

RUN NO.	POINT No.	DEPTH (m)	TVD (m)	HYDROSTATIC PRESSURE	FORMATION PRESSURE
2A	1	2004.4		3433.3	2901.8
	2	2010.8		3444.3	2909.2
	3	2012.0		3446.2	2910
	4	2013.5		3448.4	2911.4
	5	2014.5		3449.9	2912.2
	6	2015.9		3451.9	2925.5
	7	2017.5		3454.4	2915
	8	2019.0		3456.3	2916.8
	9	2020.5		3459.7	2918.4
	10	2030.3		3476.5	2932.3
	11	2032.4		3480.4	2935.7
	12	2036.0		3486.0	2940.9
	13	2041.0		3494.2	2948.3
	14	2046.0		3502.6	3955.1
	15	2052.0		3512.3	2963.7
	16	2067.0		3537.0	3985.3
	17	2119.5		3625.8	3060.8
	18	2012.0		3460.3	2908.9

FINA

Exploration & Production

Petrofina Group



BA-94-1910-1

03 OKT. 1994

REGISTERET

OLJEDIREKTORATET

**NORWAY CONTINENTAL SHELF BLOCK 24/9
(PL 150)**

GEOCHEMICAL CHARACTERISATION OF THE 24/9-6 CRUDE OIL & SCREENING OF THE WELL 24/9-5 RESERVOIR INTERVAL

REPORT : EGG/R066

**WORK BY : B. Mycke
Geochem Group Ltd.
GeoMark Research Inc.**

AUTHOR : B. Mycke

DATE : July 1994

PROJECT : EGG/94-003

FOR : Fina Exploration Norway u.a.s.

APPROVED BY : R. Burwood

TABLE 1 OIL/BITUMEN DATA - ACQUISITION PROGRAMME
NOCS BLOCK 24/9 OIL/BITUMEN - KEY TO SAMPLES

SAMPLE IDENTIFICATION	WELL		CORE	TEST/DEPTH	YIELD (%wt/wt)
HA612/GNS029* 9302-008**	24/9-6			Open Hole 2032- 2006m Stock Tank Oil	N/A
AKC2013,6/GNS030* 9302-001**	24/9-5		Core#2	2013,6m	2.4
AKC2014,6/GNS031* 9302-002**	24/9-5		"	2014,6m	4.1
AKC2015,6/GNS032* 9302-003**	24/9-5		"	2015,6m	3.7
AKC2016.3/GNS033* 9302-004**	24/9-5		"	2016,3m	3.8
AKC2017,6/GNS034* 9302-005**	24/9-5		"	2017,6m	3.0
AKC2018,6/GNS035* 9302-006**	24/9-5		"	2018,6m	3.5
AKC2019,1/GNS036* 9302-007**	24/9-5		"	2019,1m	4.4

* GeoMark Research Inc. System
 ** Geochem Group Ltd System

TABLE 2 QUALITY DATA FOR BLOCK 24/9 CRUDE OILS AND BITUMENS

WELL	24/9-3	24/9-4 "U"*	24/9-4 "L"*	24/9-5	24/9-6
API Gravity	19.50°	n.d.	n.d.	34.80°	32.70°
Pour Point (°C)	-4.00	n.d.	n.d.	-45.00	-65.00
Wax Cont. (%)	3.50	<1	<1	1.00	8.00
Wax Melt. Point (°C)	31.00	n.d.	n.d.	30.00	31.00
Sulfur (%)	0.54	4.65	1.04	0.24	0.23
Nitrogen (%)	0.23	n.d.	n.d.	0.06	0.07
Asph. Cont. (%)	2.32	9.48	24.16	0.85	1.13

* Compositated SWC bitumen extracts

"U" Cores n° 17+19

"L" Cores n° 9-11

TABLE 3 COMPILATION OF BLOCK 24/9 MATURITY DATA

WELL	ETHYLCHOLESTANE 20S/R %Rc VRE ⁺	METHYLPHENANTHRENES MPI1 %Rc VRE ⁺	METHYLDIBENZOTHIOPHENES MDBT %Rc VRE ⁺	TRIAROMATIC STEROIDS TAR % Rc VRE ⁺
24/9-3	0,79	0,68	0,74	0,74
24/9-4"U"*	0,74	0,68	0,64	0,66
24/9-4"L"*	0,79	0,68	0,69	0,67
24/9-5	0,85	0,82	0,83	0,79
24/9-5 — X of 7 core plugs	0,82	n.d.	n.d.	n.d.
24/9-6	0,81	0,83	0,84	0,79

* Compositated SWC bitumen extracts

"U" Cores n° 17+19

"L" Cores n° 9-11

+ VRE = Vitrinite reflectance equivalent maturity

APPENDICES CONTENTS

APPENDIX 1

CRUDE OIL AND BITUMEN DATA

GEOCHEM GROUP LTD.

APPENDIX 2

CRUDE OIL AND BITUMEN DATA

GEO-MARK RESEARCH INC.

APPENDIX 3

THERMOVAPORISATION AND PYROLYSIS

GEOFINA HYDROCARBON METER (GHM)

TRACES FOR 7 BITUMENS

OIL/BITUMEN DATA - ACQUISITION PROGRAMME
NOCS BLOCK 24/9 OIL/BITUMEN - KEY TO SAMPLES

SAMPLE IDENTIFICATION	WELL		CORE	TEST/DEPTH	YIELD (%wt/wt)
HA612/GNS029* 9302-008**	24/9-6			Open Hole 2032- 2006m Stock Tank Oil	N/A
AKC2013,6/GNS030* 9302-001**	24/9-5		Core#2	2013,6m	2.4
AKC2014,6/GNS031* 9302-002**	24/9-5		"	2014,6m	4.1
AKC2015,6/GNS032* 9302-003**	24/9-5		"	2015,6m	3.7
AKC2016.3/GNS033* 9302-004**	24/9-5		"	2016,3m	3.8
AKC2017,6/GNS034* 9302-005**	24/9-5		"	2017,6m	3.0
AKC2018,6/GNS035* 9302-006**	24/9-5		"	2018,6m	3.5
AKC2019,1/GNS036* 9302-007**	24/9-5		"	2019,1m	4.4

* GeoMark Research Inc. System
 ** Geochem Group Ltd System

APPENDIX 1
CRUDE OIL AND BITUMEN DATA
GEOCHEM GROUP LTD.

**GEOCHEMICAL DATA FOR CRUDE OIL HA612
AND 7 BITUMENS CODED AKC**

Prepared for

FINA EXPLORATION AND PRODUCTION

CONTENTS

TABLES

- 1 Crude Oil Composition - Chemical
- 2 Crude Oil Composition - Physical
- 3a Concentration (ppm) of Extracted C₁₅₊ Material
- 3b Composition (normalised) of C₁₅₊ Material
- 4 Composition (normalised %) of C₁₅₊ Saturate Hydrocarbons
- 5 Detailed Gasoline Range Composition
- 6 Carbon Isotope Compositions
- 7 Hydrogen and Sulphur Isotope Compositions
- 8 Methylphenanthrene Indices

FIGURES

- 1 C₄-C₉ Gas Chromatogram
- 2 Whole Oil Gas Chromatograms
- 3 Saturates Gas Chromatograms
- 4 Aromatic Gas Chromatogram

TABLE 1
CRUDE OIL COMPOSITION - CHEMICAL

JOB 9302							
GEOCHEM SAMPLE NUMBER	DEPTH/ IDENTITY	WAX CONTENT (%)	WAX MELTING POINT (°C)	SULPHUR (%)	NITROGEN (%)	V (ppm)	Ni (ppm)

WELL:

9302-008	HA 612m	8	31	0.23	0.07	<0.1	<0.1
----------	---------	---	----	------	------	------	------

TABLE 2
CRUDE OIL COMPOSITION - PHYSICAL

JOB 9302						
GEOCHEM SAMPLE NUMBER	DEPTH/ IDENTITY	SPECIFIC GRAVITY (g/cc)	API GRAVITY	VISCOSITY (cp)	POUR POINT (°C)	DISTILLATE TO 210°C (%)

WELL:

9302-008	HA 612m	0.8620	32.7		- 65.00	32.00
----------	---------	--------	------	--	---------	-------

TABLE 3a
CONCENTRATION (PPM) OF EXTRACTED C₁₅₊ MATERIAL IN ROCK

JOB 9302	L I T H O	DEPTH/ IDENTITY	TOTAL EXTRACT	HYDROCARBONS			NON HYDROCARBONS			
				Saturates	Aromatics	TOTAL	Preciptd. Asphaltenes	Eluted NSO's	Non-Eluted NSO's	TOTAL

WELL:

9302-001	2013.6m	979784	683623	150930	834553	18956	94961	31314	145231
9302-002	2014.6m	911506	626928	128434	755361	16506	126627	13012	156145
9302-003	2015.6m	911227	635405	152428	787833	16971	94204	12219	123394
9302-004	2016.3m	914379	676730	133890	810621	17363	68138	18258	103759
9302-005	2017.6m	931798	651511	146752	798263	19411	113369	755	133535
9302-006	2018.6m	913365	639148	151508	790656	15021	86103	21585	122708
9302-007	2019.1m	925694	655132	124919	780052	17689	101291	26662	145642
9302-008	HA 612m	978881	699082	159933	859015	11018	40234	68614	119866

TABLE 3b
COMPOSITION (NORMALISED %) OF C₁₅₊ MATERIAL

JOB 9302	L I T H O	DEPTH/ IDENTITY	HYDROCARBONS		NON HYDROCARBONS		
GEOCHEM SAMPLE NUMBER			Saturates	Aromatics	Preciptd. Asphaltenes	Eluted NSO's	Non-Eluted NSO's

WELL:

9302-001		2013.6m	69.77	15.40	1.93	9.69	3.20
9302-002		2014.6m	68.78	14.09	1.81	13.89	1.43
9302-003		2015.6m	69.73	16.73	1.86	10.34	1.34
9302-004		2016.3m	74.01	14.64	1.90	7.45	2.00
9302-005		2017.6m	69.92	15.75	2.08	12.17	0.08
9302-006		2018.6m	69.98	16.59	1.64	9.43	2.36
9302-007		2019.1m	70.77	13.49	1.91	10.94	2.88
9302-008		HA 612m	71.42	16.34	1.13	4.11	7.01

TABLE 4
COMPOSITION (NORMALISED %) OF C₁₅₊ SATURATE (PARAFFIN - NAPHTHENE) HYDROCARBONS

GEOCHEM SAMPLE NUMBER	001	002	003	004	005	006
DEPTH	2013.6	2014.6	2015.6	2016.3	2017.6	2018.6
SAMPLE TYPE						
nC15	10.77	12.54	11.81	9.58	10.90	14.07
nC16	10.58	10.27	10.78	9.54	9.94	11.89
nC17	9.37	8.69	9.64	8.27	7.89	9.42
nC18	8.28	7.90	8.30	7.76	7.25	8.72
nC19	6.89	6.32	6.67	5.86	5.91	6.94
nC20	6.63	6.42	6.28	6.13	6.18	6.84
nC21	5.42	5.23	4.75	5.30	4.83	5.35
nC22	5.38	5.03	4.75	4.83	4.99	5.15
nC23	5.38	4.64	4.50	4.67	4.78	4.56
nC24	5.08	4.44	4.30	4.55	4.73	4.26
nC25	4.25	3.95	3.26	4.19	4.24	3.57
nC26	4.22	4.64	3.86	4.59	4.46	3.27
nC27	3.61	3.75	3.41	4.16	4.24	2.78
nC28	3.50	3.36	3.06	4.04	3.76	2.38
nC29	2.75	2.96	3.16	3.80	3.65	2.38
nC30	2.11	2.47	2.62	2.97	2.69	1.78
nC31	2.37	2.27	2.97	3.28	3.01	1.98
nC32	1.43	1.68	1.93	2.26	2.42	1.39
nC33	1.39	1.68	1.83	2.06	2.04	1.49
nC34	0.45	1.09	1.48	1.58	1.50	1.19
nC35	0.13	0.69	0.64	0.59	0.59	0.59
Paraffin	3.47	3.29	3.49	3.58	3.66	3.03
Isoprenoid	3.70	3.55	3.98	3.56	3.68	3.76
Naphthene	92.83	93.16	92.53	92.86	92.66	93.21
CPI 1 Index	0.95	0.93	0.91	0.96	0.95	0.96
CPI 2 Index	1.01	0.97	1.02	1.03	1.05	1.07
CPI 3 Index	0.94	0.94	0.99	0.96	1.03	0.98
Prist/Phytane	1.53	1.66	1.62	1.48	1.59	1.71
Prist/nC17	2.66	3.44	2.89	3.01	3.27	3.56
Phytane/nC18	1.97	2.28	2.07	2.17	2.24	2.25

Job Number : 9302

$$C.P.I. 1 = \frac{1}{2} \left[\frac{C_{21} + C_{23} + C_{25} + C_{27}}{C_{20} + C_{22} + C_{24} + C_{26}} + \frac{C_{21} + C_{23} + C_{25} + C_{27}}{C_{22} + C_{24} + C_{26} + C_{28}} \right]$$

$$C.P.I. 2 = \frac{1}{2} \left[\frac{C_{25} + C_{27} + C_{29} + C_{31}}{C_{24} + C_{26} + C_{28} + C_{30}} + \frac{C_{25} + C_{27} + C_{29} + C_{31}}{C_{26} + C_{28} + C_{30} + C_{32}} \right]$$

$$C.P.I. 3 = \frac{2 \times (C_{27})}{C_{26} + C_{28}}$$

CT - ditch cuttings CO - core SWC - sidewall core

TABLE 4
COMPOSITION (NORMALISED %) OF C₁₅₊ SATURATE (PARAFFIN - NAPHTHENE) HYDROCARBONS

GEOCHEM SAMPLE NUMBER	007	008
DEPTH	2019.1	HA 612
SAMPLE TYPE		
nC15	13.49	11.52
nC16	11.88	10.64
nC17	9.60	8.34
nC18	8.65	7.47
nC19	6.45	6.27
nC20	6.23	6.20
nC21	5.35	4.61
nC22	4.91	4.37
nC23	4.62	4.61
nC24	4.40	4.29
nC25	4.18	3.73
nC26	3.96	4.13
nC27	3.15	3.97
nC28	2.57	3.81
nC29	2.35	3.49
nC30	1.98	3.10
nC31	2.05	2.94
nC32	0.95	2.14
nC33	1.54	2.07
nC34	1.10	1.51
nC35	0.59	0.79
Paraffin	3.10	3.43
Isoprenoid	3.68	2.98
Naphthene	93.22	93.59
CPI 1 Index	0.99	0.96
CPI 2 Index	1.07	1.00
CPI 3 Index	0.96	1.00
Prist/Phytane	1.77	1.59
Prist/nC17	3.29	3.00
Phytane/nC18	2.06	2.11

Job Number : 9302

$$C.P.I. 1 = \frac{1}{2} \left[\frac{C_{21} + C_{23} + C_{25} + C_{27}}{C_{20} + C_{22} + C_{24} + C_{26}} + \frac{C_{21} + C_{23} + C_{25} + C_{27}}{C_{22} + C_{24} + C_{26} + C_{28}} \right]$$

$$C.P.I. 2 = \frac{1}{2} \left[\frac{C_{25} + C_{27} + C_{29} + C_{31}}{C_{24} + C_{26} + C_{28} + C_{30}} + \frac{C_{25} + C_{27} + C_{29} + C_{31}}{C_{26} + C_{28} + C_{30} + C_{32}} \right]$$

$$C.P.I. 3 = \frac{2 \times (C_{27})}{C_{26} + C_{28}}$$

CT - ditch cuttings CO - core SWC - sidewall core

TABLE 5
DETAILED GASOLINE RANGE (C₄-C₇) COMPOSITION

GEOCHEM SAMPLE NUMBER	9302-008
DEPTH	HA 612
NORMALISED COMPOSITION	
isobutane	1.17
n-butane	3.31
isopentane	5.25
n-pentane	6.97
2,2-dimethylB	0.35
cyclopentane	1.52
2,3-dimethylB	0.90
2-methylP	4.21
3-methylP	3.31
n-hexane	2.90
methylCP	8.28
2,2-dimethylP	0.76
2,4-dimethylP	0.00
2,2,3-trimethylB	0.00
benzene	0.07
cyclohexane	14.15
3,3-dimethylP	0.00
1,1-dimethylCP	0.00
2-MH	2.83
2,3-dimethylP	0.69
3-MH	2.35
1,c,3-DMCP	1.93
1,t,3-DMCP	1.79
1,t,2-DMCP	3.59
3-ethylP	0.00
n-heptane(nc7)	0.41
methylCH	26.92
1,c,2-DMCP	0.00
toluene	6.35
ABUNDANCE	
nC7/C7NAPHTHENES	0.01
total MH/DMCP	0.71
1,t,2-/1,c,2-DMCP	0.00
nC6/methylCP	0.35
C6-C7 FRACTION	
%n-PARAFFINS	4.05
%iso-PARAFFINS	18.83
% NAPHTHENES	69.28
% AROMATICS	7.85

TABLE 6
CARBON ISOTOPE COMPOSITIONS (‰, PDB)

JOB 9302	DEPTH/ IDENTITY	TOTAL EXTRACT WHOLE OIL	SATURATES	AROMATICS	NSO	ASPHALTENES	DISTILLATE	
----------	--------------------	----------------------------	-----------	-----------	-----	-------------	------------	--

WELL:

9302-001	2013.6m	-28.92						
9302-002	2014.6m	-29.02						
9302-003	2015.6m	-28.98						
9302-004	2016.3m	-28.82						
9302-005	2017.6m	-28.80						
9302-006	2018.6m	-28.83						
9302-007	2019.1m	-28.84						
9302-008	HA 612m	-28.84	-29.25	-28.25	-28.43	-28.38	-28.79	

TABLE 7

**HYDROGEN (‰, SMOW) AND SULPHUR (‰, CDT) ISOTOPE COMPOSITION
ANALYSES UPON WHOLE OIL**

GEOCHEM SAMPLE NUMBER	IDENTITY	H/D	S³⁴
9302-008	HA612	-123.9	+4.4

TABLE 8
METHYLPHENANTHRENE INDICES (MPI)

JOB 9302	DEPTH/ IDENTITY	SAMPLE TYPE	MPI 1		Rcalc		MPI 2	
GEOCHEM SAMPLE NUMBER			AREA	HEIGHT	AREA	HEIGHT	AREA	HEIGHT

WELL:

9302-008	HA 612m		0.66	0.70			0.77	0.87
----------	---------	--	------	------	--	--	------	------

$$\text{MPI 1} = \frac{1.5(2\text{-MP} + 3\text{-MP})}{\text{P} + 1\text{-MP} + 9\text{-MP}} \quad \text{MPI 2} = \frac{3(2\text{-MP})}{\text{P} + 1\text{-MP} + 9\text{-MP}}$$

$$\text{Rcalc} = \begin{cases} 0.60(\text{MPI 1}) + 0.40 & (\text{if } \text{Ro} < 1.35\%) \\ -0.60(\text{MPI 1}) + 2.30 & (\text{if } \text{Ro} > 1.35\%) \end{cases}$$

CT - ditch cuttings CO - core SWC - sidewall core

APPENDIX 2
CRUDE OIL AND BITUMEN DATA
GEOMARK RESEARCH INC.

**GEOCHEMICAL CHARACTERIZATION OF
ONE CRUDE OIL AND SEVEN EXTRACTS
FROM THE NORTH SEA
FINAL REPORT**

**PREPARED FOR
FINA EXPLORATION & PRODUCTION COMPANY
BRUSSELS, BELGIUM
(Cost Allocation 1746)**

Ref. EXPLO/94/175/JP/at

**PREPARED BY
GEOMARK RESEARCH, INC
HOUSTON, TEXAS**

JOB No. FINS0394

20 June 1994

TABLE OF CONTENTS

TABLES

- 1 Crude Oil and Extract Compositional Data
- 2 Aromatic Biomarker Ratios
- 3 Biomarker Peak Identifications

APPENDICES

- A C15+ Saturate Biomarker Information, Mass Fragmentograms, and Peak Areas
- B C15+ Aromatic Biomarker Mass Fragmentograms and Peak Areas

Table 1. C15+ Compositional Data for North Sea Crude Oils and Extracts.

GeoMark #	Fina ID	% < C15	Normalized Percent					S/A	P/N*	δ ¹³ C		CV**
			Sat	Aro	NSO	Asph	Sat			Aro		
GNS006	HA-020	33.2	53.84	31.25	14.91	0.00	1.72	0.25	nd	nd	nd	
GNS007	HA-024	50.8	66.67	20.70	12.64	0.00	3.22	0.54	nd	nd	nd	
GNS008	HA-025	47.2	50.64	25.59	23.76	0.00	1.98	0.38	nd	nd	nd	
GNS009	HA-234	14.9	52.10	27.03	19.80	1.07	1.93	0.42	nd	nd	nd	
GNS010	HA-551	32.5	36.81	12.35	44.24	6.59	2.98	0.41	nd	nd	nd	
GNS011	HA-552	41.6	54.69	33.33	11.11	0.87	1.64	0.79	nd	nd	nd	
GNS012	HA-553	19.0	53.74	30.71	15.25	0.30	1.75	0.20	nd	nd	nd	
GNS012R	HA-553R	21.4	49.48	29.05	20.78	0.69	1.70	0.14	nd	nd	nd	
GNS013	HA-554	46.2	65.65	14.41	19.94	0.00	4.56	0.68	nd	nd	nd	
GNS014	HA-555	38.7	63.49	14.98	21.53	0.00	4.24	0.38	nd	nd	nd	
GNS015	HA-557	36.3	69.43	19.57	11.00	0.00	3.55	0.50	nd	nd	nd	
GNS016	HA-559	41.9	68.76	14.21	16.36	0.66	4.84	0.55	nd	nd	nd	
GNS017	HA-560	43.9	69.49	13.54	16.97	0.00	5.13	0.53	nd	nd	nd	
GNS018	HA-561	38.1	67.94	17.73	14.33	0.00	3.83	0.48	nd	nd	nd	
GNS019	HA-564	36.3	54.06	23.48	21.71	0.74	2.30	0.51	nd	nd	nd	
GNS020	HA-565	28.6	48.17	33.62	15.40	2.81	1.43	0.37	nd	nd	nd	
GNS021	HA-566	30.3	51.88	19.25	26.50	2.37	2.70	0.57	nd	nd	nd	
GNS022	HA-567	44.6	63.67	21.04	15.29	0.00	3.03	0.43	nd	nd	nd	
GNS023	HA-569	47.0	68.84	15.30	15.86	0.00	4.50	0.64	nd	nd	nd	
GNS024	HA-584	37.1	48.58	25.50	24.64	1.27	1.91	0.28	nd	nd	nd	
GNS025	HA-607B	29.7	58.35	29.80	11.84	0.00	1.96	0.14	-29.24	-28.00	0.167	
GNS026	ABS 5900'	-	12.2	8.2	30.0	49.6	1.49	0.48	nd	nd	-28.47***	
GNS027	ABS 7670'	-	10.3	13.1	22.1	54.5	0.79	0.20	nd	nd	-28.33***	
GNS028	ABS 7760'	-	7.1	14.6	22.9	55.4	0.49	nd	nd	nd	-29.42***	
GNS029	HA-612	20.7	59.6	22.8	9.0	8.6	2.62	0.16	nd	nd	nd	
GNS030	AKC 2013.6	-	55.3	24.9	14.6	5.2	2.22	0.68	nd	nd	nd	
GNS031	AKC 2014.6	-	54.8	29.8	11.0	4.4	1.84	0.38	nd	nd	nd	
GNS032	AKC 2015.6	-	57.4	22.2	16.0	4.4	2.59	0.50	nd	nd	nd	
GNS033	AKC 2016.3	-	55.8	20.9	17.8	5.5	2.67	0.47	nd	nd	nd	
GNS034	AKC 2017.6	-	59.4	22.4	13.1	5.1	2.65	0.44	nd	nd	nd	
GNS035	AKC 2018.6	-	58.3	22.1	17.1	2.6	2.64	0.54	nd	nd	nd	
GNS036	AKC 2019.1	-	58.2	23.1	14.8	4.0	2.52	0.26	nd	nd	nd	

*Paraffin/Naphthene =[normal/(branched +cyclic)]

**Canonical Variable =[(-2.53*Sat)+(2.22*Aro)]-11.65; Sofer, 1984.

*** Isotopic composition of the whole bitumen.

Table 2. Aromatic Biomarker Parameters: North Sea Crude Oils and Extracts.

GeoMark ID	Field	Depth	Flux Sample #	MPII	TAS	DBT/C4N
GNS006			HA-020	0.84	0.19	0.09
GNS007			HA-024	0.67	0.30	0.02
GNS008			HA-025	0.60	0.18	0.09
GNS009			HA-234	0.57	0.11	0.42
GNS010			HA-551	0.94	0.65	0.26
GNS011			HA-552	0.66	0.53	0.18
GNS012			HA-553	0.59	0.12	0.95
GNS012R			HA-553R	0.60	0.12	1.02
GNS013			HA-554	1.32	0.86	0.02
GNS014			HA-555	1.42	0.89	0.01
GNS015			HA-557	0.94	0.89	0.05
GNS016			HA-559	1.35	1.00	0.04
GNS017			HA-560	1.20	0.76	0.09
GNS018			HA-561	0.98	0.96	0.52
GNS019			HA-564	0.71	0.75	0.21
GNS020			HA-565	0.64	0.45	0.60
GNS021			HA-566	0.71	0.59	0.33
GNS022			HA-567	0.86	0.92	0.01
GNS023			HA-569	0.72	0.17	0.12
GNS024			HA-584	0.74	0.74	0.41
GNS025			HA-607B	0.70	0.31	0.51
GNS026			ABS 5900'	0.40	0.15	0.48
GNS027			ABS 7670'	0.49	0.06	1.86
GNS028			ABS 7760'	0.42	0.06	3.23
GNS029			HA-612	0.72	0.32	0.44

MPII = $1.5 \cdot (3+2) / (PH+9+1)$; note: not corrected to FID, based on ion chromatograms m/z 178 and 192.

TAS = $(C20+C21) / (C20-C28)$; Triaromatic Steranes.

DBT/C4N = dibenzothiophene/C4 naphthalene.

Table 3
Sterane and Terpane Peak Identifications

Peak	Formula	MW	Sterane ID*
S1	C27H48	372	13 β , 17 α diacholestane (20S)
S2	C27H48	372	13 β , 17 α diacholestane (20R)
S3	C27H48	372	5 α cholestane (20S) +
			5 β cholestane (20R)
S4	C27H48	372	5 α , 14 β , 17 β cholestane (20R) +
	C29H52	400	13 β , 17 α diastigmastane (20S)
S5 + S5B**	C27H48	372	5 α , 14 β , 17 β cholestane (20S)
S6	C27H48	372	5 α cholestane (20R)
S7	C29H52	400	diastigmastane
S8	C28H50	386	5 α ergostane (20S)
S9	C28H50	386	5 α , 14 β , 17 β ergostane (20R) +
			5 β ergostane (20R)
S10 + S10B	C28H50	386	5 α , 14 β , 17 β ergostane (20S)
S11	C28H50	386	5 α ergostane (20R)
S12	C29H52	400	5 α stigmastane (20S)
S13	C29H52	400	5 α , 14 β , 17 β stigmastane (20R)
S14 + S14B	C29H52	400	5 α , 14 β , 17 β stigmastane (20S) +
			5 β stigmastane (20R)
S15	C29H52	400	5 α stigmastane (20R)

*assumes 8 β ,9 α ,14 α ,17 α unless otherwise stated. dia=rearranged

**based on the 217 and 218 m/z mass chromatograms, respectively

Peak	Formula	MW	Terpane ID
C19	C19H34	262	tricyclic diterpane
C20	C20H36	276	tricyclic diterpane
C21	C21H38	290	tricyclic diterpane
C22	C22H40	304	tricyclic terpane
C23	C23H42	318	tricyclic terpane
C24	C24H44	332	tricyclic terpane
C25	C25H46	346	tricyclic terpane
TET	C24H42	330	tetracyclic terpane
C26	C26H48	360	tricyclic terpane
C28	C28H52	388	extended tricyclic terpane
C29	C29H54	402	extended tricyclic terpane
C30	C30H56	416	extended tricyclic terpane
Ts	C27H46	370	18 α , 21 β -22,29,30-trisnorhopane
C27T	C27H46	370	17 α ,18 α ,21 β -25,28,30-trisnorhopane
Tm	C27H46	370	17 α , 21 β -22,29,30-trisnorhopane
C28H	C28H48	384	17 α , 18 α , 21 β -28,30-bisnorhopane
C29H	C29H50	398	17 α , 21 β -30-norhopane
C29D	C29H50	398	18 α , 17 α methyl-28,30-dinorhopane
C30X	C30H52	412	17 α , 15 α -methyl-27-norhopane (diahopane)
C29M	C29H50	398	17 β , 21 α -30-normortane
OL	C30H52	412	oleanane
C30H	C30H52	412	17 α , 21 β hopane
C30M	C30H52	412	17 β , 21 α moretane
C31H	C31H54	426	17 α , 21 β -30-homohopane (22S + 22R)
GA	C30H52	412	gammacerane
C32H	C32H56	440	17 α , 21 β -bishomohopane (22S + 22R)
C33H	C33H58	454	17 α , 21 β -trishomohopane (22S + 22R)
C34H	C34H60	468	17 α , 21 β extended hopane (22S + 22R)
C35H	C35H62	482	17 α , 21 β extended hopane (22S + 22R)

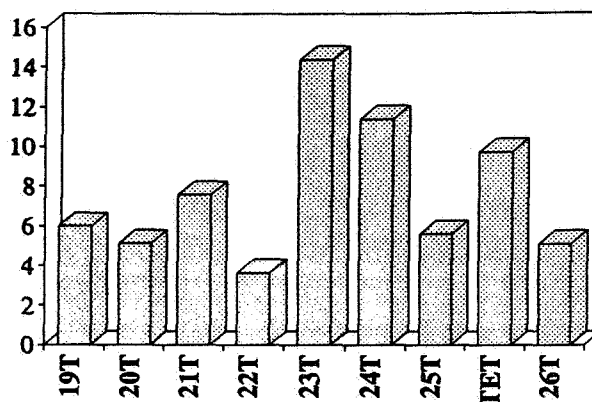
APPENDIX A

C15+ Saturate Biomarker Information, Mass Fragmentograms, and Peak Areas

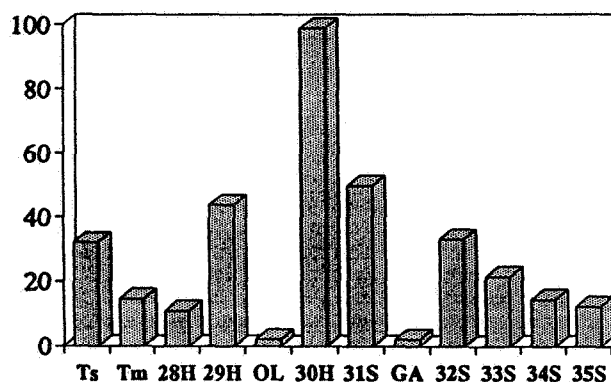
Biomarker Quantitation Report

Data File: 2901001.D
 Date File Acquired: 12 Jun 94 5:02 pm
 Acquisition Method: FAN80393.M
 Sample Name: GNS029
 Miscellaneous Info: 6.34 mg branched/cyclic hydrocarbon fraction

Peak#	m/z	Cpd.	RTmin.	Amount (ppm)	
				area	height
Tricyclic Terpanes					
1	191	C19T	23.68	9	6
2	191	C20T	27.01	7	5
3	191	C21T	30.61	9	8
4	191	C22T	34.03	3	4
5	191	C23T	38.05	14	14
6	191	C24T	40.22	12	11
7	191	C25S	44.64	3	5
8	191	C25R	44.76	5	6
9	191	TET	47.54	10	10
10	191	C26S	47.92	4	5
11	191	C26R	48.18	3	5
TRICYCLICS				78	79



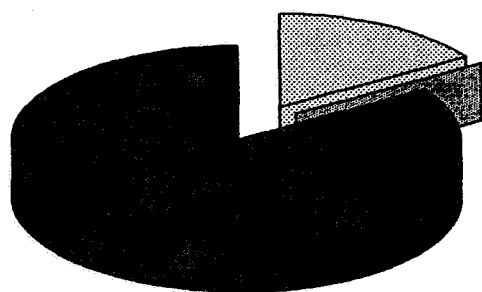
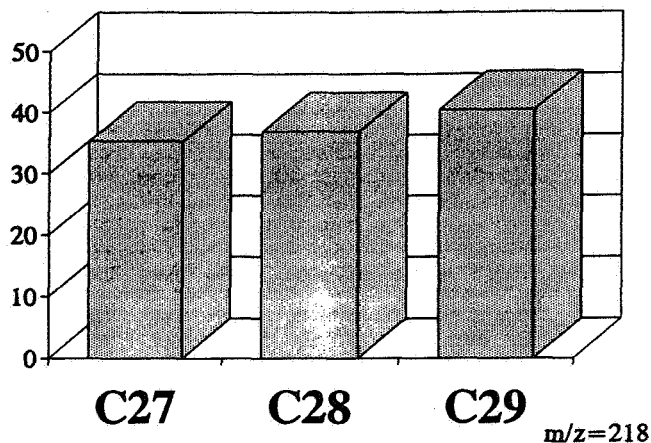
Pentacyclic Terpanes					
21	191	Ts	59.31	29	32
22	177	C27T	60.27	1	1
24	191	Tm	60.62	14	14
29	177	C28DM	61.59	2	3
34	191	C28H	63.78	12	11
37	177	C29DM	64.39	0	1
40	191	C29H	65.18	41	44
41	191	C29D	65.39	#REF!	#REF!
42	191	C30X	65.92	26	26
43	191	OL	67.57	2	2
44	191	C30H	67.92	100	99
45	191	C30M	69.15	7	10
46	191	C31S	71.09	48	50
47	191	C31R	71.48	33	31
48	191	GA	71.88	3	2
49	191	C32S	73.59	33	33
50	191	C32R	74.11	19	22
51	191	C33S	76.45	20	21
52	191	C33R	77.19	12	16
53	191	C34S	79.43	12	14
54	191	C34R	80.31	7	9
55	191	C35S	82.37	10	12
56	191	C35R	83.42	5	7
PENTACYCLICS				#REF!	#REF!



Biomarker Quantitation Report (cont.)

GNS029

Peak#	m/z	Cpd.	RTmin.	Amount	(ppm)
		<i>Steranes</i>		area	height
12	217	S1	51.55	74	76
13	217	S2	52.82	51	49
14	217	S3	57.06	7	6
15	217	S4	57.46	77	65
16	218	S4B	57.45	53	51
17	217	S5	57.76	24	25
18	218	S5B	57.76	35	35
19	217	S6	58.52	19	19
20	217	S7	58.94	59	37
23	217	S8	60.48	5	6
25	217	S9	60.92	19	18
26	218	S9B	60.92	30	28
27	217	S10	61.20	29	28
28	218	S10B	61.22	38	37
30	217	S11	62.13	13	9
31	217	S12	63.13	20	14
32	217	S13	63.76	33	27
33	218	S13B	63.76	41	41
35	217	S14	63.99	13	20
36	218	S14B	63.99	43	40
38	221	ISTD	65.04	16	16
39	217	S15	65.15	25	18
STERANES				468	417



TRICYCLICS PENTACYCLICS STERANES

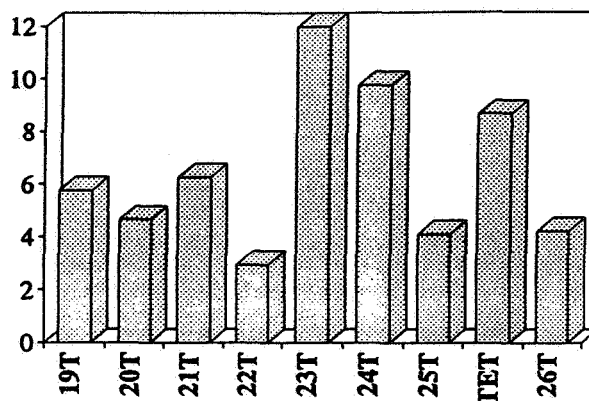
Key Ratios

	area	ht.		area	ht.
C19/C23	0.61	0.42	Ts/Tm	2.13	2.21
C21/C23	0.66	0.53	29D/29	#REF!	#REF!
C22/C23	0.17	0.25	C27T/27	0.03	0.03
C24/C23	0.80	0.79	DM/H	0.00	0.01
C26/C25	0.80	0.91	C27/H	0.43	0.47
Tet/C23	0.69	0.67	C28/H	0.12	0.11
			X/H	0.26	0.26
S1/S6	3.99	4.04	C29/H	#REF!	#REF!
%C27	30	31	M/H	0.07	0.10
%C28	33	33	OL/H	0.02	0.02
%C29	37	36	GA/H	0.03	0.02
20S/20R	0.79	0.78	C31/H	0.48	0.50
S/T	#REF!	#REF!	C35/C34	0.84	0.85
			C23/H	0.14	0.15

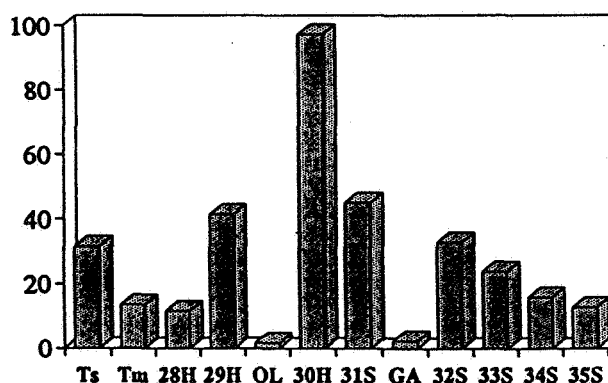
Biomarker Quantitation Report

Data File: 3001002.D
 Date File Acquired: 12 Jun 94 6:41 pm
 Acquisition Method: FAN80393.M
 Sample Name: GNS030
 Miscellaneous Info: 6.50 mg branched/cyclic hydrocarbon fraction

Peak#	m/z	Cpd.	RTmin.	Amount (ppm)	area	height
<i>Tricyclic Terpanes</i>						
1	191	C19T	23.69	12	6	
2	191	C20T	27.03	10	5	
3	191	C21T	30.64	11	6	
4	191	C22T	34.10	2	3	
5	191	C23T	38.08	12	12	
6	191	C24T	40.25	11	10	
7	191	C25S	44.69	7	4	
8	191	C25R	44.80	4	4	
9	191	TET	47.57	9	9	
10	191	C26S	47.95	4	4	
11	191	C26R	48.22	5	4	
TRICYCLICS				85	67	



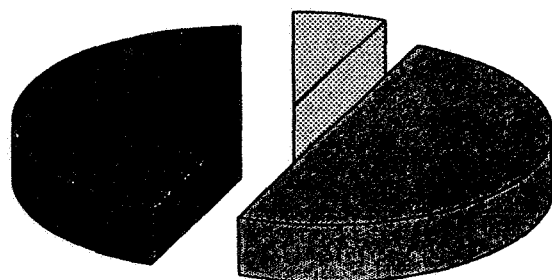
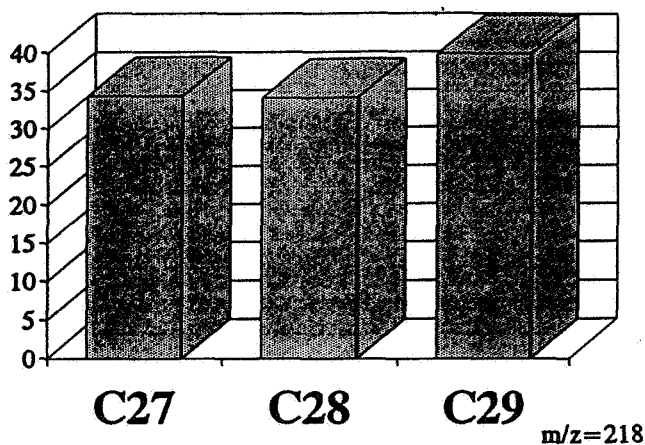
<i>Pentacyclic Terpanes</i>						
21	191	Ts	59.34	36	32	
22	177	C27T	60.02	1	1	
24	191	Tm	60.67	15	13	
29	177	C28DM	61.48	1	1	
34	191	C28H	63.83	16	11	
37	177	C29DM	64.48	0	1	
40	191	C29H	65.22	45	41	
41	191	C29D	65.43	30	29	
42	191	C30X	65.95	29	25	
43	191	OL	67.57	2	2	
44	191	C30H	67.95	114	97	
45	191	C30M	69.20	11	10	
46	191	C31S	71.14	54	45	
47	191	C31R	71.51	35	31	
48	191	GA	71.86	3	2	
49	191	C32S	73.62	36	33	
50	191	C32R	74.15	24	22	
51	191	C33S	76.48	28	24	
52	191	C33R	77.22	18	16	
53	191	C34S	79.47	20	16	
54	191	C34R	80.36	12	10	
55	191	C35S	82.40	14	13	
56	191	C35R	83.45	8	9	
PENTACYCLICS				553	484	



Biomarker Quantitation Report (cont.)

GNS030

Peak#	m/z	Cpd.	RTmin.	Amount	(ppm)
				area	height
<i>Steranes</i>					
12	217	S1	51.59	81	72
13	217	S2	52.85	54	44
14	217	S3	57.08	15	15
15	217	S4	57.50	81	65
16	218	S4B	57.48	60	50
17	217	S5	57.80	32	26
18	218	S5B	57.80	39	34
19	217	S6	58.55	17	18
20	217	S7	58.97	68	36
23	217	S8	60.53	6	6
25	217	S9	60.95	18	17
26	218	S9B	60.95	35	27
27	217	S10	61.25	35	28
28	218	S10B	61.25	40	34
30	217	S11	62.20	18	8
31	217	S12	63.16	39	18
32	217	S13	63.79	30	26
33	218	S13B	63.79	46	40
35	217	S14	64.02	33	26
36	218	S14B	64.02	49	40
38	221	ISTD	65.08	15	15
39	217	S15	65.18	25	18
STERANES				553	422



TRICYCLICS
 PENTACYCLICS
 STERANES

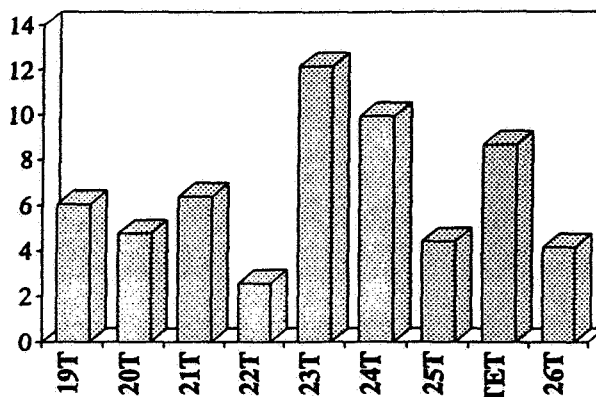
Key Ratios

	area	ht.		area	ht.
C19/C23	1.02	0.48	Ts/Tm	2.43	2.36
C21/C23	0.95	0.52	29D/29	0.67	0.71
C22/C23	0.21	0.24	C27T/27	0.02	0.02
C24/C23	0.98	0.81	DM/H	0.00	0.01
C26/C25	0.89	1.03	C27/H	0.44	0.46
Tet/C23	0.76	0.72	C28/H	0.14	0.12
			X/H	0.26	0.25
S1/S6	4.71	4.06	C29/H	0.66	0.73
%C27	31	32	M/H	0.09	0.10
%C28	31	32	OL/H	0.02	0.02
%C29	38	37	GA/H	0.03	0.02
20S/20R	1.58	1.03	C31/H	0.47	0.46
S/T	1.00	0.87	C35/C34	0.69	0.80
			C23/H	0.1	0.12

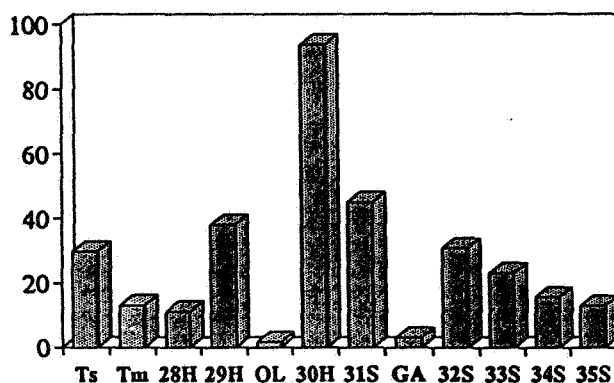
Biomarker Quantitation Report

Data File: 3101003.D
 Date File Acquired: 12 Jun 94 8:20 pm
 Acquisition Method: FAN80393.M
 Sample Name: GNS031
 Miscellaneous Info: 5.38 mg branched/cyclic hydrocarbon fraction

Peak#	m/z	Cpd.	RTmin.	Amount (ppm)	
				area	height
Tricyclic Terpanes					
1	191	C19T	23.71	8	6
2	191	C20T	27.01	7	5
3	191	C21T	30.62	8	6
4	191	C22T	34.08	3	3
5	191	C23T	38.08	12	12
6	191	C24T	40.25	9	10
7	191	C25S	44.67	4	5
8	191	C25R	44.78	4	4
9	191	TET	47.57	7	9
10	191	C26S	47.94	4	4
11	191	C26R	48.22	4	4
TRICYCLICS				71	68



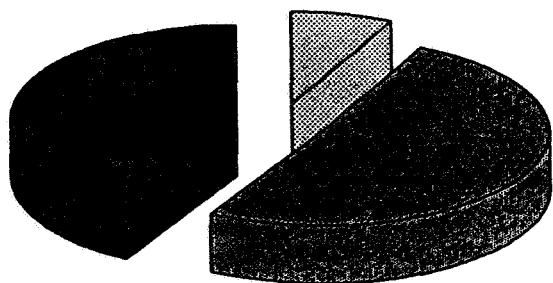
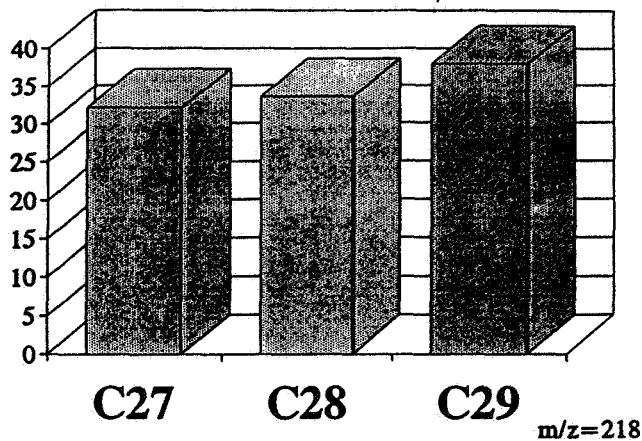
Pentacyclic Terpanes					
21	191	Ts	59.34	27	30
22	177	C27T	59.71	4	3
24	191	Tm	60.67	11	13
29	177	C28DM	61.32	3	2
34	191	C28H	63.81	13	11
37	177	C29DM	64.43	0	1
40	191	C29H	65.22	35	38
41	191	C29D	65.43	25	27
42	191	C30X	65.95	26	24
43	191	OL	67.62	1	2
44	191	C30H	67.95	87	94
45	191	C30M	69.20	6	9
46	191	C31S	71.13	44	45
47	191	C31R	71.51	31	29
48	191	GA	71.88	4	3
49	191	C32S	73.62	28	31
50	191	C32R	74.15	19	22
51	191	C33S	76.48	23	23
52	191	C33R	77.22	14	16
53	191	C34S	79.47	15	16
54	191	C34R	80.36	8	10
55	191	C35S	82.40	12	13
56	191	C35R	83.45	8	9
PENTACYCLICS				445	470



Biomarker Quantitation Report (cont.)

GNS031

Peak#	m/z	Cpd.	RTmin.	Amount	(ppm)
		<i>Steranes</i>		area	height
12	217	S1	51.59	64	68
13	217	S2	52.85	44	45
14	217	S3	57.11	4	5
15	217	S4	57.50	68	58
16	218	S4B	57.48	46	47
17	217	S5	57.80	25	24
18	218	S5B	57.80	32	32
19	217	S6	58.55	13	17
20	217	S7	58.95	65	34
23	217	S8	60.53	4	5
25	217	S9	60.95	17	17
26	218	S9B	60.95	28	27
27	217	S10	61.25	29	25
28	218	S10B	61.25	35	34
30	217	S11	62.23	10	8
31	217	S12	63.16	25	16
32	217	S13	63.79	20	24
33	218	S13B	63.79	35	37
35	217	S14	64.02	30	24
36	218	S14B	64.02	40	38
38	221	ISTD	65.08	19	19
39	217	S15	65.18	21	17
STERANES				438	386



TRICYCLICS PENTACYCLICS STERANES

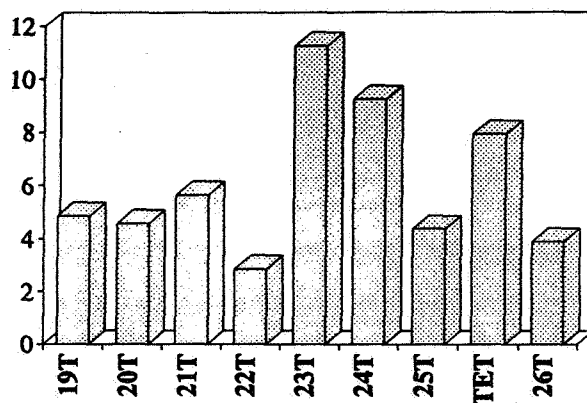
Key Ratios

	area	ht.		area	ht.
C19/C23	0.64	0.50	Ts/Tm	2.53	2.27
C21/C23	0.63	0.53	29D/29	0.72	0.72
C22/C23	0.27	0.21	C27T/27	0.12	0.06
C24/C23	0.74	0.82	DM/H	0.00	0.01
C26/C25	1.07	0.94	C27/H	0.43	0.46
Tet/C23	0.55	0.71	C28/H	0.15	0.12
			X/H	0.29	0.26
S1/S6	4.81	4.04	C29/H	0.69	0.70
%C27	30	31	M/H	0.07	0.10
%C28	32	32	OL/H	0.01	0.02
%C29	38	37	GA/H	0.04	0.03
20S/20R	1.22	0.91	C31/H	0.51	0.48
S/T	0.99	0.82	C35/C34	0.80	0.82
			C23/H	0.14	0.13

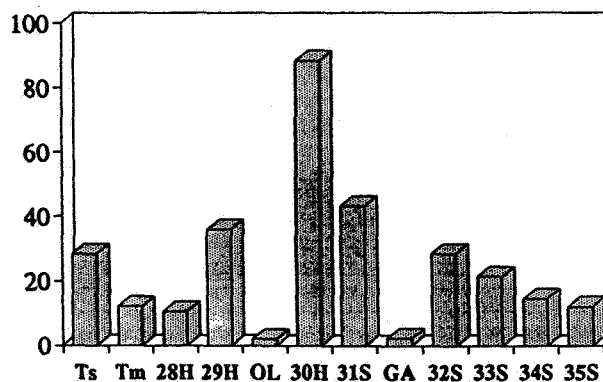
Biomarker Quantitation Report

Data File: 3201004.D
 Date File Acquired: 12 Jun 94 9:59 pm
 Acquisition Method: FAN80393.M
 Sample Name: GNS032
 Miscellaneous Info: 6.88 mg branched/cyclic hydrocarbon fraction

Peak#	m/z	Cpd.	RTmin.	Amount (ppm)	area	height
<i>Tricyclic Terpanes</i>						
1	191	C19T	23.73	8	5	
2	191	C20T	27.03	9	5	
3	191	C21T	30.66	8	6	
4	191	C22T	34.08	4	3	
5	191	C23T	38.10	13	11	
6	191	C24T	40.27	9	9	
7	191	C25S	44.71	4	5	
8	191	C25R	44.82	2	4	
9	191	TET	47.59	7	8	
10	191	C26S	47.97	2	4	
11	191	C26R	48.24	2	4	
				TRICYCLICS	69	63



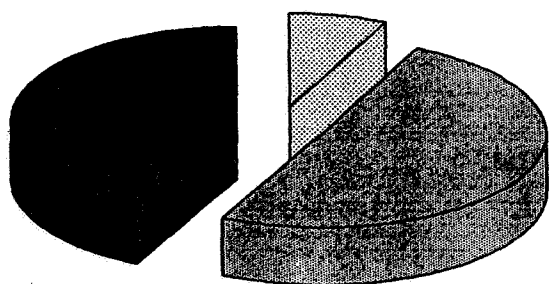
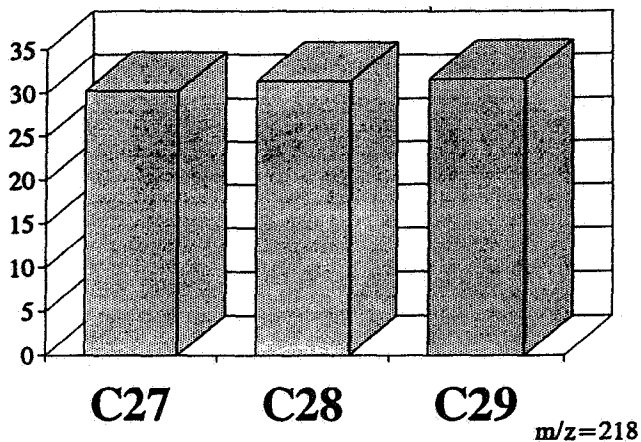
<i>Pentacyclic Terpanes</i>						
21	191	Ts	59.36	28	28	
22	177	C27T	59.76	2	2	
24	191	Tm	60.69	13	12	
29	177	C28DM	61.64	4	2	
34	191	C28H	63.85	13	10	
37	177	C29DM	64.58	0	0	
40	191	C29H	65.23	39	36	
41	191	C29D	65.44	28	26	
42	191	C30X	65.99	24	23	
43	191	OL	67.58	2	2	
44	191	C30H	67.97	95	88	
45	191	C30M	69.22	6	8	
46	191	C31S	71.14	45	43	
47	191	C31R	71.55	28	26	
48	191	GA	71.88	1	2	
49	191	C32S	73.62	30	28	
50	191	C32R	74.16	22	19	
51	191	C33S	76.50	24	21	
52	191	C33R	77.24	15	16	
53	191	C34S	79.48	17	14	
54	191	C34R	80.38	8	9	
55	191	C35S	82.42	11	12	
56	191	C35R	83.47	7	8	
				PENTACYCLICS	464	438



Biomarker Quantitation Report (cont.)

GNS032

Peak#	m/z	Cpd.	RTmin.	Amount	(ppm)
		<i>Steranes</i>		area	height
12	217	S1	51.60	68	65
13	217	S2	52.87	48	42
14	217	S3	57.01	6	6
15	217	S4	57.52	72	59
16	218	S4B	57.52	49	45
17	217	S5	57.81	25	23
18	218	S5B	57.81	31	30
19	217	S6	58.59	18	16
20	217	S7	58.99	61	33
23	217	S8	60.57	2	5
25	217	S9	60.97	17	16
26	218	S9B	60.97	29	26
27	217	S10	61.27	32	26
28	218	S10B	61.27	34	31
30	217	S11	62.22	16	8
31	217	S12	63.18	25	15
32	217	S13	63.81	25	25
33	218	S13B	63.81	38	37
35	217	S14	64.04	17	18
36	218	S14B	64.04	29	32
38	221	ISTD	65.11	15	15
39	217	S15	65.22	23	16
STERANES				454	373



▣ TRICYCLICS ▤ PENTACYCLICS ■ STERANES

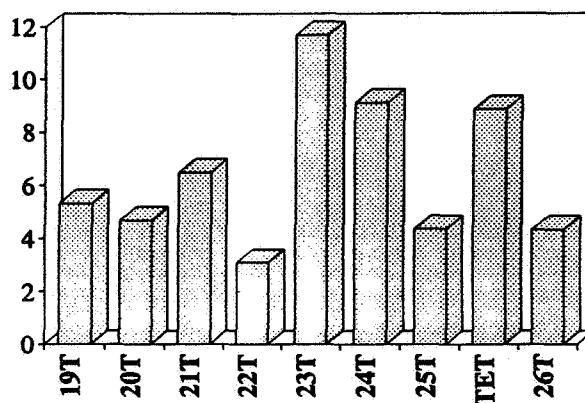
Key Ratios

	area	ht.		area	ht.
C19/C23	0.61	0.43	Ts/Tm	2.12	2.34
C21/C23	0.63	0.50	29D/29	0.71	0.73
C22/C23	0.30	0.25	C27T/27	0.05	0.06
C24/C23	0.66	0.82	DM/H	0.00	0.01
C26/C25	0.69	0.89	C27/H	0.43	0.46
Tet/C23	0.57	0.71	C28/H	0.13	0.12
			X/H	0.25	0.26
S1/S6	3.74	4.10	C29/H	0.71	0.70
%C27	33	32	M/H	0.07	0.09
%C28	37	34	OL/H	0.02	0.02
%C29	30	34	GA/H	0.01	0.03
20S/20R	1.08	0.94	C31/H	0.47	0.49
S/T	0.98	0.85	C35/C34	0.66	0.83
			C23/H	0.14	0.13

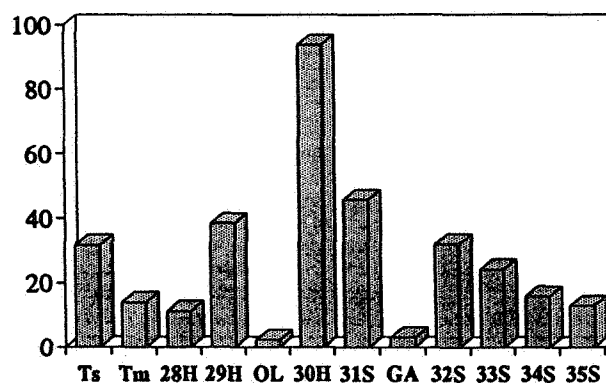
Biomarker Quantitation Report

Data File: 3301005.D
 Date File Acquired: 12 Jun 94 11:38 pm
 Acquisition Method: FAN80393.M
 Sample Name: GNS033
 Miscellaneous Info: 6.64 mg branched/cyclic hydrocarbon fraction

Peak#	m/z	Cpd.	RTmin.	Amount (ppm)	
				area	height
<i>Tricyclic Terpanes</i>					
1	191	C19T	23.71	11	5
2	191	C20T	27.01	8	5
3	191	C21T	30.66	10	6
4	191	C22T	34.08	4	3
5	191	C23T	38.10	10	12
6	191	C24T	40.27	8	9
7	191	C25S	44.69	5	5
8	191	C25R	44.81	5	4
9	191	TET	47.59	8	9
10	191	C26S	47.97	3	4
11	191	C26R	48.24	4	4
TRICYCLICS				75	67



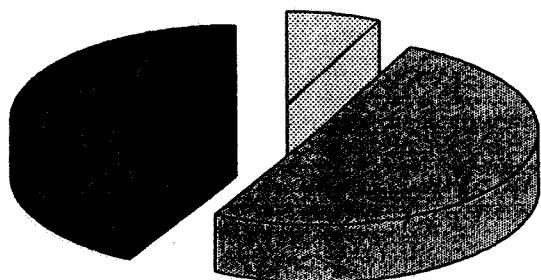
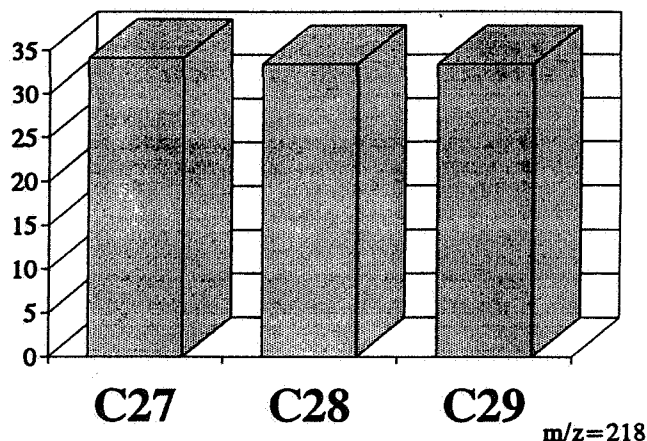
<i>Pentacyclic Terpanes</i>					
21	191	Ts	59.36	29	32
22	177	C27T	60.01	1	1
24	191	Tm	60.69	11	14
29	177	C28DM	61.62	2	2
34	191	C28H	63.85	13	11
37	177	C29DM	64.46	0	1
40	191	C29H	65.23	35	39
41	191	C29D	65.44	25	29
42	191	C30X	65.99	25	25
43	191	OL	67.41	1	2
44	191	C30H	67.97	93	94
45	191	C30M	69.22	8	9
46	191	C31S	71.14	44	46
47	191	C31R	71.53	30	29
48	191	GA	71.88	2	3
49	191	C32S	73.64	31	32
50	191	C32R	74.16	22	21
51	191	C33S	76.50	25	24
52	191	C33R	77.24	13	16
53	191	C34S	79.48	16	16
54	191	C34R	80.36	9	9
55	191	C35S	82.42	12	13
56	191	C35R	83.47	9	9
PENTACYCLICS				458	476



Biomarker Quantitation Report (cont.)

GNS033

Peak#	m/z	Cpd.	RTmin.	Amount	(ppm)
		<i>Steranes</i>		area	height
12	217	S1	51.60	65	71
13	217	S2	52.87	46	44
14	217	S3	57.13	4	6
15	217	S4	57.52	69	59
16	218	S4B	57.50	47	47
17	217	S5	57.81	28	25
18	218	S5B	57.81	32	34
19	217	S6	58.57	14	17
20	217	S7	58.97	57	34
23	217	S8	60.55	1	6
25	217	S9	60.97	15	17
26	218	S9B	60.97	28	27
27	217	S10	61.27	32	27
28	218	S10B	61.27	35	33
30	217	S11	62.20	14	8
31	217	S12	63.20	37	18
32	217	S13	63.81	26	25
33	218	S13B	63.81	36	39
35	217	S14	64.04	16	19
36	218	S14B	64.04	28	33
38	221	ISTD	65.09	15	15
39	217	S15	65.20	20	18
STERANES				446	392



■ TRICYCLICS ■ PENTACYCLICS ■ STERANES

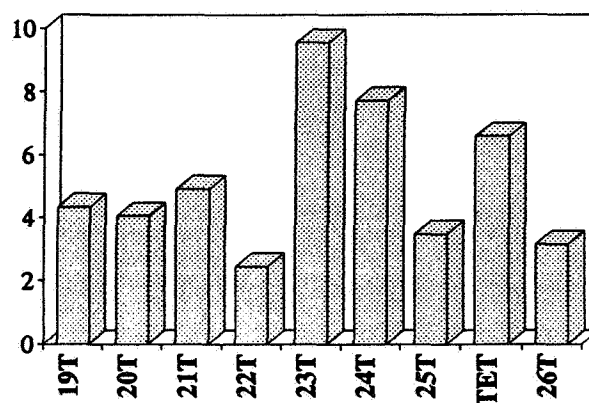
Key Ratios

	area	ht.		area	ht.
C19/C23	1.09	0.46	Ts/Tm	2.59	2.27
C21/C23	1.03	0.55	29D/29	0.71	0.74
C22/C23	0.39	0.26	C27T/27	0.02	0.03
C24/C23	0.84	0.78	DM/H	0.00	0.01
C26/C25	0.70	1.00	C27/H	0.44	0.49
Tet/C23	0.85	0.76	C28/H	0.14	0.12
			X/H	0.27	0.27
S1/S6	4.54	4.18	C29/H	0.65	0.72
%C27	34	34	M/H	0.08	0.09
%C28	37	33	OL/H	0.02	0.02
%C29	30	33	GA/H	0.02	0.03
20S/20R	1.86	1.00	C31/H	0.48	0.49
S/T	0.97	0.82	C35/C34	0.74	0.81
			C23/H	0.1	0.12

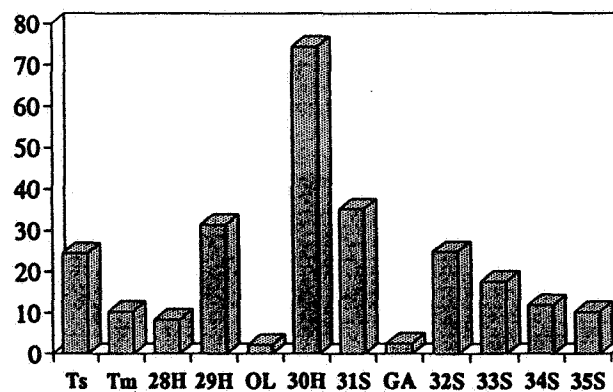
Biomarker Quantitation Report

Data File: 3401006.D
 Date File Acquired: 13 Jun 94 1:17 am
 Acquisition Method: FAN80393.M
 Sample Name: GNS034
 Miscellaneous Info: 7.30 mg branched/cyclic hydrocarbon fraction

Peak#	m/z	Cpd.	RTmin.	Amount (ppm)
				area height
<i>Tricyclic Terpanes</i>				
1	191	C19T	23.68	7 4
2	191	C20T	26.99	6 4
3	191	C21T	30.62	6 5
4	191	C22T	34.06	2 2
5	191	C23T	38.06	8 10
6	191	C24T	40.25	7 8
7	191	C25S	44.69	3 4
8	191	C25R	44.78	2 3
9	191	TET	47.57	5 7
10	191	C26S	47.96	2 3
11	191	C26R	48.22	4 3
TRICYCLICS				53 53



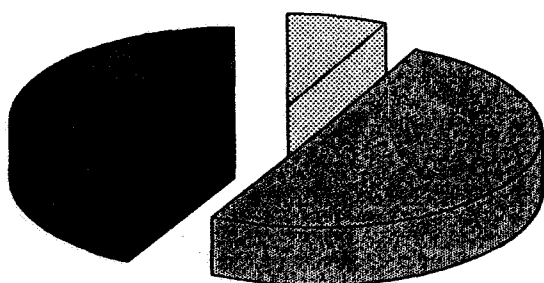
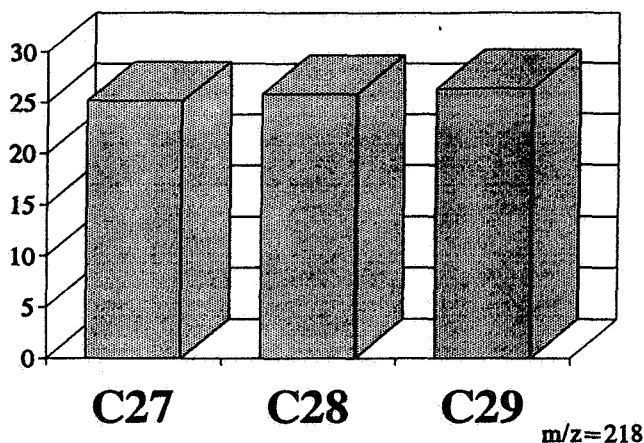
<i>Pentacyclic Terpanes</i>				
21	191	Ts	59.34	22 24
22	177	C27T	59.71	2 2
24	191	Tm	60.67	10 10
29	177	C28DM	61.32	2 2
34	191	C28H	63.81	10 8
37	177	C29DM	64.44	0 1
40	191	C29H	65.22	28 31
41	191	C29D	65.43	20 21
42	191	C30X	65.97	18 19
43	191	OL	67.39	1 2
44	191	C30H	67.95	71 75
45	191	C30M	69.20	5 7
46	191	C31S	71.13	33 35
47	191	C31R	71.51	23 23
48	191	GA	71.86	2 3
49	191	C32S	73.62	22 25
50	191	C32R	74.15	17 16
51	191	C33S	76.50	19 17
52	191	C33R	77.22	10 13
53	191	C34S	79.47	13 12
54	191	C34R	80.36	9 8
55	191	C35S	82.40	9 10
56	191	C35R	83.47	6 7
PENTACYCLICS				352 371



Biomarker Quantitation Report (cont.)

GNS034

Peak#	m/z	Cpd.	RTmin.	Amount	(ppm)
		<i>Steranes</i>		area	height
12	217	S1	51.59	50	53
13	217	S2	52.85	34	34
14	217	S3	57.09	10	4
15	217	S4	57.50	55	46
16	218	S4B	57.48	37	38
17	217	S5	57.80	20	19
18	218	S5B	57.80	25	25
19	217	S6	58.55	12	14
20	217	S7	58.97	53	26
23	217	S8	60.53	1	5
25	217	S9	60.95	13	12
26	218	S9B	60.95	21	22
27	217	S10	61.23	23	20
28	218	S10B	61.25	26	26
30	217	S11	62.20	8	6
31	217	S12	63.16	18	13
32	217	S13	63.79	30	24
33	218	S13B	63.79	27	29
35	217	S14	64.01	23	18
36	218	S14B	64.02	29	26
38	221	ISTD	65.08	14	14
39	217	S15	65.18	17	14
STERANES				368	307



■ TRICYCLICS ■ PENTACYCLICS ■ STERANES

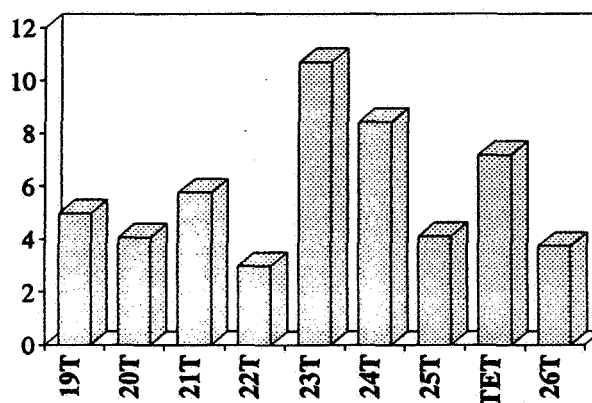
Key Ratios

	area	ht.		area	ht.
C19/C23	0.87	0.45	Ts/Tm	2.11	2.35
C21/C23	0.73	0.51	29D/29	0.71	0.68
C22/C23	0.27	0.26	C27T/27	0.06	0.07
C24/C23	0.92	0.81	DM/H	0.00	0.01
C26/C25	1.23	0.91	C27/H	0.45	0.47
Tet/C23	0.66	0.69	C28/H	0.14	0.11
			X/H	0.25	0.26
S1/S6	4.09	3.89	C29/H	0.67	0.71
%C27	31	33	M/H	0.07	0.09
%C28	32	33	OL/H	0.01	0.03
%C29	37	34	GA/H	0.02	0.03
20S/20R	1.08	0.92	C31/H	0.46	0.47
S/T	1.05	0.83	C35/C34	0.71	0.86
			C23/H	0.11	0.13

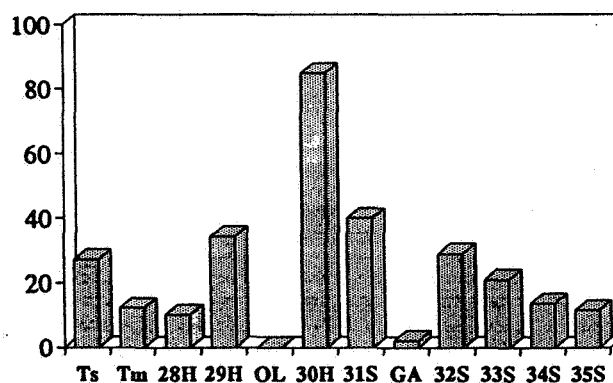
Biomarker Quantitation Report

Data File: 3501007.D
 Date File Acquired: 13 Jun 94 2:56 am
 Acquisition Method: FAN80393.M
 Sample Name: GNS035
 Miscellaneous Info: 7.40 mg branched/cyclic hydrocarbon fraction

Peak#	m/z	Cpd.	RTmin.	Amount (ppm)
				area height
<i>Tricyclic Terpanes</i>				
1	191	C19T	23.71	9 5
2	191	C20T	27.03	7 4
3	191	C21T	30.64	9 6
4	191	C22T	34.08	3 3
5	191	C23T	38.08	12 11
6	191	C24T	40.27	10 8
7	191	C25S	44.69	2 4
8	191	C25R	44.80	4 4
9	191	TET	47.57	8 7
10	191	C26S	47.96	2 4
11	191	C26R	48.22	2 4
TRICYCLICS				70 60



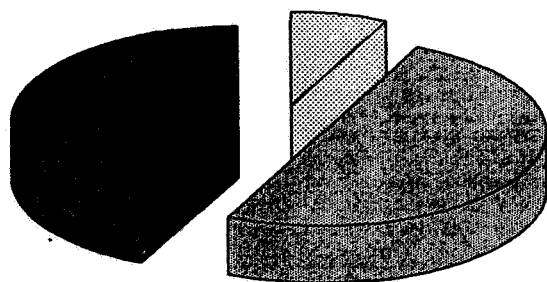
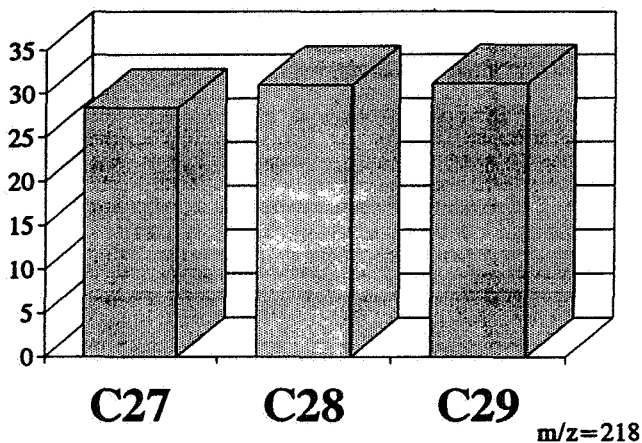
<i>Pentacyclic Terpanes</i>				
21	191	Ts	59.34	29 27
22	177	C27T	59.97	1 1
24	191	Tm	60.67	11 12
29	177	C28DM	61.62	2 2
34	191	C28H	63.83	13 10
37	177	C29DM	64.46	0 0
40	191	C29H	65.22	37 34
41	191	C29D	65.43	28 25
42	191	C30X	65.97	24 23
43	191	OL	0.00	0 0
44	191	C30H	67.97	95 85
45	191	C30M	69.20	9 8
46	191	C31S	71.13	46 40
47	191	C31R	71.53	30 26
48	191	GA	71.88	3 2
49	191	C32S	73.62	29 29
50	191	C32R	74.16	23 20
51	191	C33S	76.50	24 21
52	191	C33R	77.22	13 14
53	191	C34S	79.47	16 14
54	191	C34R	80.36	9 9
55	191	C35S	82.42	11 11
56	191	C35R	83.47	7 8
PENTACYCLICS				461 422



Biomarker Quantitation Report (cont.)

GNS035

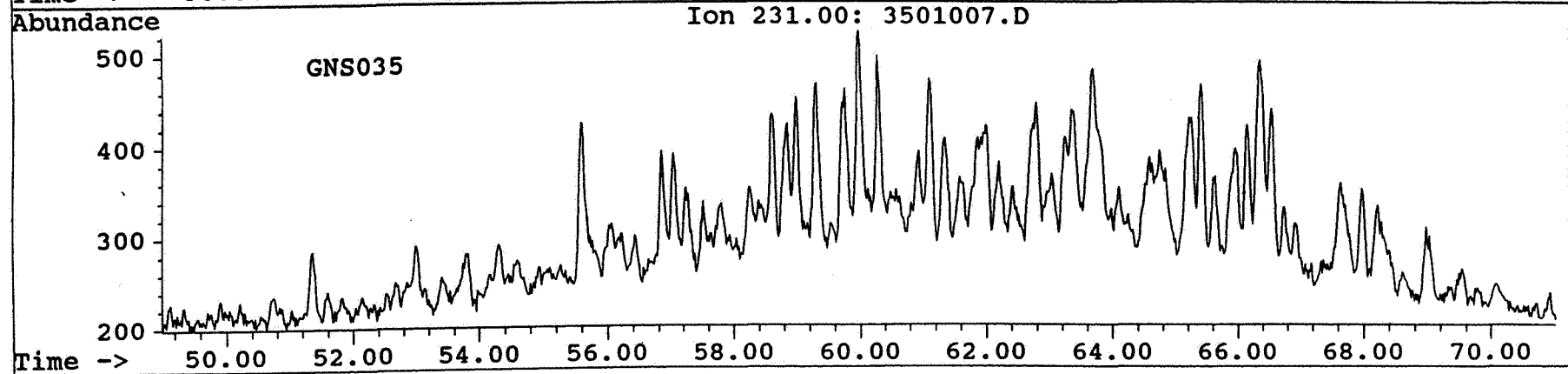
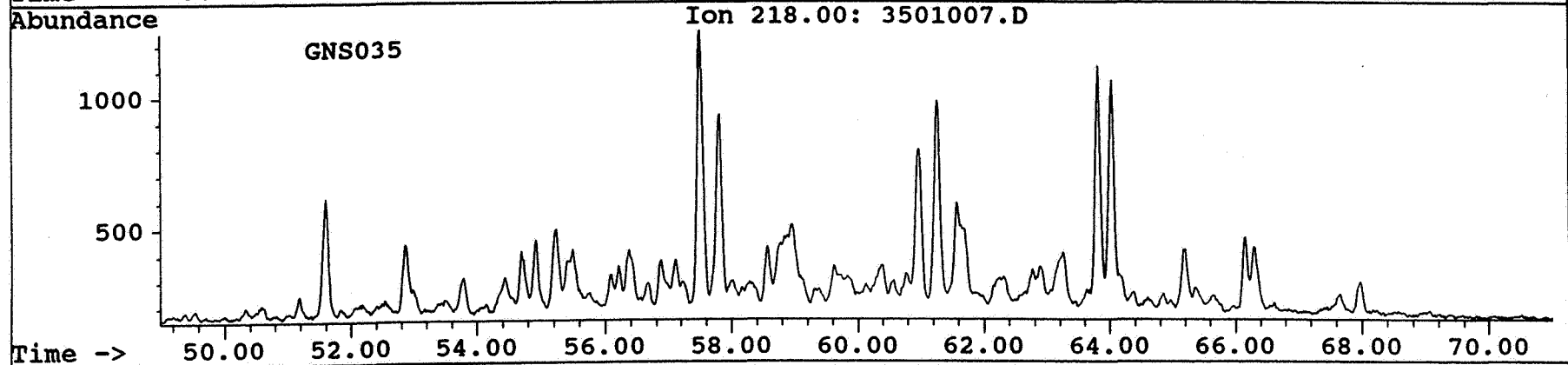
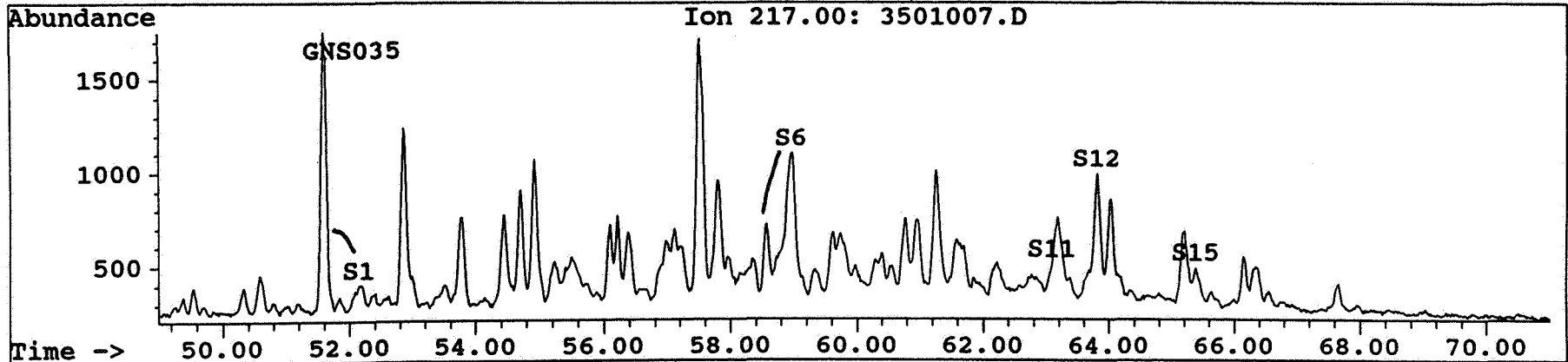
Peak#	m/z	Cpd.	RTmin.	Amount	(ppm)
		<i>Steranes</i>		area	height
12	217	S1	51.59	66	61
13	217	S2	52.85	44	39
14	217	S3	57.08	13	14
15	217	S4	57.52	70	56
16	218	S4B	57.50	50	43
17	217	S5	57.80	28	21
18	218	S5B	57.81	31	28
19	217	S6	58.57	14	15
20	217	S7	58.97	62	31
23	217	S8	60.52	4	4
25	217	S9	60.95	16	14
26	218	S9B	60.97	28	23
27	217	S10	61.25	28	25
28	218	S10B	61.25	35	31
30	217	S11	62.22	11	7
31	217	S12	63.18	23	16
32	217	S13	63.81	20	22
33	218	S13B	63.81	39	36
35	217	S14	64.02	30	21
36	218	S14B	64.02	31	31
38	221	ISTD	65.09	14	14
39	217	S15	65.20	24	16
STERANES				453	362



■ TRICYCLICS ■ PENTACYCLICS ■ STERANES

Key Ratios

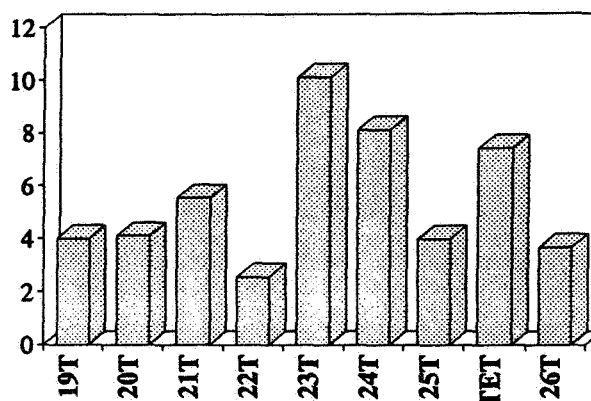
	area	ht.		area	ht.
C19/C23	0.79	0.46	Ts/Tm	2.61	2.22
C21/C23	0.72	0.54	29D/29	0.77	0.72
C22/C23	0.29	0.28	C27T/27	0.01	0.03
C24/C23	0.81	0.79	DM/H	0.00	0.00
C26/C25	0.75	0.91	C27/H	0.43	0.46
Tet/C23	0.71	0.67	C28/H	0.14	0.12
			X/H	0.25	0.27
S1/S6	4.69	4.17	C29/H	0.69	0.70
%C27	32	31	M/H	0.09	0.10
%C28	36	34	OL/H	0.00	0.00
%C29	32	34	GA/H	0.03	0.02
20S/20R	0.97	1.01	C31/H	0.48	0.47
S/T	0.98	0.86	C35/C34	0.69	0.84
			C23/H	0.12	0.13



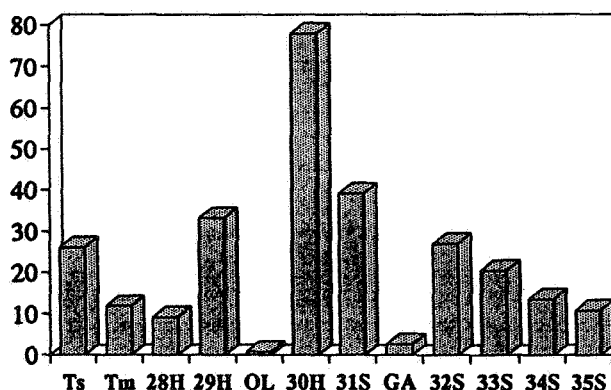
Biomarker Quantitation Report

Data File: 3601008.D
 Date File Acquired: 13 Jun 94 4:35 am
 Acquisition Method: FAN80393.M
 Sample Name: GNS036
 Miscellaneous Info: 6.18 mg branched/cyclic hydrocarbon fraction

Peak#	m/z	Cpd.	RTmin.	Amount (ppm)	
				area	height
Tricyclic Terpanes					
1	191	C19T	23.71	9	4
2	191	C20T	27.05	8	4
3	191	C21T	30.62	9	6
4	191	C22T	34.06	4	3
5	191	C23T	38.08	10	10
6	191	C24T	40.27	9	8
7	191	C25S	44.69	3	4
8	191	C25R	44.81	3	4
9	191	TET	47.59	8	7
10	191	C26S	47.94	3	3
11	191	C26R	48.22	4	4
TRICYCLICS				69	57



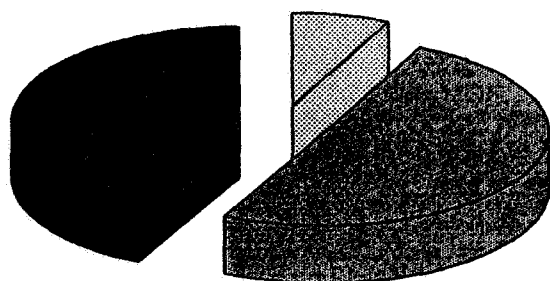
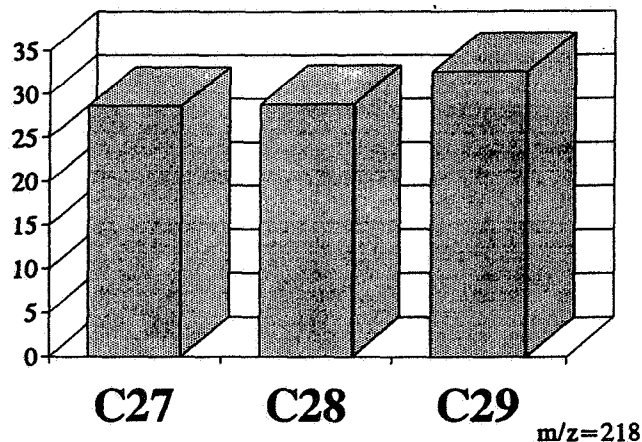
Pentacyclic Terpanes					
21	191	Ts	59.36	29	26
22	177	C27T	59.74	5	3
24	191	Tm	60.69	13	12
29	177	C28DM	61.36	3	2
34	191	C28H	63.83	12	9
37	177	C29DM	64.39	0	0
40	191	C29H	65.23	37	33
41	191	C29D	65.44	26	25
42	191	C30X	65.97	23	21
43	191	OL	67.79	0	1
44	191	C30H	67.97	89	78
45	191	C30M	69.20	6	8
46	191	C31S	71.14	43	39
47	191	C31R	71.53	30	25
48	191	GA	71.90	4	3
49	191	C32S	73.62	29	27
50	191	C32R	74.16	21	18
51	191	C33S	76.50	26	20
52	191	C33R	77.24	13	13
53	191	C34S	79.47	15	14
54	191	C34R	80.36	8	9
55	191	C35S	82.42	13	11
56	191	C35R	83.47	7	8
PENTACYCLICS				453	405



Biomarker Quantitation Report (cont.)

GNS036

Peak#	m/z	Cpd.	RTmin.	Amount	(ppm)
		<i>Steranes</i>		area	height
12	217	S1	51.59	67	61
13	217	S2	52.87	46	39
14	217	S3	57.11	12	7
15	217	S4	57.51	69	53
16	218	S4B	57.50	49	43
17	217	S5	57.81	29	22
18	218	S5B	57.81	31	29
19	217	S6	58.57	16	14
20	217	S7	58.97	72	30
23	217	S8	60.55	4	5
25	217	S9	60.95	15	14
26	218	S9B	60.97	29	24
27	217	S10	61.27	28	24
28	218	S10B	61.25	35	29
30	217	S11	62.18	12	7
31	217	S12	63.20	28	14
32	217	S13	63.81	29	23
33	218	S13B	63.81	37	35
35	217	S14	64.04	13	16
36	218	S14B	64.04	38	33
38	221	ISTD	65.09	16	16
39	217	S15	65.20	21	15
STERANES				461	344



TRICYCLICS
 PENTACYCLICS
 STERANES

Key Ratios

	area	ht.		area	ht.
C19/C23	0.86	0.39	Ts/Tm	2.21	2.18
C21/C23	0.91	0.55	29D/29	0.70	0.74
C22/C23	0.37	0.25	C27T/27	0.12	0.07
C24/C23	0.89	0.80	DM/H	0.00	0.00
C26/C25	1.30	0.92	C27/H	0.48	0.49
Tet/C23	0.75	0.73	C28/H	0.13	0.12
			X/H	0.26	0.27
S1/S6	4.16	4.23	C29/H	0.70	0.74
%C27	30	32	M/H	0.07	0.10
%C28	34	32	OL/H	0.00	0.01
%C29	37	36	GA/H	0.05	0.04
20S/20R	1.33	0.99	C31/H	0.49	0.50
S/T	1.02	0.85	C35/C34	0.85	0.80
			C23/H	0.11	0.13

APPENDIX B

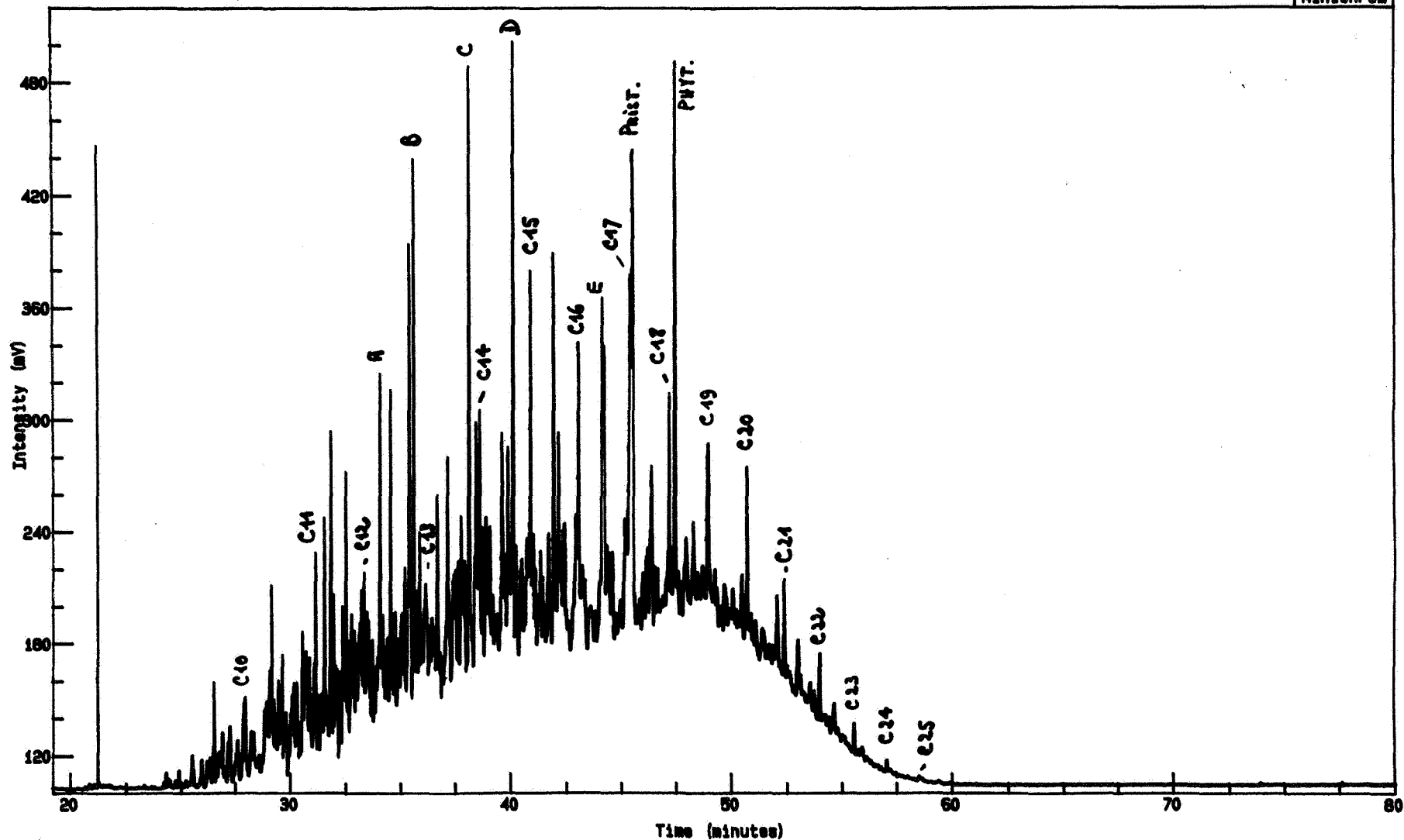
C15+ Aromatic Biomarker Mass Fragmentograms and Peak Areas

APPENDIX 3
THERMOVAPORISATION AND PYROLYSIS
GEOFINA HYDROCARBON METER (GHM)
TRACES FOR 7 BITUMENS

Analysis Name : 1 AKC2013.1.1.
NOCS 24/9-5 : AKC 2013.6(SNC) Whole rock.

Amount : 2.160E+01.

Minichrom



Instrument : GNM
Channel Title : Channel 1
Line ID : ESSAI

Method : TEST
Calibration : TEST
Run Sequence : TEST

Acquired on 22-04-94 at 06:05:15

Reported on 28-05-94 at 16:24:50

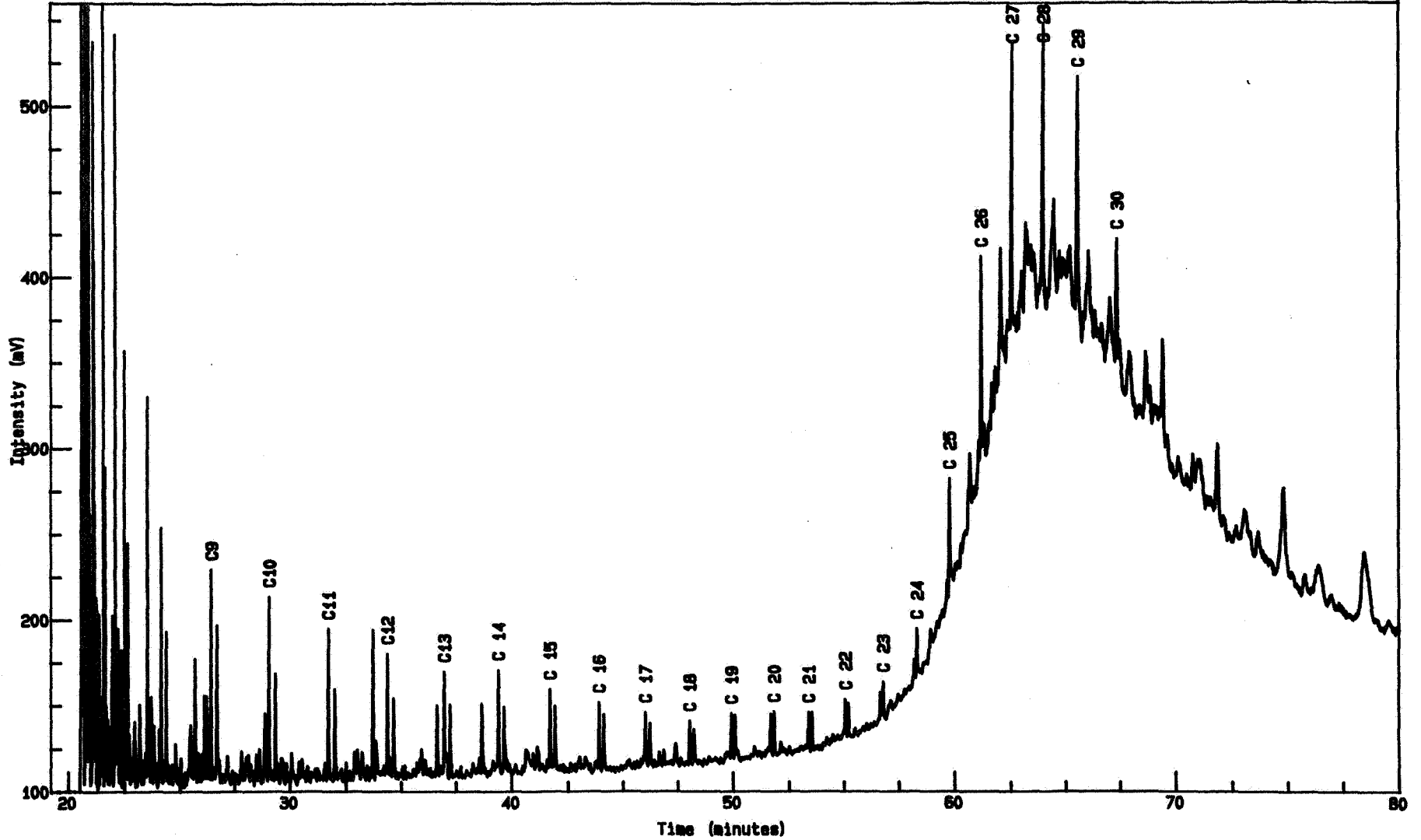
Analysis Name : 2 AKC2013, 1, 1.

NOCS 24/9-5 : AKC 2013.6(SMC) Whole rock.

Amount : 2.160E+01.

GEOFINA HYDROCARBON METER S 2 PYROLYSIS TRACE

Minichrom



Instrument : GM
Channel Title : Channel 2
Line ID : ESSAI

Method : TEST
Calibration : TEST
Run Sequence : TEST

Acquired on 22-04-94 at 06:08:15

Reported on 28-05-94 at 16:38:45

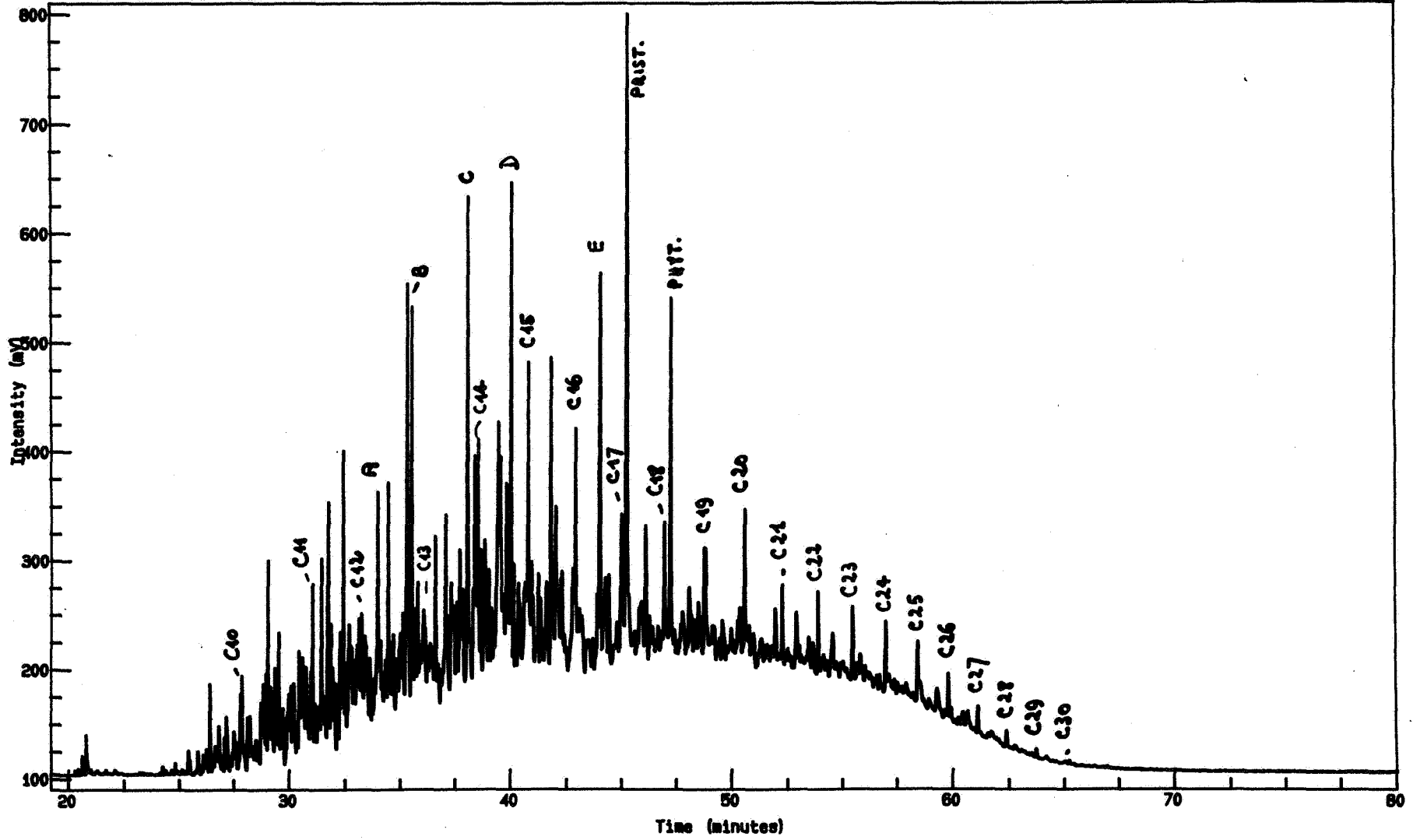
Analysis Name : 1 AKC2014, 1, 1.

NOCS 24/9-8; AKC 2014.6 (SNC) Whole rock.

Amount : 2.010E+01.

GEOPFINA HYDROCARBON METER 91 THERMOVAPORIZATION TRACE

Minichrom



Instrument : GNM
Channel Title : Channel 1
Line ID : ESSAI

Method : TEST
Calibration : TEST
Run Sequence : TEST

Acquired on 22-04-94 at 10:19:32

Reported on 28-05-94 at 09:18:31

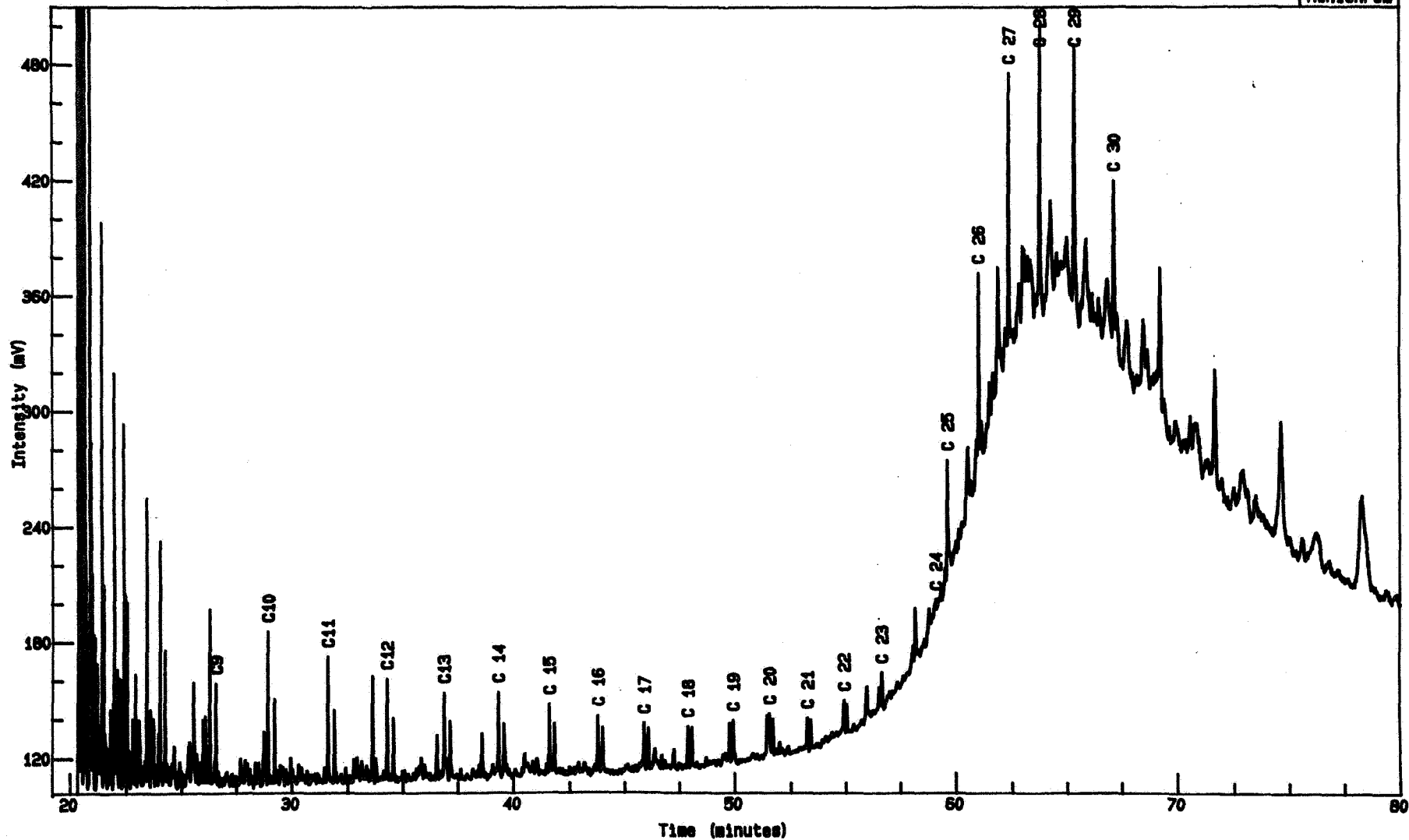
Analysis Name : 2 AKC2014, 1, 1.

NOCS 24/9-5: AKC 2014.6 (SMC) Whole rock.

Amount : 2.010E+01.

GEOFINA HYDROCARBON METER S 2 PYROLYSIS TRACE

Minichrom



Instrument : GFM
Channel Title : Channel 2
Line ID : ESSAI

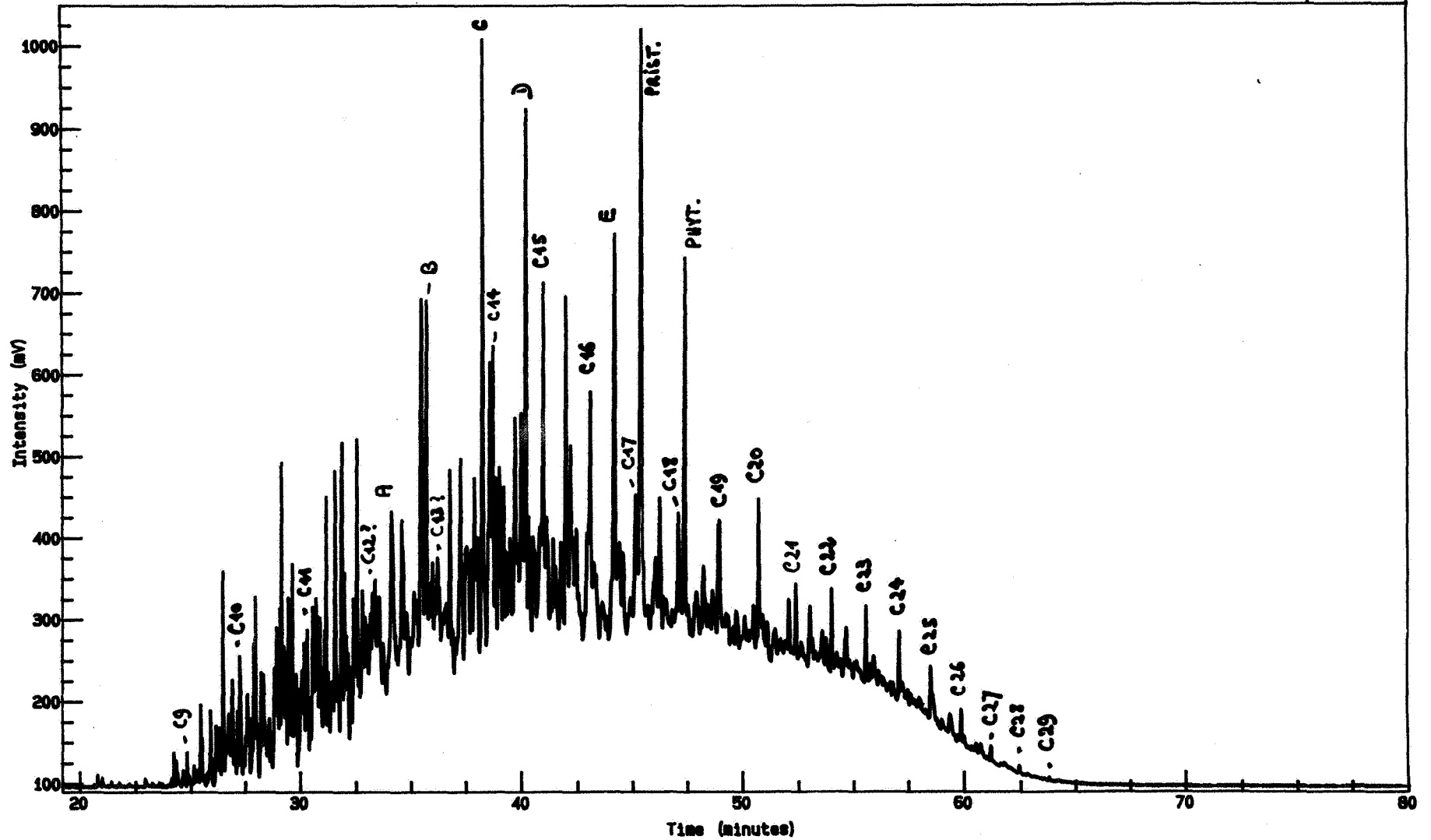
Method : TEST
Calibration : TEST
Run Sequence : TEST

Acquired on 22-04-94 at 10:19:32

Reported on 28-05-94 at 09:40:21

Analysis Name : 1 AKC2015, 1.1.
NOCS 24/9-8 AKC 2015.6 (SNC) Whole rock. Amount : 2.140E+01.
GEOFINA HYDROCARBON METER S1 THERMOVAPORIZATION TRACE

Minichrom



Instrument : GFM
Channel Title : Channel 1
Line ID : ESSAI

Method : TEST
Calibration : TEST
Run Sequence : TEST

Acquired on 23-04-94 at 10:02:26

Reported on 02-06-94 at 15:58:17

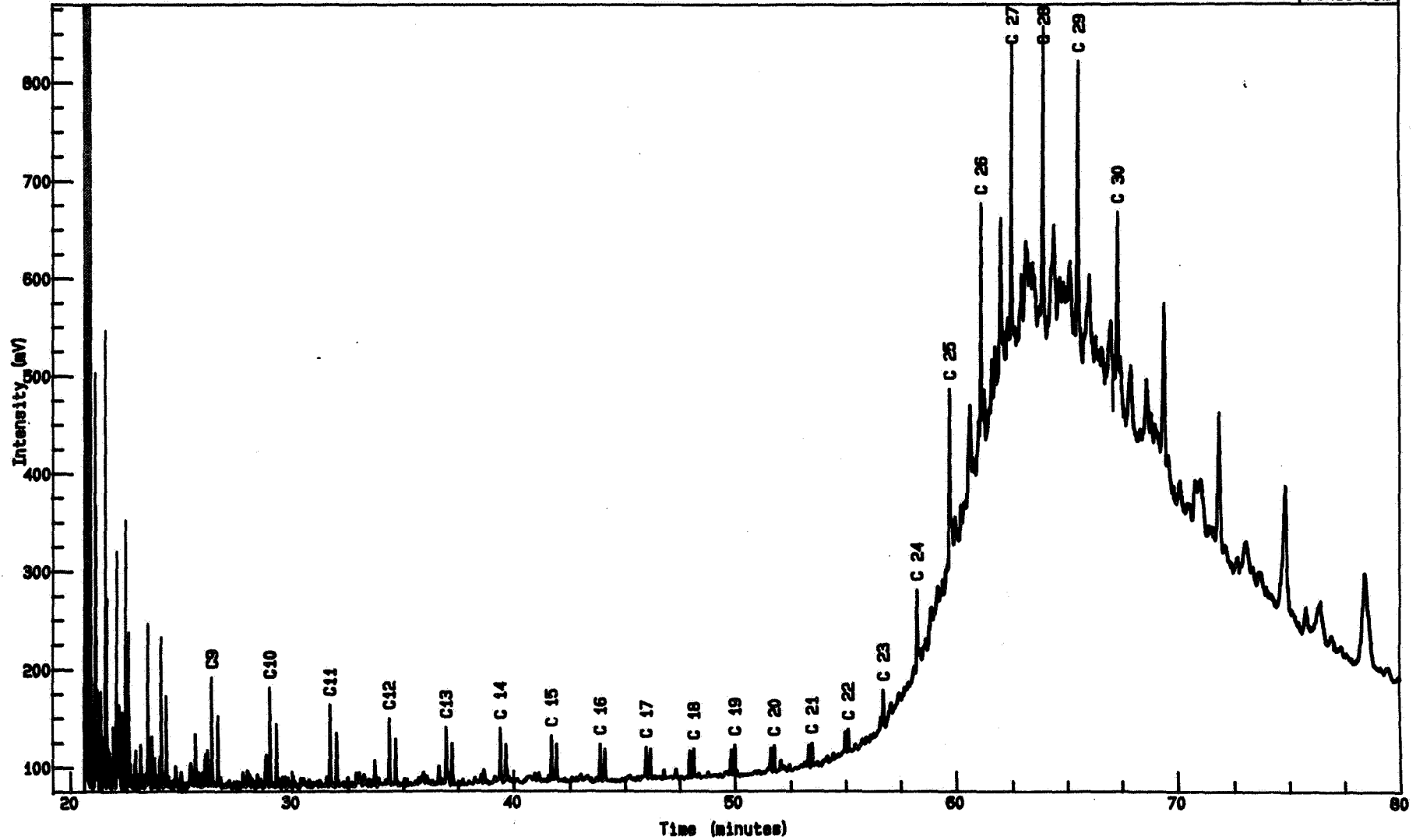
Analysis Name : 2 AKC2015, 1, 1.

NOCIS 24/9-2 AKC 2015.6 (SNC) Whole rock.

Amount : 2.140E+01.

GEOPFINA HYDROCARBON METER 8 2 PYROLYSIS TRACE

Minichrom



Instrument : 6HM
Channel Title : Channel 2
Line ID : ESSAI

Method : TEST
Calibration : TEST
Run Sequence : TEST

Acquired on 23-04-94 at 10:02:26

Reported on 02-06-94 at 16:15:55

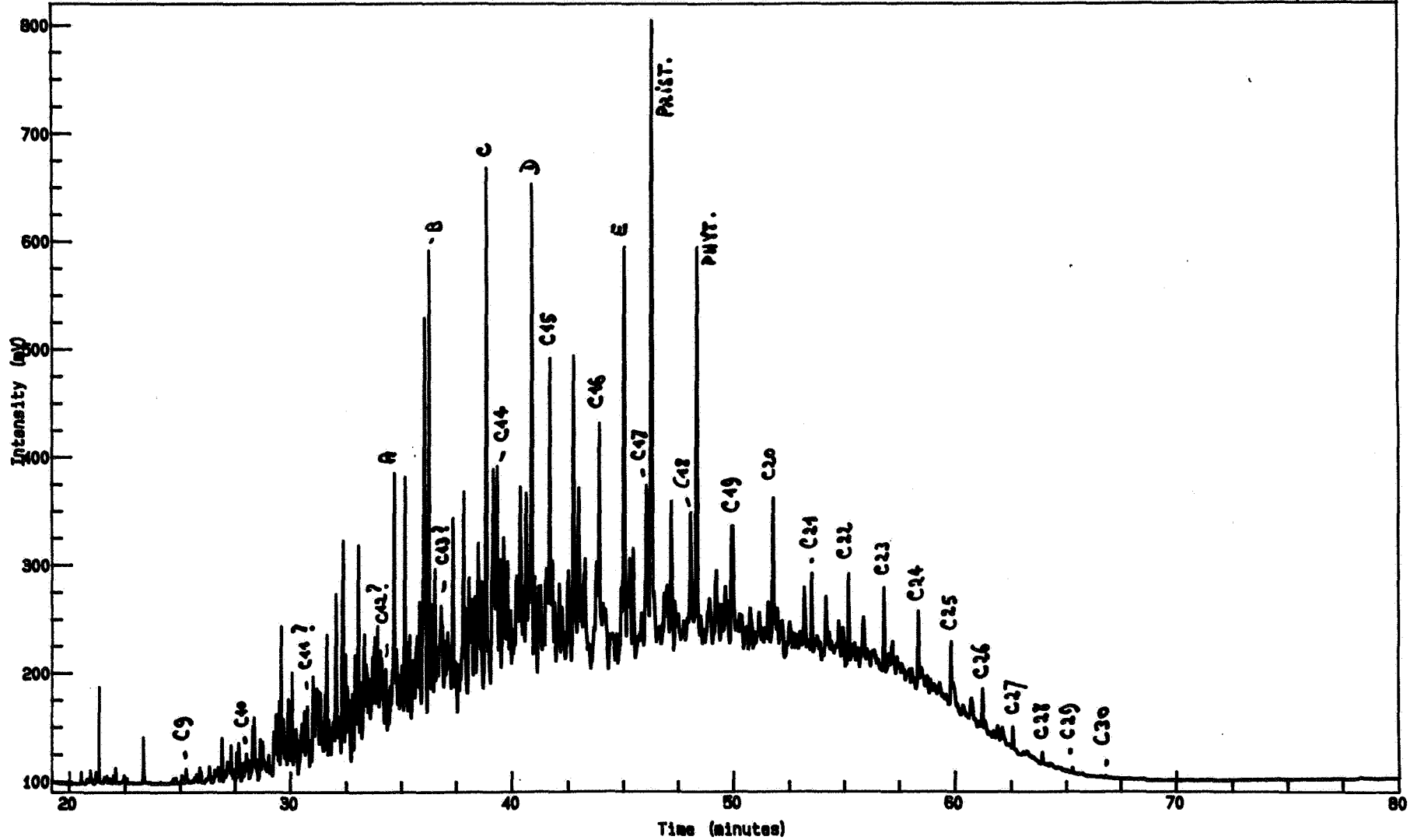
Analysis Name : 1 AKC2016, 1, 1.

NOCS 24/9-5: AKC 2016.9 (SWC) Whole rock.

Amount : 2.070E+01.

GEOFINA HYDROCARBON METER S1 THERMOVAPORIZATION TRACE

Minichrom



Instrument : GFM
Channel Title : Channel 1
Line ID : ESSAI

Method : TEST
Calibration : TEST
Run Sequence : TEST

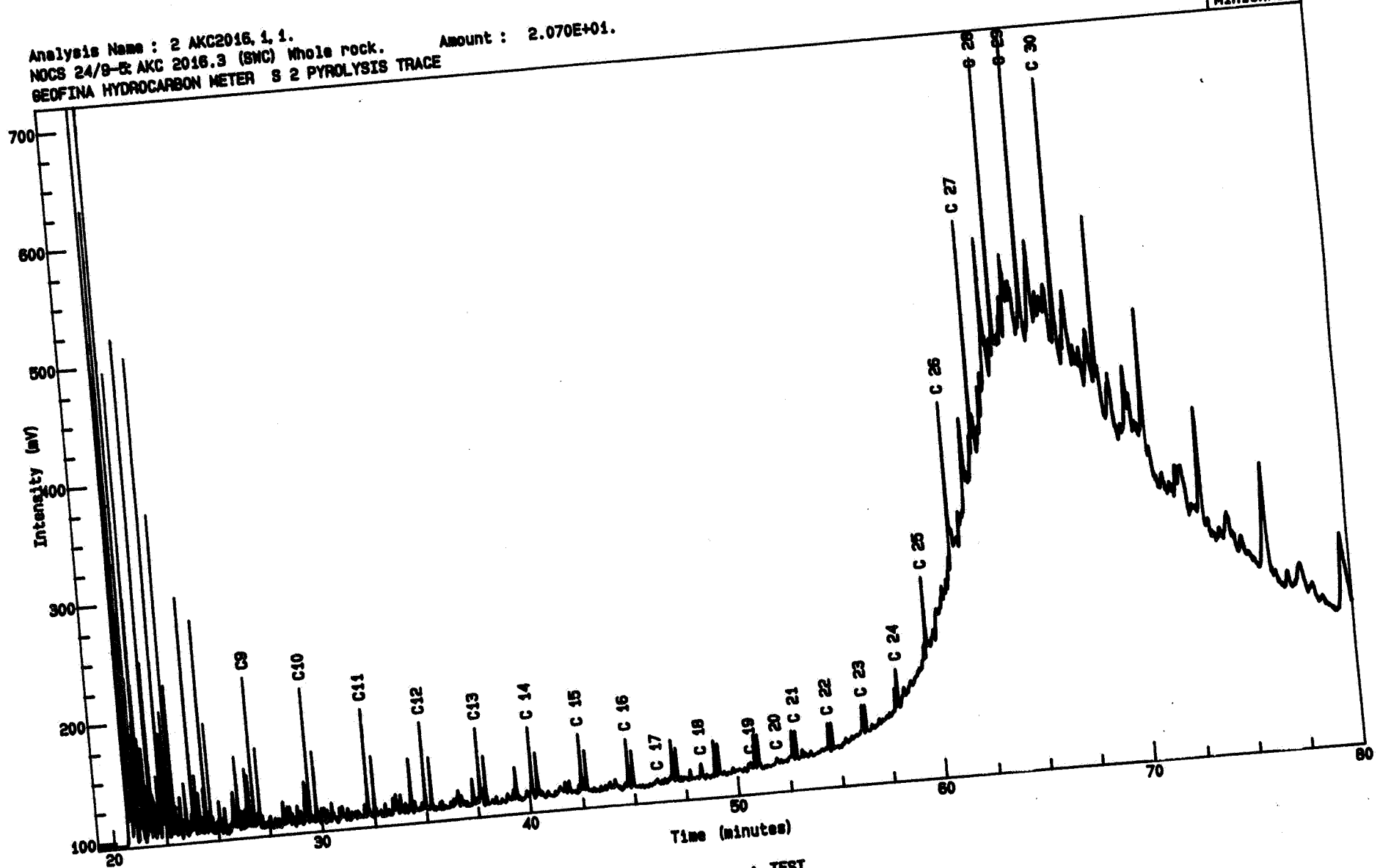
Acquired on 24-04-94 at 04:25:04

Reported on 03-06-94 at 15:31:00

Analysis Name : 2 AKC2016.1.1.
NOCS 24/9-2 AKC 2016.3 (SNC) Whole rock.
GEOFINA HYDROCARBON METER S 2 PYROLYSIS TRACE

Amount : 2.070E+01.

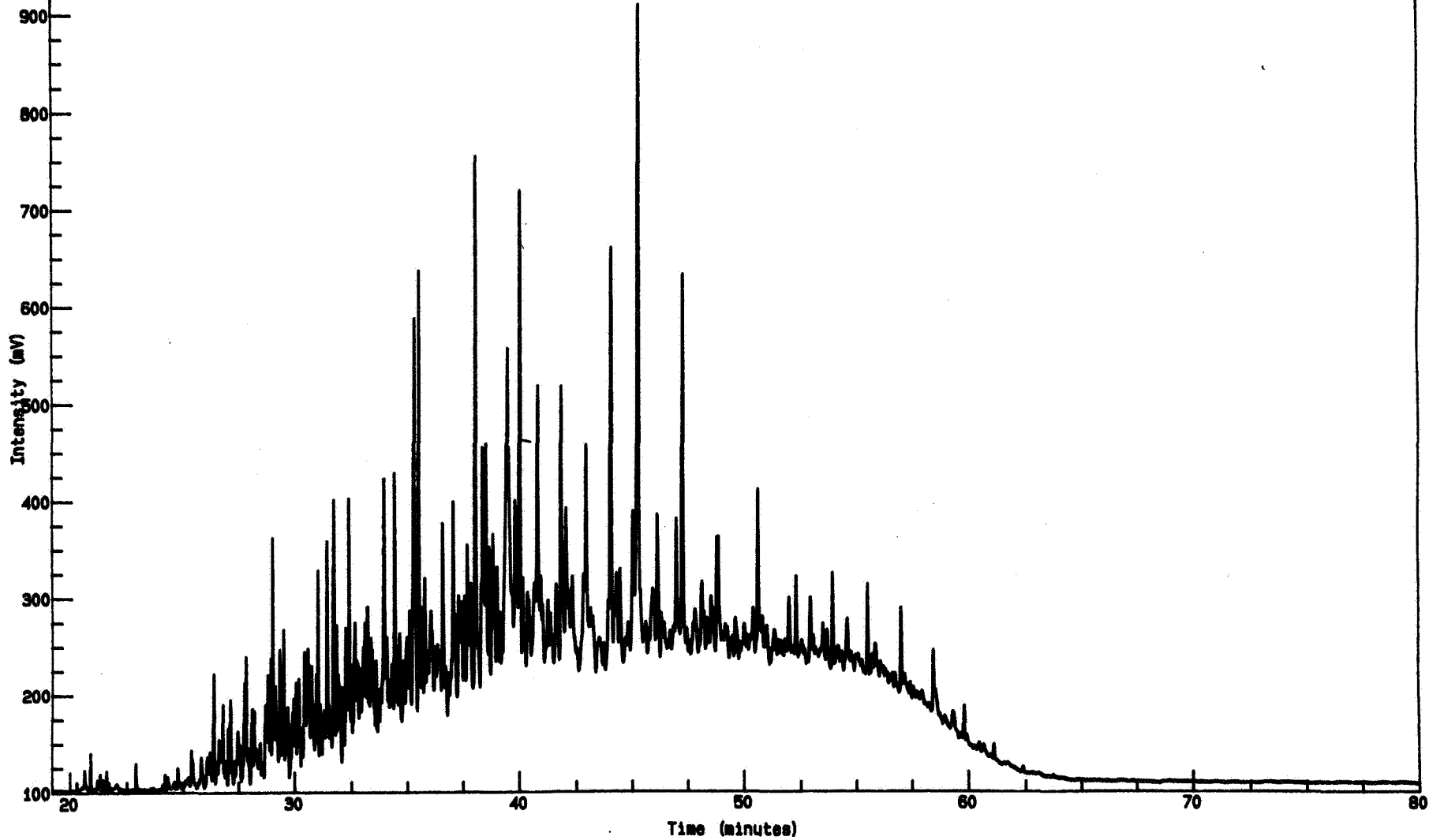
Minichrom



Method : TEST
Calibration : TEST
TEST

Analysis Name : 1 AKC2017.1.1.
NOCS 24/9-8: AKC 2017.6 (SWC) Whole rock. Amount : 2.080E+01.
GEOFINA HYDROCARBON METER S1 THERMOVAPORIZATION TRACE

Minichrom



Instrument : GFM
Channel Title : Channel 1
Line ID : ESSAI

Method : TEST
Calibration : TEST
Run Sequence : TEST

Acquired on 28-04-94 at 08:57:24

Reported on 07-06-94 at 14:50:11

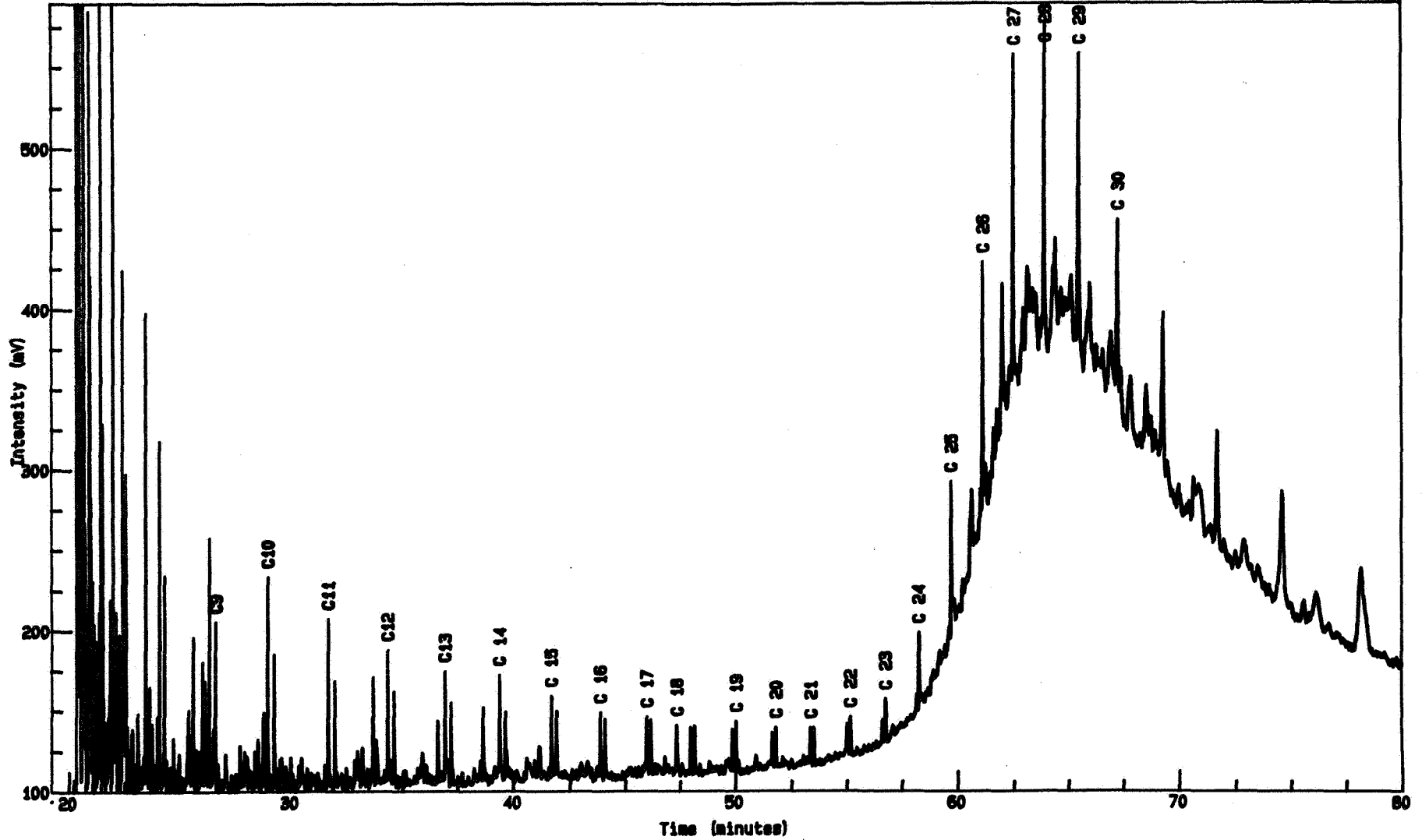
Analysis Name : 2 AKC2017.1.1.

NOCS 24/8-2 AKC 2017.6 (SNC) Whole rock.

Amount : 2.030E+01.

GEOFINA HYDROCARBON METER 8 2 PYROLYSIS TRACE

Minichrom



Instrument : GFM
Channel Title : Channel 2
Line ID : ESSAI

Method : TEST
Calibration : TEST
Run Sequence : TEST

Acquired on 28-04-84 at 04:38:52

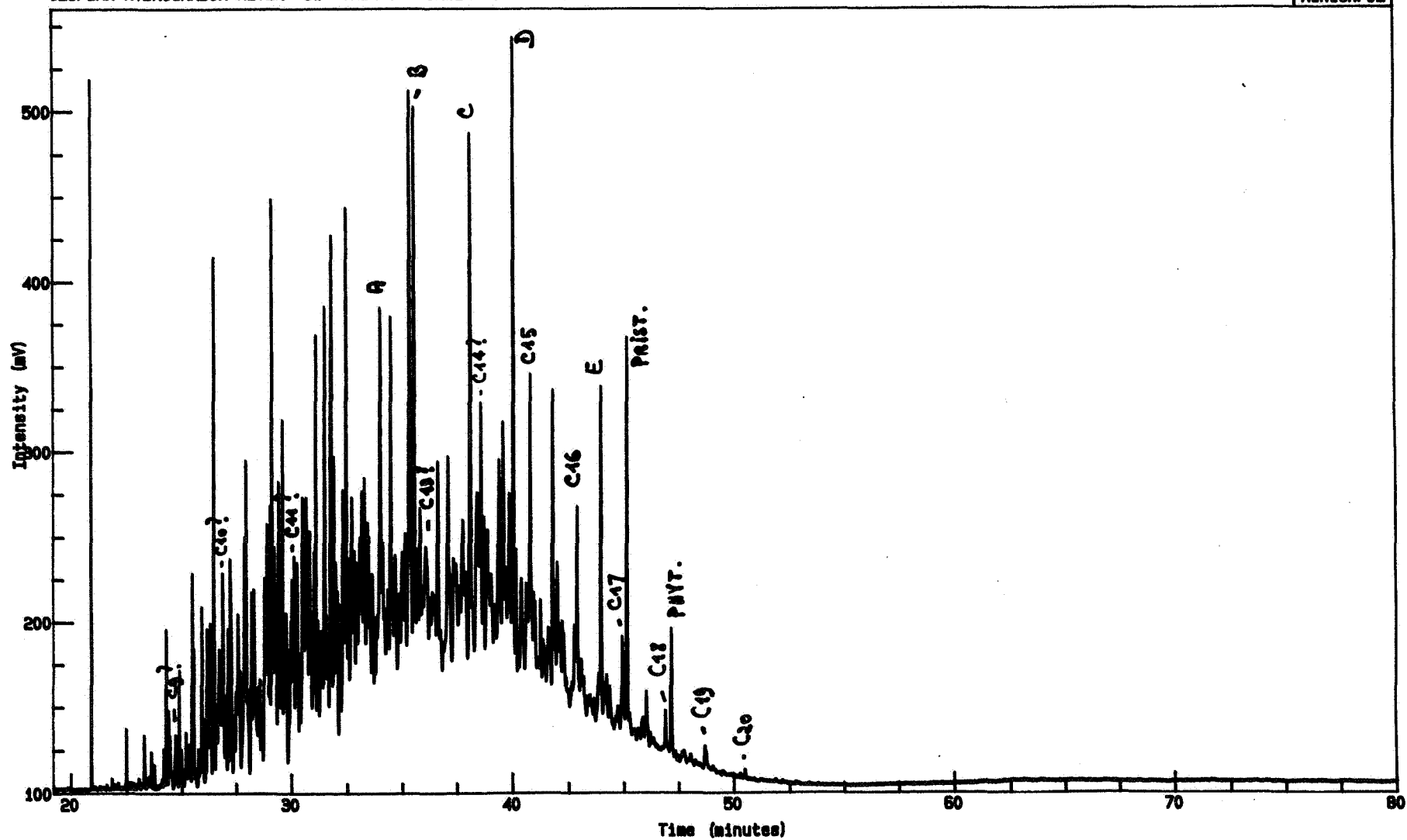
Reported on 07-06-84 at 10:41:56

Analysis Name : 1 AKC2018, 1, 1.

NOCS 24/9-8: AKC 2018.8 (SWC) Whole rock. Amount : 2.010E+01.

GEOPINA HYDROCARBON METER S1 THERMOVAPORIZATION TRACE

Minichrom



Instrument : GHM
Channel Title : Channel 1
Line ID : ESSAI

Method : TEST
Calibration : TEST
Run Sequence : TEST

Acquired on 24-04-94 at 08:15:51

Reported on 03-06-94 at 16:08:35

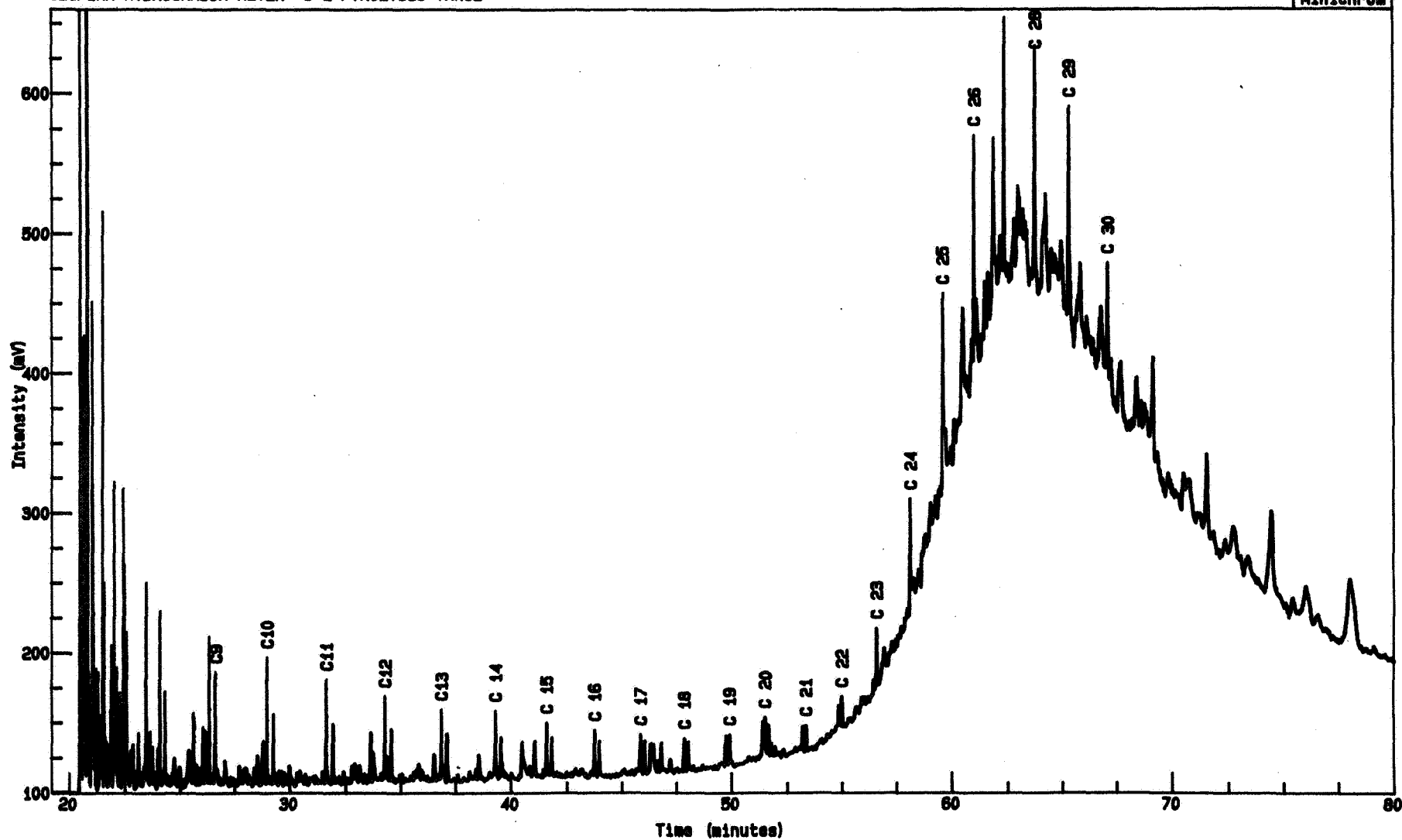
Analysis Name : 2 AKC2018, 1, 1.

NOCS 24/9-8: AKC 2018.6 (SWC) Whole rock.

Amount : 2.010E+01.

GEOFINA HYDROCARBON METER S 2 PYROLYSIS TRACE

Minichrom



Instrument : GFM
Channel Title : Channel 2
Line ID : ESSAI

Method : TEST
Calibration : TEST
Run Sequence : TEST

Acquired on 24-04-94 at 08:15:52

Reported on 06-06-94 at 09:06:38

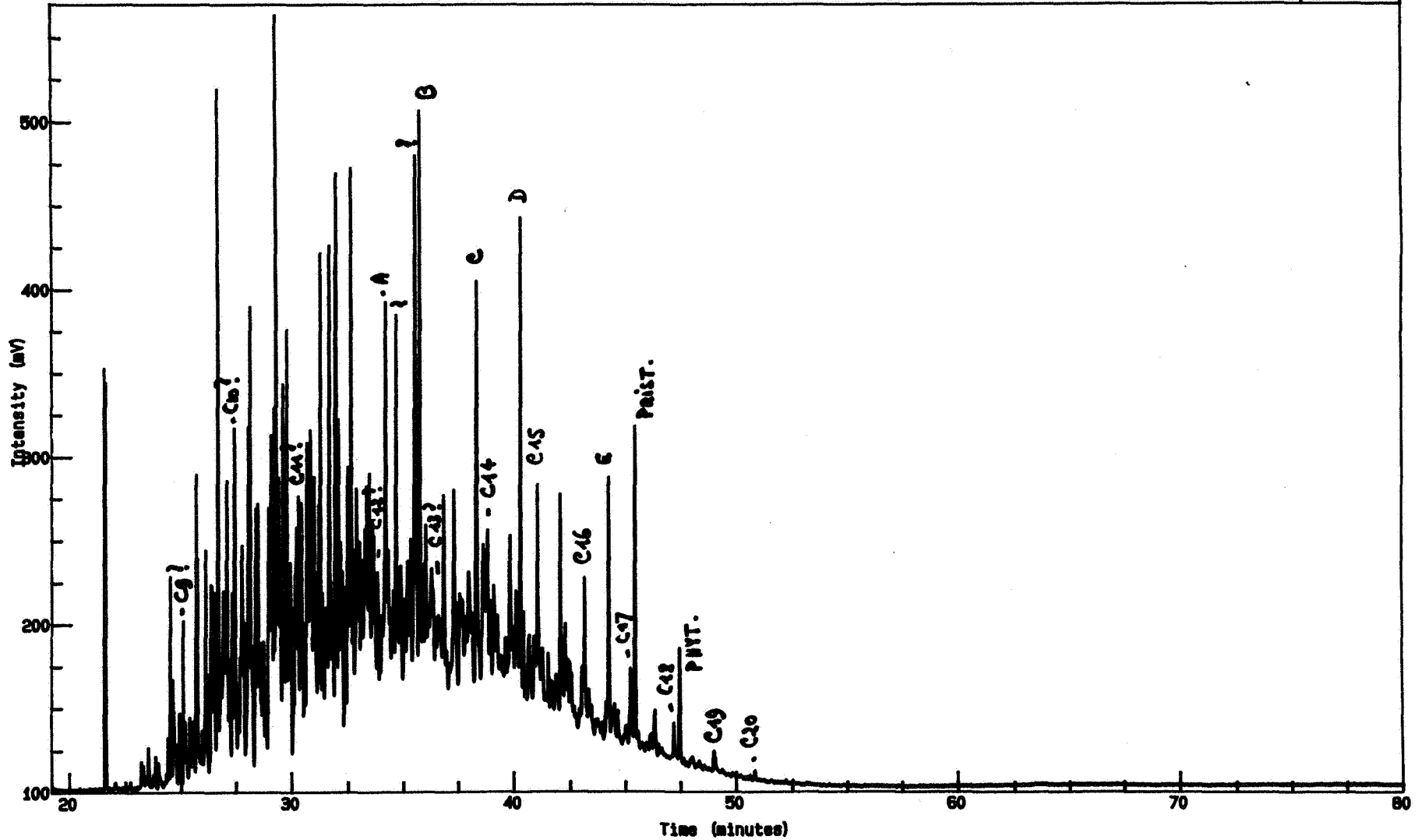
Analysis Name : 1 AKC2019, 1, 1.

NDCS 24/9-2 AKC 2019.1 (SWC) Whole rock.

Amount : 2.050E+01.

GEOPFINA HYDROCARBON METER S1 THERMOVAPORIZATION TRACE

Minichrom



Instrument : GFM
Channel Title : Channel 1
Line ID : ESSAI

Method : TEST
Calibration : TEST
Run Sequence : TEST

Acquired on 24-04-94 at 09: 51: 18

Reported on 06-06-94 at 08: 34: 11

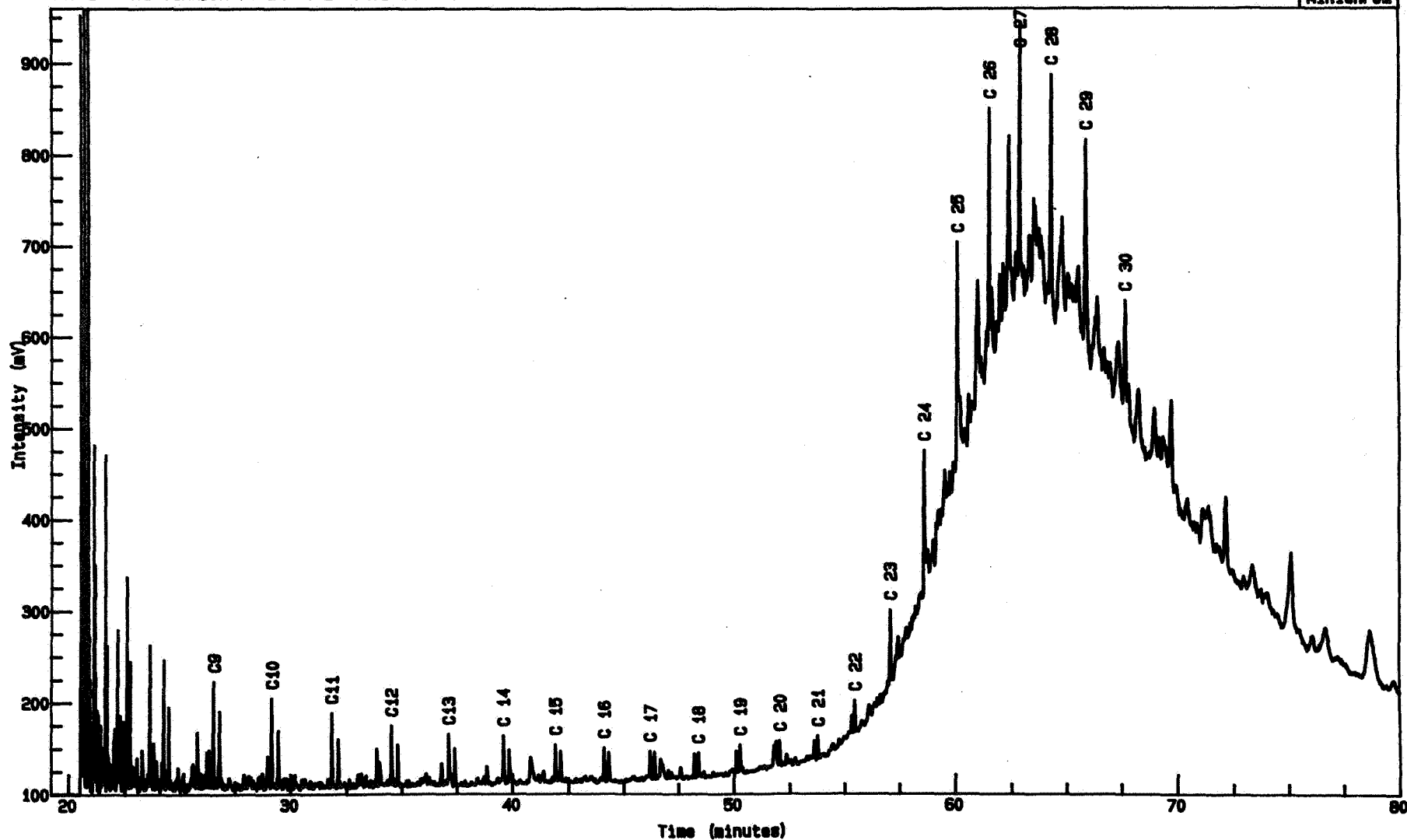
Analysis Name : 2 AKC2019, 1, 1.

NOCS 24/9-5: AKC 2019.1 (SWC) Whole rock.

Amount : 2.050E+01.

GEOFINA HYDROCARBON METER S 2 PYROLYSIS TRACE

Minichrom



Instrument : GHM
Channel Title : Channel 2
Line ID : ESSAI

Method : TEST
Calibration : TEST
Run Sequence : TEST

Acquired on 24-04-94 at 09:51:18

Reported on 06-06-94 at 09:45:25