GEOLAB NOR

# Geochemical Report on NOCS Well 2/11-10S Oil and Oil Show : Correlation with Hod and Valhall Oils



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Chapter 1

# INTRODUCTION

## 1.1 General Comments

Eight oils from Valhall and Hod fields and one oil and 3 oil show samples from NOCS well 2/11-10S were analysed. The location of the wells are shown in Figure 1. Table A shows the wells, the respective DST sample numbering and the tested intervals.

**Table A Field oils (Locations and Types)**

| Well | DST | Reservoir | Formation | DEPTH |
|---|---|---|---|---|
| 2/8a-1a | | VALHALL | TOR | |
| 2/8a-4a | | VALHALL | HOD | |
| 2/8-6 | 2 | VALHALL | HOD | 2526-2553 |
| 2/11-1 | 4 | VALHALL | TOR | 2629-2651 |
| 2/11-2 | 2 | HOD WEST | HOD | 2643-2655 |
| 2/11a-2st2 | | HOD EAST | TOR | |
| 2/11a-3 | | HOD EAST | TOR | |
| 2/11a-7a | | HOD EAST | HOD | |
| 2/11-10S | | HOD POD | TOR | |

## 1.2 Analytical Program[1]

Five of the oils, (see table A), were in-house samples of Geolab Nor. All the other oils were received as whole oils. The analytical program for the oils included topping of whole oils, MPLC-separation, whole oil GC, saturate and aromatic hydrocarbon GC, whole oil and compound class $\delta^{13}C$ isotope values and GC-MS of saturate and aromatic hydrocarbons. The analytical program is presented below in Table B.

**Table B**
**Analytical program**

| Analysis type | Sample No. | Figures | Tables |
|---|---|---|---|
| Topping of oils | 5 | - | - |
| Asphaltene precipitation and MPLC separation | 8 | 2 | 1a-b |
| Whole oil GC | 8 | 3a-e | - |
| Saturate and Aromatic Hydrocarbon GC | 9 | 3f-m | 2,3a-b |
| Isotope of $C_{15}$+ fraction | 9 | 4a-b | 4a-b |
| Saturated and Aromatic Hydrocarbon GC-MS | 9 | 5a-o | 5a-i |

All the data for the oil shows (i.e. including lithology description, TOC, Rock-Eval, thermal extraction and pyrolysis-GC, MPLC, GC and isotope and GC-MS data) and oil from 2/11-10S well (MPLC, GC and isotope and GC-MS data) can be found in a separate report on this well. All the data on all the oils, including the oil from 2/11-10S, and the chromatographic, GC-MS and isotope data for the oil shows from 2/11-10S can also be found in the appendices at the back of this correlation report. Whole oil GC and MPLC separation was not performed on the 2/8-6 oil since no oil was available. Earlier separated fractions of this oil were analysed again.

[1]This is for the oils, the oil shows are the subject of a separate report on well 2/11-10s.

# EXPERIMENTAL

# Experimental

## 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.

Total organic carbon can also be analysed on the Rock-Eval II Pyrolyser during the normal run of the instrument.

## 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 filtered 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 tetrahydrofuran in a flask and n-pentane is added to precipitate the asphaltenes.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.

## Chromatographic Separation of deasphaltened 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 in a stream of nitrogen. 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 PERKIN ELMER 8320 Gas Chromatograph equipped with an FID detector and an OV1 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 25 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 290oC at a rate of 4oC/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, 25 m SE54 capillary column and effluent splitter connected to FID and FPD detectors allowing simultaneous determination of hydrocarbons and sulphur compounds. Approximately 0.1 microlitres of whole oil are injected and the temperature program on the chromatograph runs from -10°C to 300°C at 4°C/min.

**Combined Gas Chromatography - Mass Spectrometry (GC-MS)**

The GC-MS analyses are performed on a VG TS250 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 2500 (10 % value).

The data system used is a VG PDP11/73 for acquiring data, and a Vax station 3100 for peak processing the data. 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 163 for detection of 25,28,30 trisnormoretane or 25,28,30 trisnorhopane, 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. The molecular ions M/Z 370 and 384 are also recorded for identification of $C_{27}$ and $C_{28}$ triterpanes respectively.

### Steranes

The most commonly used fragment ions for detection of steranes are M/Z 149 to distinguish between 5α and 5β steranes, M/Z 189 and 259 for detection of rearranged steranes, M/Z 217 for detection of rearranged and normal steranes and M/Z 218 for detection of 14β(H) 17β(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 $C_2$-

naphthalenes are detected by M/Z 156 and $C_3$-naphthalenes by M/Z 170.

**Benzothiophenes and Dibenzothiophenes**

Benzothiophene can be detected, as mentioned above, by M/Z 134. The M/Z 184 fragment ion is used to detect the dibenzothiophenes. The M/Z 198 and M/Z 212 fragment ions are 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, while the M/Z 206 fragment ion shows the dimethyl-substituted phenanthrenes and the M/Z 220 fragment ion shows the $C_3$ substituted phenanthrenes.

**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)

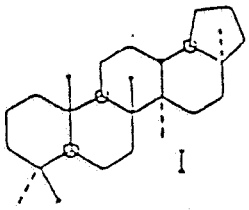
Peak Identification: (α and β refer to hydrogen atoms at C-17 and C-21 respectively unless indicated otherwise).

| | | | |
|---|---|---|---|
| 27Ts | 18α trisnorneohopane ($T_s$) | $C_{27}H_{44}$ | ( I) |
| 27Tm | 17α trisnorhopane ($T_m$) | $C_{27}H_{46}$ | ( II, R=H) |
| 28αβ | Bisnorhopane | $C_{28}H_{48}$ | ( IV) |
| 25nor30αβ* | norhopane | $C_{29}H_{50}$ | |
| 29αβ | αβ norhopane | $C_{29}H_{50}$ | ( II, R=$C_2H_5$) |
| 29Ts | norneohopane | $C_{29}H_{50}$ | |
| 29βα | βα norhopane | $C_{29}H_{50}$ | ( III, R=$C_2H_5$) |
| 30αβ | αβ hopane | $C_{30}H_{52}$ | ( II, R=i-$C_3H_7$) |
| 30O | Oleanane | $C_{30}H_{52}$ | |
| 30βα | βα hopane | $C_{30}H_{52}$ | ( III, R=i-$C_3H_7$) |
| 31αβS | 22S αβ homohopane | $C_{31}H_{54}$ | ( II, R=i-$C_4H_9$) |
| 31αβR | 22R αβ homohopane | $C_{31}H_{54}$ | ( II, R=i-$C_4H_9$) |
| 30G | gammacerane | $C_{30}H_{52}$ | |
| 31βα | βα homohopane | $C_{31}H_{54}$ | ( III, R=i-$C_4H_9$) |
| 32αβS | 22S αβ bishomohopane | $C_{32}H_{56}$ | ( II, R=i-$C_5H_{11}$) |
| 32αβR | 22R αβ bishomohopane | $C_{32}H_{56}$ | ( II, R=i-$C_5H_{11}$) |
| 33αβS | 22S αβ trishomohopane | $C_{33}H_{56}$ | ( II, R=i-$C_5H_{11}$) |
| 33αβR | 22R αβ trishomohopane | $C_{33}H_{58}$ | ( II, R=i-$C_6H_{13}$) |
| 34αβS | 22S αβ tetrakishomohopane | $C_{34}H_{60}$ | ( II, R=i-$C_7H_{15}$) |
| 34αβR | 22R αβ tetrakishomohopane | $C_{34}H_{60}$ | ( II, R=i-$C_7H_{15}$) |
| 35αβS | 22S αβ pentakishomohopane | $C_{35}H_{62}$ | ( II, Ri-$C_8H_{17}$) |
| 35αβR | 22R αβ pentakishomohopane | $C_{35}H_{62}$ | ( II, R=i-$C_8H_{17}$) |
| 23/3 | Tricyclic terpane | $C_{23}H_{42}$ | ( V, R=i-$C_4H_9$) |
| 24/3 | Tricyclic terpane | $C_{24}H_{44}$ | ( V, R=i-$C_5H_{11}$) |
| 25/3 | Tricyclic terpane (17R, 17S) | $C_{25}H_{66}$ | ( V, R=i-$C_6H_{13}$) |
| 24/4 | Tetracyclic terpane | $C_{24}H_{42}$ | ( VI) |
| 26/3 | Tricyclic terpane (17R, 17S) | $C_{26}H_{48}$ | ( V, R=i-$C_7H_{15}$) |

| | | | |
|---|---|---|---|
| 21/3 | Tricyclic terpane | $C_{21}H_{38}$ | ( V, R=$C_2H_5$) |
| 22/3 | Tricyclic terpane | $C_{22}H_{40}$ | ( V, R=$C_3H_7$) |
| 25nor28αβ* | 25,28,30-trisnorhopane/moretane | $C_{27}H_{46}$ | ( VII) |
| 30d | αβ diahopane | $C_{30}H_{52}$ | ( VIII) |

* Also identified and quantified in M/Z 177 fragmentograms

## STRUCTURES REPRESENTING TERPANES



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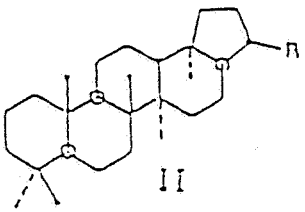


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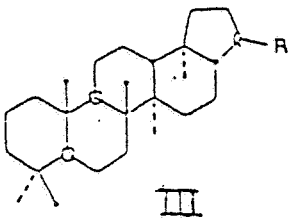


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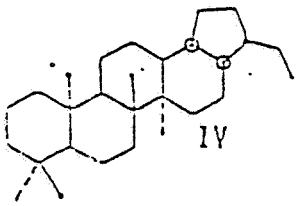

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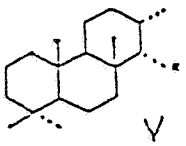

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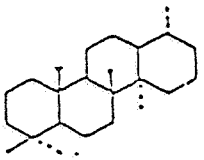

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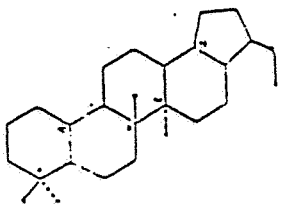

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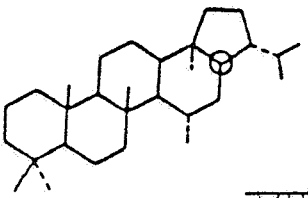


VIII

## Mass Fragmentograms representing Steranes

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

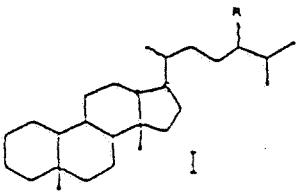
Peak Identifications: α and β refer to hydrogen atoms at C-5, C-14 and C-17 in regular steranes and at C-13 and C-17 in diasteranes.

| | | | |
|---|---|---|---|
| 21α | 5α sterane | $C_{21}H_{36}$ | (VI, R=$C_2H_5$) |
| 22α | 5α sterane | $C_{22}H_{38}$ | (VI, R=$C_3H_7$) |
| 27dβS | 20S βα diacholestane | $C_{27}H_{48}$ | ( I, R=H) |
| 27dαR | 20R βα diacholestane | $C_{27}H_{48}$ | ( I, R=H) |
| 27dαS | 20S αβ diacholestane | $C_{27}H_{48}$ | ( II, R=H) |
| 27dαR | 20R αβ diacholestane | $C_{27}H_{48}$ | ( II, R=H) |
| 28dβS | 20S βα 24-methyl-diacholestane | $C_{28}H_{50}$ | ( I, R=$CH_3$) |
| 28dβR | 20R βα 24-methyl-diacholestane | $C_{28}H_{50}$ | ( I, R=$CH_3$) |
| 28dαR | 20R αβ 24-methyl-diacholestane | $C_{28}H_{50}$ | ( II, R=$CH_3$) |
| 27ααS | + 20S ααα cholestane | $C_{27}H_{48}$ | (III, R=H) |
| 29dβS | 20S βα 24-ethyl-diacholestane | $C_{29}H_{52}$ | ( II, R=$C_2H_5$) |
| 27βββR* | + 20R αββ cholestane | $C_{27}H_{48}$ | ( IV, R=H) |
| 27βββS* | 20S αββ cholestane | $C_{27}H_{48}$ | ( IV, R=H) |
| 28dαS | + 20S αβ 24-methyl-diacholestane | $C_{28}H_{50}$ | ( II, R=$CH_3$) |
| 27ααR | 20R ααα cholestane | $C_{27}H_{48}$ | (III, R=H) |
| 29dβR | 20R βα 24-ethyl-diacholestane | $C_{29}H_{52}$ | ( I, R=$C_2H_5$) |
| 29dαR | 20R αβ 24-ethyl-diacholestane | $C_{29}H_{52}$ | ( II, R=$C_2H_5$) |
| 28ααS | 20S ααα 24-methyl-cholestane | $C_{28}H_{50}$ | (III, R=$CH_3$) |
| 28βββR* | 20R αββ 24-methyl-cholestane | $C_{28}H_{50}$ | ( IV, R=$CH_3$) |
| 29dαS | + 20S αβ 24-ethyl-diacholestane | $C_{29}H_{52}$ | ( II, R=$C_2H_5$) |
| 28βββS* | 20S αββ 24-methyl-cholestane | $C_{28}H_{50}$ | ( IV, R=$CH_3$) |
| 28ααR | 20R ααα 24-methyl-cholestane | $C_{28}H_{50}$ | (III, R=$CH_3$) |
| 29ααS | 20S ααα 24-ethyl-cholestane | $C_{29}H_{52}$ | (III, R=$C_2H_5$) |
| 29βββR* | 20R αββ 24-ethyl-cholestane | $C_{29}H_{52}$ | ( IV, R=$C_2H_5$) |
| 29βββS* | 20S αββ 24-ethyl-cholestane | $C_{29}H_{52}$ | ( IV, R=$C_2H_5$) |
| 29ααR | 20R ααα 24-ethyl-cholestane | $C_{29}H_{52}$ | (III, R=$C_2H_5$) |
| M30αα | αα 4-methyl-24-ethyl-cholestane | $C_{30}H_{54}$ | |

| | | | |
|---|---|---|---|
| M30D | αα 4,23,24-trimethyl-cholestane | $C_{30}H_{54}$ | |
| 30ααS | 20S ααα 24-propyl-cholestane | $C_{30}H_{54}$ | ( M, R=$C_3H_7$) |
| 30ββR* | 20R αββ 24-propyl-cholestane | $C_{30}H_{54}$ | ( V, R=$C_3H_7$) |
| 30ββS* | 20S αββ 24-propyl-cholestane | $C_{30}H_{54}$ | ( M, R=$C_3H_7$) |
| 30ααR | 20R ααα-24-propyl-cholestane | $C_{30}H_{54}$ | ( M, R=$C_3H_7$) |

* Compounds identified and quantified in M/Z 218 fragmentograms

## STRUCTURES REPRESENTING STERANES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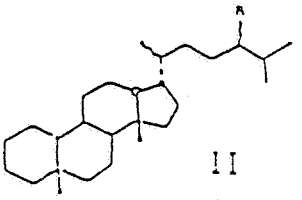
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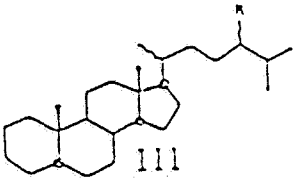
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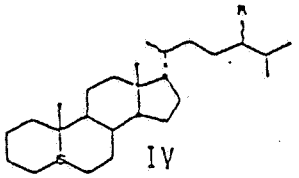
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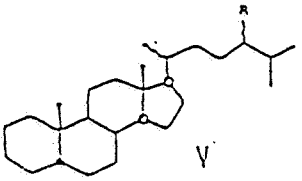
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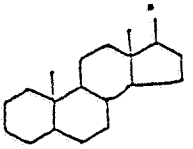
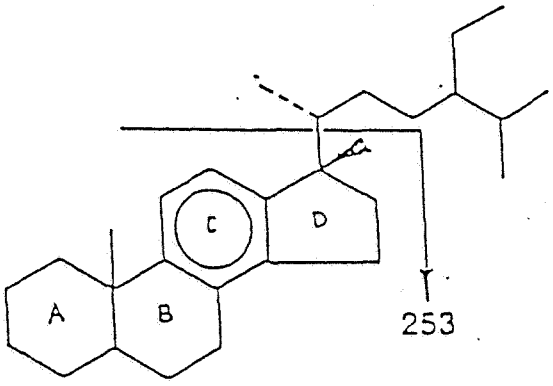

VI

## Mass Fragmentograms representing Monoaromatic Steranes (M/Z 253)

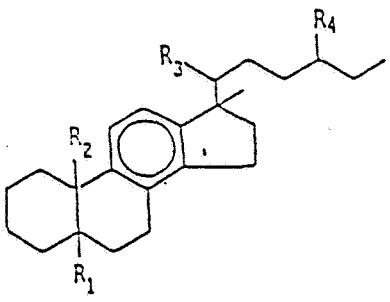
Description of C-ring monoaromatic steroid hydrocarbons

| Peak | Substituents $R_1$ | $R_2$ | $R_3$ | $R_4$ | Abbreviation of Compound |
|---|---|---|---|---|---|
| A1 | | | | | $C_{21}M$ |
| B1 | | | | | $C_{22}MA$ |
| C1 | β(H) | $CH_3$ | $S(CH_3)$ | H | $\beta SC_{27}MA$ |
| | β(H) | $CH_3$ | $R(CH_3)$ | H | $\beta RC_{27}MA$ |
| D1 | $CH_3$ | H | $R(CH_3)$ | H | $RC_{27}DMA$ |
| | α(H) | $CH_3$ | $S(CH_3)$ | H | $\alpha SC_{27}MA$ |
| E1 | β(H) | $CH_3$ | $S(CH_3)$ | $CH_3$ | $\beta SC_{28}MA$ |
| | $CH_3$ | H | $S(CH_3)$ | $CH_3$ | $SC_{28}DMA$ |
| F1 | α(H) | $CH_3$ | $R(CH_3)$ | H | $\alpha RC_{27}MA$ |
| | α(H) | $CH_3$ | $S(CH_3)$ | $CH_3$ | $\alpha SC_{28}MA$ |
| | β(H) | $CH_3$ | $R(CH_3)$ | $CH_3$ | $\beta RC_{28}MA$ |
| G1 | $CH_3$ | H | $R(CH_3)$ | $CH_3$ | $RC_{28}DMA$ |
| | β(H) | $CH_3$ | $S(CH_3)$ | $C_2H_5$ | $\beta SC_{29}MA$ |
| | $CH_3$ | H | $S(CH_3)$ | $C_2H_5$ | $SC_{29}DMA$ |
| | α(H) | $CH_3$ | $R(CH_3)$ | $CH_3$ | $\alpha RC_{28}MA$ |
| H1 | β(H) | $CH_3$ | $R(CH_3)$ | $C_2H_5$ | $\beta RC_{29}MA$ |
| | $CH_3$ | H | $R(CH_3)$ | $C_2H_5$ | $RC_{29}DMA$ |
| I1 | α(H) | $CH_3$ | $R(CH_3)$ | $C_2H_5$ | $\alpha RC_{29}MA$ |

# STRUCTURES REPRESENTING MONOAROMATIC STERANES




I

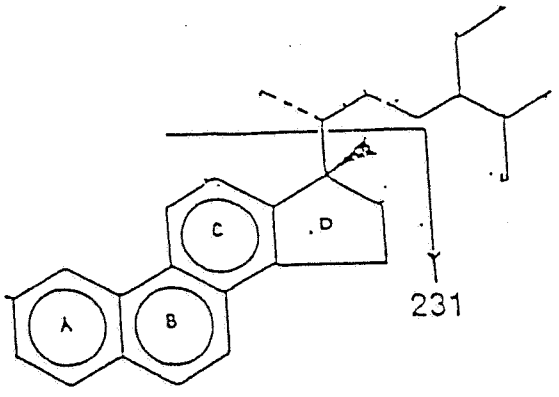


## Mass Fragmentograms representing Triaromatic Steranes (M/Z 231)

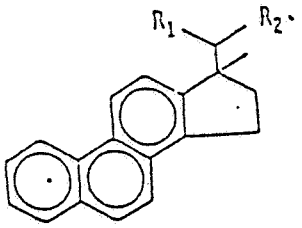
Description of ABC-ring triaromatic steroid hydrocarbons

| | Substituents | | Abbreviation |
|---|---|---|---|
| **Peak** | **$R_1$** | **$R_2$** | **of Compound** |
| a1 | $CH_3$ | H | $C_{20}TA$ |
| b1 | $CH_3$ | $CH_3$ | $C_{21}TA$ |
| c1 | $S(CH_3)$ | $C_6H_{1-3}$ | $SC_{26}TA$ |
| d1 | $R(CH_3)$ | $C_6H_{13}$ | $RC_{26}TA$ |
| | $S(CH_3)$ | $C_7H_{15}$ | $SC_{27}TA$ |
| e1 | $S(CH_3)$ | $C_8H_{17}$ | $SC_{28}TA$ |
| f1 | $S(CH_3)$ | $C_7H_{15}$ | $RC_{27}TA$ |
| g1 | $R(CH_3)$ | $C_8H_{17}$ | $RC_{28}TA$ |

# 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 $H_2O$ and $CO_2$ are trapped in individual cool traps. The $CO_2$ 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:

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

$$R = {}^{13}C/{}^{12}C$$

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

## Reproducibility

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# APPENDIX 1:

# TABLES

Table 1a: Weight of Oil and Chromatographic Fraction for OIL CORRELATION



| Well | Description | Topped (mg) | Sat (mg) | Aro (mg) | Asph (mg) | NSO (mg) | HC (mg) | Non-HC mg | Sample |
|---|---|---|---|---|---|---|---|---|---|
| 2/11-1 | DST 4 | 40.3 | 20.0 | 11.1 | 1.5 | 7.7 | 31.1 | 9.2 | K77/0005 |
| 2/11-10S | | 75.8 | 72.6 | 1.6 | 0.1 | 1.5 | 74.3 | 1.6 | K77/0001 |
| 2/11-2 | DST 2 | 72.4 | 40.8 | 21.0 | 1.6 | 9.0 | 61.8 | 10.6 | K77/0006 |
| 2/11A-2St2 | | 55.0 | 29.4 | 15.6 | 1.0 | 9.0 | 45.0 | 10.0 | K77/0007 |
| 2/11A-3 | | 81.6 | 44.4 | 23.4 | 1.0 | 12.8 | 67.8 | 13.8 | K77/0008 |
| 2/11A-7A | | 75.5 | 46.4 | 17.4 | 1.1 | 10.6 | 63.8 | 11.7 | K77/0009 |
| 2/8-6 | DST 2 | 24.2 | 12.9 | 5.7 | 1.1 | 4.5 | 18.6 | 5.6 | K77/0004 |
| 2/8A-1A | | 16.6 | 8.9 | 4.5 | 0.3 | 3.0 | 13.4 | 3.3 | K77/0002 |
| 2/8A-4A | | 9.3 | 4.8 | 2.7 | 0.1 | 1.7 | 7.5 | 1.7 | K77/0003 |
| OIL MUD | | 72.8 | 20.7 | 52.0 | - | - | 72.8 | - | K77/0010 |

Table 1b: Composition of the oil fraction (%) for OIL CORRELATION



| Well | Description | Sat T.Oil | Aro T.Oil | Asph T.Oil | NSO T.Oil | HC T.Oil | Non-HC T.Oil | Sat Aro | HC Non-HC | Sample |
|---|---|---|---|---|---|---|---|---|---|---|
| 2/11-1 | DST 4 | 49.63 | 27.54 | 3.72 | 19.11 | 77.17 | 22.83 | 180.18 | 338.04 | K77/0005 |
| 2/11-10S | | 95.72 | 2.18 | 0.13 | 1.98 | 97.89 | 2.11 | 4400.00 | 4640.63 | K77/0001 |
| 2/11-2 | DST 2 | 56.35 | 29.01 | 2.21 | 12.43 | 85.36 | 14.64 | 194.29 | 583.02 | K77/0006 |
| 2/11A-2St2 | | 53.45 | 28.36 | 1.82 | 16.36 | 81.82 | 18.18 | 188.46 | 450.00 | K77/0007 |
| 2/11A-3 | | 54.41 | 28.68 | 1.23 | 15.69 | 83.09 | 16.91 | 189.74 | 491.30 | K77/0008 |
| 2/11A-7A | | 61.46 | 23.05 | 1.46 | 14.04 | 84.50 | 15.50 | 266.67 | 545.30 | K77/0009 |
| 2/8-6 | DST 2 | 53.31 | 23.55 | 4.55 | 18.60 | 76.86 | 23.14 | 226.32 | 332.14 | K77/0004 |
| 2/8A-1A | | 53.15 | 27.03 | 1.80 | 18.02 | 80.18 | 19.82 | 196.67 | 404.55 | K77/0002 |
| 2/8A-4A | | 51.89 | 29.19 | 1.08 | 17.84 | 81.08 | 18.92 | 177.78 | 428.57 | K77/0003 |
| OIL MUD | | 28.45 | 71.55 | - | - | 100.00 | - | 39.77 | - | K77/0010 |

Table 2: Saturated Hydrocarbon Ratios for OIL CORRELATION



| Well | Description | Pristane / nC17 | Pristane / Phytane | Pristane/nC17 / Phytane/nC18 | Phytane / nC18 | CPI1 | nC17 / nC17+nC27 | Sample |
|---|---|---|---|---|---|---|---|---|
| 2/11-1 | DST 4 | 0.51 | 1.23 | 1.11 | 0.46 | 1.10 | 0.88 | K77/0005 |
| 2/11-10S | | 0.51 | 1.34 | 1.17 | 0.43 | 1.14 | 0.91 | K77/0001 |
| 2/11-2 | DST 2 | 0.51 | 1.39 | 1.27 | 0.40 | 1.13 | 0.90 | K77/0006 |
| 2/11A-2St2 | | 0.56 | 1.20 | 1.06 | 0.53 | 1.13 | 0.89 | K77/0007 |
| 2/11A-3 | | 0.57 | 1.33 | 1.19 | 0.48 | 1.13 | 0.90 | K77/0008 |
| 2/11A-7A | | 0.53 | 1.32 | 1.18 | 0.45 | 1.14 | 0.91 | K77/0009 |
| 2/8-6 | DST 2 | 0.53 | 1.31 | 1.16 | 0.45 | 1.10 | 0.88 | K77/0004 |
| 2/8A-1A | | 0.50 | 1.33 | 1.21 | 0.41 | 1.12 | 0.87 | K77/0002 |
| 2/8A-4A | | 0.46 | 1.33 | 1.21 | 0.38 | 1.12 | 0.87 | K77/0003 |
| OIL MUD | | - | - | - | - | - | - | K77/0010 |

Table 3a: Aromatic Hydrocarbon Ratios for OIL CORRELATION



| Well | Description | MNR | DMNR | BPhR | 2/1MP | MPI1 | MPI2 | Rc | DBT/P | 4/1MDBT | (3+2) /1MDBT | Sample |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2/11-1 | DST 4 | 0.96 | 1.22 | - | - | - | - | - | - | - | - | K77/0005 |
| 2/11-10S | | 1.09 | 1.50 | - | 1.18 | 0.77 | 0.92 | 0.86 | - | - | - | K77/0001 |
| 2/11-2 | DST 2 | 1.15 | 1.76 | - | 0.89 | 0.61 | 0.71 | 0.77 | - | 1.50 | 0.49 | K77/0006 |
| 2/11A-2St2 | | 1.08 | 1.61 | - | 1.00 | 0.66 | 0.75 | 0.80 | - | 1.18 | - | K77/0007 |
| 2/11A-3 | | 1.12 | 1.54 | - | 0.98 | 0.67 | 0.77 | 0.80 | - | 1.36 | 0.59 | K77/0008 |
| 2/11A-7A | | 1.09 | 1.63 | - | 0.94 | 0.68 | 0.79 | 0.81 | - | 1.70 | 0.46 | K77/0009 |
| 2/8-6 | DST 2 | 0.71 | 1.25 | - | 1.06 | 0.75 | 0.84 | 0.85 | - | 1.98 | 0.44 | K77/0004 |
| 2/8A-1A | | 1.03 | 1.47 | - | 0.97 | 0.69 | 0.78 | 0.81 | - | 1.87 | 0.50 | K77/0002 |
| 2/8A-4A | | 0.70 | 1.36 | 0.09 | 0.93 | 0.69 | 0.77 | 0.81 | - | 1.95 | - | K77/0003 |
| OIL MUD | | - | - | - | - | - | - | - | - | - | - | K77/0010 |

Table 3b: Aromatic Hydrocarbon Ratios for OIL CORRELATION



| Well | Description | F1 | F2 | Sample |
|---|---|---|---|---|
| 2/11-1 | DST 4 | - | - | K77/0005 |
| 2/11-10S | | 0.44 | 0.26 | K77/0001 |
| 2/11-2 | DST 2 | 0.40 | 0.23 | K77/0006 |
| 2/11A-2St2 | | 0.42 | 0.24 | K77/0007 |
| 2/11A-3 | | 0.42 | 0.24 | K77/0008 |
| 2/11A-7A | | 0.41 | 0.24 | K77/0009 |
| 2/8-6 | DST 2 | 0.44 | 0.25 | K77/0004 |
| 2/8A-1A | | 0.42 | 0.24 | K77/0002 |
| 2/8A-4A | | 0.41 | 0.23 | K77/0003 |
| OIL MUD | | - | - | K77/0010 |

Table 4a: Tabulation of carbon isotope data on oils for OIL CORRELATION



| Well | Descript. | Whole oil | Topped oil | Saturated | Aromatic | NSO | Asphaltenes | Sample |
|---|---|---|---|---|---|---|---|---|
| 2/11-1 | DST 4 | -27.65 | - | -27.91 | -27.30 | -27.26 | -27.42 | K77/0005 |
| 2/11-10S | | -27.70 | -27.84 | -28.04 | -27.67 | -27.78 | -27.85 | K77/0001 |
| 2/11-2 | DST 2 | -29.05 | -29.11 | -29.35 | -28.80 | -28.38 | -28.72 | K77/0006 |
| 2/11A-2St2 | | -27.89 | -27.84 | -28.03 | -27.55 | -27.70 | -28.11 | K77/0007 |
| 2/11A-3 | | -27.87 | -27.77 | -28.10 | -27.65 | -27.78 | -27.90 | K77/0008 |
| 2/11A-7A | | -27.81 | -27.80 | -27.96 | -27.68 | -27.68 | -28.06 | K77/0009 |
| 2/8-6 | DST 2 | - | - | -27.87 | -27.27 | -27.36 | -27.37 | K77/0004 |
| 2/8A-1A | | -27.60 | - | -27.83 | -26.96 | -27.15 | -27.34 | K77/0002 |
| 2/8A-4A | | -27.55 | - | -27.70 | -27.05 | -27.11 | -27.23 | K77/0003 |

Table 4b: Tabulation of cv values from carbon isotope data for OIL CORRELATION



| Well | Descript. | Saturated | Aromatic | cv value | Sample |
|---|---|---|---|---|---|
| 2/11-1 | DST 4 | -27.91 | -27.30 | -1.64 | K77/0005 |
| 2/11-10S | | -28.04 | -27.67 | -2.14 | K77/0001 |
| 2/11-2 | DST 2 | -29.35 | -28.80 | -1.33 | K77/0006 |
| 2/11A-2St2 | | -28.03 | -27.55 | -1.90 | K77/0007 |
| 2/11A-3 | | -28.10 | -27.65 | -1.94 | K77/0008 |
| 2/11A-7A | | -27.96 | -27.68 | -2.36 | K77/0009 |
| 2/8-6 | DST 2 | -27.87 | -27.27 | -1.68 | K77/0004 |
| 2/8A-1A | | -27.83 | -26.96 | -1.09 | K77/0002 |
| 2/8A-4A | | -27.70 | -27.05 | -1.62 | K77/0003 |

Table 5A: Variation in Triterpane Distribution (peak height) SIR for OIL CORRELATION



| Well | Descript. | Ratio1 | Ratio2 | Ratio3 | Ratio4 | Ratio5 | Ratio6 | Ratio7 | Ratio8 | Ratio9 | Rat.10 | Rat.11 | Rat.12 | Rat.13 | Rat.14 | Sample |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2/11-1 | DST 4 | 1.02 | 0.51 | 0.09 | 0.62 | 0.38 | 0.05 | 0.11 | 0.18 | 0.10 | 0.05 | 0.90 | 0.39 | 0.13 | 57.19 | K77/0005 |
| 2/11-10S | | 1.08 | 0.52 | 0.10 | 0.58 | 0.37 | 0.03 | 0.10 | 0.16 | 0.09 | 0.03 | 0.90 | 0.37 | 0.12 | 57.84 | K77/0001 |
| 2/11-2 | DST 2 | 1.01 | 0.50 | 0.11 | 0.58 | 0.37 | 0.04 | 0.08 | 0.13 | 0.07 | 0.03 | 0.90 | 0.37 | 0.11 | 58.30 | K77/0006 |
| 2/11A-2St2 | | 1.14 | 0.53 | 0.11 | 0.59 | 0.37 | 0.04 | 0.09 | 0.16 | 0.08 | 0.03 | 0.90 | 0.37 | 0.12 | 56.90 | K77/0007 |
| 2/11A-3 | | 1.07 | 0.52 | 0.10 | 0.56 | 0.36 | 0.03 | 0.09 | 0.16 | 0.08 | 0.04 | 0.90 | 0.36 | 0.12 | 58.23 | K77/0008 |
| 2/11A-7A | | 1.04 | 0.51 | 0.11 | 0.58 | 0.37 | 0.04 | 0.07 | 0.13 | 0.07 | 0.03 | 0.90 | 0.37 | 0.11 | 57.38 | K77/0009 |
| 2/8-6 | DST 2 | 1.04 | 0.51 | 0.12 | 0.57 | 0.36 | 0.04 | 0.07 | 0.12 | 0.06 | 0.03 | 0.90 | 0.37 | 0.12 | 58.91 | K77/0004 |
| 2/8A-1A | | 0.93 | 0.48 | 0.12 | 0.56 | 0.36 | 0.05 | 0.05 | 0.09 | 0.05 | 0.03 | 0.90 | 0.36 | 0.11 | 58.49 | K77/0002 |
| 2/8A-4A | | 0.86 | 0.46 | 0.11 | 0.51 | 0.34 | 0.04 | 0.05 | 0.09 | 0.04 | 0.04 | 0.91 | 0.34 | 0.11 | 58.81 | K77/0003 |
| OIL MUD | | - | - | - | - | - | - | - | - | - | - | - | - | - | - | K77/0010 |

## 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 5B: Variation in Sterane Distribution (peak height) SIR for OIL CORRELATION

| Well | Descript. | Ratio1 | Ratio2 | Ratio3 | Ratio4 | Ratio5 | Ratio6 | Ratio7 | Ratio8 | Ratio9 | Ratio10 | Sample |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2/11-1 | DST 4 | 0.29 | 21.74 | 52.71 | 0.99 | 0.72 | 0.15 | 0.11 | 0.36 | 0.28 | 0.71 | K77/0005 |
| 2/11-10S | | 0.26 | 22.10 | 50.43 | 0.92 | 0.70 | 0.17 | 0.13 | 0.34 | 0.28 | 0.65 | K77/0001 |
| 2/11-2 | DST 2 | 0.37 | 29.47 | 55.29 | 0.97 | 0.68 | 0.19 | 0.14 | 0.38 | 0.42 | 0.88 | K77/0006 |
| 2/11A-2St2 | | 0.26 | 22.94 | 49.19 | 0.85 | 0.68 | 0.17 | 0.13 | 0.33 | 0.30 | 0.63 | K77/0007 |
| 2/11A-3 | | 0.26 | 22.91 | 50.61 | 0.93 | 0.69 | 0.24 | 0.18 | 0.34 | 0.30 | 0.66 | K77/0008 |
| 2/11A-7A | | 0.29 | 25.60 | 50.91 | 0.89 | 0.67 | 0.18 | 0.13 | 0.34 | 0.34 | 0.70 | K77/0009 |
| 2/8-6 | DST 2 | 0.31 | 25.61 | 53.87 | 0.93 | 0.70 | 0.20 | 0.15 | 0.37 | 0.34 | 0.79 | K77/0004 |
| 2/8A-1A | | 0.39 | 31.25 | 61.60 | 0.88 | 0.72 | 0.22 | 0.16 | 0.45 | 0.45 | 1.17 | K77/0002 |
| 2/8A-4A | | 0.38 | 30.59 | 60.68 | 0.91 | 0.72 | 0.24 | 0.18 | 0.44 | 0.44 | 1.11 | K77/0003 |
| OIL MUD | | - | - | - | - | - | - | - | - | - | - | K77/0010 |

List of Sterane Distribution Ratios

Ratio 1: 27dßS / 27dßS+27aaR

Ratio 2: 29aaS / 29aaS+29aaR (%)

Ratio 3: 2*(29ßßR+29ßßS) / (29aaS+29aaR + 2*(29ßßR+29ßßS)) (%)

Ratio 4: 27dßS+27dßR+27daS+27daR / 29dßS+29dßR+29daS+29daR

Ratio 5: 29ßßR+29ßßS / 29ßßR+29ßßS+29aaS

Ratio 6: 21a+22a / 21a+22a+29aaS+29ßßR+29ßßS+29aaR

Ratio 7: 21a+22a / 21a+22a+28daR+28aaS+29daR+29aaS+29ßßR+29ßßS+29aaR

Ratio 8: 29ßßR+29ßßS / 29aaS+29ßßR+29ßßS+29aaR

Ratio 9: 29aaS / 29aaR

Ratio 10: 29ßßR+29ßßS / 29aaR

Table 5c: Variation in Triaromatic Sterane Distribution (peak height) for OIL CORRELATION



| Well | Descript. | Ratio1 | Ratio2 | Ratio3 | Ratio4 | Ratio5 | Sample |
|---|---|---|---|---|---|---|---|
| 2/11-1 | DST 4 | 0.51 | 0.49 | 0.23 | 0.25 | 0.29 | K77/0005 |
| 2/11-10S | | 0.42 | 0.39 | 0.18 | 0.19 | 0.24 | K77/0001 |
| 2/11-2 | DST 2 | 0.36 | 0.37 | 0.15 | 0.15 | 0.20 | K77/0006 |
| 2/11A-2St2 | | 0.45 | 0.41 | 0.19 | 0.20 | 0.27 | K77/0007 |
| 2/11A-3 | | 0.46 | 0.41 | 0.19 | 0.20 | 0.26 | K77/0008 |
| 2/11A-7A | | 0.46 | 0.41 | 0.19 | 0.21 | 0.27 | K77/0009 |
| 2/8-6 | DST 2 | 0.45 | 0.42 | 0.19 | 0.20 | 0.26 | K77/0004 |
| 2/8A-1A | | 0.47 | 0.47 | 0.21 | 0.22 | 0.27 | K77/0002 |
| 2/8A-4A | | 0.46 | 0.44 | 0.21 | 0.21 | 0.27 | K77/0003 |
| OIL MUD | | - | - | - | - | - | K77/0010 |

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 5d: Variation in Monoaromatic Sterane Distribution (peak height) for OIL CORRELATION



| Well | Descript. | Ratio1 | Ratio2 | Ratio3 | Ratio4 | Sample |
|---|---|---|---|---|---|---|
| 2/11-1 | DST 4 | 0.37 | 0.20 | 0.23 | 0.18 | K77/0005 |
| 2/11-10S | | 0.22 | 0.16 | 0.14 | 0.11 | K77/0001 |
| 2/11-2 | DST 2 | 0.27 | 0.18 | 0.16 | 0.13 | K77/0006 |
| 2/11A-2St2 | | 0.25 | 0.17 | 0.15 | 0.12 | K77/0007 |
| 2/11A-3 | | 0.25 | 0.17 | 0.15 | 0.12 | K77/0008 |
| 2/11A-7A | | 0.35 | 0.25 | 0.20 | 0.16 | K77/0009 |
| 2/8-6 | DST 2 | 0.28 | 0.17 | 0.17 | 0.13 | K77/0004 |
| 2/8A-1A | | 0.30 | 0.21 | 0.19 | 0.16 | K77/0002 |
| 2/8A-4A | | 0.29 | 0.20 | 0.19 | 0.15 | K77/0003 |
| OIL MUD | | - | - | - | - | K77/0010 |

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 5e: Aromatisation of Steranes (peak height) for OIL CORRELATION



| Well | Descript. | Ratio1 | Ratio2 | Sample |
|---|---|---|---|---|
| 2/11-1 | DST 4 | 0.50 | 0.76 | K77/0005 |
| 2/11-10S | | 0.54 | 0.66 | K77/0001 |
| 2/11-2 | DST 2 | 0.43 | 0.80 | K77/0006 |
| 2/11A-2St2 | | 0.55 | 0.65 | K77/0007 |
| 2/11A-3 | | 0.53 | 0.65 | K77/0008 |
| 2/11A-7A | | 0.39 | 0.73 | K77/0009 |
| 2/8-6 | DST 2 | 0.48 | 0.71 | K77/0004 |
| 2/8A-1A | | 0.39 | 0.79 | K77/0002 |
| 2/8A-4A | | 0.38 | 0.80 | K77/0003 |
| OIL MUD | | - | - | K77/0010 |

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

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Table 5F: Raw triterpane data (peak height) m/z 191 SIR for OIL CORRELATION



| Well | Descript. | 23/3 | 24/3 | 25/3 | 24/4 | 26/3 | 27Ts | 27Tm | 28aß | 25nor30aß | Sample |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 29aß | 29Ts | 30d | 29ßa | 30O | 30aß | 30ßa | 30G | 31aßS | |
| | | 31aßR | 32aßS | 32aßR | 33aßS | 33aßR | 34aßS | 34aßR | 35aßS | 35aßR | |
| 2/11-1 | DST 4 | 1228.9 | 635.1 | 420.2 | 545.1 | 351.1 | 1277.7 | 1304.3 | 1383.9 | 0.0 | K77/0005 |
| | | 7596.7 | 2649.4 | 589.1 | 1182.2 | 0.0 | 12210.5 | 1382.7 | 0.0 | 5028.8 | |
| | | 3995.5 | 3918.9 | 2933.6 | 3965.0 | 3074.6 | 2045.0 | 1567.2 | 1064.4 | 973.1 | |
| 2/11-10S | | 1941.4 | 933.7 | 629.9 | 1348.6 | 405.9 | 3515.7 | 3797.1 | 2782.2 | 0.0 | K77/0001 |
| | | 16871.0 | 5805.1 | 975.9 | 2432.6 | 0.0 | 29102.0 | 3271.5 | 0.0 | 11232.1 | |
| | | 8425.2 | 7563.8 | 5513.5 | 6889.7 | 5406.2 | 3529.3 | 2587.1 | 1813.3 | 1541.5 | |
| 2/11-2 | DST 2 | 1912.3 | 800.0 | 607.7 | 1457.4 | 392.9 | 4140.3 | 4191.9 | 2341.0 | 0.0 | K77/0006 |
| | | 17408.2 | 6217.5 | 1226.9 | 2004.2 | 0.0 | 30254.5 | 3421.2 | 0.0 | 12125.0 | |
| | | 9029.9 | 8497.4 | 6078.0 | 7186.0 | 4987.2 | 3522.4 | 2525.3 | 1977.3 | 1489.1 | |
| 2/11A-2St2 | | 2431.6 | 975.6 | 682.2 | 1628.0 | 397.9 | 4028.6 | 4583.1 | 2899.8 | 0.0 | K77/0007 |
| | | 18697.0 | 6325.8 | 1303.7 | 2447.0 | 0.0 | 31789.1 | 3640.6 | 0.0 | 12882.2 | |
| | | 9449.5 | 8338.7 | 6317.3 | 7756.9 | 5670.9 | 3617.2 | 2700.6 | 1925.1 | 1824.1 | |
| 2/11A-3 | | 1252.0 | 585.7 | 345.1 | 732.9 | 259.5 | 1635.3 | 1749.5 | 1254.6 | 0.0 | K77/0008 |
| | | 7665.1 | 2639.8 | 380.5 | 1014.2 | 0.0 | 13688.7 | 1480.7 | 0.0 | 5325.0 | |
| | | 3892.2 | 3257.7 | 2336.8 | 2780.6 | 1960.5 | 1331.6 | 995.4 | 780.4 | 635.6 | |

Table 5F: Raw triterpane data (peak height) m/z 191 SIR for OIL CORRELATION



| Well | Descript. | 23/3 | 24/3 | 25/3 | 24/4 | 26/3 | 27Ts | 27Tm | 28aß | 25nor30aß | Sample |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 29aß | 29Ts | 30d | 29ßa | 30O | 30aß | 30ßa | 30G | 31aßS | |
| | | 31aßR | 32aßS | 32aßR | 33aßS | 33aßR | 34aßS | 34aßR | 35aßS | 35aßR | |
| 2/11A-7A | | 1749.9 | 768.6 | 546.7 | 1298.9 | 294.0 | 3613.8 | 3756.9 | 2056.1 | 0.0 | K77/0009 |
| | | 16259.0 | 5829.2 | 996.2 | 1994.0 | 0.0 | 27907.1 | 3057.0 | 0.0 | 11109.3 | |
| | | 8463.3 | 7623.1 | 5661.4 | 6628.7 | 4723.5 | 3276.1 | 2388.6 | 1808.1 | 1544.7 | |
| 2/8-6 | DST 2 | 2640.0 | 1145.1 | 788.2 | 1952.5 | 514.8 | 5362.0 | 5577.3 | 2519.8 | 0.0 | K77/0004 |
| | | 21812.8 | 7645.5 | 1442.3 | 2978.6 | 0.0 | 38082.6 | 4336.9 | 0.0 | 15230.3 | |
| | | 11681.7 | 10050.4 | 7009.4 | 8762.8 | 6365.0 | 4417.0 | 3348.0 | 2198.5 | 1833.8 | |
| 2/8A-1A | | 2519.4 | 1244.2 | 892.8 | 1984.9 | 490.3 | 5604.2 | 5193.6 | 1735.9 | 0.0 | K77/0002 |
| | | 19880.9 | 7560.7 | 1762.9 | 2310.8 | 0.0 | 35714.2 | 4025.0 | 0.0 | 13981.2 | |
| | | 10342.8 | 9757.6 | 6923.7 | 8428.4 | 5966.6 | 4415.1 | 3111.7 | 1983.9 | 1524.4 | |
| 2/8A-4A | | 1402.5 | 738.3 | 510.9 | 1098.3 | 350.7 | 3083.4 | 2646.5 | 863.3 | 0.0 | K77/0003 |
| | | 9752.5 | 3736.6 | 712.3 | 1189.7 | 0.0 | 19073.1 | 1972.4 | 0.0 | 7159.0 | |
| | | 4946.5 | 4910.2 | 3439.7 | 4212.8 | 2908.5 | 2128.1 | 1419.4 | 950.5 | 749.7 | |
| OIL MUD | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | K77/0010 |
| | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |

Table 5G: Raw sterane data (peak height) m/z 217 SIR for OIL CORRELATION



| Well | Descript. | 21a | 22a | 27dßS | 27dßR | 27daS | 27daR | 28dßS | 28dßR | 28daS* | Sample |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 29dßS* | 28daR* | 27aaR | 29dßR | 29daS | 28aaS | 29daR* | 28ßßS | | |
| | | 28aaR | 29aaS | 29ßßR | 29ßßS | 29aaR | | | | | |
| 2/11-1 | DST 4 | 1568.2 | 854.5 | 3059.7 | 2400.6 | 1027.4 | 1232.4 | 1342.5 | 1069.8 | 2932.4 | K77/0005 |
| | | 3065.1 | 1921.1 | 7593.4 | 1978.2 | 853.4 | 1426.5 | 1934.7 | 1667.1 | | |
| | | 4203.8 | 1882.9 | 3021.7 | 1805.1 | 6777.5 | | | | | |
| 2/11-10S | | 2413.6 | 1406.5 | 3801.6 | 2784.8 | 1175.6 | 1329.6 | 1711.5 | 1303.8 | 4225.6 | K77/0001 |
| | | 3891.9 | 2483.6 | 11062.3 | 2371.6 | 1154.1 | 2015.6 | 2515.6 | 2143.9 | | |
| | | 6351.7 | 2688.5 | 3841.1 | 2347.9 | 9477.1 | | | | | |
| 2/11-2 | DST 2 | 2943.4 | 1577.5 | 5184.4 | 3488.5 | 1438.9 | 1672.8 | 2382.6 | 1591.2 | 5101.5 | K77/0006 |
| | | 5157.3 | 3126.8 | 8914.9 | 3100.2 | 1198.7 | 2129.1 | 2711.1 | 2764.4 | | |
| | | 5507.6 | 3439.8 | 4261.6 | 2953.7 | 8230.8 | | | | | |
| 2/11A-2St2 | | 3169.0 | 1909.9 | 4845.6 | 3361.8 | 1342.3 | 1548.9 | 2043.1 | 1628.1 | 5607.8 | K77/0007 |
| | | 5160.4 | 3492.6 | 14091.4 | 3239.7 | 1305.6 | 2828.5 | 3293.8 | 2878.1 | | |
| | | 7941.6 | 3726.0 | 4772.2 | 3091.9 | 12517.2 | | | | | |
| 2/11A-3 | | 2169.5 | 979.2 | 2208.4 | 1594.7 | 601.1 | 686.1 | 838.5 | 677.7 | 2452.7 | K77/0008 |
| | | 2216.7 | 1522.1 | 6171.2 | 1378.5 | 562.8 | 1165.7 | 1341.1 | 1192.6 | | |
| | | 3233.8 | 1499.7 | 2107.9 | 1244.8 | 5045.2 | | | | | |

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

Table 5G: Raw sterane data (peak height) m/z 217 SIR for OIL CORRELATION



| Well | Descript. | 21a | 22a | 27dßS | 27dßR | 27daS | 27daR | 28dßS | 28dßR | 28daS* | Sample |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 29dßS* | 28daR* | 27aaR | 29dßR | 29daS | 28aaS | 29daR* | 28ßßS | | |
| | | 28aaR | 29aaS | 29ßßR | 29ßßS | 29aaR | | | | | |
| 2/11A-7A | | 2419.6 | 1478.4 | 3882.9 | 2600.1 | 1166.8 | 1262.4 | 1760.3 | 1277.4 | 4291.8 | K77/0009 |
| | | 4305.1 | 2839.4 | 9679.6 | 2339.3 | 963.5 | 2063.7 | 2436.8 | 2331.1 | | |
| | | 5594.1 | 3015.1 | 3758.3 | 2349.7 | 8764.4 | | | | | |
| 2/8-6 | DST 2 | 3713.0 | 2073.1 | 5633.3 | 3825.8 | 1532.1 | 1844.2 | 2491.5 | 1810.5 | 5548.2 | K77/0004 |
| | | 5794.0 | 3599.7 | 12736.2 | 3316.7 | 1200.7 | 2522.7 | 3530.2 | 3228.4 | | |
| | | 7207.4 | 3853.4 | 5204.1 | 3583.6 | 11194.4 | | | | | |
| 2/8A-1A | | 3504.5 | 1974.0 | 5240.7 | 3504.1 | 1508.3 | 1677.1 | 2317.4 | 1614.6 | 5005.4 | K77/0002 |
| | | 6022.2 | 3738.0 | 8167.2 | 3021.4 | 1096.8 | 2334.5 | 3396.5 | 3149.2 | | |
| | | 4545.0 | 3440.7 | 5005.0 | 3826.8 | 7569.5 | | | | | |
| 2/8A-4A | | 2207.7 | 1182.0 | 2833.4 | 1913.6 | 701.8 | 928.0 | 1230.8 | 863.8 | 2747.9 | K77/0003 |
| | | 3155.9 | 2005.0 | 4560.9 | 1601.9 | 574.0 | 1231.6 | 1689.7 | 1624.8 | | |
| | | 2571.7 | 1827.4 | 2554.9 | 2054.6 | 4146.3 | | | | | |
| OIL MUD | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | K77/0010 |
| | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | |
| | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | | | | |

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

Table 5h: Raw triaromatic sterane data (peak height) m/z 231 for OIL CORRELATION



| Well | Descript. | a1 | b1 | c1 | d1 | e1 | f1 | g1 | Sample |
|---|---|---|---|---|---|---|---|---|---|
| 2/11-1 | DST 4 | 201.3 | 182.7 | 170.7 | 503.8 | 197.5 | 230.1 | 191.4 | K77/0005 |
| 2/11-10S | | 5677.4 | 5020.9 | 7439.6 | 17938.8 | 7810.6 | 8211.1 | 7831.8 | K77/0001 |
| 2/11-2 | DST 2 | 20666.3 | 21703.4 | 32683.2 | 84644.3 | 38109.9 | 41853.6 | 37368.7 | K77/0006 |
| 2/11A-2St2 | | 8729.5 | 7461.6 | 10459.0 | 23683.4 | 11870.3 | 11585.6 | 10634.2 | K77/0007 |
| 2/11A-3 | | 10198.9 | 8463.2 | 11786.5 | 29448.0 | 14095.2 | 14564.8 | 12164.9 | K77/0008 |
| 2/11A-7A | | 14028.7 | 11019.3 | 14648.3 | 38465.4 | 16919.0 | 19074.5 | 16186.8 | K77/0009 |
| 2/8-6 | DST 2 | 21982.5 | 19777.4 | 25749.7 | 63382.8 | 29419.2 | 30167.9 | 27355.0 | K77/0004 |
| 2/8A-1A | | 14228.5 | 13847.7 | 14863.9 | 38205.1 | 18557.1 | 17052.3 | 15760.3 | K77/0002 |
| 2/8A-4A | | 17619.9 | 16628.5 | 18888.7 | 47102.1 | 21724.9 | 22219.0 | 20739.1 | K77/0003 |
| OIL MUD | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | K77/0010 |

Table 5i: Raw monoaromatic sterane data (peak height) m/z 253 for OIL CORRELATION



| Well | Descript. | A1 | B1 | C1 | D1 | E1 | F1 | G1 | H1 | I1 | Sample |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2/11-1 | DST 4 | 203.6 | 83.3 | 133.5 | 173.8 | 342.1 | 34.5 | 323.8 | 245.7 | 59.1 | K77/0005 |
| 2/11-10S | | 4356.2 | 2875.2 | 6314.3 | 7912.4 | 15173.1 | 1467.6 | 12407.4 | 10085.1 | 3953.0 | K77/0001 |
| 2/11-2 | DST 2 | 16389.3 | 10172.8 | 21152.9 | 24308.6 | 45301.9 | 6766.7 | 41038.8 | 28121.2 | 9270.9 | K77/0006 |
| 2/11A-2St2 | | 6715.1 | 4151.0 | 9037.9 | 10612.9 | 20380.6 | 2399.1 | 18937.4 | 16087.8 | 5786.4 | K77/0007 |
| 2/11A-3 | | 7538.4 | 4498.2 | 10574.7 | 11405.8 | 22710.2 | 2784.9 | 20249.6 | 18008.8 | 6592.0 | K77/0008 |
| 2/11A-7A | | 7982.6 | 4880.9 | 6447.0 | 8473.6 | 14910.7 | 1956.6 | 16486.9 | 14089.2 | 5986.4 | K77/0009 |
| 2/8-6 | DST 2 | 15926.2 | 8493.7 | 15289.0 | 20156.1 | 40839.3 | 5506.8 | 36025.8 | 30546.4 | 11083.7 | K77/0004 |
| 2/8A-1A | | 8024.6 | 4909.5 | 7497.4 | 8388.5 | 18314.4 | 2688.4 | 15199.9 | 11170.6 | 4233.7 | K77/0002 |
| 2/8A-4A | | 8725.0 | 5210.4 | 9096.1 | 10384.0 | 21256.0 | 3158.2 | 16423.8 | 13660.5 | 5240.9 | K77/0003 |
| OIL MUD | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | K77/0010 |

Table 5J: Raw sterane data (peak height) m/z 218 SIR for OIL CORRELATION



| Well | Descript. | 27ßßR | 27ßßS | 28ßßR | 28ßßS | 29ßßR | 29ßßS | 30ßßR | 30ßßS | Sample |
|---|---|---|---|---|---|---|---|---|---|---|
| 2/11-1 | DST 4 | 3174.7 | 2287.3 | 1963.3 | 1949.5 | 2803.8 | 2333.4 | 507.4 | 692.8 | K77/0005 |
| 2/11-10S | | 3762.4 | 2952.5 | 2596.1 | 2551.3 | 3580.4 | 2881.3 | 681.2 | 896.3 | K77/0001 |
| 2/11-2 | DST 2 | 5169.5 | 3861.7 | 3376.5 | 3203.0 | 4202.8 | 3794.3 | 890.8 | 1152.3 | K77/0006 |
| 2/11A-2St2 | | 5380.7 | 4300.0 | 3746.7 | 3403.9 | 4557.5 | 4139.9 | 869.8 | 1193.5 | K77/0007 |
| 2/11A-3 | | 2260.7 | 1798.6 | 1447.6 | 1432.3 | 1855.6 | 1632.9 | 339.9 | 467.0 | K77/0008 |
| 2/11A-7A | | 4109.1 | 3245.7 | 2818.6 | 2775.9 | 3693.6 | 3113.1 | 738.8 | 895.3 | K77/0009 |
| 2/8-6 | DST 2 | 5981.6 | 4422.6 | 4271.3 | 3914.2 | 5068.3 | 4662.2 | 946.9 | 1149.4 | K77/0004 |
| 2/8A-1A | | 6264.6 | 4359.0 | 4067.9 | 3781.2 | 5189.1 | 4959.3 | 1094.0 | 1215.2 | K77/0002 |
| 2/8A-4A | | 3286.5 | 2510.9 | 2039.1 | 1999.0 | 2645.2 | 2484.5 | 493.0 | 634.0 | K77/0003 |
| OIL MUD | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | K77/0010 |

Table 5K: Raw triterpane data (peak height) m/z 177 SIR for OIL CORRELATION



| Well | Descript. | 25nor28aß | 25nor30aß | Sample |
|---|---|---|---|---|
| 2/11-1 | DST 4 | 259.5 | 200.4 | K77/0005 |
| 2/11-10S | | 305.9 | 88.1 | K77/0001 |
| 2/11-2 | DST 2 | 338.5 | 322.2 | K77/0006 |
| 2/11A-2St2 | | 353.2 | 248.8 | K77/0007 |
| 2/11A-3 | | 156.6 | 144.2 | K77/0008 |
| 2/11A-7A | | 250.2 | 204.5 | K77/0009 |
| 2/8-6 | DST 2 | 477.2 | 313.0 | K77/0004 |
| 2/8A-1A | | 444.1 | 329.9 | K77/0002 |
| 2/8A-4A | | 248.6 | 190.8 | K77/0003 |
| OIL MUD | | 0.0 | 0.0 | K77/0010 |