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SUNBURY-ON-THAMES

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EXPLORATION AND PRODUCTION DIVISION

GCB/27/83

FEBRUARY 1983

GEOCHEMISTRY BRANCH

GEOCHEMICAL ANALYSIS OF FOUR JURASSIC CORE PIECES FROM THE WELL 6507/10-1, HALTENBANKEN AREA, OFFSHORE NORWAY

by

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Memorandum

To Dr A.M. Spencer, BPPD Norway

From S.W. Richardson, Manager, Geochemistry Branch

Our ref GCB/27/83 Date 8th March, 1983

Your ref

Subject GEOCHEMICAL ANALYSIS OF FOUR JURASSIC CORE PIECES FROM THE WELL 6507/10-1, HALTENBANKEN AREA, OFFSHORE NORWAY.

This follow-up study on hydrocarbons extracted from 2 Jurassic sandstone members is inconclusive. The small quantities extracted suggest a local derivation; also the maturity of the extracts is similar to that expected for locally derived oil. However, neither sample correlates to the major potential sources analysed in this well (ie Kimmeridge and Coal Formation), suggesting a remote source or local generation from mid-lower Jurassic mudstones which do not have potential to source major amounts of hydrocarbons.

A third alternative is that these traces could be contaminant, from handling or preservation of the samples.

Our best estimate then is that these are not shows from a major migration route.

S.W. Richardson
Ext 677

SWR/JFN

DATA BANK SUMMARY SHEET

Coordinates of area and/or wells described.

65° 13' 10.78"N 7° 14'01.01"E

Country/Area:

OFFSHORE NORWAY (NORTH OF 62°)

Basin(s):

HALTENBANKEN

Stratigraphic range covered:

MIDDLE AND LOWER JURASSIC

Report does/~~does not~~ contain significant well data.

Keywords:

CONTENTS

1. INTRODUCTION

Four core pieces from the Norwegian well 6507/10-1 were analysed to determine whether or not hydrocarbons have migrated up-dip. Two samples were selected from the Mid Jurassic sandstone unit (special seal) and two from the Lower Jurassic sandstone unit (see Table 1 for sample list). The samples were exhaustively extracted using dichloromethane and the products analysed.

2. RESULTS AND DISCUSSION

The Mid Jurassic cores yielded very small amounts of extract (TSE = 0.001 - 0.003 %wt) and the n-alkane distributions obtained were dominated by an unidentified contaminant (figs 1 and 2). These hydrocarbons are believed not to represent residual migrated oil.

The Lower Jurassic cores also yielded low amounts of extract (TSE = 0.001 - 0.007 %wt). The n-alkane distributions (figs 3 and 4) of the two extracts are similar apart from the lower concentration of light components in core 2/2, which may have been lost during sample preparation. Although the very low extract amounts would not normally suggest residual staining as a result of migration, hydrocarbons are present and GCMS data suggest the material is mature. The carbon isotope value of $\delta 13C = -26.8\%$ rules out the local Kimmeridgian as a possible source of this material and the relatively low pristane content appears to exclude the Lower Coal Unit (Ref 1). In view of the low amounts of material extracted and the apparent lack of correlation with source rocks within the well, three possibilities could account for the presence of hydrocarbons in core 2:-

1. Indigenous, locally sourced hydrocarbons from adjacent mudstones.

2. Migration from an unidentified source.

3. Contamination.

At present, there are insufficient data to establish which of these is applicable. The results indicate the section penetrated is not on a significant migration pathway. The possibility of an oil migration route in close lateral proximity cannot be discounted or proved.

3. REFERENCES

(1) Ward, H.E. and Woodhouse, R.F. 1983, GCB/19/83

TABLE 1

Sample	Depth m	Stratigraphy	Lithological Description
Core 1/1	2880.5-2880.78 = 2.0m below top SST	Mid Jurassic Sandstone	Silver-grey sandstone, friable, a few black carbonaceous patches and light mica grains. Quartz grains sub-rounded with occasional coarser angular grains.
Core 1/2	2880.89-2881.14	Mid Jurassic Sandstone	Dark brown sandstone, very friable, small dark carbonaceous fragments and occasional mica grains. Quartz better sorted, more rounded and finer than core 1/1
Core 2/1	3080.73-3080.88 20cm below top SST	Lower Jurassic Sandstone	Brown-white sandstone, very friable, course grained, sub-angular quartz grains set in calcareous matrix
Core 2/2	3080.88-3081.0	Lower Jurassic Sandstone	Pale brown sandstone, very friable course grained quartz grains more rounded and uniform in size than core 2/1. Calcareous matrix.

TABLE 2

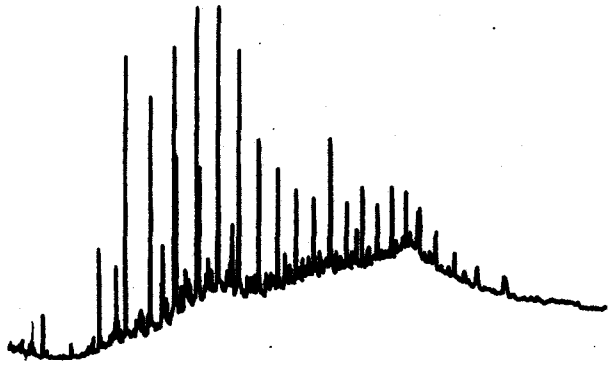
Sample	TSE %wt	SAC %wt	$\delta^{13}C$ %
Core 1/1	0.001	41.3	-27.8
Core 1/2	0.003	41.7	
Core 2/1	0.007	42.4	-26.8
Core 2/2	0.001	20.7	

TABLE 3

MOLECULAR PARAMETERS GC/MS ANALYSIS

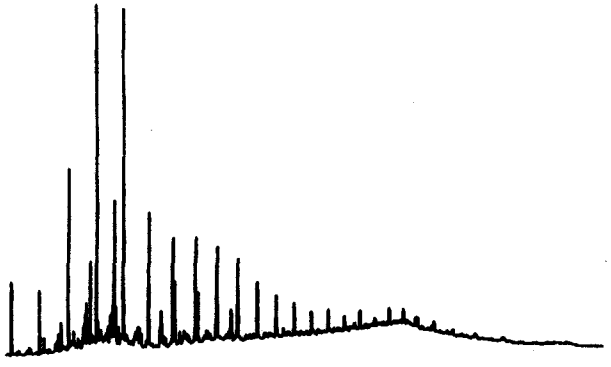
Parameter Code	Core 1/1 Ratio	Core 2/1 Ratio
H1	0.56	0.55
H2	0.38	0.48
H3	0.92	0.86
H6	0.44	0.37
S1	0.43	0.47
S2	0.47	0.45
S3	29.1:21.7:49.0	33.3:25.3:41.3

SAMPLE: CORE 1/1



SAMPLE: CORE 2/2

SAMPLE: CORE 1/2



SAMPLE: CORE 2/1

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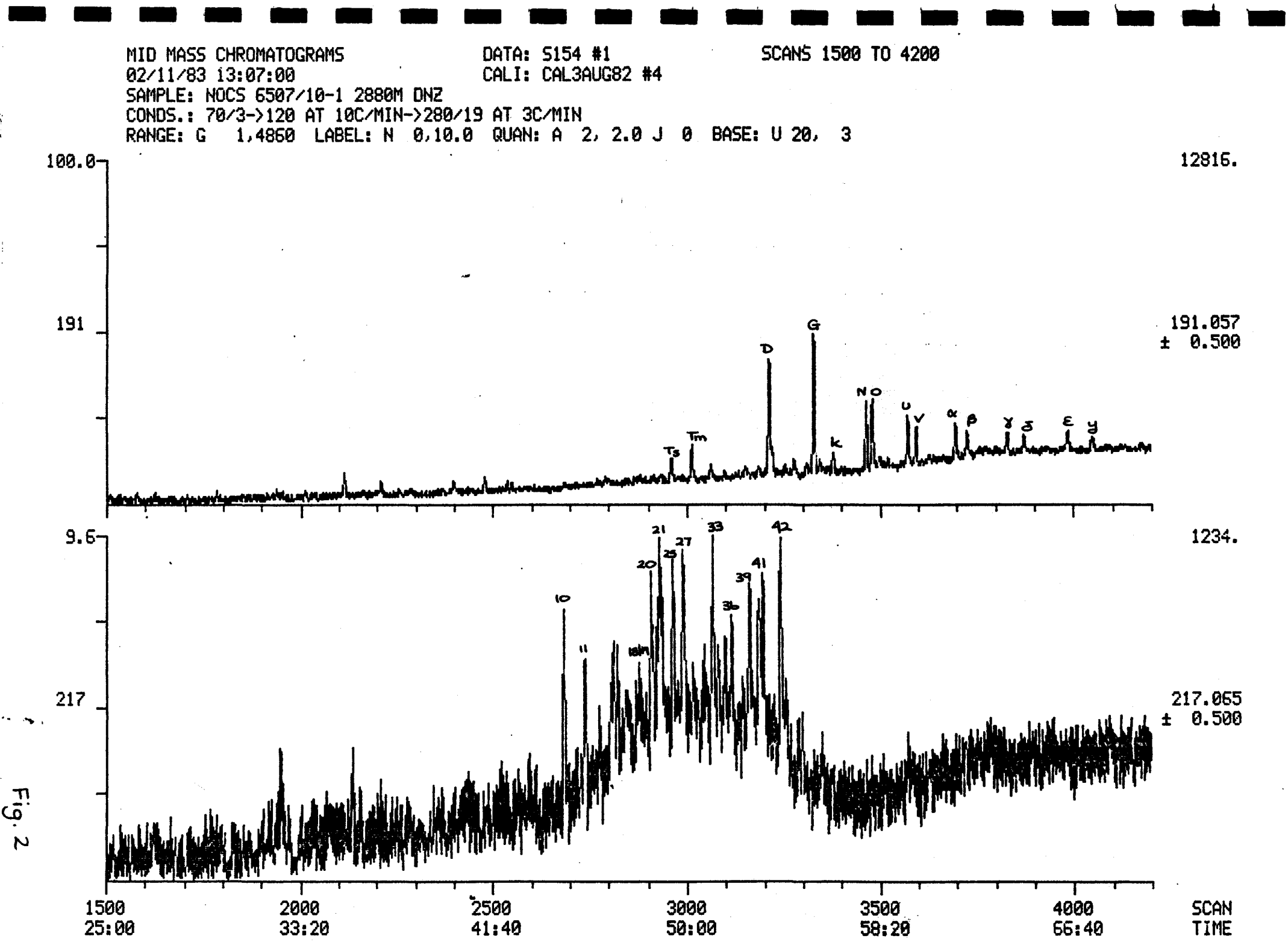
SAC FRACTION GAS CHROMATOGRAMS

Fig. 1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CALI: CAL3AUG82 #4
SCANS 1500 TO 4200
SAMPLE: NOCS 6507/10-1 2880M DNZ
CONDS.: 70/3->120 AT 10C/MIN->280/19 AT 3C/MIN
RANGE: G 1,4860 LABEL: N 0,10.0 QUAN: A 2, 2.0 J 0 BASE: U 20, 3
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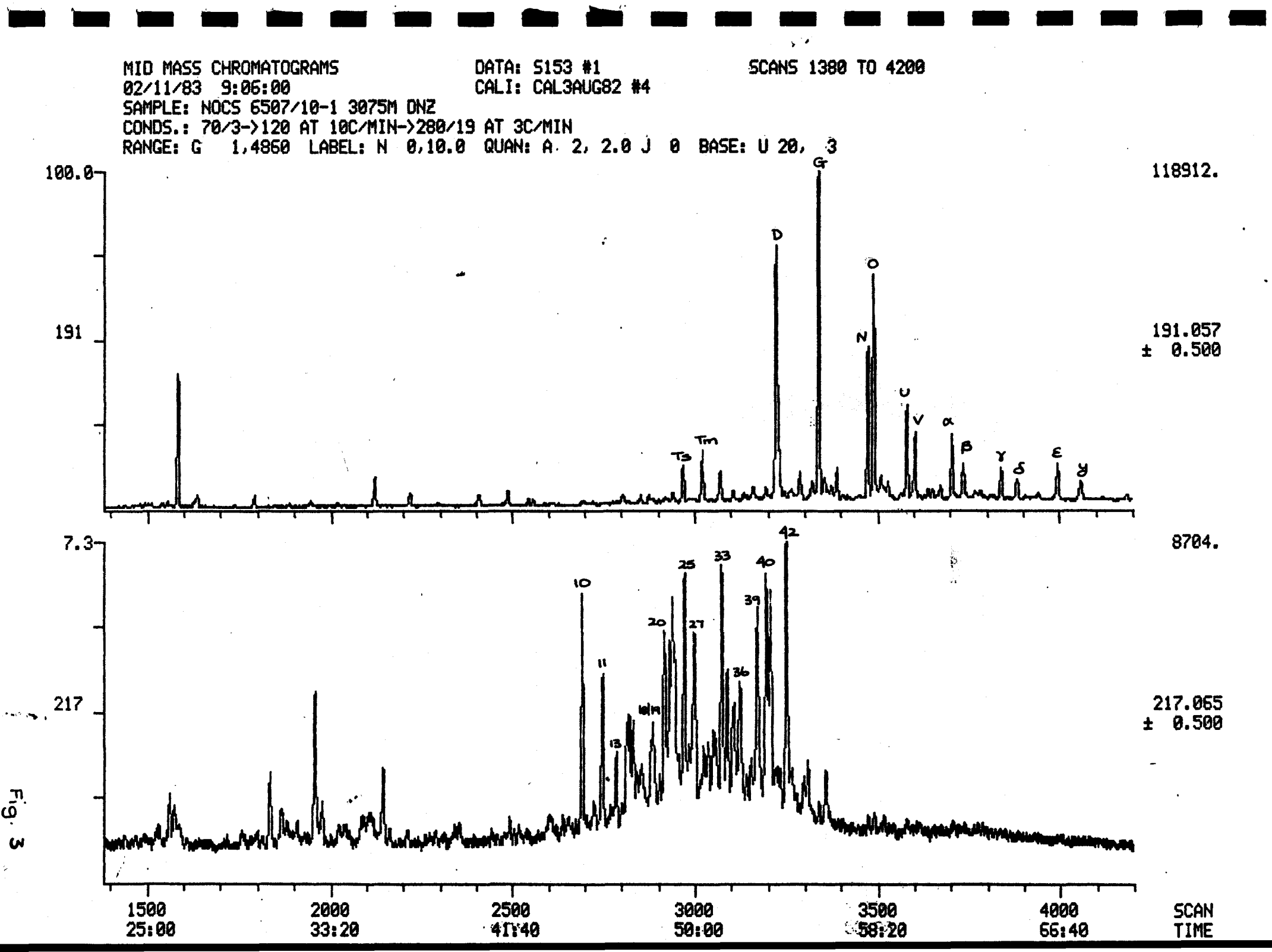
39
41
42
1500
25:00
2000
33:20
2500
41:40
3000
50:00
3500
58:20
4000
66:40
SCAN
TIME

Fig. 2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02/11/83 9:06:00
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CALI: CAL3AUG82 #4
SCANS 1380 TO 4200
SAMPLE: NOCS 6507/10-1 3075M DNZ
CONDS.: 70/3->120 AT 10C/MIN->280/19 AT 3C/MIN
RANGE: G 1,4860 LABEL: N 0,10.0 QUAN: A 2, 2.0 J 0 BASE: U 20, 3
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TIME

Fig. 3