Gas Networks Ireland

FORMER GASWORKS, DOCK ROAD, LIMERICK

Groundwater Monitoring Visit No. 41 - September 2021

70049885 / 11877
DECEMBER 2021

CONFIDENTIAL

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TYPE OF DOCUMENT (VERSION) CONFIDENTIAL

PROJECT NO. 70049885

OUR REF. NO. 70049885 / 11877

DATE: DECEMBER 2021

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QUALITY CONTROL

Issue / revision	First issue
Remarks	Version 1
Date	December 2021
Prepared by	Niall Richards
Signature	Richards, Niall (UKNAR005) Digitally signed by Richards, Niall (UKNAR005) DN: cn=Richards, Niall (UKNAR005), ou=Active, email=Niall.Richards@wsp.com Date: 2021.12.13 16:18:45
Checked by	Dave Watts
Signature	D. Watts Digitally signed by Watts, Dave (UKDAW600) Reason: I have reviewed this document Date: 2021.12.14 09:45:49
Authorised by	Tony Brown
Signature	Digitally signed by Brown, Tony (UKAWB601) Reason: I am approving this document Date: 2021.12.13 17:45:19
Project number	70049885
Report number	70049885 / 11877

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1 INTRODUCTION

WSP (formerly known as Mouchel, and prior to that Parkman) was appointed by Ervia on behalf of Gas Networks Ireland, GNI (formerly Bord Gais Eireann), on 31st March 2009, to provide engineering consultancy services for the assessment and remediation of the former gasworks site, Dock Road, Limerick City, Ireland.

WSP has carried out groundwater monitoring at the site from 2009 to November 2018; and from December 2020 until the latest monitoring round (ongoing). Through 2019 up to and including the September 2020 monitoring round, the Phase 2 remediation contractor, Murphy International Limited (MIL), carried out the groundwater monitoring and engaged Environmental Laboratory Services (ELS) to undertake the sampling and analysis, although the interpretation of the data was carried out by WSP.

The groundwater quality monitoring programme has established a baseline data set for the site prior to the remediation works which commenced in October 2016 and were completed in September 2020, as detailed in Section 2.

This report presents the results of the 41st groundwater monitoring visit, undertaken by WSP on the 14 and 15th September 2021. This report also provides a review of post remediation groundwater laboratory results compared to the baseline data set for the site prior to the remedial works commencing.

2 REMEDIATION WORKS

The remediation project was completed in two phases; Phase 1 'Pump and Treat' works and Phase 2 Stabilisation / Solidification works.

2.1 PHASE 1 'PUMP AND TREAT'

HBR Limited commenced the Phase 1 Pump & Treat works in October 2016, after successfully completing a Pilot Project in August 2015. Techniques employed by HBR Limited during this phase included direct pumping of Dense Non- Aqueous Phase Liquid (DNAPL) (coal tar), Flow Path Management (FPM) and the addition of surfactant to and heating of the injected water. Phase 1 was completed in October 2017 and a total of 80,140 litres (Approx. 75m^3) of DNAPL was extracted from underground tanks and features and disposed of off-site.

2.2 PHASE 2 STABILISATION / SOLIDIFICATION

Murphy International Limited (MIL) were subsequently commissioned by Gas Networks Ireland to undertake the Phase 2 Stabilisation / Solidification works. The Phase 2 works commenced on 14th January 2019 and were completed on 18th September 2020 (63 weeks), comprising Section 1 Enabling Works and Section 2 Stabilisation / Solidification works.

Section 1 Enabling Works were carried out between 14th January and 5th July 2019. The works comprised ivy removal from walls and internal structures, a pilot study for the proposed stabilisation / solidification works, removal of a stone arch on site for retention by the Limerick Civic Trust and the Dock Road wall stability assessment.

Section 2 Stabilisation / Solidification works were carried out between 8th July 2019 and 18th September 2020. Section 2 comprised the excavation of all soils across site to a depth of approximately 3m (shallower where rockhead was present) and to the base of underground tanks, treatment by blending a binder, generally comprising 3% ECOCEM Ground Granulated Blastfurnace Slag (GGBS) and 2% CEM 1 (Portland Cement) into the soil matrix and subsequent replacement / compaction.

3 METHODOLOGY

Following the monitoring carried out on completion of the characterisation site investigations in 2009 and 2011, quarterly groundwater monitoring visits were undertaken as part of an additional groundwater monitoring programme.

A dual phase dipmeter was used to establish the water depth and presence of non-aqueous phase liquids (NAPLs). Any visual and olfactory evidence of contamination was also noted.

There were originally 24 monitoring well locations installed on site (21 from the 2009 characterisation site investigation and three from the 2011 supplementary characterisation site investigation). The original monitoring wells were decommissioned by MIL in 2019 and 2020, during the Phase 2 stabilisation and solidification remediation works as excavations extended across the whole site to a depth of at least 3m (except where shallower rock was present). MIL subsequently installed 12 new groundwater monitoring wells (PR1 to PR12), post remediation works in August and September 2020 to allow for continued groundwater monitoring of the site. The number and location of the 12 new groundwater monitoring wells was agreed with the Environmental Protection Agency (EPA) as recommended in WSP's Hydrogeological Review / Technical Assessment Report reference 70049885/11572, dated March 2020.

These additional 12 wells will be referred to in this report as the 'post remediation monitoring wells'. This report contains the fifth round of groundwater monitoring data collected from the post remediation monitoring wells following the completion of the Phase 2 Stabilisation / Solidification works.

Table 2-1 below presents a summary of the borehole installation details (all wells were installed with a 50mm standpipe). The post remediation monitoring wells are presented on drawing 70049885/OD/2020/01 in **Appendix A**.

Table 3-1 - Schedule of post remediation monitoring wells

Post remediation monitoring well	Grid cell location	Depth of borehole (m bgl)	Response zone (m bgl)	Response zone (m MHD) (m above Malin Head Datum)	Response zone strata
PR1	A01	8.00	3.20 – 7.50	2.350 to -1.950	Bedrock
PR2	A05	8.00	4.00 – 7.50	1.857 to -1.643	Bedrock
PR3	A08	8.00	3.50 – 7.50	2.588 to -1.412	Bedrock
PR4	C11	8.00	3.50 – 7.50	2.188 to -1.812	Bedrock
PR5	F01	8.00	3.30 – 7.50	5.059 to 0.859	Quarry backfill material (clay & silt)
PR6	G05	8.00	4.00 – 7.50	4.176 to 0.676	Quarry backfill material (clay)
PR7	F08	8.00	1.50 – 7.50	6.106 to 0.106	Bedrock

Post remediation monitoring well	Grid cell location	Depth of borehole (m bgl)	Response zone (m bgl)	Response zone (m MHD) (m above Malin Head Datum)	Response zone strata
PR8	G11	8.50	0.90 – 8.00	6.516 to -0.584	Bedrock
PR9	J01	8.00	4.00 – 6.00	4.970 to 2.970	Quarry backfill material (clayey gravel and silt)
PR10	M05	8.00	5.70 – 7.50	3.872 to 2.072	Bedrock
PR11	J08	8.00	2.00 – 7.50	6.339 to 0.839	Bedrock
PR12	K11	8.50	3.00 – 8.00	5.218 to 0.218	Bedrock

Groundwater samples were recovered from all of the 12 monitoring wells and analysed for the suite of determinands listed below.

- Heavy metals - Arsenic, cadmium, chromium, hexavalent chromium, copper, lead, nickel, selenium, zinc, mercury;
- Total Petroleum Hydrocarbons Criteria Working Group (TPH CWG) (including BTEX and MTBE);
- Polyaromatic Hydrocarbons (PAHs);
- Volatile Organic Compounds (VOCs);
- Sulphate;
- Sulphide;
- Ammoniacal nitrogen;
- Cyanide; and,
- Phenols.

In order to obtain samples which are most representative of the groundwater, low flow monitoring techniques have been utilised for this monitoring visit. This technique has been developed in recent years and, with the advent of accurate in-situ water quality meters, is now the preferred method of providing representative water quality data. This method discretely pumps from the target zone of the well, operating at a very low speed, meaning that the volume of purge water can be reduced, minimising disturbance within the water column. In-situ water quality measurements (dissolved oxygen, electrical conductivity, redox potential, temperature and pH) are taken using an in-line water quality meter (YSI); and the water samples taken once parameter readings have stabilised. This method allows for better sample consistency and minimises the amount of sediment in samples, therefore giving results reflective of the true groundwater condition. . Due to the limited recharge of groundwater at locations PR6 and PR11 grab samples were obtained.

Purged water generated has been stored in an Intermediate Bulk Containers (IBC) on site for future disposal off site at a suitably licensed facility.

4 HYDROGEOLOGY RESULTS

The site-specific hydrogeology is discussed in detail in the 2010 Quantitative Risk Assessment (QRA), Options Appraisal and Remediation Report reference 1021927/R/03, dated February 2010 (QRA report), and reference should also be made to the addendum report, reference 1021927/R/18 dated January 2012. The QRA report suggests that there may be two sources of groundwater entering the site.

Source 1 – Originating from the southern corner of the site from within the rock outcrop (picked up by former monitoring well J10, located in cell J10).

Source 2 – Originating from the southeast section where groundwater is draining into the site (picked up by former monitoring well K1, located in cell K1).

These two sources seem to be partially split by the bedrock which is located at the surface around cells I10, J09, K08, K09, K10, L08, L09 and L10.

The former groundwater monitoring locations, referenced above, are presented on drawing 70049885/OD/2020/01 in **Appendix A.**

Similarly to pre-remediation groundwater plots, the September 2021 groundwater plot presented as Drawing 70049885/OD/2021/03 in **Appendix A** indicates that the source of groundwater beneath the site corresponds to Source 1, described above; groundwater appears to accumulate in the south of the site (cell J08 / location of PR11). Flow is in an approximately north westerly direction, as would be expected close to the River Shannon.

The groundwater level data from the September 2021 visit is summarised below in Table 4-1.

Table 4-1 - Groundwater levels recorded in September 2021

Post remediation monitoring well	Grid cell location	Response zone strata	Response zone		Depth to groundwater September 2021	
			m bgl	m MHD	m bgl	m MHD
PR1	A01	Bedrock	3.20 – 7.50	2.350 to -1.950	1.26	4.29
PR2	A05	Bedrock	4.00 – 7.50	1.857 to -1.643	1.69	4.17
PR3	A08	Bedrock	3.50 – 7.50	2.588 to -1.412	1.79	4.30
PR4	C11	Bedrock	3.50 – 7.50	2.188 to -1.812	1.18	4.51
PR5	F01	Quarry backfill material (clay & silt)	3.30 – 7.50	5.059 to 0.859	3.27	5.09
PR6	G05	Quarry backfill material (clay)	4.00 – 7.50	4.176 to 0.676	3.77	4.41

Post remediation monitoring well	Grid cell location	Response zone strata	Response zone		Depth to groundwater September 2021	
			m bgl	m MHD	m bgl	m MHD
PR7	F08	Bedrock	1.50 – 7.50	6.106 to 0.106	1.65	5.96
PR8	G11	Bedrock	0.90 – 8.00	6.516 to -0.584	1.79	5.63
PR9	J01	Quarry backfill material (clayey gravel and silt)	4.00 – 6.00	4.970 to 2.970	4.46	4.51
PR10	M05	Bedrock	5.70 – 7.50	3.872 to 2.072	4.96	4.61
PR11	J08	Bedrock	2.00 – 7.50	6.339 to 0.839	1.14	7.20
PR12	K11	Bedrock	3.00 – 8.00	5.218 to 0.218	1.00	7.22

Note: MHD – Malin Head Datum

The results equate to the following estimates of hydraulic gradient across the site as presented in Table 4-2:

Table 4-2 - Hydraulic gradients

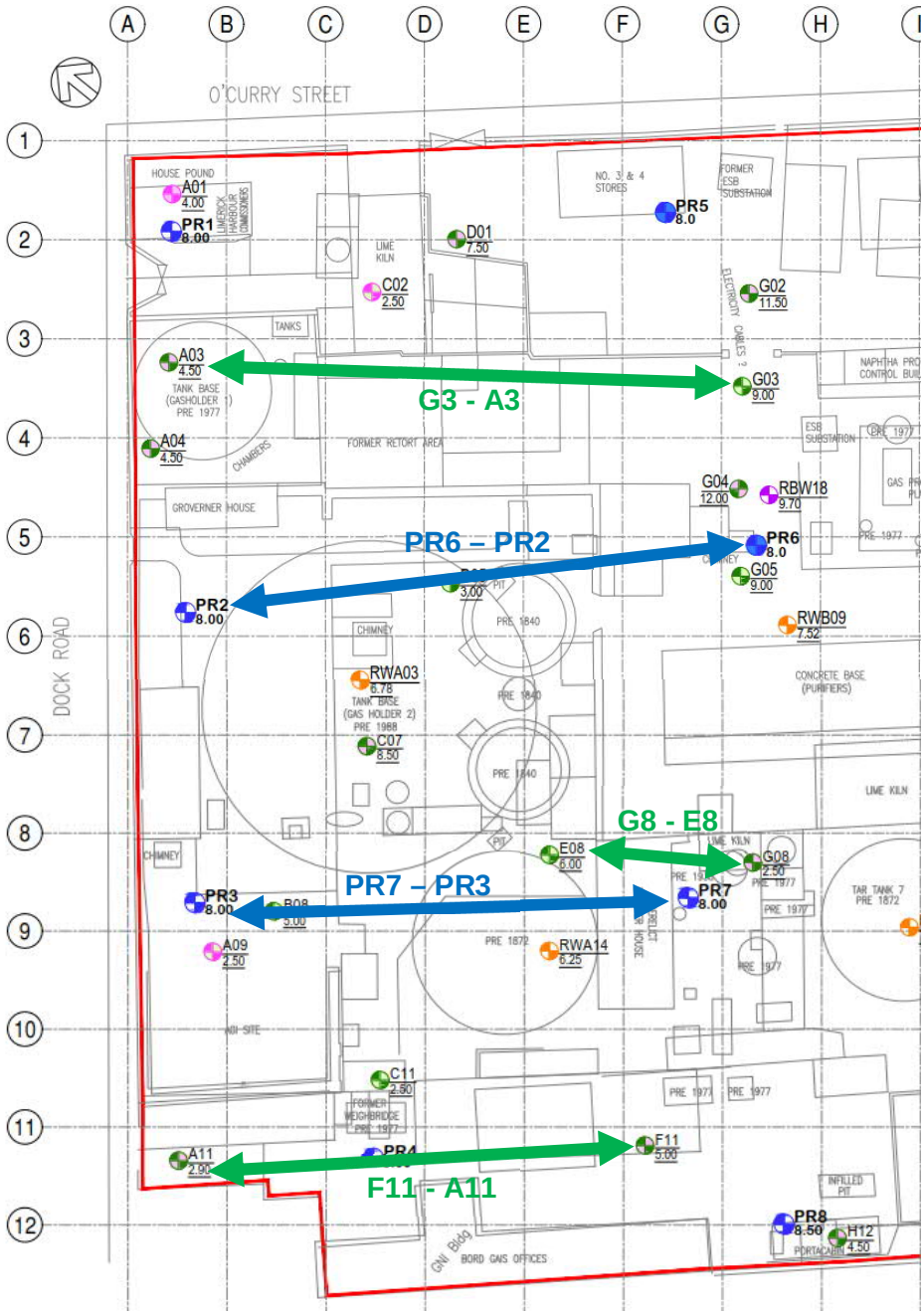
	2012 (Visit 9-12)		2013 (Visit 13-16)		2014 (Visit 17-20)		2015 (Visit 21-24)		2016 (Visit 25-27)	
G8 - E8	(approximately 1.87m / 13.5m)	0.139	(approximately 1.85m / 13.5m)	0.137	(approximately 1.85m / 13.5m)	0.137	(approximately 1.85m / 13.5m)	0.136	(approximately 1.95m / 13.5m)	0.144
G3 - A3	(approximately 2.50m / 59.9m)	0.042	(approximately 2.21m / 59.9m)	0.037	(approximately 2.28m / 59.9m)	0.038	(approximately 2.28m / 59.9m)	0.039	(approximately 2.00m / 59.9m)	0.033
F11 - A11	(approximately 1.16m / 47.15m)	0.025	(approximately 1.91m / 47.15m)	0.041	(approximately 2.07m / 47.15m)	0.044	(approximately 2.07m / 47.15m)	0.049	(approximately 1.65m / 47.15m)	0.035
Average		0.069		0.072		0.073		0.075		0.071
	2017 (Visit 28-30)		2018 (Visit 31-34)		Visit 35		Visit 36		2019 (Visit 35 and 36)	
G8 - E8	(approximately 2.81m / 13.5m)	0.21	(approximately 1.78m / 13.5m)	0.132	(approximately 1.74m / 13.5m)	0.129	(approximately 2.25m / 13.5m)	0.17	(approximately 2.00m / 13.5m)	0.15
G3 - A3	(approximately 2.63m / 59.9m)	0.044	A3 & G3 unable to be monitored	N/A	A3 & G3 unable to be monitored	N/A	A3 & G3 unable to be monitored	N/A	A3 & G3 unable to be monitored	N/A
F11 - A11	(approximately 2.49m / 47.15m)	0.05	(approximately 2.15m / 47.15m)	0.046	(approximately 2.38m / 47.15m)	0.05	(approximately 2.56m / 47.15m)	0.05	(approximately 2.47m / 47.15m)	0.05
Average		0.101		0.089		0.090		0.111		0.100
	Visit 37		Visit 38		Visit 39		Visit 40		Visit 41	
G8 - E8;	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
G5 - A5 (PR6 - PR2)	(approximately 0.34m / 58m)	0.006	(approximately 0.47m / 58m)	0.008	(approximately 0.279m / 58m)	0.0048	(approximately 0.294m / 58m)	0.005	(approximately 0.24m / 58m)	0.004
F8 - A8 (PR7 - PR3)	(approximately 2.01m / 49.79m)	0.040	(approximately 1.39m / 49.79m)	0.028	(approximately 1.828m / 49.79m)	0.037	(approximately 2.031m / 49.79m)	0.041	(approximately 1.66m / 49.79m)	0.033
Average		0.023		0.018		0.0208		0.023		0.019

Hydraulic gradients have been calculated for the post remediation monitoring wells PR6 to PR2 and PR7 to PR3, to allow for comparison with the original monitoring well locations G3 to A3 and F11 to A11 respectively, which were removed during Section 2 (Stabilisation / Solidification) of Phase 2 of the remediation project. The locations and distance between the original monitoring wells G8 to E8, mean that comparison and calculation of hydraulic gradients using the current post remediation monitoring wells cannot be made. Insert 1 below illustrates these onsite hydraulic gradients.

The hydraulic gradient beneath the site is very shallow and decreases in a westerly/north westerly direction.

Prior to the start of remediation, between 2012 and 2016, the average hydraulic gradients varied between 0.069 and 0.075. From 2017 to 2019 (during the Phase 1 works and up to the start of the Phase 2 works) the average hydraulic gradient increased to between 0.089 and 1.111. Since the completion of remediation, the average hydraulic gradient has decreased and remained consistently shallow (0.019 to 0.023).

Insert 1 - Onsite hydraulic gradients



5 VISUAL AND OLFACTORY EVIDENCE OF CONTAMINATION

5.1 2016 BASELINE DATA SET

Visual and olfactory observations from March 2016 (visit 25) and August 2016 (visit 26) have been used as a baseline data set for comparison between pre-remediation and post remediation conditions. The visual and olfactory observations from 2016 are summarised in Table 5-1 below.

Table 5-1 - Compiled 2016 visual and olfactory evidence of contamination

Year	Visit	DNAPL detected	Hydrocarbon sheen / odour	No visual or olfactory evidence of significant contamination
2016 (Pre remediation)	March (Visit 25)	C7, D1, G4 & speckles at K5 HBR01 to HBR05	A1, A3, A4, C2, C7, D1, D5, E8, F11, G2, G3, G4, G5, G8, H12, K1, K5 & M3.	A9, A11, C11, J10 & L7.
	August (Visit 26)	C7 HBR01 to HBR05	A1, A3, A4, C7, C11, D1, D5, E8, F11, G2, G3, G4, G5, G8, H12, K1, K5 & M3.	A9, A11, C2, J10 & L7.

DNAPL was encountered in four groundwater monitoring wells during the March 2016 visit - C7, D1, G4, K5, all located in the east of the site. C7 and K5 were constructed at the locations of two former gasholders.

The maximum thickness of DNAPL in March 2016 was recorded as 0.27m in C7. The five remediation wells (HBR01 – HBR05) located in tank T11 recorded DNAPL thickness between 0.04m – 1.50m.

The August 2016 visit only recorded DNAPL in groundwater monitoring well C7. During this visit, 0.25m of DNAPL was reported. Similarly to the March 2016 visit, the five remediation wells recorded DNAPL thickness between 0.25m – 1.90m.

A hydrocarbon sheen / odour was regularly noted around the former gasholders and in the quarry area (C7, D1, G4, G5 and K5).

During the March 2016 visit, yellow coloured water was retrieved from E8. Numerous other samples also displayed brown / black staining.

The water retrieved from A3, E8 and F11 also foamed which may indicate the presence of dissolved gases.

5.2 2021 POST-REMEDIATION RESULTS AND DISCUSSION

Visual and olfactory observations noted during visit 41 undertaken in September 2021, post Phase 2 Stabilisation / Solidification, has been summarised in Table 5-2 below.

Table 5-2 - September 2021 visual and olfactory evidence of contamination

Year	Visit	DNAPL detected (thickness)	Odours	Sheen	Colour
2021 (Post remediation)	September (Visit 41)	PR2 (0.25m) PR3 (0.25m) PR7 (0.21m) PR8 (0.20m)	All locations had a recorded a slight hydrocarbon odour.	A hydrocarbon sheen was noted in PR2, PR3, PR4 and PR7.	Colour was clear in PR1, PR4, PR5, PR9, PR10 A yellowish hue was noted in locations PR2, PR3, PR6, PR7 PR8, PR11, PR12

DNAPL was detected in four post remediation monitoring wells, with a maximum thickness of 0.25m. This is consistent with other post-remediation monitoring rounds.

The presence and thickness of DNAPL encountered on site has significantly reduced since 2016.

- In 2016, DNAPL was recorded at four groundwater monitoring well locations; C7, D1, G4 & speckles at K5. DNAPL was consistently measured in well C7 and varied between 0.25m – 0.27m in thickness over the two visits. All five HBR remediation wells, located within a former underground gasholder well, recorded measurable thicknesses of DNAPL over the two visits, which varied between 0.04m – 1.90m.
- In September 2021, DNAPL was recorded at PR2, PR3, PR7 and PR8, with a maximum recorded thickness of 0.25m.

The presence of odour (olfactory contamination) is generally consistent between 2016 and 2021. It should be noted that this is a subjective form of contaminative evidence and there may be a lack in consistency due to different individuals undertaking the monitoring rounds.

6 CHEMICAL TEST RESULTS

6.1 INTRODUCTION

This section presents the most recent monitoring chemical results and provides a comparison between the 2016 groundwater chemical results (baseline data prior to remediation) () and post-remediation. The March 2016 and August 2016 chemical results have been used as a representative baseline of pre-remediation groundwater quality.

The September 2021 groundwater chemical laboratory report is presented in **Appendix C**.

Pre-remediation monitoring wells with response zones which were installed in Made Ground within underground tanks (D5 and K5) have been excluded from data comparison; it is considered these would not be representative of actual groundwater conditions beneath the site as the underground tanks were not in hydraulic continuity with the surrounding groundwater regime and contained large amounts of coal tar.

The groundwater monitoring wells used for sample collection in 2016 and post remediation are shown in Table 6-1 below. A plan showing the combined groundwater monitoring locations is presented on Drawing 70049885/OD/2020/01 in **Appendix A**.

Table 6-1 – Groundwater monitoring wells (pre and post remediation)

Pre-remediation (March and August 2016)	Post-remediation (2020/2021)
A1, A3, A4, A9, A11, C2, C7, D1, E8 F11, G2, G3, G4, G5, G8, H12, J10, K1, M3	PR1, PR2, PR3, PR4, PR5, PR6, PR7, PR8, PR9, PR10, PR11, PR12

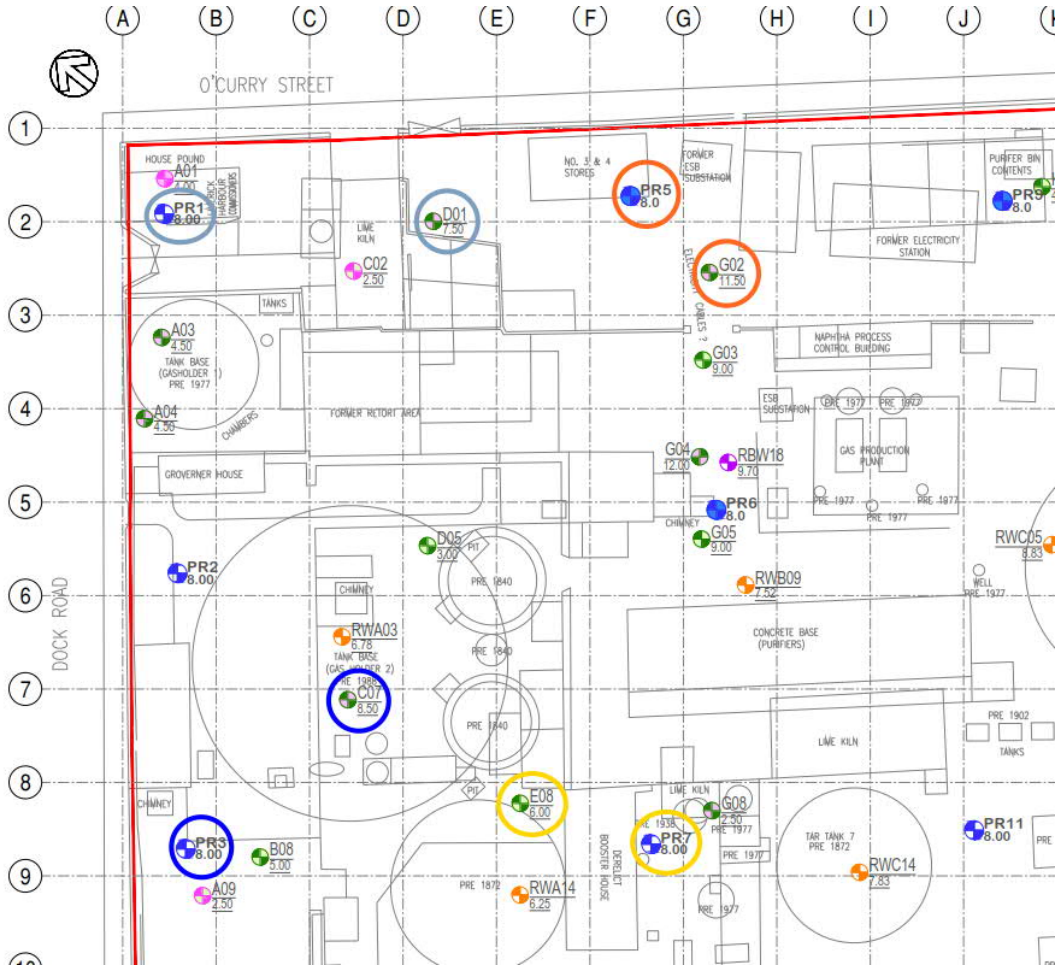
The pre remediation wells were installed during the site characterisation in 2009 and 2011 and were subsequently decommissioned as part of the Phase 2 remediation (See Section 3). The post remediation groundwater monitoring wells were installed in August and September 2020.In order to carry out trend analysis of concentrations on site over time, selected equivalent boreholes have been paired pre and post-remediation for comparison. The locations have been paired based on proximity, response zone strata (where appropriate) and borehole depth, all post-remediation wells are down hydraulic gradient of the pre-remediation wells. Furthermore C7, G2, D1 and E8 typically recorded the highest concentrations of key contaminants in 2016 therefore are a good benchmark to show an improvement in groundwater quality. The monitoring locations are presented in Table 6-2 below. Trend analysis graphs are included in Appendix C.

Table 6-2 – Selected equivalent groundwater monitoring wells

Pre-remediation well	Post-remediation well
C07	PR3
G02	PR5
D01	PR1
E08	PR7

The paired locations are indicated on Insert 2 below.

Insert 2 – Selected equivalent groundwater monitoring locations for trend analysis, pre and post remediation



Site wide overall mean and maximum contaminant concentration changes between 2016 and September 2021 have also been used where appropriate to provide a general overview of groundwater quality.

6.2 TOTAL PETROLEUM HYDROCARBONS (TPH)

The maximum Total Aliphatic and Aromatics (C5-C35) (TPH) concentration in 2016 was 51,200µg/l at location C7, high concentrations were also recorded in D1 (20,900 µg/l), E8 (22,100 µg/l), G2 (28,600 µg/l). In September 2021 a maximum concentration of 20,100µg/l was recorded at location PR7, no other concentrations over 20,000 µg/l were recorded. Concentrations over 10,000µg/l were also seen in PR2 (12,200 µg/l), PR3 (18,200 µg/l) and PR8 (19,900 µg/l). It should be noted that these are the locations which recorded DNAPL present during this round.

Trend analysis graphs are included in Appendix C.

Graph A in Appendix C shows the concentration trend analysis of TPH Total Aliphatic and Aromatics (C5-C35) concentrations pre and post-remediation at selected equivalent borehole locations. Graph B shows the concentration trend analysis for TPH Total Aliphatic and Aromatics (C12-C35) (heavy end species). The results show a downward trend. At location E8/PR7 there is an initial upward spike following remediation which may be attributed to impact loading, followed by a sharp decrease in concentration to below August 2016 pre-remediation levels.

Overall site wide mean Total Aliphatic and Aromatics (C5-C35) (TPH) concentrations show a decrease from 7,255µg/l in 2016 to 6,768µg/l in September 2021. The overall site wide mean concentration of Total Aliphatics and Aromatics (C12-C35) has decreased from 3,699.5µg/l in 2016 to 2,015µg/l in September 2021.

6.3 POLYAROMATIC HYDROCARBONS (PAH)

In 2016 the maximum concentration of PAH Total Detected USEPA 16 was recorded in D1 (10,449 µg/l); concentrations over 1,000 µg/l are also recorded in C7 (8,757 µg/l), G4 (3,628 µg/l), G2 (2,128 µg/l), E8 (1,709 µg/l), G5 (1,697 µg/l).

In September 2021 the maximum PAH Total Detected USEPA 16 concentrations was recorded in PR7 (42,700 µg/l), concentrations over 1,000 µg/l are also recorded in PR3 (3,180 µg/l), PR2 (2,990 µg/l) and PR8 (1,270 µg/l). PR7 shows a very high concentration during the September 2021 round. The high total PAH concentration at PR7 is primarily made up of Naphthalene (PAH) (36,500 µg/l). The high concentrations of PAHs at PR7 have not been seen previously in the other post-remediation monitoring rounds. Further monitoring will clarify whether this is an anomalous result.

Graph C in Appendix C shows the concentration of PAH Total Detected USEPA 16 pre and post-remediation in selected equivalent boreholes, locations E8/PR7 have been excluded until the potentially anomalous result is clarified. All other locations show a downward trend.

Graph D in Appendix C shows the concentration of Naphthalene (PAH) pre and post-remediation in selected equivalent boreholes, locations E8/PR7 have been excluded. All other show a downward trend.

The maximum benzo(a)pyrene concentration in 2016 was 298 µg/l in D1, and in September 2021 is 40.6 µg/l in PR7, which is the selected equivalent monitoring location to D1. The September 2021 result is anomalously high relative to past post-remediation monitoring rounds. The next highest concentrations are 5.6 µg/l (PR2) and 5.08 µg/l (PR3), all other results are <0.5 µg/l.

Graph E in Appendix C shows the concentration of benzo(a)pyrene pre and post-remediation in selected equivalent boreholes. All, with the exception of E8/PR7, show a downward trend over time.

It should be noted there are two test methods for naphthalene:

- Naphthalene (PAH) Laboratory reference TM178 (Modified: US EPA Method 8100) *Determination of Polynuclear Aromatic Hydrocarbons (PAH) by GC-MS in Waters*
- Naphthalene (VOC) Laboratory reference TM208 (Modified: US EPA method 8260b & 624) *Determination of Volatile Organic Compounds (VOC) by Headspace / GC-MS in Waters*

The trend analysis for Naphthalene (VOC) test results are discussed in Section 6.6.

6.4 PHENOL

In 2016 the highest concentrations of phenol were recorded in C7 (21.7mg/l) and E8 (20.3mg/l). In September 2021 the highest concentrations of phenol are recorded in PR7 (38.8mg/l), the next highest is PR3 (11.9mg/l).

High concentrations in PR7 are recorded during the September 2021 round.

Graph F in Appendix C shows the concentration of phenol pre and post-remediation in selected equivalent boreholes. There are no readings for phenol from 2016 in location E8. Locations C7/PR3 and G2/PR5 show a downward trend.

6.5 BTEX

The maximum benzene concentration in 2016 was 11,900µg/l at location C7 and in September 2021 was 5,410 µg/l at location PR3.

The maximum toluene concentration in 2016 was 5,930µg/l at location C7 and in September 2021 was 2,270 µg/l at location PR3.

The maximum ethylbenzene concentration in 2016 was 320µg/l at location G2 and the maximum ethylbenzene concentration recorded in September 2021 was 122µg/l at location PR7.

The maximum xylene (sum of detected xylenes) concentration in 2016 was 2,390 µg/l at location C7 and in September 2021 was 1,260 µg/l at location PR7.

Graph G in Appendix C shows the concentration of benzene pre and post-remediation in selected equivalent boreholes. All locations show a downward trend.

6.6 VOLATILE ORGANIC COMPOUNDS (VOCS)

The maximum naphthalene (VOC) concentration in 2016 was 5,440 µg/l in C7, high concentrations are also seen in G4 (4,850 µg/l) and G2 (3,870 µg/l). In September 2021 the maximum naphthalene (VOC) concentration was 4,130 µg/l in PR7.

Graph H in Appendix C show the concentration of naphthalene (VOC) pre and post-remediation in selected equivalent monitoring locations. VOCs were not tested in 2016 for in E8 therefore the graph for E8/PR7 is not shown.

Other VOCs recorded in groundwater in 2016 included:

- 1,2,4-Trimethylbenzene
- 1,3,5-Trimethylbenzene
- Carbon disulphide
- Isopropylbenzene,
- N-Butylbenzene
- Propylbenzene
- Sec-Butylbenzene
- Styrene

Graphs I, J and K in Appendix C show the concentration of these contaminants pre and post-remediation in selected equivalent monitoring locations C7/PR3, G2/PR5 and D1/PR1. VOCs were not tested in 2016 in E8 therefore the graph for E8/PR7 is not shown. There is VOC data missing for some post-remediation rounds. The results show a downward trend.

6.7 METALS

Arsenic, a contaminant of concern, has been selected to illustrate metal contamination trends with 2016 data.

In 2016 the maximum arsenic concentration was 134 µg/l at location E8. Concentrations over 20 µg/l were also recorded at G4 (29.4 µg/l), K1 (25 µg/l) and A3 (20.2 µg/l).

In September 2021 the maximum arsenic concentration was 30.4 µg/l at location PR2, the only other concentration over 20 µg/l was recorded in PR6 (23.1 µg/l).

Graph L in Appendix C shows the trend in concentration of arsenic between selected locations. E8/PR7, G2/PR5 and D1/PR1 show a downward trend.

Concentrations of other metals tested for generally remain consistent between selected equivalent boreholes.

6.8 AMMONIACAL NITROGEN

The maximum ammoniacal nitrogen concentration in 2016 was 71.9mg/l at location G2. PR5 is the selected equivalent post-remediation monitoring well to monitoring well G2. The concentration in September 2021 at location PR5 is 0.3mg/l.

The maximum concentration in September 2021 was at PR7 (158mg/l), high concentrations were also recorded at PR8 (132mg/l). The high concentrations seen may be attributed to ammoniacal liquor impacted soils being disturbed during remediation works.

Graph M in Appendix C shows the concentration of ammoniacal nitrogen pre and post-remediation in selected equivalent boreholes. Locations G2/PR5 and D1/PR1 show a downward trend.

6.9 SULPHATE

Graph N in Appendix C shows the concentration of sulphate pre and post-remediation in selected equivalent boreholes. Location D1/PR1 show a decrease from pre-remediation in the September monitoring round. The other locations show an increase from pre-remediation concentrations which may be attributed to disturbance from remediation works.

6.10 CYANIDE

Graph O in Appendix C shows the concentration of cyanide (total) pre and post-remediation in selected equivalent boreholes. Cyanide concentrations appear to have remained reasonably consistent since pre-remediation monitoring except for recent monitoring visits for PR7 which show an increase.

6.11 PH

Overall site wide mean pH value was 7.64 in 2016 and post-remediation has ranged from 8.94 to 9.63, and in the most recent round was 8.93.This increase seen is a result of crushed concrete and cement being used on site as part of the Phase 2 remediation works.

7 CONCLUSIONS

This report presents the results of the 41st groundwater monitoring visit, undertaken by WSP on the 14 and 15th September 2021. This is the 5th groundwater monitoring round post-remediation.

Comparison of post-remediation groundwater results to the pre-remediation results from 2016 has been undertaken at selected equivalent groundwater monitoring locations pre and post-remediation. The results generally display a downward trend in chemical concentrations of key contaminants: Total Petroleum Hydrocarbons (TPH), Polyaromatic Hydrocarbons (PAHs), Benzene, Toluene, Ethylbenzene and Xylene (BTEX) , arsenic, phenol and VOCs.

Maximum concentrations of contaminants are generally recorded at location PR7 which is consistent with previous post-remediation monitoring rounds.

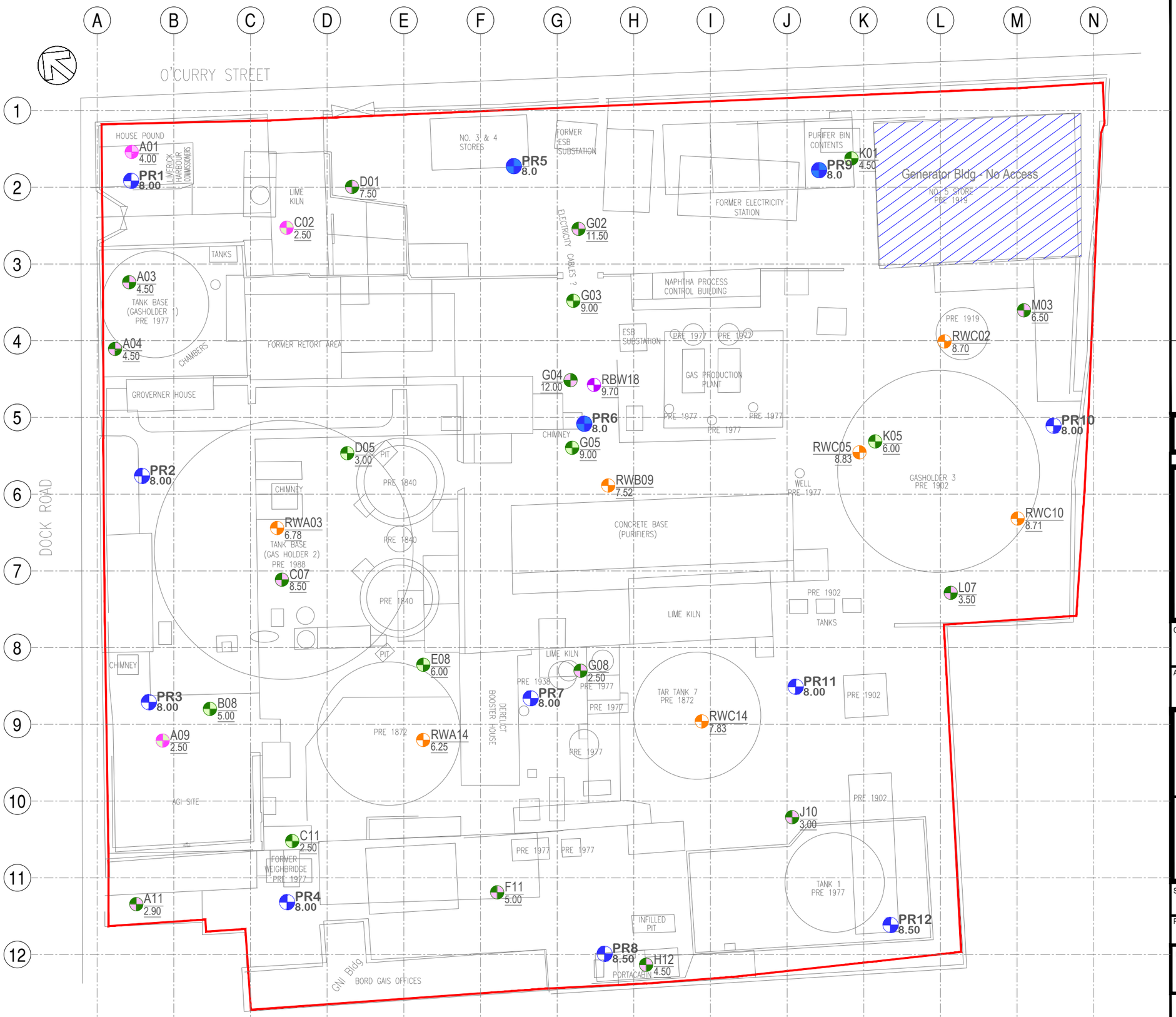
An overall decrease in the majority of key contaminant concentrations appear to demonstrate that the remedial works have improved the onsite groundwater quality although it is emphasised that this was not a key objective of the remediation strategy (which was removal of free product/U2 material and treatment of remnant soils to comply with derived Remedial Target Values (RTV's). It is also noted that the 2010 Quantitative Risk Assessment (QRA), Options Appraisal and Remediation Report states that groundwater gradients across the site are very shallow which has been consistently determined during the numerous groundwater monitoring visits. Consequently, it will take a considerable amount of time for any remnant contamination to migrate off site allowing further attenuation and retardation, effectively protecting water resources within the limestone aquifer and River Shannon.

Visual and olfactory evidence of contamination appears to have reduced since pre-remediation monitoring, including the presence and thickness of DNAPL.

The reduction in hydrocarbon concentrations demonstrate that the ultimate objective of the remediation project has been achieved, through the removal of significant sources of DNAPL contamination during Phase 1 and the soil stabilisation during Phase 2.

Appendix A

DRAWINGS



Key

Approximate Location of Former Structure

10m Grid

Historical Data:-

2009 Site Investigation

- Installation in made ground and installation depth (m bgl)
- Installation in limestone and installation depth (m bgl)

2011 Site Characterisation

- Installation in made ground and installation depth (m bgl)
- Installation in limestone and installation depth (m bgl)

HBR 2016 Remediation Well (RW)

- Borehole Location and installation depth (m bgl)

HBR 2017 Remediation Well (RW)

- Borehole Location and installation depth (m bgl)

Note: Underlined Boreholes are no longer operational.

MIL 2020 Post Remediation Well (PR)

- **Installation in** quarry backfill material **and installation depth (m bgl)**
- **Installation in limestone and installation depth (m bgl)**

DRAWING STATUS: S2 - FOR INFORMATION

wsp

1st Floor Station House, Tithebarn Street, Exchange Station, Liverpool, L2 2QP, UK
T+ 44 (0) 151 331 8100, F+ 44 (0) 151 331 8100
wsp.com

CLIENT: Gas Networks Ireland

ARCHITECT:

PROJECT: Limerick Gasworks

TITLE: Groundwater Monitoring Locations

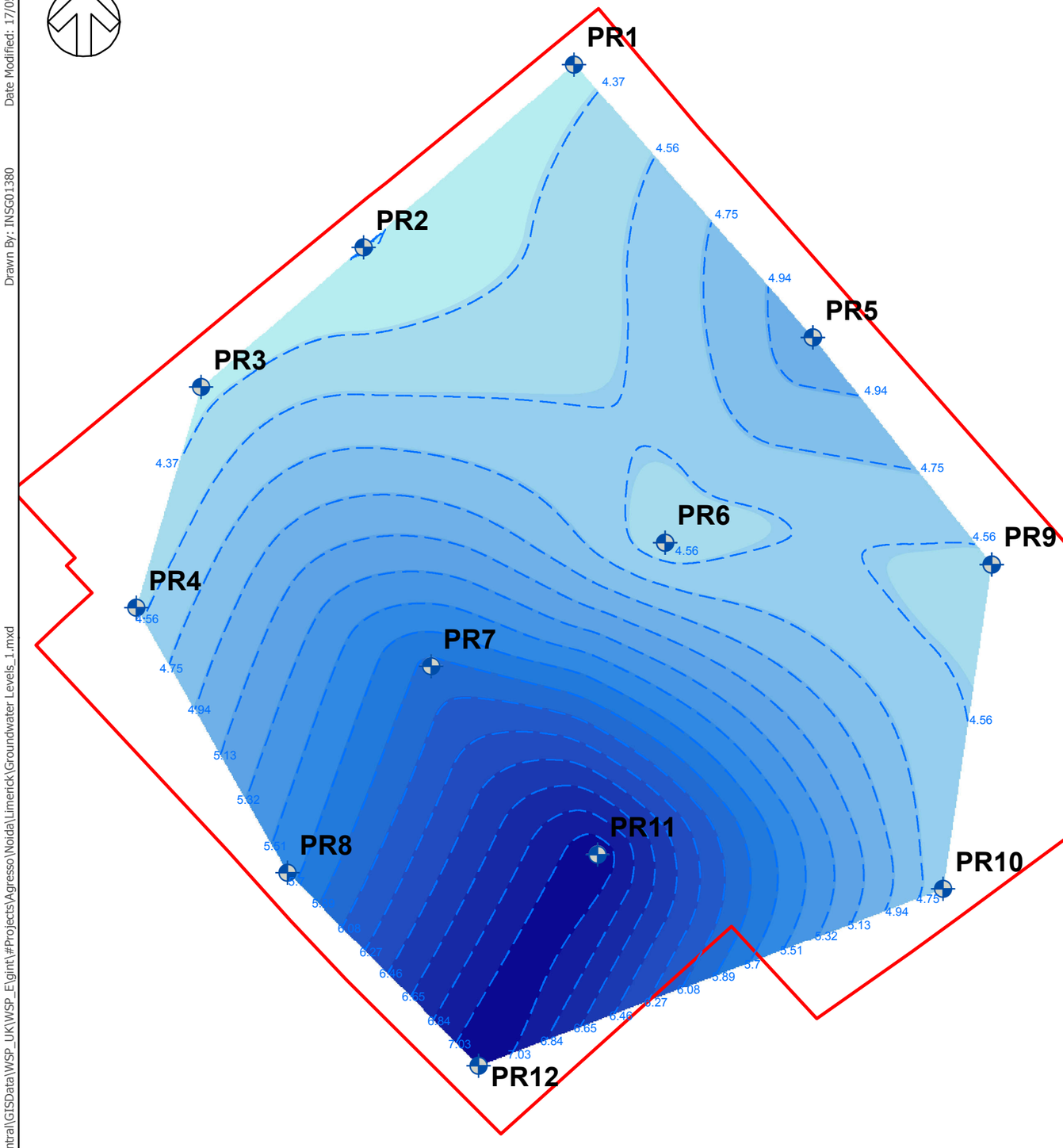
SCALE @ A3:	CHECKED:		APPROVED:
1:500	EL		TB
PROJECT No:	DESIGNED:	DRAWN:	DATE:
70038142	EL	DKT	February 21

DRAWING No: 70049885/OD/2020/01 REV: P01

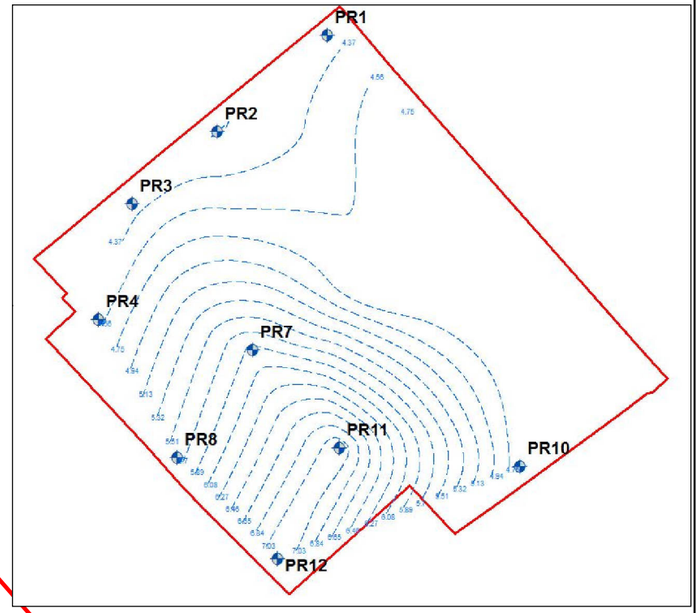
Date Modified: 17/05/2021

Drawn By: INSG01380

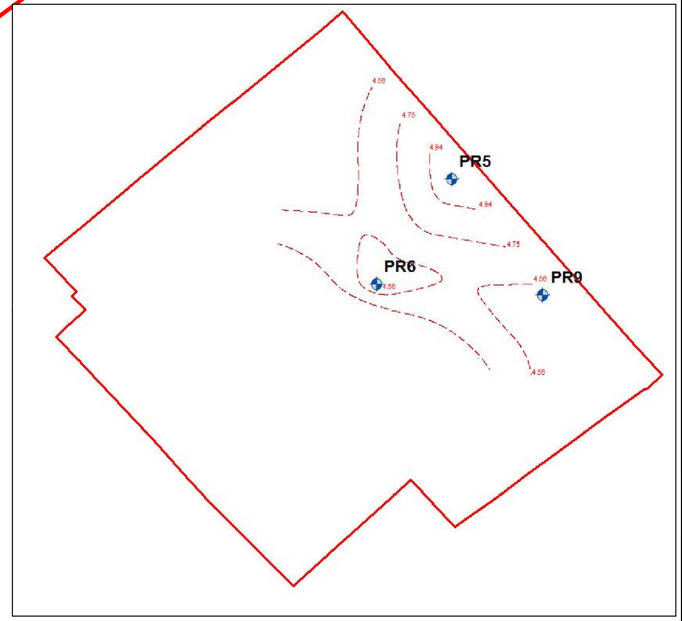
File: \\uk.wspgroup.com\UKCentral\GISData\WSP_UK\WSP_Eglint\#Projects\Agresso\Noida\Limerick\Groundwater Levels_1.mxd



Contours based on locations with response zones in bedrock only



Contours based on locations with response zones in Made Ground deposits only



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0 9 18 27 36

Meters

Legend

- Post remediation monitoring well
- Site_Boundary

Groundwater Levels September 2021

(m MHD)

- 4.16 - 4.35
- 4.35 - 4.54
- 4.54 - 4.73
- 4.73 - 4.92
- 4.92 - 5.12
- 5.12 - 5.31
- 5.31 - 5.50
- 5.50 - 5.69
- 5.69 - 5.88
- 5.88 - 6.07
- 6.07 - 6.26
- 6.26 - 6.45
- 6.45 - 6.64
- 6.64 - 6.83
- 6.83 - 7.02
- 7.02 - 7.21

DRAWING STATUS: S2 - FOR INFORMATION

1st Floor Station House, Tithebarn Street,
Exchange Station, Liverpool, L2 2QP, UK
T+ 44 (0) 151 331 8100
F+ 44 (0) 151 331 8100
Website: www.wsp.com

CLIENT: GAS NETWORKS IRELAND

ARCHITECT:

PROJECT: LIMERICK GASWORKS

TITLE: GROUNDWATER LEVELS SEPTEMBER 2021

SCALE @ A	CHECKED:	APPROVED:
1:500	EL	TB
CAD FILE:	DESIGN-DRAWN:	DATE:
WSP - A2 Landscape	SG	September 2021
PROJECT No:	DRAWING No:	REV:
70049885	70049885/OD/2021/03	03

Appendix B

CHEMICAL TEST RESULTS (SEPTEMBER 2021)

Unit 7-8 Hawarden Business Park
Manor Road (off Manor Lane)
Hawarden
Deeside
CH5 3US
Tel: (01244) 528700
Fax: (01244) 528701
email: hawardencustomerservices@alsglobal.com
Website: www.alsenvironmental.co.uk

WSP UK Limited
8 First Street
Manchester
Lancashire
M15 4RP

Attention: Niall Richards

CERTIFICATE OF ANALYSIS

Date of report Generation:	24 September 2021
Customer:	WSP UK Limited
Sample Delivery Group (SDG):	210917-103
Your Reference:	70049885
Location:	Limerick Gasworks
Report No:	614534
Order Number:	70049885-W15

We received 12 samples on Friday September 17, 2021 and 12 of these samples were scheduled for analysis which was completed on Friday September 24, 2021. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

Should this report require incorporation into client reports, it must be used in its entirety and not simply with the data sections alone.

Chemical testing (unless subcontracted) performed at ALS Environmental Hawarden.

All sample data is provided by the customer. The reported results relate to the sample supplied, and on the basis that this data is correct.
Incorrect sampling dates and/or sample information will affect the validity of results.
The customer is not permitted to reproduce this report except in full without the approval of the laboratory.

Approved By:

Sonia McWhan

Operations Manager

CERTIFICATE OF ANALYSIS

SDG: 210917-103 **Report Number:** 614534 **Superseded Report:**
Client Ref.: 70049885 **Location:** Limerick Gasworks

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
24995589	PR1	EW	0.00 - 0.00	15/09/2021
24995672	PR2	EW	0.00 - 0.00	15/09/2021
24995696	PR3	EW	0.00 - 0.00	15/09/2021
24995707	PR4	EW	0.00 - 0.00	14/09/2021
24995720	PR5	EW	0.00 - 0.00	15/09/2021
24995731	PR6	EW	0.00 - 0.00	15/09/2021
24995743	PR7	EW	0.00 - 0.00	15/09/2021
24995756	PR8	EW	0.00 - 0.00	15/09/2021
24995767	PR9	EW	0.00 - 0.00	15/09/2021
24995628	PR10	EW	0.00 - 0.00	15/09/2021
24995642	PR11	EW	0.00 - 0.00	15/09/2021
24995654	PR12	EW	0.00 - 0.00	14/09/2021

Only received samples which have had analysis scheduled will be shown on the following pages.

CERTIFICATE OF ANALYSIS

SDG: 210917-103 **Report Number:** 614534 **Superseded Report:**
Client Ref.: 70049885 **Location:** Limerick Gasworks

Results Legend

X Test

N No Determination Possible

Sample Types -
S - Soil/Solid
UNS - Unspecified Solid
GW - Ground Water
SW - Surface Water
LE - Land Leachate
PL - Prepared Leachate
PR - Process Water
SA - Saline Water
TE - Trade Effluent
TS - Treated Sewage
US - Untreated Sewage
RE - Recreational Water
DW - Drinking Water Non-regulatory
UNL - Unspecified Liquid
SL - Sludge
G - Gas
OTH - Other

Lab Sample No(s)			24995589							24995672								24995696								
Customer Sample Reference			PR1							PR2								PR3								
AGS Reference			EW							EW								EW								
Depth (m)			0.00 - 0.00							0.00 - 0.00								0.00 - 0.00								
Container			0.5l glass bottle (ALE227)	500ml Plastic (ALE208)	H2SO4 (ALE244)	HNO3 Filtered (ALE204)	NaOH (ALE245)	Vial (ALE297)	ZnAc (ALE246)	0.5l glass bottle (ALE227)	500ml Plastic (ALE208)	H2SO4 (ALE244)	HNO3 Filtered (ALE204)	NaOH (ALE245)	Vial (ALE297)	ZnAc (ALE246)	0.5l glass bottle (ALE227)	500ml Plastic (ALE208)	H2SO4 (ALE244)	HNO3 Filtered (ALE204)	NaOH (ALE245)	Vial (ALE297)	ZnAc (ALE246)			
Sample Type			GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW			
Ammoniacal Nitrogen	All	NDPs: 0 Tests: 12			X							X							X								
Anions by Kone (w)	All	NDPs: 0 Tests: 12		X							X							X								
Dissolved Metals by ICP-MS	All	NDPs: 0 Tests: 12				X							X							X						
EPH CWG (Aliphatic) Aqueous GC (W)	All	NDPs: 0 Tests: 12	X							X							X									
EPH CWG (Aromatic) Aqueous GC (W)	All	NDPs: 0 Tests: 12	X							X							X									
GRO by GC-FID (W)	All	NDPs: 0 Tests: 12						X							X								X			
Hexavalent Chromium (w)	All	NDPs: 0 Tests: 12		X							X							X								
Low Level Cyanide (W)	All	NDPs: 0 Tests: 12					X							X								X				
Mercury Dissolved	All	NDPs: 0 Tests: 12				X							X							X						
PAH Spec MS - Aqueous (W)	All	NDPs: 0 Tests: 12	X							X							X									
pH Value	All	NDPs: 0 Tests: 12		X							X							X								
Phenols by HPLC (W)	All	NDPs: 0 Tests: 12			X							X							X							
Sulphide	All	NDPs: 0 Tests: 12							X							X								X		
TPH CWG (W)	All	NDPs: 0 Tests: 12	X							X							X									
VOC MS (W)	All	NDPs: 0 Tests: 12						X							X								X			

24995731	PR6	EW	0.00 - 0.00	NaOH (ALE245)	GW								X							
				HNO3 Filtered (ALE204)	GW			X						X						
				H2SO4 (ALE244)	GW	X											X			
				500ml Plastic (ALE208)	GW		X					X				X				
				0.5l glass bottle (ALE227)	GW				X	X					X				X	
24995720	PR5	EW	0.00 - 0.00	ZnAc (ALE246)	GW													X		
				Vial (ALE297)	GW						X									X
				NaOH (ALE245)	GW								X							
				HNO3 Filtered (ALE204)	GW			X						X						
				H2SO4 (ALE244)	GW	X											X			
				500ml Plastic (ALE208)	GW		X					X				X				
				0.5l glass bottle (ALE227)	GW				X	X					X				X	
24995707	PR4	EW	0.00 - 0.00	ZnAc (ALE246)	GW													X		
				Vial (ALE297)	GW						X									X
				NaOH (ALE245)	GW								X							
				HNO3 Filtered (ALE204)	GW			X						X						
				H2SO4 (ALE244)	GW	X											X			
				500ml Plastic (ALE208)	GW		X					X				X				
				0.5l glass bottle (ALE227)	GW				X	X					X				X	

CERTIFICATE OF ANALYSIS

SDG: 210917-103 **Report Number:** 614534 **Superseded Report:**
Client Ref.: 70049885 **Location:** Limerick Gasworks

Results Legend

X Test

N No Determination Possible

Sample Types -
S - Soil/Solid
UNS - Unspecified Solid
GW - Ground Water
SW - Surface Water
LE - Land Leachate
PL - Prepared Leachate
PR - Process Water
SA - Saline Water
TE - Trade Effluent
TS - Treated Sewage
US - Untreated Sewage
RE - Recreational Water
DW - Drinking Water Non-regulatory
UNL - Unspecified Liquid
SL - Sludge
G - Gas
OTH - Other

			Lab Sample No(s)	24995731	24995743	24995756	24995767
			Customer Sample Reference	PR6	PR7	PR8	PR9
			AGS Reference	EW	EW	EW	EW
			Depth (m)	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00
			Container	Vial (ALE297)	ZnAc (ALE246)	0.5l glass bottle (ALE227)	500ml Plastic (ALE208)	H2SO4 (ALE244)	HNO3 Filtered (ALE204)	NaOH (ALE245)	Vial (ALE297)	ZnAc (ALE246)	0.5l glass bottle (ALE227)	500ml Plastic (ALE208)	H2SO4 (ALE244)	HNO3 Filtered (ALE204)	NaOH (ALE245)	Vial (ALE297)	ZnAc (ALE246)	0.5l glass bottle (ALE227)	500ml Plastic (ALE208)	H2SO4 (ALE244)	HNO3 Filtered (ALE204)	NaOH (ALE245)
			Sample Type	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW
Ammoniacal Nitrogen	All	NDPs: 0 Tests: 12						X							X							X		
Anions by Kone (w)	All	NDPs: 0 Tests: 12					X							X							X			
Dissolved Metals by ICP-MS	All	NDPs: 0 Tests: 12							X							X							X	
EPH CWG (Aliphatic) Aqueous GC (W)	All	NDPs: 0 Tests: 12			X							X							X					
EPH CWG (Aromatic) Aqueous GC (W)	All	NDPs: 0 Tests: 12			X							X							X					
GRO by GC-FID (W)	All	NDPs: 0 Tests: 12	X								X							X						
Hexavalent Chromium (w)	All	NDPs: 0 Tests: 12				X							X							X				
Low Level Cyanide (W)	All	NDPs: 0 Tests: 12							X								X							X
Mercury Dissolved	All	NDPs: 0 Tests: 12						X								X							X	
PAH Spec MS - Aqueous (W)	All	NDPs: 0 Tests: 12			X							X							X					
pH Value	All	NDPs: 0 Tests: 12				X							X							X				
Phenols by HPLC (W)	All	NDPs: 0 Tests: 12					X								X							X		
Sulphide	All	NDPs: 0 Tests: 12		X							X							X						
TPH CWG (W)	All	NDPs: 0 Tests: 12			X							X							X					
VOC MS (W)	All	NDPs: 0 Tests: 12	X							X							X							

24995654	PR12	EW	0.00 - 0.00	H2SO4 (ALE244)	GW	
				500ml Plastic (ALE208)	GW	
				0.5l glass bottle (ALE227)	GW	
				ZnAc (ALE246)	GW	
24995642	PR11	EW	0.00 - 0.00	Vial (ALE297)	GW	
				NaOH (ALE245)	GW	
				HNO3 Filtered (ALE204)	GW	
				H2SO4 (ALE244)	GW	
				500ml Plastic (ALE208)	GW	
				0.5l glass bottle (ALE227)	GW	
24995628	PR10	EW	0.00 - 0.00	ZnAc (ALE246)	GW	
				Vial (ALE297)	GW	
				NaOH (ALE245)	GW	
				HNO3 Filtered (ALE204)	GW	
				H2SO4 (ALE244)	GW	
				500ml Plastic (ALE208)	GW	
				0.5l glass bottle (ALE227)	GW	
24995767	PR9	EW	0.00 - 0.00	ZnAc (ALE246)	GW	
				Vial (ALE297)	GW	

CERTIFICATE OF ANALYSIS

SDG: 210917-103 **Report Number:** 614534 **Superseded Report:**
Client Ref.: 70049885 **Location:** Limerick Gasworks

Results Legend

X **Test**

N **No Determination Possible**

Sample Types -
S - Soil/Solid
UNS - Unspecified Solid
GW - Ground Water
SW - Surface Water
LE - Land Leachate
PL - Prepared Leachate
PR - Process Water
SA - Saline Water
TE - Trade Effluent
TS - Treated Sewage
US - Untreated Sewage
RE - Recreational Water
DW - Drinking Water Non-regulatory
UNL - Unspecified Liquid
SL - Sludge
G - Gas
OTH - Other

Lab Sample No(s)			24995654				
Customer Sample Reference			PR12				
AGS Reference			EW				
Depth (m)			0.00 - 0.00				
Container			HNO3 Filtered (ALE204)	NaOH (ALE245)	Vial (ALE297)	ZnAc (ALE246)	
Sample Type			GW	GW	GW	GW	
Dissolved Metals by ICP-MS	All	NDPs: 0 Tests: 12	X				
GRO by GC-FID (W)	All	NDPs: 0 Tests: 12			X		
Low Level Cyanide (W)	All	NDPs: 0 Tests: 12		X			
Mercury Dissolved	All	NDPs: 0 Tests: 12	X				
Sulphide	All	NDPs: 0 Tests: 12				X	
VOC MS (W)	All	NDPs: 0 Tests: 12			X		

CERTIFICATE OF ANALYSIS

SDG: 210917-103 **Report Number:** 614534 **Superseded Report:**
Client Ref.: 70049885 **Location:** Limerick Gasworks

Results Legend	
#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted - refer to subcontractor report for accreditation status.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-4+5@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	PR1	PR2	PR3	PR4	PR5	PR6
			Depth (m)	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00
			Sample Type	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)
			Date Sampled	15/09/2021	15/09/2021	15/09/2021	14/09/2021	15/09/2021	15/09/2021
			Sampled Time	.	.	.	.	.	.
			Date Received	17/09/2021	17/09/2021	17/09/2021	17/09/2021	17/09/2021	17/09/2021
			SDG Ref	210917-103	210917-103	210917-103	210917-103	210917-103	210917-103
			Lab Sample No.(s)	24995589	24995672	24995696	24995707	24995720	24995731
			AGS Reference	EW	EW	EW	EW	EW	EW
Ammoniacal Nitrogen as NH4	<300 µg/l	TM099		5450 #	15000 #	39900 #	5550 #	<300 #	33400 #
Sulphide	<10 µg/l	TM101		128 #	96.7 #	5010 #	1240 #	36.4 #	966 #
Arsenic (diss.filt)	<0.5 µg/l	TM152		8.52 #	30.4 #	17.8 #	11.4 #	1.53 #	23.1 #
Cadmium (diss.filt)	<0.08 µg/l	TM152		<0.08 #	<0.08 #	0.222 #	<0.08 #	<0.08 #	<0.08 #
Chromium (diss.filt)	<1 µg/l	TM152		5.67 #	2.14 #	1.62 #	1.79 #	1.12 #	4.59 #
Copper (diss.filt)	<0.3 µg/l	TM152		<0.3 #	0.486 #	<0.3 #	<0.3 #	3.54 #	0.417 #
Lead (diss.filt)	<0.2 µg/l	TM152		<0.2 #	0.211 #	<0.2 #	<0.2 #	<0.2 #	<0.2 #
Nickel (diss.filt)	<0.4 µg/l	TM152		1.55 #	6.45 #	11.5 #	3.13 #	5.25 #	4.99 #
Selenium (diss.filt)	<1 µg/l	TM152		<1 #	2.32 #	3.13 #	1.26 #	1.95 #	1.18 #
Zinc (diss.filt)	<1 µg/l	TM152		2.3 #	1.33 #	14.9 #	<1 #	1.14 #	2.55 #
Mercury (diss.filt)	<0.01 µg/l	TM183		<0.01 #	<0.01 #	0.0169 #	<0.01 #	<0.01 #	0.0352 #
Sulphate	<2000 µg/l	TM184		298000 #	480000 #	380000 #	423000 #	757000 #	624000 #
Chromium, Hexavalent	<30 µg/l	TM241		<30 #	<30 #	<30 #	<30 #	<30 #	<30 #
pH	<1 pH Units	TM256		8.21 #	8.14 #	10.1 #	7.74 #	7.83 #	8.06 #
Phenol	<2 µg/l	TM259		10 #	2850 #	11900 #	170 #	<2 #	950 #
Cresols	<6 µg/l	TM259		40 #	5750 #	34200 #	410 #	<6 #	2260 #
Xylenols	<8 µg/l	TM259		130 #	7890 #	29400 #	420 #	<8 #	3020 #
2,3,5-Trimethylphenol	<3 µg/l	TM259		<15 #	<30 #	<120 #	<15 #	<3 #	<15 #
2-Isopropylphenol	<6 µg/l	TM259		50 #	3280 #	11200 #	70 #	<6 #	2250 #
Phenols, Total Detected 5 speciated	<25 µg/l	TM259		230	19800	86700	1070	<25	8480
Cyanide, Total (low level)	<5 µg/l	TM279		1230 #	1660 #	3520 #	1840 #	1640 #	3090 #

Validated

CERTIFICATE OF ANALYSIS

SDG: 210917-103 **Report Number:** 614534 **Superseded Report:**
Client Ref.: 70049885 **Location:** Limerick Gasworks

Results Legend	
#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted - refer to subcontractor report for accreditation status.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-4+5@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	PR7	PR8	PR9	PR10	PR11	PR12
			Depth (m)	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00
			Sample Type	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)
			Date Sampled	15/09/2021	15/09/2021	15/09/2021	15/09/2021	15/09/2021	14/09/2021
			Sampled Time	.	.	.	.	.	.
			Date Received	17/09/2021	17/09/2021	17/09/2021	17/09/2021	17/09/2021	17/09/2021
			SDG Ref	210917-103	210917-103	210917-103	210917-103	210917-103	210917-103
			Lab Sample No.(s)	24995743	24995756	24995767	24995628	24995642	24995654
			AGS Reference	EW	EW	EW	EW	EW	EW
Ammoniacal Nitrogen as NH4	<300 µg/l	TM099		158000 #	132000 #	20600 #	399 #	20600 #	21500 #
Sulphide	<10 µg/l	TM101		13.2 #	1620 #	440 #	328 #	19.9 #	1320 #
Arsenic (diss.filt)	<0.5 µg/l	TM152		12.9 #	17.4 #	3.55 #	2.51 #	7.91 #	8 #
Cadmium (diss.filt)	<0.08 µg/l	TM152		3.28 #	0.151 #	<0.08 #	<0.08 #	0.165 #	0.0934 #
Chromium (diss.filt)	<1 µg/l	TM152		7.67 #	1.71 #	<1 #	2.62 #	1.49 #	2.5 #
Copper (diss.filt)	<0.3 µg/l	TM152		<0.3 #	<0.3 #	<0.3 #	<0.3 #	<0.3 #	<0.3 #
Lead (diss.filt)	<0.2 µg/l	TM152		<0.2 #	<0.2 #	<0.2 #	<0.2 #	<0.2 #	<0.2 #
Nickel (diss.filt)	<0.4 µg/l	TM152		33.6 #	28.6 #	1.99 #	0.797 #	5.71 #	10 #
Selenium (diss.filt)	<1 µg/l	TM152		8.94 #	6.99 #	1.08 #	<1 #	5.31 #	3.66 #
Zinc (diss.filt)	<1 µg/l	TM152		75.8 #	10.5 #	<1 #	<1 #	14.1 #	11.5 #
Mercury (diss.filt)	<0.01 µg/l	TM183		0.12 #	<0.01 #	<0.01 #	<0.01 #	0.0835 #	0.0734 #
Sulphate	<2000 µg/l	TM184		605000 #	231000 #	356000 #	447000 #	537000 #	464000 #
Chromium, Hexavalent	<30 µg/l	TM241		<30 #	<30 #	<30 #	<30 #	<30 #	<30 #
pH	<1 pH Units	TM256		9.9 #	11.8 #	8.26 #	7.85 #	9.88 #	9.4 #
Phenol	<2 µg/l	TM259		38800 #	5570 #	310 #	<2 #	1750 #	1400 #
Cresols	<6 µg/l	TM259		74700 #	14100 #	1300 #	<6 #	4180 #	3200 #
Xylenols	<8 µg/l	TM259		37700 #	13800 #	3210 #	<8 #	4030 #	2620 #
2,3,5-Trimethylphenol	<3 µg/l	TM259		<300 #	<60 #	<30 #	<3 #	<30 #	<30 #
2-Isopropylphenol	<6 µg/l	TM259		7750 #	11200 #	1790 #	<6 #	2270 #	1480 #
Phenols, Total Detected 5 speciated	<25 µg/l	TM259		159000	44700	6610	<25	12200	8700
Cyanide, Total (low level)	<5 µg/l	TM279		>25000 #	1650 #	5950 #	4050 #	4080 #	1220 #

CERTIFICATE OF ANALYSIS

SDG: 210917-103 **Report Number:** 614534 **Superseded Report:**
Client Ref.: 70049885 **Location:** Limerick Gasworks

PAH Spec MS - Aqueous (W)

Results Legend	
#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted - refer to subcontractor report for accreditation status.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-4+5@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	PR1	PR2	PR3	PR4	PR5	PR6
			Depth (m)	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00
			Sample Type	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)
			Date Sampled	15/09/2021	15/09/2021	15/09/2021	14/09/2021	15/09/2021	15/09/2021
			Sampled Time	.	.	.	.	.	.
			Date Received	17/09/2021	17/09/2021	17/09/2021	17/09/2021	17/09/2021	17/09/2021
			SDG Ref	210917-103	210917-103	210917-103	210917-103	210917-103	210917-103
			Lab Sample No.(s)	24995589	24995672	24995696	24995707	24995720	24995731
			AGS Reference	EW	EW	EW	EW	EW	EW
Naphthalene (aq)	<0.01 µg/l	TM178		0.0138 #	2620 #	2640 #	0.0285 #	<0.01 #	0.107 #
Acenaphthene (aq)	<0.005 µg/l	TM178		0.0862 #	22.2 #	33.7 #	3.89 #	<0.005 #	1.96 #
Acenaphthylene (aq)	<0.005 µg/l	TM178		0.234 #	109 #	147 #	1.83 #	0.0866 #	1.17 #
Fluoranthene (aq)	<0.005 µg/l	TM178		1.35 #	30.9 #	48.2 #	0.327 #	0.0464 #	1.58 #
Anthracene (aq)	<0.005 µg/l	TM178		<0.005 #	22.2 #	37.1 #	0.196 #	0.0161 #	<0.01 #
Phenanthrene (aq)	<0.005 µg/l	TM178		0.00716 #	70.6 #	120 #	0.59 #	0.0301 #	0.121 #
Fluorene (aq)	<0.005 µg/l	TM178		0.0948 #	44.1 #	78.7 #	1.42 #	<0.005 #	0.134 #
Chrysene (aq)	<0.005 µg/l	TM178		0.0465 #	11.2 #	10.1 #	0.0437 #	0.0205 #	0.452 #
Pyrene (aq)	<0.005 µg/l	TM178		0.811 #	22.3 #	34.6 #	0.198 #	0.0368 #	1.26 #
Benzo(a)anthracene (aq)	<0.005 µg/l	TM178		0.0551 #	11.2 #	11.8 #	0.0515 #	0.0252 #	0.508 #
Benzo(b)fluoranthene (aq)	<0.005 µg/l	TM178		0.0522 #	8.12 #	7.88 #	0.0498 #	0.0286 #	0.579 #
Benzo(k)fluoranthene (aq)	<0.005 µg/l	TM178		0.0222 #	3.3 #	3.2 #	0.0201 #	0.0129 #	0.236 #
Benzo(a)pyrene (aq)	<0.002 µg/l	TM178		0.0385 #	5.6 #	5.08 #	0.0352 #	0.0218 #	0.404 #
Dibenzo(a,h)anthracene (aq)	<0.005 µg/l	TM178		<0.005 #	<0.5 #	<0.5 #	0.0053 #	<0.005 #	0.048 #
Benzo(g,h,i)perylene (aq)	<0.005 µg/l	TM178		0.0385 #	4.95 #	4.53 #	0.041 #	0.0286 #	0.29 #
Indeno(1,2,3-cd)pyrene (aq)	<0.005 µg/l	TM178		0.0295 #	3.62 #	3.96 #	0.0323 #	0.0208 #	0.244 #
PAH, Total Detected USEPA 16 (aq)	<0.082 µg/l	TM178		2.88 #	2990 #	3180 #	8.75 #	0.374 #	9.1 #

CERTIFICATE OF ANALYSIS

SDG: 210917-103 **Report Number:** 614534 **Superseded Report:**
Client Ref.: 70049885 **Location:** Limerick Gasworks

PAH Spec MS - Aqueous (W)

Results Legend	
#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted - refer to subcontractor report for accreditation status.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-4+5@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	PR7	PR8	PR9	PR10	PR11	PR12
			Depth (m)	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00
			Sample Type	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)
			Date Sampled	15/09/2021	15/09/2021	15/09/2021	15/09/2021	15/09/2021	14/09/2021
			Sampled Time	.	.	.	.	.	.
			Date Received	17/09/2021	17/09/2021	17/09/2021	17/09/2021	17/09/2021	17/09/2021
			SDG Ref	210917-103	210917-103	210917-103	210917-103	210917-103	210917-103
			Lab Sample No.(s)	24995743	24995756	24995767	24995628	24995642	24995654
			AGS Reference	EW	EW	EW	EW	EW	EW
Naphthalene (aq)	<0.01 µg/l	TM178		36500 #	1090 #	0.0592 #	0.0104 #	436 #	155 #
Acenaphthene (aq)	<0.005 µg/l	TM178		361 #	16.5 #	34.3 #	0.0296 #	2.88 #	8.08 #
Acenaphthylene (aq)	<0.005 µg/l	TM178		2880 #	118 #	28.6 #	0.0234 #	19.3 #	19.1 #
Fluoranthene (aq)	<0.005 µg/l	TM178		378 #	4.35 #	2.36 #	0.0535 #	0.352 #	1.82 #
Anthracene (aq)	<0.005 µg/l	TM178		306 #	8.92 #	1.77 #	<0.005 #	0.521 #	2.01 #
Phenanthrene (aq)	<0.005 µg/l	TM178		924 #	<0.025 #	12.1 #	0.00512 #	2.08 #	7.03 #
Fluorene (aq)	<0.005 µg/l	TM178		751 #	22.5 #	23.8 #	<0.005 #	2.92 #	9.2 #
Chrysene (aq)	<0.005 µg/l	TM178		73.2 #	0.527 #	0.224 #	<0.005 #	<0.25 #	0.0807 #
Pyrene (aq)	<0.005 µg/l	TM178		255 #	2.34 #	1.37 #	0.00937 #	<0.25 #	1.08 #
Benzo(a)anthracene (aq)	<0.005 µg/l	TM178		81.2 #	0.866 #	0.258 #	<0.005 #	<0.25 #	0.139 #
Benzo(b)fluoranthene (aq)	<0.005 µg/l	TM178		61.3 #	0.75 #	0.202 #	0.0153 #	<0.25 #	0.0634 #
Benzo(k)fluoranthene (aq)	<0.005 µg/l	TM178		24.7 #	0.284 #	0.0858 #	0.00583 #	<0.25 #	0.0258 #
Benzo(a)pyrene (aq)	<0.002 µg/l	TM178		40.6 #	0.485 #	0.129 #	0.0105 #	<0.1 #	0.0439 #
Dibenzo(a,h)anthracene (aq)	<0.005 µg/l	TM178		3.67 #	0.0658 #	0.0163 #	<0.005 #	<0.25 #	<0.01 #
Benzo(g,h,i)perylene (aq)	<0.005 µg/l	TM178		28.8 #	0.341 #	0.122 #	0.0153 #	<0.25 #	0.0362 #
Indeno(1,2,3-cd)pyrene (aq)	<0.005 µg/l	TM178		19.9 #	0.334 #	0.088 #	<0.005 #	<0.25 #	<0.01 #
PAH, Total Detected USEPA 16 (aq)	<0.082 µg/l	TM178		42700 #	1270 #	106 #	0.178 #	464 #	203 #

CERTIFICATE OF ANALYSIS

SDG: 210917-103 **Report Number:** 614534 **Superseded Report:**
Client Ref.: 70049885 **Location:** Limerick Gasworks

TPH CWG (W)

Results Legend	
#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted - refer to subcontractor report for accreditation status.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-4+5@	Sample deviation (see appendix)

Customer Sample Ref.			PR1	PR2	PR3	PR4	PR5	PR6
Depth (m)			0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00
Sample Type			Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)
Date Sampled			15/09/2021	15/09/2021	15/09/2021	14/09/2021	15/09/2021	15/09/2021
Sampled Time			.	.	.	.	.	.
Date Received			17/09/2021	17/09/2021	17/09/2021	17/09/2021	17/09/2021	17/09/2021
SDG Ref			210917-103	210917-103	210917-103	210917-103	210917-103	210917-103
Lab Sample No.(s)			24995589	24995672	24995696	24995707	24995720	24995731
AGS Reference			EW	EW	EW	EW	EW	EW
Component	**LOD/Units**	**Method**						
GRO Surrogate % recovery**	%	TM245	99	99	96	120	103	101
GRO >C5-C12	<50 µg/l	TM245	208 #	9930 #	14800 #	439 #	<50 #	350 #
Aliphatics >C5-C6	<10 µg/l	TM245	<10	18	<100	<10	<10	<10
Aliphatics >C6-C8	<10 µg/l	TM245	11	124	291	15	<10	35
Aliphatics >C8-C10	<10 µg/l	TM245	39	651	613	71	<10	80
Aliphatics >C10-C12	<10 µg/l	TM245	44	2450	2500	132	<10	86
Aliphatics >C12-C16 (aq)	<10 µg/l	TM174	<10	<20	43	<10	<10	<20
Aliphatics >C16-C21 (aq)	<10 µg/l	TM174	<10	<20	<20	<10	<10	<20
Aliphatics >C21-C35 (aq)	<10 µg/l	TM174	<10	<20	<20	<10	<10	<20
Total Aliphatics >C12-C35 (aq)	<10 µg/l	TM174	<10	<20	43	<10	<10	<20
Total Aliphatics & Aromatics >C12-C35 (Aqueous)	<10 µg/l	TM174	188	2250	3370	235	<10	246
Aromatics >EC5-EC7	<10 µg/l	TM245	<10	2060	5930	20	<10	16
Aromatics >EC7-EC8	<10 µg/l	TM245	<10	1440	2290	20	<10	<10
Aromatics >EC8-EC10	<10 µg/l	TM245	82	1550	1440	90	<10	65
Aromatics >EC10-EC12	<10 µg/l	TM245	29	1630	1670	88	<10	57
Aromatics >EC12-EC16 (aq)	<10 µg/l	TM174	88	1330	2310	154	<10	170
Aromatics >EC16-EC21 (aq)	<10 µg/l	TM174	56	546	721	61	<10	76
Aromatics >EC21-EC35 (aq)	<10 µg/l	TM174	44	373	298	20	<10	<20
Total Aromatics >EC12-EC35 (aq)	<10 µg/l	TM174	188	2250	3330	235	<10	246
Total Aliphatics & Aromatics >C5-35 (aq)	<10 µg/l	TM174	396	12200	18200	674	<10	596
Aliphatics >C16-C35 Aqueous	<10 µg/l	TM174	<10	<20	<20	<10	<10	<20
Aromatics >EC16-EC35 (aq)	<10 µg/l	TM174	100	919	1020	81	<10	76

CERTIFICATE OF ANALYSIS

SDG: 210917-103 **Report Number:** 614534 **Superseded Report:**
Client Ref.: 70049885 **Location:** Limerick Gasworks

TPH CWG (W)

Results Legend

#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted - refer to subcontractor report for accreditation status.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-4+5@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	PR7	PR8	PR9	PR10	PR11	PR12
			Depth (m)	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00
			Sample Type	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)
			Date Sampled	15/09/2021	15/09/2021	15/09/2021	15/09/2021	15/09/2021	14/09/2021
			Sampled Time	.	.	.	.	.	.
			Date Received	17/09/2021	17/09/2021	17/09/2021	17/09/2021	17/09/2021	17/09/2021
			SDG Ref	210917-103	210917-103	210917-103	210917-103	210917-103	210917-103
			Lab Sample No.(s)	24995743	24995756	24995767	24995628	24995642	24995654
			AGS Reference	EW	EW	EW	EW	EW	EW
GRO Surrogate % recovery**	%	TM245		113	102	101	89	103	102
GRO >C5-C12	<50 µg/l	TM245		16800 #	7850 #	3350 #	<50 #	2150 #	1060 #
Aliphatics >C5-C6	<10 µg/l	TM245		52	31	<10	<10	<10	<10
Aliphatics >C6-C8	<10 µg/l	TM245		286	173	73	<10	45	30
Aliphatics >C8-C10	<10 µg/l	TM245		1340	846	311	<10	204	119
Aliphatics >C10-C12	<10 µg/l	TM245		5290	2200	983	<10	629	378
Aliphatics >C12-C16 (aq)	<10 µg/l	TM174		28	<50	<20	<10	<20	<20
Aliphatics >C16-C21 (aq)	<10 µg/l	TM174		11	<50	<20	<10	<20	<20
Aliphatics >C21-C35 (aq)	<10 µg/l	TM174		<10	<50	<20	<10	<20	<20
Total Aliphatics >C12-C35 (aq)	<10 µg/l	TM174		39	<50	<20	<10	<20	<20
Total Aliphatics & Aromatics >C12-C35 (Aqueous)	<10 µg/l	TM174		3300	12000	976	<10	785	812
Aromatics >EC5-EC7	<10 µg/l	TM245		1620	1140	501	<10	363	80
Aromatics >EC7-EC8	<10 µg/l	TM245		1830	712	219	<10	196	49
Aromatics >EC8-EC10	<10 µg/l	TM245		2820	1290	595	<10	281	149
Aromatics >EC10-EC12	<10 µg/l	TM245		3530	1470	655	<10	419	252
Aromatics >EC12-EC16 (aq)	<10 µg/l	TM174		2440	6860	628	<10	434	460
Aromatics >EC16-EC21 (aq)	<10 µg/l	TM174		666	3460	214	<10	220	199
Aromatics >EC21-EC35 (aq)	<10 µg/l	TM174		148	1690	134	<10	131	153
Total Aromatics >EC12-EC35 (aq)	<10 µg/l	TM174		3260	12000	976	<10	785	812
Total Aliphatics & Aromatics >C5-35 (aq)	<10 µg/l	TM174		20100	19900	4320	<10	2930	1880
Aliphatics >C16-C35 Aqueous	<10 µg/l	TM174		11	<50	<20	<10	<20	<20
Aromatics >EC16-EC35 (aq)	<10 µg/l	TM174		814	5150	348	<10	351	352

CERTIFICATE OF ANALYSIS

SDG: 210917-103 **Report Number:** 614534 **Superseded Report:**
Client Ref.: 70049885 **Location:** Limerick Gasworks

VOC MS (W)

Results Legend	
#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted - refer to subcontractor report for accreditation status.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-4+5@	Sample deviation (see appendix)

Customer Sample Ref.	PR1	PR2	PR3	PR4	PR5	PR6
Depth (m)	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00
Sample Type	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)
Date Sampled	15/09/2021	15/09/2021	15/09/2021	14/09/2021	15/09/2021	15/09/2021
Sampled Time	.	.	.	.	.	.
Date Received	17/09/2021	17/09/2021	17/09/2021	17/09/2021	17/09/2021	17/09/2021
SDG Ref	210917-103	210917-103	210917-103	210917-103	210917-103	210917-103
Lab Sample No.(s)	24995589	24995672	24995696	24995707	24995720	24995731
AGS Reference	EW	EW	EW	EW	EW	EW

Component	LOD/Units	Method											
Dibromofluoromethane**	%	TM208	109		109		47.4		111		109		111	
Toluene-d8**	%	TM208	101		99.3		101		102		101		99.9	
4-Bromofluorobenzene**	%	TM208	101		102		92		101		103		103	
Dichlorodifluoromethane	<1 µg/l	TM208	<1	#	<1	#	<1	#	<1	#	<1	#	<1	#
Chloromethane	<1 µg/l	TM208	<1	#	<1	#	<1	#	<1	#	<1	#	<1	#
Vinyl chloride	<1 µg/l	TM208	<1	#	<1	#	<1	#	<1	#	<1	#	<1	#
Bromomethane	<1 µg/l	TM208	<1	#	<1	#	<1	#	<1	#	<1	#	<1	#
Chloroethane	<1 µg/l	TM208	<1	#	<1	#	<1	#	<1	#	<1	#	<1	#
Trichlorofluoromethane	<1 µg/l	TM208	<1	#	<1	#	<1	#	<1	#	<1	#	<1	#
1,1-Dichloroethene	<1 µg/l	TM208	<1	#	<1	#	<1	#	<1	#	<1	#	<1	#
Carbon disulphide	<1 µg/l	TM208	<1	#	<1	#	2.62	#	1.84	#	<1	#	<1	#
Dichloromethane	<3 µg/l	TM208	<3	#	<3	#	<3	#	<3	#	<3	#	<3	#
Methyl tertiary butyl ether (MTBE)	<1 µg/l	TM208	<1	#	<1	#	<1	#	<1	#	<1	#	<1	#
trans-1,2-Dichloroethene	<1 µg/l	TM208	<1	#	<1	#	<1	#	<1	#	<1	#	<1	#
1,1-Dichloroethane	<1 µg/l	TM208	<1	#	<1	#	<1	#	<1	#	<1	#	<1	#
cis-1,2-Dichloroethene	<1 µg/l	TM208	<1	#	<1	#	<1	#	<1	#	<1	#	<1	#
2,2-Dichloropropane	<1 µg/l	TM208	<1		<1		<1		<1		<1		<1	
Bromochloromethane	<1 µg/l	TM208	<1	#	<1	#	<1	#	<1	#	<1	#	<1	#
Chloroform	<1 µg/l	TM208	1.13	#	<1	#	<1	#	<1	#	<1	#	<1	#
1,1,1-Trichloroethane	<1 µg/l	TM208	<1	#	<1	#	<1	#	<1	#	<1	#	<1	#
1,1-Dichloropropene	<1 µg/l	TM208	<1	#	<1	#	<1	#	<1	#	<1	#	<1	#
Carbontetrachloride	<1 µg/l	TM208	<1	#	<1	#	<1	#	<1	#	<1	#	<1	#
1,2-Dichloroethane	<1 µg/l	TM208	<1	#	<1	#	<1	#	<1	#	<1	#	<1	#
Benzene	<1 µg/l	TM208	<1	#	2110	#	5410	#	17.5	#	<1	#	18.2	#
Trichloroethene	<1 µg/l	TM208	<1	#	<1	#	<1	#	<1	#	<1	#	<1	#
1,2-Dichloropropane	<1 µg/l	TM208	<1	#	<1	#	<1	#	<1	#	<1	#	<1	#
Dibromomethane	<1 µg/l	TM208	<1	#	<1	#	<1	#	<1	#	<1	#	<1	#
Bromodichloromethane	<1 µg/l	TM208	<1	#	<1	#	<1	#	<1	#	<1	#	<1	#
cis-1,3-Dichloropropene	<1 µg/l	TM208	<1	#	<1	#	<1	#	<1	#	<1	#	<1	#
Toluene	<1 µg/l	TM208	<1	#	1360	#	2270	#	16.6	#	<1	#	6.41	#
trans-1,3-Dichloropropene	<1 µg/l	TM208	<1	#	<1	#	<1	#	<1	#	<1	#	<1	#
1,1,2-Trichloroethane	<1 µg/l	TM208	<1	#	<1	#	<1	#	<1	#	<1	#	<1	#

CERTIFICATE OF ANALYSIS

SDG: 210917-103 **Report Number:** 614534 **Superseded Report:**
Client Ref.: 70049885 **Location:** Limerick Gasworks

VOC MS (W)

Results Legend

#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted - refer to subcontractor report for accreditation status.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-4+$@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	PR1	PR2	PR3	PR4	PR5	PR6
			Depth (m)	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00
			Sample Type	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)
			Date Sampled	15/09/2021	15/09/2021	15/09/2021	14/09/2021	15/09/2021	15/09/2021
			Sampled Time	.	.	.	.	.	.
			Date Received	17/09/2021	17/09/2021	17/09/2021	17/09/2021	17/09/2021	17/09/2021
			SDG Ref	210917-103	210917-103	210917-103	210917-103	210917-103	210917-103
			Lab Sample No.(s)	24995589	24995672	24995696	24995707	24995720	24995731
			AGS Reference	EW	EW	EW	EW	EW	EW
1,3-Dichloropropane	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Tetrachloroethene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Dibromochloromethane	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
1,2-Dibromoethane	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Chlorobenzene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
1,1,1,2-Tetrachloroethane	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Ethylbenzene	<1 µg/l	TM208		<1 #	96.7 #	93.8 #	6.58 #	<1 #	1.95 #
m,p-Xylene	<1 µg/l	TM208		23.4 #	670 #	593 #	15.3 #	<1 #	6.78 #
o-Xylene	<1 µg/l	TM208		18.4 #	308 #	298 #	10.6 #	<1 #	6.7 #
Styrene	<1 µg/l	TM208		<1 #	<1 #	50.8 #	<1 #	<1 #	<1 #
Bromoform	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Isopropylbenzene	<1 µg/l	TM208		<1 #	4.53 #	3.61 #	<1 #	<1 #	<1 #
1,1,2,2-Tetrachloroethane	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
1,2,3-Trichloropropane	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Bromobenzene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Propylbenzene	<1 µg/l	TM208		<1 #	6.73 #	4.61 #	<1 #	<1 #	<1 #
2-Chlorotoluene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
1,3,5-Trimethylbenzene	<1 µg/l	TM208		3.26 #	47.5 #	30.1 #	3.63 #	<1 #	<1 #
4-Chlorotoluene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
tert-Butylbenzene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
1,2,4-Trimethylbenzene	<1 µg/l	TM208		10.1 #	118 #	74.6 #	10.1 #	<1 #	1.64 #
sec-Butylbenzene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
4-iso-Propyltoluene	<1 µg/l	TM208		<1 #	14 #	<1 #	<1 #	<1 #	<1 #
1,3-Dichlorobenzene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
1,4-Dichlorobenzene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
n-Butylbenzene	<1 µg/l	TM208		<1 #	<1 #	1.84 #	<1 #	<1 #	<1 #
1,2-Dichlorobenzene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
1,2-Dibromo-3-chloropropane	<1 µg/l	TM208		<1	<1	<1	<1	<1	<1
1,2,4-Trichlorobenzene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Hexachlorobutadiene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
tert-Amyl methyl ether (TAME)	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Naphthalene	<1 µg/l	TM208		<1 #	3260 #	2520 #	31.1 #	<1 #	<1 #

CERTIFICATE OF ANALYSIS

SDG: 210917-103 **Report Number:** 614534 **Superseded Report:**
Client Ref.: 70049885 **Location:** Limerick Gasworks

VOC MS (W)

Results Legend	
#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted - refer to subcontractor report for accreditation status.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-4+S@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	PR1	PR2	PR3	PR4	PR5	PR6
			Depth (m)	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00
			Sample Type	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)
			Date Sampled	15/09/2021	15/09/2021	15/09/2021	14/09/2021	15/09/2021	15/09/2021
			Sampled Time	.	.	.	.	.	.
			Date Received	17/09/2021	17/09/2021	17/09/2021	17/09/2021	17/09/2021	17/09/2021
			SDG Ref	210917-103	210917-103	210917-103	210917-103	210917-103	210917-103
			Lab Sample No.(s)	24995589	24995672	24995696	24995707	24995720	24995731
			AGS Reference	EW	EW	EW	EW	EW	EW
1,2,3-Trichlorobenzene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
1,3,5-Trichlorobenzene	<1 µg/l	TM208		<1	<1	<1	<1	<1	<1
Sum of detected Xylenes	<2 µg/l	TM208		41.8	978	891	25.9	<2	13.5

CERTIFICATE OF ANALYSIS

SDG: 210917-103 **Report Number:** 614534 **Superseded Report:**
Client Ref.: 70049885 **Location:** Limerick Gasworks

VOC MS (W)

Results Legend

#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted - refer to subcontractor report for accreditation status.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-4+5@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	PR7	PR8	PR9	PR10	PR11	PR12
			Depth (m)	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00
			Sample Type	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)
			Date Sampled	15/09/2021	15/09/2021	15/09/2021	15/09/2021	15/09/2021	14/09/2021
			Sampled Time	.	.	.	.	.	.
			Date Received	17/09/2021	17/09/2021	17/09/2021	17/09/2021	17/09/2021	17/09/2021
			SDG Ref	210917-103	210917-103	210917-103	210917-103	210917-103	210917-103
			Lab Sample No.(s)	24995743	24995756	24995767	24995628	24995642	24995654
			AGS Reference	EW	EW	EW	EW	EW	EW
Dibromofluoromethane**	%	TM208		39.1	0.36	111	110	90.7	107
Toluene-d8**	%	TM208		100	98.9	101	101	101	101
4-Bromofluorobenzene**	%	TM208		91.3	89.2	100	104	101	100
Dichlorodifluoromethane	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Chloromethane	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Vinyl chloride	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Bromomethane	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Chloroethane	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Trichlorofluoromethane	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
1,1-Dichloroethene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Carbon disulphide	<1 µg/l	TM208		3.92 #	2.72 #	1.28 #	<1 #	4.71 #	3.2 #
Dichloromethane	<3 µg/l	TM208		<3 #	<3 #	<3 #	<3 #	<3 #	<3 #
Methyl tertiary butyl ether (MTBE)	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
trans-1,2-Dichloroethene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
1,1-Dichloroethane	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
cis-1,2-Dichloroethene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
2,2-Dichloropropane	<1 µg/l	TM208		<1	<1	<1	<1	<1	<1
Bromochloromethane	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Chloroform	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
1,1,1-Trichloroethane	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
1,1-Dichloropropene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Carbontetrachloride	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
1,2-Dichloroethane	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Benzene	<1 µg/l	TM208		1360 #	1090 #	532 #	<1 #	384 #	82 #
Trichloroethene	<1 µg/l	TM208		1.6 #	<1 #	<1 #	<1 #	<1 #	<1 #
1,2-Dichloropropane	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Dibromomethane	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Bromodichloromethane	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
cis-1,3-Dichloropropene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Toluene	<1 µg/l	TM208		1410 #	648 #	210 #	<1 #	189 #	44.5 #
trans-1,3-Dichloropropene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
1,1,2-Trichloroethane	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #

CERTIFICATE OF ANALYSIS

SDG: 210917-103 **Report Number:** 614534 **Superseded Report:**
Client Ref.: 70049885 **Location:** Limerick Gasworks

VOC MS (W)

Results Legend

#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted - refer to subcontractor report for accreditation status.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-4+$@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	PR7	PR8	PR9	PR10	PR11	PR12
			Depth (m)	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00
			Sample Type	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)
			Date Sampled	15/09/2021	15/09/2021	15/09/2021	15/09/2021	15/09/2021	14/09/2021
			Sampled Time	.	.	.	.	.	.
			Date Received	17/09/2021	17/09/2021	17/09/2021	17/09/2021	17/09/2021	17/09/2021
			SDG Ref	210917-103	210917-103	210917-103	210917-103	210917-103	210917-103
			Lab Sample No.(s)	24995743	24995756	24995767	24995628	24995642	24995654
			AGS Reference	EW	EW	EW	EW	EW	EW
1,3-Dichloropropane	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Tetrachloroethene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Dibromochloromethane	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
1,2-Dibromoethane	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Chlorobenzene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
1,1,1,2-Tetrachloroethane	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Ethylbenzene	<1 µg/l	TM208		122 #	74 #	62.5 #	<1 #	13.3 #	5.49 #
m,p-Xylene	<1 µg/l	TM208		830 #	392 #	142 #	<1 #	76.6 #	36.1 #
o-Xylene	<1 µg/l	TM208		433 #	221 #	138 #	<1 #	48.6 #	22.8 #
Styrene	<1 µg/l	TM208		213 #	69.3 #	<1 #	<1 #	14.7 #	<1 #
Bromoform	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Isopropylbenzene	<1 µg/l	TM208		6.84 #	4.02 #	6.34 #	<1 #	<1 #	<1 #
1,1,2,2-Tetrachloroethane	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
1,2,3-Trichloropropane	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Bromobenzene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Propylbenzene	<1 µg/l	TM208		9.11 #	4.09 #	7.94 #	<1 #	<1 #	<1 #
2-Chlorotoluene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
1,3,5-Trimethylbenzene	<1 µg/l	TM208		51.2 #	22.1 #	18.7 #	<1 #	5.63 #	6.75 #
4-Chlorotoluene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
tert-Butylbenzene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
1,2,4-Trimethylbenzene	<1 µg/l	TM208		141 #	59.4 #	71 #	<1 #	13.2 #	12 #
sec-Butylbenzene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
4-iso-Propyltoluene	<1 µg/l	TM208		18.3 #	<1 #	1.57 #	<1 #	<1 #	<1 #
1,3-Dichlorobenzene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
1,4-Dichlorobenzene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
n-Butylbenzene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
1,2-Dichlorobenzene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
1,2-Dibromo-3-chloropropane	<1 µg/l	TM208		<1	<1	<1	<1	<1	<1
1,2,4-Trichlorobenzene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Hexachlorobutadiene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
tert-Amyl methyl ether (TAME)	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Naphthalene	<1 µg/l	TM208		4130 #	2320 #	1100 #	<1 #	502 #	364 #

CERTIFICATE OF ANALYSIS

SDG: 210917-103 **Report Number:** 614534 **Superseded Report:**
Client Ref.: 70049885 **Location:** Limerick Gasworks

VOC MS (W)

Results Legend	
#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted - refer to subcontractor report for accreditation status.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-4+5@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	PR7	PR8	PR9	PR10	PR11	PR12
			Depth (m)	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00
			Sample Type	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)
			Date Sampled	15/09/2021	15/09/2021	15/09/2021	15/09/2021	15/09/2021	14/09/2021
			Sampled Time	.	.	.	.	.	.
			Date Received	17/09/2021	17/09/2021	17/09/2021	17/09/2021	17/09/2021	17/09/2021
			SDG Ref	210917-103	210917-103	210917-103	210917-103	210917-103	210917-103
			Lab Sample No.(s)	24995743	24995756	24995767	24995628	24995642	24995654
			AGS Reference	EW	EW	EW	EW	EW	EW
1,2,3-Trichlorobenzene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
1,3,5-Trichlorobenzene	<1 µg/l	TM208		<1	<1	<1	<1	<1	<1
Sum of detected Xylenes	<2 µg/l	TM208		1260	613	280	<2	125	58.9

Table of Results - Appendix

Method No	Reference	Description
TM099	BS 2690: Part 7:1968 / BS 6068: Part2.11:1984	Determination of Ammonium in Water Samples using the Kone Analyser
TM101	Method 4500B & C, AWWA/APHA, 20th Ed., 1999	Determination of Sulphide in soil and water samples using the Kone Analyser
TM152	Method 3125B, AWWA/APHA, 20th Ed., 1999	Analysis of Aqueous Samples by ICP-MS
TM174	Analysis of Petroleum Hydrocarbons in Environmental Media – Total Petroleum Hydrocarbon Criteria	Determination of Speciated Extractable Petroleum Hydrocarbons in Waters by GC-FID
TM178	Modified: US EPA Method 8100	Determination of Polynuclear Aromatic Hydrocarbons (PAH) by GC-MS in Waters
TM183	BS EN 23506:2002, (BS 6068-2.74:2002) ISBN 0 580 38924 3	Determination of Trace Level Mercury in Waters and Leachates by PSA Cold Vapour Atomic Fluorescence Spectrometry
TM184	EPA Methods 325.1 & 325.2,	The Determination of Anions in Aqueous Matrices using the Kone Spectrophotometric Analysers
TM208	Modified: US EPA Method 8260b & 624	Determination of Volatile Organic Compounds by Headspace / GC-MS in Waters
TM241	Methods for the Examination of Waters and Associated Materials; Chromium in Raw and Potable Waters and Sewage Effluents 1980.	The Determination of Hexavalent Chromium in Waters and Leachates using the Kone Analyser
TM245	By GC-FID	Determination of GRO by Headspace in waters
TM256	The measurement of Electrical Conductivity and the Laboratory determination of pH Value of Natural, Treated and Wastewaters. HMSO, 1978. ISBN 011 751428 4.	Determination of pH in Water and Leachate using the GLpH pH Meter
TM259	by HPLC	Determination of Phenols in Waters and Leachates by HPLC
TM279		Determination of Low Level Easily Liberatable (Free) Cyanides and Total Cyanides in Waters using the Skalar SANS+ System Segmented Flow Analyser

NA = not applicable.

Chemical testing (unless subcontracted) performed at ALS Environmental Hawarden (Method codes TM) or ALS Environmental Aberdeen (Method codes S).

CERTIFICATE OF ANALYSIS

SDG: 210917-103 **Report Number:** 614534 **Superseded Report:**
Client Ref.: 70049885 **Location:** Limerick Gasworks

Test Completion Dates

Lab Sample No(s)	24995589	24995672	24995696	24995707	24995720	24995731	24995743	24995756	24995767	24995628
Customer Sample Ref.	PR1	PR2	PR3	PR4	PR5	PR6	PR7	PR8	PR9	PR10
AGS Ref.	EW	EW	EW	EW	EW	EW	EW	EW	EW	EW
Depth	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00
Type	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water
Ammoniacal Nitrogen	22-Sep-2021	22-Sep-2021	22-Sep-2021	22-Sep-2021	22-Sep-2021	22-Sep-2021	22-Sep-2021	23-Sep-2021	21-Sep-2021	21-Sep-2021
Anions by Kone (w)	18-Sep-2021	18-Sep-2021	23-Sep-2021	18-Sep-2021	18-Sep-2021	23-Sep-2021	23-Sep-2021	23-Sep-2021	18-Sep-2021	23-Sep-2021
Dissolved Metals by ICP-MS	20-Sep-2021	21-Sep-2021	20-Sep-2021	20-Sep-2021	21-Sep-2021	21-Sep-2021	20-Sep-2021	24-Sep-2021	21-Sep-2021	20-Sep-2021
EPH CWG (Aliphatic) Aqueous GC (W)	24-Sep-2021	24-Sep-2021	24-Sep-2021	24-Sep-2021	23-Sep-2021	24-Sep-2021	24-Sep-2021	23-Sep-2021	24-Sep-2021	24-Sep-2021
EPH CWG (Aromatic) Aqueous GC (W)	24-Sep-2021	24-Sep-2021	24-Sep-2021	24-Sep-2021	23-Sep-2021	24-Sep-2021	24-Sep-2021	23-Sep-2021	24-Sep-2021	24-Sep-2021
GRO by GC-FID (W)	23-Sep-2021	23-Sep-2021	24-Sep-2021	23-Sep-2021	23-Sep-2021	23-Sep-2021	24-Sep-2021	23-Sep-2021	23-Sep-2021	23-Sep-2021
Hexavalent Chromium (w)	20-Sep-2021	20-Sep-2021	20-Sep-2021	20-Sep-2021	20-Sep-2021	20-Sep-2021	20-Sep-2021	20-Sep-2021	20-Sep-2021	20-Sep-2021
Low Level Cyanide (W)	24-Sep-2021	24-Sep-2021	24-Sep-2021	24-Sep-2021	24-Sep-2021	24-Sep-2021	24-Sep-2021	24-Sep-2021	24-Sep-2021	24-Sep-2021
Mercury Dissolved	21-Sep-2021	21-Sep-2021	21-Sep-2021	21-Sep-2021	21-Sep-2021	21-Sep-2021	21-Sep-2021	23-Sep-2021	21-Sep-2021	21-Sep-2021
PAH Spec MS - Aqueous (W)	22-Sep-2021	24-Sep-2021	24-Sep-2021	22-Sep-2021	22-Sep-2021	22-Sep-2021	24-Sep-2021	22-Sep-2021	22-Sep-2021	22-Sep-2021
pH Value	20-Sep-2021	20-Sep-2021	20-Sep-2021	20-Sep-2021	20-Sep-2021	20-Sep-2021	20-Sep-2021	20-Sep-2021	20-Sep-2021	20-Sep-2021
Phenols by HPLC (W)	22-Sep-2021	22-Sep-2021	23-Sep-2021	22-Sep-2021	22-Sep-2021	22-Sep-2021	23-Sep-2021	22-Sep-2021	22-Sep-2021	21-Sep-2021
Sulphide	21-Sep-2021	21-Sep-2021	23-Sep-2021	21-Sep-2021	21-Sep-2021	21-Sep-2021	21-Sep-2021	21-Sep-2021	23-Sep-2021	21-Sep-2021
TPH CWG (W)	24-Sep-2021	24-Sep-2021	24-Sep-2021	24-Sep-2021	23-Sep-2021	24-Sep-2021	24-Sep-2021	23-Sep-2021	24-Sep-2021	24-Sep-2021
VOC MS (W)	23-Sep-2021	24-Sep-2021	24-Sep-2021	23-Sep-2021	23-Sep-2021	23-Sep-2021	24-Sep-2021	24-Sep-2021	24-Sep-2021	23-Sep-2021

Lab Sample No(s)	24995642	24995654
Customer Sample Ref.	PR11	PR12
AGS Ref.	EW	EW
Depth	0.00 - 0.00	0.00 - 0.00
Type	Ground Water	Ground Water
Ammoniacal Nitrogen	23-Sep-2021	22-Sep-2021
Anions by Kone (w)	23-Sep-2021	18-Sep-2021
Dissolved Metals by ICP-MS	21-Sep-2021	21-Sep-2021
EPH CWG (Aliphatic) Aqueous GC (W)	24-Sep-2021	24-Sep-2021
EPH CWG (Aromatic) Aqueous GC (W)	24-Sep-2021	24-Sep-2021
GRO by GC-FID (W)	23-Sep-2021	23-Sep-2021
Hexavalent Chromium (w)	20-Sep-2021	20-Sep-2021
Low Level Cyanide (W)	24-Sep-2021	24-Sep-2021
Mercury Dissolved	21-Sep-2021	21-Sep-2021
PAH Spec MS - Aqueous (W)	24-Sep-2021	22-Sep-2021
pH Value	20-Sep-2021	20-Sep-2021
Phenols by HPLC (W)	21-Sep-2021	21-Sep-2021
Sulphide	21-Sep-2021	21-Sep-2021
TPH CWG (W)	24-Sep-2021	24-Sep-2021
VOC MS (W)	24-Sep-2021	24-Sep-2021

CERTIFICATE OF ANALYSIS

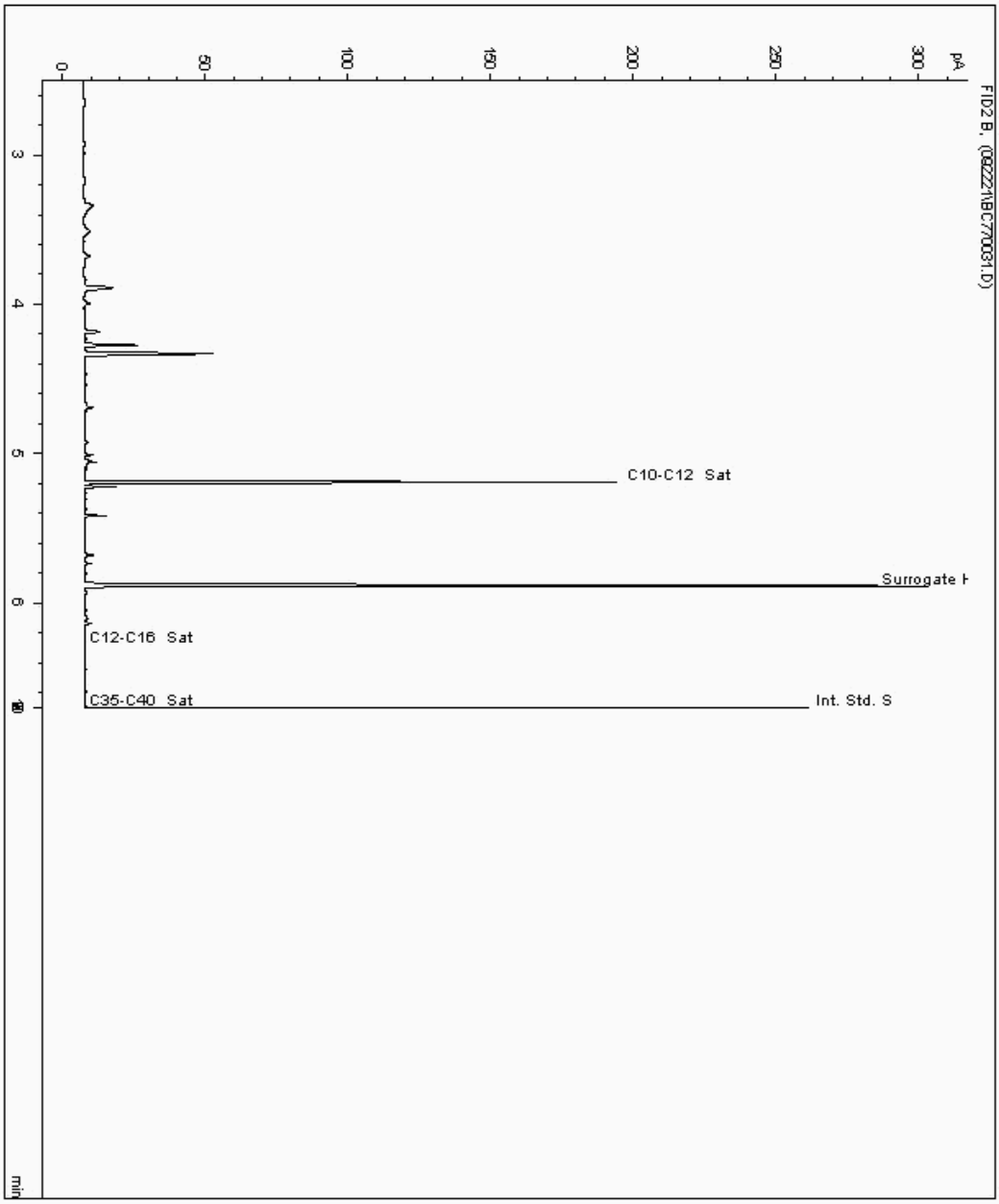
SDG: 210917-103 **Report Number:** 614534 **Superseded Report:**
Client Ref.: 70049885 **Location:** Limerick Gasworks

Chromatogram

Analysis: EPH CWG (Aliphatic) Aqueous GC (W) **Sample No :** 24996799 **Depth :** 0.00 - 0.00
Sample ID : PR8

Alcontrol/Geochem Analytical Services
Speciated TPH - SATS (C12 - C40)

Sample Identity: 23370088-
Date Acquired : 9/23/2021 4:15:14 AM
Units : ppb
Dilution :
CF : 1
Multiplier : 0.125



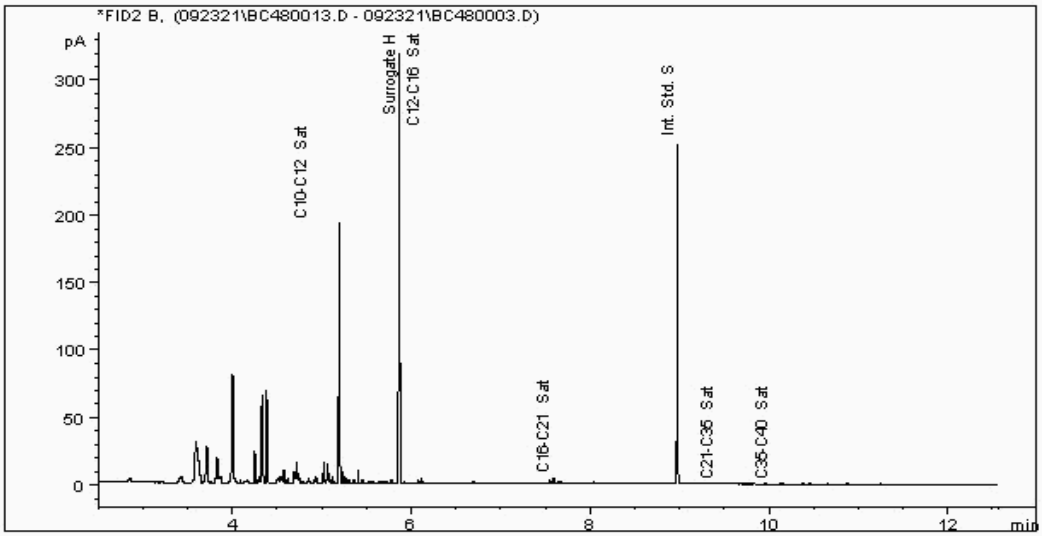
Chromatogram

Analysis: EPH CWG (Aliphatic) Aqueous GC (W) **Sample No :** 24996834 **Depth :** 0.00 - 0.00
Sample ID : PR7

Alcontrol/Geochem Analytical Services
Speciated TPH - SATS (C12 - C40)

Sample Identity: 23370068-
Date Acquired : 23/09/2021 21:25:33 PM
Units : ppb
Dilution : SE PR7[0.00 - 0.00] ->
CF : 1
Multiplier : 0.025

#	Compound Name	Main Peak Area	Amount
1	C10-C12 Sat	351.9	0.307
2	Surrogate H	236.1	0.223
3	C12-C16 Sat	32.8	0.028
4	C16-C21 Sat	12.4	0.011
5	Int. Std. S	203.4	0.250
6	C21-C35 Sat	0.0	0.000
7	C35-C40 Sat	0.0	0.000
	Total Peak Area	836.7	



CERTIFICATE OF ANALYSIS

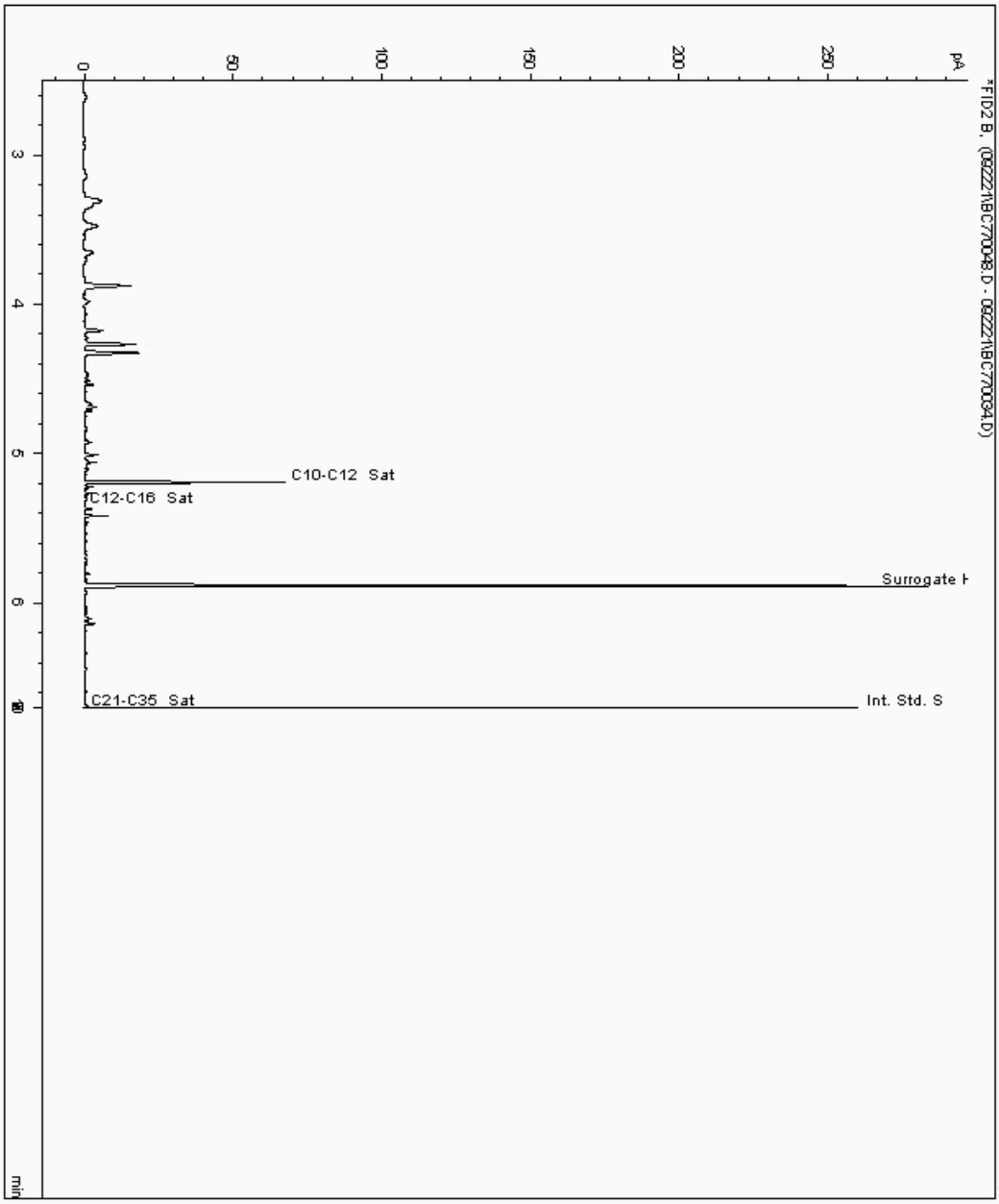
SDG: 210917-103 **Report Number:** 614534 **Superseded Report:**
Client Ref.: 70049885 **Location:** Limerick Gasworks

Chromatogram

Analysis: EPH CWG (Aliphatic) Aqueous GC (W) **Sample No :** 24996841 **Depth :** 0.00 - 0.00
Sample ID : PR3

Alcontrol/Geochem Analytical Services
Speciated TPH - SATS (C12 - C40)

Sample Identity: 23369974-
Date Acquired : 9/23/2021 3:38:43 PM
Units : ppb
Dilution :
CF : 1
Multiplier : 0.050

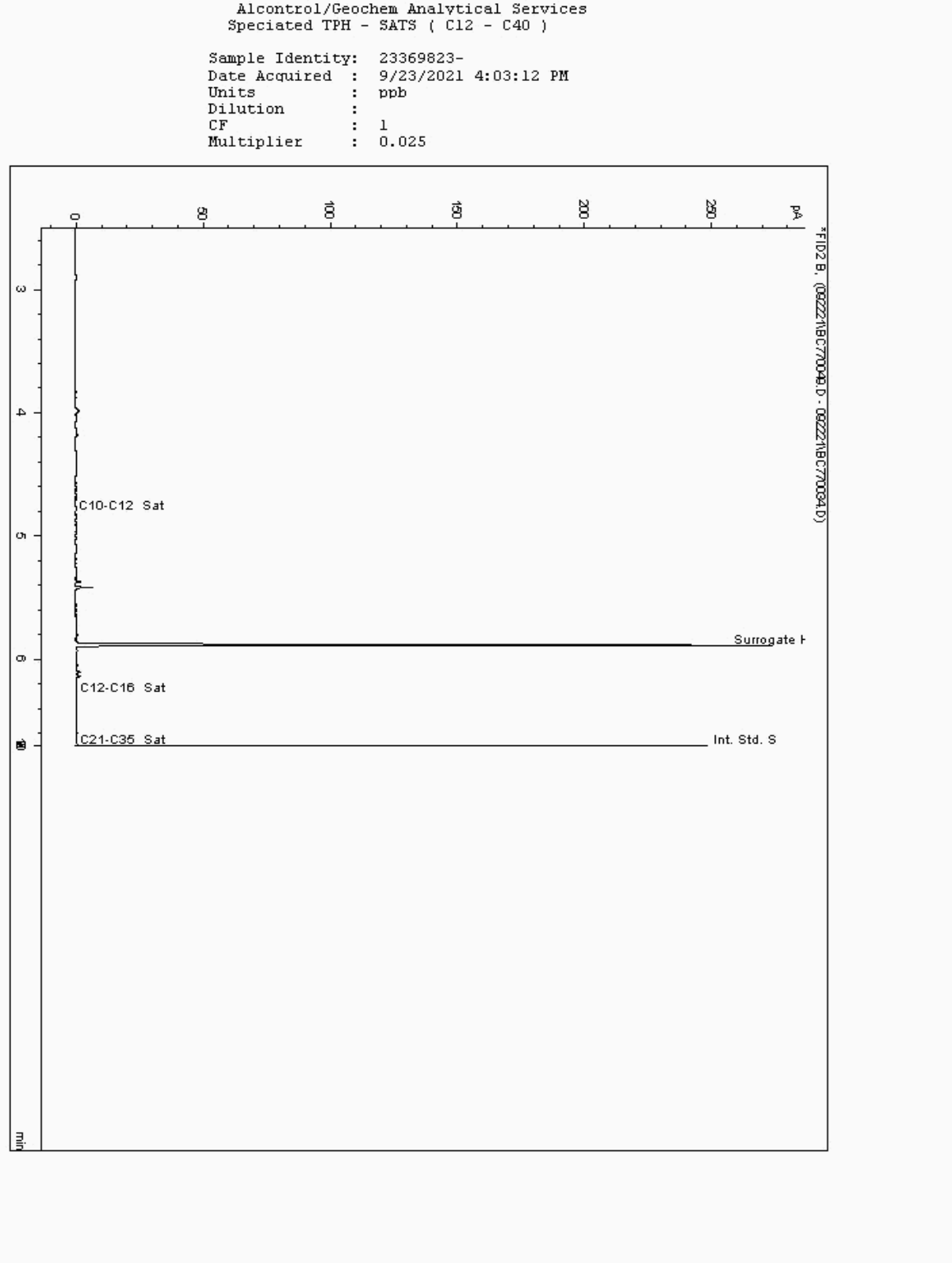


CERTIFICATE OF ANALYSIS

SDG: 210917-103 **Report Number:** 614534 **Superseded Report:**
Client Ref.: 70049885 **Location:** Limerick Gasworks

Chromatogram

Analysis: EPH CWG (Aliphatic) Aqueous GC (W) **Sample No :** 24997033 **Depth :** 0.00 - 0.00
Sample ID : PR10

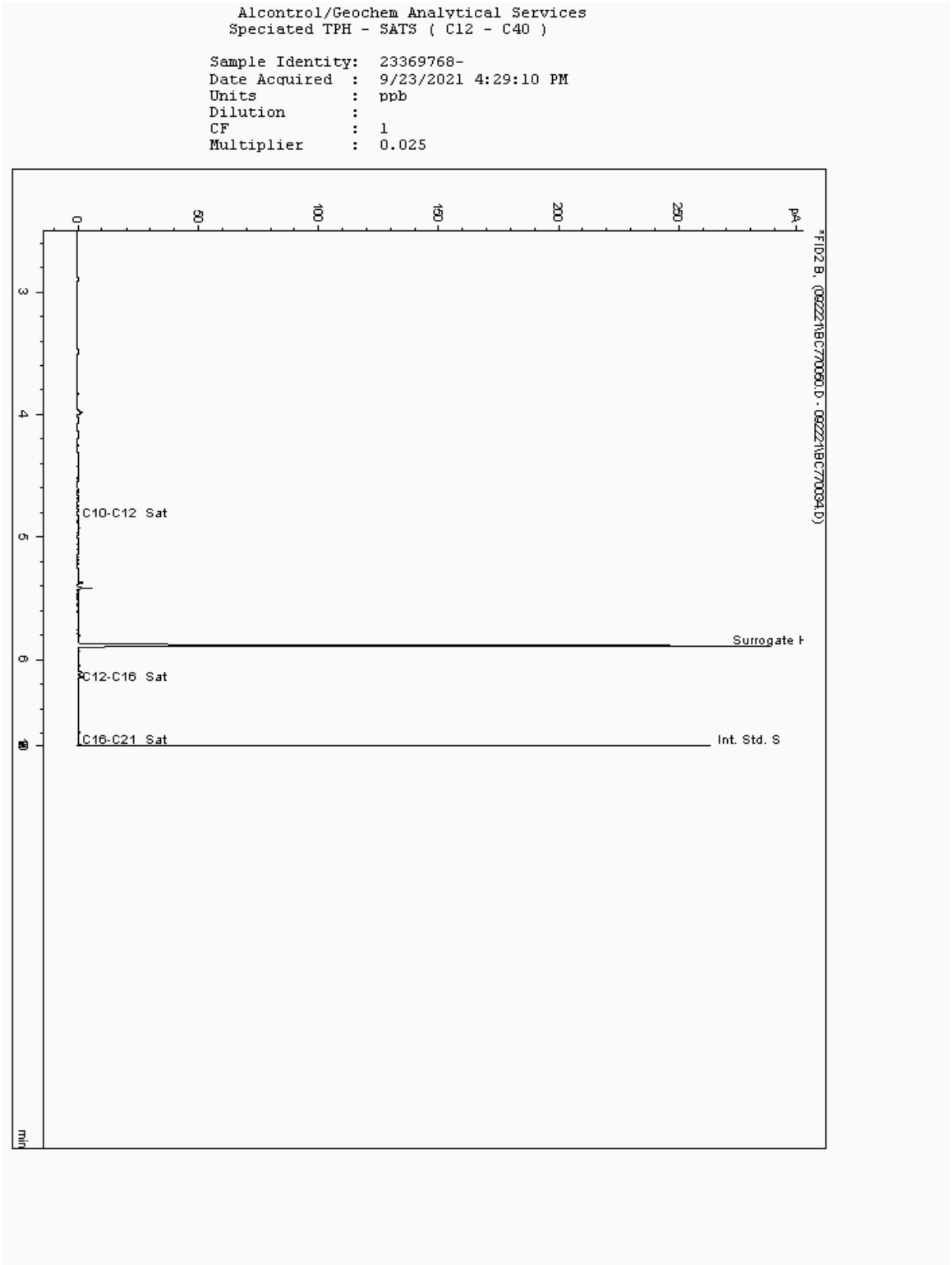


CERTIFICATE OF ANALYSIS

SDG: 210917-103 **Report Number:** 614534 **Superseded Report:**
Client Ref.: 70049885 **Location:** Limerick Gasworks

Chromatogram

Analysis: EPH CWG (Aliphatic) Aqueous GC (W) **Sample No :** 24997636 **Depth :** 0.00 - 0.00
Sample ID : PR1



CERTIFICATE OF ANALYSIS

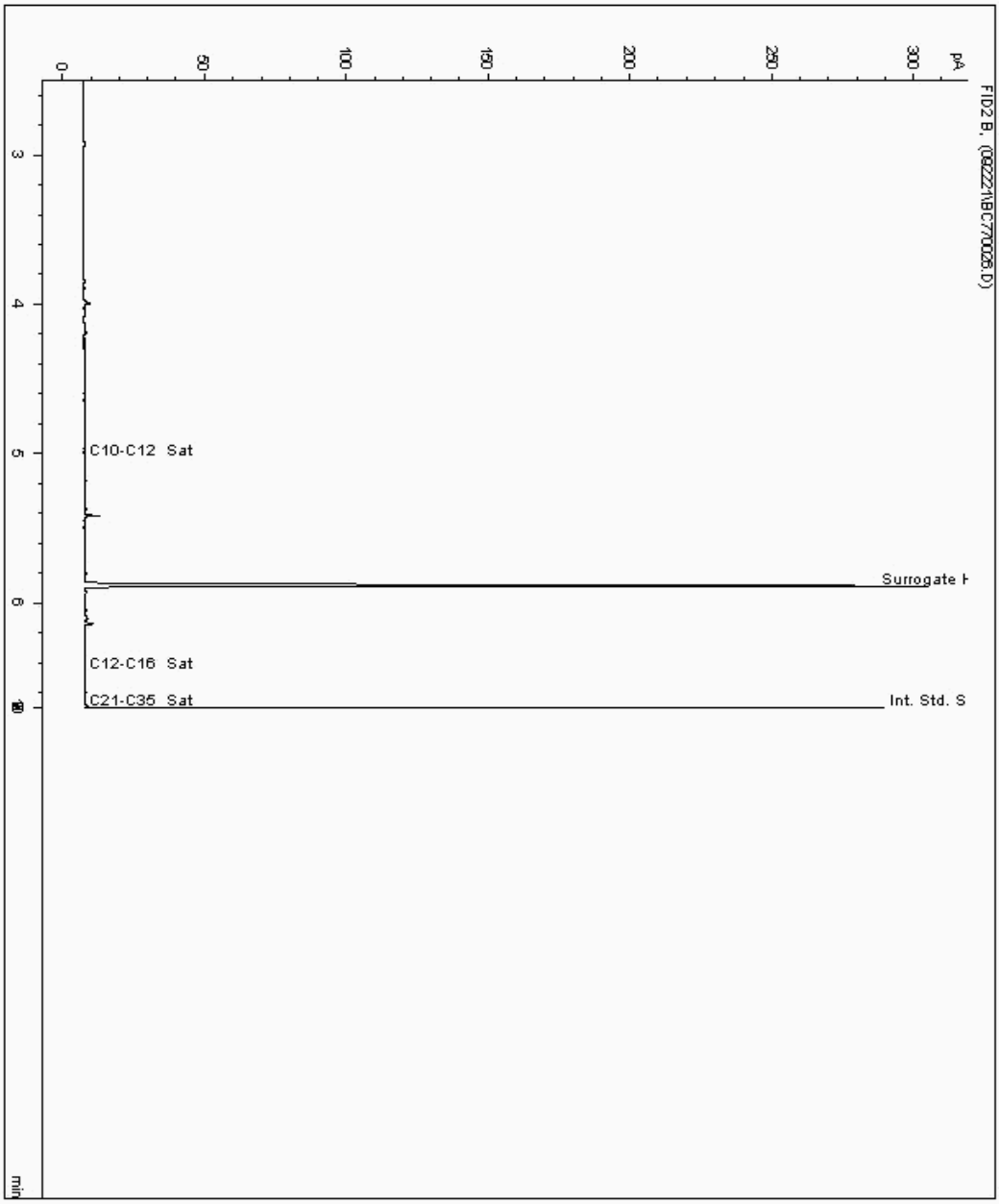
SDG: 210917-103 **Report Number:** 614534 **Superseded Report:**
Client Ref.: 70049885 **Location:** Limerick Gasworks

Chromatogram

Analysis: EPH CWG (Aliphatic) Aqueous GC (W) **Sample No :** 24997643 **Depth :** 0.00 - 0.00
Sample ID : PR5

Alcontrol/Geochem Analytical Services
Speciated TPH - SATS (C12 - C40)

Sample Identity: 23370025-
Date Acquired : 9/23/2021 2:12:51 AM
Units : ppb
Dilution :
CF : 1
Multiplier : 0.025



CERTIFICATE OF ANALYSIS

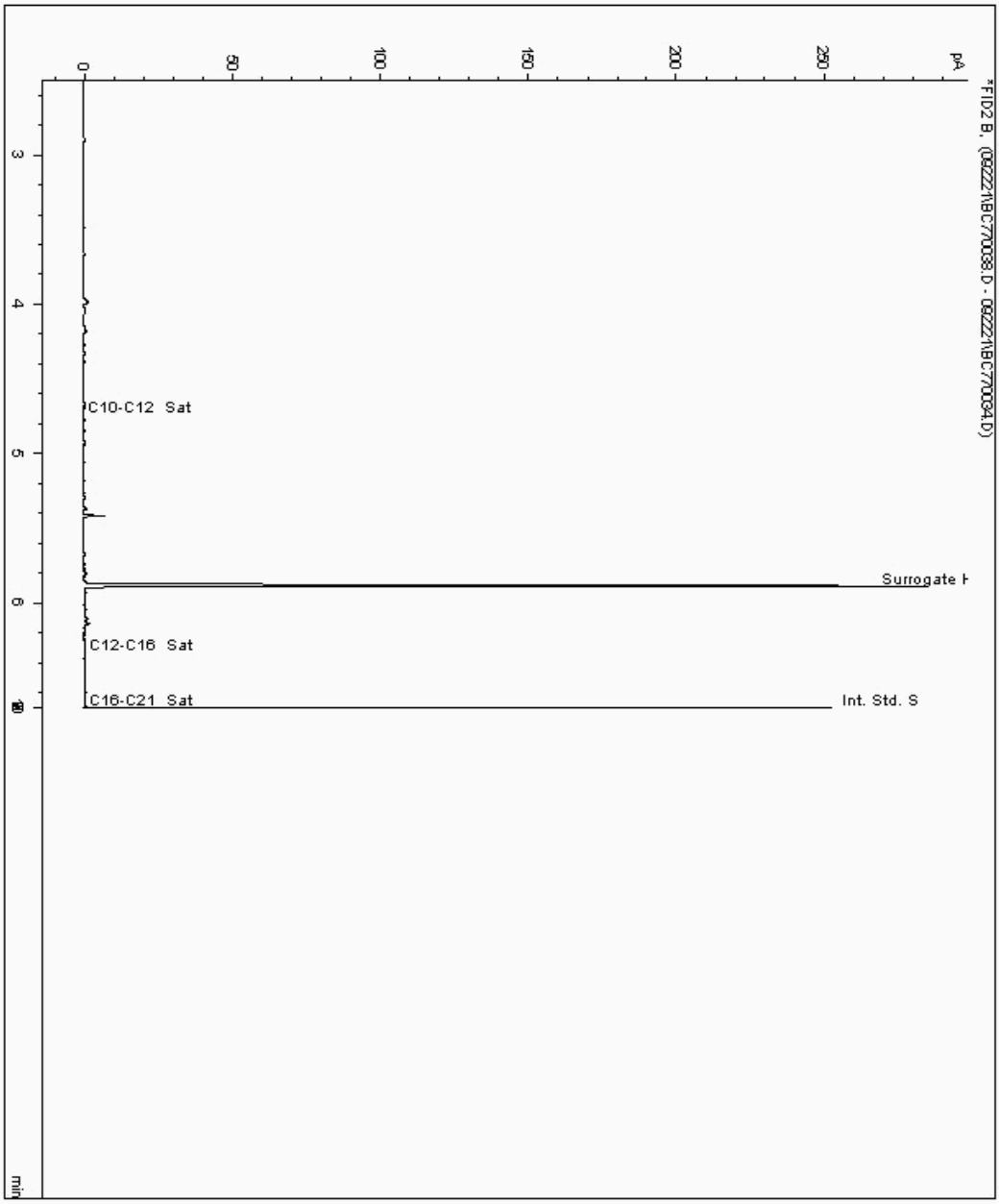
SDG: 210917-103 **Report Number:** 614534 **Superseded Report:**
Client Ref.: 70049885 **Location:** Limerick Gasworks

Chromatogram

Analysis: EPH CWG (Aliphatic) Aqueous GC (W) **Sample No :** 24997648 **Depth :** 0.00 - 0.00
Sample ID : PR6

Alcontrol/Geochem Analytical Services
Speciated TPH - SATS (C12 - C40)

Sample Identity: 23370045-
Date Acquired : 9/23/2021 11:32:52 AM
Units : ppb
Dilution :
CF : 1
Multiplier : 0.050



CERTIFICATE OF ANALYSIS

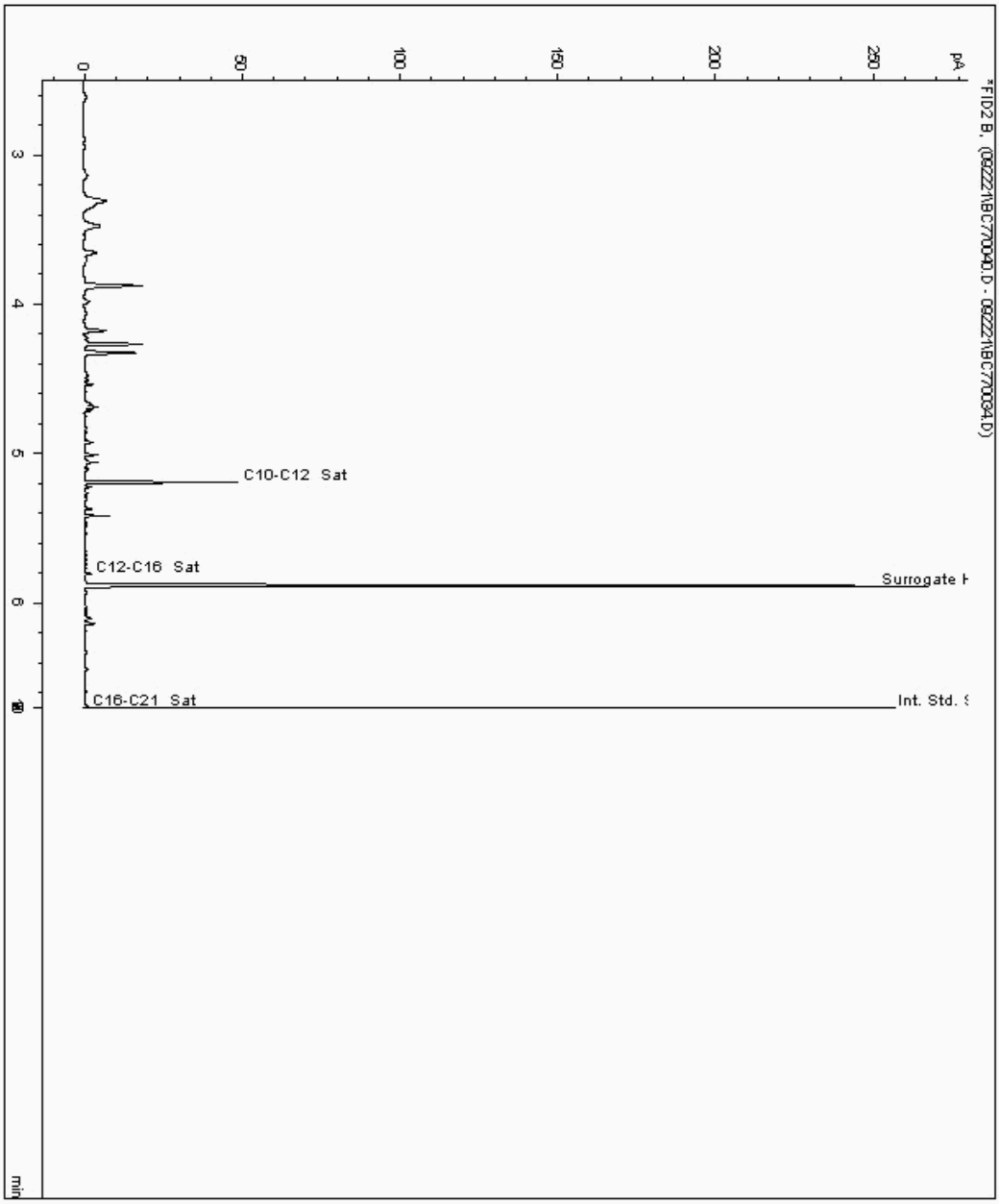
SDG: 210917-103 **Report Number:** 614534 **Superseded Report:**
Client Ref.: 70049885 **Location:** Limerick Gasworks

Chromatogram

Analysis: EPH CWG (Aliphatic) Aqueous GC (W) **Sample No :** 24997895 **Depth :** 0.00 - 0.00
Sample ID : PR2

Alcontrol/Geochem Analytical Services
Speciated TPH - SATS (C12 - C40)

Sample Identity: 23369949-
Date Acquired : 9/23/2021 12:21:56 PM
Units : ppb
Dilution :
CF : 1
Multiplier : 0.050



CERTIFICATE OF ANALYSIS

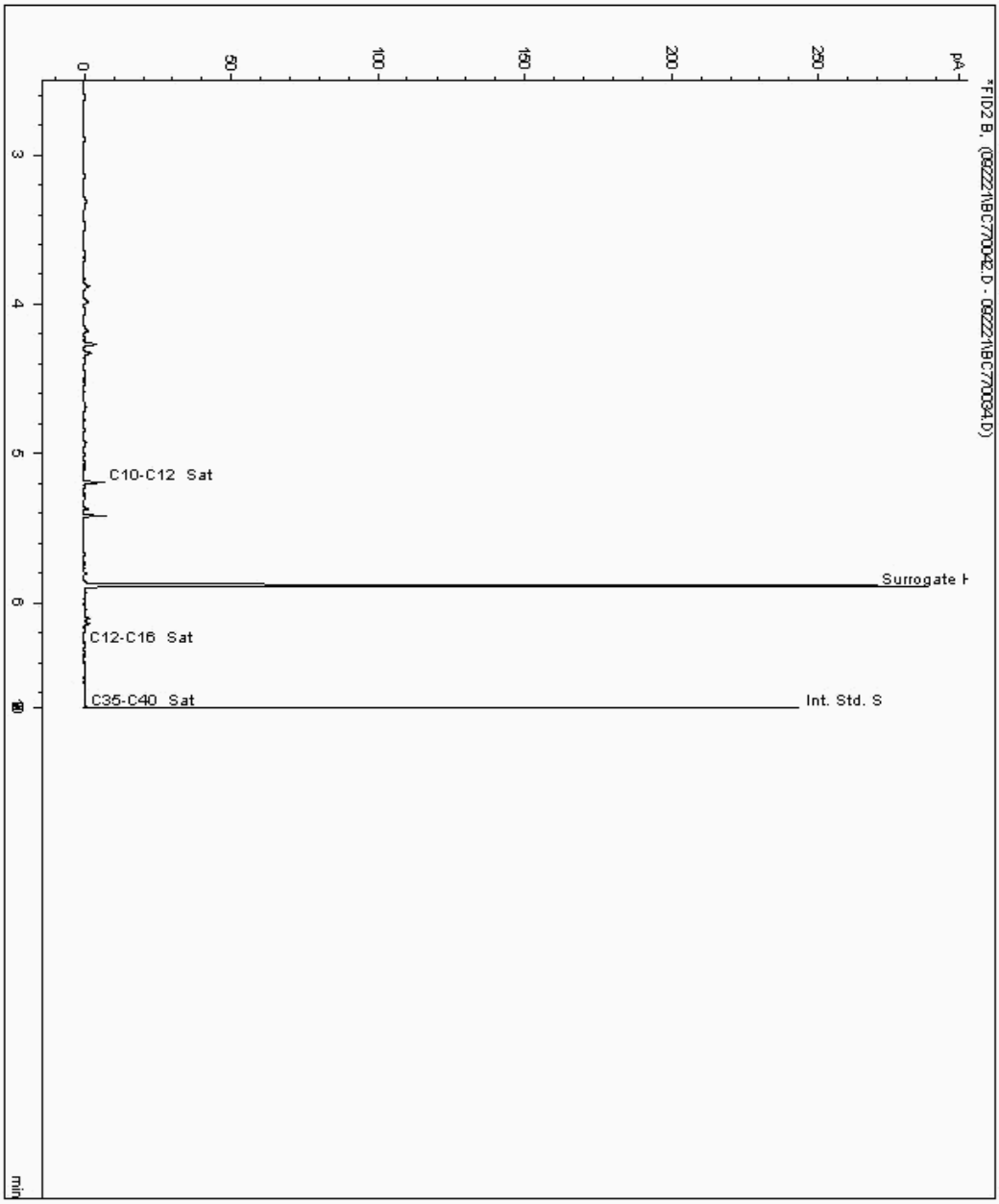
SDG: 210917-103 **Report Number:** 614534 **Superseded Report:**
Client Ref.: 70049885 **Location:** Limerick Gasworks

Chromatogram

Analysis: EPH CWG (Aliphatic) Aqueous GC (W) **Sample No :** 24997897 **Depth :** 0.00 - 0.00
Sample ID : PR11

Alcontrol/Geochem Analytical Services
Speciated TPH - SATS (C12 - C40)

Sample Identity: 23369871-
Date Acquired : 9/23/2021 1:10:48 PM
Units : ppb
Dilution :
CF : 1
Multiplier : 0.050



CERTIFICATE OF ANALYSIS

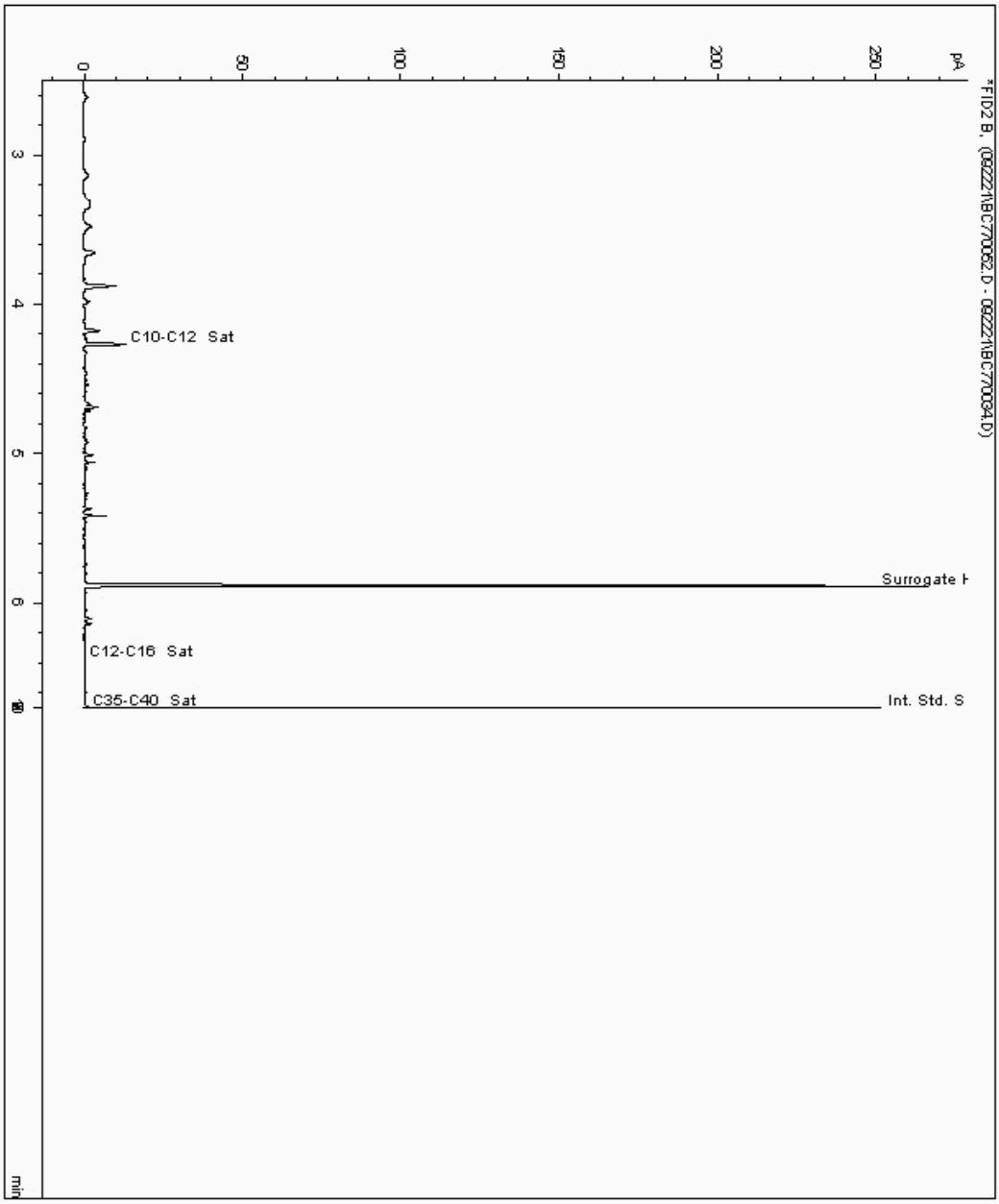
SDG: 210917-103 **Report Number:** 614534 **Superseded Report:**
Client Ref.: 70049885 **Location:** Limerick Gasworks

Chromatogram

Analysis: EPH CWG (Aliphatic) Aqueous GC (W) **Sample No :** 24997900 **Depth :** 0.00 - 0.00
Sample ID : PR9

Alcontrol/Geochem Analytical Services
Speciated TPH - SATS (C12 - C40)

Sample Identity: 23370108-
Date Acquired : 9/23/2021 5:18:08 PM
Units : ppb
Dilution :
CF : 1
Multiplier : 0.050



CERTIFICATE OF ANALYSIS

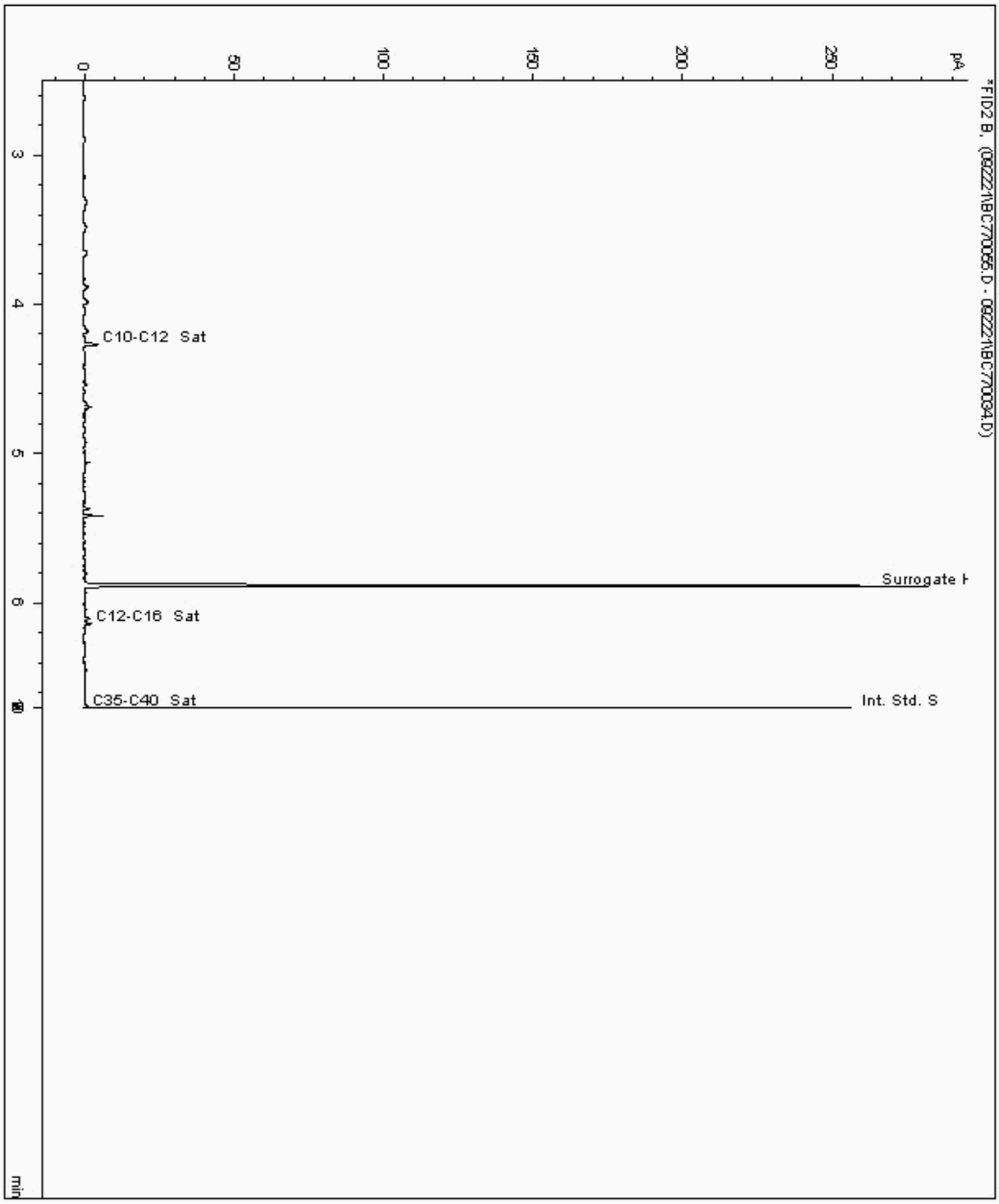
SDG: 210917-103 **Report Number:** 614534 **Superseded Report:**
Client Ref.: 70049885 **Location:** Limerick Gasworks

Chromatogram

Analysis: EPH CWG (Aliphatic) Aqueous GC (W) **Sample No :** 24997908 **Depth :** 0.00 - 0.00
Sample ID : PR4

Alcontrol/Geochem Analytical Services
Speciated TPH - SATS (C12 - C40)

Sample Identity: 23370001-
Date Acquired : 9/23/2021 6:31:11 PM
Units : ppb
Dilution :
CF : 1
Multiplier : 0.025

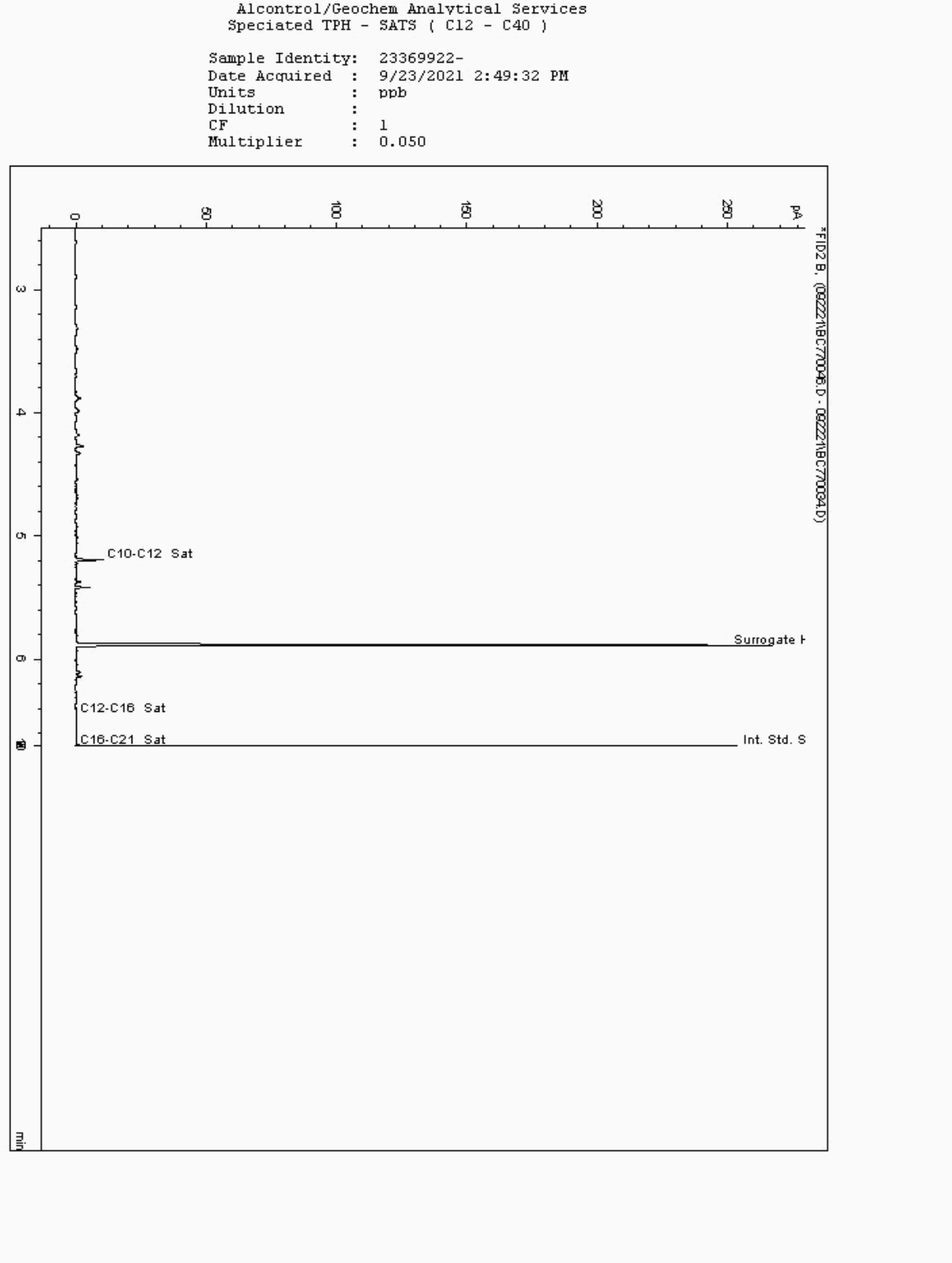


CERTIFICATE OF ANALYSIS

SDG: 210917-103 **Report Number:** 614534 **Superseded Report:**
Client Ref.: 70049885 **Location:** Limerick Gasworks

Chromatogram

Analysis: EPH CWG (Aliphatic) Aqueous GC (W) **Sample No :** 24997910 **Depth :** 0.00 - 0.00
Sample ID : PR12



CERTIFICATE OF ANALYSIS

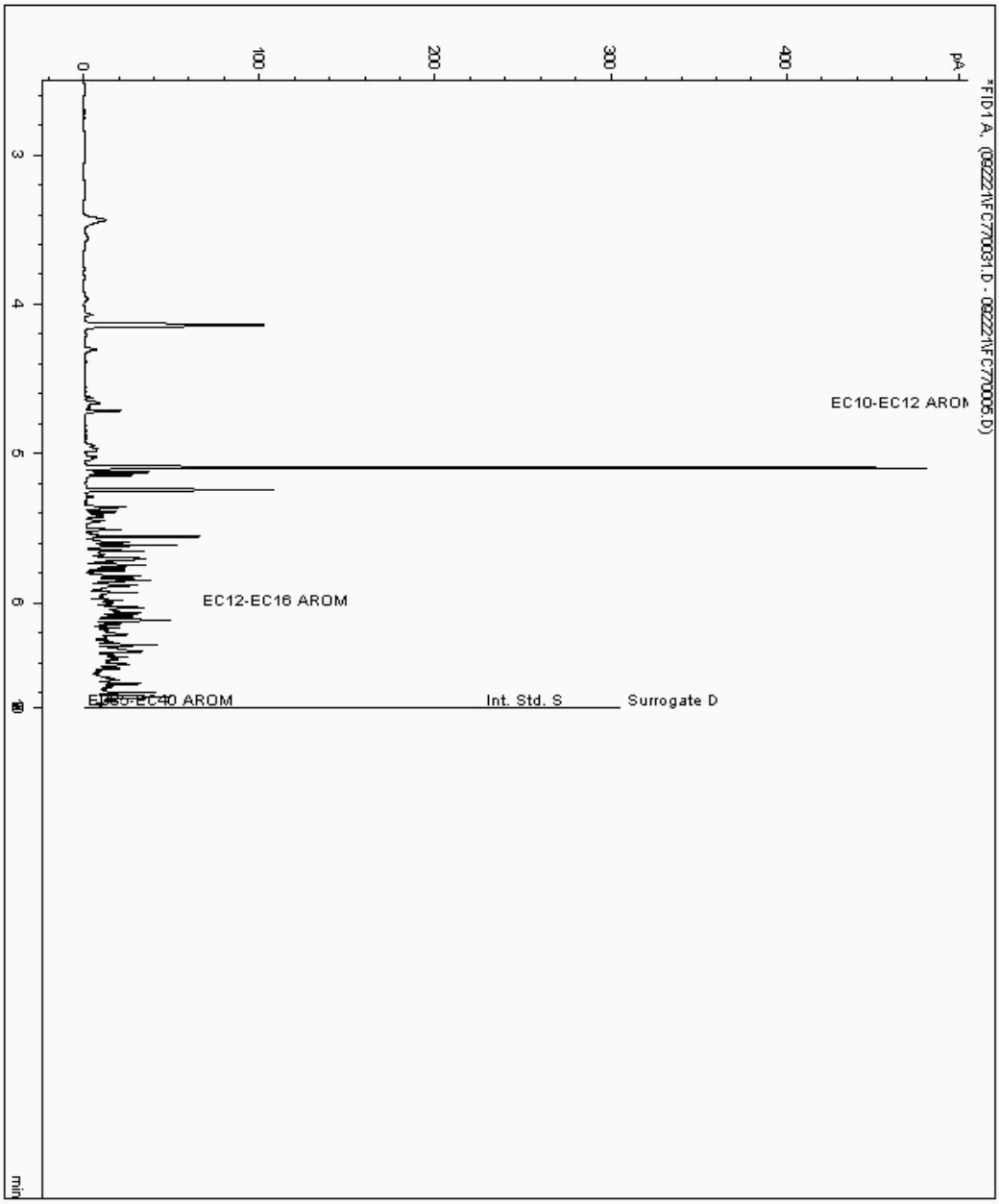
SDG: 210917-103 **Report Number:** 614534 **Superseded Report:**
Client Ref.: 70049885 **Location:** Limerick Gasworks

Chromatogram

Analysis: EPH CWG (Aromatic) Aqueous GC (W) **Sample No :** 24996799 **Depth :** 0.00 - 0.00
Sample ID : PR8

Alcontrol/Geochem Analytical Services
Speciated TPH - SATS (C12 - C40)

Sample Identity: 23370096-
Date Acquired : 9/23/2021 4:15:14 AM
Units : ppb
Dilution :
CF : 1
Multiplier : 0.125



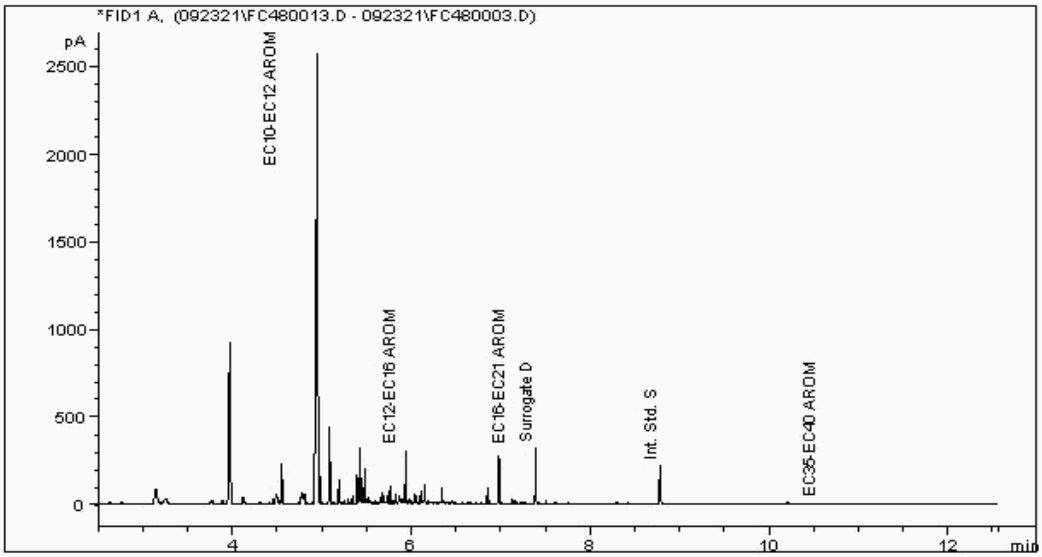
Chromatogram

Analysis: EPH CWG (Aromatic) Aqueous GC (W) **Sample No :** 24996834 **Depth :** 0.00 - 0.00
Sample ID : PR7

Alcontrol/Geochem Analytical Services
Speciated TPH - AROM (C12 - C40)

Sample Identity: 23370076-
Date Acquired : 23/09/2021 21:25:33 PM
Units : ppb
Dilution : SE PR7[0.00 - 0.00] ->
CF : 1
Multiplier : 0.025

#	Compound Name	Main Peak Area	Amount
1	EC10-EC12 AROM	5874.2	8.133
2	EC12-EC16 AROM	1997.1	2.442
3	EC16-EC21 AROM	588.8	0.666
4	Surrogate D	194.5	0.237
5	Int. Std. S	190.3	0.250
6	EC21-EC35 AROM	134.5	0.148
7	EC35-EC40 AROM	15.3	0.017
	Total Peak Area	8994.7	

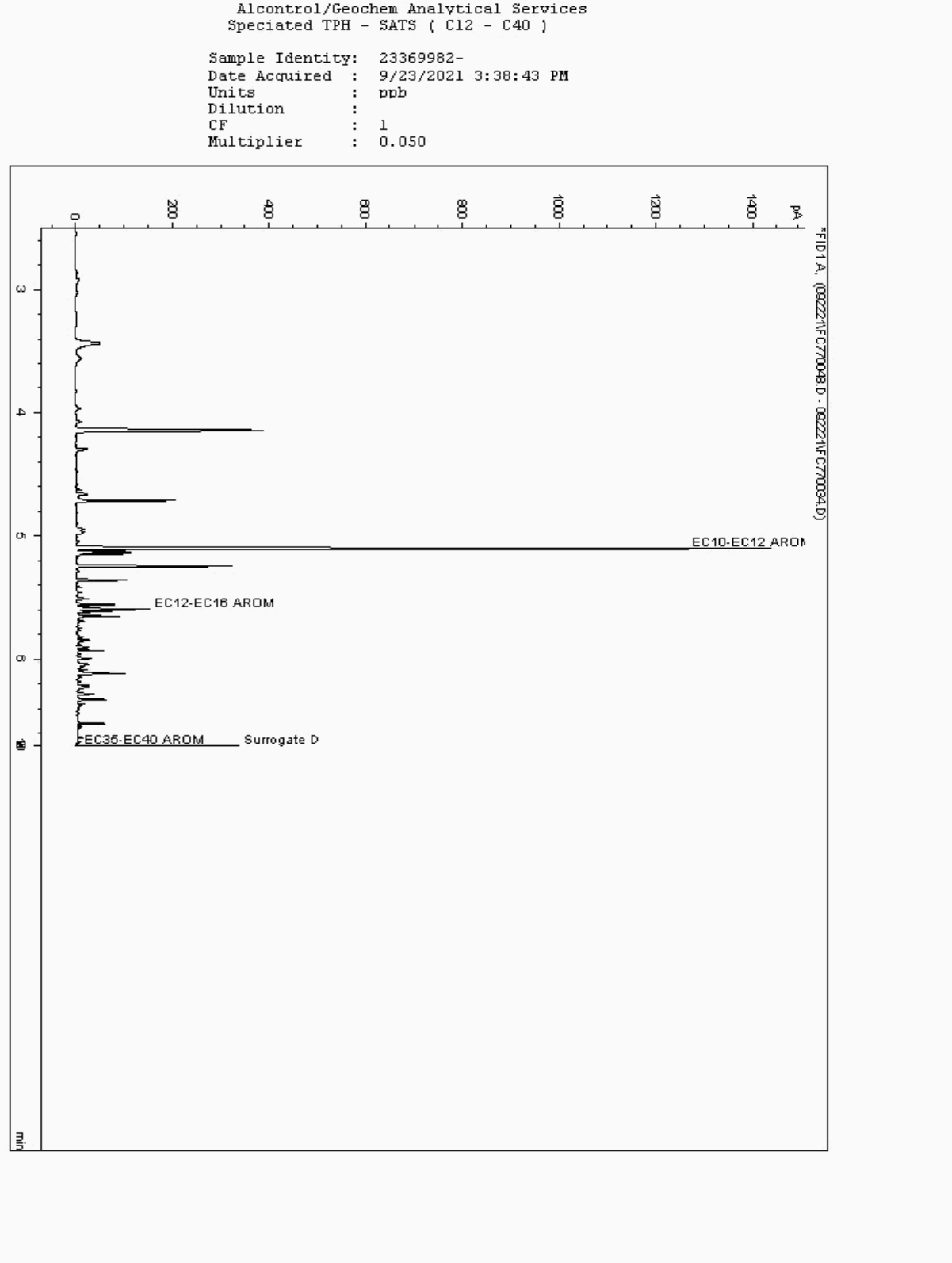


CERTIFICATE OF ANALYSIS

SDG: 210917-103 **Report Number:** 614534 **Superseded Report:**
Client Ref.: 70049885 **Location:** Limerick Gasworks

Chromatogram

Analysis: EPH CWG (Aromatic) Aqueous GC (W) **Sample No :** 24996841 **Depth :** 0.00 - 0.00
Sample ID : PR3



CERTIFICATE OF ANALYSIS

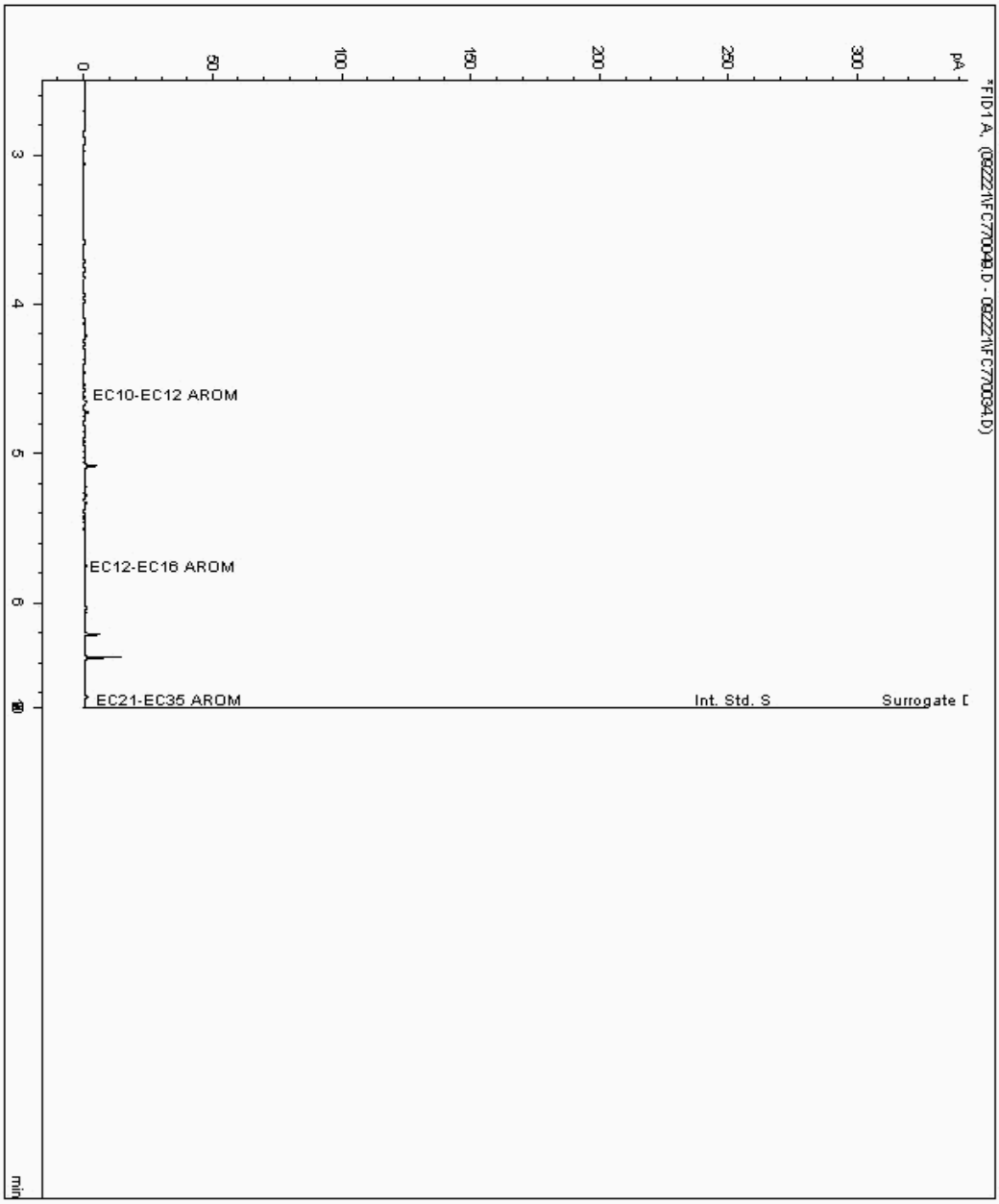
SDG: 210917-103 **Report Number:** 614534 **Superseded Report:**
Client Ref.: 70049885 **Location:** Limerick Gasworks

Chromatogram

Analysis: EPH CWG (Aromatic) Aqueous GC (W) **Sample No :** 24997033 **Depth :** 0.00 - 0.00
Sample ID : PR10

Alcontrol/Geochem Analytical Services
Speciated TPH - SATS (C12 - C40)

Sample Identity: 23369831-
Date Acquired : 9/23/2021 4:03:12 PM
Units : ppb
Dilution :
CF : 1
Multiplier : 0.025

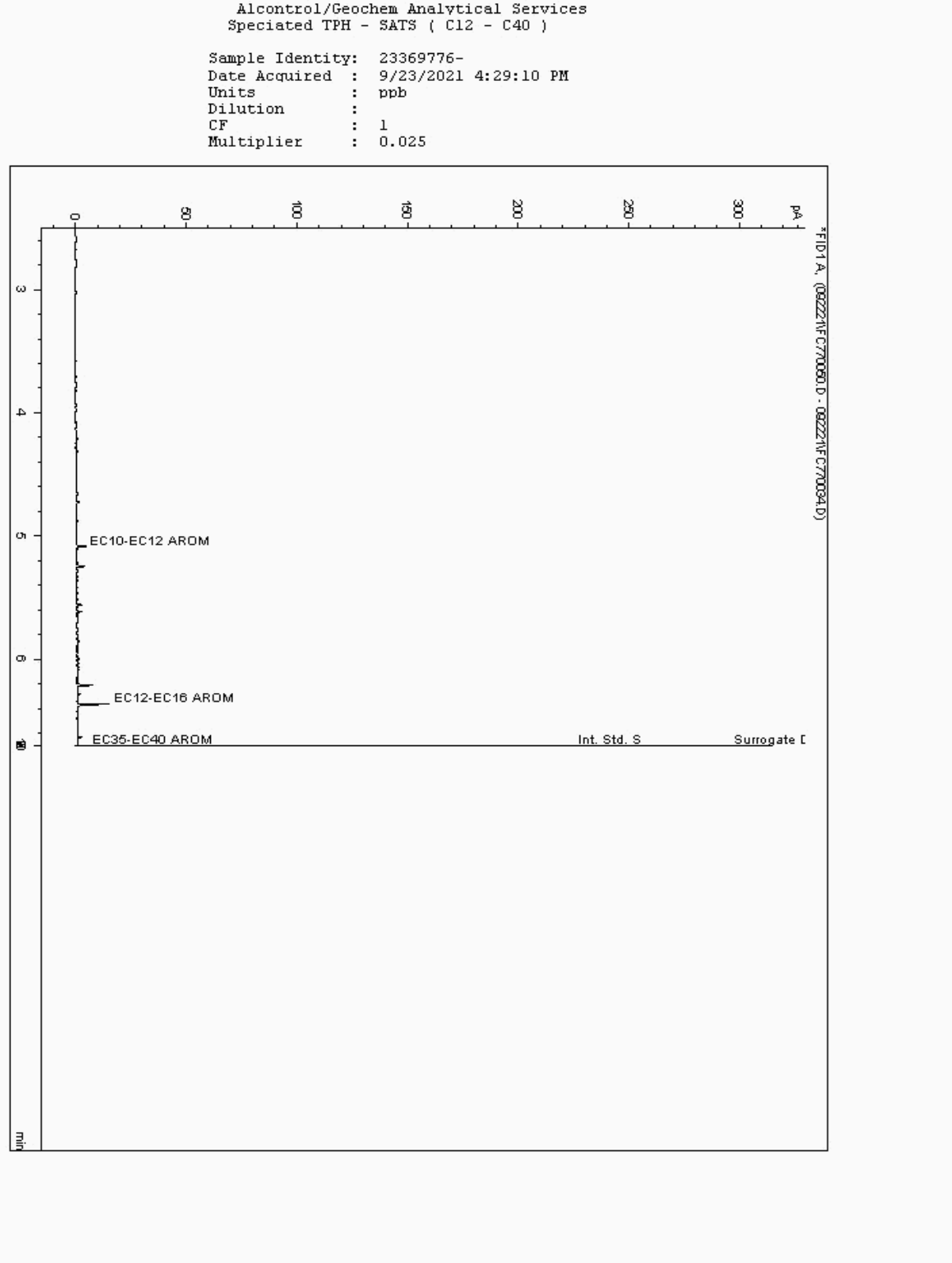


CERTIFICATE OF ANALYSIS

SDG: 210917-103 **Report Number:** 614534 **Superseded Report:**
Client Ref.: 70049885 **Location:** Limerick Gasworks

Chromatogram

Analysis: EPH CWG (Aromatic) Aqueous GC (W) **Sample No :** 24997636 **Depth :** 0.00 - 0.00
Sample ID : PR1



CERTIFICATE OF ANALYSIS

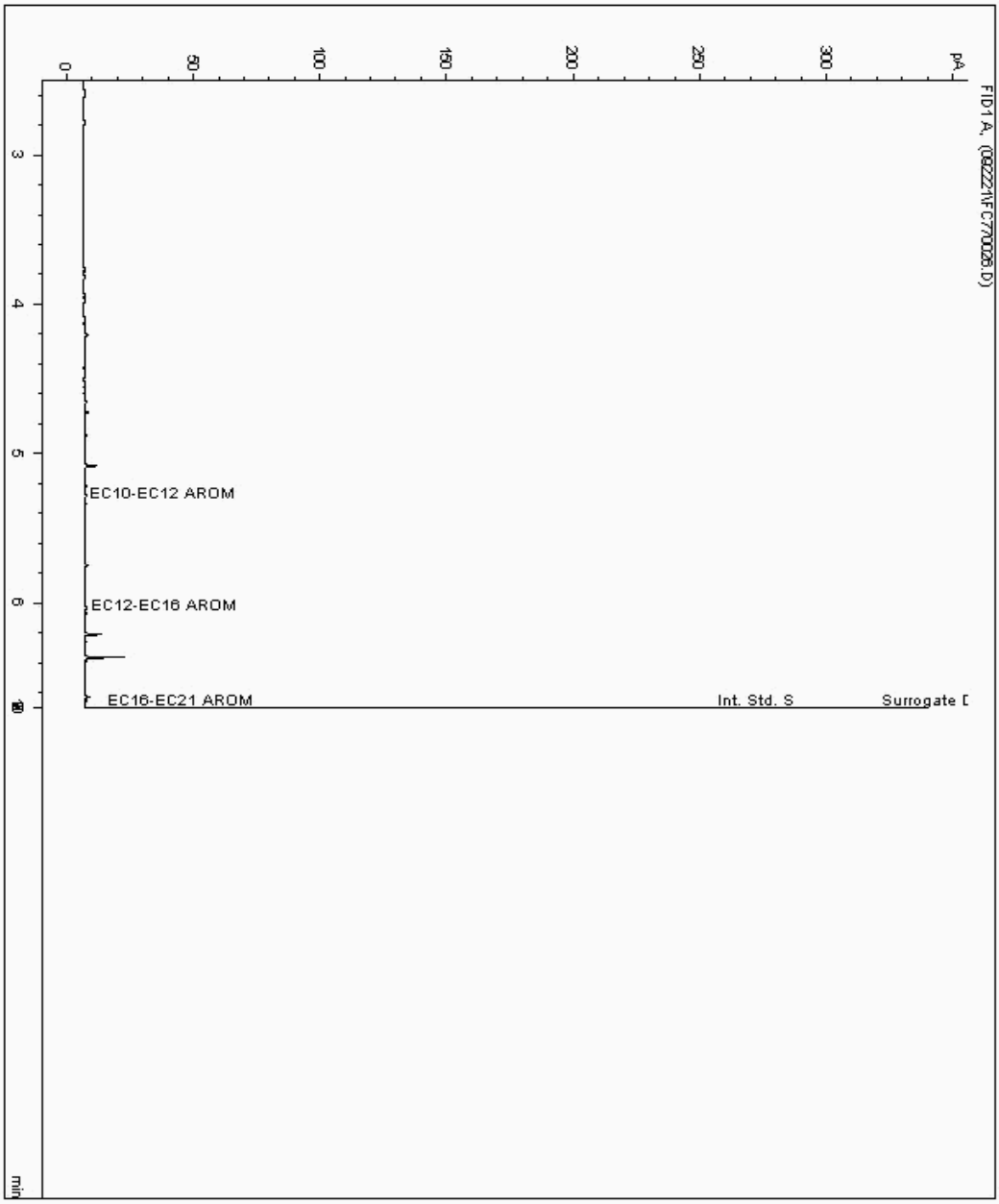
SDG: 210917-103 **Report Number:** 614534 **Superseded Report:**
Client Ref.: 70049885 **Location:** Limerick Gasworks

Chromatogram

Analysis: EPH CWG (Aromatic) Aqueous GC (W) **Sample No :** 24997643 **Depth :** 0.00 - 0.00
Sample ID : PR5

Alcontrol/Geochem Analytical Services
Speciated TPH - SATS (C12 - C40)

Sample Identity: 23370033-
Date Acquired : 9/23/2021 2:12:51 AM
Units : ppb
Dilution :
CF : 1
Multiplier : 0.025



CERTIFICATE OF ANALYSIS

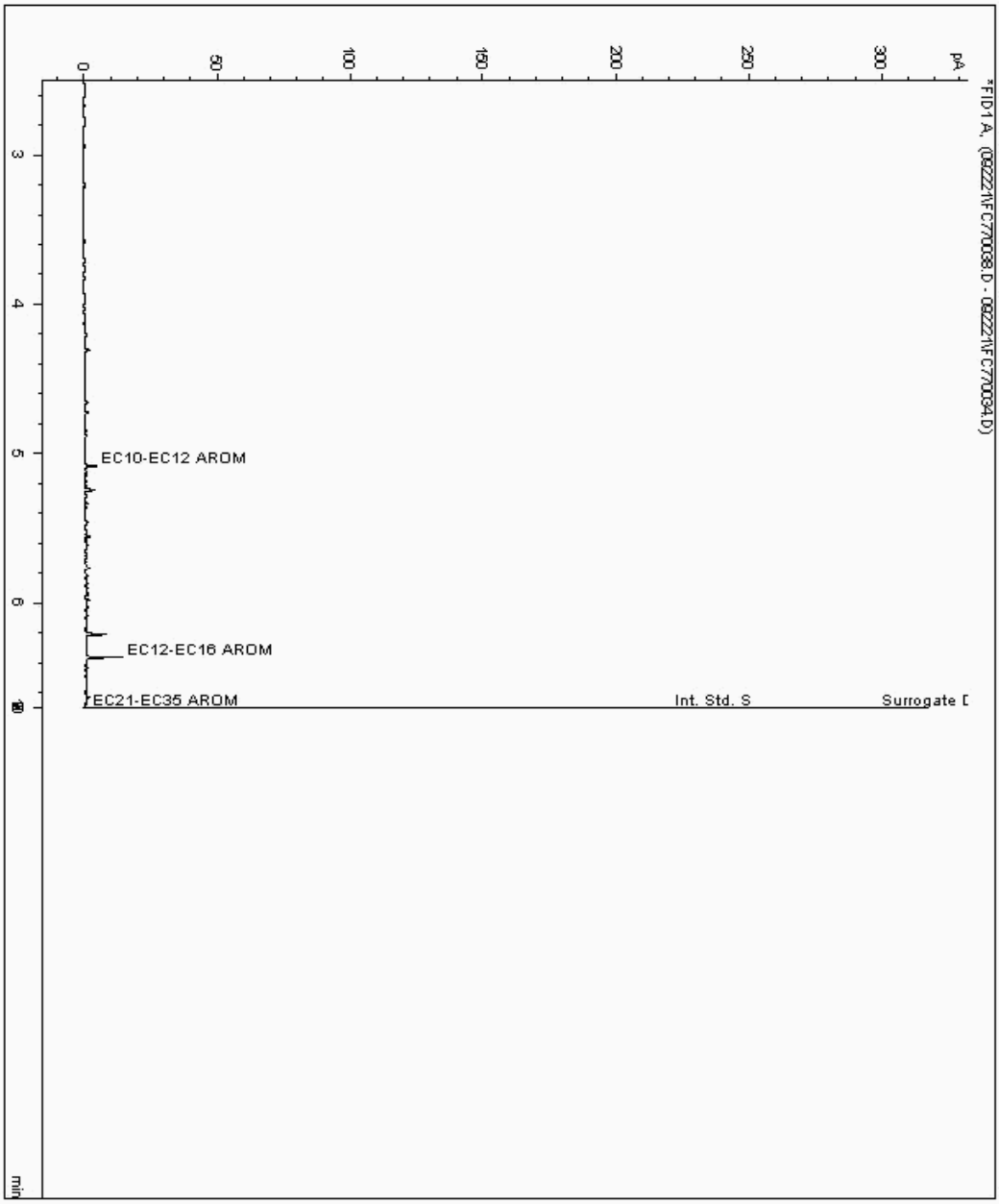
SDG: 210917-103 **Report Number:** 614534 **Superseded Report:**
Client Ref.: 70049885 **Location:** Limerick Gasworks

Chromatogram

Analysis: EPH CWG (Aromatic) Aqueous GC (W) **Sample No :** 24997648 **Depth :** 0.00 - 0.00
Sample ID : PR6

Alcontrol/Geochem Analytical Services
Speciated TPH - SATS (C12 - C40)

Sample Identity: 23370053-
Date Acquired : 9/23/2021 11:32:52 AM
Units : ppb
Dilution :
CF : 1
Multiplier : 0.050

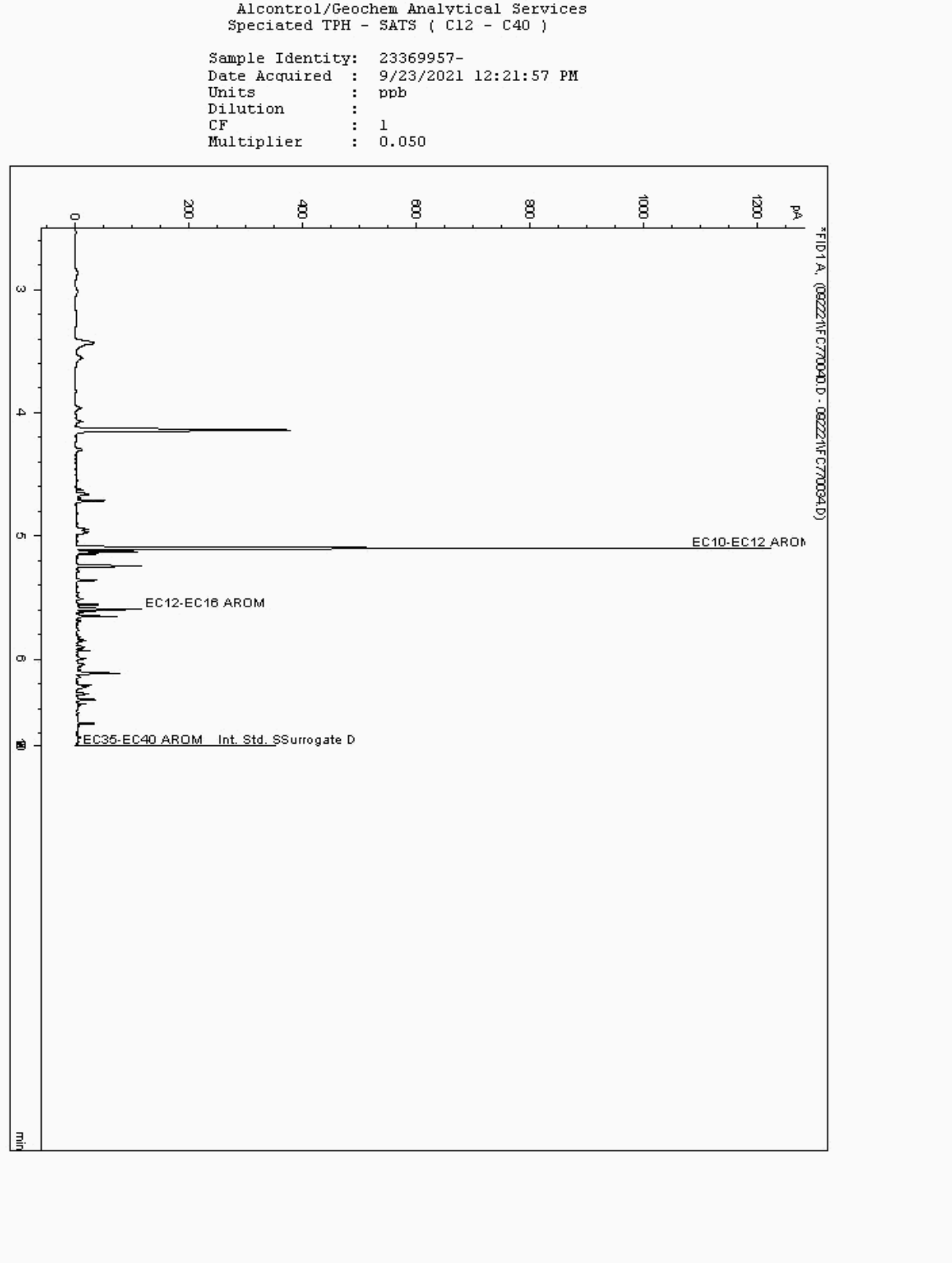


CERTIFICATE OF ANALYSIS

SDG: 210917-103 **Report Number:** 614534 **Superseded Report:**
Client Ref.: 70049885 **Location:** Limerick Gasworks

Chromatogram

Analysis: EPH CWG (Aromatic) Aqueous GC (W) **Sample No :** 24997895 **Depth :** 0.00 - 0.00
Sample ID : PR2



CERTIFICATE OF ANALYSIS

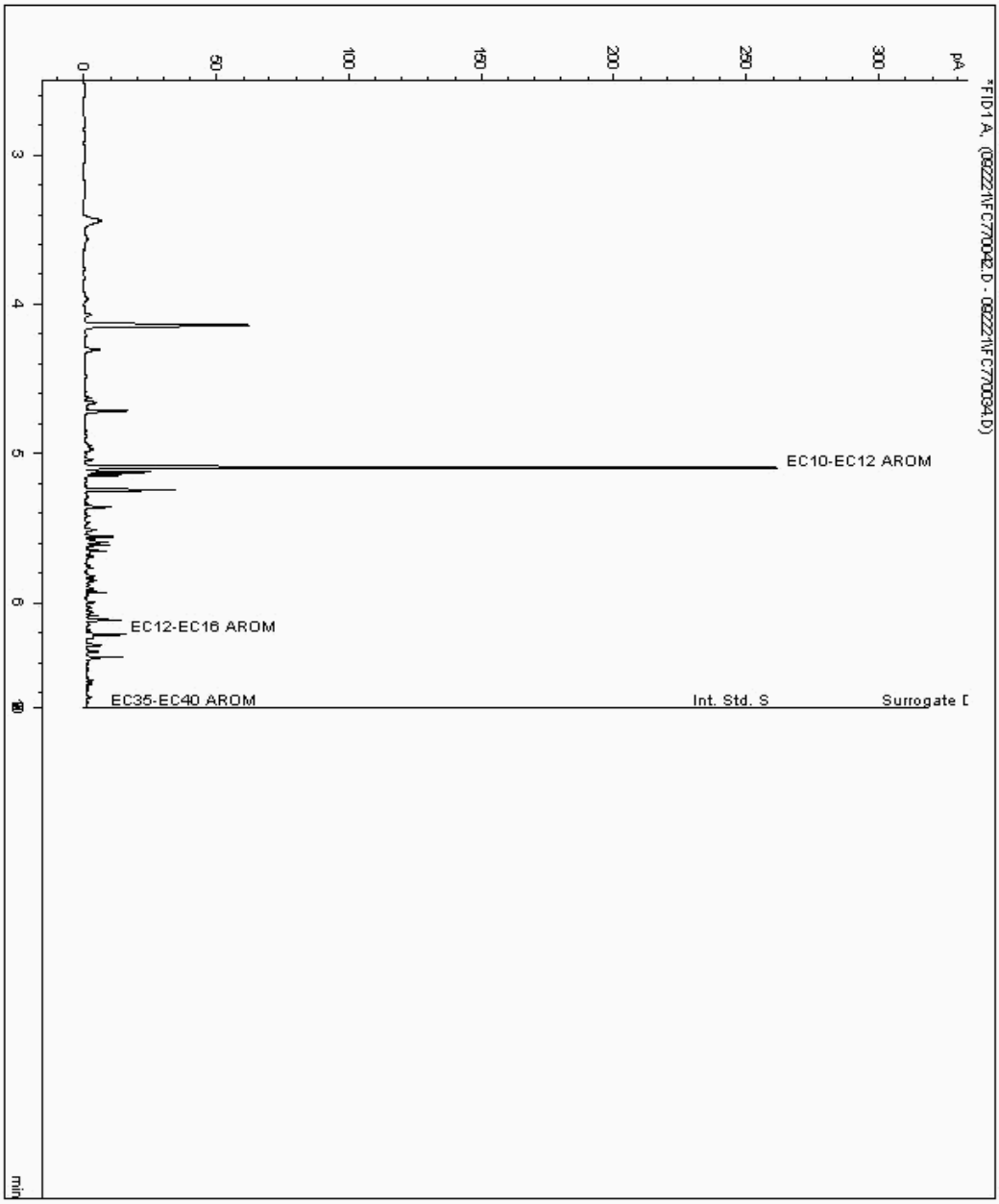
SDG: 210917-103 **Report Number:** 614534 **Superseded Report:**
Client Ref.: 70049885 **Location:** Limerick Gasworks

Chromatogram

Analysis: EPH CWG (Aromatic) Aqueous GC (W) **Sample No :** 24997897 **Depth :** 0.00 - 0.00
Sample ID : PR11

Alcontrol/Geochem Analytical Services
Speciated TPH - SATS (C12 - C40)

Sample Identity: 23369879-
Date Acquired : 9/23/2021 1:10:48 PM
Units : ppb
Dilution :
CF : 1
Multiplier : 0.050



CERTIFICATE OF ANALYSIS

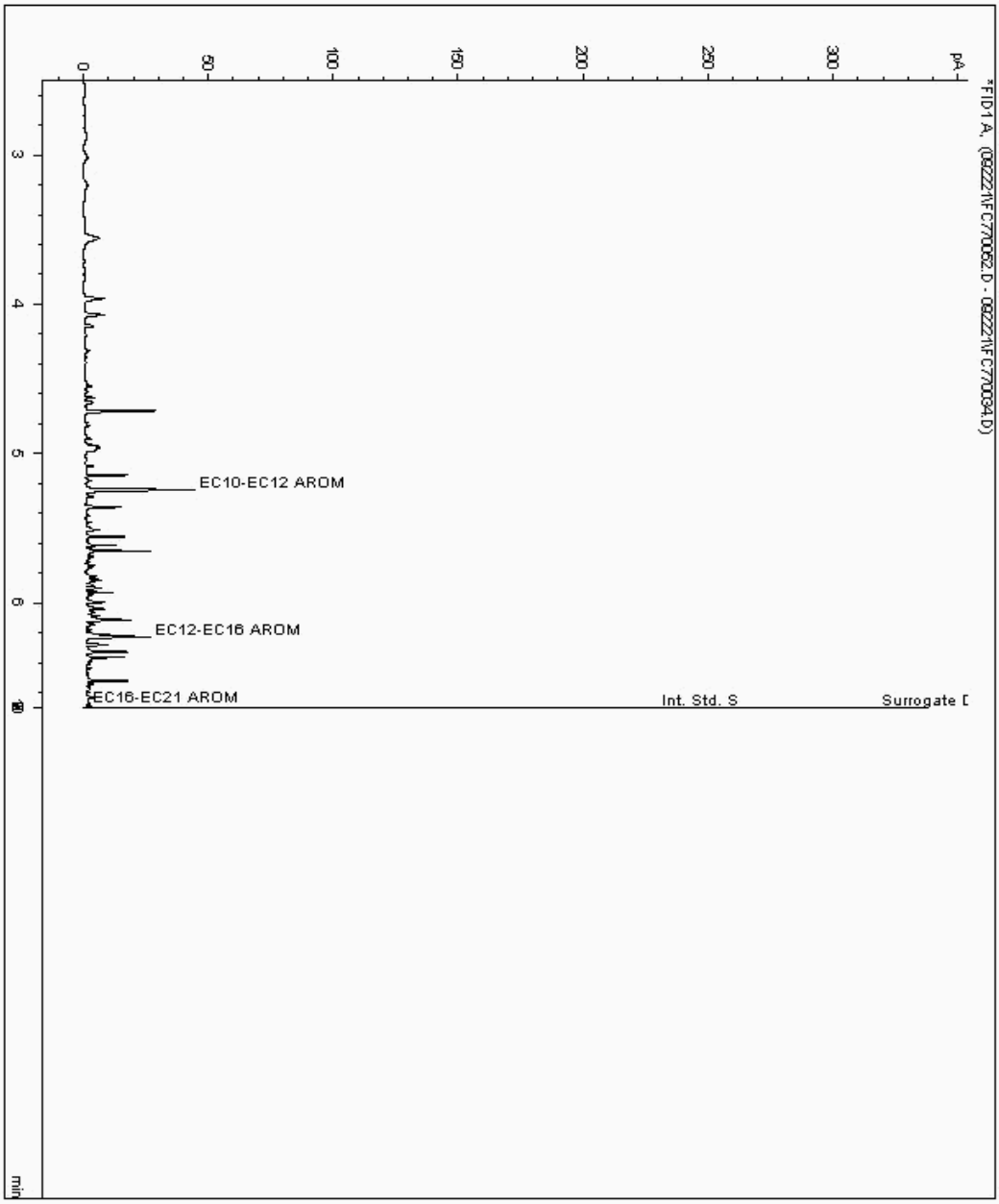
SDG: 210917-103 **Report Number:** 614534 **Superseded Report:**
Client Ref.: 70049885 **Location:** Limerick Gasworks

Chromatogram

Analysis: EPH CWG (Aromatic) Aqueous GC (W) **Sample No :** 24997900 **Depth :** 0.00 - 0.00
Sample ID : PR9

Alcontrol/Geochem Analytical Services
Speciated TPH - SATS (C12 - C40)

Sample Identity: 23370116-
Date Acquired : 9/23/2021 5:18:08 PM
Units : ppb
Dilution :
CF : 1
Multiplier : 0.050

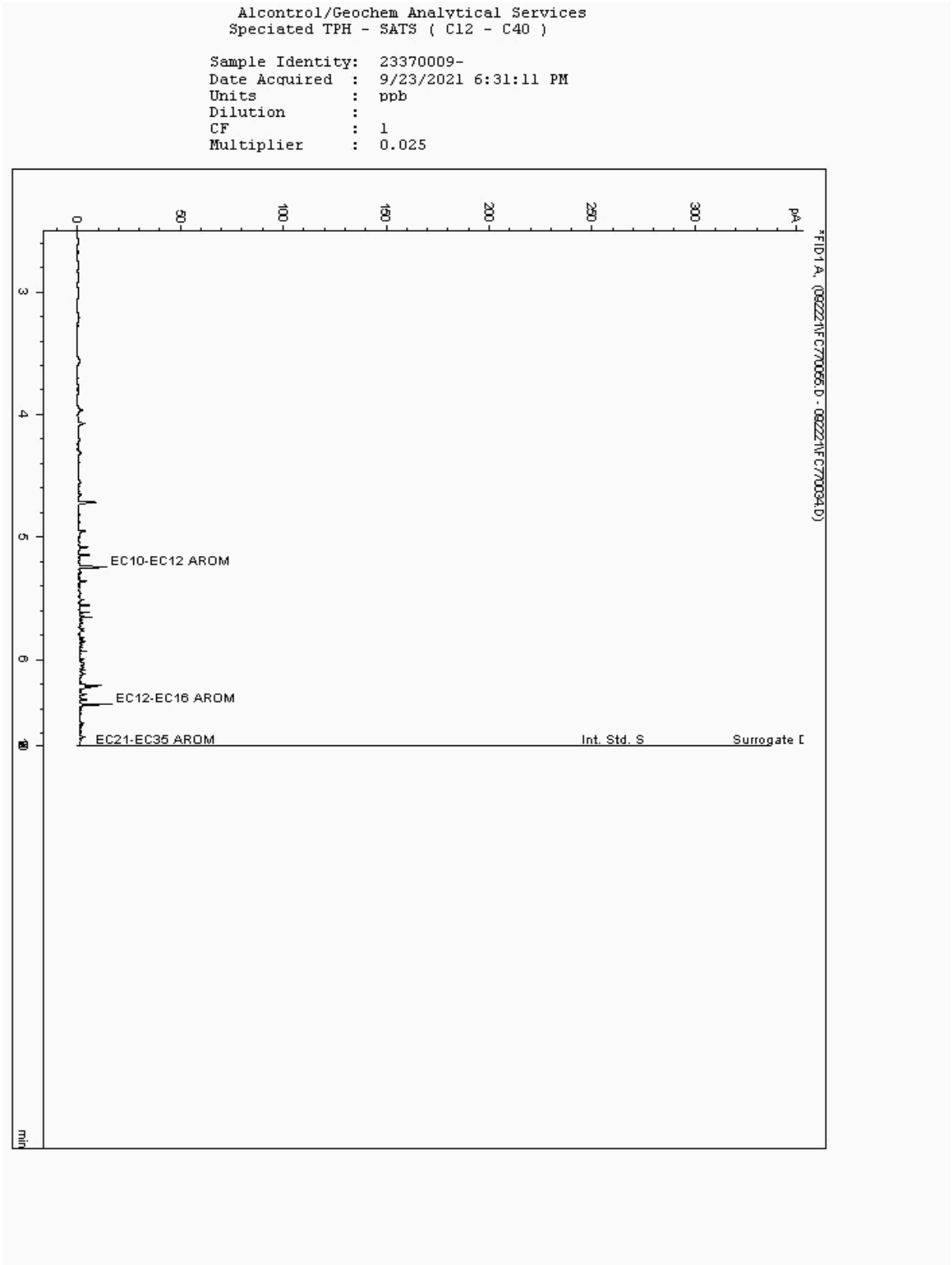


CERTIFICATE OF ANALYSIS

SDG: 210917-103 **Report Number:** 614534 **Superseded Report:**
Client Ref.: 70049885 **Location:** Limerick Gasworks

Chromatogram

Analysis: EPH CWG (Aromatic) Aqueous GC (W) **Sample No :** 24997908 **Depth :** 0.00 - 0.00
Sample ID : PR4



CERTIFICATE OF ANALYSIS

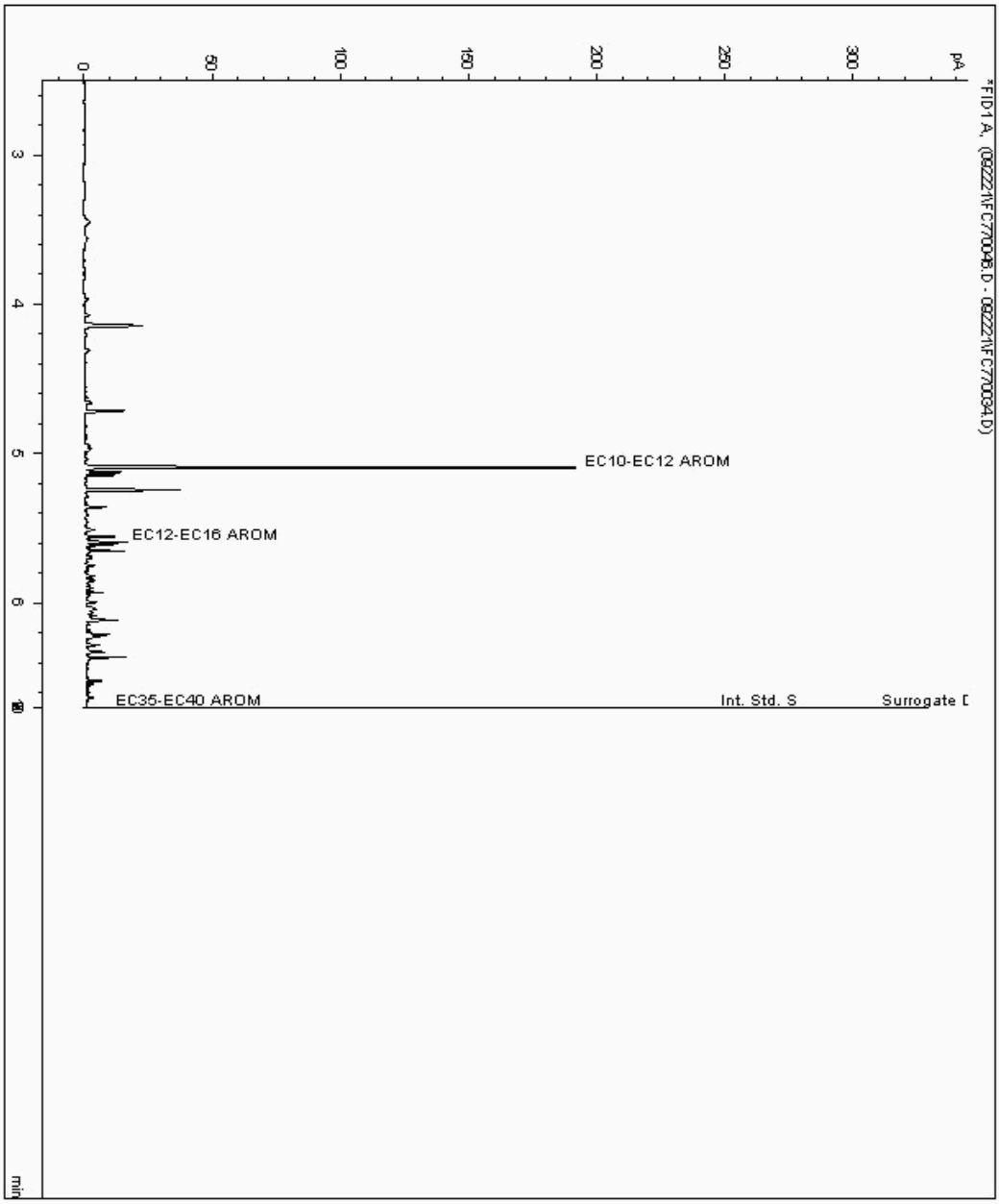
SDG: 210917-103 **Report Number:** 614534 **Superseded Report:**
Client Ref.: 70049885 **Location:** Limerick Gasworks

Chromatogram

Analysis: EPH CWG (Aromatic) Aqueous GC (W) **Sample No :** 24997910 **Depth :** 0.00 - 0.00
Sample ID : PR12

Alcontrol/Geochem Analytical Services
Speciated TPH - SATS (C12 - C40)

Sample Identity: 23369930-
Date Acquired : 9/23/2021 2:49:32 PM
Units : ppb
Dilution :
CF : 1
Multiplier : 0.050

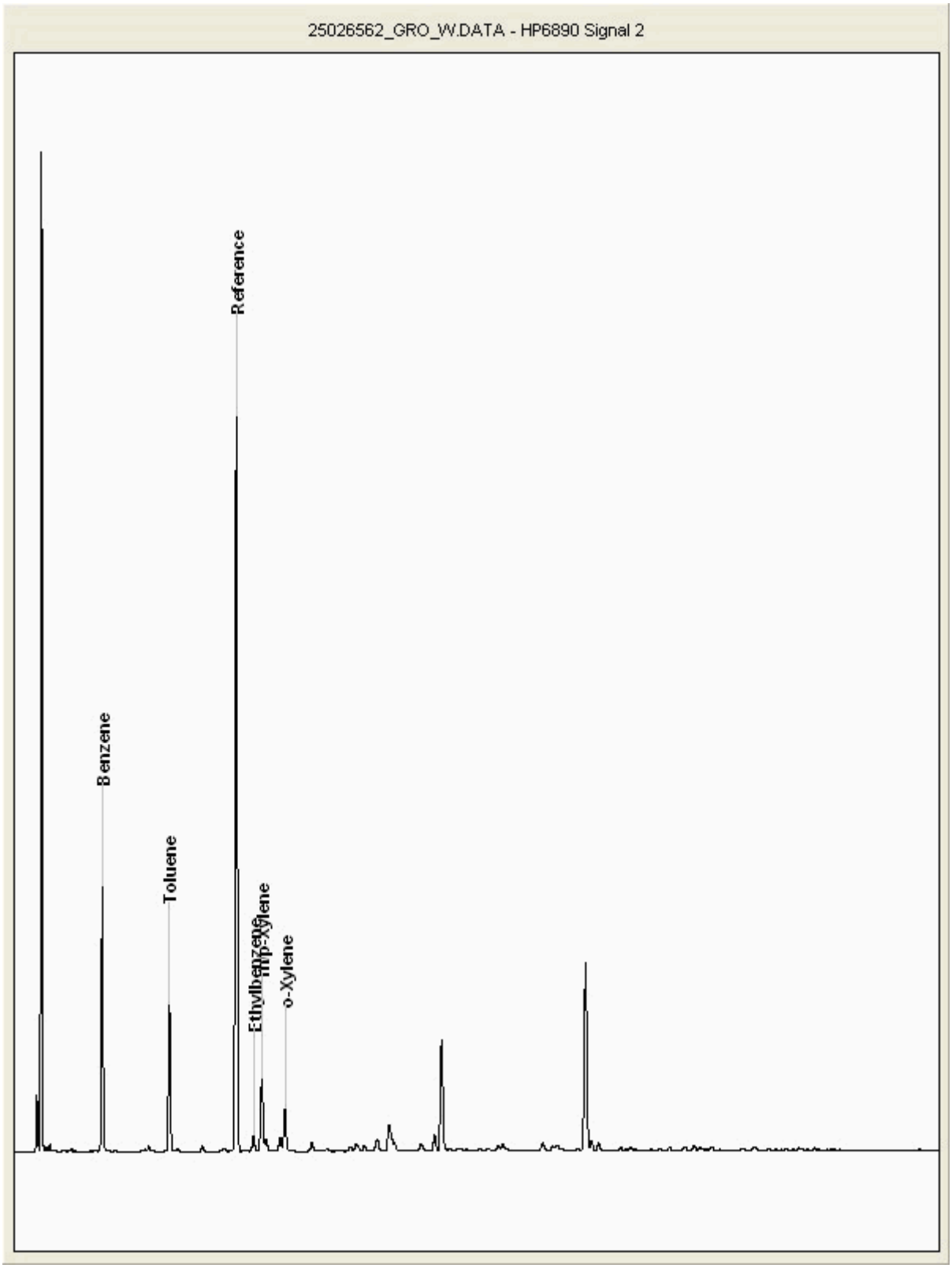


CERTIFICATE OF ANALYSIS

SDG: 210917-103 **Report Number:** 614534 **Superseded Report:**
Client Ref.: 70049885 **Location:** Limerick Gasworks

Chromatogram

Analysis: GRO by GC-FID (W) **Sample No :** 25026562 **Depth :** 0.00 - 0.00
Sample ID : PR8

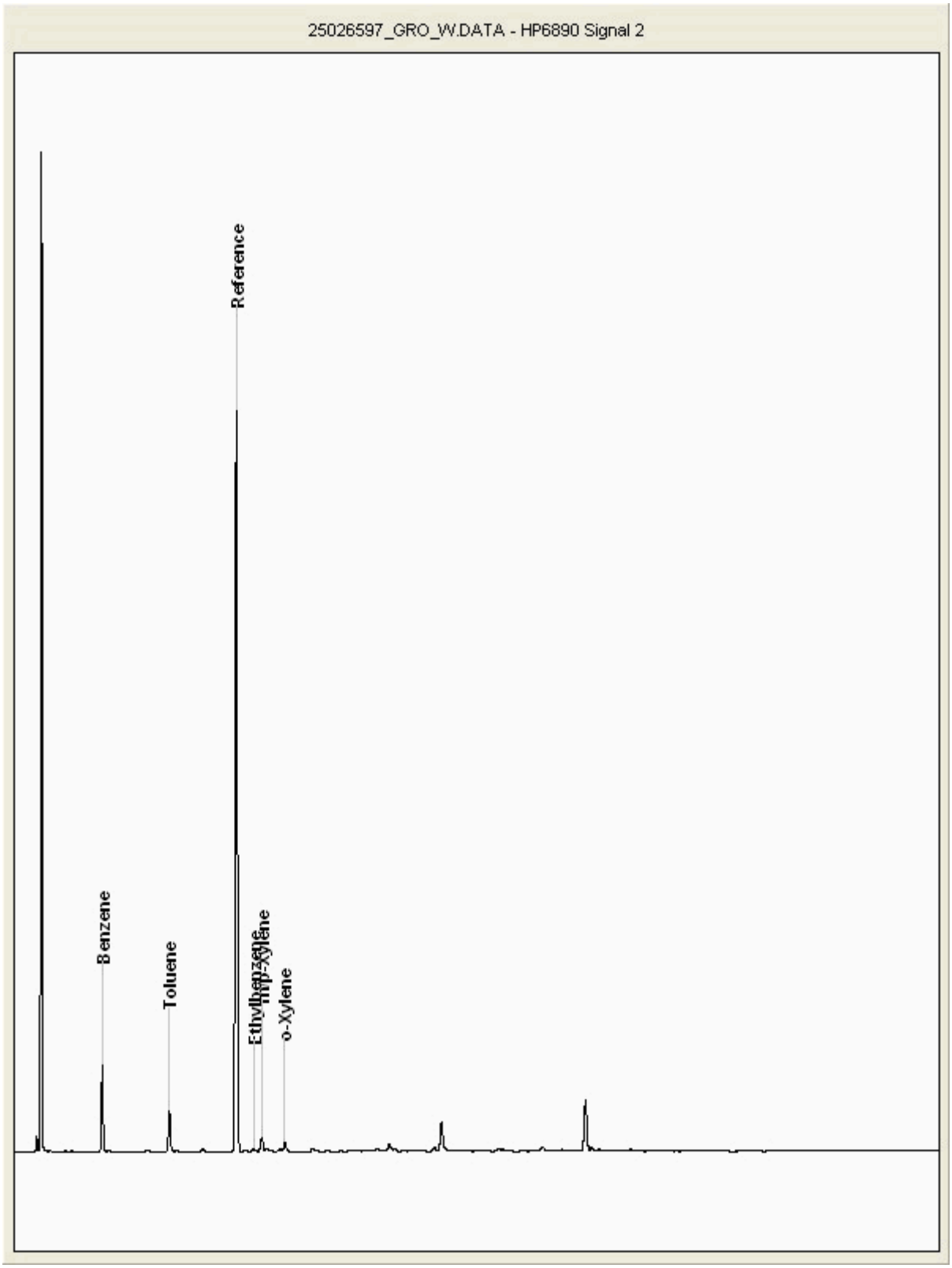


CERTIFICATE OF ANALYSIS

SDG: 210917-103 **Report Number:** 614534 **Superseded Report:**
Client Ref.: 70049885 **Location:** Limerick Gasworks

Chromatogram

Analysis: GRO by GC-FID (W) **Sample No :** 25026597 **Depth :** 0.00 - 0.00
Sample ID : PR11

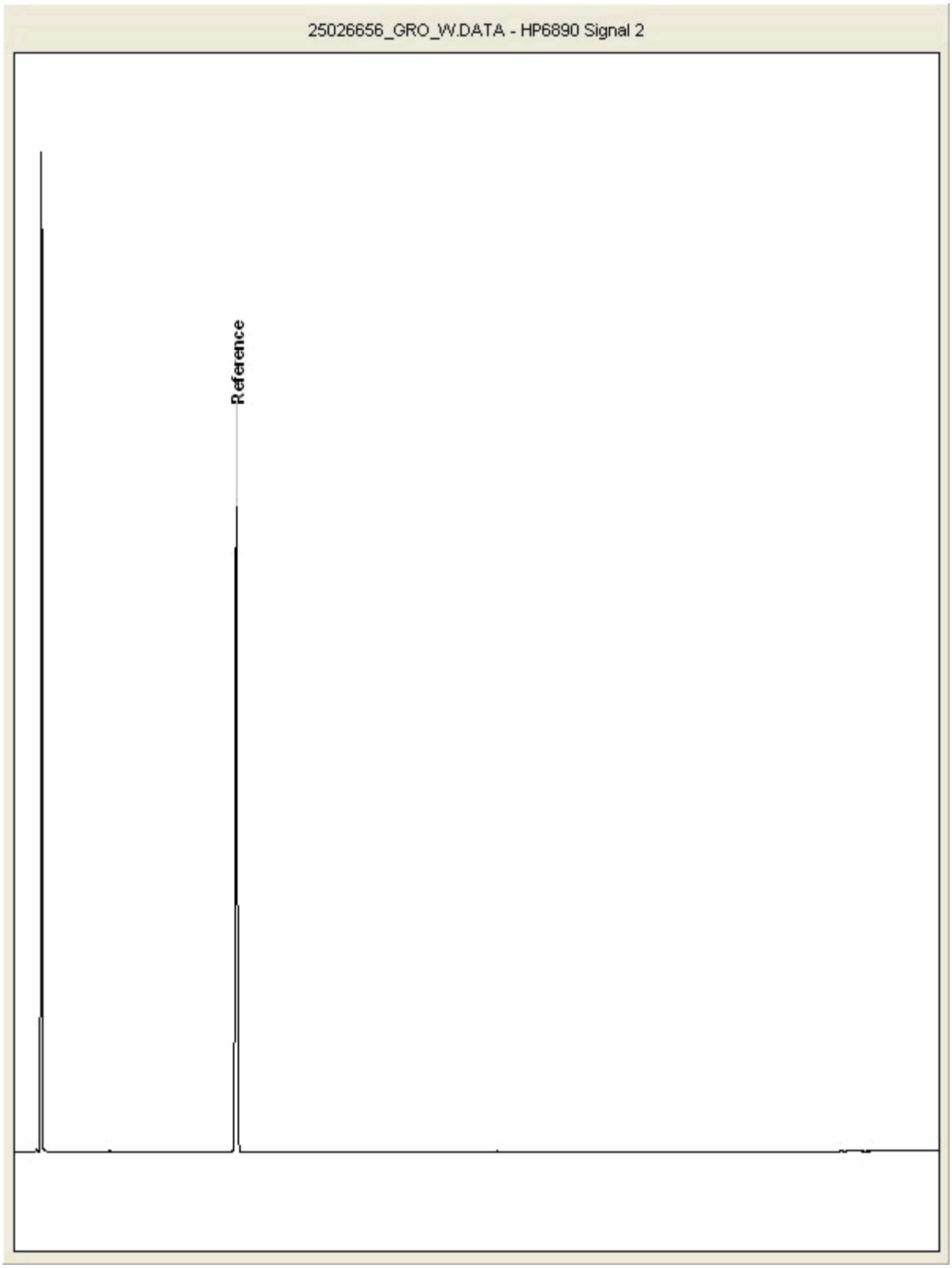


CERTIFICATE OF ANALYSIS

SDG: 210917-103 **Report Number:** 614534 **Superseded Report:**
Client Ref.: 70049885 **Location:** Limerick Gasworks

Chromatogram

Analysis: GRO by GC-FID (W) **Sample No :** 25026656 **Depth :** 0.00 - 0.00
Sample ID : PR10

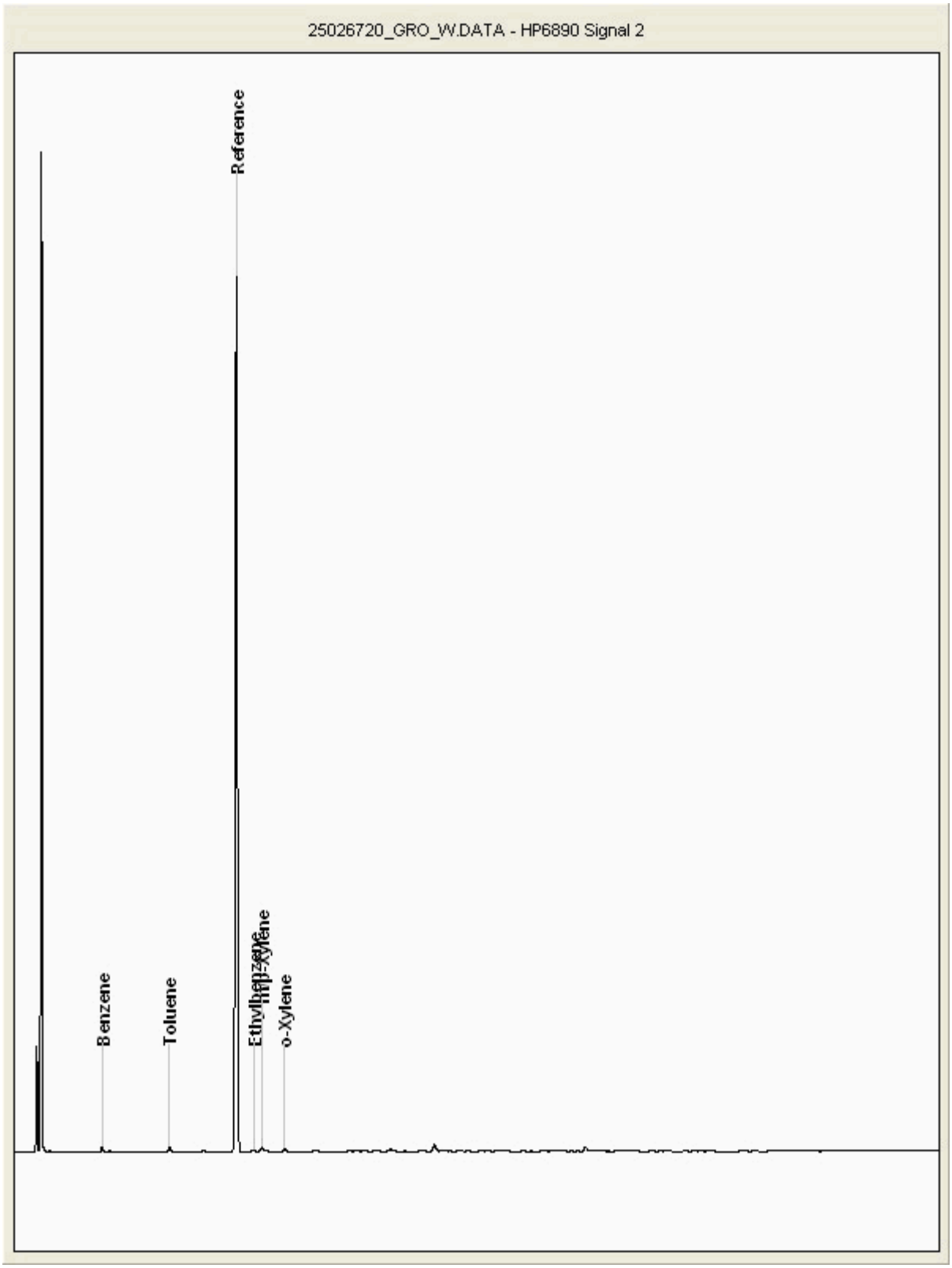


CERTIFICATE OF ANALYSIS

SDG: 210917-103 **Report Number:** 614534 **Superseded Report:**
Client Ref.: 70049885 **Location:** Limerick Gasworks

Chromatogram

Analysis: GRO by GC-FID (W) **Sample No :** 25026720 **Depth :** 0.00 - 0.00
Sample ID : PR4

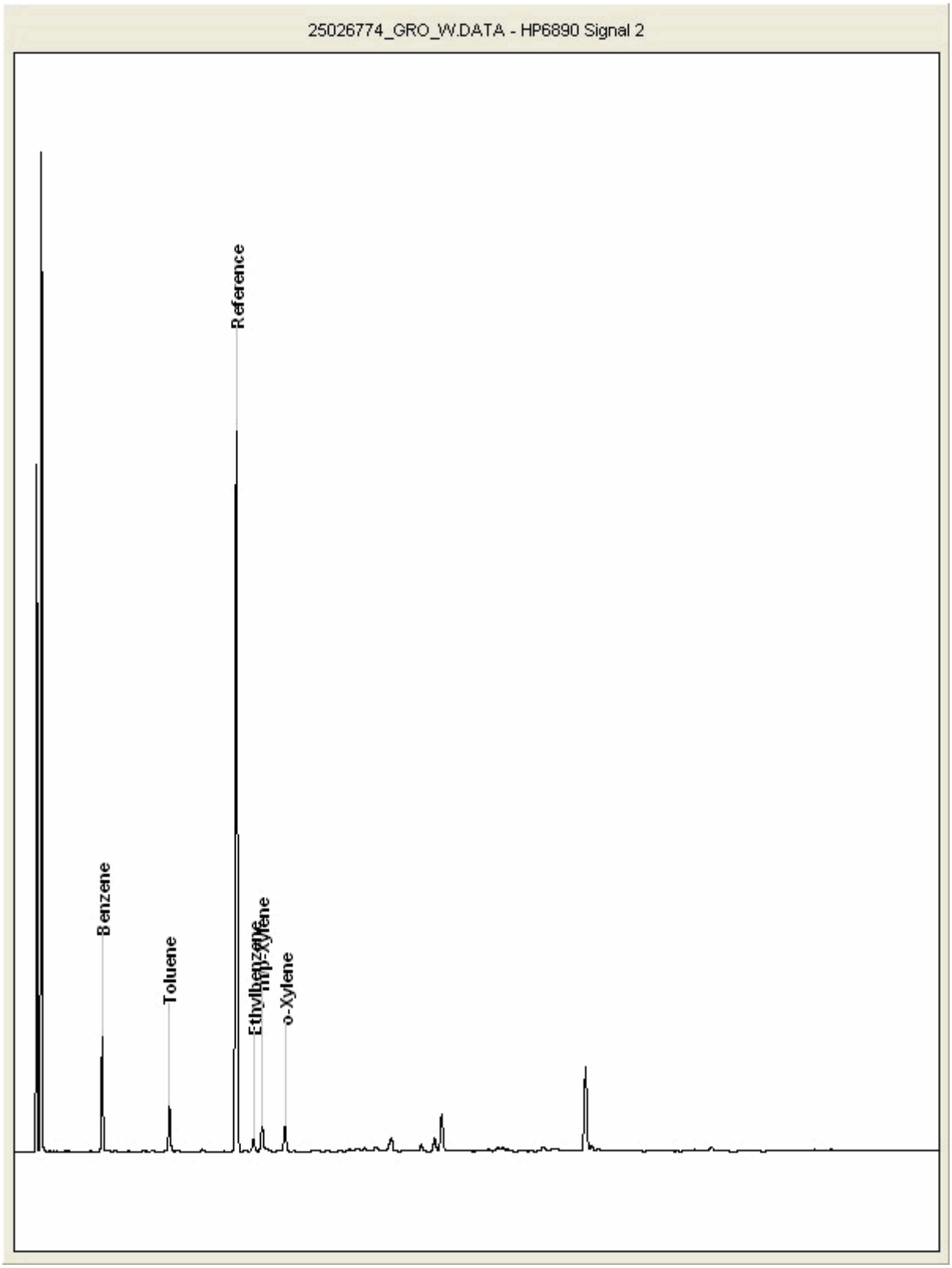


CERTIFICATE OF ANALYSIS

SDG: 210917-103 **Report Number:** 614534 **Superseded Report:**
Client Ref.: 70049885 **Location:** Limerick Gasworks

Chromatogram

Analysis: GRO by GC-FID (W) **Sample No :** 25026774 **Depth :** 0.00 - 0.00
Sample ID : PR9

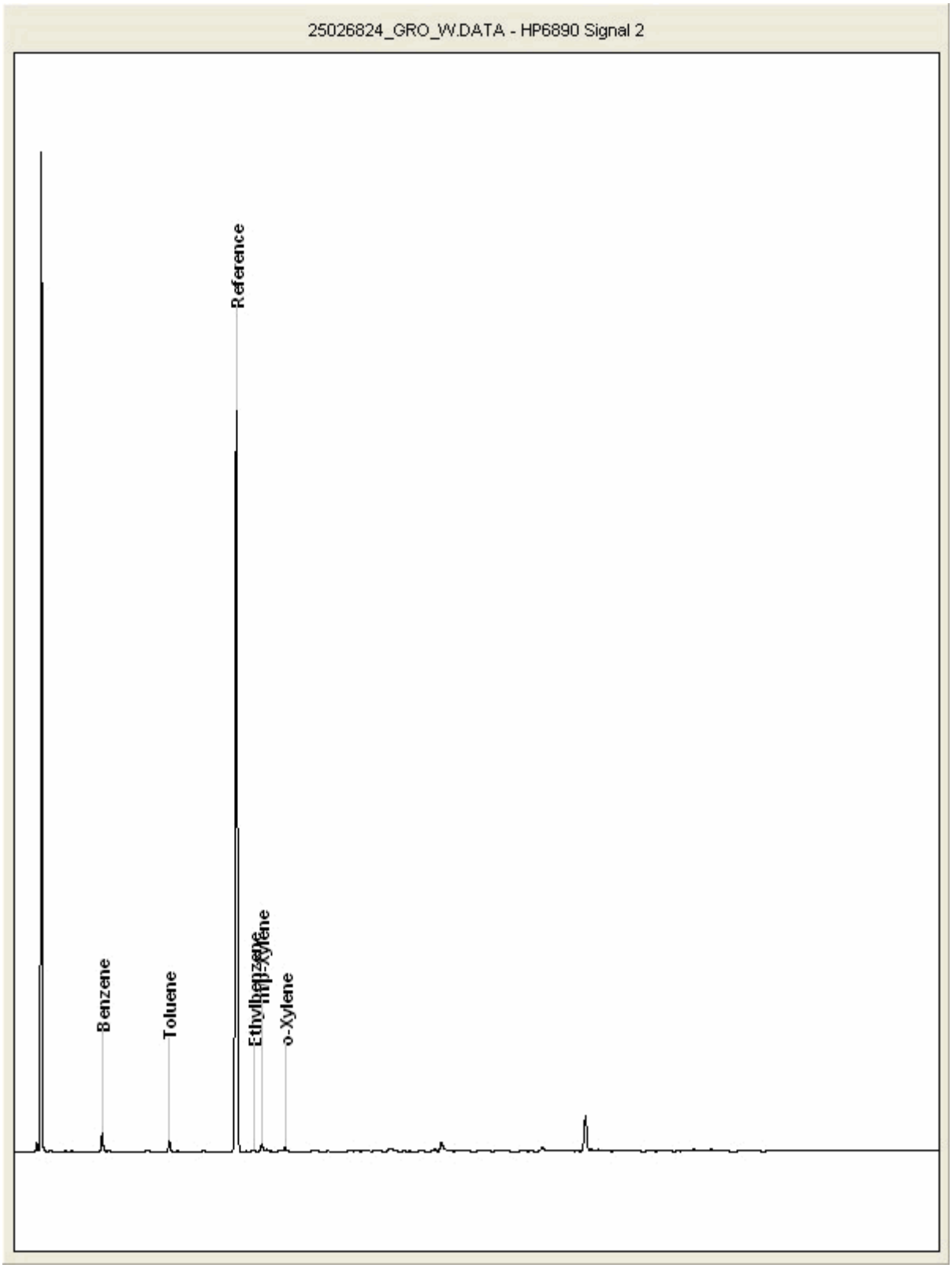


CERTIFICATE OF ANALYSIS

SDG: 210917-103 **Report Number:** 614534 **Superseded Report:**
Client Ref.: 70049885 **Location:** Limerick Gasworks

Chromatogram

Analysis: GRO by GC-FID (W) **Sample No :** 25026824 **Depth :** 0.00 - 0.00
Sample ID : PR12

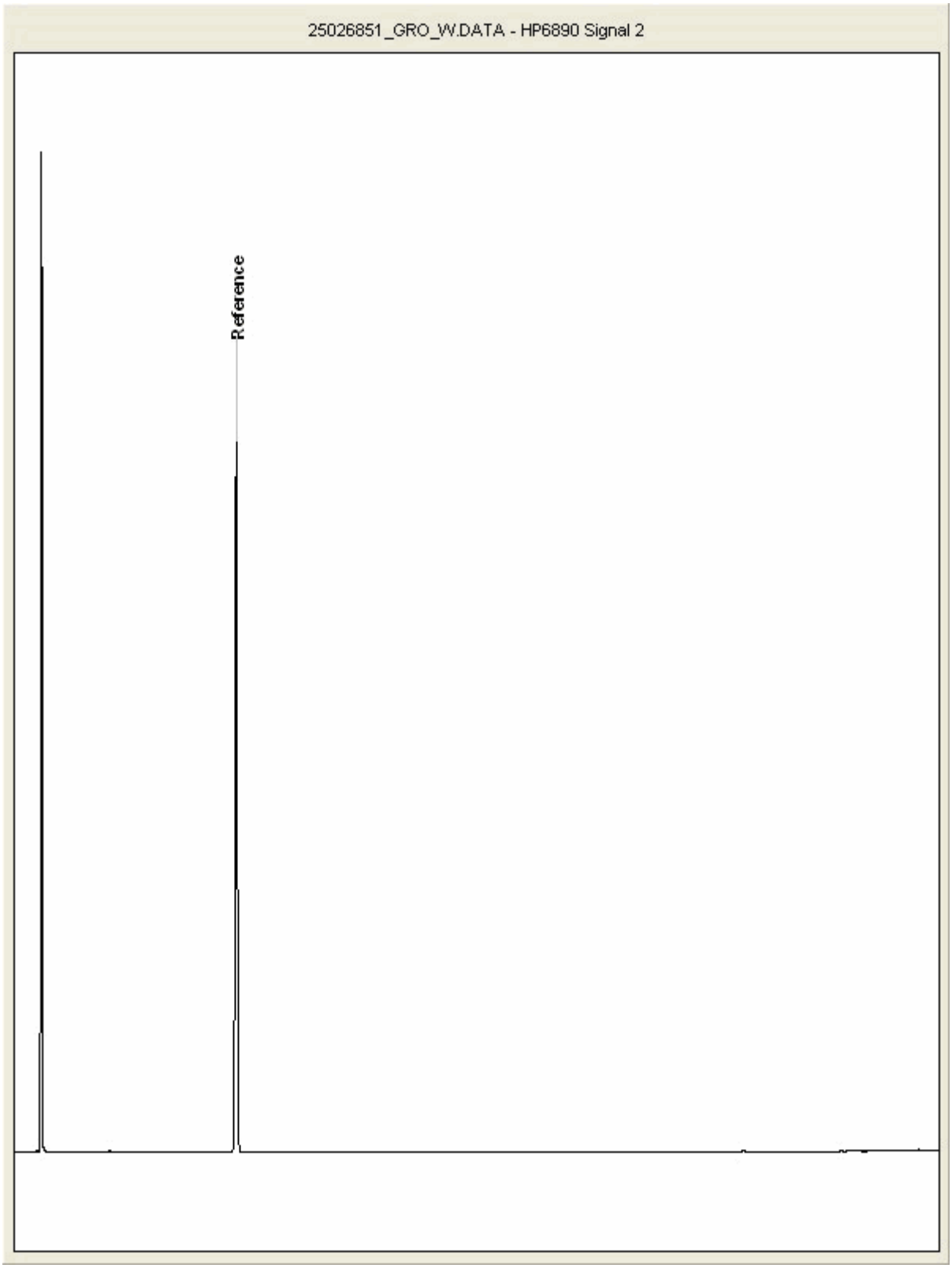


CERTIFICATE OF ANALYSIS

SDG: 210917-103 **Report Number:** 614534 **Superseded Report:**
Client Ref.: 70049885 **Location:** Limerick Gasworks

Chromatogram

Analysis: GRO by GC-FID (W) **Sample No :** 25026851 **Depth :** 0.00 - 0.00
Sample ID : PR5

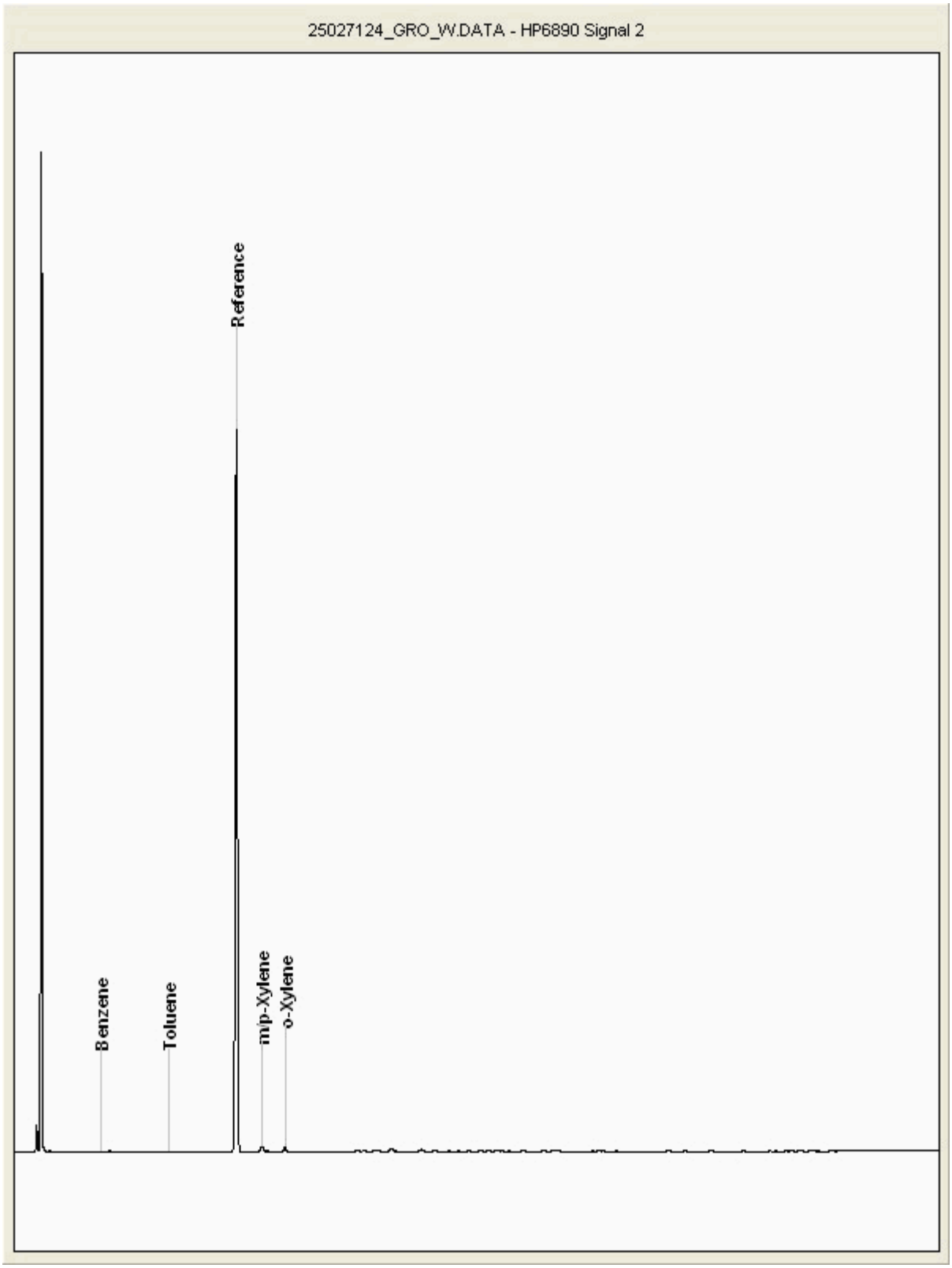


CERTIFICATE OF ANALYSIS

SDG: 210917-103 **Report Number:** 614534 **Superseded Report:**
Client Ref.: 70049885 **Location:** Limerick Gasworks

Chromatogram

Analysis: GRO by GC-FID (W) **Sample No :** 25027124 **Depth :** 0.00 - 0.00
Sample ID : PR1

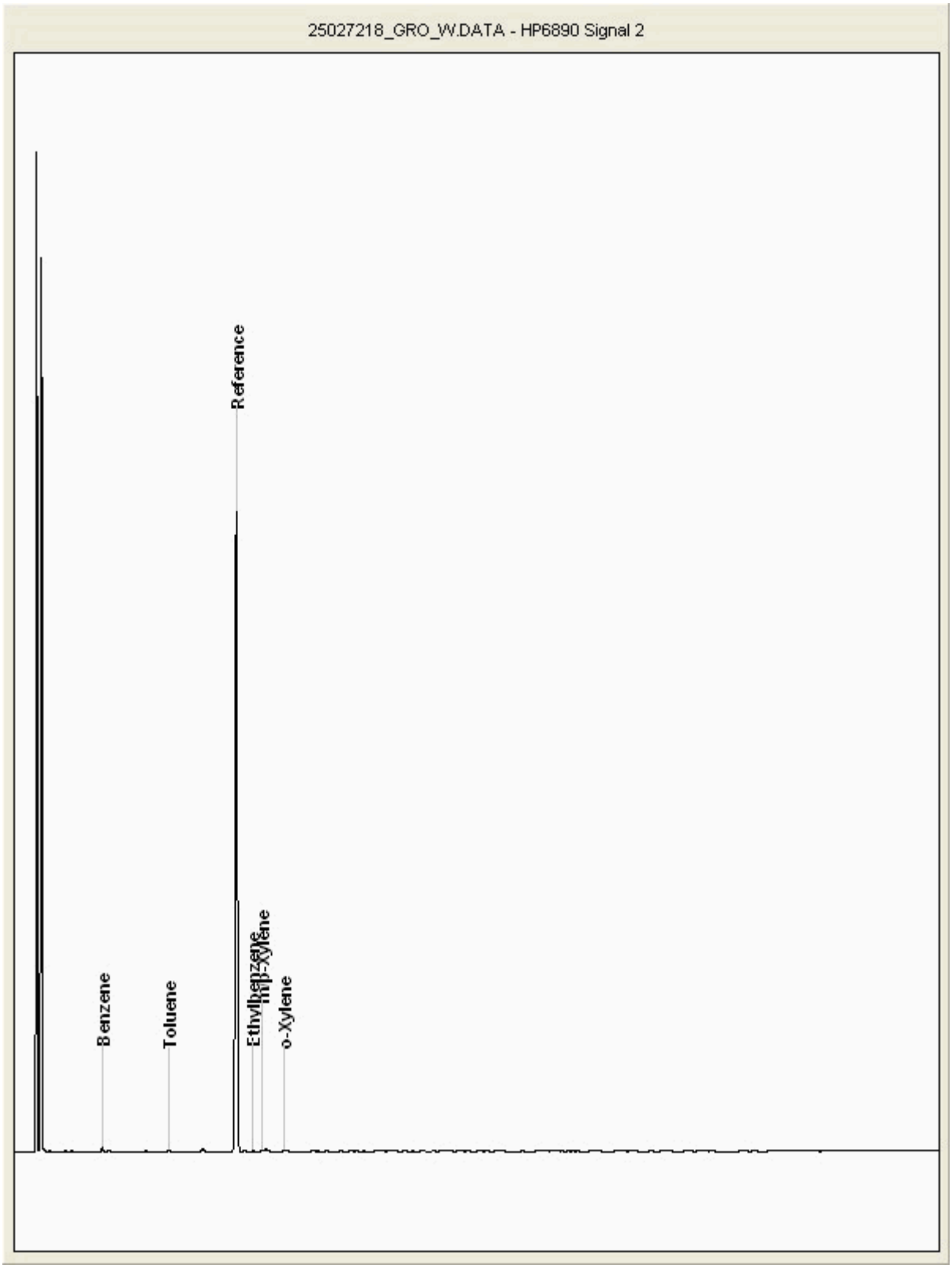


CERTIFICATE OF ANALYSIS

SDG: 210917-103 **Report Number:** 614534 **Superseded Report:**
Client Ref.: 70049885 **Location:** Limerick Gasworks

Chromatogram

Analysis: GRO by GC-FID (W) **Sample No :** 25027218 **Depth :** 0.00 - 0.00
Sample ID : PR6

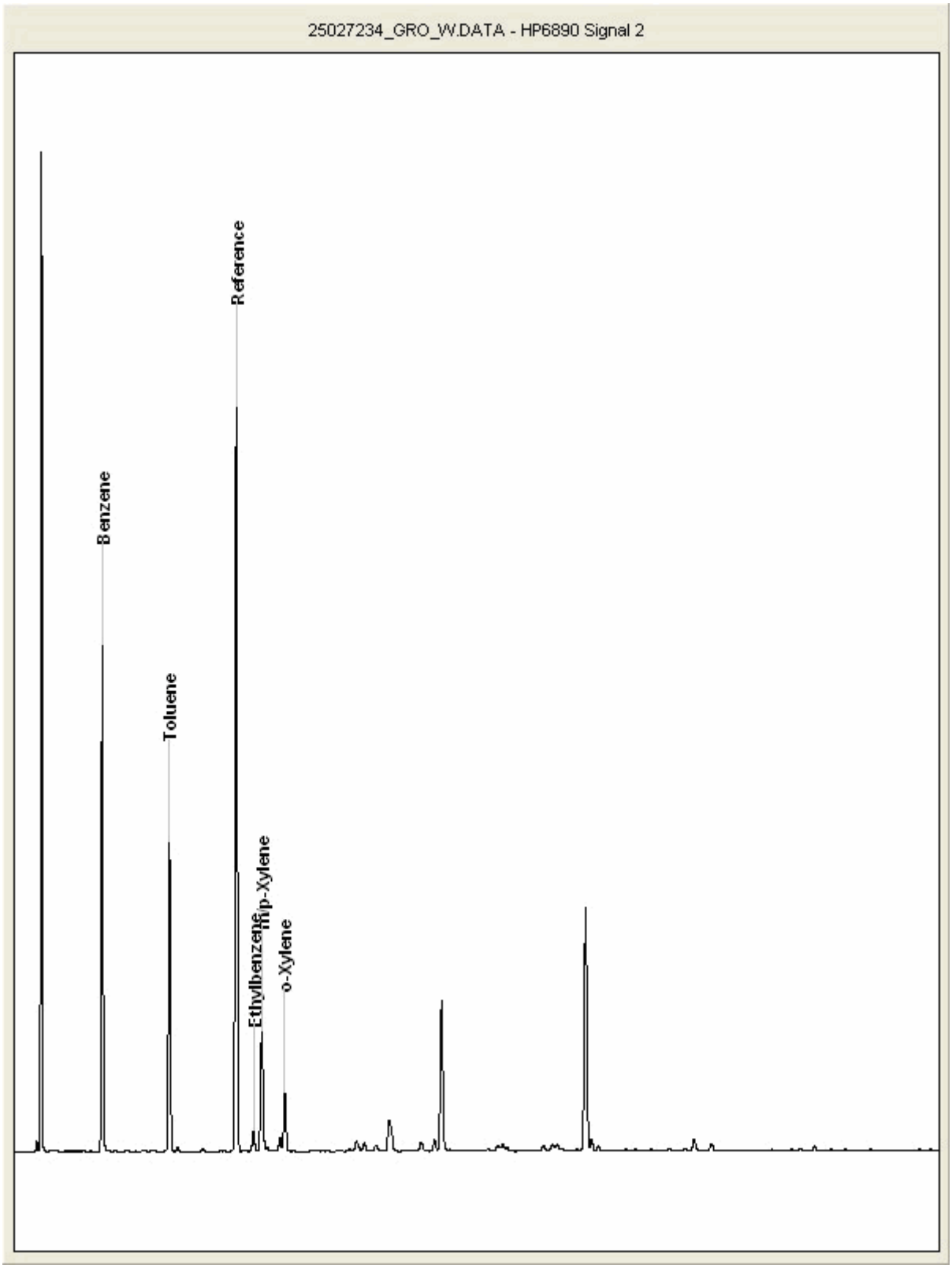


CERTIFICATE OF ANALYSIS

SDG: 210917-103 **Report Number:** 614534 **Superseded Report:**
Client Ref.: 70049885 **Location:** Limerick Gasworks

Chromatogram

Analysis: GRO by GC-FID (W) **Sample No :** 25027234 **Depth :** 0.00 - 0.00
Sample ID : PR2

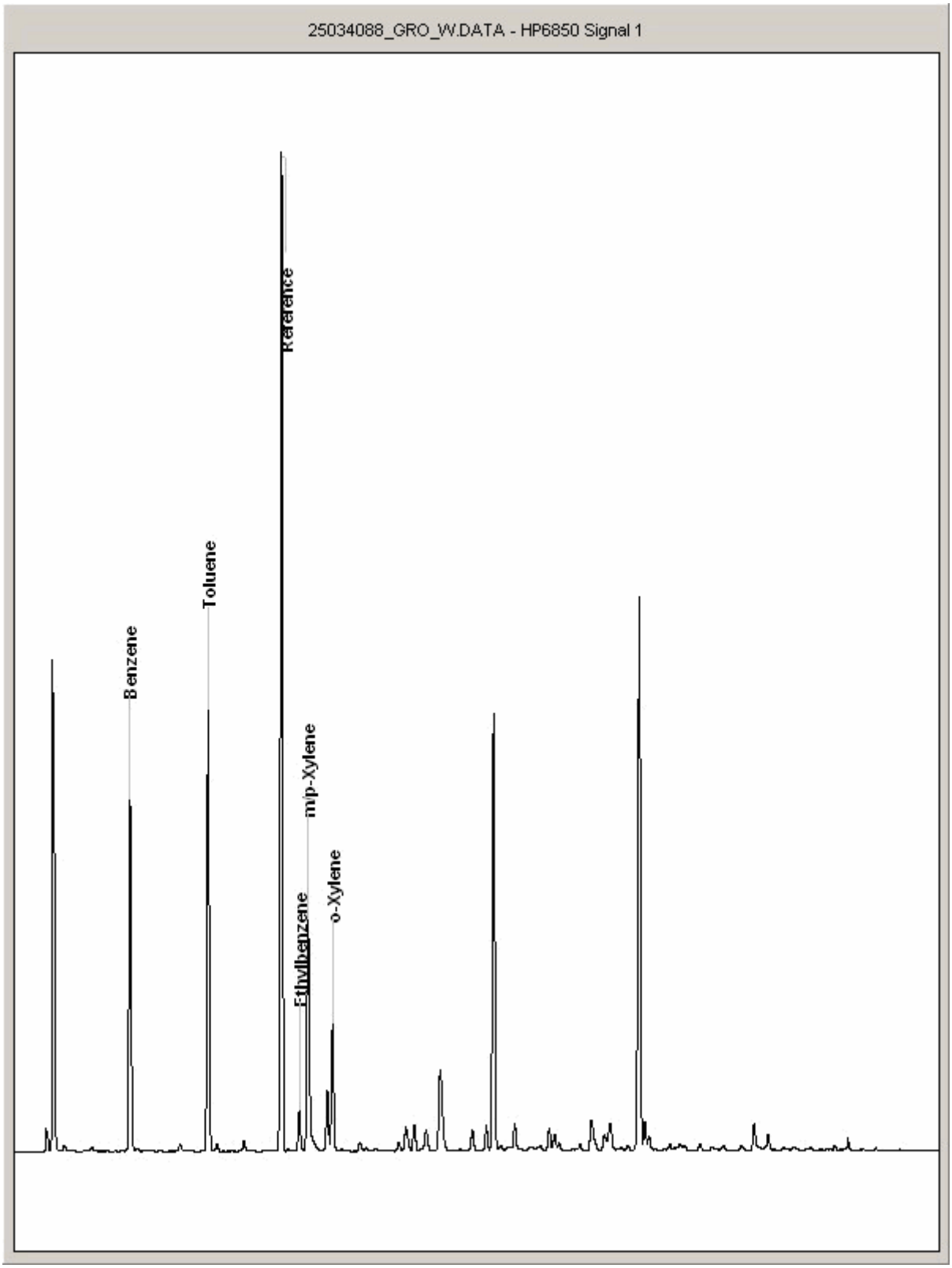


CERTIFICATE OF ANALYSIS

SDG: 210917-103 **Report Number:** 614534 **Superseded Report:**
Client Ref.: 70049885 **Location:** Limerick Gasworks

Chromatogram

Analysis: GRO by GC-FID (W) **Sample No :** 25034088 **Depth :** 0.00 - 0.00
Sample ID : PR7

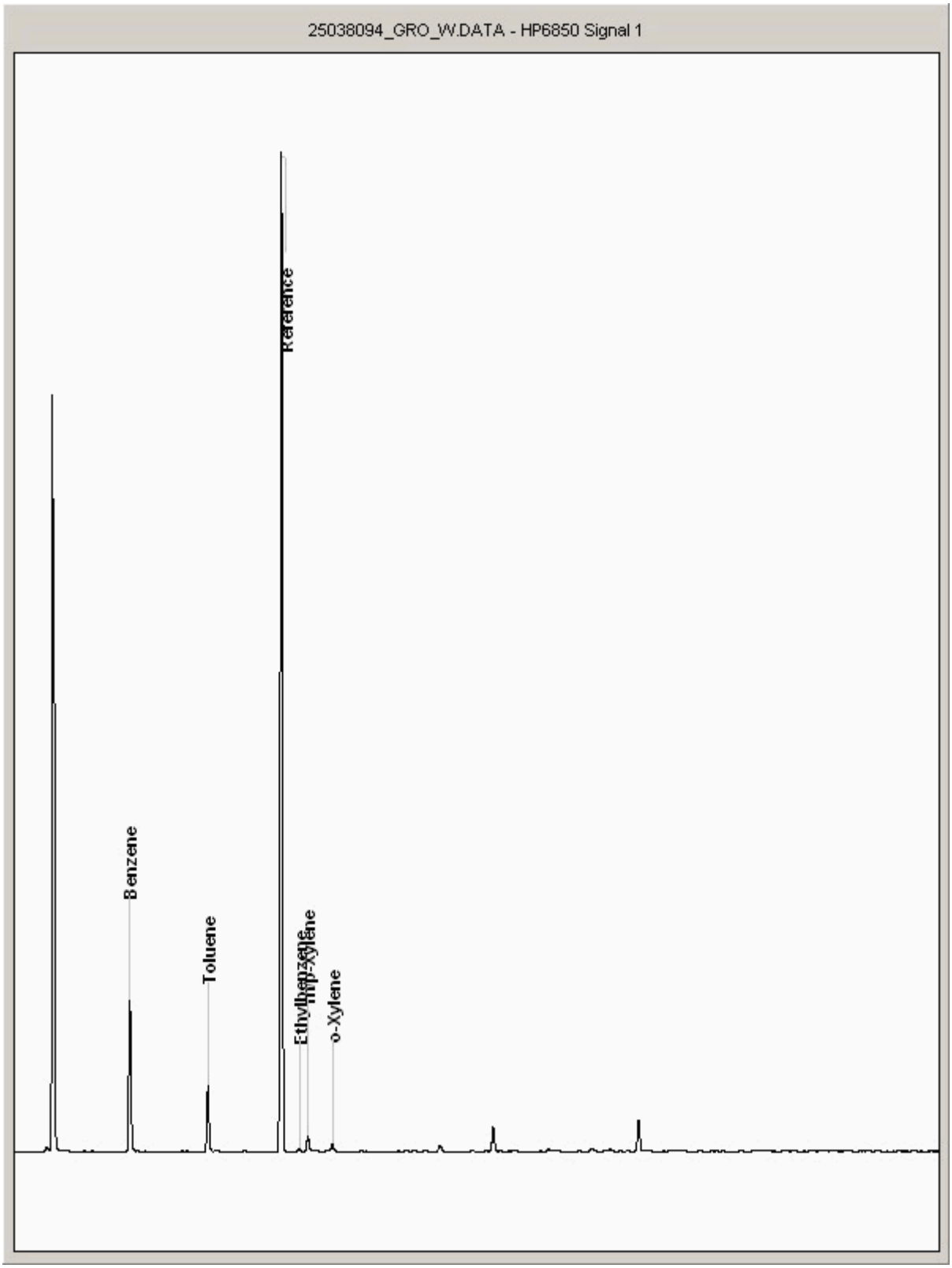


CERTIFICATE OF ANALYSIS

SDG: 210917-103 **Report Number:** 614534 **Superseded Report:**
Client Ref.: 70049885 **Location:** Limerick Gasworks

Chromatogram

Analysis: GRO by GC-FID (W) **Sample No :** 25038094 **Depth :** 0.00 - 0.00
Sample ID : PR3



Appendix General

1. Results are expressed on a dry weight basis (dried at 35ºC) for all soil analyses except for the following: NRA and CEN Leach tests, flash point LOI, pH, ammonium as NH4 by the BRE method, VOC TICs and SVOC TICs.

2. If sufficient sample is received a sub sample will be retained free of charge for 30 days after analysis is completed (e-mailed) for all sample types unless the sample is destroyed on testing. The prepared soil sub sample that is analysed for asbestos will be retained for a period of 6 months after the analysis date. All bulk samples will be retained for a period of 6 months after the analysis date. All samples received and not scheduled will be disposed of one month after the date of receipt unless we are instructed to the contrary. Once the initial period has expired, a storage charge will be applied for each month or part thereof until the client cancels the request for sample storage. ALS reserve the right to charge for samples received and stored but not analysed.

3. With respect to turnaround, we will always endeavour to meet client requirements wherever possible, but turnaround times cannot be absolutely guaranteed due to so many variables beyond our control.

4. We take responsibility for any test performed by sub-contractors (marked with an asterisk). We endeavour to use UKAS/MCERTS Accredited Laboratories, who either complete a quality questionnaire or are audited by ourselves. For some determinands there are no UKAS/MCERTS Accredited Laboratories, in this instance a laboratory with a known track record will be utilised.

5. If no separate volatile sample is supplied by the client, or if a headspace or sediment is present in the volatile sample, the integrity of the data may be compromised. This will be flagged up as an invalid VOC on the test schedule and the result marked as deviating on the test certificate.

6. NDP - No determination possible due to insufficient/unsuitable sample.

7. Results relate only to the items tested.

8. LoDs (Limit of Detection) for wet tests reported on a dry weight basis are not corrected for moisture content.

9. **Surrogate recoveries** - Surrogates are added to your sample to monitor recovery of the test requested. A % recovery is reported, results are not corrected for the recovery measured. Typical recoveries for organics tests are 70-130%. Recoveries in soils are affected by organic rich or clay rich matrices. Waters can be affected by remediation fluids or high amounts of sediment. Test results are only ever reported if all of the associated quality checks pass; it is assumed that all recoveries outside of the values above are due to matrix affect.

10. Stones/debris are not routinely removed. We always endeavour to take a representative sub sample from the received sample.

11. In certain circumstances the method detection limit may be elevated due to the sample being outside the calibration range. Other factors that may contribute to this include possible interferences. In both cases the sample would be diluted which would cause the method detection limit to be raised.

12. Mercury results quoted on soils will not include volatile mercury as the analysis is performed on a dried and crushed sample.

13. For leachate preparations other than Zero Headspace Extraction (ZHE) volatile loss may occur.

14. For the BSEN 12457-3 two batch process to allow the cumulative release to be calculated, the volume of the leachate produced is measured and filtered for all tests. We therefore cannot carry out any unfiltered analysis. The tests affected include volatiles GCFID/GCMS and all subcontracted analysis.

15. Analysis and identification of specific compounds using GCFID is by retention time only, and we routinely calibrate and quantify for benzene, toluene, ethylbenzenes and xylenes (BTEX). For total volatiles in the C5-C12 range, the total area of the chromatogram is integrated and expressed as ug/kg or ug/l. Although this analysis is commonly used for the quantification of gasoline range organics (GRO), the system will also detect other compounds such as chlorinated solvents, and this may lead to a falsely high result with respect to hydrocarbons only. It is not possible to specifically identify these non-hydrocarbons, as standards are not routinely run for any other compounds, and for more definitive identification, volatiles by GCMS should be utilised.

16. We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample. Other coarse granular material such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

17 Data retention. All records, communications and reports pertaining to the analysis are archived for seven years from the date of issue of the final report.

18. **Tentatively Identified Compounds (TICs)** are non-target peaks in VOC and SVOC analysis. All non-target peaks detected with a concentration above the LoD are subjected to a mass spectral library search. Non-target peaks with a library search confidence of >75% are reported based on the best mass spectral library match. When a non-target peak with a library search confidence of <75% is detected it is reported as "mixed hydrocarbons". Non-target compounds identified from the scan data are semi-quantified relative to one of the deuterated internal standards, under the same chromatographic conditions as the target compounds. This result is reported as a semi-quantitative value and reported as Tentatively Identified Compounds (TICs). TICs are outside the scope of UKAS accreditation and are not moisture corrected.

19. **Sample Deviations**

If a sample is classed as deviated then the associated results may be compromised.

1	**Container with Headspace provided for volatiles analysis**
2	**Incorrect container received**
3	**Deviation from method**
4	**Matrix interference**
♦	**Sample holding time exceeded in laboratory**
@	**Sample holding time exceeded due to late arrival of instructions or samples**
§	**Sampled on date not provided**

20. **Asbestos**

When requested, the individual sub sample scheduled will be analysed in house for the presence of asbestos fibres and asbestos containing material by our documented in house method TM048 based on HSG 248 (2005), which is accredited to ISO17025. If a specific asbestos fibre type is not found this will be reported as "Not detected". If no asbestos fibre types are found all will be reported as "Not detected" and the sub sample analysed deemed to be clear of asbestos. If an asbestos fibre type is found it will be reported as detected (for each fibre type found). Testing can be carried out on asbestos positive samples, but, due to Health and Safety considerations, may be replaced by alternative tests or reported as No Determination Possible (NDP). The quantity of asbestos present is not determined unless specifically requested.

Identification of Asbestos in Bulk Materials & Soils

The results for identification of asbestos in bulk materials are obtained from supplied bulk materials which have been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

The results for identification of asbestos in soils are obtained from a homogenised sub sample which has been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining.

Asbestos Type	Common Name
Chrysotile	White Asbestos
Amosite	Brown Asbestos
Crocidolite	Blue Asbestos
Fibrous Actinolite	-
Fibrous Anthophyllite	-
Fibrous Tremolite	-

Visual Estimation Of Fibre Content

Estimation of fibre content is not permitted as part of our UKAS accredited test other than: - Trace - Where only one or two asbestos fibres were identified.

Respirable Fibres

Respirable fibres are defined as fibres of <3 µm diameter, longer than 5 µm and with aspect ratios of at least 3:1 that can be inhaled into the lower regions of the lung and are generally acknowledged to be most important predictor of hazard and risk for cancers of the lung.

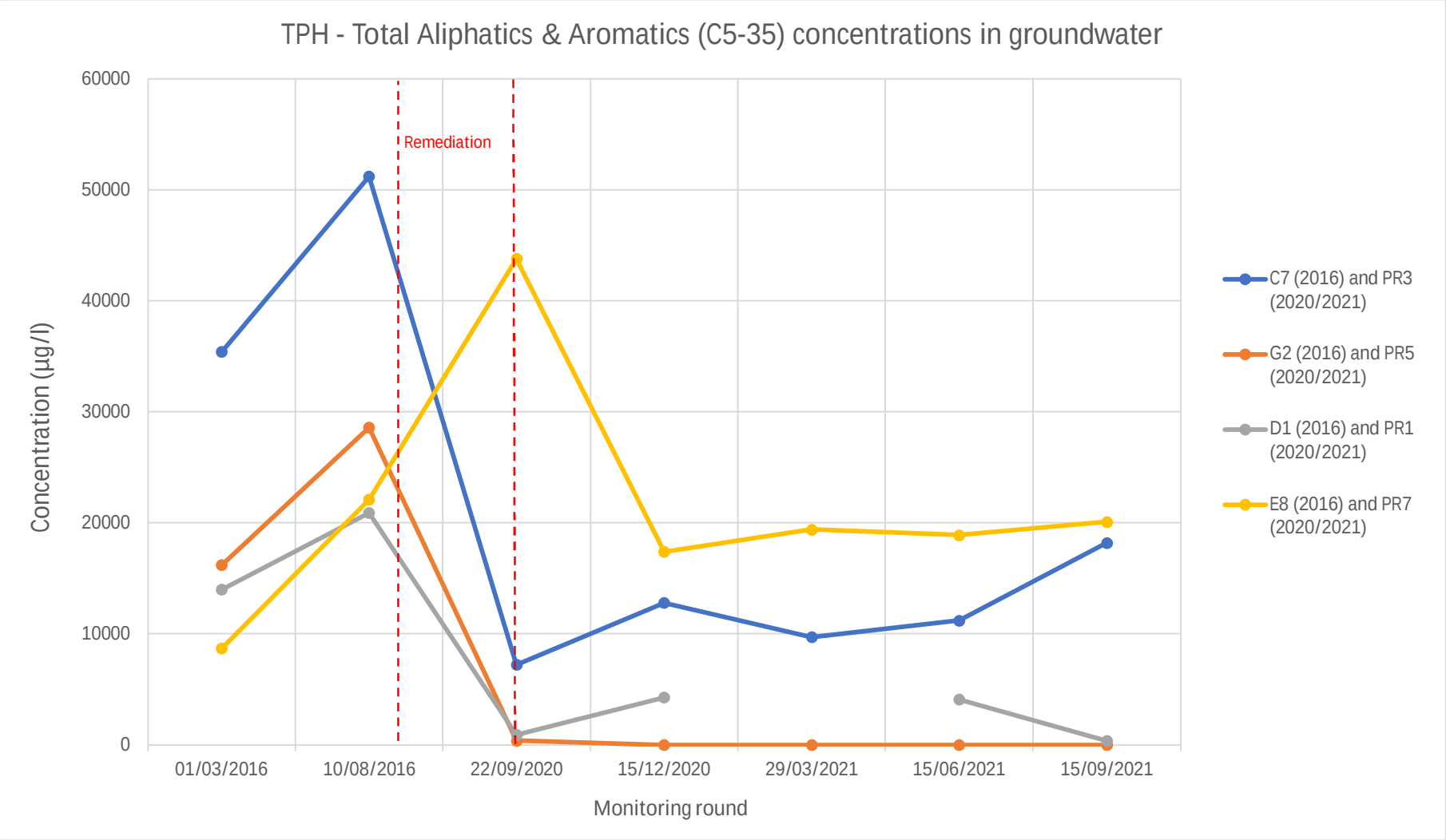
Further guidance on typical asbestos fibre content of manufactured products can be found in HSG 264.

The identification of asbestos containing materials and soils falls within our schedule of tests for which we hold UKAS accreditation, however opinions, interpretations and all other information contained in the report are outside the scope of UKAS accreditation.

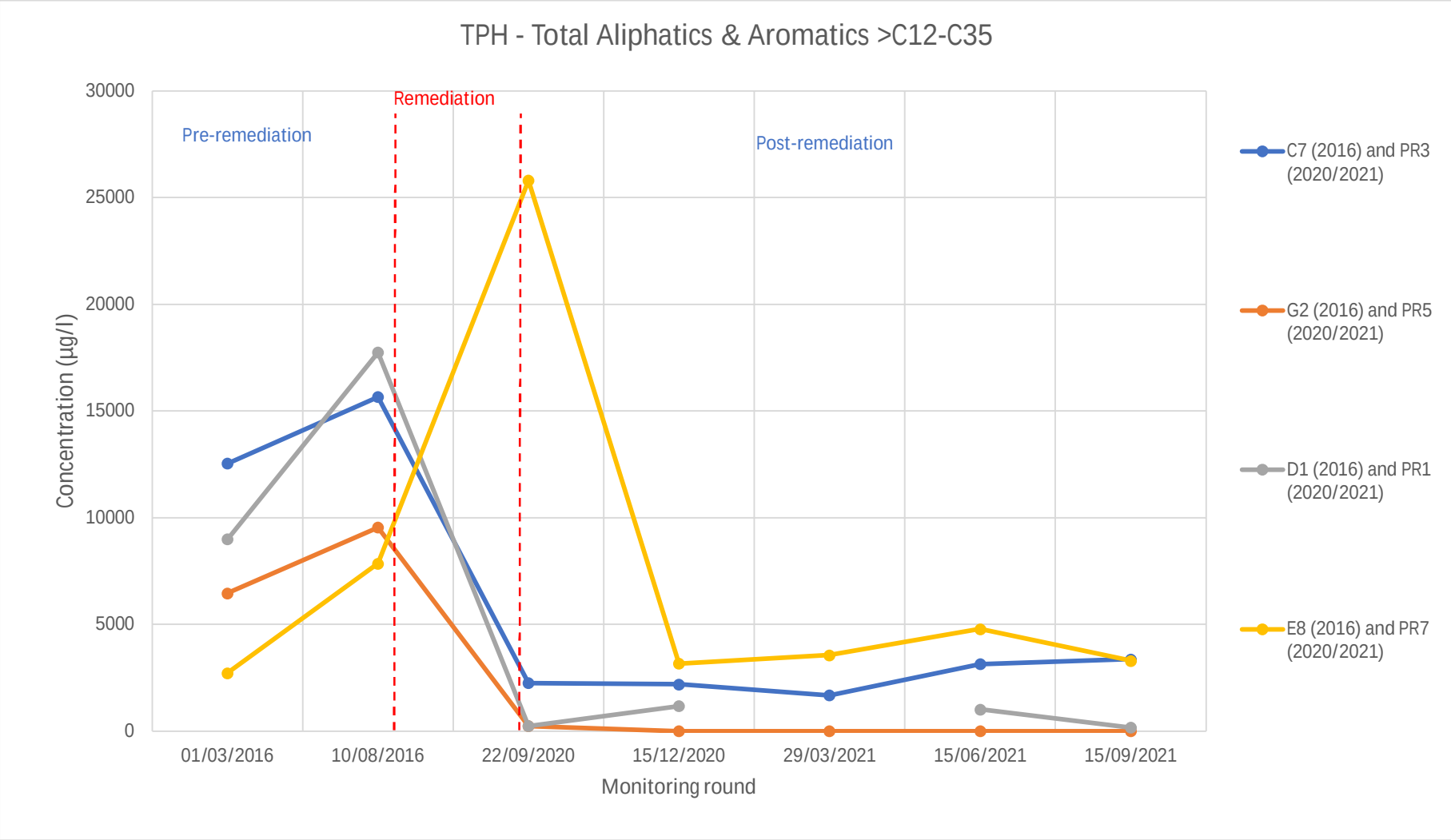
Appendix C

CONTAMINANT TREND ANALYSIS GRAPHS

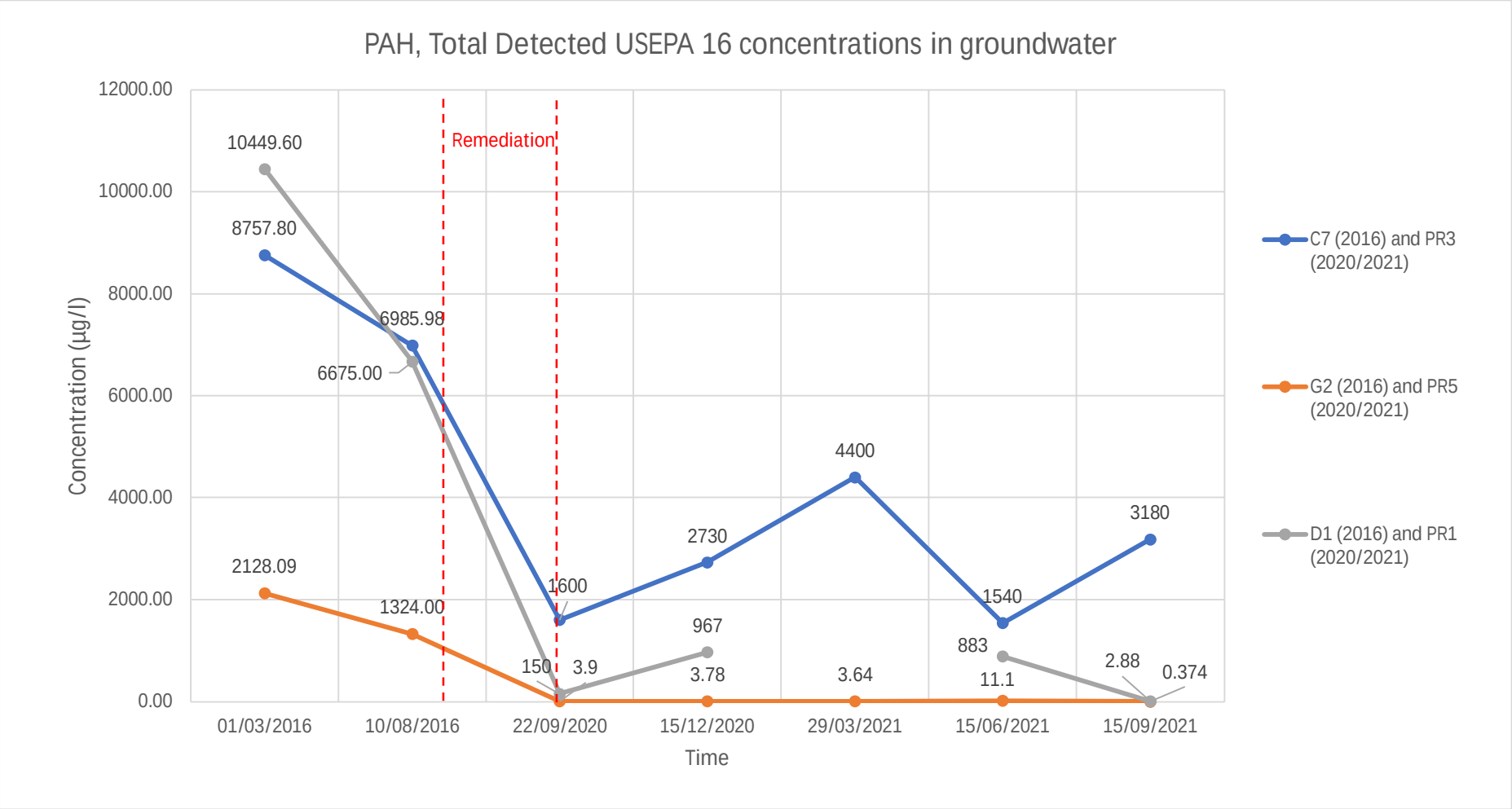
Graph A – TPH - Total Aliphatics & Aromatics (C5-35) concentrations in groundwater



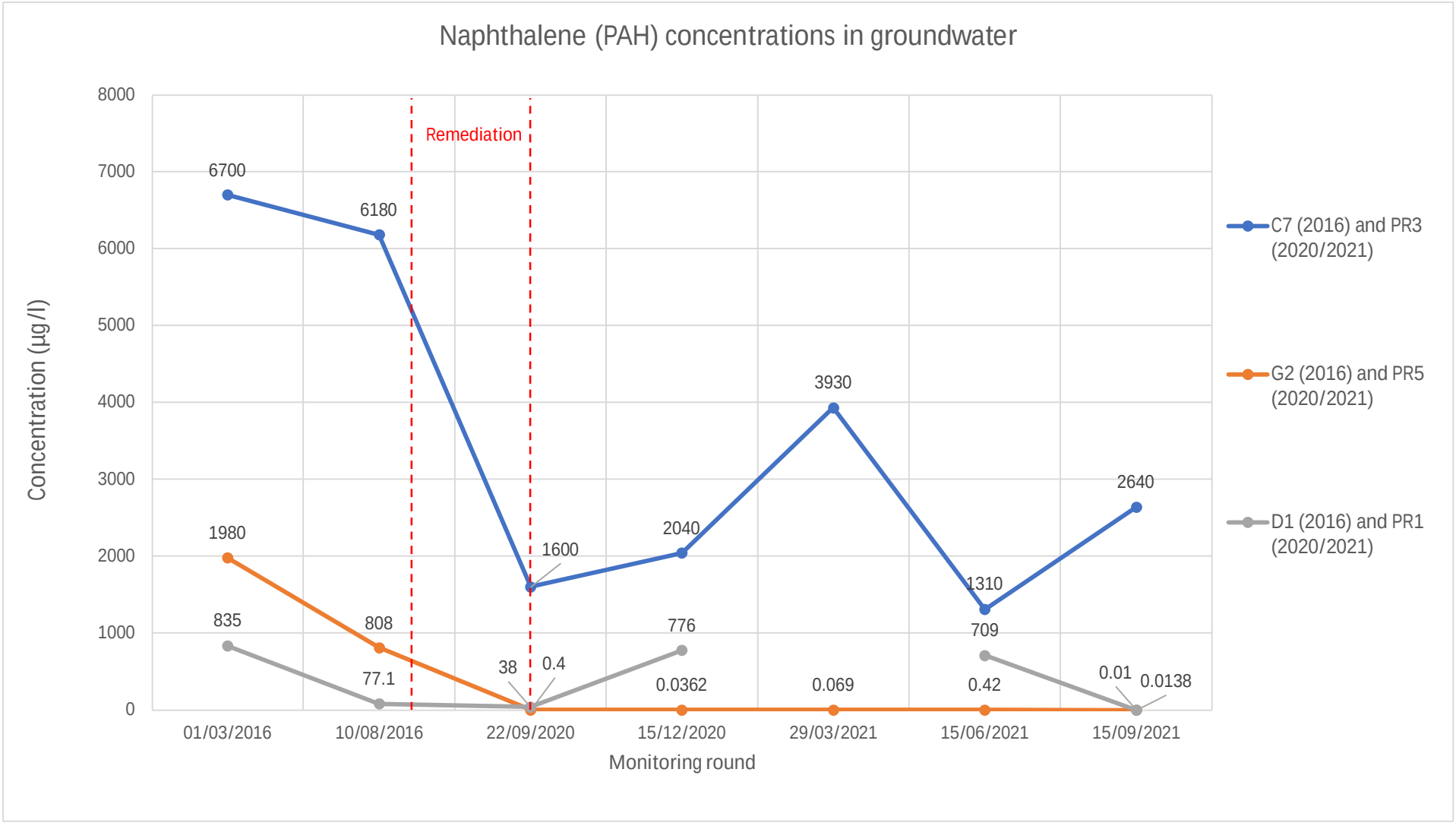
Graph B – TPH - Total Aliphatics & Aromatics (C12-35) concentrations in groundwater



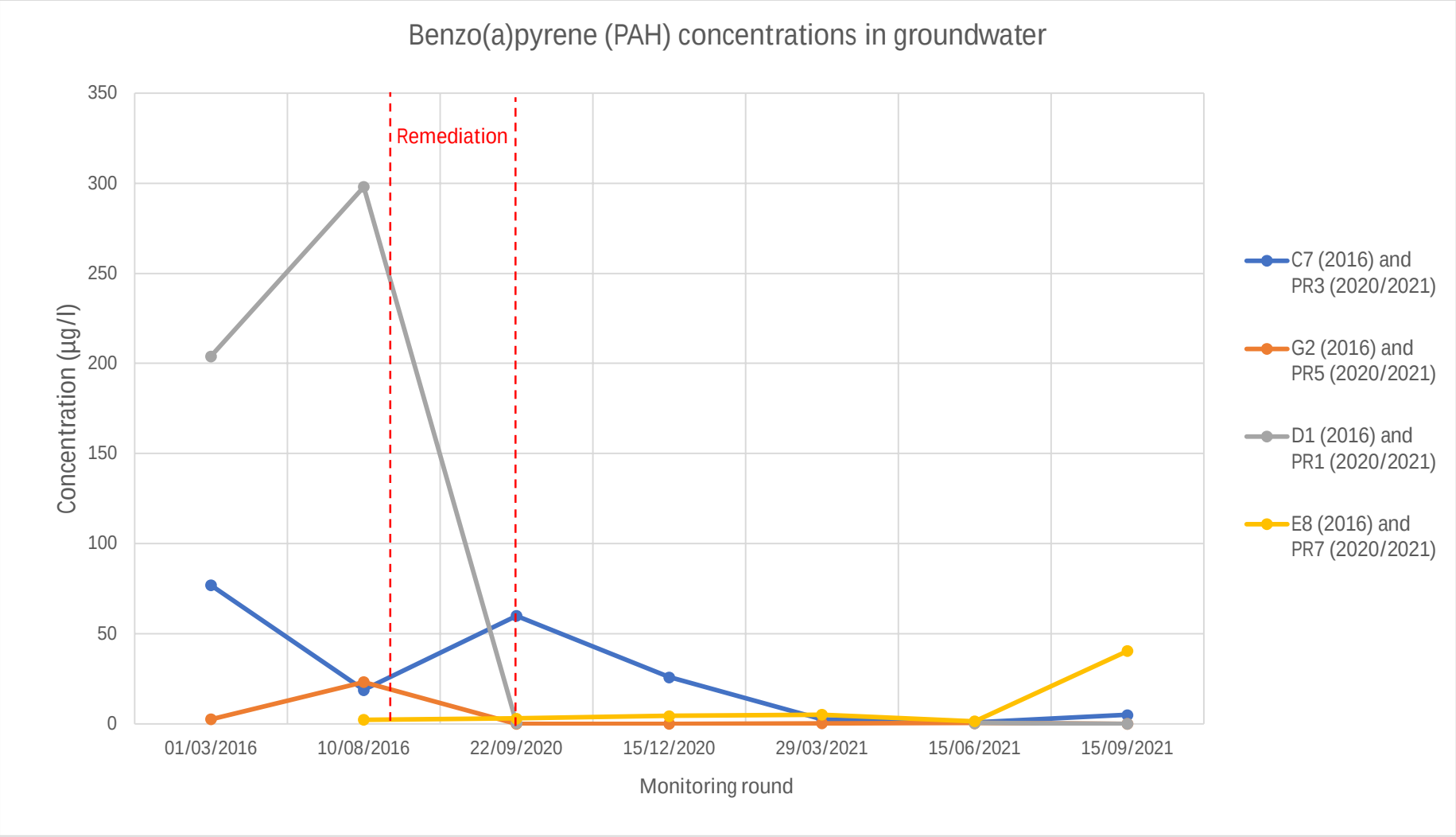
Graph C – PAH, Total Detected USEPA 16 concentrations in groundwater



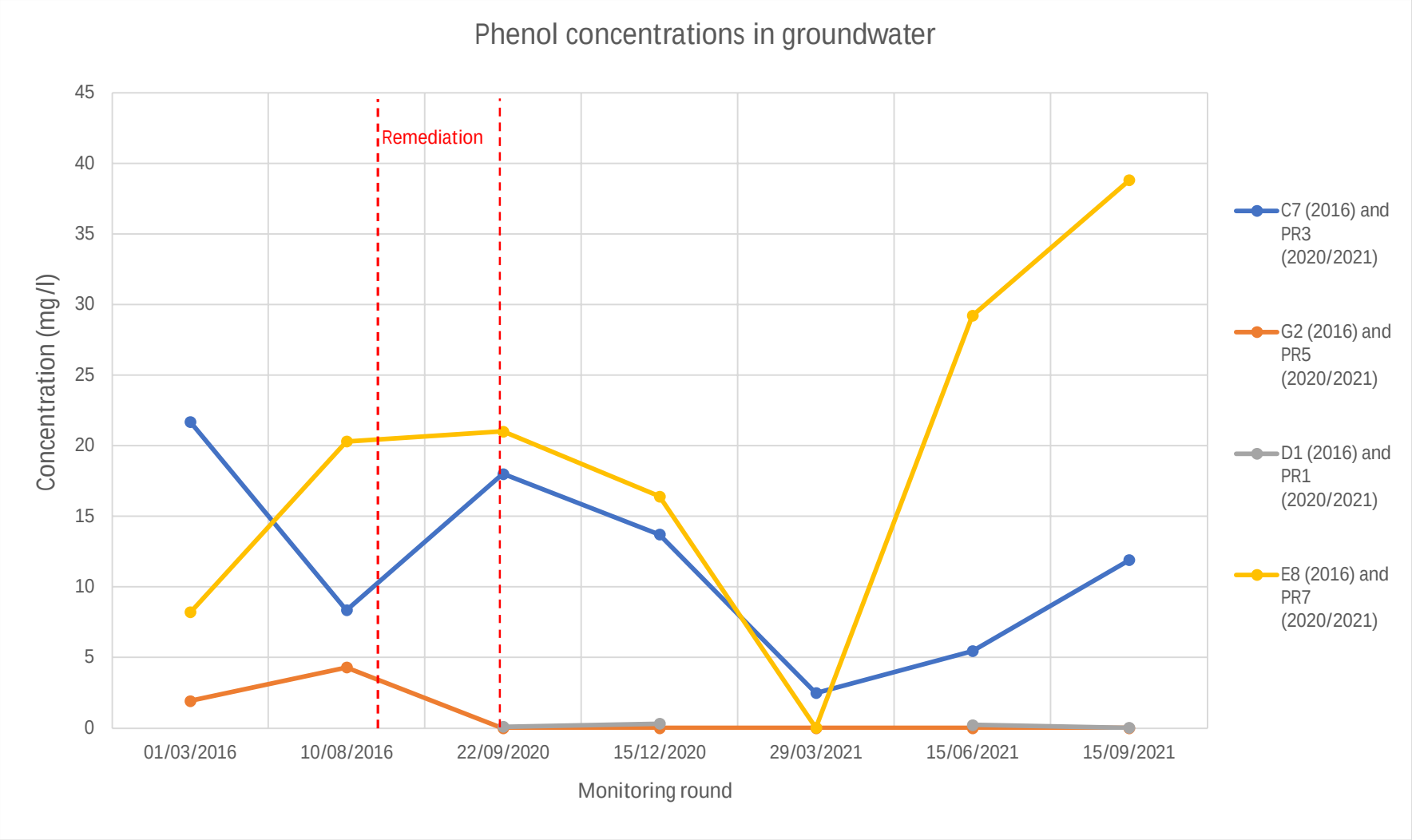
Graph D – Naphthalene (PAH) concentrations in groundwater



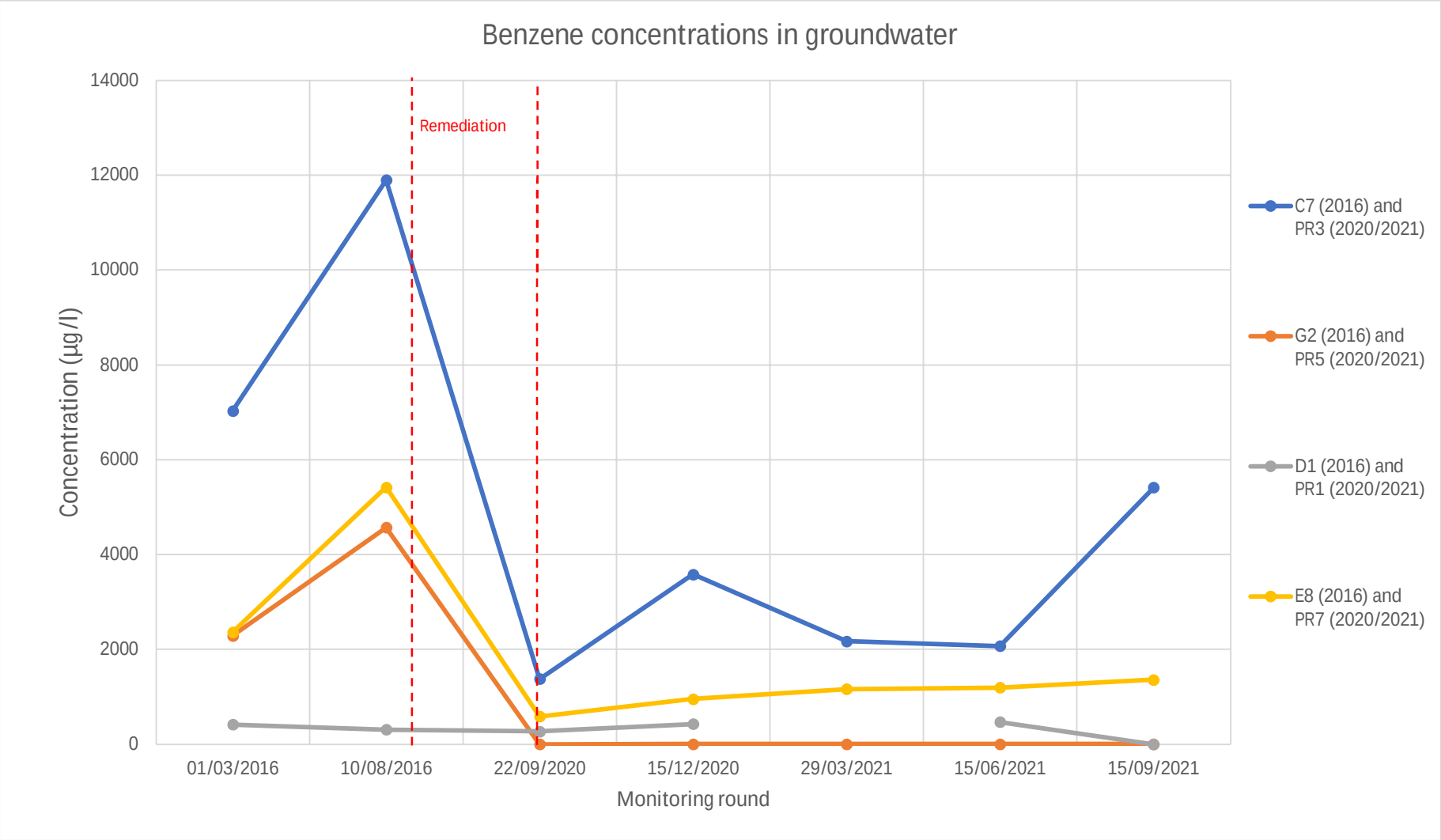
Graph E - Benzo(a)pyrene (PAH) concentrations in groundwater



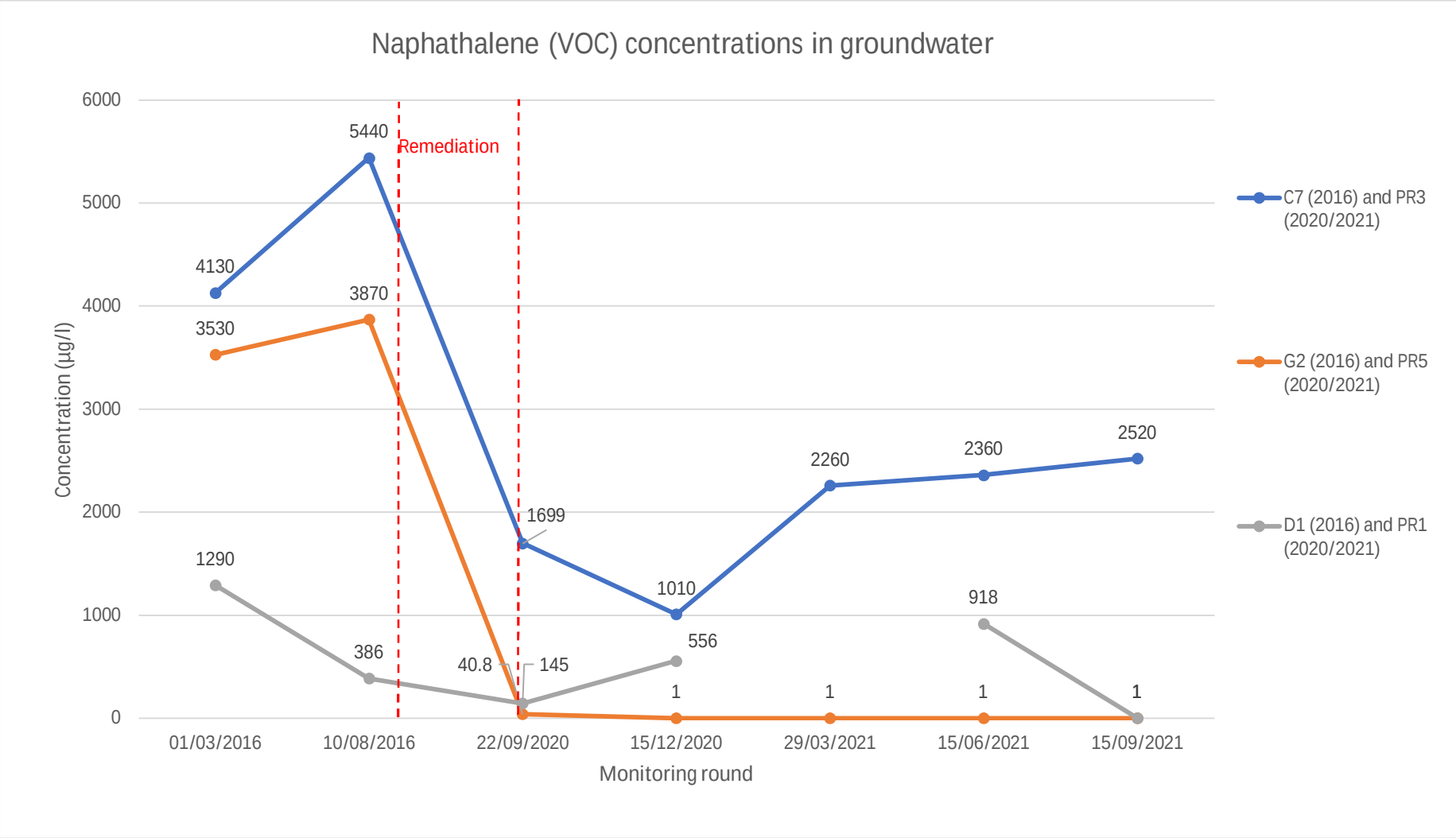
Graph F - Phenol concentrations in groundwater

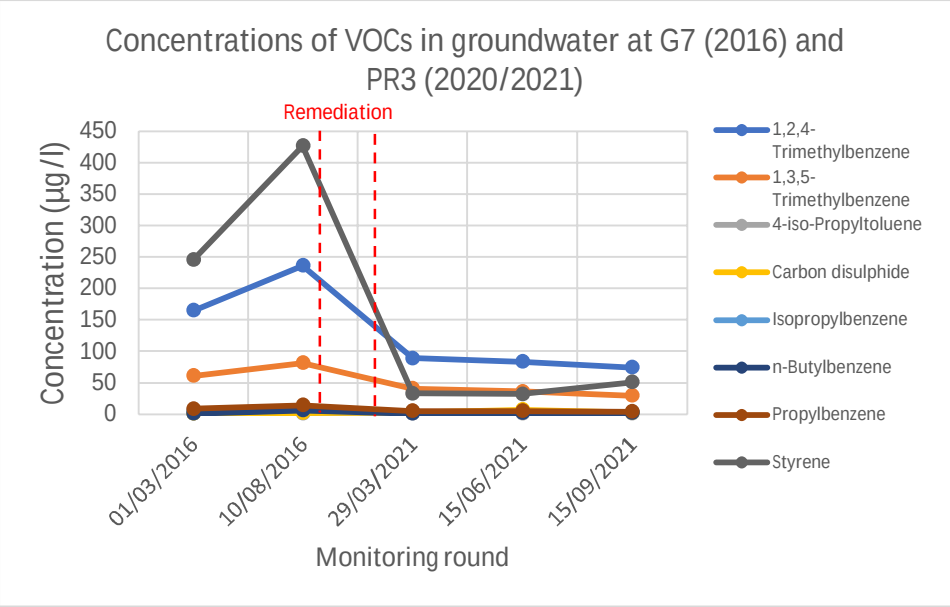


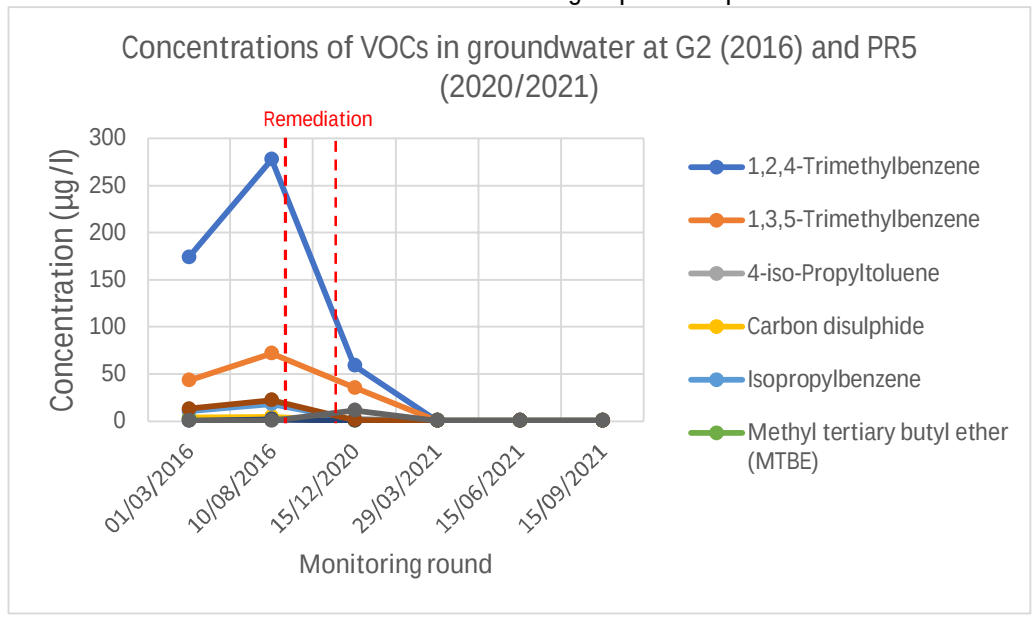
Graph G – Benzene concentrations in groundwater

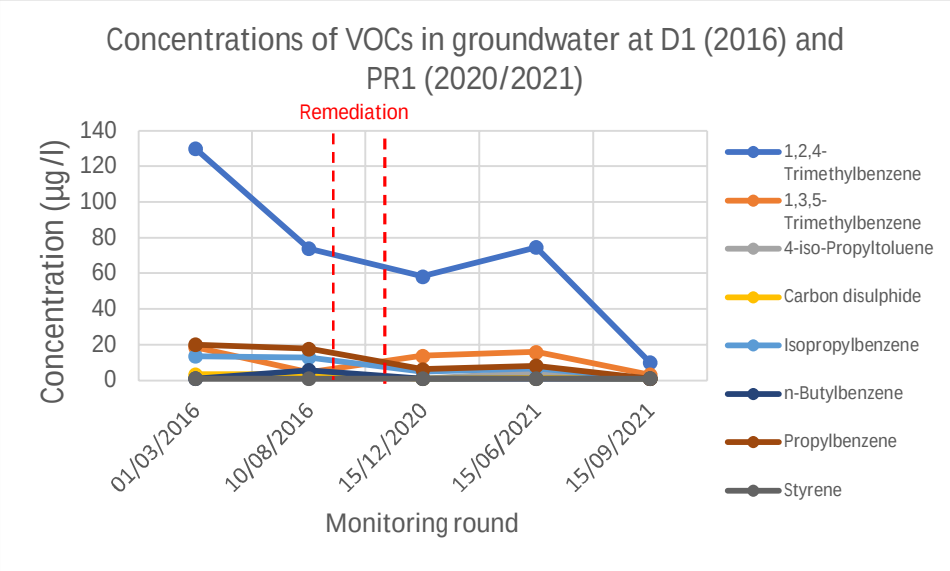


Graph H – Naphthalene (VOC) concentrations in groundwater







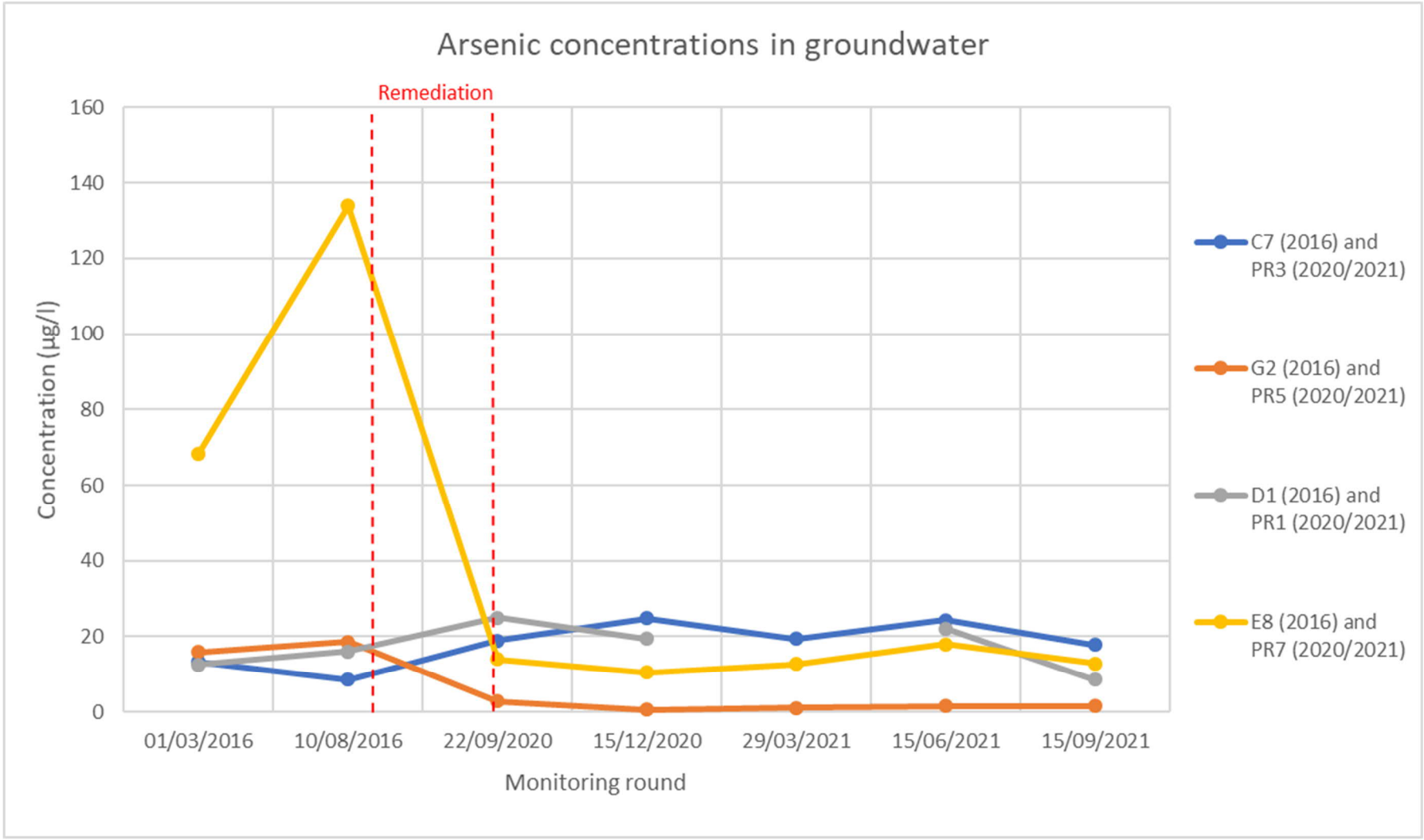


Graph I - Concentrations of VOCs in groundwater at G7 (2016) and PR3 (2020/2021)

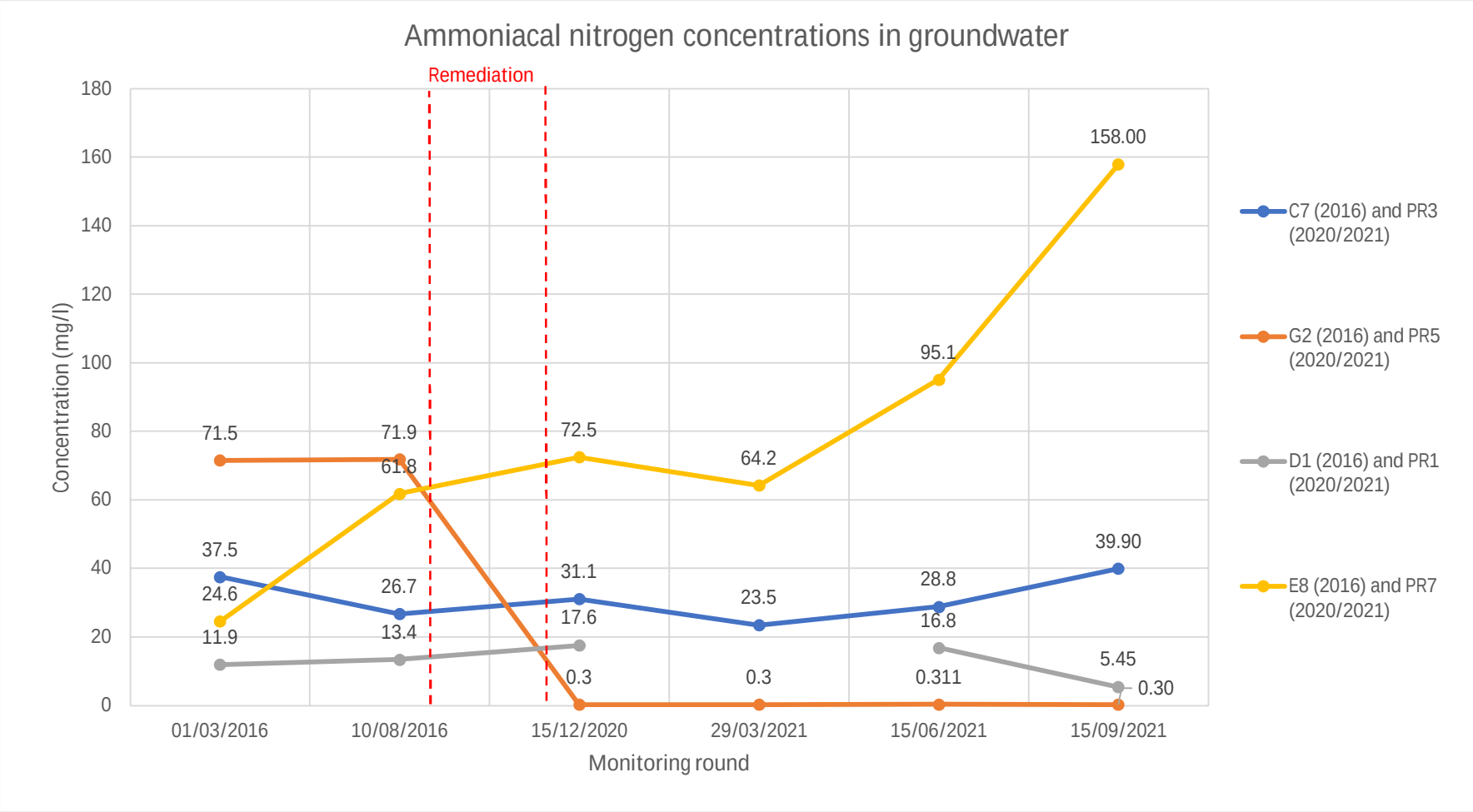
Graph J- Concentrations of VOCs in groundwater at G2 (2016) and PR5 (2020/2021)

Graph K - Concentrations of VOCs in groundwater at D1 (2016) and PR1 (2020/2021)

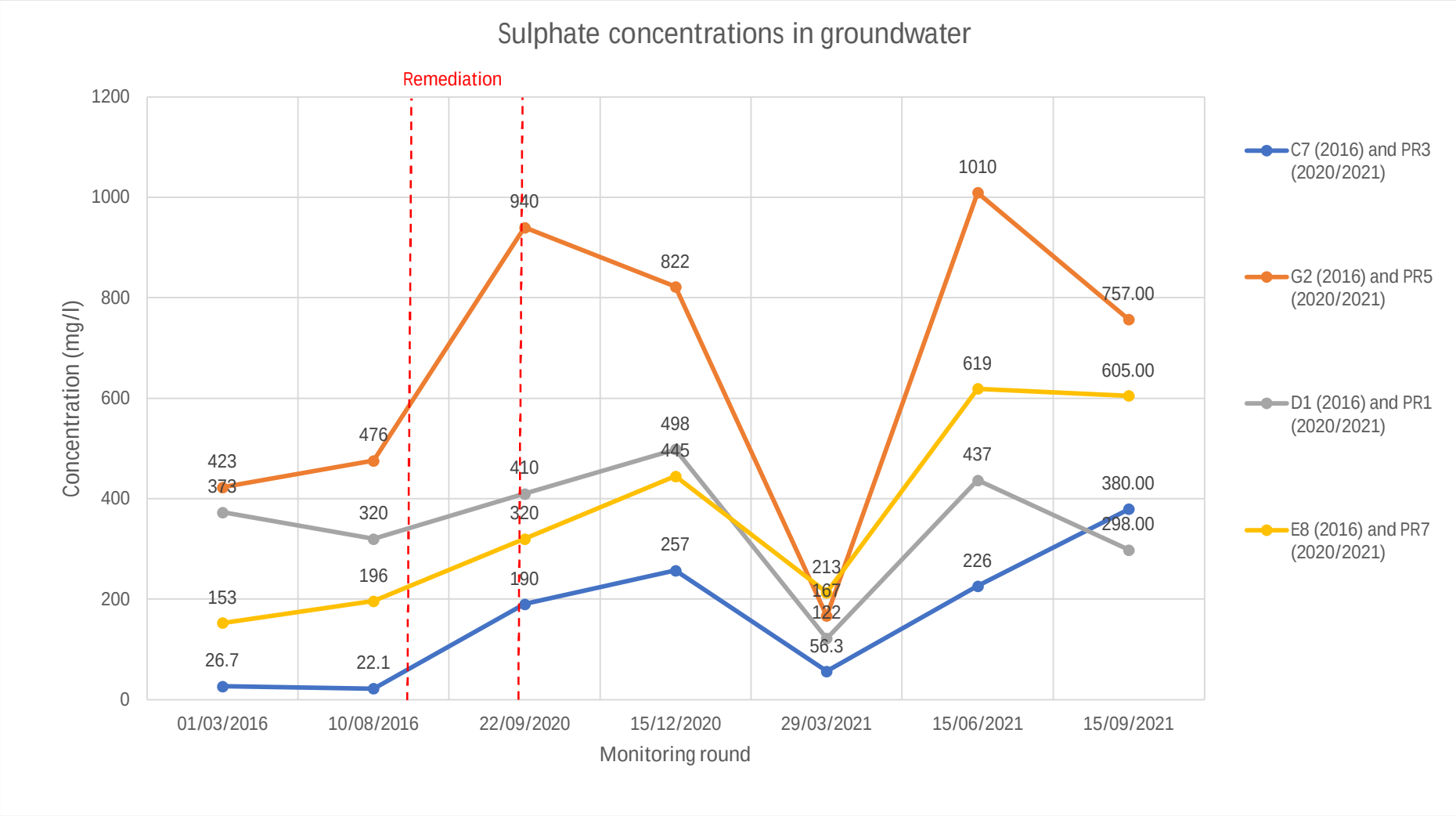
Graph L – Concentrations of Arsenic in groundwater



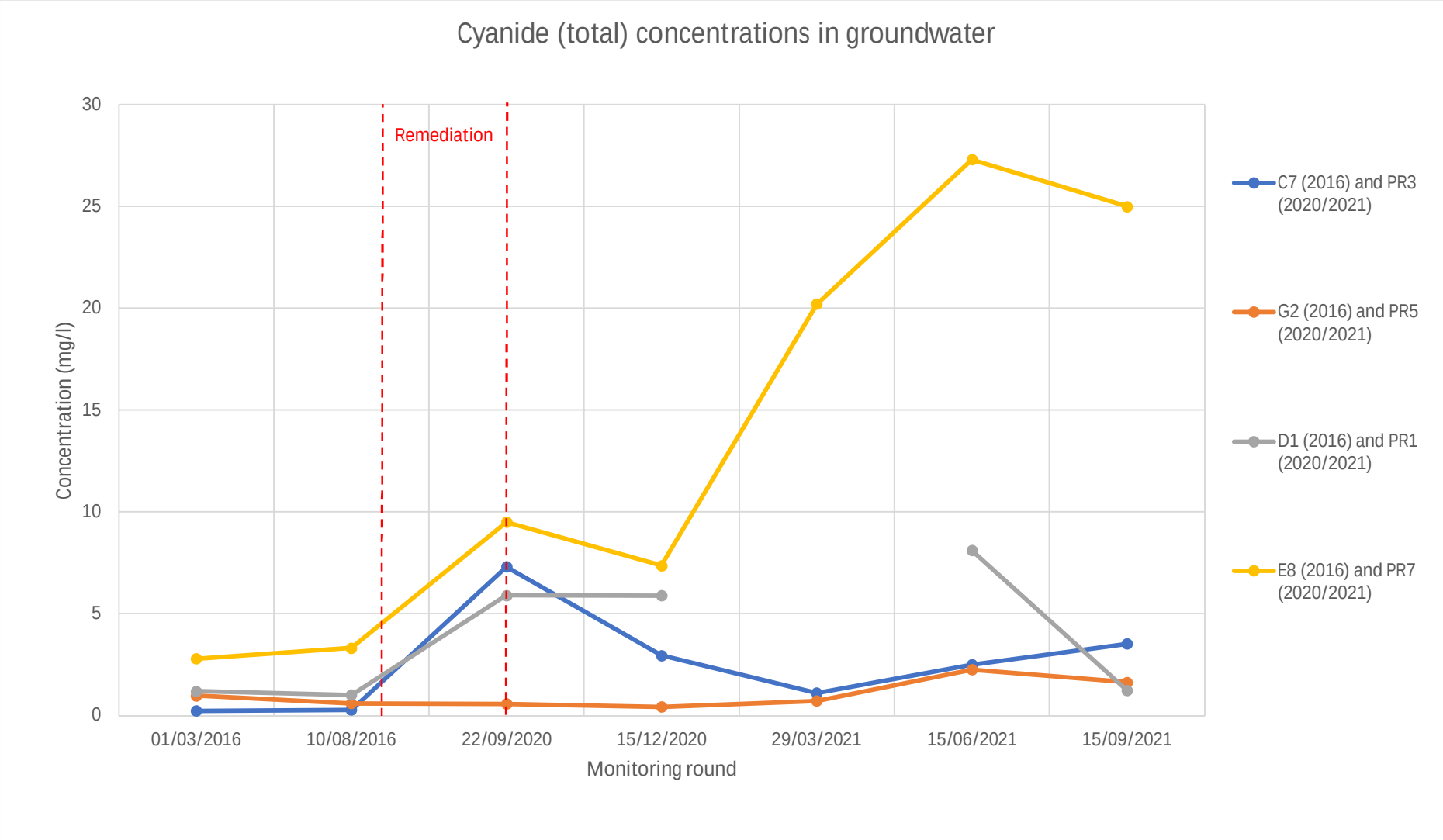
Graph M – Concentrations of ammoniacal nitrogen in groundwater



Graph N – Concentrations of sulphate in groundwater



Graph O – Concentrations of cyanide (total) in groundwater



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