDROCARBONS

Range	RF	Total Area*	Amount (ug/mL)
-----	----	-----	-----
WAGas Tol-C12 (6.70 to 10.57)	52141375	267032436	5.121
8015C 2MP-TMB (3.16 to 9.33)	87713511	227826056	2.597 M
AK101 nC6-nC10 (3.65 to 8.68)	61260787	129510991	2.114 M
NWTPHG Tol-Nap (6.70 to 11.36)	54123058	311824320	5.761

M Indicates manual integration within range

* Surrogate areas are subtracted from Total Area

NW Gas Range Subtracted Peaks

6.761	1407748	d8-Toluene
8.712	667179	4-Bromofluorobenzene
9.535	1793059	d4-Dichlorobenzene
7.872	19358495	d5-Chlorobenzene
9.876	3437298	d4-1,2-Dichlorobenzene



Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

B-5-W
17C0009-08 (Water)

Petroleum Hydrocarbons

Method: NWTPH-Dx

Sampled: 02/27/2017 13:10

Instrument: FID3

Analyzed: 03-Mar-2017 22:15

Sample Preparation:

Preparation Method: EPA 3510C SepF

Preparation Batch: BFC0024

Sample Size: 500 mL

Prepared: 02-Mar-2017

Final Volume: 1 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Diesel Range Organics (C12-C24)		1	0.100	1.62	mg/L	
HC ID: DRO						
Motor Oil Range Organics (C24-C38)		1	0.200	0.388	mg/L	
HC ID: RRO						
<i>Surrogate: o-Terphenyl</i>			50-150 %	86.0	%	

Data File: \\TARGET\share\chem2\fid3b,1\20170303,b\17030329.D
Date: 03-MAR-2017 22:15
Client ID:
Sample Info: 17C0009-08

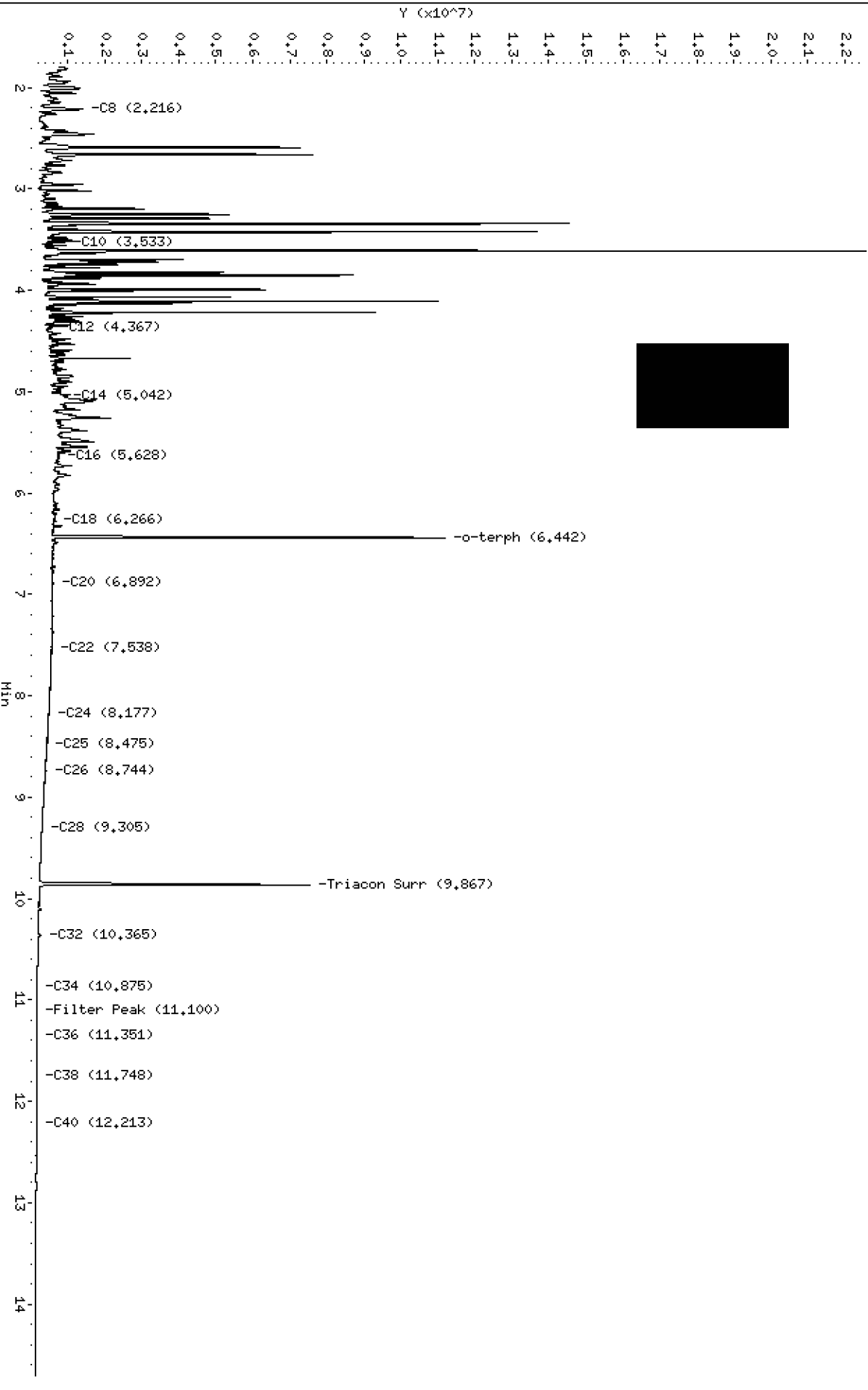
Instrument: fid3b,1

Page 1

Column phase: RTX-1

Operator: ML
Column diameter: 0.25

\\TARGET\share\chem2\fid3b,1\20170303,b\17030329.D



Analytical Resources Inc.
TPH Quantitation Report

Data file: 20170303.b/17030329.D
Method: 20170303.b\FID3TPH.m
Instrument: fid3b.i
Operator: ML
Report Date: 03/06/2017
Macro: FID3_022817

ARI ID: 17C0009-08
Client ID:
Injection: 03-MAR-2017 22:15
Dilution Factor: 1

FID:3B RESULTS

Compound	RT	Shift	Height	Area	Method	Range	Total Area	Conc
Toluene	1.893	0.012	717351	1263156	WATPHG	(Tol-C12)	159182557	7319.5
C8	2.216	0.003	1266472	2244740	WATPHD	(C12-C24)	125669371	808.2
C10	3.533	-0.000	776172	521440	WATPHM	(C24-C38)	26614210	194.2
C12	4.367	-0.005	442186	272143				
C14	5.042	0.004	798492	447469				
C16	5.628	-0.006	628412	1043262				
C18	6.266	0.012	512415	305250				
C20	6.892	-0.008	497767	1196650				
C22	7.538	-0.008	443543	351069				
C24	8.177	0.009	362378	713516				
C25	8.475	0.009	318638	195791				
C26	8.744	-0.010	282824	416427				
C28	9.305	-0.010	189984	335671				
C32	10.365	-0.010	165196	338814				
C34	10.875	0.005	45281	46461				
Filter Peak	11.100	0.001	38626	66608				
C36	11.351	0.007	31726	53966				
o-terph	6.442	0.002	10622376	8512220				
Triacon Surr	9.867	-0.001	7301383	7729859				

Range Times: NW Diesel(4.422 - 8.218) NW Gas(1.831 - 4.422) NW M.Oil(8.218 - 11.845)
AK102(3.483 - 8.416) AK103(8.416 - 11.394) Jet A(3.483 - 6.304)

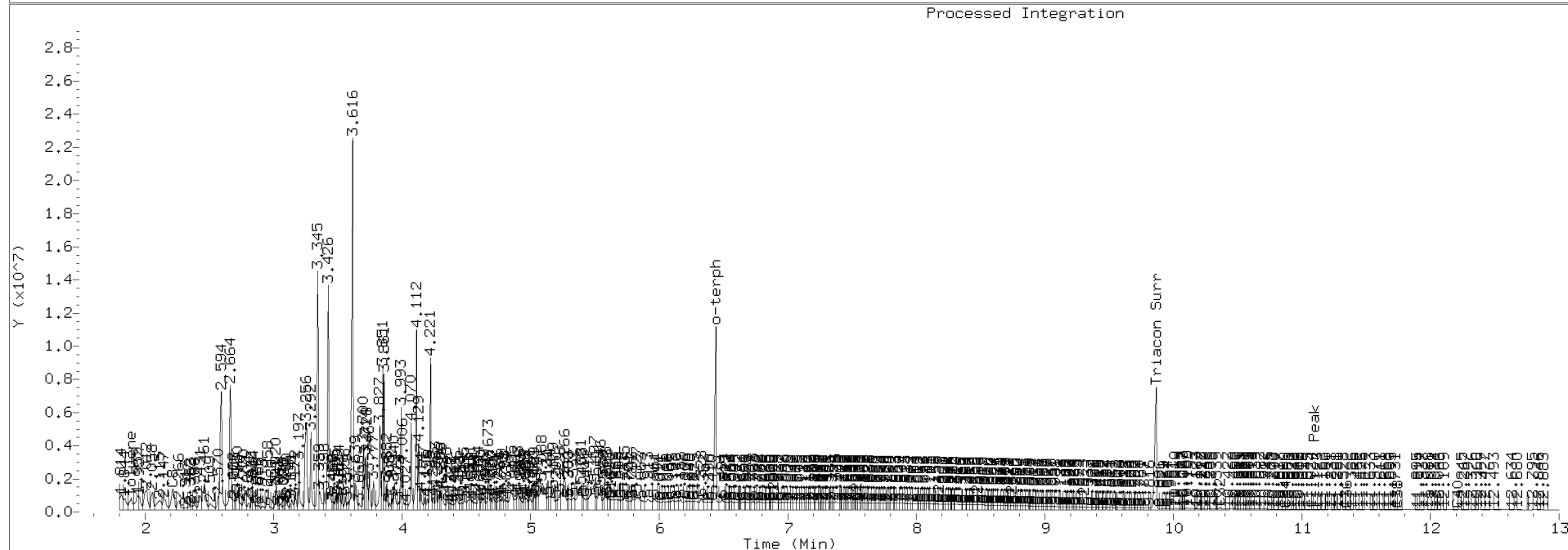
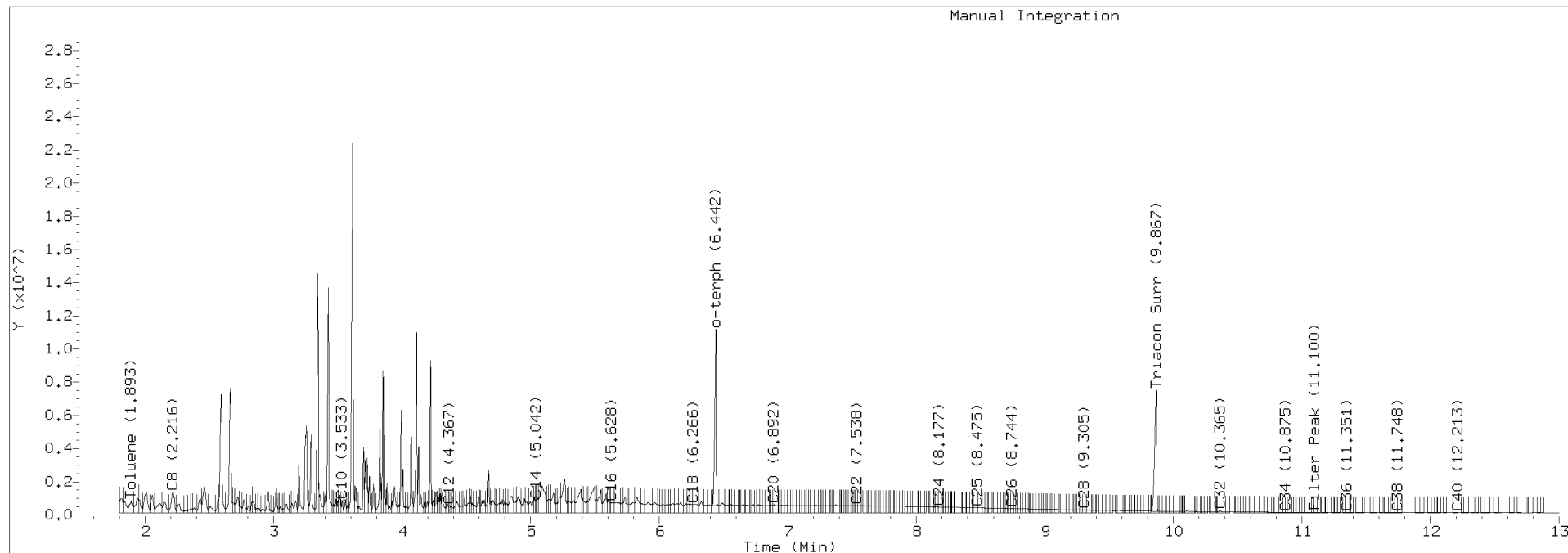
Surrogate	Area	Amount	%Rec
o-Terphenyl	8512220	38.7	86.0
Triacontane	7729859	40.5	89.9

Analyte	RF	Curve Date
o-Terph Surr	219872.3	28-FEB-2017
Triacon Surr	191068.8	28-FEB-2017
Gas	21747.6	xx-xx-xxxx
Diesel	155491.0	28-FEB-2017
Motor Oil	137039.0	28-FEB-2017

TPH Manual Integrations Report

Datafile: FID3B, 20170303.b/17030329.D Injection: 03-MAR-2017 22:15

Lab ID:17C0009-08





Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

B-5-W
17C0009-08RE1 (Water)

Volatile Organic Compounds

Method: EPA 8260C

Sampled: 02/27/2017 13:10

Instrument: NT3

Analyzed: 03-Mar-2017 15:27

Sample Preparation: Preparation Method: EPA 5030 (Purge and Trap)
Preparation Batch: BFC0084 Sample Size: 2 mL
Prepared: 03-Mar-2017 Final Volume: 10 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
1,2-Dichloroethane	107-06-2	1	1.00	24.5	ug/L	
Benzene	71-43-2	1	1.00	16.1	ug/L	
Toluene	108-88-3	1	1.00	6.53	ug/L	
Ethylbenzene	100-41-4	1	1.00	103	ug/L	
m,p-Xylene	179601-23-1	1	2.00	89.9	ug/L	
o-Xylene	95-47-6	1	1.00	1.91	ug/L	
<i>Surrogate: 1,2-Dichloroethane-d4</i>			80-129 %	121	%	
<i>Surrogate: Toluene-d8</i>			80-120 %	100	%	
<i>Surrogate: 4-Bromofluorobenzene</i>			80-120 %	105	%	



Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

B-5-W
17C0009-08RE1 (Water)

Volatile Organic Compounds

Method: NWTPHg

Sampled: 02/27/2017 13:10

Instrument: NT3

Analyzed: 03-Mar-2017 15:27

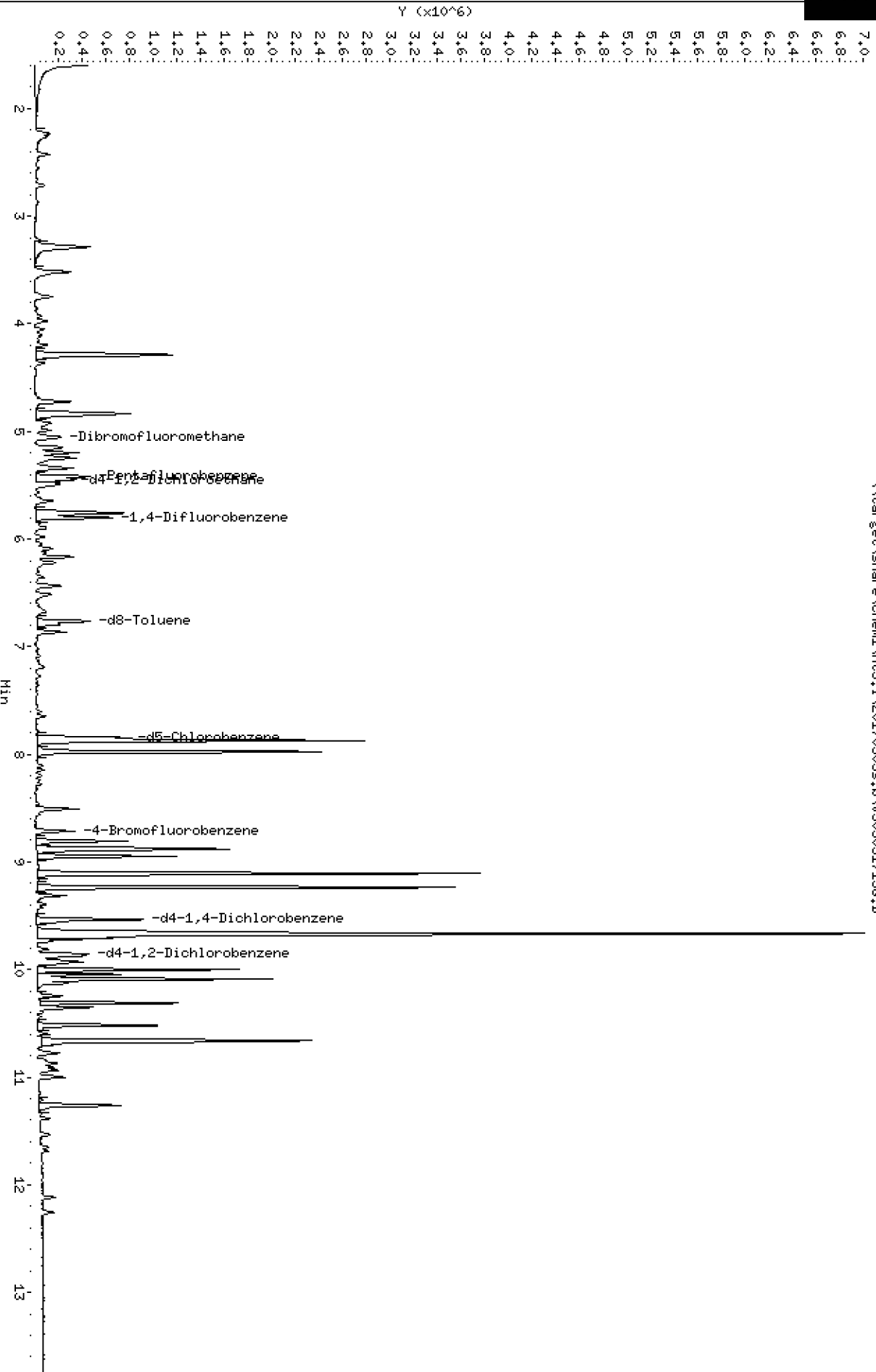
Sample Preparation: Preparation Method: EPA 5030 (Purge and Trap)
Preparation Batch: BFC0084 Sample Size: 2 mL
Prepared: 02-Mar-2017 Final Volume: 10 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Gasoline Range Organics (Tol-Nap)		1	500	5540	ug/L	
HC ID: GAS						
Surrogate: Toluene-d8			80-120 %	100	%	
Surrogate: 4-Bromofluorobenzene			80-120 %	105	%	

Data File: \\target\share\chend\nt3,1\20170303s.b\303031715G.D
Date : 03-HR-2017 15:27
Client ID:
Sample Info: 17C0009-08RE1
Column phase: RTXWMS

Instrument: nt3,1
Operator: PC
Column diameter: 0.18

\\target\share\chend\nt3,1\20170303s.b\303031715G.D



ARI Labs, Inc.

8260C 10 ml purge

Data file : \\target\share\chem1\nt3.i\20170303s.b\V303031715G.D
 Lab Smp Id: 17C0009-08RE1
 Inj Date : 03-MAR-2017 15:27
 Operator : PC Inst ID: nt3.i
 Smp Info : 17C0009-08RE1
 Misc Info : 16-
 Comment :
 Method : \\target\share\chem1\nt3.i\20170303s.b\8260C022417.m
 Meth Date : 06-Mar-2017 07:32 Paul Quant Type: ISTD
 Cal Date : 14-FEB-2017 18:50 Cal File: V302141718.D
 Als bottle: 12
 Dil Factor: 1.00000
 Integrator: HP RTE Compound Sublist: gsurr.sub
 Target Version: 4.14
 Processing Host: ORGDATA20

Compounds	QUANT	SIG	RT	EXP RT	REL RT	RESPONSE	CONCENTRATIONS	
							ON-COLUMN (ug/L)	FINAL (ug/L)
\$ 27 Dibromofluoromethane	111		5.052	5.053	(0.932)	55958	5.05308	5.053(R)
* 32 Pentafluorobenzene	168		5.419	5.420	(1.000)	235717	10.0000	
\$ 33 d4-1,2-Dichloroethane	65		5.451	5.446	(1.006)	75794	6.04943	6.049(R)
* 37 1,4-Difluorobenzene	114		5.802	5.803	(1.000)	378749	10.0000	
\$ 43 d8-Toluene	98		6.764	6.765	(1.166)	230066	5.00370	5.004(R)
* 53 d5-Chlorobenzene	117		7.843	7.844	(1.000)	367133	10.0000	
\$ 62 4-Bromofluorobenzene	174		8.715	8.715	(1.111)	80942	5.23706	5.237(R)
* 76 d4-1,4-Dichlorobenzene	152		9.533	9.534	(1.000)	199539	10.0000	
\$ 79 d4-1,2-Dichlorobenzene	152		9.858	9.858	(1.034)	96279	5.14069	5.141(R)

QC Flag Legend

R - Spike/Surrogate failed recovery limits.

ARI Labs, Inc.

INTERNAL STANDARD COMPOUNDS
 AREA AND RT SUMMARY

Instrument ID: nt3.i Calibration Date: 03-MAR-2017
 Lab File ID: V303031715G.D Calibration Time: 21:57
 Lab Smp Id: 17C0009-08RE1
 Analysis Type: VOA Level:
 Quant Type: ISTD Sample Type:
 Operator: PC
 Method File: \\target\share\chem1\nt3.i\20170303s.b\8260C022417.m
 Misc Info: 16-

Test Mode:

Use Initial Calibration Level 5.
 If Continuing Cal. use Initial Cal. Level 5

COMPOUND	STANDARD	AREA LIMIT		SAMPLE	%DIFF
		LOWER	UPPER		
32 Pentafluorobenzon	317912	158956	635824	235717	-25.85
37 1,4-Difluorobenze	512039	256020	1024078	378749	-26.03
53 d5-Chlorobenzene	494052	247026	988104	367133	-25.69
76 d4-1,4-Dichlorobe	282154	141077	564308	199539	-29.28

COMPOUND	STANDARD	RT LIMIT		SAMPLE	%DIFF
		LOWER	UPPER		
32 Pentafluorobenzon	5.42	4.92	5.92	5.42	-0.01
37 1,4-Difluorobenze	5.80	5.30	6.30	5.80	-0.01
53 d5-Chlorobenzene	7.84	7.34	8.34	7.84	-0.01
76 d4-1,4-Dichlorobe	9.53	9.03	10.03	9.53	-0.01

AREA UPPER LIMIT = +100% of internal standard area.
 AREA LOWER LIMIT = - 50% of internal standard area.
 RT UPPER LIMIT = + 0.50 minutes of internal standard RT.
 RT LOWER LIMIT = - 0.50 minutes of internal standard RT.

ARI Labs, Inc.

RECOVERY REPORT

Client Name: Client SDG: 20150930a
Sample Matrix: NONE Fraction: VOA
Lab Smp Id: 17C0009-08RE1
Level: Operator: PC
Data Type: MS DATA SampleType: SAMPLE
SpikeList File: allspike.spk Quant Type: ISTD
Sublist File: gsurr.sub
Method File: \\target\share\chem1\nt3.i\20170303s.b\8260C022417.m
Misc Info: 16-

SURROGATE COMPOUND	AMOUNT ADDED ug/L	AMOUNT RECOVERED ug/L	% RECOVERED	LIMITS
\$ 27 Dibromofluorometha	5.000	5.053	101.06	
\$ 33 d4-1,2-Dichloroeth	5.000	6.049	120.99	
\$ 43 d8-Toluene	5.000	5.004	100.07	
\$ 62 4-Bromofluorobenze	5.000	5.237	104.74	
\$ 79 d4-1,2-Dichloroben	5.000	5.141	102.81	

REVIEW SUMMARY FOR FILE - V303031715G.D

Lab ID: 17C0009-08RE1

nt3.i, 20170303s.b\8260C022417.m, 03-MAR-2017 15:27

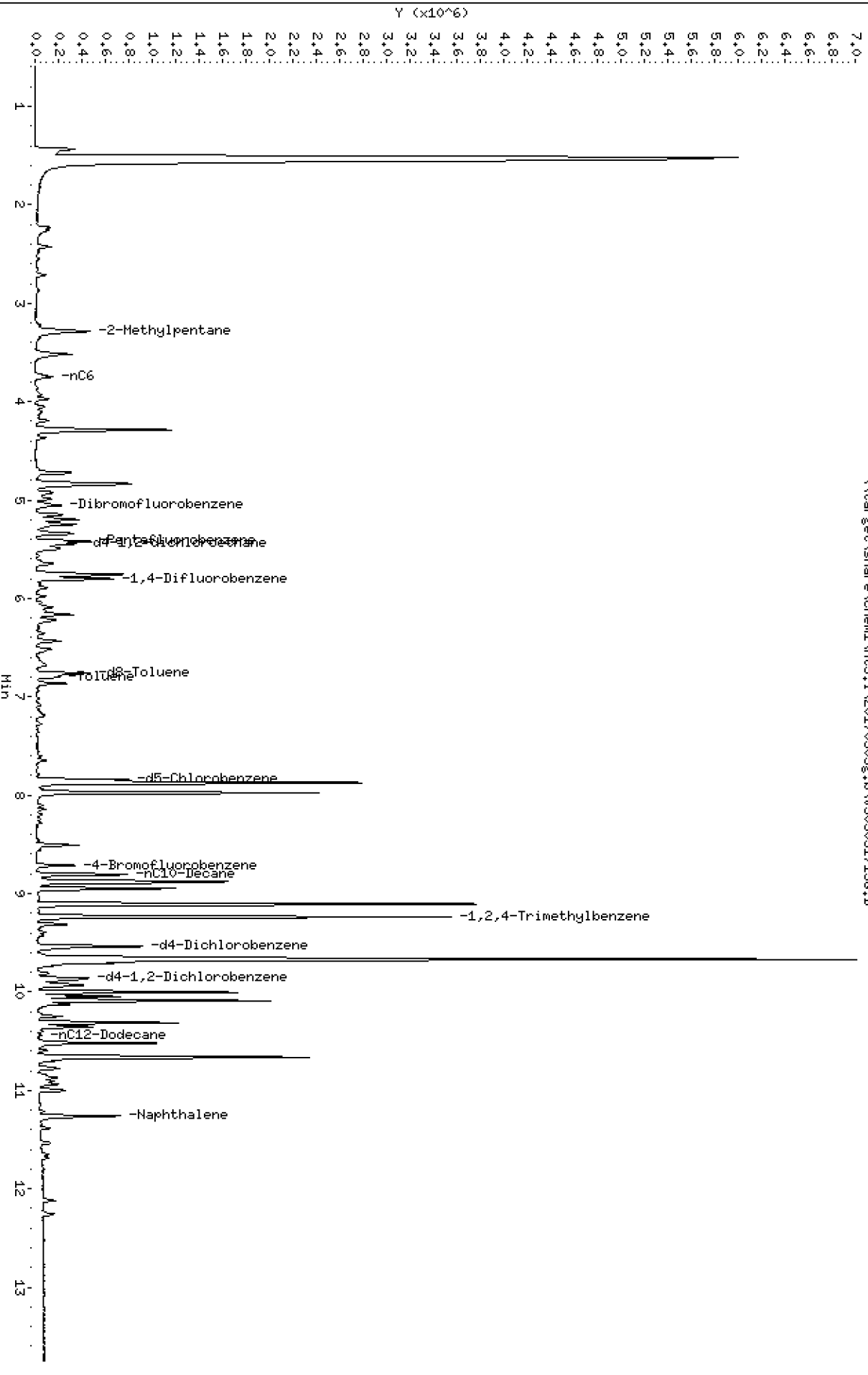
RT CO-ELUTION COMPOUNDS

Data File: \\target\share\chend\nt3.1\20170303g.jb\303031715G.D
Date : 03-HR-2017 15:27
Client ID:
Sample Info: 17C0009-08RE1

Column phase: RTXWMS

Instrument: nt3.1
Operator: PC
Column diameter: 0.18

\\target\share\chend\nt3.1\20170303g.jb\303031715G.D



Analytical Resources Inc.
GC/MS Gas Quantitation Report

Data file: 20170303g.b/V303031715G.D
Method: \20170303g.b\NWTPHG.m
Instrument: nt3.i
Gas Ical Date: 14-Feb-2017
Injection Date: 03-MAR-2017 15:27

ARI ID: 17C0009-08RE1
Client ID:
Matrix: NONE
Dilution Factor: 1.000
Operator: PC

=====

GASOLINE HYDROCARBONS

Range	RF	Total Area*	Amount (ug/mL)
-----	----	-----	-----
WAGas Tol-C12 (6.70 to 10.57)	52141375	52125913	1.000 M
8015C 2MP-TMB (3.18 to 9.34)	87713511	44335052	0.505 M
AK101 nC6-nC10 (3.65 to 8.68)	61260787	25816088	0.421 M
NWTPHG Tol-Nap (6.70 to 11.36)	54123058	59973748	1.108 M

M Indicates manual integration within range

* Surrogate areas are subtracted from Total Area

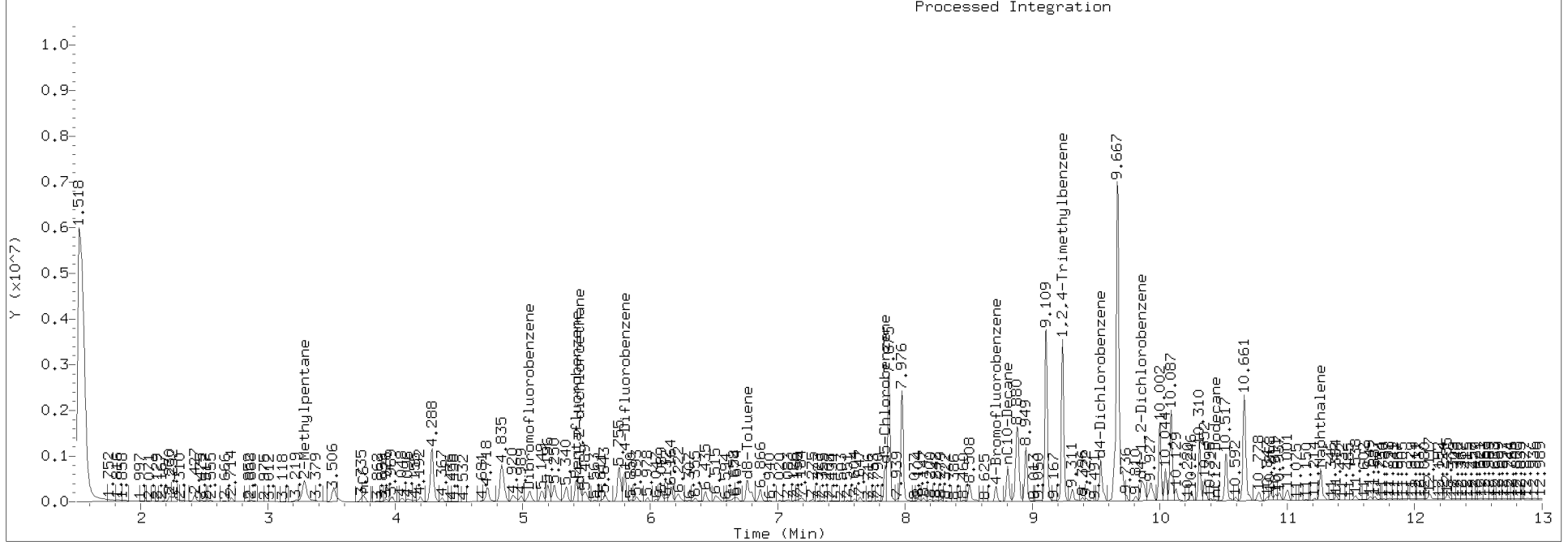
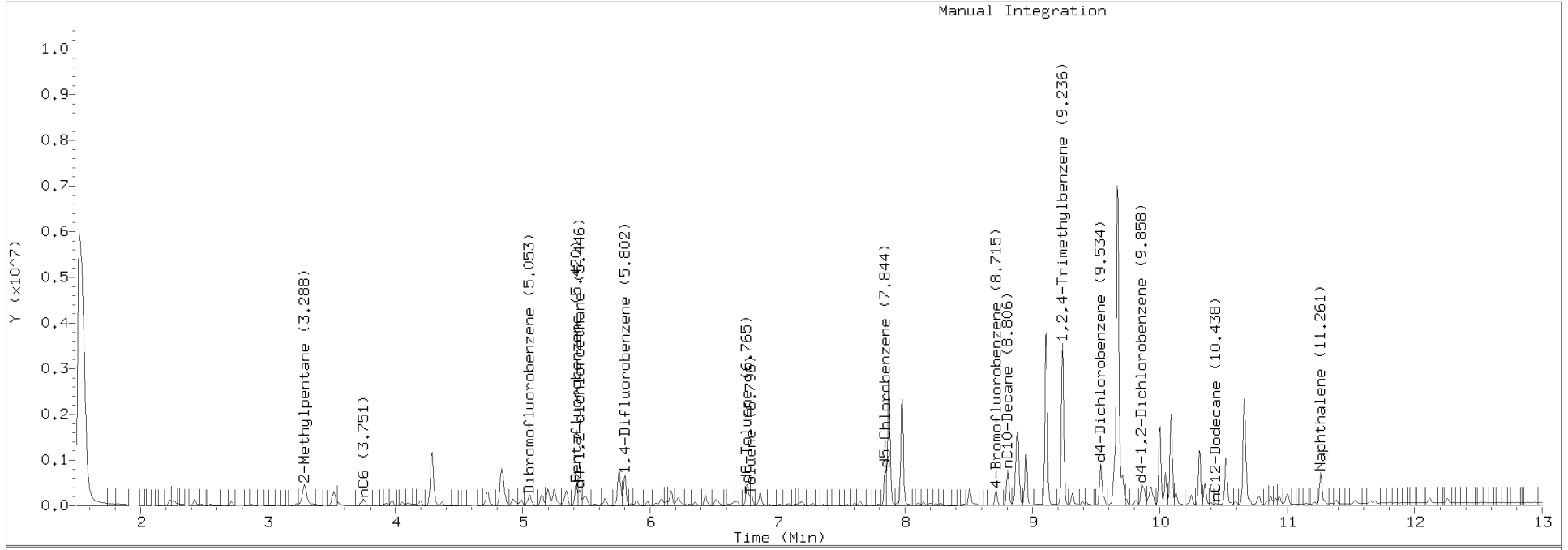
NW Gas Range Subtracted Peaks

6.765	833635	d8-Toluene
8.715	506331	4-Bromofluorobenzene
9.534	1510413	d4-Dichlorobenzene
7.844	1096040	d5-Chlorobenzene
9.858	1052517	d4-1,2-Dichlorobenzene

TPHG Manual Integrations Report

Datafile: NT3, 20170303g.b/V303031715G.D Injection: 03-MAR-2017 15:27

Lab ID:17C0009-08RE1





Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

B-8-11
17C0009-09 (Solid)

Volatile Organic Compounds

Method: EPA 8260C

Sampled: 02/27/2017 13:40

Instrument: NT5

Analyzed: 06-Mar-2017 17:31

Sample Preparation: Preparation Method: EPA 5035 (Methanol Extraction)
Preparation Batch: BFC0220 Sample Size: 5.542 g (wet) Dry Weight: 3.91 g
Prepared: 06-Mar-2017 Final Volume: 5 mL % Solids: 70.47

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
1,2-Dichloroethane	107-06-2	500	850	ND	ug/kg	U
Benzene	71-43-2	500	850	ND	ug/kg	U
Toluene	108-88-3	500	850	904	ug/kg	D
Ethylbenzene	100-41-4	500	850	13200	ug/kg	D
m,p-Xylene	179601-23-1	500	850	24700	ug/kg	D
o-Xylene	95-47-6	500	850	ND	ug/kg	U
<i>Surrogate: Dibromofluoromethane</i>			30-160 %	90.0	%	
<i>Surrogate: 1,2-Dichloroethane-d4</i>			80-124 %	83.0	%	
<i>Surrogate: Toluene-d8</i>			80-120 %	101	%	
<i>Surrogate: 4-Bromofluorobenzene</i>			80-120 %	105	%	
<i>Surrogate: 1,2-Dichlorobenzene-d4</i>			80-120 %	99.9	%	



Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

B-8-11
17C0009-09 (Solid)

Volatile Organic Compounds

Method: NWTPhg Sampled: 02/27/2017 13:40
Instrument: NT3 Analyzed: 06-Mar-2017 15:13

Sample Preparation: Preparation Method: EPA 5035 (Methanol Extraction)
Preparation Batch: BFC0131 Sample Size: 5.542 g (wet) Dry Weight: 3.91 g
Prepared: 06-Mar-2017 Final Volume: 5 mL % Solids: 70.47

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Gasoline Range Organics (Tol-Nap)		5000	850000	2030000	ug/kg	D
HC ID: GRO						
Surrogate: Toluene-d8			80-120 %	101	%	
Surrogate: 4-Bromofluorobenzene			78-123 %	99.6	%	

Data File: \\target\share\chend\nt3.1\20170306s.16\303061718G.D

Date : 06-HRR-2017 15:13

Client ID:

Sample Info: 17C0009-09

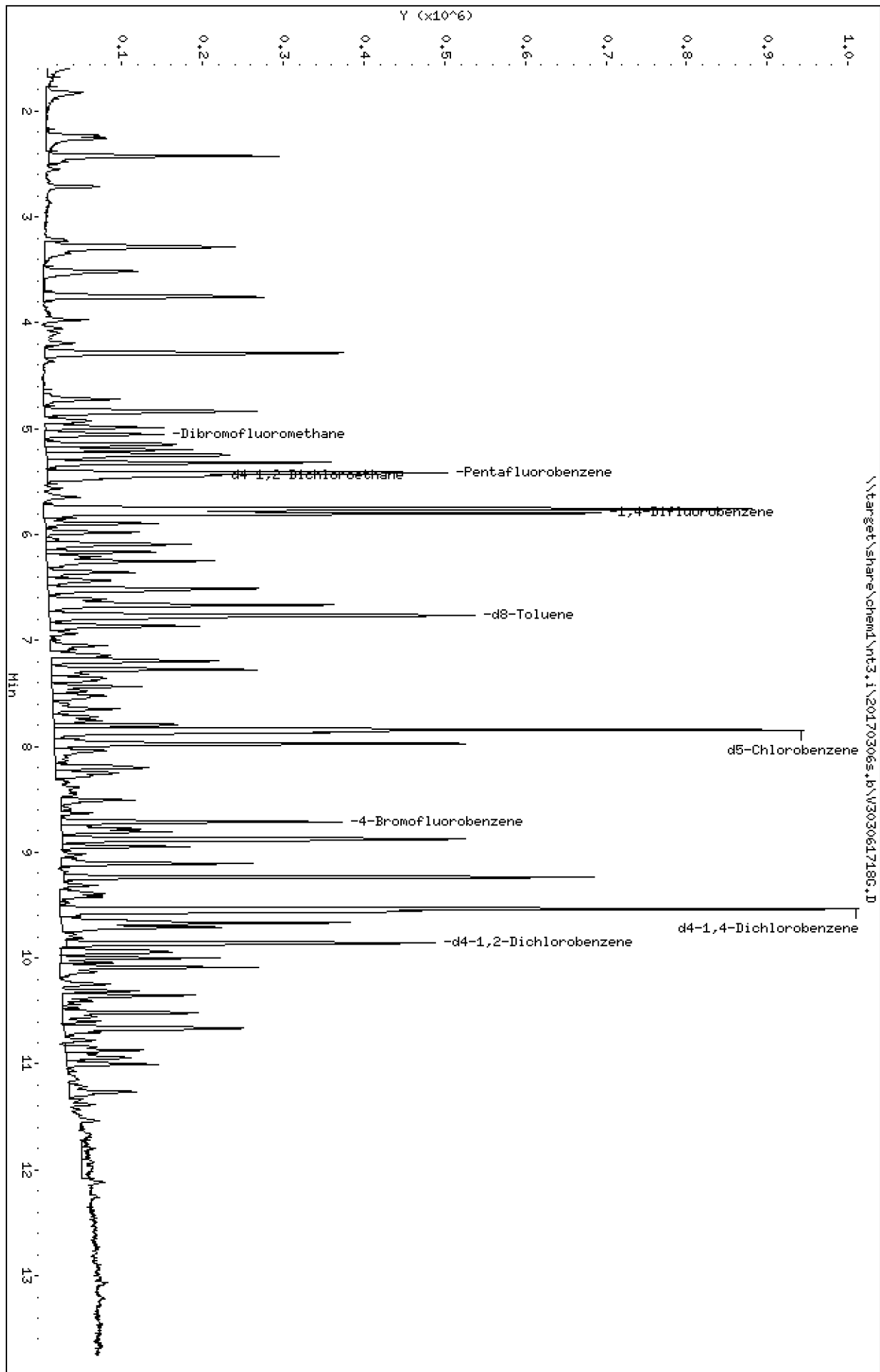
Column phase: RTXWMS

Instrument: nt3.1

Operator: PC

Column diameter: 0.18

\\target\share\chend\nt3.1\20170306s.16\303061718G.D



ARI Labs, Inc.

8260C 10 ml purge

Data file : \\target\share\chem1\nt3.i\20170306s.b\V303061718G.D
 Lab Smp Id: 17C0009-09
 Inj Date : 06-MAR-2017 15:13
 Operator : PC Inst ID: nt3.i
 Smp Info : 17C0009-09
 Misc Info : 15-
 Comment :
 Method : \\target\share\chem1\nt3.i\20170306s.b\8260C022417.m
 Meth Date : 06-Mar-2017 07:32 Paul Quant Type: ISTD
 Cal Date : 14-FEB-2017 18:50 Cal File: V302141718.D
 Als bottle: 12
 Dil Factor: 1.00000
 Integrator: HP RTE Compound Sublist: gsurr.sub
 Target Version: 4.14
 Processing Host: ORGDATA11

Concentration Formula: Amt * DF * Pv / Sa * CpndVariable

Name	Value	Description
DF	1.000	Dilution Factor
Pv	10.000	Purge Volume (mL)
Sa	10.000	Sample Amount (mL)
Cpnd Variable		Local Compound Variable

Compounds	QUANT	SIG	RT	EXP RT	REL RT	RESPONSE	CONCENTRATIONS	
							ON-COLUMN (ug/L)	FINAL (ug/L)
\$ 27 Dibromofluoromethane	111		5.053	5.053	(0.933)	59808	4.95713	4.957
* 32 Pentafluorobenzene	168		5.415	5.420	(1.000)	256811	10.0000	
\$ 33 d4-1,2-Dichloroethane	65		5.447	5.446	(1.006)	72928	5.34258	5.343
* 37 1,4-Difluorobenzene	114		5.797	5.803	(1.000)	417743	10.0000	
\$ 43 d8-Toluene	98		6.765	6.765	(1.167)	256794	5.06368	5.064
* 53 d5-Chlorobenzene	117		7.844	7.844	(1.000)	412320	10.0000	
\$ 62 4-Bromofluorobenzene	174		8.716	8.715	(1.111)	86459	4.98096	4.981
* 76 d4-1,4-Dichlorobenzene	152		9.534	9.534	(1.000)	219986	10.0000	
\$ 79 d4-1,2-Dichlorobenzene	152		9.858	9.858	(1.034)	102954	4.98616	4.986

ARI Labs, Inc.

INTERNAL STANDARD COMPOUNDS
 AREA AND RT SUMMARY

Instrument ID: nt3.i Calibration Date: 03-MAR-2017
 Lab File ID: V303061718G.D Calibration Time: 21:57
 Lab Smp Id: 17C0009-09
 Analysis Type: VOA Level: LOW
 Quant Type: ISTD Sample Type: WATER
 Operator: PC
 Method File: \\target\share\chem1\nt3.i\20170306s.b\8260C022417.m
 Misc Info: 15-

Test Mode:

Use Initial Calibration Level 5.
 If Continuing Cal. use Initial Cal. Level 5

COMPOUND	STANDARD	AREA LIMIT		SAMPLE	%DIFF
		LOWER	UPPER		
32 Pentafluorobenzon	317912	158956	635824	256811	-19.22
37 1,4-Difluorobenze	512039	256020	1024078	417743	-18.42
53 d5-Chlorobenzene	494052	247026	988104	412320	-16.54
76 d4-1,4-Dichlorobe	282154	141077	564308	219986	-22.03

COMPOUND	STANDARD	RT LIMIT		SAMPLE	%DIFF
		LOWER	UPPER		
32 Pentafluorobenzon	5.42	4.92	5.92	5.42	-0.10
37 1,4-Difluorobenze	5.80	5.30	6.30	5.80	-0.09
53 d5-Chlorobenzene	7.84	7.34	8.34	7.84	0.00
76 d4-1,4-Dichlorobe	9.53	9.03	10.03	9.53	0.00

AREA UPPER LIMIT = +100% of internal standard area.
 AREA LOWER LIMIT = - 50% of internal standard area.
 RT UPPER LIMIT = + 0.50 minutes of internal standard RT.
 RT LOWER LIMIT = - 0.50 minutes of internal standard RT.

ARI Labs, Inc.

RECOVERY REPORT

Client Name: Client SDG: 20151005
Sample Matrix: LIQUID Fraction: VOA
Lab Smp Id: 17C0009-09
Level: LOW Operator: PC
Data Type: MS DATA SampleType: SAMPLE
SpikeList File: allspike.spk Quant Type: ISTD
Sublist File: gsurr.sub
Method File: \\target\share\chem1\nt3.i\20170306s.b\8260C022417.m
Misc Info: 15-

SURROGATE COMPOUND	AMOUNT ADDED ug/L	AMOUNT RECOVERED ug/L	% RECOVERED	LIMITS
\$ 27 Dibromofluorometha	5.000	4.957	99.14	80-120
\$ 33 d4-1,2-Dichloroeth	5.000	5.343	106.85	80-128
\$ 43 d8-Toluene	5.000	5.064	101.27	80-120
\$ 62 4-Bromofluorobenze	5.000	4.981	99.62	80-120
\$ 79 d4-1,2-Dichloroben	5.000	4.986	99.72	80-120

REVIEW SUMMARY FOR FILE - V303061718G.D

Lab ID: 17C0009-09

nt3.i, 20170306s.b\8260C022417.m, 06-MAR-2017 15:13

RT CO-ELUTION COMPOUNDS

Data File: \\target\share\chend\nt3.1\20170306g.b\W303061718G.D

Date: 06-HRR-2017 15:13

Client ID:

Sample Info: 17C0009-09

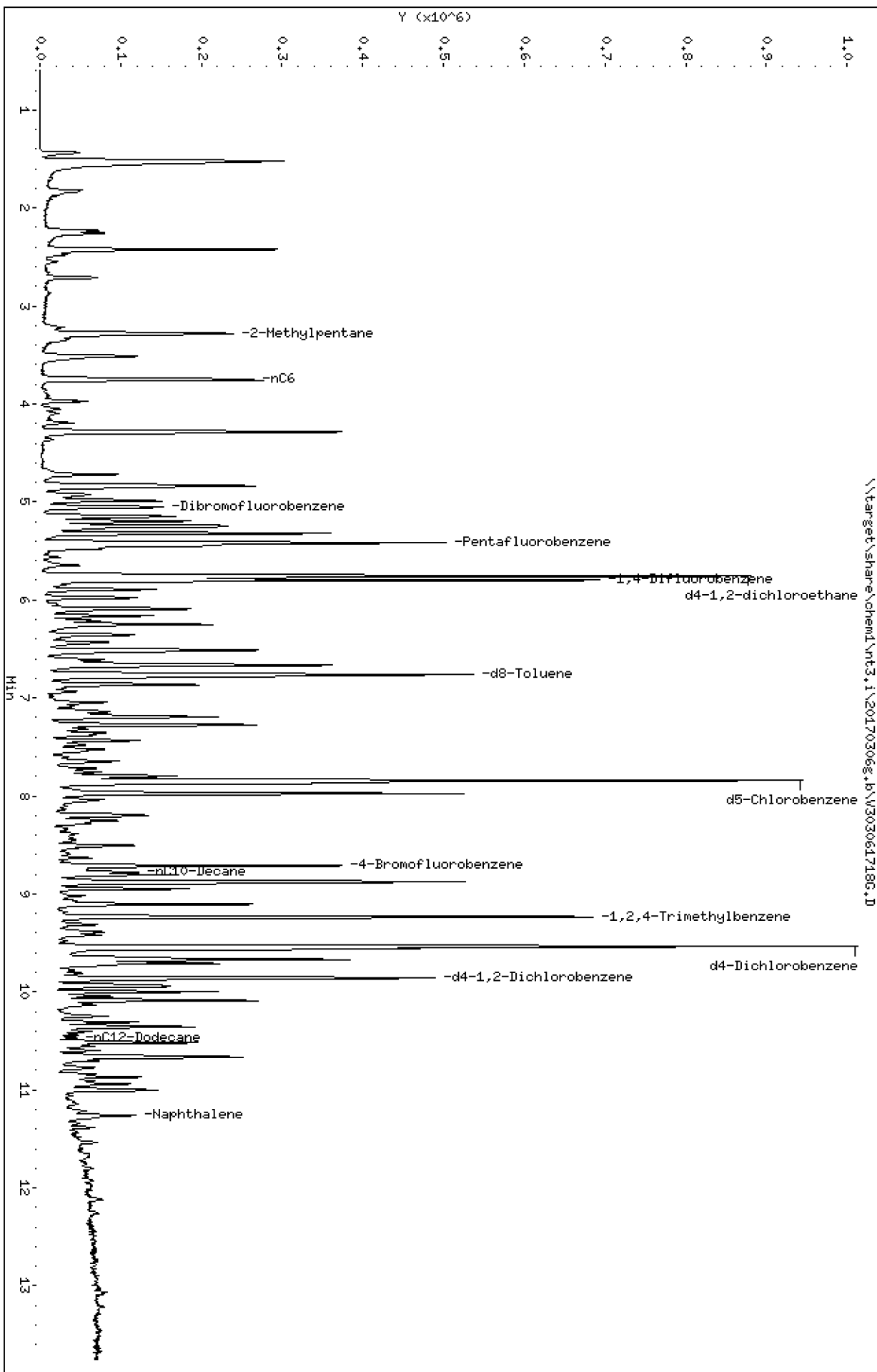
Column phase: RTXWMS

Instrument: nt3.1

Operator: PC

Column diameter: 0.18

\\target\share\chend\nt3.1\20170306g.b\W303061718G.D



Analytical Resources Inc.
GC/MS Gas Quantitation Report

Data file: 20170306g.b/V303061718G.D
Method: \20170306g.b\NWTPHG.m
Instrument: nt3.i
Gas Ical Date: 14-Feb-2017
Injection Date: 06-MAR-2017 15:13

ARI ID: 17C0009-09
Client ID:
Matrix: WATER
Dilution Factor: 1.000
Operator: PC

=====

GASOLINE HYDROCARBONS

Range	RF	Total Area*	Amount (ug/mL)
WAGas Tol-C12 (6.70 to 10.57)	52141375	11418157	0.219
8015C 2MP-TMB (3.17 to 9.34)	87713511	16674435	0.190
AK101 nC6-nC10 (3.65 to 8.68)	61260787	12585661	0.205
NWTPHG Tol-Nap (6.70 to 11.36)	54123058	12931337	0.239

M Indicates manual integration within range

* Surrogate areas are subtracted from Total Area

NW Gas Range Subtracted Peaks

6.765	1103735	d8-Toluene
8.711	563380	4-Bromofluorobenzene
9.535	1907649	d4-Dichlorobenzene
7.844	1820577	d5-Chlorobenzene
9.859	738035	d4-1,2-Dichlorobenzene



Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

B-8-11
17C0009-09 (Solid)

Petroleum Hydrocarbons

Method: NWTPH-Dx

Sampled: 02/27/2017 13:40

Instrument: FID3

Analyzed: 03-Mar-2017 15:25

Sample Preparation:

Preparation Method: EPA 3546 (Microwave)

Preparation Batch: BFC0023

Sample Size: 10.05 g (wet)

Dry Weight: 7.08 g

Prepared: 02-Mar-2017

Final Volume: 1 mL

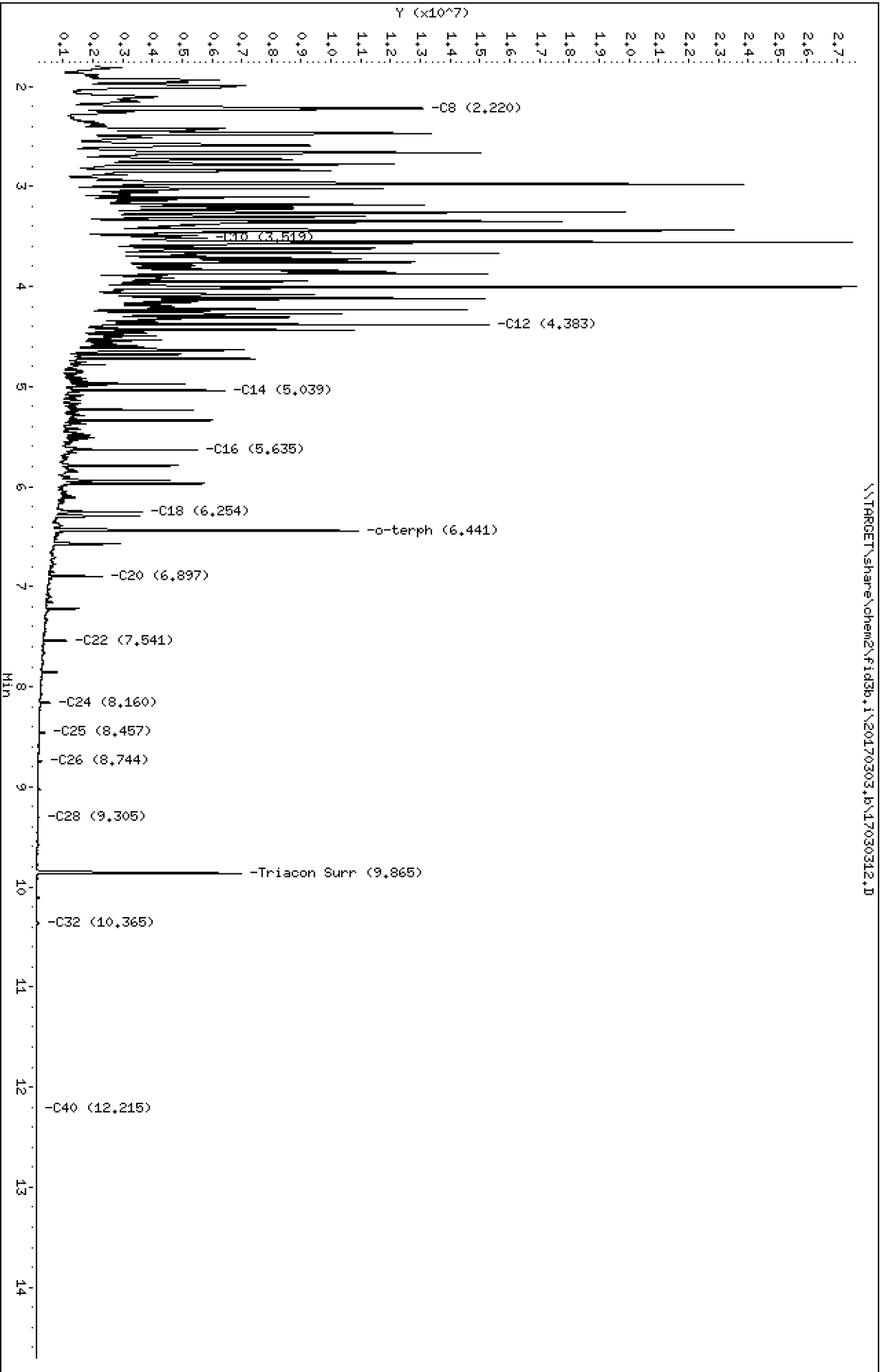
% Solids: 70.47

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Diesel Range Organics (C12-C24)		1	7.06	198	mg/kg	
HC ID: DIESEL						
Motor Oil Range Organics (C24-C38)		1	14.1	ND	mg/kg	U
<i>Surrogate: o-Terphenyl</i>			<i>50-150 %</i>	<i>80.7</i>	<i>%</i>	

Data File: \\TARGET\share\chem2\fid3b,1\20170303,b\17030312.D
Date: 03-MAR-2017 15:25
Client ID:
Sample Info: 17C0009-09

Column phase: RTX-1

Instrument: fid3b,1
Operator: ML
Column diameter: 0.25



Analytical Resources Inc.
TPH Quantitation Report

Data file: 20170303.b/17030312.D
Method: 20170303.b\FID3TPH.m
Instrument: fid3b.i
Operator: ML
Report Date: 03/06/2017
Macro: FID3_022817

ARI ID: 17C0009-09
Client ID:
Injection: 03-MAR-2017 15:25
Dilution Factor: 1

FID:3B RESULTS

Compound	RT	Shift	Height	Area	Method	Range	Total Area	Conc
Toluene	1.887	0.006	2100156	3561461	WATPHG	(Tol-C12)	770731899	35439.8
C8	2.220	0.007	12986045	18432243	WATPHD	(C12-C24)	218560723	1405.6
C10	3.519	-0.014	5727075	8586303	WATPHM	(C24-C38)	5487171	40.0
C12	4.383	0.011	15179861	11705727				
C14	5.039	0.001	6339478	5393263				
C16	5.635	0.001	5398156	3471661				
C18	6.254	-0.001	3548465	2725357				
C20	6.897	-0.003	2219684	2163888				
C22	7.541	-0.005	1017097	1027198				
C24	8.160	-0.008	469204	476183				
C25	8.457	-0.010	291698	344671				
C26	8.744	-0.010	178090	181814				
C28	9.305	-0.010	95856	123389				
C32	10.365	-0.009	95983	95967				
C34	----							
Filter Peak	----							
C36	----							
o-terph	6.441	0.001	10198616	7991335				
Triacon Surr	9.865	-0.003	6884917	6983126				

Range Times: NW Diesel(4.422 - 8.218) NW Gas(1.831 - 4.422) NW M.Oil(8.218 - 11.845)
AK102(3.483 - 8.416) AK103(8.416 - 11.394) Jet A(3.483 - 6.304)

Surrogate	Area	Amount	%Rec
o-Terphenyl	7991335	36.3	80.8
Triacontane	6983126	36.5	81.2

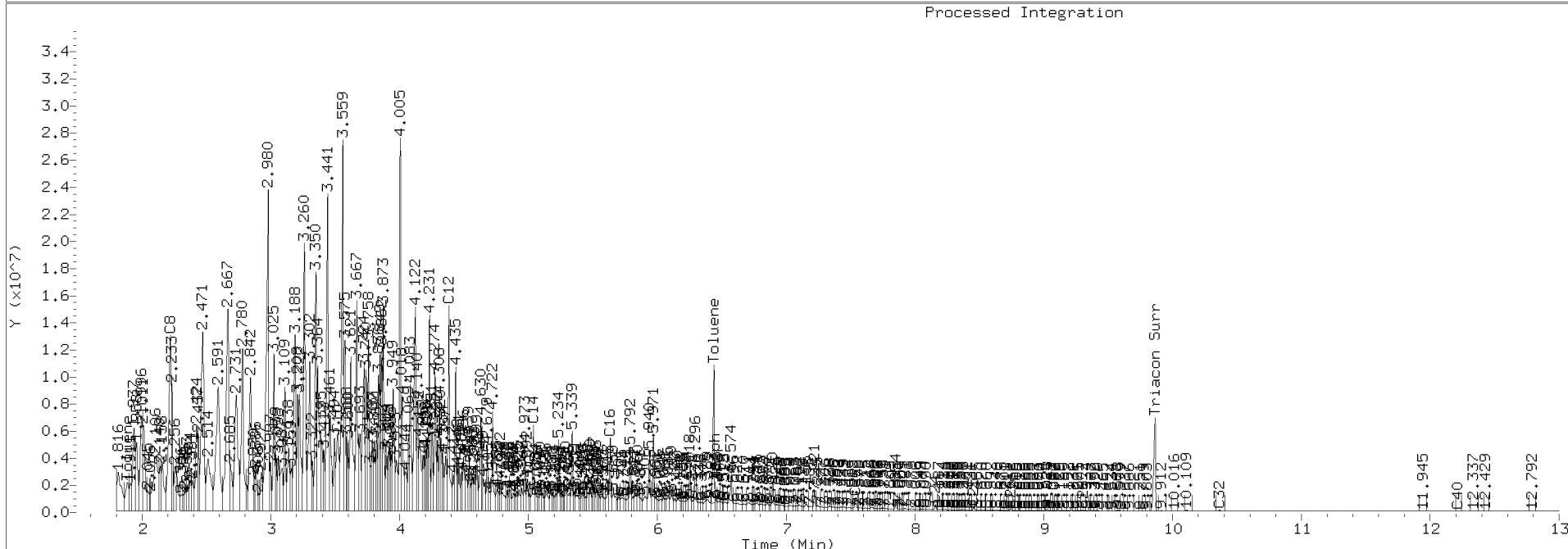
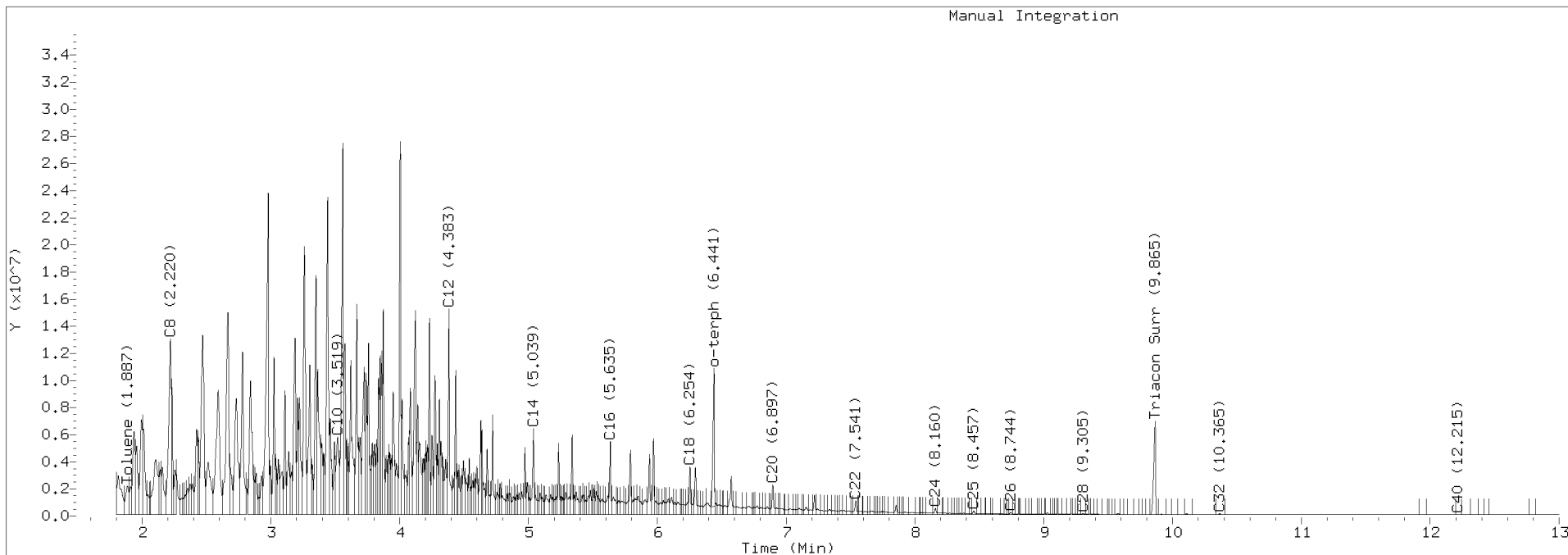


Analyte	RF	Curve Date
o-Terph Surr	219872.3	28-FEB-2017
Triacon Surr	191068.8	28-FEB-2017
Gas	21747.6	xx-xx-xxxx
Diesel	155491.0	28-FEB-2017
Motor Oil	137039.0	28-FEB-2017

TPH Manual Integrations Report

Datafile: FID3B, 20170303.b/17030312.D Injection: 03-MAR-2017 15:25

Lab ID:17C0009-09





Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

B-9-11
17C0009-10 (Solid)

Volatile Organic Compounds

Method: EPA 8260C

Sampled: 02/27/2017 14:00

Instrument: NT5

Analyzed: 07-Mar-2017 17:49

Sample Preparation:

Preparation Method: EPA 5035 (Methanol Extraction)

Preparation Batch: BFC0221

Sample Size: 6.056 g (wet)

Dry Weight: 4.29 g

Prepared: 07-Mar-2017

Final Volume: 5 mL

% Solids: 70.85

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
1,2-Dichloroethane	107-06-2	50	78.8	ND	ug/kg	U
Benzene	71-43-2	50	78.8	ND	ug/kg	U
Toluene	108-88-3	50	78.8	ND	ug/kg	U
Ethylbenzene	100-41-4	50	78.8	1160	ug/kg	
m,p-Xylene	179601-23-1	50	78.8	642	ug/kg	
o-Xylene	95-47-6	50	78.8	98.7	ug/kg	
<i>Surrogate: Dibromofluoromethane</i>			30-160 %	101	%	
<i>Surrogate: 1,2-Dichloroethane-d4</i>			80-124 %	102	%	
<i>Surrogate: Toluene-d8</i>			80-120 %	110	%	
<i>Surrogate: 4-Bromofluorobenzene</i>			80-120 %	94.3	%	
<i>Surrogate: 1,2-Dichlorobenzene-d4</i>			80-120 %	105	%	



Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

B-9-11
17C0009-10 (Solid)

Volatile Organic Compounds

Method: NWTPhg Sampled: 02/27/2017 14:00
Instrument: NT3 Analyzed: 07-Mar-2017 12:26

Sample Preparation: Preparation Method: EPA 5035 (Methanol Extraction) Dry Weight: 4.29 g
Preparation Batch: BFC0157 Sample Size: 6.056 g (wet)
Prepared: 07-Mar-2017 Final Volume: 5 mL % Solids: 70.85

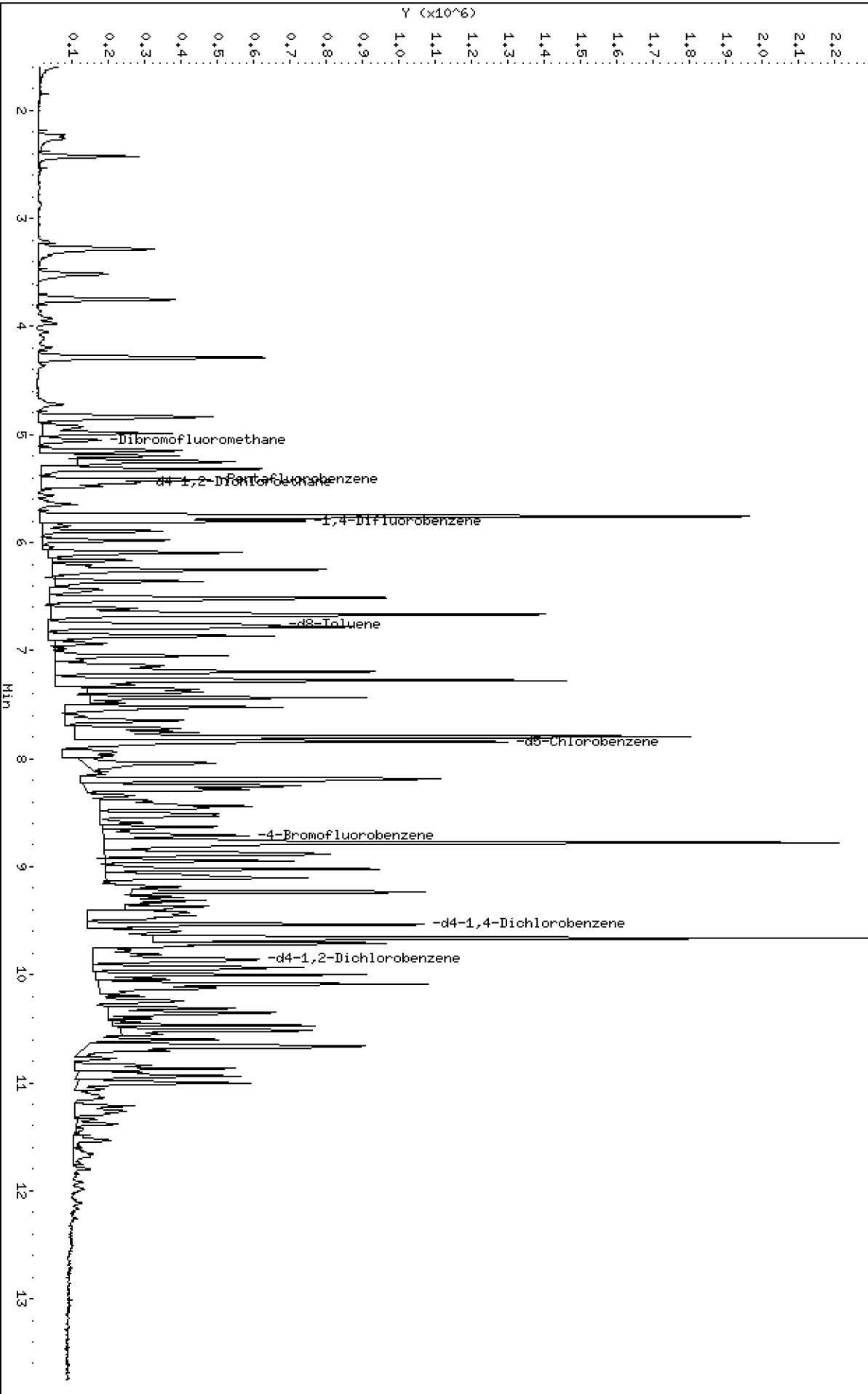
Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Gasoline Range Organics (Tol-Nap)		500	78800	1240000	ug/kg	D
HC ID: GRO						
Surrogate: Toluene-d8			80-120 %	106	%	
Surrogate: 4-Bromofluorobenzene			78-123 %	102	%	

Data File: \\target\share\chend\nt3.1\20170307s.1b\303071709G.D
Date : 07-HRR-2017 12:26
Client ID:
Sample Info: 17C0009-10

Column phase: RTXWMS

\\target\share\chend\nt3.1\20170307s.1b\303071709G.D

Instrument: nt3.1
Operator: PC
Column diameter: 0.18



ARI Labs, Inc.

8260C 10 ml purge

Data file : \\target\share\chem1\nt3.i\20170307s.b\V303071709G.D
Lab Smp Id: 17C0009-10
Inj Date : 07-MAR-2017 12:26
Operator : PC
Smp Info : 17C0009-10
Misc Info : 16-
Comment :
Method : \\target\share\chem1\nt3.i\20170307s.b\8260C022417.m
Meth Date : 06-Mar-2017 07:32 Paul
Cal Date : 14-FEB-2017 18:50
Als bottle: 12
Dil Factor: 1.00000
Integrator: HP RTE
Target Version: 4.14
Processing Host: ORGDATA11

Inst ID: nt3.i

Quant Type: ISTD

Cal File: V302141718.D

Compound Sublist: gsurr.sub

Compounds	QUANT	SIG	RT	EXP RT	REL RT	RESPONSE	CONCENTRATIONS	
							ON-COLUMN (ug/L)	FINAL (ug/L)
\$ 27 Dibromofluoromethane	111		5.053	5.053	(0.932)	56196	4.92814	4.928 (R)
* 32 Pentafluorobenzene	168		5.420	5.420	(1.000)	242721	10.0000	
\$ 33 d4-1,2-Dichloroethane	65		5.446	5.446	(1.005)	69387	5.37825	5.378 (R)
* 37 1,4-Difluorobenzene	114		5.802	5.803	(1.000)	389653	10.0000	
\$ 43 d8-Toluene	98		6.764	6.765	(1.166)	251201	5.31048	5.310 (R)
* 53 d5-Chlorobenzene	117		7.844	7.844	(1.000)	382009	10.0000	
\$ 62 4-Bromofluorobenzene	174		8.715	8.715	(1.111)	82191	5.11079	5.111 (R)
* 76 d4-1,4-Dichlorobenzene	152		9.539	9.534	(1.000)	214870	10.0000	
\$ 79 d4-1,2-Dichlorobenzene	152		9.858	9.858	(1.033)	99252	4.92132	4.921 (R)

QC Flag Legend

R - Spike/Surrogate failed recovery limits.

ARI Labs, Inc.

INTERNAL STANDARD COMPOUNDS
AREA AND RT SUMMARY

Instrument ID: nt3.i Calibration Date: 03-MAR-2017
Lab File ID: V303071709G.D Calibration Time: 21:57
Lab Smp Id: 17C0009-10
Analysis Type: VOA Level:
Quant Type: ISTD Sample Type:
Operator: PC
Method File: \\target\share\chem1\nt3.i\20170307s.b\8260C022417.m
Misc Info: 16-

Test Mode:

Use Initial Calibration Level 5.
If Continuing Cal. use Initial Cal. Level 5

COMPOUND	STANDARD	AREA LIMIT		SAMPLE	%DIFF
		LOWER	UPPER		
32 Pentafluorobenzon	317912	158956	635824	242721	-23.65
37 1,4-Difluorobenze	512039	256020	1024078	389653	-23.90
53 d5-Chlorobenzene	494052	247026	988104	382009	-22.68
76 d4-1,4-Dichlorobe	282154	141077	564308	214870	-23.85

COMPOUND	STANDARD	RT LIMIT		SAMPLE	%DIFF
		LOWER	UPPER		
32 Pentafluorobenzon	5.42	4.92	5.92	5.42	-0.00
37 1,4-Difluorobenze	5.80	5.30	6.30	5.80	-0.00
53 d5-Chlorobenzene	7.84	7.34	8.34	7.84	-0.00
76 d4-1,4-Dichlorobe	9.53	9.03	10.03	9.54	0.05

AREA UPPER LIMIT = +100% of internal standard area.
AREA LOWER LIMIT = - 50% of internal standard area.
RT UPPER LIMIT = + 0.50 minutes of internal standard RT.
RT LOWER LIMIT = - 0.50 minutes of internal standard RT.

ARI Labs, Inc.

RECOVERY REPORT

Client Name: Client SDG: 20150930a
Sample Matrix: NONE Fraction: VOA
Lab Smp Id: 17C0009-10
Level: Operator: PC
Data Type: MS DATA SampleType: SAMPLE
SpikeList File: allspike.spk Quant Type: ISTD
Sublist File: gsurr.sub
Method File: \\target\share\chem1\nt3.i\20170307s.b\8260C022417.m
Misc Info: 16-

SURROGATE COMPOUND	AMOUNT ADDED ug/L	AMOUNT RECOVERED ug/L	% RECOVERED	LIMITS
\$ 27 Dibromofluorometha	5.000	4.928	98.56	
\$ 33 d4-1,2-Dichloroeth	5.000	5.378	107.57	
\$ 43 d8-Toluene	5.000	5.310	106.21	
\$ 62 4-Bromofluorobenze	5.000	5.111	102.22	
\$ 79 d4-1,2-Dichloroben	5.000	4.921	98.43	

REVIEW SUMMARY FOR FILE - V303071709G.D

Lab ID: 17C0009-10

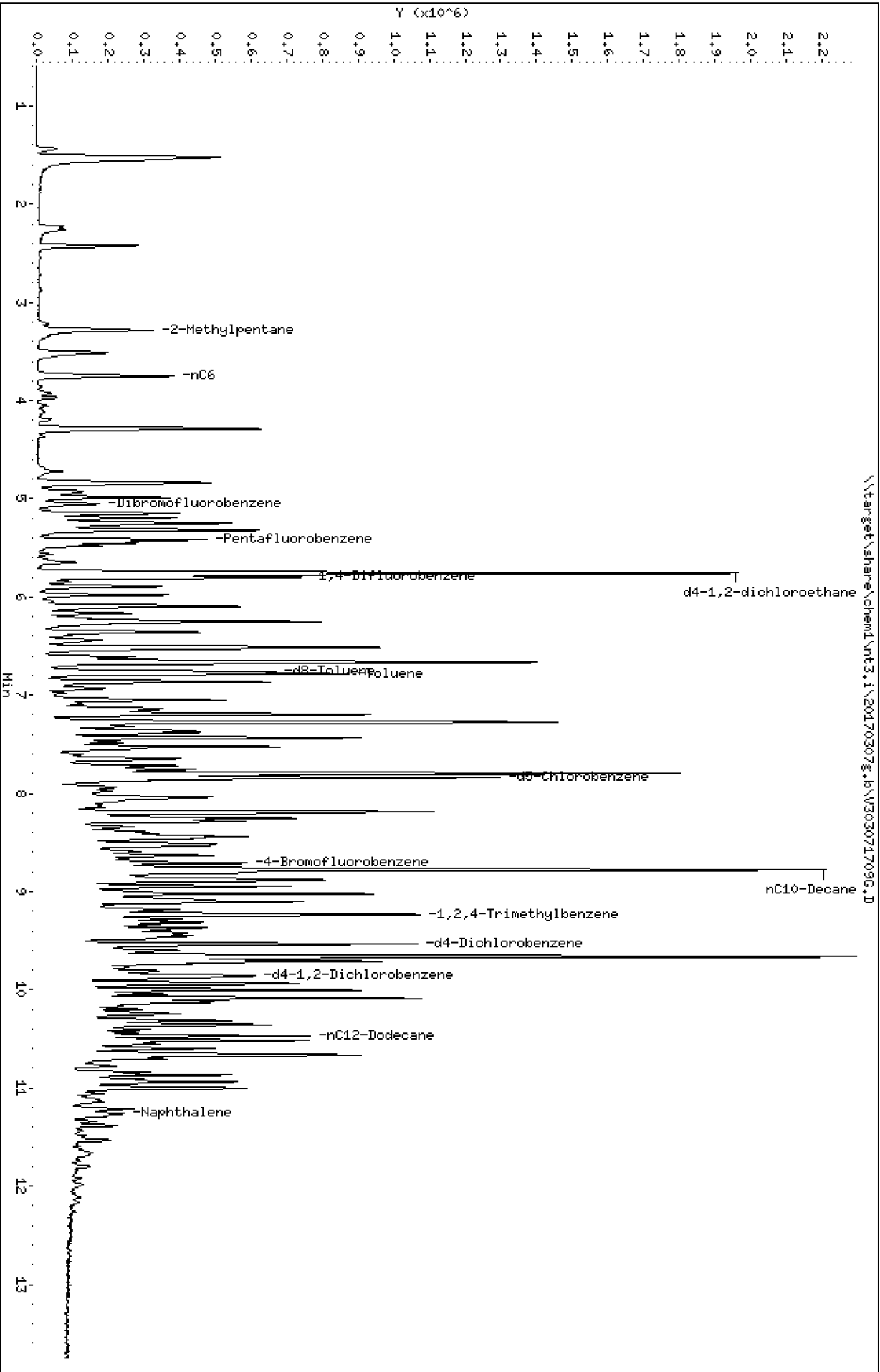
nt3.i, 20170307s.b\8260C022417.m, 07-MAR-2017 12:26

RT CO-ELUTION COMPOUNDS

Data File: \\target\share\chend\nt3.1\20170307g.jb\303071709G.D
Date: 07-HRR-2017 12:26
Client ID:
Sample Info: 17C0009-10

Column phase: RTXWMS

Instrument: nt3.1
Operator: PC
Column diameter: 0.18



Analytical Resources Inc.
GC/MS Gas Quantitation Report

Data file: 20170307g.b/V303071709G.D
Method: \20170307g.b\NWTPHG.m
Instrument: nt3.i
Gas Ical Date: 14-Feb-2017
Injection Date: 07-MAR-2017 12:26

ARI ID: 17C0009-10
Client ID:
Matrix: NONE
Dilution Factor: 1.000
Operator: PC

=====

GASOLINE HYDROCARBONS

Range	RF	Total Area*	Amount (ug/mL)
-----	----	-----	-----
WAGas Tol-C12 (6.70 to 10.57)	52141375	75566011	1.449
8015C 2MP-TMB (3.19 to 9.33)	87713511	71451949	0.815
AK101 nC6-nC10 (3.65 to 8.68)	61260787	53389832	0.872
NWTPHG Tol-Nap (6.70 to 11.36)	54123058	85249491	1.575

M Indicates manual integration within range

* Surrogate areas are subtracted from Total Area

NW Gas Range Subtracted Peaks

6.765	1030430	d8-Toluene
8.710	1203987	4-Bromofluorobenzene
9.534	1920342	d4-Dichlorobenzene
7.844	2548009	d5-Chlorobenzene
9.859	1697523	d4-1,2-Dichlorobenzene



Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

B-9-11
17C0009-10 (Solid)

Petroleum Hydrocarbons

Method: NWTPH-Dx

Sampled: 02/27/2017 14:00

Instrument: FID3

Analyzed: 03-Mar-2017 15:50

Sample Preparation:

Preparation Method: EPA 3546 (Microwave)

Preparation Batch: BFC0023

Sample Size: 10.16 g (wet)

Dry Weight: 7.20 g

Prepared: 02-Mar-2017

Final Volume: 1 mL

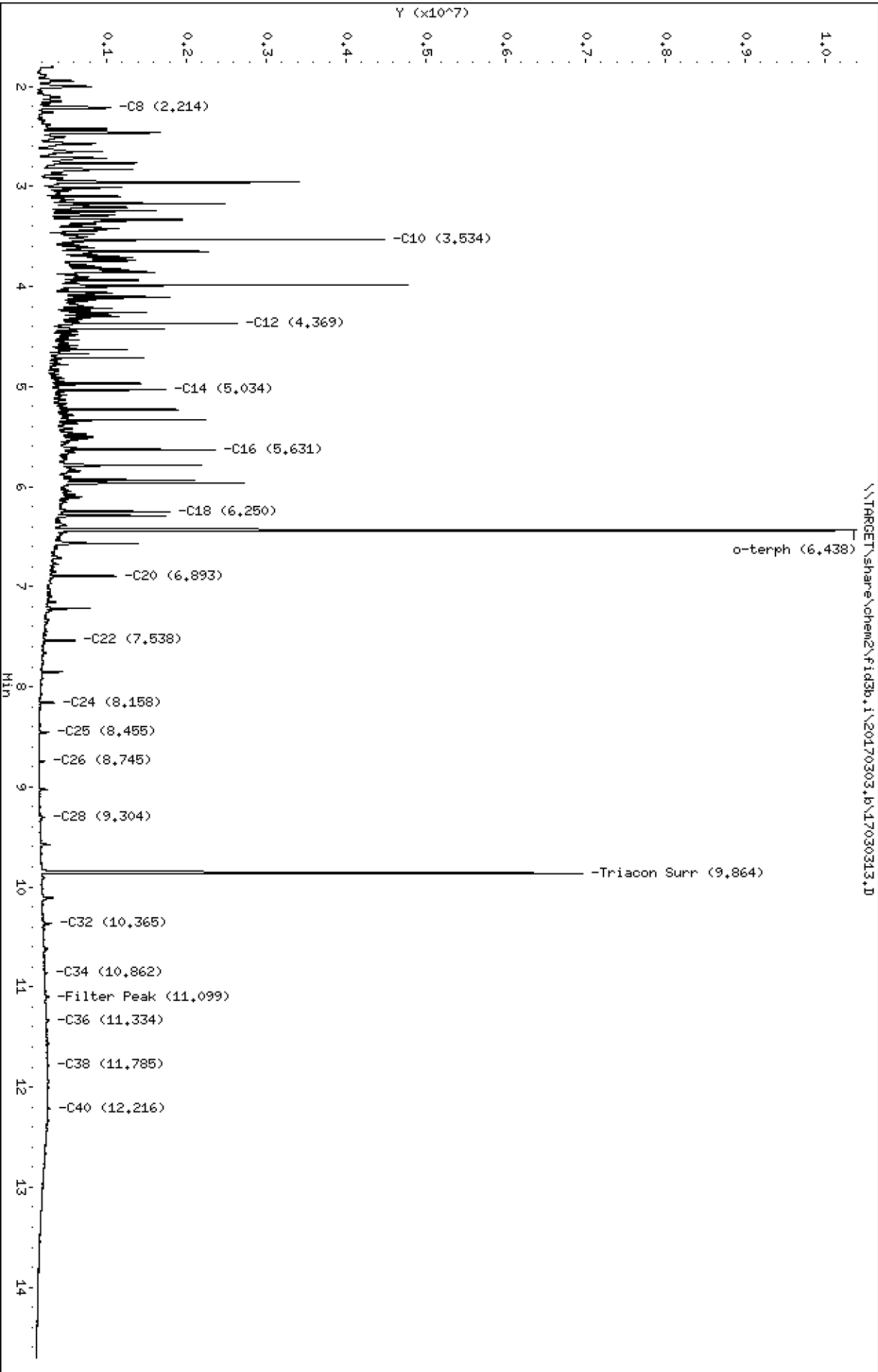
% Solids: 70.85

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Diesel Range Organics (C12-C24)		1	6.95	58.6	mg/kg	
HC ID: DIESEL						
Motor Oil Range Organics (C24-C38)		1	13.9	16.7	mg/kg	
HC ID: MOTOR OIL						
<i>Surrogate: o-Terphenyl</i>			50-150 %	76.0	%	

Data File: \\TARGET\share\chem2\fid3b,1\20170303,b\17030313.D
Date: 03-HR-2017 15:50
Client ID:
Sample Info: 17C0009-10

Column phase: RTX-1

Instrument: fid3b,1
Operator: ML
Column diameter: 0.25



Analytical Resources Inc.
TPH Quantitation Report

Data file: 20170303.b/17030313.D
Method: 20170303.b\FID3TPH.m
Instrument: fid3b.i
Operator: ML
Report Date: 03/06/2017
Macro: FID3_022817

ARI ID: 17C0009-10
Client ID:
Injection: 03-MAR-2017 15:50
Dilution Factor: 1

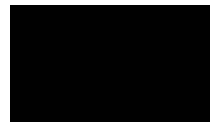
FID:3B RESULTS

Compound	RT	Shift	Height	Area	Method	Range	Total Area	Conc
Toluene	1.898	0.017	124057	246143	WATPHG	(Tol-C12)	73269704	3369.1
C8	2.214	0.002	934110	1329911	WATPHD	(C12-C24)	65543128	421.5
C10	3.534	0.001	4369773	2541732	WATPHM	(C24-C38)	16482477	120.3
C12	4.369	-0.002	2519986	1593887				
C14	5.034	-0.004	1624556	1270071				
C16	5.631	-0.003	2233111	1326720				
C18	6.250	-0.004	1680552	1199791				
C20	6.893	-0.006	1007817	930112				
C22	7.538	-0.008	487299	440148				
C24	8.158	-0.010	221967	197475				
C25	8.455	-0.011	150449	161182				
C26	8.745	-0.009	101121	148336				
C28	9.304	-0.011	99415	152395				
C32	10.365	-0.010	192967	263304				
C34	10.862	-0.008	133235	230313				
Filter Peak	11.099	0.000	149928	335463				
C36	11.334	-0.010	152741	288064				
o-terph	6.438	-0.002	10014081	7519251				
Triacon Surr	9.864	-0.003	6773907	6704431				

Range Times: NW Diesel(4.422 - 8.218) NW Gas(1.831 - 4.422) NW M.Oil(8.218 - 11.845)
AK102(3.483 - 8.416) AK103(8.416 - 11.394) Jet A(3.483 - 6.304)

Surrogate	Area	Amount	%Rec
o-Terphenyl	7519251	34.2	76.0
Triacontane	6704431	35.1	78.0

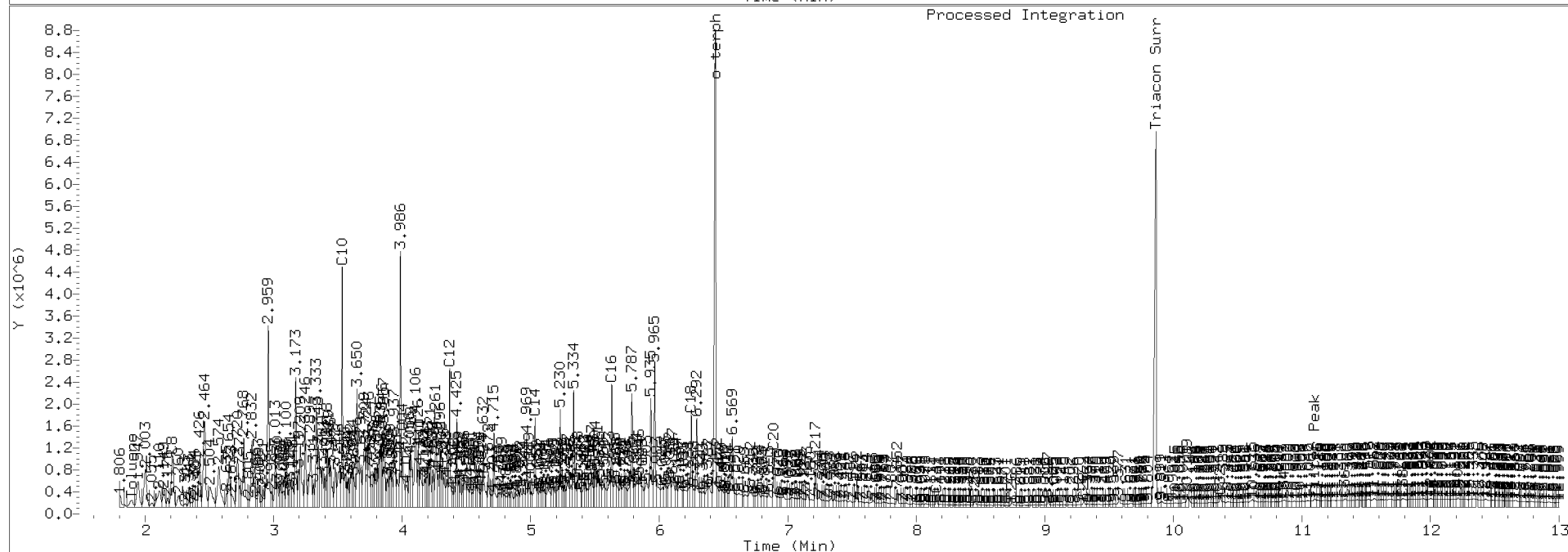
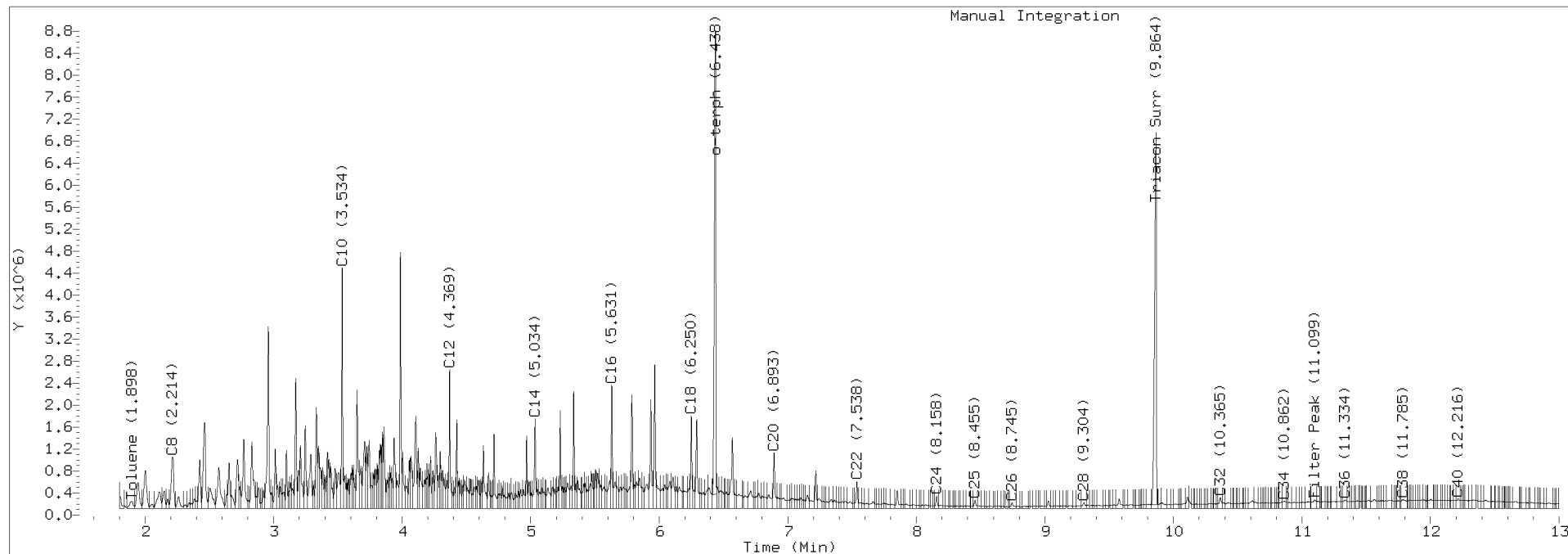
Analyte	RF	Curve Date
o-Terph Surr	219872.3	28-FEB-2017
Triacon Surr	191068.8	28-FEB-2017
Gas	21747.6	xx-xx-xxxx
Diesel	155491.0	28-FEB-2017
Motor Oil	137039.0	28-FEB-2017



TPH Manual Integrations Report

Datafile: FID3B, 20170303.b/17030313.D Injection: 03-MAR-2017 15:50

Lab ID:17C0009-10





Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

B-11-10
17C0009-11 (Solid)

Volatile Organic Compounds

Method: EPA 8260C

Sampled: 02/27/2017 14:20

Instrument: NT5

Analyzed: 06-Mar-2017 18:16

Sample Preparation:

Preparation Method: EPA 5035 (Sodium Bisulfate)

Preparation Batch: BFC0031

Sample Size: 5.49 g (wet)

Dry Weight: 3.91 g

Prepared: 01-Mar-2017

Final Volume: 5 mL

% Solids: 71.18

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
1,2-Dichloroethane	107-06-2	1	1.28	ND	ug/kg	U
Benzene	71-43-2	1	1.28	2.05	ug/kg	
Toluene	108-88-3	1	1.28	2.39	ug/kg	
Ethylbenzene	100-41-4	1	1.28	22.6	ug/kg	
m,p-Xylene	179601-23-1	1	1.28	2.95	ug/kg	
o-Xylene	95-47-6	1	1.28	1.76	ug/kg	
<i>Surrogate: Dibromofluoromethane</i>			80-120 %	88.1	%	
<i>Surrogate: 1,2-Dichloroethane-d4</i>			80-149 %	87.6	%	
<i>Surrogate: Toluene-d8</i>			77-120 %	99.7	%	
<i>Surrogate: 4-Bromofluorobenzene</i>			80-120 %	104	%	
<i>Surrogate: 1,2-Dichlorobenzene-d4</i>			80-120 %	106	%	



Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

B-11-10
17C0009-11 (Solid)

Volatile Organic Compounds

Method: NWTPhg Sampled: 02/27/2017 14:20
Instrument: NT3 Analyzed: 06-Mar-2017 16:04

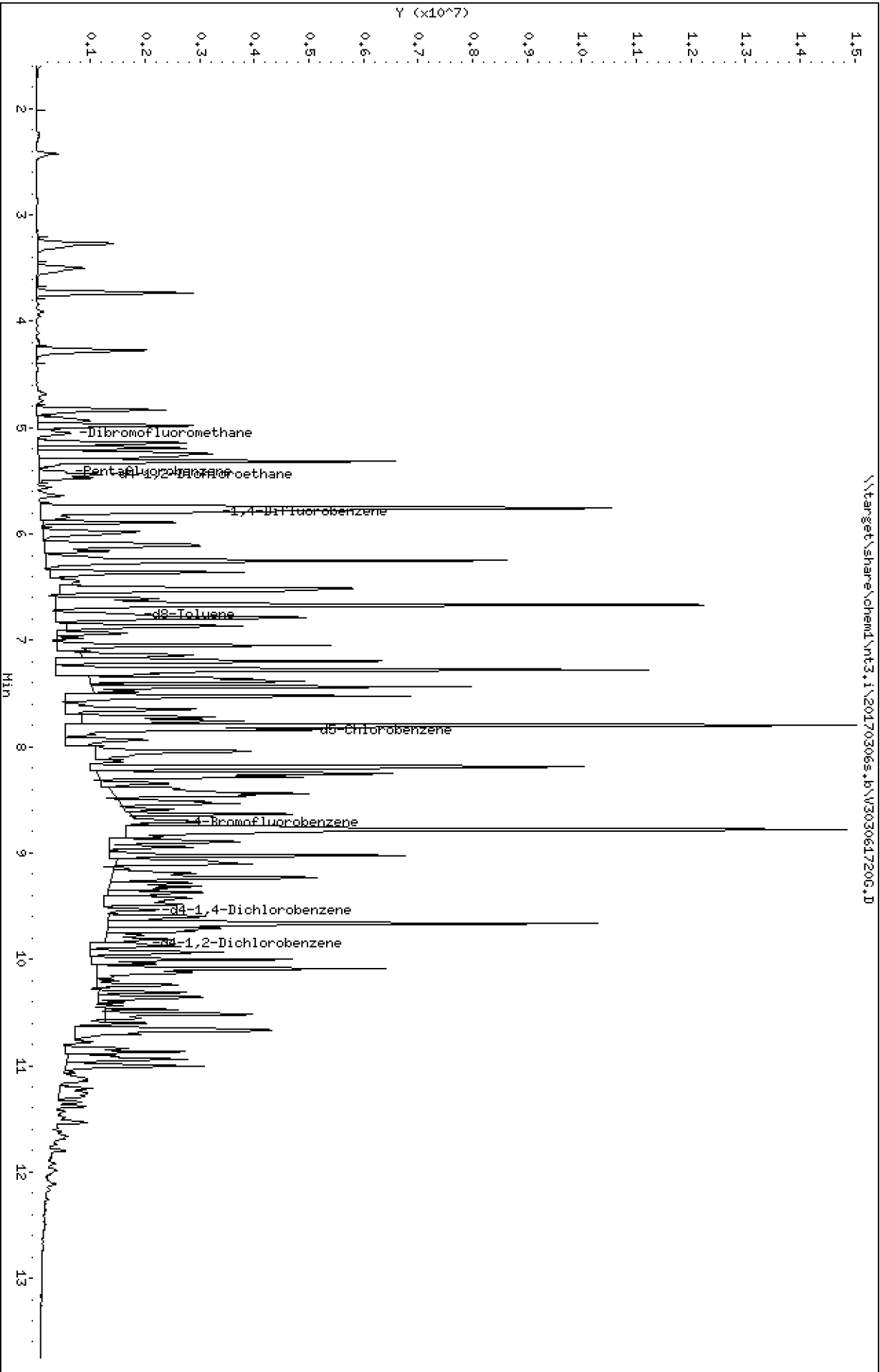
Sample Preparation: Preparation Method: EPA 5035 (Methanol Extraction) Dry Weight: 4.49 g
Preparation Batch: BFC0131 Sample Size: 6.309 g (wet)
Prepared: 06-Mar-2017 Final Volume: 5 mL % Solids: 71.18

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Gasoline Range Organics (Tol-Nap)		50	7590	901000	ug/kg	E
HC ID: GRO						
Surrogate: Toluene-d8			80-120 %	99.9	%	
Surrogate: 4-Bromofluorobenzene			78-123 %	99.6	%	

Data File: \\target\share\chend\nt3.1\20170306s.1b\303061720G.D
Date : 06-HRR-2017 16:04
Client ID:
Sample Info: 17C0009-11

Column phase: RTXWMS

Instrument: nt3.1
Operator: PC
Column diameter: 0.18



ARI Labs, Inc.

8260C 10 ml purge

Data file : \\target\share\chem1\nt3.i\20170306s.b\V303061720G.D
 Lab Smp Id: 17C0009-11
 Inj Date : 06-MAR-2017 16:04
 Operator : PC Inst ID: nt3.i
 Smp Info : 17C0009-11
 Misc Info : 15-
 Comment :
 Method : \\target\share\chem1\nt3.i\20170306s.b\8260C022417.m
 Meth Date : 06-Mar-2017 07:32 Paul Quant Type: ISTD
 Cal Date : 14-FEB-2017 18:50 Cal File: V302141718.D
 Als bottle: 12
 Dil Factor: 1.00000
 Integrator: HP RTE Compound Sublist: gsurr.sub
 Target Version: 4.14
 Processing Host: ORGDATA11

Concentration Formula: Amt * DF * Pv / Sa * CpndVariable

Name	Value	Description
DF	1.000	Dilution Factor
Pv	10.000	Purge Volume (mL)
Sa	10.000	Sample Amount (mL)
Cpnd Variable		Local Compound Variable

Compounds	QUANT	SIG	RT	EXP RT	REL RT	RESPONSE	CONCENTRATIONS	
							ON-COLUMN (ug/L)	FINAL (ug/L)
\$ 27 Dibromofluoromethane	111		5.053	5.053	(0.933)	56856	4.70054	4.701
* 32 Pentafluorobenzene	168		5.414	5.420	(1.000)	257462	10.0000	
\$ 33 d4-1,2-Dichloroethane	65		5.446	5.446	(1.006)	97837	7.14925	7.149(R)
* 37 1,4-Difluorobenzene	114		5.797	5.803	(1.000)	428215	10.0000	
\$ 43 d8-Toluene	98		6.759	6.765	(1.166)	392418	7.54879	7.549(R)
* 53 d5-Chlorobenzene	117		7.843	7.844	(1.000)	414878	10.0000	
\$ 62 4-Bromofluorobenzene	174		8.715	8.715	(1.111)	87016	4.98214	4.982
* 76 d4-1,4-Dichlorobenzene	152		9.539	9.534	(1.000)	239171	10.0000	
\$ 79 d4-1,2-Dichlorobenzene	152		9.858	9.858	(1.033)	112956	5.03174	5.032

QC Flag Legend

R - Spike/Surrogate failed recovery limits.

ARI Labs, Inc.

INTERNAL STANDARD COMPOUNDS
 AREA AND RT SUMMARY

Instrument ID: nt3.i Calibration Date: 03-MAR-2017
 Lab File ID: V303061720G.D Calibration Time: 21:57
 Lab Smp Id: 17C0009-11
 Analysis Type: VOA Level: LOW
 Quant Type: ISTD Sample Type: WATER
 Operator: PC
 Method File: \\target\share\chem1\nt3.i\20170306s.b\8260C022417.m
 Misc Info: 15-

Test Mode:

Use Initial Calibration Level 5.
 If Continuing Cal. use Initial Cal. Level 5

COMPOUND	STANDARD	AREA LIMIT		SAMPLE	%DIFF
		LOWER	UPPER		
32 Pentafluorobenzon	317912	158956	635824	257462	-19.01
37 1,4-Difluorobenze	512039	256020	1024078	428215	-16.37
53 d5-Chlorobenzene	494052	247026	988104	414878	-16.03
76 d4-1,4-Dichlorobe	282154	141077	564308	239171	-15.23

COMPOUND	STANDARD	RT LIMIT		SAMPLE	%DIFF
		LOWER	UPPER		
32 Pentafluorobenzon	5.42	4.92	5.92	5.41	-0.11
37 1,4-Difluorobenze	5.80	5.30	6.30	5.80	-0.10
53 d5-Chlorobenzene	7.84	7.34	8.34	7.84	-0.01
76 d4-1,4-Dichlorobe	9.53	9.03	10.03	9.54	0.05

AREA UPPER LIMIT = +100% of internal standard area.
 AREA LOWER LIMIT = - 50% of internal standard area.
 RT UPPER LIMIT = + 0.50 minutes of internal standard RT.
 RT LOWER LIMIT = - 0.50 minutes of internal standard RT.

ARI Labs, Inc.

RECOVERY REPORT

Client Name: Client SDG: 20151005
Sample Matrix: LIQUID Fraction: VOA
Lab Smp Id: 17C0009-11
Level: LOW Operator: PC
Data Type: MS DATA SampleType: SAMPLE
SpikeList File: allspike.spk Quant Type: ISTD
Sublist File: gsurr.sub
Method File: \\target\share\chem1\nt3.i\20170306s.b\8260C022417.m
Misc Info: 15-

SURROGATE COMPOUND	AMOUNT ADDED ug/L	AMOUNT RECOVERED ug/L	% RECOVERED	LIMITS
\$ 27 Dibromofluorometha	5.000	4.701	94.01	80-120
\$ 33 d4-1,2-Dichloroeth	5.000	7.149	142.99*	80-128
\$ 43 d8-Toluene	5.000	7.549	150.98*	80-120
\$ 62 4-Bromofluorobenze	5.000	4.982	99.64	80-120
\$ 79 d4-1,2-Dichloroben	5.000	5.032	100.63	80-120

REVIEW SUMMARY FOR FILE - V303061720G.D

Lab ID: 17C0009-11

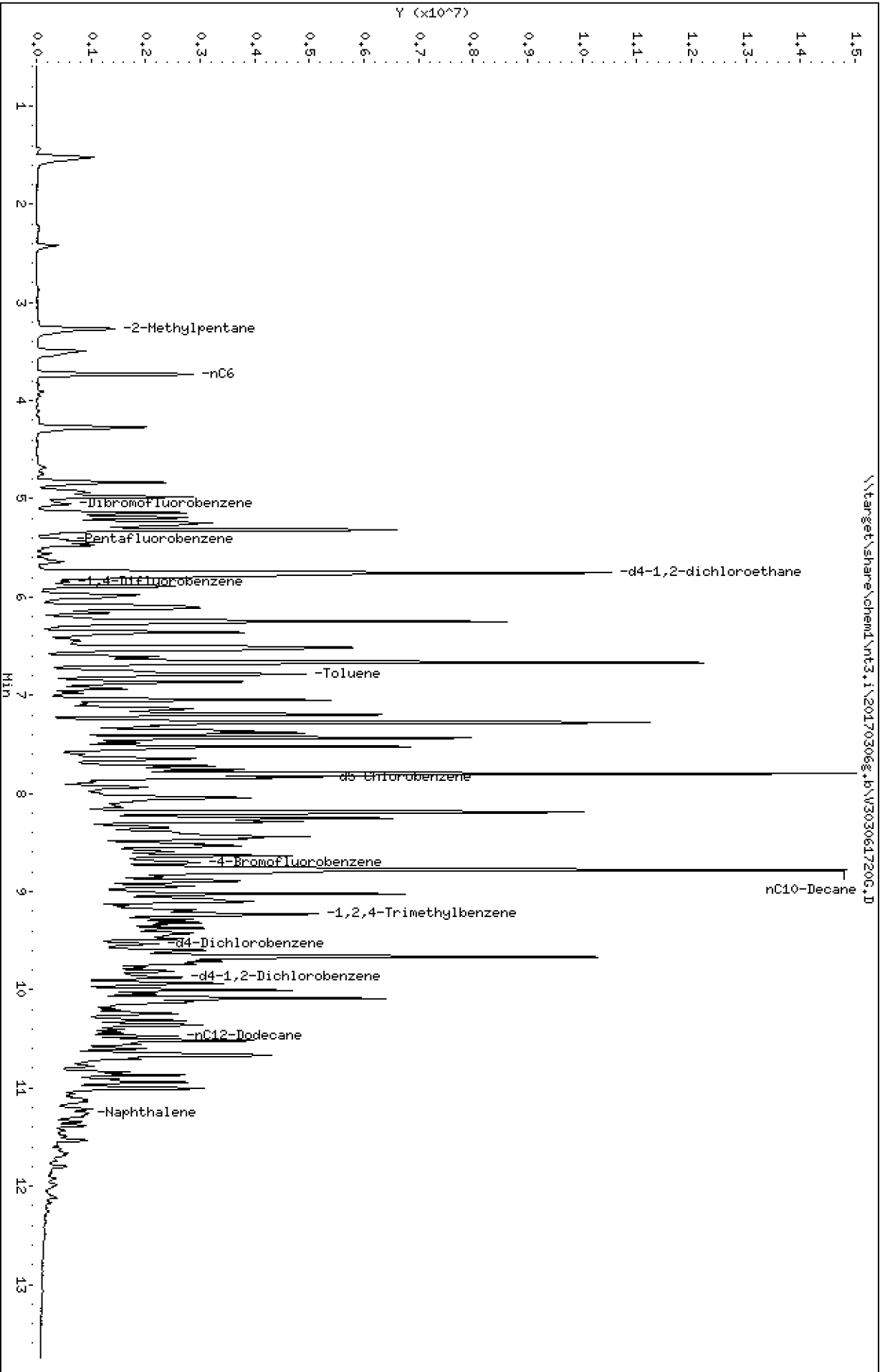
nt3.i, 20170306s.b\8260C022417.m, 06-MAR-2017 16:04

RT CO-ELUTION COMPOUNDS

Data File: \\target\share\chend\nt3,1\20170306g,b\W303061720G.D
Date: 06-HRR-2017 16:04
Client ID:
Sample Info: 17C0009-11

Column phase: RTXWMS

Instrument: nt3,1
Operator: PC
Column diameter: 0.18



Analytical Resources Inc.
GC/MS Gas Quantitation Report

Data file: 20170306g.b/V303061720G.D
Method: \20170306g.b\NWTPHG.m
Instrument: nt3.i
Gas Ical Date: 14-Feb-2017
Injection Date: 06-MAR-2017 16:04

ARI ID: 17C0009-11
Client ID:
Matrix: WATER
Dilution Factor: 1.000
Operator: PC

=====

GASOLINE HYDROCARBONS

Range	RF	Total Area*	Amount (ug/mL)
-----	----	-----	-----
WAGas Tol-C12 (6.70 to 10.57)	52141375	584310499	11.206
8015C 2MP-TMB (3.17 to 9.34)	87713511	581592053	6.631
AK101 nC6-nC10 (3.65 to 8.68)	61260787	454721185	7.423
NWTPHG Tol-Nap (6.70 to 11.36)	54123058	642327334	11.868

M Indicates manual integration within range

* Surrogate areas are subtracted from Total Area

NW Gas Range Subtracted Peaks

8.705	8072433	4-Bromofluorobenzene
9.534	6473320	d4-Dichlorobenzene
7.838	10282911	d5-Chlorobenzene
9.874	8407454	d4-1,2-Dichlorobenzene



Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

B-11-10
17C0009-11 (Solid)

Petroleum Hydrocarbons

Method: NWTPH-Dx

Sampled: 02/27/2017 14:20

Instrument: FID3

Analyzed: 03-Mar-2017 16:14

Sample Preparation:

Preparation Method: EPA 3546 (Microwave)

Preparation Batch: BFC0023

Sample Size: 10.15 g (wet)

Dry Weight: 7.22 g

Prepared: 02-Mar-2017

Final Volume: 1 mL

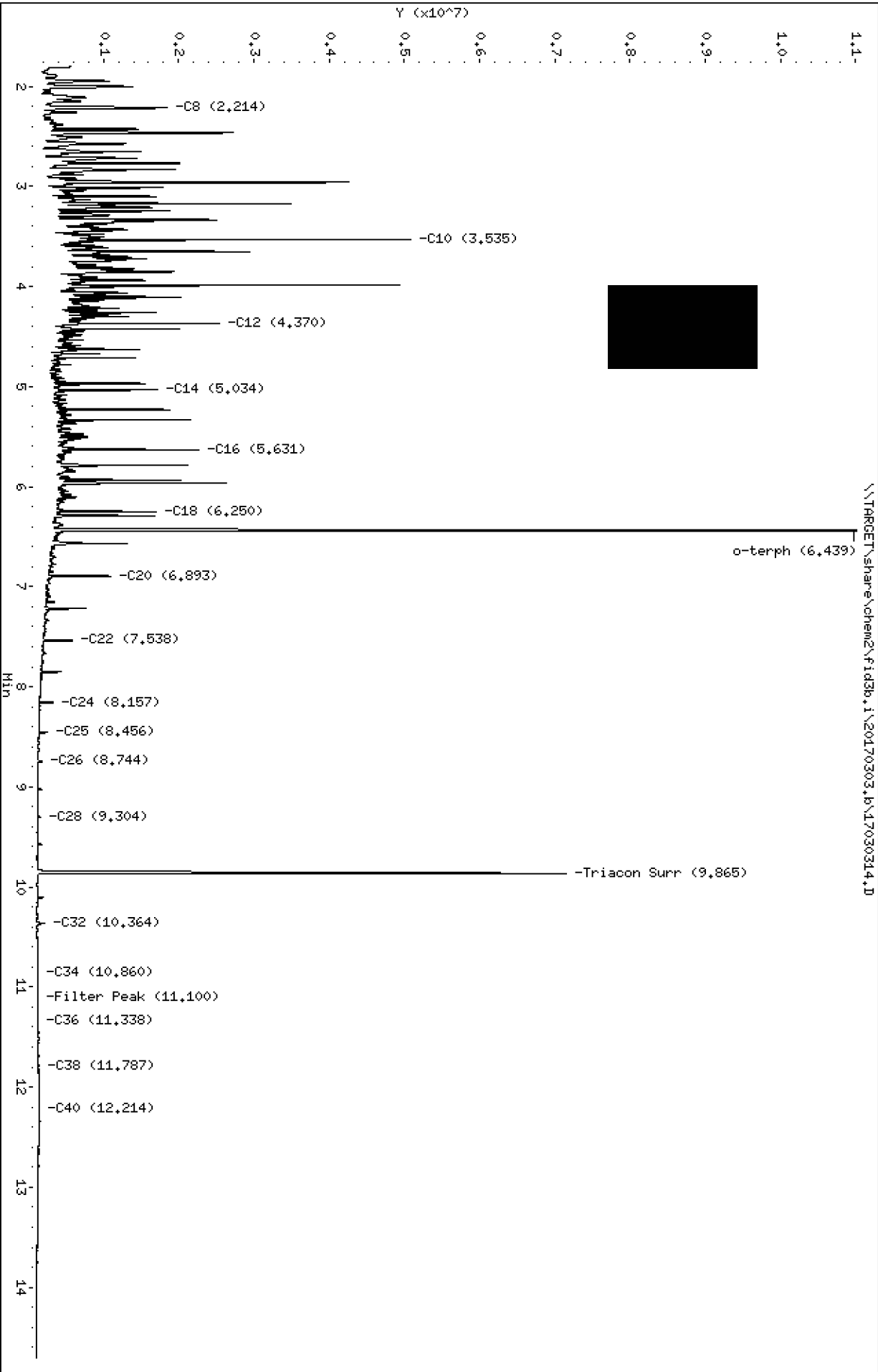
% Solids: 71.18

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Diesel Range Organics (C12-C24)		1	6.92	58.4	mg/kg	
HC ID: DIESEL						
Motor Oil Range Organics (C24-C38)		1	13.8	ND	mg/kg	U
Surrogate: <i>o</i> -Terphenyl			50-150 %	80.9	%	

Data File: \\TARGET\share\chem2\fid3b,1\20170303,b\17030314.D
Date : 03-MAR-2017 16:14
Client ID:
Sample Info: 17C0009-11

Column phase: RTX-1

Instrument: fid3b,1
Operator: ML
Column diameter: 0.25



Analytical Resources Inc.
TPH Quantitation Report

Data file: 20170303.b/17030314.D
Method: 20170303.b\FID3TPH.m
Instrument: fid3b.i
Operator: ML
Report Date: 03/06/2017
Macro: FID3_022817

ARI ID: 17C0009-11
Client ID:
Injection: 03-MAR-2017 16:14
Dilution Factor: 1

FID:3B RESULTS

Compound	RT	Shift	Height	Area	Method	Range	Total Area	Conc
Toluene	1.899	0.018	276052	658118	WATPHG	(Tol-C12)	102435032	4710.2
C8	2.214	0.001	1731618	2583619	WATPHD	(C12-C24)	65646526	422.2
C10	3.535	0.002	4981716	2889179	WATPHM	(C24-C38)	2998820	21.9
C12	4.370	-0.002	2431908	1901155				
C14	5.034	-0.004	1615830	1322130				
C16	5.631	-0.004	2161171	1288750				
C18	6.250	-0.005	1590461	1123221				
C20	6.893	-0.006	991680	913120				
C22	7.538	-0.008	477757	425264				
C24	8.157	-0.011	212315	205128				
C25	8.456	-0.011	138842	145149				
C26	8.744	-0.010	80954	85558				
C28	9.304	-0.011	47992	55590				
C32	10.364	-0.011	103146	98616				
C34	10.860	-0.010	20855	32016				
Filter Peak	11.100	0.001	23222	35618				
C36	11.338	-0.006	24784	46838				
o-terph	6.439	-0.001	10659178	8000780				
Triacon Surr	9.865	-0.003	7040903	7182230				

Range Times: NW Diesel(4.422 - 8.218) NW Gas(1.831 - 4.422) NW M.Oil(8.218 - 11.845)
AK102(3.483 - 8.416) AK103(8.416 - 11.394) Jet A(3.483 - 6.304)

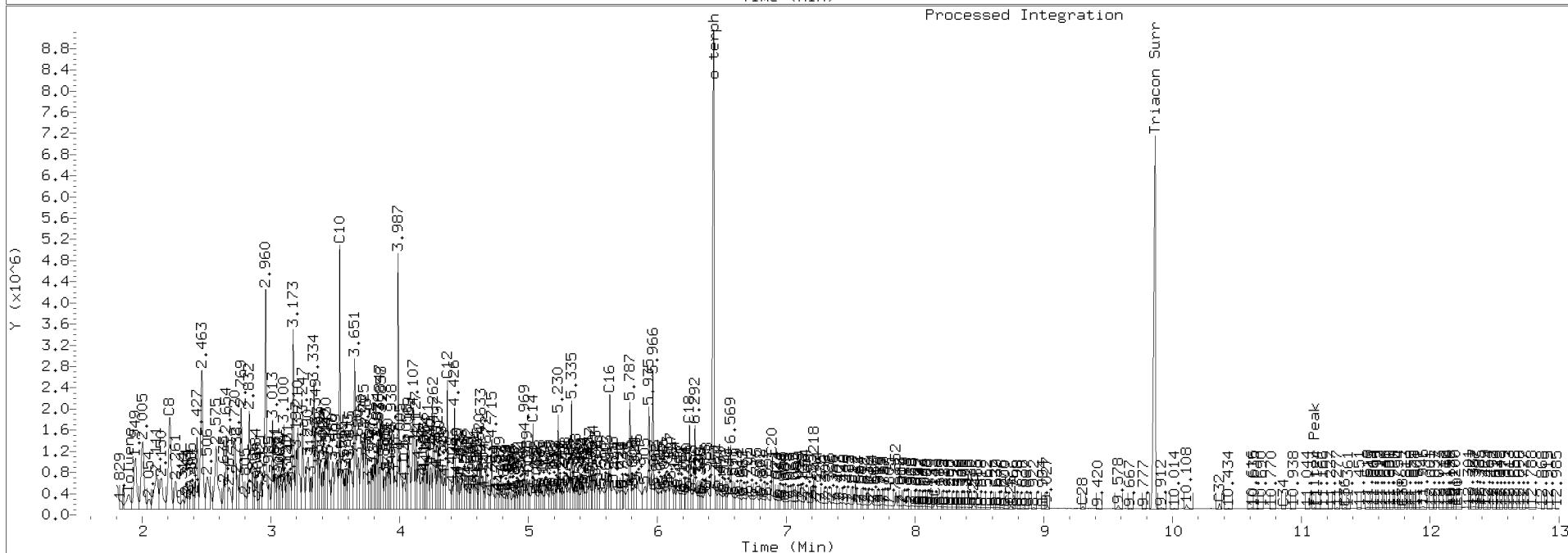
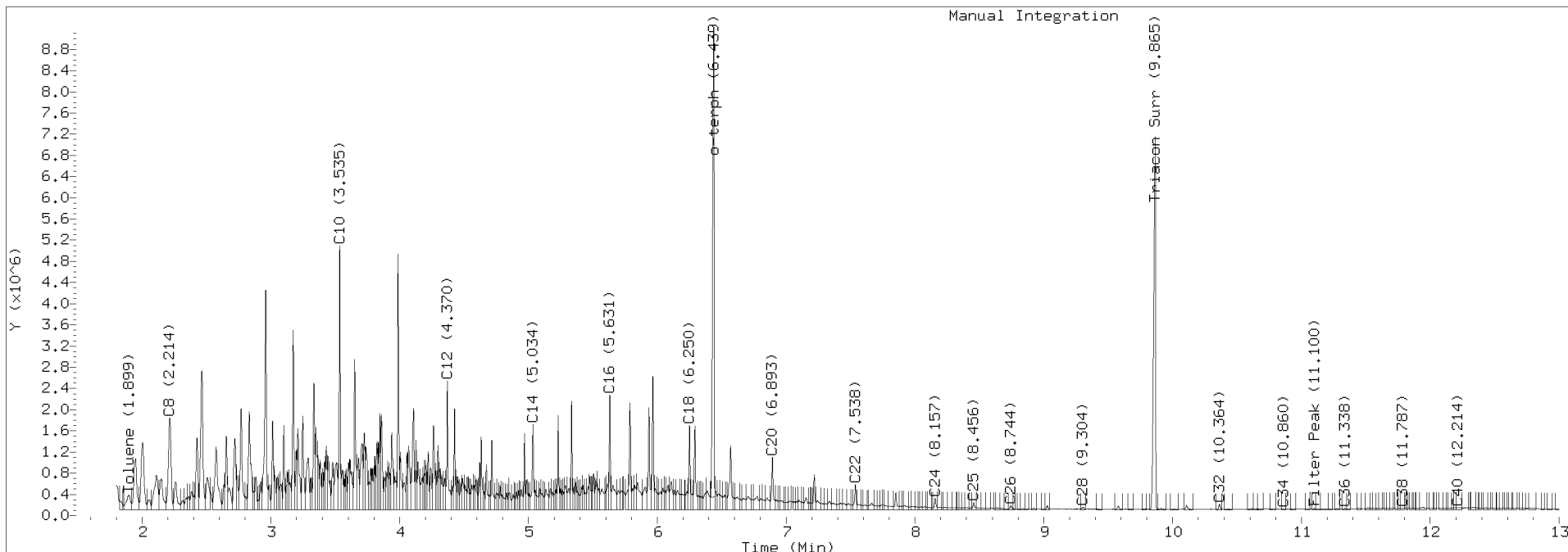
Surrogate	Area	Amount	%Rec
o-Terphenyl	8000780	36.4	80.9
Triaconthane	7182230	37.6	83.5

Analyte	RF	Curve Date
o-Terph Surr	219872.3	28-FEB-2017
Triacon Surr	191068.8	28-FEB-2017
Gas	21747.6	xx-xx-xxxx
Diesel	155491.0	28-FEB-2017
Motor Oil	137039.0	28-FEB-2017

TPH Manual Integrations Report

Datafile: FID3B, 20170303.b/17030314.D Injection: 03-MAR-2017 16:14

Lab ID:17C0009-11





Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

B-11-10
17C0009-11RE1 (Solid)

Volatile Organic Compounds

Method: NWTPHg Sampled: 02/27/2017 14:20
Instrument: NT3 Analyzed: 07-Mar-2017 12:52

Sample Preparation: Preparation Method: EPA 5035 (Methanol Extraction) Dry Weight: 4.49 g
Preparation Batch: BFC0157 Sample Size: 6.309 g (wet)
Prepared: 07-Mar-2017 Final Volume: 5 mL % Solids: 71.18

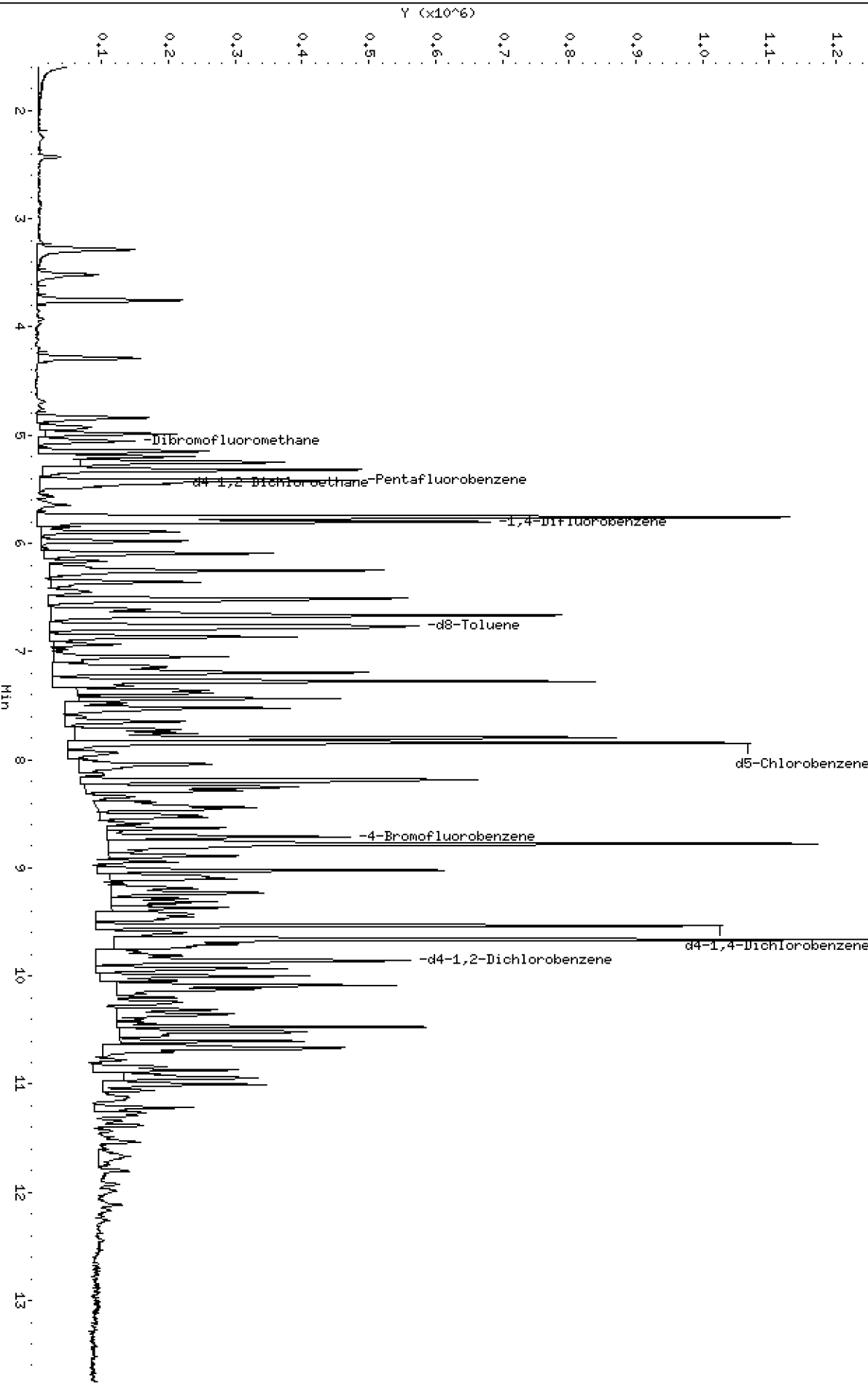
Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Gasoline Range Organics (Tol-Nap)		500	75900	576000	ug/kg	D
HC ID: GRO						
Surrogate: Toluene-d8			80-120 %	105	%	
Surrogate: 4-Bromofluorobenzene			78-123 %	98.9	%	

Data File: \\target\share\chend\nt3.1\20170307s.b\W303071710G.D
Date : 07-HRR-2017 12:52
Client ID:
Sample Info: 17C0009-11RE1

Column phase: RTXWMS

Instrument: nt3.1
Operator: PC
Column diameter: 0.18

\\target\share\chend\nt3.1\20170307s.b\W303071710G.D



ARI Labs, Inc.

8260C 10 ml purge

Data file : \\target\share\chem1\nt3.i\20170307s.b\V303071710G.D
Lab Smp Id: 17C0009-11RE1
Inj Date : 07-MAR-2017 12:52
Operator : PC Inst ID: nt3.i
Smp Info : 17C0009-11RE1
Misc Info : 16-
Comment :
Method : \\target\share\chem1\nt3.i\20170307s.b\8260C022417.m
Meth Date : 06-Mar-2017 07:32 Paul Quant Type: ISTD
Cal Date : 14-FEB-2017 18:50 Cal File: V302141718.D
Als bottle: 12
Dil Factor: 1.00000
Integrator: HP RTE Compound Sublist: gsurr.sub
Target Version: 4.14
Processing Host: ORGDATA11

Compounds	QUANT	SIG	CONCENTRATIONS					
			ON-COLUMN	REL RT		RESPONSE	FINAL	
	MASS		RT	EXP RT	REL RT	RESPONSE	(ug/L)	(ug/L)
\$ 27 Dibromofluoromethane	111		5.053	5.053	(0.932)	55321	4.96822	4.968 (R)
* 32 Pentafluorobenzene	168		5.420	5.420	(1.000)	237014	10.0000	
\$ 33 d4-1,2-Dichloroethane	65		5.447	5.446	(1.005)	65878	5.22922	5.229 (R)
* 37 1,4-Difluorobenzene	114		5.803	5.803	(1.000)	385582	10.0000	
\$ 43 d8-Toluene	98		6.765	6.765	(1.166)	244929	5.23255	5.233 (R)
* 53 d5-Chlorobenzene	117		7.844	7.844	(1.000)	386911	10.0000	
\$ 62 4-Bromofluorobenzene	174		8.716	8.715	(1.111)	80546	4.94505	4.945 (R)
* 76 d4-1,4-Dichlorobenzene	152		9.534	9.534	(1.000)	209205	10.0000	
\$ 79 d4-1,2-Dichlorobenzene	152		9.858	9.858	(1.034)	98658	5.02433	5.024 (R)

QC Flag Legend

R - Spike/Surrogate failed recovery limits.

ARI Labs, Inc.

INTERNAL STANDARD COMPOUNDS
 AREA AND RT SUMMARY

Instrument ID: nt3.i Calibration Date: 03-MAR-2017
 Lab File ID: V303071710G.D Calibration Time: 21:57
 Lab Smp Id: 17C0009-11RE1
 Analysis Type: VOA Level:
 Quant Type: ISTD Sample Type:
 Operator: PC
 Method File: \\target\share\chem1\nt3.i\20170307s.b\8260C022417.m
 Misc Info: 16-

Test Mode:

Use Initial Calibration Level 5.
 If Continuing Cal. use Initial Cal. Level 5

COMPOUND	STANDARD	AREA LIMIT		SAMPLE	%DIFF
		LOWER	UPPER		
32 Pentafluorobenzon	317912	158956	635824	237014	-25.45
37 1,4-Difluorobenze	512039	256020	1024078	385582	-24.70
53 d5-Chlorobenzene	494052	247026	988104	386911	-21.69
76 d4-1,4-Dichlorobe	282154	141077	564308	209205	-25.85

COMPOUND	STANDARD	RT LIMIT		SAMPLE	%DIFF
		LOWER	UPPER		
32 Pentafluorobenzon	5.42	4.92	5.92	5.42	0.00
37 1,4-Difluorobenze	5.80	5.30	6.30	5.80	0.00
53 d5-Chlorobenzene	7.84	7.34	8.34	7.84	0.00
76 d4-1,4-Dichlorobe	9.53	9.03	10.03	9.53	0.00

AREA UPPER LIMIT = +100% of internal standard area.
 AREA LOWER LIMIT = - 50% of internal standard area.
 RT UPPER LIMIT = + 0.50 minutes of internal standard RT.
 RT LOWER LIMIT = - 0.50 minutes of internal standard RT.

ARI Labs, Inc.

RECOVERY REPORT

Client Name: Client SDG: 20150930a
Sample Matrix: NONE Fraction: VOA
Lab Smp Id: 17C0009-11RE1
Level: Operator: PC
Data Type: MS DATA SampleType: SAMPLE
SpikeList File: allspike.spk Quant Type: ISTD
Sublist File: gsurr.sub
Method File: \\target\share\chem1\nt3.i\20170307s.b\8260C022417.m
Misc Info: 16-

SURROGATE COMPOUND	AMOUNT ADDED ug/L	AMOUNT RECOVERED ug/L	% RECOVERED	LIMITS
\$ 27 Dibromofluorometha	5.000	4.968	99.36	
\$ 33 d4-1,2-Dichloroeth	5.000	5.229	104.58	
\$ 43 d8-Toluene	5.000	5.233	104.65	
\$ 62 4-Bromofluorobenze	5.000	4.945	98.90	
\$ 79 d4-1,2-Dichloroben	5.000	5.024	100.49	

REVIEW SUMMARY FOR FILE - V303071710G.D

Lab ID: 17C0009-11RE1

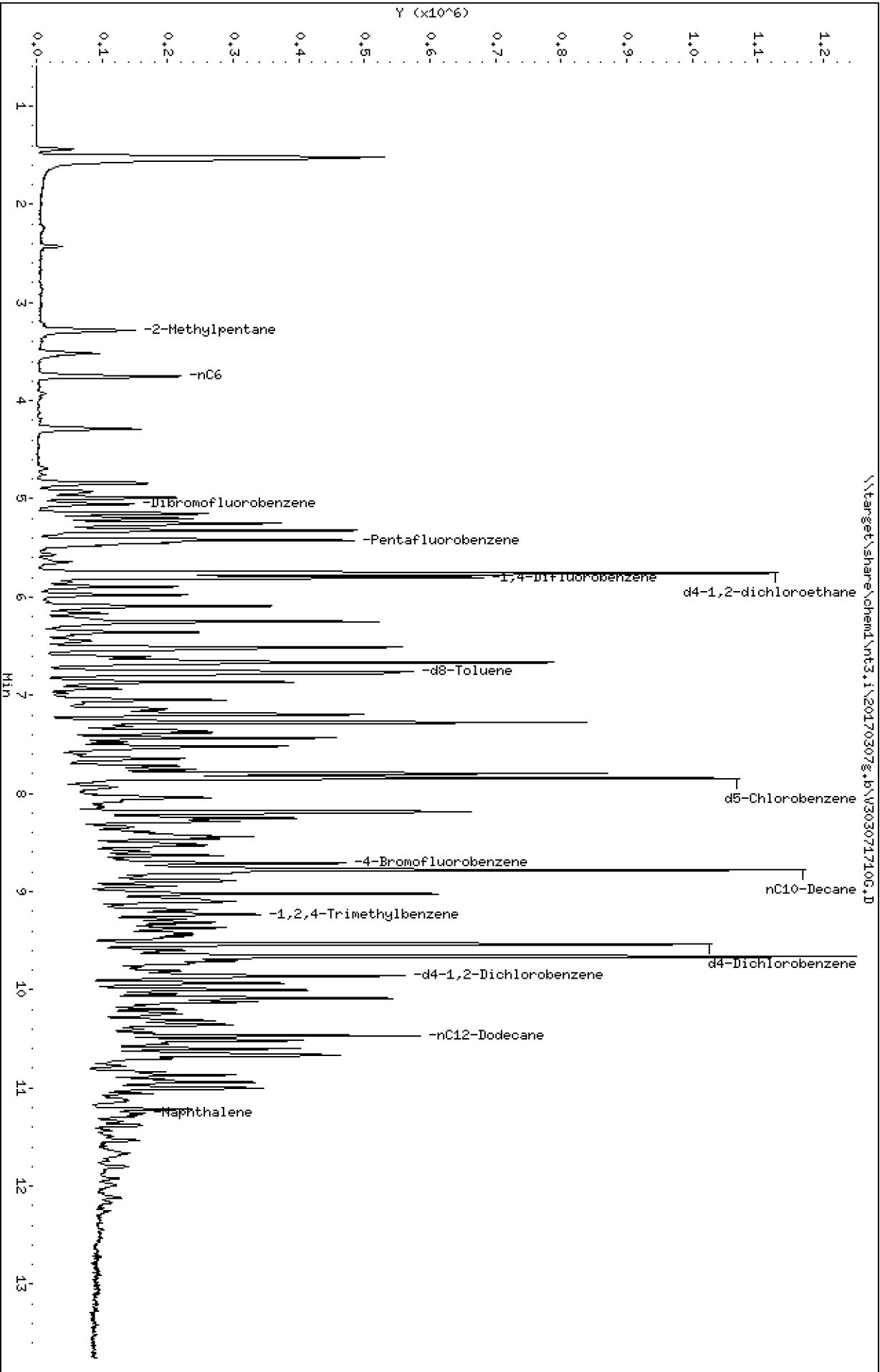
nt3.i, 20170307s.b\8260C022417.m, 07-MAR-2017 12:52

RT CO-ELUTION COMPOUNDS

Data File: \\target\share\chend\nt3,1\20170307g.b\W303071710G.D
Date: 07-HRR-2017 12:52
Client ID:
Sample Info: 17C0009-11RE1

Column phase: RTXWMS

Instrument: nt3,1
Operator: PC
Column diameter: 0.18



Analytical Resources Inc.
GC/MS Gas Quantitation Report

Data file: 20170307g.b/V303071710G.D
Method: \20170307g.b\NWTPHG.m
Instrument: nt3.i
Gas Ical Date: 14-Feb-2017
Injection Date: 07-MAR-2017 12:52

ARI ID: 17C0009-11RE1
Client ID:
Matrix: NONE
Dilution Factor: 1.000
Operator: PC

=====

GASOLINE HYDROCARBONS

Range	RF	Total Area*	Amount (ug/mL)
WAGas Tol-C12 (6.70 to 10.57)	52141375	35827182	0.687
8015C 2MP-TMB (3.19 to 9.33)	87713511	35044926	0.400
AK101 nC6-nC10 (3.65 to 8.68)	61260787	26808997	0.438
NWTPHG Tol-Nap (6.70 to 11.36)	54123058	41033691	0.758

M Indicates manual integration within range

* Surrogate areas are subtracted from Total Area

NW Gas Range Subtracted Peaks

6.765	1504686	d8-Toluene
8.711	826594	4-Bromofluorobenzene
9.535	1517420	d4-Dichlorobenzene
7.844	1735211	d5-Chlorobenzene
9.859	1131349	d4-1,2-Dichlorobenzene



Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

B-10-9
17C0009-12 (Solid)

Volatile Organic Compounds

Method: EPA 8260C

Sampled: 02/27/2017 14:40

Instrument: NT5

Analyzed: 06-Mar-2017 18:39

Sample Preparation: Preparation Method: EPA 5035 (Methanol Extraction)
Preparation Batch: BFC0220 Sample Size: 4.589 g (wet) Dry Weight: 3.17 g
Prepared: 06-Mar-2017 Final Volume: 5 mL % Solids: 69.00

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
1,2-Dichloroethane	107-06-2	50	101	ND	ug/kg	U
Benzene	71-43-2	50	101	ND	ug/kg	U
Toluene	108-88-3	50	101	ND	ug/kg	U
Ethylbenzene	100-41-4	50	101	907	ug/kg	
m,p-Xylene	179601-23-1	50	101	343	ug/kg	
o-Xylene	95-47-6	50	101	ND	ug/kg	U
<i>Surrogate: Dibromofluoromethane</i>			30-160 %	97.2	%	
<i>Surrogate: 1,2-Dichloroethane-d4</i>			80-124 %	84.5	%	
<i>Surrogate: Toluene-d8</i>			80-120 %	106	%	
<i>Surrogate: 4-Bromofluorobenzene</i>			80-120 %	104	%	
<i>Surrogate: 1,2-Dichlorobenzene-d4</i>			80-120 %	103	%	



Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

B-10-9
17C0009-12 (Solid)

Volatile Organic Compounds

Method: NWTPHg Sampled: 02/27/2017 14:40
Instrument: NT3 Analyzed: 06-Mar-2017 16:30

Sample Preparation: Preparation Method: EPA 5035 (Methanol Extraction)
Preparation Batch: BFC0131 Sample Size: 4.589 g (wet) Dry Weight: 3.17 g
Prepared: 06-Mar-2017 Final Volume: 5 mL % Solids: 69.00

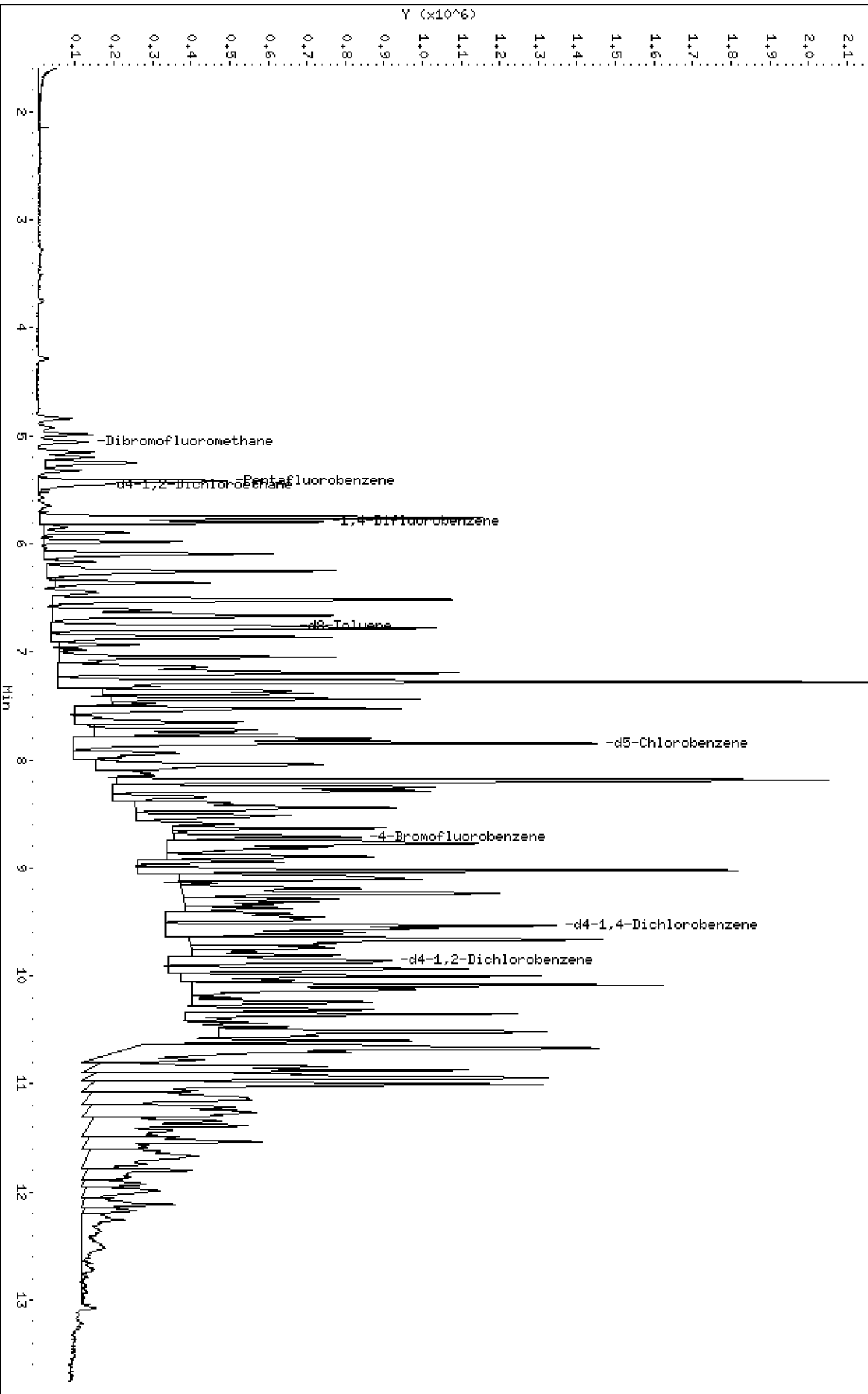
Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Gasoline Range Organics (Tol-Nap)		500	101000	2700000	ug/kg	D
HC ID: GRO						
Surrogate: Toluene-d8			80-120 %	108	%	
Surrogate: 4-Bromofluorobenzene			78-123 %	101	%	

Data File: \\target\share\chend\nt3,1\20170306s,16\W303061721G.D
Date : 06-HRR-2017 16:30
Client ID:
Sample Info: 17C00009-12

Column phase: RTXWMS

Instrument: nt3,1
Operator: PC
Column diameter: 0.18

\\target\share\chend\nt3,1\20170306s,16\W303061721G.D



ARI Labs, Inc.

8260C 10 ml purge

Data file : \\target\share\chem1\nt3.i\20170306s.b\V303061721G.D
 Lab Smp Id: 17C0009-12
 Inj Date : 06-MAR-2017 16:30
 Operator : PC Inst ID: nt3.i
 Smp Info : 17C0009-12
 Misc Info : 15-
 Comment :
 Method : \\target\share\chem1\nt3.i\20170306s.b\8260C022417.m
 Meth Date : 06-Mar-2017 07:32 Paul Quant Type: ISTD
 Cal Date : 14-FEB-2017 18:50 Cal File: V302141718.D
 Als bottle: 12
 Dil Factor: 1.00000
 Integrator: HP RTE Compound Sublist: gsurr.sub
 Target Version: 4.14
 Processing Host: ORGDATA11

Concentration Formula: Amt * DF * Pv / Sa * CpndVariable

Name	Value	Description
DF	1.000	Dilution Factor
Pv	10.000	Purge Volume (mL)
Sa	10.000	Sample Amount (mL)
Cpnd Variable		Local Compound Variable

Compounds	QUANT	SIG	RT	EXP RT	REL RT	RESPONSE	CONCENTRATIONS	
							ON-COLUMN (ug/L)	FINAL (ug/L)
\$ 27 Dibromofluoromethane	111		5.053	5.053	(0.932)	60108	4.92536	4.925
* 32 Pentafluorobenzene	168		5.420	5.420	(1.000)	259764	10.0000	
\$ 33 d4-1,2-Dichloroethane	65		5.452	5.446	(1.006)	71854	5.20406	5.204
* 37 1,4-Difluorobenzene	114		5.798	5.803	(1.000)	417685	10.0000	
\$ 43 d8-Toluene	98		6.760	6.765	(1.166)	273674	5.39728	5.397
* 53 d5-Chlorobenzene	117		7.844	7.844	(1.000)	412395	10.0000	
\$ 62 4-Bromofluorobenzene	174		8.716	8.715	(1.111)	87923	5.06438	5.064
* 76 d4-1,4-Dichlorobenzene	152		9.534	9.534	(1.000)	224821	10.0000	
\$ 79 d4-1,2-Dichlorobenzene	152		9.859	9.858	(1.034)	106391	5.04180	5.042

ARI Labs, Inc.

INTERNAL STANDARD COMPOUNDS
 AREA AND RT SUMMARY

Instrument ID: nt3.i Calibration Date: 03-MAR-2017
 Lab File ID: V303061721G.D Calibration Time: 21:57
 Lab Smp Id: 17C0009-12
 Analysis Type: VOA Level: LOW
 Quant Type: ISTD Sample Type: WATER
 Operator: PC
 Method File: \\target\share\chem1\nt3.i\20170306s.b\8260C022417.m
 Misc Info: 15-

Test Mode:

Use Initial Calibration Level 5.
 If Continuing Cal. use Initial Cal. Level 5

COMPOUND	STANDARD	AREA LIMIT		SAMPLE	%DIFF
		LOWER	UPPER		
32 Pentafluorobenzon	317912	158956	635824	259764	-18.29
37 1,4-Difluorobenze	512039	256020	1024078	417685	-18.43
53 d5-Chlorobenzene	494052	247026	988104	412395	-16.53
76 d4-1,4-Dichlorobe	282154	141077	564308	224821	-20.32

COMPOUND	STANDARD	RT LIMIT		SAMPLE	%DIFF
		LOWER	UPPER		
32 Pentafluorobenzon	5.42	4.92	5.92	5.42	0.01
37 1,4-Difluorobenze	5.80	5.30	6.30	5.80	-0.09
53 d5-Chlorobenzene	7.84	7.34	8.34	7.84	0.00
76 d4-1,4-Dichlorobe	9.53	9.03	10.03	9.53	0.00

AREA UPPER LIMIT = +100% of internal standard area.
 AREA LOWER LIMIT = - 50% of internal standard area.
 RT UPPER LIMIT = + 0.50 minutes of internal standard RT.
 RT LOWER LIMIT = - 0.50 minutes of internal standard RT.

ARI Labs, Inc.

RECOVERY REPORT

Client Name: Client SDG: 20151005
Sample Matrix: LIQUID Fraction: VOA
Lab Smp Id: 17C0009-12
Level: LOW Operator: PC
Data Type: MS DATA SampleType: SAMPLE
SpikeList File: allspike.spk Quant Type: ISTD
Sublist File: gsurr.sub
Method File: \\target\share\chem1\nt3.i\20170306s.b\8260C022417.m
Misc Info: 15-

SURROGATE COMPOUND	AMOUNT ADDED ug/L	AMOUNT RECOVERED ug/L	% RECOVERED	LIMITS
\$ 27 Dibromofluorometha	5.000	4.925	98.51	80-120
\$ 33 d4-1,2-Dichloroeth	5.000	5.204	104.08	80-128
\$ 43 d8-Toluene	5.000	5.397	107.95	80-120
\$ 62 4-Bromofluorobenze	5.000	5.064	101.29	80-120
\$ 79 d4-1,2-Dichloroben	5.000	5.042	100.84	80-120

REVIEW SUMMARY FOR FILE - V303061721G.D

Lab ID: 17C0009-12

nt3.i, 20170306s.b\8260C022417.m, 06-MAR-2017 16:30

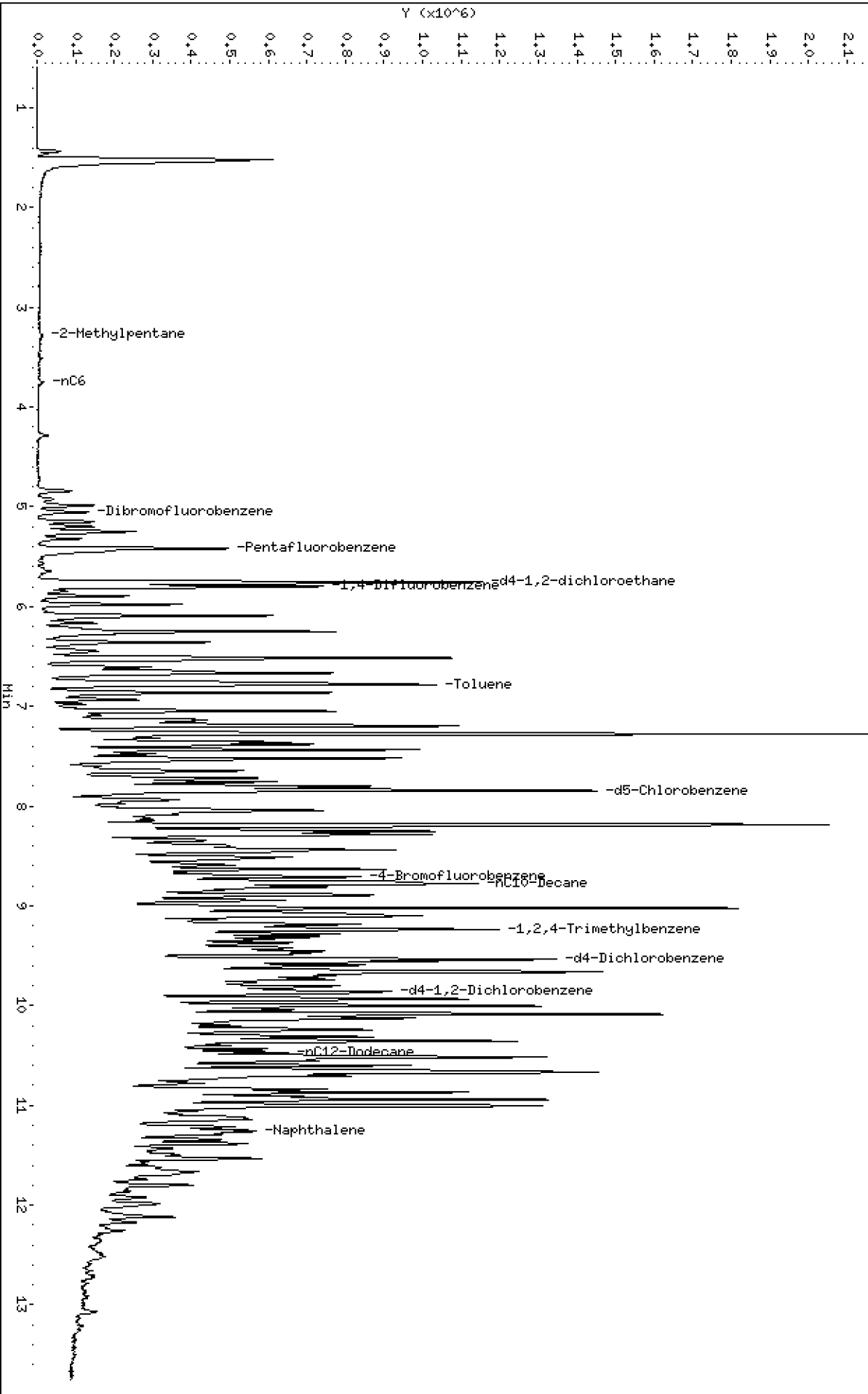
RT CO-ELUTION COMPOUNDS

Data File: \\target\share\chend\nt3,1\20170306g,b\W303061721G.D
Date : 06-HRR-2017 16:30
Client ID:
Sample Info: 17C0009-12

Column phase: RTXWMS

Instrument: nt3,1
Operator: PC
Column diameter: 0.18

\\target\share\chend\nt3,1\20170306g,b\W303061721G.D



Analytical Resources Inc.
GC/MS Gas Quantitation Report

Data file: 20170306g.b/V303061721G.D
Method: \20170306g.b\NWTPHG.m
Instrument: nt3.i
Gas Ical Date: 14-Feb-2017
Injection Date: 06-MAR-2017 16:30

ARI ID: 17C0009-12
Client ID:
Matrix: WATER
Dilution Factor: 1.000
Operator: PC

=====

GASOLINE HYDROCARBONS

Range	RF	Total Area*	Amount (ug/mL)
-----	-----	-----	-----
WAGas Tol-C12 (6.70 to 10.57)	52141375	117190758	2.248
8015C 2MP-TMB (3.17 to 9.34)	87713511	82585424	0.942
AK101 nC6-nC10 (3.65 to 8.68)	61260787	59071581	0.964
NWTPHG Tol-Nap (6.70 to 11.36)	54123058	143905858	2.659

M Indicates manual integration within range

* Surrogate areas are subtracted from Total Area

NW Gas Range Subtracted Peaks

8.711	1993445	4-Bromofluorobenzene
9.535	2367686	d4-Dichlorobenzene
7.845	2816108	d5-Chlorobenzene
9.859	2869549	d4-1,2-Dichlorobenzene



Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

B-10-9
17C0009-12 (Solid)

Petroleum Hydrocarbons

Method: NWTPH-Dx

Sampled: 02/27/2017 14:40

Instrument: FID3

Analyzed: 03-Mar-2017 16:38

Sample Preparation:

Preparation Method: EPA 3546 (Microwave)

Preparation Batch: BFC0023

Sample Size: 10.06 g (wet)

Dry Weight: 6.94 g

Prepared: 02-Mar-2017

Final Volume: 1 mL

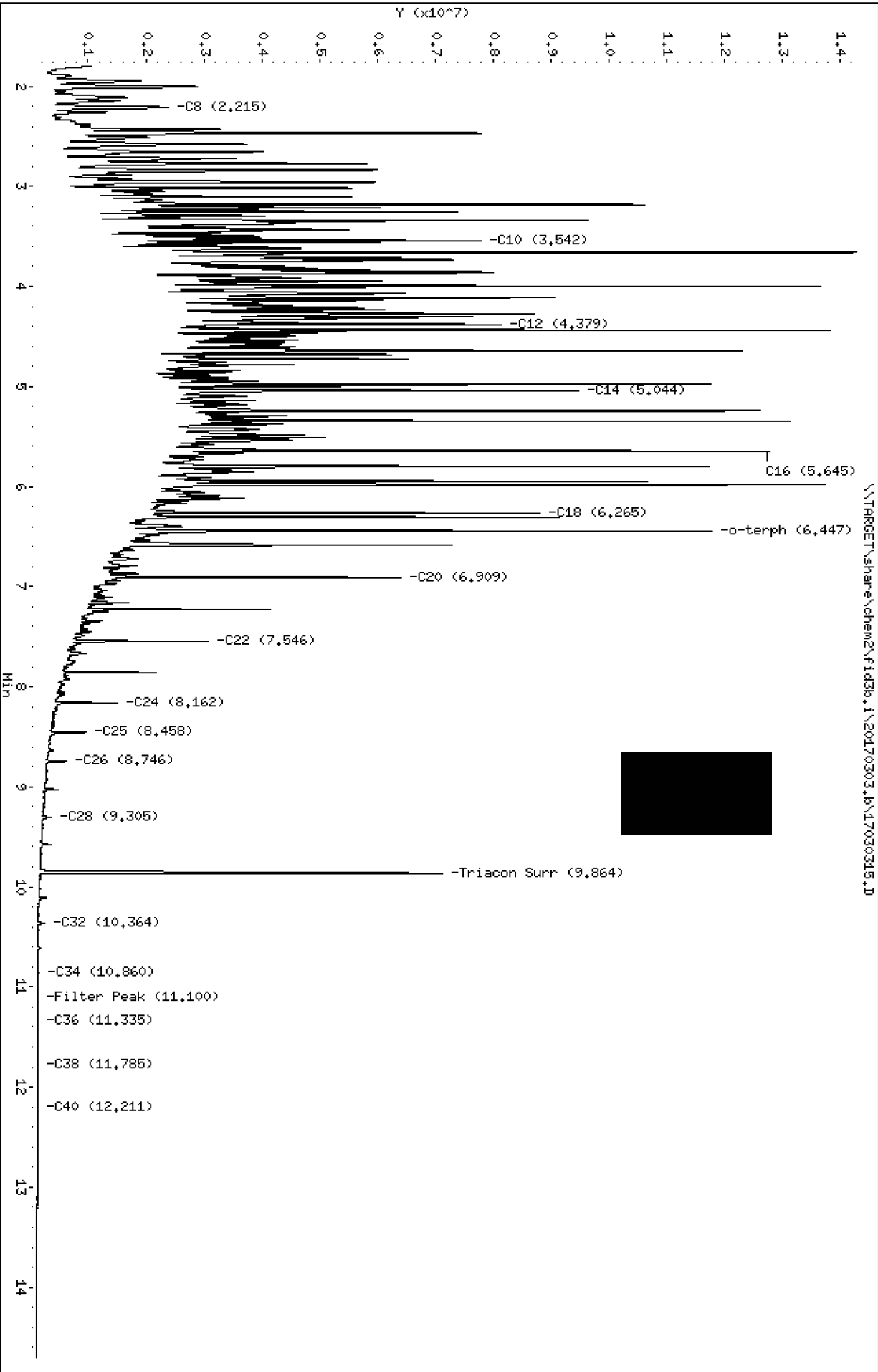
% Solids: 69.00

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Diesel Range Organics (C12-C24)		1	7.20	488	mg/kg	E
HC ID: DIESEL						
Motor Oil Range Organics (C24-C38)		1	14.4	20.5	mg/kg	
HC ID: RRO						
Surrogate: <i>o</i> -Terphenyl			50-150 %	81.8	%	

Data File: \\TARGET\share\chem2\fid3b,1\20170303,b\17030315.D
Date : 03-MAR-2017 16:38
Client ID:
Sample Info: 17C0009-12

Column phase: RTX-1

Instrument: fid3b,1
Operator: ML
Column diameter: 0.25



Analytical Resources Inc.
TPH Quantitation Report

Data file: 20170303.b/17030315.D
Method: 20170303.b\FID3TPH.m
Instrument: fid3b.i
Operator: ML
Report Date: 03/06/2017
Macro: FID3_022817

ARI ID: 17C0009-12
Client ID:
Injection: 03-MAR-2017 16:38
Dilution Factor: 1

FID:3B RESULTS

Compound	RT	Shift	Height	Area	Method	Range	Total Area	Conc
Toluene	1.894	0.013	595905	1374308	WATPHG	(Tol-C12)	423652726	19480.4
C8	2.215	0.002	2284153	4382830	WATPHD	(C12-C24)	526885121	3388.5
C10	3.542	0.009	7680401	6098587	WATPHM	(C24-C38)	19545424	142.6
C12	4.379	0.008	8045469	7252406				
C14	5.044	0.006	9384755	10419686				
C16	5.645	0.011	12691658	10259435				
C18	6.265	0.011	8704110	10230743				
C20	6.909	0.010	6295546	7673139				
C22	7.546	0.000	2972877	2896774				
C24	8.162	-0.006	1405497	1360366				
C25	8.458	-0.009	861918	1301485				
C26	8.746	-0.009	519872	838847				
C28	9.305	-0.010	250600	467943				
C32	10.364	-0.011	135859	192773				
C34	10.860	-0.010	36389	118016				
Filter Peak	11.100	0.001	30757	53895				
C36	11.335	-0.009	22189	44718				
o-terph	6.447	0.007	9829667	8081011				
Triacon Surr	9.864	-0.004	6966133	6908768				

Range Times: NW Diesel(4.422 - 8.218) NW Gas(1.831 - 4.422) NW M.Oil(8.218 - 11.845)
AK102(3.483 - 8.416) AK103(8.416 - 11.394) Jet A(3.483 - 6.304)

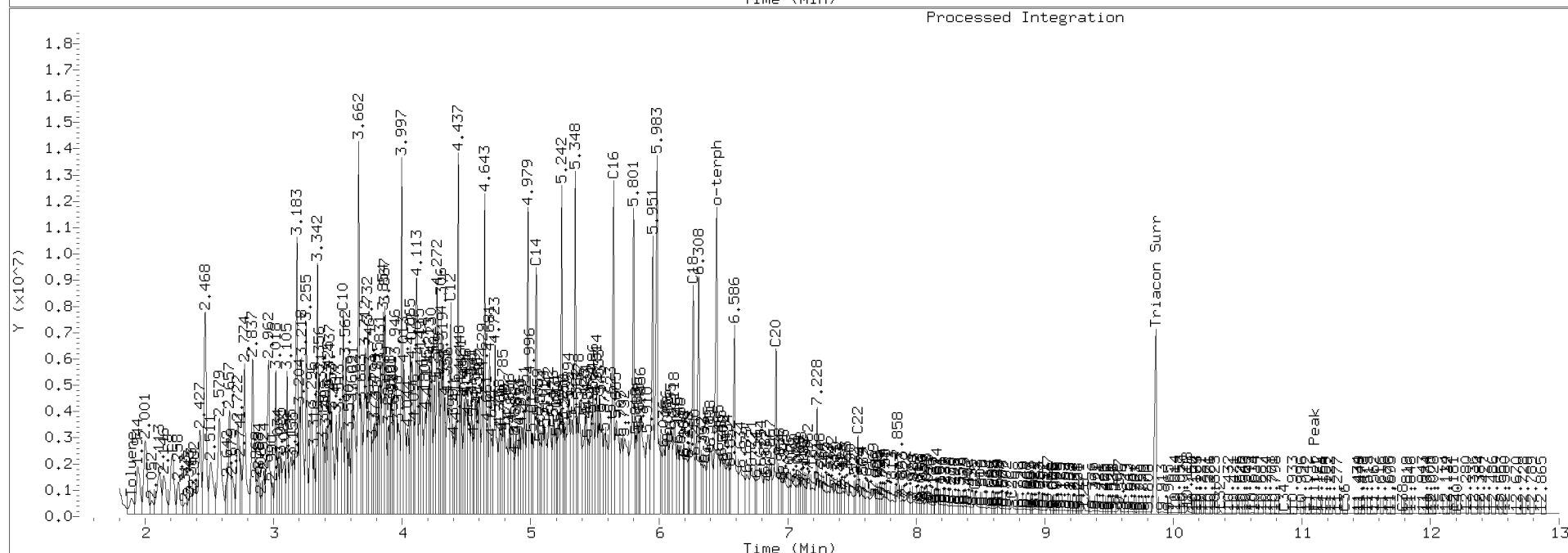
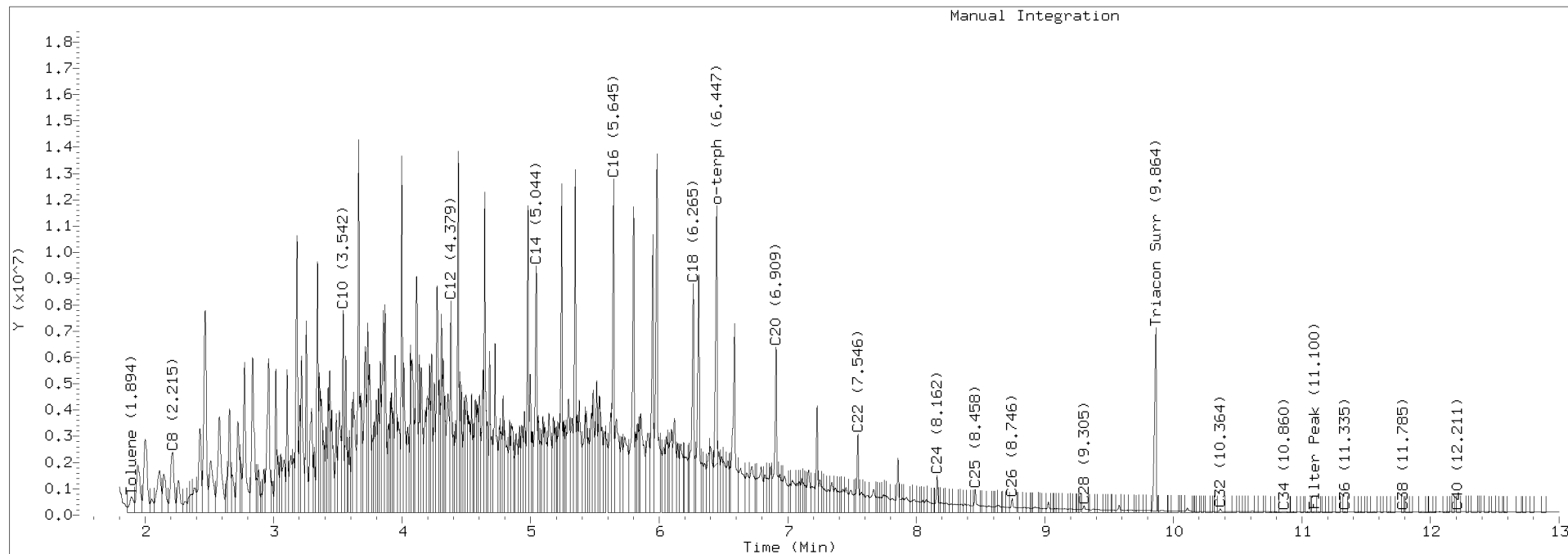
Surrogate	Area	Amount	%Rec
o-Terphenyl	8081011	36.8	81.7
Triaconthane	6908768	36.2	80.4

Analyte	RF	Curve Date
o-Terph Surr	219872.3	28-FEB-2017
Triacon Surr	191068.8	28-FEB-2017
Gas	21747.6	xx-xx-xxxx
Diesel	155491.0	28-FEB-2017
Motor Oil	137039.0	28-FEB-2017

TPH Manual Integrations Report

Datafile: FID3B, 20170303.b/17030315.D Injection: 03-MAR-2017 16:38

Lab ID:17C0009-12





Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

B-10-9
17C0009-12RE1 (Solid)

Petroleum Hydrocarbons

Method: NWTPH-Dx

Sampled: 02/27/2017 14:40

Instrument: FID3

Analyzed: 04-Mar-2017 03:01

Sample Preparation:

Preparation Method: EPA 3546 (Microwave)

Preparation Batch: BFC0023

Sample Size: 10.06 g (wet)

Prepared: 02-Mar-2017

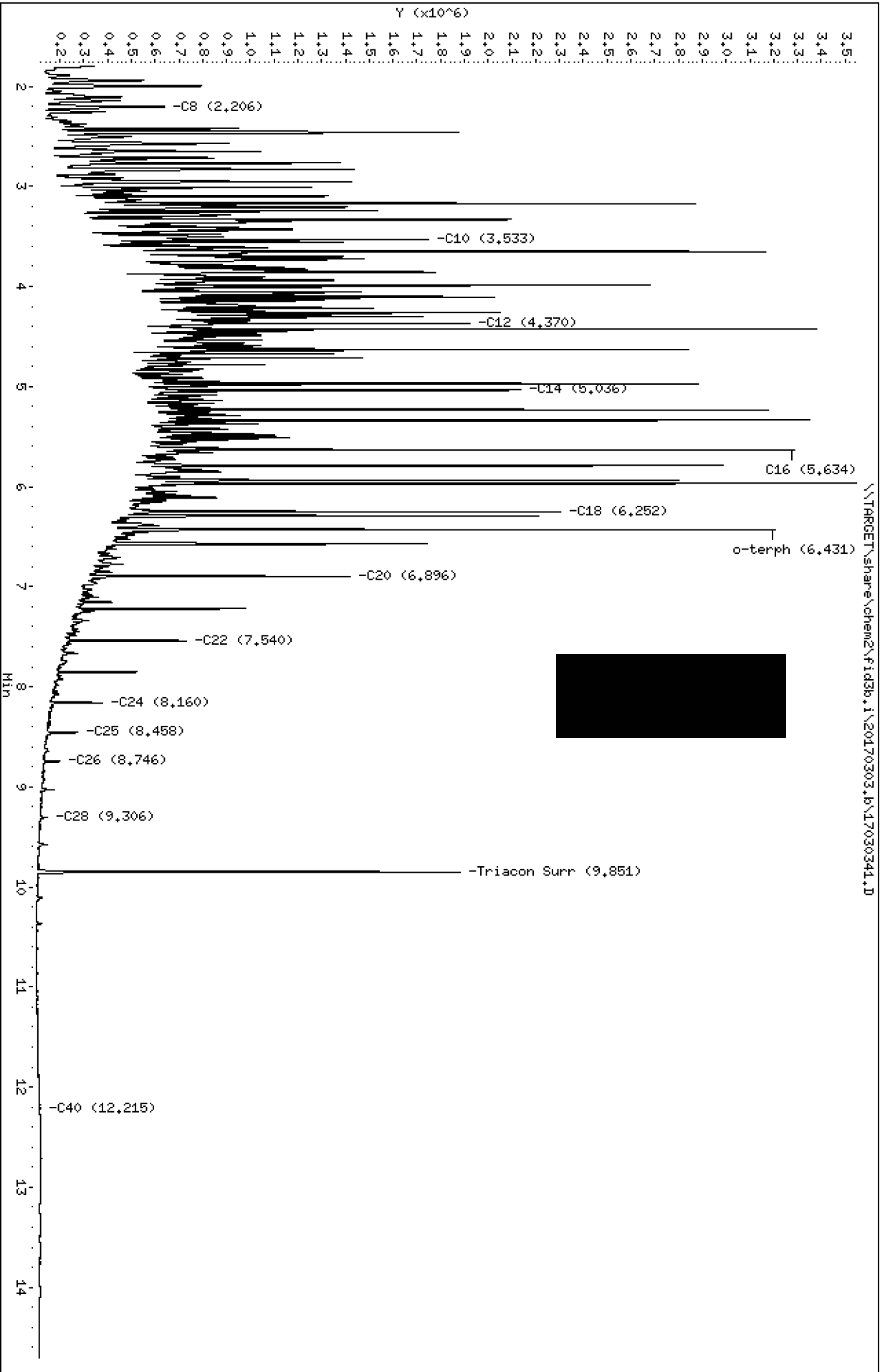
Final Volume: 1 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Diesel Range Organics (C12-C24)		5	24.9	336	mg/kg	D
HC ID: DIESEL						
Motor Oil Range Organics (C24-C38)		5	49.7	ND	mg/kg	U
<i>Surrogate: o-Terphenyl</i>			<i>50-150 %</i>	<i>83.3</i>	<i>%</i>	

Data File: \\TARGET\share\chem2\fid3b,1\20170303_b\17030341.D
Date: 04-MAR-2017 03:01
Client ID:
Sample Info: 17C0009-12REL1,5

Column phase: RTX-1

Instrument: fid3b,1
Operator: ML
Column diameter: 0,25



Analytical Resources Inc.
TPH Quantitation Report

Data file: 20170303.b/17030341.D
Method: 20170303.b\FID3TPH.m
Instrument: fid3b.i
Operator: ML
Report Date: 03/06/2017
Macro: FID3_022817

ARI ID: 17C0009-12RE1
Client ID:
Injection: 04-MAR-2017 03:01
Dilution Factor: 5

FID:3B RESULTS

Compound	RT	Shift	Height	Area	Method	Range	Total Area	Conc
Toluene	1.892	0.011	141424	263553	WATPHG	(Tol-C12)	85417646	3927.7
C8	2.206	-0.007	539669	845429	WATPHD	(C12-C24)	105118257	676.0
C10	3.533	-0.000	1650883	1263706	WATPHM	(C24-C38)	2433324	17.8
C12	4.370	-0.001	1824334	1460656				
C14	5.036	-0.002	2036340	1855560				
C16	5.634	-0.001	3189162	1990186				
C18	6.252	-0.002	2204855	1589232				
C20	6.896	-0.003	1319862	1235373				
C22	7.540	-0.006	632718	565973				
C24	8.160	-0.008	278098	274303				
C25	8.458	-0.009	170699	241825				
C26	8.746	-0.009	98409	108400				
C28	9.306	-0.009	45184	61115				
C32	----							
C34	----							
Filter Peak	----							
C36	----							
o-terph	6.431	-0.009	2759910	1640292				
Triacon Surr	9.851	-0.017	1780753	1413556				

Range Times: NW Diesel(4.422 - 8.218) NW Gas(1.831 - 4.422) NW M.Oil(8.218 - 11.845)
AK102(3.483 - 8.416) AK103(8.416 - 11.394) Jet A(3.483 - 6.304)

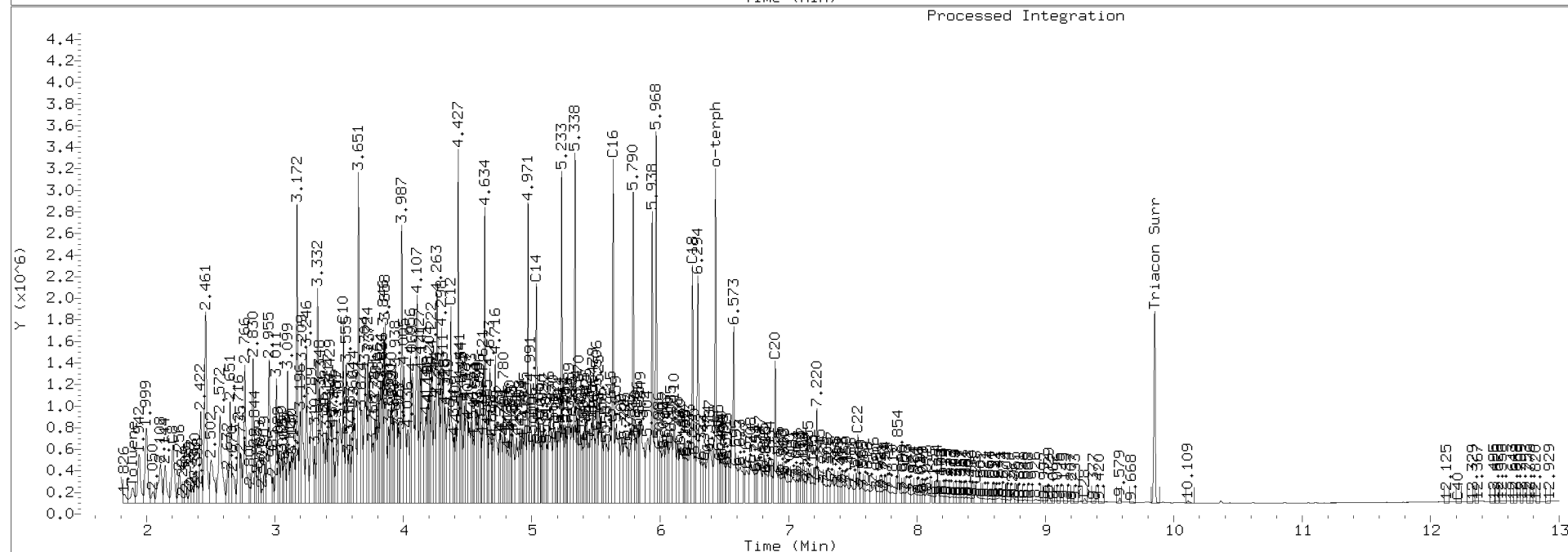
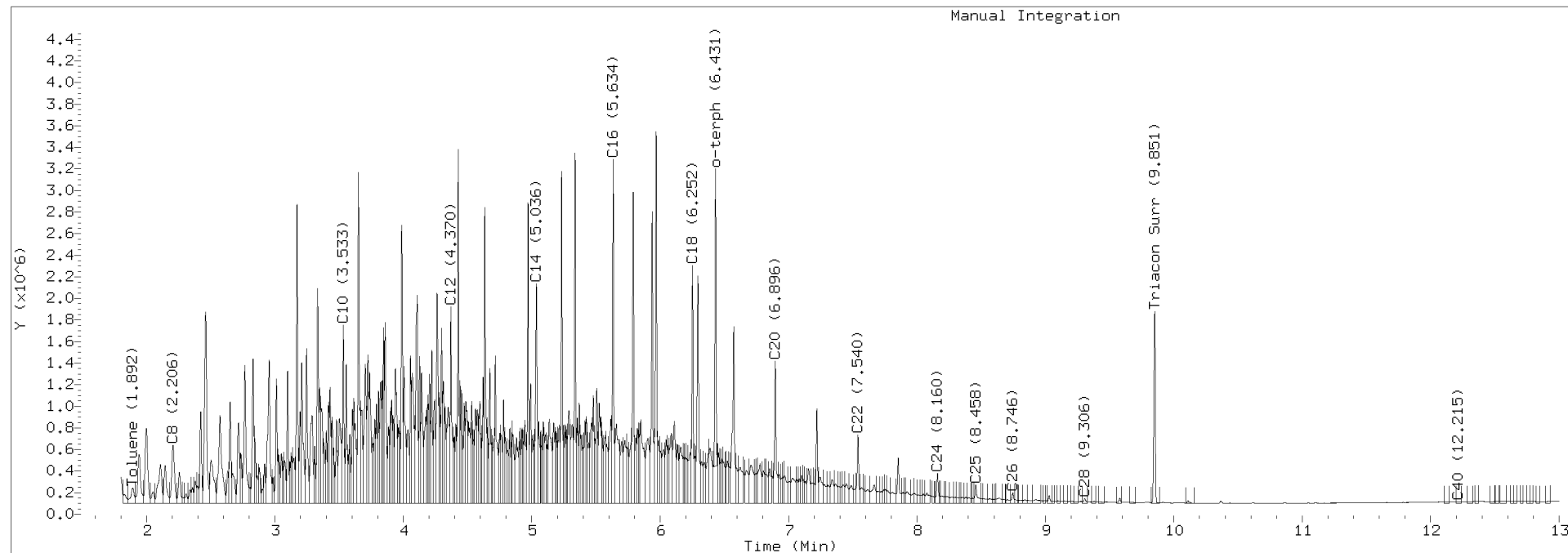
Surrogate	Area	Amount	%Rec
o-Terphenyl	1640292	7.5	82.9
Triacontane	1413556	7.4	82.2

Analyte	RF	Curve Date
o-Terph Surr	219872.3	28-FEB-2017
Triacon Surr	191068.8	28-FEB-2017
Gas	21747.6	xx-xx-xxxx
Diesel	155491.0	28-FEB-2017
Motor Oil	137039.0	28-FEB-2017

TPH Manual Integrations Report

Datafile: FID3B, 20170303.b/17030341.D Injection: 04-MAR-2017 03:01

Lab ID:17C0009-12RE1





Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

B-12-11
17C0009-13 (Solid)

Volatile Organic Compounds

Method: EPA 8260C

Sampled: 02/27/2017 15:00

Instrument: NT5

Analyzed: 06-Mar-2017 19:01

Sample Preparation: Preparation Method: EPA 5035 (Sodium Bisulfate)
Preparation Batch: BFC0031 Sample Size: 5.37 g (wet) Dry Weight: 3.88 g
Prepared: 01-Mar-2017 Final Volume: 5 mL % Solids: 72.19

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
1,2-Dichloroethane	107-06-2	1	1.29	ND	ug/kg	U
Benzene	71-43-2	1	1.29	ND	ug/kg	U
Toluene	108-88-3	1	1.29	ND	ug/kg	U
Ethylbenzene	100-41-4	1	1.29	ND	ug/kg	U
m,p-Xylene	179601-23-1	1	1.29	ND	ug/kg	U
o-Xylene	95-47-6	1	1.29	ND	ug/kg	U
<i>Surrogate: Dibromofluoromethane</i>			80-120 %	99.6	%	
<i>Surrogate: 1,2-Dichloroethane-d4</i>			80-149 %	86.3	%	
<i>Surrogate: Toluene-d8</i>			77-120 %	98.3	%	
<i>Surrogate: 4-Bromofluorobenzene</i>			80-120 %	107	%	
<i>Surrogate: 1,2-Dichlorobenzene-d4</i>			80-120 %	103	%	



Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

B-12-11
17C0009-13 (Solid)

Volatile Organic Compounds

Method: NWTPhg

Sampled: 02/27/2017 15:00

Instrument: NT3

Analyzed: 06-Mar-2017 16:56

Sample Preparation:

Preparation Method: EPA 5035 (Methanol Extraction)

Preparation Batch: BFC0131

Sample Size: 4.418 g (wet)

Dry Weight: 3.19 g

Prepared: 06-Mar-2017

Final Volume: 5 mL

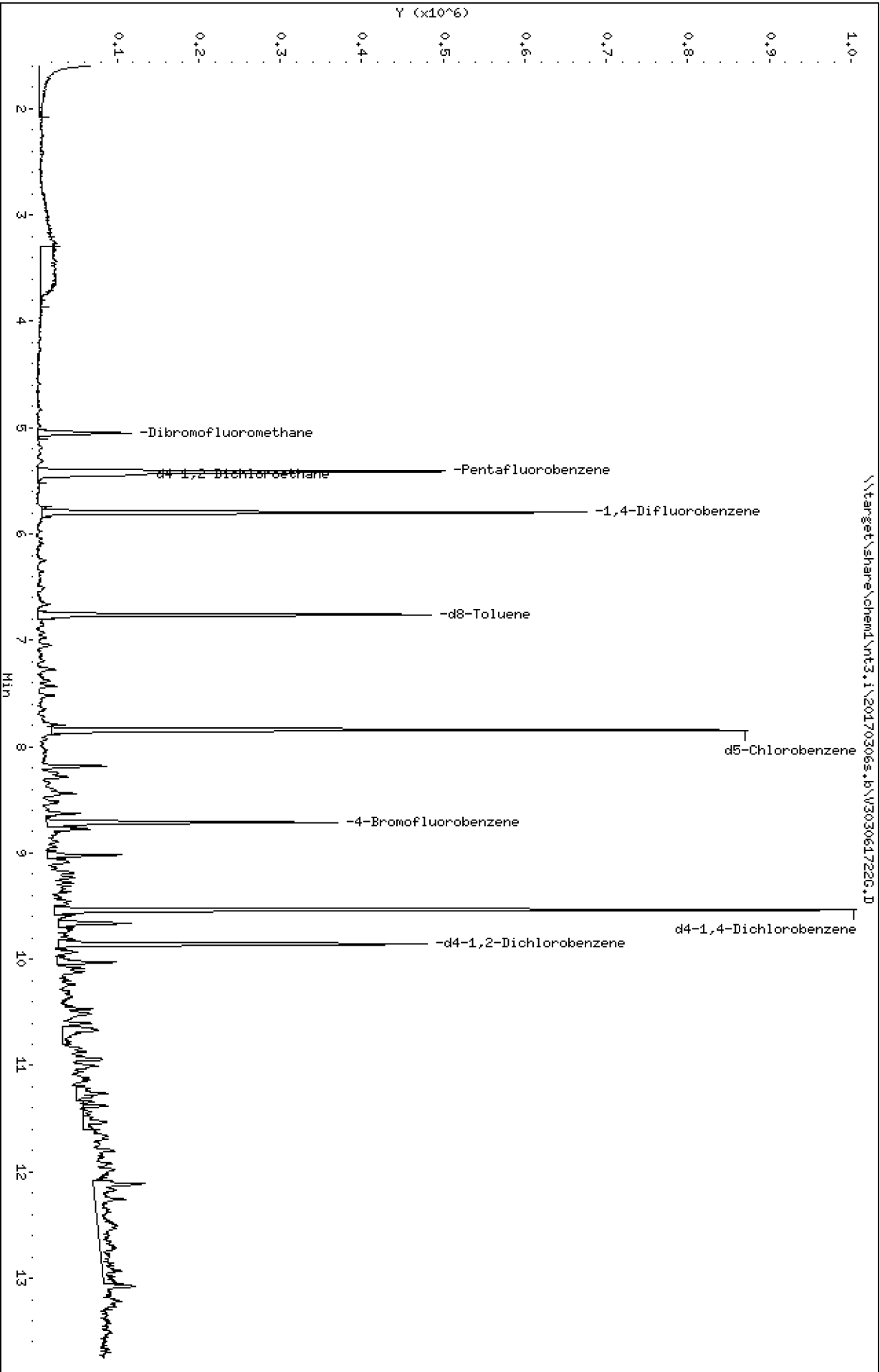
% Solids: 72.19

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Gasoline Range Organics (Tol-Nap)		50	9760	ND	ug/kg	U
HC ID: GRO						
Surrogate: Toluene-d8			80-120 %	98.6	%	
Surrogate: 4-Bromofluorobenzene			78-123 %	99.5	%	

Data File: \\target\share\chend\nt3.1\20170306s.16\303061722G.D
Date : 06-HR-2017 16:56
Client ID:
Sample Info: 17C0009-13

Column phase: RTXWMS

Instrument: nt3.1
Operator: PC
Column diameter: 0.18



ARI Labs, Inc.

8260C 10 ml purge

Data file : \\target\share\chem1\nt3.i\20170306s.b\V303061722G.D
 Lab Smp Id: 17C0009-13
 Inj Date : 06-MAR-2017 16:56
 Operator : PC
 Smp Info : 17C0009-13
 Misc Info : 15-
 Comment :
 Method : \\target\share\chem1\nt3.i\20170306s.b\8260C022417.m
 Meth Date : 06-Mar-2017 07:32 Paul
 Cal Date : 14-FEB-2017 18:50
 Als bottle: 12
 Dil Factor: 1.00000
 Integrator: HP RTE
 Target Version: 4.14
 Processing Host: ORGDATA11

Inst ID: nt3.i

Quant Type: ISTD

Cal File: V302141718.D

Compound Sublist: gsurr.sub

Concentration Formula: Amt * DF * Pv / Sa * CpndVariable

Name	Value	Description
DF	1.000	Dilution Factor
Pv	10.000	Purge Volume (mL)
Sa	10.000	Sample Amount (mL)
Cpnd Variable		Local Compound Variable

Compounds	QUANT	SIG	RT	EXP RT	REL RT	RESPONSE	CONCENTRATIONS	
							ON-COLUMN (ug/L)	FINAL (ug/L)
\$ 27 Dibromofluoromethane	111		5.053	5.053	(0.933)	58120	4.62560	4.626
* 32 Pentafluorobenzene	168		5.415	5.420	(1.000)	267450	10.0000	
\$ 33 d4-1,2-Dichloroethane	65		5.447	5.446	(1.006)	68320	4.80591	4.806
* 37 1,4-Difluorobenzene	114		5.797	5.803	(1.000)	420190	10.0000	
\$ 43 d8-Toluene	98		6.760	6.765	(1.166)	251372	4.92790	4.928
* 53 d5-Chlorobenzene	117		7.844	7.844	(1.000)	408732	10.0000	
\$ 62 4-Bromofluorobenzene	174		8.710	8.715	(1.110)	85626	4.97628	4.976
* 76 d4-1,4-Dichlorobenzene	152		9.534	9.534	(1.000)	218814	10.0000	
\$ 79 d4-1,2-Dichlorobenzene	152		9.858	9.858	(1.034)	101500	4.94207	4.942

ARI Labs, Inc.

INTERNAL STANDARD COMPOUNDS
 AREA AND RT SUMMARY

Instrument ID: nt3.i Calibration Date: 03-MAR-2017
 Lab File ID: V303061722G.D Calibration Time: 21:57
 Lab Smp Id: 17C0009-13
 Analysis Type: VOA Level: LOW
 Quant Type: ISTD Sample Type: WATER
 Operator: PC
 Method File: \\target\share\chem1\nt3.i\20170306s.b\8260C022417.m
 Misc Info: 15-

Test Mode:

Use Initial Calibration Level 5.
 If Continuing Cal. use Initial Cal. Level 5

COMPOUND	STANDARD	AREA LIMIT		SAMPLE	%DIFF
		LOWER	UPPER		
32 Pentafluorobenzon	317912	158956	635824	267450	-15.87
37 1,4-Difluorobenze	512039	256020	1024078	420190	-17.94
53 d5-Chlorobenzene	494052	247026	988104	408732	-17.27
76 d4-1,4-Dichlorobe	282154	141077	564308	218814	-22.45

COMPOUND	STANDARD	RT LIMIT		SAMPLE	%DIFF
		LOWER	UPPER		
32 Pentafluorobenzon	5.42	4.92	5.92	5.42	-0.09
37 1,4-Difluorobenze	5.80	5.30	6.30	5.80	-0.09
53 d5-Chlorobenzene	7.84	7.34	8.34	7.84	0.00
76 d4-1,4-Dichlorobe	9.53	9.03	10.03	9.53	0.00

AREA UPPER LIMIT = +100% of internal standard area.
 AREA LOWER LIMIT = - 50% of internal standard area.
 RT UPPER LIMIT = + 0.50 minutes of internal standard RT.
 RT LOWER LIMIT = - 0.50 minutes of internal standard RT.

ARI Labs, Inc.

RECOVERY REPORT

Client Name: Client SDG: 20151005
Sample Matrix: LIQUID Fraction: VOA
Lab Smp Id: 17C0009-13
Level: LOW Operator: PC
Data Type: MS DATA SampleType: SAMPLE
SpikeList File: allspike.spk Quant Type: ISTD
Sublist File: gsurr.sub
Method File: \\target\share\chem1\nt3.i\20170306s.b\8260C022417.m
Misc Info: 15-

SURROGATE COMPOUND	AMOUNT ADDED ug/L	AMOUNT RECOVERED ug/L	% RECOVERED	LIMITS
\$ 27 Dibromofluorometha	5.000	4.626	92.51	80-120
\$ 33 d4-1,2-Dichloroeth	5.000	4.806	96.12	80-128
\$ 43 d8-Toluene	5.000	4.928	98.56	80-120
\$ 62 4-Bromofluorobenze	5.000	4.976	99.53	80-120
\$ 79 d4-1,2-Dichloroben	5.000	4.942	98.84	80-120

REVIEW SUMMARY FOR FILE - V303061722G.D

Lab ID: 17C0009-13

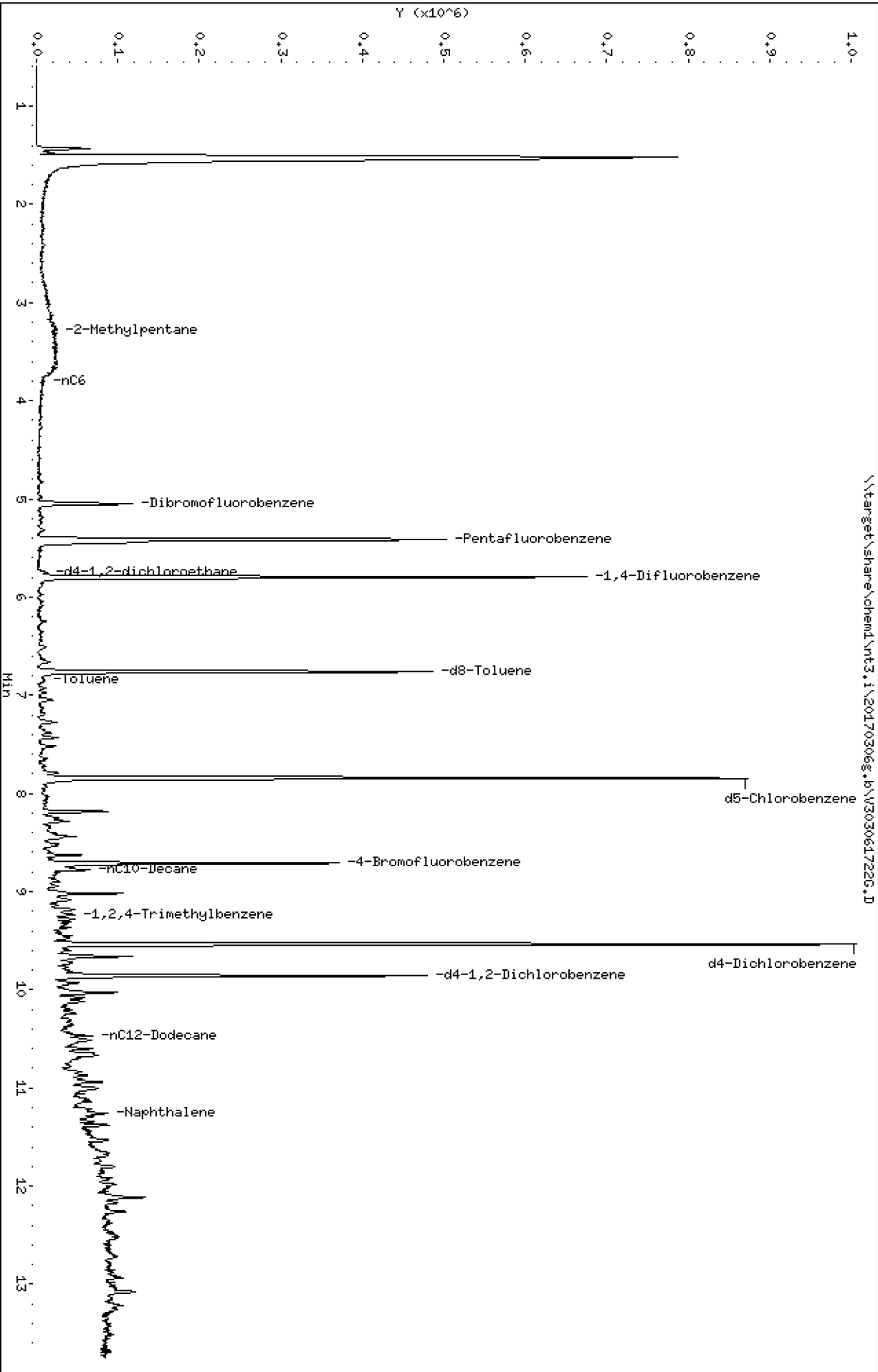
nt3.i, 20170306s.b\8260C022417.m, 06-MAR-2017 16:56

RT CO-ELUTION COMPOUNDS

Data File: \\target\share\chend\nt3,1\20170306g,b\W303061722G.D
Date: 06-MAR-2017 16:56
Client ID:
Sample Info: 17C0009-13

Column phase: RTXWMS

Instrument: nt3,1
Operator: PC
Column diameter: 0.18



Analytical Resources Inc.
GC/MS Gas Quantitation Report

Data file: 20170306g.b/V303061722G.D
Method: \20170306g.b\NWTPHG.m
Instrument: nt3.i
Gas Ical Date: 14-Feb-2017
Injection Date: 06-MAR-2017 16:56

ARI ID: 17C0009-13
Client ID:
Matrix: WATER
Dilution Factor: 1.000
Operator: PC

=====

GASOLINE HYDROCARBONS

Range	RF	Total Area*	Amount (ug/mL)
-----	----	-----	-----
WAGas Tol-C12 (6.70 to 10.57)	52141375	2250655	0.043
8015C 2MP-TMB (3.17 to 9.34)	87713511	1928251	0.022
AK101 nC6-nC10 (3.65 to 8.68)	61260787	1046807	0.017
NWTPHG Tol-Nap (6.70 to 11.36)	54123058	2864180	0.053

M Indicates manual integration within range

* Surrogate areas are subtracted from Total Area

NW Gas Range Subtracted Peaks

6.760	715227	d8-Toluene
8.711	557040	4-Bromofluorobenzene
9.535	1406984	d4-Dichlorobenzene
7.844	1311030	d5-Chlorobenzene
9.859	678678	d4-1,2-Dichlorobenzene



Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

B-12-11
17C0009-13 (Solid)

Petroleum Hydrocarbons

Method: NWTPH-Dx

Sampled: 02/27/2017 15:00

Instrument: FID3

Analyzed: 03-Mar-2017 17:03

Sample Preparation:

Preparation Method: EPA 3546 (Microwave)

Preparation Batch: BFC0023

Prepared: 02-Mar-2017

Sample Size: 10.11 g (wet)

Final Volume: 1 mL

Dry Weight: 7.30 g

% Solids: 72.19

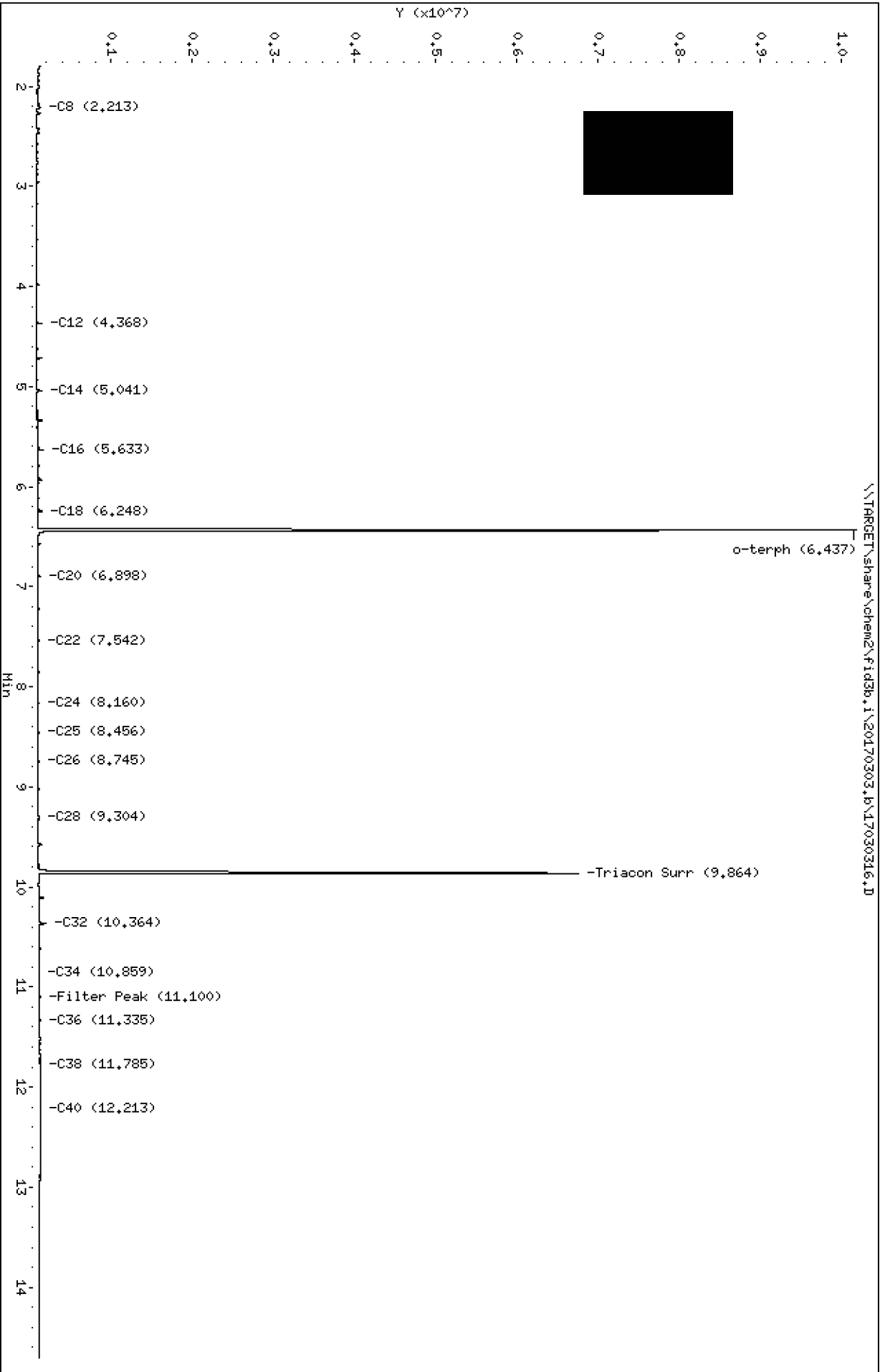
Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Diesel Range Organics (C12-C24)		1	6.85	ND	mg/kg	U
Motor Oil Range Organics (C24-C38)		1	13.7	ND	mg/kg	U
<i>Surrogate: o-Terphenyl</i>			50-150 %	76.4	%	

Data File: \\TARGET\share\chem2\FID3b,1\20170303,b\17030316.D
Date : 03-MAR-2017 17:03
Client ID:
Sample Info: 17C0009-13

Instrument: FID3b,1

Column phase: RTX-1

Operator: ML
Column diameter: 0.25



Analytical Resources Inc.
TPH Quantitation Report

Data file: 20170303.b/17030316.D
Method: 20170303.b\FID3TPH.m
Instrument: fid3b.i
Operator: ML
Report Date: 03/06/2017
Macro: FID3_022817

ARI ID: 17C0009-13
Client ID:
Injection: 03-MAR-2017 17:03
Dilution Factor: 1

FID:3B RESULTS

Compound	RT	Shift	Height	Area	Method	Range	Total Area	Conc
Toluene	1.884	0.003	38482	84205	WATPHG	(Tol-C12)	648778	29.8
C8	2.213	0.000	43687	59254	WATPHD	(C12-C24)	2175824	14.0
C10	----				WATPHM	(C24-C38)	5265447	38.4
C12	4.368	-0.004	60925	29389				
C14	5.041	0.003	61903	58875				
C16	5.633	-0.001	77100	75243				
C18	6.248	-0.006	66288	69252				
C20	6.898	-0.002	46724	66214				
C22	7.542	-0.004	29379	46884				
C24	8.160	-0.008	26160	37116				
C25	8.456	-0.010	28014	38793				
C26	8.745	-0.009	28513	48448				
C28	9.304	-0.011	37158	74514				
C32	10.364	-0.011	118351	193365				
C34	10.859	-0.011	42292	99104				
Filter Peak	11.100	0.001	45335	81141				
C36	11.335	-0.009	45786	92732				
o-terph	6.437	-0.003	10110113	7559272				
Triacon Surr	9.864	-0.004	6653128	6819804				

Range Times: NW Diesel(4.422 - 8.218) NW Gas(1.831 - 4.422) NW M.Oil(8.218 - 11.845)
AK102(3.483 - 8.416) AK103(8.416 - 11.394) Jet A(3.483 - 6.304)

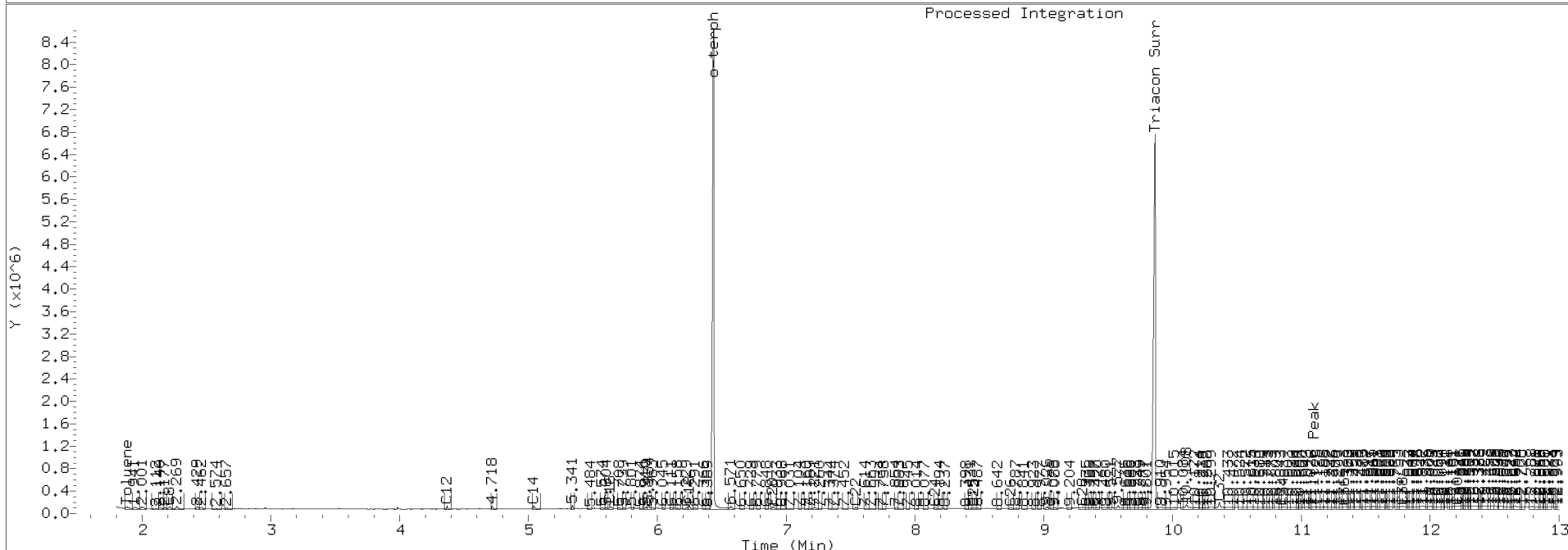
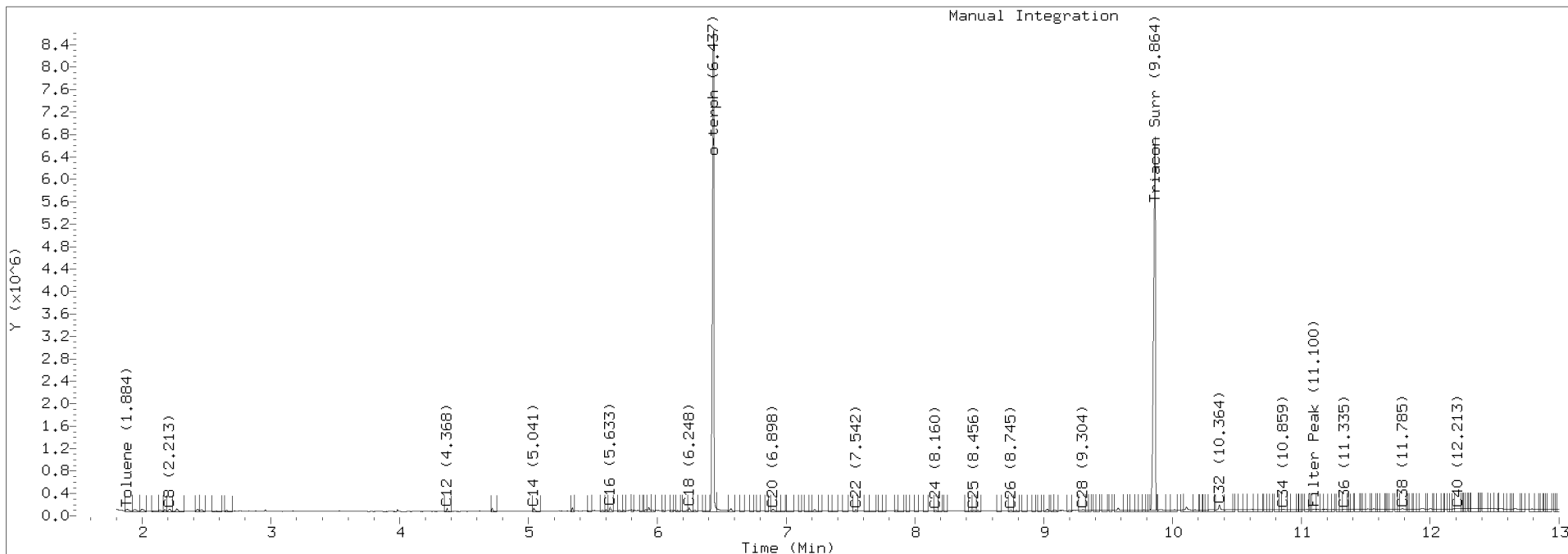
Surrogate	Area	Amount	%Rec
o-Terphenyl	7559272	34.4	76.4
Triacontane	6819804	35.7	79.3

Analyte	RF	Curve Date
o-Terph Surr	219872.3	28-FEB-2017
Triacon Surr	191068.8	28-FEB-2017
Gas	21747.6	xx-xx-xxxx
Diesel	155491.0	28-FEB-2017
Motor Oil	137039.0	28-FEB-2017

TPH Manual Integrations Report

Datafile: FID3B, 20170303.b/17030316.D Injection: 03-MAR-2017 17:03

Lab ID:17C0009-13





Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

B-13-9
17C0009-14 (Solid)

Volatile Organic Compounds

Method: EPA 8260C

Sampled: 02/27/2017 15:20

Instrument: NT5

Analyzed: 06-Mar-2017 19:24

Sample Preparation: Preparation Method: EPA 5035 (Sodium Bisulfate)
Preparation Batch: BFC0031 Sample Size: 4.26 g (wet) Dry Weight: 3.14 g
Prepared: 01-Mar-2017 Final Volume: 5 mL % Solids: 73.75

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
1,2-Dichloroethane	107-06-2	1	1.59	ND	ug/kg	U
Benzene	71-43-2	1	1.59	1.87	ug/kg	
Toluene	108-88-3	1	1.59	3.70	ug/kg	
Ethylbenzene	100-41-4	1	1.59	330	ug/kg	E
m,p-Xylene	179601-23-1	1	1.59	213	ug/kg	
o-Xylene	95-47-6	1	1.59	36.0	ug/kg	
<i>Surrogate: Dibromofluoromethane</i>			80-120 %	96.0	%	
<i>Surrogate: 1,2-Dichloroethane-d4</i>			80-149 %	87.6	%	
<i>Surrogate: Toluene-d8</i>			77-120 %	90.2	%	
<i>Surrogate: 4-Bromofluorobenzene</i>			80-120 %	118	%	
<i>Surrogate: 1,2-Dichlorobenzene-d4</i>			80-120 %	127	%	*

Sample Preparation: Preparation Method: EPA 5035 (Methanol Extraction)
Preparation Batch: BFC0286 Sample Size: 4.39 g (wet) Dry Weight: 3.24 g
Prepared: 09-Mar-2017 Final Volume: 5 mL % Solids: 73.75

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
1,2-Dichloroethane	107-06-2	50	95.0	ND	ug/kg	U
Benzene	71-43-2	50	95.0	ND	ug/kg	U
Toluene	108-88-3	50	95.0	ND	ug/kg	U
Ethylbenzene	100-41-4	50	95.0	4400	ug/kg	
m,p-Xylene	179601-23-1	50	95.0	2040	ug/kg	
o-Xylene	95-47-6	50	95.0	413	ug/kg	
<i>Surrogate: Dibromofluoromethane</i>			30-160 %	107	%	
<i>Surrogate: 1,2-Dichloroethane-d4</i>			80-124 %	97.7	%	
<i>Surrogate: Toluene-d8</i>			80-120 %	116	%	
<i>Surrogate: 4-Bromofluorobenzene</i>			80-120 %	93.4	%	
<i>Surrogate: 1,2-Dichlorobenzene-d4</i>			80-120 %	102	%	



Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

B-13-9
17C0009-14 (Solid)

Volatile Organic Compounds

Method: NWTPhg Sampled: 02/27/2017 15:20
Instrument: NT3 Analyzed: 06-Mar-2017 17:22

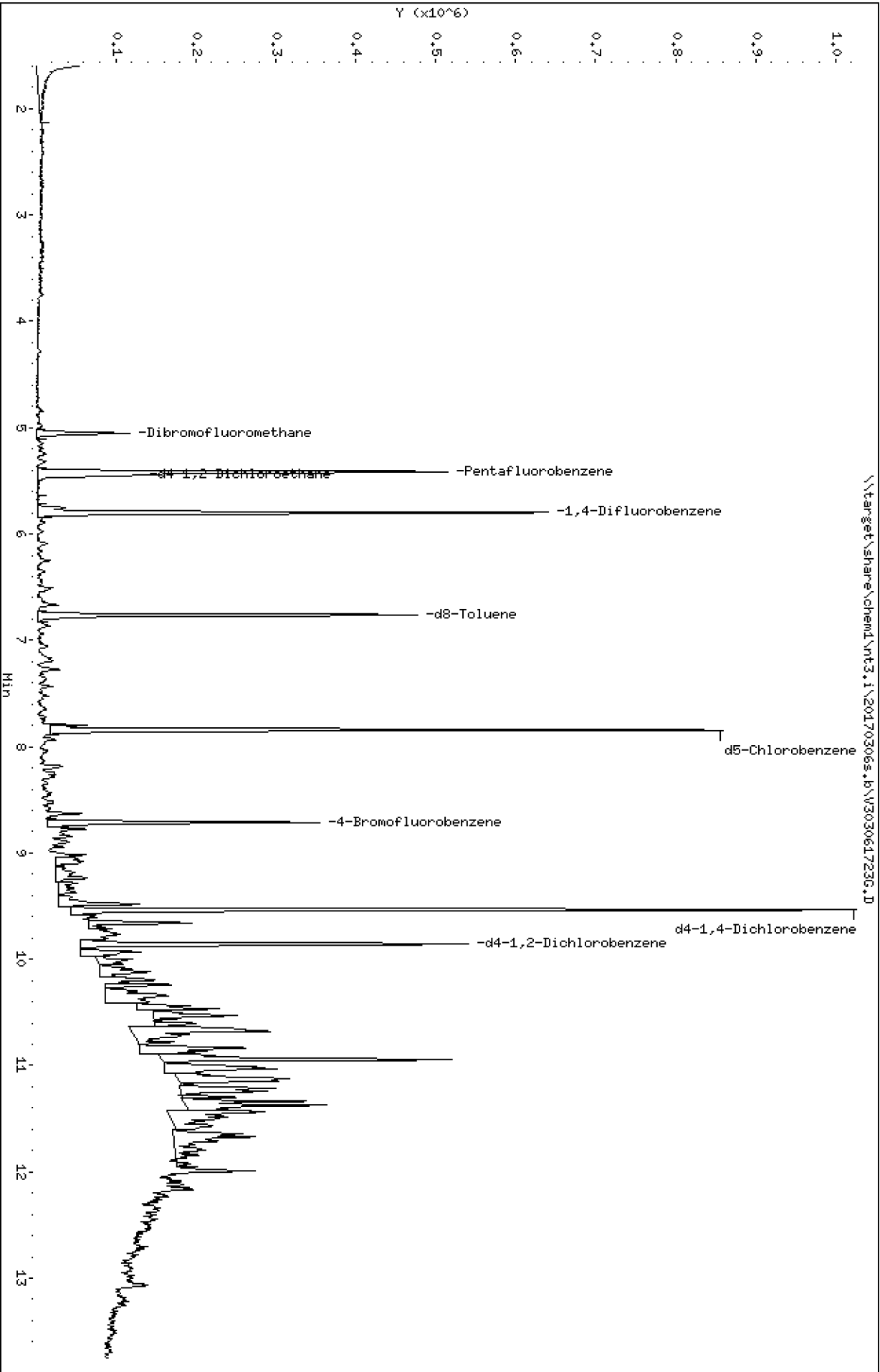
Sample Preparation: Preparation Method: EPA 5035 (Methanol Extraction)
Preparation Batch: BFC0131 Sample Size: 5.246 g (wet) Dry Weight: 3.87 g
Prepared: 06-Mar-2017 Final Volume: 5 mL % Solids: 73.75

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Gasoline Range Organics (Tol-Nap)		500	82400	251000	ug/kg	D
HC ID: GRO						
Surrogate: Toluene-d8			80-120 %	97.8	%	
Surrogate: 4-Bromofluorobenzene			78-123 %	101	%	

Data File: \\target\share\chend\nt3,1\20170306s,b\W303061723G.D
Date : 06-HRR-2017 17:22
Client ID:
Sample Info: 17C0009-14

Column phase: RTXWMS

Instrument: nt3,1
Operator: PC
Column diameter: 0.18



ARI Labs, Inc.

8260C 10 ml purge

Data file : \\target\share\chem1\nt3.i\20170306s.b\V303061723G.D
 Lab Smp Id: 17C0009-14
 Inj Date : 06-MAR-2017 17:22
 Operator : PC
 Smp Info : 17C0009-14
 Misc Info : 15-
 Comment :
 Method : \\target\share\chem1\nt3.i\20170306s.b\8260C022417.m
 Meth Date : 06-Mar-2017 07:32 Paul
 Cal Date : 14-FEB-2017 18:50
 Als bottle: 12
 Dil Factor: 1.00000
 Integrator: HP RTE
 Target Version: 4.14
 Processing Host: ORGDATA11

Inst ID: nt3.i

Quant Type: ISTD

Cal File: V302141718.D

Compound Sublist: gsurr.sub

Concentration Formula: Amt * DF * Pv / Sa * CpndVariable

Name	Value	Description
DF	1.000	Dilution Factor
Pv	10.000	Purge Volume (mL)
Sa	10.000	Sample Amount (mL)
Cpnd Variable		Local Compound Variable

Compounds	QUANT	SIG	RT	EXP RT	REL RT	RESPONSE	CONCENTRATIONS	
							ON-COLUMN (ug/L)	FINAL (ug/L)
\$ 27 Dibromofluoromethane	111		5.054	5.053	(0.933)	57688	4.74884	4.749
* 32 Pentafluorobenzene	168		5.415	5.420	(1.000)	258573	10.0000	
\$ 33 d4-1,2-Dichloroethane	65		5.447	5.446	(1.006)	68087	4.95395	4.954
* 37 1,4-Difluorobenzene	114		5.798	5.803	(1.000)	412829	10.0000	
\$ 43 d8-Toluene	98		6.760	6.765	(1.166)	245012	4.88886	4.889
* 53 d5-Chlorobenzene	117		7.844	7.844	(1.000)	405962	10.0000	
\$ 62 4-Bromofluorobenzene	174		8.716	8.715	(1.111)	85994	5.03176	5.032
* 76 d4-1,4-Dichlorobenzene	152		9.534	9.534	(1.000)	219734	10.0000	
\$ 79 d4-1,2-Dichlorobenzene	152		9.859	9.858	(1.034)	102949	4.99163	4.992

ARI Labs, Inc.

INTERNAL STANDARD COMPOUNDS
 AREA AND RT SUMMARY

Instrument ID: nt3.i Calibration Date: 03-MAR-2017
 Lab File ID: V303061723G.D Calibration Time: 21:57
 Lab Smp Id: 17C0009-14
 Analysis Type: VOA Level: LOW
 Quant Type: ISTD Sample Type: WATER
 Operator: PC
 Method File: \\target\share\chem1\nt3.i\20170306s.b\8260C022417.m
 Misc Info: 15-

Test Mode:

Use Initial Calibration Level 5.
 If Continuing Cal. use Initial Cal. Level 5

COMPOUND	STANDARD	AREA LIMIT		SAMPLE	%DIFF
		LOWER	UPPER		
32 Pentafluorobenzon	317912	158956	635824	258573	-18.67
37 1,4-Difluorobenze	512039	256020	1024078	412829	-19.38
53 d5-Chlorobenzene	494052	247026	988104	405962	-17.83
76 d4-1,4-Dichlorobe	282154	141077	564308	219734	-22.12

COMPOUND	STANDARD	RT LIMIT		SAMPLE	%DIFF
		LOWER	UPPER		
32 Pentafluorobenzon	5.42	4.92	5.92	5.42	-0.09
37 1,4-Difluorobenze	5.80	5.30	6.30	5.80	-0.08
53 d5-Chlorobenzene	7.84	7.34	8.34	7.84	0.01
76 d4-1,4-Dichlorobe	9.53	9.03	10.03	9.53	0.00

AREA UPPER LIMIT = +100% of internal standard area.
 AREA LOWER LIMIT = - 50% of internal standard area.
 RT UPPER LIMIT = + 0.50 minutes of internal standard RT.
 RT LOWER LIMIT = - 0.50 minutes of internal standard RT.

ARI Labs, Inc.

RECOVERY REPORT

Client Name: Client SDG: 20151005
Sample Matrix: LIQUID Fraction: VOA
Lab Smp Id: 17C0009-14
Level: LOW Operator: PC
Data Type: MS DATA SampleType: SAMPLE
SpikeList File: allspike.spk Quant Type: ISTD
Sublist File: gsurr.sub
Method File: \\target\share\chem1\nt3.i\20170306s.b\8260C022417.m
Misc Info: 15-

SURROGATE COMPOUND	AMOUNT ADDED ug/L	AMOUNT RECOVERED ug/L	% RECOVERED	LIMITS
\$ 27 Dibromofluorometha	5.000	4.749	94.98	80-120
\$ 33 d4-1,2-Dichloroeth	5.000	4.954	99.08	80-128
\$ 43 d8-Toluene	5.000	4.889	97.78	80-120
\$ 62 4-Bromofluorobenze	5.000	5.032	100.64	80-120
\$ 79 d4-1,2-Dichloroben	5.000	4.992	99.83	80-120

REVIEW SUMMARY FOR FILE - V303061723G.D

Lab ID: 17C0009-14

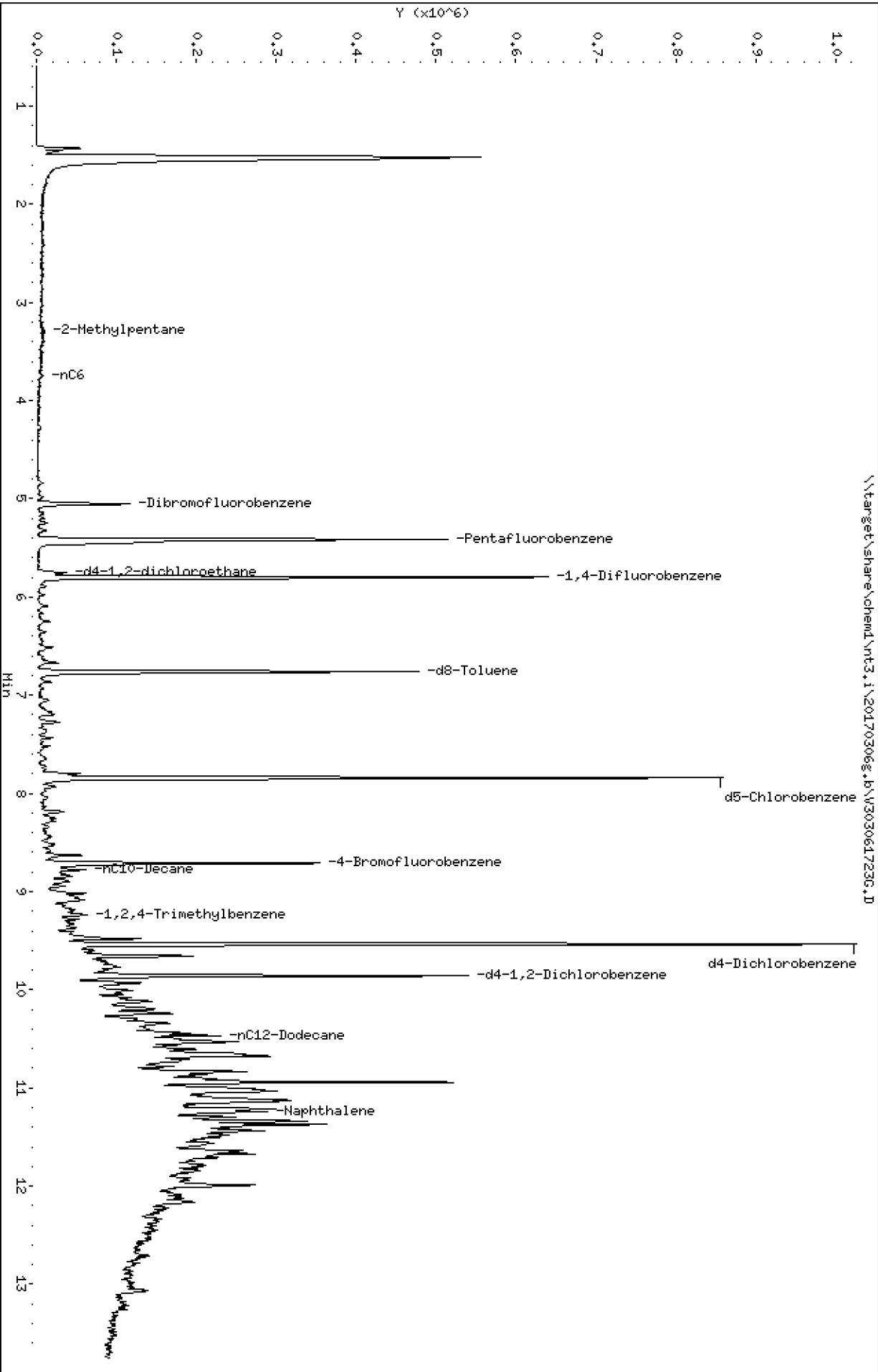
nt3.i, 20170306s.b\8260C022417.m, 06-MAR-2017 17:22

RT CO-ELUTION COMPOUNDS

Data File: \\target\share\chend\nt3.1\20170306g.b\303061723G.D
Date: 06-HR-2017 17:22
Client ID:
Sample Info: 17C0009-14

Column phase: RTXWMS

Instrument: nt3.1
Operator: PC
Column diameter: 0.18



Analytical Resources Inc.
GC/MS Gas Quantitation Report

Data file: 20170306g.b/V303061723G.D
Method: \20170306g.b\NWTPHG.m
Instrument: nt3.i
Gas Ical Date: 14-Feb-2017
Injection Date: 06-MAR-2017 17:22

ARI ID: 17C0009-14
Client ID:
Matrix: WATER
Dilution Factor: 1.000
Operator: PC

=====

GASOLINE HYDROCARBONS

Range	RF	Total Area*	Amount (ug/mL)
WAGas Tol-C12 (6.70 to 10.57)	52141375	7354490	0.141
8015C 2MP-TMB (3.17 to 9.34)	87713511	2067797	0.024
AK101 nC6-nC10 (3.65 to 8.68)	61260787	1120608	0.018
NWTPHG Tol-Nap (6.70 to 11.36)	54123058	16463171	0.304

M Indicates manual integration within range

* Surrogate areas are subtracted from Total Area

NW Gas Range Subtracted Peaks

6.760	753675	d8-Toluene
8.711	555577	4-Bromofluorobenzene
9.535	1469658	d4-Dichlorobenzene
7.845	1295456	d5-Chlorobenzene
9.859	863962	d4-1,2-Dichlorobenzene



Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

B-13-9
17C0009-14 (Solid)

Petroleum Hydrocarbons

Method: NWTPH-Dx

Sampled: 02/27/2017 15:20

Instrument: FID3

Analyzed: 03-Mar-2017 18:15

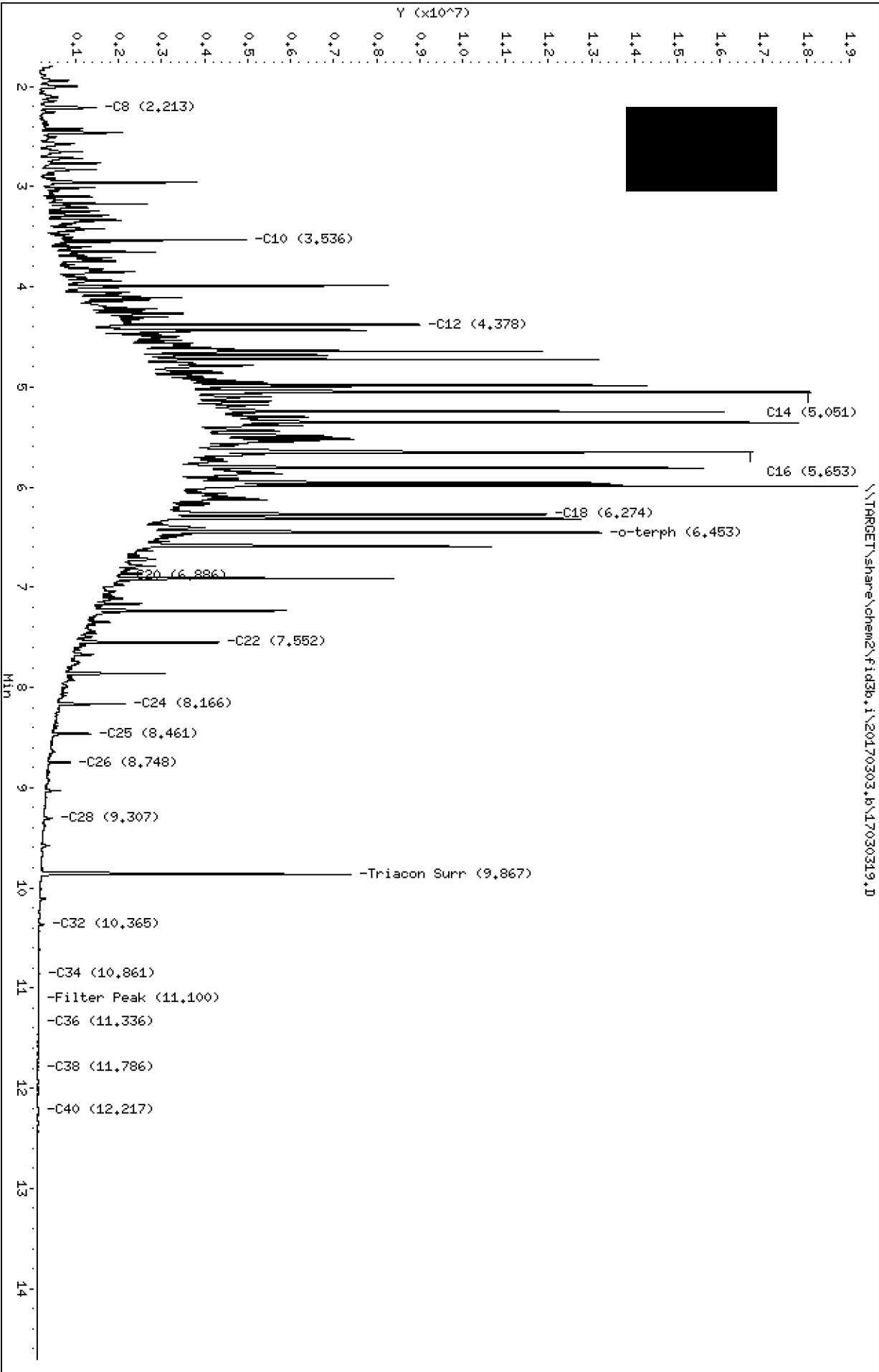
Sample Preparation: Preparation Method: EPA 3546 (Microwave)
Preparation Batch: BFC0023 Sample Size: 10.2 g (wet) Dry Weight: 7.52 g
Prepared: 02-Mar-2017 Final Volume: 1 mL % Solids: 73.75

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Diesel Range Organics (C12-C24)		1	6.65	646	mg/kg	E
HC ID: DIESEL						
Motor Oil Range Organics (C24-C38)		1	13.3	27.5	mg/kg	
HC ID: RRO						
Surrogate: <i>o</i> -Terphenyl			50-150 %	92.2	%	

Data File: \\TARGET\share\chem2\fid3b,1\20170303_b\17030319.D
Date: 03-MAR-2017 18:15
Client ID:
Sample Info: 17C0009-14

Column phase: RTX-1

Instrument: fid3b,1
Operator: ML
Column diameter: 0.25



Analytical Resources Inc.
TPH Quantitation Report

Data file: 20170303.b/17030319.D
Method: 20170303.b\FID3TPH.m
Instrument: fid3b.i
Operator: ML
Report Date: 03/06/2017
Macro: FID3_022817

ARI ID: 17C0009-14
Client ID:
Injection: 03-MAR-2017 18:15
Dilution Factor: 1

FID:3B RESULTS

Compound	RT	Shift	Height	Area	Method	Range	Total Area	Conc
Toluene	1.893	0.012	205988	416607	WATPHG	(Tol-C12)	129664287	5962.2
C8	2.213	0.000	1379771	1928643	WATPHD	(C12-C24)	755273855	4857.3
C10	3.536	0.003	4855637	2928869	WATPHM	(C24-C38)	28304537	206.5
C12	4.378	0.006	8918404	8449767				
C14	5.051	0.013	18006136	19821175				
C16	5.653	0.018	16657944	23605308				
C18	6.274	0.020	11863362	18142434				
C20	6.886	-0.014	1934461	1447057				
C22	7.552	0.006	4212469	4337778				
C24	8.166	-0.002	2037212	2517266				
C25	8.461	-0.005	1258517	1869410				
C26	8.748	-0.006	759827	838762				
C28	9.307	-0.008	361653	797361				
C32	10.365	-0.010	163267	230210				
C34	10.861	-0.009	49328	128583				
Filter Peak	11.100	0.001	35211	53533				
C36	11.336	-0.008	23432	55243				
o-terph	6.453	0.013	10371858	9131808				
Triacon Surr	9.867	-0.000	7210395	7576366				

Range Times: NW Diesel(4.422 - 8.218) NW Gas(1.831 - 4.422) NW M.Oil(8.218 - 11.845)
AK102(3.483 - 8.416) AK103(8.416 - 11.394) Jet A(3.483 - 6.304)

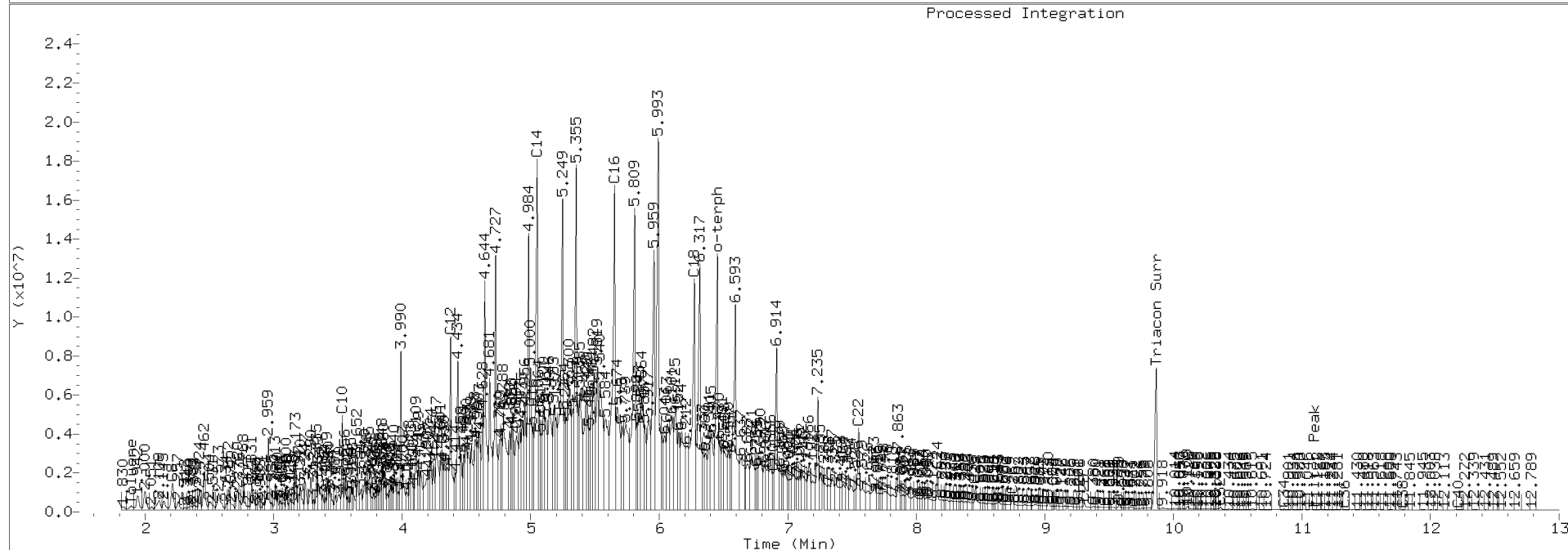
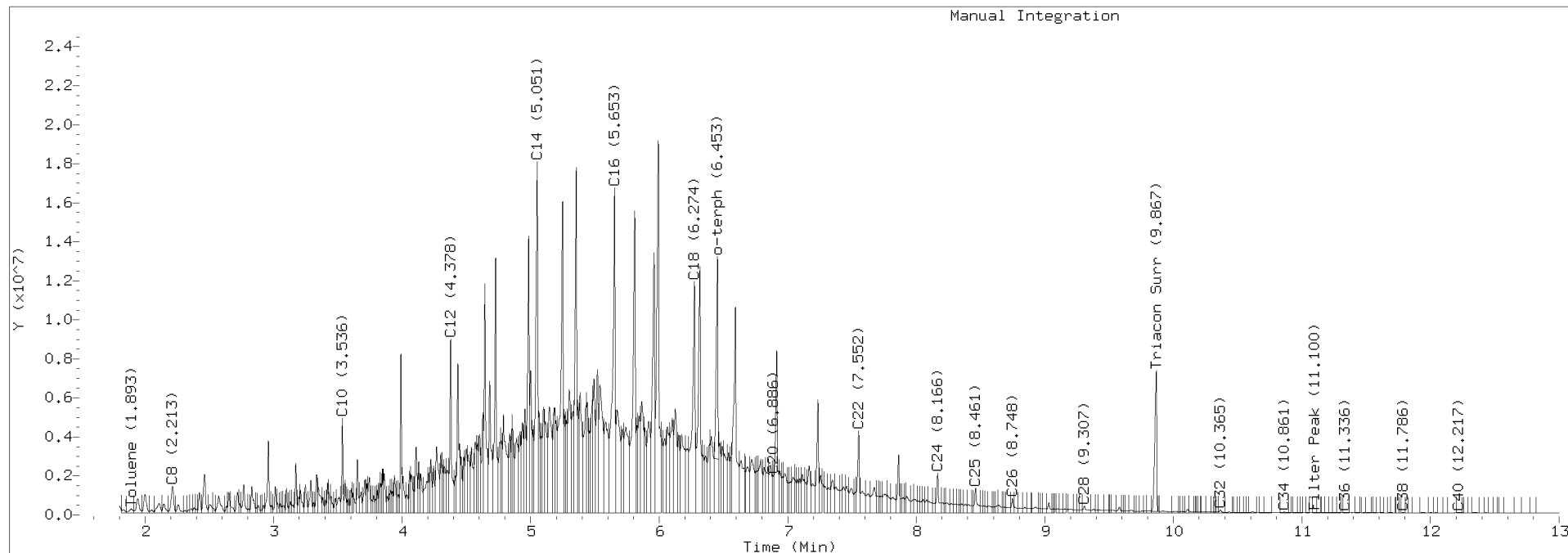
Surrogate	Area	Amount	%Rec
o-Terphenyl	9131808	41.5	92.3
Triaconthane	7576366	39.7	88.1

Analyte	RF	Curve Date
o-Terph Surr	219872.3	28-FEB-2017
Triacon Surr	191068.8	28-FEB-2017
Gas	21747.6	xx-xx-xxxx
Diesel	155491.0	28-FEB-2017
Motor Oil	137039.0	28-FEB-2017

TPH Manual Integrations Report

Datafile: FID3B, 20170303.b/17030319.D Injection: 03-MAR-2017 18:15

Lab ID:17C0009-14





Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

B-13-9
17C0009-14RE1 (Solid)

Petroleum Hydrocarbons

Method: NWTPH-Dx

Sampled: 02/27/2017 15:20

Instrument: FID3

Analyzed: 06-Mar-2017 16:10

Sample Preparation:

Preparation Method: EPA 3546 (Microwave)

Preparation Batch: BFC0023

Sample Size: 10.2 g (wet)

Dry Weight: 7.52 g

Prepared: 02-Mar-2017

Final Volume: 1 mL

% Solids: 73.75

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Diesel Range Organics (C12-C24)		5	33.2	635	mg/kg	D
HC ID: DIESEL						
Motor Oil Range Organics (C24-C38)		5	66.5	ND	mg/kg	U
<i>Surrogate: o-Terphenyl</i>			50-150 %	86.7	%	

Data File: \\TARGET\share\chem2\fid3b,1\20170306_b\17030606.D

Date: 06-HRR-2017 16:10

Client ID:

Sample Info: 17C00009-14REL1,5

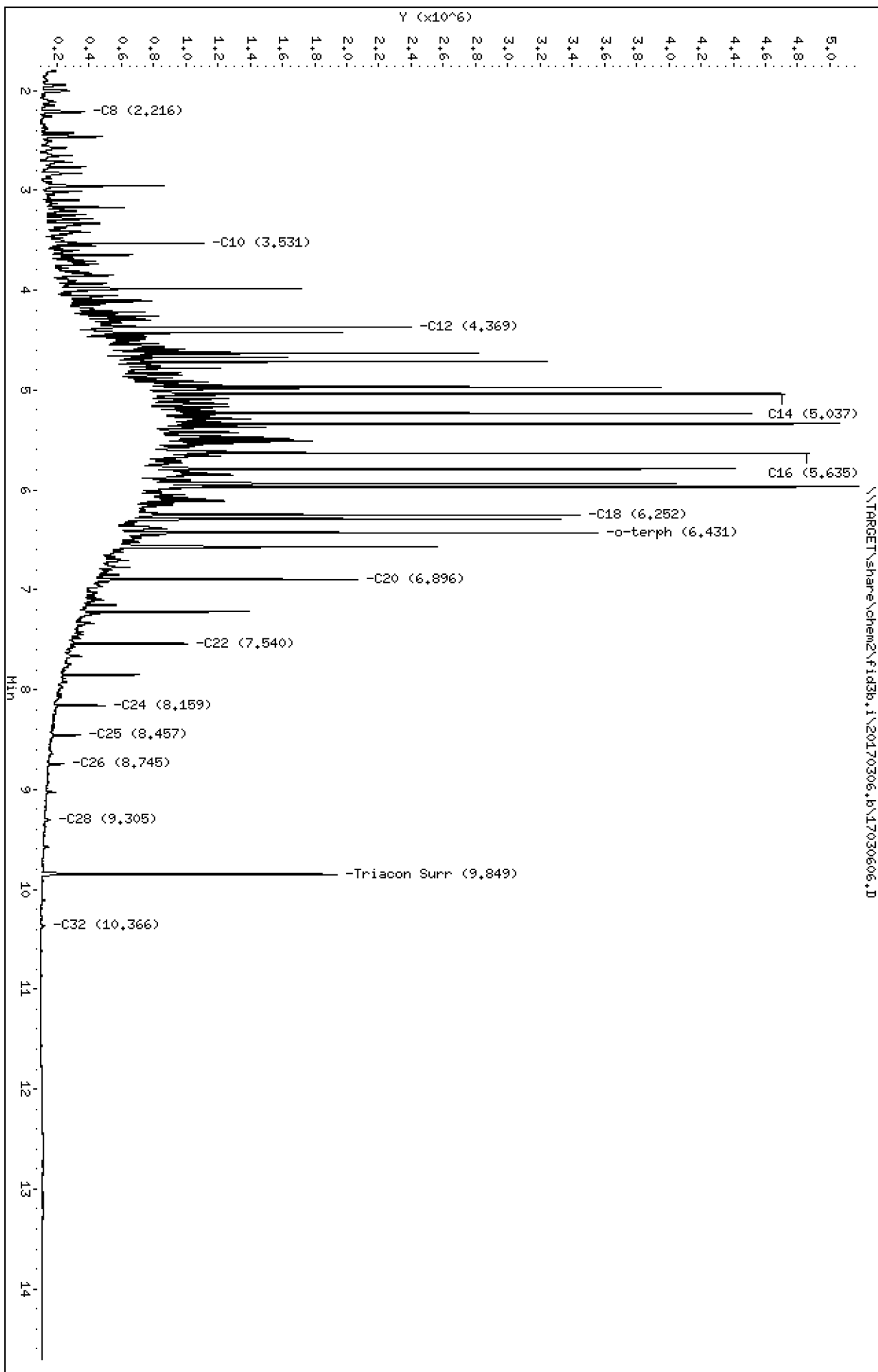
Column phase: RTX-1

Instrument: fid3b,1

Operator: ML

Column diameter: 0.25

\\TARGET\share\chem2\fid3b,1\20170306_b\17030606.D



Analytical Resources Inc.
TPH Quantitation Report

Data file: 20170306.b/17030606.D
Method: 20170306.b\FID3TPH.m
Instrument: fid3b.i
Operator: ML
Report Date: 03/07/2017
Macro: FID3_022817

ARI ID: 17C0009-14RE1
Client ID:
Injection: 06-MAR-2017 16:10
Dilution Factor: 5

FID:3B RESULTS

Compound	RT	Shift	Height	Area	Method	Range	Total Area	Conc
Toluene	1.897	0.012	45703	99194	WATPHG	(Tol-C12)	23606578	1085.5
C8	2.216	-0.002	274228	334748	WATPHD	(C12-C24)	148530767	955.2
C10	3.531	-0.000	1012381	572537	WATPHM	(C24-C38)	4097299	29.9
C12	4.369	-0.000	2300738	1470195				
C14	5.037	0.001	4616112	3869100				
C16	5.635	0.002	4775875	2983553				
C18	6.252	-0.000	3347067	2399016				
C20	6.896	-0.001	1965674	1828827				
C22	7.540	-0.004	909110	816453				
C24	8.159	-0.006	398542	426740				
C25	8.457	-0.007	245820	356455				
C26	8.745	-0.007	142019	197824				
C28	9.305	-0.009	63613	94846				
C32	10.366	-0.008	24562	27576				
C34	----							
Filter Peak	----							
C36	----							
o-terph	6.431	-0.007	2894157	1722990				
Triacon Surr	9.849	-0.018	1840506	1488771				

Range Times: NW Diesel(4.419 - 8.215) NW Gas(1.836 - 4.419) NW M.Oil(8.215 - 11.846)
AK102(3.482 - 8.414) AK103(8.414 - 11.395) Jet A(3.482 - 6.302)

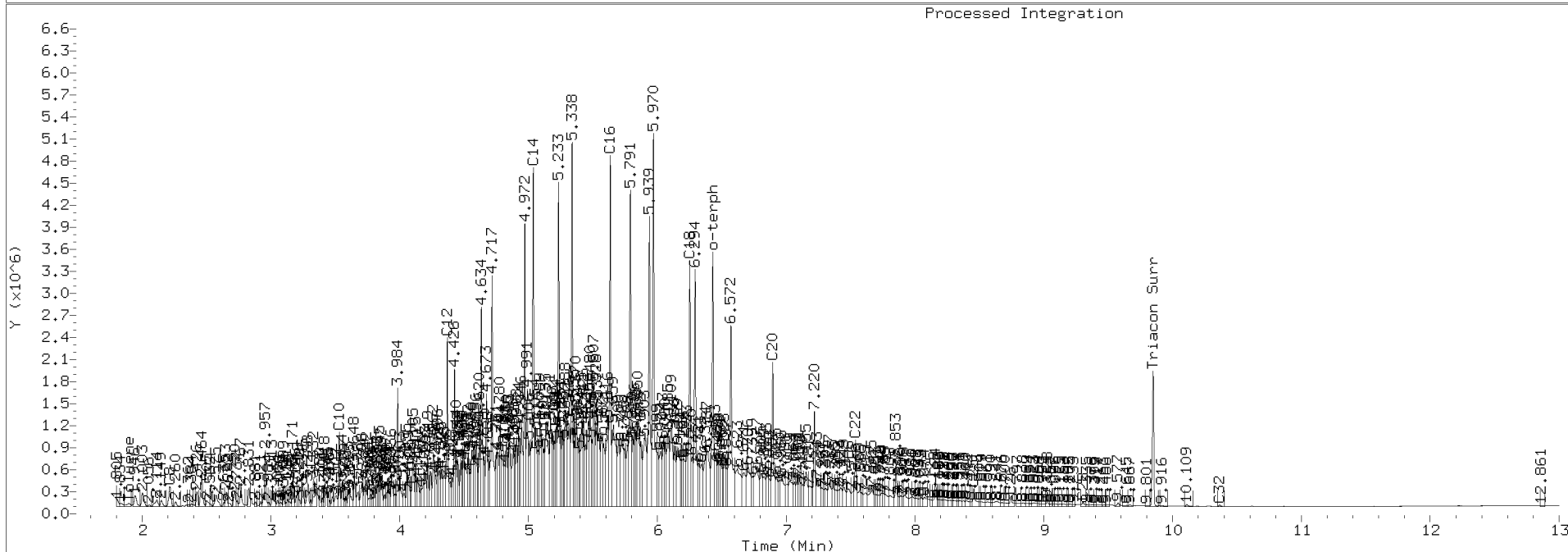
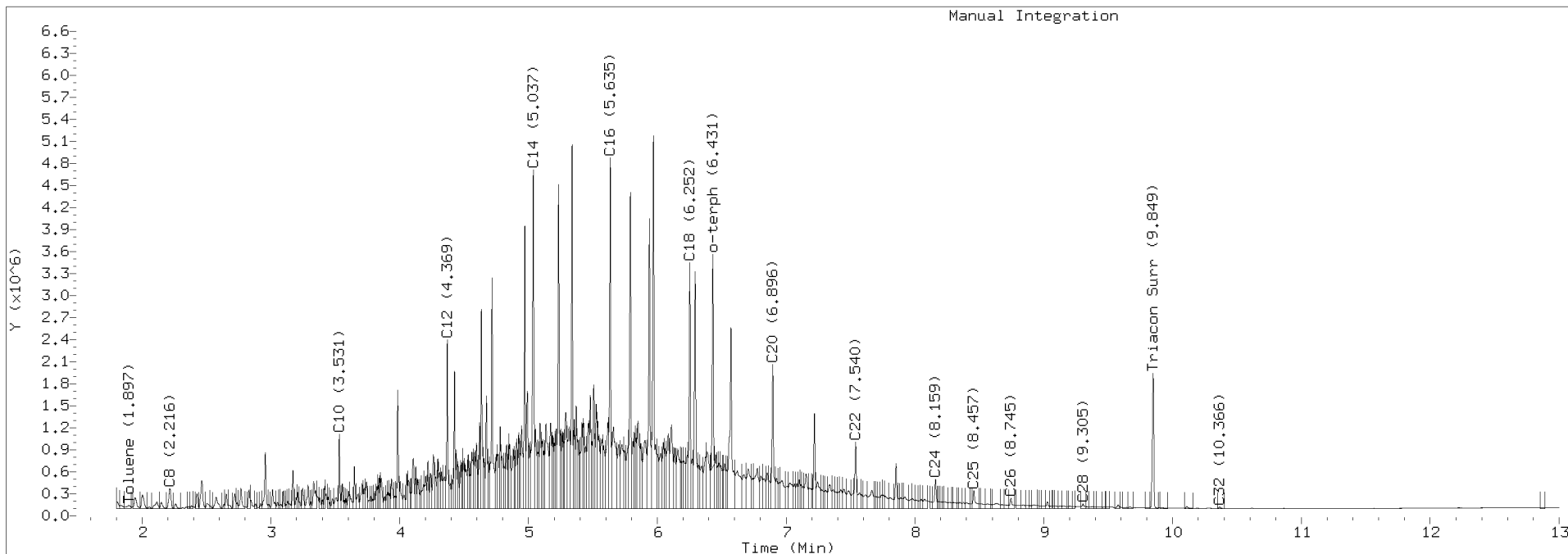
Surrogate	Area	Amount	%Rec
o-Terphenyl	1722990	7.8	87.1
Triacontane	1488771	7.8	86.6

Analyte	RF	Curve Date
o-Terph Surr	219872.3	28-FEB-2017
Triacon Surr	191068.8	28-FEB-2017
Gas	21747.6	xx-xx-xxxx
Diesel	155491.0	28-FEB-2017
Motor Oil	137039.0	28-FEB-2017

TPH Manual Integrations Report

Datafile: FID3B, 20170306.b/17030606.D Injection: 06-MAR-2017 16:10

Lab ID:17C0009-14RE1





Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

B-15-10
17C0009-15 (Solid)

Volatile Organic Compounds

Method: EPA 8260C

Sampled: 02/27/2017 15:45

Instrument: NT5

Analyzed: 06-Mar-2017 19:46

Sample Preparation: Preparation Method: EPA 5035 (Methanol Extraction)
Preparation Batch: BFC0220 Sample Size: 7.569 g (wet) Dry Weight: 5.15 g
Prepared: 06-Mar-2017 Final Volume: 5 mL % Solids: 68.01

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
1,2-Dichloroethane	107-06-2	50	72.1	ND	ug/kg	U
Benzene	71-43-2	50	72.1	96.2	ug/kg	
Toluene	108-88-3	50	72.1	282	ug/kg	
Ethylbenzene	100-41-4	50	72.1	3770	ug/kg	
m,p-Xylene	179601-23-1	50	72.1	2870	ug/kg	
o-Xylene	95-47-6	50	72.1	175	ug/kg	
<i>Surrogate: Dibromofluoromethane</i>			30-160 %	96.0	%	
<i>Surrogate: 1,2-Dichloroethane-d4</i>			80-124 %	90.0	%	
<i>Surrogate: Toluene-d8</i>			80-120 %	107	%	
<i>Surrogate: 4-Bromofluorobenzene</i>			80-120 %	106	%	
<i>Surrogate: 1,2-Dichlorobenzene-d4</i>			80-120 %	102	%	



Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

B-15-10
17C0009-15 (Solid)

Volatile Organic Compounds

Method: NWTPhg

Sampled: 02/27/2017 15:45

Instrument: NT3

Analyzed: 06-Mar-2017 17:47

Sample Preparation:

Preparation Method: EPA 5035 (Methanol Extraction)

Preparation Batch: BFC0131

Sample Size: 7.569 g (wet)

Dry Weight: 5.15 g

Prepared: 06-Mar-2017

Final Volume: 5 mL

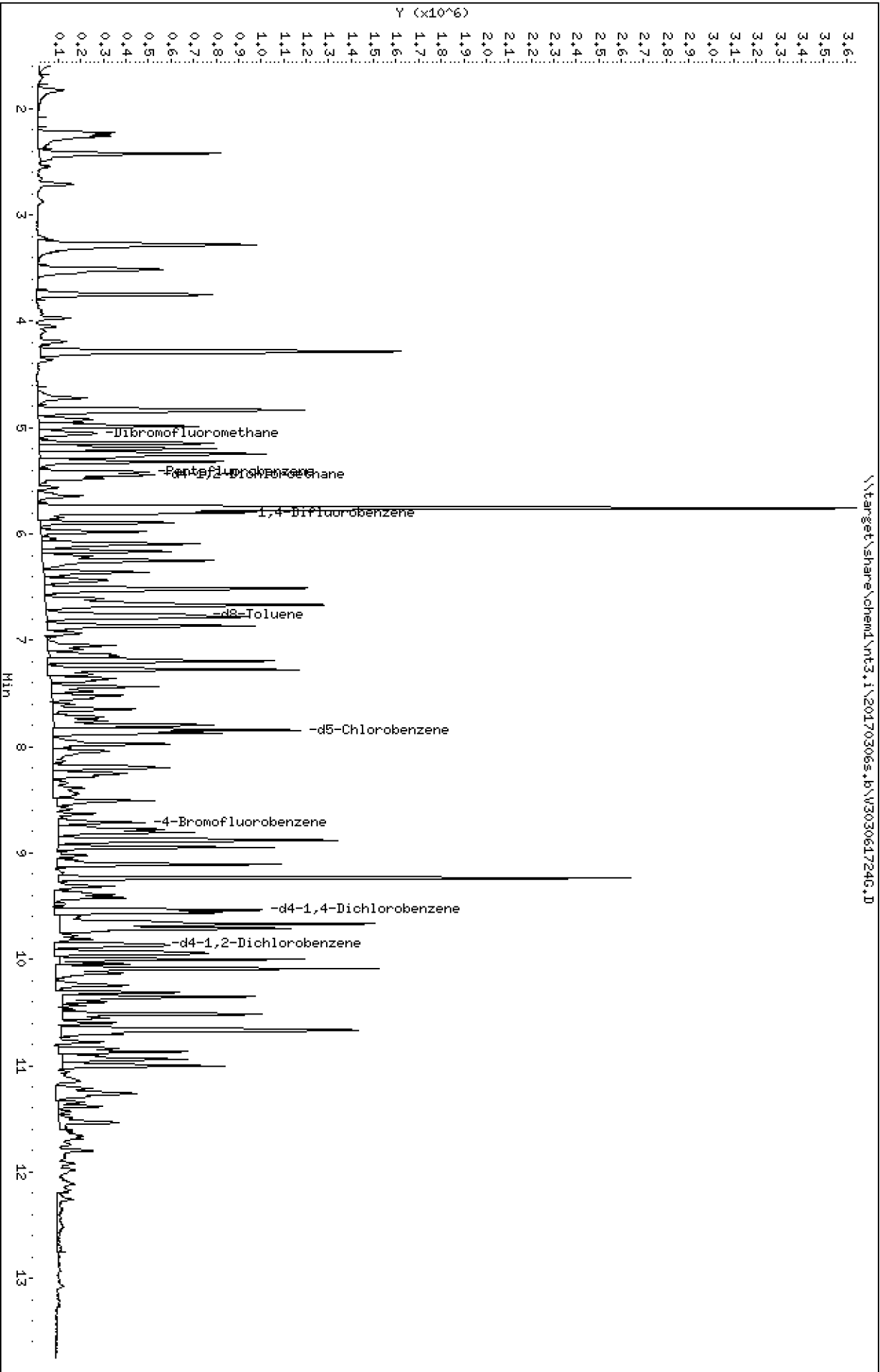
% Solids: 68.01

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Gasoline Range Organics (Tol-Nap)		500	72100	916000	ug/kg	D
HC ID: GRO						
Surrogate: Toluene-d8			80-120 %	110	%	
Surrogate: 4-Bromofluorobenzene			78-123 %	101	%	

Data File: \\target\share\chend\nt3.1\20170306s.1b\303061724G.D
Date : 06-HRR-2017 17:47
Client ID:
Sample Info: 17C0009-15

Column phase: RTXWMS

Instrument: nt3.1
Operator: PC
Column diameter: 0.18



ARI Labs, Inc.

8260C 10 ml purge

Data file : \\target\share\chem1\nt3.i\20170306s.b\V303061724G.D
 Lab Smp Id: 17C0009-15
 Inj Date : 06-MAR-2017 17:47
 Operator : PC
 Smp Info : 17C0009-15
 Misc Info : 15-
 Comment :
 Method : \\target\share\chem1\nt3.i\20170306s.b\8260C022417.m
 Meth Date : 06-Mar-2017 07:32 Paul
 Cal Date : 14-FEB-2017 18:50
 Als bottle: 12
 Dil Factor: 1.00000
 Integrator: HP RTE
 Target Version: 4.14
 Processing Host: ORGDATA11

Inst ID: nt3.i

Quant Type: ISTD

Cal File: V302141718.D

Compound Sublist: gsurr.sub

Concentration Formula: Amt * DF * Pv / Sa * CpndVariable

Name	Value	Description
DF	1.000	Dilution Factor
Pv	10.000	Purge Volume (mL)
Sa	10.000	Sample Amount (mL)
Cpnd Variable		Local Compound Variable

Compounds	QUANT	SIG	RT	EXP RT	REL RT	RESPONSE	CONCENTRATIONS	
							ON-COLUMN (ug/L)	FINAL (ug/L)
\$ 27 Dibromofluoromethane	111		5.052	5.053	(0.932)	58315	4.87795	4.878
* 32 Pentafluorobenzene	168		5.419	5.420	(1.000)	254465	10.0000	
\$ 33 d4-1,2-Dichloroethane	65		5.446	5.446	(1.005)	83805	6.19602	6.196
* 37 1,4-Difluorobenzene	114		5.802	5.803	(1.000)	406689	10.0000	
\$ 43 d8-Toluene	98		6.764	6.765	(1.166)	271505	5.49928	5.499
* 53 d5-Chlorobenzene	117		7.843	7.844	(1.000)	401009	10.0000	
\$ 62 4-Bromofluorobenzene	174		8.715	8.715	(1.111)	85356	5.05612	5.056
* 76 d4-1,4-Dichlorobenzene	152		9.533	9.534	(1.000)	219664	10.0000	
\$ 79 d4-1,2-Dichlorobenzene	152		9.857	9.858	(1.034)	104916	5.08863	5.089

ARI Labs, Inc.

INTERNAL STANDARD COMPOUNDS
 AREA AND RT SUMMARY

Instrument ID: nt3.i Calibration Date: 03-MAR-2017
 Lab File ID: V303061724G.D Calibration Time: 21:57
 Lab Smp Id: 17C0009-15
 Analysis Type: VOA Level: LOW
 Quant Type: ISTD Sample Type: WATER
 Operator: PC
 Method File: \\target\share\chem1\nt3.i\20170306s.b\8260C022417.m
 Misc Info: 15-

Test Mode:

Use Initial Calibration Level 5.
 If Continuing Cal. use Initial Cal. Level 5

COMPOUND	STANDARD	AREA LIMIT		SAMPLE	%DIFF
		LOWER	UPPER		
32 Pentafluorobenzon	317912	158956	635824	254465	-19.96
37 1,4-Difluorobenze	512039	256020	1024078	406689	-20.57
53 d5-Chlorobenzene	494052	247026	988104	401009	-18.83
76 d4-1,4-Dichlorobe	282154	141077	564308	219664	-22.15

COMPOUND	STANDARD	RT LIMIT		SAMPLE	%DIFF
		LOWER	UPPER		
32 Pentafluorobenzon	5.42	4.92	5.92	5.42	-0.02
37 1,4-Difluorobenze	5.80	5.30	6.30	5.80	-0.01
53 d5-Chlorobenzene	7.84	7.34	8.34	7.84	-0.01
76 d4-1,4-Dichlorobe	9.53	9.03	10.03	9.53	-0.01

AREA UPPER LIMIT = +100% of internal standard area.
 AREA LOWER LIMIT = - 50% of internal standard area.
 RT UPPER LIMIT = + 0.50 minutes of internal standard RT.
 RT LOWER LIMIT = - 0.50 minutes of internal standard RT.

ARI Labs, Inc.

RECOVERY REPORT

Client Name: Client SDG: 20151005
Sample Matrix: LIQUID Fraction: VOA
Lab Smp Id: 17C0009-15
Level: LOW Operator: PC
Data Type: MS DATA SampleType: SAMPLE
SpikeList File: allspike.spk Quant Type: ISTD
Sublist File: gsurr.sub
Method File: \\target\share\chem1\nt3.i\20170306s.b\8260C022417.m
Misc Info: 15-

SURROGATE COMPOUND	AMOUNT ADDED ug/L	AMOUNT RECOVERED ug/L	% RECOVERED	LIMITS
\$ 27 Dibromofluorometha	5.000	4.878	97.56	80-120
\$ 33 d4-1,2-Dichloroeth	5.000	6.196	123.92	80-128
\$ 43 d8-Toluene	5.000	5.499	109.99	80-120
\$ 62 4-Bromofluorobenze	5.000	5.056	101.12	80-120
\$ 79 d4-1,2-Dichloroben	5.000	5.089	101.77	80-120

REVIEW SUMMARY FOR FILE - V303061724G.D

Lab ID: 17C0009-15

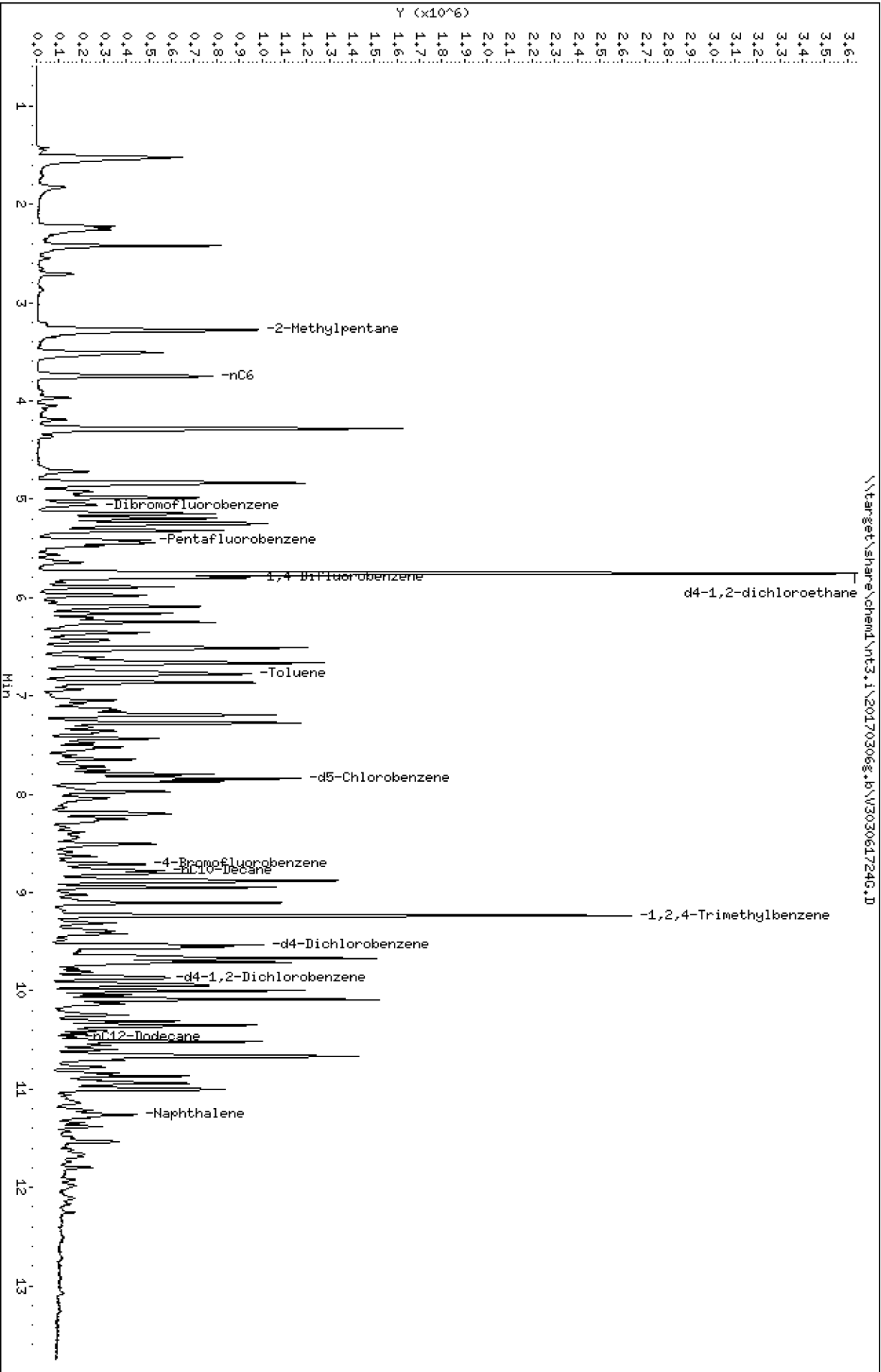
nt3.i, 20170306s.b\8260C022417.m, 06-MAR-2017 17:47

RT CO-ELUTION COMPOUNDS

Data File: \\target\share\chend\nt3.1\20170306g.jb\303061724G.D
Date: 06-HRR-2017 17:47
Client ID:
Sample Info: 17C0009-15

Column phase: RTXWMS

Instrument: nt3.1
Operator: PC
Column diameter: 0.18



Analytical Resources Inc.
GC/MS Gas Quantitation Report

Data file: 20170306g.b/V303061724G.D
Method: \20170306g.b\NWTPHG.m
Instrument: nt3.i
Gas Ical Date: 14-Feb-2017
Injection Date: 06-MAR-2017 17:47

ARI ID: 17C0009-15
Client ID:
Matrix: WATER
Dilution Factor: 1.000
Operator: PC

=====

GASOLINE HYDROCARBONS

Range	RF	Total Area*	Amount (ug/mL)
-----	----	-----	-----
WAGas Tol-C12 (6.70 to 10.57)	52141375	58317787	1.118
8015C 2MP-TMB (3.17 to 9.34)	87713511	75243879	0.858
AK101 nC6-nC10 (3.65 to 8.68)	61260787	58387927	0.953
NWTPHG Tol-Nap (6.70 to 11.36)	54123058	68792646	1.271

M Indicates manual integration within range

* Surrogate areas are subtracted from Total Area

NW Gas Range Subtracted Peaks

8.710	802971	4-Bromofluorobenzene
9.534	1404275	d4-Dichlorobenzene
7.843	1900227	d5-Chlorobenzene
9.863	1270085	d4-1,2-Dichlorobenzene



Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

B-15-10
17C0009-15 (Solid)

Petroleum Hydrocarbons

Method: NWTPH-Dx

Sampled: 02/27/2017 15:45

Instrument: FID3

Analyzed: 03-Mar-2017 18:39

Sample Preparation:

Preparation Method: EPA 3546 (Microwave)

Preparation Batch: BFC0023

Sample Size: 10.12 g (wet)

Dry Weight: 6.88 g

Prepared: 02-Mar-2017

Final Volume: 1 mL

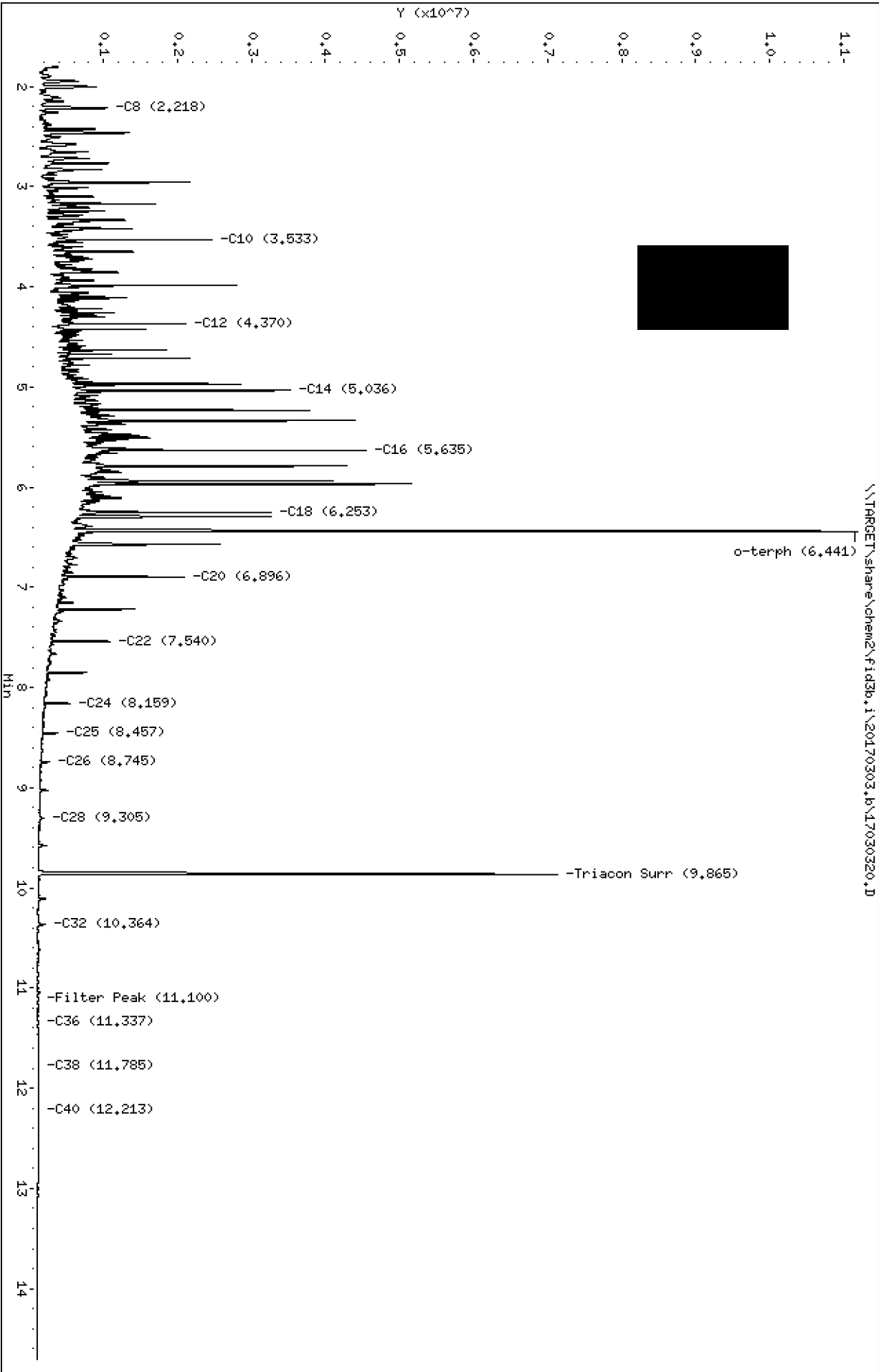
% Solids: 68.01

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Diesel Range Organics (C12-C24)		1	7.26	122	mg/kg	
HC ID: DIESEL						
Motor Oil Range Organics (C24-C38)		1	14.5	ND	mg/kg	U
Surrogate: <i>o</i> -Terphenyl			50-150 %	84.2	%	

Data File: \\TARGET\share\chem2\fid3b,1\20170303,b\17030320.D
Date: 03-MAR-2017 18:39
Client ID:
Sample Info: 17C0009-15

Column phase: RTX-1

Instrument: fid3b,1
Operator: ML
Column diameter: 0.25



Analytical Resources Inc.
TPH Quantitation Report

Data file: 20170303.b/17030320.D
Method: 20170303.b\FID3TPH.m
Instrument: fid3b.i
Operator: ML
Report Date: 03/06/2017
Macro: FID3_022817

ARI ID: 17C0009-15
Client ID:
Injection: 03-MAR-2017 18:39
Dilution Factor: 1

FID:3B RESULTS

Compound	RT	Shift	Height	Area	Method	Range	Total Area	Conc
Toluene	1.899	0.018	182109	358787	WATPHG	(Tol-C12)	54374140	2500.2
C8	2.218	0.005	954992	1248346	WATPHD	(C12-C24)	131092940	843.1
C10	3.533	-0.000	2356896	1375223	WATPHM	(C24-C38)	5363468	39.1
C12	4.370	-0.002	2013230	1558650				
C14	5.036	-0.002	3413973	2668206				
C16	5.635	-0.000	4450439	2770527				
C18	6.253	-0.001	3167564	2344146				
C20	6.896	-0.003	1983584	1843304				
C22	7.540	-0.006	987700	877757				
C24	8.159	-0.009	443602	467930				
C25	8.457	-0.010	283438	314057				
C26	8.745	-0.010	166437	222062				
C28	9.305	-0.010	98998	115798				
C32	10.364	-0.010	106405	114622				
C34	----							
Filter Peak	11.100	0.001	17148	25175				
C36	11.337	-0.007	13831	26414				
o-terph	6.441	0.001	10576196	8334609				
Triacon Surr	9.865	-0.002	7035130	7260174				

Range Times: NW Diesel(4.422 - 8.218) NW Gas(1.831 - 4.422) NW M.Oil(8.218 - 11.845)
AK102(3.483 - 8.416) AK103(8.416 - 11.394) Jet A(3.483 - 6.304)

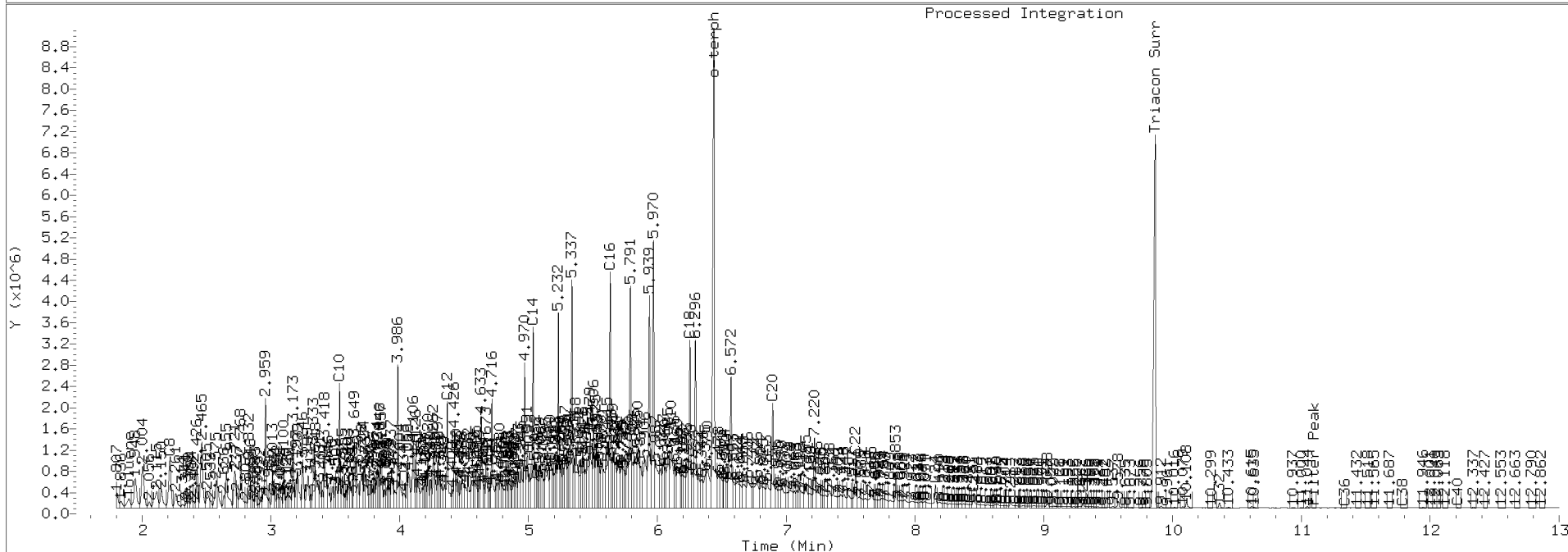
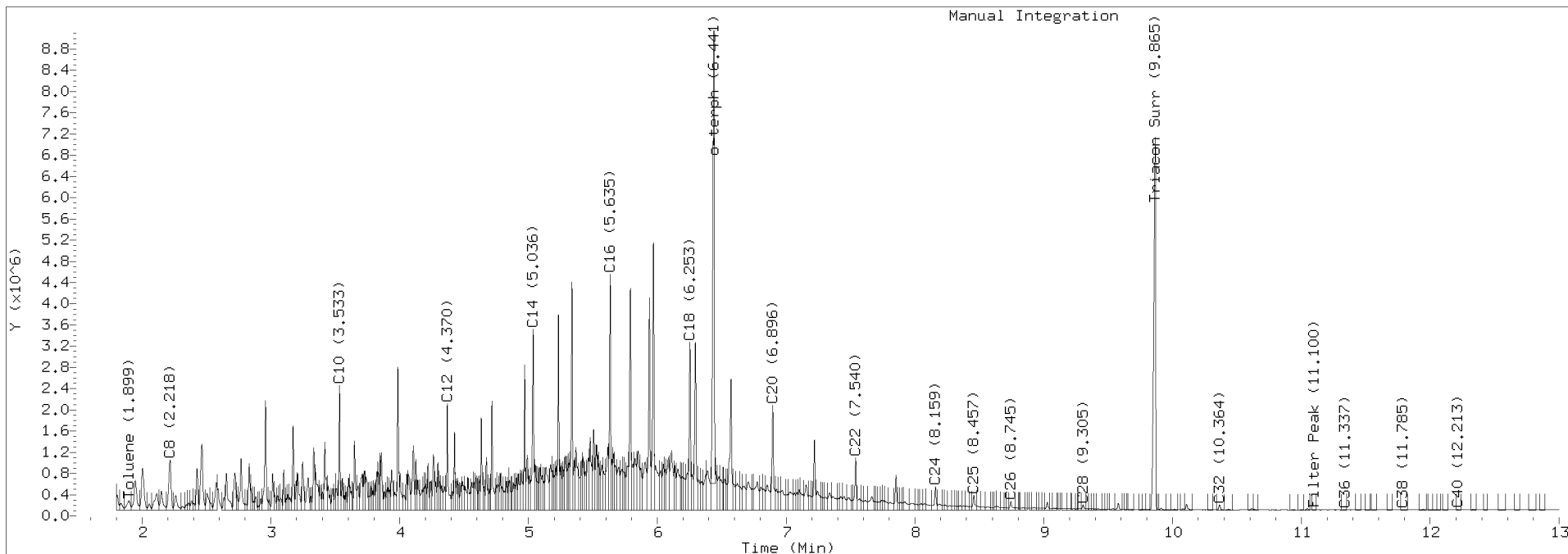
Surrogate	Area	Amount	%Rec
o-Terphenyl	8334609	37.9	84.2
Triacontane	7260174	38.0	84.4

Analyte	RF	Curve Date
o-Terph Surr	219872.3	28-FEB-2017
Triacon Surr	191068.8	28-FEB-2017
Gas	21747.6	xx-xx-xxxx
Diesel	155491.0	28-FEB-2017
Motor Oil	137039.0	28-FEB-2017

TPH Manual Integrations Report

Datafile: FID3B, 20170303.b/17030320.D Injection: 03-MAR-2017 18:39

Lab ID:17C0009-15





Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

B-14-12
17C0009-16 (Solid)

Volatile Organic Compounds

Method: EPA 8260C

Sampled: 02/27/2017 16:40

Instrument: NT5

Analyzed: 06-Mar-2017 20:09

Sample Preparation: Preparation Method: EPA 5035 (Methanol Extraction)
Preparation Batch: BFC0220 Sample Size: 8.741 g (wet) Dry Weight: 5.90 g
Prepared: 06-Mar-2017 Final Volume: 5 mL % Solids: 67.45

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
1,2-Dichloroethane	107-06-2	200	266	ND	ug/kg	U
Benzene	71-43-2	200	266	9270	ug/kg	D
Toluene	108-88-3	200	266	1550	ug/kg	D
Ethylbenzene	100-41-4	200	266	17600	ug/kg	D
m,p-Xylene	179601-23-1	200	266	29700	ug/kg	D
o-Xylene	95-47-6	200	266	594	ug/kg	D
<i>Surrogate: Dibromofluoromethane</i>			30-160 %	87.1	%	
<i>Surrogate: 1,2-Dichloroethane-d4</i>			80-124 %	85.3	%	
<i>Surrogate: Toluene-d8</i>			80-120 %	103	%	
<i>Surrogate: 4-Bromofluorobenzene</i>			80-120 %	105	%	
<i>Surrogate: 1,2-Dichlorobenzene-d4</i>			80-120 %	101	%	



Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

B-14-12
17C0009-16 (Solid)

Volatile Organic Compounds

Method: NWTPHg Sampled: 02/27/2017 16:40
Instrument: NT3 Analyzed: 06-Mar-2017 18:13

Sample Preparation: Preparation Method: EPA 5035 (Methanol Extraction) Dry Weight: 5.90 g
Preparation Batch: BFC0131 Sample Size: 8.741 g (wet)
Prepared: 06-Mar-2017 Final Volume: 5 mL % Solids: 67.45

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Gasoline Range Organics (Tol-Nap)		500	66500	1410000	ug/kg	D
HC ID: GRO						
Surrogate: Toluene-d8			80-120 %	115	%	
Surrogate: 4-Bromofluorobenzene			78-123 %	100	%	

Data File: \\target\share\chend\nt3.1\20170306s.1b\303061725G.D

Date : 06-HRR-2017 18:13

Client ID:

Sample Info: 17C0009-16

Page 1

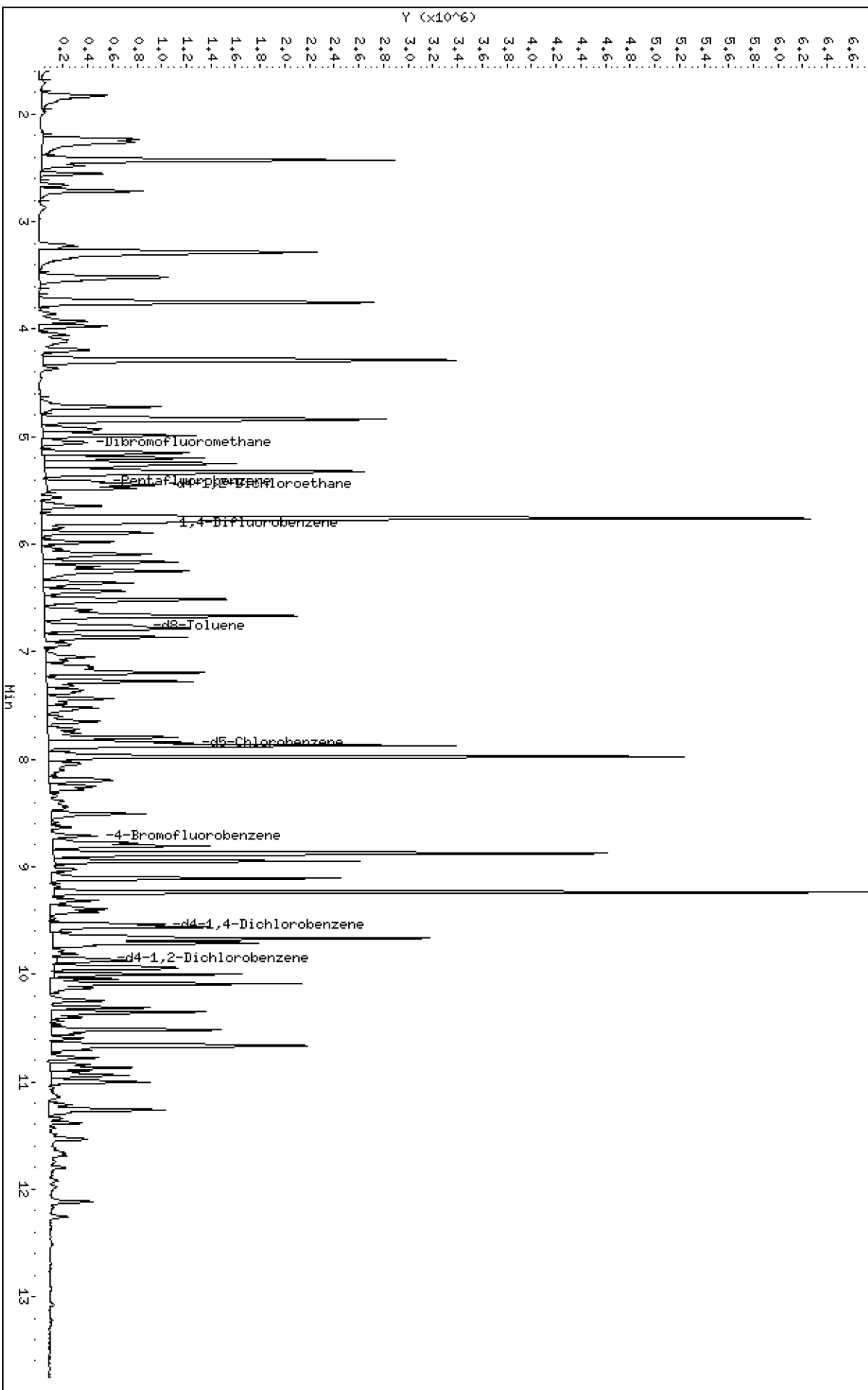
Instrument: nt3.1

Operator: PC

Column diameter: 0.18

Column phase: RTXWMS

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ARI Labs, Inc.

8260C 10 ml purge

Data file : \\target\share\chem1\nt3.i\20170306s.b\V303061725G.D
 Lab Smp Id: 17C0009-16
 Inj Date : 06-MAR-2017 18:13
 Operator : PC Inst ID: nt3.i
 Smp Info : 17C0009-16
 Misc Info : 15-
 Comment :
 Method : \\target\share\chem1\nt3.i\20170306s.b\8260C022417.m
 Meth Date : 06-Mar-2017 07:32 Paul Quant Type: ISTD
 Cal Date : 14-FEB-2017 18:50 Cal File: V302141718.D
 Als bottle: 12
 Dil Factor: 1.00000
 Integrator: HP RTE Compound Sublist: gsurr.sub
 Target Version: 4.14
 Processing Host: ORGDATA11

Concentration Formula: Amt * DF * Pv / Sa * CpndVariable

Name	Value	Description
DF	1.000	Dilution Factor
Pv	10.000	Purge Volume (mL)
Sa	10.000	Sample Amount (mL)
Cpnd Variable		Local Compound Variable

Compounds	QUANT	SIG	RT	EXP RT	REL RT	RESPONSE	CONCENTRATIONS	
							ON-COLUMN (ug/L)	FINAL (ug/L)
\$ 27 Dibromofluoromethane	111		5.052	5.053	(0.932)	60543	5.06790	5.068
* 32 Pentafluorobenzene	168		5.419	5.420	(1.000)	254285	10.0000	
\$ 33 d4-1,2-Dichloroethane	65		5.451	5.446	(1.006)	98029	7.25278	7.253(R)
* 37 1,4-Difluorobenzene	114		5.802	5.803	(1.000)	404649	10.0000	
\$ 43 d8-Toluene	98		6.764	6.765	(1.166)	281426	5.72896	5.729
* 53 d5-Chlorobenzene	117		7.843	7.844	(1.000)	410538	10.0000	
\$ 62 4-Bromofluorobenzene	174		8.715	8.715	(1.111)	86571	5.00906	5.009
* 76 d4-1,4-Dichlorobenzene	152		9.539	9.534	(1.000)	222793	10.0000	
\$ 79 d4-1,2-Dichlorobenzene	152		9.858	9.858	(1.033)	104399	4.99244	4.992

QC Flag Legend

R - Spike/Surrogate failed recovery limits.

ARI Labs, Inc.

INTERNAL STANDARD COMPOUNDS
 AREA AND RT SUMMARY

Instrument ID: nt3.i Calibration Date: 03-MAR-2017
 Lab File ID: V303061725G.D Calibration Time: 21:57
 Lab Smp Id: 17C0009-16
 Analysis Type: VOA Level: LOW
 Quant Type: ISTD Sample Type: WATER
 Operator: PC
 Method File: \\target\share\chem1\nt3.i\20170306s.b\8260C022417.m
 Misc Info: 15-

Test Mode:

Use Initial Calibration Level 5.
 If Continuing Cal. use Initial Cal. Level 5

COMPOUND	STANDARD	AREA LIMIT		SAMPLE	%DIFF
		LOWER	UPPER		
32 Pentafluorobenzon	317912	158956	635824	254285	-20.01
37 1,4-Difluorobenze	512039	256020	1024078	404649	-20.97
53 d5-Chlorobenzene	494052	247026	988104	410538	-16.90
76 d4-1,4-Dichlorobe	282154	141077	564308	222793	-21.04

COMPOUND	STANDARD	RT LIMIT		SAMPLE	%DIFF
		LOWER	UPPER		
32 Pentafluorobenzon	5.42	4.92	5.92	5.42	-0.01
37 1,4-Difluorobenze	5.80	5.30	6.30	5.80	-0.01
53 d5-Chlorobenzene	7.84	7.34	8.34	7.84	-0.01
76 d4-1,4-Dichlorobe	9.53	9.03	10.03	9.54	0.05

AREA UPPER LIMIT = +100% of internal standard area.
 AREA LOWER LIMIT = - 50% of internal standard area.
 RT UPPER LIMIT = + 0.50 minutes of internal standard RT.
 RT LOWER LIMIT = - 0.50 minutes of internal standard RT.

ARI Labs, Inc.

RECOVERY REPORT

Client Name: Client SDG: 20151005
Sample Matrix: LIQUID Fraction: VOA
Lab Smp Id: 17C0009-16
Level: LOW Operator: PC
Data Type: MS DATA SampleType: SAMPLE
SpikeList File: allspike.spk Quant Type: ISTD
Sublist File: gsurr.sub
Method File: \\target\share\chem1\nt3.i\20170306s.b\8260C022417.m
Misc Info: 15-

SURROGATE COMPOUND	AMOUNT ADDED ug/L	AMOUNT RECOVERED ug/L	% RECOVERED	LIMITS
\$ 27 Dibromofluorometha	5.000	5.068	101.36	80-120
\$ 33 d4-1,2-Dichloroeth	5.000	7.253	145.06*	80-128
\$ 43 d8-Toluene	5.000	5.729	114.58	80-120
\$ 62 4-Bromofluorobenze	5.000	5.009	100.18	80-120
\$ 79 d4-1,2-Dichloroben	5.000	4.992	99.85	80-120

REVIEW SUMMARY FOR FILE - V303061725G.D

Lab ID: 17C0009-16

nt3.i, 20170306s.b\8260C022417.m, 06-MAR-2017 18:13

RT CO-ELUTION COMPOUNDS

Data File: \\target\share\chend\nt3.1\20170306g.jb\303061725G.D

Date: 06-HRR-2017 18:13

Client ID:

Sample Info: 17C0009-16

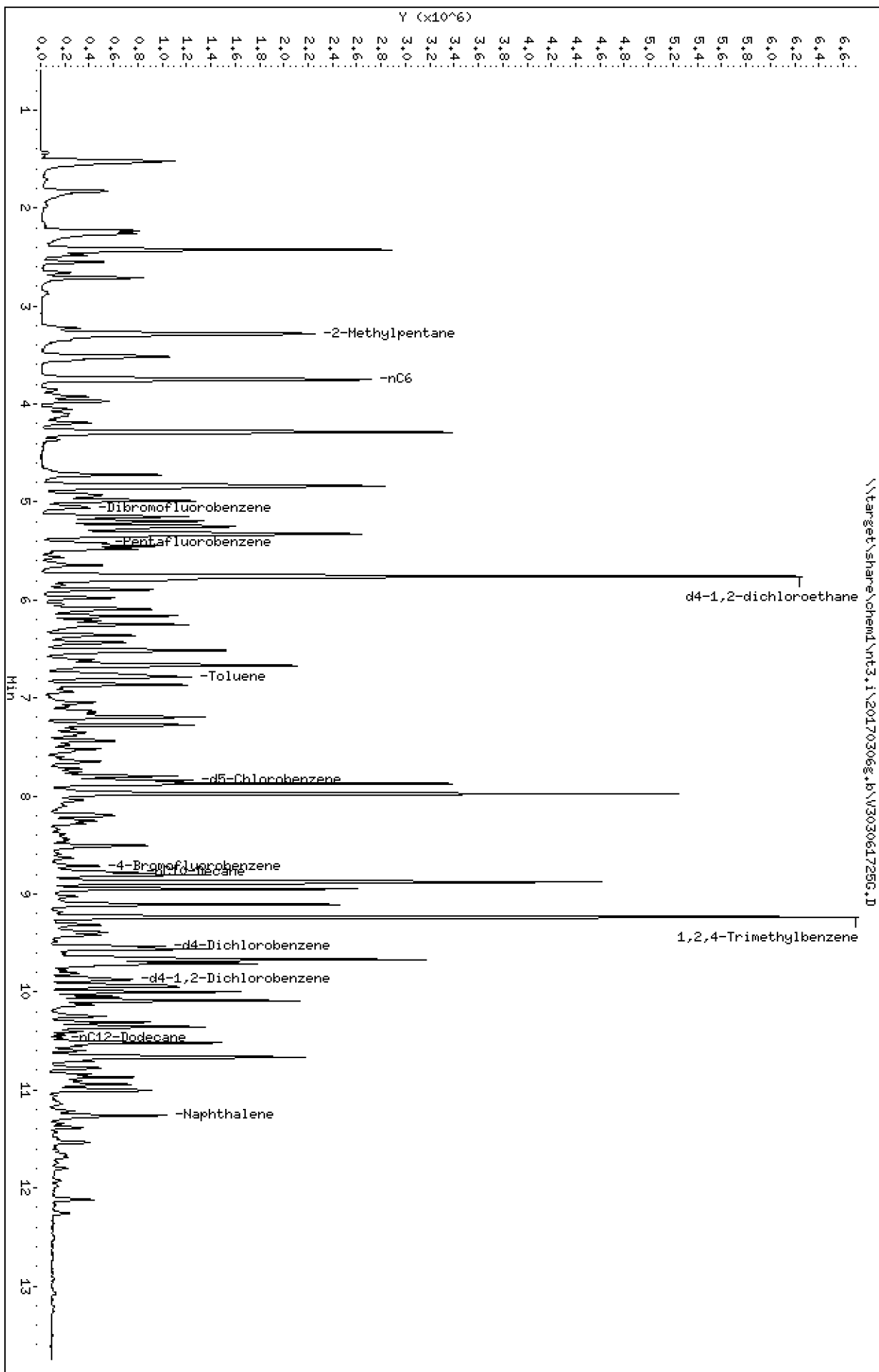
Column phase: RTXWMS

Instrument: nt3.1

Operator: PC

Column diameter: 0.18

Page 1



Analytical Resources Inc.
GC/MS Gas Quantitation Report

Data file: 20170306g.b/V303061725G.D
Method: \20170306g.b\NWTPHG.m
Instrument: nt3.i
Gas Ical Date: 14-Feb-2017
Injection Date: 06-MAR-2017 18:13

ARI ID: 17C0009-16
Client ID:
Matrix: WATER
Dilution Factor: 1.000
Operator: PC

=====

GASOLINE HYDROCARBONS

Range	RF	Total Area*	Amount (ug/mL)
WAGas Tol-C12 (6.70 to 10.57)	52141375	101628528	1.949
8015C 2MP-TMB (3.17 to 9.34)	87713511	149185661	1.701
AK101 nC6-nC10 (3.65 to 8.68)	61260787	110010853	1.796
NWTPHG Tol-Nap (6.70 to 11.36)	54123058	114722545	2.120

M Indicates manual integration within range

* Surrogate areas are subtracted from Total Area

NW Gas Range Subtracted Peaks

8.715	786970	4-Bromofluorobenzene
9.534	1498902	d4-Dichlorobenzene
7.844	1814892	d5-Chlorobenzene
9.874	1516863	d4-1,2-Dichlorobenzene



Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

B-14-12
17C0009-16 (Solid)

Petroleum Hydrocarbons

Method: NWTPH-Dx

Sampled: 02/27/2017 16:40

Instrument: FID3

Analyzed: 03-Mar-2017 19:03

Sample Preparation:

Preparation Method: EPA 3546 (Microwave)

Preparation Batch: BFC0023

Sample Size: 10.07 g (wet)

Dry Weight: 6.79 g

Prepared: 02-Mar-2017

Final Volume: 1 mL

% Solids: 67.45

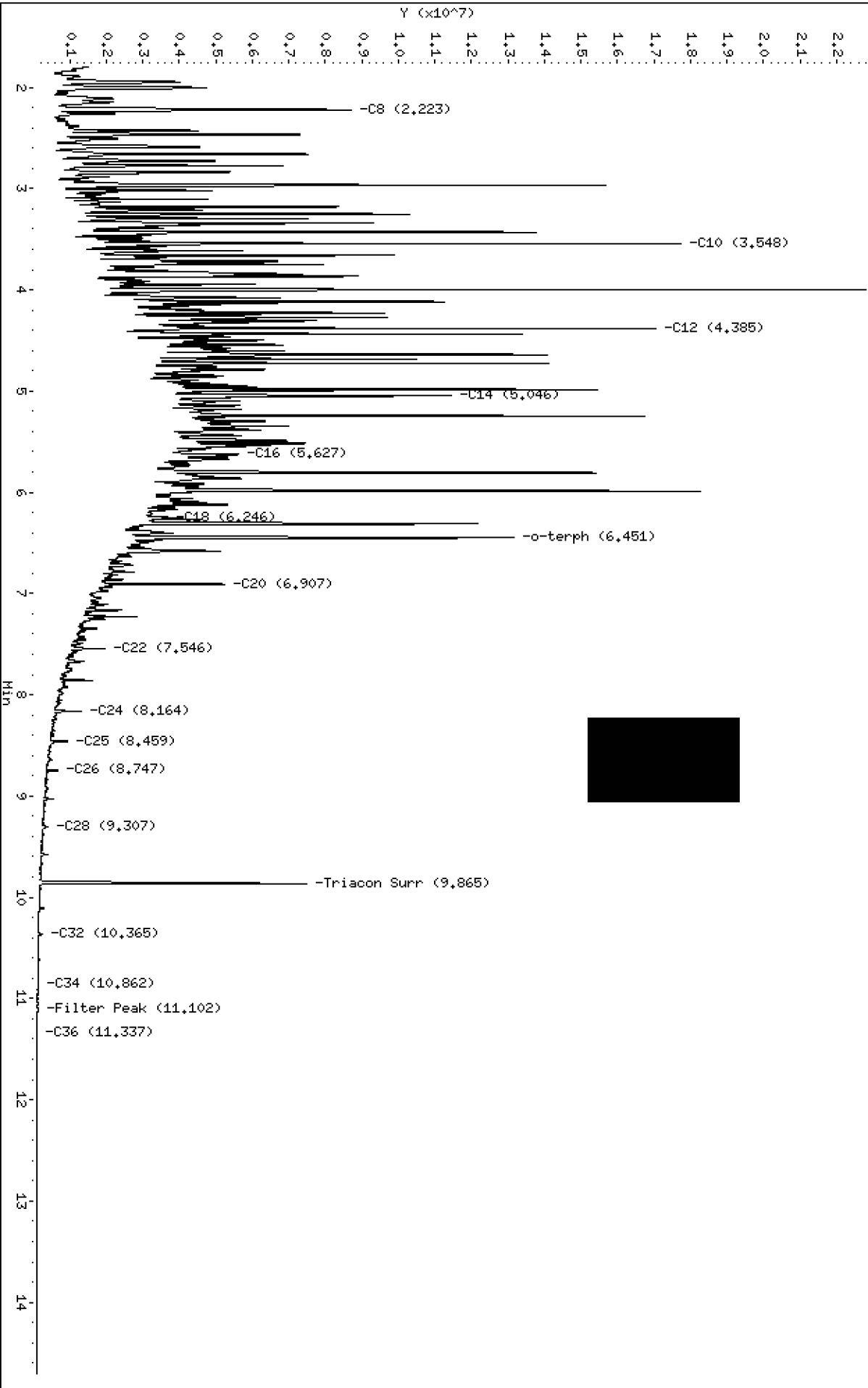
Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Diesel Range Organics (C12-C24)		1	7.36	694	mg/kg	E
HC ID: DIESEL						
Motor Oil Range Organics (C24-C38)		1	14.7	29.4	mg/kg	
HC ID: RRO						
Surrogate: <i>o</i> -Terphenyl			50-150 %	91.6	%	

Data File: \\TARGET\share\chem2\fid3b,1\20170303,b\17030321.D
Date: 03-MAR-2017 19:03
Client ID:
Sample Info: 17C0009-16

Column phase: RTX-1

Instrument: fid3b,1
Operator: ML
Column diameter: 0.25

\\TARGET\share\chem2\fid3b,1\20170303,b\17030321.D



Analytical Resources Inc.
TPH Quantitation Report

Data file: 20170303.b/17030321.D
Method: 20170303.b\FID3TPH.m
Instrument: fid3b.i
Operator: ML
Report Date: 03/06/2017
Macro: FID3_022817

ARI ID: 17C0009-16
Client ID:
Injection: 03-MAR-2017 19:03
Dilution Factor: 1

FID:3B RESULTS

Compound	RT	Shift	Height	Area	Method	Range	Total Area	Conc
Toluene	1.893	0.012	1197729	2765407	WATPHG	(Tol-C12)	473961566	21793.7
C8	2.223	0.010	8619606	13221801	WATPHD	(C12-C24)	732749871	4712.5
C10	3.548	0.015	17637408	13133999	WATPHM	(C24-C38)	27407358	200.0
C12	4.385	0.013	16965958	15818194				
C14	5.046	0.008	11371382	15844320				
C16	5.627	-0.008	5511995	8383851				
C18	6.246	-0.008	3567221	4955045				
C20	6.907	0.008	5150500	6742520				
C22	7.546	-0.000	1851519	2449432				
C24	8.164	-0.004	1204075	1618807				
C25	8.459	-0.007	826868	1999361				
C26	8.747	-0.007	583267	986789				
C28	9.307	-0.008	307075	700527				
C32	10.365	-0.010	162936	231054				
C34	10.862	-0.009	44808	135812				
Filter Peak	11.102	0.003	31186	52801				
C36	11.337	-0.007	18680	47730				
o-terph	6.451	0.011	10420182	9059138				
Triacon Surr	9.865	-0.002	7290526	7447936				

Range Times: NW Diesel(4.422 - 8.218) NW Gas(1.831 - 4.422) NW M.Oil(8.218 - 11.845)
AK102(3.483 - 8.416) AK103(8.416 - 11.394) Jet A(3.483 - 6.304)

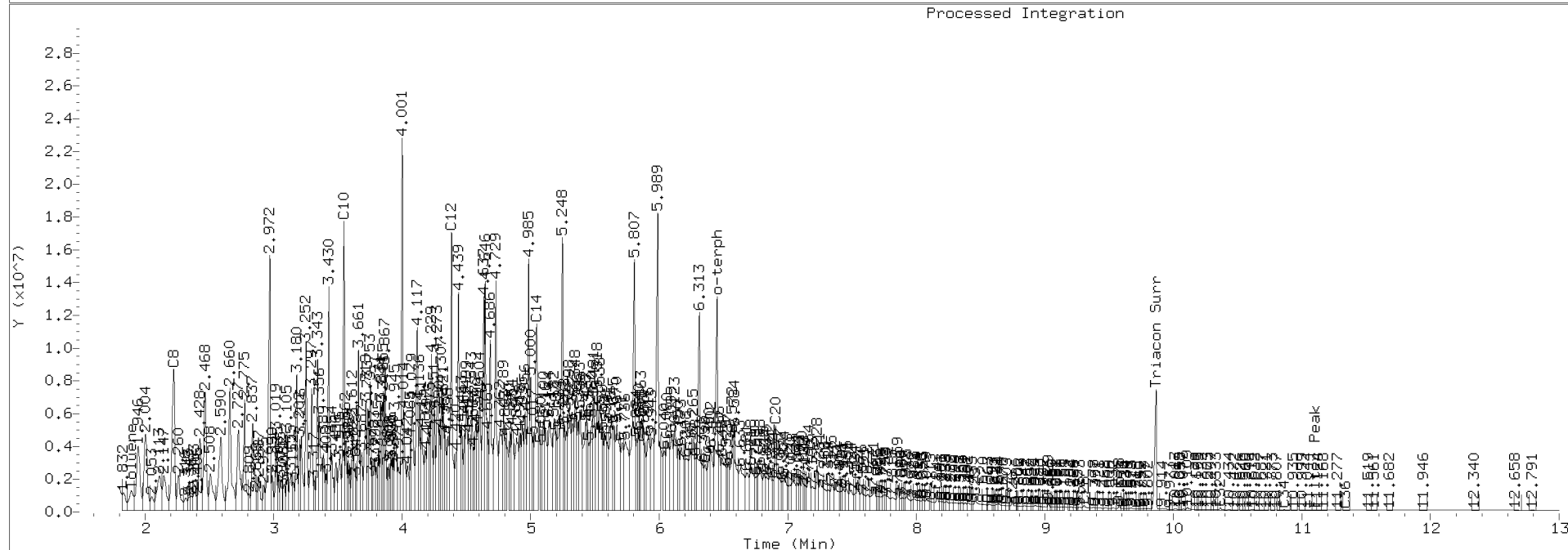
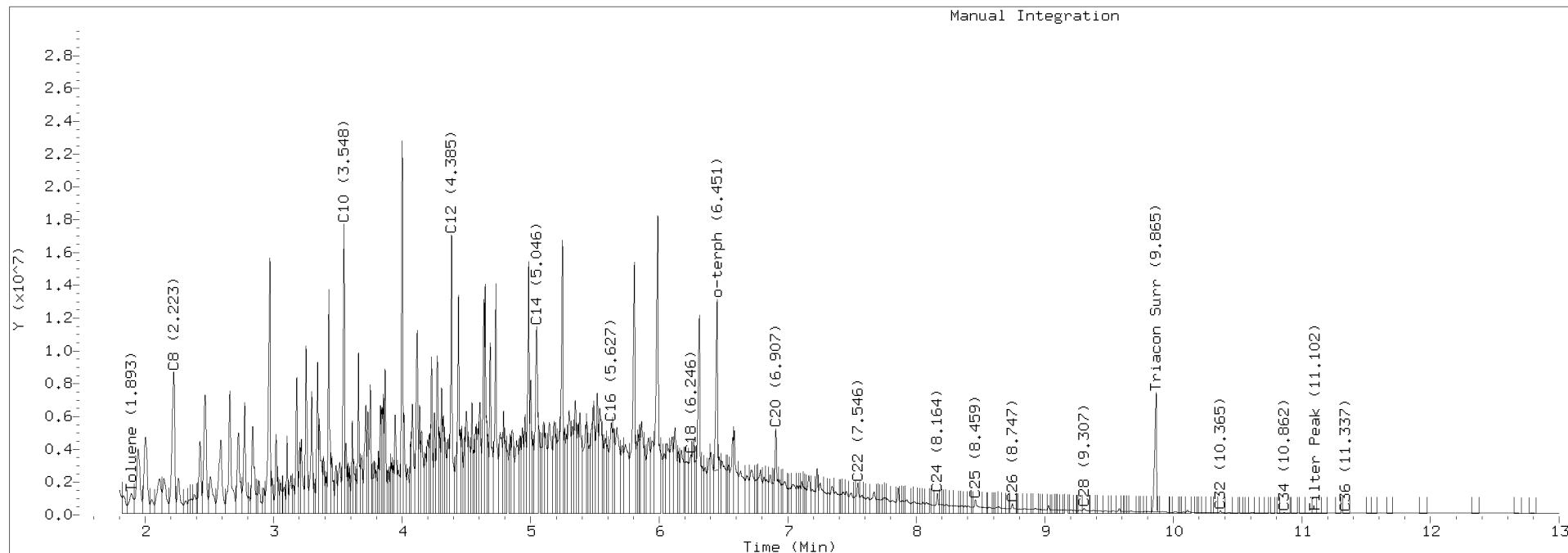
Surrogate	Area	Amount	%Rec
o-Terphenyl	9059138	41.2	91.6
Triacontane	7447936	39.0	86.6

Analyte	RF	Curve Date
o-Terph Surr	219872.3	28-FEB-2017
Triacon Surr	191068.8	28-FEB-2017
Gas	21747.6	xx-xx-xxxx
Diesel	155491.0	28-FEB-2017
Motor Oil	137039.0	28-FEB-2017

TPH Manual Integrations Report

Datafile: FID3B, 20170303.b/17030321.D Injection: 03-MAR-2017 19:03

Lab ID:17C0009-16





Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

B-14-12
17C0009-16RE1 (Solid)

Petroleum Hydrocarbons

Method: NWTPH-Dx

Sampled: 02/27/2017 16:40

Instrument: FID3

Analyzed: 06-Mar-2017 16:34

Sample Preparation:

Preparation Method: EPA 3546 (Microwave)

Preparation Batch: BFC0023

Sample Size: 10.07 g (wet)

Dry Weight: 6.79 g

Prepared: 02-Mar-2017

Final Volume: 1 mL

% Solids: 67.45

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Diesel Range Organics (C12-C24)		5	36.8	715	mg/kg	D
HC ID: DIESEL						
Motor Oil Range Organics (C24-C38)		5	73.6	ND	mg/kg	U
<i>Surrogate: o-Terphenyl</i>			50-150 %	93.3	%	

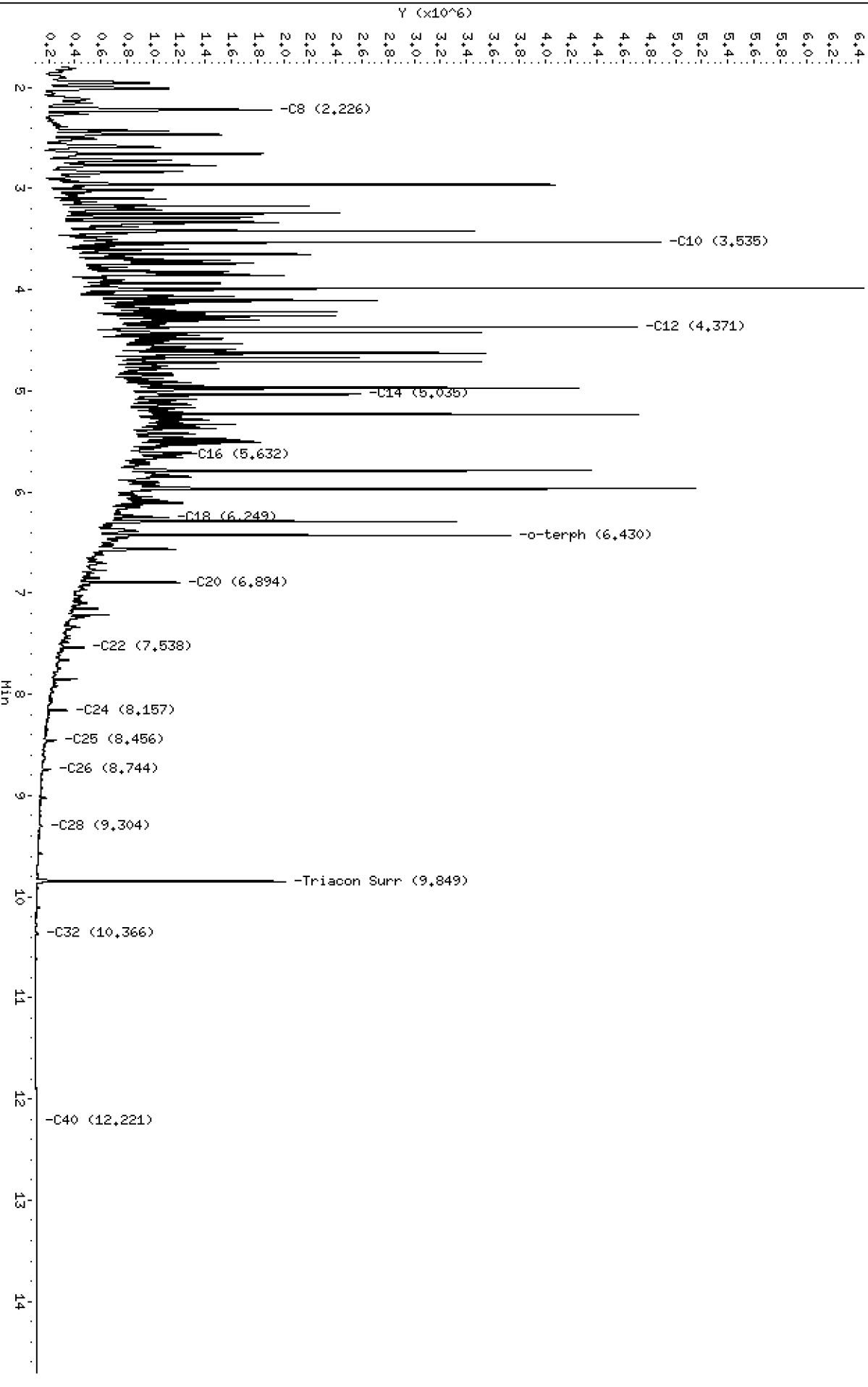
Data File: \\TARGET\share\chem2\fid3b,1\20170306_b\17030607.D
Date: 06-HRR-2017 16:34
Client ID:
Sample Info: 17C0009-16REL,5

Instrument: fid3b,1

Column phase: RTX-1

Operator: ML
Column diameter: 0.25

\\TARGET\share\chem2\fid3b,1\20170306_b\17030607.D



Analytical Resources Inc.
TPH Quantitation Report

Data file: 20170306.b/17030607.D
Method: 20170306.b\FID3TPH.m
Instrument: fid3b.i
Operator: ML
Report Date: 03/07/2017
Macro: FID3_022817

ARI ID: 17C0009-16RE1
Client ID:
Injection: 06-MAR-2017 16:34
Dilution Factor: 5

FID:3B RESULTS

Compound	RT	Shift	Height	Area	Method	Range	Total Area	Conc
Toluene	1.895	0.009	219762	303676	WATPHG	(Tol-C12)	96525684	4438.4
C8	2.226	0.008	1804705	2653282	WATPHD	(C12-C24)	151003476	971.1
C10	3.535	0.003	4793452	2718625	WATPHM	(C24-C38)	4425463	32.3
C12	4.371	0.002	4610952	3199152				
C14	5.035	-0.001	2493759	3111157				
C16	5.632	-0.001	1117782	851306				
C18	6.249	-0.003	1022057	961591				
C20	6.894	-0.004	1108181	1327507				
C22	7.538	-0.006	372065	507888				
C24	8.157	-0.008	239786	287707				
C25	8.456	-0.008	162155	367529				
C26	8.744	-0.008	113309	135400				
C28	9.304	-0.010	56940	119147				
C32	10.366	-0.008	25480	33941				
C34	----							
Filter Peak	----							
C36	----							
o-terph	6.430	-0.008	3113794	1853837				
Triacon Surr	9.849	-0.018	1913137	1531872				

Range Times: NW Diesel(4.419 - 8.215) NW Gas(1.836 - 4.419) NW M.Oil(8.215 - 11.846)
AK102(3.482 - 8.414) AK103(8.414 - 11.395) Jet A(3.482 - 6.302)

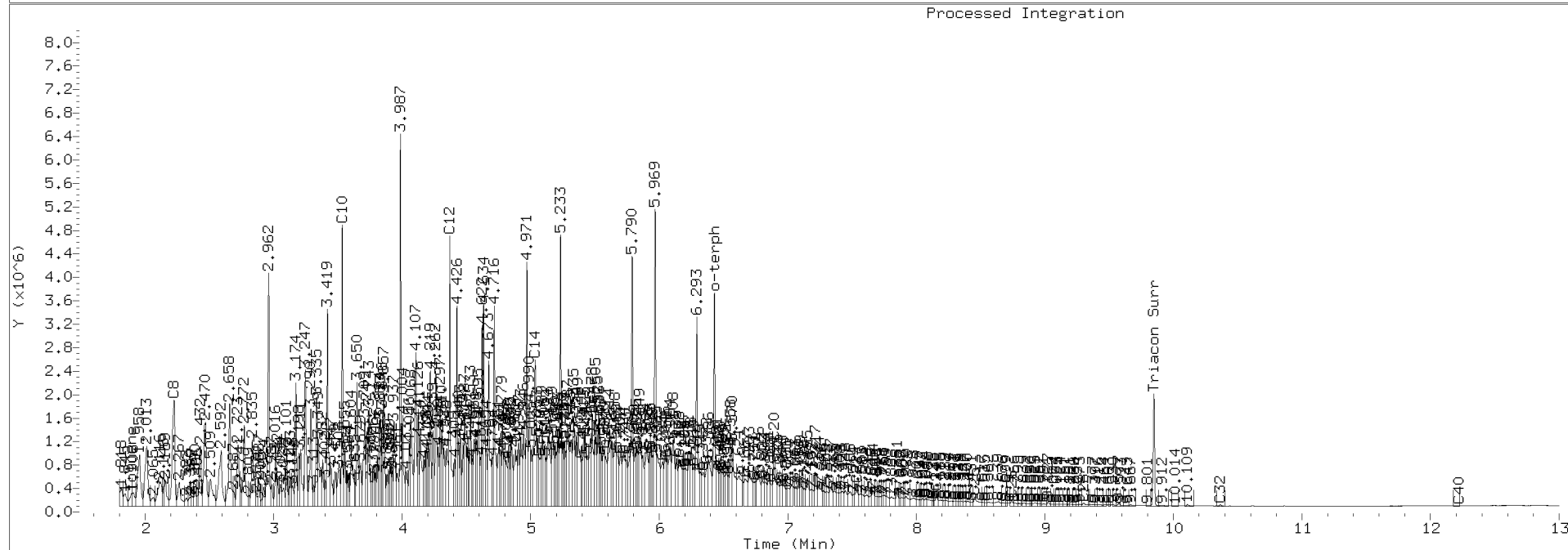
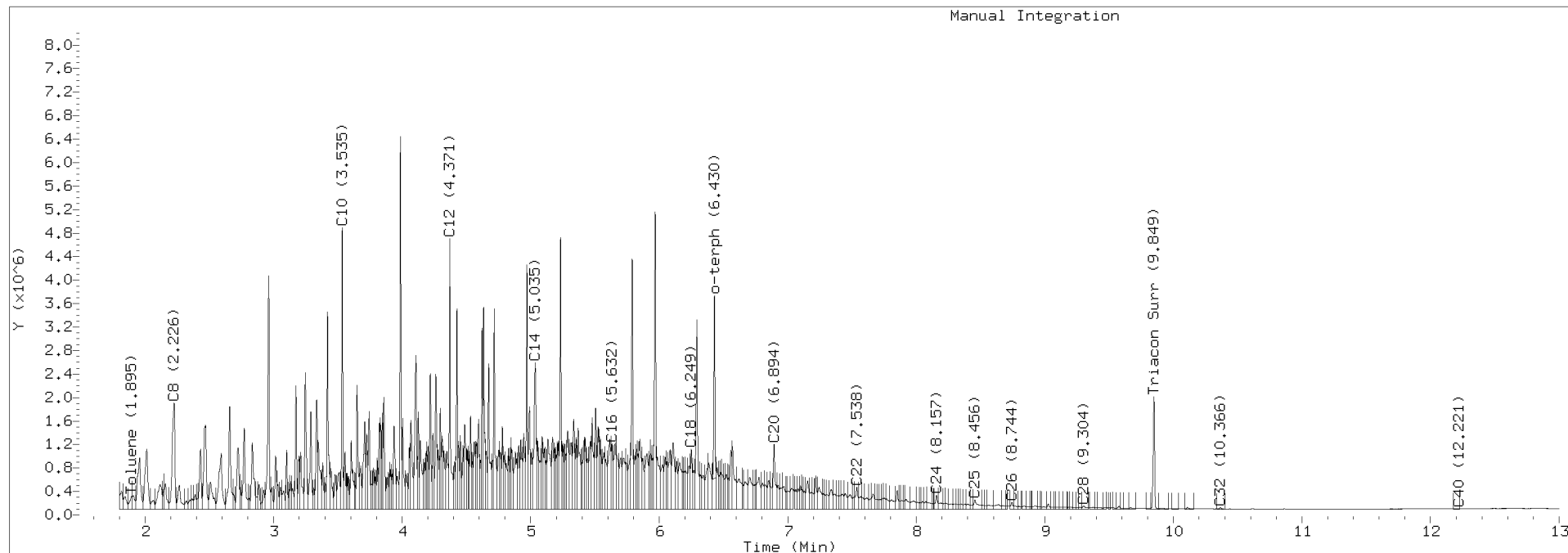
Surrogate	Area	Amount	%Rec
o-Terphenyl	1853837	8.4	93.7
Triacontane	1531872	8.0	89.1

Analyte	RF	Curve Date
o-Terph Surr	219872.3	28-FEB-2017
Triacon Surr	191068.8	28-FEB-2017
Gas	21747.6	xx-xx-xxxx
Diesel	155491.0	28-FEB-2017
Motor Oil	137039.0	28-FEB-2017

TPH Manual Integrations Report

Datafile: FID3B, 20170306.b/17030607.D Injection: 06-MAR-2017 16:34

Lab ID:17C0009-16RE1





Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

B-15-W
17C0009-17 (Water)

Volatile Organic Compounds

Method: EPA 8260C

Sampled: 02/27/2017 16:00

Instrument: NT3

Analyzed: 02-Mar-2017 13:57

Sample Preparation: Preparation Method: EPA 5030 (Purge and Trap)
Preparation Batch: BFC0055 Sample Size: 10 mL
Prepared: 02-Mar-2017 Final Volume: 10 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
1,2-Dichloroethane	107-06-2	1	0.20	2.54	ug/L	
Benzene	71-43-2	1	0.20	44.2	ug/L	
Toluene	108-88-3	1	0.20	53.9	ug/L	
Ethylbenzene	100-41-4	1	0.20	287	ug/L	E
m,p-Xylene	179601-23-1	1	0.40	176	ug/L	E
o-Xylene	95-47-6	1	0.20	12.9	ug/L	
<i>Surrogate: 1,2-Dichloroethane-d4</i>			<i>80-129 %</i>	<i>116</i>	<i>%</i>	
<i>Surrogate: Toluene-d8</i>			<i>80-120 %</i>	<i>100</i>	<i>%</i>	
<i>Surrogate: 4-Bromofluorobenzene</i>			<i>80-120 %</i>	<i>100</i>	<i>%</i>	



Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

B-15-W
17C0009-17 (Water)

Volatile Organic Compounds

Method: NWTPHg Sampled: 02/27/2017 16:00
Instrument: NT3 Analyzed: 02-Mar-2017 13:57

Sample Preparation: Preparation Method: EPA 5030 (Purge and Trap)
Preparation Batch: BFC0055 Sample Size: 10 mL
Prepared: 02-Mar-2017 Final Volume: 10 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Gasoline Range Organics (Tol-Nap)		1	100	14000	ug/L	E
HC ID: GAS						
Surrogate: Toluene-d8			80-120 %	100	%	
Surrogate: 4-Bromofluorobenzene			80-120 %	100	%	

Data File: \\target\share\chend\nt3,1\20170302s,16\303021713G.D

Date : 02-MAR-2017 13:57

Client ID:

Sample Info: 17C0009-17

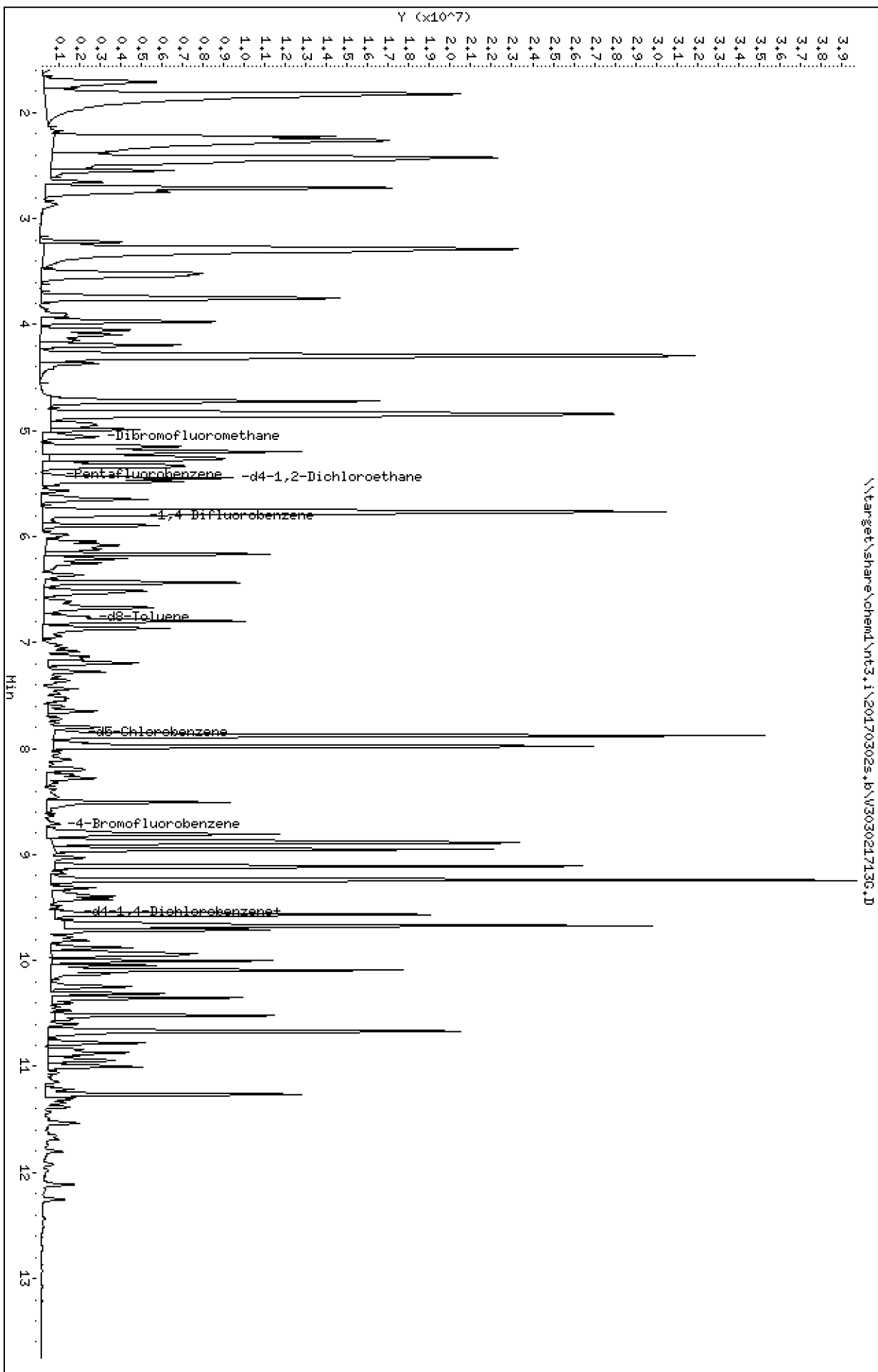
Page 1

Column phase: RTXWMS

Instrument: nt3,1

Operator: PC

Column diameter: 0.18



ARI Labs, Inc.

8260C 10 ml purge

Data file : \\target\share\chem1\nt3.i\20170302s.b\V303021713G.D
 Lab Smp Id: 17C0009-17
 Inj Date : 02-MAR-2017 13:57
 Operator : PC
 Smp Info : 17C0009-17
 Misc Info : 16-
 Comment :
 Method : \\target\share\chem1\nt3.i\20170302s.b\8260C022417.m
 Meth Date : 03-Mar-2017 15:16 nt3.i
 Cal Date : 14-FEB-2017 18:50
 Als bottle: 12
 Dil Factor: 1.00000
 Integrator: HP RTE
 Target Version: 4.14
 Processing Host: ORGDATA20

Inst ID: nt3.i

Quant Type: ISTD

Cal File: V302141718.D

Compound Sublist: gsurr.sub

Compounds	QUANT	SIG	RT	EXP RT	REL RT	RESPONSE	CONCENTRATIONS	
							ON-COLUMN (ug/L)	FINAL (ug/L)
\$ 27 Dibromofluoromethane	111		5.053	5.053	(0.932)	67753	4.89143	4.891(R)
* 32 Pentafluorobenzene	168		5.420	5.419	(1.000)	294834	10.0000	
\$ 33 d4-1,2-Dichloroethane	65		5.447	5.446	(1.005)	296667	18.9305	18.931(R)
* 37 1,4-Difluorobenzene	114		5.803	5.802	(1.000)	480129	10.0000	
\$ 43 d8-Toluene	98		6.760	6.759	(1.165)	451665	7.74906	7.749(R)
* 53 d5-Chlorobenzene	117		7.844	7.843	(1.000)	458422	10.0000	
\$ 62 4-Bromofluorobenzene	174		8.716	8.715	(1.111)	96910	5.02158	5.022(R)
* 76 d4-1,4-Dichlorobenzene	152		9.540	9.533	(1.000)	254337	10.0000	
\$ 79 d4-1,2-Dichlorobenzene	152		9.540	9.858	(1.000)	244092	10.2250	10.225(R)

QC Flag Legend

R - Spike/Surrogate failed recovery limits.

ARI Labs, Inc.

INTERNAL STANDARD COMPOUNDS
 AREA AND RT SUMMARY

Instrument ID: nt3.i Calibration Date: 02-MAR-2017
 Lab File ID: V303021713G.D Calibration Time: 21:37
 Lab Smp Id: 17C0009-17
 Analysis Type: VOA Level:
 Quant Type: ISTD Sample Type:
 Operator: PC
 Method File: \\target\share\chem1\nt3.i\20170302s.b\8260C022417.m
 Misc Info: 16-

Test Mode:

Use Initial Calibration Level 5.
 If Continuing Cal. use Initial Cal. Level 5

COMPOUND	STANDARD	AREA LIMIT		SAMPLE	%DIFF
		LOWER	UPPER		
32 Pentafluorobenzon	317912	158956	635824	294834	-7.26
37 1,4-Difluorobenze	512039	256020	1024078	480129	-6.23
53 d5-Chlorobenzene	494052	247026	988104	458422	-7.21
76 d4-1,4-Dichlorobe	282154	141077	564308	254337	-9.86

COMPOUND	STANDARD	RT LIMIT		SAMPLE	%DIFF
		LOWER	UPPER		
32 Pentafluorobenzon	5.42	4.92	5.92	5.42	0.01
37 1,4-Difluorobenze	5.80	5.30	6.30	5.80	0.01
53 d5-Chlorobenzene	7.84	7.34	8.34	7.84	0.01
76 d4-1,4-Dichlorobe	9.53	9.03	10.03	9.54	0.06

AREA UPPER LIMIT = +100% of internal standard area.
 AREA LOWER LIMIT = - 50% of internal standard area.
 RT UPPER LIMIT = + 0.50 minutes of internal standard RT.
 RT LOWER LIMIT = - 0.50 minutes of internal standard RT.

ARI Labs, Inc.

RECOVERY REPORT

Client Name: Client SDG: 20150930a
Sample Matrix: NONE Fraction: VOA
Lab Smp Id: 17C0009-17
Level: Operator: PC
Data Type: MS DATA SampleType: SAMPLE
SpikeList File: allspike.spk Quant Type: ISTD
Sublist File: gsurr.sub
Method File: \\target\share\chem1\nt3.i\20170302s.b\8260C022417.m
Misc Info: 16-

SURROGATE COMPOUND	AMOUNT ADDED ug/L	AMOUNT RECOVERED ug/L	% RECOVERED	LIMITS
\$ 27 Dibromofluorometha	5.000	4.891	97.83	
\$ 33 d4-1,2-Dichloroeth	5.000	18.931	378.61	
\$ 43 d8-Toluene	5.000	7.749	154.98	
\$ 62 4-Bromofluorobenze	5.000	5.022	100.43	
\$ 79 d4-1,2-Dichloroben	5.000	10.225	204.50	

REVIEW SUMMARY FOR FILE - V303021713G.D

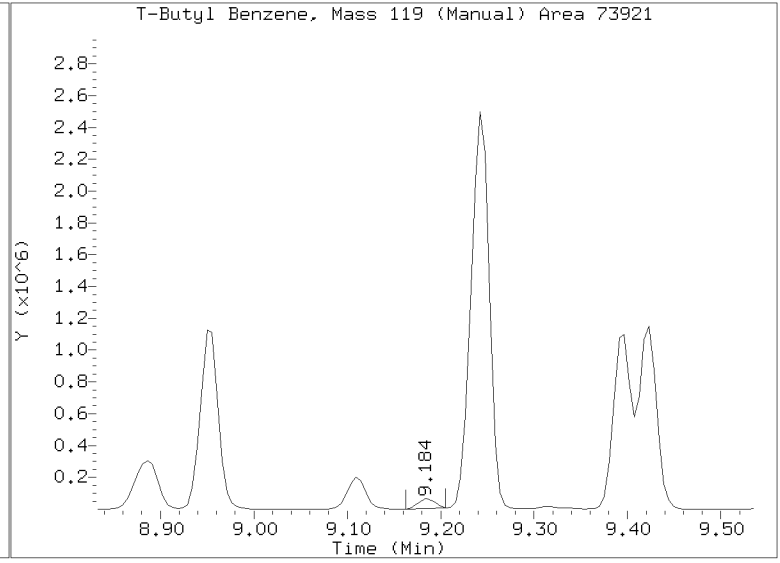
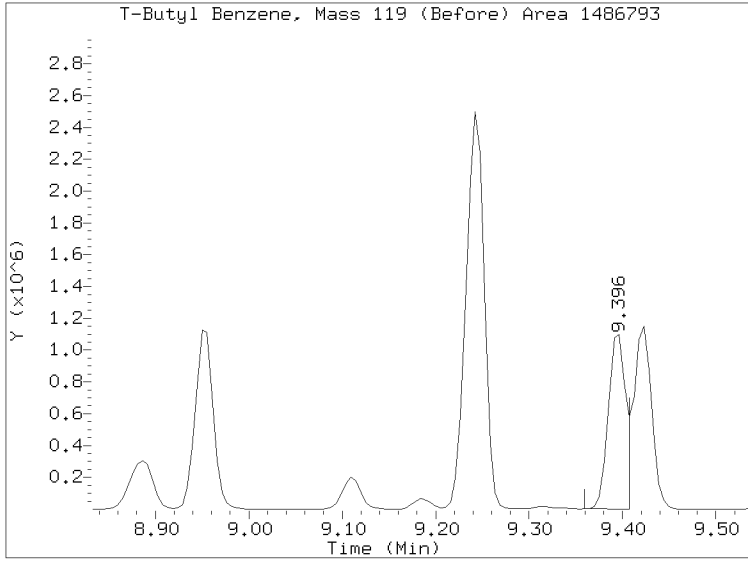
Lab ID: 17C0009-17

nt3.i, 20170302s.b\8260C022417.m, 02-MAR-2017 13:57

RT CO-ELUTION COMPOUNDS

Quant Ion Manual Peak Adjustment Report

Datafile: //target/share/chem1/nt3.i/20170302.b/V303021713.D
Injection Date: 02-MAR-2017 13:57
Lab ID:17C0009-17 Client ID:
Report Date: 03/03/2017 15:15



Data File: \\target\share\chend\nt3.1\20170302g.1b\303021713G.D

Date : 02-MAR-2017 13:57

Client ID:

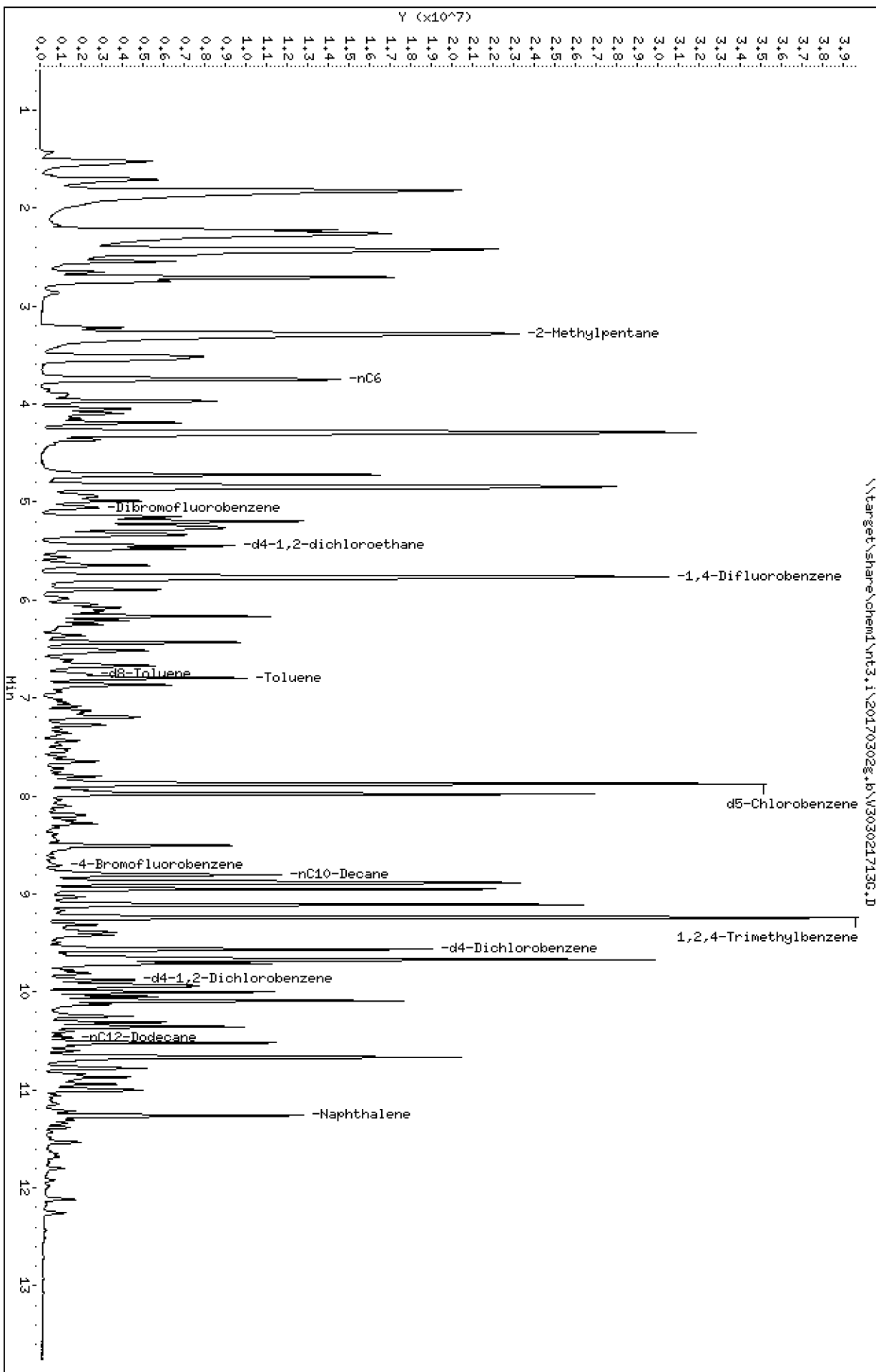
Sample Info: 17C0009-17

Column phase: RTXWMS

Instrument: nt3.1

Operator: PC

Column diameter: 0.18



Analytical Resources Inc.
GC/MS Gas Quantitation Report

Data file: 20170302g.b/V303021713G.D
Method: \20170302g.b\NWTPHG.m
Instrument: nt3.i
Gas Ical Date: 14-Feb-2017
Injection Date: 02-MAR-2017 13:57

ARI ID: 17C0009-17
Client ID:
Matrix: NONE
Dilution Factor: 1.000
Operator: PC

=====

GASOLINE HYDROCARBONS

Range	RF	Total Area*	Amount (ug/mL)
-----	----	-----	-----
WAGas Tol-C12 (6.70 to 10.57)	52141375	642132821	12.315
8015C 2MP-TMB (3.16 to 9.33)	87713511	1076766839	12.276
AK101 nC6-nC10 (3.65 to 8.68)	61260787	729355986	11.906
NWTPHG Tol-Nap (6.70 to 11.36)	54123058	755517882	13.959

M Indicates manual integration within range

* Surrogate areas are subtracted from Total Area

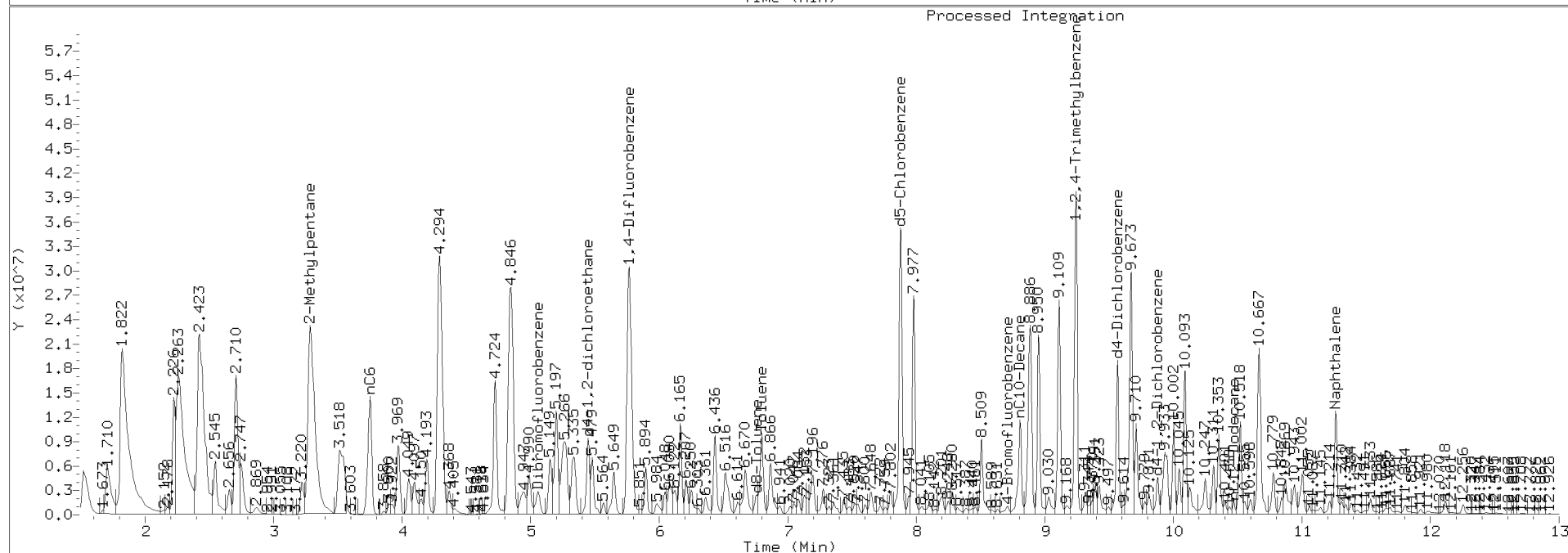
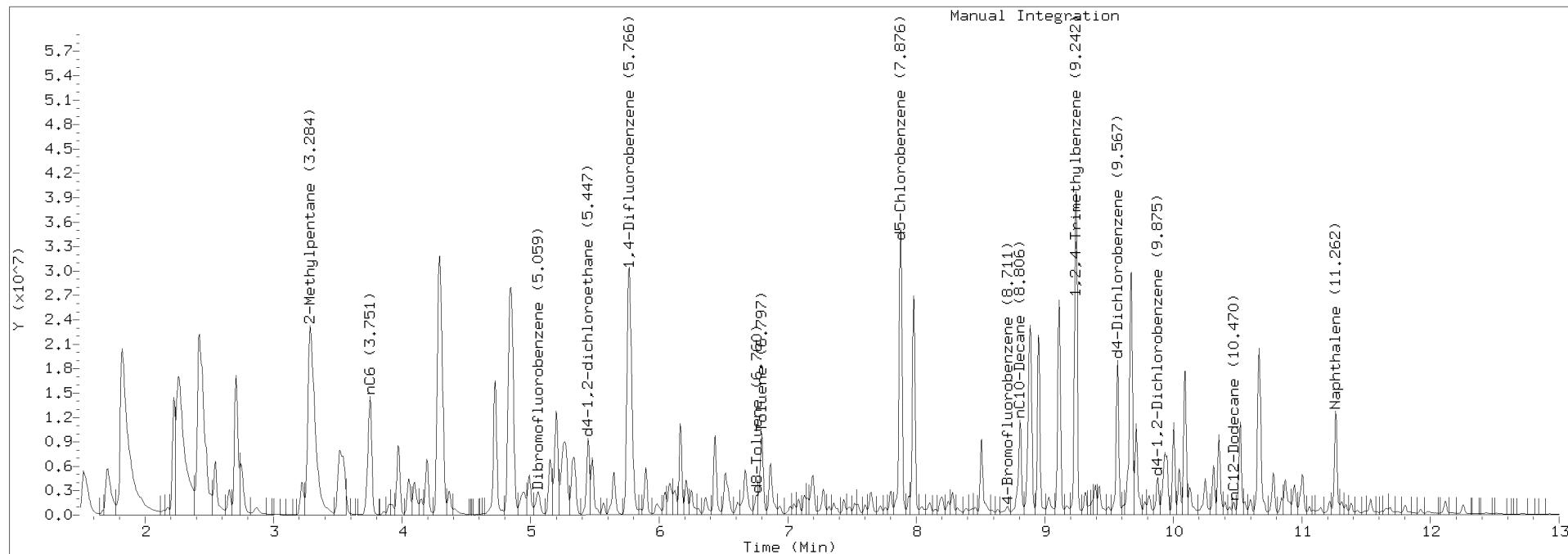
NW Gas Range Subtracted Peaks

6.760	4073768	d8-Toluene
8.711	2819247	4-Bromofluorobenzene
9.567	29412102	d4-Dichlorobenzene
7.876	60399987	d5-Chlorobenzene
9.875	7553502	d4-1,2-Dichlorobenzene

TPHG Manual Integrations Report

Datafile: NT3, 20170302g.b/V303021713G.D Injection: 02-MAR-2017 13:57

Lab ID:17C0009-17





Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

B-15-W
17C0009-17 (Water)

Petroleum Hydrocarbons

Method: NWTPH-Dx

Sampled: 02/27/2017 16:00

Instrument: FID3

Analyzed: 03-Mar-2017 22:39

Sample Preparation:

Preparation Method: EPA 3510C SepF

Preparation Batch: BFC0024

Sample Size: 475 mL

Prepared: 02-Mar-2017

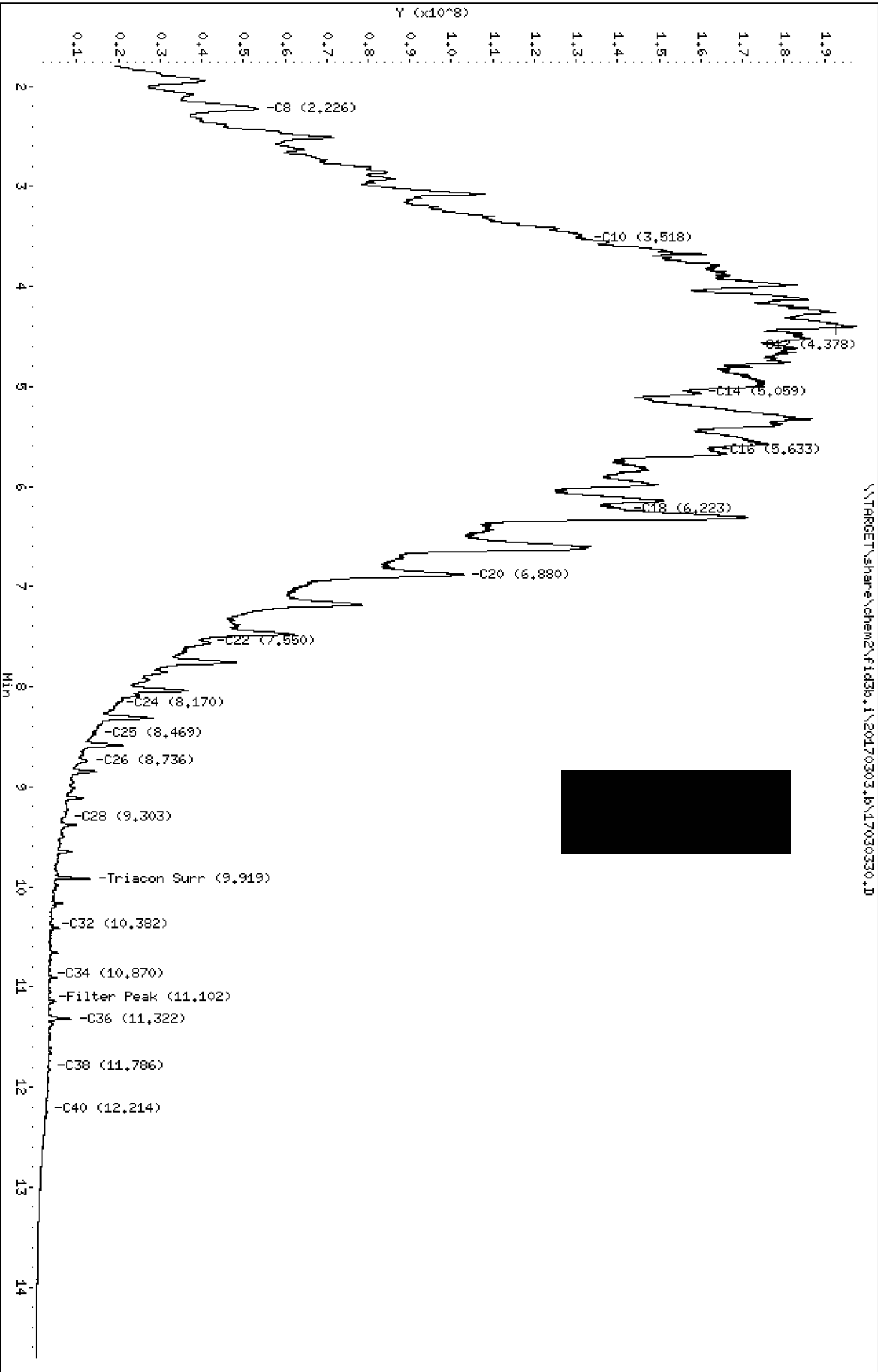
Final Volume: 2 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Diesel Range Organics (C12-C24)		1	0.211	598	mg/L	E
HC ID: DIESEL						
Motor Oil Range Organics (C24-C38)		1	0.421	40.3	mg/L	E
HC ID: MOTOR OIL						
Surrogate: <i>o</i> -Terphenyl			50-150 %		NRS	NRS

Data File: \\TARGET\share\chem2\fid3b,1\20170303_b\17030330.D
Date: 03-MAR-2017 22:39
Client ID:
Sample Info: 17C0009-17

Column phase: RTX-1

Instrument: fid3b,1
Operator: ML
Column diameter: 0.25



Analytical Resources Inc.
TPH Quantitation Report

Data file: 20170303.b/17030330.D
Method: 20170303.b\FID3TPH.m
Instrument: fid3b.i
Operator: ML
Report Date: 03/06/2017
Macro: FID3_022817

ARI ID: 17C0009-17
Client ID:
Injection: 03-MAR-2017 22:39
Dilution Factor: 1

FID:3B RESULTS

Compound	RT	Shift	Height	Area	Method	Range	Total Area	Conc
Toluene	1.875	-0.006	29774430	92764285	WATPHG (Tol-C12)		15869365913	729705.2
C8	2.226	0.013	53236969	398745552	WATPHD (C12-C24)		22090197937	142067.4
C10	3.518	-0.015	132069520	133486342	WATPHM (C24-C38)		1313163918	9582.4
C12	4.378	0.007	192708063	168662756				
C14	5.059	0.021	159446886	173544803				
C16	5.633	-0.002	162893468	94118879				
C18	6.223	-0.031	141511177	145208921				
C20	6.880	-0.019	102641173	127299547				
C22	7.550	0.004	41393305	29128662				
C24	8.170	0.002	19403954	21912302				
C25	8.469	0.003	14258044	30521490				
C26	8.736	-0.018	12298409	29116070				
C28	9.303	-0.012	6796791	13782522				
C32	10.382	0.007	4114459	6975802				
C34	10.870	0.000	3000529	1913824				
Filter Peak	11.102	0.003	3168627	5832505				
C36	11.322	-0.022	8379916	20499897				
o-terph	----							
Triacon Surr	9.919	0.051	8491685	10555853				

Range Times: NW Diesel(4.422 - 8.218) NW Gas(1.831 - 4.422) NW M.Oil(8.218 - 11.845)
AK102(3.483 - 8.416) AK103(8.416 - 11.394) Jet A(3.483 - 6.304)

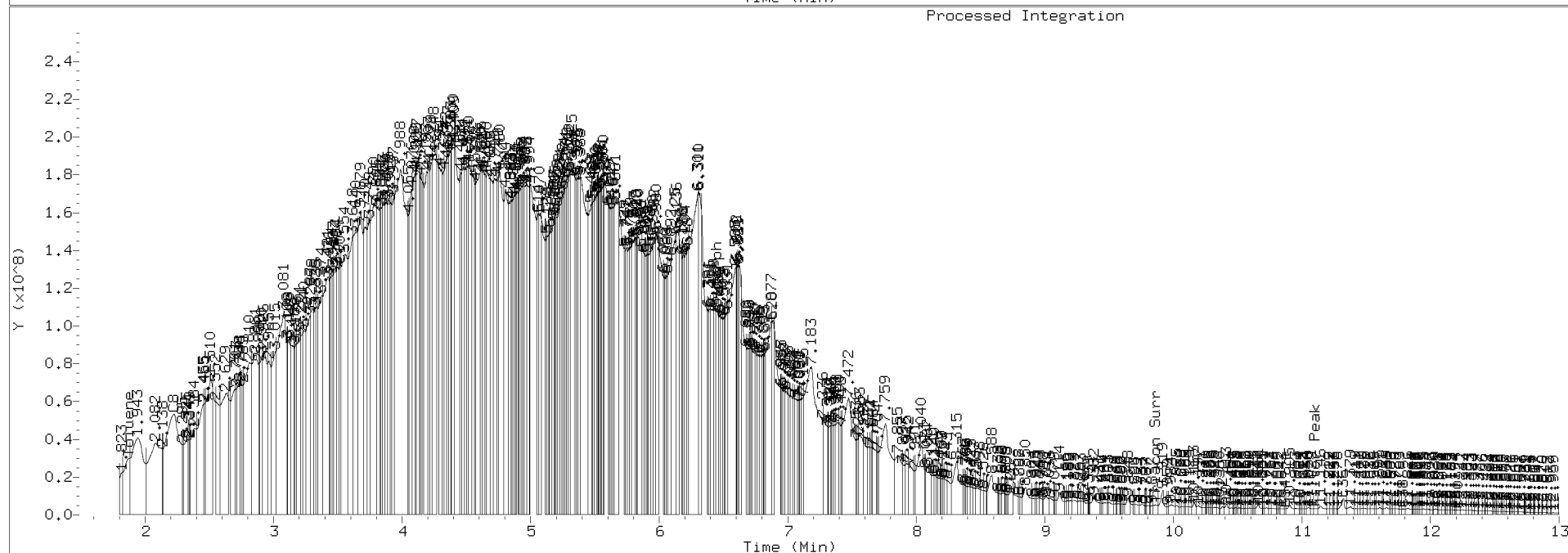
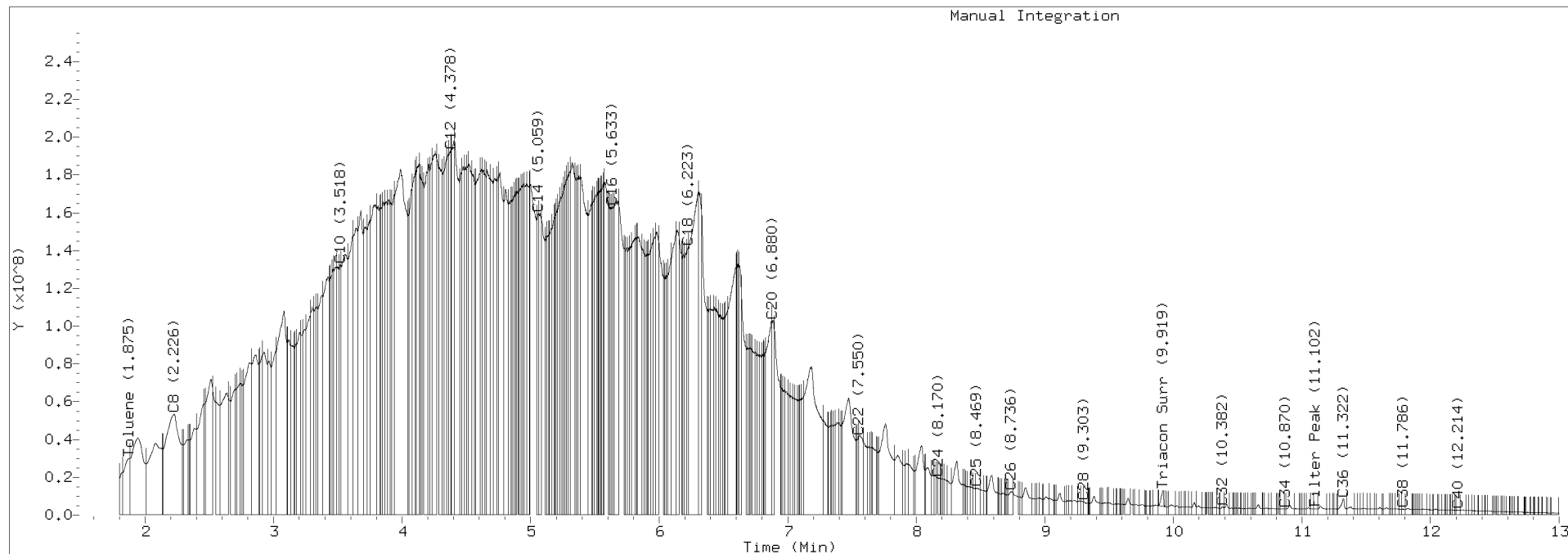
Surrogate	Area	Amount	%Rec
o-Terphenyl	0	0.0	0.0
Triacontane	10555853	55.2	122.8

Analyte	RF	Curve Date
o-Terph Surr	219872.3	28-FEB-2017
Triacon Surr	191068.8	28-FEB-2017
Gas	21747.6	xx-xx-xxxx
Diesel	155491.0	28-FEB-2017
Motor Oil	137039.0	28-FEB-2017

TPH Manual Integrations Report

Datafile: FID3B, 20170303.b/17030330.D Injection: 03-MAR-2017 22:39

Lab ID:17C0009-17





Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

B-15-W
17C0009-17RE1 (Water)

Volatile Organic Compounds

Method: EPA 8260C

Sampled: 02/27/2017 16:00

Instrument: NT3

Analyzed: 03-Mar-2017 15:52

Sample Preparation: Preparation Method: EPA 5030 (Purge and Trap)
Preparation Batch: BFC0084 Sample Size: 1 mL
Prepared: 03-Mar-2017 Final Volume: 10 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
1,2-Dichloroethane	107-06-2	1	2.00	ND	ug/L	U
Benzene	71-43-2	1	2.00	48.0	ug/L	
Toluene	108-88-3	1	2.00	57.9	ug/L	
Ethylbenzene	100-41-4	1	2.00	452	ug/L	
m,p-Xylene	179601-23-1	1	4.00	231	ug/L	
o-Xylene	95-47-6	1	2.00	15.0	ug/L	
<i>Surrogate: 1,2-Dichloroethane-d4</i>			80-129 %	110	%	
<i>Surrogate: Toluene-d8</i>			80-120 %	116	%	
<i>Surrogate: 4-Bromofluorobenzene</i>			80-120 %	97.0	%	



Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

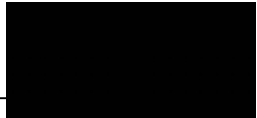
B-15-W
17C0009-17RE1 (Water)

Volatile Organic Compounds

Method: NWTPHg Sampled: 02/27/2017 16:00
Instrument: NT3 Analyzed: 03-Mar-2017 15:52

Sample Preparation: Preparation Method: EPA 5030 (Purge and Trap)
Preparation Batch: BFC0084 Sample Size: 1 mL
Prepared: 02-Mar-2017 Final Volume: 10 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Gasoline Range Organics (Tol-Nap)		1	1000	27500	ug/L	
HC ID: GAS						
Surrogate: Toluene-d8			80-120 %	116	%	
Surrogate: 4-Bromofluorobenzene			80-120 %	97.0	%	

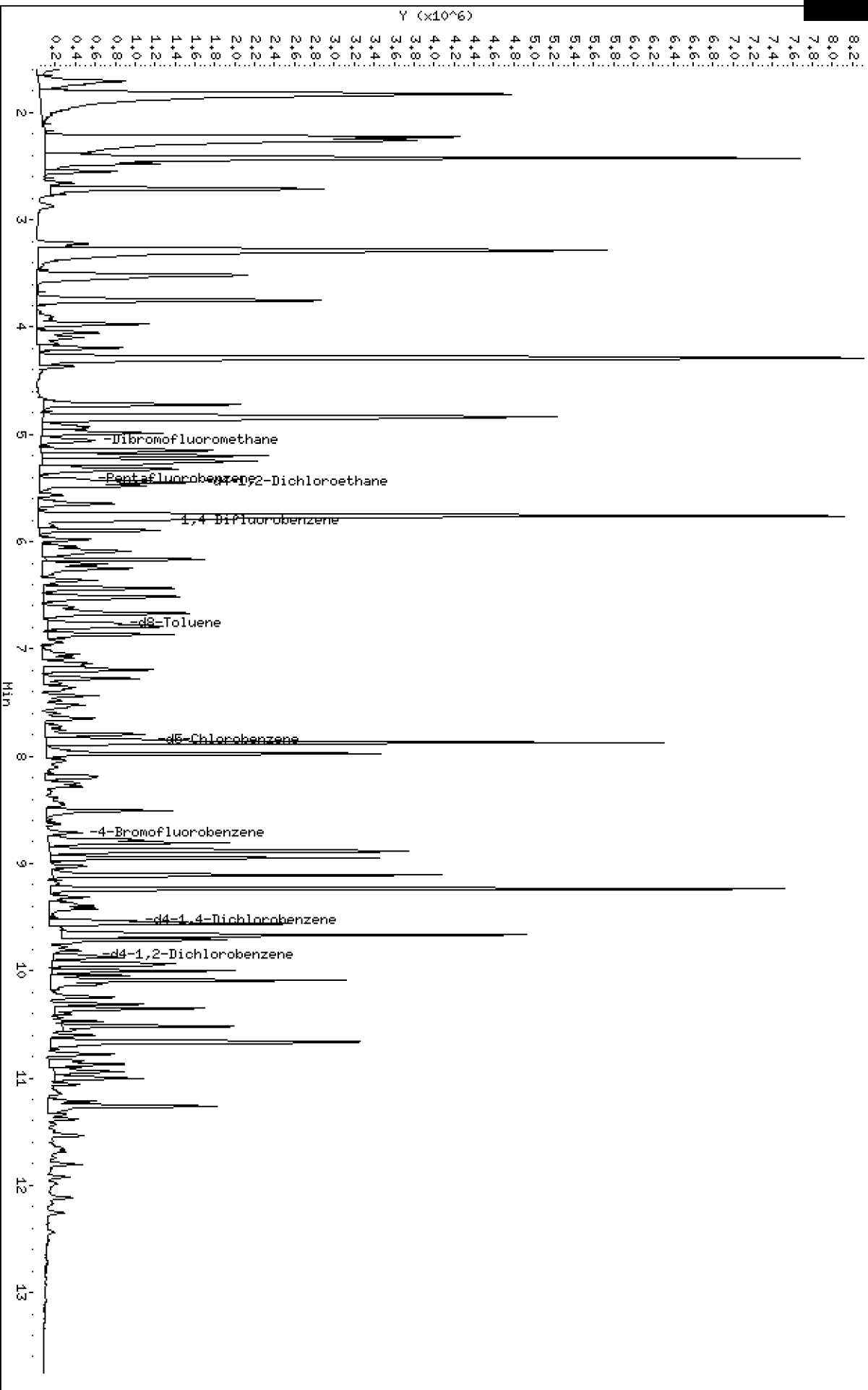


Data File: \\target\share\chend\nt3.1\20170303s.1b\303031716G.D
 Date : 03-MAR-2017 15:52
 Client ID:
 Sample Info: 17C0009-17RE1

Column phase: RTXWMS

Instrument: nt3.1
 Operator: PC
 Column diameter: 0.18

\\target\share\chend\nt3.1\20170303s.1b\303031716G.D



ARI Labs, Inc.

8260C 10 ml purge

Data file : \\target\share\chem1\nt3.i\20170303s.b\V303031716G.D
Lab Smp Id: 17C0009-17RE1
Inj Date : 03-MAR-2017 15:52
Operator : PC Inst ID: nt3.i
Smp Info : 17C0009-17RE1
Misc Info : 16-
Comment :
Method : \\target\share\chem1\nt3.i\20170303s.b\8260C022417.m
Meth Date : 06-Mar-2017 07:32 Paul Quant Type: ISTD
Cal Date : 14-FEB-2017 18:50 Cal File: V302141718.D
Als bottle: 17
Dil Factor: 1.00000
Integrator: HP RTE Compound Sublist: gsurr.sub
Target Version: 4.14
Processing Host: ORGDATA20

Compounds	QUANT	SIG	CONCENTRATIONS					
			RT	EXP RT	REL RT	RESPONSE	ON-COLUMN (ug/L)	FINAL (ug/L)
=====	=====	=====	=====	=====	=====	=====	=====	
\$ 27 Dibromofluoromethane	111		5.053	5.053	(0.932)	56670	5.02746	5.027(R)
* 32 Pentafluorobenzene	168		5.419	5.420	(1.000)	239933	10.0000	
\$ 33 d4-1,2-Dichloroethane	65		5.446	5.446	(1.005)	100704	7.89637	7.896(R)
* 37 1,4-Difluorobenzene	114		5.802	5.803	(1.000)	393000	10.0000	
\$ 43 d8-Toluene	98		6.764	6.765	(1.166)	276317	5.79169	5.792(R)
* 53 d5-Chlorobenzene	117		7.843	7.844	(1.000)	386716	10.0000	
\$ 62 4-Bromofluorobenzene	174		8.715	8.715	(1.111)	78953	4.84969	4.850(R)
* 76 d4-1,4-Dichlorobenzene	152		9.533	9.534	(1.000)	209138	10.0000	
\$ 79 d4-1,2-Dichlorobenzene	152		9.858	9.858	(1.034)	98935	5.04005	5.040(R)

QC Flag Legend

R - Spike/Surrogate failed recovery limits.

ARI Labs, Inc.

INTERNAL STANDARD COMPOUNDS
 AREA AND RT SUMMARY

Instrument ID: nt3.i Calibration Date: 03-MAR-2017
 Lab File ID: V303031716G.D Calibration Time: 21:57
 Lab Smp Id: 17C0009-17RE1
 Analysis Type: VOA Level:
 Quant Type: ISTD Sample Type:
 Operator: PC
 Method File: \\target\share\chem1\nt3.i\20170303s.b\8260C022417.m
 Misc Info: 16-

Test Mode:

Use Initial Calibration Level 5.
 If Continuing Cal. use Initial Cal. Level 5

COMPOUND	STANDARD	AREA LIMIT		SAMPLE	%DIFF
		LOWER	UPPER		
32 Pentafluorobenzon	317912	158956	635824	239933	-24.53
37 1,4-Difluorobenze	512039	256020	1024078	393000	-23.25
53 d5-Chlorobenzene	494052	247026	988104	386716	-21.73
76 d4-1,4-Dichlorobe	282154	141077	564308	209138	-25.88

COMPOUND	STANDARD	RT LIMIT		SAMPLE	%DIFF
		LOWER	UPPER		
32 Pentafluorobenzon	5.42	4.92	5.92	5.42	-0.01
37 1,4-Difluorobenze	5.80	5.30	6.30	5.80	-0.01
53 d5-Chlorobenzene	7.84	7.34	8.34	7.84	-0.01
76 d4-1,4-Dichlorobe	9.53	9.03	10.03	9.53	-0.01

AREA UPPER LIMIT = +100% of internal standard area.
 AREA LOWER LIMIT = - 50% of internal standard area.
 RT UPPER LIMIT = + 0.50 minutes of internal standard RT.
 RT LOWER LIMIT = - 0.50 minutes of internal standard RT.

ARI Labs, Inc.

RECOVERY REPORT

Client Name: Client SDG: 20150930a
Sample Matrix: NONE Fraction: VOA
Lab Smp Id: 17C0009-17RE1
Level: Operator: PC
Data Type: MS DATA SampleType: SAMPLE
SpikeList File: allspike.spk Quant Type: ISTD
Sublist File: gsurr.sub
Method File: \\target\share\chem1\nt3.i\20170303s.b\8260C022417.m
Misc Info: 16-

SURROGATE COMPOUND	AMOUNT ADDED ug/L	AMOUNT RECOVERED ug/L	% RECOVERED	LIMITS
\$ 27 Dibromofluorometha	5.000	5.027	100.55	
\$ 33 d4-1,2-Dichloroeth	5.000	7.896	157.93	
\$ 43 d8-Toluene	5.000	5.792	115.83	
\$ 62 4-Bromofluorobenze	5.000	4.850	96.99	
\$ 79 d4-1,2-Dichloroben	5.000	5.040	100.80	

REVIEW SUMMARY FOR FILE - V303031716G.D

Lab ID: 17C0009-17RE1

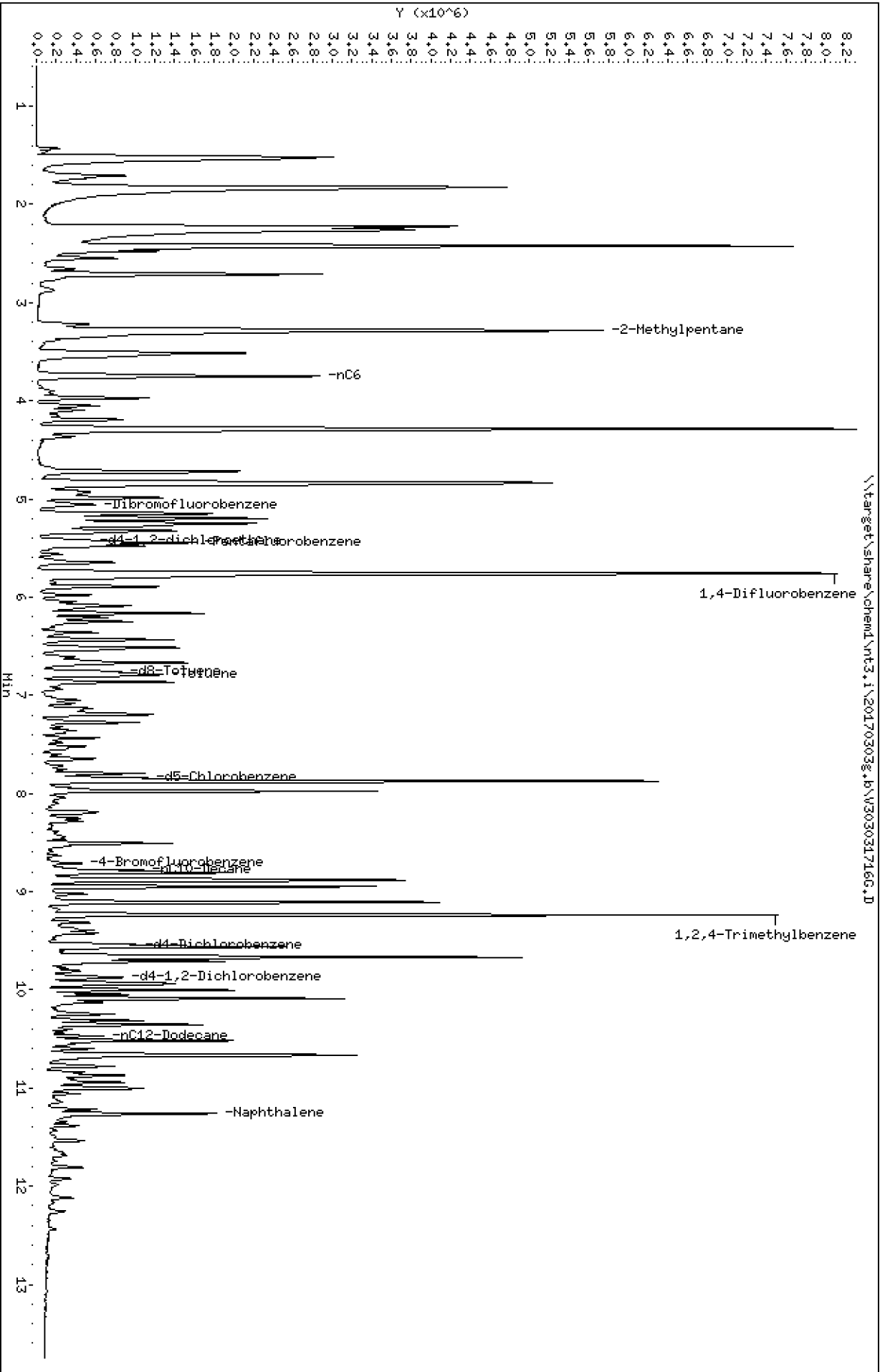
nt3.i, 20170303s.b\8260C022417.m, 03-MAR-2017 15:52

RT CO-ELUTION COMPOUNDS

Data File: \\target\share\chend\nt3.1\20170303g.b\W303031716G.D
Date: 03-HR-2017 15:52
Client ID:
Sample Info: 17C0009-17RE1

Column phase: RTXWMS

Instrument: nt3.1
Operator: PC
Column diameter: 0.18



Analytical Resources Inc.
GC/MS Gas Quantitation Report

Data file: 20170303g.b/V303031716G.D
Method: \20170303g.b\NWTPHG.m
Instrument: nt3.i
Gas Ical Date: 14-Feb-2017
Injection Date: 03-MAR-2017 15:52

ARI ID: 17C0009-17RE1
Client ID:
Matrix: NONE
Dilution Factor: 1.000
Operator: PC

=====

GASOLINE HYDROCARBONS

Range	RF	Total Area*	Amount (ug/mL)
WAGas Tol-C12 (6.70 to 10.57)	52141375	126521118	2.427
8015C 2MP-TMB (3.18 to 9.34)	87713511	198866404	2.267 M
AK101 nC6-nC10 (3.65 to 8.68)	61260787	139873303	2.283 M
NWTPHG Tol-Nap (6.70 to 11.36)	54123058	148852434	2.750

M Indicates manual integration within range

* Surrogate areas are subtracted from Total Area

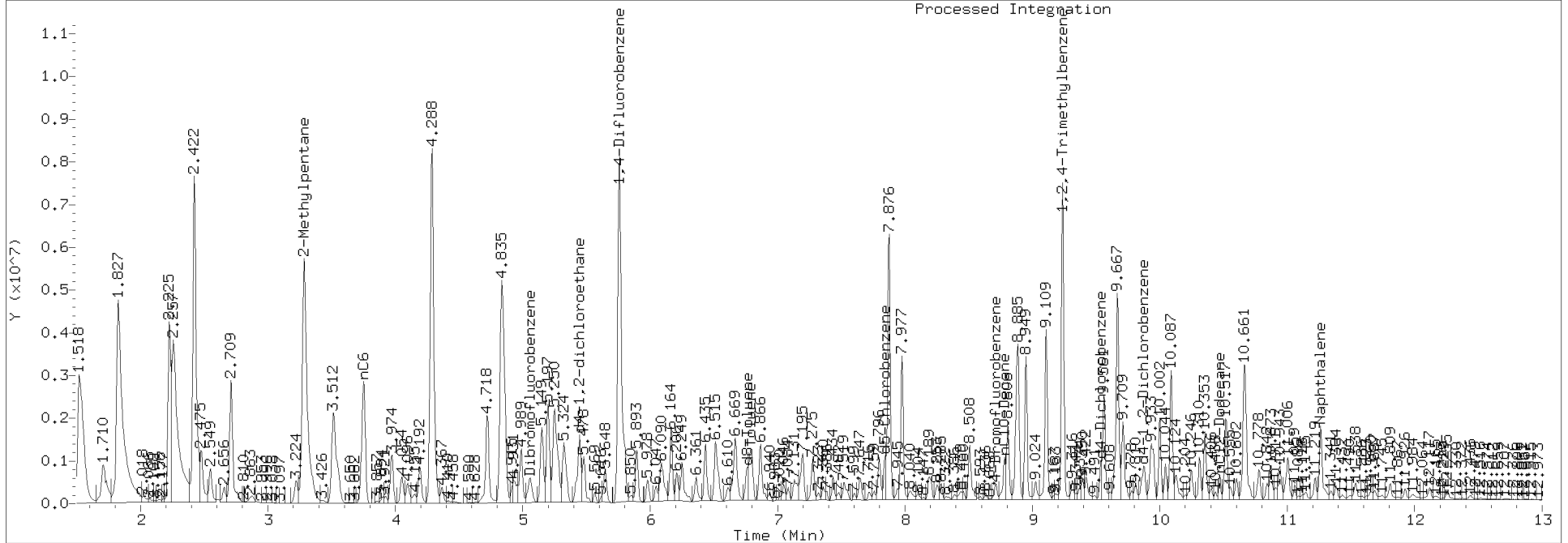
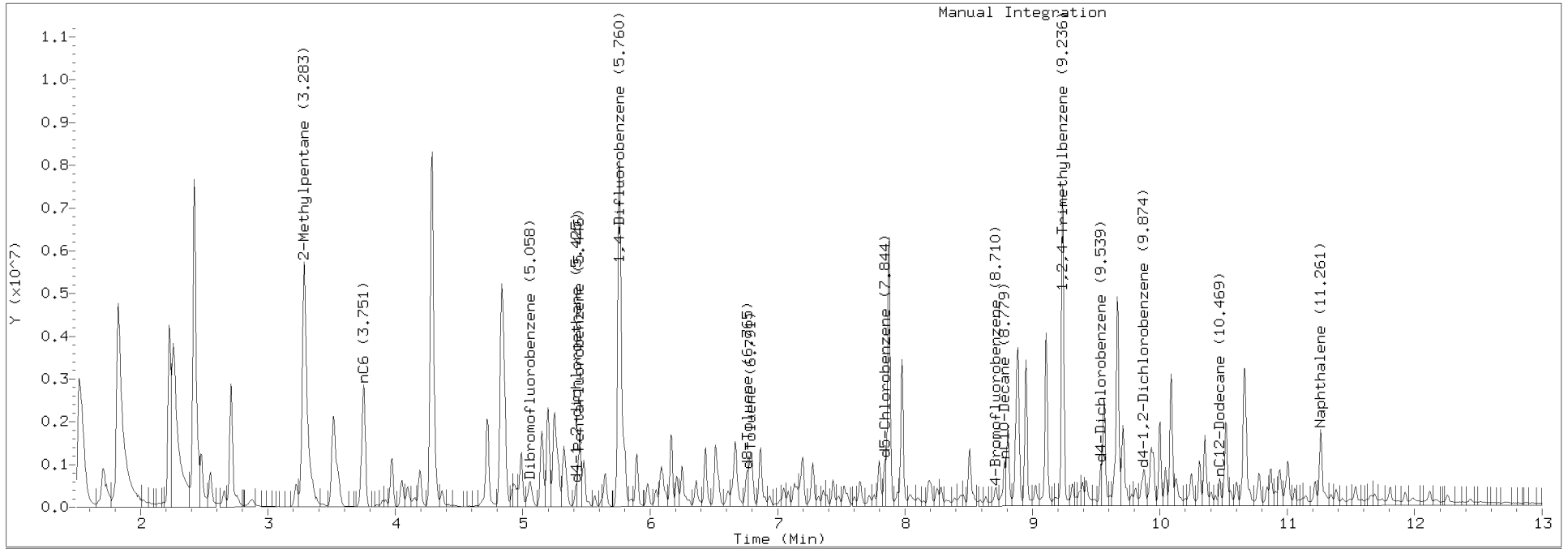
NW Gas Range Subtracted Peaks

6.765	1422273	d8-Toluene
8.710	878897	4-Bromofluorobenzene
9.539	1381307	d4-Dichlorobenzene
7.844	1413171	d5-Chlorobenzene
9.874	1957158	d4-1,2-Dichlorobenzene

TPHG Manual Integrations Report

Datafile: NT3, 20170303g.b/V303031716G.D Injection: 03-MAR-2017 15:52

Lab ID:17C0009-17RE1





Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

B-15-W
17C0009-17RE1 (Water)

Petroleum Hydrocarbons

Method: NWTPH-Dx

Sampled: 02/27/2017 16:00

Instrument: FID3

Analyzed: 03-Mar-2017 23:03

Sample Preparation:

Preparation Method: EPA 3510C SepF

Preparation Batch: BFC0024

Sample Size: 475 mL

Prepared: 02-Mar-2017

Final Volume: 2 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Diesel Range Organics (C12-C24)		20	4.21	565	mg/L	D, E
HC ID: DIESEL						
Motor Oil Range Organics (C24-C38)		20	8.42	30.3	mg/L	D
HC ID: MOTOR OIL						
Surrogate: <i>o</i> -Terphenyl			50-150 %		DI	D1

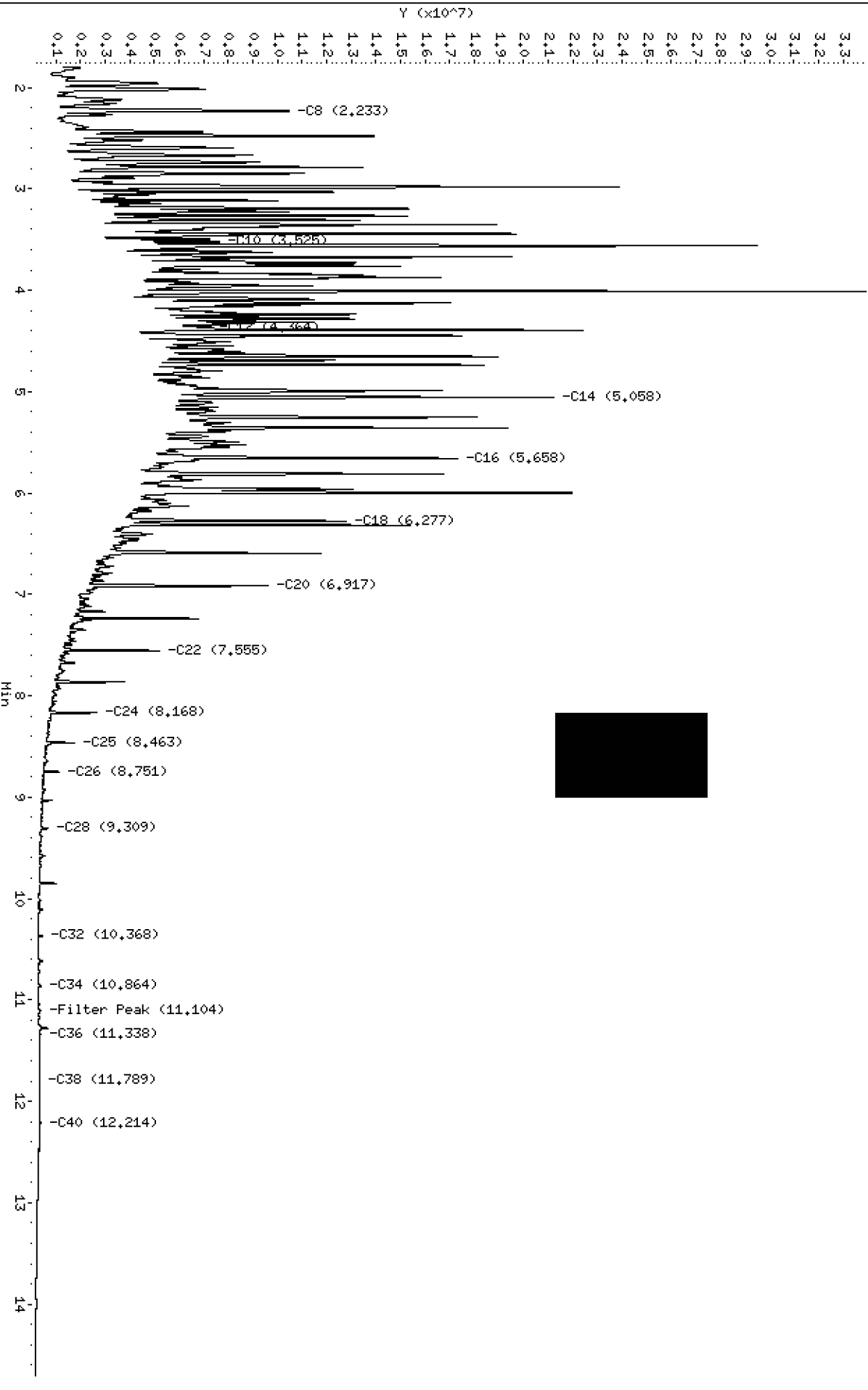
Data File: \\TARGET\share\chem2\fid3b,1\20170303,b\17030331.D
Date : 03-MAR-2017 23:03
Client ID:
Sample Info: 17C0009-17REL,20

Instrument: fid3b,1

Column phase: RTX-1

Operator: ML
Column diameter: 0.25

\\TARGET\share\chem2\fid3b,1\20170303,b\17030331.D



Analytical Resources Inc.
TPH Quantitation Report

Data file: 20170303.b/17030331.D
Method: 20170303.b\FID3TPH.m
Instrument: fid3b.i
Operator: ML
Report Date: 03/06/2017
Macro: FID3_022817

ARI ID: 17C0009-17RE1
Client ID:
Injection: 03-MAR-2017 23:03
Dilution Factor: 20

FID:3B RESULTS

Compound	RT	Shift	Height	Area	Method	Range	Total Area	Conc
Toluene	1.903	0.022	1596406	4465738	WATPHG	(Tol-C12)	915274436	42086.1
C8	2.233	0.020	10287131	18947599	WATPHD	(C12-C24)	1043900800	6713.6
C10	3.525	-0.008	7463148	10612200	WATPHM	(C24-C38)	49311088	359.8
C12	4.364	-0.008	7150482	8017938				
C14	5.058	0.020	21093732	38658189				
C16	5.658	0.023	17186571	30951310				
C18	6.277	0.023	12607894	21491677				
C20	6.917	0.018	9430243	11632462				
C22	7.555	0.009	5033675	6337440				
C24	8.168	0.001	2494211	2843366				
C25	8.463	-0.003	1582297	2294850				
C26	8.751	-0.004	965649	1072974				
C28	9.309	-0.005	500408	786109				
C32	10.368	-0.006	280962	439661				
C34	10.864	-0.006	231231	583644				
Filter Peak	11.104	0.005	220941	454656				
C36	11.338	-0.006	208840	310985				
o-terph	----							
Triacon Surr	----							

Range Times: NW Diesel(4.422 - 8.218) NW Gas(1.831 - 4.422) NW M.Oil(8.218 - 11.845)
AK102(3.483 - 8.416) AK103(8.416 - 11.394) Jet A(3.483 - 6.304)

Surrogate	Area	Amount	%Rec
o-Terphenyl	0	0.0	0.0
Triacontane	0	0.0	0.0

Analyte	RF	Curve Date
o-Terph Surr	219872.3	28-FEB-2017
Triacon Surr	191068.8	28-FEB-2017
Gas	21747.6	xx-xx-xxxx
Diesel	155491.0	28-FEB-2017
Motor Oil	137039.0	28-FEB-2017



Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

B-15-W
17C0009-17RE2 (Water)

Petroleum Hydrocarbons

Method: NWTPH-Dx

Sampled: 02/27/2017 16:00

Instrument: FID3

Analyzed: 06-Mar-2017 17:22

Sample Preparation:

Preparation Method: EPA 3510C SepF

Preparation Batch: BFC0024

Sample Size: 475 mL

Prepared: 02-Mar-2017

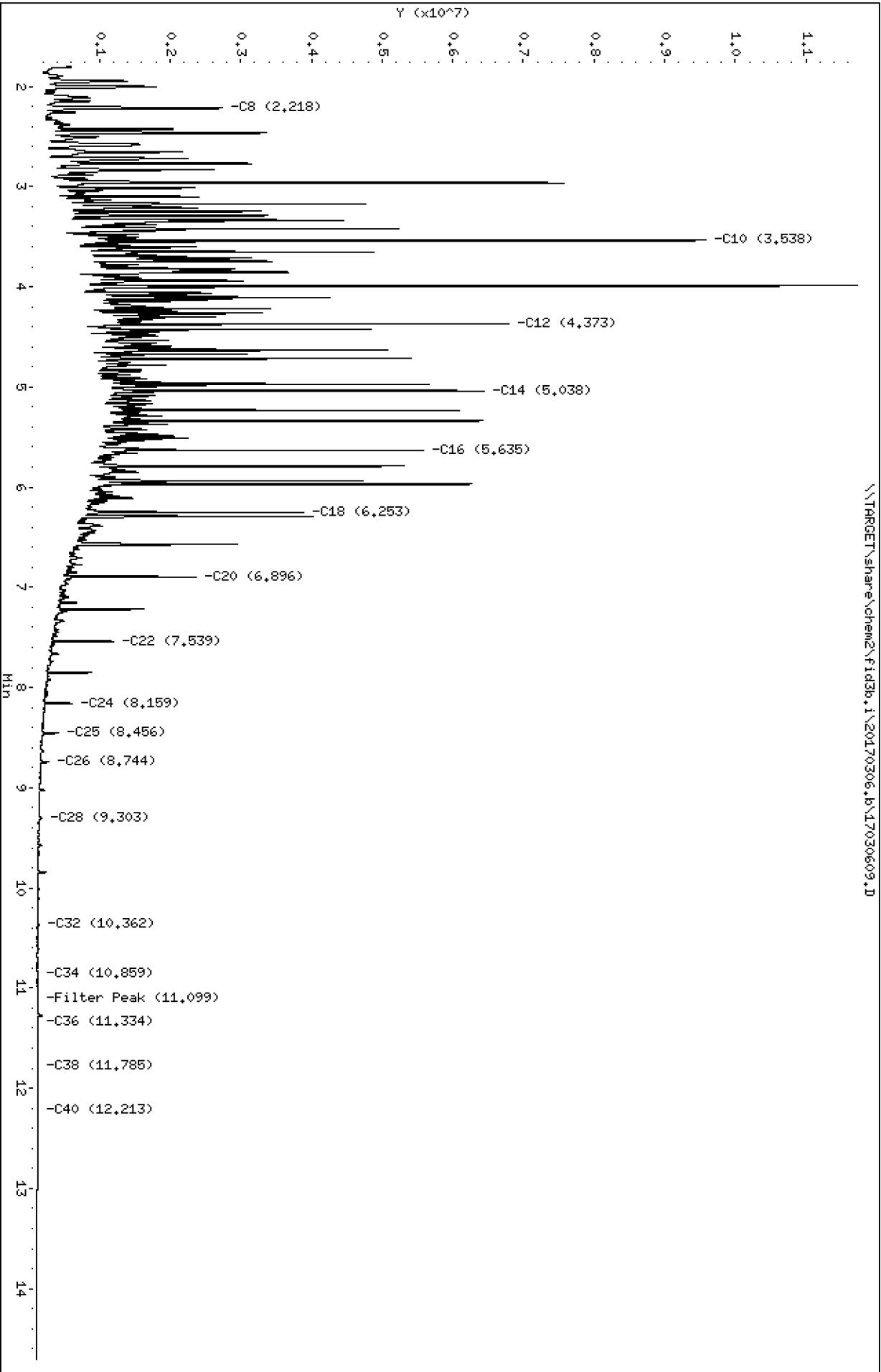
Final Volume: 2 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Diesel Range Organics (C12-C24)		100	21.1	546	mg/L	D
HC ID: DIESEL						
Motor Oil Range Organics (C24-C38)		100	42.1	ND	mg/L	U
<i>Surrogate: o-Terphenyl</i>			<i>50-150 %</i>		<i>DI</i>	<i>D1</i>

Data File: \\TARGET\share\chem2\fid3b,1\20170306_b\17030609.D
Date: 06-HRR-2017 17:22
Client ID:
Sample Info: 17C0009-17RE2

Column phase: RTX-1

Instrument: fid3b,1
Operator: ML
Column diameter: 0.25



\\TARGET\share\chem2\fid3b,1\20170306_b\17030609.D

Analytical Resources Inc.
TPH Quantitation Report

Data file: 20170306.b/17030609.D
Method: 20170306.b\FID3TPH.m
Instrument: fid3b.i
Operator: ML
Report Date: 03/07/2017
Macro: FID3_022817

ARI ID: 17C0009-17RE2
Client ID:
Injection: 06-MAR-2017 17:22
Dilution Factor: 100

FID:3B RESULTS

Compound	RT	Shift	Height	Area	Method	Range	Total Area	Conc
Toluene	1.897	0.012	360904	754863	WATPHG	(Tol-C12)	182382222	8386.3
C8	2.218	-0.000	2631645	3614069	WATPHD	(C12-C24)	201731606	1297.4
C10	3.538	0.007	9480107	5776533	WATPHM	(C24-C38)	6066480	44.3
C12	4.373	0.004	6692519	4820718				
C14	5.038	0.002	6336615	5496278				
C16	5.635	0.002	5477916	3583024				
C18	6.253	0.001	3774642	2845931				
C20	6.896	-0.002	2267848	2206843				
C22	7.539	-0.005	1098273	1008683				
C24	8.159	-0.007	505962	473558				
C25	8.456	-0.008	305520	440556				
C26	8.744	-0.008	176967	236116				
C28	9.303	-0.011	87014	160689				
C32	10.362	-0.012	39884	63856				
C34	10.859	-0.012	28972	56880				
Filter Peak	11.099	0.001	25453	50022				
C36	11.334	-0.011	23785	34818				
o-terph	----							
Triacon Surr	----							

Range Times: NW Diesel(4.419 - 8.215) NW Gas(1.836 - 4.419) NW M.Oil(8.215 - 11.846)
AK102(3.482 - 8.414) AK103(8.414 - 11.395) Jet A(3.482 - 6.302)

Surrogate	Area	Amount	%Rec
o-Terphenyl	0	0.0	0.0
Triacontane	0	0.0	0.0

Analyte	RF	Curve Date
o-Terph Surr	219872.3	28-FEB-2017
Triacon Surr	191068.8	28-FEB-2017
Gas	21747.6	xx-xx-xxxx
Diesel	155491.0	28-FEB-2017
Motor Oil	137039.0	28-FEB-2017



Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

B-16-11
17C0009-18 (Solid)

Volatile Organic Compounds

Method: EPA 8260C

Sampled: 02/27/2017 17:00

Instrument: NT5

Analyzed: 07-Mar-2017 18:57

Sample Preparation: Preparation Method: EPA 5035 (Methanol Extraction)
Preparation Batch: BFC0221 Sample Size: 6.634 g (wet) Dry Weight: 4.83 g
Prepared: 07-Mar-2017 Final Volume: 5 mL % Solids: 72.81

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
1,2-Dichloroethane	107-06-2	100	141	ND	ug/kg	U
Benzene	71-43-2	100	141	ND	ug/kg	U
Toluene	108-88-3	100	141	175	ug/kg	D
Ethylbenzene	100-41-4	100	141	5510	ug/kg	D
m,p-Xylene	179601-23-1	100	141	11200	ug/kg	D
o-Xylene	95-47-6	100	141	1250	ug/kg	D
<i>Surrogate: Dibromofluoromethane</i>			30-160 %	109	%	
<i>Surrogate: 1,2-Dichloroethane-d4</i>			80-124 %	119	%	
<i>Surrogate: Toluene-d8</i>			80-120 %	101	%	
<i>Surrogate: 4-Bromofluorobenzene</i>			80-120 %	95.1	%	
<i>Surrogate: 1,2-Dichlorobenzene-d4</i>			80-120 %	101	%	



Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

B-16-11
17C0009-18 (Solid)

Volatile Organic Compounds

Method: NWTPHg Sampled: 02/27/2017 17:00
Instrument: NT3 Analyzed: 06-Mar-2017 18:39

Sample Preparation: Preparation Method: EPA 5035 (Methanol Extraction) Dry Weight: 4.83 g
Preparation Batch: BFC0131 Sample Size: 6.634 g (wet)
Prepared: 06-Mar-2017 Final Volume: 5 mL % Solids: 72.81

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Gasoline Range Organics (Tol-Nap)		500	70400	4310000	ug/kg	D, E
HC ID: GRO						
Surrogate: Toluene-d8			80-120 %	99.9	%	
Surrogate: 4-Bromofluorobenzene			78-123 %	103	%	

Data File: \\target\share\chend\nt3.1\20170306s.16\303061726G.D

Date : 06-HRR-2017 18:39

Client ID:

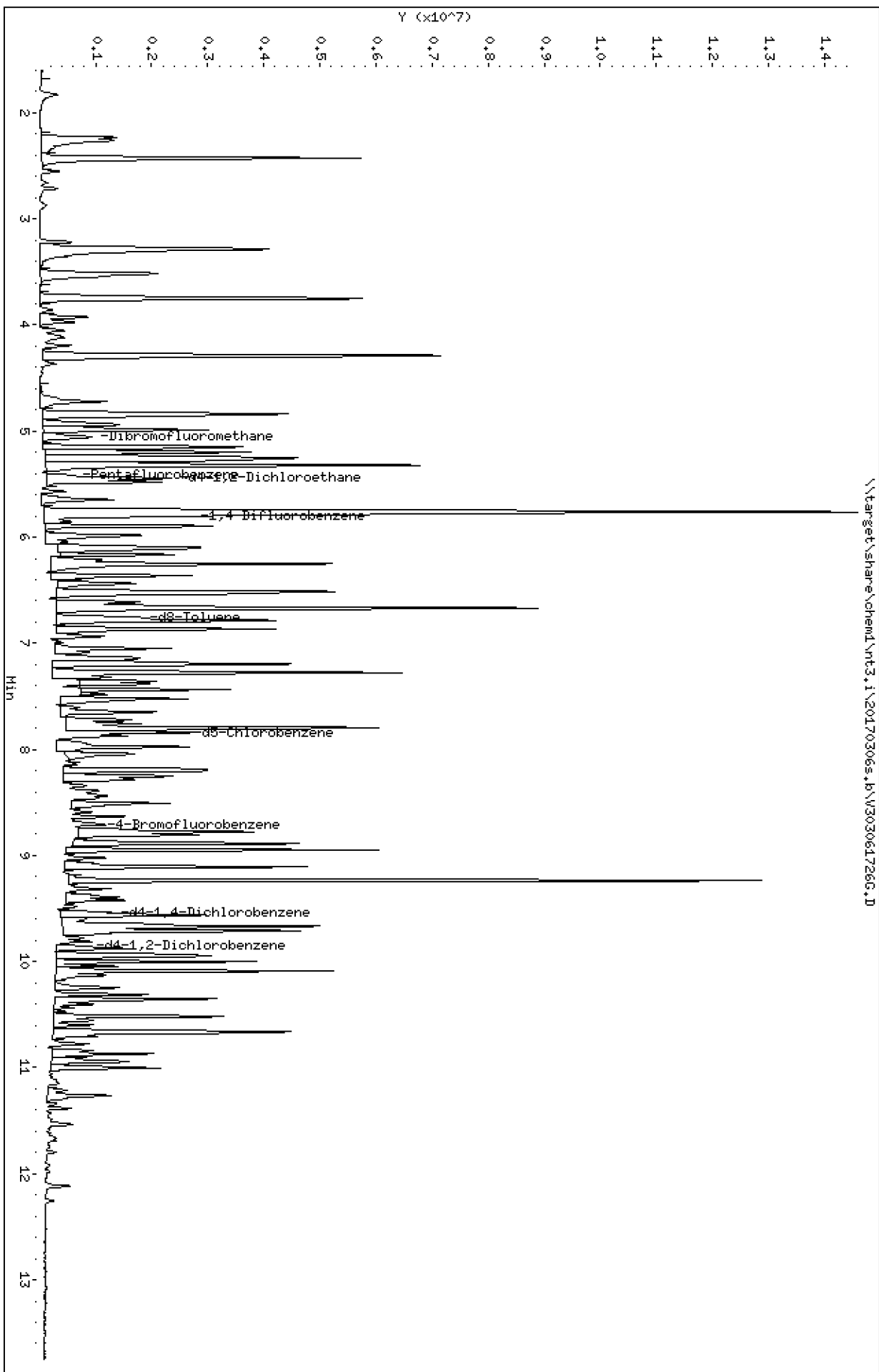
Sample Info: 17C0009-18

Column phase: RTXWMS

Instrument: nt3.1

Operator: PC

Column diameter: 0.18



ARI Labs, Inc.

8260C 10 ml purge

Data file : \\target\share\chem1\nt3.i\20170306s.b\V303061726G.D
 Lab Smp Id: 17C0009-18
 Inj Date : 06-MAR-2017 18:39
 Operator : PC Inst ID: nt3.i
 Smp Info : 17C0009-18
 Misc Info : 15-
 Comment :
 Method : \\target\share\chem1\nt3.i\20170306s.b\8260C022417.m
 Meth Date : 06-Mar-2017 07:32 Paul Quant Type: ISTD
 Cal Date : 14-FEB-2017 18:50 Cal File: V302141718.D
 Als bottle: 12
 Dil Factor: 1.00000
 Integrator: HP RTE Compound Sublist: gsurr.sub
 Target Version: 4.14
 Processing Host: ORGDATA11

Concentration Formula: Amt * DF * Pv / Sa * CpndVariable

Name	Value	Description
DF	1.000	Dilution Factor
Pv	10.000	Purge Volume (mL)
Sa	10.000	Sample Amount (mL)
Cpnd Variable		Local Compound Variable

Compounds	QUANT	SIG	RT	EXP RT	REL RT	RESPONSE	CONCENTRATIONS	
							ON-COLUMN (ug/L)	FINAL (ug/L)
\$ 27 Dibromofluoromethane	111		5.053	5.053	(0.932)	59019	4.85816	4.858
* 32 Pentafluorobenzene	168		5.420	5.420	(1.000)	258586	10.0000	
\$ 33 d4-1,2-Dichloroethane	65		5.446	5.446	(1.005)	148009	10.7685	10.768 (R)
* 37 1,4-Difluorobenzene	114		5.802	5.803	(1.000)	421425	10.0000	
\$ 43 d8-Toluene	98		6.765	6.765	(1.166)	370762	7.24712	7.247 (R)
* 53 d5-Chlorobenzene	117		7.844	7.844	(1.000)	402448	10.0000	
\$ 62 4-Bromofluorobenzene	174		8.715	8.715	(1.111)	87233	5.14883	5.149
* 76 d4-1,4-Dichlorobenzene	152		9.539	9.534	(1.000)	233165	10.0000	
\$ 79 d4-1,2-Dichlorobenzene	152		9.858	9.858	(1.033)	105827	4.83561	4.836

QC Flag Legend

R - Spike/Surrogate failed recovery limits.

ARI Labs, Inc.

INTERNAL STANDARD COMPOUNDS
 AREA AND RT SUMMARY

Instrument ID: nt3.i Calibration Date: 03-MAR-2017
 Lab File ID: V303061726G.D Calibration Time: 21:57
 Lab Smp Id: 17C0009-18
 Analysis Type: VOA Level: LOW
 Quant Type: ISTD Sample Type: WATER
 Operator: PC
 Method File: \\target\share\chem1\nt3.i\20170306s.b\8260C022417.m
 Misc Info: 15-

Test Mode:

Use Initial Calibration Level 5.
 If Continuing Cal. use Initial Cal. Level 5

COMPOUND	STANDARD	AREA LIMIT		SAMPLE	%DIFF
		LOWER	UPPER		
32 Pentafluorobenzon	317912	158956	635824	258586	-18.66
37 1,4-Difluorobenze	512039	256020	1024078	421425	-17.70
53 d5-Chlorobenzene	494052	247026	988104	402448	-18.54
76 d4-1,4-Dichlorobe	282154	141077	564308	233165	-17.36

COMPOUND	STANDARD	RT LIMIT		SAMPLE	%DIFF
		LOWER	UPPER		
32 Pentafluorobenzon	5.42	4.92	5.92	5.42	-0.00
37 1,4-Difluorobenze	5.80	5.30	6.30	5.80	-0.00
53 d5-Chlorobenzene	7.84	7.34	8.34	7.84	-0.00
76 d4-1,4-Dichlorobe	9.53	9.03	10.03	9.54	0.05

AREA UPPER LIMIT = +100% of internal standard area.
 AREA LOWER LIMIT = - 50% of internal standard area.
 RT UPPER LIMIT = + 0.50 minutes of internal standard RT.
 RT LOWER LIMIT = - 0.50 minutes of internal standard RT.

ARI Labs, Inc.

RECOVERY REPORT

Client Name: Client SDG: 20151005
Sample Matrix: LIQUID Fraction: VOA
Lab Smp Id: 17C0009-18
Level: LOW Operator: PC
Data Type: MS DATA SampleType: SAMPLE
SpikeList File: allspike.spk Quant Type: ISTD
Sublist File: gsurr.sub
Method File: \\target\share\chem1\nt3.i\20170306s.b\8260C022417.m
Misc Info: 15-

SURROGATE COMPOUND	AMOUNT ADDED ug/L	AMOUNT RECOVERED ug/L	% RECOVERED	LIMITS
\$ 27 Dibromofluorometha	5.000	4.858	97.16	80-120
\$ 33 d4-1,2-Dichloroeth	5.000	10.768	215.37*	80-128
\$ 43 d8-Toluene	5.000	7.247	144.94*	80-120
\$ 62 4-Bromofluorobenze	5.000	5.149	102.98	80-120
\$ 79 d4-1,2-Dichloroben	5.000	4.836	96.71	80-120

REVIEW SUMMARY FOR FILE - V303061726G.D

Lab ID: 17C0009-18

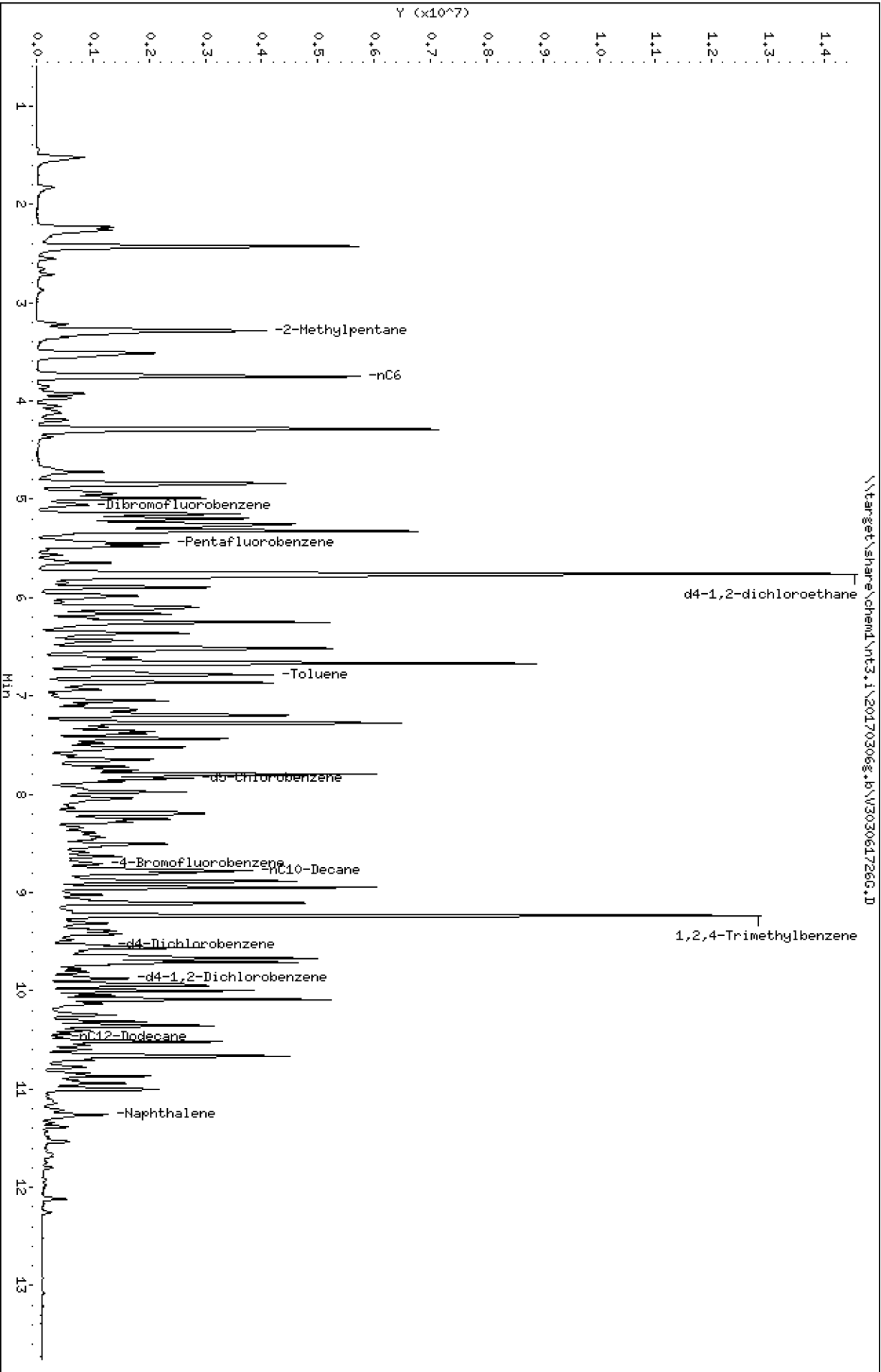
nt3.i, 20170306s.b\8260C022417.m, 06-MAR-2017 18:39

RT CO-ELUTION COMPOUNDS

Data File: \\target\share\chend\nt3.1\20170306g.jb\303061726G.D
Date: 06-HR-2017 18:39
Client ID:
Sample Info: 17C0009-18

Column phase: RTXWMS

Instrument: nt3.1
Operator: PC
Column diameter: 0.18



Analytical Resources Inc.
GC/MS Gas Quantitation Report

Data file: 20170306g.b/V303061726G.D
Method: \20170306g.b\NWTPHG.m
Instrument: nt3.i
Gas Ical Date: 14-Feb-2017
Injection Date: 06-MAR-2017 18:39

ARI ID: 17C0009-18
Client ID:
Matrix: WATER
Dilution Factor: 1.000
Operator: PC

=====

GASOLINE HYDROCARBONS

Range	RF	Total Area*	Amount (ug/mL)
WAGas Tol-C12 (6.70 to 10.57)	52141375	299911739	5.752
8015C 2MP-TMB (3.17 to 9.34)	87713511	416930329	4.753
AK101 nC6-nC10 (3.65 to 8.68)	61260787	330564408	5.396
NWTPHG Tol-Nap (6.70 to 11.36)	54123058	331239395	6.120

M Indicates manual integration within range

* Surrogate areas are subtracted from Total Area

NW Gas Range Subtracted Peaks

8.711	3568180	4-Bromofluorobenzene
9.540	1955508	d4-Dichlorobenzene
7.839	4868751	d5-Chlorobenzene
9.875	3293082	d4-1,2-Dichlorobenzene



Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

B-16-11
17C0009-18 (Solid)

Petroleum Hydrocarbons

Method: NWTPH-Dx

Sampled: 02/27/2017 17:00

Instrument: FID3

Analyzed: 03-Mar-2017 19:28

Sample Preparation:

Preparation Method: EPA 3546 (Microwave)

Preparation Batch: BFC0023

Sample Size: 10.08 g (wet)

Dry Weight: 7.34 g

Prepared: 02-Mar-2017

Final Volume: 1 mL

% Solids: 72.81

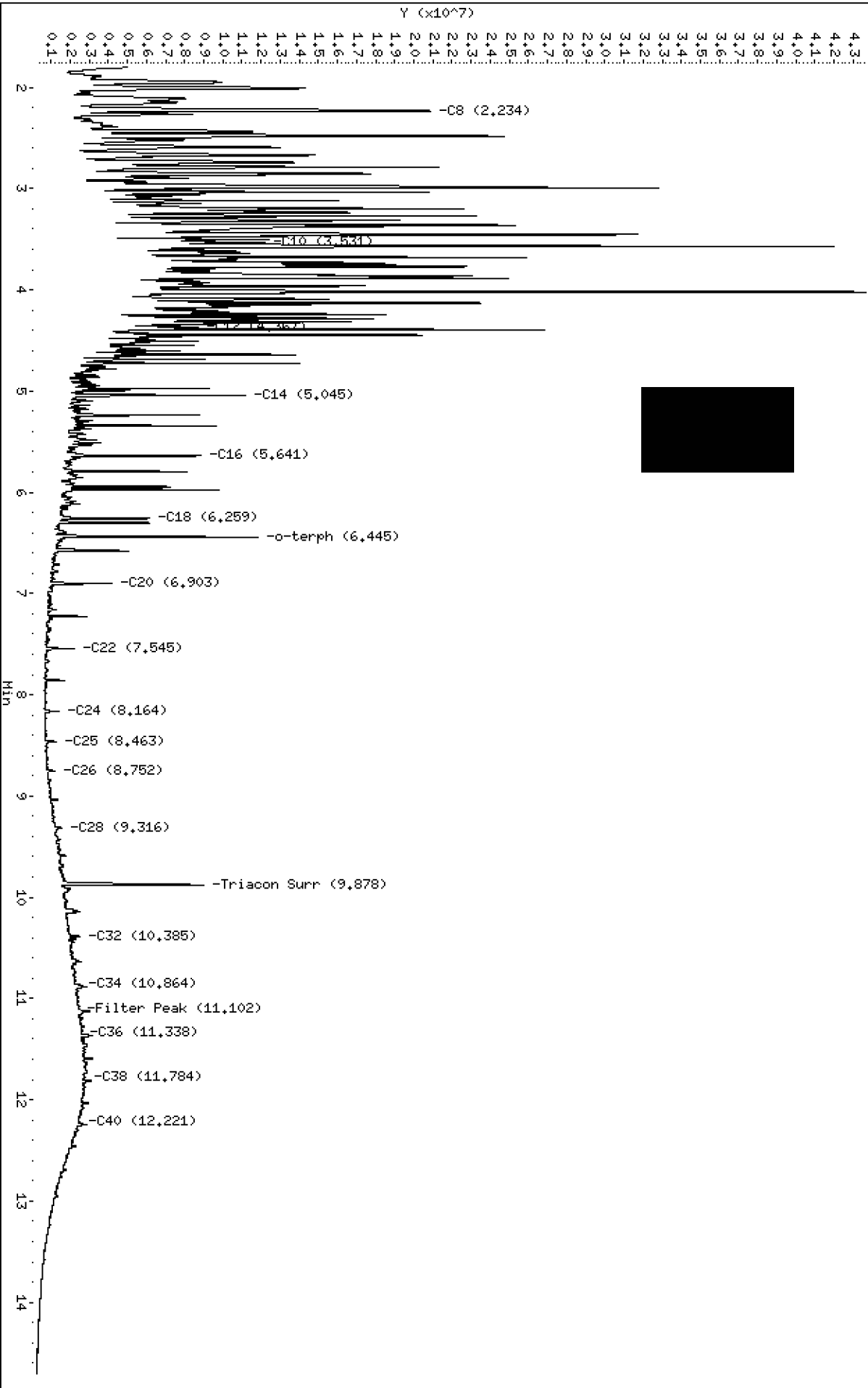
Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Diesel Range Organics (C12-C24)		1	6.81	376	mg/kg	E
HC ID: DIESEL						
Motor Oil Range Organics (C24-C38)		1	13.6	321	mg/kg	
HC ID: MOTOR OIL						
Surrogate: <i>o</i> -Terphenyl			50-150 %	88.2	%	

Data File: \\TARGET\share\chem2\fid3b,1\20170303,b\17030322.D
Date: 03-MAR-2017 19:28
Client ID:
Sample Info: 17C0009-18

Column phase: RTX-1

Instrument: fid3b,1
Operator: ML
Column diameter: 0.25

\\TARGET\share\chem2\fid3b,1\20170303,b\17030322.D



Analytical Resources Inc.
TPH Quantitation Report

Data file: 20170303.b/17030322.D
Method: 20170303.b\FID3TPH.m
Instrument: fid3b.i
Operator: ML
Report Date: 03/06/2017
Macro: FID3_022817

ARI ID: 17C0009-18
Client ID:
Injection: 03-MAR-2017 19:28
Dilution Factor: 1

FID:3B RESULTS

Compound	RT	Shift	Height	Area	Method	Range	Total Area	Conc
Toluene	1.889	0.008	3329074	7622390	WATPHG	(Tol-C12)	1430622526	65782.9
C8	2.234	0.021	20581106	42686570	WATPHD	(C12-C24)	429168051	2760.1
C10	3.531	-0.002	11965126	16714725	WATPHM	(C24-C38)	322978992	2356.8
C12	4.367	-0.005	8437891	8525125				
C14	5.045	0.007	10950877	10376042				
C16	5.641	0.006	8581525	7018106				
C18	6.259	0.005	5926362	6770251				
C20	6.903	0.003	3899328	3980872				
C22	7.545	-0.001	1990788	1977849				
C24	8.164	-0.004	1161371	1291968				
C25	8.463	-0.004	990660	1472709				
C26	8.752	-0.002	921920	1383025				
C28	9.316	0.001	1314378	2851465				
C32	10.385	0.011	2238549	3689286				
C34	10.864	-0.007	2239458	1922079				
Filter Peak	11.102	0.003	2191830	1173320				
C36	11.338	-0.006	2360866	981084				
o-terph	6.445	0.005	10506968	8738243				
Triacon Surr	9.878	0.011	7439212	7920806				

Range Times: NW Diesel(4.422 - 8.218) NW Gas(1.831 - 4.422) NW M.Oil(8.218 - 11.845)
AK102(3.483 - 8.416) AK103(8.416 - 11.394) Jet A(3.483 - 6.304)

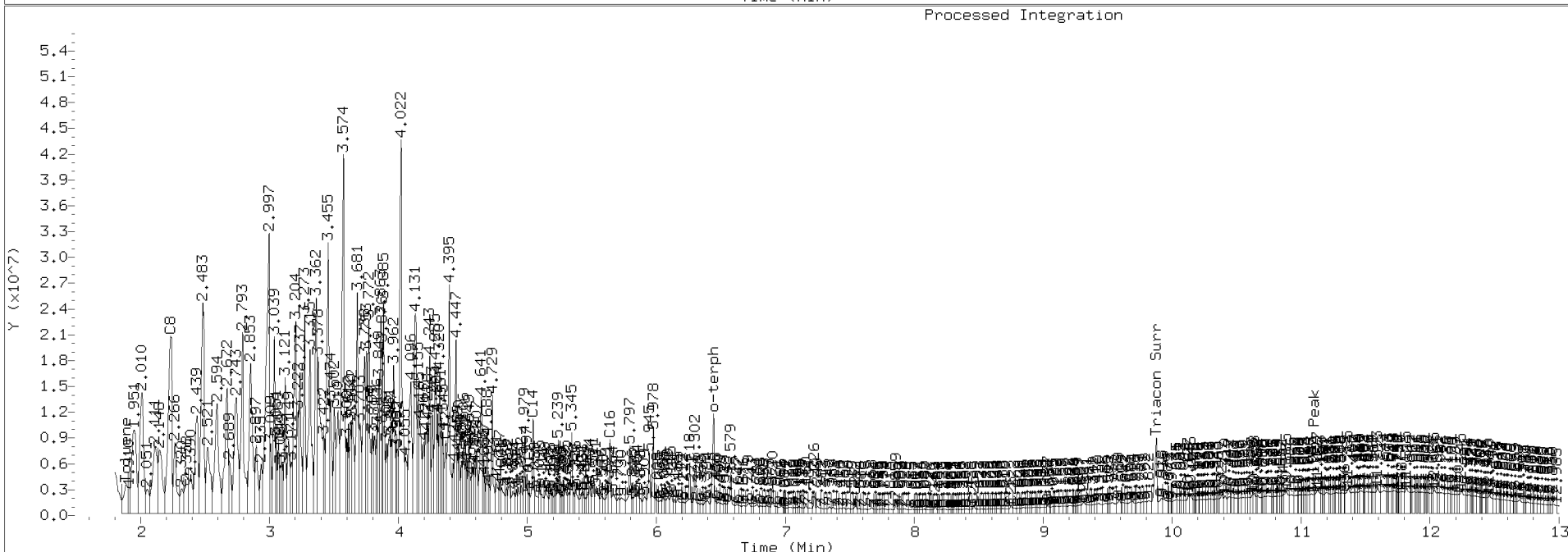
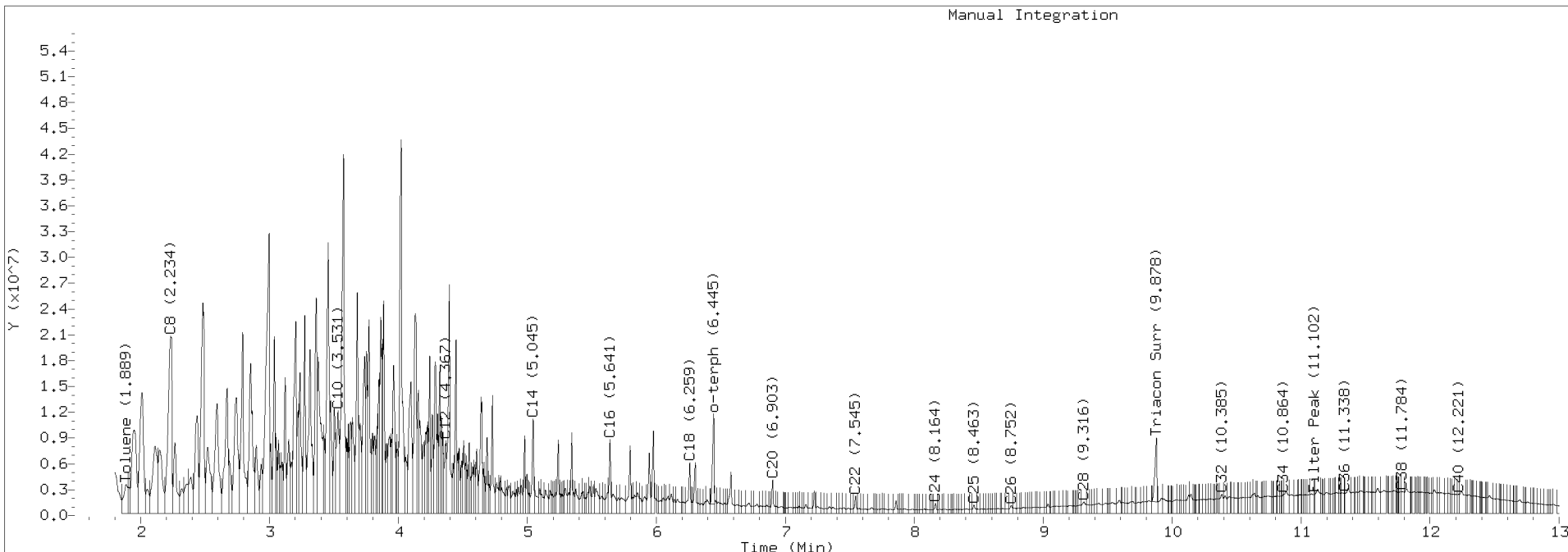
Surrogate	Area	Amount	%Rec
o-Terphenyl	8738243	39.7	88.3
Triaconthane	7920806	41.5	92.1

Analyte	RF	Curve Date
o-Terph Surr	219872.3	28-FEB-2017
Triacon Surr	191068.8	28-FEB-2017
Gas	21747.6	xx-xx-xxxx
Diesel	155491.0	28-FEB-2017
Motor Oil	137039.0	28-FEB-2017

TPH Manual Integrations Report

Datafile: FID3B, 20170303.b/17030322.D Injection: 03-MAR-2017 19:28

Lab ID:17C0009-18





Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

B-16-11

17C0009-18RE1 (Solid)

Volatile Organic Compounds

Method: NWTPHg Sampled: 02/27/2017 17:00
Instrument: NT3 Analyzed: 07-Mar-2017 13:18

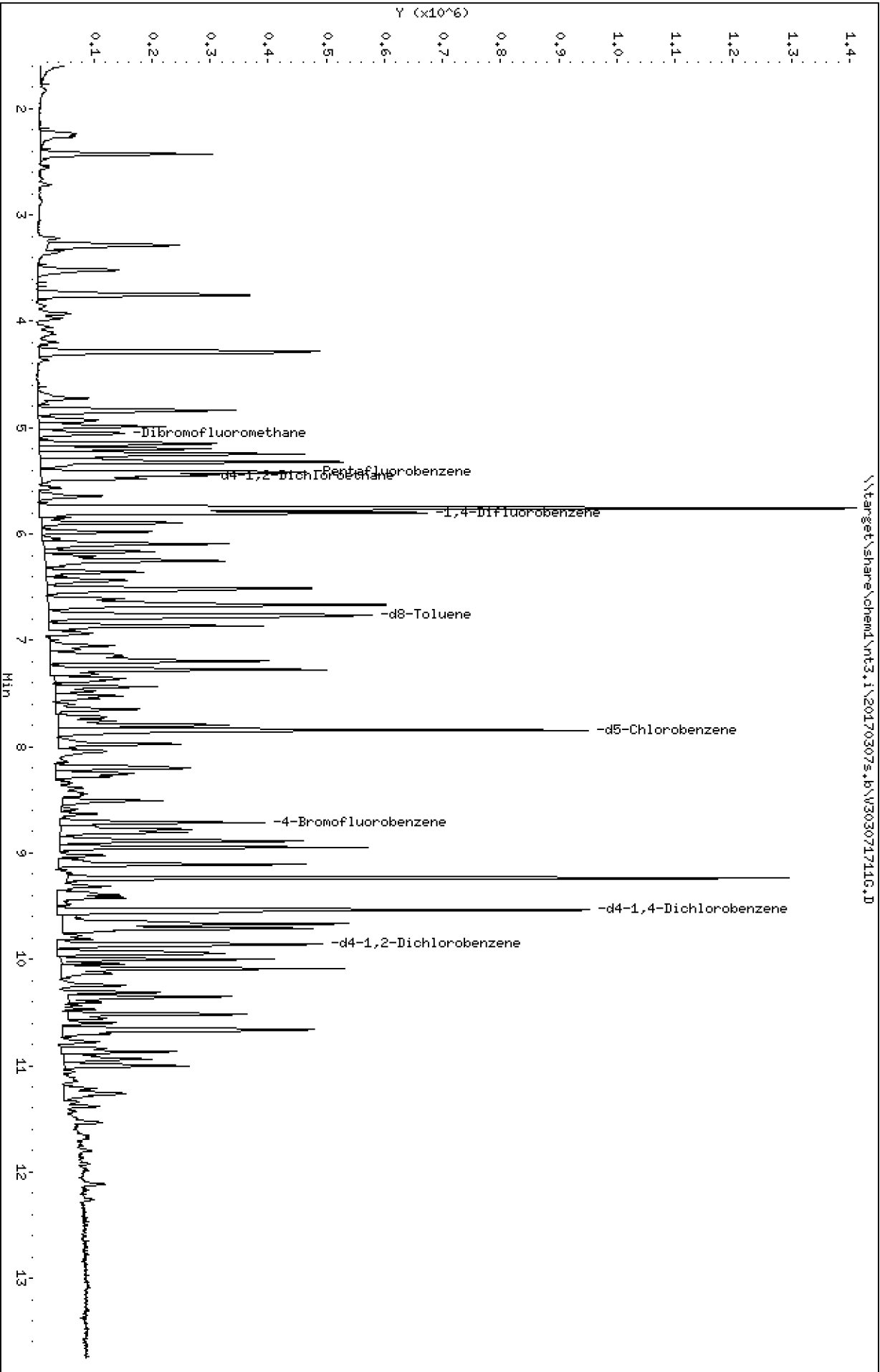
Sample Preparation: Preparation Method: EPA 5035 (Methanol Extraction) Dry Weight: 4.83 g
Preparation Batch: BFC0157 Sample Size: 6.634 g (wet)
Prepared: 07-Mar-2017 Final Volume: 5 mL % Solids: 72.81

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Gasoline Range Organics (Tol-Nap)		500	70400	304000	ug/kg	D
HC ID: GRO						
Surrogate: Toluene-d8			80-120 %	105	%	
Surrogate: 4-Bromofluorobenzene			78-123 %	102	%	

Data File: \\target\share\chend\nt3.1\20170307s.1b\303071711G.D
Date : 07-HRR-2017 13:18
Client ID:
Sample Info: 17C0009-18RE1

Column phase: RTXWMS

Instrument: nt3.1
Operator: PC
Column diameter: 0.18



ARI Labs, Inc.

8260C 10 ml purge

Data file : \\target\share\chem1\nt3.i\20170307s.b\V303071711G.D
Lab Smp Id: 17C0009-18RE1
Inj Date : 07-MAR-2017 13:18
Operator : PC Inst ID: nt3.i
Smp Info : 17C0009-18RE1
Misc Info : 16-
Comment :
Method : \\target\share\chem1\nt3.i\20170307s.b\8260C022417.m
Meth Date : 06-Mar-2017 07:32 Paul Quant Type: ISTD
Cal Date : 14-FEB-2017 18:50 Cal File: V302141718.D
Als bottle: 12
Dil Factor: 1.00000
Integrator: HP RTE Compound Sublist: gsurr.sub
Target Version: 4.14
Processing Host: ORGDATA11

Compounds	QUANT	SIG	CONCENTRATIONS					
			ON-COLUMN	FINAL				
	MASS		RT	EXP RT	REL RT	RESPONSE	(ug/L)	(ug/L)
=====	=====		=====	=====	=====	=====	=====	=====
\$ 27 Dibromofluoromethane	111		5.058	5.053	(0.933)	54677	4.84566	4.846(R)
* 32 Pentafluorobenzene	168		5.419	5.420	(1.000)	240180	10.0000	
\$ 33 d4-1,2-Dichloroethane	65		5.451	5.446	(1.006)	71970	5.63748	5.637(R)
* 37 1,4-Difluorobenzene	114		5.802	5.803	(1.000)	387018	10.0000	
\$ 43 d8-Toluene	98		6.764	6.765	(1.166)	247130	5.25999	5.260(R)
* 53 d5-Chlorobenzene	117		7.843	7.844	(1.000)	386866	10.0000	
\$ 62 4-Bromofluorobenzene	174		8.715	8.715	(1.111)	83307	5.11515	5.115(R)
* 76 d4-1,4-Dichlorobenzene	152		9.539	9.534	(1.000)	212435	10.0000	
\$ 79 d4-1,2-Dichlorobenzene	152		9.858	9.858	(1.033)	100756	5.05316	5.053(R)

QC Flag Legend

R - Spike/Surrogate failed recovery limits.

ARI Labs, Inc.

INTERNAL STANDARD COMPOUNDS
 AREA AND RT SUMMARY

Instrument ID: nt3.i Calibration Date: 03-MAR-2017
 Lab File ID: V303071711G.D Calibration Time: 21:57
 Lab Smp Id: 17C0009-18RE1
 Analysis Type: VOA Level:
 Quant Type: ISTD Sample Type:
 Operator: PC
 Method File: \\target\share\chem1\nt3.i\20170307s.b\8260C022417.m
 Misc Info: 16-

Test Mode:

Use Initial Calibration Level 5.
 If Continuing Cal. use Initial Cal. Level 5

COMPOUND	STANDARD	AREA LIMIT		SAMPLE	%DIFF
		LOWER	UPPER		
32 Pentafluorobenzon	317912	158956	635824	240180	-24.45
37 1,4-Difluorobenze	512039	256020	1024078	387018	-24.42
53 d5-Chlorobenzene	494052	247026	988104	386866	-21.70
76 d4-1,4-Dichlorobe	282154	141077	564308	212435	-24.71

COMPOUND	STANDARD	RT LIMIT		SAMPLE	%DIFF
		LOWER	UPPER		
32 Pentafluorobenzon	5.42	4.92	5.92	5.42	-0.01
37 1,4-Difluorobenze	5.80	5.30	6.30	5.80	-0.01
53 d5-Chlorobenzene	7.84	7.34	8.34	7.84	-0.01
76 d4-1,4-Dichlorobe	9.53	9.03	10.03	9.54	0.05

AREA UPPER LIMIT = +100% of internal standard area.
 AREA LOWER LIMIT = - 50% of internal standard area.
 RT UPPER LIMIT = + 0.50 minutes of internal standard RT.
 RT LOWER LIMIT = - 0.50 minutes of internal standard RT.

ARI Labs, Inc.

RECOVERY REPORT

Client Name: Client SDG: 20150930a
Sample Matrix: NONE Fraction: VOA
Lab Smp Id: 17C0009-18RE1
Level: Operator: PC
Data Type: MS DATA SampleType: SAMPLE
SpikeList File: allspike.spk Quant Type: ISTD
Sublist File: gsurr.sub
Method File: \\target\share\chem1\nt3.i\20170307s.b\8260C022417.m
Misc Info: 16-

SURROGATE COMPOUND	AMOUNT ADDED ug/L	AMOUNT RECOVERED ug/L	% RECOVERED	LIMITS
\$ 27 Dibromofluorometha	5.000	4.846	96.91	
\$ 33 d4-1,2-Dichloroeth	5.000	5.637	112.75	
\$ 43 d8-Toluene	5.000	5.260	105.20	
\$ 62 4-Bromofluorobenze	5.000	5.115	102.30	
\$ 79 d4-1,2-Dichloroben	5.000	5.053	101.06	

REVIEW SUMMARY FOR FILE - V303071711G.D

Lab ID: 17C0009-18RE1

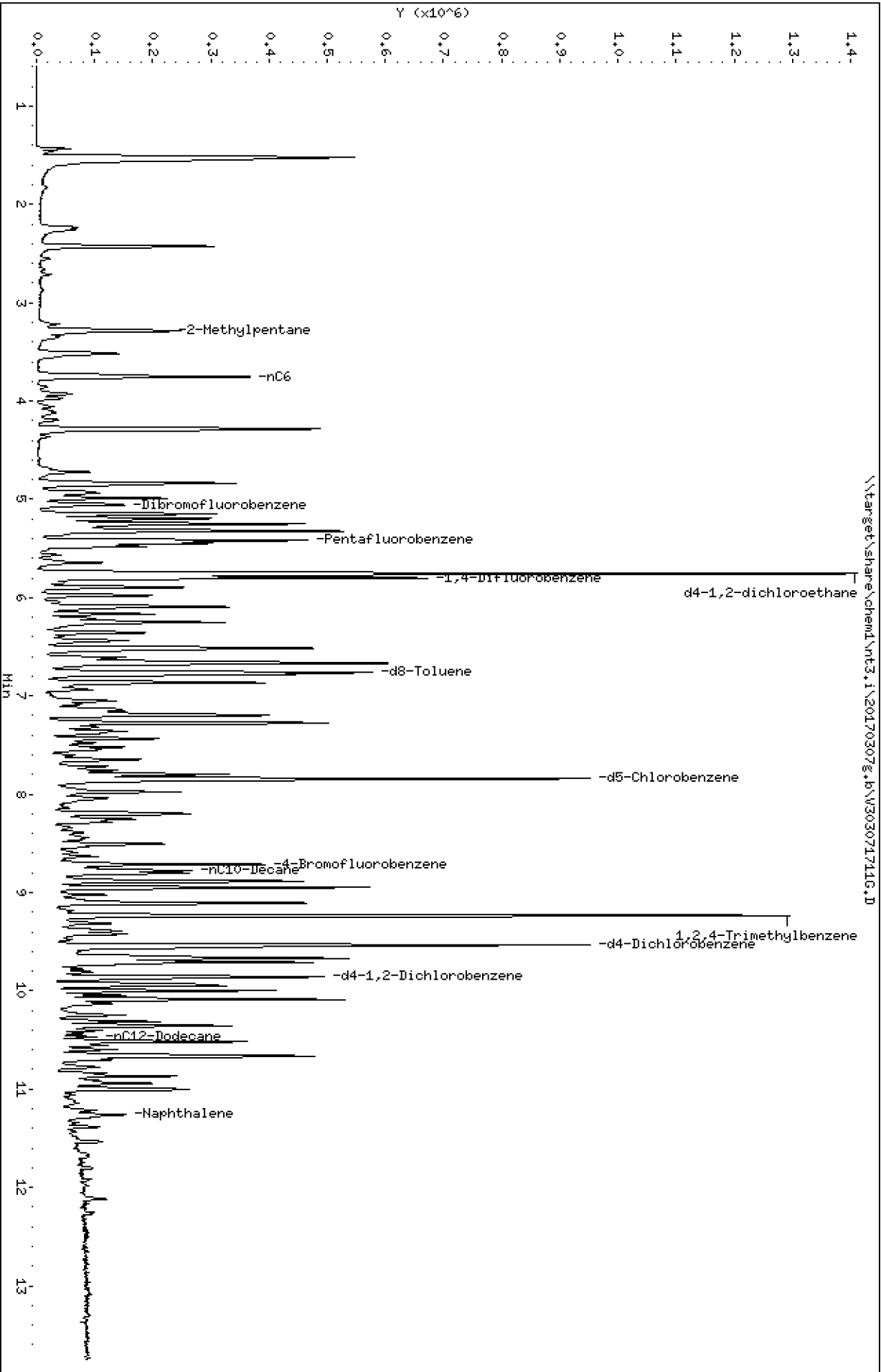
nt3.i, 20170307s.b\8260C022417.m, 07-MAR-2017 13:18

RT CO-ELUTION COMPOUNDS

Data File: \\target\share\chend\nt3.1\20170307g.jb\W303071711G.D
Date : 07-HRR-2017 13:18
Client ID:
Sample Info: 17C0009-18RE1

Column phase: RTXWMS

Instrument: nt3.1
Operator: PC
Column diameter: 0.18



Analytical Resources Inc.
GC/MS Gas Quantitation Report

Data file: 20170307g.b/V303071711G.D
Method: \20170307g.b\NWTPHG.m
Instrument: nt3.i
Gas Ical Date: 14-Feb-2017
Injection Date: 07-MAR-2017 13:18

ARI ID: 17C0009-18RE1
Client ID:
Matrix: NONE
Dilution Factor: 1.000
Operator: PC

=====

GASOLINE HYDROCARBONS

Range	RF	Total Area*	Amount (ug/mL)
WAGas Tol-C12 (6.70 to 10.57)	52141375	20521691	0.394
8015C 2MP-TMB (3.19 to 9.33)	87713511	28308184	0.323
AK101 nC6-nC10 (3.65 to 8.68)	61260787	22125031	0.361
NWTPHG Tol-Nap (6.70 to 11.36)	54123058	23366483	0.432

M Indicates manual integration within range

* Surrogate areas are subtracted from Total Area

NW Gas Range Subtracted Peaks

6.765	1399918	d8-Toluene
8.715	606136	4-Bromofluorobenzene
9.534	1688151	d4-Dichlorobenzene
7.844	1657191	d5-Chlorobenzene
9.858	792744	d4-1,2-Dichlorobenzene



Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

B-16-11

17C0009-18RE1 (Solid)

Petroleum Hydrocarbons

Method: NWTPH-Dx

Sampled: 02/27/2017 17:00

Instrument: FID3

Analyzed: 04-Mar-2017 03:25

Sample Preparation:

Preparation Method: EPA 3546 (Microwave)

Preparation Batch: BFC0023

Sample Size: 10.08 g (wet)

Prepared: 02-Mar-2017

Final Volume: 1 mL

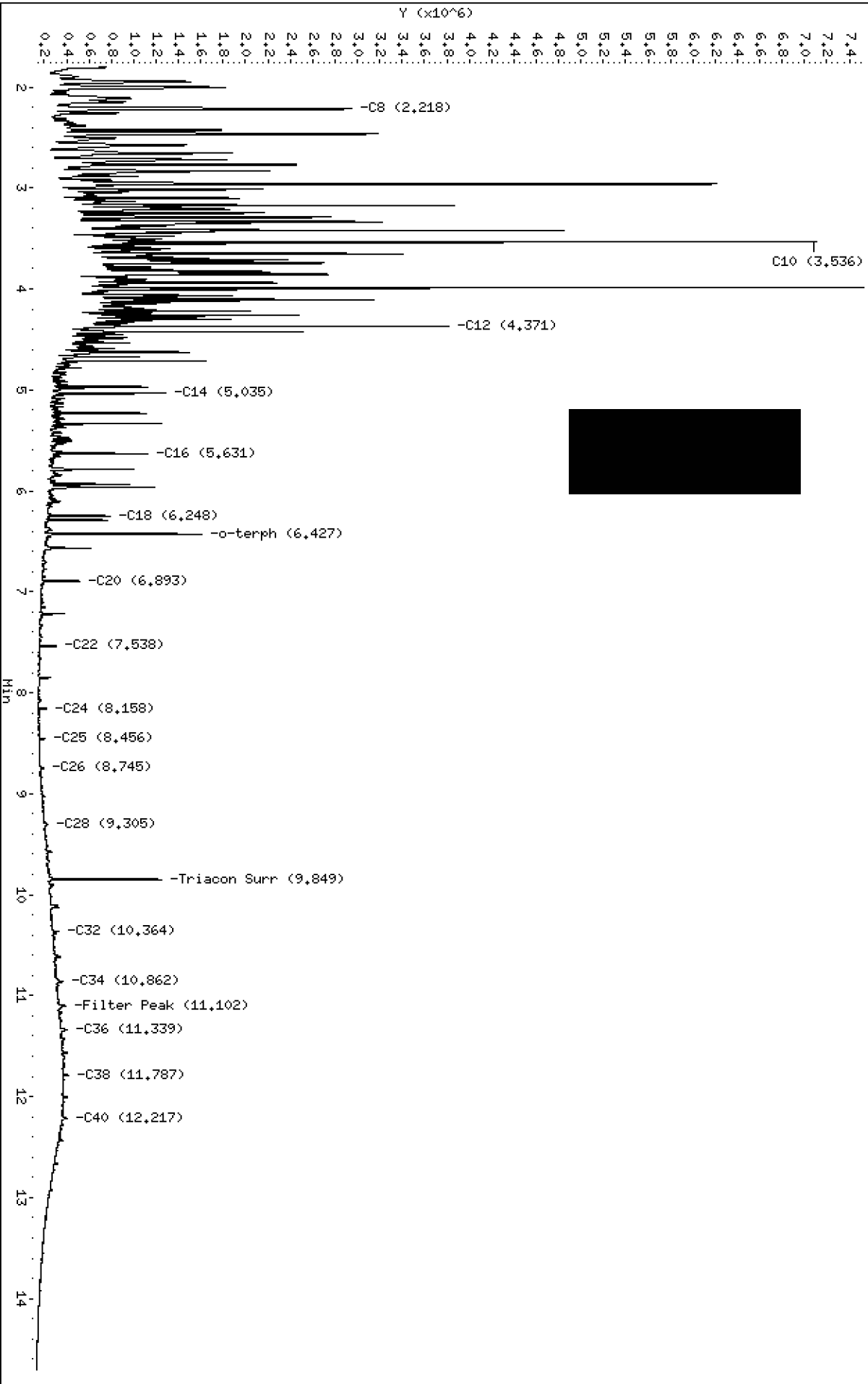
Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Diesel Range Organics (C12-C24)		10	49.6	221	mg/kg	D
HC ID: DIESEL						
Motor Oil Range Organics (C24-C38)		10	99.2	193	mg/kg	D
<i>Surrogate: o-Terphenyl</i>			<i>50-150 %</i>	<i>82.2</i>	<i>%</i>	

Data File: \\TARGET\share\chem2\fid3b,1\20170303,b\17030342.D
Date: 04-MAR-2017 03:25
Client ID:
Sample Info: 17C0009-18REL,10

Column phase: RTX-1

Instrument: fid3b,1
Operator: ML
Column diameter: 0.25

\\TARGET\share\chem2\fid3b,1\20170303,b\17030342.D



Analytical Resources Inc.
TPH Quantitation Report

Data file: 20170303.b/17030342.D
Method: 20170303.b\FID3TPH.m
Instrument: fid3b.i
Operator: ML
Report Date: 03/06/2017
Macro: FID3_022817

ARI ID: 17C0009-18RE1
Client ID:
Injection: 04-MAR-2017 03:25
Dilution Factor: 10

FID:3B RESULTS

Compound	RT	Shift	Height	Area	Method	Range	Total Area	Conc
Toluene	1.898	0.017	375786	842691	WATPHG	(Tol-C12)	138008793	6345.9
C8	2.218	0.005	2817922	4116178	WATPHD	(C12-C24)	34652897	222.9
C10	3.536	0.003	6977273	4097223	WATPHM	(C24-C38)	26685514	194.7
C12	4.371	-0.001	3691594	2034632				
C14	5.035	-0.003	1148126	934515				
C16	5.631	-0.004	997872	612346				
C18	6.248	-0.006	661154	454898				
C20	6.893	-0.007	382874	323011				
C22	7.538	-0.008	173599	148168				
C24	8.158	-0.010	92020	80821				
C25	8.456	-0.011	70401	85995				
C26	8.745	-0.009	67752	131615				
C28	9.305	-0.010	104097	234400				
C32	10.364	-0.010	193839	339643				
C34	10.862	-0.009	235834	529921				
Filter Peak	11.102	0.003	257637	897652				
C36	11.339	-0.005	275409	544931				
o-terph	6.427	-0.013	1399665	814073				
Triacon Surr	9.849	-0.019	1008177	770222				

Range Times: NW Diesel(4.422 - 8.218) NW Gas(1.831 - 4.422) NW M.Oil(8.218 - 11.845)
AK102(3.483 - 8.416) AK103(8.416 - 11.394) Jet A(3.483 - 6.304)

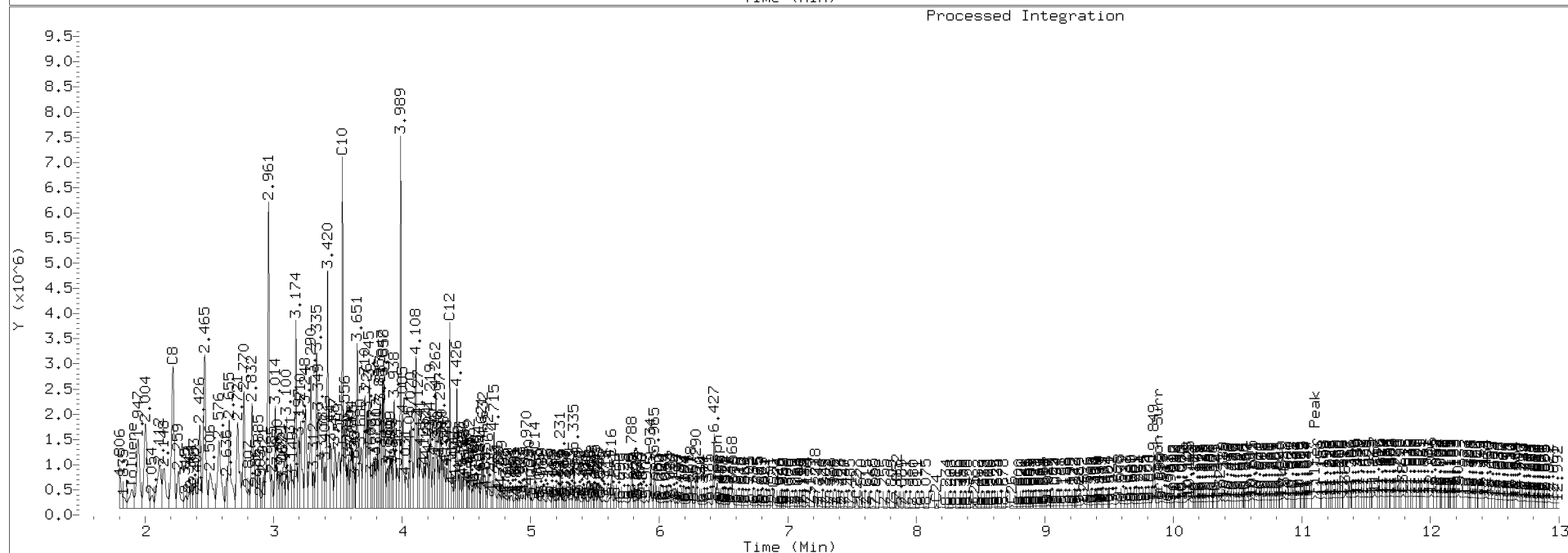
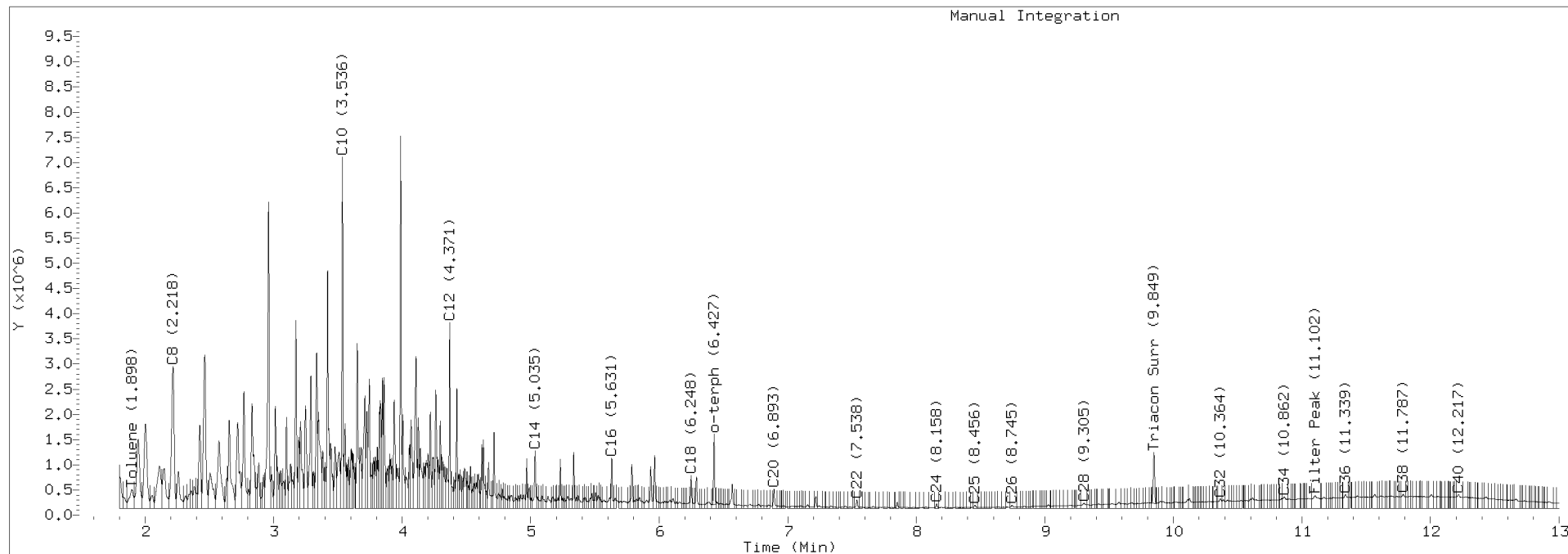
Surrogate	Area	Amount	%Rec
o-Terphenyl	814073	3.7	82.3
Triaconthane	770222	4.0	89.6

Analyte	RF	Curve Date
o-Terph Surr	219872.3	28-FEB-2017
Triacon Surr	191068.8	28-FEB-2017
Gas	21747.6	xx-xx-xxxx
Diesel	155491.0	28-FEB-2017
Motor Oil	137039.0	28-FEB-2017

TPH Manual Integrations Report

Datafile: FID3B, 20170303.b/17030342.D Injection: 04-MAR-2017 03:25

Lab ID:17C0009-18RE1





Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

B-17-W
17C0009-19 (Water)

Volatile Organic Compounds

Method: EPA 8260C

Sampled: 02/27/2017 17:30

Instrument: NT3

Analyzed: 02-Mar-2017 19:04

Sample Preparation: Preparation Method: EPA 5030 (Purge and Trap)
Preparation Batch: BFC0055 Sample Size: 10 mL
Prepared: 02-Mar-2017 Final Volume: 10 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
1,2-Dichloroethane	107-06-2	1	0.20	1.77	ug/L	
Benzene	71-43-2	1	0.20	ND	ug/L	U
Toluene	108-88-3	1	0.20	ND	ug/L	U
Ethylbenzene	100-41-4	1	0.20	ND	ug/L	U
m,p-Xylene	179601-23-1	1	0.40	ND	ug/L	U
o-Xylene	95-47-6	1	0.20	ND	ug/L	U
<i>Surrogate: 1,2-Dichloroethane-d4</i>			80-129 %	105	%	
<i>Surrogate: Toluene-d8</i>			80-120 %	98.1	%	
<i>Surrogate: 4-Bromofluorobenzene</i>			80-120 %	96.2	%	



Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

B-17-W
17C0009-19 (Water)

Volatile Organic Compounds

Method: NWTPHg

Sampled: 02/27/2017 17:30

Instrument: NT3

Analyzed: 02-Mar-2017 19:04

Sample Preparation: Preparation Method: EPA 5030 (Purge and Trap)
Preparation Batch: BFC0055 Sample Size: 10 mL
Prepared: 02-Mar-2017 Final Volume: 10 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Gasoline Range Organics (Tol-Nap)		1	100	ND	ug/L	U
Surrogate: Toluene-d8			80-120 %	98.1	%	
Surrogate: 4-Bromofluorobenzene			80-120 %	96.2	%	

Data File: \\target\share\chend\nt3,1\20170302s,b\303021725G.D
Date : 02-MAR-2017 19:04
Client ID: Repun for c/o
Sample Info: 17C0009-19

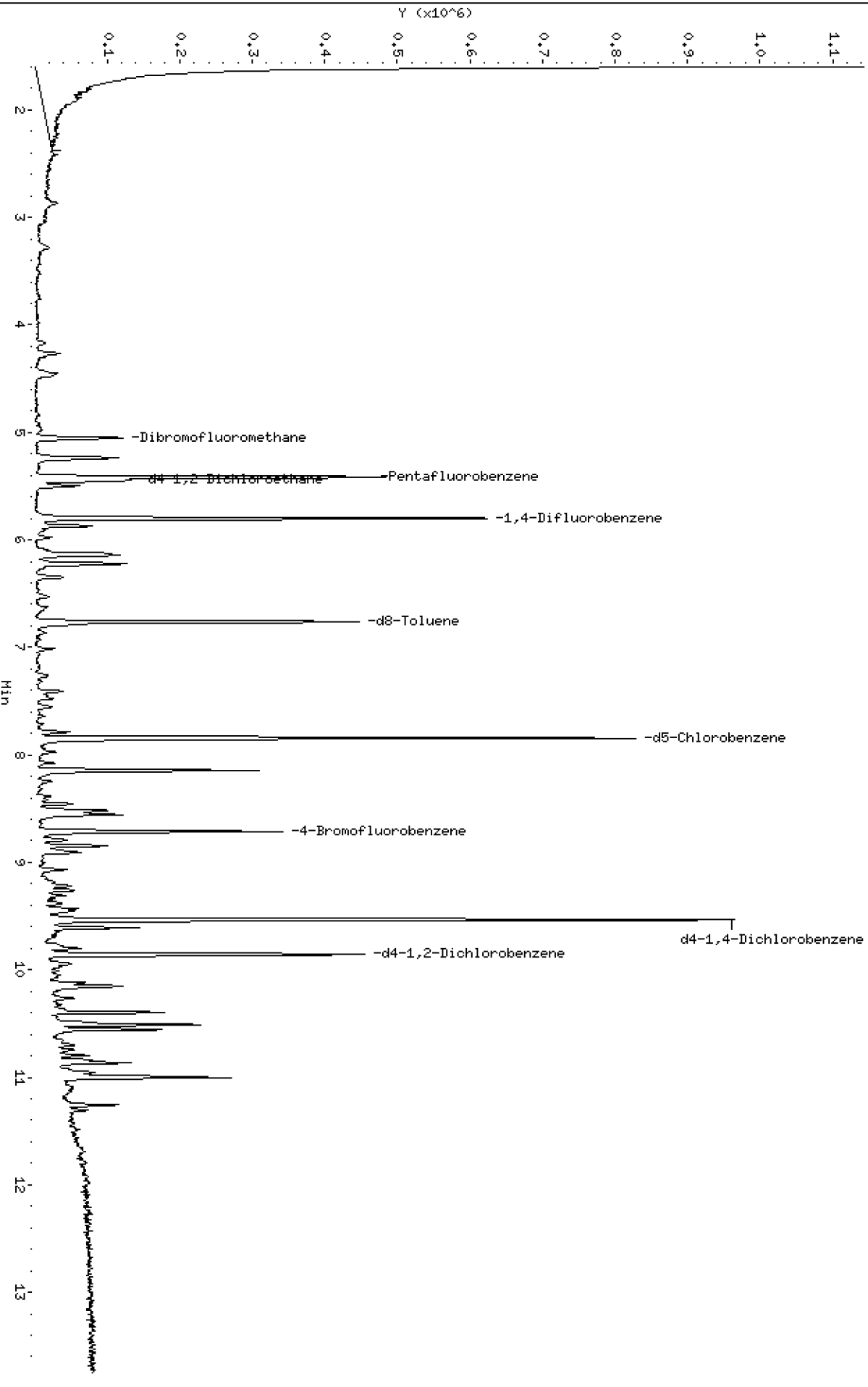
Instrument: nt3,1

Page 1

Column phase: RTXWMS

Operator: PC
Column diameter: 0.18

\\target\share\chend\nt3,1\20170302s,b\303021725G.D



ARI Labs, Inc.

8260C 10 ml purge
Data file : \\target\share\chem1\nt3.i\20170302s.b\V303021725G.D
Lab Smp Id: 17C0009-19 Client Smp ID: Rerun for c/o
Inj Date : 02-MAR-2017 19:04
Operator : PC Inst ID: nt3.i
Smp Info : 17C0009-19
Misc Info : 16-
Comment :
Method : \\target\share\chem1\nt3.i\20170302s.b\8260C022417.m
Meth Date : 03-Mar-2017 15:16 nt3.i Quant Type: ISTD
Cal Date : 14-FEB-2017 18:50 Cal File: V302141718.D
Als bottle: 12
Dil Factor: 1.00000
Integrator: HP RTE Compound Sublist: gsurr.sub
Target Version: 4.14
Processing Host: ORGDATA20

Compounds	QUANT	SIG	CONCENTRATIONS					
			RT	EXP RT	REL RT	RESPONSE	ON-COLUMN (ug/L)	FINAL (ug/L)
\$ 27 Dibromofluoromethane	111	====	5.053	5.053	(0.932)	57316	4.89562	4.896(R)
* 32 Pentafluorobenzene	168		5.420	5.419	(1.000)	249203	10.0000	
\$ 33 d4-1,2-Dichloroethane	65		5.446	5.446	(1.005)	69258	5.22862	5.229(R)
* 37 1,4-Difluorobenzene	114		5.802	5.802	(1.000)	389868	10.0000	
\$ 43 d8-Toluene	98		6.759	6.759	(1.165)	232222	4.90655	4.907(R)
* 53 d5-Chlorobenzene	117		7.843	7.843	(1.000)	384509	10.0000	
\$ 62 4-Bromofluorobenzene	174		8.715	8.715	(1.111)	77852	4.80951	4.810(R)
* 76 d4-1,4-Dichlorobenzene	152		9.534	9.533	(1.000)	207988	10.0000	
\$ 79 d4-1,2-Dichlorobenzene	152		9.858	9.858	(1.034)	97273	4.98278	4.983(R)

QC Flag Legend

R - Spike/Surrogate failed recovery limits.

ARI Labs, Inc.

INTERNAL STANDARD COMPOUNDS
 AREA AND RT SUMMARY

Instrument ID: nt3.i Calibration Date: 02-MAR-2017
 Lab File ID: V303021725G.D Calibration Time: 21:37
 Lab Smp Id: 17C0009-19 Client Smp ID: Rerun for c/o
 Analysis Type: VOA Level:
 Quant Type: ISTD Sample Type:
 Operator: PC
 Method File: \\target\share\chem1\nt3.i\20170302s.b\8260C022417.m
 Misc Info: 16-

Test Mode:

Use Initial Calibration Level 5.
 If Continuing Cal. use Initial Cal. Level 5

COMPOUND	STANDARD	AREA LIMIT		SAMPLE	%DIFF
		LOWER	UPPER		
32 Pentafluorobenzon	317912	158956	635824	249203	-21.61
37 1,4-Difluorobenze	512039	256020	1024078	389868	-23.86
53 d5-Chlorobenzene	494052	247026	988104	384509	-22.17
76 d4-1,4-Dichlorobe	282154	141077	564308	207988	-26.29

COMPOUND	STANDARD	RT LIMIT		SAMPLE	%DIFF
		LOWER	UPPER		
32 Pentafluorobenzon	5.42	4.92	5.92	5.42	0.00
37 1,4-Difluorobenze	5.80	5.30	6.30	5.80	0.00
53 d5-Chlorobenzene	7.84	7.34	8.34	7.84	0.00
76 d4-1,4-Dichlorobe	9.53	9.03	10.03	9.53	0.00

AREA UPPER LIMIT = +100% of internal standard area.
 AREA LOWER LIMIT = - 50% of internal standard area.
 RT UPPER LIMIT = + 0.50 minutes of internal standard RT.
 RT LOWER LIMIT = - 0.50 minutes of internal standard RT.

ARI Labs, Inc.

RECOVERY REPORT

Client Name: Client SDG: 20150930a
Sample Matrix: NONE Fraction: VOA
Lab Smp Id: 17C0009-19 Client Smp ID: Rerun for c/o
Level: Operator: PC
Data Type: MS DATA SampleType: SAMPLE
SpikeList File: allspike.spk Quant Type: ISTD
Sublist File: gsurr.sub
Method File: \\target\share\chem1\nt3.i\20170302s.b\8260C022417.m
Misc Info: 16-

SURROGATE COMPOUND	AMOUNT ADDED ug/L	AMOUNT RECOVERED ug/L	% RECOVERED	LIMITS
\$ 27 Dibromofluorometha	5.000	4.896	97.91	
\$ 33 d4-1,2-Dichloroeth	5.000	5.229	104.57	
\$ 43 d8-Toluene	5.000	4.907	98.13	
\$ 62 4-Bromofluorobenze	5.000	4.810	96.19	
\$ 79 d4-1,2-Dichloroben	5.000	4.983	99.66	

REVIEW SUMMARY FOR FILE - V303021725G.D

Lab ID: 17C0009-19

nt3.i, 20170302s.b\8260C022417.m, 02-MAR-2017 19:04

RT CO-ELUTION COMPOUNDS

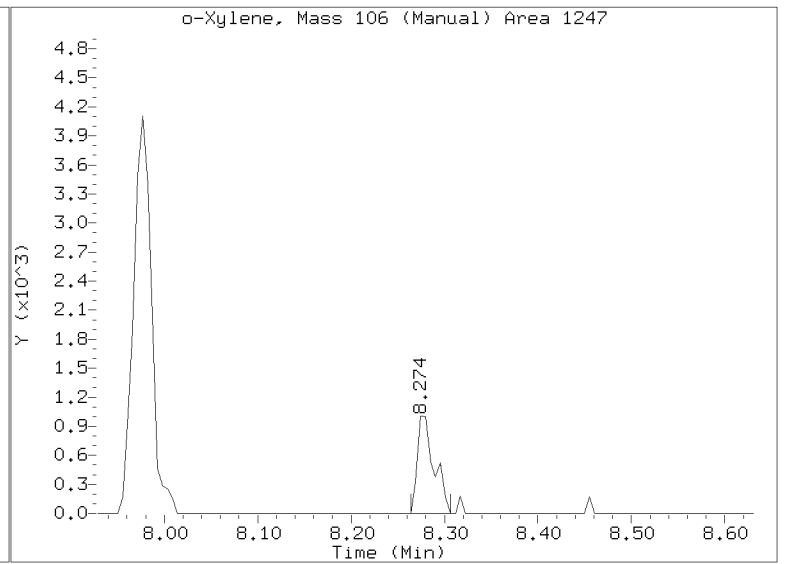
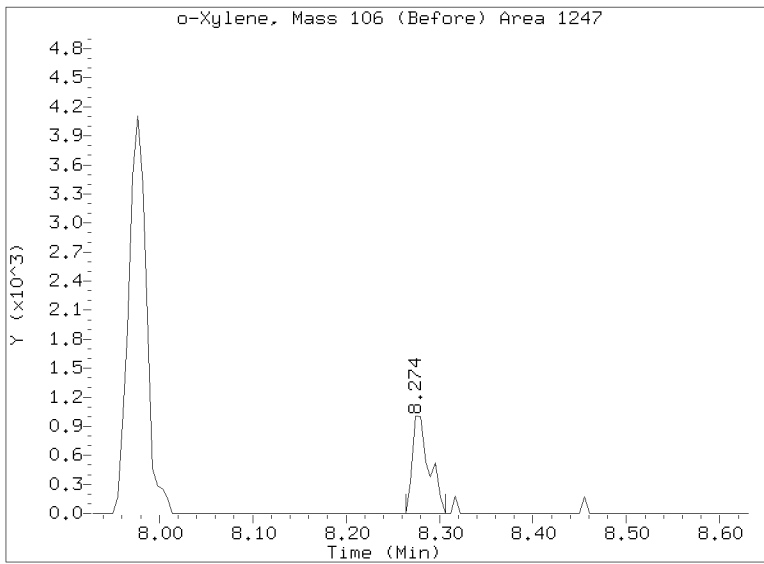
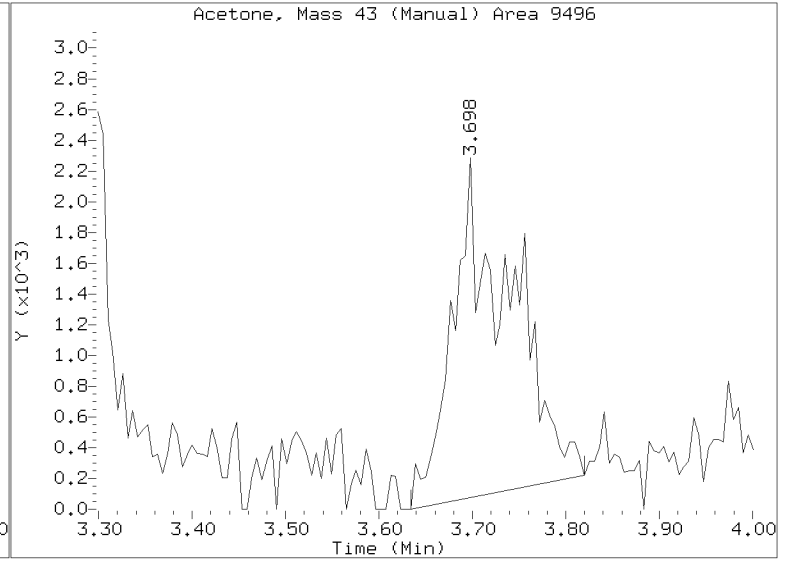
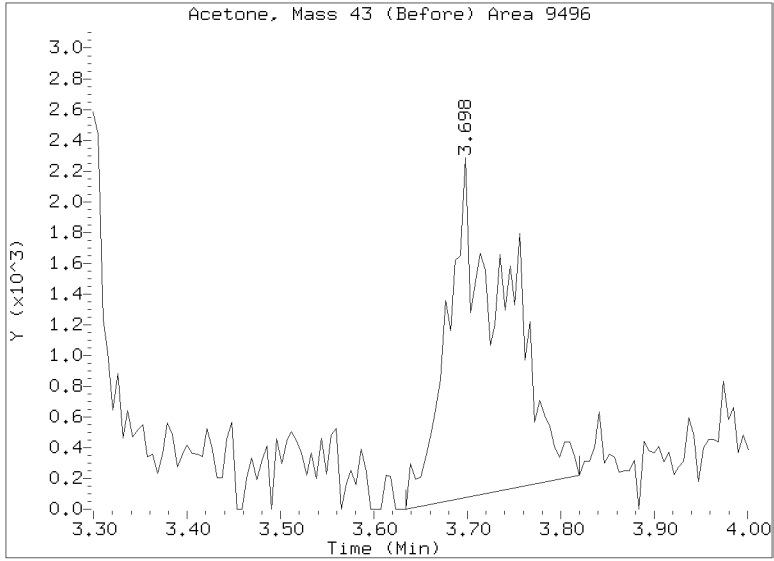
Quant Ion Manual Peak Adjustment Report

Datafile: //target/share/chem1/nt3.i/20170302.b/V303021725.D

Injection Date: 02-MAR-2017 19:04

Lab ID:17C0009-19 Client ID:Rerun for c/o

Report Date: 03/03/2017 15:15

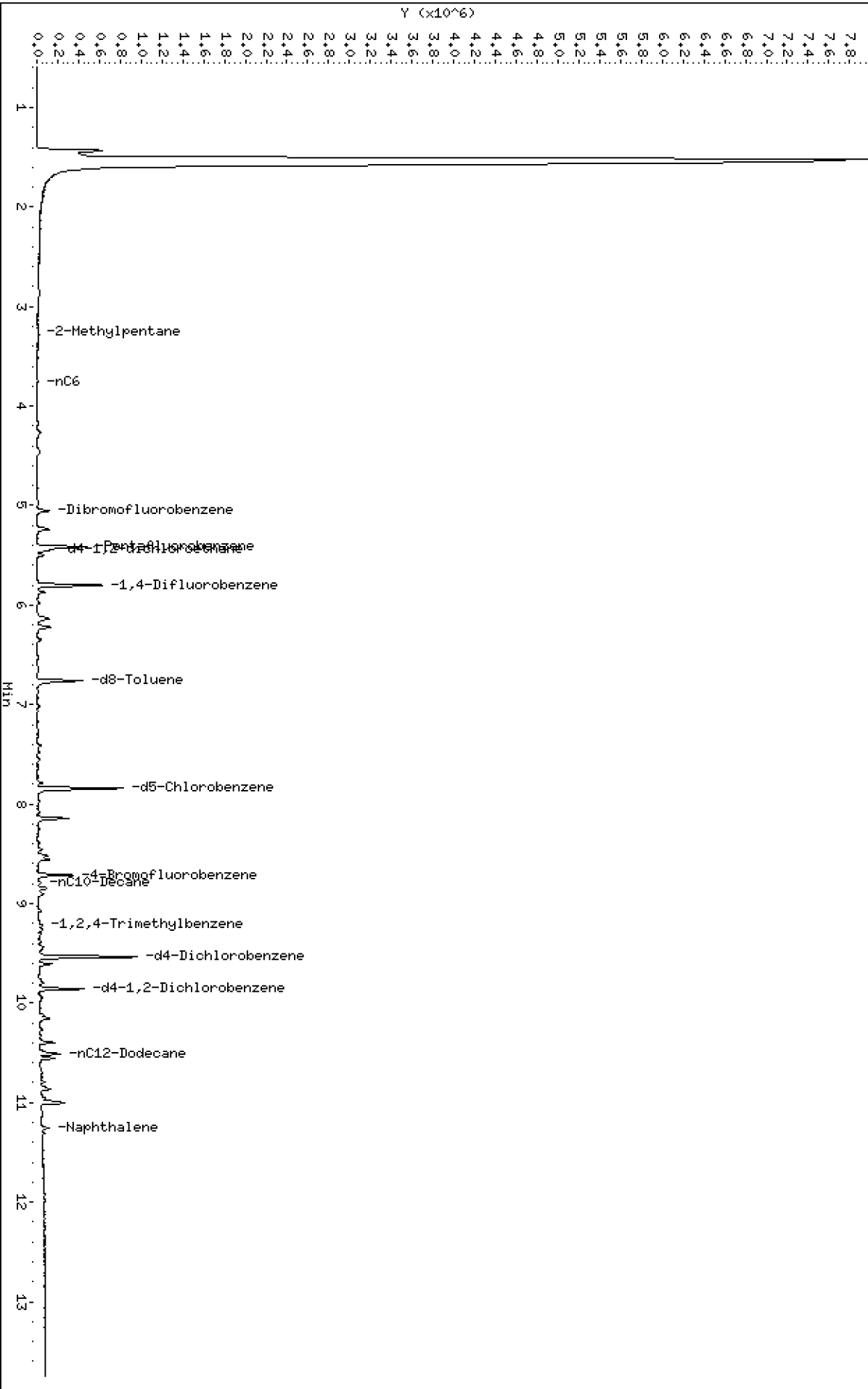


Data File: \\target\share\chend\nt3.1\20170302g.1b\303021725G.D
 Date : 02-MAR-2017 19:04
 Client ID:
 Sample Info: 17C0009-19

Column phase: RTXWMS

Instrument: nt3.1
 Operator: PC
 Column diameter: 0.18

\\target\share\chend\nt3.1\20170302g.1b\303021725G.D



Analytical Resources Inc.
GC/MS Gas Quantitation Report

Data file: 20170302g.b/V303021725G.D
Method: \20170302g.b\NWTPHG.m
Instrument: nt3.i
Gas Ical Date: 14-Feb-2017
Injection Date: 02-MAR-2017 19:04

ARI ID: 17C0009-19
Client ID:
Matrix: NONE
Dilution Factor: 1.000
Operator: PC

=====

GASOLINE HYDROCARBONS

Range	RF	Total Area*	Amount (ug/mL)
-----	----	-----	-----
WAGas Tol-C12 (6.70 to 10.57)	52141375	3918073	0.075
8015C 2MP-TMB (3.16 to 9.33)	87713511	3652255	0.042 M
AK101 nC6-nC10 (3.65 to 8.68)	61260787	2944336	0.048 M
NWTPHG Tol-Nap (6.70 to 11.36)	54123058	4885998	0.090

M Indicates manual integration within range

* Surrogate areas are subtracted from Total Area

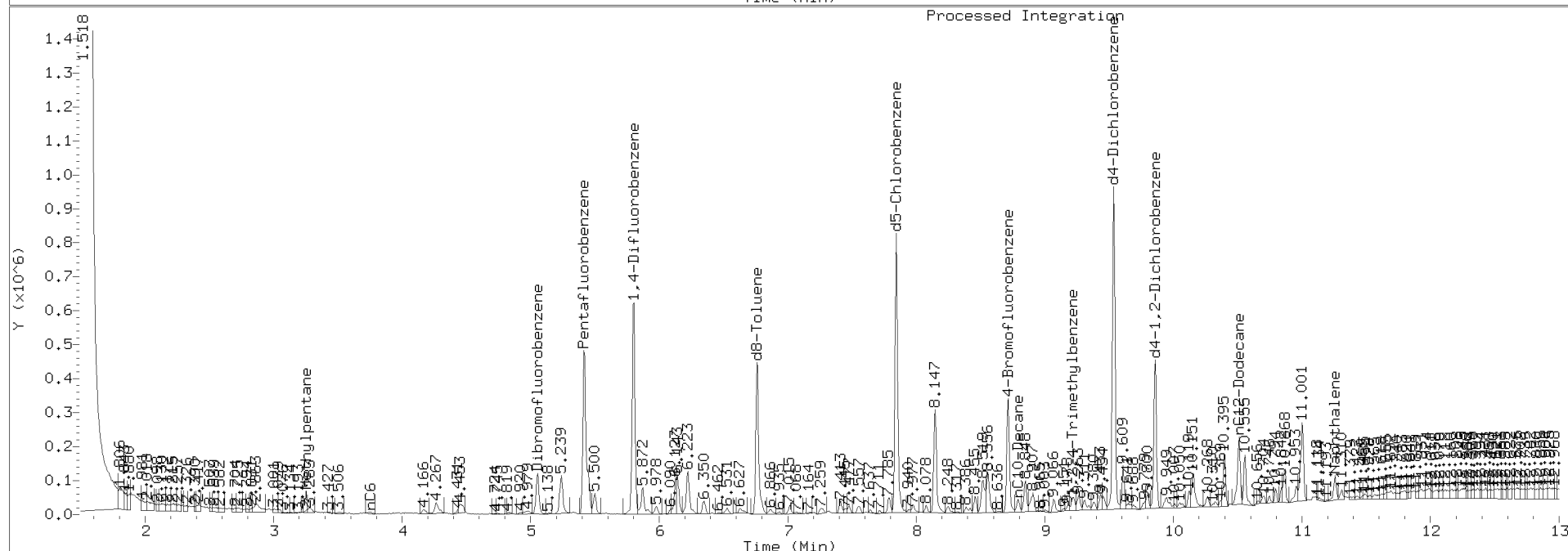
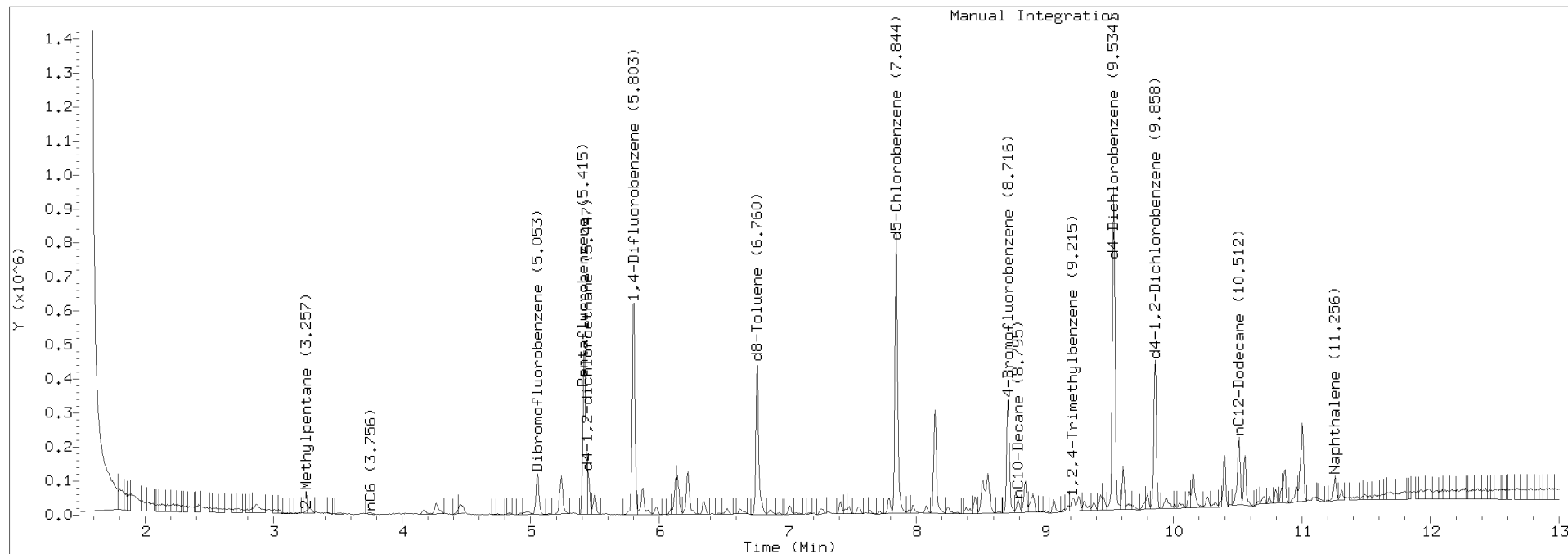
NW Gas Range Subtracted Peaks

6.760	739038	d8-Toluene
8.716	514734	4-Bromofluorobenzene
9.534	1426251	d4-Dichlorobenzene
7.844	1284373	d5-Chlorobenzene
9.858	645745	d4-1,2-Dichlorobenzene

TPHG Manual Integrations Report

Datafile: NT3, 20170302g.b/V303021725G.D Injection: 02-MAR-2017 19:04

Lab ID:17C0009-19





Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

B-17-W
17C0009-19 (Water)

Petroleum Hydrocarbons

Method: NWTPH-Dx

Sampled: 02/27/2017 17:30

Instrument: FID3

Analyzed: 03-Mar-2017 23:26

Sample Preparation:

Preparation Method: EPA 3510C SepF

Preparation Batch: BFC0024

Sample Size: 500 mL

Prepared: 02-Mar-2017

Final Volume: 1 mL

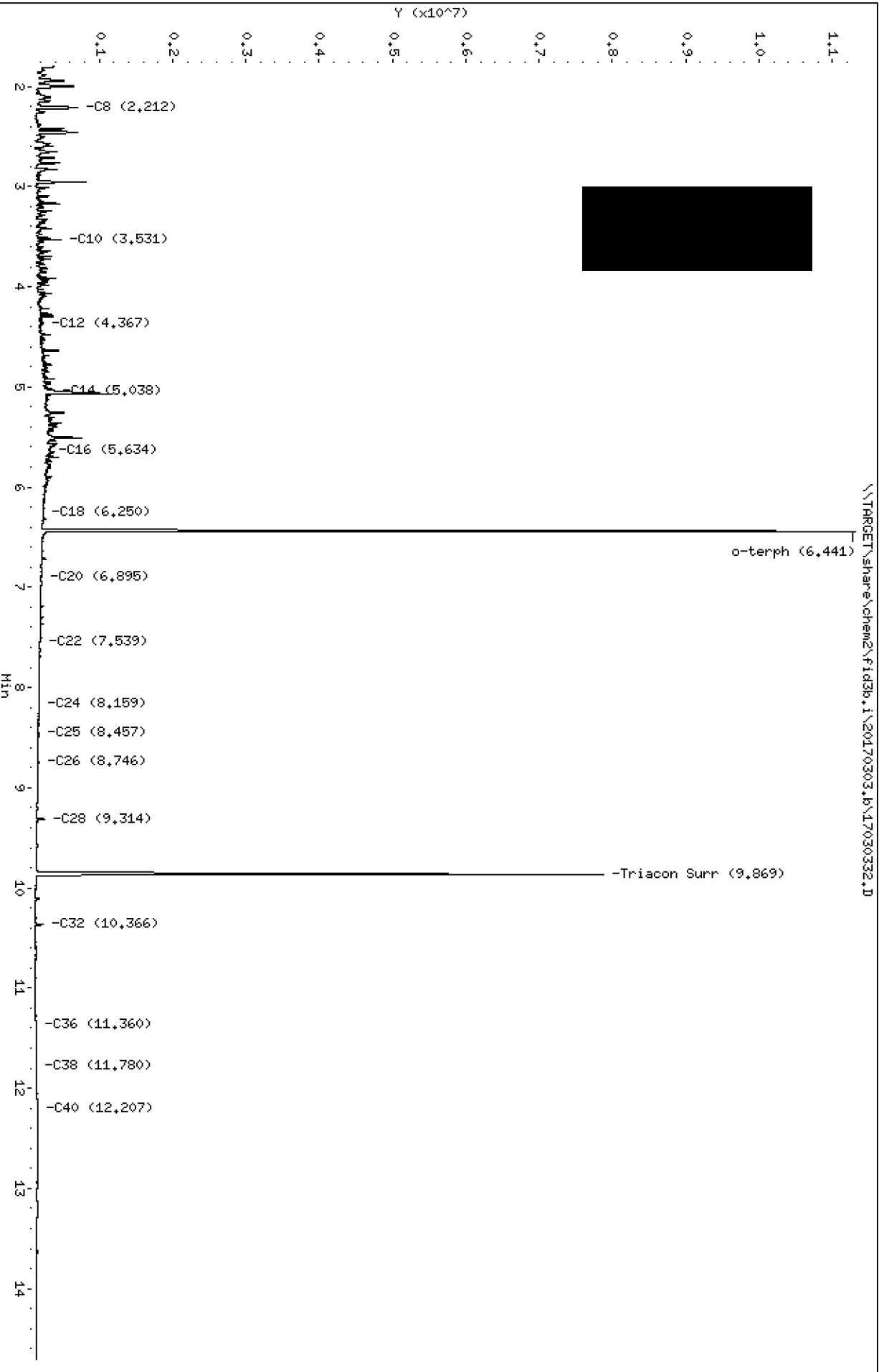
Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Diesel Range Organics (C12-C24)		1	0.100	0.356	mg/L	
HC ID: DRO						
Motor Oil Range Organics (C24-C38)		1	0.200	ND	mg/L	U
<i>Surrogate: o-Terphenyl</i>			<i>50-150 %</i>	<i>87.3</i>	<i>%</i>	

Data File: \\TARGET\share\chem2\fid3b,1\20170303,b\17030332.D
Date: 03-HR-2017 23:26
Client ID:
Sample Info: 17C0009-19

Instrument: fid3b,1

Column phase: RTX-1

Operator: ML
Column diameter: 0.25



Analytical Resources Inc.
TPH Quantitation Report

Data file: 20170303.b/17030332.D
Method: 20170303.b\FID3TPH.m
Instrument: fid3b.i
Operator: ML
Report Date: 03/06/2017
Macro: FID3_022817

ARI ID: 17C0009-19
Client ID:
Injection: 03-MAR-2017 23:26
Dilution Factor: 1

FID:3B RESULTS

Compound	RT	Shift	Height	Area	Method	Range	Total Area	Conc
Toluene	1.886	0.005	148519	282845	WATPHG	(Tol-C12)	14915745	685.9
C8	2.212	-0.001	579501	796379	WATPHD	(C12-C24)	27667380	177.9
C10	3.531	-0.002	359472	194510	WATPHM	(C24-C38)	3140753	22.9
C12	4.367	-0.004	120697	101234				
C14	5.038	-0.000	269826	208706				
C16	5.634	-0.001	202253	147789				
C18	6.250	-0.004	114525	152588				
C20	6.895	-0.005	85173	100446				
C22	7.539	-0.007	73958	137013				
C24	8.159	-0.009	62571	77915				
C25	8.457	-0.009	58685	90349				
C26	8.746	-0.008	52831	111742				
C28	9.314	-0.001	122148	128256				
C32	10.366	-0.009	104862	103399				
C34	----							
Filter Peak	----							
C36	11.360	0.016	14043	42378				
o-terph	6.441	0.001	11091158	8634086				
Triacon Surr	9.869	0.001	7749392	8155388				

Range Times: NW Diesel(4.422 - 8.218) NW Gas(1.831 - 4.422) NW M.Oil(8.218 - 11.845)
AK102(3.483 - 8.416) AK103(8.416 - 11.394) Jet A(3.483 - 6.304)

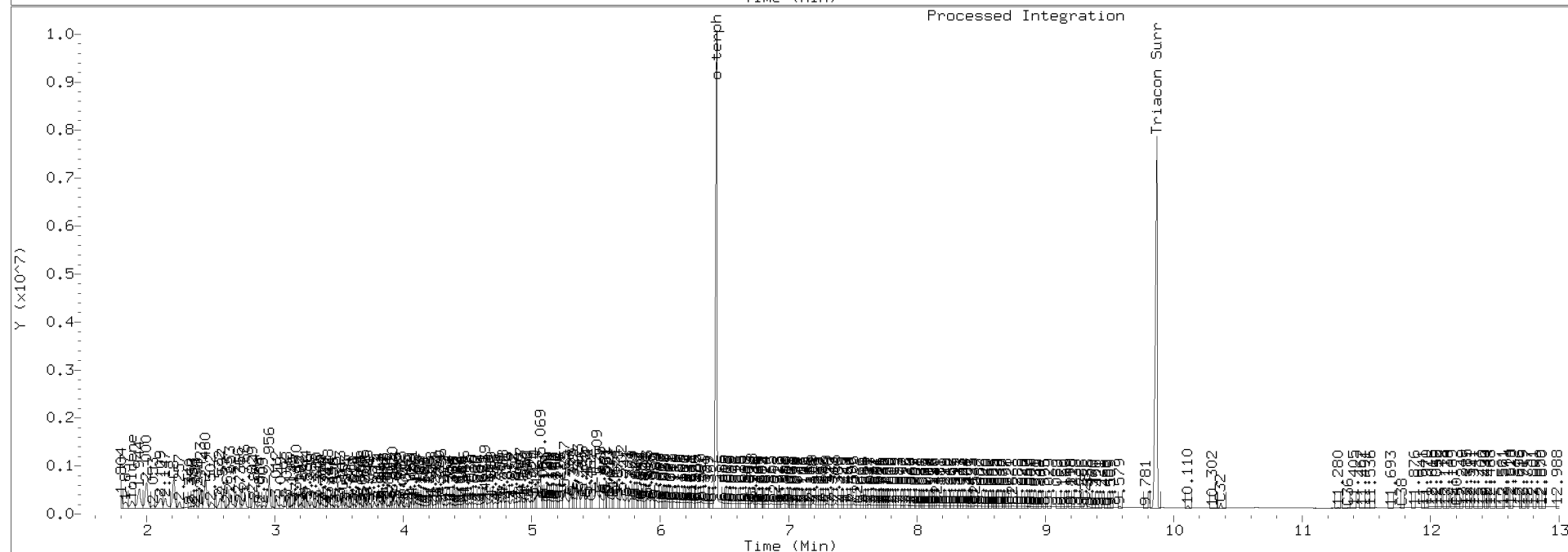
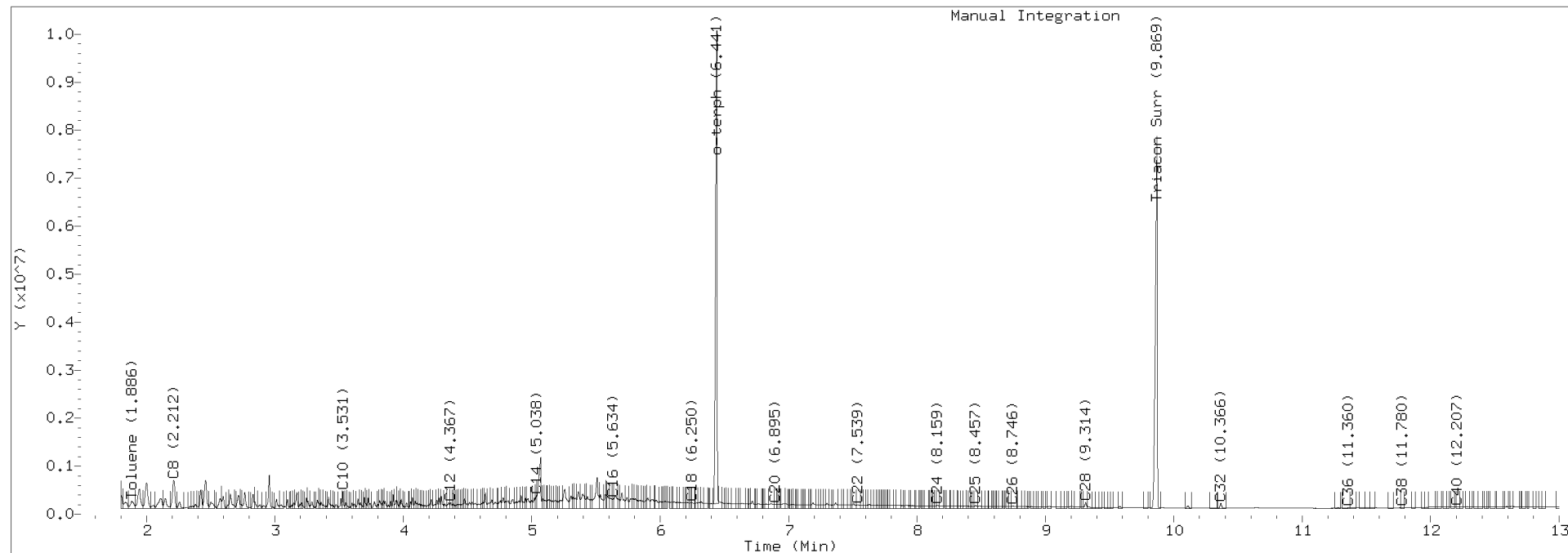
Surrogate	Area	Amount	%Rec
o-Terphenyl	8634086	39.3	87.3
Triacontane	8155388	42.7	94.9

Analyte	RF	Curve Date
o-Terph Surr	219872.3	28-FEB-2017
Triacon Surr	191068.8	28-FEB-2017
Gas	21747.6	xx-xx-xxxx
Diesel	155491.0	28-FEB-2017
Motor Oil	137039.0	28-FEB-2017

TPH Manual Integrations Report

Datafile: FID3B, 20170303.b/17030332.D Injection: 03-MAR-2017 23:26

Lab ID:17C0009-19





Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

Volatile Organic Compounds - Quality Control

Batch BFC0031 - EPA 5035 (Sodium Bisulfate)

Instrument: NT5

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BFC0031-BLK1)										
				Prepared: 01-Mar-2017 Analyzed: 06-Mar-2017 12:02						
1,2-Dichloroethane	ND	1.00	ug/kg							U
Benzene	ND	1.00	ug/kg							U
Toluene	ND	1.00	ug/kg							U
Ethylbenzene	ND	1.00	ug/kg							U
m,p-Xylene	ND	1.00	ug/kg							U
o-Xylene	ND	1.00	ug/kg							U
<i>Surrogate: Dibromofluoromethane</i>	44.6		ug/kg	50.0		89.3	80-120			
<i>Surrogate: 1,2-Dichloroethane-d4</i>	42.4		ug/kg	50.0		84.7	80-149			
<i>Surrogate: Toluene-d8</i>	49.4		ug/kg	50.0		98.7	77-120			
<i>Surrogate: 4-Bromofluorobenzene</i>	51.5		ug/kg	50.0		103	80-120			
<i>Surrogate: 1,2-Dichlorobenzene-d4</i>	50.0		ug/kg	50.0		100	80-120			



Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

Volatile Organic Compounds - Quality Control

Batch BFC0031 - EPA 5035 (Sodium Bisulfate)

Instrument: NT5

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
LCS (BFC0031-BS1)				Prepared: 01-Mar-2017 Analyzed: 06-Mar-2017 10:44						
1,2-Dichloroethane	47.5		ug/kg	50.0		95.0	76-120			
Benzene	51.6		ug/kg	50.0		103	80-120			
Toluene	53.4		ug/kg	50.0		107	75-120			
Ethylbenzene	52.3		ug/kg	50.0		105	80-125			
m,p-Xylene	107		ug/kg	100		107	76-121			
o-Xylene	52.9		ug/kg	50.0		106	67-132			
<i>Surrogate: Dibromofluoromethane</i>	49.9		ug/kg	50.0		99.7	80-120			
<i>Surrogate: 1,2-Dichloroethane-d4</i>	46.1		ug/kg	50.0		92.3	80-149			
<i>Surrogate: Toluene-d8</i>	49.7		ug/kg	50.0		99.5	77-120			
<i>Surrogate: 4-Bromofluorobenzene</i>	51.0		ug/kg	50.0		102	80-120			
<i>Surrogate: 1,2-Dichlorobenzene-d4</i>	50.6		ug/kg	50.0		101	80-120			



Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

Volatile Organic Compounds - Quality Control

Batch BFC0031 - EPA 5035 (Sodium Bisulfate)

Instrument: NT5

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
LCS Dup (BFC0031-BSD1)				Prepared: 01-Mar-2017 Analyzed: 06-Mar-2017 11:39						
1,2-Dichloroethane	45.1		ug/kg	50.0		90.2	76-120	5.17	30	
Benzene	50.2		ug/kg	50.0		100	80-120	2.72	30	
Toluene	52.0		ug/kg	50.0		104	75-120	2.62	30	
Ethylbenzene	51.8		ug/kg	50.0		104	80-125	0.83	30	
m,p-Xylene	108		ug/kg	100		108	76-121	0.63	30	
o-Xylene	53.0		ug/kg	50.0		106	67-132	0.11	30	
<i>Surrogate: Dibromofluoromethane</i>	49.9		ug/kg	50.0		99.8	80-120			
<i>Surrogate: 1,2-Dichloroethane-d4</i>	45.1		ug/kg	50.0		90.2	80-149			
<i>Surrogate: Toluene-d8</i>	49.0		ug/kg	50.0		98.1	77-120			
<i>Surrogate: 4-Bromofluorobenzene</i>	51.5		ug/kg	50.0		103	80-120			
<i>Surrogate: 1,2-Dichlorobenzene-d4</i>	50.6		ug/kg	50.0		101	80-120			



Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

Volatile Organic Compounds - Quality Control

Batch BFC0055 - EPA 5030 (Purge and Trap)

Instrument: NT3

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BFC0055-BLK1)				Prepared: 02-Mar-2017 Analyzed: 02-Mar-2017 11:45						
1,2-Dichloroethane	ND	0.20	ug/L							U
Benzene	ND	0.20	ug/L							U
Toluene	ND	0.20	ug/L							U
Ethylbenzene	ND	0.20	ug/L							U
m,p-Xylene	ND	0.40	ug/L							U
o-Xylene	ND	0.20	ug/L							U
<i>Surrogate: 1,2-Dichloroethane-d4</i>	5.24		ug/L	5.00		105	80-129			
<i>Surrogate: Toluene-d8</i>	5.07		ug/L	5.00		101	80-120			
<i>Surrogate: 4-Bromofluorobenzene</i>	5.10		ug/L	5.00		102	80-120			



Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

Volatile Organic Compounds - Quality Control

Batch BFC0055 - EPA 5030 (Purge and Trap)

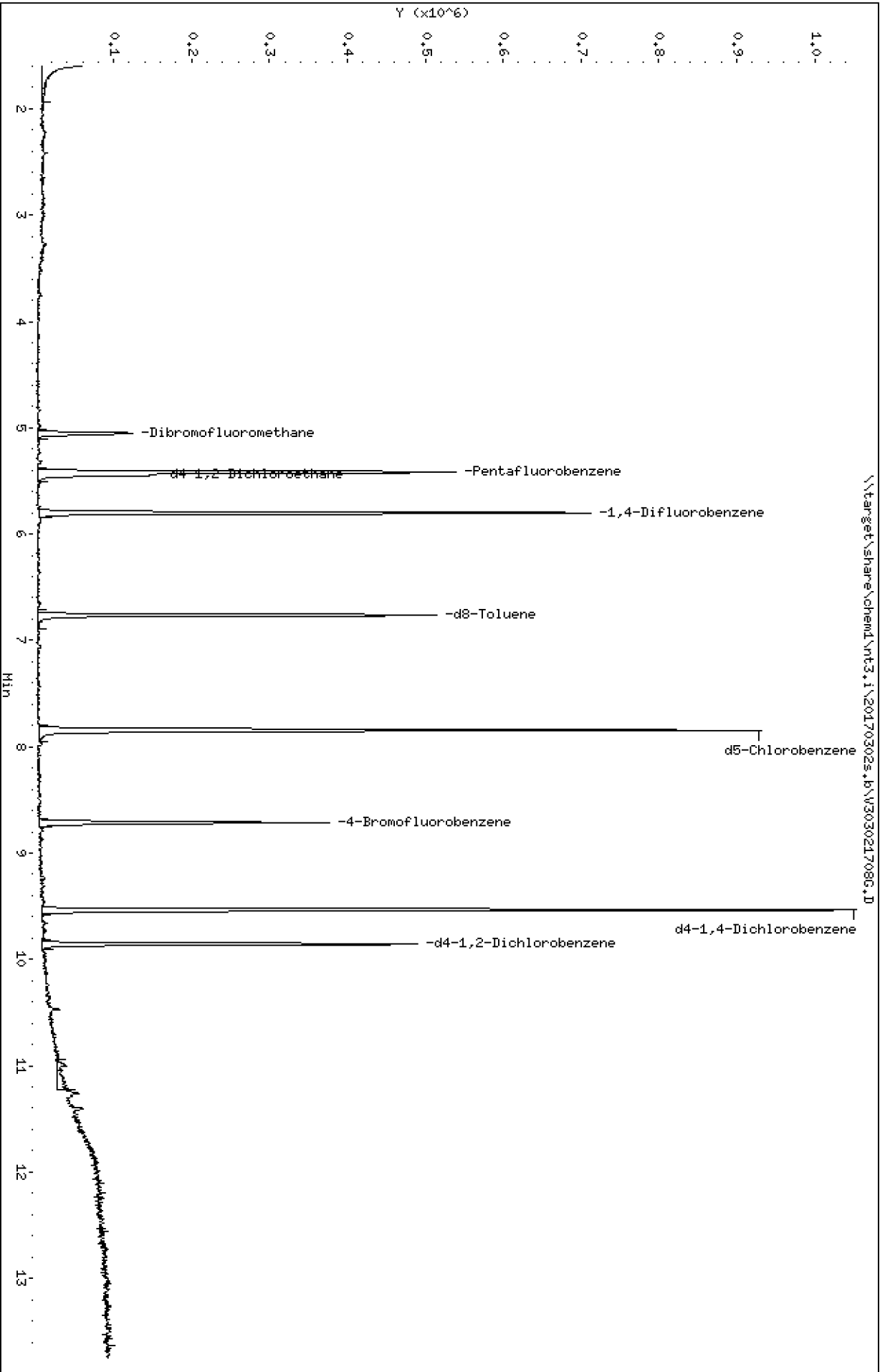
Instrument: NT3

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BFC0055-BLK2)					Prepared: 02-Mar-2017 Analyzed: 02-Mar-2017 11:45					
Gasoline Range Organics (Tol-Nap)	ND	100	ug/L							U
Surrogate: Toluene-d8	5.07		ug/L	5.00		101	80-120			
Surrogate: 4-Bromofluorobenzene	5.10		ug/L	5.00		102	80-120			

Data File: \\target\share\chend\nt3,1\20170302s,b\303021708G.D
Date : 02-MAR-2017 11:45
Client ID:
Sample Info: BFC0055-BLK2

Column phase: RTXWMS

Instrument: nt3,1
Operator: PC
Column diameter: 0.18



ARI Labs, Inc.

8260C 10 ml purge

Data file : \\target\share\chem1\nt3.i\20170302s.b\V303021708G.D
Lab Smp Id: BFC0055-BLK2
Inj Date : 02-MAR-2017 11:45
Operator : PC
Smp Info : BFC0055-BLK2
Misc Info : 16-
Comment :
Method : \\target\share\chem1\nt3.i\20170302s.b\8260C022417.m
Meth Date : 03-Mar-2017 15:16 nt3.i
Cal Date : 14-FEB-2017 18:50
Als bottle: 12
Dil Factor: 1.00000
Integrator: HP RTE
Target Version: 4.14
Processing Host: ORGDATA20

Inst ID: nt3.i

Quant Type: ISTD

Cal File: V302141718.D

Compound Sublist: gsurr.sub

Compounds	QUANT	SIG	CONCENTRATIONS					
			RT	EXP RT	REL RT	RESPONSE	ON-COLUMN (ug/L)	FINAL (ug/L)
\$ 27 Dibromofluoromethane	111	====	5.052	5.053	(0.932)	65475	4.98864	4.989(R)
* 32 Pentafluorobenzene	168		5.419	5.419	(1.000)	279369	10.0000	
\$ 33 d4-1,2-Dichloroethane	65		5.445	5.446	(1.005)	77818	5.24050	5.240(R)
* 37 1,4-Difluorobenzene	114		5.802	5.802	(1.000)	447187	10.0000	
\$ 43 d8-Toluene	98		6.764	6.759	(1.166)	275150	5.06840	5.068(R)
* 53 d5-Chlorobenzene	117		7.843	7.843	(1.000)	427312	10.0000	
\$ 62 4-Bromofluorobenzene	174		8.714	8.715	(1.111)	91789	5.10250	5.102(R)
* 76 d4-1,4-Dichlorobenzene	152		9.533	9.533	(1.000)	233949	10.0000	
\$ 79 d4-1,2-Dichlorobenzene	152		9.857	9.858	(1.034)	106559	4.85274	4.853(R)

QC Flag Legend

R - Spike/Surrogate failed recovery limits.

ARI Labs, Inc.

INTERNAL STANDARD COMPOUNDS
 AREA AND RT SUMMARY

Instrument ID: nt3.i Calibration Date: 02-MAR-2017
 Lab File ID: V303021708G.D Calibration Time: 21:37
 Lab Smp Id: BFC0055-BLK2
 Analysis Type: VOA Level:
 Quant Type: ISTD Sample Type:
 Operator: PC
 Method File: \\target\share\chem1\nt3.i\20170302s.b\8260C022417.m
 Misc Info: 16-

Test Mode:

Use Initial Calibration Level 5.
 If Continuing Cal. use Initial Cal. Level 5

COMPOUND	STANDARD	AREA LIMIT		SAMPLE	%DIFF
		LOWER	UPPER		
32 Pentafluorobenzon	317912	158956	635824	279369	-12.12
37 1,4-Difluorobenze	512039	256020	1024078	447187	-12.67
53 d5-Chlorobenzene	494052	247026	988104	427312	-13.51
76 d4-1,4-Dichlorobe	282154	141077	564308	233949	-17.08

COMPOUND	STANDARD	RT LIMIT		SAMPLE	%DIFF
		LOWER	UPPER		
32 Pentafluorobenzon	5.42	4.92	5.92	5.42	-0.01
37 1,4-Difluorobenze	5.80	5.30	6.30	5.80	-0.01
53 d5-Chlorobenzene	7.84	7.34	8.34	7.84	-0.01
76 d4-1,4-Dichlorobe	9.53	9.03	10.03	9.53	-0.00

AREA UPPER LIMIT = +100% of internal standard area.
 AREA LOWER LIMIT = - 50% of internal standard area.
 RT UPPER LIMIT = + 0.50 minutes of internal standard RT.
 RT LOWER LIMIT = - 0.50 minutes of internal standard RT.

ARI Labs, Inc.

RECOVERY REPORT

Client Name: Client SDG: 20150930a
Sample Matrix: NONE Fraction: VOA
Lab Smp Id: BFC0055-BLK2
Level: Operator: PC
Data Type: MS DATA SampleType: SAMPLE
SpikeList File: allspike.spk Quant Type: ISTD
Sublist File: gsurr.sub
Method File: \\target\share\chem1\nt3.i\20170302s.b\8260C022417.m
Misc Info: 16-

SURROGATE COMPOUND	AMOUNT ADDED ug/L	AMOUNT RECOVERED ug/L	% RECOVERED	LIMITS
\$ 27 Dibromofluorometha	5.000	4.989	99.77	
\$ 33 d4-1,2-Dichloroeth	5.000	5.240	104.81	
\$ 43 d8-Toluene	5.000	5.068	101.37	
\$ 62 4-Bromofluorobenze	5.000	5.102	102.05	
\$ 79 d4-1,2-Dichloroben	5.000	4.853	97.05	

REVIEW SUMMARY FOR FILE - V303021708G.D

Lab ID: BFC0055-BLK2

nt3.i, 20170302s.b\8260C022417.m, 02-MAR-2017 11:45

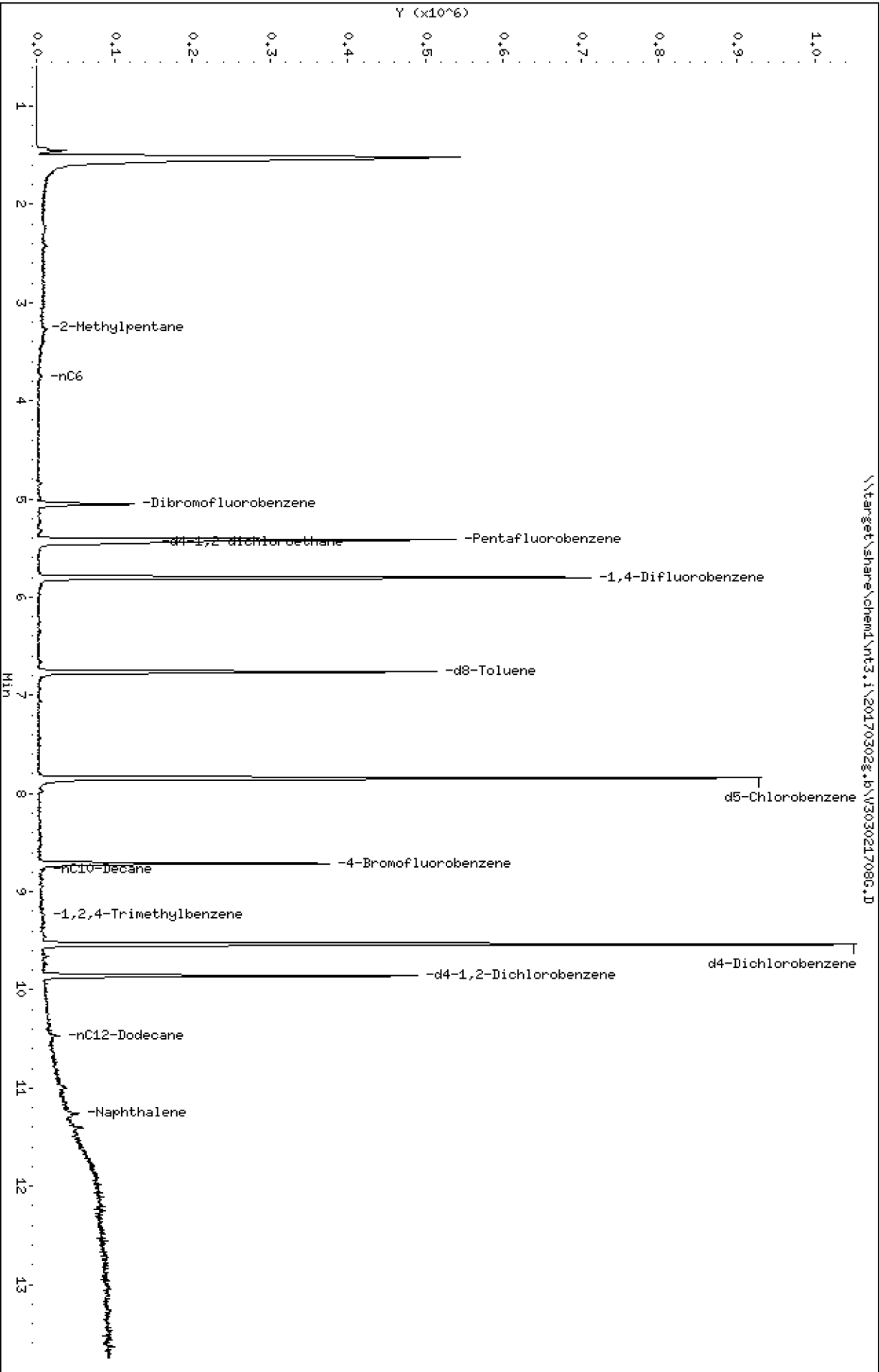
RT CO-ELUTION COMPOUNDS

Data File: \\target\share\chend\nt3,1\20170302g,b\303021708G.D
Date: 02-MAR-2017 11:45
Client ID:
Sample Info: BFC0055-BLK2

Column phase: RTXWMS

Instrument: nt3,1
Operator: PC
Column diameter: 0.18

\\target\share\chend\nt3,1\20170302g,b\303021708G.D



Analytical Resources Inc.
GC/MS Gas Quantitation Report

Data file: 20170302g.b/V303021708G.D
Method: \20170302g.b\NWTPHG.m
Instrument: nt3.i
Gas Ical Date: 14-Feb-2017
Injection Date: 02-MAR-2017 11:45

ARI ID: BFC0055-BLK2
Client ID:
Matrix: NONE
Dilution Factor: 1.000
Operator: PC

=====

GASOLINE HYDROCARBONS

Range	RF	Total Area*	Amount (ug/mL)
WAGas Tol-C12 (6.70 to 10.57)	52141375	219958	0.004
8015C 2MP-TMB (3.16 to 9.33)	87713511	243433	0.003 M
AK101 nC6-nC10 (3.65 to 8.68)	61260787	123614	0.002 M
NWTPHG Tol-Nap (6.70 to 11.36)	54123058	346084	0.006

M Indicates manual integration within range

* Surrogate areas are subtracted from Total Area

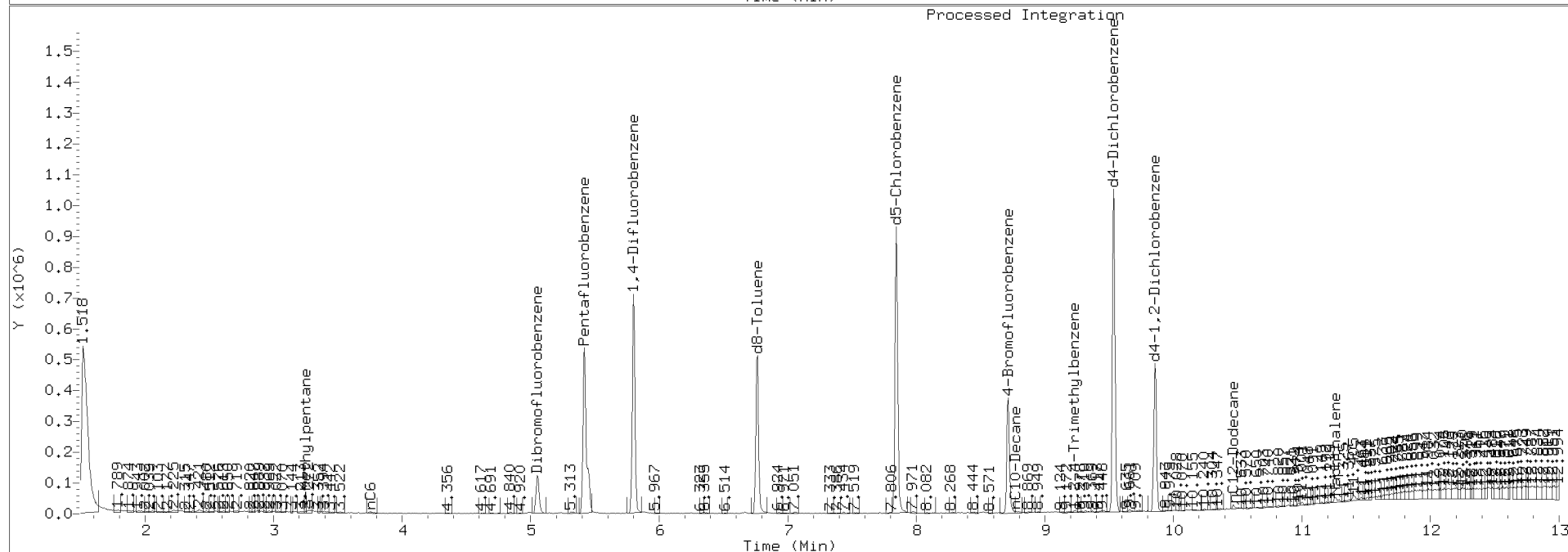
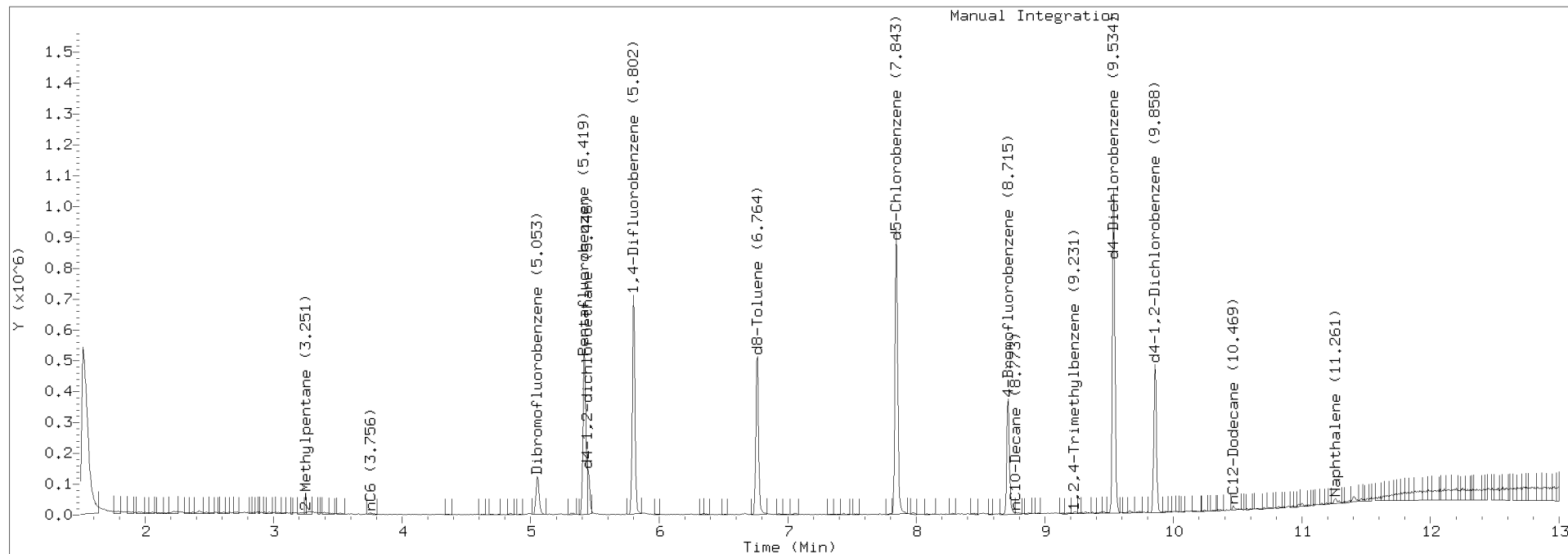
NW Gas Range Subtracted Peaks

6.764	775619	d8-Toluene
8.715	568454	4-Bromofluorobenzene
9.534	1517679	d4-Dichlorobenzene
7.843	1379751	d5-Chlorobenzene
9.858	711060	d4-1,2-Dichlorobenzene

TPHG Manual Integrations Report

Datafile: NT3, 20170302g.b/V303021708G.D Injection: 02-MAR-2017 11:45

Lab ID: BFC0055-BLK2





Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

Volatile Organic Compounds - Quality Control

Batch BFC0055 - EPA 5030 (Purge and Trap)

Instrument: NT3

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
LCS (BFC0055-BS1)		Prepared: 02-Mar-2017 Analyzed: 02-Mar-2017 09:35								
1,2-Dichloroethane	9.18	0.20	ug/L	10.0		91.8	75-123			
Benzene	9.31	0.20	ug/L	10.0		93.1	80-120			
Toluene	9.47	0.20	ug/L	10.0		94.7	80-120			
Ethylbenzene	9.84	0.20	ug/L	10.0		98.4	80-120			
m,p-Xylene	19.9	0.40	ug/L	20.0		99.5	80-121			
o-Xylene	10.1	0.20	ug/L	10.0		101	80-121			
<i>Surrogate: 1,2-Dichloroethane-d4</i>	4.94		ug/L	5.00		98.7	80-129			
<i>Surrogate: Toluene-d8</i>	4.90		ug/L	5.00		98.1	80-120			
<i>Surrogate: 4-Bromofluorobenzene</i>	4.91		ug/L	5.00		98.2	80-120			



Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

Volatile Organic Compounds - Quality Control

Batch BFC0055 - EPA 5030 (Purge and Trap)

Instrument: NT3

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
LCS (BFC0055-BS2)				Prepared: 02-Mar-2017 Analyzed: 02-Mar-2017 10:27						
Gasoline Range Organics (Tol-Nap)	1080	100	ug/L	1000		108	80-120			
Surrogate: Toluene-d8	5.04		ug/L	5.00		101	80-120			
Surrogate: 4-Bromofluorobenzene	4.98		ug/L	5.00		99.6	80-120			

Data File: \\target\share\chemd\nt3,1\20170302s,b\303021705LCSG.D

Date : 02-MAR-2017 10:27

Client ID: Gas

Sample Info: BFC0055-B52

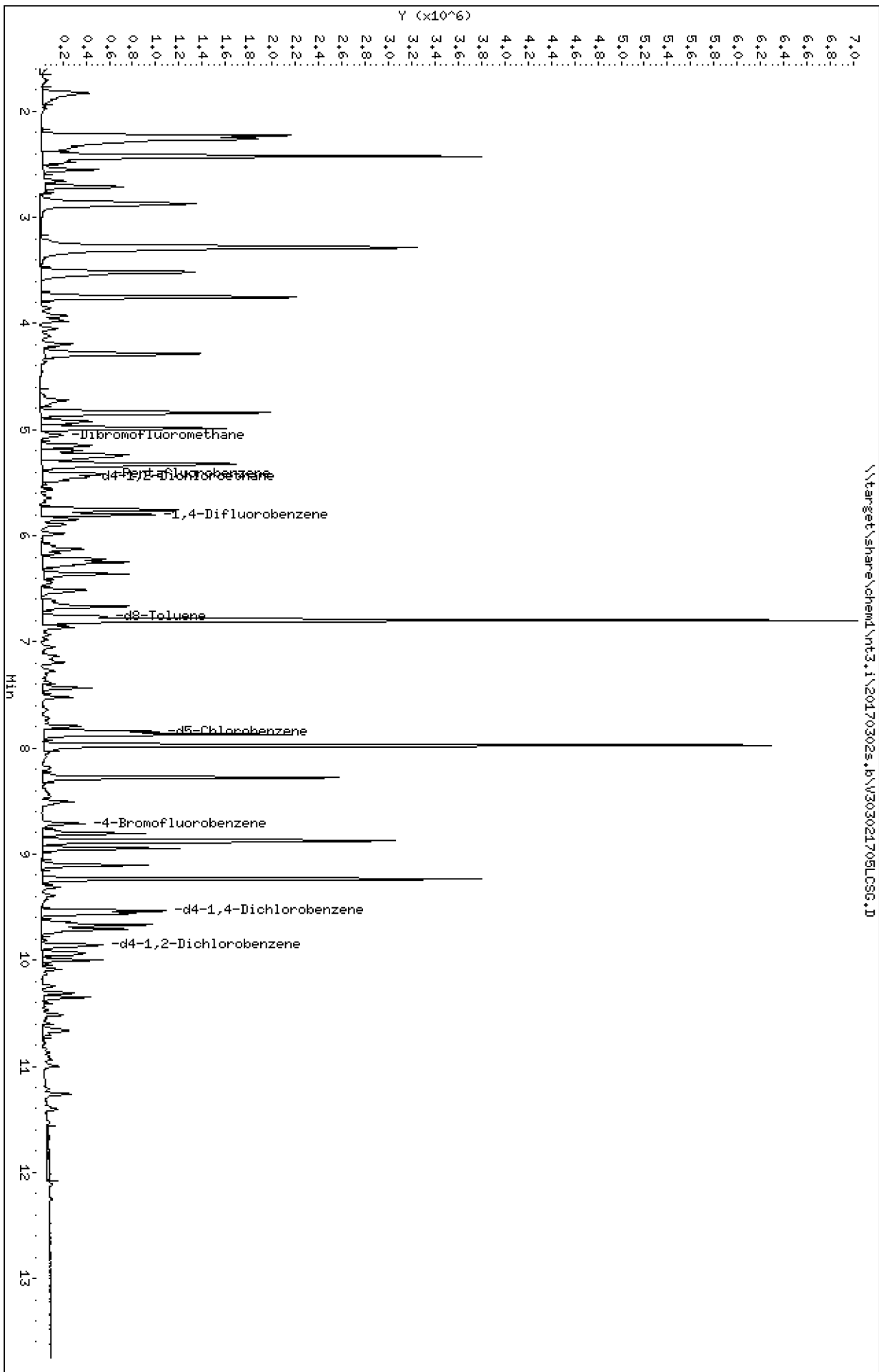
Page 1

Column phase: RTXWMS

Instrument: nt3,1

Operator: PC

Column diameter: 0.18



ARI Labs, Inc.

8260C 10 ml purge

Data file : \\target\share\chem1\nt3.i\20170302s.b\V303021705LCSG.D
Lab Smp Id: BFC0055-BS2 Client Smp ID: Gas
Inj Date : 02-MAR-2017 10:27
Operator : PC Inst ID: nt3.i
Smp Info : BFC0055-BS2
Misc Info : 16-
Comment :
Method : \\target\share\chem1\nt3.i\20170302s.b\8260C022417.m
Meth Date : 03-Mar-2017 15:16 nt3.i Quant Type: ISTD
Cal Date : 14-FEB-2017 18:50 Cal File: V302141718.D
Als bottle: 12
Dil Factor: 1.00000
Integrator: HP RTE Compound Sublist: gsurr.sub
Target Version: 4.14
Processing Host: ORGDATA20

Compounds	QUANT	SIG	CONCENTRATIONS					
			RT	EXP RT	REL RT	RESPONSE	ON-COLUMN (ug/L)	FINAL (ug/L)
\$ 27 Dibromofluoromethane	111	====	5.053	5.053	(0.932)	66928	5.04053	5.041(R)
* 32 Pentafluorobenzene	168		5.420	5.419	(1.000)	282629	10.0000	
\$ 33 d4-1,2-Dichloroethane	65		5.446	5.446	(1.005)	85682	5.70353	5.704(R)
* 37 1,4-Difluorobenzene	114		5.802	5.802	(1.000)	456513	10.0000	
\$ 43 d8-Toluene	98		6.764	6.759	(1.166)	279523	5.04376	5.044(R)
* 53 d5-Chlorobenzene	117		7.843	7.843	(1.000)	439688	10.0000	
\$ 62 4-Bromofluorobenzene	174		8.715	8.715	(1.111)	92182	4.98011	4.980(R)
* 76 d4-1,4-Dichlorobenzene	152		9.534	9.533	(1.000)	238489	10.0000	
\$ 79 d4-1,2-Dichlorobenzene	152		9.858	9.858	(1.034)	110902	4.95437	4.954(R)

QC Flag Legend

R - Spike/Surrogate failed recovery limits.

ARI Labs, Inc.

INTERNAL STANDARD COMPOUNDS
AREA AND RT SUMMARY

Instrument ID: nt3.i
Lab File ID: V303021705LCSG.D
Lab Smp Id: BFC0055-BS2
Analysis Type: VOA
Quant Type: ISTD
Operator: PC
Method File: \\target\share\chem1\nt3.i\20170302s.b\8260C022417.m
Misc Info: 16-

Calibration Date: 02-MAR-2017
Calibration Time: 21:37
Client Smp ID: Gas
Level:
Sample Type:

Test Mode:

Use Initial Calibration Level 5.
If Continuing Cal. use Initial Cal. Level 5

COMPOUND	STANDARD	AREA LIMIT		SAMPLE	%DIFF
		LOWER	UPPER		
32 Pentafluorobenzon	317912	158956	635824	282629	-11.10
37 1,4-Difluorobenze	512039	256020	1024078	456513	-10.84
53 d5-Chlorobenzene	494052	247026	988104	439688	-11.00
76 d4-1,4-Dichlorobe	282154	141077	564308	238489	-15.48

COMPOUND	STANDARD	RT LIMIT		SAMPLE	%DIFF
		LOWER	UPPER		
32 Pentafluorobenzon	5.42	4.92	5.92	5.42	0.01
37 1,4-Difluorobenze	5.80	5.30	6.30	5.80	0.01
53 d5-Chlorobenzene	7.84	7.34	8.34	7.84	0.00
76 d4-1,4-Dichlorobe	9.53	9.03	10.03	9.53	0.00

AREA UPPER LIMIT = +100% of internal standard area.
AREA LOWER LIMIT = - 50% of internal standard area.
RT UPPER LIMIT = + 0.50 minutes of internal standard RT.
RT LOWER LIMIT = - 0.50 minutes of internal standard RT.

ARI Labs, Inc.

RECOVERY REPORT

Client Name: Client SDG: 20150930a
Sample Matrix: NONE Fraction: VOA
Lab Smp Id: BFC0055-BS2 Client Smp ID: Gas
Level: Operator: PC
Data Type: MS DATA SampleType: SAMPLE
SpikeList File: allspike.spk Quant Type: ISTD
Sublist File: gsurr.sub
Method File: \\target\share\chem1\nt3.i\20170302s.b\8260C022417.m
Misc Info: 16-

SURROGATE COMPOUND	AMOUNT ADDED ug/L	AMOUNT RECOVERED ug/L	% RECOVERED	LIMITS
\$ 27 Dibromofluorometha	5.000	5.041	100.81	
\$ 33 d4-1,2-Dichloroeth	5.000	5.704	114.07	
\$ 43 d8-Toluene	5.000	5.044	100.88	
\$ 62 4-Bromofluorobenze	5.000	4.980	99.60	
\$ 79 d4-1,2-Dichloroben	5.000	4.954	99.09	

REVIEW SUMMARY FOR FILE - V303021705LCSG.D

Lab ID: BFC0055-BS2
nt3.i, 20170302s.b\8260C022417.m, 02-MAR-2017 10:27

RT CO-ELUTION COMPOUNDS

Data File: \\target\share\chemd\nt3,1\20170302g.jb\303021705LCSG.D

Date: 02-MAR-2017 10:27

Client ID:

Sample Info: BFC0055-B52

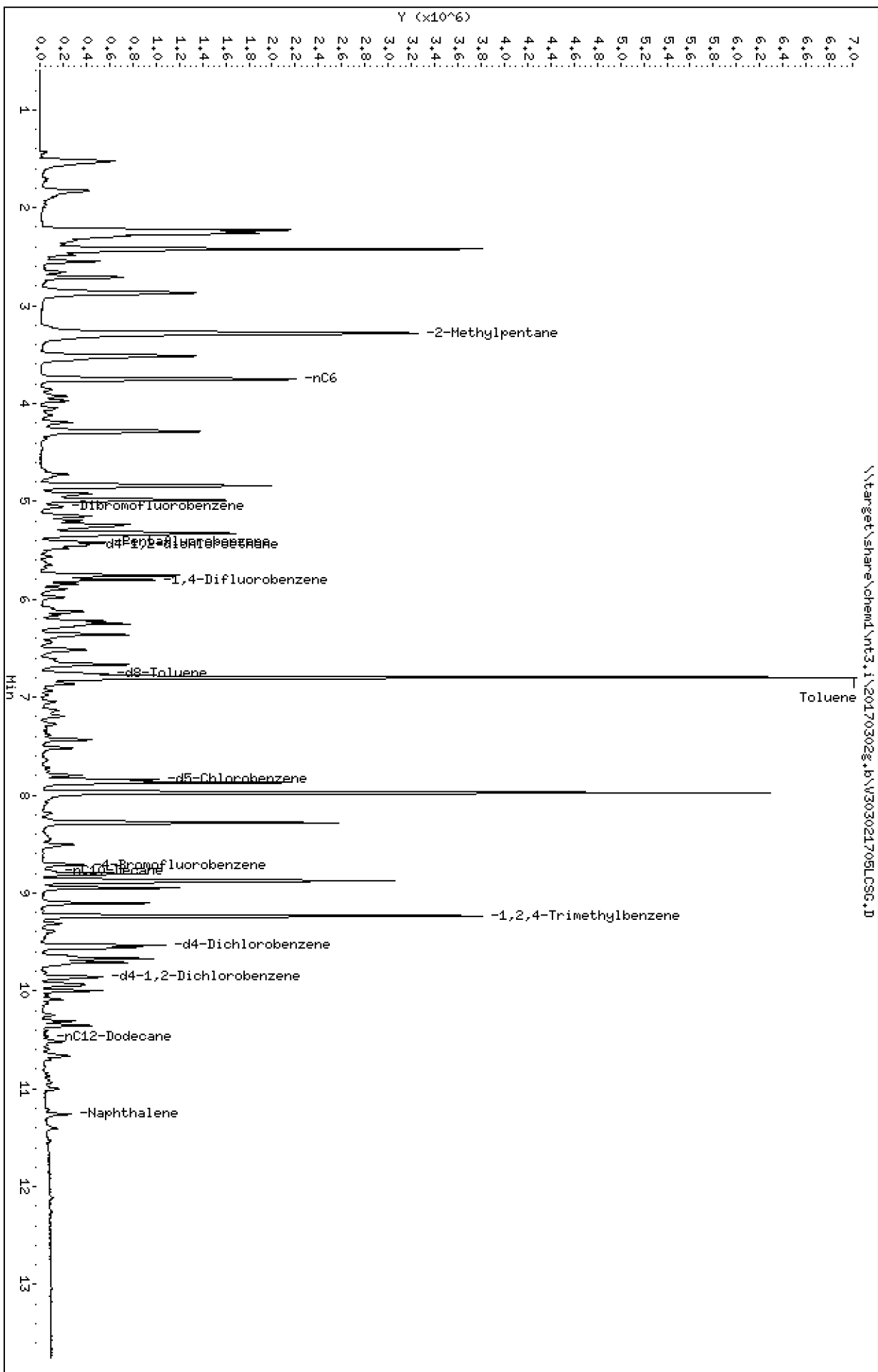
Column phase: RTXWMS

Instrument: nt3,1

Operator: PC

Column diameter: 0.18

Page 1



Analytical Resources Inc.
GC/MS Gas Quantitation Report

Data file: 20170302g.b/V303021705LCSG.D
Method: \20170302g.b\NWTPHG.m
Instrument: nt3.i
Gas Ical Date: 14-Feb-2017
Injection Date: 02-MAR-2017 10:27

ARI ID: BFC0055-BS2
Client ID:
Matrix: WATER
Dilution Factor: 1.000
Operator: PC

=====

GASOLINE HYDROCARBONS

Range	RF	Total Area*	Amount (ug/mL)
WAGas Tol-C12 (6.70 to 10.57)	52141375	55686493	1.068
8015C 2MP-TMB (3.16 to 9.33)	87713511	96648123	1.102
AK101 nC6-nC10 (3.65 to 8.68)	61260787	69689032	1.138
NWTPHG Tol-Nap (6.70 to 11.36)	54123058	58380424	1.079

M Indicates manual integration within range

* Surrogate areas are subtracted from Total Area

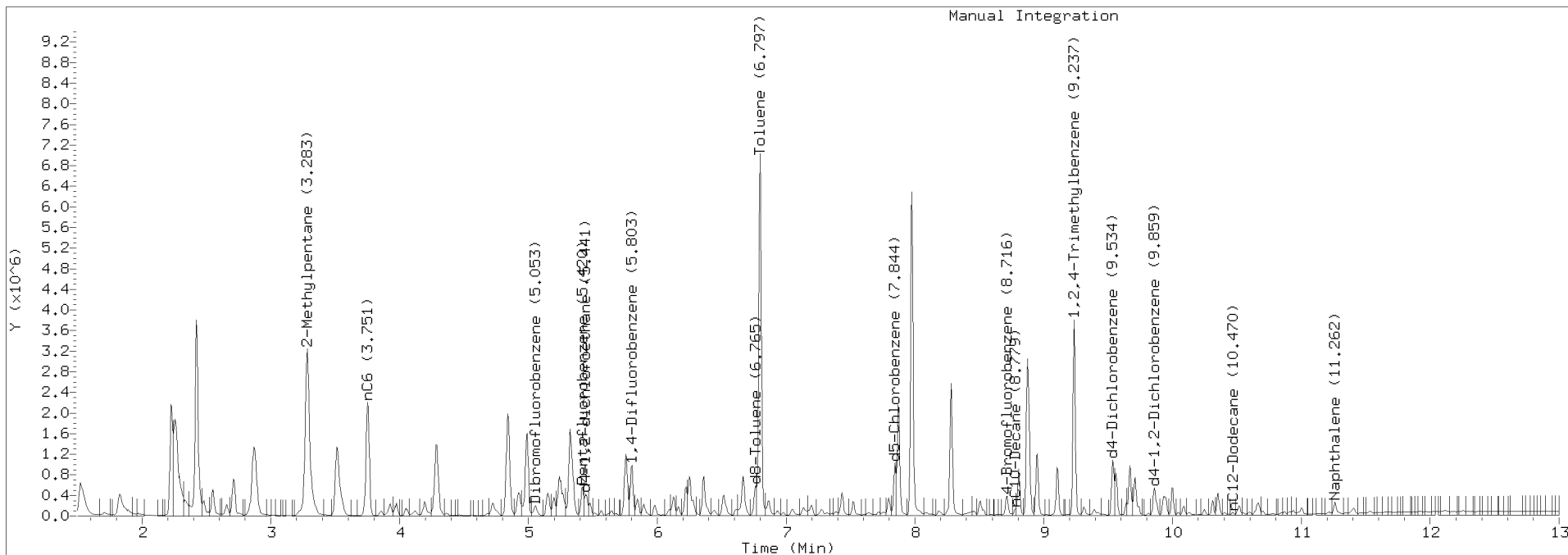
NW Gas Range Subtracted Peaks

6.765	852430	d8-Toluene
8.716	622980	4-Bromofluorobenzene
9.534	1574961	d4-Dichlorobenzene
7.844	1440811	d5-Chlorobenzene
9.859	975655	d4-1,2-Dichlorobenzene

TPHG Manual Integrations Report

Datafile: NT3, 20170302g.b/V303021705LCSG.D Injection: 02-MAR-2017 10:27

Lab ID: BFC0055-BS2





Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

Volatile Organic Compounds - Quality Control

Batch BFC0055 - EPA 5030 (Purge and Trap)

Instrument: NT3

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
LCS Dup (BFC0055-BSD1)				Prepared: 02-Mar-2017 Analyzed: 02-Mar-2017 10:01						
1,2-Dichloroethane	9.70	0.20	ug/L	10.0		97.0	75-123	5.45	30	
Benzene	9.52	0.20	ug/L	10.0		95.2	80-120	2.17	30	
Toluene	9.70	0.20	ug/L	10.0		97.0	80-120	2.36	30	
Ethylbenzene	9.78	0.20	ug/L	10.0		97.8	80-120	0.60	30	
m,p-Xylene	19.7	0.40	ug/L	20.0		98.3	80-121	1.21	30	
o-Xylene	9.91	0.20	ug/L	10.0		99.1	80-121	1.95	30	
<i>Surrogate: 1,2-Dichloroethane-d4</i>	5.01		ug/L	5.00		100	80-129			
<i>Surrogate: Toluene-d8</i>	5.07		ug/L	5.00		101	80-120			
<i>Surrogate: 4-Bromofluorobenzene</i>	4.95		ug/L	5.00		99.0	80-120			



Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

Volatile Organic Compounds - Quality Control

Batch BFC0055 - EPA 5030 (Purge and Trap)

Instrument: NT3

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
LCS Dup (BFC0055-BSD2)				Prepared: 02-Mar-2017 Analyzed: 02-Mar-2017 10:53						
Gasoline Range Organics (Tol-Nap)	1110	100	ug/L	1000		111	80-120	2.59	30	
Surrogate: Toluene-d8	5.04		ug/L	5.00		101	80-120			
Surrogate: 4-Bromofluorobenzene	4.93		ug/L	5.00		98.6	80-120			

Data File: \\target\share\chend\nt3,1\20170302s,1b\303021706G.D

Date : 02-MAR-2017 10:53

Client ID: Gas

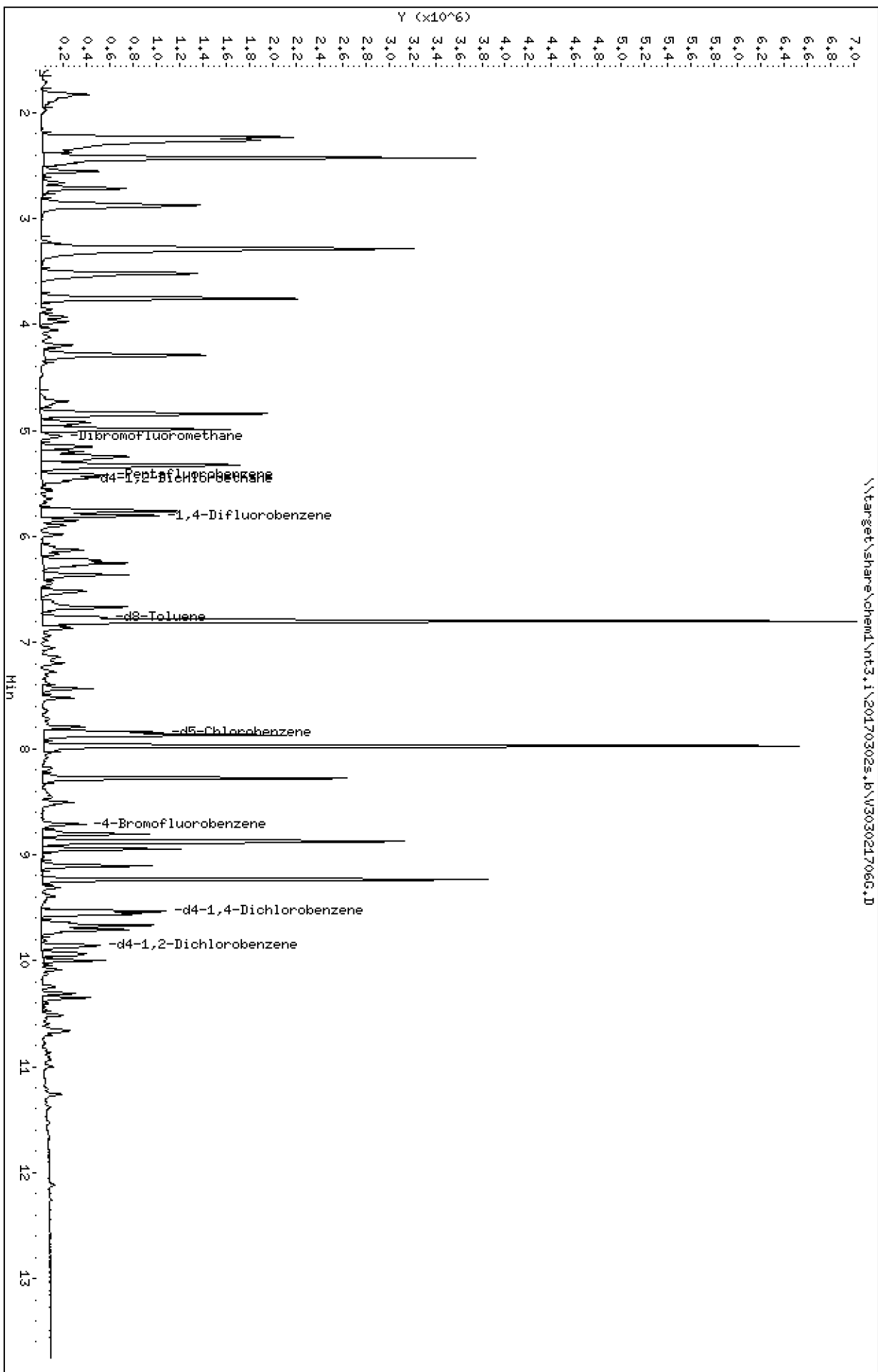
Sample Info: BFC0055-BSM2

Column phase: RTXWMS

Instrument: nt3,1

Operator: PC

Column diameter: 0.18



ARI Labs, Inc.

8260C 10 ml purge
Data file : \\target\share\chem1\nt3.i\20170302s.b\V303021706G.D
Lab Smp Id: BFC0055-BSD2 Client Smp ID: Gas
Inj Date : 02-MAR-2017 10:53
Operator : PC Inst ID: nt3.i
Smp Info : BFC0055-BSD2
Misc Info : 16-
Comment :
Method : \\target\share\chem1\nt3.i\20170302s.b\8260C022417.m
Meth Date : 03-Mar-2017 15:16 nt3.i Quant Type: ISTD
Cal Date : 14-FEB-2017 18:50 Cal File: V302141718.D
Als bottle: 12
Dil Factor: 1.00000
Integrator: HP RTE Compound Sublist: gsurr.sub
Target Version: 4.14
Processing Host: ORGDATA20

Compounds	QUANT	SIG	CONCENTRATIONS					
			RT	EXP RT	REL RT	RESPONSE	ON-COLUMN (ug/L)	FINAL (ug/L)
\$ 27 Dibromofluoromethane	111		5.053	5.053	(0.932)	64706	4.76683	4.767 (R)
* 32 Pentafluorobenzene	168		5.419	5.419	(1.000)	288935	10.0000	
\$ 33 d4-1,2-Dichloroethane	65		5.451	5.446	(1.006)	86443	5.62860	5.629 (R)
* 37 1,4-Difluorobenzene	114		5.802	5.802	(1.000)	465465	10.0000	
\$ 43 d8-Toluene	98		6.764	6.759	(1.166)	284546	5.03565	5.036 (R)
* 53 d5-Chlorobenzene	117		7.843	7.843	(1.000)	454024	10.0000	
\$ 62 4-Bromofluorobenzene	174		8.715	8.715	(1.111)	94197	4.92828	4.928 (R)
* 76 d4-1,4-Dichlorobenzene	152		9.534	9.533	(1.000)	242907	10.0000	
\$ 79 d4-1,2-Dichlorobenzene	152		9.858	9.858	(1.034)	112897	4.95177	4.952 (R)

QC Flag Legend

R - Spike/Surrogate failed recovery limits.

ARI Labs, Inc.

INTERNAL STANDARD COMPOUNDS
 AREA AND RT SUMMARY

Instrument ID: nt3.i Calibration Date: 02-MAR-2017
 Lab File ID: V303021706G.D Calibration Time: 21:37
 Lab Smp Id: BFC0055-BSD2 Client Smp ID: Gas
 Analysis Type: VOA Level:
 Quant Type: ISTD Sample Type:
 Operator: PC
 Method File: \\target\share\chem1\nt3.i\20170302s.b\8260C022417.m
 Misc Info: 16-

Test Mode:

Use Initial Calibration Level 5.
 If Continuing Cal. use Initial Cal. Level 5

COMPOUND	STANDARD	AREA LIMIT		SAMPLE	%DIFF
		LOWER	UPPER		
32 Pentafluorobenzon	317912	158956	635824	288935	-9.11
37 1,4-Difluorobenze	512039	256020	1024078	465465	-9.10
53 d5-Chlorobenzene	494052	247026	988104	454024	-8.10
76 d4-1,4-Dichlorobe	282154	141077	564308	242907	-13.91

COMPOUND	STANDARD	RT LIMIT		SAMPLE	%DIFF
		LOWER	UPPER		
32 Pentafluorobenzon	5.42	4.92	5.92	5.42	0.00
37 1,4-Difluorobenze	5.80	5.30	6.30	5.80	0.00
53 d5-Chlorobenzene	7.84	7.34	8.34	7.84	0.00
76 d4-1,4-Dichlorobe	9.53	9.03	10.03	9.53	0.00

AREA UPPER LIMIT = +100% of internal standard area.
 AREA LOWER LIMIT = - 50% of internal standard area.
 RT UPPER LIMIT = + 0.50 minutes of internal standard RT.
 RT LOWER LIMIT = - 0.50 minutes of internal standard RT.

ARI Labs, Inc.

RECOVERY REPORT

Client Name: Client SDG: 20150930a
Sample Matrix: NONE Fraction: VOA
Lab Smp Id: BFC0055-BSD2 Client Smp ID: Gas
Level: Operator: PC
Data Type: MS DATA SampleType: SAMPLE
SpikeList File: allspike.spk Quant Type: ISTD
Sublist File: gsurr.sub
Method File: \\target\share\chem1\nt3.i\20170302s.b\8260C022417.m
Misc Info: 16-

SURROGATE COMPOUND	AMOUNT ADDED ug/L	AMOUNT RECOVERED ug/L	% RECOVERED	LIMITS
\$ 27 Dibromofluorometha	5.000	4.767	95.34	
\$ 33 d4-1,2-Dichloroeth	5.000	5.629	112.57	
\$ 43 d8-Toluene	5.000	5.036	100.71	
\$ 62 4-Bromofluorobenze	5.000	4.928	98.57	
\$ 79 d4-1,2-Dichloroben	5.000	4.952	99.04	

REVIEW SUMMARY FOR FILE - V303021706G.D

Lab ID: BFC0055-BSD2

nt3.i, 20170302s.b\8260C022417.m, 02-MAR-2017 10:53

RT CO-ELUTION COMPOUNDS

Data File: \\target\share\chend\nt3.1\20170302g.jb\303021706G.D

Date : 02-MAR-2017 10:53

Client ID:

Sample Info: BFC0055-BSM2

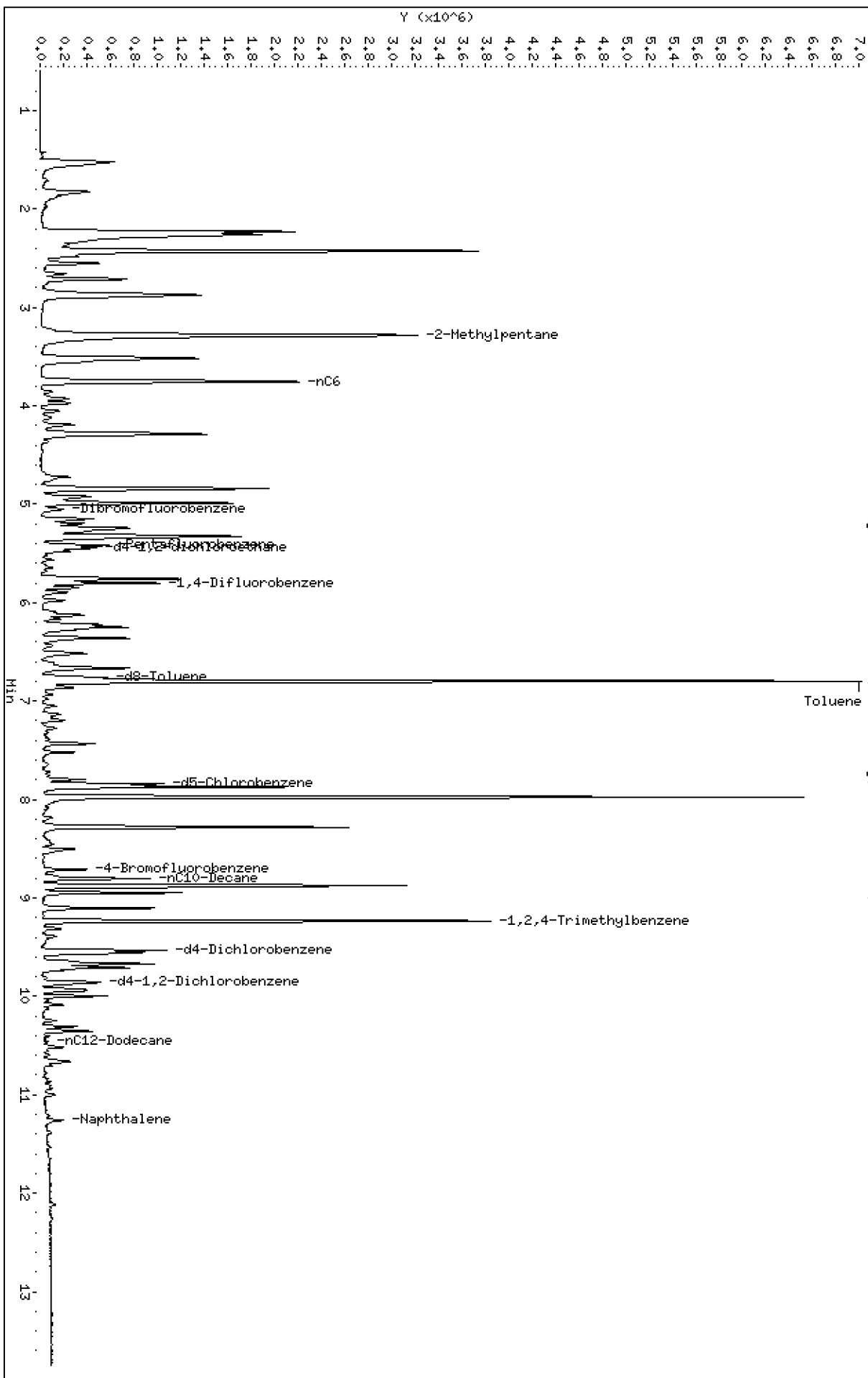
Column phase: RTXWMS

Instrument: nt3.1

Operator: PC

Column diameter: 0.18

\\target\share\chend\nt3.1\20170302g.jb\303021706G.D



Analytical Resources Inc.
GC/MS Gas Quantitation Report

Data file: 20170302g.b/V303021706G.D
Method: \20170302g.b\NWTPHG.m
Instrument: nt3.i
Gas Ical Date: 14-Feb-2017
Injection Date: 02-MAR-2017 10:53

ARI ID: BFC0055-BSD2
Client ID:
Matrix: WATER
Dilution Factor: 1.000
Operator: PC

=====

GASOLINE HYDROCARBONS

Range	RF	Total Area*	Amount (ug/mL)
-----	----	-----	-----
WAGas Tol-C12 (6.70 to 10.57)	52141375	57414396	1.101
8015C 2MP-TMB (3.16 to 9.33)	87713511	98003544	1.117
AK101 nC6-nC10 (3.65 to 8.68)	61260787	70592179	1.152
NWTPHG Tol-Nap (6.70 to 11.36)	54123058	59914524	1.107

M Indicates manual integration within range

* Surrogate areas are subtracted from Total Area

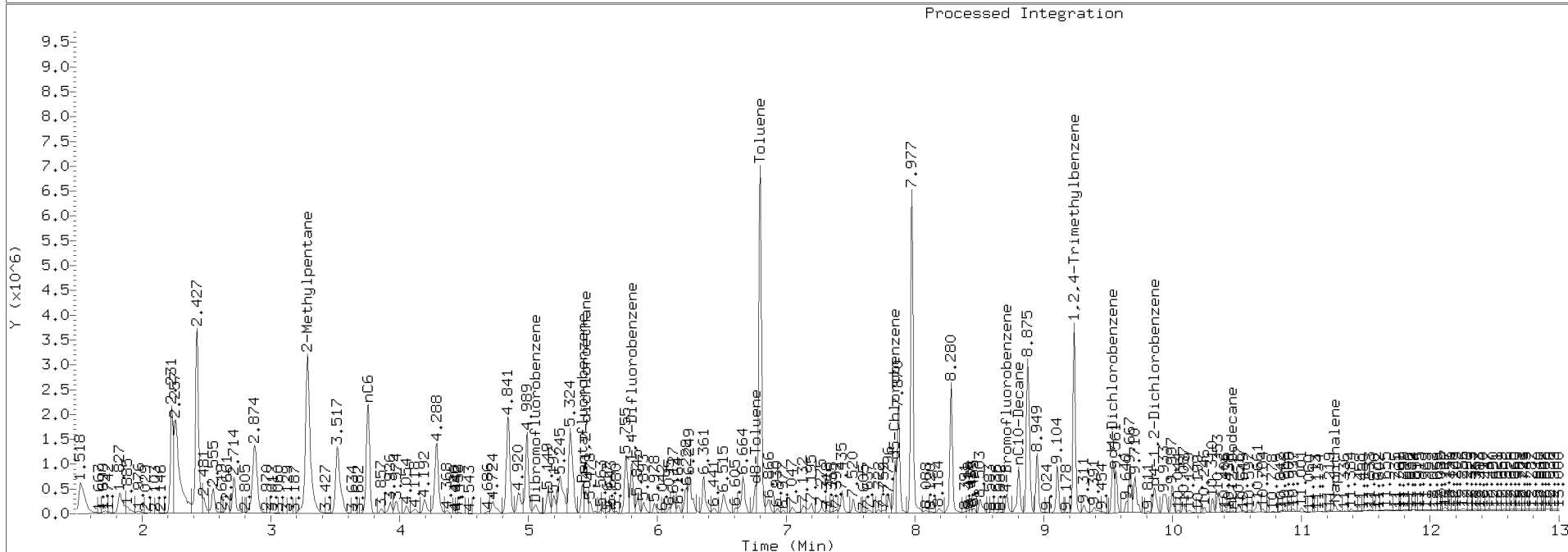
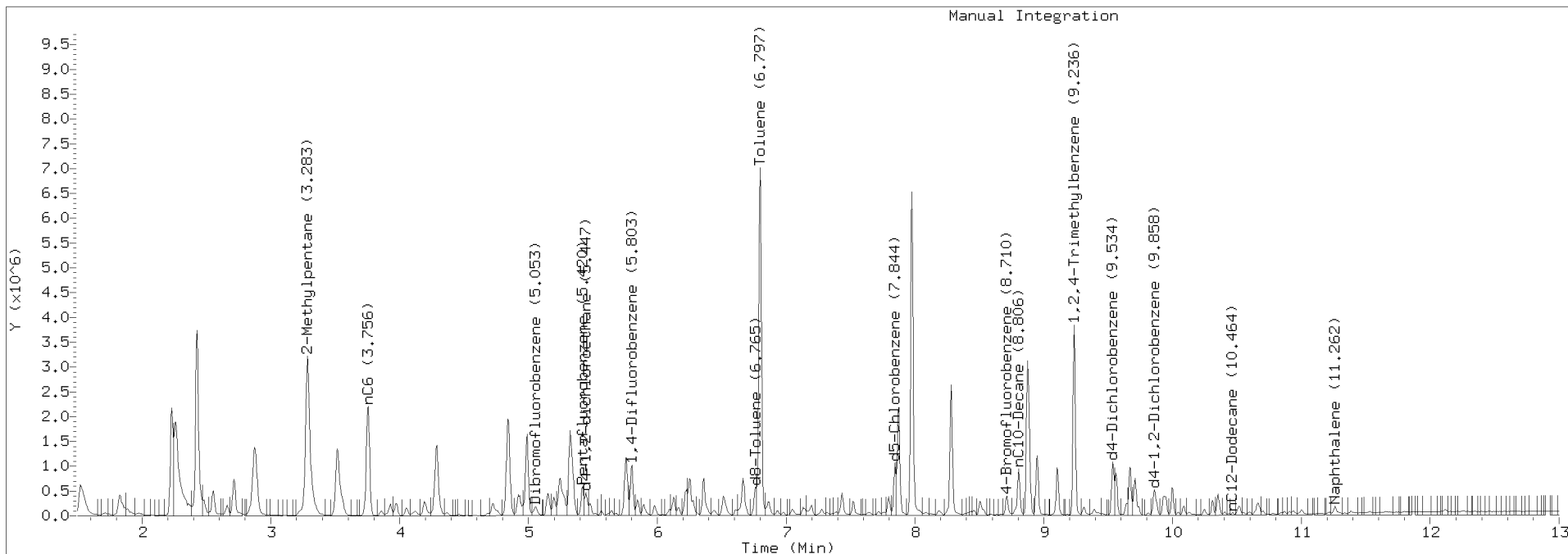
NW Gas Range Subtracted Peaks

6.765	852041	d8-Toluene
8.710	621901	4-Bromofluorobenzene
9.534	1574740	d4-Dichlorobenzene
7.844	1450977	d5-Chlorobenzene
9.858	968381	d4-1,2-Dichlorobenzene

TPHG Manual Integrations Report

Datafile: NT3, 20170302g.b/V303021706G.D Injection: 02-MAR-2017 10:53

Lab ID: BFC0055-BSD2





Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

Volatile Organic Compounds - Quality Control

Batch BFC0055 - EPA 5030 (Purge and Trap)

Instrument: NT3

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Matrix Spike (BFC0055-MS1)		Source: 17C0009-19		Prepared: 02-Mar-2017		Analyzed: 02-Mar-2017 19:29				
1,2-Dichloroethane	12.4	0.20	ug/L	10.0	1.77	106	75-123			
Benzene	10.1	0.20	ug/L	10.0	ND	101	80-120			
Toluene	10.6	0.20	ug/L	10.0	ND	104	80-120			
Ethylbenzene	10.3	0.20	ug/L	10.0	ND	103	80-120			
m,p-Xylene	20.6	0.40	ug/L	20.0	ND	102	80-121			
o-Xylene	10.5	0.20	ug/L	10.0	ND	105	80-121			
<i>Surrogate: 1,2-Dichloroethane-d4</i>	5.27		ug/L	5.00	5.23	105	80-129			
<i>Surrogate: Toluene-d8</i>	5.08		ug/L	5.00	4.91	102	80-120			
<i>Surrogate: 4-Bromofluorobenzene</i>	5.01		ug/L	5.00	4.81	100	80-120			

Recovery limits for target analytes in MS/MSD QC samples are advisory only.



Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

Volatile Organic Compounds - Quality Control

Batch BFC0055 - EPA 5030 (Purge and Trap)

Instrument: NT3

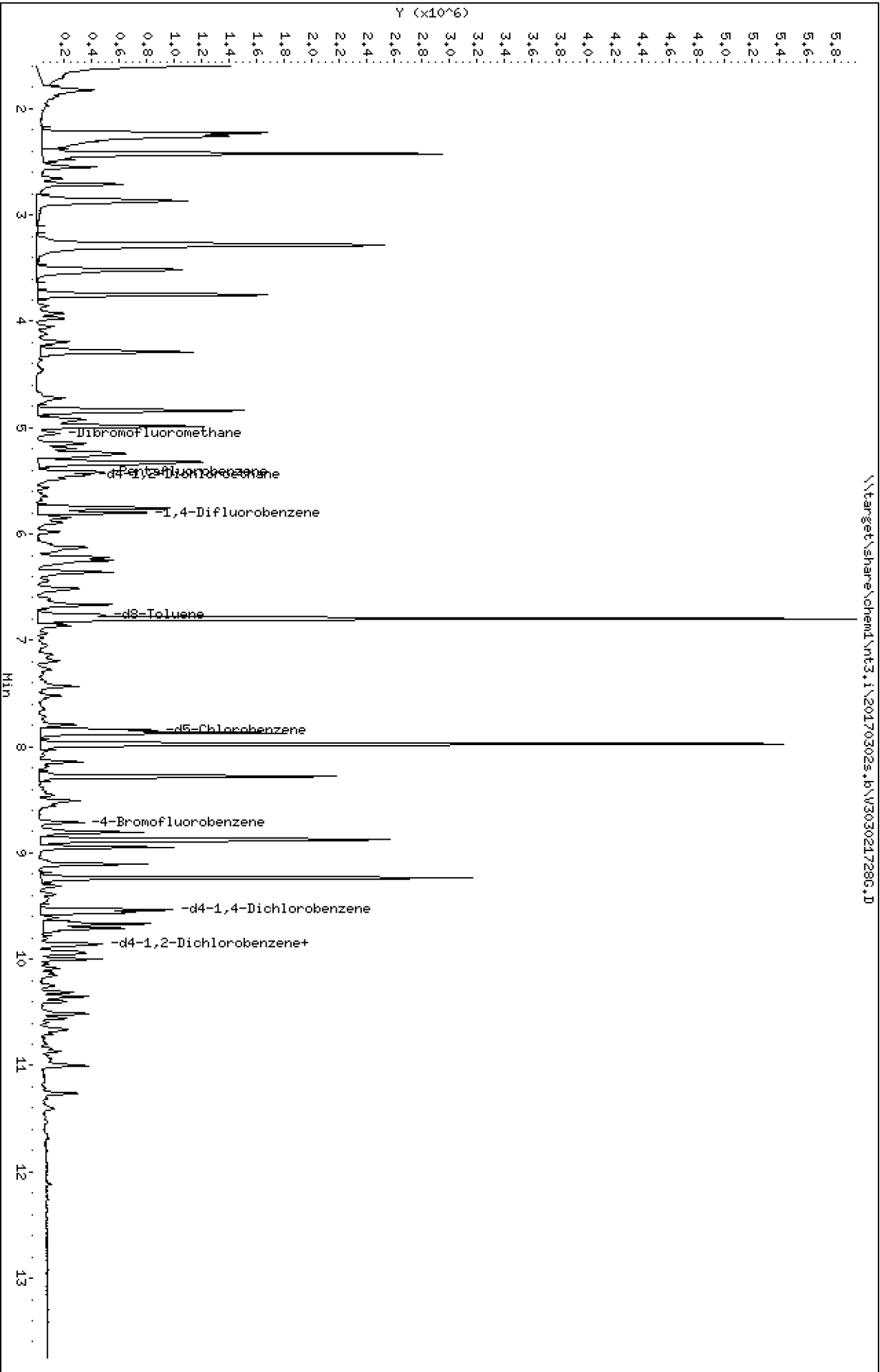
QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Matrix Spike (BFC0055-MS2)		Source: 17C0009-19		Prepared: 02-Mar-2017		Analyzed: 02-Mar-2017 20:21				
Gasoline Range Organics (Tol-Nap)	1040	100	ug/L	1000	ND	95.0	80-120			
Surrogate: Toluene-d8	4.94		ug/L	5.00	4.91	98.8	80-120			
Surrogate: 4-Bromofluorobenzene	5.01		ug/L	5.00	4.81	100	80-120			

Recovery limits for target analytes in MS/MSD QC samples are advisory only.

Data File: \\target\share\chend\nt3,1\20170302s,1b\303021728G.D
Date : 02-MAR-2017 20:21
Client ID:
Sample Info: BFC0055-HS2

Column phase: RTXWMS

Instrument: nt3,1
Operator: PC
Column diameter: 0.18



ARI Labs, Inc.

8260C 10 ml purge

Data file : \\target\share\chem1\nt3.i\20170302s.b\V303021728G.D
Lab Smp Id: BFC0055-MS2
Inj Date : 02-MAR-2017 20:21
Operator : PC
Smp Info : BFC0055-MS2
Misc Info : 16-
Comment :
Method : \\target\share\chem1\nt3.i\20170302s.b\8260C022417.m
Meth Date : 03-Mar-2017 15:16 nt3.i
Cal Date : 14-FEB-2017 18:50
Als bottle: 12
Dil Factor: 1.00000
Integrator: HP RTE
Target Version: 4.14
Processing Host: ORGDATA20

Inst ID: nt3.i

Quant Type: ISTD

Cal File: V302141718.D

Compound Sublist: gsurr.sub

Compounds	QUANT	SIG	RT	EXP RT	REL RT	RESPONSE	CONCENTRATIONS	
							ON-COLUMN (ug/L)	FINAL (ug/L)
\$ 27 Dibromofluoromethane	111		5.053	5.053	(0.932)	55260	4.68831	4.688 (R)
* 32 Pentafluorobenzene	168		5.420	5.419	(1.000)	250888	10.0000	
\$ 33 d4-1,2-Dichloroethane	65		5.446	5.446	(1.005)	75595	5.66870	5.669 (R)
* 37 1,4-Difluorobenzene	114		5.803	5.802	(1.000)	398952	10.0000	
\$ 43 d8-Toluene	98		6.759	6.759	(1.165)	239146	4.93779	4.938 (R)
* 53 d5-Chlorobenzene	117		7.844	7.843	(1.000)	382323	10.0000	
\$ 62 4-Bromofluorobenzene	174		8.715	8.715	(1.111)	80699	5.01389	5.014 (R)
* 76 d4-1,4-Dichlorobenzene	152		9.534	9.533	(1.000)	207991	10.0000	
\$ 79 d4-1,2-Dichlorobenzene	152		9.858	9.858	(1.034)	101354	5.19175	5.192 (R)

QC Flag Legend

R - Spike/Surrogate failed recovery limits.

ARI Labs, Inc.

INTERNAL STANDARD COMPOUNDS
 AREA AND RT SUMMARY

Instrument ID: nt3.i Calibration Date: 02-MAR-2017
 Lab File ID: V303021728G.D Calibration Time: 21:37
 Lab Smp Id: BFC0055-MS2
 Analysis Type: VOA Level:
 Quant Type: ISTD Sample Type:
 Operator: PC
 Method File: \\target\share\chem1\nt3.i\20170302s.b\8260C022417.m
 Misc Info: 16-

Test Mode:

Use Initial Calibration Level 5.
 If Continuing Cal. use Initial Cal. Level 5

COMPOUND	STANDARD	AREA LIMIT		SAMPLE	%DIFF
		LOWER	UPPER		
32 Pentafluorobenzon	317912	158956	635824	250888	-21.08
37 1,4-Difluorobenze	512039	256020	1024078	398952	-22.09
53 d5-Chlorobenzene	494052	247026	988104	382323	-22.61
76 d4-1,4-Dichlorobe	282154	141077	564308	207991	-26.28

COMPOUND	STANDARD	RT LIMIT		SAMPLE	%DIFF
		LOWER	UPPER		
32 Pentafluorobenzon	5.42	4.92	5.92	5.42	0.01
37 1,4-Difluorobenze	5.80	5.30	6.30	5.80	0.01
53 d5-Chlorobenzene	7.84	7.34	8.34	7.84	0.01
76 d4-1,4-Dichlorobe	9.53	9.03	10.03	9.53	0.01

AREA UPPER LIMIT = +100% of internal standard area.
 AREA LOWER LIMIT = - 50% of internal standard area.
 RT UPPER LIMIT = + 0.50 minutes of internal standard RT.
 RT LOWER LIMIT = - 0.50 minutes of internal standard RT.

ARI Labs, Inc.

RECOVERY REPORT

Client Name: Client SDG: 20150930a
Sample Matrix: NONE Fraction: VOA
Lab Smp Id: BFC0055-MS2
Level: Operator: PC
Data Type: MS DATA SampleType: SAMPLE
SpikeList File: allspike.spk Quant Type: ISTD
Sublist File: gsurr.sub
Method File: \\target\share\chem1\nt3.i\20170302s.b\8260C022417.m
Misc Info: 16-

SURROGATE COMPOUND	AMOUNT ADDED ug/L	AMOUNT RECOVERED ug/L	% RECOVERED	LIMITS
\$ 27 Dibromofluorometha	5.000	4.688	93.77	
\$ 33 d4-1,2-Dichloroeth	5.000	5.669	113.37	
\$ 43 d8-Toluene	5.000	4.938	98.76	
\$ 62 4-Bromofluorobenze	5.000	5.014	100.28	
\$ 79 d4-1,2-Dichloroben	5.000	5.192	103.84	

REVIEW SUMMARY FOR FILE - V303021728G.D

Lab ID: BFC0055-MS2
nt3.i, 20170302s.b\8260C022417.m, 02-MAR-2017 20:21

RT CO-ELUTION COMPOUNDS

Data File: \\target\share\chend\nt3.1\20170302g.1b\303021728G.D

Date: 02-MAR-2017 20:21

Client ID:

Sample Info: BFC0055-HS2

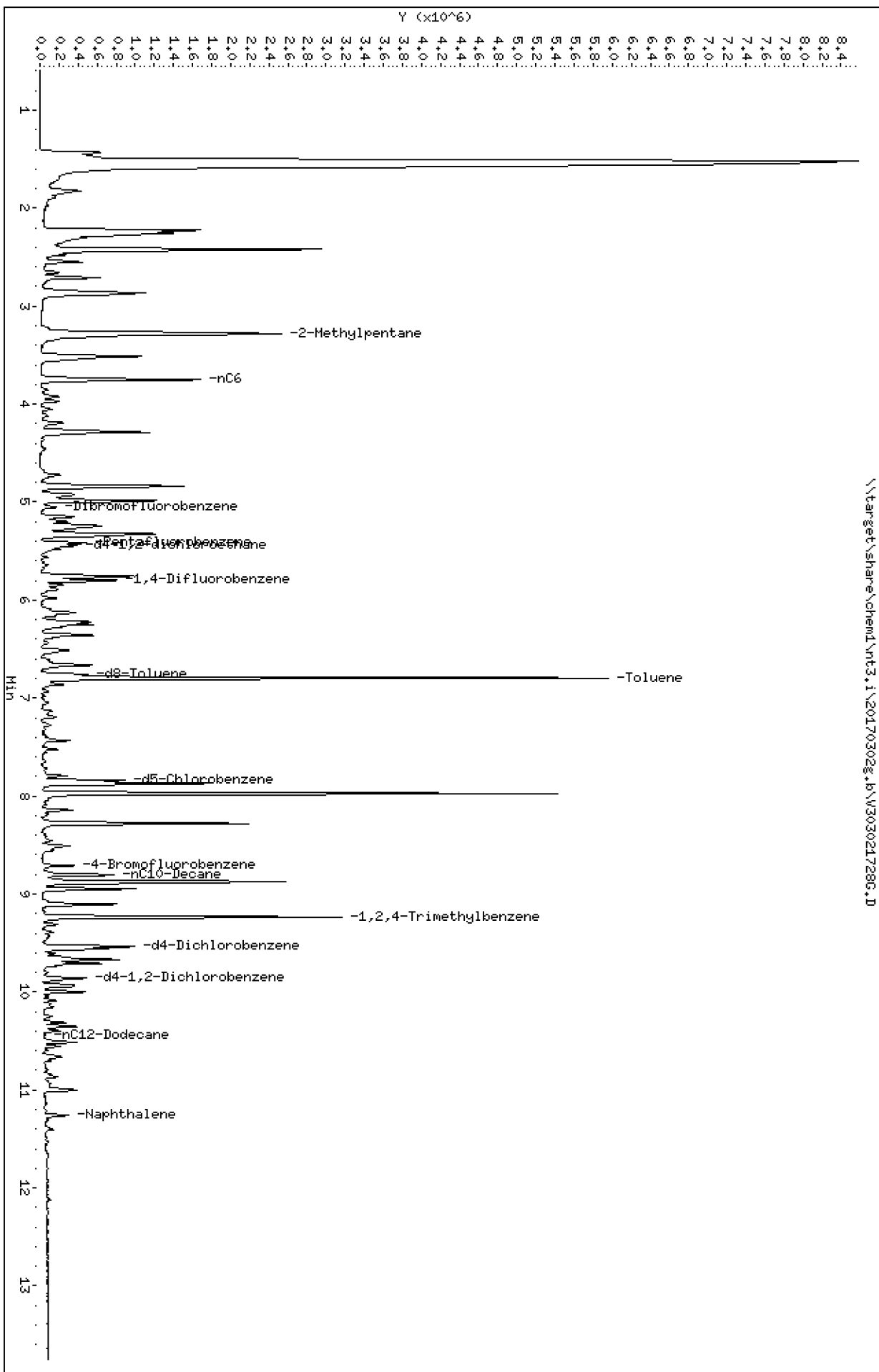
Column phase: RTXWMS

Instrument: nt3.1

Operator: PC

Column diameter: 0.18

\\target\share\chend\nt3.1\20170302g.1b\303021728G.D



Analytical Resources Inc.
GC/MS Gas Quantitation Report

Data file: 20170302g.b/V303021728G.D
Method: \20170302g.b\NWTPHG.m
Instrument: nt3.i
Gas Ical Date: 14-Feb-2017
Injection Date: 02-MAR-2017 20:21

ARI ID: BFC0055-MS2
Client ID:
Matrix: NONE
Dilution Factor: 1.000
Operator: PC

=====

GASOLINE HYDROCARBONS

Range	RF	Total Area*	Amount (ug/mL)
-----	----	-----	-----
WAGas Tol-C12 (6.70 to 10.57)	52141375	52221935	1.002
8015C 2MP-TMB (3.16 to 9.33)	87713511	80402718	0.917
AK101 nC6-nC10 (3.65 to 8.68)	61260787	57490921	0.938
NWTPHG Tol-Nap (6.70 to 11.36)	54123058	56308695	1.040

M Indicates manual integration within range

* Surrogate areas are subtracted from Total Area

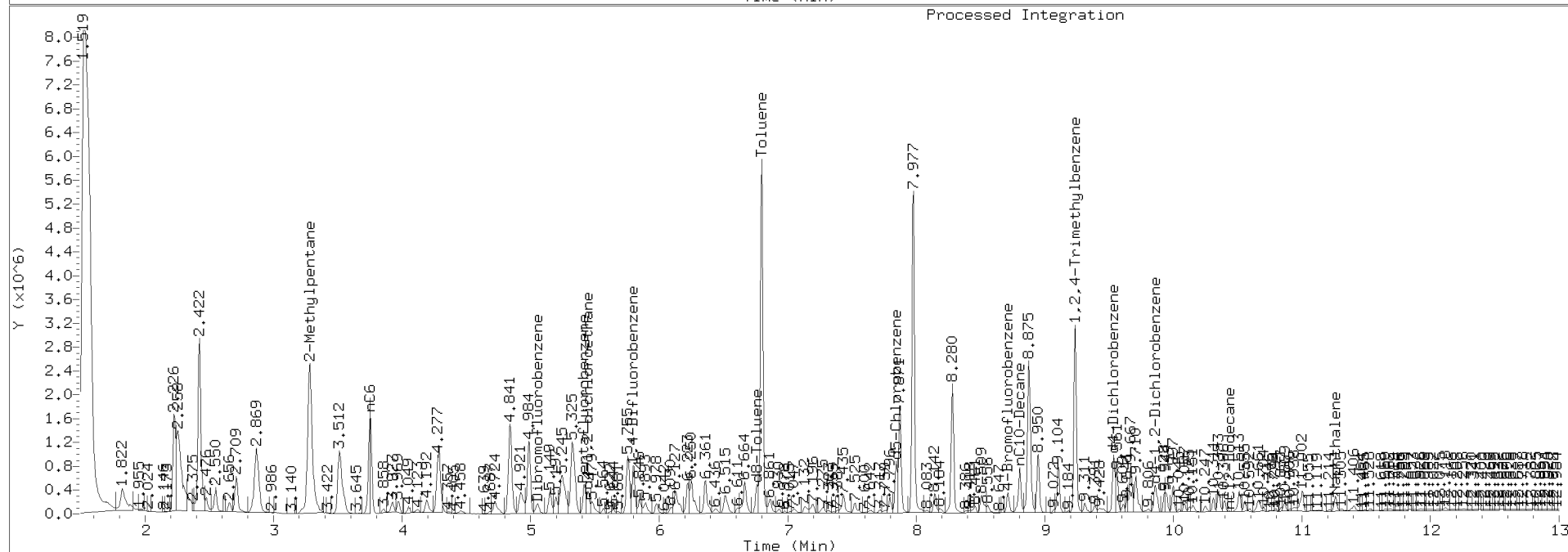
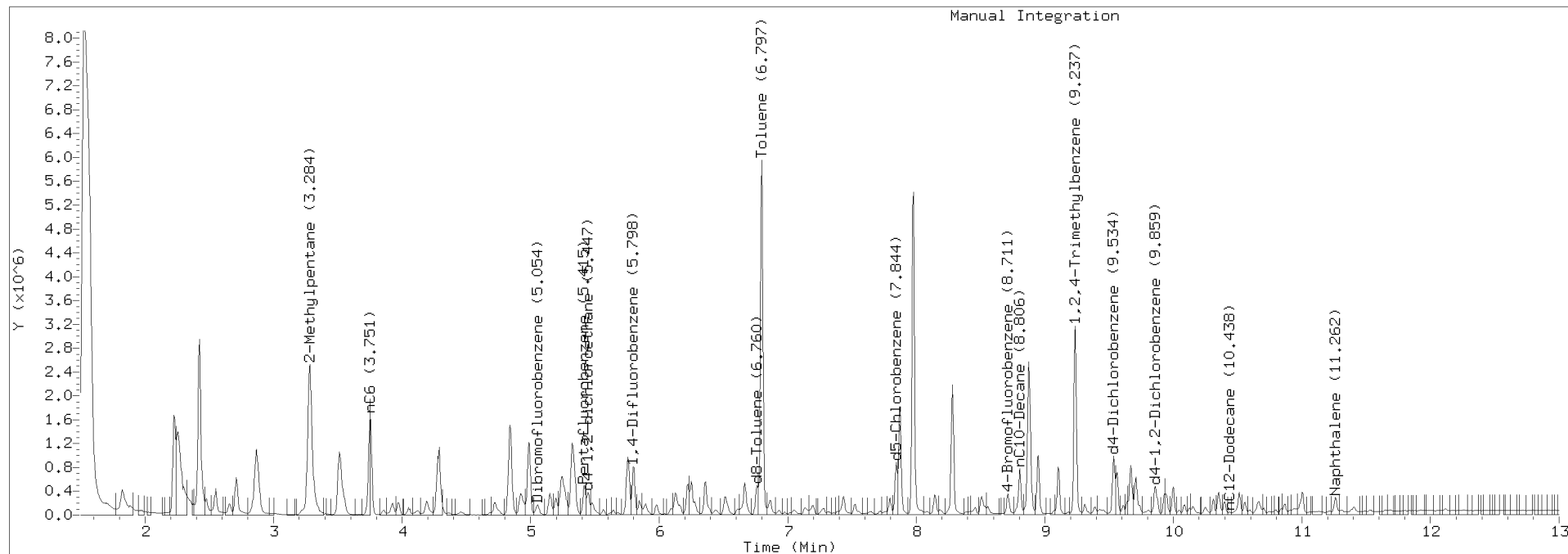
NW Gas Range Subtracted Peaks

6.760	761117	d8-Toluene
8.711	578192	4-Bromofluorobenzene
9.534	1504996	d4-Dichlorobenzene
7.844	1274493	d5-Chlorobenzene
9.859	929932	d4-1,2-Dichlorobenzene

TPHG Manual Integrations Report

Datafile: NT3, 20170302g.b/V303021728G.D Injection: 02-MAR-2017 20:21

Lab ID: BFC0055-MS2





Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

Volatile Organic Compounds - Quality Control

Batch BFC0055 - EPA 5030 (Purge and Trap)

Instrument: NT3

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Matrix Spike Dup (BFC0055-MSD1)		Source: 17C0009-19		Prepared: 02-Mar-2017		Analyzed: 02-Mar-2017 19:55				
1,2-Dichloroethane	12.4	0.20	ug/L	10.0	1.77	106	75-123	0.04	30	
Benzene	9.88	0.20	ug/L	10.0	ND	98.4	80-120	2.45	30	
Toluene	10.3	0.20	ug/L	10.0	ND	101	80-120	2.86	30	
Ethylbenzene	10.0	0.20	ug/L	10.0	ND	100	80-120	2.69	30	
m,p-Xylene	20.2	0.40	ug/L	20.0	ND	100	80-121	1.91	30	
o-Xylene	10.1	0.20	ug/L	10.0	ND	101	80-121	3.40	30	
<i>Surrogate: 1,2-Dichloroethane-d4</i>	5.24		ug/L	5.00	5.23	105	80-129			
<i>Surrogate: Toluene-d8</i>	5.16		ug/L	5.00	4.91	103	80-120			
<i>Surrogate: 4-Bromofluorobenzene</i>	4.99		ug/L	5.00	4.81	99.9	80-120			

Recovery limits for target analytes in MS/MSD QC samples are advisory only.



Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

Volatile Organic Compounds - Quality Control

Batch BFC0055 - EPA 5030 (Purge and Trap)

Instrument: NT3

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Matrix Spike Dup (BFC0055-MSD2)		Source: 17C0009-19		Prepared: 02-Mar-2017		Analyzed: 02-Mar-2017 20:46				
Gasoline Range Organics (Tol-Nap)	1070	100	ug/L	1000	ND	98.3	80-120	3.07	30	
Surrogate: Toluene-d8	5.18		ug/L	5.00	4.91	104	80-120			
Surrogate: 4-Bromofluorobenzene	4.94		ug/L	5.00	4.81	98.8	80-120			

Recovery limits for target analytes in MS/MSD QC samples are advisory only.

Data File: \\target\share\chend\nt3.1\20170302s.1b\303021729G.D

Date : 02-MAR-2017 20:46

Client ID:

Sample Info: BFC0055-HSD2

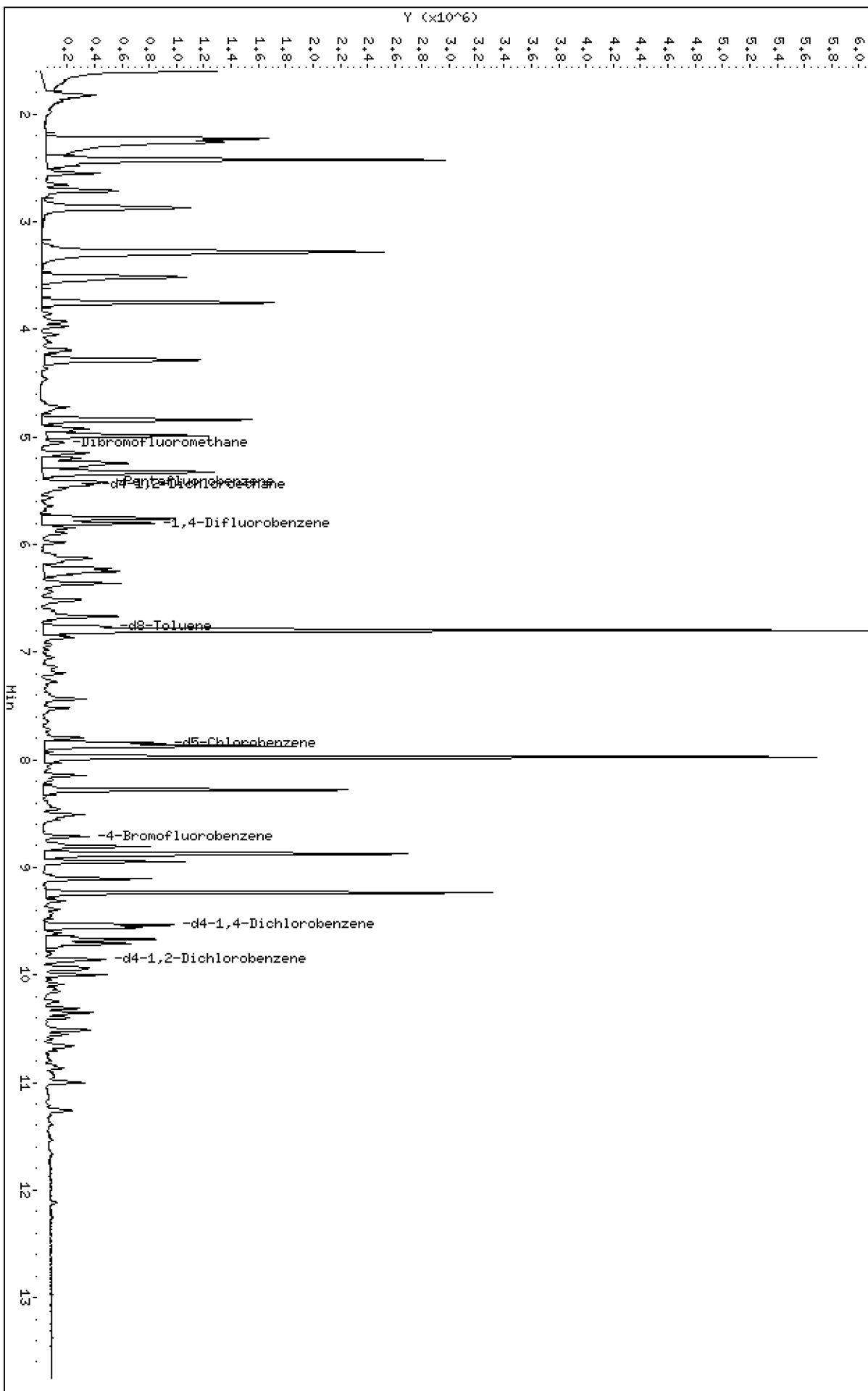
Column phase: RTXWMS

Instrument: nt3.1

Operator: PC

Column diameter: 0.18

\\target\share\chend\nt3.1\20170302s.1b\303021729G.D



ARI Labs, Inc.

8260C 10 ml purge

Data file : \\target\share\chem1\nt3.i\20170302s.b\V303021729G.D
 Lab Smp Id: BFC0055-MSD2
 Inj Date : 02-MAR-2017 20:46
 Operator : PC Inst ID: nt3.i
 Smp Info : BFC0055-MSD2
 Misc Info : 16-
 Comment :
 Method : \\target\share\chem1\nt3.i\20170302s.b\8260C022417.m
 Meth Date : 03-Mar-2017 15:16 nt3.i Quant Type: ISTD
 Cal Date : 14-FEB-2017 18:50 Cal File: V302141718.D
 Als bottle: 12
 Dil Factor: 1.00000
 Integrator: HP RTE Compound Sublist: gsurr.sub
 Target Version: 4.14
 Processing Host: ORGDATA20

Compounds	QUANT	SIG	RT	EXP RT	REL RT	RESPONSE	CONCENTRATIONS	
							ON-COLUMN (ug/L)	FINAL (ug/L)
\$ 27 Dibromofluoromethane	111		5.052	5.053	(0.932)	57363	4.96983	4.970(R)
* 32 Pentafluorobenzene	168		5.419	5.419	(1.000)	245683	10.0000	
\$ 33 d4-1,2-Dichloroethane	65		5.446	5.446	(1.005)	76411	5.85129	5.851(R)
* 37 1,4-Difluorobenzene	114		5.802	5.802	(1.000)	394323	10.0000	
\$ 43 d8-Toluene	98		6.764	6.759	(1.166)	247941	5.17948	5.179(R)
* 53 d5-Chlorobenzene	117		7.843	7.843	(1.000)	396663	10.0000	
\$ 62 4-Bromofluorobenzene	174		8.715	8.715	(1.111)	82513	4.94126	4.941(R)
* 76 d4-1,4-Dichlorobenzene	152		9.533	9.533	(1.000)	212762	10.0000	
\$ 79 d4-1,2-Dichlorobenzene	152		9.857	9.858	(1.034)	101236	5.06943	5.069(R)

QC Flag Legend

R - Spike/Surrogate failed recovery limits.

ARI Labs, Inc.

INTERNAL STANDARD COMPOUNDS
AREA AND RT SUMMARY

Instrument ID: nt3.i Calibration Date: 02-MAR-2017
Lab File ID: V303021729G.D Calibration Time: 21:37
Lab Smp Id: BFC0055-MSD2
Analysis Type: VOA Level:
Quant Type: ISTD Sample Type:
Operator: PC
Method File: \\target\share\chem1\nt3.i\20170302s.b\8260C022417.m
Misc Info: 16-

Test Mode:

Use Initial Calibration Level 5.
If Continuing Cal. use Initial Cal. Level 5

COMPOUND	STANDARD	AREA LIMIT		SAMPLE	%DIFF
		LOWER	UPPER		
32 Pentafluorobenzon	317912	158956	635824	245683	-22.72
37 1,4-Difluorobenze	512039	256020	1024078	394323	-22.99
53 d5-Chlorobenzene	494052	247026	988104	396663	-19.71
76 d4-1,4-Dichlorobe	282154	141077	564308	212762	-24.59

COMPOUND	STANDARD	RT LIMIT		SAMPLE	%DIFF
		LOWER	UPPER		
32 Pentafluorobenzon	5.42	4.92	5.92	5.42	-0.00
37 1,4-Difluorobenze	5.80	5.30	6.30	5.80	-0.00
53 d5-Chlorobenzene	7.84	7.34	8.34	7.84	-0.00
76 d4-1,4-Dichlorobe	9.53	9.03	10.03	9.53	-0.00

AREA UPPER LIMIT = +100% of internal standard area.
AREA LOWER LIMIT = - 50% of internal standard area.
RT UPPER LIMIT = + 0.50 minutes of internal standard RT.
RT LOWER LIMIT = - 0.50 minutes of internal standard RT.

ARI Labs, Inc.

RECOVERY REPORT

Client Name: Client SDG: 20150930a
Sample Matrix: NONE Fraction: VOA
Lab Smp Id: BFC0055-MSD2
Level: Operator: PC
Data Type: MS DATA SampleType: SAMPLE
SpikeList File: allspike.spk Quant Type: ISTD
Sublist File: gsurr.sub
Method File: \\target\share\chem1\nt3.i\20170302s.b\8260C022417.m
Misc Info: 16-

SURROGATE COMPOUND	AMOUNT ADDED ug/L	AMOUNT RECOVERED ug/L	% RECOVERED	LIMITS
\$ 27 Dibromofluorometha	5.000	4.970	99.40	
\$ 33 d4-1,2-Dichloroeth	5.000	5.851	117.03	
\$ 43 d8-Toluene	5.000	5.179	103.59	
\$ 62 4-Bromofluorobenze	5.000	4.941	98.83	
\$ 79 d4-1,2-Dichloroben	5.000	5.069	101.39	

REVIEW SUMMARY FOR FILE - V303021729G.D

Lab ID: BFC0055-MSD2

nt3.i, 20170302s.b\8260C022417.m, 02-MAR-2017 20:46

RT CO-ELUTION COMPOUNDS

Data File: \\target\share\chend\nt3.1\20170302g.b\303021729G.D

Date : 02-MAR-2017 20:46

Client ID:

Sample Info: BFC0055-HSD2

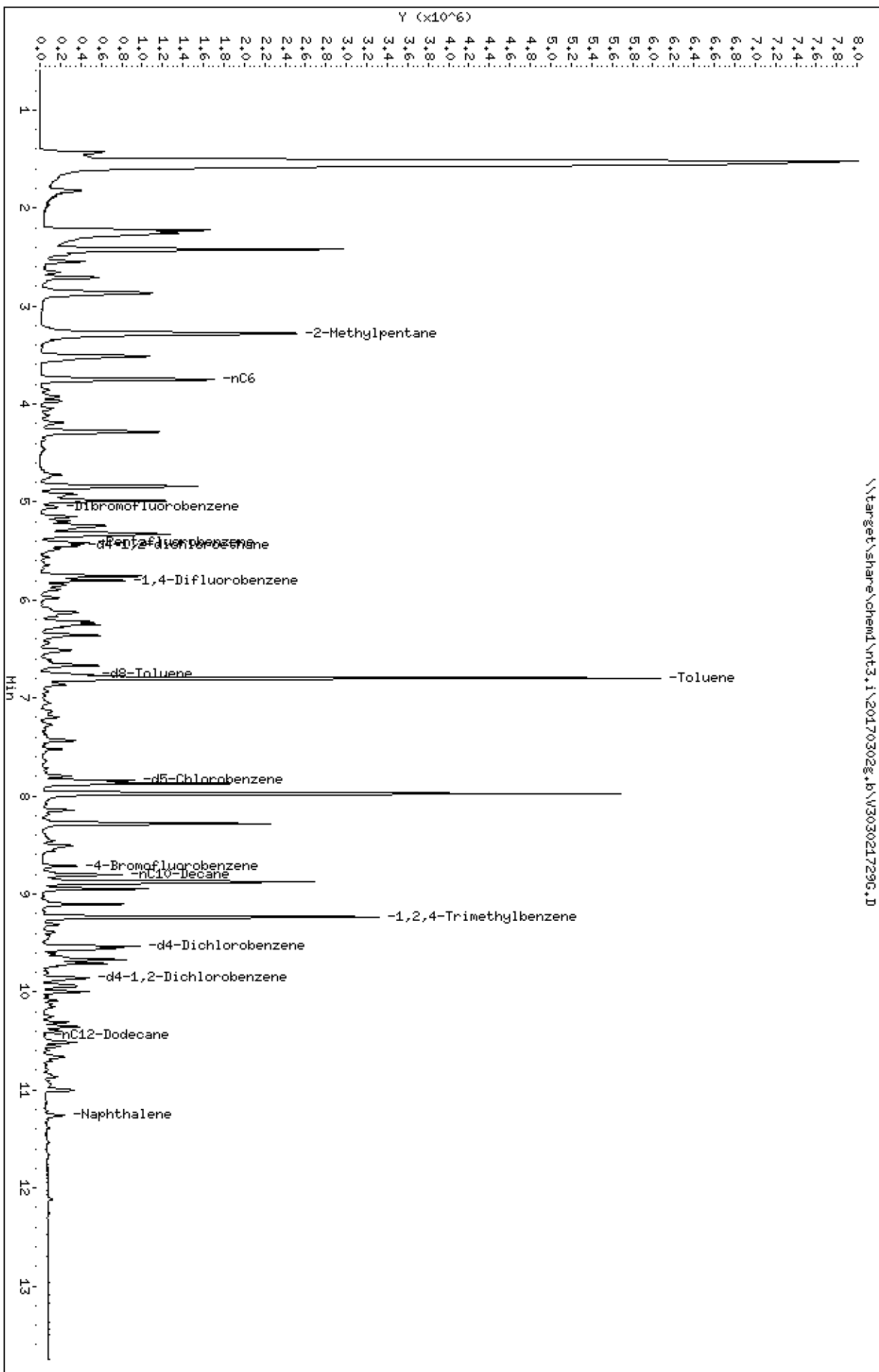
Column phase: RTXWMS

Instrument: nt3.1

Operator: PC

Column diameter: 0.18

\\target\share\chend\nt3.1\20170302g.b\303021729G.D



Analytical Resources Inc.
GC/MS Gas Quantitation Report

Data file: 20170302g.b/V303021729G.D
Method: \20170302g.b\NWTPHG.m
Instrument: nt3.i
Gas Ical Date: 14-Feb-2017
Injection Date: 02-MAR-2017 20:46

ARI ID: BFC0055-MSD2
Client ID:
Matrix: NONE
Dilution Factor: 1.000
Operator: PC

=====

GASOLINE HYDROCARBONS

Range	RF	Total Area*	Amount (ug/mL)
WAGas Tol-C12 (6.70 to 10.57)	52141375	54145913	1.038
8015C 2MP-TMB (3.16 to 9.33)	87713511	84216959	0.960 M
AK101 nC6-nC10 (3.65 to 8.68)	61260787	60726100	0.991 M
NWTPHG Tol-Nap (6.70 to 11.36)	54123058	58067153	1.073

M Indicates manual integration within range

* Surrogate areas are subtracted from Total Area

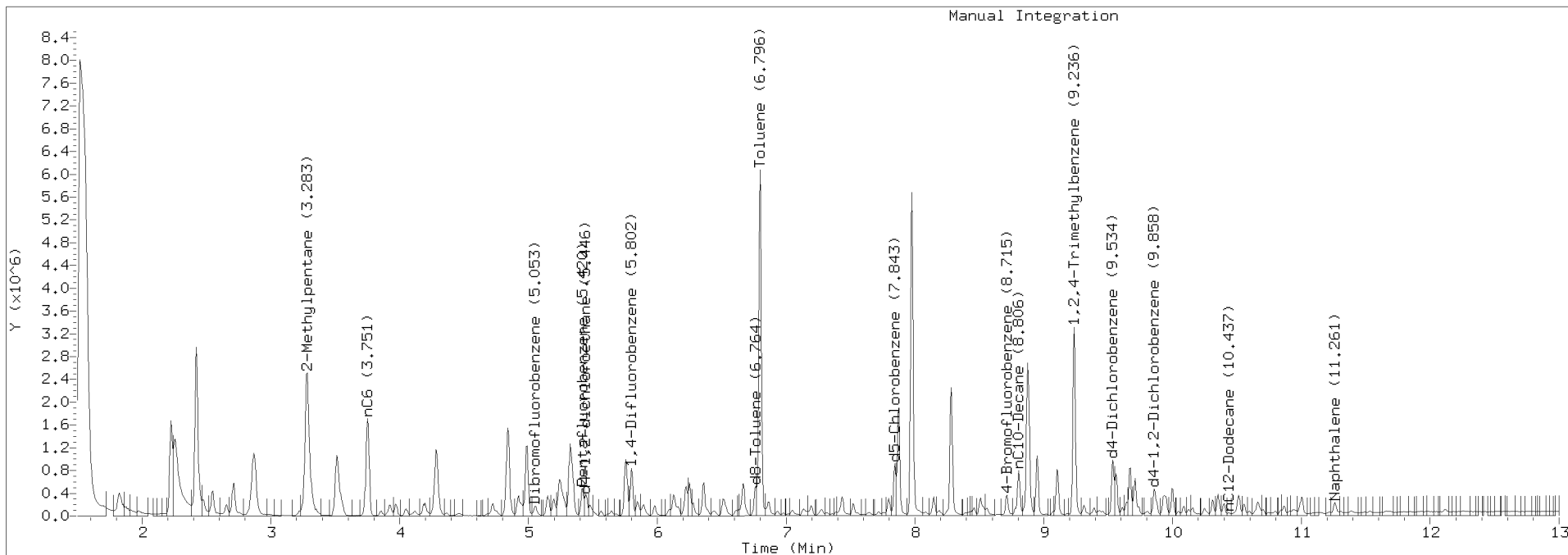
NW Gas Range Subtracted Peaks

6.764	733545	d8-Toluene
8.715	613071	4-Bromofluorobenzene
9.534	1455751	d4-Dichlorobenzene
7.843	1259407	d5-Chlorobenzene
9.858	934062	d4-1,2-Dichlorobenzene

TPHG Manual Integrations Report

Datafile: NT3, 20170302g.b/V303021729G.D Injection: 02-MAR-2017 20:46

Lab ID: BFC0055-MSD2





Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

Volatile Organic Compounds - Quality Control

Batch BFC0084 - EPA 5030 (Purge and Trap)

Instrument: NT3

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BFC0084-BLK1)				Prepared: 03-Mar-2017 Analyzed: 03-Mar-2017 12:05						
1,2-Dichloroethane	ND	0.20	ug/L							U
Benzene	ND	0.20	ug/L							U
Toluene	ND	0.20	ug/L							U
Ethylbenzene	ND	0.20	ug/L							U
m,p-Xylene	ND	0.40	ug/L							U
o-Xylene	ND	0.20	ug/L							U
<i>Surrogate: 1,2-Dichloroethane-d4</i>	5.07		ug/L	5.00		101	80-129			
<i>Surrogate: Toluene-d8</i>	4.94		ug/L	5.00		98.7	80-120			
<i>Surrogate: 4-Bromofluorobenzene</i>	4.90		ug/L	5.00		98.0	80-120			



Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

Volatile Organic Compounds - Quality Control

Batch BFC0084 - EPA 5030 (Purge and Trap)

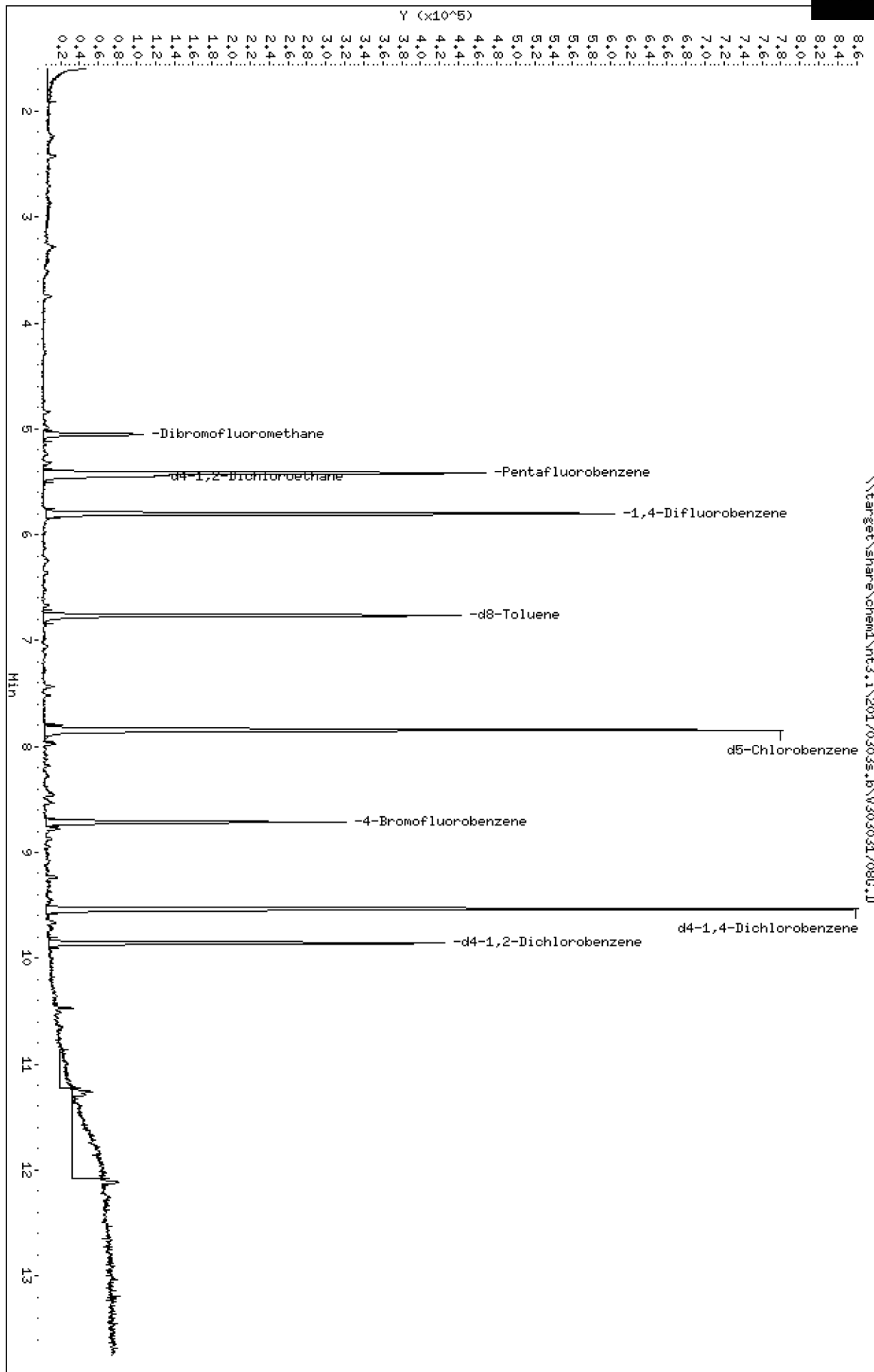
Instrument: NT3

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BFC0084-BLK2)				Prepared: 03-Mar-2017 Analyzed: 03-Mar-2017 12:05						
Gasoline Range Organics (Tol-Nap)	ND	100	ug/L							U
Surrogate: Toluene-d8	4.94		ug/L	5.00		98.7	80-120			
Surrogate: 4-Bromofluorobenzene	4.90		ug/L	5.00		98.0	80-120			

Data File: \\target\share\chend\nt3,1\20170303s,b\303031708G.D
 Date: 03-MAR-2017 12:05
 Client ID:
 Sample Info: BFC0084-BLK2
 Column phase: RTXWMS

Instrument: nt3,1
 Operator: PC
 Column diameter: 0.18

\\target\share\chend\nt3,1\20170303s,b\303031708G.D



ARI Labs, Inc.

8260C 10 ml purge

Data file : \\target\share\chem1\nt3.i\20170303s.b\V303031708G.D
Lab Smp Id: BFC0084-BLK2
Inj Date : 03-MAR-2017 12:05
Operator : PC Inst ID: nt3.i
Smp Info : BFC0084-BLK2
Misc Info : 16-
Comment :
Method : \\target\share\chem1\nt3.i\20170303s.b\8260C022417.m
Meth Date : 06-Mar-2017 07:32 Paul Quant Type: ISTD
Cal Date : 14-FEB-2017 18:50 Cal File: V302141718.D
Als bottle: 12
Dil Factor: 1.00000
Integrator: HP RTE Compound Sublist: gsurr.sub
Target Version: 4.14
Processing Host: ORGDATA20

Compounds	QUANT	SIG	RT	EXP RT	REL RT	RESPONSE	CONCENTRATIONS	
							ON-COLUMN (ug/L)	FINAL (ug/L)
\$ 27 Dibromofluoromethane	111		5.052	5.053	(0.932)	53157	4.75195	4.752 (R)
* 32 Pentafluorobenzene	168		5.419	5.420	(1.000)	238108	10.0000	
\$ 33 d4-1,2-Dichloroethane	65		5.451	5.446	(1.006)	64113	5.06574	5.066 (R)
* 37 1,4-Difluorobenzene	114		5.802	5.803	(1.000)	381901	10.0000	
\$ 43 d8-Toluene	98		6.764	6.765	(1.166)	228887	4.93697	4.937 (R)
* 53 d5-Chlorobenzene	117		7.843	7.844	(1.000)	369610	10.0000	
\$ 62 4-Bromofluorobenzene	174		8.714	8.715	(1.111)	76252	4.90055	4.901 (R)
* 76 d4-1,4-Dichlorobenzene	152		9.538	9.534	(1.000)	195212	10.0000	
\$ 79 d4-1,2-Dichlorobenzene	152		9.857	9.858	(1.033)	92694	5.05898	5.059 (R)

QC Flag Legend

R - Spike/Surrogate failed recovery limits.

ARI Labs, Inc.

INTERNAL STANDARD COMPOUNDS
 AREA AND RT SUMMARY

Instrument ID: nt3.i Calibration Date: 03-MAR-2017
 Lab File ID: V303031708G.D Calibration Time: 21:57
 Lab Smp Id: BFC0084-BLK2
 Analysis Type: VOA Level:
 Quant Type: ISTD Sample Type:
 Operator: PC
 Method File: \\target\share\chem1\nt3.i\20170303s.b\8260C022417.m
 Misc Info: 16-

Test Mode:

Use Initial Calibration Level 5.
 If Continuing Cal. use Initial Cal. Level 5

COMPOUND	STANDARD	AREA LIMIT		SAMPLE	%DIFF
		LOWER	UPPER		
32 Pentafluorobenzon	317912	158956	635824	238108	-25.10
37 1,4-Difluorobenze	512039	256020	1024078	381901	-25.42
53 d5-Chlorobenzene	494052	247026	988104	369610	-25.19
76 d4-1,4-Dichlorobe	282154	141077	564308	195212	-30.81

COMPOUND	STANDARD	RT LIMIT		SAMPLE	%DIFF
		LOWER	UPPER		
32 Pentafluorobenzon	5.42	4.92	5.92	5.42	-0.02
37 1,4-Difluorobenze	5.80	5.30	6.30	5.80	-0.02
53 d5-Chlorobenzene	7.84	7.34	8.34	7.84	-0.01
76 d4-1,4-Dichlorobe	9.53	9.03	10.03	9.54	0.04

AREA UPPER LIMIT = +100% of internal standard area.
 AREA LOWER LIMIT = - 50% of internal standard area.
 RT UPPER LIMIT = + 0.50 minutes of internal standard RT.
 RT LOWER LIMIT = - 0.50 minutes of internal standard RT.

ARI Labs, Inc.

RECOVERY REPORT

Client Name: Client SDG: 20150930a
Sample Matrix: NONE Fraction: VOA
Lab Smp Id: BFC0084-BLK2
Level: Operator: PC
Data Type: MS DATA SampleType: SAMPLE
SpikeList File: allspike.spk Quant Type: ISTD
Sublist File: gsurr.sub
Method File: \\target\share\chem1\nt3.i\20170303s.b\8260C022417.m
Misc Info: 16-

SURROGATE COMPOUND	AMOUNT ADDED ug/L	AMOUNT RECOVERED ug/L	% RECOVERED	LIMITS
\$ 27 Dibromofluorometha	5.000	4.752	95.04	
\$ 33 d4-1,2-Dichloroeth	5.000	5.066	101.31	
\$ 43 d8-Toluene	5.000	4.937	98.74	
\$ 62 4-Bromofluorobenze	5.000	4.901	98.01	
\$ 79 d4-1,2-Dichloroben	5.000	5.059	101.18	

REVIEW SUMMARY FOR FILE - V303031708G.D

Lab ID: BFC0084-BLK2

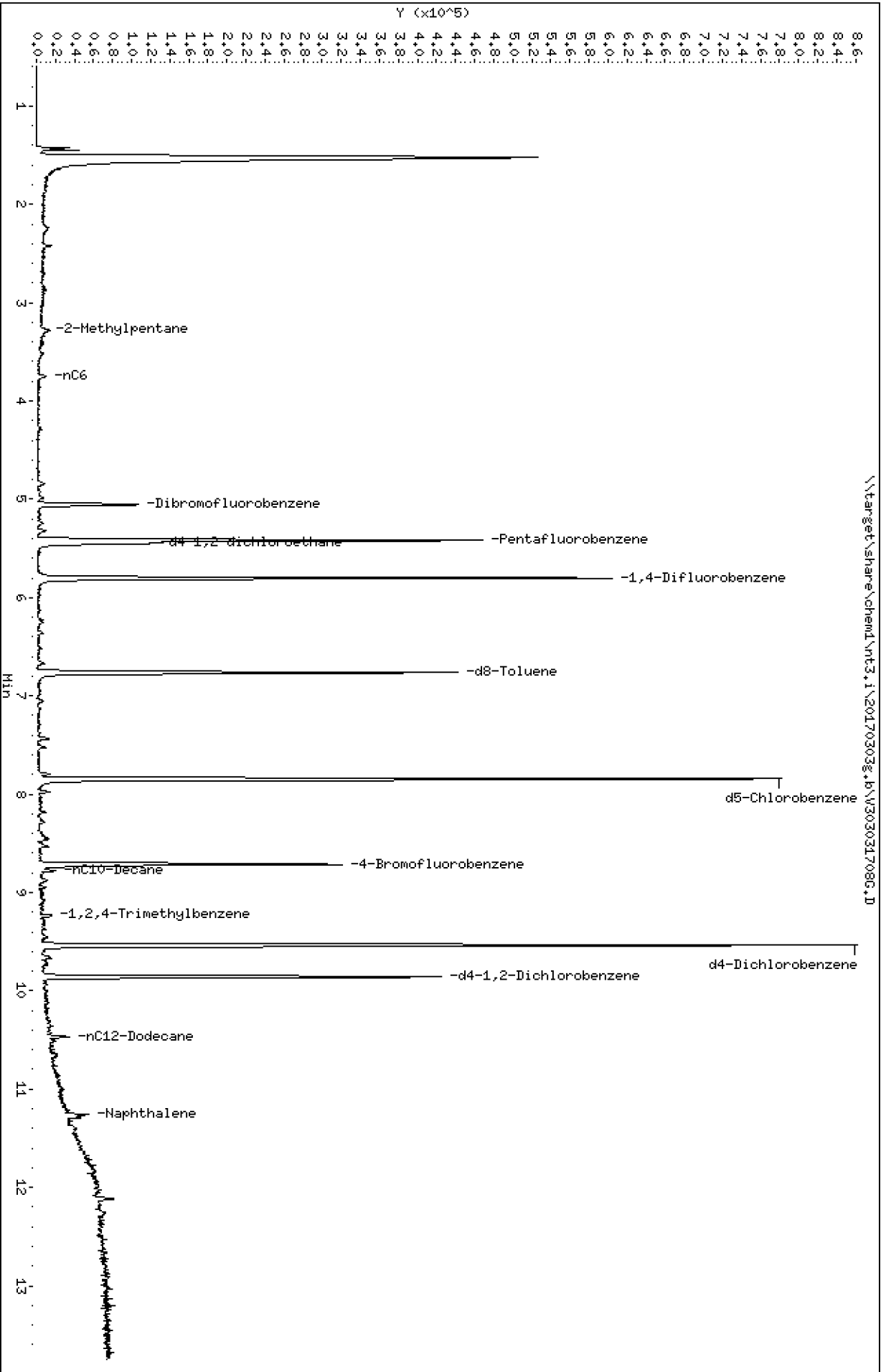
nt3.i, 20170303s.b\8260C022417.m, 03-MAR-2017 12:05

RT CO-ELUTION COMPOUNDS

Data File: \\target\share\chend\nt3.1\20170303g.b\303031708G.D
Date: 03-MAR-2017 12:05
Client ID:
Sample Info: BFC0084-BLK2

Column phase: RTXWMS

Instrument: nt3.1
Operator: PC
Column diameter: 0.18



Analytical Resources Inc.
GC/MS Gas Quantitation Report

Data file: 20170303g.b/V303031708G.D
Method: \20170303g.b\NWTPHG.m
Instrument: nt3.i
Gas Ical Date: 14-Feb-2017
Injection Date: 03-MAR-2017 12:05

ARI ID: BFC0084-BLK2
Client ID:
Matrix: NONE
Dilution Factor: 1.000
Operator: PC

=====

GASOLINE HYDROCARBONS

Range	RF	Total Area*	Amount (ug/mL)
WAGas Tol-C12 (6.70 to 10.57)	52141375	419588	0.008
8015C 2MP-TMB (3.18 to 9.34)	87713511	485667	0.006 M
AK101 nC6-nC10 (3.65 to 8.68)	61260787	331098	0.005 M
NWTPHG Tol-Nap (6.70 to 11.36)	54123058	536735	0.010 M

M Indicates manual integration within range

* Surrogate areas are subtracted from Total Area

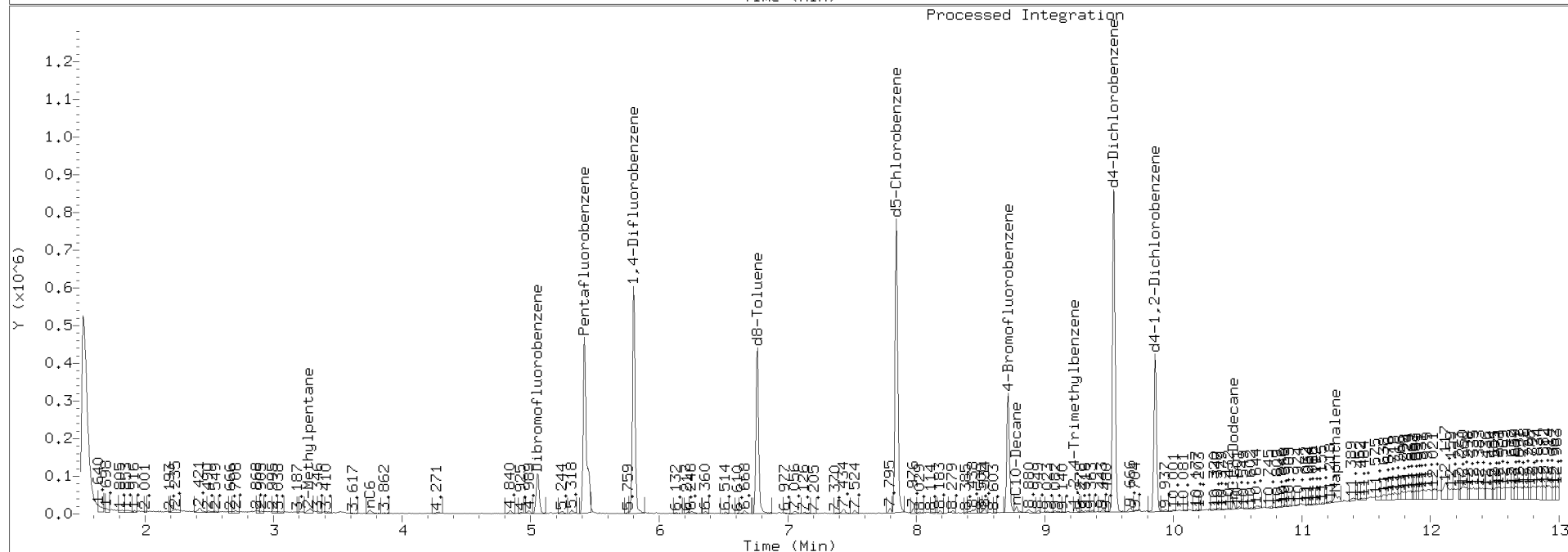
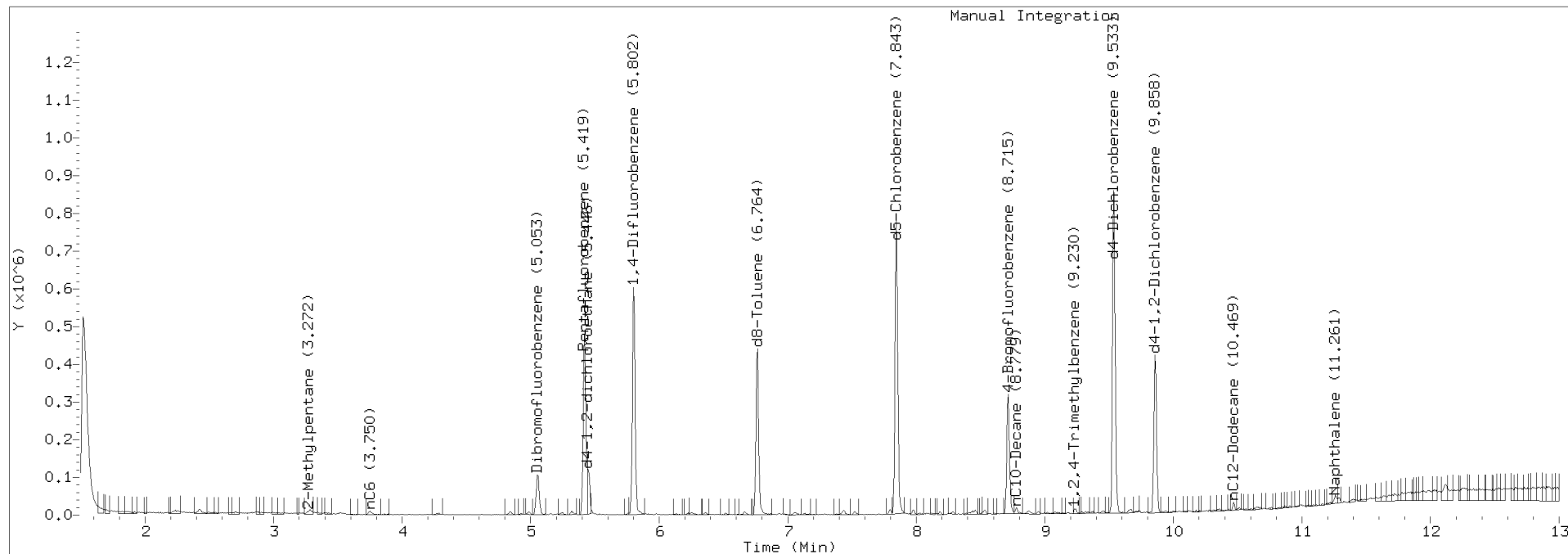
NW Gas Range Subtracted Peaks

6.764	657276	d8-Toluene
8.715	474007	4-Bromofluorobenzene
9.533	1287023	d4-Dichlorobenzene
7.843	1169494	d5-Chlorobenzene
9.858	608056	d4-1,2-Dichlorobenzene

TPHG Manual Integrations Report

Datafile: NT3, 20170303g.b/V303031708G.D Injection: 03-MAR-2017 12:05

Lab ID: BFC0084-BLK2





Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

Volatile Organic Compounds - Quality Control

Batch BFC0084 - EPA 5030 (Purge and Trap)

Instrument: NT3

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
LCS (BFC0084-BS1)		Prepared: 03-Mar-2017 Analyzed: 03-Mar-2017 10:22								
1,2-Dichloroethane	9.91	0.20	ug/L	10.0		99.1	75-123			
Benzene	9.83	0.20	ug/L	10.0		98.3	80-120			
Toluene	10.1	0.20	ug/L	10.0		101	80-120			
Ethylbenzene	10.2	0.20	ug/L	10.0		102	80-120			
m,p-Xylene	20.4	0.40	ug/L	20.0		102	80-121			
o-Xylene	10.2	0.20	ug/L	10.0		102	80-121			
<i>Surrogate: 1,2-Dichloroethane-d4</i>	4.99		ug/L	5.00		99.7	80-129			
<i>Surrogate: Toluene-d8</i>	5.16		ug/L	5.00		103	80-120			
<i>Surrogate: 4-Bromofluorobenzene</i>	5.09		ug/L	5.00		102	80-120			



Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

Volatile Organic Compounds - Quality Control

Batch BFC0084 - EPA 5030 (Purge and Trap)

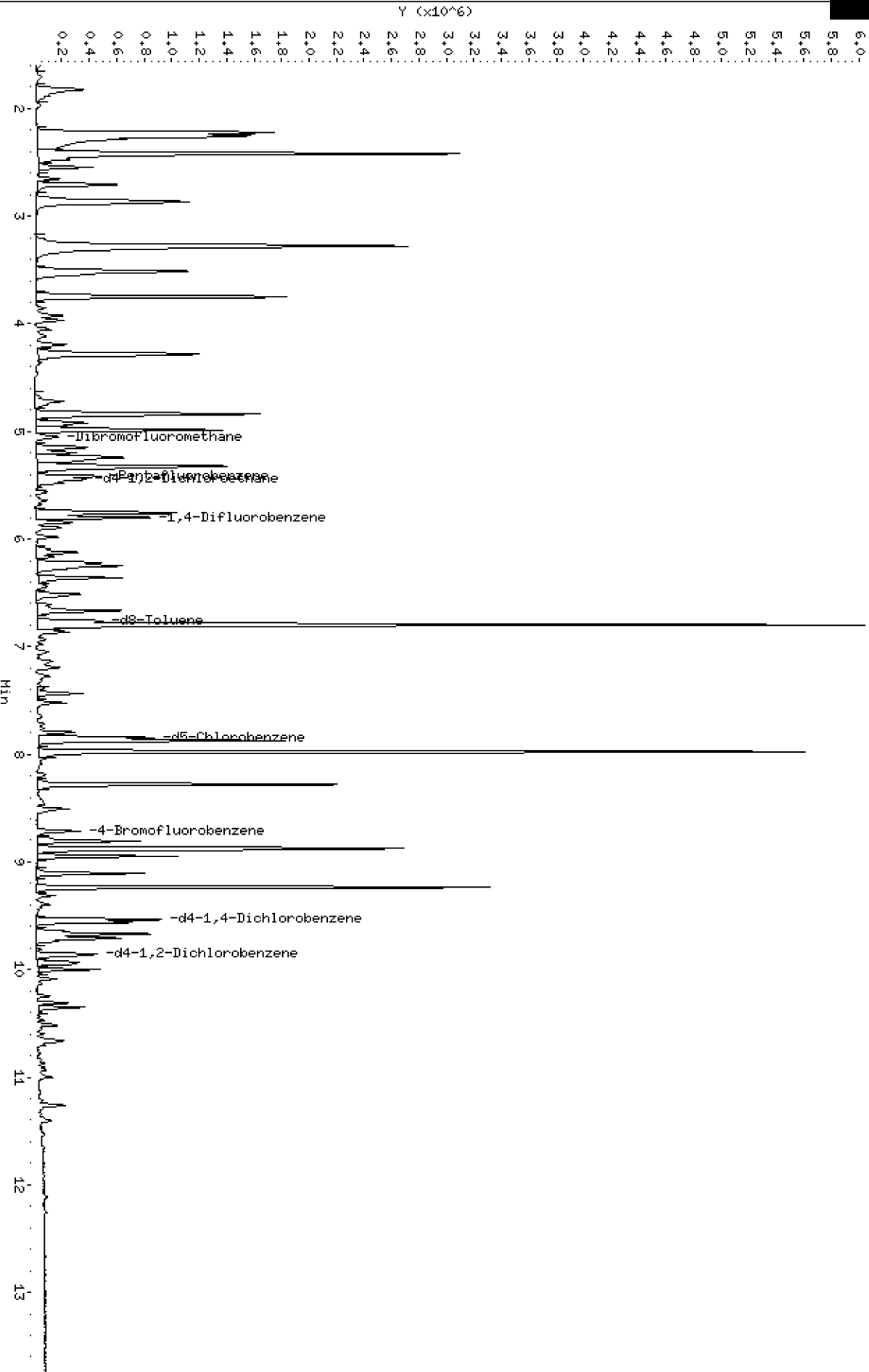
Instrument: NT3

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
LCS (BFC0084-BS2)				Prepared: 03-Mar-2017 Analyzed: 03-Mar-2017 11:13						
Gasoline Range Organics (Tol-Nap)	948	100	ug/L	1000		94.8	80-120			
Surrogate: Toluene-d8	5.03		ug/L	5.00		101	80-120			
Surrogate: 4-Bromofluorobenzene	4.98		ug/L	5.00		99.5	80-120			

Data File: \\target\share\chemd\nt3,1\20170303s,b\303031706LCSG.D
Date : 03-HRR-2017 11:13
Client ID:
Sample Info: BFC0084-B52
Column phase: RTXWMS

Instrument: nt3,1
Operator: PC
Column diameter: 0.18

\\target\share\chemd\nt3,1\20170303s,b\303031706LCSG.D



ARI Labs, Inc.

8260C 10 ml purge

Data file : \\target\share\chem1\nt3.i\20170303s.b\V303031706LCSG.D
Lab Smp Id: BFC0084-BS2
Inj Date : 03-MAR-2017 11:13
Operator : PC
Smp Info : BFC0084-BS2
Misc Info : 16-
Comment :
Method : \\target\share\chem1\nt3.i\20170303s.b\8260C022417.m
Meth Date : 06-Mar-2017 07:32 Paul
Cal Date : 14-FEB-2017 18:50
Als bottle: 12
Dil Factor: 1.00000
Integrator: HP RTE
Target Version: 4.14
Processing Host: ORGDATA20

Inst ID: nt3.i

Quant Type: ISTD

Cal File: V302141718.D

Compound Sublist: gsurr.sub

Compounds	QUANT	SIG	RT	EXP RT	REL RT	RESPONSE	CONCENTRATIONS	
							ON-COLUMN (ug/L)	FINAL (ug/L)
\$ 27 Dibromofluoromethane	111		5.052	5.053	(0.932)	54730	4.76819	4.768 (R)
* 32 Pentafluorobenzene	168		5.419	5.420	(1.000)	244319	10.0000	
\$ 33 d4-1,2-Dichloroethane	65		5.446	5.446	(1.005)	71368	5.49562	5.496 (R)
* 37 1,4-Difluorobenzene	114		5.802	5.803	(1.000)	396022	10.0000	
\$ 43 d8-Toluene	98		6.764	6.765	(1.166)	241788	5.02928	5.029 (R)
* 53 d5-Chlorobenzene	117		7.843	7.844	(1.000)	387727	10.0000	
\$ 62 4-Bromofluorobenzene	174		8.715	8.715	(1.111)	81243	4.97734	4.977 (R)
* 76 d4-1,4-Dichlorobenzene	152		9.539	9.534	(1.000)	204016	10.0000	
\$ 79 d4-1,2-Dichlorobenzene	152		9.858	9.858	(1.033)	96860	5.05822	5.058 (R)

QC Flag Legend

R - Spike/Surrogate failed recovery limits.

ARI Labs, Inc.

INTERNAL STANDARD COMPOUNDS
 AREA AND RT SUMMARY

Instrument ID: nt3.i Calibration Date: 03-MAR-2017
 Lab File ID: V303031706LCSG.D Calibration Time: 21:57
 Lab Smp Id: BFC0084-BS2
 Analysis Type: VOA Level:
 Quant Type: ISTD Sample Type:
 Operator: PC
 Method File: \\target\share\chem1\nt3.i\20170303s.b\8260C022417.m
 Misc Info: 16-

Test Mode:

Use Initial Calibration Level 5.
 If Continuing Cal. use Initial Cal. Level 5

COMPOUND	STANDARD	AREA LIMIT		SAMPLE	%DIFF
		LOWER	UPPER		
32 Pentafluorobenzon	317912	158956	635824	244319	-23.15
37 1,4-Difluorobenze	512039	256020	1024078	396022	-22.66
53 d5-Chlorobenzene	494052	247026	988104	387727	-21.52
76 d4-1,4-Dichlorobe	282154	141077	564308	204016	-27.69

COMPOUND	STANDARD	RT LIMIT		SAMPLE	%DIFF
		LOWER	UPPER		
32 Pentafluorobenzon	5.42	4.92	5.92	5.42	-0.01
37 1,4-Difluorobenze	5.80	5.30	6.30	5.80	-0.01
53 d5-Chlorobenzene	7.84	7.34	8.34	7.84	-0.01
76 d4-1,4-Dichlorobe	9.53	9.03	10.03	9.54	0.05

AREA UPPER LIMIT = +100% of internal standard area.
 AREA LOWER LIMIT = - 50% of internal standard area.
 RT UPPER LIMIT = + 0.50 minutes of internal standard RT.
 RT LOWER LIMIT = - 0.50 minutes of internal standard RT.

ARI Labs, Inc.

RECOVERY REPORT

Client Name: Client SDG: 20150930a
Sample Matrix: NONE Fraction: VOA
Lab Smp Id: BFC0084-BS2
Level: Operator: PC
Data Type: MS DATA SampleType: SAMPLE
SpikeList File: allspike.spk Quant Type: ISTD
Sublist File: gsurr.sub
Method File: \\target\share\chem1\nt3.i\20170303s.b\8260C022417.m
Misc Info: 16-

SURROGATE COMPOUND	AMOUNT ADDED ug/L	AMOUNT RECOVERED ug/L	% RECOVERED	LIMITS
\$ 27 Dibromofluorometha	5.000	4.768	95.36	
\$ 33 d4-1,2-Dichloroeth	5.000	5.496	109.91	
\$ 43 d8-Toluene	5.000	5.029	100.59	
\$ 62 4-Bromofluorobenze	5.000	4.977	99.55	
\$ 79 d4-1,2-Dichloroben	5.000	5.058	101.16	

REVIEW SUMMARY FOR FILE - V303031706LCSG.D

Lab ID: BFC0084-BS2

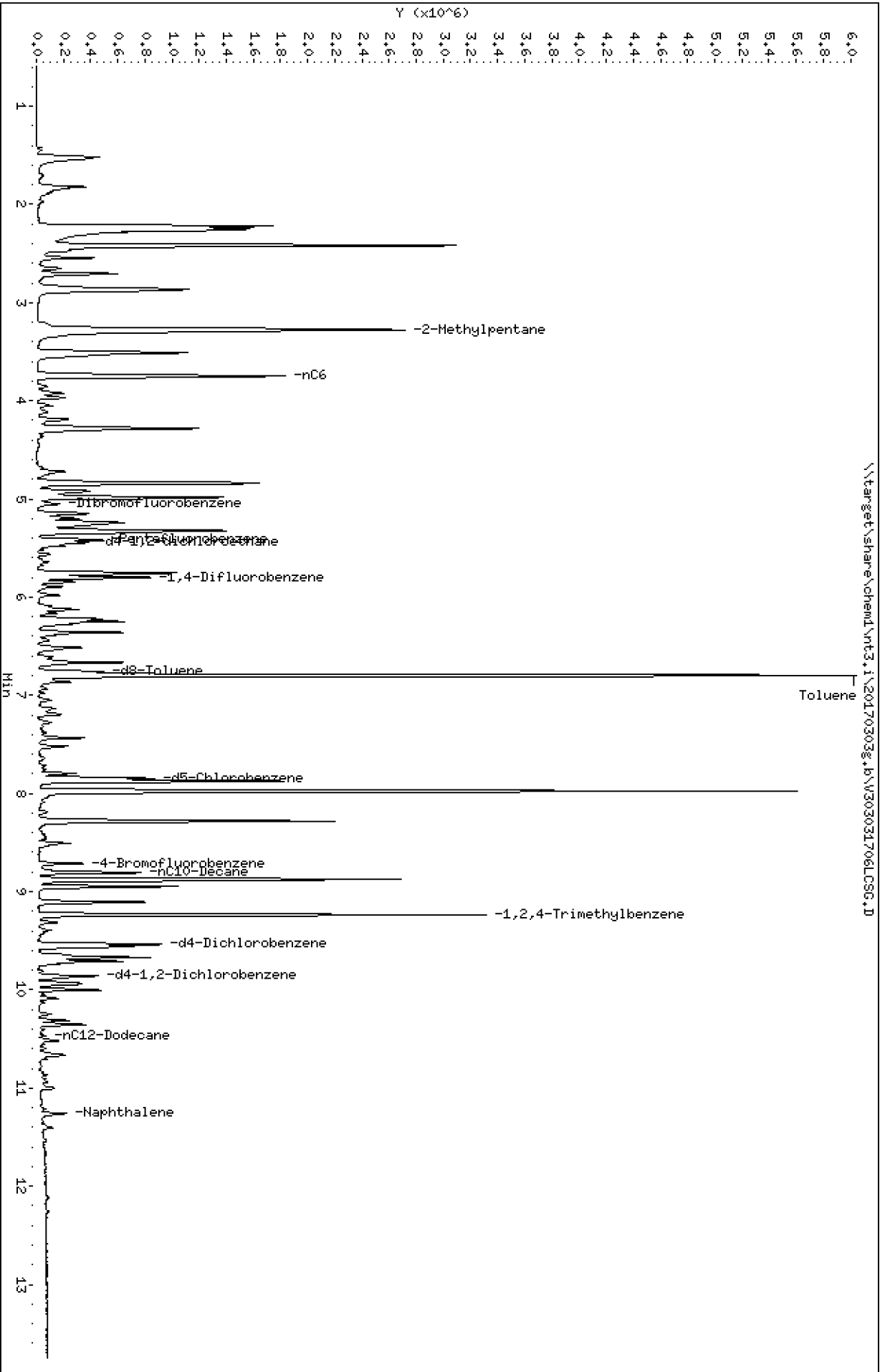
nt3.i, 20170303s.b\8260C022417.m, 03-MAR-2017 11:13

RT CO-ELUTION COMPOUNDS

Data File: \\target\share\chemd\nt3,1\20170303g.jb\W303031706LDSG.D
Date : 03-MAR-2017 11:13
Client ID:
Sample Info: BFC0084-B52

Column phase: RTXWMS

Instrument: nt3,1
Operator: PC
Column diameter: 0.18



Analytical Resources Inc.
GC/MS Gas Quantitation Report

Data file: 20170303g.b/V303031706LCSG.D
Method: \20170303g.b\NWTPHG.m
Instrument: nt3.i
Gas Ical Date: 14-Feb-2017
Injection Date: 03-MAR-2017 11:13

ARI ID: BFC0084-BS2
Client ID:
Matrix: WATER
Dilution Factor: 1.000
Operator: PC

=====

GASOLINE HYDROCARBONS

Range	RF	Total Area*	Amount (ug/mL)
WAGas Tol-C12 (6.70 to 10.57)	52141375	48781131	0.936
8015C 2MP-TMB (3.18 to 9.34)	87713511	82798133	0.944
AK101 nC6-nC10 (3.65 to 8.68)	61260787	59774965	0.976
NWTPHG Tol-Nap (6.70 to 11.36)	54123058	51301508	0.948

M Indicates manual integration within range

* Surrogate areas are subtracted from Total Area

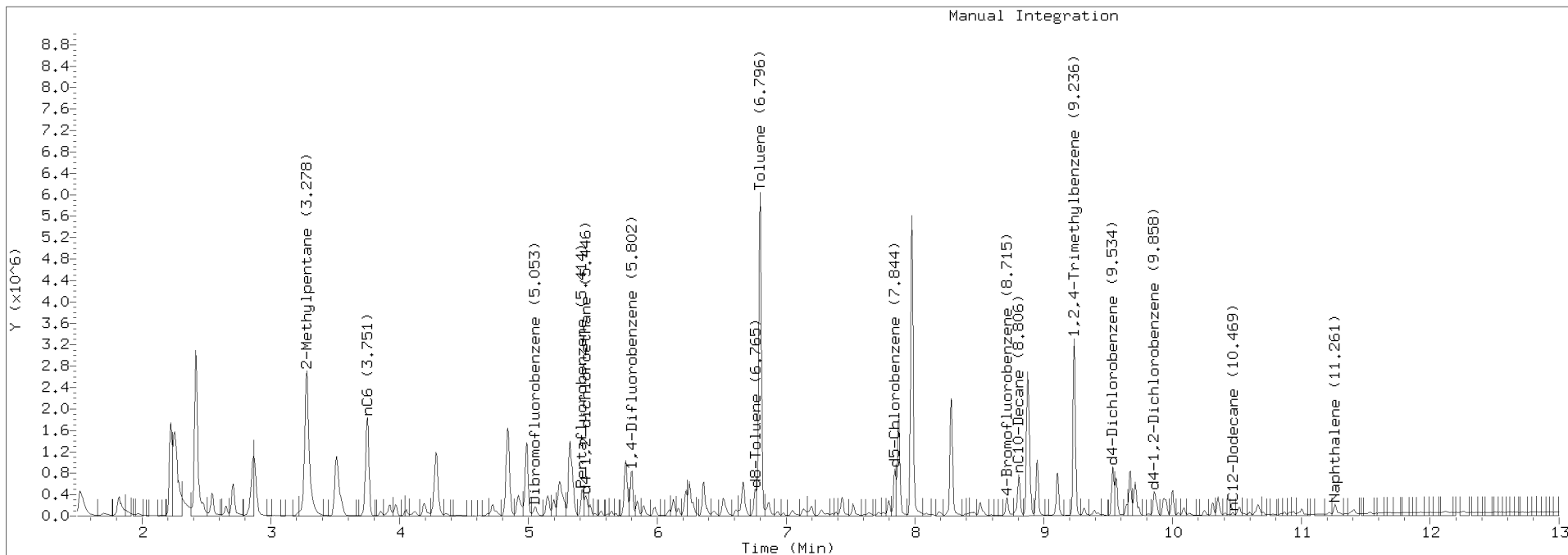
NW Gas Range Subtracted Peaks

6.765	745236	d8-Toluene
8.715	558953	4-Bromofluorobenzene
9.534	1339493	d4-Dichlorobenzene
7.844	1228586	d5-Chlorobenzene
9.858	856043	d4-1,2-Dichlorobenzene

TPHG Manual Integrations Report

Datafile: NT3, 20170303g.b/V303031706LCSG.D Injection: 03-MAR-2017 11:13

Lab ID: BFC0084-BS2





Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

Volatile Organic Compounds - Quality Control

Batch BFC0084 - EPA 5030 (Purge and Trap)

Instrument: NT3

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
LCS Dup (BFC0084-BSD1)				Prepared: 03-Mar-2017 Analyzed: 03-Mar-2017 10:47						
1,2-Dichloroethane	9.65	0.20	ug/L	10.0		96.5	75-123	2.64	30	
Benzene	9.48	0.20	ug/L	10.0		94.8	80-120	3.62	30	
Toluene	9.63	0.20	ug/L	10.0		96.3	80-120	4.60	30	
Ethylbenzene	9.77	0.20	ug/L	10.0		97.7	80-120	4.25	30	
m,p-Xylene	19.7	0.40	ug/L	20.0		98.3	80-121	3.67	30	
o-Xylene	10.0	0.20	ug/L	10.0		100	80-121	1.80	30	
<i>Surrogate: 1,2-Dichloroethane-d4</i>	5.15		ug/L	5.00		103	80-129			
<i>Surrogate: Toluene-d8</i>	5.04		ug/L	5.00		101	80-120			
<i>Surrogate: 4-Bromofluorobenzene</i>	5.15		ug/L	5.00		103	80-120			



Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

Volatile Organic Compounds - Quality Control

Batch BFC0084 - EPA 5030 (Purge and Trap)

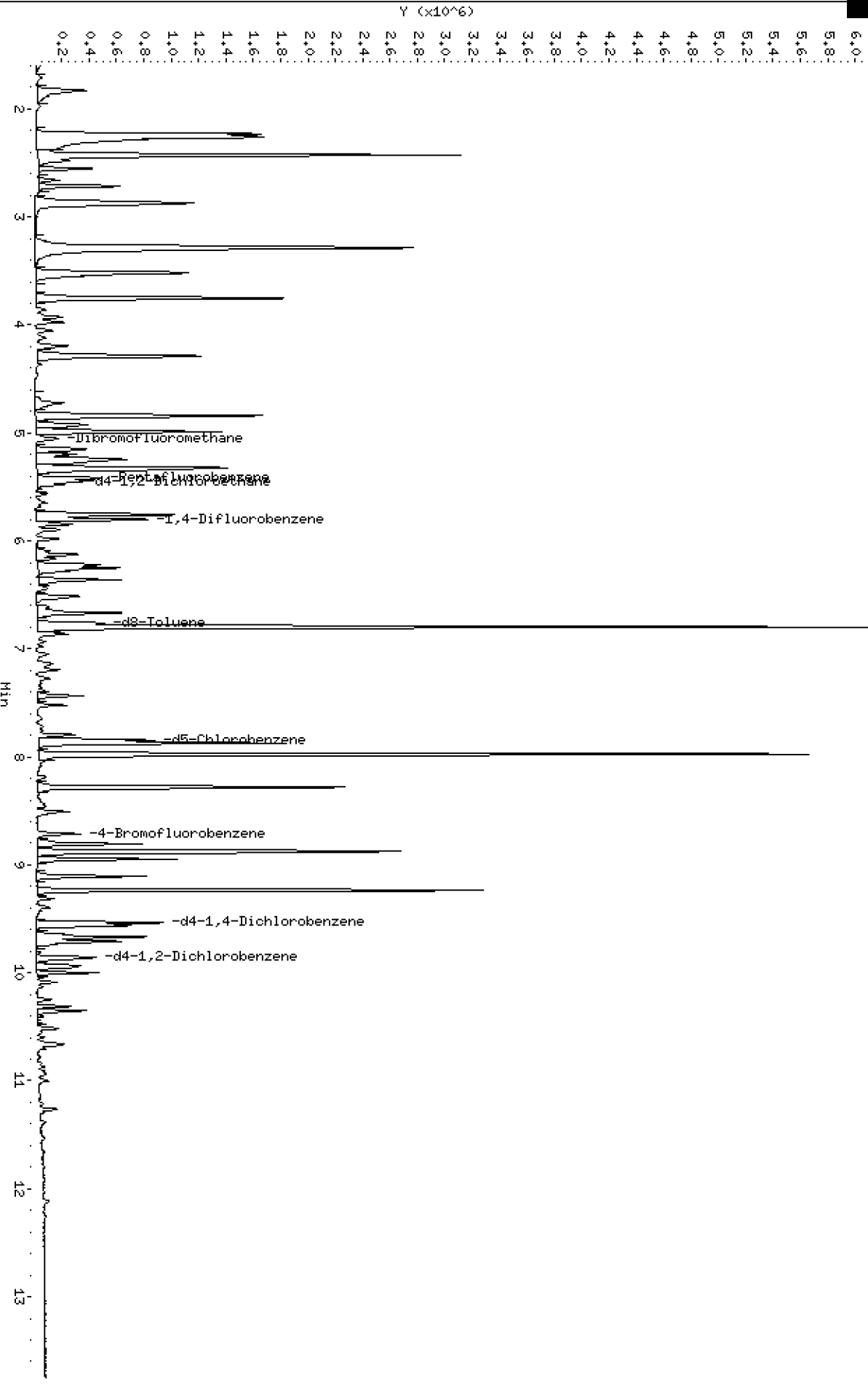
Instrument: NT3

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
LCS Dup (BFC0084-BSD2)				Prepared: 03-Mar-2017 Analyzed: 03-Mar-2017 11:39						
Gasoline Range Organics (Tol-Nap)	954	100	ug/L	1000		95.4	80-120	0.61	30	
Surrogate: Toluene-d8	4.99		ug/L	5.00		99.7	80-120			
Surrogate: 4-Bromofluorobenzene	4.89		ug/L	5.00		97.7	80-120			

Data File: \\target\share\chend\nt3.1\20170303s.1b\303031707G.D
Date : 03-MAR-2017 11:39
Client ID: Gas
Sample Info: BFC0084-BSM2
Column phase: RTXWMS

Instrument: nt3.1
Operator: PC
Column diameter: 0.18

\\target\share\chend\nt3.1\20170303s.1b\303031707G.D



ARI Labs, Inc.

8260C 10 ml purge

Data file : \\target\share\chem1\nt3.i\20170303s.b\V303031707G.D
 Lab Smp Id: BFC0084-BSD2 Client Smp ID: Gas
 Inj Date : 03-MAR-2017 11:39
 Operator : PC Inst ID: nt3.i
 Smp Info : BFC0084-BSD2
 Misc Info : 16-
 Comment :
 Method : \\target\share\chem1\nt3.i\20170303s.b\8260C022417.m
 Meth Date : 06-Mar-2017 07:32 Paul Quant Type: ISTD
 Cal Date : 14-FEB-2017 18:50 Cal File: V302141718.D
 Als bottle: 12
 Dil Factor: 1.00000
 Integrator: HP RTE Compound Sublist: gsurr.sub
 Target Version: 4.14
 Processing Host: ORGDATA20

Compounds	QUANT	SIG	RT	EXP RT	REL RT	RESPONSE	CONCENTRATIONS	
							ON-COLUMN (ug/L)	FINAL (ug/L)
\$ 27 Dibromofluoromethane	111		5.053	5.053	(0.932)	55875	4.85176	4.852 (R)
* 32 Pentafluorobenzene	168		5.420	5.420	(1.000)	245134	10.0000	
\$ 33 d4-1,2-Dichloroethane	65		5.452	5.446	(1.006)	72441	5.55970	5.560 (R)
* 37 1,4-Difluorobenzene	114		5.803	5.803	(1.000)	397642	10.0000	
\$ 43 d8-Toluene	98		6.765	6.765	(1.166)	240661	4.98544	4.985 (R)
* 53 d5-Chlorobenzene	117		7.844	7.844	(1.000)	388125	10.0000	
\$ 62 4-Bromofluorobenzene	174		8.715	8.715	(1.111)	79854	4.88723	4.887 (R)
* 76 d4-1,4-Dichlorobenzene	152		9.534	9.534	(1.000)	204263	10.0000	
\$ 79 d4-1,2-Dichlorobenzene	152		9.858	9.858	(1.034)	95752	4.99432	4.994 (R)

QC Flag Legend

R - Spike/Surrogate failed recovery limits.

ARI Labs, Inc.

INTERNAL STANDARD COMPOUNDS
 AREA AND RT SUMMARY

Instrument ID: nt3.i Calibration Date: 03-MAR-2017
 Lab File ID: V303031707G.D Calibration Time: 21:57
 Lab Smp Id: BFC0084-BSD2 Client Smp ID: Gas
 Analysis Type: VOA Level:
 Quant Type: ISTD Sample Type:
 Operator: PC
 Method File: \\target\share\chem1\nt3.i\20170303s.b\8260C022417.m
 Misc Info: 16-

Test Mode:

Use Initial Calibration Level 5.
 If Continuing Cal. use Initial Cal. Level 5

COMPOUND	STANDARD	AREA LIMIT		SAMPLE	%DIFF
		LOWER	UPPER		
32 Pentafluorobenzon	317912	158956	635824	245134	-22.89
37 1,4-Difluorobenze	512039	256020	1024078	397642	-22.34
53 d5-Chlorobenzene	494052	247026	988104	388125	-21.44
76 d4-1,4-Dichlorobe	282154	141077	564308	204263	-27.61

COMPOUND	STANDARD	RT LIMIT		SAMPLE	%DIFF
		LOWER	UPPER		
32 Pentafluorobenzon	5.42	4.92	5.92	5.42	-0.00
37 1,4-Difluorobenze	5.80	5.30	6.30	5.80	-0.00
53 d5-Chlorobenzene	7.84	7.34	8.34	7.84	-0.00
76 d4-1,4-Dichlorobe	9.53	9.03	10.03	9.53	-0.00

AREA UPPER LIMIT = +100% of internal standard area.
 AREA LOWER LIMIT = - 50% of internal standard area.
 RT UPPER LIMIT = + 0.50 minutes of internal standard RT.
 RT LOWER LIMIT = - 0.50 minutes of internal standard RT.

ARI Labs, Inc.

RECOVERY REPORT

Client Name: Client SDG: 20150930a
Sample Matrix: NONE Fraction: VOA
Lab Smp Id: BFC0084-BSD2 Client Smp ID: Gas
Level: Operator: PC
Data Type: MS DATA SampleType: SAMPLE
SpikeList File: allspike.spk Quant Type: ISTD
Sublist File: gsurr.sub
Method File: \\target\share\chem1\nt3.i\20170303s.b\8260C022417.m
Misc Info: 16-

SURROGATE COMPOUND	AMOUNT ADDED ug/L	AMOUNT RECOVERED ug/L	% RECOVERED	LIMITS
\$ 27 Dibromofluorometha	5.000	4.852	97.04	
\$ 33 d4-1,2-Dichloroeth	5.000	5.560	111.19	
\$ 43 d8-Toluene	5.000	4.985	99.71	
\$ 62 4-Bromofluorobenze	5.000	4.887	97.74	
\$ 79 d4-1,2-Dichloroben	5.000	4.994	99.89	

REVIEW SUMMARY FOR FILE - V303031707G.D

Lab ID: BFC0084-BSD2

nt3.i, 20170303s.b\8260C022417.m, 03-MAR-2017 11:39

RT CO-ELUTION COMPOUNDS

Data File: \\target\share\chend\nt3.1\20170303g.b\303031707G.D

Date: 03-MAR-2017 11:39

Client ID:

Sample Info: BFC0084-BSM2

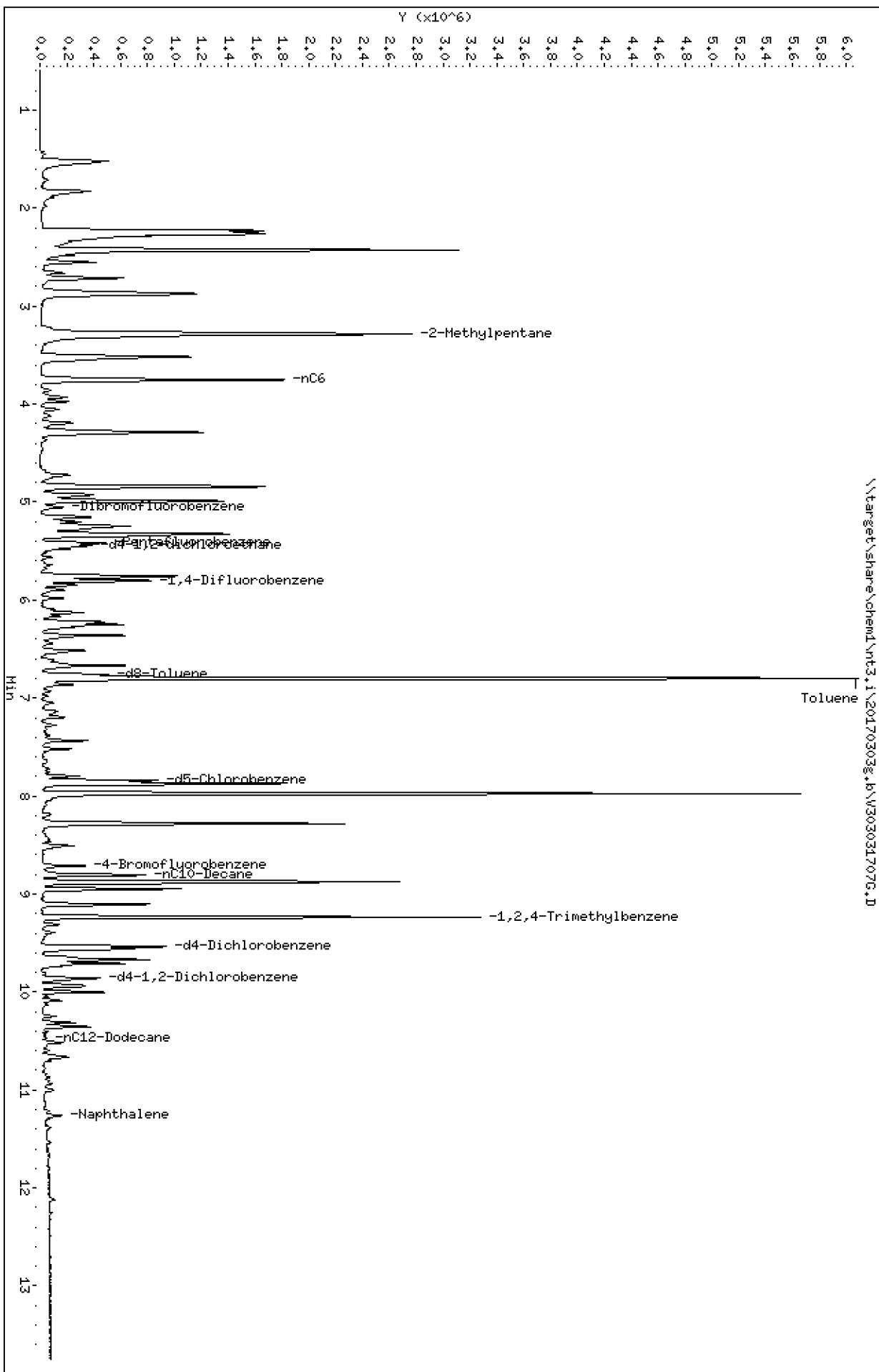
Column phase: RTXWMS

Instrument: nt3.1

Operator: PC

Column diameter: 0.18

Page 1



Analytical Resources Inc.
GC/MS Gas Quantitation Report

Data file: 20170303g.b/V303031707G.D
Method: \20170303g.b\NWTPHG.m
Instrument: nt3.i
Gas Ical Date: 14-Feb-2017
Injection Date: 03-MAR-2017 11:39

ARI ID: BFC0084-BSD2
Client ID:
Matrix: WATER
Dilution Factor: 1.000
Operator: PC

=====

GASOLINE HYDROCARBONS

Range	RF	Total Area*	Amount (ug/mL)
-----	----	-----	-----
WAGas Tol-C12 (6.70 to 10.57)	52141375	49232512	0.944 M
8015C 2MP-TMB (3.18 to 9.34)	87713511	81455763	0.929 M
AK101 nC6-nC10 (3.65 to 8.68)	61260787	58121363	0.949
NWTPHG Tol-Nap (6.70 to 11.36)	54123058	51613390	0.954 M

M Indicates manual integration within range

* Surrogate areas are subtracted from Total Area

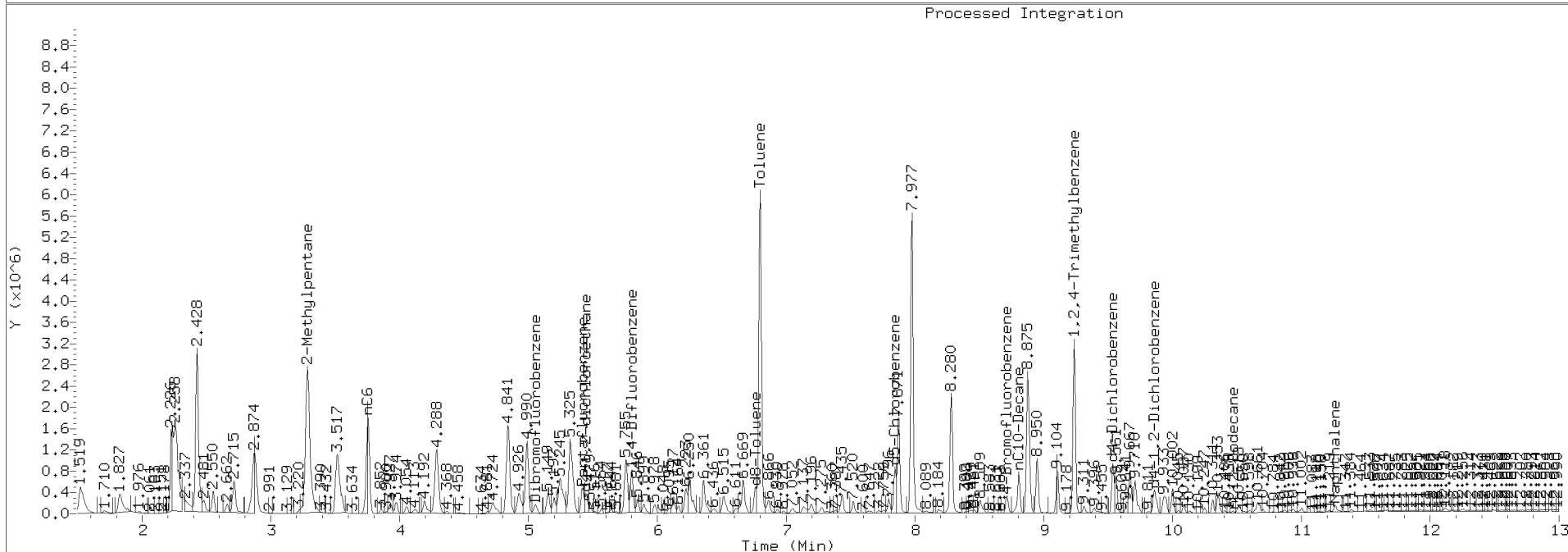
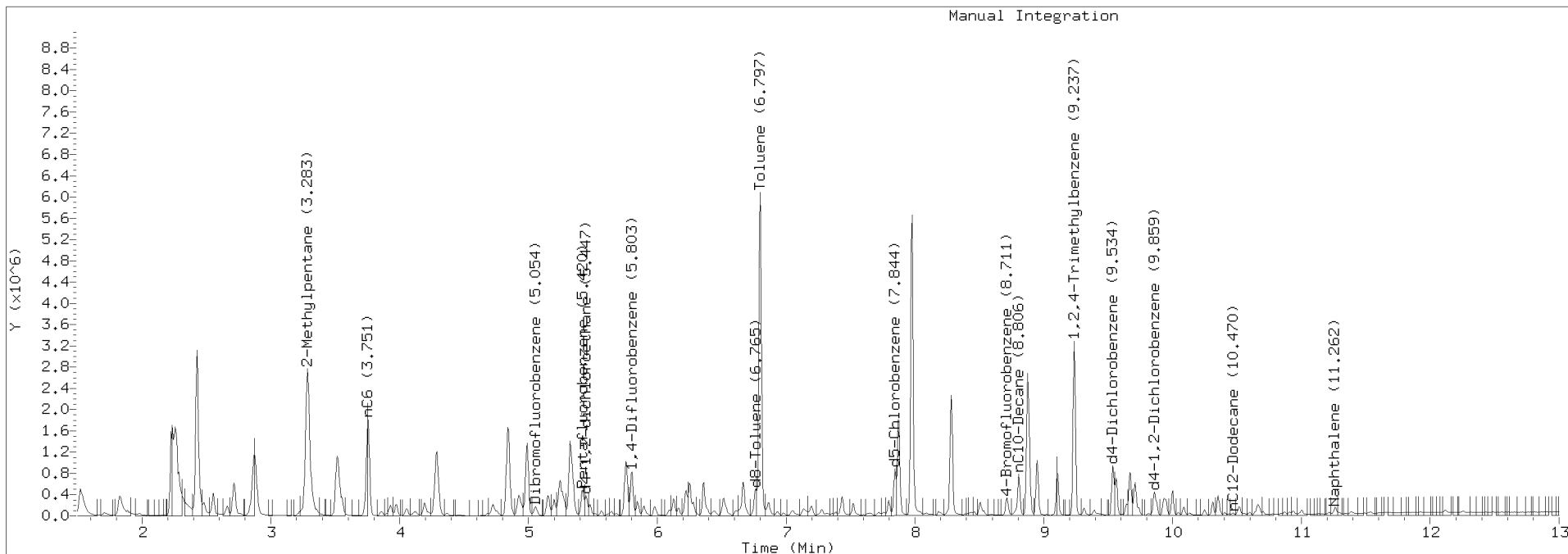
NW Gas Range Subtracted Peaks

6.765	738819	d8-Toluene
8.711	542475	4-Bromofluorobenzene
9.534	1337592	d4-Dichlorobenzene
7.844	1235837	d5-Chlorobenzene
9.859	842214	d4-1,2-Dichlorobenzene

TPHG Manual Integrations Report

Datafile: NT3, 20170303g.b/V303031707G.D Injection: 03-MAR-2017 11:39

Lab ID: BFC0084-BSD2





Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

Volatile Organic Compounds - Quality Control

Batch BFC0131 - EPA 5035 (Methanol Extraction)

Instrument: NT3

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BFC0131-BLK1)				Prepared: 06-Mar-2017 Analyzed: 06-Mar-2017 10:47						
Gasoline Range Organics (Tol-Nap)	ND	5000	ug/kg							U
Surrogate: Toluene-d8	4.98		ug/kg	5.00		99.6	80-120			
Surrogate: 4-Bromofluorobenzene	5.05		ug/kg	5.00		101	78-123			

Data File: \\target\share\chend\nt3,1\20170306s,b\303061708G.D

Date : 06-HR-2017 10:47

Client ID:

Sample Info: BFC0131-BLK1

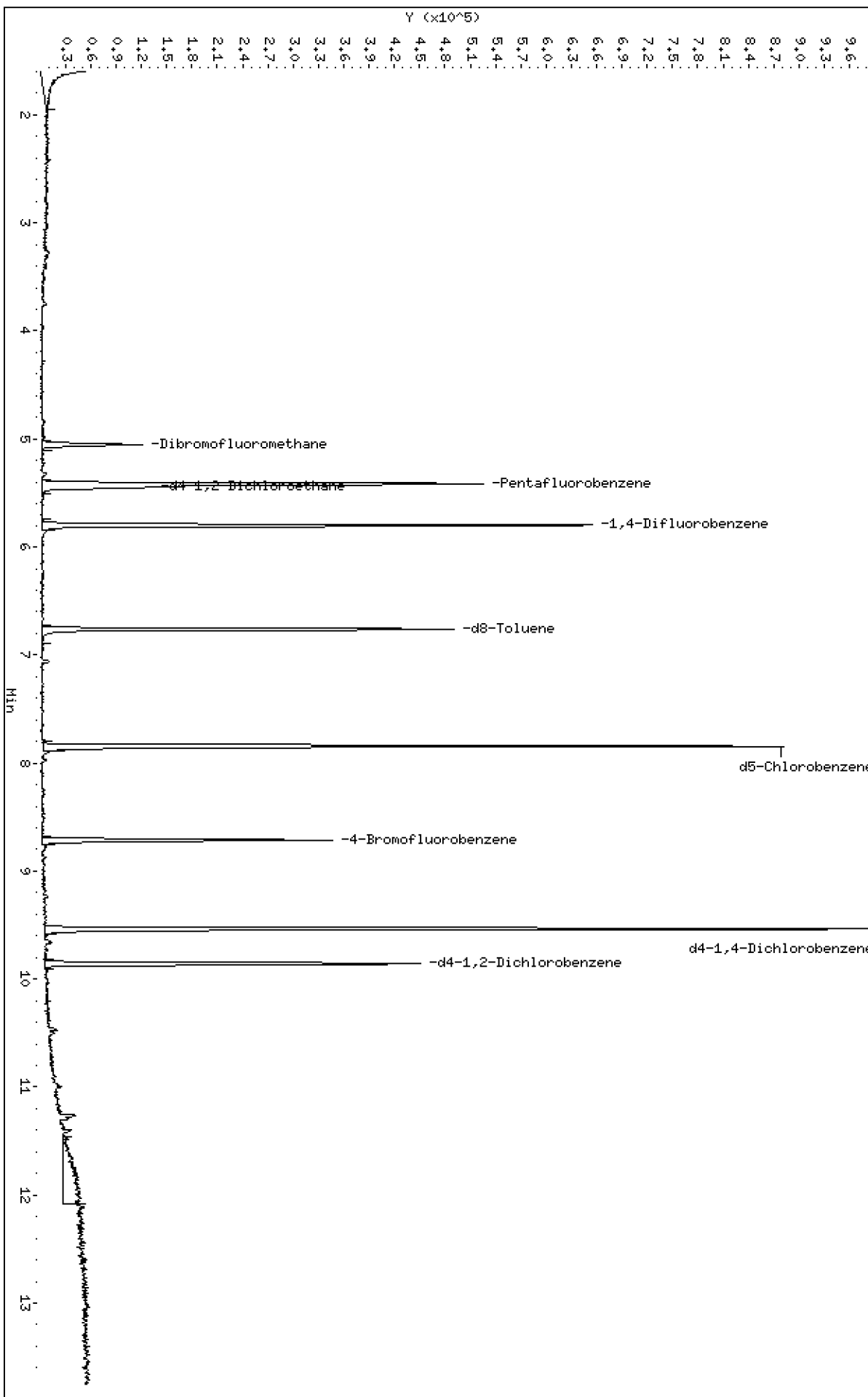
Column phase: RTXWMS

Instrument: nt3,1

Operator: PC

Column diameter: 0.18

\\target\share\chend\nt3,1\20170306s,b\303061708G.D



ARI Labs, Inc.

8260C 10 ml purge

Data file : \\target\share\chem1\nt3.i\20170306s.b\V303061708G.D
 Lab Smp Id: BFC0131-BLK1
 Inj Date : 06-MAR-2017 10:47
 Operator : PC
 Smp Info : BFC0131-BLK1
 Misc Info : 16-
 Comment :
 Method : \\target\share\chem1\nt3.i\20170306s.b\8260C022417.m
 Meth Date : 06-Mar-2017 07:32 Paul
 Cal Date : 14-FEB-2017 18:50
 Als bottle: 12
 Dil Factor: 1.00000
 Integrator: HP RTE
 Target Version: 4.14
 Processing Host: ORGDAT11

Inst ID: nt3.i

Quant Type: ISTD
 Cal File: V302141718.D

Compound Sublist: gsurr.sub

Compounds	QUANT	SIG	RT	EXP RT	REL RT	RESPONSE	CONCENTRATIONS	
							ON-COLUMN (ug/L)	FINAL (ug/L)
\$ 27 Dibromofluoromethane	111		5.053	5.053	(0.933)	58884	4.79146	4.791(R)
* 32 Pentafluorobenzene	168		5.415	5.420	(1.000)	261586	10.0000	
\$ 33 d4-1,2-Dichloroethane	65		5.447	5.446	(1.006)	70518	5.07173	5.072(R)
* 37 1,4-Difluorobenzene	114		5.803	5.803	(1.000)	416113	10.0000	
\$ 43 d8-Toluene	98		6.760	6.765	(1.165)	251612	4.98093	4.981(R)
* 53 d5-Chlorobenzene	117		7.844	7.844	(1.000)	406118	10.0000	
\$ 62 4-Bromofluorobenzene	174		8.716	8.715	(1.111)	86402	5.05369	5.054(R)
* 76 d4-1,4-Dichlorobenzene	152		9.534	9.534	(1.000)	216269	10.0000	
\$ 79 d4-1,2-Dichlorobenzene	152		9.859	9.858	(1.034)	101710	5.01057	5.011(R)

QC Flag Legend

R - Spike/Surrogate failed recovery limits.

ARI Labs, Inc.

INTERNAL STANDARD COMPOUNDS
 AREA AND RT SUMMARY

Instrument ID: nt3.i Calibration Date: 03-MAR-2017
 Lab File ID: V303061708G.D Calibration Time: 21:57
 Lab Smp Id: BFC0131-BLK1
 Analysis Type: VOA Level:
 Quant Type: ISTD Sample Type:
 Operator: PC
 Method File: \\target\share\chem1\nt3.i\20170306s.b\8260C022417.m
 Misc Info: 16-

Test Mode:

Use Initial Calibration Level 5.
 If Continuing Cal. use Initial Cal. Level 5

COMPOUND	STANDARD	AREA LIMIT		SAMPLE	%DIFF
		LOWER	UPPER		
32 Pentafluorobenzon	317912	158956	635824	261586	-17.72
37 1,4-Difluorobenze	512039	256020	1024078	416113	-18.73
53 d5-Chlorobenzene	494052	247026	988104	406118	-17.80
76 d4-1,4-Dichlorobe	282154	141077	564308	216269	-23.35

COMPOUND	STANDARD	RT LIMIT		SAMPLE	%DIFF
		LOWER	UPPER		
32 Pentafluorobenzon	5.42	4.92	5.92	5.42	-0.09
37 1,4-Difluorobenze	5.80	5.30	6.30	5.80	0.01
53 d5-Chlorobenzene	7.84	7.34	8.34	7.84	0.00
76 d4-1,4-Dichlorobe	9.53	9.03	10.03	9.53	0.00

AREA UPPER LIMIT = +100% of internal standard area.
 AREA LOWER LIMIT = - 50% of internal standard area.
 RT UPPER LIMIT = + 0.50 minutes of internal standard RT.
 RT LOWER LIMIT = - 0.50 minutes of internal standard RT.

ARI Labs, Inc.

RECOVERY REPORT

Client Name: Client SDG: 20150930a
Sample Matrix: NONE Fraction: VOA
Lab Smp Id: BFC0131-BLK1
Level: Operator: PC
Data Type: MS DATA SampleType: SAMPLE
SpikeList File: allspike.spk Quant Type: ISTD
Sublist File: gsurr.sub
Method File: \\target\share\chem1\nt3.i\20170306s.b\8260C022417.m
Misc Info: 16-

SURROGATE COMPOUND	AMOUNT ADDED ug/L	AMOUNT RECOVERED ug/L	% RECOVERED	LIMITS
\$ 27 Dibromofluorometha	5.000	4.791	95.83	
\$ 33 d4-1,2-Dichloroeth	5.000	5.072	101.43	
\$ 43 d8-Toluene	5.000	4.981	99.62	
\$ 62 4-Bromofluorobenze	5.000	5.054	101.07	
\$ 79 d4-1,2-Dichloroben	5.000	5.011	100.21	

REVIEW SUMMARY FOR FILE - V303061708G.D

Lab ID: BFC0131-BLK1

nt3.i, 20170306s.b\8260C022417.m, 06-MAR-2017 10:47

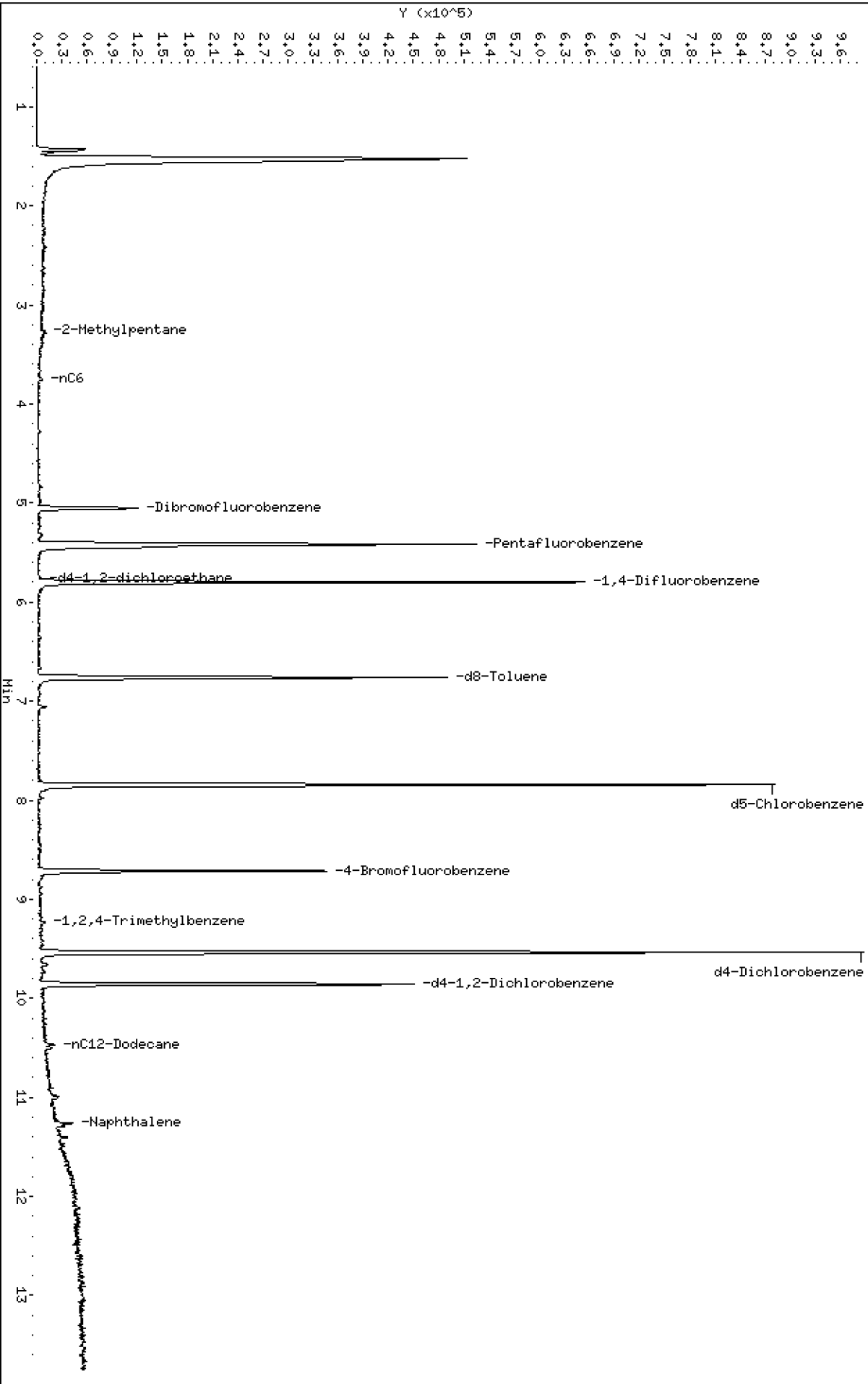
RT CO-ELUTION COMPOUNDS

Data File: \\target\share\chend\nt3,1\20170306g,b\303061708G.D
Date: 06-HR-2017 10:47
Client ID:
Sample Info: BFC0131-BLK1

Column phase: RTXWMS

Instrument: nt3,1
Operator: PC
Column diameter: 0.18

\\target\share\chend\nt3,1\20170306g,b\303061708G.D



Analytical Resources Inc.
GC/MS Gas Quantitation Report

Data file: 20170306g.b/V303061708G.D
Method: \20170306g.b\NWTPHG.m
Instrument: nt3.i
Gas Ical Date: 14-Feb-2017
Injection Date: 06-MAR-2017 10:47

ARI ID: BFC0131-BLK1
Client ID:
Matrix: NONE
Dilution Factor: 1.000
Operator: PC

=====

GASOLINE HYDROCARBONS

Range	RF	Total Area*	Amount (ug/mL)
-----	----	-----	-----
WAGas Tol-C12 (6.70 to 10.57)	52141375	190908	0.004
8015C 2MP-TMB (3.17 to 9.34)	87713511	201835	0.002
AK101 nC6-nC10 (3.65 to 8.68)	61260787	112294	0.002
NWTPHG Tol-Nap (6.70 to 11.36)	54123058	277759	0.005

M Indicates manual integration within range

* Surrogate areas are subtracted from Total Area

NW Gas Range Subtracted Peaks

6.760	719796	d8-Toluene
8.716	522670	4-Bromofluorobenzene
9.535	1403112	d4-Dichlorobenzene
7.845	1310117	d5-Chlorobenzene
9.859	667716	d4-1,2-Dichlorobenzene



Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

Volatile Organic Compounds - Quality Control

Batch BFC0131 - EPA 5035 (Methanol Extraction)

Instrument: NT3

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
LCS (BFC0131-BS1)				Prepared: 06-Mar-2017 Analyzed: 06-Mar-2017 09:30						
Gasoline Range Organics (Tol-Nap)	48500	5000	ug/kg	50000		96.9	70-121			
Surrogate: Toluene-d8	5.06		ug/kg	5.00		101	80-120			
Surrogate: 4-Bromofluorobenzene	5.03		ug/kg	5.00		101	78-123			

Data File: \\target\share\chemd\nt3,1\20170306s.b\303061705GLCS.D

Date : 06-HRR-2017 09:30

Client ID:

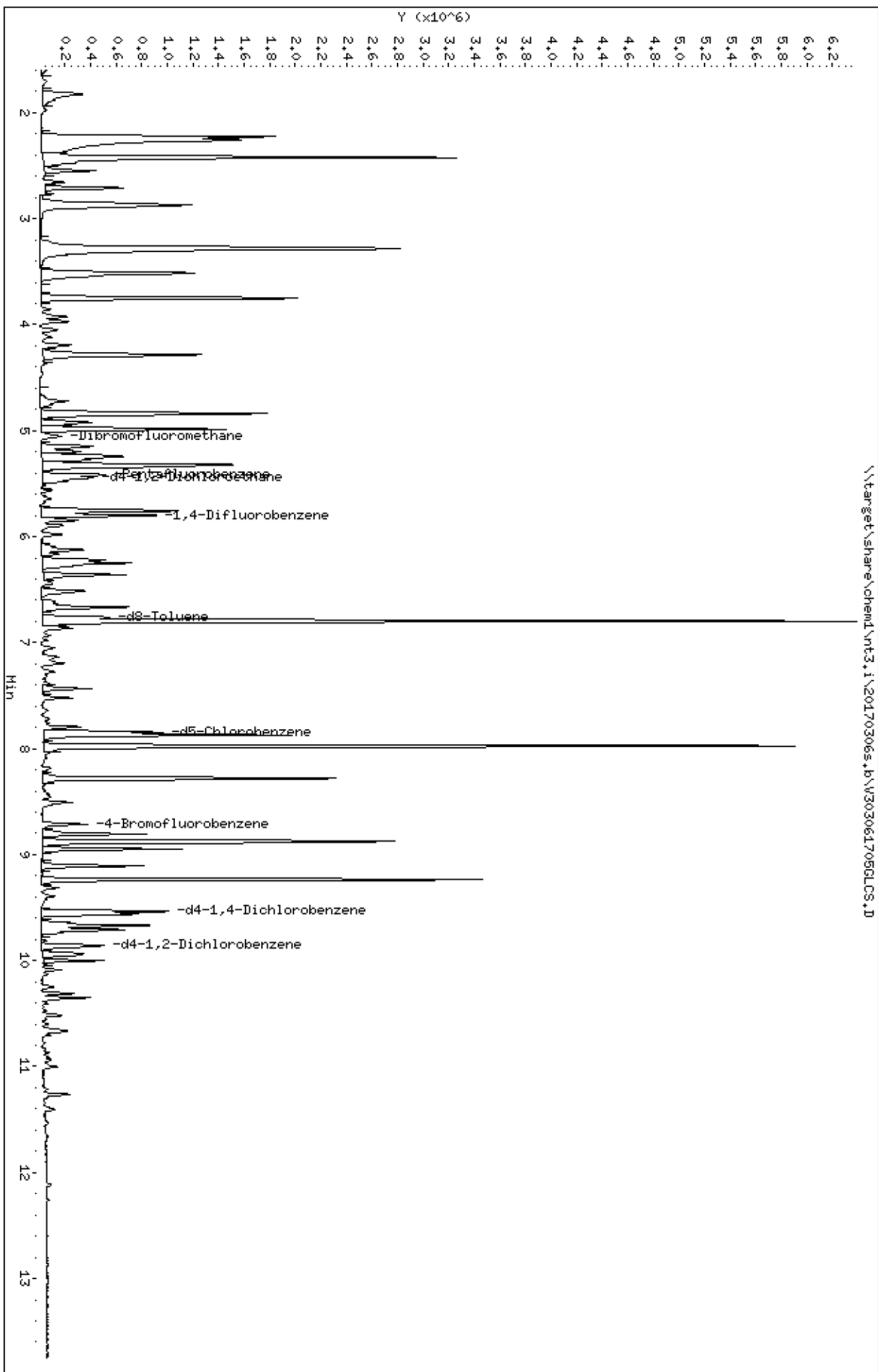
Sample Info: BFC0131-BS1

Column phase: RTXWMS

Instrument: nt3,1

Operator: PC

Column diameter: 0.18



ARI Labs, Inc.

8260C 10 ml purge

Data file : \\target\share\chem1\nt3.i\20170306s.b\V303061705GLCS.D
 Lab Smp Id: BFC0131-BS1
 Inj Date : 06-MAR-2017 09:30
 Operator : PC
 Smp Info : BFC0131-BS1
 Misc Info : 15-
 Comment :
 Method : \\target\share\chem1\nt3.i\20170306s.b\8260C022417.m
 Meth Date : 06-Mar-2017 07:32 Paul
 Cal Date : 14-FEB-2017 18:50
 Als bottle: 12
 Dil Factor: 1.00000
 Integrator: HP RTE
 Target Version: 4.14
 Processing Host: ORGDATA11

Inst ID: nt3.i

Quant Type: ISTD

Cal File: V302141718.D

Compound Sublist: gsurr.sub

Concentration Formula: Amt * DF * Pv / Sa * CpndVariable

Name	Value	Description
DF	1.000	Dilution Factor
Pv	10.000	Purge Volume (mL)
Sa	10.000	Sample Amount (mL)
Cpnd Variable		Local Compound Variable

Compounds	QUANT	SIG	RT	EXP RT	REL RT	RESPONSE	CONCENTRATIONS	
							ON-COLUMN (ug/L)	FINAL (ug/L)
\$ 27 Dibromofluoromethane	111		5.053	5.053	(0.932)	60293	4.83249	4.832
* 32 Pentafluorobenzene	168		5.420	5.420	(1.000)	265571	10.0000	
\$ 33 d4-1,2-Dichloroethane	65		5.446	5.446	(1.005)	76214	5.39914	5.399
* 37 1,4-Difluorobenzene	114		5.803	5.803	(1.000)	430697	10.0000	
\$ 43 d8-Toluene	98		6.759	6.765	(1.165)	264617	5.06100	5.061
* 53 d5-Chlorobenzene	117		7.844	7.844	(1.000)	424043	10.0000	
\$ 62 4-Bromofluorobenzene	174		8.715	8.715	(1.111)	89849	5.03316	5.033
* 76 d4-1,4-Dichlorobenzene	152		9.534	9.534	(1.000)	223371	10.0000	
\$ 79 d4-1,2-Dichlorobenzene	152		9.858	9.858	(1.034)	104868	5.00189	5.002

ARI Labs, Inc.

INTERNAL STANDARD COMPOUNDS
AREA AND RT SUMMARY

Instrument ID: nt3.i
Lab File ID: V303061705GLCS.D
Lab Smp Id: BFC0131-BS1
Analysis Type: VOA
Quant Type: ISTD
Operator: PC
Method File: \\target\share\chem1\nt3.i\20170306s.b\8260C022417.m
Misc Info: 15-

Calibration Date: 03-MAR-2017
Calibration Time: 21:57
Level: LOW
Sample Type: WATER

Test Mode:

Use Initial Calibration Level 5.
If Continuing Cal. use Initial Cal. Level 5

COMPOUND	STANDARD	AREA LIMIT		SAMPLE	%DIFF
		LOWER	UPPER		
32 Pentafluorobenzon	317912	158956	635824	265571	-16.46
37 1,4-Difluorobenze	512039	256020	1024078	430697	-15.89
53 d5-Chlorobenzene	494052	247026	988104	424043	-14.17
76 d4-1,4-Dichlorobe	282154	141077	564308	223371	-20.83

COMPOUND	STANDARD	RT LIMIT		SAMPLE	%DIFF
		LOWER	UPPER		
32 Pentafluorobenzon	5.42	4.92	5.92	5.42	0.00
37 1,4-Difluorobenze	5.80	5.30	6.30	5.80	0.00
53 d5-Chlorobenzene	7.84	7.34	8.34	7.84	0.00
76 d4-1,4-Dichlorobe	9.53	9.03	10.03	9.53	0.00

AREA UPPER LIMIT = +100% of internal standard area.
AREA LOWER LIMIT = - 50% of internal standard area.
RT UPPER LIMIT = + 0.50 minutes of internal standard RT.
RT LOWER LIMIT = - 0.50 minutes of internal standard RT.

ARI Labs, Inc.

RECOVERY REPORT

Client Name: Client SDG: 20151005
Sample Matrix: LIQUID Fraction: VOA
Lab Smp Id: BFC0131-BS1
Level: LOW Operator: PC
Data Type: MS DATA SampleType: SAMPLE
SpikeList File: allspike.spk Quant Type: ISTD
Sublist File: gsurr.sub
Method File: \\target\share\chem1\nt3.i\20170306s.b\8260C022417.m
Misc Info: 15-

SURROGATE COMPOUND	AMOUNT ADDED ug/L	AMOUNT RECOVERED ug/L	% RECOVERED	LIMITS
\$ 27 Dibromofluorometha	5.000	4.832	96.65	80-120
\$ 33 d4-1,2-Dichloroeth	5.000	5.399	107.98	80-128
\$ 43 d8-Toluene	5.000	5.061	101.22	80-120
\$ 62 4-Bromofluorobenze	5.000	5.033	100.66	80-120
\$ 79 d4-1,2-Dichloroben	5.000	5.002	100.04	80-120

REVIEW SUMMARY FOR FILE - V303061705GLCS.D

Lab ID: BFC0131-BS1

nt3.i, 20170306s.b\8260C022417.m,

06-MAR-2017 09:30

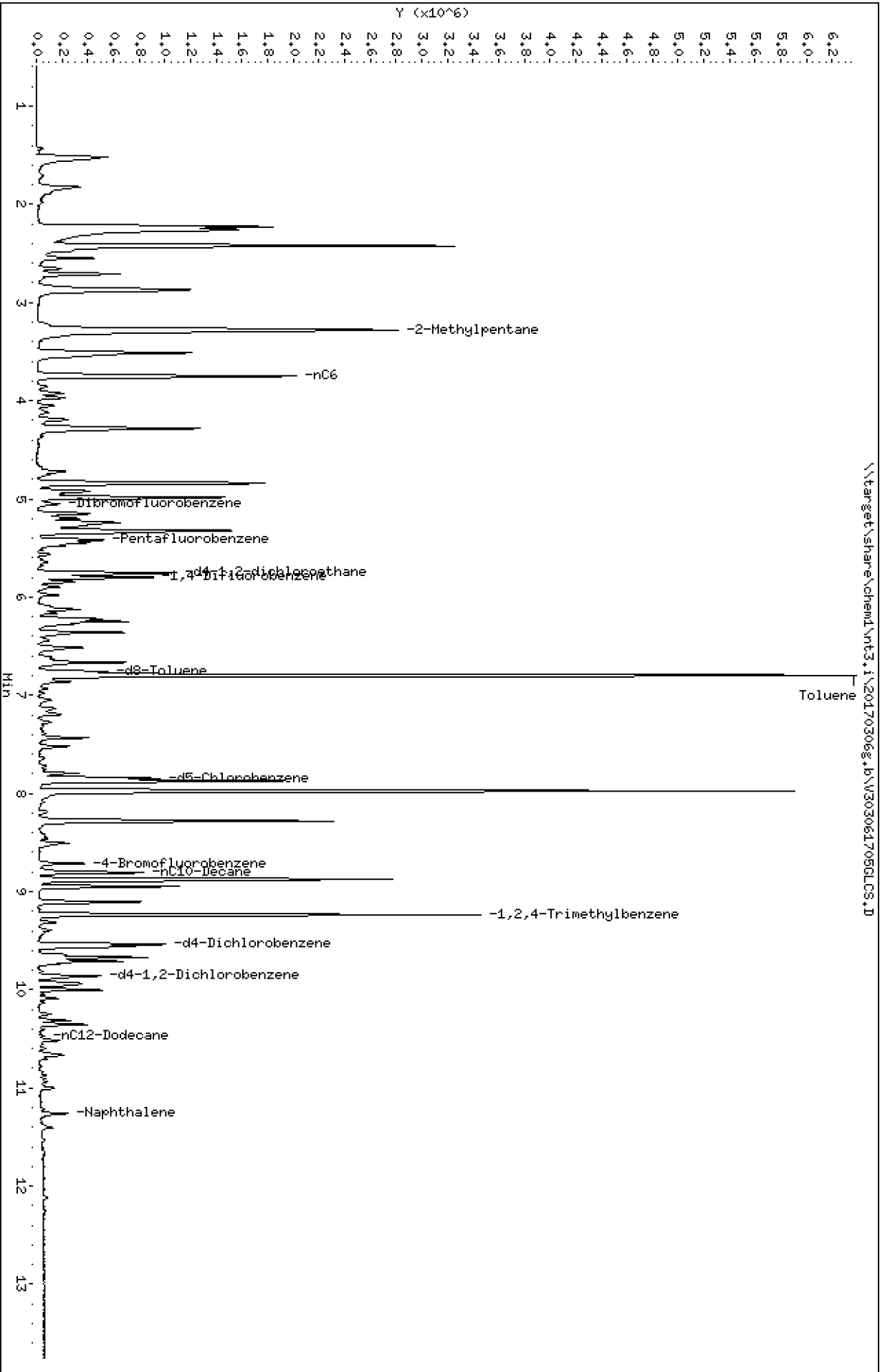
RT

CO-ELUTION COMPOUNDS

Data File: \\target\share\chemd\nt3,1\20170306g.b\303061705GLCS.D
Date : 06-HRR-2017 09:30
Client ID:
Sample Info: BFC0131-BS1

Column phase: RTXWMS

Instrument: nt3,1
Operator: PC
Column diameter: 0.18



Analytical Resources Inc.
GC/MS Gas Quantitation Report

Data file: 20170306g.b/V303061705GLCS.D
Method: \20170306g.b\NWTPHG.m
Instrument: nt3.i
Gas Ical Date: 14-Feb-2017
Injection Date: 06-MAR-2017 09:30

ARI ID: BFC0131-BS1
Client ID:
Matrix: WATER
Dilution Factor: 1.000
Operator: PC

=====

GASOLINE HYDROCARBONS

Range	RF	Total Area*	Amount (ug/mL)
-----	----	-----	-----
WAGas Tol-C12 (6.70 to 10.57)	52141375	50772094	0.974
8015C 2MP-TMB (3.17 to 9.34)	87713511	86645944	0.988
AK101 nC6-nC10 (3.65 to 8.68)	61260787	62274298	1.017
NWTPHG Tol-Nap (6.70 to 11.36)	54123058	52448395	0.969

M Indicates manual integration within range

* Surrogate areas are subtracted from Total Area

NW Gas Range Subtracted Peaks

6.760	815666	d8-Toluene
8.716	585475	4-Bromofluorobenzene
9.535	1444106	d4-Dichlorobenzene
7.844	1355749	d5-Chlorobenzene
9.859	902626	d4-1,2-Dichlorobenzene



Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

Volatile Organic Compounds - Quality Control

Batch BFC0131 - EPA 5035 (Methanol Extraction)

Instrument: NT3

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
LCS Dup (BFC0131-BSD1)				Prepared: 06-Mar-2017 Analyzed: 06-Mar-2017 09:55						
Gasoline Range Organics (Tol-Nap)	47100	5000	ug/kg	50000		94.1	70-121	2.93	30	
Surrogate: Toluene-d8	5.04		ug/kg	5.00		101	80-120			
Surrogate: 4-Bromofluorobenzene	4.85		ug/kg	5.00		97.0	78-123			

Data File: \\target\share\chend\nt3.1\20170306s.1b\303061706G.D

Date : 06-MAR-2017 09:55

Client ID:

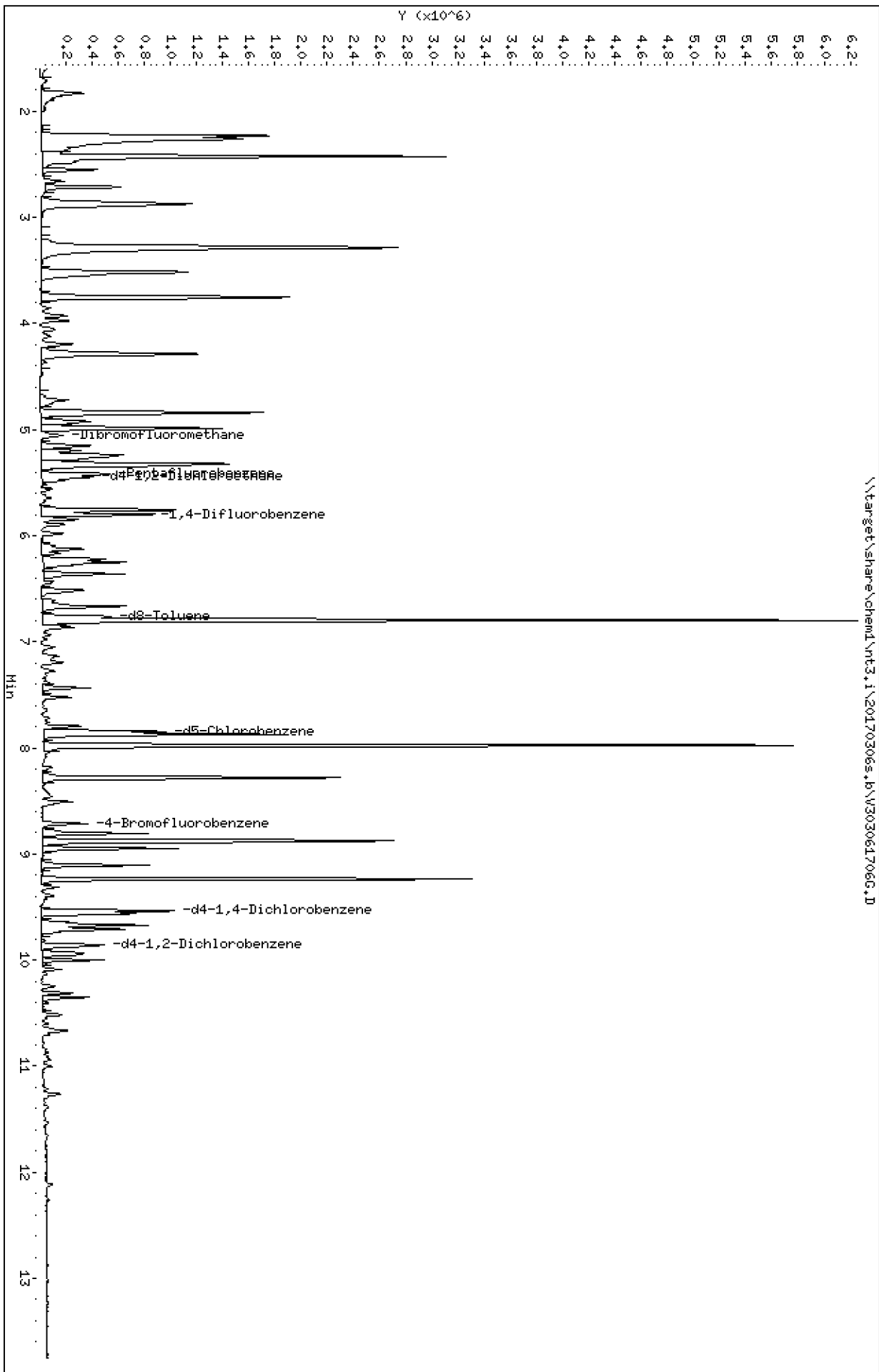
Sample Info: BFC0131-BSM1

Column phase: RTXWMS

Instrument: nt3.1

Operator: PC

Column diameter: 0.18



ARI Labs, Inc.

8260C 10 ml purge

Data file : \\target\share\chem1\nt3.i\20170306s.b\V303061706G.D
Lab Smp Id: BFC0131-BSD1
Inj Date : 06-MAR-2017 09:55
Operator : PC Inst ID: nt3.i
Smp Info : BFC0131-BSD1
Misc Info : 16-
Comment :
Method : \\target\share\chem1\nt3.i\20170306s.b\8260C022417.m
Meth Date : 06-Mar-2017 07:32 Paul Quant Type: ISTD
Cal Date : 14-FEB-2017 18:50 Cal File: V302141718.D
Als bottle: 12
Dil Factor: 1.00000
Integrator: HP RTE Compound Sublist: gsurr.sub
Target Version: 4.14
Processing Host: ORGDAT11

Compounds	QUANT	SIG	CONCENTRATIONS					
			ON-COLUMN	FINAL				
	MASS		RT	EXP RT	REL RT	RESPONSE	(ug/L)	(ug/L)
=====	=====		=====	=====	=====	=====	=====	=====
\$ 27 Dibromofluoromethane	111		5.053	5.053	(0.932)	60589	4.80591	4.806(R)
* 32 Pentafluorobenzene	168		5.420	5.420	(1.000)	268351	10.0000	
\$ 33 d4-1,2-Dichloroethane	65		5.447	5.446	(1.005)	75334	5.28151	5.282(R)
* 37 1,4-Difluorobenzene	114		5.803	5.803	(1.000)	425459	10.0000	
\$ 43 d8-Toluene	98		6.765	6.765	(1.166)	260464	5.04290	5.043(R)
* 53 d5-Chlorobenzene	117		7.844	7.844	(1.000)	418258	10.0000	
\$ 62 4-Bromofluorobenzene	174		8.716	8.715	(1.111)	85399	4.85005	4.850(R)
* 76 d4-1,4-Dichlorobenzene	152		9.534	9.534	(1.000)	224108	10.0000	
\$ 79 d4-1,2-Dichlorobenzene	152		9.859	9.858	(1.034)	103662	4.92811	4.928(R)

QC Flag Legend

R - Spike/Surrogate failed recovery limits.

ARI Labs, Inc.

INTERNAL STANDARD COMPOUNDS
 AREA AND RT SUMMARY

Instrument ID: nt3.i Calibration Date: 03-MAR-2017
 Lab File ID: V303061706G.D Calibration Time: 21:57
 Lab Smp Id: BFC0131-BSD1
 Analysis Type: VOA Level:
 Quant Type: ISTD Sample Type:
 Operator: PC
 Method File: \\target\share\chem1\nt3.i\20170306s.b\8260C022417.m
 Misc Info: 16-

Test Mode:

Use Initial Calibration Level 5.
 If Continuing Cal. use Initial Cal. Level 5

COMPOUND	STANDARD	AREA LIMIT		SAMPLE	%DIFF
		LOWER	UPPER		
32 Pentafluorobenzon	317912	158956	635824	268351	-15.59
37 1,4-Difluorobenze	512039	256020	1024078	425459	-16.91
53 d5-Chlorobenzene	494052	247026	988104	418258	-15.34
76 d4-1,4-Dichlorobe	282154	141077	564308	224108	-20.57

COMPOUND	STANDARD	RT LIMIT		SAMPLE	%DIFF
		LOWER	UPPER		
32 Pentafluorobenzon	5.42	4.92	5.92	5.42	0.00
37 1,4-Difluorobenze	5.80	5.30	6.30	5.80	0.00
53 d5-Chlorobenzene	7.84	7.34	8.34	7.84	0.00
76 d4-1,4-Dichlorobe	9.53	9.03	10.03	9.53	0.00

AREA UPPER LIMIT = +100% of internal standard area.
 AREA LOWER LIMIT = - 50% of internal standard area.
 RT UPPER LIMIT = + 0.50 minutes of internal standard RT.
 RT LOWER LIMIT = - 0.50 minutes of internal standard RT.

ARI Labs, Inc.

RECOVERY REPORT

Client Name: Client SDG: 20150930a
Sample Matrix: NONE Fraction: VOA
Lab Smp Id: BFC0131-BSD1
Level: Operator: PC
Data Type: MS DATA SampleType: SAMPLE
SpikeList File: allspike.spk Quant Type: ISTD
Sublist File: gsurr.sub
Method File: \\target\share\chem1\nt3.i\20170306s.b\8260C022417.m
Misc Info: 16-

SURROGATE COMPOUND	AMOUNT ADDED ug/L	AMOUNT RECOVERED ug/L	% RECOVERED	LIMITS
\$ 27 Dibromofluorometha	5.000	4.806	96.12	
\$ 33 d4-1,2-Dichloroeth	5.000	5.282	105.63	
\$ 43 d8-Toluene	5.000	5.043	100.86	
\$ 62 4-Bromofluorobenze	5.000	4.850	97.00	
\$ 79 d4-1,2-Dichloroben	5.000	4.928	98.56	

REVIEW SUMMARY FOR FILE - V303061706G.D

Lab ID: BFC0131-BSD1

nt3.i, 20170306s.b\8260C022417.m, 06-MAR-2017 09:55

RT CO-ELUTION COMPOUNDS

Data File: \\target\share\chend\nt3,1\20170306g.jb\303061706G.D

Date : 06-MAR-2017 09:55

Client ID:

Sample Info: BFC0131-BSM1

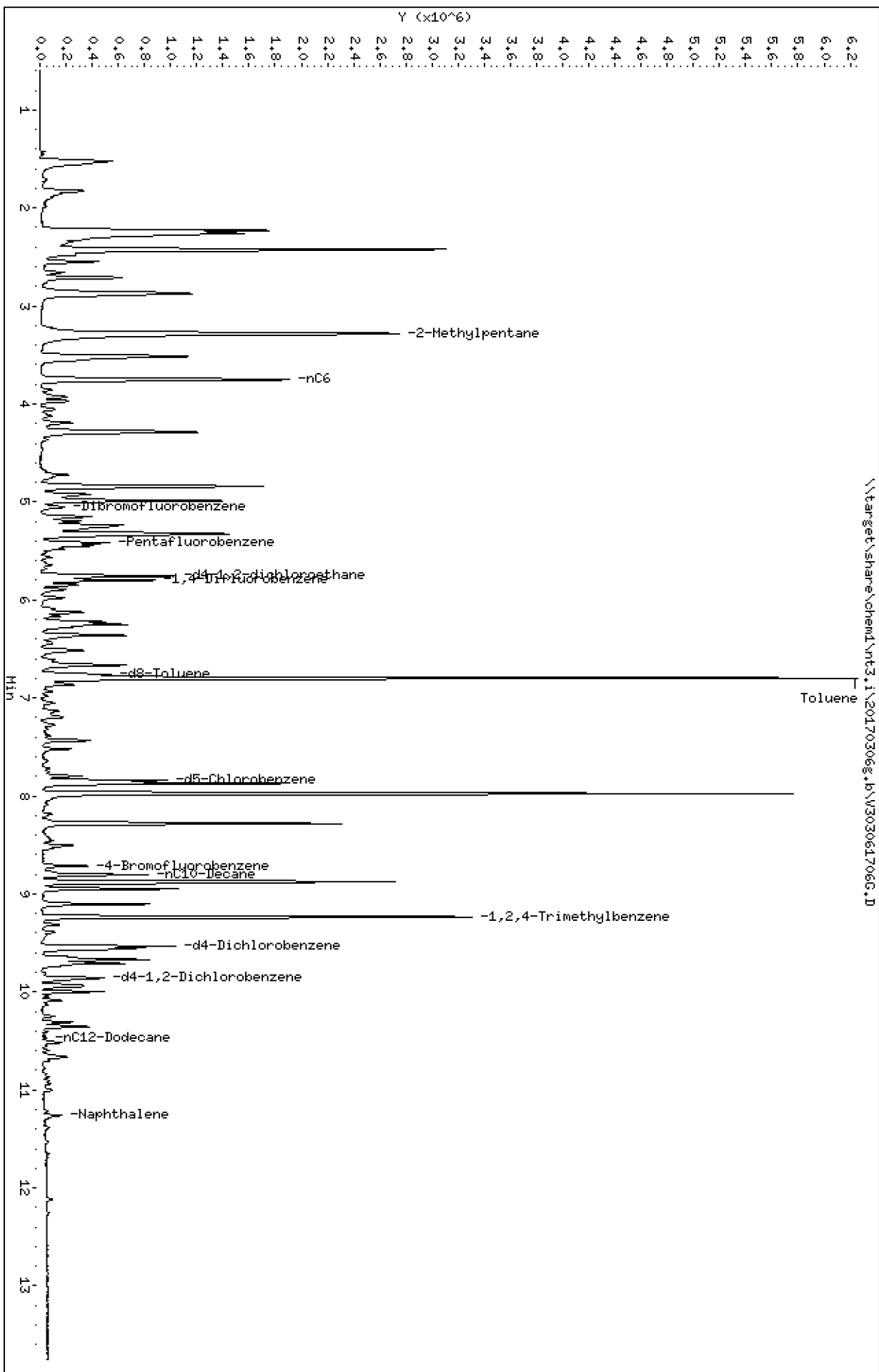
Column phase: RTXWMS

Instrument: nt3,1

Operator: PC

Column diameter: 0.18

Page 1



Analytical Resources Inc.
GC/MS Gas Quantitation Report

Data file: 20170306g.b/V303061706G.D
Method: \20170306g.b\NWTPHG.m
Instrument: nt3.i
Gas Ical Date: 14-Feb-2017
Injection Date: 06-MAR-2017 09:55

ARI ID: BFC0131-BSD1
Client ID:
Matrix: WATER
Dilution Factor: 1.000
Operator: PC

=====

GASOLINE HYDROCARBONS

Range	RF	Total Area*	Amount (ug/mL)
WAGas Tol-C12 (6.70 to 10.57)	52141375	49552081	0.950
8015C 2MP-TMB (3.17 to 9.34)	87713511	83495291	0.952
AK101 nC6-nC10 (3.65 to 8.68)	61260787	59923291	0.978
NWTPHG Tol-Nap (6.70 to 11.36)	54123058	50934599	0.941

M Indicates manual integration within range

* Surrogate areas are subtracted from Total Area

NW Gas Range Subtracted Peaks

6.765	796657	d8-Toluene
8.716	569312	4-Bromofluorobenzene
9.535	1456256	d4-Dichlorobenzene
7.844	1346086	d5-Chlorobenzene
9.859	881156	d4-1,2-Dichlorobenzene



Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

Volatile Organic Compounds - Quality Control

Batch BFC0157 - EPA 5035 (Methanol Extraction)

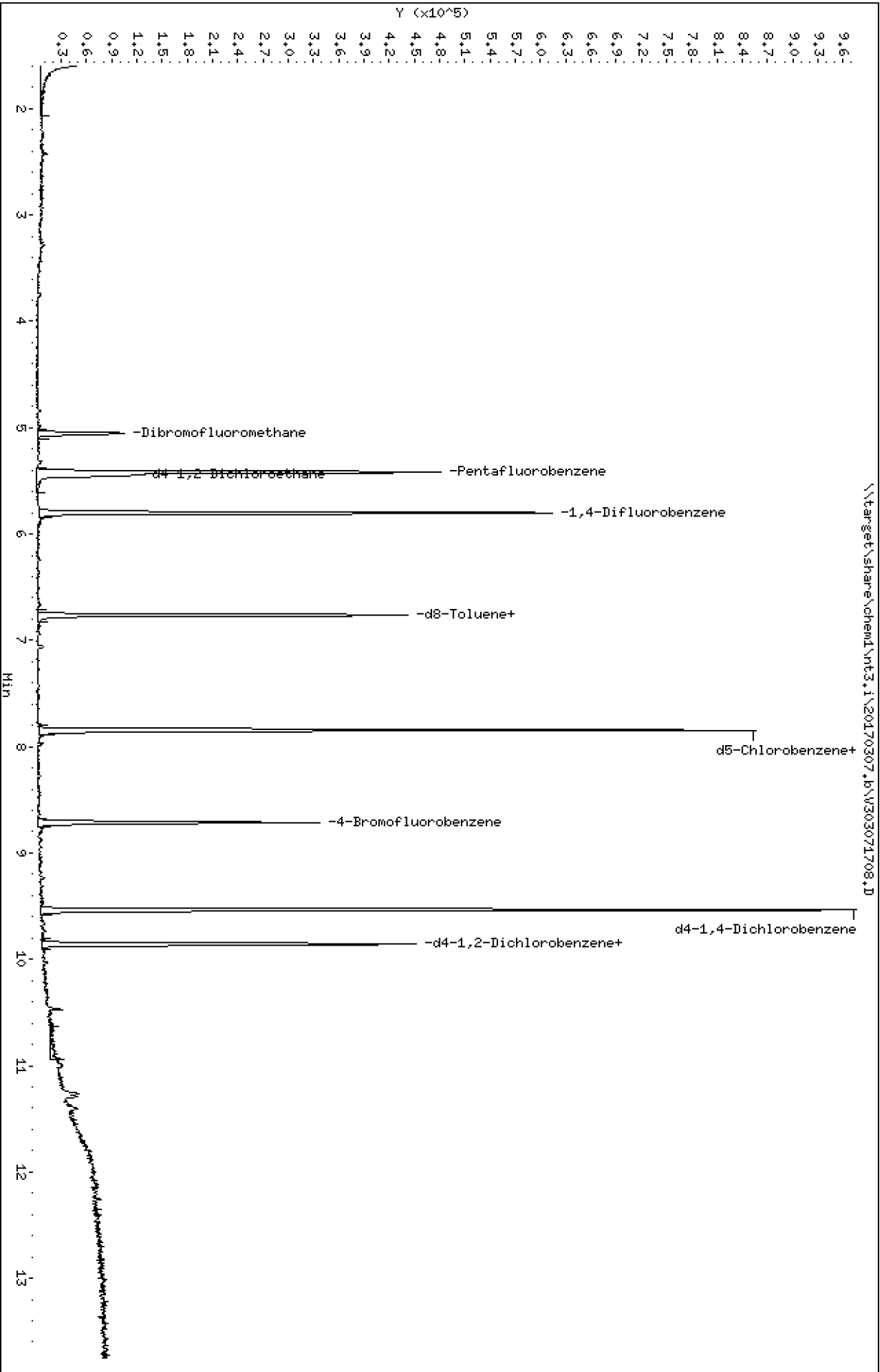
Instrument: NT3

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BFC0157-BLK1)				Prepared: 07-Mar-2017 Analyzed: 07-Mar-2017 12:00						
Gasoline Range Organics (Tol-Nap)	ND	5000	ug/kg							U
Surrogate: Toluene-d8	4.93		ug/kg	5.00		98.6	80-120			
Surrogate: 4-Bromofluorobenzene	4.96		ug/kg	5.00		99.1	78-123			

Data File: \\target\share\chemd\nt3.1\20170307.B\303071708.D
Date: 07-MAR-2017 12:00
Client ID:
Sample Info: BFC-BLK1

Column phase: RTXWMS

Instrument: nt3.1
Operator: PC
Column diameter: 0.18



Date : 07-MAR-2017 12:00

Client ID:

Instrument: nt3.i

Sample Info: BFC-BLK1

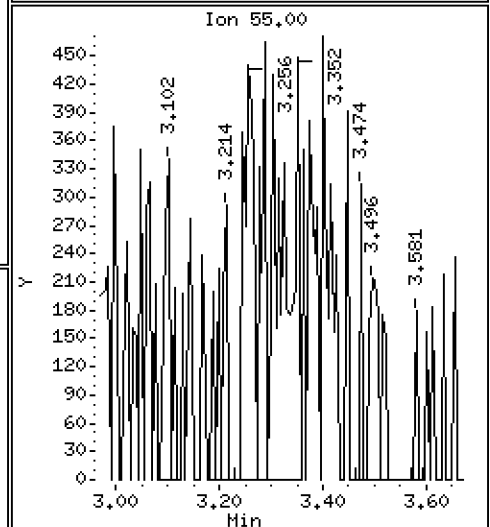
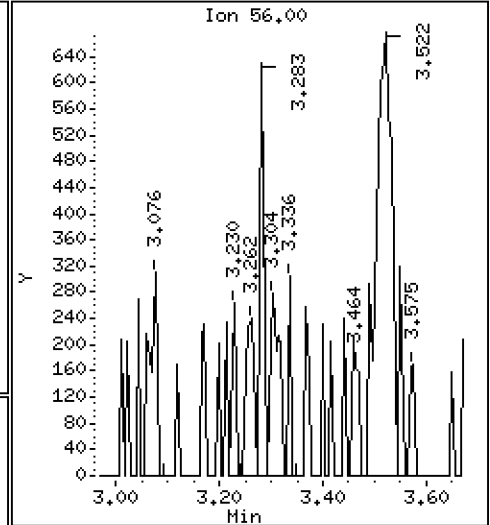
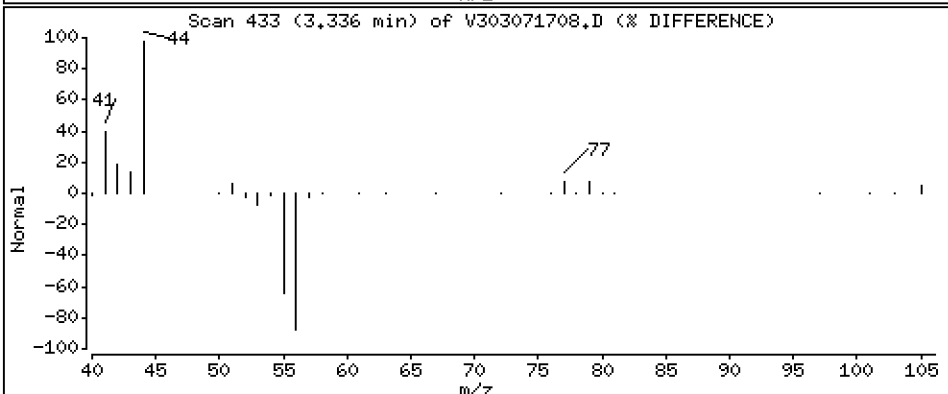
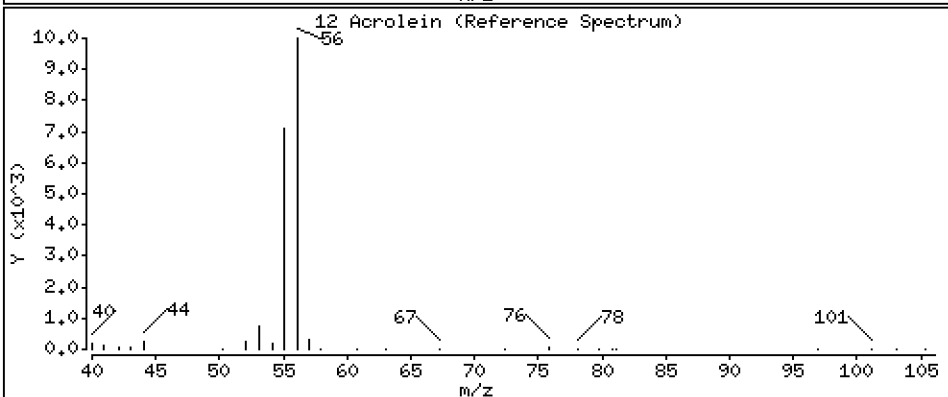
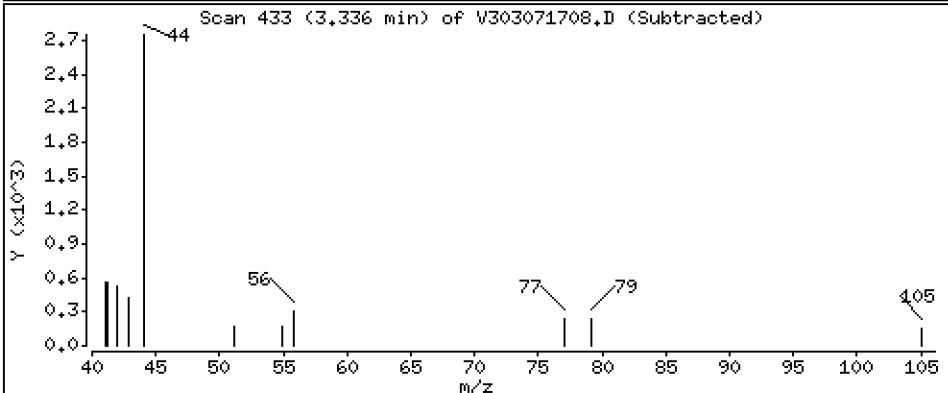
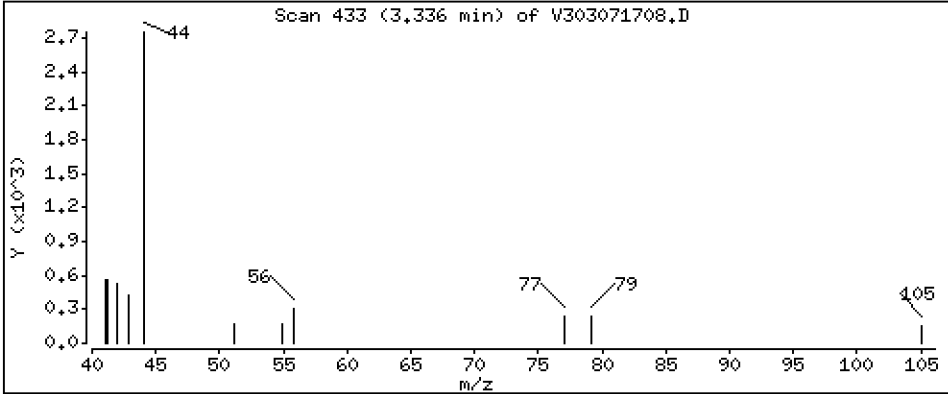
Operator: PC

Column phase: RTXVMS

Column diameter: 0.18

12 Acrolein

Concentration: 0.03415 ug/L



Date : 07-MAR-2017 12:00

Client ID:

Instrument: nt3.i

Sample Info: BFC-BLK1

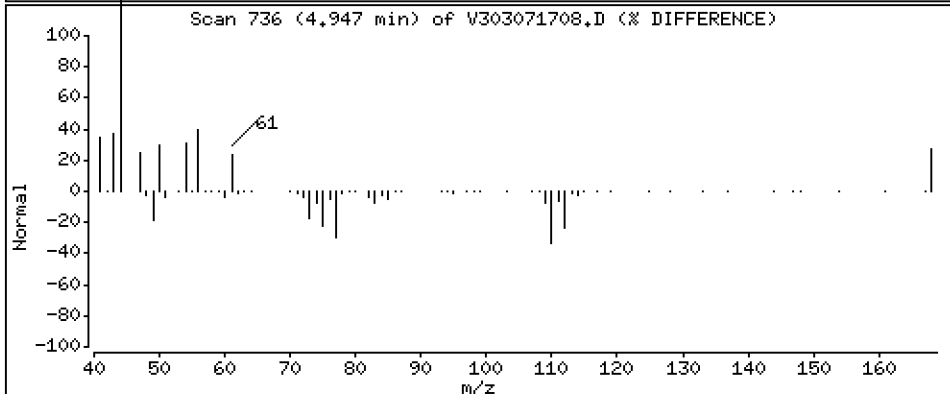
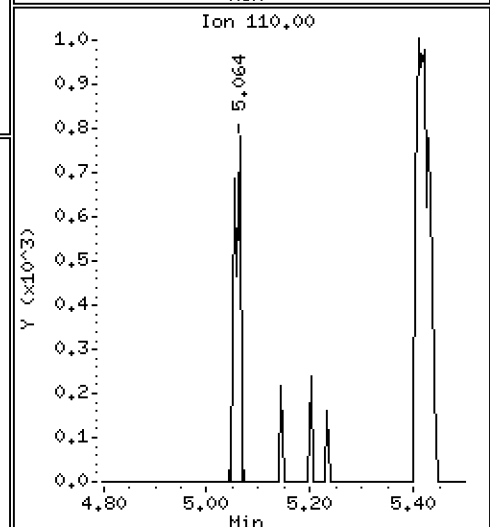
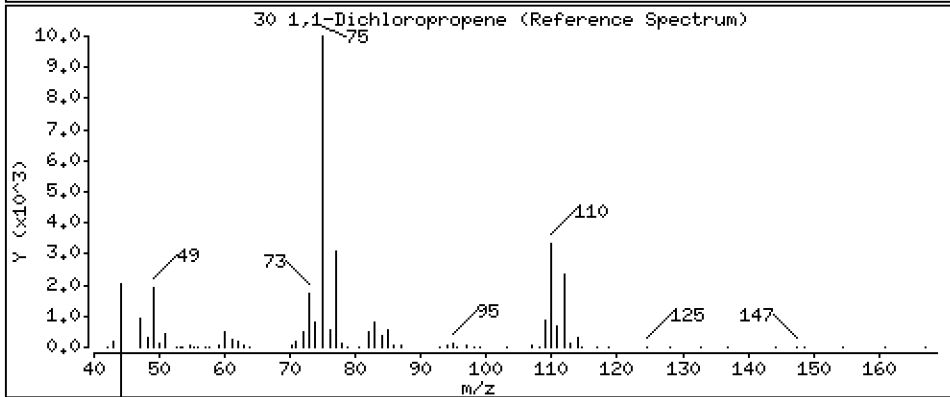
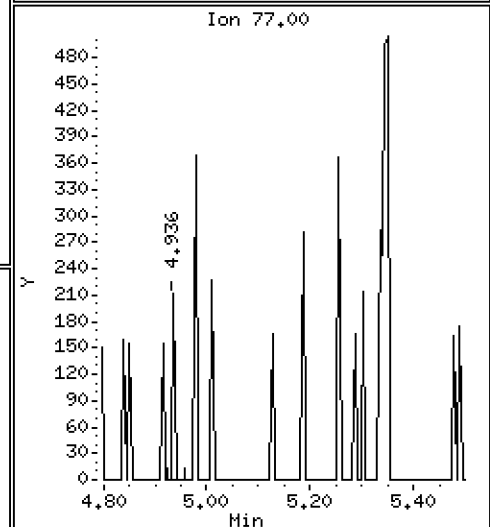
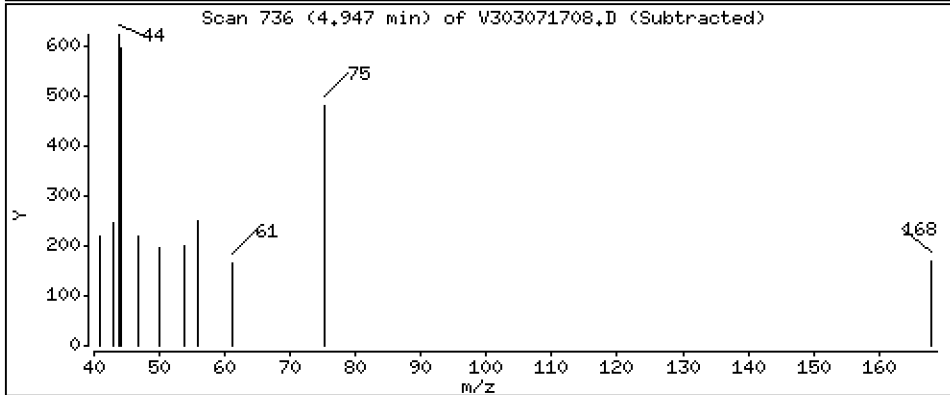
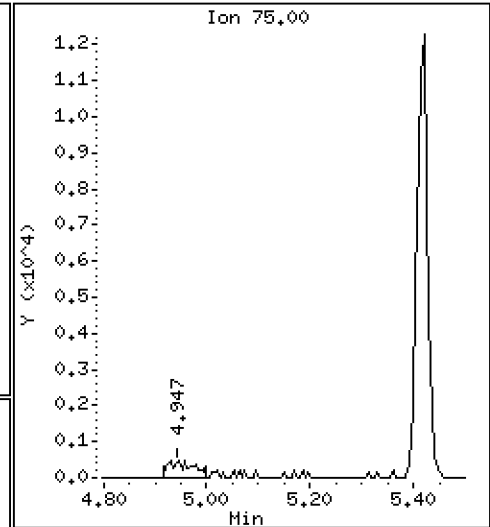
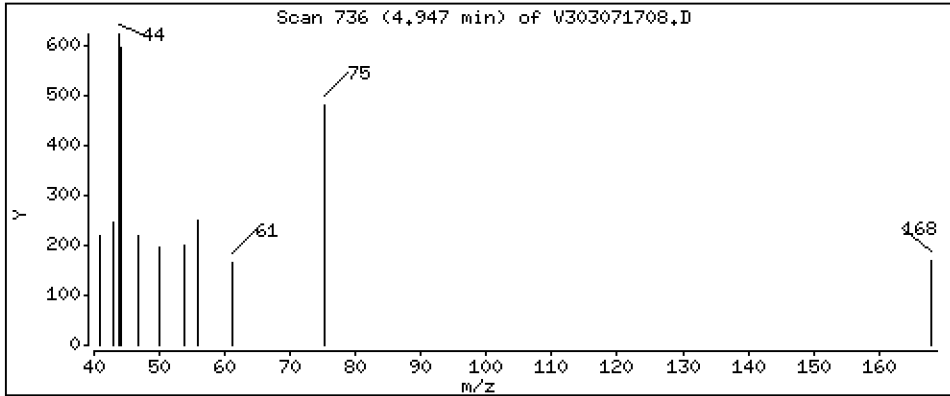
Operator: PC

Column phase: RTXVMS

Column diameter: 0,18

30 1,1-Dichloropropene

Concentration: 0,06783 ug/L



Date : 07-MAR-2017 12:00

Client ID:

Instrument: nt3.i

Sample Info: BFC-BLK1

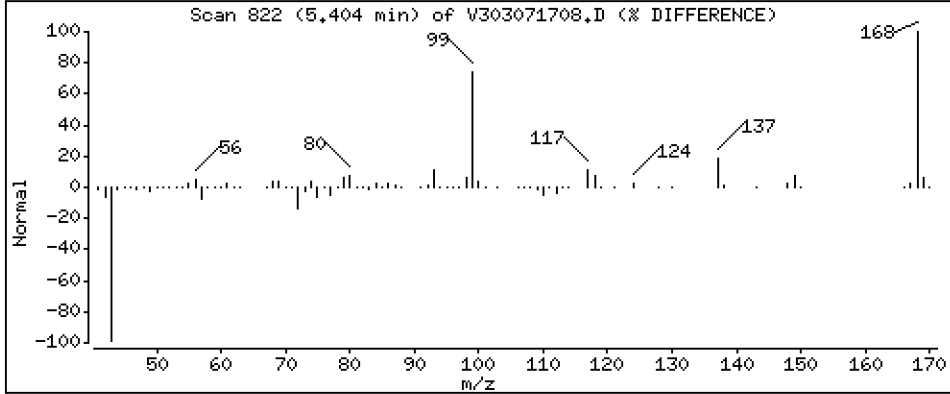
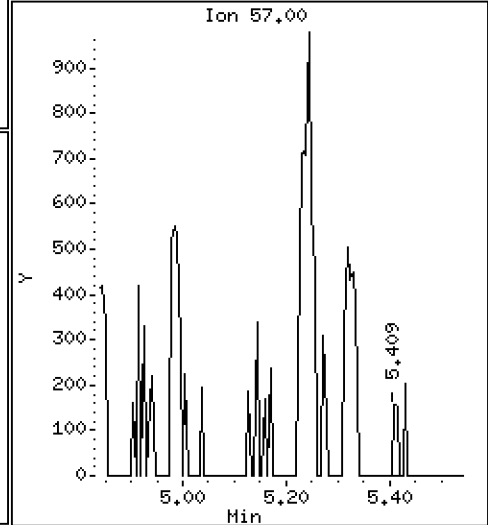
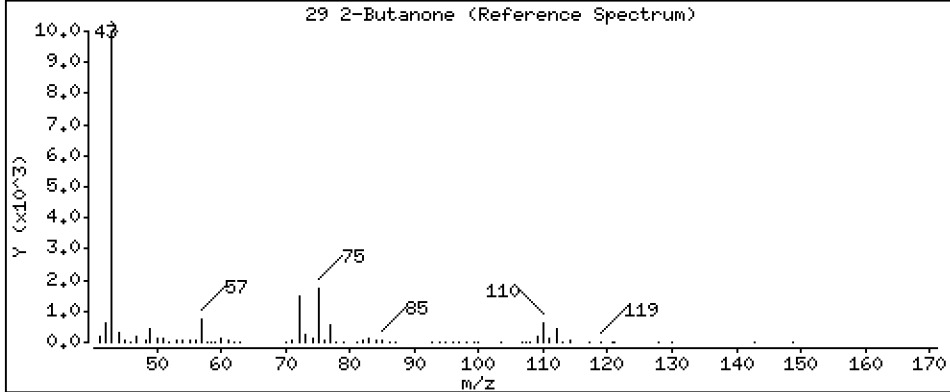
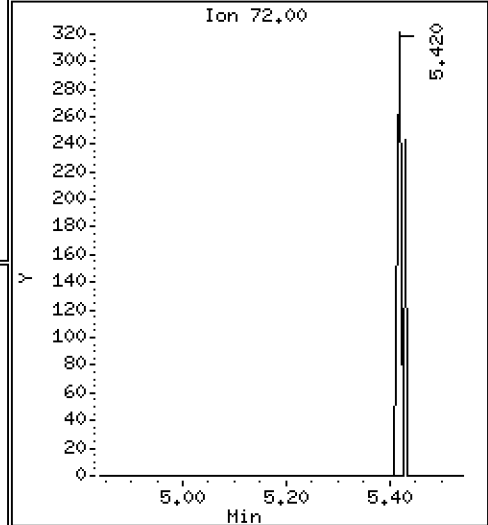
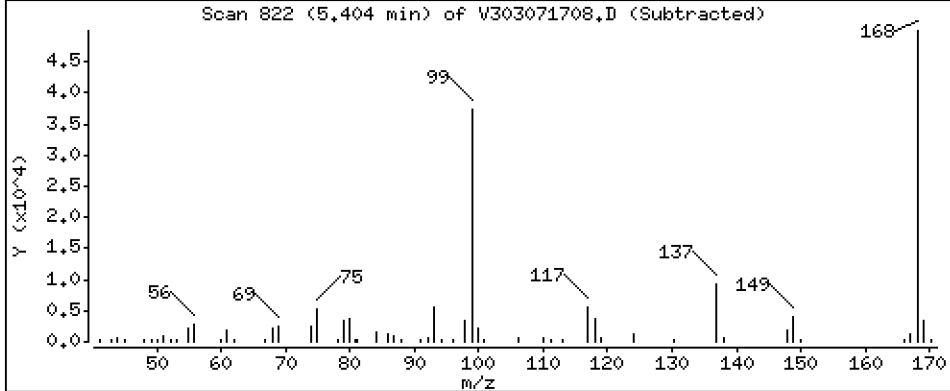
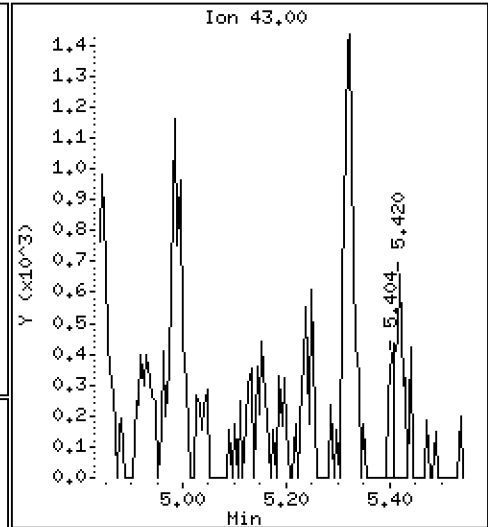
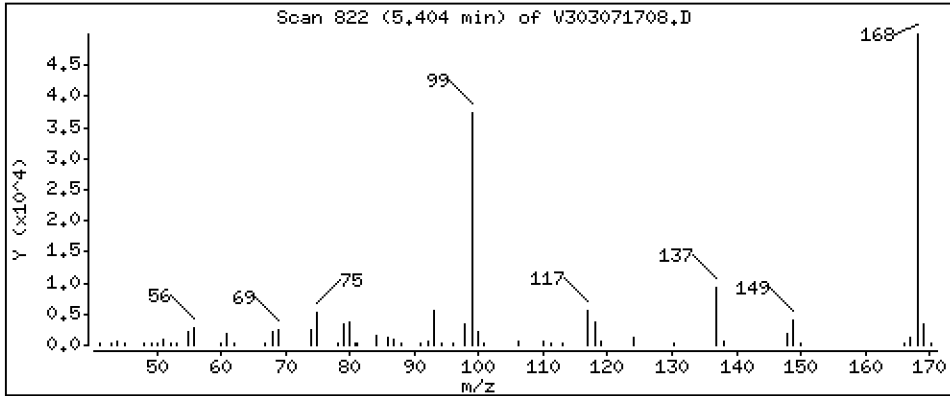
Operator: PC

Column phase: RTXVMS

Column diameter: 0.18

29 2-Butanone

Concentration: 0.04951 ug/L



Date : 07-MAR-2017 12:00

Client ID:

Instrument: nt3.i

Sample Info: BFC-BLK1

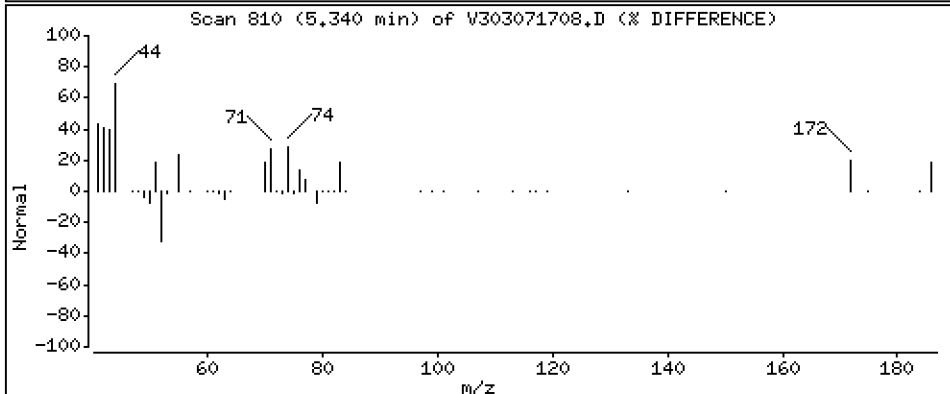
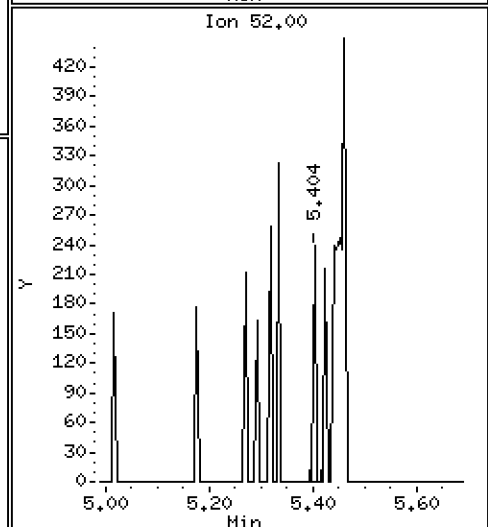
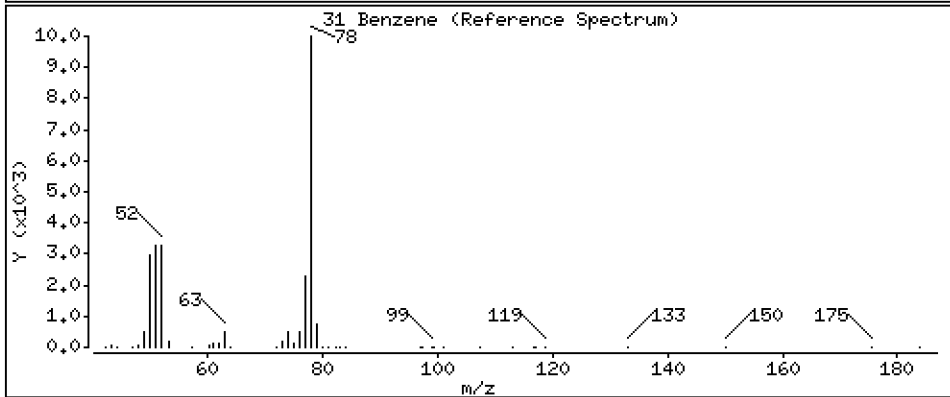
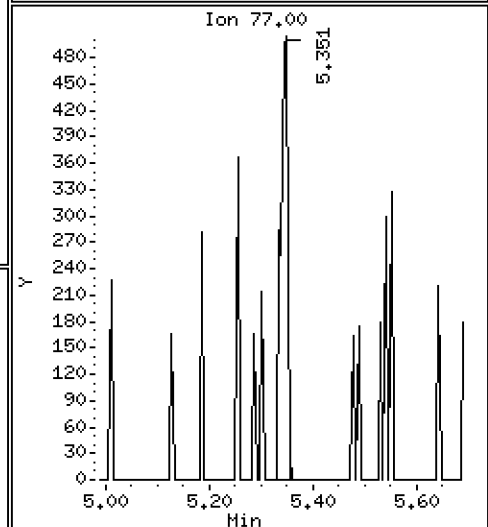
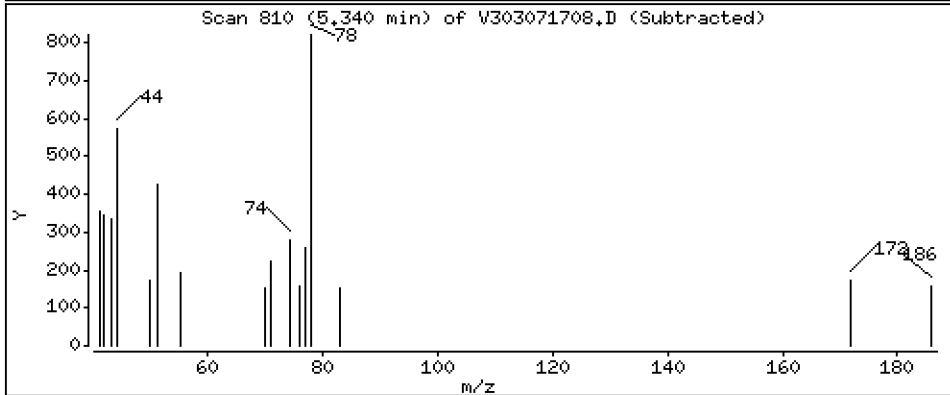
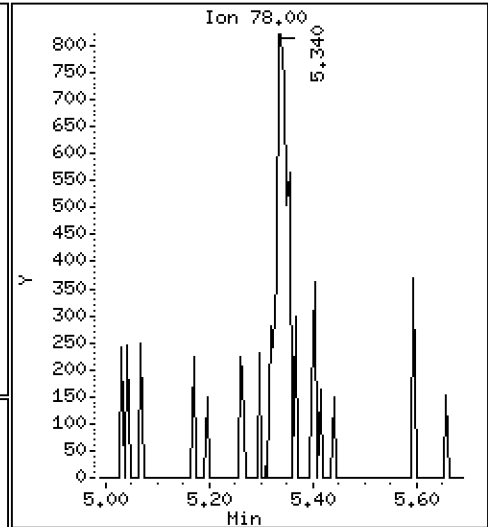
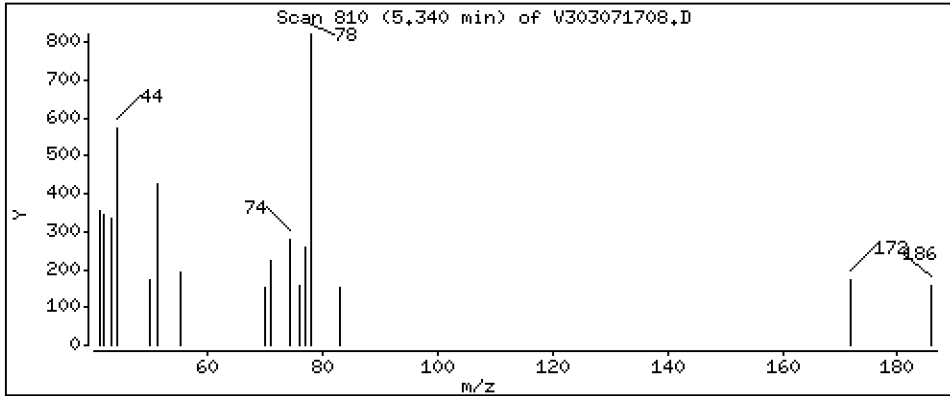
Operator: PC

Column phase: RTXVMS

Column diameter: 0.18

31 Benzene

Concentration: 0.02118 ug/L



Date : 07-MAR-2017 12:00

Client ID:

Instrument: nt3.i

Sample Info: BFC-BLK1

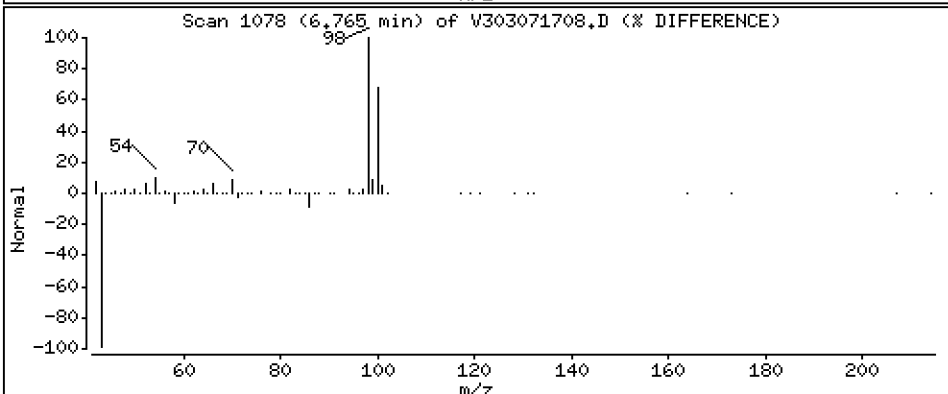
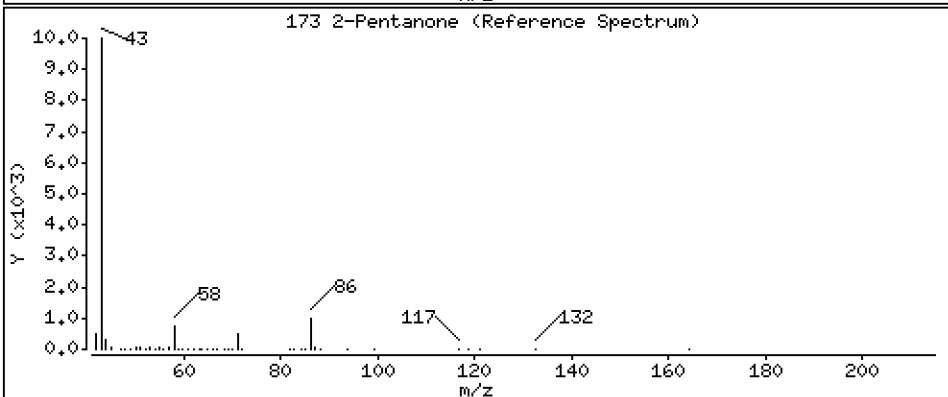
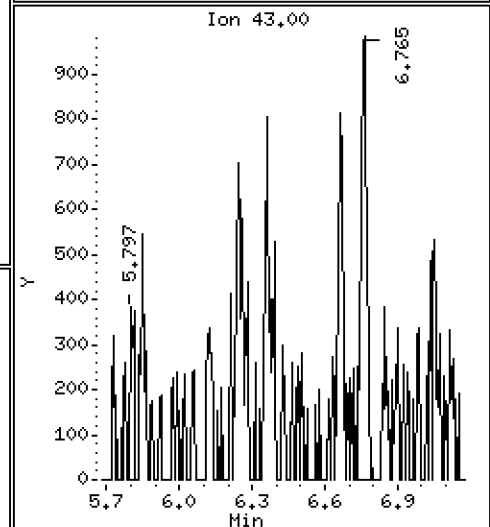
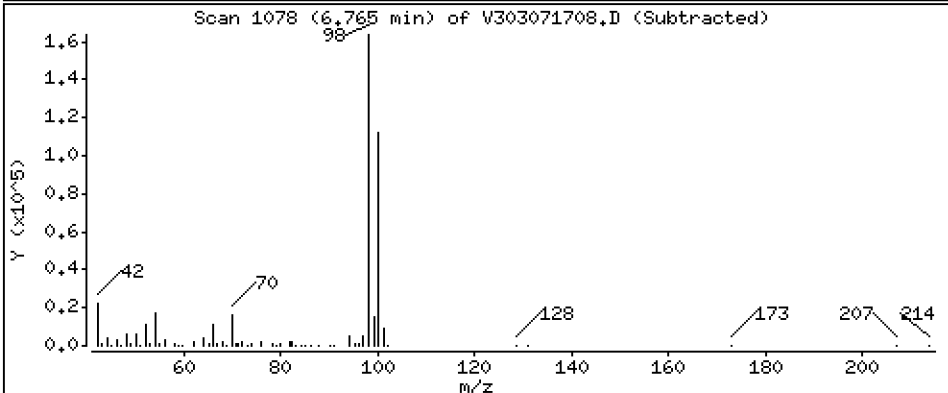
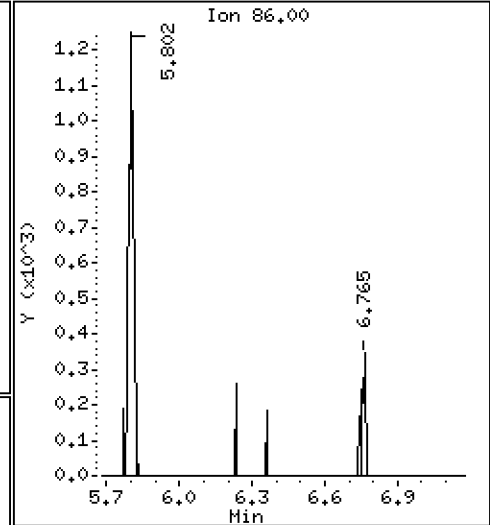
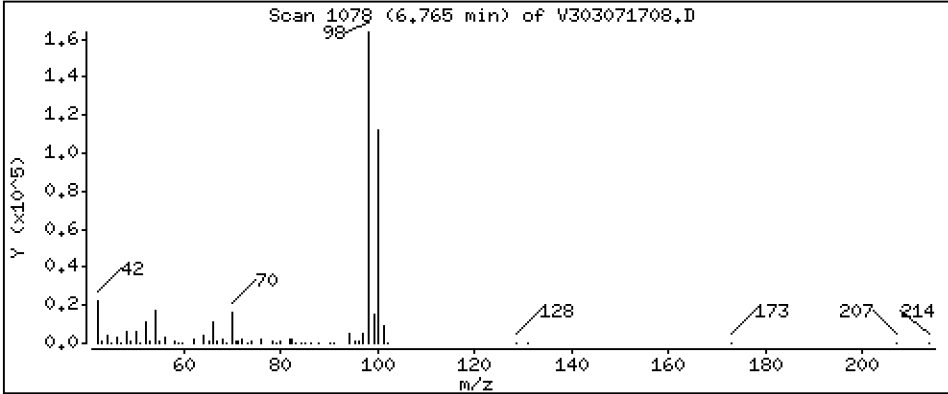
Operator: PC

Column phase: RTXVMS

Column diameter: 0.18

173 2-Pentanone

Concentration: 0.2527 ug/L



Date : 07-MAR-2017 12:00

Client ID:

Instrument: nt3.i

Sample Info: BFC-BLK1

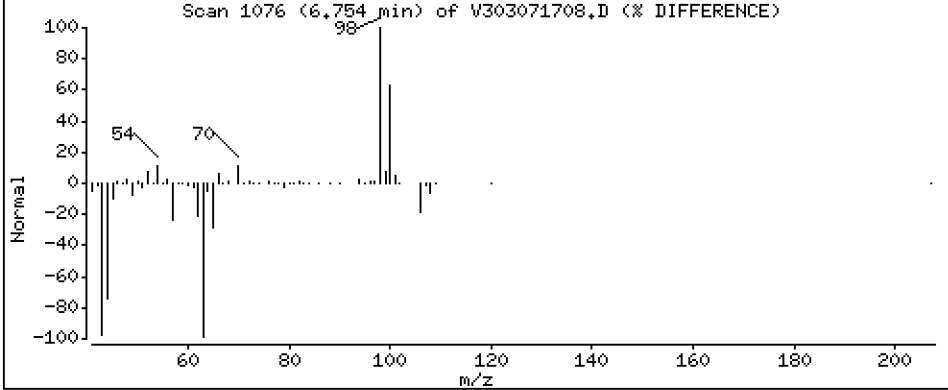
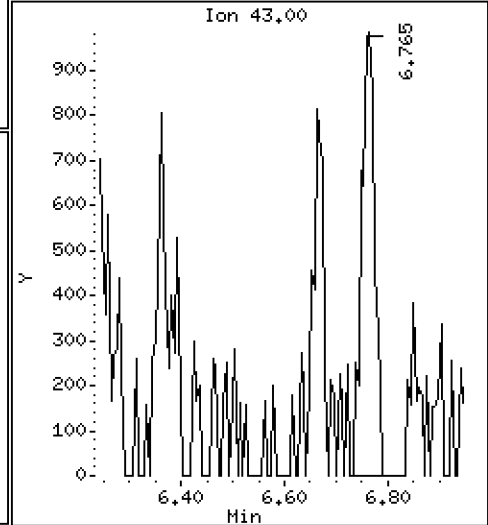
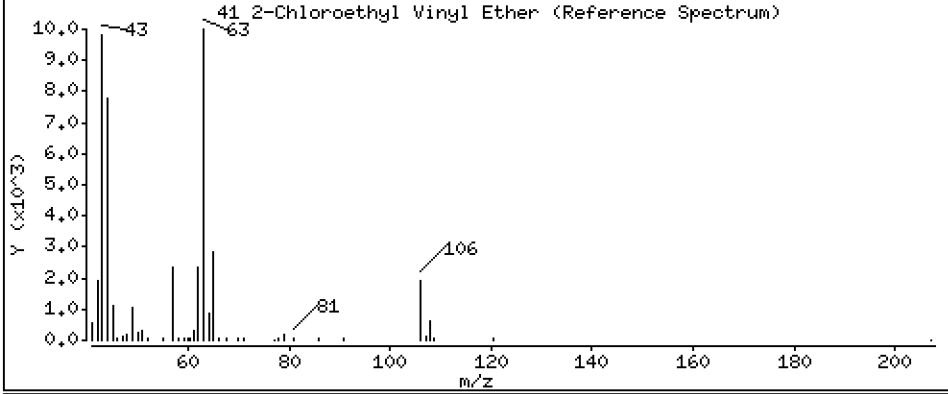
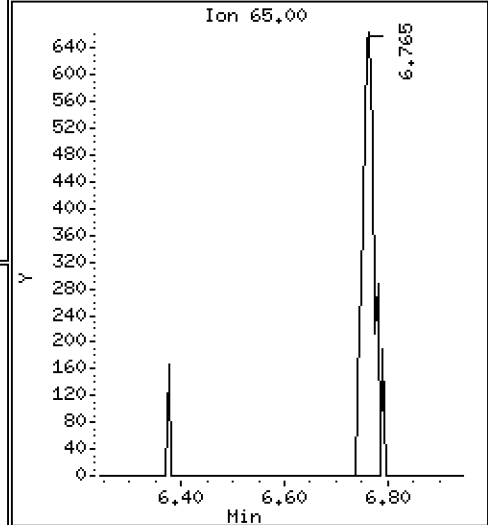
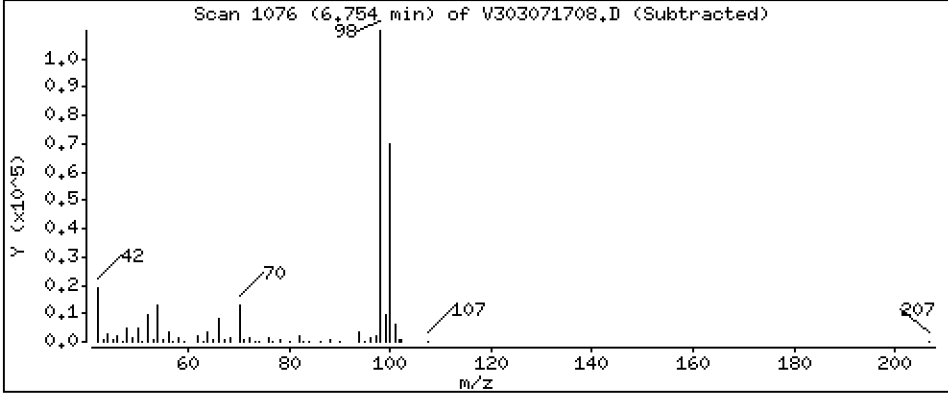
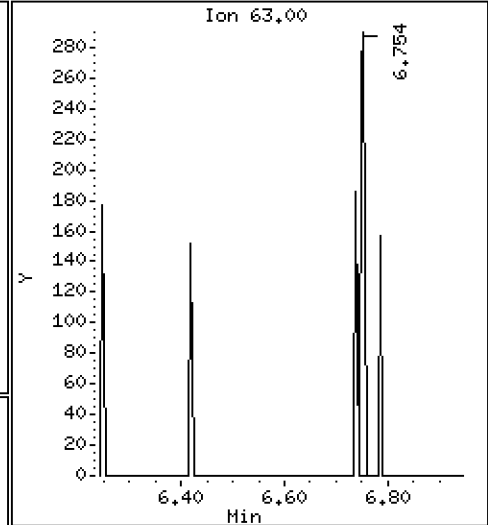
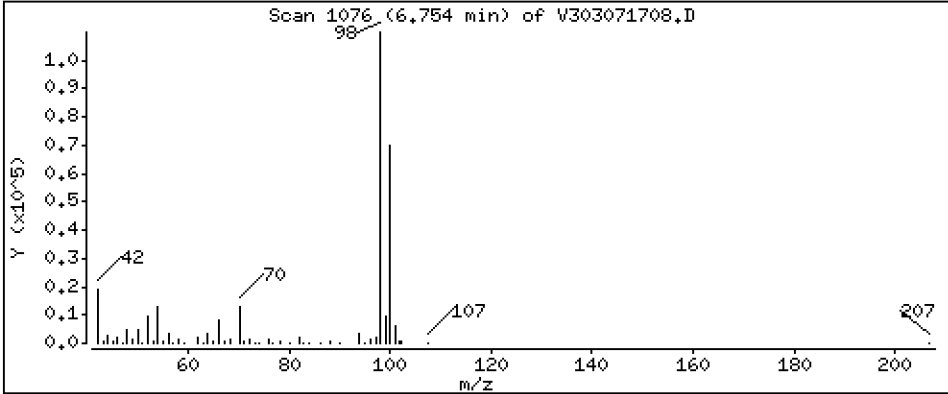
Operator: PC

Column phase: RTXVMS

Column diameter: 0,18

41 2-Chloroethyl Vinyl Ether

Concentration: 0,02003 ug/L



Date : 07-MAR-2017 12:00

Client ID:

Instrument: nt3.i

Sample Info: BFC-BLK1

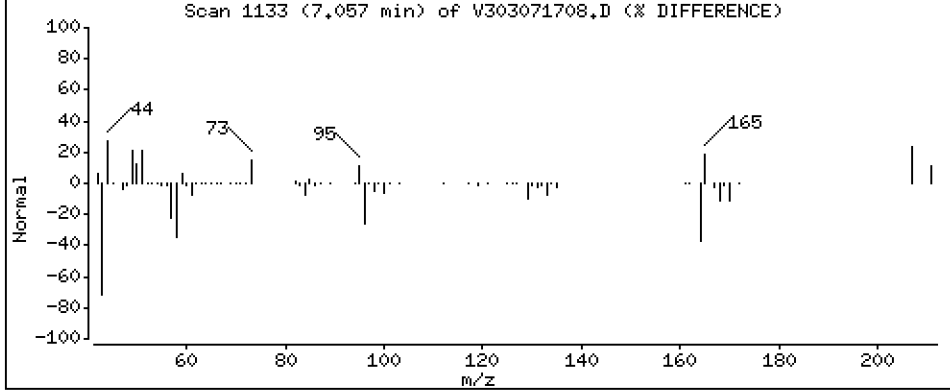
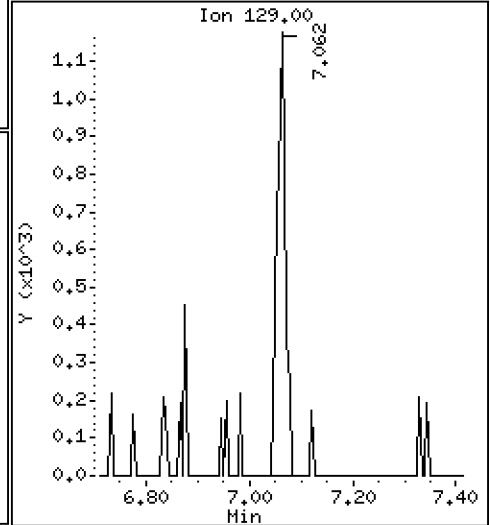
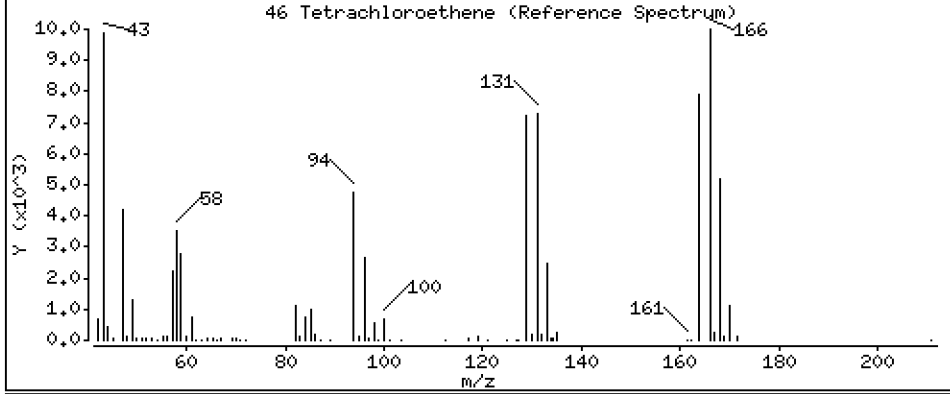
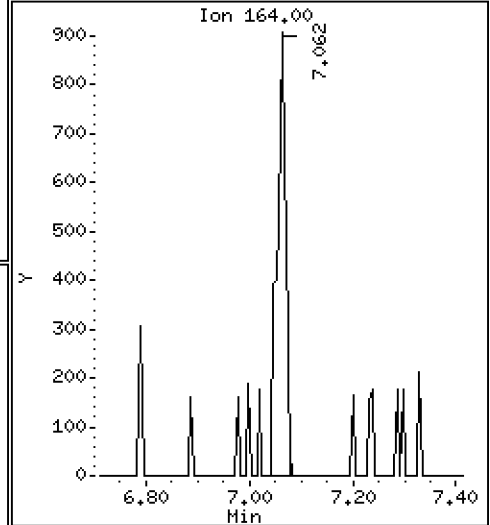
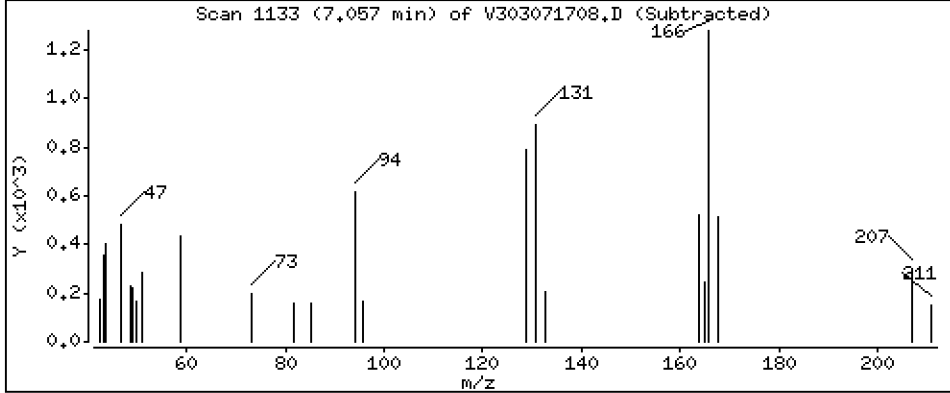
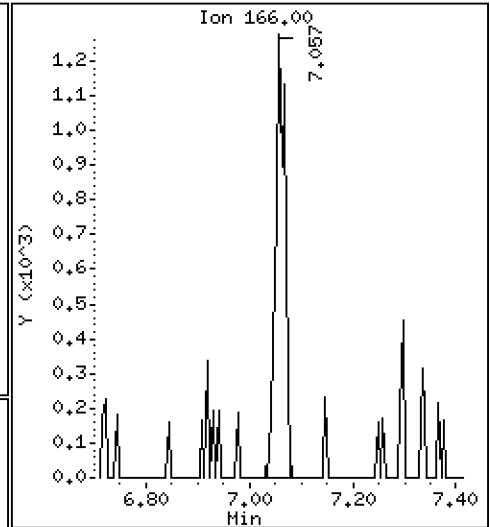
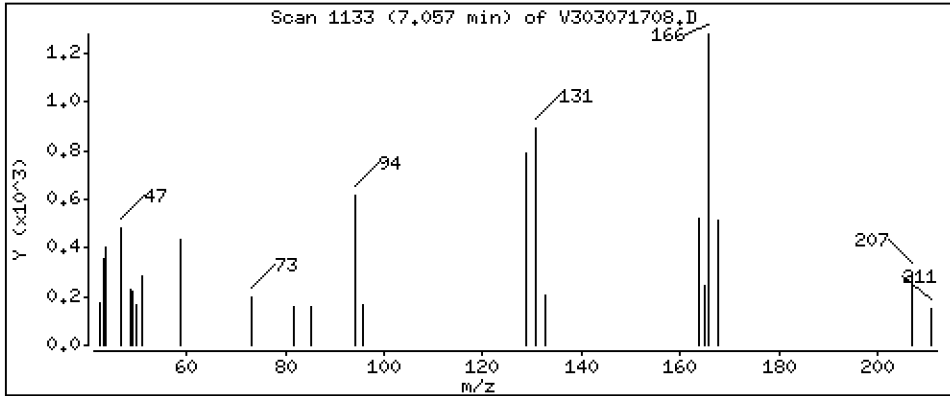
Operator: PC

Column phase: RTXVMS

Column diameter: 0.18

46 Tetrachloroethene

Concentration: 0.09100 ug/L



Date : 07-MAR-2017 12:00

Client ID:

Instrument: nt3.i

Sample Info: BFC-BLK1

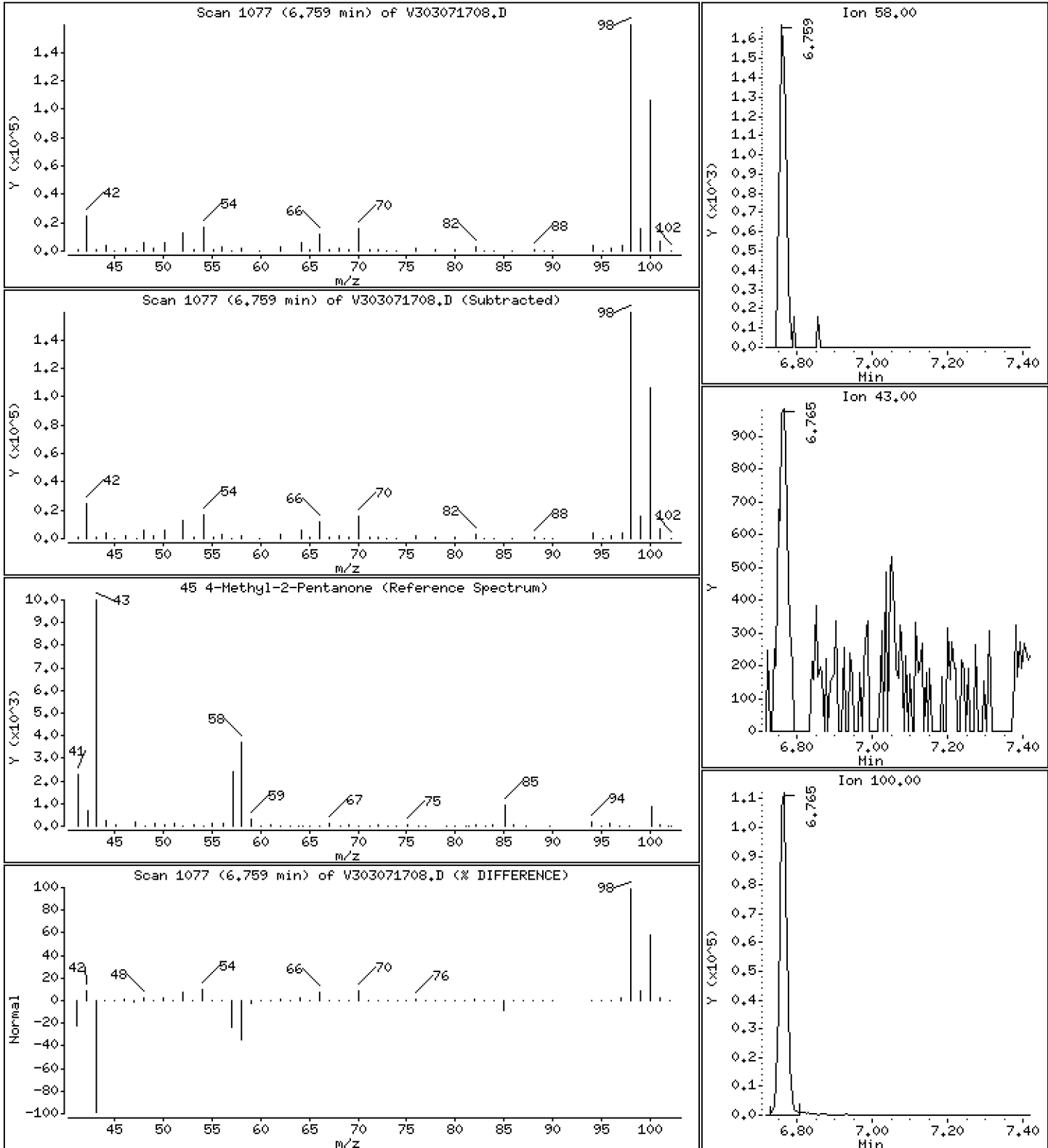
Operator: PC

Column phase: RTXVMS

Column diameter: 0.18

45 4-Methyl-2-Pentanone

Concentration: 0.3987 ug/L



Date : 07-MAR-2017 12:00

Client ID:

Instrument: nt3.i

Sample Info: BFC-BLK1

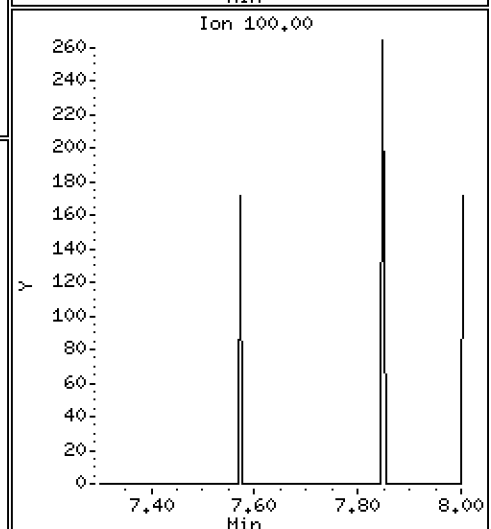
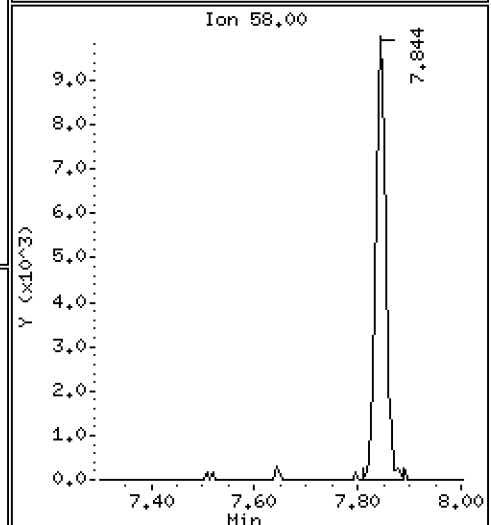
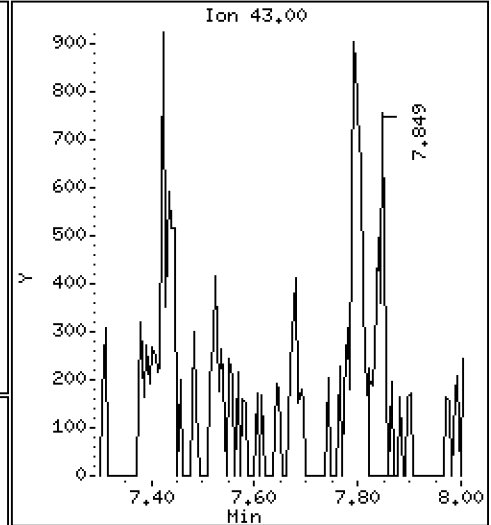
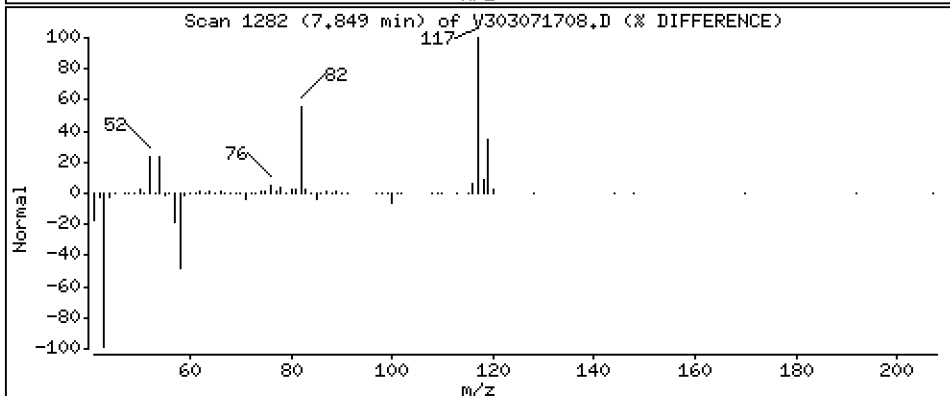
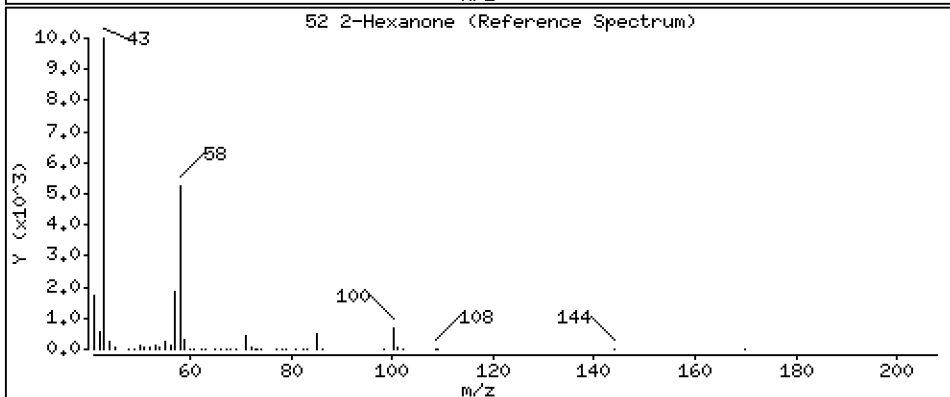
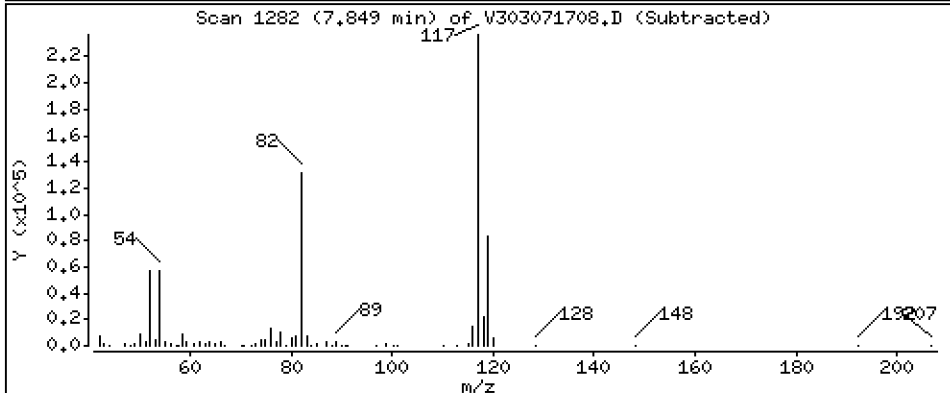
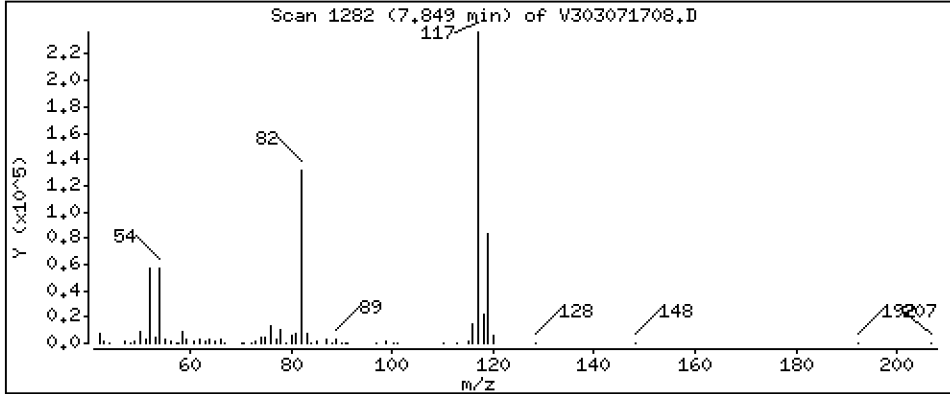
Operator: PC

Column phase: RTXVMS

Column diameter: 0,18

52 2-Hexanone

Concentration: 0,08434 ug/L



Date : 07-MAR-2017 12:00

Client ID:

Instrument: nt3.i

Sample Info: BFC-BLK1

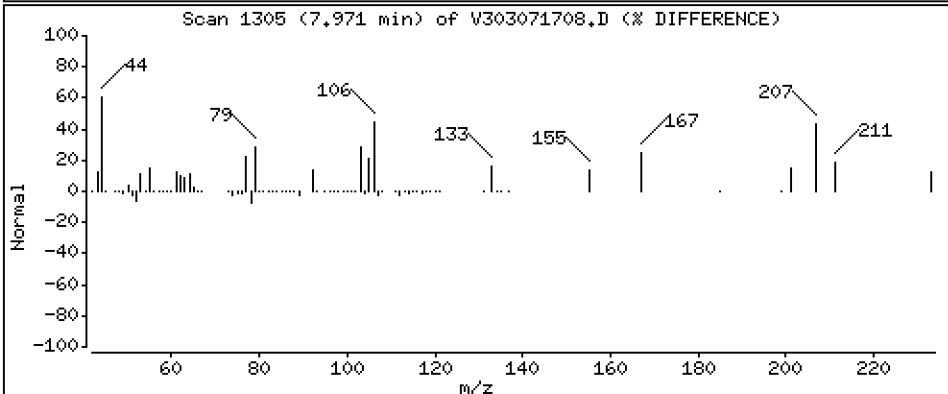
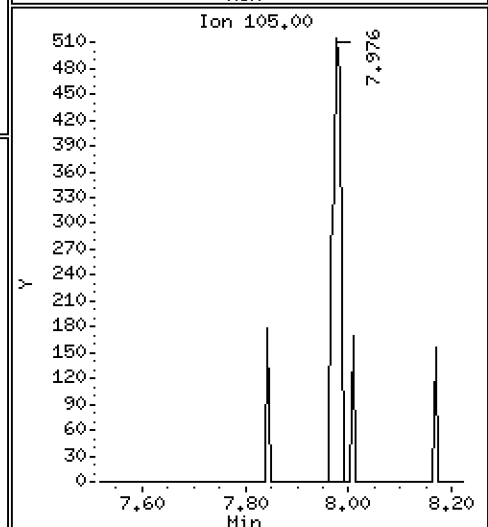
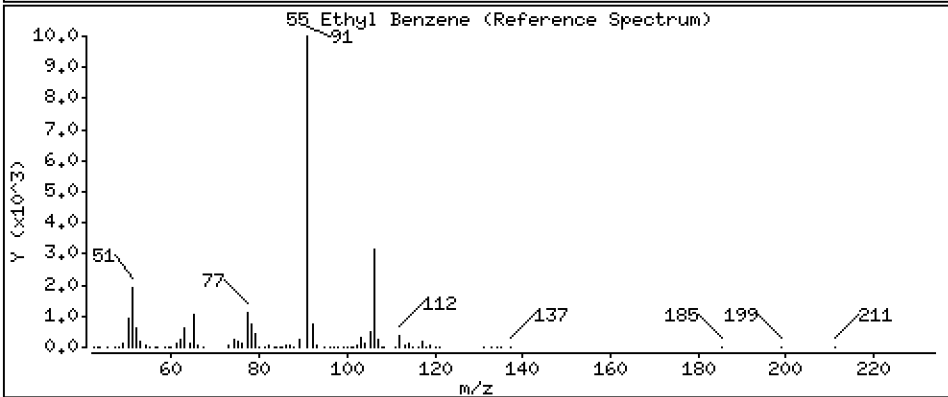
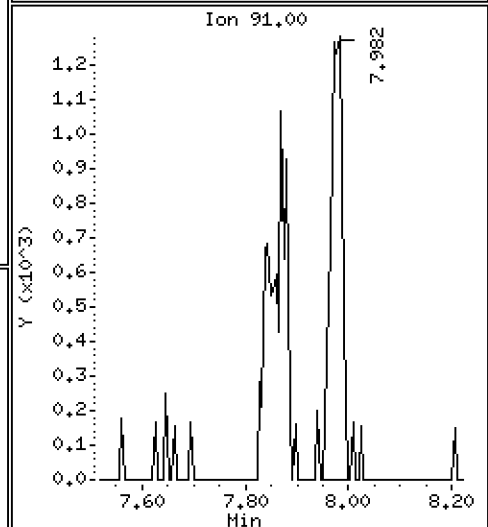
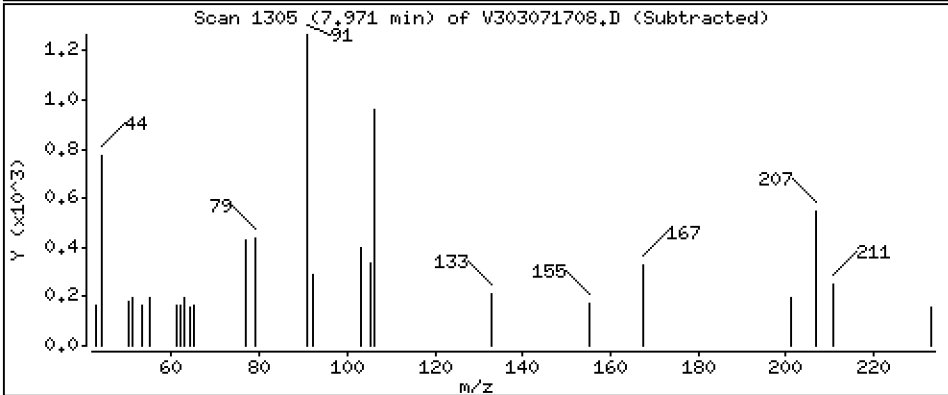
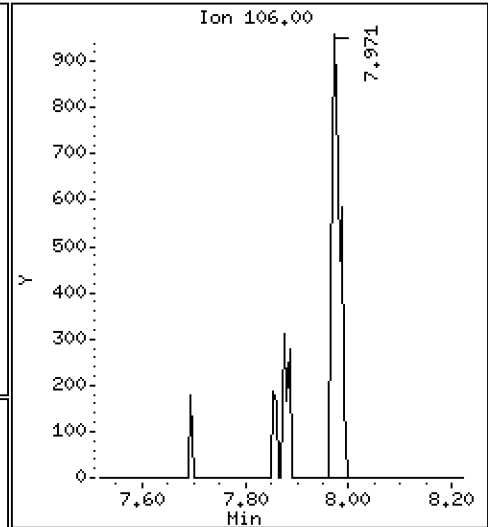
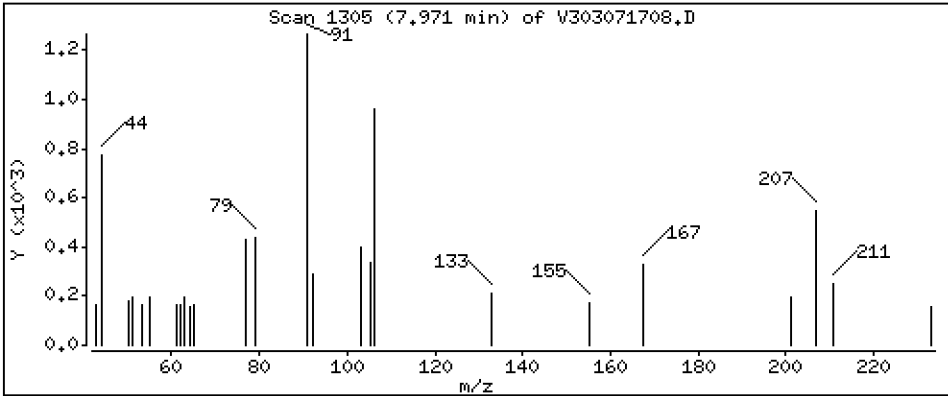
Operator: PC

Column phase: RTXVMS

Column diameter: 0.18

55 Ethyl Benzene

Concentration: 0.04174 ug/L



Date : 07-MAR-2017 12:00

Client ID:

Instrument: nt3.i

Sample Info: BFC-BLK1

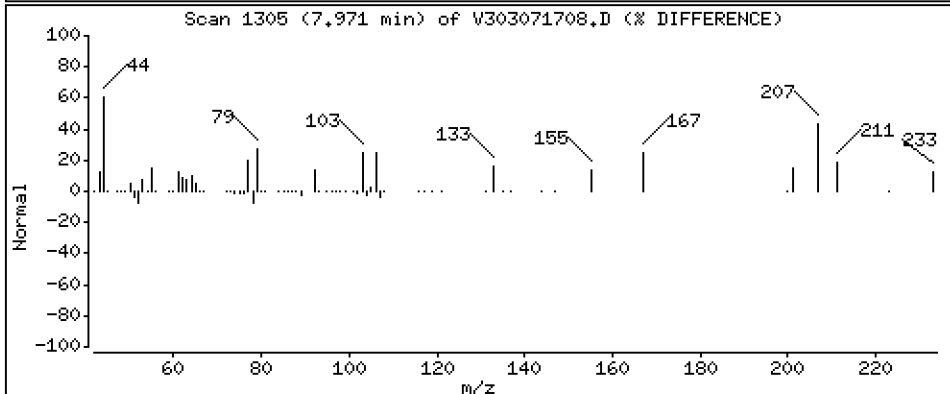
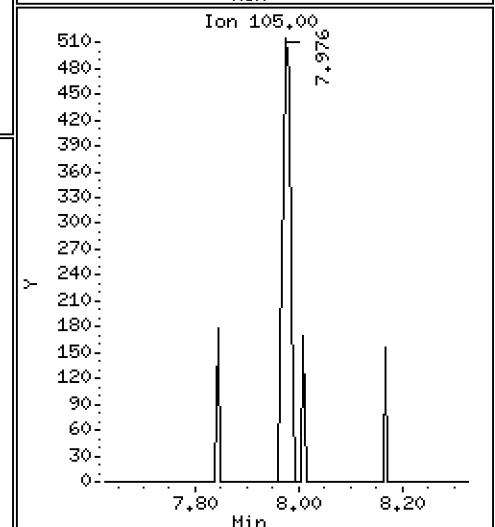
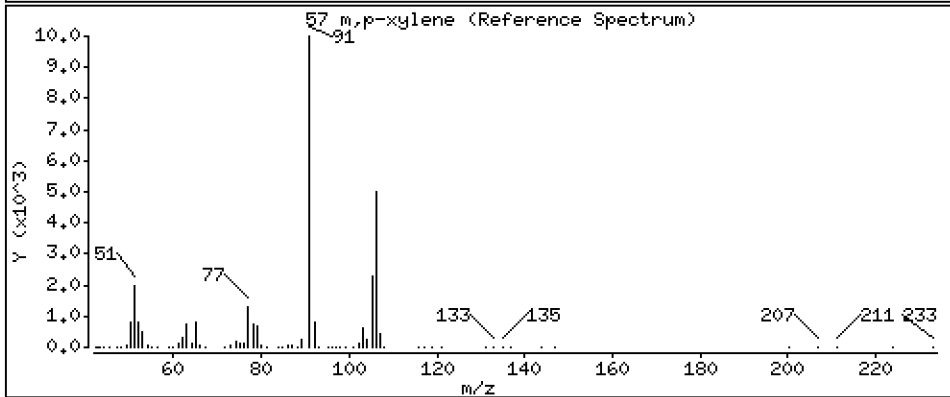
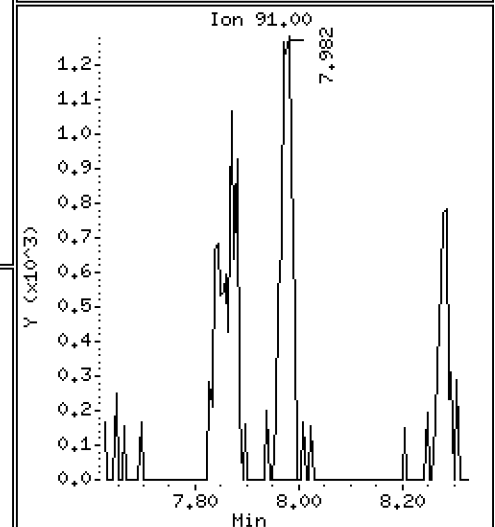
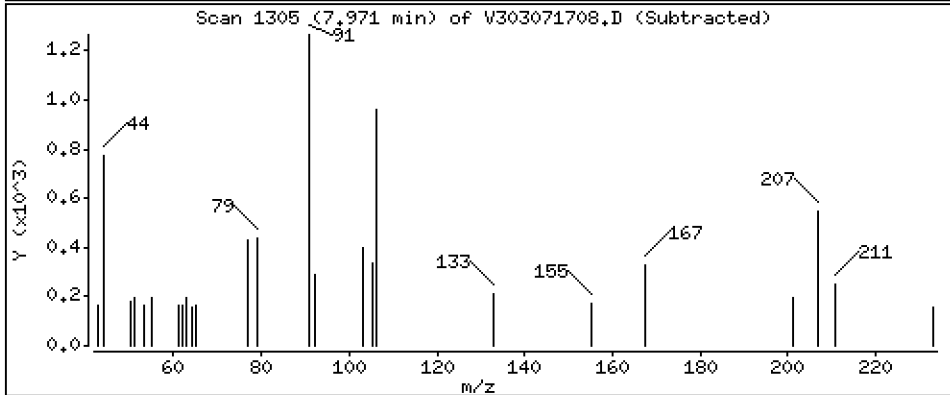
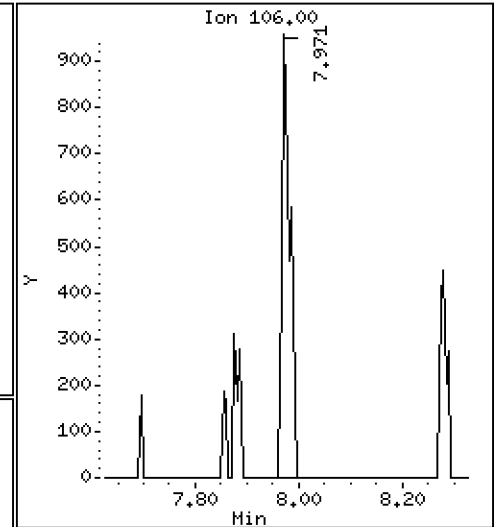
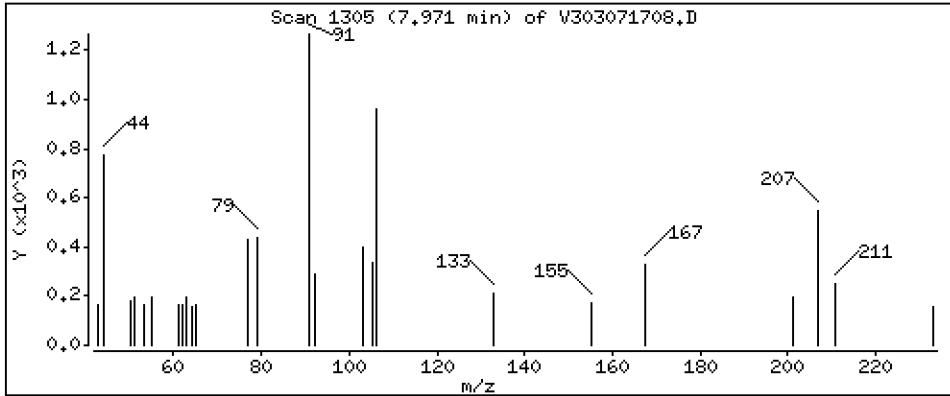
Operator: PC

Column phase: RTXVMS

Column diameter: 0.18

57 m,p-xylene

Concentration: 0.03387 ug/L



Date : 07-MAR-2017 12:00

Client ID:

Instrument: nt3.i

Sample Info: BFC-BLK1

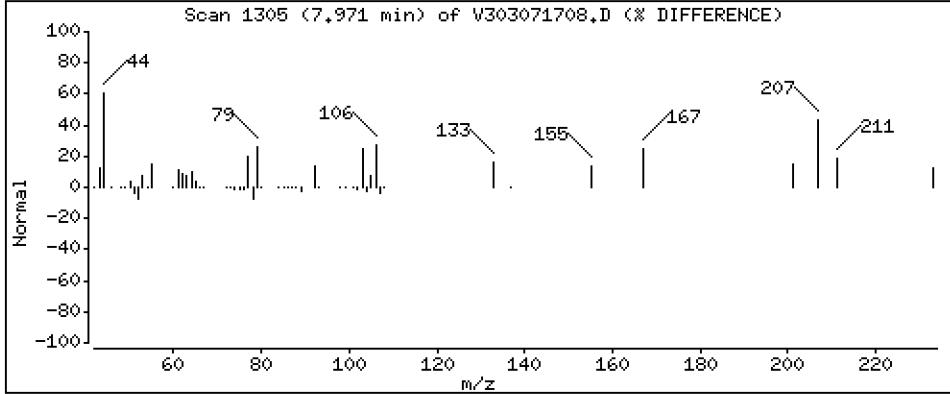
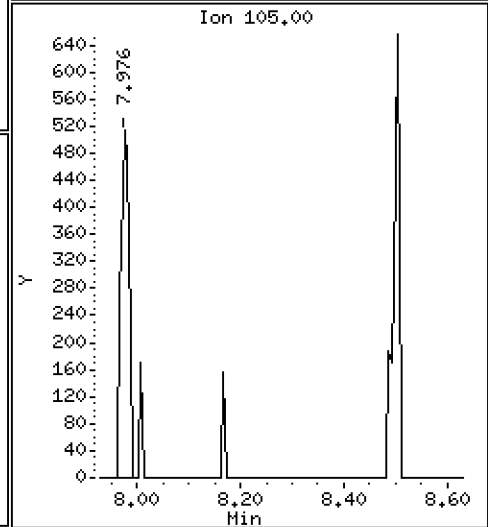
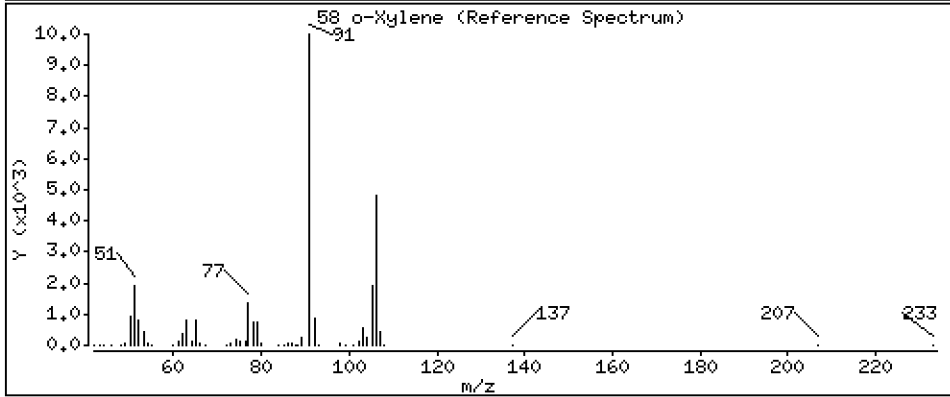
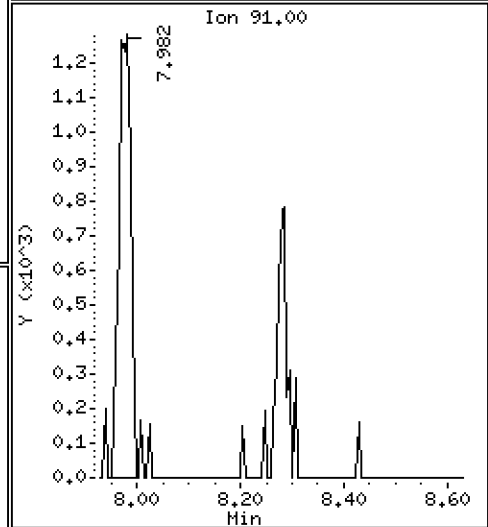
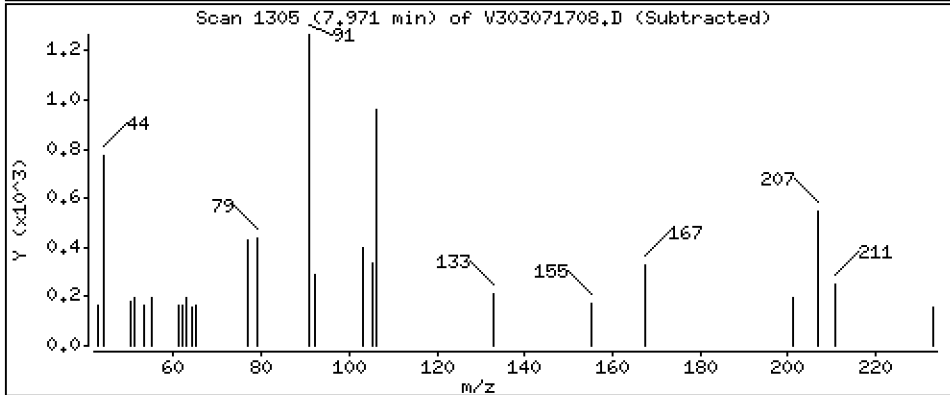
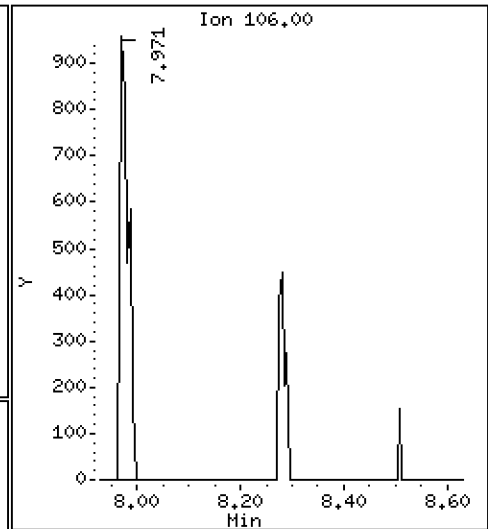
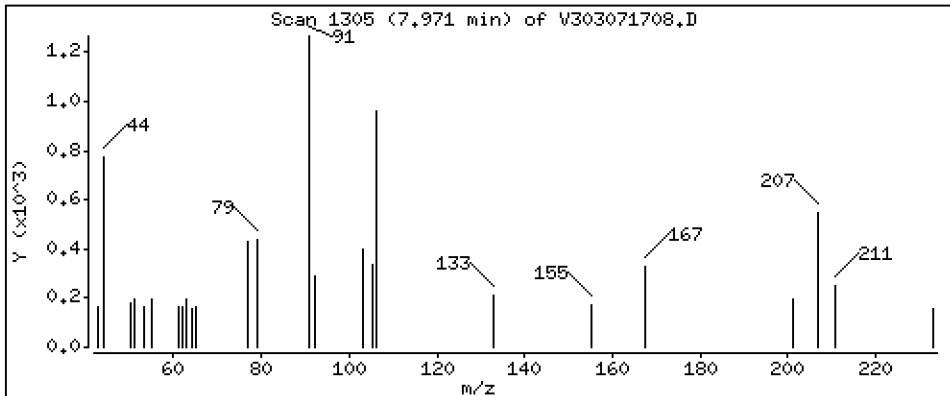
Operator: PC

Column phase: RTXVMS

Column diameter: 0.18

58 o-Xylene

Concentration: 0.03491 ug/L



Date : 07-MAR-2017 12:00

Client ID:

Instrument: nt3.i

Sample Info: BFC-BLK1

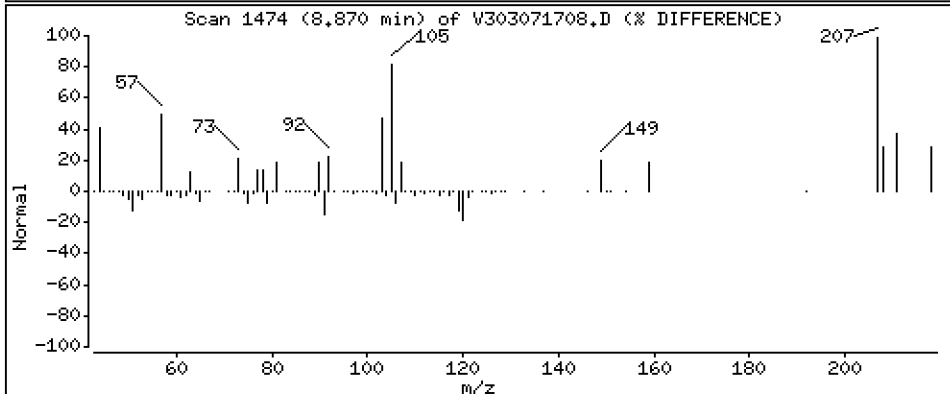
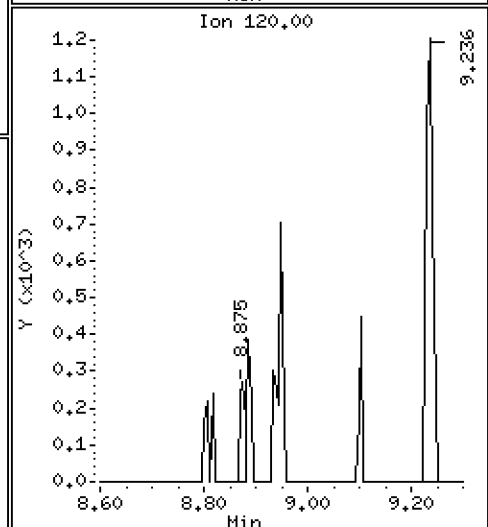
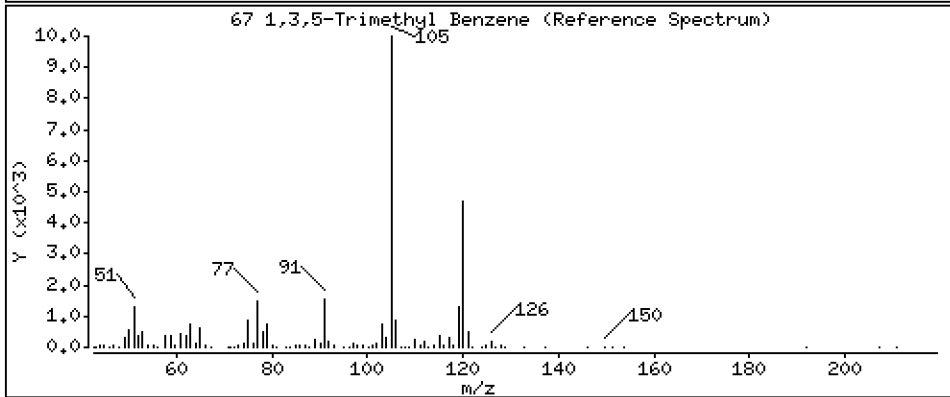
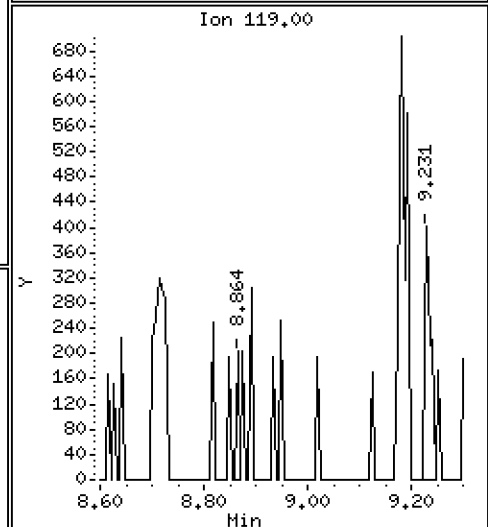
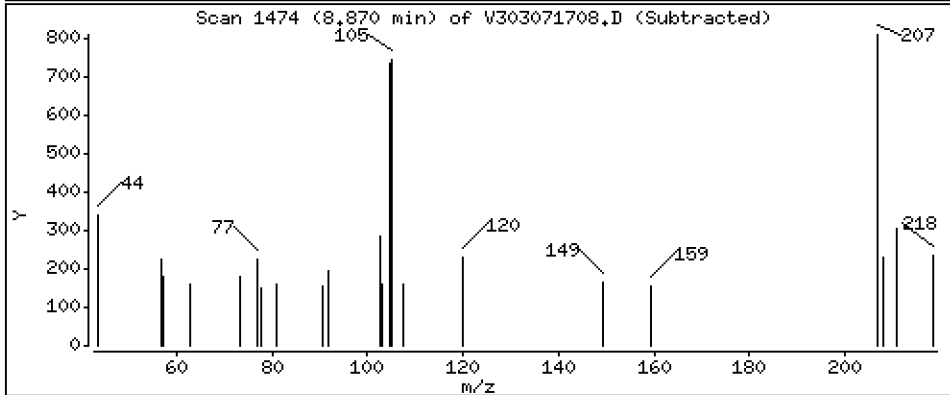
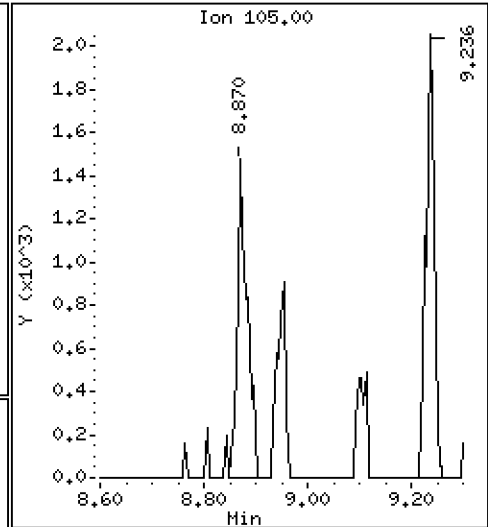
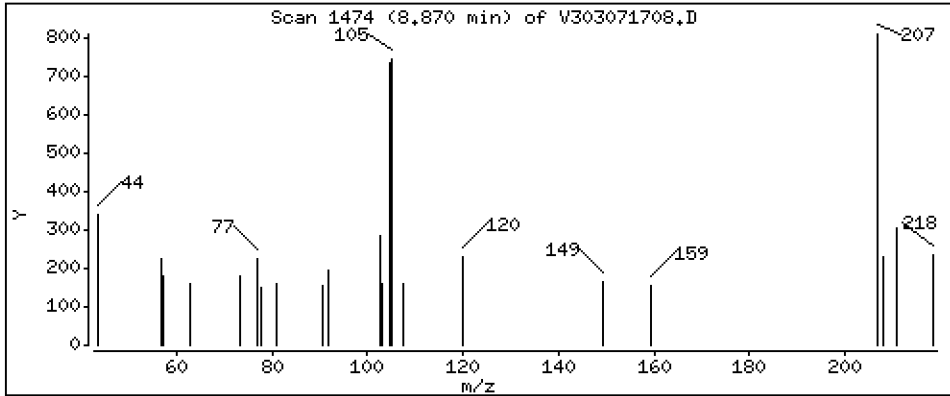
Operator: PC

Column phase: RTXVMS

Column diameter: 0.18

67 1,3,5-Trimethyl Benzene

Concentration: 0.03018 ug/L



Date : 07-MAR-2017 12:00

Client ID:

Instrument: nt3.i

Sample Info: BFC-BLK1

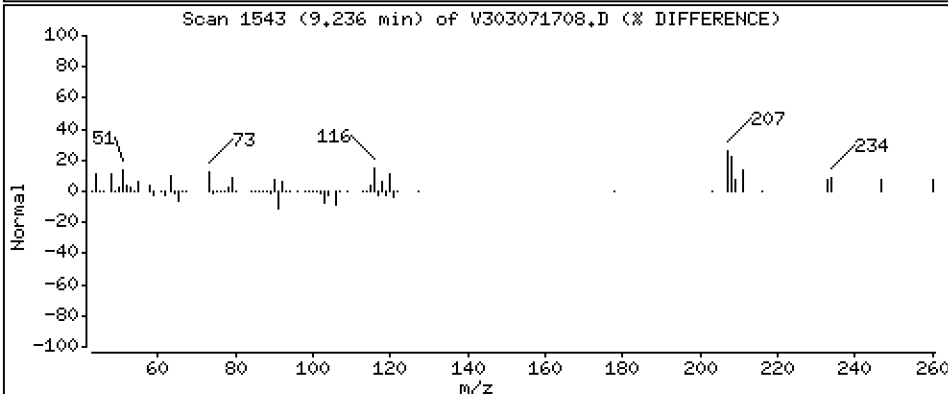
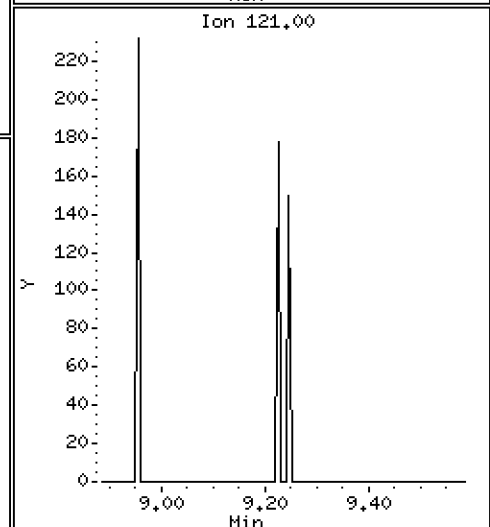
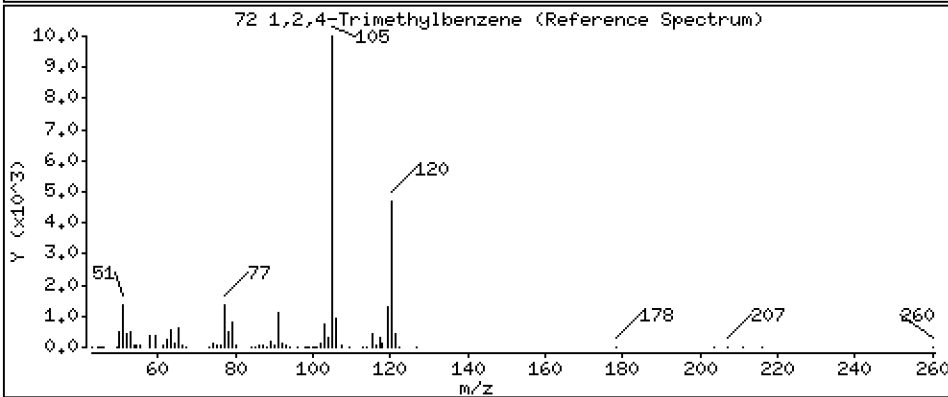
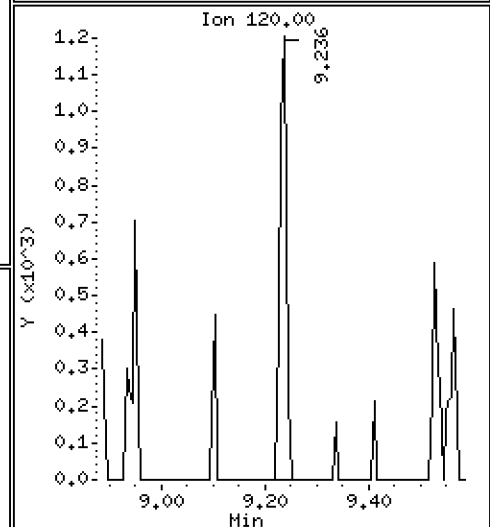
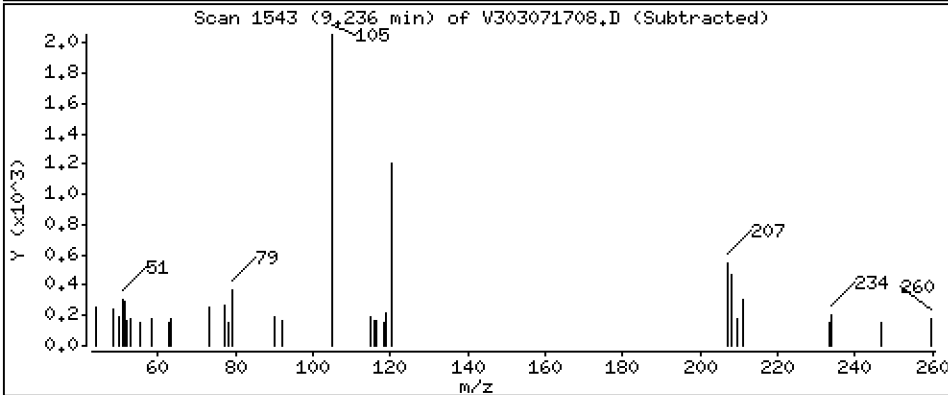
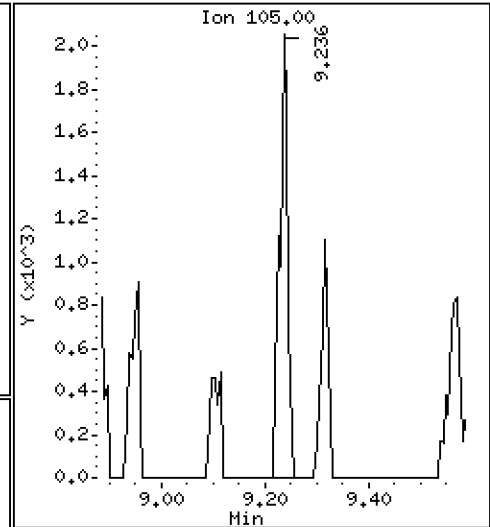
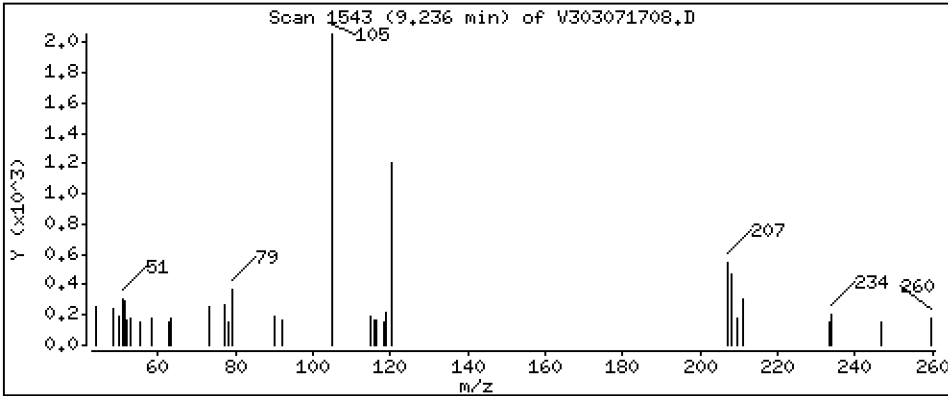
Operator: PC

Column phase: RTXVMS

Column diameter: 0.18

72 1,2,4-Trimethylbenzene

Concentration: 0.03379 ug/L



Date : 07-MAR-2017 12:00

Client ID:

Instrument: nt3.i

Sample Info: BFC-BLK1

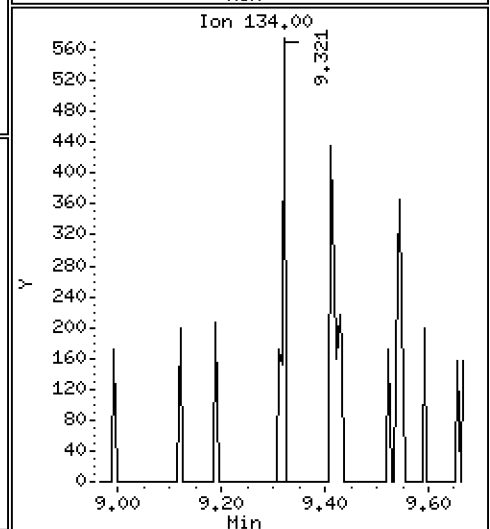
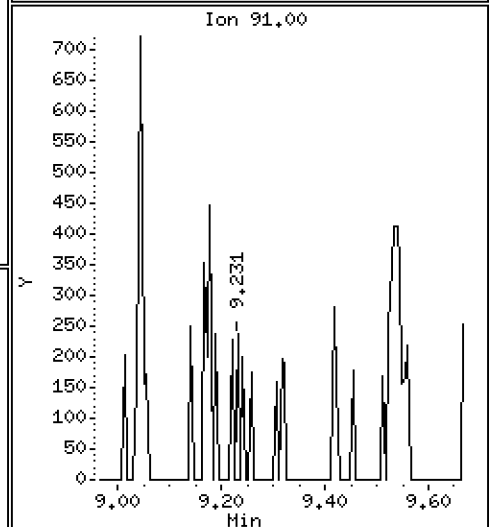
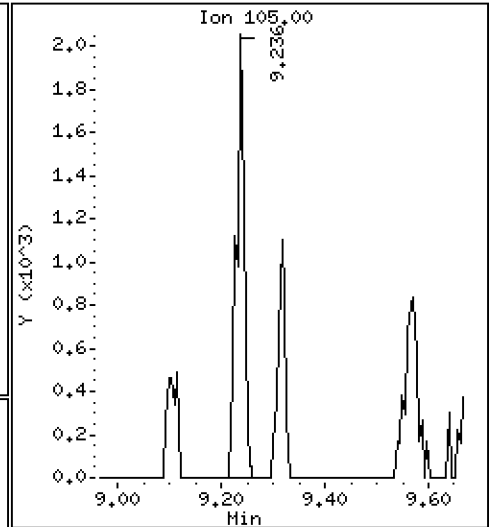
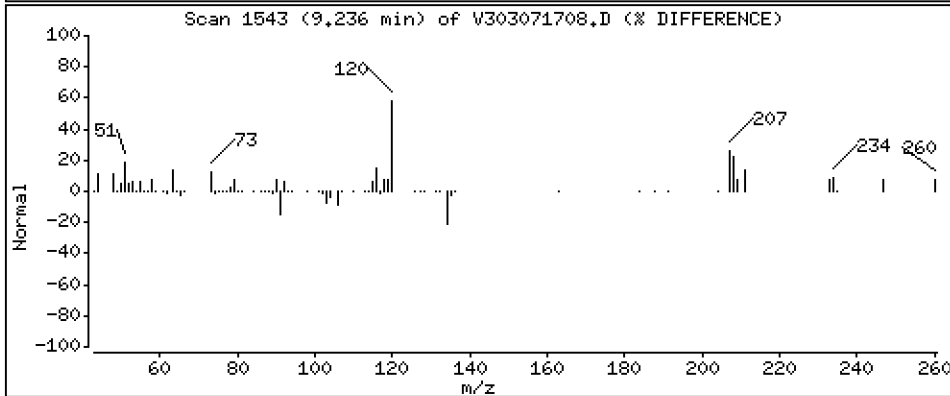
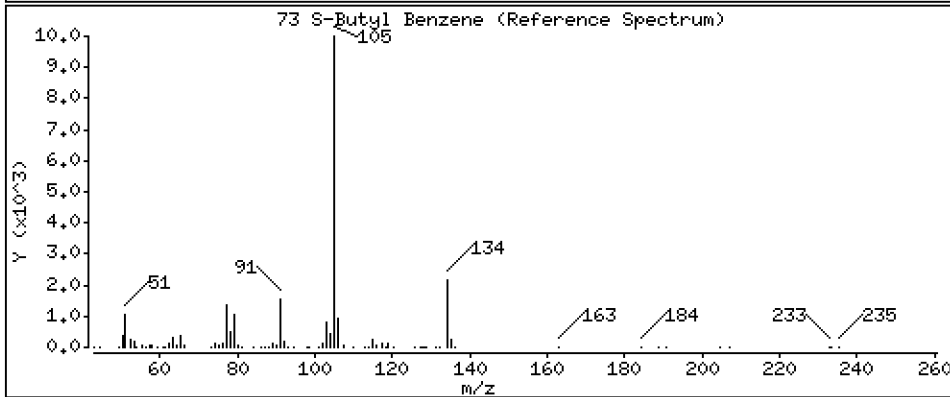
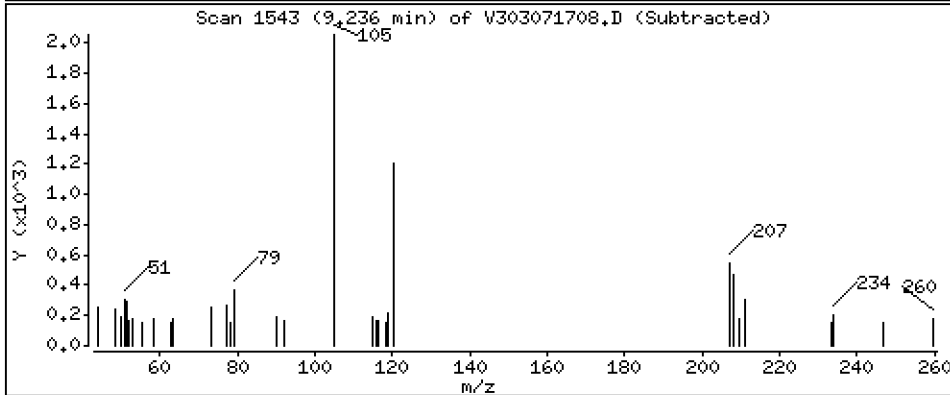
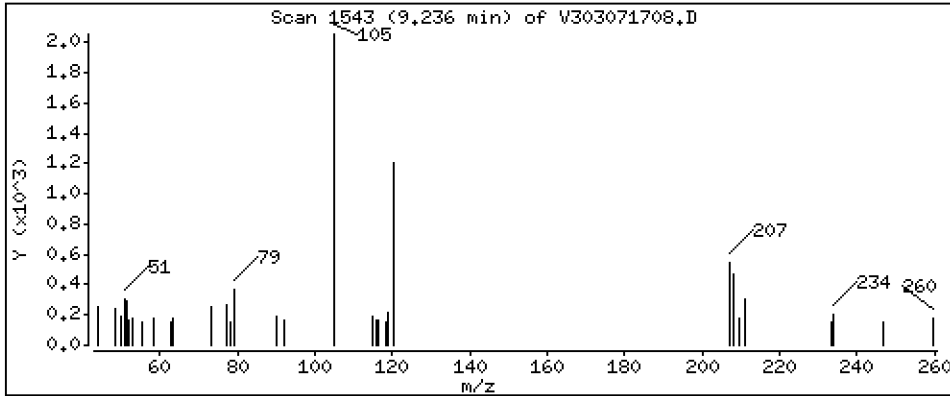
Operator: PC

Column phase: RTXVMS

Column diameter: 0.18

73 S-Butyl Benzene

Concentration: 0.02916 ug/L



Date : 07-MAR-2017 12:00

Client ID:

Instrument: nt3.i

Sample Info: BFC-BLK1

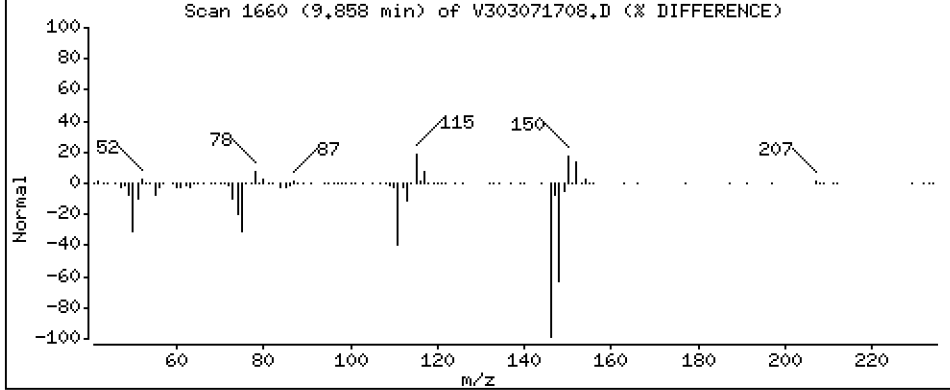
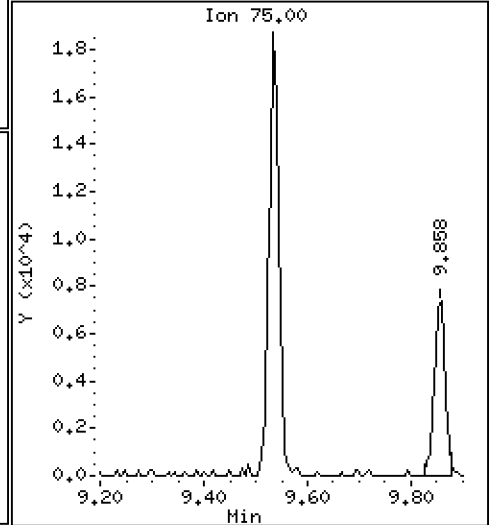
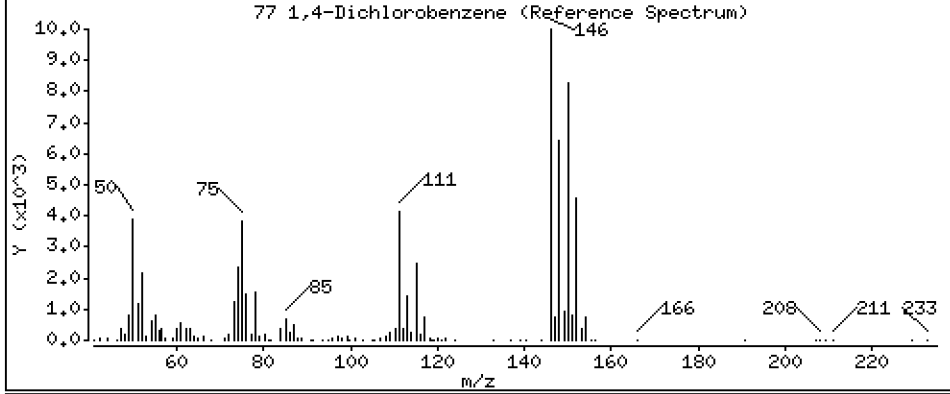
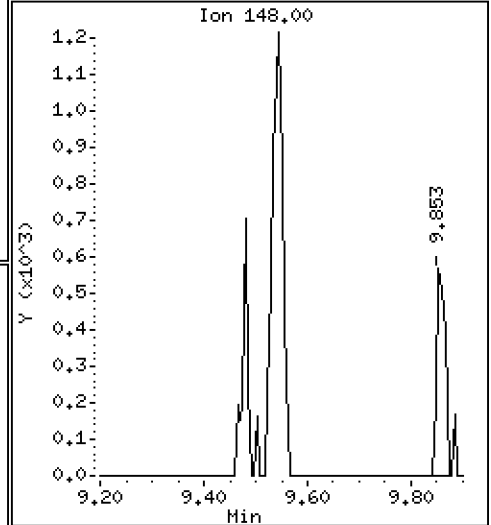
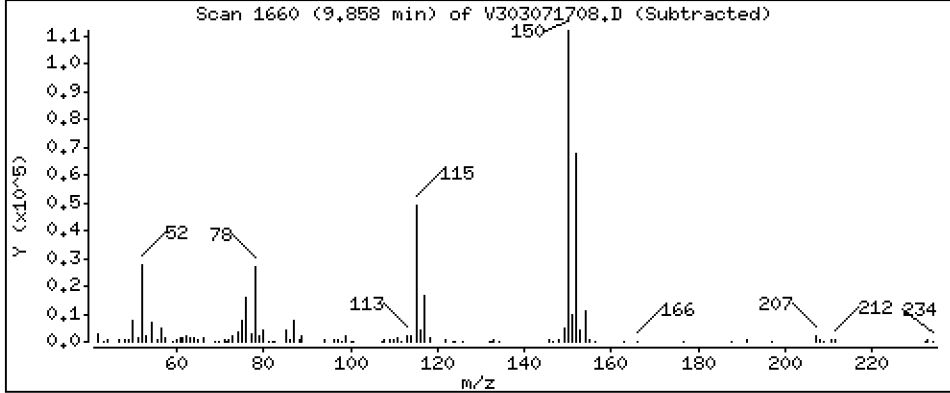
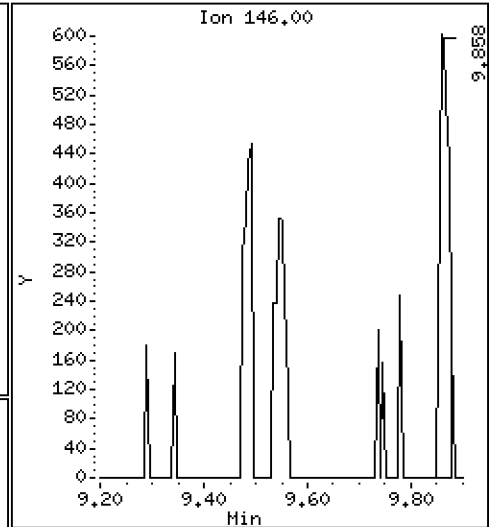
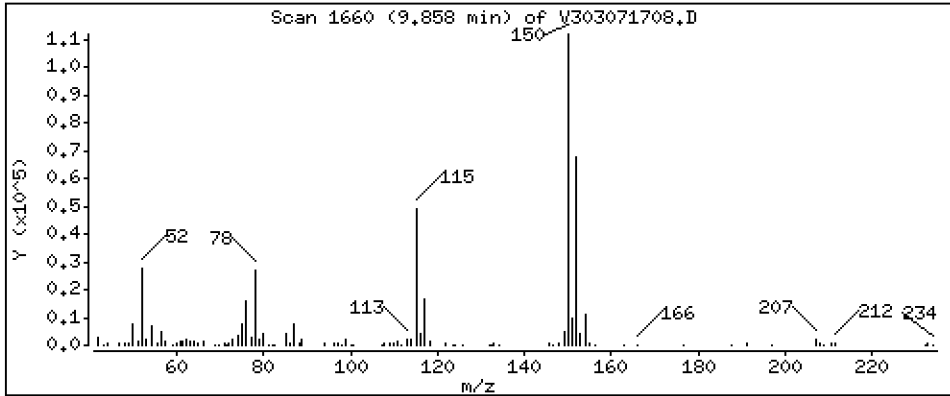
Operator: PC

Column phase: RTXVMS

Column diameter: 0.18

77 1,4-Dichlorobenzene

Concentration: 0.02040 ug/L



Date : 07-MAR-2017 12:00

Client ID:

Instrument: nt3.i

Sample Info: BFC-BLK1

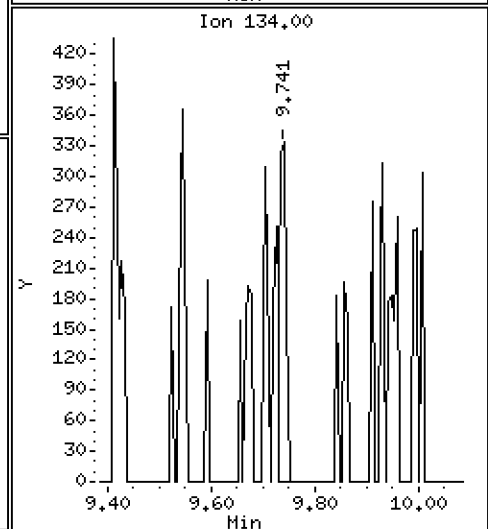
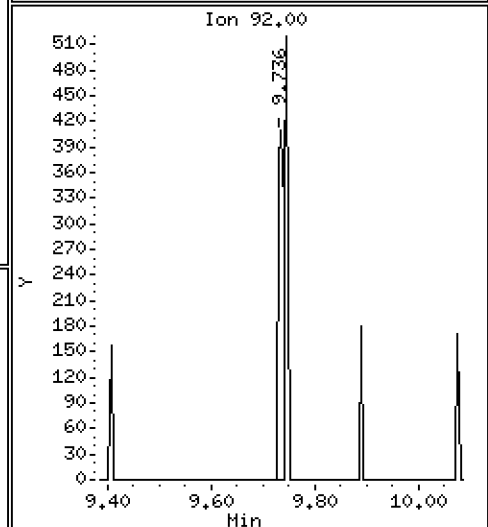
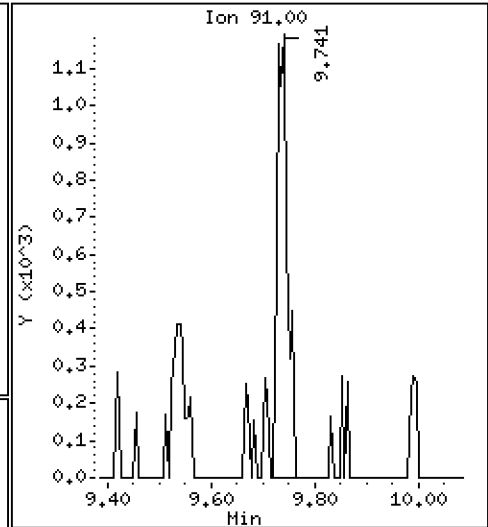
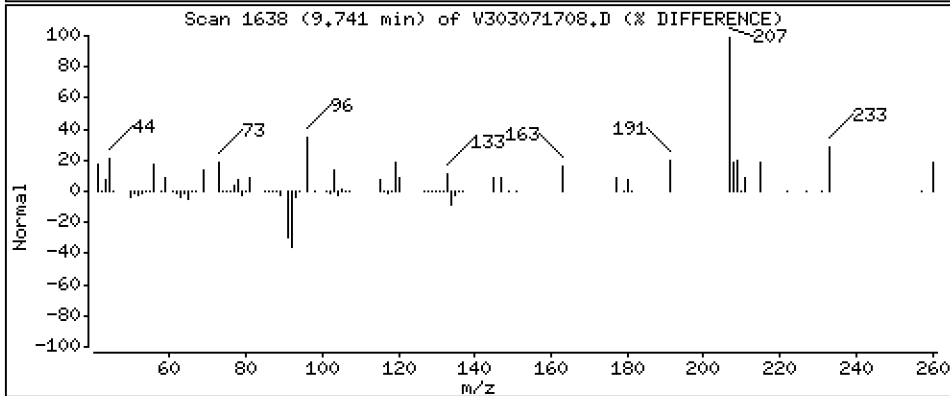
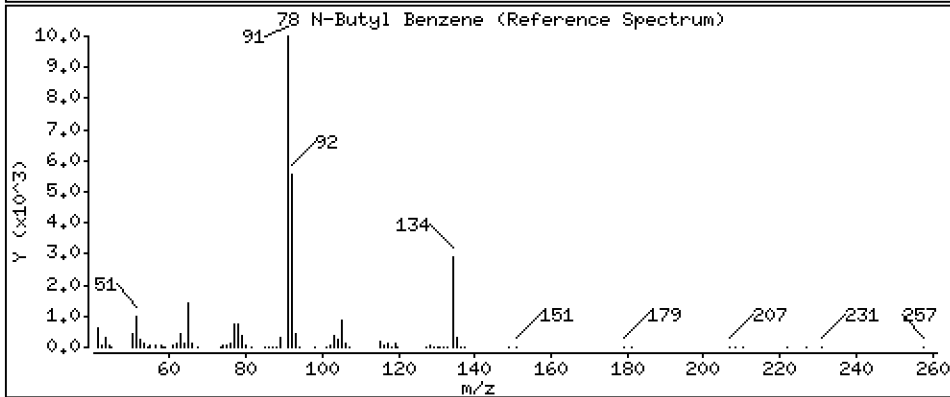
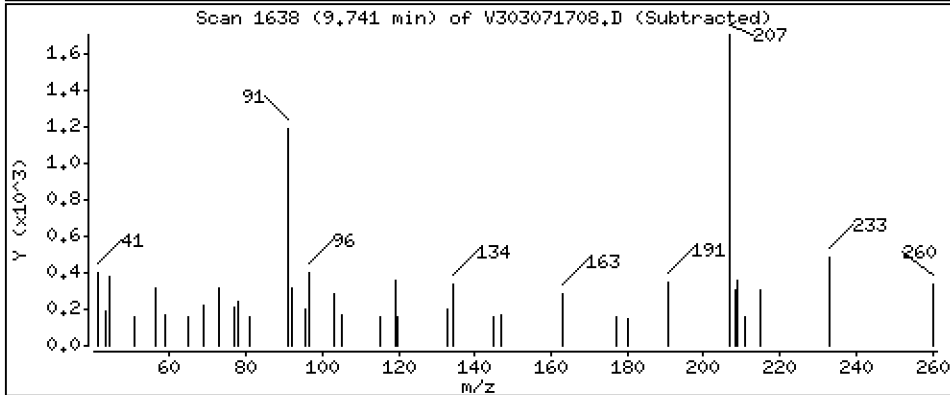
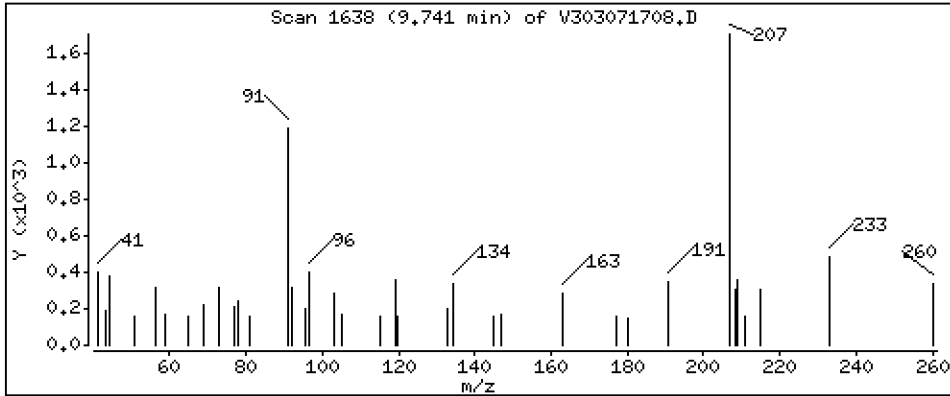
Operator: PC

Column phase: RTXVMS

Column diameter: 0.18

78 N-Butyl Benzene

Concentration: 0.02966 ug/L



Date : 07-MAR-2017 12:00

Client ID:

Instrument: nt3.i

Sample Info: BFC-BLK1

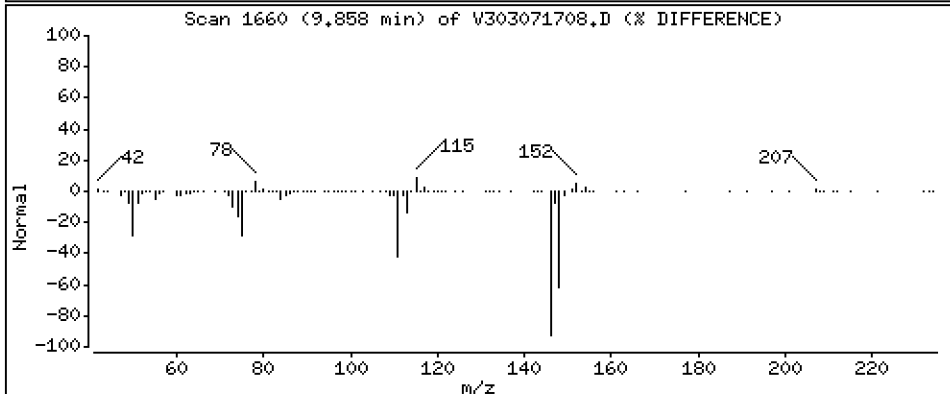
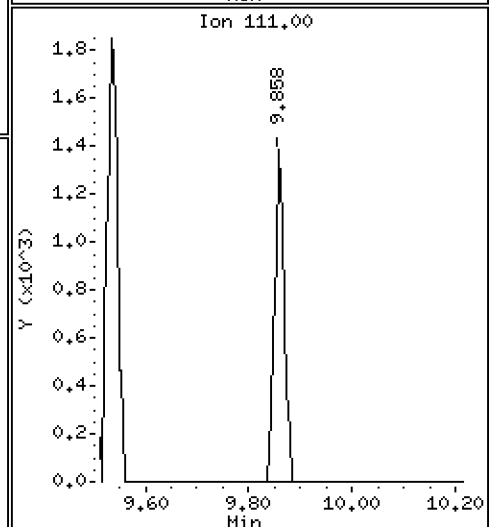
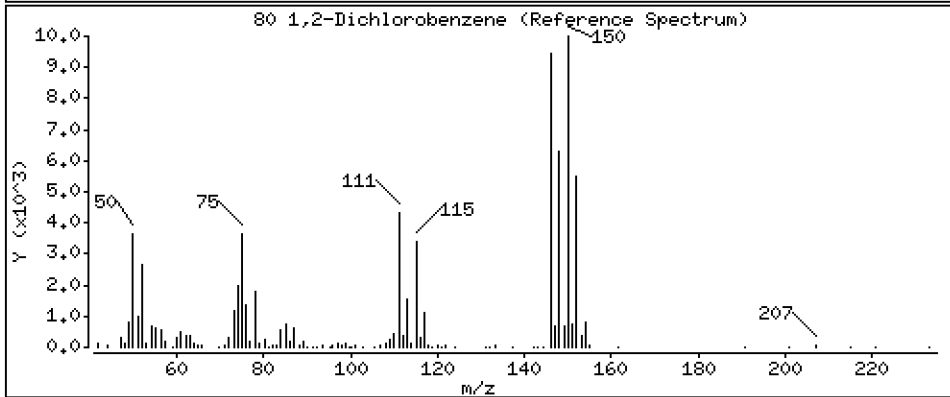
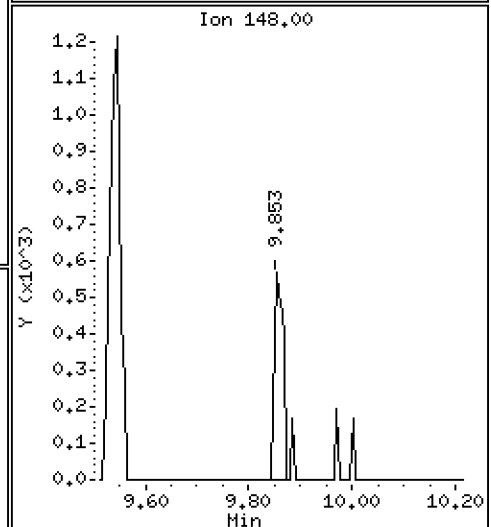
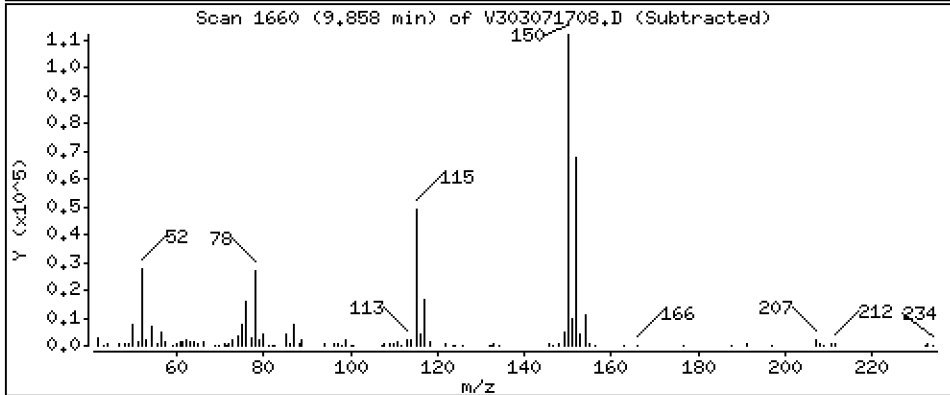
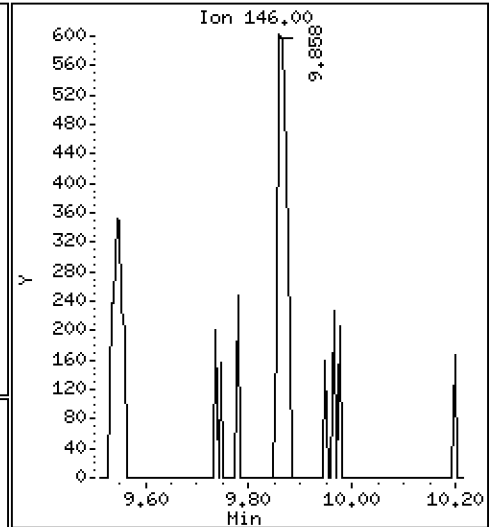
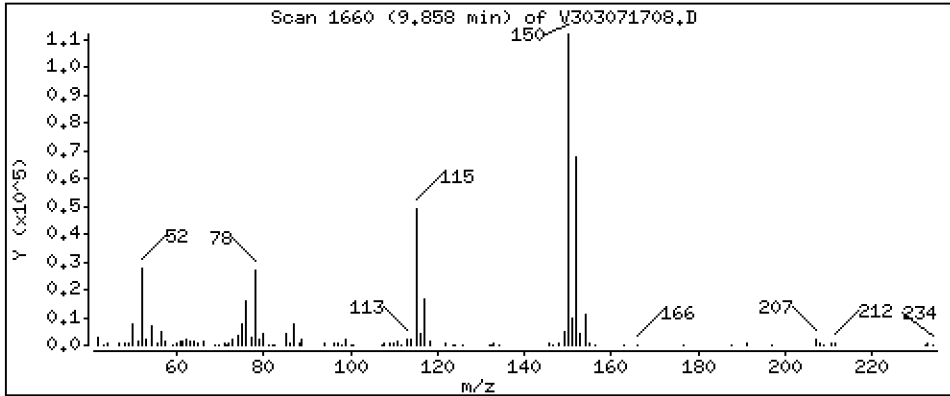
Operator: PC

Column phase: RTXVMS

Column diameter: 0.18

80 1,2-Dichlorobenzene

Concentration: 0.02269 ug/L



Date : 07-MAR-2017 12:00

Client ID:

Instrument: nt3.i

Sample Info: BFC-BLK1

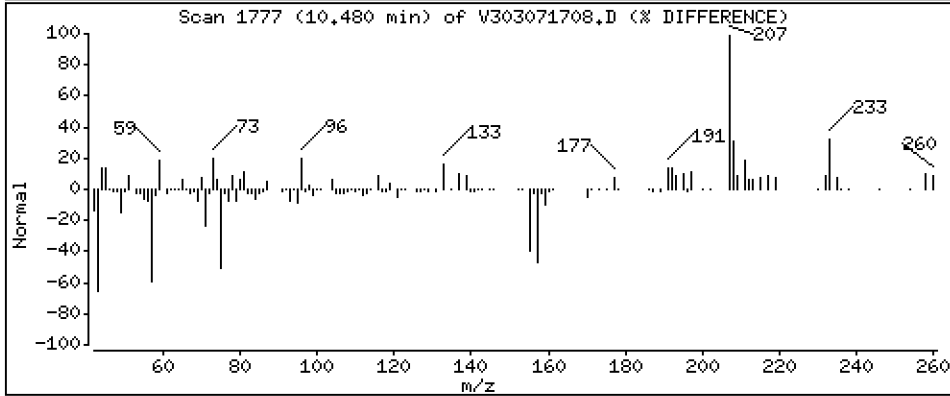
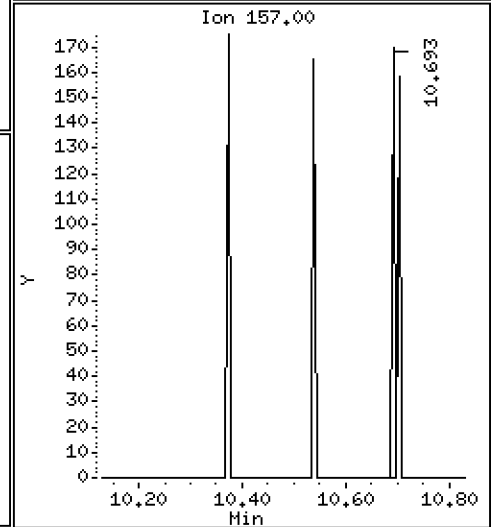
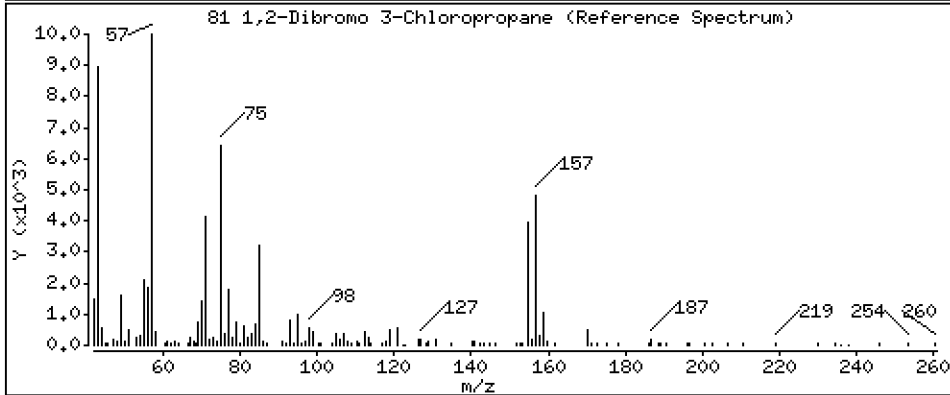
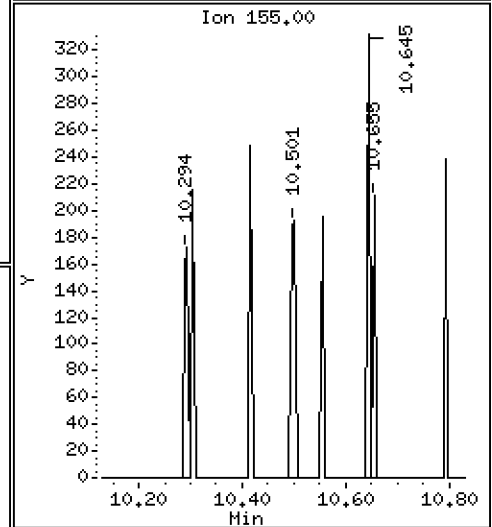
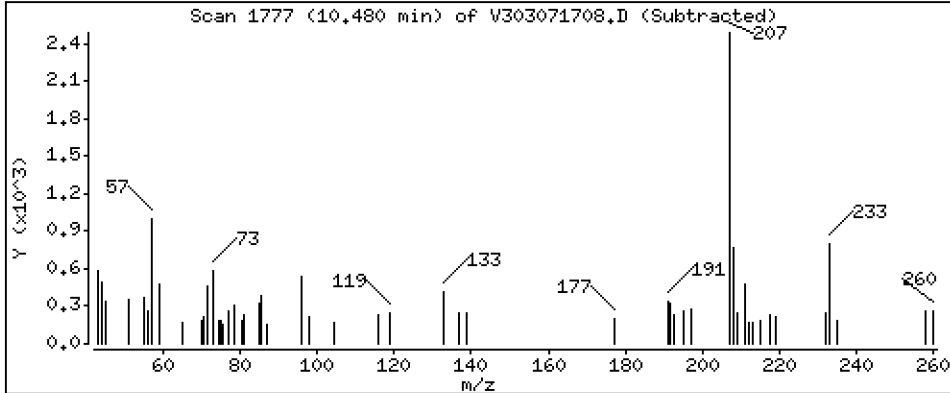
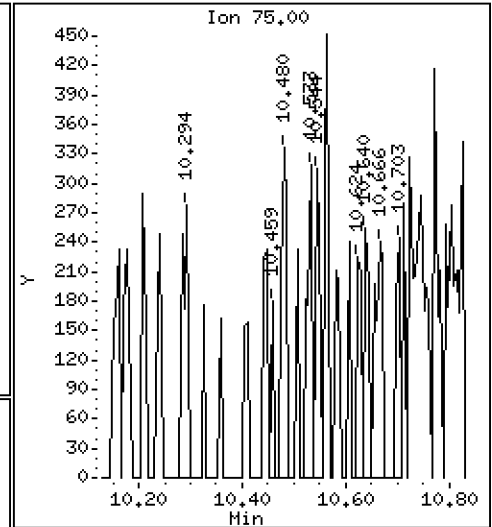
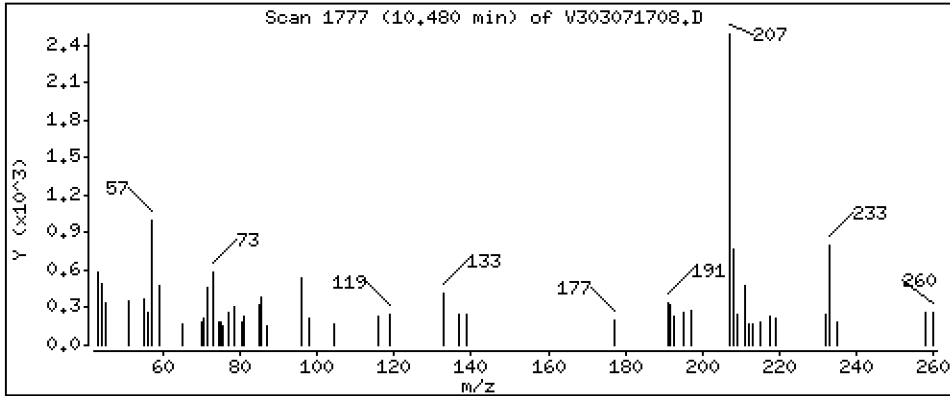
Operator: PC

Column phase: RTXVMS

Column diameter: 0.18

81 1,2-Dibromo 3-Chloropropane

Concentration: 0.1203 ug/L



Date : 07-MAR-2017 12:00

Client ID:

Instrument: nt3.i

Sample Info: BFC-BLK1

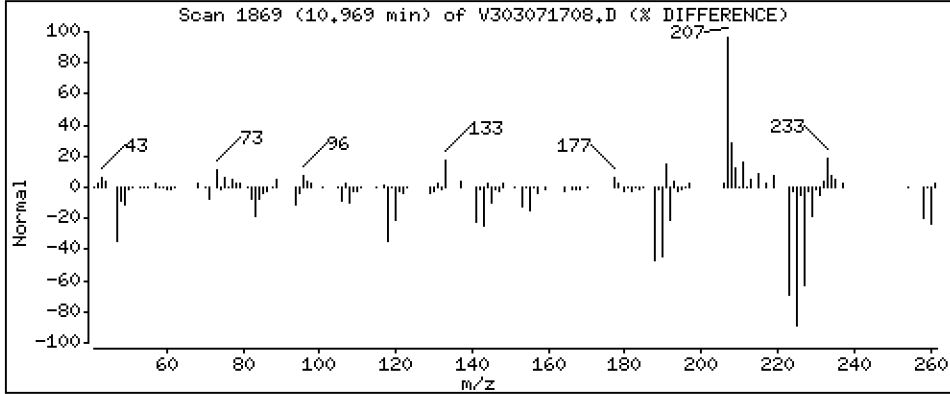
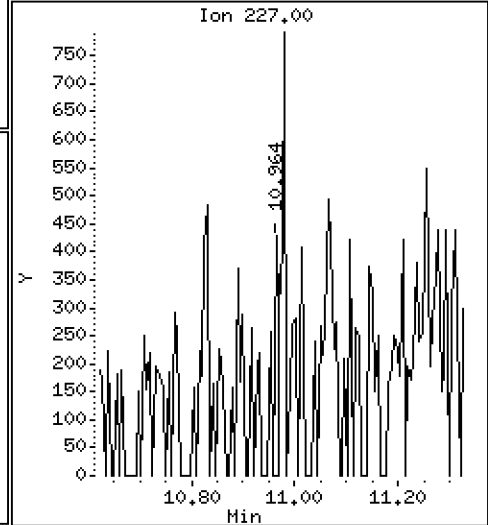
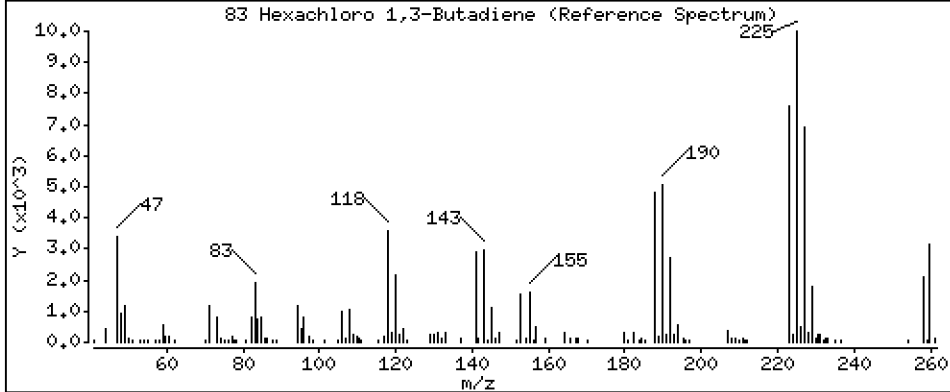
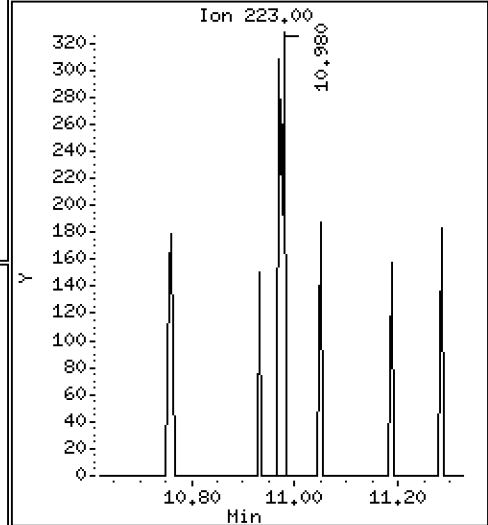
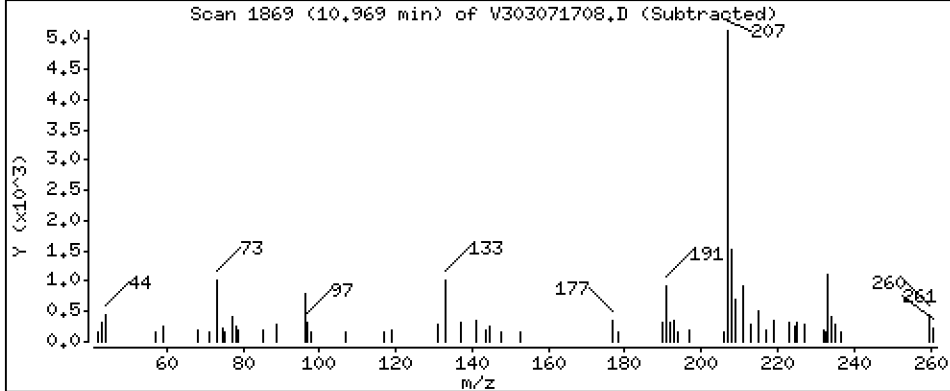
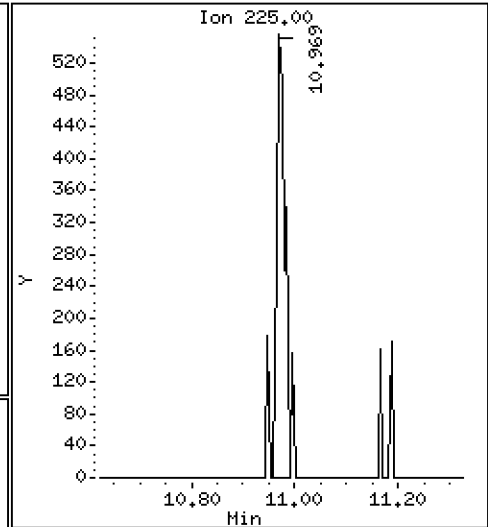
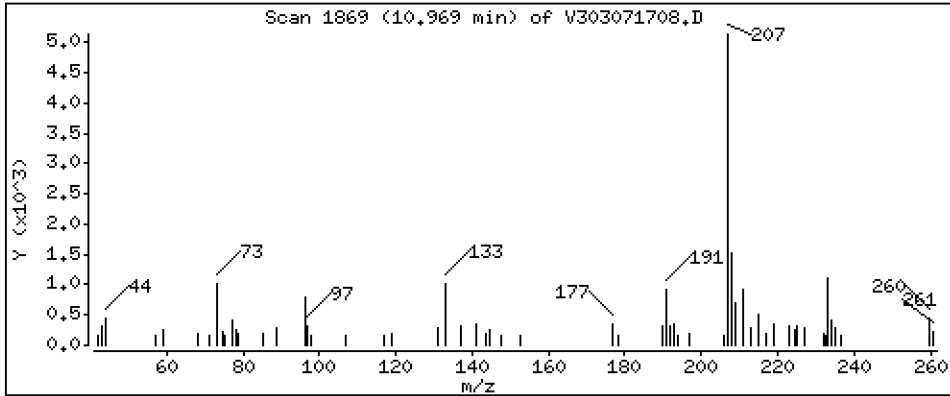
Operator: PC

Column phase: RTXVMS

Column diameter: 0.18

83 Hexachloro 1,3-Butadiene

Concentration: 0.07134 ug/L



Date : 07-MAR-2017 12:00

Client ID:

Instrument: nt3.i

Sample Info: BFC-BLK1

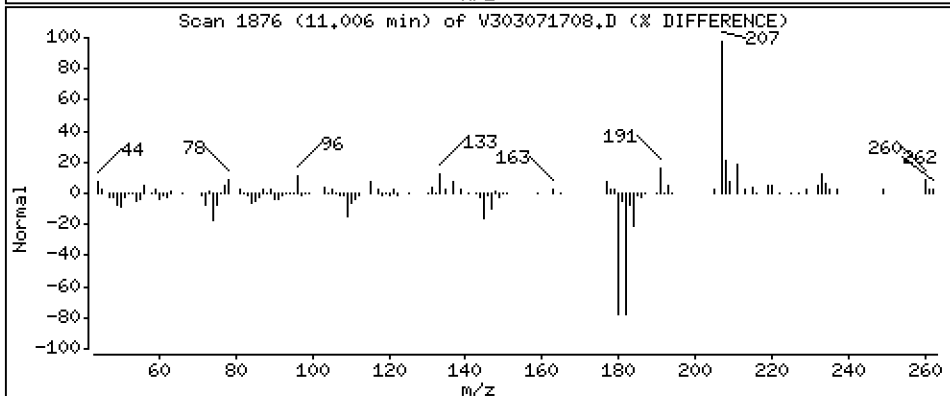
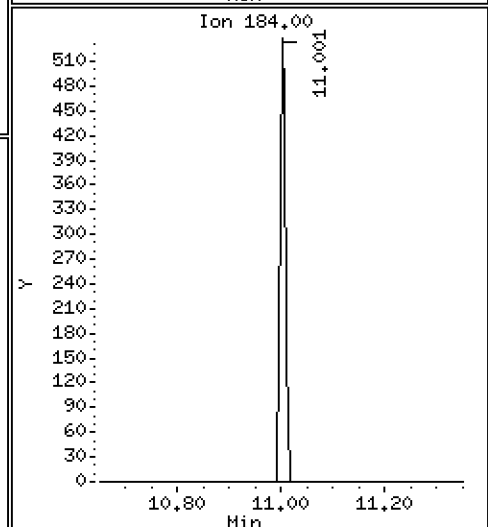
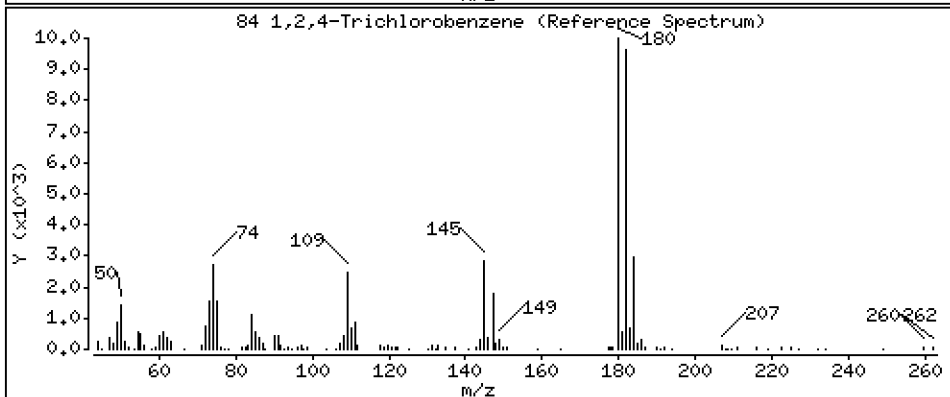
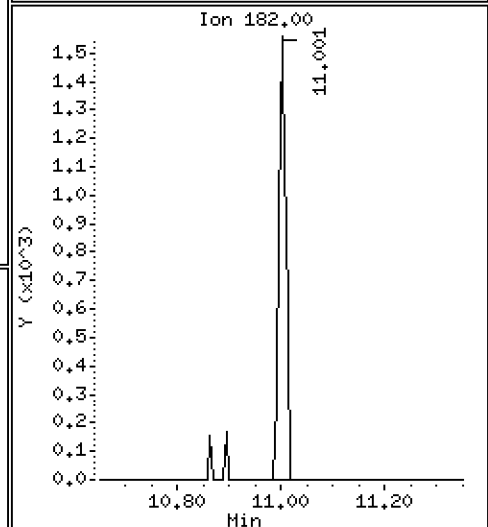
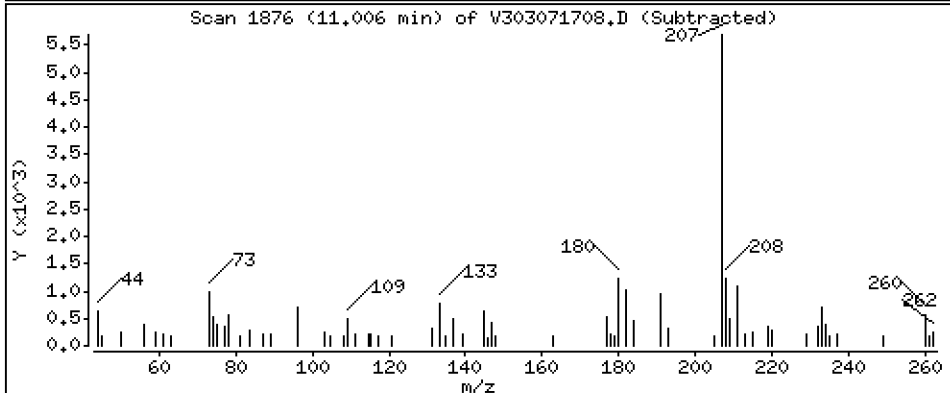
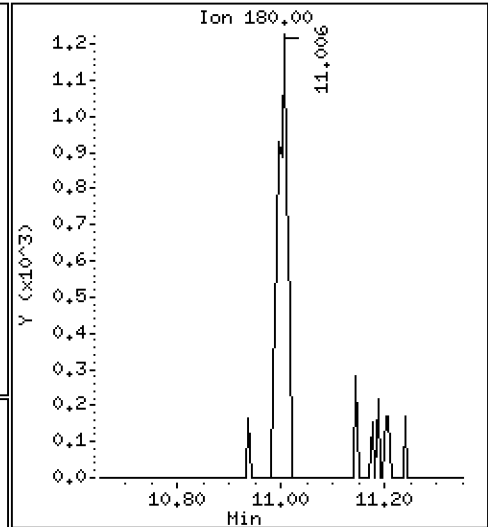
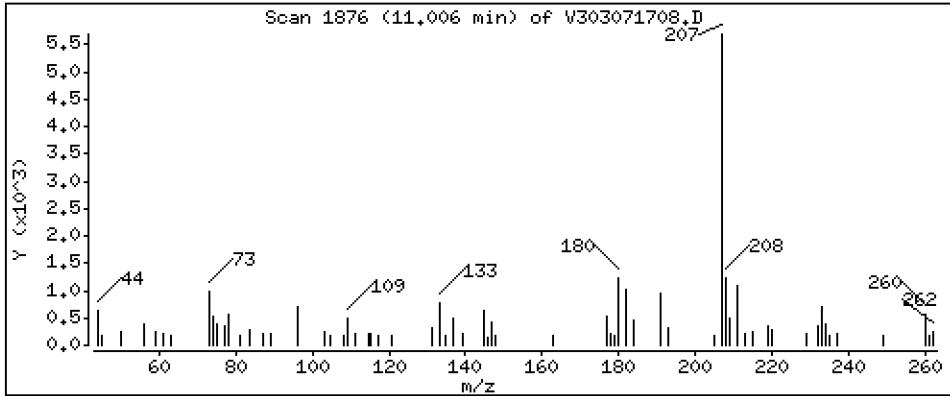
Operator: PC

Column phase: RTXVMS

Column diameter: 0,18

84 1,2,4-Trichlorobenzene

Concentration: 0,08370 ug/L



Date : 07-MAR-2017 12:00

Client ID:

Instrument: nt3.i

Sample Info: BFC-BLK1

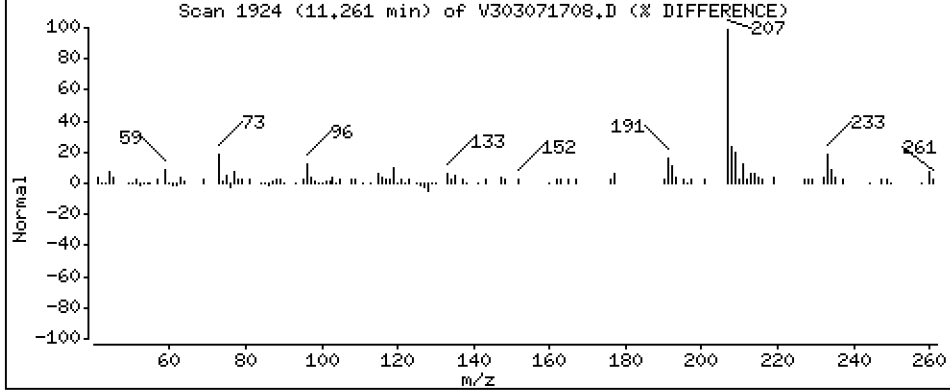
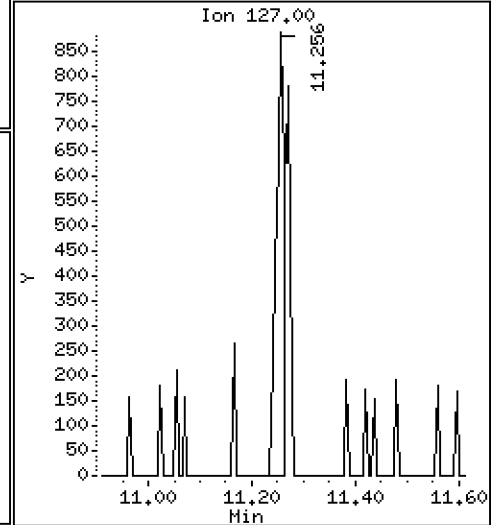
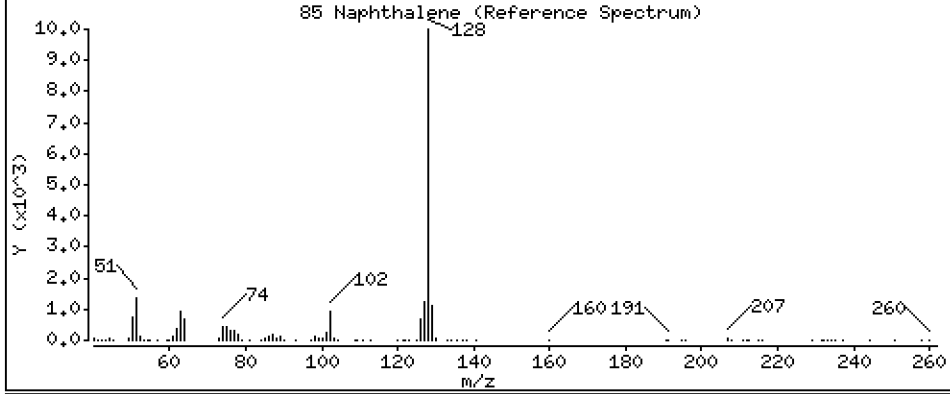
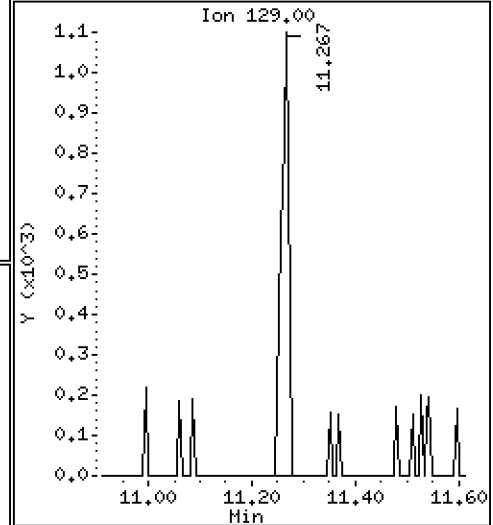
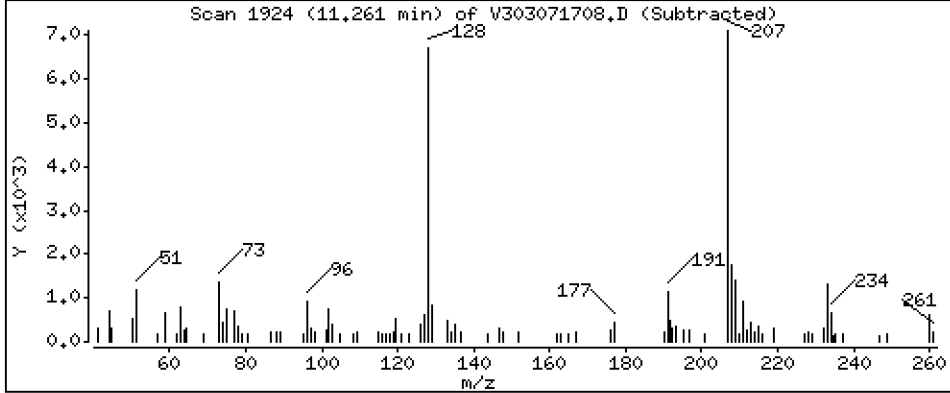
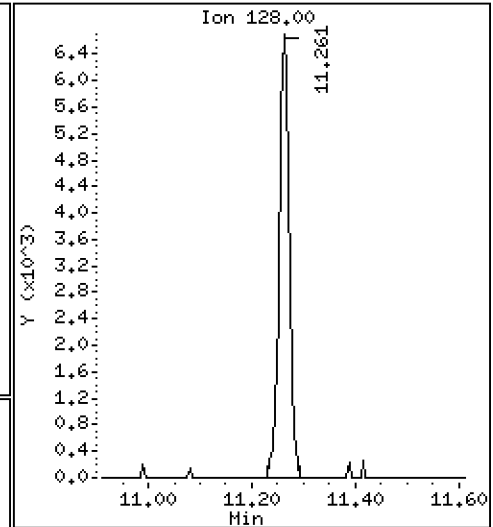
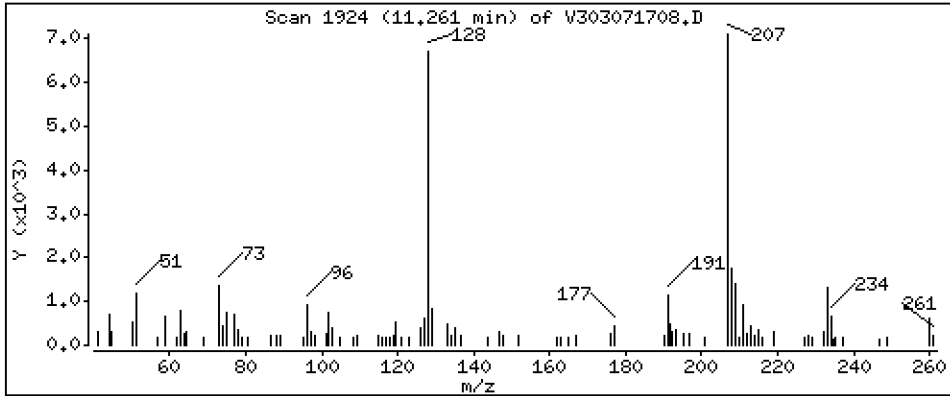
Operator: PC

Column phase: RTXVMS

Column diameter: 0.18

85 Naphthalene

Concentration: 0.2931 ug/L



Date : 07-MAR-2017 12:00

Client ID:

Instrument: nt3.i

Sample Info: BFC-BLK1

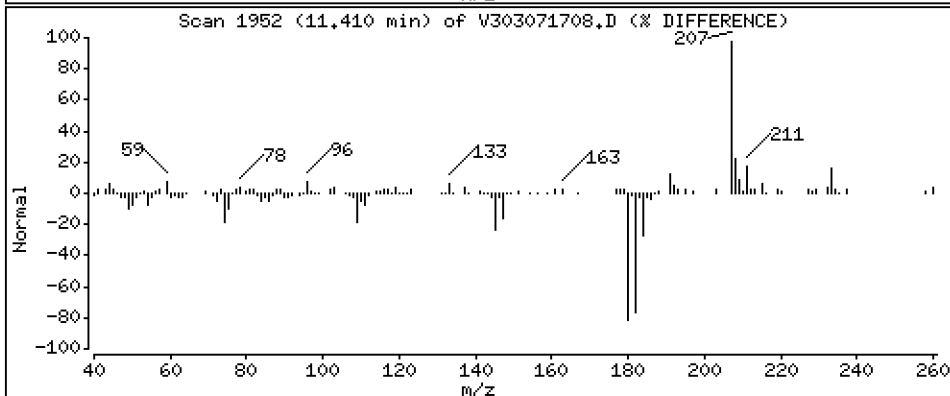
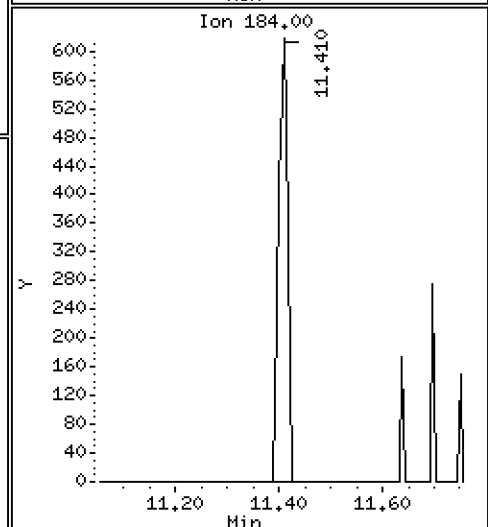
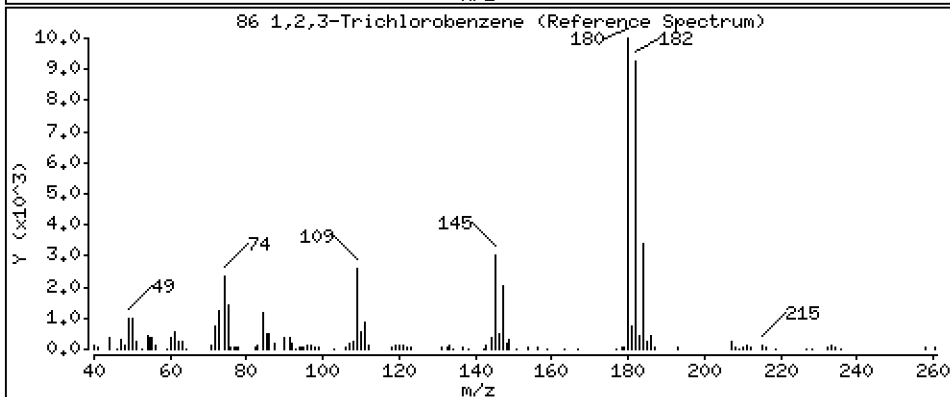
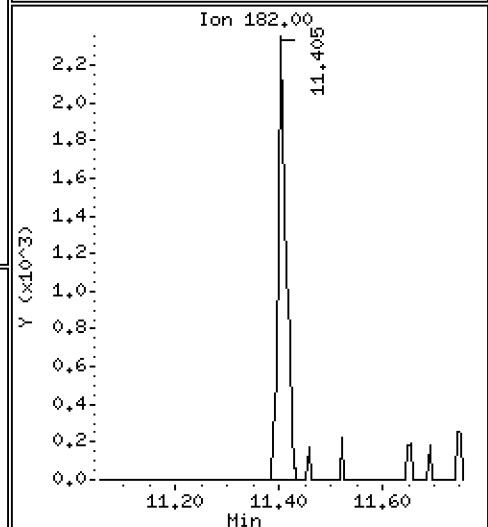
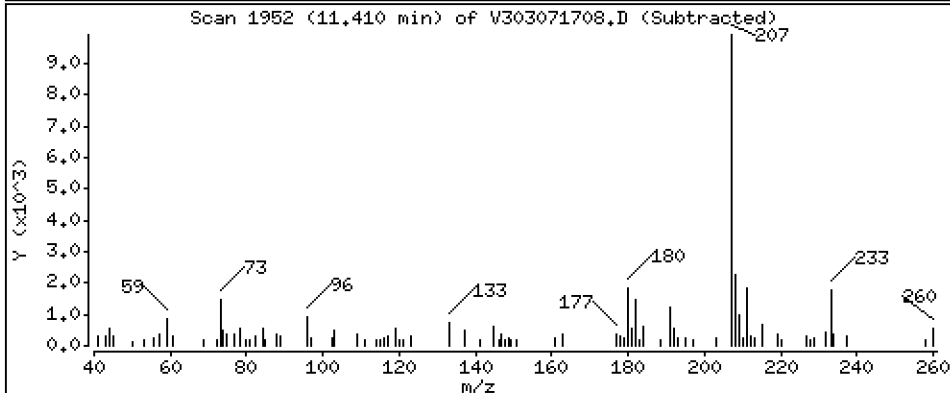
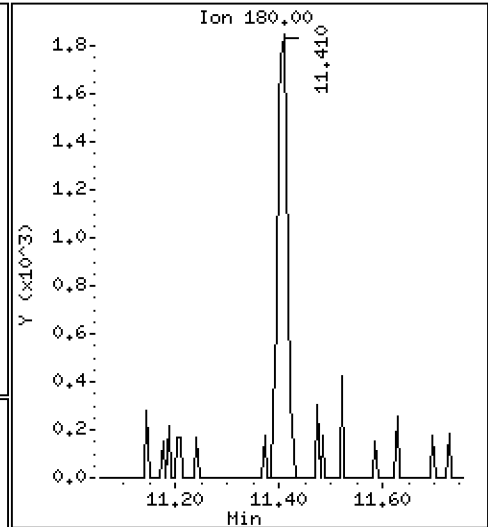
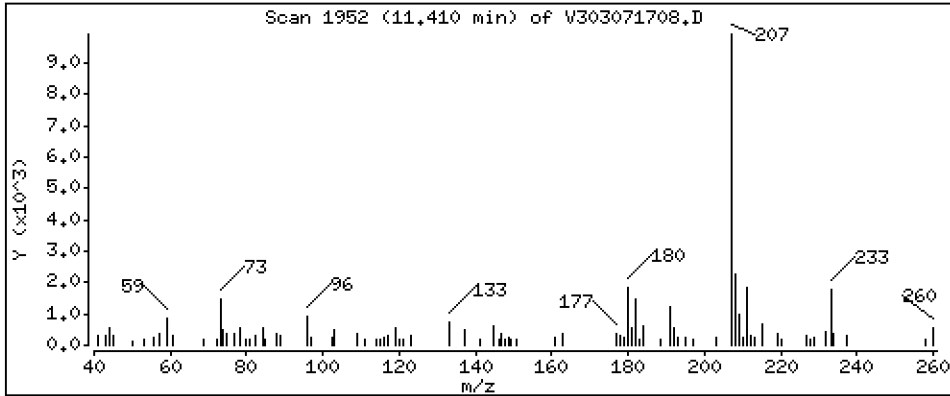
Operator: PC

Column phase: RTXVMS

Column diameter: 0.18

86 1,2,3-Trichlorobenzene

Concentration: 0.1828 ug/L



ARI Labs, Inc.

8260C 10 ml purge

Data file : \\target\share\chem1\nt3.i\20170307.b\V303071708.D
 Lab Smp Id: BFC-BLK1
 Inj Date : 07-MAR-2017 12:00
 Operator : PC Inst ID: nt3.i
 Smp Info : BFC-BLK1
 Misc Info : 16-
 Comment :
 Method : \\target\share\chem1\nt3.i\20170307.b\8260C022417.m
 Meth Date : 07-Mar-2017 12:07 patrickb Quant Type: ISTD
 Cal Date : 14-FEB-2017 18:50 Cal File: V302141718.D
 Als bottle: 12 QC Sample: BLANK
 Dil Factor: 1.00000
 Integrator: HP RTE Compound Sublist: mdl.sub
 Target Version: 4.14
 Processing Host: ORGDATA11

Compounds	QUANT	SIG	RT	EXP RT	REL RT	RESPONSE	CONCENTRATIONS	
							ON-COLUMN (ug/L)	FINAL (ug/L)
1 Dichlorodifluoromethane	85							
2 Chloromethane	50							
3 Vinyl Chloride	62							
4 Bromomethane	94							
5 Chloroethane	64							
6 Trichlorofluoromethane	101							
7 1,1-Dichloroethene	61							
8 Carbon Disulfide	76							
9 112Trichloro122Trifluoroethane	101							
10 Iodomethane	142							
11 Bromoethane	108							
12 Acrolein	56		3.336	3.320	(0.616)	97	0.03415	0.03415
13 Methylene Chloride	84							
14 Acetone	43							
15 Trans-1,2-Dichloroethene	96							
17 Methyl tert butyl ether	73							
18 1,1-Dichloroethane	63							
19 Acrylonitrile	53							
20 Vinyl Acetate	43							
22 Cis-1,2-Dichloroethene	96							
23 2,2-Dichloropropane	77							
24 Bromochloromethane	128							
25 Chloroform	83							
26 Carbon Tetrachloride	117							
\$ 27 Dibromofluoromethane	111		5.052	5.053	(0.932)	54884	4.81954	4.820 (R)
28 1,1,1-Trichloroethane	97							
30 1,1-Dichloropropene	75		4.946	5.148	(0.853)	1555	0.06783	0.06783
29 2-Butanone	43		5.403	5.191	(0.997)	342	0.04951	0.04951
31 Benzene	78		5.340	5.340	(0.920)	1382	0.02118	0.02118
* 32 Pentafluorobenzene	168		5.419	5.414	(1.000)	242396	10.0000	
\$ 33 d4-1,2-Dichloroethane	65		5.446	5.447	(1.005)	63935	4.96231	4.962 (R)
34 1,2-Dichloroethane	62							
36 Trichloroethene	130							

Compounds	QUANT	SIG	RT	EXP RT	REL RT	RESPONSE	CONCENTRATIONS	
							ON-COLUMN (ug/L)	FINAL (ug/L)
* 37 1,4-Difluorobenzene	114		5.802	5.803	(1.000)	388047	10.0000	
38 Dibromomethane	93		Compound Not Detected.					
39 1,2-Dichloropropane	63		Compound Not Detected.					
40 Bromodichloromethane	83		Compound Not Detected.					
173 2-Pentanone	86		6.764	6.429	(1.166)	401	0.25273	0.2527
41 2-Chloroethyl Vinyl Ether	63		6.753	6.594	(1.164)	177	0.02003	0.02003
42 Cis 1,3-dichloropropene	75		Compound Not Detected.					
\$ 43 d8-Toluene	98		6.764	6.759	(1.166)	232195	4.92900	4.929(R)
44 Toluene	92		Compound Not Detected.					
46 Tetrachloroethene	166		7.056	7.062	(0.900)	1668	0.09100	0.09100
45 4-Methyl-2-Pentanone	58		6.759	7.067	(1.165)	2123	0.39866	0.3987
47 Trans 1,3-Dichloropropene	75		Compound Not Detected.					
48 1,1,2-Trichloroethane	97		Compound Not Detected.					
49 Chlorodibromomethane	129		Compound Not Detected.					
50 1,3-Dichloropropane	76		Compound Not Detected.					
51 1,2-Dibromoethane	107		Compound Not Detected.					
52 2-Hexanone	43		7.848	7.652	(1.001)	852	0.08434	0.08434
* 53 d5-Chlorobenzene	117		7.843	7.843	(1.000)	375942	10.0000	
54 Chlorobenzene	112		Compound Not Detected.					
55 Ethyl Benzene	106		7.971	7.870	(1.016)	1092	0.04174	0.04174
56 1,1,1,2-Tetrachloroethane	131		Compound Not Detected.					
57 m,p-xylene	106		7.971	7.976	(1.016)	1092	0.03387	0.03387
58 o-Xylene	106		7.971	8.279	(1.016)	1092	0.03491	0.03491
59 Styrene	104		Compound Not Detected.					
60 Bromoform	173		Compound Not Detected.					
61 Isopropyl Benzene	105		Compound Not Detected.					
\$ 62 4-Bromofluorobenzene	174		8.715	8.715	(1.111)	78448	4.95677	4.957(R)
63 Bromobenzene	156		Compound Not Detected.					
64 N-Propyl Benzene	91		Compound Not Detected.					
65 1,1,2,2-Tetrachloroethane	83		Compound Not Detected.					
66 2-Chloro Toluene	91		Compound Not Detected.					
67 1,3,5-Trimethyl Benzene	105		8.869	8.949	(0.930)	2023	0.03018	0.03018
68 1,2,3-Trichloropropane	110		Compound Not Detected.					
69 Trans-1,4-Dichloro 2-Butene	53		Compound Not Detected.					
70 4-Chloro Toluene	91		Compound Not Detected.					
71 T-Butyl Benzene	119		Compound Not Detected.					
72 1,2,4-Trimethylbenzene	105		9.236	9.236	(0.969)	2311	0.03379	0.03379
73 S-Butyl Benzene	105		9.236	9.316	(0.969)	2311	0.02916	0.02916
74 4-Isopropyl Toluene	119		Compound Not Detected.					
75 1,3-Dichlorobenzene	146		Compound Not Detected.					
* 76 d4-1,4-Dichlorobenzene	152		9.533	9.534	(1.000)	203566	10.0000	
77 1,4-Dichlorobenzene	146		9.858	9.550	(1.034)	802	0.02040	0.02040
78 N-Butyl Benzene	91		9.741	9.736	(1.022)	1715	0.02966	0.02966
\$ 79 d4-1,2-Dichlorobenzene	152		9.858	9.858	(1.034)	94742	4.95855	4.959(R)
80 1,2-Dichlorobenzene	146		9.858	9.863	(1.034)	802	0.02269	0.02269
81 1,2-Dibromo 3-Chloropropane	75		10.480	10.480	(1.099)	258	0.12027	0.1203
83 Hexachloro 1,3-Butadiene	225		10.969	10.974	(1.151)	615	0.07134	0.07134
84 1,2,4-Trichlorobenzene	180		11.006	11.001	(1.154)	1663	0.08370	0.08370
85 Naphthalene	128		11.261	11.261	(1.181)	9395	0.29314	0.2931
86 1,2,3-Trichlorobenzene	180		11.410	11.405	(1.197)	2536	0.18278	0.1828

QC Flag Legend

R - Spike/Surrogate failed recovery limits.

ARI Labs, Inc.

INTERNAL STANDARD COMPOUNDS
 AREA AND RT SUMMARY

Instrument ID: nt3.i Calibration Date: 07-MAR-2017
 Lab File ID: V303071708.D Calibration Time: 09:51
 Lab Smp Id: BFC-BLK1
 Analysis Type: VOA Level:
 Quant Type: ISTD Sample Type:
 Operator: PC
 Method File: \\target\share\chem1\nt3.i\20170307.b\8260C022417.m
 Misc Info: 16-

Test Mode:

Use Initial Calibration Level 5.
 If Continuing Cal. use Initial Cal. Level 5

COMPOUND	STANDARD	AREA LIMIT		SAMPLE	%DIFF
		LOWER	UPPER		
32 Pentafluorobenzon	317912	158956	635824	242396	-23.75
37 1,4-Difluorobenze	512039	256020	1024078	388047	-24.22
53 d5-Chlorobenzene	494052	247026	988104	375942	-23.91
76 d4-1,4-Dichlorobe	282154	141077	564308	203566	-27.85

COMPOUND	STANDARD	RT LIMIT		SAMPLE	%DIFF
		LOWER	UPPER		
32 Pentafluorobenzon	5.41	4.91	5.91	5.42	0.09
37 1,4-Difluorobenze	5.80	5.30	6.30	5.80	-0.00
53 d5-Chlorobenzene	7.84	7.34	8.34	7.84	-0.00
76 d4-1,4-Dichlorobe	9.53	9.03	10.03	9.53	-0.00

AREA UPPER LIMIT = +100% of internal standard area.
 AREA LOWER LIMIT = - 50% of internal standard area.
 RT UPPER LIMIT = + 0.50 minutes of internal standard RT.
 RT LOWER LIMIT = - 0.50 minutes of internal standard RT.

ARI Labs, Inc.

RECOVERY REPORT

Client Name: Client SDG: 20150930a
Sample Matrix: NONE Fraction: VOA
Lab Smp Id: BFC-BLK1
Level: Operator: PC
Data Type: MS DATA SampleType: BLANK
SpikeList File: allspike.spk Quant Type: ISTD
Sublist File: mdl.sub
Method File: \\target\share\chem1\nt3.i\20170307.b\8260C022417.m
Misc Info: 16-

SURROGATE COMPOUND	AMOUNT ADDED ug/L	AMOUNT RECOVERED ug/L	% RECOVERED	LIMITS
\$ 27 Dibromofluorometha	5.000	4.820	96.39	
\$ 33 d4-1,2-Dichloroeth	5.000	4.962	99.25	
\$ 43 d8-Toluene	5.000	4.929	98.58	
\$ 62 4-Bromofluorobenze	5.000	4.957	99.14	
\$ 79 d4-1,2-Dichloroben	5.000	4.959	99.17	

REVIEW SUMMARY FOR FILE - V303071708.D

Lab ID: BFC-BLK1
nt3.i, 20170307.b\8260C022417.m, 07-MAR-2017 12:00

RT	CO-ELUTION COMPOUNDS
7.971	m,p-xylene and Ethyl Benzene
7.971	o-Xylene and Ethyl Benzene
9.236	1,2,4-Trimethylbenzene and S-Butyl Benzene
9.858	1,2-Dichlorobenzene and 1,4-Dichlorobenzene
9.858	d4-1,2-Dichlorobenzene and 1,4-Dichlorobenzene

Quant Method: ICAL

RRT CHECK

RRT	CCV	RRT	DELTA	COMPOUND

NONE				

On Column LOD for nt3.i, 8260C022417.m, mdl.sub = 0.0200

Data File: \\target\share\chem1\nt3.i\20170307s.b\V303071708GS.D Page 1
Report Date: 09-Mar-2017 08:32

ARI Labs, Inc.

8260C 10 ml purge
Data file : \\target\share\chem1\nt3.i\20170307s.b\V303071708GS.D
Lab Smp Id: BFC0157-BLK1
Inj Date : 07-MAR-2017 12:00
Operator : PC Inst ID: nt3.i
Smp Info : BFC0157-BLK1
Misc Info : 16-
Comment :
Method : \\target\share\chem1\nt3.i\20170307s.b\8260C022417.m
Meth Date : 06-Mar-2017 07:32 Paul Quant Type: ISTD
Cal Date : 14-FEB-2017 18:50 Cal File: V302141718.D
Als bottle: 12 QC Sample: BLANK
Dil Factor: 1.00000
Integrator: HP RTE Compound Sublist: gsurr.sub

Target Version: 4.14
Processing Host: ORGDATA11

Compounds	QUANT	SIG	RT	EXP RT	REL RT	RESPONSE	CONCENTRATIONS	
							ON-COLUMN (ug/L)	FINAL (ug/L)
=====	=====		=====	=====	=====	=====	=====	
\$ 27 Dibromofluoromethane	111		5.052	5.053	(0.932)	54037	4.74516	4.745(R)
* 32 Pentafluorobenzene	168		5.419	5.420	(1.000)	242396	10.0000	
\$ 33 d4-1,2-Dichloroethane	65		5.446	5.446	(1.005)	63935	4.96231	4.962(R)
* 37 1,4-Difluorobenzene	114		5.802	5.803	(1.000)	388047	10.0000	
\$ 43 d8-Toluene	98		6.764	6.765	(1.166)	232195	4.92900	4.929(R)
* 53 d5-Chlorobenzene	117		7.843	7.844	(1.000)	375942	10.0000	
\$ 62 4-Bromofluorobenzene	174		8.715	8.715	(1.111)	78448	4.95677	4.957(R)
* 76 d4-1,4-Dichlorobenzene	152		9.533	9.534	(1.000)	203566	10.0000	
\$ 79 d4-1,2-Dichlorobenzene	152		9.858	9.858	(1.034)	94742	4.95855	4.959(R)

QC Flag Legend

R - Spike/Surrogate failed recovery limits.

ARI Labs, Inc.

INTERNAL STANDARD COMPOUNDS
 AREA AND RT SUMMARY

Instrument ID: nt3.i Calibration Date: 03-MAR-2017
 Lab File ID: V303071708GS.D Calibration Time: 21:57
 Lab Smp Id: BFC0157-BLK1
 Analysis Type: VOA Level:
 Quant Type: ISTD Sample Type:
 Operator: PC
 Method File: \\target\share\chem1\nt3.i\20170307s.b\8260C022417.m
 Misc Info: 16-

Test Mode:

Use Initial Calibration Level 5.
 If Continuing Cal. use Initial Cal. Level 5

COMPOUND	STANDARD	AREA LIMIT		SAMPLE	%DIFF
		LOWER	UPPER		
32 Pentafluorobenzon	317912	158956	635824	242396	-23.75
37 1,4-Difluorobenze	512039	256020	1024078	388047	-24.22
53 d5-Chlorobenzene	494052	247026	988104	375942	-23.91
76 d4-1,4-Dichlorobe	282154	141077	564308	203566	-27.85

COMPOUND	STANDARD	RT LIMIT		SAMPLE	%DIFF
		LOWER	UPPER		
32 Pentafluorobenzon	5.42	4.92	5.92	5.42	-0.01
37 1,4-Difluorobenze	5.80	5.30	6.30	5.80	-0.01
53 d5-Chlorobenzene	7.84	7.34	8.34	7.84	-0.01
76 d4-1,4-Dichlorobe	9.53	9.03	10.03	9.53	-0.01

AREA UPPER LIMIT = +100% of internal standard area.
 AREA LOWER LIMIT = - 50% of internal standard area.
 RT UPPER LIMIT = + 0.50 minutes of internal standard RT.
 RT LOWER LIMIT = - 0.50 minutes of internal standard RT.

ARI Labs, Inc.

RECOVERY REPORT

Client Name: Client SDG: 20150930a
Sample Matrix: NONE Fraction: VOA
Lab Smp Id: BFC0157-BLK1
Level: Operator: PC
Data Type: MS DATA SampleType: BLANK
SpikeList File: allspike.spk Quant Type: ISTD
Sublist File: gsurr.sub
Method File: \\target\share\chem1\nt3.i\20170307s.b\8260C022417.m
Misc Info: 16-

SURROGATE COMPOUND	AMOUNT ADDED ug/L	AMOUNT RECOVERED ug/L	% RECOVERED	LIMITS
\$ 27 Dibromofluorometha	5.000	4.745	94.90	
\$ 33 d4-1,2-Dichloroeth	5.000	4.962	99.25	
\$ 43 d8-Toluene	5.000	4.929	98.58	
\$ 62 4-Bromofluorobenze	5.000	4.957	99.14	
\$ 79 d4-1,2-Dichloroben	5.000	4.959	99.17	

REVIEW SUMMARY FOR FILE - V303071708GS.D

Lab ID: BFC0157-BLK1

nt3.i, 20170307s.b\8260C022417.m, 07-MAR-2017 12:00

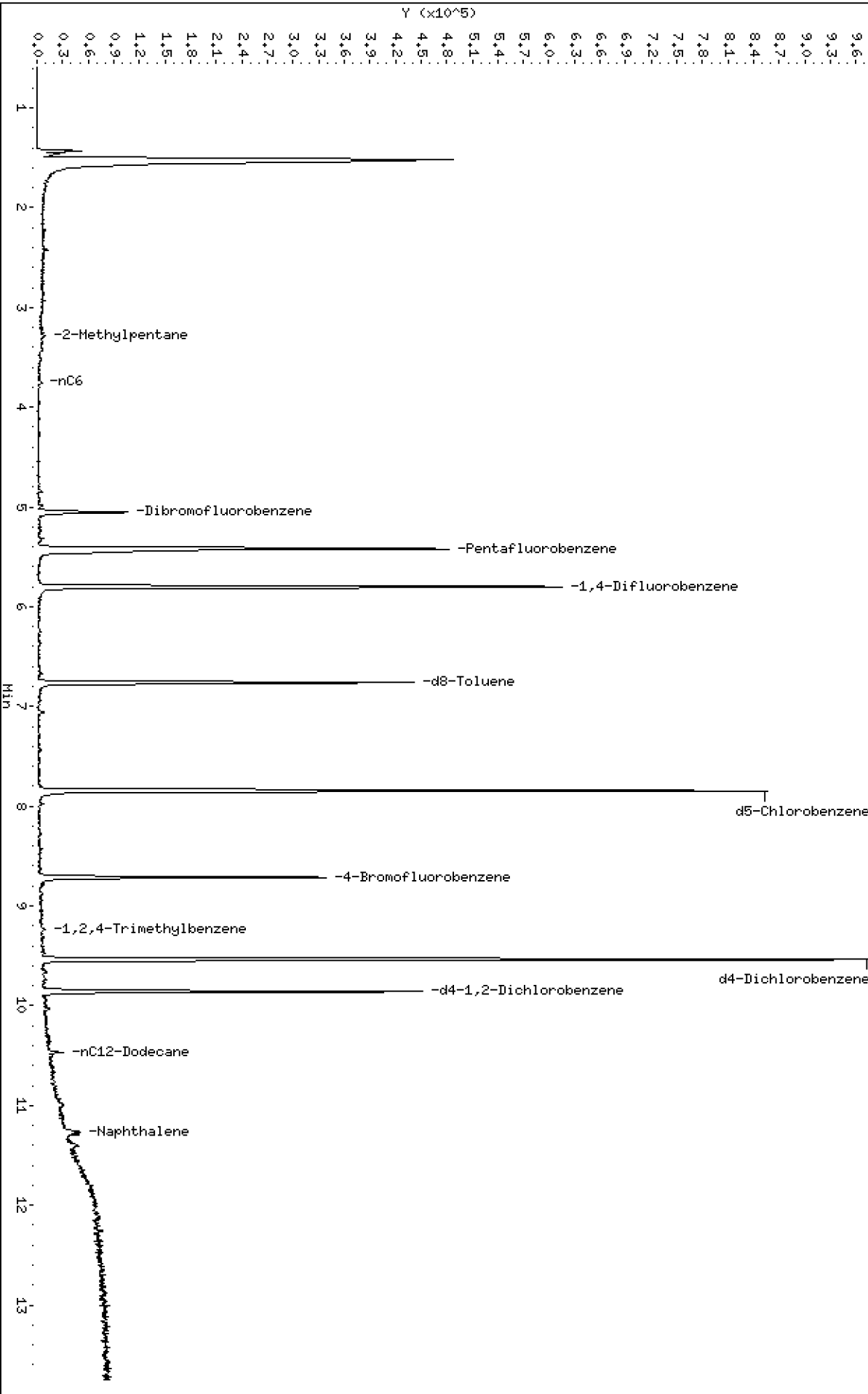
RT CO-ELUTION COMPOUNDS

Data File: \\target\share\chemd\nt3.1\20170307g.b\W30307170805.D
Date: 07-HRR-2017 12:00
Client ID:
Sample Info: BFC0157-BLK1

Column phase: RTXWMS

Instrument: nt3.1
Operator: PC
Column diameter: 0.18

\\target\share\chemd\nt3.1\20170307g.b\W30307170805.D



Analytical Resources Inc.
GC/MS Gas Quantitation Report

Data file: 20170307g.b/V303071708GS.D
Method: \20170307g.b\NWTPHG.m
Instrument: nt3.i
Gas Ical Date: 14-Feb-2017
Injection Date: 07-MAR-2017 12:00

ARI ID: BFC0157-BLK1
Client ID:
Matrix: NONE
Dilution Factor: 1.000
Operator: PC

=====

GASOLINE HYDROCARBONS

Range	RF	Total Area*	Amount (ug/mL)
-----	----	-----	-----
WAGas Tol-C12 (6.70 to 10.57)	52141375	150710	0.003
8015C 2MP-TMB (3.19 to 9.33)	87713511	149011	0.002
AK101 nC6-nC10 (3.65 to 8.68)	61260787	94927	0.002
NWTPHG Tol-Nap (6.70 to 11.36)	54123058	270559	0.005

M Indicates manual integration within range

* Surrogate areas are subtracted from Total Area

NW Gas Range Subtracted Peaks

6.765	670313	d8-Toluene
8.715	495410	4-Bromofluorobenzene
9.534	1342492	d4-Dichlorobenzene
7.844	1207115	d5-Chlorobenzene
9.858	641660	d4-1,2-Dichlorobenzene



Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

Volatile Organic Compounds - Quality Control

Batch BFC0157 - EPA 5035 (Methanol Extraction)

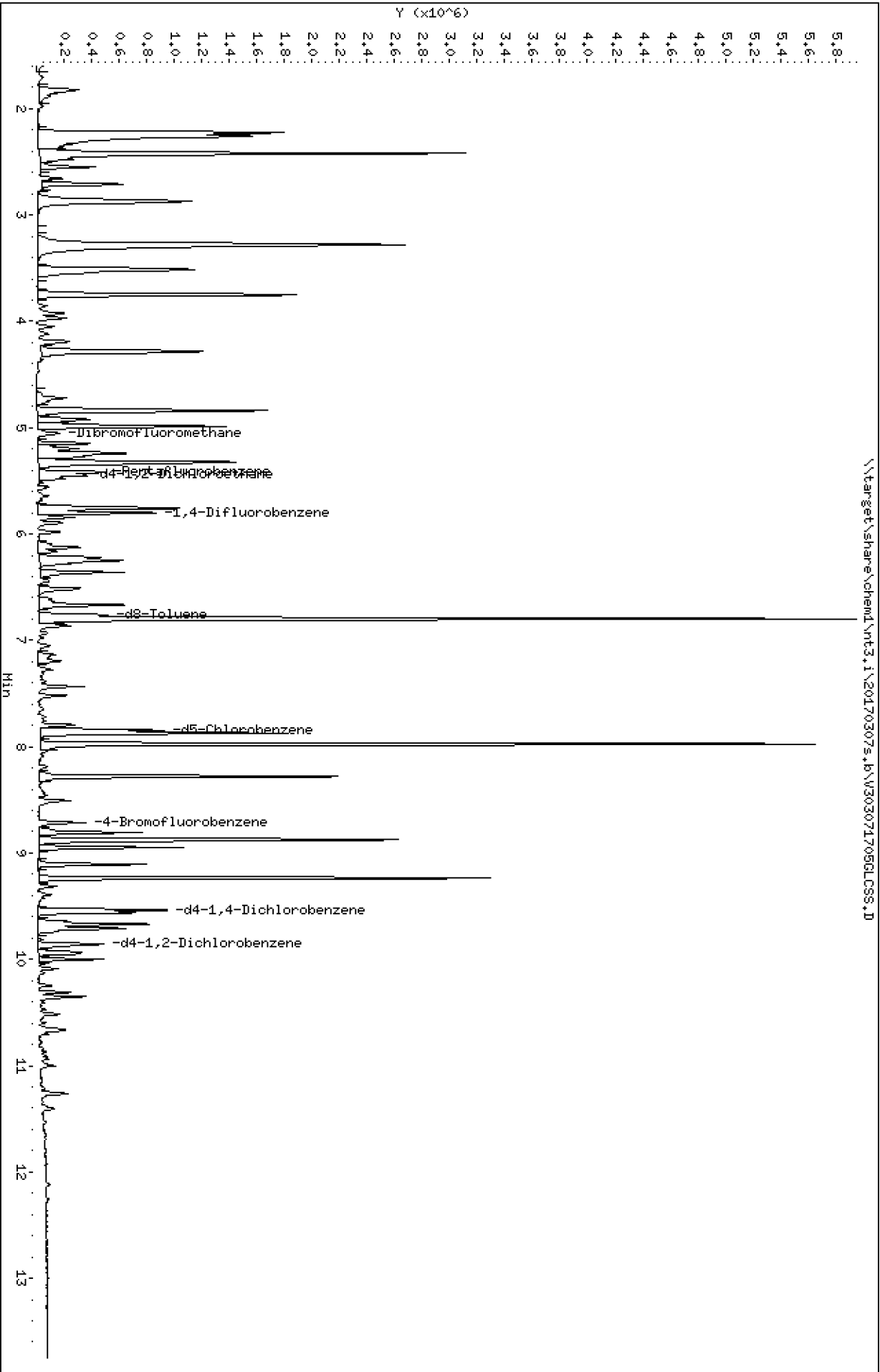
Instrument: NT3

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
LCS (BFC0157-BS1)				Prepared: 07-Mar-2017 Analyzed: 07-Mar-2017 10:42						
Gasoline Range Organics (Tol-Nap)	46000	5000	ug/kg	50000		92.1	70-121			
Surrogate: Toluene-d8	5.03		ug/kg	5.00		101	80-120			
Surrogate: 4-Bromofluorobenzene	5.06		ug/kg	5.00		101	78-123			

Data File: \\target\share\chemd\nt3.1\20170307s.b\303071705GLCSS.D
Date : 07-HRR-2017 10:42
Client ID:
Sample Info: BFC0157-BS1

Column phase: RTXWMS

Instrument: nt3.1
Operator: PC
Column diameter: 0.18



ARI Labs, Inc.

8260C 10 ml purge

Data file : \\target\share\chem1\nt3.i\20170307s.b\V303071705GLCSS.D
Lab Smp Id: BFC0157-BS1
Inj Date : 07-MAR-2017 10:42
Operator : PC
Smp Info : BFC0157-BS1
Misc Info : 15-
Comment :
Method : \\target\share\chem1\nt3.i\20170307s.b\8260C022417.m
Meth Date : 06-Mar-2017 07:32 Paul
Cal Date : 14-FEB-2017 18:50
Als bottle: 12
Dil Factor: 1.00000
Integrator: HP RTE
Target Version: 4.14
Processing Host: ORGDATA11

Inst ID: nt3.i

Quant Type: ISTD

Cal File: V302141718.D

Compound Sublist: gsurr.sub

Concentration Formula: Amt * DF * Pv / Sa * CpndVariable

Name	Value	Description
DF	1.000	Dilution Factor
Pv	10.000	Purge Volume (mL)
Sa	10.000	Sample Amount (mL)
Cpnd Variable		Local Compound Variable

Compounds	QUANT	SIG	RT	EXP RT	REL RT	RESPONSE	CONCENTRATIONS	
							ON-COLUMN (ug/L)	FINAL (ug/L)
\$ 27 Dibromofluoromethane	111		5.052	5.053	(0.932)	56520	4.77143	4.771
* 32 Pentafluorobenzene	168		5.419	5.420	(1.000)	252138	10.0000	
\$ 33 d4-1,2-Dichloroethane	65		5.446	5.446	(1.005)	75385	5.62493	5.625
* 37 1,4-Difluorobenzene	114		5.802	5.803	(1.000)	402633	10.0000	
\$ 43 d8-Toluene	98		6.764	6.765	(1.166)	245908	5.03099	5.031
* 53 d5-Chlorobenzene	117		7.843	7.844	(1.000)	395250	10.0000	
\$ 62 4-Bromofluorobenzene	174		8.715	8.715	(1.111)	84183	5.05929	5.059
* 76 d4-1,4-Dichlorobenzene	152		9.538	9.534	(1.000)	216091	10.0000	
\$ 79 d4-1,2-Dichlorobenzene	152		9.857	9.858	(1.033)	98617	4.86220	4.862

ARI Labs, Inc.

INTERNAL STANDARD COMPOUNDS
AREA AND RT SUMMARY

Instrument ID: nt3.i
Lab File ID: V303071705GLCSS.D
Lab Smp Id: BFC0157-BS1
Analysis Type: VOA
Quant Type: ISTD
Operator: PC
Method File: \\target\share\chem1\nt3.i\20170307s.b\8260C022417.m
Misc Info: 15-

Calibration Date: 03-MAR-2017
Calibration Time: 21:57
Level: LOW
Sample Type: WATER

Test Mode:

Use Initial Calibration Level 5.
If Continuing Cal. use Initial Cal. Level 5

COMPOUND	STANDARD	AREA LIMIT		SAMPLE	%DIFF
		LOWER	UPPER		
32 Pentafluorobenzen	317912	158956	635824	252138	-20.69
37 1,4-Difluorobenze	512039	256020	1024078	402633	-21.37
53 d5-Chlorobenzene	494052	247026	988104	395250	-20.00
76 d4-1,4-Dichlorobe	282154	141077	564308	216091	-23.41

COMPOUND	STANDARD	RT LIMIT		SAMPLE	%DIFF
		LOWER	UPPER		
32 Pentafluorobenzen	5.42	4.92	5.92	5.42	-0.02
37 1,4-Difluorobenze	5.80	5.30	6.30	5.80	-0.02
53 d5-Chlorobenzene	7.84	7.34	8.34	7.84	-0.01
76 d4-1,4-Dichlorobe	9.53	9.03	10.03	9.54	0.05

AREA UPPER LIMIT = +100% of internal standard area.
AREA LOWER LIMIT = - 50% of internal standard area.
RT UPPER LIMIT = + 0.50 minutes of internal standard RT.
RT LOWER LIMIT = - 0.50 minutes of internal standard RT.

ARI Labs, Inc.

RECOVERY REPORT

Client Name: Client SDG: 20151005
Sample Matrix: LIQUID Fraction: VOA
Lab Smp Id: BFC0157-BS1
Level: LOW Operator: PC
Data Type: MS DATA SampleType: SAMPLE
SpikeList File: allspike.spk Quant Type: ISTD
Sublist File: gsurr.sub
Method File: \\target\share\chem1\nt3.i\20170307s.b\8260C022417.m
Misc Info: 15-

SURROGATE COMPOUND	AMOUNT ADDED ug/L	AMOUNT RECOVERED ug/L	% RECOVERED	LIMITS
\$ 27 Dibromofluorometha	5.000	4.771	95.43	80-120
\$ 33 d4-1,2-Dichloroeth	5.000	5.625	112.50	80-128
\$ 43 d8-Toluene	5.000	5.031	100.62	80-120
\$ 62 4-Bromofluorobenze	5.000	5.059	101.19	80-120
\$ 79 d4-1,2-Dichloroben	5.000	4.862	97.24	80-120

REVIEW SUMMARY FOR FILE - V303071705GLCSS.D

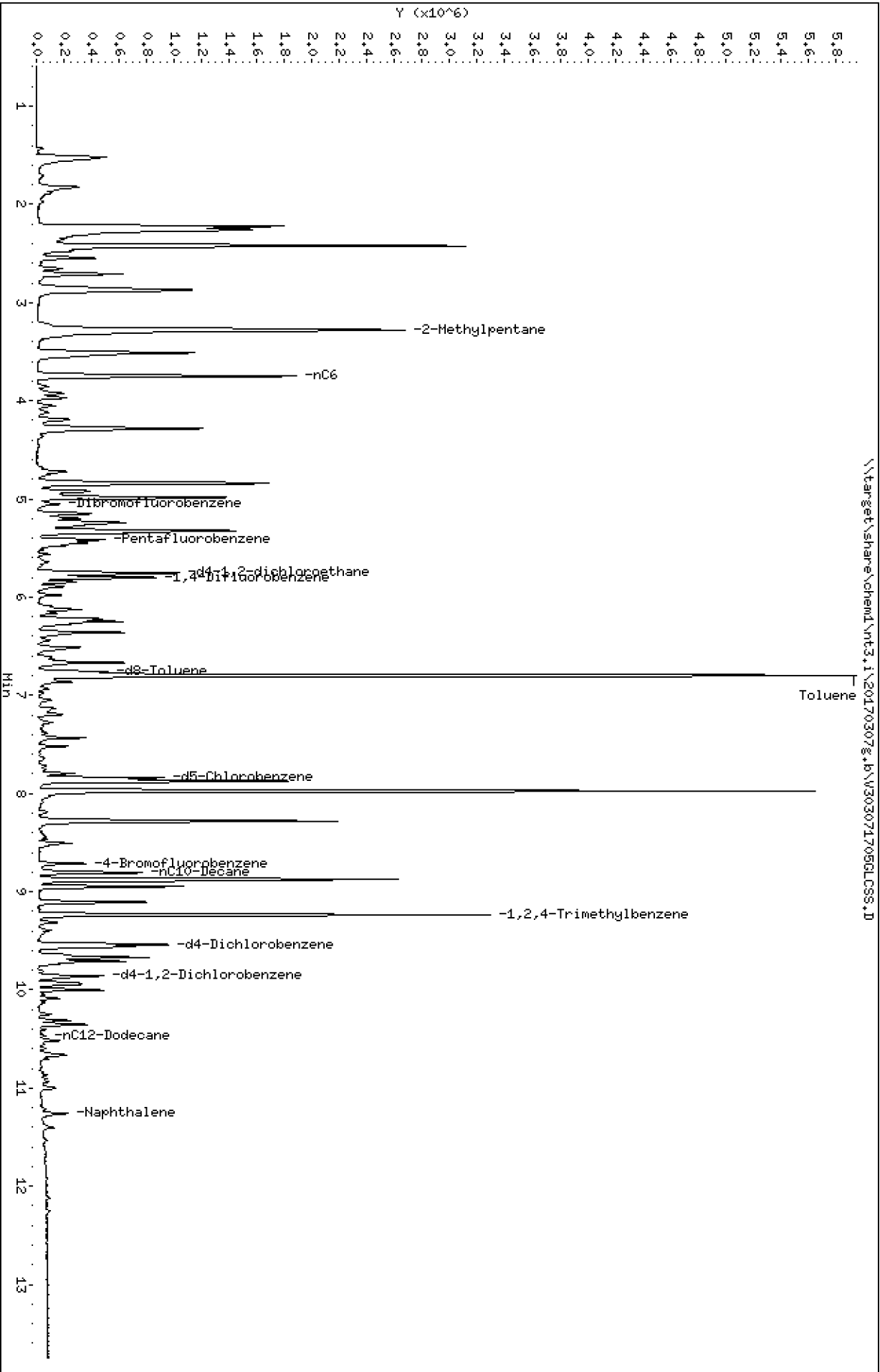
Lab ID: BFC0157-BS1
nt3.i, 20170307s.b\8260C022417.m, 07-MAR-2017 10:42

RT CO-ELUTION COMPOUNDS

Data File: \\target\share\chemd\nt3.1\20170307g.b\303071705GLCSS.D
Date: 07-HRR-2017 10:42
Client ID:
Sample Info: BFC0157-BS1

Column phase: RTXWMS

Instrument: nt3.1
Operator: PC
Column diameter: 0.18



Analytical Resources Inc.
GC/MS Gas Quantitation Report

Data file: 20170307g.b/V303071705GLCSS.D
Method: \20170307g.b\NWTPHG.m
Instrument: nt3.i
Gas Ical Date: 14-Feb-2017
Injection Date: 07-MAR-2017 10:42

ARI ID: BFC0157-BS1
Client ID:
Matrix: WATER
Dilution Factor: 1.000
Operator: PC

=====

GASOLINE HYDROCARBONS

Range	RF	Total Area*	Amount (ug/mL)
WAGas Tol-C12 (6.70 to 10.57)	52141375	48310678	0.927
8015C 2MP-TMB (3.19 to 9.33)	87713511	81920742	0.934
AK101 nC6-nC10 (3.65 to 8.68)	61260787	58833913	0.960
NWTPHG Tol-Nap (6.70 to 11.36)	54123058	49823377	0.921

M Indicates manual integration within range

* Surrogate areas are subtracted from Total Area

NW Gas Range Subtracted Peaks

6.764	738094	d8-Toluene
8.715	557581	4-Bromofluorobenzene
9.539	1369038	d4-Dichlorobenzene
7.843	1257828	d5-Chlorobenzene
9.858	866210	d4-1,2-Dichlorobenzene



Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

Volatile Organic Compounds - Quality Control

Batch BFC0157 - EPA 5035 (Methanol Extraction)

Instrument: NT3

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
LCS Dup (BFC0157-BSD1)				Prepared: 07-Mar-2017 Analyzed: 07-Mar-2017 11:08						
Gasoline Range Organics (Tol-Nap)	44000	5000	ug/kg	50000		87.9	70-121	4.58	30	
Surrogate: Toluene-d8	5.10		ug/kg	5.00		102	80-120			
Surrogate: 4-Bromofluorobenzene	5.04		ug/kg	5.00		101	78-123			

ARI Labs, Inc.

8260C 10 ml purge

Data file : \\target\share\chem1\nt3.i\20170307s.b\V303071706GS.D
 Lab Smp Id: BFC0157-BSD1
 Inj Date : 07-MAR-2017 11:08
 Operator : PC
 Smp Info : BFC0157-BSD1
 Misc Info : 15-
 Comment :
 Method : \\target\share\chem1\nt3.i\20170307s.b\8260C022417.m
 Meth Date : 06-Mar-2017 07:32 Paul
 Cal Date : 14-FEB-2017 18:50
 Als bottle: 12
 Dil Factor: 1.00000
 Integrator: HP RTE
 Target Version: 4.14
 Processing Host: ORGDATA11

Inst ID: nt3.i

Quant Type: ISTD
 Cal File: V302141718.D

Compound Sublist: gsurr.sub

Concentration Formula: Amt * DF * Pv / Sa * CpndVariable

Name	Value	Description
DF	1.000	Dilution Factor
Pv	10.000	Purge Volume (mL)
Sa	10.000	Sample Amount (mL)
Cpnd Variable		Local Compound Variable

Compounds	QUANT	SIG	RT	EXP RT	REL RT	RESPONSE	CONCENTRATIONS	
							ON-COLUMN (ug/L)	FINAL (ug/L)
\$ 27 Dibromofluoromethane	111		5.053	5.053	(0.932)	58177	4.90614	4.906
* 32 Pentafluorobenzene	168		5.420	5.420	(1.000)	252404	10.0000	
\$ 33 d4-1,2-Dichloroethane	65		5.446	5.446	(1.005)	73657	5.49020	5.490
* 37 1,4-Difluorobenzene	114		5.803	5.803	(1.000)	407823	10.0000	
\$ 43 d8-Toluene	98		6.765	6.765	(1.166)	252254	5.09515	5.095
* 53 d5-Chlorobenzene	117		7.844	7.844	(1.000)	400138	10.0000	
\$ 62 4-Bromofluorobenzene	174		8.715	8.715	(1.111)	84979	5.04475	5.045
* 76 d4-1,4-Dichlorobenzene	152		9.534	9.534	(1.000)	215822	10.0000	
\$ 79 d4-1,2-Dichlorobenzene	152		9.858	9.858	(1.034)	100754	4.97376	4.974

ARI Labs, Inc.

INTERNAL STANDARD COMPOUNDS
AREA AND RT SUMMARY

Instrument ID: nt3.i
Lab File ID: V303071706GS.D
Lab Smp Id: BFC0157-BSD1
Analysis Type: VOA
Quant Type: ISTD
Operator: PC
Method File: \\target\share\chem1\nt3.i\20170307s.b\8260C022417.m
Misc Info: 15-

Calibration Date: 03-MAR-2017
Calibration Time: 21:57
Level: LOW
Sample Type: WATER

Test Mode:

Use Initial Calibration Level 5.
If Continuing Cal. use Initial Cal. Level 5

COMPOUND	STANDARD	AREA LIMIT		SAMPLE	%DIFF
		LOWER	UPPER		
32 Pentafluorobenzen	317912	158956	635824	252404	-20.61
37 1,4-Difluorobenze	512039	256020	1024078	407823	-20.35
53 d5-Chlorobenzene	494052	247026	988104	400138	-19.01
76 d4-1,4-Dichlorobe	282154	141077	564308	215822	-23.51

COMPOUND	STANDARD	RT LIMIT		SAMPLE	%DIFF
		LOWER	UPPER		
32 Pentafluorobenzen	5.42	4.92	5.92	5.42	0.00
37 1,4-Difluorobenze	5.80	5.30	6.30	5.80	0.00
53 d5-Chlorobenzene	7.84	7.34	8.34	7.84	0.00
76 d4-1,4-Dichlorobe	9.53	9.03	10.03	9.53	0.00

AREA UPPER LIMIT = +100% of internal standard area.
AREA LOWER LIMIT = - 50% of internal standard area.
RT UPPER LIMIT = + 0.50 minutes of internal standard RT.
RT LOWER LIMIT = - 0.50 minutes of internal standard RT.

ARI Labs, Inc.

RECOVERY REPORT

Client Name: Client SDG: 20151005
Sample Matrix: LIQUID Fraction: VOA
Lab Smp Id: BFC0157-BSD1
Level: LOW Operator: PC
Data Type: MS DATA SampleType: SAMPLE
SpikeList File: allspike.spk Quant Type: ISTD
Sublist File: gsurr.sub
Method File: \\target\share\chem1\nt3.i\20170307s.b\8260C022417.m
Misc Info: 15-

SURROGATE COMPOUND	AMOUNT ADDED ug/L	AMOUNT RECOVERED ug/L	% RECOVERED	LIMITS
\$ 27 Dibromofluorometha	5.000	4.906	98.12	80-120
\$ 33 d4-1,2-Dichloroeth	5.000	5.490	109.80	80-128
\$ 43 d8-Toluene	5.000	5.095	101.90	80-120
\$ 62 4-Bromofluorobenze	5.000	5.045	100.89	80-120
\$ 79 d4-1,2-Dichloroben	5.000	4.974	99.48	80-120

REVIEW SUMMARY FOR FILE - V303071706GS.D

Lab ID: BFC0157-BSD1

nt3.i, 20170307s.b\8260C022417.m,

07-MAR-2017 11:08

RT

CO-ELUTION COMPOUNDS

Data File: \\target\share\chemd\nt3.1\20170307g.b\W303071706GS.D

Date : 07-MAR-2017 11:08

Client ID:

Sample Info: BFC0157-BSM1

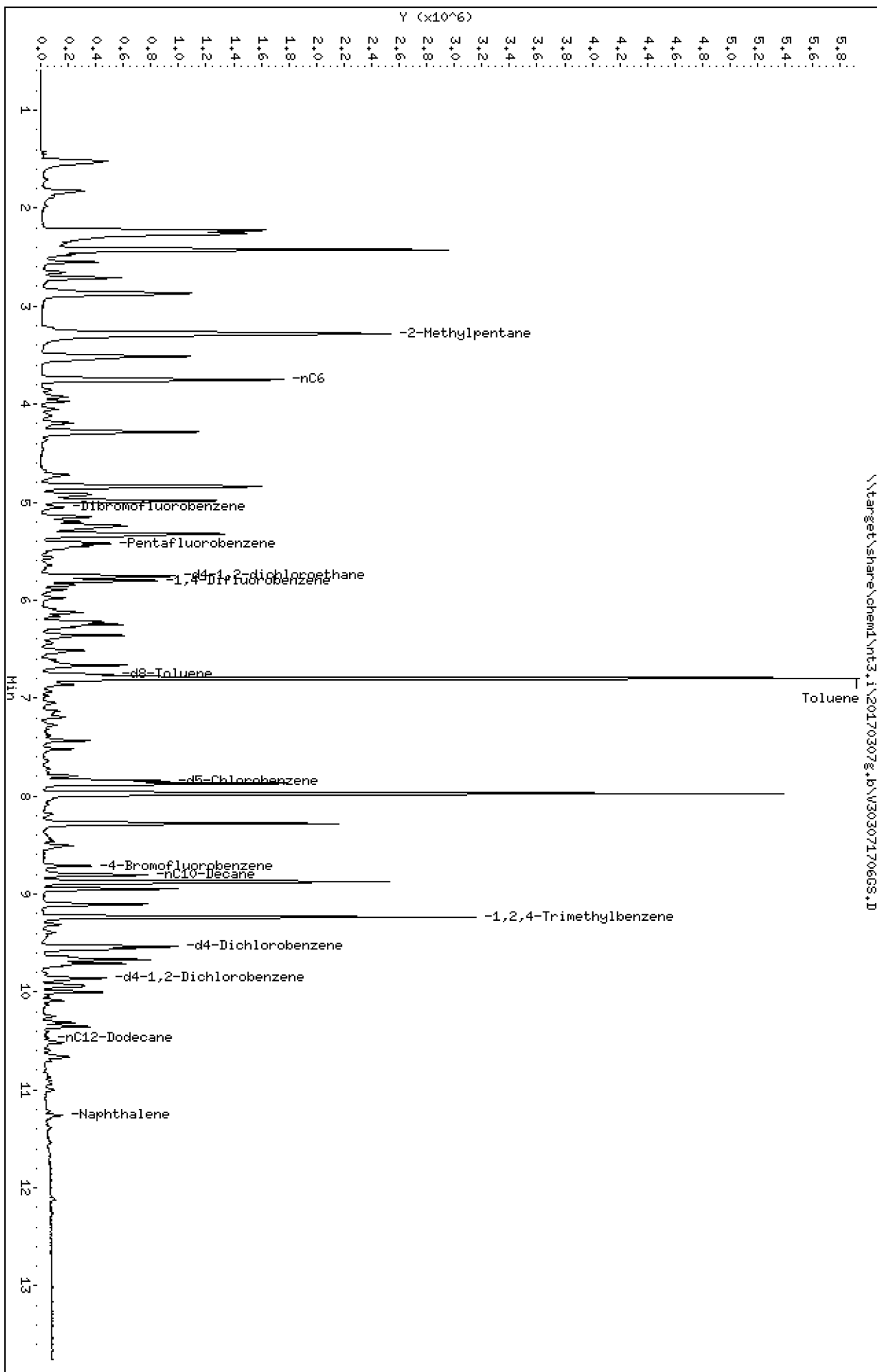
Column phase: RTXWMS

Instrument: nt3.1

Operator: PC

Column diameter: 0.18

Page 1



Analytical Resources Inc.
GC/MS Gas Quantitation Report

Data file: 20170307g.b/V303071706GS.D
Method: \20170307g.b\NWTPHG.m
Instrument: nt3.i
Gas Ical Date: 14-Feb-2017
Injection Date: 07-MAR-2017 11:08

ARI ID: BFC0157-BSD1
Client ID:
Matrix: WATER
Dilution Factor: 1.000
Operator: PC

=====

GASOLINE HYDROCARBONS

Range	RF	Total Area*	Amount (ug/mL)
WAGas Tol-C12 (6.70 to 10.57)	52141375	46230127	0.887
8015C 2MP-TMB (3.19 to 9.33)	87713511	77948354	0.889
AK101 nC6-nC10 (3.65 to 8.68)	61260787	56024780	0.915
NWTPHG Tol-Nap (6.70 to 11.36)	54123058	47592122	0.879

M Indicates manual integration within range

* Surrogate areas are subtracted from Total Area

NW Gas Range Subtracted Peaks

6.765	761765	d8-Toluene
8.716	545469	4-Bromofluorobenzene
9.535	1406820	d4-Dichlorobenzene
7.844	1300155	d5-Chlorobenzene
9.859	834604	d4-1,2-Dichlorobenzene



Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

Volatile Organic Compounds - Quality Control

Batch BFC0220 - EPA 5035 (Methanol Extraction)

Instrument: NT5

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BFC0220-BLK1)				Prepared: 06-Mar-2017 Analyzed: 06-Mar-2017 12:02						
1,2-Dichloroethane	ND	50.0	ug/kg							U
Benzene	ND	50.0	ug/kg							U
Toluene	ND	50.0	ug/kg							U
Ethylbenzene	ND	50.0	ug/kg							U
m,p-Xylene	ND	50.0	ug/kg							U
o-Xylene	ND	50.0	ug/kg							U
<i>Surrogate: Dibromofluoromethane</i>	44.6		ug/kg	50.0		89.3	30-160			
<i>Surrogate: 1,2-Dichloroethane-d4</i>	42.4		ug/kg	50.0		84.7	80-124			
<i>Surrogate: Toluene-d8</i>	49.4		ug/kg	50.0		98.7	80-120			
<i>Surrogate: 4-Bromofluorobenzene</i>	51.5		ug/kg	50.0		103	80-120			
<i>Surrogate: 1,2-Dichlorobenzene-d4</i>	50.0		ug/kg	50.0		100	80-120			



Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

Volatile Organic Compounds - Quality Control

Batch BFC0220 - EPA 5035 (Methanol Extraction)

Instrument: NT5

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
LCS (BFC0220-BS1)				Prepared: 06-Mar-2017 Analyzed: 06-Mar-2017 10:44						
1,2-Dichloroethane	2370		ug/kg	2500		95.0	75-120			
Benzene	2580		ug/kg	2500		103	80-120			
Toluene	2670		ug/kg	2500		107	77-120			
Ethylbenzene	2610		ug/kg	2500		105	79-122			
m,p-Xylene	5350		ug/kg	5000		107	81-122			
o-Xylene	2650		ug/kg	2500		106	79-120			
<i>Surrogate: Dibromofluoromethane</i>	49.9		ug/kg	50.0		99.7	30-160			
<i>Surrogate: 1,2-Dichloroethane-d4</i>	46.1		ug/kg	50.0		92.3	80-124			
<i>Surrogate: Toluene-d8</i>	49.7		ug/kg	50.0		99.5	80-120			
<i>Surrogate: 4-Bromofluorobenzene</i>	51.0		ug/kg	50.0		102	80-120			
<i>Surrogate: 1,2-Dichlorobenzene-d4</i>	50.6		ug/kg	50.0		101	80-120			



Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

Volatile Organic Compounds - Quality Control

Batch BFC0220 - EPA 5035 (Methanol Extraction)

Instrument: NT5

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
LCS Dup (BFC0220-BSD1)				Prepared: 06-Mar-2017 Analyzed: 06-Mar-2017 11:39						
1,2-Dichloroethane	2250		ug/kg	2500		90.2	75-120	5.17	30	
Benzene	2510		ug/kg	2500		100	80-120	2.72	30	
Toluene	2600		ug/kg	2500		104	77-120	2.62	30	
Ethylbenzene	2590		ug/kg	2500		104	79-122	0.83	30	
m,p-Xylene	5390		ug/kg	5000		108	81-122	0.63	30	
o-Xylene	2650		ug/kg	2500		106	79-120	0.11	30	
<i>Surrogate: Dibromofluoromethane</i>	49.9		ug/kg	50.0		99.8	30-160			
<i>Surrogate: 1,2-Dichloroethane-d4</i>	45.1		ug/kg	50.0		90.2	80-124			
<i>Surrogate: Toluene-d8</i>	49.0		ug/kg	50.0		98.1	80-120			
<i>Surrogate: 4-Bromofluorobenzene</i>	51.5		ug/kg	50.0		103	80-120			
<i>Surrogate: 1,2-Dichlorobenzene-d4</i>	50.6		ug/kg	50.0		101	80-120			



Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

Volatile Organic Compounds - Quality Control

Batch BFC0221 - EPA 5035 (Methanol Extraction)

Instrument: NT5

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BFC0221-BLK1)				Prepared: 07-Mar-2017 Analyzed: 07-Mar-2017 16:36						
1,2-Dichloroethane	ND	50.0	ug/kg							U
Benzene	ND	50.0	ug/kg							U
Toluene	ND	50.0	ug/kg							U
Ethylbenzene	ND	50.0	ug/kg							U
m,p-Xylene	ND	50.0	ug/kg							U
o-Xylene	ND	50.0	ug/kg							U
<i>Surrogate: Dibromofluoromethane</i>	47.5		ug/kg	50.0		95.1	30-160			
<i>Surrogate: 1,2-Dichloroethane-d4</i>	46.9		ug/kg	50.0		93.8	80-124			
<i>Surrogate: Toluene-d8</i>	50.8		ug/kg	50.0		102	80-120			
<i>Surrogate: 4-Bromofluorobenzene</i>	46.5		ug/kg	50.0		92.9	80-120			
<i>Surrogate: 1,2-Dichlorobenzene-d4</i>	49.9		ug/kg	50.0		99.8	80-120			



Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

Volatile Organic Compounds - Quality Control

Batch BFC0221 - EPA 5035 (Methanol Extraction)

Instrument: NT5

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
LCS (BFC0221-BS1)				Prepared: 07-Mar-2017 Analyzed: 07-Mar-2017 15:36						
1,2-Dichloroethane	2100		ug/kg	2500		84.0	75-120			
Benzene	2720		ug/kg	2500		109	80-120			
Toluene	2730		ug/kg	2500		109	77-120			
Ethylbenzene	2610		ug/kg	2500		104	79-122			
m,p-Xylene	5330		ug/kg	5000		107	81-122			
o-Xylene	2710		ug/kg	2500		109	79-120			
<i>Surrogate: Dibromofluoromethane</i>	50.8		ug/kg	50.0		102	30-160			
<i>Surrogate: 1,2-Dichloroethane-d4</i>	47.1		ug/kg	50.0		94.1	80-124			
<i>Surrogate: Toluene-d8</i>	50.3		ug/kg	50.0		101	80-120			
<i>Surrogate: 4-Bromofluorobenzene</i>	45.7		ug/kg	50.0		91.4	80-120			
<i>Surrogate: 1,2-Dichlorobenzene-d4</i>	50.3		ug/kg	50.0		101	80-120			



Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

Volatile Organic Compounds - Quality Control

Batch BFC0221 - EPA 5035 (Methanol Extraction)

Instrument: NT5

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
LCS Dup (BFC0221-BSD1)				Prepared: 07-Mar-2017 Analyzed: 07-Mar-2017 16:13						
1,2-Dichloroethane	1950		ug/kg	2500		78.1	75-120	7.24	30	
Benzene	2670		ug/kg	2500		107	80-120	1.69	30	
Toluene	2740		ug/kg	2500		110	77-120	0.28	30	
Ethylbenzene	2600		ug/kg	2500		104	79-122	0.45	30	
m,p-Xylene	5430		ug/kg	5000		109	81-122	1.92	30	
o-Xylene	2630		ug/kg	2500		105	79-120	3.29	30	
<i>Surrogate: Dibromofluoromethane</i>	54.2		ug/kg	50.0		108	30-160			
<i>Surrogate: 1,2-Dichloroethane-d4</i>	45.7		ug/kg	50.0		91.4	80-124			
<i>Surrogate: Toluene-d8</i>	50.9		ug/kg	50.0		102	80-120			
<i>Surrogate: 4-Bromofluorobenzene</i>	46.2		ug/kg	50.0		92.3	80-120			
<i>Surrogate: 1,2-Dichlorobenzene-d4</i>	50.4		ug/kg	50.0		101	80-120			



Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

Volatile Organic Compounds - Quality Control

Batch BFC0286 - EPA 5035 (Methanol Extraction)

Instrument: NT5

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BFC0286-BLK1)				Prepared: 09-Mar-2017 Analyzed: 09-Mar-2017 11:33						
1,2-Dichloroethane	ND	50.0	ug/kg							U
Benzene	ND	50.0	ug/kg							U
Toluene	ND	50.0	ug/kg							U
Ethylbenzene	ND	50.0	ug/kg							U
m,p-Xylene	ND	50.0	ug/kg							U
o-Xylene	ND	50.0	ug/kg							U
<i>Surrogate: Dibromofluoromethane</i>	46.8		ug/kg	50.0		93.6	30-160			
<i>Surrogate: 1,2-Dichloroethane-d4</i>	45.6		ug/kg	50.0		91.1	80-124			
<i>Surrogate: Toluene-d8</i>	51.0		ug/kg	50.0		102	80-120			
<i>Surrogate: 4-Bromofluorobenzene</i>	46.5		ug/kg	50.0		92.9	80-120			
<i>Surrogate: 1,2-Dichlorobenzene-d4</i>	50.2		ug/kg	50.0		100	80-120			



Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

Volatile Organic Compounds - Quality Control

Batch BFC0286 - EPA 5035 (Methanol Extraction)

Instrument: NT5

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
LCS (BFC0286-BS1)				Prepared: 09-Mar-2017 Analyzed: 09-Mar-2017 10:28						
1,2-Dichloroethane	1880		ug/kg	2500		75.1	75-120			Q
Benzene	2530		ug/kg	2500		101	80-120			
Toluene	2570		ug/kg	2500		103	77-120			
Ethylbenzene	2460		ug/kg	2500		98.2	79-122			
m,p-Xylene	5130		ug/kg	5000		103	81-122			
o-Xylene	2490		ug/kg	2500		99.8	79-120			
<i>Surrogate: Dibromofluoromethane</i>	48.9		ug/kg	50.0		97.8	30-160			
<i>Surrogate: 1,2-Dichloroethane-d4</i>	44.4		ug/kg	50.0		88.7	80-124			
<i>Surrogate: Toluene-d8</i>	50.5		ug/kg	50.0		101	80-120			
<i>Surrogate: 4-Bromofluorobenzene</i>	46.6		ug/kg	50.0		93.2	80-120			
<i>Surrogate: 1,2-Dichlorobenzene-d4</i>	50.2		ug/kg	50.0		100	80-120			



Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

Volatile Organic Compounds - Quality Control

Batch BFC0286 - EPA 5035 (Methanol Extraction)

Instrument: NT5

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
LCS Dup (BFC0286-BSD1)				Prepared: 09-Mar-2017 Analyzed: 09-Mar-2017 11:10						
1,2-Dichloroethane	2040		ug/kg	2500		81.6	75-120	8.24	30	Q
Benzene	2770		ug/kg	2500		111	80-120	8.84	30	
Toluene	2820		ug/kg	2500		113	77-120	9.23	30	
Ethylbenzene	2730		ug/kg	2500		109	79-122	10.70	30	
m,p-Xylene	5740		ug/kg	5000		115	81-122	11.30	30	
o-Xylene	2850		ug/kg	2500		114	79-120	13.10	30	
Surrogate: Dibromofluoromethane	53.0		ug/kg	50.0		106	30-160			
Surrogate: 1,2-Dichloroethane-d4	44.6		ug/kg	50.0		89.2	80-124			
Surrogate: Toluene-d8	49.8		ug/kg	50.0		99.6	80-120			
Surrogate: 4-Bromofluorobenzene	47.1		ug/kg	50.0		94.2	80-120			
Surrogate: 1,2-Dichlorobenzene-d4	50.4		ug/kg	50.0		101	80-120			



Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

Petroleum Hydrocarbons - Quality Control

Batch BFC0023 - EPA 3546 (Microwave)

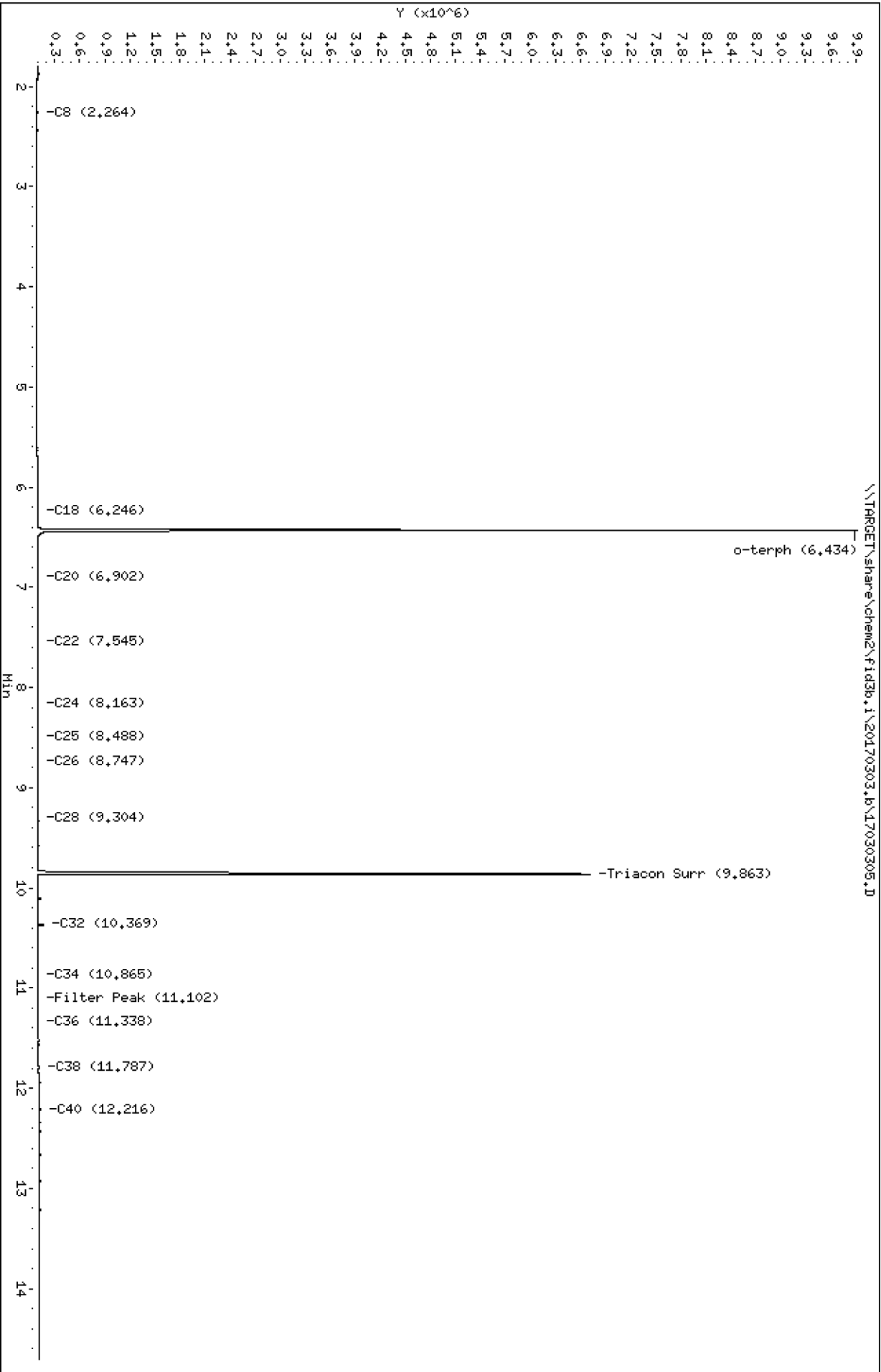
Instrument: FID3

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BFC0023-BLK1)				Prepared: 02-Mar-2017 Analyzed: 03-Mar-2017 12:35						
Diesel Range Organics (C12-C24)	ND	5.00	mg/kg							U
Motor Oil Range Organics (C24-C38)	ND	10.0	mg/kg							U
<i>Surrogate: o-Terphenyl</i>	3.41		mg/kg	4.50		75.8	50-150			

Data File: \\TARGET\share\chem2\fid3b,1\20170303,6\17030305.D
Date : 03-MAR-2017 12:35
Client ID:
Sample Info: BFC0023-BLK1

Column phase: RTX-1

Instrument: fid3b,1
Operator: ML
Column diameter: 0.25



Analytical Resources Inc.
TPH Quantitation Report

Data file: 20170303.b/17030305.D
Method: 20170303.b\FID3TPH.m
Instrument: fid3b.i
Operator: ML
Report Date: 03/06/2017
Macro: FID3_022817

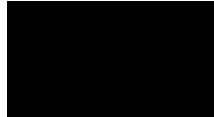
ARI ID: BFC0023-BLK1
Client ID:
Injection: 03-MAR-2017 12:35
Dilution Factor: 1

FID:3B RESULTS

Compound	RT	Shift	Height	Area	Method	Range	Total Area	Conc
Toluene	1.872	-0.009	27283	49439	WATPHG	(Tol-C12)	81901	3.8
C8	2.264	0.051	20302	32461	WATPHD	(C12-C24)	575536	3.7
C10	----				WATPHM	(C24-C38)	1910024	13.9
C12	----							
C14	----							
C16	----							
C18	6.246	-0.008	16179	31424				
C20	6.902	0.003	15539	34842				
C22	7.545	-0.001	14861	25920				
C24	8.163	-0.005	16044	31496				
C25	8.488	0.022	17365	33291				
C26	8.747	-0.008	17071	28914				
C28	9.304	-0.011	18975	25227				
C32	10.369	-0.006	84540	129384				
C34	10.865	-0.006	19504	37549				
Filter Peak	11.102	0.003	21924	33140				
C36	11.338	-0.006	24004	46590				
o-terph	6.434	-0.006	9840839	7490158				
Triacon Surr	9.863	-0.005	6631070	6661059				

Range Times: NW Diesel(4.422 - 8.218) NW Gas(1.831 - 4.422) NW M.Oil(8.218 - 11.845)
AK102(3.483 - 8.416) AK103(8.416 - 11.394) Jet A(3.483 - 6.304)

Surrogate	Area	Amount	%Rec
o-Terphenyl	7490158	34.1	75.7
Triacontane	6661059	34.9	77.5



Analyte	RF	Curve Date
o-Terph Surr	219872.3	28-FEB-2017
Triacon Surr	191068.8	28-FEB-2017
Gas	21747.6	xx-xx-xxxx
Diesel	155491.0	28-FEB-2017
Motor Oil	137039.0	28-FEB-2017



Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

Petroleum Hydrocarbons - Quality Control

Batch BFC0023 - EPA 3546 (Microwave)

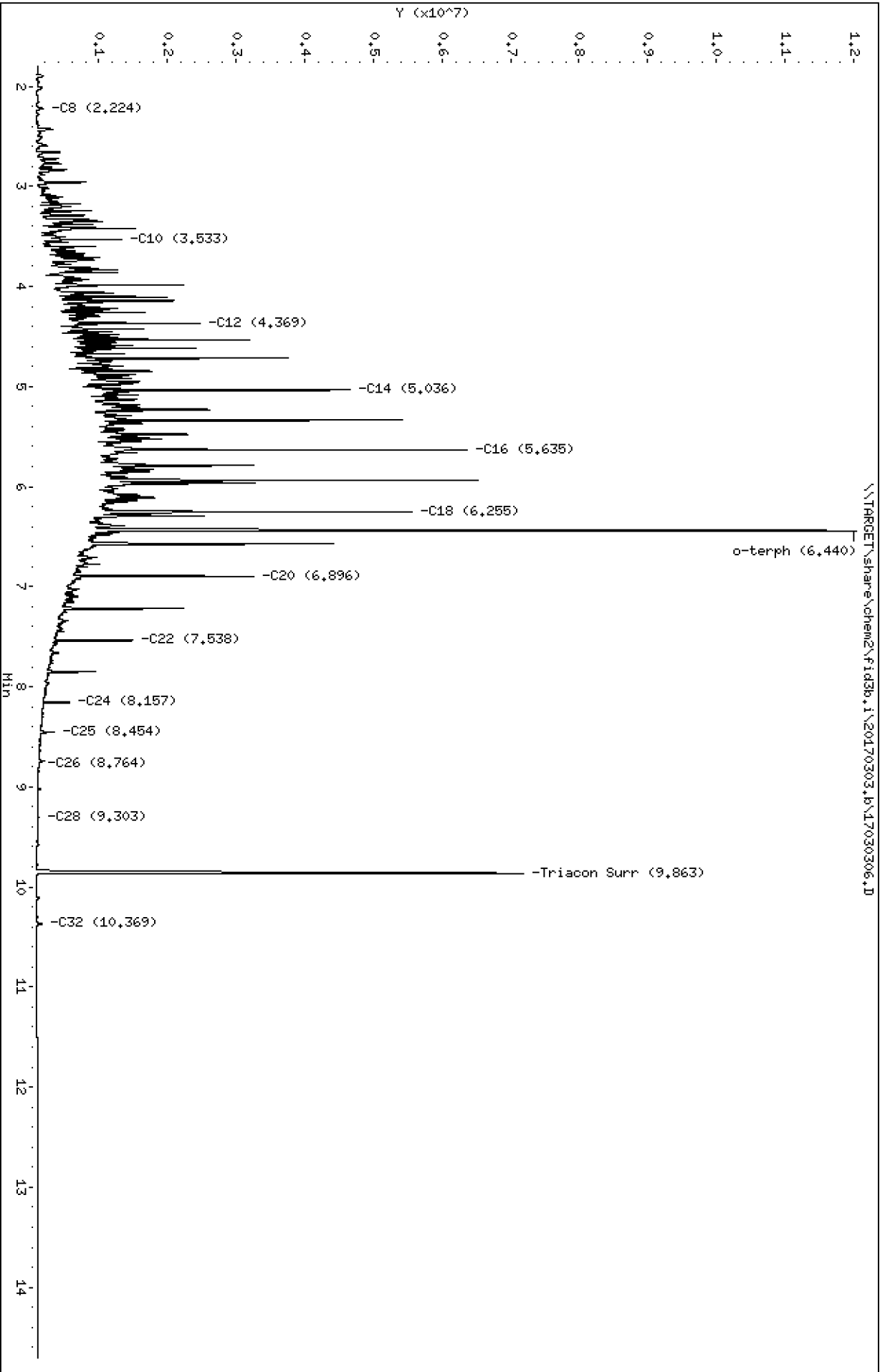
Instrument: FID3

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
LCS (BFC0023-BS1)					Prepared: 02-Mar-2017 Analyzed: 03-Mar-2017 12:59					
Diesel Range Organics (C12-C24)	127	5.00	mg/kg	150		84.7	63-120			
Surrogate: <i>o</i> -Terphenyl	3.99		mg/kg	4.50		88.7	50-150			

Data File: \\TARGET\share\chem2\fid3b,1\20170303,b\17030306.D
Date: 03-MAR-2017 12:59
Client ID:
Sample Info: BFC0023-BS1

Column phase: RTX-1

Instrument: fid3b,1
Operator: ML
Column diameter: 0.25



Analytical Resources Inc.
TPH Quantitation Report

Data file: 20170303.b/17030306.D
Method: 20170303.b\FID3TPH.m
Instrument: fid3b.i
Operator: ML
Report Date: 03/06/2017
Macro: FID3_022817

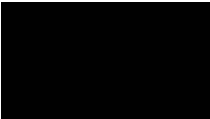
ARI ID: BFC0023-BS1
Client ID:
Injection: 03-MAR-2017 12:59
Dilution Factor: 1

FID:3B RESULTS

Compound	RT	Shift	Height	Area	Method	Range	Total Area	Conc
Toluene	1.894	0.013	91430	122390	WATPHG	(Tol-C12)	45374252	2086.4
C8	2.224	0.011	97809	131348	WATPHD	(C12-C24)	197618085	1270.9
C10	3.533	-0.000	1240450	859697	WATPHM	(C24-C38)	3096317	22.6
C12	4.369	-0.003	2383657	1376254				
C14	5.036	-0.002	4576933	3538680				
C16	5.635	0.000	6272479	4902246				
C18	6.255	0.000	5471350	4459397				
C20	6.896	-0.004	3160348	2968348				
C22	7.538	-0.008	1406501	1240098				
C24	8.157	-0.011	479738	448920				
C25	8.454	-0.013	251037	251140				
C26	8.764	0.009	36745	60488				
C28	9.303	-0.012	33413	43153				
C32	10.369	-0.005	75846	103549				
C34	----							
Filter Peak	----							
C36	----							
o-terph	6.440	0.000	11092053	8762930				
Triacon Surr	9.863	-0.005	7107958	7445902				

Range Times: NW Diesel(4.422 - 8.218) NW Gas(1.831 - 4.422) NW M.Oil(8.218 - 11.845)
AK102(3.483 - 8.416) AK103(8.416 - 11.394) Jet A(3.483 - 6.304)

Surrogate	Area	Amount	%Rec
o-Terphenyl	8762930	39.9	88.6
Triacontane	7445902	39.0	86.6

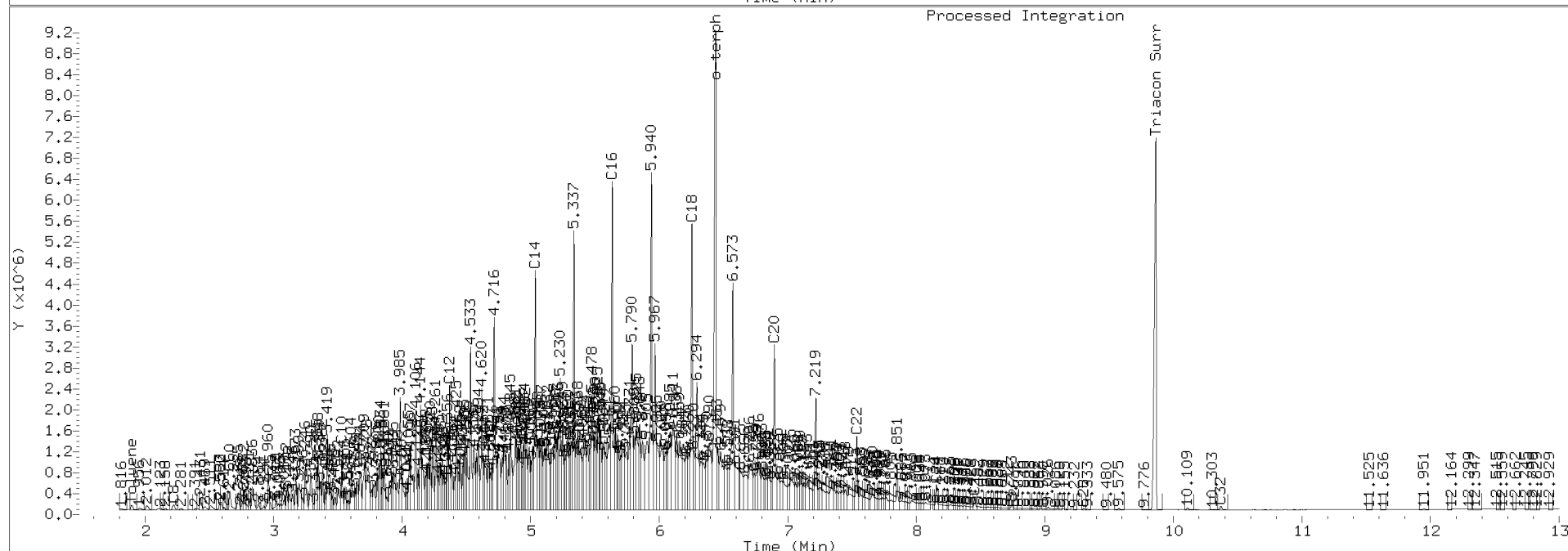
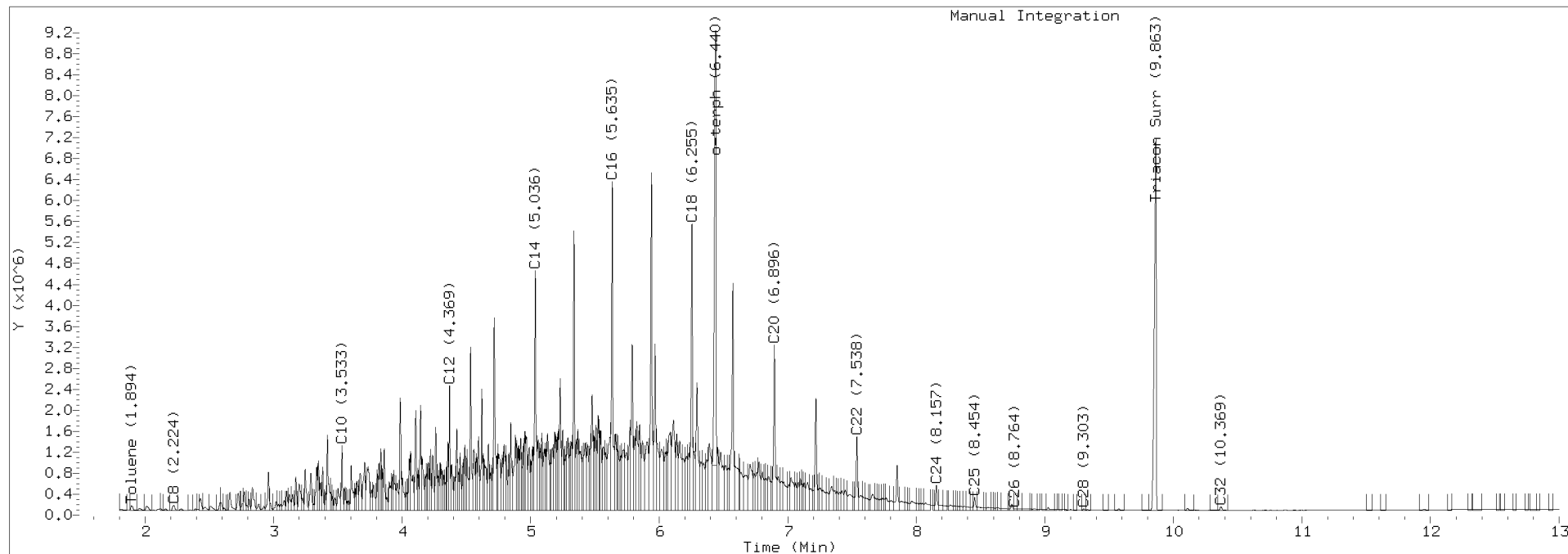


Analyte	RF	Curve Date
o-Terph Surr	219872.3	28-FEB-2017
Triacon Surr	191068.8	28-FEB-2017
Gas	21747.6	xx-xx-xxxx
Diesel	155491.0	28-FEB-2017
Motor Oil	137039.0	28-FEB-2017

TPH Manual Integrations Report

Datafile: FID3B, 20170303.b/17030306.D Injection: 03-MAR-2017 12:59

Lab ID: BFC0023-BS1





Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

Petroleum Hydrocarbons - Quality Control

Batch BFC0024 - EPA 3510C SepF

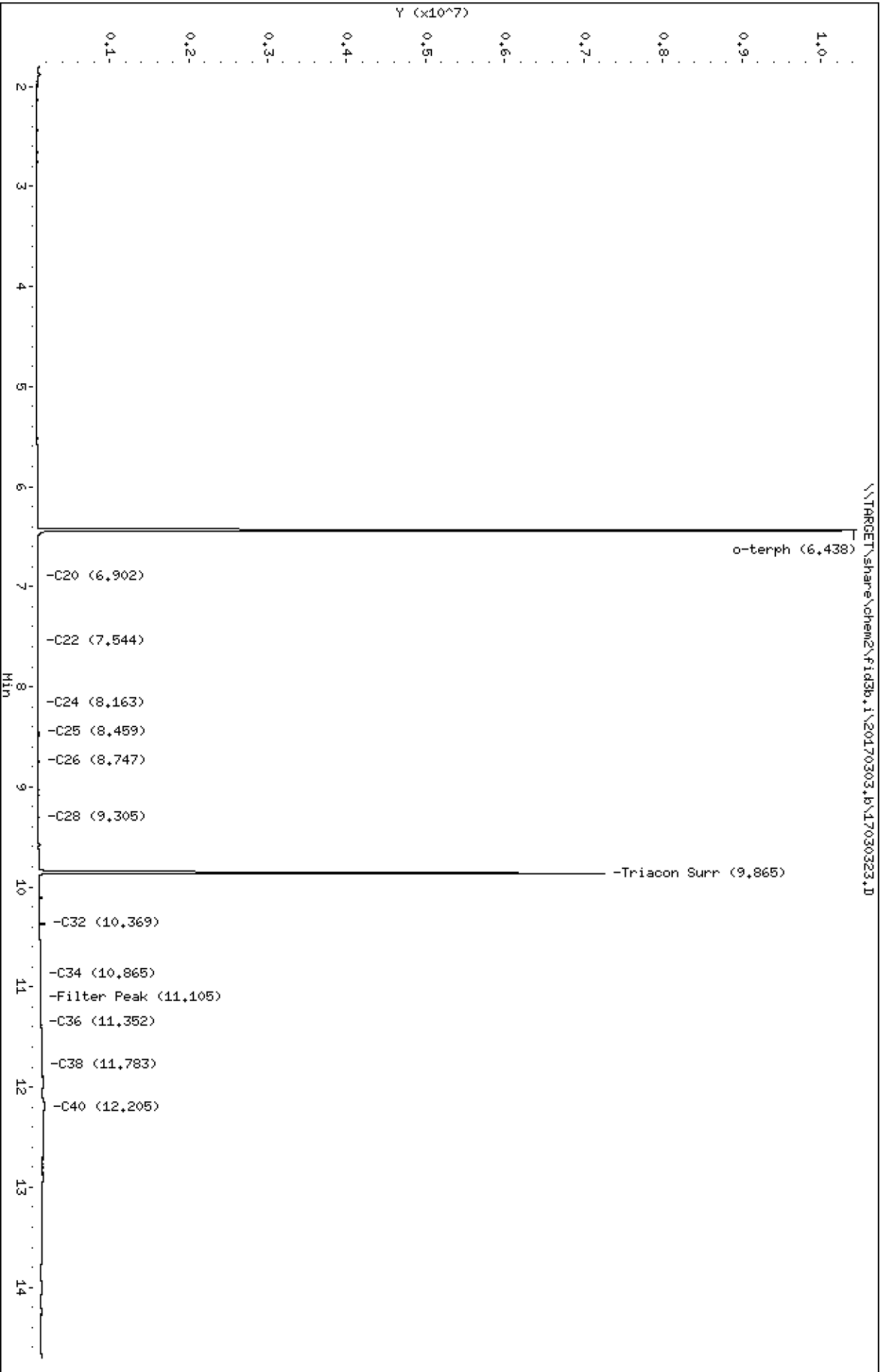
Instrument: FID3

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BFC0024-BLK1)				Prepared: 02-Mar-2017 Analyzed: 03-Mar-2017 19:52						
Diesel Range Organics (C12-C24)	ND	0.100	mg/L							U
Motor Oil Range Organics (C24-C38)	ND	0.200	mg/L							U
<i>Surrogate: o-Terphenyl</i>	0.0724		mg/L	0.0900		80.4	50-150			

Data File: \\TARGET\share\chem2\fid3b,1\20170303,6\17030323.D
Date : 03-MAR-2017 19:52
Client ID:
Sample Info: BFC0024-BLK1

Column phase: RTX-1

Instrument: fid3b,1
Operator: ML
Column diameter: 0.25



Analytical Resources Inc.
TPH Quantitation Report

Data file: 20170303.b/17030323.D
Method: 20170303.b\FID3TPH.m
Instrument: fid3b.i
Operator: ML
Report Date: 03/06/2017
Macro: FID3_022817

ARI ID: BFC0024-BLK1
Client ID:
Injection: 03-MAR-2017 19:52
Dilution Factor: 1

FID:3B RESULTS

Compound	RT	Shift	Height	Area	Method	Range	Total Area	Conc
Toluene	1.882	0.001	59719	68703	WATPHG	(Tol-C12)	118272	5.4
C8	----				WATPHD	(C12-C24)	645417	4.2
C10	----				WATPHM	(C24-C38)	6966107	50.8
C12	----							
C14	----							
C16	----							
C18	----							
C20	6.902	0.002	14780	32522				
C22	7.544	-0.002	15469	29856				
C24	8.163	-0.005	25197	42984				
C25	8.459	-0.007	27392	38774				
C26	8.747	-0.007	29001	46746				
C28	9.305	-0.010	29278	43974				
C32	10.369	-0.006	107395	195513				
C34	10.865	-0.006	51425	103655				
Filter Peak	11.105	0.006	56266	64239				
C36	11.352	0.008	59694	34431				
o-terph	6.438	-0.002	10366749	7953289				
Triacon Surr	9.865	-0.002	7149841	7195085				

Range Times: NW Diesel(4.422 - 8.218) NW Gas(1.831 - 4.422) NW M.Oil(8.218 - 11.845)
AK102(3.483 - 8.416) AK103(8.416 - 11.394) Jet A(3.483 - 6.304)

Surrogate	Area	Amount	%Rec
o-Terphenyl	7953289	36.2	80.4
Triacontane	7195085	37.7	83.7

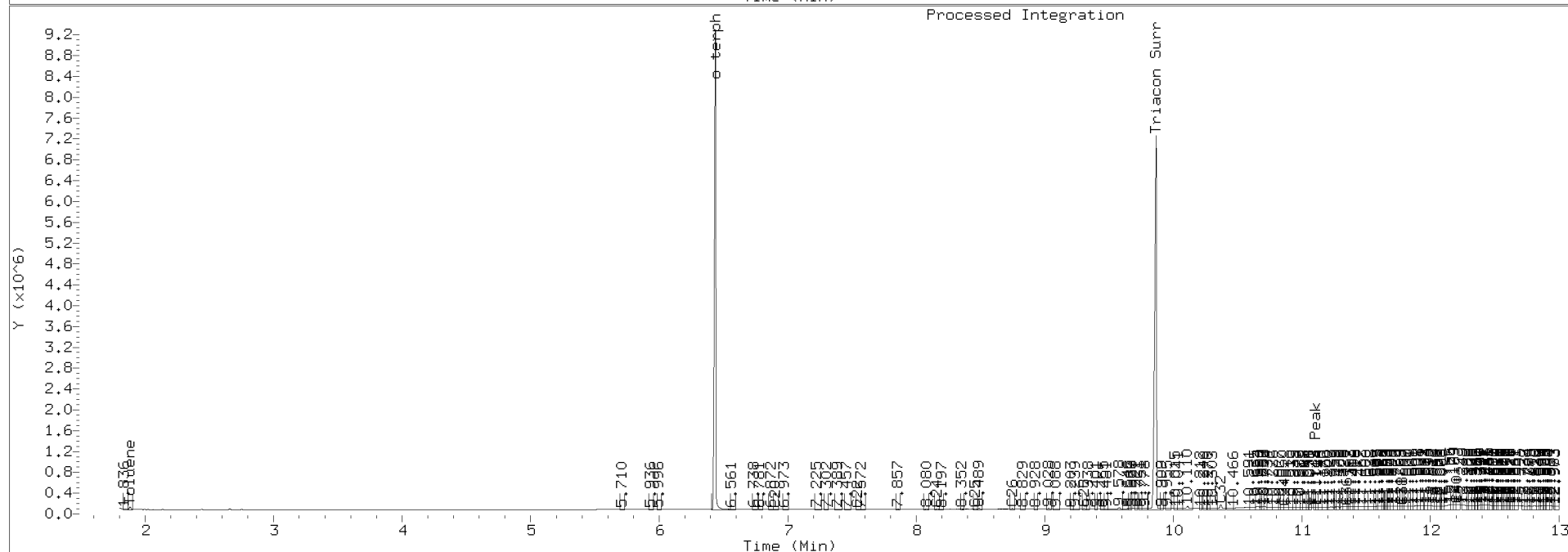
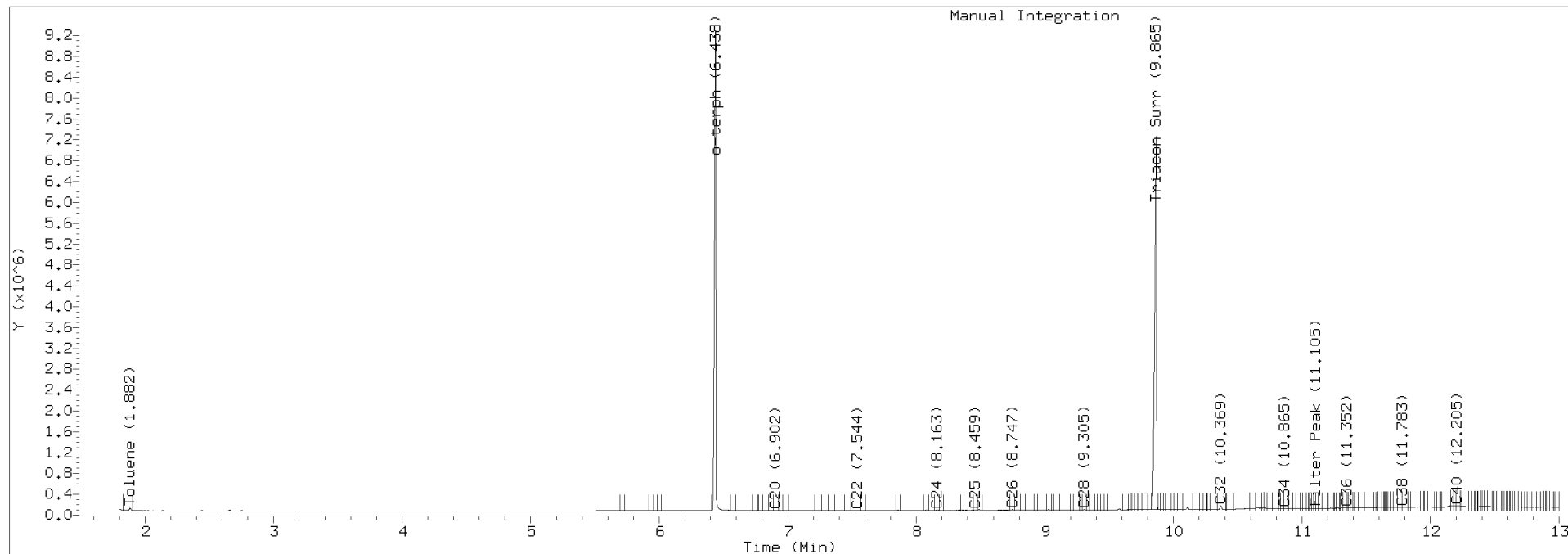


Analyte	RF	Curve Date
o-Terph Surr	219872.3	28-FEB-2017
Triacon Surr	191068.8	28-FEB-2017
Gas	21747.6	xx-xx-xxxx
Diesel	155491.0	28-FEB-2017
Motor Oil	137039.0	28-FEB-2017

TPH Manual Integrations Report

Datafile: FID3B, 20170303.b/17030323.D Injection: 03-MAR-2017 19:52

Lab ID: BFC0024-BLK1





Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

Petroleum Hydrocarbons - Quality Control

Batch BFC0024 - EPA 3510C SepF

Instrument: FID3

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BFC0024-BLK2)				Prepared: 03-Mar-2017 Analyzed: 04-Mar-2017 00:38						
Diesel Range Organics (C12-C24)	ND	0.100	mg/L							U
Motor Oil Range Organics (C24-C38)	ND	0.200	mg/L							U
<i>Surrogate: o-Terphenyl</i>	0.0656		mg/L	0.0900		72.9	50-150			

Data File: \\TARGET\share\chem2\fid3b,1\20170303,bl\17030335.D

Date : 04-MAR-2017 00:38

Client ID:

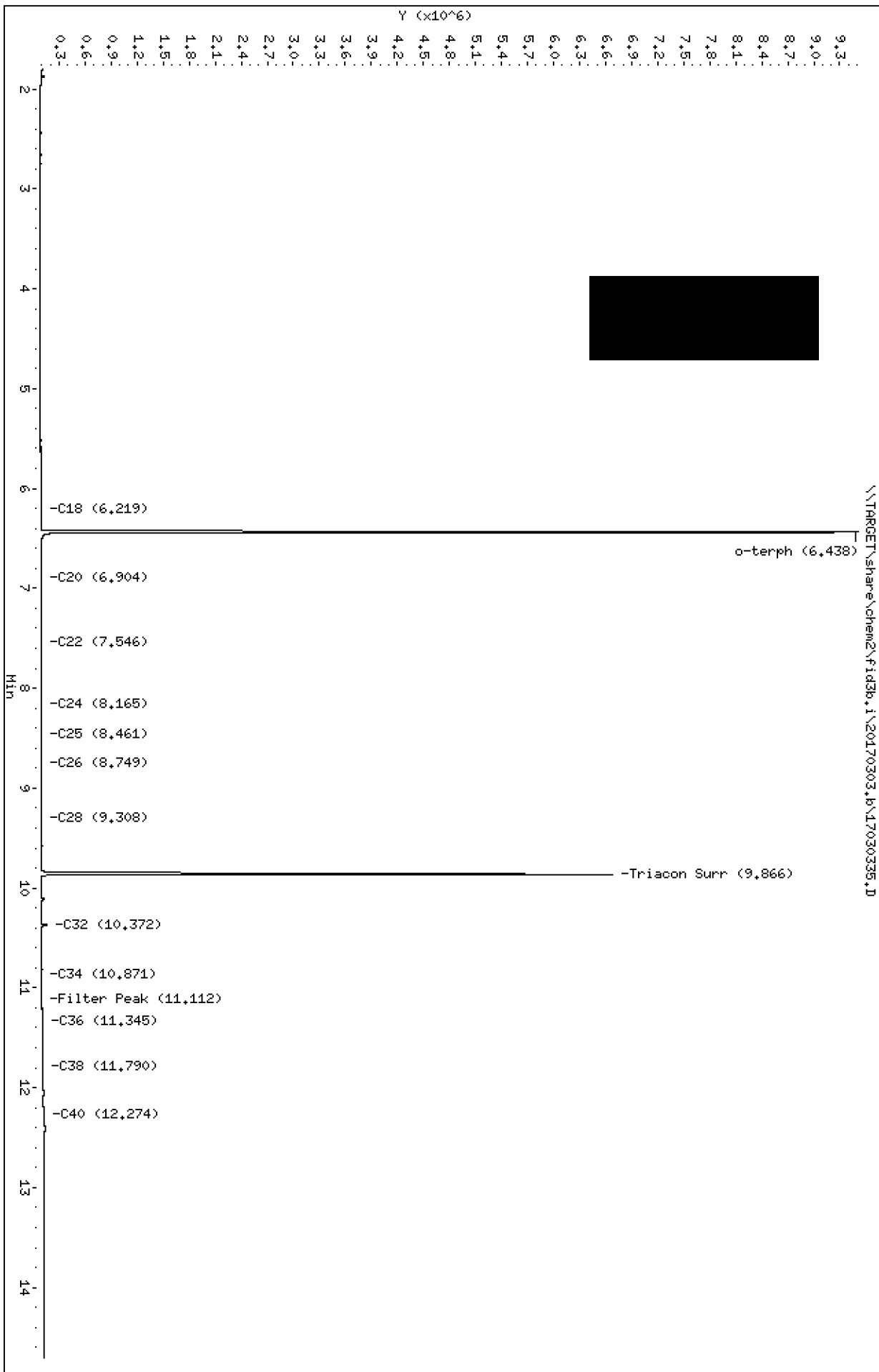
Sample Info: BFC0024-BLK2

Column phase: RTX-1

Instrument: fid3b,1

Operator: ML

Column diameter: 0.25



Analytical Resources Inc.
TPH Quantitation Report

Data file: 20170303.b/17030335.D
Method: 20170303.b\FID3TPH.m
Instrument: fid3b.i
Operator: ML
Report Date: 03/06/2017
Macro: FID3_022817

ARI ID: BFC0024-BLK2
Client ID:
Injection: 04-MAR-2017 00:38
Dilution Factor: 1

FID:3B RESULTS

Compound	RT	Shift	Height	Area	Method	Range	Total Area	Conc
Toluene	1.877	-0.004	48845	78711	WATPHG	(Tol-C12)	78712	3.6
C8	----				WATPHD	(C12-C24)	598621	3.8
C10	----				WATPHM	(C24-C38)	2128405	15.5
C12	----							
C14	----							
C16	----							
C18	6.219	-0.035	13540	30047				
C20	6.904	0.004	14534	41056				
C22	7.546	-0.000	14825	27379				
C24	8.165	-0.003	19495	36845				
C25	8.461	-0.005	21094	30005				
C26	8.749	-0.006	21998	31660				
C28	9.308	-0.007	22491	28413				
C32	10.372	-0.003	79456	136725				
C34	10.871	0.001	23219	58854				
Filter Peak	11.112	0.013	21991	36596				
C36	11.345	0.001	27786	25348				
o-terph	6.438	-0.002	9434786	7214526				
Triacon Surr	9.866	-0.002	6602576	6748195				

Range Times: NW Diesel(4.422 - 8.218) NW Gas(1.831 - 4.422) NW M.Oil(8.218 - 11.845)
AK102(3.483 - 8.416) AK103(8.416 - 11.394) Jet A(3.483 - 6.304)

Surrogate	Area	Amount	%Rec
o-Terphenyl	7214526	32.8	72.9
Triacontane	6748195	35.3	78.5

Analyte	RF	Curve Date
o-Terph Surr	219872.3	28-FEB-2017
Triacon Surr	191068.8	28-FEB-2017
Gas	21747.6	xx-xx-xxxx
Diesel	155491.0	28-FEB-2017
Motor Oil	137039.0	28-FEB-2017



Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

Petroleum Hydrocarbons - Quality Control

Batch BFC0024 - EPA 3510C SepF

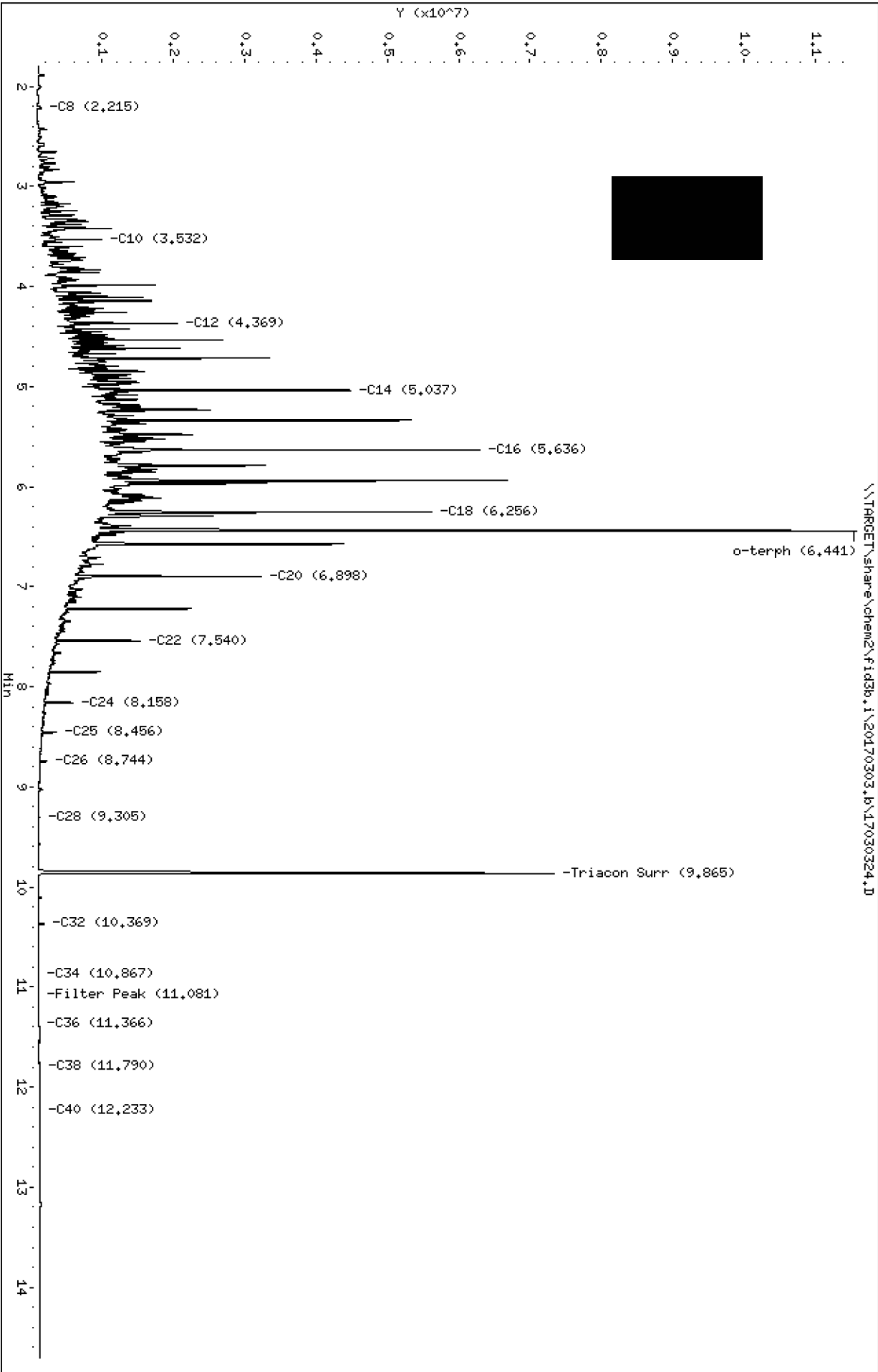
Instrument: FID3

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
LCS (BFC0024-BS1)					Prepared: 02-Mar-2017 Analyzed: 03-Mar-2017 20:16					
Diesel Range Organics (C12-C24)	2.50	0.100	mg/L	3.00		83.2	56-120			
Surrogate: <i>o</i> -Terphenyl	0.0780		mg/L	0.0900		86.7	50-150			

Data File: \\TARGET\share\chem2\fid3b,1\20170303,b\17030324.D
Date : 03-MAR-2017 20:16
Client ID:
Sample Info: BFC0024-BS1

Column phase: RTX-1

Instrument: fid3b,1
Operator: ML
Column diameter: 0.25



Analytical Resources Inc.
TPH Quantitation Report

Data file: 20170303.b/17030324.D
Method: 20170303.b\FID3TPH.m
Instrument: fid3b.i
Operator: ML
Report Date: 03/06/2017
Macro: FID3_022817

ARI ID: BFC0024-BS1
Client ID:
Injection: 03-MAR-2017 20:16
Dilution Factor: 1

FID:3B RESULTS

Compound	RT	Shift	Height	Area	Method	Range	Total Area	Conc
Toluene	1.888	0.008	103973	140525	WATPHG	(Tol-C12)	34719748	1596.5
C8	2.215	0.002	62663	94350	WATPHD	(C12-C24)	194150640	1248.6
C10	3.532	-0.000	909021	647466	WATPHM	(C24-C38)	4691328	34.2
C12	4.369	-0.002	1960939	1123968				
C14	5.037	-0.001	4396078	3340389				
C16	5.636	0.002	6219147	4759152				
C18	6.256	0.002	5537786	4530127				
C20	6.898	-0.001	3141840	3086753				
C22	7.540	-0.005	1443458	1252478				
C24	8.158	-0.009	497988	478456				
C25	8.456	-0.010	268676	253962				
C26	8.744	-0.010	138430	154099				
C28	9.305	-0.009	41648	57484				
C32	10.369	-0.005	94458	143298				
C34	10.867	-0.003	18777	30357				
Filter Peak	11.081	-0.018	18269	32173				
C36	11.366	0.022	27975	162147				
o-terph	6.441	0.002	10632201	8569427				
Triacon Surr	9.865	-0.003	7248845	7517533				

Range Times: NW Diesel(4.422 - 8.218) NW Gas(1.831 - 4.422) NW M.Oil(8.218 - 11.845)
AK102(3.483 - 8.416) AK103(8.416 - 11.394) Jet A(3.483 - 6.304)

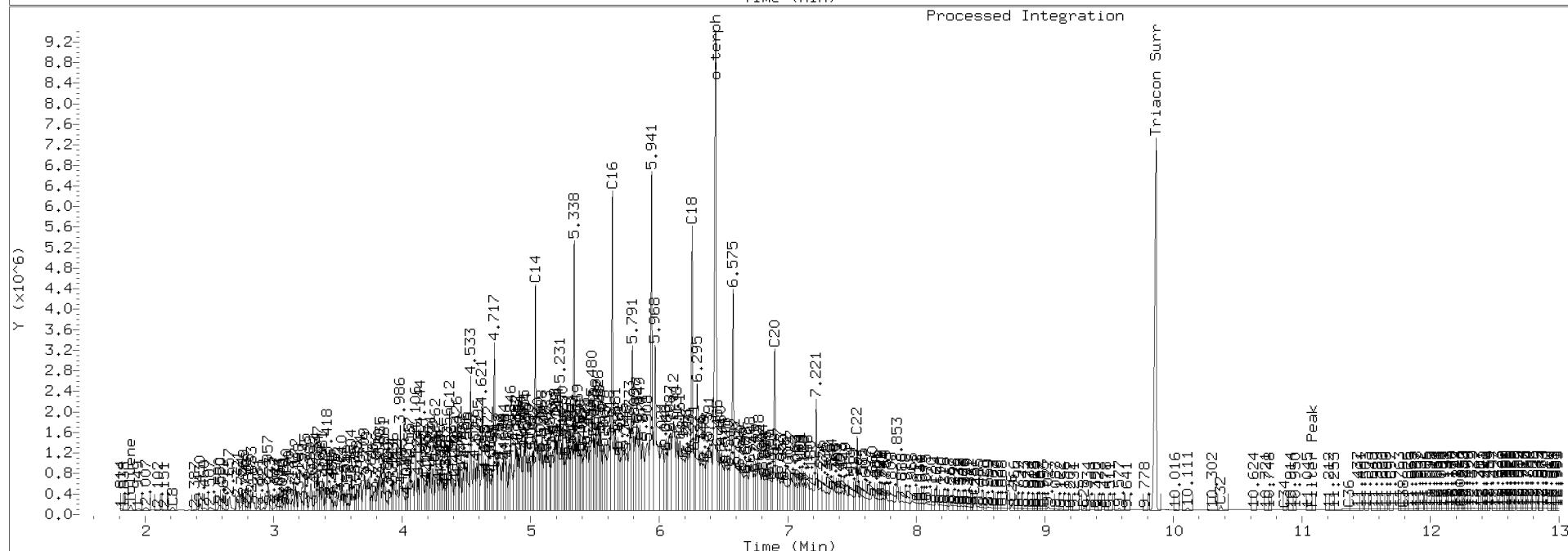
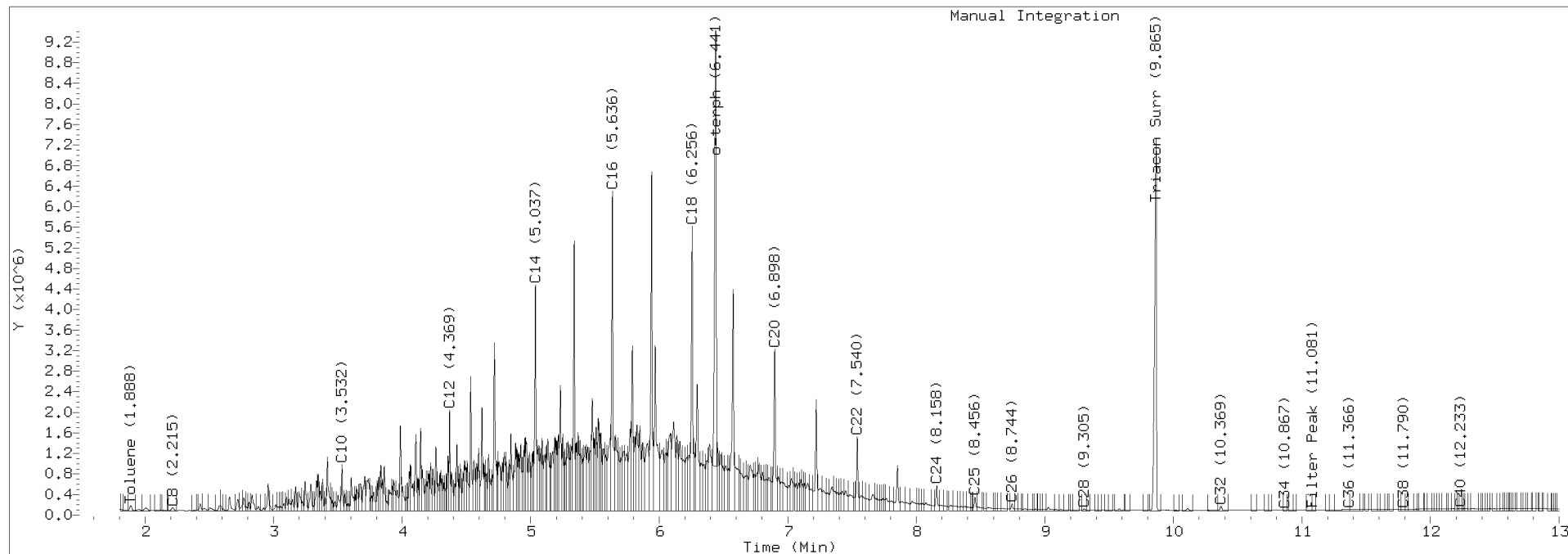
Surrogate	Area	Amount	%Rec
o-Terphenyl	8569427	39.0	86.6
Triaconthane	7517533	39.3	87.4

Analyte	RF	Curve Date
o-Terph Surr	219872.3	28-FEB-2017
Triacon Surr	191068.8	28-FEB-2017
Gas	21747.6	xx-xx-xxxx
Diesel	155491.0	28-FEB-2017
Motor Oil	137039.0	28-FEB-2017

TPH Manual Integrations Report

Datafile: FID3B, 20170303.b/17030324.D Injection: 03-MAR-2017 20:16

Lab ID: BFC0024-BS1





Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

Petroleum Hydrocarbons - Quality Control

Batch BFC0024 - EPA 3510C SepF

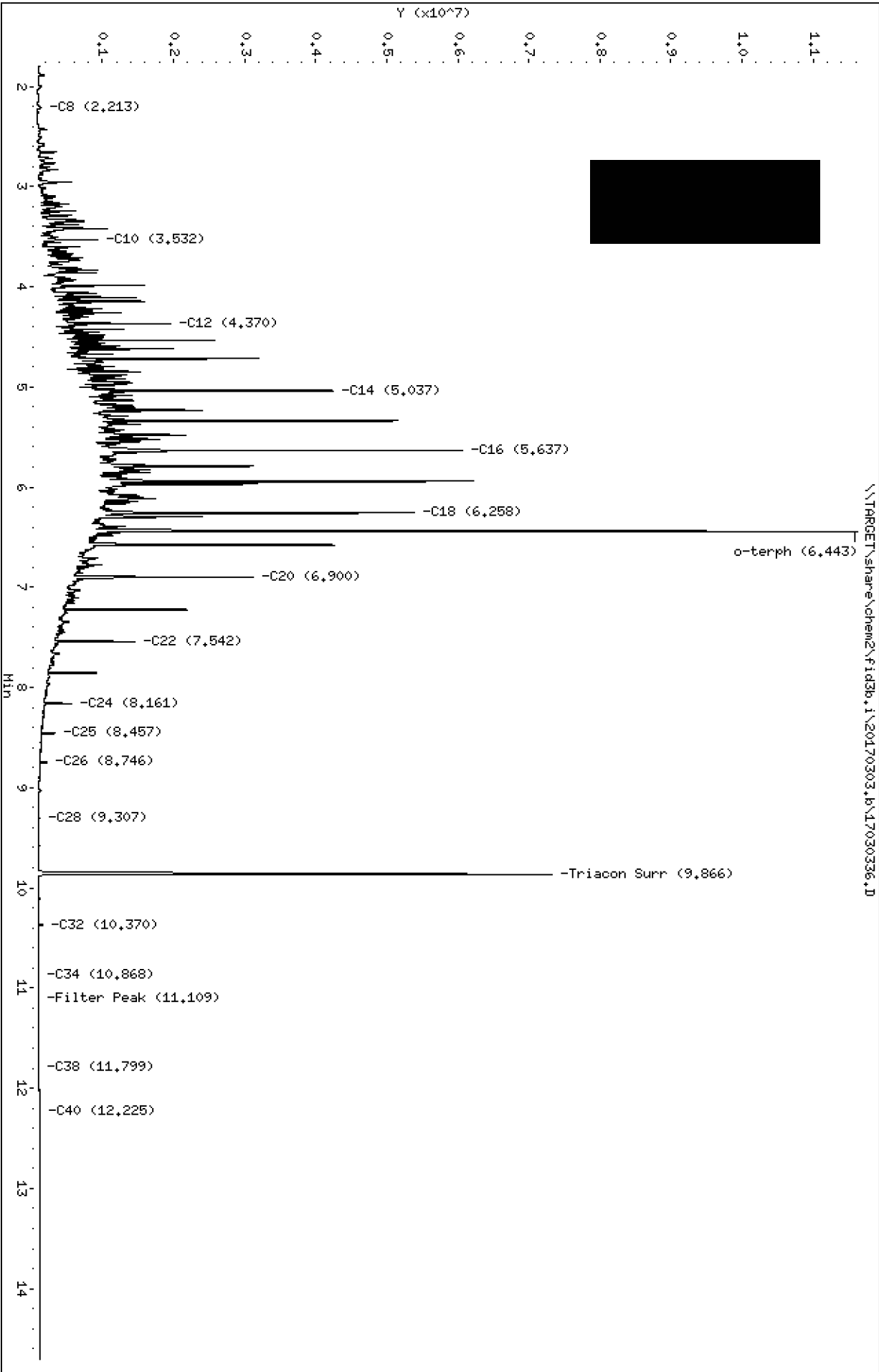
Instrument: FID3

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
LCS (BFC0024-BS2)					Prepared: 03-Mar-2017 Analyzed: 04-Mar-2017 01:02					
Diesel Range Organics (C12-C24)	2.38	0.100	mg/L	3.00		79.2	56-120			
Surrogate: <i>o</i> -Terphenyl	0.0762		mg/L	0.0900		84.7	50-150			

Data File: \\TARGET\share\chem2\fid3b,1\20170303,b\17030336.D
Date : 04-MAR-2017 01:02
Client ID:
Sample Info: BFC0024-B52

Column phase: RTX-1

Instrument: fid3b,1
Operator: ML
Column diameter: 0.25



Analytical Resources Inc.
TPH Quantitation Report

Data file: 20170303.b/17030336.D
Method: 20170303.b\FID3TPH.m
Instrument: fid3b.i
Operator: ML
Report Date: 03/06/2017
Macro: FID3_022817

ARI ID: BFC0024-BS2
Client ID:
Injection: 04-MAR-2017 01:02
Dilution Factor: 1

FID:3B RESULTS

Compound	RT	Shift	Height	Area	Method	Range	Total Area	Conc
Toluene	1.889	0.008	100360	130567	WATPHG	(Tol-C12)	33138065	1523.8
C8	2.213	-0.000	61585	97261	WATPHD	(C12-C24)	184831440	1188.7
C10	3.532	-0.001	847633	613364	WATPHM	(C24-C38)	3837299	28.0
C12	4.370	-0.002	1870634	1086533				
C14	5.037	-0.001	4170980	3184439				
C16	5.637	0.002	5987554	4628032				
C18	6.258	0.003	5310508	4314607				
C20	6.900	0.000	3043500	2989780				
C22	7.542	-0.004	1373501	1212627				
C24	8.161	-0.007	477796	451892				
C25	8.457	-0.009	253953	265629				
C26	8.746	-0.008	131860	171756				
C28	9.307	-0.008	39090	45979				
C32	10.370	-0.005	86457	126340				
C34	10.868	-0.002	17357	45910				
Filter Peak	11.109	0.010	16401	29732				
C36	----							
o-terph	6.443	0.003	10704752	8381702				
Triacon Surr	9.866	-0.002	7245557	7487194				

Range Times: NW Diesel(4.422 - 8.218) NW Gas(1.831 - 4.422) NW M.Oil(8.218 - 11.845)
AK102(3.483 - 8.416) AK103(8.416 - 11.394) Jet A(3.483 - 6.304)

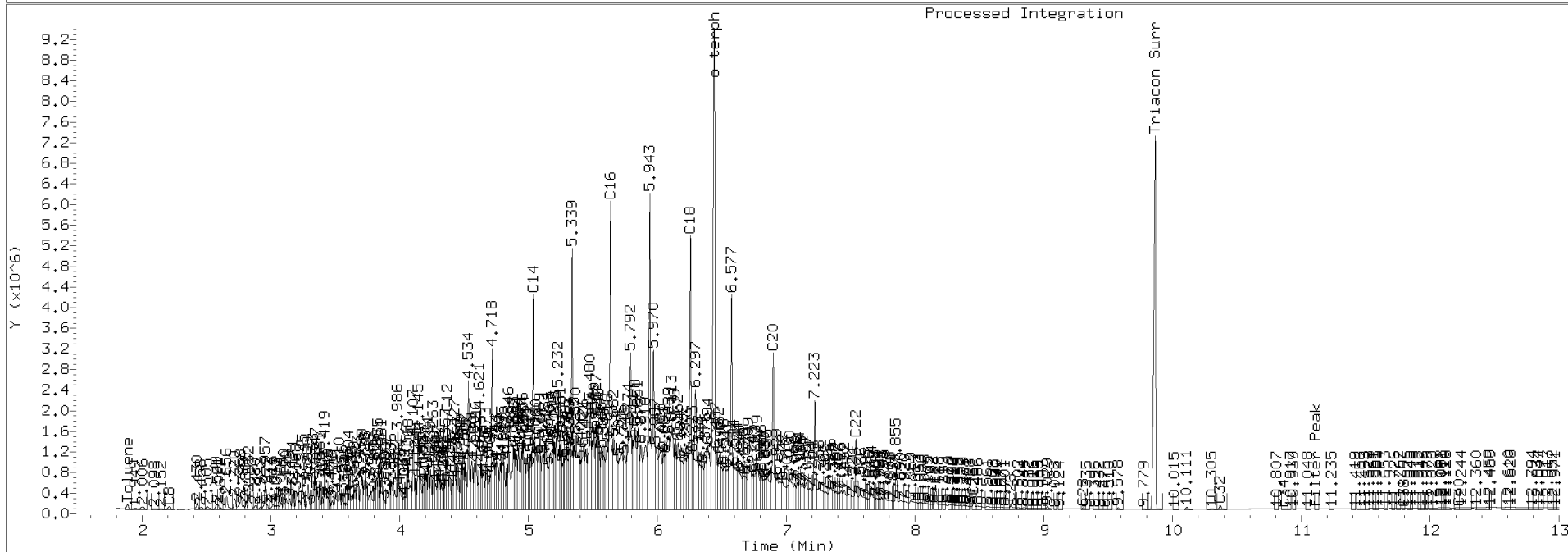
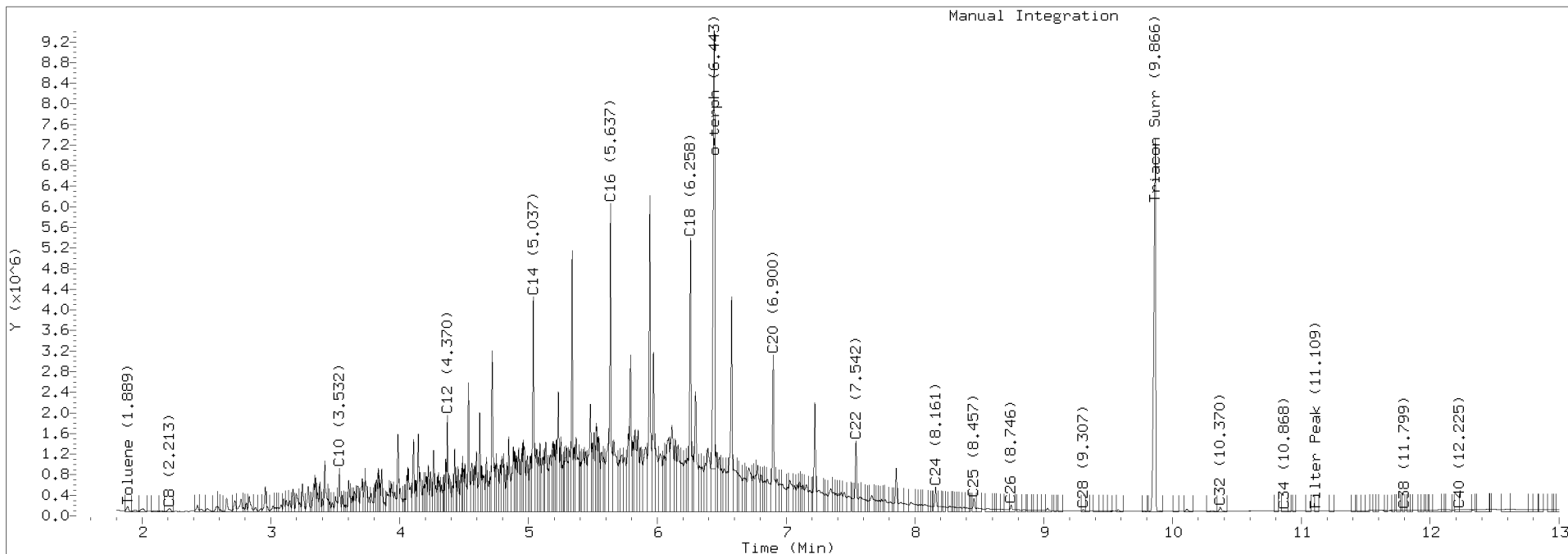
Surrogate	Area	Amount	%Rec
o-Terphenyl	8381702	38.1	84.7
Triacontane	7487194	39.2	87.1

Analyte	RF	Curve Date
o-Terph Surr	219872.3	28-FEB-2017
Triacon Surr	191068.8	28-FEB-2017
Gas	21747.6	xx-xx-xxxx
Diesel	155491.0	28-FEB-2017
Motor Oil	137039.0	28-FEB-2017

TPH Manual Integrations Report

Datafile: FID3B, 20170303.b/17030336.D Injection: 04-MAR-2017 01:02

Lab ID: BFC0024-BS2





Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

Petroleum Hydrocarbons - Quality Control

Batch BFC0024 - EPA 3510C SepF

Instrument: FID3

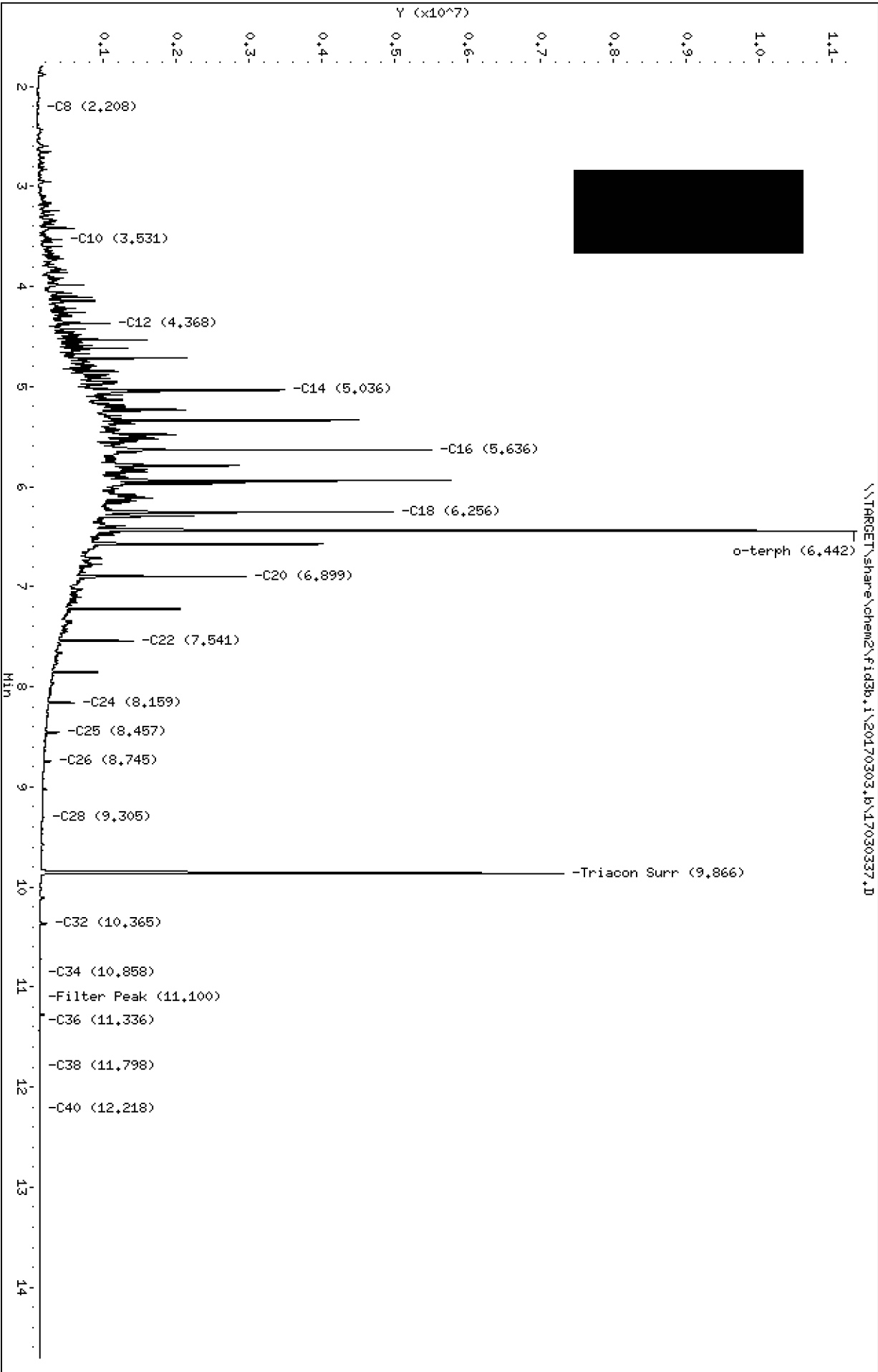
QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
MS (BFC0024-MS1)		Source: 17C0009-19		Prepared: 03-Mar-2017		Analyzed: 04-Mar-2017 01:26				
Diesel Range Organics (C12-C24)	2.30	0.102	mg/L	3.06	0.356	63.6	56-120			
Surrogate: <i>o</i> -Terphenyl	0.0753		mg/L	0.0918	0.0786	82.0	50-150			

Recovery limits for target analytes in MS/MSD QC samples are advisory only.

Data File: \\TARGET\share\chem2\fid3b,1\20170303,b\17030337.D
Date : 04-MAR-2017 01:26
Client ID:
Sample Info: BFC0024-HSI

Column phase: RTX-1

Instrument: fid3b,1
Operator: ML
Column diameter: 0.25



Analytical Resources Inc.
TPH Quantitation Report

Data file: 20170303.b/17030337.D
Method: 20170303.b\FID3TPH.m
Instrument: fid3b.i
Operator: ML
Report Date: 03/06/2017
Macro: FID3_022817

ARI ID: BFC0024-MS1
Client ID:
Injection: 04-MAR-2017 01:26
Dilution Factor: 1

FID:3B RESULTS

Compound	RT	Shift	Height	Area	Method	Range	Total Area	Conc
Toluene	1.880	-0.001	104665	147704	WATPHG	(Tol-C12)	18342428	843.4
C8	2.208	-0.005	22270	31225	WATPHD	(C12-C24)	175345381	1127.7
C10	3.531	-0.002	334096	224262	WATPHM	(C24-C38)	12066767	88.1
C12	4.368	-0.004	994502	596554				
C14	5.036	-0.002	3407329	2680914				
C16	5.636	0.001	5422459	4227234				
C18	6.256	0.002	4897267	4820917				
C20	6.899	-0.001	2865260	2820766				
C22	7.541	-0.005	1329853	1450060				
C24	8.159	-0.009	513104	515483				
C25	8.457	-0.009	301827	375166				
C26	8.745	-0.010	193407	392321				
C28	9.305	-0.010	98814	175524				
C32	10.365	-0.010	135252	252682				
C34	10.858	-0.013	39476	108594				
Filter Peak	11.100	0.001	35170	85127				
C36	11.336	-0.008	31154	35883				
o-terph	6.442	0.002	10420981	8106500				
Triacon Surr	9.866	-0.002	7184928	7397778				

Range Times: NW Diesel(4.422 - 8.218) NW Gas(1.831 - 4.422) NW M.Oil(8.218 - 11.845)
AK102(3.483 - 8.416) AK103(8.416 - 11.394) Jet A(3.483 - 6.304)

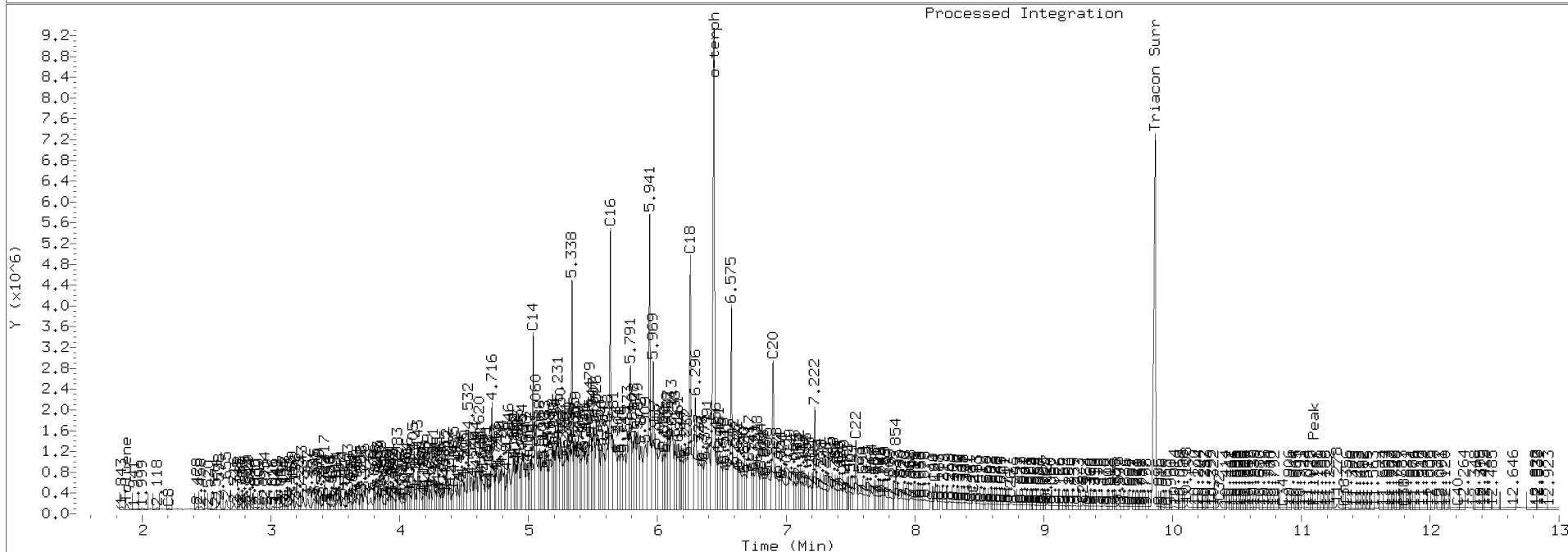
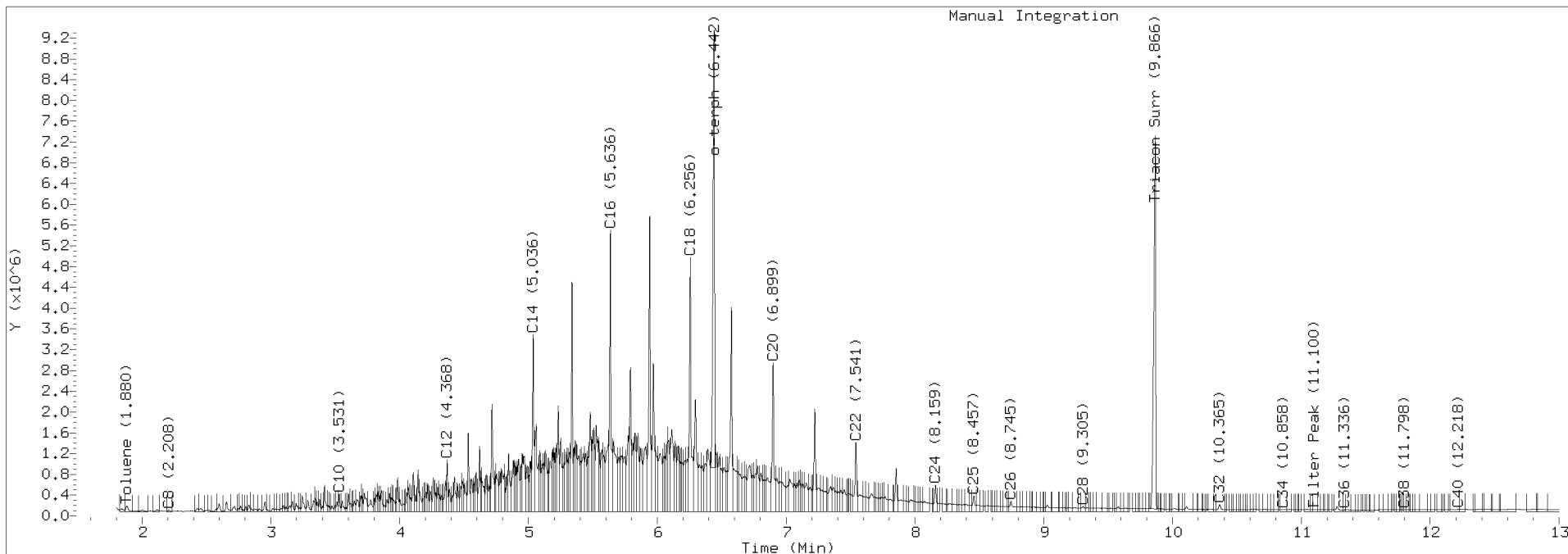
Surrogate	Area	Amount	%Rec
o-Terphenyl	8106500	36.9	81.9
Triaconthane	7397778	38.7	86.0

Analyte	RF	Curve Date
o-Terph Surr	219872.3	28-FEB-2017
Triacon Surr	191068.8	28-FEB-2017
Gas	21747.6	xx-xx-xxxx
Diesel	155491.0	28-FEB-2017
Motor Oil	137039.0	28-FEB-2017

TPH Manual Integrations Report

Datafile: FID3B, 20170303.b/17030337.D Injection: 04-MAR-2017 01:26

Lab ID: BFC0024-MS1





Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

Petroleum Hydrocarbons - Quality Control

Batch BFC0024 - EPA 3510C SepF

Instrument: FID3

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
MSD (BFC0024-MSD1)		Source: 17C0009-19		Prepared: 03-Mar-2017		Analyzed: 04-Mar-2017 01:50				
Diesel Range Organics (C12-C24)	2.62	0.102	mg/L	3.06	0.356	73.9	56-120	12.90	30	
Surrogate: <i>o</i> -Terphenyl	0.0735		mg/L	0.0918	0.0786	80.0	50-150			

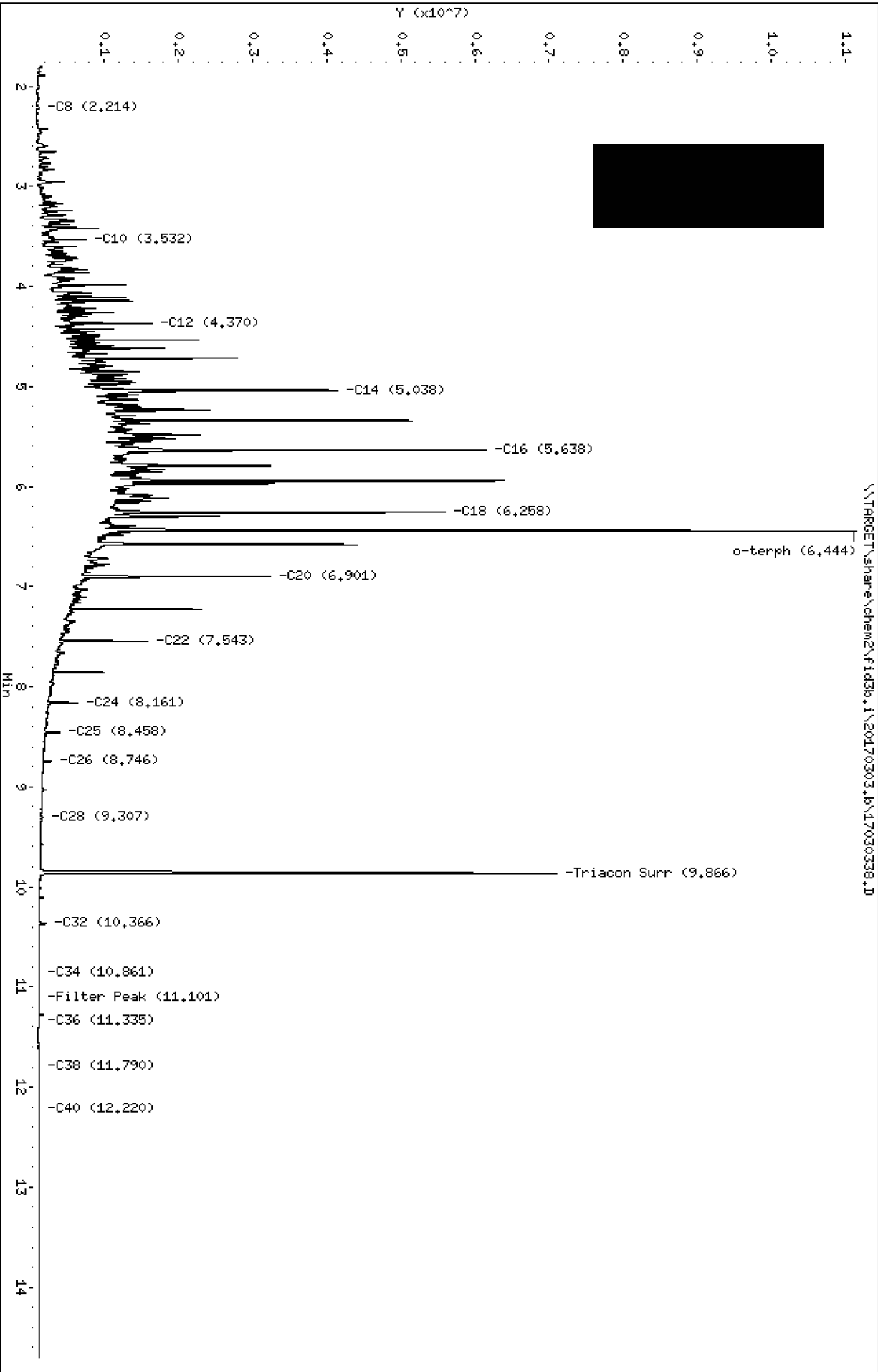
Recovery limits for target analytes in MS/MSD QC samples are advisory only.

Data File: \\TARGET\share\chem2\fid3b,1\20170303,b\17030338.D
Date : 04-MAR-2017 01:50
Client ID:
Sample Info: BFC0024-HSD1

Instrument: fid3b,1

Column phase: RTX-1

Operator: ML
Column diameter: 0.25



Analytical Resources Inc.
TPH Quantitation Report

Data file: 20170303.b/17030338.D
Method: 20170303.b\FID3TPH.m
Instrument: fid3b.i
Operator: ML
Report Date: 03/06/2017
Macro: FID3_022817

ARI ID: BFC0024-MSD1
Client ID:
Injection: 04-MAR-2017 01:50
Dilution Factor: 1

FID:3B RESULTS

Compound	RT	Shift	Height	Area	Method	Range	Total Area	Conc
Toluene	1.888	0.007	112072	151454	WATPHG	(Tol-C12)	29400393	1351.9
C8	2.214	0.001	40666	58865	WATPHD	(C12-C24)	199576936	1283.5
C10	3.532	-0.001	664351	454184	WATPHM	(C24-C38)	11631761	84.9
C12	4.370	-0.002	1562368	923186				
C14	5.038	-0.000	4069624	3128670				
C16	5.638	0.003	6069917	4874277				
C18	6.258	0.004	5518350	5403778				
C20	6.901	0.001	3152865	3071546				
C22	7.543	-0.003	1496397	1344104				
C24	8.161	-0.007	552955	555815				
C25	8.458	-0.008	320632	395208				
C26	8.746	-0.008	199831	251712				
C28	9.307	-0.008	95568	149381				
C32	10.366	-0.008	126270	205068				
C34	10.861	-0.009	34774	63960				
Filter Peak	11.101	0.002	31655	78537				
C36	11.335	-0.009	30728	33195				
o-terph	6.444	0.004	10138621	7925236				
Triacon Surr	9.866	-0.002	6965987	7005140				

Range Times: NW Diesel(4.422 - 8.218) NW Gas(1.831 - 4.422) NW M.Oil(8.218 - 11.845)
AK102(3.483 - 8.416) AK103(8.416 - 11.394) Jet A(3.483 - 6.304)

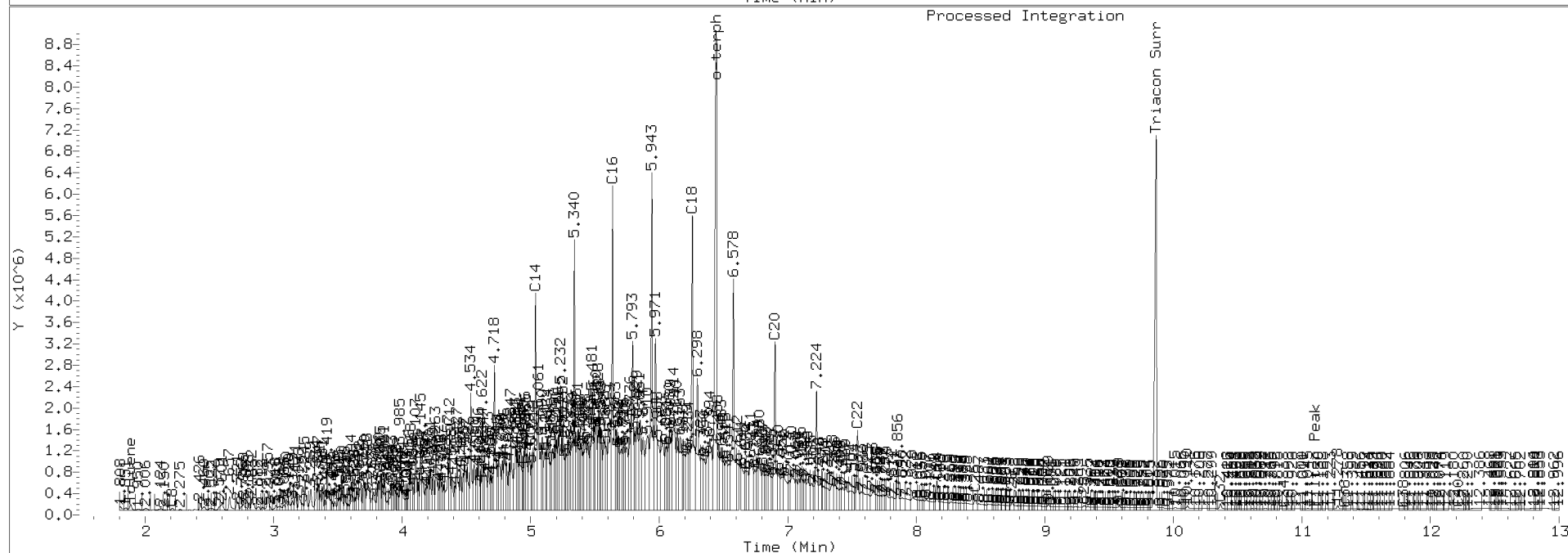
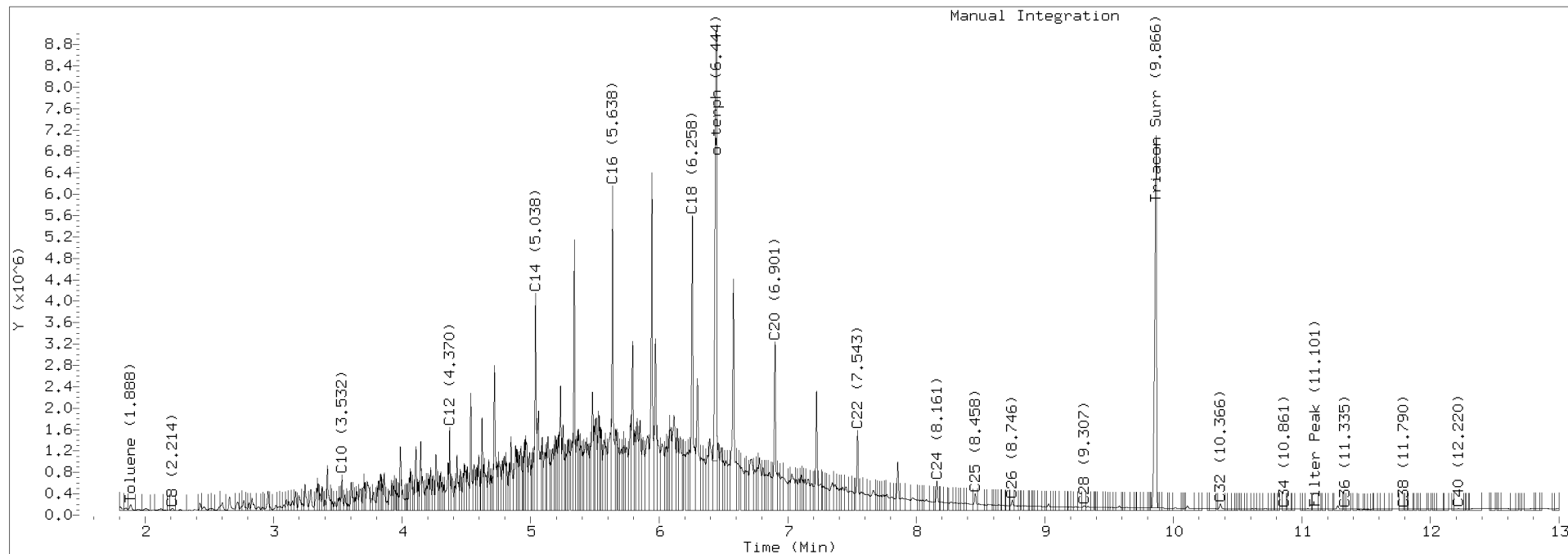
Surrogate	Area	Amount	%Rec
o-Terphenyl	7925236	36.0	80.1
Triaconthane	7005140	36.7	81.5

Analyte	RF	Curve Date
o-Terph Surr	219872.3	28-FEB-2017
Triacon Surr	191068.8	28-FEB-2017
Gas	21747.6	xx-xx-xxxx
Diesel	155491.0	28-FEB-2017
Motor Oil	137039.0	28-FEB-2017

TPH Manual Integrations Report

Datafile: FID3B, 20170303.b/17030338.D Injection: 04-MAR-2017 01:50

Lab ID: BFC0024-MSD1





Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

Certified Analyses included in this Report

Analyte	Certifications
EPA 8260C in Solid	
Chloromethane	WADOE, DoD-ELAP, NELAP, CALAP, ADEC
Vinyl Chloride	WADOE, DoD-ELAP, NELAP, CALAP, ADEC
Bromomethane	WADOE, DoD-ELAP, NELAP, CALAP, ADEC
Chloroethane	WADOE, DoD-ELAP, NELAP, CALAP, ADEC
Trichlorofluoromethane	WADOE, DoD-ELAP, NELAP, CALAP, ADEC
Acrolein	WADOE, DoD-ELAP, NELAP, CALAP
1,1,2-Trichloro-1,2,2-Trifluoroethane	WADOE, DoD-ELAP, NELAP, CALAP, ADEC
Acetone	WADOE, DoD-ELAP, NELAP, CALAP
1,1-Dichloroethene	WADOE, DoD-ELAP, NELAP, CALAP, ADEC
Bromoethane	WADOE, DoD-ELAP, NELAP, CALAP, ADEC
Iodomethane	WADOE, DoD-ELAP, NELAP, CALAP, ADEC
Methylene Chloride	WADOE, DoD-ELAP, NELAP, CALAP, ADEC
Acrylonitrile	WADOE, DoD-ELAP, NELAP, CALAP
Carbon Disulfide	WADOE, DoD-ELAP, NELAP, CALAP, ADEC
trans-1,2-Dichloroethene	WADOE, DoD-ELAP, NELAP, CALAP, ADEC
Vinyl Acetate	WADOE, DoD-ELAP, NELAP, CALAP
1,1-Dichloroethane	WADOE, DoD-ELAP, NELAP, CALAP, ADEC
2-Butanone	WADOE, DoD-ELAP, NELAP, CALAP
2,2-Dichloropropane	WADOE, DoD-ELAP, NELAP, CALAP
cis-1,2-Dichloroethene	WADOE, DoD-ELAP, NELAP, CALAP, ADEC
Chloroform	WADOE, DoD-ELAP, NELAP, CALAP, ADEC
Bromochloromethane	WADOE, DoD-ELAP, NELAP, CALAP, ADEC
1,1,1-Trichloroethane	WADOE, DoD-ELAP, NELAP, CALAP, ADEC
1,1-Dichloropropene	WADOE, DoD-ELAP, NELAP, CALAP, ADEC
Carbon tetrachloride	WADOE, DoD-ELAP, NELAP, CALAP, ADEC
1,2-Dichloroethane	WADOE, DoD-ELAP, NELAP, CALAP, ADEC
Benzene	WADOE, DoD-ELAP, NELAP, CALAP, ADEC
Trichloroethene	WADOE, DoD-ELAP, NELAP, CALAP, ADEC
1,2-Dichloropropane	WADOE, DoD-ELAP, NELAP, CALAP, ADEC
Bromodichloromethane	WADOE, DoD-ELAP, NELAP, CALAP, ADEC
Dibromomethane	WADOE, DoD-ELAP, NELAP, CALAP, ADEC
2-Chloroethyl vinyl ether	WADOE, DoD-ELAP, NELAP
4-Methyl-2-Pentanone	WADOE, DoD-ELAP, NELAP, CALAP
cis-1,3-Dichloropropene	WADOE, DoD-ELAP, NELAP, CALAP, ADEC
Toluene	WADOE, DoD-ELAP, NELAP, CALAP, ADEC



Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

trans-1,3-Dichloropropene	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
2-Hexanone	WADOE,DoD-ELAP,NELAP,CALAP
1,1,2-Trichloroethane	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
1,3-Dichloropropane	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
Tetrachloroethene	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
Dibromochloromethane	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
1,2-Dibromoethane	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
Chlorobenzene	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
Ethylbenzene	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
1,1,1,2-Tetrachloroethane	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
m,p-Xylene	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
o-Xylene	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
Xylenes, total	WADOE
Styrene	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
Bromoform	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
1,1,2,2-Tetrachloroethane	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
1,2,3-Trichloropropane	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
trans-1,4-Dichloro 2-Butene	WADOE,DoD-ELAP,NELAP
n-Propylbenzene	WADOE,DoD-ELAP,NELAP,CALAP
Bromobenzene	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
Isopropyl Benzene	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
2-Chlorotoluene	WADOE,DoD-ELAP,NELAP,CALAP
4-Chlorotoluene	WADOE,DoD-ELAP,NELAP,CALAP
t-Butylbenzene	WADOE,DoD-ELAP,NELAP,CALAP
1,3,5-Trimethylbenzene	WADOE,DoD-ELAP,NELAP,CALAP
1,2,4-Trimethylbenzene	WADOE,DoD-ELAP,NELAP,CALAP
s-Butylbenzene	WADOE,DoD-ELAP,NELAP,CALAP
4-Isopropyl Toluene	WADOE,DoD-ELAP,NELAP,CALAP
1,3-Dichlorobenzene	WADOE,DoD-ELAP,NELAP,CALAP
1,4-Dichlorobenzene	WADOE,DoD-ELAP,NELAP,CALAP
n-Butylbenzene	WADOE,DoD-ELAP,NELAP,CALAP
1,2-Dichlorobenzene	WADOE,DoD-ELAP,NELAP,CALAP
1,2-Dibromo-3-chloropropane	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
1,2,4-Trichlorobenzene	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
Hexachloro-1,3-Butadiene	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
Naphthalene	WADOE,DoD-ELAP,NELAP,CALAP
1,2,3-Trichlorobenzene	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
Dichlorodifluoromethane	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
Methyl tert-butyl Ether	WADOE,DoD-ELAP,NELAP,CALAP



Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

n-Hexane	WADOE
2-Pentanone	WADOE
Dibromofluoromethane	WADOE
4-Bromofluorobenzene	WADOE
Chloromethane	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
Vinyl Chloride	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
Bromomethane	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
Chloroethane	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
Trichlorofluoromethane	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
Acrolein	WADOE,DoD-ELAP,NELAP,CALAP
1,1,2-Trichloro-1,2,2-Trifluoroethane	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
Acetone	WADOE,DoD-ELAP,NELAP,CALAP
1,1-Dichloroethene	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
Bromoethane	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
Iodomethane	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
Methylene Chloride	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
Acrylonitrile	WADOE,DoD-ELAP,NELAP,CALAP
Carbon Disulfide	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
trans-1,2-Dichloroethene	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
Vinyl Acetate	WADOE,DoD-ELAP,NELAP,CALAP
1,1-Dichloroethane	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
2-Butanone	WADOE,DoD-ELAP,NELAP,CALAP
2,2-Dichloropropane	WADOE,DoD-ELAP,NELAP,CALAP
cis-1,2-Dichloroethene	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
Chloroform	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
Bromochloromethane	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
1,1,1-Trichloroethane	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
1,1-Dichloropropene	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
Carbon tetrachloride	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
1,2-Dichloroethane	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
Benzene	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
Trichloroethene	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
1,2-Dichloropropane	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
Bromodichloromethane	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
Dibromomethane	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
4-Methyl-2-Pentanone	WADOE,DoD-ELAP,NELAP,CALAP
cis-1,3-Dichloropropene	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
Toluene	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
trans-1,3-Dichloropropene	WADOE,DoD-ELAP,NELAP,CALAP,ADEC



Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

2-Hexanone	WADOE,DoD-ELAP,NELAP,CALAP
1,1,2-Trichloroethane	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
1,3-Dichloropropane	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
Tetrachloroethene	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
Dibromochloromethane	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
1,2-Dibromoethane	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
Chlorobenzene	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
Ethylbenzene	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
1,1,1,2-Tetrachloroethane	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
m,p-Xylene	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
o-Xylene	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
Styrene	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
Bromoform	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
1,1,2,2-Tetrachloroethane	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
1,2,3-Trichloropropane	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
trans-1,4-Dichloro 2-Butene	WADOE
n-Propylbenzene	WADOE,DoD-ELAP,NELAP,CALAP
Bromobenzene	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
Isopropyl Benzene	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
2-Chlorotoluene	WADOE,DoD-ELAP,NELAP,CALAP
4-Chlorotoluene	WADOE,DoD-ELAP,NELAP,CALAP
t-Butylbenzene	WADOE,DoD-ELAP,NELAP,CALAP
1,3,5-Trimethylbenzene	WADOE,DoD-ELAP,NELAP,CALAP
1,2,4-Trimethylbenzene	WADOE,DoD-ELAP,NELAP,CALAP
s-Butylbenzene	WADOE,DoD-ELAP,NELAP,CALAP
4-Isopropyl Toluene	WADOE,DoD-ELAP,NELAP,CALAP
1,3-Dichlorobenzene	WADOE,DoD-ELAP,NELAP,CALAP
1,4-Dichlorobenzene	WADOE,DoD-ELAP,NELAP,CALAP
n-Butylbenzene	WADOE,DoD-ELAP,NELAP,CALAP
1,2-Dichlorobenzene	WADOE,DoD-ELAP,NELAP,CALAP
1,2-Dibromo-3-Chloropropane	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
1,2,4-Trichlorobenzene	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
Hexachloro-1,3-Butadiene	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
Naphthalene	WADOE,DoD-ELAP,NELAP,CALAP
1,2,3-Trichlorobenzene	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
Dichlorodifluoromethane	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
Methyl tert-butyl Ether	WADOE,DoD-ELAP,NELAP,CALAP
n-Hexane	WADOE

EPA 8260C in Water



Pacific Groundwater Group
2377 Eastlake Ave. E. Suite 200
Seattle WA, 98102

Project: Cascade Natural Gas
Project Number: Cascade Natural Gas
Project Manager: Glen Wallace

Reported:
15-Mar-2017 15:28

Chloromethane	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
Vinyl Chloride	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
Bromomethane	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
Chloroethane	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
Trichlorofluoromethane	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
Acrolein	DoD-ELAP,NELAP,CALAP,WADOE
1,1,2-Trichloro-1,2,2-Trifluoroethane	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
Acetone	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
1,1-Dichloroethene	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
Bromoethane	DoD-ELAP,NELAP,CALAP,WADOE
Iodomethane	DoD-ELAP,NELAP,CALAP,WADOE
Methylene Chloride	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
Acrylonitrile	DoD-ELAP,NELAP,CALAP,WADOE
Carbon Disulfide	DoD-ELAP,NELAP,CALAP,WADOE
trans-1,2-Dichloroethene	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
Vinyl Acetate	DoD-ELAP,NELAP,CALAP,WADOE
1,1-Dichloroethane	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
2-Butanone	DoD-ELAP,NELAP,CALAP,WADOE
2,2-Dichloropropane	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
cis-1,2-Dichloroethene	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
Chloroform	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
Bromochloromethane	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
1,1,1-Trichloroethane	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
1,1-Dichloropropene	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
Carbon tetrachloride	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
1,2-Dichloroethane	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
Benzene	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
Trichloroethene	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
1,2-Dichloropropane	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
Bromodichloromethane	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
Dibromomethane	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
2-Chloroethyl vinyl ether	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
4-Methyl-2-Pentanone	DoD-ELAP,NELAP,CALAP,WADOE
cis-1,3-Dichloropropene	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
Toluene	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
trans-1,3-Dichloropropene	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
2-Hexanone	DoD-ELAP,NELAP,CALAP,WADOE
1,1,2-Trichloroethane	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
1,3-Dichloropropane	DoD-ELAP,ADEC,NELAP,CALAP,WADOE



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Project Manager: Glen Wallace

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15-Mar-2017 15:28

Tetrachloroethene	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
Dibromochloromethane	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
1,2-Dibromoethane	DoD-ELAP,NELAP,CALAP,WADOE
Chlorobenzene	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
Ethylbenzene	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
1,1,1,2-Tetrachloroethane	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
m,p-Xylene	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
o-Xylene	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
Styrene	DoD-ELAP,NELAP,CALAP,WADOE
Bromoform	DoD-ELAP,NELAP,CALAP,WADOE
1,1,1,2-Tetrachloroethane	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
1,2,3-Trichloropropane	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
trans-1,4-Dichloro 2-Butene	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
n-Propylbenzene	DoD-ELAP,NELAP,CALAP,WADOE
Bromobenzene	DoD-ELAP,NELAP,CALAP,WADOE
Isopropyl Benzene	DoD-ELAP,NELAP,CALAP,WADOE
2-Chlorotoluene	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
4-Chlorotoluene	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
t-Butylbenzene	DoD-ELAP,NELAP,CALAP,WADOE
1,3,5-Trimethylbenzene	DoD-ELAP,NELAP,CALAP,WADOE
1,2,4-Trimethylbenzene	DoD-ELAP,NELAP,CALAP,WADOE
s-Butylbenzene	DoD-ELAP,NELAP,CALAP,WADOE
4-Isopropyl Toluene	DoD-ELAP,NELAP,CALAP,WADOE
1,3-Dichlorobenzene	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
1,4-Dichlorobenzene	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
n-Butylbenzene	DoD-ELAP,NELAP,CALAP,WADOE
1,2-Dichlorobenzene	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
1,2-Dibromo-3-chloropropane	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
1,2,4-Trichlorobenzene	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
Hexachloro-1,3-Butadiene	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
Naphthalene	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
1,2,3-Trichlorobenzene	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
Dichlorodifluoromethane	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
Methyl tert-butyl Ether	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
n-Hexane	WADOE
2-Pentanone	WADOE

NWTPH-Dx in Solid

Diesel Range Organics (C12-C24)	DoD-ELAP,NELAP,WADOE
Diesel Range Organics (C10-C25)	DoD-ELAP,NELAP,WADOE



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Diesel Range Organics (Tol-C18)	DoD-ELAP,NELAP,WADOE
Diesel Range Organics (C10-24)	DoD-ELAP,NELAP,WADOE
Diesel Range Organics (C10-C28)	DoD-ELAP,NELAP,WADOE
Motor Oil Range Organics (C24-C38)	DoD-ELAP,NELAP,WADOE
Motor Oil Range Organics (C25-C36)	DoD-ELAP,NELAP,WADOE
Motor Oil Range Organics (C24-C40)	DoD-ELAP,NELAP,WADOE
Mineral Oil Range Organics (C16-C28)	DoD-ELAP,NELAP,WADOE
Mineral Spirits Range Organics (Tol-C12)	DoD-ELAP,NELAP,WADOE
JP8 Range Organics (C8-C18)	DoD-ELAP,NELAP,WADOE
JP5 Range Organics (C10-C16)	DoD-ELAP,NELAP,WADOE
JP4 Range Organics (Tol-C14)	DoD-ELAP,NELAP,WADOE
Jet-A Range Organics (C10-C18)	DoD-ELAP,NELAP,WADOE
Kerosene Range Organics (Tol-C18)	DoD-ELAP,NELAP,WADOE
Stoddard Range Organics (C8-C12)	DoD-ELAP,NELAP,WADOE
Creosote Range Organics (C12-C22)	DoD-ELAP,NELAP,WADOE
Bunker C Range Organics (C10-C38)	DoD-ELAP,NELAP,WADOE
Transformer Oil Range Organics (C12-C28)	DoD-ELAP,NELAP,WADOE

NWTPH-Dx in Water

Diesel Range Organics (C12-C24)	DoD-ELAP,NELAP,WADOE
Diesel Range Organics (C10-C25)	DoD-ELAP,NELAP,WADOE
Diesel Range Organics (Tol-C18)	DoD-ELAP,NELAP,WADOE
Diesel Range Organics (C10-24)	DoD-ELAP,NELAP,WADOE
Diesel Range Organics (C10-C28)	DoD-ELAP,NELAP,WADOE
Motor Oil Range Organics (C24-C38)	DoD-ELAP,NELAP,WADOE
Motor Oil Range Organics (C25-C36)	DoD-ELAP,NELAP,WADOE
Motor Oil Range Organics (C24-C40)	DoD-ELAP,NELAP,WADOE
Mineral Spirits Range Organics (Tol-C12)	DoD-ELAP,NELAP,WADOE
Mineral Oil Range Organics (C16-C28)	DoD-ELAP,NELAP,WADOE
Kerosene Range Organics (Tol-C18)	DoD-ELAP,NELAP,WADOE
JP8 Range Organics (C8-C18)	DoD-ELAP,NELAP,WADOE
JP5 Range Organics (C10-C16)	DoD-ELAP,NELAP,WADOE
JP4 Range Organics (Tol-C14)	DoD-ELAP,NELAP,WADOE
Jet-A Range Organics (C10-C18)	DoD-ELAP,NELAP,WADOE
Creosote Range Organics (C12-C22)	DoD-ELAP,NELAP,WADOE
Bunker C Range Organics (C10-C38)	DoD-ELAP,NELAP,WADOE
Stoddard Range Organics (C8-C12)	DoD-ELAP,NELAP,WADOE
Transformer Oil Range Organics (C12-C28)	DoD-ELAP,NELAP,WADOE

NWTPHg in Water



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Gasoline Range Organics (Tol-Nap)	WADOE,DoD-ELAP
Gasoline Range Organics (2MP-TMB)	WADOE,DoD-ELAP
Gasoline Range Organics (Tol-C12)	WADOE,DoD-ELAP
Gasoline Range Organics (C6-C10)	WADOE,ADEC,DoD-ELAP
Gasoline Range Organics (C5-C12)	WADOE,DoD-ELAP

Code	Description	Number	Expires
ADEC	Alaska Dept of Environmental Conservation	UST-033	05/06/2017
CALAP	California Department of Public Health CAELAP	2748	02/28/2018
DoD-ELAP	DoD-Environmental Laboratory Accreditation Program	66169	03/30/2017
NELAP	ORELAP - Oregon Laboratory Accreditation Program	WA100006	05/11/2017
WADOE	WA Dept of Ecology	C558	06/30/2017
WA-DW	Ecology - Drinking Water	C558	06/30/2017



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Notes and Definitions

Y1	Raised reporting limit due to interference
U	This analyte is not detected above the applicable reporting or detection limit.
Q	Indicates a detected analyte with an initial or continuing calibration that does not meet established acceptance criteria (<20% RSD, <20% drift or minimum RRF)
NRS	This surrogate not reported due to chromatographic interference
E	The analyte concentration exceeds the upper limit of the calibration range of the instrument established by the initial calibration (ICAL)
D1	Surrogate was not detected due to sample extract dilution
D	The reported value is from a dilution
*	Flagged value is not within established control limits.
DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference
[2C]	Indicates this result was quantified on the second column on a dual column analysis.

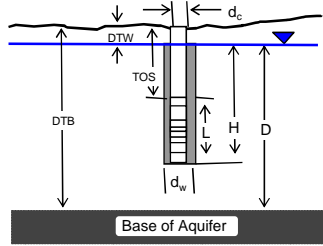
APPENDIX D
SLUG TEST CALCULATION FORMS

WELL ID: CNGMW-12 SLUG OUT #1

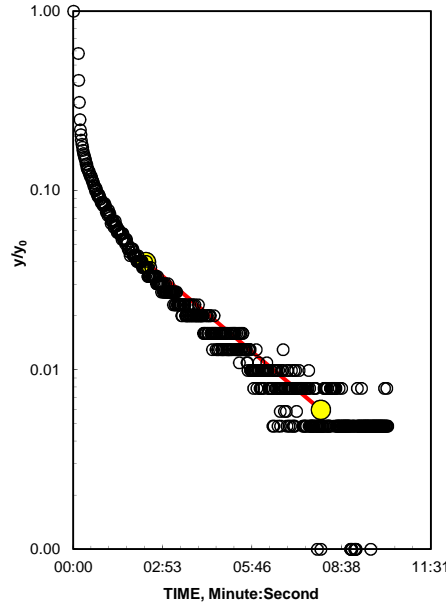
INPUT	
Construction:	
Casing dia. (d_c)	2 Inch
Annulus dia. (d_w)	8 Inch
Screen Length (L)	10 Feet
Depths to:	
water level (DTW)	7.29 Feet
top of screen (TOS)	7 Feet
Base of Aquifer (DTB)	20 Feet
Annular Fill:	
across screen --	Medium Sand
above screen --	Bentonite
Aquifer Material -- Fine Sand	

COMPUTED	
L_{wetted}	9.71 Feet
D =	12.71 Feet
H =	9.71 Feet
L/r_w =	29.13
Y_0 -DISPLACEMENT =	1.89 Feet
Y_0 -SLUG =	3.03 Feet
From look-up table using L/r_w	
Partial penetrate A =	2.481
B =	0.409
$\ln(Re/r_w)$ =	2.261
Re =	3.20 Feet
Slope =	0.002438 \log_{10}/sec
$t_{90\%}$ recovery =	410 sec
Input is consistent.	
K =	0.39 Feet/Day

Local ID: SMW-1
 Date: 3/31/2014
 Time: 10:35



Adjust slope of line to estimate K



Entry	Reduced Data Time, Hr:Min:Sec	Water Level
1	10:35:30.0	5.40
2	10:35:51.0	7.00
3	10:36:04.0	7.06
4	10:36:17.0	7.11
5	10:36:30.0	7.13
6	10:36:43.0	7.16
7	10:36:56.0	7.18
8	10:37:09.0	7.19
9	10:37:22.0	7.20
10	10:37:35.0	7.21
11	10:37:48.0	7.22
12	10:38:01.0	7.23
13	10:38:14.0	7.23
14	10:38:27.0	7.23
15	10:38:40.0	7.24
16	10:38:53.0	7.25
17	10:39:06.0	7.25
18	10:39:19.0	7.25
19	10:39:32.0	7.25
20	10:39:45.0	7.25
21	10:39:58.0	7.27
22	10:40:11.0	7.26
23	10:40:24.0	7.26
24	10:40:37.0	7.27
25	10:40:50.0	7.27
26	10:41:03.0	7.27
27	10:41:16.0	7.27
28	10:41:29.0	7.27
29	10:41:42.0	7.27
30	10:41:55.0	7.28
31	10:42:08.0	7.28
32	10:42:21.0	7.28
33	10:42:34.0	7.28
34	10:42:47.0	7.28
35	10:43:00.0	7.28
36	10:43:13.0	7.28
37	10:43:26.0	7.28
38	10:43:39.0	7.28
39	10:43:52.0	7.28
40	10:44:05.0	7.28
41	10:44:18.0	7.28
42	10:44:31.0	7.28
43	10:44:44.0	7.28
44	10:44:57.0	7.28
45	10:45:10.0	7.28

K= 0.39 is less than likely minimum of 3 for Fine Sand

REMARKS: Bouwer and Rice analysis of slug test, WRR 1976

Halford, K., and Kuniandy, E., 2002. *Documentation of Spreadsheets for the Analysis of Aquifer-Test and Slug-Test Data*. U.S. Geological Survey Open-File Report 02-197.

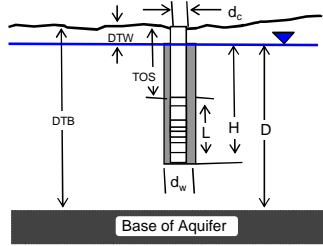
WELL ID: CNGMW-12 SLUG IN #1

INPUT	
Construction:	
Casing dia. (d_c)	2 Inch
Annulus dia. (d_w)	8 Inch
Screen Length (L)	10 Feet
Depths to:	
water level (DTW)	8.08 Feet
top of screen (TOS)	7 Feet
Base of Aquifer (DTB)	20 Feet
Annular Fill:	
across screen --	Medium Sand
above screen --	Bentonite
Aquifer Material -- Fine Sand	

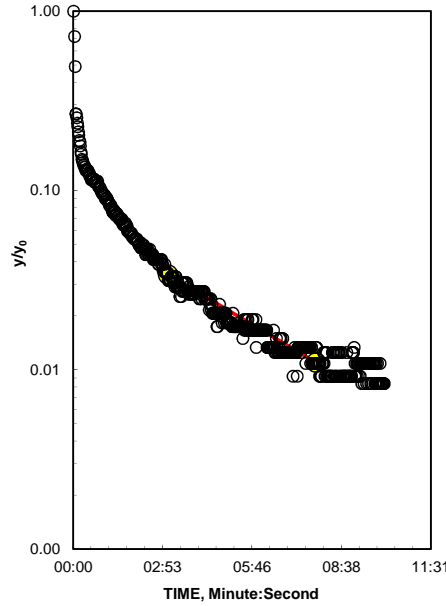
COMPUTED	
L_{wetted}	8.92 Feet
D =	11.92 Feet
H =	8.92 Feet
L/r_w =	26.76
Y_0 -DISPLACEMENT =	2.32 Feet
Y_0 -SLUG =	3.46 Feet
From look-up table using L/r_w	
Partial penetrate A =	2.413
B =	0.395
$\ln(Re/r_w)$ =	2.187
Re =	2.97 Feet
Slope =	0.001714 \log_{10}/sec
$t_{90\%}$ recovery =	584 sec
Input is consistent.	
K =	0.29 Feet/Day

Local ID: CNGMW-12

Date: 2/28/2017
Time: 10:19



Adjust slope of line to estimate K



Entry	Reduced Data Time, Hr:Min:Sec	Water Level
1	10:19:32.0	10.40
2	10:19:46.0	8.46
3	10:19:59.0	8.38
4	10:20:12.0	8.34
5	10:20:25.0	8.31
6	10:20:38.0	8.29
7	10:20:51.0	8.26
8	10:21:04.0	8.24
9	10:21:17.0	8.22
10	10:21:30.0	8.20
11	10:21:43.0	8.19
12	10:21:56.0	8.18
13	10:22:09.0	8.18
14	10:22:22.0	8.18
15	10:22:35.0	8.15
16	10:22:48.0	8.15
17	10:23:01.0	8.15
18	10:23:14.0	8.14
19	10:23:27.0	8.14
20	10:23:40.0	8.14
21	10:23:53.0	8.14
22	10:24:06.0	8.13
23	10:24:19.0	8.12
24	10:24:32.0	8.12
25	10:24:45.0	8.12
26	10:24:58.0	8.12
27	10:25:11.0	8.12
28	10:25:24.0	8.12
29	10:25:37.0	8.12
30	10:25:50.0	8.11
31	10:26:03.0	8.11
32	10:26:16.0	8.11
33	10:26:29.0	8.11
34	10:26:42.0	8.11
35	10:26:55.0	8.11
36	10:27:08.0	8.11
37	10:27:21.0	8.11
38	10:27:34.0	8.11
39	10:27:47.0	8.10
40	10:28:00.0	8.10
41	10:28:13.0	8.10
42	10:28:26.0	8.10
43	10:28:39.0	8.11
44	10:28:52.0	8.11
45	10:29:05.0	8.11

K= 0.29 is less than likely minimum of 3 for Fine Sand

REMARKS: Bouwer and Rice analysis of slug test, WRR 1976

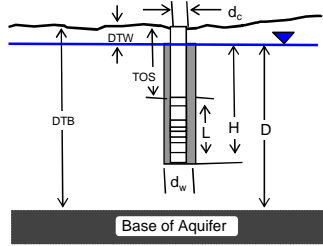
Halford, K., and Kuniandy, E., 2002. *Documentation of Spreadsheets for the Analysis of Aquifer-Test and Slug-Test Data*. U.S. Geological Survey Open-File Report 02-197.

WELL ID: CNGMW-12 SLUG IN #2

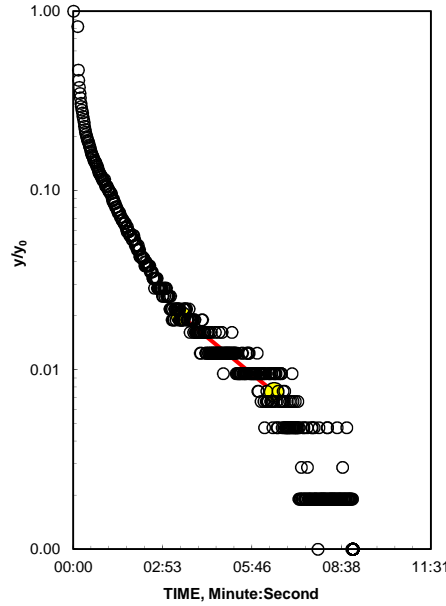
INPUT	
Construction:	
Casing dia. (d_c)	2 Inch
Annulus dia. (d_w)	8 Inch
Screen Length (L)	10 Feet
Depths to:	
water level (DTW)	7.29 Feet
top of screen (TOS)	7 Feet
Base of Aquifer (DTB)	20 Feet
Annular Fill:	
across screen --	Coarse Sand
above screen --	Bentonite
Aquifer Material -- Fine Sand	

COMPUTED	
L_{wetted}	9.71 Feet
D =	12.71 Feet
H =	9.71 Feet
L/r_w =	29.13
Y_0 -DISPLACEMENT =	2.01 Feet
Y_0 -SLUG =	3.03 Feet
From look-up table using L/r_w	
Partial penetrate A =	2.481
B =	0.409
$\ln(Re/r_w)$ =	2.261
Re =	3.20 Feet
Slope =	0.002366 \log_{10}/sec
$t_{90\%}$ recovery =	423 sec
Input is consistent.	
K =	0.38 Feet/Day

Local ID: SMW-1
 Date: 3/31/2014
 Time: 11:02



Adjust slope of line to estimate K



Entry	Reduced Data Time, Hr:Min:Sec	Water Level
1	11:02:28.0	9.30
2	11:02:46.0	7.81
3	11:02:57.0	7.66
4	11:03:08.0	7.58
5	11:03:19.0	7.54
6	11:03:30.0	7.50
7	11:03:41.0	7.48
8	11:03:52.0	7.45
9	11:04:03.0	7.43
10	11:04:14.0	7.41
11	11:04:25.0	7.40
12	11:04:36.0	7.38
13	11:04:47.0	7.37
14	11:04:58.0	7.36
15	11:05:09.0	7.36
16	11:05:20.0	7.34
17	11:05:31.0	7.34
18	11:05:42.0	7.33
19	11:05:53.0	7.33
20	11:06:04.0	7.33
21	11:06:15.0	7.33
22	11:06:26.0	7.32
23	11:06:37.0	7.33
24	11:06:48.0	7.31
25	11:06:59.0	7.31
26	11:07:10.0	7.31
27	11:07:21.0	7.31
28	11:07:32.0	7.31
29	11:07:43.0	7.31
30	11:07:54.0	7.31
31	11:08:05.0	7.31
32	11:08:16.0	7.31
33	11:08:27.0	7.31
34	11:08:38.0	7.31
35	11:08:49.0	7.30
36	11:09:00.0	7.30
37	11:09:11.0	7.30
38	11:09:22.0	7.30
39	11:09:33.0	7.30
40	11:09:44.0	7.30
41	11:09:55.0	7.29
42	11:10:06.0	7.29
43	11:10:17.0	7.29
44	11:10:28.0	7.29
45	11:10:39.0	7.30

K= 0.38 is less than likely minimum of 3 for Fine Sand

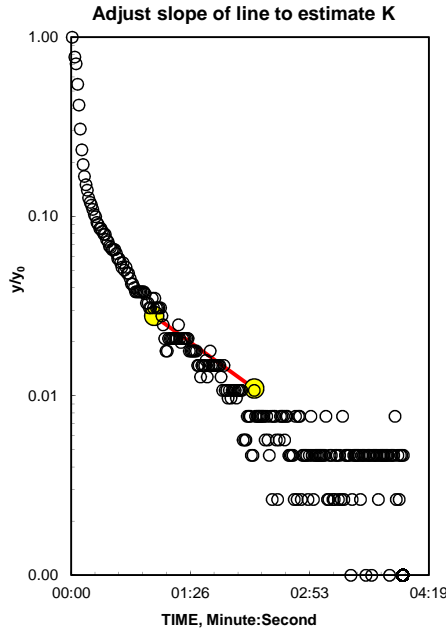
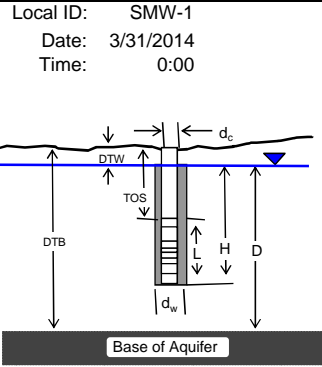
REMARKS: Bouwer and Rice analysis of slug test, WRR 1976

Halford, K., and Kuniandy, E., 2002. *Documentation of Spreadsheets for the Analysis of Aquifer-Test and Slug-Test Data*. U.S. Geological Survey Open-File Report 02-197.

WELL ID: CNGMW-12 SLUG IN #2

INPUT	
Construction:	
Casing dia. (d_c)	2 Inch
Annulus dia. (d_w)	8 Inch
Screen Length (L)	10 Feet
Depths to:	
water level (DTW)	7.29 Feet
top of screen (TOS)	7 Feet
Base of Aquifer (DTB)	20 Feet
Annular Fill:	
across screen --	Medium Sand
above screen --	Bentonite
Aquifer Material -- Fine Sand	

COMPUTED	
L_{wetted}	9.71 Feet
D =	12.71 Feet
H =	9.71 Feet
L/r_w =	29.13
Y_0 -DISPLACEMENT =	1.89 Feet
Y_0 -SLUG =	3.03 Feet
From look-up table using L/r_w	
Partial penetrate A =	2.481
B =	0.409
$\ln(Re/r_w)$ =	2.261
Re =	3.20 Feet
Slope =	0.005597 \log_{10}/sec
$t_{90\%}$ recovery =	179 sec
Input is consistent.	
K =	0.9 Feet/Day



Entry	Reduced Data Time, Hr:Min:Sec	Water Level
1	0:00:00.0	5.40
2	0:00:06.0	6.71
3	0:00:11.0	7.02
4	0:00:16.0	7.10
5	0:00:21.0	7.13
6	0:00:26.0	7.15
7	0:00:31.0	7.17
8	0:00:36.0	7.19
9	0:00:41.0	7.20
10	0:00:46.0	7.22
11	0:00:51.0	7.22
12	0:00:56.0	7.23
13	0:01:01.0	7.23
14	0:01:06.0	7.24
15	0:01:11.0	7.25
16	0:01:16.0	7.25
17	0:01:21.0	7.25
18	0:01:26.0	7.26
19	0:01:31.0	7.26
20	0:01:36.0	7.26
21	0:01:41.0	7.26
22	0:01:46.0	7.26
23	0:01:51.0	7.27
24	0:01:56.0	7.27
25	0:02:01.0	7.27
26	0:02:06.0	7.28
27	0:02:11.0	7.28
28	0:02:16.0	7.28
29	0:02:21.0	7.28
30	0:02:26.0	7.28
31	0:02:31.0	7.28
32	0:02:36.0	7.28
33	0:02:41.0	7.29
34	0:02:46.0	7.29
35	0:02:51.0	7.29
36	0:02:56.0	7.28
37	0:03:01.0	7.28
38	0:03:06.0	7.29
39	0:03:11.0	7.28
40	0:03:16.0	7.28
41	0:03:21.0	7.28
42	0:03:26.0	7.28
43	0:03:31.0	7.28
44	0:03:36.0	7.28
45	0:03:41.0	7.28

K= 0.9 is less than likely minimum of 3 for Fine Sand

REMARKS: Bouwer and Rice analysis of slug test, WRR 1976

Halford, K., and Kuniandy, E., 2002. *Documentation of Spreadsheets for the Analysis of Aquifer-Test and Slug-Test Data*. U.S. Geological Survey Open-File Report 02-197.

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