



GEOCHEMICAL REPORT.

SEAHORSE - 1.

BAY A
GEOCHEMICAL REPORTS BOX

W 705 SEAHORSE - 1 WELL

GEOCHEMICAL REPORT EPR. 206 ES. 78.

BY

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DECEMBER 1978.

EXXON PRODUCTION RESEARCH COMPANY

GEOCHEMICAL ANALYSES OF OIL SAMPLES FROM THE
SEAHORSE-1 WELL, GIPPSLAND BASIN

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Reservoir Evaluation Division

December 1978

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GEOCHEMICAL ANALYSES OF OIL SAMPLES FROM THE
SEAHORSE-1 WELL, GIPPSLAND BASIN

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SUMMARY AND CONCLUSIONS

Three crude oil samples from the Seahorse-1 well were analyzed for their geochemical "fingerprint" properties. This work was requested in the September 7, 1978 letter 61/BJB by B. R. Griffith. Charges for the work were billed to our Job No. 5523 (Esso Australia's 01-00-025-270-125-045-430).

Samples analyzed were:

R.F.T. #6 - 1437 m (EPR No. 69402-A)
R.F.T. #5 - 1514 m (EPR No. 69402-B)
R.F.T. #17 - 1608.5 m (EPR No. 69402-C)

Results were requested by October 30, and data were sent to Mr. Brian Burns on October 9 and October 26. This report serves as a permanent, retrievable record of the results. Interpretations have already been made by Mr. Burns.

The chemical data are listed in Tables 1 and 2, and gas chromatograms of the oils and of their heavy saturate fractions are shown in Figs. 1 thru 6.

PROCEDURES

The total samples were analyzed by an extended-range gas chromatograph (Figs. 1 thru 3).

The samples were "topped" to leave the heavy (C_{15+}) residues, and the asphaltenes were removed by use of excess pentane. The pentane-soluble fractions were separated by liquid column chromatography (Table 1). The saturate and aromatic fractions were analyzed by mass spectrometry for their molecular types, and they were analyzed by a different mass spectrometer to obtain their stable carbon isotope values (Table 1). The heavy saturate fractions were also analyzed by gas chromatography (Figs. 4 thru 6).

Light gasolines (C_4-C_7) were analyzed by gas chromatography (Tables 2A, 2B, 2C).

TABLE 1 CHEMICAL ANALYSES OF SEAHORSE-1 OIL SAMPLES
(Analyses by S. Adams, R. Barrientos, H. Fry)

Test	R.F.T. 6	R.F.T. 15	R.F.T. 17
<u>Depth (meters)</u>	1437	1514	1608.5
<u>EPR No.</u>	59402-A	69402-B	59402-C
<u>API Gravity (at 60°F)</u>	56.0	48.6	49.4
<u>Sulfur (% by weight)</u>			
<u>C₄-C₇ (%)</u>	12.4	14.9	13.4
<u>C₁₅₊ (%)</u>	37.0	59.7	58.4
<u>Gross Composition of C₁₅₊ (%)</u>			
Saturates	50.4	58.3	55.4
Aromatics	14.4	12.0	11.4
Eluted NSO's	4.8	3.3	3.3
Noneluted NSO's	28.6	24.9	29.5
Asphaltenes	1.9	1.5	.3
<u>Saturate Molecular Types (%)</u>			
Paraffins	78.7	81.7	93.3
1-Ring Naphthenes	2.8	1.5	1.7
2- " "	5.2	6.6	5.5
3- " "	5.3	5.2	5.2
4- " "	4.1	3.4	3.1
5- " "	1.2	.3	0.7
6- " "	2.6	.8	0.5
<u>Aromatic Molecular Types (%)</u>			
Benzenes	14.6	15.3	14.9
Indanes	10.8	8.4	8.4
Indenes	17.7	13.9	15.0
Naphthalenes	7.1	9.7	11.5
Tetrahydrophenanthrenes	13.5	17.1	19.7
Dihydrophenanthrenes	16.7	19.9	22.1
Phenanthrenes	1.9	3.4	0.9
Pyrenes	0.0	1.3	0.0
Chrysenes	7.1	2.3	1.0
Benzothiophenes	1.5	0.3	0.8
Dibenzothiophenes	8.9	7.4	5.6
Thiophenophenanthrenes	0.0	0.0	0.0
<u>Four-Ring Naphthenes (%)</u>			
20 Carbon Atoms	45.9	62.9	73.7
21 " "	19.7	22.9	26.3
22 " "	14.8	14.3	0.0
23 " "	11.5	0.0	0.0
24 " "	8.2	0.0	0.0
25 " "	0.0	0.0	0.0
26 " "	0.0	0.0	0.0
27 " "	0.0	0.0	0.0
28 " "	0.0	0.0	0.0
29 " "	0.0	0.0	0.0
30 " "	0.0	0.0	0.0
31 " "	0.0	0.0	0.0
32 " "	0.0	0.0	0.0
<u>Carbon Isotope Values (‰ from PDB)</u>			
Saturates	-27.0	-26.9	-27.2
Aromatics	-26.2	-25.3	-25.2

TABLE 2A

C4-C7 OIL

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69402A OFF. AUSTRALIA, SEAHORSE-1, RFT #6 1437 METERS

	TOTAL PERCENT	NORM PERCENT		TOTAL PERCENT	NORM PERCENT
METHANE	0.000		CHEX	0.699	3.63
ETHANE	0.006		33-DMP	0.000	0.00
PROFANE	0.259		11-DMCP	0.424	3.43
IBUTANE	0.315	2.54	2-MHEX	0.000	0.00
NBUTANE	0.737	5.95	23-DMP	0.190	1.54
IPENTANE	0.663	5.36	3-MHEX	0.386	3.12
NPENTANE	0.825	6.67	103-DMCP	0.308	2.49
22-DMB	0.035	0.28	1T3-DMCP	0.175	1.41
OPENTANE	0.069	0.56	1T2-DMCP	0.311	2.51
23-DMB	0.125	1.01	3-EPENT	0.000	0.00
2-MP	0.689	5.57	224-TMP	0.000	0.00
3-MP	0.378	3.05	NHEPTANE	1.304	10.54
NHEXANE	1.164	9.41	102-DMCP	0.017	0.14
MCP	0.706	5.70	MCH	2.660	21.49
22-DMP	0.000	0.00	ECP	0.035	0.28
24-DMP	0.077	0.62	BENZENE	0.014	0.11
223-TMB	0.000	0.00	TOLUENE	0.070	0.57

TOTALS

ALL COMP	12.640
GASOLINE	12.375

SIG COMP RATIOS

C1/C2	2.49
A /D2	6.40
D1/D2	0.22
C1/D2	9.81
PENT/IPENT	1.24
CH/MCP	0.99

TABLE 2B

C4-C7 OIL

05 OCT 78

69402B OFF. AUSTRALIA, SEAHORSE-1, RFT #15, 1514 METERS

	TOTAL PERCENT	NORM PERCENT		TOTAL PERCENT	NORM PERCENT
METHANE	0.000		CHEX	0.855	5.76
ETHANE	0.006		33-DMP	0.000	0.00
PROPANE	0.113		11-DMCP	0.488	3.29
IBUTANE	0.292	1.96	2-MHEX	0.000	0.00
NBUTANE	0.666	4.48	23-DMP	0.220	1.48
IPENTANE	0.852	5.73	3-MHEX	0.463	3.11
NPENTANE	1.000	6.73	103-DMCP	0.248	1.67
22-DMB	0.042	0.28	113-DMCP	0.207	1.39
CPENTANE	0.059	0.40	112-DMCP	0.539	3.63
23-DMB	0.143	0.96	3-EPENT	0.000	0.00
2-MP	0.766	5.16	224-TMP	0.000	0.00
3-MP	0.428	2.88	NHEPTANE	1.681	11.31
NHEXANE	1.328	8.93	102-DMCP	0.022	0.15
MCP	0.822	5.53	MCH	3.466	23.33
22-DMP	0.000	0.00	ECF	0.070	0.47
24-DMP	0.087	0.59	BENZENE	0.017	0.12
223-TMB	0.000	0.00	TOLUENE	0.100	0.67

TOTALS

ALL COMP	14.979
GASOLINE	14.861

SIG COMP RATIOS

C1/C2	2.62
A /D2	6.50
D1/D2	0.25
C1/D2	10.40
PENT/IPENT	1.17
CH/MCP	1.04

TABLE 2C

C4-C7 OIL

05 OCT 78

69402C OFF. AUSTRALIA, SEAHORSE-1, RFT #17, 1408.5 METERS

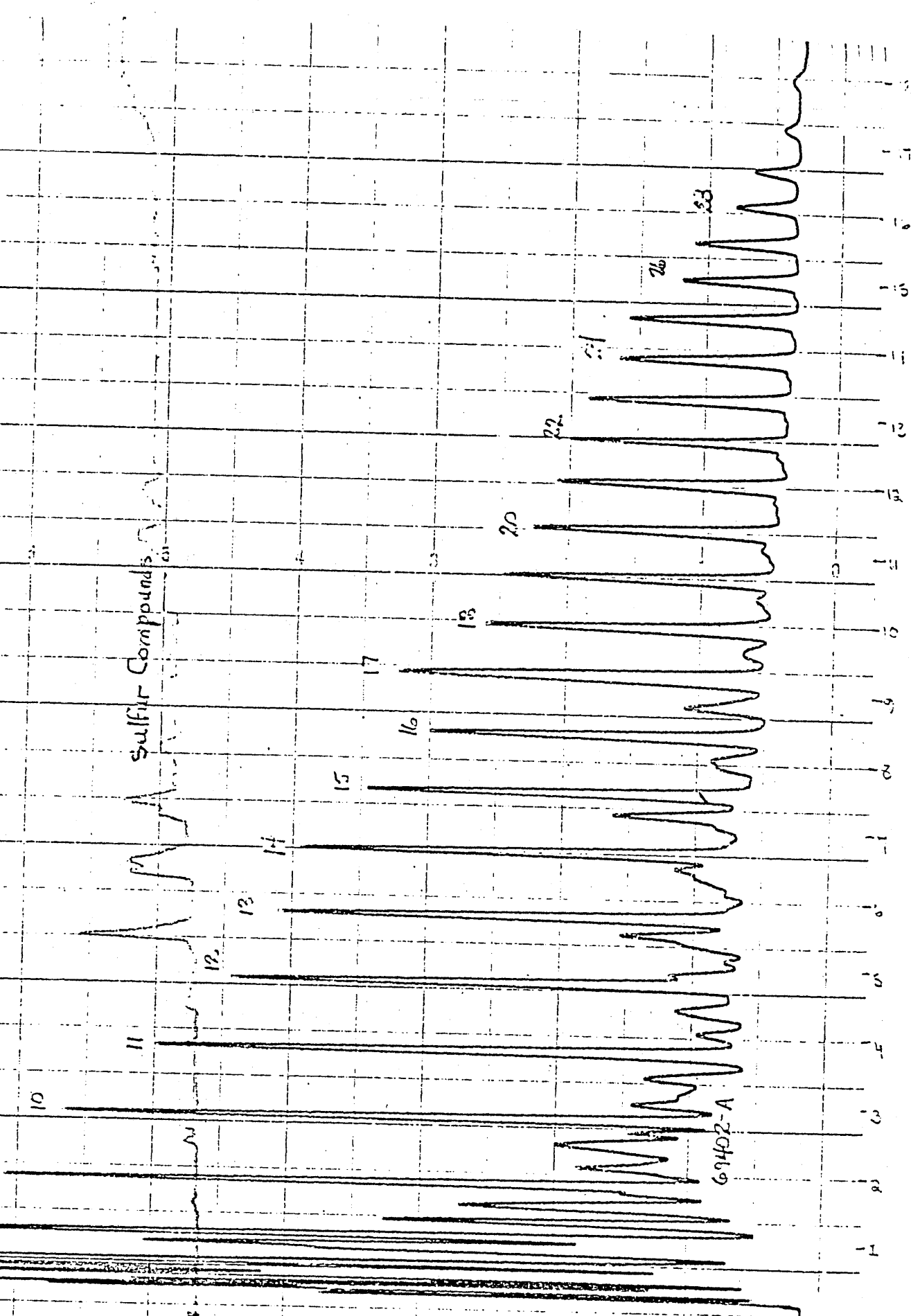
	TOTAL PERCENT	NORM PERCENT		TOTAL PERCENT	NORM PERCENT
METHANE	0.000		CHEX	0.799	5.99
ETHANE	0.005		33-DMP	0.000	0.00
PROPANE	0.364		11-DMCP	0.328	2.45
IBUTANE	0.309	2.32	2-MHEX	0.000	0.00
NBUTANE	0.721	5.40	23-DMP	0.170	1.28
IPENTANE	0.756	5.66	3-MHEX	0.309	2.32
NPENTANE	0.771	5.77	103-DMCP	0.196	1.47
22-DMB	0.032	0.24	1T3-DMCP	0.156	1.17
CPENTANE	0.083	0.62	1T2-DMCP	0.394	2.95
23-DMB	0.111	0.83	3-EPENT	0.000	0.00
2-MP	0.565	4.24	224-TMP	0.000	0.00
3-MP	0.321	2.41	NHEPTANE	1.165	8.73
NHEXANE	0.955	7.15	102-DMCP	0.035	0.26
MCP	0.719	5.38	MCH	3.967	29.72
22-DMF	0.000	0.00	EDF	0.045	0.34
24-DMF	0.068	0.51	BENZENE	0.035	0.26
223-TMB	0.000	0.00	TOLUENE	0.340	2.55

TOTALS

ALL COMP	13.718
GASOLINE	13.350

SIG COMP RATIOS

C1/C2	3.40
A /D2	6.85
D1/D2	1.21
C1/D2	16.47
PENT/IPENT	1.02
CH/MCP	1.11

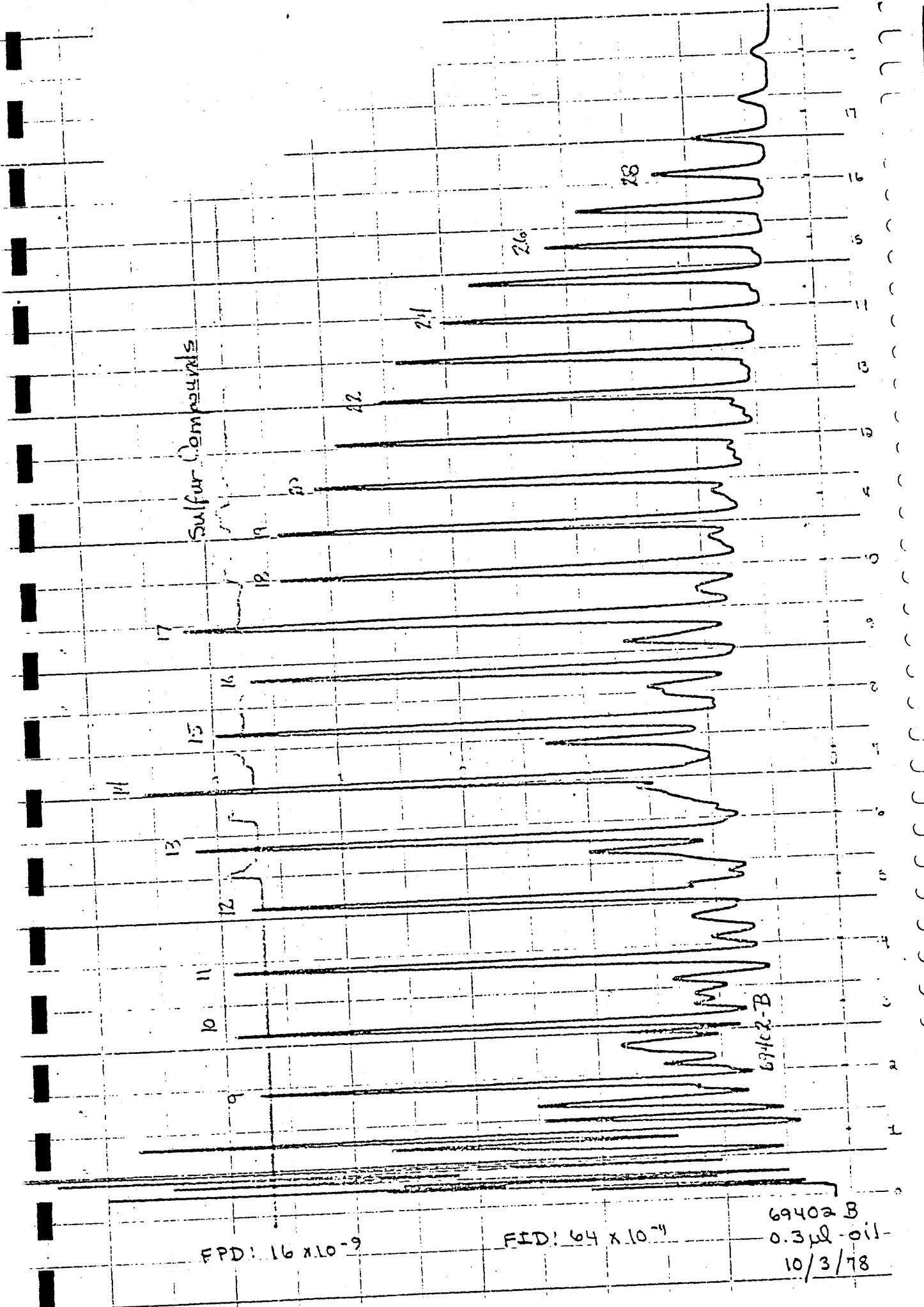


FPD: 16×10^{-9}

FID: 64×10^{-11}

69402 A
 0.3 μ l oil
 10/4/78 VHL

FIG. 1 Total Oil, Test 6, 1437 meters

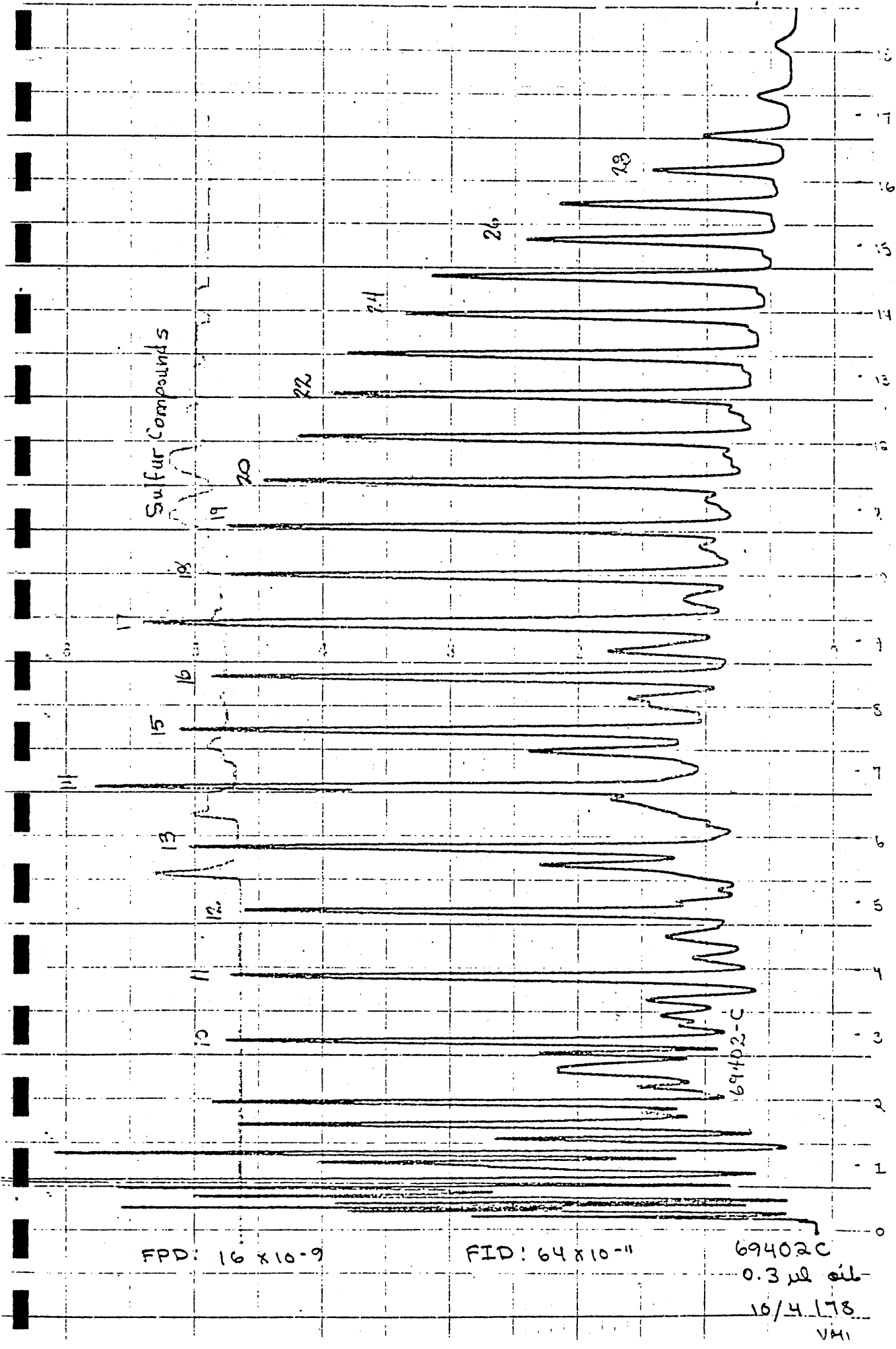


FPD: 16×10^{-9}

FID: 64×10^{-11}

69402 B
 0.3 μ l oil-
 10/3/78

FIG. 2 Total Oil, Test 15, 1514 meters



FPD: 16×10^{-9}

FID: 64×10^{-11}

69402C
 0.3 μ l oil
 16/4/78
 VHI

FIG. 3 Total Oil, Test 17, 1608.5 meters

81.10/01

6949

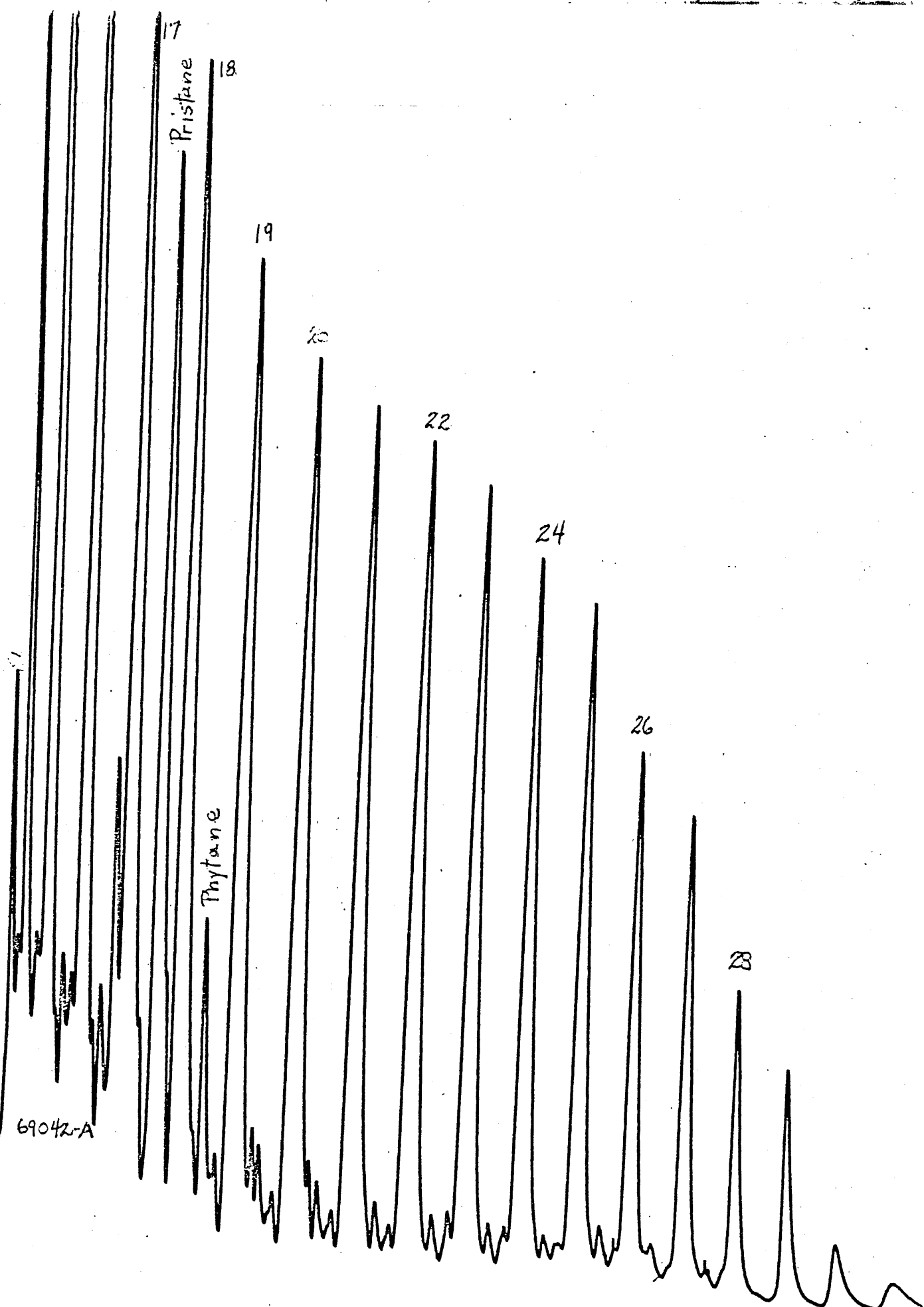


FIG. 4 Heavy Saturates, Test 6, 1437 meters

Spot
10/10/78

69042-B

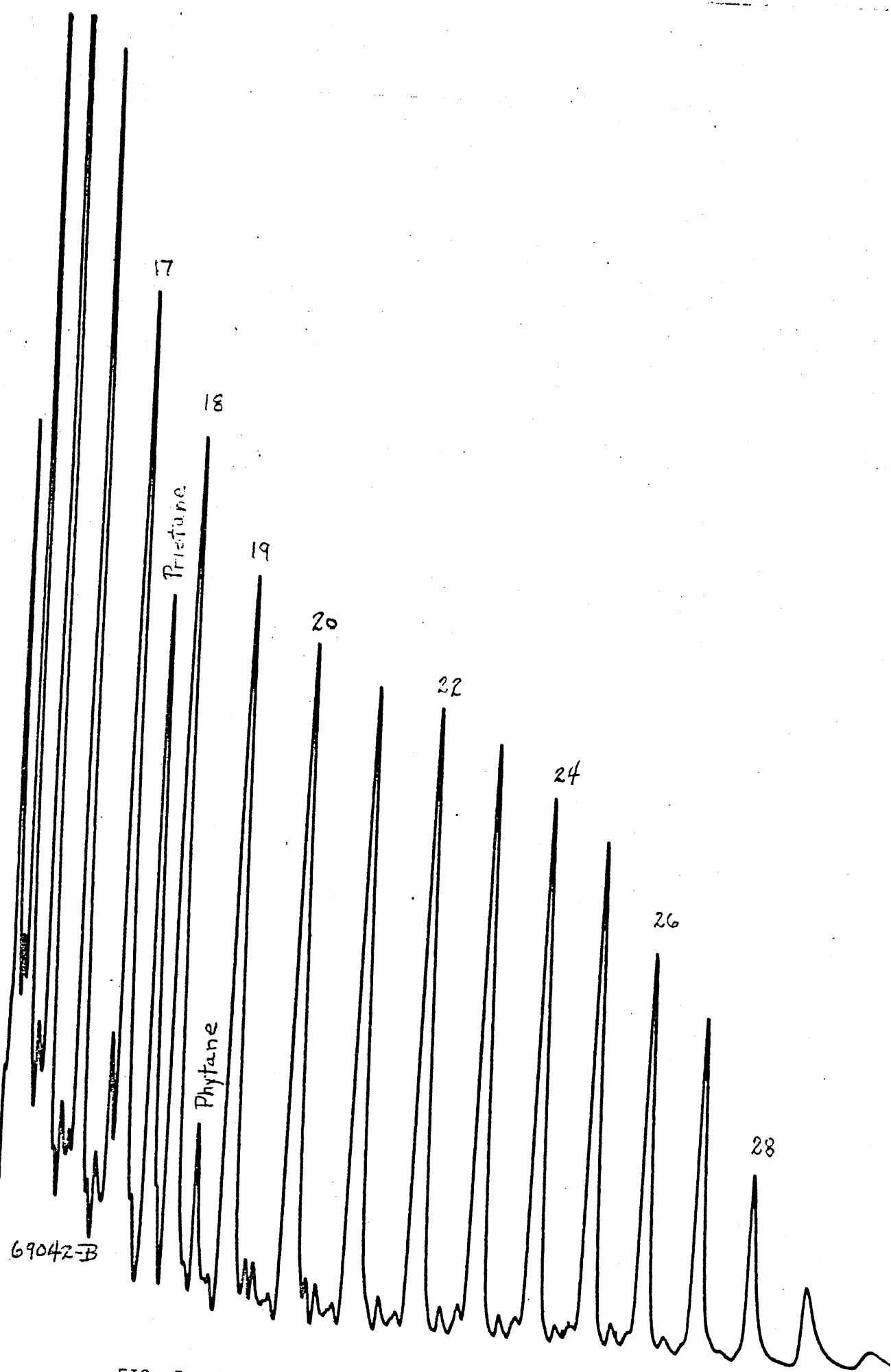


FIG. 5 Heavy Saturates, Test 15, 1514 meters

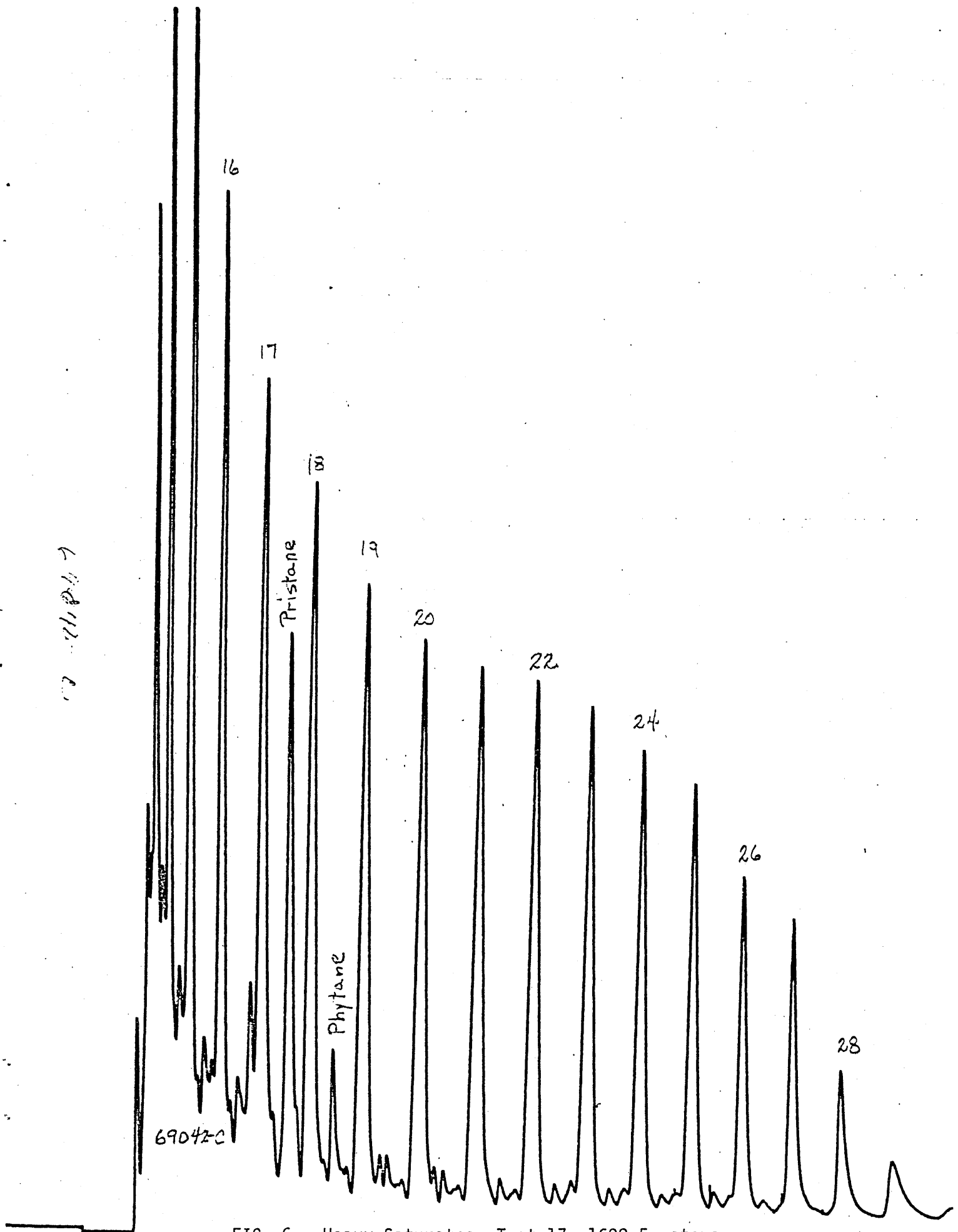


FIG. 6. Heavy Saturates, Test 17, 1608.5 meters



ESSO AUSTRALIA LTD.
GIPPSLAND LABORATORY

Sample: SEA HORSE 1 CRUDE
 Sample Source: #1 WELLHEAD
 Date Sampled: 29.8.78
 Pressure: 5674 kPa
 Temperature: 20°C

COMPONENT	WEIGHT %	COMPONENT	WEIGHT %
Oxygen	0.076	Isobutane	2.217
Nitrogen		n-Butane	4.058
Carbon Dioxide	0.202	Neopentane	
Methane	33.328	Isopentane	2.974
Ethane	2.734	n-Pentane	3.186
Propane	5.194	Hexanes and heavier *	76.031

** Density by Pycnometer ASTM D 1480-62 (Reapproved 1976)
0.7792 g/ml

*** Corrected to 60°F.

- Remarks: 1. Although these results are reported to three and four decimal places, this bears no relationships to the accuracy of the analysis.
 2. Chromatographic analysis in accordance with Esso Method GL 1.
 3. Depentanisation in accordance with Esso Method GL 2.
 *4. By difference assuming the balance is hexanes and heavier.
 **5. Determined on depentanised fraction.
 ***6. Using ASTM - IP Petroleum Measurement Tables 1955.

Tested by *[Signature]*

Checked by *[Signature]*

Date of Testing 24.11.78

Approved Signatory *[Signature]*

Date 4/12/78

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