

July 2013 Groundwater Monitoring

Former Irondale Iron and Steel Plant Site
Irondale, Washington

for

Washington State Department of Ecology

December 5, 2014



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**July 2013 Groundwater Monitoring
Former Irondale Iron and Steel Plant Site
Irondale, Washington**

File No. 0504-042-02

December 5, 2014

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Table of Contents

INTRODUCTION.....	1
SCOPE OF SERVICES	1
GROUNDWATER MONITORING RESULTS	2
General	2
Groundwater Conditions.....	2
Groundwater Sampling.....	2
SURFACE WATER SAMPLING RESULTS.....	3
CONCLUSIONS.....	3
LIMITATIONS.....	4
REFERENCES	4

LIST OF TABLES

Table 1. Summary of Groundwater Level Measurements

Table 2. Summary of Groundwater Chemical Analytical Data – Petroleum Hydrocarbons, cPAHs and Dissolved Metals

LIST OF FIGURES

Figure 1. Vicinity Map

Figure 2. Groundwater Monitoring Results – Dissolved Metals

Figure 3. July 2013 Groundwater Elevation Contours

APPENDICES

Appendix A. Field Procedures

Appendix B. Data Validation Memorandum and Chemical Analytical Results

Appendix C. Report Limitations and Guidelines for Use

INTRODUCTION

This report summarizes the results of the July 2013 quarterly groundwater monitoring event (Round 3), which also includes surface water sampling, at the Former Irondale Iron and Steel Plant Site (Site, also known as Irondale Beach Park) in Irondale, Washington. The Site is a 13-acre property located at 526 Moore Street in the town of Irondale, latitude 48° 2' 38" N longitude 122° 45' 60" W, approximately 5 miles south of Port Townsend, Washington (see Vicinity Map, Figure 1). The Site is owned by Jefferson County and is currently used as an undeveloped day-use park (Irondale Beach Park). It is bounded by Port Townsend Bay to the east, residential properties to the south, southwest and northwest, and parklands to the north. The Site includes both upland and aquatic land. The general site layout is shown on the attached Groundwater Monitoring Results – Dissolved Metals, Figure 2.

From 1881 to 1919, iron and steel were produced intermittently at the Site by various owners. Steel plant operations during this time resulted in metals, carcinogenic polycyclic aromatic hydrocarbons (cPAHs) and/or petroleum contamination of soil, sediment and/or groundwater. Washington State Department of Ecology (Ecology) completed a cleanup action consisting of excavation of upland soil and marine sediment along the shoreline that contain chemicals of concern (COC) concentrations greater than Site-Specific cleanup levels, excavation of slag material outside of remedial excavations to facilitate shoreline habitat restoration, and installation of a multi-component environmental cap in two upland areas where surface soil exceeded Site-Specific cleanup levels. The cleanup action was completed in December 2012.

GeoEngineers, Inc. (GeoEngineers) has been providing site characterization, cleanup and groundwater monitoring services at the Site since 2007.

SCOPE OF SERVICES

New wells (MW-6 through MW-9) were installed following completion of remedial excavation activities. An existing monitoring well MW-5 located outside of the remedial excavation footprint was also sampled as part of the post-construction groundwater monitoring. The purpose of the groundwater monitoring program is to evaluate the effectiveness of the cleanup action, with respect to protection of groundwater. As outlined in the Engineering Design Report (GeoEngineers, 2012), post-construction groundwater monitoring is being performed on a quarterly basis for a minimum of one year. Surface water sampling was performed at three locations during this monitoring event at the specific request of Ecology.

Our specific scope of services for the July 2013 monitoring event is as follows:

1. Measure the depths to groundwater in each well (MW-5 through MW-9). Estimate groundwater flow direction at the site based on the groundwater depths.
2. Purge approximately three well volumes of water from the wells prior to sampling. Obtain groundwater samples using low-flow methodology in accordance with the field procedures outlined in Appendix A from the five wells for chemical analysis.
3. Obtain surface water samples from three locations in Port Townsend Bay; one near the creek at the northern end of the park and two near monitoring wells MW-9 and MW-6.

4. Submit the groundwater samples to an Ecology-certified laboratory for chemical analysis of diesel- and heavy oil-range hydrocarbons by Ecology Method NWTPH-Dx, total carcinogenic polycyclic aromatic hydrocarbons (cPAHs) by EPA Method SW 8270D-SIM, and dissolved metals (copper and nickel) by EPA Method 200.8. Ecology determined that the dissolved cPAH analysis was not required for this event based on the chemical analytical results of the January 2013 groundwater monitoring event.
5. Submit the surface water samples to an Ecology-certified laboratory for chemical analysis of dissolved metals (copper and nickel) by EPA Method 200.8.
6. Evaluate the chemical analytical results relative to Site-Specific groundwater cleanup levels consistent with MTCA requirements. Site-specific groundwater cleanup levels are presented in Table 2.

GROUNDWATER MONITORING RESULTS

General

Monitoring wells MW-5 through MW-9 were used to evaluate groundwater flow direction and obtain groundwater samples. Monitoring well MW-5 was installed prior to the cleanup action during the site characterization phase and is located outside of the cleanup action areas. Monitoring wells MW-6 through MW-8 were installed after cleanup action activities within the limits of petroleum- and metals-contaminated soil remedial excavation areas. Monitoring well MW-9 was installed after cleanup action activities within the limits of the metals-contaminated soil remedial excavation area. The approximate locations of the monitoring wells are shown in Figure 2. Groundwater level measurement and sampling procedures are described in Appendix A. Depth to groundwater measurements are presented in Table 1. Groundwater chemical analytical data is summarized in Table 2. A copy of the laboratory report for the July 2013 groundwater analyses is presented in Appendix B.

Monitoring wells MW-5 through MW-9 were surveyed by Van Aller Surveying during February 2013 for creating the “As-Built Map of the Irondale Iron and Steel Plant Cleanup Action.”

Groundwater Conditions

Groundwater conditions beneath the Site were evaluated by measuring groundwater levels and obtaining groundwater samples from MW-5 through MW-9 on July 16, 2013. Groundwater depths ranged from approximately 3 to 5.8 feet below ground surface (bgs) in the monitoring wells. The shallow depths to water in the monitoring wells are attributed to the proximity of Port Townsend Bay located approximately 20 to 60 feet east from the monitoring wells. Based on site topography, the ground surface is relatively flat, though the ground surface elevation is slightly higher in the southern portion of the site (near MW-6 and MW-7) compared to the ground surface in the northern portion of the site. The groundwater flow direction beneath the site based on July 2013 groundwater elevations is to the east toward Port Townsend Bay (see Figure 3).

Groundwater Sampling

Groundwater samples from MW-5 through MW-9 were submitted to Analytical Resources, Inc. (ARI) an environmental laboratory in Tukwila, Washington for chemical analysis of diesel- and heavy oil-range hydrocarbons, cPAHs, and dissolved copper and dissolved nickel.

- **Hydrocarbons.** Diesel- and heavy oil-range hydrocarbons either were not detected or were detected at concentrations less than the site specific cleanup levels for MW-5 through MW-9.
- **cPAHs.** cPAH constituents were not detected in samples obtained from MW-6 and MW-8. cPAH constituents were detected at concentrations that exceeded the site-specific cleanup level for Total cPAH – TEQ in the groundwater sample from MW-7. Groundwater samples obtained from MW-5 and MW-9 were not tested for cPAH constituents per Ecology’s direction.
- **Dissolved Copper.** Dissolved copper was detected in the sample from MW-9 at a concentration (7 µg/L) greater than the site-specific cleanup level of 2.4 µg/L. Dissolved copper either was not detected, or was detected at concentrations less than the site-specific cleanup level in the remaining wells sampled (in MW-5 through MW-8).
- **Dissolved Nickel.** Dissolved nickel was detected in the sample from MW-9 at a concentration (77 µg/L) greater than the site-specific cleanup level of 8.2 µg/L. Dissolved nickel was detected at concentrations less than the site-specific cleanup level in the samples from MW-5 through MW-8.

SURFACE WATER SAMPLING RESULTS

Surface water samples were collected from three locations in Port Townsend Bay upon Ecology’s request. Surface water sample SW-01 was obtained near the creek at the northern end of the park. This location was selected to evaluate surface water quality away from the remedial excavation areas. Surface water samples SW-02 and SW-03 were obtained near monitoring wells MW-9 and MW-6, respectively. These locations were selected to evaluate surface water quality adjacent to the remedial excavation areas. Surface water samples obtained during the July 2013 monitoring event were analyzed for dissolved copper and dissolved nickel.

- Dissolved copper and nickel were detected at concentrations greater than their respective site-specific cleanup levels in samples from SW-02 and SW-03. Dissolved copper and nickel were detected in sample SW-01 at concentrations that were less than their respective site-specific cleanup levels.

CONCLUSIONS

Groundwater monitoring is being conducted at the former Irondale Iron and Steel Plant site to evaluate the post-construction effectiveness of the cleanup action as outlined in the Final Engineering Design Report (GeoEngineers, 2012). Groundwater samples obtained during the July 2013 sampling event were analyzed for diesel- and heavy oil-range hydrocarbons, cPAHs, and dissolved copper and dissolved nickel. Surface water sampling was performed during this monitoring event upon Ecology’s request. Surface water samples were analyzed for dissolved copper and dissolved nickel.

Contaminants of concern were either not detected or detected at concentrations less than the site specific cleanup levels in all groundwater and surface water samples with the exception of the following wells: MW-7, MW-9 and SW-02 and SW-03.

- cPAH constituents were detected at concentration that exceed the MTCA TEQ in MW-7.
- Dissolved copper and nickel were detected in the sample from MW-9 at concentrations greater than their respective site-specific cleanup levels.

- Dissolved copper and nickel were detected in surface water samples from SW-02 and SW-03 locations at concentrations greater than the site-specific cleanup levels.

The cPAH and copper and nickel results at MW-7, MW-9 and SW-02 and SW-03 are located in the vicinity of the TPH-area remedial excavation (MW-7 and SW-03) and the Metals-area excavation and slag outcrop removal (MW-9 and SW-02).

The July 2013 groundwater monitoring event is the third of the four planned quarterly groundwater monitoring events. July 2013 groundwater results were generally consistent with previous monitoring events.

LIMITATIONS

We have prepared this report for use by the Washington State Department of Ecology. The information contained herein is not intended for use by others and it is not applicable to other sites. No other (third) party may rely on the product of our services unless we agree in advance and in writing to such reliance.

Within the limitations of scope, schedule and budget, our services have been executed in accordance with generally accepted environmental science practices in this area at the time this report was prepared. The conclusions and opinions presented in this report are based on our professional knowledge, judgment and experience. No warranty or other conditions, express or implied, should be understood.

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Please refer to Appendix C titled "Report Limitations and Guidelines for Use" for additional information pertaining to use of this report.

REFERENCES

GeoEngineers, 2009, "Revised Draft Remedial Investigation/Feasibility Study Report, Irondale Iron and Steel Plant, Irondale, Washington, Ecology Facility/Site No. 95275518." GEI File No. 0504-042-01, August 13, 2009.

GeoEngineers, 2012, "Final Engineering Design Report, Irondale Iron and Steel Plant, Irondale, Washington." GEI File No. 0504-042-02, May 1, 2012.

Table 1
Summary of Groundwater Level Measurements
 Former Irondale Iron and Steel Plant Site
 Irondale, Washington

Groundwater Monitoring Well ¹	Quarterly Groundwater Monitoring Event	Date Measured	Top of Casing Elevation ² (feet)	Depth to Water from Top of Casing (feet)	Groundwater Elevation ² (feet)
MW-5	Round 1	1/4/2013	13.97	5.01	8.96
	Round 2	4/10/2013		4.4	9.57
	Round 3	7/16/2013		5.2	8.77
MW-6	Round 1	1/4/2013	17.04	3.23	13.81
	Round 2	4/10/2013		3.16	13.88
	Round 3	7/16/2013		3.05	13.99
MW-7	Round 1	1/4/2013	15.98	5.08	10.90
	Round 2	4/10/2013		5.06	10.92
	Round 3	7/16/2013		5.81	10.17
MW-8	Round 1	1/4/2013	11.93	4.00	7.93
	Round 2	4/10/2013		4.68	7.25
	Round 3	7/16/2013		5.81	6.12
MW-9	Round 1	1/4/2013	11.77	4.83	6.94
	Round 2	4/10/2013		5.52	6.25
	Round 3	7/16/2013		5.51	6.26

Notes:

¹Monitoring well locations are shown on Figure 2.

²Elevation is referenced to Mean Lower Low Water (MLLW). Elevation measurements were obtained from "ASBUILT MAP" provided by Van Aller Surveying to Anderson Environmental Contracting, LLC dated February 2013. Top of casing elevations were estimated by subtracting the distance between the top of the monument and the top of the casing at each well.

Table 2
Summary of Groundwater Chemical Analytical Data - Petroleum Hydrocarbons, cPAHs and Dissolved Metals¹
 Former Irondale Iron and Steel Plant Site
 Irondale, Washington

Sample Identification ²	Quarterly Groundwater Monitoring Event	Sample Date	Petroleum Hydrocarbons ³		Carcinogenic Polycyclic Aromatic Hydrocarbons (cPAHs) ⁴									Dissolved Metals ⁵		
			Diesel-Range	Heavy Oil-Range	Total or Dissolved cPAH	Benzo[a]anthracene	Chrysene	Benzo[b]fluoranthene	Benzo[k]fluoranthene	Benzo[a]pyrene	Indeno[1,2,3-c,d]pyrene	Dibenz[a,h]anthracene	Total cPAH - TEQ ⁴	Copper	Nickel	
Groundwater Samples																
MW05-130104	Round 1	1/4/2013	100 U	200 U	-	-	-	-	-	-	-	-	-	-	1.3	5.6
MW05-130410	Round 2	4/10/2013	100 U	200 U	-	-	-	-	-	-	-	-	-	-	1.5	5.1
MW05-130716	Round 3	7/16/2013	100 U	200 U	-	-	-	-	-	-	-	-	-	-	0.9	4.6
MW06-130104 ⁶	Round 1	1/4/2013	100 U	200 U	Total	0.010 U	0.0066 J	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.00757 J	0.8	5.8
	Round 1	1/4/2013	-	-	Dissolved	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.00755 U	-	-
MW06-130410	Round 2	4/10/2013	100 U	200 U	Total	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.00755 U	0.5 U	4.2
MW06-130716	Round 3	7/16/2013	100 U	200 U	Total	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.00755 U	0.6	4.9
MW07-130104	Round 1	1/4/2013	100 U	200 U	Total	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.00755 U	0.8	4.4
	Round 1	1/4/2013	-	-	Dissolved	0.010 U	0.0072 J	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.00757 J	-	-
MW07-130410	Round 2	4/10/2013	160	200 U	Total	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.00755 U	1.4	5.1
MW07-130716	Round 3	7/16/2013	200	200 U	Total	0.087	0.11	0.056	0.042	0.11	0.028	0.012	0.1336	0.5 U	2.7	
MW08-130104	Round 1	1/4/2013	100 U	200 U	Total	0.0075 J	0.0094 J	0.0063 J	0.010 U	0.0078 J	0.010 U	0.010 U	0.0108 J	0.5 U	5	
	Round 1	1/4/2013	-	-	Dissolved	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.00755 U	-	-	
MW08-130410	Round 2	4/10/2013	100 U	200 U	Total	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.00755 U	2.2	4.9	
MW08-130716	Round 3	7/16/2013	100 U	200 U	Total	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.00755 U	0.9	4.4	
MW09-130104 ⁶	Round 1	1/4/2013	100 U	200 U	-	-	-	-	-	-	-	-	-	-	7	90
MW09-130410 ⁶	Round 2	4/10/2013	100 U	200 U	-	-	-	-	-	-	-	-	-	-	7	10
MW09-130716 ⁶	Round 3	7/16/2013	100 U	200 U	-	-	-	-	-	-	-	-	-	-	7	77
Surface water Samples																
SW01-130716	Round 1	7/16/2013	-	-	-	-	-	-	-	-	-	-	-	-	1.4	4.8
SW02-130716-DUP ⁷	Round 1	7/16/2013	-	-	-	-	-	-	-	-	-	-	-	-	13	16
SW03-130716	Round 1	7/16/2013	-	-	-	-	-	-	-	-	-	-	-	-	9	16
Site-Specific Groundwater Cleanup Level⁸			500	500	-	see TEQ	see TEQ	see TEQ	see TEQ	see TEQ	see TEQ	see TEQ	see TEQ	0.018	2.4	8.2

Notes:

¹Reported results are in micrograms per liter (µg/L).

²Groundwater monitoring well locations and surface water sample locations are shown in Figure 2.

³Petroleum Hydrocarbons analyzed using NWTPH-Dx.

⁴cPAHs analyzed using EPA method 8270D-SIM. Total carcinogenic PAHs (cPAHs) calculated using toxic equivalent (TEQ) methodology relative to benzo(a)pyrene. cPAHs that were not detected were assigned a value of one half of the reporting limit for these calculations. Samples analyzed for dissolved cPAHs were laboratory filtered using a 0.7 µm borosilicate glass, binder free filter.

⁵Dissolved Metals analyzed using EPA method 200.8 (field filtered).

⁶A field duplicate groundwater sample was obtained from this monitoring well (diesel- and heavy oil-range and cPAHs for MW-6 and metals for MW-9). Higher of the two detected concentrations (parent and field duplicate) is reported for each of the analyte.

⁷A field duplicate surface sample was obtained from SW-02 (dissolved metals). Higher of the two detected concentrations (parent and field duplicate) is reported for each of the analyte.

⁸Site-specific groundwater cleanup level is referenced from Table 1 of the Final Engineering Design Report (GeoEngineers, 2012).

MTCA = Model Toxics Control Act

- = not analyzed. Monitoring wells are located in the area remediated due to metals contamination.

U = Laboratory qualifier indicating analyte not detected at level above listed reporting limit.

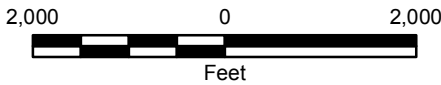
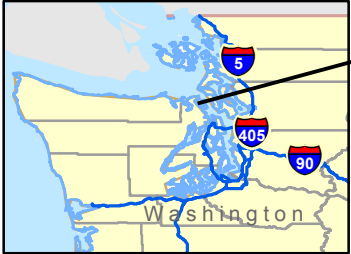
Bold indicates analyte was detected.

Chemical analyses performed by Analytical Resources, Inc., in Tukwila, Washington.

Shaded values represent concentrations greater than the Site-Specific cleanup level.

Map Revised: May 24, 2007

Office: SEA Path: P:\0\0504042\100\GIS\050404200 FIG-1.mxd



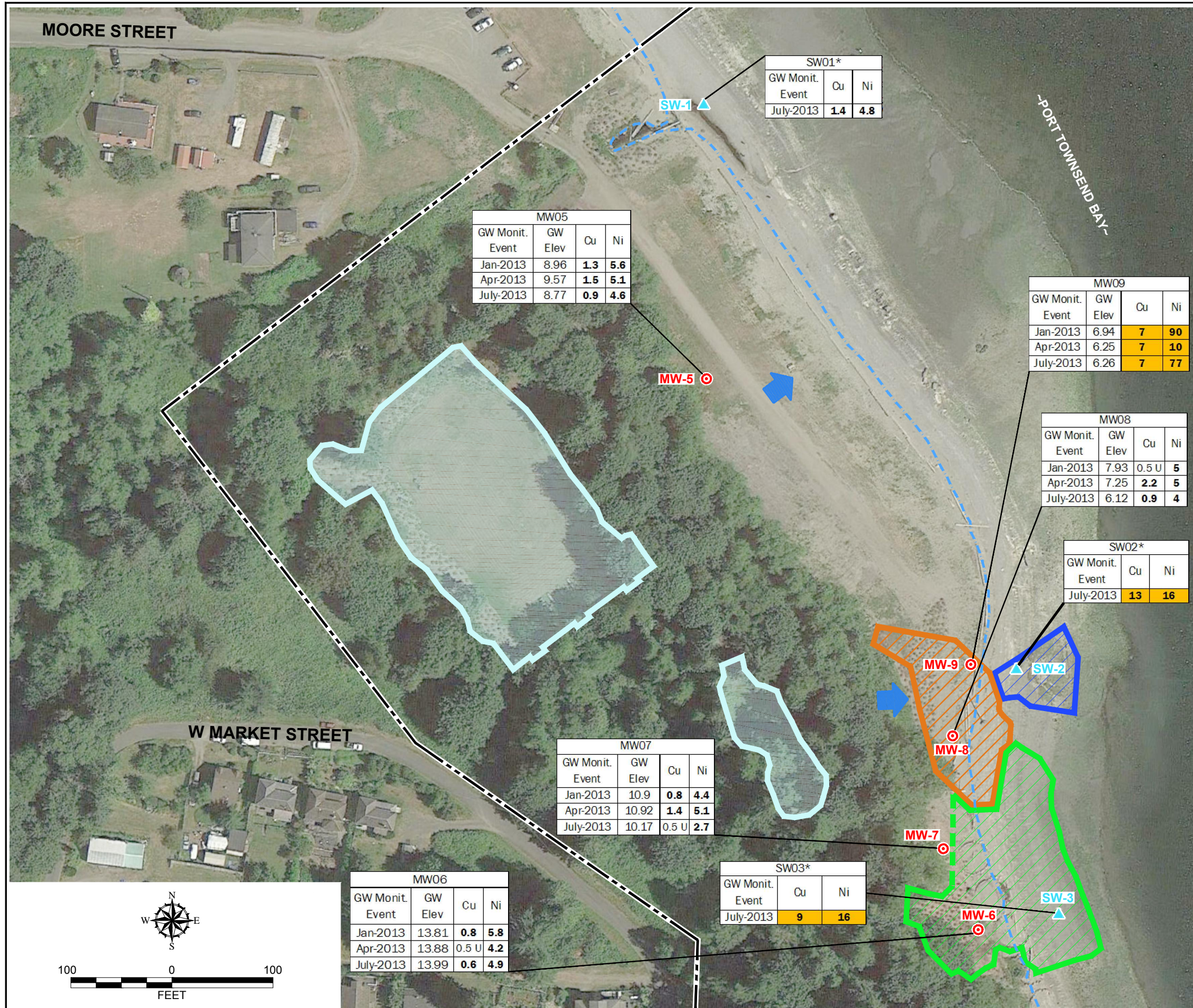
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Data Sources: ESRI Data & Maps, Street Maps 2005
 Transverse Mercator, Zone 10 N North, North American Datum 1983
 North arrow oriented to grid north

Vicinity Map	
Irondale Iron and Steel Plant Irondale, Washington	
	Figure 1

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Legend

- Site Boundary
- Ordinary High Water (Estimated at Elevation 10.5 feet)
- Metals Area - Excavation
- Metals Area - Cap
- TPH Area - Excavation
- Slag Outcrop - Removal
- MW-1 ○ Monitoring Well Location
- ▲ SW-1 ▲ Surface Water Monitoring Location
- ➔ Assumed Groundwater Flow Direction

Data Box Explanation:

GW Monit. = Groundwater Monitoring
 GW Elev = Groundwater Elevation in feet
 Cu = Dissolved Copper
 Ni = Dissolved Nickel

Exceedance of site-specific groundwater cleanup level (Cu = 2.4 µg/L; Ni = 8.2 µg/L)

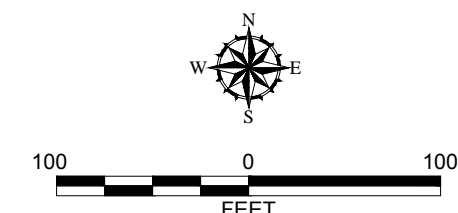
U = Analyte not detected above method reporting limit

Groundwater results in µg/L

*Surface water samples were collected only during the listed events.

- ### Notes
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 3. Dissolved metals (Copper and Nickel) were analyzed using EPA Method 200.8. Samples were field filtered.
 4. TPH and PAH results are presented in Table 2.
- Reference: Aerial photo (July 2013) from Google Earth Pro.

Groundwater Monitoring Results - Dissolved Metals	
Irondale Iron and Steel Plant Irondale, Washington	
GEOENGINEERS	Figure 2



MW06				
GW Monit. Event	GW Elev	Cu	Ni	
Jan-2013	13.81	0.8	5.8	
Apr-2013	13.88	0.5 U	4.2	
July-2013	13.99	0.6	4.9	

MW07				
GW Monit. Event	GW Elev	Cu	Ni	
Jan-2013	10.9	0.8	4.4	
Apr-2013	10.92	1.4	5.1	
July-2013	10.17	0.5 U	2.7	

SW03*			
GW Monit. Event	Cu	Ni	
July-2013	9	16	

MW05				
GW Monit. Event	GW Elev	Cu	Ni	
Jan-2013	8.96	1.3	5.6	
Apr-2013	9.57	1.5	5.1	
July-2013	8.77	0.9	4.6	

SW01*			
GW Monit. Event	Cu	Ni	
July-2013	1.4	4.8	

MW09				
GW Monit. Event	GW Elev	Cu	Ni	
Jan-2013	6.94	7	90	
Apr-2013	6.25	7	10	
July-2013	6.26	7	77	

MW08				
GW Monit. Event	GW Elev	Cu	Ni	
Jan-2013	7.93	0.5 U	5	
Apr-2013	7.25	2.2	5	
July-2013	6.12	0.9	4	

SW02*			
GW Monit. Event	Cu	Ni	
July-2013	13	16	

P:\10\0504\04\2\02\CAD\2013 GW ELEVATION CONTOUR FIGURES\JULY 2013 GW ELEVATION CONTOURS.DWG\TAB:LAYOUT MODIFIED BY TRICHAUD ON DEC 04, 2014 - 13:40

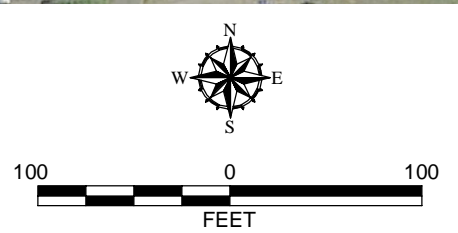


Legend

- Site Boundary
- Ordinary High Water (Estimated at Elevation 10.5 feet)
- MW-1 Monitoring Well Location
- (8.77) Groundwater Elevation (feet)
- 8 Groundwater Elevation Contour (feet)
- Groundwater Flow Direction

Notes

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- Reference: Aerial photo (July 2013) from Google Earth Pro.



July 2013	
Groundwater Elevation Contours	
Former Irondale Iron and Steel Plant Irondale, Washington	
	Figure 3

APPENDIX A

Field Procedures

APPENDIX A FIELD PROCEDURES

General

Monitoring well MW-5 was constructed at the Former Irondale Iron and Steel Plant Site (Site) in June 2007 and MW-6 through MW-9 were constructed at the Site in December 2012 after remedial activities had been completed. The monitoring well construction details for MW-5 through MW-9 are presented in Appendix A of the January 2013 Groundwater Monitoring Report.

Depth to Groundwater Measurements

The depth to groundwater was measured in the monitoring wells using an electric water level indicator. The depth to groundwater was measured relative to the top of the well casings. Water level measurement equipment was washed in a Liqui-Nox® solution, followed by a distilled water rinse prior to use in the well.

Groundwater Sample Collection and Handling

Groundwater samples were obtained from monitoring wells MW-5 through MW-9 in July 2013.

Groundwater samples were obtained from monitoring wells using a peristaltic pump and disposable polyethylene tubing. Groundwater was pumped at approximately 0.5 liter per minute using a peristaltic pump through tubing placed within the screened interval. A Horiba U-22 water quality measuring system with flow-through cell was used to monitor the following water quality parameters during purging: electrical conductivity, dissolved oxygen, pH, salinity, total dissolved solids, turbidity, and temperature. Groundwater samples were obtained once ambient groundwater conditions were reached. Groundwater conditions were considered ambient once the measured parameters varied by less than 10 percent on three consecutive measurements taken approximately 3 minutes apart. The stabilized field measurements are documented in the attached Groundwater Sample Collection Forms.

Samples for dissolved metals analysis were field filtered by pumping water through a 0.45 micron filter directly into the sample container using a peristaltic pump. Groundwater samples obtained were transferred to laboratory-prepared sample jars. Sample containers were filled to minimize headspace. The samples were placed in a cooler with ice pending transport to the analytical laboratory. Samples requiring preservative (e.g., HCl for diesel- and oil-range hydrocarbon analyses) contained the proper preservative in the laboratory-prepared bottles. Chain-of-custody procedures were followed in transporting the samples to the laboratory.

Surface water Sample Collection and Handling

Surface water samples were collected from three locations in Port Townsend Bay upon Ecology's request during the July 2013 groundwater monitoring event. Surface water sample SW-01 was obtained near the creek at the northern end of the park. Surface water samples SW-02 and SW-03 were obtained near monitoring wells MW-9 and MW-6, respectively.

Surface water was collected in an amber-glass bottle provided from the laboratory by directly immersing the bottle into the surface water body. A field filtered surface water sample was then collected by pumping water from the amber-bottle through a 0.45 micron filter directly into the sample container using a

peristaltic pump. Sample containers were filled to minimize headspace. The samples were placed in a cooler with ice pending transport to the analytical laboratory.

Samples requiring preservative contained the proper preservative in the laboratory-prepared bottles. Chain-of-custody procedures were followed in transporting the samples to the laboratory.

Investigative Wastes

Purged groundwater (approximately 5 gallons) removed from the monitoring well casings on July 16, 2013 during groundwater sampling was stored in a 5-gallon bucket. Purged groundwater generated during the well sampling activities was disposed in the sanitary sewer at GeoEngineers' office in Redmond, Washington in August 2013.

GROUNDWATER SAMPLE COLLECTION FORM

Project LEONDALE Job No. 0504-042-02 Collector FK Casing Elevation _____ MW ID MW05

PURGE DATA

Well Condition: Secure Yes No Describe Damage None
(Padlock brand and number)

Depth to Water (from top of well casing) 5.20 ft

Depth to Base of Well 18-75 ft Height of Water Column _____

Well Casing Type/Diameter 1-INCH

One Casing Volume (gal.) _____

Purge Method Pump (type) PERISTALTIC Bailer (type) _____

Gallons Purged 21.0

(Remove minimum of 3 well volumes or until field parameters stabilize)

Purge Water Storage/Disposal 5-gal BUCKET

(Drum identification, sample analysis, sample results, storage location, etc.)

Diameter (in.)	OD	ID	Volume Gal./Linear Ft
2	2.375"	2.067"	0.17
3	3.500"	3.068"	0.38
4	4.500"	4.026"	0.66
6	6.625"	6.065"	1.5
8	8.625"	7.981"	2.6

SAMPLING DATA

Date Collected (mo/dy/yr) 7/16/13

Sample Location and Depth MW05 Time Collected 1920

Tidal Cycle NA High Tide at 11:50 a.m. Low Tide at 5:00 p.m. Weather OVERCAST

Sample type (Groundwater, Product, Other) GW

Sample Collected with Bailer Pump Other

Made of Stainless Steel PVC Teflon Disposable LDPE Other

Sampler Decon Procedure DISPOSABLE TUBING & ALLONOX RINSE WITH

Sample Description (color, free product thickness, odor, turbidity, etc.) COLORLESS DISTILLED WATER

FIELD PARAMETERS

Time	Purge Volume (liter)	pH	Conductivity (µS/cm)	Turbidity (NTU)	Dissolved Oxygen	Temperature (°C)	Salinity (%)	TDS (g/l)	Sea Water Potential	ORP (mV)
1900	0.1	9.11	1.24	27.3	5.88	11.6	0.1	0.8	0	77
1905	0.5	8.6	1.21	24.1	5.12	11.5	0.1	0.8	0	85
1910	0.5	8.3	1.20	22.9	4.83	11.5	0.1	0.8	0	92
1915	0.5	8.2	1.2	22.8	4.76	11.5	0.1	0.8	0	94
1920	0.5	8.1	1.2	22.7	4.72	11.5	0.1	0.8	0	96

Meters Used for Measurement HORIBA U-22

pH/Con./DO Instrument Calibration Yes No Spectrophotometer _____ E-Tape

ADDITIONAL INFORMATION

Samples Composited Overtime, Distance NA

Analyses, Number and Volume of Sample Containers MW05-130716

Duplicate Sample Number(s) NO

Signature _____ Date 7/16/13 Page 1 of 1

Check if additional information on back

GROUNDWATER SAMPLE COLLECTION FORM

Project IRONDALE Job No. 0504-042-02 Collector FK Casing Elevation _____ MW ID MW06

PURGE DATA

Well Condition: Secure Yes No Describe Damage None
(Padlock brand and number)

Depth to Water (from top of well casing) 3.05 ft

Depth to Base of Well 11.25 ft Height of Water Column _____

Well Casing Type/Diameter 1-inch

One Casing Volume (gal.) 1-gal

Purge Method Pump (type) PERISTALTIC Bailer (type) _____

Gallons Purged 1.0

(Remove minimum of 3 well volumes or until field parameters stabilize)

Purge Water Storage/Disposal 5-gal BUCKET

(Drum identification, sample analysis, sample results, storage location, etc.)

Diameter (in.)	OD	ID	Volume Gal./ Linear Ft
2	2.375"	2.067"	0.17
3	3.500"	3.068"	0.38
4	4.500"	4.026"	0.66
6	6.625"	6.065"	1.5
8	8.625"	7.981"	2.6

SAMPLING DATA

Date Collected (mo/d/yr) 7/16/13

Sample Location and Depth MW06

Time Collected 1515

Tidal Cycle NA High Tide at 1150 AM Low Tide at 5:00 PM

Weather SUNNY

Sample type (Groundwater, Product, Other) GW

Sample Collected with Bailer Pump Other _____

Made of Stainless Steel PVC Teflon Disposable LDPE Other _____

Sampler Decon Procedure DISPOSABLE TUBING & ALLOX RINSE WITH

Sample Description (color, free product thickness, odor, turbidity, etc.) COLORLESS DISTILLED WATER

FIELD PARAMETERS

Time	Purge Volume (liter)	pH	Conductivity (µS/cm)	Turbidity (NTU)	Dissolved Oxygen	Temperature (°C)	Salinity (%)	TDS (g/l)	Sea Water Potential	ORP (mV)
1445	0.1	7.7	1.53	50	4.92	13.4	0.1	0.9	0	100
1450	0.5	7.5	1.4	34	4.44	13.3	0.1	0.9	0	80
1455	0.5	7.5	1.3	26	4.62	13.2	0.1	0.8	0	65
1500	0.5	7.5	1.2	17	6.29	13.1	0.1	0.8	0	59
1505	0.5	7.4	1.1	14	6.28	13.0	0.1	0.8	0	45
1510	0.5	7.4	1.1	12	6.09	13.1	0.1	0.8	0	43
1515	0.5	7.4	1.1	11	6.02	13.0	0.1	0.8	0	41

Meters Used for Measurement HORIBA U-22

pH/Con./DO Instrument Calibration Yes No Spectrophotometer _____ E-Tape

ADDITIONAL INFORMATION

Samples Composited Overtime, Distance NA

Analyses, Number and Volume of Sample Containers MW06-130716 9

Duplicate Sample Number(s) MW06-130716-DUP

Signature [Signature] Date 7/16/13 Page 1 of 1

Check if additional information on back

GROUNDWATER SAMPLE COLLECTION FORM

Project IRONDALE Job No. 0564-042-02 Collector FK Casing Elevation _____ MW ID MW07

PURGE DATA

Well Condition: Secure Yes No Describe Damage None

Depth to Water (from top of well casing) 5.81 ft

Depth to Base of Well 11.75 ft Height of Water Column _____

Well Casing Type/Diameter 1-INCH

One Casing Volume (gal.) ~110

Purge Method Pump (type) PERISTALTIC Bailer (type) _____

Gallons Purged _____

(Remove minimum of 3 well volumes or until field parameters stabilize)

Purge Water Storage/Disposal 5-gal BUCKET

(Drum identification, sample analysis, sample results, storage location, etc.)

Diameter (in.)	OD	ID	Volume Gal./ Linear Ft
2	2.375"	2.067"	0.17
3	3.500"	3.068"	0.38
4	4.500"	4.026"	0.66
6	6.625"	6.065"	1.5
8	8.625"	7.981"	2.6

SAMPLING DATA

Date Collected (mo/dy/yr) 7/16/15

Sample Location and Depth MW07

Time Collected 1630

Tidal Cycle NA High Tide at 11:50 a.m. Low Tide at 5:00 p.m.

Weather SUNNY

Sample type (Groundwater, Product, Other) GW

Sample Collected with Bailer Pump Other

Made of Stainless Steel PVC Teflon Disposable LDPE Other

Sampler Decon Procedure DISPOSABLE TUBING ALLOWOX RINSE w/DISTILLED

Sample Description (color, free product thickness, odor, turbidity, etc.) COLORLESS WATER

FIELD PARAMETERS

Time	Purge Volume (liter)	pH	Conductivity (µS/cm)	Turbidity (NTU)	Dissolved Oxygen	Temperature (°F/C)	Salinity (%)	TDS (g/l)	Sea Water Potential	ORP (mV)
1600	0.1	7.95	0.97	32	4.84	13.4	0	0.6	0	110
1605	0.5	7.88	0.96	22	4.57	13.4	0	0.6	0	95
1610	0.5	7.84	0.95	16	4.41	13.3	0	0.6	0	64
1615	0.5	7.76	0.94	15	4.31	13.3	0	0.6	0	41
1620	0.5	7.73	0.94	15	4.17	13.3	0	0.6	0	28
1625	0.5	7.71	0.93	15.2	4.06	13.3	0	0.6	0	25
1630	0.5	7.70	0.93	14.9	4.07	13.3	0	0.6	0	24

Meters Used for Measurement HORIBA U-22

pH/Con./DO Instrument Calibration Yes No Spectrophotometer _____ E-Tape

ADDITIONAL INFORMATION

Samples Composited Overtime, Distance NA

Analyses, Number and Volume of Sample Containers MW07-130716

Duplicate Sample Number(s) No

Signature [Signature] Date 7/16/15 Page 1 of 1

Check if additional information on back

GROUNDWATER SAMPLE COLLECTION FORM

Project IRONDALE Job No. 0504-042-02 Collector FK Casing Elevation _____ MW ID MW08

PURGE DATA

Well Condition: Secure Yes No Describe Damage NONE

(Padlock brand and number) _____

Depth to Water (from top of well casing) 5.81 ft

Depth to Base of Well 12.15 ft Height of Water Column _____

Well Casing Type/Diameter 1-INCH

One Casing Volume (gal.) 11.0

Purge Method Pump (type) PERISTALTIC Bailer (type) _____

Gallons Purged _____

(Remove minimum of 3 well volumes or until field parameters stabilize)

Purge Water Storage/Disposal 5-gal BUCKET

(Drum identification, sample analysis, sample results, storage location, etc.)

Diameter (in.)	OD	ID	Volume Gal./ Linear Ft
2	2.375"	2.067"	0.17
3	3.500"	3.068"	0.38
4	4.500"	4.026"	0.66
6	6.625"	6.065"	1.5
8	8.625"	7.981"	2.6

SAMPLING DATA

Date Collected (mo/d/yr) 7/16/13

Sample Location and Depth MW08

Time Collected 1715

Tidal Cycle NA High Tide at 11:50 a.m. Low Tide at 5:00 p.m. Weather SUNNY

Sample type (Groundwater, Product, Other) GW

Sample Collected with Bailer Pump Other _____

Made of Stainless Steel PVC Teflon Disposable LDPE Other _____

Sampler Decon Procedure DISPOSABLE TUBING & ALCONOX RINSE W/DISTILLED WATER

Sample Description (color, free product thickness, odor, turbidity, etc.) COLORLESS

FIELD PARAMETERS

Time	Purge Volume (liter)	pH	Conductivity (µS/cm)	Turbidity (NTU)	Dissolved Oxygen	Temperature (°C)	Salinity (%)	TDS (g/l)	Sea Water Potential	ORP (mV)
1655	0.1	7.69	1.1	201	4.88	13.8	0	0.7	0	92
1700	0.5	7.56	1.09	143	4.48	13.7	0	0.7	0	79
1705	0.5	7.50	1.09	90.1	4.35	13.9	0	0.7	0	67
1710	0.5	7.45	1.09	77.2	4.26	13.7	0	0.7	0	63
1715	0.5	7.41	1.08	71.3	4.18	13.7	0	0.7	0	61

Meters Used for Measurement HORIBA U-22

pH/Con./DO Instrument Calibration Yes No Spectrophotometer _____ E-Tape

ADDITIONAL INFORMATION

Samples Composited Overtime, Distance NA

Analyses, Number and Volume of Sample Containers MW08-130716

Duplicate Sample Number(s) NO

Signature _____ Date 7/16/13 Page 1 of 1

Check if additional information on back

GROUNDWATER SAMPLE COLLECTION FORM

Project IRONDALE Job No. 0504-042067 Collector FK Casing Elevation _____ MW ID MW09

PURGE DATA

Well Condition: Secure Yes No Describe Damage None

(Padlock brand and number) _____

Depth to Water (from top of well casing) 5.51 ft

Depth to Base of Well 17.05 ft Height of Water Column _____

Well Casing Type/Diameter 1-INCH

One Casing Volume (gal.) _____

Purge Method Pump (type) PERISTALTIC Bailer (type) _____

Gallons Purged _____

(Remove minimum of 3 well volumes or until field parameters stabilize)

Purge Water Storage/Disposal 5-gal BUCKET

(Drum identification, sample analysis, sample results, storage location, etc.)

Diameter (in.)	OD	ID	Volume Gal./ Linear Ft
2	2.375"	2.067"	0.17
3	3.500"	3.068"	0.38
4	4.500"	4.026"	0.66
6	6.625"	6.065"	1.5
8	8.625"	7.981"	2.6

SAMPLING DATA

Date Collected (mo/dy/yr) 7/16/13

Sample Location and Depth MW08 Time Collected 1815

Tidal Cycle NA High Tide at 11:50 a.m. Low Tide at 5:00 p.m. Weather OVERCAST

Sample type (Groundwater, Product, Other) GW

Sample Collected with Bailer Pump Other _____

Made of Stainless Steel PVC Teflon Disposable LDPE Other _____

Sampler Decon Procedure DISPOSABLE TUBING

Sample Description (color, free product thickness, odor, turbidity, etc.) SIGNIFICANT IRON OXIDE PRECIPITATE IN PURGED WATER

FIELD PARAMETERS

Time	Purge Volume (liter)	pH	Conductivity (µS/cm)	Turbidity (NTU)	Dissolved Oxygen	Temperature (°C)	Salinity (%)	TDS (g/l)	Sea Water Potential	ORP (mV)
1755	0.1	7.98	23.9	15.2	8.89	14.9	1.4	15	10	94
1800	0.5	8.26	22.8	14.1	9.02	14.4	1.4	14	10	64
1805	0.5	8.36	21.7	13.1	8.78	14.2	1.3	13	9	52
1810	0.5	8.41	21.1	14.2	8.77	14.2	1.3	13	9	48
1815	0.5	8.40	21.0	14.1	8.86	14.1	1.3	13	9	47
1820	0.5	8.42	21.1	14.0	8.76	14.0	1.3	13	9	45

Meters Used for Measurement HORIBA U-22

pH/Con./DO Instrument Calibration Yes No Spectrophotometer _____ E-Tape

ADDITIONAL INFORMATION

Samples Composited Overtime, Distance NA

Analyses, Number and Volume of Sample Containers MW09-130716

Duplicate Sample Number(s) _____

MW09-130716-DUP Metals Dissolved

Signature [Signature] Date 7/16/13 Page 1 of 1

Check if additional information on back

APPENDIX B
Data Validation Memorandum and
Chemical Analytical Results

Project: Irondale Remedial Cleanup Action, Quarterly Groundwater Monitoring (Round 3)
File: 00504-042-02
Date: August 16, 2013
Lab Report: WX80 (ARI)

This report presents the results of a United States Environmental Protection Agency (USEPA)-defined Stage 2A validation (USEPA Document 540-R-08-005; USEPA, 2009) of analytical data from the analyses of eleven groundwater samples obtained from the Post-Construction Quarterly Groundwater Monitoring Event (Round 3) at the former Irondale Iron and Steel Plant site in Irondale, Washington. Samples obtained were submitted to Analytical Resources Incorporated (ARI) of Tukwila, Washington for chemical analysis of diesel- and heavy oil-range petroleum hydrocarbons (NWTPH-Dx), dissolved and total carcinogenic polycyclic aromatic hydrocarbons (cPAHs), and dissolved metals (copper and nickel).

The objective of the data quality assessment was to review laboratory analytical procedures and QC results to evaluate whether the samples were analyzed using well-defined and acceptable methods that provide quantitation limits below applicable regulatory criteria, the precision and accuracy of the data are well defined and sufficient to provide defensible data, and the quality assurance/quality control (QA/QC) procedures utilized by the laboratory meet acceptable industry practices and standards.

The ARI Sample Delivery Group (SDG; noted above) was reviewed for the following quality control (QC) elements:

- Chain of Custody
- Holding Times
- Surrogates/Labeled Compounds
- Method and Equipment Rinsate Blanks
- Laboratory Control Samples/Ongoing Precision and Recovery Samples
- Matrix Spikes/Matrix Spike Duplicates
- Laboratory and Field Duplicates

DATA QUALITY ASSESSMENT SUMMARY

The results for each of the QC elements are summarized below. The data assessment was performed using guidance in two USEPA documents: USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review (USEPA, 2010) and USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (USEPA, 2008).

Chain-of-Custody Documentation

Chain-of-custody forms were provided with the laboratory analytical reports. No transcription errors were found, and the appropriate signatures were applied. There were no anomalies mentioned in the sample receipt forms, with the following exception:

- The sample container temperature was recorded at the lab at 9.3 degrees Celsius, outside of the temperature limits of between 2 and 6 degrees Celsius. Since the samples were received by the lab within 24 hours of the sampling event, no qualifiers were required.

Holding Times

The holding time is defined as the time that elapses between sample collection and sample analysis. Maximum holding time criteria exist for each analysis to help ensure that the analyte concentrations found at the time of analysis reflect the concentration present at the time of sample collection. Established holding times were met for all analyses.

Surrogate Recoveries

A surrogate compound is a compound that is chemically similar to the analytes of interest, but unlikely to be found in any environmental sample. Surrogates are used for organic analyses and are added to all samples, standards, and blanks to serve as an accuracy and specificity check of each analysis. The surrogates are added at a known concentration and percent recoveries are calculated following analysis. All surrogate percent recoveries (%R) for field samples were within the laboratory control limits, with the following exception:

- (cPAHs) The %R value for the surrogate d14-Dibenzo(a,h)anthracene was less than the control limits in Sample MW07-130716. For this reason, the laboratory diluted and re-analyzed the sample with both surrogate %R values within their respective control limits. The diluted analysis reported some target analytes as being not detected at elevated reporting limits; therefore, this second analysis should not be used for the purposes of this sampling event. The positive results for all target analytes in the initial analysis were qualified as estimated (J) in Sample MW07-130716. The positive results and reporting limits for all target analytes were labeled as do-not-report (DNR) in the diluted analysis for Sample MW07-130716.

Method Blanks

Method blanks are analyzed to ensure that laboratory procedures and reagents do not introduce measurable concentrations of the analytes of interest. Method blanks were analyzed with each batch of samples, at a frequency of one per twenty samples. For all sample batches, method blanks for all applicable methods were analyzed at the required frequency. None of the analytes of interest were detected above the contract required quantitation limits.

Matrix Spikes/Matrix Spike Duplicates

Because the actual analyte concentration in an environmental sample is not known, the accuracy of a particular analysis is usually inferred by performing a matrix spike (MS) analysis. One aliquot of sample is analyzed in the normal manner, and then a second aliquot of the sample is spiked with a known amount of analyte concentration and analyzed. From these analyses, a %R is calculated. Matrix spike duplicates (MSD)

analyses are generally performed for organic analyses as a precision check. For some organic analytical methods, such as NWTPH-Dx, a laboratory control sample/ laboratory control sample duplicate (LCS/LCSD) sample set is performed in lieu of a MS/MSD analysis.

For inorganics methods, the matrix spike (referred to as a “spiked sample”) is typically followed by a post spike sample if any element recoveries were outside the control limits in the “spike sample”.

Matrix spike analyses should be performed once per analytical batch or every twenty field samples, whichever is more frequent. The recovery criteria for matrix spikes and laboratory control samples are specified in the laboratory documents as are the relative percent difference (RPD) values. The frequency requirements were met for all analyses and the %R/RPD values were within the proper control limits.

Laboratory Control Samples

A laboratory control sample is essentially a blank sample that is spiked with a known amount of analyte concentration and analyzed. It is to be treated much like a matrix spike, without the possibility for matrix interference. As there is no actual sample matrix in the analysis, the analytical expectations for accuracy and precision are usually more rigorous and qualification would apply to all samples in the batch, instead of the parent sample only.

Laboratory control sample analyses should be performed once per analytical batch or every twenty field samples, whichever is more frequent. The recovery criteria for laboratory control samples are specified in the laboratory documents as are the RPD values. The frequency requirements were met for all analyses, and the %R/RPD values were within the proper control limits.

Laboratory Duplicates (Metals and Fuels only)

Internal laboratory duplicate analyses are performed to monitor the precision of the analyses. Two separate aliquots of a sample are analyzed as distinct samples in the laboratory, and the RPD between the two results is calculated. Duplicate analyses should be performed once per analytical batch. If one or more of the samples used has a concentration greater than five times the reporting limit for that sample, the absolute difference is used instead of the RPD.

Laboratory duplicates were analyzed at the proper frequency and the specified acceptance criteria were met in all cases.

Field Replicates/Duplicates

Field duplicate samples were collected and analyzed along with the reviewed sample batches. The duplicate samples were analyzed for the same parameters as the associated parent samples. As mentioned above for the laboratory duplicates the RPD is used as the criteria for assessing precision, unless one or more of the samples used has a concentration greater than five times the reporting limit for that sample. In this case, the absolute difference is used instead of the RPD.

The following field duplicate sample sets were collected for this sampling event:

- MW06-130716/MW06-130716-DUP, MW09-130716/MW09-130716-DUP, and SW02-130716/SW02-130716-DUP

The RPD/absolute difference values for the field duplicate sample sets were within their respective control limits.

OVERALL ASSESSMENT

As was determined by this data validation, the laboratory followed the specified analytical methods. Accuracy was acceptable, as demonstrated by the surrogates, LCS/LCSD, and MS/MSD %R values, with the exception noted above. Precision was acceptable, as demonstrated by the field duplicate, laboratory duplicate, LCS/LCSD and MS/MSD RPD and absolute difference values.

Data were qualified because of a surrogate %R outlier.

Based on this validation, the data were of acceptable quality for their intended use.

REFERENCES

- U.S. Environmental Protection Agency (USEPA). "Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review," OSWER 9240.1-51, EPA 540-R-10-011. January 2010.
- U.S. Environmental Protection Agency (USEPA). "Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review," EPA-540-R-08-01. June 2008.
- U.S. Environmental Protection Agency (USEPA). "Guidance for Labeling Externally Validated Laboratory Analytical Data for Superfund Use," EPA-540-R-08-005. January 2009.



Analytical Resources, Incorporated
Analytical Chemists and Consultants

July 29, 2013

Neil Morton
GeoEngineers, Inc.
Plaza 600 Building
600 Stewart Street, Suite 1700
Seattle, WA 98101

RE: Client Project: Former Irondale Iron & Steel Plant, 0542-042-02
ARI Job No.: WX80

Dear Neil:

Please find enclosed the Chain of Custody record (COC), sample receipt documentation, and the final data package for samples from the project referenced above.

Sample receipt and details of these analyses are discussed in the Case Narrative.

An electronic copy of this package will remain on file with ARI. Should you have any questions or problems, please feel free to contact me at your convenience.

Sincerely,

ANALYTICAL RESOURCES, INC.

A handwritten signature in black ink, appearing to read "Cheronne Oreiro".

Cheronne Oreiro
Project Manager
(206) 695-6214
cheronneo@arilabs.com
www.arilabs.com

cc: eFile: WX80

Enclosures

Chain of Custody Documentation

ARI Job ID: WX80

Chain of Custody Record & Laboratory Analysis Request

ARI Assigned Number: **WX80**
 Turn-around Requested: **STANDARD**
 ARI Client Company: **GEOTECHNICAL ENGINEERS** Phone: **206.728.2674**
 Client Contact: **NEIL MORTON**
 Client Project Name: **FORMER IRONDALE IRON & STEEL PLANT**
 Client Project #: **0542-042-01** Samplers: **FASIH KHAN**

Page: **1** of **2**
 Date: **7/16/13** Ice Present? **Yes**
 No. of Coolers: **1** Cooler Temps: **9.3**

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



Sample ID	Date	Time	Matrix	No Containers	Analysis Requested			Notes/Comments
					NEED DX	CPAHS	DISCLOSED CIN-3	
MW05-130716	7/16/13	1920	WATER	3	<input checked="" type="checkbox"/>			
MW06-130716		1515		5	<input checked="" type="checkbox"/>			
MW07-130716		1630		5	<input checked="" type="checkbox"/>			
MW08-130716		1715		5	<input checked="" type="checkbox"/>			
MW09-130716		1815		3	<input checked="" type="checkbox"/>			
MW06-130716-DUP		1515		4	<input checked="" type="checkbox"/>			
MW09-130716-DUP		1815		1	<input checked="" type="checkbox"/>			
SW01-130716		1300		1	<input checked="" type="checkbox"/>			
SW02-130716		1315		1	<input checked="" type="checkbox"/>			
SW03-130716		1335	✓	1	<input checked="" type="checkbox"/>			
Comments/Special Instructions	Relinquished by (Signature)		Received by (Signature)		Relinquished by (Signature)		Received by (Signature)	
	Printed Name: FASIH KHAN Company: ARI		Printed Name: A. Volgardsen Company: ARI		Printed Name: _____ Company: _____		Printed Name: _____ Company: _____	
Date & Time: 7/17/13 1235		Date & Time: 7/17/13 1235		Date & Time: _____		Date & Time: _____		

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, notwithstanding 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.

2008 0809 0910 1011 1112 1213 1314 1415 1516 1617 1718 1819 1920 2021 2122 2223 2324 2425 2526 2727 2828 2929 3031 3132 3233 3334 3435 3536 3637 3738 3839 3940 4041 4142 4243 4344 4445 4546 4647 4748 4849 4950 5051 5152 5253 5354 5455 5556 5657 5758 5859 5960 6061 6162 6263 6364 6465 6566 6667 6768 6869 6970 7071 7172 7273 7374 7475 7576 7677 7778 7879 7980 8081 8182 8283 8384 8485 8586 8687 8788 8889 8990 9091 9192 9293 9394 9495 9596 9697 9798 9899 0000



Cooler Receipt Form

ARI Client: GeoEngineers

Project Name: Former Irondale Iron & Steel

COC No(s): _____ (NA)

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

Assigned ARI Job No. WX80

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) 9.3

If cooler temperature is out of compliance fill out form 00070F Temp Gun ID# 90877952

Cooler Accepted by: AV Date 7/17/13 Time 1235

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: BOX

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

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: YES Date/Time _____ Equipment _____ Split by: _____

Samples Logged by: AV Date: 7/17/13 Time 1626

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

Sample ID on Bottle	Sample ID on COC	Sample ID on Bottle	Sample ID on COC

Additional Notes, Discrepancies, & Resolutions:
1-500ml AG from MW06-130716-DUP label was Blank, Sample ID determined through process of elimination.

By: AV Date: 7/17/13

			Small → "sm"
			Peabubbles → "pb"
			Large → "lg"
			Headspace → "hs"



Cooler Temperature Compliance Form

WX80

Cooler#:	Temperature(°C):	
Sample ID	Bottle Count	Bottle Type
All Samples received above 6°C.		

Cooler#:	Temperature(°C):	
Sample ID	Bottle Count	Bottle Type

Cooler#:	Temperature(°C):	
Sample ID	Bottle Count	Bottle Type

Cooler#:	Temperature(°C):	
Sample ID	Bottle Count	Bottle Type

Completed by: AV Date: 7/17/13 Time: 16:26

PRESERVATION VERIFICATION 07/17/13

Page 1 of 1



ARI Job No: **WX80**

PC: Cheronne
VTSR: 07/17/13

Inquiry Number: NONE
Analysis Requested: 07/17/13
Contact: Morton, Neil
Client: Geoengineers
Logged by: AV
Sample Set Used: Yes-481
Validatable Package: Lv3
Deliverables:

Project #: 0542-042-02
Project: Former Irondale Iron & Steel Plant
Sample Site:
SDG No:
Analytical Protocol: In-house

LOGNUM ARI ID	CLIENT ID	CN >12	WAD >12	NH3 <2	COD <2	FOG <2	MET <2	PHEN <2	PHOS <2	TKN <2	NO23 <2	TOC <2	S2 >9	TPHD <2	Fe2+ <2	DMET DOC FLT FLT	PARAMETER	ADJUSTED TO	LOT NUMBER	AMOUNT ADDED	DATE/BY
13-15140 WX80A	MW05-130716						DIS									Y					
13-15141 WX80B	MW06-130716						DIS									Y					
13-15142 WX80C	MW07-130716						DIS									Y					
13-15143 WX80D	MW08-130716						DIS									Y					
13-15144 WX80E	MW09-130716						DIS									Y					
13-15145 WX80F	MW06-130716-DUP																				
13-15146 WX80G	MW09-130716-DUP						DIS									Y					
13-15147 WX80H	SW01-130716						DIS									Y					
13-15148 WX80I	SW02-130716						DIS									Y					
13-15149 WX80J	SW03-130716						DIS									Y					
13-15150 WX80K	SW02-130716-DUP						DIS									Y					

P=Pass

Checked By AV Date 7/17/13

Case Narrative, Data Qualifiers, Control Limits

ARI Job ID: WX80



Case Narrative

Client: GeoEngineers, Inc.

Project: Former Irondale Iron & Steel Plant, 0542-042-02

ARI Job No.: WX80

Sample Receipt

Eleven water samples were received on July 17, 2013 under ARI job WX80. The cooler temperature measured by IR thermometer following ARI SOP was 9.3°C. For further details regarding sample receipt, please refer to the Cooler Receipt Form.

Low-Level SIM PAHs by SW8270

The samples were extracted and analyzed within the method recommended holding times.

Initial and continuing calibrations were within method requirements. Internal standard areas were within limits.

The surrogate percent recovery of d14-Dibenzo(a,h)anthracene fell outside the control limits low for sample **MW07-130716**. The sample was re-analyzed at a dilution and all surrogate percent recoveries were within control limits. No further corrective action was taken.

The method blank was clean at the reporting limits. The LCS and LCSD percent recoveries were within control limits.

NWTPH-Dx

The samples were extracted and analyzed within the method recommended holding times.

Initial and continuing calibrations were within method requirements.

The surrogate percent recoveries were within control limits.

The method blank was clean at the reporting limits. The LCS and LCSD percent recoveries were within control limits.

Dissolved Metals by Method 200.8

The samples and associated laboratory QC were digested and analyzed within recommended holding times.

The method blank was clean at the reporting limits. The LCS percent recoveries were within control limits.

The matrix spike percent recoveries and duplicate RPDs were within control limits.

Sample ID Cross Reference Report



ARI Job No: WX80
Client: Geoengineers
Project Event: 0542-042-02
Project Name: Former Irondale Iron & Steel Plant

Sample ID	ARI Lab ID	ARI LIMS ID	Matrix	Sample Date/Time	VTSR
1. MW05-130716	WX80A	13-15140	Water	07/16/13 19:20	07/17/13 12:35
2. MW06-130716	WX80B	13-15141	Water	07/16/13 15:15	07/17/13 12:35
3. MW07-130716	WX80C	13-15142	Water	07/16/13 16:30	07/17/13 12:35
4. MW08-130716	WX80D	13-15143	Water	07/16/13 17:15	07/17/13 12:35
5. MW09-130716	WX80E	13-15144	Water	07/16/13 18:15	07/17/13 12:35
6. MW06-130716-DUP	WX80F	13-15145	Water	07/16/13 15:15	07/17/13 12:35
7. MW09-130716-DUP	WX80G	13-15146	Water	07/16/13 18:15	07/17/13 12:35
8. SW01-130716	WX80H	13-15147	Water	07/16/13 13:00	07/17/13 12:35
9. SW02-130716	WX80I	13-15148	Water	07/16/13 13:15	07/17/13 12:35
10. SW03-130716	WX80J	13-15149	Water	07/16/13 13:35	07/17/13 12:35
11. SW02-130716-DUP	WX80K	13-15150	Water	07/16/13 13:15	07/17/13 12:35



Data Reporting Qualifiers

Effective 2/14/2011

Inorganic Data

- U Indicates that the target analyte was not detected at the reported concentration
- * Duplicate RPD is not within established control limits
- B Reported value is less than the CRDL but \geq the Reporting Limit
- N Matrix Spike recovery not within established control limits
- NA Not Applicable, analyte not spiked
- H The natural concentration of the spiked element is so much greater than the concentration spiked that an accurate determination of spike recovery is not possible
- L Analyte concentration is ≤ 5 times the Reporting Limit and the replicate control limit defaults to ± 1 RL instead of the normal 20% RPD

Organic Data

- U Indicates that the target analyte was not detected at the reported concentration
- * Flagged value is not within established control limits
- B Analyte detected in an associated Method Blank at a concentration greater than one-half of ARI's Reporting Limit or 5% of the regulatory limit or 5% of the analyte concentration in the sample.
- J Estimated concentration when the value is less than ARI's established reporting limits
- D The spiked compound was not detected due to sample extract dilution
- E Estimated concentration calculated for an analyte response above the valid instrument calibration range. A dilution is required to obtain an accurate quantification of the analyte.
- 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).



- S Indicates an analyte response that has saturated the detector. The calculated concentration is not valid; a dilution is required to obtain valid quantification of the analyte
- NA The flagged analyte was not analyzed for
- NR Spiked compound recovery is not reported due to chromatographic interference
- NS The flagged analyte was not spiked into the sample
- M Estimated value for an analyte detected and confirmed by an analyst but with low spectral match parameters. This flag is used only for GC-MS analyses
- M2 The sample contains PCB congeners that do not match any standard Aroclor pattern. The PCBs are identified and quantified as the Aroclor whose pattern most closely matches that of the sample. The reported value is an estimate.
- N The analysis indicates the presence of an analyte for which there is presumptive evidence to make a "tentative identification"
- Y The analyte is not detected at or above the reported concentration. The reporting limit is raised due to chromatographic interference. The Y flag is equivalent to the U flag with a raised reporting limit.
- EMPC Estimated Maximum Possible Concentration (EMPC) defined in EPA Statement of Work DLM02.2 as a value "calculated for 2,3,7,8-substituted isomers for which the quantitation and /or confirmation ion(s) has signal to noise in excess of 2.5, but does not meet identification criteria" **(Dioxin/Furan analysis only)**
- C The analyte was positively identified on only one of two chromatographic columns. Chromatographic interference prevented a positive identification on the second column
- P The analyte was detected on both chromatographic columns but the quantified values differ by $\geq 40\%$ RPD with no obvious chromatographic interference
- X Analyte signal includes interference from polychlorinated diphenyl ethers. **(Dioxin/Furan analysis only)**
- Z Analyte signal includes interference from the sample matrix or perfluorokerosene ions. **(Dioxin/Furan analysis only)**



Geotechnical Data

- A The total of all fines fractions. This flag is used to report total fines when only sieve analysis is requested and balances total grain size with sample weight.
- F Samples were frozen prior to particle size determination
- SM Sample matrix was not appropriate for the requested analysis. This normally refers to samples contaminated with an organic product that interferes with the sieving process and/or moisture content, porosity and saturation calculations
- SS Sample did not contain the proportion of "fines" required to perform the pipette portion of the grain size analysis
- W Weight of sample in some pipette aliquots was below the level required for accurate weighting



LOD¹, LOQ² and Control Limits Summary
Analysis of Water Samples for Low Concentration PNA
EPA Method 8270 – SIM

Separatory Funnel Extraction (EPA Method 3510C) using 500 mL sample with extract concentrated to 0.5 mL final volume. Silica gel cleanup performed on extract prior to analysis. ARI bench Sheet 3071F

DL, LOD & LOQ units are nanograms per liter (ng/L) = parts-per-trillion (ppt). LOD Spike level = LOQ

Naphthalene	0.85	5	10	37 – 120	≤ 30	
2-Methylnaphthalene	0.72	5	10	39 – 120	≤ 30	
Acenaphthylene	0.81	5	10	35 – 120	≤ 30	
Acenaphthene	0.83	5	10	38 – 120	≤ 30	
Dibenzofuran	0.94	5	10	36 – 120	≤ 30	
Fluorene	1.41	5	10	41 – 120	≤ 30	
Phenanthrene	1.01	5	10	41 – 120	≤ 30	
Anthracene	0.58	5	10	28 – 120	≤ 30	
Fluoranthene	0.92	5	10	49 – 120	≤ 30	
Pyrene	0.70	5	10	42 – 120	≤ 30	
Benzo(a)anthracene	1.27	5	10	42 – 120	≤ 30	
Chrysene	1.57	5	10	46 – 120	≤ 30	
Benzo(b)fluoranthene	2.54	5	10	39 – 120	≤ 30	
Benzo(k)fluoranthene	0.85	5	10	50 – 120	≤ 30	
Benzo(j)fluoranthene	1.65	5	10	30 – 160 ⁵	≤ 30	
Benzo(a)pyrene	1.14	5	10	20 – 120	≤ 30	
Indeno(1,2,3-cd)pyrene	1.82	5	10	32 – 120	≤ 30	
Dibenz(a,h)anthracene	0.97	5	10	30 – 120	≤ 30	
Benzo(g,h,i)perylene	1.87	5	10	27 – 120	≤ 30	
1-Methylnaphthalene	0.88	5	10	38 – 120	≤ 30	
Perylene	3.21	5	10	30 – 160 ⁵	≤ 30	
2-Methylnaphthalene-d ₁₀				40 – 120	35 – 120	≤ 30
Fluoranthene-d ₁₀				30 – 160 ⁵	30 – 160 ⁵	≤ 30
Dibenzo(a,h)anthracene-d ₁₄				31 – 120	26 – 120	≤ 30

(1) Detection Limit (DL), Limit of Detection (LOD) and Limit of Quantitation (LOQ) are defined in ARI SOP 1018S

(2) Control limits calculated using data from all samples prepared between 4/1/11 through 3/31/12.

(3) Highlighted control limits (**bold font**) are adjusted from the calculated values to reflect that ARI does not use control limits < 10 for the lower limit or < 120 for the upper limit.

(4) Relative Percent Difference between analytes in replicate analyzes. If C_O and C_D are the concentrations of the original and duplicate respectively then

$$RPD = \frac{|C_O - C_D|}{\frac{C_O + C_D}{2}} \times 100$$

(5) Default limits pending generation of historic limits for Benzo(j)fluoranthene and Perylene



Quality Control Criteria
Total Petroleum Hydrocarbons
(Diesel & Motor Oil)

Analysis Code	Analyte ⁵	DL ¹ ppm	LOD ¹ ppm	LOQ ² ppm	Spike % Recovery Control Limits ³			RPD ⁴
					LCS	MB/LCS Surrogate	Sample Surrogate	
HCIWVX	NWTPH-HCID – Water Samples	--	--	0.50 ⁷	--	--	50-150	≤ 40
HCISVX	NWTPH-HCID – Solid Samples	--	--	50 ⁷	--	--	50-150	
DIESWI	DRO – NWTPH-Dext (C ₁₂ -C ₂₄)	0.022	0.05	0.1	64-112	50-150	50-150	≤ 40
AK2WSI	DRO – AK102 (C ₁₀ -C ₂₅)	0.022	0.05	0.1	75-125 ⁶	60-120	50-150	
OILWSI	RRO – NWTPH-Dext (C ₂₄ -C ₃₈)	0.044	0.1	0.2	60 – 130 ⁸	50-150	50-150	
AK3WSI	RRO – AK103 (C ₂₅ -C ₃₆)	0.030 ⁹	0.1	0.2	60-120 ⁶	60-120	50-150	
DIESWI	DRO – NWTPH-Dext (C ₁₂ -C ₂₄)	0.039	0.05	0.1	61-104	50-150	50-150	≤ 40
AK2WSI	DRO – AK102 (C ₁₀ -C ₂₅)	0.042	0.05	0.1	75-125 ⁶	60-120	50-150	
OILWSI	RRO – NWTPH-Dext (C ₂₄ -C ₃₈)	0.010	0.1	0.2	60 – 130 ⁸	50-150	50-150	
AK3WSI	RRO – AK103 (C ₂₅ -C ₃₆)	0.030 ⁸	0.1	0.2	60-120 ⁶	60-120	50-150	
DIESMI	DRO – NWTPH-Dext (C ₁₂ -C ₂₄)	1.35	2.5	5	62-119	50-150	50-150	≤ 40
DIESMI	DRO – NWTPH-Dext Jet A	2.22 ¹¹	2.5	5	60 – 130 ⁸	50-150	50-150	
AK2SMI	DRO – AK102 (C ₁₀ -C ₂₅)	2.43	2.5	5	75-125 ⁶	60-120	50-150	
OILSMI	RRO – NWTPH-Dext (C ₂₄ -C ₃₈)	2.48	5	10	60 – 130 ⁸	50-150	50-150	
AK3SMI	RRO – AK103 (C ₂₅ -C ₃₆)	0.665 ⁹	5	10	60-120 ⁶	60-120	50-150	
DIESMI	DRO – NWTPH-Dext (C ₁₂ -C ₂₄)	1.28	2.5	5	60-108	50-150	50-150	≤ 40
AK2SMI	DRO – AK102 (C ₁₀ -C ₂₅)	2.06	2.5	5	75-125 ⁶	60-120	50-150	
OILSMI	RRO – NWTPH-Dext (C ₂₄ -C ₃₈)	1.57	5	10	60 – 130 ⁸	50-150	50-150	
AK3SMI	RRO – AK103 (C ₂₅ -C ₃₆)	0.665 ¹⁰	5	10	60-120 ⁶	60-120	50-150	

(1) DL (Detection Limit) and LOD (Limit of Detection) as defined in ARI SOP 1018S.

(2) Limit of Quantitation as defined in ARI SOP 1018S. The spike concentration used to determine the DL and the concentration of the lowest standard used to calibrate the GC-FID instrument.

(3) All surrogate recovery limits are specified in the published methods (AK102, AK103 & NWTPH-Dext). The surrogate standard is o-Terphenyl.

(4) Acceptance criteria for the relative percent difference (RPD) between analytes in replicate analyzes. If C_O and C_D are the concentrations of the original and duplicate respectively then

$$RPD = \frac{|C_O - C_D|}{\frac{C_O + C_D}{2}} \times 100$$

(5) DRO = Diesel Range Organics and RRO = Residual Range Organics as defined in the methods referenced in footnote 3.

(6) Method specified LCS acceptance limits.

(7) Method specified reporting limits

(8) Default LCS control limits pending calculation of historic limits

(9) MDL study QD55 completed 2/12/10

(10) MDL study QD35 completed 1/29/10

(11) LOD Study UI44 completed 2/28/12



Quality Control Parameters for Metals Analysis ICP-MS EPA Methods 200.8 or 6020A								
Analyte	Mass	Aqueous Samples ²			Spike Recovery		RPD ³	Solids ²
		DL ¹ µg/L	LOD ¹ µg/L	LOQ ¹ µg/L	Matrix Spike	LCS		LOQ ¹ mg/kg
Aluminum	27	1.601	10	20.0	75 – 125	80 – 120	≤ 20	20.0
Antimony	121	0.010	0.1	0.2	75 – 125	80 – 120	≤ 20	0.2
	123	0.011	0.1	0.2	75 – 125	80 – 120	≤ 20	0.2
Arsenic #1	75	0.048	0.1	0.2	75 – 125	80 – 120	≤ 20	0.2
Arsenic #2	75	0.092	0.25	0.5	75 – 125	80 – 120	≤ 20	0.5
Barium	135	0.020	0.25	0.5	75 – 125	80 – 120	≤ 20	0.5
	137	0.019	0.25	0.5	75 – 125	80 – 120	≤ 20	0.5
Beryllium	9	0.021	0.1	0.2	75 – 125	80 – 120	≤ 20	0.2
Cadmium	111	0.010	0.05	0.1	75 – 125	80 – 120	≤ 20	0.1
	114	0.005	0.05	0.1	75 – 125	80 – 120	≤ 20	0.1
Calcium	43	3.983	25	50.0	75 – 125	80 – 120	≤ 20	50.0
Chromium	52	0.045	0.25	0.5	75 – 125	80 – 120	≤ 20	0.5
	53	0.118	0.25	0.5	75 – 125	80 – 120	≤ 20	0.5
Cobalt	59	0.011	0.1	0.2	75 – 125	80 – 120	≤ 20	0.2
Copper	63	0.158	0.25	0.5	75 – 125	80 – 120	≤ 20	0.5
	65	0.236	0.25	0.5	75 – 125	80 – 120	≤ 20	0.5
Iron	54	5.753	10	20.0	75 – 125	80 – 120	≤ 20	20.0
	57	3.876	10	20.0	75 – 125	80 – 120	≤ 20	20.0
Lead	208	0.046	0.05	0.1	75 – 125	80 – 120	≤ 20	0.1
Magnesium	24	0.297	10	20.0	75 – 125	80 – 120	≤ 20	20.0
Manganese	55	0.022	0.25	0.5	75 – 125	80 – 120	≤ 20	0.5
Molybdenum	98	0.013	0.1	0.2	75 – 125	80 – 120	≤ 20	0.2
Nickel	60	0.079	0.25	0.5	75 – 125	80 – 120	≤ 20	0.5
	62	0.089	0.25	0.5	75 – 125	80 – 120	≤ 20	0.5
Potassium	39	2.944	10	20.0	75 – 125	80 – 120	≤ 20	20.0
Selenium	82	0.127	0.25	0.5	75 – 125	80 – 120	≤ 20	0.5
	78	0.324	1.0	2.0	75 – 125	80 – 120	≤ 20	2.0
Silver	107	0.008	0.1	0.2	75 – 125	80 – 120	≤ 20	0.2
Sodium	23	2.833	50	100.0	75 – 125	80 – 120	≤ 20	100.0
Thorium ⁴	232	0.013	0.1	0.2	75 – 125	80 – 120	≤ 20	0.2
Thallium	205	0.004	0.1	0.2	75 – 125	80 – 120	≤ 20	0.2
Uranium ⁴	238	0.003	0.1	0.2	75 – 125	80 – 120	≤ 20	0.2
Vanadium	51	0.043	0.1	0.2	75 – 125	80 – 120	≤ 20	0.2
Zinc	66	0.497	2	4.0	75 – 125	80 – 120	≤ 20	4.0
	67	0.531	2	4.0	75 – 125	80 – 120	≤ 20	4.0
	68	0.524	2	4.0	75 – 125	80 – 120	≤ 20	4.0

(1) Detection Limit (DL), Limit of Detection Limit (LOD) and Limit of Quantitation (LOQ) as defined in ARI SOP 1018S

(2) 50 mL sample and 50 mL final volume Solids LOQ based on 100% solids using 1.0 g sample 100 mL final volume.

(3) Relative Percent Difference in replicate analyzes. $RPD = \frac{|C_o - C_D|}{\frac{C_o + C_D}{2}} \times 100$ where C_o=Original, C_D=Duplicate

(4) ARI has no accreditation for these elements.

**SIM PAH Analysis
Report and Summary QC Forms**

ARI Job ID: WX80

ORGANICS ANALYSIS DATA SHEET
 PNAs by Low Level SW8270D-SIM GC/MS
 Extraction Method: SW3510C
 Page 1 of 1

Sample ID: MW06-130716
 SAMPLE

Lab Sample ID: WX80B
 LIMS ID: 13-15141
 Matrix: Water
 Data Release Authorized: *mmw*
 Reported: 07/24/13

QC Report No: WX80-Geoengineers
 Project: Former Irondale Iron & Steel Plant
 Event: 0542-042-02
 Date Sampled: 07/16/13
 Date Received: 07/17/13

Date Extracted: 07/19/13
 Date Analyzed: 07/20/13 17:45
 Instrument/Analyst: NT11/VTS

Sample Amount: 500 mL
 Final Extract Volume: 0.5 mL
 Dilution Factor: 1.00

CAS Number	Analyte	RL	Result
56-55-3	Benzo(a)anthracene	0.010	< 0.010 U
218-01-9	Chrysene	0.010	< 0.010 U
205-99-2	Benzo(b)fluoranthene	0.010	< 0.010 U
207-08-9	Benzo(k)fluoranthene	0.010	< 0.010 U
50-32-8	Benzo(a)pyrene	0.010	< 0.010 U
193-39-5	Indeno(1,2,3-cd)pyrene	0.010	< 0.010 U
53-70-3	Dibenz(a,h)anthracene	0.010	< 0.010 U
TOTBFA	Total Benzofluoranthenes	0.020	< 0.020 U

Reported in µg/L (ppb)

SIM Semivolatile Surrogate Recovery

d10-2-Methylnaphthalene 71.7%
 d14-Dibenzo(a,h)anthracene 66.3%

ORGANICS ANALYSIS DATA SHEET
PNAs by Low Level SW8270D-SIM GC/MS
Extraction Method: SW3510C
 Page 1 of 1

Sample ID: MW07-130716
SAMPLE

Lab Sample ID: WX80C
 LIMS ID: 13-15142
 Matrix: Water
 Data Release Authorized: *mmw*
 Reported: 07/24/13

QC Report No: WX80-Geoengineers
 Project: Former Irondale Iron & Steel Plant
 Event: 0542-042-02
 Date Sampled: 07/16/13
 Date Received: 07/17/13

Date Extracted: 07/19/13
 Date Analyzed: 07/20/13 19:35
 Instrument/Analyst: NT11/VTS

Sample Amount: 500 mL
 Final Extract Volume: 0.5 mL
 Dilution Factor: 1.00

CAS Number	Analyte	RL	Result
56-55-3	Benzo (a) anthracene	0.010	0.087
218-01-9	Chrysene	0.010	0.11
205-99-2	Benzo (b) fluoranthene	0.010	0.056
207-08-9	Benzo (k) fluoranthene	0.010	0.042
50-32-8	Benzo (a) pyrene	0.010	0.11
193-39-5	Indeno (1,2,3-cd) pyrene	0.010	0.028
53-70-3	Dibenz (a,h) anthracene	0.010	0.012
TOTBEA	Total Benzofluoranthenes	0.020	0.14

Reported in µg/L (ppb)

SIM Semivolatile Surrogate Recovery

d10-2-Methylnaphthalene 64.7%
 d14-Dibenzo (a,h)anthracene 17.4%

ORGANICS ANALYSIS DATA SHEET
PNAs by Low Level SW8270D-SIM GC/MS
Extraction Method: SW3510C
 Page 1 of 1

Sample ID: MW07-130716
DILUTION

Lab Sample ID: WX80C
 LIMS ID: 13-15142
 Matrix: Water
 Data Release Authorized: *MMW*
 Reported: 07/24/13

QC Report No: WX80-Geoengineers
 Project: Former Irondale Iron & Steel Plant
 Event: 0542-042-02
 Date Sampled: 07/16/13
 Date Received: 07/17/13

Date Extracted: 07/19/13
 Date Analyzed: 07/20/13 18:13
 Instrument/Analyst: NT11/VTS

Sample Amount: 500 mL
 Final Extract Volume: 0.5 mL
 Dilution Factor: 5.00

CAS Number	Analyte	RL	Result
56-55-3	Benzo (a) anthracene	0.050	0.086
218-01-9	Chrysene	0.050	0.11
205-99-2	Benzo (b) fluoranthene	0.050	< 0.050 U
207-08-9	Benzo (k) fluoranthene	0.050	< 0.050 U
50-32-8	Benzo (a) pyrene	0.050	0.10
193-39-5	Indeno (1,2,3-cd) pyrene	0.050	< 0.050 U
53-70-3	Dibenz (a,h) anthracene	0.050	< 0.050 U
TOTBFA	Total Benzofluoranthenes	0.10	0.12

Reported in µg/L (ppb)

SIM Semivolatile Surrogate Recovery

d10-2-Methylnaphthalene 66.5%
 d14-Dibenzo (a,h) anthracene 26.8%

ORGANICS ANALYSIS DATA SHEET
PNA's by Low Level SW8270D-SIM GC/MS
Extraction Method: SW3510C
 Page 1 of 1

Sample ID: MW08-130716
SAMPLE

Lab Sample ID: WX80D
 LIMS ID: 13-15143
 Matrix: Water
 Data Release Authorized: *mmw*
 Reported: 07/24/13

QC Report No: WX80-Geoengineers
 Project: Former Irondale Iron & Steel Plant
 Event: 0542-042-02
 Date Sampled: 07/16/13
 Date Received: 07/17/13

Date Extracted: 07/19/13
 Date Analyzed: 07/20/13 18:40
 Instrument/Analyst: NT11/VTS

Sample Amount: 500 mL
 Final Extract Volume: 0.5 mL
 Dilution Factor: 1.00

CAS Number	Analyte	RL	Result
56-55-3	Benzo(a)anthracene	0.010	< 0.010 U
218-01-9	Chrysene	0.010	< 0.010 U
205-99-2	Benzo(b)fluoranthene	0.010	< 0.010 U
207-08-9	Benzo(k)fluoranthene	0.010	< 0.010 U
50-32-8	Benzo(a)pyrene	0.010	< 0.010 U
193-39-5	Indeno(1,2,3-cd)pyrene	0.010	< 0.010 U
53-70-3	Dibenz(a,h)anthracene	0.010	< 0.010 U
TOTBFA	Total Benzofluoranthenes	0.020	< 0.020 U

Reported in µg/L (ppb)

SIM Semivolatile Surrogate Recovery

d10-2-Methylnaphthalene 84.3%
 d14-Dibenzo(a,h)anthracene 72.3%

ORGANICS ANALYSIS DATA SHEET
PNA's by Low Level SW8270D-SIM GC/MS
Extraction Method: SW3510C
 Page 1 of 1

Sample ID: MW06-130716-DUP
SAMPLE

Lab Sample ID: WX80F
 LIMS ID: 13-15145
 Matrix: Water
 Data Release Authorized: *TW*
 Reported: 07/24/13

QC Report No: WX80-Geoengineers
 Project: Former Irondale Iron & Steel Plant
 Event: 0542-042-02
 Date Sampled: 07/16/13
 Date Received: 07/17/13

Date Extracted: 07/19/13
 Date Analyzed: 07/20/13 19:08
 Instrument/Analyst: NT11/VTS

Sample Amount: 500 mL
 Final Extract Volume: 0.5 mL
 Dilution Factor: 1.00

CAS Number	Analyte	RL	Result
56-55-3	Benzo(a)anthracene	0.010	< 0.010 U
218-01-9	Chrysene	0.010	< 0.010 U
205-99-2	Benzo(b)fluoranthene	0.010	< 0.010 U
207-08-9	Benzo(k)fluoranthene	0.010	< 0.010 U
50-32-8	Benzo(a)pyrene	0.010	< 0.010 U
193-39-5	Indeno(1,2,3-cd)pyrene	0.010	< 0.010 U
53-70-3	Dibenz(a,h)anthracene	0.010	< 0.010 U
TOTBFA	Total Benzofluoranthenes	0.020	< 0.020 U

Reported in µg/L (ppb)

SIM Semivolatile Surrogate Recovery

d10-2-Methylnaphthalene 76.3%
 d14-Dibenzo(a,h)anthracene 76.3%

SIM SW8270 SURROGATE RECOVERY SUMMARY

Matrix: Water

QC Report No: WX80-Geoengineers
Project: Former Irondale Iron & Steel Plant
0542-042-02

<u>Client ID</u>	<u>MNP</u>	<u>DBA</u>	<u>TOT OUT</u>
MB-071913	76.7%	67.3%	0
LCS-071913	80.3%	73.7%	0
LCSD-071913	80.3%	74.0%	0
MW06-130716	71.7%	66.3%	0
MW07-130716	64.7%	17.4%*	1
MW07-130716 DL	66.5%	26.8%	0
MW08-130716	84.3%	72.3%	0
MW06-130716-DUP	76.3%	76.3%	0

LCS/MB LIMITS QC LIMITS

(MNP) = d10-2-Methylnaphthalene (40-120) (35-120)
(DBA) = d14-Dibenzo(a,h)anthracene (31-120) (26-120)

Prep Method: SW3510C
Log Number Range: 13-15141 to 13-15145

ORGANICS ANALYSIS DATA SHEET
PNAs by Low Level SW8270D-SIM GC/MS
 Page 1 of 1

Sample ID: LCS-071913
LAB CONTROL SAMPLE

Lab Sample ID: LCS-071913
 LIMS ID: 13-15141
 Matrix: Water
 Data Release Authorized: *mw*
 Reported: 07/24/13

QC Report No: WX80-Geoengineers
 Project: Former Irondale Iron & Steel Plant
 Event: 0542-042-02
 Date Sampled: NA
 Date Received: NA

Date Extracted LCS/LCSD: 07/19/13
 Date Analyzed LCS: 07/20/13 16:23
 LCSD: 07/20/13 16:50
 Instrument/Analyst LCS: NT11/VTS
 LCSD: NT11/VTS

Sample Amount LCS: 500 mL
 LCSD: 500 mL
 Final Extract Volume LCS: 0.50 mL
 LCSD: 0.50 mL
 Dilution Factor LCS: 1.00
 LCSD: 1.00

Analyte	LCS	LCS		LCSD	LCSD		RPD
		Spike Added-LCS	Recovery		Spike Added-LCSD	Recovery	
Benzo(a)anthracene	0.206	0.300	68.7%	0.214	0.300	71.3%	3.8%
Chrysene	0.219	0.300	73.0%	0.227	0.300	75.7%	3.6%
Benzo(b)fluoranthene	0.206	0.300	68.7%	0.216	0.300	72.0%	4.7%
Benzo(k)fluoranthene	0.221	0.300	73.7%	0.227	0.300	75.7%	2.7%
Benzo(a)pyrene	0.191	0.300	63.7%	0.199	0.300	66.3%	4.1%
Indeno(1,2,3-cd)pyrene	0.221	0.300	73.7%	0.231	0.300	77.0%	4.4%
Dibenz(a,h)anthracene	0.216	0.300	72.0%	0.222	0.300	74.0%	2.7%
Total Benzofluoranthenes	0.687	0.900	76.3%	0.709	0.900	78.8%	3.2%

Reported in µg/L (ppb)

RPD calculated using sample concentrations per SW846.

SIM Semivolatile Surrogate Recovery

	LCS	LCSD
d10-2-Methylnaphthalene	80.3%	80.3%
d14-Dibenzo(a,h)anthracene	73.7%	74.0%

4B
SEMIVOLATILE METHOD BLANK SUMMARY

BLANK NO.

WX80MBW1

Lab Name: ANALYTICAL RESOURCES INC
ARI Job No: WX80
Lab File ID: WX80MB
Instrument ID: NT11
Matrix: LIQUID

Client: GEOENGINEERS
Project: FORMER IRONDALE IRON
Date Extracted: 07/19/13
Date Analyzed: 07/20/13
Time Analyzed: 1556

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS and MSD:

	CLIENT SAMPLE NO.	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED
	=====	=====	=====	=====
01	WX80LCSW1	WX80LCSW1	WX80SB	07/20/13
02	WX80LCSDW1	WX80LCSDW1	WX80SBD	07/20/13
03	MW06-130716	WX80B	WX80B	07/20/13
04	MW07-130716	WX80C	WX80C	07/20/13
05	MW08-130716	WX80D	WX80D	07/20/13
06	MW06-130716-DUP	WX80F	WX80F	07/20/13
07	MW07-130716	WX80C	WX80C2	07/20/13
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ORGANICS ANALYSIS DATA SHEET
PNAs by Low Level SW8270D-SIM GC/MS
Extraction Method: SW3510C
 Page 1 of 1

Sample ID: MB-071913
METHOD BLANK

Lab Sample ID: MB-071913
 LIMS ID: 13-15141
 Matrix: Water
 Data Release Authorized: *MWJ*
 Reported: 07/24/13

QC Report No: WX80-Geoengineers
 Project: Former Irondale Iron & Steel Plant
 Event: 0542-042-02
 Date Sampled: NA
 Date Received: NA

Date Extracted: 07/19/13
 Date Analyzed: 07/20/13 15:56
 Instrument/Analyst: NT11/VTS

Sample Amount: 500 mL
 Final Extract Volume: 0.5 mL
 Dilution Factor: 1.00

CAS Number	Analyte	RL	Result
56-55-3	Benzo(a)anthracene	0.010	< 0.010 U
218-01-9	Chrysene	0.010	< 0.010 U
205-99-2	Benzo(b)fluoranthene	0.010	< 0.010 U
207-08-9	Benzo(k)fluoranthene	0.010	< 0.010 U
50-32-8	Benzo(a)pyrene	0.010	< 0.010 U
193-39-5	Indeno(1,2,3-cd)pyrene	0.010	< 0.010 U
53-70-3	Dibenz(a,h)anthracene	0.010	< 0.010 U
TOTBFA	Total Benzofluoranthenes	0.020	< 0.020 U

Reported in µg/L (ppb)

SIM Semivolatile Surrogate Recovery

d10-2-Methylnaphthalene 76.7%
 d14-Dibenzo(a,h)anthracene 67.3%

5B
SEMIVOLATILE ORGANIC INSTRUMENT PERFORMANCE CHECK
DECAFLUOROTRIPHENYLPHOSPHINE (DFTPP)

Lab Name: ANALYTICAL RESOURCES INC

Client: GEOENGINEERS

Instrument ID: NT11

Project: FORMER IRONDALE IRON

DFTPP Injection Date: 07/10/13

DFTPP Injection Time: 1058

m/e	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE
51	10.0 - 80.0% of mass 198	36.8
68	Less than 2.0% of mass 69	0.3 (0.8)1
69	Mass 69 relative abundance	38.5
70	Less than 2.0% of mass 69	0.2 (0.6)1
127	10.0 - 80.0% of mass 198	45.6
197	Less than 2.0% of mass 198	0.0
198	Base Peak, 100% relative abundance	100.0
199	5.0 to 9.0% of mass 198	7.1
275	10.0 - 60.0% of mass 198	25.9
365	Greater than 1.0% of mass 198	3.60
441	0.0 - 24.0% of mass 442	14.3 (15.3)2
442	50.0 - 200.0% of mass 198	93.5
443	15.0 - 24.0% of mass 442	19.2 (20.5)2

1-Value is % mass 69

2-Value is % mass 442

THIS CHECK APPLIES TO THE FOLLOWING SAMPLES, MS, MSD, BLANKS, AND STANDARDS:

	CLIENT SAMPLE NO.	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED	TIME ANALYZED
01		SIM 250	IC0710A	07/10/13	1113
02		SIM 1000	IC0710B	07/10/13	1140
03		SIM 10	IC0710C	07/10/13	1217
04		SIM 500	IC0710D	07/10/13	1244
05		SIM 50	IC0710E	07/10/13	1312
06		SIM 100	IC0710F	07/10/13	1339
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5B
SEMIVOLATILE ORGANIC INSTRUMENT PERFORMANCE CHECK
DECAFLUOROTRIPHENYLPHOSPHINE (DFTPP)

Lab Name: ANALYTICAL RESOURCES INC

Client: GEOENGINEERS

Instrument ID: NT11

Project: FORMER IRONDALE IRON

DFTPP Injection Date: 07/20/13

DFTPP Injection Time: 1513

m/e	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE
51	10.0 - 80.0% of mass 198	44.5
68	Less than 2.0% of mass 69	0.1 (0.3)1
69	Mass 69 relative abundance	41.2
70	Less than 2.0% of mass 69	0.3 (0.7)1
127	10.0 - 80.0% of mass 198	48.7
197	Less than 2.0% of mass 198	0.5
198	Base Peak, 100% relative abundance	100.0
199	5.0 to 9.0% of mass 198	7.5
275	10.0 - 60.0% of mass 198	27.9
365	Greater than 1.0% of mass 198	3.40
441	0.0 - 24.0% of mass 442	14.5 (16.4)2
442	50.0 - 200.0% of mass 198	88.8
443	15.0 - 24.0% of mass 442	19.5 (22.0)2

1-Value is % mass 69

2-Value is % mass 442

THIS CHECK APPLIES TO THE FOLLOWING SAMPLES, MS, MSD, BLANKS, AND STANDARDS:

	CLIENT SAMPLE NO.	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED	TIME ANALYZED
01		LOW SIM 250	CC0720	07/20/13	1528
02	WX80MBW1	WX80MBW1	WX80MB	07/20/13	1556
03	WX80LCSW1	WX80LCSW1	WX80SB	07/20/13	1623
04	WX80LCSDW1	WX80LCSDW1	WX80SBD	07/20/13	1650
05	MW06-130716	WX80B	WX80B	07/20/13	1745
06	MW07-130716	WX80C	WX80C	07/20/13	1813
07	MW08-130716	WX80D	WX80D	07/20/13	1840
08	MW06-130716-DUP	WX80F	WX80F	07/20/13	1908
09	MW07-130716	WX80C	WX80C2	07/20/13	1935
10					
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22					

SEMIVOLATILE 8270-D INITIAL CALIBRATION DATA

Lab Name: ANALYTICAL RESOURCES INC

Client: GEOENGINEERS

ARI Job No: WX80

Project: FORMER IRONDALE IRON

Instrument ID: NT11

Calibration Date: 07/10/13

Method = lowsim.m

Cal levels = 6

LAB FILE ID:	RRF10 =IC0710C	RRF50 =IC0710E	RRF100=IC0710F	RRF250=IC0710A	RRF500=IC0710D	RRF1000=IC0710B		
COMPOUND	RRF 10	RRF 50	RRF 100	RRF 250	RRF 500	RRF 1000	RRF	%RSD /R^2
Naphthalene	1.045	1.012	1.020	0.973	0.950	0.892	0.982	5.6
2-Methylnaphthalene	0.648	0.646	0.661	0.651	0.652	0.629	0.648	1.6
Acenaphthylene	1.712	1.697	1.661	1.636	1.614	1.500	1.637	4.7
Acenaphthene	1.048	1.036	1.037	1.000	0.999	0.943	1.010	3.9
Dibenzofuran	1.630	1.624	1.643	1.555	1.529	1.406	1.564	5.8
Fluorene	1.197	1.195	1.199	1.169	1.173	1.109	1.174	2.9
Phenanthrene	1.117	1.107	1.115	1.054	1.036	0.952	1.064	6.0
Anthracene	1.047	1.028	1.063	1.037	1.038	0.969	1.030	3.1
Fluoranthene	1.198	1.178	1.217	1.190	1.210	1.117	1.185	3.0
Pyrene	1.632	1.552	1.585	1.539	1.536	1.418	1.544	4.6
Benzo(a)anthracene	1.580	1.493	1.500	1.444	1.441	1.348	1.468	5.3
Chrysene	1.579	1.521	1.536	1.472	1.471	1.350	1.488	5.3
Benzo(b)fluoranthene	1.660	1.442	1.472	1.581	1.408	1.559	1.520	6.3
Benzo(k)fluoranthene	1.591	1.756	1.793	1.563	1.767	1.481	1.658	7.9
Benzo(j)fluoranthene	1.577	1.579	1.591	1.620	1.579	1.505	1.575	2.4
Benzo(a)pyrene	1.304	1.285	1.306	1.286	1.286	1.239	1.284	1.9
Indeno(1,2,3-cd)pyrene	1.541	1.558	1.612	1.546	1.610	1.510	1.563	2.6
Dibenzo(a,h)anthracene	1.209	1.252	1.270	1.224	1.276	1.213	1.241	2.3
Benzo(g,h,i)perylene	1.411	1.386	1.398	1.310	1.354	1.284	1.357	3.8
1-methylnaphthalene	0.658	0.644	0.651	0.649	0.643	0.622	0.644	1.9
Perylene	1.480	1.433	1.451	1.421	1.409	1.348	1.424	3.2
2-Methylnaphthalene-d10	0.661	0.671	0.682	0.662	0.670	0.634	0.663	2.5
Dibenzo(a,h)anthracene-d14	0.996	1.092	1.100	1.080	1.123	1.098	1.082	4.1
Fluoranthene-d10	1.172	1.140	1.163	1.135	1.146	1.071	1.138	3.1

<- Outside QC limits: %RSD <20% or R^2 > 0.990

SEMIVOLATILE 8270-D CONTINUING CALIBRATION CHECK

Lab Name: ANALYTICAL RESOURCES INC

Client: GEOENGINEERS

ARI Job No: WX80

Project: FORMER IRONDALE IRON

Instrument ID: NT11

Cont. Calib. Date: 07/20/13

Init. Calib. Date: 07/10/13

Cont. Calib. Time: 1528

COMPOUND	CalAmt or ARF	CC Amt or RF	MIN RRF	CURVE TYPE	%D or Drift
=====	=====	=====	=====	=====	=====
Naphthalene	0.982	0.959	0.700	AVRG	-2.3
2-Methylnaphthalene	0.648	0.676	0.400	AVRG	4.3
Acenaphthylene	1.637	1.596	0.900	AVRG	-2.5
Acenaphthene	1.010	1.012	0.900	AVRG	0.2
Dibenzofuran	1.564	1.594	0.800	AVRG	1.9
Fluorene	1.174	1.182	0.900	AVRG	0.7
Phenanthrene	1.064	1.073	0.700	AVRG	0.8
Anthracene	1.030	1.042	0.700	AVRG	1.2
Fluoranthene	1.185	1.246	0.600	AVRG	5.1
Pyrene	1.544	1.429	0.600	AVRG	-7.4
Benzo(a)anthracene	1.468	1.296	0.800	AVRG	-11.7
Chrysene	1.488	1.438	0.700	AVRG	-3.4
Benzo(b)fluoranthene	1.520	1.332	0.700	AVRG	-12.4
Benzo(k)fluoranthene	1.658	1.776	0.700	AVRG	7.1
Benzo(j)fluoranthene	1.575	1.643	0.010	AVRG	4.3
Benzo(a)pyrene	1.284	1.209	0.700	AVRG	-5.8
Indeno(1,2,3-cd)pyrene	1.563	1.490	0.500	AVRG	-4.7
Dibenzo(a,h)anthracene	1.241	1.170	0.400	AVRG	-5.7
Benzo(g,h,i)perylene	1.357	1.252	0.500	AVRG	-7.7
1-methylnaphthalene	0.644	0.671	0.010	AVRG	4.2
Perylene	1.424	1.386	0.010	AVRG	-2.7
=====	=====	=====	=====	=====	=====
2-Methylnaphthalene-d10	0.663	0.698	0.010	AVRG	5.3
Dibenzo(a,h)anthracene-d14	1.082	1.038	0.010	AVRG	-4.1
Fluoranthene-d10	1.138	1.164	0.010	AVRG	2.3

<- Exceeds QC limit of 20% D

* RF less than minimum RF

8B
SEMIVOLATILE INTERNAL STANDARD AREA AND RT SUMMARY

Lab Name: ANALYTICAL RESOURCES INC

Client: GEOENGINEERS

ARI Job No: WX80

Project: FORMER IRONDALE IRON

Ical Midpoint ID: IC0710A

Ical Date: 07/10/13

Instrument ID: NT11

Cont. Cal Date: 07/20/13

	IS1 (NPT) AREA #	RT #	IS2 (ANT) AREA #	RT #	IS3 (PHN) AREA #	RT #
=====	=====	=====	=====	=====	=====	=====
ICAL MIDPT	222182	5.82	137730	8.78	229890	11.41
UPPER LIMIT	444364		275460		459780	
LOWER LIMIT	111091		68865		114945	
=====	=====	=====	=====	=====	=====	=====
CCAL	236329	5.38	155968	8.30	267267	10.90
UPPER LIMIT		5.88		8.80		11.40
LOWER LIMIT		4.88		7.80		10.40
01 WX80MBW1	206120	5.38	146575	8.30	269844	10.90
02 WX80LCSW1	201214	5.38	147134	8.30	267320	10.90
03 WX80LCSW1	202789	5.38	147389	8.30	266183	10.90
04 MW06-130716	204242	5.38	142687	8.30	262608	10.90
05 MW07-130716	197953	5.38	137482	8.30	247844	10.90
06 MW08-130716	189238	5.38	142430	8.30	256457	10.90
07 MW06-130716-	212154	5.38	143358	8.30	255242	10.90
08 MW07-130716	205487	5.38	136493	8.30	234174	10.90
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IS1 = Naphthalene-d8
IS2 = Acenaphthene-d10
IS3 = Phenanthrene-d10

AREA UPPER LIMIT = +100% of internal standard area from Ical midpoint
AREA LOWER LIMIT = - 50% of internal standard area from Ical midpoint
RT UPPER LIMIT = + 0.50 minutes of internal standard RT from Cont. Cal
RT LOWER LIMIT = - 0.50 minutes of internal standard RT from Cont. Cal

* Values outside of QC limits.

SEMIVOLATILE INTERNAL STANDARD AREA AND RT SUMMARY

Lab Name: ANALYTICAL RESOURCES INC

Client: GEOENGINEERS

ARI Job No: WX80

Project: FORMER IRONDALE IRON

Ical Midpoint ID: IC0710A

Ical Date: 07/10/13

Instrument ID: NT11

Cont. Cal Date: 07/20/13

	IS4 (CRY) AREA #	RT #	IS5 (PRY) AREA #	RT #	AREA #	RT #
=====	=====	=====	=====	=====	=====	=====
ICAL MIDPT	178964	16.10	156980	18.60		
UPPER LIMIT	357928		313960			
LOWER LIMIT	89482		78490			
=====	=====	=====	=====	=====	=====	=====
CCAL	223041	15.54	191964	17.97		
UPPER LIMIT		16.04		18.47		
LOWER LIMIT		15.04		17.47		
01 WX80MBW1	209636	15.54	182587	17.97		
02 WX80LCSW1	214572	15.54	185517	17.97		
03 WX80LCSDW1	214045	15.54	183452	17.97		
04 MW06-130716	199844	15.54	177578	17.97		
05 MW07-130716	130058	15.54	122592	17.97		
06 MW08-130716	192881	15.54	177126	17.97		
07 MW06-130716-	188686	15.54	159038	17.97		
08 MW07-130716	127901	15.54	107512	17.97		
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IS4 = Chrysene-d12

IS5 = Perylene-d12

AREA UPPER LIMIT = +100% of internal standard area from Ical midpoint

AREA LOWER LIMIT = - 50% of internal standard area from Ical midpoint

RT UPPER LIMIT = + 0.50 minutes of internal standard RT from Cont. Cal

RT LOWER LIMIT = - 0.50 minutes of internal standard RT from Cont. Cal

* Values outside of QC limits.

**TPHD Analysis
Report and Summary QC Forms**

ARI Job ID: WX80

**ORGANICS ANALYSIS DATA SHEET
TOTAL DIESEL RANGE HYDROCARBONS**

NWTPHD by GC/FID
Extraction Method: SW3510C
Page 1 of 1

QC Report No: WX80-Geoengineers
Project: Former Irondale Iron & Steel Pl
0542-042-02

Matrix: Water

Date Received: 07/17/13

Data Release Authorized: *mw*
Reported: 07/25/13

ARI ID	Sample ID	Extraction Date	Analysis Date	EFV DF	Range/Surrogate	RL	Result
MB-071913 13-15140	Method Blank HC ID: ---	07/19/13	07/24/13 FID4A	1.00 1.0	Diesel Range Motor Oil Range o-Terphenyl	0.10 0.20	< 0.10 U < 0.20 U 96.8%
WX80A 13-15140	MW05-130716 HC ID: ---	07/19/13	07/24/13 FID4A	1.00 1.0	Diesel Range Motor Oil Range o-Terphenyl	0.10 0.20	< 0.10 U < 0.20 U 86.4%
WX80B 13-15141	MW06-130716 HC ID: ---	07/19/13	07/24/13 FID4A	1.00 1.0	Diesel Range Motor Oil Range o-Terphenyl	0.10 0.20	< 0.10 U < 0.20 U 89.2%
WX80C 13-15142	MW07-130716 HC ID: DRO	07/19/13	07/24/13 FID4A	1.00 1.0	Diesel Range Motor Oil Range o-Terphenyl	0.10 0.20	0.20 < 0.20 U 95.2%
WX80D 13-15143	MW08-130716 HC ID: ---	07/19/13	07/24/13 FID4A	1.00 1.0	Diesel Range Motor Oil Range o-Terphenyl	0.10 0.20	< 0.10 U < 0.20 U 93.0%
WX80E 13-15144	MW09-130716 HC ID: ---	07/19/13	07/24/13 FID4A	1.00 1.0	Diesel Range Motor Oil Range o-Terphenyl	0.10 0.20	< 0.10 U < 0.20 U 95.0%
WX80F 13-15145	MW06-130716-DUP HC ID: ---	07/19/13	07/24/13 FID4A	1.00 1.0	Diesel Range Motor Oil Range o-Terphenyl	0.10 0.20	< 0.10 U < 0.20 U 97.4%

Reported in mg/L (ppm)

EFV-Effective Final Volume in mL.
DL-Dilution of extract prior to analysis.
RL-Reporting limit.

Diesel range quantitation on total peaks in the range from C12 to C24.
Motor Oil range quantitation on total peaks in the range from C24 to C38.
HC ID: DRO/RRO indicates results of organics or additional hydrocarbons in ranges are not identifiable.

Analytical Resources Inc.
TPH Quantitation Report

Data file: /chem3/fid4a.i/20130724.b/0724a007.d
Method: /chem3/fid4a.i/20130724.b/ftphfid4a.m
Instrument: fid4a.i
Operator: JR/VTS/JW
Report Date: 07/24/2013
Macro: 20-MAY-2013
Calibration Dates: Gas:21-MAR-2013 Diesel:13-APR-2013 M.Oil:20-MAY-2013

ARI ID: WX80MBW1
Client ID: WX80MBW1
Injection: 24-JUL-2013 12:58
Dilution Factor: 1

FID:4A RESULTS

Compound	RT	Shift	Height	Area	Method	Range	Total Area	Conc
Toluene	1.334	-0.011	4416	6238	WATPHG (Tol-C12)		55701	3.58
C8	1.654	-0.012	268	491	WATPHD (C12-C24)		159255	10.97
C10	3.332	-0.005	264	391	WATPHM (C24-C38)		184271	14.28
C12	4.236	-0.001	361	700	AK102 (C10-C25)		180034	10.46
C14	4.915	-0.003	686	1263	AK103 (C25-C36)		146200	15.89
C16	5.508	-0.003	627	769				
C18	6.089	-0.004	674	1024				
C20	6.667	-0.003	720	1008				
C22	7.223	-0.004	619	2574				
C24	7.751	-0.006	621	1540				
C25	8.002	-0.006	635	894				
C26	8.247	-0.016	677	1332				
C28	8.710	-0.002	1312	2273				
C32	9.585	0.015	8144	11649				
C34	9.974	-0.004	1167	301				
Filter Peak	11.450	-0.010	2663	1799	BUNKERC (C10-C38)		358772	36.07
C36	10.382	0.007	2324	5966				
C38	10.770	0.005	1779	2261				
C40	11.150	0.000	2482	5833				
o-terph	6.254	0.000	1074993	839969				
Triacon Surr	9.167	0.007	821042	770871				

Range Times: NW Diesel (4.237 - 7.756) AK102 (3.34 - 8.01) Jet A (3.34 - 6.09)
NW M.Oil (7.76 - 10.77) AK103 (8.01 - 10.38) OR Diesel (3.34 - 8.71)

Surrogate	Area	Amount	%Rec
o-Terphenyl	839969	43.6	96.8
Triacontane	770871	39.9	88.6

JW
7/24/13

M Indicates the peak was manually integrated

Analyte	RF	Curve Date
o-Terph Surr	19283.0	13-APR-2013
Triacon Surr	19327.9	20-MAY-2013
Gas	15539.5	21-MAR-2013
Diesel	14514.5	13-APR-2013
Motor Oil	12905.1	20-MAY-2013
AK102	17214.8	11-APR-2013
AK103	9202.1	25-SEP-2012
Bunker C	9947.9	18-JUL-2013

Data File: /chem3/fid4a.i/20130724.b/0724s007.d

Date: 24-JUL-2013 12:58

Client ID: MK80MBM1

Sample Info: MK80MBM1

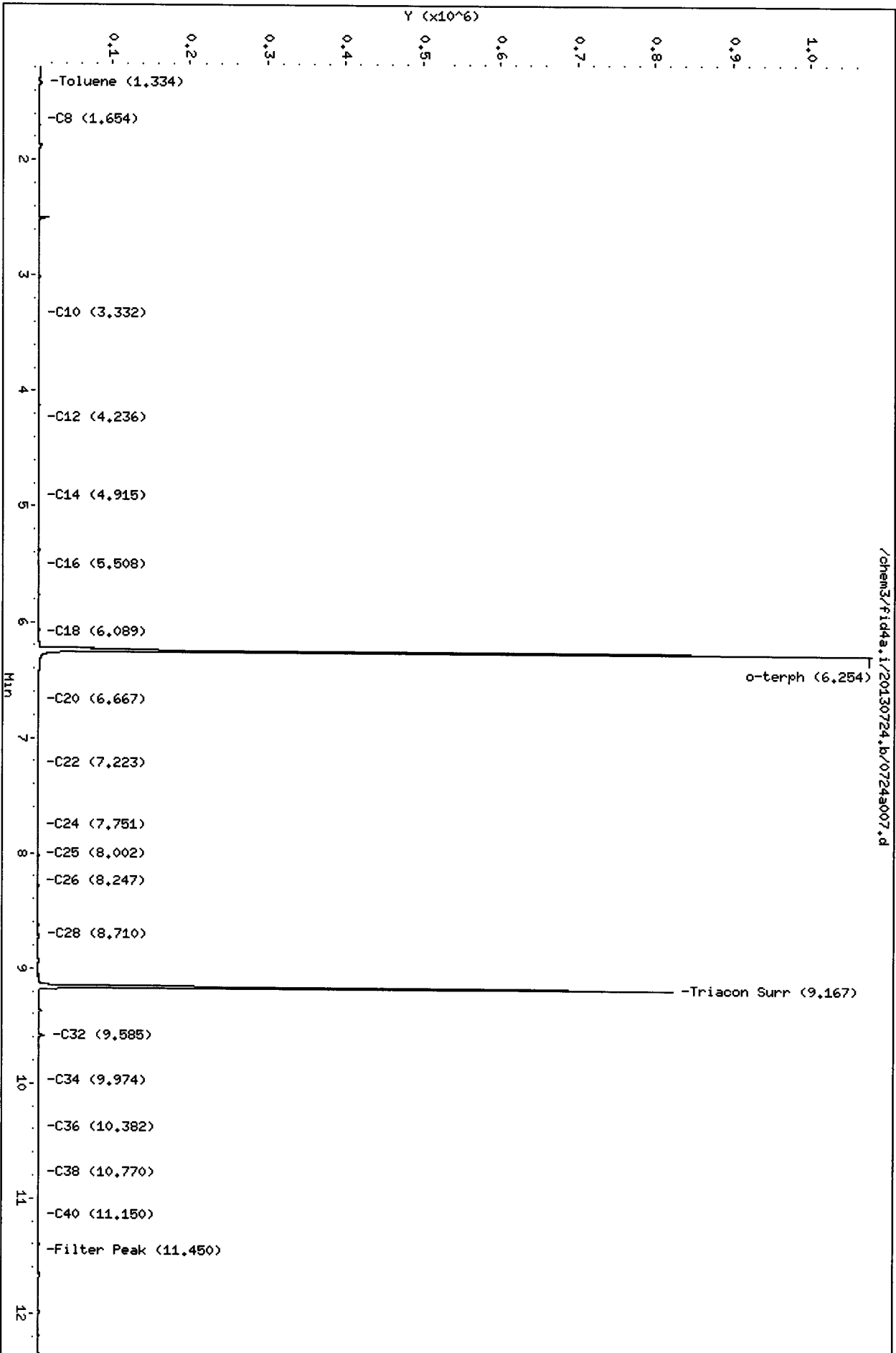
Column phase: RTX-1

Instrument: fid4a.i

Operator: JR/VTS/JM

Column diameter: 0.25

/chem3/fid4a.i/20130724.b/0724s007.d



Analytical Resources Inc.
TPH Quantitation Report

Data file: /chem3/fid4a.i/20130724.b/0724a010.d
Method: /chem3/fid4a.i/20130724.b/ftphfid4a.m
Instrument: fid4a.i
Operator: JR/VTS/JW
Report Date: 07/24/2013
Macro: 20-MAY-2013
Calibration Dates: Gas:21-MAR-2013 Diesel:13-APR-2013 M.Oil:20-MAY-2013

ARI ID: WX80A
Client ID: MW05-130716
Injection: 24-JUL-2013 13:59
Dilution Factor: 1

FID:4A RESULTS

Compound	RT	Shift	Height	Area	Method	Range	Total Area	Conc
Toluene	1.344	-0.001	4805	7320	WATPHG	(Tol-C12)	84954	5.47
C8	1.696	0.030	2204	4477	WATPHD	(C12-C24)	201422	13.88
C10	3.335	-0.002	341	321	WATPHM	(C24-C38)	231484	17.94
C12	4.240	0.002	632	1201	AK102	(C10-C25)	234423	13.62
C14	4.915	-0.003	767	1851	AK103	(C25-C36)	183395	19.93
C16	5.510	-0.002	635	1066				
C18	6.087	-0.006	742	1423				
C20	6.665	-0.004	991	1705				
C22	7.221	-0.007	919	2020				
C24	7.751	-0.005	854	2207				
C25	8.002	-0.006	879	1016				
C26	8.247	-0.016	918	1565				
C28	8.708	-0.004	1626	1656				
C32	9.569	-0.002	8506	11206				
C34	9.980	0.003	1501	3419				
Filter Peak	11.465	0.004	2493	5275	BUNKERC	(C10-C38)	458165	46.06
C36	10.387	0.011	1713	4769				
C38	10.755	-0.010	1796	1872				
C40	11.149	0.000	2251	4110				
o-terph	6.253	-0.001	1008558	749520				
Triacon Surr	9.161	0.001	785427	707807				

Range Times: NW Diesel(4.237 - 7.756) AK102(3.34 - 8.01) Jet A(3.34 - 6.09)
NW M.Oil(7.76 - 10.77) AK103(8.01 - 10.38) OR Diesel(3.34 - 8.71)

Surrogate	Area	Amount	%Rec
o-Terphenyl	749520	38.9	86.4
Triacontane	707807	36.6	81.4

SLW
7/24/13

M Indicates the peak was manually integrated

Analyte	RF	Curve Date
o-Terph Surr	19283.0	13-APR-2013
Triacon Surr	19327.9	20-MAY-2013
Gas	15539.5	21-MAR-2013
Diesel	14514.5	13-APR-2013
Motor Oil	12905.1	20-MAY-2013
AK102	17214.8	11-APR-2013
AK103	9202.1	25-SEP-2012
Bunker C	9947.9	18-JUL-2013

Data File: /chem3/fid4a.i/20130724.b/0724a010.d

Date: 24-JUL-2013 13:59

Client ID: MN05-130716

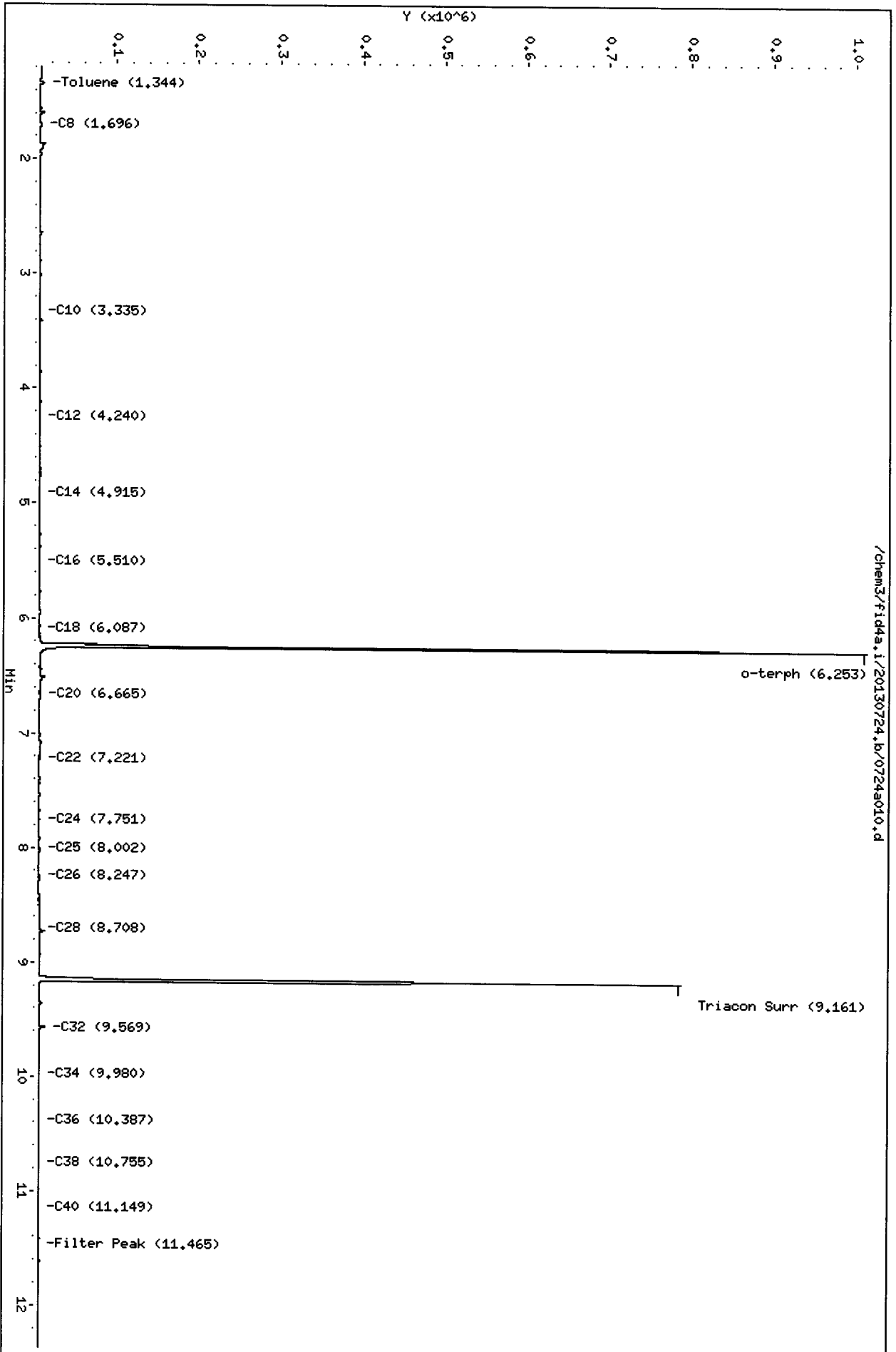
Sample Info: MX804

Column phase: RTX-1

Instrument: fid4a.i

Operator: JR/VTS/JM

Column diameter: 0.25



Analytical Resources Inc.
TPH Quantitation Report

Data file: /chem3/fid4a.i/20130724.b/0724a011.d
Method: /chem3/fid4a.i/20130724.b/ftphfid4a.m
Instrument: fid4a.i
Operator: JR/VTS/JW
Report Date: 07/24/2013
Macro: 20-MAY-2013
Calibration Dates: Gas:21-MAR-2013 Diesel:13-APR-2013 M.Oil:20-MAY-2013

ARI ID: WX80B
Client ID: MW06-130716
Injection: 24-JUL-2013 14:20
Dilution Factor: 1

FID:4A RESULTS

Compound	RT	Shift	Height	Area	Method	Range	Total Area	Conc
Toluene	1.337	-0.008	11519	15457	WATPHG	(Tol-C12)	88750	5.71
C8	1.699	0.033	1794	3766	WATPHD	(C12-C24)	513481	35.38
C10	3.334	-0.003	289	232	WATPHM	(C24-C38)	398604	30.89
C12	4.246	0.009	763	886	AK102	(C10-C25)	565051	32.82
C14	4.915	-0.003	1722	2478	AK103	(C25-C36)	329856	35.85
C16	5.521	0.010	2010	1567				
C18	6.085	-0.008	3798	4197				
C20	6.666	-0.003	2606	3834				
C22	7.222	-0.006	2516	3832				
C24	7.748	-0.008	2663	5743				
C25	8.001	-0.007	2832	4994				
C26	8.244	-0.018	2632	7032				
C28	8.706	-0.006	3054	3317				
C32	9.560	-0.011	10695	15597				
C34	9.987	0.009	2098	2791				
Filter Peak	11.472	0.012	2697	2356	BUNKERC	(C10-C38)	944016	94.90
C36	10.389	0.013	2126	2040				
C38	10.749	-0.017	2454	7521				
C40	11.130	-0.019	2715	10453				
o-terph	6.253	0.000	1024628	773760				
Triacon Surr	9.155	-0.005	806564	743942				

Range Times: NW Diesel (4.237 - 7.756) AK102 (3.34 - 8.01) Jet A (3.34 - 6.09)
NW M.Oil (7.76 - 10.77) AK103 (8.01 - 10.38) OR Diesel (3.34 - 8.71)

Surrogate	Area	Amount	%Rec
o-Terphenyl	773760	40.1	89.2
Triacontane	743942	38.5	85.5

JW
7/24/13

M Indicates the peak was manually integrated

Analyte	RF	Curve Date
o-Terph Surr	19283.0	13-APR-2013
Triacon Surr	19327.9	20-MAY-2013
Gas	15539.5	21-MAR-2013
Diesel	14514.5	13-APR-2013
Motor Oil	12905.1	20-MAY-2013
AK102	17214.8	11-APR-2013
AK103	9202.1	25-SEP-2012
Bunker C	9947.9	18-JUL-2013

Data File: /chem3/fid4a,i/20130724,b/0724a011.d

Date: 24-JUL-2013 14:20

Client ID: M406-130716

Sample Info: M8808

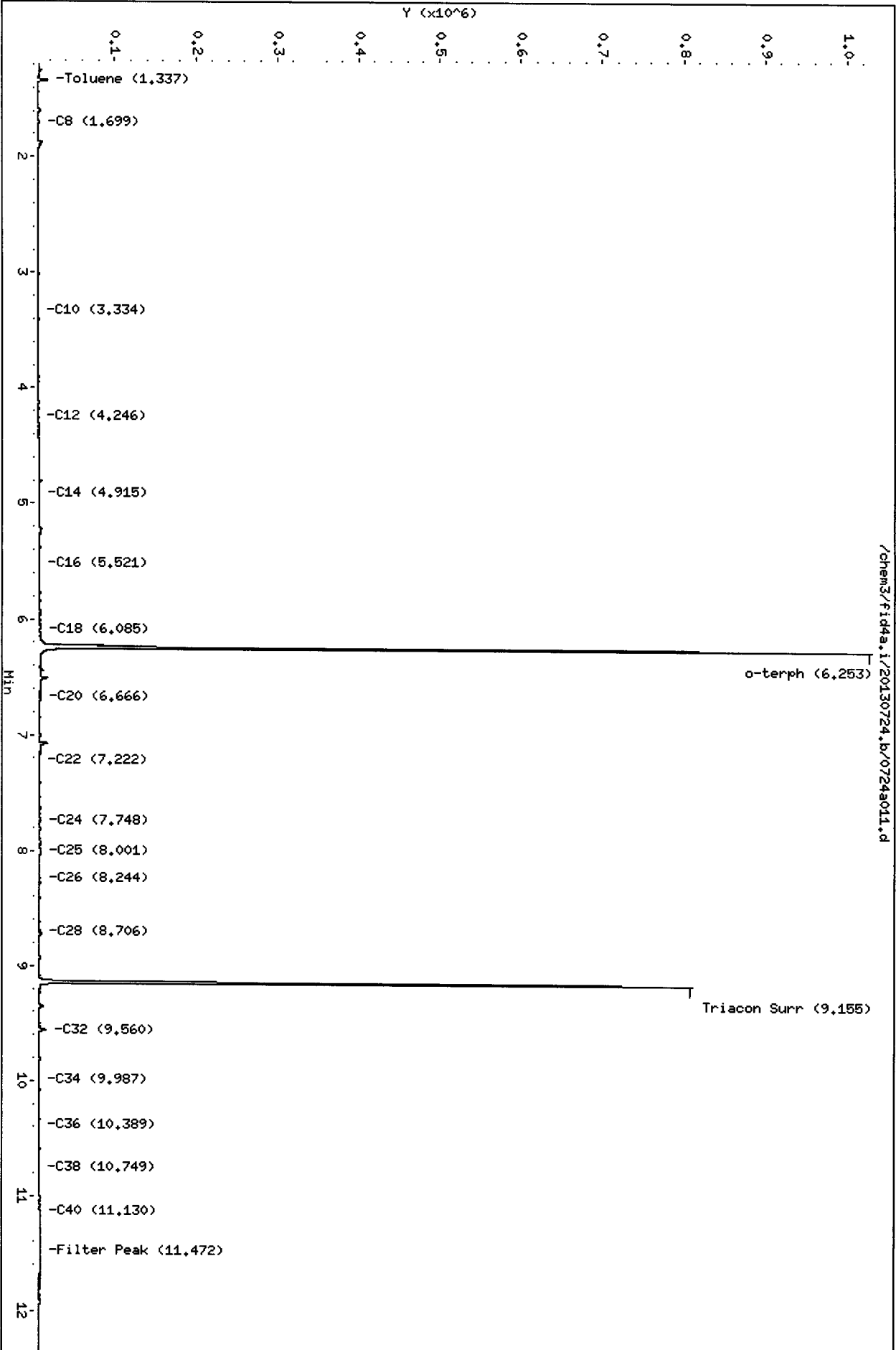
Column phase: RTX-1

Instrument: fid4a.i

Operator: JR/VTS/JM

Column diameter: 0.25

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Analytical Resources Inc.
TPH Quantitation Report

Data file: /chem3/fid4a.i/20130724.b/0724a012.d
Method: /chem3/fid4a.i/20130724.b/ftphfid4a.m
Instrument: fid4a.i
Operator: JR/VTS/JW
Report Date: 07/24/2013
Macro: 20-MAY-2013
Calibration Dates: Gas:21-MAR-2013 Diesel:13-APR-2013 M.Oil:20-MAY-2013

ARI ID: WX80C
Client ID: MW07-130716
Injection: 24-JUL-2013 14:41
Dilution Factor: 1

FID:4A RESULTS

Compound	RT	Shift	Height	Area	Method	Range	Total Area	Conc
Toluene	1.348	0.004	9381	14420	WATPHG	(Tol-C12)	135978	8.75
C8	1.707	0.041	2069	4776	WATPHD	(C12-C24)	1471451	101.38
C10	3.335	-0.001	305	223	WATPHM	(C24-C38)	879476	68.15
C12	4.237	-0.001	1622	2218	AK102	(C10-C25)	1577292	91.62
C14	4.917	-0.001	3893	6574	AK103	(C25-C36)	733789	79.74
C16	5.509	-0.003	6420	5520				
C18	6.086	-0.007	9214	12612				
C20	6.667	-0.003	8226	13707				
C22	7.243	0.016	7016	9816				
C24	7.750	-0.007	6614	10214				
C25	8.000	-0.008	6456	10062				
C26	8.282	0.019	4888	11126				
C28	8.731	0.019	9907	10002				
C32	9.567	-0.003	27519	45711				
C34	9.984	0.006	21011	25249				
Filter Peak	11.483	0.023	3747	18423	BUNKERC	(C10-C38)	2399674	241.23
C36	10.391	0.016	15665	28029				
C38	10.744	-0.021	3363	6096				
C40	11.141	-0.009	3535	7178				
o-terph	6.254	0.000	993101	825731				
Triacon Surr	9.167	0.007	820201	760815				

Range Times: NW Diesel (4.237 - 7.756) AK102 (3.34 - 8.01) Jet A (3.34 - 6.09)
NW M.Oil (7.76 - 10.77) AK103 (8.01 - 10.38) OR Diesel (3.34 - 8.71)

Surrogate	Area	Amount	%Rec
o-Terphenyl	825731	42.8	95.2 M
Triacontane	760815	39.4	87.5 M

JW
7/24/13

M Indicates the peak was manually integrated

Analyte	RF	Curve Date
o-Terph Surr	19283.0	13-APR-2013
Triacon Surr	19327.9	20-MAY-2013
Gas	15539.5	21-MAR-2013
Diesel	14514.5	13-APR-2013
Motor Oil	12905.1	20-MAY-2013
AK102	17214.8	11-APR-2013
AK103	9202.1	25-SEP-2012
Bunker C	9947.9	18-JUL-2013

Data File: /chem3/fid4a.i/20130724.b/0724a012.d

Date: 24-JUL-2013 14:41

Client ID: MM07-130716

Sample Info: MX80C

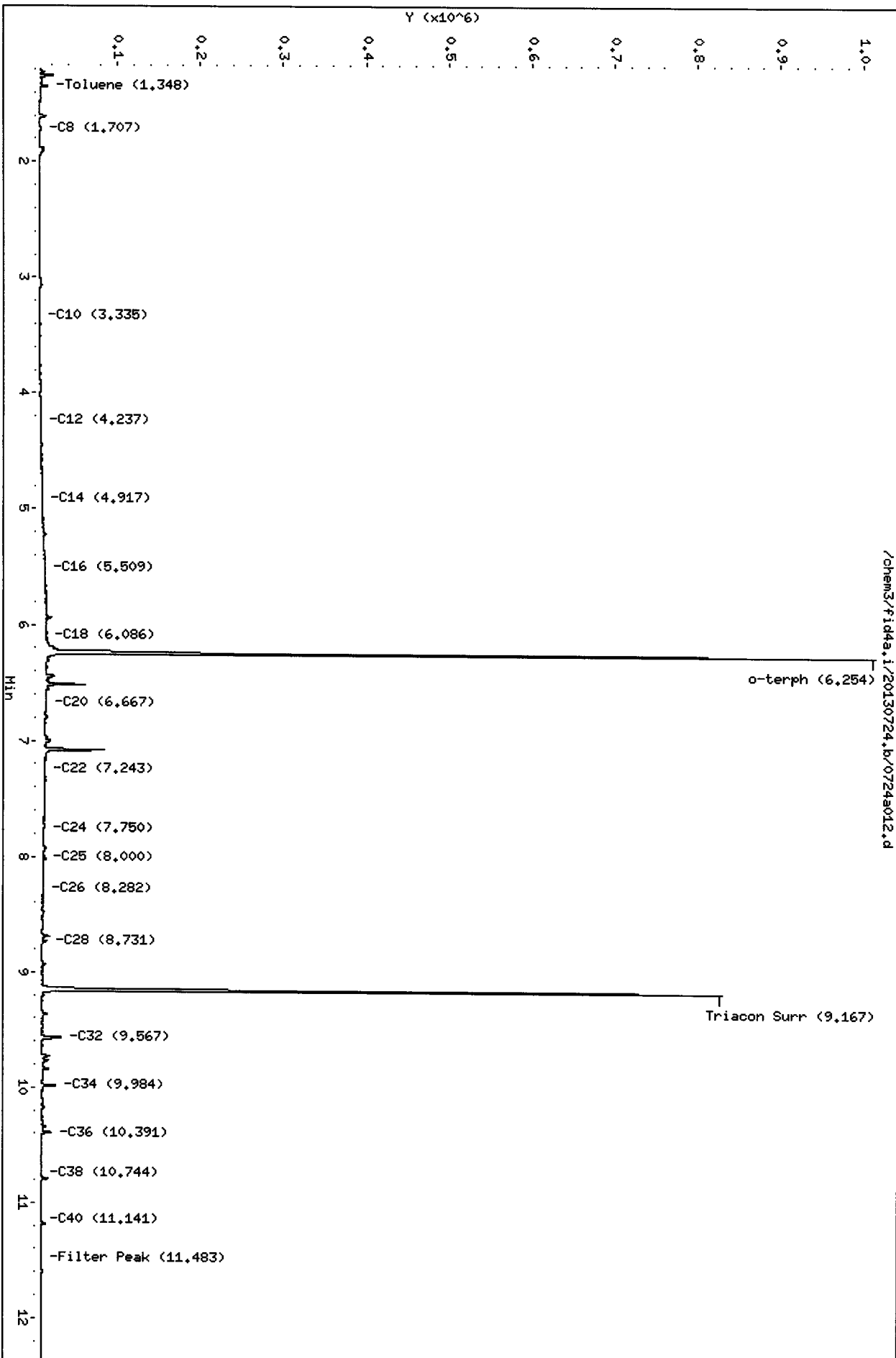
Column phase: RTX-1

Instrument: fid4a.i

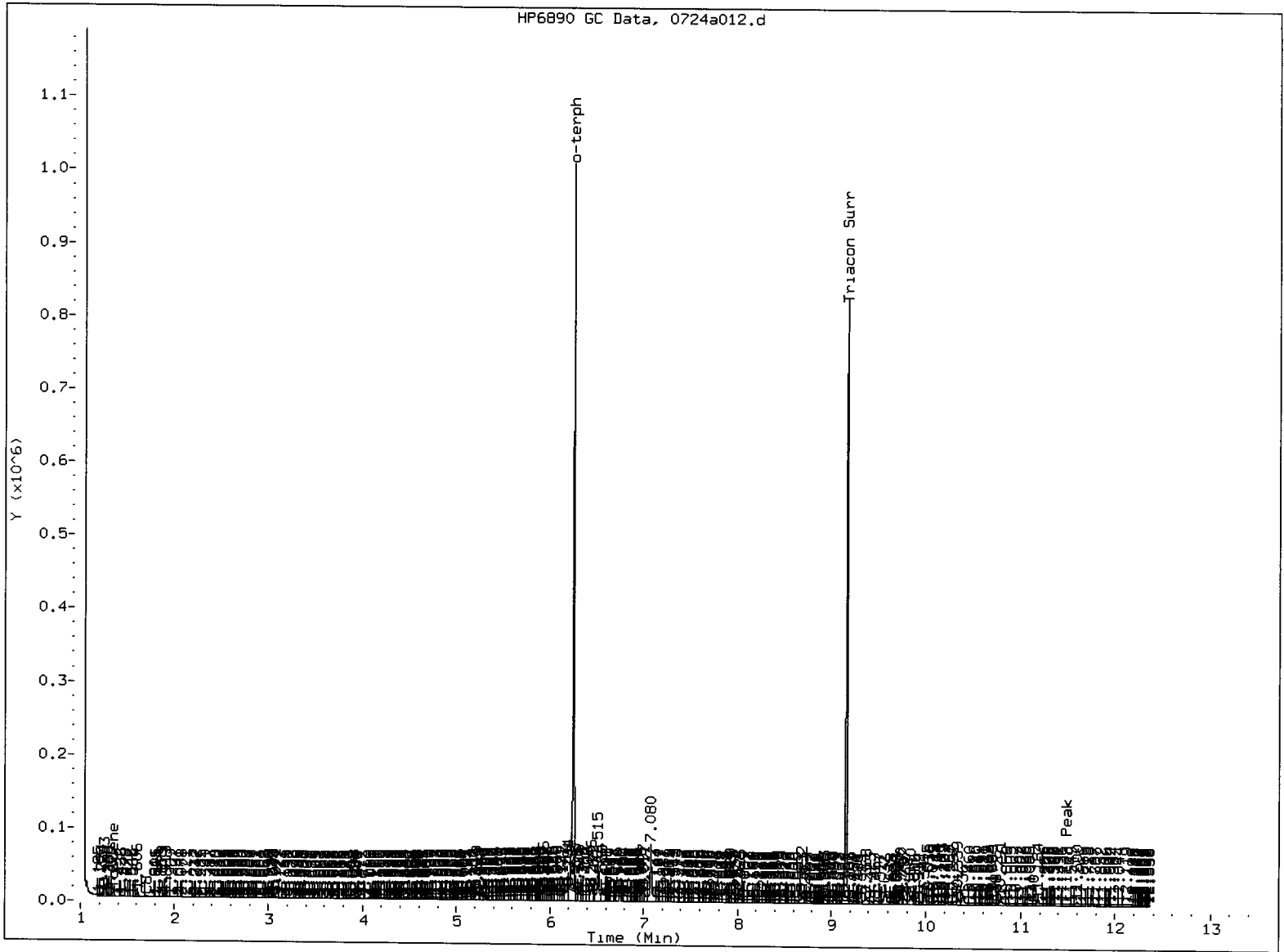
Operator: JR/VTS/JM

Column diameter: 0.25

Page 1



JW
7/24/13



MANUAL INTEGRATION

- 1. Baseline correction
- 3. Peak not found
- ⑤. Skipped surrogate

Analyst: JW

Date: 7/24/07

Analytical Resources Inc.
TPH Quantitation Report

Data file: /chem3/fid4a.i/20130724.b/0724a013.d
Method: /chem3/fid4a.i/20130724.b/ftphfid4a.m
Instrument: fid4a.i
Operator: JR/VTS/JW
Report Date: 07/24/2013
Macro: 20-MAY-2013
Calibration Dates: Gas:21-MAR-2013 Diesel:13-APR-2013 M.Oil:20-MAY-2013

ARI ID: WX80D
Client ID: MW08-130716
Injection: 24-JUL-2013 15:01
Dilution Factor: 1

FID:4A RESULTS

Compound	RT	Shift	Height	Area	Method	Range	Total Area	Conc
Toluene	1.350	0.005	3716	5657	WATPHG	(Tol-C12)	64869	4.17
C8	1.716	0.050	1134	2449	WATPHD	(C12-C24)	236501	16.29
C10	3.335	-0.001	159	176	WATPHM	(C24-C38)	298805	23.15
C12	4.221	-0.017	408	848	AK102	(C10-C25)	263953	15.33
C14	4.916	-0.002	818	1316	AK103	(C25-C36)	238474	25.92
C16	5.509	-0.002	779	1326				
C18	6.087	-0.006	852	1408				
C20	6.666	-0.004	1148	1651				
C22	7.222	-0.006	1344	2638				
C24	7.748	-0.008	1506	2034				
C25	8.001	-0.007	1555	1551				
C26	8.282	0.019	1880	3739				
C28	8.704	-0.009	2263	2572				
C32	9.546	-0.024	9571	13338				
C34	9.970	-0.008	1729	2654				
Filter Peak	11.462	0.002	2645	1891	BUNKERC	(C10-C38)	551141	55.40
C36	10.365	-0.011	1886	1283				
C38	10.757	-0.009	2055	613				
C40	11.149	0.000	2574	5006				
o-terph	6.254	0.000	1076556	806697				
Triacon Surr	9.148	-0.012	828941	743040				

Range Times: NW Diesel(4.237 - 7.756) AK102(3.34 - 8.01) Jet A(3.34 - 6.09)
NW M.Oil(7.76 - 10.77) AK103(8.01 - 10.38) OR Diesel(3.34 - 8.71)

Surrogate	Area	Amount	%Rec
o-Terphenyl	806697	41.8	93.0
Triacontane	743040	38.4	85.4

*370
7/24/12*

M Indicates the peak was manually integrated

Analyte	RF	Curve Date
o-Terph Surr	19283.0	13-APR-2013
Triacon Surr	19327.9	20-MAY-2013
Gas	15539.5	21-MAR-2013
Diesel	14514.5	13-APR-2013
Motor Oil	12905.1	20-MAY-2013
AK102	17214.8	11-APR-2013
AK103	9202.1	25-SEP-2012
Bunker C	9947.9	18-JUL-2013

Data File: /chem3/fid4a,i/20130724,b/0724a013.d

Date: 24-JUL-2013 15:01

Client ID: MM09-130716

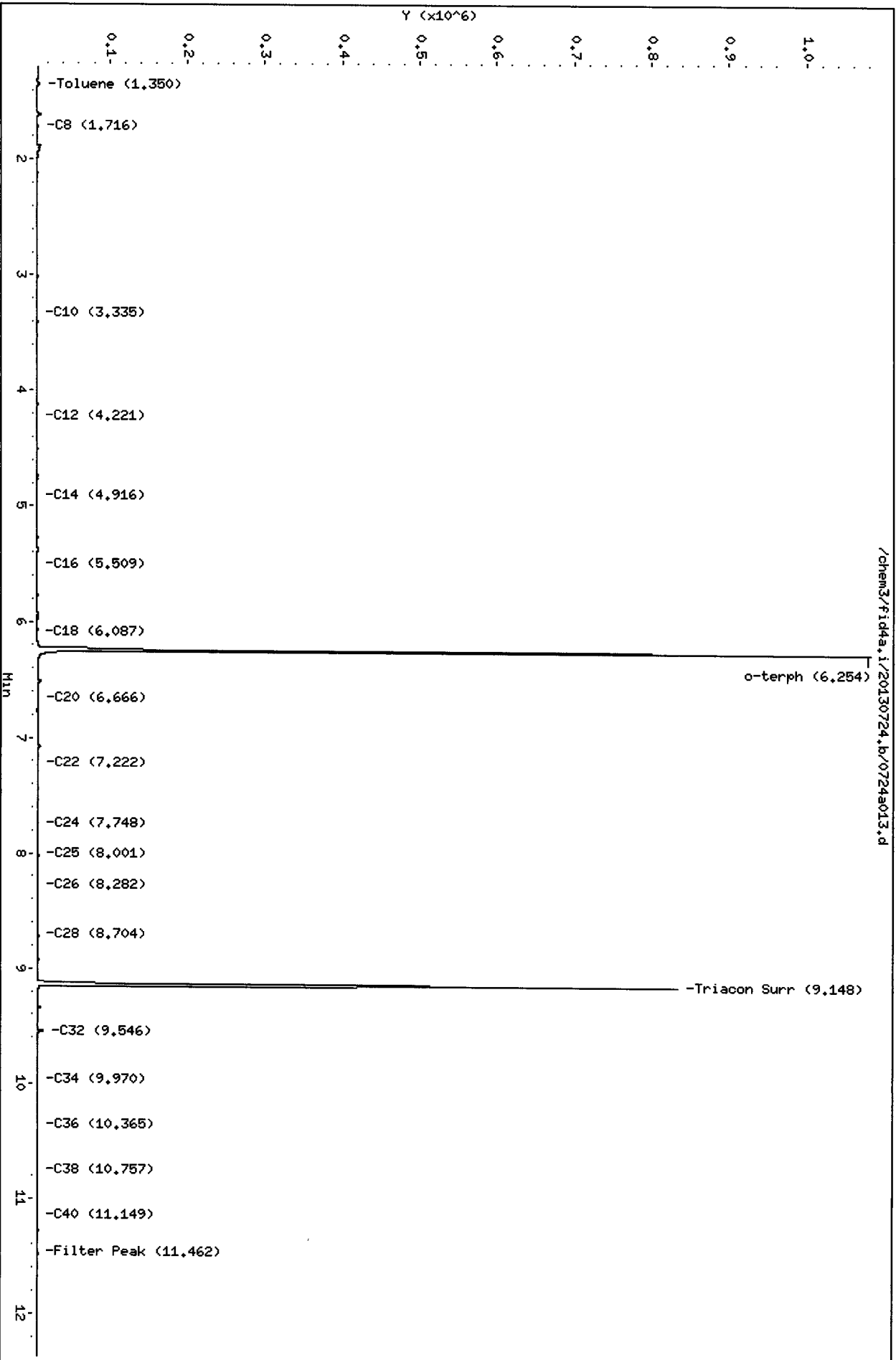
Sample Info: WX80D

Column phase: RTX-1

Instrument: fid4a.i

Operator: JR/VTS/JM

Column diameter: 0.25



Analytical Resources Inc.
TPH Quantitation Report

Data file: /chem3/fid4a.i/20130724.b/0724a014.d
Method: /chem3/fid4a.i/20130724.b/ftphfid4a.m
Instrument: fid4a.i
Operator: JR/VTS/JW
Report Date: 07/24/2013
Macro: 20-MAY-2013
Calibration Dates: Gas:21-MAR-2013 Diesel:13-APR-2013 M.Oil:20-MAY-2013

ARI ID: WX80E
Client ID: MW09-130716
Injection: 24-JUL-2013 15:22
Dilution Factor: 1

FID:4A RESULTS

Compound	RT	Shift	Height	Area	Method	Range	Total Area	Conc
Toluene	1.349	0.005	4839	6464	WATPHG	(Tol-C12)	138034	8.88
C8	1.697	0.031	4380	9064	WATPHD	(C12-C24)	430562	29.66
C10	3.336	-0.001	388	483	WATPHM	(C24-C38)	456847	35.40
C12	4.247	0.009	660	950	AK102	(C10-C25)	481712	27.98
C14	4.915	-0.002	1286	2575	AK103	(C25-C36)	377063	40.98
C16	5.509	-0.002	1104	1962				
C18	6.108	0.015	1143	658				
C20	6.664	-0.005	1787	2793				
C22	7.223	-0.004	2208	4427				
C24	7.750	-0.006	2736	8760				
C25	8.000	-0.008	2346	2521				
C26	8.283	0.020	5274	11182				
C28	8.708	-0.005	3128	3772				
C32	9.568	-0.002	10801	17239				
C34	9.966	-0.012	2716	3246				
Filter Peak	11.461	0.000	2996	4114	BUNKERC	(C10-C38)	919675	92.45
C36	10.352	-0.024	4829	11806				
C38	10.759	-0.006	2727	5133				
C40	11.151	0.001	2995	8288				
o-terph	6.254	0.001	1055242	824248				
Triacon Surr	9.160	0.000	837237	775307				

Range Times: NW Diesel (4.237 - 7.756) AK102 (3.34 - 8.01) Jet A (3.34 - 6.09)
NW M.Oil (7.76 - 10.77) AK103 (8.01 - 10.38) OR Diesel (3.34 - 8.71)

Surrogate	Area	Amount	%Rec
o-Terphenyl	824248	42.7	95.0
Triacontane	775307	40.1	89.1

M Indicates the peak was manually integrated

JW
7/24/13

Analyte	RF	Curve Date
o-Terph Surr	19283.0	13-APR-2013
Triacon Surr	19327.9	20-MAY-2013
Gas	15539.5	21-MAR-2013
Diesel	14514.5	13-APR-2013
Motor Oil	12905.1	20-MAY-2013
AK102	17214.8	11-APR-2013
AK103	9202.1	25-SEP-2012
Bunker C	9947.9	18-JUL-2013

Data File: /chem3/fid4a.i/20130724.b/0724a014.d

Date: 24-JUL-2013 15:22

Client ID: MH09-130716

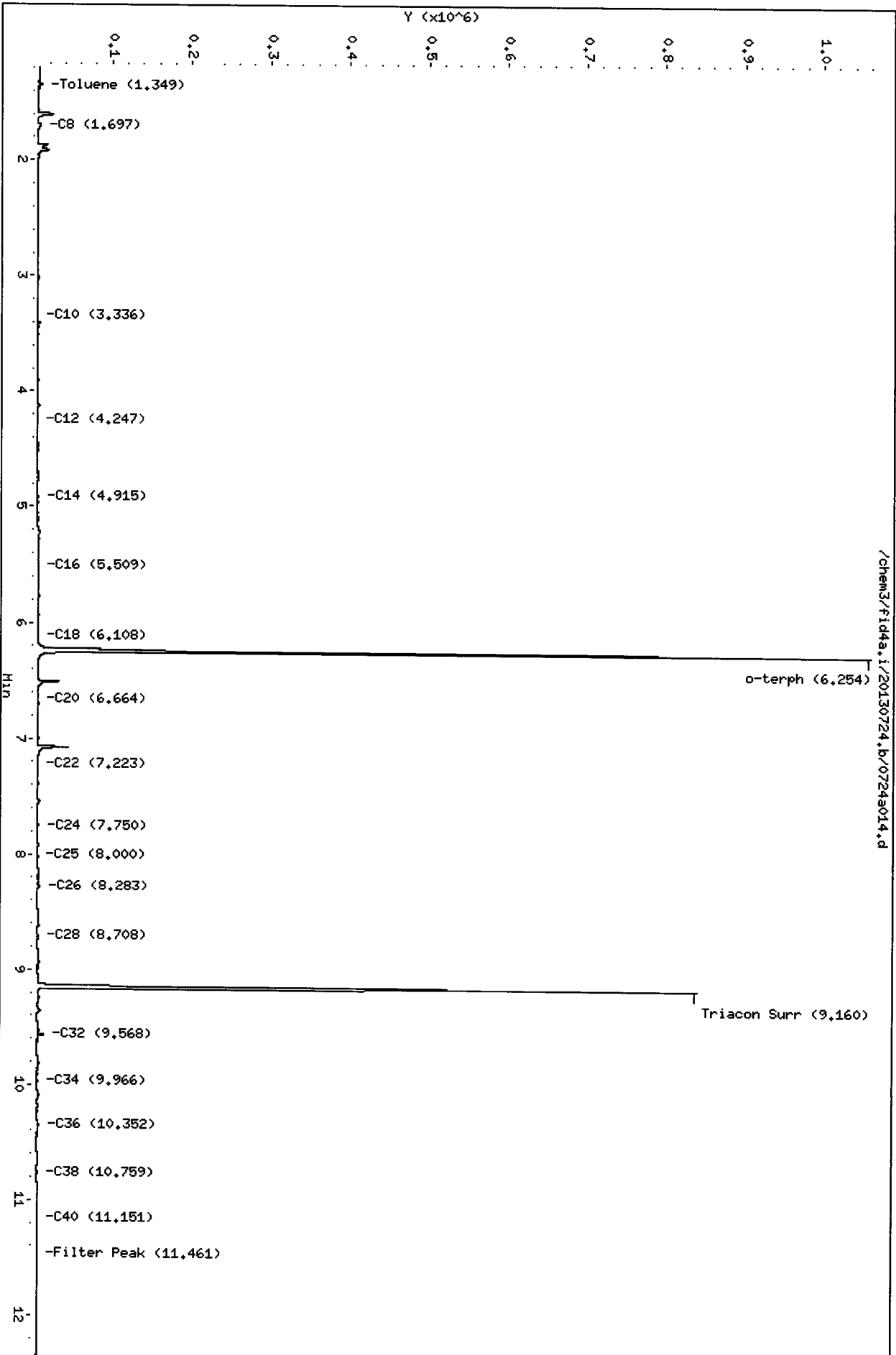
Sample Info: MX80E

Column phase: RTX-1

Instrument: fid4a.i

Operator: JR/VTS/JM

Column diameter: 0.25



/chem3/fid4a.i/20130724.b/0724a014.d

130716

Analytical Resources Inc.
TPH Quantitation Report

Data file: /chem3/fid4a.i/20130724.b/0724a015.d
Method: /chem3/fid4a.i/20130724.b/ftphfid4a.m
Instrument: fid4a.i
Operator: JR/VTS/JW
Report Date: 07/24/2013
Macro: 20-MAY-2013
Calibration Dates: Gas:21-MAR-2013 Diesel:13-APR-2013 M.Oil:20-MAY-2013

ARI ID: WX80F
Client ID: MW06-130716-DUP
Injection: 24-JUL-2013 15:42
Dilution Factor: 1

FID:4A RESULTS

Compound	RT	Shift	Height	Area	Method	Range	Total Area	Conc
Toluene	1.344	0.000	12950	13936	WATPHG	(Tol-C12)	132134	8.50
C8	1.703	0.037	2108	4852	WATPHD	(C12-C24)	544281	37.50
C10	3.335	-0.001	341	237	WATPHM	(C24-C38)	556855	43.15
C12	4.237	-0.001	795	372	AK102	(C10-C25)	608266	35.33
C14	4.915	-0.003	1910	2759	AK103	(C25-C36)	467344	50.79
C16	5.507	-0.004	2151	3262				
C18	6.086	-0.007	3409	4278				
C20	6.662	-0.008	2821	4073				
C22	7.219	-0.008	2822	4244				
C24	7.751	-0.006	3079	5322				
C25	8.000	-0.008	3490	4811				
C26	8.260	-0.002	2865	2256				
C28	8.705	-0.008	4126	4826				
C32	9.556	-0.014	12542	19393				
C34	9.980	0.003	3137	2905				
Filter Peak	11.469	0.008	3089	2828	BUNKERC	(C10-C38)	1136956	114.29
C36	10.381	0.006	3143	2769				
C38	10.779	0.014	3072	1097				
C40	11.168	0.018	3344	7606				
o-terph	6.254	0.000	1071359	845501				
Triacon Surr	9.154	-0.006	811270	763002				

Range Times: NW Diesel(4.237 - 7.756) AK102(3.34 - 8.01) Jet A(3.34 - 6.09)
NW M.Oil(7.76 - 10.77) AK103(8.01 - 10.38) OR Diesel(3.34 - 8.71)

Surrogate	Area	Amount	%Rec
o-Terphenyl	845501	43.8	97.4
Triacotane	763002	39.5	87.7

TW
7/24/13

M Indicates the peak was manually integrated

Analyte	RF	Curve Date
o-Terph Surr	19283.0	13-APR-2013
Triacon Surr	19327.9	20-MAY-2013
Gas	15539.5	21-MAR-2013
Diesel	14514.5	13-APR-2013
Motor Oil	12905.1	20-MAY-2013
AK102	17214.8	11-APR-2013
AK103	9202.1	25-SEP-2012
Bunker C	9947.9	18-JUL-2013

Data File: /chem3/fid4a.1/20130724.b/0724a015.d

Date: 24-JUL-2013 15:42

Client ID: MK06-130716-DUP

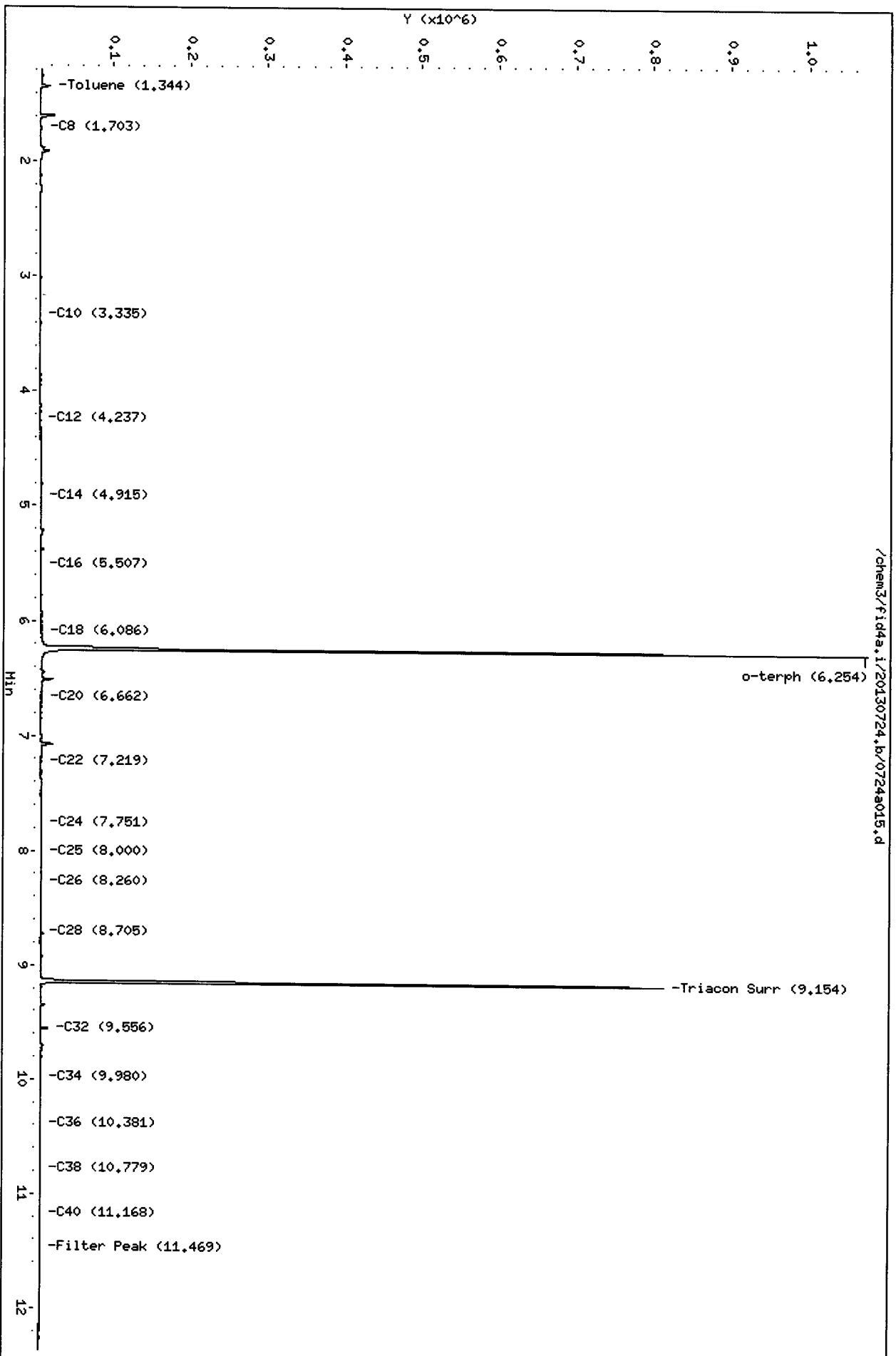
Sample Info: MK80F

Column phase: RTX-1

Instrument: fid4a.1

Operator: JR/VTS/JM

Column diameter: 0.25



TPHD SURROGATE RECOVERY SUMMARY

Matrix: Water

QC Report No: WX80-Geoengineers
Project: Former Irondale Iron & Steel Plant
0542-042-02

<u>Client ID</u>	<u>OTER</u>	<u>TOT OUT</u>
MB-071913	96.8%	0
LCS-071913	85.5%	0
LCSD-071913	84.7%	0
MW05-130716	86.4%	0
MW06-130716	89.2%	0
MW07-130716	95.2%	0
MW08-130716	93.0%	0
MW09-130716	95.0%	0
MW06-130716-DUP	97.4%	0

LCS/MB LIMITS QC LIMITS

(OTER) = o-Terphenyl

(50-150)

(50-150)

Prep Method: SW3510C
Log Number Range: 13-15140 to 13-15145



ORGANICS ANALYSIS DATA SHEET

NWTPHD by GC/FID

Page 1 of 1

Sample ID: LCS-071913

LCS/LCSD

Lab Sample ID: LCS-071913

LIMS ID: 13-15140

Matrix: Water

Data Release Authorized: *[Signature]*

Reported: 07/25/13

QC Report No: WX80-Geoengineers

Project: Former Irondale Iron & Steel Plant
0542-042-02

Date Sampled: NA

Date Received: NA

Date Extracted LCS/LCSD: 07/19/13

Sample Amount LCS: 500 mL

LCSD: 500 mL

Date Analyzed LCS: 07/24/13 13:18

Final Extract Volume LCS: 1.0 mL

LCSD: 07/24/13 13:39

LCSD: 1.0 mL

Instrument/Analyst LCS: FID4A/JLW

Dilution Factor LCS: 1.00

LCSD: FID4A/JLW

LCSD: 1.00

Range	LCS	Spike Added-LCS	LCS Recovery	LCSD	Spike Added-LCSD	LCSD Recovery	RPD
Diesel	2.83	3.00	94.3%	2.77	3.00	92.3%	2.1%

TPHD Surrogate Recovery

	LCS	LCSD
o-Terphenyl	85.5%	84.7%

Results reported in mg/L

RPD calculated using sample concentrations per SW846.

Analytical Resources Inc.
TPH Quantitation Report

Data file: /chem3/fid4a.i/20130724.b/0724a008.d
Method: /chem3/fid4a.i/20130724.b/ftphfid4a.m
Instrument: fid4a.i
Operator: JR/VTS/JW
Report Date: 07/24/2013
Macro: 20-MAY-2013
Calibration Dates: Gas:21-MAR-2013 Diesel:13-APR-2013 M.Oil:20-MAY-2013

ARI ID: WX80LCSW1
Client ID: WX80LCSW1
Injection: 24-JUL-2013 13:18
Dilution Factor: 1

FID:4A RESULTS

Compound	RT	Shift	Height	Area	Method	Range	Total Area	Conc
Toluene	1.333	-0.011	14654	13361	WATPHG	(Tol-C12)	4212741	271.10
C8	1.678	0.012	4014	2874	WATPHD	(C12-C24)	20526624	1414.21
C10	3.332	-0.004	87144	86446	WATPHM	(C24-C38)	406472	31.50
C12	4.238	0.001	175190	192623	AK102	(C10-C25)	23676709	1375.37
C14	4.919	0.001	348429	289540	AK103	(C25-C36)	287501	31.24
C16	5.514	0.003	509729	437780				
C18	6.096	0.003	486831	451283				
C20	6.669	-0.001	298752	348416				
C22	7.224	-0.004	140836	158079				
C24	7.750	-0.007	48944	67961				
C25	8.001	-0.007	25152	27376				
C26	8.281	0.019	4314	9263				
C28	8.707	-0.006	3375	5314				
C32	9.570	0.000	8090	10468				
C34	9.984	0.006	1113	4593				
Filter Peak	11.476	0.015	2285	6160	BUNKERC	(C10-C38)	23997880	2412.37
C36	10.394	0.018	1281	3545				
C38	10.768	0.002	1524	1900				
C40	11.155	0.005	1989	3057				
o-terph	6.257	0.003	1005767	742184				
Triacon Surr	9.160	0.000	826416	751816				

Range Times: NW Diesel(4.237 - 7.756) AK102(3.34 - 8.01) Jet A(3.34 - 6.09)
NW M.Oil(7.76 - 10.77) AK103(8.01 - 10.38) OR Diesel(3.34 - 8.71)

Surrogate	Area	Amount	%Rec
o-Terphenyl	742184	38.5	85.5 M
Triacontane	751816	38.9	86.4

JW
7/24/13

M Indicates the peak was manually integrated

Analyte	RF	Curve Date
o-Terph Surr	19283.0	13-APR-2013
Triacon Surr	19327.9	20-MAY-2013
Gas	15539.5	21-MAR-2013
Diesel	14514.5	13-APR-2013
Motor Oil	12905.1	20-MAY-2013
AK102	17214.8	11-APR-2013
AK103	9202.1	25-SEP-2012
Bunker C	9947.9	18-JUL-2013

Data File: /chem3/fid4a.1/20130724.b/0724a008.d

Date: 24-JUL-2013 13:18

Client ID: MK80LCSM1

Sample Info: MK80LCSM1

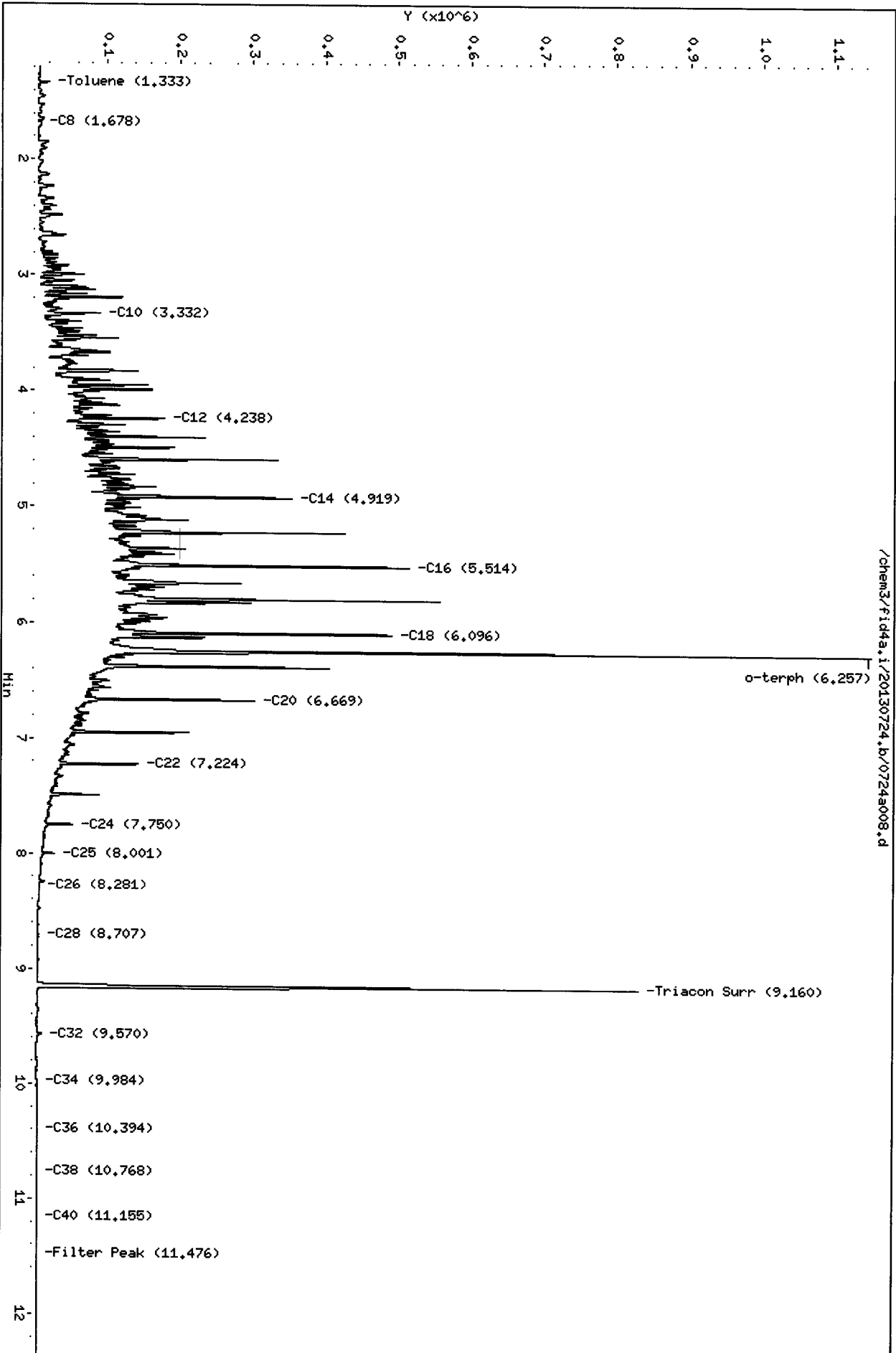
Column phase: RTX-1

Instrument: fid4a.i

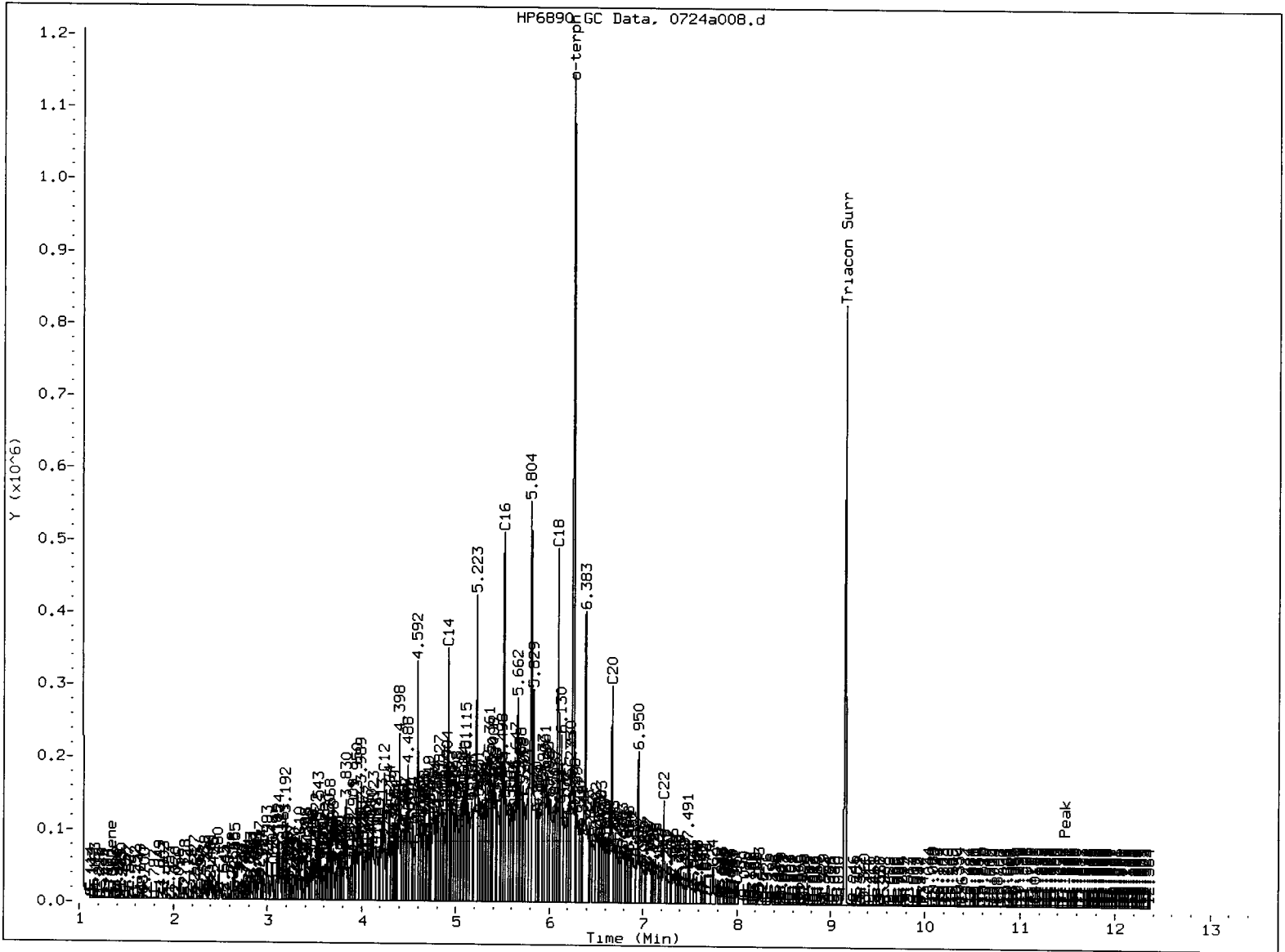
Operator: JR/VTS/JM

Column diameter: 0.25

/chem3/fid4a.1/20130724.b/0724a008.d



7/24/13



MANUAL INTEGRATION

- 1. Baseline correction
- 3. Peak not found
- ⑤. Skipped surrogate

Analyst: JL

Date: 7/24/12

Analytical Resources Inc.
TPH Quantitation Report

Data file: /chem3/fid4a.i/20130724.b/0724a009.d
Method: /chem3/fid4a.i/20130724.b/ftphfid4a.m
Instrument: fid4a.i
Operator: JR/VTS/JW
Report Date: 07/24/2013
Macro: 20-MAY-2013
Calibration Dates: Gas:21-MAR-2013 Diesel:13-APR-2013 M.Oil:20-MAY-2013

ARI ID: WX80LCSDW1
Client ID: WX80LCSDW1
Injection: 24-JUL-2013 13:39
Dilution Factor: 1

FID:4A RESULTS

Compound	RT	Shift	Height	Area	Method	Range	Total Area	Conc
Toluene	1.342	-0.003	13523	13706	WATPHG	(Tol-C12)	4257781	274.00
C8	1.654	-0.012	8400	13118	WATPHD	(C12-C24)	20095296	1384.50
C10	3.333	-0.003	87281	60198	WATPHM	(C24-C38)	411282	31.87
C12	4.238	0.001	174776	199697	AK102	(C10-C25)	23248165	1350.48
C14	4.919	0.001	355453	507407	AK103	(C25-C36)	300405	32.65
C16	5.515	0.003	519013	451037				
C18	6.096	0.004	494197	676810				
C20	6.669	0.000	301684	347952				
C22	7.225	-0.003	141113	148490				
C24	7.750	-0.006	48536	53916				
C25	8.002	-0.006	25216	40990				
C26	8.245	-0.017	12377	18877				
C28	8.706	-0.007	3203	4969				
C32	9.565	-0.005	7888	11630				
C34	9.975	-0.003	961	2821				
Filter Peak	11.451	-0.009	2150	3116	BUNKERC	(C10-C38)	23576780	2370.04
C36	10.385	0.009	1142	2953				
C38	10.775	0.010	1439	1364				
C40	11.154	0.004	1907	3857				
o-terph	6.258	0.004	1006217	734695				
Triacon Surr	9.156	-0.004	818317	744693				

Range Times: NW Diesel(4.237 - 7.756) AK102(3.34 - 8.01) Jet A(3.34 - 6.09)
NW M.Oil(7.76 - 10.77) AK103(8.01 - 10.38) OR Diesel(3.34 - 8.71)

Surrogate	Area	Amount	%Rec
o-Terphenyl	734695	38.1	84.7 M
Triacontane	744693	38.5	85.6

JW
7/24/13

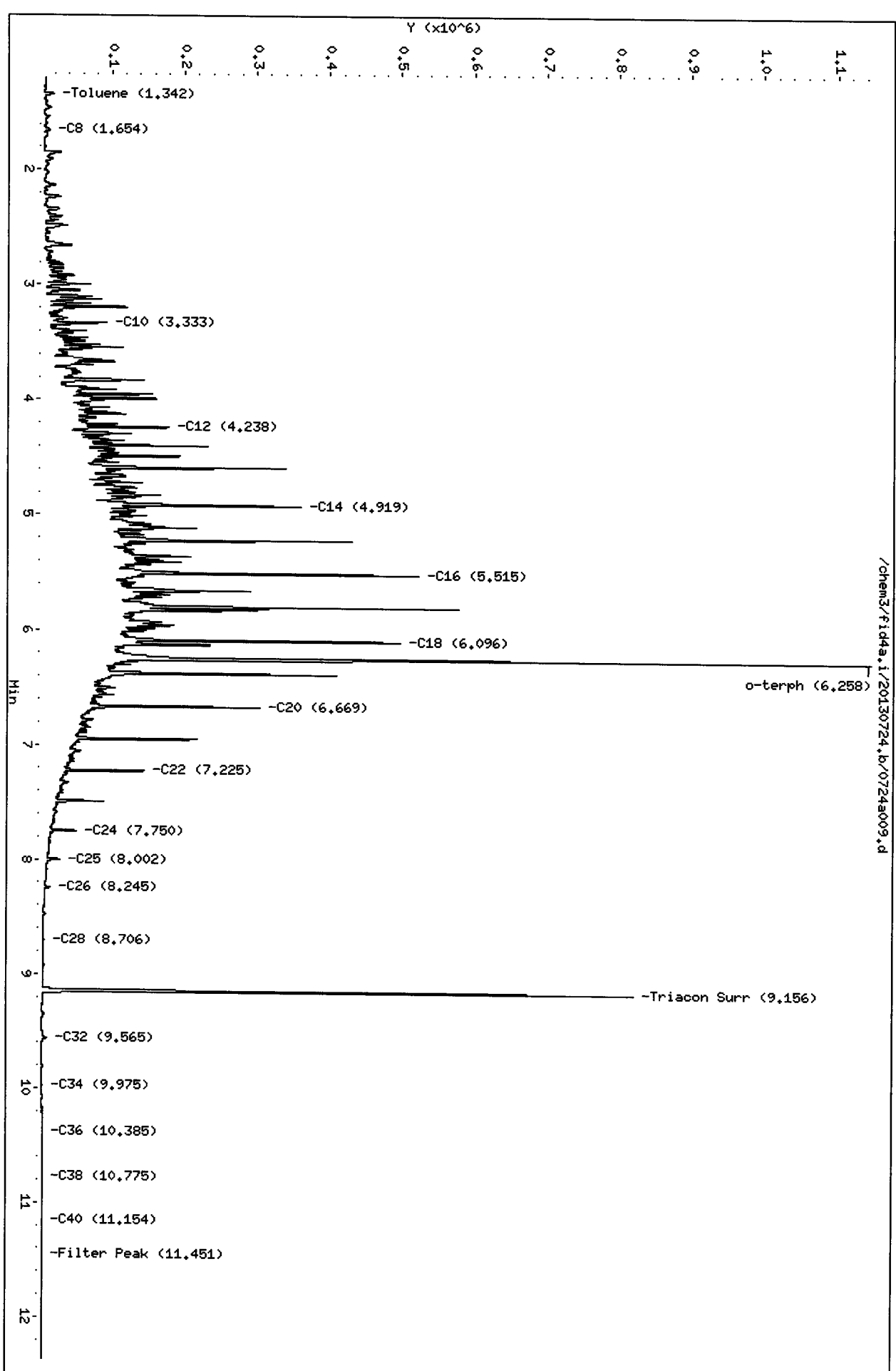
M Indicates the peak was manually integrated

Analyte	RF	Curve Date
o-Terph Surr	19283.0	13-APR-2013
Triacon Surr	19327.9	20-MAY-2013
Gas	15539.5	21-MAR-2013
Diesel	14514.5	13-APR-2013
Motor Oil	12905.1	20-MAY-2013
AK102	17214.8	11-APR-2013
AK103	9202.1	25-SEP-2012
Bunker C	9947.9	18-JUL-2013

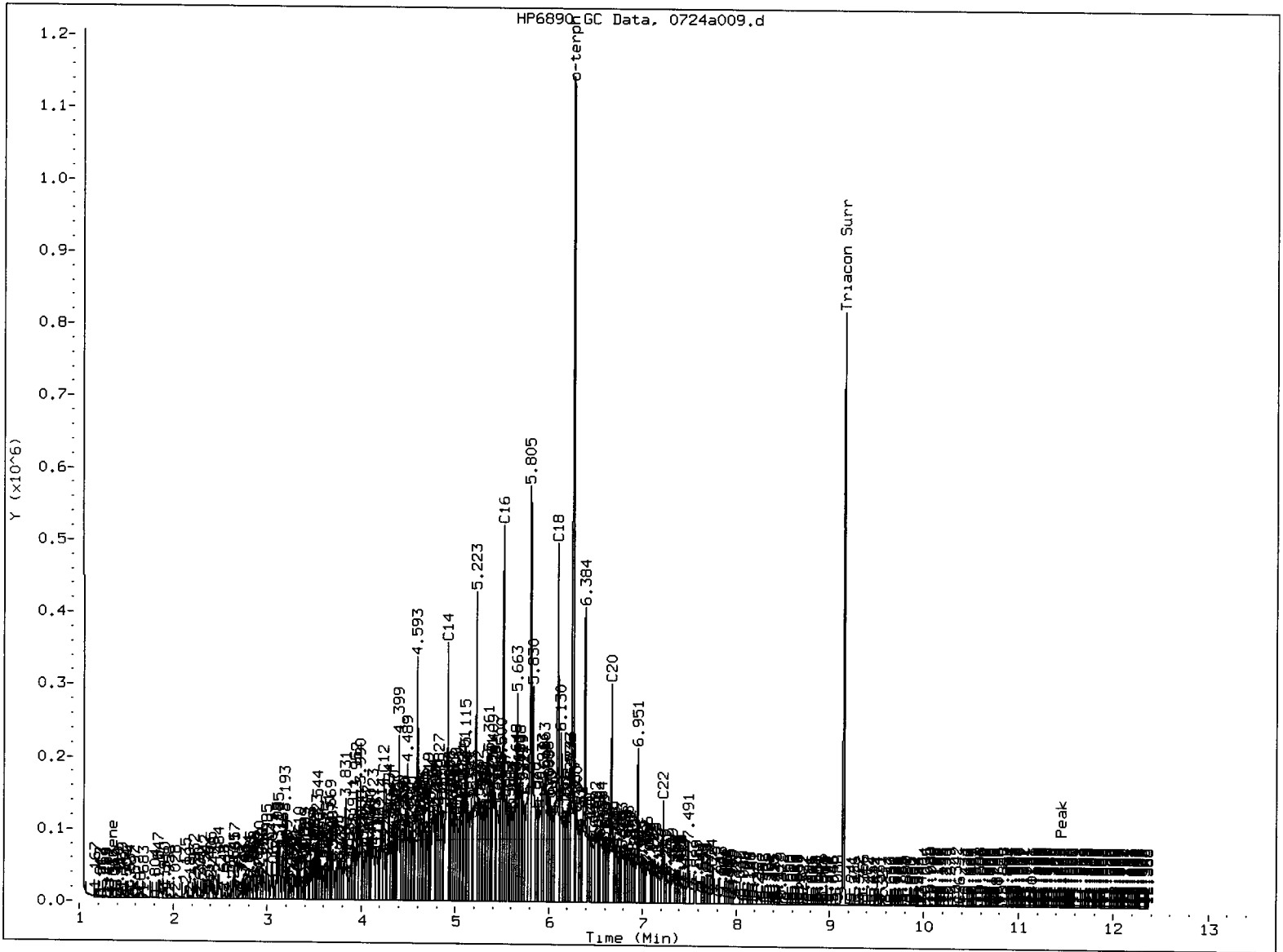
Data File: /chem3/fid4a.1/20130724.b/0724a009.d
Date: 24-JUL-2013 13:39
Client ID: MK80LCSDM1
Sample Info: MK80LCSDM1
Column phase: RTX-1

Instrument: fid4a.1
Operator: JR/VTS/JM
Column diameter: 0.25

JLU
7/24/13



/chem3/fid4a.1/20130724.b/0724a009.d



MANUAL INTEGRATION

- 1. Baseline correction
- 3. Peak not found
- 5. Skipped surrogate

Analyst: JW

Date: 7/24/13

TOTAL DIESEL RANGE HYDROCARBONS-EXTRACTION REPORT

Matrix: Water
Date Received: 07/17/13

ARI Job: WX80
Project: Former Irondale Iron & Steel Plant
0542-042-02

ARI ID	Client ID	Samp Amt	Final Vol	Prep Date
13-15140-071913MB1	Method Blank	500 mL	1.00 mL	07/19/13
13-15140-071913LCS1	Lab Control	500 mL	1.00 mL	07/19/13
13-15140-071913LCSD1	Lab Control Dup	500 mL	1.00 mL	07/19/13
13-15140-WX80A	MW05-130716	500 mL	1.00 mL	07/19/13
13-15141-WX80B	MW06-130716	500 mL	1.00 mL	07/19/13
13-15142-WX80C	MW07-130716	500 mL	1.00 mL	07/19/13
13-15143-WX80D	MW08-130716	500 mL	1.00 mL	07/19/13
13-15144-WX80E	MW09-130716	500 mL	1.00 mL	07/19/13
13-15145-WX80F	MW06-130716-DUP	500 mL	1.00 mL	07/19/13

4
TPH METHOD BLANK SUMMARY

BLANK NO.

WX80MBW1

Lab Name: ANALYTICAL RESOURCES INC

Client: GEOENGINEERS

SDG No.: WX80

Project No.: FORMER IRONDALE IRON & ST

Date Extracted: 07/19/13

Matrix: LIQUID

Date Analyzed : 07/24/13

Instrument ID : FID4A

Time Analyzed : 1258

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS, and MSD:

	CLIENT SAMPLE NO.	LAB SAMPLE ID	DATE ANALYZED
	=====	=====	=====
01	WX80LCSW1	WX80LCSW1	07/24/13
02	WX80LCSDW1	WX80LCSDW1	07/24/13
03	MW05-130716	WX80A	07/24/13
04	MW06-130716	WX80B	07/24/13
05	MW07-130716	WX80C	07/24/13
06	MW08-130716	WX80D	07/24/13
07	MW09-130716	WX80E	07/24/13
08	MW06-130716-	WX80F	07/24/13
09			
10			
11			
12			
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27			
28			
29			
30			

6a
DIESEL INITIAL CALIBRATION

Lab Name: ANALYTICAL RESOURCES, INC.

Client: GeoEngineers

Instrument: FID4A.I

Project: Former Irondale Iron a

Calibration Date: 13-APR-2013

SDG No.: WX80

3

Diesel Range	RF1 50	RF2 100	RF3 250	RF4 500	RF5 1000	RF6 2500	Ave RF	%RSD
WA Diesel	15188	15021	14479	14279	14226	13910	14517	3.4
AK Diesel	17981	17836	17184	16948	16866	16485	17217	3.4
OR Diesel	18067	17904	17254	17021	16941	16562	17291	3.4
Cal Diesel	17937	17789	17145	16910	16821	16447	17175	3.4
o-Terph	20876	20737	19497	18356	18320	17911	19283	6.7

<- Indicates %RSD outside limits

Surrogate areas are not included in Diesel RF calculation.

Quant Ranges : WA Diesel C12-C24 (3.908-7.326)
 AK Diesel C10-C25 (2.967-7.574)
 OR Diesel C10-C28 (2.967-8.269)
 Cal Diesel C10-C24 (2.967-7.326)

Calibration Files Analysis Time

0413a006.d	13-APR-2013 11:53
0413a007.d	13-APR-2013 12:13
0413a008.d	13-APR-2013 12:34
0413a009.d	13-APR-2013 12:54
0413a010.d	13-APR-2013 13:15
0413a011.d	13-APR-2013 13:35

6a
NW MOTOR OIL RANGE INITIAL CALIBRATION

Lab Name: ANALYTICAL RESOURCES, INC.

Client: GeoEngineers

Instrument: FID4A.I

Project: Former Irondale Iron a

Calibration Date: 20-MAY-2013

SDG No.: WX80

Product Range	RF1 100	RF2 250	RF3 500	RF4 1000	RF5 2500	RF6 5000	Ave RF	%RSD
WA M.Oil C24-C38	14505	14238	13594	13326	11838	9930	12905	13.4
Triac Surr	19882	20137	19857	19391	18502	18199	19328	4.1

<- Indicates %RSD outside limits

Surrogate areas are not included in Motor Oil RF calculation.

Calibration Files Analysis Time

0520a016.d	20-MAY-2013 17:53
0520a017.d	20-MAY-2013 18:13
0520a018.d	20-MAY-2013 18:34
0520a019.d	20-MAY-2013 18:55
0520a020.d	20-MAY-2013 19:15
0520a021.d	20-MAY-2013 19:36

7a
DIESEL CONTINUING CALIBRATION VERIFICATION

Lab Name: ANALYTICAL RESOURCES, INC. Client: GeoEngineers
 ICal Date: 13-APR-2013 Project: Former Irondale Iro
 CCal Date: 24-JUL-2013 SDG No.: WX80
 Analysis Time: 09:18 Lab ID: DIESEL#1
 Instrument: FID4A.I Lab File Name: 0724a004.d

Diesel Range	Area*	CalcAmt	NomAmt	% D
WADies (C12-C24)	3974648	273.8	250	9.5
AK102 (C10-C25)	4659565	270.7	250	8.3
NASDies (C10-C24)	4642240	235.4	250	-5.8
Terphenyl	761966	39.5	45	-12.2
Creos (C12-C22)	3832429	1756.5	250	602.6 <-

* Surrogate areas are subtracted from range areas
 <- Indicates a %D outside QC limits

7a
MOTOR OIL CONTINUING CALIBRATION VERIFICATION

Lab Name: ANALYTICAL RESOURCES, INC.

Client: GeoEngineers

ICal Date: 20-MAY-2013

Project: Former Irondale Iro

CCal Date: 24-JUL-2013

SDG No.: WX80

Analysis Time: 09:38

Lab ID: MOIL#1

Instrument: FID4A.I

Lab File Name: 0724a005.d

M.oil Range	Area*	CalcAmt	NomAmt	% D
WAMoil (C24-C38)	6314654	489.3	500	-2.1
AK103 (C25-C36)	5495001	597.1	500	19.4
OR MOIL (C28-C40)	4912252	650.4	500	30.1
CRUDE (Tol-C40)	7450502	986.5	500	97.3
n-Triacontane	821020	42.5	45	-5.6

* Surrogate areas are subtracted from range areas
<- Indicates a %D outside QC limits

7a
DIESEL CONTINUING CALIBRATION VERIFICATION

Lab Name: ANALYTICAL RESOURCES, INC. Client: GeoEngineers
 ICal Date: 13-APR-2013 Project: Former Irondale Iro
 CCal Date: 24-JUL-2013 SDG No.: WX80
 Analysis Time: 17:46 Lab ID: DIESEL#2
 Instrument: FID4A.I Lab File Name: 0724a021.d

Diesel Range	Area*	CalcAmt	NomAmt	% D
WADies (C12-C24)	3838420	264.5	250	5.8
AK102 (C10-C25)	4527463	263.0	250	5.2
NASDies (C10-C24)	4512945	228.8	250	-8.5
Terphenyl	913225	47.4	45	5.2
Creos (C12-C22)	3708976	1699.9	250	580.0 <-

* Surrogate areas are subtracted from range areas
 <- Indicates a %D outside QC limits

7a
MOTOR OIL CONTINUING CALIBRATION VERIFICATION

Lab Name: ANALYTICAL RESOURCES, INC. Client: GeoEngineers
 ICal Date: 20-MAY-2013 Project: Former Irondale Iro
 CCal Date: 24-JUL-2013 SDG No.: WX80
 Analysis Time: 18:06 Lab ID: MOIL#2
 Instrument: FID4A.I Lab File Name: 0724a022.d

M.oil Range	Area*	CalcAmt	NomAmt	% D
WAMoil (C24-C38)	6189090	479.6	500	-4.1
AK103 (C25-C36)	5339099	580.2	500	16.0
OR MOIL (C28-C40)	4746017	628.4	500	25.7
CRUDE (Tol-C40)	7233226	957.7	500	91.5
n-Triacontane	840267	43.5	45	-3.4

* Surrogate areas are subtracted from range areas
 <- Indicates a %D outside QC limits

8
TPH ANALYTICAL SEQUENCE

Lab Name: ANALYTICAL RESOURCES INC

Client: GEOENGINEERS

SDG No.: WX80

Project: FORMER IRONDALE IRON & STEEL

Instrument ID: FID4A

GC Column: RTX-1

THE ANALYTICAL SEQUENCE OF BLANKS, SAMPLES, AND STANDARDS,
IS GIVEN BELOW:

SURROGATE RT FROM DAILY STANDARD						
		TERPH: 6.25		TRIAAC: 9.16		
CLIENT	LAB	DATE	TIME	TERPH	TRIAAC	
SAMPLE NO.	SAMPLE ID	ANALYZED	ANALYZED	RT #	RT #	#
=====	=====	=====	=====	=====	=====	=====
01	ZZZZZ	ZZZZZ	07/24/13	0817	6.26	9.18
02		RT0724	07/24/13	0837	6.25	9.16
03	ZZZZZ	ZZZZZ	07/24/13	0857	6.26	9.16
04	FORMER IROND	DIESEL#1	07/24/13	0918	6.26	9.14
05	FORMER IROND	MOIL#1	07/24/13	0938	6.24	9.15
06	ZZZZZ	ZZZZZ	07/24/13	1238	6.26	9.19
07	WX80MBW1	WX80MBW1	07/24/13	1258	6.25	9.17
08	WX80LCSW1	WX80LCSW1	07/24/13	1318	6.26	9.16
09	WX80LCSDW1	WX80LCSDW1	07/24/13	1339	6.26	9.16
10	MW05-130716	WX80A	07/24/13	1359	6.25	9.16
11	MW06-130716	WX80B	07/24/13	1420	6.25	9.15
12	MW07-130716	WX80C	07/24/13	1441	6.25	9.17
13	MW08-130716	WX80D	07/24/13	1501	6.25	9.15
14	MW09-130716	WX80E	07/24/13	1522	6.25	9.16
15	MW06-130716-	WX80F	07/24/13	1542	6.25	9.15
16	ZZZZZ	ZZZZZ	07/24/13	1603	6.25	9.14
17	ZZZZZ	ZZZZZ	07/24/13	1623	6.26	9.15
18	ZZZZZ	ZZZZZ	07/24/13	1644	6.25	9.14
19	ZZZZZ	ZZZZZ	07/24/13	1704	6.25	9.15
20	ZZZZZ	ZZZZZ	07/24/13	1725	6.25	9.14
21	FORMER IROND	DIESEL#2	07/24/13	1746	6.26	9.14
22	FORMER IROND	MOIL#2	07/24/13	1806	6.24	9.15
23	ZZZZZ	ZZZZZ	07/24/13	1827	6.26	9.16
24	ZZZZZ	ZZZZZ	07/24/13	1848		
25	ZZZZZ	ZZZZZ	07/24/13	1910		

TERPH = o-terph
TRIAAC = Triacon Surr

QC LIMITS
(+/- 0.05 MINUTES)
(+/- 0.05 MINUTES)

* Values outside of QC limits.

8
TPH ANALYTICAL SEQUENCE

Lab Name: ANALYTICAL RESOURCES INC

Client: GeoEngineers

SDG No.: WX80

Project: Former Irondale Iron and Ste

Instrument ID: FID4A

GC Column: RTX-1

THE ANALYTICAL SEQUENCE OF BLANKS, SAMPLES, AND STANDARDS,
IS GIVEN BELOW:

SURROGATE RT FROM DAILY STANDARD					
		TERPH: 5.72	TRIAAC: 8.54		
CLIENT SAMPLE NO.	LAB SAMPLE ID	DATE ANALYZED	TIME ANALYZED	TERPH RT #	TRIAAC RT #
=====	=====	=====	=====	=====	=====
01	RINSE	05/20/13	1100	5.79*	8.61*
02	RINSE	05/20/13	1120	5.77*	8.60*
03	RINSE	05/20/13	1141	5.77*	8.63*
04	RINSE	05/20/13	1202	5.77*	8.60*
05	RT0520	05/20/13	1223	5.72	8.54
06	IB0520	05/20/13	1244	5.71	8.54
07	DIESEL#1	05/20/13	1305	5.72	8.52
08	MOIL#1	05/20/13	1325	5.73	8.54
09	RINSE	05/20/13	1528	5.72	8.55
10	MINSP 50	05/20/13	1549	5.71	8.53
11	MINSP 100	05/20/13	1609	5.71	8.52
12	MINSP 250	05/20/13	1630	5.72	8.55
13	MINSP 500	05/20/13	1651	5.73	8.54
14	MINSP 1000	05/20/13	1711	5.74	8.56
15	MINSP 2500	05/20/13	1732	5.76	8.55
16	MOIL 100	05/20/13	1753	5.71	8.53
17	MOIL 250	05/20/13	1813	5.71	8.54
18	MOIL 500	05/20/13	1834	5.71	8.54
19	MOIL 1000	05/20/13	1855	5.71	8.56
20	MOIL 2500	05/20/13	1915	5.71	8.58
21	MOIL 5000	05/20/13	1936	5.71	8.61*
22	MOIL ICV 500	05/20/13	1956	5.71	8.54

TERPH = o-terph
 TRIAC = Triacon Surr

QC LIMITS
 (+/- 0.05 MINUTES)
 (+/- 0.05 MINUTES)

* Values outside of QC limits.

8
TPH ANALYTICAL SEQUENCE

Lab Name: ANALYTICAL RESOURCES INC

Client: GeoEngineers

SDG No.: WX80

Project: Former Irondale Iron and Ste

Instrument ID: FID4A

GC Column: RTX-1

THE ANALYTICAL SEQUENCE OF BLANKS, SAMPLES, AND STANDARDS,
IS GIVEN BELOW:

SURROGATE RT FROM DAILY STANDARD					
		TERPH: 5.86		TRIAIC: 8.70	
CLIENT SAMPLE NO.	LAB SAMPLE ID	DATE ANALYZED	TIME ANALYZED	TERPH RT #	TRIAIC RT #
01	RINSE	04/13/13	0947	5.87	8.70
02	RT0413	04/13/13	1007	5.86	8.70
03	IB0413	04/13/13	1027	5.86	8.69
04	DIESEL#1	04/13/13	1047	5.87	8.69
05	MOIL#1	04/13/13	1107	5.85	8.69
06	DIESEL50	04/13/13	1153	5.86	8.71
07	DIESEL100	04/13/13	1213	5.86	8.71
08	DIESEL250	04/13/13	1234	5.87	8.71
09	DIESEL500	04/13/13	1254	5.87	8.71
10	DIESEL1000	04/13/13	1315	5.88	8.71
11	DIESEL2500	04/13/13	1335	5.90	8.70
12	DIESELICV250	04/13/13	1356	5.86	8.70
13	MOIL100	04/13/13	1416	5.90	8.67
14	MOIL250	04/13/13	1436	5.90	8.68
15	MOIL500	04/13/13	1457	5.90	8.68
16	MOIL1000	04/13/13	1517	5.90	8.70
17	MOIL2500	04/13/13	1538	5.90	8.72
18	MOIL5000	04/13/13	1558	5.90	8.75
19	MOILICV500	04/13/13	1619	5.90	8.68

TERPH = o-terph

TRIAIC = Triacon Surr

QC LIMITS

(+/- 0.05 MINUTES)

(+/- 0.05 MINUTES)

* Values outside of QC limits.

Metals Analysis
Report and Summary QC Forms

ARI Job ID: WX80

INORGANICS ANALYSIS DATA SHEET

DISSOLVED METALS

Page 1 of 1


Sample ID: MW05-130716

SAMPLE

Lab Sample ID: WX80A

LIMS ID: 13-15140

Matrix: Water

Data Release Authorized: 

Reported: 07/25/13

QC Report No: WX80-Geoengineers

Project: Former Irondale Iron & Steel Plant

0542-042-02

Date Sampled: 07/16/13

Date Received: 07/17/13

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	µg/L	Q
200.8	07/18/13	200.8	07/24/13	7440-50-8	Copper	0.5	0.9	
200.8	07/18/13	200.8	07/24/13	7440-02-0	Nickel	0.5	4.6	

U-Analyte undetected at given RL

RL-Reporting Limit

**INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS**

**Sample ID: MW06-130716
SAMPLE**

Page 1 of 1

Lab Sample ID: WX80B
LIMS ID: 13-15141
Matrix: Water
Data Release Authorized:
Reported: 07/25/13



QC Report No: WX80-Geoengineers
Project: Former Irondale Iron & Steel Plant
0542-042-02
Date Sampled: 07/16/13
Date Received: 07/17/13

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	µg/L	Q
200.8	07/18/13	200.8	07/24/13	7440-50-8	Copper	0.5	0.6	
200.8	07/18/13	200.8	07/24/13	7440-02-0	Nickel	0.5	4.9	

U-Analyte undetected at given RL
RL-Reporting Limit

INORGANICS ANALYSIS DATA SHEET

DISSOLVED METALS

Page 1 of 1

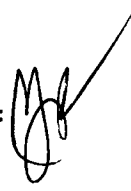
Sample ID: MW07-130716

SAMPLE

Lab Sample ID: WX80C

LIMS ID: 13-15142

Matrix: Water

Data Release Authorized: 

Reported: 07/25/13

QC Report No: WX80-Geoengineers

Project: Former Irondale Iron & Steel Plant

0542-042-02

Date Sampled: 07/16/13

Date Received: 07/17/13

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	µg/L	Q
200.8	07/18/13	200.8	07/24/13	7440-50-8	Copper	0.5	0.5	U
200.8	07/18/13	200.8	07/24/13	7440-02-0	Nickel	0.5	2.7	

U-Analyte undetected at given RL

RL-Reporting Limit

**INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS**

**Sample ID: MW08-130716
SAMPLE**

Page 1 of 1

Lab Sample ID: WX80D
LIMS ID: 13-15143
Matrix: Water
Data Release Authorized:
Reported: 07/25/13



QC Report No: WX80-Geoengineers
Project: Former Irondale Iron & Steel Plant
0542-042-02
Date Sampled: 07/16/13
Date Received: 07/17/13

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	µg/L	Q
200.8	07/18/13	200.8	07/24/13	7440-50-8	Copper	0.5	0.9	
200.8	07/18/13	200.8	07/24/13	7440-02-0	Nickel	0.5	4.4	

U-Analyte undetected at given RL
RL-Reporting Limit

**INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS**

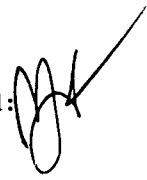
**Sample ID: MW09-130716
SAMPLE**

Page 1 of 1

Lab Sample ID: WX80E

LIMS ID: 13-15144

Matrix: Water

Data Release Authorized: 

Reported: 07/25/13

QC Report No: WX80-Geoengineers

Project: Former Irondale Iron & Steel Plant
0542-042-02

Date Sampled: 07/16/13

Date Received: 07/17/13

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	µg/L	Q
200.8	07/18/13	200.8	07/24/13	7440-50-8	Copper	2	7	
200.8	07/18/13	200.8	07/24/13	7440-02-0	Nickel	2	77	

U-Analyte undetected at given RL


RL-Reporting Limit



**INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS**

**Sample ID: MW09-130716-DUP
SAMPLE**

Page 1 of 1

Lab Sample ID: WX80G
LIMS ID: 13-15146
Matrix: Water
Data Release Authorized: 
Reported: 07/25/13

QC Report No: WX80-Geoengineers
Project: Former Irondale Iron & Steel Plant
0542-042-02
Date Sampled: 07/16/13
Date Received: 07/17/13

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	µg/L	Q
200.8	07/18/13	200.8	07/24/13	7440-50-8	Copper	2	7	
200.8	07/18/13	200.8	07/24/13	7440-02-0	Nickel	2	76	

U-Analyte undetected at given RL
RL-Reporting Limit

**INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS**

Page 1 of 1

**Sample ID: SW01-130716
SAMPLE**

Lab Sample ID: WX80H
LIMS ID: 13-15147
Matrix: Water
Data Release Authorized:
Reported: 07/25/13



QC Report No: WX80-Geoengineers
Project: Former Irondale Iron & Steel Plant
0542-042-02
Date Sampled: 07/16/13
Date Received: 07/17/13

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	µg/L	Q
200.8	07/18/13	200.8	07/24/13	7440-50-8	Copper	0.5	1.4	
200.8	07/18/13	200.8	07/24/13	7440-02-0	Nickel	0.5	4.8	

U-Analyte undetected at given RL
RL-Reporting Limit

INORGANICS ANALYSIS DATA SHEET

DISSOLVED METALS


Page 1 of 1

Sample ID: SW02-130716
SAMPLE

Lab Sample ID: WX80I

LIMS ID: 13-15148

Matrix: Water

Data Release Authorized: 

Reported: 07/25/13

QC Report No: WX80-Geoengineers

Project: Former Irondale Iron & Steel Plant

0542-042-02

Date Sampled: 07/16/13

Date Received: 07/17/13

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	µg/L	Q
200.8	07/18/13	200.8	07/24/13	7440-50-8	Copper	5	10	
200.8	07/18/13	200.8	07/24/13	7440-02-0	Nickel	5	16	

U-Analyte undetected at given RL

RL-Reporting Limit

**INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS**

Page 1 of 1

**Sample ID: SW03-130716
SAMPLE**

Lab Sample ID: WX80J
LIMS ID: 13-15149
Matrix: Water
Data Release Authorized:
Reported: 07/25/13



QC Report No: WX80-Geoengineers
Project: Former Irondale Iron & Steel Plant
0542-042-02
Date Sampled: 07/16/13
Date Received: 07/17/13

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	µg/L	Q
200.8	07/18/13	200.8	07/24/13	7440-50-8	Copper	5	9	
200.8	07/18/13	200.8	07/24/13	7440-02-0	Nickel	5	16	

U-Analyte undetected at given RL
RL-Reporting Limit

INORGANICS ANALYSIS DATA SHEET

DISSOLVED METALS

Page 1 of 1

**Sample ID: SW02-130716-DUP
SAMPLE**

Lab Sample ID: WX80K
LIMS ID: 13-15150
Matrix: Water
Data Release Authorized:
Reported: 07/25/13



QC Report No: WX80-Geoengineers
Project: Former Irondale Iron & Steel Plant
0542-042-02
Date Sampled: 07/16/13
Date Received: 07/17/13

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	µg/L	Q
200.8	07/18/13	200.8	07/24/13	7440-50-8	Copper	5	13	
200.8	07/18/13	200.8	07/24/13	7440-02-0	Nickel	5	16	

U-Analyte undetected at given RL
RL-Reporting Limit

INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS
Page 1 of 1

Sample ID: MW05-130716
MATRIX SPIKE

Lab Sample ID: WX80A
LIMS ID: 13-15140
Matrix: Water
Data Release Authorized:
Reported: 07/25/13



QC Report No: WX80-Geoengineers
Project: Former Irondale Iron & Steel Plant
0542-042-02
Date Sampled: 07/16/13
Date Received: 07/17/13

MATRIX SPIKE QUALITY CONTROL REPORT

Analyte	Analysis Method	Sample	Spike	Spike Added	% Recovery	Q
Copper	200.8	0.9	23.8	25.0	91.6%	
Nickel	200.8	4.6	27.0	25.0	89.6%	

Reported in µg/L

N-Control Limit Not Met
H-% Recovery Not Applicable, Sample Concentration Too High
NA-Not Applicable, Analyte Not Spiked

Percent Recovery Limits: 75-125%

INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS
Page 1 of 1

Sample ID: MW05-130716
DUPLICATE

Lab Sample ID: WX80A
LIMS ID: 13-15140
Matrix: Water
Data Release Authorized:
Reported: 07/25/13



QC Report No: WX80-Geoengineers
Project: Former Irondale Iron & Steel Plant
0542-042-02
Date Sampled: 07/16/13
Date Received: 07/17/13

MATRIX DUPLICATE QUALITY CONTROL REPORT

Analyte	Analysis Method	Sample	Duplicate	RPD	Control Limit	Q
Copper	200.8	0.9	1.0	10.5%	+/- 0.5	L
Nickel	200.8	4.6	4.7	2.2%	+/- 20%	

Reported in µg/L


*-Control Limit Not Met
L-RPD Invalid, Limit = Detection Limit

**INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS**

Sample ID: LAB CONTROL

Page 1 of 1

Lab Sample ID: WX80LCS
LIMS ID: 13-15150
Matrix: Water
Data Release Authorized:
Reported: 07/25/13



QC Report No: WX80-Geoengineers
Project: Former Irondale Iron & Steel Plant
0542-042-02
Date Sampled: NA
Date Received: NA

BLANK SPIKE QUALITY CONTROL REPORT

Analyte	Analysis Method	Spike Found	Spike Added	% Recovery	Q
Copper	200.8	25.7	25.0	103%	
Nickel	200.8	25.1	25.0	100%	

Reported in µg/L

N-Control limit not met
Control Limits: 80-120%

**INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS**

Sample ID: METHOD BLANK

Page 1 of 1

Lab Sample ID: WX80MB

QC Report No: WX80-Geoengineers

LIMS ID: 13-15150

Project: Former Irondale Iron & Steel Plant

Matrix: Water

0542-042-02

Data Release Authorized:

Date Sampled: NA

Reported: 07/25/13

Date Received: NA

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	µg/L	Q
200.8	07/18/13	200.8	07/24/13	7440-50-8	Copper	0.5	0.5	U
200.8	07/18/13	200.8	07/24/13	7440-02-0	Nickel	0.5	0.5	U

U-Analyte undetected at given RL
RL-Reporting Limit



Calibration Verification

CLIENT: Geoenineers
PROJECT: Former Irondale Iron
SDG: WX80

UNITS: ug/L

ANALYTE	EL	M	RUN	ICVTV	ICV	%R	CCVTV	CCV1	%R	CCV2	%R	CCV3	%R	CCV4	%R	CCV5	%R
Copper	CU	PMS	MS072482	50.0	52.13	104.3	50.0	50.29	100.6	50.44	100.9	50.26	100.5	50.46	100.9	51.67	103.3
Nickel	NI	PMS	MS072482	50.0	52.13	104.3	50.0	50.10	100.2	50.54	101.1	50.13	100.3	49.06	98.1	48.64	97.3

Control Limits: Mercury 80-120; Other Metals 90-110

57 66 81 83 84

CRDL Standard

CLIENT: Geoengineers

PROJECT: Former Irondale Iron

SDG: WX80



ANALYTICAL
RESOURCES
INCORPORATED

UNITS: ug/L

ANALYTE	EL	M	RUN	CRA/I	TV	CR-1	%R	CR-2	%R	CR-3	%R	CR-4	%R	CR-5	%R	CR-6	%R
---------	----	---	-----	-------	----	------	----	------	----	------	----	------	----	------	----	------	----

Copper	CU	PMS	MS072482		0.5	0.52	104.0										
Nickel	NI	PMS	MS072482		0.5	0.49	98.0										

20080815 08:30:00

Control Limits: no control limits have been established by the EPA at this time.

Calibration Blanks

CLIENT: Geoenigneers

PROJECT: Former Irondale Iron

SDG: WX80



UNITS: ug/L

ANALYTE	EL	METH	RUN	CRDL	IDL	ICB	C	CCB1	C	CCB2	C	CCB3	C	CCB4	C	CCB5	C
Copper	CU	PMS	MS072482	25.0	0.5	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Nickel	NI	PMS	MS072482	40.0	0.5	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U

WX80 : 00007

ICP Interference Check Sample



CLIENT: Geoengineers

ICS SOURCE: I.V.

PROJECT: Former Irondale Iron

RUNID: MS072482

SDG: WX80

INSTRUMENT ID: PE ELAN 6000

UNITS: ug/L

ANALYTE	ICSA TV	ICSAB TV	ICSA1	ICSAB1	%R	ICSA2	ICSAB2	%R	ICSA3	ICSAB3	%R
Antimony			0.1	0.1	0.1						
Arsenic	20		0.1	19.5	97.5						
Barium			0.0	0.1							
Cadmium	20		0.1	19.7	98.5						
Copper	20		0.5	19.9	99.5						
Nickel	20		0.6	20.3	101.5						
Silver	20		0.0	19.2	96.0						
Zinc	20		2.5	21.2	106.0						

WX80 : 000000

IDLs and ICP Linear Ranges



CLIENT: Geoengineers

PROJECT: Former Irondale Iron

SDG: WX80

UNITS: ug/L

ANALYTE	EL	METH	INSTRUMENT	WAVELENGTH (nm)	GFA		RL	RL DATE	ICP LINEAR RANGE (ug/L)	ICP LR DATE
					BACK- GROUND	CLP CRDL				
Copper	CU	PMS	PE ELAN 6000 MS	0.00		25	0.5	4/1/2012		
Nickel	NI	PMS	PE ELAN 6000 MS	0.00		40	0.5	4/1/2012		

Preparation Log



CLIENT: Geoengineers

ANALYSIS METHOD: PMS

PROJECT: Former Irondale Iron

ARI PREP CODE: REN

SDG: WX80

PREPDATE: 7/18/2013

CLIENT ID	ARI ID	MASS (g)	INITIAL VOLUME (mL)	FINAL VOLUME (mL)
MW05-130716	WX80A	0.000	50.0	25.0
MW05-130716D	WX80ADUP	0.000	50.0	25.0
MW05-130716S	WX80ASPK	0.000	50.0	25.0
MW06-130716	WX80B	0.000	50.0	25.0
MW07-130716	WX80C	0.000	50.0	25.0
MW08-130716	WX80D	0.000	50.0	25.0
MW09-130716	WX80E	0.000	50.0	25.0
MW09-130716-DUP	WX80G	0.000	50.0	25.0
SW01-130716	WX80H	0.000	50.0	25.0
SW02-130716	WX80I	0.000	50.0	25.0
SW03-130716	WX80J	0.000	50.0	25.0
SW02-130716-DUP	WX80K	0.000	50.0	25.0
PBW	WX80MB1	0.000	50.0	25.0
LCSW	WX80MB1SPK	0.000	50.0	25.0

Analysis Run Log

CLIENT: Geoenigneers

PROJECT: Former Irondale Iron

SDG: WX80

INSTRUMENT ID: PE ELAN 6000 MS

RUNID: MS072482 METHOD: PMS

START DATE: 7/24/2013

END DATE: 7/24/2013



CLIENT ID	ARI ID	DIL.	TIME	%R	AG	AL	AS	B	BA	BE	CA	CD	CO	CR	CU	FE	FG	HG	K	MG	MN	MO	NA	NI	PB	SB	SE	SI	SN	TI	TL	U	V	ZN		
S0		1.00	11200																																X	
S1		1.00	11250																																X	
S2		1.00	11310																																X	
S3		1.00	11360																																X	
S4		1.00	11420																																X	
ZZZZZZ		1.00	11480																																X	
ICV	Rinse Samp1	1.00	11590																																X	
ICB	MICV	1.00	12050																																X	
CCV	ICB	1.00	12050																																X	
CCB	MCCV1	1.00	12100																																X	
CRI	CCB1	1.00	12160																																X	
ICSA	MCRI	1.00	12210																																X	
ICSAB	ICSAI	1.00	12250																																X	
CCV	ICSABI	1.00	12310																																X	
CCB	MCCV2	1.00	12370																																X	
PW	CCB2	1.00	12430																																X	
ZZZZZZ	WX80MB1	2.00	12540																																X	
ZZZZZZ	DI CHECK	1.00	13000																																	
ZZZZZZ	ERAP197	10.00	13050																																	
MW05-130716D	WX80ADUP	2.00	13110																																X	
MW05-130716	WX80A	2.00	13160																																X	
MW05-130716S	WX80ASPX	2.00	13220																																X	
MW06-130716	WX80B	2.00	13270																																X	
MW07-130716	WX80C	2.00	13330																																X	
MW08-130716	WX80D	2.00	13380																																X	
LCSW	WX80MB1SPK	2.00	13440																																X	
CCV	MCCV3	1.00	13490																																X	
CCB	CCB3	1.00	13550																																X	
MW09-130716	WX80E	50.00	14000																																X	
MW09-130716-DUP	WX80G	50.00	14050																																X	
SW01-130716	WX80H	50.00	14110																																X	
SW02-130716	WX80I	50.00	14160																																X	
SW03-130716	WX80J	50.00	14220																																X	
SW02-130716-DUP	WX80K	50.00	14270																																X	
CCV	MCCV4	1.00	14330																																X	
CCB	CCB4	1.00	14380																																X	

Analysis Run Log



CLIENT: Geoengineers
 PROJECT: Former Irondale Iron
 SDG: WX80
 INSTRUMENT ID: PE ELAN 6000 MS
 RUNID: MS072482
 METHOD: PMS
 START DATE: 7/24/2013
 END DATE: 7/24/2013

CLIENT ID	ARI ID	DIL.	TIME	%R	AG	AL	AS	B	BA	BE	CA	CD	CO	CR	CU	FE	HG	K	MG	MN	MO	NA	NI	PB	SB	SE	SI	SN	TI	TL	U	V	ZN	
ZZZZZZ	DI CHECK	1.00	14450																															
MW09-130716	WX80E	10.00	14500												X																			
ZZZZZZ	DI CHECK	1.00	15000																															
MW09-130716-DUP	WX80G	10.00	15160												X																			
SW01-130716	WX80H	2.00	15210												X																			
SW02-130716	WX80I	20.00	15270												X																			
SW03-130716	WX80J	20.00	15320												X																			
SW02-130716-DUP	WX80K	20.00	15370												X																			
CCV	MCCV5	1.00	15430												X																			
CCB	CCB5	1.00	15490												X																			

APPENDIX C
Report Limitations and Guidelines for Use

APPENDIX C REPORT LIMITATIONS AND GUIDELINES FOR USE¹

This Appendix provides information to help you manage your risks with respect to the use of this report.

Read These Provisions Closely

Some clients, design professionals and contractors may not recognize that the geoscience practices (geotechnical engineering, geology and environmental science) are far less exact than other engineering and natural science disciplines. This lack of understanding can create unrealistic expectations that could lead to disappointments, claims and disputes. GeoEngineers includes these explanatory “limitations” provisions in our reports to help reduce such risks. Please confer with GeoEngineers if you are unclear how these “Report Limitations and Guidelines for Use” apply to your project or site.

Environmental Services Are Performed For Specific Purposes, Persons And Projects

This report has been prepared for the exclusive use by the Washington Department of Ecology. This report is not intended for use by others, and the information contained herein is not applicable to other sites.

GeoEngineers structures our services to meet the specific needs of our clients. For example, an environmental site assessment study conducted for a property owner may not fulfill the needs of a prospective purchaser of the same property. Because each environmental study is unique, each environmental report is unique, prepared solely for the specific client and project site. This report should not be applied for any purpose or project except the one originally contemplated.

This Environmental Report Is Based On A Unique Set Of Project-Specific Factors

This report has been prepared for the former Irondale Iron and Steel Plant site at the intersection of East Moore Street and 1st Avenue in Irondale, Washington. GeoEngineers considered a number of unique, project-specific factors when establishing the scope of services for this project and report. Unless GeoEngineers specifically indicates otherwise, do not rely on this report if it was:

- not prepared for you,
- not prepared for your project,
- not prepared for the specific site explored, or
- completed before important project changes were made.

If important changes are made after the date of this report, GeoEngineers should be given the opportunity to review our interpretations and recommendations and provide written modifications or confirmation, as appropriate.

¹ Developed based on material provided by ASFE, Professional Firms Practicing in the Geosciences; www.asfe.org.

Reliance Conditions For Third Parties

No other party may rely on the product of our services unless we agree in advance and in writing to such reliance. This is to provide our firm with reasonable protection against open-ended liability claims by third parties with whom there would otherwise be no contractual limits to their actions. Within the limitations of scope, schedule and budget, our services have been executed in accordance with our Agreement with the Client and generally accepted environmental practices in this area at the time this report was prepared.

Environmental Regulations Are Always Evolving

Some substances may be present in the site vicinity in quantities or under conditions that may have led, or may lead, to contamination of the subject site, but are not included in current local, state or federal regulatory definitions of hazardous substances or do not otherwise present current potential liability. GeoEngineers cannot be responsible if the standards for appropriate inquiry, or regulatory definitions of hazardous substance change, or if more stringent environmental standards are developed in the future.

Uncertainty May Remain Even After This Study Is Completed

No environmental assessment can wholly eliminate uncertainty regarding the potential for contamination in connection with a property. Our interpretation of subsurface conditions in this study is based on field observations and chemical analytical data from widely-spaced sampling locations. It is always possible that contamination exists in areas that were not explored, sampled or analyzed.

Subsurface Conditions Can Change

This environmental report is based on conditions that existed at the time the study was performed. The findings and conclusions of this report may be affected by the passage of time, by manmade events such as construction on or adjacent to the site, by new releases of hazardous substances, or by natural events such as floods, earthquakes, slope instability or groundwater fluctuations. Always contact GeoEngineers before applying this report to determine if it is still applicable.

Soil And Groundwater End Use

The cleanup levels referenced in this report are site- and situation-specific. The cleanup levels may not be applicable for other sites or for other on-site uses of the affected media (soil and/or groundwater). Note that hazardous substances may be present in some of the site soil and/or groundwater at detectable concentrations that are less than the referenced cleanup levels. GeoEngineers should be contacted prior to the export of soil or groundwater from the subject site or reuse of the affected media on site to evaluate the potential for associated environmental liabilities. We cannot be responsible for potential environmental liability arising out of the transfer of soil and/or groundwater from the subject site to another location or its reuse on site in instances that we were not aware of or could not control.

Most Environmental Findings Are Professional Opinions

Our interpretations of subsurface conditions are based on field observations and chemical analytical data from widely spaced sampling locations at the site. Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. GeoEngineers reviewed field and laboratory data and then applied our professional judgment to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ – sometimes significantly – from those indicated in this report. Our report, conclusions and interpretations should not be construed as a warranty of the subsurface conditions.