Environmental Forensic Report

Queens West Parcel 9

SDG: AI060602



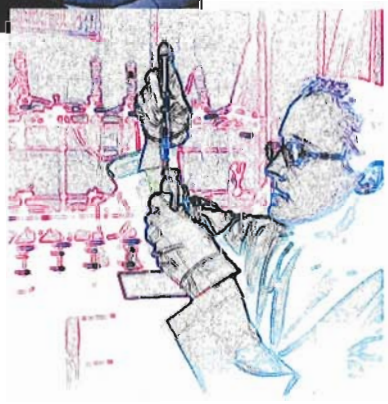
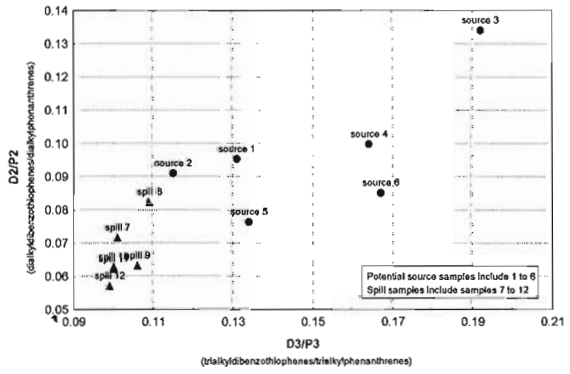


Figure 1. Double Ratio Plot



Report To:

AKRF
34 S. Broadway
White Plains, NY 10601

Report By:

META Environmental, Inc.
49 Clarendon Street
Watertown, MA 02472

June 13, 2006

Identifying and allocating sources of pollutants in complex environments.

META Environmental, Inc.
ENGINEERING & CHEMISTRY

Final Laboratory Report

META Environmental, Inc.
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Watertown, MA 02472

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Certification

This certifies that this package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed herein. Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager and Quality Assurance Officer, as verified by the following signatures.

James A. Roush — Date: 6/15/2006
Environmental Scientist, Laboratory Manager

David M. Mauro — Date: 6/15/06
Senior Scientist, Quality Assurance Officer

Sample Delivery Group Narrative

Project:	Queens West Parcel 9
Client:	AKRF 34 S. Broadway White Plains, NY 10601
Report Contact:	Becky Kinal
Dates of Receipt:	06/02/2006
Sample Summary:	The sample received for this project is summarized in the attached sample login forms.
META Project Number:	A07010

Chain of Custody

The samples were received in good condition. The internal temperature of the shipment containers were as follows:

Sample *QW-tank 19* received: 06/02/2006	6.5°C
Sample *QW-tank 20* received: 06/02/2006	11.3°C

Internal chain of custody procedures were followed after sample receipt. Samples were stored in a locked refrigerator. A sample custody logbook contains the record of sample removal from the secure sample storage area to the sample preparation laboratory. The custody record for the sample extracts is present on the sample extraction logbook page.

The disposal of samples and extracts will be authorized one month after the release of this data report. Sample disposal will be documented.

Methods

The NAPL samples were prepared by waste dilution (EPA 3580) using dichloromethane (DCM). The extracts were spiked with internal standard and analyzed by GC/FID (EPA 8100M) and GC/MS/SIM (EPA 8270M).

Results

Sample results are presented in summary forms (CLP Form 1 equivalent) which follow this narrative.

Quality Control

Analyte Flags

The detection limits were determined as the sample equivalent of the lowest linear initial calibration standard. Analytes measured between 50% and 100% of the lowest standard were reported as "estimated" and flagged with the letter "J." Undetected analytes were reported as null and flagged with the letter, "U." Analytes marked with a "B" were detected in the associated blank and should be reviewed for a possible positive bias. No deviations were thought significant enough to compromise the integrity of the reported values.

Holding Times

The NAPL samples were extracted within holding times. The samples and extracts were stored at 4°C ± 2°C prior to extraction and analysis. The extracts were analyzed within 40 days of sample preparation.

Surrogate Spikes

Extraction surrogates were added to all samples prior to extraction. All surrogate compounds were recovered within the 50%-120% acceptable criterion.

Blanks

Toluene was detected in the method blank at a level just above the RL. Both samples had toluene detected at greater than 5x the blank level.

Blank Spikes
A blank spike was extracted with the NAPL batch. All spiked compounds were recovered within criteria.

Internal Standards
Internal standards were recovered within acceptable QC limits (50%-200%) relative to the continuing calibration standards.

Interpretation

QW-tank 19

Sample *QW-tank 19* contained petrogenic material (see definitions). The petrogenic material was indicated by the unresolved complex mixture (UCM) that eluted from about 10 minutes (C9 – nonane) to about 45 minutes (C35 – pentatriacontane) with a maximum at about 29 minutes (C18 – octadecane) in the GC/FID chromatogram (Appendix B). The presence of dominant alkane hydrocarbons as well as the ratios of C17/pristine and C18/phytane (Table 1) indicated that this material had not been subject to severe weathering.

This pattern is consistent with a No. 4 fuel oil or marine diesel fuel.

QW-tank 20

Sample *QW-tank 20* also contained petrogenic material. This petrogenic material was again indicated by an unresolved complex mixture (UCM) that eluted from about 10 minutes (C9 – nonane) to about 45 minutes (C35 – pentatriacontane) with an earlier maximum at about 24 minutes (C15 – pentadecane) as compared to *QW-tank 19* . Sample *QW-tank 20* also had dominant alkane hydrocarbons present, and high ratios of C17/pristine and C18/phytane indicating that this material had not been subject to severe weathering.

This pattern is also consistent with a No. 4 fuel oil or marine diesel fuel.

Discussion

Both samples appear to be #4 fuel oils; the double ratio plots (Figures 1 & 2) show a somewhat close correlation, and the PAH histogram distributions (Appendix D) of both samples are similar, however, the GC/FID fingerprints (Appendix B) appear different and the GC/MS diagnostic ratios (Table 1) show dissimilarity. For example, the relative percent difference (RPD) of the pristane/phytane ratio was 47.7%. Similarly the RPD of the C3D/C3PA ratio was 34.1%. These RPDs are higher than expected from samples of the same source material. Of specific interest is the

sesqueterpane biomarker distribution (ion 123 in Appendix E). Sesqueterpane distributions of similar material should be similar, even after severe weathering. The two sample's sesqueterpane distributions are quite dissimilar, and suggest that these two #4 fuel oils were produced from different crude oil feedstocks.

There were no indications of other petroleum products or pyrogenic substances in any of the samples.

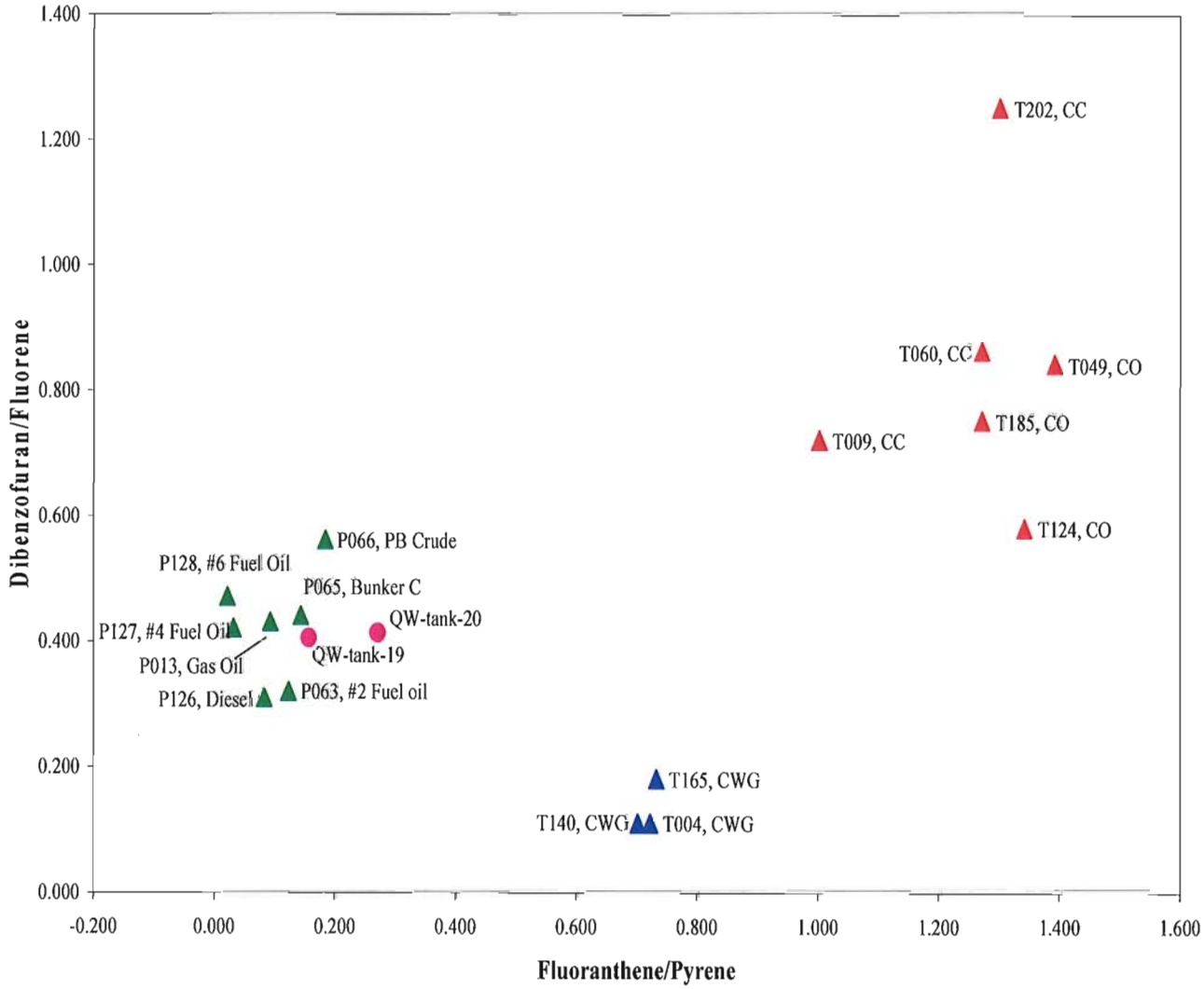
Table 1. Selected Source and Weathering Ratios

	Fl/Py	D/F	C17/Pris	C18/Phy	Pris/Phy	C3D/C3PA	C2D/C2PA	BF/MP
QW-tank-19	0.153	0.405	1.732	1.683	1.047	0.970	0.725	0.089
QW-tank-20	0.269	0.413	1.758	2.474	1.703	0.914	0.514	0.120

Ratios:

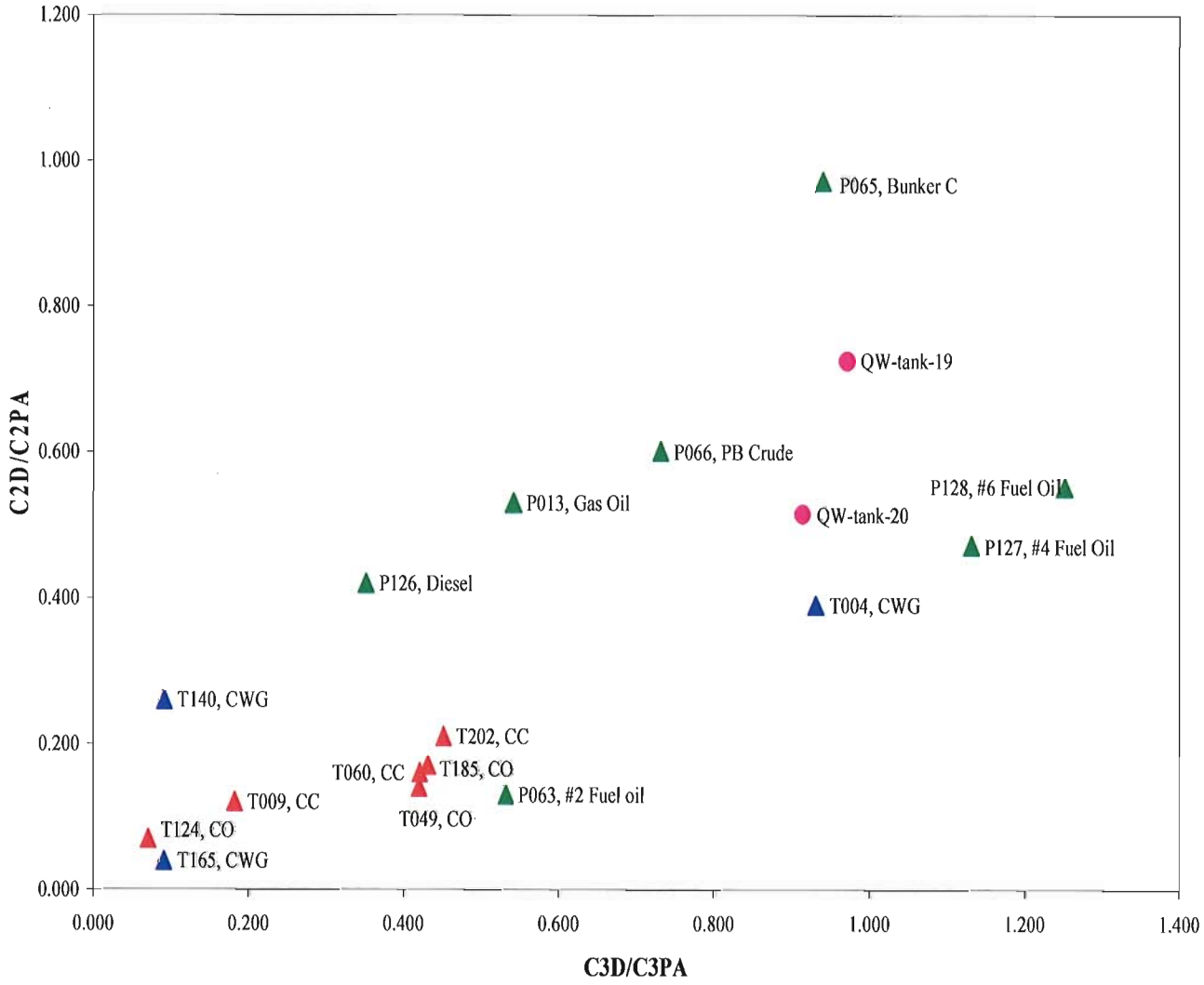
Fl/Py	fluoranthene/pyrene
D/F	dibenzofuran/fluorene
C17/Pris	heptadecane/pristane
C18/Phy	octadecane/phytane
Pris/Phy	pristane/phytane
C3D/C3PA	trialkyldibenzothiophenes/trialkylphenanthrenes/anthracenes
C2D/C2PA	dialkyldibenzothiophenes/dialkylphenanthrenes/anthracenes
BF/MP	benzofluorenes/methylpyrenes

Figure 1. Selected Diagnostic Ratios – Fl/Py v. D/F



TXXX	Tar Sample from META's in house source library
CC	Coal Carbonization Tar
CO	Coke Oven Tar
CWG	Carbureted Water Gas Tar
●	Field Samples

Figure 3. Selected Diagnostic Ratios – C3D/C3PA v. C2D/C2PA



TXXX	Tar Sample from META's in house source library
CC	Coal Carbonization Tar
CO	Coke Oven Tar
CWG	Carbureted Water Gas Tar
●	Field Samples

Definitions

Pyrogenic substances are complex mixtures of primarily hydrocarbons produced from organic matter subjected to high temperatures but with insufficient oxygen for complete combustion. Pyrogenic materials are produced by fires, internal combustion engines, and furnaces. They also are formed when coke or gas are produced from coal or oil. Coal-tar based products, such as roofing, pavement sealers, waterproofing, pesticides, and some shampoos contain pyrogenic materials.

Petrogenic substances include crude oil and crude oil derivatives such as gasoline, heating oil, and asphalt.

Pitch is the semi-solid or solid material consisting of high molecular weight hydrocarbons that remain following coal tar distillation.

References

1) Christensen, L.B. and T.H. Larsen. "Method for determining the age of diesel oil spills in the soil." Ground Water Monitoring and Remediation, 13(4): 142-149, 1993.
2) Kaplan, I.R., Y. Galperin, H. Alimi, R. Lee, and S. Lu. "Patterns of chemical changes during environmental alteration of hydrocarbon fuels." Ground Water Monitoring and Remediation, 16(4): 113-125, 1996.
3) Schmidt, G.W. "Forensic petroleum hydrocarbon fingerprinting and age of release developments." Hydrocarbon Pattern Recognition and Dating Conference, University of Wisconsin-Madison, Nov. 1997.
4) McNicoll, D., Tousignant, L.P., Augustine, P. "Facts and Fallacies: Petroleum Degradation in a Subsurface Environment." Contaminated Soil Sediment and Water, 17-21, June,July 2001
5) "Chemical Fingerprinting of Hydrocarbons," in: Introduction to Environmental Forensics. B.L. Murphy and R.D. Morrison editors, Academic Press, San Diego, CA 2002.
6) Hurst, Richard W. and Schmidt, Gene W. "Age Significance of nC17/Pr Ratios in Forensic Investigations of Refined Product and Crude Oil Releases," Environmental Geosciences, 12(3): 177-192, 2005.
7) Mauro, D.M., "Chemical Source Attribution at former MGP Sites," EPRI Report 1000728, December 2000.

Appendix A
Chains of Custody

CHAIN OF CUSTODY RECORD

PROJECT NAME Queens West (10516-0009)
COMPANY AKRF, Inc
ADDRESS 440 Park Ave S. 7th floor, NY, NY 10016
PHONE 914-922-2362 FAX
EMAIL becky_kinal@akrf.com
SAMPLED BY Tamisha Lansiquot (Print Name) Lansiquot (Signature)
(Print Name) (Signature)
(Print Name) (Signature)

META Environmental, Inc.
ENGINEERING & CHEMISTRY
49 Clarendon Street
Watertown, MA 02472
TEL: (617) 923-4662
FAX: (617) 923-4610
WWW.METAENV.COM

SAMPLE NO.	DATE	TIME	SAMPLER'S INITIALS	SAMPLE ID (SAMPLE LOCATION)	CONTAINER SIZE	CONTAINER G/P	GRAB	COMP	NO. OF CONTAINERS	SAMPLE MATRIX	PRESERVATIVE	ANALYSES: 8260 FID Ethanol 8260 PAH 8260 TMS SIM	COMMENTS
1	5/22/06	2:30p	TL	QW-tank 19	40Z				3	A	No	X X	A1060617-01a,b,c
2	5/22/06	3:00p	TL	QW-tank 20	40Z				2	Aqueous	NO	X X	A1060602-02a,b

Relinquished by	Date/Time	Relinquished by	Date/Time	Relinquished by	Date/Time
Lansiquot	5/22/06				
Received by	**Date/Time**	**Received by**	**Date/Time**	**Received for Laboratory by**	**Date/Time**
Kaumil K Lakhani	6/02/06 9:30				

Method of Shipment:

Remarks:

SAMPLES ARE ACTUALLY NAPL - PROCESS AS WASTE DILUTION PER BECKY KINAL

Temp._____°C

@ tank 20 (6.5 °C)
@ tank 19 (11.3 °C)

META Environmental, Inc.

Sample Recipt Log

Lab ID	Field ID	Matrix	Prep Method	Cleanup Method	Analysis Method	Date Sampled	Date Received	Project #	Container	Comments	Clent Name	Project Name
AI060602-01 a,b,c	QW-tank-19	NAPL	2512		4007/4008	5/22/2006	6/2/2006	A07010-60	3 x 4 oz	See COC for extraction	AKRF	Queens West (10516-0009)
AI060602-02 a,b	QW-tank-20	NAPL	2512		4007/4008	5/25/2006	6/2/2006	A07010-60	2 x 4 oz	See COC for extraction	AKRF	Queens West (10516-0009)

Logged By: [signature]

Date: 6/02/06

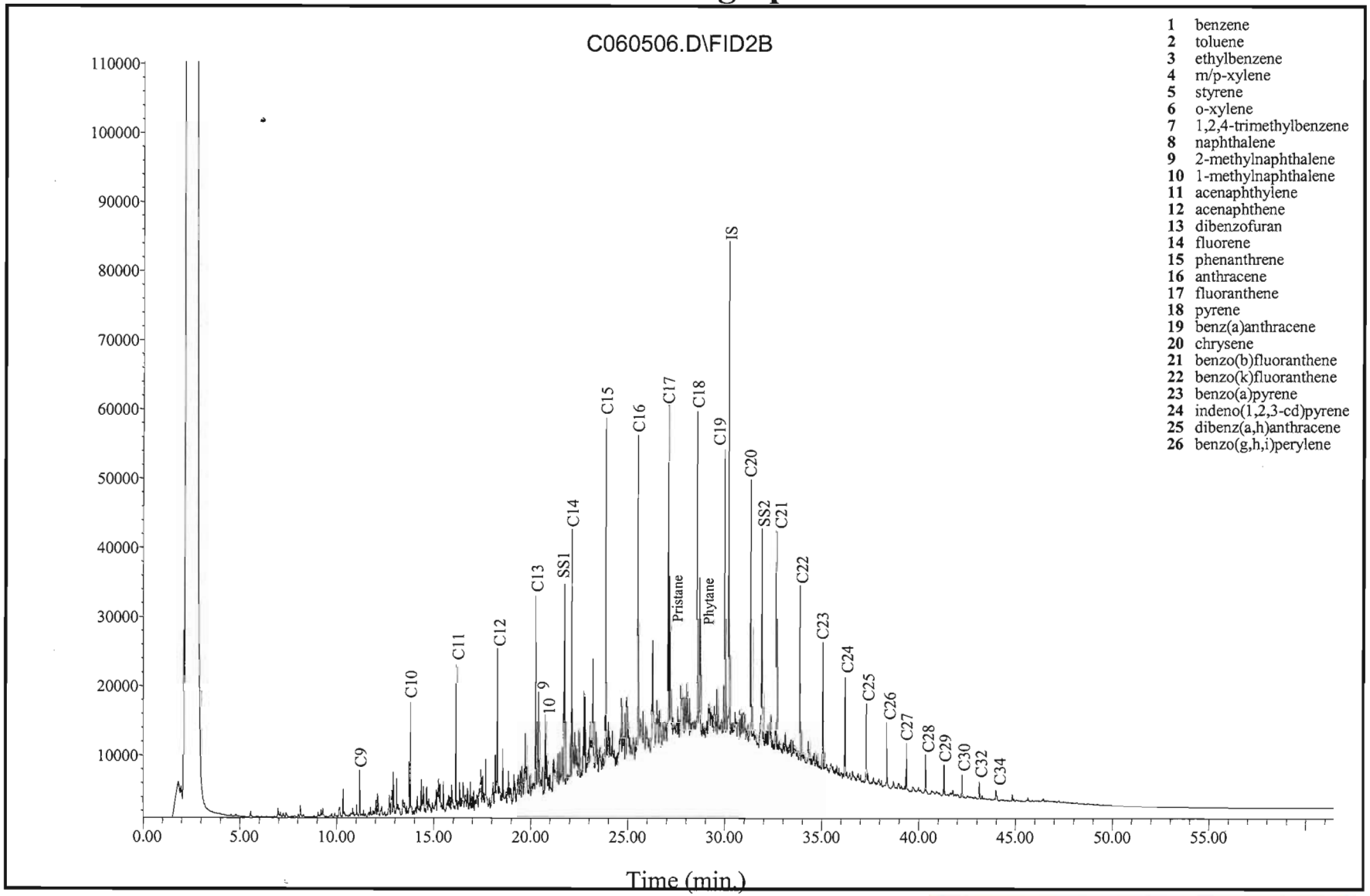
Reviewed By: [signature]

Date: 6/2/06

Appendix B

GC/FID Fingerprints

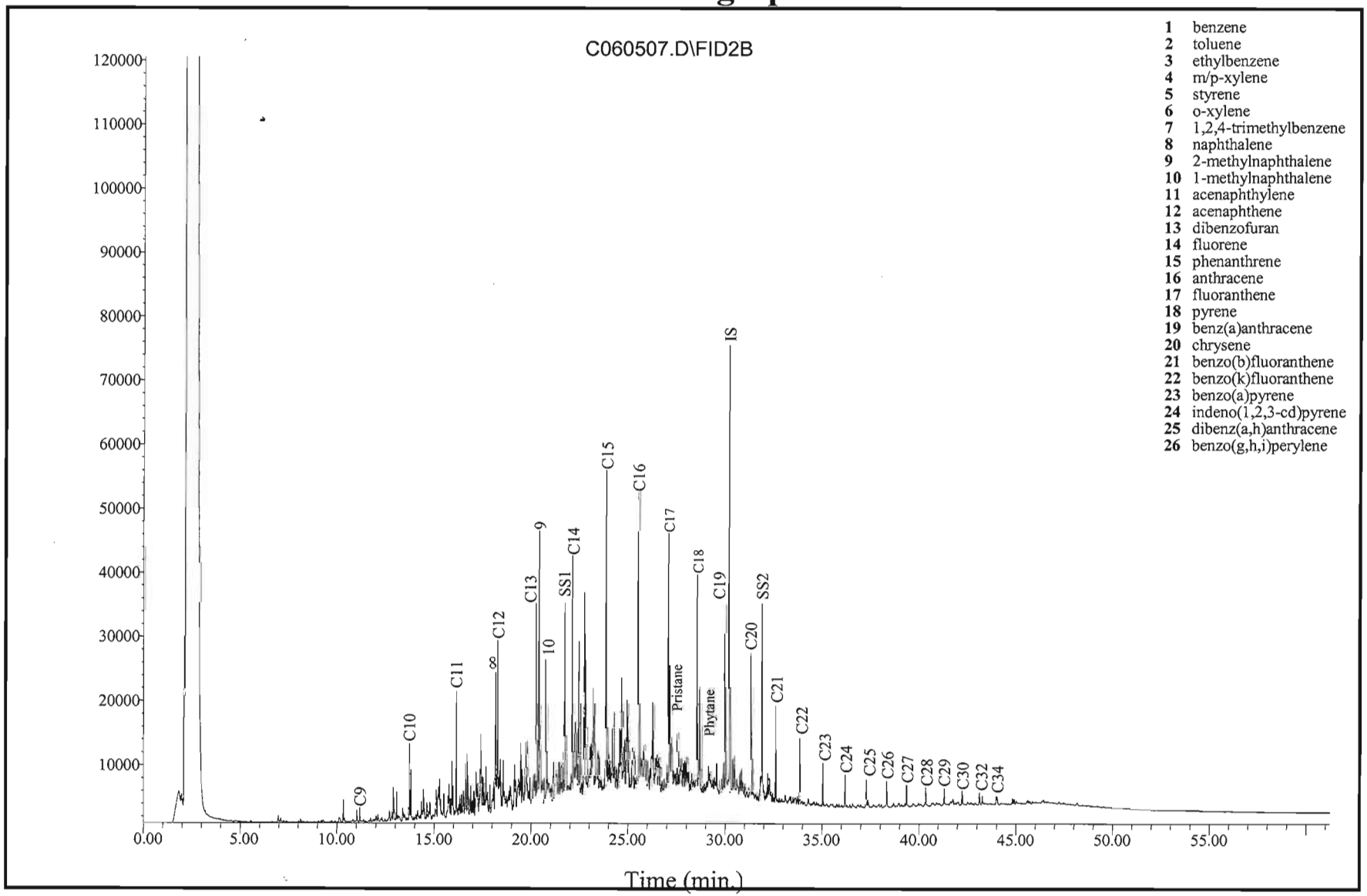
GC/FID Fingerprint



IS – o-terphenyl
SS1 – 2-fluorobiphenyl
SS2 – 5a-androstane

Field ID:	QW-tank-19
Laboratory ID:	AI060602-01a
Method:	EPA 8100 mod.

GC/FID Fingerprint

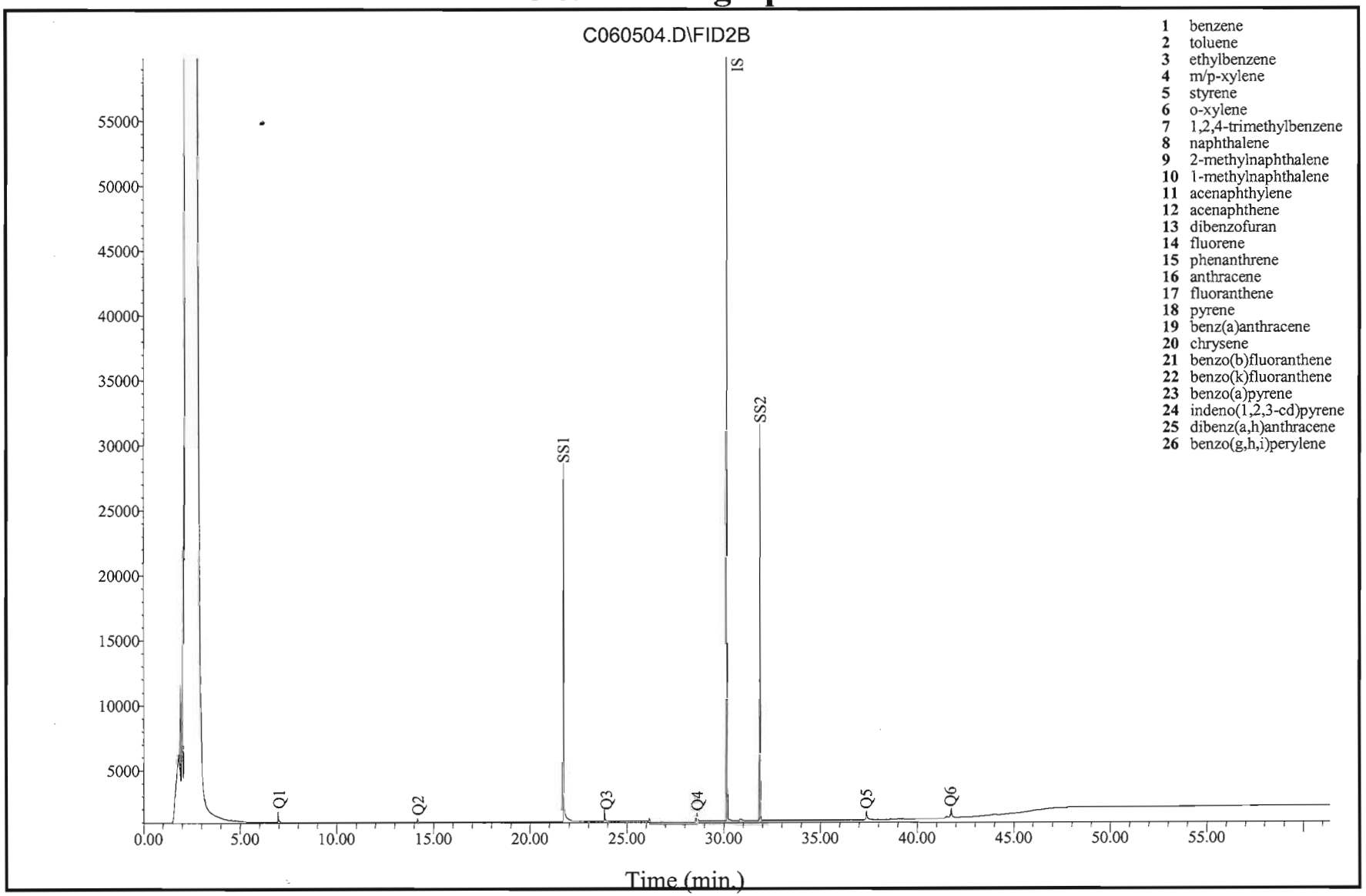


IS – o-terphenyl
SS1 – 2-fluorobiphenyl
SS2 – 5a-androstane

Field ID:	QW-tank-20
Laboratory ID:	AI060602-02a
Method:	EPA 8100 mod.

META

GC/FID Fingerprint



IS – o-terphenyl
SS1 – 2-fluorobiphenyl
SS2 – 5a-androstane

Field ID:	Method Blank
Laboratory ID:	LA060602-MB
Method:	EPA 8100 mod.

META

Appendix C

MAH/PAH Concentrations

Analytical Results for Volatile and Semivolatile Organics
META Environmental, Inc.

Field ID: QW-tank-19

Client:	AKRF	Preparation Method:	EPA 3580
Project:	Queens West Parcel 9	Cleanup Method(s):	NA
		Analysis Method:	EPA 8270M
Lab ID	AI060602-01A		
File ID:	E060619.D	Matrix:	NAPL
		Preservation:	None
Date Sampled:	5/22/2006	Decanted:	None
Date Received:	6/2/2006		
Date Prepared:	6/2/2006	Sample Size (g):	0.0121
Date Cleanup:	NA	Percent Solid:	NA
Date Analyzed:	6/7/2006	Extract Volume (µl):	2000
Instrument:	El Camino	Prep DF:	1.00
Operator:	JAR	Analysis DF:	1.00
		Injection Volume (µl):	1.00
Batch QC:	LA060602-MB		

Analyte	Concentration (mg/kg)		RL	EDL	Comments
MAH & PAH COMPOUNDS:					
Benzene		U	8.26	4.13	
Toluene	86.5	B	8.26	4.13	
Ethylbenzene	91.0		1.65	0.825	
m/p-Xylenes	417		1.65	0.825	
Styrene	12.3	B	1.65	0.825	
o-Xylene	185		1.65	0.825	
Isopropylbenzene	47.9		1.65	0.825	
n-Propylbenzene	102		1.65	0.825	
1,3,5-Trimethylbenzene	258		1.65	0.825	
1,2,4-Trimethylbenzene	749		1.65	0.825	
t-Butylbenzene		U	1.65	0.825	
sec-Butylbenzene	118		1.65	0.825	
p-Isopropyltoluene	106		1.65	0.825	
n-Butylbenzene	155		1.65	0.825	
C1 - Benzene	60.2	B	8.26	4.13	
C2 - Benzene	355		1.65	0.825	
C3 - Benzene	136		1.65	0.825	
C4 - Benzene	1,060		1.65	0.825	
C5 - Benzene	883		1.65	0.825	
trans-Decalin	232		1.65	0.825	
cis-Decalin	33.8		1.65	0.825	
Naphthalene	516		1.65	0.825	
2-Methylnaphthalene	1,500		1.65	0.825	
1-Methylnaphthalene	1,120		1.65	0.825	
C1 - Naphthalene	1,600		1.65	0.825	
C2 - Naphthalene	2,240		1.65	0.825	
C3- Naphthalene	1,870		1.65	0.825	
C4- Naphthalene	1,040		1.65	0.825	
Acenaphthylene	35.6		1.65	0.825	
Acenaphthene	212		1.65	0.825	
Dibenzofuran	102		1.65	0.825	
Fluorene	252		1.65	0.825	
C1 - Fluorene	461		1.65	0.825	
C2 - Fluorene	699		1.65	0.825	
C3 - Fluorene	556		1.65	0.825	
Phenanthrene	314		1.65	0.825	
Anthracene	351		1.65	0.825	
C1 - Phenanthrene/Anthracene	623		1.65	0.825	

Analytical Results for Volatile and Semivolatile Organics
META Environmental, Inc.

Field ID: QW-tank-19

Client:	AKRF	Preparation Method:	EPA 3580
Project:	Queens West Parcel 9	Cleanup Method(s):	NA
		Analysis Method:	EPA 8270M
Lab ID	AI060602-01A		
File ID:	E060619.D	Matrix:	NAPL
		Preservation:	None
Date Sampled:	5/22/2006	Decanted:	None
Date Received:	6/2/2006		
Date Prepared:	6/2/2006	Sample Size (g):	0.0121
Date Cleanup:	NA	Percent Solid:	NA
Date Analyzed:	6/7/2006	Extract Volume (µl):	2000
Instrument:	El Camino	Prep DF:	1.00
Operator:	JAR	Analysis DF:	1.00
		Injection Volume (µl):	1.00
Batch QC:	LA060602-MB		

Analyte	Concentration (mg/kg)		RL	EDL	Comments
C2 - Phenanthrene/Anthracene	695		1.65	0.825	
C3 - Phenanthrene/Anthracene	432		1.65	0.825	
C4 - Phenanthrene/Anthracene	178		1.65	0.825	
Dibenzothiophene	88.9		1.65	0.825	
C1 - Dibenzothiophene	296		1.65	0.825	
C2 - Dibenzothiophene	504		1.65	0.825	
C3 - Dibenzothiophene	419		1.65	0.825	
C4 - Dibenzothiophene	206		1.65	0.825	
Benzo(b)naphtho(2,1-d)thiophene	7.46		1.65	0.825	
Fluoranthene	6.06		1.65	0.825	
Pyrene	39.6		1.65	0.825	
C1 - Fluoranthene/Pyrene	105		1.65	0.825	
C2 - Fluoranthene/Pyrene	128		1.65	0.825	
C3 - Fluoranthene/Pyrene	100		1.65	0.825	
Benz[a]anthracene	3.41		1.65	0.825	
Chrysene*	22.4		1.65	0.825	
C1 - Benz(a)anthracene/Chrysene	54.3		1.65	0.825	
C2 - Benz(a)anthracene/Chrysene	66.7		1.65	0.825	
C3 - Benz(a)anthracene/Chrysene	56.7		1.65	0.825	
C4 - Benz(a)anthracene/Chrysene	43.0		1.65	0.825	
Benzo[b]fluoranthene	3.15		1.65	0.825	
Benzo[j/k]fluoranthene		U	1.65	0.825	
Benzo(e)pyrene	6.53		1.65	0.825	
Benzo[a]pyrene	2.61		1.65	0.825	
Perylene	2.04		1.65	0.825	
Indeno[1,2,3-cd]pyrene		U	1.65	0.825	
Dibenz[a,h]anthracene		U	1.65	0.825	
Benzo[g,h,i]perylene	1.62	J	1.65	0.825	
Coronene		U	1.65	0.825	
Retene		U	1.65	0.825	
Benzo(b/c)fluorenes	5.84		1.65	0.825	
2-Methylpyrene	17.8		1.65	0.825	
4-Methylpyrene	28.7		1.65	0.825	
1-Methylpyrene	19.3		1.65	0.825	
Heptadecane	6,130		1.65	0.825	
Pristane	3,540		1.65	0.825	
Octadecane	5,690		1.65	0.825	
Phytane	3,380		1.65	0.825	
2,6,10-trimethyldodecane	1,160		1.65	0.825	

Analytical Results for Volatile and Semivolatile Organics
META Environmental, Inc.

Field ID: QW-tank-19

Client:	AKRF	Preparation Method:	EPA 3580
Project:	Queens West Parcel 9	Cleanup Method(s):	NA
		Analysis Method:	EPA 8270M
Lab ID	AI060602-01A		
File ID:	E060619.D	Matrix:	NAPL
		Preservation:	None
Date Sampled:	5/22/2006	Decanted:	None
Date Received:	6/2/2006		
Date Prepared:	6/2/2006	Sample Size (g):	0.0121
Date Cleanup:	NA	Percent Solid:	NA
Date Analyzed:	6/7/2006	Extract Volume (µl):	2000
Instrument:	El Camino	Prep DF:	1.00
Operator:	JAR	Analysis DF:	1.00
		Injection Volume (µl):	1.00
Batch QC:	LA060602-MB		

Analyte	Concentration (mg/kg)	RL	EDL	Comments
2,6,10-trimethyltridecane	2,160	1.65	0.825	
Norpristane	1,860	1.65	0.825	
Total PAH (16)	1,760	1.65	0.825	
Total PAH (42)	14,300	1.65	0.825	

Extraction Surrogate Recoveries (%)		Limits
Toluene-d8	78	50 - 120
Phenanthrene-d10	96	50 - 120
Perylene-d12	106	50 - 120

NA - Not applicable.
B - Analyte detected in the Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.
* - Triphenylene is known to coelute with this compound.

Analytical Results for Volatile and Semivolatile Organics
META Environmental, Inc.

Field ID: QW-tank-20

Client:	AKRF	Preparation Method:	EPA 3580
Project:	Queens West Parcel 9	Cleanup Method(s):	NA
		Analysis Method:	EPA 8270M
Lab ID	AI060602-02A		
File ID:	E060620.D	Matrix:	NAPL
		Preservation:	None
Date Sampled:	5/25/2006	Decanted:	None
Date Received:	6/2/2006		
Date Prepared:	6/2/2006	Sample Size (g):	0.0105
Date Cleanup:	NA	Percent Solid:	NA
Date Analyzed:	6/7/2006	Extract Volume (µl):	2000
Instrument:	El Camino	Prep DF:	1.00
Operator:	JAR	Analysis DF:	1.00
		Injection Volume (µl):	1.00
Batch QC:	LA060602-MB		

Analyte	Concentration (mg/kg)		RL	EDL	Comments
MAH & PAH COMPOUNDS:					
Benzene		U	9.52	4.76	
Toluene	93.9	B	9.52	4.76	
Ethylbenzene	83.6		1.9	0.950	
m/p-Xylenes	430		1.9	0.950	
Styrene	1.0	JB	1.9	0.950	
o-Xylene	214		1.9	0.950	
Isopropylbenzene	28.5		1.9	0.950	
n-Propylbenzene	98.2		1.9	0.950	
1,3,5-Trimethylbenzene	377		1.9	0.950	
1,2,4-Trimethylbenzene	1,280		1.9	0.950	
t-Butylbenzene		U	1.9	0.950	
sec-Butylbenzene	41.6		1.9	0.950	
p-Isopropyltoluene	96.8		1.9	0.950	
n-Butylbenzene	316		1.9	0.950	
C1 - Benzene	65.7	B	9.52	4.76	
C2 - Benzene	373		1.9	0.950	
C3 - Benzene	1,500		1.9	0.950	
C4 - Benzene	2,780		1.9	0.950	
C5 - Benzene	2,050		1.9	0.950	
trans-Decalin	241		1.9	0.950	
cis-Decalin	22.8		1.9	0.950	
Naphthalene	1,570		1.9	0.950	
2-Methylnaphthalene	4,290		1.9	0.950	
1-Methylnaphthalene	2,430		1.9	0.950	
C1 - Naphthalene	4,120		1.9	0.950	
C2 - Naphthalene	6,240		1.9	0.950	
C3- Naphthalene	5,090		1.9	0.950	
C4- Naphthalene	2,470		1.9	0.950	
Acenaphthylene		U	1.9	0.950	
Acenaphthene	158		1.9	0.950	
Dibenzofuran	116		1.9	0.950	
Fluorene	281		1.9	0.950	
C1 - Fluorene	732		1.9	0.950	
C2 - Fluorene	1,010		1.9	0.950	
C3 - Fluorene	636		1.9	0.950	
Phenanthrene	770		1.9	0.950	
Anthracene	85.1		1.9	0.950	
C1 - Phenanthrene/Anthracene	1,820		1.9	0.950	

Analytical Results for Volatile and Semivolatile Organics
META Environmental, Inc.

Field ID: QW-tank-20

Client:	AKRF	Preparation Method:	EPA 3580
Project:	Queens West Parcel 9	Cleanup Method(s):	NA
		Analysis Method:	EPA 8270M
Lab ID	AI060602-02A		
File ID:	E060620.D	Matrix:	NAPL
		Preservation:	None
Date Sampled:	5/25/2006	Decanted:	None
Date Received:	6/2/2006		
Date Prepared:	6/2/2006	Sample Size (g):	0.0105
Date Cleanup:	NA	Percent Solid:	NA
Date Analyzed:	6/7/2006	Extract Volume (µl):	2000
Instrument:	El Camino	Prep DF:	1.00
Operator:	JAR	Analysis DF:	1.00
		Injection Volume (µl):	1.00
Batch QC:	LA060602-MB		

Analyte	Concentration (mg/kg)	RL	EDL	Comments
C2 - Phenanthrene/Anthracene	1,520	1.9	0.950	
C3 - Phenanthrene/Anthracene	625	1.9	0.950	
C4 - Phenanthrene/Anthracene	193	1.9	0.950	
Dibenzothiophene	228	1.9	0.950	
C1 - Dibenzothiophene	617	1.9	0.950	
C2 - Dibenzothiophene	781	1.9	0.950	
C3 - Dibenzothiophene	571	1.9	0.950	
C4 - Dibenzothiophene	274	1.9	0.950	
Benzo(b)naphtho(2,1-d)thiophene	20.2	1.9	0.950	
Fluoranthene	15.2	1.9	0.950	
Pyrene	56.6	1.9	0.950	
C1 - Fluoranthene/Pyrene	118	1.9	0.950	
C2 - Fluoranthene/Pyrene	126	1.9	0.950	
C3 - Fluoranthene/Pyrene	97.8	1.9	0.950	
Benz[a]anthracene	6.12	1.9	0.950	
Chrysene*	20.3	1.9	0.950	
C1 - Benz(a)anthracene/Chrysene	54.1	1.9	0.950	
C2 - Benz(a)anthracene/Chrysene	75.1	1.9	0.950	
C3 - Benz(a)anthracene/Chrysene	66.7	1.9	0.950	
C4 - Benz(a)anthracene/Chrysene	47.9	1.9	0.950	
Benzo[b]fluoranthene	3.1	1.9	0.950	
Benzo[j/k]fluoranthene	U	1.9	0.950	
Benzo(e)pyrene	7.47	1.9	0.950	
Benzo[a]pyrene	4.9	1.9	0.950	
Perylene	3.18	1.9	0.950	
Indeno[1,2,3-cd]pyrene	U	1.9	0.950	
Dibenz[a,h]anthracene	U	1.9	0.950	
Benzo[g,h,i]perylene	3.22	1.9	0.950	
Coronene	U	1.9	0.950	
Retene	U	1.9	0.950	
Benzo(b/c)fluorenes	8.34	1.9	0.950	
2-Methylpyrene	22.7	1.9	0.950	
4-Methylpyrene	27.5	1.9	0.950	
1-Methylpyrene	19.3	1.9	0.950	
Heptadecane	6,260	1.9	0.950	
Pristane	3,560	1.9	0.950	
Octadecane	5,170	1.9	0.950	
Phytane	2,090	1.9	0.950	
2,6,10-trimethyldodecane	1,150	1.9	0.950	

Analytical Results for Volatile and Semivolatile Organics
META Environmental, Inc.

Field ID: **QW-tank-20**

Client:	AKRF	Preparation Method:	EPA 3580
Project:	Queens West Parcel 9	Cleanup Method(s):	NA
		Analysis Method:	EPA 8270M
Lab ID	AI060602-02A		
File ID:	E060620.D	Matrix:	NAPL
		Preservation:	None
Date Sampled:	5/25/2006	Decanted:	None
Date Received:	6/2/2006		
Date Prepared:	6/2/2006	Sample Size (g):	0.0105
Date Cleanup:	NA	Percent Solid:	NA
Date Analyzed:	6/7/2006	Extract Volume (µl):	2000
Instrument:	El Camino	Prep DF:	1.00
Operator:	JAR	Analysis DF:	1.00
		Injection Volume (µl):	1.00
Batch QC:	LA060602-MB		

Analyte	Concentration (mg/kg)	RL	EDL	Comments
2,6,10-trimethyltridecane	2,540	1.9	0.950	
Norpristane	1,640	1.9	0.950	
Total PAH (16)	2,970	1.9	0.950	
Total PAH (42)	30,600	1.9	0.950	

Extraction Surrogate Recoveries (%)		Limits
Toluene-d8	75	50 - 120
Phenanthrene-d10	90	50 - 120
Perylene-d12	97	50 - 120

NA - Not applicable.
B - Analyte detected in the Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.
* - Triphenylene is known to coelute with this compound.

Analytical Results for Volatile and Semivolatile Organics
META Environmental, Inc.

Field ID: **Method Blank**

Client:	AKRF	Preparation Method:	EPA 3580
Project:	Queens West Parcel 9	Cleanup Method(s):	NA
		Analysis Method:	EPA 8270M
Lab ID	LA060602-MB		
File ID:	E060614.D	Matrix:	NAPL
		Preservation:	None
Date Sampled:	NA	Decanted:	None
Date Received:	NA		
Date Prepared:	6/2/2006	Sample Size (g):	0.0100
Date Cleanup:	NA	Percent Solid:	NA
Date Analyzed:	6/7/2006	Extract Volume (µl):	2000
Instrument:	El Camino	Prep DF:	1.00
Operator:	JAR	Analysis DF:	1.00
		Injection Volume (µl):	1.00
Batch QC:	LA060602-MB		

Analyte	Concentration (mg/kg)	RL	EDL	Comments
MAH & PAH COMPOUNDS:				
Benzene	U	10.0	5.0	
Toluene	12.4	10.0	5.0	
Ethylbenzene	U	2.0	1.0	
m/p-Xylenes	U	2.0	1.0	
Styrene	1.84 J	2.0	1.0	
o-Xylene	U	2.0	1.0	
Isopropylbenzene	U	2.0	1.0	
n-Propylbenzene	U	2.0	1.0	
1,3,5-Trimethylbenzene	U	2.0	1.0	
1,2,4-Trimethylbenzene	U	2.0	1.0	
t-Butylbenzene	U	2.0	1.0	
sec-Butylbenzene	U	2.0	1.0	
p-Isopropyltoluene	U	2.0	1.0	
n-Butylbenzene	U	2.0	1.0	
C1 - Benzene	8.49 J	10.0	5.0	
C2 - Benzene	U	2.0	1.0	
C3 - Benzene	U	2.0	1.0	
C4 - Benzene	U	2.0	1.0	
C5 - Benzene	U	2.0	1.0	
trans-Decalin	U	2.0	1.0	
cis-Decalin	U	2.0	1.0	
Naphthalene	U	2.0	1.0	
2-Methylnaphthalene	U	2.0	1.0	
1-Methylnaphthalene	U	2.0	1.0	
C1 - Naphthalene	U	2.0	1.0	
C2 - Naphthalene	U	2.0	1.0	
C3- Naphthalene	U	2.0	1.0	
C4- Naphthalene	U	2.0	1.0	
Acenaphthylene	U	2.0	1.0	
Acenaphthene	U	2.0	1.0	
Dibenzofuran	U	2.0	1.0	
Fluorene	U	2.0	1.0	
C1 - Fluorene	U	2.0	1.0	
C2 - Fluorene	U	2.0	1.0	
C3 - Fluorene	U	2.0	1.0	
Phenanthrene	U	2.0	1.0	
Anthracene	U	2.0	1.0	

Analytical Results for Volatile and Semivolatile Organics
META Environmental, Inc.

Field ID: **Method Blank**

Client:	AKRF	Preparation Method:	EPA 3580
Project:	Queens West Parcel 9	Cleanup Method(s):	NA
		Analysis Method:	EPA 8270M
Lab ID	LA060602-MB		
File ID:	E060614.D	Matrix:	NAPL
		Preservation:	None
Date Sampled:	NA	Decanted:	None
Date Received:	NA		
Date Prepared:	6/2/2006	Sample Size (g):	0.0100
Date Cleanup:	NA	Percent Solid:	NA
Date Analyzed:	6/7/2006	Extract Volume (µl):	2000
Instrument:	El Camino	Prep DF:	1.00
Operator:	JAR	Analysis DF:	1.00
		Injection Volume (µl):	1.00
Batch QC:	LA060602-MB		

Analyte	Concentration (mg/kg)	RL	EDL	Comments
C1 - Phenanthrene/Anthracene	U	2.0	1.0	
C2 - Phenanthrene/Anthracene	U	2.0	1.0	
C3 - Phenanthrene/Anthracene	U	2.0	1.0	
C4 - Phenanthrene/Anthracene	U	2.0	1.0	
Dibenzothiophene	U	2.0	1.0	
C1 - Dibenzothiophene	U	2.0	1.0	
C2 - Dibenzothiophene	U	2.0	1.0	
C3 - Dibenzothiophene	U	2.0	1.0	
C4 - Dibenzothiophene	U	2.0	1.0	
Benzo(b)naphtho(2,1-d)thiophene	U	2.0	1.0	
Fluoranthene	U	2.0	1.0	
Pyrene	U	2.0	1.0	
C1 - Fluoranthene/Pyrene	U	2.0	1.0	
C2 - Fluoranthene/Pyrene	U	2.0	1.0	
C3 - Fluoranthene/Pyrene	U	2.0	1.0	
Benz[a]anthracene	U	2.0	1.0	
Chrysene*	U	2.0	1.0	
C1 - Benz(a)anthracene/Chrysene	U	2.0	1.0	
C2 - Benz(a)anthracene/Chrysene	U	2.0	1.0	
C3 - Benz(a)anthracene/Chrysene	U	2.0	1.0	
C4 - Benz(a)anthracene/Chrysene	U	2.0	1.0	
Benzo[b]fluoranthene	U	2.0	1.0	
Benzo[j/k]fluoranthene	U	2.0	1.0	
Benzo(e)pyrene	U	2.0	1.0	
Benzo[a]pyrene	U	2.0	1.0	
Perylene	U	2.0	1.0	
Indeno[1,2,3-cd]pyrene	U	2.0	1.0	
Dibenz[a,h]anthracene	U	2.0	1.0	
Benzo[g,h,i]perylene	U	2.0	1.0	
Coronene	U	2.0	1.0	
Retene	U	2.0	1.0	
Benzo(b/c)fluorenes	U	2.0	1.0	
2-Methylpyrene	U	2.0	1.0	
4-Methylpyrene	U	2.0	1.0	
1-Methylpyrene	U	2.0	1.0	
Heptadecane	U	2.0	1.0	
Pristane	U	2.0	1.0	
Octadecane	U	2.0	1.0	
Phytane	U	2.0	1.0	

Analytical Results for Volatile and Semivolatile Organics
META Environmental, Inc.

Field ID: Method Blank

Client:	AKRF	Preparation Method:	EPA 3580
Project:	Queens West Parcel 9	Cleanup Method(s):	NA
		Analysis Method:	EPA 8270M
Lab ID	LA060602-MB		
File ID:	E060614.D	Matrix:	NAPL
		Preservation:	None
Date Sampled:	NA	Decanted:	None
Date Received:	NA		
Date Prepared:	6/2/2006	Sample Size (g):	0.0100
Date Cleanup:	NA	Percent Solid:	NA
Date Analyzed:	6/7/2006	Extract Volume (µl):	2000
Instrument:	El Camino	Prep DF:	1.00
Operator:	JAR	Analysis DF:	1.00
		Injection Volume (µl):	1.00
Batch QC:	LA060602-MB		

Analyte	Concentration (mg/kg)	RL	EDL	Comments
2,6,10-trimethyldodecane	U	2.0	1.0	
2,6,10-trimethyltridecane	U	2.0	1.0	
Norpristane	U	2.0	1.0	
Total PAH (16)	U	2.0	1.0	
Total PAH (42)	U	2.0	1.0	

Extraction Surrogate Recoveries (%)		Limits
Toluene-d8	101	50 - 120
Phenanthrene-d10	91	50 - 120
Perylene-d12	80	50 - 120

NA - Not applicable.
B - Analyte detected in the Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.
* - Triphenylene is known to coelute with this compound.

Analytical Results for Volatile and Semivolatile Organics
META Environmental, Inc.

Field ID: **Method Blank Spike**

Client:	AKRF	Preparation Method:	EPA 3580
Project:	Queens West Parcel 9	Cleanup Method(s):	NA
		Analysis Method:	EPA 8270M
Lab ID	LA060602-MBS		
File ID:	E060615.D	Matrix:	NAPL
		Preservation:	None
Date Sampled:	NA	Decanted:	None
Date Received:	NA		
Date Prepared:	6/2/2006	Sample Size (g):	0.0100
Date Cleanup:	NA	Percent Solid:	NA
Date Analyzed:	6/7/2006	Extract Volume (µl):	2000
Instrument:	El Camino	Prep DF:	1.00
Operator:	JAR	Analysis DF:	1.00
		Injection Volume (µl):	1.00
Batch QC:	LA060602-MB		

Analyte	Concentration (mg/kg)			RL	EDL	Comments
MAH & PAH COMPOUNDS:	Spike Amount					% Recovery
Benzene	200	148		10.0	5.0	74 %
Toluene	200	215	B	10.0	5.0	108 %
Ethylbenzene	200	206		2.0	1.0	103 %
m/p-Xylenes	200	202		2.0	1.0	101 %
Styrene	200	185	B	2.0	1.0	93 %
o-Xylene	200	205		2.0	1.0	103 %
Isopropylbenzene	200	208		2.0	1.0	104 %
n-Propylbenzene	200	208		2.0	1.0	104 %
1,3,5-Trimethylbenzene	200	207		2.0	1.0	104 %
1,2,4-Trimethylbenzene	200	206		2.0	1.0	103 %
t-Butylbenzene	200	207		2.0	1.0	104 %
sec-Butylbenzene	200	208		2.0	1.0	104 %
p-Isopropyltoluene	200	208		2.0	1.0	104 %
n-Butylbenzene	200	208		2.0	1.0	104 %
C1 - Benzene			BU	10.0	5.0	
C2 - Benzene			U	2.0	1.0	
C3 - Benzene			U	2.0	1.0	
C4 - Benzene			U	2.0	1.0	
C5 - Benzene			U	2.0	1.0	
trans-Decalin			U	2.0	1.0	
cis-Decalin			U	2.0	1.0	
Naphthalene	200	208		2.0	1.0	104 %
2-Methylnaphthalene	200	206		2.0	1.0	103 %
1-Methylnaphthalene	200	209		2.0	1.0	105 %
C1 - Naphthalene			U	2.0	1.0	
C2 - Naphthalene			U	2.0	1.0	
C3- Naphthalene			U	2.0	1.0	
C4- Naphthalene			U	2.0	1.0	
Acenaphthylene	200	211		2.0	1.0	106 %
Acenaphthene	200	217		2.0	1.0	109 %
Dibenzofuran	200	221		2.0	1.0	111 %
Fluorene	200	212		2.0	1.0	106 %
C1 - Fluorene			U	2.0	1.0	
C2 - Fluorene			U	2.0	1.0	
C3 - Fluorene			U	2.0	1.0	
Phenanthrene	200	215		2.0	1.0	108 %
Anthracene	200	214		2.0	1.0	107 %

Analytical Results for Volatile and Semivolatile Organics
META Environmental, Inc.

Field ID: **Method Blank Spike**

Client:	AKRF	Preparation Method:	EPA 3580
Project:	Queens West Parcel 9	Cleanup Method(s):	NA
		Analysis Method:	EPA 8270M
Lab ID	LA060602-MBS		
File ID:	E060615.D	Matrix:	NAPL
		Preservation:	None
Date Sampled:	NA	Decanted:	None
Date Received:	NA		
Date Prepared:	6/2/2006	Sample Size (g):	0.0100
Date Cleanup:	NA	Percent Solid:	NA
Date Analyzed:	6/7/2006	Extract Volume (µl):	2000
Instrument:	El Camino	Prep DF:	1.00
Operator:	JAR	Analysis DF:	1.00
		Injection Volume (µl):	1.00
Batch QC:	LA060602-MB		

Analyte		Concentration (mg/kg)		RL	EDL	Comments
C1 - Phenanthrene/Anthracene			U	2.0	1.0	
C2 - Phenanthrene/Anthracene			U	2.0	1.0	
C3 - Phenanthrene/Anthracene			U	2.0	1.0	
C4 - Phenanthrene/Anthracene			U	2.0	1.0	
Dibenzothiophene			U	2.0	1.0	
C1 - Dibenzothiophene			U	2.0	1.0	
C2 - Dibenzothiophene			U	2.0	1.0	
C3 - Dibenzothiophene			U	2.0	1.0	
C4 - Dibenzothiophene			U	2.0	1.0	
Benzo(b)naphtho(2,1-d)thiophene			U	2.0	1.0	
Fluoranthene	200	227		2.0	1.0	114 %
Pyrene	200	219		2.0	1.0	110 %
C1 - Fluoranthene/Pyrene			U	2.0	1.0	
C2 - Fluoranthene/Pyrene			U	2.0	1.0	
C3 - Fluoranthene/Pyrene			U	2.0	1.0	
Benz[a]anthracene	200	200		2.0	1.0	100 %
Chrysene*	200	220		2.0	1.0	110 %
C1 - Benz(a)anthracene/Chrysene			U	2.0	1.0	
C2 - Benz(a)anthracene/Chrysene			U	2.0	1.0	
C3 - Benz(a)anthracene/Chrysene			U	2.0	1.0	
C4 - Benz(a)anthracene/Chrysene			U	2.0	1.0	
Benzo[b]fluoranthene	200	199		2.0	1.0	100 %
Benzo[j/k]fluoranthene	200	213		2.0	1.0	107 %
Benzo(e)pyrene			U	2.0	1.0	
Benzo[a]pyrene	200	188		2.0	1.0	94 %
Perylene			U	2.0	1.0	
Indeno[1,2,3-cd]pyrene	200	180		2.0	1.0	90 %
Dibenz[a,h]anthracene	200	191		2.0	1.0	96 %
Benzo[g,h,i]perylene	200	186		2.0	1.0	93 %
Coronene			U	2.0	1.0	
Retene			U	2.0	1.0	
Benzo(b/c)fluorenes			U	2.0	1.0	
2-Methylpyrene			U	2.0	1.0	
4-Methylpyrene			U	2.0	1.0	
1-Methylpyrene			U	2.0	1.0	
Heptadecane			U	2.0	1.0	
Pristane			U	2.0	1.0	
Octadecane			U	2.0	1.0	
Phytane			U	2.0	1.0	

Analytical Results for Volatile and Semivolatile Organics
META Environmental, Inc.

Field ID: Method Blank Spike

Client:	AKRF	Preparation Method:	EPA 3580
Project:	Queens West Parcel 9	Cleanup Method(s):	NA
		Analysis Method:	EPA 8270M
Lab ID	LA060602-MBS		
File ID:	E060615.D	Matrix:	NAPL
		Preservation:	None
Date Sampled:	NA	Decanted:	None
Date Received:	NA		
Date Prepared:	6/2/2006	Sample Size (g):	0.0100
Date Cleanup:	NA	Percent Solid:	NA
Date Analyzed:	6/7/2006	Extract Volume (µl):	2000
Instrument:	El Camino	Prep DF:	1.00
Operator:	JAR	Analysis DF:	1.00
		Injection Volume (µl):	1.00
Batch QC:	LA060602-MB		

Analyte	Concentration (mg/kg)	RL	EDL	Comments
2,6,10-trimethyldodecane	U	2.0	1.0	
2,6,10-trimethyltridecane	U	2.0	1.0	
Norpristane	U	2.0	1.0	

Extraction Surrogate Recoveries (%)		Limits
Toluene-d8	94	50 - 120
Phenanthrene-d10	89	50 - 120
Perylene-d12	82	50 - 120

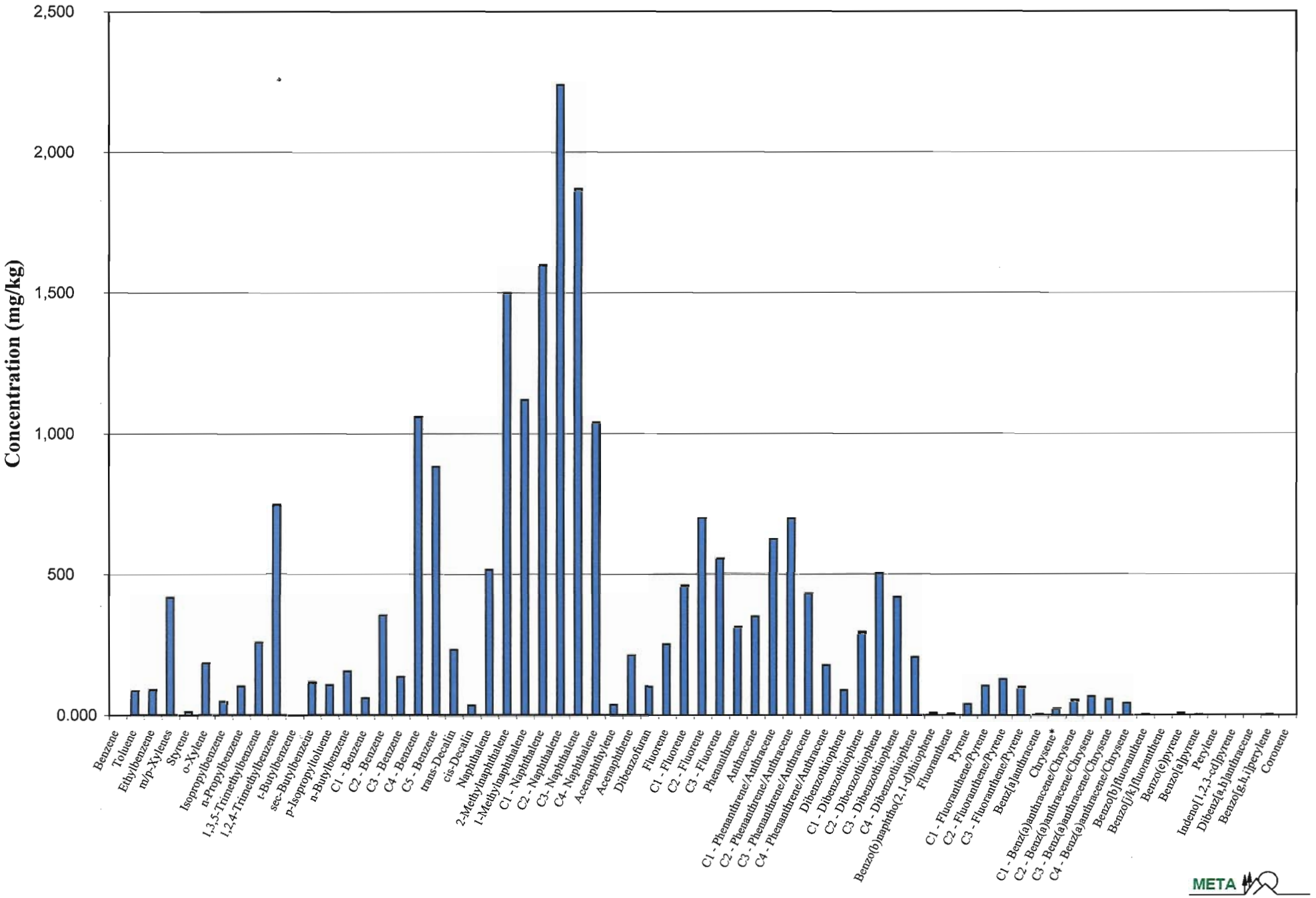
NA - Not applicable.
B - Analyte detected in the Blank.
J - Estimated value; detected between the RL and DL.
U - Analyte not detected above DL.
D - Analyte reported from a diluted extract.
E - Estimate, result detected above calibration range.
I - Concentration/Peak ID uncertain due to potential interference.
RL - Reporting limit is the sample equivalent of the lowest linear calibration concentration.
EDL - Estimated detection limit is 50% of RL.
* - Triphenylene is known to coelute with this compound.

Appendix D

Extended MAH/PAH Profiles – Histograms

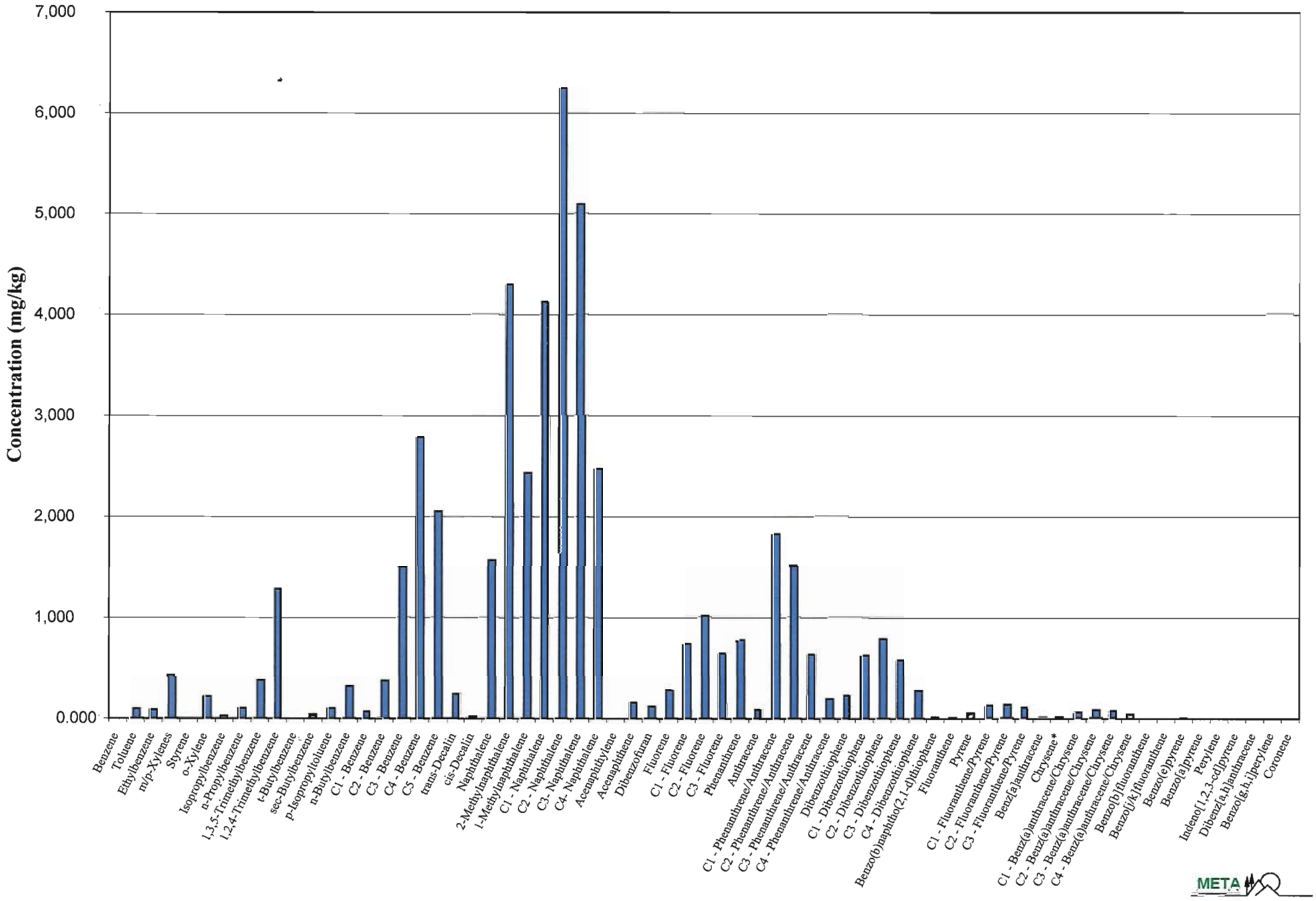
QW-tank-19

AI060602-01A



QW-tank-20

AI060602-02A



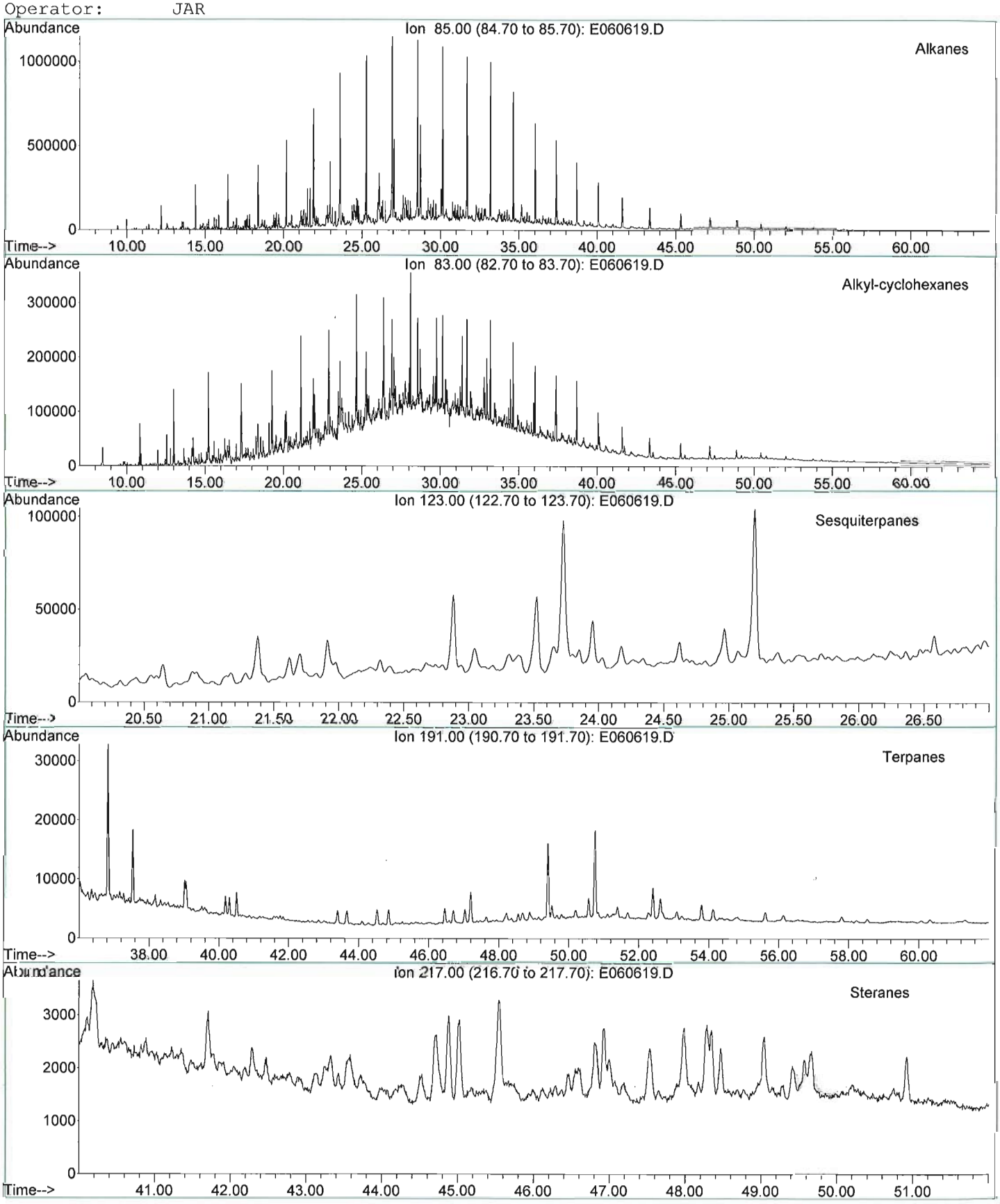
Appendix E

Extracted Ion Current Profiles (EICPs)

META Environmental, Inc.

GC/MS EXTRACTED ION CHROMATOGRAM

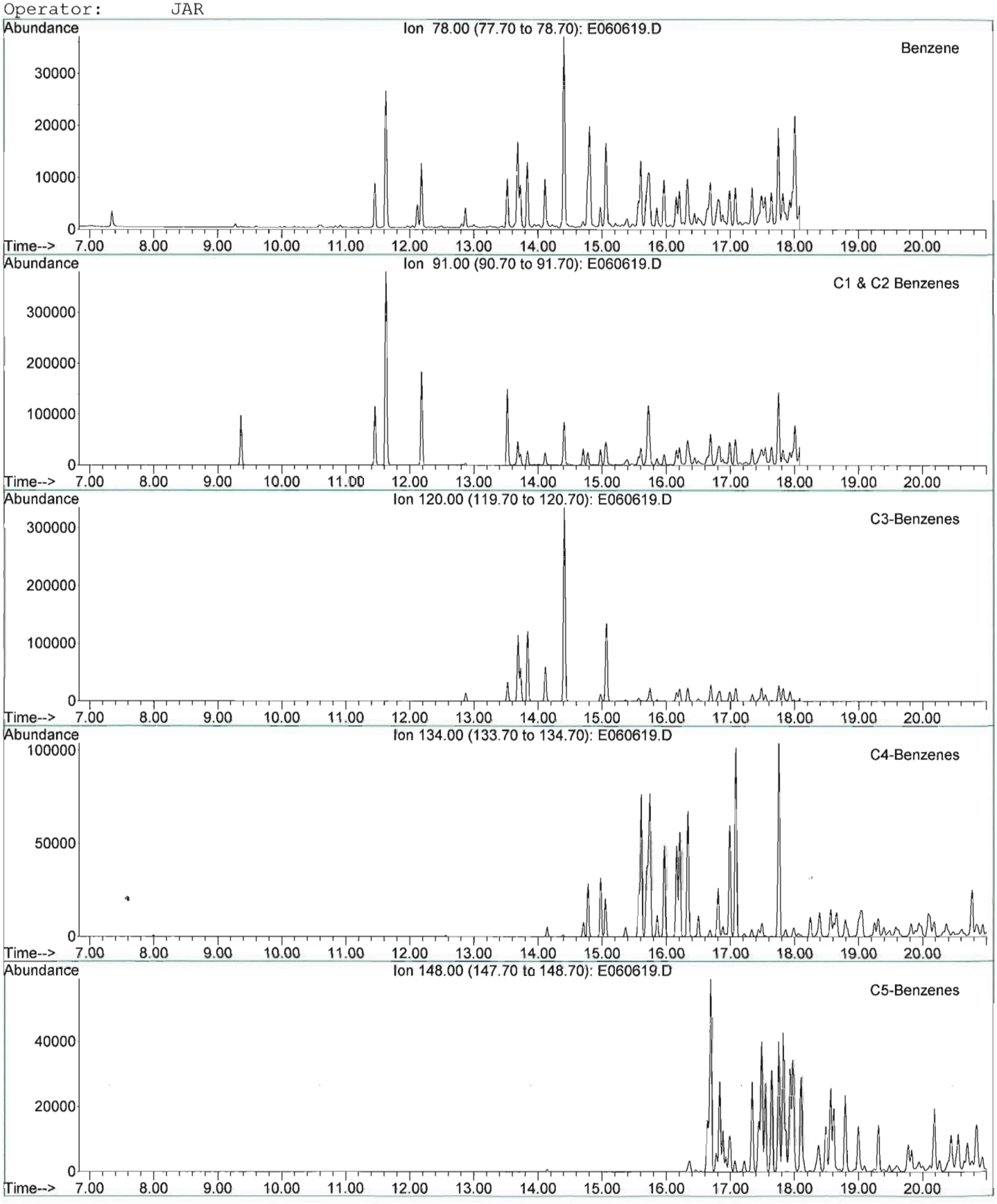
File: J:\1\DATA\E060606\E060619.D
Date Acquired: 7 Jun 2006 1:19 pm
Method File: 4008SIM2.M
Sample Name: AI060602-01A
Misc Info: QW-tank-19
Operator: JAR



META Environmental, Inc.

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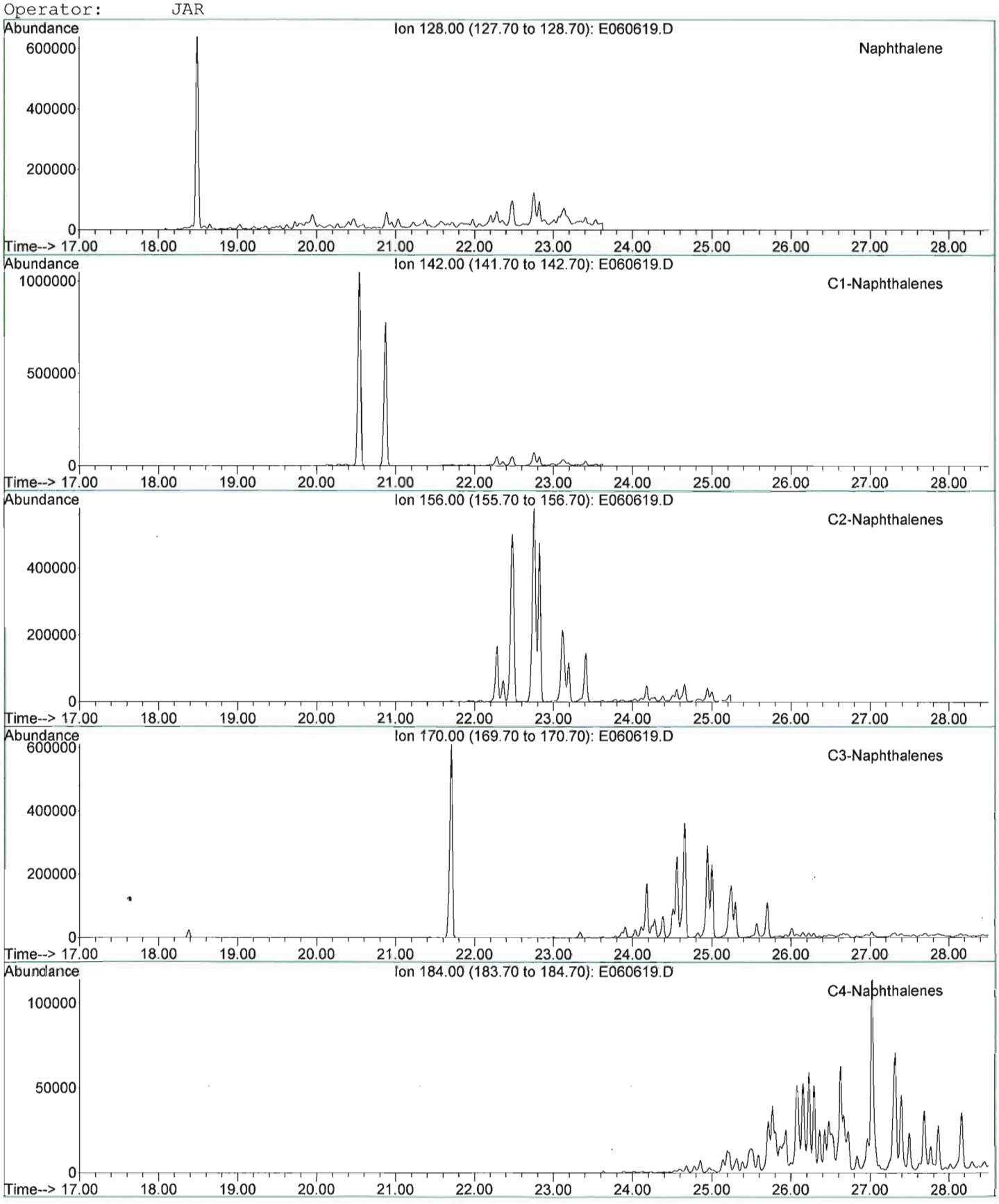
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Date Acquired: 7 Jun 2006 1:19 pm
Method File: 4008SIM2.M
Sample Name: AI060602-01A
Misc Info: QW-tank-19
Operator: JAR



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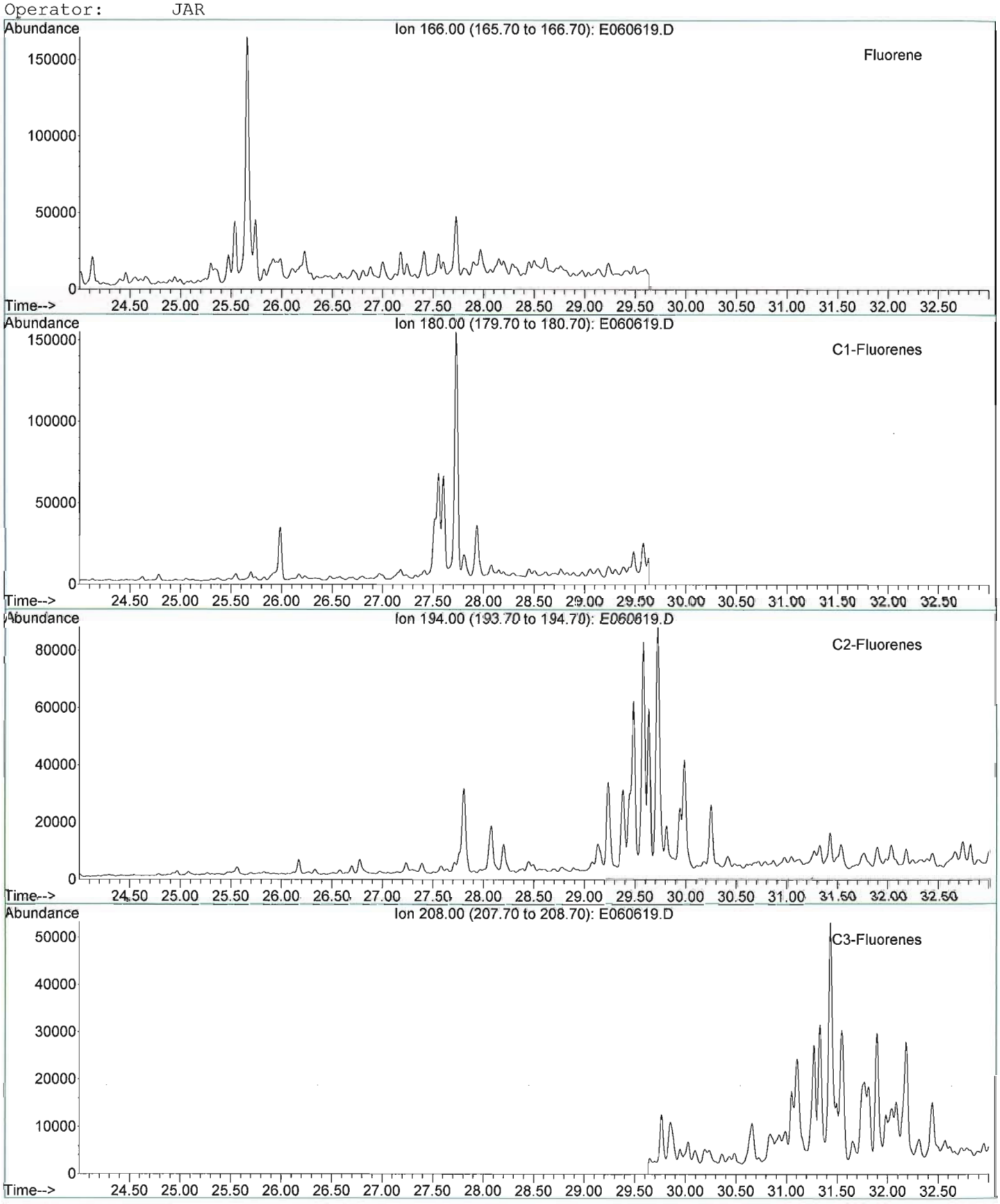
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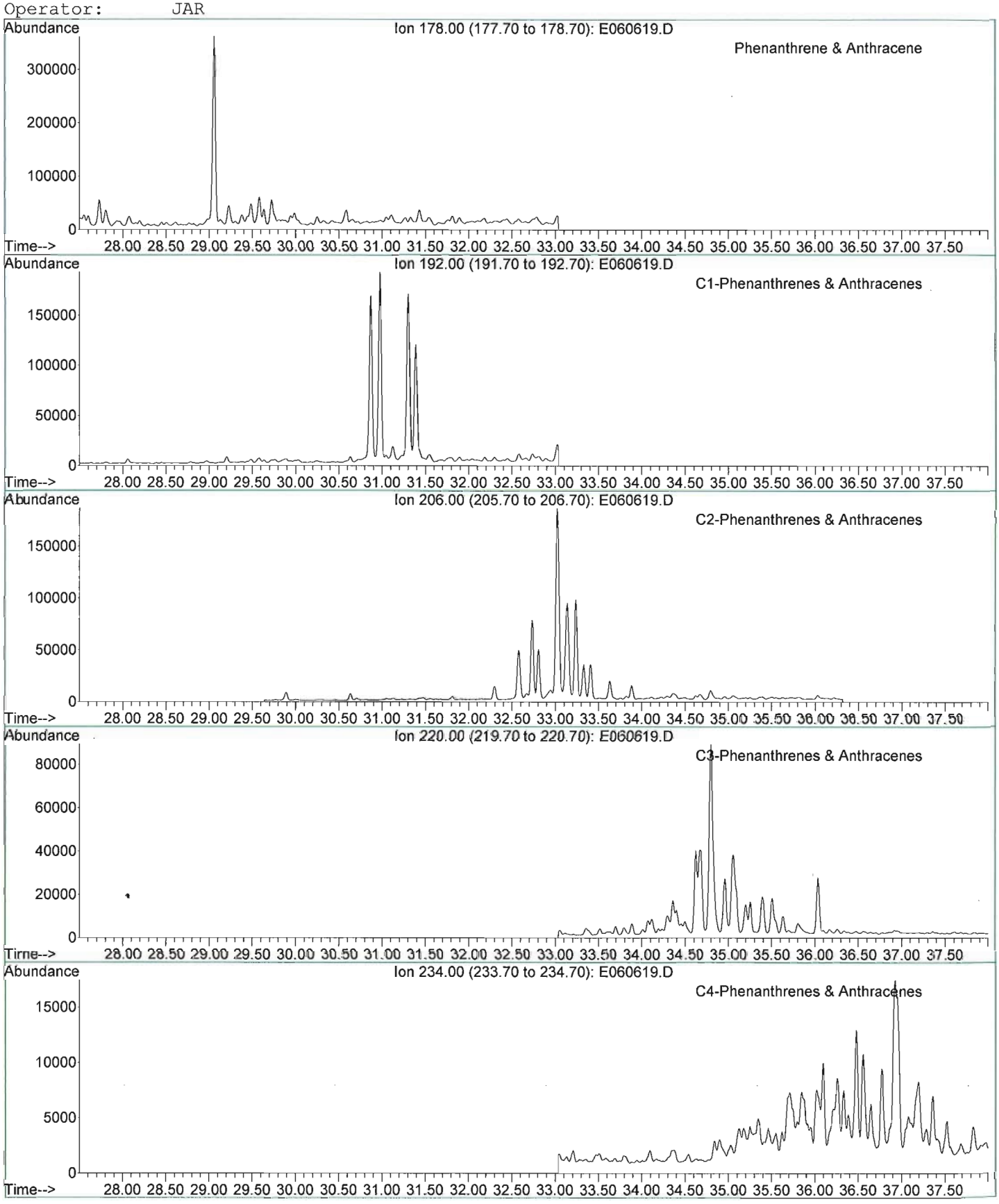
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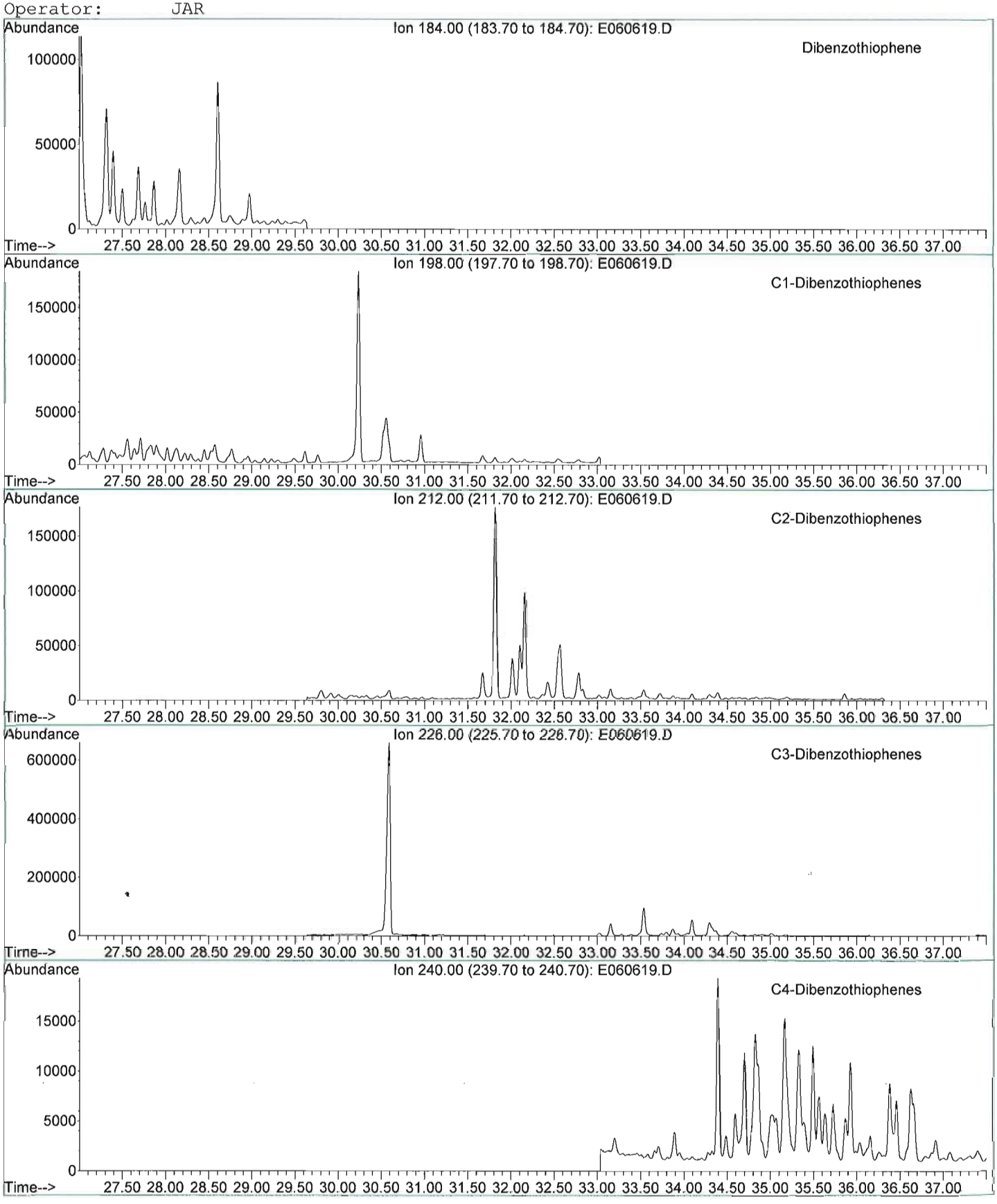
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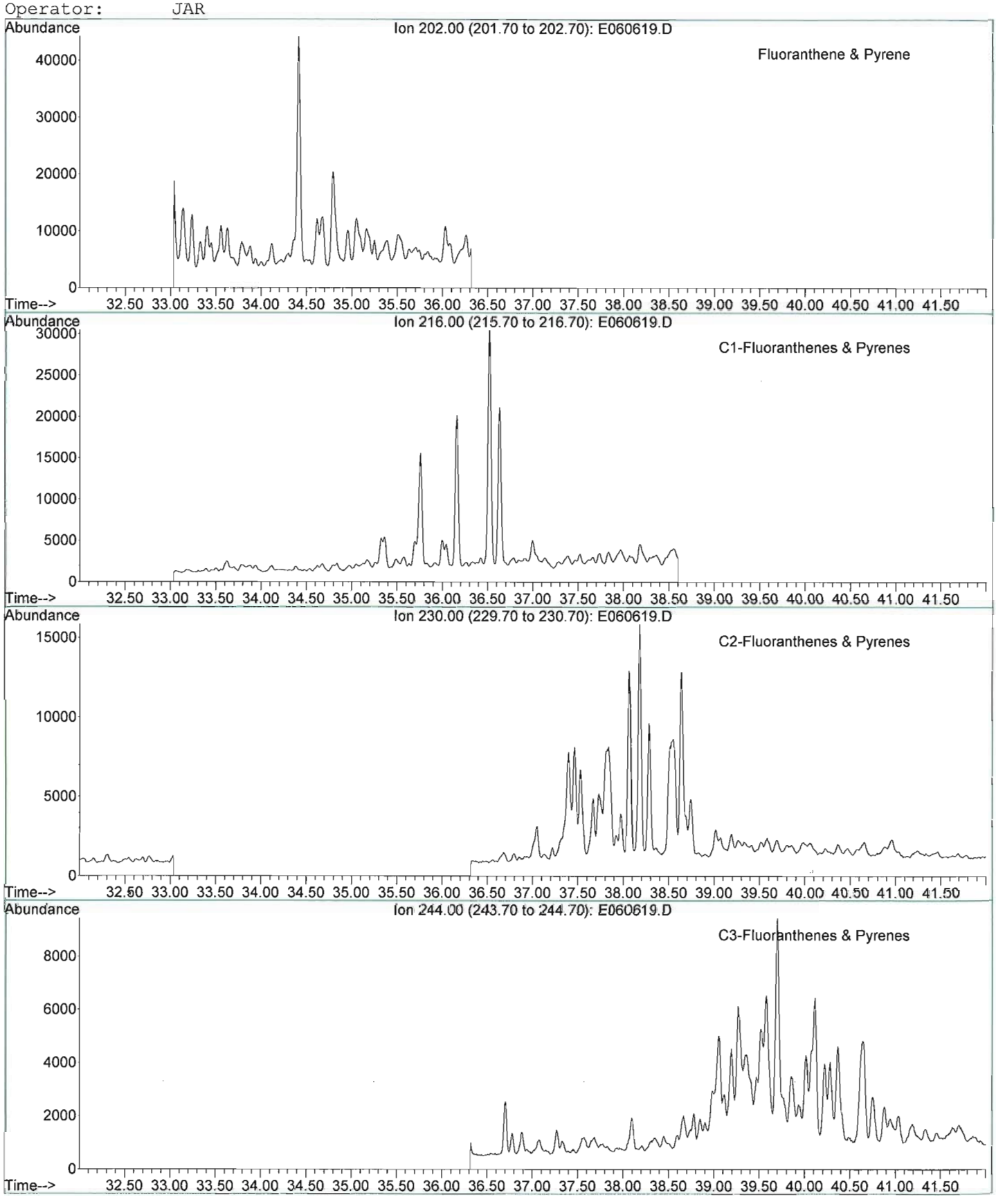
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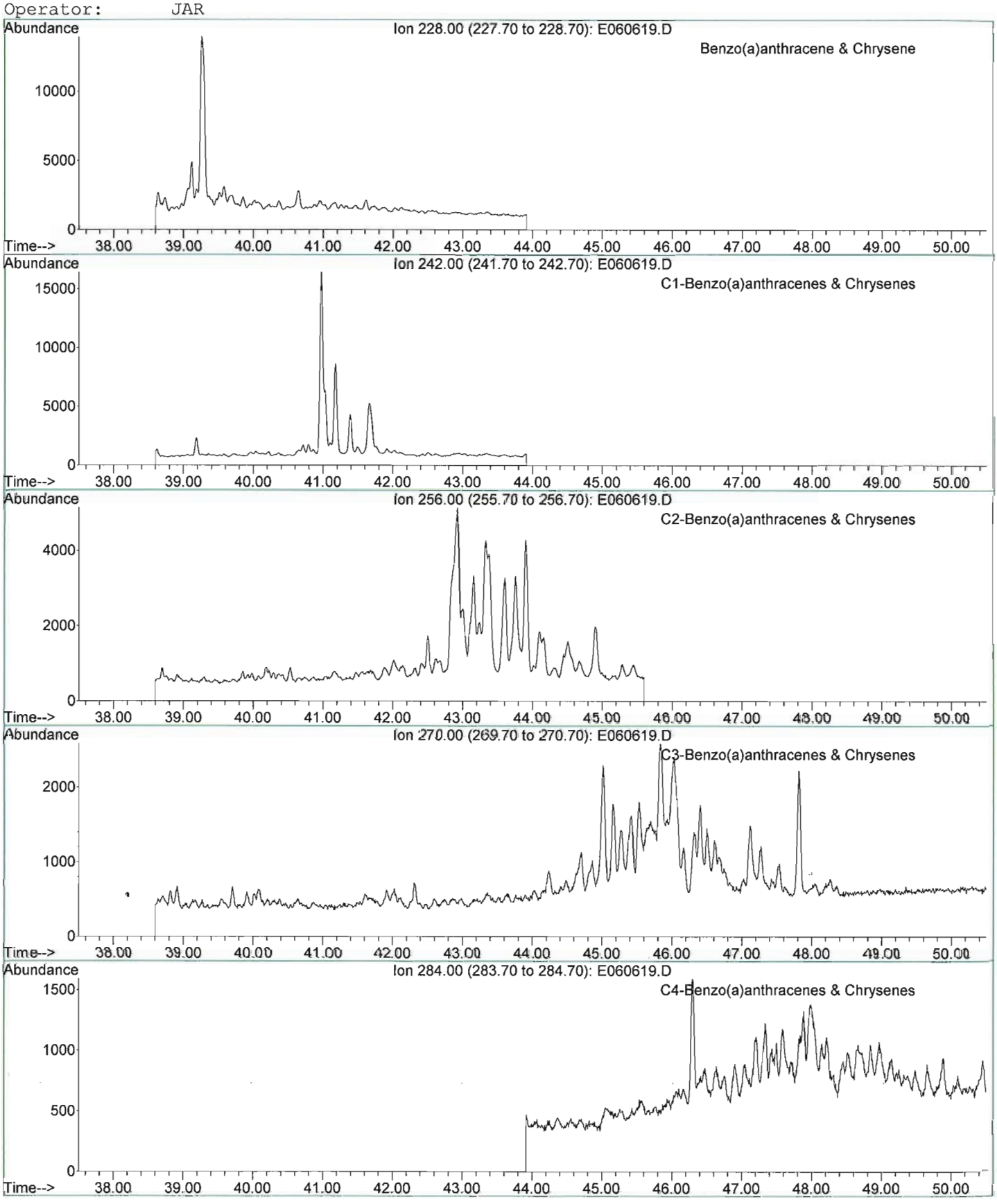
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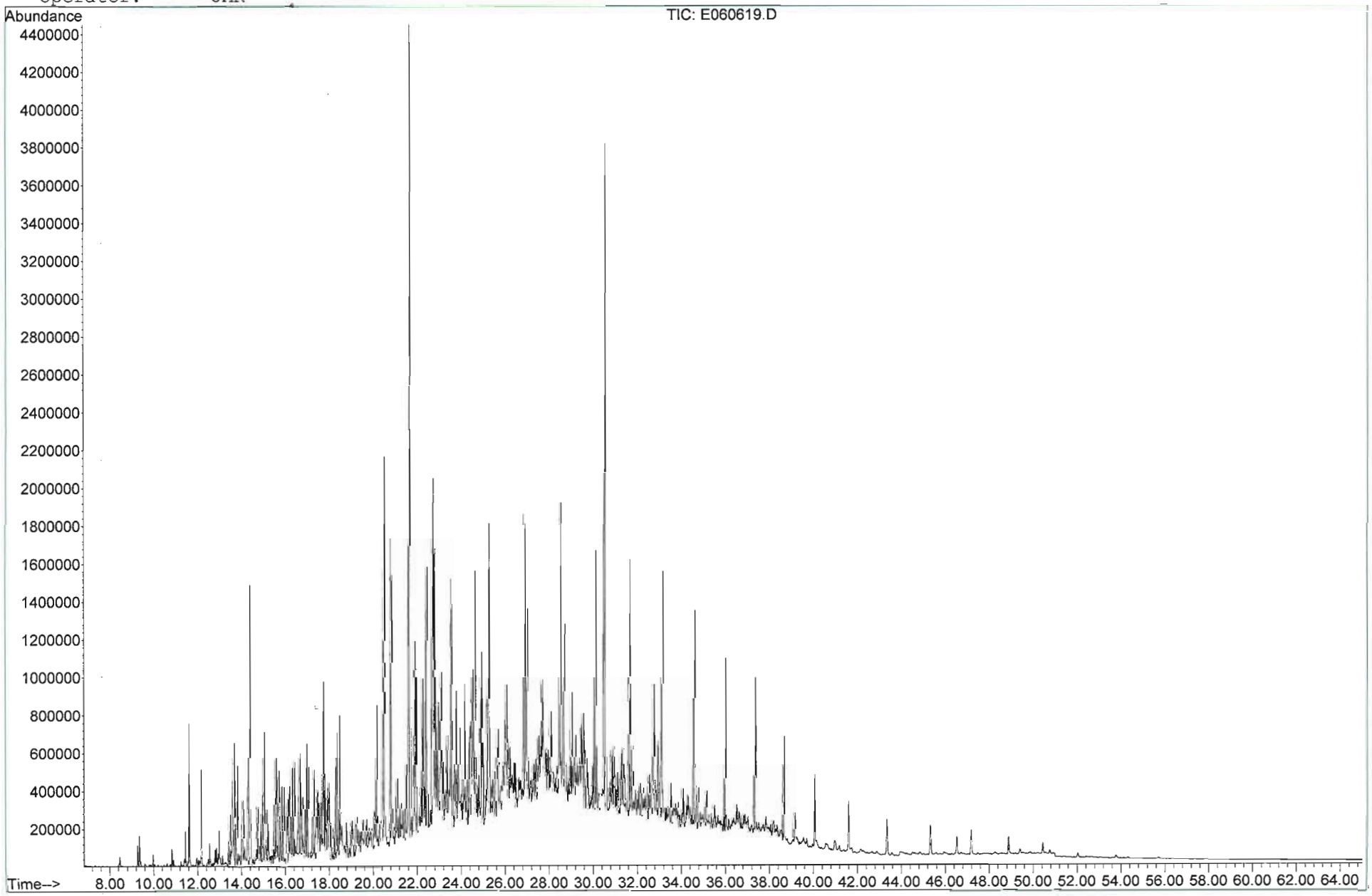
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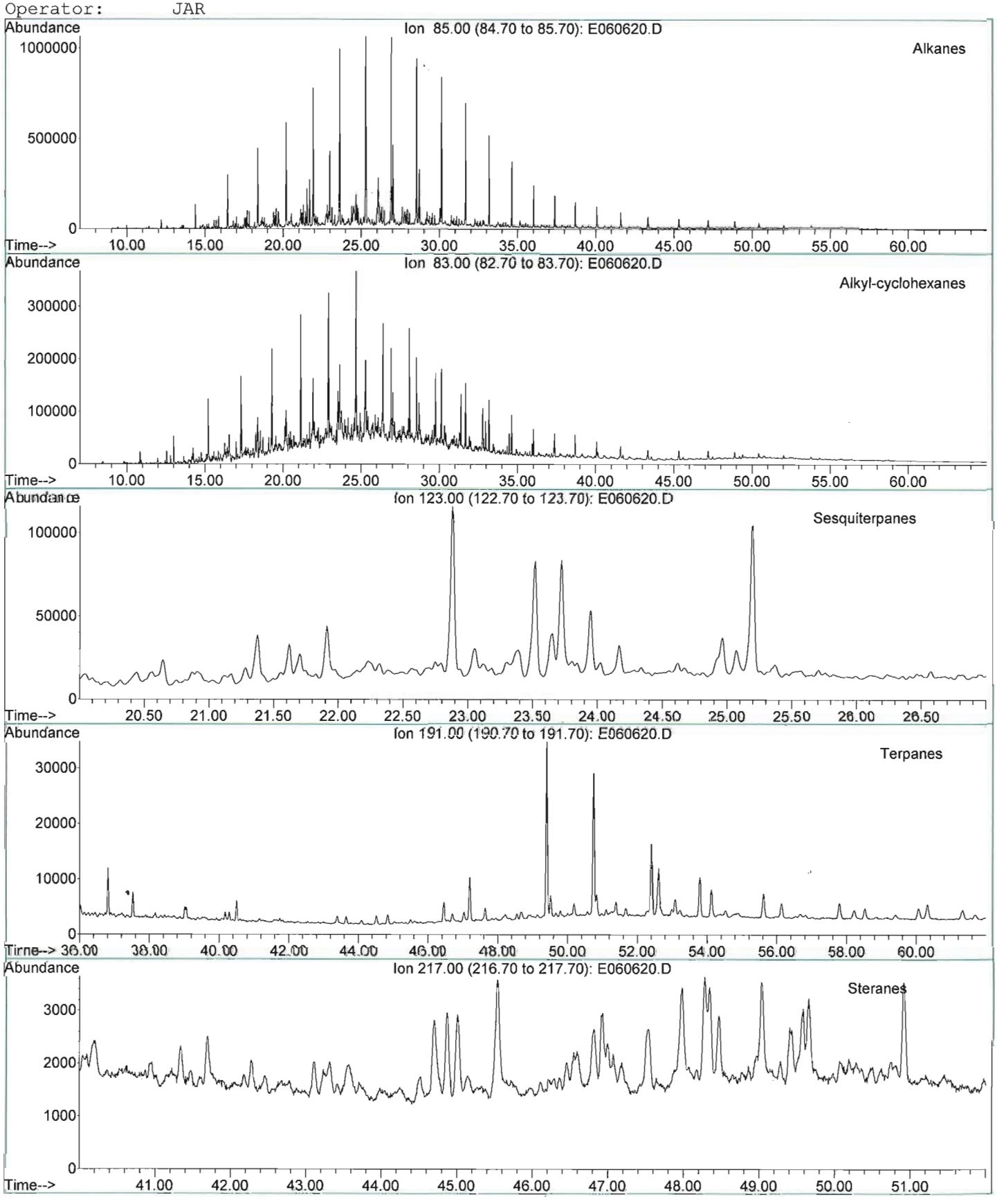
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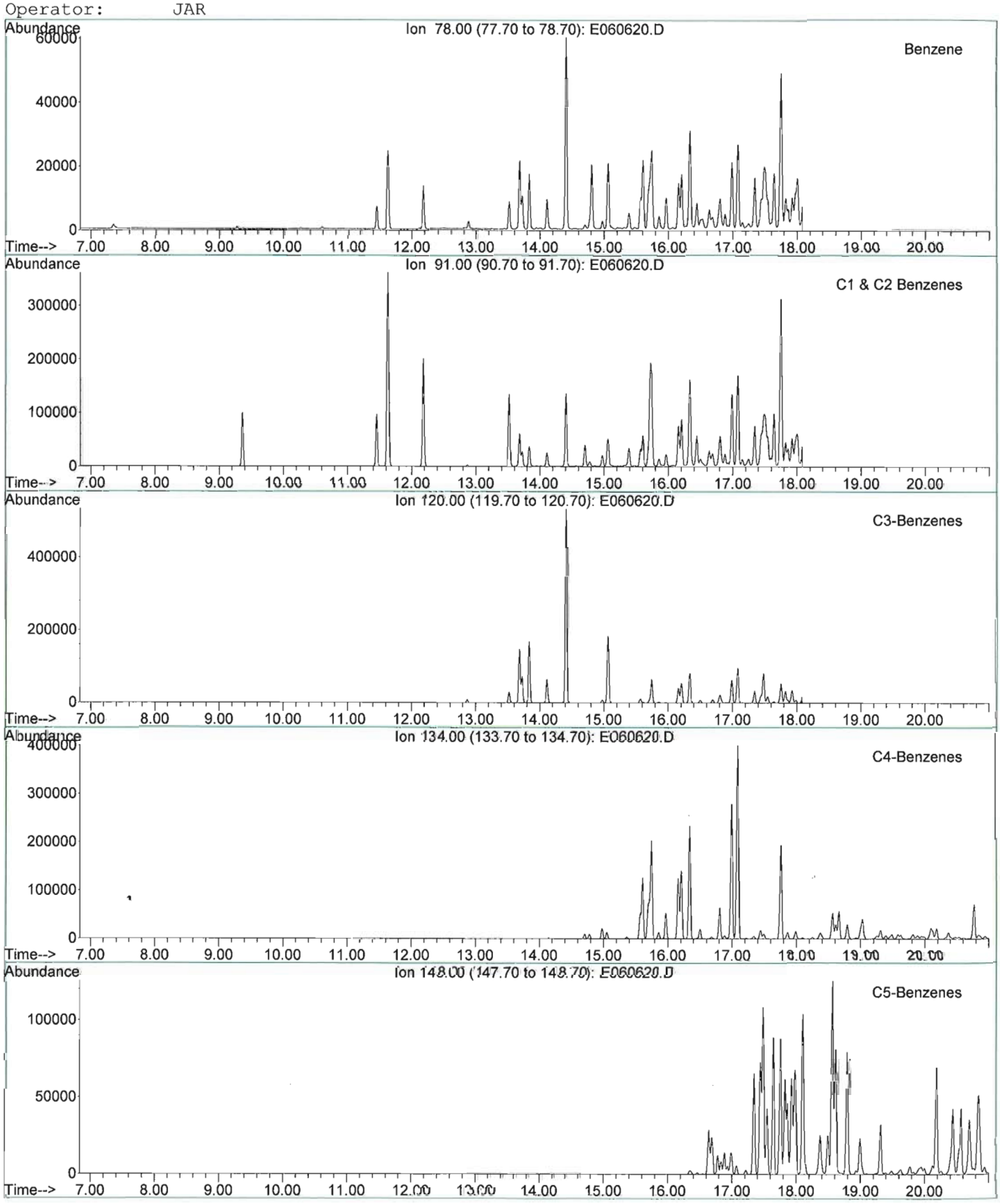
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Misc Info: QW-tank-20
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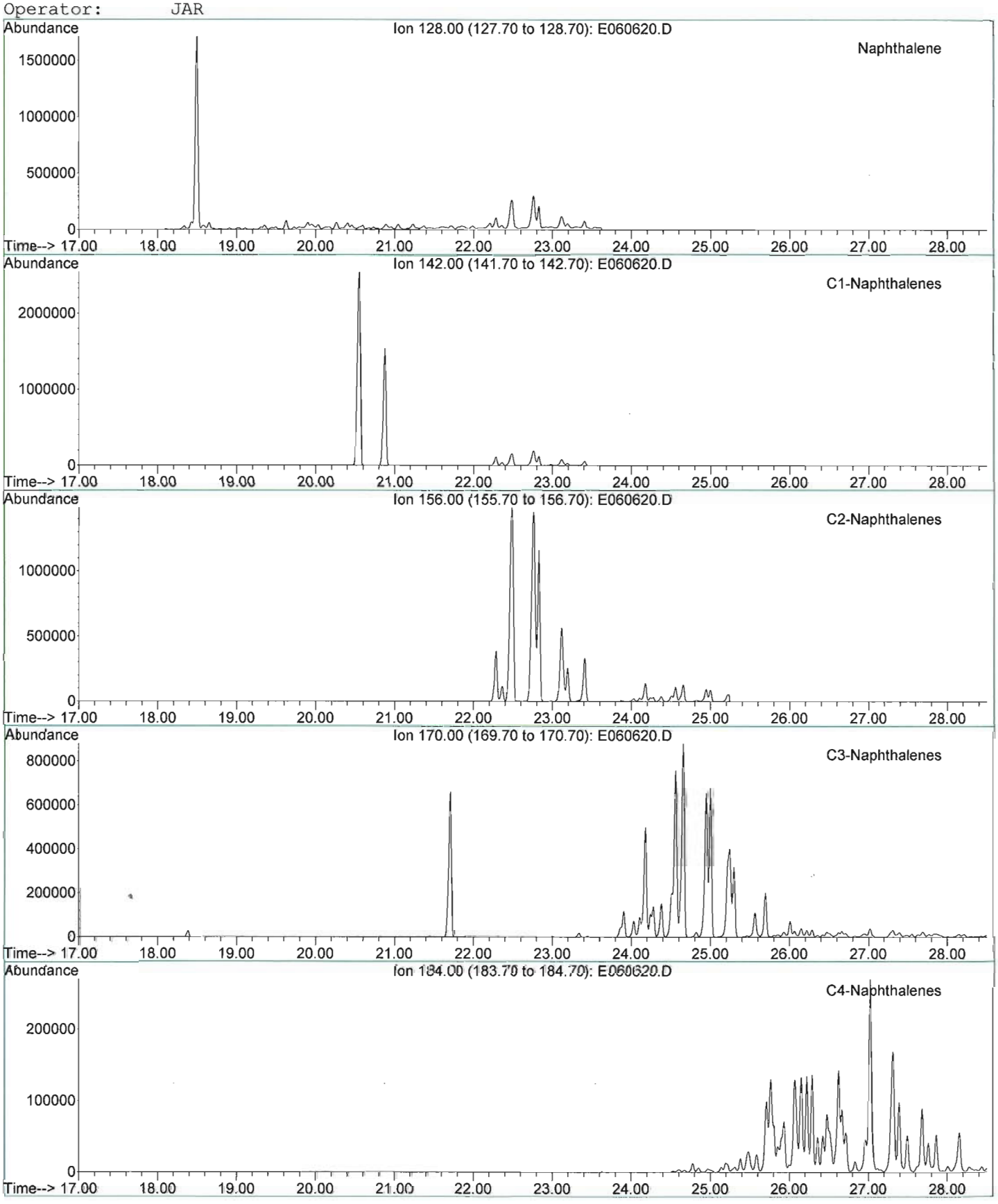
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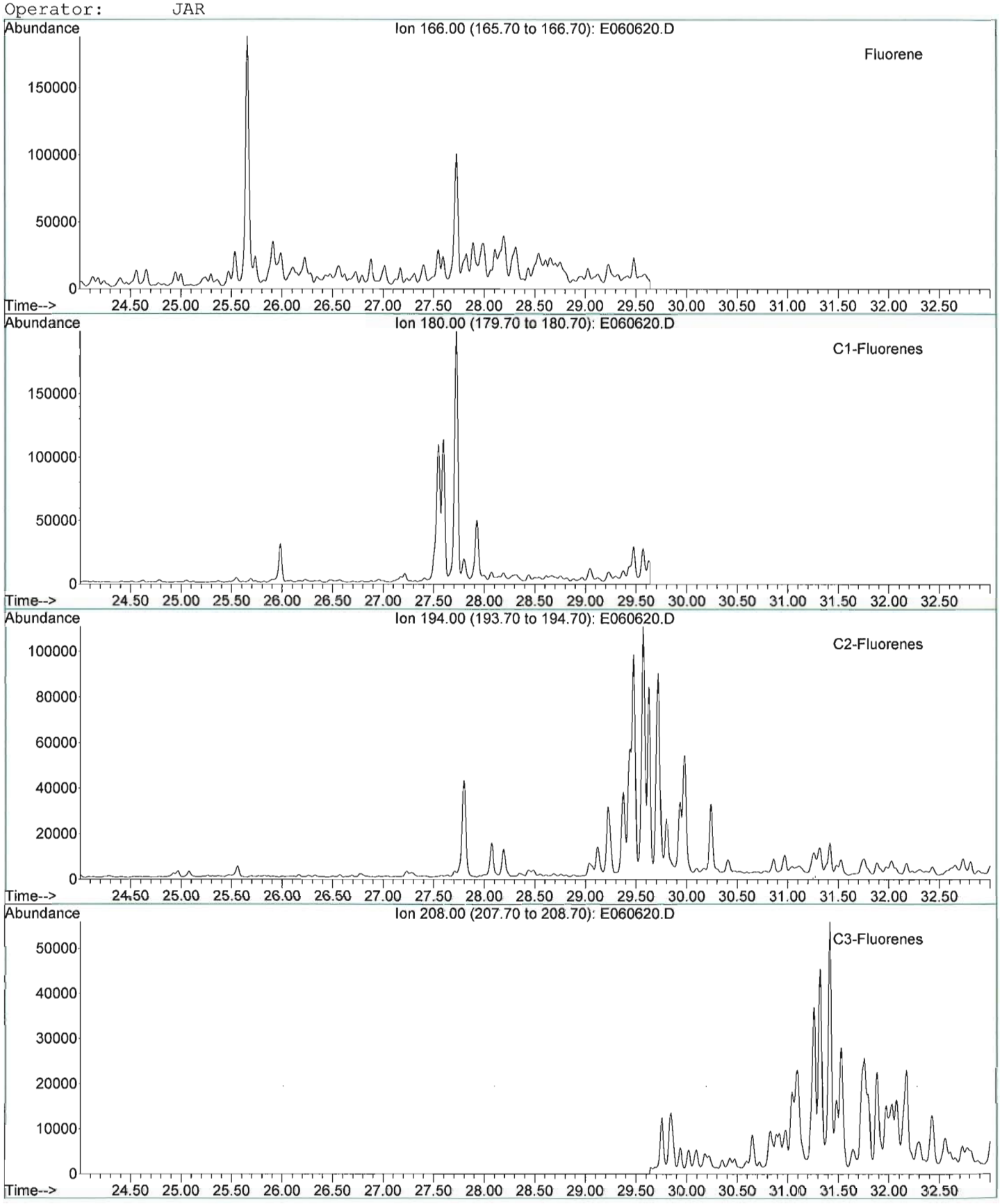
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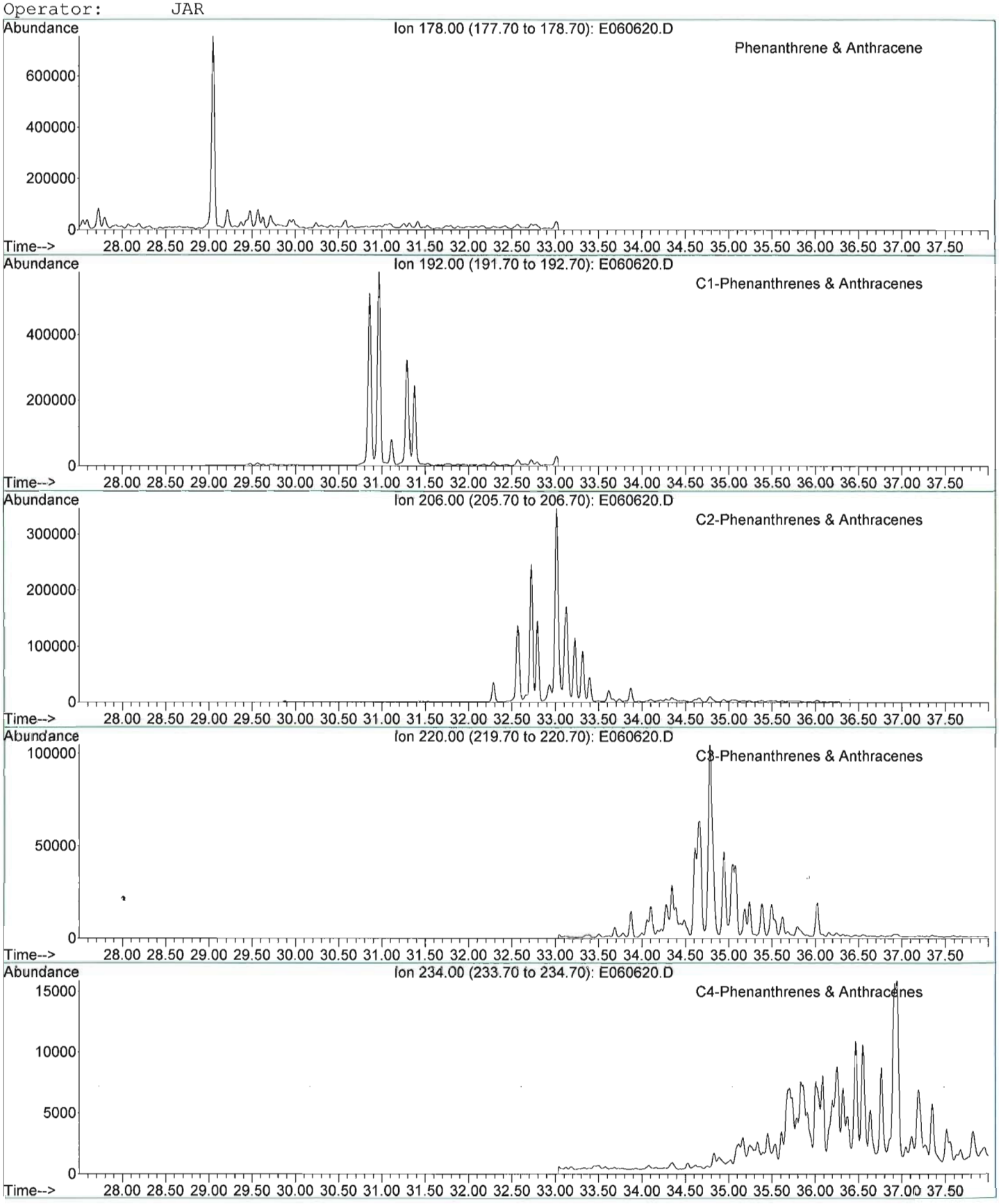
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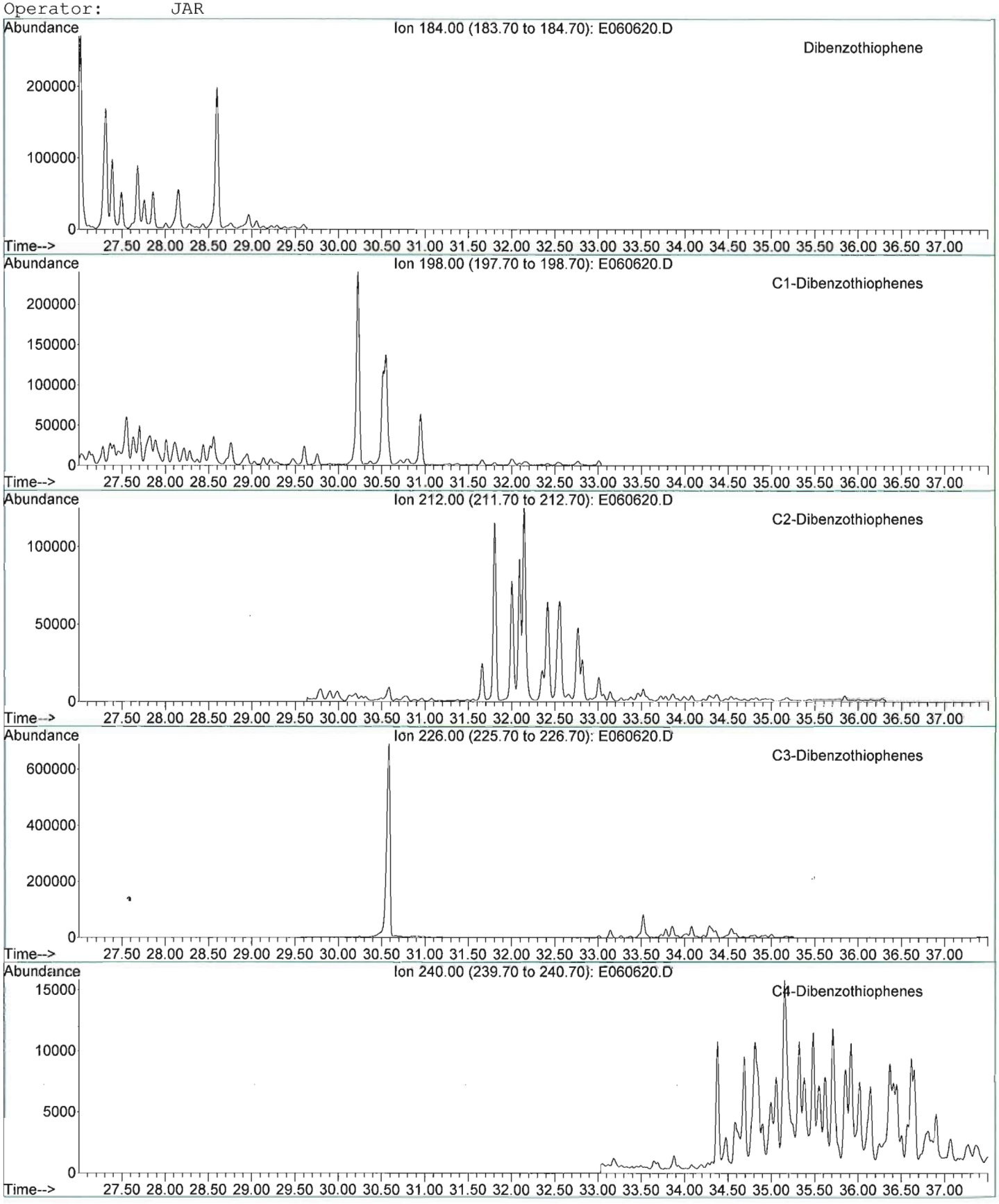
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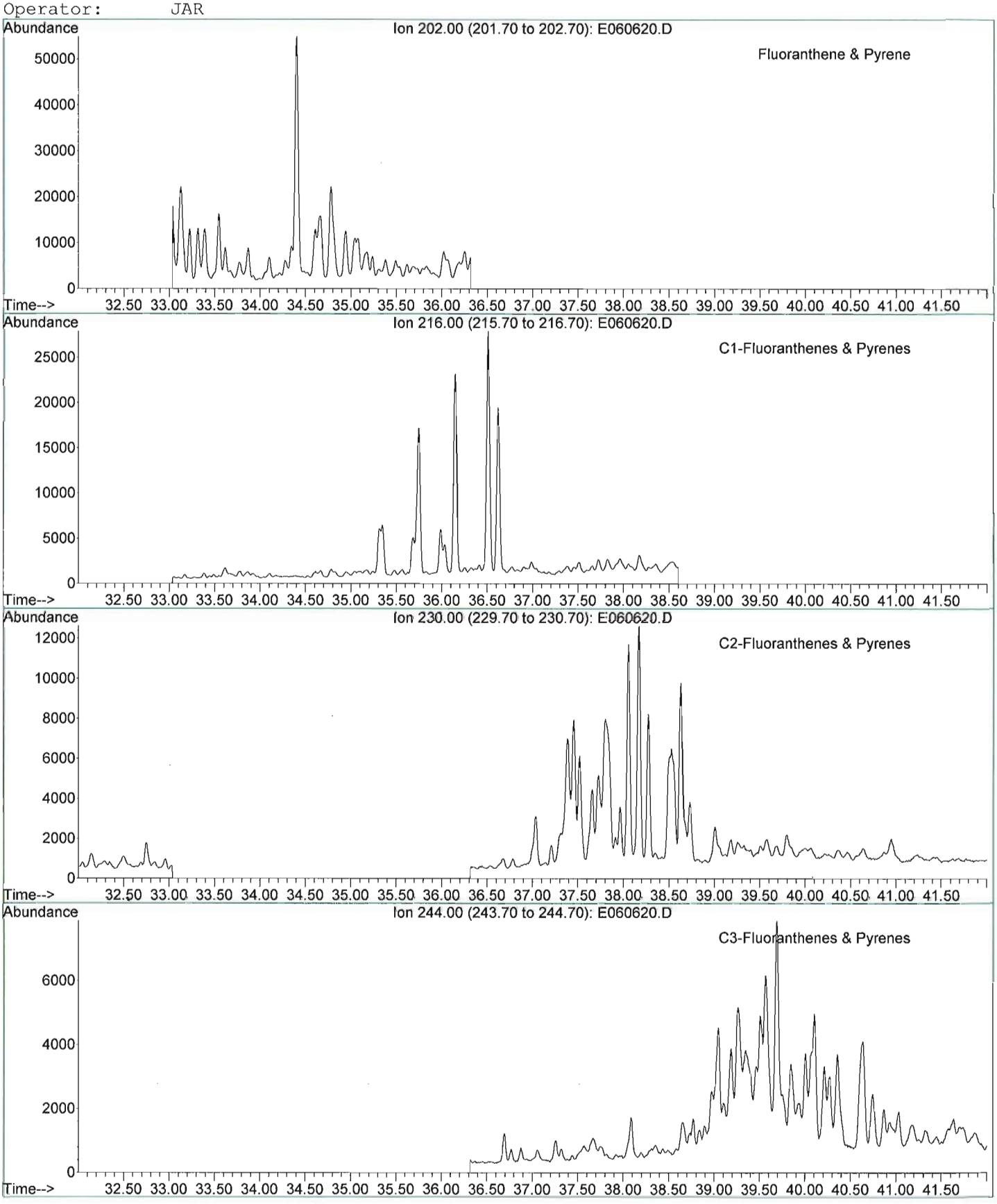
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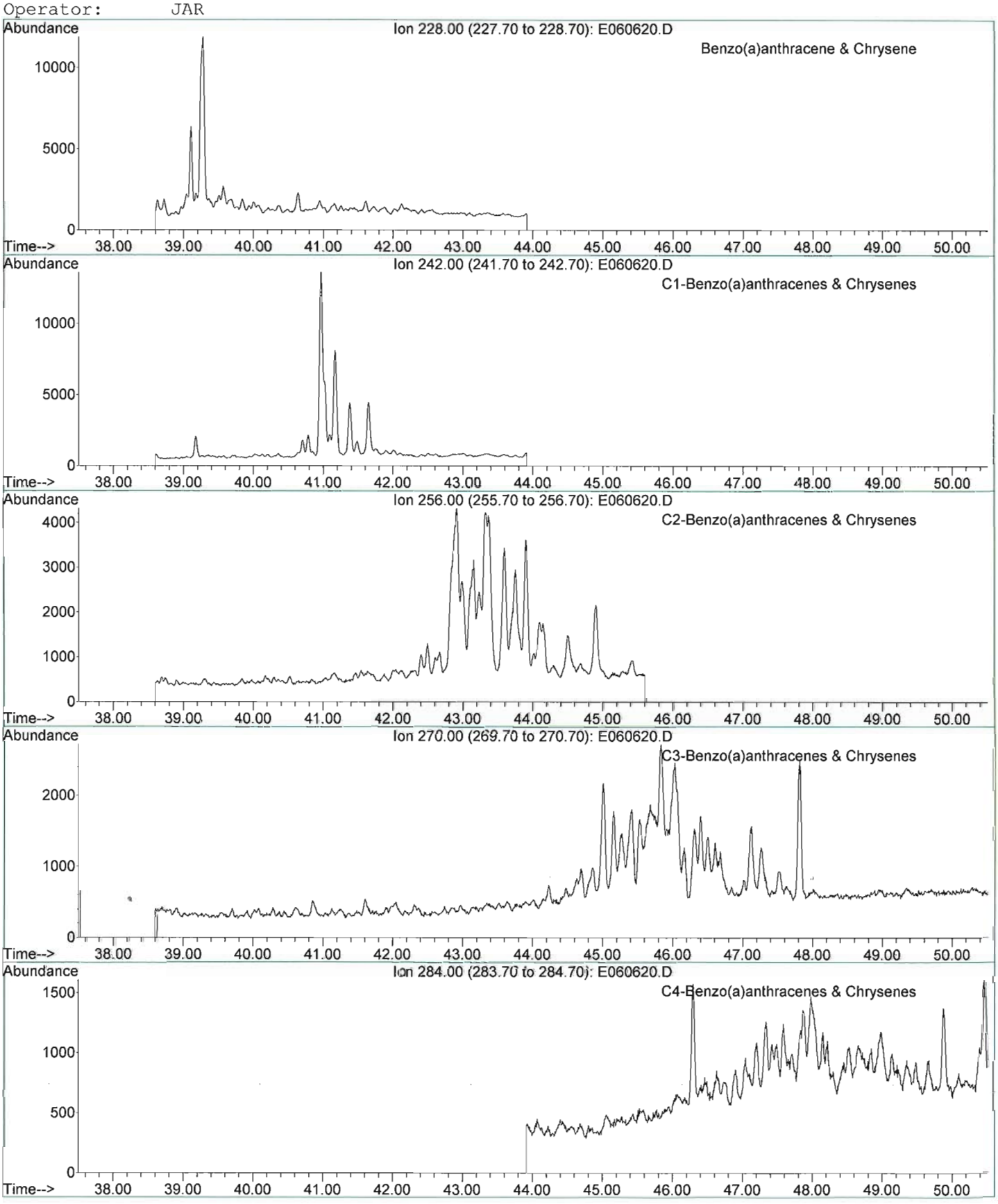
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