GTI Project Number: 40453-01

COMPARATIVE ANALYSIS OF FOUR LIQUID SAMPLES (PIPE #1, PIPE #2, MW-21A and MW-10B) FROM THE NSP/ASHLAND LAKEFRONT SITE, ASHLAND, WISCONSIN

FIFTH ADDENDUM TO THE REPORT:

COMPARATIVE ANALYSIS OF NAPL RESIDUES FROM THE NSP ASHLAND FORMER MGP SITE AND THE ASHLAND LAKEFRONT PROPERTY (KREHER PARK)

Prepared by

GAS TECHNOLOGY INSTITUTE
1700 South Mount Prospect Road
Des Plaines, Illinois 60018

For

NORTHERN STATES POWER COMPANY
414 Nicollet Mall
Minneapolis, Minnesota 55401

August, 2002

Xcel Energy℠

414 Nicollet Mall
Minneapolis, Minnesota 55401-1993

RECEIVED
DNR SPOONER
'02 AUG 16 AM 10 11

August 13, 2002

Jamie Dunn
WDNR - Northwest Region Headquarters
810 W. Maple St.
Spooner, WI 54801

RE: Ashland Lakefront Project: Fifth Addendum

Dear Mr. Dunn:

Enclosed for your information and records is a copy of the Gas Technology Institute's (GTI's) report concerning the samples associated with the MW-21A and MW-10B and the two pipes sampled in the courtyard of the service center at Ashland. Included as appendices of this report are the forensic reports prepared by META Environmental, Inc..

If you have any questions concerning this report, please let me know.

Sincerely,

Jerry C. Winslow

Jerry C. Winslow

Principal Environmental Engineer

Enclosure

cc: Mark Gordon
Deborah Johnson

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Appendix A: Environmental Forensic Report – Two Liquid Samples; December 21, 2001
Appendix A: Environmental Forensic Report – Two Liquid Samples; May 2, 2002

EXECUTIVE SUMMARY

The Gas Technology Institute (GTI) has conducted laboratory analysis of four liquid (water) samples retrieved from buried pipes (termed Pipe #1 and Pipe #2) and other locations (MW-21A and MW-10B) found at or near the NSP/Ashland Lakefront Site in Ashland, Wisconsin. Samples were tested using identical methods described in the report, *Comparative Analysis Of NAPL Residues From The NSP Ashland Former MGP Site And The Ashland Lakefront Property (Kreher Park)* (NAPL Report, March, 2000), and evaluated against results of that report and associated Addendum reports. An initial Addendum Report, *Comparative Analysis Of Sediment Samples From The Chequamegon Bay Near The Kreher Park Shoreline, Ashland, Wisconsin*, was prepared in May 2000. A second Addendum report, *Comparative Analysis Of Two Samples From Kreher Park, Ashland, Wisconsin*, was prepared in April 2001. A third Addendum, *Comparative Analysis Of Ten Sediment Samples From Chequamegon Bay, Ashland, Wisconsin*, was prepared in May 2001. A Fourth Addendum, *Analysis Of Eleven Liquid Samples And One Soil Sample From The Ashland Lakefront Property Site (Various Locations), Ashland, Wisconsin*, was prepared in November, 2001. This document serves as a Fifth Addendum Report.

Using GC/FID fingerprinting techniques, results concluded that all four liquid samples tested contain both pyrogenic (tar) and petrogenic (middle weight petroleum distillate) substances, with pyrogenic substances predominating. All tar fingerprints from these samples resemble MGP-type tars, with notable differences, however.

Samples Pipe #1 and Pipe #2, collected during November, 2001, were different in percentage of both aromatic and aliphatic components. Sample Pipe #2 was also more weathered. Other differences, such as specific diagnostic ratio numbers, indicate different sources or batch materials of NAPL in these samples.

Samples MW-21A and MW-10B, collected during April 2002, showed less variance in the percentages of aliphatic and aromatic content. A relatively small percentage of these samples (3.6% and 4.6% of total, respectively) is aliphatic component; this fraction in both samples appears unweathered. However, comparing diagnostic ratios for NAPL material in these samples with those derived from samples Pipe #1 and Pipe #2, results indicate a third source of tar material.

The tar in all samples described here appears dissimilar to that found in well MW-15, from the Ashland site property.

The chemical fingerprints and diagnostic ratios from these four samples were also compared against results from previously tested samples at or near the Ashland site.

INTRODUCTION

Northern States Power Company (NSP) has contracted the Gas Technology Institute (GTI) to determine whether four liquid (water) samples retrieved on two separate sampling events at or around the Ashland Lakefront Property Site, Ashland, Wisconsin are chemically similar or dissimilar to 1) each other, by sampling event, 2) each other, sampling events compared, and, 3) NAPL residues found in wells located at the NSP former MGP site (MW-15 and EW-1), in Kreher Park (MW-7) and in the Bay Area (12 sediment samples). The results of these water analyses serve as the Fifth Addendum to the report, *Comparative Analysis of NAPL Residues From The NSP Ashland Former MGP Site And The Ashland Lakefront Property (Kreher Park)* (NAPL Report).

GTI and its subcontractor (META Environmental, Inc.) have completed forensic analysis of four liquid (water) samples, collected during two separate sampling events (November, 2001 and December, 2002). Analyses of these samples have included identification and/or quantification of: 1) monocyclic hydrocarbons (MAHs), 2) polycyclic aromatic hydrocarbons (PAHs), and, 3) aliphatic hydrocarbons and polar hydrocarbons. Analyses and hydrocarbon fingerprinting were performed using gas chromatography with flame ionization detection (GC/FID). These analyses are described in detail in the NAPL Report. Results of all sediment analyses are included in this Fifth Addendum Report, with expanded analytical data detailed in Appendix A and Appendix B.

SITE BACKGROUND

Site details have been previously described in the NAPL Report and other Addendum Reports.

METHODS

Liquid (water) samples were collected on two separate sampling events. One sampling event occurred on November 12, 2001. These samples, Pipe #1 and Pipe #2, were collected from various locations by URS Corporation, on behalf of the Northern States Power Company (see Figure 1). The second sampling event occurred on April 5, 2002. These samples, MW-21A and MW-10B were retrieved from monitoring wells near the Ashland former MGP site. These samples were also collected by URS Corporation, on behalf of the Northern States Power Company. This work was completed to further characterize areas of potential contamination at or around the site.

The samples selected for fingerprint laboratory analysis were placed in 4-ounce glass jars, filled to the top with zero headspace, and sealed with screw-cap tops. The samples were packed in ice, and shipped overnight with the completed chain-of-custody forms to the laboratory (META Environmental, Inc., Watertown, MA) for immediate analysis. The results of laboratory testing were sent to GTI for interpretation.

Analyses of the samples included: 1) gas chromatography with flame ionization detection (GC/FID), and, 2) simulated distillation. A chromatographic fingerprint was obtained from each sample using GC/FID, identifying and/or quantifying each of the compound classes: 1) monocyclic hydrocarbons (MAHs), 2) polycyclic aromatic hydrocarbons (PAHs), and, 3) aliphatic hydrocarbons and polar hydrocarbons.

RESULTS

The GC/FID fingerprint data from the four liquid (water) samples shows that the whole extracts of all samples contain both pyrogenic (tar) and petrogenic (middle weight petroleum distillate) materials, with pyrogenic materials predominating. However, the percent aromatic and aliphatic fractions in the liquid samples vary widely. Particular observations drawn from the results are as follows:

- The GC/FID fingerprints of the whole extracts of the four liquid samples exhibit a tar-like pattern, probably MGP-type tar.

Pertaining to Samples Pipe #1 and Pipe #2

- The GC/FID fingerprints of the aromatic fractions (tar) of the samples Pipe #1 and Pipe #2 are nearly consistent in percent of total; Pipe #1 possessed 74.9% tar fraction and Pipe #2 possessed 78.3% tar fraction. These percentages are lower than the aromatic fractions in NAPL samples from wells MW-15 and EW-1 (84%).

- The GC/FID fingerprints of the aliphatic (middle weight petroleum distillate) fraction of the Pipe samples are highly dissimilar to the each other; sample Pipe #1 contained 19.0% aliphatic fraction while sample Pipe #2 contained 32.8% aliphatic fraction. Neither of these percentages is similar to the NAPL samples retrieved from the Ashland NSP former MGP property (MW-15 and EW-1, approximately 9%).

- Material in sample Pipe #2 is highly weathered, as compared with Pipe #1.

- The Source and Weathering Ratios (diagnostic ratios) for each of these samples varies widely between each other. These ratios also differed from those found in any of the samples tested from the Ashland NSP former MGP site, Kreher Park and the Bay Area (12 Bay Area samples were averaged below).

Table 1				
	Fl/Py	**D/F**	**Pris/Phy**	**C3D/C3PA**
Pipe #1	0.83	0.55	1.28	0.37
Pipe #2	0.99	0.63	1.51	0.72
Average 12 samples ($\pm$2s)	0.69$\pm$0.6	0.18$\pm$0.1	1.09$\pm$0.2	1.0$\pm$0.23

Pertaining to Samples MW-21A and MW-10B

- The GC/FID fingerprints of the aromatic fractions (tar) of the samples MW-21A and MW-10B are not consistent in percent of total; MW-21A possessed 70.2% tar fraction and MW-10B possessed 80.9% tar fraction. These percentages are higher or lower than the aromatic fractions in NAPL samples from wells MW-15 and EW-1 (84%).

- The GC/FID fingerprints of the MW-21A and MW-10B aliphatic (middle weight petroleum distillate) fraction are similar to each other, i.e., 3.6% and 4.6% aliphatic fraction, respectively. These percentages are lower than the NAPL samples retrieved from the Ashland NSP former MGP property (MW-15 and EW-1, approximately 9%). The aliphatic material is relatively unweathered.

- The Source and Weathering Ratios (diagnostic ratios) for each of these samples is mostly consistent between each other. However, these ratios differed from those found in any of the samples tested from the Ashland NSP former MGP site, Kreher Park and the Bay Area (12 Bay Area samples were averaged below), and differed from those of the Pipe samples.

Table 2

	Fl/Py	D/F	Pris/Phy	C3D/C3PA
MW-21A	0.77	0.34	1.75	0.75
MW-10B	0.77	0.48	1.81	0.67
Pipe #1	0.83	0.55	1.28	0.37
Pipe #2	0.99	0.63	1.51	0.72
Average 12 samples (±2s)	0.69 ± 006	0.18 ± 011	1.09 ± 022	1.0 ± 0.3

The actual GC/FID scans or fingerprints for the samples are shown in Appendix A of the Addendum report.

DISCUSSION OF RESULTS

Results of all testing indicated the following:

1) The aromatic component (tar) from all four liquid (water) samples varies, with samples Pipe #1 and Pipe #2 being dissimilar to each other, to samples MW-21A and MW-10B and to the previously tested samples from the Ashland site, Kreher Park and the Bay area.

2) The quantity (percentage) of aliphatic compounds in the liquid (water) samples varies between the Pipe samples, and between the Pipe samples and the samples MW-21A and MW-10B. The percentage aliphatic fraction in the samples MW-21A and MW-10B more closely resemble those from the Ashland site. This fraction in sample Pipe #2 resembles that found in the sample from Kreher Park (MW-7).

3) The Source and Weathering Ratios (diagnostic ratios) for samples Pipe #1 and Pipe #2 are dissimilar and samples MW-21A and MW-10B are dissimilar to the Pipe samples. However, ratios from all four samples differed from those found in any of the samples tested from the Ashland NSP former MGP site, Kreher Park and the Bay Area.

CONCLUSIONS

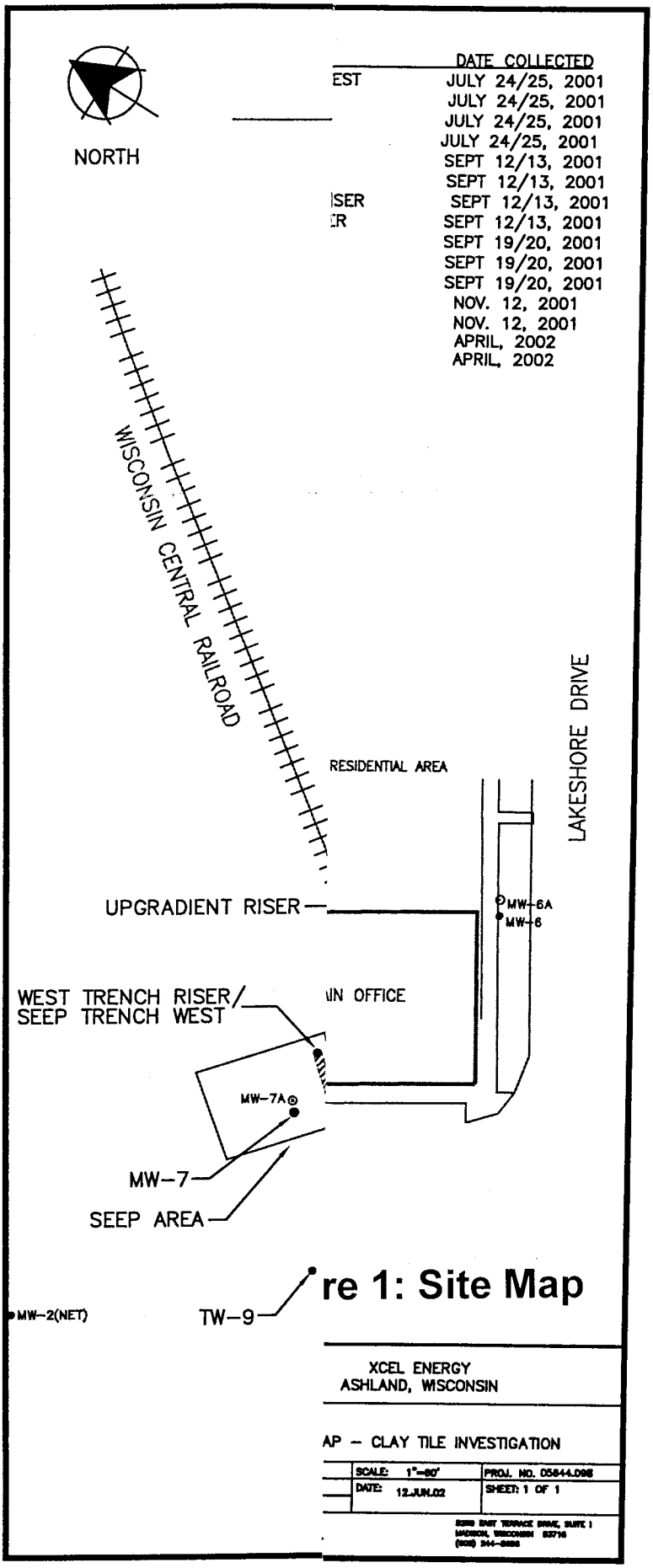
The following conclusions can be drawn from examination of all four samples tested here and in comparison of these four samples to previously tested samples from the Ashland site, Kreher Park and Bay area.

1) Pipe #1 and Pipe #2 materials possess notable differences. First, the NAPL in Pipe #2 was substantially more weathered than in Pipe #1. This is indicated by the reduced relative concentrations of MAHs and light PAHs, including naphthalene in the Pipe #2 sample. The naphthalene/phenanthrene ratio in Pipe #2 was less than half that of Pipe #1, further indicating a weathered sample. Also, other diagnostic ratios were different. For example, the fluoranthene/pyrene (Fl/Py) ratios were 0.83 vs 0.99 for Pipe #1 and Pipe #2 respectively. The Fl/Py ratio differences were supported by differences in the dibenzofuran/fluorene, pristine/phytane, and trialkyldibenzofurans/trialkylphenanthrenes ratios. The significance of this difference may not be assessed with just two samples; however, it is the experience of GTI that a difference of this magnitude may indicate different sources or batches of NAPL. Therefore, there appears to be two tars present in samples Pipe #1 and Pipe #2, different from tar present in sample MW-15.

2) The diagnostic ratios in the Pipe #1 and Pipe #2 samples differed from those in the other previously tested samples from the Ashland site. These data may indicate that the NAPL in the pipes was produced at higher temperature, probably from coal, and with a lower sulfur content feedstock than the NAPLs from other locations previously tested.

3) Results from this testing of Pipe #1 by META Environmental, Inc. were very similar to Battelle's results for the 2" and 12" steel pipes. Battelle also concluded that the NAPL in the steel pipes was different from the NAPLs at other locations. However, it does not appear that sample Pipe #2 tested by META Environmental, Inc is the same sample that was tested by Battelle. It is not clear why the sample received by META labeled Pipe #2 was so different from the associated Battelle sample.

FIGURES


NORTH
DATE COLLECTED
EST
JULY 24/25, 2001
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JULY 24/25, 2001
SEPT 12/13, 2001
SEPT 12/13, 2001
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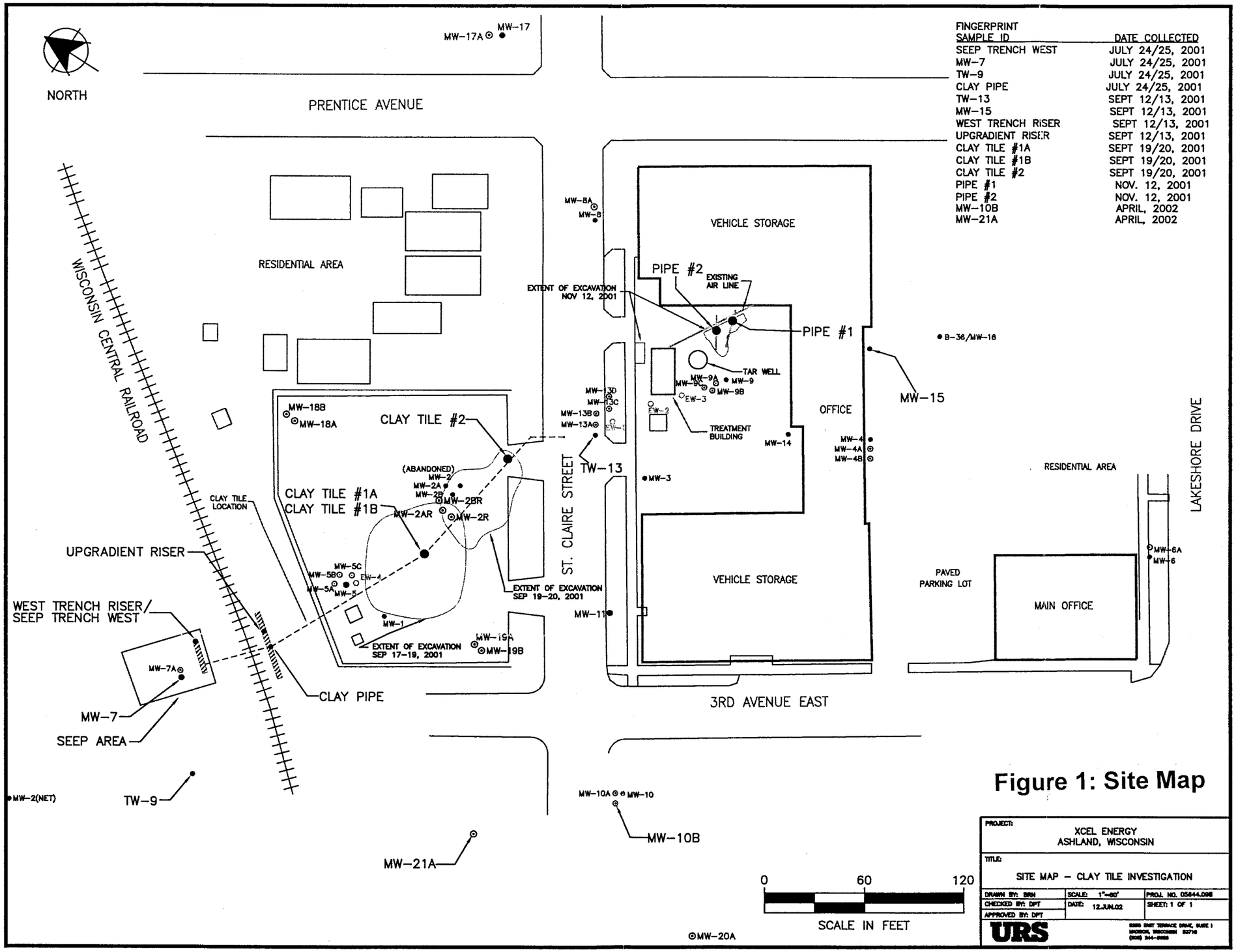
SEPT 19/20, 2001
SEPT 19/20, 2001
SEPT 19/20, 2001
NOV. 12, 2001
NOV. 12, 2001
APRIL, 2002
APRIL, 2002
WISCONSIN CENTRAL RAILROAD
LAKESHORE DRIVE
RESIDENTIAL AREA
UPGRADIENT RISER
MW-6A
MW-6
WEST TRENCH RISER/
SEEP TRENCH WEST
IN OFFICE
MW-7A
MW-7
SEEP AREA
re 1: Site Map
MW-2(NET)
TW-9
XCEL ENERGY
ASHLAND, WISCONSIN
AP – CLAY TILE INVESTIGATION
SCALE: 1"=60'
PROJ. NO. 05844.098
DATE: 12.JUN.02
SHEET: 1 OF 1
FILE: S:\\CADDFILES\NSP\GTL_SAMPLE_LOCATIONS_REVISED6-12-02



FINGERPRINT SAMPLE ID	DATE COLLECTED
SEEP TRENCH WEST	JULY 24/25, 2001
MW-7	JULY 24/25, 2001
TW-9	JULY 24/25, 2001
CLAY PIPE	JULY 24/25, 2001
TW-13	SEPT 12/13, 2001
MW-15	SEPT 12/13, 2001
WEST TRENCH RISER	SEPT 12/13, 2001
UPGRADIENT RISER	SEPT 12/13, 2001
CLAY TILE #1A	SEPT 19/20, 2001
CLAY TILE #1B	SEPT 19/20, 2001
CLAY TILE #2	SEPT 19/20, 2001
PIPE #1	NOV. 12, 2001
PIPE #2	NOV. 12, 2001
MW-10B	APRIL, 2002
MW-21A	APRIL, 2002

Figure 1: Site Map

PROJECT: XCEL ENERGY ASHLAND, WISCONSIN

TITLE: SITE MAP – CLAY TILE INVESTIGATION

DRAWN BY: BRN	SCALE: 1"=60'	PROJ. NO. 05844.098
CHECKED BY: DPT	DATE: 12.JUN.02	SHEET: 1 OF 1
APPROVED BY: DPT		

URS

FILE: S:\CADDFILES\NSP\GTI_SAMPLE_LOCATIONS_REVISED6-12-02

APPENDICES

Appendix 1: Environmental Forensic Report – Two Liquid Samples
December 21, 2001

Environmental Forensic Report

Two Liquid Samples

SDG: IG011114

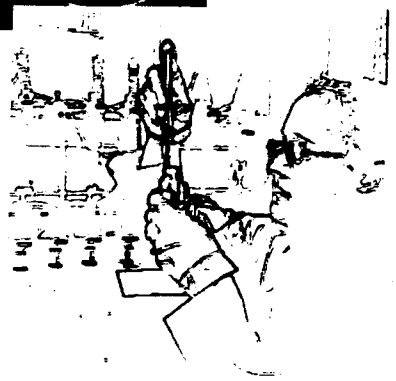
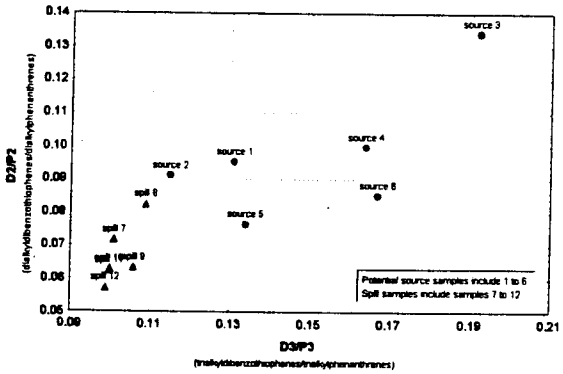


Figure 1. Double Ratio Plot



Report To:

Gas Technology Institute
1700 S. Mt. Prospect Road
Des Plaines, IL 60018

Report By:

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

December 21, 2001

Identifying and allocating sources of pollutants in complex environments.

META Environmental, Inc.
ENGINEERING & CHEMISTRY

DRAFT Laboratory Report

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

Phone: 617-923-4662
Fax: 617-923-4610
e-Mail: metaenv@aol.com

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 Director and Quality Assurance Officer, as verified by the following signatures.

12/21/01

David R. Craig
Laboratory Director, META Environmental, Inc.

Date

12/21/01

David M. Mauro
Quality Assurance Officer, META Environmental, Inc.

Date

Sample Delivery Group Narrative

Project: Ashland MGP Site Forensic Analyses

Client: Gas Technology Institute
1700 S. Mt. Prospect Road
Des Plains, IL 60018

Report Contact: Dr. Diane Saber

Date of Receipt: 11/14/01

Sample Summary:

The samples received for this project are summarized in the attached sample login forms.

META Project Number: I05001-60

Chain of Custody

Samples were received in good condition. The internal temperatures of the shipment containers were as follows:

Samples received 11/14/2001 7.0°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 1 month after the release of this data report. Sample disposal will be documented.

Methods

The non-aqueous phase liquid (NAPL) samples were prepared by waste dilution (EPA 3580) to a 5mg/ml concentration in DCM. The extracts were spiked with internal standard and analyzed by GC/FID (EPA 8100 mod.) and GC/MS/SIM (EPA 8260/8270 mod.).

Subsequently, a portion of each extract was fractionated into aliphatic, aromatic, and polar fractions using silica gel column chromatography (EPA 3630 mod.). Each fraction was analyzed by GC/FID (EPA 8100 mod.).

Results

Sample results were 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." No value was reported above the calibration range. Undetected analytes were 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

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

Surrogate Spikes

Fractionation surrogates were added to all extracts prior to fractionation. Recoveries for all surrogates are reported with the sample results.

Blanks

The method blank contained low concentrations of naphthalene and 1-methylnaphthalene. Samples containing these analytes at a concentration less than five times that found in the blank

should be reviewed for positive bias. The fractionated blanks contained peaks associated with the silica gel. The presence of these peaks does not effect the data interpretation

Internal Standards

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

Interpretation

The GC/FID fingerprints of the whole, aliphatic, and aromatic portions of the two samples were very similar. Both of the samples exhibited characteristics of pyrogenic and petrogenic substances, with the pyrogenic portion predominant. The substantial amounts of parent PAHs (e g., naphthalene phenanthrene, pyrene) indicated the presence of tar. However, the unresolved complex mixture (UCM or "hump") centered around about 17 minutes and the numerous small peaks from about 10 minutes to about 25 minutes indicated the presence of a middle distillate of petroleum.

Table 1 presents the total hydrocarbon concentrations of the whole, aliphatic, and aromatic portions of each sample.

Table 1
Aliphatic and Aromatic Hydrocarbons in NAPL Samples

Sample	TEH (mg/kg)	Aliphatic (mg/kg)	Aromatic (mg/kg)	% Aliphatic	% Aromatic
Pipe #1	295,000	56,400	221,000	19.0	74.9
Pipe #2	194,000	63,700	152,000	32.8	78.3

TEH - total extractable hydrocarbons

References

1 "Chemical Source Attribution at Former MGP Sites," EPRI Report 1000728, December 2000.

Table 1
Source and Weathering Ratios

Sample	Fl/Py	D/F	C17/Pris	C18/Phy	Pris/Phy	C3D/C3PA	C2D/C2PA	N/P
Pipe #1	0.83	0.55	0.33	0.56	1.28	0.37	0.31	1.71
Pipe #2	0.99	0.63	2.10	1.82	1.51	0.72	0.37	0.73

Ratios:

Fl/Py	fluoranthene/pyrene
D/F	dibenzofuran/fluorene
C17/Pris	septadecane/pristane
C18/Phy	octadecane/phytane
Pris/Phy	pristane/phytane
C3D/C3PA	trialkyldibenzothiophenes/trialkylphenanthrenes/anthracenes
C2D/C2PA	dialkyldibenzothiophenes/dialkylphenanthrenes/anthracenes
N/P	Naphthalene/Phenanthrene

Appendix A

Chains of Custody

META ENVIRONMENTAL SAMPLE RECEIPT

Lab ID	Field ID	Matrix	Analysis	Date Sampled	Date Received	Client/ Project	Container/ Storage	Comments/Logger
IG011114-01a,b	PIPE #1	NAPL	2512/3009/4007/4008	11/12/01	11/14/01	I05001-60	2 x 40 mL vial	
IG011114-02a,b	PIPE #2	NAPL	2512/3009/4007/4008	11/12/01	11/14/01	I05001-60	2 x 40 mL vial	

K Pittson

NO. 43242

NORTHERN LAKE SERVICE, INC.

Analytical Laboratory and Environmental Services

400 North Lake Avenue • Crandon, WI 54520-1298
Tel: (715) 478-2777 • Fax: (715) 478-3060

SAMPLE COLLECTION AND CHAIN OF CUSTODY RECORD

Wisconsin Lab Cert. No. 721026460

ETURN THIS FORM WITH SAMPLES.

DNR LICENSE	FID
ENT: URS Corp.	PROJECT TITLE: NSP/Ashland Lakefront
DDRESS: 250 E. Terrace Dr. Suite I	PROJECT NO.: 05644-098
P.O. NO.	
Madison STATE: WI ZIP: 53718	CONTACT: M. McCulloch
PHONE: 608/245-8092	

	NLS LAB. NO.	SAMPLE ID	DNR ID	COLLECTION DATE	COLLECTION TIME	SAMPLE TYPE	GRAB/ COMP.	CONTAINER/PRESERVATIVE V-NP				COLLECTION REMARKS
1.	[redacted]	PIPE #1		11/12	1030	PROD	Grab	2		IL0111	Y-01	Fingerprint Analysis
		PIPE #2		11/12	100PM	"	"	2		↓	-02ab	" "
3.												
5.												
8.												
0.												
2.												

AMPLE TYPE:
SW=surface water, WW=wastewater, GW=groundwater, DW=drinking water, TIS=tissue, AIR=air, PROD=product, SOIL=soil, SED=sediment
describe others

CONTAINER: P = plastic, G = glass, V = glass vial, B = plastic bag
describe others

PRESERVATIVES & PREPARATION: NP = nothing added, S = sulfuric acid, N = nitric acid, Z = zinc acetate, OH = sodium hydroxide, HA = hydrochloric & ascorbic acid, H = hydrochloric acid, F = field filtered

LLECTED BY (signatures): Mel A McCulloch	CUSTODY SEAL NO. (IF ANY)	DATE/TIME
LINQUISHED BY (signature): Mel A McCulloch	RECEIVED BY (signature): Fed Ex	DATE/TIME: 11/13/01 430PM
ELINQUISHED BY (signature)	RECEIVED BY (signature): K. Peterson 7°C	DATE/TIME: 11/14/01 9:30 am
PATCHED BY (signature)	METHOD OF TRANSPORT	DATE/TIME

[redacted]

REMARKS & OTHER INFORMATION: Send results to Diane Saber @ GTI

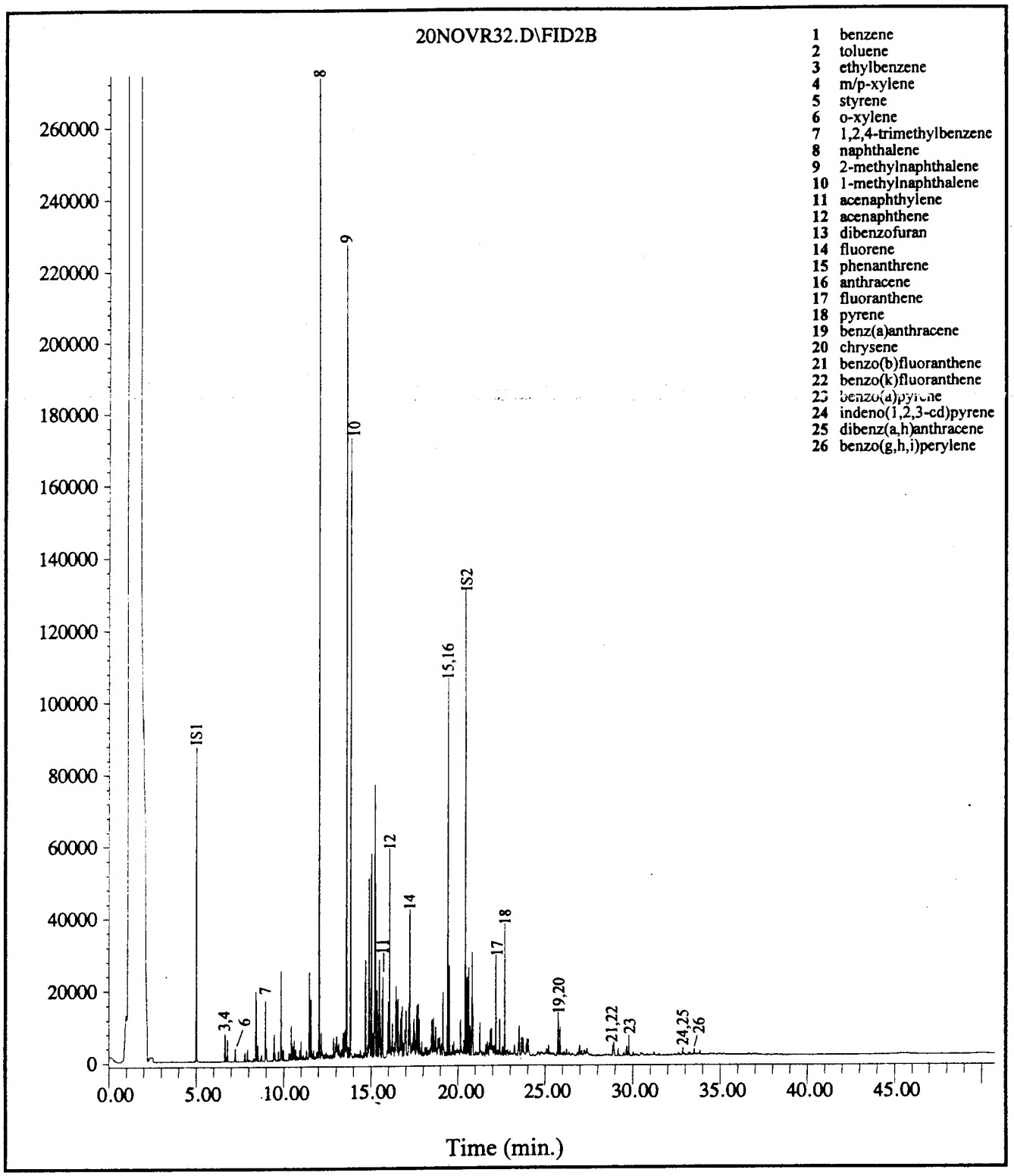
PORTANT:
1. TO MEET REGULATORY REQUIREMENTS, THIS FORM **MUST** BE COMPLETED IN DETAIL AND INCLUDED IN THE SHIPPER CONTAINING THE SAMPLES DESCRIBED.
2. PLEASE USE ONE LINE PER SAMPLE, **NOT** PER BOTTLE.
3. RETURN THIS FORM WITH SAMPLES - CLIENT MAY KEEP PINK COPY.

ORIGINAL COPY

Appendix B

GC/FID Fingerprints

GC/FID Fingerprint

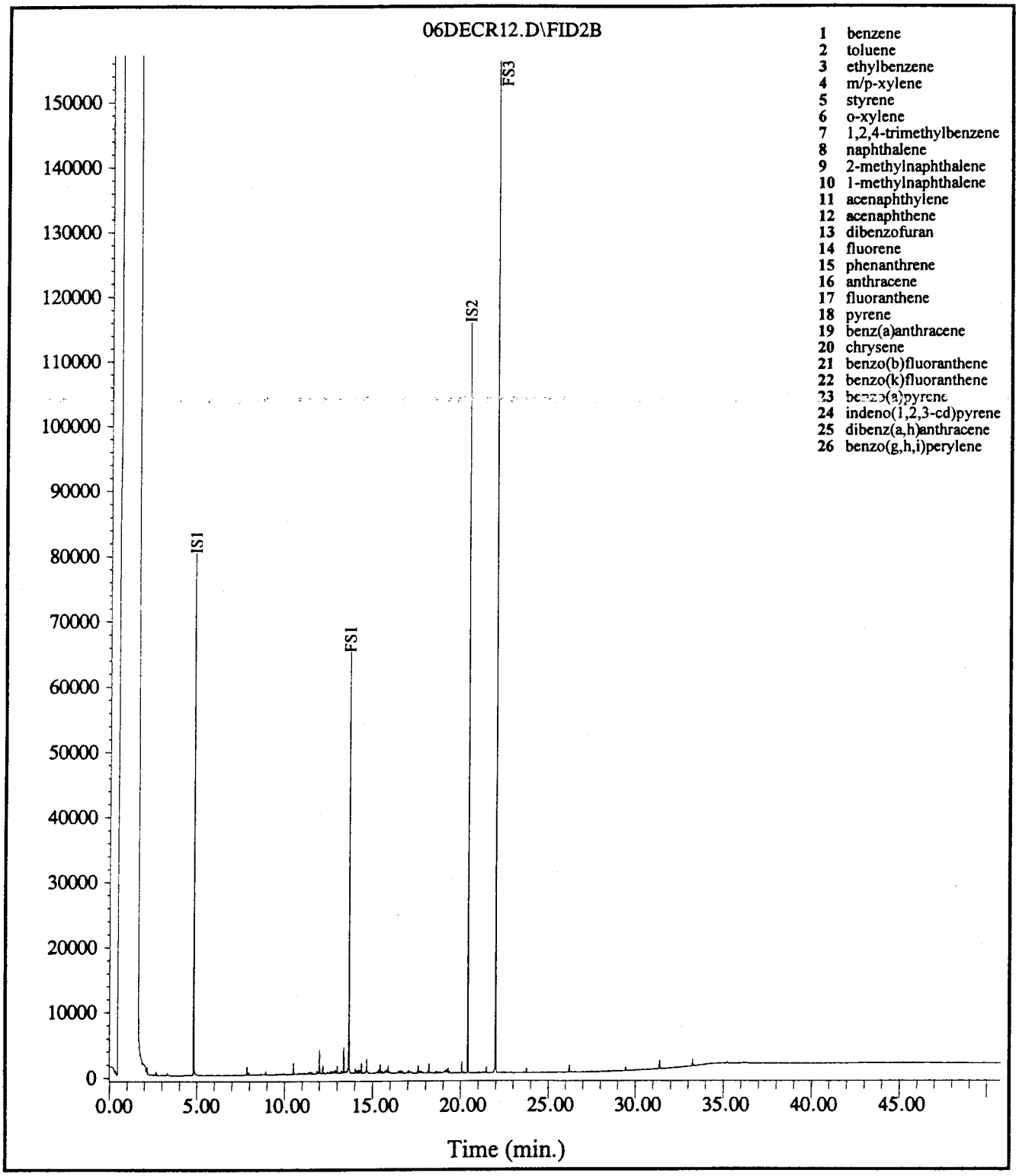


IS1 - 2,4-difluorotoluene
IS2 - o-terphenyl

Field ID:	**Pipe #1**
Laboratory ID:	IG011114-01
Method:	MET4007D

META

GC/FID Fingerprint



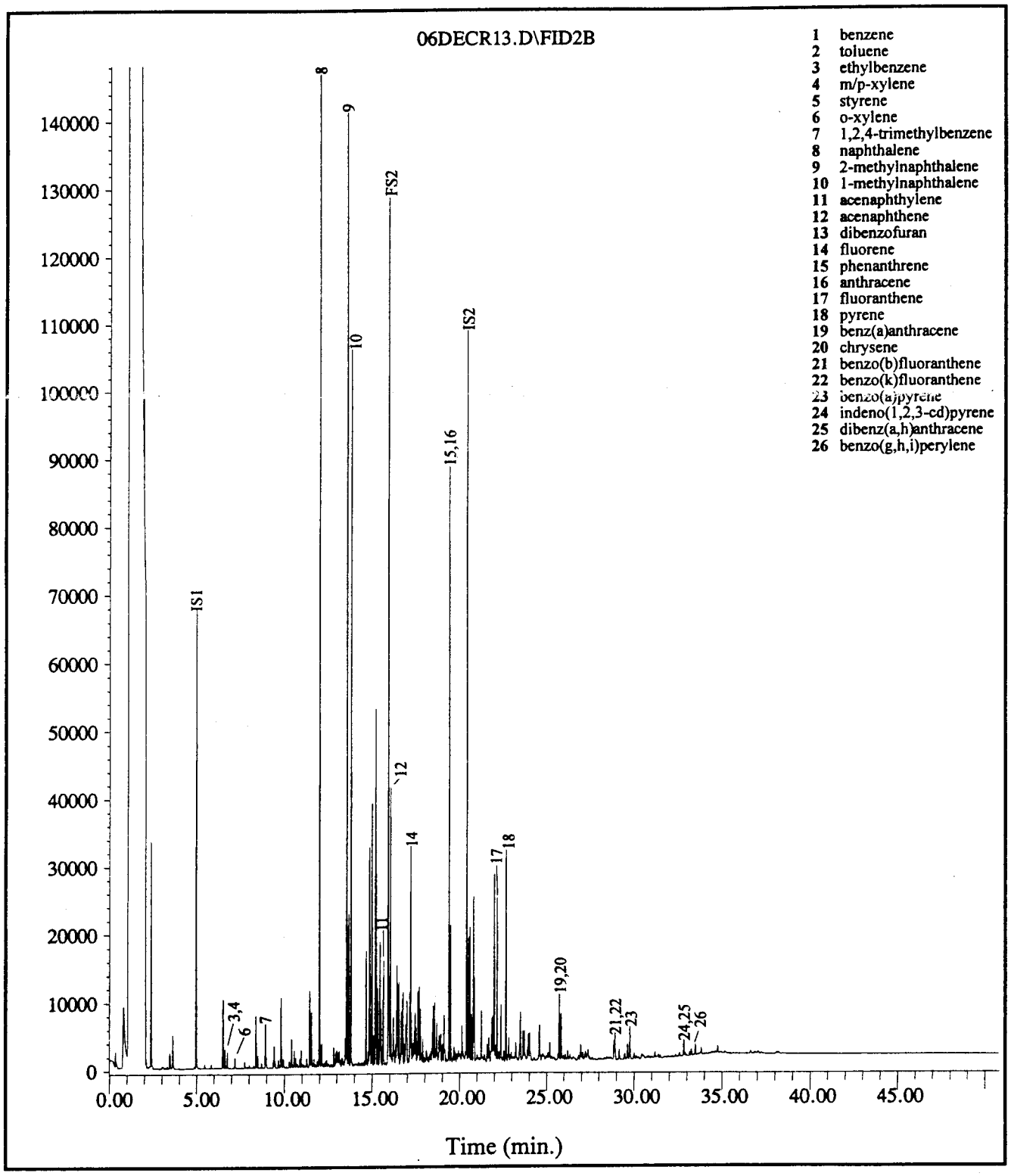
IS1 - 2,4-difluorotoluene
IS2 - o-terphenyl
SS1 - fluorobenzene
SS2 - 2-fluorobiphenyl
SS3 - 5α-androstane
FS1 – 2,5-dibromotoluene
FS2 – 2-bromonaphthalene
FS3 – 1-chlorooctane

Field ID:	**Pipe #1**
Laboratory ID:	IG011114-01PF
Method:	MET4007D

lg011114.ppt

META

GC/FID Fingerprint



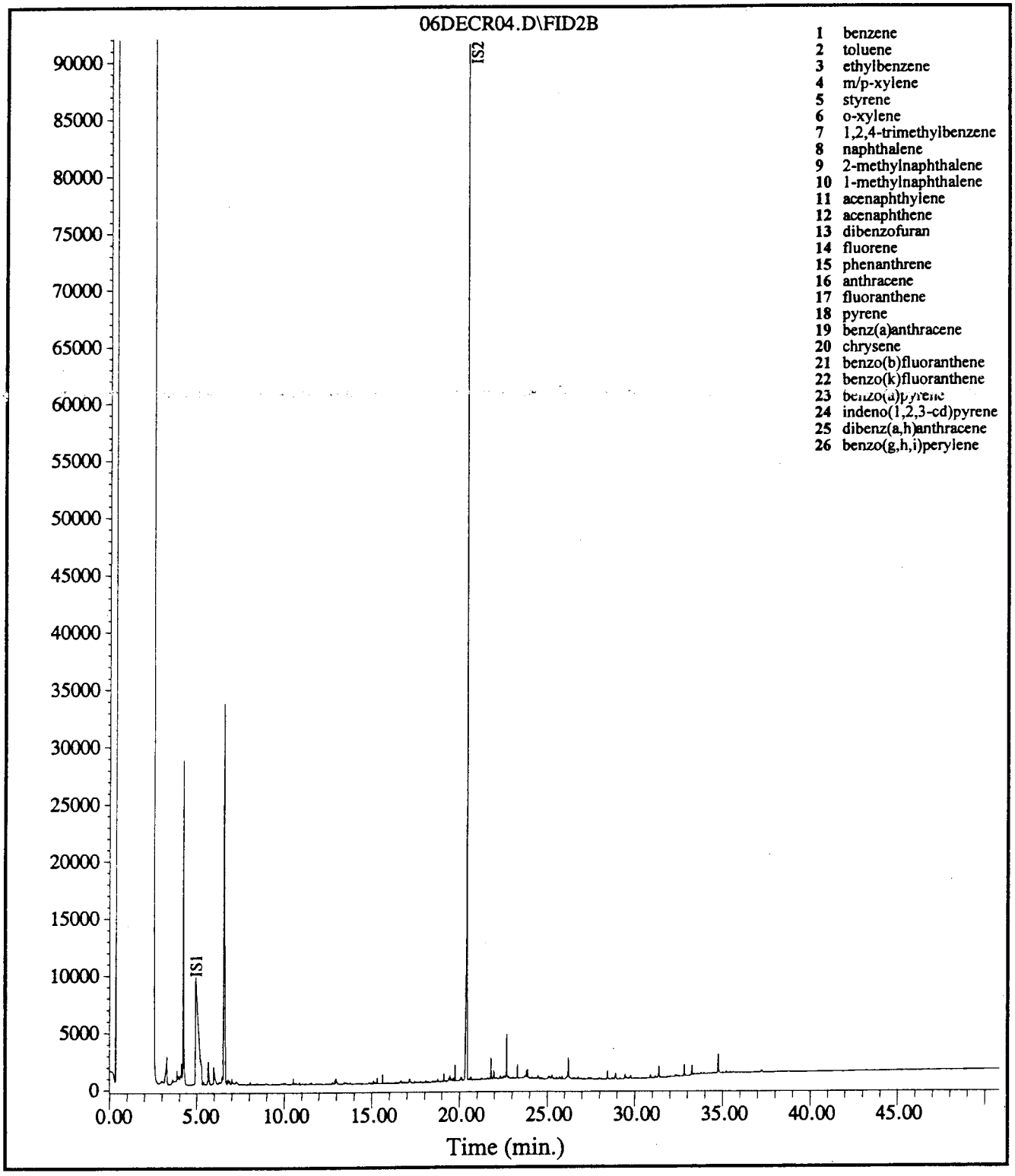
IS1 - 2,4-difluorotoluene
IS2 - o-terphenyl
SS1 - fluorobenzene
SS2 - 2-fluorobiphenyl
SS3 - 5α-androstane
FS1 – 2,5-dibromotoluene
FS2 – 2-bromonaphthalene
FS3 – 1-chlorooctane

Field ID:	**Pipe #1**
Laboratory ID:	IG011114-01DF
Method:	MET4007D

Ig011114.ppt

META

GC/FID Fingerprint

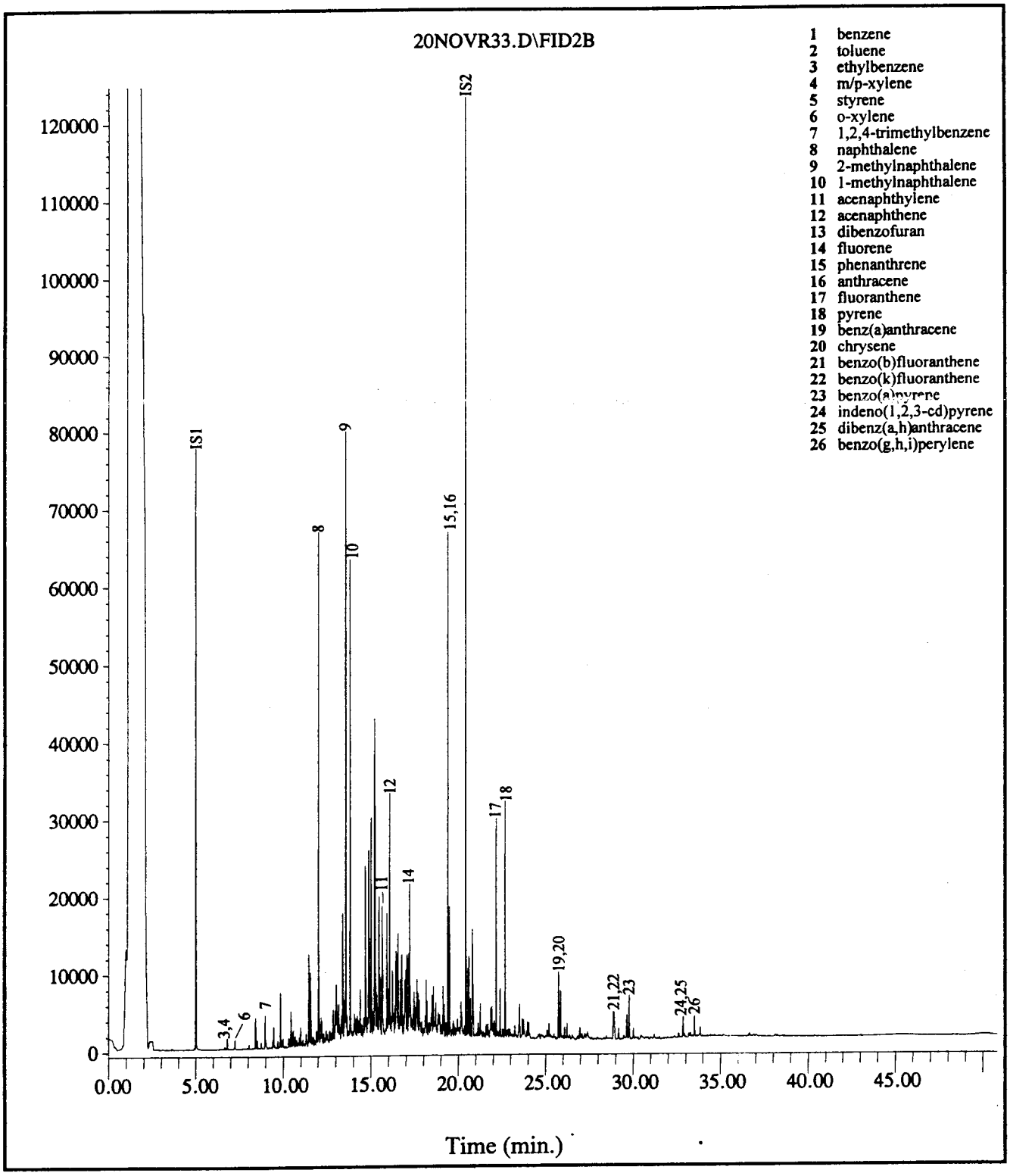


IS1 - 2,4-difluorotoluene
IS2 - o-terphenyl
SS1 - fluorobenzene
SS2 - 2-fluorobiphenyl
SS3 - 5α-androstane

Field ID:	**Pipe #1**
Laboratory ID:	IG011114-01MF
Method:	MET4007D

META

GC/FID Fingerprint



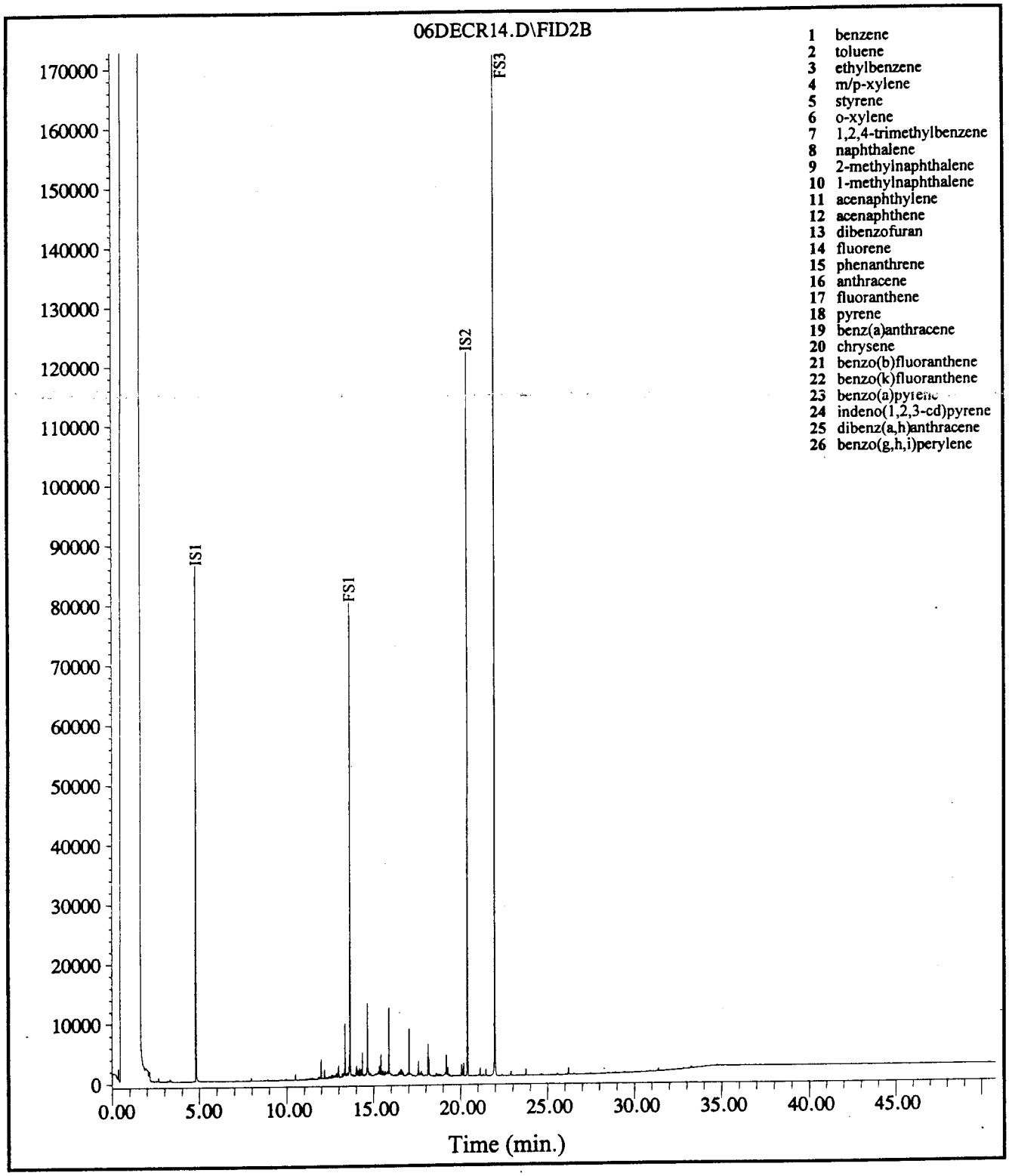
IS1 - 2,4-difluorotoluene
IS2 - o-terphenyl
SS1 - fluorobenzene
SS2 - 2-fluorobiphenyl
SS3 - 5α-androstane

Field ID:	**Pipe #2**
Laboratory ID:	IG011114-02
Method:	MET4007D

lg011114.ppt

META

GC/FID Fingerprint



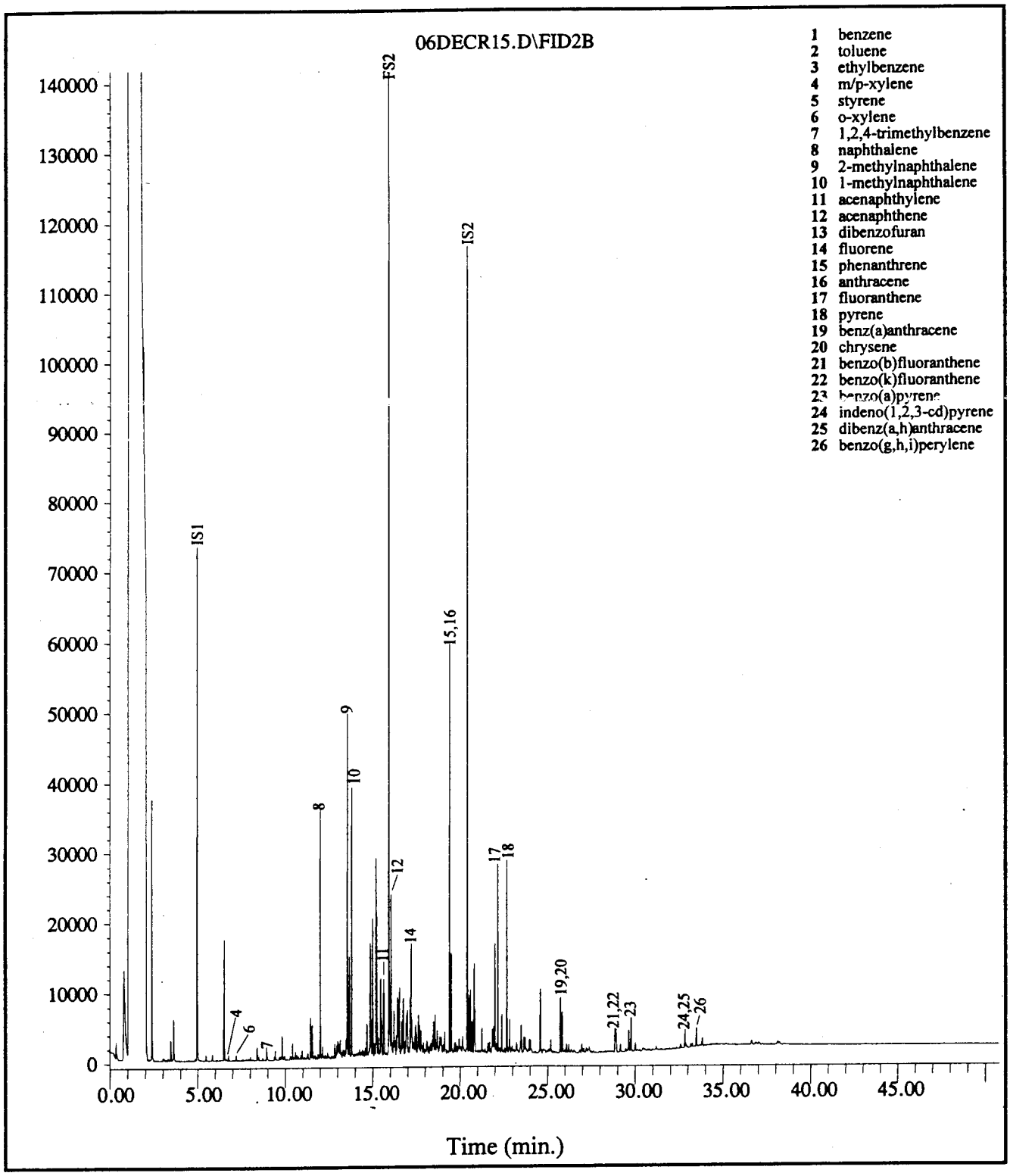
IS1 - 2,4-difluorotoluene
IS2 - o-terphenyl
SS1 - fluorobenzene
SS2 - 2-fluorobiphenyl
SS3 - 5α-androstane
FS1 – 2,5-dibromotoluene
FS2 – 2-bromonaphthalene
FS3 – 1-chlorooctane

Field ID:	**Pipe #2**
Laboratory ID:	IG011114-02PF
Method:	MET4007D

lg011114.ppt

META

GC/FID Fingerprint



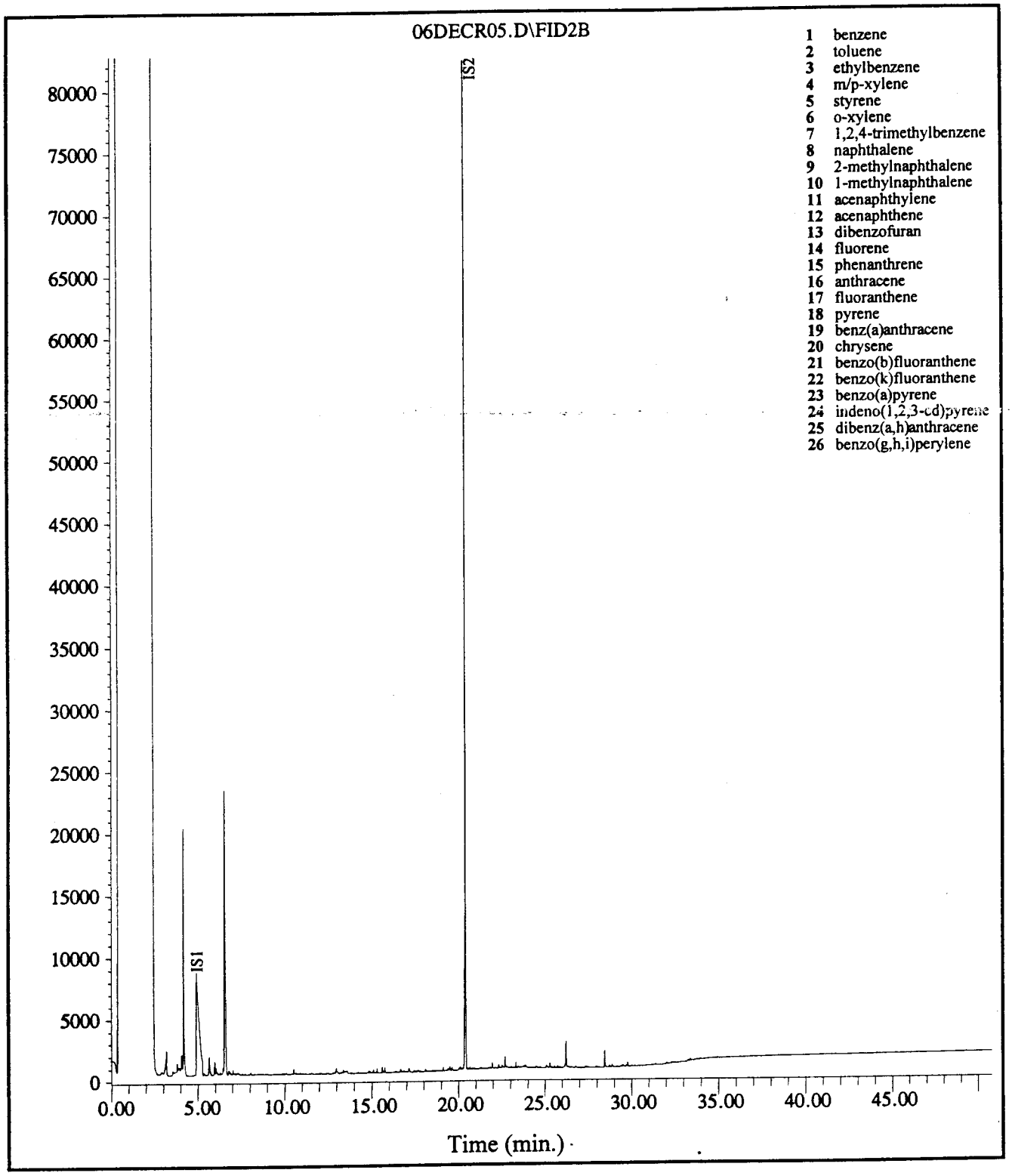
IS1 - 2,4-difluorotoluene
IS2 - o-terphenyl
SS1 - fluorobenzene
SS2 - 2-fluorobiphenyl
SS3 - 5α-androstane
FS1 – 2,5-dibromotoluene
FS2 – 2-bromonaphthalene
FS3 – 1-chlorooctane

Field ID:	**Pipe #2**
Laboratory ID:	IG011114-02DF
Method:	MET4007D

lg011114.ppt

META

GC/FID Fingerprint



IS1 - 2,4-difluorotoluene
IS2 - o-terphenyl
SS1 - fluorobenzene
SS2 - 2-fluorobiphenyl
SS3 - 5α-androstane

Field ID:	**Pipe #2**
Laboratory ID:	IG011114-02MF
Method:	MET4007D

META

Appendix C

Chemical Concentrations

Ananlytical Results for Total Petroleum Hydrocarbons

META Environmental, Inc.

Client:	GTI	Instrument:	GC3-Rear
Project:	Ashland	Analysis Date:	12/6/01
Calibration Material:	Alkane	Alkane Range:	C6-C40

Sample Data		Sample Size	Final Volume	Percent	Dilution	SS1 %Rec	SS2 %Rec	SS3 %Rec	FS1 %Rec	FS2 %Rec	FS3 %Rec			
Field ID	Lab ID	(mL or g)	(mL)	Solid	Factor	(FB)	(2FBP)	(5AA)	2,5_DBT	2-BN	1-CO	TPH	Units	Comments
Fractionation Blank	IG011206-FBPF	0.010	0.5	100%	1	NA	NA	NA	38%	0%	54%	31,900	mg/kg	
	IG011206-FBDF					NA	NA	NA	44%	80%	0%	47,000	mg/kg	
	IG011206-FBMF					NA	NA	NA	0%	0%	0%	35,400	mg/kg	
Method Blank	IG011120-MB	0.010	0.5	100%	1	NA	NA	NA	NA	NA	NA	21,500	mg/kg	
	IG011120-MBPF					NA	NA	NA	67%	0%	86%	43,600	mg/kg	
	IG011120-MBDF					NA	NA	NA	27%	97%	0%	54,600	mg/kg	
	IG011120-MBMF					NA	NA	NA	0%	0%	0%	37,200	mg/kg	
Pipe #1	IG011114-01	0.012	0.5	100%	1	NA	NA	NA	NA	NA	NA	295,000	mg/kg	
	IG011114-01PF					NA	NA	NA	66%	0%	81%	50,200	mg/kg	
	IG011114-01DF					NA	NA	NA	24%	87%	0%	221,000	mg/kg	
	IG011114-01MF					NA	NA	NA	0%	0%	0%	23,700	mg/kg	
Pipe #2	IG011114-02	0.013	0.5	100%	1	NA	NA	NA	NA	NA	NA	194,000	mg/kg	
	IG011114-02PF					NA	NA	NA	80%	0%	93%	63,700	mg/kg	
	IG011114-02DF					NA	NA	NA	14%	95%	0%	152,000	mg/kg	
	IG011114-02MF					NA	NA	NA	0%	0%	0%	21,500	mg/kg	

META

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

Field ID: **PIPE#1**

Client:	GTI
Project:	Ashland
Lab ID:	IG011114-01
File ID:	21NOV07.D
Date Sampled:	11/12/01
Date Received:	11/14/01
Date Prepared:	11/20/01
Date Cleanup:	
Date Analyzed:	11/21/01
Instrument:	GC-2/MS
Operator:	kty

Preparation Method:	EPA 3580	
Cleanup Method(s):		
Analysis Method:	GC/MS (EPA 8260/8270 Mod.)	
Matrix:	NAPL	
Preservation:	None	
Decanted:	No	
Sample Size:	0.0121	g
%Solid:	100%	
Extract Volume:	2	mL
Prep DF:	1	
Analysis DF:	1	
Injection Volume:	0.001	mL
Batch QC:	IG011120-MB	

Analyte:	Concentration mg/kg	Q	RL mg/kg	DL mg/kg	Comments
PAH COMPOUNDS:					
Benzene		U	16.5	8.26	
Toluene	27.6		16.5	8.26	
Ethylbenzene	529		16.5	8.26	
m/p-Xylenes	371		16.5	8.26	
Styrene		U	16.5	8.26	
o-Xylene	183		16.5	8.26	
1,2,4-Trimethylbenzene	948		16.5	8.26	
Naphthalene	11,800	B	16.5	8.26	
2-Methylnaphthalene	12,900		16.5	8.26	
1-Methylnaphthalene	7,650	B	16.5	8.26	
Acenaphthylene	1,130		16.5	8.26	
Acenaphthene	3,100		16.5	8.26	
Dibenzofuran	1,330		16.5	8.26	
Fluorene	2,440		16.5	8.26	
Phenanthrene	6,880		16.5	8.26	
Anthracene	1,900		16.5	8.26	
Fluoranthene	1,960		16.5	8.26	
Pyrene	2,370		16.5	8.26	
Benz[a]anthracene	1,050		16.5	8.26	
Chrysene	718		16.5	8.26	
Benzo[b]fluoranthene	357		16.5	8.26	
Benzo[k]fluoranthene	454		16.5	8.26	
Benzo[a]pyrene	692		16.5	8.26	
Indeno[1,2,3-cd]pyrene	226		16.5	8.26	
Dibenz[a,h]anthracene	64.3		16.5	8.26	
Benzo[g,h,i]perylene	228		16.5	8.26	
ALKYLATED PAHs:					
C0-Benzene		U	16.5	8.26	
C1-Benzene	31.3		16.5	8.26	
C2-Benzene	1,360		16.5	8.26	
C3-Benzene	4,310		16.5	8.26	
C4-Benzene	3,350		16.5	8.26	
C5-Benzene	147		16.5	8.26	
C0-Naphthalene	11,800	B	16.5	8.26	
C1-Naphthalene	11,100	B	16.5	8.26	
C2-Naphthalene	7,670		16.5	8.26	
C3-Naphthalene	2,440		16.5	8.26	
C4-Naphthalene	488		16.5	8.26	
C0-Fluorene	2,440		16.5	8.26	
C1-Fluorene	2,490		16.5	8.26	
C2-Fluorene	784		16.5	8.26	
C3-Fluorene	206		16.5	8.26	
C0-Phenanthrene/Anthracene	9,140		16.5	8.26	
C1-Phenanthrene/Anthracene	5,310		16.5	8.26	
C2-Phenanthrene/Anthracene	1,600		16.5	8.26	
C3-Phenanthrene/Anthracene	294		16.5	8.26	
C4-Phenanthrene/Anthracene	61.3		16.5	8.26	

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

		Preparation Method:	EPA 3580
Field ID:	**PIPE#1**	Cleanup Method(s):	
Client:	GTI	Analysis Method:	GC/MS (EPA 8260/8270 Mod.)
Project:	Ashland	Matrix:	NAPL
		Preservation:	None
Lab ID:	IG011114-01	Decanted:	No
File ID:	21NOV07.D		
		Sample Size:	0.0121 g
Date Sampled:	11/12/01	%Solid:	100%
Date Received:	11/14/01	Extract Volume:	2 mL
Date Prepared:	11/20/01	Prep DF:	1
Date Cleanup:		Analysis DF:	1
Date Analyzed:	11/21/01	Injection Volume:	0.001 mL
Instrument:	GC-2/MS		
Operator:	kty	Batch QC:	IG011120-MB

Analyte:	Concentration mg/kg	Q	RL mg/kg	DL mg/kg	Comments
C0-Dibenzothiophene	1,310		16.5	8.26	
C1-Dibenzothiophene	1,160		16.5	8.26	
C2-Dibenzothiophene	402		16.5	8.26	
C3-Dibenzothiophene	109		16.5	8.26	
C0-Fluoranthene/Pyrene	5,480		16.5	8.26	
C1-Fluoranthene/Pyrene	2,260		16.5	8.26	
C2-Fluoranthene/Pyrene	630		16.5	8.26	
C3-Fluoranthene/Pyrene	125		16.5	8.26	
C0-Benz(a)anthracene/Chrysene	1,920		16.5	8.26	
C1-Benz(a)anthracene/Chrysene	782		16.5	8.26	
C2-Benz(a)anthracene/Chrysene	216		16.5	8.26	
C3-Benz(a)anthracene/Chrysene	90.1		16.5	8.26	
C4-Benz(a)anthracene/Chrysene	42.2		16.5	8.26	

Surrogates	%R	Min	Max
Fluorobenzene	Not Spiked	50%	150%
2-Fluorobiphenyl	Not Spiked	50%	120%
5a-Androstane	Not Spiked	50%	120%

Qualifiers:

B	Analyte detected in the blank
D	Analyte reported from a diluted extract
U	Undetected above the detection limit
J	Estimated value detected between the reporting and detection limits
E	Estimated value detected above calibration range
RL	Reporting limit is the sample equivalent of the lowest linear calibration concentration
EDL	Estimated detection limit is 50% of the RL

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

Field ID: **PIPE#2**

Client:	GTI
Project:	Ashland
Lab ID:	IG011114-02
File ID:	21NOV06.D
Date Sampled:	11/12/01
Date Received:	11/14/01
Date Prepared:	11/20/01
Date Cleanup:	
Date Analyzed:	11/21/01
Instrument:	GC-2/MS
Operator:	kty

Preparation Method:	EPA 3580	
Cleanup Method(s):		
Analysis Method:	GC/MS (EPA 8260/8270 Mod.)	
Matrix:	NAPL	
Preservation:	None	
Decanted:	No	
Sample Size:	0.0127	g
%Solid:	100%	
Extract Volume:	2	mL
Prep DF:	1	
Analysis DF:	1	
Injection Volume:	0.001	mL
Batch QC:	IG011120-MB	

Analyte:	Concentration mg/kg	Q	RL mg/kg	DL mg/kg	Comments
PAH COMPOUNDS:					
Benzene		U	15.7	7.87	
Toluene	17.3		15.7	7.87	
Ethylbenzene	17.4		15.7	7.87	
m/p-Xylenes	66.3		15.7	7.87	
Styrene		U	15.7	7.87	
o-Xylene	64.7		15.7	7.87	
1,2,4-Trimethylbenzene	245		15.7	7.87	
Naphthalene	3,360	B	15.7	7.87	
2-Methylnaphthalene	4,820		15.7	7.87	
1-Methylnaphthalene	3,250	B	15.7	7.87	
Acenaphthylene	968		15.7	7.87	
Acenaphthene	1,780		15.7	7.87	
Dibenzofuran	773		15.7	7.87	
Fluorene	1,230		15.7	7.87	
Phenanthrene	4,630		15.7	7.87	
Anthracene	1,220		15.7	7.87	
Fluoranthene	2,030		15.7	7.87	
Pyrene	2,040		15.7	7.87	
Benz[a]anthracene	808		15.7	7.87	
Chrysene	620		15.7	7.87	
Benzo[b]fluoranthene	418		15.7	7.87	
Benzo[k]fluoranthene	415		15.7	7.87	
Benzo[a]pyrene	703		15.7	7.87	
Indeno[1,2,3-cd]pyrene	294		15.7	7.87	
Dibenz[a,h]anthracene	35.0		15.7	7.87	
Benzo[g,h,i]perylene	380		15.7	7.87	
ALKYLATED PAHs:					
C0-Benzene		U	15.7	7.87	
C1-Benzene	20.3		15.7	7.87	
C2-Benzene	209		15.7	7.87	
C3-Benzene	1,200		15.7	7.87	
C4-Benzene	2,030		15.7	7.87	
C5-Benzene	437		15.7	7.87	
C0-Naphthalene	3,360	B	15.7	7.87	
C1-Naphthalene	4,420	B	15.7	7.87	
C2-Naphthalene	4,420		15.7	7.87	
C3-Naphthalene	1,230		15.7	7.87	
C4-Naphthalene	555		15.7	7.87	
C0-Fluorene	1,230		15.7	7.87	
C1-Fluorene	1,530		15.7	7.87	
C2-Fluorene	755		15.7	7.87	
C3-Fluorene	236		15.7	7.87	
C0-Phenanthrene/Anthracene	5,990		15.7	7.87	
C1-Phenanthrene/Anthracene	2,580		15.7	7.87	
C2-Phenanthrene/Anthracene	881		15.7	7.87	
C3-Phenanthrene/Anthracene	200		15.7	7.87	
C4-Phenanthrene/Anthracene	72.5		15.7	7.87	

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

		Preparation Method:	EPA 3580
Field ID:	**PIPE#2**	Cleanup Method(s):	
Client:	GTI	Analysis Method:	GC/MS (EPA 8260/8270 Mod.)
Project:	Ashland	Matrix:	NAPL
		Preservation:	None
Lab ID:	IG011114-02	Decanted:	No
File ID:	21NOV06.D		
		Sample Size:	0.0127 g
Date Sampled:	11/12/01	%Solid:	100%
Date Received:	11/14/01	Extract Volume:	2 mL
Date Prepared:	11/20/01	Prep DF:	1
Date Cleanup:		Analysis DF:	1
Date Analyzed:	11/21/01	Injection Volume:	0.001 mL
Instrument:	GC-2/MS		
Operator:	kty	Batch QC:	IG011120-MB

Analyte:	Concentration mg/kg	Q	RL mg/kg	DL mg/kg	Comments
C0-Dibenzothiophene	482		15.7	7.87	
C1-Dibenzothiophene	478		15.7	7.87	
C2-Dibenzothiophene	329		15.7	7.87	
C3-Dibenzothiophene	143		15.7	7.87	
C0-Fluoranthene/Pyrene	4,860		15.7	7.87	
C1-Fluoranthene/Pyrene	1,220		15.7	7.87	
C2-Fluoranthene/Pyrene	333		15.7	7.87	
C3-Fluoranthene/Pyrene	140		15.7	7.87	
C0-Benz(a)anthracene/Chrysene	1,530		15.7	7.87	
C1-Benz(a)anthracene/Chrysene	418		15.7	7.87	
C2-Benz(a)anthracene/Chrysene	125		15.7	7.87	
C3-Benz(a)anthracene/Chrysene	83.2		15.7	7.87	
C4-Benz(a)anthracene/Chrysene	42.1		15.7	7.87	

Surrogates	%R	Min	Max
Fluorobenzene	Not Spiked	50%	150%
2-Fluorobiphenyl	Not Spiked	50%	120%
5a-Androstane	Not Spiked	50%	120%

Qualifiers:

B	Analyte detected in the blank
D	Analyte reported from a diluted extract
U	Undetected above the detection limit
J	Estimated value detected between the reporting and detection limits
E	Estimated value detected above calibration range
RL	Reporting limit is the sample equivalent of the lowest linear calibration concentration
EDL	Estimated detection limit is 50% of the RL

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

Field ID: **Method Blank**

Client:	GTI
Project:	Ashland
Lab ID:	IG011120-MB
File ID:	21NOV03.D
Date Sampled:	11/12/01
Date Received:	11/14/01
Date Prepared:	11/20/01
Date Cleanup:	
Date Analyzed:	11/21/01
Instrument:	GC-2/MS
Operator:	kty

Preparation Method:	EPA 3580
Cleanup Method(s):	
Analysis Method:	GC/MS (EPA 8260/8270 Mod.)
Matrix:	NAPL
Preservation:	None
Decanted:	No
Sample Size:	0.01 g
%Solid:	100%
Extract Volume:	2 mL
Prep DF:	1
Analysis DF:	1
Injection Volume:	0.001 mL
Batch QC:	IG011120-MB

Analyte:	Concentration mg/kg	Q	RL mg/kg	DL mg/kg	Comments
PAH COMPOUNDS:					
Benzene		U	20.0	10.0	
Toluene		U	20.0	10.0	
Ethylbenzene		U	20.0	10.0	
m/p-Xylenes		U	20.0	10.0	
Styrene		U	20.0	10.0	
o-Xylene		U	20.0	10.0	
1,2,4-Trimethylbenzene		U	20.0	10.0	
Naphthalene	21.2		20.0	10.0	
2-Methylnaphthalene		U	20.0	10.0	
1-Methylnaphthalene	10.0	J	20.0	10.0	
Acenaphthylene		U	20.0	10.0	
Acenaphthene		U	20.0	10.0	
Dibenzofuran		U	20.0	10.0	
Fluorene		U	20.0	10.0	
Phenanthrene		U	20.0	10.0	
Anthracene		U	20.0	10.0	
Fluoranthene		U	20.0	10.0	
Pyrene		U	20.0	10.0	
Benz[a]anthracene		U	20.0	10.0	
Chrysene		U	20.0	10.0	
Benzo[b]fluoranthene		U	20.0	10.0	
Benzo[k]fluoranthene		U	20.0	10.0	
Benzo[a]pyrene		U	20.0	10.0	
Indeno[1,2,3-cd]pyrene		U	20.0	10.0	
Dibenz[a,h]anthracene		U	20.0	10.0	
Benzo[g,h,i]perylene		U	20.0	10.0	
ALKYLATED PAHs:					
C0-Benzene		U	20.0	10.0	
C1-Benzene		U	20.0	10.0	
C2-Benzene		U	20.0	10.0	
C3-Benzene		U	20.0	10.0	
C4-Benzene		U	20.0	10.0	
C5-Benzene		U	20.0	10.0	
C0-Naphthalene	21.2		20.0	10.0	
C1-Naphthalene	12.4	J	20.0	10.0	
C2-Naphthalene		U	20.0	10.0	
C3-Naphthalene		U	20.0	10.0	
C4-Naphthalene		U	20.0	10.0	
C0-Fluorene		U	20.0	10.0	
C1-Fluorene		U	20.0	10.0	
C2-Fluorene		U	20.0	10.0	
C3-Fluorene		U	20.0	10.0	
C0-Phenanthrene/Anthracene		U	20.0	10.0	
C1-Phenanthrene/Anthracene		U	20.0	10.0	
C2-Phenanthrene/Anthracene		U	20.0	10.0	
C3-Phenanthrene/Anthracene		U	20.0	10.0	
C4-Phenanthrene/Anthracene		U	20.0	10.0	

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

Field ID: **Method Blank**

Client:	GTI
Project:	Ashland
Lab ID:	IG011120-MB
File ID:	21NOV03.D
Date Sampled:	11/12/01
Date Received:	11/14/01
Date Prepared:	11/20/01
Date Cleanup:	
Date Analyzed:	11/21/01
Instrument:	GC-2/MS
Operator:	kty

Preparation Method:	EPA 3580	
Cleanup Method(s):		
Analysis Method:	GC/MS (EPA 8260/8270 Mod.)	
Matrix:	NAPL	
Preservation:	None	
Decanted:	No	
Sample Size:	0.01	g
%Solid:	100%	
Extract Volume:	2	mL
Prep DF:	1	
Analysis DF:	1	
Injection Volume:	0.001	mL
Batch QC:	IG011120-MB	

Analyte:	Concentration mg/kg	Q	RL mg/kg	DL mg/kg	Comments
C0-Dibenzothiophene		U	20.0	10.0	
C1-Dibenzothiophene		U	20.0	10.0	
C2-Dibenzothiophene		U	20.0	10.0	
C3-Dibenzothiophene		U	20.0	10.0	
C0-Fluoranthene/Pyrene		U	20.0	10.0	
C1-Fluoranthene/Pyrene		U	20.0	10.0	
C2-Fluoranthene/Pyrene		U	20.0	10.0	
C3-Fluoranthene/Pyrene		U	20.0	10.0	
C0-Benz(a)anthracene/Chrysene		U	20.0	10.0	
C1-Benz(a)anthracene/Chrysene		U	20.0	10.0	
C2-Benz(a)anthracene/Chrysene		U	20.0	10.0	
C3-Benz(a)anthracene/Chrysene		U	20.0	10.0	
C4-Benz(a)anthracene/Chrysene		U	20.0	10.0	

Surrogates	%R	Min	Max
Fluorobenzene	Not Spiked	50%	150%
2-Fluorobiphenyl	Not Spiked	50%	120%
5a-Androstane	Not Spiked	50%	120%

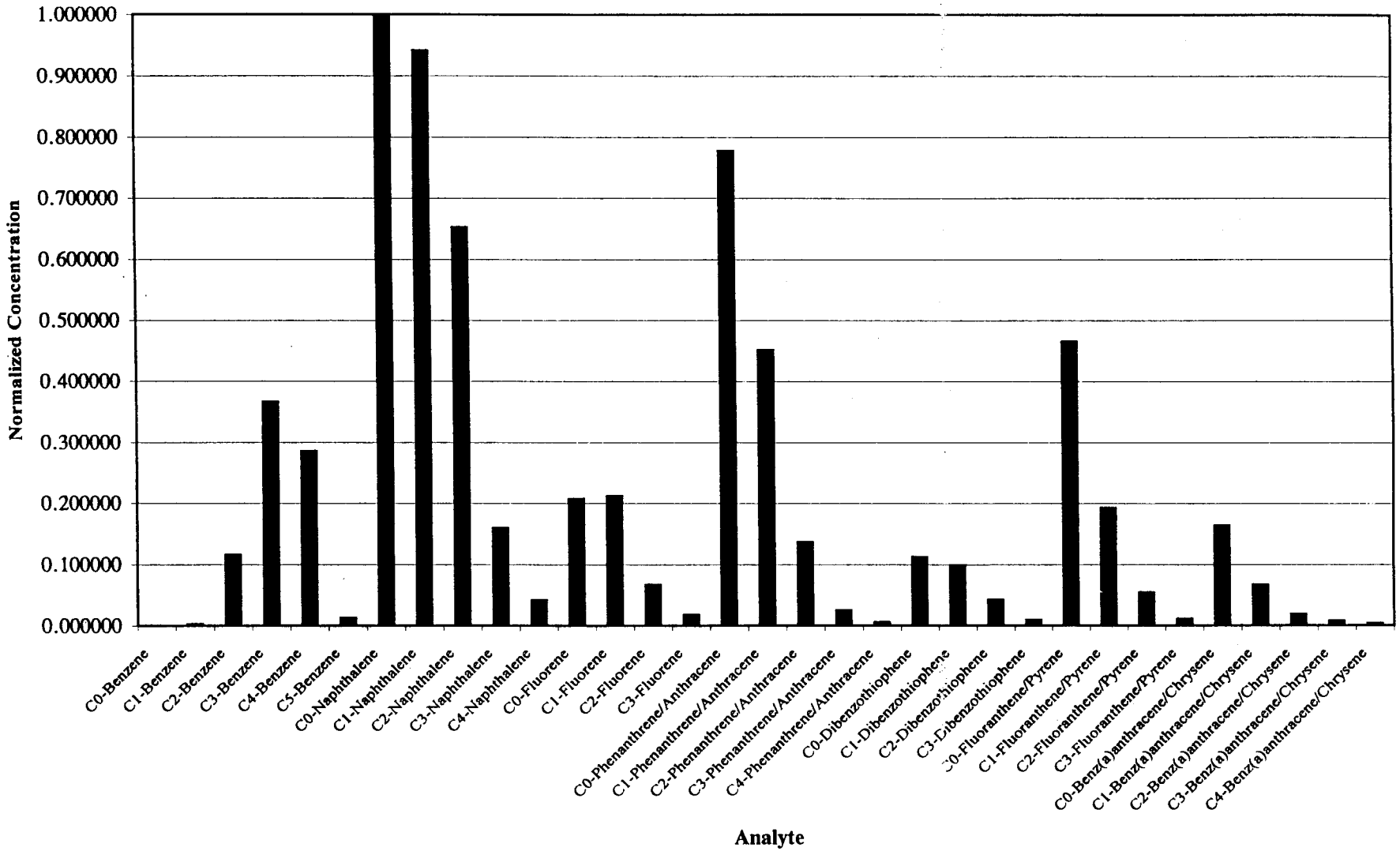
Qualifiers:

B	Analyte detected in the blank
D	Analyte reported from a diluted extract
U	Undetected above the detection limit
J	Estimated value detected between the reporting and detection limits
E	Estimated value detected above calibration range
RL	Reporting limit is the sample equivalent of the lowest linear calibration concentration
EDL	Estimated detection limit is 50% of the RL

Appendix D

Extended PAH Profiles - Bar Graphs

Pipe #1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0.200000
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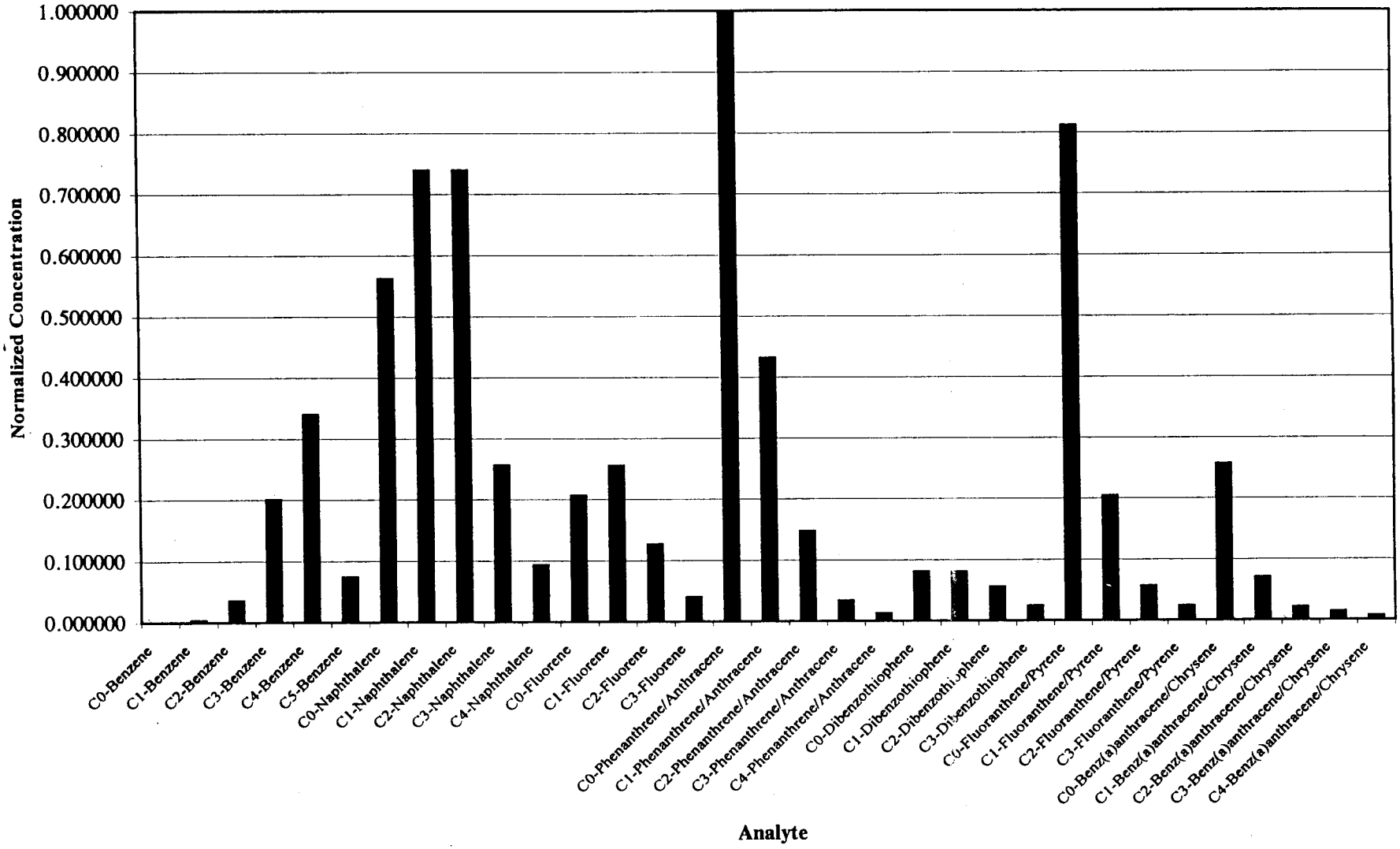
0.000000
C0-Benzene
C1-Benzene
C2-Benzene
C3-Benzene
C4-Benzene
C5-Benzene
C0-Naphthalene
C1-Naphthalene
C2-Naphthalene
C3-Naphthalene
C4-Naphthalene
C0-Fluorene
C1-Fluorene
C2-Fluorene
C3-Fluorene
C0-Phenanthrene/Anthracene
C1-Phenanthrene/Anthracene
C2-Phenanthrene/Anthracene
C3-Phenanthrene/Anthracene
C4-Phenanthrene/Anthracene
C0-Dibenzothiophene
C1-Dibenzothiophene
C2-Dibenzothiophene
C3-Dibenzothiophene
C0-Fluoranthene/Pyrene
C1-Fluoranthene/Pyrene
C2-Fluoranthene/Pyrene
C3-Fluoranthene/Pyrene
C0-Benz(a)anthracene/Chrysene
C1-Benz(a)anthracene/Chrysene
C2-Benz(a)anthracene/Chrysene
C3-Benz(a)anthracene/Chrysene
C4-Benz(a)anthracene/Chrysene
Analyte

META

Pipe #2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0.000000
Normalized Concentration
C0-Benzene
C1-Benzene
C2-Benzene
C3-Benzene
C4-Benzene
C5-Benzene
C0-Naphthalene
C1-Naphthalene
C2-Naphthalene
C3-Naphthalene
C4-Naphthalene
C0-Fluorene
C1-Fluorene
C2-Fluorene
C3-Fluorene
C0-Phenanthrene/Anthracene
C1-Phenanthrene/Anthracene
C2-Phenanthrene/Anthracene
C3-Phenanthrene/Anthracene
C4-Phenanthrene/Anthracene
C0-Dibenzothiophene
C1-Dibenzothiophene
C2-Dibenzothiophene
C3-Dibenzothiophene
C0-Fluoranthene/Pyrene
C1-Fluoranthene/Pyrene
C2-Fluoranthene/Pyrene
C3-Fluoranthene/Pyrene
C0-Benz(a)anthracene/Chrysene
C1-Benz(a)anthracene/Chrysene
C2-Benz(a)anthracene/Chrysene
C3-Benz(a)anthracene/Chrysene
C4-Benz(a)anthracene/Chrysene
Analyte

META

Appendix E

Extracted Ion Current Profiles (EICs)

Primary Ions for Target Compounds and Compound Groups

Target Compound or Group	Abbreviation	Ion
Alkylated cyclohexanes		83
Normal alkanes, pristane, phytane		85
Isoprenoid hydrocarbons, pristane, phytane		113
Olefins		115
Hopanes		191
Steranes		217
Benzene	B	78
Monoalkylbenzenes	C1B	91
Dialkylbenzenes	C2B	91
Trialkylbenzenes	C3B	105
Tetraalkylbenzenes	C4B	119
Pentaalkylbenzenes	C5B	133
Naphthalene	N	128
Monoalkylnaphthalenes	C1N	142
Dialkylnaphthalenes	C2N	156
Trialkylnaphthalenes	C3N	170
Tetraalkylnaphthalenes	C4N	184
Fluorene	F	166
Monoalkylfluorenes	C1F	180
Dialkylfluorenes	C2F	194
Trialkylfluorenes	C3F	208
Phenanthrene, anthracene	PA	178
Monoalkylphenanthrenes and anthracenes	C1PA	192
Dialkylphenanthrenes and anthracenes	C2PA	206
Trialkylphenanthrenes and anthracenes	C3PA	220
Tetraalkylphenanthrenes and anthracenes	C4PA	234
Dibenzothiophene	D	184
Monoalkyldibenzothiophenes	C1D	198
Dialkyldibenzothiophenes	C2D	212
Trialkyldibenzothiophenes	C3D	226
Fluoranthene, pyrene	FP	202
Monoalkylfluoranthenes and pyrenes	C1FP	216
Dialkylfluoranthenes and pyrenes	C2FP	230
Trialkyfluoranthenes and pyrenes	C3FP	244
Benz(a)anthracene, chrysene	BC	228
Monoalkylbenz(a)anthracenes and chrysenes	C1BC	242
Dialkylbenz(a)anthracenes and chrysenes	C2BC	256
Trialkylbenz(a)anthracenes and chrysenes	C3BC	270
Tetraalkylbenz(a)anthrancenes and chrysenes	C4BC	284

Field ID: PIPE#1
Lab ID: IG011114-01
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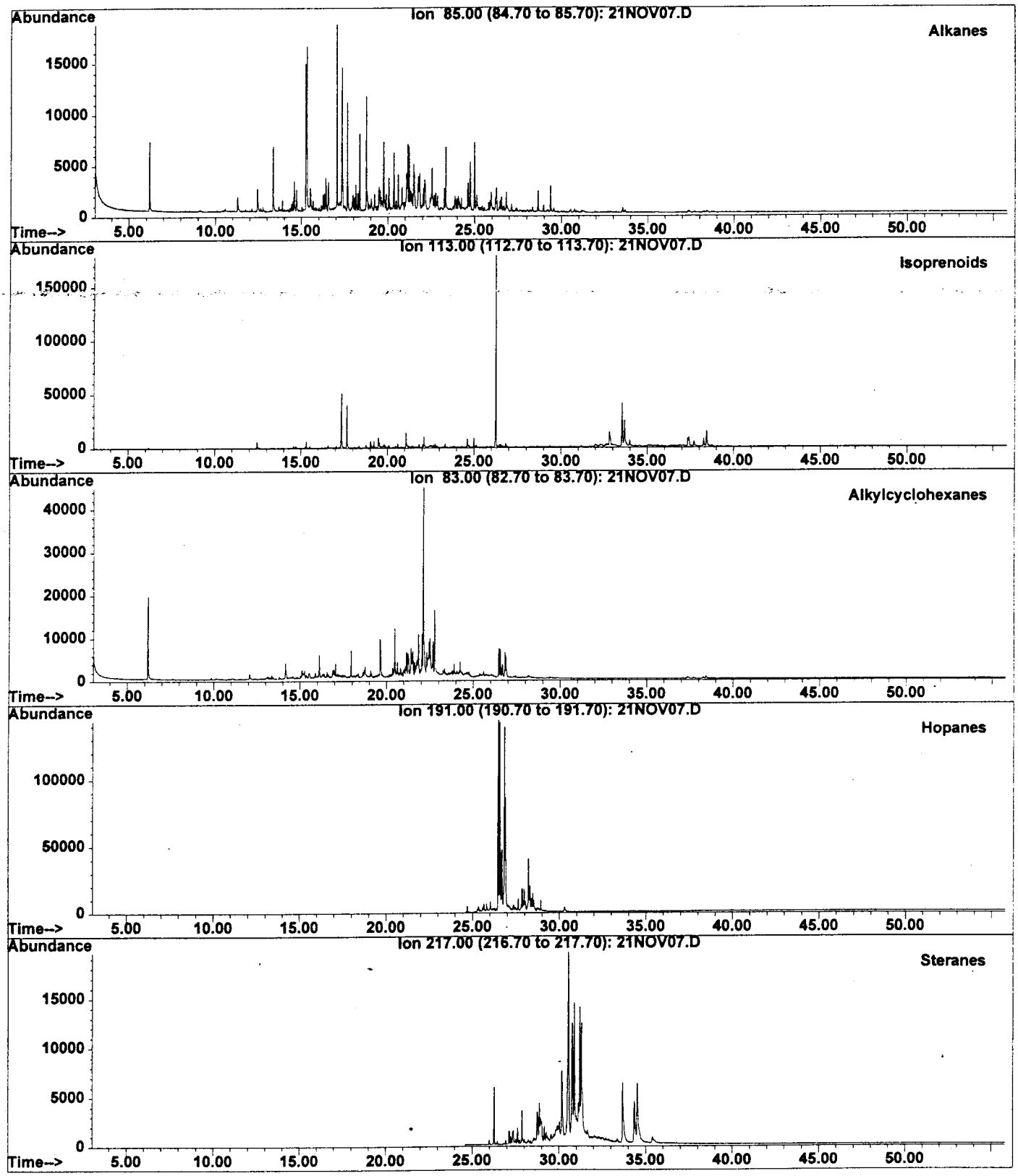
Acquired: 21 Nov 20101 9:11 pm using AcqMethod SIM4008M
Instrument: GC-2/MS Operator: kty



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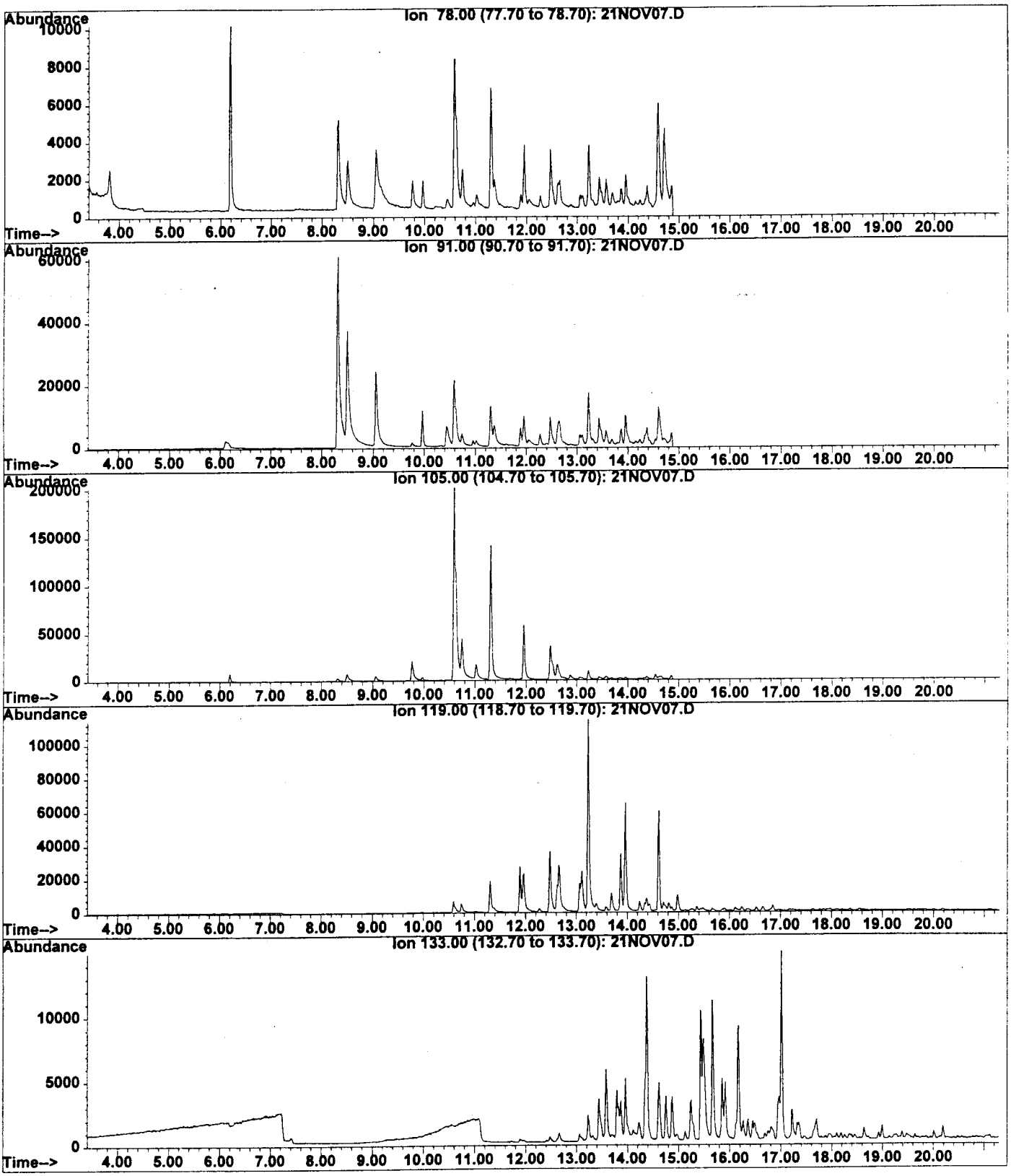
Instrument: GC-2/MS Operator: kty

Benzenes



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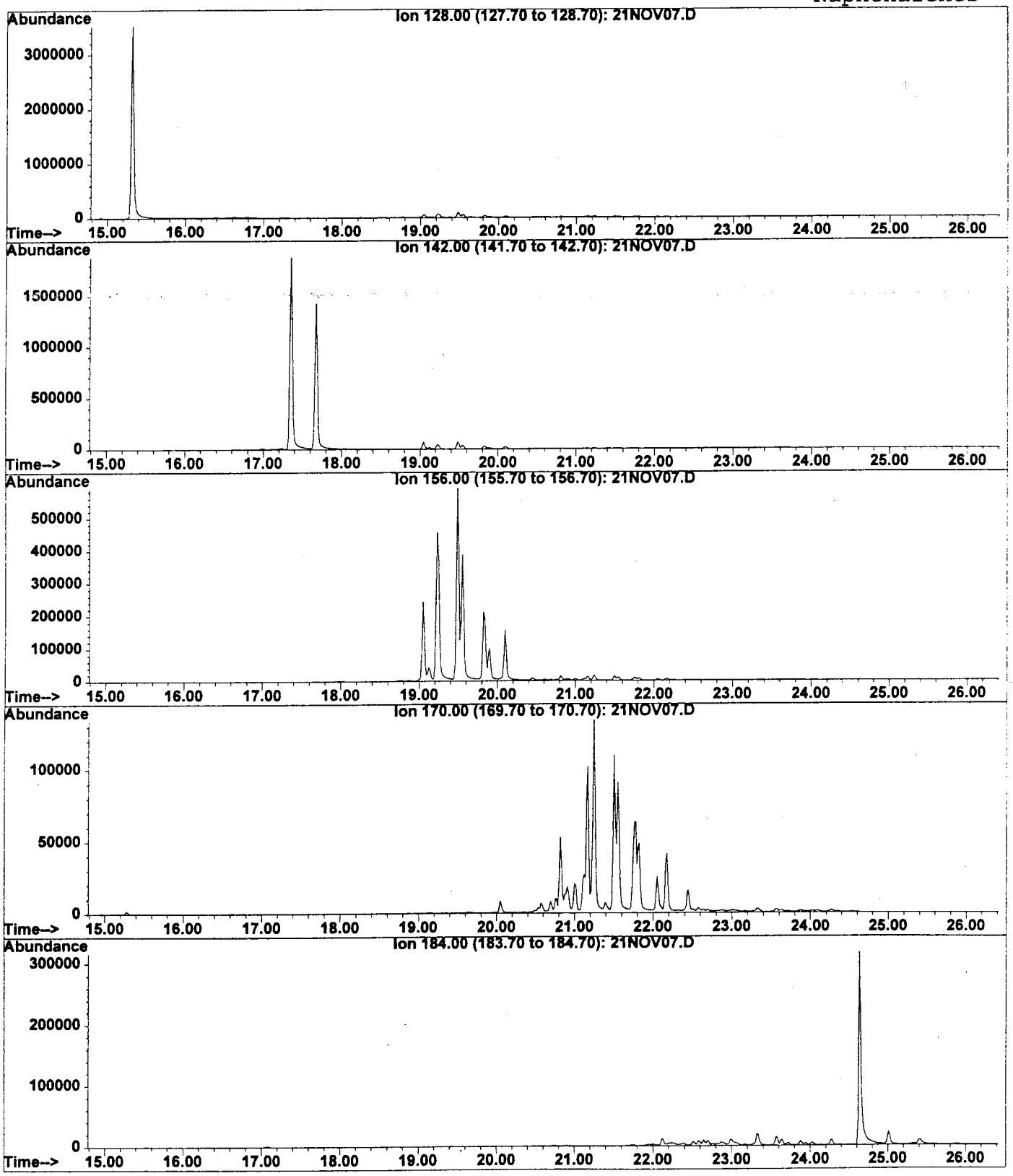
Instrument: GC-2/MS Operator: kty

Naphthalenes



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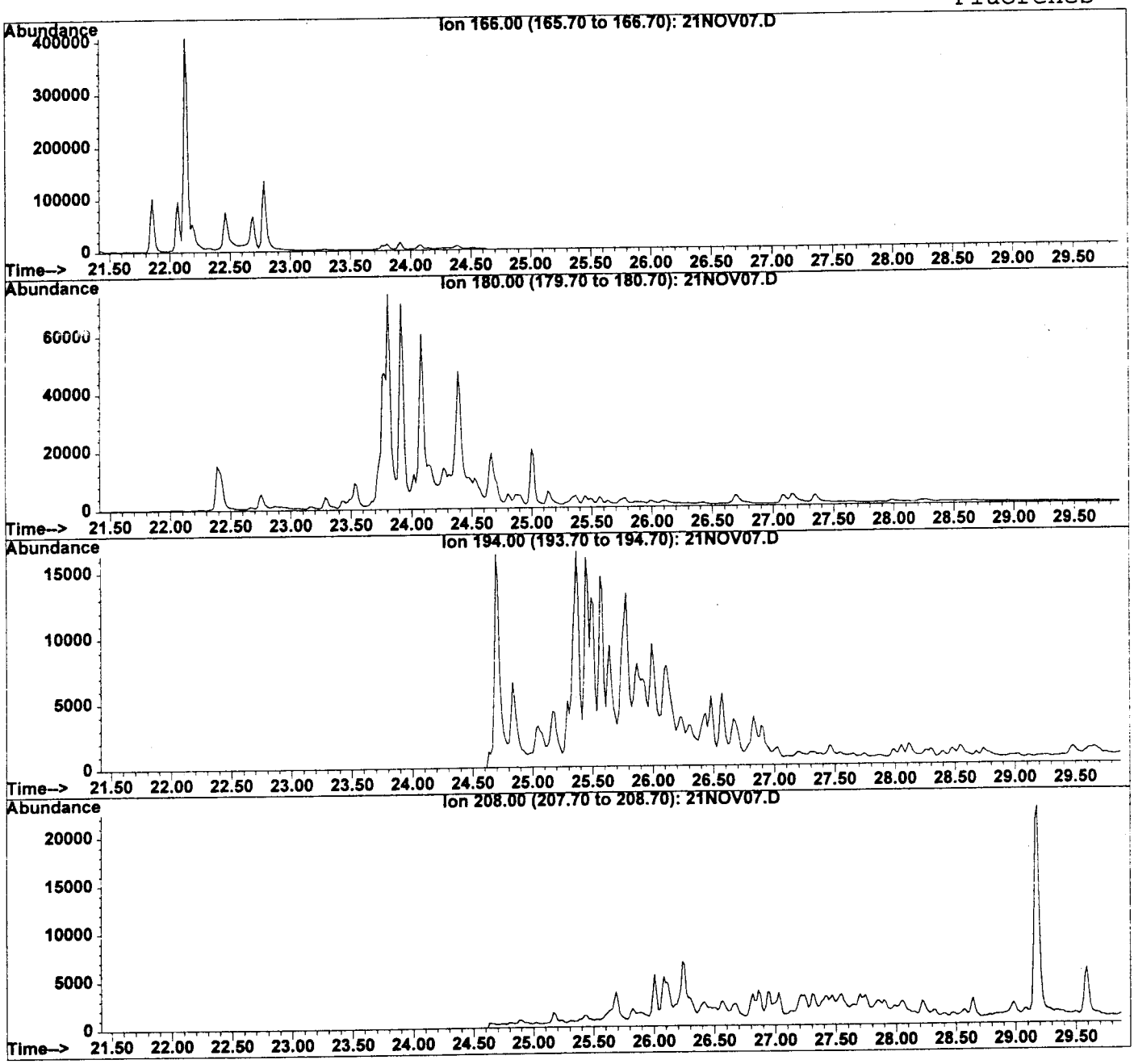
Fluorenes



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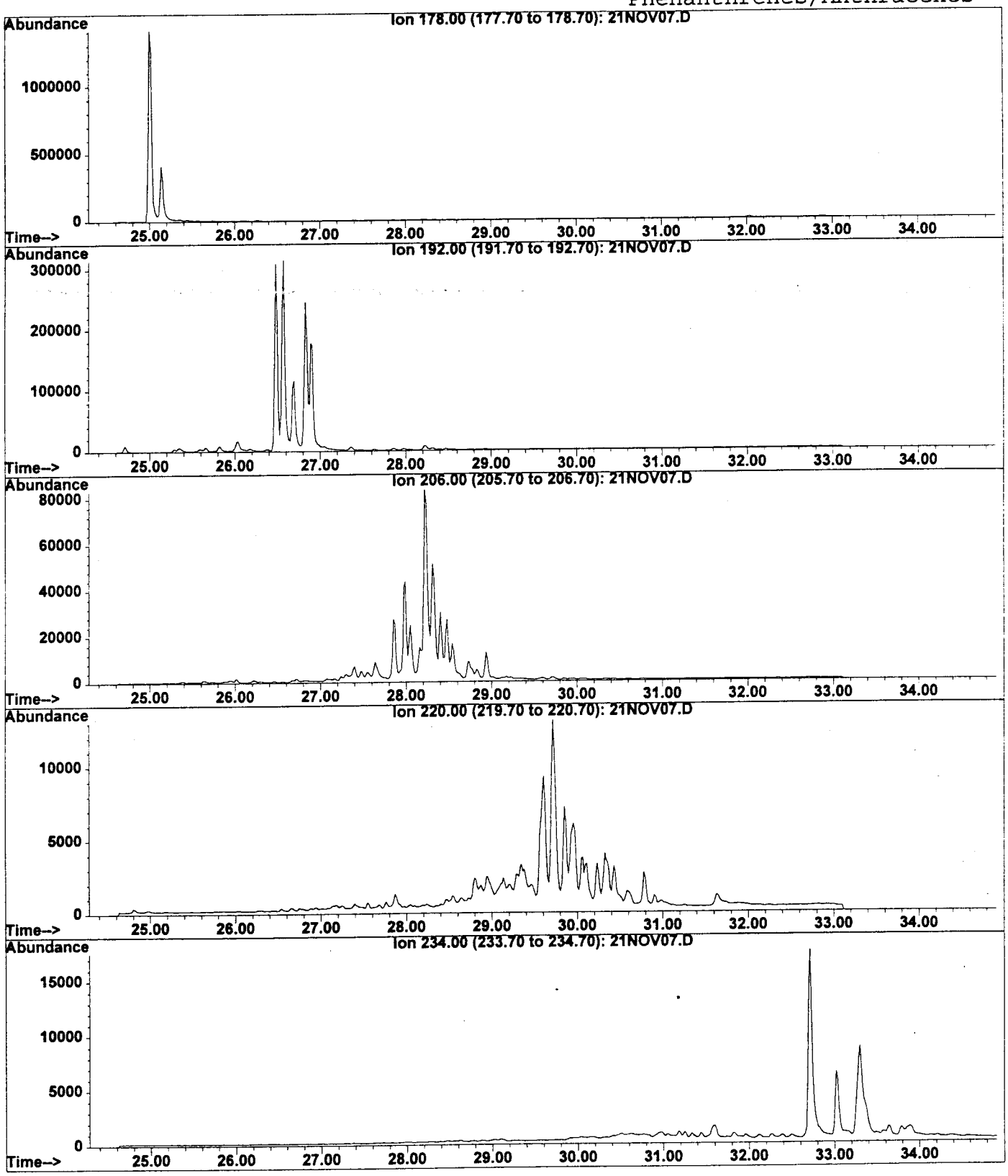
Acquired: 21 Nov 20101 9:11 pm using AcqMethod SIM4008M
Instrument: GC-2/MS Operator: kty

Phenanthrenes/Anthracenes



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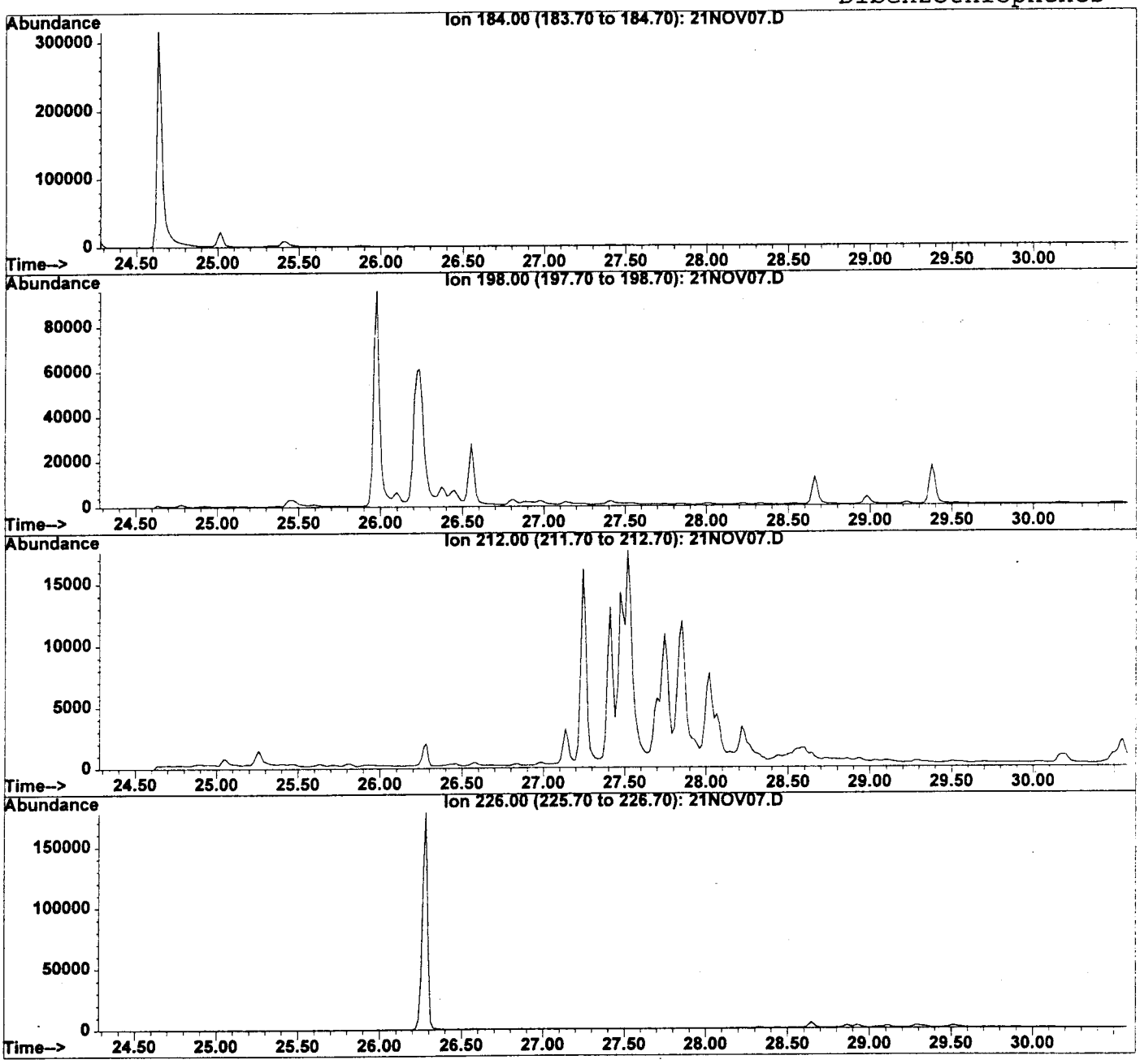
Instrument: GC-2/MS Operator: kty

Dibenzothiophenes



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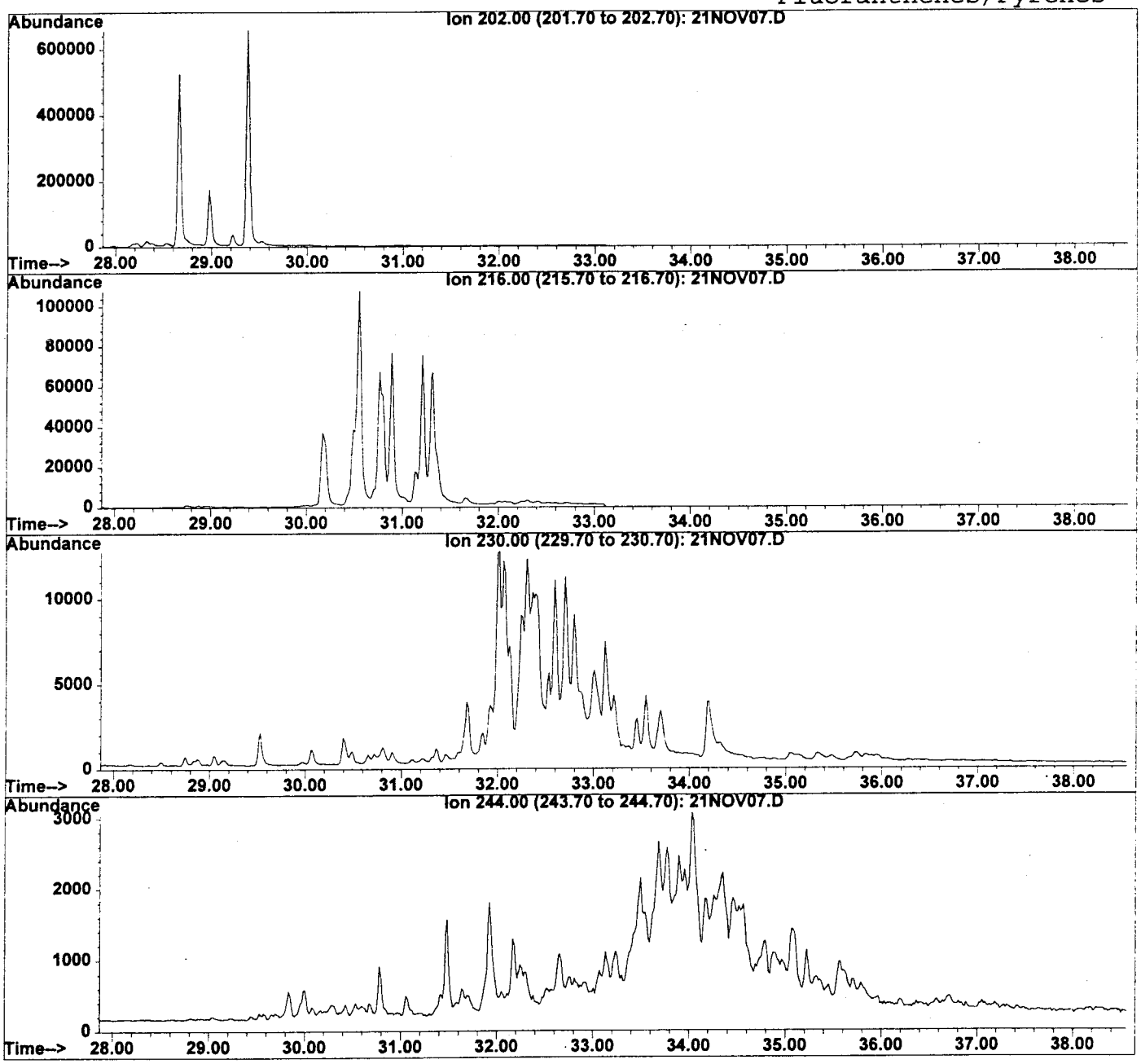
Instrument: GC-2/MS Operator: kty

Fluoranthenes/Pyrenes



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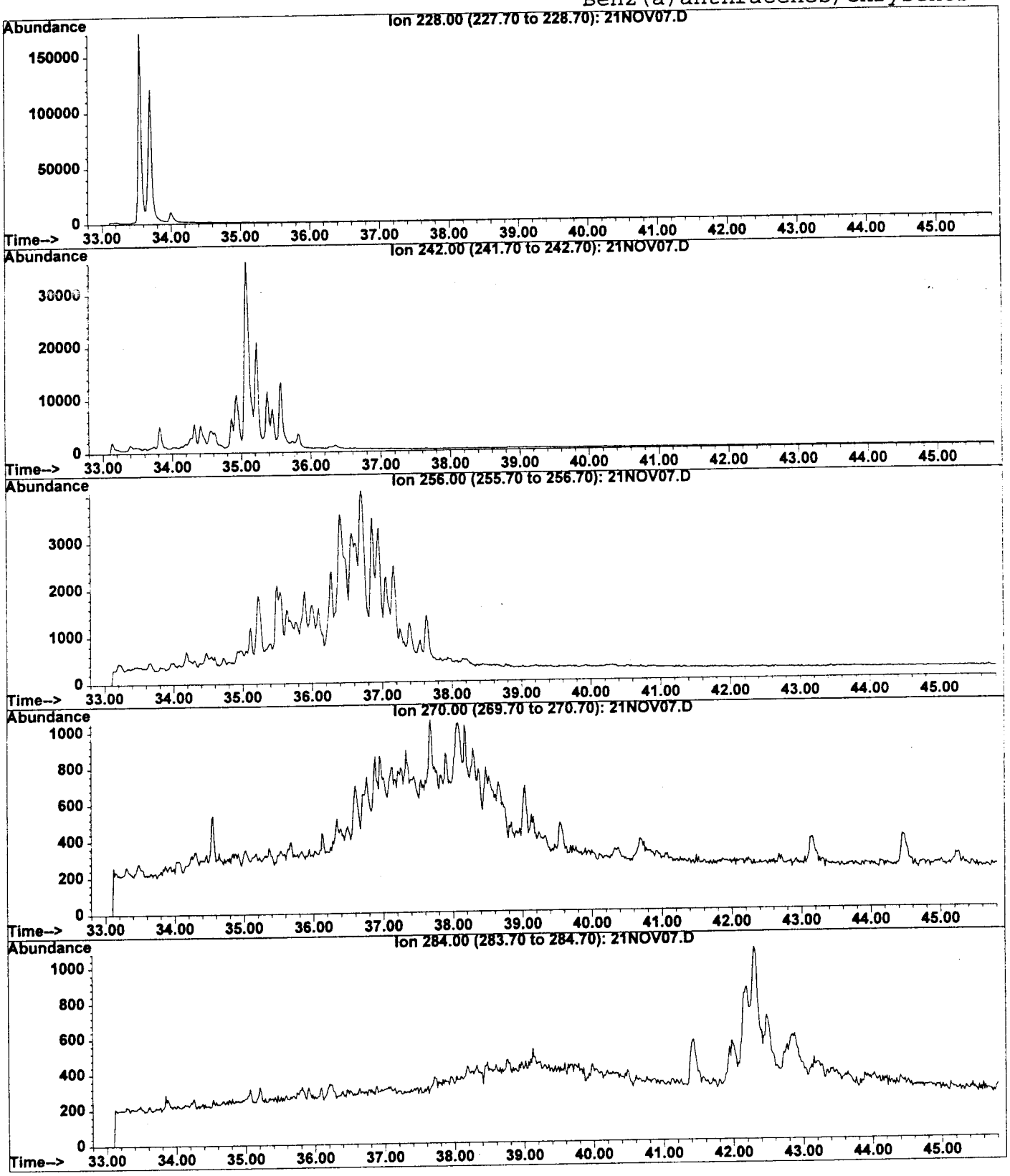
Instrument: GC-2/MS Operator: kty

Benz(a)anthracenes/Chrysenes



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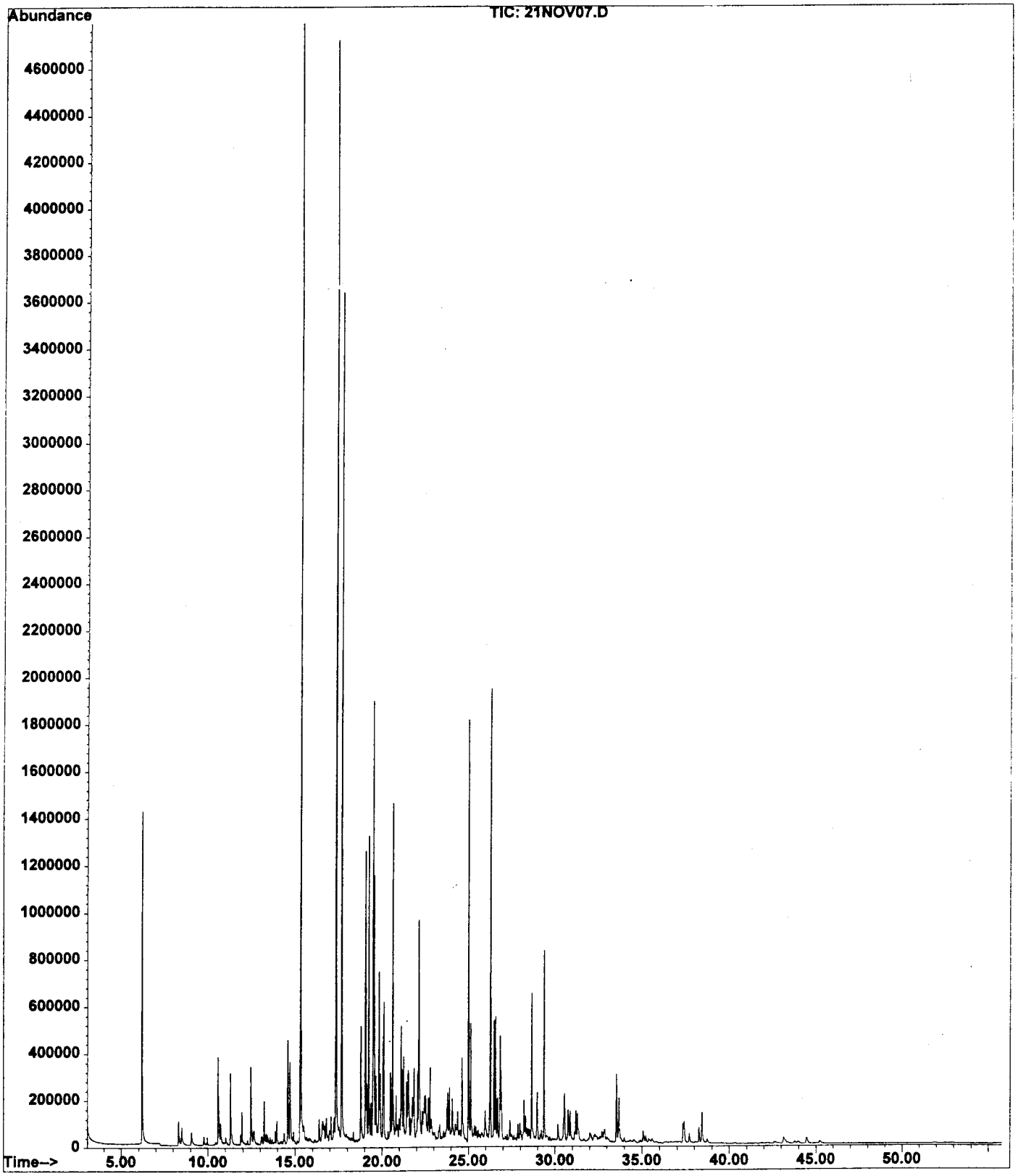

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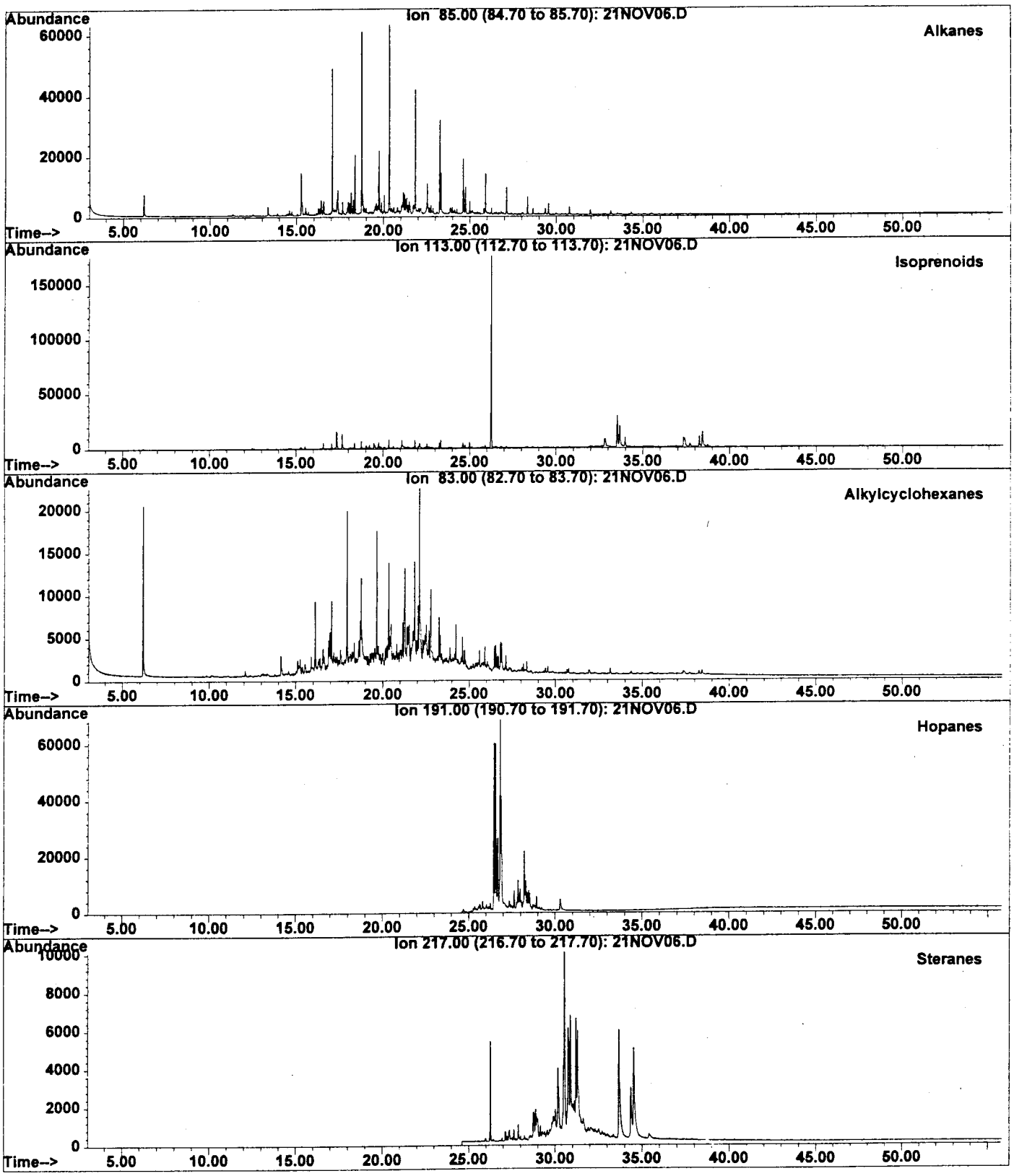

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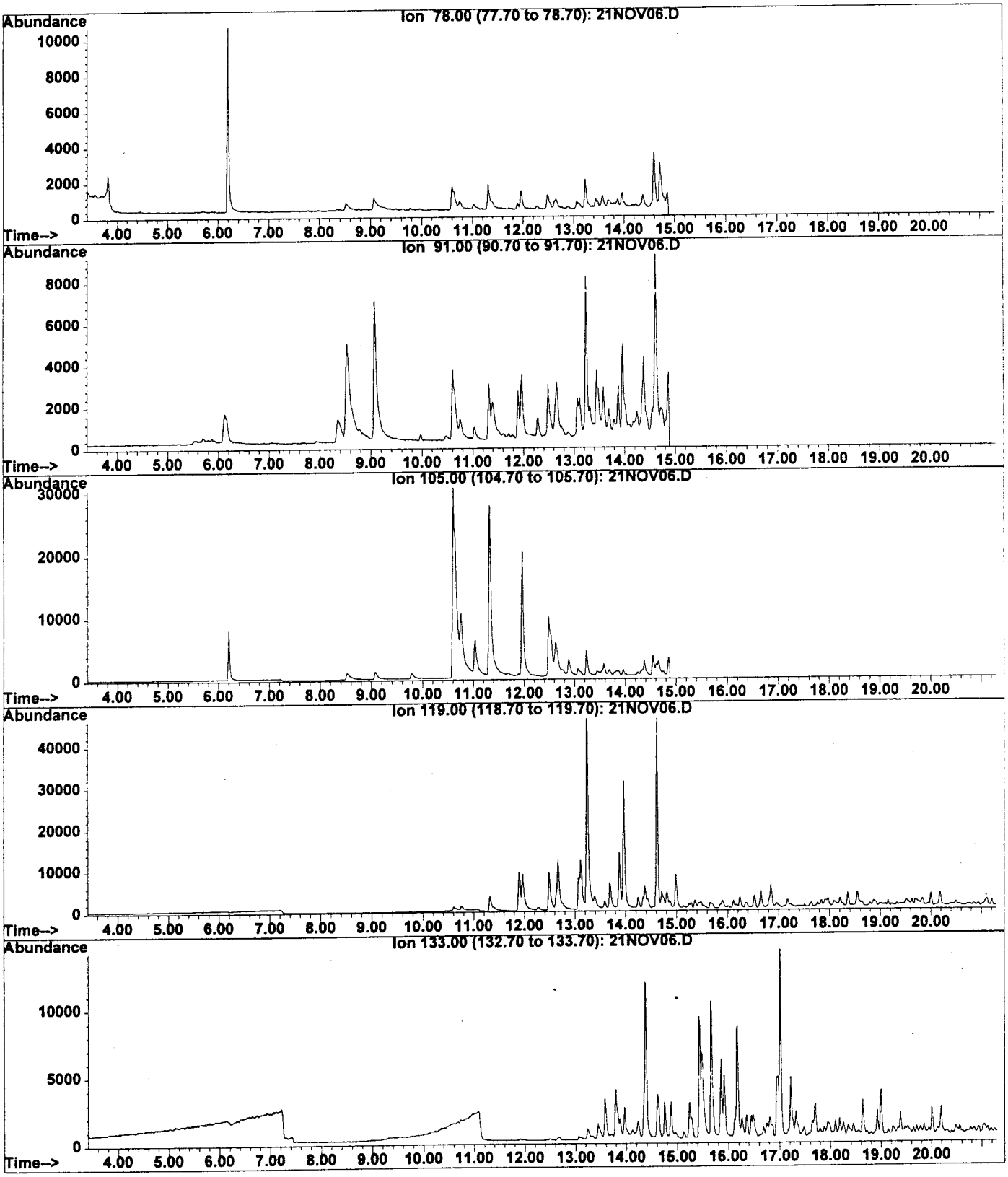
Benzenes



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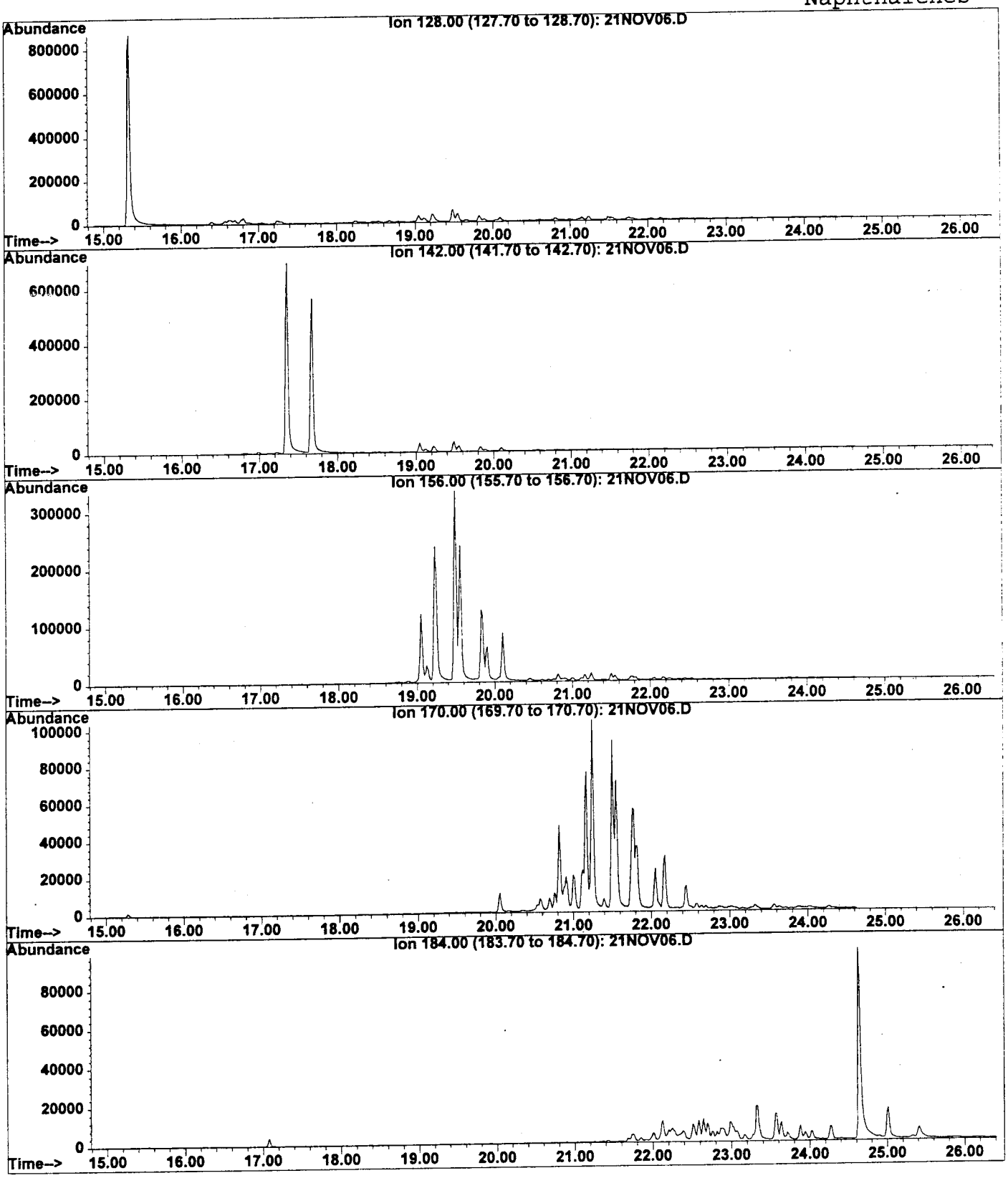
Instrument: GC-2/MS Operator: kty

Naphthalenes



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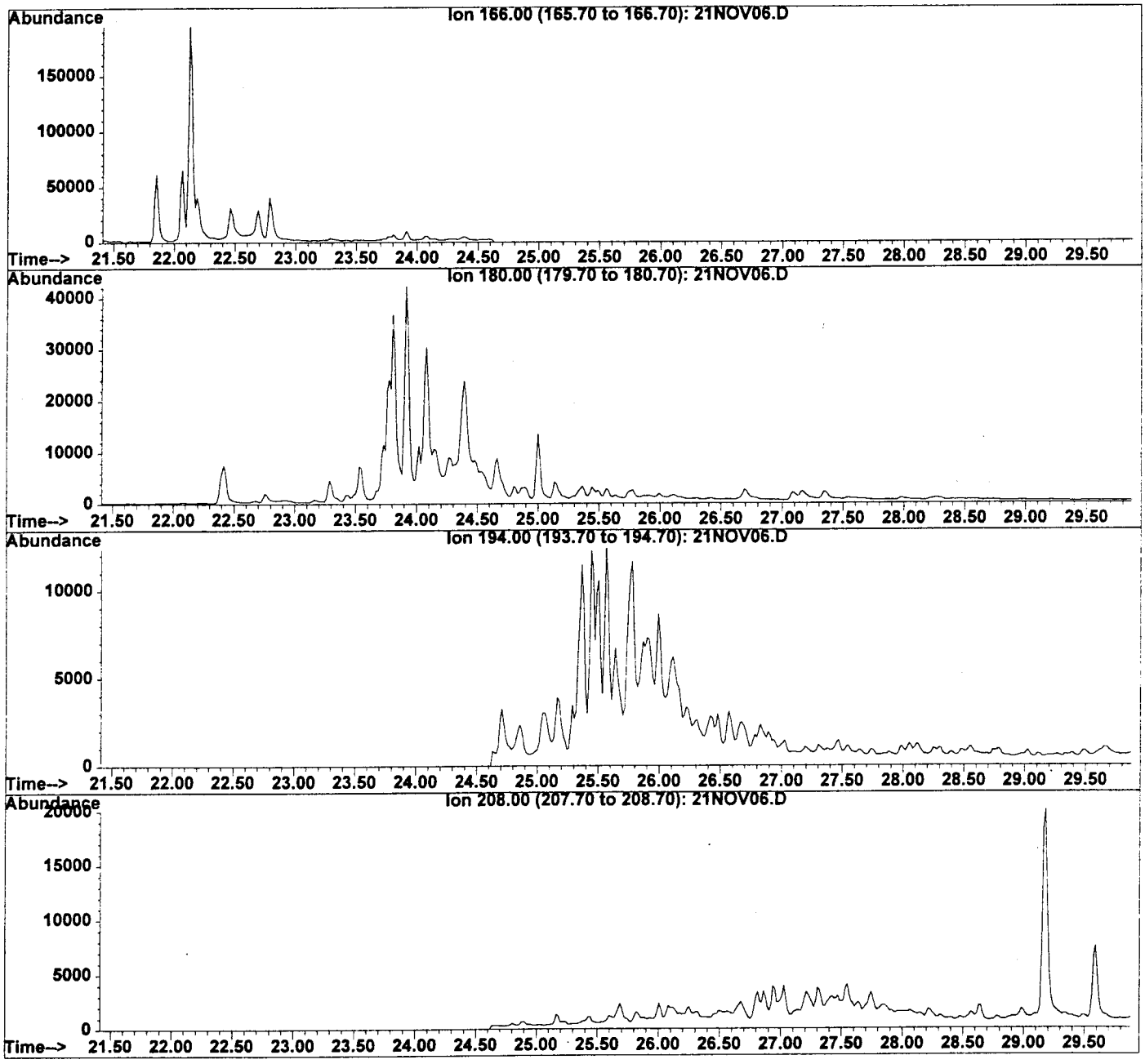
Instrument: GC-2/MS Operator: kty

Fluorenes



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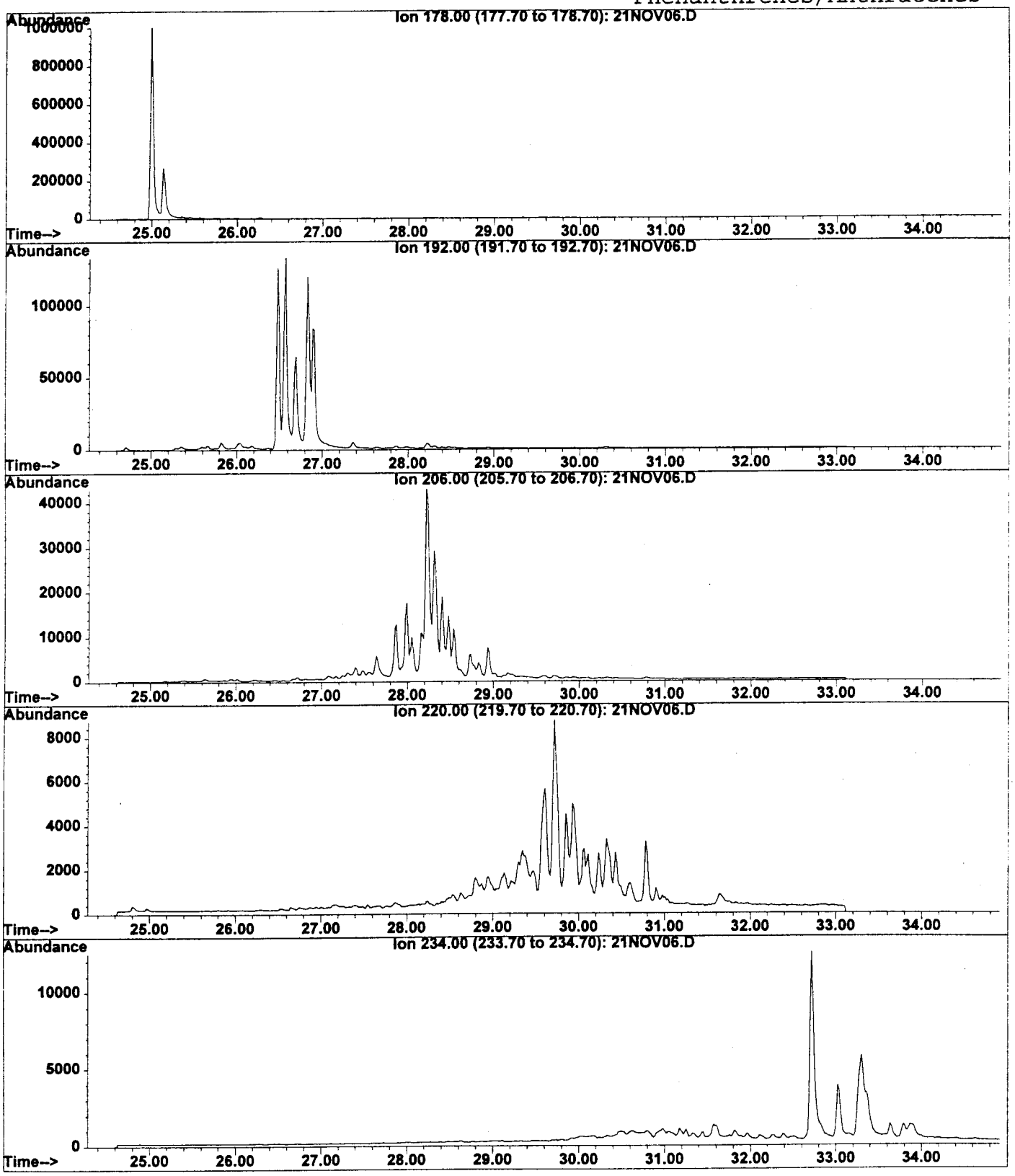
Instrument: GC-2/MS Operator: kty

Phenanthrenes/Anthracenes



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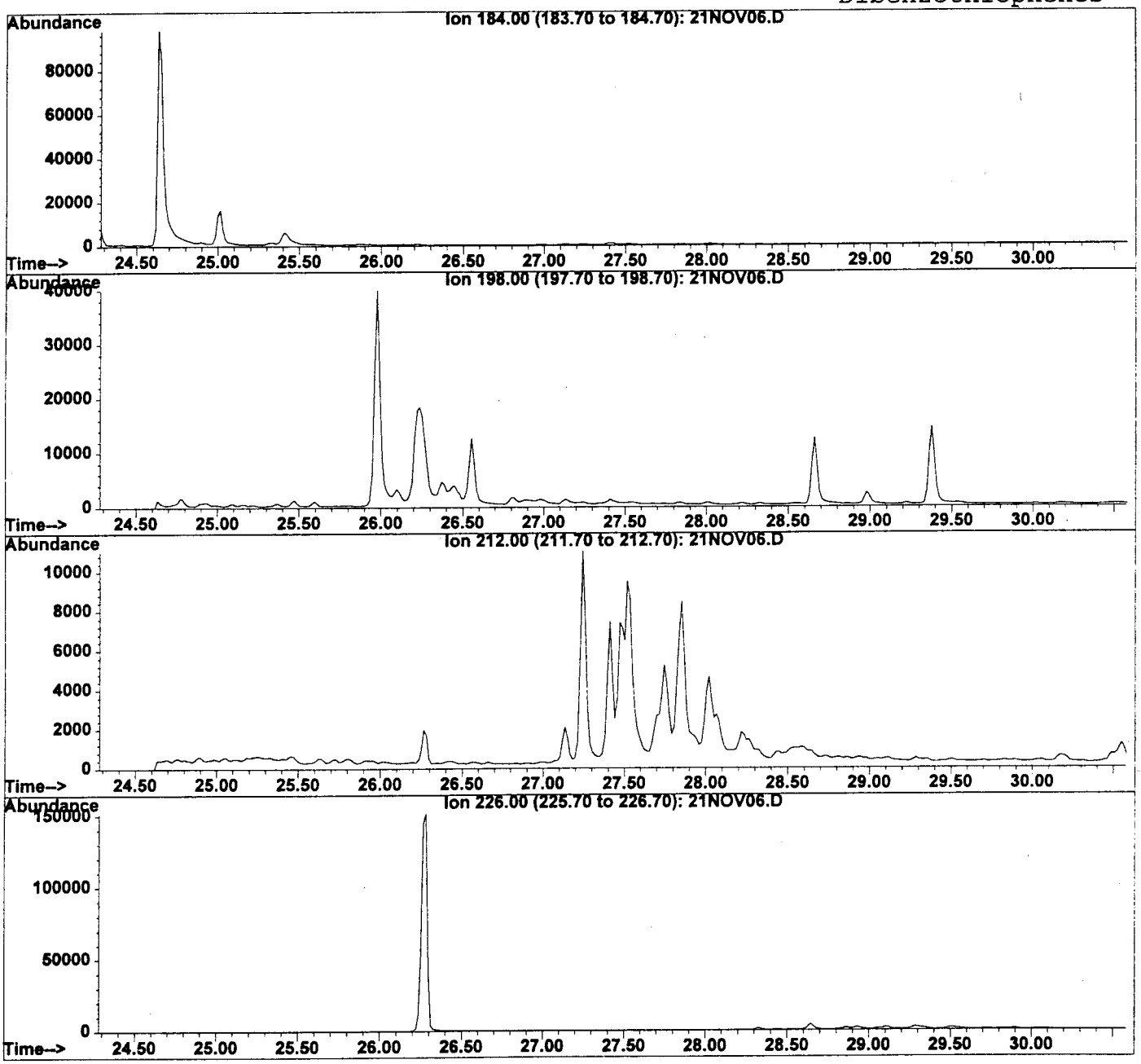
Dibenzothiophenes



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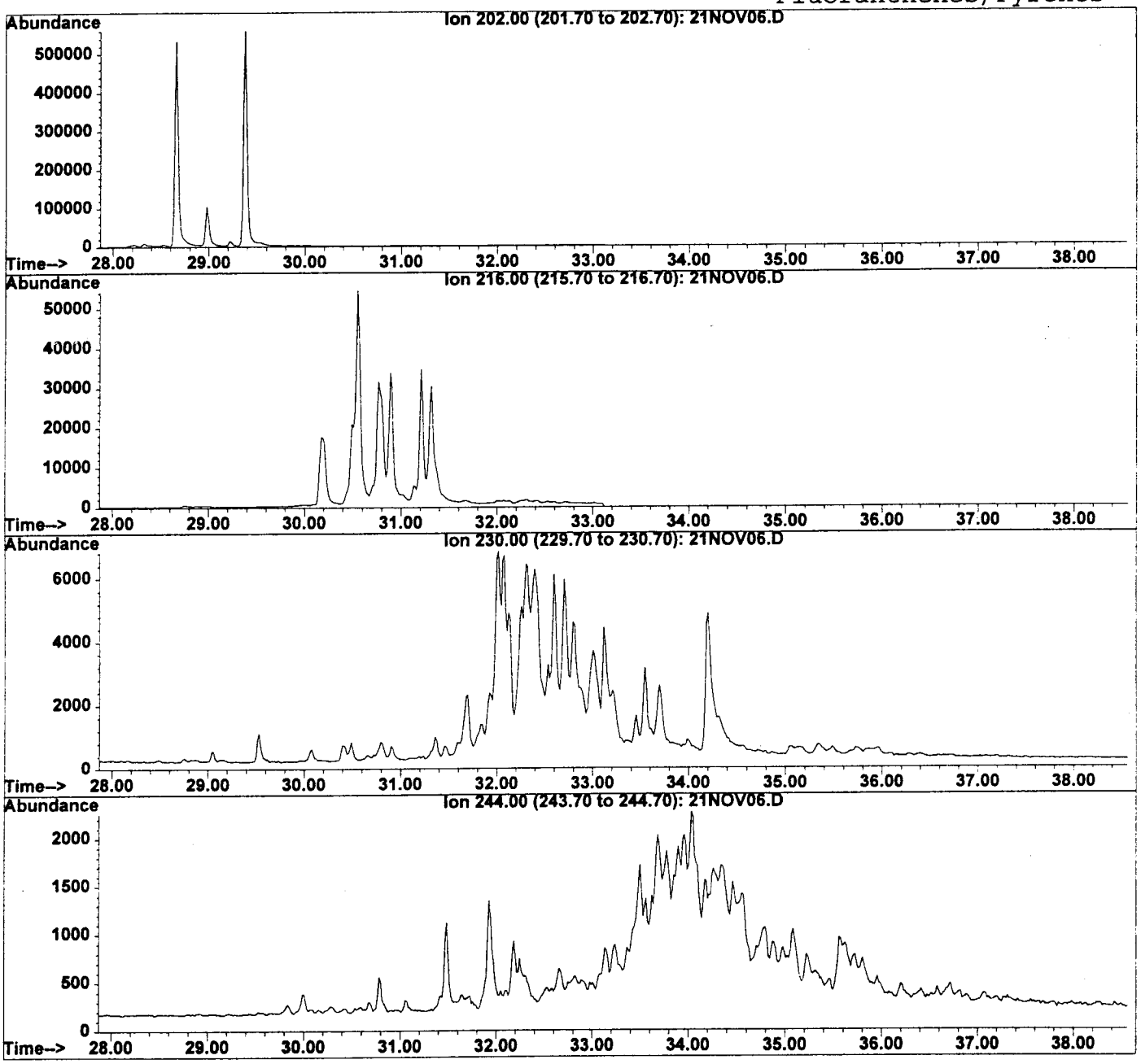
Fluoranthenes/Pyrenes



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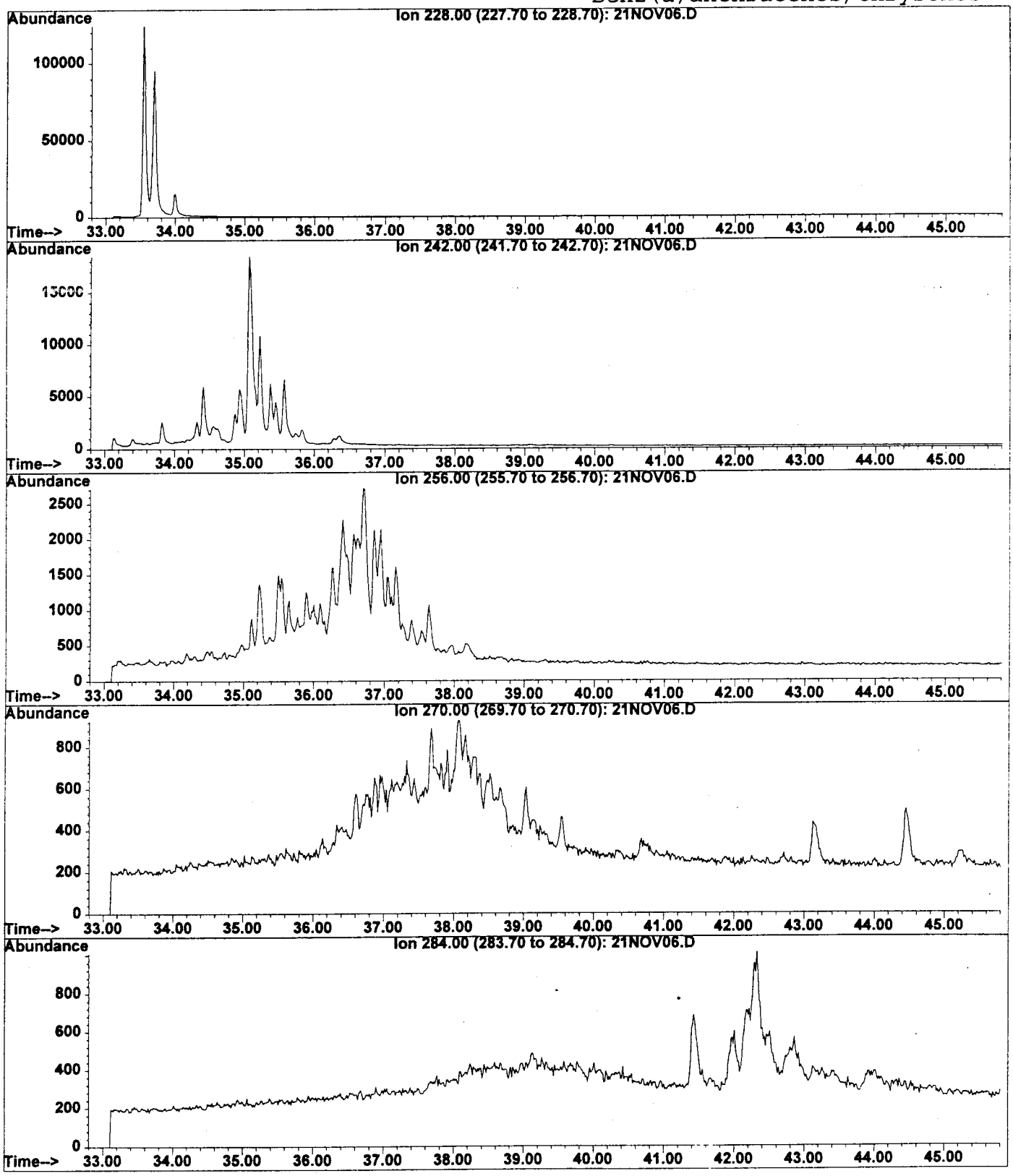
Instrument: GC-2/MS Operator: kty

Benz(a)anthracenes/Chrysenes



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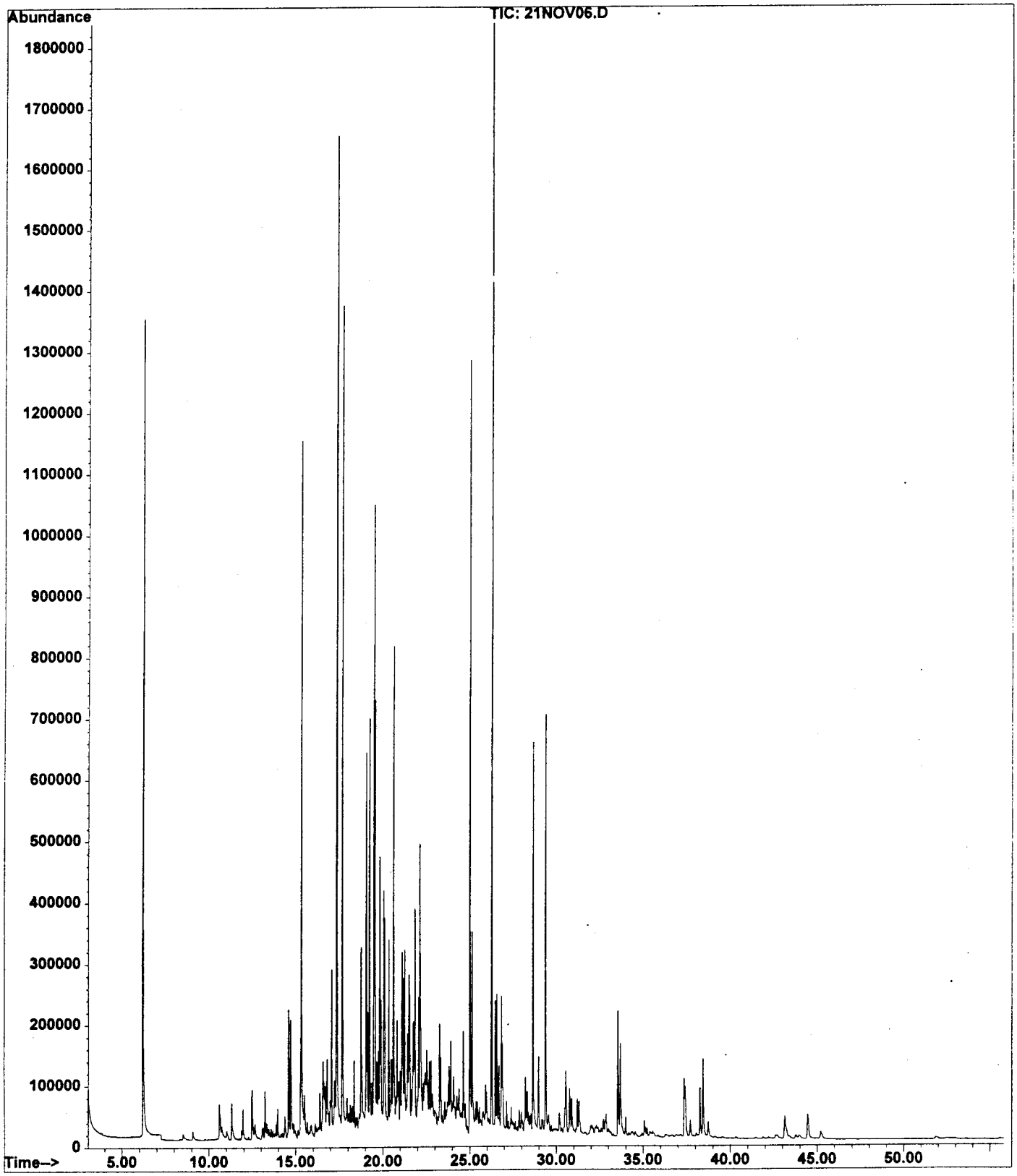


Appendix 2: Environmental Forensic Report – Two Liquid Samples
May 2, 2002

Environmental Forensic Report

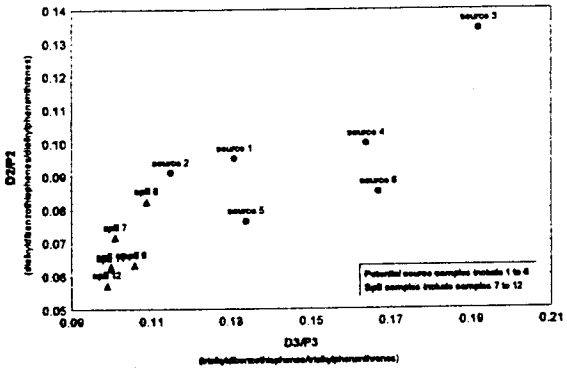
Two Liquid Samples

SDG: IG020405

Report To:

Gas Technology Institute
1700 S. Mt. Prospect Road
Des Plaines, IL 60018

Figure 1. Double Ratio Plot



Report By:

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

May 2, 2002

Identifying and allocating sources of pollutants in complex environments.

META Environmental, Inc.
ENGINEERING & CHEMISTRY

DRAFT Laboratory Report

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

Phone: 617-923-4662
Fax: 617-923-4610
e-Mail: dcraig@metaenv.com

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 Director and Quality Assurance Officer, as verified by the following signatures.

David R. Craig — 5/2/02 Date
Laboratory Director, META Environmental, Inc.

David M. Mauro — 5/2/02 Date
Quality Assurance Officer, META Environmental, Inc.

Sample Delivery Group Narrative

Project: Ashland MGP Site Forensic Analyses

Client: Gas Technology Institute
1700 S. Mt. Prospect Road
Des Plains, IL 60018

Report Contact: Dr. Diane Saber

Date of Receipt: 4/5/02

Sample Summary:

The samples received for this project are summarized in the attached sample login forms.

META Project Number: G13008-60

Chain of Custody

Samples were received in good condition. The internal temperatures of the shipment containers were as follows:

Samples received 4/5/2002 7.2°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 1 month after the release of this data report. Sample disposal will be documented.

Methods

The non-aqueous phase liquid (NAPL) samples were prepared by waste dilution (EPA 3580) to a 5mg/ml concentration in DCM. The extracts were spiked with internal standard and analyzed by GC/FID (EPA 8100 mod.) and GC/MS/SIM (EPA 8260/8270 mod.).

Subsequently, a portion of each extract was fractionated into aliphatic, aromatic, and polar fractions using silica gel column chromatography (EPA 3630 mod.). Each fraction was analyzed by GC/FID (EPA 8100 mod.).

Results

Sample results were 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." No value was reported above the calibration range. Undetected analytes were 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

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

Surrogate Spikes

Fractionation surrogates were added to all extracts prior to fractionation. Recoveries for all surrogates are reported with the sample results.

Blanks

No target analytes were found above the detection limit in the dilution blank

Internal Standards

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

Interpretation

The GC/FID fingerprints of the whole, aliphatic, and aromatic portions of the two samples were very similar. Both of the samples exhibited characteristics of pyrogenic and petrogenic substances, with the pyrogenic portion predominant. The substantial amounts of parent PAHs (e.g., naphthalene, phenanthrene, pyrene) indicated the presence of tar. However, the unresolved complex mixture (UCM or "hump") centered around about 17 minutes and the numerous small peaks from about 10 minutes to about 25 minutes indicated the presence of a middle distillate of petroleum.

Table 1 presents the total hydrocarbon concentrations of the whole, aliphatic, and aromatic portions of each sample.

Table 1
Aliphatic and Aromatic Hydrocarbons in NAPL Samples

Sample	TEH (mg/kg)	Aliphatic (mg/kg)	Aromatic (mg/kg)	% Aliphatic	% Aromatic
MW-21A	316,000	11,500	222,000	3.6	70.2
MW-10B	666,000	30,800	539,000	4.6	80.9

TEH – total extractable hydrocarbons

References

1 "Chemical Source Attribution at Former MGP Sites," EPRI Report 1000728, December 2000.

Table 1
Source and Weathering Ratios

Sample	Fl/Py	D/F	C17/Pris	C18/Phy	Pris/Phy	C3D/C3PA	C2D/C2PA	N/P
MW-21A	0.77	0.34	3.14	2.19	1.75	0.75	0.49	2.59
MW-10B	0.79	0.48	3.18	2.06	1.81	0.67	0.44	6.59

Ratios:

Fl/Py	fluoranthene/pyrene
D/F	dibenzofuran/fluorene
C17/Pris	septadecane/pristane
C18/Phy	octadecane/phytane
Pris/Phy	pristane/phytane
C3D/C3PA	trialkyldibenzothiophenes/trialkylphenanthrenes/anthracenes
C2D/C2PA	dialkyldibenzothiophenes/dialkylphenanthrenes/anthracenes
N/P	Naphthalene/Phenanthrene

Appendix A

Chains of Custody

META ENVIRONMENTAL SAMPLE RECEIPT

Lab ID	Field ID	Matrix	Analysis	Date Sampled	Date Received	Client/ Project	Container/ Storage
IG020405-01	MW-21A	NAPL	2512/4008/Fingerprint/TPH	04/04/02	04/05/02	G13008-60	40mL VOA Vial
IG020405-02	MW-10B	NAPL	2512/4008/Fingerprint/TPH	04/04/02	04/05/02	G13008-60	40mL VOA Vial

Dism 4/5/02

Analytical Laboratory and Environmental Services
400 North Lake Avenue • Crandon, WI 54520-1298
Tel: (715) 478-2777 • Fax: (715) 478-3060

SAMPLE COLLECTION AND CHAIN OF CUSTODY RECORD

Underground Storage Tank Projects

Wisconsin Lab Cert. No. 721026460

RETURN THIS FORM WITH SAMPLES.

CLIENT: URS Corp.	PROJECT TITLE: NSP - Ashland	
ADDRESS: 5250 E. Terrace Dr. Ste I	PROJECT NO.: 05644-098	QUOTATION NO.:
CITY: Madison STATE: WI ZIP: 53718	CONTACT: Dave Trainor	PHONE: 608-244-5656

ENTER OTHER PARAMETERS-CHECK BELOW IF FIELD FILTERED

NLS LAB. NO.	SAMPLE ID	COLLECTION DATE	COLLECTION TIME	SAMPLE TYPE	GRO	PVOC	DRO	VOC 8021	PAH	Mod. Fied	8100 Fingerprint							
[redacted]	MW-21A	4/4/02	0940	tar						X	X					IG020405-01		
[redacted]	MW-10B	↓	1000	tar						X	X						↓	-02

7.2°C

COLLECTED BY (signature): [signature]	[signature]	CUSTODY SEAL NO. (IF ANY): 9:30am	DATE/TIME: 4/5/02
RELINQUISHED BY (signature): [signature]	RECEIVED BY (signature):		DATE/TIME:
RELINQUISHED BY (signature):	RECEIVED BY (signature):		DATE/TIME:
DISPATCHED BY (signature):	METHOD OF TRANSPORT:		DATE/TIME:

REPORT TO: Dave Trainor @ URS Corp.

RECEIVED AT NLS BY (signature): [redacted]	DATE/TIME: [redacted]	CONDITION: [redacted]	TEMP: [redacted]
SEAL INTACT? YES/NO [redacted]	REMARKS & OTHER INFORMATION		

SAMPLE TYPE GW=groundwater, WW=waste water, DW=drinking water, S=soil

INVOICE TO: Same

IMPORTANT:
1. TO MEET REGULATORY REQUIREMENTS, THIS FORM **MUST** BE COMPLETED IN DETAIL AND INCLUDED IN THE SHIPPER CONTAINING THE SAMPLES DESCRIBED.
2. PLEASE USE ONE LINE PER SAMPLE, **NOT** PER BOTTLE.
3. RETURN THIS FORM WITH SAMPLES - CLIENT MAY KEEP PINK COPY.
4. PARTIES COLLECTING SAMPLE, LISTED AS REPORT TO AND LISTED AS INVOICE TO AGREE TO STANDARD TERMS & CONDITIONS ON REVERSE.

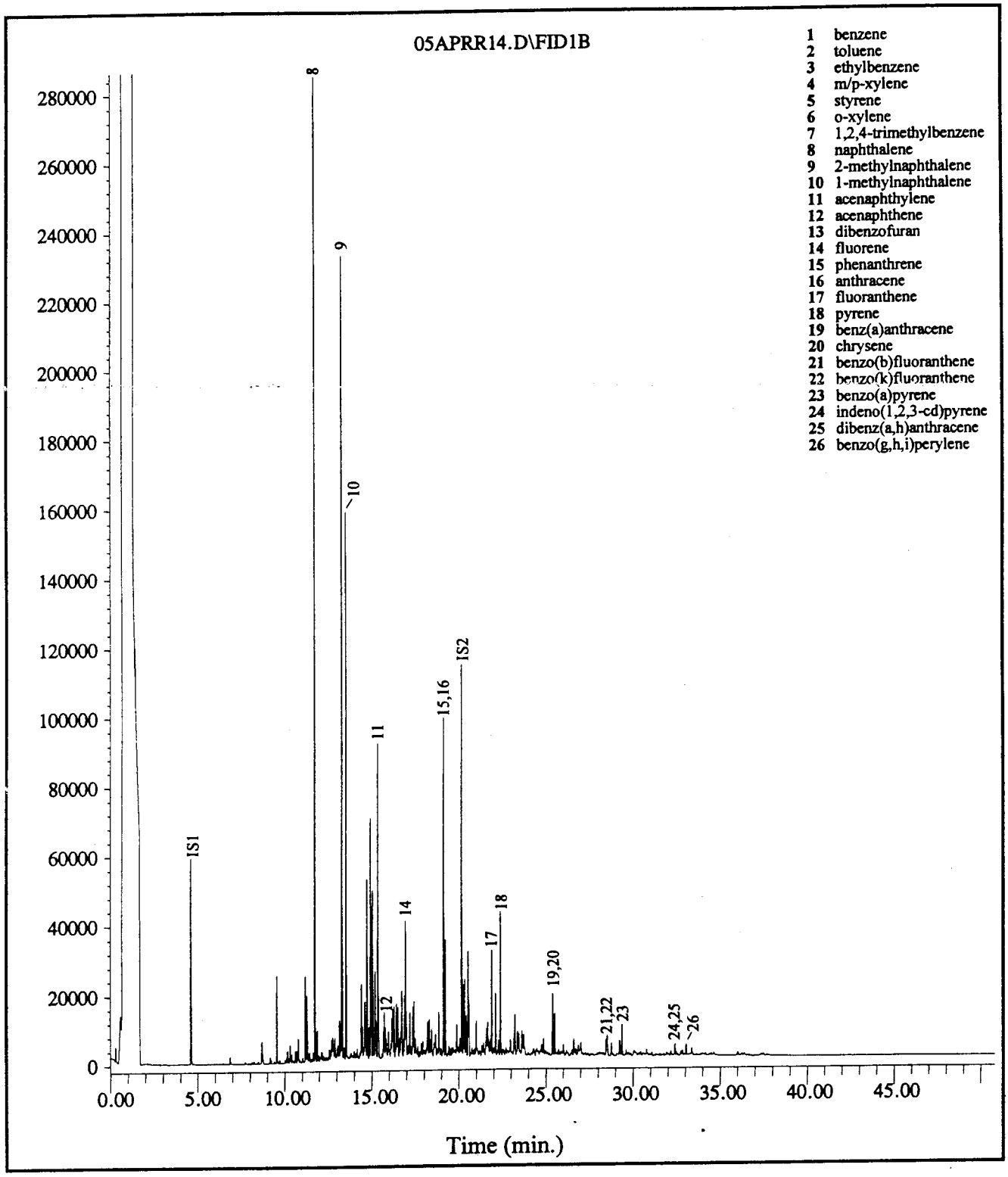
ORIGINAL COPY

26 89

Appendix B

GC/FID Fingerprints

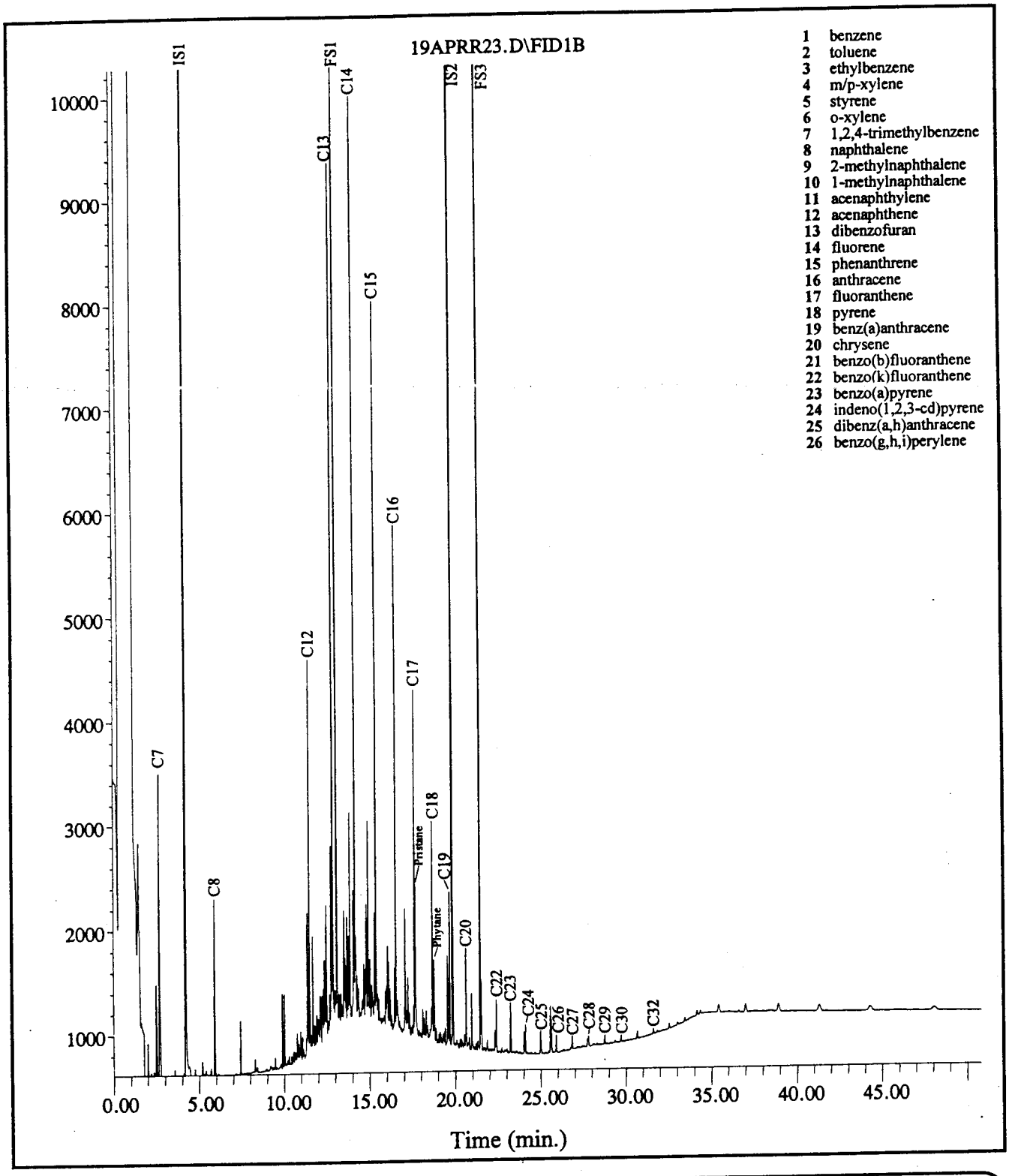
GC/FID Fingerprint



IS1 - 2,4-difluorotoluene
IS2 - o-terphenyl

Field ID:	**MW-21A**
Laboratory ID:	IG020405-01
Method:	MET4007D

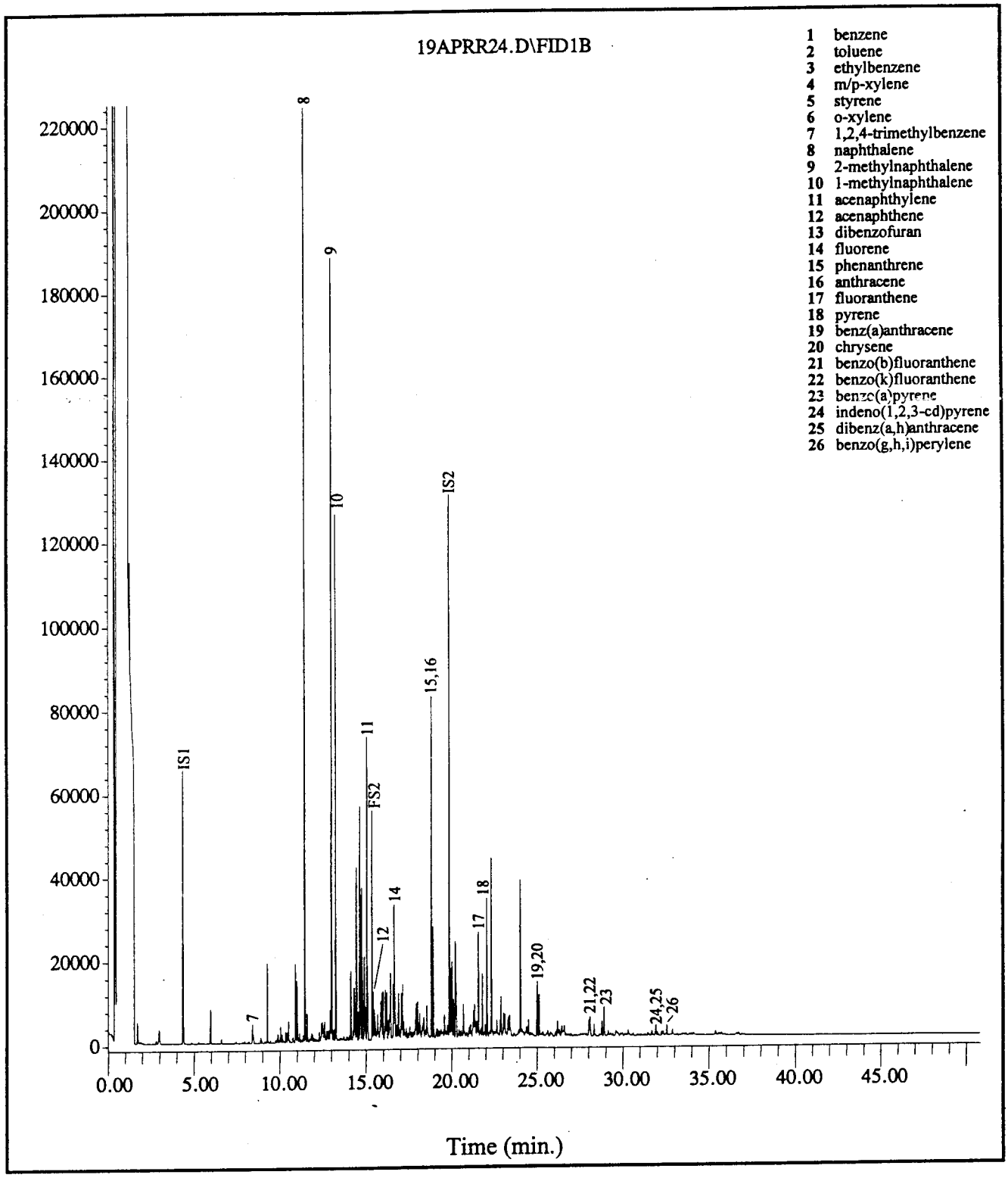
GC/FID Fingerprint



IS1 - 2,4-difluorotoluene
IS2 - o-terphenyl
FS1 - 2,5 - dibromotoluene
FS2 - 2-bromonaphthalene
FS3 - 1-chlorooctadecane

Field ID:	**MW-21A**
Laboratory ID:	IG020405-01PF
Method:	MET4007D

GC/FID Fingerprint



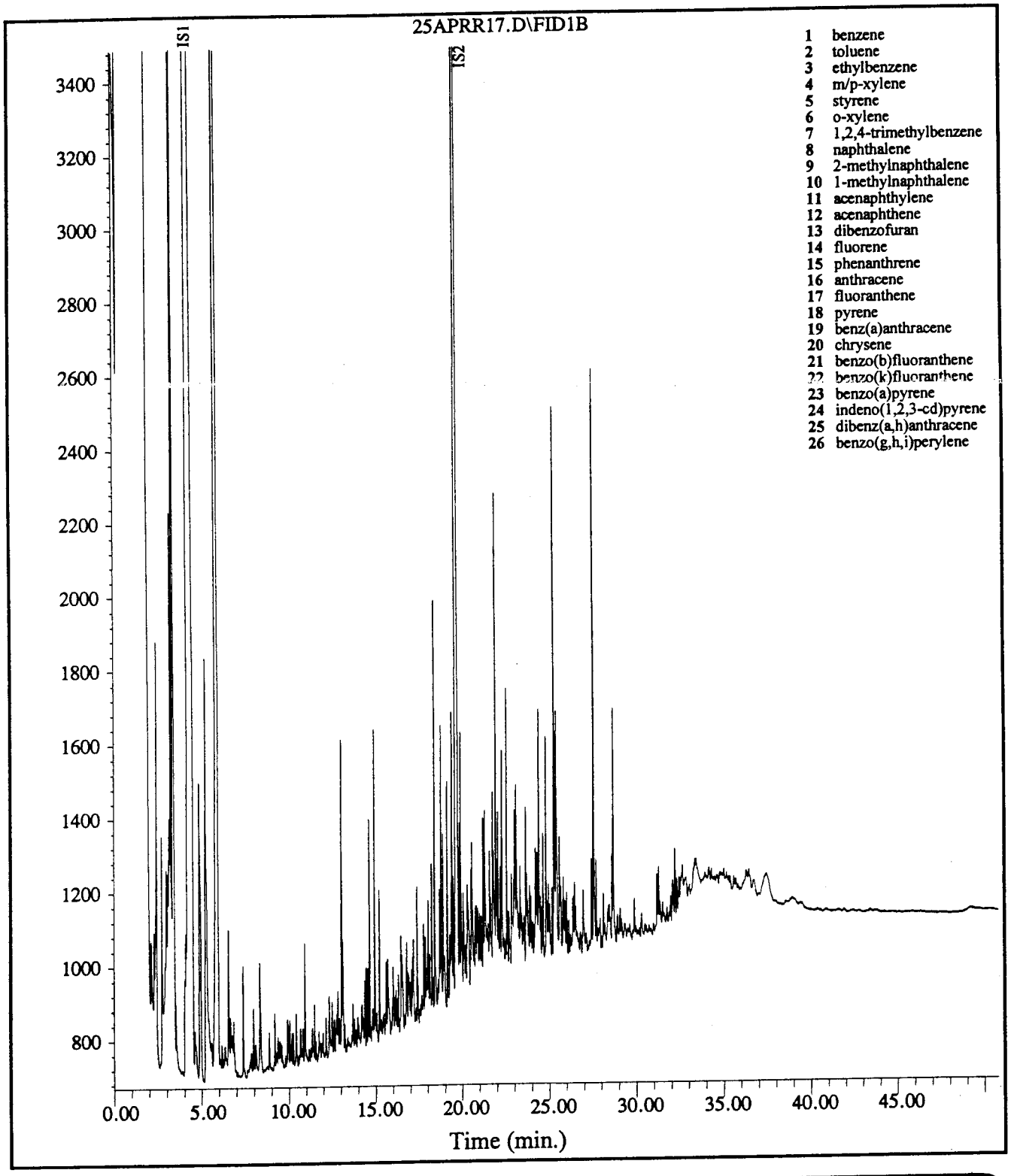
IS1 - 2,4-difluorotoluene
IS2 - o-terphenyl
FS1 - 2,5 - dibromotoluene
FS2 - 2-bromonaphthalene
FS3 - 1-chlorooctadecane

Field ID:	**MW-21A**
Laboratory ID:	IG020405-01DF
Method:	MET4007D

ig0405.ppt

META

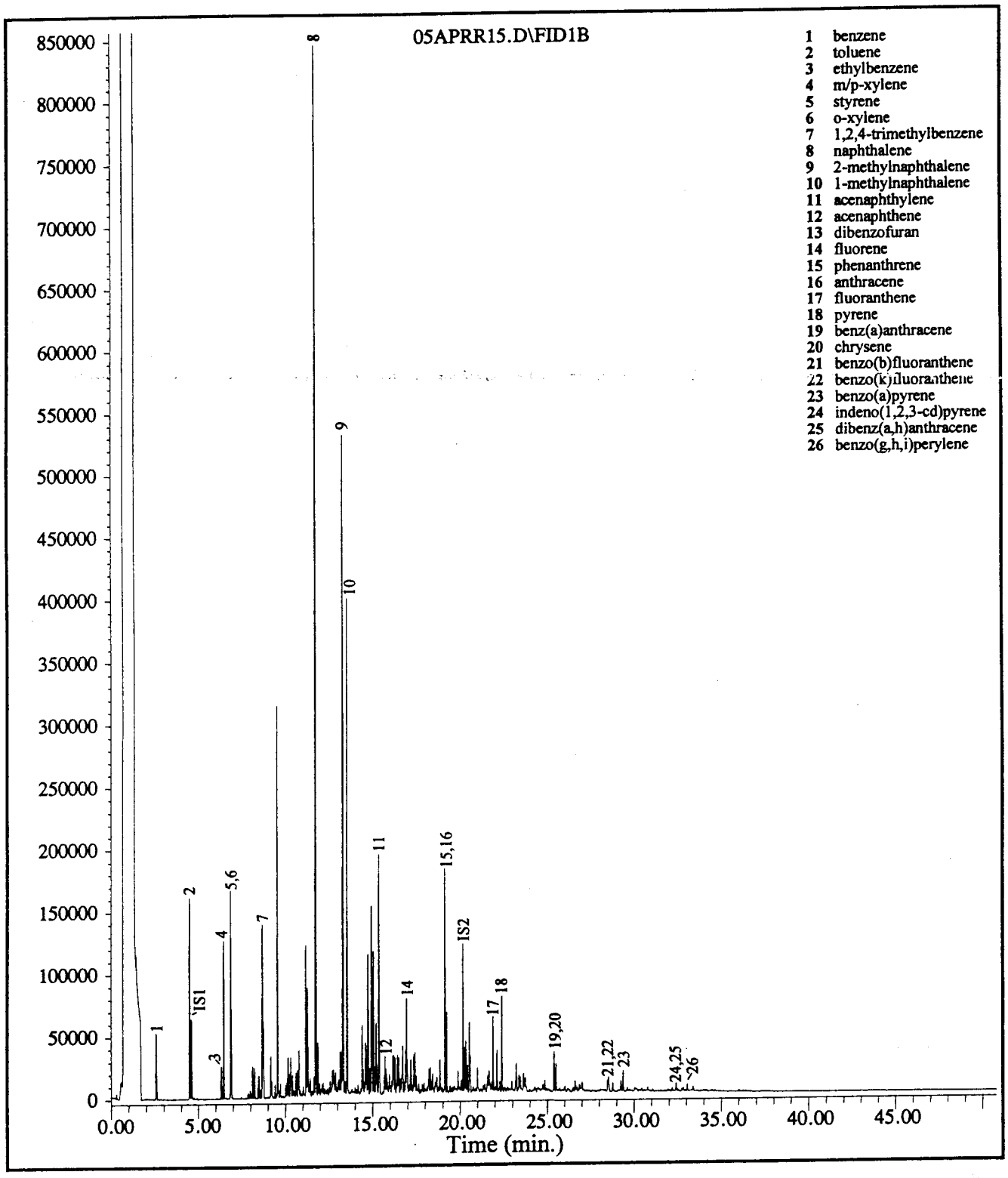
GC/FID Fingerprint



IS1 - 2,4-difluorotoluene
IS2 - o-terphenyl

Field ID:	**MW-21A**
Laboratory ID:	IG020405-01MF
Method:	MET4007D

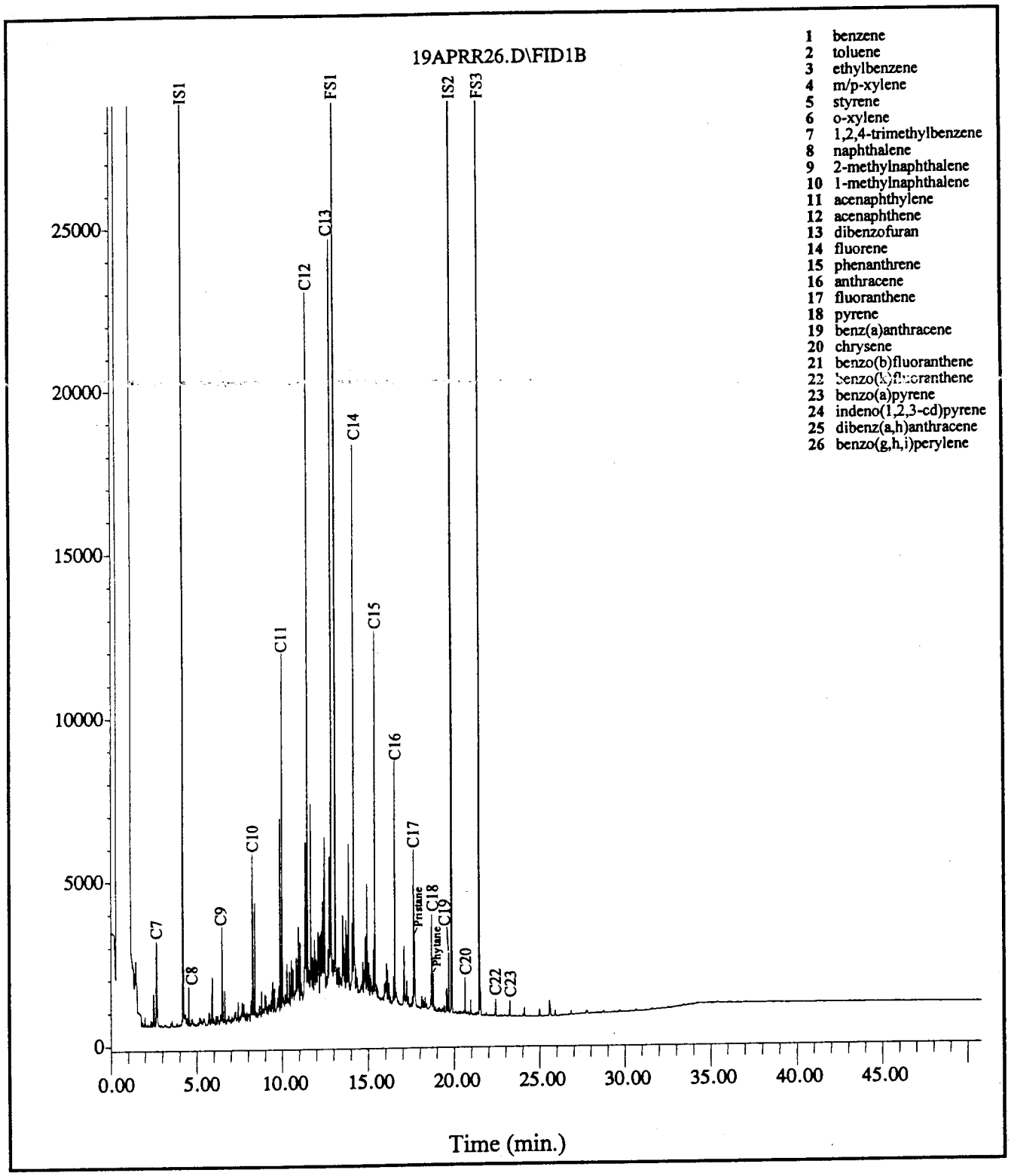
GC/FID Fingerprint



IS1 - 2,4-difluorotoluene
IS2 - o-terphenyl

Field ID:	**MW-10B**
Laboratory ID:	IG020405-02
Method:	MET4007D

GC/FID Fingerprint

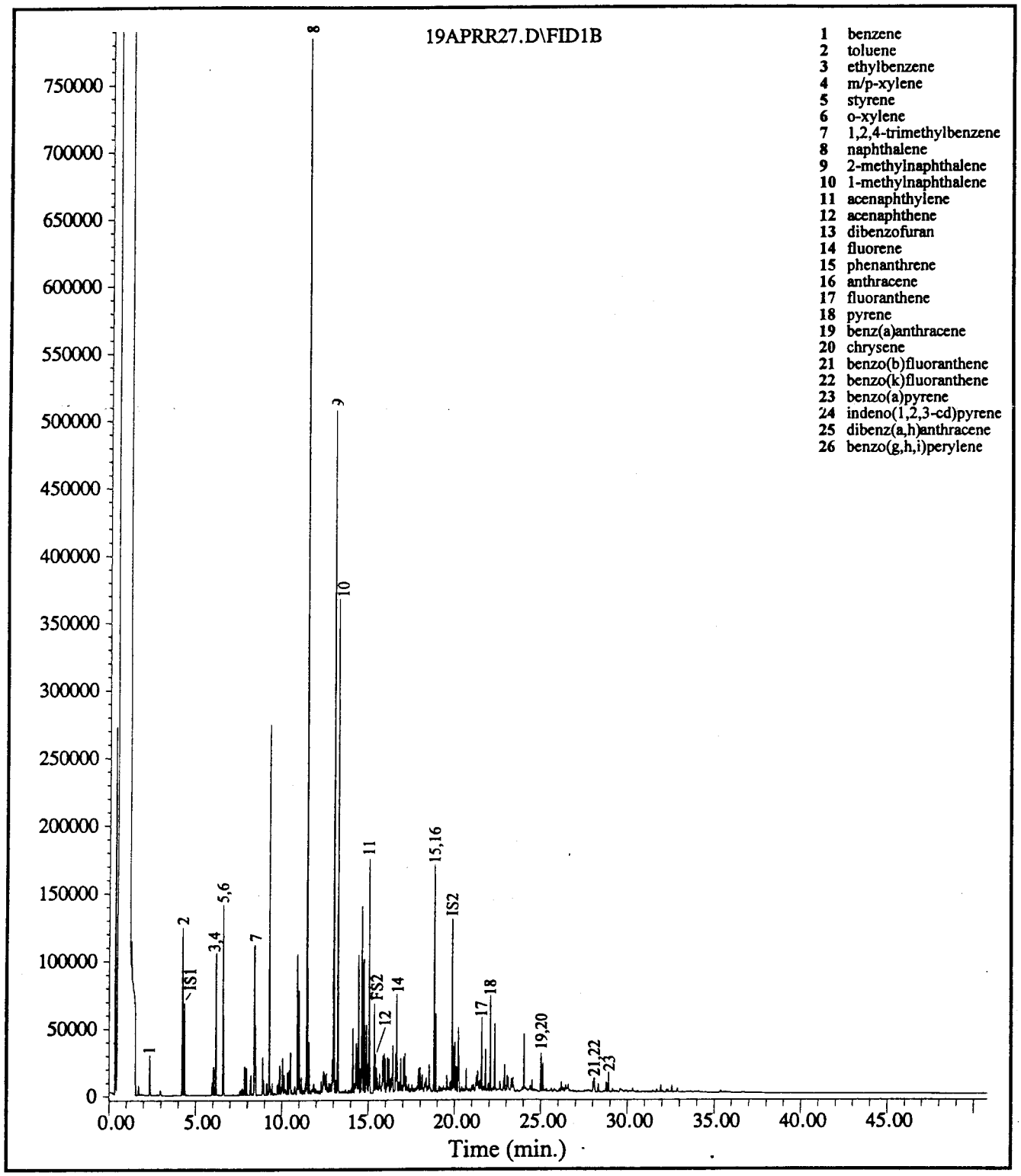


IS1 - 2,4-difluorotoluene
IS2 - o-terphenyl
FS1 - 2,5 - dibromotoluene
FS2 - 2-bromonaphthalene
FS3 - 1-chlorooctadecane

Field ID:	**MW-10B**
Laboratory ID:	IG020405-02PF
Method:	MET4007D

ig0405.ppt

GC/FID Fingerprint



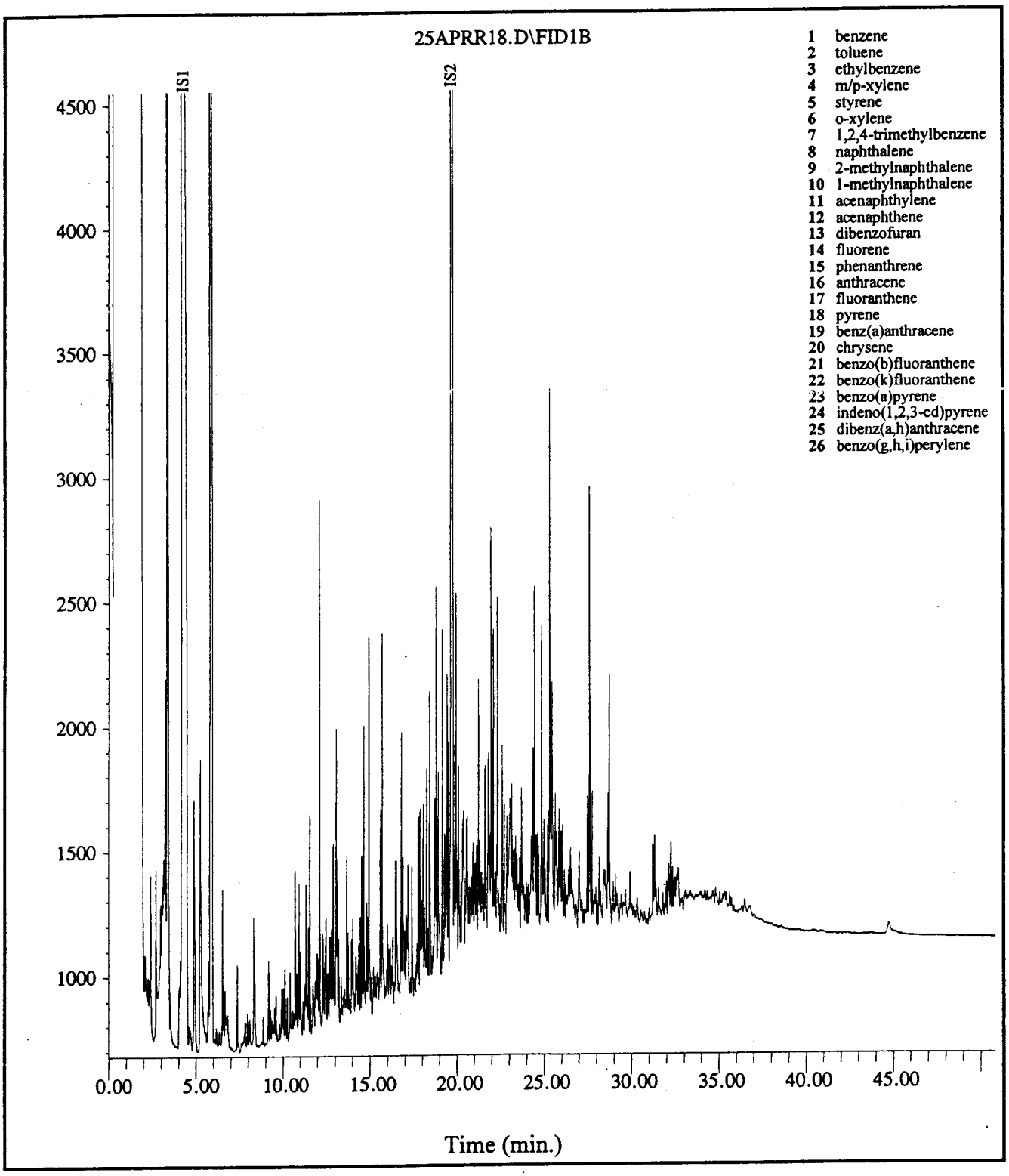
IS1 - 2,4-difluorotoluene
IS2 - o-terphenyl
FS1 - 2,5 - dibromotoluene
FS2 - 2-bromonaphthalene
FS3 - 1-chlorooctadecane

Field ID:	**MW-10B**
Laboratory ID:	IG020405-02DF
Method:	MET4007D

ig0405.c,1

META

GC/FID Fingerprint



IS1 - 2,4-difluorotoluene
IS2 - o-terphenyl

Field ID:	**MW-10B**
Laboratory ID:	IG020405-02MF
Method:	MET4007D

Appendix C

Chemical Concentrations

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

Field ID: **MW-21A**

Client:	GTI
Project:	Ashland Phase II
Lab ID:	IG020405-01
File ID:	10APR10.D
Date Sampled:	4/4/02
Date Received:	4/5/02
Date Prepared:	4/5/02
Date Cleanup:	
Date Analyzed:	10 Apr 2002 4:28 pm
Instrument:	HP_5972
Operator:	kty

Preparation Method:	EPA 3580	
Cleanup Method(s):		
Analysis Method:	GC/MS (EPA 8260/8270 Mod.)	
Matrix:	NAPL	
Preservation:	None	
Decanted:	No	
Sample Size:	0.0094	g
%Solid:	100%	
Extract Volume:	2	mL
Prep DF:	1	
Analysis DF:	1	
Injection Volume:	0.001	mL
Batch QC:	IG020405-MB	

Analyte:	Concentration mg/kg	Q	RL mg/kg	EDL mg/kg	Comments
PAH COMPOUNDS:					
Benzene		U	21.3	10.6	
Toluene		U	21.3	10.6	
Ethylbenzene	16.9	J	21.3	10.6	
m/p-Xylenes	30.9		21.3	10.6	
Styrene	403		21.3	10.6	
o-Xylene	26.2		21.3	10.6	
1,2,4-Trimethylbenzene	324		21.3	10.6	
Naphthalene	28,000	D	21.3	10.6	
2-Methylnaphthalene	26,300	D	21.3	10.6	
1-Methylnaphthalene	15,700		21.3	10.6	
Acenaphthylene	10,400		21.3	10.6	
Acenaphthene	913		21.3	10.6	
Dibenzofuran	1,380		21.3	10.6	
Fluorene	4,080		21.3	10.6	
Phenanthrene	10,800		21.3	10.6	
Anthracene	3,830		21.3	10.6	
Fluoranthene	3,380		21.3	10.6	
Pyrene	4,410		21.3	10.6	
Benz[a]anthracene	2,090		21.3	10.6	
Chrysene	1,720		21.3	10.6	
Benzo[b]fluoranthene	847		21.3	10.6	
Benzo[k]fluoranthene	1,120		21.3	10.6	
Benzo[a]pyrene	1,740		21.3	10.6	
Indeno[1,2,3-cd]pyrene	657		21.3	10.6	
Dibenz[a,h]anthracene	212		21.3	10.6	
Benzo[g,h,i]perylene	771		21.3	10.6	
ALKYLATED PAHs:					
C0-Benzene		U	21.3	10.6	
C1-Benzene		U	21.3	10.6	
C2-Benzene	147		21.3	10.6	
C3-Benzene	655		21.3	10.6	
C4-Benzene	1,130		21.3	10.6	
C5-Benzene	481		21.3	10.6	
C0-Naphthalene	28,000	D	21.3	10.6	
C1-Naphthalene	23,900	D	21.3	10.6	
C2-Naphthalene	15,200		21.3	10.6	
C3-Naphthalene	3,150		21.3	10.6	
C4-Naphthalene	832		21.3	10.6	

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

		Preparation Method:	EPA 3580	
Field ID:	**MW-21A**	Cleanup Method(s):		
Client:	GTI	Analysis Method:	GC/MS (EPA 8260/8270 Mod.)	
Project:	Ashland Phase II	Matrix:	NAPL	
		Preservation:	None	
Lab ID:	IG020405-01	Decanted:	No	
File ID:	10APR10.D			
		Sample Size:	0.0094	g
Date Sampled:	4/4/02	%Solid:	100%	
Date Received:	4/5/02	Extract Volume:	2	mL
Date Prepared:	4/5/02	Prep DF:	1	
Date Cleanup:		Analysis DF:	1	
Date Analyzed:	10 Apr 2002 4:28 pm	Injection Volume:	0.001	mL
Instrument:	HP_5972			
Operator:	kty	Batch QC:	IG020405-MB	

Analyte:	Concentration mg/kg	Q	RL mg/kg	EDL mg/kg	Comments
C0-Fluorene	4,080		21.3	10.6	
C1-Fluorene	4,230		21.3	10.6	
C2-Fluorene	1,050		21.3	10.6	
C3-Fluorene	246		21.3	10.6	
C0-Phenanthrene/Anthracene	14,600		21.3	10.6	
C1-Phenanthrene/Anthracene	7,570		21.3	10.6	
C2-Phenanthrene/Anthracene	2,000		21.3	10.6	
C3-Phenanthrene/Anthracene	408		21.3	10.6	
C4-Phenanthrene/Anthracene	83.1		21.3	10.6	
C0-Dibenzothiophene	1,710		21.3	10.6	
C1-Dibenzothiophene	1,520		21.3	10.6	
C2-Dibenzothiophene	982		21.3	10.6	
C3-Dibenzothiophene	308		21.3	10.6	
C0-Fluoranthene/Pyrene	10,300		21.3	10.6	
C1-Fluoranthene/Pyrene	4,330		21.3	10.6	
C2-Fluoranthene/Pyrene	1,360		21.3	10.6	
C3-Fluoranthene/Pyrene	247		21.3	10.6	
C0-Benz(a)anthracene/Chrysene	3,820		21.3	10.6	
C1-Benz(a)anthracene/Chrysene	1,220		21.3	10.6	
C2-Benz(a)anthracene/Chrysene	414		21.3	10.6	
C3-Benz(a)anthracene/Chrysene	73.3		21.3	10.6	
C4-Benz(a)anthracene/Chrysene	57.5		21.3	10.6	

EXTRACTION SURROGATE COMPOUNDS:	%R	Min	Max
Fluorobenzene	NS	50%	150%
2-Fluorobiphenyl	NS	50%	120%
5a-Androstane	NS	50%	120%

Qualifiers:

B	Analyte detected in the blank
D	Analyte reported from a diluted extract
U	Undetected above the detection limit
J	Estimated value detected between the reporting and detection limits
E	Estimated value detected above calibration range
RL	Reporting limit is the sample equivalent of the lowest linear calibration concentration
EDL	Estimated detection limit is 50% of the RL

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

		Preparation Method:	EPA 3580
Field ID:	**MW-10B**	Cleanup Method(s):	
Client:	GTI	Analysis Method:	GC/MS (EPA 8260/8270 Mod.)
Project:	Ashland Phase II	Matrix:	NAPL
		Preservation:	None
Lab ID:	IG020405-02	Decanted:	No
File ID:	10APR12.D		
		Sample Size:	0.0126 g
Date Sampled:	4/4/02	%Solid:	100%
Date Received:	4/5/02	Extract Volume:	2 mL
Date Prepared:	4/5/02	Prep DF:	1
Date Cleanup:		Analysis DF:	1
Date Analyzed:	10 Apr 2002 6:47 pm	Injection Volume:	0.001 mL
Instrument:	HP_5972		
Operator:	kty	Batch QC:	IG020405-MB

Analyte:	Concentration mg/kg	Q	RL mg/kg	EDL mg/kg	Comments
PAH COMPOUNDS:					
Benzene	7,160		15.9	7.94	
Toluene	14,600		15.9	7.94	
Ethylbenzene	2,170		15.9	7.94	
m/p-Xylenes	10,200		15.9	7.94	
Styrene	13,000		15.9	7.94	
o-Xylene	5,130		15.9	7.94	
1,2,4-Trimethylbenzene	6,350		15.9	7.94	
Naphthalene	92,300	D	15.9	7.94	
2-Methylnaphthalene	55,600	D	15.9	7.94	
1-Methylnaphthalene	35,000	D	15.9	7.94	
Acenaphthylene	15,200		15.9	7.94	
Acenaphthene	1,540		15.9	7.94	
Dibenzofuran	2,960		15.9	7.94	
Fluorene	6,220		15.9	7.94	
Phenanthrene	14,000		15.9	7.94	
Anthracene	5,350		15.9	7.94	
Fluoranthene	4,820		15.9	7.94	
Pyrene	6,090		15.9	7.94	
Benz[a]anthracene	2,980		15.9	7.94	
Chrysene	2,500		15.9	7.94	
Benzo[b]fluoranthene	1,380		15.9	7.94	
Benzo[k]fluoranthene	1,780		15.9	7.94	
Benzo[a]pyrene	2,680		15.9	7.94	
Indeno[1,2,3-cd]pyrene	1,070		15.9	7.94	
Dibenz[a,h]anthracene	370		15.9	7.94	
Benzo[g,h,i]perylene	1,180		15.9	7.94	
ALKYLATED PAHs:					
C0-Benzene	7,160		15.9	7.94	
C1-Benzene	17,300		15.9	7.94	
C2-Benzene	20,300		15.9	7.94	
C3-Benzene	14,000		15.9	7.94	
C4-Benzene	7,370		15.9	7.94	
C5-Benzene	1,410		15.9	7.94	
C0-Naphthalene	92,300	D	15.9	7.94	
C1-Naphthalene	50,600	D	15.9	7.94	
C2-Naphthalene	24,900		15.9	7.94	
C3-Naphthalene	4,680		15.9	7.94	
C4-Naphthalene	1,190		15.9	7.94	

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

		Preparation Method:	EPA 3580
Field ID:	**MW-10B**	Cleanup Method(s):	
Client:	GTI	Analysis Method:	GC/MS (EPA 8260/8270 Mod.)
Project:	Ashland Phase II	Matrix:	NAPL
		Preservation:	None
Lab ID:	IG020405-02	Decanted:	No
File ID:	10APR12.D		
		Sample Size:	0.0126 g
Date Sampled:	4/4/02	%Solid:	100%
Date Received:	4/5/02	Extract Volume:	2 mL
Date Prepared:	4/5/02	Prep DF:	1
Date Cleanup:		Analysis DF:	1
Date Analyzed:	10 Apr 2002 6:47 pm	Injection Volume:	0.001 mL
Instrument:	HP_5972		
Operator:	kty	Batch QC:	IG020405-MB

Analyte:	Concentration mg/kg	Q	RL mg/kg	EDL mg/kg	Comments
C0-Fluorene	6,220		15.9	7.94	
C1-Fluorene	6,320		15.9	7.94	
C2-Fluorene	1,440		15.9	7.94	
C3-Fluorene	303		15.9	7.94	
C0-Phenanthrene/Anthracene	19,500	D	15.9	7.94	
C1-Phenanthrene/Anthracene	10,200		15.9	7.94	
C2-Phenanthrene/Anthracene	2,630		15.9	7.94	
C3-Phenanthrene/Anthracene	529		15.9	7.94	
C4-Phenanthrene/Anthracene	101		15.9	7.94	
C0-Dibenzothiophene	2,590		15.9	7.94	
C1-Dibenzothiophene	2,030		15.9	7.94	
C2-Dibenzothiophene	1,170		15.9	7.94	
C3-Dibenzothiophene	354		15.9	7.94	
C0-Fluoranthene/Pyrene	14,600		15.9	7.94	
C1-Fluoranthene/Pyrene	6,180		15.9	7.94	
C2-Fluoranthene/Pyrene	2,000		15.9	7.94	
C3-Fluoranthene/Pyrene	364		15.9	7.94	
C0-Benz(a)anthracene/Chrysene	5,500		15.9	7.94	
C1-Benz(a)anthracene/Chrysene	1,870		15.9	7.94	
C2-Benz(a)anthracene/Chrysene	629		15.9	7.94	
C3-Benz(a)anthracene/Chrysene	130		15.9	7.94	
C4-Benz(a)anthracene/Chrysene	43.9		15.9	7.94	

EXTRACTION SURROGATE COMPOUNDS:	%R	Min	Max
Fluorobenzene	NS	50%	150%
2-Fluorobiphenyl	NS	50%	120%
5a-Androstane	NS	50%	120%

Qualifiers:

B	Analyte detected in the blank
D	Analyte reported from a diluted extract
U	Undetected above the detection limit
J	Estimated value detected between the reporting and detection limits
E	Estimated value detected above calibration range
RL	Reporting limit is the sample equivalent of the lowest linear calibration concentration
EDL	Estimated detection limit is 50% of the RL

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

Field ID: **Method Blank**

Client:	GTI
Project:	Ashland Phase II
Lab ID:	IG020405-MB
File ID:	10APR08.D
Date Sampled:	
Date Received:	
Date Prepared:	4/5/02
Date Cleanup:	
Date Analyzed:	10 Apr 2002 2:10 pm
Instrument:	HP_5972
Operator:	kty

Preparation Method:	EPA 3580	
Cleanup Method(s):		
Analysis Method:	GC/MS (EPA 8260/8270 Mod.)	
Matrix:	NAPL	
Preservation:	None	
Decanted:	No	
Sample Size:	0.01	g
%Solid:	100%	
Extract Volume:	2	mL
Prep DF:	1	
Analysis DF:	1	
Injection Volume:	0.001	mL
Batch QC:	IG020405-MB	

Analyte:	Concentration mg/kg	Q	RL mg/kg	EDL mg/kg	Comments
PAH COMPOUNDS:					
Benzene		U	20.0	10.0	
Toluene		U	20.0	10.0	
Ethylbenzene		U	20.0	10.0	
m/p-Xylenes		U	20.0	10.0	
Styrene		U	20.0	10.0	
o-Xylene		U	20.0	10.0	
1,2,4-Trimethylbenzene		U	20.0	10.0	
Naphthalene		U	20.0	10.0	
2-Methylnaphthalene		U	20.0	10.0	
1-Methylnaphthalene		U	20.0	10.0	
Acenaphthylene		U	20.0	10.0	
Acenaphthene		U	20.0	10.0	
Dibenzofuran		U	20.0	10.0	
Fluorene		U	20.0	10.0	
Phenanthrene		U	20.0	10.0	
Anthracene		U	20.0	10.0	
Fluoranthene		U	20.0	10.0	
Pyrene		U	20.0	10.0	
Benz[a]anthracene		U	20.0	10.0	
Chrysene		U	20.0	10.0	
Benzo[b]fluoranthene		U	20.0	10.0	
Benzo[k]fluoranthene		U	20.0	10.0	
Benzo[a]pyrene		U	20.0	10.0	
Indeno[1,2,3-cd]pyrene		U	20.0	10.0	
Dibenz[a,h]anthracene		U	20.0	10.0	
Benzo[g,h,i]perylene		U	20.0	10.0	
ALKYLATED PAHs:					
C0-Benzene		U	20.0	10.0	
C1-Benzene		U	20.0	10.0	
C2-Benzene		U	20.0	10.0	
C3-Benzene		U	20.0	10.0	
C4-Benzene		U	20.0	10.0	
C5-Benzene		U	20.0	10.0	
C0-Naphthalene		U	20.0	10.0	
C1-Naphthalene		U	20.0	10.0	
C2-Naphthalene		U	20.0	10.0	
C3-Naphthalene		U	20.0	10.0	
C4-Naphthalene		U	20.0	10.0	

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

Field ID:	**Method Blank**	Preparation Method:	EPA 3580
		Cleanup Method(s):	
Client:	GTI	Analysis Method:	GC/MS (EPA 8260/8270 Mod.)
Project:	Ashland Phase II	Matrix:	NAPL
		Preservation:	None
Lab ID:	IG020405-MB	Decanted:	No
File ID:	10APR08.D		
		Sample Size:	0.01 g
Date Sampled:		%Solid:	100%
Date Received:		Extract Volume:	2 mL
Date Prepared:	4/5/02	Prep DF:	1
Date Cleanup:		Analysis DF:	1
Date Analyzed:	10 Apr 2002 2:10 pm	Injection Volume:	0.001 mL
Instrument:	HP_5972		
Operator:	kty	Batch QC:	IG020405-MB

Analyte:	Concentration mg/kg	Q	RL mg/kg	EDL mg/kg	Comments
C0-Fluorene		U	20.0	10.0	
C1-Fluorene		U	20.0	10.0	
C2-Fluorene		U	20.0	10.0	
C3-Fluorene		U	20.0	10.0	
C0-Phenanthrene/Anthracene		U	20.0	10.0	
C1-Phenanthrene/Anthracene		U	20.0	10.0	
C2-Phenanthrene/Anthracene		U	20.0	10.0	
C3-Phenanthrene/Anthracene		U	20.0	10.0	
C4-Phenanthrene/Anthracene		U	20.0	10.0	
C0-Dibenzothiophene		U	20.0	10.0	
C1-Dibenzothiophene		U	20.0	10.0	
C2-Dibenzothiophene		U	20.0	10.0	
C3-Dibenzothiophene		U	20.0	10.0	
C0-Fluoranthene/Pyrene		U	20.0	10.0	
C1-Fluoranthene/Pyrene		U	20.0	10.0	
C2-Fluoranthene/Pyrene		U	20.0	10.0	
C3-Fluoranthene/Pyrene		U	20.0	10.0	
C0-Benz(a)anthracene/Chrysene		U	20.0	10.0	
C1-Benz(a)anthracene/Chrysene		U	20.0	10.0	
C2-Benz(a)anthracene/Chrysene		U	20.0	10.0	
C3-Benz(a)anthracene/Chrysene		U	20.0	10.0	
C4-Benz(a)anthracene/Chrysene		U	20.0	10.0	

EXTRACTION SURROGATE COMPOUNDS:	%R	Min	Max
Fluorobenzene	NS	50%	150%
2-Fluorobiphenyl	NS	50%	120%
5a-Androstane	NS	50%	120%

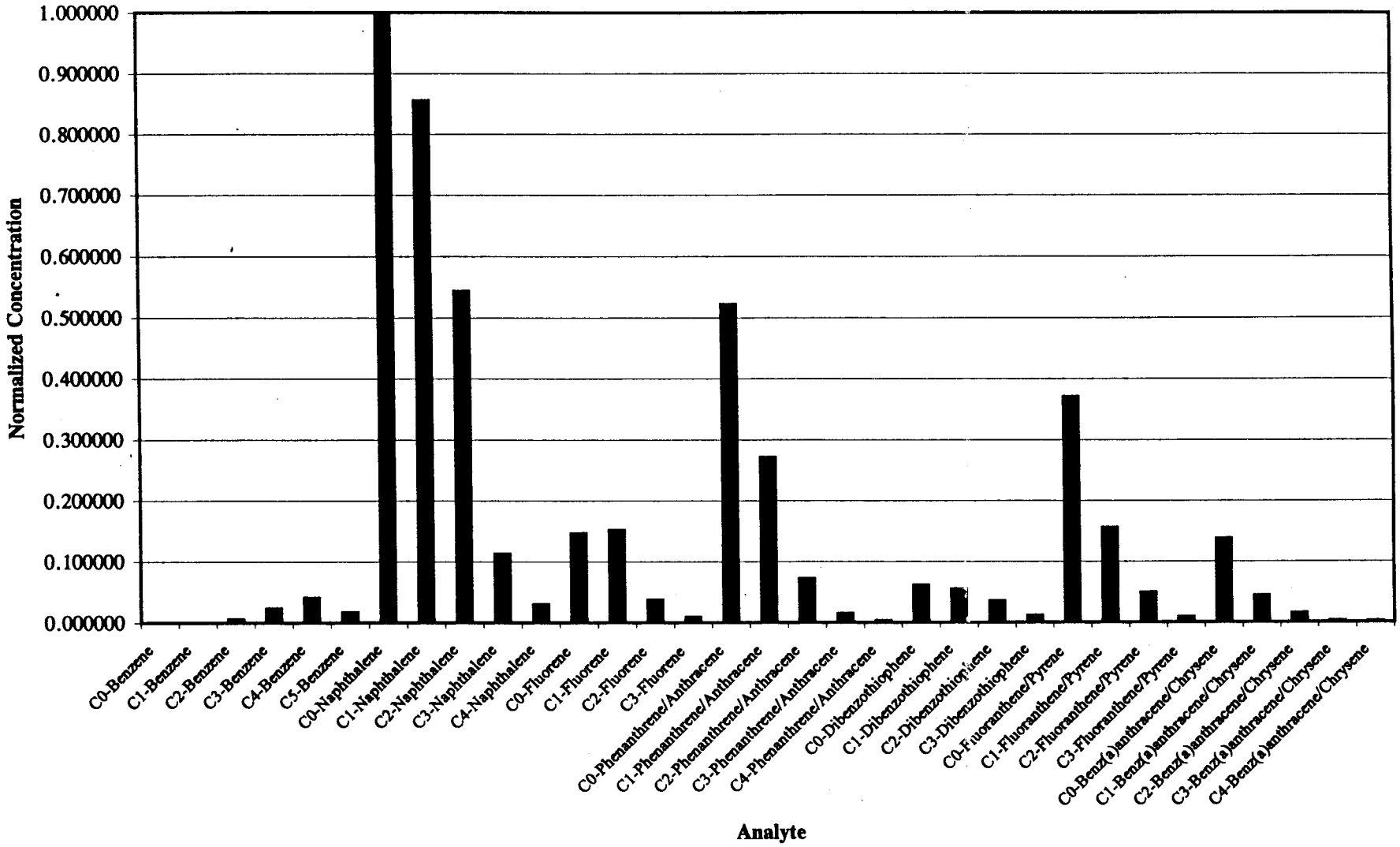
Qualifiers:

B	Analyte detected in the blank
D	Analyte reported from a diluted extract
U	Undetected above the detection limit
J	Estimated value detected between the reporting and detection limits
E	Estimated value detected above calibration range
RL	Reporting limit is the sample equivalent of the lowest linear calibration concentration
EDL	Estimated detection limit is 50% of the RL

Appendix D

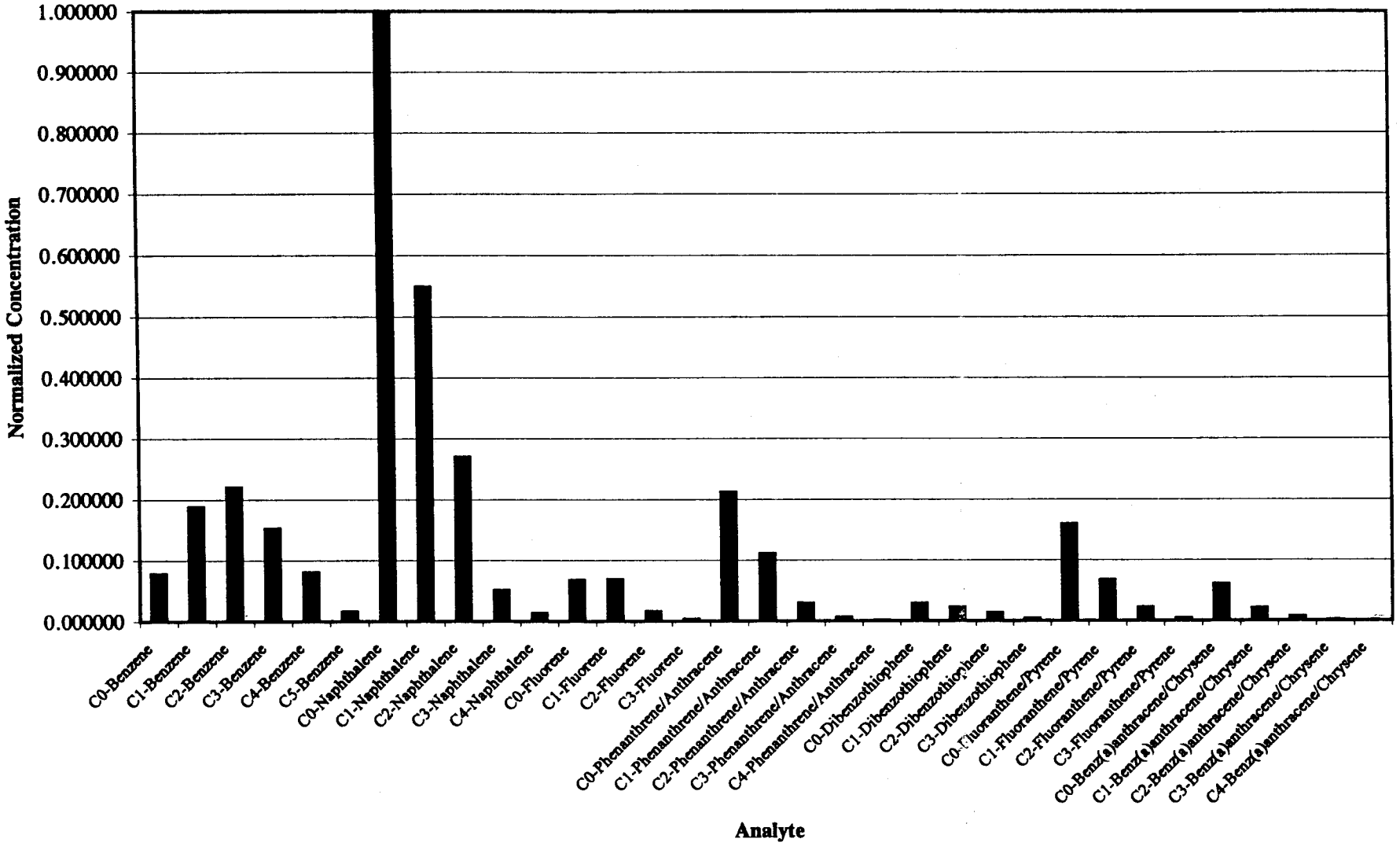
Extended PAH Profiles - Bar Graphs

MW-21A


Normalized Concentration
1.000000
0.900000
0.800000
0.700000
0.600000
0.500000
0.400000
0.300000
0.200000
0.100000
0.000000
C0-Benzene
C1-Benzene
C2-Benzene
C3-Benzene
C4-Benzene
C5-Benzene
C0-Naphthalene
C1-Naphthalene
C2-Naphthalene
C3-Naphthalene
C4-Naphthalene
C0-Fluorene
C1-Fluorene
C2-Fluorene
C3-Fluorene
C0-Phenanthrene/Anthracene
C1-Phenanthrene/Anthracene
C2-Phenanthrene/Anthracene
C3-Phenanthrene/Anthracene
C4-Phenanthrene/Anthracene
C0-Dibenzothiophene
C1-Dibenzothiophene
C2-Dibenzothiophene
C3-Dibenzothiophene
C0-Fluoranthene/Pyrene
C1-Fluoranthene/Pyrene
C2-Fluoranthene/Pyrene
C3-Fluoranthene/Pyrene
C0-Benz(a)anthracene/Chrysene
C1-Benz(a)anthracene/Chrysene
C2-Benz(a)anthracene/Chrysene
C3-Benz(a)anthracene/Chrysene
C4-Benz(a)anthracene/Chrysene
Analyte

META

MW-10B

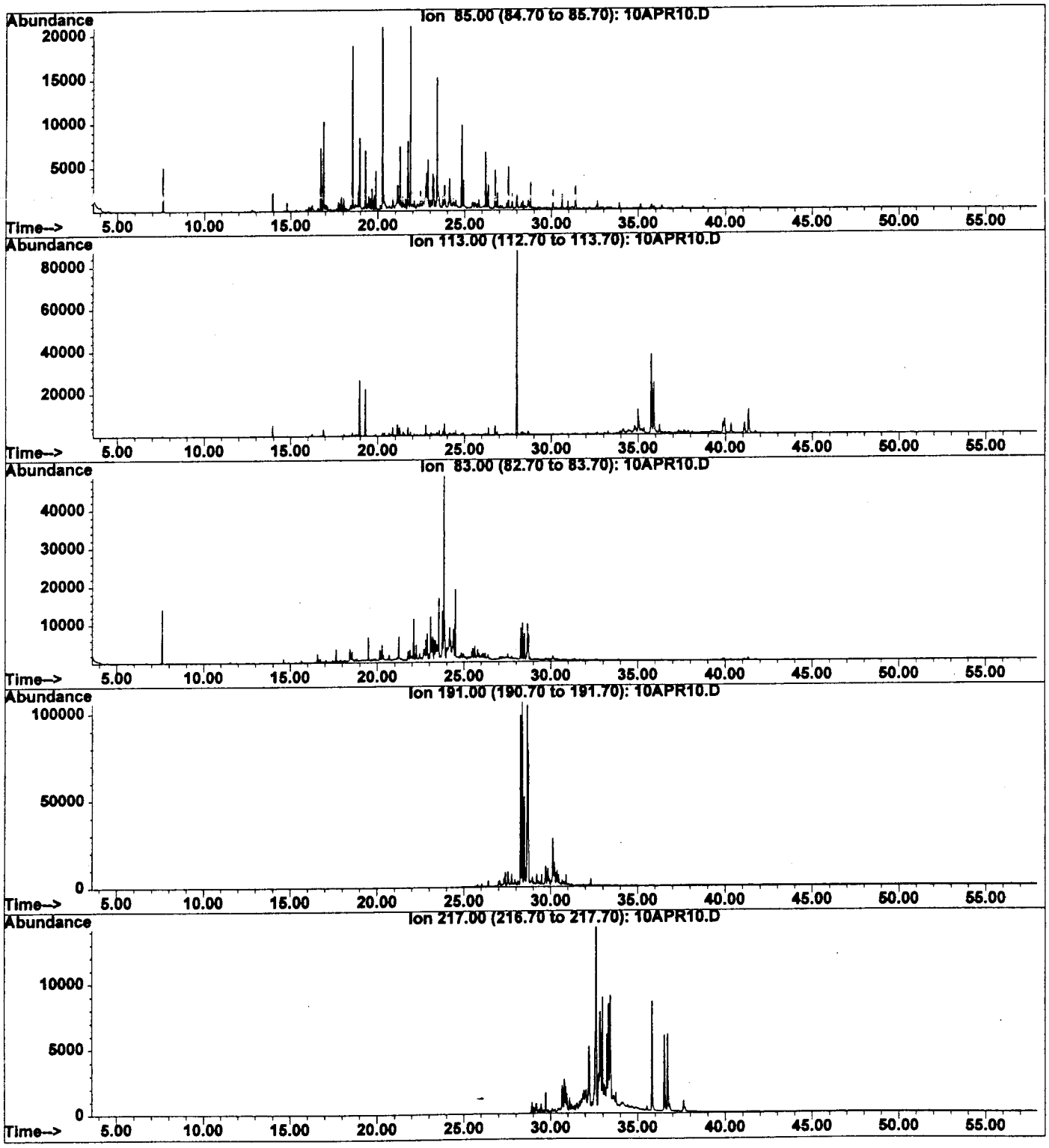

Normalized Concentration
1.000000
0.900000
0.800000
0.700000
0.600000
0.500000
0.400000
0.300000
0.200000
0.100000
0.000000
C0-Benzene
C1-Benzene
C2-Benzene
C3-Benzene
C4-Benzene
C5-Benzene
C0-Naphthalene
C1-Naphthalene
C2-Naphthalene
C3-Naphthalene
C4-Naphthalene
C0-Fluorene
C1-Fluorene
C2-Fluorene
C3-Fluorene
C0-Phenanthrene/Anthracene
C1-Phenanthrene/Anthracene
C2-Phenanthrene/Anthracene
C3-Phenanthrene/Anthracene
C4-Phenanthrene/Anthracene
C0-Dibenzothiophene
C1-Dibenzothiophene
C2-Dibenzothiophene
C3-Dibenzothiophene
C0-Fluoranthene/Pyrene
C1-Fluoranthene/Pyrene
C2-Fluoranthene/Pyrene
C3-Fluoranthene/Pyrene
C0-Benz(a)anthracene/Chrysene
C1-Benz(a)anthracene/Chrysene
C2-Benz(a)anthracene/Chrysene
C3-Benz(a)anthracene/Chrysene
C4-Benz(a)anthracene/Chrysene
Analyte

META

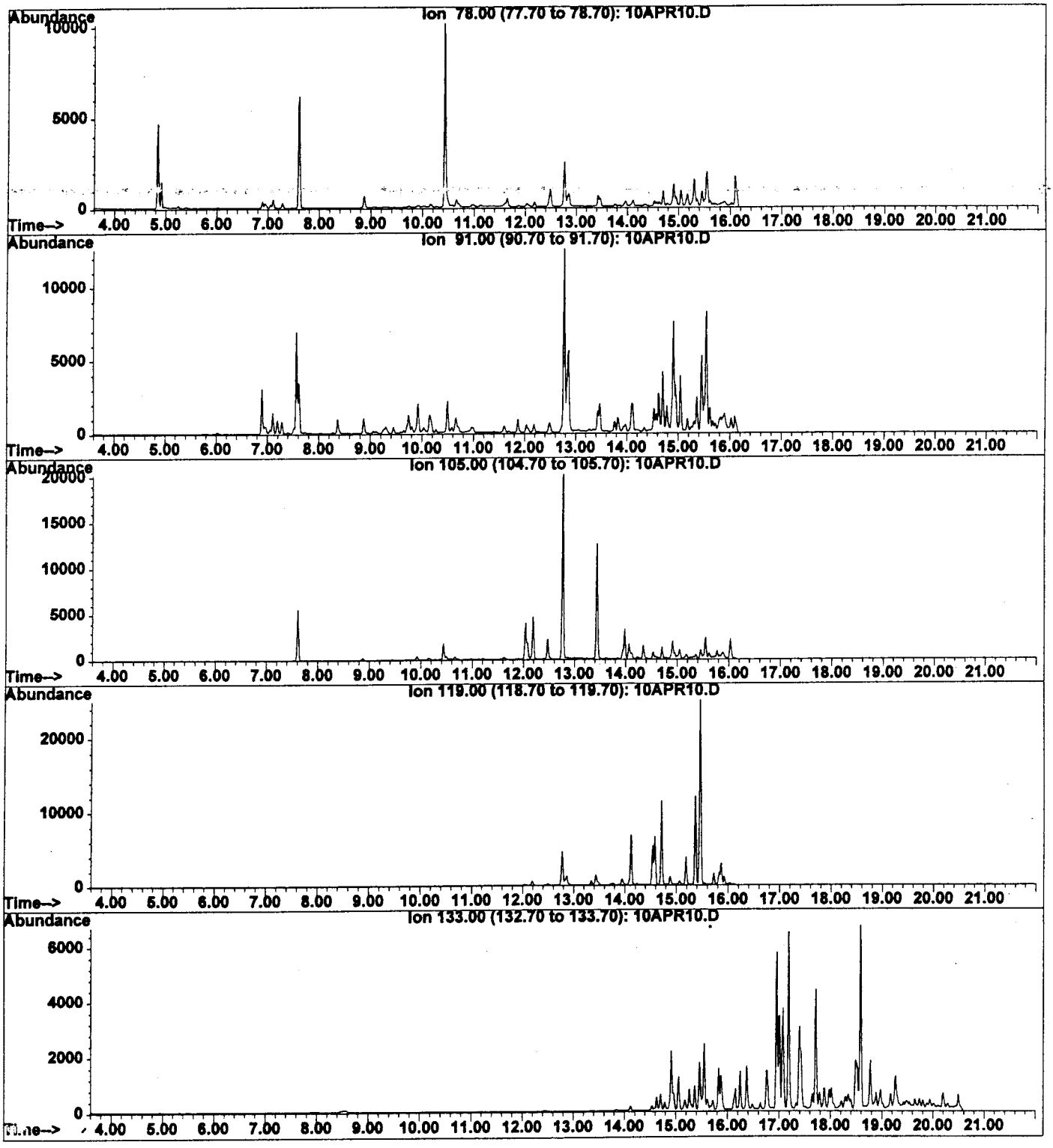
Appendix E

Extracted Ion Current Profiles (EICs)

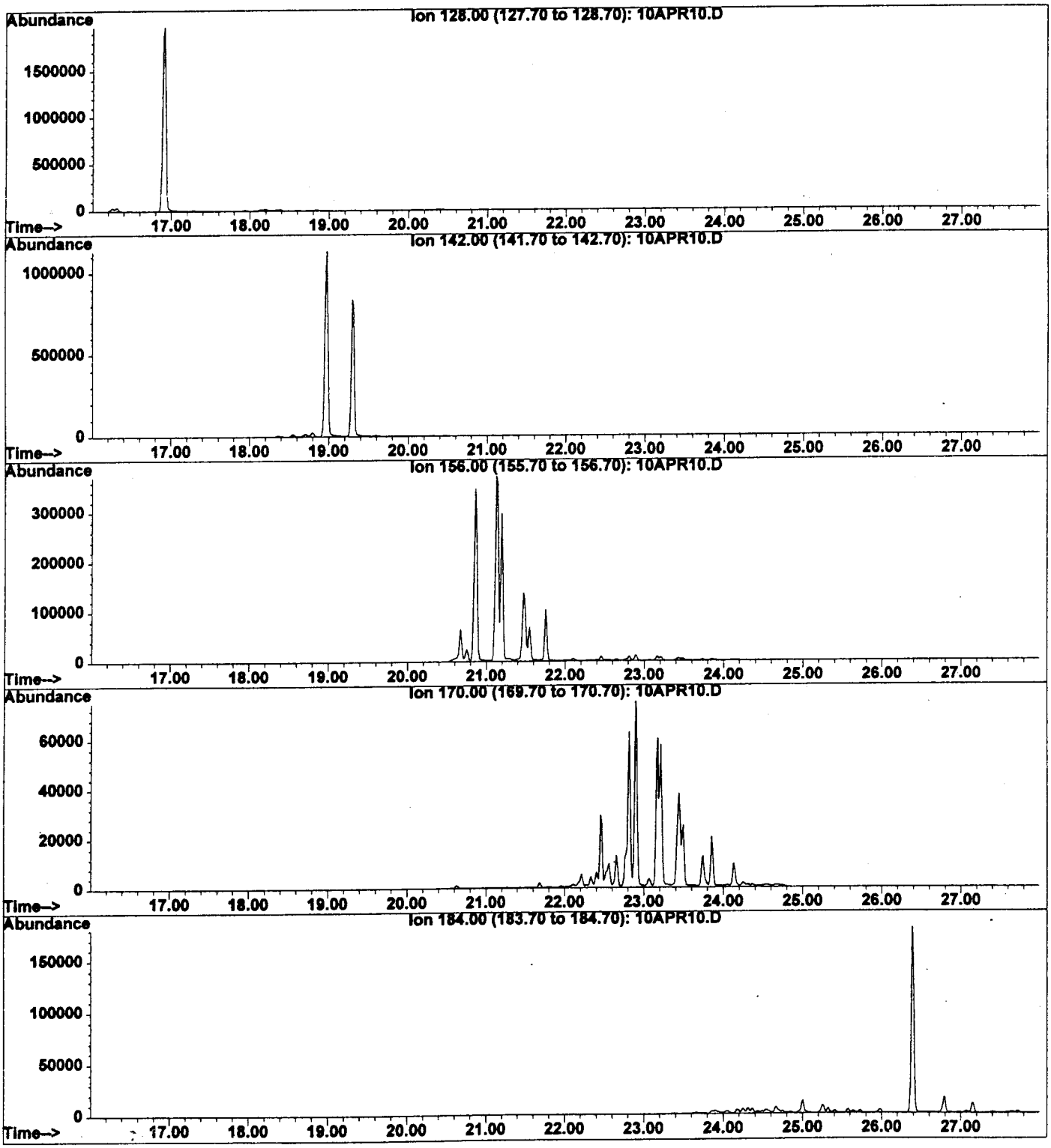
File : I:\1\DATA\020410\10APR10.D
Operator : kty
Acquired : 10 Apr 2002 4:28 pm using AcqMethod SIM4008A
Instrument : HP_5972
Sample Name: IG020405-01
Misc Info : ~~Soop (3.29.02)~~ MW-21A
Vial Number: 10



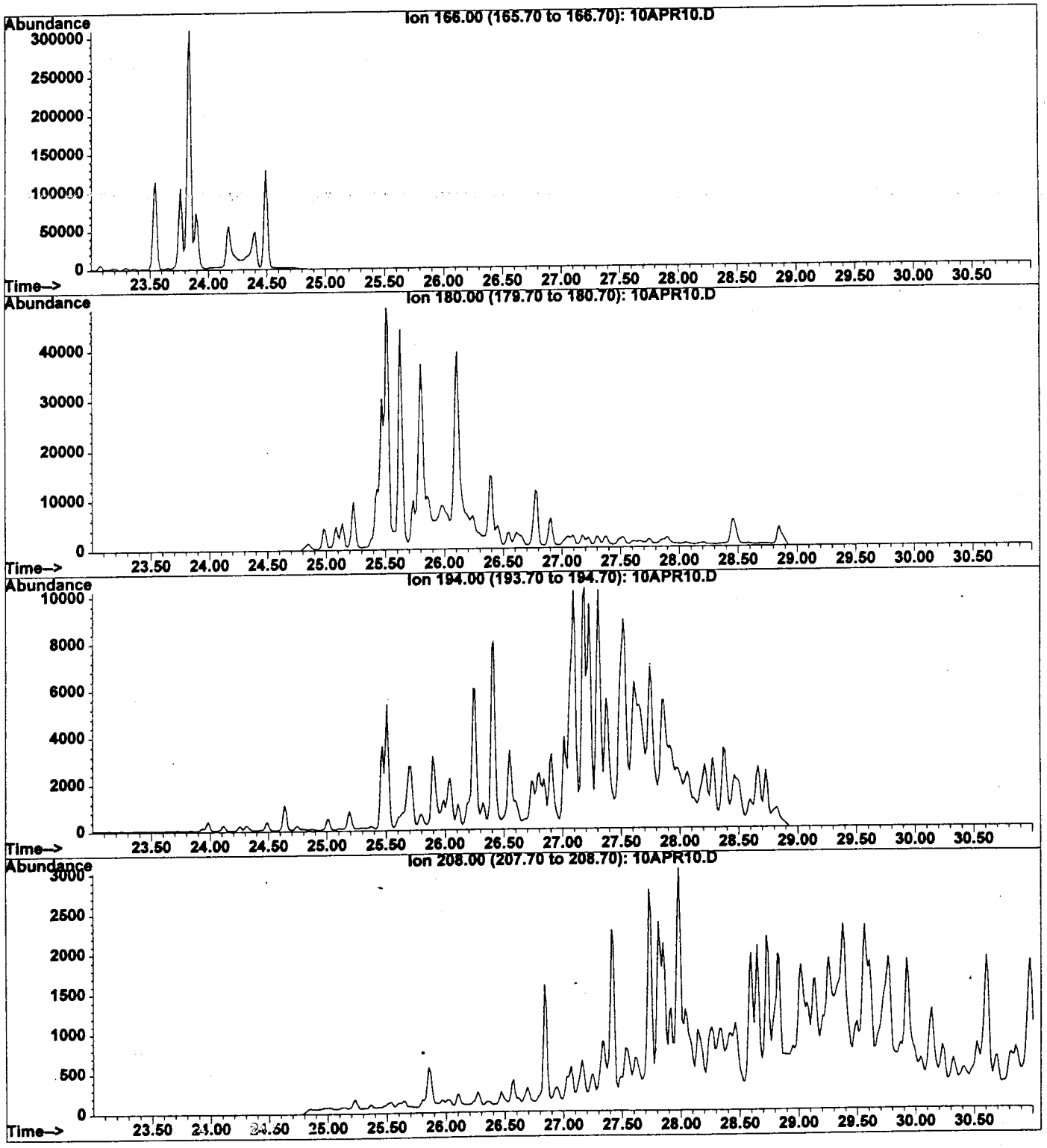
File : I:\1\DATA\020410\10APR10.D
Operator : kty
Acquired : 10 Apr 2002 4:28 pm using AcqMethod SIM4008A
Instrument : HP_5972
Sample Name: IG020405-01
Misc Info : ~~Seep (3.29.02)~~ MW-21A
Vial Number: 10



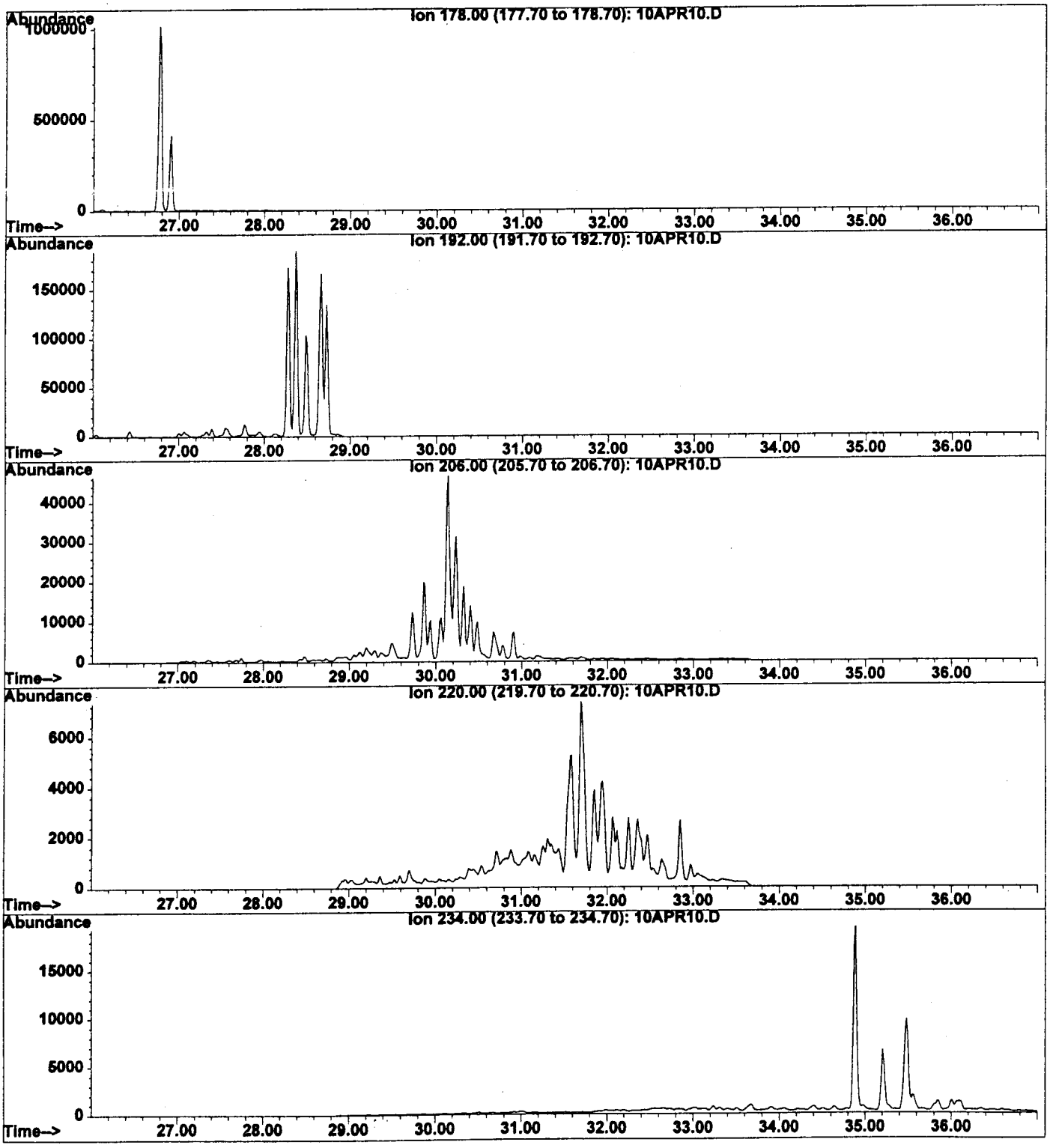
File : I:\1\DATA\020410\10APR10.D
Operator : kty
Acquired : 10 Apr 2002 4:28 pm using AcqMethod SIM4008A
Instrument : HP_5972
Sample Name: IG020405-01
Misc Info : ~~Seep (3.29.02)~~ MW-21A
Vial Number: 10



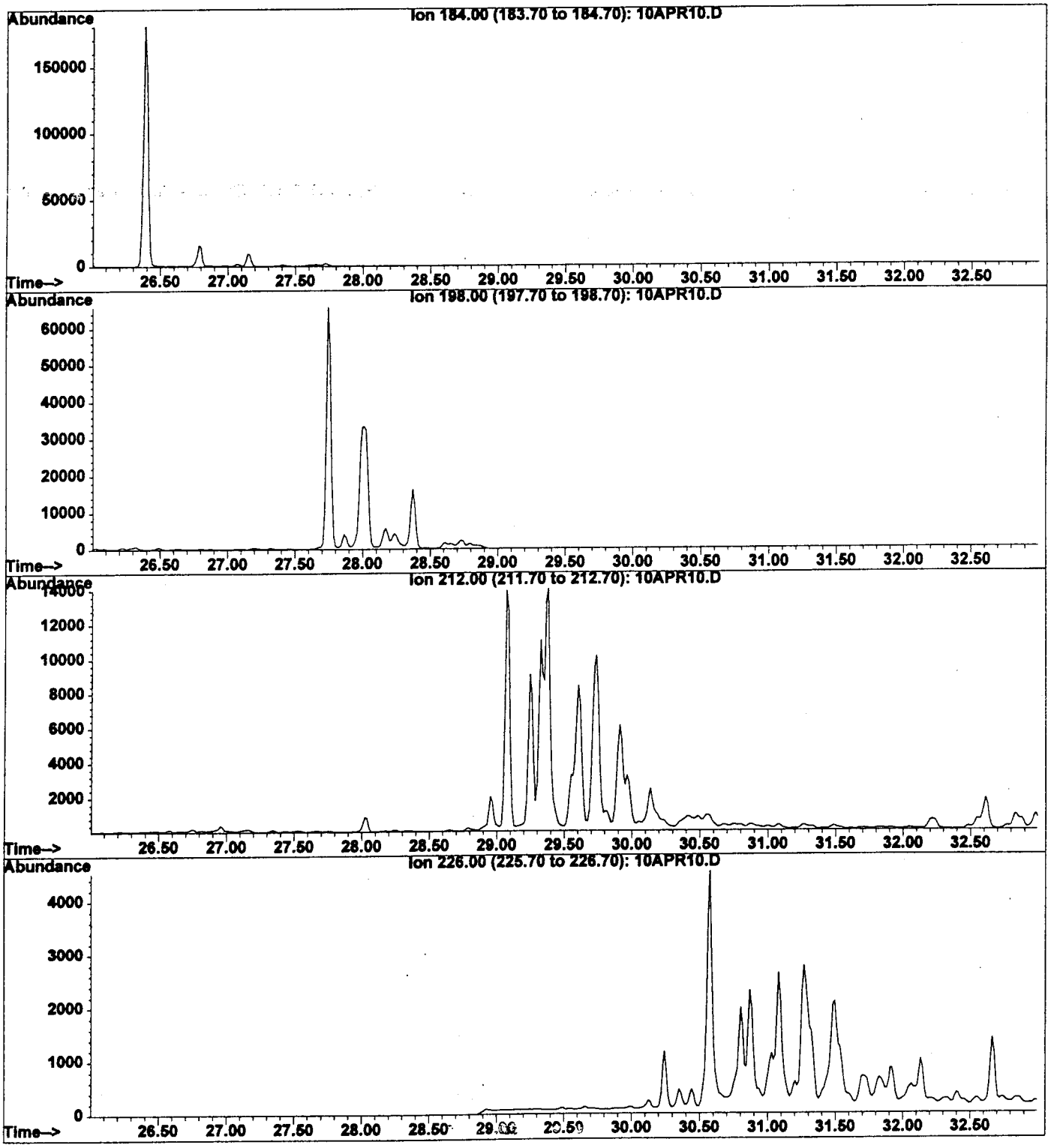
File : I:\1\DATA\020410\10APR10.D
Operator : kty
Acquired : 10 Apr 2002 4:28 pm using AcqMethod SIM4008A
Instrument : HP_5972
Sample Name: IG020405-01
Misc Info : ~~Seep (3.29.02)~~ MW-21A
Vial Number: 10



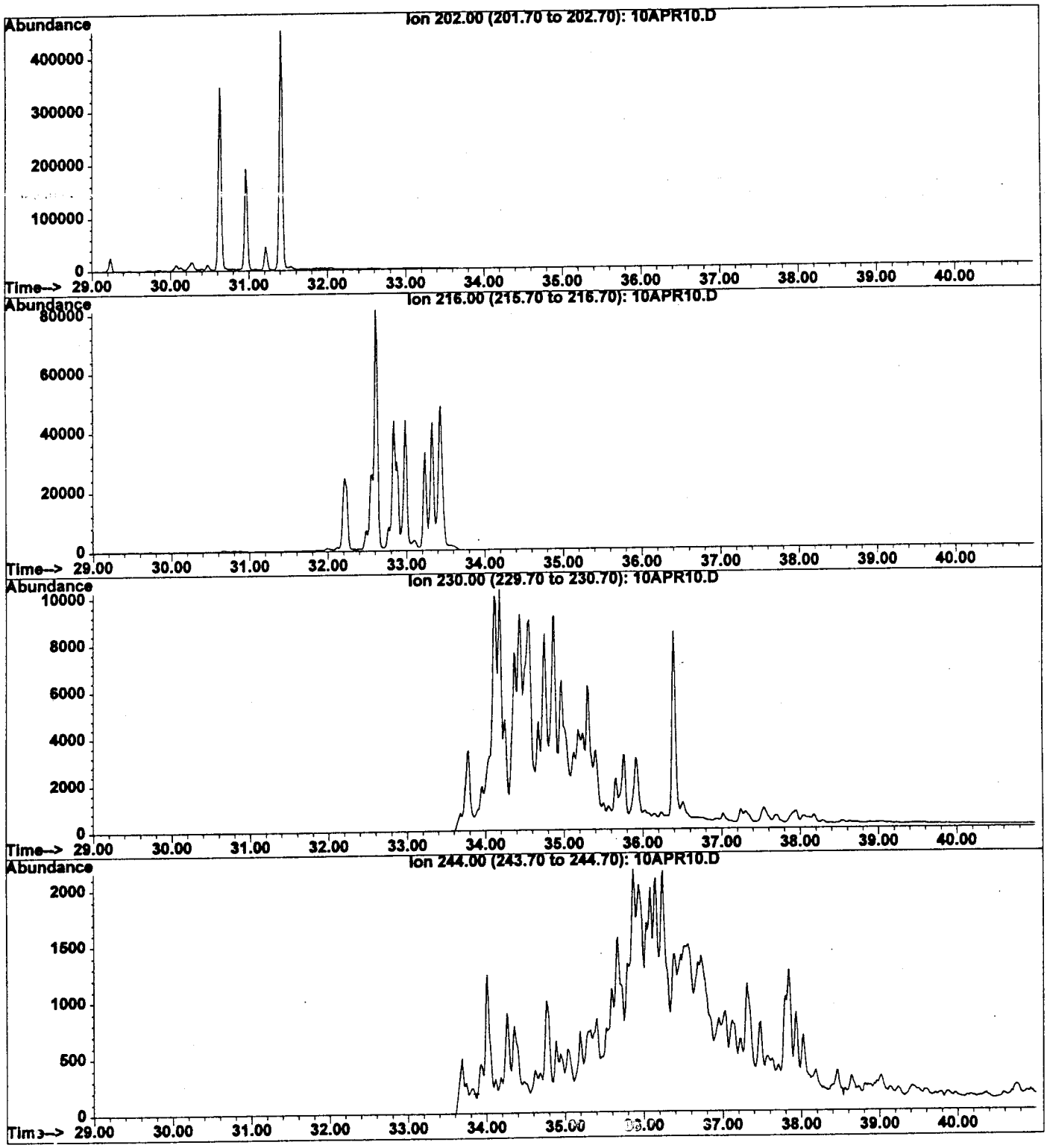
File : I:\1\DATA\020410\10APR10.D
Operator : kty
Acquired : 10 Apr 2002 4:28 pm using AcqMethod SIM4008A
Instrument : HP_5972
Sample Name: IG020405-01
Misc Info : ~~Seep (3.29.02)~~ MW-21A
Vial Number: 10



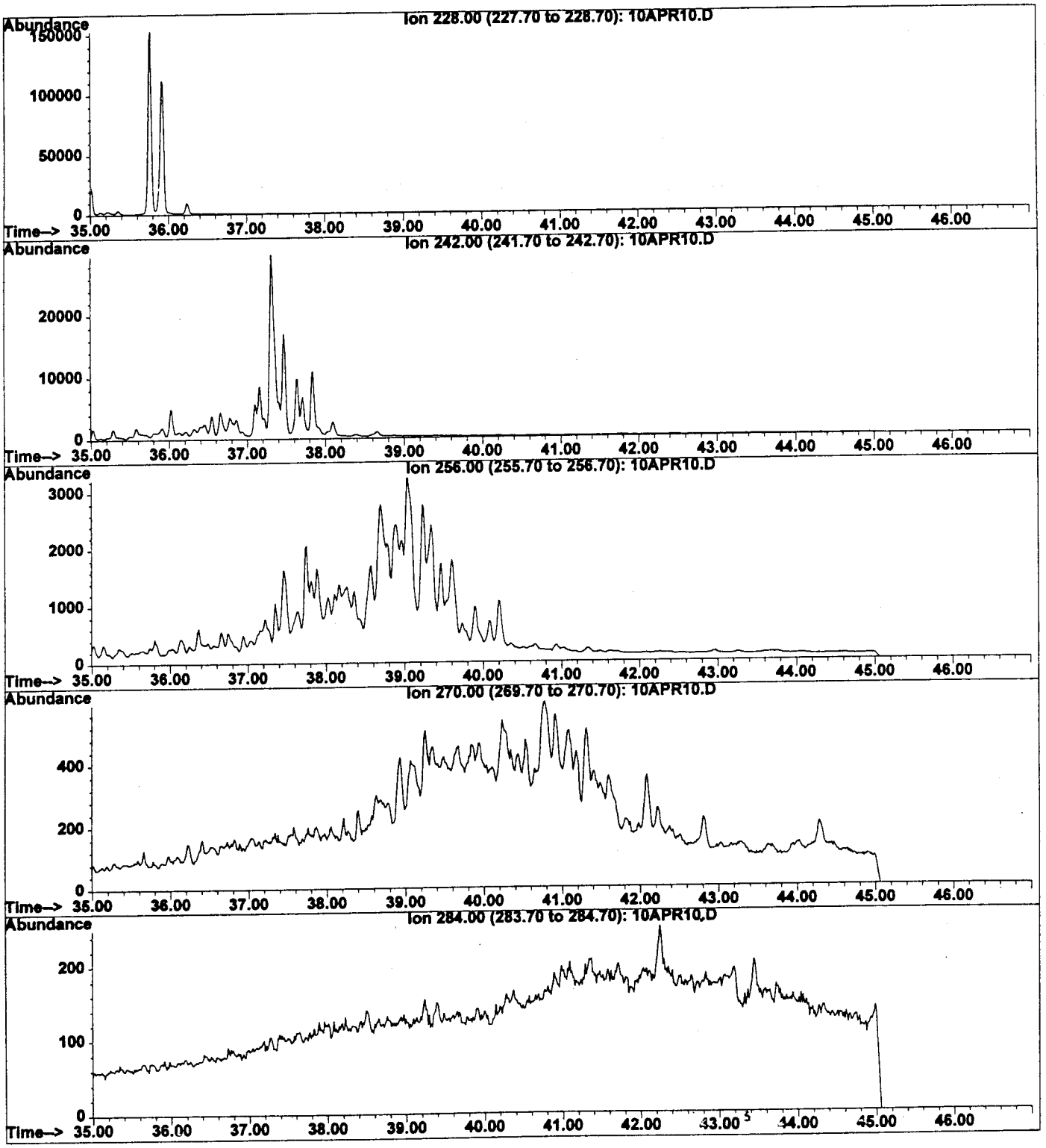
File : I:\1\DATA\020410\10APR10.D
Operator : kty
Acquired : 10 Apr 2002 4:28 pm using AcqMethod SIM4008A
Instrument : HP_5972
Sample Name: IG020405-01
Misc Info : ~~Soep (3.29.02)~~ NW-21A
Vial Number: 10



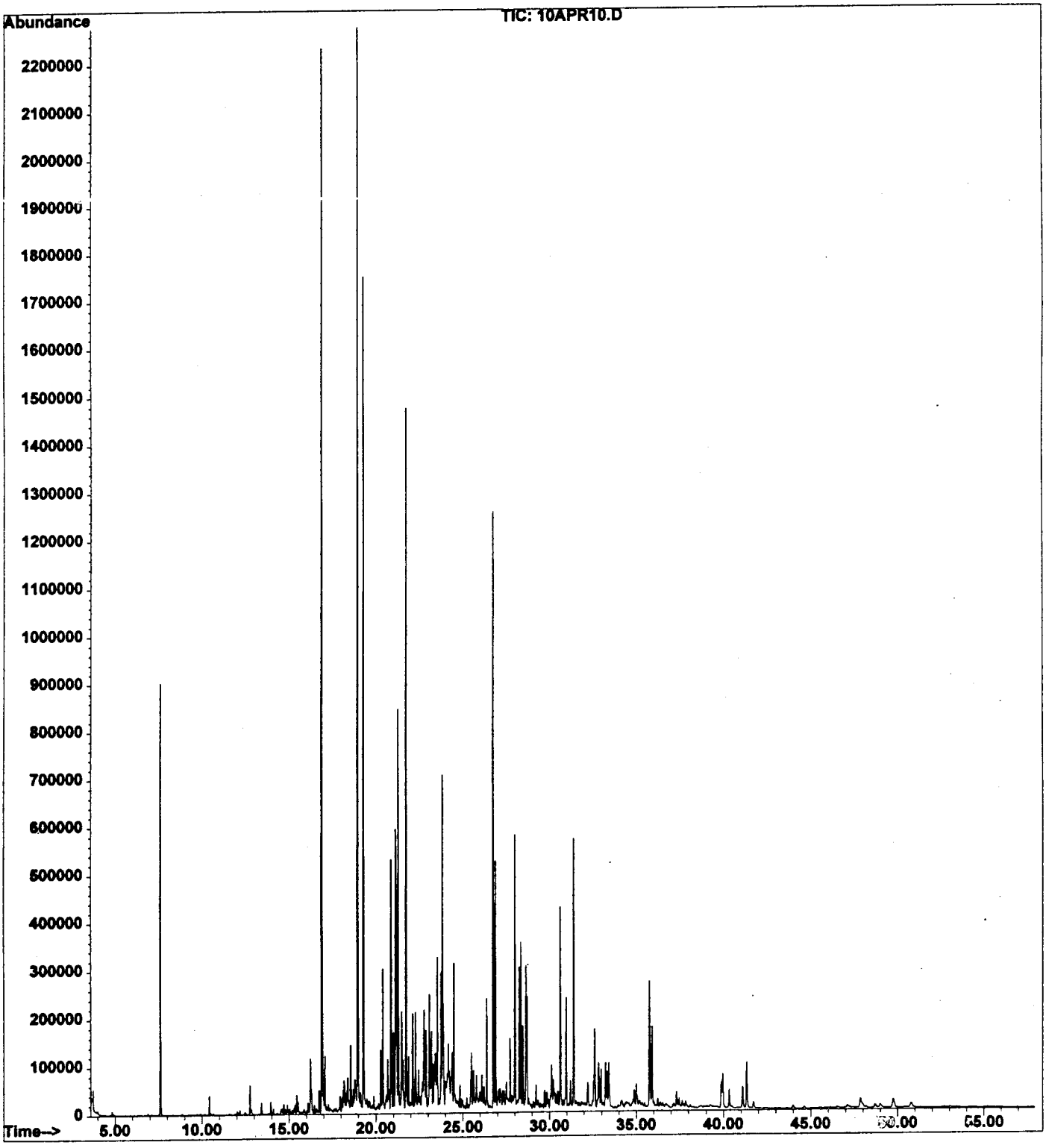
File : I:\1\DATA\020410\10APR10.D
Operator : kty
Acquired : 10 Apr 2002 4:28 pm using AcqMethod SIM4008A
Instrument : HP_5972
Sample Name: IG020405-01
Misc Info : ~~Seep (3.29.02)~~ MW-21A
Vial Number: 10



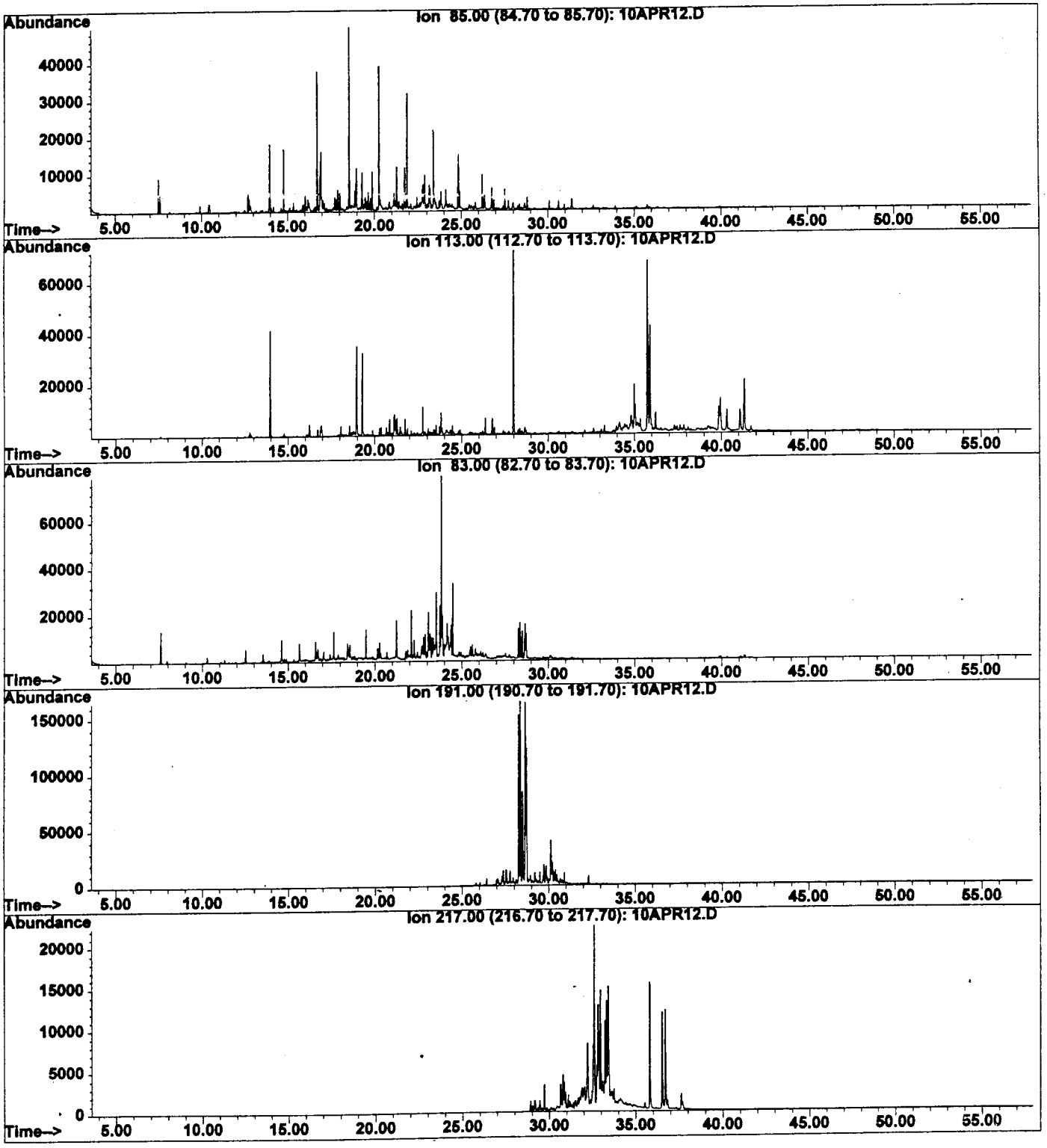
File : I:\1\DATA\020410\10APR10.D
Operator : kty
Acquired : 10 Apr 2002 4:28 pm using AcqMethod SIM4008A
Instrument : HP_5972
Sample Name: IG020405-01
Misc Info : ~~Seep (3.29.02)~~ MW-21A
Vial Number: 10



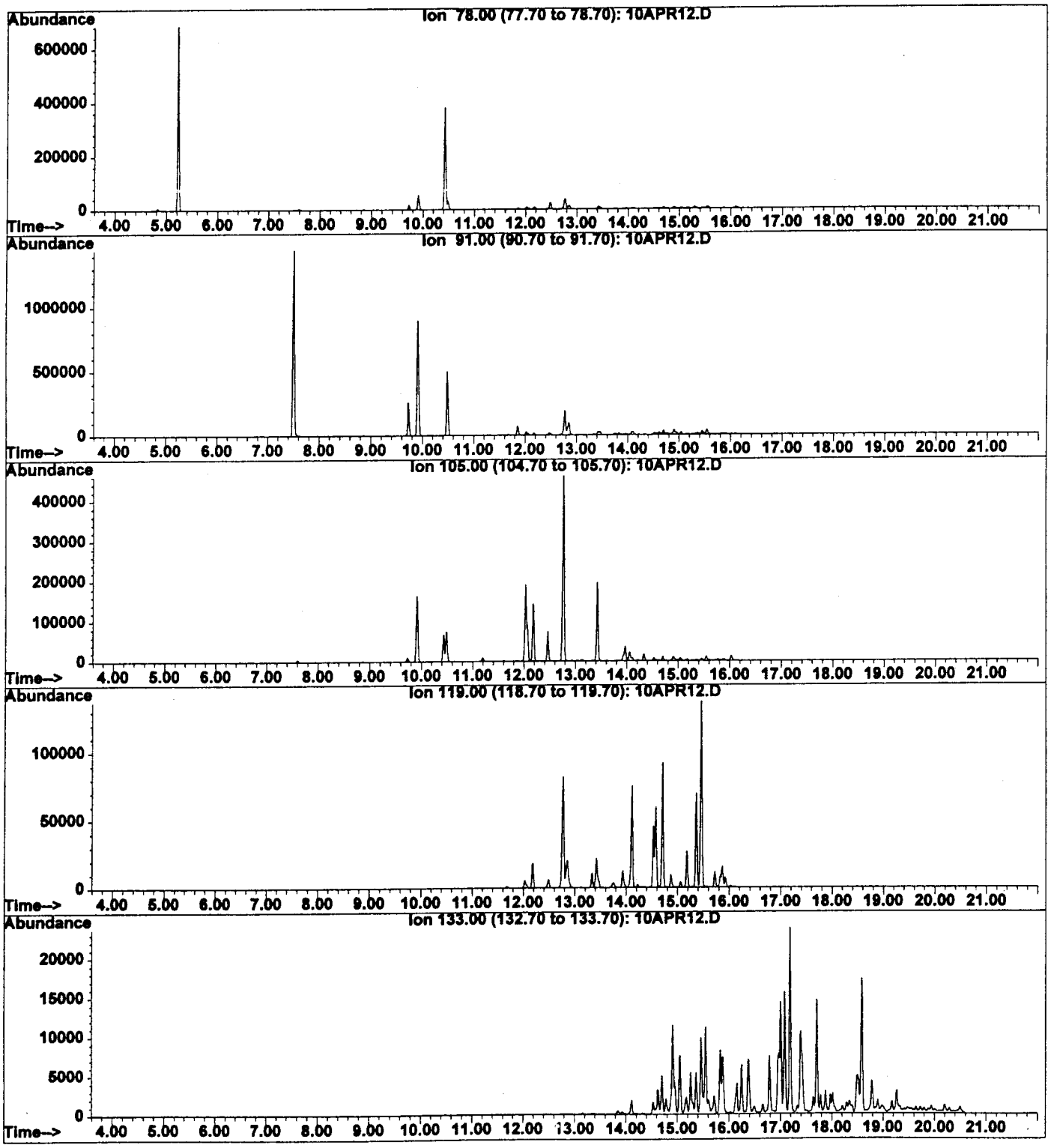
File : I:\1\DATA\020410\10APR10.D
Operator : kty
Acquired : 10 Apr 2002 4:28 pm using AcqMethod SIM4008A
Instrument : HP_5972
Sample Name: IG020405-01
Misc Info : ~~Seep (3.29.02)~~ MW-21A
Vial Number: 10



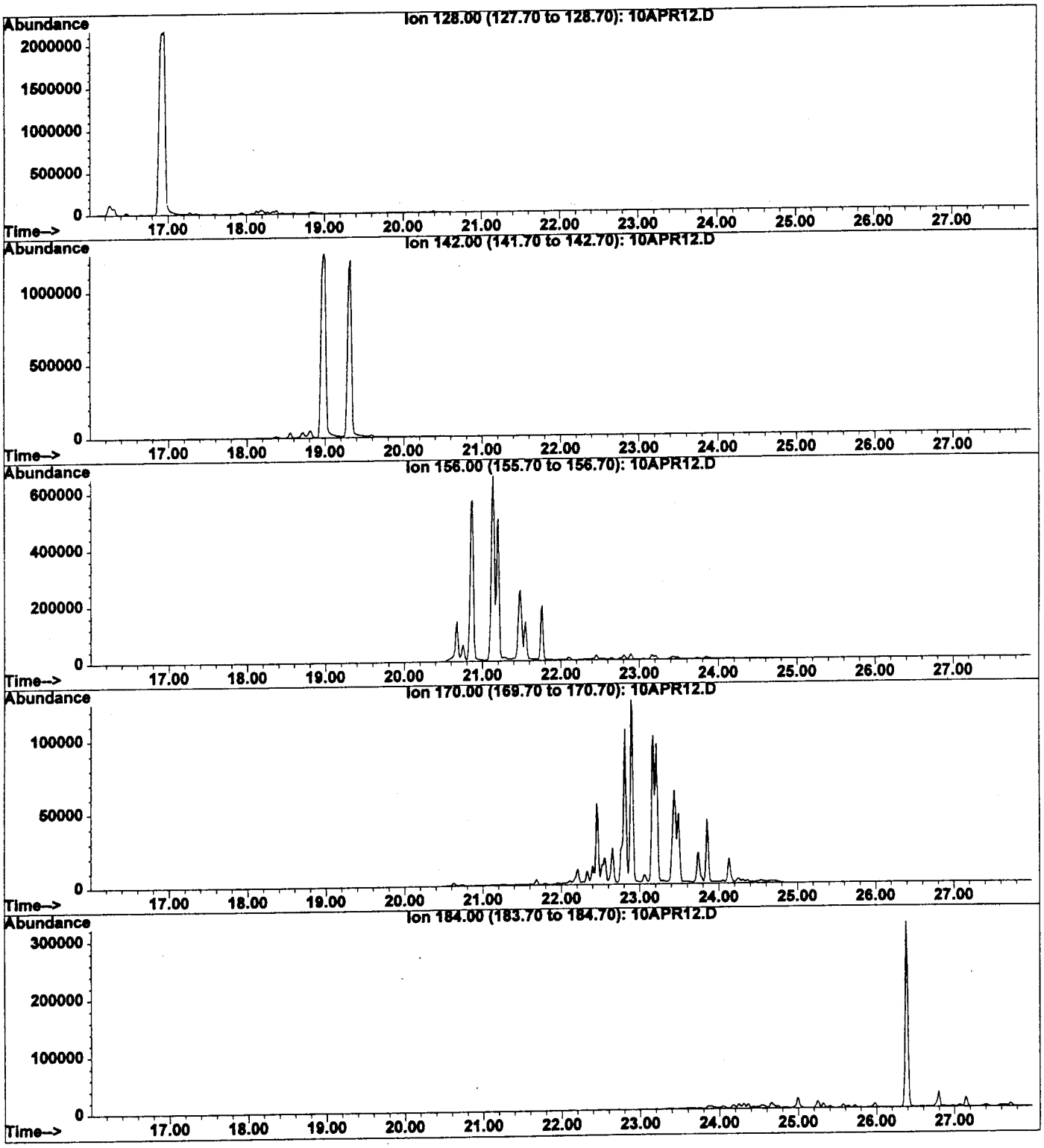
File : I:\1\DATA\020410\10APR12.D
Operator : kty
Acquired : 10 Apr 2002 6:47 pm using AcqMethod SIM4008A
Instrument : HP_5972
Sample Name: IG020405-02
Misc Info : ~~Seep (3.29.02)~~ MW-10B
Vial Number: 12



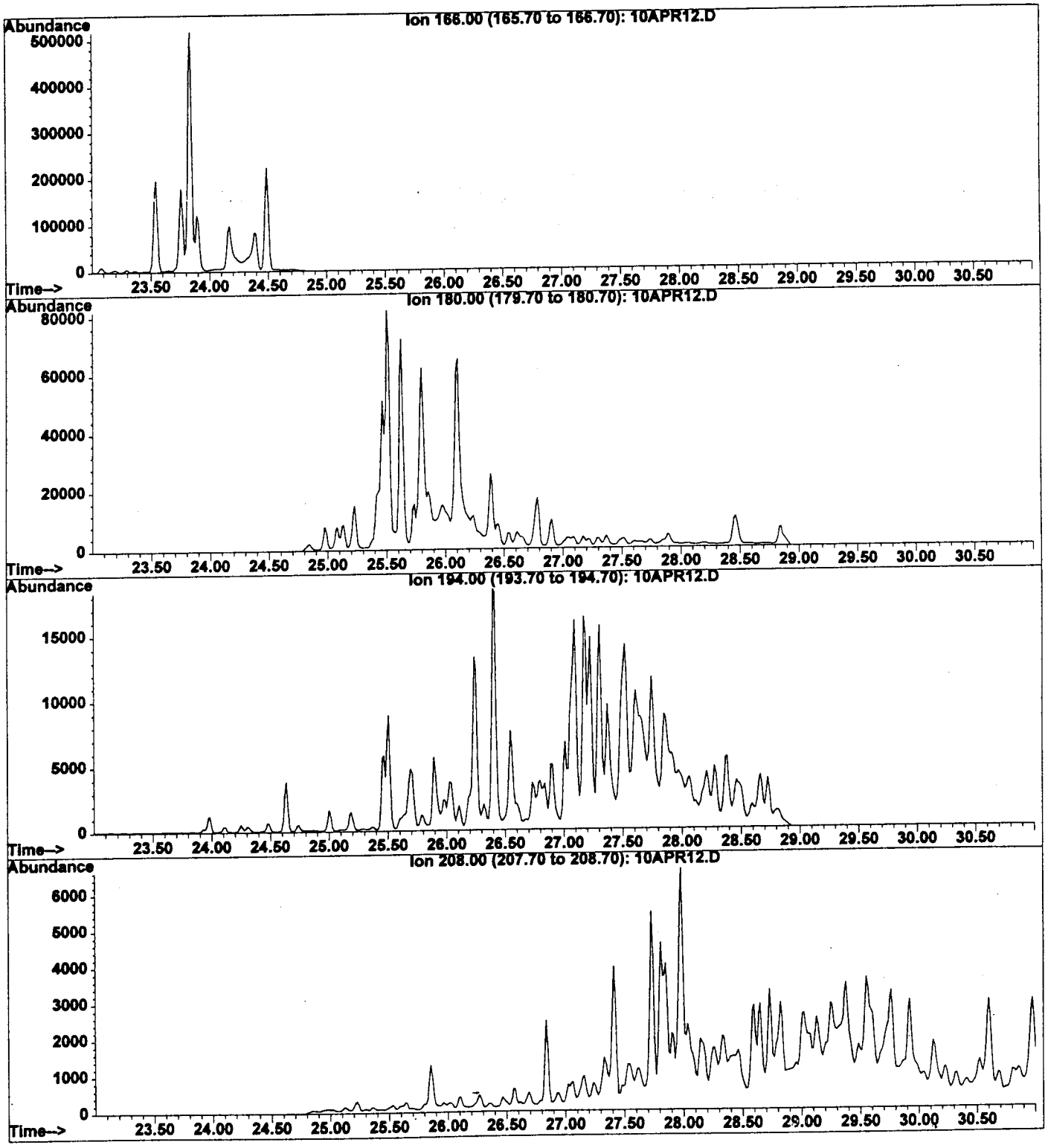
File : I:\1\DATA\020410\10APR12.D
Operator : kty
Acquired : 10 Apr 2002 6:47 pm using AcqMethod SIM4008A
Instrument : HP_5972
Sample Name: IG020405-02
Misc Info : ~~Seep (3.29.02)~~ MW-10B
Vial Number: 12



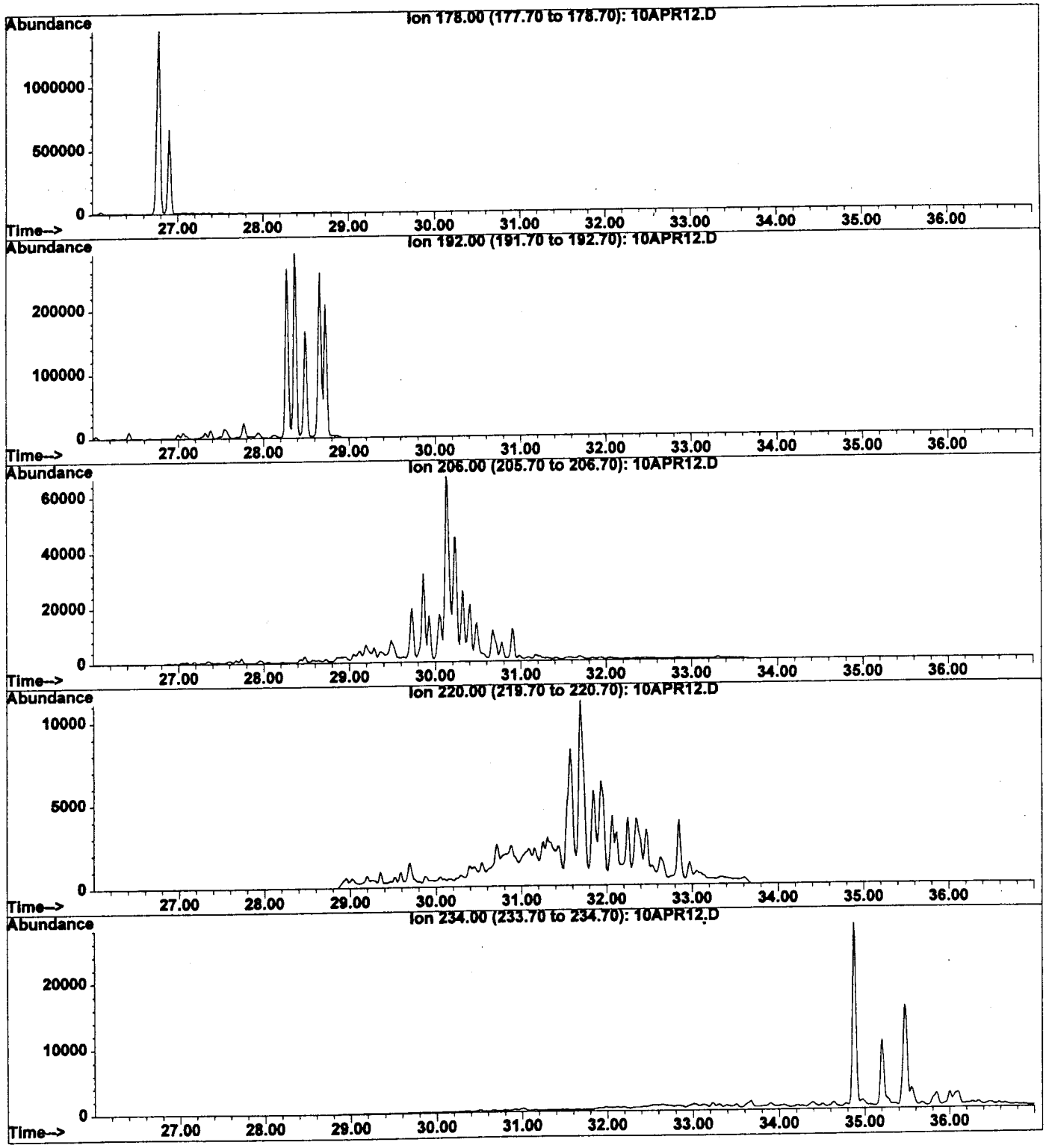
File : I:\1\DATA\020410\10APR12.D
Operator : kty
Acquired : 10 Apr 2002 6:47 pm using AcqMethod SIM4008A
Instrument : HP_5972
Sample Name: IG020405-02
Misc Info : ~~Soop (3.29.02)~~ MW-10B
Vial Number: 12



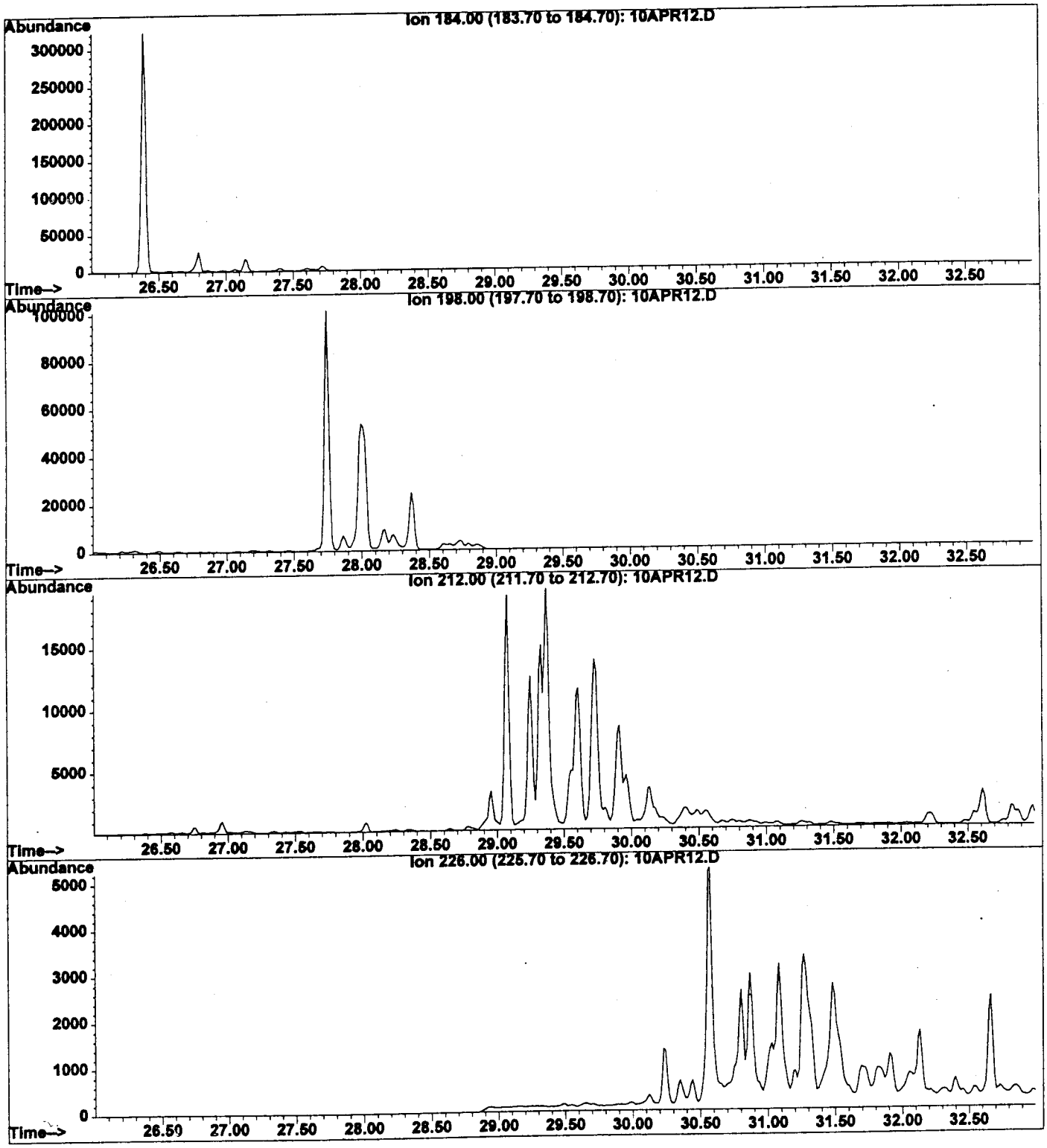
File : I:\1\DATA\020410\10APR12.D
Operator : kty
Acquired : 10 Apr 2002 6:47 pm using AcqMethod SIM4008A
Instrument : HP_5972
Sample Name: IG020405-02
Misc Info : ~~Soep (3.29.02)~~ MW-10B
Vial Number: 12



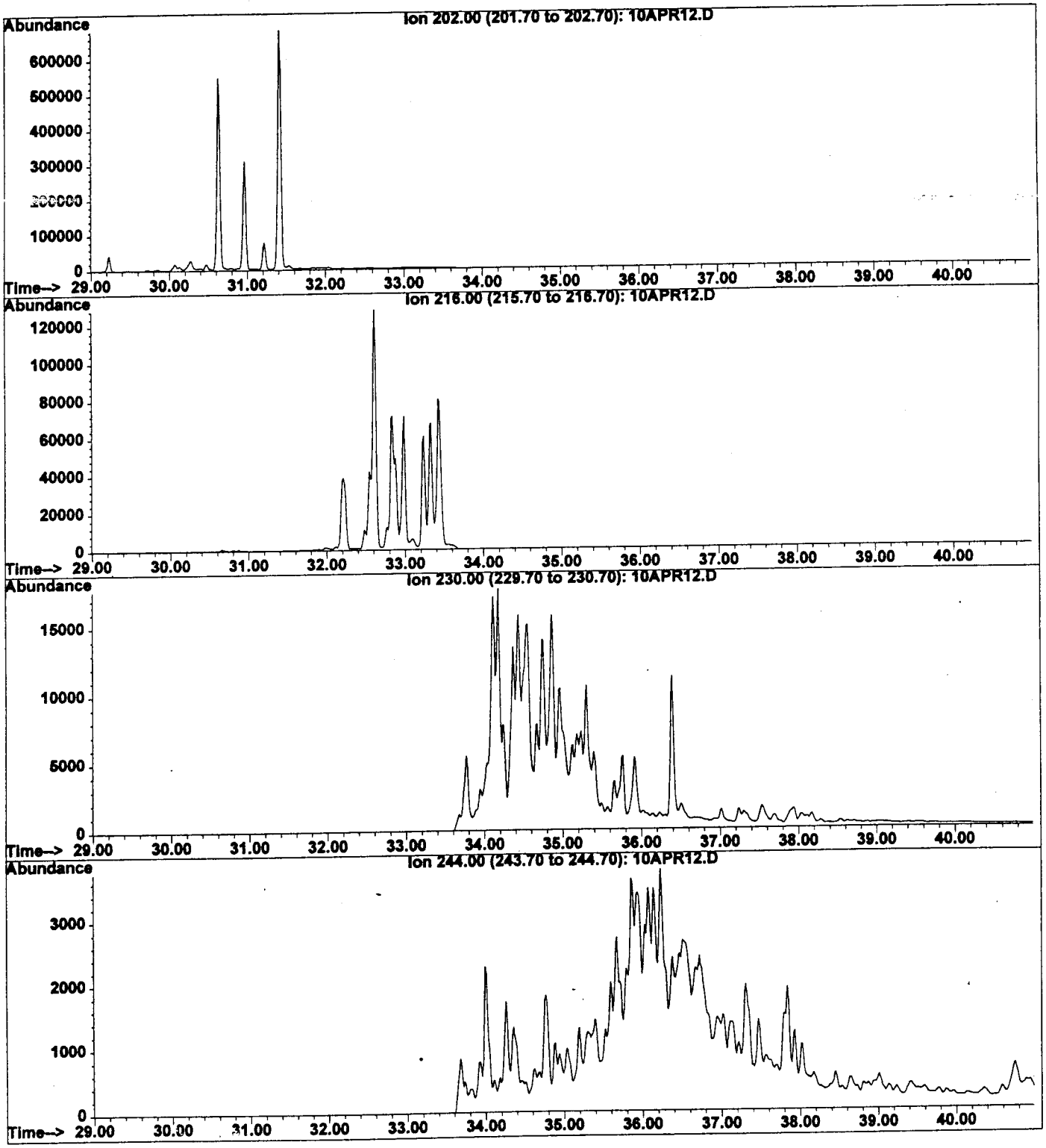
File : I:\1\DATA\020410\10APR12.D
Operator : kty
Acquired : 10 Apr 2002 6:47 pm using AcqMethod SIM4008A
Instrument : HP_5972
Sample Name: IG020405-02
Misc Info : ~~Seep (3.29.02)~~ MW-10B
Vial Number: 12



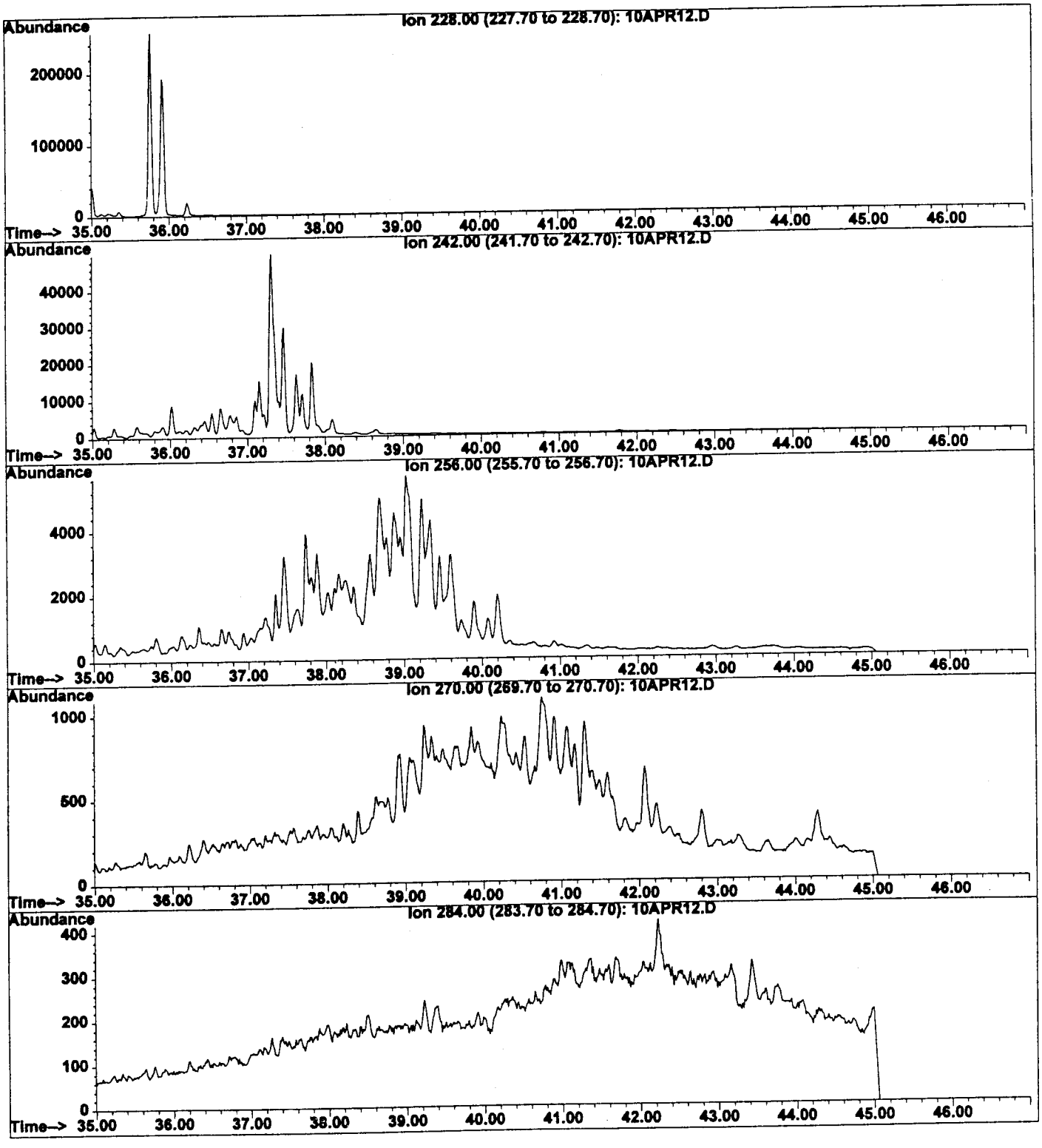
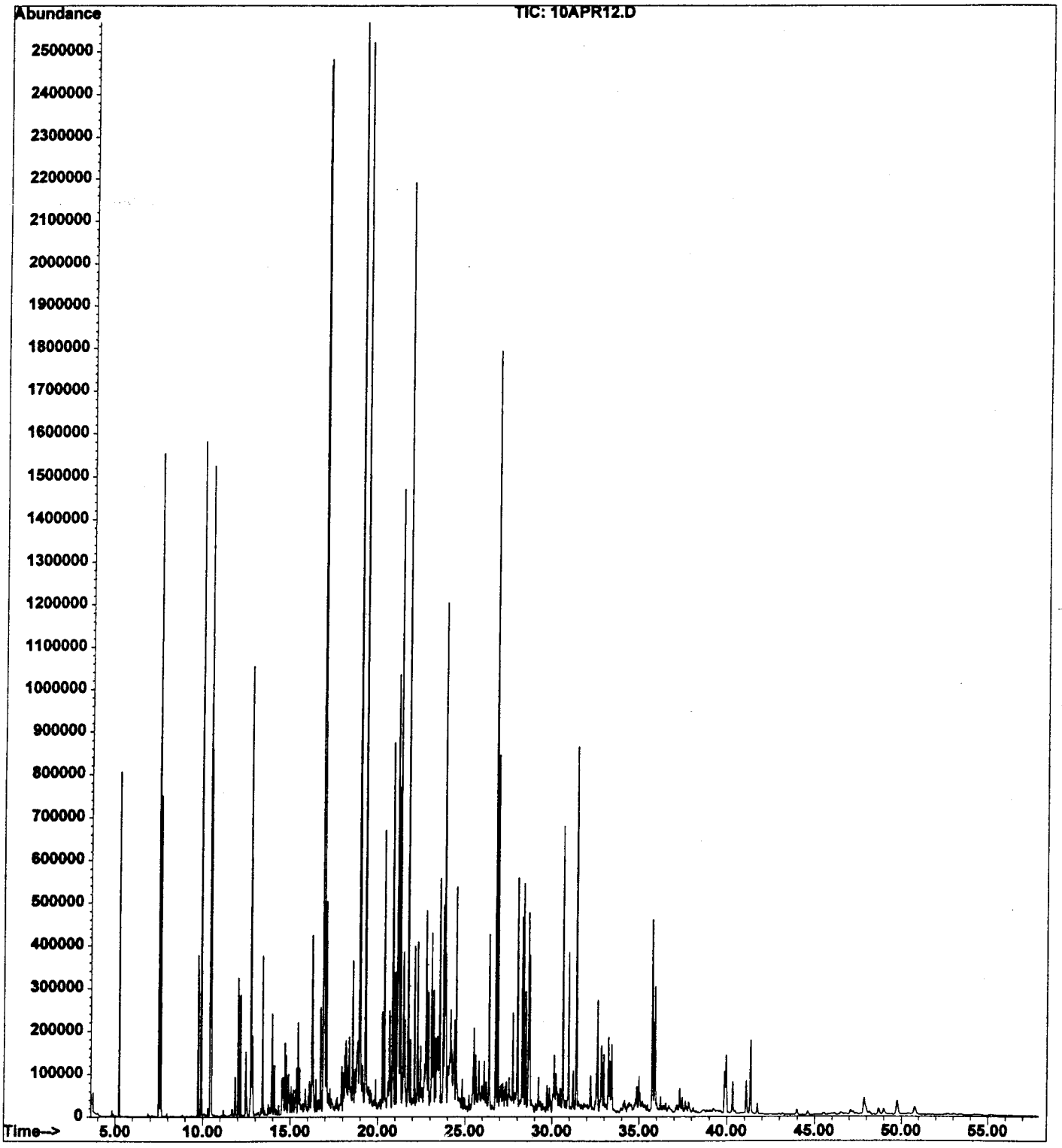
File : I:\1\DATA\020410\10APR12.D
Operator : kty
Acquired : 10 Apr 2002 6:47 pm using AcqMethod SIM4008A
Instrument : HP_5972
Sample Name: IG020405-02
Misc Info : ~~Seep (3.29.02)~~ MW-1B
Vial Number: 12



File : I:\1\DATA\020410\10APR12.D
Operator : kty
Acquired : 10 Apr 2002 6:47 pm using AcqMethod SIM4008A
Instrument : HP_5972
Sample Name: IG020405-02
Misc Info : ~~Seep (3.29.02)~~ MW-10B
Vial Number: 12



File : I:\1\DATA\020410\10APR12.D
Operator : kty
Acquired : 10 Apr 2002 6:47 pm using AcqMethod SIM4008A
Instrument : HP_5972
Sample Name: IG020405-02
Misc Info : ~~Seep (3.29.02)~~ MW-10B
Vial Number: 12



File : I:\1\DATA\020410\10APR12.D
Operator : kty
Acquired : 10 Apr 2002 6:47 pm using AcqMethod SIM4008A
Instrument : HP_5972
Sample Name: IG020405-02
Misc Info : ~~Seep (3.29.02)~~ MW-WB
Vial Number: 12