

INTERPRETATION REPORT

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CLIENT:

**Amoco Norway Oil
Company**

REF(S)

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TITLE

Geochemical Analysis, NOCS 1/3-8

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REGISTRERT

OLJEDIREKTORATET

Introduction

One mud sample (from a can marked "20550 pump strokes") containing what was believed to be condensate (apparently from 4529 m MD) was analysed on behalf of Amoco (by authorisation of Kjell Øygard). A light yellow liquid (from here on reported as 4529 m MD Oil) was separated out from the mud using a separating funnel and analysed. The 4529 m MD Oil sample was analysed by a series of geochemical analyses (cf. Analytical Programme). In addition, an oil based mud sample (4532 m) was analysed to establish differences with the separated liquid, if any.

Cuttings samples in the interval 1000 - 5194 m were also received with an initial objective of conducting a complete range of geochemical analyses.

a fan which could blow away the fumes. Again this was very time consuming. Also the samples were almost unrecognisable. They could usually not be identified as separate lithologies, but looked more like a "porridge".

All equipment used for handling the samples was strongly contaminated by the drill mud. Thick layers of the mud were clogging up sieves and sample trays. Even the wash basins were covered with the mud and it was very difficult to remove.

In addition to the above mentioned problems, we also found that the samples contaminated the instruments. The Rock-Eval instrument was badly contaminated and results from one sample was found to affect several samples that followed. A major cleaning of the instrument was necessary after finishing the analysis of these samples. Also other instruments were found to be contaminated. Columns (both in MPLC and GC systems) were "poisoned" and lost their separation abilities very quickly.

The analytical results derived from these samples were, as expected, very poor. It was attempted to clean the samples using a solvent (hexane) before analysis, but even this did not help much. In the end, it was concluded that no useful data (with the exception of vitrinite) could be derived from the cuttings samples and the work was terminated before the planned analytical program was finished (in agreement with Kjell Øygard of Amoco).

Conclusions

The liquid separated out from the drill mud (4529 m MD Oil) from well NOCS 1/3-8 is a light oil which has been derived from a marine source rock (most likely the Upper Jurassic) at a maturity of 0.9 % Ro (towards the base, but within the oil window). The observed maturity is estimated to have required a source rock temperature of about 150° C.

The well enters top oil window at about 3200 m, base oil window at about 4100 m and base condensate window at 4600 m. The other analytical data for the cuttings samples are considered highly unreliable due to the dominance of the oil based drill mud. The mud system used in this well also caused severe operational problems at our laboratory.

Experimental

Headspace Gas Analysis

The analysis is performed using a Varian 3400 gas chromatograph with a 50 m Plot fused silica $\text{Al}_2\text{O}_3/\text{KCL}$ column, loop injector and flame ionization detector. Helium is used as carrier gas and the column is run from 70°C to 200°C, at a rate of 12°C/min. Final hold time is 13 min.

Two cm^3 of headspace gas are removed from each sample can for chromatographic analysis of the C_1 to C_7 range of hydrocarbons.

Occluded Gas Analysis

The gas chromatograph used for this analysis is identical to that used for headspace gas analysis and is operated under the same conditions. The canned samples are washed in thermostat-controlled water to remove drilling contaminants and sieved on a 2 mm mesh sieve to remove large, caved rock fragments. An aliquot (ca 25 mg) of sieved sample is crushed with 25 cm^3 water in an airtight ball mill. After crushing, 2 cm^3 of the released gas are removed from the ball mill for gas chromatographic analysis.

Total Organic Carbon (TOC) and Total Carbon Analysis

This analysis is performed using a LECO CS244 Carbon Analyser.

Hand-picked lithologies from cuttings samples are crushed with a mortar and pestle and approximately 200 mg (50 mg for coals) are accurately weighed into LECO crucibles. The samples are then treated three times with 10 % hydrochloric acid to remove oxidized (carbonate) carbon, and washed four times with distilled water. The samples are dried on a hotplate at 60 - 70°C before analysis of total organic carbon.

Total carbon is also analysed on the same instrument using approximately 200 mg of

untreated crushed whole rock. Oxidized (carbonate) carbon is calculated by weight difference.

Rock-Eval Pyrolysis

This analysis is performed by using a Rock-Eval II Pyrolyser. Approximately 100 mg crushed whole rock is analysed. The sample is first heated at 300°C for three min in an atmosphere of helium to release the free hydrocarbons present (S1 peak) and then pyrolysed by increasing the temperature from 300°C to 600°C (temp. gradient 25°C/min) (S2 peak). Both the S1 and S2 yields are measured using a flame ionization detector (FID). In the temperature interval between 300°C and 390°C, the released gases are split and a proportion passed through a carbon dioxide trap, which is connected to a thermal conductivity detector (TCD). The value obtained from the TCD corresponds to the amount of oxygen contained in the kerogen of the sample and is reported as the S3 peak.

Thermal Extraction/Pyrolysis Gas Chromatography

The instrument used for this analysis is a Varian 3400 Gas Chromatograph interfaced to a pyrolysis oven (the pyrolyser). Up to 15 mg of whole rock sample is loaded on the pyrolyser and heated isothermally, at 300°C, for 4 min, during which time thermal extraction of the free hydrocarbons occurs (equivalent to the S1 peak of the Rock-Eval). The released gases pass to a 25 m OV1 column with a liquid nitrogen-cooled trap.

After 4 min the pyrolysis oven is temperature programmed up to 530°C, at a rate of 37°C/min, causing bound hydrocarbons to be released from the kerogen (equivalent to the S2 peak of the Rock-Eval). The released gases pass to a 25 m OV1 column with a liquid nitrogen-cooled trap.

The temperature program of the gas chromatograph oven, in which the columns are housed is -10°C to 290°C at a rate of 6°C/min. Both the columns are linked to a FID.

Solvent Extraction of Organic Matter (EOM)

The samples are extracted using a Tecator Soxtec HT-System. Carefully weighed samples are taken in a pre-extracted thimble. Some activated copper is added to the extraction cup and dichloromethane/methanol (93/7) is used as an extraction solvent. The samples are boiled for 1 hour and then rinsed for 2 hours. If the samples contain more than 10 % TOC, then the whole procedure is repeated once. The resulting solution is transferred to a flask and the solvent removed by rotary evaporation (200 mb, 30°C). The amount of EOM is gravimetrically established.

Removal of Asphaltenes

The EOM is dissolved in n-pentane in a flask to precipitate the asphaltenes by ultrasonic bath for 3 min. The solution is then stored in the dark and at ambient temperature for at least 8 hours. The solution is then filtered (Baker 10-spe system) and the precipitated asphaltenes returned to the original flask by dissolution in dichloromethane. The solvent is removed by rotary evaporation at 200 mB and 30°C.

Iatroscan

Saturates, aromatics and polars are qualitatively and quantitatively assessed using Iatroscan TLC-FID and employing Chromarod S-III rods. Deasphalted EOM was dissolved in DCM/MeOH. 1-3 μ l of the solution is spotted on the pre-activated rods, using an auto-spotter. The rods are developed in n-hexane (35 mins), followed by toluene (13 mins) with 2 mins air-drying between every stage. The developed rods are introduced in a 60°C oven for 90 seconds. The rods are analysed using Iatroscan and the data collected and processed using Multichrom data system.

Chromatographic Separation of deasphalted EOM

Chromatographic separation is performed using an MPLC system developed by the company. The EOM (minus asphaltenes) is injected into the MPLC and separated using hexane as an eluent. The saturated and aromatic hydrocarbon fractions are collected and the solvent removed using a rotary evaporator at 30°C. The fractions are then transferred to small pre-weighed vials and evaporated to dryness overnight. The vials are re-weighed to obtain the weights of both the saturated and the aromatic fractions. The weight of the NSO fraction which is retained on the column, is obtained by weight difference.

Gas Chromatographic Analyses

Saturated hydrocarbon fractions:

The instrument used for this analysis is a DANI 8510 Gas Chromatograph equipped with an FID detector and an OV1 (25m) column. The carrier gas is helium and the temperature program runs from 80°C to 300°C at a rate of 4°C/min. Final hold time is 20 mins. The saturated hydrocarbon fraction is diluted by 1:30 and a 1 microlitre aliquot of this is injected into the instrument.

Aromatic hydrocarbon fractions:

The instrument used is a Varian 3400 Gas Chromatograph with a 40 m SE 54 capillary column, split injector and a column splitter leading to FID and FPD detectors, which allows simultaneous analysis of co-eluting hydrocarbons and sulphur compounds. The carrier gas is helium and the temperature program runs from 40°C to 290°C at a rate of 4°C/min. Final hold time is 10 mins. The aromatic hydrocarbon fraction is diluted by 1:30 and a 1 microlitre aliquot of this is injected into the instrument.

Whole Oil/Whole Extract

Whole oil chromatograms are determined on a Perkin Elmer Sigma 2000 gas chromatograph fitted with a split injector, 50 m OV-1 capillary column and effluent splitter connected to FID and FPD detectors allowing simultaneous determination of hydrocarbons and sulphur compounds. Approximately 0.2-0.4 microlitres of whole oil are injected and the temperature program on the chromatograph runs from -10°C to 300°C at 4°C/min.

Vitrinite Reflectance Analysis

Samples to be analysed for vitrinite reflectance are ground to small granules (if necessary) using a pestle and mortar and are then mounted in a fast setting resin. The resin blocks are first ground flat using a coarse corundum paper to expose the rock granule surfaces and then with three finer grades of corundum paper to improve these surfaces and reduce scratches. The blocks are finally polished on a rotating Selvyt-covered lap using three grades of diamond suspension fluid. An appropriate lubricant is used when necessary.

Reflectance measurements are made under oil immersion at 546 nm using a Zeiss Universal Photo microscope II equipped with a HP 9000 series computer system. The polished blocks are mounted on the microscope stage and scanned manually in order to locate and measure particles of vitrinite. An attempt is made to obtain readings from 15-20 individual particles per sample, but this is not always possible in samples with low amounts of phytoclasts.

Visual Kerogen Microscopy

Kerogen concentrates are obtained from samples prepared by HCl and HF digestion followed by zinc bromide flotation to remove pyrite and other heavy mineral residues. The cleaned concentrates are mounted on slides by smearing, these being analysed microscopically in transmitted white light and UV light (530 nm barrier filter) to determine the Spore Colour or Thermal Alteration Indices (SCI or TAI) and the colour

and intensity of spore fluorescence. The spore colour index, backed by spore fluorescence, is used as an alternative maturity parameter to verify the results obtained from vitrinite reflectance

Fluorescence Colour	Colour Index	Corresp. Vitrinite Reflectance
Green	1	0.2 %
Green/yellow	2	0.2-0.3 %
Yellow	3	0.3 %
Yellow/orange	4	0.4 %
Light orange	5	0.5 %
Moderate-orange	6	0.6 %
Dark orange	7	0.8 %
Dark orange/red	8	1.0 %
Spore fluorescence extinction	9	1.3 %

NB. This table only provides a rudimentary correlation as vitrinite reflectance and spore fluorescence colour are both independently affected by factors such as depositional environment and catagenic history.

Combined Gas Chromatography - Mass Spectrometry (GC-MS)

The GC-MS analyses are performed on a Autospec Ultima system interfaced to a Hewlett Packard 5890 gas chromatograph. The GC is fitted with a fused silica SE54 capillary column (40 m x 0.22 mm i.d.) directly into the ion source. Helium (12 psi) is used as carrier gas and the injections are performed in splitless mode. The GC oven is programmed from 45°C to 150°C at 35°C/min, at which point the programme rate is 2°C/min up to 310°C where the column is held isothermally for 15 min. For the aromatic hydrocarbons, the GC oven is programmed from 50°C to 310°C at 5°C/min. and held isothermally at 310°C for 15 min. The mass spectrometer is operated in electron impact (EI) mode at 70 eV electron energy, a trap current of 500 uA and a

source temperature of 220°C. The instrument resolution used is 1500 (10 % value).

The data system used is a VG OPUS system. The samples are analysed in multiple ion detection mode (MID) at a scan cycle time of approximately 1.1 sec. Calculation of peak ratios is performed from peak heights in the appropriate mass fragmentograms.

Saturated Fractions

Terpanes

The most commonly used fragment ions for detection of terpanes are M/Z 177 for detection of demethylated hopanes or moretanes, M/Z 191 for detection of tricyclic, tetracyclic- and pentacyclic terpanes and M/Z 205 for methylated hopanes or moretanes.

Steranes

The most commonly used fragment ions for detection of steranes are M/Z 259 for detection of rearranged steranes, M/Z 217 for detection of rearranged and normal steranes and M/Z 218 for detection of 14 β (H) 17 β (H) steranes.

The M/Z 231 fragment ion is used to detect possible aromatic contamination of the saturated fraction. It is also used for detection of methyl steranes.

Aromatic Fractions

Naphthalenes

Methyl naphthalenes are normally detected by the M/Z 142 fragment ion, while C₂-naphthalenes are detected by M/Z 156 and C₃-naphthalenes by M/Z 170.

Dibenzothiophenes

The M/Z 184 fragment ion is used to detect the dibenzothiophenes. The M/Z 198 fragment ion is used for methyl-substituted dibenzothiophenes and dimethyl-substituted dibenzothiophenes respectively.

Phenanthrenes

Phenanthrene is detected using the M/Z 178 fragment ion. Anthracene will, if present, also give a signal in the M/Z 178 fragment ion. Methyl-substituted phenanthrenes give signals in the M/Z 192 fragment ion.

Aromatic Steranes

Monoaromatic steranes are detected using the M/Z 253 fragment ion, while the triaromatic steranes are detected using the M/Z 231 fragment ion.

Mass Fragmentograms representing Terpanes
(M/Z 163, 177, 191, 205, 370, 384, 398, 412 and 426)

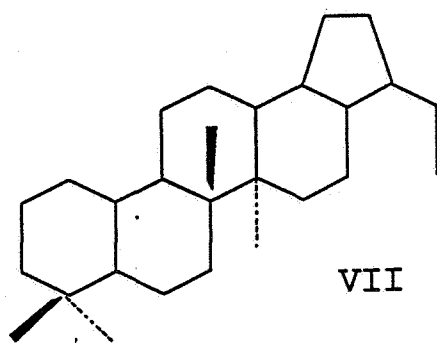
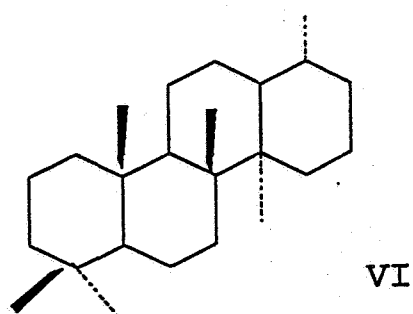
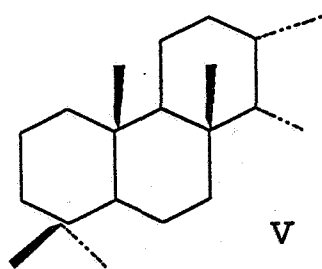
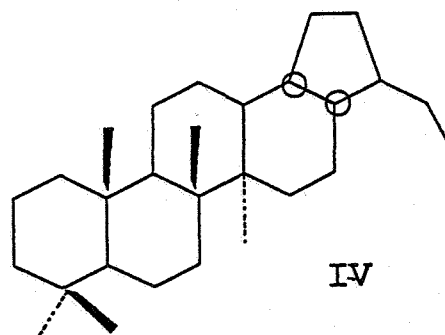
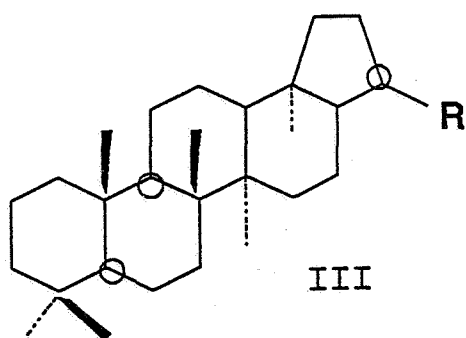
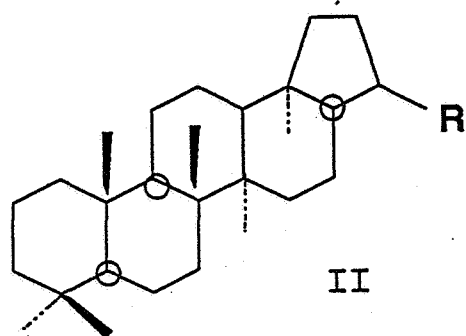
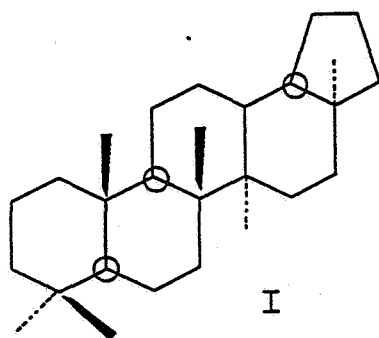
Peak Identification: (α and β refer to hydrogen atoms at C-17 and C-21 respectively unless indicated otherwise).

27Ts	18 α trisnorneohopane (T _s)	C ₂₇ H ₄₄	(I)
27Tm	17 α trisnorhopane (T _m)	C ₂₇ H ₄₆	(II, R=H)
28 $\alpha\beta$	Bisnorhopane	C ₂₈ H ₄₈	(IV)
25nor30 $\alpha\beta^*$	norhopane	C ₂₉ H ₅₀	
29 $\alpha\beta$	$\alpha\beta$ norhopane	C ₂₉ H ₅₀	(II, R=C ₂ H ₅)
29Ts	norneohopane	C ₂₉ H ₅₀	
29 $\beta\alpha$	$\beta\alpha$ norhopane	C ₂₉ H ₅₀	(III, R=C ₂ H ₅)
30 $\alpha\beta$	$\alpha\beta$ hopane	C ₃₀ H ₅₂	(II, R=i-C ₃ H ₇)
30O	Oleanane	C ₃₀ H ₅₂	
30 $\beta\alpha$	$\beta\alpha$ hopane	C ₃₀ H ₅₂	(III, R=i-C ₃ H ₇)
31 $\alpha\beta$ S	22S $\alpha\beta$ homohopane	C ₃₁ H ₅₄	(II, R=i-C ₄ H ₉)
31 $\alpha\beta$ R	22R $\alpha\beta$ homohopane	C ₃₁ H ₅₄	(II, R=i-C ₄ H ₉)
30G	gammacerane	C ₃₀ H ₅₂	
31 $\beta\alpha$	$\beta\alpha$ homohopane	C ₃₁ H ₅₄	(III, R=i-C ₄ H ₉)
32 $\alpha\beta$ S	22S $\alpha\beta$ bishomohopane	C ₃₂ H ₅₆	(II, R=i-C ₅ H ₁₁)
32 $\alpha\beta$ R	22R $\alpha\beta$ bishomohopane	C ₃₂ H ₅₆	(II, R=i-C ₅ H ₁₁)
33 $\alpha\beta$ S	22S $\alpha\beta$ trishomohopane	C ₃₃ H ₅₈	(II, R=i-C ₅ H ₁₁)
33 $\alpha\beta$ R	22R $\alpha\beta$ trishomohopane	C ₃₃ H ₅₈	(II, R=i-C ₆ H ₁₃)
34 $\alpha\beta$ S	22S $\alpha\beta$ tetrakishomohopane	C ₃₄ H ₆₀	(II, R=i-C ₇ H ₁₅)
34 $\alpha\beta$ R	22R $\alpha\beta$ tetrakishomohopane	C ₃₄ H ₆₀	(II, R=i-C ₇ H ₁₅)
35 $\alpha\beta$ S	22S $\alpha\beta$ pentakishomohopane	C ₃₅ H ₆₂	(II, R=i-C ₈ H ₁₇)
35 $\alpha\beta$ R	22R $\alpha\beta$ pentakishomohopane	C ₃₅ H ₆₂	(II, R=i-C ₈ H ₁₇)
23/3	Tricyclic terpane	C ₂₃ H ₄₂	(V, R=i-C ₄ H ₉)
24/3	Tricyclic terpane	C ₂₄ H ₄₄	(V, R=i-C ₅ H ₁₁)
25/3	Tricyclic terpane (17R, 17S)	C ₂₅ H ₄₆	(V, R=i-C ₆ H ₁₃)
24/4	Tetracyclic terpane	C ₂₄ H ₄₂	(VI)
26/3	Tricyclic terpane (17R, 17S)	C ₂₆ H ₄₈	(V, R=i-C ₇ H ₁₅)

21/3	Tricyclic terpane	$C_{21}H_{38}$	(V, R= C_2H_5)
22/3	Tricyclic terpane	$C_{22}H_{40}$	(V, R= C_3H_7)
25nor28 $\alpha\beta$ *	25,28,30-trisnorhopane/moretane	$C_{27}H_{46}$	(VII)
30d	$\alpha\beta$ diahopane	$C_{30}H_{52}$	(VIII)

* Also identified and quantified in M/Z 177 fragmentograms

STRUCTURES REPRESENTING TERPANES



Mass Fragmentograms representing Steranes

(M/Z 149, 189, 217, 218, 259, 372, 386, 400 and 414)

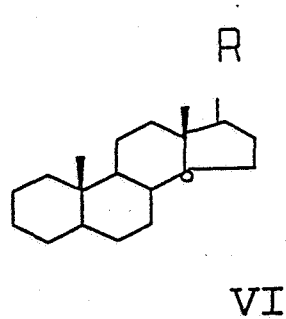
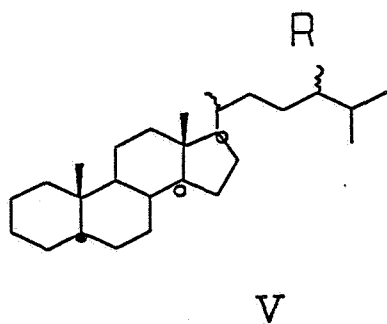
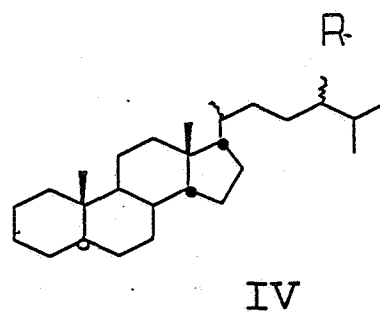
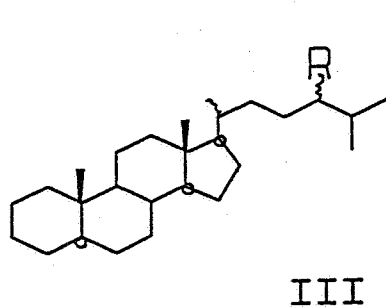
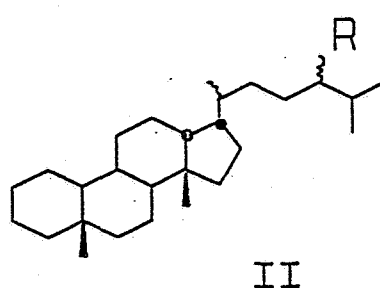
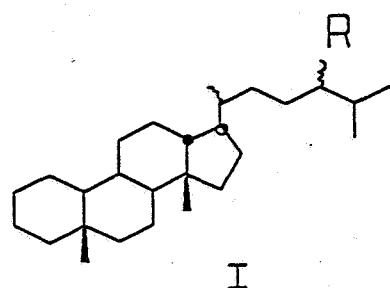
Peak Identifications: α and β refer to hydrogen atoms at C-5, C-14 and C-17 in regular steranes and at C-13 and C-17 in diasteranes.

21 α	5 α sterane	C ₂₁ H ₃₆	(VI, R=C ₂ H ₅)
22 α	5 α sterane	C ₂₂ H ₃₈	(VI, R=C ₃ H ₇)
27d β S	20S $\beta\alpha$ diacholestane	C ₂₇ H ₄₈	(I, R=H)
27d α R	20R $\beta\alpha$ diacholestane	C ₂₇ H ₄₈	(I, R=H)
27d α S	20S $\alpha\beta$ diacholestane	C ₂₇ H ₄₈	(II, R=H)
27d α R	20R $\alpha\beta$ diacholestane	C ₂₇ H ₄₈	(II, R=H)
28d β S	20S $\beta\alpha$ 24-methyl-diacholestane	C ₂₈ H ₅₀	(I, R=CH ₃)
28d β R	20R $\beta\alpha$ 24-methyl-diacholestane	C ₂₈ H ₅₀	(I, R=CH ₃)
28d α R	20R $\alpha\beta$ 24-methyl-diacholestane	C ₂₈ H ₅₀	(II, R=CH ₃)
27 $\alpha\alpha$ S	+ 20S $\alpha\alpha\alpha$ cholestane	C ₂₇ H ₄₈	(III, R=H)
29d β S	20S $\beta\alpha$ 24-ethyl-diacholestane	C ₂₉ H ₅₂	(II, R=C ₂ H ₅)
27 $\beta\beta$ R*	+ 20R $\alpha\beta\beta$ cholestane	C ₂₇ H ₄₈	(IV, R=H)
27 $\beta\beta$ S*	20S $\alpha\beta\beta$ cholestane	C ₂₇ H ₄₈	(IV, R=H)
28d α S	+ 20S $\alpha\beta$ 24-methyl-diacholestane	C ₂₈ H ₅₀	(II, R=CH ₃)
27 $\alpha\alpha$ R	20R $\alpha\alpha\alpha$ cholestane	C ₂₇ H ₄₈	(III, R=H)
29d β R	20R $\beta\alpha$ 24-ethyl-diacholestane	C ₂₉ H ₅₂	(I, R=C ₂ H ₅)
29d α R	20R $\alpha\beta$ 24-ethyl-diacholestane	C ₂₉ H ₅₂	(II, R=C ₂ H ₅)
28 $\alpha\alpha$ S	20S $\alpha\alpha\alpha$ 24-methyl-cholestane	C ₂₈ H ₅₀	(III, R=CH ₃)
28 $\beta\beta$ R*	20R $\alpha\beta\beta$ 24-methyl-cholestane	C ₂₈ H ₅₀	(IV, R=CH ₃)
29d α S	+ 20S $\alpha\beta$ 24-ethyl-diacholestane	C ₂₉ H ₅₂	(II, R=C ₂ H ₅)
28 $\beta\beta$ S*	20S $\alpha\beta\beta$ 24-methyl-cholestane	C ₂₈ H ₅₀	(IV, R=CH ₃)
28 $\alpha\alpha$ R	20R $\alpha\alpha\alpha$ 24-methyl-cholestane	C ₂₈ H ₅₀	(III, R=CH ₃)
29 $\alpha\alpha$ S	20S $\alpha\alpha\alpha$ 24-ethyl-cholestane	C ₂₉ H ₅₂	(III, R=C ₂ H ₅)
29 $\beta\beta$ R*	20R $\alpha\beta\beta$ 24-ethyl-cholestane	C ₂₉ H ₅₂	(IV, R=C ₂ H ₅)
29 $\beta\beta$ S*	20S $\alpha\beta\beta$ 24-ethyl-cholestane	C ₂₉ H ₅₂	(IV, R=C ₂ H ₅)
29 $\alpha\alpha$ R	20R $\alpha\alpha\alpha$ 24-ethyl-cholestane	C ₂₉ H ₅₂	(III, R=C ₂ H ₅)
M30 $\alpha\alpha$	$\alpha\alpha$ 4-methyl-24-ethyl-cholestane	C ₃₀ H ₅₄	

M30D	$\alpha\alpha$ 4,23,24-trimethyl-cholestane	$C_{30}H_{54}$	
30 $\alpha\alpha$ S	20S $\alpha\alpha\alpha$ 24-propyl-cholestane	$C_{30}H_{54}$	(IV, R=C ₃ H ₇)
30 $\beta\beta$ R*	20R $\alpha\beta\beta$ 24-propyl-cholestane	$C_{30}H_{54}$	(V, R=C ₃ H ₇)
30 $\beta\beta$ S*	20S $\alpha\beta\beta$ 24-propyl-cholestane	$C_{30}H_{54}$	(IV, R=C ₃ H ₇)
30 $\alpha\alpha$ R	20R $\alpha\alpha\alpha$ -24-propyl-cholestane	$C_{30}H_{54}$	(IV, R=C ₃ H ₇)

* Compounds identified and quantified in M/Z 218 fragmentograms

STRUCTURES REPRESENTING STERANES

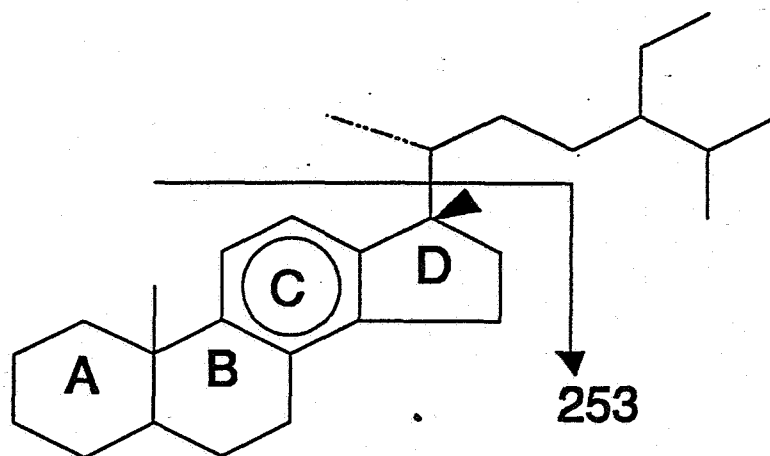


Mass Fragmentograms representing Monoaromatic Steranes (M/Z 253)

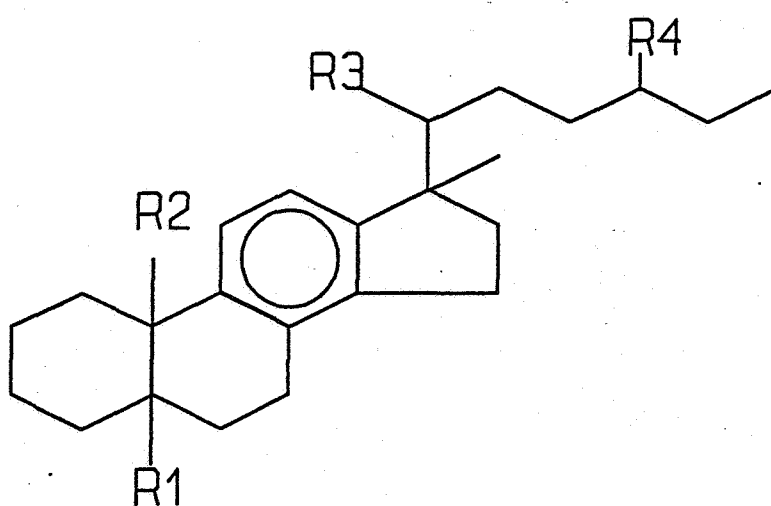
Description of C-ring monoaromatic steroid hydrocarbons

Peak	R ₁	Substituents R ₂ R ₃		R ₄	Abbreviation of Compound
A1					C ₂₁ M
B1					C ₂₂ MA
C1	β(H)	CH ₃	S(CH ₃)	H	βSC ₂₇ MA
	β(H)	CH ₃	R(CH ₃)	H	βRC ₂₇ MA
D1	CH ₃	H	R(CH ₃)	H	RC ₂₇ DMA
	α(H)	CH ₃	S(CH ₃)	H	αSC ₂₇ MA
E1	β(H)	CH ₃	S(CH ₃)	CH ₃	βSC ₂₈ MA
	CH ₃	H	S(CH ₃)	CH ₃	SC ₂₈ DMA
F1	α(H)	CH ₃	R(CH ₃)	H	αRC ₂₇ MA
	α(H)	CH ₃	S(CH ₃)	CH ₃	αSC ₂₈ MA
	β(H)	CH ₃	R(CH ₃)	CH ₃	βRC ₂₈ MA
G1	CH ₃	H	R(CH ₃)	CH ₃	RC ₂₈ DMA
	β(H)	CH ₃	S(CH ₃)	C ₂ H ₅	βSC ₂₉ MA
	CH ₃	H	S(CH ₃)	C ₂ H ₅	SC ₂₉ DMA
	α(H)	CH ₃	R(CH ₃)	CH ₃	αRC ₂₈ MA
H1	β(H)	CH ₃	R(CH ₃)	C ₂ H ₅	βRC ₂₉ MA
	CH ₃	H	R(CH ₃)	C ₂ H ₅	RC ₂₉ DMA
I1	α(H)	CH ₃	R(CH ₃)	C ₂ H ₅	αRC ₂₉ MA

STRUCTURES REPRESENTING MONOAROMATIC STERANES



I

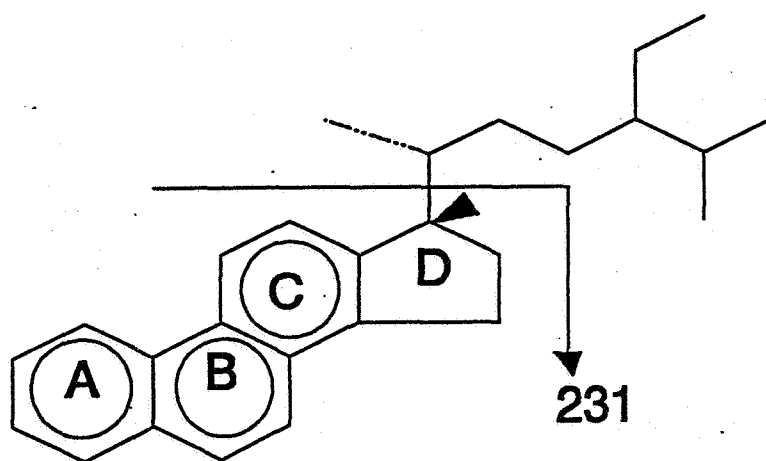


Mass Fragmentograms representing Triaromatic Steranes
(M/Z 231)

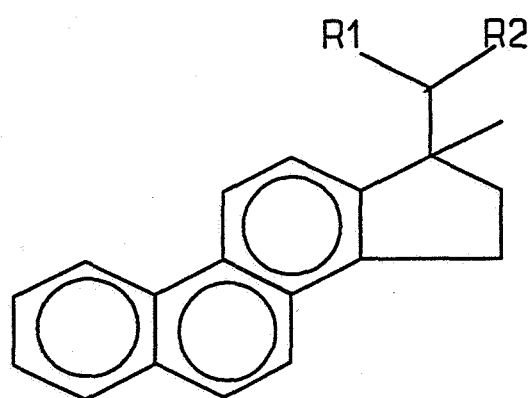
Description of ABC-ring triaromatic steroid hydrocarbons

Peak	Substituents		Abbreviation of Compound
	R ₁	R ₂	
a1	CH ₃	H	C ₂₀ TA
b1	CH ₃	CH ₃	C ₂₁ TA
c1	S(CH ₃)	C ₆ H ₁₋₃	SC ₂₆ TA
d1	R(CH ₃)	C ₆ H ₁₃	RC ₂₆ TA
	S(CH ₃)	C ₇ H ₁₅	SC ₂₇ TA
e1	S(CH ₃)	C ₈ H ₁₇	SC ₂₈ TA
f1	S(CH ₃)	C ₇ H ₁₅	RC ₂₇ TA
g1	R(CH ₃)	C ₈ H ₁₇	RC ₂₈ TA

STRUCTURES REPRESENTING TRIAROMATIC STERANES



II



Stable Carbon Isotope Ratio Mass Spectrometry

Carbon isotope analysis is performed on a dual inlet VG SIRA 10 instrument. The combustion of the samples is performed by a Carlo Erba EA 1108 element analyser directly connected to the inlet system of the mass spectrometer.

The combustion temperature is 1020°C and the carrier gas used was Helium. After the combustion H₂O and CO₂ are trapped in individual cool traps. The CO₂ gas is then heated up before admission into the mass spectrometer. The whole operation is controlled by an IBM PC50 computer system.

δ-values

The isotope ratios are given as δ-values in ‰ versus the PDB-standard:

$$\delta^{13}\text{C} = (R_{\text{sample}} - R_{\text{standard}}/R_{\text{standard}}) \times 1000$$
$$R = {}^{13}\text{C}/{}^{12}\text{C}$$

The PDB-standard (a marine chalk of the Pee Dee-formation, USA) was created by Craig 1957. All results of ¹³C/¹²C-analysis of organic matter today are calculated (Craig correction) against this international standard.

Reproducibility

The precision of the combustion system and the mass spectrometer is controlled by determination of an international calibrated standard, NBS22 oil and a house standard carbon. Replicate analyses are also performed on samples.

Appendix I - Rock Analyses

Table 1 : Lithology description for well NOCS 1/3-8

Depth unit of measure: m

Depth	Type	Grp	Frm	Age	Trb	Sample
Int	Cvd	TOC%	%	Lithology description		
1000.00						0106
				100 Sh/Clst: ol gy, calc		0106-1L
1200.00						0107
				100 Sh/Clst: drk y brn, calc		0107-1L
1400.00						0108
				100 Sh/Clst: drk y brn, calc		0108-1L
1600.00						0109
				100 Sh/Clst: drk y brn, calc		0109-1L
1800.00						0110
				100 Sh/Clst: ol gy		0110-1L
2000.00						0111
				100 Sh/Clst: drk brn gy		0111-1L
2200.00						0112
				100 Sh/Clst: drk brn gy		0112-1L
2400.00						0113
				100 Sh/Clst: pl y brn		0113-1L
2600.00						0114
				100 Sh/Clst: pl y brn		0114-1L

Table 1 : Lithology description for well NOCS 1/3-8

Depth unit of measure: m

Depth	Type	Grp	Frm	Age	Trb	Sample
Int Cvd	TOC%	%	Lithology description			
2800.00						0115
			100	Sh/Clst: m gy to pl y brn		0115-1L
3001.00						0116
			80	Sh/Clst: lt gy to m gy		0116-2L
			20	Sh/Clst: pl y brn		0116-1L
3199.00						0117
			100	Sh/Clst: m gy to pl y brn		0117-1L
3400.00						0118
			70	Ca : w, chk		0118-2L
			30	Sh/Clst: m gy to pl y brn		0118-1L
3601.00						0119
			100	Sh/Clst: w, chk, dd		0119-1L
3799.00						0120
			80	Ca : w, chk, dd		0120-1L
			20	Sh/Clst: m gy to pl y brn		0120-2L
4000.00						0121
			80	Ca : w, chk, dd		0121-1L
			20	Sh/Clst: pl red brn, dd		0121-2L
4180.00						0122
			100	Ca : w, chk, dd		0122-1L
4240.00				Shtl Hod Upper Cretaceous		0001
	2.18		100	Ca : w to lt gy, chk, dd		0001-1L

Table 1 : Lithology description for well NOCS 1/3-8

Depth unit of measure: m

Depth	Type	Grp	Frm	Age	Trb	Sample
Int Cvd	TOC%	%	Lithology description			
4270.00			Shtl	Hod	Upper Cretaceous	0002
	1.84	100	Ca		: w to lt gy, chk, dd	0002-1L
4300.00			Shtl	Hod	Upper Cretaceous	0003
	1.70	100	Ca		: w to lt gy, chk, dd	0003-1L
4330.00			Shtl	Hod	Upper Cretaceous	0004
	2.82	100	Ca		: w to lt gy, chk, dd	0004-1L
4360.00			Shtl	Hod	Upper Cretaceous	0005
	1.36	100	Ca		: w to lt gy, chk, dd	0005-1L
4381.00			Shtl	Blod	Upper Cretaceous	0006
	1.32	100	Marl		: w to drk gy, chk, dd	0006-1L
4387.00			Shtl	Blod	Upper Cretaceous	0007
	1.69	100	Marl		: w to drk gy, chk, dd	0007-1L
4390.00			Shtl	Blod	Upper Cretaceous	0008
	2.97	100	Marl		: w to drk gy, dd	0008-1L
4396.00			Shtl	Blod	Upper Cretaceous	0009
	2.52	100	Marl		: w to drk gy, dd	0009-1L
4402.00			Shtl	Blod	Upper Cretaceous	0010
	1.92	100	Marl		: w to drk gy, dd	0010-1L

Table 1 : Lithology description for well NOCS 1/3-8

Depth unit of measure: m

Depth	Type	Grp	Frm	Age	Trb	Sample
Int	Cvd	TOC%	%	Lithology description		
4411.00				Shtl Hldr Upper Cretaceous		0011
	2.64	100	Ca	: w to m gy, chk, dd		0011-1L
4432.00				Shtl Hldr Upper Cretaceous		0012
	2.82	100	Ca	: w to m gy, chk, dd		0012-1L
4450.00				Shtl Hldr Upper Cretaceous		0013
	2.15	100	Ca	: w to m gy, chk, dd		0013-1L
4459.00				Crkn Rødb Lower Cretaceous		0014
	2.97	100	Marl	: lt gy to drk gy to drk gn gy, dd		0014-1L
4471.00				Crkn Rødb Lower Cretaceous		0015
	2.37	100	Marl	: lt gy to drk gy to drk gn gy, dd		0015-1L
4480.00				Crkn Rødb Lower Cretaceous		0016
	2.11	50	Marl	: lt gy to drk gy to drk gn gy, dd		0016-1L
		50	Sh/Clst:	red brn, calc		0016-2L
4490.00				Crkn Rødb Lower Cretaceous		0017
	1.75	50	Marl	: lt gy to drk gy to drk gn gy, dd		0017-1L
		50	Sh/Clst:	red brn, calc		0017-2L
4500.20				Crkn Rødb Lower Cretaceous		0018
	1.37	100	Marl	: drk gy to drk gn gy, dd		0018-1L
4507.00				Crkn Sola Lower Cretaceous		0019
	2.32	100	Marl	: drk gy to drk gn gy, dd		0019-1L

Table 1 : Lithology description for well NOCS 1/3-8

Depth unit of measure: m

Depth	Type	Grp	Frm	Age	Trb	Sample
Int Cvd	TOC%	%	Lithology description			
4513.00			Crkn Sola Lower Cretaceous			0020
	1.58	100	Marl	: m gy to drk gy, dd		0020-1L
4519.00			Crkn Sola Lower Cretaceous			0021
	1.59	100	Marl	: m gy to drk gy, dd		0021-1L
4531.00			Crkn Sola Lower Cretaceous			0022
	1.42	100	Marl	: m gy to drk gy, dd		0022-1L
4534.00			Crkn Sola Lower Cretaceous			0023
	1.97	100	Marl	: m gy to drk gy, dd		0023-1L
4537.00			Crkn Sola Lower Cretaceous			0024
	1.30	100	Marl	: m gy to drk gy, dd		0024-1L
4540.00			Crkn Sola Lower Cretaceous			0025
	1.91	100	Marl	: m gy to drk gy, dd		0025-1L
4546.00			Crkn Sola Lower Cretaceous			0026
	2.06	100	Marl	: m gy to drk gy, dd		0026-1L
4549.00			Crkn Sola Lower Cretaceous			0027
	2.14	100	Marl	: m gy to drk gy, dd		0027-1L
4552.00			Crkn Sola Lower Cretaceous			0028
	1.79	100	Marl	: m gy to drk gy, dd		0028-1L

Table 1 : Lithology description for well NOCS 1/3-8

Depth unit of measure: m

Depth	Type	Grp	Frm	Age	Trb	Sample
Int	Cvd	TOC%	%	Lithology description		
4558.00				Crkn Tuxe Lower Cretaceous		0029
	3.43	100	Marl	: m gy to drk gy, dd		0029-1L
4564.00				Crkn Tuxe Lower Cretaceous		0030
	3.49	100	Marl	: m gy to drk gy, dd		0030-1L
4570.00				Crkn Tuxe Lower Cretaceous		0031
	2.65	100	Marl	: m gy to drk gy, dd		0031-1L
4576.00				Crkn Tuxe Lower Cretaceous		0032
	2.12	100	Marl	: m gy to drk gy, dd		0032-1L
4582.00				Crkn Tuxe Lower Cretaceous		0033
	1.94	100	Marl	: m gy to drk gy, dd		0033-1L
4588.00				Crkn Tuxe Lower Cretaceous		0034
	1.80	100	Marl	: m gy to drk gy, dd		0034-1L
4594.00				Crkn Tuxe Lower Cretaceous		0035
	2.32	100	Marl	: m gy to drk gy, dd		0035-1L
4597.00				Crkn Tuxe Lower Cretaceous		0036
	2.04	100	Marl	: m gy to drk gy, dd		0036-1L
4600.00				Crkn Tuxe Lower Cretaceous		0037
	1.94	100	Marl	: m gy to drk gy, dd		0037-1L

Table 1 : Lithology description for well NOCS 1/3-8

Depth unit of measure: m

Depth	Type	Grp	Frm	Age	Trb	Sample
Int Cvd	TOC%	%	Lithology description			
4606.00			Crkn Tuxe Lower Cretaceous			0038
	1.30	100	Marl	: m gy to drk gy, dd		0038-1L
4609.00			Crkn Tuxe Lower Cretaceous			0039
	1.74	100	Marl	: m gy to drk gy, dd		0039-1L
4612.00			Crkn Tuxe Lower Cretaceous			0040
	1.76	100	Marl	: m gy to drk gy, dd		0040-1L
4618.00			Crkn Tuxe Lower Cretaceous			0041
	1.56	100	Marl	: m gy to drk gy, dd		0041-1L
4624.00			Crkn Tuxe Lower Cretaceous			0042
		100	Marl	: m gy to drk gy, dd		0042-1L
4630.00			Crkn Tuxe Lower Cretaceous			0043
	1.41	100	Marl	: m gy to drk gy, dd		0043-1L
4636.00			Crkn Tuxe Lower Cretaceous			0044
	1.82	100	Marl	: m gy to drk gy, dd		0044-1L
4642.00			Crkn Tuxe Lower Cretaceous			0045
	1.92	100	Marl	: m gy to drk gy, dd		0045-1L
4648.00			Crkn Tuxe Lower Cretaceous			0046
	1.98	100	Marl	: m gy to drk gy, dd		0046-1L

Table 1 : Lithology description for well NOCS 1/3-8

Depth unit of measure: m

Depth	Type	Grp	Frm	Age	Trb	Sample
Int	Cvd	TOC%	%	Lithology description		
4654.00				Crkn Tuxe Lower Cretaceous		0047
	1.32	100	Marl	: m gy to drk gy, dd		0047-1L
4660.00				Crkn Tuxe Lower Cretaceous		0048
	1.59	100	Marl	: m gy to drk gy, dd		0048-1L
4666.00				Crkn Tuxe Lower Cretaceous		0049
	1.77	100	Marl	: m gy to drk gy, dd		0049-1L
4672.00				Crkn Tuxe Lower Cretaceous		0050
	2.07	100	Marl	: m gy to drk gy, dd		0050-1L
4678.00				Crkn Tuxe Lower Cretaceous		0051
	1.46	100	Marl	: m gy to drk gy, dd		0051-1L
4684.00				Crkn Tuxe Lower Cretaceous		0052
	1.69	100	Marl	: m gy to drk gy, dd		0052-1L
4690.00				Crkn Åsga Lower Cretaceous		0053
	2.49	100	Marl	: m gy to drk gy, dd		0053-1L
4696.00				Crkn Åsga Lower Cretaceous		0054
	2.18	100	Marl	: m gy to drk gy, dd		0054-1L
4702.00				Crkn Åsga Lower Cretaceous		0055
	1.84	100	Marl	: m gy to drk gy, dd		0055-1L

Table 1 : Lithology description for well NOCS 1/3-8

Depth unit of measure: m

Depth	Type	Grp	Frm	Age	Trb	Sample
Int Cvd	TOC%	%	Lithology description			
4708.00			Crkn Åsga Lower Cretaceous			0056
	1.94	100	Marl	: m gy to drk gy, dd		0056-1L
4714.00			Crkn Åsga Lower Cretaceous			0057
	2.22	100	Marl	: m gy to drk gy, dd		0057-1L
4720.00			Crkn Åsga Lower Cretaceous			0058
	2.14	100	Marl	: m gy to drk gy, dd		0058-1L
4723.00			Crkn Åsga Lower Cretaceous			0059
	2.24	100	Marl	: m gy to drk gy, dd		0059-1L
4726.00			Crkn Åsga Lower Cretaceous			0060
	2.13	100	Marl	: m gy to drk gy, dd		0060-1L
4729.00			Crkn Åsga Lower Cretaceous			0061
	2.33	100	Marl	: m gy to drk gy, dd		0061-1L
4732.00			Crkn Åsga Lower Cretaceous			0062
	1.97	100	Marl	: m gy to drk gy, dd		0062-1L
4738.00			Tyne Mand Upper Jurassic			0063
	4.25	100	Sh/Clst:	brn blk, dd		0063-1L
4741.00			Tyne Mand Upper Jurassic			0064
	4.48	100	Sh/Clst:	brn blk, dd		0064-1L

Table 1 : Lithology description for well NOCS 1/3-8

Depth unit of measure: m

Depth	Type	Grp	Frm	Age	Trb	Sample
Int	Cvd	TOC%	%	Lithology description		
4750.00				Tyne Fars Upper Jurassic		0065
	3.80	100		Sh/Clst: brn blk, dd		0065-1L
4756.00				Tyne Fars Upper Jurassic		0066
	3.60	100		Sh/Clst: brn blk, dd		0066-1L
4762.00				Tyne Fars Upper Jurassic		0067
	3.57	100		Sh/Clst: brn blk, dd		0067-1L
4774.00				Tyne Fars Upper Jurassic		0068
	2.54	100		Sh/Clst: brn blk, dd		0068-1L
4786.00				Tyne Fars Upper Jurassic		0069
	3.63	100		Sh/Clst: brn blk, dd		0069-1L
4798.00				Tyne Fars Upper Jurassic		0070
	3.23	100		Sh/Clst: brn blk, dd		0070-1L
4804.00				Tyne Fars Upper Jurassic		0071
	2.96	100		Sh/Clst: brn blk to dsk y brn, dd		0071-1L
4810.00				Tyne Fars Upper Jurassic		0072
	3.26	100		Sh/Clst: brn blk to dsk y brn, dd		0072-1L
4822.00				Tyne Fars Upper Jurassic		0073
	3.41	100		Sh/Clst: brn blk to dsk y brn, dd		0073-1L

Table 1 : Lithology description for well NOCS 1/3-8

Depth unit of measure: m

Depth	Type	Grp	Frm	Age	Trb	Sample
Int Cvd	TOC%	%	Lithology description			
4834.00			Tyne Fars Upper Jurassic			0074
	3.32	100	Sh/Clst: brn blk to dsk y brn, dd			0074-1L
4846.00			Tyne Fars Upper Jurassic			0075
	2.75	100	Sh/Clst: brn blk to dsk y brn, dd			0075-1L
4858.00			Tyne Fars Upper Jurassic			0077
	3.06	100	Sh/Clst: brn blk to dsk y brn, dd			0077-1L
4864.00			Tyne Fars Upper Jurassic			0076
	3.60	100	Sh/Clst: brn blk to dsk y brn, dd			0076-1L
4870.00			Tyne Fars Upper Jurassic			0078
	3.05	100	Sh/Clst: brn blk to dsk y brn, dd			0078-1L
4882.00			Tyne Fars Upper Jurassic			0079
	5.61	100	Sh/Clst: brn blk, dd			0079-1L
4894.00			Tyne Fars Upper Jurassic			0080
	4.59	100	Sh/Clst: brn blk, dd			0080-1L
4906.00			Tyne Fars Upper Jurassic			0081
	3.56	80	Sh/Clst: brn blk, dd			0081-1L
		20	Sh/Clst: red brn, dd			0081-2L
4918.00			Tyne Fars Upper Jurassic			0082
	5.58	100	Sh/Clst: brn blk to dsk y brn, dd			0082-1L

Table 1 : Lithology description for well NOCS 1/3-8

Depth unit of measure: m

Depth	Type	Grp	Frm	Age	Trb	Sample
Int	Cvd	TOC%	%	Lithology description		
4930.00				Tyne Fars Upper Jurassic		0083
	4.65	100		Sh/Clst: brn blk to dsk y brn, dd		0083-1L
4942.00				Tyne Fars Upper Jurassic		0084
	5.35	100		Sh/Clst: brn blk to dsk y brn, dd		0084-1L
4954.00				Tyne Fars Upper Jurassic		0085
	5.39	100		Sh/Clst: brn blk to dsk y brn, dd		0085-1L
4966.00				Tyne Fars Upper Jurassic		0086
	6.20	100		Sh/Clst: brn blk, dd		0086-1L
4978.00				Tyne Fars Upper Jurassic		0087
	5.56	100		Sh/Clst: brn blk, dd		0087-1L
4990.00				Tyne Fars Upper Jurassic		0088
	4.63	100		Sh/Clst: brn blk, dd		0088-1L
5002.00				Tyne Fars Upper Jurassic		0089
	2.94	100		Sh/Clst: brn blk to dsk y brn, calc, dd		0089-1L
5014.00				Tyne Heha Upper Jurassic		0090
	1.59	100	Ca	: w, chk, dd		0090-1L
5025.30	ccp			Tyne Heha Upper Jurassic		0102
	2.54	100	S/Sst	: lt gy		0102-1L

Table 1 : Lithology description for well NOCS 1/3-8

Depth unit of measure: m

Depth	Type	Grp	Frm	Age	Trb	Sample
Int	Cvd	TOC%	%	Lithology description		
5028.65	ccp			Tyne Heha Upper Jurassic		0103
	0.07	100	S/Sst	: lt gy		0103-1L
5032.00				Tyne Heha Upper Jurassic		0091
	2.16	100	Ca	: w, chk, dd		0091-1L
5033.40	ccp			Tyne Heha Upper Jurassic		0104
	0.12	100	S/Sst	: m gy		0104-1L
5038.20	ccp			Tyne Heha Upper Jurassic		0105
	0.19	100	S/Sst	: lt gy		0105-1L
5050.00				Tyne Heha Upper Jurassic		0092
	2.27	100	Ca	: w, chk, dd		0092-1L
5068.00				Tyne Heha Upper Jurassic		0093
	1.80	100	Sh/Clst:	w to lt gn gy, dd		0093-1L
5077.00				Tyne Heha Upper Jurassic		0094
	2.29	100	Sh/Clst:	w to lt gn gy, dd		0094-1L
5086.00				Tyne Heha Upper Jurassic		0095
	2.10	100	Sh/Clst:	w to lt gn gy, dd		0095-1L
5104.00				Tyne Heha Upper Jurassic		0096
	2.33	100	Sh/Clst:	w to lt gn gy, dd		0096-1L

Table 1 : Lithology description for well NOCS 1/3-8

Depth unit of measure: m

Depth	Type	Grp	Frm	Age	Trb	Sample
Int Cvd	TOC%	%	Lithology description			
5122.00			Tyne Heha Upper Jurassic			0097
	2.81	100	Sh/Clst: w to lt gn gy, dd			0097-1L
5140.00			Tyne Heha Upper Jurassic			0098
	1.92	100	Sh/Clst: w to lt gn gy, dd			0098-1L
5158.00			Tyne Heha Upper Jurassic			0099
	2.31	100	Sh/Clst: w to lt gn gy, dd			0099-1L
5176.00			Triassic			0100
	2.92	100	Sh/Clst: red brn, dd			0100-1L
5194.00			Triassic			0101
	2.79	100	Sh/Clst: lt gn gy, dd			0101-1L

Table 2: Rock-Eval table for well NOCS 1/3-8

Page: 1

Depth unit of measure: m

Depth	Typ	Form	Lithology	S1	S2	S3	S2/S3	TOC	HI	OI	PP	PI	Tmax	Sample
4240.00	cut	HOD	Ca : w to lt gy	35.60	10.87	1.37	7.93	2.18	499	63	46.5	0.77	441	0001-1L
4270.00	cut	HOD	Ca : w to lt gy	33.25	11.35	1.31	8.66	1.84	617	71	44.6	0.75	444	0002-1L
4300.00	cut	HOD	Ca : w to lt gy	36.32	8.00	1.40	5.71	1.70	471	82	44.3	0.82	438	0003-1L
4330.00	cut	HOD	Ca : w to lt gy	66.41	16.33	1.47	11.11	2.82	579	52	82.7	0.80	444	0004-1L
4360.00	cut	HOD	Ca : w to lt gy	20.05	8.90	1.39	6.40	1.36	654	102	28.9	0.69	440	0005-1L
4381.00	cut	BLOD	Marl : w to drk gy	10.28	8.42	1.43	5.89	1.32	638	108	18.7	0.55	441	0006-1L
4387.00	cut	BLOD	Marl : w to drk gy	10.50	11.95	1.49	8.02	1.69	707	88	22.5	0.47	441	0007-1L
4390.00	cut	BLOD	Marl : w to drk gy	41.67	13.86	1.89	7.33	2.97	467	64	55.5	0.75	442	0008-1L
4396.00	cut	BLOD	Marl : w to drk gy	29.75	14.61	1.71	8.54	2.52	580	68	44.4	0.67	443	0009-1L
4402.00	cut	BLOD	Marl : w to drk gy	20.76	11.22	1.47	7.63	1.92	584	77	32.0	0.65	439	0010-1L
4411.00	cut	HIDR	Ca : w to m gy	41.04	11.27	1.61	7.00	2.64	427	61	52.3	0.78	439	0011-1L
4432.00	cut	HIDR	Ca : w to m gy	48.98	12.16	1.40	8.69	2.82	431	50	61.1	0.80	439	0012-1L
4450.00	cut	HIDR	Ca : w to m gy	33.15	12.14	1.33	9.13	2.15	565	62	45.3	0.73	441	0013-1L
4459.00	cut	RØDB	Marl : lt gy to drk gy to drk gn gy	46.01	13.30	1.42	9.37	2.97	448	48	59.3	0.78	444	0014-1L
4471.00	cut	RØDB	Marl : lt gy to drk gy to drk gn gy	24.05	12.35	1.73	7.14	2.37	521	73	36.4	0.66	443	0015-1L

Table 2: Rock-Eval table for well NOCS 1/3-8

Depth unit of measure: m

Depth	Typ	Form	Lithology	S1	S2	S3	S2/S3	TOC	HI	OI	PP	PI	Tmax	Sample
4480.00	cut	RØDB	Marl : lt gy to drk gy to drk gn gy	25.90	10.82	1.49	7.26	2.11	513	71	36.7	0.71	434	0016-1L
4490.00	cut	RØDB	Marl : lt gy to drk gy to drk gn gy	19.35	8.79	1.48	5.94	1.75	502	85	28.1	0.69	440	0017-1L
4500.20	cut	RØDB	Marl : drk gy to drk gn gy	13.12	8.26	1.36	6.07	1.37	603	99	21.4	0.61	441	0018-1L
4507.00	cut	SOLA	Marl : drk gy to drk gn gy	25.80	9.14	1.81	5.05	2.32	394	78	34.9	0.74	440	0019-1L
4513.00	cut	SOLA	Marl : m gy to drk gy	11.16	7.30	0.86	8.49	1.58	462	54	18.5	0.60	428	0020-1L
4519.00	cut	SOLA	Marl : m gy to drk gy	17.86	9.47	0.97	9.76	1.59	596	61	27.3	0.65	434	0021-1L
4531.00	cut	SOLA	Marl : m gy to drk gy	15.69	5.79	1.21	4.79	1.42	408	85	21.5	0.73	437	0022-1L
4534.00	cut	SOLA	Marl : m gy to drk gy	22.26	5.78	1.58	3.66	1.97	293	80	28.0	0.79	425	0023-1L
4537.00	cut	SOLA	Marl : m gy to drk gy	17.97	4.77	1.15	4.15	1.30	367	88	22.7	0.79	437	0024-1L
4540.00	cut	SOLA	Marl : m gy to drk gy	18.56	9.14	1.02	8.96	1.91	479	53	27.7	0.67	436	0025-1L
4546.00	cut	SOLA	Marl : m gy to drk gy	27.06	8.95	1.35	6.63	2.06	434	66	36.0	0.75	441	0026-1L
4549.00	cut	SOLA	Marl : m gy to drk gy	30.32	9.46	1.55	6.10	2.14	442	72	39.8	0.76	439	0027-1L
4552.00	cut	SOLA	Marl : m gy to drk gy	23.67	7.68	1.71	4.49	1.79	429	96	31.4	0.76	438	0028-1L
4558.00	cut	TUXE	Marl : m gy to drk gy	25.30	10.08	1.34	7.52	3.43	294	39	35.4	0.72	440	0029-1L
4564.00	cut	TUXE	Marl : m gy to drk gy	27.31	8.47	1.58	5.36	3.49	243	45	35.8	0.76	443	0030-1L

Table 2: Rock-Eval table for well NOCS 1/3-8

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Depth unit of measure: m

Depth	Typ	Form	Lithology	S1	S2	S3	S2/S3	TOC	HI	OI	PP	PI	Tmax	Sample
4570.00	cut	TUXE	Marl : m gy to drk gy	29.68	10.15	1.79	5.67	2.65	383	68	39.8	0.75	438	0031-1L
4576.00	cut	TUXE	Marl : m gy to drk gy	23.69	7.43	1.51	4.92	2.12	350	71	31.1	0.76	438	0032-1L
4582.00	cut	TUXE	Marl : m gy to drk gy	23.66	8.08	1.14	7.09	1.94	416	59	31.7	0.75	441	0033-1L
4588.00	cut	TUXE	Marl : m gy to drk gy	19.14	8.15	1.48	5.51	1.80	453	82	27.3	0.70	443	0034-1L
4594.00	cut	TUXE	Marl : m gy to drk gy	25.14	7.70	1.22	6.31	2.32	332	53	32.8	0.77	442	0035-1L
4597.00	cut	TUXE	Marl : m gy to drk gy	23.44	9.32	1.35	6.90	2.04	457	66	32.8	0.72	443	0036-1L
4600.00	cut	TUXE	Marl : m gy to drk gy	18.07	6.80	1.30	5.23	1.94	351	67	24.9	0.73	441	0037-1L
4606.00	cut	TUXE	Marl : m gy to drk gy	12.79	5.82	1.15	5.06	1.30	448	88	18.6	0.69	441	0038-1L
4609.00	cut	TUXE	Marl : m gy to drk gy	16.03	8.20	1.20	6.83	1.74	471	69	24.2	0.66	442	0039-1L
4612.00	cut	TUXE	Marl : m gy to drk gy	18.07	7.05	1.37	5.15	1.76	401	78	25.1	0.72	441	0040-1L
4618.00	cut	TUXE	Marl : m gy to drk gy	19.25	6.25	1.49	4.19	1.56	401	96	25.5	0.75	438	0041-1L
4624.00	cut	TUXE	Marl : m gy to drk gy	2.56	2.79	0.81	3.44	-	-	-	5.3	0.48	445	0042-1L
4630.00	cut	TUXE	Marl : m gy to drk gy	8.41	9.13	1.16	7.87	1.41	648	82	17.5	0.48	443	0043-1L
4636.00	cut	TUXE	Marl : m gy to drk gy	22.64	8.45	1.66	5.09	1.82	464	91	31.1	0.73	440	0044-1L
4642.00	cut	TUXE	Marl : m gy to drk gy	21.81	8.98	1.51	5.95	1.92	468	79	30.8	0.71	439	0045-1L
4648.00	cut	TUXE	Marl : m gy to drk gy	23.88	7.73	1.48	5.22	1.98	390	75	31.6	0.76	437	0046-1L

Table 2: Rock-Eval table for well NOCS 1/3-8

Depth unit of measure: m

Depth	Typ	Form	Lithology	S1	S2	S3	S2/S3	TOC	HI	OI	PP	PI	Tmax	Sample
4654.00	cut	TUXE	Marl : m gy to drk gy	17.40	6.05	1.42	4.26	1.32	458	108	23.5	0.74	435	0047-1L
4660.00	cut	TUXE	Marl : m gy to drk gy	20.46	7.11	1.77	4.02	1.59	447	111	27.6	0.74	434	0048-1L
4666.00	cut	TUXE	Marl : m gy to drk gy	18.73	7.92	1.58	5.01	1.77	447	89	26.6	0.70	436	0049-1L
4672.00	cut	TUXE	Marl : m gy to drk gy	24.18	7.76	1.53	5.07	2.07	375	74	31.9	0.76	433	0050-1L
4678.00	cut	TUXE	Marl : m gy to drk gy	15.63	6.34	1.52	4.17	1.46	434	104	22.0	0.71	435	0051-1L
4684.00	cut	TUXE	Marl : m gy to drk gy	16.62	7.80	1.53	5.10	1.69	462	91	24.4	0.68	434	0052-1L
4690.00	cut	ÅSGA	Marl : m gy to drk gy	28.44	9.40	1.68	5.60	2.49	378	67	37.8	0.75	428	0053-1L
4696.00	cut	ÅSGA	Marl : m gy to drk gy	20.30	10.16	1.72	5.91	2.18	466	79	30.5	0.67	431	0054-1L
4702.00	cut	ÅSGA	Marl : m gy to drk gy	16.23	9.70	1.61	6.02	1.84	527	88	25.9	0.63	429	0055-1L
4708.00	cut	ÅSGA	Marl : m gy to drk gy	17.47	9.55	2.20	4.34	1.94	492	113	27.0	0.65	431	0056-1L
4714.00	cut	ÅSGA	Marl : m gy to drk gy	25.21	8.28	1.96	4.22	2.22	373	88	33.5	0.75	426	0057-1L
4720.00	cut	ÅSGA	Marl : m gy to drk gy	27.09	8.98	1.45	6.19	2.14	420	68	36.1	0.75	429	0058-1L
4723.00	cut	ÅSGA	Marl : m gy to drk gy	26.65	7.13	1.80	3.96	2.24	318	80	33.8	0.79	427	0059-1L
4726.00	cut	ÅSGA	Marl : m gy to drk gy	22.98	8.40	2.14	3.93	2.13	394	100	31.4	0.73	430	0060-1L
4729.00	cut	ÅSGA	Marl : m gy to drk gy	26.39	8.15	2.31	3.53	2.33	350	99	34.5	0.76	429	0061-1L
4732.00	cut	ÅSGA	Marl : m gy to drk gy	14.34	9.24	2.07	4.46	1.97	469	105	23.6	0.61	431	0062-1L

Table 2: Rock-Eval table for well NOCS 1/3-8

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Depth unit of measure: m

Depth	Typ	Form	Lithology	S1	S2	S3	S2/S3	TOC	HI	OI	PP	PI	Tmax	Sample
4738.00	cut	MAND	Sh/Clst: brn blk	22.22	10.76	1.25	8.61	4.25	253	29	33.0	0.67	438	0063-1L
4741.00	cut	MAND	Sh/Clst: brn blk	30.35	9.93	1.49	6.66	4.48	222	33	40.3	0.75	438	0064-1L
4750.00	cut	FARS	Sh/Clst: brn blk	30.59	9.92	1.38	7.19	3.80	261	36	40.5	0.76	435	0065-1L
4756.00	cut	FARS	Sh/Clst: brn blk	30.50	10.87	1.35	8.05	3.60	302	38	41.4	0.74	437	0066-1L
4762.00	cut	FARS	Sh/Clst: brn blk	25.46	10.95	0.64	17.11	3.57	307	18	36.4	0.70	435	0067-1L
4774.00	cut	FARS	Sh/Clst: brn blk	8.51	8.18	0.81	10.10	2.54	322	32	16.7	0.51	432	0068-1L
4786.00	cut	FARS	Sh/Clst: brn blk	32.00	11.81	1.00	11.81	3.63	325	28	43.8	0.73	435	0069-1L
4798.00	cut	FARS	Sh/Clst: brn blk	28.89	11.47	0.89	12.89	3.23	355	28	40.4	0.72	432	0070-1L
4804.00	cut	FARS	Sh/Clst: brn blk to dsk y brn	25.43	11.58	0.68	17.03	2.96	391	23	37.0	0.69	430	0071-1L
4810.00	cut	FARS	Sh/Clst: brn blk to dsk y brn	33.56	8.85	1.16	7.63	3.26	271	36	42.4	0.79	433	0072-1L
4822.00	cut	FARS	Sh/Clst: brn blk to dsk y brn	30.87	9.36	1.28	7.31	3.41	274	38	40.2	0.77	430	0073-1L
4834.00	cut	FARS	Sh/Clst: brn blk to dsk y brn	27.43	9.61	0.88	10.92	3.32	289	27	37.0	0.74	432	0074-1L
4846.00	cut	FARS	Sh/Clst: brn blk to dsk y brn	24.22	7.41	0.97	7.64	2.75	269	35	31.6	0.77	433	0075-1L
4858.00	cut	FARS	Sh/Clst: brn blk to dsk y brn	28.99	7.94	0.70	11.34	3.06	259	23	36.9	0.78	428	0077-1L
4864.00	cut	FARS	Sh/Clst: brn blk to dsk y brn	32.66	12.33	1.22	10.11	3.60	343	34	45.0	0.73	433	0076-1L
4870.00	cut	FARS	Sh/Clst: brn blk to dsk y brn	22.64	10.42	0.99	10.53	3.05	342	32	33.1	0.68	431	0078-1L

Table 2: Rock-Eval table for well NOCS 1/3-8

Depth unit of measure: m

Depth	Typ	Form	Lithology	S1	S2	S3	S2/S3	TOC	HI	OI	PP	PI	Tmax	Sample
4882.00	cut	FARS	Sh/Clst: brn blk	29.38	11.26	1.28	8.80	5.61	201	23	40.6	0.72	430	0079-1L
4894.00	cut	FARS	Sh/Clst: brn blk	31.86	8.95	0.93	9.62	4.59	195	20	40.8	0.78	431	0080-1L
4906.00	cut	FARS	Sh/Clst: brn blk	46.60	14.42	1.19	12.12	3.56	405	33	61.0	0.76	431	0081-1L
4918.00	cut	FARS	Sh/Clst: brn blk to dsk y brn	46.38	13.95	1.33	10.49	5.58	250	24	60.3	0.77	433	0082-1L
4930.00	cut	FARS	Sh/Clst: brn blk to dsk y brn	36.59	10.74	1.59	6.75	4.65	231	34	47.3	0.77	435	0083-1L
4942.00	cut	FARS	Sh/Clst: brn blk to dsk y brn	38.44	13.03	1.32	9.87	5.35	244	25	51.5	0.75	432	0084-1L
4954.00	cut	FARS	Sh/Clst: brn blk to dsk y brn	39.15	12.07	1.17	10.32	5.39	224	22	51.2	0.76	435	0085-1L
4966.00	cut	FARS	Sh/Clst: brn blk	46.91	12.28	1.40	8.77	6.20	198	23	59.2	0.79	433	0086-1L
4978.00	cut	FARS	Sh/Clst: brn blk	46.34	11.18	1.44	7.76	5.56	201	26	57.5	0.81	434	0087-1L
4990.00	cut	FARS	Sh/Clst: brn blk	47.49	10.23	1.21	8.45	4.63	221	26	57.7	0.82	432	0088-1L
5002.00	cut	FARS	Sh/Clst: brn blk to dsk y brn	28.31	10.09	1.32	7.64	2.94	343	45	38.4	0.74	437	0089-1L
5014.00	cut	HEHA	Ca : w	28.86	7.19	1.01	7.12	1.59	452	64	36.0	0.80	433	0090-1L
5025.30	ccp	HEHA	S/Sst : lt gy	2.87	0.63	0.45	1.40	2.54	25	18	3.5	0.82	398	0102-1L
5028.65	ccp	HEHA	S/Sst : lt gy	0.26	0.30	0.36	0.83	0.07	429	514	0.6	0.46	430	0103-1L
5032.00	cut	HEHA	Ca : w	25.49	13.45	1.11	12.12	2.16	623	51	38.9	0.65	435	0091-1L
5033.40	ccp	HEHA	S/Sst : m gy	0.42	0.68	0.30	2.27	0.12	567	250	1.1	0.38	360	0104-1L

Table 2: Rock-Eval table for well NOCS 1/3-8

Depth unit of measure: m

Depth	Typ	Form	Lithology	S1	S2	S3	S2/S3	TOC	HI	OI	PP	PI	Tmax	Sample
5038.20	ccp	HEHA	S/Sst : lt gy	1.42	0.89	0.31	2.87	0.19	468	163	2.3	0.61	412	0105-1L
5050.00	cut	HEHA	Ca : w	40.81	9.45	0.94	10.05	2.27	416	41	50.3	0.81	432	0092-1L
5068.00	cut	HEHA	Sh/Clst: w to lt gn gy	30.72	6.15	0.83	7.41	1.80	342	46	36.9	0.83	433	0093-1L
5077.00	cut	HEHA	Sh/Clst: w to lt gn gy	32.04	6.53	0.86	7.59	2.29	285	38	38.6	0.83	431	0094-1L
5086.00	cut	HEHA	Sh/Clst: w to lt gn gy	37.49	6.21	0.98	6.34	2.10	296	47	43.7	0.86	431	0095-1L
5104.00	cut	HEHA	Sh/Clst: w to lt gn gy	42.96	9.01	1.27	7.09	2.33	387	55	52.0	0.83	432	0096-1L
5122.00	cut	HEHA	Sh/Clst: w to lt gn gy	43.56	9.64	1.09	8.84	2.81	343	39	53.2	0.82	430	0097-1L
5140.00	cut	HEHA	Sh/Clst: w to lt gn gy	37.33	4.61	1.03	4.48	1.92	240	54	41.9	0.89	434	0098-1L
5158.00	cut	HEHA	Sh/Clst: w to lt gn gy	30.04	9.18	0.81	11.33	2.31	397	35	39.2	0.77	432	0099-1L
5176.00	cut		Sh/Clst: red brn	29.84	11.48	1.31	8.76	2.92	393	45	41.3	0.72	428	0100-1L
5194.00	cut		Sh/Clst: lt gn gy	37.58	11.22	1.13	9.93	2.79	402	41	48.8	0.77	435	0101-1L

Table 2B: Rock-Eval table for well RE, STD

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Depth unit of measure: m

Depth	Typ	Form	Lithology	S1	S2	S3	S2/S3	TOC	HI	OI	PP	PI	Tmax	Sample
1.00	std		bulk	0.47	18.85	2.20	8.57	-	-	-	19.3	0.02	422	0176-0B
2.00	std		bulk	0.42	18.50	2.18	8.49	-	-	-	18.9	0.02	423	0177-0B
3.00	std		bulk	0.48	19.11	2.12	9.01	-	-	-	19.6	0.02	422	0178-0B
4.00	std		bulk	0.45	19.76	2.12	9.32	-	-	-	20.2	0.02	421	0179-0B
5.00	std		bulk	0.50	18.96	2.07	9.16	-	-	-	19.5	0.03	424	0180-0B
6.00	std		bulk	0.55	19.62	2.15	9.13	-	-	-	20.2	0.03	423	0181-0B

Table 3 : Pyrolysis GC Data (S2 peak) as Percentage of Total Area for Well NOCS 1/3-8

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Depth unit of measure: m

Depth	Typ	Lithology	C1	C2-C5	C6-C14	C15+	S2 from Rock-Eval	Sample
4531.00	cut	Marl : m gy to drk gy	2.80	22.92	49.60	24.69	5.79	0022-1L
5025.30	ccp	S/Sst : lt gy	3.95	28.40	51.79	15.87	0.63	0102-1L

Table 4a: MPLC Bulk Composition: Weight of EOM and Fraction for well NOCS 1/3-8

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Depth unit of measure: m

Depth	Typ	Lithology	Rock Extracted (g)	EOM (mg)	Sat (mg)	Aro (mg)	Asph (mg)	NSO (mg)	HC (mg)	Non-HC (mg)	TOC(e) (%)	Sample
4741.00	cut	Sh/Clst: brn blk	6.0	158.0	105.4	8.4	1.6	42.6	113.8	44.2	4.48	0064-1L
5025.30	ccp	S/Sst : lt gy	8.7	16.1	11.1	0.5	1.6	2.9	11.6	4.5	2.54	0102-1L

Table 4b: MPLC Bulk Composition: Concentration of EOM and Fraction (wt ppm rock) for well NOCS 1/3-8

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Depth unit of measure: m

Depth	Typ	Lithology	EOM	Sat	Aro	Asph	NSO	HC	Non-HC	Sample
4741.00	cut	Sh/Clst: brn blk	26297	17540	1399	274	7082	18940	7356	0064-1L
5025.30	ccp	S/Sst : lt gy	1844	1278	54	182	328	1333	511	0102-1L

Table 4c: MPLC Bulk Composition: Concentration of EOM and Fraction (mg/g TOC(e)) for well NOCS 1/3-8

Page: 1

Depth unit of measure: m

Depth	Typ	Lithology	EOM	Sat	Aro	Asph	NSO	HC	Non-HC	Sample
4741.00	cut	Sh/Clst: brn blk	587.00	391.54	31.25	6.13	158.08	422.79	164.21	0064-1L
5025.30	ccp	S/Sst : lt gy	72.63	50.34	2.16	7.19	12.94	52.50	20.14	0102-1L

Table 4d: MPLC Bulk Composition: Material extracted from the rock (%) for well NOCS 1/3-8

Page: 1

Depth unit of measure: m

Depth	Typ	Lithology	Sat	Aro	Asph	NSO	Total	HC	Non-HC	Recov. MPLC	Recov. Asph	Sample
4741.00	cut	Sh/Clst: brn blk	66.70	5.32	1.04	26.93	100.00	72.03	27.97	-	-	0064-1L
5025.30	ccp	S/Sst : lt gy	69.31	2.97	9.90	17.82	100.00	72.28	27.72	-	-	0102-1L

Table 4e: MPLC Bulk Composition: Ratios for well NOCS 1/3-8

Depth unit of measure: m

Depth	Typ	Lithology	Sat	HC	Asp	Sample
			Aro	Non-HC	NSO	
4741.00	cut	Sh/Clst: brn blk	12.53	2.57	0.04	0064-1L
5025.30	ccp	S/Sst : lt gy	23.33	2.61	0.56	0102-1L

Table 5: Saturated Hydrocarbon Ratios (peak area) for well NOCS 1/3-8

Page: 1

Depth unit of measure: m

Depth	Typ	Lithology	Pristane	Pristane	Pristane/nC17	Phytane	nC17	Sample
			nC17	Phytane	Phytane/nC18	nC18	nC17+nC27	
4741.00	cut	Sh/Clst: brn blk	0.42	1.24	1.16	0.36	0.99	0064-1L
5025.30	ccp	S/Sst : lt gy	0.46	0.89	1.25	0.36	1.00	0102-1L

Table 6a: Aromatic Hydrocarbon Ratios (peak area) for well NOCS 1/3-8

Page: 1

Depth unit of measure: m

Depth	Typ	Lithology	MNR	DMNR	BPhR	2/1MP	MPI1	MPI2	Rc	DBT/P	4/1MDBT	(3+2) /1MDBT	Sample
4741.00	cut	Sh/Clst: brn blk	0.71	1.52	0.17	1.12	0.88	1.02	0.93	-	-	-	0064-1L
5025.30	ccp	S/Sst : lt gy	-	-	-	0.98	0.84	0.83	0.90	-	-	-	0102-1L

Table 6b: Aromatic Hydrocarbon Ratios (peak area) for well NOCS 1/3-8

Page: 1

Depth unit of measure: m

Depth	Typ	Lithology	F1	F2	Sample
4741.00	cut	Sh/Clst: brn blk	0.45	0.26	0064-1L
5025.30	ccp	S/Sst : lt gy	0.47	0.23	0102-1L

Table 7 : Thermal Maturity Data for well NOCS 1/3-8

Page: 1

Depth unit of measure: m

Depth	Typ	Lithology	Vitrinite Reflectance (%)	Number of Readings	Standard Deviation (%)	Spore Fluorescence Colour	SCI	Tmax (°C)	Sample
1000.00	cut	Sh/Clst: ol gy	0.21	23	0.03	-	-	-	0106-1L
1200.00	cut	Sh/Clst: drk y brn	0.22	26	0.04	-	-	-	0107-1L
1400.00	cut	Sh/Clst: drk y brn	0.21	14	0.03	-	-	-	0108-1L
1600.00	cut	Sh/Clst: drk y brn	0.27	12	0.06	-	-	-	0109-1L
1800.00	cut	Sh/Clst: ol gy	0.26	6	0.03	-	-	-	0110-1L
2000.00	cut	Sh/Clst: drk brn gy	0.26	20	0.03	-	-	-	0111-1L
2200.00	cut	Sh/Clst: drk brn gy	0.28	21	0.03	-	-	-	0112-1L
2400.00	cut	Sh/Clst: pl y brn	0.34	25	0.05	-	-	-	0113-1L
2600.00	cut	Sh/Clst: pl y brn	0.35	23	0.03	-	-	-	0114-1L
2800.00	cut	Sh/Clst: m gy to pl y brn	0.38	25	0.05	-	-	-	0115-1L
3001.00	cut	Sh/Clst: pl y brn	0.54	26	0.07	-	-	-	0116-1L
3199.00	cut	Sh/Clst: m gy to pl y brn	0.58	20	0.06	-	-	-	0117-1L
3400.00	cut	Sh/Clst: m gy to pl y brn	0.67	3	0.04	-	-	-	0118-1L
3601.00	cut	Sh/Clst: w	NDP	-	-	-	-	-	0119-1L
3799.00	cut	Sh/Clst: m gy to pl y brn	NDP	-	-	-	-	-	0120-2L

Table 7 : Thermal Maturity Data for well NOCS 1/3-8

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Depth unit of measure: m

Depth	Typ Lithology	Vitrinite Reflectance (%)	Number of Readings	Standard Deviation (%)	Spore Fluorescence Colour	SCI	Tmax (°C)	Sample
4000.00	cut Sh/Clst: pl red brn	NDP	-	-	-	-	-	0121-2L
4180.00	cut Ca : w	NDP	-	-	-	-	-	0122-1L
4240.00	cut bulk	1.13	5	0.09	-	-	441	0001-0B
4330.00	cut bulk	NDP	-	-	-	-	444	0004-0B
4390.00	cut bulk	1.20	22	0.15	-	-	442	0008-0B
4402.00	cut bulk	1.21	13	0.14	-	-	439	0010-0B
4459.00	cut bulk	1.22	22	0.16	-	-	444	0014-0B
4507.00	cut bulk	1.30	23	0.18	-	-	440	0019-0B
4534.00	cut bulk	1.33	17	0.09	-	-	425	0023-0B
4558.00	cut bulk	1.23	10	0.17	-	-	440	0029-0B
4582.00	cut bulk	1.41	4	0.05	-	-	441	0033-0B
4600.00	cut bulk	1.36	14	0.09	-	-	441	0037-0B
4630.00	cut bulk	1.44	23	0.24	-	-	443	0043-0B
4648.00	cut bulk	1.27	28	0.22	-	-	437	0046-0B
4672.00	cut bulk	1.40	12	0.15	-	-	433	0050-0B

Table 7 : Thermal Maturity Data for well NOCS 1/3-8

Page: 3

Depth unit of measure: m

Depth	Typ Lithology	Vitrinite Reflectance (%)	Number of Readings	Standard Deviation (%)	Spore Fluorescence Colour	SCI	Tmax (°C)	Sample
4690.00	cut bulk	1.46	20	0.17	-	-	428	0053-0B
4714.00	cut bulk	1.34	18	0.11	-	-	426	0057-0B
4723.00	cut bulk	1.46	26	0.16	-	-	427	0059-0B
4729.00	cut bulk	1.40	19	0.15	-	-	429	0061-0B
4738.00	cut bulk	1.41	26	0.16	-	-	438	0063-0B
4750.00	cut bulk	NDP	-	-	-	-	435	0065-0B
4762.00	cut bulk	1.53	24	0.19	-	-	435	0067-0B
4786.00	cut bulk	1.49	22	0.21	-	-	435	0069-0B
4804.00	cut bulk	1.42	17	0.19	-	-	430	0071-0B
4822.00	cut bulk	1.11	16	0.13	-	-	430	0073-0B
4846.00	cut bulk	1.53	22	0.20	-	-	433	0075-0B
4864.00	cut bulk	1.60	16	0.12	-	-	433	0076-0B
4882.00	cut bulk	1.54	12	0.13	-	-	430	0079-0B
4906.00	cut bulk	1.44	10	0.16	-	-	431	0081-0B
4930.00	cut bulk	NDP	-	-	-	-	435	0083-0B

Table 7 : Thermal Maturity Data for well NOCS 1/3-8

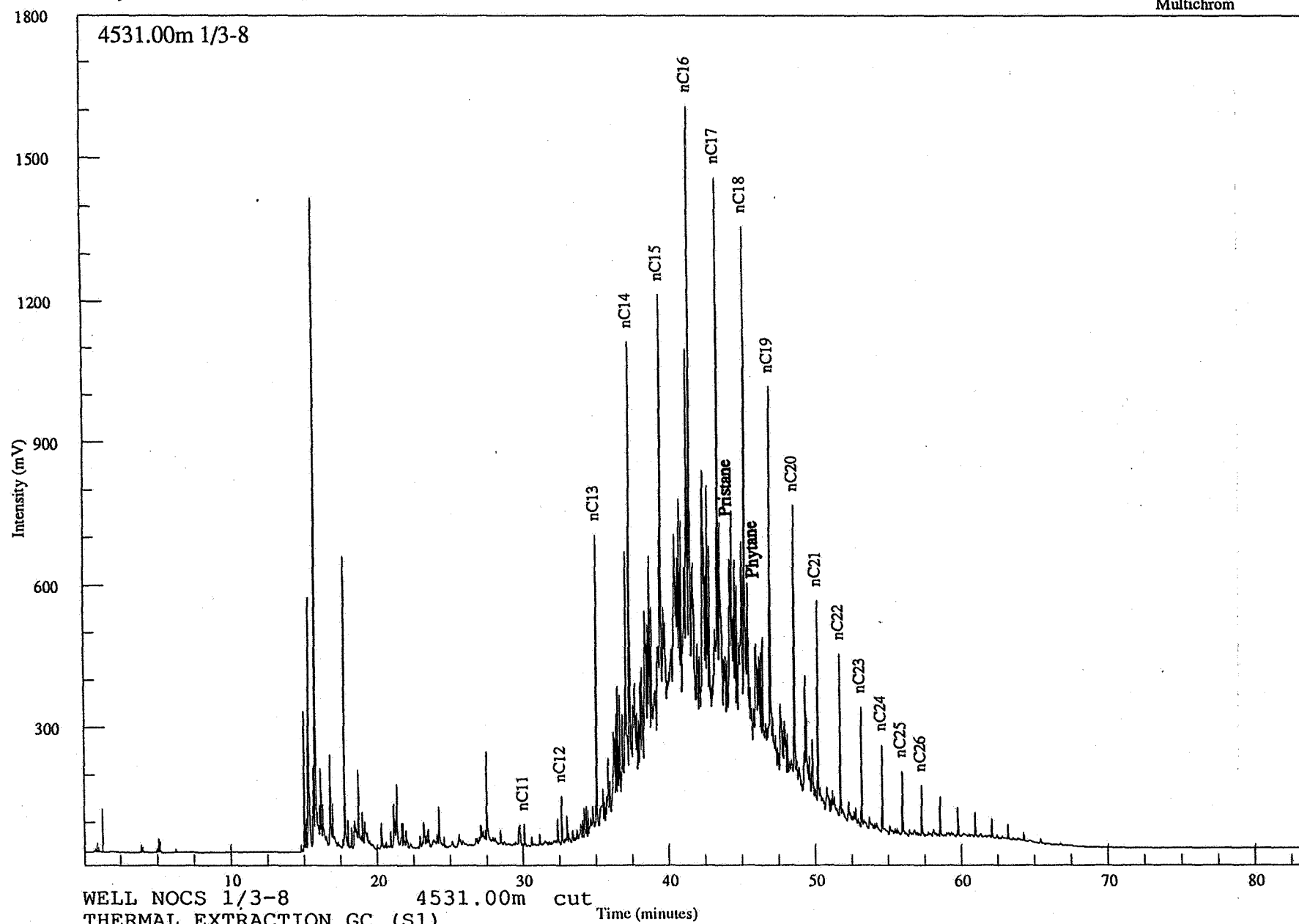
Page: 4

Depth unit of measure: m

Depth	Typ	Lithology	Vitrinite Reflectance (%)	Number of Readings	Standard Deviation (%)	Spore Fluorescence Colour	SCI	Tmax (°C)	Sample
4954.00	cut	bulk	1.74	13	0.26	-	-	435	0085-0B
4978.00	cut	bulk	1.47	21	0.20	-	-	434	0087-0B
5002.00	cut	bulk	1.69	19	0.09	-	-	437	0089-0B
5068.00	cut	bulk	NDP	-	-	-	-	433	0093-0B
5086.00	cut	bulk	NDP	-	-	-	-	431	0095-0B
5122.00	cut	bulk	NDP	-	-	-	-	430	0097-0B
5158.00	cut	bulk	NDP	-	-	-	-	432	0099-0B
5194.00	cut	bulk	1.61	2	0.24	-	-	435	0101-0B

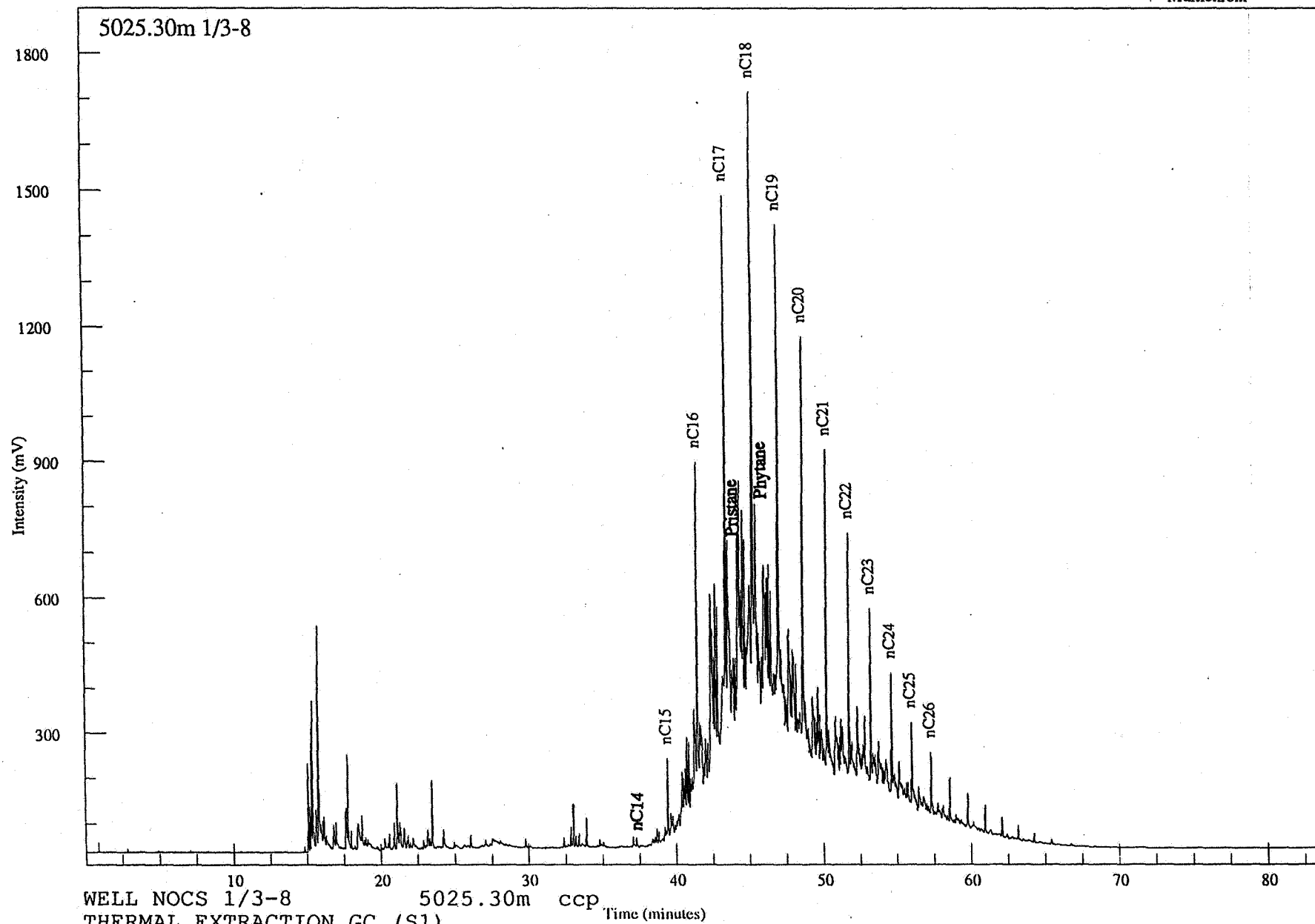
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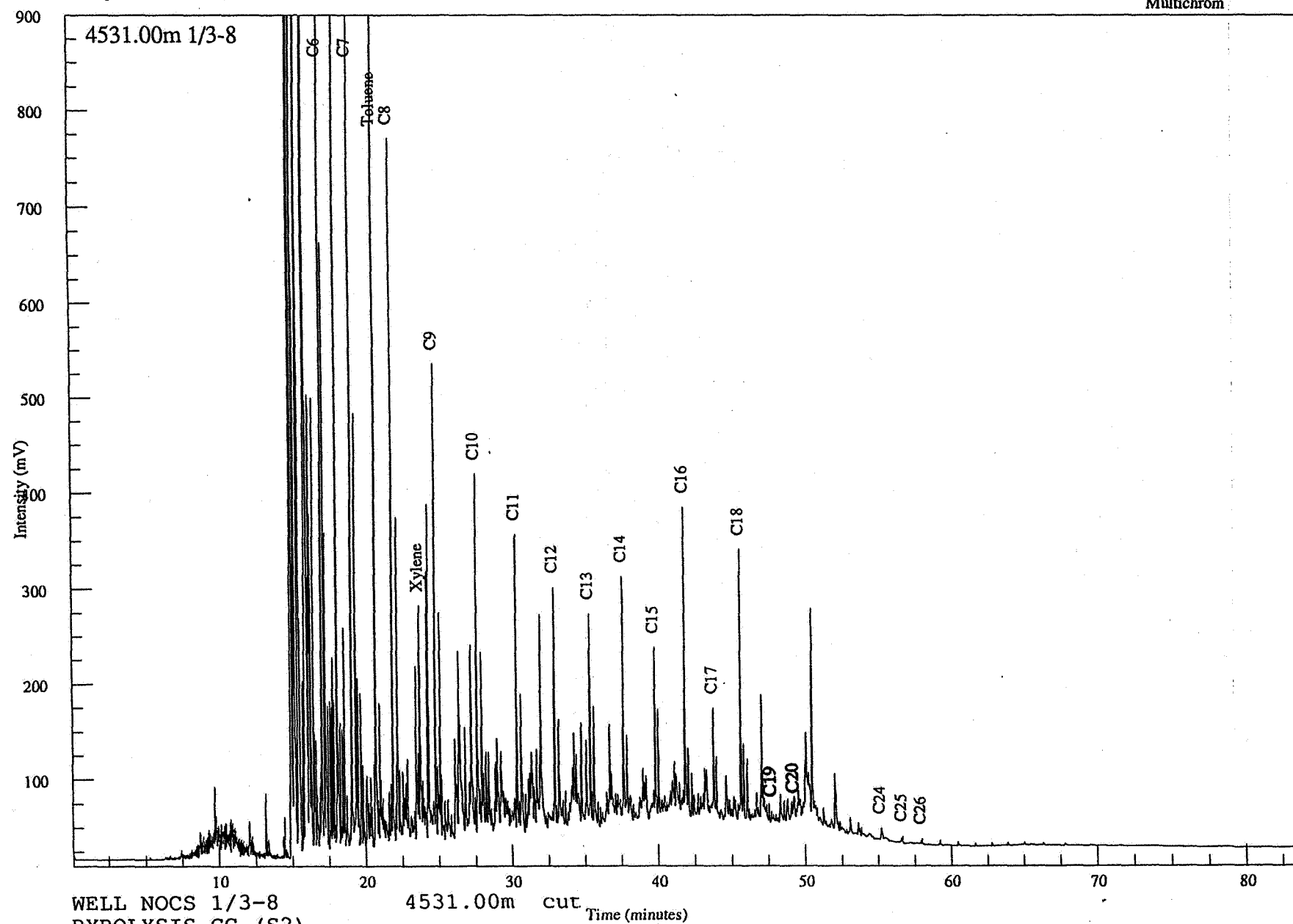
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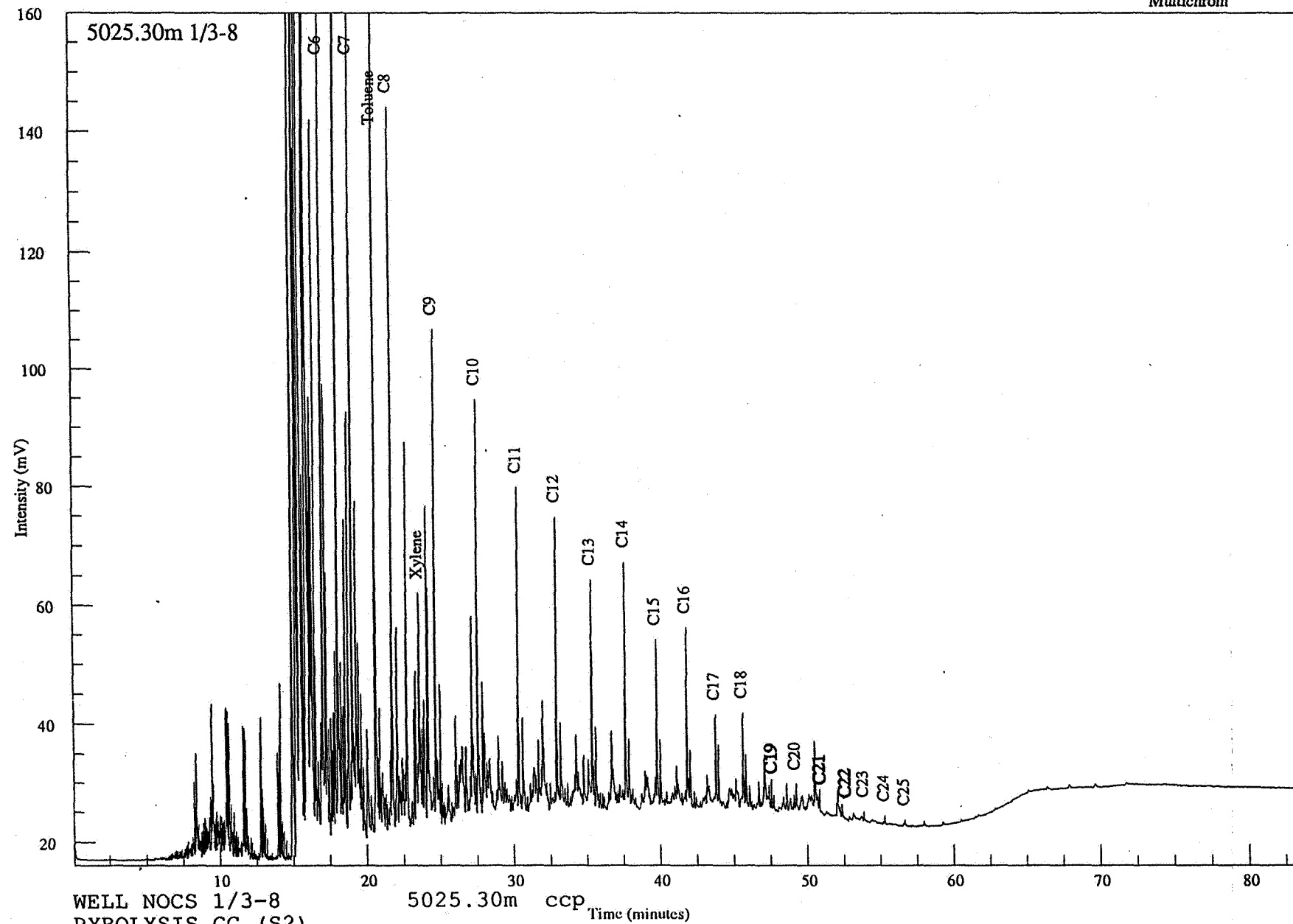
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WELL NOCS 1/3-8
PYROLYSIS GC (S2)
Marl: m gy to drk gy

Analysis Name : [60429] 21 PF46A,11,1.

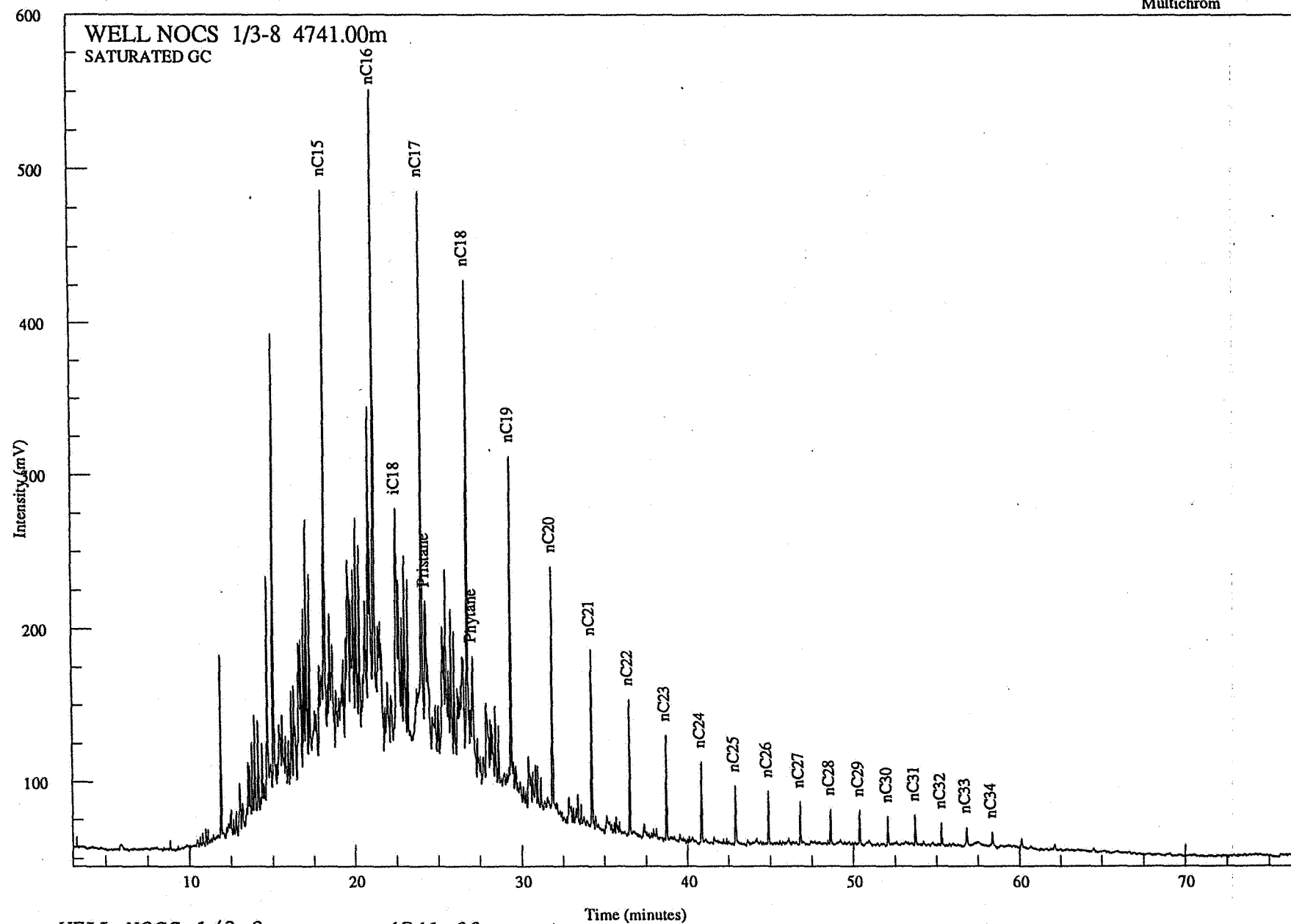
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WELL NOCS 1/3-8
PYROLYSIS GC (S2)
S/Sst: 1t gy

Analysis Name : [62351] 5 SP7400641L,1,1.

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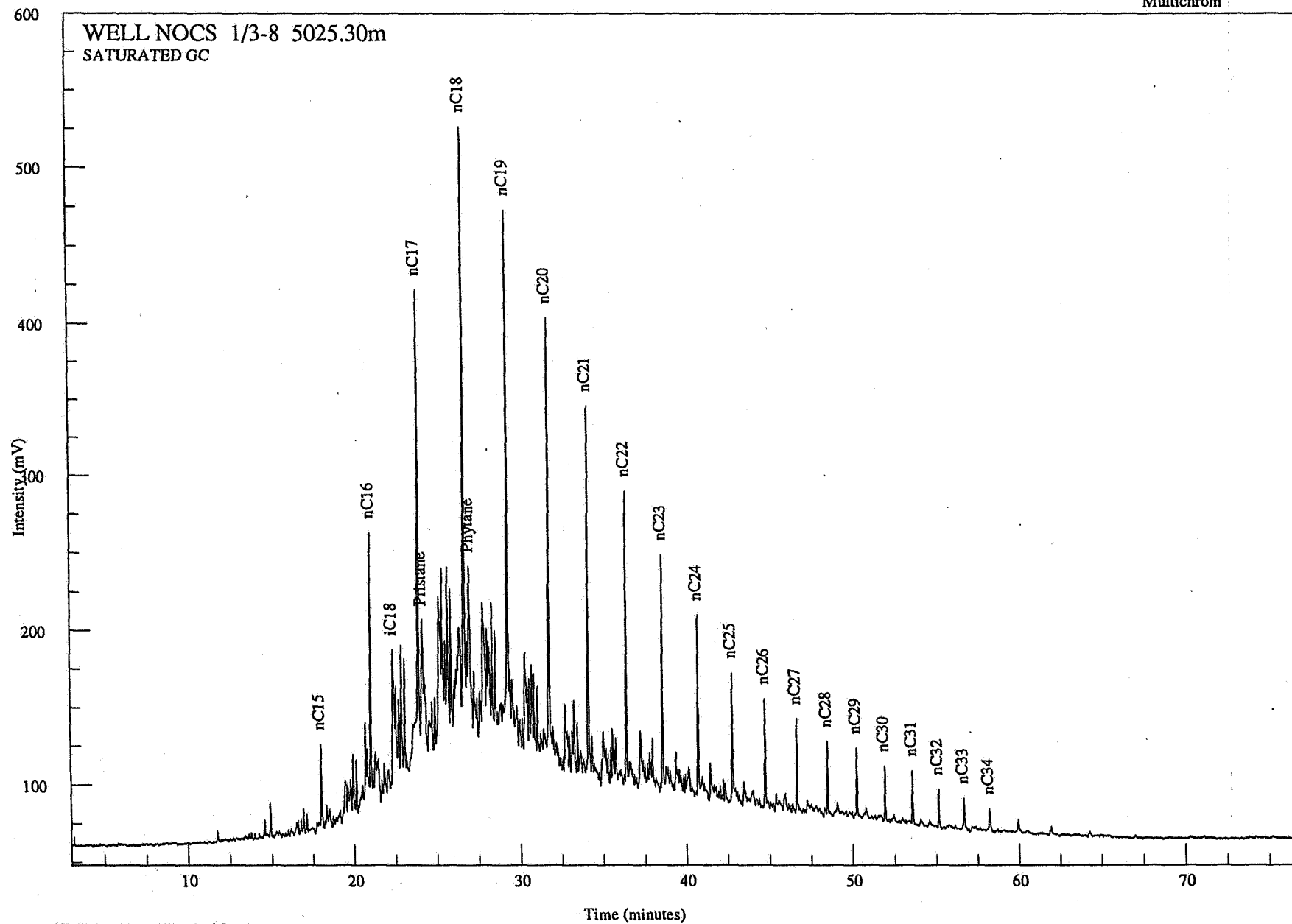


WELL NOCS 1/3-8
SATURATED GC
Sh/C1st: brn blk

4741.00m cut

Analysis Name : [62351] 5 SP7401021L,1,1.

Multichrom

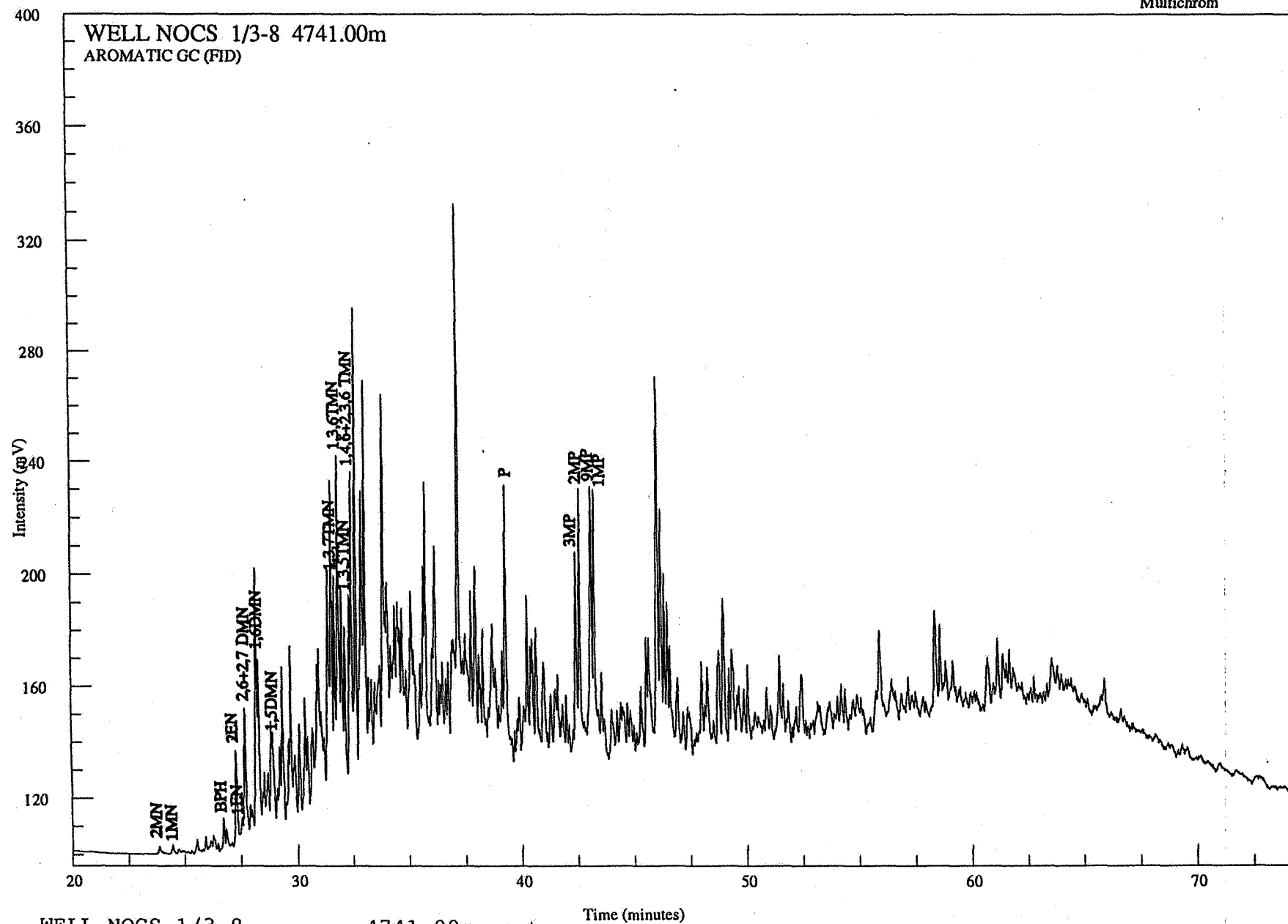


WELL NOCS 1/3-8
SATURATED GC
S/Sst: 1t gy

5025.30m ccp

Analysis Name : [62389] 29 AP8200030B,4,1.

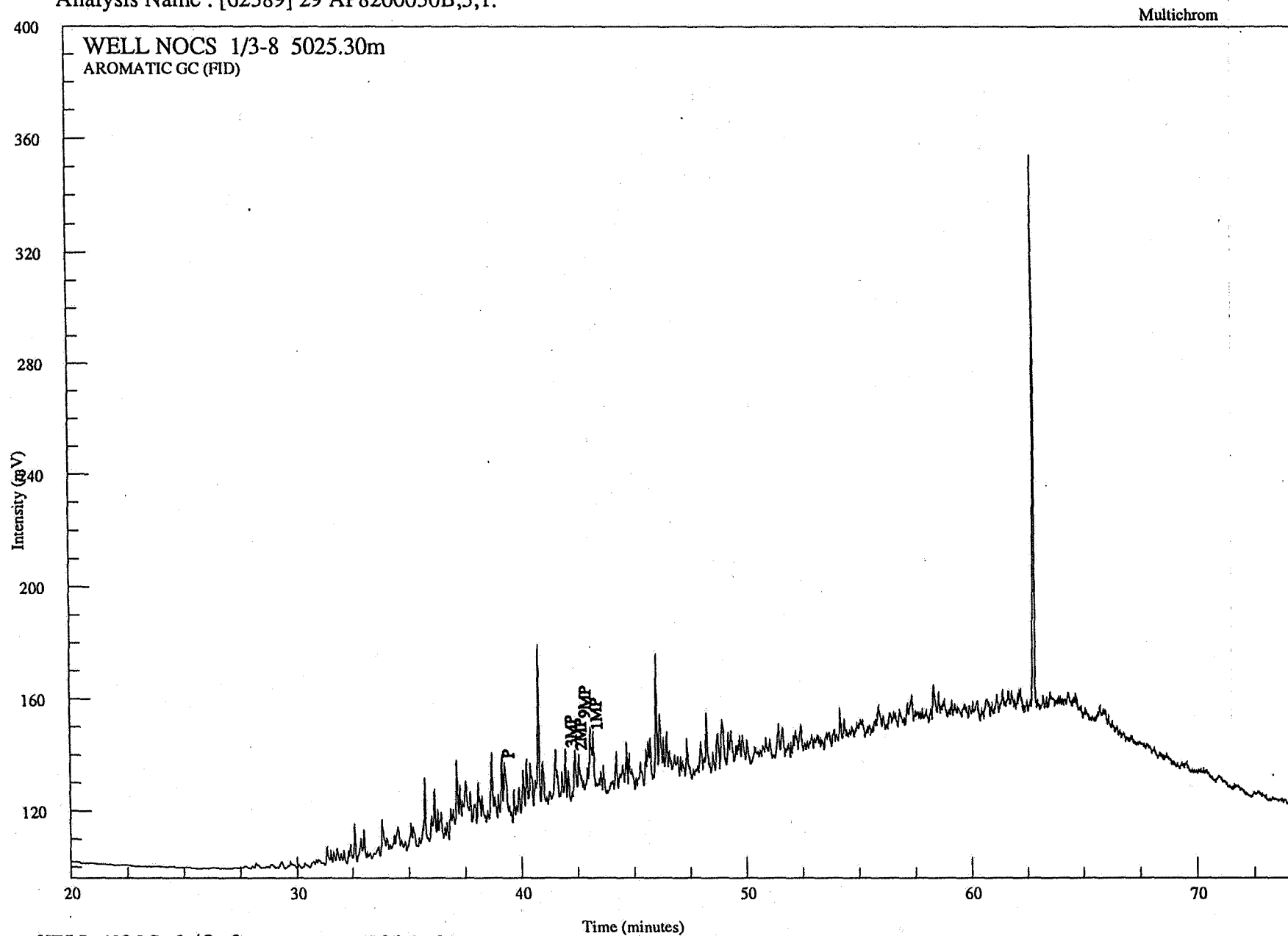
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WELL NOCS 1/3-8
AROMATIC GC (FID)
Sh/Clst: brn blk

4741.00m cul.

Analysis Name : [62389] 29 AP8200030B,5,1.

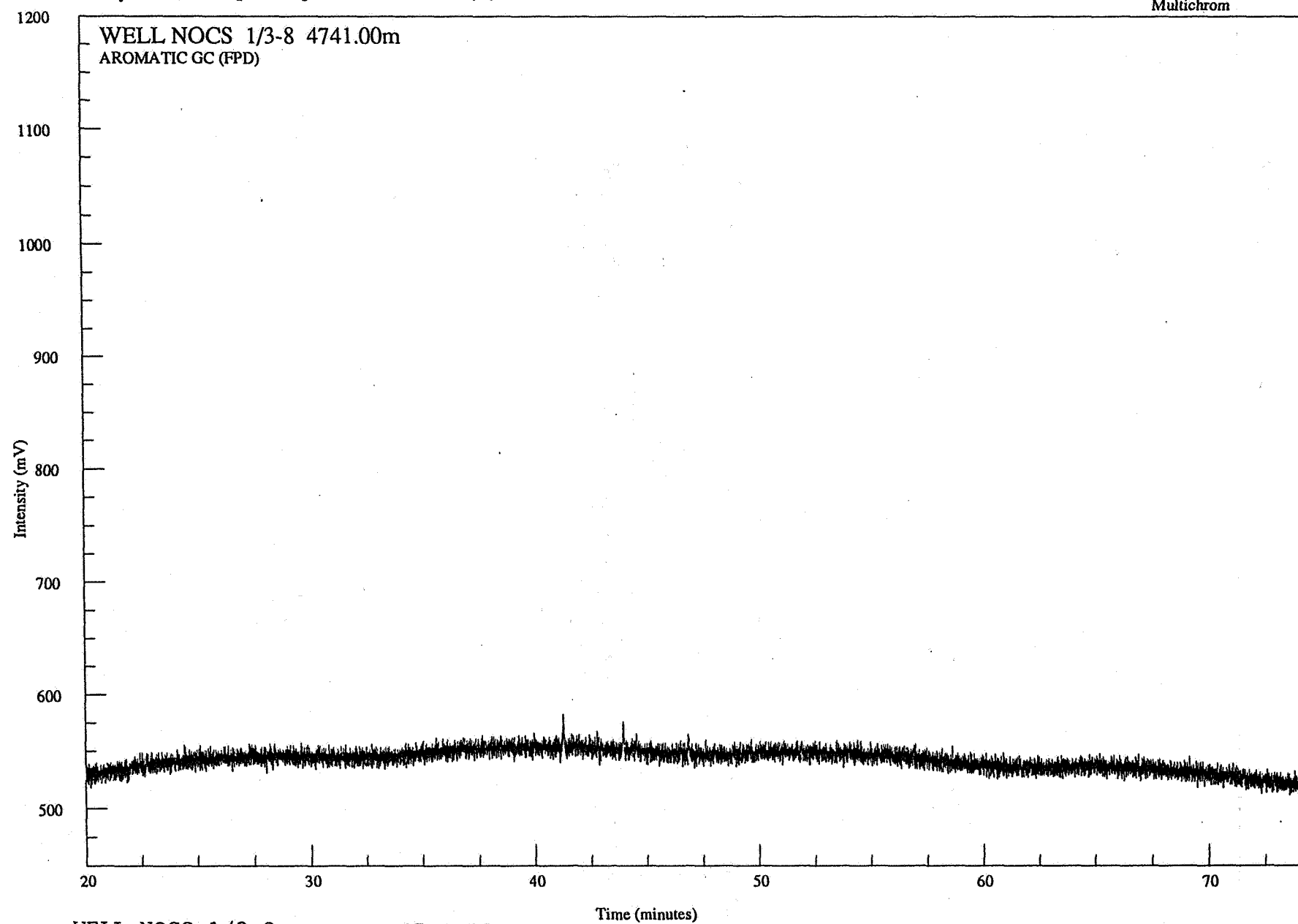


WELL NOCS 1/3-8
AROMATIC GC (FID)
S/Sst: 1t gy

5025.30m ccp

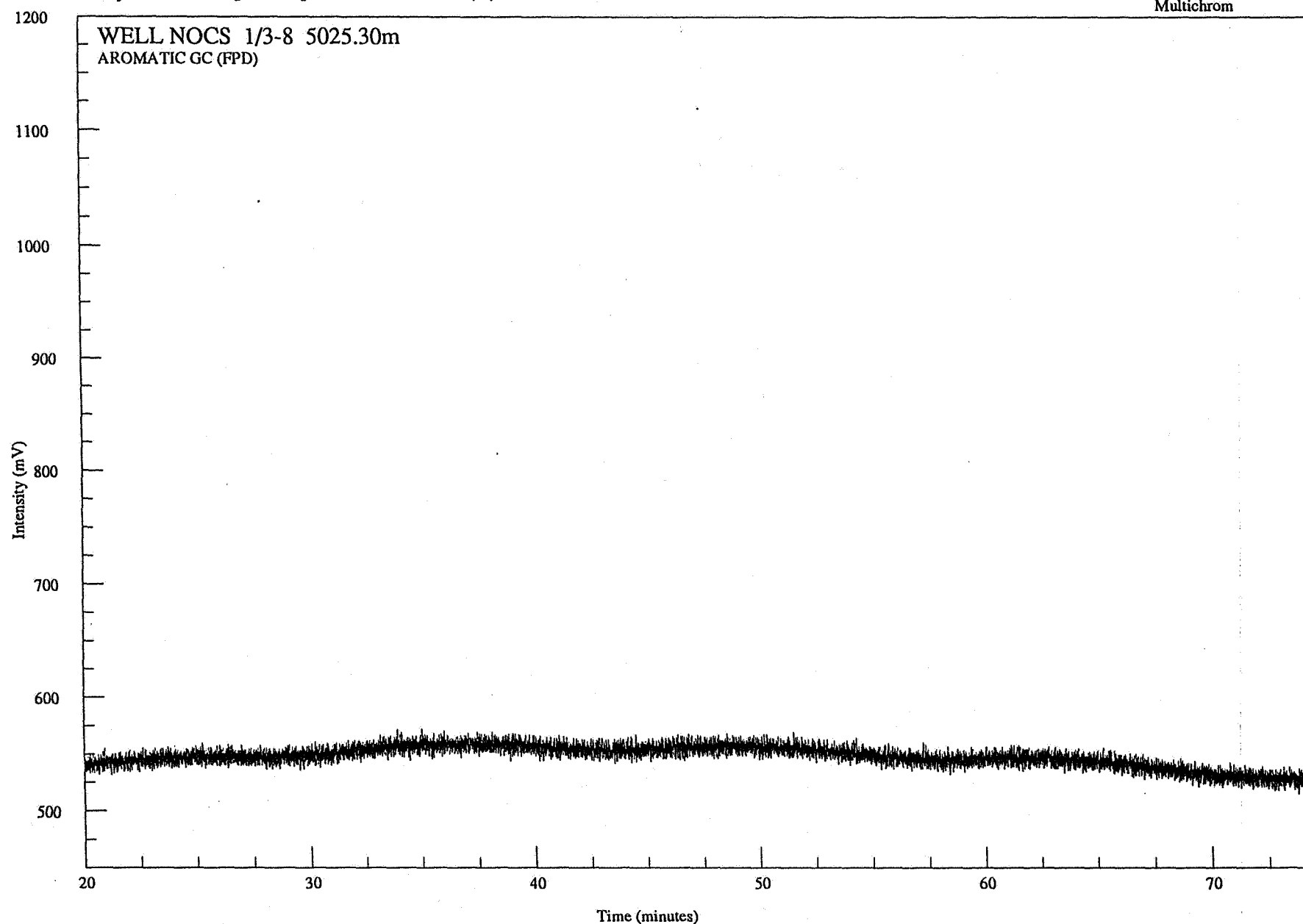
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Multichrom



WELL NOCS 1/3-8
AROMATIC GC (FPD)
Sh/Clst: brn blk

Analysis Name : [62389] 30 AP8200030B,5,1.



WELL NOCS 1/3-8
AROMATIC GC (FPD)
S/Sst: 1t gy

5025.30m ccp

Appendix II - Oil Analyses

Table 1A: Light Hydrocarbons from Whole Oil GC for NOCS 1/3-8

Well	Description	iC4	nC4	iC5	nC5	2,2DMC4	2,3DMC4	2MC5	3MC5	nC6	MCyC5	Benz	Sample
NOCS 1/3-8	4529m OIL	-	-	-	-	0.19	-	-	-	6.26	2.19	2.27	P04/0002

Table 1B: Light Hydrocarbons from Whole Oil GC for NOCS 1/3-8

Well	Description	CyC6	2MC6	3MC6	1,3ci- DMCyC5	1,3tr- DMCyC5	1,2tr- DMCyC5	nC7	MCyC6	Tol	nC8	p/m- Xylene	Sample
NOCS 1/3-8	4529m OIL	3.03	3.10	2.19	0.57	0.55	0.96	6.36	6.68	2.13	6.47	3.18	P04/0002

Table 1c: Thompson's indices for NOCS 1/3-8

Well	Description	A	B	X	W	C	I	F	H	U	R	S	Sample
NOCS 1/3-8	4529m OIL	0.36	0.33	0.49	7.49	1.30	2.54	0.95	27.13	1.38	2.05	32.95	P04/0002

THOMPSON'S INDICES

$$A = \frac{\text{Benzene}}{nC6}$$

$$B = \frac{\text{Toluene}}{nC7}$$

$$X = \frac{\text{p/m-xylene}}{nC8}$$

$$W = \frac{\text{Benzene} * 10}{CyC6}$$

$$C = \frac{nC6 + nC7}{CyC6 + MCyC6}$$

$$I = \frac{2MC6 + 3MC6}{1,3ciDMCyC5 + 1,3trDMCyC5 + 1,2trDMCyC5}$$

$$F = \frac{nC7}{MCyC6}$$

$$H = \frac{nC7 * 100}{CyC6 + 2MC6 + 2,3DMC4 + 3MC6 + 1,3ciDMCyC5 + 1,3trDMCyC5 + 1,2trDMCyC5 + nC7 + MCyC6}$$

$$U = \frac{CyC6}{MCyC5}$$

$$R = \frac{nC7}{2MC6}$$

$$S = \frac{nC6}{2,2DMC4}$$

Table 2a: MPLC Bulk Composition: Weight of Oil and Fraction for NOCS 1/3-8

Well	Description	Whole oil (mg)	Light (mg)	Topped (mg)	Sat (mg)	Aro (mg)	Asph (mg)	NSO (mg)	HC (mg)	Non-HC (mg)	Sample
NOCS 1/3-8	4529m OIL	112.1	12.5	99.6	86.1	9.7	0.1	3.7	95.8	3.8	P04/0002

Table 2b: MPLC Bulk Composition: Comparison of topped oil (%) for NOCS 1/3-8

Well	Description	Sat	Aro	Asph	NSO	Total	HC	Non-HC	Recov. MPLC	Recov. Asph	Sample
NOCS 1/3-8	4529m OIL	86.43	9.74	0.10	3.73	100.00	96.17	3.83	0.73	1.00	P04/0002

Table 2c: MPLC Bulk Composition: Ratios in topped oil for NOCS 1/3-8

Well	Description	Sat Aro	HC Non-HC	Asp NSO	Sample
NOCS 1/3-8	4529m OIL	8.87	25.10	0.03	P04/0002

Table 3A: Quantitative Analysis of Saturated Fraction for well NOCS 1/3-8

sample	nC15 mg/g sat	nC16 mg/g sat	iC18 mg/g sat	nC17 mg/g sat	Pr mg/g sat	nC18 mg/g sat	Ph mg/g sat	nC19 mg/g sat	nC20 mg/g sat	nC21 mg/g sat	nC22 mg/g sat	nC23 mg/g sat	nC24 mg/g sat	nC25 mg/g sat	nC26 mg/g sat	nC27 mg/g sat	nC28 mg/g sat	nC29 mg/g sat	nC30 mg/g sat	nC31 mg/g sat	nC32 mg/g sat	nC33 mg/g sat	nC34 mg/g sat
oil 20550	18.54	17.54	5.20	15.86	9.65	13.95	5.40	11.63	9.23	6.93	6.05	5.04	4.16	3.56	2.68	2.01	1.66	1.49	1.13	0.86	0.59	0.50	0.00

Table 3b: Saturated Hydrocarbon Ratios (peak area) for NOCS 1/3-8

Well	Description	Pristane	Pristane	Pristane/nC17	Phytane	CPI1	nC17	Sample
		nC17	Phytane	Phytane/nC18	nC18		nC17+nC27	
NOCS 1/3-8	4529m OIL	0.61	1.79	1.57	0.39	1.06	0.89	P04/0002

Table 4a: Aromatic Hydrocarbon Ratios (peak area) for NOCS 1/3-8

Well	Description	MNR	DMNR	BPhR	2/1MP	MPI1	MPI2	Rc	DBT/P	4/1MDBT	(3+2) /1MDBT	Sample
NOCS 1/3-8	4529m OIL	2.19	5.55	0.24	1.16	0.89	0.99	0.93	-	-	-	P04/0002

Table 4b: Aromatic Hydrocarbon Ratios (peak area) for NOCS 1/3-8

Well	Description	F1	F2	Sample
NOCS 1/3-8	4529m OIL	0.47	0.26	P04/0002

Table 5A: Isotope GC of Oil, Saturated Fraction, for NOCS 1/3-8

Well	Description	nC9	nC10	nC11	nC12	iC13	iC14	nC13	iC15	nC14	Sample
NOCS 1/3-8	4529m OIL	-	-	-30.20	-30.20	-28.20	-28.50	-29.50	-28.10	-29.50	P04/0002

Table 5B: Isotope GC of Oil, Saturated Fraction, for NOCS 1/3-8

Well	Description	iC16	nC15	nC16	iC18	nC17	pristane	nC18	phytane	nC19	Sample
NOCS 1/3-8	4529m OIL	-28.30	-29.60	-29.50	-28.50	-29.70	-29.80	-29.90	-29.30	-29.60	P04/0002

Table 5C: Isotope GC of Oil, Saturated Fraction, for NOCS 1/3-8

Well	Description	nC20	nC21	nC22	nC23	nC24	nC25	nC26	nC27	nC28	Sample
NOCS 1/3-8	4529m OIL	-29.90	-29.90	-30.10	-29.90	-30.20	-29.70	-30.00	-29.70	-30.10	P04/0002

Table 5D: Isotope GC of Oil, Saturated Fraction, for NOCS 1/3-8

Well	Description	nC29	nC30	nC31	nC32	nC33	nC34	nC35	nC36	Sample
NOCS 1/3-8	4529m OIL	-30.20	-30.50	-30.70	-	-	-	-	-	P04/0002

Table 6a: Variation in Triterpane Distribution (peak height) SIR for NOCS 1/3-8

Page: 1

Well	Descript.	Ratio1	Ratio2	Ratio3	Ratio4	Ratio5	Ratio6	Ratio7	Ratio8	Ratio9	Rat.10	Rat.11	Rat.12	Rat.13	Rat.14	Sample
NOCS 1/3-8	4529m OIL	0.57	0.36	0.48	0.98	0.49	1.24	0.08	0.08	0.07	0.57	0.93	0.52	0.13	53.67	P04/0002

List of Triterpane Distribution Ratios

Ratio 1: 27Tm / 27Ts

Ratio 2: 27Tm / 27Tm+27Ts

Ratio 3: 27Tm / 27Tm+30aß+30ßa

Ratio 4: 29aß / 30aß

Ratio 5: 29aß / 29aß+30aß

Ratio 6: 30d / 30aß

Ratio 7: 28aß / 30aß

Ratio 8: 28aß / 29aß

Ratio 9: 28aß / 28aß+30aß

Ratio 10: 24/3 / 30aß

Ratio 11: 30aß / 30aß+30ßa

Ratio 12: 29aß+29ßa / 29aß+29ßa+30aß+30ßa

Ratio 13: 29ßa+30ßa / 29aß+30aß

Ratio 14: 32aßS / 32aßS+32aßR (%)

Table 6b: Variation in Sterane Distribution (peak height) SIR for NOCS 1/3-8

Page: 1

<u>Well</u>	<u>Descript.</u>	<u>Ratio1</u>	<u>Ratio2</u>	<u>Ratio3</u>	<u>Ratio4</u>	<u>Ratio5</u>	<u>Ratio6</u>	<u>Ratio7</u>	<u>Ratio8</u>	<u>Ratio9</u>	<u>Ratio10</u>	<u>Sample</u>
NOCS 1/3-8	4529m OIL	0.74	60.66	72.45	2.15	0.68	0.50	0.30	0.57	1.54	3.34	P04/0002

List of Sterane Distribution RatiosRatio 1: $27\text{d}\beta\text{S} / 27\text{d}\beta\text{S} + 27\text{aaR}$ Ratio 2: $29\text{aaS} / 29\text{aaS} + 29\text{aaR} \text{ (%)}$ Ratio 3: $2 * (29\beta\beta\text{R} + 29\beta\beta\text{S}) / (29\text{aaS} + 29\text{aaR} + 2 * (29\beta\beta\text{R} + 29\beta\beta\text{S})) \text{ (%)}$ Ratio 4: $27\text{d}\beta\text{S} + 27\text{d}\beta\text{R} + 27\text{daR} + 27\text{daS} / 29\text{d}\beta\text{S} + 29\text{d}\beta\text{R} + 29\text{daR} + 29\text{daS}$ Ratio 5: $29\beta\beta\text{R} + 29\beta\beta\text{S} / 29\beta\beta\text{R} + 29\beta\beta\text{S} + 29\text{aaS}$ Ratio 6: $21\text{a} + 22\text{a} / 21\text{a} + 22\text{a} + 29\text{aaS} + 29\beta\beta\text{R} + 29\beta\beta\text{S} + 29\text{aaR}$ Ratio 7: $21\text{a} + 22\text{a} / 21\text{a} + 22\text{a} + 28\text{daS} + 28\text{aaS} + 29\text{daR} + 29\text{aaS} + 29\beta\beta\text{R} + 29\beta\beta\text{S} + 29\text{aaR}$ Ratio 8: $29\beta\beta\text{R} + 29\beta\beta\text{S} / 29\text{aaS} + 29\beta\beta\text{R} + 29\beta\beta\text{S} + 29\text{aaR}$ Ratio 9: $29\text{aaS} / 29\text{aaR}$ Ratio 10: $29\beta\beta\text{R} + 29\beta\beta\text{S} / 29\text{aaR}$

Table 6c: Raw triterpane data (peak height) m/z 191 SIR for NOCS 1/3-8

Well	Descript.	23/3	24/3	25/3	24/4	26/3	27Ts	27Tm	28aß	25nor30aß	Sample
		29aß	29Ts	30d	29ßa	300	30aß	30ßa	30G	31aßS	
		31aßR	32aßS	32aßR	33aßS	33aßR	34aßS	34aßR	35aßS	35aßR	
NOCS 1/3-8	4529m OIL	20070.4	11752.7	7260.2	11945.7	4427.8	36118.0	20422.2	1641.5	4645.1	P04/0002
		20035.4	22238.6	25489.6	4037.7	0.0	20488.3	1426.2	0.0	7636.4	
		7958.4	6238.0	5385.5	3857.7	4514.8	2769.8	2447.4	2164.1	1284.6	

Table 6d: Raw sterane data (peak height) m/z 217 SIR for NOCS 1/3-8

Well	Descript.	21a	22a	27dßS	27dßR	27daR	27daS	28dßS	28dßR	28daR*	Sample
		29dßS*	28daS*	27aaR	29dßR	29daR	28aaS	29daS*	28ßßS		
		28aaR	29aaS	29ßßR	29ßßS	29aaR					
NOCS 1/3-8	4529m OIL	24737.3	4516.9	101529.0	87500.7	39859.3	33288.9	43163.6	32311.6	25480.3	P04/0002
		50835.4	16984.8	36555.9	39073.8	13922.3	5100.3	17877.4	6861.7		
		2674.5	7762.9	8636.4	8190.0	5035.1					

* 28daR coel with 27aaS, 29dßS coel with 27ßßR, 28daS coel with 27ßßS, 29daS coel with 28ßßR

Table 6e: Raw triterpane data (peak height) m/z 177 SIR for NOCS 1/3-8

Well	Descript.	25nor28aß	25nor30aß	Sample
NOCS 1/3-8	4529m OIL	0.0	0.0	P04/0002

Table 6f: Raw sterane data (peak height) m/z 218 SIR for NOCS 1/3-8

Well	Descript.	27ßßR	27ßßS	28ßßR	28ßßS	29ßßR	29ßßS	30ßßR	30ßßS	Sample
NOCS 1/3-8	4529m OIL	14918.5	8948.6	8784.7	8744.7	10160.1	10273.0	1763.2	1985.4	P04/0002

Table 6g: Amount of triterpanes (ppb) m/z 191 SIR for NOCS 1/3-8

Well	Descript.	23/3	24/3	25/3	24/4	26/3	27Ts	27Tm	28aß	25nor30aß	Sample
		29aß	29Ts	30d	29ßa	300	30aß	30ßa	30G	31aßS	
		31aßR	32aßS	32aßR	33aßS	33aßR	34aßS	34aßR	35aßS	35aßR	
NOCS 1/3-8	4529m OIL	9608.3	5626.4	3475.7	5718.7	2119.7	17290.8	9776.7	785.8	2223.7	P04/0002
		9591.5	10646.3	12202.6	1933.0	0.0	9808.3	682.8	0.0	3655.8	
		3809.9	2986.3	2578.2	1846.8	2161.4	1326.0	1171.6	1036.0	615.0	

Table 6h: Amount of steranes (ppb) m/z 217 SIR for NOCS 1/3-8

Page: 1

Well	Descript.	21a	22a	27dBS	27dBR	27daR	27daS	28dBS	28dBR	28daR*	Sample
		29dBS*	28daS*	27aaR	29dBR	29daR	28aaS	29daS*	28BS		
		28aaR	29aaS	29BSR	29BS	29aaR					
NOCS 1/3-8	4529m OIL	11842.5	2162.4	48604.9	41889.2	19081.8	15936.4	20663.7	15468.5	12198.2	P04/0002
		24336.4	8131.1	17500.4	18705.8	6665.0	2441.7	8558.4	3284.9		
		1280.3	3716.3	4134.5	3920.8	2410.4					

* 28daR coel with 27aaS, 29dBS coel with 27BSR, 28daS coel with 27BS, 29daS coel with 28BSR

Table 6i: Amount of standard and weight of sample for NOCS 1/3-8

Well	Descript.	Standard	Amount	Weight	Sample
NOCS 1/3-8	4529m OIL	70129.6	1.400	41.7	P04/0002

Table 7a: Variation in Triaromatic Sterane Distribution (peak height) for NOCS 1/3-8

<u>Well</u>	<u>Descript.</u>	<u>Ratio1</u>	<u>Ratio2</u>	<u>Ratio3</u>	<u>Ratio4</u>	<u>Ratio5</u>	<u>Sample</u>
NOCS 1/3-8	4529m OIL	0.84	0.80	0.66	0.66	0.79	P04/0002

Ratio1: $a1 / a1 + g1$

Ratio2: $b1 / b1 + g1$

Ratio3: $a1 + b1 / a1 + b1 + c1 + d1 + e1 + f1 + g1$

Ratio4: $a1 / a1 + e1 + f1 + g1$

Ratio5: $a1 / a1 + d1$

Table 7b: Variation in Monoaromatic Sterane Distribution (peak height) for NOCS 1/3-8

Page: 1

<u>Well</u>	<u>Descript.</u>	<u>Ratio1</u>	<u>Ratio2</u>	<u>Ratio3</u>	<u>Ratio4</u>	<u>Sample</u>
NOCS 1/3-8	4529m OIL	0.64	0.51	0.51	0.38	P04/0002

Ratio1: A1 / A1 + E1
Ratio2: B1 / B1 + E1

Ratio3: A1 / A1 + E1 + G1
Ratio4: A1+B1 / A1+B1+C1+D1+E1+F1+G1+H1+I1

Table 7c: Aromatisation of Steranes (peak height) for NOCS 1/3-8

<u>Well</u>	<u>Descript.</u>	<u>Ratio1</u>	<u>Ratio2</u>	<u>Sample</u>
NOCS 1/3-8	4529m OIL	0.36	0.95	P04/0002

Ratio1:
$$\frac{C1+D1+E1+F1+G1+H1+I1}{C1+D1+E1+F1+G1+H1+I1 + c1+d1+e1+f1+g1}$$

Ratio2: $g1 / g1 + I1$

Table 7d: Raw triaromatic sterane data (peak height) m/z 231 for NOCS 1/3-8

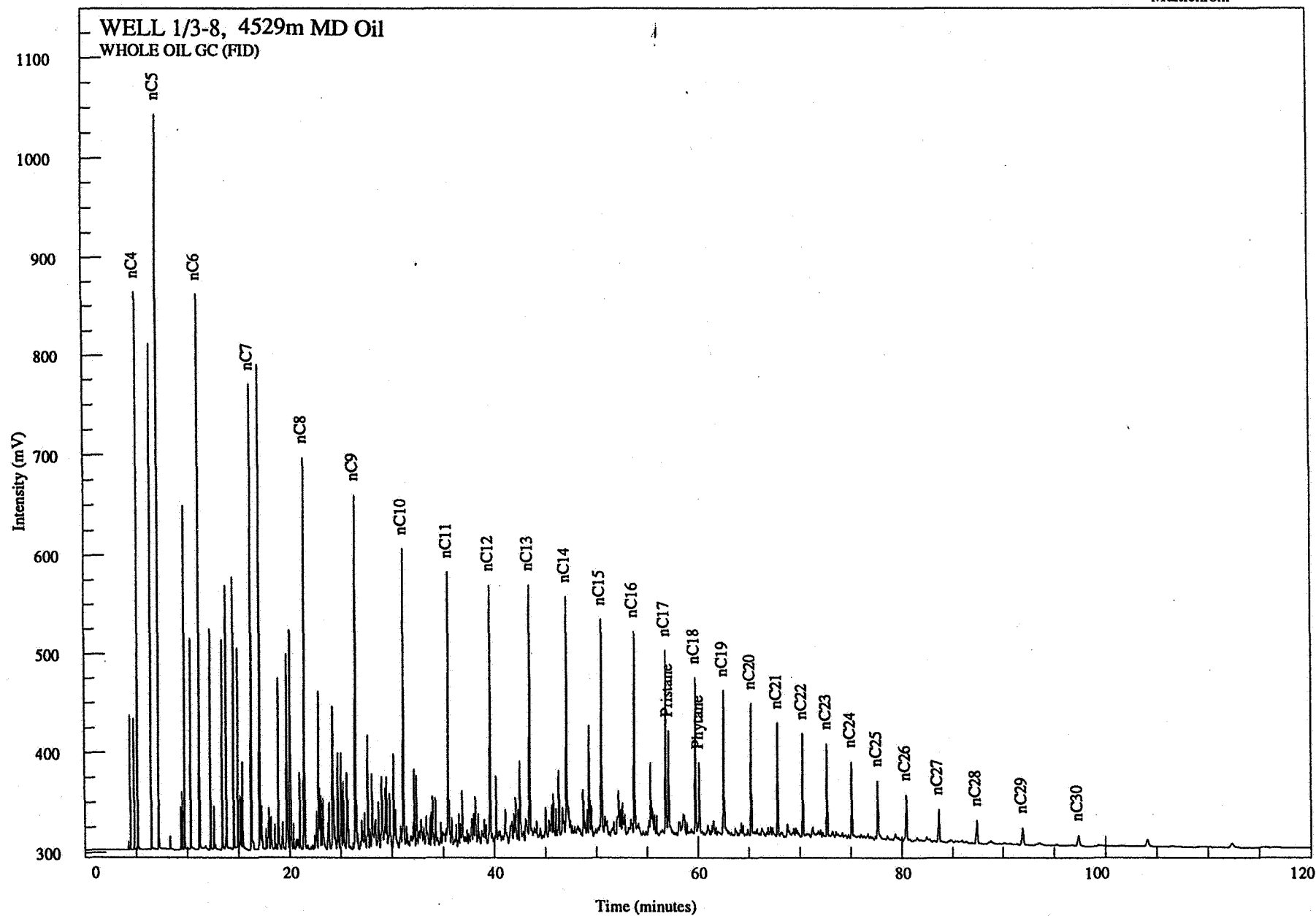
Well	Descript.	a1	b1	c1	d1	e1	f1	g1	Sample
NOCS 1/3-8	4529m OIL	260012.3	194243.9	23167.3	69460.9	51957.8	36885.9	47735.2	P04/0002

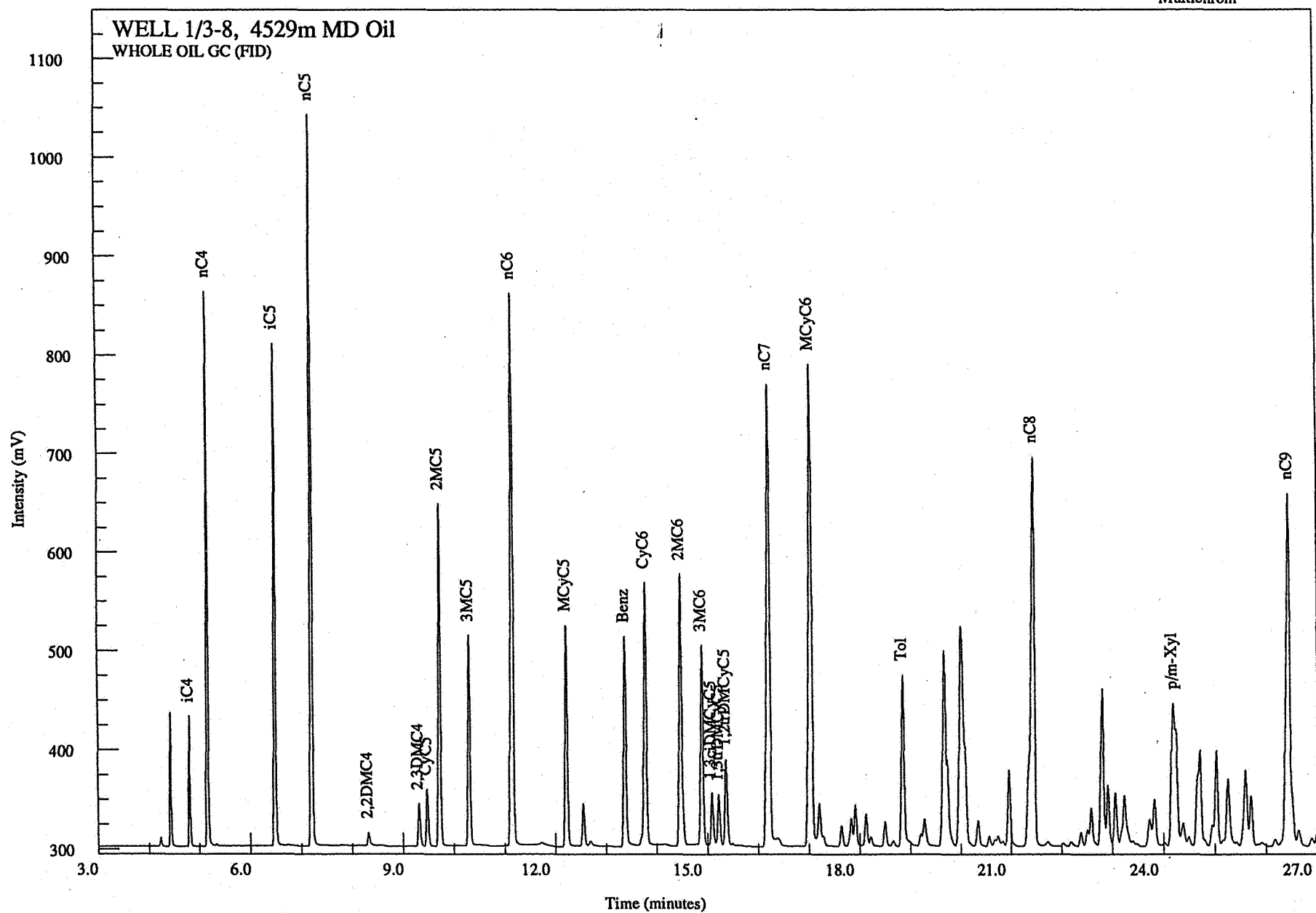
Table 7e: Raw monoaromatic sterane data (peak height) m/z 253 for NOCS 1/3-8

Well	Descript.	A1	B1	C1	D1	E1	F1	G1	H1	I1	Sample
NOCS 1/3-8	4529m OIL	49651.3	29431.8	17049.6	16773.4	28217.9	18873.4	20196.8	28081.5	2411.0	P04/0002

Analysis Name : [TESTING] 31 AMOCO,1,1.

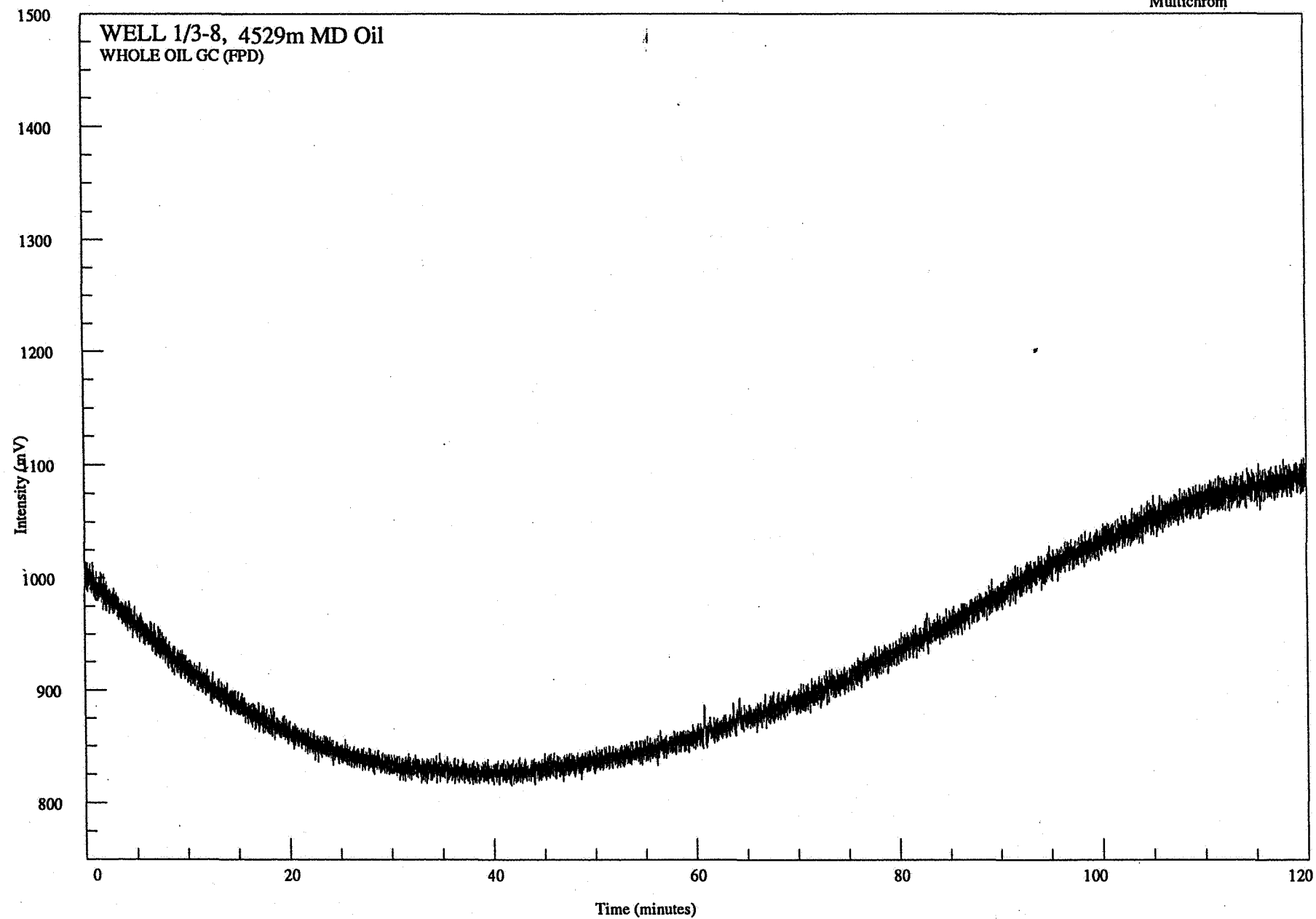
Multichrom





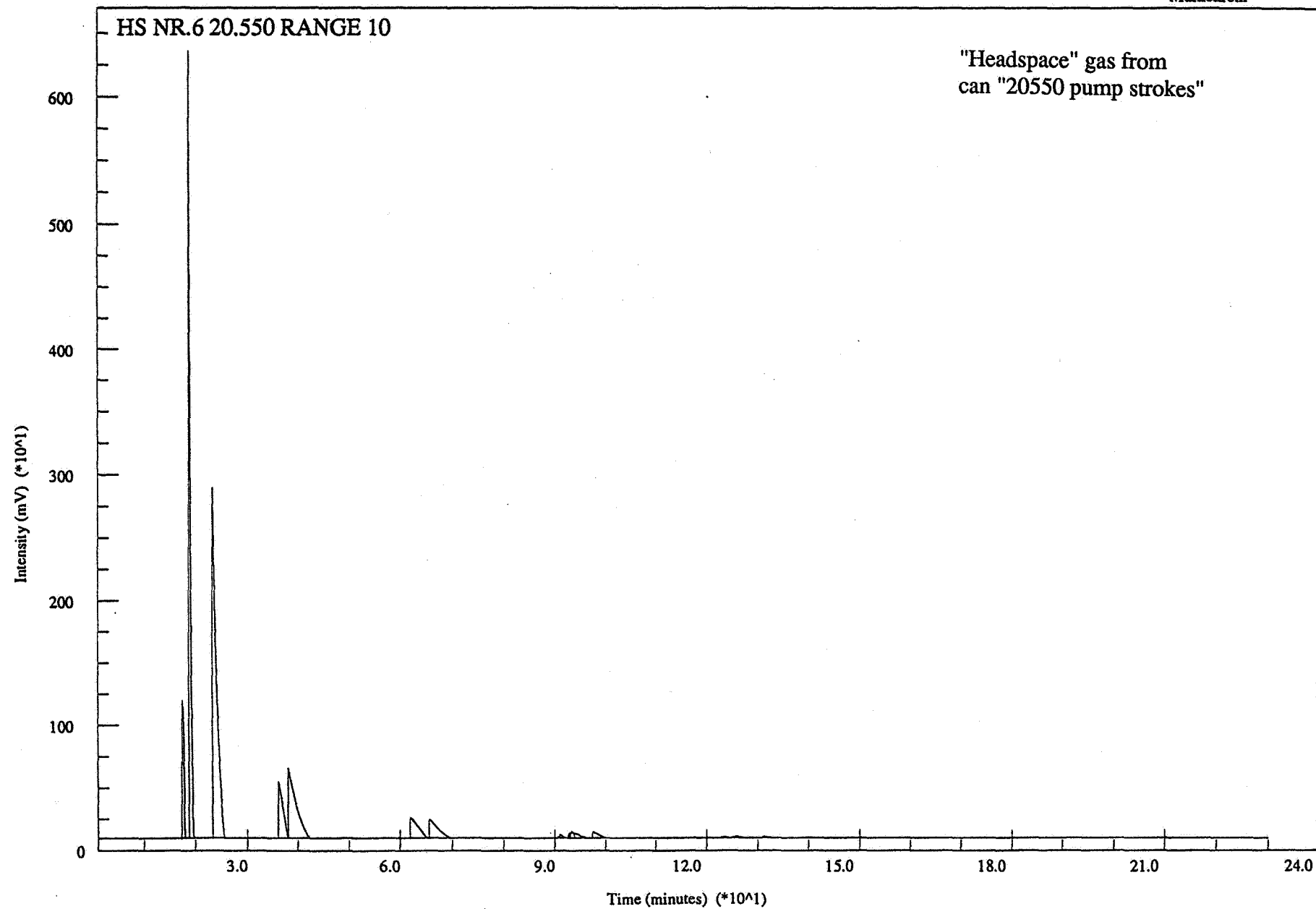
Analysis Name : [TESTING] 32 AMOCO,1,1.

Multichrom



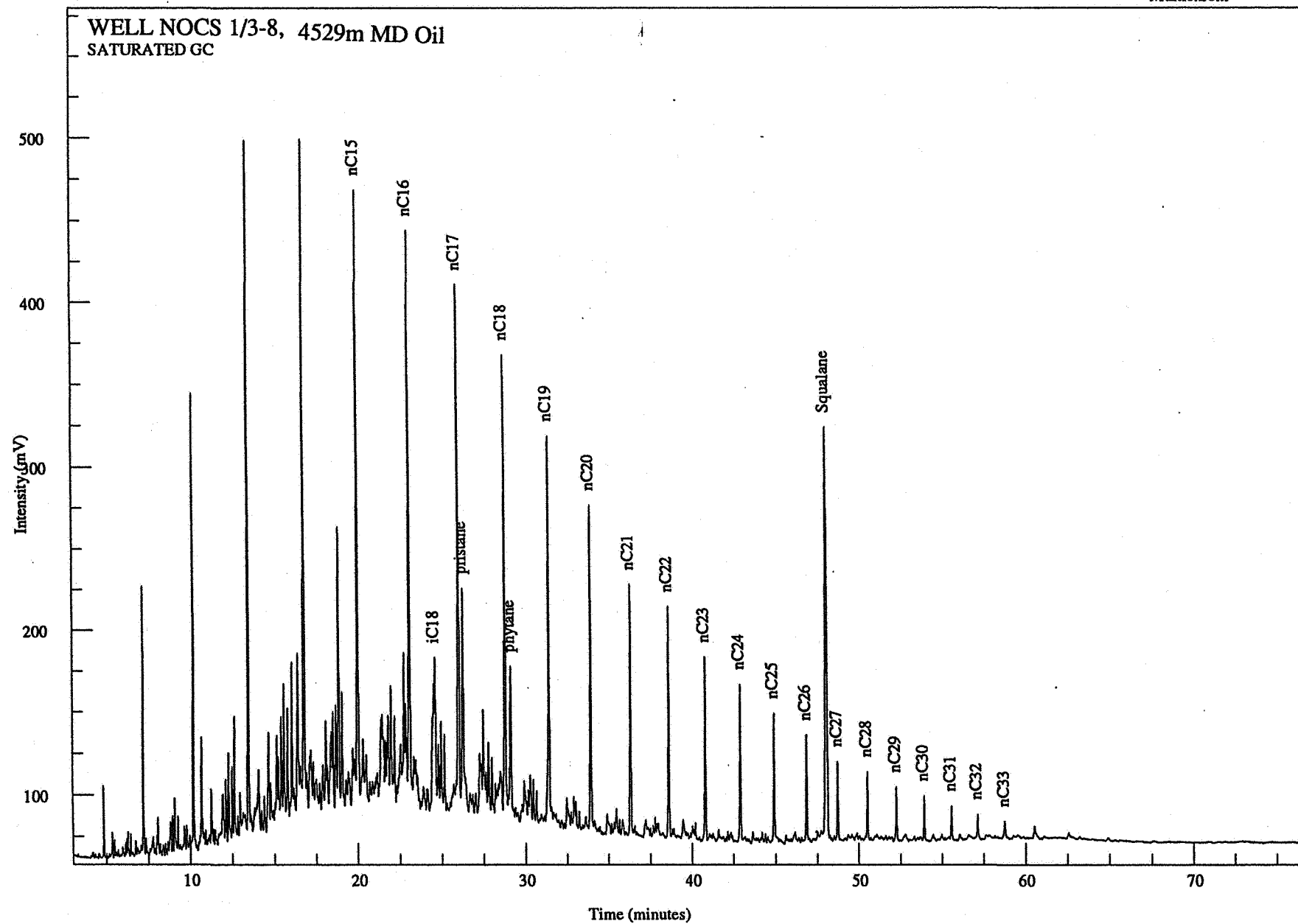
Analysis Name : [62324] 20 HSNR6B,1,1.

Multichrom



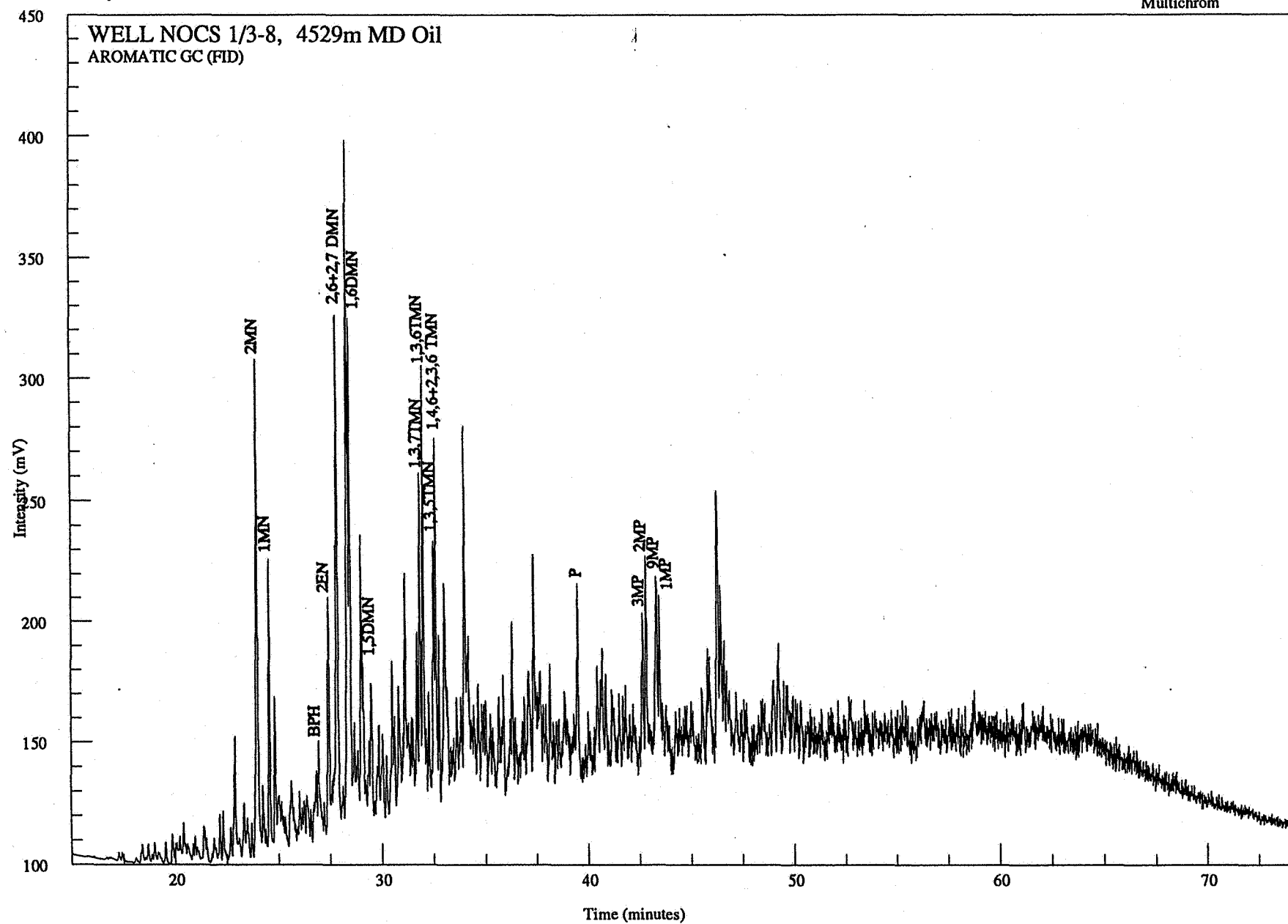
Analysis Name : [62351] 6 SAPO4,2,1.

Multichrom



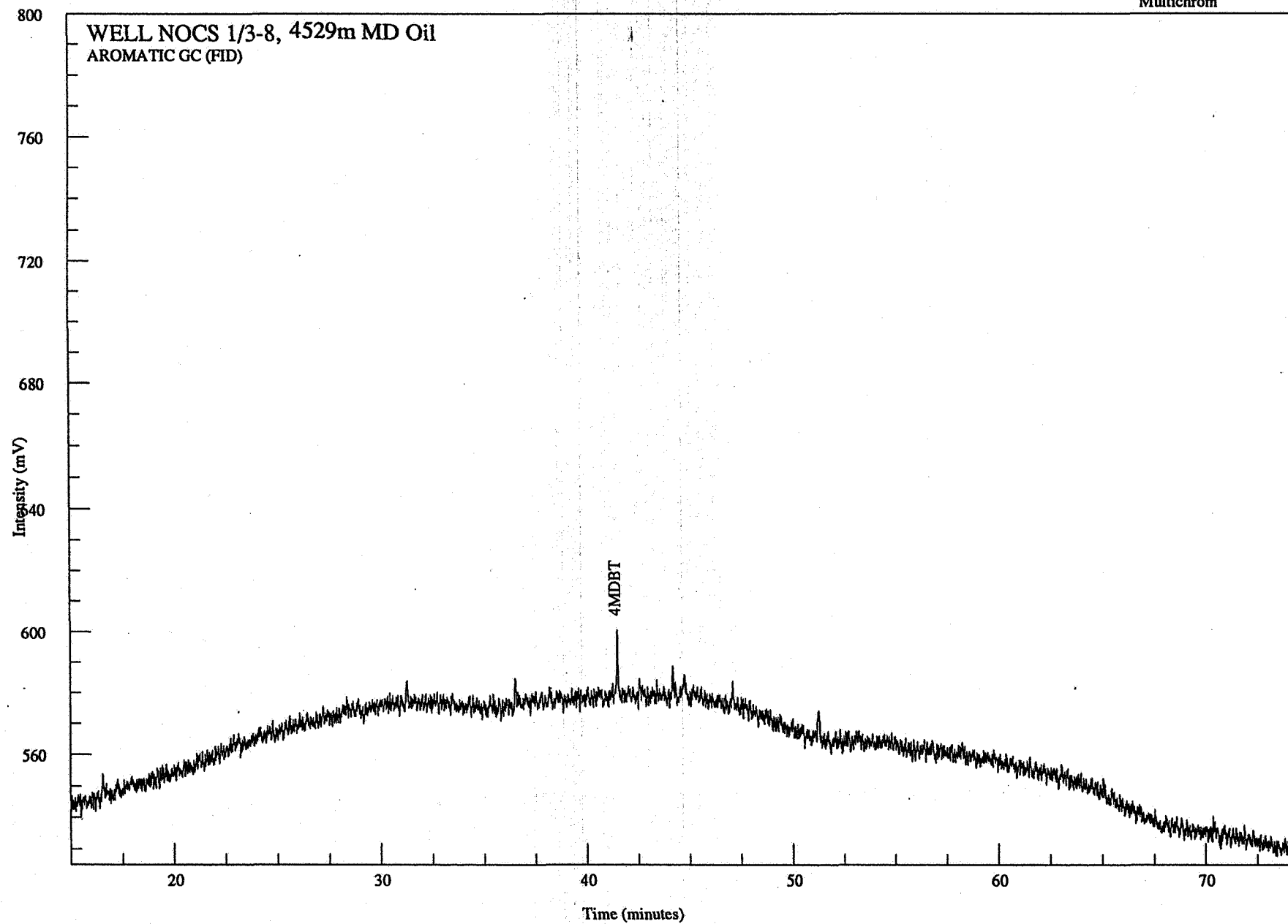
Analysis Name : [62351] 29 ARPO4,3,1.

Multichrom



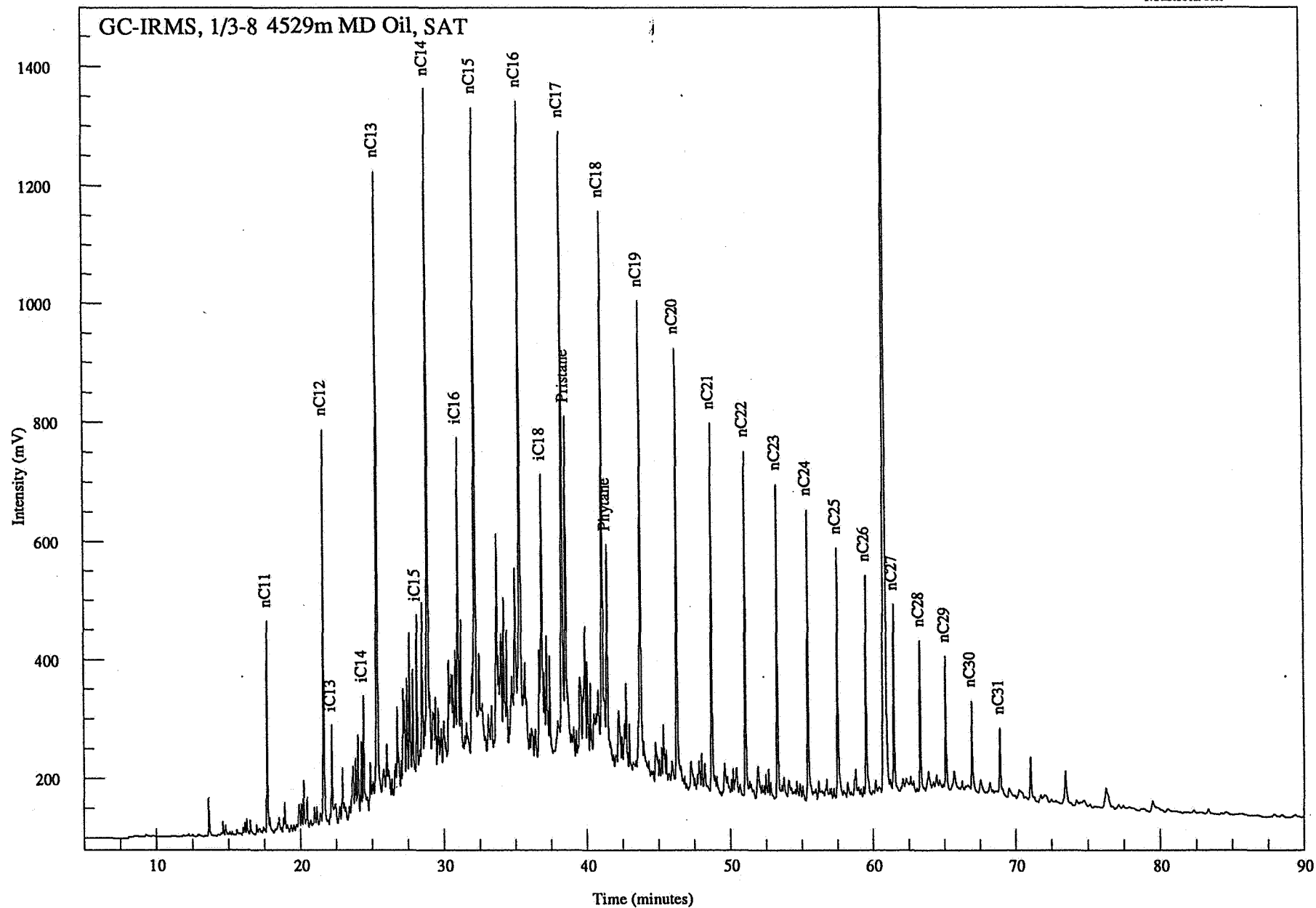
Analysis Name : [62351] 30 ARPO4,3,1.

Multichrom

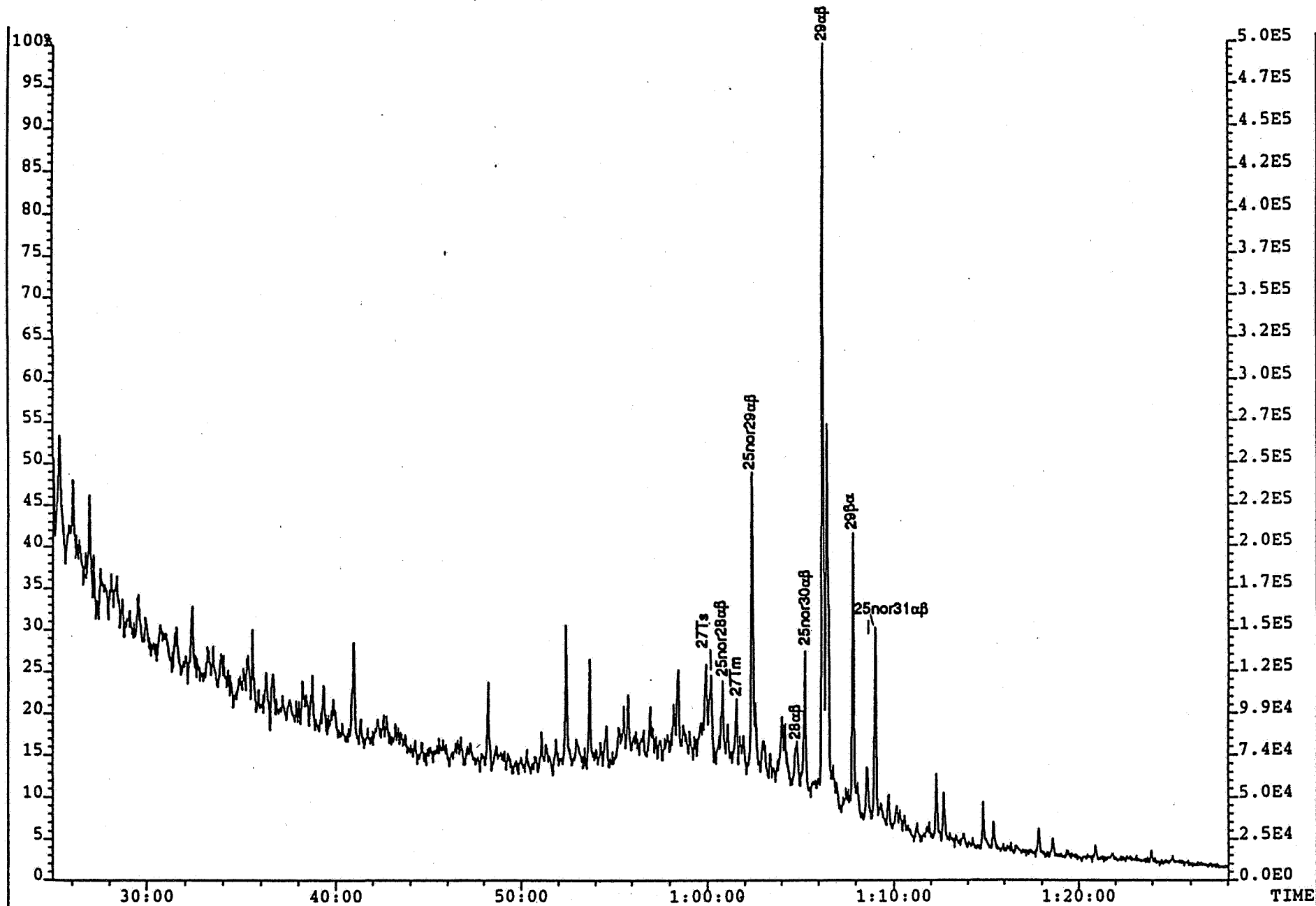


Analysis Name : [62051] 3 SA138,1,1.

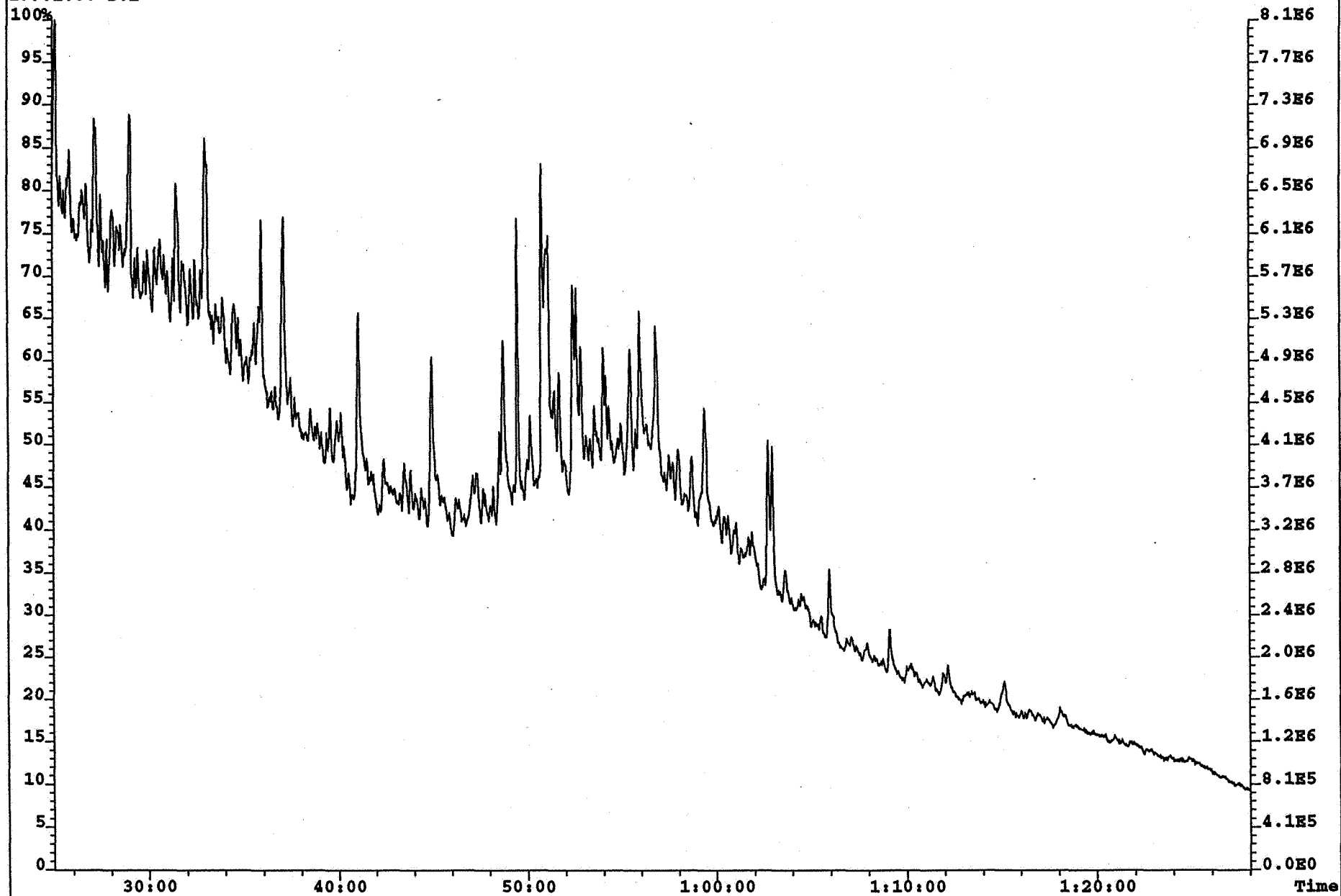
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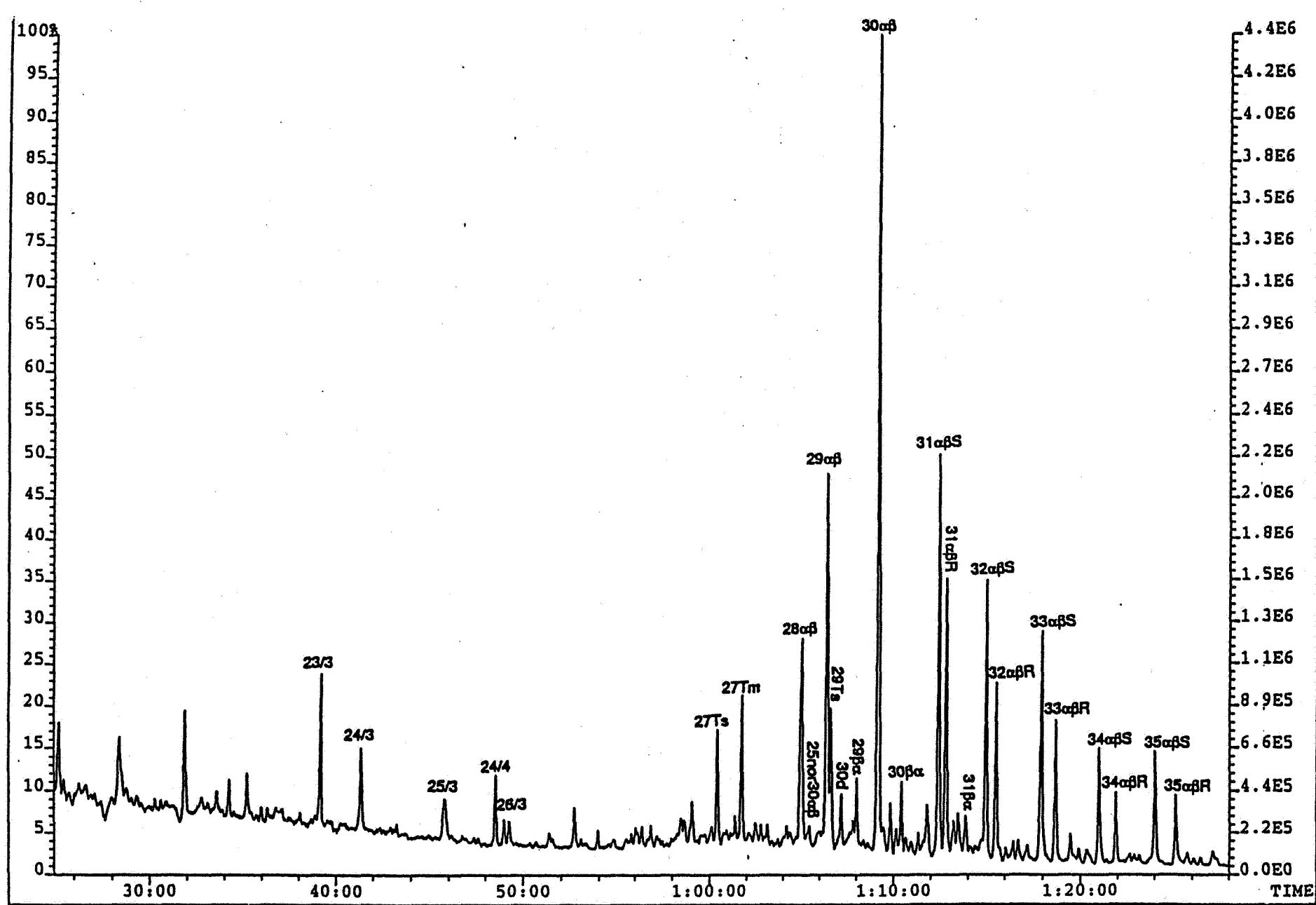
EXAMPLE OF IDENTIFICATION FOR M/Z 177 DEMETHYLATED TRITERPANES



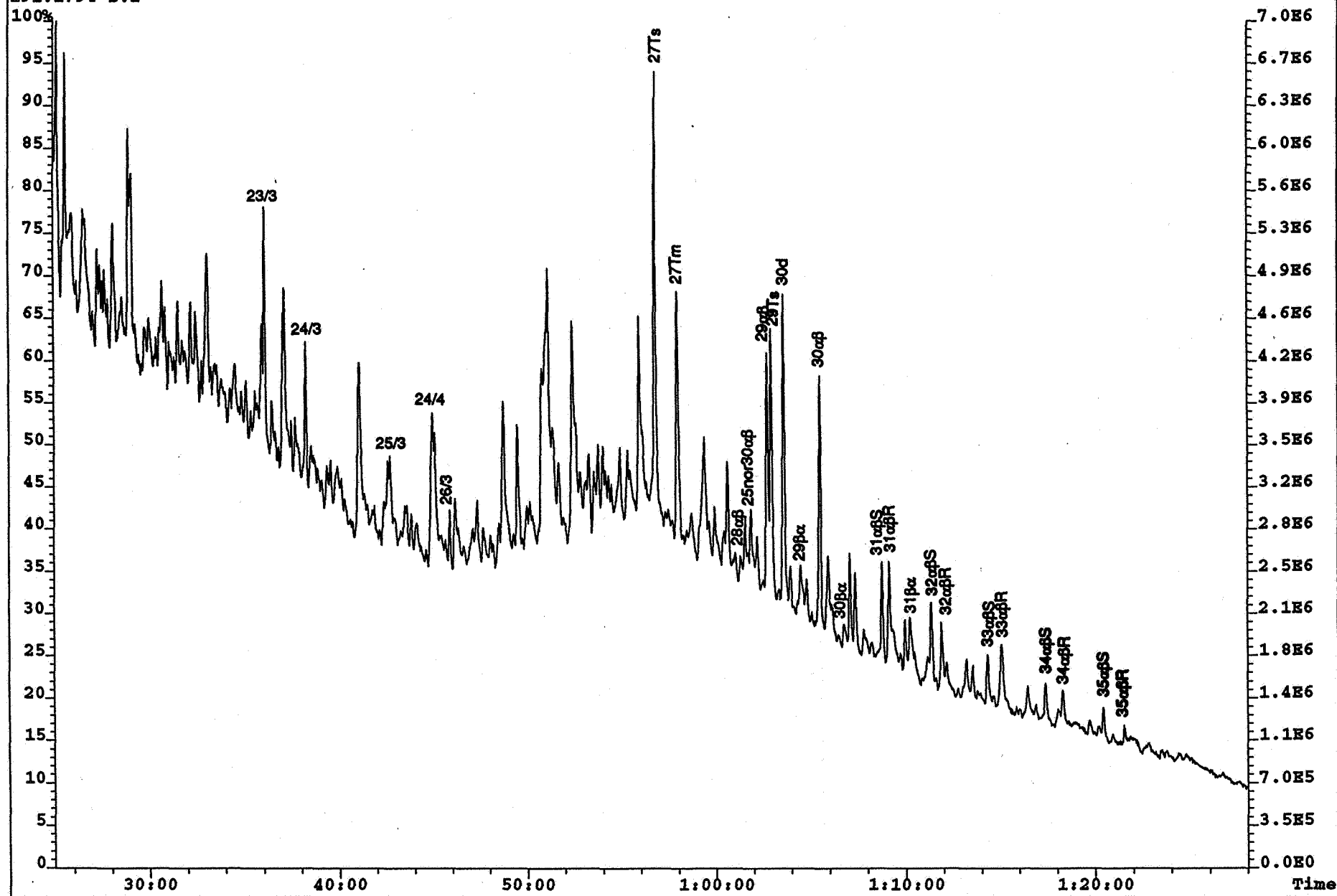
File: AMOSAT1 #1-4324 Acq: 5-MAY-1997 13:01:36 GC FI+ Voltage SIR AutoSpec-Ultima
Sample#2 File Text: SATURATED FRACTION Text: WELL 1/3-8, 4529m MD Oil Exp: STGUIDSAT
177.1638 S:2



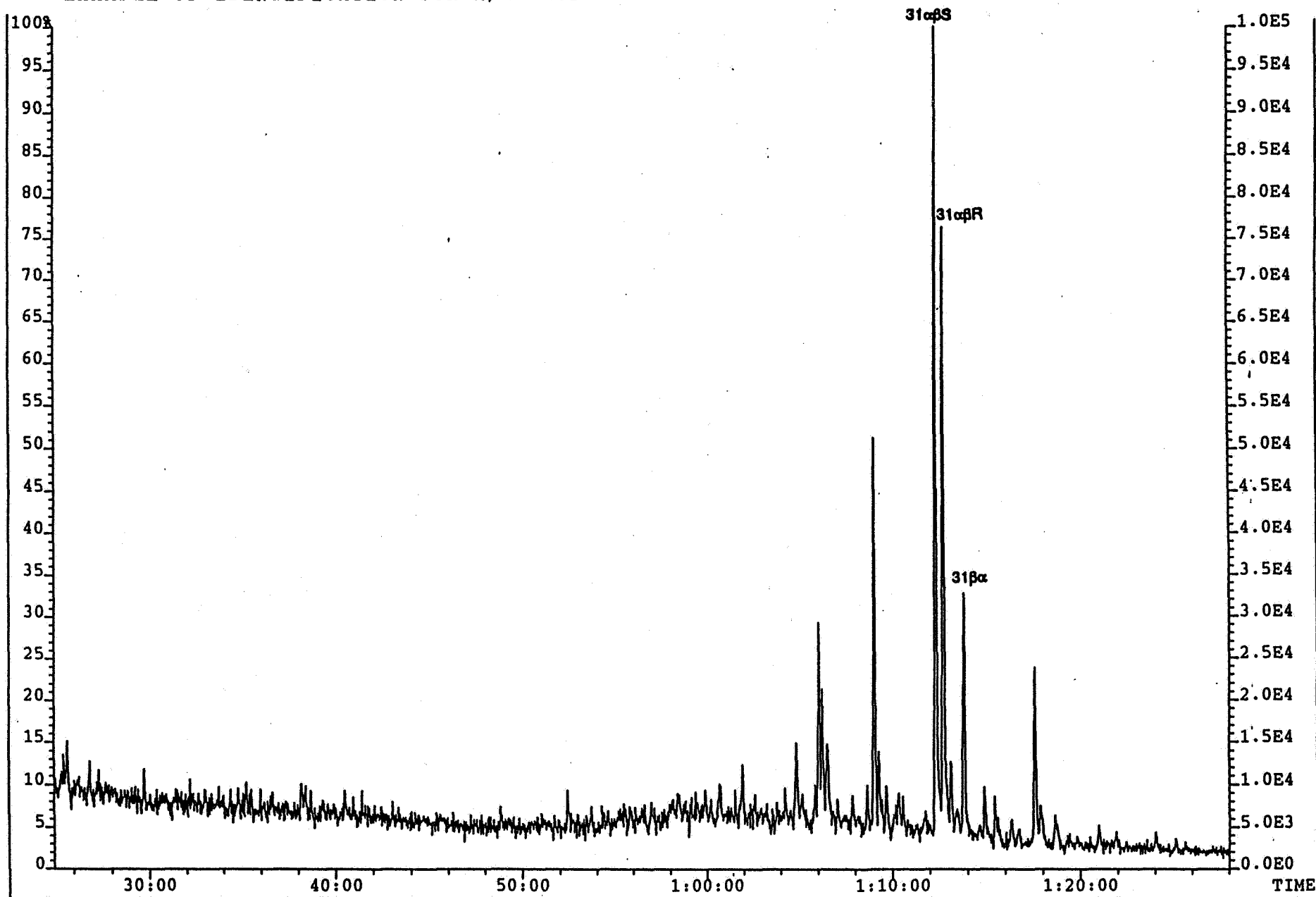
EXAMPLE OF IDENTIFICATION FOR M/Z 191 TRITERPANES



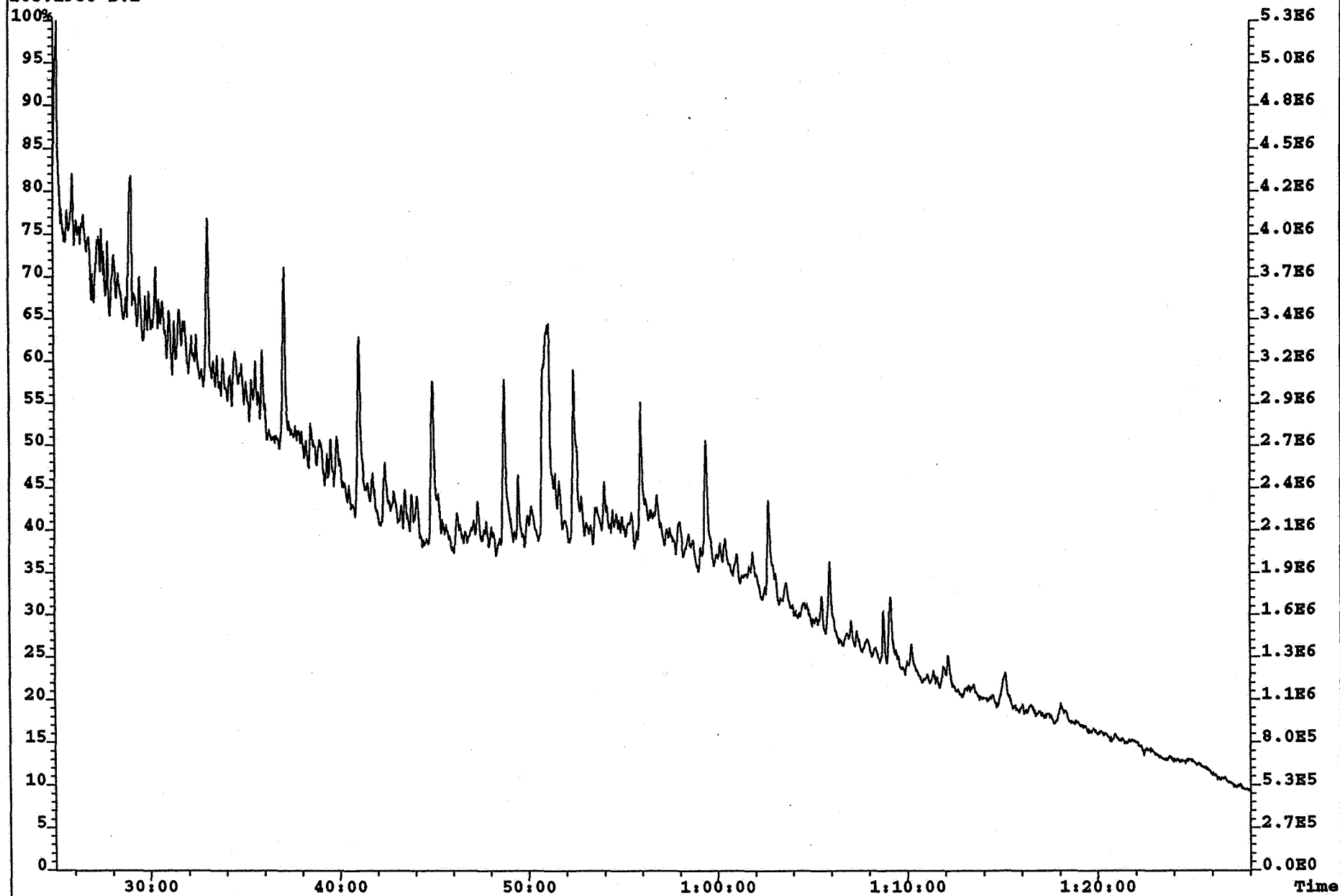
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Sample#2 File Text: SATURATED FRACTION Text: WELL 1/3-8, 4529m MD Oil Exp: STGUIDSAT
191.1794 S:2



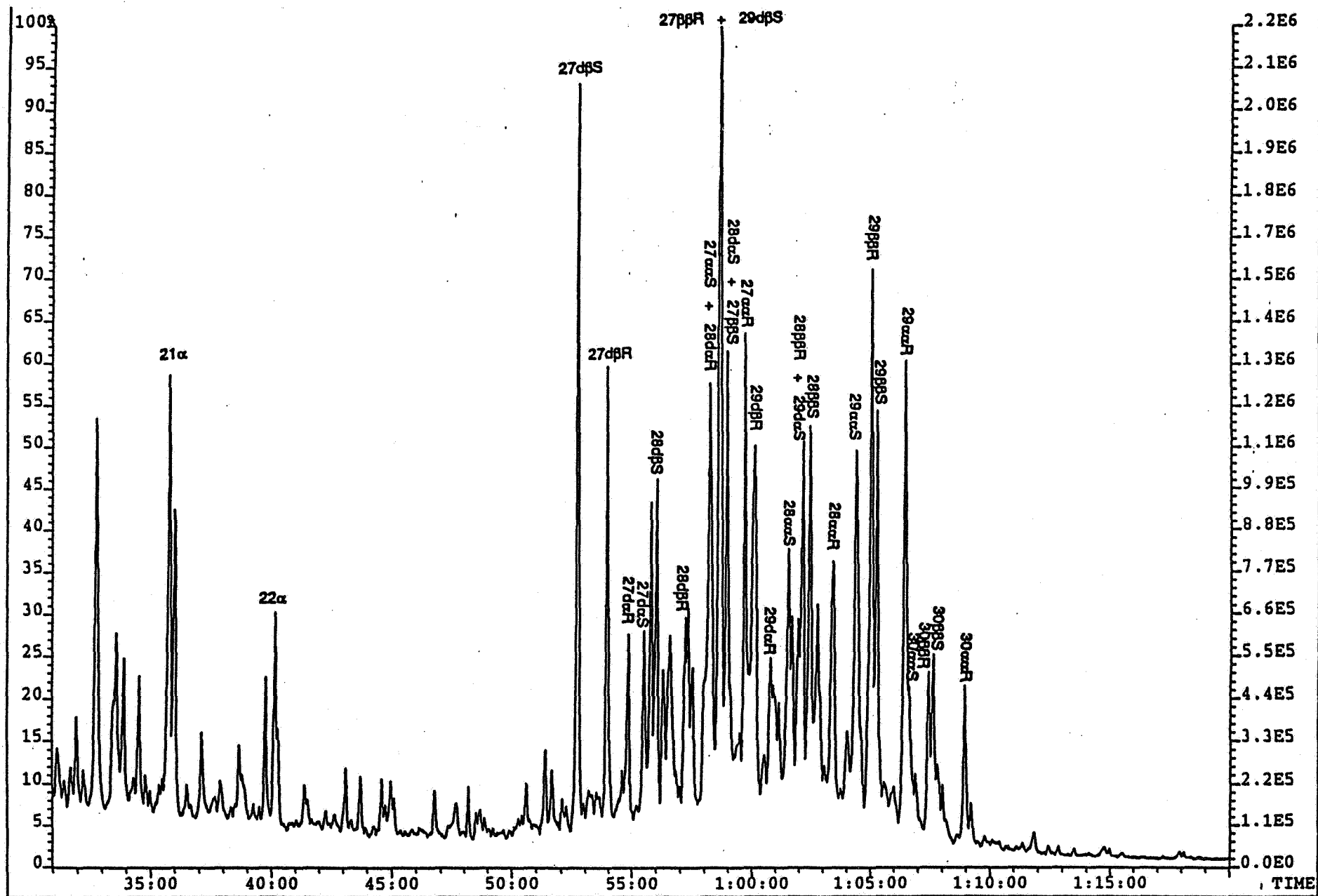
EXAMPLE OF IDENTIFICATION FOR M/Z 205 METHYLATED TRITERPANES



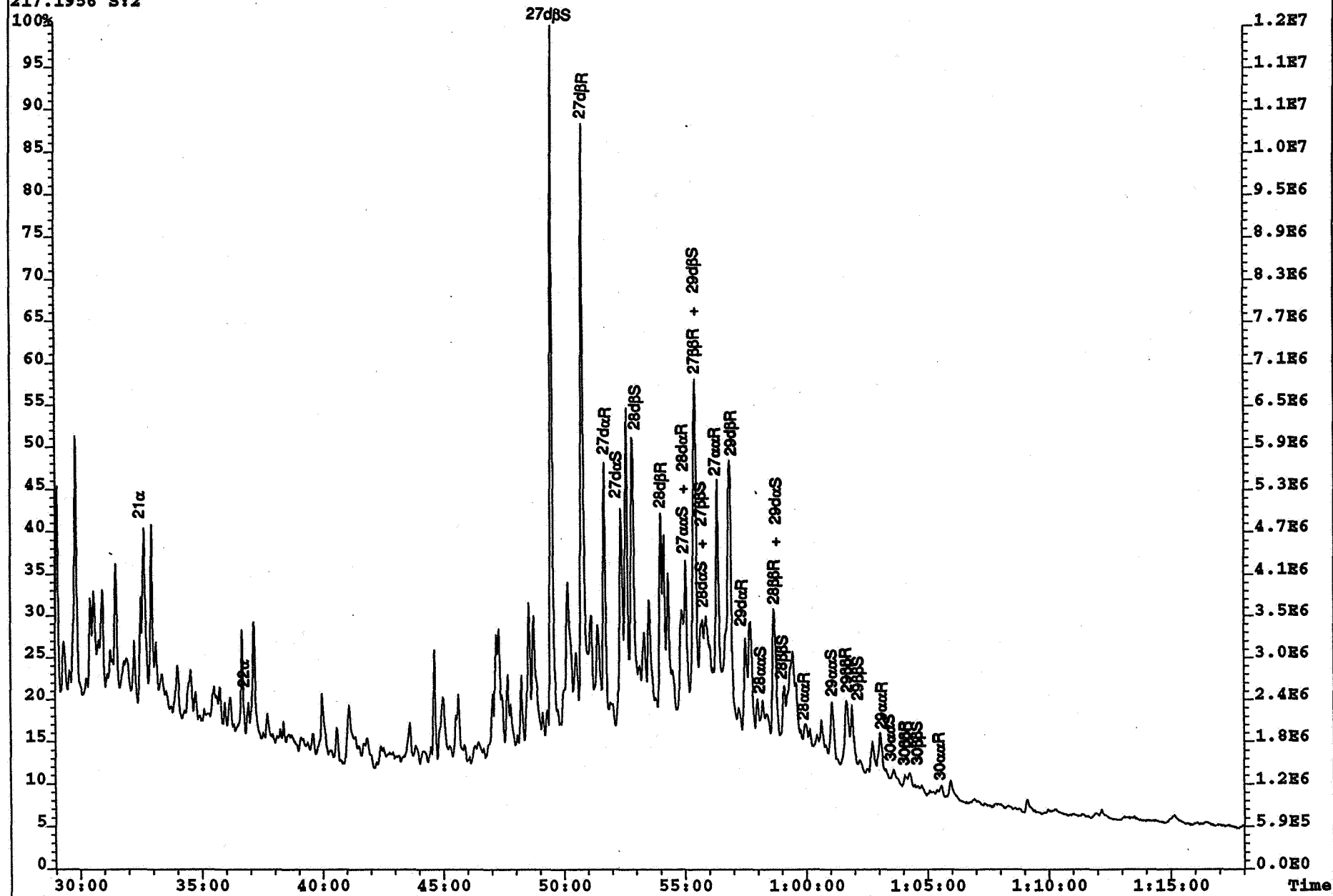
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Sample#2 File Text: SATURATED FRACTION Text: WELL 1/3-8, 4529m MD Oil Exp: STGUIDSAT
205.1950 S:2



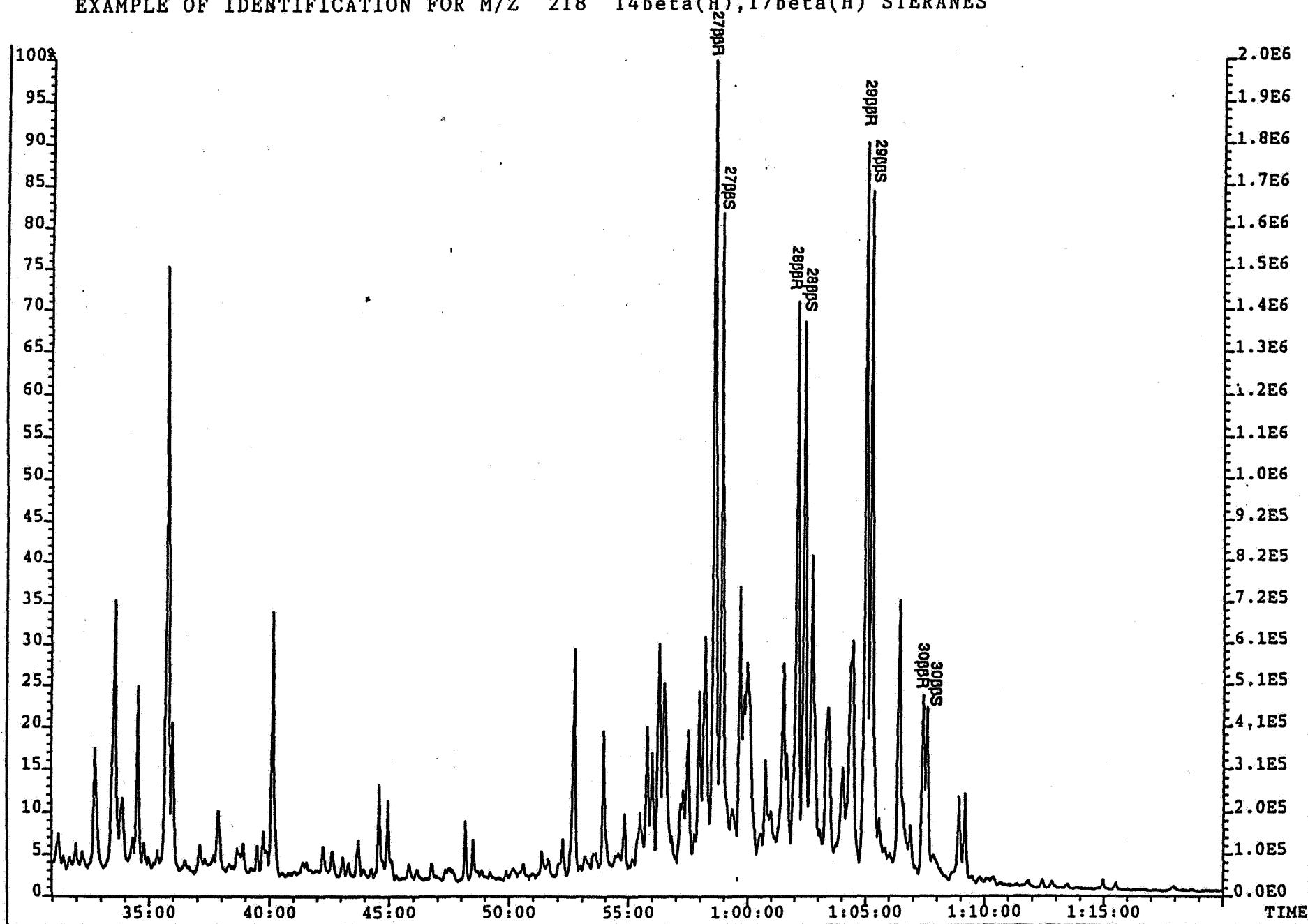
EXAMPLE OF IDENTIFICATION FOR M/Z 217 STERANES



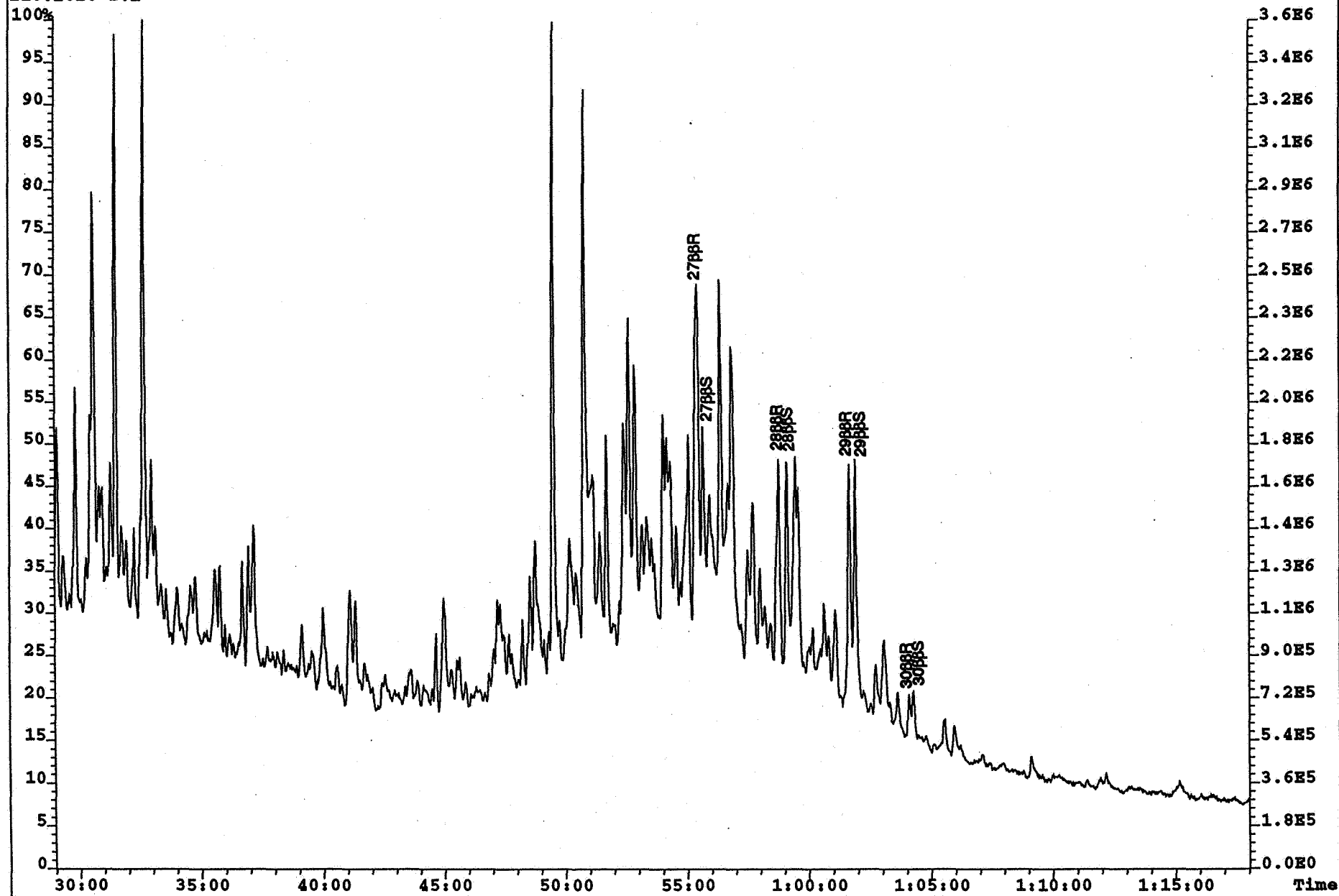
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Sample#2 File Text: SATURATED FRACTION Text: WELL 1/3-8, 4529m MD Oil Exp: STGUIDSAT
217.1956 S:2



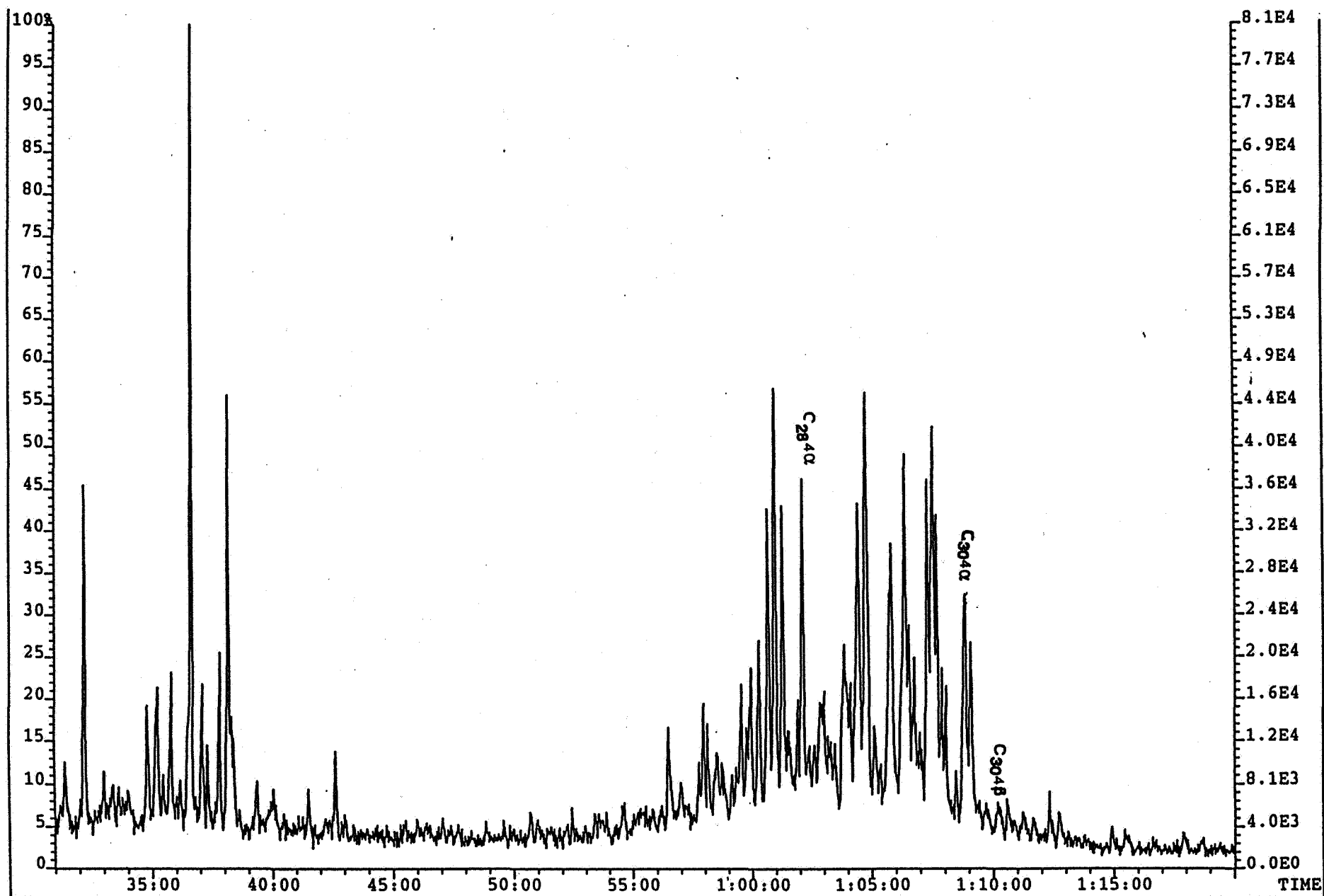
EXAMPLE OF IDENTIFICATION FOR M/Z 218 14beta(H),17beta(H) STERANES



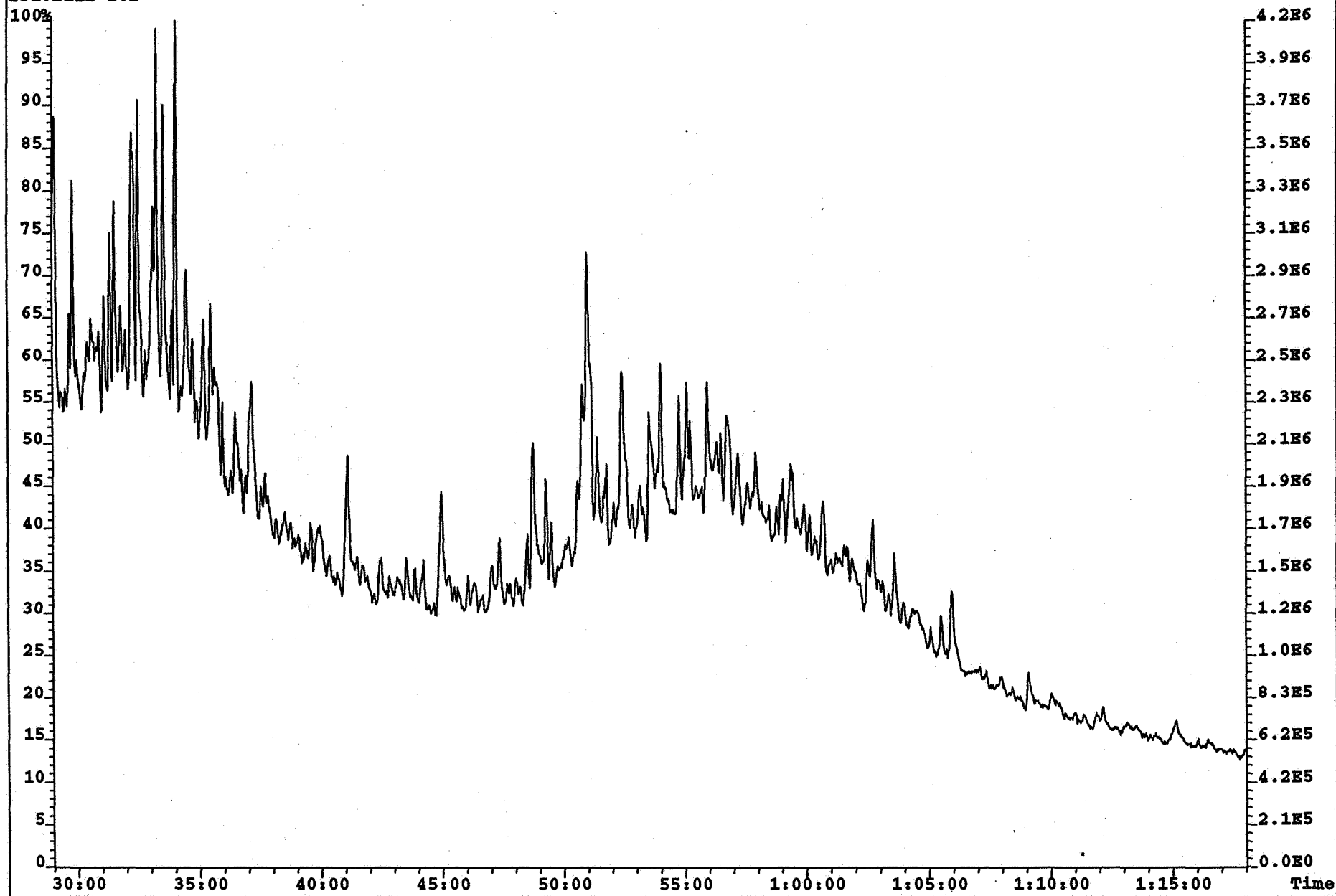
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218.2028 S:2



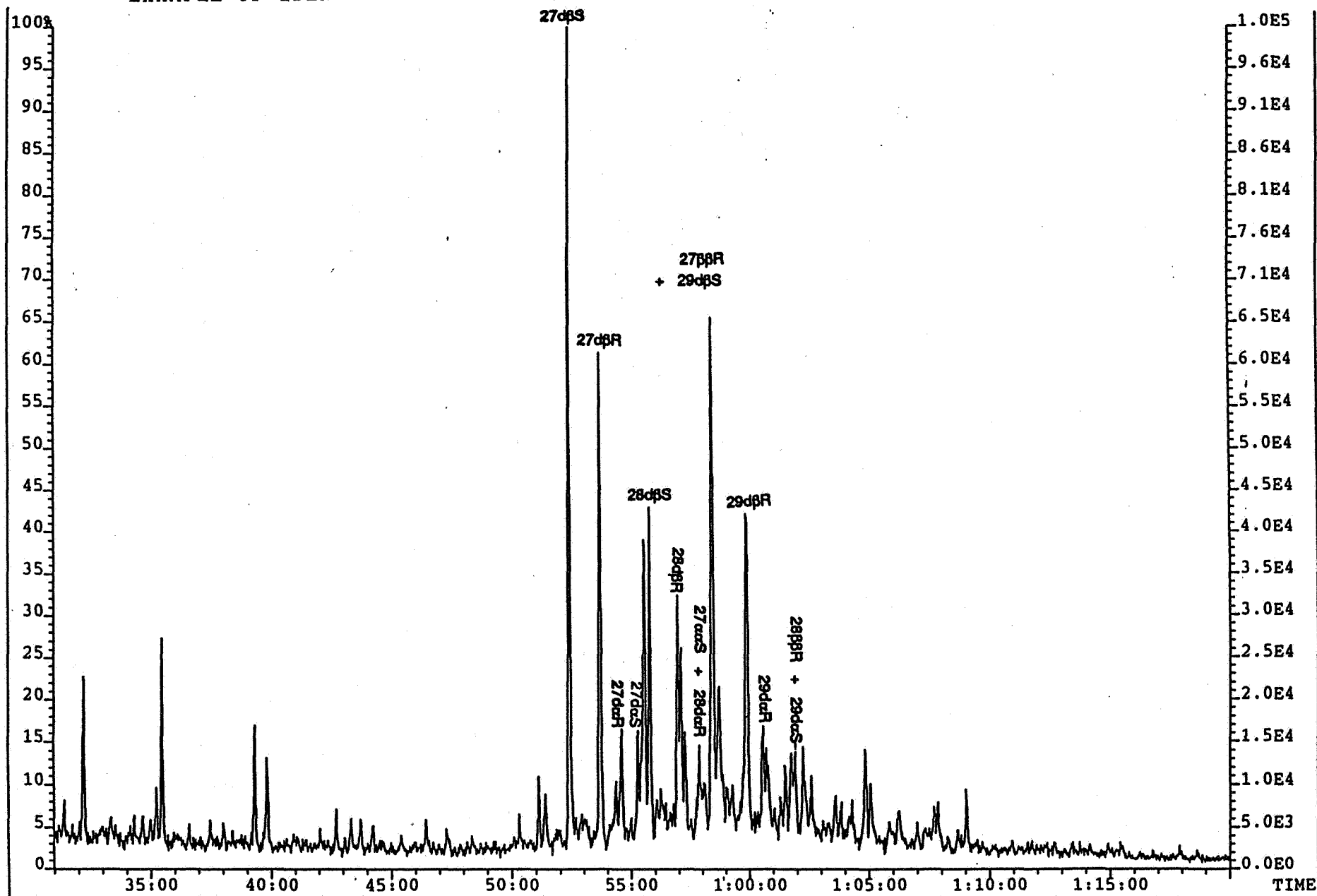
EXAMPLE OF IDENTIFICATION FOR M/Z 231 METHYL STERANES



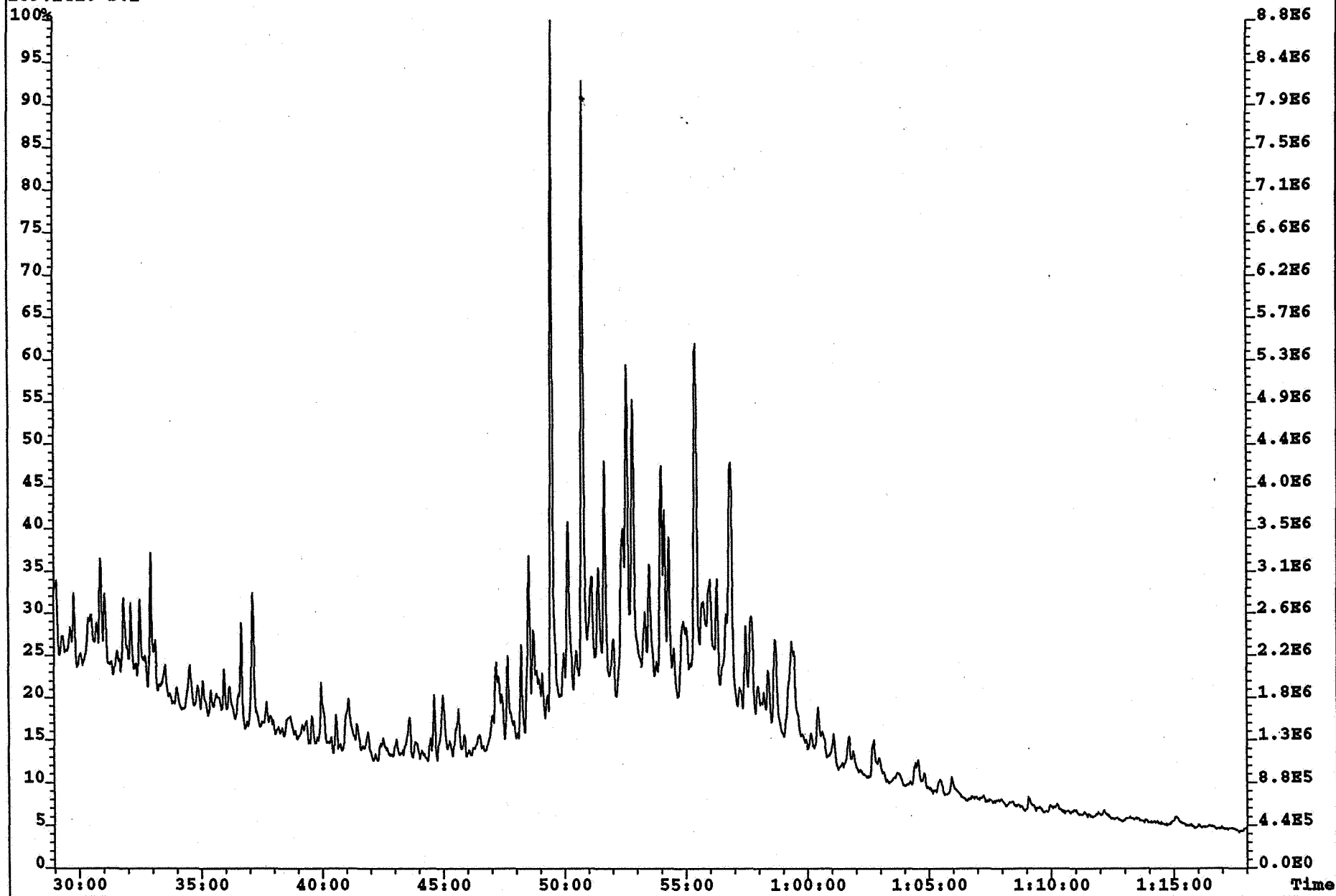
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231.2112 S:2



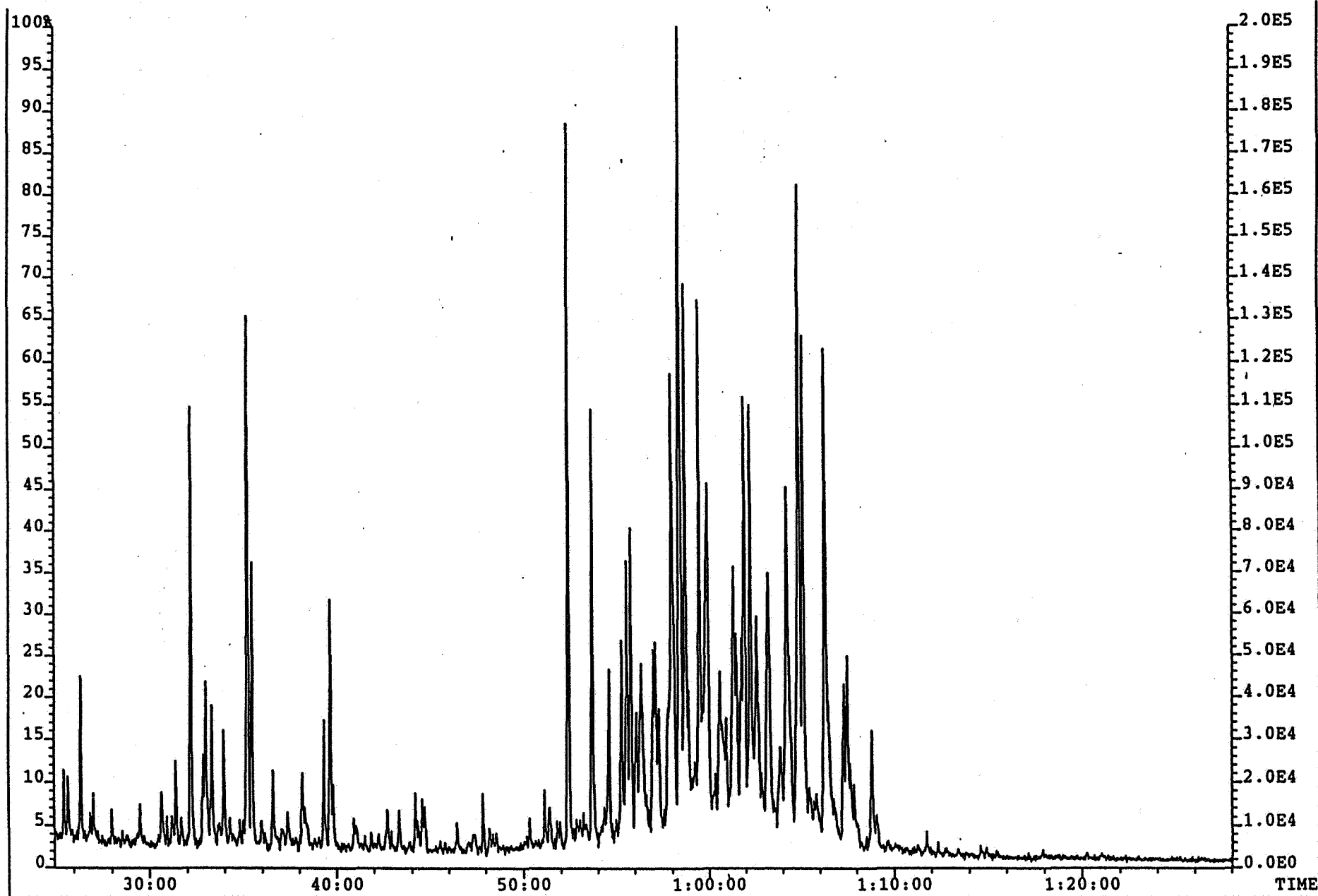
EXAMPLE OF IDENTIFICATION FOR M/Z 259 REARRANGED STERANES



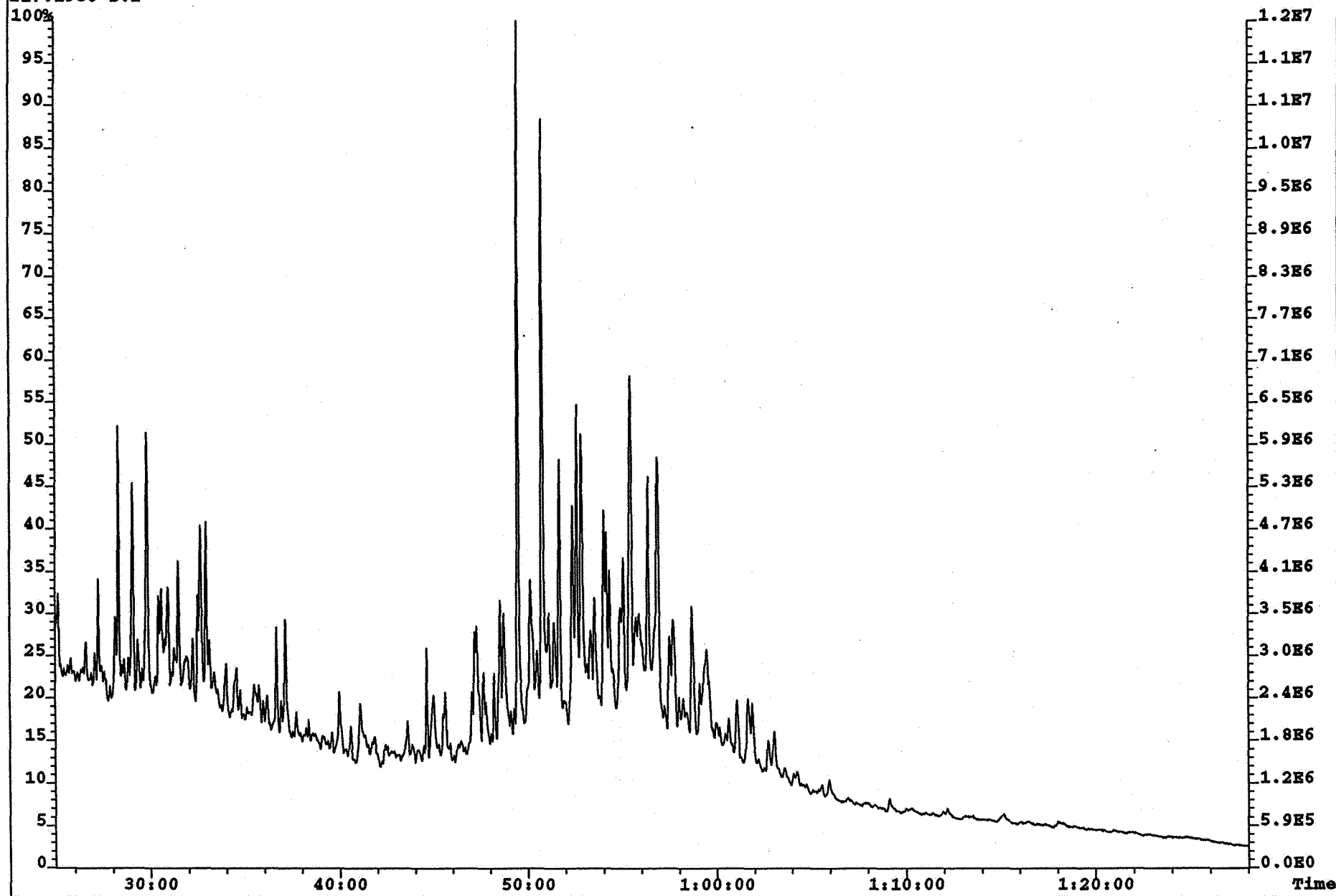
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Sample#2 File Text: SATURATED FRACTION Text: WELL 1/3-8, 4529m MD Oil Exp: STGUIDSAT
259.2418 S:2



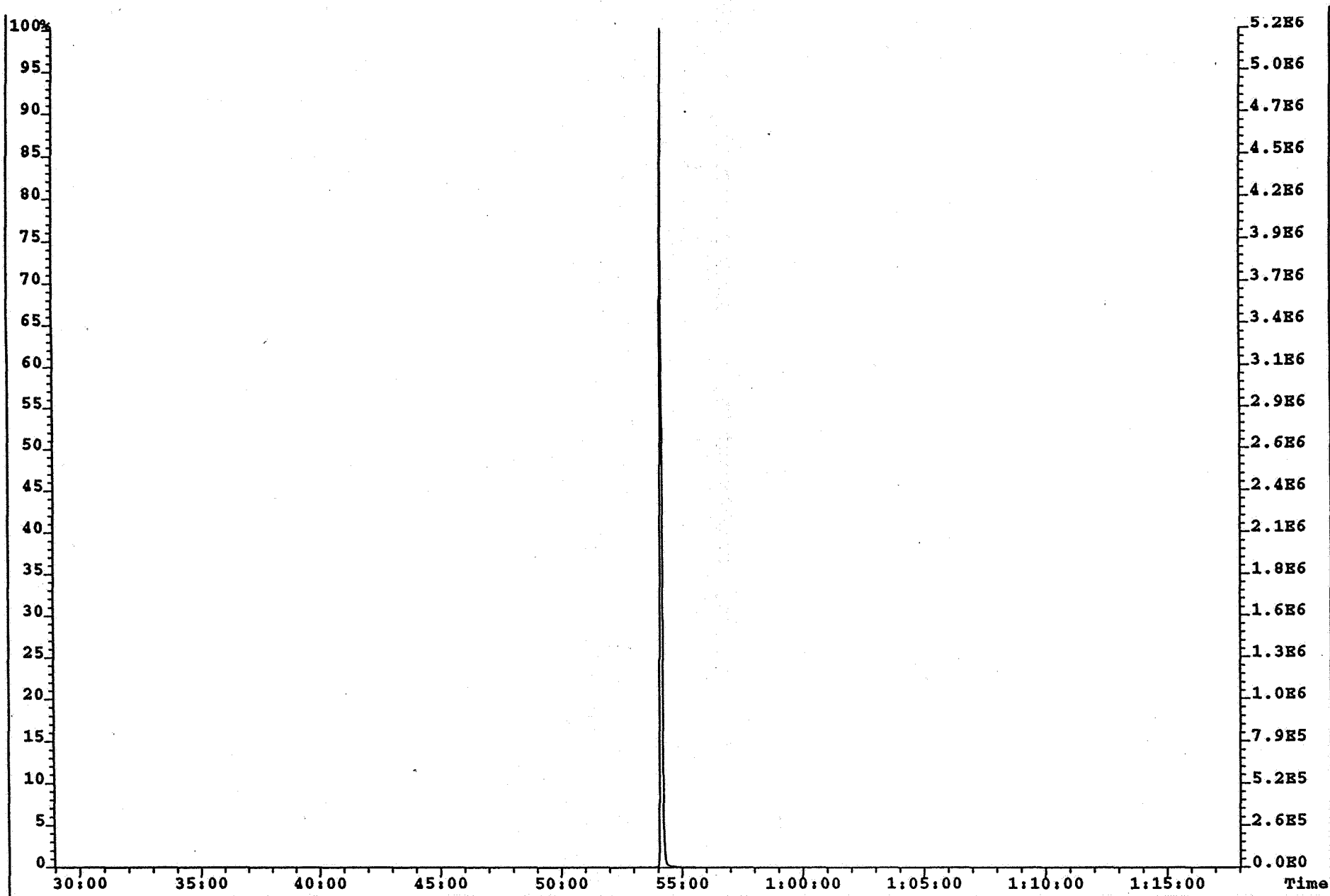
M/Z 217 Fragmentograms, processed using the Triterpane
Window for comparison between Steranes and Triterpanes



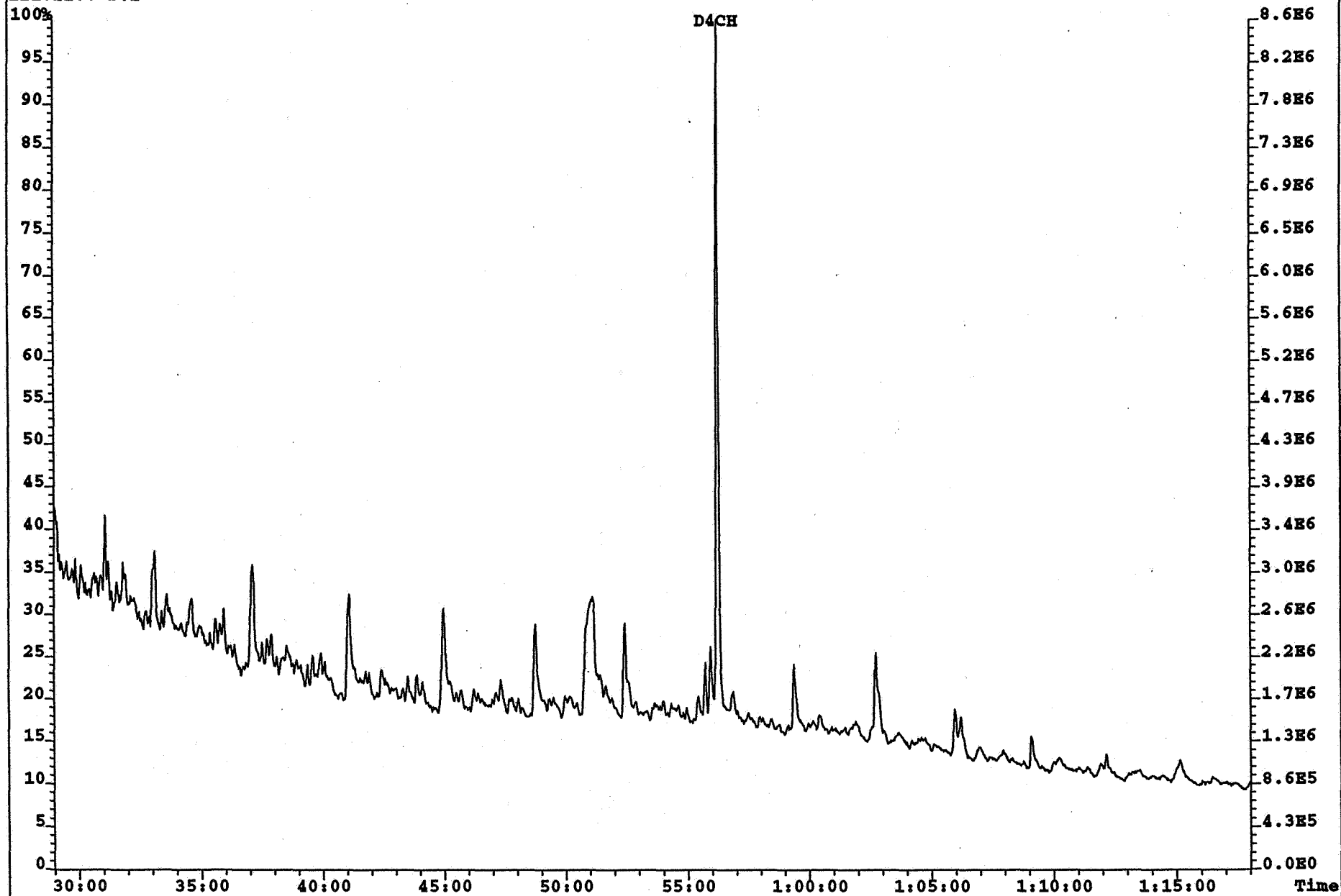
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Sample#2 File Text: SATURATED FRACTION Text: WELL 1/3-8, 4529m MD Oil Exp: STGUIDSAT
217.1956 S:2



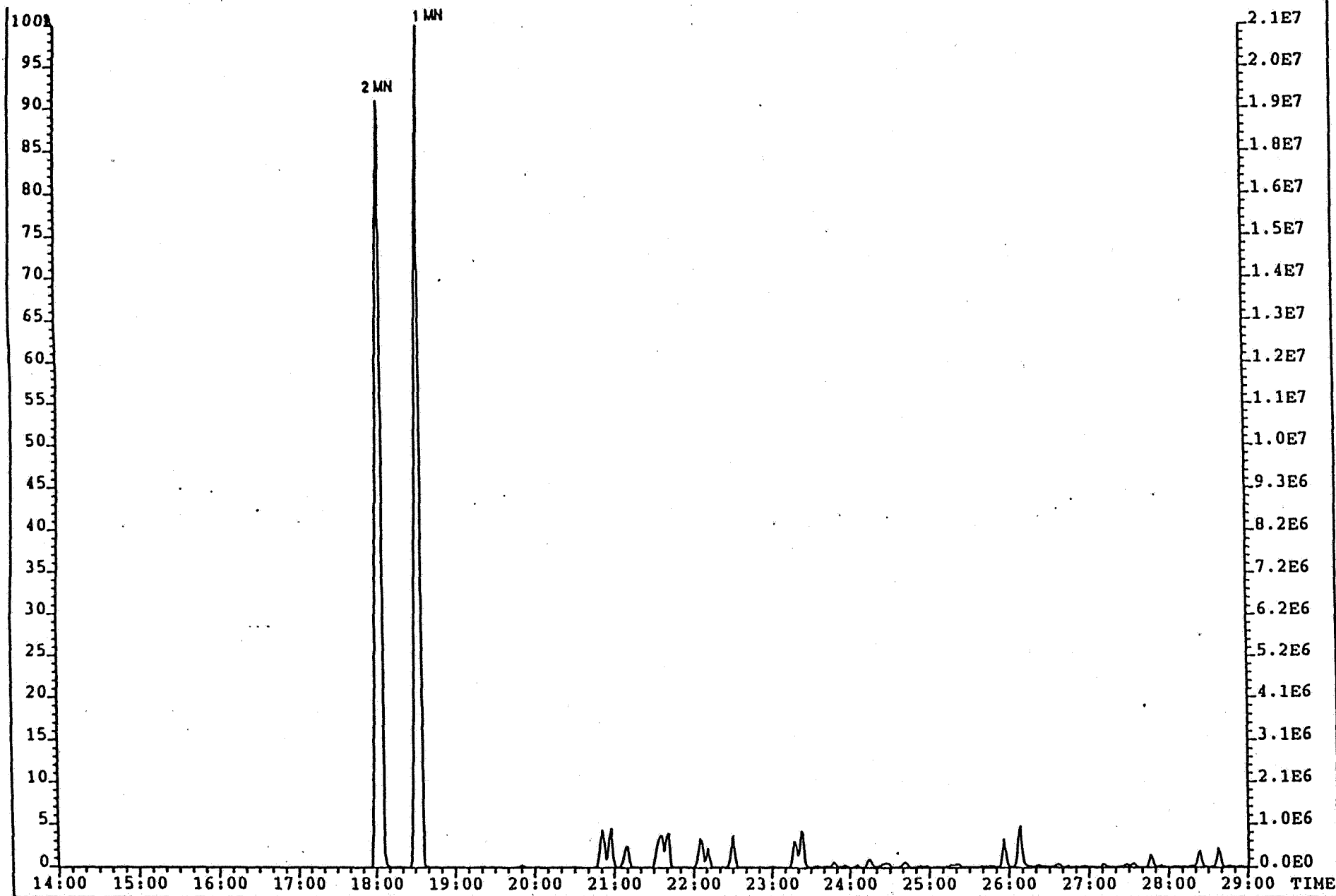
EXAMPLE OF PEAK IDENTIFICATION FOR M/Z 221 D4-CHOLESTANE (STD)



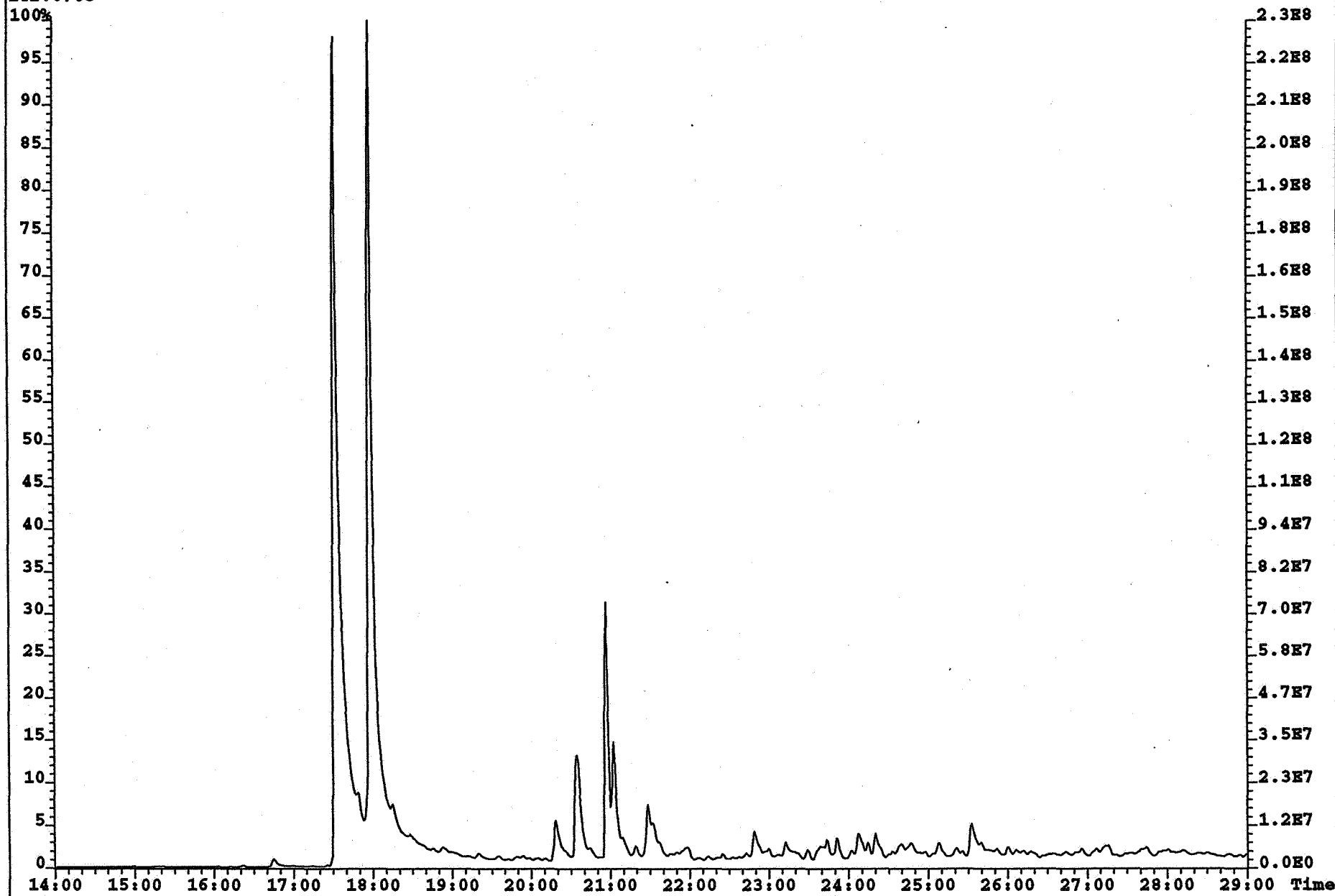
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221.2200 S:2



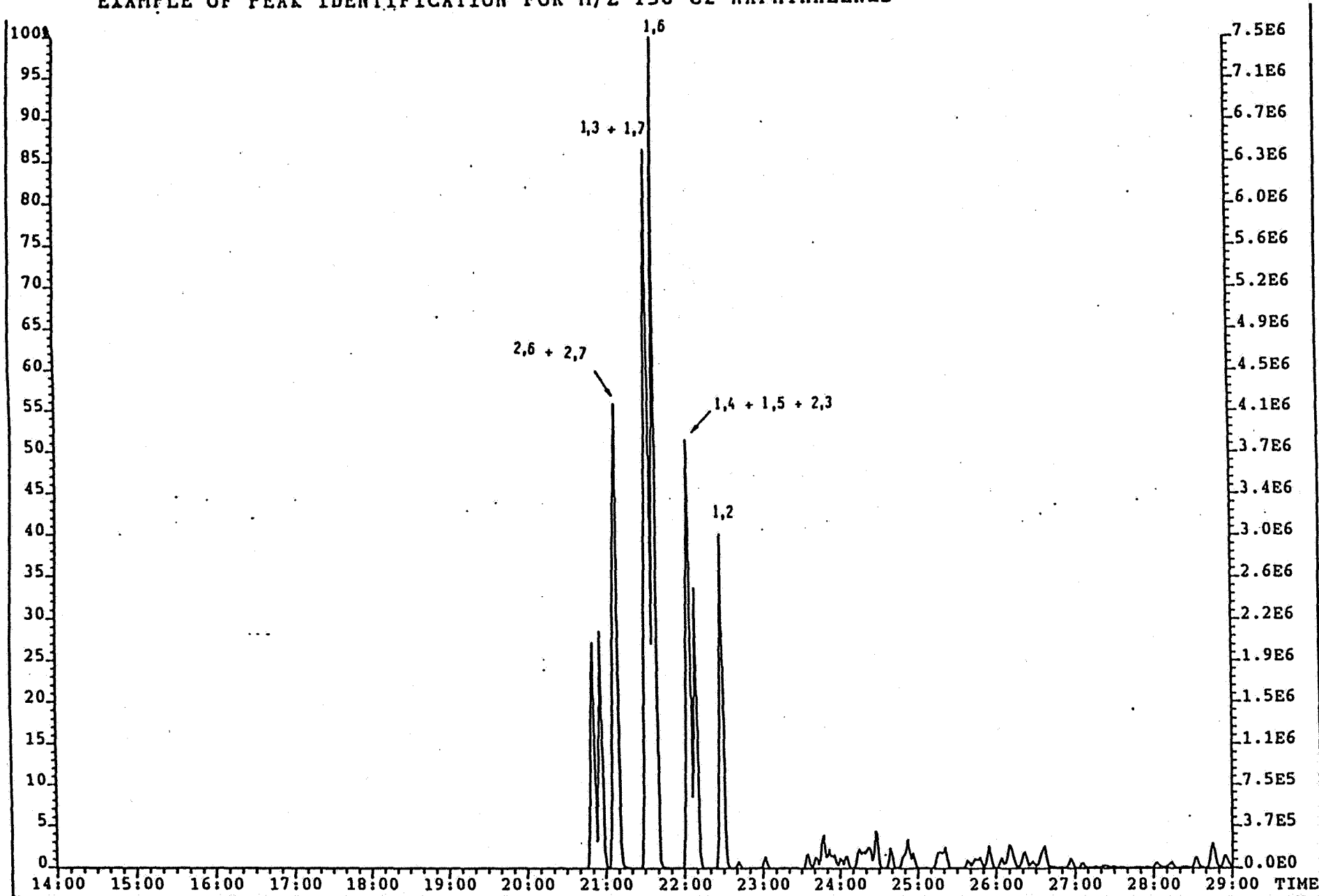
EXAMPLE OF PEAK IDENTIFICATION FOR M/Z 142 METHYL NAPHTHALENES



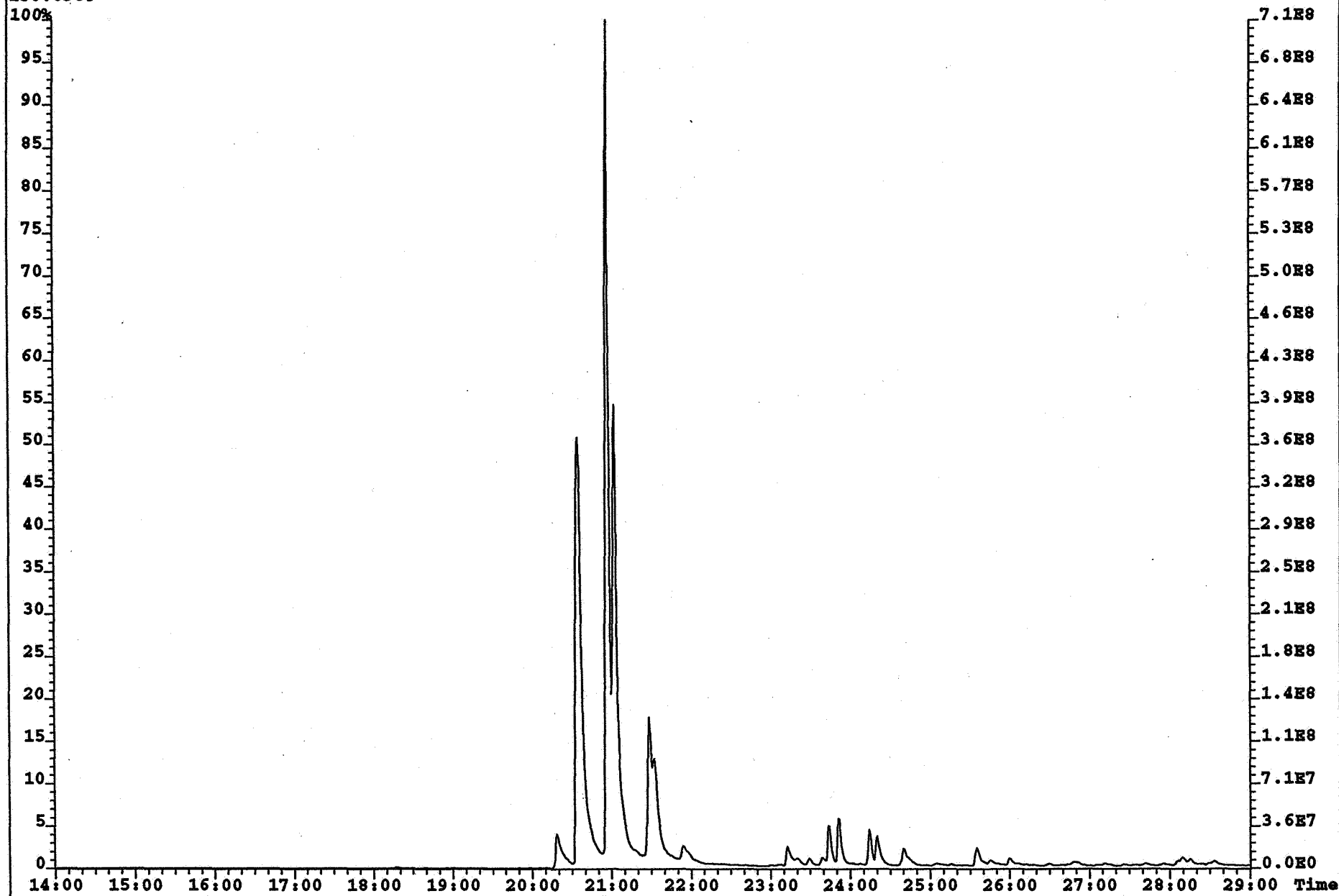
File: AMOARO4 #1-1921 Acq: 6-MAY-1997 13:56:25 GC EI+ Voltage SIR AutoSpec-Ultima
Sample#1 File Text: AROMATIC FRACTION Text: WELL 1/3-8, 4529m MD Oil Exp: STGUIDAROLM
142.0783



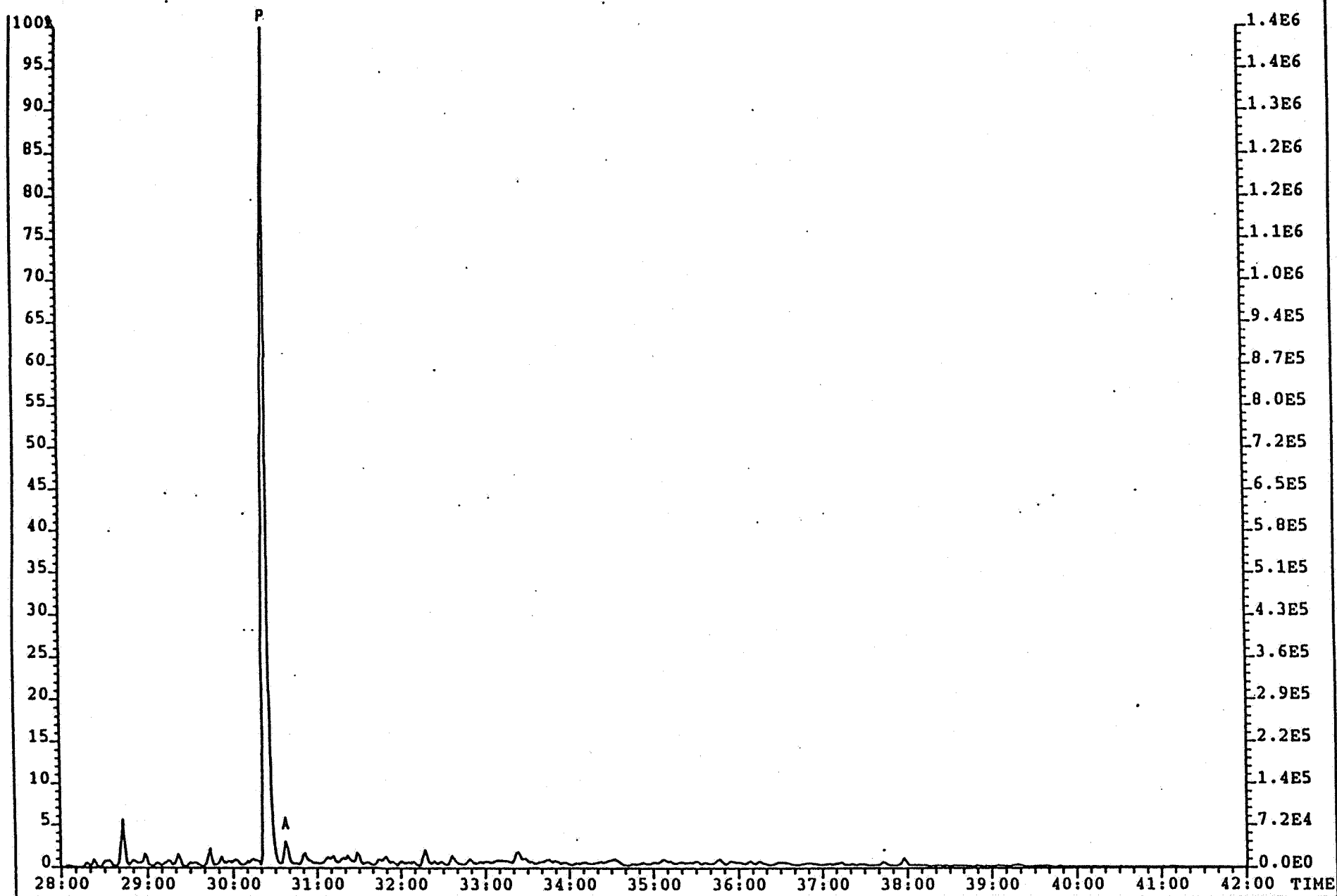
EXAMPLE OF PEAK IDENTIFICATION FOR M/Z 156 C2 NAPHTHALENES



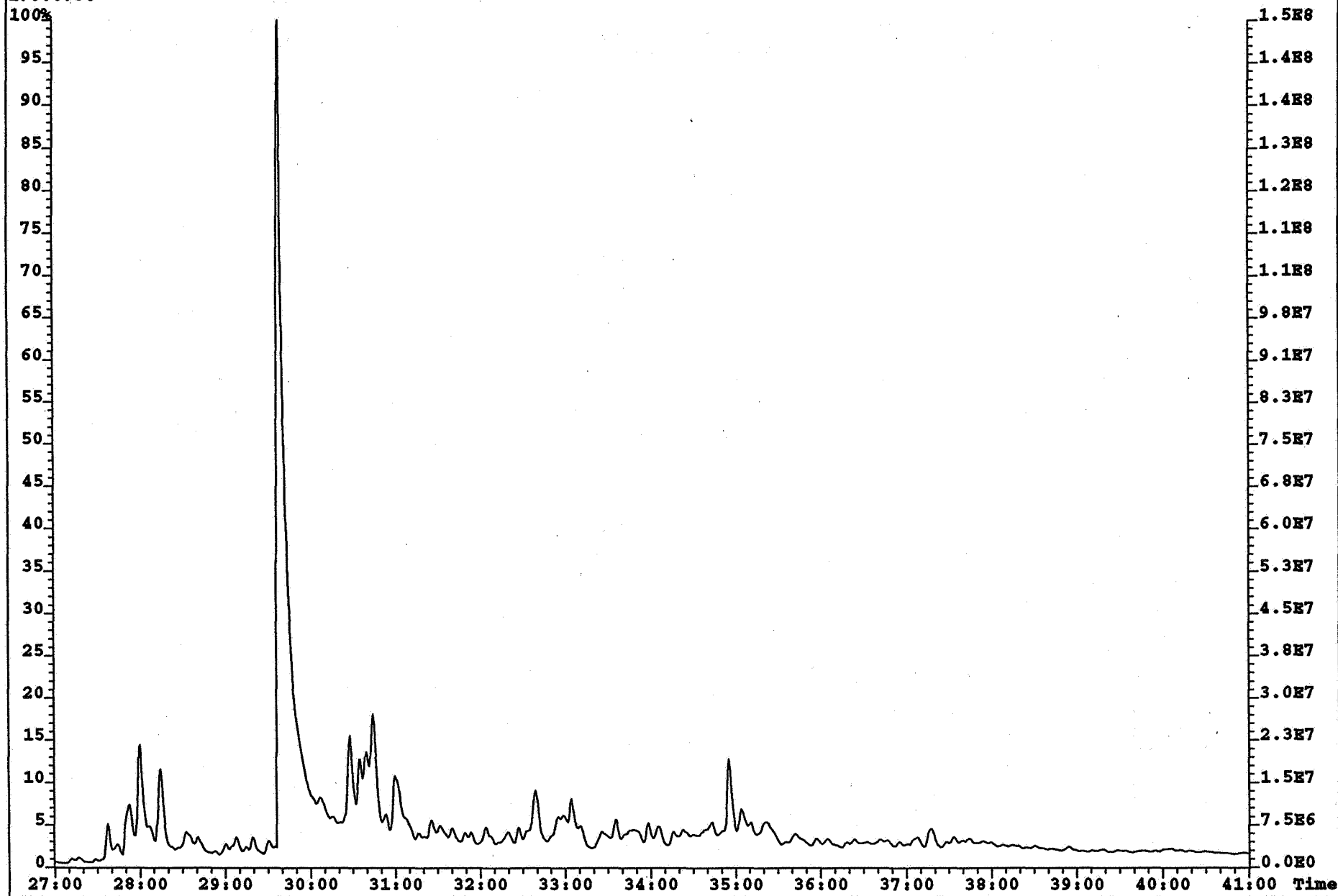
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Sample#1 File Text: AROMATIC FRACTION Text: WELL 1/3-8, 4529m MD Oil Exp: STGUIDAROLM
156.0939



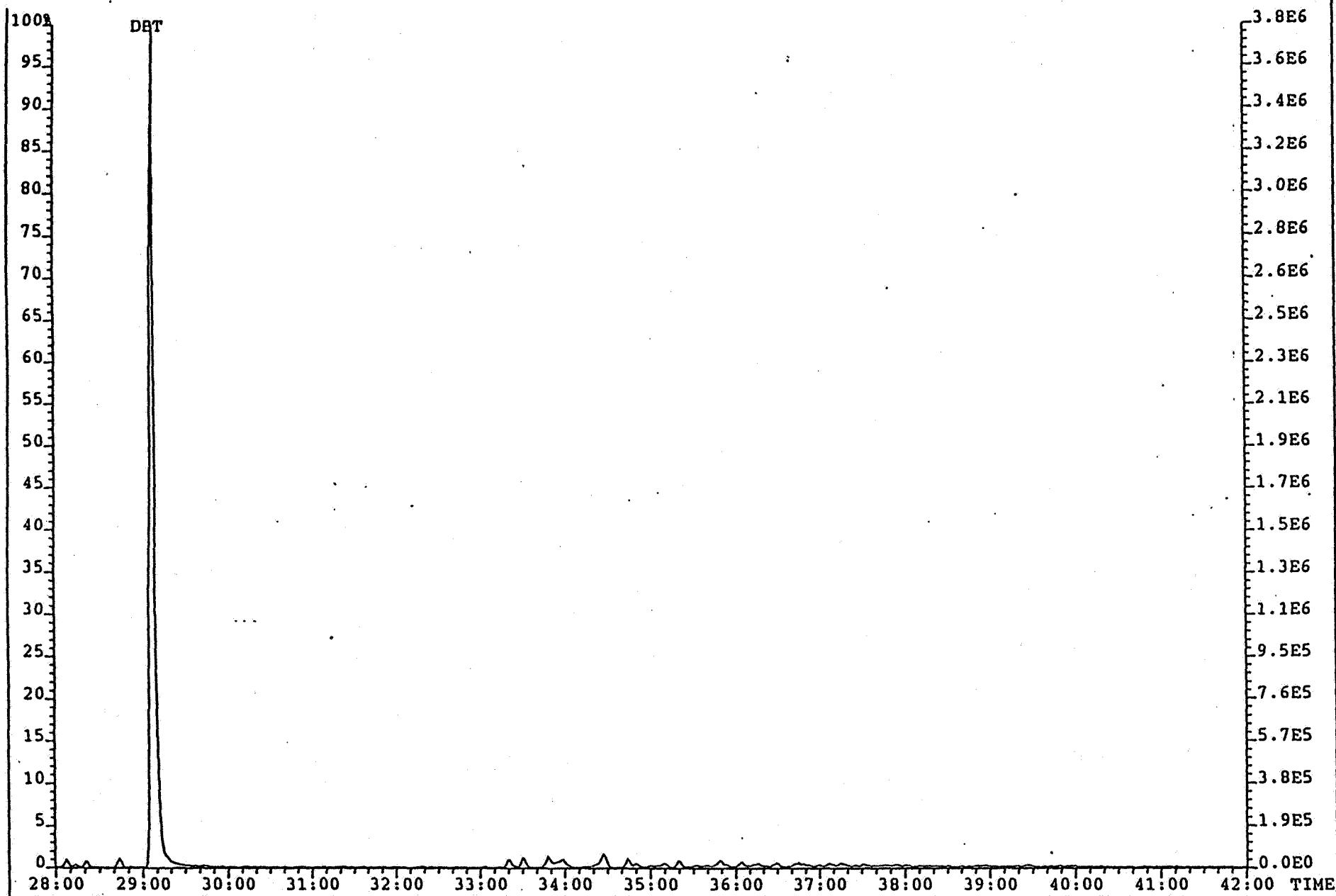
EXAMPLE OF PEAK IDENTIFICATION FOR M/Z 178 PHENANTHRENE AND ANTHRACENE

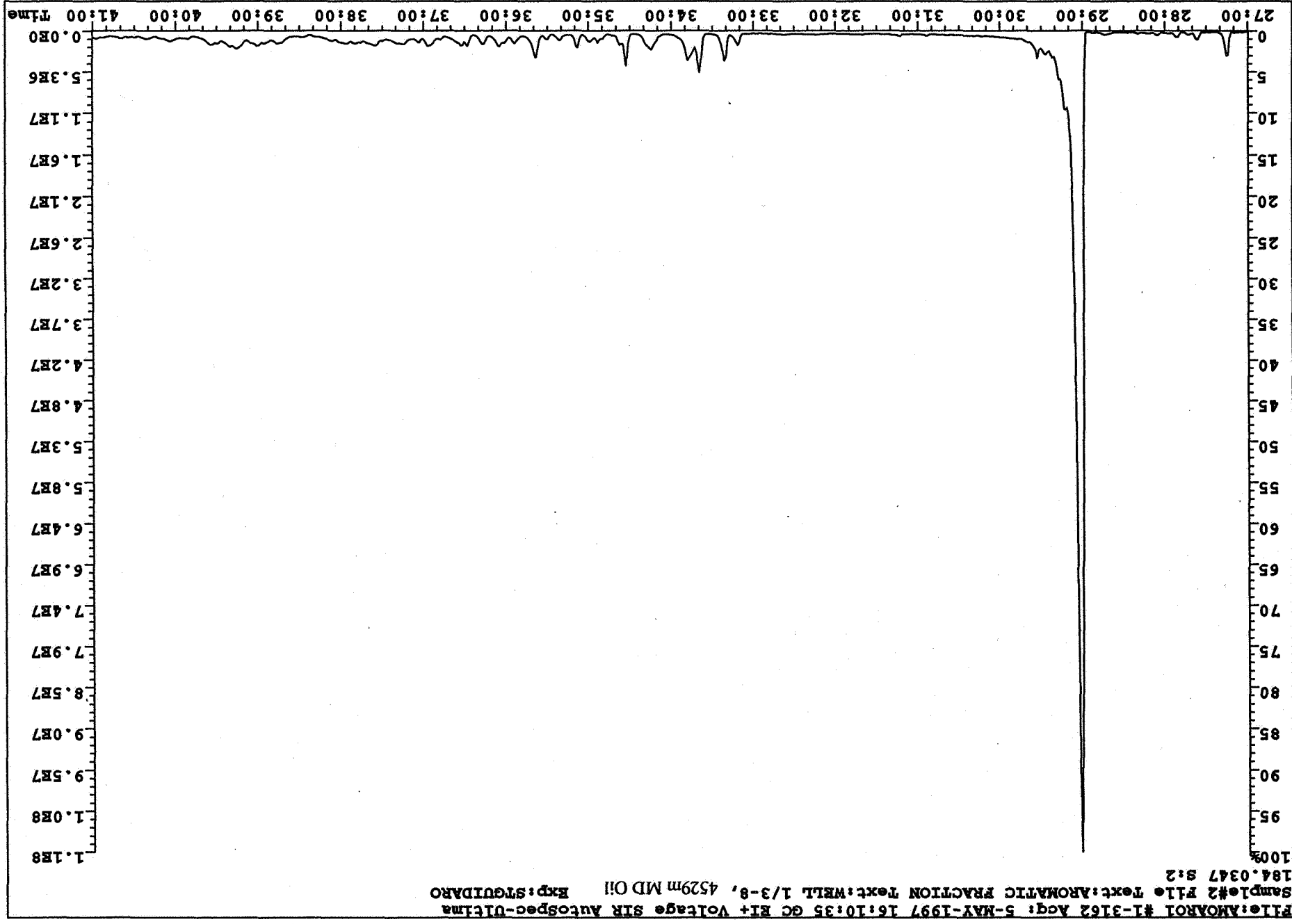


File: AMOARO4 #1-4719 Acq: 6-MAY-1997 13:56:25 GC EI+ Voltage SIR AutoSpec-Ultima
Sample#1 File Text: AROMATIC FRACTION Text: WELL 1/3-8, 4529m MD Oil Exp: STGUIDAROLM
178.0730

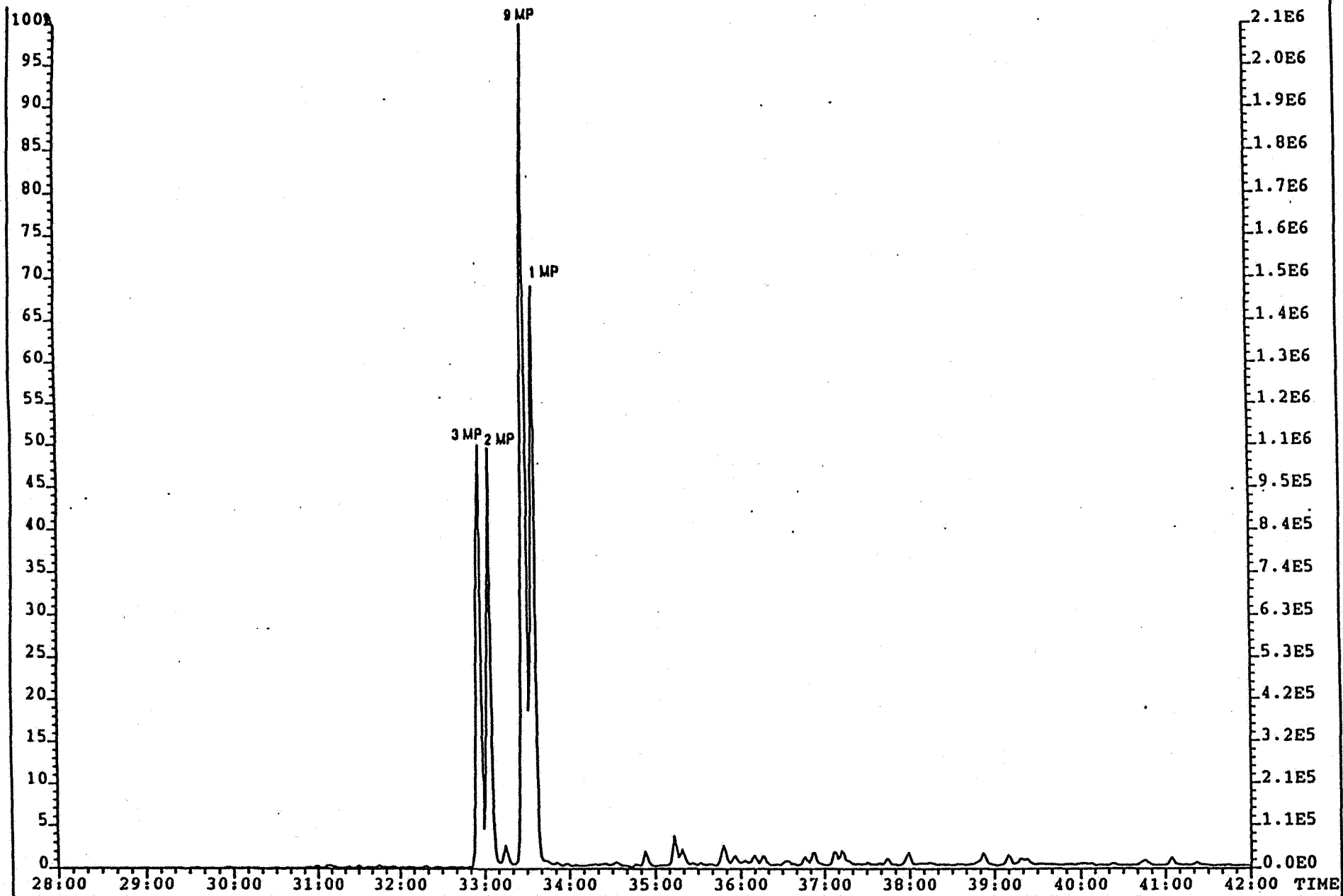


EXAMPLE OF PEAK IDENTIFICATION FOR M/Z 184 DIBENZOTHIOPHENE

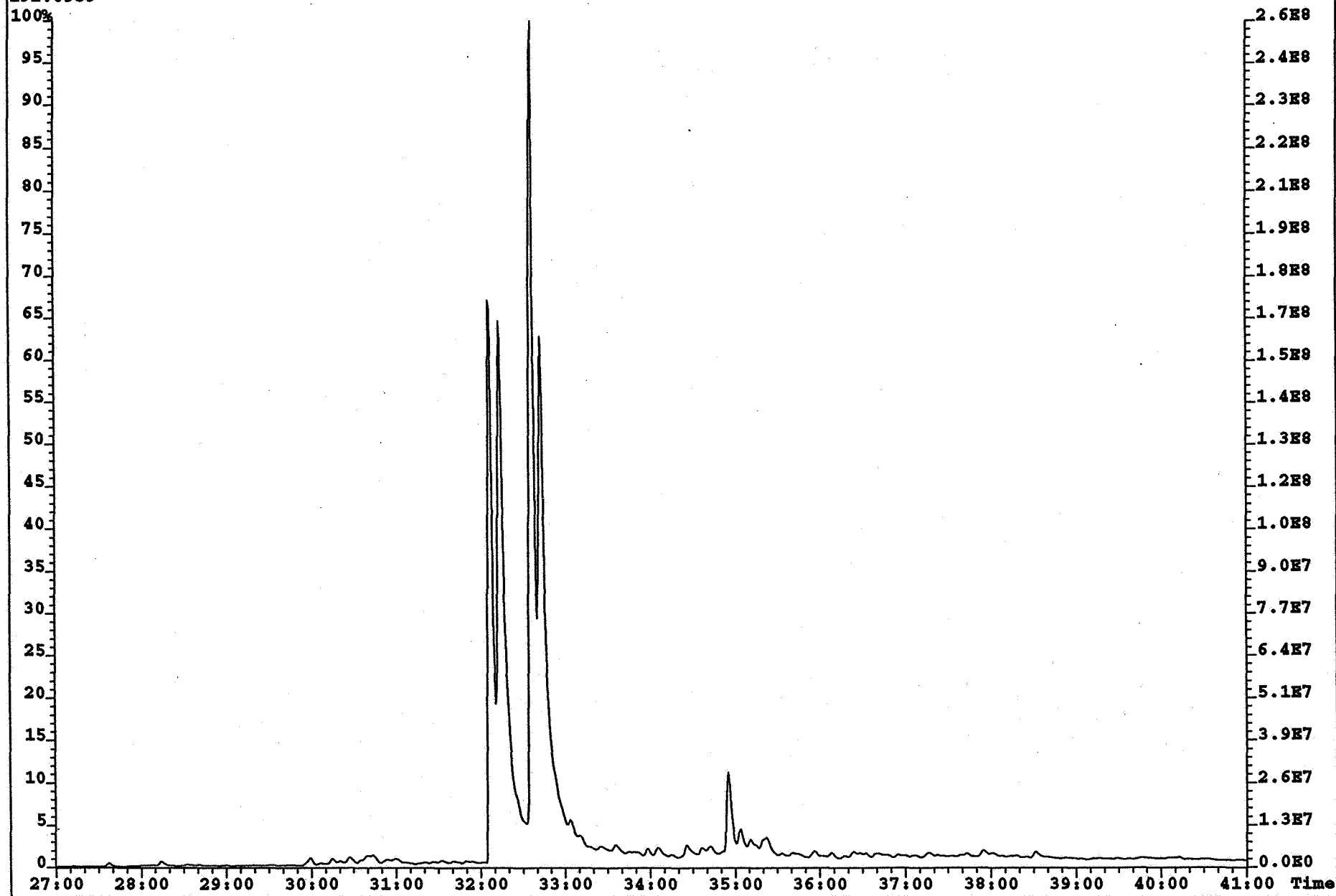




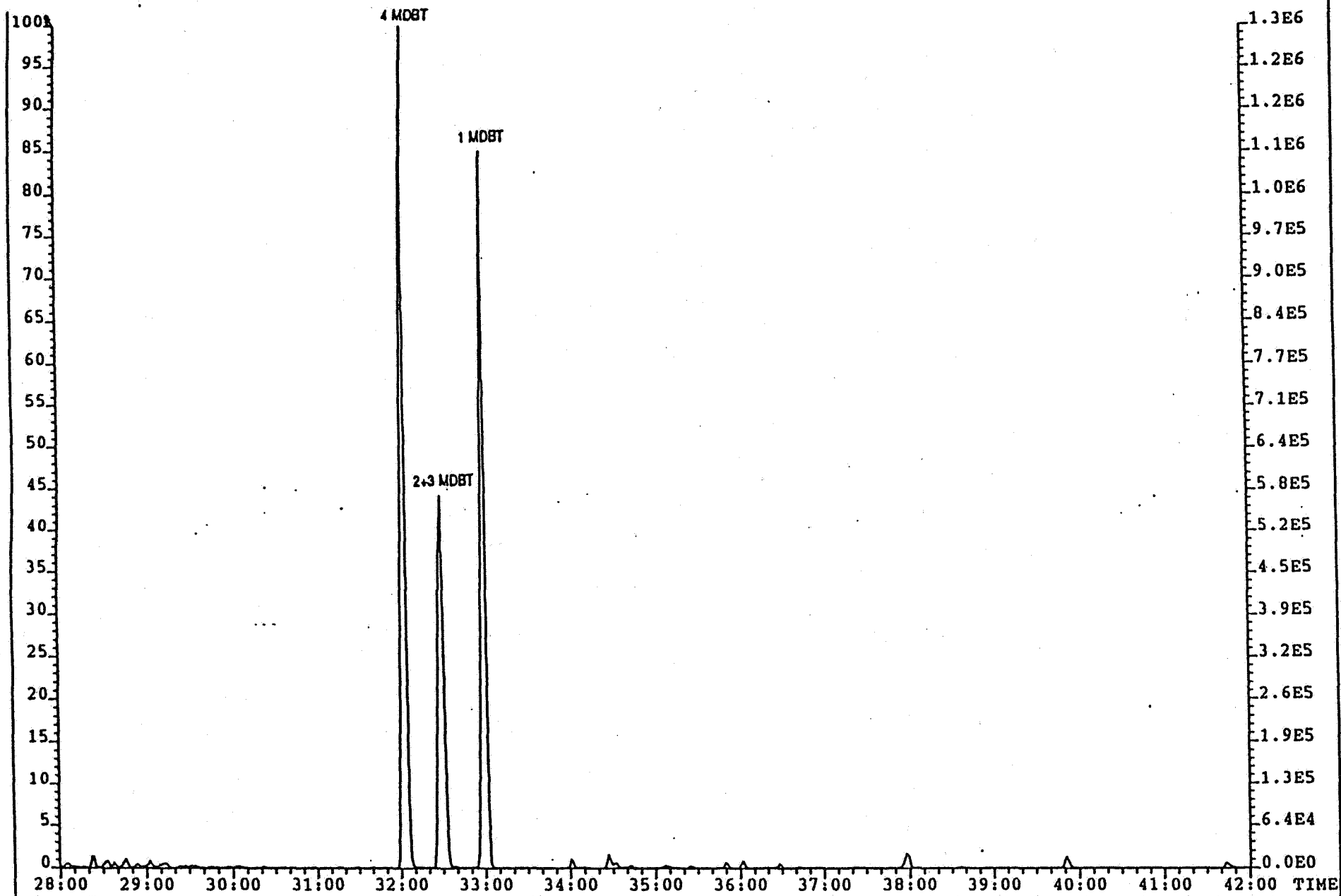
EXAMPLE OF PEAK IDENTIFICATION FOR M/Z 192 METHYL PHENANTHRENES



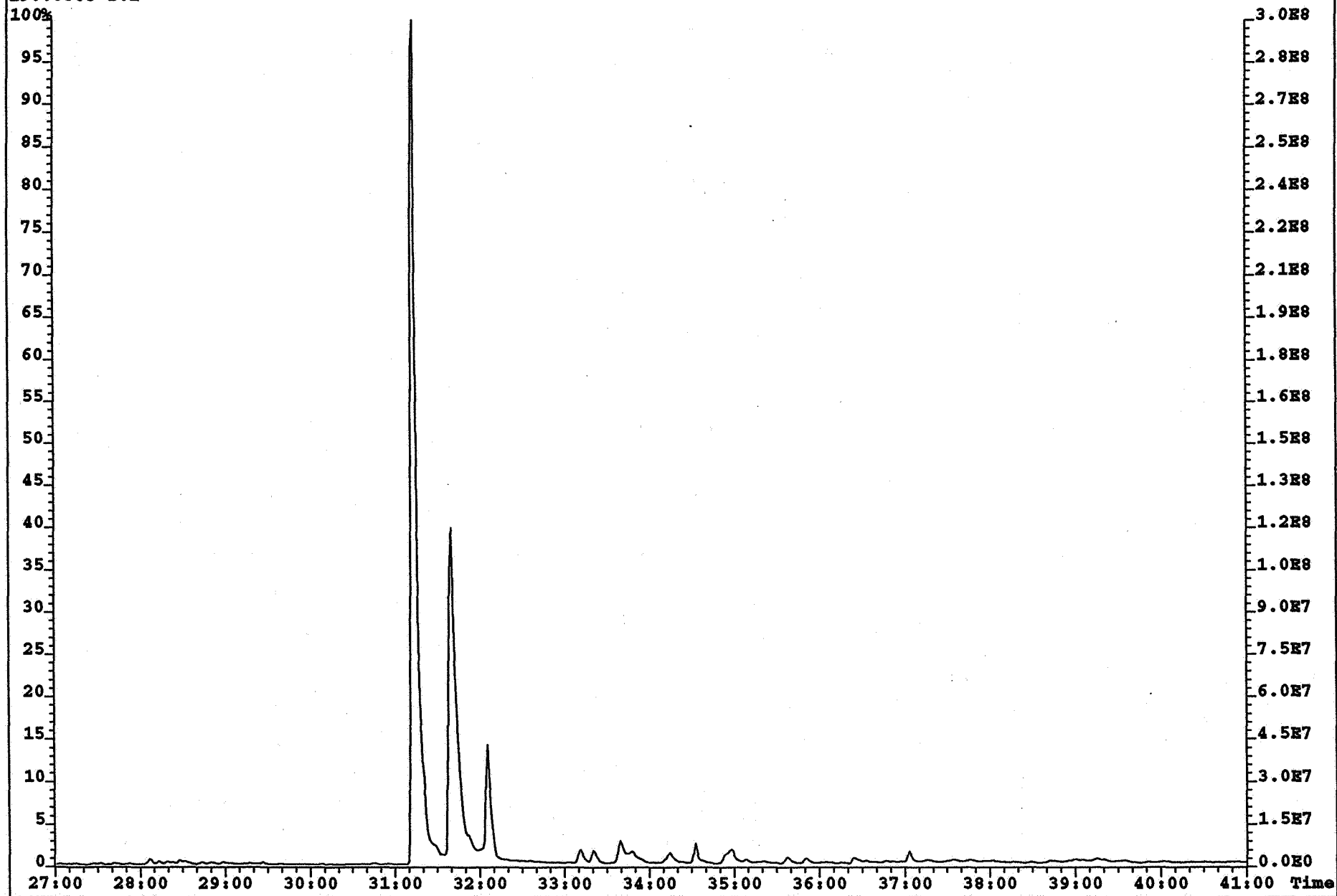
File: AMOAR04 #1-4719 Acq: 6-MAY-1997 13:56:25 GC EI+ Voltage SIR AutoSpec-Ultima
Sample#1 File Text: AROMATIC FRACTION Text: WELL 1/3-8, 4529m MD Oil Exp: STGUIDAROLM
192.0939



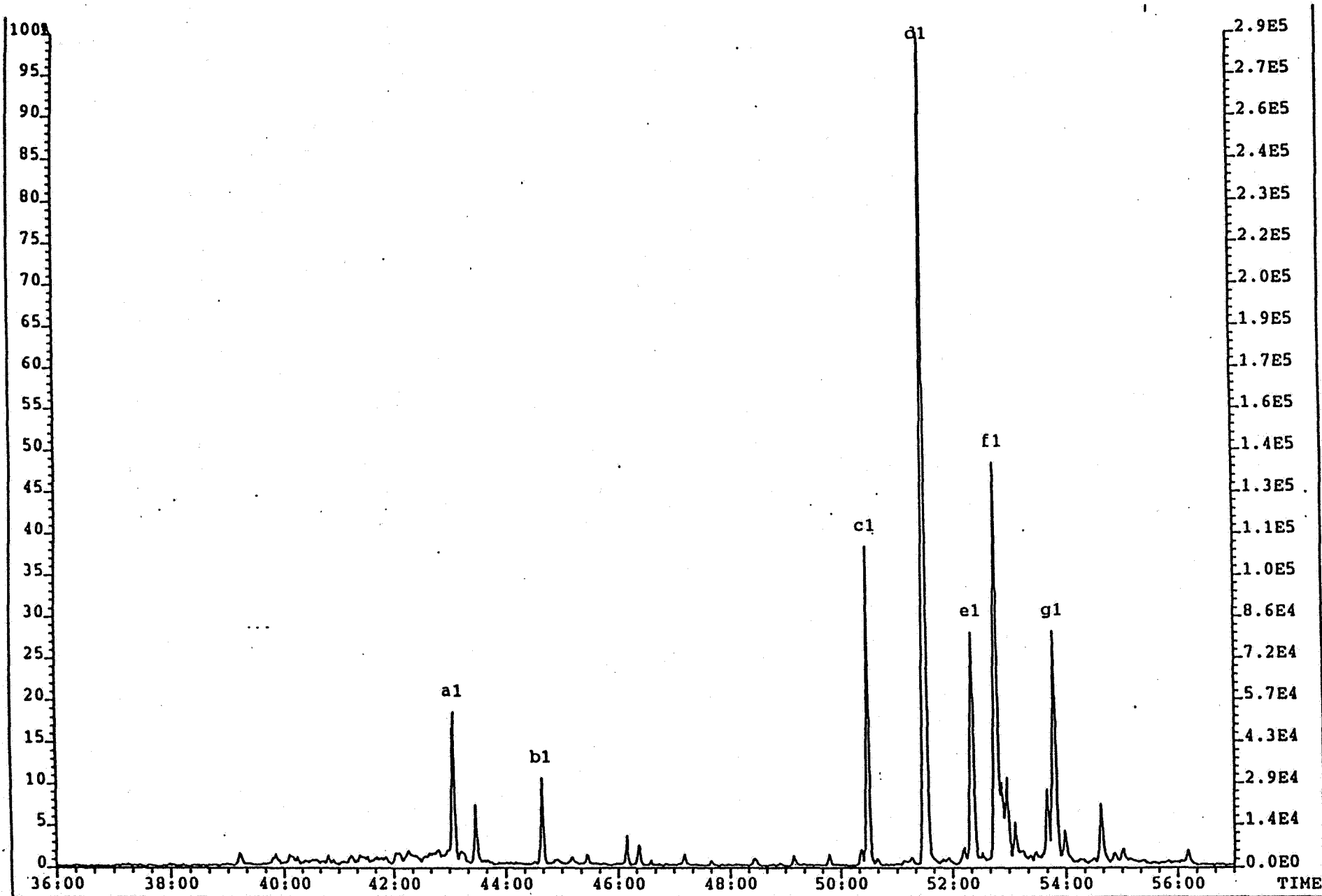
EXAMPLE OF PEAK IDENTIFICATION FOR M/Z 198 DIBENZOTHIOPHENES



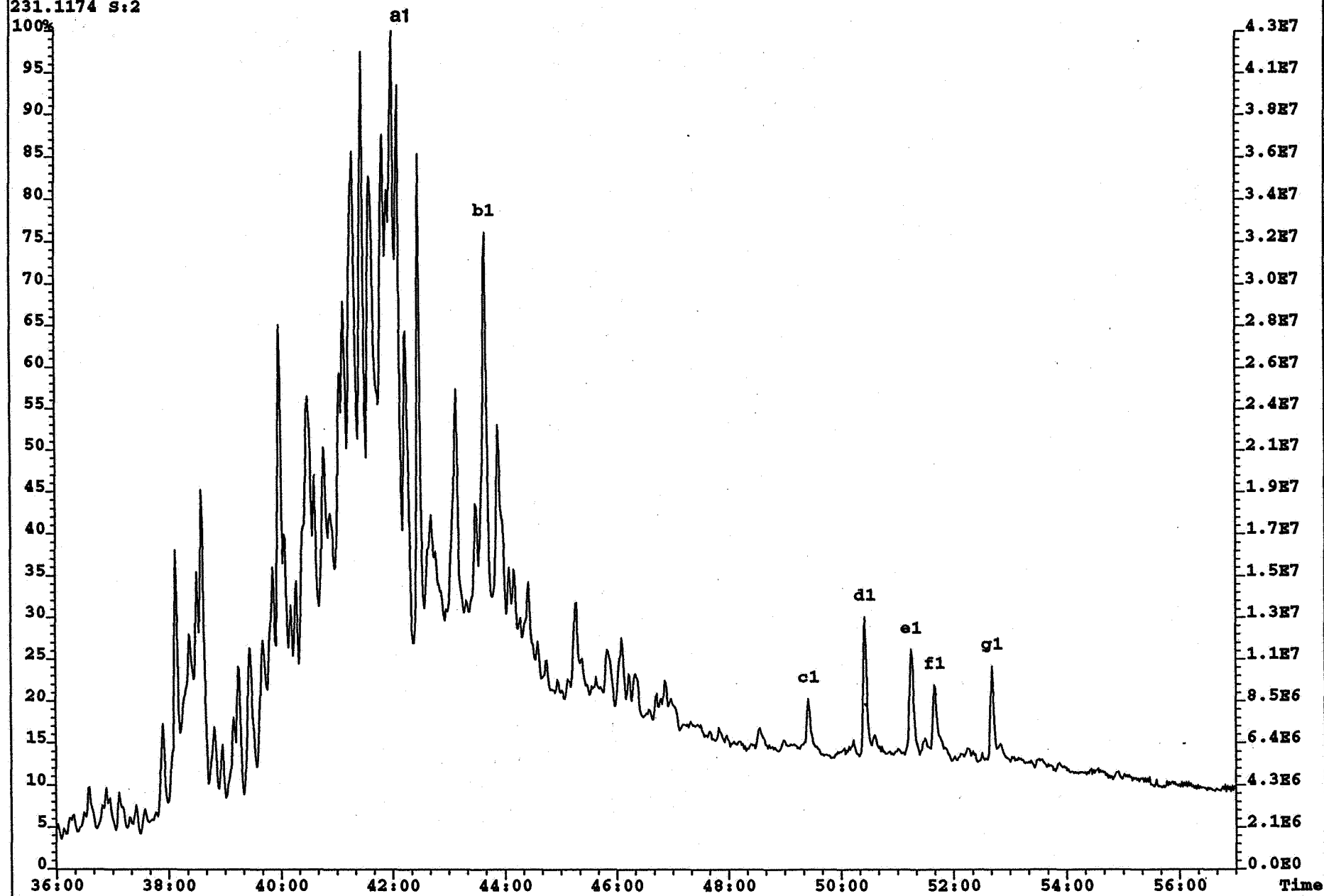
File: AMOARO1 #1-3162 Acq: 5-MAY-1997 16:10:35 GC FI+ Voltage SIR AutoSpec-Ultima
Sample#2 File Text: AROMATIC FRACTION Text: WELL 1/3-8, 4529m MD Oil Exp: STGUIDARO
198.0503 S:2



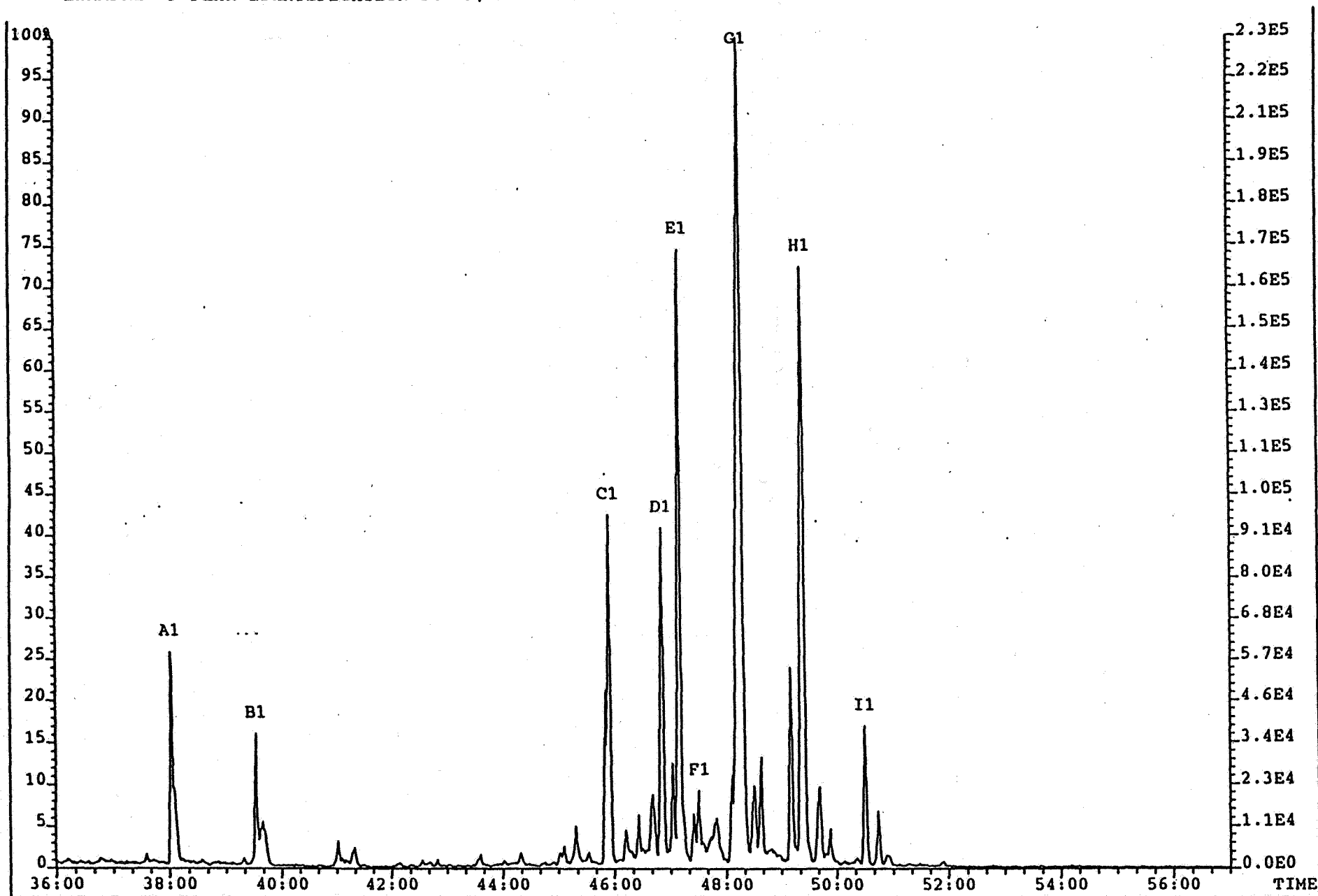
EXAMPLE OF PEAK IDENTIFICATION FOR M/Z 231 TRIAROMATIC STERANES



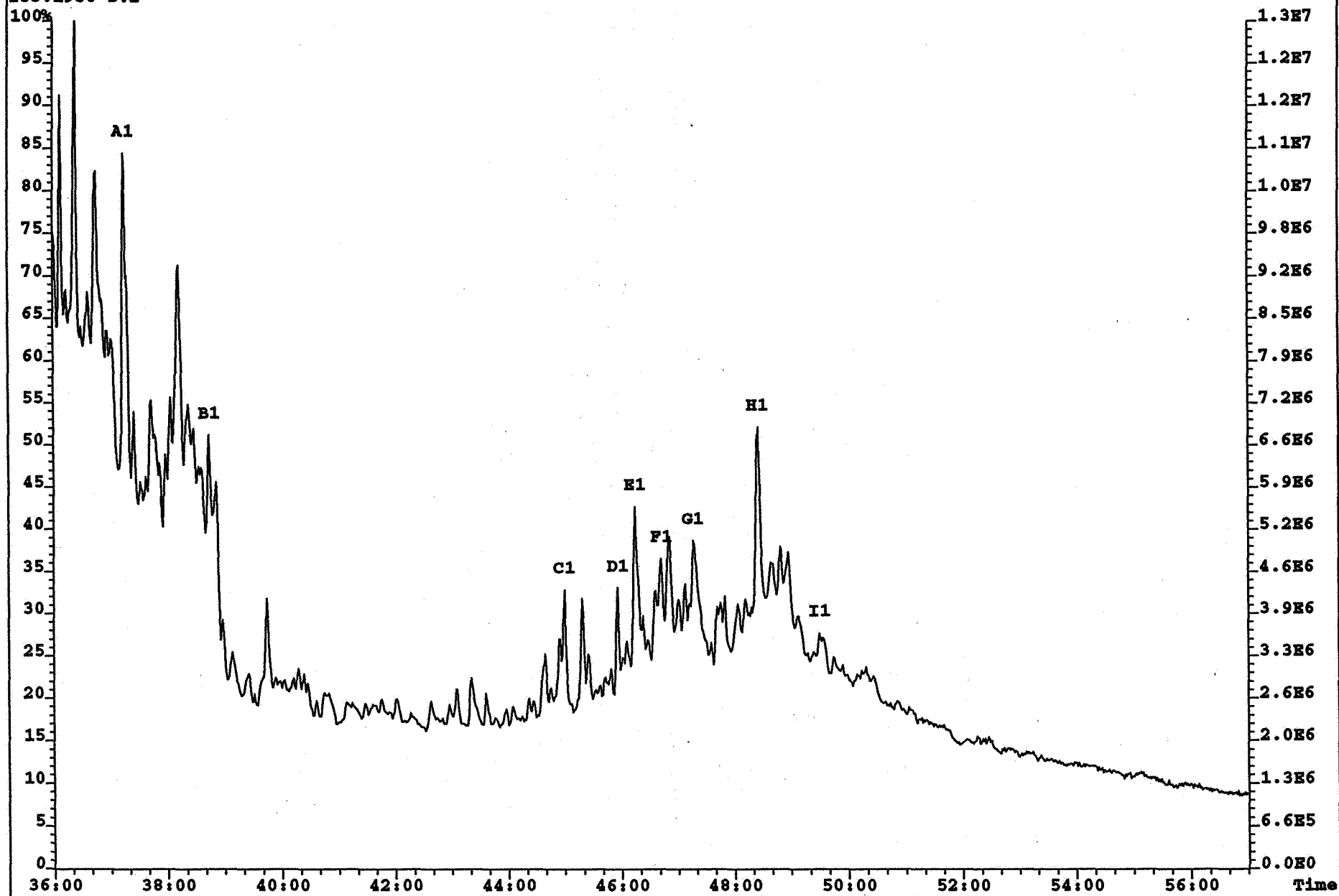
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Sample#2 File Text: AROMATIC FRACTION Text: WELL 1/3-8, 4529m MD Oil Exp: STGUIDARO
231.1174 S:2



EXAMPLE OF PEAK IDENTIFICATION FOR M/Z 253 MONOAROMATIC STERANES



File: AMOARO1 #1-3162 Acq: 5-MAY-1997 16:10:35 GC EI+ Voltage SIR AutoSpec-Ultima
Sample#2 File Text: AROMATIC FRACTION Text: WELL 1/3-8, 4529m MD Oil Exp: STGUIDARO
253.1956 S:2



Appendix III - Mud Analysis

Table 1: EOM GC, Well NOCS 1/3-8. BORESLAM

Sample	Yield nC10 (ppm of EOM)	Yield nC11 (ppm)	Yield nC12 (ppm)	Yield nC13 (ppm)	Yield nC14 (ppm)	Yield nC15 (ppm)	Yield nC16 (ppm)	Yield nC17 (ppm)	Yield Pristane (ppm)	Yield nC18 (ppm)	Yield Phytane (ppm)
4532m	1655.5	2202.6	4708.7	16750.0	20442.6	18269.0	15631.1	9543.7	5977.8	8615.5	2905.8

Sample	Yield nC19 (ppm)	Yield nC20 (ppm)	Yield nC21 (ppm)	Yield nC22 (ppm)	Yield nC23 (ppm)	Yield nC24 (ppm)	Yield nC25 (ppm)	Yield nC26 (ppm)	Yield nC27 (ppm)	Yield nC28 (ppm)	Yield nC29 (ppm)
4532m	5146.3	3452.7	2241.7	1760.9	1346.3	1098.8	823.0	695.3	529.9	428.5	409.0

Sample	Yield nC30 (ppm)	Yield nC31 (ppm)	Yield nC32 (ppm)	Yield nC33 (ppm)	Yield nC34 (ppm)	Yield nC35 (ppm)	RT <nC23 (ppm)	RT =>nC23 (ppm)	C10-C35 n-alk. (ppm)	EOM (mg)	Ratio pr/ph
4532m	307.2	303.7	244.9	0.0	0.0	0.0	593780.5	52467.6	125490.4	148.60	2.06

Table 1: EOM GC, Well NOCS 1/3-8. BORESLAM

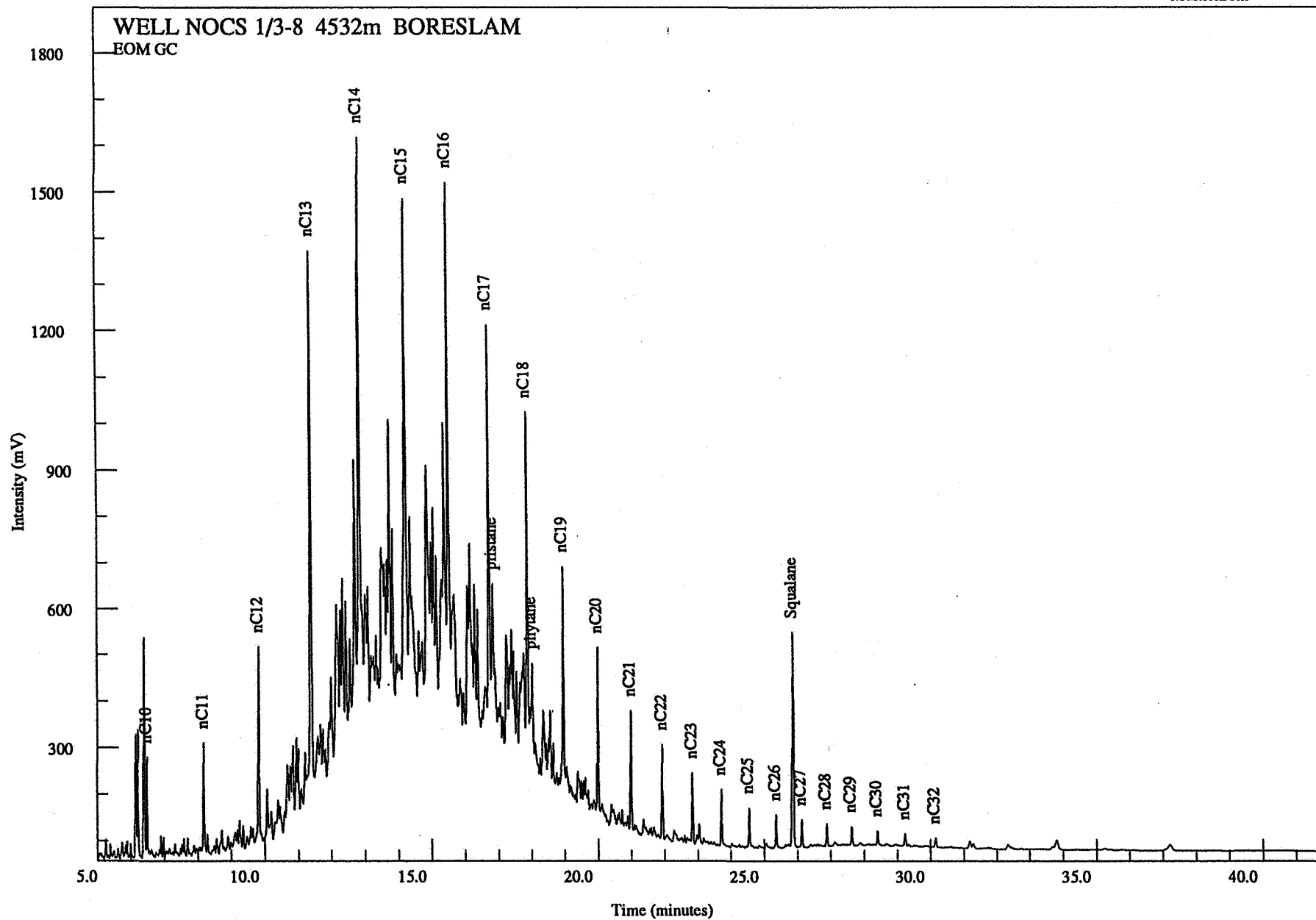
Sample	Yield nC10	Yield nC11	Yield nC12	Yield nC13	Yield nC14	Yield nC15	Yield nC16	Yield nC17	Yield Pristane	Yield nC18	Yield Phytane
	(ug/g mud)	(ug/g mud)	(ug/g mud)	(ug/g mud)	(ug/g mud)	(ug/g mud)	(ug/g mud)	(ug/g mud)	(ug/g mud)	(ug/g mud)	(ug/g mud)
4532m	246.00	327.29	699.69	2489.01	3037.72	2714.72	2322.74	1418.17	888.29	1280.24	431.79

Sample	Yield nC19	Yield nC20	Yield nC21	Yield nC22	Yield nC23	Yield nC24	Yield nC25	Yield nC26	Yield nC27	Yield nC28	Yield nC29
	(ug/g mud)	(ug/g mud)	(ug/g mud)	(ug/g mud)	(ug/g mud)	(ug/g mud)	(ug/g mud)	(ug/g mud)	(ug/g mud)	(ug/g mud)	(ug/g mud)
4532m	764.73	513.06	333.10	261.67	200.05	163.28	122.29	103.32	78.74	63.67	60.77

Sample	Yield nC30	Yield nC31	Yield nC32	Yield nC33	Yield nC34	Yield nC35	RT <nC23	RT =>nC23	C10-C35 n-alk.	EOM
	(ug/g mud)	(ug/g mud)	(ug/g mud)	(ug/g mud)	(ug/g mud)	(ug/g mud)	(ug/g mud)	(ug/g mud)	(ug/g mud)	(ug/g mud)
4532m	45.65	45.13	36.39	0.00	0.00	0.00	88234.13	7796.54	18647.52	148597.22

Analysis Name : [62351] 6 EOM138R2,1,1.

Multichrom



Appendix IV - Vitrinite Reflectance



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Report type	Report number IFE/KR/F-97/214	Date 1997-11-28																	
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<table border="1"><thead><tr><th></th><th>Name</th><th>Date</th><th>Signature</th></tr></thead><tbody><tr><td>Prepared by</td><td>Kristine Aasgaard</td><td>1997-11-28</td><td><i>Kristine Aasgaard</i></td></tr><tr><td>Reviewed by</td><td>Kjersti Iden</td><td>1997-11-28</td><td><i>Kjersti Iden</i></td></tr><tr><td>Approved by</td><td>Björg Andresen</td><td>1997-11-28</td><td><i>Björg Andresen</i></td></tr></tbody></table>					Name	Date	Signature	Prepared by	Kristine Aasgaard	1997-11-28	<i>Kristine Aasgaard</i>	Reviewed by	Kjersti Iden	1997-11-28	<i>Kjersti Iden</i>	Approved by	Björg Andresen	1997-11-28	<i>Björg Andresen</i>
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Prepared by	Kristine Aasgaard	1997-11-28	<i>Kristine Aasgaard</i>																
Reviewed by	Kjersti Iden	1997-11-28	<i>Kjersti Iden</i>																
Approved by	Björg Andresen	1997-11-28	<i>Björg Andresen</i>																

1 Introduction

This report gives the result of routine vitrinite reflectance analyses on 53 samples covering the interval from 1000 to 5194 mRKB in well 1/3-8 offshore Norway.

2 Material

2.1 Samples

The material was provided from the client as 36 washed and dried cuttings samples in october-97 and 17 washed and dried cuttings samples in november-97. Reporting of all the samples is here collected in one report for well 1/3-8.

2.2 Geological information and casing points

Information on stratigraphy in well 1/3-8 was not provided from the client.

3 Analytical techniques

3.1 Preparation

The cuttings samples were washed and then treated with hydrochloric and hydrofluoric acid prior to further preparation. The aim was to avoid soft and expanding mineral phases in order to ensure good polishing quality. 26 samples were treated with dichloromethane (table 1) because of oily substances which prevented further preparation. The sample material resulting from the acid treatment was embedded in an epoxy resin to make briquettes, ground flat and polished using 0.25 micron diamond paste and magnesium oxide as the two final steps.

3.2 Analysis

The analytical equipment being used was a Zeiss MPM 03 photometer microscope equipped with an Epiplan-Neofluar 40/0.90 oil objective. The sensitive measuring spot was kept constant for all measurements at about 2.5 micron in diameter. The measurements were made through a green band pass filter (546 nm) and in oil immersion (refractive index 1.515 at 18°C). The readings were made without a polarizer and using a stationary stage. This procedure is called measurement of random reflectance (%Rm). The photometer is calibrated daily against a standard of known reflectance (%Rm= 0.588) and routinely (daily) checked against two other standards of significant different reflectances (%Rm=0.879 and 1.696). A deviation from these values of less than ± 0.01 and ± 0.02 respectively is considered as acceptable. The calibration is routinely checked during the course of measurements at least every hour, and a deviation of less than ± 0.005 is considered as acceptable.

For each sample at least 20 points were measured if possible, and quality ratings are given to various important aspects which may affect the measurements. These aspects are abundance of vitrinite, uncertainties in the identification of indigenous vitrinite, type of vitrinite, particle size, particle surface quality and abundance of pyrite.

3.3 Presentation of results

The raw data from the measurements are presented in appendix for each sample both as tabulated data and histograms. A true vitrinite population is selected among the readings based on observations made during the measurements, and arithmetic mean values are calculated for this population and other populations. A quality rating is given to the true population. The results are listed in table 1. Figure 1 shows a vitrinite reflectance data versus depth plot in both linear and logarithmic scale.

4 Results

26 samples from the deep part of well 1/3-8 were greasy and difficult to prepare. To make further preparation possible, the samples were treated with dichloromethane, which brought them to a moderate acceptable quality. The majority of the samples deeper than 3600mRKB were poor in

vitrinite content. Though, it has been possible to establish a fairly good vitrinite reflectance towards depth trend for well 1/3-8.

Table 1. Vitrinite reflectance data table

Analysis type:		Vitrinite reflectance							
Well:		1/3-8							
Number of samples:		53							
Time period for analysis:		oct-97, now-97							
Analysis performed by:		Kristine Aasgaard, Institutt for energiteknikk							
Analysis ordered by:		Geolab Nor/Amoco							
IFE sample code	Depth (m)	Sample type	Lithology	Vitr. refl. (%Rm)	Stand. dev.	Number of readings	Sample description	Sample quality	Sample prep.
971257	1000	cut	clyst/sst	0.21	0.03	23	ooo--o	M	HF
971258	1200	cut	clyst/sst	0.22	0.04	26	ooo-o+	M	HF
971259	1400	cut	clyst/sst	0.21	0.03	14	--oo-o+	M	HF
971260	1600	cut	clyst/sst	0.27	0.06	12	--oo--o	M	HF
971261	1800	cut	clyst/sst	0.26	0.03	6	--oo--o	P	HF
971262	2000	cut	clyst/sst	0.26	0.03	20	ooo-oo	G	HF
971263	2200	cut	clyst/sst	0.28	0.03	21	ooo--+	M	HF
971264	2400	cut	clyst/sst	0.34	0.05	25	ooo--o	M	HF
971265	2600	cut	clyst/sst	0.35	0.03	23	ooo-o+	M	HF
971266	2800	cut	clyst/sst	0.38	0.05	25	ooo-o+	M	HF
971267	3001	cut	clyst/sst	0.54	0.07	26	ooo-o+	M	HF
971268	3199	cut	clyst/sst	0.58	0.06	20	ooo--+	M	HF
971269	3400	cut	clyst/lst	0.67	0.04	3	--oo-o+	P	HF
971270	3601	cut	clyst/lst	barren	*	*	*	P	HF
971271	3799	cut	clyst/lst	barren	*	*	*	P	HF
971272	4000	cut	clyst/lst	barren	*	*	*	P	HF
971273	4180	cut	clyst/lst	barren	*	*	*	P	HF
970981	4240	cut	clyst/lst	1.13	0.09	5	--oo-oo	P	HF
970982	4330	cut	clyst/lst	barren					HF
970983	4390	cut	clst/sst	1.20	0.15	22	ooo-oo	M	HF/DCM
970984	4402	cut	clst/sst	1.21	0.14	13	--oo-oo	M	HF/DCM

Table 1. Vitrinite reflectance data table, continued

IFE sample code	Depth (m)	Sample type	Lithology	Vitr. refl. (%Rm)	Stand. dev.	Number of readings	Sample description	Sample quality	Sample prep.
970985	4459	cut	clst	1.22	0.16	22	000--0	M	HF/DCM
970986	4507	cut	clst	1.30	0.18	23	000-00	M	HF/DCM
970987	4534	cut	clst	1.33	0.09	17	000--0	M	HF/DCM
970988	4558	cut	clst	1.23	0.17	10	-00-00	P	HF
970989	4582	cut	clst	1.41	0.05	4	-±0-00	P	HF
970990	4600	cut	clst	1.36	0.09	14	000--0	M	HF/DCM
970991	4630	cut	clst/sst	1.44	0.24	23	0±0-00	P	HF/DCM
970992	4648	cut	clst/sst	1.27	0.20	28	0±0-00	P	HF/DCM
970993	4672	cut	clst/sst	1.40	0.15	12	-00--0	P	HF/DCM
970994	4690	cut	clst/sst	1.46	0.17	20	000-00	M	HF/DCM
970995	4714	cut	clst	1.34	0.11	18	00±--0	P	HF/DCM
970996	4723	cut	clst	1.46	0.16	26	000--0	M	HF/DCM
970997	4729	cut	clst/sst	1.40	0.15	19	00---0	P	HF/DCM
970998	4738	cut	clst	1.41	0.16	26	000---+	M	HF
970999	4750	cut	clst	barren					HF
971000	4762	cut	clst	1.53	0.19	24	000---+	M	HF/DCM
971001	4786	cut	clst	1.49	0.21	22	000---+	M	HF/DCM
971002	4804	cut	clst	1.42	0.19	17	-00---+	M	HF/DCM
971003	4822	cut	clst	1.11	0.13	16	-±±---+	P	HF/DCM
971004	4846	cut	clst	1.53	0.20	22	000---+	P	HF/DCM
971005	4864	cut	clst	1.60	0.12	16	-±---+	P	HF/DCM
971006	4882	cut	clst	1.54	0.13	12	-±0---+	P	HF
971007	4906	cut	clst	1.44	0.16	10	-00--0	P	HF/DCM
971008	4930	cut	clst	barren					HF
971009	4954	cut	clst	1.74	0.26	13	-±0---+	P	HF
971010	4978	cut	clst	1.47	0.20	21	000-00	M	HF
971011	5002	cut	clst	1.69	0.09	19	000--0	M	HF/DCM
971012	5068	cut	clst/sst	barren					HF/DCM
971013	5086	cut	clst/sst	barren					HF/DCM
971014	5122	cut	clst/sst	barren					HF/DCM

Table 1. Vitrinite reflectance data table, continued

IFE sample code	Depth (m)	Sample type	Lithology	Vitr. refl. (%Rm)	Stand. dev.	Number of readings	Sample description	Sample quality	Sample prep.
971015	5158	cut	clst/sst	barren					HF/DCM
971016	5194	cut	clst/sst	1.61	0.24	2	-00--0	P	HF/DCM

Legend to vitrinite reflectance data table

sst	sandstone		
slst	siltstone		
clst	claystone		
sh	shale		
lst	limestone		
HF	sample treated with hydrofluoric acid prior to epoxy resin embedding		
DCM	sample treated with dichloromethane prior to epoxy resin embedding		
G	Good quality sample		
M	Moderate quality sample		
P	Poor quality sample		
ooooo	Sample description:	1	Abundance of vitrinite
123456		2	Identification of vitrinite
		3	Type of vitrinite
		4	Vitrinite fragment size
		5	Vitrinite surface quality
		6	Abundance of pyrite
-	may give too low vitrinite reflectance sample value		
o	reliable vitrinite reflectance sample value		
+	may give too high vitrinite reflectance sample value		