Jurassic Oils and Source Rocks of Northern Morocco

Applied Petroleum Technology AS
P.O. Box 173 Kalbakken
NO-0903 Oslo
Norway

Address:	**Applied Petroleum Technology AS** **P.O. Box 173 Kalbakken** **NO-0903 Oslo** **Norway**
Telephone:	**+47 453 96 000**

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Authors

Hanne Olsson
Stefan Gulbrandsen
Martin Fowler
Jamie Webb

	Name	Date	Signature
Reviewed by	Jamie Webb	31.05.2019	[signature]
Approved by	Martin Fowler	31.05.2019	[signature]

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Interpretation Report

Executive Summary

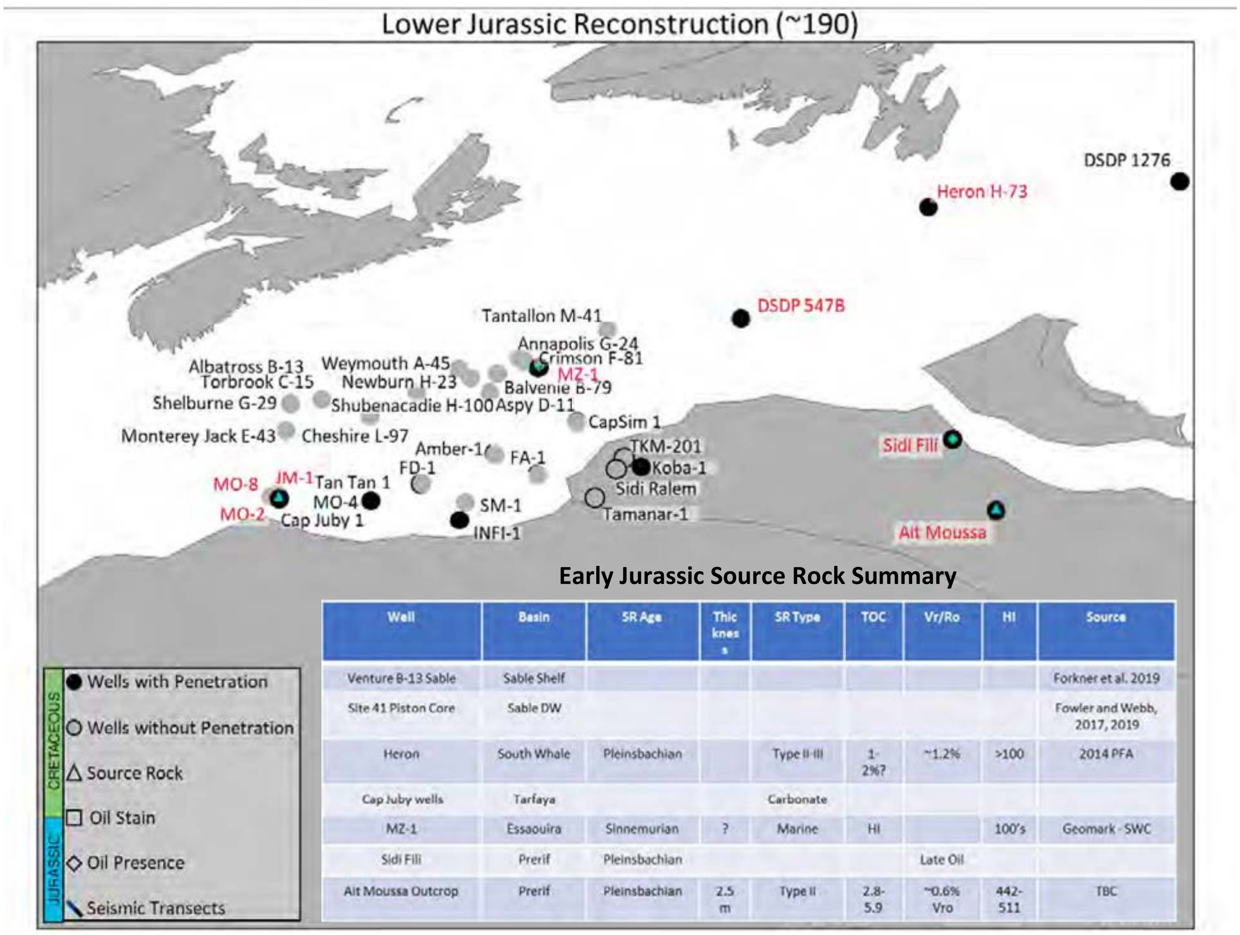
This report is the main deliverable for stage three of the Nova Scotia-Morocco Geochemistry Study. It includes new data from samples collected to resolve gaps in the understanding of Moroccan petroleum systems. This new data is combined with older reports to give a brief overview of Moroccan source rocks and oils and how these compare to those from offshore Nova Scotia.

Significant results from the new analyses include the following:

- No source rocks are present in the Jurassic intervals analyzed from two recent wells, Mazagan-1 (MZ-1) and Tamanar-1, drilled in the offshore part of the Essaouira Basin. It was noted that GeoMark found one Sinnemurian-age SWC sample with a TOC content sufficient for a source rock in MZ-1.
- The Sidi Rhalem oils have a carbonate source rock deposited under very restricted conditions such as in a lagoonal environment. The hydrocarbon potential of the thin Oxfordian organic-rich interval in TKM-201 was confirmed. This unit is not the source of the Sidi Rhalem oils. Either a slightly different facies of this interval and/or an equivalent, less mature interval that is part of thicker source rock sequence, could be the source.
- An oil thought to be from the SM-1 discovery shows very different characteristics to those described by the operator for the oil and those obtained from analysis of cuttings collected from this well. Taking into account the uncertainties in the origin of this sample, it was thought that the data obtained on a cuttings sample from SM-1 was more representative of this discovery.
- Hydrocarbons extracted from the cuttings sample from the Upper Jurassic reservoir at SM-1 are biodegraded and show a more clastic character than other Tarfaya Basin oils which have a carbonate source rock.
- The high TOC content of an Early Cretaceous – Late Jurassic cuttings sample from Ifni-1 was confirmed to be from the presence of some coaly material.
- Staining in a Late Jurassic sample from Ifni-1 was confirmed. These hydrocarbons are biodegraded with a carbonate, possibly Cretaceous source rock.
- A very significant finding is that the biomarker distributions of unbiodegraded hydrocarbons in Middle Jurassic reservoirs at MO-8 and JM-1 resemble those of biodegraded hydrocarbons in Upper Jurassic reservoirs at MO-2 and JM-1. This implies that there may only be one restricted carbonate source rock responsible for the Cap Juby oils. It should be noted that this is still tentative as this conclusion is not supported by the current isotopic data which is complicated by sample type, reservoir processes, storage affects and contamination.
- Extracts of Lower Jurassic organic-rich samples collected from the Aït Moussa outcrop are lower maturity than Sidi Fili oils but have biomarker characteristics that suggest higher maturity equivalents of these silty marls are the source rocks of the oils.

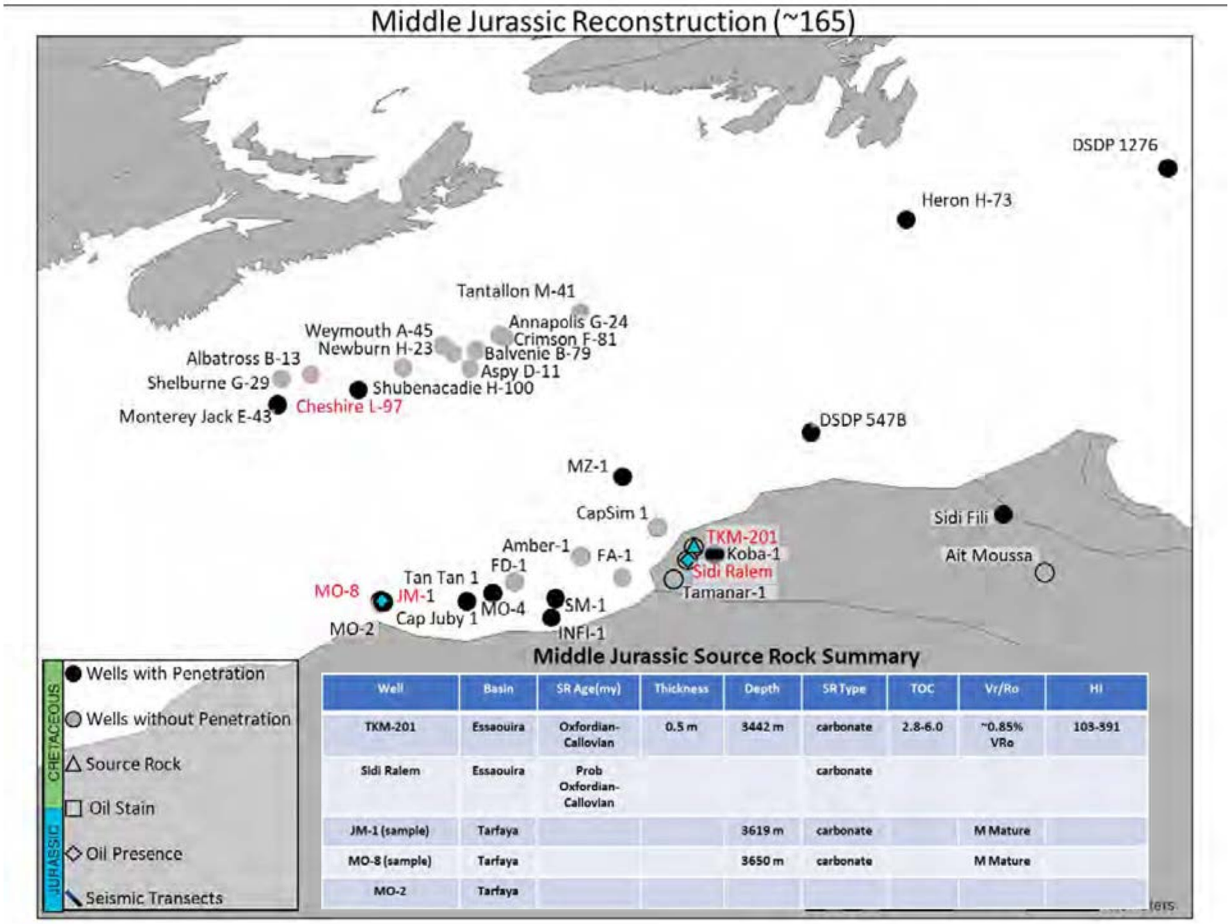
Overall, there is little similarity in the occurrence of Jurassic source rocks between Nova Scotia and northern Morocco. The principle confirmed Jurassic source rock in the offshore of Nova Scotia is an Upper Jurassic deltaic clastic source rock. The main source rocks in northern Morocco are most likely Lower Jurassic marine carbonates. Information in some recent reports have raised the possibility that similar Lower Jurassic source rocks to those in northern Morocco may be present offshore Nova Scotia. Middle Jurassic carbonates are also a minor source of oil in northern Morocco. Presently there are no known equivalents to these offshore Nova Scotia.

Paleogeographic maps for the Lower, Middle and Upper Jurassic (prepared by N. Morrison for this study) showing the occurrence of oils and source rocks across the Nova Scotia-northern Morocco conjugate margin, plus a data summary for these occurrences, are shown in Figures 1 to 3.



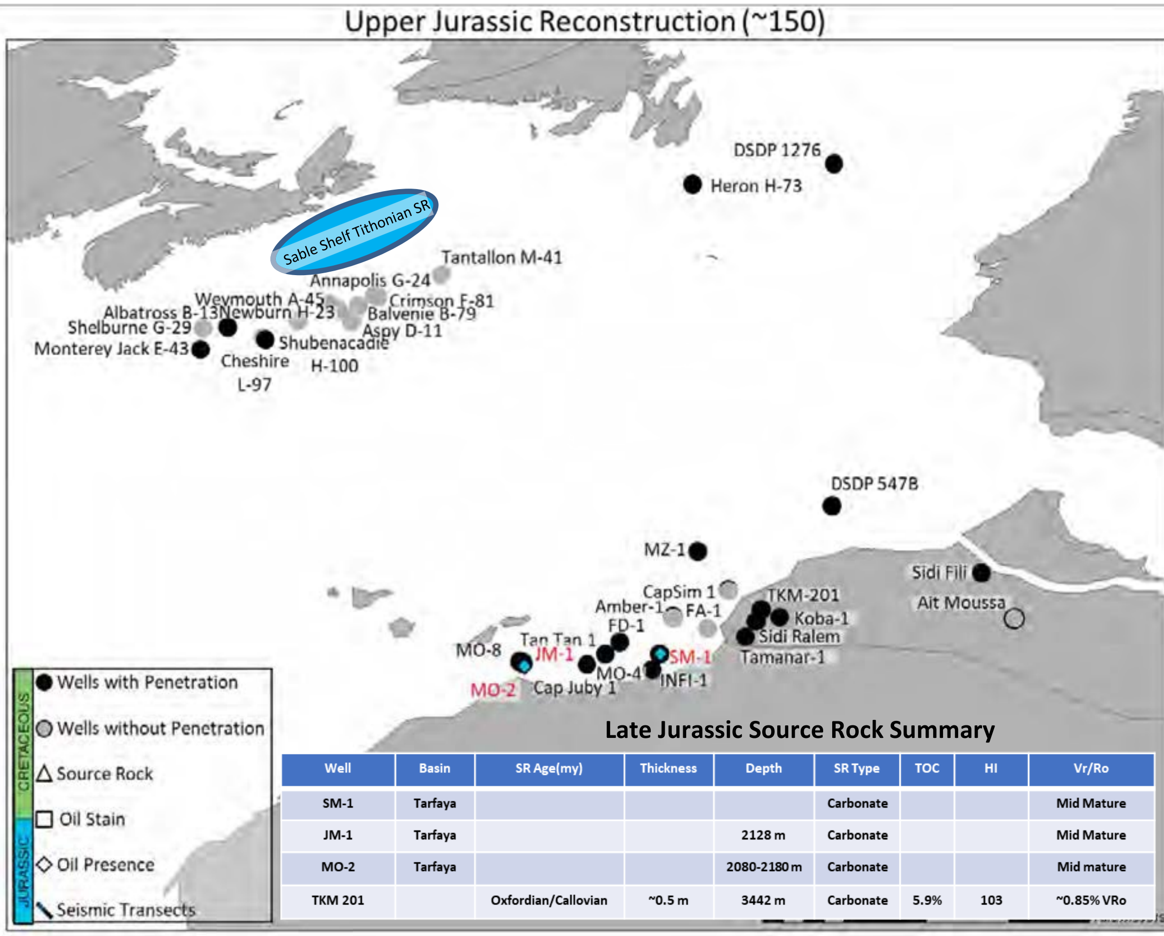
Well	Basin	SR Age	Thickness	SR Type	TOC	Vr/Ro	HI	Source
Venture B-13 Sable	Sable Shelf							Forkner et al. 2019
Site 41 Piston Core	Sable DW							Fowler and Webb, 2017, 2019
Heron	South Whale	Pleinsbachian		Type II-III	1-2%?	~1.2%	>100	2014 PFA
Cap Juby wells	Tarfaya			Carbonate				
MZ-1	Essaouira	Sinnemurian	?	Marine	HI		100's	Geomark - SWC
Sidi Fili	Prerif	Pleinsbachian				Late Oil		
Ait Moussa Outcrop	Prerif	Pleinsbachian	2.5 m	Type II	2.8-5.9	~0.6% Vro	442-511	TBC

Figure 1. Lower Jurassic paleogeographic reconstruction map and source rock summary table



Well	Basin	SR Age(my)	Thickness	Depth	SR Type	TOC	Vr/Ro	HI
TKM-201	Essaouira	Oxfordian-Callovian	0.5 m	3442 m	carbonate	2.8-6.0	~0.85% VRo	103-391
Sidi Ralem	Essaouira	Prob Oxfordian-Callovian			carbonate			
JM-1 (sample)	Tarfaya			3619 m	carbonate		M Mature	
MO-8 (sample)	Tarfaya			3650 m	carbonate		M Mature	
MO-2	Tarfaya							

Figure 2. Middle Jurassic paleogeographic reconstruction map and source rock summary table



Late Jurassic Source Rock Summary

Well	Basin	SR Age(my)	Thickness	Depth	SR Type	TOC	HI	Vr/Ro
SM-1	Tarfaya				Carbonate			Mid Mature
JM-1	Tarfaya			2128 m	Carbonate			Mid Mature
MO-2	Tarfaya			2080-2180 m	Carbonate			Mid mature
TKM 201		Oxfordian/Callovian	~0.5 m	3442 m	Carbonate	5.9%	103	~0.85% VRo

Figure 3. Upper Jurassic paleogeographic reconstruction map and source rock summary table

Foreword and Acknowledgements

This report is a contribution to a larger multidisciplinary study of the Nova Scotia – Morocco Conjugate Margin. The geochemical component of this project was split into three tasks. The first was a review and analysis of historical geochemical data related to possible Jurassic petroleum systems present in the Moroccan offshore (Fowler, 2018). The data used for this was mostly proprietary reports provided by ONHYM (Office National des Hydrocarbures et des Mines), as well as published papers and on-line company releases. Based on this review, wells and other locations were suggested which could provide samples for new analyses that would increase the understanding of Jurassic petroleum systems in northern Morocco. Discussions with ONHYM personnel caused these suggestions to be revised, taking into account additional data not available when the original report was prepared, and the availability of material to sample.

The second part of the Morocco geochemistry project was sampling and analysis. Sampling took place in October 2018. The samples were sent to the APT laboratories for analyses. A data report was provided as a deliverable for this part of the project in January 2019. An updated, complete set of results is provided with this report that includes data from samples provided later from other sources.

This report represents the main deliverable for stage three of the study. It includes an interpretation of the new geochemical data and attempts to incorporate this with the older data to provide an overview of Jurassic petroleum systems in northern Morocco. This is then compared to what is known about petroleum systems offshore Nova Scotia.

This report benefitted from the assistance of many people. These include:
ONHYM: Abdellah Ait Salem, Asmae Benarchid, Mohammed Nahim
OERA: Russell Dmytriw – assistance in sampling
Weston Stratigraphic: Janice Weston - provision of samples
Dalhousie University: Grant Wach, Ricardo de Silva - provision of Aït Moussa outcrop samples
NS DoE Project team: Adam MacDonald, Matt Luheshi, Fraser Keppie, Natasha Morrison
APT Canada: Jamie Webb

Introduction

In this work phase, new data was interpreted by basin and incorporated with the older data compiled in the Moroccan Jurassic Geochemistry review, a deliverable for the first part of the study.

Some of the data and wells in this report are still confidential so circulation of this document should be restricted until ONHYM releases the report for public review.

Note that if a vitrinite reflectance equivalent is provided for Tmax, the empirical equation of Jarvie et al (2001) is used. This correlation only provides an approximate estimate as Tmax can be affected by other factors besides maturity.

It was noted that saturate fraction gas chromatograms (SFGCs) of both core and cuttings samples collected at the ONHYM core facility have anomalous amounts of n-alkanes in the C_{13}-C_{15} range which are obvious contamination. The presence of these relatively volatile compounds suggests that they represent more recent contamination as they would be expected to have evaporated if they were drilling additives. In many samples these compounds are especially conspicuous because of the evaporation of most compounds before nC_{20}. These are not present in the oils analyzed or the outcrop samples from Ait Moussa. Examination of older reports indicates that these compounds were not present in extracts analyzed by *APT (2005)* but are present in the extracts of JM-1 samples analyzed by *Robertson (2014)*[1] and of FA-1 samples analyzed by *GeoMark (2014)*. In a Robertson (2012) study (figures shown by *Crossley, 2015*), they are not present in extracts of JM-1 but possibly in a MO-2 sample where they are labelled “diesel contamination?”. This contamination is not related to the sampling bags used as these were also used for another study of samples from a different part of the world which did not show high amounts of the C_{13} and C_{14} n-alkanes in their GCs. Hence it is suggested this contamination is related to something that was done to samples stored in Rabat in the 2012-2014 period.

[1] References in italics are proprietary. Publicly available and proprietary reports are listed separately in the bibliography.

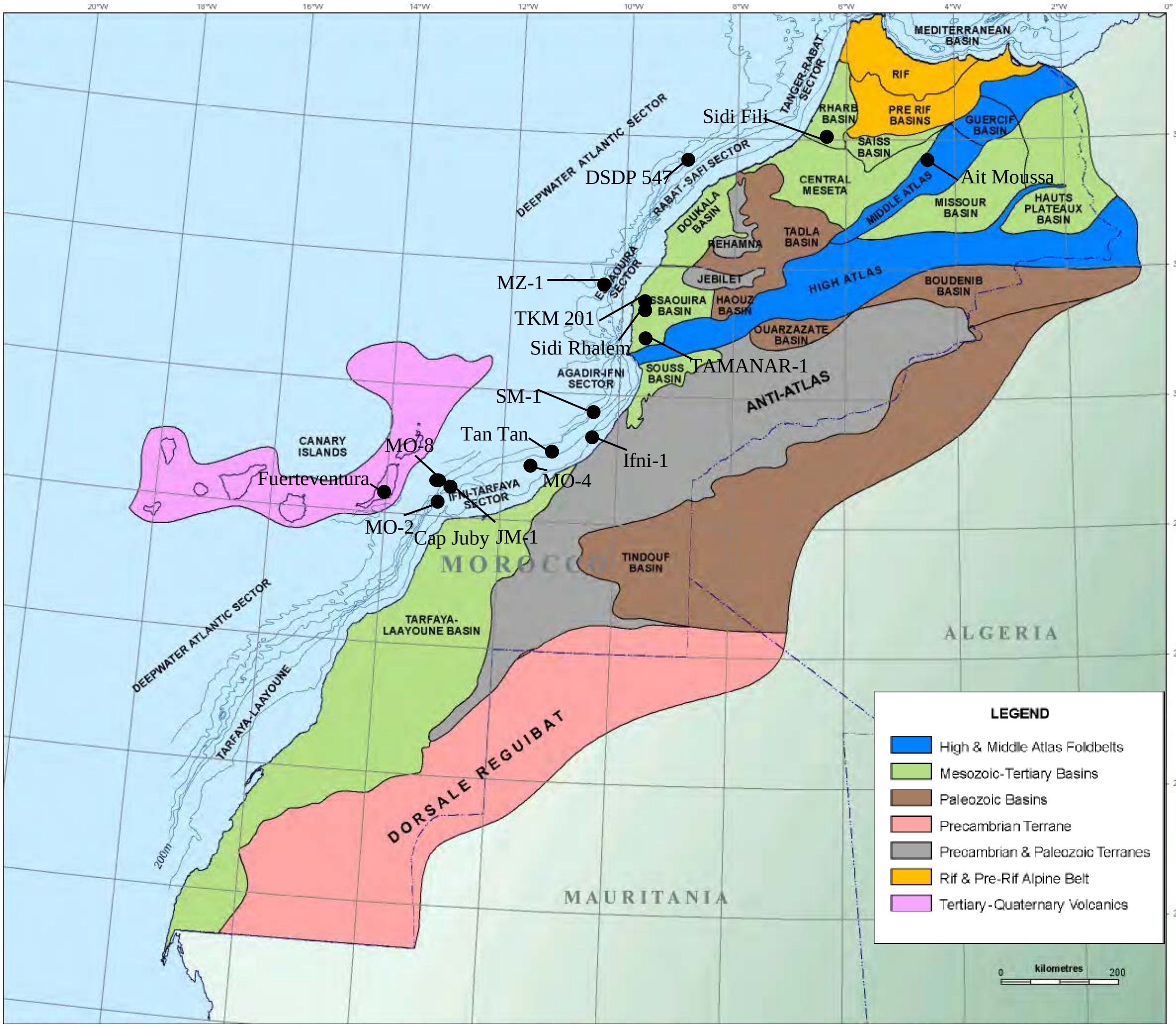


Figure 4. Map of Morocco showing sedimentary basins and certain key locations referred to in the report.

New Data

Essaouira Basin

Mazagan-1 (MZ-1)

Mazagan-1 (MZ-1) was drilled in 2015 by Pura Vida and partners in the deep-water offshore part of the Essaouira Basin (Fig. 4). It penetrated an extensive Jurassic section and TD is in the Lower Jurassic (Sinemurian) at 6150 m SSTVD. No oil shows were reported in the Jurassic or the Cretaceous. This well was extended to its final depth in order to intersect Lower Jurassic source rocks which “provided interesting information” according to a company statement.

Based on *RPS Energy (2016)* biostratigraphy, the "Early Jurassic to late Triassic" 6030-6160 m section was originally suggested for sampling, although more recent work reviewing the biostratigraphy of this well by Weston Stratigraphic has suggested TD is of Sinemurian age. The sampling interval was chosen was because RPS recorded dark organic-rich marls over the 6050-6130 m interval. ONHYM suggested, based on the gamma ray log that the 4962-5080 m Oxfordian-Callovian age section should also be sampled. For the current study, cutting samples representing the 4960-5130 m and 6040-6162 m intervals were sampled and analyzed by Rock-Eval/TOC. As shown in Figure 5, there is a significant colour difference between the 6040 and 6050 m cuttings which agreed with their observation of darker coloured sediments in the latter.

Figure 5. Cutting samples collected from MZ-1 from 6040 m and 6050 m. Note darker colour of the latter.

As these cuttings were obviously contaminated with drilling additives, they were pre-extracted before analysis and this is the data shown in Table 7. Hence PI values cannot be used to indicate staining.

Samples from the upper Oxfordian – Callovian section have TOC contents ranging from 0.14 to 0.61% and HI values from 39 to 158 mg HC/g TOC. All samples with TOC contents greater than 0.3% have HI values less than 100. As expected with so many samples with very low S2 peaks, Tmax values are erratic. Samples with higher S2 values tend to have Tmax of 438 to 441°C (equivalent to ~0.73 to 0.78% vitrinite reflectance) suggesting that this section is early mature with respect to hydrocarbon generation. The very low TOC and HI values for this level of maturity indicates this section has very little hydrocarbon potential.

The Sinemurian 6040-6162 m section has TOC contents ranging from 0.13 to 0.82% and HI values of 57 to 130. Many of the Tmax values are unreliable because of the low S2 peaks. Two samples over this interval have S2 values greater than 0.5 with Tmax values of 449 and 451°C suggesting a vitrinite reflectance of around 0.92 to 0.96%, and hence a maturity corresponding to the later parts of the oil window.

Based on these results obtained from cuttings, neither of the sections from MZ-1 have the potential to generate hydrocarbons. They appear to contain low amounts of Type III organic matter.

After providing the initial Rock-Eval/TOC results to ONHYM, they provided similar data obtained by GeoMark in 2016 for the MZ-1 well operators on both cuttings and side wall core (SWC) samples. The data obtained by GeoMark from cuttings samples was very similar to that obtained for this study. None of GeoMark's pre-extracted cuttings samples had TOC contents above 0.5%. The average TOC content of the 82 extracted cuttings samples from 4530-6162 m was 0.25%. These were associated with very low HI values. Geomark concluded that there was "poor source rock potential" over this section. GeoMark also analyzed 27 SWC samples from 3470 – 6175 m that were not available for this study. Five of these pre-extracted samples have TOC contents greater than 1%.

The SWC sample with the highest TOC content is from 6125 m. It has 3.35% TOC, a HI of 127 and a Tmax of 452°C (~0.95% vitrinite reflectance). This indicates it could have significant hydrocarbon potential. However, examining the data more closely suggests this sample represents a very thin interval. A SWC sample from 6126 m has a TOC content of only 0.07%. Cuttings samples from 6120 and 6130 m analyzed for this study have TOC contents of 0.61 and 0.46% respectively. This supports only a thin organic-rich interval that is not easily picked up by analyzing cuttings. GeoMark did not analyze cuttings over this depth range. The 6125 m SWC sample may be related to the 10% black organic component of the claystones that make up 90% of the rock in the 6125 m cuttings description provided for this well.

The other four SWC samples with greater than 1% TOC are from between 6043 and 6050 m and range from 1.00 to 1.47% TOC. This could suggest a more extensive relatively organic-rich interval of several metres. If such an interval was present, then it should be evident in the cuttings results. However, TOC data for cuttings samples from 6040, 6050 and 6060m collected for this study are between 0.34 and 0.52% respectively. This does not support a potential source rock over this depth. There are no GeoMark cuttings data for these depths. The cuttings descriptions for 6045 m mention a dark grey/black claystone. The 6050 m cuttings are said to consist of 90% claystone of which 10% is said to be black organic claystone. A similar descriptor is used at other depths such as 6070, 6075, 6110 and 6115 m which are also not associated with higher TOC contents. Janice Weston commented that at 6090 m, "marls are dark grey/black, organic-rich and yield a pungent smell when placed in HCL" This likely relates to the minor amount of black organic claystones. According to the RPS Biostratigraphy Report, "marine derived amorphous organic material occurs in abundance between 6050m and 6130m. Based on the TOC data, the observed quantity of amorphous organic matter is exaggerated.

One cuttings sample from MZ-1 was selected for extraction. This was the 6100 m which had the highest TOC content of 0.82%. A relatively large amount of extract was obtained (Table 8) of 3626 mg extractable organic matter (EOM) /kg rock (i.e. ppm) with a very high saturate/aromatic hydrocarbon content (20.7). This is usually an indication of contamination by drilling additives. This is confirmed by the saturated hydrocarbon gas chromatogram (SFGC) dominated by C_{12}-C_{16} n-alkanes on an unresolved complex mixture (UCM) hump suggesting a diesel-based additive was used. Drilling muds of this type usually do not affect the biomarker distribution. However, the steranes of this sample show a very unusual distribution dominated by the biologically inherited C_{27} 5α(H),14α(H),17α(H) 20R isomer. This could suggest the organic matter is very immature which is very unlikely based on the depth, Tmax and the isomer distribution of the C_{29} steranes. Hence the anomalous abundance of the C_{27} 5α(H),14α(H),17α(H) 20R sterane in this sample is most likely related to contamination and the biomarker distributions can also be considered to be compromised.

In summary, there is possible evidence of rare thin intervals with elevated TOC contents (1-3.3%) of Sinemurian age at MZ-1. These are not volumetrically significant enough to be possible source rocks for economic quantities of hydrocarbons at this location.

Tamanar-1

Tamanar-1 was drilled by Petroleum Exploration Ltd. (PEL) and partners in 2014-2015 in the Haha-2 block, onshore in the Essaouira Basin. It is located about 60 km south of the Sidi Rhalem oil field. The well t.d. at 2422 m. This well was not on the proposed sampling list as it was thought to be not available. However, when the team arrived for sampling, it was proposed by ONHYM, who are a partner in this well. Thirty-six samples from 415 to 795 m, corresponding to an Oxfordian to Callovian-Bathonian section were collected from Tamanar-1. Based on palynological evidence, the 725 m sample was dated as Late to latest Oxfordian *(Weston, 2019)* and was suggested to have been deposited in an open marine, inner to near neritic environment.

This well was drilled with oil-based additives; hence samples were pre-extracted prior to analysis. TOC contents are very low and range from 0.1 to 0.37% with the highest HI value being 162 mg HC/g TOC (Table 7). Only two very low TOC samples have HI values greater than 100. The cuttings samples that were observed to be darker during sampling (715-735 m interval) are those with the higher TOC contents but unfortunately, they are just 0.30 to 0.37%. Tmax is very erratic reflecting the low S2 values and is not a reliable indicator of maturity for this interval.

Tamanar-1 does not show any potential to generate hydrocarbons over the analyzed interval. It contains very low amounts of Type III-IV organic matter. This agrees with the palynological observations that most of the kerogen is terrestrially derived organic matter *(Weston, 2019).*

TOUKIMT-201 and Sidi Rhalem

Historically, there has been oil production from Jurassic reservoirs in the onshore portion of the Essaouira Basin at Sidi Rhalem (Fig. 4). In the early 1980s, the Sidi Rhalem field was producing 280 BOPD from Callovian to 'Argovian' (mid-Oxfordian) carbonates. Gas and condensate have also been produced elsewhere in the onshore Essaouira Basin from Callovian-Oxfordian sandstones at Toukimt, Meskala, Kechoula, N'Dark and Jeer, although only the former two fields are currently producing. These gases are thought to have a Paleozoic source although a Jurassic contribution has been suggested (Broughton and Trepanier, 1993). More recently (2013-2017), gas has been discovered in Liassic reservoirs in the Koba-1 and Kamar-1 wells in what is now the Kechoula Gas Field. As these wells are in the vicinity of the N'Dark and Jeer fields, it is assumed that this gas has a similar Paleozoic source. Based on the Petroleum Exploration Ltd. (PEL) website, the presence of the Sidi Rhalem oilfield is partly responsible for that companies' exploration in the onshore Haha blocks south of the oilfield, including the Tamanar-1 well that was sampled for this study.

The organic-rich Oxfordian-Callovian interval in the Toukimt-201 (TKM-201) well has been investigated by several groups and is commonly thought to be the source of the Sidi Rhalem oils (e.g. Broughton and Trepanier, 1993; Morabet et al., 1998). However, this does not seem to have been confirmed by a detailed oil-source correlation. As part of this study, organic-rich core samples from TKM-201 were collected and analyzed and compared to the results from the analysis of a recently sampled Sidi Rhalem oil that was supplied by ONHYM.

Based on previous published Rock-Eval/TOC analyses of the TKM-201 core over the 3432 – 3444 m interval (Brown and Ruth, 1984; ONAREP/PCIAC, 1990; APT 2006) a significant proportion has little or no hydrocarbon potential with only samples between 3442.0 and 3442.5 m having TOC contents greater than 2%. Reported HI values are low (highest is 261) which are partly because of the maturity of this section. Brown and Ruth (1984) reported vitrinite reflectance values of 0.75% (3442 m) and 0.78% (3440.5 m) suggesting a maturity in the early oil window. However, Tmax values of 445-450°C are reported by all the labs, suggesting a higher maturity as these correlate to an equivalent vitrinite reflectance of about 0.85-0.90%. Hence, a proportion of the hydrocarbon potential may have been realized, and TOC and HI values would have originally been higher.

For this study, two samples of the TKM-201 core were collected from around 3442 m. It is not possible to provide a more accurate depth because of the condition of the core, as this interval has been heavily sampled previously (Fig 6a). The two samples came from a larger chunk of black shale that was about 5 cm thick. They were distinguished visually by one ('B') being fossiliferous. It had a bivalve that was removed from the sample used for geochemical analysis and provided for biostratigraphy. Palynological evidence indicated that it was Oxfordian *(Weston, 2019).* A freshly collected Sidi Rhalem oil was provided by ONHYM for this study. It is not known from which specific well that the sample was taken. This oil shows very similar characteristics to previously analyzed oils from Sidi Rhalem, such as the RH-8 sample investigated by *APT (2006)*.

Figure 6. a) TKM-201 core showing black shale interval around 3442 m, b) black shale interval of sample A (piece on left), c) sample B showing the bivalve that was present in this sample.

The two TKM-201 core samples both have high TOC contents with the ‘A’ (non-fossiliferous) sample being higher with 5.99% versus 2.76% for the fossiliferous ‘B’ sample (Table 7). The ‘A’ sample has a higher TOC than the previous TKM-201 3442 m sample analyzed by *Brown and Ruth (1984)* which was 4.29%. However, the HI of 103 is lower than that for the earlier analysis (261). The ‘B’ sample has a higher HI of 391. The Tmax values (444 and 447°C) are similar to those reported previously, suggesting (a) that much of the hydrocarbon potential of these samples has been realized and (b) originally, they could have had significantly higher TOC and HI values. PI values are low (0.07) suggesting samples are not stained heavily. This could partly be due to the length of time that the core has been stored in a warm environment and the loss of more volatile components. This might also be the reason why both shale samples give fairly low extract yields for mature good quality source rocks of 1349 and 2588 mg EOM/g rock (i.e. ppm) (Table 8). Hydrocarbons make up a similar proportion of both extracts (~28.5%). They do differ in the saturate/aromatic hydrocarbon ratio with ‘A’ being almost twice that of ‘B’ (1.33 vs. 0.70).

The SFGCs of the TKM-201 samples are both dominated by n-alkanes with anomalously high amounts of the C_{13} and C_{14} n-alkanes which are probably due to contamination (Fig. 7a, b). This is especially evident for sample ‘A’ where there is a secondary maximum around nC_{17}-nC_{19} that is not apparent for the ‘B’ sample. These samples show a similar ratio of isoprenoids to n-alkanes (i.e. pristane/C_{17} and phytane/C_{18}) which might be expected because of their similar maturity. They differ in their pristane/phytane values with ‘A’ (0.96) lower than ‘B’ (1.52) which could indicate more anoxic depositional conditions for the former but may also be due to it showing a high degree of evaporation as suggested by the secondary maximum in the n-alkane distribution.

The Sidi Rhalem oil is 76% hydrocarbons which is lower than expected for an unbiodegraded oil. Based on the SFGC, the higher proportion of polar compounds might be partly from the evaporation of the more volatile hydrocarbons. The SFGC of the Sidi Rhalem oil (Fig. 7c) is similar to previous samples analyzed from this field including the RH-8 sample examined by *APT (2006)*. It shows an even carbon number preference over the C_{20}-C_{28} range and a very low pristane/phytane (pr/ph) ratio (0.31). The pr/ph ratio is a little lower than 0.45 which was obtained on oils from RH-6 and RH-8 by *Shell (1998)* and *APT (2006)* possibly because of evaporation of this sample prior to analysis. The pristane/nC_{17} and especially the phytane/C_{18} ratio are high and similar to previous samples. This together with even carbon number preference, suggests a low maturity for the Sidi Rhalem oils.

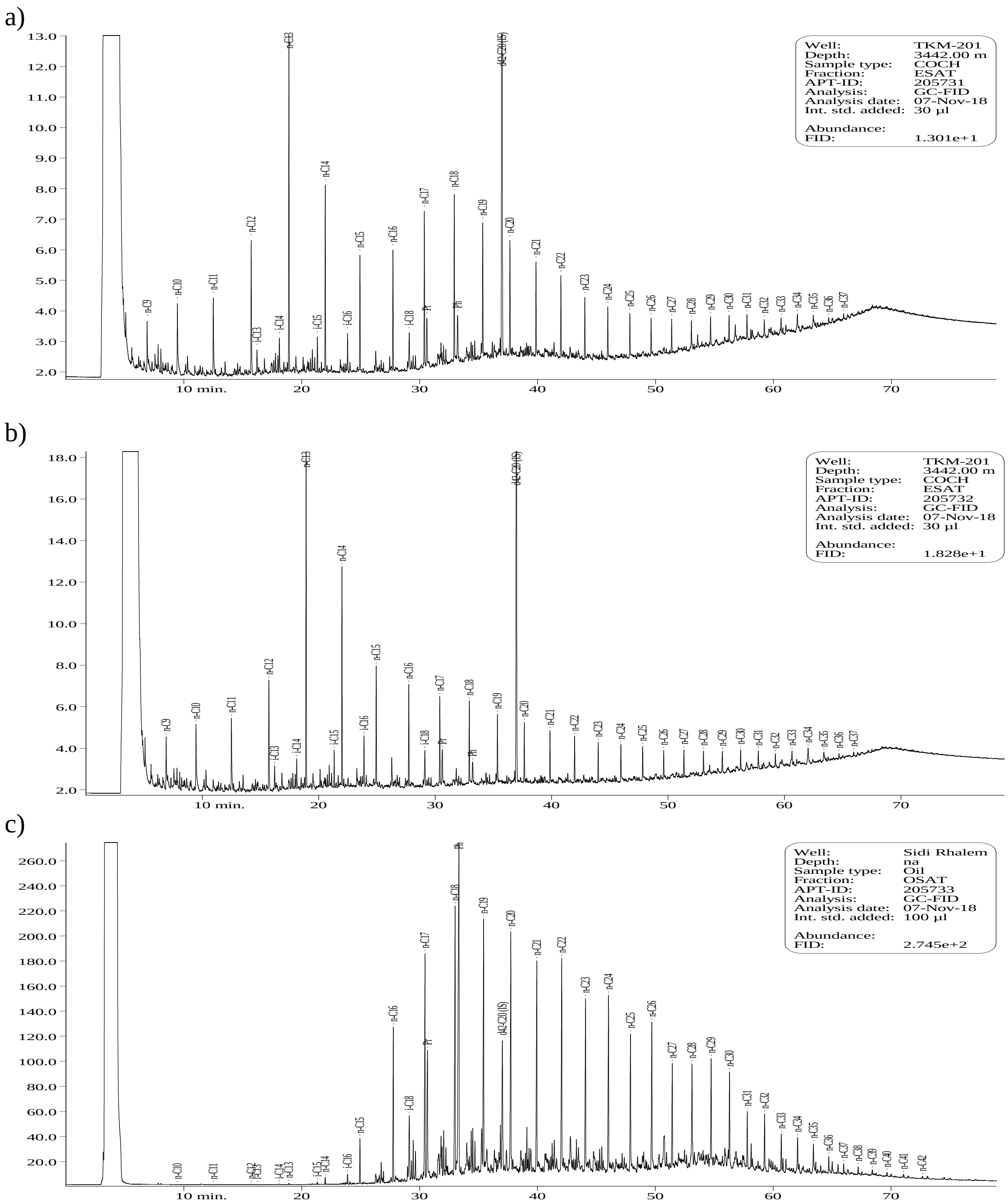


Figure 7. Saturate Fraction Gas Chromatograms of extracts from TKM-201 3442 m; a and b are samples A and B respectively; and of the Sidi Rhalem oil (c).

The Sidi Rhalem oil has a biomarker distribution that resembles that of the RH-8 oil previously analyzed by APT (2006), especially for the steranes. However, the m/z 191 shows some minor differences with the Sidi Rhalem oil showing less of a homohopane prominence and higher gammacerane relative to the C_{31} hopanes compared to the RH-8 oil. This is more similar to the RH-6 oil analyzed by Shell (1998). The RH-8 analyses of APT (2006) and ONAREP/PCIAC (1990) are similar. This suggests a minor variation between the produced oils from the different wells in the Sidi Rhalem field which could reflect minor facies changes in the source rock. This is not uncommon for carbonate source rocks deposited under very restricted conditions, as appears to be the case for the Sidi Rhalem oils.

The TKM-201 extracts show characteristics of a marine (C_{27}-C_{30} sterane distributions) carbonate (high C_{24} tetracyclic terpane, high abundance of short-chain steranes, ratio of C_{22}/C_{21} and C_{24}/C_{23} tricyclic terpanes) source deposited under anoxic (low pr/ph, C_{35} homohopane prominence, high 29/30 hopane ratio) conditions (Fig. 8). This agrees with the biostratigraphic assessment that the sample is a calcareous claystone deposited in a relatively distal, but partially restricted marine setting, possibly a lagoon *(Weston, 2019)*. The Sidi Rhalem oil also shows characteristics suggesting a marine carbonate source rock but one that was deposited under hypersaline conditions. Evidence for hypersalinity include the very low pr/ph ratio, the high abundance of gammacerane and the V-shape C_{31}-C_{35} homohopane distribution. It also might explain the very high 24/23 tricyclic terpane ratio which is close to the highest value on Figure 13.76 of Peters et al. (2005) which plots more than 500 worldwide crude oil samples.

The biomarker distributions for the two TKM-201 extracts show some similarities but also some differences to the Sidi Rhalem oils. Notably in the m/z 191 mass chromatograms (Fig. 8), relative to the oil, the extracts have a much higher C_{29}/C_{30} hopane ratio (1.01 and 0.95 versus 0.29) and much lower gammacerane (Gm/Hop ~0.1 versus 0.33). The extracts also have a higher abundance of tricyclic terpanes relative to hopanes, higher amounts of rearranged relative to unrearranged hopanes and steranes (Table 4) and of short-chain steranes to C_{27}-C_{29} steranes. These latter differences could be all related to a higher maturity of the TKM-201 rock extracts. The ‘B’ extract consistently shows a slightly greater maturity than the ‘A’ sample despite both coming from very similar depths (Table 4). The primary organic matter input to the shales and the source rock of the oil are similar, as suggested by the sterane carbon number distributions of the TKM-201 extracts and the oil, although the latter has a slightly greater proportion of C_{27} steranes. Sterane isomerization ratios are near equilibrium values for both the TKM-201 extracts and the oil although the former has somewhat higher %bb values (Table 4).

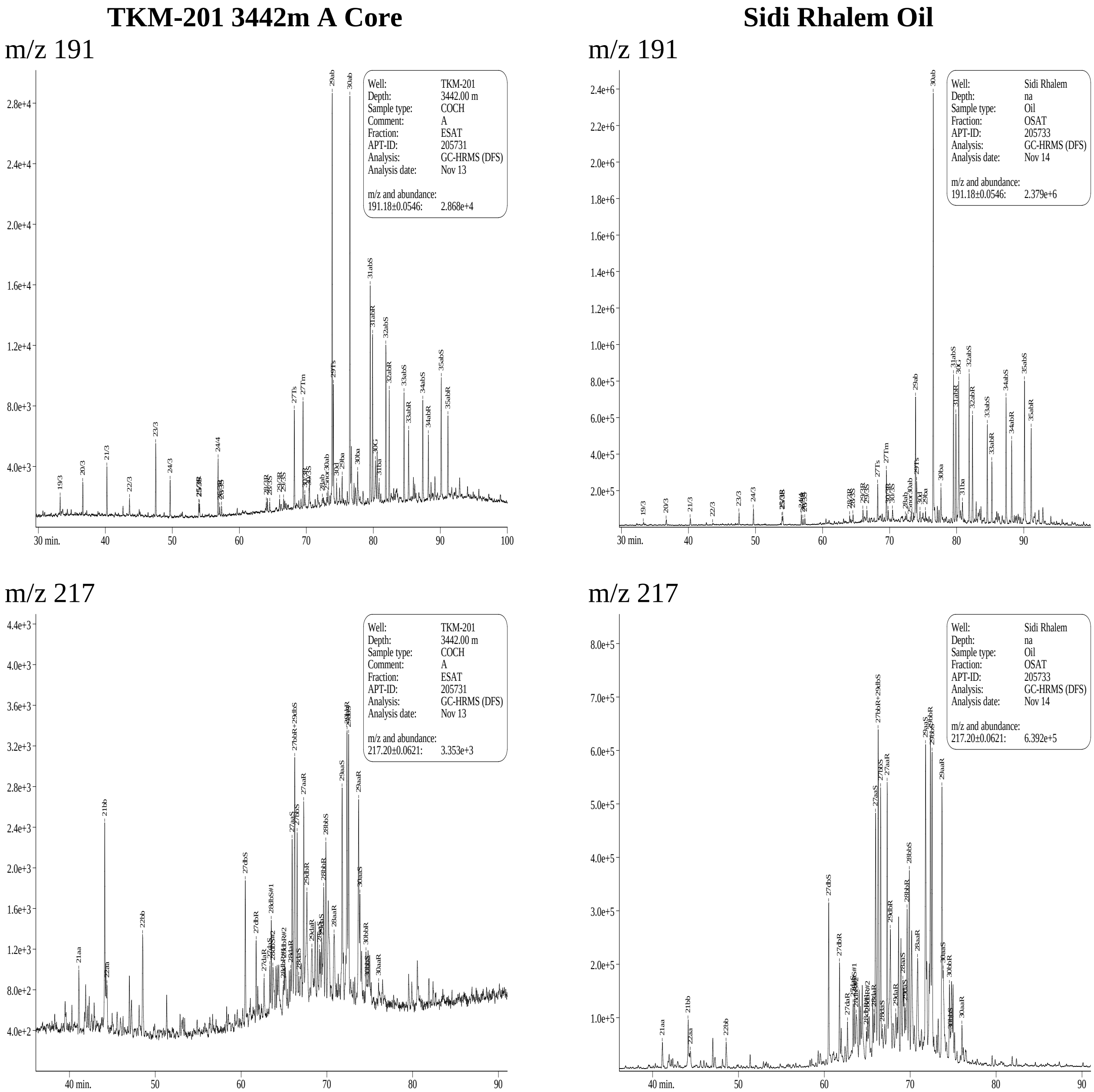


Figure 8. M/z 191 and m/z 217 mass chromatograms showing the distributions of terpanes and sterane respectively for the TKM-201 3442 m A core sample and the Sidi Rhalem oil. Significant differences can be observed between the two samples such as the relative abundance of the C_{29} and C_{30} 17α(H)-hopanes, the abundance of gammacerane and of the rearranged to unrearranged hopanes and steranes.

Comparing the aromatic sterane distributions of the extracts and the oil is difficult because of the very low concentration of the C_{26}-C_{28} triaromatic or C_{27}-C_{29} monoaromatic compounds in the former (Fig. 9), especially in the ‘B’ sample where peaks are barely above the background signal. This, and the very high triaromatic and monoaromatic cracking ratios for the extracts compared to the oil, indicates a significantly greater maturity. This is also suggested by the distributions of methyldibenzothiophenes and methylphenanthrenes as indicated by the MSAro2 and MSAro3 ratios in Table 5, as well as the trimethylnaphthalenes. Overall, the organic matter in the TKM-201 is most probably within the late oil window while the Sidi Rhalem oil was generated in the early to middle part of the oil window.

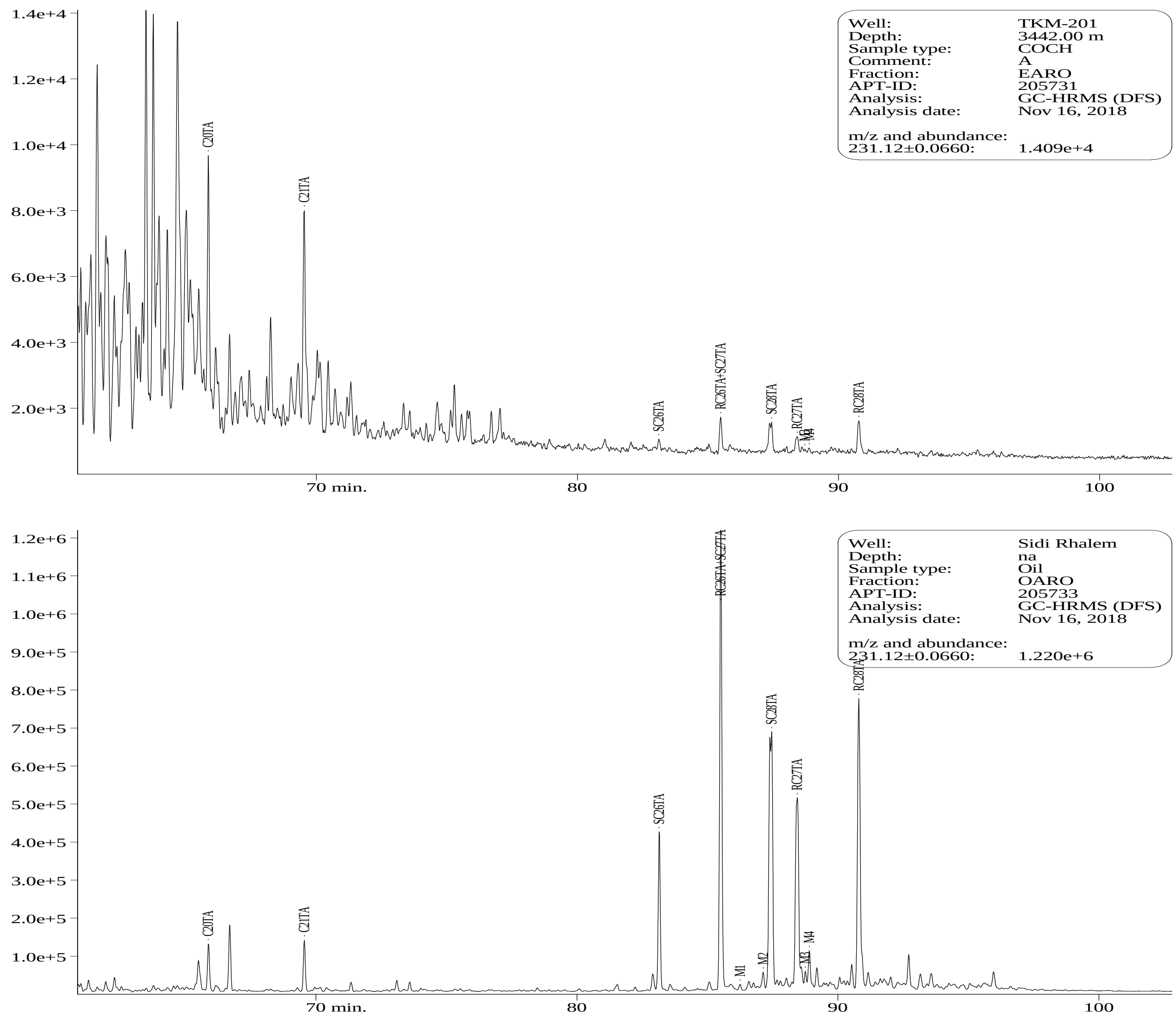


Figure 9. M/z 231 mass chromatograms showing the distributions of triaromatic steranes for the TKM-201 3442 m A core sample (upper) and the Sidi Rhalem oil (lower).

The Sidi Rhalem oil has $\delta^{13}C$ values for saturated hydrocarbons of -30.7‰ and for aromatic hydrocarbons of -29.2‰ (Table 17). These compare to -30.2 and -29.1 measured by *APT (2006)* previously on the RH-8 oil and -29.6 to -30‰ for saturates and -28.4 to -28.8 ‰ for aromatics measured by *Shell (1998)* and *Amoco (1984)*. Carbon isotopes were measured for the TKM-201 ‘B’ sample because a greater amount of EOM was obtained from this sample. The $\delta^{13}C$ values for the saturate and aromatic hydrocarbons are -28.8 and -29.6‰ respectively (Table 9). This is highly unusual as the ^{13}C increases for fractions of increasing polarity and boiling point (e.g. Peters et al. 2005, p.144) and this is not the case for this sample where the aromatic fraction is ^{13}C depleted compared to the saturate fraction. Processes that could influence this, such as biodegradation, are not a factor for these samples. The suspected contamination of the saturated fraction, as suggested by the anomalous abundance of C_{13} and C_{14} n-alkanes, may be the reason for the TKM-201 'B' extract being less ^{13}C depleted than the Sidi Rhalem oil samples. This is possibly supported by the $\delta^{13}C$ of the aromatic fraction of the TKM-201 extracts being more similar to the oils. If the saturates were 1‰ lighter than the aromatics (similar to the oils) then the extracts would be isotopically similar to the oil. However, the higher maturity of the extracts will also affect their isotope results. Because of these problems, the hydrocarbon fraction isotope values are unfortunately not considered a reliable parameter for aiding the oil-source correlation of the TKM-201 Oxfordian-Callovian interval to the Sidi Rhalem oil.

Maturity and biomarker differences indicate that the Oxfordian organic interval at TKM-201 cannot be the source of the Sidi Rhalem oils. While the interval has the necessary organic richness and maturity to have generated the hydrocarbons at Sidi Rhalem, there are important differences in the biomarker distributions (e.g. pr/ph, homohopanes, relative abundance of the C_{29} hopane and gammacerane to the C_{30} hopane) which suggests that a source rock with different characteristics was the source of the oils. The interval identified with source rock potential in the TKM-201 core is very thin and hence an equivalent would be unlikely to be able to source the Sidi Rhalem field. Possible explanations to account for the presence of the oils are that the TKM-201 interval is part of a thicker source rock sequence that overall has geochemical characteristics more similar to the oils, or that there is another source rock interval that has yet to be observed in wells in the area. With regard to the first possible explanation, the TKM-201 well is about 14 km north east of the Sidi Rhalem field and there could be a different thicker facies of the Oxfordian interval, equivalent to that sampled, closer to the oil field.

Tarfaya Basin

Sidi Moussa-1 (SM-1)

The SM-1 well was drilled by Genel and partners in 2014. The Sidi Moussa block lies between the Essaouira and Tarfaya basins (Fig. 4). According to Genel, this well t.d. at 2825 m and encountered oil in “fractured and brecciated cavernous Upper Jurassic carbonates”. According to information supplied by ONHYM, this oil showed an API range of 15-26° and was heavily biodegraded up to a level of 6 (it is assumed that this is referring to the Peters and Moldowan biodegradation scale).

Originally, the intention was to just to sample cuttings in the depth range of the reported oil show. Three unwashed cuttings samples from 2056, 2086 and 2100 m were obtained. The 2086 m sample that was taken from the depth where the oil was tested was strange. Rather than rock cuttings, the sample appear to consist mostly of woody/fibrous material with particles of white plastic/paint (Fig. 10) The 2101 m cuttings showed more visual indications of staining than the 2086 m cuttings. There were problems with drilling over this part of the well and it may be that, unfortunately, only well control materials have been collected in the cuttings from 2086 m. After the cuttings samples had been collected, a ‘SM-1 oil sample’ was obtained by ONHYM for this study.

a) 2086 m

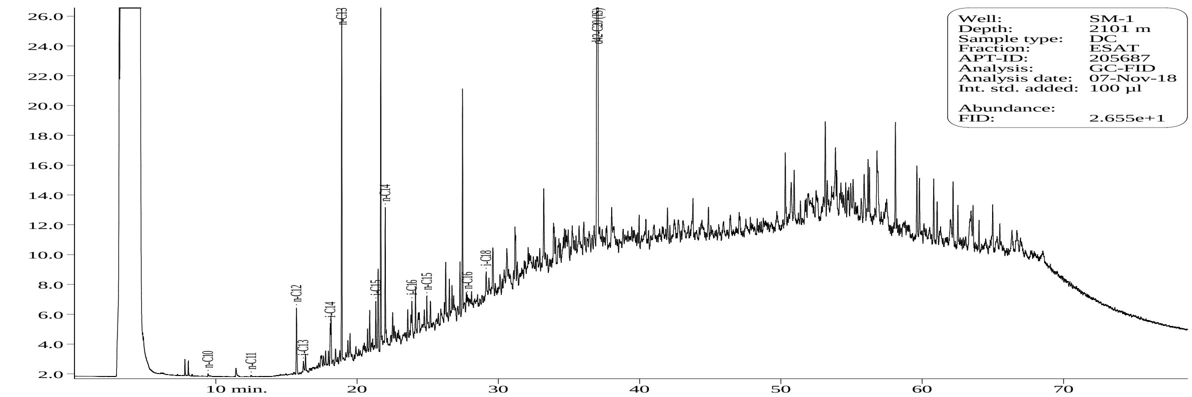
b) 2101 m

Figure 10. Cuttings samples collected from the SM-1 well: a) 2086 m, note fibrous material and white plastic; b) 2101 m, stained with heavy oil.

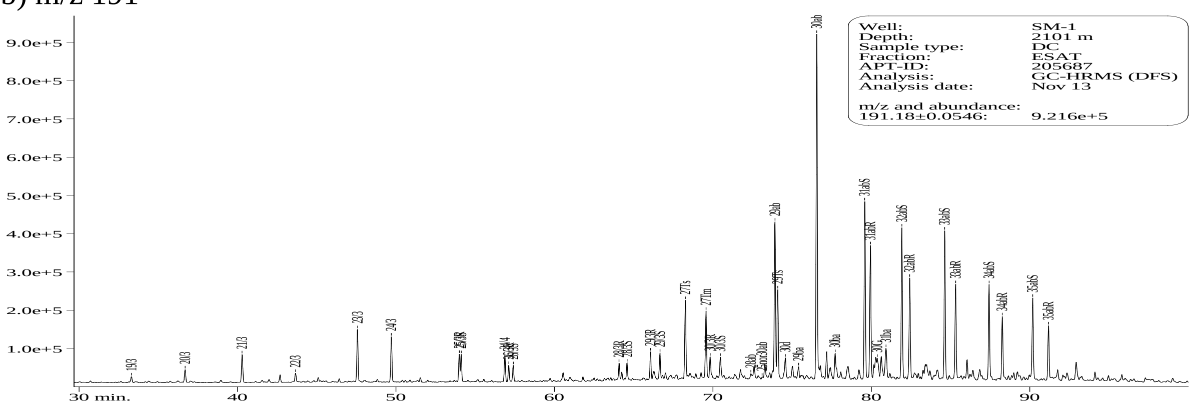
The cuttings samples were analyzed for TOC prior to extraction. They all have low TOC contents (as expected for reservoir rocks), from 0.28 to 0.70% (Table 6), with the 2101 m sample having the highest TOC content. Very little EOM was obtained from the 2086 m sample (Table 8), just 0.3 mg from 1.3 g of material, none of which was hydrocarbons. Hence there is no oil staining in the sample collected. The 2056 m sample gave 1342 mg of EOM per g of rock (ppm) of which only 25.8% was hydrocarbons suggesting that it is not heavily stained. The SFGC of this sample shows n-alkane peaks on a small UCM hump over the nC_{17}-nC_{24} elution time with biomarker peaks evident at later elution times. The biomarkers show low maturity distributions. For example, the steranes are dominated by the 5α(H),14α(H),17α(H) 20R isomers inherited from biological precursors and the hopanes show relatively high abundances of the thermally less stable 17β(H)-hopanes. Based on this, this sample is also not stained but only contains autochthonous hydrocarbons.

The 2101 m sample gave much the highest amount of EOM (7027 ppm) of the SM-1 cuttings samples, of which 39.5% was hydrocarbons with a saturate/aromatic ratio of 2.73. The SFGC of this sample is dominated by a large UCM hump with biomarker peaks superimposed, indicating a highly biodegraded sample (Fig. 11a). The C_{12}-C_{14} n-alkane contaminants, especially nC_{13}, are present in this sample. Unlike the 2056 m sample, the biomarker distributions of this sample are of sufficient maturity to support that it is stained by migrated oil. The m/z 191 mass chromatogram shows a moderate abundance of homohopanes with no C_{34} or C_{35} prominence, low tricyclic terpanes relative to 17α(H)-hopanes, low gammacerane and a high abundance of rearranged hopanes (Fig 11b). The m/z 217 mass chromatogram shows a very high abundance of diasteranes, low amounts of short-chain steranes, C_{29} steranes predominating over C_{27} steranes, and the presence of C_{30} 4-desmethylsteranes (Fig 11c). This suggests a mature marine clastic source rock was responsible for these hydrocarbons. Aromatic hydrocarbon parameters indicate differing levels of maturity with the methylphenanthrenes suggesting about 0.86% vitrinite reflectance for the level of thermal maturity. The methyldibenzothiophenes and trimethylnaphthalenes suggest lower maturity but their distributions may be affected by biodegradation. This is most evident for the aromatic steranes. The triaromatic cracking ratios are much lower than the monoaromatic sterane cracking ratio (e.g. Crack2 versus MSArom1, 0.18 vs 0.48, Table 5). This is probably because the C_{21} and C_{22} monoaromatic steranes are much more resistant to biodegradation than their C_{20} and C_{21} triaromatic equivalents (e.g. Wardroper et al., 1984). Biodegradation does not seem to have affected the saturated biomarkers with no 25-norhopanes present (peak labelled 25nor31ab on m/z 177 mass chromatogram is obviously the C_{30} 17α(H)-hopane). Hence, as suggested by information provided by ONHYM for the SM-1 oil, this sample has a biodegradation level of 6 on the Peters and Moldowan scale. Assuming a normal geothermal gradient, biodegradation of this severity most likely occurred when this reservoir was shallower.

a) SFGC



b) m/z 191



c) m/z 217

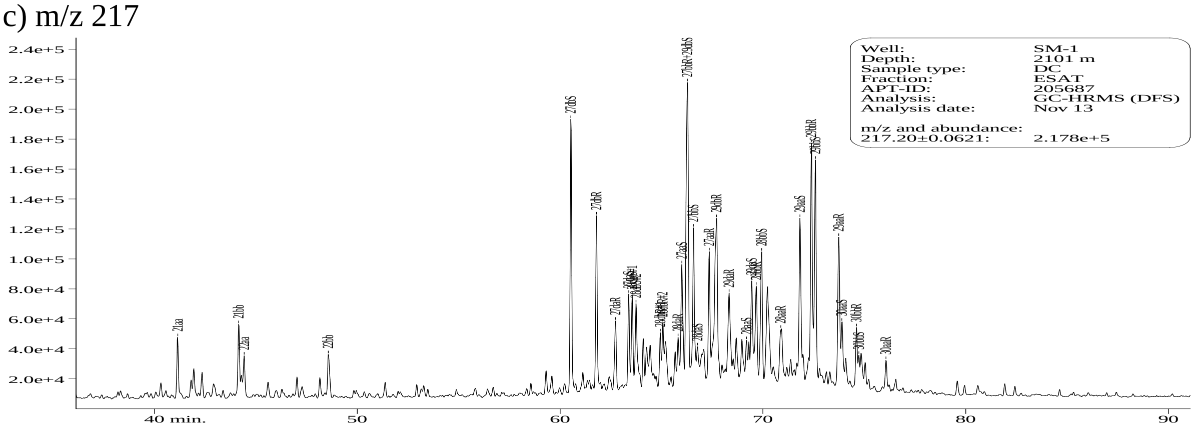


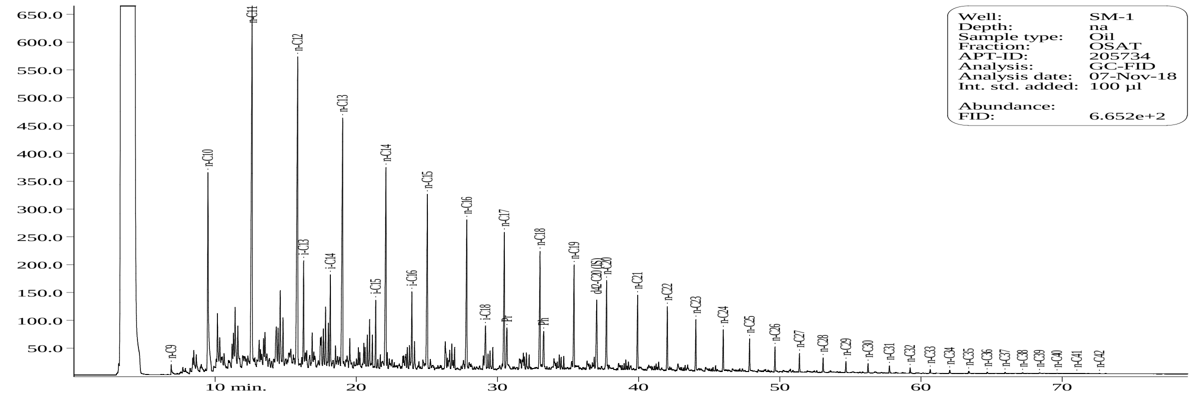
Figure 11. Geochemical data for SM-1 2101 m cuttings extract: a) SFGC, b) m/z 191 mass chromatogram showing distribution of hopanes and terpanes, c) m/z 217 mass chromatogram showing distribution of steranes.

The SM-1 oil is 93.8% hydrocarbons with a relatively high saturate/aromatic ratio (Table 8). The SFGC shows a smooth distribution of n-alkanes (Fig. 12a), a low relative abundance of isoprenoids (e.g. pr/C_{17} is 0.35) with biomarker peaks not evident. This indicates a mature unbiodegraded oil. Based on the gross composition of the oil and the SFGC, an API greater than 26°, the higher API attributed to the SM-1 oil, might have been expected.

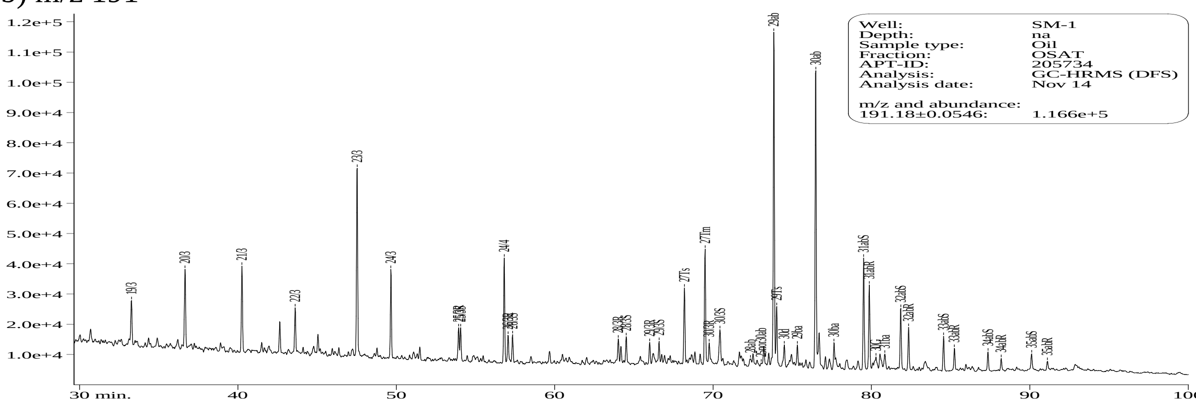
The pr/ph ratio of the oil is 1.07 suggesting a source rock deposited in a dysoxic to anoxic environment. The biomarker distributions of the SM-1 oil sample include a high C_{29}/C_{30} hopane ratio, high tricyclic terpanes, low homohopanes with no C_{34} or C_{35} prominence, very low gammacerane, low rearranged hopanes, high short-chain steranes, moderate diasteranes, C_{27}>C_{29} steranes, and the presence of C_{30} 4-desmethyl steranes (Fig 12b and c). On plots of C_{22}/C_{21} versus C_{24}/C_{23} tricyclic terpanes (e.g. Fig. 13.76, Peters et al., 2005) and C_{26}/C_{25} tricyclic terpanes versus C_{31}R/C_{30} hopanes (Peters et al., 2005 Fig. 13.77) it plots with mostly carbonate sourced oils. Hence the geochemical data suggests a carbonate source rock.

Biomarker maturity parameters such as the sterane isomerization ratio suggest the oil was generated in the middle of the oil window. This is supported by aromatic parameters based on the distribution of methylphenanthrenes and trimethylnaphthalenes which, using the equations of Radke, suggest 0.75-0.76% VRo_{equiv}. The monoaromatic and triaromatic cracking ratio are relatively high and could, using Figure 14.3 of Peters et al. (2005), suggest up to 0.9% VRo. The correlation of maturity parameters can be affected by organic facies and lithology and hence the vitrinite reflectance equivalent values should be used cautiously.

a) SFGC



b) m/z 191



c) m/z 217

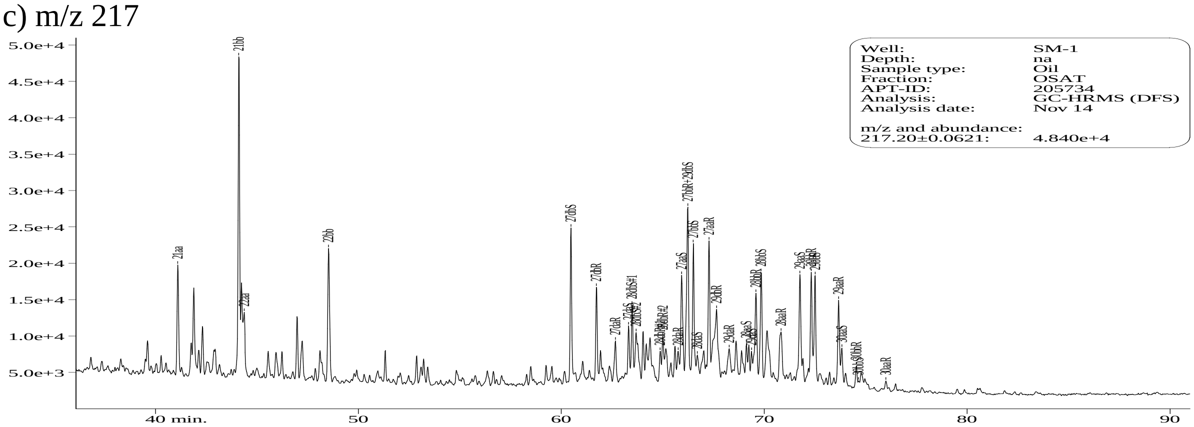


Figure 12. Geochemical data for 'SM-1 oil': a) SFGC, b) m/z 191 mass chromatogram showing distribution of hopanes and terpanes, c) m/z 217 mass chromatogram showing distribution of steranes.

It is evident from the above that there are many geochemical differences between the SM-1 oil sample provided and the cuttings extract from 2101 m in the same well (i.e. compare Figs 11 and 12). For example, compared to the oil, the 2101 m cuttings sample extract has a much lower C_{29}/C_{30} hopane ratio, higher abundance of homohopanes with a different carbon number distribution, lower amounts of tricyclic terpanes relative to hopanes, a much lower abundance of the C_{24} tetracyclic terpane relative to the C_{26} tricyclic terpanes, different C_{27}-C_{29} sterane carbon number distributions, lower relative abundance of short-chain steranes and very different C_{26}-C_{28} triaromatic sterane distribution. These are source differences and cannot be explained by the biodegradation of the cuttings sample hydrocarbons or any difference in thermal maturity.

On the logs provided by ONHYM, lost circulation contamination is indicated between 2086 m and 2101 m which might be responsible for the unusual material in the 2086 m cuttings. The lost circulation was probably related to the well penetrating the fractured carbonates that comprise the reservoir. It seems unlikely that the oil from 2086 m would have a different source rock from hydrocarbons 15 m deeper in what appears to be a continuous reservoir without some indication of mixing. Hence, other reasons for the differences between the samples have to be considered. One is that the samples are not what they were labelled to be. The SM-1 cuttings samples were collected by the author in person and there was nothing to suggest that the bag and box that they came from was anything other than what was labelled. The oil was provided to ONHYM by a third party and hence there is less known about the origin of this sample. It was a light mature oil which does not agree with the description of the SM-1 oil provided by ONHYM that is presumably based on information provided by the operators. This says the oil is heavily biodegraded and ranges in API from 15 to 26°. The cuttings extract is biodegraded to the level reported for the SM-1 oil. Additionally, according to the information provided by ONHYM, the SM-1 oil was thought to come from a clay-rich anoxic marine source rock which agrees more with biomarker characteristics of the 2101 m cuttings sample extract than the SM-1 oil provided for this study. Carbon isotope values of the saturate and aromatic fractions measured on the SM-1 oil provided for this study were $\delta^{13}C$ -28.1 and -27.0‰ respectively. These do appear to be close to where the SM-1 oil plots on a Sofer Plot of $\delta^{13}C$ sats versus $\delta^{13}C$ arom that was also provided in the deck of slides on results from SM-1 by ONHYM. No carbon isotope data was obtained for the cuttings sample in this study.

Based on how much more is known about the origin of the SM-1 2101 m cuttings samples compared to the 'SM-1 oil', and given that the geochemistry of the extract of these cuttings agrees more with what has been reported for the SM-1 oil, it is thought that the cuttings extract data is more likely to be representative of the hydrocarbons in the Upper Jurassic reservoir at SM-1.

Ifni-1

Ifni-1 was drilled in 1976 in the northern part of the Tarfaya Basin, nearer to shore than other wells in this basin. It is about 50 km south east of the SM-1 well. It t.d. in the Triassic around 2000 m and penetrated a Late-Middle Jurassic section. It has been reported to contain organic-rich intervals with TOC contents up to 3.36% (Benarchid, 2013). Information uncovered by ONHYM suggested that the high TOC contents were encountered in the Early Cretaceous-Late Jurassic interval (3000-3030 ft, 914.4-923.5 m) and may relate to the presence of coal. It was also noted that the 2460-2470 ft (749.8-752.9 m) and 3360-3390 ft (1024.1-1033.3 m) intervals had been reported to be oil-stained. The latter are thought to be Lower Kimmeridgian-Upper Oxfordian in age (*Petrostrat*, *2015*).

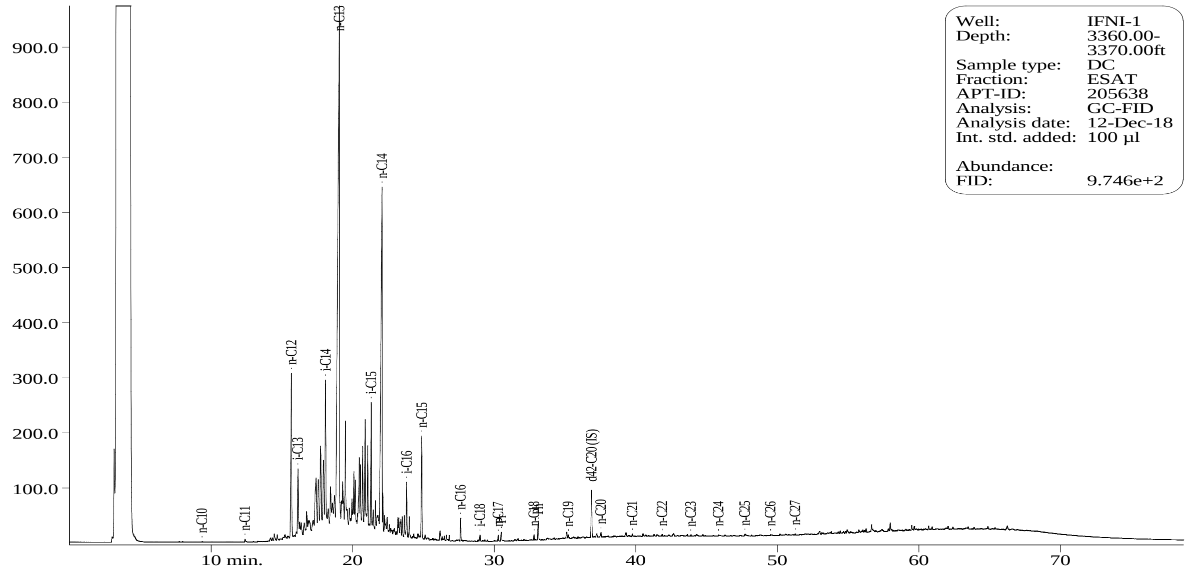
Cuttings samples over the 2460-2470 ft interval could not be found for sampling. Three cuttings samples were collected over 3000-3030 ft to see if there was an organic-rich interval present. These were grey coloured with some minor dark blobs, which were most prevalent in the 3020-3030 ft sample. Two cuttings samples were collected over 3360-3390 ft to check if this Late Jurassic interval was oil-stained. These samples were red-coloured with black blobs that are especially prevalent in the 3360-3370 ft sample (Fig. 13).

Figure 13. Cuttings samples from 3360-3370 m collected for extraction to investigate if there was oil staining. Note black blobs within the red sandstone.

Two of the three samples from the 3000-3030 ft interval are organic-lean with TOC contents of 0.17 and 0.27%, but the TOC content of the 3020-3030 ft sample is 8.33%. This latter sample has a HI of 102 and a Tmax of 428°C that suggests it contains immature Type III organic matter. This sample was extracted, as well as that from 3010-3020 ft. The 3010 ft sample gave a very low amount of extract that based on its very high saturate/aromatic ratio and its SFGC is almost completely drilling additive. The organic-rich 3020-3030 ft sample gave 2079 mg EOM/kg rock that was 23.9% hydrocarbons. It had a much lower saturate/aromatic hydrocarbon ratio than the 3010 ft sample suggesting that it is less contaminated by the drilling additive. The SFGC does show the presence of OBM but also C_{23}-C_{29} n-alkanes with a strong odd carbon number preference indicating the presence of low maturity higher land plant derived hydrocarbons. The biomarkers confirm this. For example, the sterane distributions are dominated by the C_{29} 5α(H),14α(H),17α(H) 20R isomers and the presence of probable gymnosperm-derived diterpenoids are evident in the m/z 191 mass chromatogram eluting close to the C_{19} and C_{20} tricyclic terpanes. Hence, geochemical analyses support the idea that the organic matter in this sample could be low maturity terrestrial derived organic matter such as from a coaly interval. This agrees with what was suggested by ONHYM for the organic matter in these high TOC samples at Ifni-1.

The two potentially stained Late Jurassic samples from 3360 and 3380 ft have TOC contents of 1.99 and 0.63% respectively. They both have low HI values of less than 100 and Tmax values that indicate their kerogen is immature. They have relatively high PI values of 0.15 (for cuttings stored for this length of time) and their pyrograms show broad S2 peaks with an early eluting secondary peak suggesting that they could contain heavy oil/bitumen. The 3360 ft sample was extracted and gave 2436 mg EOM/kg rock. The extract consisted of 61.9% hydrocarbons with a very high saturate/aromatic ratio of 12.73 suggesting drilling additive contamination. This was confirmed by the SFGC (Fig. 14a) that shows alkanes eluting between nC_{12} and nC_{16} as the highest peaks. When the SFGC is blown-up (Fig 14b), the drilling additive appears to be superimposed on a broad UCM hump suggesting highly biodegraded migrated hydrocarbons are present in this sample. There are also very low amounts of nC_{16} -C_{25} alkanes that may not be from the drilling additive but are less degraded hydrocarbons that are present in the reservoir. Partial biodegradation is suggested by the high pr/C17 (2.05) and ph/C18 (4.36) ratio that could be due to the isoprenoids being less susceptible to biodegradation. Low maturity as a reason for these ratios is ruled out by the mature biomarker distributions. The pr/ph ratio is 0.51, implying the source rock of these hydrocarbons was deposited in a highly anoxic environment, if the isoprenoids are representative of the staining hydrocarbons.

a)



b)

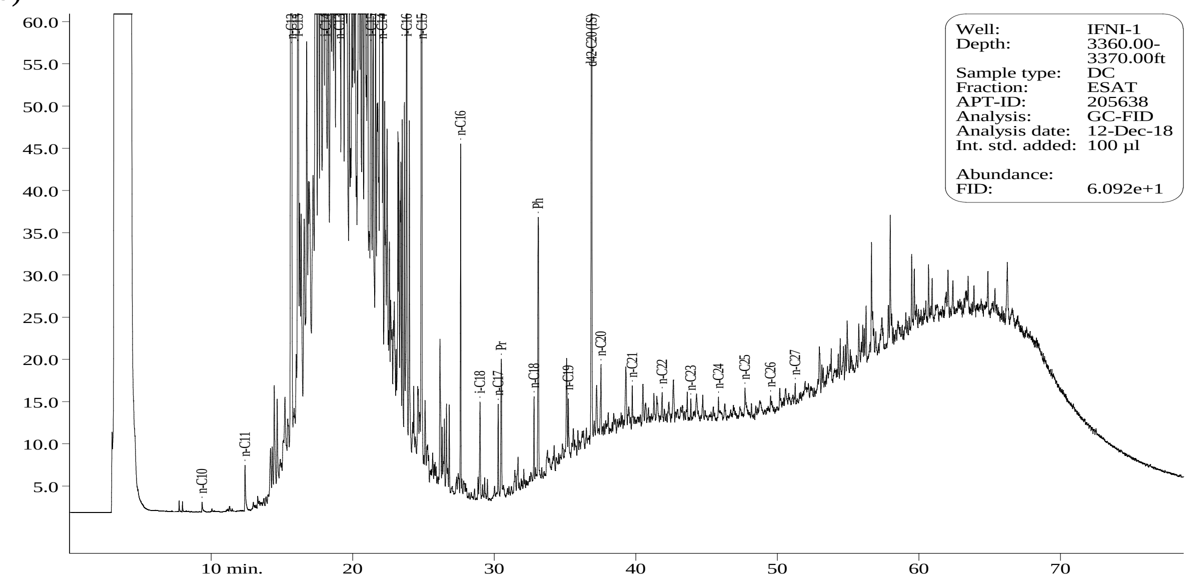
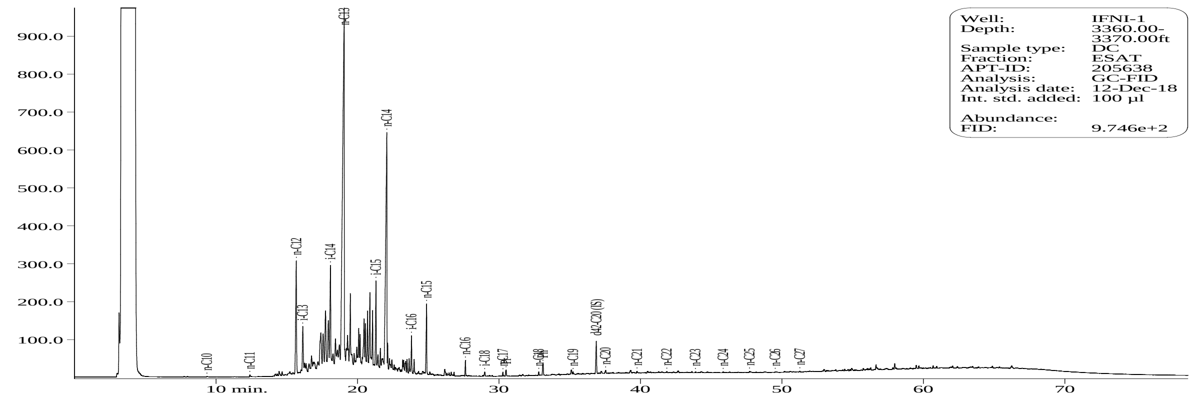


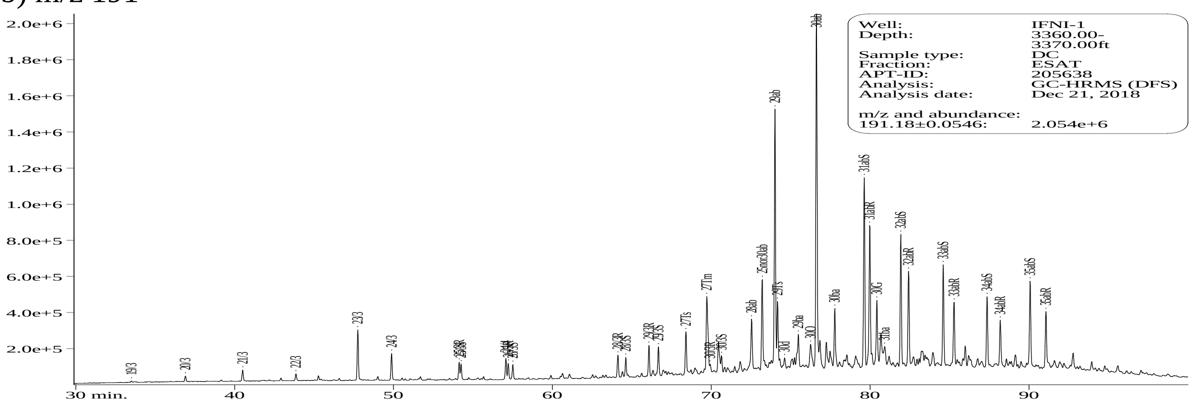
Figure 14. SFGC of Ifni-1 3360-3370 m: a) Showing the impact of the additive eluting between the C12 and C15 n-alkanes, b) the SFGC blown up to show the UCM hump of later eluting compounds.

The m/z 177 mass chromatogram shows the presence of 25-norhopanes in the 3360 ft sample indicating that these hydrocarbons have been severely affected by biodegradation, possibly up to 7 on the Peters and Moldowan (1993) scale. Biomarker distributions indicate the hydrocarbons are from a mature source rock. The m/z 191 mass chromatogram (Fig. 15a) shows a relatively high C_{29}/C_{30} hopane ratio, high abundance of homohopanes with a C_{35} prominence, high gammacerane and low abundance of tricyclic terpanes and rearranged hopanes. The relative abundance of some of these compounds could be affected by the biodegradation with compounds such as the C_{29} hopane, C_{35} homohopane and gammacerane being more resistant to biodegradation than the C_{30} hopane. However, the tricyclic terpanes are more resistant than the hopanes and their relatively low abundance suggests that the hopanes have not been severely affected. Tricyclic terpane ratios (e.g. 22/21, 24/23) suggest a carbonate source rock. The m/z 217 mass chromatogram (Fig 15b) does not suggest significant biodegradation of the steranes has occurred although some alteration is a possibility. The C_{27}-C_{29} steranes show a 31:30:39 ratio with the C_{28}/C_{29} ratio favouring a Jurassic-Cretaceous age source rock (Grantham and Wakefield, 1988). The proportion of C_{28} steranes is higher than observed for the stains present in Jurassic rocks (30% versus 20-22%) which might be evidence for a younger, possibly Cretaceous source rock. C_{30} 4-desmethylsteranes are present indicating a marine source rock. The m/z 245 mass chromatogram of the aromatic fraction is dominated by dinosteranes in contrast to the 3020 ft coaly sample where these compounds were essentially absent, also suggesting a Mesozoic marine source rock. Aromatic sterane cracking ratios suggest a low maturity for these hydrocarbons which agrees with that from the C_{29} sterane isomers, and suggests the hydrocarbons were generated in the early part of the oil window. As both the triaromatic and monoaromatic sterane cracking ratios are both low, it is assumed that there has not been preferential degradation of the C_{20} and C_{21} triaromatic steranes. The distributions of methylphenanthrenes and trimethylnaphthalenes suggest a maturity in the 0.86-0.89% vitrinite reflectance equivalent range, although these compounds could have been affected by biodegradation.

a) SFGC



b) m/z 191



c) m/z 217

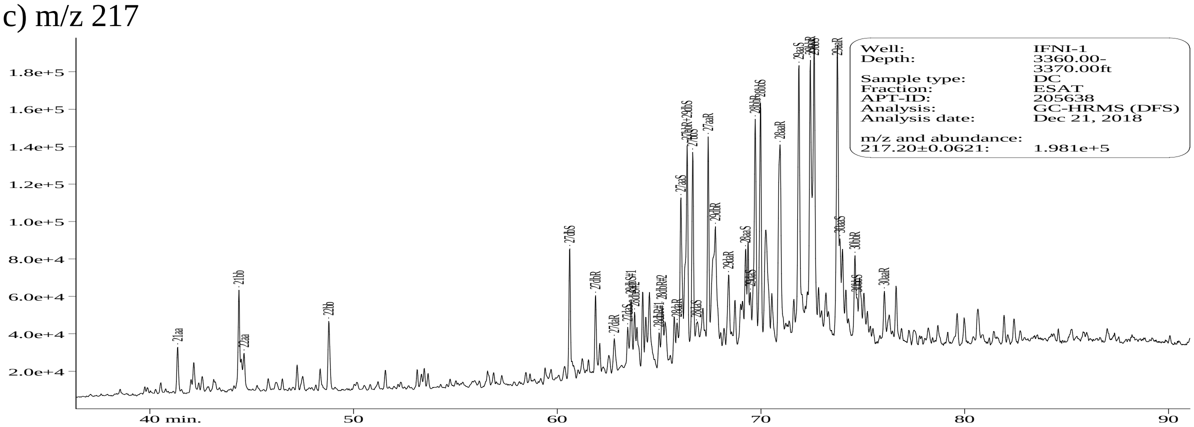


Figure 15. Geochemical data for Ifni-1 3360-3370 m cuttings extract: a) SFGC, b) m/z 191 mass chromatogram showing distribution of hopanes and terpanes, c) m/z 217 mass chromatogram showing distribution of steranes.

Geochemical evidence supports 3360-3390 ft Late Jurassic interval in the Ifni-1 well having been stained, especially between 3360-3370 ft. These hydrocarbons appear to have most likely a Cretaceous, marine, anoxic restricted carbonate source and were generated most likely in the earlier part of the oil window. The depth of this stained interval at Ifni-1 is shallow enough that biodegradation would be expected to be occurring today. If the minor amount of unbiodegraded C_{16}-C_{25} n-alkanes not derived from the drilling fluid and are from the same source rock, this could suggest that the reservoir is being charged today. Comparing the Ifni-1 staining hydrocarbons to the SM-1 oil and cuttings samples indicates that they do not have the same source rock, with the former possibly a Cretaceous carbonate and the latter an Jurassic, clastic interval.

Cap Juby Area Wells, Offshore Tarfaya Basin

MO-8

MO-8 is an older well that was drilled by Exxon in the Cap Juby area, offshore Tarfaya Basin. Unbiodegraded oil was found within the Middle Jurassic over the 11900-12000 ft interval. It was reported to have an API of between 37.6 and 39.4° and to be significantly isotopically lighter than the MO-2 oil *(Texaco, 1989; Shell, 1998).* Earlier analyses suggested that this oil had a different source to the oil found in the Upper Jurassic in the nearby MO-2 well. However, there is very little data for MO-8 and the biomarker data *(Shell, 1998)* is of low quality and not really good enough for comparison with MO-2 and other Moroccan oils. *Shell (1998)*, on the basis of these analyses, interpreted MO-8 to have a “shaly to probably marly” source rock with MO-2 having a carbonate source rock. Core was available for the stained interval at MO-8 and was sampled at two slightly different depth intervals (11975.25 and 11975.75 ft). The core is shown in Figure 16.

Figure 16. MO-8 stained core from the interval sampled for this study.

High amounts of EOM were obtained from both MO-8 samples (Table 8). Both extracts showed a similar composition with relatively low amounts of hydrocarbons (29.9 and 26.9%) for an oil. Their saturate/aromatic hydrocarbon ratio are much lower than those recorded by Texaco and Shell (3.16 and 2.31 respectively). The SFGCs of the MO-8 samples show loss of light ends but high C_{13} and C_{14} n-alkanes suggesting contamination, as seen for other samples in this study. Compared to the Texaco and Shell oil samples, the C_{20+} n-alkanes are in very much higher relative abundance in the extracts. This suggests that evaporation of lighter hydrocarbons has been extensive in the decades that this core has been stored. This partly explains the lower proportion of hydrocarbons and saturate/aromatic hydrocarbon ratio in the extracts compared to the oil samples analyzed previously. While this limits what can be said about the quality of the oil, it does help the biomarker analyses by increasing the concentration of these higher molecular weight compounds. Hence the biomarker analyses of the extract samples give much better data than those of *Shell (1998)* and provide much more information on the source of the hydrocarbons (e.g. Fig. 18).

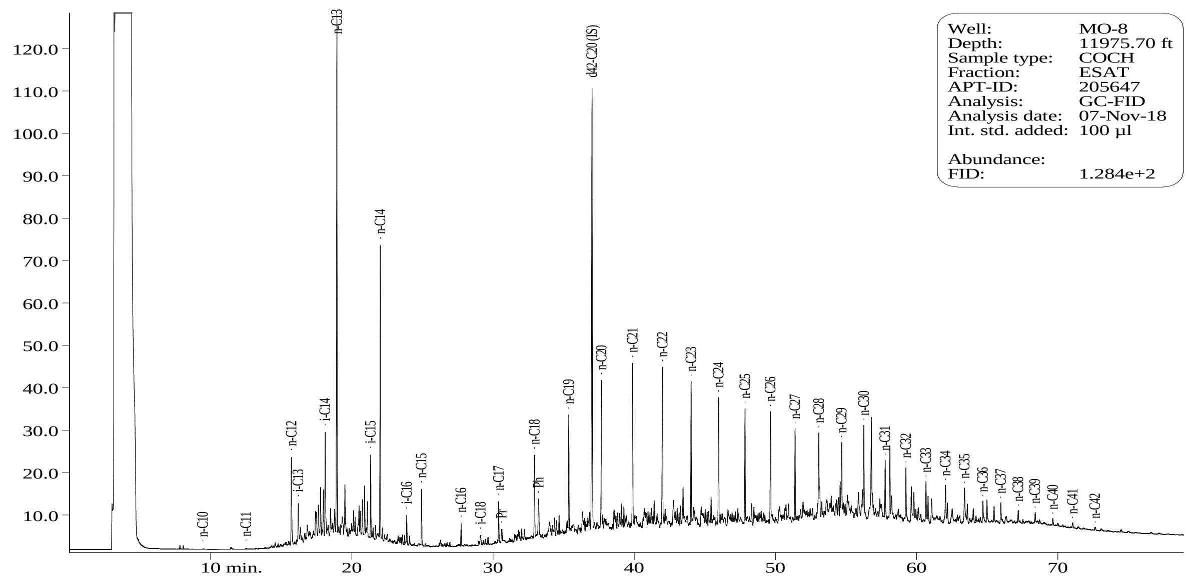
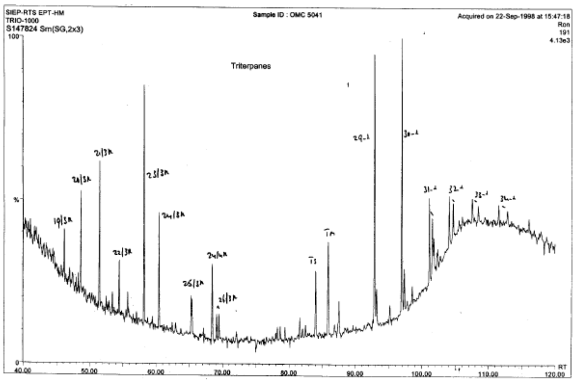


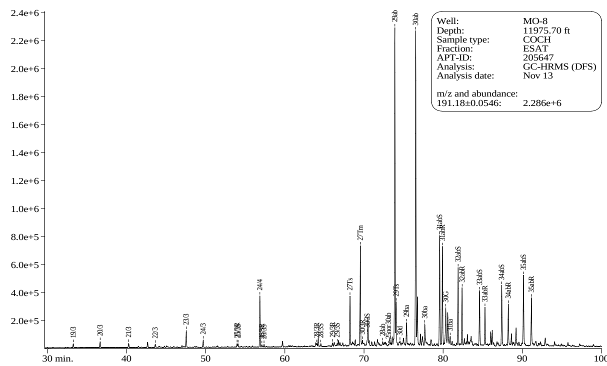
Figure 17. Saturate fraction gas chromatogram for MO-8 11975.70 ft extract. The 11975.25 ft sample is almost identical.

MO-8 1998

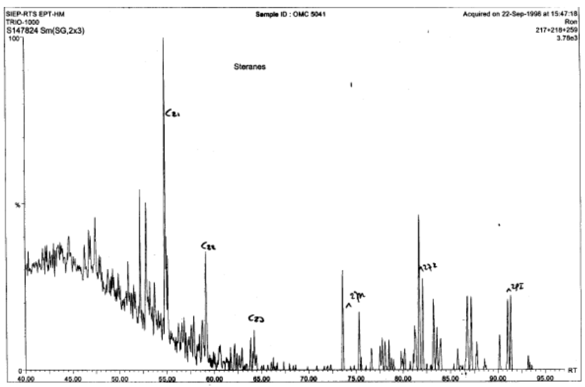
MO-8 11975.7 ft

a) m/z 191





b) m/z 217



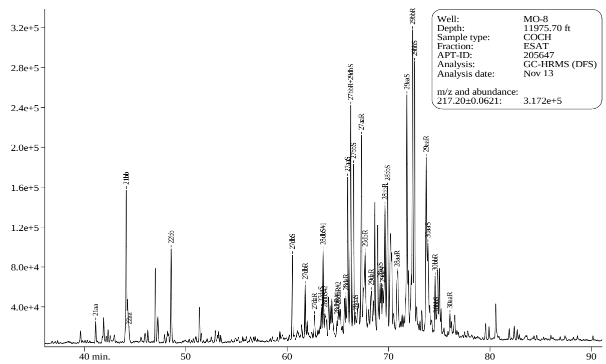
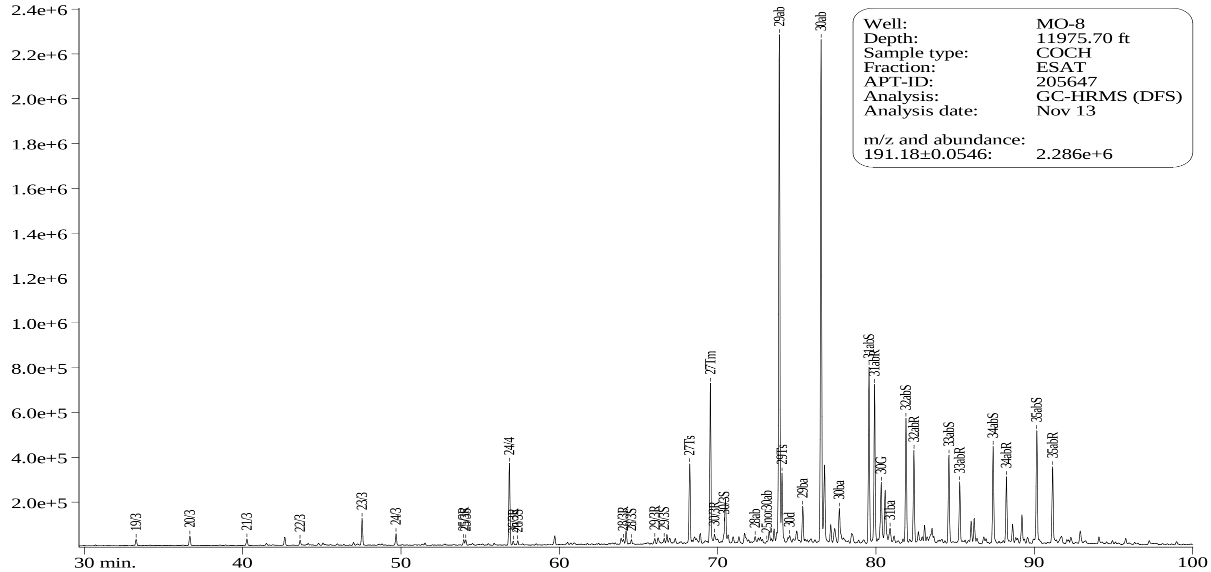


Figure 18. M/z 191 and 217 mass chromatograms showing terpane and sterane distributions respectively in a) MO-8 oil analyzed by *Shell (1998)* and the 11975.70 ft extract analyzed for this study. Note the much greater peak resolution in b), a product of the loss of lighter hydrocarbons increasing the concentration of biomarkers and improvements in GC-MS technology.

Both MO-8 samples have very similar biomarker distributions. Characteristics of the terpane distributions include a high C_{29}/C_{30} hopane ratio, moderate gammacerane, low tricyclic terpanes, C_{24} tetracyclic terpane>C_{26} tricyclic terpanes, low amounts of rearranged hopanes and tricyclic terpane distributions that are usually associated with carbonate oils. The steranes show a low abundance of rearranged steranes, relatively high abundance of short-chain steranes. These characteristics suggest an anoxic carbonate was the source of this oil. The C_{27}:C_{28}:C_{29} distribution is 33:20:47 which gives a low C_{28}/C_{29} value for a marine Jurassic sourced oil because of the relatively high amount of C_{29} steranes. The triaromatic steranes show an equivalent C_{28} predominance over the C_{26} and C_{27} members. While this could possibly suggest an older age for the source of this oil, it is more likely due to a contribution of terrestrially derived organic matter to the source rock or deposition in a restricted environment. The aromatic steranes show relatively high cracking ratio (Table 5) suggesting a more mature oil. The m/z 245 mass chromatogram is dominated by aromatic dinosteranes, as expected for a Jurassic sourced oil.

The maturity of the MO-8 hydrocarbons is suggested to be late oil window based on the aromatic steranes. Other aromatic parameters, based on the distributions of methylphenanthrenes, dibenzothiophenes or trimethylnaphthalenes, are likely to have had their distributions affected by their volatility which may explain why they suggest lower maturity for the hydrocarbons between 0.64 and 0.75% vitrinite reflectance equivalent. Sterane isomerization distributions are close to their equilibrium values suggesting mid oil window maturity. The relatively low amounts of rearranged hopanes and steranes compared to their unrearranged counterparts is considered here to be more a function of a carbonate source rock than lower maturity. Overall, the maturity of the MO-8 hydrocarbons is thought to be most likely middle oil window, around 0.8 to 0.85% vitrinite reflectance but there is some uncertainty in that inference.

a) m/z 191



c) m/z 217

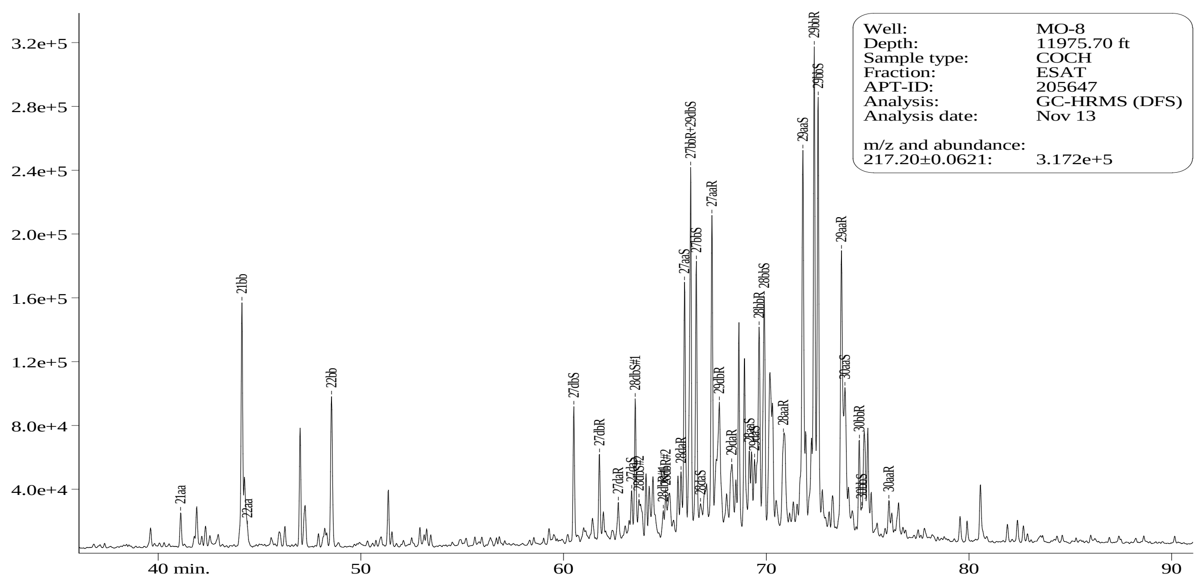


Figure 19. Geochemical data for MO-8 11975.7 ft extract: a) m/z 191 mass chromatogram showing distribution of hopanes and terpanes, b) m/z 217 mass chromatogram showing distribution of steranes.

There are difficulties in comparing the data obtained for this study from the MO-8 core samples to the oil analyses done previously by *Texaco (1989)* and *Shell (1998)*. The first is obviously the nature of the samples. Texaco and Shell analyzed crude oil samples. These indicate that the tested oil was light, dominated by lighter n-alkanes with low concentrations of C_{20+} compounds. In contrast, the SFGCs of the MO-8 extracts are dominated by C_{20+} n-alkanes. This is presumably because of the evaporation of lighter compounds from the core while it has been in storage over the last 40+ years. The gas chromatograms from the earlier oil analyses support a higher rather than a lower maturity for the oil. The pristane/phytane ratio from the Texaco and Shell reports are 1.67 and 1.43 respectively, which do not suggest strongly anoxic depositional environment for the source rock. Also, the contamination indicated by the high C_{13} and C_{14} n-alkane peaks in the cuttings samples is not observed in the oil GCs.

As indicated by Figure 18, the higher quality of the new GC-MS analyses is obvious compared to those done by *Shell (1998)*. Reasons for this include better instrumentation and the loss of most of the lighter n-alkanes which has increased the concentration of biomarkers. This is evident by easily observed hopane peaks in the SFGCs of the MO-8 core samples where in the equivalent part of the *Shell (1998)* oil chromatograms even the n-alkane peaks are barely above the base line. Hence while the Shell oil analyses have low signal to noise, this is much better for the core analyses. This might explain some of the differences in the biomarker distributions between the analyses. These differences include the *Shell (1998)* analysis showing much higher abundances of short-chain steranes relative to the C_{27}-C_{29} steranes, a higher relative abundance of diasteranes, C_{29} predominating over C_{27} steranes, a much higher abundance of tricyclic terpanes, and a lower abundance of homohopanes with no C_{35} prominence observable.

Similarities between the Shell and current analysis include both having a high C_{29}/C_{30} ratio, C_{24} tetracyclic terpane in higher abundance than the C_{26} tricyclic terpanes and low Ts/Tm. There is some concern that the differences could be related to the extensive evaporation of hydrocarbons from this sample as they all involve a later eluting compound increasing in abundance relative to earlier eluting compounds. The similarities between the samples involve compounds that have similar elution times, hence are of similar volatility. The boiling point of C_{20} n-alkane (around the same as the earlier eluting tricyclic terpanes) is 343°C and C_{30} n-alkane (which elutes close to the C_{29} 17α(H)-hopane) is 450°C. The MO-8 core has been stored in a non-air conditioned facility for almost fifty years. While it seems unlikely that even under these conditions that compounds with volatilities as low as the biomarker compounds could have been affected by evaporation, the possibility of evaporative effects should be kept in mind when using the data.

Although there is the possibility of the MO-8 core extract having been badly affected by evaporation, it is interesting to compare the biomarker distributions with those of MO-2 oil analyzed by APT in 2006. As shown by the mass chromatograms in Figure 20, there are a lot of similarities between the MO-2 oil and the MO-8 core extracts, enough to suggest the same or a very similar source rock. Differences between the MO-2 and MO-8 samples are those that might be expected by the effects of biodegradation on the former and evaporation on the latter. For example, the lower amount of short-chain steranes in the MO-8 samples compared to MO-2 oil could be due to them being partially lost by evaporation. In contrast, the MO-8 core extracts show higher amounts of the C_{20} and C_{21} relative to the C_{26}-C_{28} triaromatic steranes which could be related to the biodegradation of these compounds in the MO-2 oil. However, short-chain monoaromatic steranes are also higher compared to higher molecular weight homologues in the MO-8 samples and these compounds are more resistant to biodegradation. Rather than biodegradation this difference might suggest the MO-8 core extract hydrocarbons have lower maturity than the MO-2 oil. Most saturate biomarker parameters (sterane isomerization, ratio of rearranged hopanes to hopanes unlike rearranged steranes to regular steranes where MO-2 is much higher) suggest the MO-2 and MO-8 samples have similar maturity. Aromatic maturity differences between the samples are difficult to compare because of the alteration processes.

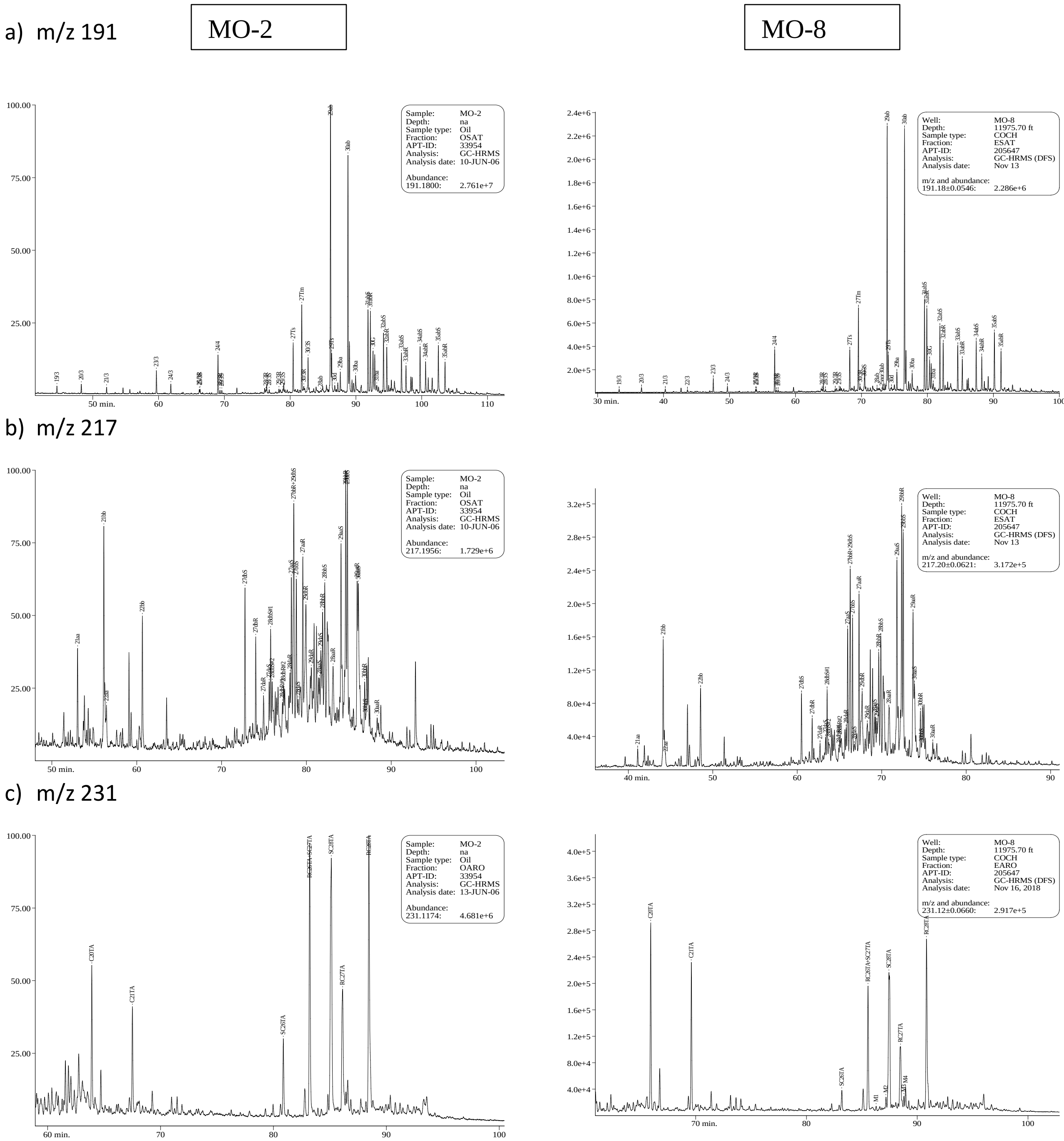


Figure 20. Comparison of biomarker data for a MO-2 oil sample analyzed by APT (2005) and a MO-8 core extract from the reservoir interval analyzed for this study; a) m/z 191 mass chromatograms showing terpane distributions, b) m/z 217 mass chromatograms showing sterane distributions and c) m/z 231 mass chromatograms showing triaromatic sterane distributions.. Note the many similarities between the Upper and Middle Jurassic reservoired hydrocarbons.

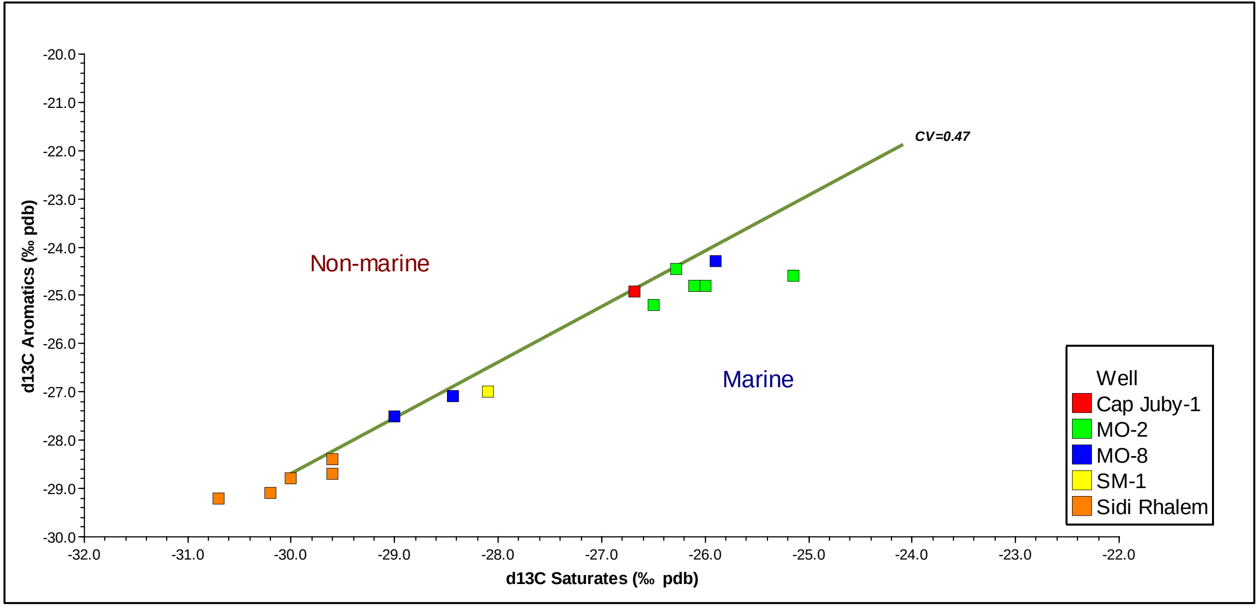


Figure 21. Sofer Plot of hydrocarbon fraction $\delta^{13}C$ data for Morocco oils

All saturate and aromatic hydrocarbon $\delta^{13}C$ data is presented in Table X1 and on a Sofer Plot in Figure 21. Table X1 shows the variation between isotopic analyses done by different laboratories and on samples analyzed at different times. Some of the variation between the different laboratories might reflect the type or quality of the sample (how much of the original oil has been loss to evaporation).

Well	Sample	Type	$\delta^{13}C$ Sat	$\delta^{13}C$ Aro
MO-8	11975.7ft APT (2019)	Core	-25.9	-24.3
	Shell (1998)	Oil	-29	-27.5
	Texaco (1989)	Oil	-28.44	-27.1
MO-2	Shell (1998)	Oil	-26	-24.8
	Texaco (1989)	Oil	-26.28	-24.46
	Amoco (1984)	Oil	-25.15	-24.6
	APT (2006)	Oil	-26.5	-25.2
	Mobil (1985)	Oil	-26.11	-24.81
Sidi Rhalem	Shell (1998)	Oil	-30	-28.8
	APT (2006)	Oil	-30.2	-29.1
	Amoco (1984) RH-8	Oil	-29.6	-28.4
	Amoco (1984) RH-2	Oil	-29.6	-28.7
	APT (2019)	Oil	-30.7	-29.2
Cap Juby-1	Mobil (1985)	Oil	-26.68	-24.92
SM-1	APT (2019)	Oil	-28.1	-27

Table X1. Compilation of hydrocarbon fraction $\delta^{13}C$ data for Morocco oils. Note for reasons discussed elsewhere in the text, the 'SM-1 oil' is unlikely to be from SM-1 well.

The MO-8 extract $\delta^{13}C$ values are similar to those of the MO-2 oil values obtained from the MO-2 oil by *APT (2006)* (Table X1) which could provide further support to the biomarker data, in suggesting that the MO-2 and MO-8 oils could have the same source rock. However, the difference between the $\delta^{13}C$ for the hydrocarbon fractions of the 11975.7 ft core extract and the values that *Texaco (1989)* and *Shell (1998)* obtained from MO-8 oil is significant. The cuttings are isotopically much heavier. This could be due to the extensive loss of the more volatile compounds from the core as an enrichment of ^{13}C occurs during volatilization of hydrocarbons. A quick survey of the literature could find no reports on the isotopic changes in samples that have been stored for the length of time of the MO-8 core and have suffered a similar extensive loss of lighter hydrocarbons. Hence it is not certain that this is a reasonable explanation for the isotopic differences between the MO-8 core and oil hydrocarbons. Another possible contributing factor to the isotopic differences is the presence of the anomalous hydrocarbons in the nC_{13}-nC_{14} region of the SFGC which may be isotopically heavier to the oil hydrocarbons. It is not known if there are also aromatic contaminants but this is not suggested by the TKM-201 and Sidi Rhalem data. Variation between laboratories does not appear to be the reason as in Table X1, the APT values for the MO-2 and Sidi Rhalem oils are similar to those reported from other groups.

Based on the problems in comparing MO-8 core and oil samples, it is not reasonable to compare the new MO-8 core isotopic data with the MO-2 oil. Using the older data, the MO-2 oil saturate and aromatic hydrocarbons show a range of $\delta^{13}C$ values of -25.15 to -26.5‰ and -24.6 to -25.2‰ respectively, compared to MO-8 oil sample which has $\delta^{13}C$ values of -28.44 to -29.0‰ for the saturates and -27.10 to -27.55‰ for the aromatics. These differences are large enough to suggest that the two oils do have different source rocks, as suggested by earlier workers. It is possible that some of the isotopic difference between the two oils could be due to the extensive biodegradation of MO-2, although reports suggest this only causes changes of 1‰ and possibly 2‰ (e.g. Stahl, 1980; Sofer, 1984; Marcano et al., 2013).

Overall, the biomarker data strongly suggests that the MO-2 and MO-8 oils have the same source rock while older isotopic data indicates the opposite. At the very least, the source rock for the two oils was deposited in a very similar carbonate depositional environment, contradicting the earlier reports that suggested MO-8 had a clastic source rock.

Juby Maritime-1

The Juby Maritime-1 (JM-1) well was drilled in 2014-2015 by Chariot and partners. It is located just two miles from MO-2. JM-1 found the presence of heavy oil in the Upper Jurassic over a gross interval of 110 m that was tested originally in MO-2. It also went down to the Middle Jurassic to test where light oil was found at MO-8. Logs report the presence of "traces of bitumen" within the Middle Jurassic. A report done by *Robertson (2014)* was provided by ONHYM which gave some data on the Upper Jurassic oil seep, confirming that it was biodegraded. However, there were no biomarker analyses that would confirm the similarity between the JM-1 and MO-2 samples. Hence the objectives of sampling JM-1 was to confirm the similarity between the JM-1 and MO-2 Upper Jurassic oils, and to check if there was staining of the Middle Jurassic.

Four washed cuttings samples were collected from JM-1. Two samples from 2128 and 2134 m were collected from the Upper Jurassic stained interval. Two samples were also collected from the Middle Jurassic from 3619 and 3631 m.

Only the 2128 m sample gave a large amount of EOM with 9024 mg EOM/Kg rock. The other samples gave very low amounts, with the 2134 m sample giving just 171 and the two Middle Jurassic samples 203 and 304 mg EOM/Kg rock. The 2134 m sample also shows biomarker distributions that are immature, for example the steranes are dominated by the 5α(H),14α(H),17α(H) 20R biologically inherited isomers. This indicates that this sample was not stained by migrated hydrocarbons and hence will not be discussed further here.

The SFGC of the 2128 m sample shows the contamination by the nC_{13} and nC_{14} and other alkanes in their vicinity, as seen in other samples. The remainder of the SFGC is a UCM hump with peaks superimposed on it that are n-alkanes and biomarkers. This suggests it is a mixture of unbiodegraded and biodegraded hydrocarbons. The SFGC is similar to that shown in the Robertson report for their JM-1 2138 m sample, including the nC_{13} and nC_{14} contamination.

The pr/ph ratio of the 2128 m sample is 0.73 which is lower than that reported by *Robertson (2014)* with the ratio of their samples close to unity. This is probably because of the greater degree of evaporation of the lighter hydrocarbons in the sample collected for this study. The pr/nC_{17} and ph/nC_{18} ratio is high as expected for a biodegraded sample.

The biomarker distributions for the JM-1 2128 m sample are very similar to those for the MO-2 oil. For example, both show a high C_{29}/C_{30} hopane ratio, a similar homohopane distribution, gammacerane in similar relative abundance to the hopanes, low amounts of tricyclic terpanes with the C_{24} tetracyclic terpane in higher abundance than the C_{26} tricyclic terpanes, the same sterane C_{27}:C_{28}:C_{29} distribution (31:21:48) and very similar amounts of rearranged hopanes and steranes compared to their unrearranged counterparts and similar aromatic sterane distributions. The only difference is the greater amount of short-chain steranes in the MO-2 oil.

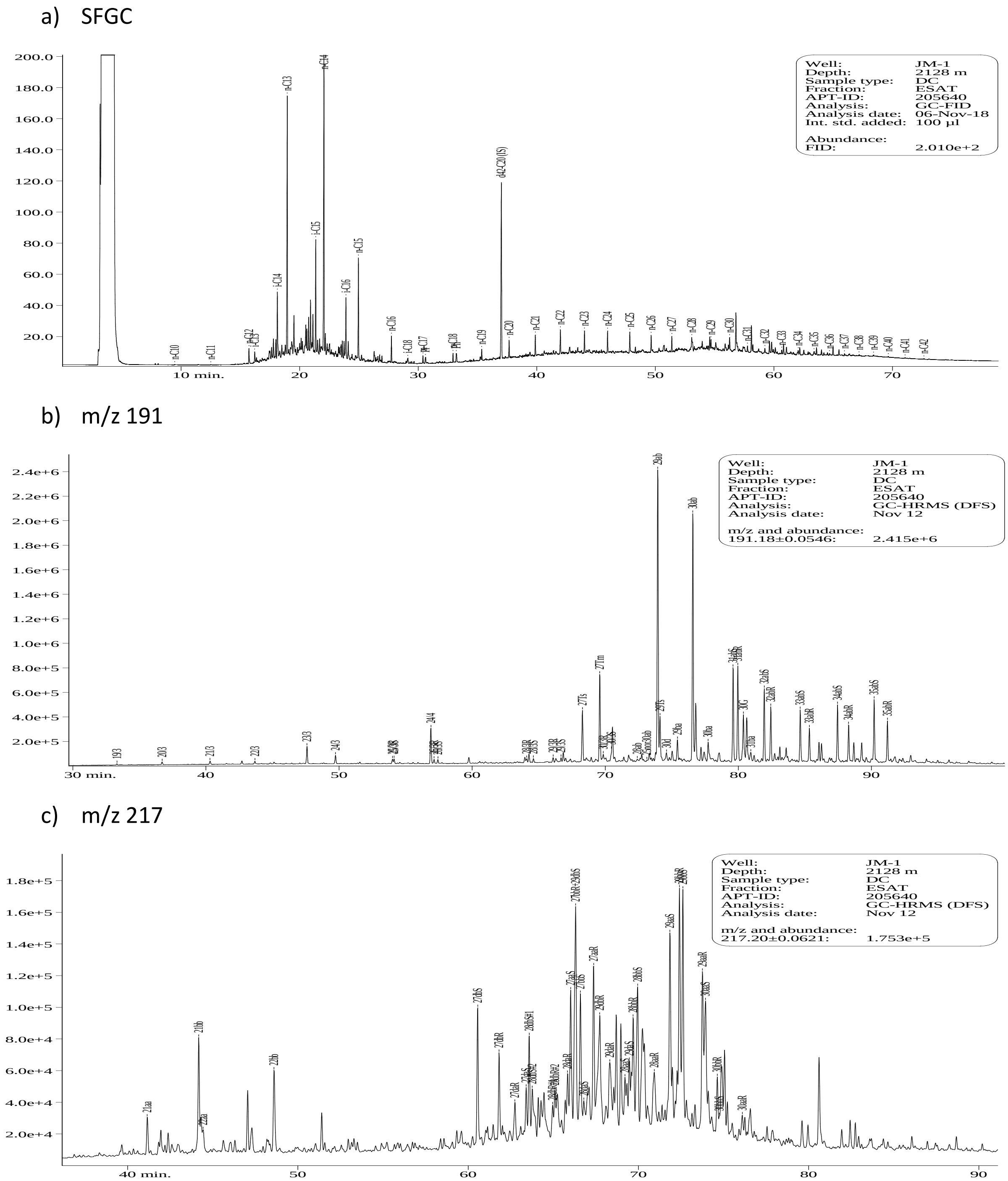
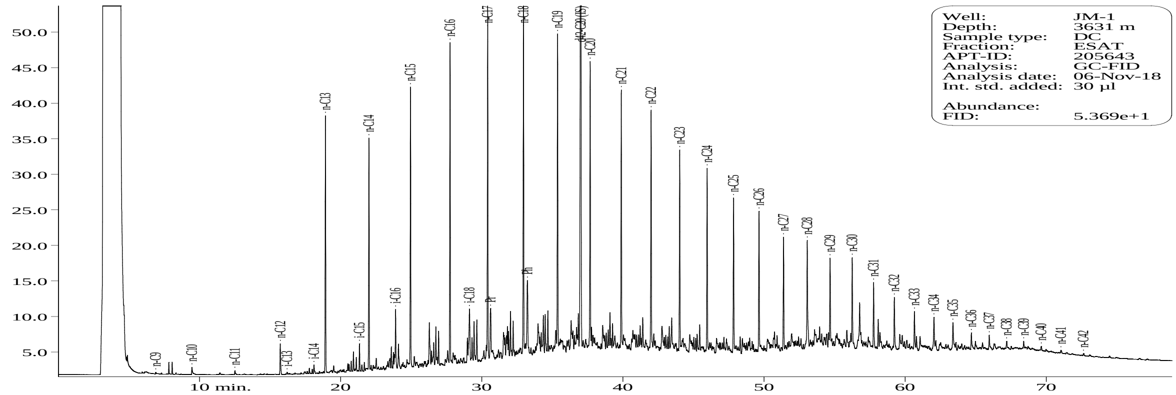


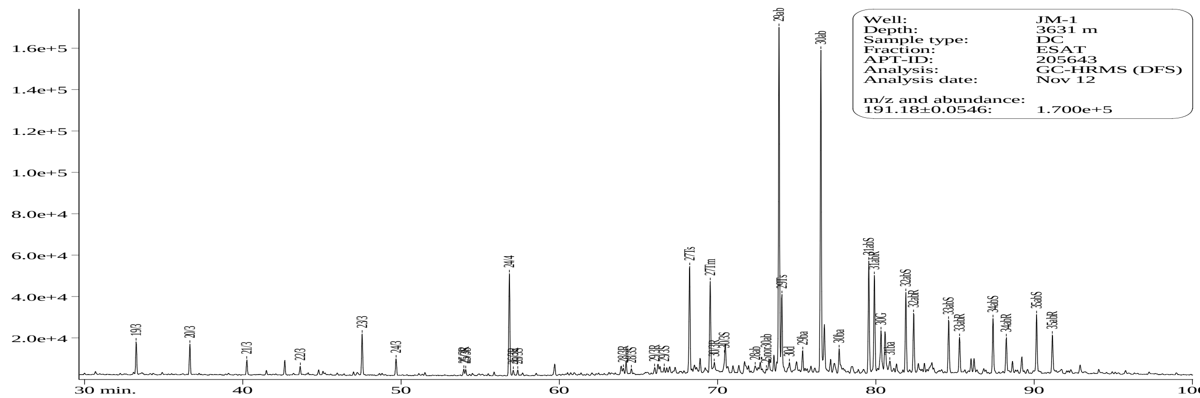
Figure 22. Geochemical data for JM-1 Upper Jurassic 2128 m cuttings extract: a) SFGC, b) m/z 191 mass chromatogram showing distribution of hopanes and terpanes, c) m/z 217 mass chromatogram showing distribution of steranes.

Although JM-1 Middle Jurassic extracts from 3619 and 3631 gave low amounts of EOM, they have very similar geochemical characteristics that suggest they are probably stained by migrated hydrocarbons. Hydrocarbons make up a large proportion of their extracts (52-56%) and their SFGCs (Fig 23a) and biomarker distributions indicate the hydrocarbons are mature. The SFGCs are dominated by n-alkanes indicating that biodegradation has not occurred. The n-alkanes show a smooth distribution of decreasing abundance with increasing carbon number and isoprenoids are in low abundance compared to n-alkanes (as indicated by the low pr/nC_{17} and ph/nC_{18} ratios in Table 3), suggesting a level of maturity in the oil window. The samples have a low pr/ph ratio of 0.68-0.69 indicating a source rock deposited under highly anoxic conditions. Their biomarker distributions are very similar to the 2128 m sample (Fig. 23b and c). There are some differences between some of the aromatic hydrocarbon distributions, but these can be attributed to the biodegradation of the Upper Jurassic sample. For example, the triaromatic sterane cracking ratio is much lower for the 2128 m compared to the 3619 and 3631 m samples (Table 5), most likely because of the susceptibility to biodegradation of the short-chain triaromatic steranes. Due to the lack of biodegradation, aromatic maturity parameters for the 3619 and 3631 m samples are probably valid. They suggest a maturity in the early to middle part of the oil window, around 0.75 to 0.80% VRo equivalent which is compatible with the saturated biomarker parameters.

a) SFGC



b) m/z 191



c) m/z 217

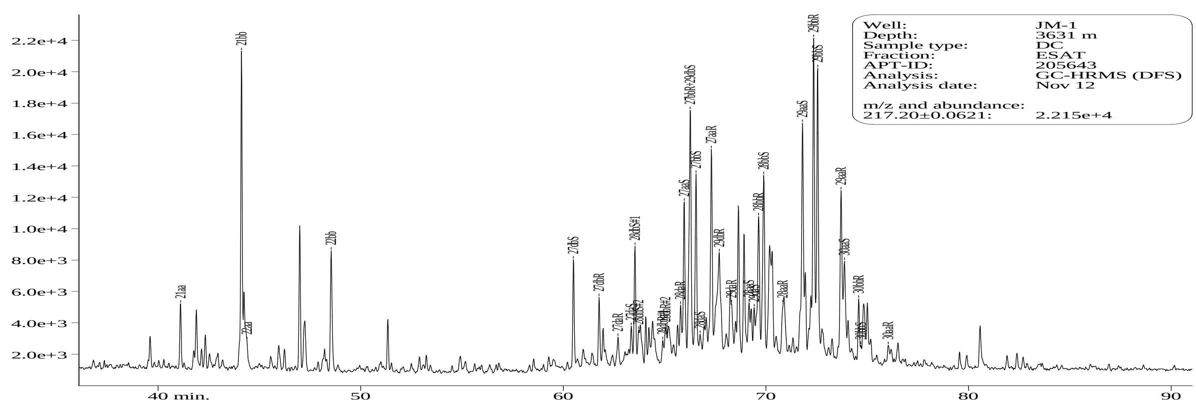
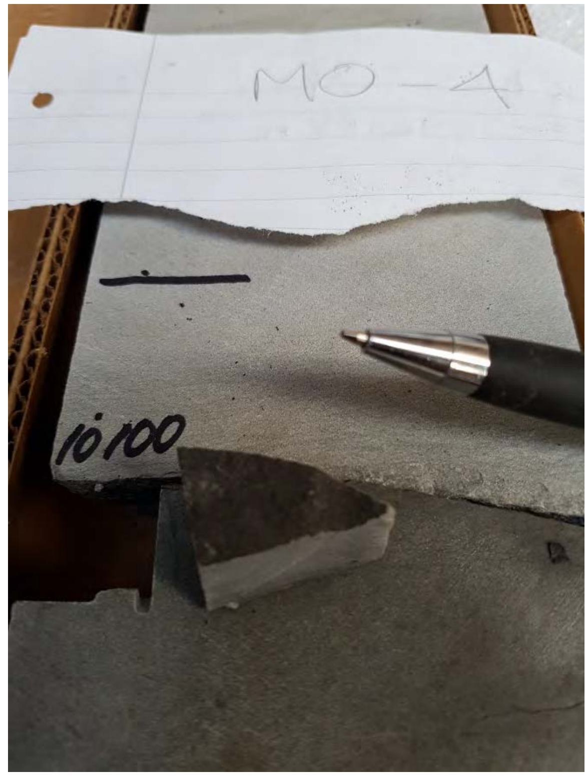


Figure 23. Geochemical data for JM-1 Middle Jurassic 3631 m cuttings extract: a) SFGC, b) m/z 191 mass chromatogram showing distribution of hopanes and terpanes, c) m/z 217 mass chromatogram showing distribution of steranes.

The close similarity of the MO-2 and JM-1 Upper Jurassic hydrocarbons in their source characteristics and degree of alteration is not unexpected as this is the same reservoir. The similarity of the JM-1 Upper and Middle Jurassic biomarker distributions supports the tentative conclusion that the MO-2 Upper Jurassic and MO-8 Middle Jurassic hydrocarbons have the same or similar source rock. All three wells were drilled very close to each other. Hence biomarker data implies that a single source rock could be responsible for all of the oil at Cap Juby. As discussed previously, this is not supported by the older isotopic data for MO-2 and MO-8 oils. Unfortunately, there was not enough extract for isotopic analyses to be done to compare the $\delta^{13}C$ values of the hydrocarbon fractions from the JM-1 extracts to see if this isotopic data would support the single source hypothesis.

MO-4

MO-4 is the most northerly of the MO wells drilled by Esso in the 1960's-70's and is south west of Tan Tan-1. It was reported to have encountered minor oil and gas shows in the Upper Jurassic. Previous work on this well has just looked for possible source rocks in the penetrated sequence (*APT, 2006*). This indicated that an interval at the top of the well from 445 to 1460 ft in the Upper Cretaceous had some hydrocarbon source potential but nothing in the deeper part of the well within the Jurassic where TOC contents were all less than 0.5%. ONHYM indicated that there was a report that suggested heavy oil traces in the Upper Jurassic at 6767 ft (core 5) and in the Middle Jurassic at 10097 ft (core 8). The Upper Jurassic core was not available for sampling. Two samples were collected from the Middle Jurassic core at 10098.30 ft (3077.96 m) and 10100.25 ft (3078.56 m). These samples were taken where the core shows a darker layer along bedding (Fig. 24). There was no indication of pervasive staining in this core.



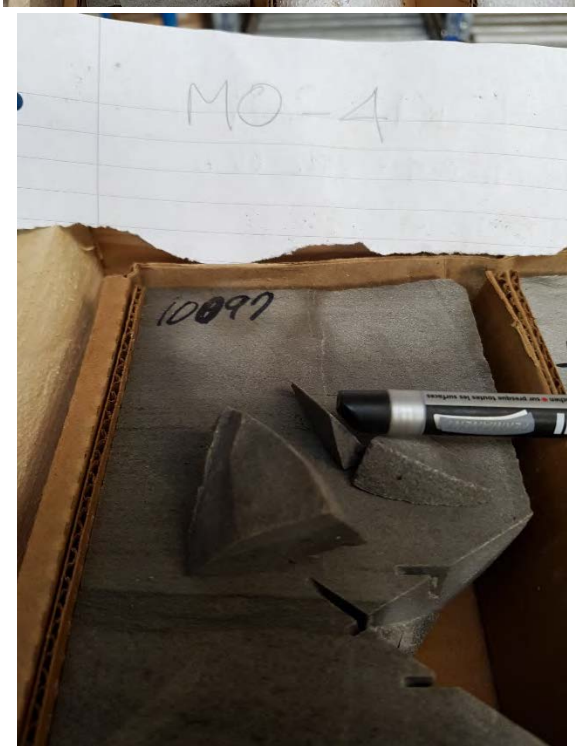
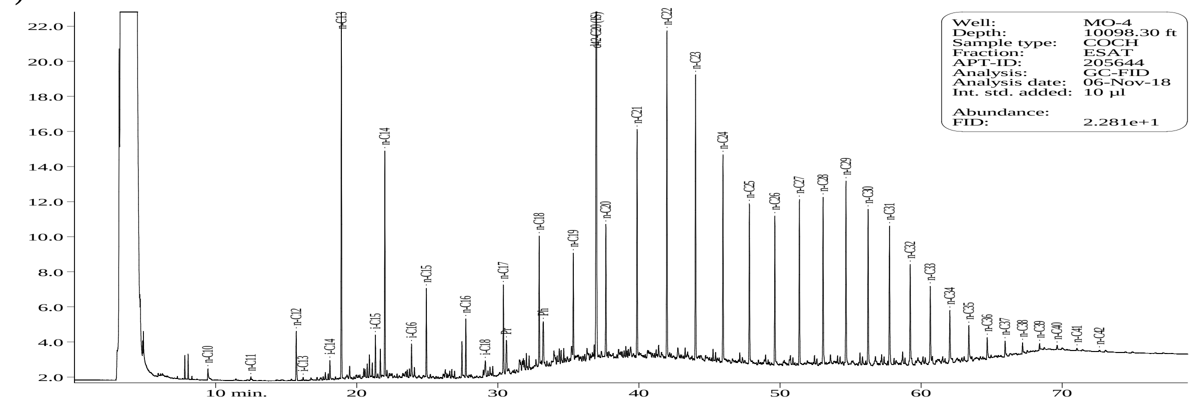


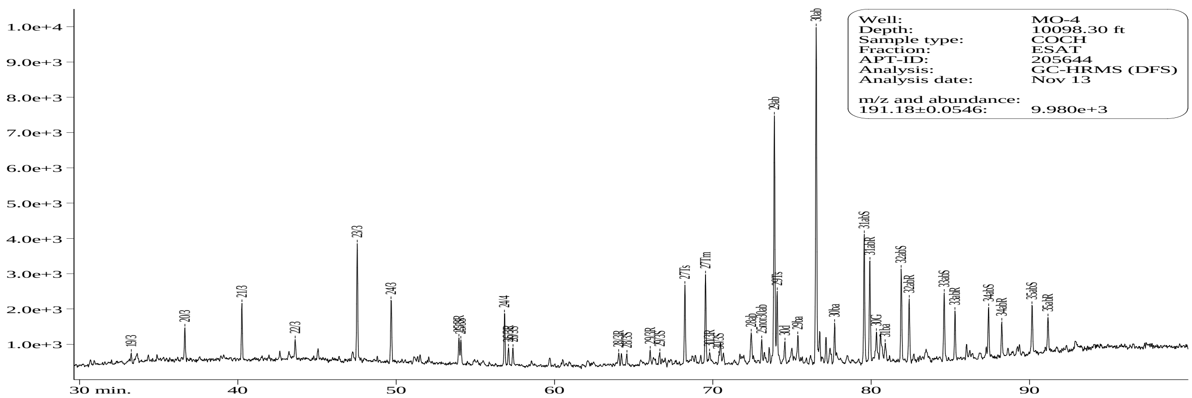
Figure 24. Photographs of MO-4 core 4, showing where the two samples at 10098.30 and 10100.25 ft were taken.

Very low amounts of EOM were obtained from these MO-4 samples. The EOM contains a low proportion of hydrocarbons with a high saturate/aromatic ratio (2.58 and 3.58). The SFGCs are very similar (Fig. 25). Except for the contamination around the nC_{13} and nC_{14} alkane peaks, lighter peaks are missing, presumably because of evaporation during storage. This means that GC parameters such as pristane/phytane and pristane/nC_{17} are meaningless. The remaining n-alkanes show a bimodal pattern with a maximum at the earliest peak that is not affected by evaporation (nC_{22} and nC_{24}) and a secondary maximum at nC_{29} (Fig. 25). There is no indication of an odd carbon number preference with the CPI being close to unity (Table 3). It is evident from the SFGCs that despite the evaporation, biomarkers are still in very low concentration in these samples. Both samples have similar biomarker distributions that show characteristics of being sourced from a higher maturity source rock (~0.9 -1.0% VRo equivalent based on aromatic parameters) with a more clastic lithology than seen for any of the northern Morocco oil samples. The lack of widespread staining in the core and the very low amount of extract suggests that these hydrocarbons are mostly likely derived from intervals close to where the samples were taken and do not represent migrated oil.

a) SFGC



d) m/z 191



e) m/z 217

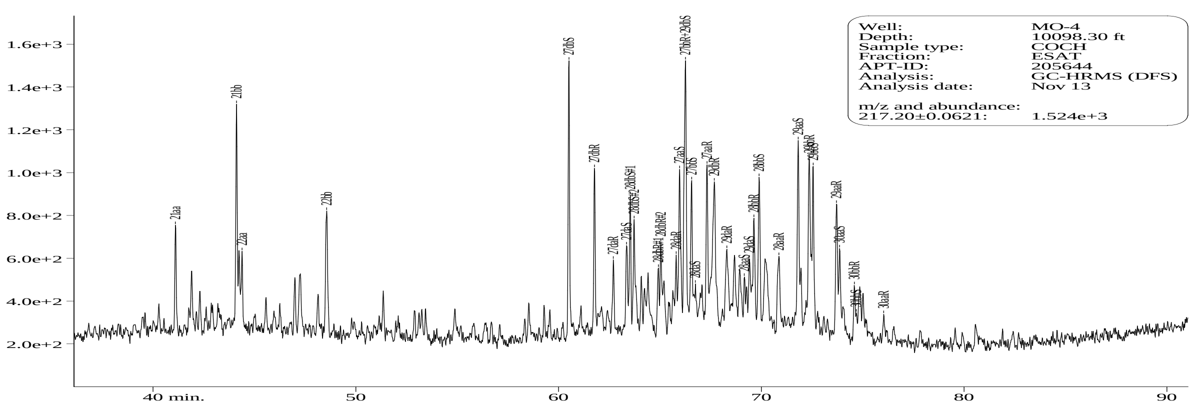


Figure 25. Geochemical data for MO-4 Middle Jurassic 10098.30 ft cuttings extract: a) SFGC, b) m/z 191 mass chromatogram showing distribution of hopanes and terpanes, c) m/z 217 mass chromatogram showing distribution of steranes.

Tan Tan-1

Tan Tan-1 was drilled in 1984-85 by Amoco and penetrated an extensive Jurassic section (the well TD was Early Toarcian to latest Hettangian) (Weston, 2019). There are reports of possible dead or residual oil in this well while others suggest that this is drilling contamination (e.g. *Shell, 1992*; *APT, 2006*). Two samples from 15200-15210 ft (~4638 m) and 16460-16470 ft (~5017 m) were collected to confirm whether the black blobs observed in Tan Tan-1 samples are dead migrated oil or contamination. In particular, a lot of black material was evident in the former sample. At a later date, Janice Weston provided an additional sample taken from a claystone interval around 14250 ft (~4496 m) for source rock analysis. However, during the preparation of this sample for biostratigraphic analysis, it was noted that it contained a lot of what appeared to be a black additive.

TOC/Rock-Eval analysis was made on pre-extracted samples for the 15200 and 16460 ft samples (Table 7). The TOC content of the 15200 ft sample was 61.6% which is extremely high suggesting just black material was analyzed. This sample had a very low HI value of 4. The Rock-Eval pyrogram shows a very broad S2 peak with an earlier eluting secondary S2 peak. The 16460 ft sample showed similar pyrogram. This sample had a much lower TOC of 1.23% and higher HI of 130, possibly suggesting some kerogen may be present in this sample.

The 14750 ft sample was analyzed both before and after extraction. The original sample had a TOC content of 17.2%, a S2 of 121.17mg/g and a HI of 704 while the post-extracted sample had a TOC content of just 0.51%, a S2 of 0.29 mg/g and a HI of 56. This indicates that most of the S2 was removed by extraction. The S2 peak in the unextracted sample looks 'normal' so this a little surprising. It implies a soluble material with low volatility comprises the S2 peak. The S2 peak for the extracted sample had a shape not unlike that observed for the 15200 and 16460 ft samples.

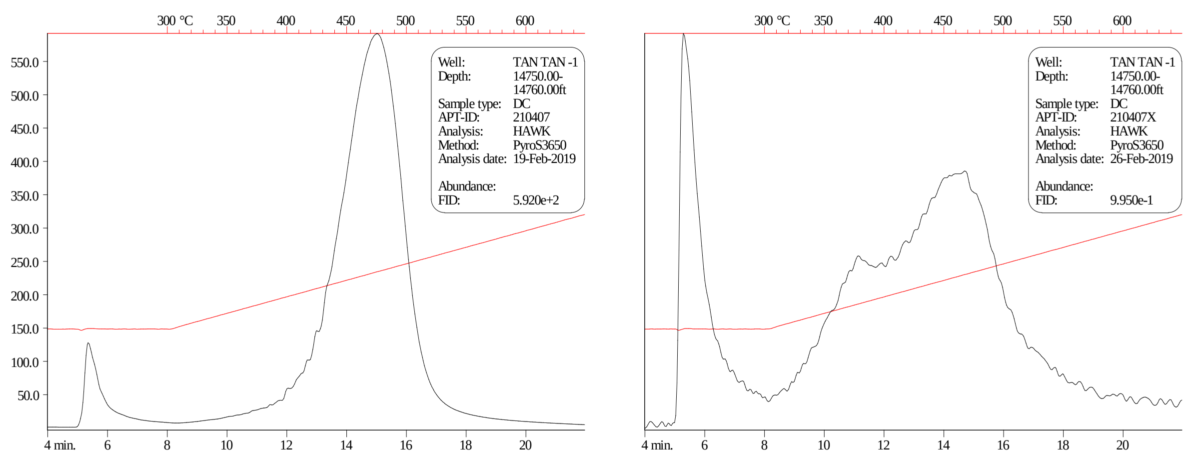


Figure 26. Pyrograms from the analysis of the Tan Tan-1 14750 ft sample; left) pre-extracted sample, right) post-extracted sample. The TOC content of the sample decreased from 17.2 to 0.51% and the S2 peak from 121.17 to 0.29 after extraction.

All three Tan Tan-1 samples gave very high amounts of EOM, especially the 15210 m sample which gave an extremely high 700548 mg EOM/g Rock, further supporting that mostly the black material was analyzed for this sample. Hydrocarbons make up a small proportion of the extract of all three extracts with a range of 7.2 to 20.3% (Table 8).

Only the 15200 and 16460 ft samples were analyzed by GC and GC-MS. The SFGCs of the 15200 and 16460 ft are similar and unusual (Fig 28). They comprise a lower molecular weight n-alkanes with C_{14}-C_{16} in highest abundance and biomarker peaks superimposed on a UCM hump. The biomarker distributions are also similar and unusual. Sterane distributions are dominated by C_{28} and C_{29} with much lower amounts of C_{27}. The C_{27}:C_{28}:C_{29} sterane ratio 12:42:46. The C_{28} and C_{29} steranes show a low maturity distribution dominated by the 5α(H),14α(H),17α(H) 20R isomers while the C_{27} steranes show a more mature distribution with measured values close to equilibrium values for the %20S and %bb parameters in Table 4. The m/z 191 mass chromatogram also suggests a low maturity with the relative high abundance of the moretanes and low abundance of tricyclic terpanes. Homohopanes are in low abundance with gammacerane a much higher peak than the C_{31} compounds. The biomarker distributions strongly resemble those for gilsonite published by Ohm et al. (2007). This similarity is shown in Figure 27. Gilsonite is a naturally occurring solid bitumen in the Uinta Basin that is derived from a Tertiary lacustrine source rock.

The geochemical data indicates that one of the drilling contaminants used at Tan Tan-1 is gilsonite. It is also suspected that it is contaminated by coaly particles as well. The very high TOC content of the extracted 15200 ft sample suggests that the main contaminant in this sample is the very immature coal/lignite particles described by Shell (1992) in other Tan Tan-1 samples. There is no evidence to support the presence of source rocks in this well.

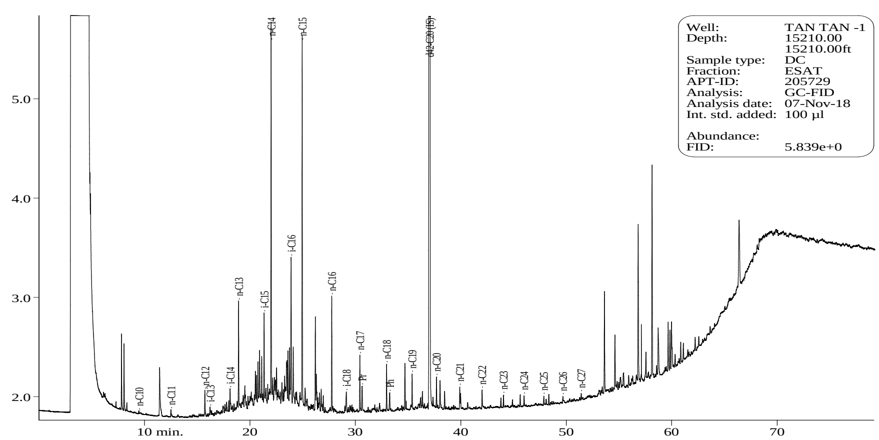


Figure 27. SFGC of Tan Tan-1 15210 ft cuttings sample that is believed to be contaminated by gilsonite.

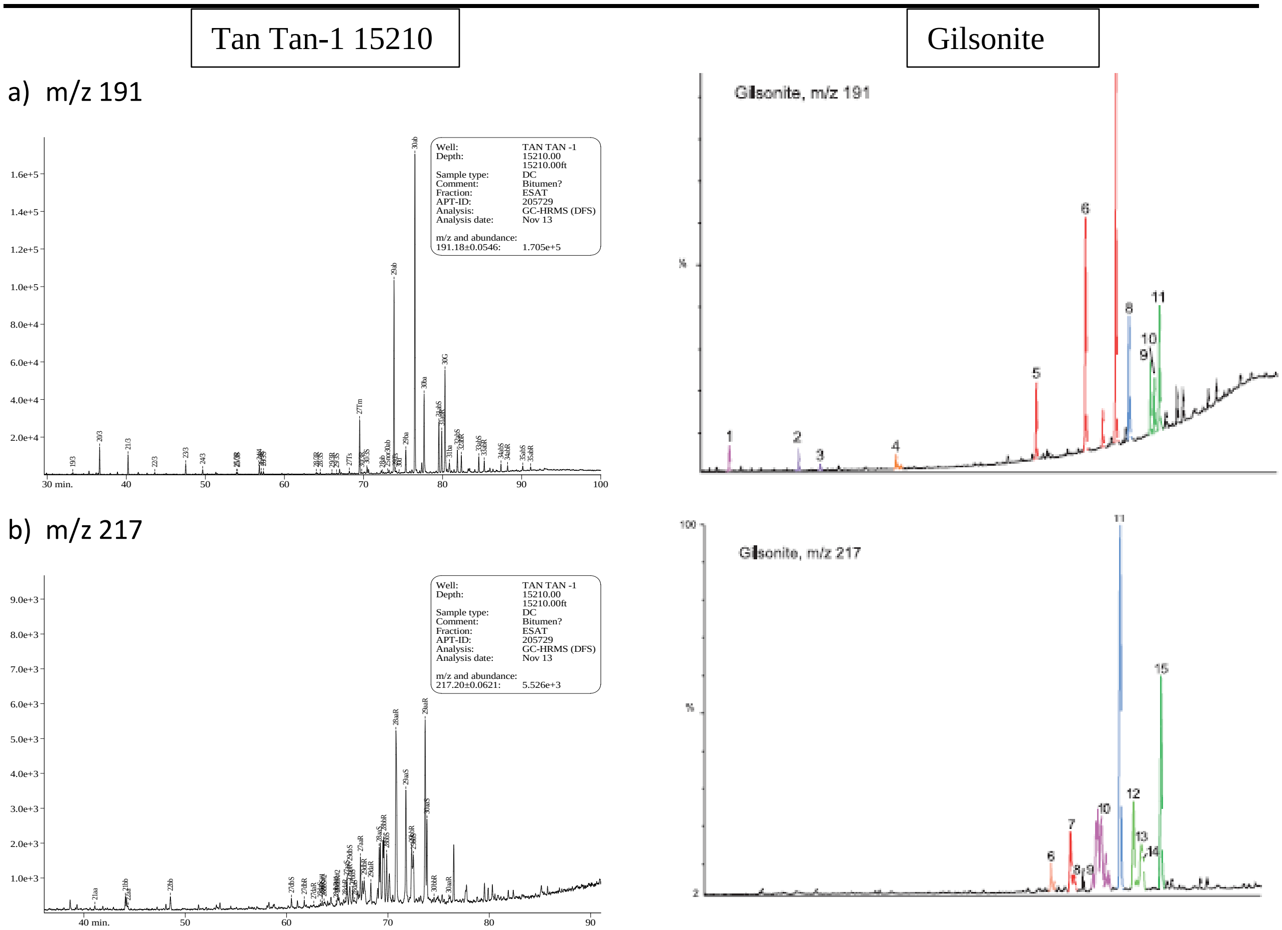


Figure 28. Comparison of a) the m/z 191 and b) the m/z 217 mass chromatograms of the Tan Tan-1 15210 ft sample and those for gilsonite shown by Ohm et al. (2007) showing their close similarity.

Aït Moussa Outcrop Samples

The well-studied outcrop at Aït Moussa (Fig. 4) has about 20 m of Pliensbachian to earliest Toarcian interbedded dark marls and argillaceous limestone with the former being the source facies. According to Rachidi et al. (2009), the total thickness of intervals with source potential is 2.5 m with an average TOC content of 3.2%. The most detailed geochemical study of the Aït Moussa section was that by Sachse et al. (2012). They reported TOC contents up to 6.71% and a maximum HI for the highest TOC sample of 657. Sachse et al. (2012) measured vitrinite reflectance and found a range from 0.5 to 0.66%. This and other data suggested to those authors that the organic matter was in the oil window but had not reached peak generation although some hydrocarbons were thought to have been generated and expelled. Hence the original TOC and HI of the Pliensbachian source rock intervals are expected to have been a little higher. Microscopically, the organic matter contained abundant liptinite that was mostly alginite. Silva (2017) showed a summary diagram for his sampling of the Aït Moussa outcrop which indicates that his results were very similar to those of Sachse et al. (2012).

The only biomarker data for an Aït Moussa sample is provided by Sachse et al. (2012) and is for just one sample. This data suggests that the sample had an open-marine, clastic dominated, depositional environment. Pristane/phytane ratios are 1.22 to 1.69; there is a low C_{29}/C_{30} hopane ratio; homohopanes decrease in concentration with increasing carbon number; there is a high abundance of rearranged hopanes and steranes compared to unrearranged counterparts (especially for the level of maturity); and a very low gammacerane abundance. Another interval showed higher TOC and HI values (400-500) suggesting it has a greater proportion of algal-derived organic matter, but no detailed geochemistry reports of this sample were found. Oils in the Sidi Fili Trend of the Prerif Basin are believed to be sourced from equivalents of the Lower Jurassic source rocks that are present at Aït Moussa (e.g. Morabet et al., 1998). The limited amount of biomarker data on the potential Lower Jurassic source rocks means that this conclusion is not proven.

For this study, three samples from the Aït Moussa outcrop were supplied by G. Wach and R. Silva of Dalhousie University, Nova Scotia. The samples were selected based on the data in *Silva (2017)* and are from three separate organic-rich shale intervals within the Pleinsbachian section. These were labelled 345, 371 and 383 m with the latter being the uppermost sample. The samples were reanalyzed by Rock-Eval/TOC (Table 7) and gave TOC contents of 4.98, 2.79 and 5.86% respectively. The three samples have similar HI values of 442 to 511 suggesting Type II organic matter. The Tmax values range from 436 to 444°C indicating early to mid-oil window. The values for the 345 and 371 m samples which are 443 and 444°C are a little higher than indicated by Silva for his analyses and by other authors. These values do confirm that the organic matter at Ait Moussa is in the oil window and hence originally had better hydrocarbon potential than indicated by the present TOC and HI values.

The samples give a substantial amount of extract ranging from 5051 to 7390 mg EOM/kg rock with hydrocarbons making up between 35.3 and 45.8% (Table 8). All three samples give similar SFGCs (e.g. Fig. 29a) with a smooth distribution of n-alkanes that decrease in abundance with increasing molecular weight. The pristane/nC_{17} ratio varies between 0.43 and 0.81 with the 371 m sample showing a significantly higher value for this and the phytane/nC_{18} ratio than the other two samples. This is likely because this outcrop sample is less 'fresh' than the other two as its n-alkane maximum is at C_{16} rather than C_{13} or C_{14} in the case of the other two samples, suggesting it has lost more lighter compounds to evaporation. This would also be the reason for the higher UCM in the SFGC of this sample. The pr/ph ratios for the 345 and 383 samples are similar (1.33 and 1.47) and do not support a strongly anoxic environment of deposition. These are higher than that for the 371 m sample (1.19) where this ratio might be lower because of the evaporation observed for the n- alkanes with pristane being more volatile than phytane.

The samples show many similarities in their biomarker distributions suggesting that the organic-rich intervals were deposited under similar paleoenvironmental conditions. The m/z 191 mass chromatograms show a low C_{29}/C_{30} hopane ratio, no homohopane prominence, a low abundance of tricyclic terpanes, very low gammacerane and relatively low amounts of rearranged hopanes for the level of maturity (Fig.29b). The m/z 217 mass chromatogram shows high amounts of diasteranes relative to regular steranes, low amounts of short-chain steranes, presence of C_{30} 4-desmethylsteranes and very similar C_{27}:C_{28}:C_{29} distributions of ~42:22:36 (Fig. 29c). The m/z 245 mass chromatogram of the aromatic fraction is dominated by dinosterol derived compounds.

These mass chromatograms are similar to the partial m/z 191 and 217 chromatograms shown by Sachse et al. (2012) for one Aït Moussa outcrop sample. Overall the biomarker distribution suggests a marine shale which agrees with the lithological descriptions of the more organic-rich intervals as being silty marls containing marine-derived organic matter with variable terrestrial influence (Sachse et al., 2012).

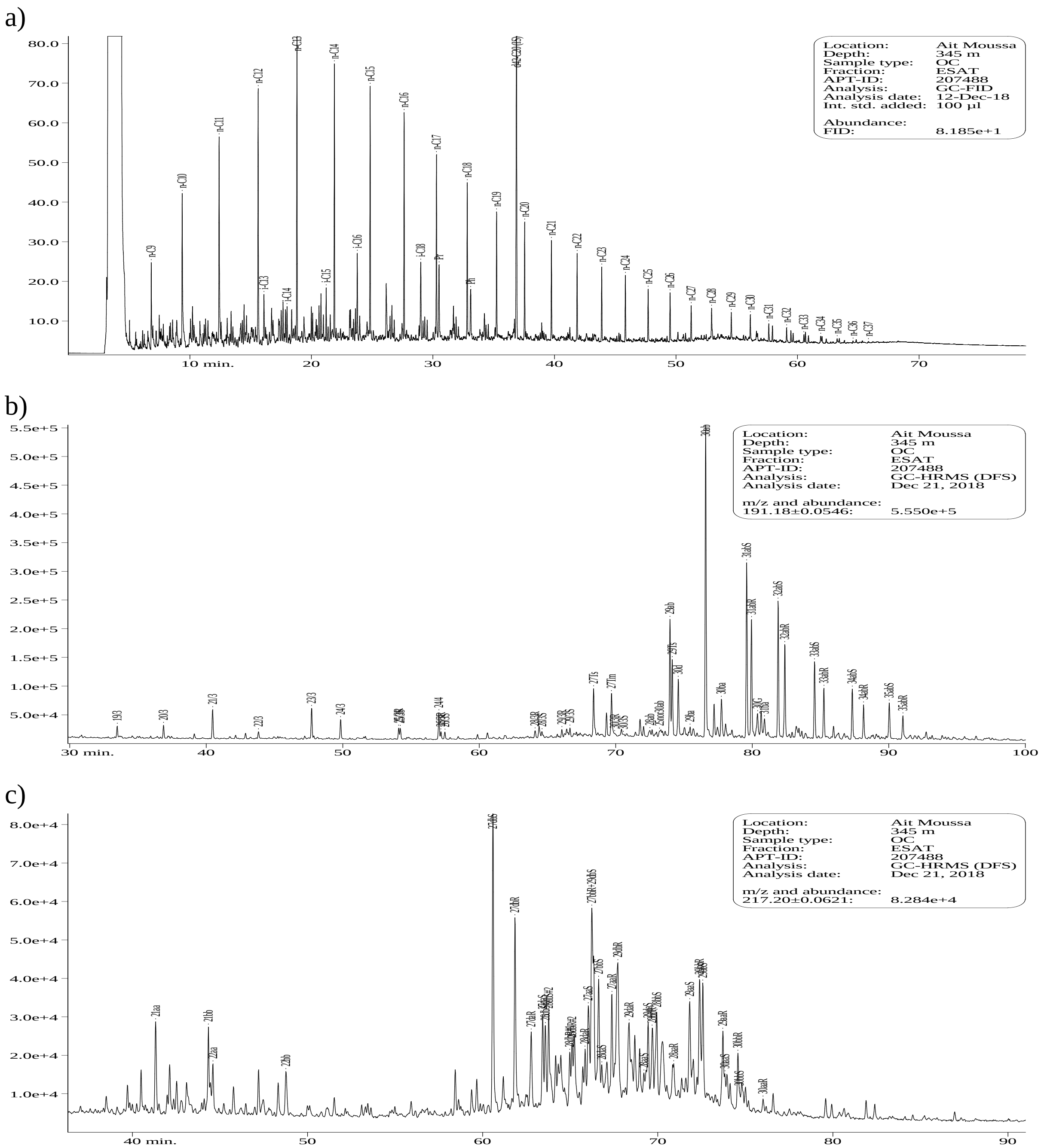


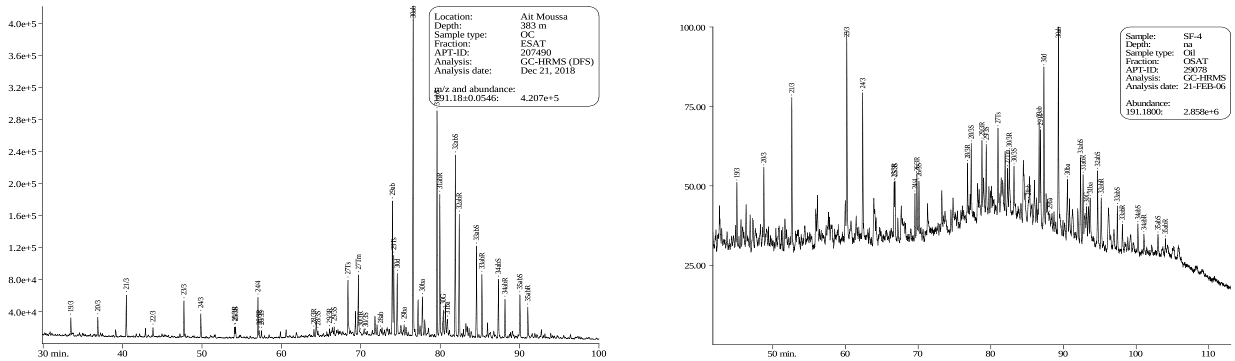
Figure 29. Geochemical data for Aït Moussa Lower Jurassic (Pleinsbachian?) 345 m outcrop sample extract: a) SFGC, b) m/z 191 mass chromatogram showing distribution of hopanes and terpanes, c) m/z 217 mass chromatogram showing distribution of steranes.

Aromatic maturity parameters based on the distributions of methylphenathrenes, methyldibenzothiophenes and trimethylnaphthalenes suggest a maturity in the 0.68 to 0.79% range which, like the Tmax data, suggests a somewhat higher maturity than that suggested by Sachse et al (2012.).

A comparison of the Aït Moussa extracts with oils from the Sidi Fili field indicates some similarities and some differences. As indicated in Figure 30, the Sidi Fili oil have higher abundances of tricyclic terpanes and rearranged hopanes relative to the 17α(H)-hopanes and higher rearranged steranes relative to regular steranes. This reflects the higher maturity of the oils. The pr/ph ratios for the three Sidi Fili oils analyzed by *APT (2006)* range from 1.84 to 1.90 and hence are slightly higher than the Aït Moussa extracts which could also be a function of maturity. The Sidi Fili oils differ from the Sidi Rhalem and Cap Juby oils because they show a more clastic, open marine signature. The large difference in maturity makes the comparison between the Aït Moussa extracts and the Sidi Fili oils difficult, but the latter have characteristics that are generally consistent with being derived from a source rock similar to the Lower Jurassic at Aït Moussa.

Ait Moussa 383 | Sidi Fili

a) m/z 191



b) m/z 217

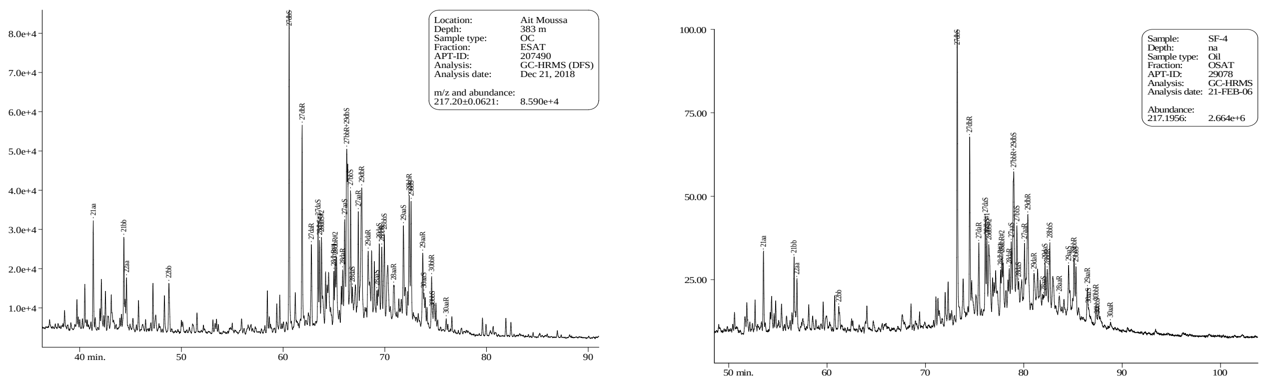


Figure 30. A comparison of biomarker signatures for an Aït Moussa Lower Jurassic extract from 383 m and an oil from the Sidi Fili oil field; a) m/z 191 mass chromatograms showing distributions of terpanes and b) m/z 217 mass chromatograms showing the distributions of steranes.

Discussion

Oils and Seeps

Results from this study provide new or improved data on oils and seeps from the Upper Jurassic at SM-1 and JM-1 and Middle Jurassic at MO-8, JM-1, and Ifni-1. No evidence was found to indicate the presence of seeps in the Middle Jurassic at MO-4. Unfortunately, samples from the Upper Jurassic where it has been suggested that there are stronger indications for possible staining were not available for sampling. As suggested by earlier reports (e.g. *Shell, 1992, Maersk, 2006*), Tan Tan-1 is severely contaminated rather than stained.

Well	Basin	Depth (m)	Depth (ft)	Age	B/g	~ Maturity in oil window
Sidi Fili	Prerif	?		L. Jur	No	late
Sidi Rhalem	Essaouira	?		M. Jur	No	early
SM-1	Tarfaya	2101	6893	U. Jur	Yes	mid
Ifni-1	Tarfaya	1024-1033	3360-3370	U. Jur	Yes	early
MO-2	Tarfaya	2080-2180	6825-7150	U. Jur	Yes	mid
MO-8	Tarfaya		11975	M. Jur	No	mid
JM-1	Tarfaya	2128	6982	U. Jur	Yes	mid
JM-1	Tarfaya	3619	11873	M. Jur	No	mid

Well	pr/ph	29/30 hopane	Homohopane prominence	Gammmacerane abundance	Tricyclics abundance	Tricyclic depositional environment	C24 tetracyclic abundance	C27 vs C29 steranes	dia/reg steranes	short-chain sterane abundance
Sidi Fili	high	low	No	low	very high	shale	mod	C27>C29	very high	low
Sidi Rhalem	very low	low	Yes	high	low	carbonate	low	C27~C29	low	low
SM-1	n/a	low	No	low	low	shale	low	C29>C27	high	low
Ifni-1	n/a	mod	Yes	mod	low	carbonate	low	C29>C27	low	low
MO-2	n/a	high	Yes	mod	low	carbonate	high	C29>C27	mod	high
MO-8	mod	high	Yes	mod	low	carbonate	high	C29>C27	low	high
JM-1	n/a	high	Yes	mod	low	carbonate	high	C29>C27	mod	mod
JM-1	low	high	Yes	mod	low	marl	mod	C29>C27	low-mod	high

Table X2. Summary of geochemical characteristics of Moroccan Jurassic oils and seeps examined in this study.

Table X2 summarizes some characteristics and geochemistry of Moroccan oils and seeps. It uses data obtained for this study, as well as previous data for the MO-2 (*Texaco, 1989; Shell, 1998, APT, 2006*) and Sidi Fili (*APT, 2006*) oils. The objective of this table is to make it easier for a non-geochemist to compare the characteristics of the oils and stains. Isotopic data is not included in Table X2 as it is shown in Table X1. This is partly because of the difficulties of comparing isotopic data from different labs and different types of samples that have been altered in reservoir or post-collection, as has been previously discussed. Isotopic data will be incorporated into the following discussion where appropriate. The data for SM-1 is based on that from the extraction of the 2101 m cuttings as there is a major doubt over whether the 'SM-1 oil' sample is actually from this well.

As apparent from Table X2, the Sidi Fili oils are very different from Jurassic oils elsewhere in northern Morocco. They are unbiodegraded, high maturity oils that have a shale source rock. The Aït Moussa extracts are much lower maturity than the oils but have characteristics that suggest at higher maturity that similar intervals are the source of the Sidi Fili oils.

Sidi Rhalem oil has a carbonate source, like most of the oils, but one that was deposited under more restricted conditions such as lagoonal environment as suggested by *Weston (2019)* for the Oxfordian organic-rich interval in TKM-201. It is isotopically the lightest of the Moroccan oils.

The other oils and seeps come from the Tarfaya Basin. The widespread occurrence of oil/seeps in this basin indicates the presence of one or more areally extensive source rocks, although none have yet been penetrated. There are indications of some regional variation in the nature of the source rock(s). SM-1 stain shows more clastic characteristics than the other Tarfaya Basin oils such as lower C_{29}/C_{30} hopane ratio, no homohopane prominence, low gammacerane, distribution of tricyclic terpanes suggesting a shale source rock, and higher amounts of rearranged compared to unrearranged steranes and hopanes. It does have a similar ratio of C_{27}:C_{28}:C_{29} steranes to the Cap Juby oils, suggesting similar primary organic matter. Although SM-1 is near to Ifni-1, the stains in the two wells show many different geochemical differences with the Ifni-1 having more carbonate features. Ifni-1 also shows a different C_{27}-C_{29} distribution to the other samples with a greater proportion of C_{28} steranes. This may suggest a younger, Cretaceous source rock.

An important outcome of this study is the similarity of the biomarker distributions of the Upper and Middle Jurassic reservoired oils at Cap Juby with regard to their source. This is indicated by Table X2 and Figure 20. Differences between oils from the two reservoirs can be mostly attributed to biodegradation, maturity or the effects of sample storage. This suggests that hydrocarbons in the Upper and Middle Jurassic reservoirs could have the same source rock which would suggest that it is Middle Jurassic or older. Based on structural interpretations of the Cap Juby structure (e.g. *Enterprise Oil, 2001, Fig. 7.3.3*) it does not seem possible for an Upper Jurassic source rock to charge a Middle Jurassic reservoir.

The isotopic data is not as supportive of a single source with the values obtained from the MO-8 core sample different from those of the oil obtained previously (Table X1). The former are closer to MO-2 oil values than the latter which would suggest different source rocks. Possible reasons for this have been discussed and there is no simple explanation. A suggestion for follow-up work would be investigating if MO-8 oil and MO-2 stained core samples could be obtained for comparison, or alternatively investigating if there is enough extract (or material remaining from JM-1 samples that were collected for this study to extract), to compare the carbon isotopes of the Upper and Middle Jurassic hydrocarbons from this well.

All oils/stains in Upper Jurassic reservoirs are biodegraded. The Middle Jurassic oils from the Cap Juby area wells are not biodegraded. The Upper Jurassic reservoirs are just over 2000 m depth which under normal geothermal gradients would be at temperatures that are too high for extensive biodegradation. According to *Core Labs (1989)* a vitrinite reflectance of 0.5% is reached around 1900 m which has been suggested to correlate to a temperature of around 80°C under normal burial conditions (e.g. Barker and Pawlewicz, 1994). A temperature of 80°C is around the maximum for subsurface biodegradation. The extensive alteration of hydrocarbons in the Upper Jurassic reservoir at MO-2 imply it was at a significantly lower temperature, hence shallower depth when originally charged. The presence of a component of

unbiodegraded hydrocarbons in the MO-2 Upper Jurassic reservoir suggests that this reservoir continued to be filled as it was buried deeper to its present depth at temperatures too high for the extensive biodegradation of these later charging hydrocarbons. The additional 1500 m depth was sufficient for the Cap Juby Middle Jurassic reservoirs to have never undergone biodegradation.
The Ifni-1 3360-3390 m sample also biodegraded. This almost certainly related to the shallow depth of the Late Jurassic in this nearshore well which is currently just over 1000 m, indicating that biodegradation is expected to be presently occurring at this location.

Source Rocks

In the review of previous data that was done for the first part of this project, it was noted that there were few reports of Jurassic-age source rocks capable of generating significant quantities of hydrocarbons in northern Morocco. Table X3 is the summary table reproduced from this previous report. Unfortunately, the new data presented in this report has failed to add any new significant source rock locations.

Basin	**Location**	**Age**	**TOC content**	**OM Type**	**Comments**
Prerif	Aït Moussa	Pleinsbachian-Toarcian	up to 6.7%	Type II	possibly localized occurrence
Offshore Doukkala	DSDP 547B	Sinemurian - Pleinsbachian	up to 4.7%	Type III-II	only very thin intervals
Onshore Essaouira	TKM-201	Oxfordian-Callovian	up to 5.99%	Type II	only thin intervals

Table X3. Jurassic source rock intervals in northern Morocco that can be confirmed by data available. Updated from 'Review of historical studies of Morocco Jurassic petroleum systems with identification of knowledge gaps' *(Fowler, 2018)*, that was done as the principle product for Part I of this study with the higher TOC for the TKM-201 interval obtained from the new samples.

The extended Jurassic intervals screened for source rock potential in the MZ-1 and Tamanar-1 wells that were drilled in the Essaouira Basin show little evidence for potential to generate economic quantities of hydrocarbons. Partial data was subsequently provided from a GeoMark 2016 study of the MZ-1 well by ONHYM that agreed with the results obtained by this study on the analysis of cuttings samples. The GeoMark study also analyzed SWC samples and one Early Jurassic sample from 6125 m was reported with a TOC content of 3.35%.The HI for this sample was only 127 but this may be a result of its elevated maturity has it has a Tmax of 452°C suggesting late oil window and implying possibly significant original potential. However, a review of the data suggests that the 6125 m interval is very thin and unlikely to be the source of large volumes of hydrocarbons. It is possible that thicker intervals of this potential source rock could have developed elsewhere under more favourable depositional conditions but that is pure speculation at this time.

The source rock potential has been confirmed for the thin Oxfordian interval at ~3442 m in the onshore Essaouira Basin TKM-201 well. A comparison of the geochemical characteristics of extracts of this interval with the Sidi Rhalem oils indicate that a different facies or different interval is the source of the Sidi Rhalem oils. The TKM-201 core is only 10 m and it is possible that the organic-rich interval sampled was a part of a more extensive interval with source rock potential that is not available for sampling. However, no other potential source rock intervals have been indicated by extensive previous analysis of samples from wells that have penetrated the Jurassic in this part of the Essaouira Basin. It has been suggested that the undrilled Neknafa syncline, which lies between Toukimt and Sidi Rhalem, may host richer, more hydrocarbon-prone, Oxfordian shales equivalent to those observed in TKM-201 (Broughton and Trepanier, 1993).

Unfortunately, there is still no data that provides information on what are the potential Jurassic source rocks in the Cap Juby area. The presence of reservoired hydrocarbons in Jurassic reservoirs obviously indicates that these exist but have not been penetrated yet. Previously, it has been thought that there must be at least two intervals under the assumption that the Upper and Middle Jurassic reservoirs have different source rocks. Biomarker data suggests that this could just be one Middle Jurassic or older interval. This might explain why a source rock has not been observed to date as most wells in the Cap Juby area have t.d. in the Upper Jurassic.

Comparison of Morocco to offshore Nova Scotia

Most geochemical data for offshore Nova Scotia regarding source rocks and oils comes from the shallow water Scotian Shelf, particularly in the Sable Island area. This is a function of where most wells were drilled which reflects the discovery of economic quantities of hydrocarbons in this area. This data was reviewed for the Play Fairway Atlas (PFA) (Nova Scotia Energy Department, 2011) and five potential source rocks were suggested to occur on the Scotian Atlantic Margin. These were in increasing age: Aptian, Valanginian, Tithonian-Kimmeridgian, Callovian and Early Jurassic. Fowler et al. (2016) reassessed these conclusions as well as the possibility of a Cenomanian-Turonian (C-T) source rock. They concluded that there was only good evidence for the Tithonian-Kimmeridgian Verrill Canyon Formation being an actual source rock for Scotian Shelf hydrocarbons.

Cretaceous source rocks are not the subject of this report, but similarities and differences will be briefly summarize here before a discussion of Jurassic source rocks.

Cenomanian-Turonian – C-T organic-rich intervals are not apparent in Scotian Shelf or Slope wells based on present data. There are rare occurrences of thin organic-rich C-T in the western North Atlantic, for example at ODP site 1276, north east of the Carson Basin (Arnaboli and Meyers, 2006; van Bentrum et al., 2012), site U1407 IDOP leg 342 (Norris et al., 2014) on the South East Newfoundland Ridge, south east of the Carson Basin. The ODP site 1276 C-T interval was about 3.5 m thick with some very high TOC contents greater than 10%. However, not all the section was organic-rich and HI values suggested Type III or Type III-II organic matter with there being a terrestrial component to the organic matter. Site U1407 is the closest to offshore Nova Scotia. Here the section was mostly organic-lean except for two closely spaced samples from the uppermost Cenomanian at 232.35 and 232.38 m that have very high TOC contents of 10.18 and 11.63% and HI values of “600 to 620”. This was from a “laminated to massive black shale” that varied in thickness from 15 to 44 cm in the three U1407 holes and occurs within a carbonate (chalk) sequence. This might be of some interest of explaining the unusual oil that occurs in the Upper Cretaceous at Heron H-73 in the South Whale Basin.

The C-T is an excellent potential source rock onshore and offshore Morocco. Intervals up to 800 m have been reported (Kolonic et al, 2002) although the intervals examined in detail by these authors in onshore Tarfaya Basin wells varied from 20 to 180 m. These authors noted that the sections contained variable TOC and organic matter type. It was suggested that they were deposited in an open shelf upwelling system. Sachse et al. (2011) have reported very high TOC contents associated with Type I or Type II organic matter from Tarfaya Basin outcrops. C-T organic-rich intervals have also been reported in wells drilled in other basins such as in DSDP 547A, MARCAN-1 and Souss-1 but are not present in some wells that penetrated this section such as DSDP 370 and BTS-1. Where present, and if sufficiently mature, the C-T would be an excellent source rock. It has been exploited as an oil shale. While immature in most of Morocco, it is thought to be the source of the Ain Hamra oil in the Prerif Basin (Morabet et al., 1998). Based on the geochemical data of APT (2006) this is correct.

As reviewed above, a major difference between offshore Nova Scotia and Morocco is the lack of a significant C-T source rock in the former. This is related to paleogeography. The C-T interval offshore Morocco was deposited in an upwelling zone. These are prevalent on the western side of continents due to the effect of prevailing winds and Coriolis Force. This leads to nutrient-rich water rising along the continental edge causing a huge increase in bioproductivity and leading to conditions conducive to deposition of potential source rocks. Upwelling is much less common on eastern continental shelves and hence this type of source rock would not be expected in the western Central Atlantic.

Lower Cretaceous – An Aptian interval within the Naskapi Formation and Valanginian interval within the Mississauga Formation were the two possible Lower Cretaceous source rocks identified in the PFA. There is evidence for widespread elevated TOC contents in both intervals (up to 3% but usually 1-2%) on the Scotian Shelf but despite their low maturity, they have Type III or IV organic matter (HI values generally <100) indicating little hydrocarbon potential. These intervals are also present in Scotian Slope wells. For example, marginally mature samples from a Naskapi Shale section in the Monterey Jack E-43A well from 5490 to 5530 m have TOC contents up to 1.79% and HI values up to 163 (note these may be higher than real values, as S2 peaks indicate some possible contamination).

Crossley (2015) summarizes Lower Cretaceous source rock occurrence in Morocco. Good quality oil-prone Lower Cretaceous source facies have been reported in many wells along the Morocco Atlantic margin. Crossley noted that these were not thick but suggested that well locations may not have been the best locations for development of source facies. Examination of data (e.g. *Petronas, 2004*) suggests that the Valanginian does not show much hydrocarbon potential in Morocco having both low TOC contents and HI values. The Aptian interval is generally similar to that offshore Nova Scotia but occasionally shows better potential, such as at DSDP sites 370 and 545 (but not 547A and 547B despite detailed sampling) and MARCAN-1 (Type III-II organic matter). No oils in Moroccan have been attributed a Lower Cretaceous source rock, although this is a possibility for the Ifni-1 stain from 3360 ft examined in this study.

Based on the quick comparison done for this report, the Lower Cretaceous in both offshore Morocco and Nova Scotia has a similar low hydrocarbon potential.

Upper Jurassic – The principle source rock for Scotian Shelf hydrocarbons is the Tithonian-Kimmeridgian Mic Mac/Verrill Canyon interval. This is an organic-rich rock with Type III-II organic matter containing a large terrestrial component that was deposited in a deltaic environment. The organic matter type is reflected in the types of hydrocarbons found on the Scotian Shelf which is dominantly gas with condensate/light oil. There was no source rock potential in the Upper Jurassic at Cheshire and Monterey Jack wells. The Verrill Canyon 6610-6625 m interval at Monterey Jack was described as dark grey to black fissile shales but all samples analyzed from this interval had less than 1% TOC. The lack of Upper Jurassic source rocks in these wells on the Scotian Slope is probably explained by them being outboard of the deltaic conditions needed for organic matter preservation.

No Upper Jurassic source rocks have yet been identified in Morocco. Crossley (2015) mentions possible source rocks in the AGM-1 and AGM-2 wells drilled in the Agadir Basin. This is not supported by the Rock-Eval/TOC data for these wells (e.g. Petronas, 2004). Crossley also suggested Upper Jurassic source rocks are present in Tan Tan-1. As discussed earlier in this report, this interval is severely contaminated and the data he quotes almost certainly is a result of this contamination. It has been suggested that Upper Jurassic source rocks could have generated the Upper Jurassic reservoired oils at Cap Juby. Other authors have not supported this with, for example, the ONARE/ONHYM authored Morabet et al. (1998) paper favouring a Lower Jurassic source.

The presence of the Tithonian-Kimmeridgian source rock on the Nova Scotia margin and its absence on the Moroccan side of the conjugate margin is because a large delta developed at this time offshore Nova Scotia with no equivalent on the Moroccan side. There is currently no evidence to suggest there were conditions during the Upper Jurassic in Morocco that would favour source rock deposition.

Middle Jurassic – The only potential Middle Jurassic source rock interval suggested by the PFA was a Callovian interval in the Misaine Member. This was essentially based on one sample from one well (Abenaki J-56) that was contaminated by ligno-sulfonate and hence is suspicious. Even if the data is treated at face-value and the sample is representative of a more widespread interval, as it is thin and contains Type III organic matter, it is not going to source significant quantities of hydrocarbons. A section with occasional elevated TOC contents up to 1.24% was present in the lower part of the Misiane Member at Cheshire. The samples were in the oil window and hence the HI values which range up to 175 could have been originally a little higher but not enough to make this a potential source for oil.

The Oxfordian interval in the TKM-201 well, onshore Essaouira Basin is the only identified Middle Jurassic source rock in Morocco. This has high TOC contents and Type II organic matter. Although the interval at TKM-201 is very thin, it seems probable that a similar and presumably thicker section is responsible for the oils at Sidi Rhalem. The source for these oils appears to be a restricted carbonate, possibly lagoonal. It is possible that similar conditions could exist elsewhere in Morocco and also on the Nova Scotia side such as within the near age equivalent Scaterie Member, but in an area not yet drilled.

An Early Jurassic source rock was also considered in the PFA Atlas as contributing to Scotian Shelf hydrocarbons. There was no strong geochemical evidence to support this and data subsequently obtained for the Play Fairway project also does support a Lower Jurassic contribution. Recently, Forkner et al. (2018), mostly on the basis of the quantitative extended diamondoid analysis of one of their eight Sable Island area light oil samples (from Venture B-

13) have suggested a Lower Jurassic contribution to hydrocarbons in this area. These source rocks are believed to occur in fault-related half grabens slightly inboard of the later Jurassic reef margin. Possible evidence for the presence of Lower Jurassic sourced hydrocarbons on the Scotian Shelf is suggested by the presence of an oil seep in the vicinity of the Aspy D-11 oil well (Fowler and Webb, 2017, 2019). It was not possible to identify the source rock of the seeping hydrocarbons but based on modelled maturity in the PFA Atlas, these hydrocarbons are more likely to be sourced from the Lower Jurassic source than the Tithonian. To the north of the Nova Scotia margin, there is recent evidence for a Lower Jurassic petroleum system with a source rock deposited under restricted carbonate conditions in several wells drilled on the southern Grand Banks (APT, 2019).

In Morocco, Lower Jurassic Sinemurian-Pleinsbachian-Toarcian source rocks are known from the onshore Prerif and the offshore Doukkala basins. Mature equivalents of the former are probable source rocks for the Sidi Fili trend oils and Lower Jurassic source rocks have been suggested as the source of the Cap Juby oils (Morabet et al., 1998). These intervals are relatively thin with even the 60 m outcrop section at Aït Moussa only comprising about 2.5 m of potential source rocks (Rachidi et al., 2009). They have also been found in very few wells. This might be caused by a combination of relatively few wells penetrating the Lower Jurassic and the location of the wells not being the best for the occurrence of source rocks. Bodin et al. (2011) noted that Lower Jurassic source rocks may only be deposited in localized restricted sub-basins and hence, would have only sporadic occurrence.

Based on current knowledge, the Lower Jurassic appears to be the most likely source of hydrocarbons in the Moroccan offshore. Recent information is suggesting that the Lower Jurassic may be significant also for offshore Nova Scotia and the Grand Banks, especially on the deep-water Scotian Slope. These source rocks are likely to be marine carbonates deposited under restricted conditions which would tend to favour a near-shore location, such as in lagoonal or sabkha environments and hence their sporadic occurrence.

In summary, a prolific Upper Jurassic deltaic source rock occurs on the Scotian Shelf with possible indications that a Lower Jurassic carbonate might also be present on both the Scotian Shelf and Slope. Thin intervals of Middle and Lower Jurassic source rocks are known to be present in Morocco with a more significant carbonate source interval implied in the Cap Juby area by the presence of substantial volumes of oil. There has been relatively little exploration in most of the offshore of both areas and future drilling, especially in the Lower Jurassic, may indicate more extensive source rocks and, hopefully, economic quantities of hydrocarbons.

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Analytical Data

Table 1. Samples

Well	Type	Depth	APT ID
IFNI-1	DC	3010 ft	205635
IFNI-1	DC	3020 ft	205636
IFNI-1	DC	3030 ft	205637
IFNI-1	DC	3370 ft	205638
IFNI-1	DC	3390 ft	205639
JM-1	DC	2128 m	205640
JM-1	DC	2134 m	205641
JM-1	DC	3619 m	205642
JM-1	DC	3631 m	205643
MO-4	COCH	10098.3 ft	205644
MO-4	COCH	10100.25 ft	205645
MO-8	COCH	11975.25 ft	205646
MO-8	COCH	11975.7 ft	205647
MZ-1	DC	4960 m	205648
MZ-1	DC	4970 m	205649
MZ-1	DC	4980 m	205650
MZ-1	DC	4990 m	205651
MZ-1	DC	5000 m	205652
MZ-1	DC	5010 m	205653
MZ-1	DC	5020 m	205654
MZ-1	DC	5030 m	205655
MZ-1	DC	5040 m	205656
MZ-1	DC	5050 m	205657
MZ-1	DC	5060 m	205658
MZ-1	DC	5070 m	205659
MZ-1	DC	5075 m	205660
MZ-1	DC	5085 m	205661
MZ-1	DC	5090 m	205662
MZ-1	DC	5095 m	205663
MZ-1	DC	5100 m	205664
MZ-1	DC	5110 m	205665
MZ-1	DC	5105 m	205666
MZ-1	DC	5120 m	205667
MZ-1	DC	5130 m	205668
MZ-1	DC	6040 m	205669
MZ-1	DC	6050 m	205670
MZ-1	DC	6060 m	205671
MZ-1	DC	6070 m	205672
MZ-1	DC	6080 m	205673
MZ-1	DC	6090 m	205674
MZ-1	DC	6100 m	205675
MZ-1	DC	6110 m	205676
MZ-1	DC	6120 m	205677
MZ-1	DC	6130 m	205678
MZ-1	DC	6140 m	205679
MZ-1	DC	6145 m	205680
MZ-1	DC	6150 m	205681
MZ-1	DC	6155 m	205682
MZ-1	DC	6160 m	205683
MZ-1	DC	6162 m	205684
SM-1	DC	2056 m	205685
SM-1	DC	2086 m	205686
SM-1	DC	2101 m	205687
TAMANAR-1	DC	415 m	205688
TAMANAR-1	DC	425 m	205689
TAMANAR-1	DC	435 m	205690
TAMANAR-1	DC	445 m	205691
TAMANAR-1	DC	455 m	205692
TAMANAR-1	DC	465 m	205693
TAMANAR-1	DC	475 m	205694
TAMANAR-1	DC	485 m	205695
TAMANAR-1	DC	495 m	205696
TAMANAR-1	DC	505 m	205697
TAMANAR-1	DC	515 m	205698
TAMANAR-1	DC	525 m	205699
TAMANAR-1	DC	535 m	205700
TAMANAR-1	DC	545 m	205701
TAMANAR-1	DC	555 m	205702
TAMANAR-1	DC	565 m	205703
TAMANAR-1	DC	575 m	205704
TAMANAR-1	DC	585 m	205705
TAMANAR-1	DC	595 m	205706
TAMANAR-1	DC	605 m	205707
TAMANAR-1	DC	615 m	205708
TAMANAR-1	DC	625 m	205709
TAMANAR-1	DC	635 m	205710
TAMANAR-1	DC	645 m	205711
TAMANAR-1	DC	655 m	205712
TAMANAR-1	DC	665 m	205713
TAMANAR-1	DC	675 m	205714
TAMANAR-1	DC	685 m	205715
TAMANAR-1	DC	695 m	205716
TAMANAR-1	DC	705 m	205717
TAMANAR-1	DC	710 m	205718
TAMANAR-1	DC	715 m	205719
TAMANAR-1	DC	720 m	205720
TAMANAR-1	DC	725 m	205721
TAMANAR-1	DC	735 m	205722
TAMANAR-1	DC	745 m	205723
TAMANAR-1	DC	755 m	205724
TAMANAR-1	DC	765 m	205725
TAMANAR-1	DC	775 m	205726
TAMANAR-1	DC	785 m	205727
TAMANAR-1	DC	795 m	205728
TAN TAN -1	DC	15210-15210 ft	205729
TAN TAN -1	DC	16460 ft	205730
TKM-201	COCH	3442 m	205731
TKM-201	COCH	3442 m	205732
Sidi Rhalem	Oil		205733
SM-1	Oil		205734
Ait Moussa	OC	345 m	207488
Ait Moussa	OC	371 m	207489
Ait Moussa	OC	383 m	207490
Cap Juby-1	DC	4360 m	210406
TAN TAN -1	DC	14760 ft	210407

Table 2. Number of analyses performed

Analysis	Cuttings	Core	Fluid	Other	Total
Leco TOC	98	2		3	103
TOC/Rock-Eval	92	2		3	97
Extraction	15	6		3	24
Asphaltenes	15	6	2	3	26
MPLC	15	6	2	3	26
GC of Saturated hydrocarbons	13	6	2	3	24
GC-MS of Saturated hydrocarbons	13	6	2	3	24
GC-MS of Aromatic hydrocarbons	13	6	2	3	24
Stable isotopes of fractions	1	2	2	1	6

Table 3. GC of saturated compounds (parameters)

Well	Sample type	Sample info	Upper Depth	Lower Depth	Depth units	APT ID	CPI 1	Pr/n-C17	Ph/n-C18	(Pr/n-C17)/ (Ph/n-C18))	Pr/Ph	n-C17/ (n-C17+n-C27)
IFNI-1	DC		3010	3020	ft	205636	1.24	1.23	1.26	0.98	0.80	0.84
IFNI-1	DC		3020	3030	ft	205637	2.10	1.34	1.10	1.21	1.00	0.37
IFNI-1	DC		3360	3370	ft	205638	1.83	2.05	4.36	0.47	0.51	0.81
JM-1	DC			2128	m	205640	0.85	1.15	1.46	0.78	0.73	0.35
JM-1	DC			2134	m	205641	1.63	0.58	0.49	1.20	0.82	0.47
JM-1	DC			3619	m	205642	0.94	0.26	0.36	0.71	0.69	0.76
JM-1	DC			3631	m	205643	0.89	0.24	0.36	0.68	0.68	0.74
MO-4	COCH			10098.30	ft	205644	1.04	0.59	0.59	1.00	0.67	0.33
MO-4	COCH			10100.25	ft	205645	1.06	0.55	0.61	0.91	0.69	0.16
MO-8	COCH			11975.25	ft	205646	0.88	0.48	0.69	0.70	0.35	0.33
MO-8	COCH			11975.70	ft	205647	0.88	0.54	0.78	0.69	0.34	0.30
MZ-1	DC			6100	m	205675	1.03	0.36	0.29	1.26	1.82	0.97
SM-1	DC			2056	m	205685	1.39	0.98	1.00	0.98	0.55	0.54
SM-1	DC			2086	m	205686	1.16	0.58	0.54	1.07	0.85	0.58
SM-1	DC			2101	m	205687						
TAN TAN -1	DC	Bitumen?	15210	15210	ft	205729	1.67	0.68	0.58	1.16	1.48	0.90
TAN TAN -1	DC			16460	ft	205730	0.87	1.07	0.93	1.15	1.04	0.82
TKM-201	COCH	A		3442.00	m	205731	1.06	0.51	0.48	1.07	0.96	0.80
TKM-201	COCH	B		3442.00	m	205732	1.05	0.64	0.46	1.39	1.52	0.77
Sidi Rhalem	Oil					205733	0.88	0.74	1.81	0.41	0.31	0.68
SM-1	Oil					205734	1.01	0.35	0.39	0.90	1.07	0.91
Ait Moussa	OC			345	m	207488	0.92	0.62	0.50	1.22	1.47	0.83
Ait Moussa	OC			371	m	207489	0.92	0.81	0.74	1.10	1.19	0.75
Ait Moussa	OC			383	m	207490	0.92	0.47	0.43	1.09	1.33	0.86

Table 4. GCMS SIR of saturated compounds (parameters)

Well	Sample type	Sample info	Upper Depth	Lower Depth	Depth units	APT ID	%23:3	%28ab	%30D	%27Ts	%22S	%29Ts	%20S	%bb	%27dbS	%C27	%C29	28/29	24:4/23:3
IFNI-1	DC		3010	3020	ft	205636	34.80	7.01	4.39	24.03	52.85	11.25	49.87	46.55	42.51	42.85	30.83	0.72	0.32
IFNI-1	DC		3020	3030	ft	205637	23.08	10.38	4.67	22.49	57.17	12.63	18.11	34.40	35.04	14.34	57.87	0.43	0.28
IFNI-1	DC		3360	3370	ft	205638	12.50	12.77	2.88	35.77	58.16	16.00	47.88	50.48	25.75	30.58	39.17	0.67	0.42
JM-1	DC			2128	m	205640	6.57	1.08	3.29	37.12	57.07	15.29	55.03	57.58	31.48	30.67	47.87	0.42	2.04
JM-1	DC			2134	m	205641	5.28	0.55	0.58	8.86	51.25	2.21	31.19	24.96	21.81	21.56	43.83	0.62	0.66
JM-1	DC			3619	m	205642	9.43	2.17	3.86	55.95	58.26	19.12	59.18	62.46	25.61	30.59	47.78	0.42	1.91
JM-1	DC			3631	m	205643	11.36	2.30	2.85	53.85	57.68	19.47	57.84	60.26	23.79	31.29	47.54	0.41	2.47
MO-4	COCH			10098.30	ft	205644	26.07	8.49	6.14	47.34	59.34	17.69	58.01	51.23	47.10	37.93	37.15	0.55	0.45
MO-4	COCH			10100.25	ft	205645	33.82	7.70	6.10	47.54	61.16	18.72	60.56	42.86	37.29	38.74	34.13	0.63	0.29
MO-8	COCH			11975.25	ft	205646	5.10	1.31	1.51	31.85	57.90	12.25	58.08	57.88	19.62	32.54	47.33	0.37	2.93
MO-8	COCH			11975.70	ft	205647	5.05	1.33	1.43	33.28	57.49	12.20	57.32	58.20	19.65	31.86	47.83	0.38	3.06
MZ-1	DC			6100	m	205675	13.81	5.56	4.80	57.07	59.66	23.13	45.84	48.73	15.57	40.85	34.23	0.67	1.66
SM-1	DC			2056	m	205685	15.91	1.40	4.15	35.68	59.91	15.56	16.16	31.16	13.39	31.32	42.83	0.71	0.42
SM-1	DC			2086	m	205686	26.90	8.34	3.90	44.51	57.13	17.36	39.79	50.71	34.41	37.72	36.44	0.61	0.49
SM-1	DC			2101	m	205687	13.27	1.54	5.62	53.71	59.93	20.49	52.05	59.66	52.69	34.49	45.72	0.41	0.50
TAN TAN -1	DC	Bitumen?	15210	15210	ft	205729	3.25	0.25	0.19	4.80	56.71	0.78	38.16	25.94	12.46	12.66	43.32	0.86	0.86
TAN TAN -1	DC			16460	ft	205730	3.88	0.18	0.24	4.93	56.90	0.81	37.92	25.03	12.08	14.21	42.76	0.85	0.80
TKM-201	COCH	A		3442.00	m	205731	15.33	2.12	5.09	48.13	58.52	22.78	50.89	56.39	28.43	32.67	45.82	0.40	0.78
TKM-201	COCH	B		3442.00	m	205732	19.57	2.39	11.48	54.81	59.72	26.11	51.46	53.86	29.71	33.82	45.37	0.41	0.69
Sidi Rhalem	Oil					205733	2.79	1.38	2.41	42.45	58.08	8.60	53.11	51.75	24.09	38.23	41.86	0.41	0.83
SM-1	Oil					205734	38.86	2.35	6.88	39.79	58.79	16.82	55.47	53.02	39.77	42.32	31.29	0.66	0.56
Ait Moussa	OC			345	m	207488	8.99	1.91	15.57	52.65	59.44	19.82	56.57	58.22	59.69	40.20	38.19	0.49	0.87
Ait Moussa	OC			371	m	207489	9.73	2.52	20.04	51.04	59.90	18.58	59.27	60.35	68.17	43.26	34.99	0.54	0.92
Ait Moussa	OC			383	m	207490	9.99	1.84	15.81	47.62	59.72	19.54	56.11	59.63	60.57	42.16	37.34	0.52	1.11

%23:3 23:3/(23:3+30αβ)*100
%28αβ 28αβ/(28αβ+30αβ)*100
%30D 30D/(30D+30αβ)*100
%27Ts 27Ts/(27Ts+27Tm)*100
%22S 32αβS/(32αβS+32αβR)*100
%29Ts 29Ts/(29Ts+30αβ)*100
%20S 29ααS/(29ααS+29ααR)*100
%ββ 29ββ(R+S)/(29ββ(R+S)+29αα(R+S))*100

%27dβS 27dβS/(27dβS+27αα(R+S))*100
%C27 27ββ(R+S)/(27ββ(R+S)+28ββ(R+S)+29ββ(R+S))*100
%C29 29ββ(R+S)/(27ββ(R+S)+28ββ(R+S)+29ββ(R+S))*100
28/29 (28αα(R+S)+28ββ(R+S))/(29αα(R+S)+29ββ(R+S))
24:4/23:3 24:4/23:3

Table 5. GCMS SIR of aromatic compounds (parameters)

Well	Sample type	Sample info	Upper Depth	Lower Depth	Depth units	APT ID	AROM2	Crack1	Crack2	MSAro1	MSAro2	MSAro3	MSAro4	MSAro5	MSAro6	MSAro7	MSAro8	MSAro9
IFNI-1	DC		3010	3020	ft	205636	0.62	0.38	0.25	0.30	2.71	0.46	0.97	3.22	2.62	0.18	18.48	0.67
IFNI-1	DC		3020	3030	ft	205637	0.32	0.23	0.13	0.07	3.58	0.52	1.61	4.84	1.55	0.16	15.34	0.27
IFNI-1	DC		3360	3370	ft	205638	0.74	0.21	0.10	0.07	2.74	0.50	1.31	4.54	1.92	0.20	41.34	0.66
JM-1	DC			2128	m	205640	0.72	0.25	0.14	0.16	1.47	0.46	1.18	3.67	1.90	0.16	7.57	0.76
JM-1	DC			2134	m	205641	0.86	0.11	0.05	0.12	1.76	0.36	0.77	1.20	0.34	0.18	0.80	0.83
JM-1	DC			3619	m	205642	0.81	0.75	0.61	0.28	4.10	0.37	1.00	3.14	1.63	0.74	12.25	0.80
JM-1	DC			3631	m	205643	0.77	0.75	0.62	0.36	3.57	0.37	1.11	3.53	4.44	0.65	7.08	0.78
MO-4	COCH			10098.30	ft	205644	0.58	0.42	0.27	0.26	4.65	0.56	1.59	5.38	2.09	0.13	14.46	0.72
MO-4	COCH			10100.25	ft	205645	0.39	0.65	0.43	0.22	3.94	0.57	1.79	5.25	1.77	0.15	8.79	0.61
MO-8	COCH			11975.25	ft	205646	0.88	0.55	0.41	0.53	1.84	0.34	1.09	1.14	2.91	0.79	8.23	0.87
MO-8	COCH			11975.70	ft	205647	0.88	0.52	0.40	0.52	1.72	0.34	1.18	1.35	2.86	0.78	8.38	0.87
MZ-1	DC			6100	m	205675	0.33	0.54	0.29	0.09	3.54	0.49	1.38	4.15	1.04	0.05	17.15	0.29
SM-1	DC			2056	m	205685	0.38	0.30	0.19	0.17	1.82	0.46	1.35	2.37	0.91	0.32	10.34	0.34
SM-1	DC			2086	m	205686	0.52	0.32	0.17	0.22	2.58	0.43	1.21	3.57	1.79	0.11	2.11	0.64
SM-1	DC			2101	m	205687	0.90	0.30	0.18	0.48	2.59	0.44	1.42	0.97	3.42	0.39	3.22	0.93
TAN TAN -1	DC	Bitumen?	15210	15210	ft	205729	0.85	0.08	0.04	0.28	3.23	0.49	0.69	6.31	1.51	0.17	2.95	0.92
TAN TAN -1	DC			16460	ft	205730	0.78	0.11	0.06	0.13	2.99	0.48	1.18	3.26	1.47	0.15	2.22	0.85
TKM-201	COCH	A		3442.00	m	205731	0.87	0.89	0.79	0.52	5.03	0.43	1.60	5.29	2.78	0.06	110.58	0.76
TKM-201	COCH	B		3442.00	m	205732	0.92	0.96	0.89	0.52	4.72	0.42	1.39	5.76	2.65	0.06	107.78	0.73
Sidi Rhalem	Oil					205733	0.78	0.14	0.07	0.10	1.84	0.32	0.95	2.22	2.56	1.36	15.33	0.79
SM-1	Oil					205734	0.54	0.84	0.57	0.50	1.45	0.33	1.32	4.21	1.58	3.74	4.29	0.57
Ait Moussa	OC			345	m	207488	0.88	0.61	0.41	0.33	3.55	0.34	1.02	2.67	3.11	0.06	78.04	0.89
Ait Moussa	OC			371	m	207489	0.85	0.48	0.27	0.18	3.87	0.34	0.78	2.07	3.20	0.07	59.46	0.86
Ait Moussa	OC			383	m	207490	0.91	0.55	0.35	0.27	3.53	0.31	0.83	1.18	4.70	0.00	72.04	0.91

AROM2: $(C_{20}TA+C_{21}TA+SC_{26}TA+RC_{26}TA+SC_{27}TA+SC_{28}TA+RC_{27}TA+RC_{28}TA/(C_{20}TA+C_{21}TA+SC_{26}TA+RC_{26}TA+SC_{27}TA+SC_{28}TA+RC_{27}TA+RC_{28}TA+C_{21}MA+C_{22}MA+\beta SC_{27}MA+\beta RC_{27}MA+\beta RC_{27}DMA+\alpha SC_{27}MA+\beta SC_{28}MA+\beta SC_{28}DMA+\alpha RC_{27}DMA+\alpha SC_{27}DMA+\alpha RC_{27}MA+\alpha SC_{28}MA+\alpha SC_{29}MA+\alpha RC_{29}MA)$

Crack1: $(C_{20}TA)/(C_{20}TA+RC_{28}TA)$

Crack2: $(C_{20}TA+C_{21}TA)/(C_{20}TA+C_{21}TA+SC_{26}TA+RC_{26}TA+SC_{27}TA+SC_{28}TA+RC_{27}TA+RC_{28}TA)$

MSAro1: $(C_{21}MA+C_{22}MA)/(C_{21}MA+C_{22}MA+\beta SC_{27}MA+\beta RC_{27}MA+\beta RC_{27}DMA+\alpha SC_{27}MA+\beta SC_{28}MA+\beta SC_{28}DMA+\alpha RC_{27}DMA+\alpha SC_{27}DMA+\alpha RC_{27}MA+\alpha SC_{28}MA+\alpha SC_{29}MA+\alpha RC_{29}MA)$

MSAro2: 4-MDBT/1-MDBT

MSAro3: (2-MP+3-MP)/(1-MP+2-MP+3-MP+9-MP)

MSAro4: 2-MN/1-MN

MSAro5: (2,6-DMN+2,7-DMN)/1,5-DMN

MSAro6: 4-MDBT/DBT

MSAro7: DBT/P

MSAro8: 3-MP/Retene

MSAro9: $RC_{28}TA/(RC_{28}TA+\alpha RC_{28}MA+\beta RC_{29}MA+\beta RC_{29}DMA)$

Table 6. Leco TOC data

Well	Sample type	Sample info	Upper Depth	Lower Depth	Depth units	APT ID	TOC (%)
IFNI-1	DC		3000	3010	ft	205635X	0.17
IFNI-1	DC		3010	3020	ft	205636X	0.23
IFNI-1	DC		3020	3030	ft	205637X	8.33
IFNI-1	DC		3360	3370	ft	205638X	1.99
IFNI-1	DC		3380	3390	ft	205639X	0.63
MZ-1	DC			4960	m	205648X	0.27
MZ-1	DC			4970	m	205649X	0.25
MZ-1	DC			4980	m	205650X	0.36
MZ-1	DC			4990	m	205651X	0.35
MZ-1	DC			5000	m	205652X	0.28
MZ-1	DC			5010	m	205653X	0.39
MZ-1	DC			5020	m	205654X	0.40
MZ-1	DC			5030	m	205655X	0.35
MZ-1	DC			5040	m	205656X	0.38
MZ-1	DC			5050	m	205657X	0.61
MZ-1	DC			5060	m	205658X	0.46
MZ-1	DC			5070	m	205659X	0.34
MZ-1	DC			5075	m	205660X	0.46
MZ-1	DC			5085	m	205661X	0.14
MZ-1	DC			5090	m	205662X	0.20
MZ-1	DC			5095	m	205663X	0.19
MZ-1	DC			5100	m	205664X	0.21
MZ-1	DC			5110	m	205665X	0.19
MZ-1	DC			5105	m	205666X	0.23
MZ-1	DC			5120	m	205667X	0.16
MZ-1	DC			5130	m	205668X	0.14
MZ-1	DC			6040	m	205669X	0.40
MZ-1	DC			6040	m	205669	0.63
MZ-1	DC			6040	m	205669X	0.39
MZ-1	DC			6050	m	205670X	0.34
MZ-1	DC			6050	m	205670	0.57

Well	Sample type	Sample info	Upper Depth	Lower Depth	Depth units	APT ID	TOC (%)
MZ-1	DC			6050	m	205670X	0.34
MZ-1	DC			6060	m	205671X	0.52
MZ-1	DC			6070	m	205672X	0.71
MZ-1	DC			6080	m	205673X	0.61
MZ-1	DC			6090	m	205674X	0.56
MZ-1	DC			6100	m	205675X	0.82
MZ-1	DC			6110	m	205676X	0.54
MZ-1	DC			6120	m	205677X	0.61
MZ-1	DC			6120	m	205677	0.82
MZ-1	DC			6120	m	205677X	0.61
MZ-1	DC			6130	m	205678X	0.46
MZ-1	DC			6140	m	205679X	0.29
MZ-1	DC			6145	m	205680X	0.34
MZ-1	DC			6150	m	205681X	0.21
MZ-1	DC			6155	m	205682X	0.27
MZ-1	DC			6160	m	205683X	0.13
MZ-1	DC			6162	m	205684X	0.25
SM-1	DC			2056	m	205685X	0.36
SM-1	DC			2086	m	205686X	0.28
SM-1	DC			2101	m	205687X	0.70
TAMANAR-1	DC			415	m	205688	0.16
TAMANAR-1	DC			425	m	205689	0.12
TAMANAR-1	DC			435	m	205690	0.14
TAMANAR-1	DC			445	m	205691	0.13
TAMANAR-1	DC			455	m	205692	0.14
TAMANAR-1	DC			465	m	205693	0.19
TAMANAR-1	DC			475	m	205694	0.24
TAMANAR-1	DC			485	m	205695	0.15
TAMANAR-1	DC			495	m	205696	0.16
TAMANAR-1	DC			505	m	205697	0.10
TAMANAR-1	DC			515	m	205698	0.16
TAMANAR-1	DC			525	m	205699	0.18

Well	Sample type	Sample info	Upper Depth	Lower Depth	Depth units	APT ID	TOC (%)
TAMANAR-1	DC			535	m	205700	0.08
TAMANAR-1	DC			545	m	205701	0.13
TAMANAR-1	DC			555	m	205702	0.18
TAMANAR-1	DC			565	m	205703	0.19
TAMANAR-1	DC			575	m	205704	0.23
TAMANAR-1	DC			585	m	205705	0.22
TAMANAR-1	DC			595	m	205706	0.11
TAMANAR-1	DC			605	m	205707	0.10
TAMANAR-1	DC			615	m	205708	0.16
TAMANAR-1	DC			625	m	205709	0.17
TAMANAR-1	DC			635	m	205710	0.15
TAMANAR-1	DC			645	m	205711	0.16
TAMANAR-1	DC			655	m	205712	0.16
TAMANAR-1	DC			665	m	205713	0.16
TAMANAR-1	DC			675	m	205714	0.15
TAMANAR-1	DC			685	m	205715	0.17
TAMANAR-1	DC			695	m	205716	0.17
TAMANAR-1	DC			705	m	205717	0.21
TAMANAR-1	DC			710	m	205718	0.32
TAMANAR-1	DC			715	m	205719	0.37
TAMANAR-1	DC			720	m	205720	0.35
TAMANAR-1	DC			725	m	205721	0.32
TAMANAR-1	DC			735	m	205722	0.24
TAMANAR-1	DC			745	m	205723	0.37
TAMANAR-1	DC			755	m	205724	0.32
TAMANAR-1	DC			765	m	205725	0.25
TAMANAR-1	DC			775	m	205726	0.13
TAMANAR-1	DC			785	m	205727	0.19
TAMANAR-1	DC			795	m	205728	0.16
TAN TAN -1	DC	Bitumen?	15210	15210	ft	205729X	61.60
TAN TAN -1	DC			16460	ft	205730X	1.23
TKM-201	COCH	A		3442.00	m	205731	5.99

Well	Sample type	Sample info	Upper Depth	Lower Depth	Depth units	APT ID	TOC (%)
TKM-201	COCH	B		3442.00	m	205732	2.76
Ait Moussa	OC			345	m	207488	4.98
Ait Moussa	OC			371	m	207489	2.79
Ait Moussa	OC			383	m	207490	5.86
Cap Juby-1	DC			4360	m	210406	2.03
Cap Juby-1	DC			4360	m	210406X	0.51
TAN TAN -1	DC		14750	14760	ft	210407	17.20
TAN TAN -1	DC		14750	14760	ft	210407X	0.51

Table 7. TOC and Rock-Eval data

Well	Sample type	Sample info	Upper Depth	Lower Depth	Depth units	APT ID	S1 (mg/g)	S2 (mg/g)	S3 (mg/g)	Tmax (°C)	PP (mg/g)	PI (wt ratio)	HI (mg HC/ g TOC)	OI (mg CO2/ g TOC)	TOC (%)*
IFNI-1	DC		3000	3010	ft	205635X	0.09	0.09	0.25	324	0.18	0.50	55	152	0.17
IFNI-1	DC		3010	3020	ft	205636X	0.07	0.11	0.33	430	0.18	0.39	47	142	0.23
IFNI-1	DC		3020	3030	ft	205637X	0.11	8.46	1.07	428	8.57	0.01	102	13	8.33
IFNI-1	DC		3360	3370	ft	205638X	0.24	1.72	1.17	429	1.96	0.12	86	59	1.99
IFNI-1	DC		3380	3390	ft	205639X	0.09	0.50	0.70	429	0.59	0.15	79	111	0.63
MZ-1	DC			4960	m	205648X	0.08	0.50	0.38	410	0.58	0.14	187	142	0.27
MZ-1	DC			4970	m	205649X	0.07	0.35	0.18	354	0.42	0.17	138	71	0.25
MZ-1	DC			4980	m	205650X	0.07	0.38	0.21	363	0.45	0.16	106	59	0.36
MZ-1	DC			4990	m	205651X	0.06	0.32	0.23	367	0.38	0.16	92	66	0.35
MZ-1	DC			5000	m	205652X	0.08	0.36	0.34	428	0.44	0.18	127	120	0.28
MZ-1	DC			5010	m	205653X	0.10	0.40	0.35	432	0.50	0.20	103	90	0.39
MZ-1	DC			5020	m	205654X	0.09	0.52	0.28	433	0.61	0.15	129	69	0.40
MZ-1	DC			5030	m	205655X	0.07	0.43	0.16	356	0.50	0.14	121	45	0.35
MZ-1	DC			5040	m	205656X	0.06	0.37	0.22	432	0.43	0.14	98	58	0.38
MZ-1	DC			5050	m	205657X	0.07	0.60	0.24	437	0.67	0.10	99	39	0.61
MZ-1	DC			5060	m	205658X	0.05	0.42	0.19	436	0.47	0.11	91	41	0.46
MZ-1	DC			5070	m	205659X	0.06	0.35	0.16	363	0.41	0.15	101	46	0.34
MZ-1	DC			5075	m	205660X	0.06	0.51	0.23	439	0.57	0.11	112	50	0.46
MZ-1	DC			5085	m	205661X	0.06	0.35	0.22	436	0.41	0.15	252	158	0.14
MZ-1	DC			5090	m	205662X	0.06	0.61	0.22	443	0.67	0.09	299	108	0.20
MZ-1	DC			5095	m	205663X	0.07	0.49	0.22	434	0.56	0.13	263	118	0.19
MZ-1	DC			5100	m	205664X	0.06	0.79	0.23	438	0.85	0.07	371	108	0.21
MZ-1	DC			5110	m	205665X	0.05	0.59	0.24	443	0.64	0.08	306	124	0.19
MZ-1	DC			5105	m	205666X	0.06	0.84	0.20	440	0.90	0.07	370	88	0.23
MZ-1	DC			5120	m	205667X	0.04	0.51	0.18	441	0.55	0.07	321	113	0.16
MZ-1	DC			5130	m	205668X	0.04	0.48	0.15	441	0.52	0.08	356	111	0.14
MZ-1	DC			6040	m	205669X	0.06	0.36	0.29	447	0.42	0.14	91	73	0.40
MZ-1	DC			6050	m	205670X	0.07	0.45	0.22	437	0.52	0.13	130	64	0.34
MZ-1	DC			6060	m	205671X	0.06	0.50	0.21	445	0.56	0.11	97	41	0.52
MZ-1	DC			6070	m	205672X	0.06	0.56	0.31	451	0.62	0.10	79	44	0.71
MZ-1	DC			6080	m	205673X	0.07	0.50	0.23	446	0.57	0.12	82	38	0.61

Well	Sample type	Sample info	Upper Depth	Lower Depth	Depth units	APT ID	S1 (mg/g)	S2 (mg/g)	S3 (mg/g)	Tmax (°C)	PP (mg/g)	PI (wt ratio)	HI (mg HC/ g TOC)	OI (mg CO2/ g TOC)	TOC (%)*
MZ-1	DC			6090	m	205674X	0.07	0.45	0.25	444	0.52	0.13	80	45	0.56
MZ-1	DC			6100	m	205675X	0.07	0.57	0.31	449	0.64	0.11	70	38	0.82
MZ-1	DC			6110	m	205676X	0.06	0.39	0.22	448	0.45	0.13	72	41	0.54
MZ-1	DC			6120	m	205677X	0.05	0.43	0.24	445	0.48	0.10	71	40	0.61
MZ-1	DC			6130	m	205678X	0.06	0.36	0.21	455	0.42	0.14	78	45	0.46
MZ-1	DC			6140	m	205679X	0.06	0.18	0.20	421	0.24	0.25	62	69	0.29
MZ-1	DC			6145	m	205680X	0.05	0.19	0.21	422	0.24	0.21	57	63	0.34
MZ-1	DC			6150	m	205681X	0.05	0.16	0.18	435	0.21	0.24	75	85	0.21
MZ-1	DC			6155	m	205682X	0.06	0.22	0.19	420	0.28	0.21	83	71	0.27
MZ-1	DC			6160	m	205683X	0.05	0.14	0.14	417	0.19	0.26	111	111	0.13
MZ-1	DC			6162	m	205684X	0.06	0.19	0.14	424	0.25	0.24	77	56	0.25
SM-1	DC			2056	m	205685X	0.08	0.97	0.30	351	1.05	0.08	272	84	0.36
SM-1	DC			2086	m	205686X	0.14	0.77	0.42	335	0.91	0.15	276	151	0.28
SM-1	DC			2101	m	205687X	0.14	1.96	1.41	460	2.10	0.07	279	201	0.70
TAMANAR-1	DC			415	m	205688	0.09	0.09	0.14	439	0.18	0.50	57	89	0.16
TAMANAR-1	DC			425	m	205689	0.04	0.05	0.13	432	0.09	0.44	42	110	0.12
TAMANAR-1	DC			435	m	205690	0.06	0.12	0.14	436	0.18	0.33	85	99	0.14
TAMANAR-1	DC			445	m	205691	0.04	0.08	0.14	432	0.12	0.33	62	109	0.13
TAMANAR-1	DC			455	m	205692	0.04	0.08	0.16	440	0.12	0.33	59	119	0.14
TAMANAR-1	DC			465	m	205693	0.09	0.16	0.10	437	0.25	0.36	83	52	0.19
TAMANAR-1	DC			475	m	205694	0.09	0.22	0.10	447	0.31	0.29	91	41	0.24
TAMANAR-1	DC			485	m	205695	0.07	0.12	0.10	442	0.19	0.37	78	65	0.15
TAMANAR-1	DC			495	m	205696	0.05	0.14	0.10	438	0.19	0.26	88	63	0.16
TAMANAR-1	DC			505	m	205697	0.05	0.08	0.09	428	0.13	0.38	83	94	0.10
TAMANAR-1	DC			515	m	205698	0.05	0.12	0.15	434	0.17	0.29	74	92	0.16
TAMANAR-1	DC			525	m	205699	0.04	0.11	0.16	440	0.15	0.27	62	90	0.18
TAMANAR-1	DC			535	m	205700	0.04	0.05	0.10	433	0.09	0.44	59	118	0.08
TAMANAR-1	DC			545	m	205701	0.05	0.08	0.13	430	0.13	0.38	62	100	0.13
TAMANAR-1	DC			555	m	205702	0.06	0.20	0.13	448	0.26	0.23	112	73	0.18
TAMANAR-1	DC			565	m	205703	0.03	0.02	0.05	300	0.05	0.60	10	26	0.19
TAMANAR-1	DC			575	m	205704	0.05	0.19	0.20	441	0.24	0.21	83	88	0.23
TAMANAR-1	DC			585	m	205705	0.06	0.21	0.18	424	0.27	0.22	96	82	0.22

Well	Sample type	Sample info	Upper Depth	Lower Depth	Depth units	APT ID	S1 (mg/g)	S2 (mg/g)	S3 (mg/g)	Tmax (°C)	PP (mg/g)	PI (wt ratio)	HI (mg HC/ g TOC)	OI (mg CO2/ g TOC)	TOC (%)*
TAMANAR-1	DC			595	m	205706	0.07	0.18	0.14	436	0.25	0.28	162	126	0.11
TAMANAR-1	DC			605	m	205707	0.04	0.06	0.11	436	0.10	0.40	61	112	0.10
TAMANAR-1	DC			615	m	205708	0.06	0.11	0.13	424	0.17	0.35	70	83	0.16
TAMANAR-1	DC			625	m	205709	0.09	0.12	0.17	433	0.21	0.43	72	102	0.17
TAMANAR-1	DC			635	m	205710	0.07	0.08	0.10	427	0.15	0.47	53	67	0.15
TAMANAR-1	DC			645	m	205711	0.05	0.11	0.12	441	0.16	0.31	70	76	0.16
TAMANAR-1	DC			655	m	205712	0.05	0.09	0.19	424	0.14	0.36	55	116	0.16
TAMANAR-1	DC			665	m	205713	0.04	0.08	0.12	437	0.12	0.33	49	74	0.16
TAMANAR-1	DC			675	m	205714	0.03	0.07	0.16	426	0.10	0.30	47	107	0.15
TAMANAR-1	DC			685	m	205715	0.06	0.14	0.16	437	0.20	0.30	80	91	0.17
TAMANAR-1	DC			695	m	205716	0.05	0.11	0.15	425	0.16	0.31	64	88	0.17
TAMANAR-1	DC			705	m	205717	0.06	0.13	0.17	438	0.19	0.32	63	83	0.21
TAMANAR-1	DC			710	m	205718	0.06	0.21	0.17	436	0.27	0.22	66	54	0.32
TAMANAR-1	DC			715	m	205719	0.07	0.18	0.23	447	0.25	0.28	49	62	0.37
TAMANAR-1	DC			720	m	205720	0.06	0.19	0.22	444	0.25	0.24	55	63	0.35
TAMANAR-1	DC			725	m	205721	0.05	0.15	0.14	451	0.20	0.25	47	44	0.32
TAMANAR-1	DC			735	m	205722	0.04	0.09	0.15	437	0.13	0.31	38	63	0.24
TAMANAR-1	DC			745	m	205723	0.08	0.16	0.16	445	0.24	0.33	44	44	0.37
TAMANAR-1	DC			755	m	205724	0.08	0.20	0.19	441	0.28	0.29	63	60	0.32
TAMANAR-1	DC			765	m	205725	0.07	0.14	0.11	434	0.21	0.33	56	44	0.25
TAMANAR-1	DC			775	m	205726	0.04	0.09	0.14	432	0.13	0.31	71	110	0.13
TAMANAR-1	DC			785	m	205727	0.05	0.17	0.20	441	0.22	0.23	89	105	0.19
TAMANAR-1	DC			795	m	205728	0.05	0.14	0.20	415	0.19	0.26	88	125	0.16
TAN TAN -1	DC	Bitumen?	15210	15210	ft	205729X	0.22	2.63	0.91	425	2.85	0.08	4	1	61.60
TAN TAN -1	DC			16460	ft	205730X	0.11	1.60	0.45	432	1.71	0.06	130	37	1.23
TKM-201	COCH	A		3442.00	m	205731	0.47	6.19	0.12	447	6.66	0.07	103	2	5.99
TKM-201	COCH	B		3442.00	m	205732	0.80	10.78	0.20	444	11.58	0.07	391	7	2.76
Ait Moussa	OC			345	m	207488	1.20	22.00	0.10	443	23.20	0.05	442	2	4.98
Ait Moussa	OC			371	m	207489	1.03	13.00	0.15	444	14.03	0.07	466	5	2.79
Ait Moussa	OC			383	m	207490	0.99	29.95	0.33	436	30.94	0.03	511	6	5.86
Cap Juby-1	DC			4360	m	210406	39.84	3.82	0.44	434	43.66	0.91	188	22	2.03
Cap Juby-1	DC			4360	m	210406X	0.48	0.73	0.37	436	1.21	0.40	142	72	0.51
TAN TAN -1	DC		14750	14760	ft	210407	8.13	121.17	0.42	438	129.30	0.06	704	2	17.20

Well	Sample type	Sample info	Upper Depth	Lower Depth	Depth units	APT ID	S1 (mg/g)	S2 (mg/g)	S3 (mg/g)	Tmax (°C)	PP (mg/g)	PI (wt ratio)	HI (mg HC/ g TOC)	OI (mg CO2/ g TOC)	TOC (%)*
TAN TAN -1	DC		14750	14760	ft	210407X	0.08	0.29	0.31	430	0.37	0.22	56	60	0.51

*: Leco TOC

Table 8. Extraction, Asphaltene precipitation and MPLC data

Well	Sample type	Sample info	Upper Depth	Lower Depth	Depth units	APT ID	Rock weight (g)	EOM (mg)	EOM (mg/kg Rock)	SAT (wt% of EOM/Oil)	ARO (wt% of EOM/Oil)	POL (wt% of EOM/Oil)	ASP (wt% of EOM/Oil)	HC (wt% of EOM/Oil)
IFNI-1	DC		3010	3020	ft	205636	3.160	2.8	886	40.6	2.3	28.9	28.2	42.9
IFNI-1	DC		3020	3030	ft	205637	3.367	7.0	2079	16.0	7.9	35.0	41.1	23.9
IFNI-1	DC		3360	3370	ft	205638	18.188	44.3	2436	57.3	4.5	29.6	8.5	61.9
JM-1	DC			2128	m	205640	3.612	32.6	9024	15.6	15.1	30.0	39.3	30.7
JM-1	DC			2134	m	205641	9.339	1.6	171	9.9	4.2	30.4	55.6	14.1
JM-1	DC			3619	m	205642	17.761	3.6	203	29.5	22.7	35.8	12.0	52.2
JM-1	DC			3631	m	205643	16.774	5.1	304	32.7	24.1	31.3	12.0	56.7
MO-4	COCH			10098.30	ft	205644	19.934	2.1	105	20.1	7.8	32.9	39.2	27.9
MO-4	COCH			10100.25	ft	205645	13.873	1.3	94	24.7	6.9	38.5	29.9	31.6
MO-8	COCH			11975.25	ft	205646	4.613	125.1	27117	18.6	11.3	19.5	50.6	29.9
MO-8	COCH			11975.70	ft	205647	5.178	155.6	30048	16.4	10.5	21.7	51.4	26.9
MZ-1	DC			6100	m	205675	4.937	17.9	3626	37.2	1.8	42.2	18.8	39.0
SM-1	DC			2056	m	205685	9.387	12.6	1342	15.5	10.3	68.9	5.3	25.8
SM-1	DC			2086	m	205686	1.303	0.3	230	0.0	0.0	0.0	100.0	0.0
SM-1	DC			2101	m	205687	17.375	122.1	7027	28.9	10.6	54.5	6.0	39.5
TAN TAN -1	DC	Bitumen?	15210	15210	ft	205729	1.295	907.0	700548	10.4	9.9	12.6	67.1	20.3
TAN TAN -1	DC			16460	ft	205730	4.118	776.7	188634	9.7	5.6	19.4	65.3	15.3
TKM-201	COCH	A		3442.00	m	205731	5.337	7.2	1349	16.2	12.2	26.2	45.4	28.4
TKM-201	COCH	B		3442.00	m	205732	5.100	13.2	2588	11.8	16.8	28.8	42.6	28.6
Sidi Rhalem	Oil					205733				57.0	19.0	17.9	6.1	76.0
SM-1	Oil					205734				73.9	19.4	6.2	0.5	93.3
Ait Moussa	OC			345	m	207488	17.849	131.9	7390	17.5	25.2	39.6	17.7	42.7
Ait Moussa	OC			371	m	207489	11.344	57.3	5051	23.1	22.7	37.8	16.4	45.8
Ait Moussa	OC			383	m	207490	11.878	62.2	5237	19.2	16.1	40.9	23.8	35.3
Cap Juby-1	DC			4360	m	210406	7.049	355.7	50464	53.6	18.2	12.2	16.0	71.8
TAN TAN -1	DC		14750	14760	ft	210407	0.581	85.6	147231	4.8	2.4	21.7	71.1	7.2

Table 9. GC of saturated compounds (peak area)

Well	Sample type	Sample info	Upper Depth	Lower Depth	Depth units	APT ID	n-C8	n-C9	n-C10	n-C11	n-C12	i-C13	i-C14	n-C13	i-C15	n-C14	i-C16	n-C15	n-C16	i-C18
IFNI-1	DC		3010	3020	ft	205636	0.00e0	0.00e0	3.10e1	9.90e1	1.51e3	7.90e2	1.93e3	8.32e3	1.17e3	3.99e3	5.11e2	7.37e2	1.87e2	9.40e1
IFNI-1	DC		3020	3030	ft	205637	0.00e0	3.00e0	2.70e1	5.70e1	1.09e3	6.20e2	1.59e3	6.82e3	1.04e3	3.85e3	4.72e2	8.38e2	2.36e2	1.10e2
IFNI-1	DC		3360	3370	ft	205638	0.00e0	0.00e0	2.30e1	1.07e2	6.37e3	2.63e3	5.44e3	3.97e4	3.68e3	1.88e4	1.60e3	3.11e3	5.75e2	2.39e2
JM-1	DC			2128	m	205640	0.00e0	0.00e0	5.00e0	4.00e0	1.70e2	1.27e2	7.25e2	2.56e3	1.04e3	3.15e3	6.22e2	9.42e2	2.40e2	8.50e1
JM-1	DC			2134	m	205641	0.00e0	3.00e0	2.30e1	2.60e1	6.71e2	1.10e1	2.70e1	2.39e3	3.80e1	3.36e2	5.40e1	1.28e2	6.90e1	2.10e1
JM-1	DC			3619	m	205642	0.00e0	8.00e0	3.00e1	3.40e1	1.08e2	1.10e1	1.90e1	4.87e2	3.80e1	3.34e2	9.10e1	3.55e2	3.74e2	1.02e2
JM-1	DC			3631	m	205643	0.00e0	4.00e0	2.10e1	1.30e1	6.90e1	6.00e0	1.90e1	5.02e2	5.10e1	4.35e2	1.30e2	5.46e2	6.07e2	1.70e2
MO-4	COCH			10098.30	ft	205644	0.00e0	0.00e0	1.30e1	4.00e0	4.50e1	3.00e0	1.80e1	2.86e2	3.30e1	1.72e2	3.10e1	7.10e1	4.80e1	2.30e1
MO-4	COCH			10100.25	ft	205645	0.00e0	0.00e0	1.10e1	3.00e0	3.80e1	4.00e0	3.60e1	3.32e2	7.50e1	3.04e2	6.80e1	1.18e2	4.40e1	1.70e1
MO-8	COCH			11975.25	ft	205646	0.00e0	0.00e0	2.00e0	4.00e0	2.97e2	1.49e2	4.18e2	1.56e3	2.82e2	9.35e2	1.24e2	2.02e2	8.10e1	5.70e1
MO-8	COCH			11975.70	ft	205647	0.00e0	0.00e0	2.00e0	4.00e0	3.31e2	1.57e2	4.32e2	1.77e3	2.66e2	9.39e2	1.07e2	1.83e2	7.30e1	5.50e1
MZ-1	DC			6100	m	205675	0.00e0	4.00e0	2.70e1	8.70e1	1.36e3	8.13e2	3.34e3	1.32e4	4.41e3	1.47e4	3.02e3	5.99e3	2.42e3	5.19e2
SM-1	DC			2056	m	205685	0.00e0	0.00e0	5.00e0	2.00e0	3.10e1	4.00e0	7.00e0	1.05e2	5.00e0	2.70e1	5.00e0	1.00e1	7.00e0	4.00e0
SM-1	DC			2086	m	205686	0.00e0	0.00e0	1.10e1	4.00e0	2.80e1	1.00e0	5.00e0	3.10e2	1.70e1	1.38e2	2.60e1	4.80e1	2.00e1	4.00e0
SM-1	DC			2101	m	205687	0.00e0	0.00e0	3.00e0	2.00e0	7.00e1	1.60e1	4.90e1	3.31e2	4.90e1	1.27e2	3.90e1	3.30e1	1.30e1	5.10e1
TAN TAN -1	DC	Bitumen?	15210	15210	ft	205729	0.00e0	0.00e0	1.00e0	1.00e0	5.00e0	2.00e0	4.00e0	1.60e1	1.30e1	5.40e1	2.50e1	5.20e1	1.60e1	5.00e0
TAN TAN -1	DC			16460	ft	205730	0.00e0	0.00e0	0.00e0	0.00e0	4.00e0	1.00e0	3.00e0	2.00e1	9.00e0	2.60e1	1.20e1	1.50e1	5.00e0	4.00e0
TKM-201	COCH	A		3442.00	m	205731	0.00e0	2.90e1	4.80e1	4.80e1	7.20e1	1.50e1	2.00e1	1.55e2	1.60e1	8.10e1	1.90e1	5.30e1	5.60e1	2.70e1
TKM-201	COCH	B		3442.00	m	205732	0.00e0	4.40e1	6.60e1	6.60e1	9.00e1	2.30e1	2.60e1	2.26e2	2.30e1	1.42e2	4.20e1	8.10e1	6.80e1	3.90e1
Sidi Rhalem	Oil					205733	0.00e0	0.00e0	0.00e0	1.00e0	3.00e0	2.00e0	5.00e0	1.30e1	2.60e1	7.30e1	1.22e2	4.87e2	1.92e3	1.15e3
SM-1	Oil					205734	0.00e0	3.27e2	7.51e3	1.64e4	1.40e4	3.21e3	2.67e3	1.05e4	1.76e3	7.83e3	2.39e3	6.60e3	5.54e3	1.99e3
Ait Moussa	OC			345	m	207488	0.00e0	3.29e2	7.35e2	9.53e2	1.02e3	2.41e2	1.66e2	1.07e3	1.79e2	9.81e2	3.37e2	8.91e2	8.23e2	4.20e2
Ait Moussa	OC			371	m	207489	0.00e0	3.00e0	1.20e1	4.00e1	1.56e2	5.10e1	5.40e1	4.87e2	8.90e1	4.78e2	2.38e2	5.19e2	6.28e2	4.46e2
Ait Moussa	OC			383	m	207490	0.00e0	5.00e0	4.10e1	1.48e2	4.51e2	1.43e2	1.14e2	8.33e2	1.43e2	8.79e2	3.17e2	9.30e2	9.22e2	4.54e2

Table 9. continued, GC of saturated compounds (peak area)

Well	Sample type	Sample info	Upper Depth	Lower Depth	Depth units	APT ID	n-C17	Pr	n-C18	Ph	n-C19	n-C20	n-C21	n-C22	n-C23	n-C24	n-C25	n-C26	n-C27	n-C28
IFNI-1	DC		3010	3020	ft	205636	7.90e1	9.80e1	9.70e1	1.23e2	6.20e1	4.80e1	2.60e1	2.20e1	1.80e1	1.70e1	1.80e1	1.40e1	1.60e1	1.50e1
IFNI-1	DC		3020	3030	ft	205637	1.21e2	1.61e2	1.46e2	1.61e2	1.17e2	1.05e2	7.80e1	7.50e1	7.70e1	6.60e1	1.24e2	6.40e1	2.07e2	7.60e1
IFNI-1	DC		3360	3370	ft	205638	1.74e2	3.57e2	1.59e2	6.93e2	1.11e2	1.40e2	8.00e1	8.30e1	4.40e1	4.50e1	6.70e1	4.40e1	4.00e1	0.00e0
JM-1	DC			2128	m	205640	8.00e1	9.20e1	8.60e1	1.26e2	1.11e2	1.84e2	1.99e2	2.66e2	2.23e2	2.18e2	2.31e2	1.81e2	1.48e2	2.00e2
JM-1	DC			2134	m	205641	7.50e1	4.40e1	1.09e2	5.30e1	1.07e2	1.01e2	8.10e1	7.60e1	7.00e1	6.10e1	7.30e1	5.20e1	8.40e1	3.90e1
JM-1	DC			3619	m	205642	4.34e2	1.12e2	4.46e2	1.62e2	4.08e2	3.81e2	3.41e2	3.23e2	2.48e2	2.21e2	1.87e2	1.65e2	1.35e2	1.43e2
JM-1	DC			3631	m	205643	7.07e2	1.73e2	7.10e2	2.55e2	6.54e2	5.99e2	5.31e2	5.23e2	4.18e2	3.88e2	3.42e2	3.14e2	2.53e2	3.13e2
MO-4	COCH			10098.30	ft	205644	7.10e1	4.20e1	1.05e2	6.20e1	9.10e1	1.12e2	1.91e2	2.74e2	2.38e2	1.78e2	1.36e2	1.26e2	1.42e2	1.50e2
MO-4	COCH			10100.25	ft	205645	3.90e1	2.20e1	5.20e1	3.20e1	4.30e1	4.80e1	7.20e1	1.39e2	2.00e2	2.24e2	2.08e2	1.94e2	2.14e2	2.33e2
MO-8	COCH			11975.25	ft	205646	1.54e2	7.50e1	3.10e2	2.15e2	4.42e2	5.43e2	5.78e2	6.10e2	4.71e2	4.43e2	4.05e2	3.88e2	3.11e2	3.34e2
MO-8	COCH			11975.70	ft	205647	1.40e2	7.60e1	2.86e2	2.23e2	4.24e2	5.46e2	5.92e2	6.69e2	5.12e2	4.78e2	4.39e2	4.10e2	3.32e2	3.67e2
MZ-1	DC			6100	m	205675	7.68e2	2.77e2	5.31e2	1.52e2	3.71e2	2.49e2	1.64e2	1.22e2	8.00e1	5.90e1	4.10e1	3.10e1	2.50e1	1.90e1
SM-1	DC			2056	m	205685	9.00e0	9.00e0	1.60e1	1.60e1	1.70e1	1.60e1	1.30e1	1.10e1	1.10e1	8.00e0	8.00e0	6.00e0	8.00e0	8.00e0
SM-1	DC			2086	m	205686	1.30e1	7.00e0	1.60e1	9.00e0	1.50e1	1.70e1	1.60e1	1.70e1	1.20e1	1.20e1	1.00e1	9.00e0	9.00e0	8.00e0
SM-1	DC			2101	m	205687	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0
TAN TAN -1	DC	Bitumen?	15210	15210	ft	205729	9.00e0	6.00e0	7.00e0	4.00e0	6.00e0	5.00e0	3.00e0	3.00e0	2.00e0	2.00e0	2.00e0	1.00e0	1.00e0	0.00e0
TAN TAN -1	DC			16460	ft	205730	5.00e0	5.00e0	5.00e0	5.00e0	5.00e0	6.00e0	4.00e0	4.00e0	2.00e0	2.00e0	2.00e0	1.00e0	1.00e0	1.00e0
TKM-201	COCH	A		3442.00	m	205731	7.10e1	3.60e1	7.80e1	3.70e1	6.70e1	5.80e1	4.50e1	4.00e1	3.00e1	2.70e1	2.40e1	1.90e1	1.80e1	1.60e1
TKM-201	COCH	B		3442.00	m	205732	6.50e1	4.10e1	5.90e1	2.70e1	5.10e1	4.50e1	3.60e1	3.30e1	2.90e1	3.00e1	2.80e1	2.30e1	1.90e1	1.80e1
Sidi Rhalem	Oil					205733	3.06e3	2.26e3	4.08e3	7.39e3	3.60e3	3.71e3	3.14e3	3.20e3	2.50e3	2.63e3	2.12e3	2.23e3	1.44e3	1.66e3
SM-1	Oil					205734	4.88e3	1.72e3	4.11e3	1.61e3	3.44e3	2.94e3	2.38e3	1.96e3	1.47e3	1.22e3	9.38e2	7.30e2	5.01e2	4.25e2
Ait Moussa	OC			345	m	207488	7.11e2	4.38e2	5.93e2	2.99e2	4.90e2	4.31e2	3.74e2	3.41e2	2.76e2	2.59e2	2.13e2	1.98e2	1.48e2	1.43e2
Ait Moussa	OC			371	m	207489	6.17e2	5.01e2	5.70e2	4.22e2	4.90e2	4.52e2	3.96e2	3.75e2	3.25e2	3.33e2	2.83e2	2.94e2	2.09e2	2.14e2
Ait Moussa	OC			383	m	207490	8.61e2	4.08e2	7.05e2	3.06e2	5.65e2	4.77e2	3.93e2	3.46e2	2.74e2	2.61e2	2.08e2	1.96e2	1.39e2	1.41e2

Table 9. continued, GC of saturated compounds (peak area)

Well	Sample type	Sample info	Upper Depth	Lower Depth	Depth units	APT ID	n-C29	n-C30	n-C31	n-C32	n-C33	n-C34	n-C35	n-C36	n-C37	n-C38	n-C39	n-C40	n-C41	n-C42
IFNI-1	DC		3010	3020	ft	205636	1.70e1	1.20e1	1.50e1	8.00e0	9.00e0	7.00e0	5.00e0	4.00e0	3.00e0	2.00e0	2.00e0	0.00e0	0.00e0	0.00e0
IFNI-1	DC		3020	3030	ft	205637	1.01e2	4.40e1	3.60e1	1.80e1	1.60e1	1.30e1	1.40e1	6.00e0	5.00e0	3.00e0	3.00e0	2.00e0	2.00e0	1.00e0
IFNI-1	DC		3360	3370	ft	205638	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0
JM-1	DC			2128	m	205640	1.33e2	1.72e2	7.70e1	7.10e1	5.00e1	5.60e1	4.50e1	2.30e1	2.40e1	2.10e1	1.70e1	1.00e1	7.00e0	8.00e0
JM-1	DC			2134	m	205641	5.70e1	3.10e1	4.40e1	1.70e1	2.50e1	1.00e1	1.30e1	3.00e0	2.00e0	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0
JM-1	DC			3619	m	205642	1.15e2	1.16e2	8.90e1	7.40e1	5.80e1	5.30e1	4.70e1	2.50e1	2.10e1	1.40e1	9.00e0	8.00e0	7.00e0	4.00e0
JM-1	DC			3631	m	205643	2.14e2	2.19e2	1.60e2	1.35e2	1.05e2	1.01e2	8.90e1	4.50e1	3.50e1	2.50e1	2.00e1	1.50e1	1.00e1	7.00e0
MO-4	COCH			10098.30	ft	205644	1.61e2	1.40e2	1.30e2	9.40e1	8.00e1	5.70e1	4.20e1	2.50e1	1.60e1	1.20e1	8.00e0	5.00e0	4.00e0	2.00e0
MO-4	COCH			10100.25	ft	205645	2.75e2	2.58e2	2.57e2	1.97e2	1.62e2	1.08e2	8.10e1	5.30e1	3.80e1	2.30e1	1.30e1	8.00e0	5.00e0	4.00e0
MO-8	COCH			11975.25	ft	205646	2.81e2	3.48e2	2.15e2	2.05e2	1.67e2	1.57e2	1.87e2	1.03e2	8.70e1	5.60e1	5.40e1	3.40e1	2.60e1	1.80e1
MO-8	COCH			11975.70	ft	205647	3.01e2	3.75e2	2.33e2	2.21e2	1.84e2	1.79e2	2.02e2	1.03e2	9.30e1	5.90e1	5.50e1	3.50e1	2.30e1	1.80e1
MZ-1	DC			6100	m	205675	1.80e1	1.80e1	1.50e1	1.00e1	9.00e0	1.10e1	9.00e0	4.00e0	4.00e0	2.00e0	2.00e0	3.00e0	2.00e0	2.00e0
SM-1	DC			2056	m	205685	9.00e0	5.00e0	8.00e0	3.00e0	4.00e0	2.00e0	4.00e0	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0
SM-1	DC			2086	m	205686	1.00e1	7.00e0	9.00e0	5.00e0	5.00e0	3.00e0	3.00e0	1.00e0	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0
SM-1	DC			2101	m	205687	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0
TAN TAN -1	DC	Bitumen?	15210	15210	ft	205729	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0
TAN TAN -1	DC			16460	ft	205730	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0
TKM-201	COCH	A		3442.00	m	205731	1.70e1	1.60e1	1.40e1	1.00e1	1.10e1	1.10e1	8.00e0	4.00e0	3.00e0	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0
TKM-201	COCH	B		3442.00	m	205732	1.80e1	1.80e1	1.70e1	1.10e1	1.60e1	2.20e1	1.20e1	4.00e0	4.00e0	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0
Sidi Rhalem	Oil					205733	1.56e3	1.36e3	8.41e2	7.60e2	5.44e2	6.27e2	4.73e2	2.68e2	1.58e2	1.18e2	9.30e1	6.10e1	5.50e1	4.20e1
SM-1	Oil					205734	3.42e2	2.67e2	2.24e2	1.62e2	1.37e2	1.18e2	8.40e1	4.60e1	3.70e1	2.80e1	2.30e1	1.20e1	5.00e0	6.00e0
Ait Moussa	OC			345	m	207488	1.18e2	1.13e2	7.60e1	6.40e1	4.20e1	4.00e1	2.80e1	1.00e1	7.00e0	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0
Ait Moussa	OC			371	m	207489	2.14e2	2.01e2	1.64e2	1.54e2	1.01e2	7.70e1	6.60e1	2.60e1	1.90e1	1.40e1	7.00e0	0.00e0	0.00e0	0.00e0
Ait Moussa	OC			383	m	207490	1.30e2	1.15e2	8.20e1	7.30e1	4.70e1	4.50e1	3.50e1	1.20e1	8.00e0	6.00e0	4.00e0	0.00e0	0.00e0	0.00e0

Table 10. GC of saturated compounds (amounts in ng/g)

Well	Sample type	Sample info	Upper Depth	Lower Depth	Depth units	APT ID	n-C8	n-C9	n-C10	n-C11	n-C12	i-C13	i-C14	n-C13	i-C15	n-C14	i-C16	n-C15	n-C16	i-C18
IFNI-1	DC		3010	3020	ft	205636	0.00e0	0.00e0	3.43e5	1.09e6	1.66e7	8.69e6	2.12e7	9.14e7	1.29e7	4.39e7	5.61e6	8.10e6	2.05e6	1.03e6
IFNI-1	DC		3020	3030	ft	205637	0.00e0	1.34e4	1.26e5	2.67e5	5.11e6	2.91e6	7.45e6	3.20e7	4.89e6	1.81e7	2.22e6	3.94e6	1.11e6	5.19e5
IFNI-1	DC		3360	3370	ft	205638	0.00e0	0.00e0	5.15e4	2.41e5	1.43e7	5.92e6	1.23e7	8.94e7	8.29e6	4.24e7	3.61e6	7.01e6	1.29e6	5.39e5
JM-1	DC			2128	m	205640	0.00e0	0.00e0	1.06e4	8.85e3	3.88e5	2.88e5	1.65e6	5.84e6	2.37e6	7.18e6	1.42e6	2.15e6	5.47e5	1.94e5
JM-1	DC			2134	m	205641	0.00e0	5.32e4	3.67e5	4.05e5	1.06e7	1.71e5	4.32e5	3.76e7	5.99e5	5.29e6	8.43e5	2.01e6	1.08e6	3.25e5
JM-1	DC			3619	m	205642	0.00e0	4.95e4	1.97e5	2.24e5	7.14e5	7.28e4	1.24e5	3.21e6	2.48e5	2.21e6	6.02e5	2.34e6	2.46e6	6.72e5
JM-1	DC			3631	m	205643	0.00e0	1.93e4	1.07e5	6.33e4	3.49e5	3.03e4	9.74e4	2.53e6	2.59e5	2.19e6	6.53e5	2.75e6	3.06e6	8.58e5
MO-4	COCH			10098.30	ft	205644	0.00e0	0.00e0	1.47e5	4.62e4	4.98e5	3.73e4	1.99e5	3.20e6	3.72e5	1.93e6	3.42e5	7.88e5	5.37e5	2.61e5
MO-4	COCH			10100.25	ft	205645	0.00e0	0.00e0	2.13e5	6.53e4	7.36e5	8.64e4	6.87e5	6.39e6	1.45e6	5.86e6	1.30e6	2.27e6	8.41e5	3.31e5
MO-8	COCH			11975.25	ft	205646	0.00e0	0.00e0	4.13e3	1.00e4	6.65e5	3.34e5	9.37e5	3.50e6	6.31e5	2.10e6	2.77e5	4.53e5	1.81e5	1.29e5
MO-8	COCH			11975.70	ft	205647	0.00e0	0.00e0	4.62e3	9.03e3	7.49e5	3.56e5	9.78e5	4.00e6	6.03e5	2.12e6	2.43e5	4.14e5	1.65e5	1.24e5
MZ-1	DC			6100	m	205675	0.00e0	1.24e4	8.75e4	2.88e5	4.49e6	2.68e6	1.10e7	4.35e7	1.45e7	4.84e7	9.97e6	1.98e7	7.98e6	1.71e6
SM-1	DC			2056	m	205685	0.00e0	0.00e0	2.83e4	1.09e4	1.81e5	2.22e4	3.90e4	6.08e5	3.19e4	1.57e5	3.06e4	5.86e4	3.93e4	2.06e4
SM-1	DC			2086	m	205686	0.00e0	0.00e0	1.02e6	4.29e5	2.67e6	9.98e4	4.94e5	3.00e7	1.65e6	1.34e7	2.52e6	4.61e6	1.91e6	4.10e5
SM-1	DC			2101	m	205687	0.00e0	0.00e0	5.47e3	3.40e3	1.27e5	2.99e4	8.94e4	6.00e5	8.94e4	2.31e5	7.14e4	5.95e4	2.33e4	9.27e4
TAN TAN -1	DC	Bitumen?	15210	15210	ft	205729	0.00e0	0.00e0	1.24e3	2.87e3	1.10e4	4.92e3	8.92e3	3.77e4	3.01e4	1.25e5	5.66e4	1.20e5	3.68e4	1.25e4
TAN TAN -1	DC			16460	ft	205730	0.00e0	0.00e0	0.00e0	0.00e0	8.68e3	2.00e3	7.35e3	4.58e4	2.14e4	5.99e4	2.87e4	3.45e4	1.28e4	8.57e3
TKM-201	COCH	A		3442.00	m	205731	0.00e0	3.27e5	5.39e5	5.43e5	8.17e5	1.73e5	2.24e5	1.76e6	1.80e5	9.21e5	2.21e5	6.05e5	6.31e5	3.03e5
TKM-201	COCH	B		3442.00	m	205732	0.00e0	2.93e5	4.38e5	4.44e5	5.99e5	1.56e5	1.74e5	1.51e6	1.54e5	9.50e5	2.80e5	5.40e5	4.56e5	2.58e5
Sidi Rhalem	Oil					205733	0.00e0	0.00e0	7.60e2	2.58e3	6.81e3	3.85e3	1.02e4	2.54e4	5.07e4	1.46e5	2.43e5	9.68e5	3.82e6	2.28e6
SM-1	Oil					205734	0.00e0	5.81e5	1.33e7	2.90e7	2.48e7	5.69e6	4.73e6	1.85e7	3.11e6	1.39e7	4.24e6	1.17e7	9.83e6	3.54e6
Ait Moussa	OC			345	m	207488	0.00e0	9.55e5	2.13e6	2.76e6	2.96e6	6.99e5	4.82e5	3.11e6	5.20e5	2.85e6	9.77e5	2.58e6	2.39e6	1.22e6
Ait Moussa	OC			371	m	207489	0.00e0	5.12e3	2.46e4	8.05e4	3.09e5	1.01e5	1.08e5	9.68e5	1.77e5	9.51e5	4.74e5	1.03e6	1.25e6	8.86e5
Ait Moussa	OC			383	m	207490	0.00e0	1.48e4	1.26e5	4.59e5	1.40e6	4.44e5	3.54e5	2.59e6	4.45e5	2.73e6	9.85e5	2.89e6	2.86e6	1.41e6

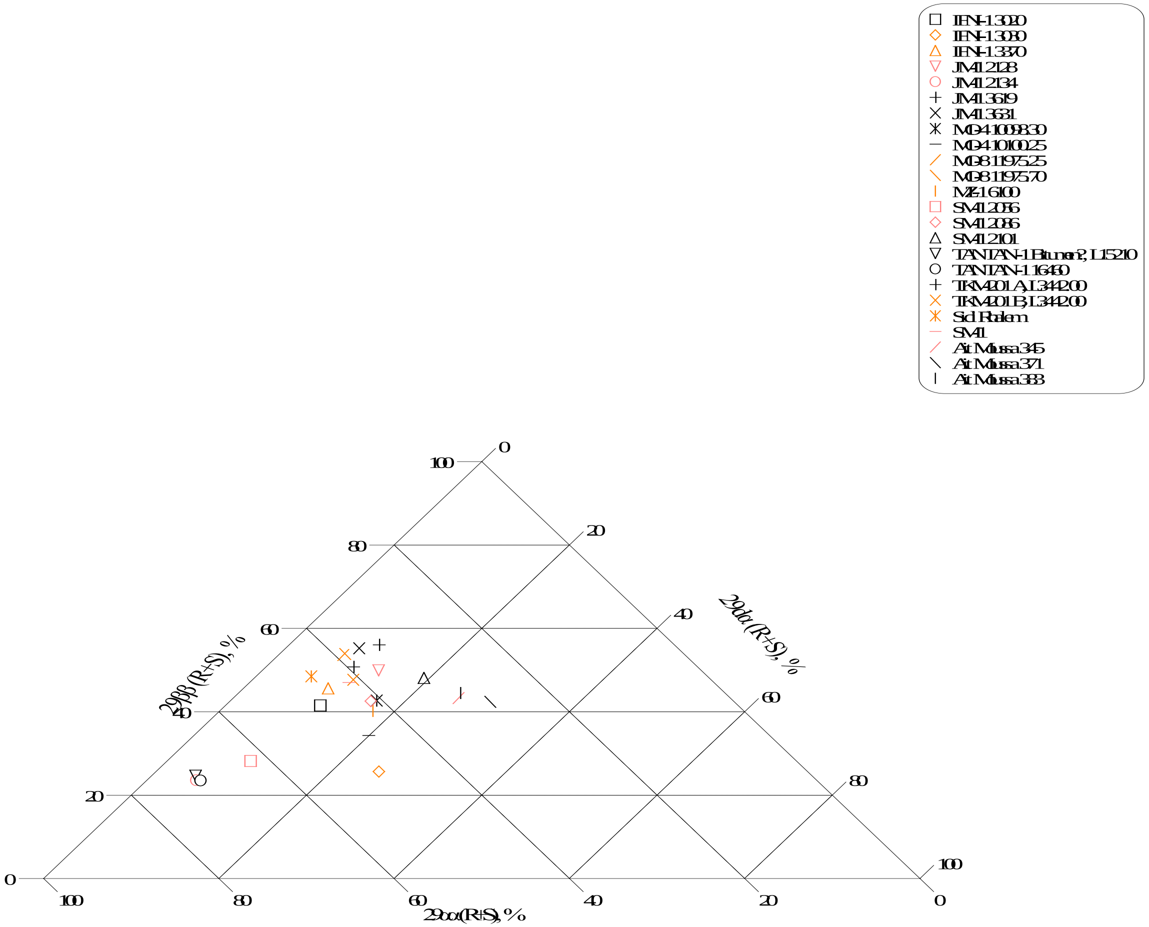
Table 10. continued, GC of saturated compounds (amounts in ng/g)

Well	Sample type	Sample info	Upper Depth	Lower Depth	Depth units	APT ID	n-C17	Pr	n-C18	Ph	n-C19	n-C20	n-C21	n-C22	n-C23	n-C24	n-C25	n-C26	n-C27	n-C28
IFNI-1	DC		3010	3020	ft	205636	8.71e5	1.08e6	1.07e6	1.35e6	6.82e5	5.30e5	2.88e5	2.43e5	1.96e5	1.89e5	1.99e5	1.59e5	1.71e5	1.63e5
IFNI-1	DC		3020	3030	ft	205637	5.67e5	7.58e5	6.86e5	7.57e5	5.48e5	4.93e5	3.66e5	3.54e5	3.61e5	3.12e5	5.82e5	3.02e5	9.71e5	3.55e5
IFNI-1	DC		3360	3370	ft	205638	3.93e5	8.03e5	3.58e5	1.56e6	2.49e5	3.15e5	1.81e5	1.87e5	9.81e4	1.01e5	1.51e5	9.85e4	9.02e4	0.00e0
JM-1	DC			2128	m	205640	1.83e5	2.10e5	1.96e5	2.86e5	2.53e5	4.19e5	4.55e5	6.06e5	5.08e5	4.97e5	5.28e5	4.14e5	3.37e5	4.56e5
JM-1	DC			2134	m	205641	1.18e6	6.89e5	1.72e6	8.37e5	1.68e6	1.59e6	1.27e6	1.20e6	1.10e6	9.58e5	1.15e6	8.13e5	1.32e6	6.17e5
JM-1	DC			3619	m	205642	2.86e6	7.37e5	2.94e6	1.07e6	2.69e6	2.51e6	2.25e6	2.13e6	1.64e6	1.46e6	1.23e6	1.09e6	8.90e5	9.46e5
JM-1	DC			3631	m	205643	3.56e6	8.72e5	3.58e6	1.28e6	3.30e6	3.02e6	2.67e6	2.63e6	2.10e6	1.95e6	1.72e6	1.58e6	1.27e6	1.58e6
MO-4	COCH			10098.30	ft	205644	7.93e5	4.68e5	1.18e6	6.95e5	1.02e6	1.25e6	2.14e6	3.06e6	2.66e6	1.99e6	1.52e6	1.41e6	1.59e6	1.68e6
MO-4	COCH			10100.25	ft	205645	7.60e5	4.21e5	1.00e6	6.13e5	8.23e5	9.27e5	1.39e6	2.67e6	3.84e6	4.31e6	4.00e6	3.74e6	4.11e6	4.48e6
MO-8	COCH			11975.25	ft	205646	3.45e5	1.67e5	6.95e5	4.82e5	9.91e5	1.22e6	1.30e6	1.37e6	1.05e6	9.93e5	9.08e5	8.69e5	6.96e5	7.48e5
MO-8	COCH			11975.70	ft	205647	3.17e5	1.71e5	6.48e5	5.05e5	9.60e5	1.23e6	1.34e6	1.51e6	1.16e6	1.08e6	9.93e5	9.28e5	7.51e5	8.31e5
MZ-1	DC			6100	m	205675	2.53e6	9.15e5	1.75e6	5.01e5	1.22e6	8.21e5	5.40e5	4.01e5	2.63e5	1.94e5	1.36e5	1.02e5	8.23e4	6.33e4
SM-1	DC			2056	m	205685	5.19e4	5.08e4	9.20e4	9.17e4	9.63e4	9.44e4	7.54e4	6.23e4	6.58e4	4.36e4	4.89e4	3.55e4	4.36e4	4.58e4
SM-1	DC			2086	m	205686	1.23e6	7.13e5	1.55e6	8.34e5	1.46e6	1.68e6	1.52e6	1.61e6	1.20e6	1.11e6	9.93e5	9.18e5	8.81e5	7.83e5
SM-1	DC			2101	m	205687	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0
TAN TAN -1	DC	Bitumen?	15210	15210	ft	205729	2.05e4	1.39e4	1.61e4	9.36e3	1.31e4	1.22e4	7.68e3	7.85e3	4.77e3	4.56e3	3.75e3	2.42e3	2.24e3	0.00e0
TAN TAN -1	DC			16460	ft	205730	1.06e4	1.14e4	1.18e4	1.10e4	1.27e4	1.35e4	9.10e3	9.54e3	5.52e3	5.22e3	3.60e3	2.59e3	2.37e3	2.56e3
TKM-201	COCH	A		3442.00	m	205731	8.00e5	4.10e5	8.90e5	4.25e5	7.57e5	6.62e5	5.12e5	4.57e5	3.44e5	3.03e5	2.76e5	2.17e5	2.00e5	1.86e5
TKM-201	COCH	B		3442.00	m	205732	4.32e5	2.75e5	3.96e5	1.82e5	3.42e5	3.00e5	2.39e5	2.23e5	1.91e5	2.00e5	1.88e5	1.54e5	1.30e5	1.22e5
Sidi Rhalem	Oil					205733	6.08e6	4.49e6	8.11e6	1.47e7	7.15e6	7.38e6	6.24e6	6.36e6	4.97e6	5.23e6	4.22e6	4.43e6	2.87e6	3.31e6
SM-1	Oil					205734	8.65e6	3.04e6	7.28e6	2.85e6	6.10e6	5.21e6	4.21e6	3.48e6	2.61e6	2.17e6	1.66e6	1.29e6	8.88e5	7.54e5
Ait Moussa	OC			345	m	207488	2.06e6	1.27e6	1.72e6	8.66e5	1.42e6	1.25e6	1.08e6	9.91e5	8.02e5	7.51e5	6.17e5	5.76e5	4.30e5	4.14e5
Ait Moussa	OC			371	m	207489	1.23e6	9.97e5	1.13e6	8.40e5	9.74e5	8.98e5	7.88e5	7.46e5	6.46e5	6.62e5	5.62e5	5.85e5	4.15e5	4.25e5
Ait Moussa	OC			383	m	207490	2.67e6	1.27e6	2.19e6	9.50e5	1.75e6	1.48e6	1.22e6	1.07e6	8.51e5	8.12e5	6.45e5	6.07e5	4.33e5	4.38e5

Table 10. continued, GC of saturated compounds (amounts in ng/g)

Well	Sample type	Sample info	Upper Depth	Lower Depth	Depth units	APT ID	n-C29	n-C30	n-C31	n-C32	n-C33	n-C34	n-C35	n-C36	n-C37	n-C38	n-C39	n-C40	n-C41	n-C42
IFNI-1	DC		3010	3020	ft	205636	1.91e5	1.33e5	1.68e5	8.65e4	9.83e4	7.20e4	5.26e4	3.96e4	2.99e4	1.96e4	2.00e4	0.00e0	0.00e0	0.00e0
IFNI-1	DC		3020	3030	ft	205637	4.77e5	2.07e5	1.70e5	8.33e4	7.62e4	5.89e4	6.60e4	2.78e4	2.36e4	1.39e4	1.22e4	8.66e3	1.06e4	5.95e3
IFNI-1	DC		3360	3370	ft	205638	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0
JM-1	DC			2128	m	205640	3.03e5	3.91e5	1.76e5	1.62e5	1.15e5	1.27e5	1.02e5	5.19e4	5.46e4	4.86e4	3.87e4	2.29e4	1.54e4	1.87e4
JM-1	DC			2134	m	205641	8.90e5	4.95e5	6.95e5	2.64e5	3.91e5	1.51e5	1.98e5	4.65e4	3.65e4	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0
JM-1	DC			3619	m	205642	7.61e5	7.65e5	5.86e5	4.87e5	3.83e5	3.51e5	3.07e5	1.63e5	1.38e5	9.42e4	6.18e4	5.46e4	4.51e4	2.63e4
JM-1	DC			3631	m	205643	1.08e6	1.10e6	8.07e5	6.80e5	5.29e5	5.07e5	4.51e5	2.25e5	1.78e5	1.25e5	1.01e5	7.50e4	5.11e4	3.62e4
MO-4	COCH			10098.30	ft	205644	1.80e6	1.56e6	1.45e6	1.05e6	8.89e5	6.38e5	4.69e5	2.77e5	1.79e5	1.29e5	8.43e4	5.49e4	4.09e4	2.60e4
MO-4	COCH			10100.25	ft	205645	5.29e6	4.97e6	4.94e6	3.79e6	3.11e6	2.08e6	1.55e6	1.02e6	7.30e5	4.45e5	2.51e5	1.61e5	9.33e4	7.09e4
MO-8	COCH			11975.25	ft	205646	6.30e5	7.80e5	4.81e5	4.59e5	3.74e5	3.52e5	4.20e5	2.30e5	1.95e5	1.24e5	1.20e5	7.70e4	5.72e4	3.95e4
MO-8	COCH			11975.70	ft	205647	6.81e5	8.49e5	5.28e5	5.00e5	4.17e5	4.05e5	4.58e5	2.33e5	2.10e5	1.35e5	1.25e5	7.87e4	5.28e4	4.09e4
MZ-1	DC			6100	m	205675	6.08e4	5.78e4	4.81e4	3.14e4	3.09e4	3.49e4	3.12e4	1.21e4	1.27e4	6.46e3	7.31e3	9.53e3	6.64e3	7.85e3
SM-1	DC			2056	m	205685	5.50e4	3.08e4	4.84e4	1.64e4	2.18e4	1.33e4	2.11e4	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0
SM-1	DC			2086	m	205686	9.58e5	7.13e5	8.72e5	5.08e5	4.51e5	2.89e5	2.81e5	7.90e4	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0
SM-1	DC			2101	m	205687	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0
TAN TAN -1	DC	Bitumen?	15210	15210	ft	205729	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0
TAN TAN -1	DC			16460	ft	205730	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0
TKM-201	COCH	A		3442.00	m	205731	1.94e5	1.77e5	1.56e5	1.13e5	1.29e5	1.24e5	8.68e4	4.39e4	3.50e4	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0
TKM-201	COCH	B		3442.00	m	205732	1.23e5	1.21e5	1.15e5	7.64e4	1.04e5	1.47e5	7.94e4	2.86e4	2.41e4	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0
Sidi Rhalem	Oil					205733	3.10e6	2.70e6	1.67e6	1.51e6	1.08e6	1.25e6	9.41e5	5.34e5	3.13e5	2.35e5	1.85e5	1.22e5	1.10e5	8.34e4
SM-1	Oil					205734	6.06e5	4.73e5	3.98e5	2.88e5	2.43e5	2.09e5	1.49e5	8.12e4	6.62e4	5.03e4	4.15e4	2.16e4	9.14e3	9.93e3
Ait Moussa	OC			345	m	207488	3.43e5	3.29e5	2.20e5	1.86e5	1.22e5	1.17e5	8.20e4	2.99e4	1.89e4	0.00e0	0.00e0	0.00e0	0.00e0	0.00e0
Ait Moussa	OC			371	m	207489	4.26e5	3.99e5	3.25e5	3.06e5	2.00e5	1.53e5	1.31e5	5.18e4	3.76e4	2.80e4	1.45e4	0.00e0	0.00e0	0.00e0
Ait Moussa	OC			383	m	207490	4.04e5	3.58e5	2.56e5	2.28e5	1.46e5	1.40e5	1.07e5	3.75e4	2.57e4	1.86e4	1.10e4	0.00e0	0.00e0	0.00e0

Steranes Triangle Plots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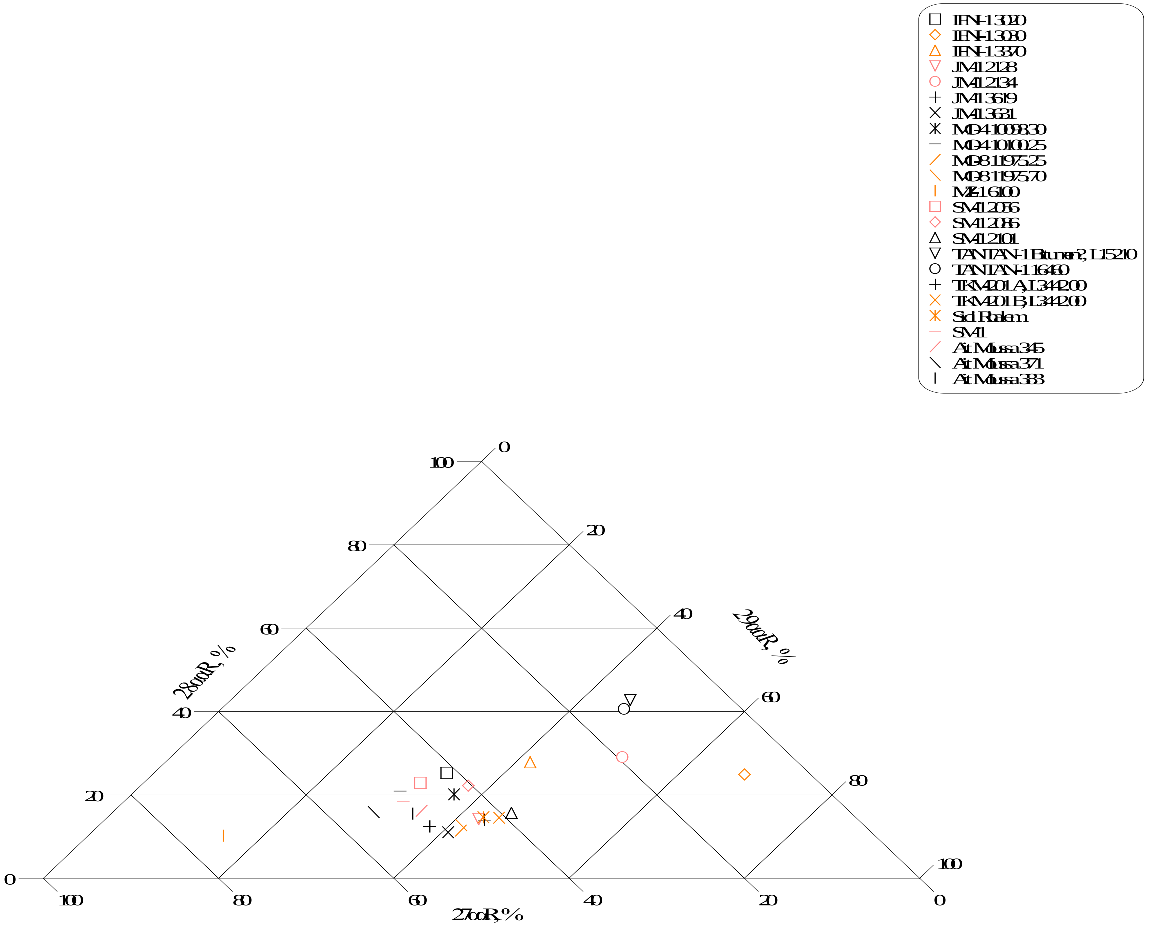
MG-4 10100.25
MG-8 11975.25
MG-8 11975.70
MZ-1 6100
SM-1 2056
SM-1 2086
SM-1 2101
TANTAN-1 Bitumen?, 1,15210
TANTAN-1 16460
TKM-201 A, 1,3442.00
TKM-201 B, 1,3442.00
Sidi Rbalem
SM-1
Ait Moussa 345
Ait Moussa 371
Ait Moussa 383
0
20
40
60
80
100
29αββ(R+S), %
29ααα(R+S), %
29ααα(R+S), %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MG-8 11975.25
MG-8 11975.70
MZ-1 6100
SM-1 2056
SM-1 2086
SM-1 2101
TANTAN-1 Bitumen?, L15210
TANTAN-1 16450
TKM-201 A, L3442.00
TKM-201 B, L3442.00
Sidi Rhalem
SM-1
Ait Moussa 345
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Ait Moussa 383
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0
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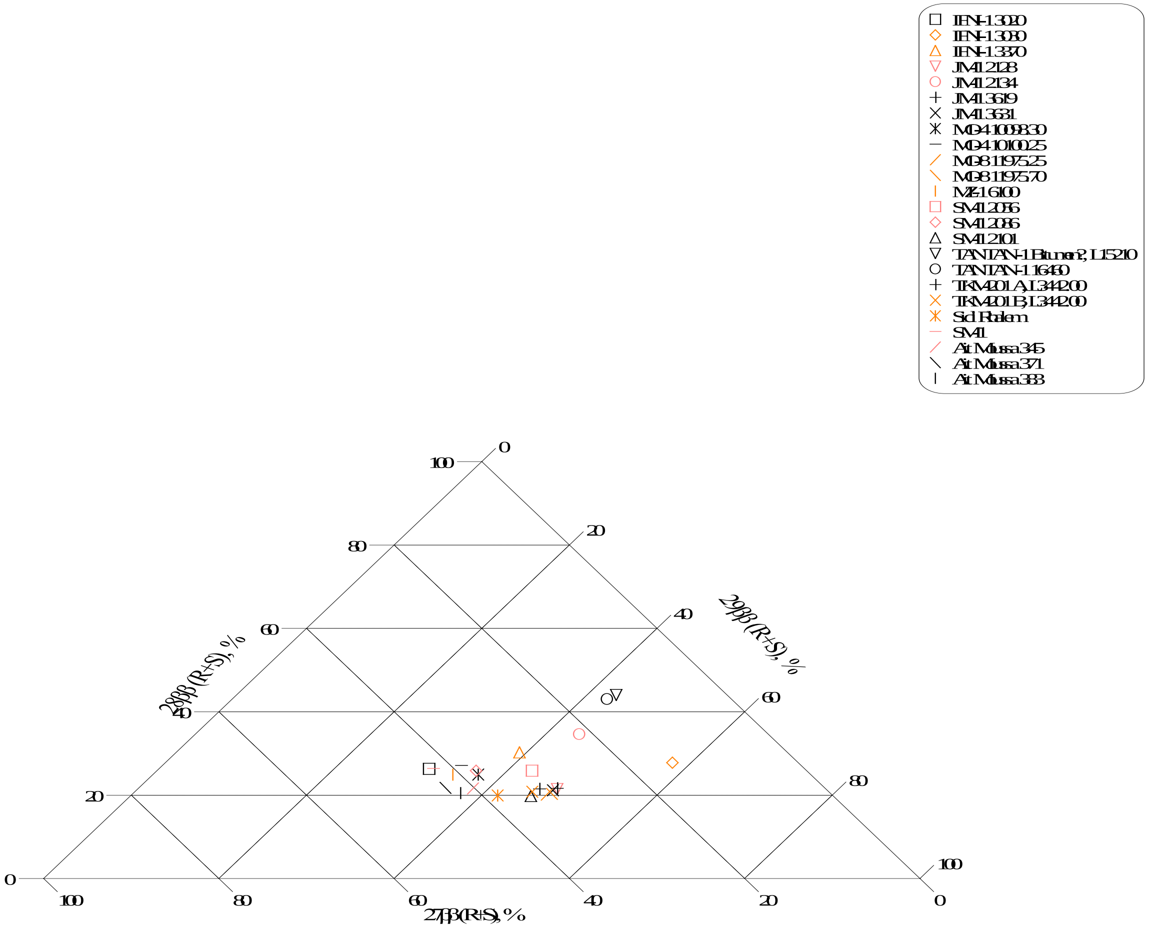
40
60
80
100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JM-1 2128
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JM-1 3619
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MG-4 10098.30
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MG-8 11975.25
MG-8 11975.70
MZ-1 6100
SM-1 2056
SM-1 2086
SM-1 2101
TANTAN-1 Bitumen?, 1,15210
TANTAN-1 16450
TKM-201 A, 1,344.200
TKM-201 B, 1,344.200
Sidi Rhalem
SM-1
Ait Moussa 345
Ait Moussa 371
Ait Moussa 383
0
20
40
60
80
100
27ββ(R+S), %
28ββ(R+S), %
29ββ(R+S), %

Table 11. GCMS SIR of saturated compounds (peak height)

						m/z	177				191									
Well	Sample type	Sample info	Upper Depth	Lower Depth	Depth units	APT ID	25nor28αβ	25nor29αβ	25nor30αβ	25nor31αβR	19/3	20/3	21/3	22/3	23/3	24/3	25/3R	25/3S	24/4	26/3R
IFNI-1	DC		3010	3020	ft	205636	1.05e2	4.30e2	3.46e2	4.80e2	5.16e2	1.31e3	1.87e3	6.50e2	2.56e3	1.21e3	4.14e2	3.14e2	8.11e2	3.24e2
IFNI-1	DC		3020	3030	ft	205637	4.10e2	1.63e3	1.32e3	1.62e3	1.46e3	2.85e3	3.35e3	1.31e3	5.45e3	2.44e3	7.86e2	7.43e2	1.51e3	4.70e2
IFNI-1	DC		3360	3370	ft	205638	7.09e4	4.64e5	2.65e5	2.80e5	8.26e3	3.10e4	6.21e4	3.81e4	2.80e5	1.48e5	9.83e4	8.88e4	1.18e5	9.09e4
JM-1	DC			2128	m	205640	2.68e4	3.03e4	6.79e3	1.64e5	1.02e4	2.27e4	2.66e4	2.31e4	1.42e5	6.89e4	3.80e4	3.89e4	2.89e5	3.48e4
JM-1	DC			2134	m	205641	2.92e2	1.09e3	7.89e2	8.82e3	8.42e2	9.05e3	7.65e3	1.31e3	6.48e3	2.86e3	1.07e3	9.64e2	4.29e3	1.14e3
JM-1	DC			3619	m	205642	1.86e3	2.10e3	1.13e3	8.13e3	5.71e3	6.05e3	3.68e3	2.28e3	1.02e4	4.58e3	1.84e3	1.85e3	1.94e4	1.62e3
JM-1	DC			3631	m	205643	3.69e3	3.22e3	1.29e3	1.26e4	1.60e4	1.49e4	7.27e3	4.22e3	2.00e4	8.10e3	3.21e3	3.00e3	4.93e4	2.65e3
MO-4	COCH			10098.30	ft	205644	3.55e2	8.61e2	5.75e2	8.53e2	2.98e2	9.67e2	1.63e3	5.94e2	3.37e3	1.79e3	7.71e2	7.13e2	1.50e3	5.38e2
MO-4	COCH			10100.25	ft	205645	1.11e2	2.06e2	1.09e2	2.02e2	1.20e2	5.02e2	6.62e2	2.54e2	1.16e3	6.13e2	2.20e2	2.19e2	3.36e2	2.03e2
MO-8	COCH			11975.25	ft	205646	2.51e4	1.01e4	3.75e3	1.23e5	2.12e4	3.19e4	2.08e4	1.56e4	8.37e4	3.67e4	1.69e4	1.68e4	2.45e5	1.29e4
MO-8	COCH			11975.70	ft	205647	3.61e4	1.61e4	6.08e3	1.81e5	2.81e4	4.20e4	2.89e4	2.25e4	1.19e5	5.17e4	2.48e4	2.39e4	3.65e5	1.76e4
MZ-1	DC			6100	m	205675	1.43e3	1.83e3	9.83e2	2.75e3	6.20e2	1.94e3	2.31e3	1.25e3	5.31e3	2.52e3	1.74e3	1.37e3	8.83e3	1.66e3
SM-1	DC			2056	m	205685	1.55e2	2.77e2	1.24e2	1.18e3	3.52e2	1.20e3	1.90e3	5.63e2	2.76e3	1.88e3	7.90e2	7.78e2	1.15e3	4.43e2
SM-1	DC			2086	m	205686	8.20e1	1.54e2	7.00e1	1.42e2	8.90e1	2.35e2	4.04e2	1.50e2	5.98e2	2.89e2	1.11e2	1.08e2	2.91e2	8.70e1
SM-1	DC			2101	m	205687	8.47e3	6.99e3	5.41e3	6.88e4	1.58e4	3.35e4	7.31e4	2.38e4	1.38e5	1.18e5	7.27e4	7.21e4	6.95e4	4.39e4
TAN TAN -1	DC	Bitumen?	15210	15210	ft	205729	7.00e1	9.03e2	6.31e2	1.33e4	9.75e2	1.46e4	1.04e4	1.01e3	5.69e3	2.55e3	1.08e3	1.04e3	4.92e3	1.48e3
TAN TAN -1	DC			16460	ft	205730	7.30e1	5.78e2	4.22e2	8.71e3	6.60e2	1.02e4	7.32e3	7.37e2	4.43e3	1.93e3	8.44e2	7.16e2	3.56e3	1.06e3
TKM-201	COCH	A		3442.00	m	205731	4.52e2	8.65e2	4.24e2	2.19e3	1.29e3	2.19e3	3.26e3	1.21e3	4.89e3	2.48e3	9.30e2	8.95e2	3.83e3	6.54e2
TKM-201	COCH	B		3442.00	m	205732	2.32e2	6.14e2	3.44e2	1.34e3	1.54e3	2.07e3	3.92e3	9.96e2	3.90e3	2.43e3	7.79e2	7.00e2	2.69e3	6.99e2
Sidi Rhalem	Oil					205733	7.03e4	0.00e0	1.33e4	1.91e5	1.52e4	2.98e4	3.73e4	9.35e3	6.75e4	8.98e4	4.70e4	4.96e4	5.63e4	3.21e4
SM-1	Oil					205734	3.51e3	1.75e3	6.84e2	7.73e3	1.52e4	2.65e4	2.85e4	1.55e4	6.26e4	2.96e4	1.12e4	1.12e4	3.48e4	9.26e3
Ait Moussa	OC			345	m	207488	5.67e3	2.49e3	0.00e0	3.73e4	2.12e4	2.30e4	5.10e4	1.22e4	5.37e4	3.45e4	1.98e4	1.94e4	4.68e4	1.34e4
Ait Moussa	OC			371	m	207489	5.55e3	1.73e3	2.08e3	2.07e4	1.09e4	1.34e4	3.25e4	8.34e3	3.19e4	2.19e4	1.22e4	1.14e4	2.93e4	7.95e3
Ait Moussa	OC			383	m	207490	5.45e3	2.04e3	0.00e0	2.81e4	2.29e4	2.39e4	5.21e4	1.17e4	4.57e4	3.00e4	1.35e4	1.39e4	5.09e4	9.52e3

Table 11. continued, GCMS SIR of saturated compounds (peak height)

						m/z	191													
Well	Sample type	Sample info	Upper Depth	Lower Depth	Depth units	APT ID	26/3S	28/3R	28/3S	29/3R	29/3S	27Ts	27Tm	30/3R	30/3S	28αβ	25nor30αβ	29αβ	29Ts	30d
IFNI-1	DC		3010	3020	ft	205636	2.65e2	2.63e2	2.51e2	2.81e2	3.14e2	6.03e2	1.91e3	1.63e2	1.64e2	3.61e2	4.17e2	3.36e3	6.07e2	2.20e2
IFNI-1	DC		3020	3030	ft	205637	4.61e2	7.12e2	7.50e2	6.73e2	6.14e2	2.32e3	7.98e3	2.13e2	5.90e2	2.10e3	1.81e3	1.10e4	2.63e3	8.90e2
IFNI-1	DC		3360	3370	ft	205638	8.35e4	1.24e5	1.11e5	1.73e5	1.62e5	2.38e5	4.27e5	5.18e4	9.64e4	2.87e5	5.00e5	1.44e6	3.73e5	5.82e4
JM-1	DC			2128	m	205640	3.29e4	3.36e4	3.37e4	3.98e4	3.83e4	4.21e5	7.13e5	6.18e4	7.52e4	2.21e4	1.25e4	2.37e6	3.65e5	6.89e4
JM-1	DC			2134	m	205641	1.16e3	7.01e2	7.27e2	5.58e2	5.96e2	2.48e3	2.55e4	8.16e2	9.59e2	6.40e2	8.89e2	7.24e4	2.62e3	6.80e2
JM-1	DC			3619	m	205642	1.48e3	1.61e3	1.46e3	1.85e3	1.69e3	2.74e4	2.16e4	2.59e3	3.57e3	2.16e3	1.74e3	9.01e4	2.31e4	3.92e3
JM-1	DC			3631	m	205643	2.80e3	3.12e3	2.88e3	3.15e3	3.03e3	5.15e4	4.42e4	5.05e3	6.48e3	3.66e3	2.02e3	1.67e5	3.76e4	4.56e3
MO-4	COCH			10098.30	ft	205644	5.35e2	3.99e2	3.68e2	4.33e2	3.84e2	2.27e3	2.52e3	3.21e2	2.74e2	8.85e2	6.92e2	7.02e3	2.05e3	6.24e2
MO-4	COCH			10100.25	ft	205645	1.80e2	1.37e2	1.50e2	1.47e2	1.38e2	5.90e2	6.51e2	1.25e2	8.60e1	1.89e2	1.19e2	1.86e3	5.22e2	1.47e2
MO-8	COCH			11975.25	ft	205646	1.29e4	1.54e4	1.37e4	1.72e4	1.60e4	2.42e5	5.17e5	2.66e4	2.76e4	2.07e4	6.11e3	1.69e6	2.18e5	2.39e4
MO-8	COCH			11975.70	ft	205647	1.91e4	2.23e4	2.11e4	2.47e4	2.45e4	3.56e5	7.13e5	3.93e4	5.92e4	3.03e4	9.05e3	2.27e6	3.12e5	3.25e4
MZ-1	DC			6100	m	205675	1.40e3	1.92e3	1.58e3	1.66e3	1.90e3	1.42e4	1.07e4	7.08e2	3.22e3	1.95e3	2.01e3	4.05e4	9.98e3	1.67e3
SM-1	DC			2056	m	205685	4.41e2	3.94e2	4.84e2	6.49e2	5.70e2	2.17e3	3.91e3	5.71e2	6.45e2	2.08e2	1.40e2	8.36e3	2.69e3	6.32e2
SM-1	DC			2086	m	205686	7.80e1	7.70e1	5.40e1	8.50e1	5.40e1	3.61e2	4.50e2	7.40e1	7.50e1	1.48e2	1.37e2	1.35e3	3.41e2	6.60e1
SM-1	DC			2101	m	205687	4.30e4	4.57e4	4.63e4	7.36e4	6.97e4	2.06e5	1.78e5	5.77e4	5.72e4	1.41e4	5.38e3	4.10e5	2.32e5	5.36e4
TAN TAN -1	DC	Bitumen?	15210	15210	ft	205729	1.47e3	9.21e2	9.01e2	6.85e2	5.81e2	1.45e3	2.88e4	7.91e2	1.77e3	4.26e2	8.33e2	1.03e5	1.33e3	3.27e2
TAN TAN -1	DC			16460	ft	205730	1.00e3	6.06e2	5.60e2	3.97e2	4.07e2	9.78e2	1.89e4	5.39e2	1.28e3	2.02e2	4.66e2	6.62e4	8.91e2	2.59e2
TKM-201	COCH	A		3442.00	m	205731	7.00e2	7.41e2	6.96e2	7.70e2	7.60e2	6.56e3	7.07e3	9.19e2	7.55e2	5.86e2	6.04e2	2.72e4	7.98e3	1.45e3
TKM-201	COCH	B		3442.00	m	205732	7.13e2	6.74e2	7.77e2	7.13e2	7.37e2	4.68e3	3.85e3	7.35e2	4.23e2	3.92e2	4.65e2	1.52e4	5.67e3	2.08e3
Sidi Rhalem	Oil					205733	3.45e4	4.23e4	4.64e4	6.79e4	6.60e4	2.07e5	2.81e5	6.12e4	6.31e4	3.29e4	4.80e3	6.84e5	2.21e5	5.82e4
SM-1	Oil					205734	9.52e3	8.37e3	9.18e3	7.26e3	7.56e3	2.51e4	3.81e4	7.13e3	1.16e4	2.37e3	1.13e3	1.11e5	1.99e4	7.27e3
Ait Moussa	OC			345	m	207488	1.29e4	1.28e4	1.09e4	1.37e4	1.54e4	8.35e4	7.51e4	5.58e3	4.00e3	1.06e4	9.56e3	2.05e5	1.34e5	1.00e5
Ait Moussa	OC			371	m	207489	7.90e3	8.21e3	7.08e3	8.95e3	1.10e4	4.04e4	3.87e4	5.11e3	3.07e3	7.65e3	6.73e3	1.06e5	6.75e4	7.42e4
Ait Moussa	OC			383	m	207490	9.35e3	9.15e3	7.07e3	9.10e3	1.14e4	6.87e4	7.56e4	4.13e3	3.75e3	7.70e3	0.00e0	1.68e5	9.99e4	7.73e4

Table 11. continued, GCMS SIR of saturated compounds (peak height)

						m/z	191													
Well	Sample type	Sample info	Upper Depth	Lower Depth	Depth units	APT ID	29βα	30O	30αβ	30βα	31αβS	31αβR	30G	31βα	32αβS	32αβR	33αβS	33αβR	34αβS	34αβR
IFNI-1	DC		3010	3020	ft	205636	1.01e3	0.00e0	4.79e3	1.48e3	2.85e3	2.14e3	6.17e2	9.12e2	1.01e3	8.98e2	6.40e2	5.65e2	5.07e2	3.47e2
IFNI-1	DC		3020	3030	ft	205637	2.92e3	0.00e0	1.82e4	4.23e3	9.81e3	7.94e3	1.66e3	2.08e3	5.30e3	3.97e3	3.37e3	2.47e3	2.72e3	1.99e3
IFNI-1	DC		3360	3370	ft	205638	1.86e5	1.30e5	1.96e6	3.30e5	1.05e6	7.86e5	3.70e5	1.13e5	7.32e5	5.27e5	5.60e5	3.54e5	3.90e5	2.62e5
JM-1	DC			2128	m	205640	1.76e5	0.00e0	2.02e6	1.60e5	7.70e5	7.83e5	3.86e5	7.99e4	5.98e5	4.50e5	4.25e5	2.77e5	4.70e5	3.05e5
JM-1	DC			2134	m	205641	1.37e4	0.00e0	1.16e5	3.32e4	2.53e4	2.25e4	3.26e4	6.76e3	1.04e4	9.90e3	6.81e3	5.61e3	3.92e3	3.03e3
JM-1	DC			3619	m	205642	6.23e3	0.00e0	9.75e4	7.81e3	3.80e4	3.14e4	1.52e4	4.18e3	2.65e4	1.90e4	1.89e4	1.29e4	1.79e4	1.19e4
JM-1	DC			3631	m	205643	1.04e4	0.00e0	1.56e5	1.18e4	5.43e4	4.73e4	2.06e4	5.93e3	3.88e4	2.85e4	2.54e4	1.73e4	2.65e4	1.73e4
MO-4	COCH			10098.30	ft	205644	8.11e2	0.00e0	9.55e3	1.15e3	3.69e3	2.92e3	8.92e2	5.58e2	2.65e3	1.81e3	1.94e3	1.41e3	1.46e3	1.03e3
MO-4	COCH			10100.25	ft	205645	1.92e2	0.00e0	2.27e3	2.38e2	7.65e2	5.48e2	1.75e2	1.22e2	4.82e2	3.06e2	3.05e2	2.00e2	2.35e2	1.69e2
MO-8	COCH			11975.25	ft	205646	1.12e5	0.00e0	1.56e6	1.07e5	5.59e5	4.82e5	1.82e5	4.50e4	3.79e5	2.76e5	2.73e5	1.74e5	2.89e5	1.97e5
MO-8	COCH			11975.70	ft	205647	1.63e5	0.00e0	2.24e6	1.55e5	7.86e5	7.08e5	2.72e5	6.68e4	5.54e5	4.10e5	3.92e5	2.74e5	4.32e5	2.97e5
MZ-1	DC			6100	m	205675	3.16e3	0.00e0	3.32e4	4.16e3	1.42e4	1.06e4	3.80e3	1.31e3	6.88e3	4.65e3	4.10e3	2.62e3	2.09e3	1.42e3
SM-1	DC			2056	m	205685	1.54e3	0.00e0	1.46e4	2.97e3	5.82e3	5.51e3	3.77e3	1.33e3	4.76e3	3.19e3	4.02e3	2.90e3	2.92e3	1.91e3
SM-1	DC			2086	m	205686	1.78e2	0.00e0	1.62e3	2.25e2	5.60e2	4.95e2	2.28e2	1.25e2	3.97e2	2.98e2	3.12e2	1.98e2	1.86e2	1.27e2
SM-1	DC			2101	m	205687	3.18e4	0.00e0	9.01e5	6.74e4	4.64e5	3.49e5	5.49e4	8.04e4	3.96e5	2.65e5	3.88e5	2.49e5	2.50e5	1.66e5
TAN TAN -1	DC	Bitumen?	15210	15210	ft	205729	1.24e4	0.00e0	1.70e5	4.20e4	2.71e4	2.21e4	5.46e4	5.22e3	1.20e4	9.14e3	8.32e3	6.06e3	4.18e3	3.13e3
TAN TAN -1	DC			16460	ft	205730	8.17e3	0.00e0	1.10e5	2.65e4	1.70e4	1.35e4	3.57e4	3.22e3	7.23e3	5.48e3	4.91e3	3.37e3	2.40e3	1.79e3
TKM-201	COCH	A		3442.00	m	205731	1.90e3	0.00e0	2.70e4	2.23e3	1.44e4	1.12e4	2.84e3	1.38e3	1.04e4	7.36e3	7.23e3	4.74e3	6.69e3	4.36e3
TKM-201	COCH	B		3442.00	m	205732	1.01e3	0.00e0	1.60e4	1.40e3	1.10e4	8.23e3	1.47e3	1.13e3	8.79e3	5.93e3	5.62e3	3.75e3	4.55e3	2.88e3
Sidi Rhalem	Oil					205733	5.77e4	0.00e0	2.35e6	1.92e5	8.13e5	5.97e5	7.78e5	1.15e5	8.19e5	5.91e5	5.41e5	3.39e5	6.90e5	4.54e5
SM-1	Oil					205734	7.44e3	0.00e0	9.84e4	8.84e3	3.69e4	2.79e4	4.13e3	5.01e3	2.03e4	1.42e4	1.14e4	7.47e3	6.29e3	4.13e3
Ait Moussa	OC			345	m	207488	1.71e4	0.00e0	5.44e5	6.65e4	3.05e5	2.06e5	4.21e4	3.31e4	2.38e5	1.63e5	1.34e5	8.80e4	8.74e4	5.96e4
Ait Moussa	OC			371	m	207489	8.88e3	0.00e0	2.96e5	3.71e4	1.96e5	1.37e5	2.87e4	1.86e4	1.74e5	1.17e5	9.44e4	6.34e4	6.65e4	4.45e4
Ait Moussa	OC			383	m	207490	1.33e4	0.00e0	4.12e5	4.95e4	2.82e5	1.78e5	3.32e4	2.14e4	2.27e5	1.53e5	1.14e5	7.86e4	7.33e4	4.84e4

Table 11. continued, GCMS SIR of saturated compounds (peak height)

						m/z	191		217													
Well	Sample type	Sample info	Upper Depth	Lower Depth	Depth units	APT ID	35αβS	35αβR	21αα	21ββ	22αα	22ββ	27dβS	27dβR	27daR	27daS	28dβS#1	28dβS#2	28dβR#1	28dβR#2
IFNI-1	DC		3010	3020	ft	205636	6.37e2	2.74e2	5.30e2	9.81e2	3.97e2	4.20e2	4.97e2	3.20e2	1.26e2	1.82e2	1.88e2	1.90e2	1.35e2	1.64e2
IFNI-1	DC		3020	3030	ft	205637	3.51e3	2.21e3	1.39e3	2.87e3	8.37e2	1.03e3	1.08e3	6.63e2	3.76e2	4.04e2	2.47e3	2.62e3	1.69e3	2.46e3
IFNI-1	DC		3360	3370	ft	205638	4.82e5	3.16e5	2.47e4	5.42e4	2.03e4	3.70e4	6.96e4	4.23e4	1.79e4	2.33e4	3.75e4	3.09e4	1.83e4	3.24e4
JM-1	DC			2128	m	205640	5.14e5	3.41e5	2.37e4	7.30e4	1.45e4	5.21e4	8.75e4	5.69e4	2.38e4	3.26e4	6.50e4	3.15e4	1.98e4	2.89e4
JM-1	DC			2134	m	205641	3.09e3	2.33e3	3.63e2	1.01e3	2.95e2	7.11e2	8.87e2	5.42e2	2.54e2	3.15e2	4.83e2	3.49e2	2.11e2	4.25e2
JM-1	DC			3619	m	205642	2.01e4	1.37e4	1.86e3	8.01e3	1.00e3	3.13e3	3.83e3	2.30e3	1.02e3	1.36e3	3.77e3	1.23e3	7.96e2	1.22e3
JM-1	DC			3631	m	205643	2.84e4	1.86e4	4.17e3	2.03e4	1.90e3	7.72e3	7.01e3	4.46e3	1.82e3	2.42e3	7.50e3	2.13e3	1.37e3	2.12e3
MO-4	COCH			10098.30	ft	205644	1.42e3	1.03e3	5.17e2	1.07e3	3.86e2	5.99e2	1.30e3	7.87e2	3.49e2	4.13e2	6.49e2	5.37e2	3.05e2	4.16e2
MO-4	COCH			10100.25	ft	205645	1.86e2	1.74e2	1.85e2	3.55e2	1.11e2	1.97e2	3.04e2	1.61e2	1.04e2	1.13e2	1.71e2	1.13e2	7.40e1	9.10e1
MO-8	COCH			11975.25	ft	205646	3.51e5	2.28e5	1.54e4	1.11e5	9.34e3	6.67e4	5.74e4	3.65e4	1.47e4	2.01e4	5.72e4	1.61e4	1.03e4	1.68e4
MO-8	COCH			11975.70	ft	205647	5.03e5	3.43e5	2.16e4	1.53e5	1.30e4	9.44e4	8.53e4	5.42e4	2.30e4	2.92e4	8.64e4	2.31e4	1.62e4	2.59e4
MZ-1	DC			6100	m	205675	1.80e3	1.45e3	5.72e2	1.34e3	4.93e2	1.25e3	2.92e3	1.87e3	8.10e2	8.87e2	1.33e3	1.09e3	7.24e2	9.15e2
SM-1	DC			2056	m	205685	2.79e3	2.06e3	5.93e2	1.03e3	3.41e2	5.21e2	1.48e3	9.56e2	4.06e2	5.79e2	5.78e2	4.91e2	2.82e2	4.70e2
SM-1	DC			2086	m	205686	2.57e2	1.65e2	1.26e2	2.26e2	9.80e1	1.38e2	1.50e2	1.00e2	4.70e1	4.40e1	6.60e1	5.30e1	3.90e1	6.40e1
SM-1	DC			2101	m	205687	2.15e5	1.43e5	4.06e4	4.90e4	2.79e4	2.91e4	1.83e5	1.17e5	4.59e4	6.33e4	6.23e4	5.64e4	3.59e4	4.25e4
TAN TAN -1	DC	Bitumen?	15210	15210	ft	205729	2.68e3	2.18e3	1.17e2	3.73e2	9.80e1	3.79e2	2.87e2	2.29e2	7.80e1	9.90e1	1.69e2	1.25e2	7.00e1	2.29e2
TAN TAN -1	DC			16460	ft	205730	1.41e3	1.22e3	8.50e1	2.90e2	7.90e1	2.94e2	1.97e2	1.19e2	6.90e1	7.80e1	1.02e2	9.00e1	7.10e1	1.73e2
TKM-201	COCH	A		3442.00	m	205731	8.04e3	5.49e3	6.18e2	2.05e3	4.66e2	1.01e3	1.43e3	7.93e2	3.84e2	4.90e2	9.35e2	4.73e2	2.67e2	4.56e2
TKM-201	COCH	B		3442.00	m	205732	5.16e3	3.44e3	4.81e2	1.29e3	4.43e2	7.03e2	1.17e3	7.61e2	4.53e2	5.27e2	6.40e2	5.79e2	2.24e2	4.53e2
Sidi Rhalem	Oil					205733	7.81e5	5.24e5	4.86e4	8.98e4	3.10e4	4.88e4	3.03e5	1.87e5	7.42e4	1.07e5	1.14e5	8.64e4	5.11e4	7.45e4
SM-1	Oil					205734	5.58e3	3.06e3	1.52e4	4.41e4	8.94e3	1.83e4	2.14e4	1.31e4	5.62e3	7.50e3	1.03e4	6.43e3	4.06e3	6.09e3
Ait Moussa	OC			345	m	207488	6.32e4	4.08e4	2.38e4	2.25e4	1.30e4	1.16e4	7.78e4	5.00e4	1.98e4	2.41e4	2.12e4	2.43e4	1.39e4	1.63e4
Ait Moussa	OC			371	m	207489	5.53e4	3.51e4	1.54e4	1.27e4	9.55e3	7.22e3	9.69e4	6.11e4	2.30e4	2.91e4	2.49e4	2.54e4	1.53e4	1.78e4
Ait Moussa	OC			383	m	207490	5.40e4	3.86e4	2.79e4	2.39e4	1.36e4	1.25e4	8.17e4	5.16e4	2.06e4	2.66e4	2.16e4	2.23e4	1.34e4	1.63e4

Table 11. continued, GCMS SIR of saturated compounds (peak height)

						m/z	217													
Well	Sample type	Sample info	Upper Depth	Lower Depth	Depth units	APT ID	28daR	27ααS	27ββR+29dβS	27ββS	28daS	27ααR	29dβR	29daR	28ααS	29daS	28ββR	28ββS	28ααR	29ααS
IFNI-1	DC		3010	3020	ft	205636	1.58e2	2.76e2	2.45e2	2.81e2	7.50e1	3.96e2	2.13e2	5.60e1	1.51e2	8.90e1	2.36e2	2.23e2	2.42e2	3.18e2
IFNI-1	DC		3020	3030	ft	205637	1.60e3	9.38e2	6.42e3	1.20e3	1.26e3	1.07e3	4.78e3	2.87e3	6.82e2	3.20e3	2.00e3	1.47e3	3.53e3	2.12e3
IFNI-1	DC		3360	3370	ft	205638	2.06e4	8.66e4	1.13e5	1.09e5	1.67e4	1.14e5	6.47e4	3.73e4	5.05e4	2.71e4	1.20e5	1.28e5	1.04e5	1.43e5
JM-1	DC			2128	m	205640	3.71e4	8.94e4	1.41e5	8.57e4	1.76e4	1.01e5	6.91e4	3.92e4	3.02e4	4.07e4	6.78e4	8.72e4	3.31e4	1.22e5
JM-1	DC			2134	m	205641	2.47e2	9.02e2	9.51e2	5.56e2	1.52e2	2.28e3	8.09e2	3.66e2	1.08e3	3.36e2	1.55e3	1.26e3	3.41e3	2.74e3
JM-1	DC			3619	m	205642	1.66e3	4.84e3	7.65e3	5.78e3	6.44e2	6.29e3	3.08e3	2.05e3	1.50e3	1.53e3	4.53e3	5.64e3	1.57e3	6.95e3
JM-1	DC			3631	m	205643	3.25e3	9.74e3	1.55e4	1.13e4	9.76e2	1.27e4	6.14e3	2.98e3	3.19e3	2.87e3	8.68e3	1.13e4	2.90e3	1.47e4
MO-4	COCH			10098.30	ft	205644	3.16e2	7.17e2	1.23e3	6.68e2	1.86e2	7.45e2	6.68e2	3.42e2	1.83e2	2.81e2	4.81e2	6.85e2	3.48e2	8.79e2
MO-4	COCH			10100.25	ft	205645	7.50e1	2.29e2	2.35e2	1.52e2	4.30e1	2.82e2	1.71e2	8.70e1	7.70e1	1.06e2	1.40e2	1.51e2	1.21e2	2.68e2
MO-8	COCH			11975.25	ft	205646	2.50e4	1.07e5	1.57e5	1.18e5	9.78e3	1.29e5	5.00e4	2.49e4	3.15e4	2.74e4	8.22e4	9.65e4	3.15e4	1.60e5
MO-8	COCH			11975.70	ft	205647	3.69e4	1.55e5	2.27e5	1.67e5	1.45e4	1.94e5	7.57e4	3.75e4	4.69e4	4.18e4	1.25e5	1.44e5	5.35e4	2.34e5
MZ-1	DC			6100	m	205675	9.08e2	2.03e3	1.88e3	2.74e3	4.77e2	1.38e4	1.67e3	1.40e3	9.15e2	7.82e2	2.14e3	1.97e3	1.90e3	2.42e3
SM-1	DC			2056	m	205685	2.90e2	1.30e3	1.93e3	8.70e2	1.87e2	8.30e3	1.04e3	5.34e2	3.34e2	5.13e2	1.75e3	8.57e2	4.17e3	1.11e3
SM-1	DC			2086	m	205686	4.00e1	1.10e2	1.52e2	1.21e2	3.70e1	1.75e2	7.70e1	4.70e1	4.70e1	5.70e1	1.04e2	8.70e1	9.60e1	1.07e2
SM-1	DC			2101	m	205687	3.17e4	7.98e4	2.00e5	1.02e5	2.25e4	8.45e4	1.07e5	5.70e4	2.62e4	6.60e4	6.28e4	8.58e4	3.42e4	1.08e5
TAN TAN -1	DC	Bitumen?	15210	15210	ft	205729	1.09e2	6.70e2	5.11e2	3.88e2	9.10e1	1.34e3	6.64e2	6.04e2	1.62e3	0.00e0	1.90e3	1.40e3	4.92e3	3.24e3
TAN TAN -1	DC			16460	ft	205730	8.70e1	4.51e2	3.41e2	2.70e2	0.00e0	9.85e2	4.62e2	3.74e2	1.05e3	1.02e2	1.22e3	8.95e2	2.98e3	2.06e3
TKM-201	COCH	A		3442.00	m	205731	3.61e2	1.64e3	2.43e3	1.69e3	2.68e2	1.97e3	1.07e3	4.94e2	4.64e2	5.39e2	1.08e3	1.53e3	6.43e2	2.07e3
TKM-201	COCH	B		3442.00	m	205732	2.33e2	1.26e3	1.94e3	1.48e3	2.55e2	1.51e3	9.21e2	4.43e2	3.16e2	5.21e2	8.38e2	1.34e3	5.39e2	1.76e3
Sidi Rhalem	Oil					205733	7.84e4	4.53e5	6.07e5	4.96e5	4.42e4	5.01e5	2.23e5	6.88e4	1.33e5	8.14e4	2.66e5	3.38e5	1.73e5	5.73e5
SM-1	Oil					205734	3.60e3	1.39e4	2.31e4	1.80e4	2.58e3	1.84e4	9.21e3	3.73e3	4.33e3	3.46e3	1.16e4	1.46e4	6.79e3	1.47e4
Ait Moussa	OC			345	m	207488	1.42e4	2.53e4	5.06e4	3.17e4	9.35e3	2.72e4	3.52e4	1.89e4	5.10e3	1.84e4	1.73e4	2.18e4	9.05e3	2.55e4
Ait Moussa	OC			371	m	207489	1.42e4	2.18e4	4.99e4	2.86e4	9.70e3	2.34e4	3.45e4	1.62e4	4.66e3	1.76e4	1.43e4	1.70e4	6.82e3	1.87e4
Ait Moussa	OC			383	m	207490	1.32e4	2.59e4	4.38e4	3.30e4	8.32e3	2.72e4	3.31e4	1.69e4	6.99e3	1.89e4	1.81e4	2.13e4	8.44e3	2.39e4

Table 11. continued, GCMS SIR of saturated compounds (peak height)

						m/z	217							218						
Well	Sample type	Sample info	Upper Depth	Lower Depth	Depth units	APT ID	29ββR	29ββS	29ααR	30ααS	30ββR	30ββS	30ααR	27ββR	27ββS	28ββR	28ββS	29ββR	29ββS	30ββR
IFNI-1	DC		3010	3020	ft	205636	2.78e2	2.76e2	3.19e2	1.31e2	1.27e2	9.50e1	0.00e0	5.80e2	4.78e2	3.31e2	3.18e2	4.09e2	3.52e2	1.60e2
IFNI-1	DC		3020	3030	ft	205637	3.39e3	2.75e3	9.58e3	3.20e2	0.00e0	0.00e0	1.99e2	1.20e3	1.06e3	2.15e3	2.23e3	5.02e3	4.11e3	0.00e0
IFNI-1	DC		3360	3370	ft	205638	1.46e5	1.58e5	1.55e5	5.21e4	4.48e4	2.25e4	2.81e4	1.97e5	1.91e5	1.80e5	2.04e5	2.45e5	2.52e5	4.45e4
JM-1	DC			2128	m	205640	1.51e5	1.50e5	9.97e4	8.15e4	3.52e4	1.11e4	1.60e4	1.72e5	1.43e5	9.41e4	1.26e5	2.46e5	2.45e5	2.72e4
JM-1	DC			2134	m	205641	1.56e3	1.36e3	6.05e3	1.74e3	2.29e2	1.06e2	3.78e2	1.29e3	1.03e3	1.79e3	1.93e3	2.44e3	2.27e3	2.49e2
JM-1	DC			3619	m	205642	1.03e4	9.26e3	4.79e3	3.34e3	2.09e3	6.56e2	8.11e2	1.08e4	9.40e3	6.30e3	8.00e3	1.63e4	1.53e4	1.51e3
JM-1	DC			3631	m	205643	2.02e4	1.83e4	1.07e4	6.22e3	3.91e3	9.86e2	1.27e3	2.24e4	1.88e4	1.22e4	1.57e4	3.25e4	3.01e4	2.69e3
MO-4	COCH			10098.30	ft	205644	8.11e2	7.81e2	6.37e2	4.32e2	2.71e2	1.43e2	1.48e2	1.44e3	1.08e3	7.01e2	9.52e2	1.25e3	1.21e3	3.12e2
MO-4	COCH			10100.25	ft	205645	1.83e2	1.50e2	1.75e2	8.80e1	4.80e1	3.40e1	3.80e1	3.71e2	2.81e2	1.99e2	2.58e2	3.00e2	2.73e2	4.90e1
MO-8	COCH			11975.25	ft	205646	1.97e5	1.81e5	1.16e5	6.37e4	3.81e4	1.02e4	1.49e4	2.33e5	1.99e5	1.20e5	1.47e5	3.23e5	3.06e5	2.71e4
MO-8	COCH			11975.70	ft	205647	3.00e5	2.69e5	1.74e5	8.87e4	5.68e4	1.51e4	2.30e4	3.40e5	2.86e5	1.82e5	2.17e5	4.97e5	4.42e5	4.15e4
MZ-1	DC			6100	m	205675	2.49e3	2.54e3	2.86e3	7.41e2	5.76e2	3.67e2	3.13e2	5.35e3	4.68e3	3.08e3	3.04e3	4.41e3	4.00e3	7.57e2
SM-1	DC			2056	m	205685	1.53e3	1.57e3	5.75e3	7.50e2	4.84e2	2.56e2	1.20e3	2.00e3	1.44e3	1.61e3	1.23e3	2.42e3	2.29e3	3.68e2
SM-1	DC			2086	m	205686	1.35e2	1.42e2	1.62e2	9.40e1	3.40e1	2.50e1	0.00e0	2.29e2	1.91e2	1.53e2	1.35e2	2.19e2	1.87e2	7.90e1
SM-1	DC			2101	m	205687	1.59e5	1.48e5	9.93e4	4.30e4	4.08e4	2.27e4	2.12e4	2.19e5	1.75e5	1.00e5	1.26e5	2.72e5	2.50e5	4.61e4
TAN TAN -1	DC	Bitumen?	15210	15210	ft	205729	1.59e3	1.39e3	5.25e3	2.40e3	1.59e2	0.00e0	1.50e2	6.86e2	6.14e2	2.31e3	2.20e3	2.20e3	2.24e3	1.09e2
TAN TAN -1	DC			16460	ft	205730	9.64e2	8.48e2	3.37e3	1.61e3	7.20e1	0.00e0	8.00e1	5.15e2	4.38e2	1.47e3	1.42e3	1.46e3	1.41e3	7.90e1
TKM-201	COCH	A		3442.00	m	205731	2.65e3	2.62e3	2.00e3	1.07e3	5.01e2	1.91e2	2.56e2	3.37e3	2.82e3	1.80e3	2.28e3	4.45e3	4.23e3	4.63e2
TKM-201	COCH	B		3442.00	m	205732	2.11e3	1.89e3	1.66e3	6.76e2	3.25e2	1.91e2	2.46e2	2.73e3	2.37e3	1.33e3	1.80e3	3.52e3	3.32e3	3.79e2
Sidi Rhalem	Oil					205733	5.93e5	5.65e5	5.06e5	1.64e5	1.38e5	4.27e4	7.11e4	9.63e5	8.40e5	4.21e5	5.18e5	1.03e6	9.47e5	1.05e5
SM-1	Oil					205734	1.51e4	1.48e4	1.18e4	5.28e3	3.10e3	1.06e3	1.43e3	3.55e4	3.11e4	1.86e4	2.29e4	2.46e4	2.46e4	2.61e3
Ait Moussa	OC			345	m	207488	3.18e4	3.10e4	1.96e4	8.63e3	1.46e4	4.95e3	3.75e3	6.01e4	5.06e4	2.72e4	3.23e4	5.32e4	5.20e4	1.23e4
Ait Moussa	OC			371	m	207489	2.49e4	2.31e4	1.28e4	7.53e3	1.47e4	3.56e3	2.93e3	5.28e4	4.32e4	2.29e4	2.53e4	4.02e4	3.75e4	1.04e4
Ait Moussa	OC			383	m	207490	3.21e4	3.09e4	1.87e4	8.58e3	1.32e4	4.22e3	3.29e3	6.65e4	5.50e4	2.73e4	3.18e4	5.35e4	5.41e4	1.06e4

Table 11. continued, GCMS SIR of saturated compounds (peak height)

						m/z	
Well	Sample type	Sample info	Upper Depth	Lower Depth	Depth units	APT ID	30ββS
IFNI-1	DC		3010	3020	ft	205636	1.25e2
IFNI-1	DC		3020	3030	ft	205637	0.00e0
IFNI-1	DC		3360	3370	ft	205638	3.64e4
JM-1	DC			2128	m	205640	1.99e4
JM-1	DC			2134	m	205641	2.19e2
JM-1	DC			3619	m	205642	1.06e3
JM-1	DC			3631	m	205643	1.55e3
MO-4	COCH			10098.30	ft	205644	2.03e2
MO-4	COCH			10100.25	ft	205645	3.90e1
MO-8	COCH			11975.25	ft	205646	1.82e4
MO-8	COCH			11975.70	ft	205647	2.72e4
MZ-1	DC			6100	m	205675	4.72e2
SM-1	DC			2056	m	205685	3.11e2
SM-1	DC			2086	m	205686	6.10e1
SM-1	DC			2101	m	205687	3.73e4
TAN TAN -1	DC	Bitumen?	15210	15210	ft	205729	8.80e1
TAN TAN -1	DC			16460	ft	205730	0.00e0
TKM-201	COCH	A		3442.00	m	205731	3.34e2
TKM-201	COCH	B		3442.00	m	205732	3.33e2
Sidi Rhalem	Oil					205733	7.40e4
SM-1	Oil					205734	1.84e3
Ait Moussa	OC			345	m	207488	6.44e3
Ait Moussa	OC			371	m	207489	4.58e3
Ait Moussa	OC			383	m	207490	5.73e3

Abbreviations of saturated biomarkers

17α(H), 21β(H)-25,28,30-trisnorhopane	25nor28αβ
17α, 21β-25,30-bisnorhopane	25nor29αβ
17α(H), 21β(H)-25-norhopane	25nor30αβ
17α, 21β, 22(R/S)-25-norhomohopane	25nor31αβ
$C_{19}H_{34}$ tricyclic terpane	19/3
$C_{20}H_{36}$ tricyclic terpane	20/3
$C_{21}H_{38}$ tricyclic terpane	21/3
$C_{23}H_{42}$ tricyclic terpane	23/3
$C_{24}H_{44}$ tricyclic terpane	24/3
$C_{25}H_{46}$ tricyclic terpane	25/3R
$C_{25}H_{46}$ tricyclic terpane	25/3S
$C_{24}H_{42}$ tetracyclic terpane	24/4
$C_{26}H_{48}$ tricyclic terpane	26/3R
$C_{26}H_{48}$ tricyclic terpane	26/3S
$C_{28}H_{52}$ tricyclic terpane	28/3R
$C_{28}H_{52}$ tricyclic terpane	28/3S
$C_{29}H_{54}$ tricyclic terpane	29/3R
$C_{29}H_{54}$ tricyclic terpane	29/3S
18α(H)-22,29,30-trisnorneohopane	27Ts
17α(H)-22,29,30-trisnorhopane	27Tm
$C_{30}H_{56}$ tricyclic terpane	30/3R
$C_{30}H_{56}$ tricyclic terpane	30/3S
17α(H), 21β(H)-28,30-bisnorhopane	28αβ
17α(H), 21β(H)-30-norhopane	29αβ
18α(H)-30-norneohopane	29Ts
15α-methyl-17α(H)-27-norhopane (diahopane)	30d
17β(H), 21α(H)-30-norhopane (normoretane)	29βα
18α(H)-oleanane	30O
17α(H), 21β(H)-hopane	30αβ
17β(H), 21α(H)-hopane (moretane)	30βα
17α(H), 21β(H), 22(S)-homohopane	31αβS
17α(H), 21β(H), 22(R)-homohopane	31αβR
Gammacerane	30G
17β(H), 21α(H)-homohopane	31βα
17α(H), 21β(H), 22(S)-bishomohopane	32αβS
17α(H), 21β(H), 22(R)-bishomohopane	32αβR
17α(H), 21β(H), 22(S)-trishomohopane	33αβS

17α(H), 21β(H), 22(R)-trishomohopane	33αβR
17α(H), 21β(H), 22(S)-tetrakishomohopane	34αβS
17α(H), 21β(H), 22(R)-tetrakishomohopane	34αβR
17α(H), 21β(H), 22(S)-pentakishomohopane	35αβS
17α(H), 21β(H), 22(R)-pentakishomohopane	35αβR
C21-5α(H), 14α(H), 17α(H)-pregnane	21αα
C21-5α(H), 14β(H), 17β(H)-pregnane	21ββ
C22-5α(H), 14α(H), 17α(H)-pregnane	22αα
C22-5α(H), 14β(H), 17β(H)-pregnane	22ββ
13β(H), 17α(H), 20(S)-cholestane (diasterane)	27dβS
13β(H), 17α(H), 20(R)-cholestane (diasterane)	27dβR
13α(H), 17β(H), 20(R)-cholestane (diasterane)	27dαR
13α(H), 17β(H), 20(S)-cholestane (diasterane)	27dαS
24-methyl-13β(H), 17α(H), 20(S)-cholestane (diasterane)	28dβS
24-methyl-13β(H), 17α(H), 20(R)-cholestane (diasterane)	28dβR
24-methyl-13α(H), 17β(H), 20(R)-cholestane (diasterane)	28dαR
5α(H), 14α(H), 17α(H), 20(S)-cholestane	27ααS
5α(H), 14β(H), 17β(H), 20(R)-cholestane	27ββR
24-ethyl-13β(H), 17α(H), 20(S)-cholestane (diasterane)	29dβS
5α(H), 14β(H), 17β(H), 20(S)-cholestane	27ββS
24-methyl-13α(H), 17β(H), 20(S)-cholestane (diasterane)	28dαS
5α(H), 14α(H), 17α(H), 20(R)-cholestane	27ααR
24-ethyl-13β(H), 17α(H), 20(R)-cholestane (diasterane)	29dβR
24-ethyl-13α(H), 17β(H), 20(R)-cholestane (diasterane)	29dαR
24-methyl-5α(H), 14α(H), 17α(H), 20(S)-cholestane	28ααS
24-ethyl-13α(H), 17β(H), 20(S)-cholestane (diasterane)	29dαS
24-methyl-5α(H), 14β(H), 17β(H), 20(R)-cholestane	28ββR
24-methyl-5α(H), 14β(H), 17β(H), 20(S)-cholestane	28ββS
24-methyl-5α(H), 14α(H), 17α(H), 20(R)-cholestane	28ααR
24-ethyl-5α(H), 14α(H), 17α(H), 20(S)-cholestane	29ααS
24-ethyl-5α(H), 14β(H), 17β(H), 20(R)-cholestane	29ββR
24-ethyl-5α(H), 14β(H), 17β(H), 20(S)-cholestane	29ββS
24-ethyl-5α(H), 14α(H), 17α(H), 20(R)-cholestane	29ααR
24-propyl-5α(H), 14α(H), 17α(H), 20(S)-cholestane	30ααS
24-propyl-5α(H), 14β(H), 17β(H), 20(R)-cholestane	30ββR
24-propyl-5α(H), 14β(H), 17β(H), 20(S)-cholestane	30ββS
24-propyl-5α(H), 14α(H), 17α(H), 20(R)-cholestane	30ααR

Table 12. GCMS SIR of saturated compounds (peak area)

						m/z	177				191									
Well	Sample type	Sample info	Upper Depth	Lower Depth	Depth units	APT ID	25nor28αβ	25nor29αβ	25nor30αβ	25nor31αβR	19/3	20/3	21/3	22/3	23/3	24/3	25/3R	25/3S	24/4	26/3R
IFNI-1	DC		3010	3020	ft	205636	4.07e2	2.43e3	1.79e3	2.89e3	2.70e3	7.00e3	9.53e3	3.98e3	1.25e4	6.16e3	2.15e3	1.73e3	4.31e3	1.72e3
IFNI-1	DC		3020	3030	ft	205637	2.59e3	1.13e4	6.10e3	9.64e3	8.01e3	1.41e4	1.66e4	6.80e3	2.66e4	1.19e4	4.31e3	3.75e3	8.11e3	2.45e3
IFNI-1	DC		3360	3370	ft	205638	3.68e5	2.95e6	1.52e6	1.77e6	4.36e4	1.70e5	3.63e5	2.19e5	1.49e6	7.73e5	4.90e5	4.79e5	6.39e5	4.70e5
JM-1	DC			2128	m	205640	1.80e5	1.71e5	3.12e4	9.80e5	5.99e4	1.26e5	1.50e5	1.28e5	7.52e5	3.67e5	1.91e5	2.03e5	1.51e6	1.95e5
JM-1	DC			2134	m	205641	1.50e3	5.36e3	4.24e3	4.59e4	4.00e3	4.08e4	3.49e4	7.19e3	3.10e4	1.51e4	5.46e3	5.02e3	2.15e4	5.67e3
JM-1	DC			3619	m	205642	1.65e4	1.14e4	5.63e3	4.31e4	2.55e4	2.87e4	1.82e4	1.24e4	5.10e4	2.39e4	9.25e3	9.31e3	9.95e4	9.41e3
JM-1	DC			3631	m	205643	2.74e4	1.73e4	7.40e3	7.46e4	7.66e4	6.99e4	3.53e4	2.15e4	9.86e4	4.16e4	1.62e4	1.61e4	2.50e5	1.46e4
MO-4	COCH			10098.30	ft	205644	1.67e3	5.66e3	3.02e3	5.17e3	1.33e3	5.10e3	7.35e3	3.36e3	1.67e4	9.34e3	3.75e3	3.79e3	7.72e3	2.68e3
MO-4	COCH			10100.25	ft	205645	4.32e2	1.26e3	6.64e2	1.18e3	6.06e2	2.32e3	3.31e3	1.50e3	6.20e3	3.11e3	1.24e3	1.10e3	1.83e3	9.83e2
MO-8	COCH			11975.25	ft	205646	1.56e5	4.00e4	1.72e4	6.69e5	1.13e5	1.68e5	1.11e5	8.36e4	4.28e5	1.94e5	8.92e4	8.80e4	1.28e6	7.86e4
MO-8	COCH			11975.70	ft	205647	2.22e5	7.36e4	2.27e4	9.88e5	1.58e5	2.38e5	1.67e5	1.23e5	6.03e5	2.76e5	1.31e5	1.26e5	1.83e6	9.81e4
MZ-1	DC			6100	m	205675	7.06e3	1.21e4	6.41e3	1.80e4	2.89e3	1.06e4	1.28e4	6.79e3	2.96e4	1.38e4	8.94e3	8.23e3	4.60e4	9.01e3
SM-1	DC			2056	m	205685	7.49e2	1.74e3	5.13e2	5.98e3	1.75e3	5.45e3	9.22e3	3.19e3	1.41e4	9.17e3	3.81e3	3.76e3	5.79e3	2.43e3
SM-1	DC			2086	m	205686	2.77e2	9.15e2	3.51e2	7.99e2	3.42e2	1.24e3	1.79e3	8.52e2	3.04e3	1.33e3	6.63e2	5.97e2	1.45e3	4.27e2
SM-1	DC			2101	m	205687	7.81e4	2.24e4	3.15e4	4.04e5	1.02e5	1.97e5	4.24e5	1.40e5	7.35e5	6.27e5	3.51e5	3.70e5	3.67e5	2.34e5
TAN TAN -1	DC	Bitumen?	15210	15210	ft	205729	2.36e2	4.53e3	3.39e3	6.74e4	4.22e3	6.48e4	4.72e4	4.75e3	2.67e4	1.33e4	5.44e3	4.89e3	2.41e4	7.27e3
TAN TAN -1	DC			16460	ft	205730	3.26e2	3.11e3	2.51e3	4.58e4	3.08e3	4.58e4	3.46e4	3.69e3	2.04e4	9.86e3	4.22e3	3.72e3	1.78e4	5.38e3
TKM-201	COCH	A		3442.00	m	205731	2.67e3	5.58e3	1.98e3	1.24e4	6.44e3	1.03e4	1.64e4	7.27e3	2.37e4	1.21e4	4.54e3	4.22e3	1.92e4	3.47e3
TKM-201	COCH	B		3442.00	m	205732	7.52e2	3.31e3	2.17e3	7.63e3	7.01e3	9.32e3	1.90e4	5.77e3	1.94e4	1.16e4	3.82e3	3.65e3	1.29e4	4.32e3
Sidi Rhalem	Oil					205733	4.41e5	0.00e0	7.26e4	1.12e6	1.16e5	2.20e5	2.40e5	6.42e4	3.59e5	4.72e5	2.70e5	2.51e5	3.05e5	1.94e5
SM-1	Oil					205734	3.65e4	9.64e3	2.84e3	3.99e4	8.58e4	1.48e5	1.43e5	8.34e4	3.22e5	1.43e5	5.99e4	5.63e4	1.71e5	5.62e4
Ait Moussa	OC			345	m	207488	4.20e4	1.68e4	0.00e0	2.13e5	1.11e5	1.23e5	2.78e5	7.34e4	2.91e5	1.92e5	1.01e5	1.03e5	2.59e5	7.44e4
Ait Moussa	OC			371	m	207489	4.75e4	7.49e3	1.04e4	1.20e5	5.63e4	7.15e4	1.75e5	4.73e4	1.70e5	1.17e5	5.99e4	6.01e4	1.55e5	4.63e4
Ait Moussa	OC			383	m	207490	4.37e4	1.12e4	0.00e0	1.59e5	1.11e5	1.25e5	2.56e5	6.33e4	2.29e5	1.53e5	7.00e4	7.20e4	2.60e5	5.16e4

Table 12. continued, GCMS SIR of saturated compounds (peak area)

						m/z	191													
Well	Sample type	Sample info	Upper Depth	Lower Depth	Depth units	APT ID	26/3S	28/3R	28/3S	29/3R	29/3S	27Ts	27Tm	30/3R	30/3S	28αβ	25nor30αβ	29αβ	29Ts	30d
IFNI-1	DC		3010	3020	ft	205636	1.31e3	1.66e3	1.55e3	1.78e3	1.14e3	3.30e3	1.01e4	6.56e2	7.97e2	2.51e3	2.48e3	1.84e4	3.38e3	1.22e3
IFNI-1	DC		3020	3030	ft	205637	2.88e3	4.62e3	5.32e3	3.63e3	3.66e3	1.55e4	4.50e4	1.05e3	3.04e3	1.42e4	9.85e3	5.65e4	1.47e4	4.51e3
IFNI-1	DC		3360	3370	ft	205638	4.67e5	6.99e5	5.94e5	9.23e5	9.39e5	1.37e6	3.37e6	3.00e5	5.41e5	2.14e6	2.81e6	7.87e6	2.02e6	3.64e5
JM-1	DC			2128	m	205640	1.70e5	1.99e5	1.66e5	2.29e5	1.97e5	2.22e6	3.80e6	4.85e5	2.76e5	2.02e5	6.22e4	1.25e7	2.04e6	5.42e5
JM-1	DC			2134	m	205641	5.61e3	4.87e3	4.25e3	2.94e3	2.99e3	1.34e4	1.27e5	4.75e3	3.72e3	4.66e3	5.47e3	3.59e5	1.39e4	5.25e3
JM-1	DC			3619	m	205642	7.94e3	9.37e3	7.85e3	1.01e4	9.27e3	1.43e5	1.16e5	2.42e4	1.26e4	2.02e4	9.16e3	4.68e5	1.27e5	2.71e4
JM-1	DC			3631	m	205643	1.48e4	1.85e4	1.63e4	1.84e4	1.60e4	2.73e5	2.36e5	4.39e4	2.24e4	3.26e4	8.32e3	8.21e5	2.09e5	2.81e4
MO-4	COCH			10098.30	ft	205644	2.78e3	2.36e3	2.00e3	2.45e3	2.28e3	1.15e4	1.29e4	1.94e3	1.08e3	6.01e3	3.82e3	3.77e4	1.07e4	4.06e3
MO-4	COCH			10100.25	ft	205645	9.40e2	9.26e2	7.30e2	1.00e3	7.03e2	3.06e3	3.29e3	6.21e2	3.61e2	1.51e3	7.93e2	9.82e3	2.89e3	8.44e2
MO-8	COCH			11975.25	ft	205646	6.81e4	9.61e4	7.79e4	1.02e5	1.15e5	1.29e6	2.61e6	1.66e5	9.56e4	1.50e5	2.56e4	8.59e6	1.27e6	1.80e5
MO-8	COCH			11975.70	ft	205647	9.88e4	1.41e5	1.13e5	1.50e5	1.71e5	1.90e6	3.72e6	3.08e5	2.01e5	2.50e5	4.60e4	1.21e7	1.76e6	2.20e5
MZ-1	DC			6100	m	205675	1.09e4	1.50e4	8.91e3	9.56e3	1.07e4	8.17e4	6.31e4	4.76e3	1.64e4	1.57e4	1.27e4	2.14e5	5.66e4	1.19e4
SM-1	DC			2056	m	205685	2.15e3	2.01e3	2.33e3	3.20e3	2.62e3	1.30e4	2.12e4	2.91e3	5.24e3	1.09e3	6.55e2	4.33e4	1.51e4	3.83e3
SM-1	DC			2086	m	205686	3.09e2	2.87e2	3.52e2	6.94e2	2.79e2	2.25e3	2.62e3	2.04e2	4.78e2	9.48e2	8.24e2	7.31e3	1.89e3	2.41e2
SM-1	DC			2101	m	205687	2.33e5	2.46e5	2.55e5	3.65e5	3.72e5	1.09e6	9.72e5	3.66e5	3.74e5	9.49e4	2.84e4	2.23e6	1.26e6	3.60e5
TAN TAN -1	DC	Bitumen?	15210	15210	ft	205729	7.23e3	5.66e3	4.19e3	3.76e3	3.18e3	8.32e3	1.46e5	4.85e3	4.89e3	1.56e3	5.97e3	5.20e5	6.91e3	9.15e2
TAN TAN -1	DC			16460	ft	205730	5.16e3	3.84e3	2.94e3	2.28e3	2.26e3	6.13e3	9.73e4	2.67e3	3.64e3	7.01e2	2.56e3	3.36e5	4.67e3	1.17e3
TKM-201	COCH	A		3442.00	m	205731	3.97e3	4.12e3	3.91e3	4.45e3	4.28e3	3.30e4	3.56e4	7.15e3	2.69e3	4.39e3	3.63e3	1.40e5	4.15e4	8.88e3
TKM-201	COCH	B		3442.00	m	205732	4.01e3	4.18e3	4.37e3	3.74e3	4.94e3	2.31e4	1.95e4	6.16e3	1.40e3	2.84e3	2.75e3	7.71e4	3.04e4	1.25e4
Sidi Rhalem	Oil					205733	2.30e5	2.47e5	3.05e5	3.96e5	4.88e5	1.13e6	1.58e6	4.21e5	4.85e5	2.38e5	1.92e4	3.86e6	1.25e6	3.77e5
SM-1	Oil					205734	4.84e4	4.82e4	4.76e4	3.79e4	4.29e4	1.30e5	1.98e5	4.05e4	8.40e4	2.08e4	5.99e3	5.63e5	1.09e5	4.78e4
Ait Moussa	OC			345	m	207488	8.15e4	8.20e4	6.60e4	7.44e4	8.56e4	5.31e5	5.14e5	4.10e4	3.09e4	9.78e4	4.96e4	1.10e6	7.38e5	6.03e5
Ait Moussa	OC			371	m	207489	4.69e4	5.60e4	3.64e4	5.21e4	6.07e4	3.06e5	2.45e5	3.90e4	2.35e4	6.80e4	3.67e4	5.70e5	3.51e5	4.18e5
Ait Moussa	OC			383	m	207490	5.54e4	5.65e4	3.78e4	5.22e4	6.22e4	4.29e5	4.71e5	3.08e4	3.33e4	7.78e4	0.00e0	9.18e5	5.18e5	4.41e5

Table 12. continued, GCMS SIR of saturated compounds (peak area)

						m/z	191													
Well	Sample type	Sample info	Upper Depth	Lower Depth	Depth units	APT ID	29βα	30O	30αβ	30βα	31αβS	31αβR	30G	31βα	32αβS	32αβR	33αβS	33αβR	34αβS	34αβR
IFNI-1	DC		3010	3020	ft	205636	5.04e3	0.00e0	2.55e4	8.23e3	1.52e4	1.23e4	3.95e3	7.47e3	6.28e3	5.34e3	4.57e3	3.27e3	3.43e3	2.14e3
IFNI-1	DC		3020	3030	ft	205637	1.57e4	0.00e0	9.65e4	2.44e4	5.25e4	4.74e4	1.08e4	1.51e4	2.70e4	2.26e4	1.78e4	1.31e4	1.42e4	1.15e4
IFNI-1	DC		3360	3370	ft	205638	1.18e6	1.20e6	1.14e7	2.05e6	5.81e6	4.97e6	2.46e6	1.04e6	3.89e6	3.01e6	3.05e6	2.07e6	2.16e6	1.64e6
JM-1	DC			2128	m	205640	9.69e5	0.00e0	1.09e7	1.22e6	4.17e6	4.20e6	2.66e6	6.35e5	3.14e6	2.40e6	2.19e6	1.52e6	2.42e6	1.69e6
JM-1	DC			2134	m	205641	7.22e4	0.00e0	5.69e5	1.80e5	1.27e5	1.16e5	1.82e5	4.78e4	5.54e4	5.08e4	3.58e4	2.86e4	2.05e4	1.71e4
JM-1	DC			3619	m	205642	3.43e4	0.00e0	4.95e5	5.80e4	1.95e5	1.79e5	1.06e5	3.40e4	1.38e5	1.05e5	9.86e4	6.86e4	9.69e4	6.75e4
JM-1	DC			3631	m	205643	5.52e4	0.00e0	7.89e5	6.45e4	2.79e5	2.64e5	1.49e5	5.07e4	2.01e5	1.50e5	1.34e5	9.46e4	1.36e5	9.46e4
MO-4	COCH			10098.30	ft	205644	5.55e3	0.00e0	5.00e4	5.79e3	1.93e4	1.60e4	6.11e3	4.06e3	1.36e4	1.02e4	1.08e4	7.00e3	7.87e3	5.88e3
MO-4	COCH			10100.25	ft	205645	1.07e3	0.00e0	1.15e4	1.36e3	3.85e3	3.17e3	1.06e3	1.17e3	2.57e3	1.86e3	1.56e3	1.23e3	1.43e3	7.84e2
MO-8	COCH			11975.25	ft	205646	6.00e5	0.00e0	8.04e6	7.27e5	2.75e6	2.52e6	1.28e6	3.78e5	1.93e6	1.41e6	1.42e6	9.71e5	1.54e6	1.06e6
MO-8	COCH			11975.70	ft	205647	8.77e5	0.00e0	1.14e7	1.06e6	4.11e6	3.75e6	1.86e6	5.50e5	2.89e6	2.14e6	2.10e6	1.48e6	2.35e6	1.60e6
MZ-1	DC			6100	m	205675	2.19e4	0.00e0	1.86e5	2.54e4	7.79e4	6.15e4	2.49e4	6.85e3	3.82e4	2.63e4	2.20e4	1.45e4	1.13e4	8.59e3
SM-1	DC			2056	m	205685	9.13e3	0.00e0	7.82e4	1.75e4	2.97e4	2.80e4	2.43e4	8.78e3	2.67e4	1.79e4	2.10e4	1.66e4	1.53e4	1.09e4
SM-1	DC			2086	m	205686	1.32e3	0.00e0	8.56e3	1.44e3	3.38e3	3.24e3	1.84e3	6.83e2	2.30e3	1.51e3	1.85e3	8.84e2	9.46e2	4.62e2
SM-1	DC			2101	m	205687	1.92e5	0.00e0	4.66e6	5.24e5	2.52e6	1.87e6	3.53e5	6.30e5	2.05e6	1.46e6	1.95e6	1.33e6	1.31e6	9.01e5
TAN TAN -1	DC	Bitumen?	15210	15210	ft	205729	6.66e4	0.00e0	8.57e5	2.26e5	1.40e5	1.14e5	3.16e5	3.83e4	6.51e4	4.64e4	4.21e4	3.17e4	2.16e4	1.59e4
TAN TAN -1	DC			16460	ft	205730	4.37e4	0.00e0	5.52e5	1.43e5	9.05e4	7.33e4	2.05e5	2.45e4	3.75e4	2.88e4	2.50e4	1.86e4	1.27e4	9.22e3
TKM-201	COCH	A		3442.00	m	205731	1.09e4	0.00e0	1.40e5	1.35e4	7.47e4	6.23e4	2.48e4	1.13e4	5.46e4	3.84e4	3.80e4	2.66e4	3.57e4	2.34e4
TKM-201	COCH	B		3442.00	m	205732	6.65e3	0.00e0	8.40e4	7.10e3	5.70e4	4.45e4	1.57e4	9.05e3	4.64e4	3.17e4	2.94e4	2.00e4	2.46e4	1.57e4
Sidi Rhalem	Oil					205733	3.27e5	0.00e0	1.24e7	1.29e6	4.29e6	3.30e6	5.50e6	9.10e5	4.39e6	3.16e6	2.83e6	1.91e6	3.82e6	2.52e6
SM-1	Oil					205734	4.27e4	0.00e0	5.12e5	4.58e4	1.88e5	1.47e5	4.33e4	3.64e4	1.09e5	7.49e4	5.73e4	4.17e4	3.49e4	2.22e4
Ait Moussa	OC			345	m	207488	9.97e4	0.00e0	2.90e6	4.61e5	1.63e6	1.20e6	3.62e5	2.58e5	1.28e6	9.23e5	7.23e5	4.99e5	4.81e5	3.36e5
Ait Moussa	OC			371	m	207489	4.49e4	0.00e0	1.55e6	2.67e5	1.04e6	7.54e5	2.47e5	1.51e5	9.11e5	6.47e5	5.04e5	3.48e5	3.58e5	2.57e5
Ait Moussa	OC			383	m	207490	6.69e4	0.00e0	2.18e6	3.32e5	1.44e6	9.94e5	2.81e5	1.79e5	1.17e6	8.19e5	5.90e5	4.13e5	3.88e5	2.71e5

Table 12. continued, GCMS SIR of saturated compounds (peak area)

						m/z	191		217											
Well	Sample type	Sample info	Upper Depth	Lower Depth	Depth units	APT ID	35αβS	35αβR	21αα	21ββ	22αα	22ββ	27dβS	27dβR	27daR	27daS	28dβS#1	28dβS#2	28dβR#1	28dβR#2
IFNI-1	DC		3010	3020	ft	205636	3.02e3	1.17e3	2.79e3	5.19e3	2.25e3	2.66e3	2.62e3	1.65e3	8.69e2	1.05e3	1.11e3	8.54e2	8.22e2	6.19e2
IFNI-1	DC		3020	3030	ft	205637	1.85e4	1.32e4	7.14e3	1.48e4	5.04e3	6.71e3	5.80e3	4.36e3	1.57e3	1.69e3	1.32e4	1.53e4	9.30e3	1.46e4
IFNI-1	DC		3360	3370	ft	205638	2.96e6	1.93e6	1.45e5	3.19e5	1.49e5	2.47e5	3.77e5	2.43e5	1.36e5	1.50e5	2.59e5	1.90e5	1.07e5	2.29e5
JM-1	DC			2128	m	205640	2.76e6	1.81e6	1.34e5	4.29e5	1.05e5	3.52e5	4.84e5	3.22e5	1.68e5	1.85e5	3.70e5	2.70e5	1.08e5	1.86e5
JM-1	DC			2134	m	205641	1.83e4	1.30e4	1.93e3	5.03e3	2.14e3	4.60e3	4.51e3	2.75e3	1.60e3	1.64e3	2.53e3	2.54e3	1.11e3	2.56e3
JM-1	DC			3619	m	205642	1.12e5	8.13e4	1.02e4	4.28e4	4.97e3	1.92e4	1.92e4	1.18e4	6.47e3	7.35e3	2.12e4	6.68e3	4.51e3	8.67e3
JM-1	DC			3631	m	205643	1.54e5	1.06e5	2.20e4	1.05e5	6.58e3	4.65e4	3.54e4	2.35e4	1.23e4	1.36e4	4.13e4	9.34e3	7.74e3	1.51e4
MO-4	COCH			10098.30	ft	205644	8.53e3	6.02e3	2.70e3	5.38e3	2.24e3	4.48e3	6.64e3	4.42e3	1.98e3	2.63e3	3.46e3	3.14e3	1.76e3	2.40e3
MO-4	COCH			10100.25	ft	205645	1.47e3	9.07e2	1.04e3	1.89e3	8.44e2	1.30e3	1.61e3	9.65e2	6.41e2	8.28e2	8.43e2	6.83e2	3.88e2	6.74e2
MO-8	COCH			11975.25	ft	205646	1.83e6	1.31e6	8.32e4	6.19e5	2.52e4	4.16e5	2.95e5	1.98e5	1.02e5	1.11e5	3.34e5	8.82e4	5.87e4	1.14e5
MO-8	COCH			11975.70	ft	205647	2.77e6	1.97e6	1.21e5	9.01e5	3.57e4	6.02e5	4.50e5	3.01e5	1.57e5	1.66e5	4.95e5	1.29e5	9.24e4	1.55e5
MZ-1	DC			6100	m	205675	1.13e4	9.13e3	4.24e3	7.28e3	3.53e3	7.40e3	1.60e4	1.08e4	4.74e3	5.92e3	8.25e3	8.45e3	3.76e3	5.29e3
SM-1	DC			2056	m	205685	1.83e4	1.26e4	2.82e3	5.69e3	2.35e3	3.78e3	7.32e3	5.14e3	2.32e3	3.95e3	3.27e3	3.38e3	1.41e3	2.39e3
SM-1	DC			2086	m	205686	1.35e3	1.07e3	6.67e2	1.19e3	7.07e2	1.01e3	8.14e2	5.98e2	2.30e2	2.35e2	4.76e2	2.43e2	2.38e2	2.50e2
SM-1	DC			2101	m	205687	1.24e6	7.73e5	2.43e5	2.95e5	1.71e5	2.21e5	9.77e5	6.15e5	2.82e5	3.33e5	3.46e5	4.09e5	1.74e5	2.63e5
TAN TAN -1	DC	Bitumen?	15210	15210	ft	205729	1.71e4	1.35e4	6.28e2	1.85e3	2.65e2	2.41e3	1.70e3	1.22e3	3.97e2	4.26e2	8.15e2	5.76e2	2.83e2	1.73e3
TAN TAN -1	DC			16460	ft	205730	9.94e3	7.40e3	3.86e2	1.46e3	4.30e2	1.87e3	1.05e3	7.49e2	4.01e2	3.78e2	6.16e2	3.65e2	3.15e2	1.31e3
TKM-201	COCH	A		3442.00	m	205731	4.39e4	2.96e4	3.58e3	1.08e4	2.93e3	7.05e3	7.13e3	4.32e3	2.61e3	2.36e3	4.94e3	4.28e3	1.42e3	2.40e3
TKM-201	COCH	B		3442.00	m	205732	3.02e4	2.06e4	3.21e3	7.33e3	2.52e3	5.35e3	7.08e3	4.09e3	3.21e3	3.26e3	3.70e3	6.89e3	1.37e3	2.83e3
Sidi Rhalem	Oil					205733	4.35e6	3.15e6	3.18e5	5.78e5	2.29e5	3.58e5	1.64e6	1.04e6	4.94e5	6.25e5	7.22e5	5.04e5	3.15e5	4.45e5
SM-1	Oil					205734	3.60e4	1.79e4	8.40e4	2.38e5	6.09e4	1.21e5	1.12e5	7.06e4	3.72e4	3.98e4	5.88e4	3.99e4	2.27e4	3.46e4
Ait Moussa	OC			345	m	207488	4.01e5	2.70e5	1.34e5	1.34e5	8.40e4	9.11e4	4.34e5	2.90e5	1.34e5	1.36e5	1.30e5	1.48e5	8.11e4	9.01e4
Ait Moussa	OC			371	m	207489	3.23e5	2.15e5	8.56e4	7.69e4	5.43e4	6.14e4	5.31e5	3.49e5	1.56e5	1.56e5	1.44e5	1.51e5	7.99e4	1.06e5
Ait Moussa	OC			383	m	207490	3.29e5	2.17e5	1.45e5	1.42e5	8.07e4	9.41e4	4.38e5	2.94e5	1.29e5	1.44e5	1.13e5	1.30e5	7.09e4	9.42e4

Table 12. continued, GCMS SIR of saturated compounds (peak area)

						m/z	217													
Well	Sample type	Sample info	Upper Depth	Lower Depth	Depth units	APT ID	28daR	27ααS	27ββR+29dβS	27ββS	28daS	27ααR	29dβR	29daR	28ααS	29daS	28ββR	28ββS	28ααR	29ααS
IFNI-1	DC		3010	3020	ft	205636	9.55e2	1.61e3	1.24e3	1.73e3	3.81e2	2.13e3	1.58e3	2.79e2	6.95e2	2.19e2	1.40e3	1.85e3	1.23e3	1.95e3
IFNI-1	DC		3020	3030	ft	205637	8.66e3	7.89e3	4.99e4	1.22e4	6.72e3	9.58e3	4.74e4	2.17e4	3.70e3	2.27e4	1.34e4	8.64e3	3.02e4	1.32e4
IFNI-1	DC		3360	3370	ft	205638	1.29e5	6.52e5	7.40e5	6.99e5	6.81e4	6.27e5	6.22e5	2.69e5	2.86e5	1.48e5	8.96e5	8.24e5	9.82e5	9.93e5
JM-1	DC			2128	m	205640	2.29e5	5.75e5	1.10e6	5.63e5	1.27e5	6.22e5	8.61e5	3.88e5	1.65e5	2.38e5	4.39e5	6.48e5	3.47e5	8.69e5
JM-1	DC			2134	m	205641	1.48e3	6.63e3	7.46e3	3.58e3	9.24e2	1.19e4	8.04e3	1.94e3	5.29e3	1.26e3	9.77e3	7.40e3	1.50e4	1.66e4
JM-1	DC			3619	m	205642	9.99e3	2.90e4	5.40e4	3.29e4	4.81e3	3.83e4	3.22e4	1.93e4	8.39e3	8.43e3	3.32e4	3.76e4	5.80e3	4.91e4
JM-1	DC			3631	m	205643	1.70e4	5.91e4	1.11e5	6.30e4	5.26e3	7.78e4	8.16e4	1.46e4	1.87e4	1.66e4	6.49e4	7.95e4	1.07e4	9.13e4
MO-4	COCH			10098.30	ft	205644	1.55e3	4.94e3	9.46e3	3.82e3	9.32e2	4.53e3	7.08e3	3.18e3	8.83e2	1.73e3	2.89e3	4.32e3	3.05e3	5.28e3
MO-4	COCH			10100.25	ft	205645	3.71e2	1.68e3	1.99e3	9.48e2	1.54e2	1.56e3	1.53e3	7.83e2	4.09e2	6.12e2	1.00e3	1.09e3	6.94e2	1.63e3
MO-8	COCH			11975.25	ft	205646	1.36e5	6.38e5	1.05e6	6.53e5	8.09e4	7.35e5	4.81e5	1.95e5	1.82e5	1.67e5	6.37e5	7.01e5	1.05e5	1.11e6
MO-8	COCH			11975.70	ft	205647	2.13e5	9.35e5	1.54e6	9.50e5	1.17e5	1.12e6	7.15e5	3.68e5	2.77e5	2.46e5	9.75e5	1.05e6	2.20e5	1.64e6
MZ-1	DC			6100	m	205675	5.72e3	4.33e3	1.05e4	1.73e4	1.72e3	7.51e4	2.29e4	1.04e4	5.03e3	4.58e3	1.44e4	1.38e4	1.79e4	1.57e4
SM-1	DC			2056	m	205685	1.52e3	3.28e3	1.44e4	5.67e3	8.87e2	4.24e4	5.41e3	4.12e3	1.57e3	1.45e3	9.44e3	6.42e3	3.50e4	6.90e3
SM-1	DC			2086	m	205686	2.36e2	9.14e2	1.24e3	6.24e2	1.34e2	8.05e2	7.17e2	2.91e2	1.85e2	1.93e2	5.30e2	2.61e2	3.71e2	8.08e2
SM-1	DC			2101	m	205687	2.00e5	5.48e5	1.62e6	6.91e5	1.57e5	4.56e5	1.14e6	4.77e5	1.38e5	4.24e5	4.53e5	5.58e5	1.41e5	6.64e5
TAN TAN -1	DC	Bitumen?	15210	15210	ft	205729	4.94e2	4.59e3	3.94e3	2.07e3	4.21e2	6.78e3	6.21e3	3.14e3	8.13e3	0.00e0	1.07e4	8.07e3	4.19e4	2.13e4
TAN TAN -1	DC			16460	ft	205730	5.85e2	3.26e3	2.08e3	1.44e3	0.00e0	5.01e3	3.08e3	2.32e3	5.27e3	2.69e2	6.70e3	5.29e3	1.26e4	1.45e4
TKM-201	COCH	A		3442.00	m	205731	2.09e3	9.69e3	1.68e4	9.98e3	1.60e3	1.13e4	1.08e4	5.19e3	2.23e3	2.84e3	7.07e3	9.95e3	6.54e3	1.39e4
TKM-201	COCH	B		3442.00	m	205732	1.67e3	8.33e3	1.48e4	8.46e3	2.02e3	8.35e3	1.02e4	3.39e3	1.76e3	2.96e3	5.33e3	8.15e3	5.26e3	1.19e4
Sidi Rhalem	Oil					205733	4.90e5	2.96e6	4.01e6	2.97e6	3.19e5	2.92e6	2.08e6	5.68e5	7.56e5	4.73e5	1.89e6	2.34e6	1.69e6	3.76e6
SM-1	Oil					205734	2.29e4	9.38e4	1.61e5	1.07e5	1.59e4	1.03e5	1.29e5	3.32e4	2.07e4	1.69e4	8.64e4	8.98e4	3.63e4	9.86e4
Ait Moussa	OC			345	m	207488	8.97e4	1.92e5	3.44e5	2.40e5	6.63e4	1.74e5	3.49e5	1.52e5	2.47e4	1.11e5	1.21e5	1.62e5	4.65e4	1.82e5
Ait Moussa	OC			371	m	207489	8.82e4	1.78e5	3.46e5	2.18e5	6.85e4	1.41e5	3.46e5	1.20e5	2.39e4	1.04e5	9.72e4	1.35e5	6.50e4	1.30e5
Ait Moussa	OC			383	m	207490	8.28e4	1.85e5	2.88e5	2.34e5	5.83e4	1.63e5	3.50e5	1.31e5	3.76e4	1.11e5	1.33e5	1.59e5	7.57e4	1.68e5

Table 12. continued, GCMS SIR of saturated compounds (peak area)

						m/z	217							218						
Well	Sample type	Sample info	Upper Depth	Lower Depth	Depth units	APT ID	29ββR	29ββS	29ααR	30ααS	30ββR	30ββS	30ααR	27ββR	27ββS	28ββR	28ββS	29ββR	29ββS	30ββR
IFNI-1	DC		3010	3020	ft	205636	1.95e3	2.48e3	2.29e3	4.02e2	5.31e2	5.42e2	0.00e0	2.93e3	2.65e3	2.26e3	2.19e3	2.56e3	2.70e3	6.48e2
IFNI-1	DC		3020	3030	ft	205637	2.25e4	2.02e4	6.03e4	9.15e2	0.00e0	0.00e0	8.48e2	3.89e3	7.16e3	1.62e4	1.35e4	3.00e4	2.60e4	0.00e0
IFNI-1	DC		3360	3370	ft	205638	1.01e6	1.16e6	1.04e6	2.68e5	3.00e5	8.08e4	1.94e5	1.19e6	1.07e6	1.24e6	1.26e6	1.52e6	1.62e6	2.57e5
JM-1	DC			2128	m	205640	9.38e5	9.06e5	6.82e5	7.05e5	2.02e5	3.13e4	1.19e5	1.05e6	7.85e5	6.78e5	8.02e5	1.43e6	1.39e6	1.66e5
JM-1	DC			2134	m	205641	7.71e3	7.46e3	3.67e4	9.48e3	1.23e3	4.80e2	2.12e3	8.11e3	5.84e3	1.15e4	1.07e4	1.50e4	1.44e4	1.47e3
JM-1	DC			3619	m	205642	6.20e4	5.39e4	3.39e4	2.58e4	1.17e4	3.04e3	6.00e3	5.96e4	4.67e4	4.20e4	4.92e4	8.95e4	8.39e4	9.20e3
JM-1	DC			3631	m	205643	1.21e5	1.05e5	7.39e4	4.48e4	2.15e4	2.73e3	8.71e3	1.25e5	9.94e4	8.14e4	9.91e4	1.78e5	1.68e5	1.41e4
MO-4	COCH			10098.30	ft	205644	6.06e3	4.43e3	4.36e3	2.92e3	1.60e3	6.33e2	9.69e2	8.20e3	5.91e3	4.60e3	6.17e3	7.86e3	7.34e3	1.67e3
MO-4	COCH			10100.25	ft	205645	1.33e3	9.95e2	1.27e3	5.34e2	3.09e2	1.31e2	1.26e2	1.93e3	1.49e3	1.48e3	1.44e3	1.94e3	1.70e3	3.53e2
MO-8	COCH			11975.25	ft	205646	1.19e6	1.05e6	8.11e5	5.38e5	2.09e5	3.88e4	9.83e4	1.24e6	1.00e6	8.40e5	9.23e5	1.85e6	1.69e6	1.50e5
MO-8	COCH			11975.70	ft	205647	1.78e6	1.54e6	1.28e6	7.01e5	3.28e5	4.40e4	1.53e5	1.85e6	1.49e6	1.26e6	1.37e6	2.79e6	2.46e6	2.34e5
MZ-1	DC			6100	m	205675	1.70e4	1.95e4	1.94e4	3.35e3	4.26e3	1.21e3	2.44e3	3.03e4	2.52e4	2.17e4	2.02e4	2.61e4	2.57e4	3.65e3
SM-1	DC			2056	m	205685	8.80e3	4.68e3	3.50e4	4.48e3	3.22e3	9.54e2	7.32e3	1.28e4	7.75e3	1.04e4	7.68e3	1.51e4	1.88e4	2.49e3
SM-1	DC			2086	m	205686	6.65e2	4.88e2	8.29e2	5.31e2	1.34e2	6.50e1	0.00e0	1.46e3	1.07e3	8.48e2	8.39e2	1.50e3	1.32e3	2.33e2
SM-1	DC			2101	m	205687	9.57e5	8.83e5	6.76e5	2.81e5	2.44e5	1.15e5	1.36e5	1.42e6	9.37e5	6.65e5	7.42e5	1.52e6	1.43e6	2.76e5
TAN TAN -1	DC	Bitumen?	15210	15210	ft	205729	1.13e4	8.23e3	3.29e4	1.27e4	1.04e3	0.00e0	6.54e2	5.10e3	3.10e3	1.43e4	1.28e4	1.36e4	1.32e4	5.63e2
TAN TAN -1	DC			16460	ft	205730	7.78e3	5.76e3	2.08e4	8.36e3	3.34e2	0.00e0	3.16e2	3.34e3	2.42e3	9.24e3	8.02e3	9.57e3	7.67e3	6.13e2
TKM-201	COCH	A		3442.00	m	205731	1.65e4	1.46e4	1.37e4	7.08e3	3.28e3	5.31e2	1.69e3	1.85e4	1.49e4	1.20e4	1.30e4	2.48e4	2.28e4	2.86e3
TKM-201	COCH	B		3442.00	m	205732	1.30e4	1.08e4	1.07e4	3.82e3	2.66e3	6.16e2	1.72e3	1.56e4	1.30e4	9.24e3	1.06e4	1.97e4	1.82e4	2.64e3
Sidi Rhalem	Oil					205733	3.59e6	3.37e6	3.52e6	1.31e6	7.97e5	1.25e5	4.19e5	5.44e6	4.71e6	2.75e6	3.14e6	5.94e6	5.38e6	5.82e5
SM-1	Oil					205734	9.41e4	8.58e4	7.83e4	3.18e4	1.71e4	4.86e3	9.48e3	1.93e5	1.63e5	1.27e5	1.31e5	1.42e5	1.38e5	1.44e4
Ait Moussa	OC			345	m	207488	2.21e5	2.00e5	1.36e5	4.33e4	1.04e5	1.62e4	2.47e4	3.79e5	2.93e5	1.77e5	2.02e5	3.34e5	3.09e5	7.16e4
Ait Moussa	OC			371	m	207489	1.67e5	1.44e5	9.09e4	3.77e4	9.50e4	8.74e3	1.82e4	3.02e5	2.25e5	1.49e5	1.63e5	2.34e5	2.28e5	6.08e4
Ait Moussa	OC			383	m	207490	2.07e5	1.95e5	1.31e5	4.34e4	9.05e4	1.69e4	2.05e4	4.47e5	3.01e5	1.85e5	1.99e5	3.16e5	3.02e5	6.49e4

Table 12. continued, GCMS SIR of saturated compounds (peak area)

						m/z	
Well	Sample type	Sample info	Upper Depth	Lower Depth	Depth units	APT ID	30ββS
IFNI-1	DC		3010	3020	ft	205636	4.64e2
IFNI-1	DC		3020	3030	ft	205637	0.00e0
IFNI-1	DC		3360	3370	ft	205638	2.08e5
JM-1	DC			2128	m	205640	1.12e5
JM-1	DC			2134	m	205641	1.07e3
JM-1	DC			3619	m	205642	4.85e3
JM-1	DC			3631	m	205643	9.10e3
MO-4	COCH			10098.30	ft	205644	1.22e3
MO-4	COCH			10100.25	ft	205645	1.15e2
MO-8	COCH			11975.25	ft	205646	1.01e5
MO-8	COCH			11975.70	ft	205647	1.53e5
MZ-1	DC			6100	m	205675	1.91e3
SM-1	DC			2056	m	205685	1.70e3
SM-1	DC			2086	m	205686	2.74e2
SM-1	DC			2101	m	205687	1.98e5
TAN TAN -1	DC	Bitumen?	15210	15210	ft	205729	3.37e2
TAN TAN -1	DC			16460	ft	205730	0.00e0
TKM-201	COCH	A		3442.00	m	205731	2.04e3
TKM-201	COCH	B		3442.00	m	205732	1.82e3
Sidi Rhalem	Oil					205733	4.59e5
SM-1	Oil					205734	1.02e4
Ait Moussa	OC			345	m	207488	3.09e4
Ait Moussa	OC			371	m	207489	2.10e4
Ait Moussa	OC			383	m	207490	2.57e4

Table 13. GCMS SIR of saturated compounds (amounts in ng/g)

						m/z	177				191									
Well	Sample type	Sample info	Upper Depth	Lower Depth	Depth units	APT ID	25nor28αβ	25nor29αβ	25nor30αβ	25nor31αβR	19/3	20/3	21/3	22/3	23/3	24/3	25/3R	25/3S	24/4	26/3R
IFNI-1	DC		3010	3020	ft	205636	9.86e2	4.04e3	3.25e3	4.51e3	4.85e3	1.24e4	1.76e4	6.12e3	2.40e4	1.14e4	3.89e3	2.95e3	7.62e3	3.04e3
IFNI-1	DC		3020	3030	ft	205637	1.45e3	5.77e3	4.66e3	5.71e3	5.15e3	1.01e4	1.18e4	4.61e3	1.93e4	8.61e3	2.78e3	2.63e3	5.33e3	1.66e3
IFNI-1	DC		3360	3370	ft	205638	3.02e4	1.98e5	1.13e5	1.20e5	3.52e3	1.32e4	2.65e4	1.62e4	1.19e5	6.31e4	4.19e4	3.79e4	5.03e4	3.88e4
JM-1	DC			2128	m	205640	1.09e4	1.23e4	2.76e3	6.66e4	4.16e3	9.22e3	1.08e4	9.38e3	5.79e4	2.80e4	1.55e4	1.58e4	1.18e5	1.41e4
JM-1	DC			2134	m	205641	3.72e3	1.39e4	1.00e4	1.12e5	1.07e4	1.15e5	9.74e4	1.67e4	8.24e4	3.64e4	1.35e4	1.23e4	5.46e4	1.45e4
JM-1	DC			3619	m	205642	9.97e3	1.13e4	6.05e3	4.35e4	3.06e4	3.24e4	1.97e4	1.22e4	5.44e4	2.45e4	9.84e3	9.94e3	1.04e5	8.67e3
JM-1	DC			3631	m	205643	1.23e4	1.07e4	4.29e3	4.21e4	5.32e4	4.96e4	2.42e4	1.41e4	6.65e4	2.70e4	1.07e4	9.99e3	1.64e5	8.83e3
MO-4	COCH			10098.30	ft	205644	3.99e3	9.70e3	6.48e3	9.60e3	3.36e3	1.09e4	1.83e4	6.69e3	3.79e4	2.01e4	8.68e3	8.02e3	1.69e4	6.05e3
MO-4	COCH			10100.25	ft	205645	2.42e3	4.48e3	2.37e3	4.39e3	2.61e3	1.09e4	1.44e4	5.52e3	2.51e4	1.33e4	4.77e3	4.75e3	7.30e3	4.41e3
MO-8	COCH			11975.25	ft	205646	1.44e4	5.78e3	2.15e3	7.05e4	1.22e4	1.83e4	1.19e4	8.95e3	4.80e4	2.10e4	9.70e3	9.60e3	1.41e5	7.42e3
MO-8	COCH			11975.70	ft	205647	1.53e4	6.84e3	2.57e3	7.67e4	1.19e4	1.78e4	1.22e4	9.55e3	5.06e4	2.19e4	1.05e4	1.01e4	1.55e5	7.48e3
MZ-1	DC			6100	m	205675	1.98e3	2.52e3	1.36e3	3.80e3	8.57e2	2.68e3	3.20e3	1.72e3	7.34e3	3.48e3	2.40e3	1.89e3	1.22e4	2.29e3
SM-1	DC			2056	m	205685	2.88e2	5.13e2	2.31e2	2.19e3	6.52e2	2.22e3	3.51e3	1.04e3	5.12e3	3.48e3	1.46e3	1.44e3	2.13e3	8.20e2
SM-1	DC			2086	m	205686	6.27e3	1.18e4	5.39e3	1.09e4	6.80e3	1.80e4	3.10e4	1.15e4	4.58e4	2.22e4	8.47e3	8.26e3	2.23e4	6.63e3
SM-1	DC			2101	m	205687	2.87e3	2.37e3	1.83e3	2.33e4	5.35e3	1.13e4	2.48e4	8.06e3	4.67e4	4.01e4	2.47e4	2.44e4	2.36e4	1.49e4
TAN TAN -1	DC	Bitumen?	15210	15210	ft	205729	5.30e1	6.82e2	4.76e2	1.00e4	7.36e2	1.10e4	7.89e3	7.59e2	4.30e3	1.93e3	8.14e2	7.82e2	3.72e3	1.12e3
TAN TAN -1	DC			16460	ft	205730	8.10e1	6.44e2	4.70e2	9.71e3	7.35e2	1.13e4	8.16e3	8.22e2	4.94e3	2.15e3	9.41e2	7.98e2	3.97e3	1.18e3
TKM-201	COCH	A		3442.00	m	205731	1.68e3	3.22e3	1.58e3	8.15e3	4.80e3	8.16e3	1.21e4	4.50e3	1.82e4	9.22e3	3.47e3	3.33e3	1.43e4	2.44e3
TKM-201	COCH	B		3442.00	m	205732	4.61e2	1.22e3	6.85e2	2.67e3	3.07e3	4.12e3	7.81e3	1.99e3	7.78e3	4.84e3	1.55e3	1.40e3	5.36e3	1.39e3
Sidi Rhalem	Oil					205733	2.76e4	0.00e0	5.20e3	7.50e4	5.96e3	1.17e4	1.46e4	3.67e3	2.65e4	3.52e4	1.84e4	1.94e4	2.21e4	1.26e4
SM-1	Oil					205734	1.50e3	7.47e2	2.92e2	3.30e3	6.51e3	1.13e4	1.22e4	6.63e3	2.67e4	1.26e4	4.77e3	4.78e3	1.48e4	3.96e3
Ait Moussa	OC			345	m	207488	3.20e3	1.41e3	0.00e0	2.11e4	1.20e4	1.30e4	2.88e4	6.89e3	3.03e4	1.95e4	1.12e4	1.09e4	2.64e4	7.54e3
Ait Moussa	OC			371	m	207489	2.41e3	7.54e2	9.03e2	8.99e3	4.76e3	5.84e3	1.41e4	3.62e3	1.39e4	9.52e3	5.29e3	4.96e3	1.27e4	3.46e3
Ait Moussa	OC			383	m	207490	2.84e3	1.06e3	0.00e0	1.46e4	1.19e4	1.25e4	2.72e4	6.11e3	2.38e4	1.56e4	7.02e3	7.25e3	2.65e4	4.96e3

Table 13. continued, GCMS SIR of saturated compounds (amounts in ng/g)

						m/z	191													
Well	Sample type	Sample info	Upper Depth	Lower Depth	Depth units	APT ID	26/3S	28/3R	28/3S	29/3R	29/3S	27Ts	27Tm	30/3R	30/3S	28αβ	25nor30αβ	29αβ	29Ts	30d
IFNI-1	DC		3010	3020	ft	205636	2.49e3	2.47e3	2.36e3	2.64e3	2.95e3	5.67e3	1.79e4	1.54e3	1.54e3	3.40e3	3.92e3	3.16e4	5.71e3	2.07e3
IFNI-1	DC		3020	3030	ft	205637	1.63e3	2.52e3	2.65e3	2.38e3	2.17e3	8.19e3	2.82e4	7.51e2	2.09e3	7.44e3	6.41e3	3.90e4	9.29e3	3.15e3
IFNI-1	DC		3360	3370	ft	205638	3.56e4	5.30e4	4.73e4	7.37e4	6.91e4	1.01e5	1.82e5	2.21e4	4.11e4	1.22e5	2.13e5	6.14e5	1.59e5	2.48e4
JM-1	DC			2128	m	205640	1.34e4	1.37e4	1.37e4	1.62e4	1.56e4	1.71e5	2.90e5	2.52e4	3.06e4	9.01e3	5.09e3	9.66e5	1.48e5	2.80e4
JM-1	DC			2134	m	205641	1.48e4	8.92e3	9.25e3	7.10e3	7.58e3	3.15e4	3.24e5	1.04e4	1.22e4	8.14e3	1.13e4	9.21e5	3.33e4	8.65e3
JM-1	DC			3619	m	205642	7.92e3	8.62e3	7.83e3	9.89e3	9.08e3	1.47e5	1.16e5	1.39e4	1.91e4	1.16e4	9.35e3	4.83e5	1.24e5	2.10e4
JM-1	DC			3631	m	205643	9.32e3	1.04e4	9.61e3	1.05e4	1.01e4	1.72e5	1.47e5	1.68e4	2.16e4	1.22e4	6.72e3	5.56e5	1.25e5	1.52e4
MO-4	COCH			10098.30	ft	205644	6.02e3	4.50e3	4.14e3	4.88e3	4.32e3	2.55e4	2.84e4	3.61e3	3.09e3	9.97e3	7.80e3	7.91e4	2.31e4	7.03e3
MO-4	COCH			10100.25	ft	205645	3.91e3	2.98e3	3.25e3	3.20e3	2.99e3	1.28e4	1.41e4	2.71e3	1.87e3	4.10e3	2.59e3	4.04e4	1.13e4	3.19e3
MO-8	COCH			11975.25	ft	205646	7.39e3	8.83e3	7.82e3	9.84e3	9.19e3	1.39e5	2.96e5	1.53e4	1.58e4	1.19e4	3.50e3	9.67e5	1.25e5	1.37e4
MO-8	COCH			11975.70	ft	205647	8.07e3	9.46e3	8.94e3	1.05e4	1.04e4	1.51e5	3.02e5	1.67e4	2.51e4	1.28e4	3.83e3	9.61e5	1.32e5	1.38e4
MZ-1	DC			6100	m	205675	1.93e3	2.65e3	2.18e3	2.29e3	2.63e3	1.96e4	1.47e4	9.78e2	4.44e3	2.70e3	2.77e3	5.60e4	1.38e4	2.31e3
SM-1	DC			2056	m	205685	8.18e2	7.30e2	8.96e2	1.20e3	1.06e3	4.02e3	7.24e3	1.06e3	1.20e3	3.84e2	2.59e2	1.55e4	4.98e3	1.17e3
SM-1	DC			2086	m	205686	5.97e3	5.86e3	4.14e3	6.47e3	4.15e3	2.76e4	3.45e4	5.68e3	5.72e3	1.13e4	1.05e4	1.03e5	2.61e4	5.06e3
SM-1	DC			2101	m	205687	1.46e4	1.55e4	1.57e4	2.50e4	2.36e4	6.99e4	6.03e4	1.96e4	1.94e4	4.79e3	1.82e3	1.39e5	7.88e4	1.82e4
TAN TAN -1	DC	Bitumen?	15210	15210	ft	205729	1.11e3	6.96e2	6.80e2	5.18e2	4.39e2	1.10e3	2.17e4	5.97e2	1.34e3	3.22e2	6.29e2	7.75e4	1.01e3	2.47e2
TAN TAN -1	DC			16460	ft	205730	1.12e3	6.75e2	6.24e2	4.42e2	4.54e2	1.09e3	2.10e4	6.01e2	1.42e3	2.25e2	5.19e2	7.39e4	9.94e2	2.89e2
TKM-201	COCH	A		3442.00	m	205731	2.61e3	2.76e3	2.59e3	2.87e3	2.83e3	2.44e4	2.63e4	3.42e3	2.81e3	2.18e3	2.25e3	1.01e5	2.97e4	5.40e3
TKM-201	COCH	B		3442.00	m	205732	1.42e3	1.34e3	1.55e3	1.42e3	1.47e3	9.32e3	7.68e3	1.47e3	8.44e2	7.81e2	9.27e2	3.02e4	1.13e4	4.15e3
Sidi Rhalem	Oil					205733	1.35e4	1.66e4	1.82e4	2.66e4	2.59e4	8.12e4	1.10e5	2.40e4	2.47e4	1.29e4	1.88e3	2.68e5	8.67e4	2.28e4
SM-1	Oil					205734	4.07e3	3.57e3	3.92e3	3.10e3	3.23e3	1.07e4	1.63e4	3.04e3	4.97e3	1.01e3	4.83e2	4.72e4	8.50e3	3.11e3
Ait Moussa	OC			345	m	207488	7.29e3	7.21e3	6.17e3	7.72e3	8.70e3	4.72e4	4.24e4	3.15e3	2.26e3	5.97e3	5.40e3	1.15e5	7.59e4	5.66e4
Ait Moussa	OC			371	m	207489	3.44e3	3.57e3	3.08e3	3.89e3	4.78e3	1.75e4	1.68e4	2.22e3	1.34e3	3.33e3	2.92e3	4.61e4	2.94e4	3.22e4
Ait Moussa	OC			383	m	207490	4.87e3	4.77e3	3.68e3	4.74e3	5.94e3	3.58e4	3.94e4	2.15e3	1.95e3	4.01e3	0.00e0	8.74e4	5.21e4	4.03e4

Table 13. continued, GCMS SIR of saturated compounds (amounts in ng/g)

						m/z	191													
Well	Sample type	Sample info	Upper Depth	Lower Depth	Depth units	APT ID	29βα	30O	30αβ	30βα	31αβS	31αβR	30G	31βα	32αβS	32αβR	33αβS	33αβR	34αβS	34αβR
IFNI-1	DC		3010	3020	ft	205636	9.47e3	0.00e0	4.50e4	1.39e4	2.68e4	2.01e4	5.81e3	8.57e3	9.46e3	8.44e3	6.02e3	5.31e3	4.77e3	3.26e3
IFNI-1	DC		3020	3030	ft	205637	1.03e4	0.00e0	6.42e4	1.50e4	3.47e4	2.81e4	5.85e3	7.34e3	1.87e4	1.40e4	1.19e4	8.74e3	9.62e3	7.05e3
IFNI-1	DC		3360	3370	ft	205638	7.93e4	5.52e4	8.36e5	1.41e5	4.48e5	3.35e5	1.58e5	4.84e4	3.12e5	2.25e5	2.39e5	1.51e5	1.66e5	1.12e5
JM-1	DC			2128	m	205640	7.18e4	0.00e0	8.23e5	6.49e4	3.13e5	3.19e5	1.57e5	3.25e4	2.43e5	1.83e5	1.73e5	1.13e5	1.91e5	1.24e5
JM-1	DC			2134	m	205641	1.75e5	0.00e0	1.48e6	4.22e5	3.22e5	2.86e5	4.14e5	8.60e4	1.32e5	1.26e5	8.66e4	7.14e4	4.99e4	3.85e4
JM-1	DC			3619	m	205642	3.34e4	0.00e0	5.23e5	4.19e4	2.04e5	1.68e5	8.16e4	2.24e4	1.42e5	1.02e5	1.01e5	6.92e4	9.61e4	6.38e4
JM-1	DC			3631	m	205643	3.48e4	0.00e0	5.19e5	3.93e4	1.81e5	1.58e5	6.87e4	1.98e4	1.29e5	9.50e4	8.47e4	5.75e4	8.84e4	5.75e4
MO-4	COCH			10098.30	ft	205644	9.13e3	0.00e0	1.07e5	1.30e4	4.16e4	3.29e4	1.00e4	6.28e3	2.98e4	2.04e4	2.18e4	1.58e4	1.64e4	1.16e4
MO-4	COCH			10100.25	ft	205645	4.16e3	0.00e0	4.92e4	5.17e3	1.66e4	1.19e4	3.81e3	2.64e3	1.05e4	6.65e3	6.61e3	4.34e3	5.11e3	3.66e3
MO-8	COCH			11975.25	ft	205646	6.41e4	0.00e0	8.94e5	6.13e4	3.21e5	2.76e5	1.04e5	2.58e4	2.17e5	1.58e5	1.57e5	9.97e4	1.66e5	1.13e5
MO-8	COCH			11975.70	ft	205647	6.89e4	0.00e0	9.51e5	6.57e4	3.33e5	3.00e5	1.15e5	2.83e4	2.35e5	1.74e5	1.66e5	1.16e5	1.83e5	1.26e5
MZ-1	DC			6100	m	205675	4.37e3	0.00e0	4.58e4	5.75e3	1.97e4	1.46e4	5.24e3	1.81e3	9.51e3	6.43e3	5.67e3	3.62e3	2.89e3	1.97e3
SM-1	DC			2056	m	205685	2.86e3	0.00e0	2.70e4	5.50e3	1.08e4	1.02e4	6.99e3	2.46e3	8.83e3	5.91e3	7.45e3	5.37e3	5.41e3	3.54e3
SM-1	DC			2086	m	205686	1.36e4	0.00e0	1.24e5	1.72e4	4.29e4	3.79e4	1.75e4	9.55e3	3.04e4	2.28e4	2.39e4	1.52e4	1.42e4	9.71e3
SM-1	DC			2101	m	205687	1.08e4	0.00e0	3.06e5	2.29e4	1.57e5	1.18e5	1.86e4	2.73e4	1.34e5	8.97e4	1.32e5	8.43e4	8.48e4	5.65e4
TAN TAN -1	DC	Bitumen?	15210	15210	ft	205729	9.37e3	0.00e0	1.28e5	3.17e4	2.05e4	1.67e4	4.13e4	3.95e3	9.04e3	6.90e3	6.28e3	4.58e3	3.16e3	2.36e3
TAN TAN -1	DC			16460	ft	205730	9.10e3	0.00e0	1.22e5	2.95e4	1.90e4	1.50e4	3.98e4	3.58e3	8.06e3	6.11e3	5.48e3	3.76e3	2.68e3	1.99e3
TKM-201	COCH	A		3442.00	m	205731	7.09e3	0.00e0	1.01e5	8.29e3	5.37e4	4.17e4	1.06e4	5.15e3	3.87e4	2.74e4	2.69e4	1.77e4	2.49e4	1.62e4
TKM-201	COCH	B		3442.00	m	205732	2.01e3	0.00e0	3.20e4	2.80e3	2.19e4	1.64e4	2.92e3	2.25e3	1.75e4	1.18e4	1.12e4	7.47e3	9.08e3	5.73e3
Sidi Rhalem	Oil					205733	2.26e4	0.00e0	9.22e5	7.53e4	3.18e5	2.34e5	3.05e5	4.50e4	3.21e5	2.32e5	2.12e5	1.33e5	2.71e5	1.78e5
SM-1	Oil					205734	3.18e3	0.00e0	4.20e4	3.78e3	1.57e4	1.19e4	1.76e3	2.14e3	8.68e3	6.09e3	4.87e3	3.19e3	2.69e3	1.76e3
Ait Moussa	OC			345	m	207488	9.67e3	0.00e0	3.07e5	3.75e4	1.72e5	1.16e5	2.38e4	1.87e4	1.34e5	9.18e4	7.55e4	4.97e4	4.94e4	3.37e4
Ait Moussa	OC			371	m	207489	3.86e3	0.00e0	1.29e5	1.61e4	8.51e4	5.96e4	1.25e4	8.07e3	7.57e4	5.06e4	4.10e4	2.75e4	2.89e4	1.94e4
Ait Moussa	OC			383	m	207490	6.94e3	0.00e0	2.14e5	2.58e4	1.47e5	9.25e4	1.73e4	1.11e4	1.18e5	7.96e4	5.93e4	4.10e4	3.82e4	2.52e4

Table 13. continued, GCMS SIR of saturated compounds (amounts in ng/g)

						m/z	191		217													
Well	Sample type	Sample info	Upper Depth	Lower Depth	Depth units	APT ID	35αβS	35αβR	21αα	21ββ	22αα	22ββ	27dβS	27dβR	27daR	27daS	28dβS#1	28dβS#2	28dβR#1	28dβR#2
IFNI-1	DC		3010	3020	ft	205636	5.99e3	2.58e3	4.98e3	9.23e3	3.73e3	3.95e3	4.67e3	3.01e3	1.19e3	1.71e3	1.77e3	1.78e3	1.27e3	1.54e3
IFNI-1	DC		3020	3030	ft	205637	1.24e4	7.82e3	4.90e3	1.02e4	2.96e3	3.62e3	3.83e3	2.34e3	1.33e3	1.43e3	8.75e3	9.26e3	5.98e3	8.70e3
IFNI-1	DC		3360	3370	ft	205638	2.06e5	1.35e5	1.05e4	2.31e4	8.67e3	1.58e4	2.97e4	1.80e4	7.64e3	9.93e3	1.60e4	1.32e4	7.82e3	1.38e4
JM-1	DC			2128	m	205640	2.09e5	1.39e5	9.64e3	2.97e4	5.91e3	2.12e4	3.56e4	2.31e4	9.70e3	1.33e4	2.65e4	1.28e4	8.07e3	1.17e4
JM-1	DC			2134	m	205641	3.93e4	2.97e4	4.61e3	1.28e4	3.76e3	9.04e3	1.13e4	6.90e3	3.23e3	4.01e3	6.15e3	4.44e3	2.68e3	5.41e3
JM-1	DC			3619	m	205642	1.08e5	7.36e4	9.94e3	4.29e4	5.37e3	1.68e4	2.05e4	1.23e4	5.44e3	7.26e3	2.02e4	6.61e3	4.27e3	6.52e3
JM-1	DC			3631	m	205643	9.48e4	6.21e4	1.39e4	6.76e4	6.34e3	2.57e4	2.34e4	1.49e4	6.07e3	8.06e3	2.50e4	7.09e3	4.58e3	7.07e3
MO-4	COCH			10098.30	ft	205644	1.60e4	1.15e4	5.82e3	1.21e4	4.34e3	6.75e3	1.47e4	8.86e3	3.93e3	4.65e3	7.31e3	6.05e3	3.44e3	4.68e3
MO-4	COCH			10100.25	ft	205645	4.03e3	3.77e3	4.01e3	7.70e3	2.42e3	4.28e3	6.60e3	3.49e3	2.27e3	2.46e3	3.72e3	2.46e3	1.61e3	1.97e3
MO-8	COCH			11975.25	ft	205646	2.01e5	1.30e5	8.85e3	6.38e4	5.36e3	3.82e4	3.29e4	2.09e4	8.43e3	1.15e4	3.28e4	9.20e3	5.90e3	9.66e3
MO-8	COCH			11975.70	ft	205647	2.13e5	1.45e5	9.16e3	6.49e4	5.52e3	4.00e4	3.62e4	2.30e4	9.72e3	1.24e4	3.66e4	9.78e3	6.84e3	1.10e4
MZ-1	DC			6100	m	205675	2.49e3	2.00e3	7.90e2	1.85e3	6.82e2	1.73e3	4.03e3	2.58e3	1.12e3	1.23e3	1.84e3	1.51e3	1.00e3	1.26e3
SM-1	DC			2056	m	205685	5.17e3	3.81e3	1.10e3	1.90e3	6.32e2	9.65e2	2.75e3	1.77e3	7.53e2	1.07e3	1.07e3	9.09e2	5.23e2	8.71e2
SM-1	DC			2086	m	205686	1.97e4	1.26e4	9.64e3	1.73e4	7.48e3	1.05e4	1.15e4	7.62e3	3.62e3	3.39e3	5.03e3	4.07e3	2.99e3	4.86e3
SM-1	DC			2101	m	205687	7.28e4	4.84e4	1.38e4	1.66e4	9.45e3	9.85e3	6.21e4	3.97e4	1.56e4	2.15e4	2.11e4	1.91e4	1.22e4	1.44e4
TAN TAN -1	DC	Bitumen?	15210	15210	ft	205729	2.03e3	1.64e3	8.80e1	2.82e2	7.40e1	2.86e2	2.16e2	1.73e2	5.90e1	7.50e1	1.28e2	9.40e1	5.30e1	1.73e2
TAN TAN -1	DC			16460	ft	205730	1.57e3	1.36e3	9.50e1	3.23e2	8.80e1	3.27e2	2.20e2	1.33e2	7.70e1	8.70e1	1.13e2	1.00e2	7.90e1	1.93e2
TKM-201	COCH	A		3442.00	m	205731	3.00e4	2.05e4	2.30e3	7.65e3	1.74e3	3.77e3	5.34e3	2.95e3	1.43e3	1.83e3	3.48e3	1.76e3	9.96e2	1.70e3
TKM-201	COCH	B		3442.00	m	205732	1.03e4	6.86e3	9.58e2	2.57e3	8.82e2	1.40e3	2.33e3	1.52e3	9.03e2	1.05e3	1.28e3	1.15e3	4.47e2	9.02e2
Sidi Rhalem	Oil					205733	3.06e5	2.05e5	1.91e4	3.52e4	1.21e4	1.91e4	1.19e5	7.33e4	2.91e4	4.18e4	4.45e4	3.39e4	2.00e4	2.92e4
SM-1	Oil					205734	2.38e3	1.31e3	6.51e3	1.88e4	3.82e3	7.84e3	9.13e3	5.60e3	2.40e3	3.20e3	4.40e3	2.75e3	1.74e3	2.60e3
Ait Moussa	OC			345	m	207488	3.57e4	2.30e4	1.34e4	1.27e4	7.33e3	6.57e3	4.39e4	2.83e4	1.12e4	1.36e4	1.19e4	1.37e4	7.84e3	9.18e3
Ait Moussa	OC			371	m	207489	2.40e4	1.53e4	6.69e3	5.54e3	4.15e3	3.14e3	4.21e4	2.66e4	1.00e4	1.26e4	1.08e4	1.10e4	6.65e3	7.75e3
Ait Moussa	OC			383	m	207490	2.81e4	2.01e4	1.45e4	1.25e4	7.10e3	6.51e3	4.25e4	2.69e4	1.07e4	1.39e4	1.12e4	1.16e4	7.00e3	8.50e3

Table 13. continued, GCMS SIR of saturated compounds (amounts in ng/g)

						m/z	217													
Well	Sample type	Sample info	Upper Depth	Lower Depth	Depth units	APT ID	28daR	27ααS	27ββR+29dβS	27ββS	28daS	27ααR	29dβR	29daR	28ααS	29daS	28ββR	28ββS	28ααR	29ααS
IFNI-1	DC		3010	3020	ft	205636	1.49e3	2.60e3	2.30e3	2.65e3	7.04e2	3.72e3	2.01e3	5.24e2	1.42e3	8.33e2	2.22e3	2.10e3	2.28e3	2.99e3
IFNI-1	DC		3020	3030	ft	205637	5.65e3	3.32e3	2.27e4	4.25e3	4.47e3	3.78e3	1.69e4	1.01e4	2.41e3	1.13e4	7.08e3	5.18e3	1.25e4	7.49e3
IFNI-1	DC		3360	3370	ft	205638	8.79e3	3.69e4	4.83e4	4.64e4	7.14e3	4.86e4	2.76e4	1.59e4	2.15e4	1.16e4	5.10e4	5.46e4	4.43e4	6.09e4
JM-1	DC			2128	m	205640	1.51e4	3.64e4	5.76e4	3.49e4	7.16e3	4.12e4	2.81e4	1.60e4	1.23e4	1.66e4	2.76e4	3.55e4	1.35e4	4.96e4
JM-1	DC			2134	m	205641	3.14e3	1.15e4	1.21e4	7.07e3	1.93e3	2.90e4	1.03e4	4.66e3	1.38e4	4.27e3	1.97e4	1.60e4	4.34e4	3.49e4
JM-1	DC			3619	m	205642	8.88e3	2.59e4	4.10e4	3.10e4	3.45e3	3.37e4	1.65e4	1.10e4	8.01e3	8.18e3	2.43e4	3.02e4	8.42e3	3.72e4
JM-1	DC			3631	m	205643	1.08e4	3.25e4	5.15e4	3.76e4	3.25e3	4.24e4	2.04e4	9.94e3	1.06e4	9.56e3	2.89e4	3.77e4	9.67e3	4.90e4
MO-4	COCH			10098.30	ft	205644	3.56e3	8.08e3	1.38e4	7.52e3	2.10e3	8.39e3	7.52e3	3.85e3	2.06e3	3.16e3	5.42e3	7.71e3	3.92e3	9.90e3
MO-4	COCH			10100.25	ft	205645	1.62e3	4.96e3	5.11e3	3.29e3	9.42e2	6.13e3	3.71e3	1.90e3	1.67e3	2.30e3	3.04e3	3.28e3	2.63e3	5.83e3
MO-8	COCH			11975.25	ft	205646	1.43e4	6.11e4	8.99e4	6.77e4	5.61e3	7.37e4	2.87e4	1.43e4	1.81e4	1.57e4	4.71e4	5.53e4	1.81e4	9.18e4
MO-8	COCH			11975.70	ft	205647	1.56e4	6.58e4	9.60e4	7.08e4	6.14e3	8.21e4	3.21e4	1.59e4	1.99e4	1.77e4	5.28e4	6.08e4	2.27e4	9.92e4
MZ-1	DC			6100	m	205675	1.26e3	2.80e3	2.59e3	3.79e3	6.60e2	1.91e4	2.30e3	1.93e3	1.26e3	1.08e3	2.96e3	2.72e3	2.62e3	3.35e3
SM-1	DC			2056	m	205685	5.36e2	2.40e3	3.58e3	1.61e3	3.47e2	1.54e4	1.92e3	9.90e2	6.20e2	9.51e2	3.24e3	1.59e3	7.73e3	2.05e3
SM-1	DC			2086	m	205686	3.05e3	8.45e3	1.16e4	9.26e3	2.83e3	1.34e4	5.93e3	3.62e3	3.59e3	4.37e3	7.94e3	6.69e3	7.37e3	8.20e3
SM-1	DC			2101	m	205687	1.08e4	2.71e4	6.80e4	3.47e4	7.61e3	2.87e4	3.61e4	1.93e4	8.88e3	2.24e4	2.13e4	2.91e4	1.16e4	3.66e4
TAN TAN -1	DC	Bitumen?	15210	15210	ft	205729	8.20e1	5.06e2	3.86e2	2.93e2	6.90e1	1.02e3	5.02e2	4.56e2	1.22e3	0.00e0	1.44e3	1.06e3	3.72e3	2.45e3
TAN TAN -1	DC			16460	ft	205730	9.70e1	5.03e2	3.80e2	3.01e2	0.00e0	1.10e3	5.15e2	4.17e2	1.17e3	1.14e2	1.36e3	9.97e2	3.32e3	2.29e3
TKM-201	COCH	A		3442.00	m	205731	1.34e3	6.10e3	9.06e3	6.29e3	9.99e2	7.34e3	3.99e3	1.84e3	1.73e3	2.01e3	4.03e3	5.71e3	2.40e3	7.72e3
TKM-201	COCH	B		3442.00	m	205732	4.63e2	2.50e3	3.86e3	2.94e3	5.07e2	3.01e3	1.84e3	8.83e2	6.30e2	1.04e3	1.67e3	2.68e3	1.08e3	3.51e3
Sidi Rhalem	Oil					205733	3.07e4	1.77e5	2.38e5	1.94e5	1.73e4	1.96e5	8.75e4	2.70e4	5.20e4	3.19e4	1.04e5	1.32e5	6.77e4	2.25e5
SM-1	Oil					205734	1.54e3	5.96e3	9.89e3	7.69e3	1.10e3	7.88e3	3.94e3	1.59e3	1.85e3	1.48e3	4.94e3	6.22e3	2.90e3	6.28e3
Ait Moussa	OC			345	m	207488	8.02e3	1.43e4	2.85e4	1.79e4	5.28e3	1.54e4	1.99e4	1.07e4	2.88e3	1.04e4	9.77e3	1.23e4	5.11e3	1.44e4
Ait Moussa	OC			371	m	207489	6.18e3	9.49e3	2.17e4	1.24e4	4.22e3	1.02e4	1.50e4	7.05e3	2.03e3	7.63e3	6.22e3	7.38e3	2.97e3	8.13e3
Ait Moussa	OC			383	m	207490	6.90e3	1.35e4	2.28e4	1.72e4	4.33e3	1.42e4	1.73e4	8.82e3	3.64e3	9.87e3	9.45e3	1.11e4	4.40e3	1.25e4

Table 13. continued, GCMS SIR of saturated compounds (amounts in ng/g)

						m/z	217							218						
Well	Sample type	Sample info	Upper Depth	Lower Depth	Depth units	APT ID	29ββR	29ββS	29ααR	30ααS	30ββR	30ββS	30ααR	27ββR	27ββS	28ββR	28ββS	29ββR	29ββS	30ββR
IFNI-1	DC		3010	3020	ft	205636	2.62e3	2.60e3	3.00e3	1.23e3	1.20e3	8.94e2	0.00e0	5.45e3	4.49e3	3.11e3	2.99e3	3.85e3	3.31e3	1.51e3
IFNI-1	DC		3020	3030	ft	205637	1.20e4	9.71e3	3.39e4	1.13e3	0.00e0	0.00e0	7.05e2	4.24e3	3.76e3	7.61e3	7.90e3	1.78e4	1.45e4	0.00e0
IFNI-1	DC		3360	3370	ft	205638	6.23e4	6.74e4	6.63e4	2.22e4	1.91e4	9.58e3	1.20e4	8.41e4	8.14e4	7.68e4	8.70e4	1.04e5	1.08e5	1.90e4
JM-1	DC			2128	m	205640	6.13e4	6.11e4	4.06e4	3.31e4	1.43e4	4.51e3	6.49e3	7.01e4	5.80e4	3.83e4	5.13e4	1.00e5	9.99e4	1.11e4
JM-1	DC			2134	m	205641	1.99e4	1.73e4	7.70e4	2.21e4	2.91e3	1.34e3	4.81e3	1.64e4	1.31e4	2.28e4	2.45e4	3.11e4	2.88e4	3.17e3
JM-1	DC			3619	m	205642	5.51e4	4.96e4	2.57e4	1.79e4	1.12e4	3.52e3	4.35e3	5.80e4	5.04e4	3.37e4	4.29e4	8.75e4	8.18e4	8.10e3
JM-1	DC			3631	m	205643	6.73e4	6.10e4	3.57e4	2.07e4	1.30e4	3.29e3	4.24e3	7.48e4	6.25e4	4.06e4	5.23e4	1.08e5	1.00e5	8.95e3
MO-4	COCH			10098.30	ft	205644	9.14e3	8.80e3	7.17e3	4.86e3	3.05e3	1.62e3	1.66e3	1.62e4	1.21e4	7.89e3	1.07e4	1.41e4	1.37e4	3.51e3
MO-4	COCH			10100.25	ft	205645	3.97e3	3.25e3	3.79e3	1.92e3	1.04e3	7.29e2	8.16e2	8.05e3	6.09e3	4.31e3	5.59e3	6.52e3	5.94e3	1.06e3
MO-8	COCH			11975.25	ft	205646	1.13e5	1.04e5	6.63e4	3.65e4	2.18e4	5.86e3	8.56e3	1.34e5	1.14e5	6.88e4	8.44e4	1.85e5	1.75e5	1.55e4
MO-8	COCH			11975.70	ft	205647	1.27e5	1.14e5	7.39e4	3.76e4	2.41e4	6.40e3	9.75e3	1.44e5	1.21e5	7.71e4	9.19e4	2.11e5	1.87e5	1.76e4
MZ-1	DC			6100	m	205675	3.44e3	3.51e3	3.96e3	1.02e3	7.96e2	5.07e2	4.32e2	7.40e3	6.46e3	4.25e3	4.20e3	6.09e3	5.52e3	1.05e3
SM-1	DC			2056	m	205685	2.83e3	2.92e3	1.07e4	1.39e3	8.96e2	4.74e2	2.23e3	3.71e3	2.67e3	2.98e3	2.28e3	4.48e3	4.24e3	6.81e2
SM-1	DC			2086	m	205686	1.03e4	1.09e4	1.24e4	7.21e3	2.60e3	1.90e3	0.00e0	1.75e4	1.47e4	1.17e4	1.04e4	1.68e4	1.43e4	6.02e3
SM-1	DC			2101	m	205687	5.37e4	5.01e4	3.37e4	1.46e4	1.38e4	7.68e3	7.20e3	7.42e4	5.92e4	3.39e4	4.26e4	9.22e4	8.46e4	1.56e4
TAN TAN -1	DC	Bitumen?	15210	15210	ft	205729	1.20e3	1.05e3	3.97e3	1.81e3	1.20e2	0.00e0	1.13e2	5.18e2	4.63e2	1.75e3	1.67e3	1.67e3	1.69e3	8.20e1
TAN TAN -1	DC			16460	ft	205730	1.08e3	9.45e2	3.76e3	1.79e3	8.10e1	0.00e0	8.90e1	5.74e2	4.88e2	1.63e3	1.58e3	1.63e3	1.57e3	8.80e1
TKM-201	COCH	A		3442.00	m	205731	9.86e3	9.75e3	7.45e3	3.97e3	1.87e3	7.12e2	9.53e2	1.25e4	1.05e4	6.68e3	8.47e3	1.66e4	1.57e4	1.72e3
TKM-201	COCH	B		3442.00	m	205732	4.20e3	3.76e3	3.31e3	1.35e3	6.47e2	3.81e2	4.91e2	5.44e3	4.72e3	2.66e3	3.60e3	7.02e3	6.61e3	7.55e2
Sidi Rhalem	Oil					205733	2.32e5	2.21e5	1.98e5	6.41e4	5.41e4	1.67e4	2.79e4	3.78e5	3.29e5	1.65e5	2.03e5	4.03e5	3.71e5	4.11e4
SM-1	Oil					205734	6.47e3	6.31e3	5.04e3	2.25e3	1.33e3	4.54e2	6.12e2	1.52e4	1.33e4	7.96e3	9.78e3	1.05e4	1.05e4	1.12e3
Ait Moussa	OC			345	m	207488	1.79e4	1.75e4	1.11e4	4.87e3	8.24e3	2.79e3	2.12e3	3.39e4	2.86e4	1.54e4	1.82e4	3.00e4	2.93e4	6.95e3
Ait Moussa	OC			371	m	207489	1.08e4	1.01e4	5.59e3	3.27e3	6.39e3	1.55e3	1.27e3	2.30e4	1.88e4	9.97e3	1.10e4	1.75e4	1.63e4	4.51e3
Ait Moussa	OC			383	m	207490	1.67e4	1.61e4	9.75e3	4.47e3	6.90e3	2.20e3	1.72e3	3.46e4	2.87e4	1.42e4	1.66e4	2.79e4	2.82e4	5.51e3

Table 13. continued, GCMS SIR of saturated compounds (amounts in ng/g)

						m/z	
Well	Sample type	Sample info	Upper Depth	Lower Depth	Depth units	APT ID	30ββS
IFNI-1	DC		3010	3020	ft	205636	1.18e3
IFNI-1	DC		3020	3030	ft	205637	0.00e0
IFNI-1	DC		3360	3370	ft	205638	1.55e4
JM-1	DC			2128	m	205640	8.11e3
JM-1	DC			2134	m	205641	2.78e3
JM-1	DC			3619	m	205642	5.65e3
JM-1	DC			3631	m	205643	5.16e3
MO-4	COCH			10098.30	ft	205644	2.29e3
MO-4	COCH			10100.25	ft	205645	8.47e2
MO-8	COCH			11975.25	ft	205646	1.04e4
MO-8	COCH			11975.70	ft	205647	1.15e4
MZ-1	DC			6100	m	205675	6.52e2
SM-1	DC			2056	m	205685	5.76e2
SM-1	DC			2086	m	205686	4.70e3
SM-1	DC			2101	m	205687	1.26e4
TAN TAN -1	DC	Bitumen?	15210	15210	ft	205729	6.60e1
TAN TAN -1	DC			16460	ft	205730	0.00e0
TKM-201	COCH	A		3442.00	m	205731	1.24e3
TKM-201	COCH	B		3442.00	m	205732	6.64e2
Sidi Rhalem	Oil					205733	2.90e4
SM-1	Oil					205734	7.84e2
Ait Moussa	OC			345	m	207488	3.64e3
Ait Moussa	OC			371	m	207489	1.99e3
Ait Moussa	OC			383	m	207490	2.98e3

Table 14. GCMS SIR of aromatic compounds (peak height)

						m/z	142		156										170	
Well	Sample type	Sample info	Upper Depth	Lower Depth	Depth units	APT ID	2-MN	1-MN	2-EN	1-EN	2,6-DMN	2,7-DMN	1,3- + 1,7-DMN	1,6-DMN	2,3- + 1,4-DMN	1,5-DMN	1,2-DMN	1,8-DMN	1,3,7-TMN	1,3,6-TMN
IFNI-1	DC		3010	3020	ft	205636	5.29e4	5.46e4	4.03e3	3.52e3	1.26e4	1.60e4	3.38e4	2.70e4	7.41e3	8.89e3	5.02e3	1.26e2	9.13e3	1.35e4
IFNI-1	DC		3020	3030	ft	205637	1.98e6	1.23e6	1.70e5	7.91e4	1.03e6	1.20e6	1.85e6	1.80e6	6.71e5	4.62e5	3.23e5	4.62e3	8.57e5	1.69e6
IFNI-1	DC		3360	3370	ft	205638	8.51e5	6.49e5	5.75e4	3.37e4	3.30e5	3.83e5	6.74e5	6.04e5	2.13e5	1.57e5	1.03e5	1.35e3	2.77e5	4.97e5
JM-1	DC			2128	m	205640	3.85e4	3.26e4	6.63e3	3.21e3	2.50e4	2.60e4	5.35e4	4.01e4	1.75e4	1.39e4	9.70e3	3.56e2	2.70e4	3.62e4
JM-1	DC			2134	m	205641	1.05e5	1.37e5	1.03e4	7.86e3	5.33e4	4.97e4	1.23e5	1.40e5	5.00e4	8.59e4	4.32e4	1.91e3	3.43e4	4.52e4
JM-1	DC			3619	m	205642	5.49e4	5.47e4	8.21e3	6.00e3	3.57e4	4.04e4	9.42e4	7.14e4	2.95e4	2.42e4	1.49e4	3.51e2	6.47e4	1.11e5
JM-1	DC			3631	m	205643	4.42e4	3.97e4	6.57e3	4.61e3	2.96e4	3.20e4	6.85e4	5.83e4	2.25e4	1.74e4	1.08e4	6.15e2	6.13e4	1.10e5
MO-4	COCH			10098.30	ft	205644	2.81e4	1.76e4	3.27e3	1.38e3	1.21e4	1.40e4	2.67e4	1.78e4	9.38e3	4.85e3	4.27e3	1.82e2	2.00e4	3.21e4
MO-4	COCH			10100.25	ft	205645	4.64e4	2.59e4	3.88e3	1.76e3	1.57e4	1.69e4	3.08e4	2.33e4	1.05e4	6.20e3	4.79e3	1.66e2	1.47e4	2.37e4
MO-8	COCH			11975.25	ft	205646	8.39e3	7.73e3	1.80e3	1.49e3	6.99e3	7.43e3	2.85e4	2.31e4	1.41e4	1.27e4	1.07e4	1.64e2	5.60e4	9.97e4
MO-8	COCH			11975.70	ft	205647	6.86e3	5.80e3	1.34e3	8.78e2	5.23e3	5.60e3	1.88e4	1.52e4	9.38e3	8.04e3	7.47e3	2.12e2	4.62e4	8.63e4
MZ-1	DC			6100	m	205675	3.28e5	2.37e5	2.55e4	1.19e4	9.42e4	1.03e5	2.12e5	1.49e5	5.67e4	4.74e4	2.42e4	3.41e2	7.69e4	1.09e5
SM-1	DC			2056	m	205685	1.43e4	1.06e4	1.75e3	1.40e3	4.95e3	4.63e3	1.16e4	6.35e3	4.56e3	4.04e3	4.49e3	1.46e3	5.17e3	6.60e3
SM-1	DC			2086	m	205686	1.23e4	1.01e4	9.26e2	5.98e2	2.72e3	3.23e3	7.20e3	5.03e3	2.12e3	1.67e3	9.09e2	0.00e0	1.85e3	2.43e3
SM-1	DC			2101	m	205687	9.64e3	6.80e3	1.41e3	1.35e3	4.93e3	3.62e3	8.24e3	5.90e3	4.18e3	8.84e3	4.60e3	5.44e3	8.85e3	4.69e3
TAN TAN -1	DC	Bitumen?	15210	15210	ft	205729	2.41e4	3.47e4	1.31e4	5.66e3	7.80e4	8.10e4	1.64e5	1.04e5	4.49e4	2.52e4	1.17e4	0.00e0	4.24e4	5.28e4
TAN TAN -1	DC			16460	ft	205730	6.80e3	5.77e3	1.68e3	9.04e2	1.06e4	1.18e4	3.25e4	2.10e4	1.06e4	6.87e3	3.02e3	0.00e0	1.86e4	2.36e4
TKM-201	COCH	A		3442.00	m	205731	7.03e6	4.39e6	2.47e5	8.93e4	2.04e6	2.04e6	4.14e6	3.00e6	1.24e6	7.70e5	3.53e5	7.83e2	1.18e6	1.65e6
TKM-201	COCH	B		3442.00	m	205732	1.77e7	1.27e7	8.25e5	2.67e5	5.73e6	5.74e6	1.19e7	8.58e6	3.19e6	1.99e6	9.75e5	1.66e3	2.76e6	3.52e6
Sidi Rhalem	Oil					205733	3.22e4	3.39e4	1.22e4	6.50e3	5.66e4	5.02e4	1.36e5	1.22e5	5.06e4	4.81e4	3.50e4	3.44e2	2.63e5	4.26e5
SM-1	Oil					205734	2.75e7	2.09e7	3.05e6	1.38e6	9.42e6	8.83e6	1.66e7	1.53e7	3.99e6	4.33e6	2.99e6	3.55e4	5.82e6	9.37e6
Ait Moussa	OC			345	m	207488	1.70e7	1.66e7	1.59e6	1.18e6	4.50e6	5.37e6	1.59e7	1.32e7	4.62e6	3.69e6	2.26e6	6.80e3	4.54e6	7.43e6
Ait Moussa	OC			371	m	207489	1.77e6	2.27e6	3.80e5	3.20e5	1.11e6	1.30e6	4.36e6	3.37e6	1.32e6	1.17e6	6.61e5	2.82e3	1.89e6	2.80e6
Ait Moussa	OC			383	m	207490	7.60e5	9.20e5	6.77e4	6.20e4	2.26e5	2.62e5	1.34e6	9.57e5	3.86e5	4.15e5	1.38e5	1.51e3	7.01e5	1.29e6

Table 14. continued, GCMS SIR of aromatic compounds (peak height)

						m/z	170						178	192				206		
Well	Sample type	Sample info	Upper Depth	Lower Depth	Depth units	APT ID	1,3,5- + 1,4,6-TMN	2,3,6-TMN	1,2,7-TMN	1,6,7 + 1,2,6-TMN	1,2,4-TMN	1,2,5-TMN	P	3-MP	2-MP	9-MP	1-MP	2-EP+9-EP+ 3,6-DMP	1-EP	2,6- + 2,7- + 3,5-DMP
IFNI-1	DC		3010	3020	ft	205636	1.11e4	7.07e3	2.30e3	6.32e3	1.30e3	4.16e3	4.40e4	2.63e4	3.46e4	4.08e4	3.14e4	4.99e3	1.04e4	7.09e3
IFNI-1	DC		3020	3030	ft	205637	9.50e5	1.25e6	2.68e5	7.59e5	8.81e4	7.07e5	5.16e6	1.65e6	2.20e6	1.92e6	1.71e6	1.46e5	3.35e5	2.26e5
IFNI-1	DC		3360	3370	ft	205638	3.14e5	3.44e5	7.82e4	2.27e5	3.27e4	1.77e5	3.21e6	1.60e6	2.34e6	2.11e6	1.87e6	2.12e5	5.68e5	3.89e5
JM-1	DC			2128	m	205640	3.05e4	2.53e4	8.09e3	2.12e4	3.90e3	2.01e4	2.64e5	3.65e5	4.86e5	5.73e5	4.16e5	1.77e5	4.04e5	2.32e5
JM-1	DC			2134	m	205641	7.42e4	3.15e4	1.37e4	6.08e4	8.43e3	6.03e5	1.57e5	2.30e4	3.35e4	3.70e4	6.31e4	3.64e3	6.85e3	4.87e3
JM-1	DC			3619	m	205642	7.45e4	5.73e4	1.58e4	4.40e4	8.51e3	3.63e4	1.29e5	4.19e4	5.96e4	1.04e5	6.79e4	9.55e3	1.70e4	1.23e4
JM-1	DC			3631	m	205643	6.89e4	5.79e4	1.41e4	3.93e4	8.71e3	3.72e4	8.08e4	4.17e4	6.79e4	1.19e5	7.05e4	1.32e4	2.59e4	2.03e4
MO-4	COCH			10098.30	ft	205644	2.25e4	2.24e4	6.06e3	1.45e4	3.48e3	1.03e4	1.72e5	1.00e5	1.34e5	1.10e5	7.12e4	1.85e4	4.06e4	2.58e4
MO-4	COCH			10100.25	ft	205645	1.60e4	1.70e4	4.93e3	1.18e4	2.30e3	7.56e3	7.98e4	3.74e4	4.97e4	4.06e4	2.58e4	6.68e3	1.43e4	9.70e3
MO-8	COCH			11975.25	ft	205646	1.34e5	5.47e4	3.19e4	7.92e4	3.69e4	1.22e5	5.86e5	3.34e5	5.55e5	1.12e6	6.28e5	1.00e5	1.53e5	1.08e5
MO-8	COCH			11975.70	ft	205647	1.13e5	5.16e4	3.01e4	7.51e4	3.23e4	1.11e5	6.68e5	4.05e5	6.58e5	1.34e6	7.45e5	1.25e5	1.94e5	1.37e5
MZ-1	DC			6100	m	205675	8.54e4	8.12e4	1.81e4	5.94e4	9.85e3	3.46e4	4.00e5	1.53e5	1.79e5	1.87e5	1.63e5	2.00e4	4.22e4	2.71e4
SM-1	DC			2056	m	205685	9.67e3	4.78e3	3.02e3	5.55e3	4.66e3	7.01e3	4.35e4	1.02e4	9.97e3	1.20e4	1.17e4	1.45e3	1.91e3	1.04e3
SM-1	DC			2086	m	205686	2.34e3	1.53e3	5.22e2	1.44e3	3.06e2	1.10e3	4.27e3	1.35e3	1.59e3	2.18e3	1.75e3	2.98e2	4.38e2	3.25e2
SM-1	DC			2101	m	205687	2.42e4	5.09e3	8.78e3	1.22e4	2.49e4	2.66e4	1.46e5	1.13e5	9.94e4	1.31e5	1.35e5	7.37e4	1.05e5	4.98e4
TAN TAN -1	DC	Bitumen?	15210	15210	ft	205729	3.39e4	2.57e4	5.71e3	1.74e4	2.75e3	8.46e3	9.76e3	3.86e3	4.50e3	5.20e3	3.60e3	8.47e2	1.36e3	8.94e2
TAN TAN -1	DC			16460	ft	205730	1.72e4	1.18e4	2.89e3	8.81e3	1.65e3	4.83e3	8.06e3	3.18e3	3.91e3	4.58e3	3.11e3	7.59e2	1.36e3	1.08e3
TKM-201	COCH	A		3442.00	m	205731	1.09e6	1.36e6	1.83e5	8.37e5	7.49e4	2.20e5	3.52e6	1.43e6	1.91e6	2.50e6	1.96e6	1.53e5	3.81e5	2.71e5
TKM-201	COCH	B		3442.00	m	205732	2.43e6	2.89e6	3.96e5	1.83e6	1.80e5	4.39e5	6.64e6	2.49e6	3.42e6	4.61e6	3.54e6	3.13e5	7.27e5	5.06e5
Sidi Rhalem	Oil					205733	4.18e5	3.41e5	9.54e4	2.98e5	5.52e4	2.72e5	4.18e5	7.84e5	4.46e5	1.32e6	1.26e6	2.76e5	4.80e5	4.47e5
SM-1	Oil					205734	7.21e6	3.90e6	1.61e6	3.66e6	1.03e6	2.82e6	3.34e5	4.48e5	3.01e5	9.39e5	6.07e5	2.37e5	4.87e5	9.47e4
Ait Moussa	OC			345	m	207488	6.94e6	3.76e6	1.67e6	4.29e6	8.95e5	2.49e6	1.78e7	6.38e6	7.32e6	1.59e7	1.10e7	9.49e5	1.41e6	7.92e5
Ait Moussa	OC			371	m	207489	2.88e6	1.52e6	6.75e5	1.69e6	4.11e5	1.10e6	7.65e6	3.19e6	3.82e6	8.28e6	5.52e6	5.73e5	9.09e5	4.91e5
Ait Moussa	OC			383	m	207490	1.30e6	3.71e5	1.61e5	6.55e5	9.84e4	3.49e5	7.78e6	3.38e6	4.52e6	1.03e7	7.57e6	6.96e5	1.15e6	6.67e5

Table 14. continued, GCMS SIR of aromatic compounds (peak height)

						m/z	206							219	184	198			253	
Well	Sample type	Sample info	Upper Depth	Lower Depth	Depth units	APT ID	1,3- + 2,10- + 3,9- + 3,10-DMP	1,6- + 2,5- + 2,9-DMP	1,7-DMP	2,3-DMP	1,9- + 4,9- + 4,10-DMP	1,8-DMP	1,2-DMP	Retene	DBT	4-MDBT	(3+2)-MDBT	1-MDBT	C21MA	C22MA
IFNI-1	DC		3010	3020	ft	205636	3.37e4	1.76e4	1.72e4	6.18e3	9.41e3	4.30e3	2.39e3	1.42e3	7.87e3	2.06e4	1.08e4	7.62e3	9.50e1	5.90e1
IFNI-1	DC		3020	3030	ft	205637	1.00e6	5.35e5	7.88e5	1.78e5	2.68e5	1.33e5	9.77e4	1.08e5	8.29e5	1.28e6	6.64e5	3.59e5	4.75e3	1.72e3
IFNI-1	DC		3360	3370	ft	205638	1.77e6	8.61e5	1.08e6	2.81e5	4.46e5	2.43e5	1.35e5	3.87e4	6.35e5	1.22e6	8.21e5	4.46e5	1.00e3	6.47e2
JM-1	DC			2128	m	205640	1.12e6	5.30e5	5.22e5	2.44e5	2.97e5	1.48e5	1.24e5	4.81e4	4.14e4	7.86e4	8.52e4	5.33e4	4.71e4	4.85e4
JM-1	DC			2134	m	205641	1.94e4	1.72e4	7.94e4	5.47e3	8.77e3	8.35e3	1.38e4	2.86e4	2.87e4	9.90e3	6.33e3	5.63e3	4.63e2	4.84e2
JM-1	DC			3619	m	205642	8.89e4	4.72e4	5.06e4	1.37e4	3.45e4	1.88e4	1.07e4	3.42e3	9.46e4	1.54e5	5.91e4	3.77e4	1.46e3	1.21e3
JM-1	DC			3631	m	205643	1.38e5	7.54e4	8.83e4	1.75e4	5.14e4	2.79e4	1.46e4	5.89e3	5.29e4	2.34e5	1.21e5	6.58e4	4.52e3	3.28e3
MO-4	COCH			10098.30	ft	205644	8.88e4	4.37e4	3.55e4	2.02e4	1.72e4	6.94e3	4.82e3	6.92e3	2.20e4	4.60e4	2.75e4	9.90e3	3.59e2	2.08e2
MO-4	COCH			10100.25	ft	205645	3.05e4	1.50e4	1.34e4	6.62e3	5.63e3	2.50e3	1.80e3	4.25e3	1.19e4	2.10e4	1.37e4	5.33e3	1.38e2	8.60e1
MO-8	COCH			11975.25	ft	205646	9.88e5	5.01e5	6.96e5	1.23e5	3.94e5	2.20e5	1.92e5	4.07e4	4.61e5	1.34e6	8.90e5	7.29e5	4.89e4	2.54e4
MO-8	COCH			11975.70	ft	205647	1.24e6	6.31e5	8.57e5	1.50e5	4.87e5	2.70e5	2.31e5	4.83e4	5.20e5	1.49e6	1.05e6	8.65e5	6.34e4	3.12e4
MZ-1	DC			6100	m	205675	1.30e5	6.58e4	5.81e4	3.20e4	3.08e4	1.74e4	6.07e3	8.91e3	2.15e4	2.22e4	9.48e3	6.28e3	3.15e2	2.43e2
SM-1	DC			2056	m	205685	7.28e3	3.53e3	3.47e3	1.33e3	2.47e3	1.30e3	1.06e3	9.87e2	1.38e4	1.26e4	5.61e3	6.92e3	1.08e3	2.17e3
SM-1	DC			2086	m	205686	1.66e3	7.85e2	8.50e2	2.71e2	5.25e2	2.38e2	2.02e2	6.38e2	4.74e2	8.50e2	4.57e2	3.30e2	1.12e2	7.20e1
SM-1	DC			2101	m	205687	2.87e5	1.79e5	2.14e5	7.08e4	1.40e5	8.35e4	6.16e4	3.51e4	5.70e4	1.95e5	8.15e4	7.51e4	4.44e4	2.60e4
TAN TAN -1	DC	Bitumen?	15210	15210	ft	205729	5.07e3	2.20e3	2.44e3	7.09e2	9.92e2	5.53e2	3.31e2	1.31e3	1.66e3	2.51e3	1.16e3	7.75e2	4.04e2	2.11e2
TAN TAN -1	DC			16460	ft	205730	4.50e3	2.18e3	2.34e3	6.55e2	8.78e2	4.60e2	3.18e2	1.43e3	1.23e3	1.81e3	7.87e2	6.03e2	1.24e2	1.00e2
TKM-201	COCH	A		3442.00	m	205731	1.57e6	7.70e5	7.69e5	2.90e5	5.18e5	2.36e5	1.07e5	1.29e4	2.26e5	6.30e5	2.18e5	1.25e5	7.49e2	6.68e2
TKM-201	COCH	B		3442.00	m	205732	3.04e6	1.48e6	1.42e6	5.50e5	9.82e5	4.36e5	2.12e5	2.31e4	4.20e5	1.11e6	3.99e5	2.36e5	7.38e2	1.18e3
Sidi Rhalem	Oil					205733	1.70e6	9.55e5	1.35e6	2.03e5	5.74e5	3.47e5	1.76e5	5.11e4	5.68e5	1.45e6	8.93e5	7.91e5	6.23e4	4.68e4
SM-1	Oil					205734	1.12e6	7.91e5	5.63e5	1.17e5	4.33e5	1.99e5	9.11e4	1.04e5	1.25e6	1.97e6	1.82e6	1.36e6	4.63e4	2.21e4
Ait Moussa	OC			345	m	207488	8.88e6	3.66e6	3.33e6	1.19e6	2.98e6	1.46e6	8.87e5	8.17e4	1.14e6	3.53e6	8.59e5	9.95e5	2.54e4	1.81e4
Ait Moussa	OC			371	m	207489	5.49e6	2.25e6	1.96e6	7.19e5	1.92e6	8.86e5	4.99e5	5.37e4	5.66e5	1.81e6	3.57e5	4.68e5	1.55e4	1.14e4
Ait Moussa	OC			383	m	207490	7.15e6	3.04e6	2.95e6	9.39e5	2.38e6	1.34e6	6.10e5	4.69e4	1.65e4	7.75e4	1.06e4	2.20e4	1.11e4	8.37e3

Table 14. continued, GCMS SIR of aromatic compounds (peak height)

						m/z	253													231
Well	Sample type	Sample info	Upper Depth	Lower Depth	Depth units	APT ID	βSC27MA	βSC27DMA	βRC27MA+ βRC27DMA	αSC27MA	βSC28MA+ βSC28DMA+ αRC27DMA	αSC27DMA	αRC27MA	αSC28MA	βRC28MA+ βRC28DMA	βSC29MA+ βSC29DMA	αSC29MA	αRC28MA+ βRC29MA+ βRC29DMA	αRC29MA	C20TA
IFNI-1	DC		3010	3020	ft	205636	1.80e1	5.20e1	4.00e1	1.80e1	9.40e1	3.70e1	3.00e1	3.20e1	6.40e1	1.46e2	5.10e1	9.70e1	4.60e1	1.25e2
IFNI-1	DC		3020	3030	ft	205637	2.28e2	1.03e3	7.72e2	3.58e2	1.73e4	1.01e4	7.14e2	9.43e3	1.41e4	5.06e4	2.79e4	3.98e4	2.22e4	4.40e3
IFNI-1	DC		3360	3370	ft	205638	8.93e2	1.25e3	1.50e3	4.58e2	5.72e3	1.94e3	4.97e2	2.73e3	4.45e3	9.71e3	5.18e3	8.02e3	4.82e3	4.19e3
JM-1	DC			2128	m	205640	5.55e4	5.13e4	7.30e4	2.71e4	1.54e5	1.44e4	2.71e4	6.18e4	1.09e5	2.38e5	5.84e4	1.20e5	4.45e4	1.25e5
JM-1	DC			2134	m	205641	2.97e2	8.94e2	8.38e2	2.90e2	2.69e3	8.26e2	2.73e2	6.57e2	1.66e3	2.84e3	7.26e2	2.11e3	5.68e2	1.39e3
JM-1	DC			3619	m	205642	4.81e2	9.27e2	9.40e2	6.70e2	1.70e3	2.78e2	6.49e2	7.33e2	9.68e2	1.41e3	7.46e2	1.17e3	5.99e2	1.38e4
JM-1	DC			3631	m	205643	1.16e3	1.50e3	1.77e3	1.61e3	2.77e3	5.76e2	1.52e3	1.57e3	1.59e3	2.63e3	1.71e3	2.03e3	1.37e3	2.14e4
MO-4	COCH			10098.30	ft	205644	9.00e1	2.11e2	3.25e2	6.10e1	3.85e2	7.70e1	5.80e1	4.36e2	2.62e2	3.63e2	8.60e1	2.36e2	5.90e1	4.47e2
MO-4	COCH			10100.25	ft	205645	4.00e1	7.50e1	1.67e2	1.70e1	1.15e2	2.50e1	2.90e1	3.87e2	9.10e1	1.04e2	3.10e1	5.50e1	0.00e0	1.58e2
MO-8	COCH			11975.25	ft	205646	1.69e3	2.20e4	1.75e4	2.51e3	3.00e4	3.93e3	3.15e3	3.50e3	2.23e4	3.70e4	1.76e3	2.88e4	1.49e3	2.32e5
MO-8	COCH			11975.70	ft	205647	2.47e3	2.62e4	2.20e4	3.66e3	4.02e4	4.94e3	4.28e3	4.67e3	2.98e4	4.92e4	2.85e3	3.84e4	2.07e3	2.84e5
MZ-1	DC			6100	m	205675	5.50e2	8.76e2	1.07e3	4.05e2	2.00e3	2.50e2	3.43e2	6.47e2	1.20e3	1.50e3	4.08e2	9.87e2	3.31e2	4.86e2
SM-1	DC			2056	m	205685	5.66e2	1.07e3	1.42e3	1.12e3	2.78e3	2.98e2	1.47e3	5.97e3	2.71e3	1.57e3	1.38e3	4.90e3	1.42e3	1.10e3
SM-1	DC			2086	m	205686	4.90e1	7.20e1	1.02e2	4.80e1	1.67e2	4.50e1	5.40e1	8.50e1	1.03e2	1.26e2	5.10e1	9.60e1	4.90e1	7.80e1
SM-1	DC			2101	m	205687	2.98e3	2.28e4	2.06e4	3.03e3	3.35e4	4.78e3	2.79e3	3.90e3	2.45e4	2.35e4	2.58e3	1.97e4	2.04e3	1.19e5
TAN TAN -1	DC	Bitumen?	15210	15210	ft	205729	1.03e2	9.90e1	1.47e2	6.30e1	3.50e2	4.50e1	7.90e1	2.88e2	3.14e2	4.61e2	3.03e2	2.70e2	2.01e2	2.70e2
TAN TAN -1	DC			16460	ft	205730	7.70e1	1.08e2	1.13e2	6.50e1	2.93e2	3.30e1	6.70e1	3.77e2	2.67e2	5.21e2	3.15e2	2.79e2	2.20e2	1.95e2
TKM-201	COCH	A		3442.00	m	205731	1.22e2	2.50e2	2.60e2	6.70e1	3.96e2	8.70e1	8.60e1	1.04e2	2.36e2	3.50e2	8.00e1	3.13e2	8.70e1	8.20e3
TKM-201	COCH	B		3442.00	m	205732	1.98e2	3.35e2	2.69e2	1.49e2	3.84e2	1.09e2	1.71e2	1.76e2	2.36e2	4.01e2	1.66e2	2.88e2	1.16e2	1.87e4
Sidi Rhalem	Oil					205733	6.01e4	2.40e5	1.99e5	8.81e4	3.09e5	4.54e4	7.97e4	6.05e4	2.04e5	2.94e5	6.36e4	1.99e5	4.85e4	1.24e5
SM-1	Oil					205734	8.01e3	1.43e4	1.41e4	5.31e3	2.16e4	2.34e3	4.36e3	6.67e3	1.32e4	1.37e4	3.27e3	8.16e3	2.51e3	5.67e4
Ait Moussa	OC			345	m	207488	6.16e3	2.40e4	1.93e4	6.65e3	2.81e4	7.99e3	6.34e3	6.17e3	1.48e4	2.74e4	5.59e3	1.72e4	3.96e3	2.21e5
Ait Moussa	OC			371	m	207489	8.08e3	3.36e4	2.90e4	8.19e3	3.81e4	1.16e4	8.16e3	6.94e3	1.75e4	2.97e4	5.82e3	2.05e4	4.41e3	1.20e5
Ait Moussa	OC			383	m	207490	3.59e3	1.42e4	1.19e4	3.91e3	1.74e4	4.92e3	3.71e3	3.35e3	9.30e3	1.51e4	2.85e3	1.09e4	2.14e3	1.33e5

Table 14. continued, GCMS SIR of aromatic compounds (peak height)

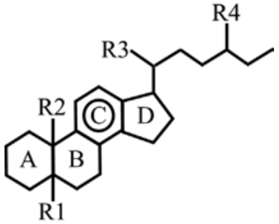
						m/z	231										245			
Well	Sample type	Sample info	Upper Depth	Lower Depth	Depth units	APT ID	C21TA	SC26TA	RC26TA+ SC27TA	M1	M2	SC28TA	RC27TA	M3	M4	RC28TA	3MS-TA	4MS-TA	2,24DMS-TA	3,24DMS+3M R-TA
IFNI-1	DC		3010	3020	ft	205636	9.10e1	7.00e1	1.59e2	0.00e0	0.00e0	1.61e2	5.60e1	0.00e0	0.00e0	2.00e2	0.00e0	0.00e0	0.00e0	4.50e1
IFNI-1	DC		3020	3030	ft	205637	1.60e3	5.60e2	8.13e3	9.10e1	3.34e2	1.11e4	5.32e3	3.83e2	2.70e2	1.49e4	4.88e2	6.05e2	6.01e2	6.14e3
IFNI-1	DC		3360	3370	ft	205638	3.33e3	3.62e3	2.20e4	8.73e2	2.41e3	1.15e4	1.30e4	2.68e3	4.04e3	1.59e4	1.16e3	3.89e3	1.54e3	8.15e3
JM-1	DC			2128	m	205640	1.03e5	1.06e5	3.89e5	1.14e4	3.07e4	3.26e5	1.68e5	2.96e4	5.22e4	3.80e5	1.59e4	8.22e4	1.44e4	5.74e4
JM-1	DC			2134	m	205641	9.69e2	4.31e3	1.62e4	1.54e2	5.90e2	8.45e3	7.28e3	5.64e2	9.64e2	1.07e4	7.60e2	1.38e3	5.60e2	2.84e3
JM-1	DC			3619	m	205642	1.12e4	1.97e3	4.33e3	1.41e2	2.11e2	3.73e3	1.67e3	2.96e2	4.67e2	4.58e3	3.59e2	1.82e3	1.62e2	5.54e2
JM-1	DC			3631	m	205643	2.29e4	3.33e3	7.62e3	2.37e2	3.64e2	6.82e3	2.79e3	5.16e2	8.27e2	7.16e3	6.91e2	3.40e3	3.94e2	1.09e3
MO-4	COCH			10098.30	ft	205644	3.61e2	1.48e2	6.53e2	3.80e1	7.30e1	4.80e2	3.16e2	6.80e1	1.26e2	6.09e2	2.60e1	1.08e2	4.00e1	1.21e2
MO-4	COCH			10100.25	ft	205645	1.23e2	0.00e0	1.32e2	0.00e0	0.00e0	7.40e1	7.80e1	0.00e0	0.00e0	8.50e1	0.00e0	0.00e0	0.00e0	4.10e1
MO-8	COCH			11975.25	ft	205646	1.81e5	2.46e4	1.50e5	6.04e3	1.53e4	1.62e5	7.30e4	1.52e4	2.53e4	1.91e5	5.10e3	2.72e4	6.58e3	2.30e4
MO-8	COCH			11975.70	ft	205647	2.25e5	3.07e4	1.88e5	6.67e3	1.87e4	2.07e5	9.36e4	1.92e4	3.25e4	2.58e5	6.39e3	3.51e4	8.65e3	3.04e4
MZ-1	DC			6100	m	205675	4.49e2	2.80e2	8.51e2	4.50e1	8.10e1	3.84e2	3.89e2	6.70e1	1.12e2	4.11e2	5.60e1	9.40e1	3.50e1	1.62e2
SM-1	DC			2056	m	205685	1.14e3	5.14e2	3.06e3	1.00e2	2.92e2	1.90e3	1.58e3	3.67e2	6.44e2	2.54e3	8.70e1	2.88e2	1.99e2	6.89e2
SM-1	DC			2086	m	205686	7.40e1	9.90e1	2.16e2	0.00e0	0.00e0	1.44e2	1.22e2	7.40e1	8.60e1	1.69e2	0.00e0	0.00e0	0.00e0	0.00e0
SM-1	DC			2101	m	205687	1.30e5	5.73e4	3.64e5	1.26e4	3.39e4	2.18e5	1.85e5	3.48e4	6.85e4	2.83e5	9.33e3	2.51e4	1.73e4	6.36e4
TAN TAN -1	DC	Bitumen?	15210	15210	ft	205729	2.49e2	4.60e2	3.63e3	6.80e1	2.01e2	2.71e3	1.62e3	2.13e2	4.75e2	3.09e3	2.23e2	2.87e2	1.98e2	1.39e3
TAN TAN -1	DC			16460	ft	205730	1.56e2	2.58e2	1.82e3	0.00e0	0.00e0	1.41e3	9.07e2	5.20e1	6.10e1	1.64e3	7.30e1	8.80e1	7.20e1	6.40e2
TKM-201	COCH	A		3442.00	m	205731	6.63e3	4.22e2	1.10e3	0.00e0	0.00e0	9.38e2	5.08e2	1.34e2	1.66e2	9.95e2	9.80e1	2.21e2	5.20e1	2.13e2
TKM-201	COCH	B		3442.00	m	205732	1.63e4	9.01e2	1.28e3	0.00e0	0.00e0	9.12e2	5.62e2	2.59e2	2.55e2	7.81e2	2.22e2	2.89e2	0.00e0	3.14e2
Sidi Rhalem	Oil					205733	1.35e5	4.19e5	1.21e6	1.52e4	4.49e4	6.76e5	5.00e5	4.22e4	9.62e4	7.63e5	1.06e5	2.58e5	5.46e4	2.58e5
SM-1	Oil					205734	3.45e4	8.56e3	2.96e4	5.53e2	1.32e3	1.06e4	1.06e4	1.34e3	2.39e3	1.07e4	1.15e3	2.33e3	1.03e3	4.01e3
Ait Moussa	OC			345	m	207488	1.84e5	6.74e4	1.83e5	7.70e3	2.20e4	1.16e5	7.50e4	2.21e4	3.39e4	1.39e5	1.31e4	3.46e4	9.13e3	3.66e4
Ait Moussa	OC			371	m	207489	1.03e5	7.88e4	2.10e5	9.92e3	2.69e4	1.09e5	8.33e4	2.73e4	4.00e4	1.31e5	1.32e4	5.02e4	9.75e3	3.81e4
Ait Moussa	OC			383	m	207490	1.23e5	5.52e4	1.53e5	6.42e3	1.71e4	8.56e4	6.59e4	1.86e4	2.69e4	1.09e5	9.28e3	2.72e4	6.35e3	2.56e4

Table 14. continued, GCMS SIR of aromatic compounds (peak height)

						m/z	245													
Well	Sample type	Sample info	Upper Depth	Lower Depth	Depth units	APT ID	4,24DMS+4MR-TA	D1-TA	3M24ES-TA	D2-TA	4M24ES-TA	3,24DMR-TA	4,24DMR-TA	D3-TA	D4-TA	2M24ER-TA	3M24ER-TA	D5-TA	4M24ER-TA	D6-TA
IFNI-1	DC		3010	3020	ft	205636	5.90e1	3.50e1	4.70e1	1.34e2	1.13e2	0.00e0	0.00e0	9.60e1	1.00e2	3.40e1	4.60e1	0.00e0	9.80e1	1.01e2
IFNI-1	DC		3020	3030	ft	205637	2.87e3	2.70e2	1.39e4	9.32e2	6.73e3	0.00e0	1.88e3	4.23e2	1.73e3	8.86e2	1.03e4	5.82e2	6.12e3	6.20e2
IFNI-1	DC		3360	3370	ft	205638	1.33e4	5.43e3	5.79e3	1.57e4	8.21e3	5.64e3	7.85e3	1.68e4	2.09e4	1.40e3	5.49e3	1.53e4	1.01e4	2.83e4
JM-1	DC			2128	m	205640	1.19e5	4.99e4	6.83e4	1.27e5	7.66e4	3.35e4	6.68e4	1.23e5	1.49e5	1.89e4	6.11e4	1.07e5	7.98e4	2.07e5
JM-1	DC			2134	m	205641	3.08e3	5.28e2	2.10e3	1.34e3	2.24e3	2.03e3	2.06e3	1.84e3	2.38e3	1.21e3	2.11e3	1.14e3	2.30e3	1.64e3
JM-1	DC			3619	m	205642	1.92e3	4.59e2	8.48e2	1.08e3	1.25e3	4.41e2	8.34e2	1.28e3	1.40e3	3.49e2	7.46e2	8.71e2	1.22e3	1.79e3
JM-1	DC			3631	m	205643	3.33e3	8.27e2	1.49e3	1.90e3	2.40e3	7.55e2	1.65e3	2.11e3	2.27e3	6.97e2	1.26e3	1.43e3	2.10e3	2.77e3
MO-4	COCH			10098.30	ft	205644	2.24e2	7.50e1	1.46e2	2.09e2	1.50e2	9.40e1	1.34e2	2.21e2	2.66e2	5.80e1	1.24e2	2.38e2	1.75e2	3.86e2
MO-4	COCH			10100.25	ft	205645	0.00e0	3.40e1	4.00e1	5.20e1	4.00e1	0.00e0	3.90e1	5.00e1	4.80e1	0.00e0	3.10e1	3.70e1	4.60e1	5.70e1
MO-8	COCH			11975.25	ft	205646	6.38e4	2.52e4	3.32e4	5.84e4	5.19e4	1.57e4	3.60e4	6.06e4	7.57e4	9.74e3	2.92e4	5.02e4	5.07e4	9.70e4
MO-8	COCH			11975.70	ft	205647	8.13e4	3.18e4	4.29e4	7.51e4	6.43e4	1.99e4	4.69e4	7.91e4	9.69e4	1.36e4	3.71e4	6.81e4	6.94e4	1.25e5
MZ-1	DC			6100	m	205675	2.16e2	8.90e1	1.11e2	2.16e2	1.26e2	9.50e1	1.28e2	1.72e2	2.20e2	5.40e1	9.40e1	1.51e2	1.42e2	2.69e2
SM-1	DC			2056	m	205685	8.18e2	3.85e2	5.29e2	9.93e2	6.31e2	4.05e2	5.52e2	9.67e2	1.14e3	1.85e2	6.09e2	8.63e2	7.81e2	1.62e3
SM-1	DC			2086	m	205686	0.00e0	6.10e1	0.00e0	1.12e2	0.00e0	0.00e0	0.00e0	0.00e0	1.53e2	0.00e0	8.40e1	1.13e2	7.40e1	1.05e2
SM-1	DC			2101	m	205687	8.39e4	3.87e4	4.81e4	9.95e4	6.27e4	3.94e4	4.63e4	9.56e4	1.21e5	1.66e4	5.16e4	9.08e4	7.16e4	1.67e5
TAN TAN -1	DC	Bitumen?	15210	15210	ft	205729	1.01e3	4.27e2	1.22e3	1.02e3	1.20e3	1.01e3	5.55e2	8.94e2	1.23e3	2.59e2	1.38e3	8.42e2	9.63e2	1.50e3
TAN TAN -1	DC			16460	ft	205730	3.12e2	5.00e1	4.77e2	1.34e2	1.18e3	9.47e2	1.81e2	9.80e1	8.50e1	8.70e1	6.17e2	6.80e1	2.23e2	1.44e2
TKM-201	COCH	A		3442.00	m	205731	3.60e2	1.37e2	2.43e2	3.46e2	3.06e2	1.67e2	1.88e2	3.75e2	4.27e2	1.00e2	2.28e2	2.51e2	3.16e2	5.28e2
TKM-201	COCH	B		3442.00	m	205732	2.47e2	1.74e2	2.82e2	1.85e2	3.12e2	2.73e2	2.03e2	3.30e2	3.53e2	9.50e1	2.02e2	1.66e2	2.58e2	2.63e2
Sidi Rhalem	Oil					205733	4.23e5	1.01e5	1.78e5	2.76e5	1.94e5	1.17e5	2.25e5	2.68e5	3.21e5	4.60e4	1.99e5	2.14e5	1.94e5	4.41e5
SM-1	Oil					205734	4.08e3	1.19e3	2.14e3	2.78e3	2.14e3	1.68e3	1.98e3	2.36e3	3.00e3	6.10e2	1.78e3	1.92e3	1.89e3	3.22e3
Ait Moussa	OC			345	m	207488	6.69e4	2.17e4	2.88e4	5.68e4	3.68e4	2.01e4	3.49e4	5.83e4	6.77e4	9.69e3	2.86e4	4.74e4	3.60e4	8.40e4
Ait Moussa	OC			371	m	207489	8.94e4	2.64e4	2.64e4	7.55e4	4.23e4	2.23e4	4.97e4	7.46e4	9.34e4	9.79e3	2.65e4	6.12e4	4.19e4	1.12e5
Ait Moussa	OC			383	m	207490	4.86e4	1.51e4	1.79e4	4.09e4	2.38e4	1.38e4	2.57e4	4.40e4	4.99e4	6.61e3	1.93e4	3.55e4	2.33e4	6.24e4

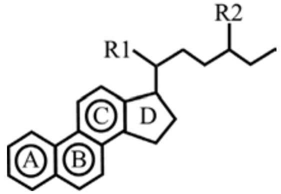
Abbreviation of aromatic biomarkers

C-ring monoaromatic steroid



Substituents				
R$_1$	R$_2$	R$_3$	R$_4$	Label
				C$_{21}$MA
				C$_{22}$MA
β(H)	CH_3	S(CH_3)	H	βSC$_{27}$MA
β(CH_3)	H	S(CH_3)	H	βSC$_{27}$DMA
β(CH_3)	H	RCH$_3$)	H	βRC$_{27}$DMA+
β(H)	CH_3	R(CH_3)	H	βRC$_{27}$MA
α(H)	CH_3	S(CH_3)	H	αSC$_{27}$MA
β(H)	CH_3	S(CH_3)	CH_3	βSC$_{28}$MA+
α(CH_3)	H	R(CH_3)	H	αRC$_{27}$DMA+
β(CH_3)	H	S(CH_3)	CH_3	βSC$_{28}$DMA
α(CH_3)	H	S(CH_3)	CH_3	αSC$_{27}$DMA
α(H)	CH_3	R(CH_3)	H	αRC$_{27}$MA
α(H)	CH_3	S(CH_3)	CH_3	αSC$_{28}$MA
β(H)	CH_3	R(CH_3)	CH_3	βRC$_{28}$MA+
β(CH_3)	H	R(CH_3)	CH_3	βRC$_{28}$DMA
β(H)	CH_3	S(CH_3)	C_2H_5	βSC$_{29}$MA+
β(CH_3)	H	S(CH_3)	C_2H_5	βSC$_{29}$DMA
α(H)	CH_3	S(CH_3)	C_2H_5	αSC$_{29}$MA
α(H)	CH_3	R(CH_3)	CH_3	αRC$_{28}$MA+
β(H)	CH_3	R(CH_3)	C_2H_5	βRC$_{29}$MA+
β(CH_3)	H	R(CH_3)	C_2H_5	βRC$_{29}$DMA
α(H)	CH_3	R(CH_3)	C_2H_5	αRC$_{29}$MA

ABC-ring triaromatic steroids



Substituents		
R$_1$	R$_2$	Label
CH_3	H	C$_{20}$TA
CH_3	CH_3	C$_{21}$TA
S(CH_3)	C_6H_{13}	SC$_{26}$TA
R(CH_3)	C_6H_{13}	RC$_{26}$TA+
S(CH3)	C_7H_{15}	SC$_{27}$TA
S(CH_3)	C_8H_{17}	SC$_{28}$TA
R(CH_3)	C_7H_{15}	RC$_{27}$TA
R(CH_3)	C_8H_{17}	RC$_{28}$TA

Polycyclic aromatic hydrocarbons and sulphur compounds

MN	Methylnaphthalene
EN	Ethylnaphthalene
DMN	Dimethylnaphthalene
TMN	Trimethylnaphthalene
TeMN	Tetramethylnaphthalene
P	Phenanthrene
MP	Methylphenanthrene
EP	Ethylphenanthrene
DMP	Dimethylphenanthrene
DBT	Dibenzothiophene
MDBT	Methyldibenzothiophene
DMDBT	Dimethyldibenzothiophene

Tri-aromatic steroids (TA)

3MS-TA	(20S) 3-methyl TA
4MS-TA	(20S) 4-methyl TA
2,24DMS-TA	(20S) 2,24-dimethyl TA
3,24DMS-TA	(20S) 3,24-dimethyl TA
3MR-TA	(20R) 3-methyl TA
4,24DMS-TA	(20S) 4,24-dimethyl TA
4MR-TA	(20R) 4-methyl TA
3M24ES-TA	(20S) 3-methyl-24-ethyl TA
4M24ES-TA	(20S) 4-methyl-24-ethyl TA
3,24DMR-TA	(20R) 3,24-dimethyl TA
4,24DMR-TA	(20R) 4,24-dimethyl TA
2M24ER-TA	(20R) 2-methyl-24-ethyl TA
3M24ER-TA	(20R) 3-methyl-24-ethyl TA
4M24ER-TA	(20R) 4-methyl-24-ethyl TA

Tri-aromatic dinosteroids

D1-TA	TA-dinosteroid #1
D2-TA	TA-dinosteroid #2
D3-TA	TA-dinosteroid #3
D4-TA	TA-dinosteroid #4
D5-TA	TA-dinosteroid #5
D6-TA	TA-dinosteroid #6
M1	23,24-dimethyl-triaromatic steroid #1
M2	23,24-dimethyl-triaromatic steroid #2
M3	23,24-dimethyl-triaromatic steroid #3
M4	23,24-dimethyl-triaromatic steroid #4

Table 15. GCMS SIR of aromatic compounds (peak area)

						m/z	142		156										170	
Well	Sample type	Sample info	Upper Depth	Lower Depth	Depth units	APT ID	2-MN	1-MN	2-EN	1-EN	2,6-DMN	2,7-DMN	1,3- + 1,7-DMN	1,6-DMN	2,3- + 1,4-DMN	1,5-DMN	1,2-DMN	1,8-DMN	1,3,7-TMN	1,3,6-TMN
IFNI-1	DC		3010	3020	ft	205636	6.36e5	5.53e5	3.69e4	3.76e4	9.06e4	2.46e5	3.56e5	3.87e5	8.61e4	1.20e5	6.40e4	1.02e3	1.17e5	1.85e5
IFNI-1	DC		3020	3030	ft	205637	1.43e7	8.83e6	1.30e6	6.39e5	7.23e6	1.04e7	1.47e7	1.55e7	5.95e6	4.12e6	2.85e6	4.89e4	8.11e6	1.60e7
IFNI-1	DC		3360	3370	ft	205638	6.66e6	4.86e6	4.67e5	3.01e5	2.40e6	3.48e6	5.65e6	5.54e6	2.05e6	1.48e6	9.75e5	1.60e4	2.75e6	5.03e6
JM-1	DC			2128	m	205640	3.04e5	2.56e5	5.61e4	3.12e4	2.12e5	2.52e5	5.09e5	4.07e5	1.86e5	1.37e5	1.06e5	2.24e3	3.11e5	4.26e5
JM-1	DC			2134	m	205641	7.40e5	9.57e5	7.76e4	6.12e4	4.10e5	4.09e5	9.54e5	1.08e6	4.31e5	7.27e5	3.85e5	1.76e4	3.30e5	4.22e5
JM-1	DC			3619	m	205642	3.86e5	3.93e5	6.27e4	5.01e4	2.37e5	3.26e5	7.47e5	5.99e5	2.64e5	2.03e5	1.31e5	2.15e3	6.20e5	1.00e6
JM-1	DC			3631	m	205643	3.21e5	2.82e5	5.09e4	3.82e4	1.91e5	2.72e5	5.58e5	4.90e5	2.08e5	1.53e5	1.01e5	4.30e3	5.72e5	1.01e6
MO-4	COCH			10098.30	ft	205644	2.16e5	1.28e5	2.45e4	1.12e4	8.80e4	1.25e5	2.17e5	1.67e5	8.56e4	4.23e4	3.77e4	9.56e2	1.84e5	3.09e5
MO-4	COCH			10100.25	ft	205645	3.45e5	1.93e5	2.99e4	1.45e4	1.13e5	1.49e5	2.54e5	2.06e5	9.84e4	5.47e4	4.43e4	5.48e2	1.44e5	2.25e5
MO-8	COCH			11975.25	ft	205646	6.31e4	5.54e4	1.53e4	1.38e4	5.15e4	6.94e4	2.47e5	2.12e5	1.35e5	1.18e5	1.03e5	7.80e2	6.22e5	1.07e6
MO-8	COCH			11975.70	ft	205647	5.21e4	4.50e4	1.11e4	5.24e3	3.86e4	5.42e4	1.68e5	1.45e5	9.61e4	7.50e4	7.37e4	6.09e2	5.32e5	9.43e5
MZ-1	DC			6100	m	205675	2.84e6	1.89e6	2.08e5	1.26e5	6.23e5	1.12e6	1.88e6	1.60e6	5.62e5	5.04e5	2.64e5	3.51e3	8.39e5	1.18e6
SM-1	DC			2056	m	205685	1.07e5	7.38e4	1.50e4	1.13e4	3.81e4	4.13e4	9.72e4	5.63e4	4.27e4	3.61e4	3.94e4	1.31e4	5.83e4	6.95e4
SM-1	DC			2086	m	205686	9.66e4	7.81e4	8.09e3	3.79e3	2.12e4	3.12e4	6.22e4	4.93e4	2.17e4	1.45e4	1.04e4	0.00e0	1.62e4	2.44e4
SM-1	DC			2101	m	205687	7.08e4	4.97e4	1.12e4	1.07e4	3.84e4	3.57e4	7.33e4	6.26e4	4.36e4	8.87e4	4.79e4	6.75e4	1.22e5	4.74e4
TAN TAN -1	DC	Bitumen?	15210	15210	ft	205729	1.72e5	2.38e5	9.85e4	4.58e4	5.56e5	6.79e5	1.30e6	8.80e5	4.24e5	2.18e5	1.11e5	0.00e0	4.04e5	5.04e5
TAN TAN -1	DC			16460	ft	205730	5.31e4	4.07e4	1.27e4	7.99e3	8.13e4	1.02e5	2.75e5	1.91e5	1.00e5	6.16e4	3.13e4	0.00e0	1.75e5	2.37e5
TKM-201	COCH	A		3442.00	m	205731	4.42e7	2.97e7	1.81e6	6.49e5	1.48e7	1.53e7	3.18e7	2.39e7	1.07e7	6.14e6	2.96e6	4.06e3	1.04e7	1.45e7
TKM-201	COCH	B		3442.00	m	205732	1.17e8	8.48e7	5.99e6	2.00e6	4.23e7	4.20e7	9.06e7	6.56e7	2.87e7	1.61e7	8.30e6	1.71e4	2.47e7	3.19e7
Sidi Rhalem	Oil					205733	2.39e5	2.46e5	9.74e4	5.29e4	4.54e5	4.14e5	1.16e6	1.07e6	5.01e5	4.40e5	3.36e5	2.28e3	2.77e6	4.38e6
SM-1	Oil					205734	1.98e8	1.56e8	2.56e7	1.14e7	7.60e7	7.13e7	1.57e8	1.31e8	3.99e7	3.84e7	2.88e7	4.21e5	6.01e7	8.72e7
Ait Moussa	OC			345	m	207488	1.21e8	1.28e8	1.43e7	1.03e7	3.59e7	4.89e7	1.46e8	1.21e8	4.64e7	3.59e7	2.32e7	9.32e4	5.34e7	7.85e7
Ait Moussa	OC			371	m	207489	1.30e7	1.66e7	2.98e6	2.73e6	8.58e6	1.16e7	3.69e7	3.07e7	1.33e7	1.07e7	6.41e6	3.17e4	2.09e7	3.02e7
Ait Moussa	OC			383	m	207490	5.64e6	6.81e6	5.25e5	5.33e5	1.71e6	2.39e6	1.12e7	8.60e6	3.77e6	3.77e6	1.30e6	1.61e4	7.10e6	1.26e7

Table 15. continued, GCMS SIR of aromatic compounds (peak area)

						m/z	170						178	192				206		
Well	Sample type	Sample info	Upper Depth	Lower Depth	Depth units	APT ID	1,3,5- + 1,4,6-TMN	2,3,6-TMN	1,2,7-TMN	1,6,7 + 1,2,6-TMN	1,2,4-TMN	1,2,5-TMN	P	3-MP	2-MP	9-MP	1-MP	2-EP+9-EP+ 3,6-DMP	1-EP	2,6- + 2,7- + 3,5-DMP
IFNI-1	DC		3010	3020	ft	205636	1.30e5	1.02e5	1.83e4	7.29e4	1.16e4	4.95e4	3.45e5	1.62e5	2.66e5	2.46e5	2.22e5	3.51e4	5.94e4	5.56e4
IFNI-1	DC		3020	3030	ft	205637	9.27e6	1.13e7	2.43e6	1.16e7	7.99e5	6.54e6	2.59e7	7.93e6	1.12e7	9.59e6	8.85e6	8.56e5	1.70e6	1.14e6
IFNI-1	DC		3360	3370	ft	205638	3.15e6	3.45e6	6.78e5	3.49e6	3.10e5	1.72e6	1.69e7	7.81e6	1.18e7	1.07e7	9.58e6	1.22e6	2.86e6	1.96e6
JM-1	DC			2128	m	205640	3.49e5	2.90e5	8.12e4	3.42e5	4.72e4	2.28e5	1.58e6	1.99e6	2.69e6	3.07e6	2.24e6	1.03e6	2.08e6	1.21e6
JM-1	DC			2134	m	205641	6.80e5	2.86e5	1.16e5	8.38e5	7.47e4	5.28e6	7.80e5	1.14e5	1.67e5	1.82e5	3.38e5	2.10e4	3.34e4	2.44e4
JM-1	DC			3619	m	205642	7.07e5	5.12e5	1.39e5	6.63e5	7.70e4	3.33e5	6.37e5	2.03e5	2.95e5	4.99e5	3.47e5	5.60e4	8.22e4	6.08e4
JM-1	DC			3631	m	205643	6.60e5	5.21e5	1.20e5	5.82e5	7.96e4	3.36e5	4.08e5	2.02e5	3.28e5	5.78e5	3.61e5	7.80e4	1.28e5	9.90e4
MO-4	COCH			10098.30	ft	205644	2.15e5	2.02e5	5.24e4	2.19e5	3.29e4	9.02e4	8.68e5	4.79e5	6.60e5	5.35e5	3.48e5	9.51e4	2.01e5	1.29e5
MO-4	COCH			10100.25	ft	205645	1.54e5	1.59e5	4.02e4	1.71e5	2.11e4	6.89e4	4.15e5	1.83e5	2.53e5	1.97e5	1.30e5	3.48e4	7.01e4	4.71e4
MO-8	COCH			11975.25	ft	205646	1.33e6	5.49e5	2.95e5	1.20e6	3.55e5	1.18e6	3.15e6	1.66e6	2.88e6	5.82e6	3.26e6	6.12e5	7.72e5	5.50e5
MO-8	COCH			11975.70	ft	205647	1.17e6	5.27e5	2.70e5	1.17e6	3.32e5	1.14e6	3.77e6	2.03e6	3.47e6	7.03e6	3.90e6	7.63e5	9.99e5	6.98e5
MZ-1	DC			6100	m	205675	8.92e5	8.89e5	1.56e5	8.96e5	9.64e4	3.58e5	2.40e6	8.03e5	1.04e6	1.00e6	9.43e5	1.16e5	2.20e5	1.58e5
SM-1	DC			2056	m	205685	9.35e4	4.63e4	2.67e4	8.22e4	4.13e4	6.58e4	2.26e5	5.01e4	5.07e4	6.02e4	5.93e4	8.38e3	9.15e3	5.65e3
SM-1	DC			2086	m	205686	2.45e4	1.59e4	5.27e3	2.01e4	3.47e3	1.09e4	2.46e4	7.32e3	9.15e3	1.18e4	1.01e4	1.85e3	2.32e3	1.91e3
SM-1	DC			2101	m	205687	2.38e5	5.63e4	8.89e4	1.48e5	2.50e5	2.75e5	8.11e5	5.94e5	5.30e5	7.04e5	7.28e5	4.29e5	5.41e5	2.50e5
TAN TAN -1	DC	Bitumen?	15210	15210	ft	205729	3.28e5	2.48e5	5.07e4	2.35e5	2.49e4	8.07e4	4.95e4	2.00e4	2.43e4	2.68e4	1.96e4	4.64e3	7.00e3	5.21e3
TAN TAN -1	DC			16460	ft	205730	1.74e5	1.16e5	2.50e4	1.24e5	1.45e4	4.65e4	4.27e4	1.62e4	2.19e4	2.36e4	1.70e4	4.73e3	6.69e3	5.28e3
TKM-201	COCH	A		3442.00	m	205731	1.05e7	1.18e7	1.55e6	1.01e7	6.88e5	1.99e6	1.73e7	6.86e6	9.28e6	1.20e7	9.84e6	8.47e5	1.85e6	1.27e6
TKM-201	COCH	B		3442.00	m	205732	2.40e7	2.60e7	3.32e6	2.29e7	1.67e6	4.15e6	3.30e7	1.25e7	1.66e7	2.24e7	1.76e7	1.67e6	3.51e6	2.35e6
Sidi Rhalem	Oil					205733	4.40e6	3.33e6	8.90e5	2.33e6	5.92e5	2.77e6	2.40e6	4.10e6	2.35e6	7.05e6	6.70e6	1.61e6	2.40e6	2.18e6
SM-1	Oil					205734	7.27e7	3.76e7	1.50e7	3.14e7	1.02e7	2.78e7	1.79e6	2.21e6	1.54e6	4.78e6	3.28e6	1.26e6	2.38e6	4.49e5
Ait Moussa	OC			345	m	207488	7.30e7	3.94e7	1.60e7	6.64e7	1.06e7	2.68e7	9.24e7	3.21e7	3.83e7	7.98e7	5.54e7	5.96e6	7.38e6	4.19e6
Ait Moussa	OC			371	m	207489	3.05e7	1.55e7	6.44e6	2.62e7	4.45e6	1.12e7	4.12e7	1.66e7	1.93e7	4.15e7	2.84e7	3.77e6	4.60e6	2.50e6
Ait Moussa	OC			383	m	207490	1.32e7	3.67e6	1.59e6	8.03e6	9.94e5	3.48e6	3.99e7	1.72e7	2.22e7	4.96e7	3.59e7	4.40e6	5.80e6	3.46e6

Table 15. continued, GCMS SIR of aromatic compounds (peak area)

						m/z	206							219	184	198			253	
Well	Sample type	Sample info	Upper Depth	Lower Depth	Depth units	APT ID	1,3- + 2,10- + 3,9- + 3,10-DMP	1,6- + 2,5- + 2,9-DMP	1,7-DMP	2,3-DMP	1,9- + 4,9- + 4,10-DMP	1,8-DMP	1,2-DMP	Retene	DBT	4-MDBT	(3+2)-MDBT	1-MDBT	C21MA	C22MA
IFNI-1	DC		3010	3020	ft	205636	2.40e5	1.36e5	1.25e5	3.88e4	6.27e4	3.04e4	1.58e4	8.21e3	7.37e4	1.43e5	8.53e4	4.68e4	4.83e2	2.69e2
IFNI-1	DC		3020	3030	ft	205637	6.33e6	4.22e6	3.99e6	9.73e5	1.61e6	6.86e5	5.23e5	5.56e5	4.52e6	6.40e6	3.31e6	1.80e6	2.16e4	1.37e4
IFNI-1	DC		3360	3370	ft	205638	1.07e7	5.92e6	5.38e6	1.46e6	2.27e6	1.23e6	6.98e5	2.06e5	3.46e6	6.24e6	4.25e6	2.25e6	6.27e3	3.07e3
JM-1	DC			2128	m	205640	7.19e6	3.67e6	2.72e6	1.37e6	1.63e6	8.13e5	6.81e5	3.11e5	2.53e5	4.40e5	4.78e5	2.94e5	2.39e5	3.85e5
JM-1	DC			2134	m	205641	1.23e5	1.51e5	4.08e5	2.93e4	5.34e4	4.23e4	6.78e4	1.40e5	1.45e5	4.89e4	3.20e4	2.74e4	2.71e3	3.79e3
JM-1	DC			3619	m	205642	5.45e5	3.11e5	2.49e5	6.95e4	1.69e5	9.44e4	5.23e4	1.97e4	4.68e5	7.41e5	2.89e5	1.82e5	7.17e3	8.71e3
JM-1	DC			3631	m	205643	8.42e5	4.81e5	4.41e5	9.12e4	2.64e5	1.40e5	7.40e4	3.38e4	2.55e5	1.11e6	5.87e5	3.20e5	2.27e4	2.32e4
MO-4	COCH			10098.30	ft	205644	5.47e5	2.82e5	1.81e5	9.80e4	8.97e4	3.39e4	2.35e4	3.45e4	1.13e5	2.21e5	1.38e5	4.96e4	1.92e3	1.59e3
MO-4	COCH			10100.25	ft	205645	1.89e5	9.82e4	6.70e4	3.34e4	2.94e4	1.22e4	9.02e3	2.06e4	6.26e4	1.04e5	6.82e4	2.67e4	7.04e2	4.36e2
MO-8	COCH			11975.25	ft	205646	6.28e6	3.25e6	3.60e6	6.23e5	2.06e6	1.10e6	9.59e5	2.51e5	2.51e6	6.88e6	4.60e6	3.80e6	2.42e5	1.45e5
MO-8	COCH			11975.70	ft	205647	7.98e6	4.12e6	4.46e6	7.89e5	2.55e6	1.38e6	1.20e6	3.04e5	2.91e6	8.12e6	5.45e6	4.55e6	3.09e5	1.77e5
MZ-1	DC			6100	m	205675	8.79e5	4.79e5	3.38e5	1.78e5	1.76e5	9.85e4	3.40e4	4.80e4	1.44e5	1.27e5	6.12e4	3.35e4	1.73e3	1.74e3
SM-1	DC			2056	m	205685	4.67e4	2.35e4	1.81e4	7.08e3	1.38e4	6.71e3	5.83e3	5.31e3	7.25e4	6.45e4	2.93e4	3.59e4	5.10e3	1.27e4
SM-1	DC			2086	m	205686	1.03e4	5.85e3	4.76e3	1.52e3	2.70e3	1.21e3	1.09e3	3.41e3	3.08e3	4.58e3	2.68e3	1.89e3	5.05e2	6.02e2
SM-1	DC			2101	m	205687	2.01e6	1.26e6	1.08e6	3.58e5	7.55e5	4.12e5	3.27e5	2.23e5	3.17e5	9.95e5	4.27e5	3.93e5	2.30e5	1.48e5
TAN TAN -1	DC	Bitumen?	15210	15210	ft	205729	3.15e4	1.59e4	1.47e4	3.89e3	6.18e3	2.65e3	1.85e3	6.66e3	9.01e3	1.29e4	6.26e3	4.17e3	1.94e3	1.24e3
TAN TAN -1	DC			16460	ft	205730	2.78e4	1.68e4	1.56e4	3.54e3	5.26e3	2.65e3	1.88e3	7.13e3	6.90e3	9.83e3	4.48e3	3.24e3	6.55e2	7.97e2
TKM-201	COCH	A		3442.00	m	205731	9.87e6	5.18e6	3.70e6	1.41e6	2.49e6	1.14e6	5.49e5	7.81e4	1.09e6	3.08e6	1.06e6	6.26e5	4.27e3	4.34e3
TKM-201	COCH	B		3442.00	m	205732	1.90e7	9.85e6	6.80e6	2.78e6	4.73e6	2.12e6	1.04e6	1.51e5	2.12e6	5.63e6	1.98e6	1.20e6	5.20e3	7.43e3
Sidi Rhalem	Oil					205733	1.09e7	6.31e6	6.91e6	1.06e6	3.02e6	1.78e6	9.18e5	3.04e5	3.15e6	7.79e6	4.62e6	4.18e6	3.16e5	3.06e5
SM-1	Oil					205734	7.32e6	5.38e6	2.89e6	6.20e5	2.32e6	1.01e6	4.60e5	5.43e5	6.67e6	1.03e7	8.98e6	6.99e6	2.20e5	1.58e5
Ait Moussa	OC			345	m	207488	5.52e7	2.48e7	1.69e7	6.16e6	1.52e7	7.58e6	4.62e6	6.13e5	6.64e6	1.88e7	4.60e6	5.53e6	1.37e5	1.23e5
Ait Moussa	OC			371	m	207489	3.39e7	1.56e7	1.03e7	3.75e6	1.00e7	4.72e6	2.68e6	3.96e5	3.17e6	9.49e6	1.90e6	2.45e6	8.38e4	7.93e4
Ait Moussa	OC			383	m	207490	4.36e7	2.00e7	1.47e7	4.67e6	1.23e7	6.68e6	3.12e6	3.45e5	9.41e4	4.19e5	5.79e4	1.12e5	6.03e4	5.82e4

Table 15. continued, GCMS SIR of aromatic compounds (peak area)

						m/z	253													231
Well	Sample type	Sample info	Upper Depth	Lower Depth	Depth units	APT ID	βSC27MA	βSC27DMA	βRC27MA+ βRC27DMA	αSC27MA	βSC28MA+ βSC28DMA+ αRC27DMA	αSC27DMA	αRC27MA	αSC28MA	βRC28MA+ βRC28DMA	βSC29MA+ βSC29DMA	αSC29MA	αRC28MA+ βRC29MA+ βRC29DMA	αRC29MA	C20TA
IFNI-1	DC		3010	3020	ft	205636	1.15e2	2.79e2	2.31e2	9.70e1	5.31e2	2.74e2	8.30e1	1.75e2	3.98e2	9.37e2	3.31e2	7.45e2	3.30e2	7.15e2
IFNI-1	DC		3020	3030	ft	205637	2.05e3	7.06e3	4.60e3	2.06e3	1.01e5	8.80e4	3.37e3	4.63e4	7.32e4	3.75e5	1.85e5	3.96e5	1.71e5	2.26e4
IFNI-1	DC		3360	3370	ft	205638	5.61e3	9.27e3	9.26e3	2.53e3	3.65e4	1.61e4	2.27e3	1.42e4	2.27e4	8.52e4	3.53e4	8.91e4	4.01e4	2.49e4
JM-1	DC			2128	m	205640	2.92e5	3.14e5	4.65e5	1.44e5	1.11e6	1.27e5	1.46e5	3.57e5	5.46e5	2.04e6	3.95e5	1.59e6	3.91e5	7.28e5
JM-1	DC			2134	m	205641	1.59e3	4.50e3	4.67e3	1.49e3	1.60e4	4.34e3	1.22e3	3.34e3	8.80e3	2.38e4	4.63e3	2.40e4	4.43e3	6.83e3
JM-1	DC			3619	m	205642	2.33e3	4.93e3	5.46e3	3.82e3	1.14e4	2.85e3	3.20e3	3.98e3	5.52e3	1.46e4	5.25e3	1.36e4	5.14e3	6.94e4
JM-1	DC			3631	m	205643	6.35e3	8.14e3	9.79e3	9.48e3	1.97e4	5.44e3	8.00e3	7.96e3	8.36e3	2.86e4	1.12e4	2.52e4	1.00e4	1.14e5
MO-4	COCH			10098.30	ft	205644	3.50e2	1.19e3	2.34e3	3.50e2	2.63e3	5.74e2	1.85e2	2.92e3	1.60e3	2.88e3	5.37e2	2.19e3	2.36e2	2.68e3
MO-4	COCH			10100.25	ft	205645	2.19e2	4.07e2	1.03e3	6.90e1	8.27e2	9.00e1	6.80e1	2.18e3	4.57e2	8.91e2	1.50e2	3.62e2	0.00e0	1.05e3
MO-8	COCH			11975.25	ft	205646	1.04e4	1.13e5	9.64e4	1.72e4	1.73e5	3.34e4	1.86e4	2.11e4	1.29e5	2.48e5	1.16e4	2.31e5	9.54e3	1.21e6
MO-8	COCH			11975.70	ft	205647	1.56e4	1.41e5	1.20e5	2.19e4	2.23e5	4.20e4	2.49e4	2.83e4	1.71e5	3.21e5	1.88e4	3.07e5	1.51e4	1.53e6
MZ-1	DC			6100	m	205675	2.82e3	4.85e3	6.04e3	2.25e3	1.35e4	1.96e3	1.83e3	3.52e3	9.85e3	1.27e4	3.01e3	1.18e4	2.54e3	2.28e3
SM-1	DC			2056	m	205685	2.86e3	5.67e3	7.57e3	5.40e3	2.28e4	1.67e3	6.55e3	2.94e4	2.89e4	1.04e4	1.01e4	4.07e4	1.06e4	5.89e3
SM-1	DC			2086	m	205686	3.55e2	4.49e2	6.33e2	2.22e2	1.23e3	2.51e2	3.22e2	4.14e2	5.82e2	1.10e3	3.05e2	4.92e2	3.62e2	3.44e2
SM-1	DC			2101	m	205687	1.65e4	1.23e5	1.16e5	1.98e4	1.90e5	4.16e4	1.48e4	2.21e4	1.46e5	1.82e5	1.82e4	1.76e5	1.42e4	6.68e5
TAN TAN -1	DC	Bitumen?	15210	15210	ft	205729	4.38e2	6.02e2	8.75e2	4.43e2	2.52e3	2.38e2	3.89e2	1.37e3	2.22e3	2.51e3	1.82e3	3.33e3	1.56e3	1.51e3
TAN TAN -1	DC			16460	ft	205730	4.07e2	5.75e2	6.52e2	3.21e2	2.35e3	1.05e2	2.49e2	1.76e3	2.00e3	2.66e3	2.25e3	3.32e3	1.87e3	1.07e3
TKM-201	COCH	A		3442.00	m	205731	5.42e2	1.30e3	1.39e3	2.23e2	2.53e3	2.78e2	4.13e2	3.94e2	1.49e3	2.84e3	5.16e2	2.55e3	3.86e2	4.58e4
TKM-201	COCH	B		3442.00	m	205732	8.47e2	2.03e3	1.72e3	7.82e2	2.34e3	6.77e2	7.60e2	8.19e2	1.31e3	3.86e3	1.05e3	3.10e3	3.84e2	1.09e5
Sidi Rhalem	Oil					205733	3.11e5	1.22e6	1.15e6	4.92e5	1.81e6	4.13e5	4.21e5	3.25e5	1.23e6	2.30e6	4.31e5	1.89e6	4.09e5	6.88e5
SM-1	Oil					205734	4.33e4	7.84e4	8.59e4	2.89e4	1.45e5	2.25e4	2.12e4	3.52e4	1.01e5	1.21e5	2.45e4	1.02e5	1.75e4	3.05e5
Ait Moussa	OC			345	m	207488	3.47e4	1.26e5	1.12e5	4.11e4	1.79e5	7.07e4	3.46e4	3.38e4	8.88e4	2.05e5	3.58e4	1.66e5	3.05e4	1.25e6
Ait Moussa	OC			371	m	207489	4.39e4	1.74e5	1.59e5	4.60e4	2.39e5	1.06e5	4.13e4	3.91e4	9.99e4	2.40e5	3.71e4	1.96e5	3.96e4	7.31e5
Ait Moussa	OC			383	m	207490	2.08e4	7.22e4	6.86e4	2.18e4	1.10e5	4.54e4	1.93e4	1.80e4	5.59e4	1.17e5	1.90e4	1.02e5	1.65e4	7.29e5

Table 15. continued, GCMS SIR of aromatic compounds (peak area)

						m/z	231										245			
Well	Sample type	Sample info	Upper Depth	Lower Depth	Depth units	APT ID	C21TA	SC26TA	RC26TA+ SC27TA	M1	M2	SC28TA	RC27TA	M3	M4	RC28TA	3MS-TA	4MS-TA	2,24DMS-TA	3,24DMS+3MR-TA
IFNI-1	DC		3010	3020	ft	205636	4.48e2	5.23e2	1.01e3	0.00e0	0.00e0	1.50e3	4.35e2	0.00e0	0.00e0	1.45e3	0.00e0	0.00e0	0.00e0	2.20e2
IFNI-1	DC		3020	3030	ft	205637	9.51e3	3.33e3	4.67e4	4.67e2	2.09e3	1.06e5	4.43e4	2.57e3	1.16e3	9.88e4	4.61e3	4.54e3	4.48e3	3.84e4
IFNI-1	DC		3360	3370	ft	205638	1.85e4	1.99e4	1.31e5	4.26e3	1.30e4	1.10e5	1.15e5	1.50e4	2.39e4	1.09e5	9.93e3	2.03e4	1.08e4	5.67e4
JM-1	DC			2128	m	205640	5.94e5	5.99e5	2.25e6	6.44e4	1.58e5	1.53e6	1.45e6	1.56e5	3.18e5	2.87e6	1.03e5	4.55e5	9.21e4	4.02e5
JM-1	DC			2134	m	205641	5.11e3	2.16e4	8.81e4	8.86e2	3.45e3	7.51e4	5.93e4	3.00e3	6.91e3	7.08e4	6.28e3	6.86e3	3.47e3	2.12e4
JM-1	DC			3619	m	205642	5.65e4	1.10e4	2.37e4	7.71e2	1.08e3	1.78e4	1.32e4	1.48e3	2.69e3	3.13e4	1.79e3	9.59e3	8.52e2	3.91e3
JM-1	DC			3631	m	205643	1.17e5	2.02e4	4.25e4	1.29e3	1.85e3	7.05e4	2.37e4	2.79e3	4.59e3	5.10e4	3.50e3	1.85e4	2.58e3	7.60e3
MO-4	COCH			10098.30	ft	205644	2.45e3	7.94e2	3.56e3	2.64e2	3.27e2	2.64e3	1.89e3	2.90e2	5.64e2	4.40e3	8.60e1	5.13e2	3.29e2	8.43e2
MO-4	COCH			10100.25	ft	205645	6.92e2	0.00e0	7.90e2	0.00e0	0.00e0	7.63e2	4.70e2	0.00e0	0.00e0	5.47e2	0.00e0	0.00e0	0.00e0	2.05e2
MO-8	COCH			11975.25	ft	205646	9.27e5	1.45e5	8.67e5	3.06e4	7.84e4	7.97e5	6.18e5	7.70e4	1.38e5	1.34e6	3.20e4	1.46e5	5.14e4	1.50e5
MO-8	COCH			11975.70	ft	205647	1.17e6	1.82e5	1.13e6	3.68e4	9.75e4	1.21e6	3.93e5	9.62e4	1.77e5	1.87e6	3.99e4	1.95e5	5.57e4	1.95e5
MZ-1	DC			6100	m	205675	2.99e3	1.60e3	4.84e3	3.86e2	3.98e2	3.57e3	3.09e3	3.08e2	5.70e2	2.75e3	2.80e2	4.60e2	1.28e2	9.22e2
SM-1	DC			2056	m	205685	6.09e3	2.76e3	1.77e4	3.68e2	1.68e3	1.86e4	1.36e4	1.83e3	4.03e3	1.71e4	2.97e2	1.52e3	1.22e3	4.49e3
SM-1	DC			2086	m	205686	4.19e2	6.27e2	1.26e3	0.00e0	0.00e0	1.34e3	6.80e2	2.23e2	4.60e2	1.15e3	0.00e0	0.00e0	0.00e0	0.00e0
SM-1	DC			2101	m	205687	6.88e5	3.24e5	2.08e6	6.51e4	1.84e5	1.07e6	1.63e6	1.82e5	4.23e5	1.89e6	6.66e4	1.33e5	1.45e5	4.20e5
TAN TAN -1	DC	Bitumen?	15210	15210	ft	205729	1.50e3	2.63e3	1.94e4	2.12e2	1.14e3	1.21e4	1.33e4	9.73e2	2.42e3	2.03e4	1.23e3	1.57e3	1.37e3	8.84e3
TAN TAN -1	DC			16460	ft	205730	8.73e2	1.33e3	1.02e4	0.00e0	0.00e0	1.26e4	7.34e3	2.23e2	2.82e2	1.09e4	3.88e2	5.63e2	3.44e2	3.80e3
TKM-201	COCH	A		3442.00	m	205731	4.24e4	2.80e3	7.44e3	0.00e0	0.00e0	4.06e3	4.18e3	6.43e2	8.82e2	7.70e3	4.85e2	1.21e3	2.82e2	1.60e3
TKM-201	COCH	B		3442.00	m	205732	1.05e5	6.56e3	9.28e3	0.00e0	0.00e0	1.01e4	4.97e3	7.86e2	1.38e3	5.73e3	1.32e3	1.40e3	0.00e0	1.80e3
Sidi Rhalem	Oil					205733	7.02e5	2.28e6	7.02e6	8.03e4	2.78e5	3.35e6	4.24e6	2.10e5	5.52e5	5.57e6	6.41e5	1.36e6	3.88e5	1.80e6
SM-1	Oil					205734	1.91e5	4.67e4	1.64e5	2.95e3	7.32e3	6.09e4	8.76e4	7.43e3	1.33e4	7.21e4	6.69e3	1.28e4	6.60e3	2.58e4
Ait Moussa	OC			345	m	207488	1.05e6	3.98e5	1.06e6	4.35e4	1.17e5	1.11e6	6.34e5	1.18e5	2.08e5	9.30e5	9.50e4	1.87e5	7.05e4	2.47e5
Ait Moussa	OC			371	m	207489	5.92e5	4.36e5	1.18e6	5.58e4	1.36e5	1.02e6	7.12e5	1.46e5	2.33e5	8.62e5	1.05e5	2.67e5	7.00e4	2.60e5
Ait Moussa	OC			383	m	207490	6.58e5	2.94e5	8.68e5	3.36e4	9.44e4	8.37e5	5.54e5	9.93e4	1.66e5	6.95e5	6.48e4	1.41e5	4.68e4	1.69e5

Table 15. continued, GCMS SIR of aromatic compounds (peak area)

						m/z	245													
Well	Sample type	Sample info	Upper Depth	Lower Depth	Depth units	APT ID	4,24DMS+4MR-TA	D1-TA	3M24ES-TA	D2-TA	4M24ES-TA	3,24DMR-TA	4,24DMR-TA	D3-TA	D4-TA	2M24ER-TA	3M24ER-TA	D5-TA	4M24ER-TA	D6-TA
IFNI-1	DC		3010	3020	ft	205636	3.52e2	1.75e2	1.31e2	1.33e3	8.36e2	0.00e0	0.00e0	5.38e2	4.23e2	1.50e2	3.04e2	0.00e0	5.17e2	3.46e2
IFNI-1	DC		3020	3030	ft	205637	1.75e4	1.58e3	1.31e5	5.09e3	6.14e4	0.00e0	1.62e4	1.88e3	1.42e4	5.61e3	7.00e4	3.50e3	4.47e4	3.72e3
IFNI-1	DC		3360	3370	ft	205638	7.70e4	3.61e4	5.79e4	8.60e4	5.08e4	5.30e4	6.81e4	9.09e4	1.12e5	9.34e3	5.81e4	1.05e5	6.71e4	1.52e5
JM-1	DC			2128	m	205640	7.41e5	2.89e5	6.20e5	7.48e5	7.56e5	3.48e5	6.00e5	6.68e5	8.17e5	1.42e5	5.37e5	7.70e5	5.35e5	1.23e6
JM-1	DC			2134	m	205641	1.91e4	2.92e3	1.96e4	8.12e3	1.36e4	1.73e4	1.82e4	1.06e4	1.25e4	7.34e3	2.01e4	8.84e3	1.48e4	9.89e3
JM-1	DC			3619	m	205642	1.03e4	2.61e3	7.79e3	7.74e3	1.22e4	3.55e3	4.10e3	6.54e3	7.22e3	2.39e3	6.40e3	6.61e3	8.24e3	1.06e4
JM-1	DC			3631	m	205643	2.05e4	5.12e3	1.29e4	1.34e4	2.07e4	5.41e3	1.46e4	1.13e4	1.29e4	5.72e3	1.22e4	1.06e4	1.43e4	1.68e4
MO-4	COCH			10098.30	ft	205644	1.25e3	6.06e2	9.00e2	1.44e3	8.52e2	8.08e2	7.32e2	1.12e3	1.54e3	3.68e2	6.30e2	1.76e3	1.38e3	2.46e3
MO-4	COCH			10100.25	ft	205645	0.00e0	1.30e2	1.34e2	2.67e2	2.58e2	0.00e0	1.07e2	2.63e2	2.85e2	0.00e0	2.22e2	3.16e2	2.80e2	3.51e2
MO-8	COCH			11975.25	ft	205646	3.83e5	1.44e5	3.10e5	3.68e5	4.83e5	1.46e5	3.23e5	3.29e5	4.10e5	8.36e4	2.58e5	3.12e5	3.46e5	5.75e5
MO-8	COCH			11975.70	ft	205647	5.02e5	1.86e5	3.92e5	4.55e5	3.76e5	1.71e5	4.17e5	4.22e5	5.31e5	1.14e5	3.34e5	4.98e5	4.62e5	7.82e5
MZ-1	DC			6100	m	205675	1.38e3	3.81e2	8.66e2	1.26e3	7.48e2	3.56e2	8.26e2	1.03e3	1.07e3	3.25e2	8.17e2	9.80e2	1.09e3	1.68e3
SM-1	DC			2056	m	205685	5.29e3	2.43e3	4.75e3	5.87e3	6.05e3	4.23e3	5.11e3	5.31e3	5.93e3	1.34e3	5.00e3	6.09e3	4.78e3	1.00e4
SM-1	DC			2086	m	205686	0.00e0	4.23e2	0.00e0	7.37e2	0.00e0	0.00e0	0.00e0	0.00e0	8.58e2	0.00e0	4.35e2	4.93e2	3.37e2	8.22e2
SM-1	DC			2101	m	205687	5.23e5	2.29e5	4.41e5	5.96e5	3.33e5	3.73e5	4.33e5	5.23e5	6.66e5	1.23e5	4.35e5	6.51e5	4.59e5	1.00e6
TAN TAN -1	DC	Bitumen?	15210	15210	ft	205729	6.19e3	2.85e3	6.94e3	6.37e3	1.04e4	8.50e3	2.94e3	5.06e3	7.18e3	1.77e3	1.06e4	6.10e3	6.69e3	9.31e3
TAN TAN -1	DC			16460	ft	205730	1.73e3	2.97e2	4.73e3	1.23e3	7.05e3	5.73e3	9.75e2	4.10e2	4.74e2	7.14e2	4.27e3	4.27e2	1.66e3	9.16e2
TKM-201	COCH	A		3442.00	m	205731	2.22e3	7.42e2	2.40e3	2.04e3	2.80e3	6.91e2	1.64e3	2.16e3	2.43e3	3.16e2	1.71e3	1.91e3	1.97e3	3.03e3
TKM-201	COCH	B		3442.00	m	205732	1.54e3	8.25e2	2.13e3	9.74e2	1.27e3	9.57e2	1.02e3	1.72e3	2.31e3	4.91e2	6.75e2	7.82e2	1.39e3	1.67e3
Sidi Rhalem	Oil					205733	2.62e6	5.86e5	1.71e6	1.55e6	9.40e5	1.11e6	1.89e6	1.48e6	1.75e6	3.66e5	1.48e6	1.60e6	1.26e6	2.65e6
SM-1	Oil					205734	2.46e4	6.86e3	1.97e4	1.61e4	1.09e4	8.87e3	1.69e4	1.34e4	1.63e4	4.81e3	1.49e4	1.37e4	1.20e4	2.02e4
Ait Moussa	OC			345	m	207488	4.12e5	1.30e5	2.62e5	3.54e5	2.16e5	1.97e5	3.08e5	3.25e5	3.85e5	7.52e4	2.63e5	3.33e5	2.38e5	4.80e5
Ait Moussa	OC			371	m	207489	5.34e5	1.64e5	2.42e5	4.81e5	4.34e5	2.28e5	4.16e5	4.10e5	5.05e5	7.46e4	2.52e5	4.33e5	2.74e5	6.46e5
Ait Moussa	OC			383	m	207490	2.93e5	8.87e4	1.44e5	2.51e5	2.34e5	1.46e5	2.25e5	2.40e5	2.71e5	4.97e4	1.70e5	2.49e5	1.51e5	3.68e5

Table 16. GCMS SIR of aromatic compounds (amounts in ng/g)

						m/z	142		156										170	
Well	Sample type	Sample info	Upper Depth	Lower Depth	Depth units	APT ID	2-MN	1-MN	2-EN	1-EN	2,6-DMN	2,7-DMN	1,3- + 1,7-DMN	1,6-DMN	2,3- + 1,4-DMN	1,5-DMN	1,2-DMN	1,8-DMN	1,3,7-TMN	1,3,6-TMN
IFNI-1	DC		3010	3020	ft	205636	1.01e5	1.04e5	7.66e3	6.70e3	2.40e4	3.05e4	6.43e4	5.15e4	1.41e4	1.69e4	9.55e3	2.40e2	1.74e4	2.58e4
IFNI-1	DC		3020	3030	ft	205637	9.45e5	5.88e5	8.11e4	3.78e4	4.92e5	5.74e5	8.85e5	8.58e5	3.20e5	2.21e5	1.54e5	2.20e3	4.09e5	8.09e5
IFNI-1	DC		3360	3370	ft	205638	8.00e4	6.10e4	5.41e3	3.17e3	3.10e4	3.60e4	6.34e4	5.68e4	2.00e4	1.48e4	9.64e3	1.27e2	2.60e4	4.67e4
JM-1	DC			2128	m	205640	3.34e3	2.83e3	5.76e2	2.78e2	2.17e3	2.26e3	4.64e3	3.48e3	1.52e3	1.21e3	8.42e2	3.10e1	2.35e3	3.15e3
JM-1	DC			2134	m	205641	1.31e5	1.71e5	1.28e4	9.78e3	6.62e4	6.18e4	1.53e5	1.74e5	6.22e4	1.07e5	5.37e4	2.38e3	4.26e4	5.62e4
JM-1	DC			3619	m	205642	2.68e4	2.67e4	4.00e3	2.92e3	1.74e4	1.97e4	4.59e4	3.48e4	1.44e4	1.18e4	7.26e3	1.71e2	3.16e4	5.42e4
JM-1	DC			3631	m	205643	1.47e4	1.32e4	2.18e3	1.53e3	9.82e3	1.06e4	2.27e4	1.94e4	7.49e3	5.80e3	3.59e3	2.04e2	2.04e4	3.65e4
MO-4	COCH			10098.30	ft	205644	2.54e4	1.59e4	2.95e3	1.25e3	1.09e4	1.26e4	2.41e4	1.61e4	8.48e3	4.38e3	3.86e3	1.65e2	1.81e4	2.90e4
MO-4	COCH			10100.25	ft	205645	5.49e4	3.07e4	4.60e3	2.09e3	1.86e4	2.00e4	3.65e4	2.77e4	1.24e4	7.35e3	5.68e3	1.97e2	1.74e4	2.81e4
MO-8	COCH			11975.25	ft	205646	3.55e2	3.27e2	7.60e1	6.30e1	2.95e2	3.14e2	1.21e3	9.75e2	5.96e2	5.36e2	4.53e2	7.00e0	2.37e3	4.21e3
MO-8	COCH			11975.70	ft	205647	2.87e2	2.43e2	5.60e1	3.70e1	2.19e2	2.35e2	7.87e2	6.39e2	3.93e2	3.37e2	3.13e2	9.00e0	1.94e3	3.61e3
MZ-1	DC			6100	m	205675	7.90e4	5.71e4	6.14e3	2.88e3	2.27e4	2.47e4	5.11e4	3.59e4	1.37e4	1.14e4	5.85e3	8.20e1	1.85e4	2.62e4
SM-1	DC			2056	m	205685	2.43e3	1.80e3	2.99e2	2.38e2	8.44e2	7.89e2	1.98e3	1.08e3	7.77e2	6.88e2	7.65e2	2.48e2	8.81e2	1.13e3
SM-1	DC			2086	m	205686	9.43e4	7.78e4	7.13e3	4.60e3	2.10e4	2.48e4	5.54e4	3.87e4	1.63e4	1.28e4	6.99e3	0.00e0	1.43e4	1.87e4
SM-1	DC			2101	m	205687	3.21e2	2.27e2	4.70e1	4.50e1	1.64e2	1.21e2	2.75e2	1.97e2	1.39e2	2.95e2	1.53e2	1.81e2	2.95e2	1.56e2
TAN TAN -1	DC	Bitumen?	15210	15210	ft	205729	9.68e2	1.40e3	5.28e2	2.27e2	3.14e3	3.26e3	6.58e3	4.20e3	1.81e3	1.01e3	4.71e2	0.00e0	1.71e3	2.12e3
TAN TAN -1	DC			16460	ft	205730	2.37e2	2.01e2	5.80e1	3.20e1	3.70e2	4.11e2	1.13e3	7.33e2	3.69e2	2.39e2	1.05e2	0.00e0	6.49e2	8.23e2
TKM-201	COCH	A		3442.00	m	205731	2.45e6	1.53e6	8.61e4	3.11e4	7.10e5	7.09e5	1.44e6	1.05e6	4.32e5	2.68e5	1.23e5	2.73e2	4.11e5	5.74e5
TKM-201	COCH	B		3442.00	m	205732	3.56e6	2.56e6	1.66e5	5.39e4	1.15e6	1.16e6	2.39e6	1.73e6	6.43e5	4.01e5	1.96e5	3.35e2	5.56e5	7.09e5
Sidi Rhalem	Oil					205733	1.41e3	1.48e3	5.35e2	2.84e2	2.48e3	2.20e3	5.96e3	5.32e3	2.21e3	2.10e3	1.53e3	1.50e1	1.15e4	1.87e4
SM-1	Oil					205734	1.21e6	9.20e5	1.34e5	6.09e4	4.15e5	3.89e5	7.32e5	6.73e5	1.76e5	1.91e5	1.32e5	1.56e3	2.57e5	4.13e5
Ait Moussa	OC			345	m	207488	1.31e6	1.28e6	1.23e5	9.07e4	3.47e5	4.14e5	1.23e6	1.01e6	3.56e5	2.84e5	1.74e5	5.24e2	3.50e5	5.72e5
Ait Moussa	OC			371	m	207489	1.23e5	1.57e5	2.64e4	2.22e4	7.73e4	9.05e4	3.03e5	2.34e5	9.19e4	8.11e4	4.58e4	1.96e2	1.31e5	1.95e5
Ait Moussa	OC			383	m	207490	8.11e4	9.83e4	7.23e3	6.63e3	2.41e4	2.79e4	1.43e5	1.02e5	4.12e4	4.43e4	1.47e4	1.62e2	7.48e4	1.37e5

Table 16. continued, GCMS SIR of aromatic compounds (amounts in ng/g)

						m/z	170						178	192				206		
Well	Sample type	Sample info	Upper Depth	Lower Depth	Depth units	APT ID	1,3,5- + 1,4,6-TMN	2,3,6-TMN	1,2,7-TMN	1,6,7 + 1,2,6-TMN	1,2,4-TMN	1,2,5-TMN	P	3-MP	2-MP	9-MP	1-MP	2-EP+9-EP+ 3,6-DMP	1-EP	2,6- + 2,7- + 3,5-DMP
IFNI-1	DC		3010	3020	ft	205636	2.12e4	1.35e4	4.38e3	1.20e4	2.47e3	7.92e3	1.08e5	6.46e4	8.49e4	1.00e5	7.70e4	1.22e4	2.55e4	1.74e4
IFNI-1	DC		3020	3030	ft	205637	4.54e5	5.95e5	1.28e5	3.63e5	4.21e4	3.38e5	2.19e6	6.99e5	9.33e5	8.13e5	7.22e5	6.20e4	1.42e5	9.57e4
IFNI-1	DC		3360	3370	ft	205638	2.95e4	3.23e4	7.35e3	2.14e4	3.07e3	1.67e4	2.74e5	1.37e5	1.99e5	1.80e5	1.60e5	1.81e4	4.85e4	3.32e4
JM-1	DC			2128	m	205640	2.65e3	2.20e3	7.02e2	1.84e3	3.39e2	1.75e3	2.74e4	3.79e4	5.05e4	5.95e4	4.32e4	1.84e4	4.20e4	2.41e4
JM-1	DC			2134	m	205641	9.22e4	3.92e4	1.71e4	7.56e4	1.05e4	7.50e5	2.19e5	3.20e4	4.66e4	5.15e4	8.77e4	5.06e3	9.53e3	6.78e3
JM-1	DC			3619	m	205642	3.63e4	2.79e4	7.71e3	2.14e4	4.15e3	1.77e4	7.74e4	2.52e4	3.59e4	6.25e4	4.09e4	5.76e3	1.02e4	7.41e3
JM-1	DC			3631	m	205643	2.29e4	1.92e4	4.68e3	1.31e4	2.89e3	1.23e4	3.11e4	1.60e4	2.61e4	4.56e4	2.71e4	5.09e3	9.96e3	7.81e3
MO-4	COCH			10098.30	ft	205644	2.03e4	2.02e4	5.47e3	1.31e4	3.14e3	9.28e3	1.88e5	1.09e5	1.47e5	1.20e5	7.78e4	2.02e4	4.44e4	2.82e4
MO-4	COCH			10100.25	ft	205645	1.90e4	2.01e4	5.84e3	1.39e4	2.72e3	8.96e3	1.31e5	6.12e4	8.14e4	6.66e4	4.22e4	1.09e4	2.34e4	1.59e4
MO-8	COCH			11975.25	ft	205646	5.65e3	2.31e3	1.35e3	3.35e3	1.56e3	5.14e3	4.65e4	2.65e4	4.40e4	8.85e4	4.98e4	7.95e3	1.22e4	8.55e3
MO-8	COCH			11975.70	ft	205647	4.73e3	2.16e3	1.26e3	3.15e3	1.35e3	4.66e3	5.11e4	3.09e4	5.03e4	1.02e5	5.69e4	9.54e3	1.48e4	1.05e4
MZ-1	DC			6100	m	205675	2.06e4	1.96e4	4.36e3	1.43e4	2.38e3	8.34e3	1.01e5	3.85e4	4.51e4	4.70e4	4.11e4	5.04e3	1.06e4	6.82e3
SM-1	DC			2056	m	205685	1.65e3	8.14e2	5.14e2	9.46e2	7.95e2	1.19e3	9.81e3	2.30e3	2.25e3	2.70e3	2.65e3	3.26e2	4.30e2	2.34e2
SM-1	DC			2086	m	205686	1.80e4	1.17e4	4.02e3	1.10e4	2.35e3	8.49e3	4.73e4	1.49e4	1.76e4	2.42e4	1.94e4	3.30e3	4.85e3	3.60e3
SM-1	DC			2101	m	205687	8.05e2	1.70e2	2.93e2	4.07e2	8.30e2	8.85e2	8.65e3	6.69e3	5.90e3	7.78e3	8.02e3	4.37e3	6.26e3	2.95e3
TAN TAN -1	DC	Bitumen?	15210	15210	ft	205729	1.36e3	1.03e3	2.30e2	6.99e2	1.10e2	3.40e2	6.79e2	2.69e2	3.13e2	3.62e2	2.50e2	5.90e1	9.50e1	6.20e1
TAN TAN -1	DC			16460	ft	205730	5.98e2	4.11e2	1.01e2	3.07e2	5.80e1	1.68e2	5.15e2	2.03e2	2.50e2	2.92e2	1.98e2	4.80e1	8.70e1	6.90e1
TKM-201	COCH	A		3442.00	m	205731	3.79e5	4.72e5	6.38e4	2.92e5	2.61e4	7.66e4	1.41e6	5.71e5	7.64e5	9.99e5	7.83e5	6.13e4	1.52e5	1.08e5
TKM-201	COCH	B		3442.00	m	205732	4.90e5	5.82e5	7.99e4	3.68e5	3.62e4	8.83e4	1.43e6	5.36e5	7.35e5	9.92e5	7.61e5	6.73e4	1.56e5	1.09e5
Sidi Rhalem	Oil					205733	1.83e4	1.49e4	4.17e3	1.30e4	2.42e3	1.19e4	3.47e4	6.50e4	3.70e4	1.09e5	1.04e5	2.29e4	3.98e4	3.71e4
SM-1	Oil					205734	3.18e5	1.72e5	7.09e4	1.61e5	4.56e4	1.24e5	2.26e4	3.03e4	2.04e4	6.35e4	4.11e4	1.60e4	3.29e4	6.41e3
Ait Moussa	OC			345	m	207488	5.35e5	2.90e5	1.29e5	3.30e5	6.89e4	1.92e5	1.67e6	5.99e5	6.88e5	1.49e6	1.04e6	8.91e4	1.32e5	7.44e4
Ait Moussa	OC			371	m	207489	2.00e5	1.05e5	4.68e4	1.17e5	2.85e4	7.62e4	4.71e5	1.97e5	2.35e5	5.11e5	3.40e5	3.54e4	5.60e4	3.03e4
Ait Moussa	OC			383	m	207490	1.39e5	3.96e4	1.72e4	7.00e4	1.05e4	3.73e4	6.94e5	3.02e5	4.03e5	9.19e5	6.75e5	6.21e4	1.02e5	5.95e4

Table 16. continued, GCMS SIR of aromatic compounds (amounts in ng/g)

						m/z	206							219	184	198			253	
Well	Sample type	Sample info	Upper Depth	Lower Depth	Depth units	APT ID	1,3- + 2,10- + 3,9- + 3,10-DMP	1,6- + 2,5- + 2,9-DMP	1,7-DMP	2,3-DMP	1,9- + 4,9- + 4,10-DMP	1,8-DMP	1,2-DMP	Retene	DBT	4-MDBT	(3+2)-MDBT	1-MDBT	C21MA	C22MA
IFNI-1	DC		3010	3020	ft	205636	8.26e4	4.31e4	4.22e4	1.52e4	2.31e4	1.06e4	5.86e3	3.49e3	1.93e4	5.05e4	2.66e4	1.87e4	1.06e3	6.60e2
IFNI-1	DC		3020	3030	ft	205637	4.25e5	2.27e5	3.34e5	7.54e4	1.14e5	5.62e4	4.14e4	4.56e4	3.51e5	5.44e5	2.81e5	1.52e5	4.32e3	1.57e3
IFNI-1	DC		3360	3370	ft	205638	1.51e5	7.36e4	9.25e4	2.40e4	3.81e4	2.08e4	1.15e4	3.31e3	5.42e4	1.04e5	7.01e4	3.81e4	1.27e2	8.20e1
JM-1	DC			2128	m	205640	1.17e5	5.51e4	5.42e4	2.54e4	3.08e4	1.54e4	1.29e4	5.00e3	4.30e3	8.17e3	8.85e3	5.54e3	4.83e3	4.97e3
JM-1	DC			2134	m	205641	2.70e4	2.40e4	1.11e5	7.61e3	1.22e4	1.16e4	1.92e4	3.97e4	3.99e4	1.38e4	8.81e3	7.83e3	1.04e3	1.09e3
JM-1	DC			3619	m	205642	5.36e4	2.84e4	3.05e4	8.22e3	2.08e4	1.13e4	6.45e3	2.06e3	5.70e4	9.31e4	3.56e4	2.27e4	1.19e3	9.87e2
JM-1	DC			3631	m	205643	5.31e4	2.90e4	3.39e4	6.72e3	1.98e4	1.07e4	5.61e3	2.27e3	2.03e4	9.01e4	4.64e4	2.53e4	2.17e3	1.58e3
MO-4	COCH			10098.30	ft	205644	9.71e4	4.78e4	3.88e4	2.20e4	1.88e4	7.59e3	5.27e3	7.56e3	2.41e4	5.03e4	3.01e4	1.08e4	6.43e2	3.71e2
MO-4	COCH			10100.25	ft	205645	4.99e4	2.46e4	2.20e4	1.08e4	9.22e3	4.10e3	2.95e3	6.96e3	1.95e4	3.45e4	2.24e4	8.74e3	3.62e2	2.26e2
MO-8	COCH			11975.25	ft	205646	7.83e4	3.98e4	5.52e4	9.72e3	3.13e4	1.74e4	1.52e4	3.23e3	3.66e4	1.07e5	7.06e4	5.78e4	4.21e3	2.18e3
MO-8	COCH			11975.70	ft	205647	9.50e4	4.82e4	6.55e4	1.15e4	3.72e4	2.07e4	1.76e4	3.69e3	3.97e4	1.14e5	8.01e4	6.61e4	5.12e3	2.52e3
MZ-1	DC			6100	m	205675	3.26e4	1.66e4	1.46e4	8.05e3	7.75e3	4.37e3	1.53e3	2.24e3	5.41e3	5.60e3	2.39e3	1.58e3	1.54e2	1.19e2
SM-1	DC			2056	m	205685	1.64e3	7.96e2	7.83e2	2.99e2	5.58e2	2.93e2	2.40e2	2.23e2	3.11e3	2.84e3	1.27e3	1.56e3	4.14e2	8.37e2
SM-1	DC			2086	m	205686	1.84e4	8.70e3	9.41e3	3.00e3	5.81e3	2.64e3	2.24e3	7.07e3	5.25e3	9.41e3	5.05e3	3.66e3	1.77e3	1.15e3
SM-1	DC			2101	m	205687	1.70e4	1.06e4	1.27e4	4.20e3	8.31e3	4.95e3	3.65e3	2.08e3	3.38e3	1.16e4	4.83e3	4.46e3	2.76e3	1.62e3
TAN TAN -1	DC	Bitumen?	15210	15210	ft	205729	3.52e2	1.53e2	1.69e2	4.90e1	6.90e1	3.80e1	2.30e1	9.10e1	1.15e2	1.74e2	8.10e1	5.40e1	9.50e1	4.90e1
TAN TAN -1	DC			16460	ft	205730	2.87e2	1.39e2	1.49e2	4.20e1	5.60e1	2.90e1	2.00e1	9.20e1	7.90e1	1.15e2	5.00e1	3.80e1	1.40e1	1.10e1
TKM-201	COCH	A		3442.00	m	205731	6.26e5	3.08e5	3.07e5	1.16e5	2.07e5	9.45e4	4.28e4	5.16e3	9.04e4	2.52e5	8.70e4	5.00e4	4.07e2	3.63e2
TKM-201	COCH	B		3442.00	m	205732	6.53e5	3.17e5	3.05e5	1.18e5	2.11e5	9.38e4	4.57e4	4.97e3	9.04e4	2.39e5	8.59e4	5.07e4	1.98e2	3.17e2
Sidi Rhalem	Oil					205733	1.41e5	7.92e4	1.12e5	1.68e4	4.76e4	2.88e4	1.46e4	4.24e3	4.71e4	1.21e5	7.41e4	6.56e4	5.18e3	3.89e3
SM-1	Oil					205734	7.58e4	5.35e4	3.81e4	7.89e3	2.93e4	1.35e4	6.17e3	7.05e3	8.44e4	1.34e5	1.23e5	9.21e4	3.49e3	1.67e3
Ait Moussa	OC			345	m	207488	8.35e5	3.43e5	3.13e5	1.12e5	2.80e5	1.37e5	8.33e4	7.68e3	1.07e5	3.32e5	8.07e4	9.35e4	3.10e3	2.20e3
Ait Moussa	OC			371	m	207489	3.39e5	1.39e5	1.21e5	4.44e4	1.18e5	5.46e4	3.07e4	3.31e3	3.49e4	1.12e5	2.20e4	2.88e4	1.27e3	9.40e2
Ait Moussa	OC			383	m	207490	6.38e5	2.71e5	2.63e5	8.38e4	2.12e5	1.20e5	5.44e4	4.19e3	1.47e3	6.91e3	9.41e2	1.96e3	1.35e3	1.02e3

Table 16. continued, GCMS SIR of aromatic compounds (amounts in ng/g)

						m/z	253													231
Well	Sample type	Sample info	Upper Depth	Lower Depth	Depth units	APT ID	βSC27MA	βSC27DMA	βRC27MA+ βRC27DMA	αSC27MA	βSC28MA+ βSC28DMA+ αRC27DMA	αSC27DMA	αRC27MA	αSC28MA	βRC28MA+ βRC28DMA	βSC29MA+ βSC29DMA	αSC29MA	αRC28MA+ βRC29MA+ βRC29DMA	αRC29MA	C20TA
IFNI-1	DC		3010	3020	ft	205636	2.01e2	5.75e2	4.45e2	1.94e2	1.05e3	4.12e2	3.28e2	3.59e2	7.14e2	1.62e3	5.67e2	1.08e3	5.10e2	1.38e3
IFNI-1	DC		3020	3030	ft	205637	2.07e2	9.41e2	7.03e2	3.26e2	1.58e4	9.20e3	6.50e2	8.59e3	1.28e4	4.60e4	2.54e4	3.62e4	2.02e4	4.01e3
IFNI-1	DC		3360	3370	ft	205638	1.13e2	1.57e2	1.90e2	5.80e1	7.22e2	2.44e2	6.30e1	3.44e2	5.61e2	1.22e3	6.53e2	1.01e3	6.07e2	5.28e2
JM-1	DC			2128	m	205640	5.69e3	5.26e3	7.49e3	2.77e3	1.58e4	1.48e3	2.78e3	6.34e3	1.12e4	2.44e4	5.99e3	1.23e4	4.57e3	1.29e4
JM-1	DC			2134	m	205641	6.68e2	2.01e3	1.89e3	6.53e2	6.06e3	1.86e3	6.14e2	1.48e3	3.73e3	6.40e3	1.63e3	4.76e3	1.28e3	3.12e3
JM-1	DC			3619	m	205642	3.93e2	7.57e2	7.67e2	5.47e2	1.39e3	2.26e2	5.30e2	5.98e2	7.90e2	1.15e3	6.08e2	9.52e2	4.89e2	1.13e4
JM-1	DC			3631	m	205643	5.59e2	7.20e2	8.51e2	7.75e2	1.33e3	2.77e2	7.29e2	7.54e2	7.62e2	1.27e3	8.21e2	9.77e2	6.57e2	1.03e4
MO-4	COCH			10098.30	ft	205644	1.62e2	3.77e2	5.81e2	1.09e2	6.88e2	1.38e2	1.04e2	7.79e2	4.69e2	6.50e2	1.55e2	4.22e2	1.05e2	7.99e2
MO-4	COCH			10100.25	ft	205645	1.04e2	1.96e2	4.40e2	4.30e1	3.03e2	6.70e1	7.50e1	1.02e3	2.40e2	2.73e2	8.00e1	1.45e2	0.00e0	4.17e2
MO-8	COCH			11975.25	ft	205646	1.45e2	1.90e3	1.50e3	2.16e2	2.58e3	3.38e2	2.71e2	3.01e2	1.92e3	3.18e3	1.51e2	2.48e3	1.28e2	1.99e4
MO-8	COCH			11975.70	ft	205647	1.99e2	2.12e3	1.78e3	2.96e2	3.25e3	3.99e2	3.46e2	3.77e2	2.41e3	3.98e3	2.30e2	3.10e3	1.67e2	2.30e4
MZ-1	DC			6100	m	205675	2.69e2	4.29e2	5.24e2	1.98e2	9.76e2	1.22e2	1.68e2	3.16e2	5.87e2	7.31e2	2.00e2	4.83e2	1.62e2	2.38e2
SM-1	DC			2056	m	205685	2.18e2	4.13e2	5.45e2	4.30e2	1.07e3	1.15e2	5.66e2	2.30e3	1.04e3	6.03e2	5.32e2	1.89e3	5.48e2	4.23e2
SM-1	DC			2086	m	205686	7.72e2	1.15e3	1.61e3	7.55e2	2.65e3	7.13e2	8.56e2	1.35e3	1.63e3	2.00e3	8.04e2	1.53e3	7.70e2	1.24e3
SM-1	DC			2101	m	205687	1.85e2	1.42e3	1.28e3	1.88e2	2.08e3	2.97e2	1.74e2	2.43e2	1.53e3	1.46e3	1.60e2	1.22e3	1.27e2	7.43e3
TAN TAN -1	DC	Bitumen?	15210	15210	ft	205729	2.40e1	2.30e1	3.50e1	1.50e1	8.20e1	1.10e1	1.90e1	6.80e1	7.40e1	1.08e2	7.10e1	6.30e1	4.70e1	6.30e1
TAN TAN -1	DC			16460	ft	205730	9.00e0	1.20e1	1.20e1	7.00e0	3.20e1	4.00e0	7.00e0	4.20e1	2.90e1	5.70e1	3.50e1	3.10e1	2.40e1	2.10e1
TKM-201	COCH	A		3442.00	m	205731	6.60e1	1.36e2	1.41e2	3.70e1	2.15e2	4.70e1	4.70e1	5.60e1	1.28e2	1.90e2	4.30e1	1.70e2	4.70e1	4.45e3
TKM-201	COCH	B		3442.00	m	205732	5.30e1	9.00e1	7.20e1	4.00e1	1.03e2	2.90e1	4.60e1	4.70e1	6.30e1	1.07e2	4.50e1	7.70e1	3.10e1	5.01e3
Sidi Rhalem	Oil					205733	5.00e3	1.99e4	1.65e4	7.32e3	2.56e4	3.77e3	6.62e3	5.03e3	1.69e4	2.44e4	5.29e3	1.66e4	4.03e3	1.03e4
SM-1	Oil					205734	6.03e2	1.07e3	1.06e3	4.00e2	1.63e3	1.77e2	3.28e2	5.02e2	9.93e2	1.04e3	2.46e2	6.15e2	1.89e2	4.27e3
Ait Moussa	OC			345	m	207488	7.51e2	2.93e3	2.35e3	8.11e2	3.43e3	9.74e2	7.73e2	7.52e2	1.80e3	3.34e3	6.81e2	2.10e3	4.83e2	2.70e4
Ait Moussa	OC			371	m	207489	6.65e2	2.76e3	2.39e3	6.74e2	3.13e3	9.58e2	6.72e2	5.71e2	1.44e3	2.44e3	4.79e2	1.69e3	3.63e2	9.90e3
Ait Moussa	OC			383	m	207490	4.36e2	1.72e3	1.45e3	4.75e2	2.11e3	5.98e2	4.51e2	4.07e2	1.13e3	1.83e3	3.46e2	1.32e3	2.60e2	1.62e4

Table 16. continued, GCMS SIR of aromatic compounds (amounts in ng/g)

						m/z	231										245			
Well	Sample type	Sample info	Upper Depth	Lower Depth	Depth units	APT ID	C21TA	SC26TA	RC26TA+ SC27TA	M1	M2	SC28TA	RC27TA	M3	M4	RC28TA	3MS-TA	4MS-TA	2,24DMS-TA	3,24DMS+3M R-TA
IFNI-1	DC		3010	3020	ft	205636	1.01e3	7.80e2	1.77e3	0.00e0	0.00e0	1.79e3	6.19e2	0.00e0	0.00e0	2.22e3	0.00e0	0.00e0	0.00e0	5.04e2
IFNI-1	DC		3020	3030	ft	205637	1.45e3	5.09e2	7.40e3	8.30e1	3.04e2	1.01e4	4.85e3	3.49e2	2.46e2	1.36e4	4.44e2	5.51e2	5.47e2	5.59e3
IFNI-1	DC		3360	3370	ft	205638	4.20e2	4.57e2	2.77e3	1.10e2	3.04e2	1.45e3	1.64e3	3.38e2	5.09e2	2.00e3	1.47e2	4.90e2	1.94e2	1.03e3
JM-1	DC			2128	m	205640	1.05e4	1.08e4	3.99e4	1.17e3	3.15e3	3.34e4	1.72e4	3.03e3	5.35e3	3.90e4	1.63e3	8.43e3	1.48e3	5.89e3
JM-1	DC			2134	m	205641	2.18e3	9.71e3	3.65e4	3.47e2	1.33e3	1.90e4	1.64e4	1.27e3	2.17e3	2.40e4	1.71e3	3.11e3	1.26e3	6.40e3
JM-1	DC			3619	m	205642	9.18e3	1.61e3	3.53e3	1.15e2	1.72e2	3.04e3	1.36e3	2.42e2	3.81e2	3.74e3	2.93e2	1.49e3	1.32e2	4.52e2
JM-1	DC			3631	m	205643	1.10e4	1.60e3	3.66e3	1.14e2	1.75e2	3.28e3	1.34e3	2.48e2	3.98e2	3.44e3	3.32e2	1.63e3	1.90e2	5.22e2
MO-4	COCH			10098.30	ft	205644	6.45e2	2.64e2	1.17e3	6.80e1	1.31e2	8.58e2	5.65e2	1.22e2	2.26e2	1.09e3	4.70e1	1.93e2	7.20e1	2.17e2
MO-4	COCH			10100.25	ft	205645	3.23e2	0.00e0	3.47e2	0.00e0	0.00e0	1.96e2	2.06e2	0.00e0	0.00e0	2.24e2	0.00e0	0.00e0	0.00e0	1.09e2
MO-8	COCH			11975.25	ft	205646	1.56e4	2.12e3	1.29e4	5.20e2	1.31e3	1.39e4	6.29e3	1.31e3	2.18e3	1.64e4	4.39e2	2.34e3	5.66e2	1.98e3
MO-8	COCH			11975.70	ft	205647	1.81e4	2.48e3	1.52e4	5.39e2	1.51e3	1.67e4	7.56e3	1.55e3	2.62e3	2.09e4	5.16e2	2.84e3	6.98e2	2.46e3
MZ-1	DC			6100	m	205675	2.20e2	1.37e2	4.16e2	2.20e1	4.00e1	1.88e2	1.90e2	3.30e1	5.50e1	2.01e2	2.70e1	4.60e1	1.70e1	7.90e1
SM-1	DC			2056	m	205685	4.38e2	1.98e2	1.18e3	3.80e1	1.12e2	7.30e2	6.08e2	1.41e2	2.48e2	9.79e2	3.40e1	1.11e2	7.70e1	2.65e2
SM-1	DC			2086	m	205686	1.18e3	1.57e3	3.43e3	0.00e0	0.00e0	2.29e3	1.95e3	1.18e3	1.37e3	2.69e3	0.00e0	0.00e0	0.00e0	0.00e0
SM-1	DC			2101	m	205687	8.05e3	3.56e3	2.26e4	7.85e2	2.11e3	1.36e4	1.15e4	2.17e3	4.26e3	1.76e4	5.80e2	1.56e3	1.08e3	3.96e3
TAN TAN -1	DC	Bitumen?	15210	15210	ft	205729	5.80e1	1.08e2	8.51e2	1.60e1	4.70e1	6.37e2	3.80e2	5.00e1	1.11e2	7.24e2	5.20e1	6.70e1	4.60e1	3.26e2
TAN TAN -1	DC			16460	ft	205730	1.70e1	2.80e1	2.00e2	0.00e0	0.00e0	1.55e2	1.00e2	6.00e0	7.00e0	1.80e2	8.00e0	1.00e1	8.00e0	7.00e1
TKM-201	COCH	A		3442.00	m	205731	3.60e3	2.29e2	6.00e2	0.00e0	0.00e0	5.09e2	2.76e2	7.30e1	9.00e1	5.40e2	5.30e1	1.20e2	2.80e1	1.16e2
TKM-201	COCH	B		3442.00	m	205732	4.36e3	2.41e2	3.43e2	0.00e0	0.00e0	2.44e2	1.50e2	6.90e1	6.80e1	2.09e2	6.00e1	7.70e1	0.00e0	8.40e1
Sidi Rhalem	Oil					205733	1.12e4	3.48e4	1.01e5	1.26e3	3.73e3	5.62e4	4.15e4	3.51e3	7.99e3	6.34e4	8.82e3	2.15e4	4.53e3	2.14e4
SM-1	Oil					205734	2.60e3	6.45e2	2.23e3	4.20e1	9.90e1	8.01e2	7.96e2	1.01e2	1.80e2	8.08e2	8.60e1	1.75e2	7.70e1	3.02e2
Ait Moussa	OC			345	m	207488	2.25e4	8.22e3	2.23e4	9.39e2	2.68e3	1.41e4	9.14e3	2.69e3	4.14e3	1.69e4	1.60e3	4.22e3	1.11e3	4.46e3
Ait Moussa	OC			371	m	207489	8.47e3	6.49e3	1.73e4	8.16e2	2.21e3	8.96e3	6.86e3	2.25e3	3.29e3	1.08e4	1.09e3	4.13e3	8.02e2	3.13e3
Ait Moussa	OC			383	m	207490	1.50e4	6.72e3	1.86e4	7.80e2	2.09e3	1.04e4	8.01e3	2.26e3	3.27e3	1.33e4	1.13e3	3.31e3	7.72e2	3.12e3

Table 16. continued, GCMS SIR of aromatic compounds (amounts in ng/g)

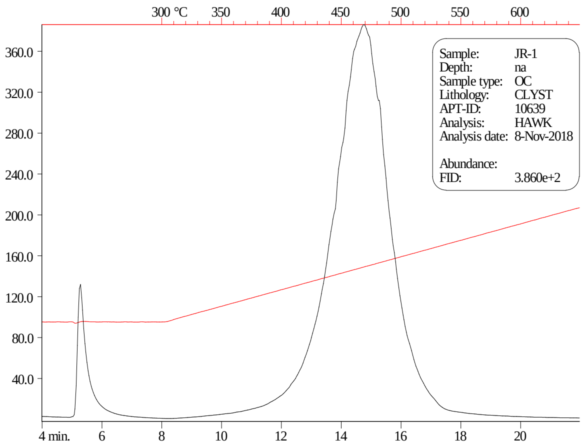
						m/z	245													
Well	Sample type	Sample info	Upper Depth	Lower Depth	Depth units	APT ID	4,24DMS+4MR-TA	D1-TA	3M24ES-TA	D2-TA	4M24ES-TA	3,24DMR-TA	4,24DMR-TA	D3-TA	D4-TA	2M24ER-TA	3M24ER-TA	D5-TA	4M24ER-TA	D6-TA
IFNI-1	DC		3010	3020	ft	205636	6.59e2	3.87e2	5.18e2	1.48e3	1.26e3	0.00e0	0.00e0	1.07e3	1.11e3	3.82e2	5.15e2	0.00e0	1.09e3	1.12e3
IFNI-1	DC		3020	3030	ft	205637	2.61e3	2.46e2	1.27e4	8.49e2	6.13e3	0.00e0	1.71e3	3.85e2	1.58e3	8.07e2	9.39e3	5.29e2	5.57e3	5.64e2
IFNI-1	DC		3360	3370	ft	205638	1.68e3	6.85e2	7.30e2	1.98e3	1.04e3	7.11e2	9.90e2	2.12e3	2.64e3	1.76e2	6.93e2	1.93e3	1.28e3	3.57e3
JM-1	DC			2128	m	205640	1.22e4	5.12e3	7.00e3	1.30e4	7.86e3	3.44e3	6.85e3	1.26e4	1.52e4	1.94e3	6.26e3	1.09e4	8.18e3	2.12e4
JM-1	DC			2134	m	205641	6.92e3	1.19e3	4.74e3	3.02e3	5.04e3	4.57e3	4.64e3	4.15e3	5.36e3	2.73e3	4.75e3	2.58e3	5.18e3	3.69e3
JM-1	DC			3619	m	205642	1.56e3	3.74e2	6.92e2	8.80e2	1.02e3	3.60e2	6.80e2	1.04e3	1.14e3	2.84e2	6.09e2	7.11e2	9.92e2	1.46e3
JM-1	DC			3631	m	205643	1.60e3	3.97e2	7.17e2	9.13e2	1.16e3	3.63e2	7.91e2	1.02e3	1.09e3	3.35e2	6.04e2	6.85e2	1.01e3	1.33e3
MO-4	COCH			10098.30	ft	205644	4.00e2	1.34e2	2.61e2	3.74e2	2.68e2	1.69e2	2.40e2	3.95e2	4.76e2	1.04e2	2.22e2	4.25e2	3.14e2	6.90e2
MO-4	COCH			10100.25	ft	205645	0.00e0	9.00e1	1.06e2	1.37e2	1.06e2	0.00e0	1.03e2	1.31e2	1.25e2	0.00e0	8.30e1	9.70e1	1.21e2	1.50e2
MO-8	COCH			11975.25	ft	205646	5.49e3	2.17e3	2.86e3	5.03e3	4.47e3	1.35e3	3.10e3	5.21e3	6.52e3	8.39e2	2.51e3	4.32e3	4.37e3	8.35e3
MO-8	COCH			11975.70	ft	205647	6.56e3	2.57e3	3.46e3	6.06e3	5.19e3	1.61e3	3.79e3	6.39e3	7.83e3	1.10e3	3.00e3	5.50e3	5.61e3	1.01e4
MZ-1	DC			6100	m	205675	1.06e2	4.40e1	5.40e1	1.06e2	6.10e1	4.70e1	6.30e1	8.40e1	1.07e2	2.60e1	4.60e1	7.40e1	6.90e1	1.31e2
SM-1	DC			2056	m	205685	3.15e2	1.48e2	2.04e2	3.82e2	2.43e2	1.56e2	2.12e2	3.72e2	4.38e2	7.10e1	2.35e2	3.32e2	3.01e2	6.22e2
SM-1	DC			2086	m	205686	0.00e0	9.66e2	0.00e0	1.78e3	0.00e0	0.00e0	0.00e0	0.00e0	2.43e3	0.00e0	1.34e3	1.80e3	1.18e3	1.66e3
SM-1	DC			2101	m	205687	5.22e3	2.40e3	2.99e3	6.19e3	3.90e3	2.45e3	2.88e3	5.95e3	7.54e3	1.03e3	3.21e3	5.64e3	4.45e3	1.04e4
TAN TAN -1	DC	Bitumen?	15210	15210	ft	205729	2.36e2	1.00e2	2.86e2	2.39e2	2.81e2	2.37e2	1.30e2	2.10e2	2.89e2	6.10e1	3.25e2	1.98e2	2.26e2	3.52e2
TAN TAN -1	DC			16460	ft	205730	3.40e1	5.00e0	5.20e1	1.50e1	1.30e2	1.04e2	2.00e1	1.10e1	9.00e0	1.00e1	6.80e1	8.00e0	2.50e1	1.60e1
TKM-201	COCH	A		3442.00	m	205731	1.95e2	7.40e1	1.32e2	1.88e2	1.66e2	9.10e1	1.02e2	2.04e2	2.32e2	5.40e1	1.24e2	1.36e2	1.71e2	2.86e2
TKM-201	COCH	B		3442.00	m	205732	6.60e1	4.70e1	7.60e1	4.90e1	8.40e1	7.30e1	5.40e1	8.80e1	9.40e1	2.50e1	5.40e1	4.40e1	6.90e1	7.00e1
Sidi Rhalem	Oil					205733	3.51e4	8.39e3	1.48e4	2.29e4	1.61e4	9.68e3	1.87e4	2.22e4	2.67e4	3.82e3	1.65e4	1.78e4	1.61e4	3.67e4
SM-1	Oil					205734	3.07e2	9.00e1	1.61e2	2.09e2	1.61e2	1.26e2	1.49e2	1.78e2	2.26e2	4.60e1	1.34e2	1.44e2	1.43e2	2.42e2
Ait Moussa	OC			345	m	207488	8.16e3	2.64e3	3.51e3	6.92e3	4.48e3	2.45e3	4.25e3	7.10e3	8.25e3	1.18e3	3.48e3	5.78e3	4.39e3	1.02e4
Ait Moussa	OC			371	m	207489	7.35e3	2.18e3	2.17e3	6.21e3	3.48e3	1.83e3	4.09e3	6.14e3	7.69e3	8.06e2	2.18e3	5.04e3	3.45e3	9.22e3
Ait Moussa	OC			383	m	207490	5.91e3	1.84e3	2.17e3	4.98e3	2.89e3	1.68e3	3.13e3	5.35e3	6.07e3	8.04e2	2.34e3	4.32e3	2.83e3	7.58e3

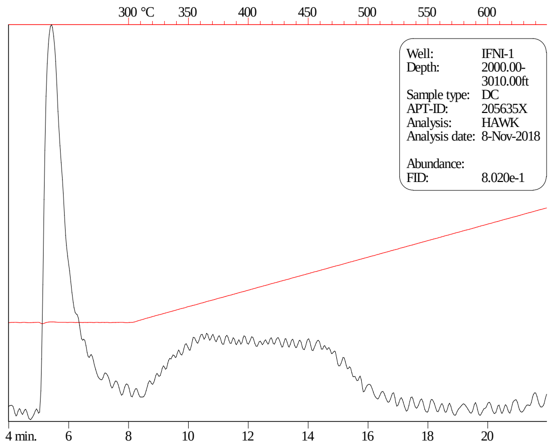
Table 17. Isotopes of fractions (δ¹³C (‰ VPDB))

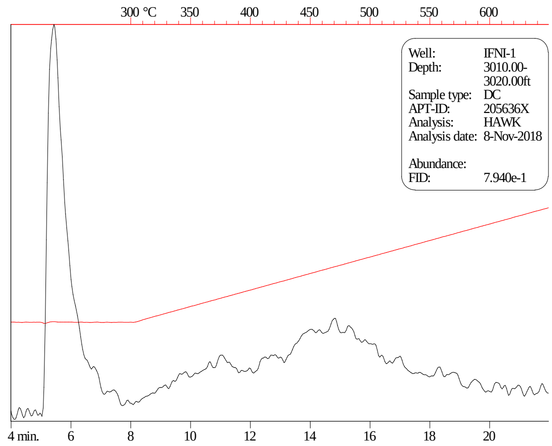
Well	Sample type	Sample info	Upper Depth	Lower Depth	Depth units	APT ID	δ¹³C-Oil/EOM	δ¹³C-Sat	δ¹³C-Aro
MO-8	COCH			11975.70	ft	205647		-25.9	-24.3
TAN TAN -1	DC	Bitumen?	15210	15210	ft	205729		-32.9	-27.4
TKM-201	COCH	B		3442.00	m	205732		-28.8	-29.6
Sidi Rhalem	Oil					205733		-30.7	-29.2
SM-1	Oil					205734		-28.1	-27.0
Ait Moussa	OC			345	m	207488		-27.9	-26.0

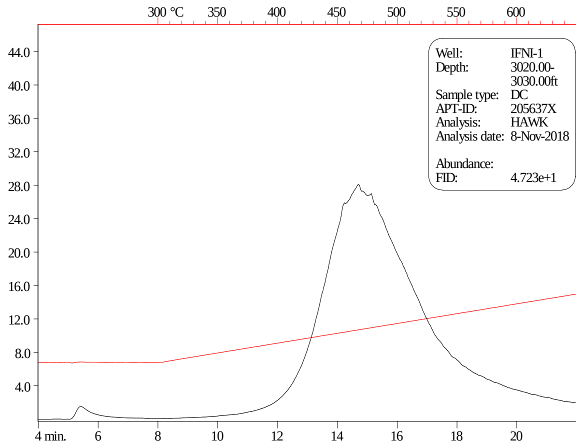
Rock-Eval pyrograms

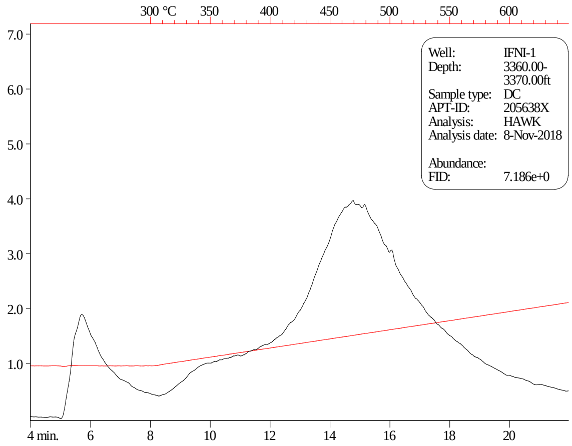
The temperature scale for the pyrograms is uncalibrated. The TMax temperature is lower than on the graphs.

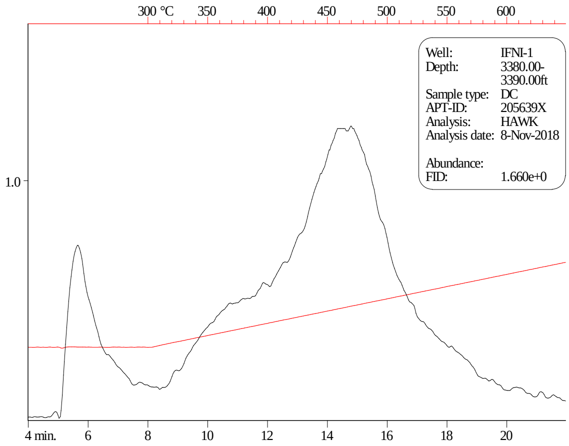


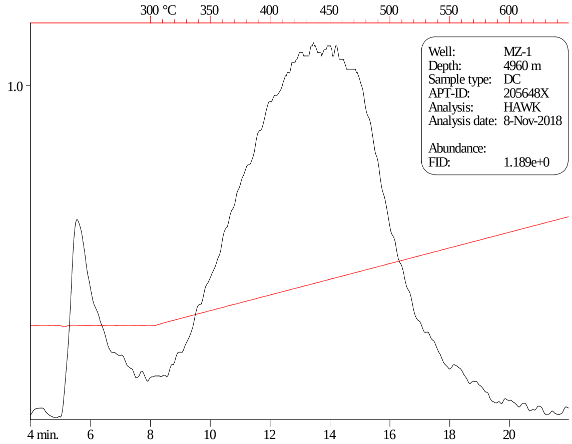


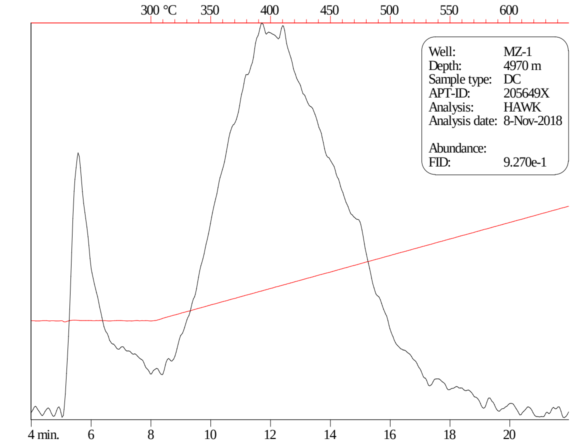


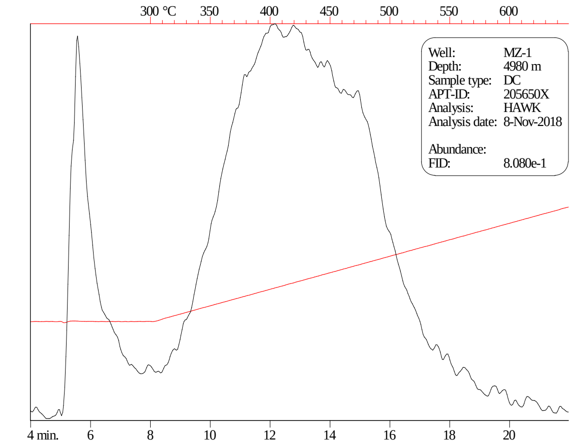


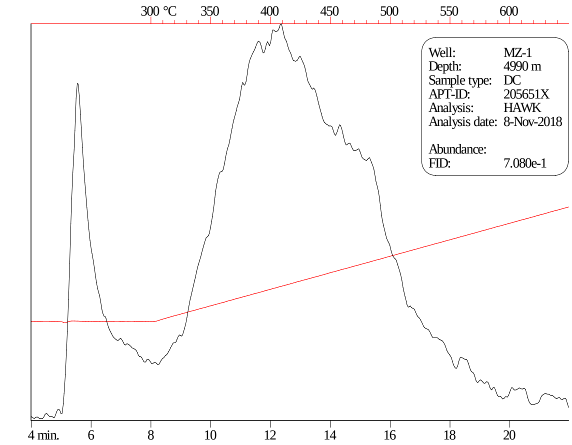


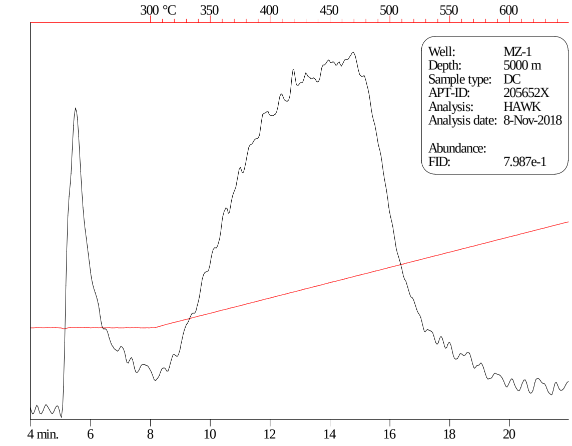


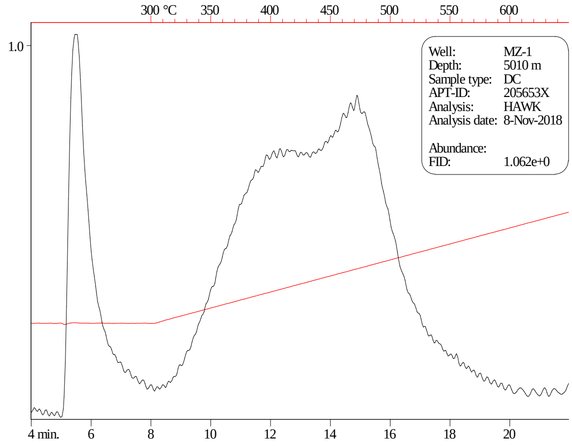

300 °C 350 400 450 500 550 600
1.0
Well: MZ-1
Depth: 4960 m
Sample type: DC
APT-ID: 205648X
Analysis: HAWK
Analysis date: 8-Nov-2018
Abundance:
FID: 1.189e+0
4 min. 6 8 10 12 14 16 18 20

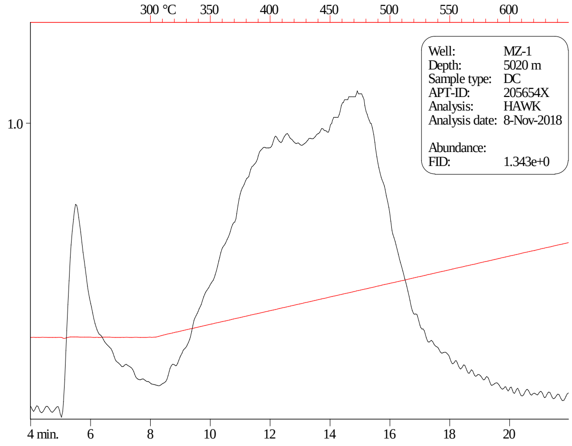

300 °C 350 400 450 500 550 600
Well: MZ-1
Depth: 4970 m
Sample type: DC
APT-ID: 205649X
Analysis: HAWK
Analysis date: 8-Nov-2018
Abundance:
FID: 9.270e-1
4 min. 6 8 10 12 14 16 18 20

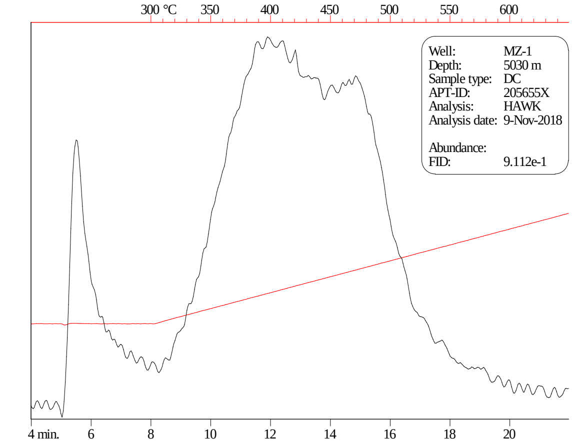

300 °C 350 400 450 500 550 600
Well: MZ-1
Depth: 4980 m
Sample type: DC
APT-ID: 205650X
Analysis: HAWK
Analysis date: 8-Nov-2018
Abundance:
FID: 8.080e-1
4 min. 6 8 10 12 14 16 18 20

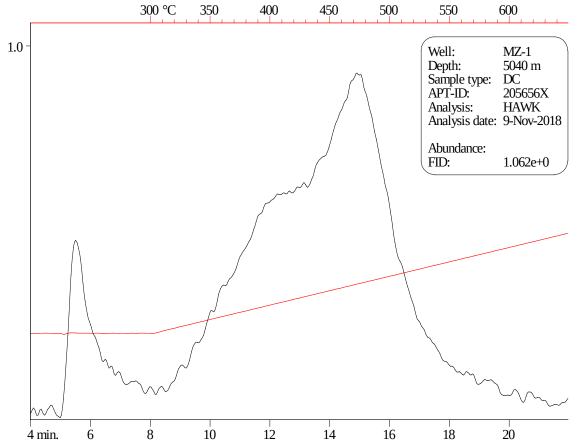

300 °C 350 400 450 500 550 600
Well: MZ-1
Depth: 4990 m
Sample type: DC
APT-ID: 205651X
Analysis: HAWK
Analysis date: 8-Nov-2018
Abundance:
FID: 7.080e-1
4 min. 6 8 10 12 14 16 18 20

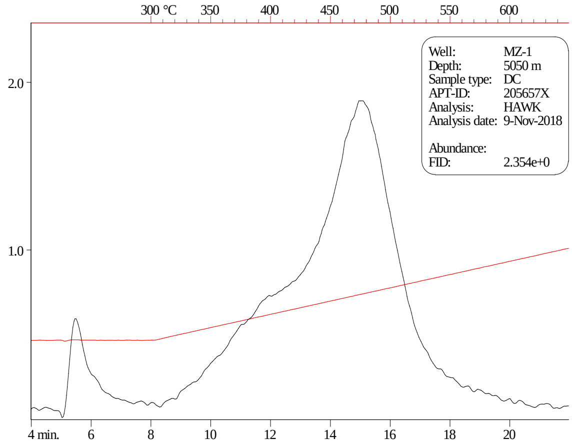

300 °C 350 400 450 500 550 600
Well: MZ-1
Depth: 5000 m
Sample type: DC
APT-ID: 205652X
Analysis: HAWK
Analysis date: 8-Nov-2018
Abundance:
FID: 7.987e-1
4 min. 6 8 10 12 14 16 18 20

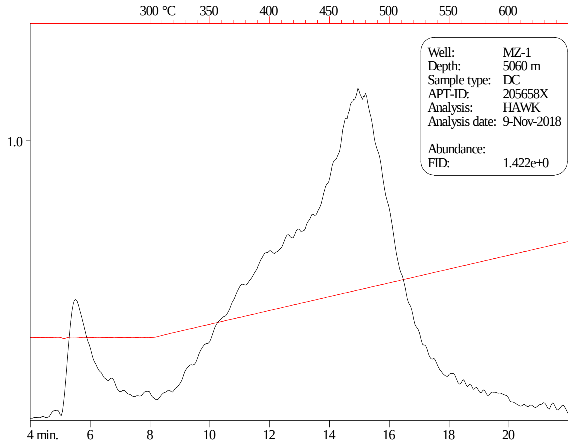

300 °C 350 400 450 500 550 600
1.0
Well: MZ-1
Depth: 5010 m
Sample type: DC
APT-ID: 205653X
Analysis: HAWK
Analysis date: 8-Nov-2018
Abundance:
FID: 1.062e+0
4 min. 6 8 10 12 14 16 18 20

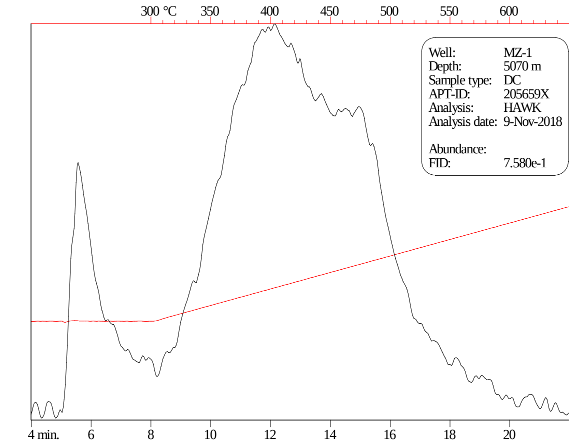

300 °C 350 400 450 500 550 600
1.0
Well: MZ-1
Depth: 5020 m
Sample type: DC
APT-ID: 205654X
Analysis: HAWK
Analysis date: 8-Nov-2018
Abundance:
FID: 1.343e+0
4 min. 6 8 10 12 14 16 18 20

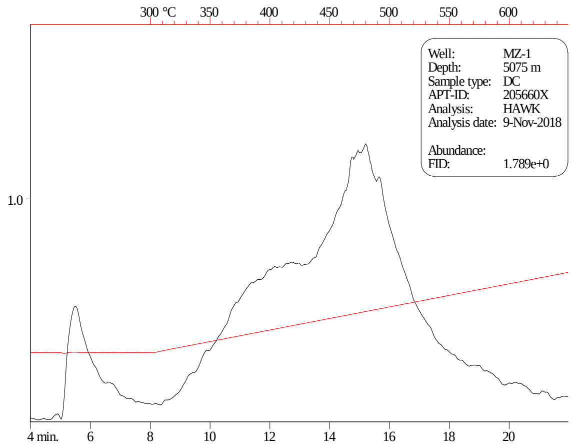

300 °C 350 400 450 500 550 600
Well: MZ-1
Depth: 5030 m
Sample type: DC
APT-ID: 205655X
Analysis: HAWK
Analysis date: 9-Nov-2018
Abundance:
FID: 9.112e-1
4 min. 6 8 10 12 14 16 18 20

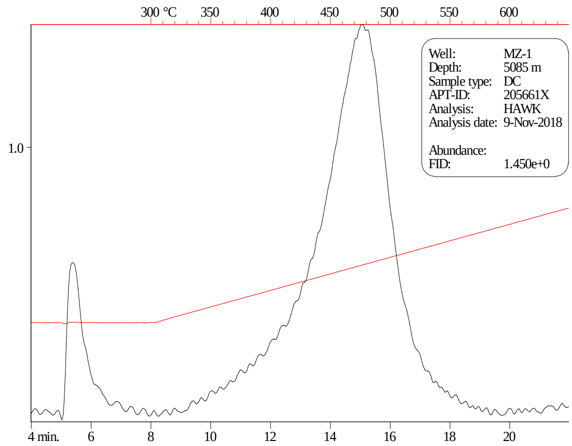

300 °C 350 400 450 500 550 600
Well: MZ-1
Depth: 5040 m
Sample type: DC
APT-ID: 205656X
Analysis: HAWK
Analysis date: 9-Nov-2018
Abundance:
FID: 1.062e+0
1.0
4 min. 6 8 10 12 14 16 18 20

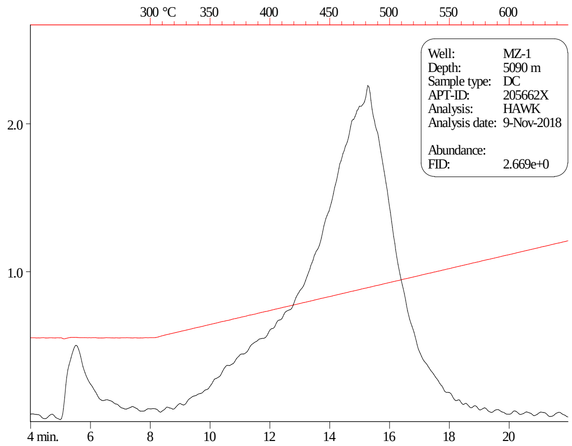

300 °C 350 400 450 500 550 600
Well: MZ-1
Depth: 5050 m
Sample type: DC
APT-ID: 205657X
Analysis: HAWK
Analysis date: 9-Nov-2018
Abundance:
FID: 2.354e+0
2.0
1.0
4 min. 6 8 10 12 14 16 18 20

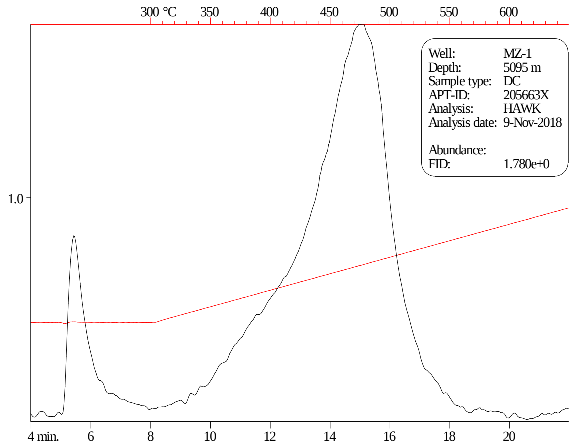

300 °C 350 400 450 500 550 600
Well: MZ-1
Depth: 5060 m
Sample type: DC
APT-ID: 205658X
Analysis: HAWK
Analysis date: 9-Nov-2018
Abundance:
FID: 1.422e+0
1.0
4 min. 6 8 10 12 14 16 18 20

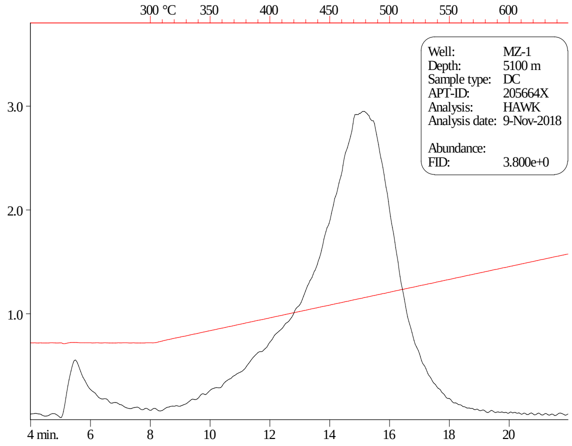

300 °C 350 400 450 500 550 600
Well: MZ-1
Depth: 5070 m
Sample type: DC
APT-ID: 205659X
Analysis: HAWK
Analysis date: 9-Nov-2018
Abundance:
FID: 7.580e-1
4 min. 6 8 10 12 14 16 18 20

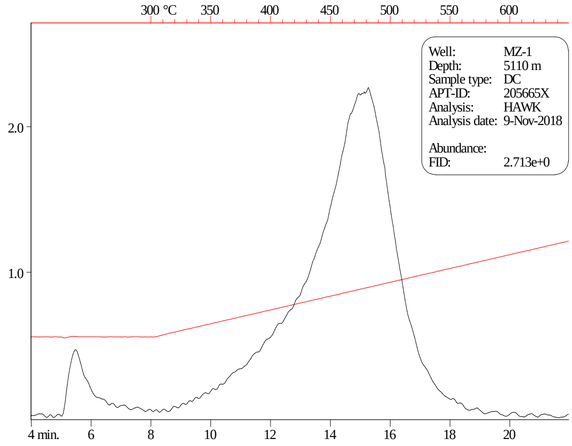

300 °C 350 400 450 500 550 600
Well: MZ-1
Depth: 5075 m
Sample type: DC
APT-ID: 205660X
Analysis: HAWK
Analysis date: 9-Nov-2018
Abundance:
FID: 1.789e+0
1.0
4 min. 6 8 10 12 14 16 18 20

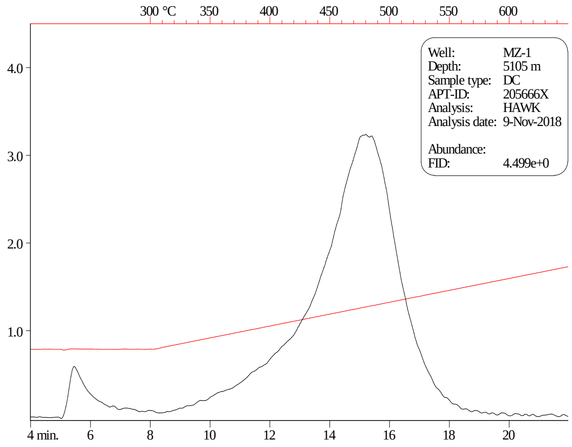

300 °C 350 400 450 500 550 600
Well: MZ-1
Depth: 5085 m
Sample type: DC
APT-ID: 205661X
Analysis: HAWK
Analysis date: 9-Nov-2018
Abundance:
FID: 1.450e+0
1.0
4 min. 6 8 10 12 14 16 18 20

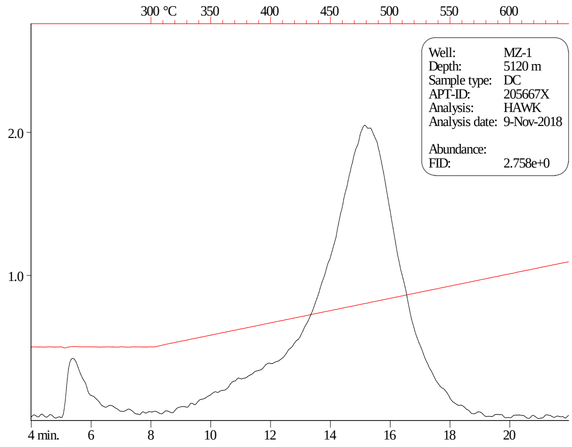

300 °C 350 400 450 500 550 600
Well: MZ-1
Depth: 5090 m
Sample type: DC
APT-ID: 205662X
Analysis: HAWK
Analysis date: 9-Nov-2018
Abundance:
FID: 2.669e+0
2.0
1.0
4 min. 6 8 10 12 14 16 18 20

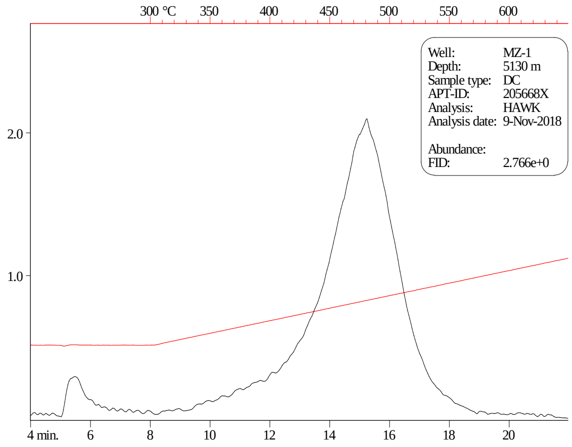

300 °C 350 400 450 500 550 600
Well: MZ-1
Depth: 5095 m
Sample type: DC
APT-ID: 205663X
Analysis: HAWK
Analysis date: 9-Nov-2018
Abundance:
FID: 1.780e+0
1.0
4 min. 6 8 10 12 14 16 18 20

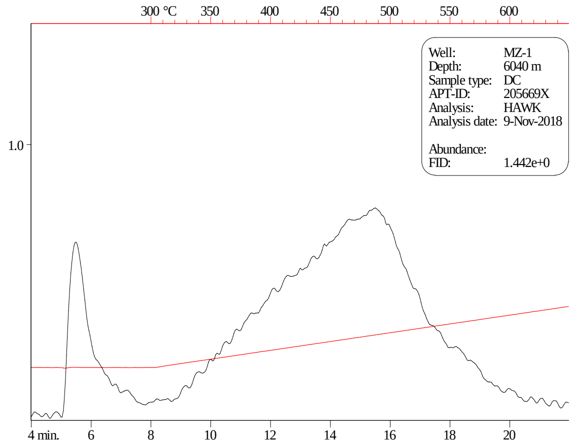

300 °C 350 400 450 500 550 600
3.0
2.0
1.0
4 min. 6 8 10 12 14 16 18 20
Well: MZ-1
Depth: 5100 m
Sample type: DC
APT-ID: 205664X
Analysis: HAWK
Analysis date: 9-Nov-2018
Abundance:
FID: 3.800e+0

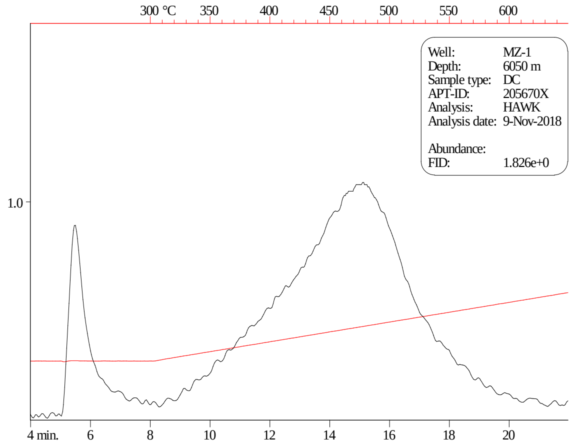

300 °C 350 400 450 500 550 600
2.0
1.0
4 min. 6 8 10 12 14 16 18 20
Well: MZ-1
Depth: 5110 m
Sample type: DC
APT-ID: 205665X
Analysis: HAWK
Analysis date: 9-Nov-2018
Abundance:
FID: 2.713e+0

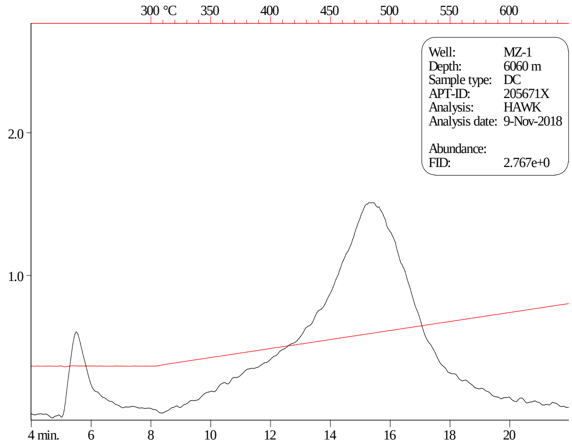

300 °C 350 400 450 500 550 600
4.0
3.0
2.0
1.0
4 min. 6 8 10 12 14 16 18 20
Well: MZ-1
Depth: 5105 m
Sample type: DC
APT-ID: 205666X
Analysis: HAWK
Analysis date: 9-Nov-2018
Abundance:
FID: 4.499e+0

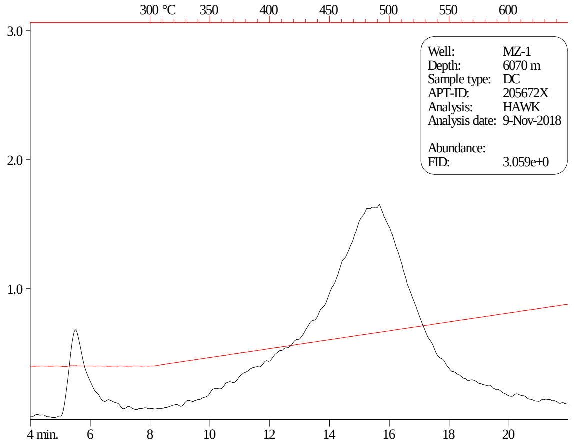

300 °C 350 400 450 500 550 600
2.0
1.0
4 min. 6 8 10 12 14 16 18 20
Well: MZ-1
Depth: 5120 m
Sample type: DC
APT-ID: 205667X
Analysis: HAWK
Analysis date: 9-Nov-2018
Abundance:
FID: 2.758e+0


300 °C 350 400 450 500 550 600
2.0
1.0
4 min. 6 8 10 12 14 16 18 20
Well: MZ-1
Depth: 5130 m
Sample type: DC
APT-ID: 205668X
Analysis: HAWK
Analysis date: 9-Nov-2018
Abundance:
FID: 2.766e+0

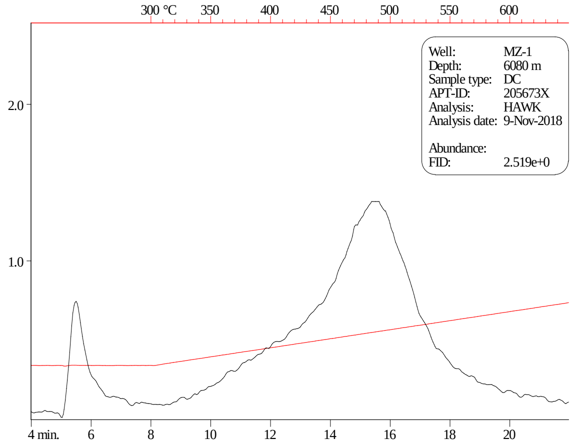

300 °C 350 400 450 500 550 600
1.0
4 min. 6 8 10 12 14 16 18 20
Well: MZ-1
Depth: 6040 m
Sample type: DC
APT-ID: 205669X
Analysis: HAWK
Analysis date: 9-Nov-2018
Abundance:
FID: 1.442e+0


300 °C 350 400 450 500 550 600
1.0
4 min. 6 8 10 12 14 16 18 20
Well: MZ-1
Depth: 6050 m
Sample type: DC
APT-ID: 205670X
Analysis: HAWK
Analysis date: 9-Nov-2018
Abundance:
FID: 1.826e+0

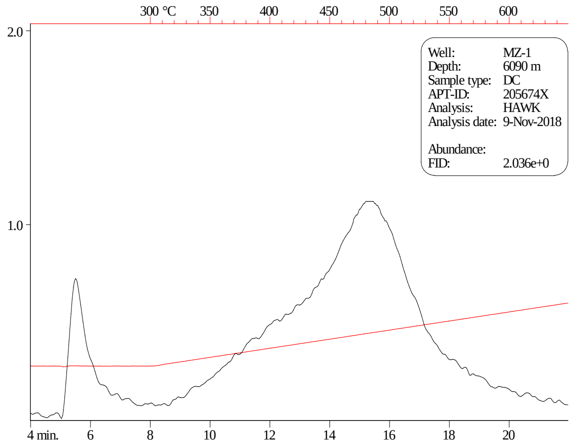

300 °C 350 400 450 500 550 600
2.0
1.0
4 min. 6 8 10 12 14 16 18 20
Well: MZ-1
Depth: 6060 m
Sample type: DC
APT-ID: 205671X
Analysis: HAWK
Analysis date: 9-Nov-2018
Abundance:
FID: 2.767e+0



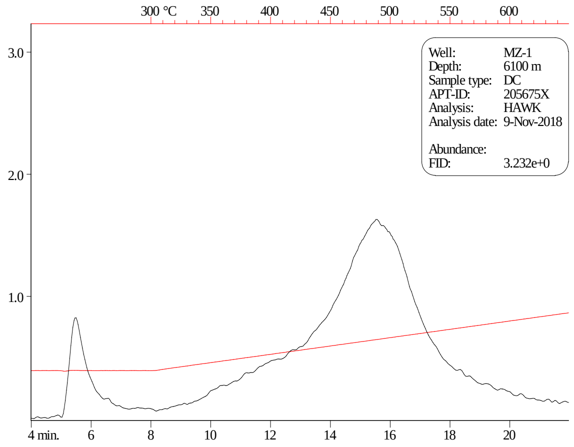
Well: MZ-1
Depth: 6070 m
Sample type: DC
APT-ID: 205672X
Analysis: HAWK
Analysis date: 9-Nov-2018
Abundance:
FID: 3.059e+0
300 °C 350 400 450 500 550 600
3.0 2.0 1.0
4 min. 6 8 10 12 14 16 18 20



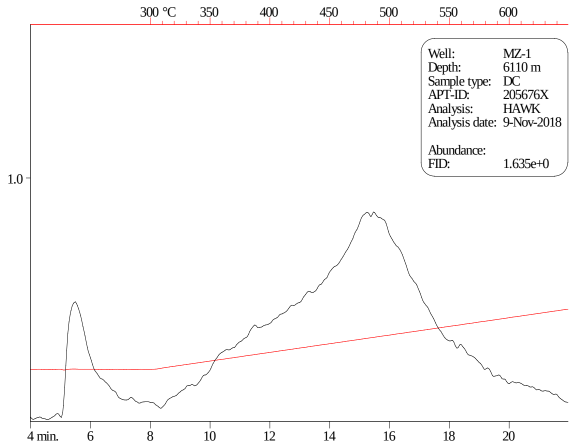
Well: MZ-1
Depth: 6080 m
Sample type: DC
APT-ID: 205673X
Analysis: HAWK
Analysis date: 9-Nov-2018
Abundance:
FID: 2.519e+0
300 °C 350 400 450 500 550 600
2.0 1.0
4 min. 6 8 10 12 14 16 18 20



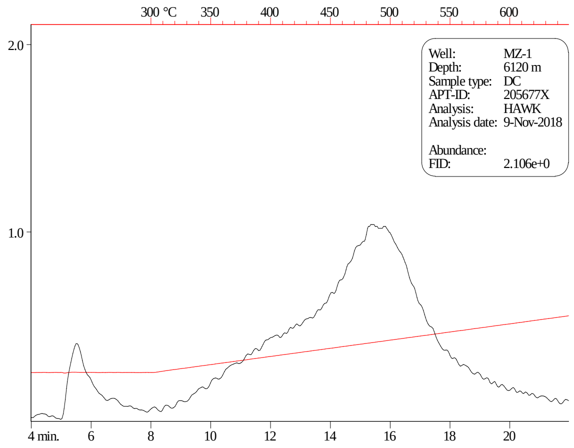
Well: MZ-1
Depth: 6090 m
Sample type: DC
APT-ID: 205674X
Analysis: HAWK
Analysis date: 9-Nov-2018
Abundance:
FID: 2.036e+0
300 °C 350 400 450 500 550 600
2.0 1.0
4 min. 6 8 10 12 14 16 18 20



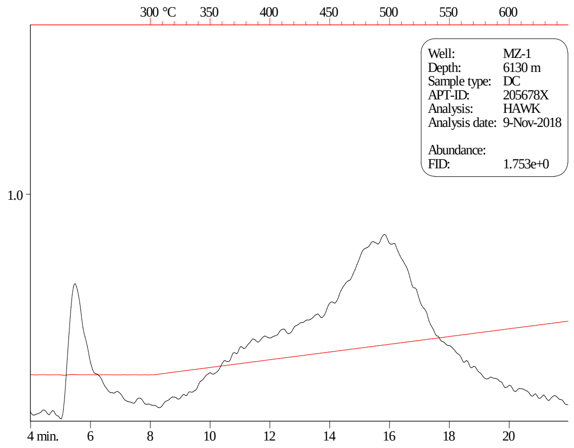
Well: MZ-1
Depth: 6100 m
Sample type: DC
APT-ID: 205675X
Analysis: HAWK
Analysis date: 9-Nov-2018
Abundance:
FID: 3.232e+0
300 °C 350 400 450 500 550 600
3.0 2.0 1.0
4 min. 6 8 10 12 14 16 18 20



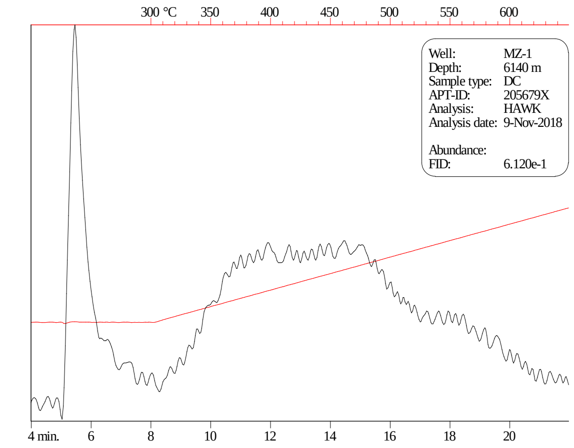
Well: MZ-1
Depth: 6110 m
Sample type: DC
APT-ID: 205676X
Analysis: HAWK
Analysis date: 9-Nov-2018
Abundance:
FID: 1.635e+0
300 °C 350 400 450 500 550 600
1.0
4 min. 6 8 10 12 14 16 18 20



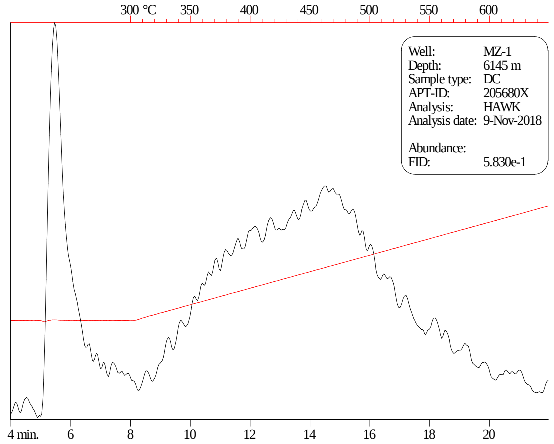
Well: MZ-1
Depth: 6120 m
Sample type: DC
APT-ID: 205677X
Analysis: HAWK
Analysis date: 9-Nov-2018
Abundance:
FID: 2.106e+0
300 °C 350 400 450 500 550 600
2.0 1.0
4 min. 6 8 10 12 14 16 18 20

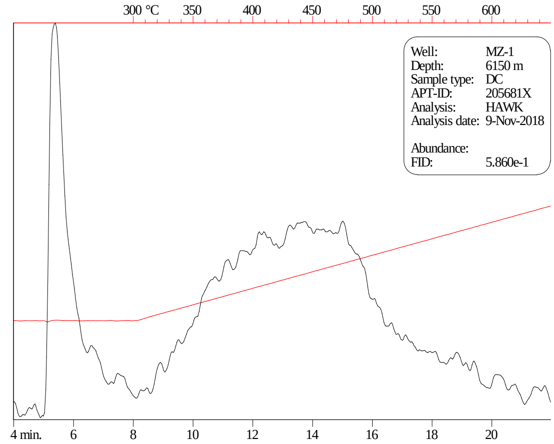


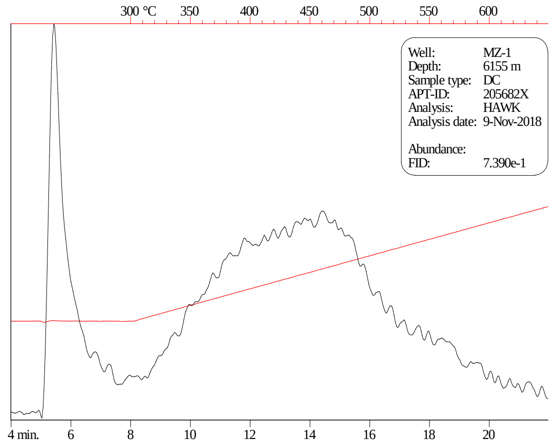
Well: MZ-1
Depth: 6130 m
Sample type: DC
APT-ID: 205678X
Analysis: HAWK
Analysis date: 9-Nov-2018
Abundance:
FID: 1.753e+0
300 °C 350 400 450 500 550 600
1.0
4 min. 6 8 10 12 14 16 18 20

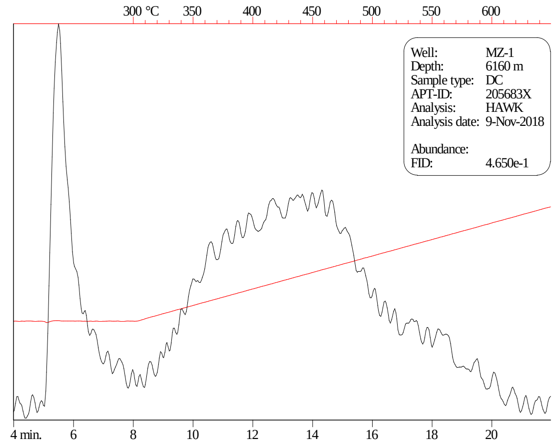


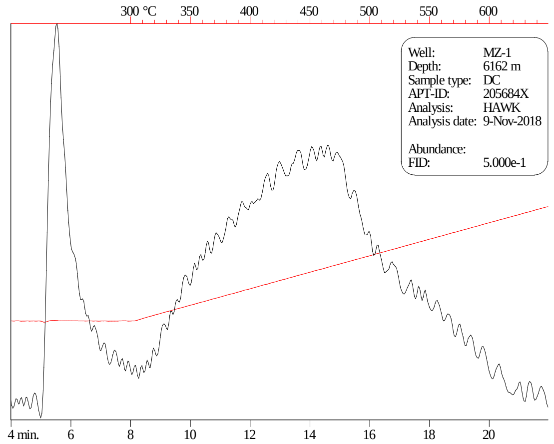
Well: MZ-1
Depth: 6140 m
Sample type: DC
APT-ID: 205679X
Analysis: HAWK
Analysis date: 9-Nov-2018
Abundance:
FID: 6.120e-1
300 °C 350 400 450 500 550 600
4 min. 6 8 10 12 14 16 18 20

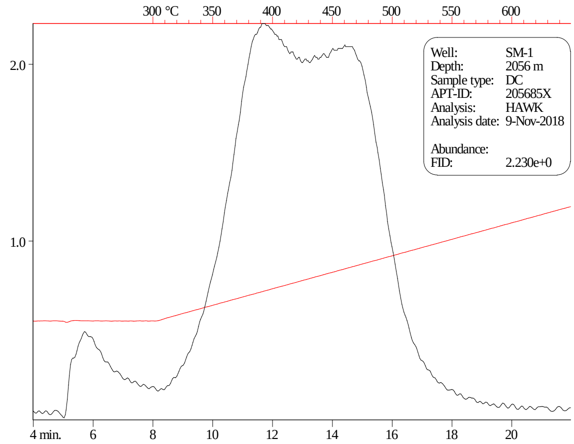

300 °C 350 400 450 500 550 600
Well: MZ-1
Depth: 6145 m
Sample type: DC
APT-ID: 205680X
Analysis: HAWK
Analysis date: 9-Nov-2018
Abundance:
FID: 5.830e-1
4 min. 6 8 10 12 14 16 18 20

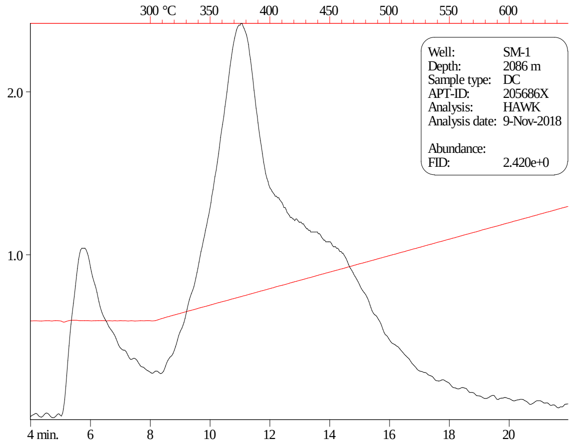

300 °C 350 400 450 500 550 600
Well: MZ-1
Depth: 6150 m
Sample type: DC
APT-ID: 205681X
Analysis: HAWK
Analysis date: 9-Nov-2018
Abundance:
FID: 5.860e-1
4 min. 6 8 10 12 14 16 18 20

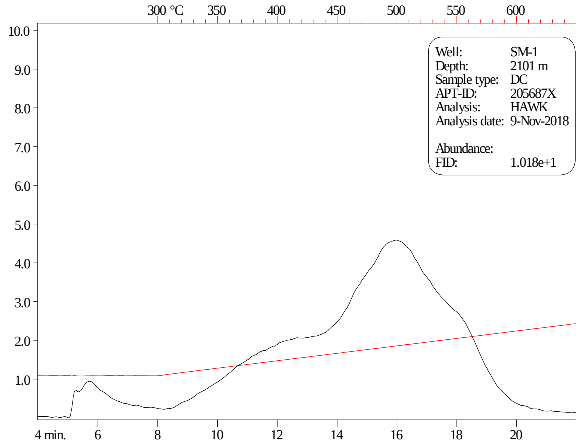

300 °C 350 400 450 500 550 600
Well: MZ-1
Depth: 6155 m
Sample type: DC
APT-ID: 205682X
Analysis: HAWK
Analysis date: 9-Nov-2018
Abundance:
FID: 7.390e-1
4 min. 6 8 10 12 14 16 18 20

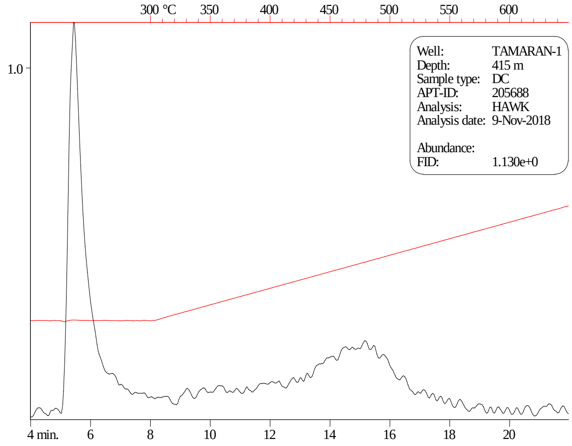

300 °C 350 400 450 500 550 600
Well: MZ-1
Depth: 6160 m
Sample type: DC
APT-ID: 205683X
Analysis: HAWK
Analysis date: 9-Nov-2018
Abundance:
FID: 4.650e-1
4 min. 6 8 10 12 14 16 18 20

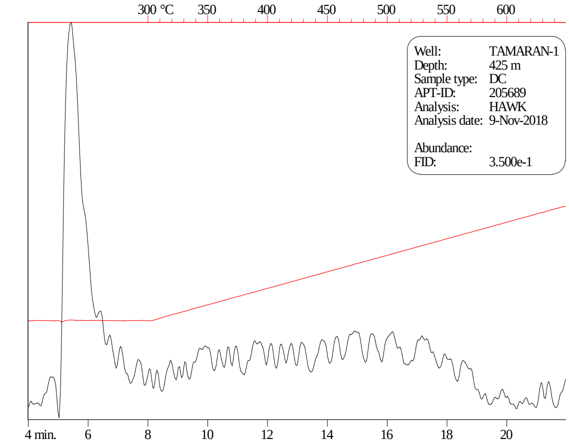

300 °C 350 400 450 500 550 600
Well: MZ-1
Depth: 6162 m
Sample type: DC
APT-ID: 205684X
Analysis: HAWK
Analysis date: 9-Nov-2018
Abundance:
FID: 5.000e-1
4 min. 6 8 10 12 14 16 18 20

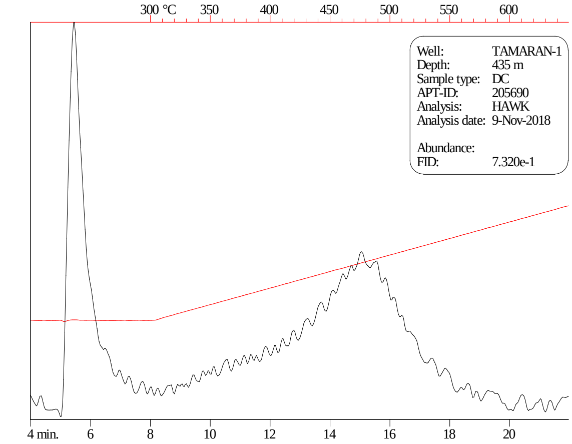

300 °C 350 400 450 500 550 600
2.0
1.0
Well: SM-1
Depth: 2056 m
Sample type: DC
APT-ID: 205685X
Analysis: HAWK
Analysis date: 9-Nov-2018
Abundance:
FID: 2.230e+0
4 min. 6 8 10 12 14 16 18 20

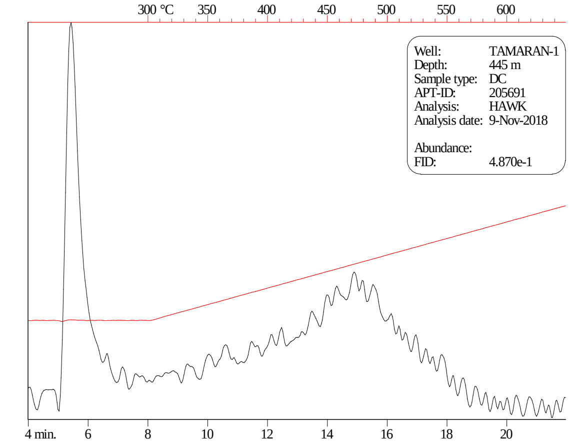

300 °C 350 400 450 500 550 600
2.0
1.0
Well: SM-1
Depth: 2086 m
Sample type: DC
APT-ID: 205686X
Analysis: HAWK
Analysis date: 9-Nov-2018
Abundance:
FID: 2.420e+0
4 min. 6 8 10 12 14 16 18 20

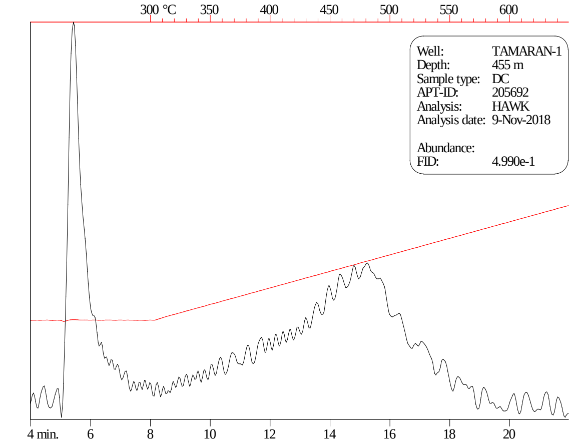

300 °C 350 400 450 500 550 600
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
Well: SM-1
Depth: 2101 m
Sample type: DC
APT-ID: 205687X
Analysis: HAWK
Analysis date: 9-Nov-2018
Abundance:
FID: 1.018e+1
4 min. 6 8 10 12 14 16 18 20

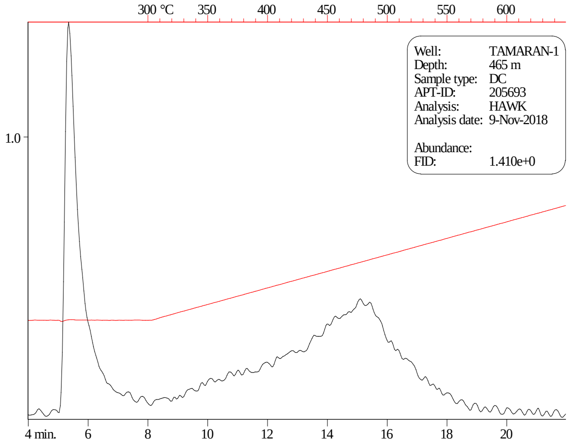

Well: TAMARAN-1
Depth: 415 m
Sample type: DC
APT-ID: 205688
Analysis: HAWK
Analysis date: 9-Nov-2018
Abundance:
FID: 1.130e+0

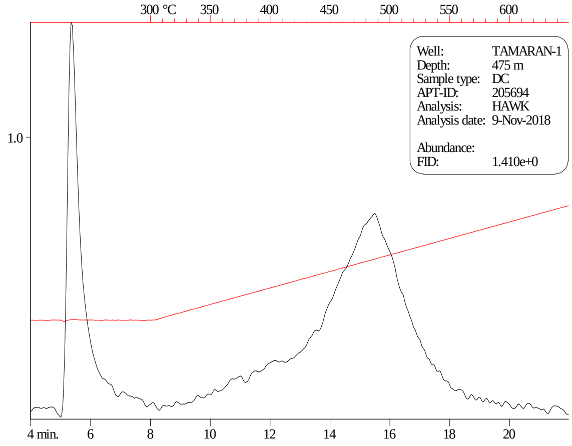

Well: TAMARAN-1
Depth: 425 m
Sample type: DC
APT-ID: 205689
Analysis: HAWK
Analysis date: 9-Nov-2018
Abundance:
FID: 3.500e-1

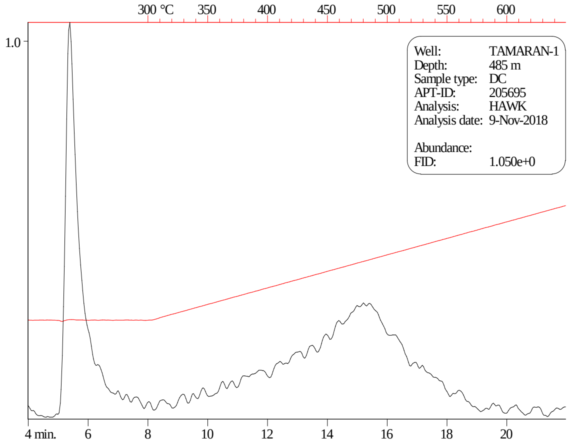

Well: TAMARAN-1
Depth: 435 m
Sample type: DC
APT-ID: 205690
Analysis: HAWK
Analysis date: 9-Nov-2018
Abundance:
FID: 7.320e-1

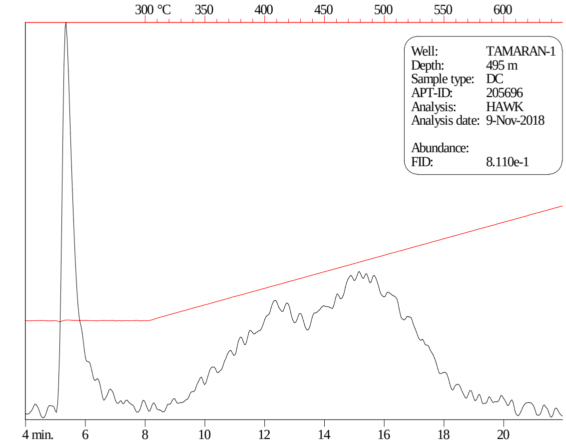

Well: TAMARAN-1
Depth: 445 m
Sample type: DC
APT-ID: 205691
Analysis: HAWK
Analysis date: 9-Nov-2018
Abundance:
FID: 4.870e-1

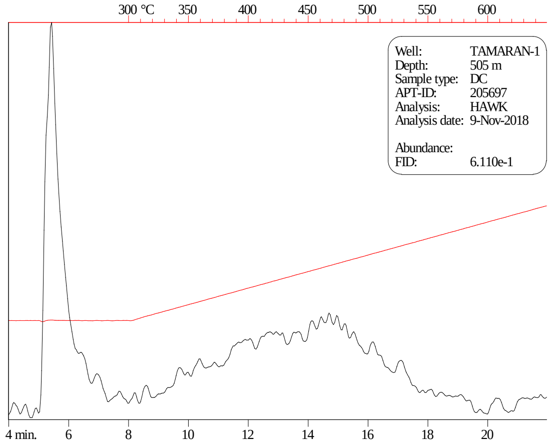

Well: TAMARAN-1
Depth: 455 m
Sample type: DC
APT-ID: 205692
Analysis: HAWK
Analysis date: 9-Nov-2018
Abundance:
FID: 4.990e-1

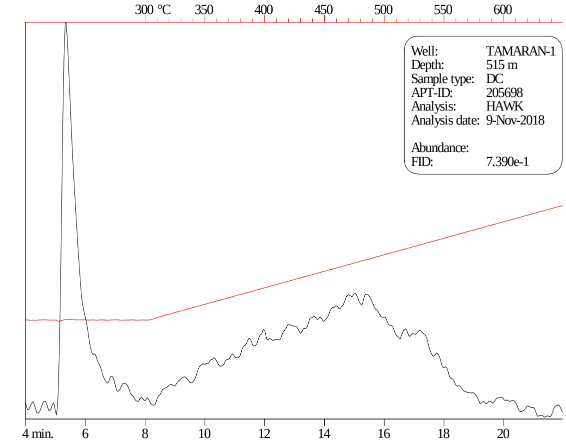

Well: TAMARAN-1
Depth: 465 m
Sample type: DC
APT-ID: 205693
Analysis: HAWK
Analysis date: 9-Nov-2018
Abundance:
FID: 1.410e+0

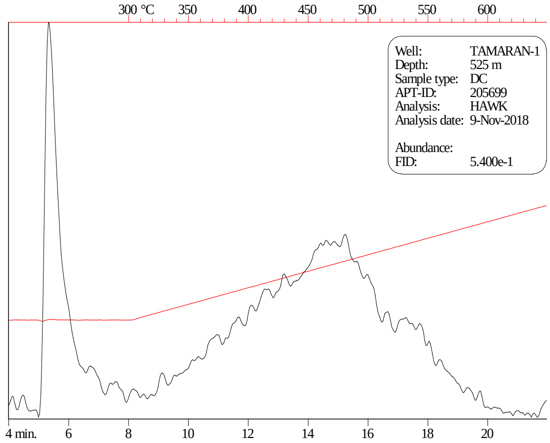

Well: TAMARAN-1
Depth: 475 m
Sample type: DC
APT-ID: 205694
Analysis: HAWK
Analysis date: 9-Nov-2018
Abundance:
FID: 1.410e+0

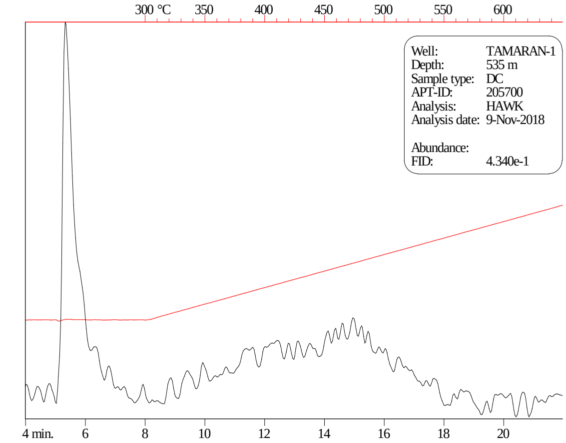

Well: TAMARAN-1
Depth: 485 m
Sample type: DC
APT-ID: 205695
Analysis: HAWK
Analysis date: 9-Nov-2018
Abundance:
FID: 1.050e+0

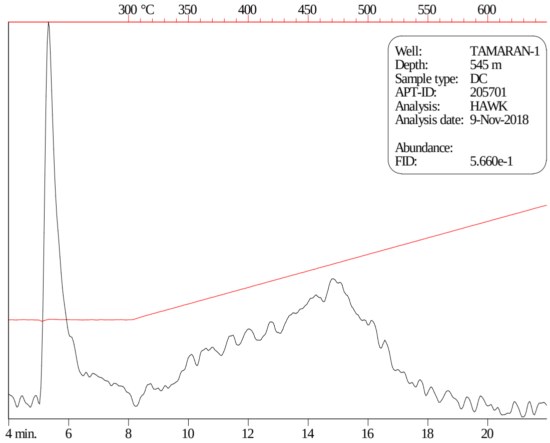

300 °C 350 400 450 500 550 600
Well: TAMARAN-1
Depth: 495 m
Sample type: DC
APT-ID: 205696
Analysis: HAWK
Analysis date: 9-Nov-2018
Abundance:
FID: 8.110e-1
4 min. 6 8 10 12 14 16 18 20

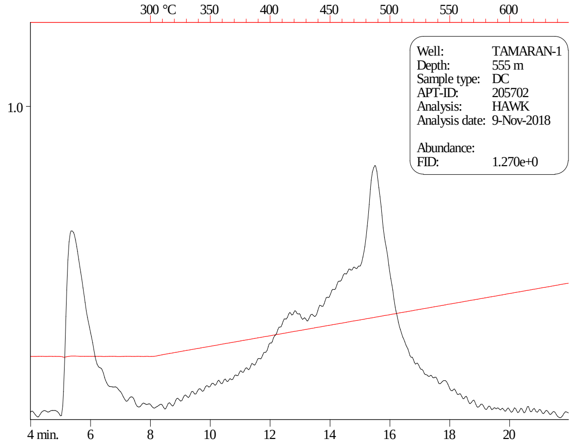

300 °C 350 400 450 500 550 600
Well: TAMARAN-1
Depth: 505 m
Sample type: DC
APT-ID: 205697
Analysis: HAWK
Analysis date: 9-Nov-2018
Abundance:
FID: 6.110e-1
4 min. 6 8 10 12 14 16 18 20

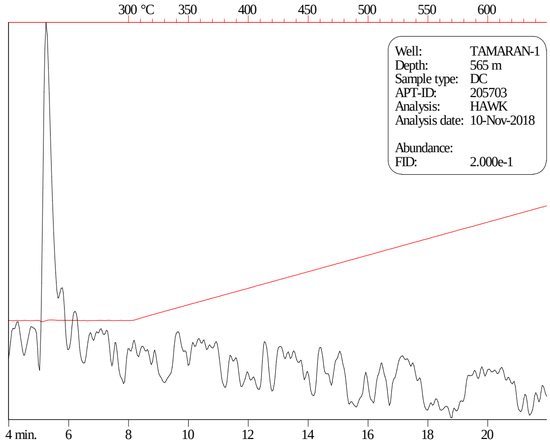

300 °C 350 400 450 500 550 600
Well: TAMARAN-1
Depth: 515 m
Sample type: DC
APT-ID: 205698
Analysis: HAWK
Analysis date: 9-Nov-2018
Abundance:
FID: 7.390e-1
4 min. 6 8 10 12 14 16 18 20

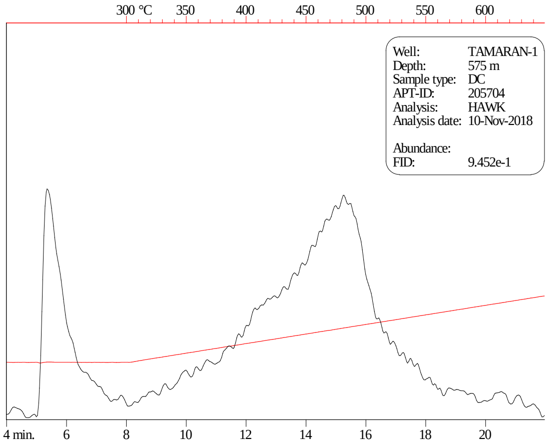

300 °C 350 400 450 500 550 600
Well: TAMARAN-1
Depth: 525 m
Sample type: DC
APT-ID: 205699
Analysis: HAWK
Analysis date: 9-Nov-2018
Abundance:
FID: 5.400e-1
4 min. 6 8 10 12 14 16 18 20

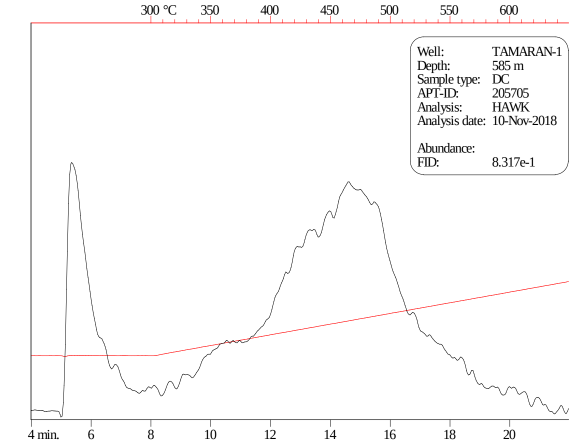

300 °C 350 400 450 500 550 600
Well: TAMARAN-1
Depth: 535 m
Sample type: DC
APT-ID: 205700
Analysis: HAWK
Analysis date: 9-Nov-2018
Abundance:
FID: 4.340e-1
4 min. 6 8 10 12 14 16 18 20

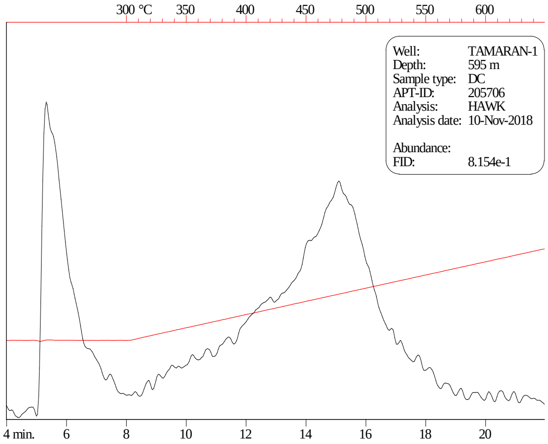

300 °C 350 400 450 500 550 600
Well: TAMARAN-1
Depth: 545 m
Sample type: DC
APT-ID: 205701
Analysis: HAWK
Analysis date: 9-Nov-2018
Abundance:
FID: 5.660e-1
4 min. 6 8 10 12 14 16 18 20

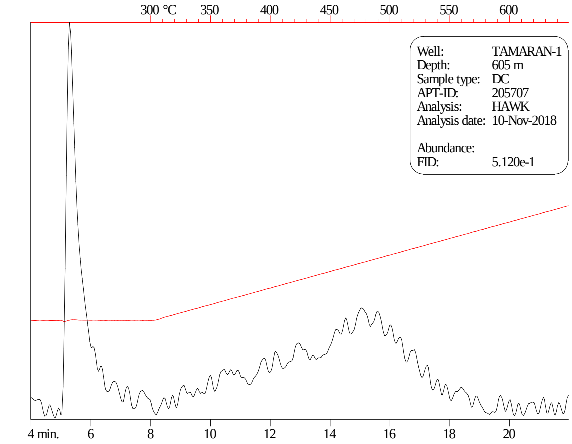

300 °C 350 400 450 500 550 600
1.0
Well: TAMARAN-1
Depth: 555 m
Sample type: DC
APT-ID: 205702
Analysis: HAWK
Analysis date: 9-Nov-2018
Abundance:
FID: 1.270e+0
4 min. 6 8 10 12 14 16 18 20

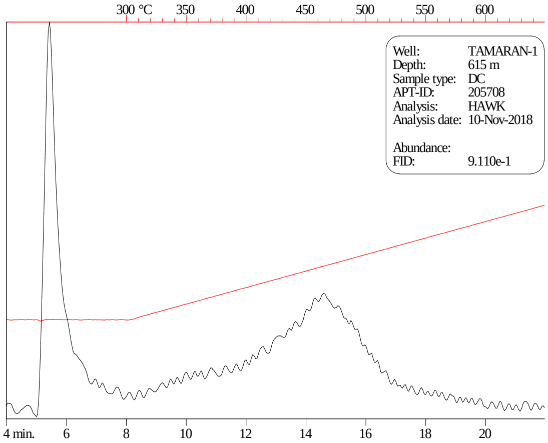

300 °C 350 400 450 500 550 600
Well: TAMARAN-1
Depth: 565 m
Sample type: DC
APT-ID: 205703
Analysis: HAWK
Analysis date: 10-Nov-2018
Abundance:
FID: 2.000e-1
4 min. 6 8 10 12 14 16 18 20

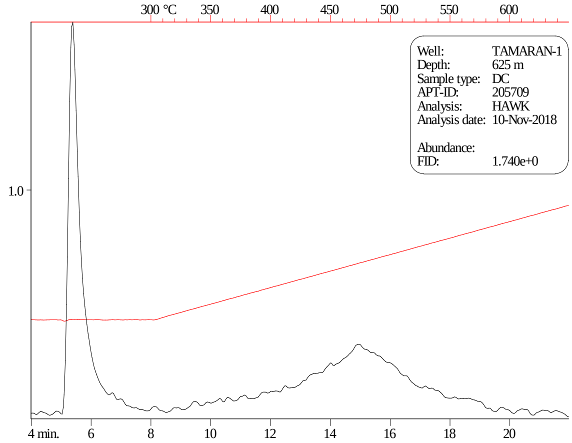

300 °C 350 400 450 500 550 600
Well: TAMARAN-1
Depth: 575 m
Sample type: DC
APT-ID: 205704
Analysis: HAWK
Analysis date: 10-Nov-2018
Abundance:
FID: 9.452e-1
4 min. 6 8 10 12 14 16 18 20

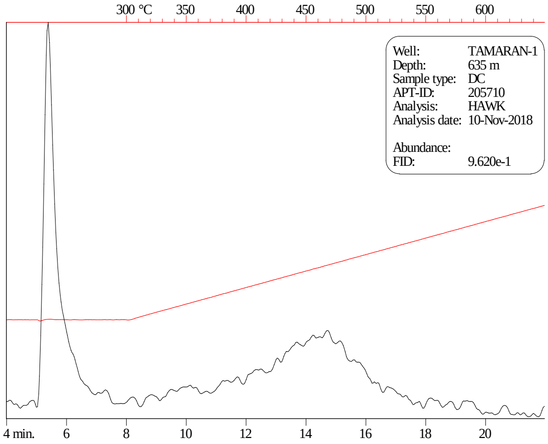

300 °C 350 400 450 500 550 600
Well: TAMARAN-1
Depth: 585 m
Sample type: DC
APT-ID: 205705
Analysis: HAWK
Analysis date: 10-Nov-2018
Abundance:
FID: 8.317e-1
4 min. 6 8 10 12 14 16 18 20

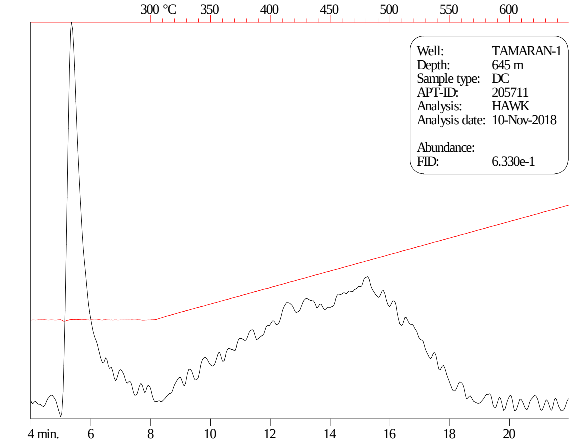

300 °C 350 400 450 500 550 600
Well: TAMARAN-1
Depth: 595 m
Sample type: DC
APT-ID: 205706
Analysis: HAWK
Analysis date: 10-Nov-2018
Abundance:
FID: 8.154e-1
4 min. 6 8 10 12 14 16 18 20

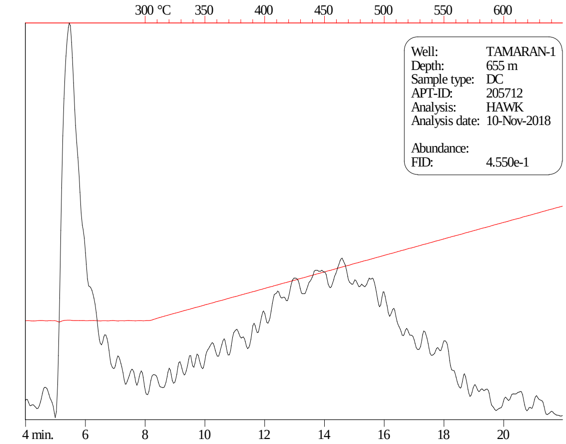

300 °C 350 400 450 500 550 600
Well: TAMARAN-1
Depth: 605 m
Sample type: DC
APT-ID: 205707
Analysis: HAWK
Analysis date: 10-Nov-2018
Abundance:
FID: 5.120e-1
4 min. 6 8 10 12 14 16 18 20

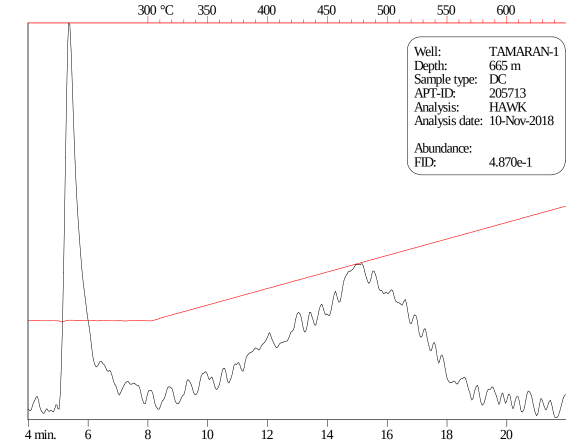

300 °C 350 400 450 500 550 600
Well: TAMARAN-1
Depth: 615 m
Sample type: DC
APT-ID: 205708
Analysis: HAWK
Analysis date: 10-Nov-2018
Abundance:
FID: 9.110e-1
4 min. 6 8 10 12 14 16 18 20

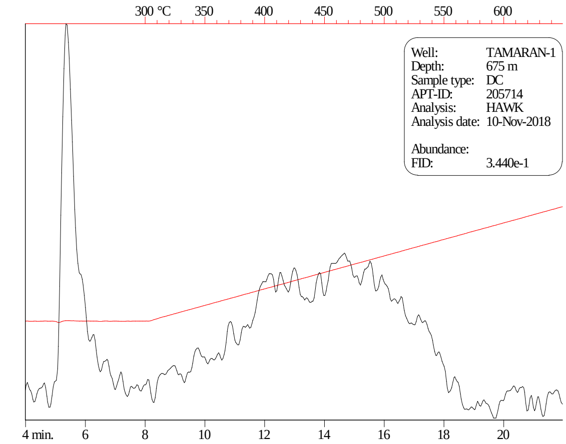

300 °C 350 400 450 500 550 600
1.0
Well: TAMARAN-1
Depth: 625 m
Sample type: DC
APT-ID: 205709
Analysis: HAWK
Analysis date: 10-Nov-2018
Abundance:
FID: 1.740e+0
4 min. 6 8 10 12 14 16 18 20

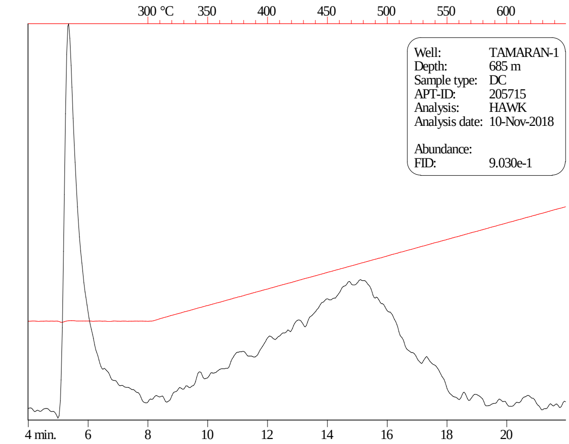

300 °C 350 400 450 500 550 600
Well: TAMARAN-1
Depth: 635 m
Sample type: DC
APT-ID: 205710
Analysis: HAWK
Analysis date: 10-Nov-2018
Abundance:
FID: 9.620e-1
4 min. 6 8 10 12 14 16 18 20

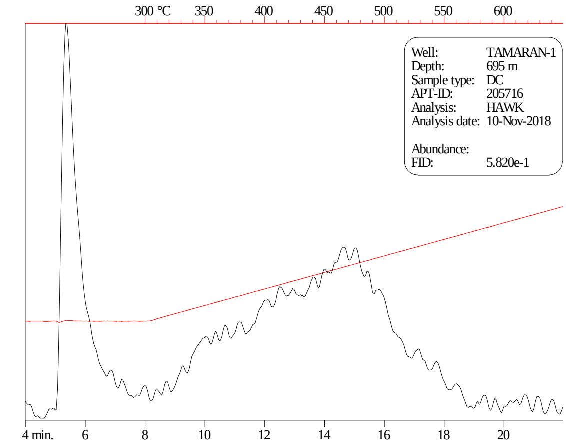

300 °C 350 400 450 500 550 600
Well: TAMARAN-1
Depth: 645 m
Sample type: DC
APT-ID: 205711
Analysis: HAWK
Analysis date: 10-Nov-2018
Abundance:
FID: 6.330e-1
4 min. 6 8 10 12 14 16 18 20

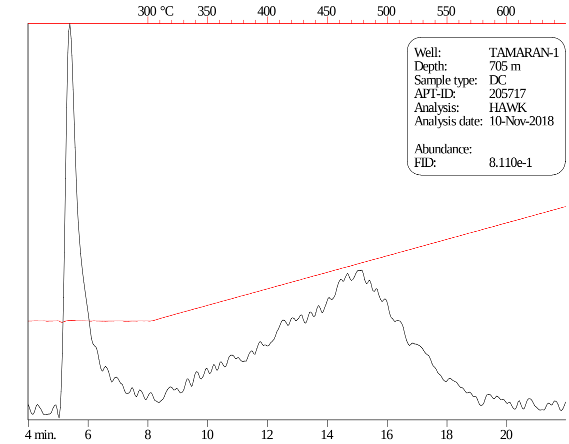

300 °C 350 400 450 500 550 600
Well: TAMARAN-1
Depth: 655 m
Sample type: DC
APT-ID: 205712
Analysis: HAWK
Analysis date: 10-Nov-2018
Abundance:
FID: 4.550e-1
4 min. 6 8 10 12 14 16 18 20

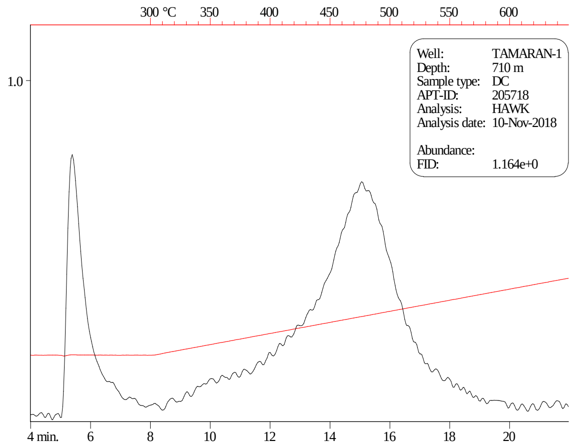

300 °C 350 400 450 500 550 600
Well: TAMARAN-1
Depth: 665 m
Sample type: DC
APT-ID: 205713
Analysis: HAWK
Analysis date: 10-Nov-2018
Abundance:
FID: 4.870e-1
4 min. 6 8 10 12 14 16 18 20

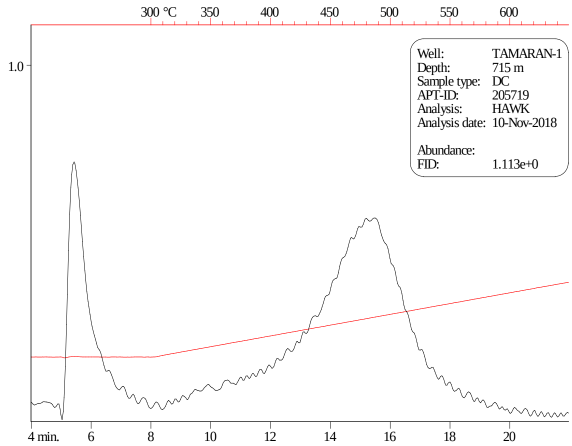

300 °C 350 400 450 500 550 600
Well: TAMARAN-1
Depth: 675 m
Sample type: DC
APT-ID: 205714
Analysis: HAWK
Analysis date: 10-Nov-2018
Abundance:
FID: 3.440e-1
4 min. 6 8 10 12 14 16 18 20

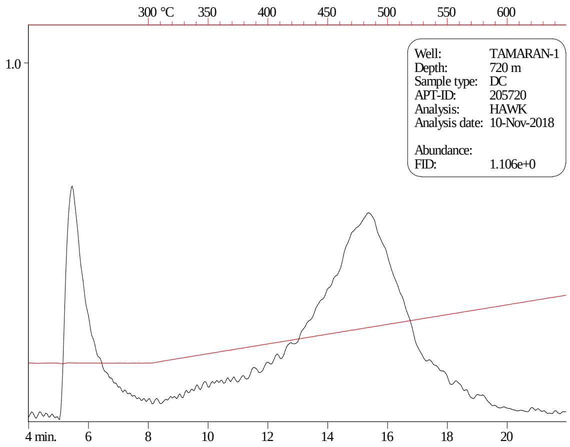

300 °C 350 400 450 500 550 600
Well: TAMARAN-1
Depth: 685 m
Sample type: DC
APT-ID: 205715
Analysis: HAWK
Analysis date: 10-Nov-2018
Abundance:
FID: 9.030e-1
4 min. 6 8 10 12 14 16 18 20

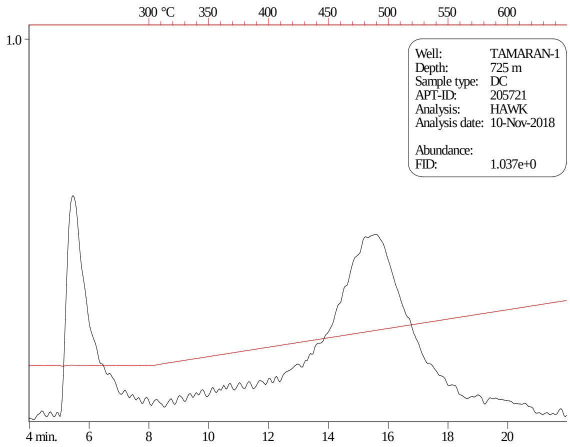

300 °C 350 400 450 500 550 600
Well: TAMARAN-1
Depth: 695 m
Sample type: DC
APT-ID: 205716
Analysis: HAWK
Analysis date: 10-Nov-2018
Abundance:
FID: 5.820e-1
4 min. 6 8 10 12 14 16 18 20

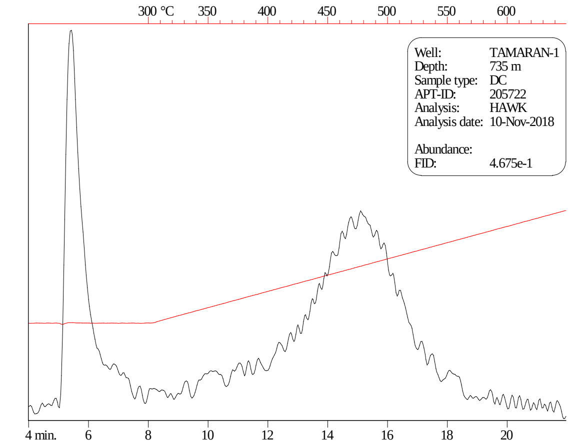

300 °C 350 400 450 500 550 600
Well: TAMARAN-1
Depth: 705 m
Sample type: DC
APT-ID: 205717
Analysis: HAWK
Analysis date: 10-Nov-2018
Abundance:
FID: 8.110e-1
4 min. 6 8 10 12 14 16 18 20

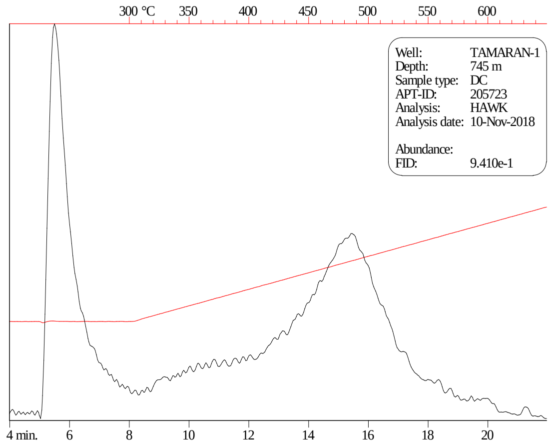

300 °C 350 400 450 500 550 600
1.0
Well: TAMARAN-1
Depth: 710 m
Sample type: DC
APT-ID: 205718
Analysis: HAWK
Analysis date: 10-Nov-2018
Abundance:
FID: 1.164e+0
4 min. 6 8 10 12 14 16 18 20

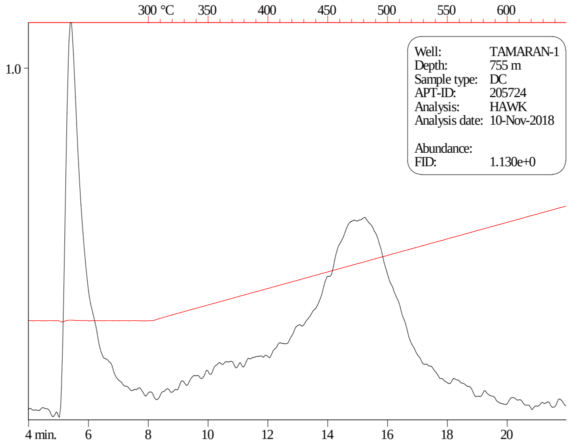

300 °C 350 400 450 500 550 600
1.0
Well: TAMARAN-1
Depth: 715 m
Sample type: DC
APT-ID: 205719
Analysis: HAWK
Analysis date: 10-Nov-2018
Abundance:
FID: 1.113e+0
4 min. 6 8 10 12 14 16 18 20

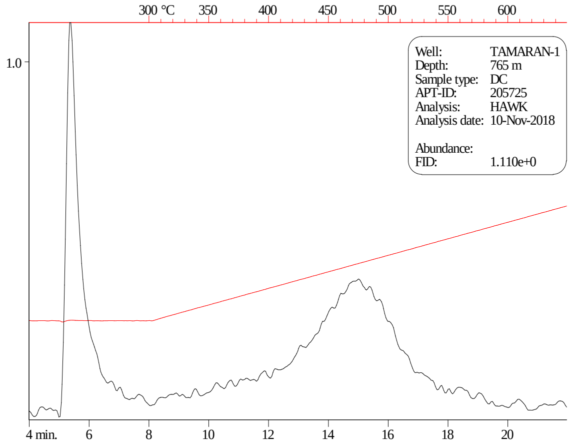

300 °C 350 400 450 500 550 600
1.0
Well: TAMARAN-1
Depth: 720 m
Sample type: DC
APT-ID: 205720
Analysis: HAWK
Analysis date: 10-Nov-2018
Abundance:
FID: 1.106e+0
4 min. 6 8 10 12 14 16 18 20

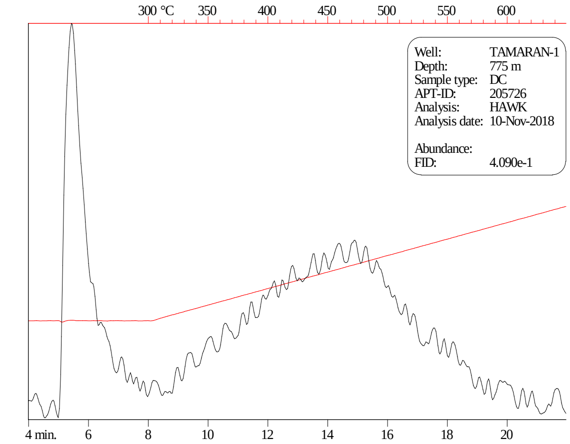

300 °C 350 400 450 500 550 600
1.0
Well: TAMARAN-1
Depth: 725 m
Sample type: DC
APT-ID: 205721
Analysis: HAWK
Analysis date: 10-Nov-2018
Abundance:
FID: 1.037e+0
4 min. 6 8 10 12 14 16 18 20

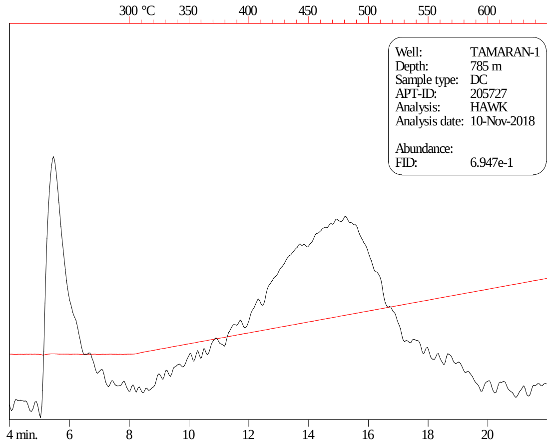

300 °C 350 400 450 500 550 600
Well: TAMARAN-1
Depth: 735 m
Sample type: DC
APT-ID: 205722
Analysis: HAWK
Analysis date: 10-Nov-2018
Abundance:
FID: 4.675e-1
4 min. 6 8 10 12 14 16 18 20

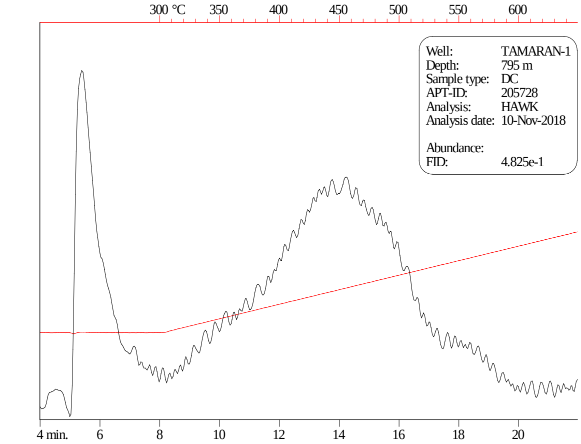

300 °C 350 400 450 500 550 600
Well: TAMARAN-1
Depth: 745 m
Sample type: DC
APT-ID: 205723
Analysis: HAWK
Analysis date: 10-Nov-2018
Abundance:
FID: 9.410e-1
4 min. 6 8 10 12 14 16 18 20

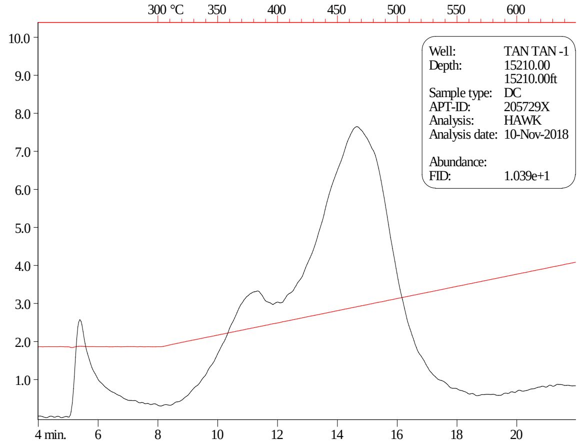

300 °C 350 400 450 500 550 600
1.0
Well: TAMARAN-1
Depth: 755 m
Sample type: DC
APT-ID: 205724
Analysis: HAWK
Analysis date: 10-Nov-2018
Abundance:
FID: 1.130e+0
4 min. 6 8 10 12 14 16 18 20

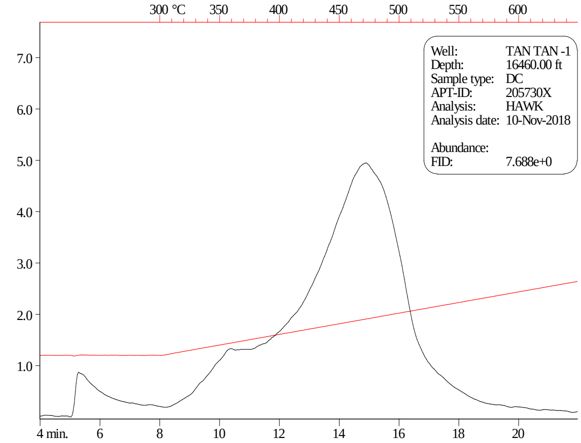

300 °C 350 400 450 500 550 600
1.0
Well: TAMARAN-1
Depth: 765 m
Sample type: DC
APT-ID: 205725
Analysis: HAWK
Analysis date: 10-Nov-2018
Abundance:
FID: 1.110e+0
4 min. 6 8 10 12 14 16 18 20

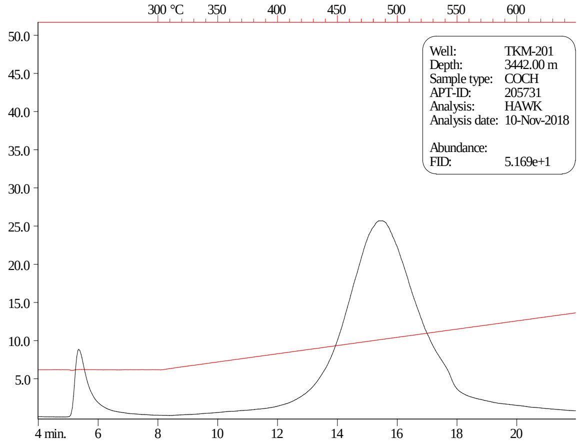

300 °C 350 400 450 500 550 600
Well: TAMARAN-1
Depth: 775 m
Sample type: DC
APT-ID: 205726
Analysis: HAWK
Analysis date: 10-Nov-2018
Abundance:
FID: 4.090e-1
4 min. 6 8 10 12 14 16 18 20

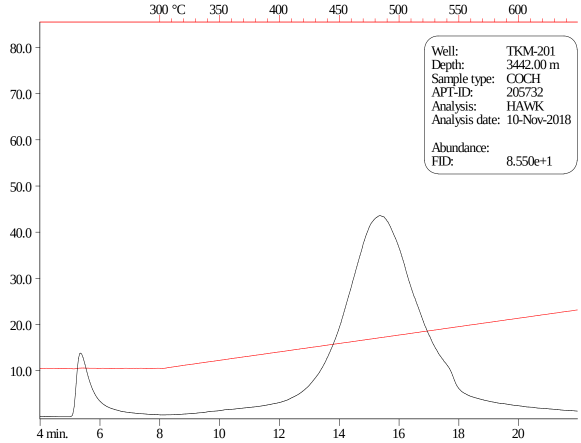

300 °C 350 400 450 500 550 600
Well: TAMARAN-1
Depth: 785 m
Sample type: DC
APT-ID: 205727
Analysis: HAWK
Analysis date: 10-Nov-2018
Abundance:
FID: 6.947e-1
4 min. 6 8 10 12 14 16 18 20

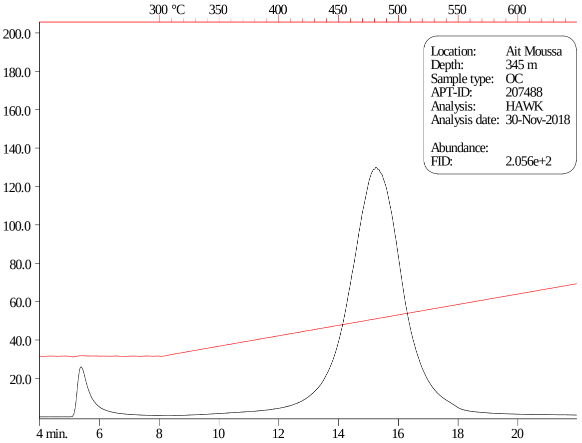

Well: TAMARAN-1
Depth: 795 m
Sample type: DC
APT-ID: 205728
Analysis: HAWK
Analysis date: 10-Nov-2018
Abundance:
FID: 4.825e-1

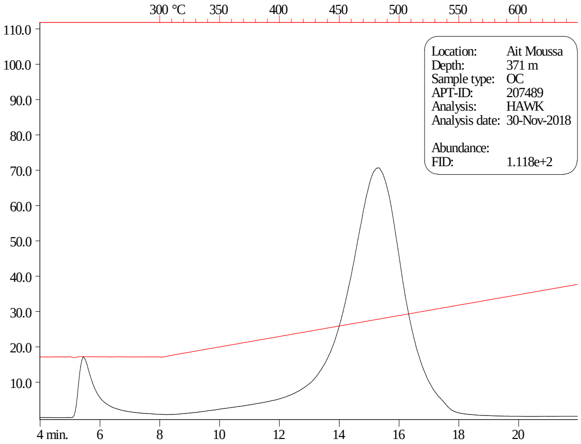

Well: TAN TAN -1
Depth: 15210.00 15210.00ft
Sample type: DC
APT-ID: 205729X
Analysis: HAWK
Analysis date: 10-Nov-2018
Abundance:
FID: 1.039e+1

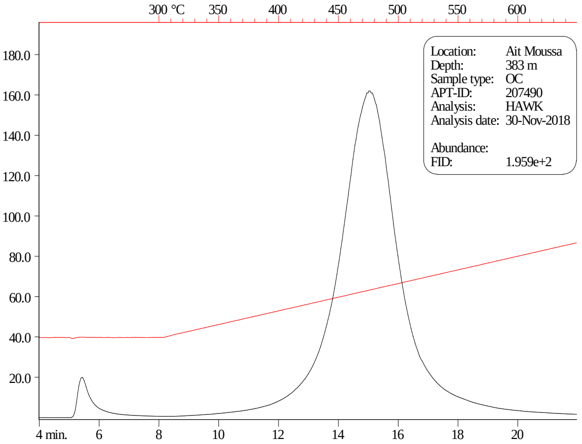

Well: TAN TAN -1
Depth: 16460.00 ft
Sample type: DC
APT-ID: 205730X
Analysis: HAWK
Analysis date: 10-Nov-2018
Abundance:
FID: 7.688e+0

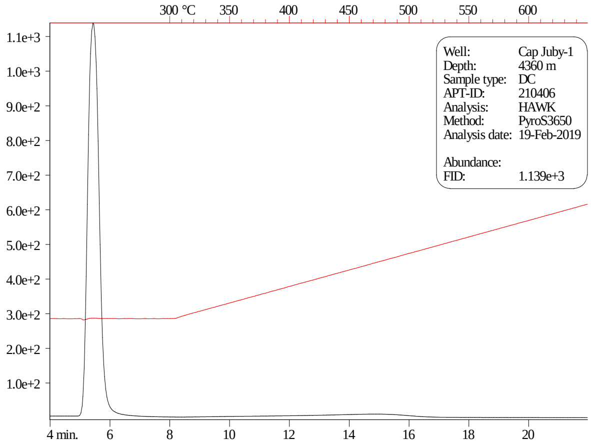

Well: TKM-201
Depth: 3442.00 m
Sample type: COCH
APT-ID: 205731
Analysis: HAWK
Analysis date: 10-Nov-2018
Abundance:
FID: 5.169e+1

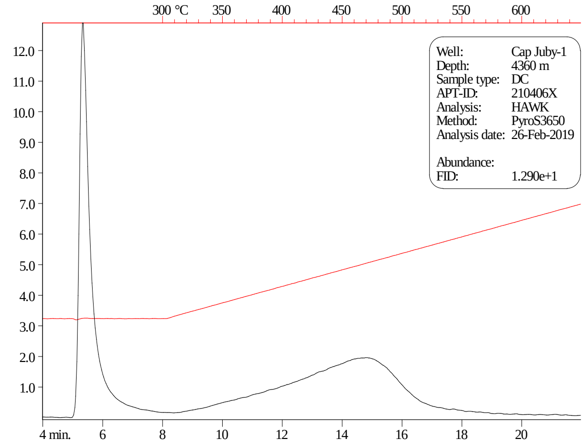

Well: TKM-201
Depth: 3442.00 m
Sample type: COCH
APT-ID: 205732
Analysis: HAWK
Analysis date: 10-Nov-2018
Abundance:
FID: 8.550e+1

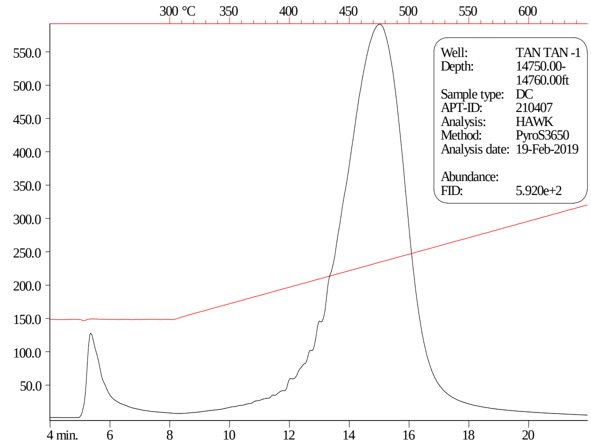

Location: Ait Moussa
Depth: 345 m
Sample type: OC
APT-ID: 207488
Analysis: HAWK
Analysis date: 30-Nov-2018
Abundance:
FID: 2.056e+2

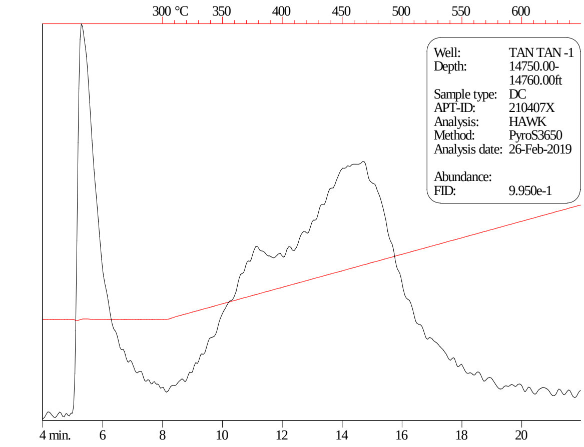

Location: Ait Moussa
Depth: 371 m
Sample type: OC
APT-ID: 207489
Analysis: HAWK
Analysis date: 30-Nov-2018
Abundance:
FID: 1.118e+2


Location: Ait Moussa
Depth: 383 m
Sample type: OC
APT-ID: 207490
Analysis: HAWK
Analysis date: 30-Nov-2018
Abundance:
FID: 1.959e+2

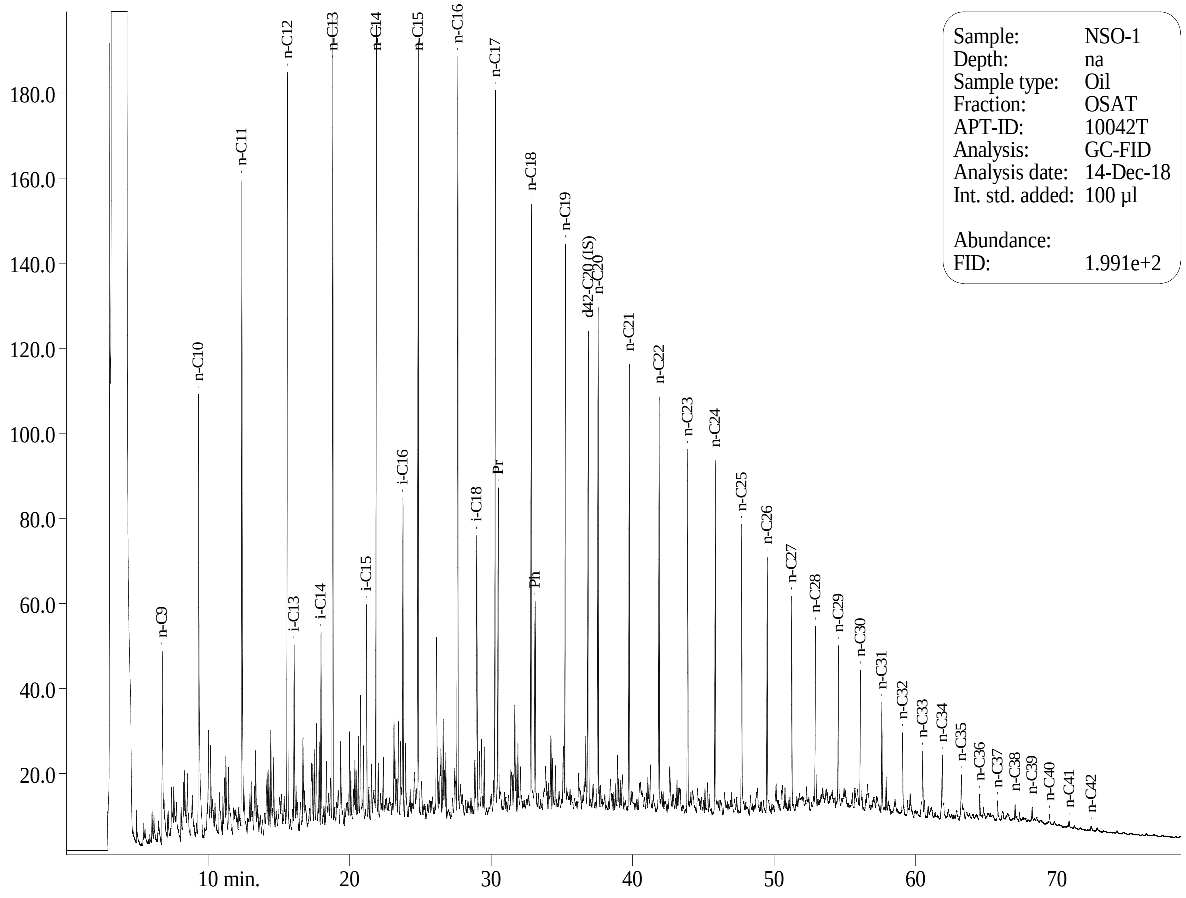

Well: Cap Juby-1
Depth: 4360 m
Sample type: DC
APT-ID: 210406
Analysis: HAWK
Method: PyroS3650
Analysis date: 19-Feb-2019
Abundance:
FID: 1.139e+3


Well: Cap Juby-1
Depth: 4360 m
Sample type: DC
APT-ID: 210406X
Analysis: HAWK
Method: PyroS3650
Analysis date: 26-Feb-2019
Abundance:
FID: 1.290e+1

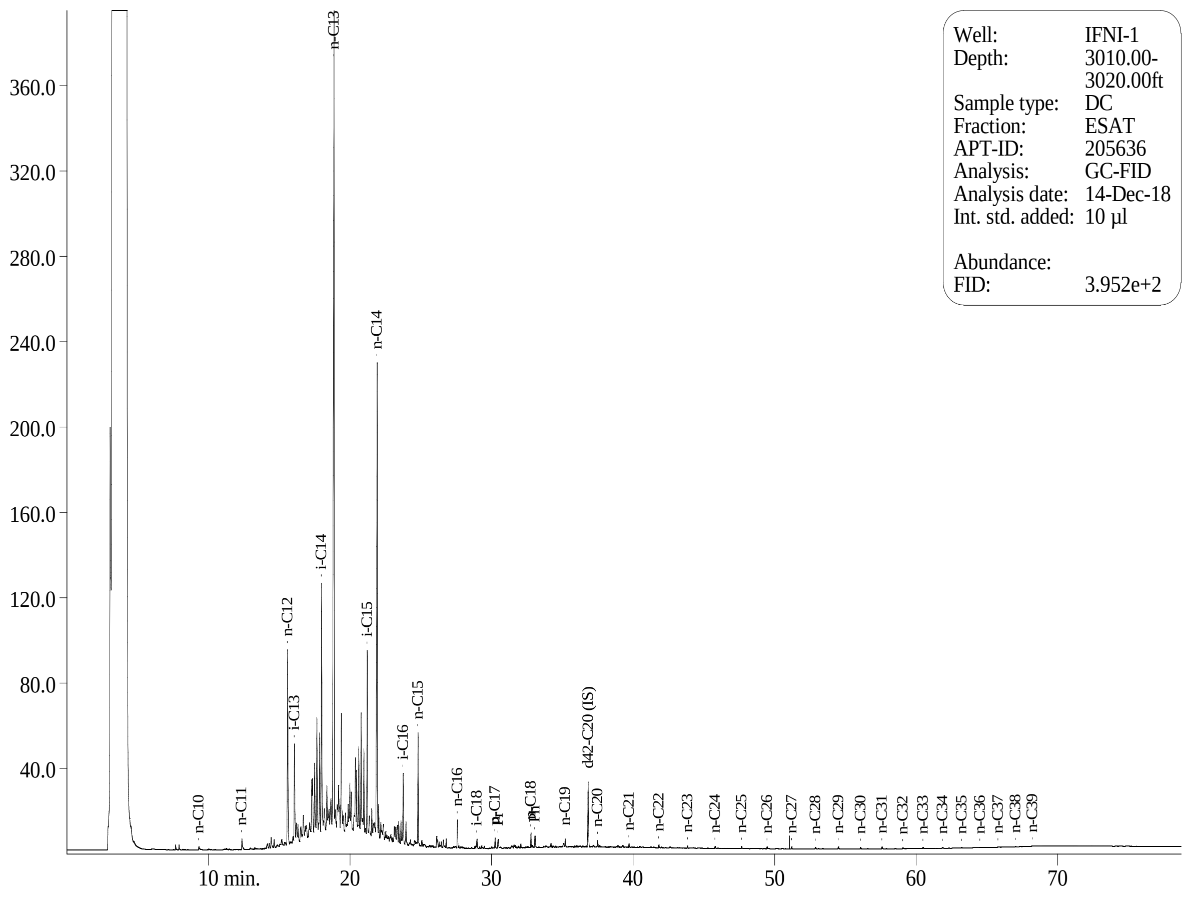

Well: TAN TAN -1
Depth: 14750.00-14760.00ft
Sample type: DC
APT-ID: 210407
Analysis: HAWK
Method: PyroS3650
Analysis date: 19-Feb-2019
Abundance:
FID: 5.920e+2


Well: TAN TAN -1
Depth: 14750.00-14760.00ft
Sample type: DC
APT-ID: 210407X
Analysis: HAWK
Method: PyroS3650
Analysis date: 26-Feb-2019
Abundance:
FID: 9.950e-1

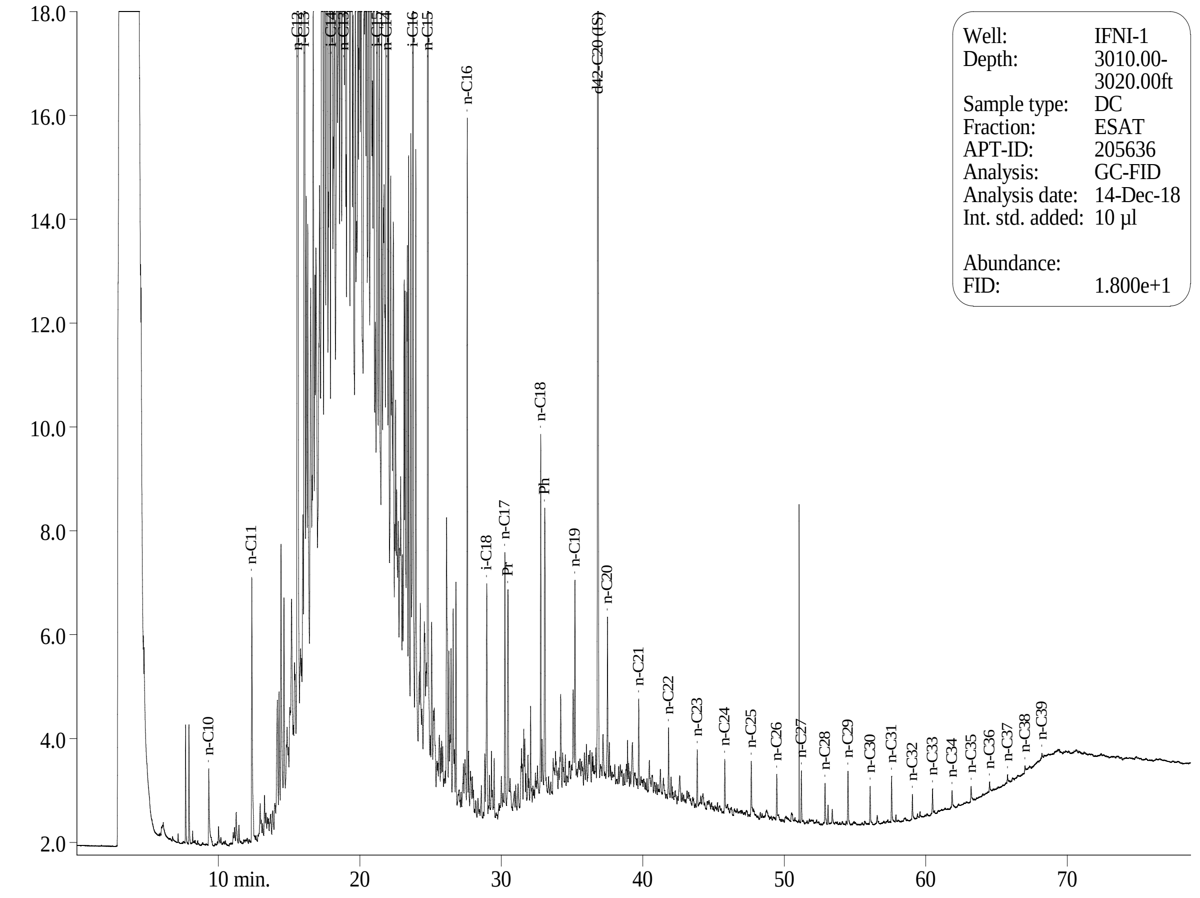
GC Chromatograms of Saturated Hydrocarbons

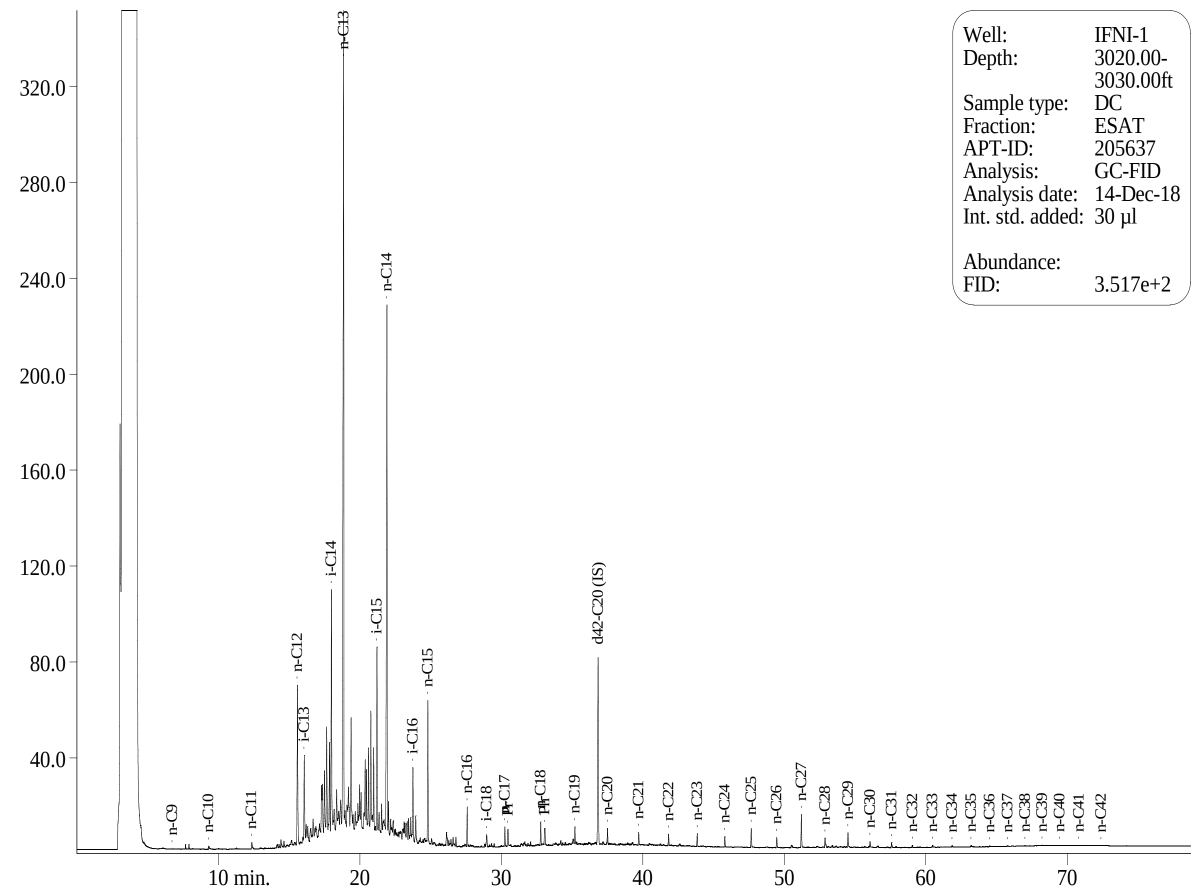


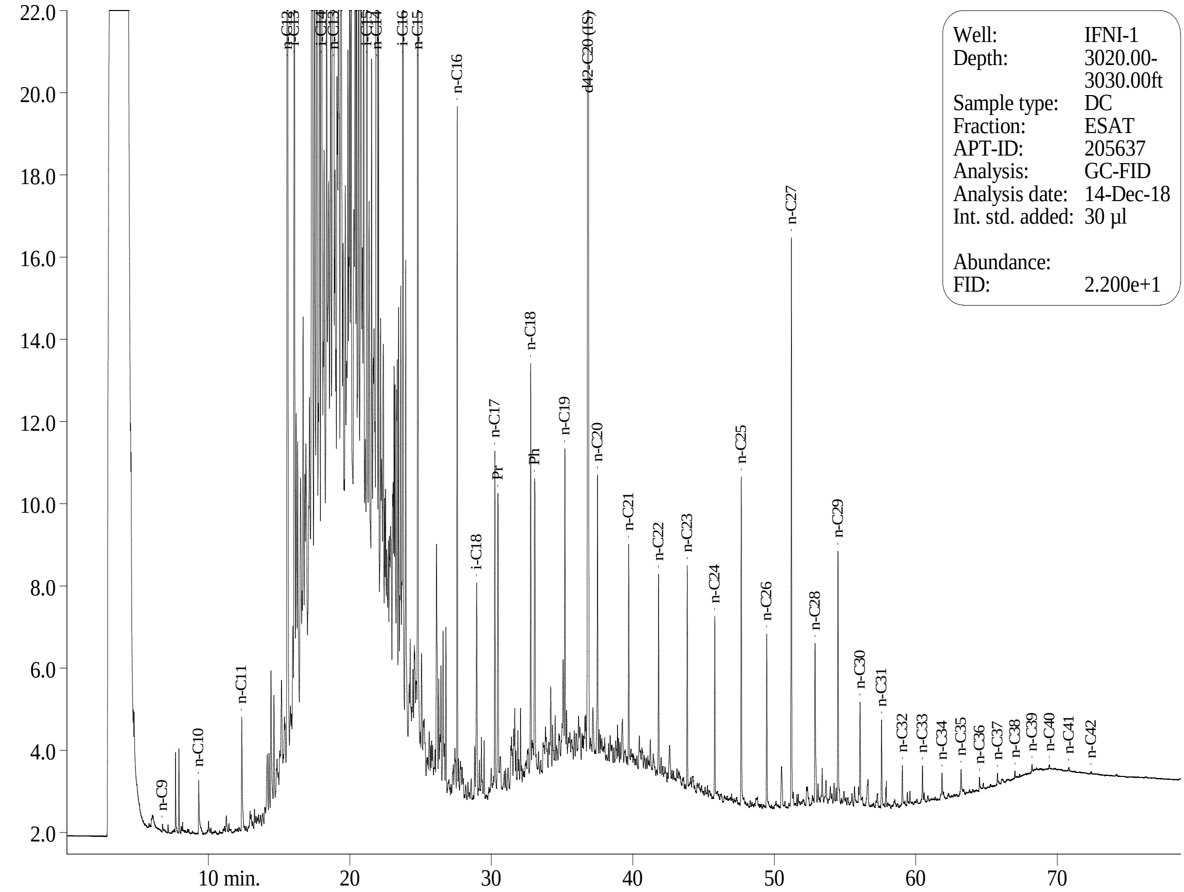
Sample: NSO-1
Depth: na
Sample type: Oil
Fraction: OSAT
APT-ID: 10042T
Analysis: GC-FID
Analysis date: 14-Dec-18
Int. std. added: 100 µl
Abundance:
FID: 1.991e+2

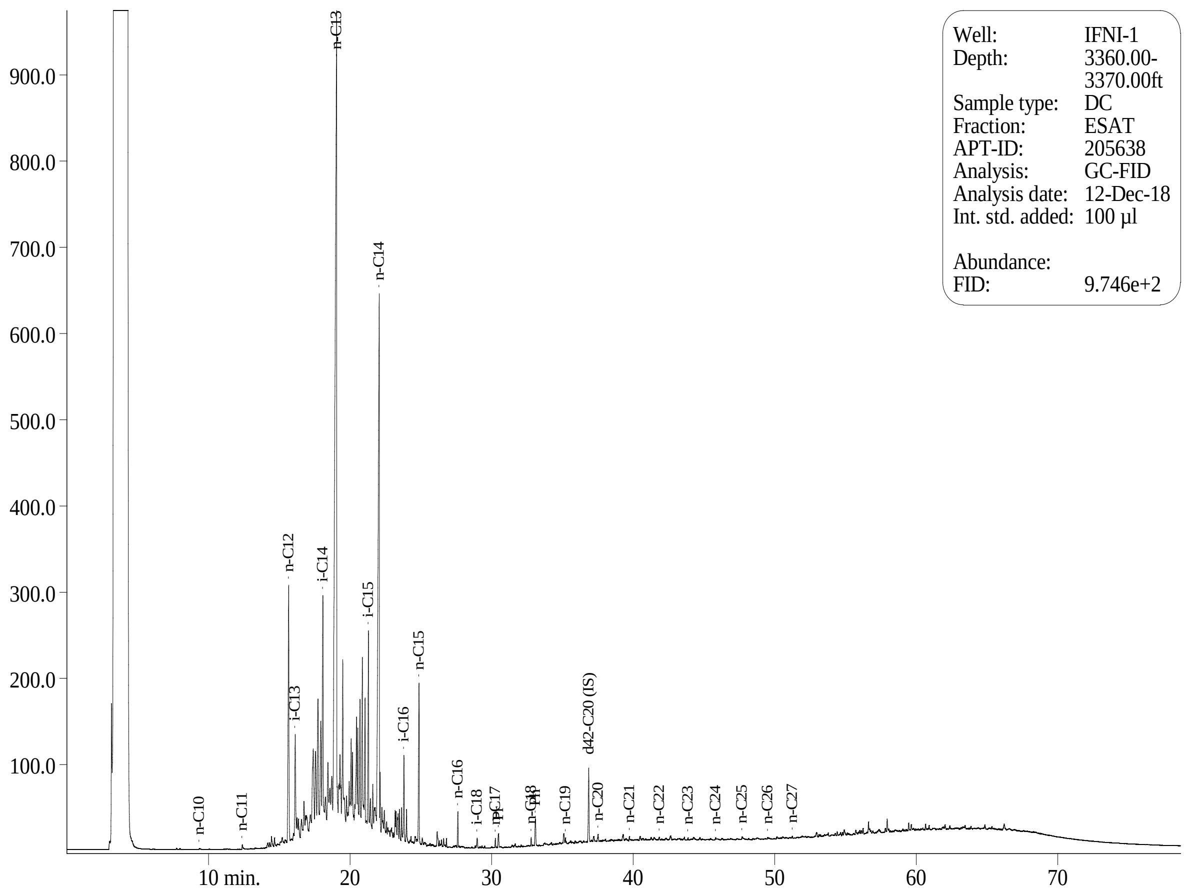


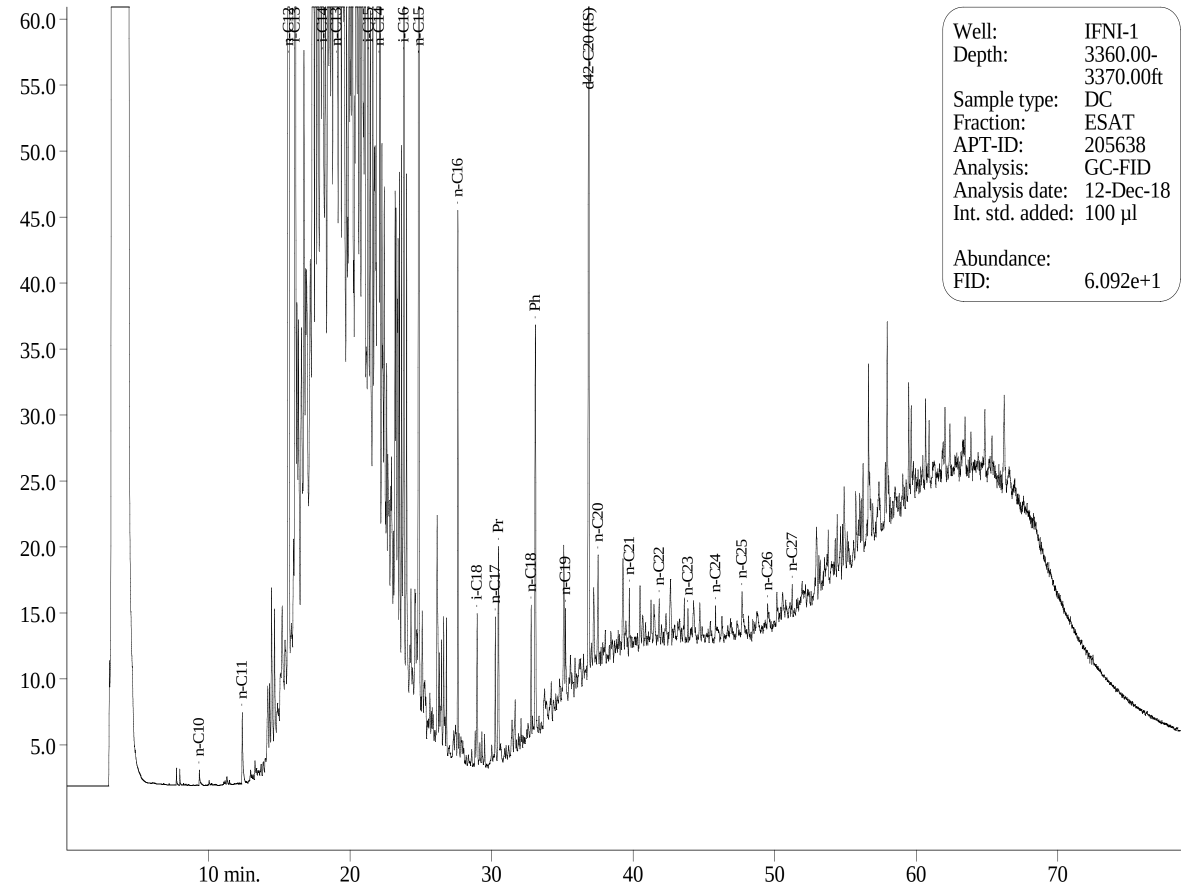
Well: IFNI-1
Depth: 3010.00-3020.00ft
Sample type: DC
Fraction: ESAT
APT-ID: 205636
Analysis: GC-FID
Analysis date: 14-Dec-18
Int. std. added: 10 µl
Abundance:
FID: 3.952e+2

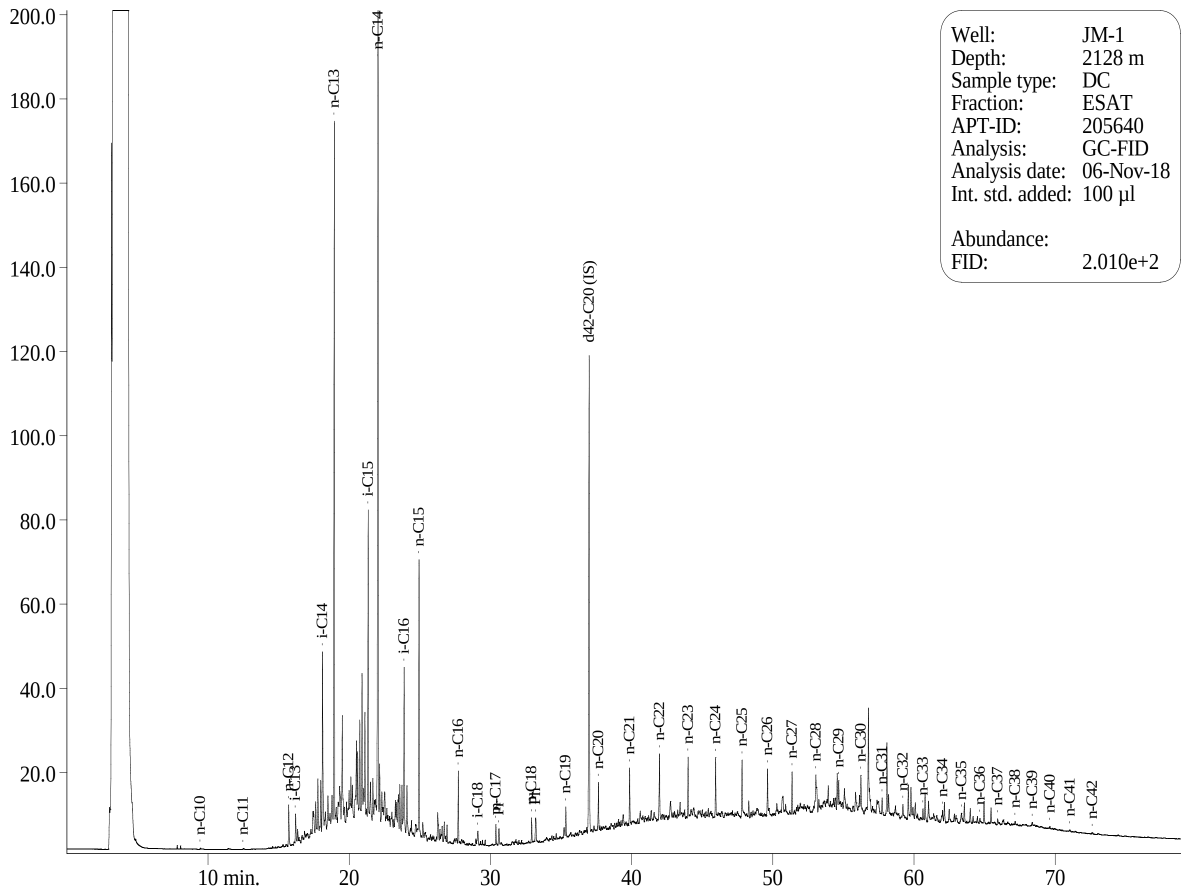

Well: IFNI-1
Depth: 3010.00-3020.00ft
Sample type: DC
Fraction: ESAT
APT-ID: 205636
Analysis: GC-FID
Analysis date: 14-Dec-18
Int. std. added: 10 µl
Abundance:
FID: 1.800e+1
18.0
16.0
14.0
12.0
10.0
8.0
6.0
4.0
2.0
10 min.
20
30
40
50
60
70
n-C10
n-C11
n-C16
i-C18
n-C17
Pr
n-C18
Ph
n-C19
d42-C20 (IS)
n-C20
n-C21
n-C22
n-C23
n-C24
n-C25
n-C26
n-C27
n-C28
n-C29
n-C30
n-C31
n-C32
n-C33
n-C34
n-C35
n-C36
n-C37
n-C38
n-C39

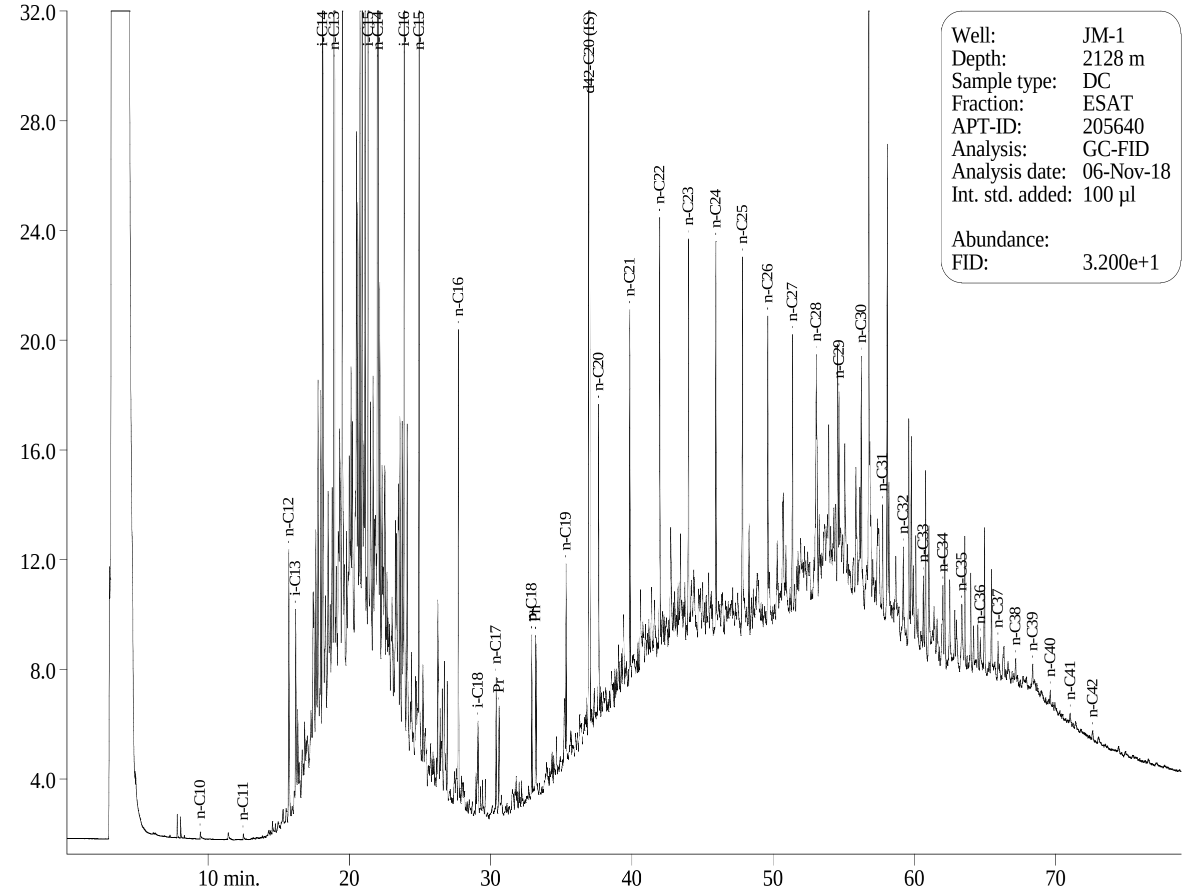

Well: IFNI-1
Depth: 3020.00-3030.00ft
Sample type: DC
Fraction: ESAT
APT-ID: 205637
Analysis: GC-FID
Analysis date: 14-Dec-18
Int. std. added: 30 µl
Abundance:
FID: 3.517e+2
320.0
280.0
240.0
200.0
160.0
120.0
80.0
40.0
10 min.
20
30
40
50
60
70
n-C9
n-C10
n-C11
n-C12
i-C13
i-C14
n-C13
i-C15
n-C14
i-C16
n-C15
n-C16
i-C18
n-C17
Pr
n-C18
Ph
n-C19
d42-C20 (IS)
n-C20
n-C21
n-C22
n-C23
n-C24
n-C25
n-C26
n-C27
n-C28
n-C29
n-C30
n-C31
n-C32
n-C33
n-C34
n-C35
n-C36
n-C37
n-C38
n-C39
n-C40
n-C41
n-C42

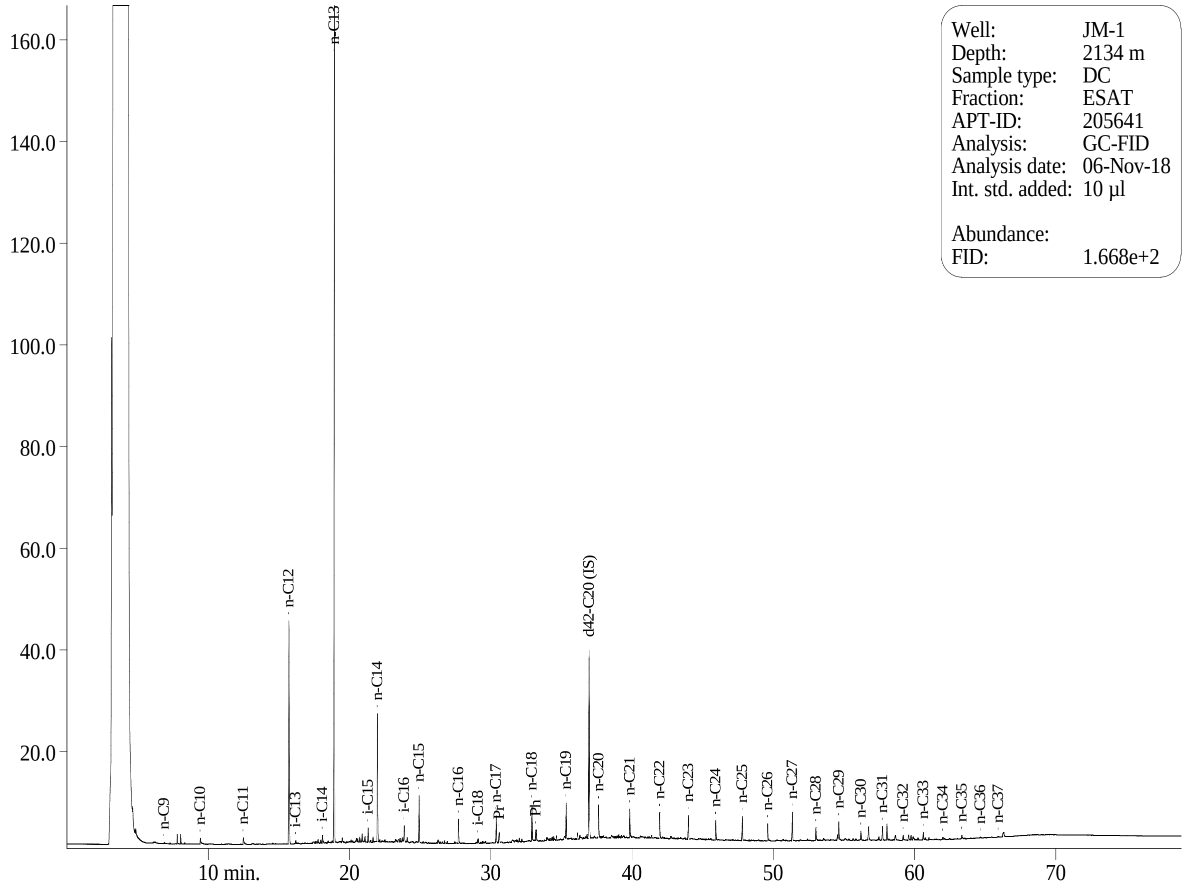

Well: IFNI-1
Depth: 3020.00-3030.00ft
Sample type: DC
Fraction: ESAT
APT-ID: 205637
Analysis: GC-FID
Analysis date: 14-Dec-18
Int. std. added: 30 µl
Abundance:
FID: 2.200e+1
22.0
20.0
18.0
16.0
14.0
12.0
10.0
8.0
6.0
4.0
2.0
10 min.
20
30
40
50
60
70
n-C9
n-C10
n-C11
n-C16
i-C18
n-C17
Pr
n-C18
Ph
n-C19
d42-C20 (IS)
n-C20
n-C21
n-C22
n-C23
n-C24
n-C25
n-C26
n-C27
n-C28
n-C29
n-C30
n-C31
n-C32
n-C33
n-C34
n-C35
n-C36
n-C37
n-C38
n-C39
n-C40
n-C41
n-C42

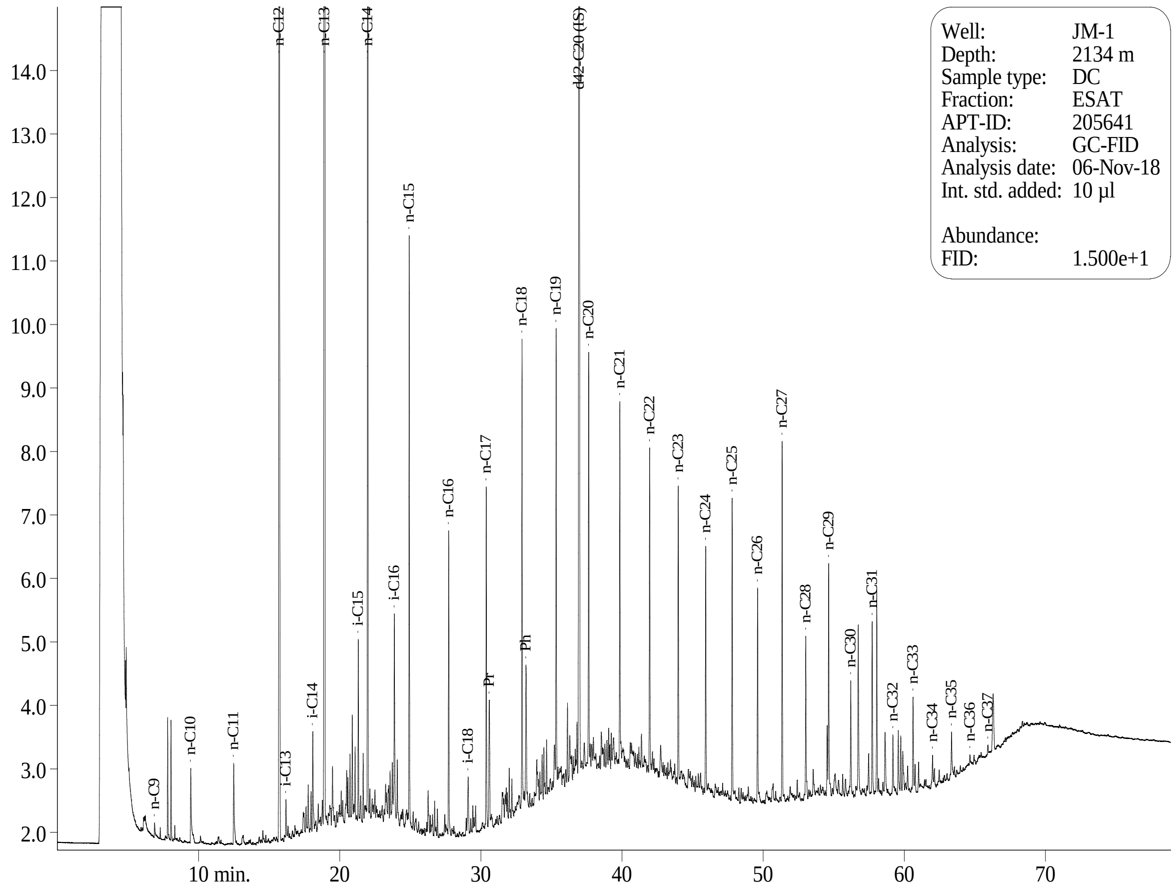

Well: IFNI-1
Depth: 3360.00-3370.00ft
Sample type: DC
Fraction: ESAT
APT-ID: 205638
Analysis: GC-FID
Analysis date: 12-Dec-18
Int. std. added: 100 µl
Abundance:
FID: 9.746e+2
900.0
800.0
700.0
600.0
500.0
400.0
300.0
200.0
100.0
10 min.
20
30
40
50
60
70
n-C10
n-C11
n-C12
i-C13
i-C14
n-C13
i-C15
n-C14
i-C16
n-C15
n-C16
i-C18
n-C17
n-C18
Ph
n-C19
d42-C20 (IS)
n-C20
n-C21
n-C22
n-C23
n-C24
n-C25
n-C26
n-C27

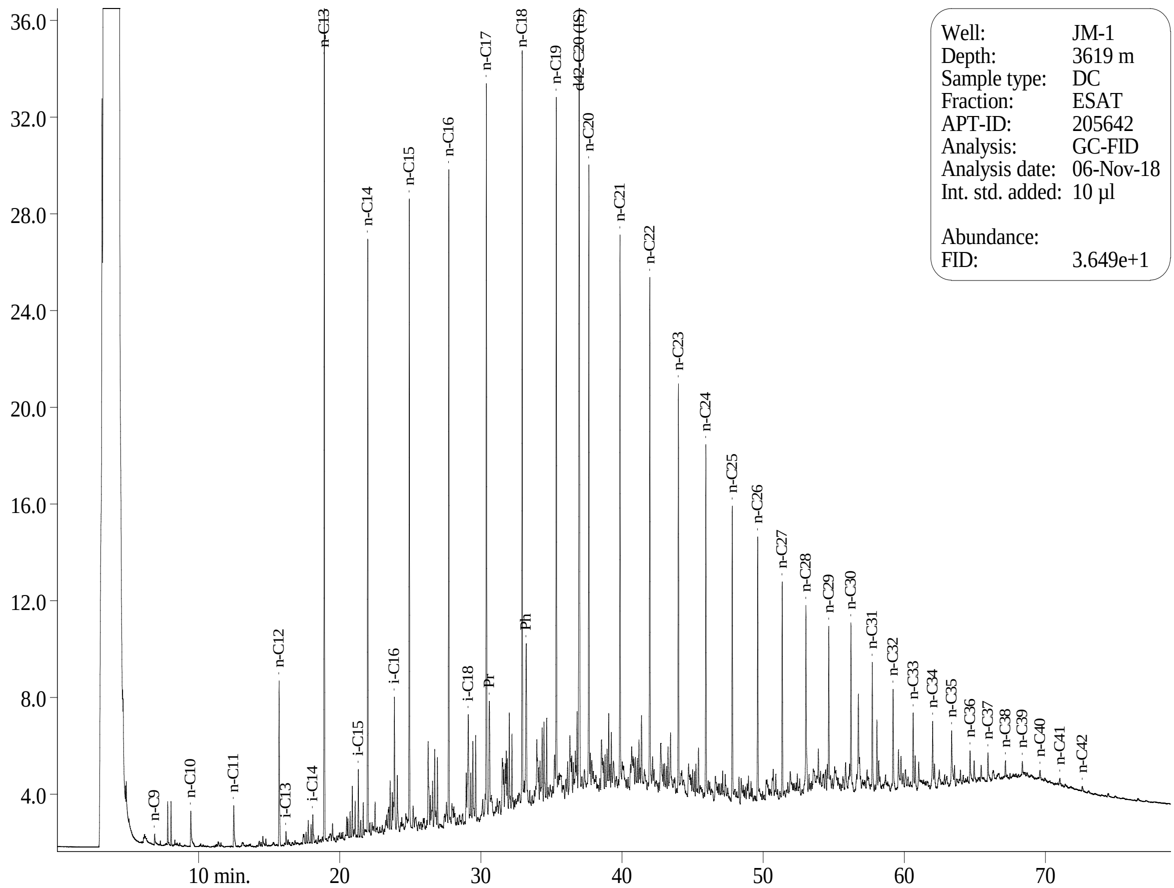

Well: IFNI-1
Depth: 3360.00-3370.00ft
Sample type: DC
Fraction: ESAT
APT-ID: 205638
Analysis: GC-FID
Analysis date: 12-Dec-18
Int. std. added: 100 µl
Abundance:
FID: 6.092e+1
10 min.
20
30
40
50
60
70

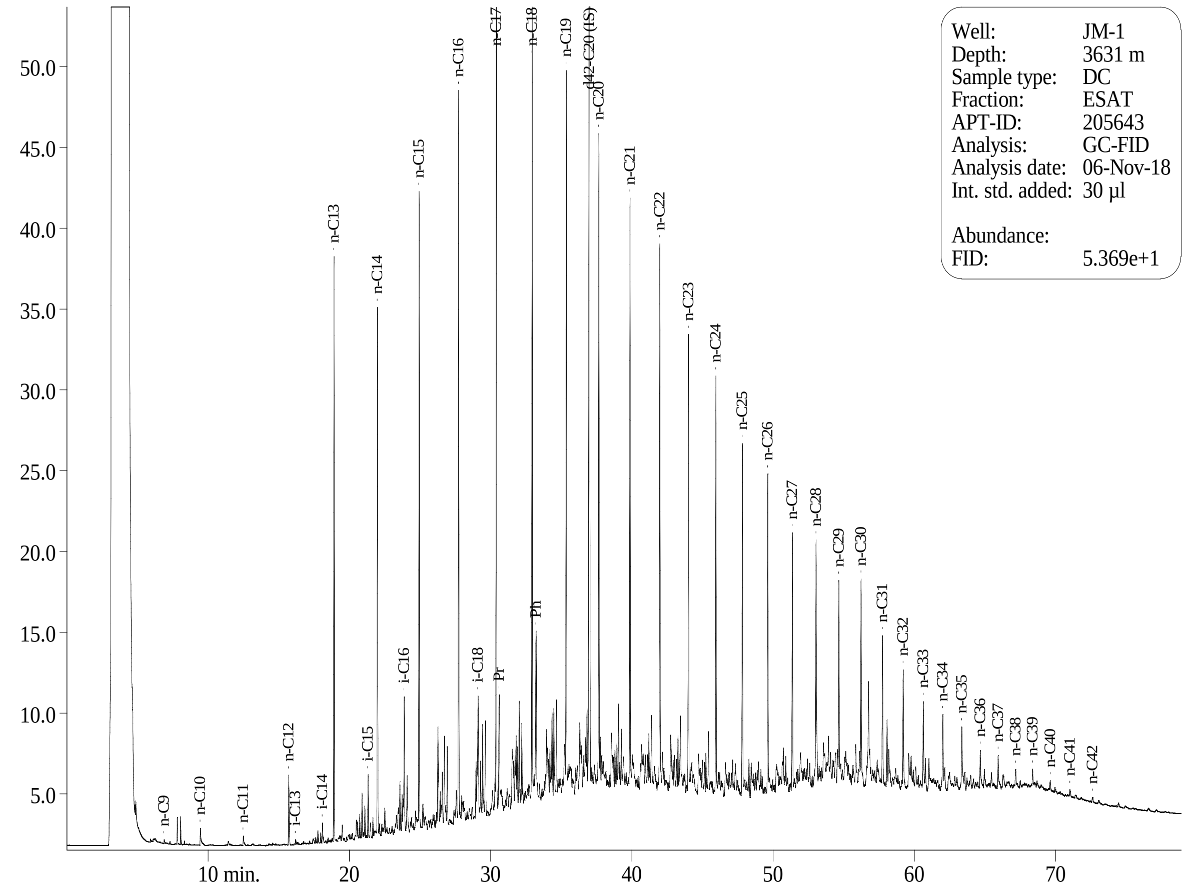

Well: JM-1
Depth: 2128 m
Sample type: DC
Fraction: ESAT
APT-ID: 205640
Analysis: GC-FID
Analysis date: 06-Nov-18
Int. std. added: 100 µl
Abundance:
FID: 2.010e+2
10 min.
20
30
40
50
60
70

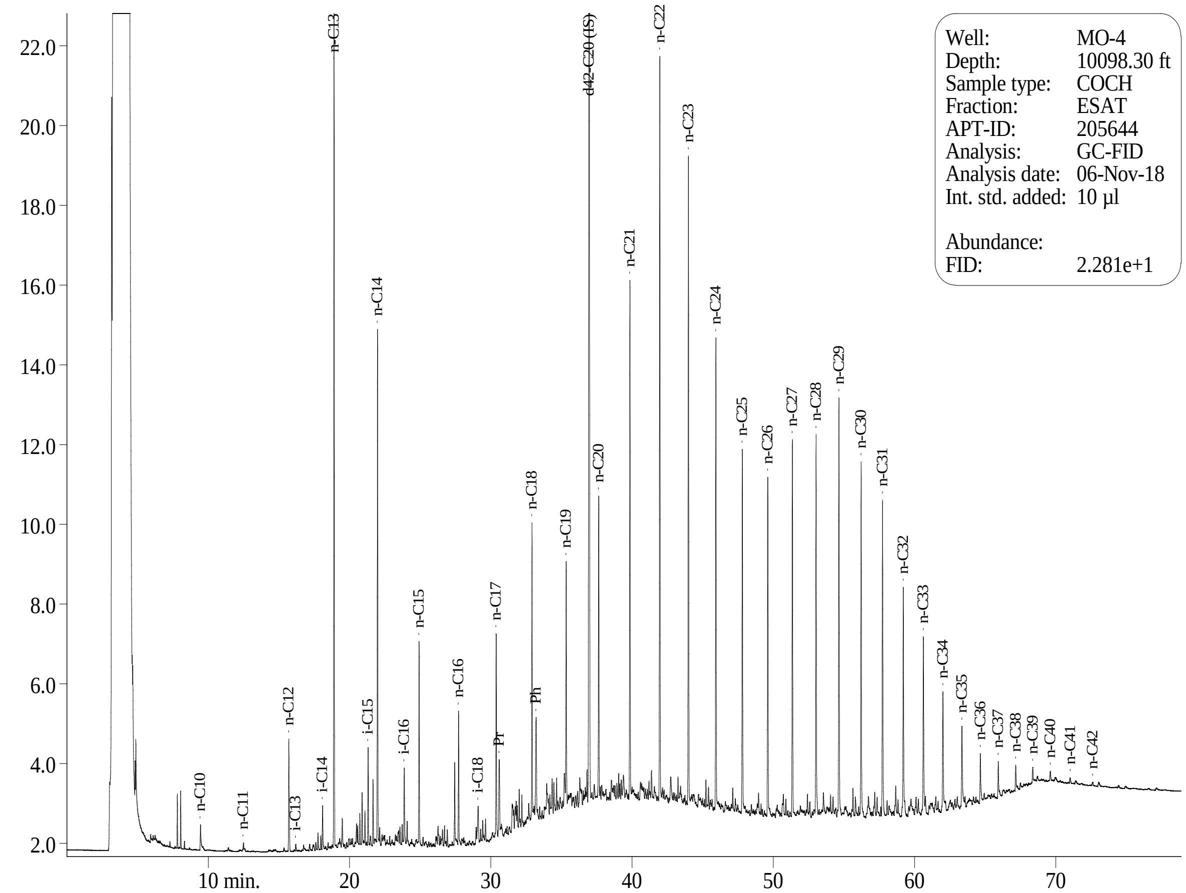

Well: JM-1
Depth: 2128 m
Sample type: DC
Fraction: ESAT
APT-ID: 205640
Analysis: GC-FID
Analysis date: 06-Nov-18
Int. std. added: 100 µl
Abundance:
FID: 3.200e+1
d42-C20 (IS)
10 min.
20
30
40
50
60
70

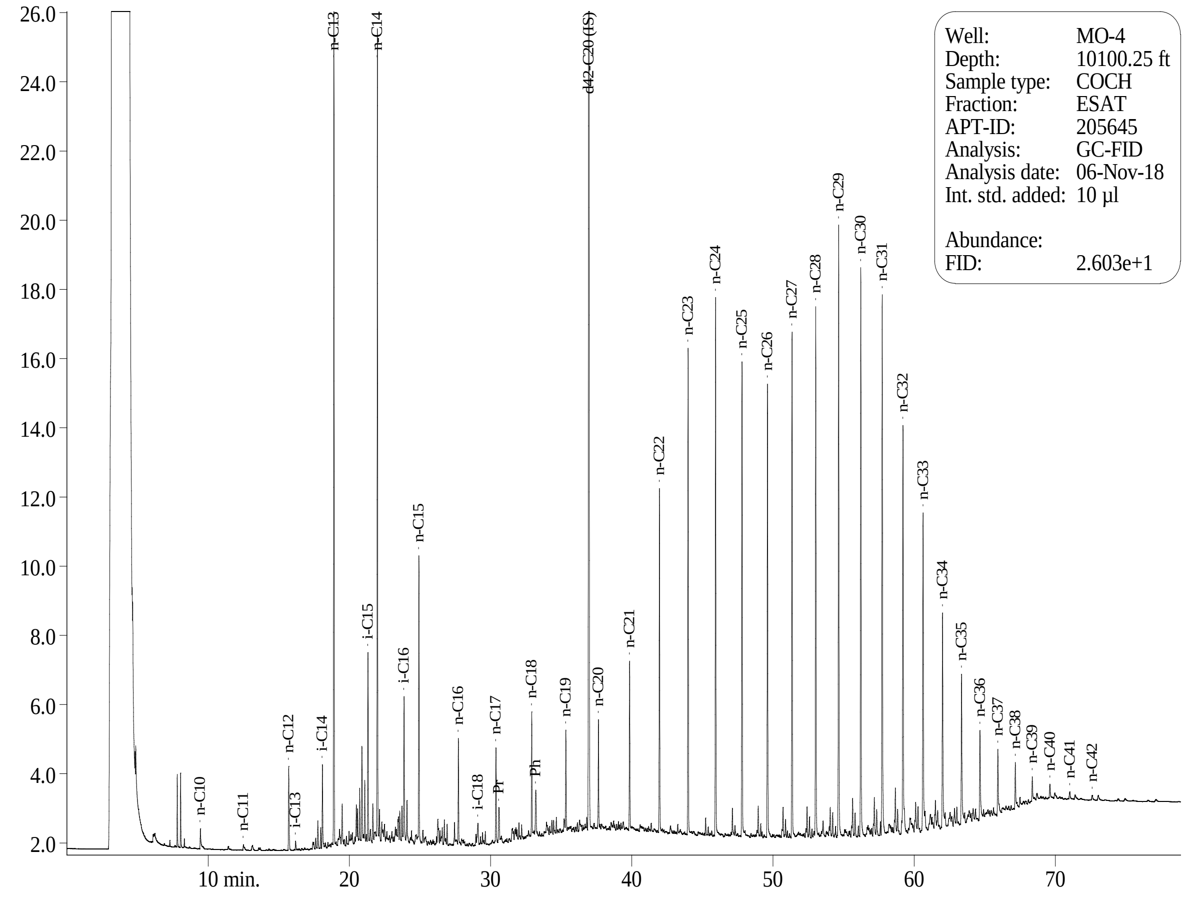

Well: JM-1
Depth: 2134 m
Sample type: DC
Fraction: ESAT
APT-ID: 205641
Analysis: GC-FID
Analysis date: 06-Nov-18
Int. std. added: 10 µl
Abundance:
FID: 1.668e+2
d42-C20 (IS)
10 min.
20
30
40
50
60
70

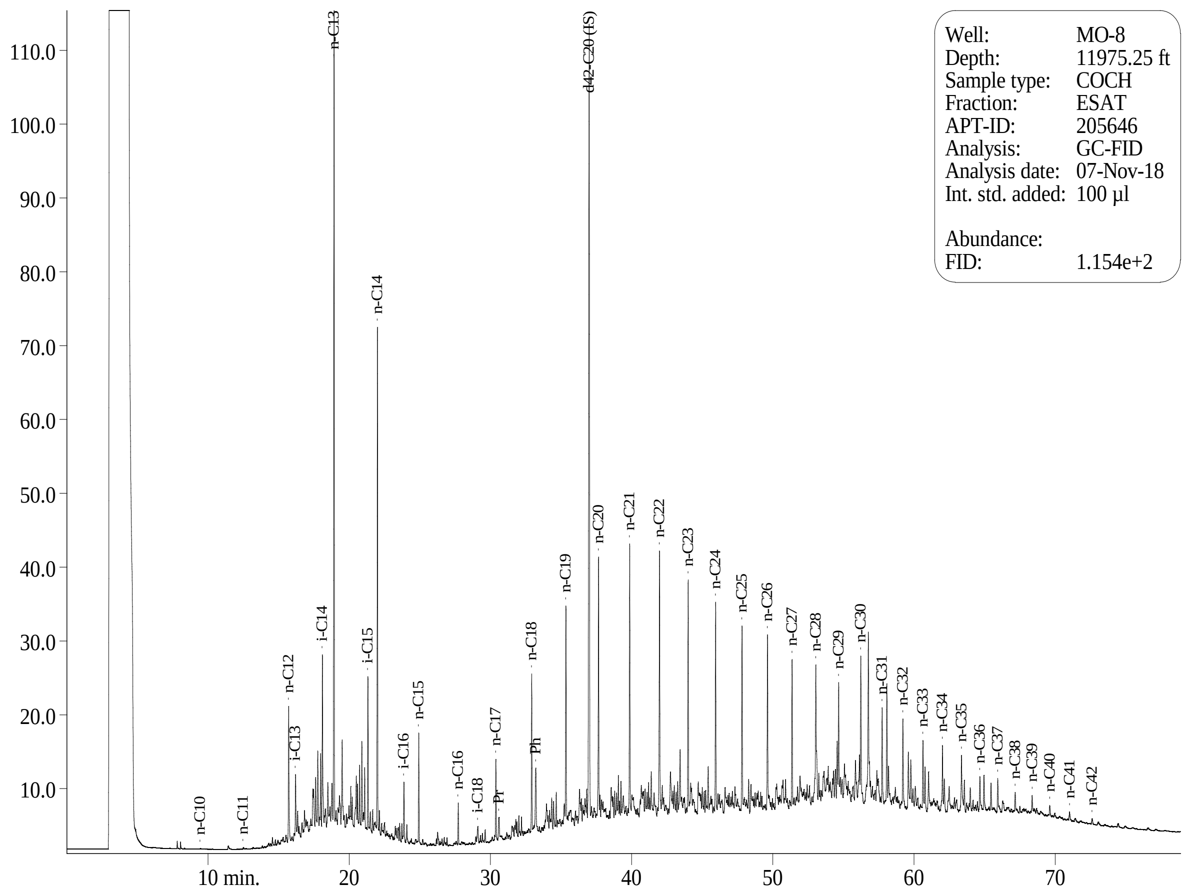

Well: JM-1
Depth: 2134 m
Sample type: DC
Fraction: ESAT
APT-ID: 205641
Analysis: GC-FID
Analysis date: 06-Nov-18
Int. std. added: 10 µl
Abundance:
FID: 1.500e+1
10 min.
20
30
40
50
60
70

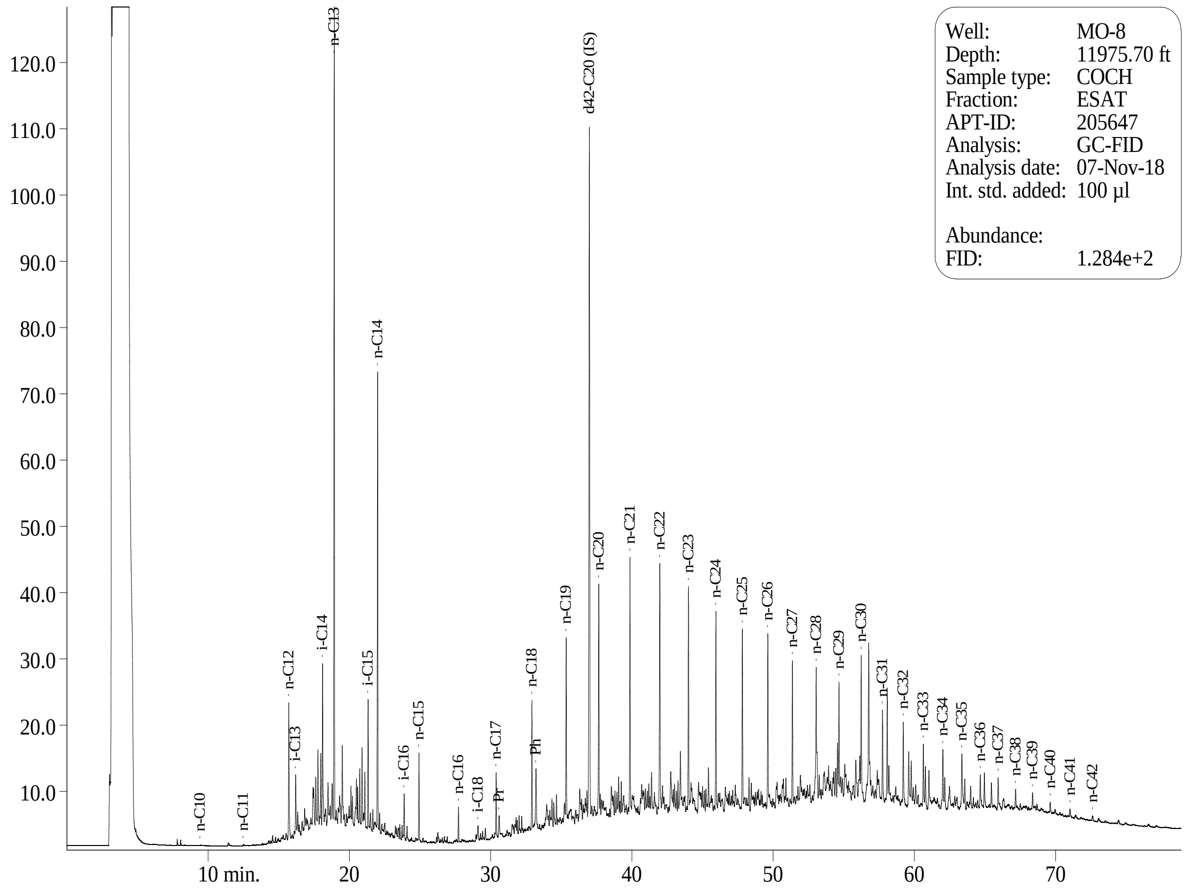

Well: JM-1
Depth: 3619 m
Sample type: DC
Fraction: ESAT
APT-ID: 205642
Analysis: GC-FID
Analysis date: 06-Nov-18
Int. std. added: 10 µl
Abundance:
FID: 3.649e+1
10 min.
20
30
40
50
60
70

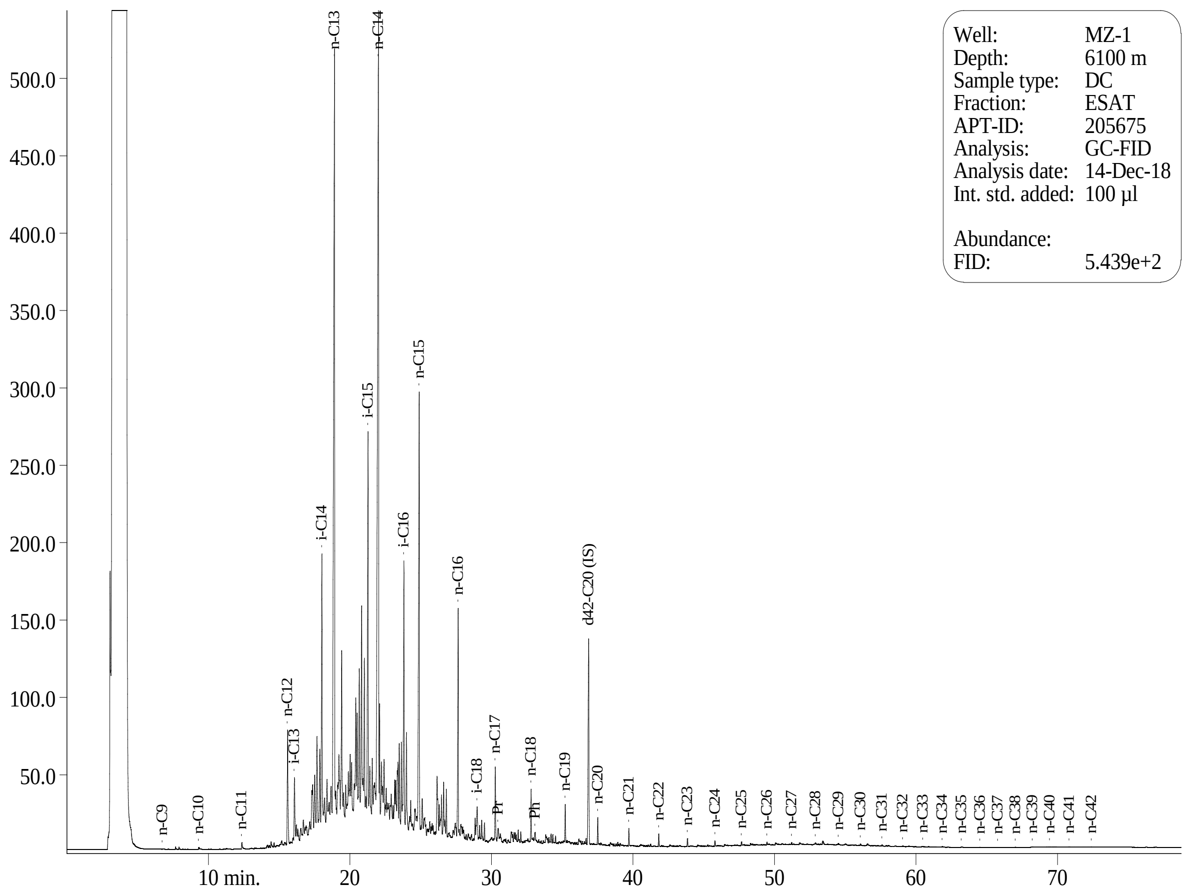

Well: JM-1
Depth: 3631 m
Sample type: DC
Fraction: ESAT
APT-ID: 205643
Analysis: GC-FID
Analysis date: 06-Nov-18
Int. std. added: 30 µl
Abundance:
FID: 5.369e+1
50.0
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
10 min.
20
30
40
50
60
70
n-C9
n-C10
n-C11
n-C12
i-C13
i-C14
n-C13
n-C14
i-C15
i-C16
n-C15
n-C16
i-C18
n-C17
Pr
n-C18
Ph
n-C19
d42-C20 (IS)
n-C20
n-C21
n-C22
n-C23
n-C24
n-C25
n-C26
n-C27
n-C28
n-C29
n-C30
n-C31
n-C32
n-C33
n-C34
n-C35
n-C36
n-C37
n-C38
n-C39
n-C40
n-C41
n-C42

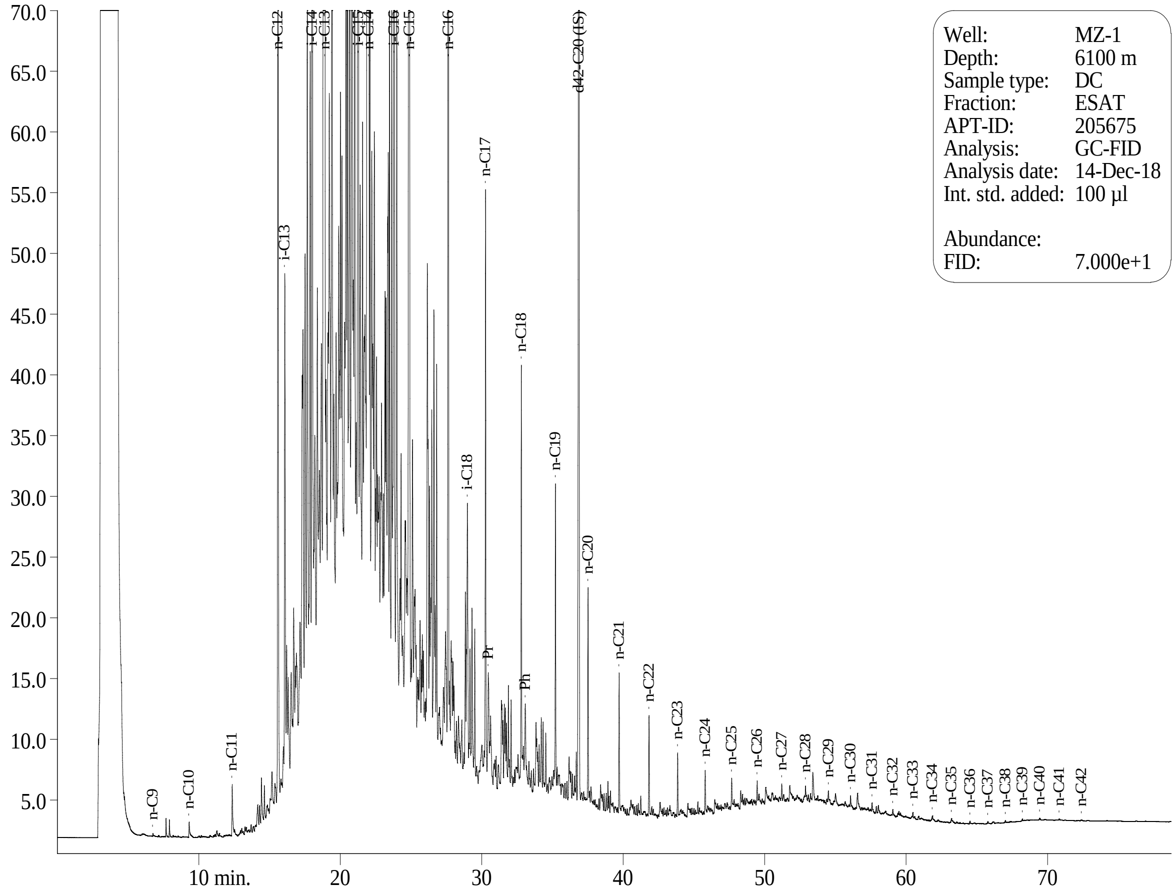

Well: MO-4
Depth: 10098.30 ft
Sample type: COCH
Fraction: ESAT
APT-ID: 205644
Analysis: GC-FID
Analysis date: 06-Nov-18
Int. std. added: 10 µl
Abundance:
FID: 2.281e+1
22.0
20.0
18.0
16.0
14.0
12.0
10.0
8.0
6.0
4.0
2.0
10 min.
20
30
40
50
60
70
n-C10
n-C11
n-C12
i-C13
i-C14
n-C13
i-C15
n-C14
i-C16
n-C15
n-C16
i-C18
n-C17
Pr
n-C18
Ph
n-C19
d42-C20 (IS)
n-C20
n-C21
n-C22
n-C23
n-C24
n-C25
n-C26
n-C27
n-C28
n-C29
n-C30
n-C31
n-C32
n-C33
n-C34
n-C35
n-C36
n-C37
n-C38
n-C39
n-C40
n-C41
n-C42

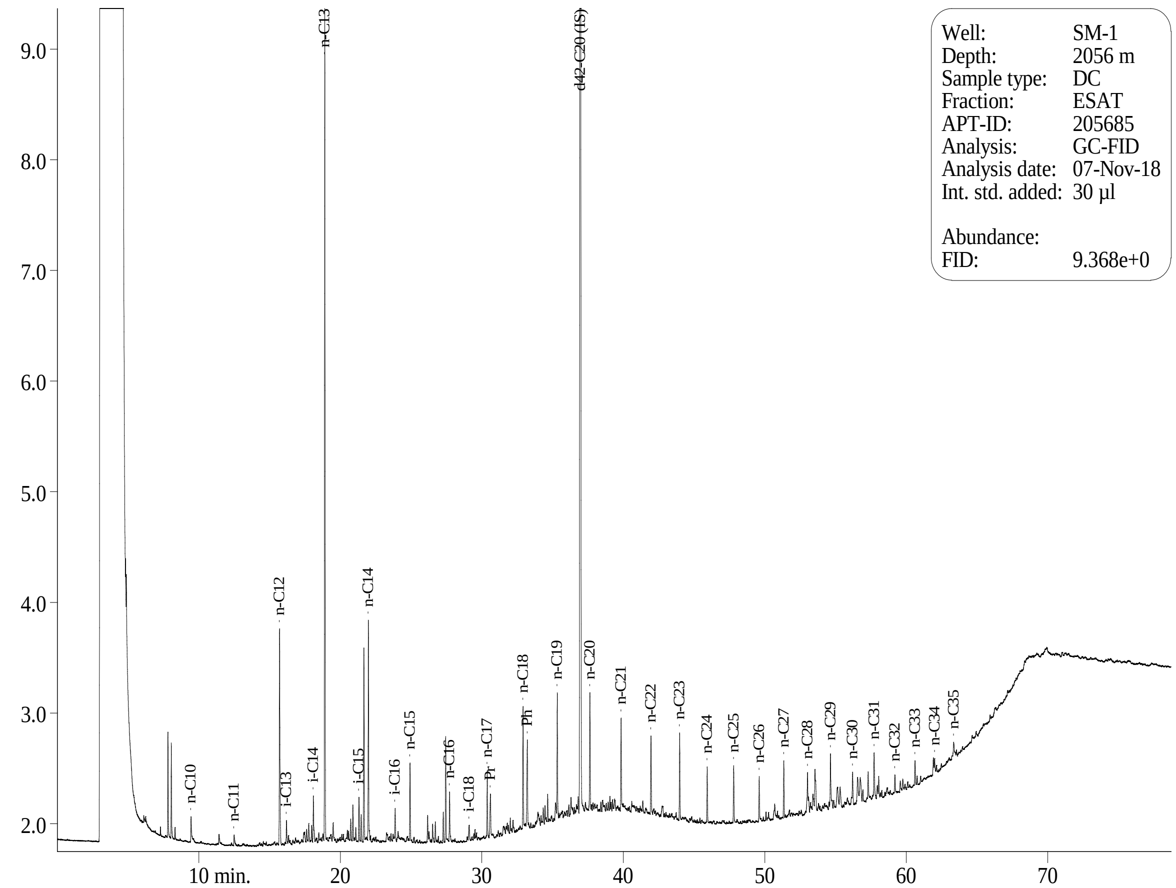

Well: MO-4
Depth: 10100.25 ft
Sample type: COCH
Fraction: ESAT
APT-ID: 205645
Analysis: GC-FID
Analysis date: 06-Nov-18
Int. std. added: 10 µl
Abundance:
FID: 2.603e+1
n-C10
n-C11
n-C12
i-C13
i-C14
n-C13
n-C14
i-C15
i-C16
n-C15
n-C16
i-C18
n-C17
Pr
n-C18
Ph
n-C19
d42-C20 (IS)
n-C20
n-C21
n-C22
n-C23
n-C24
n-C25
n-C26
n-C27
n-C28
n-C29
n-C30
n-C31
n-C32
n-C33
n-C34
n-C35
n-C36
n-C37
n-C38
n-C39
n-C40
n-C41
n-C42
10 min.

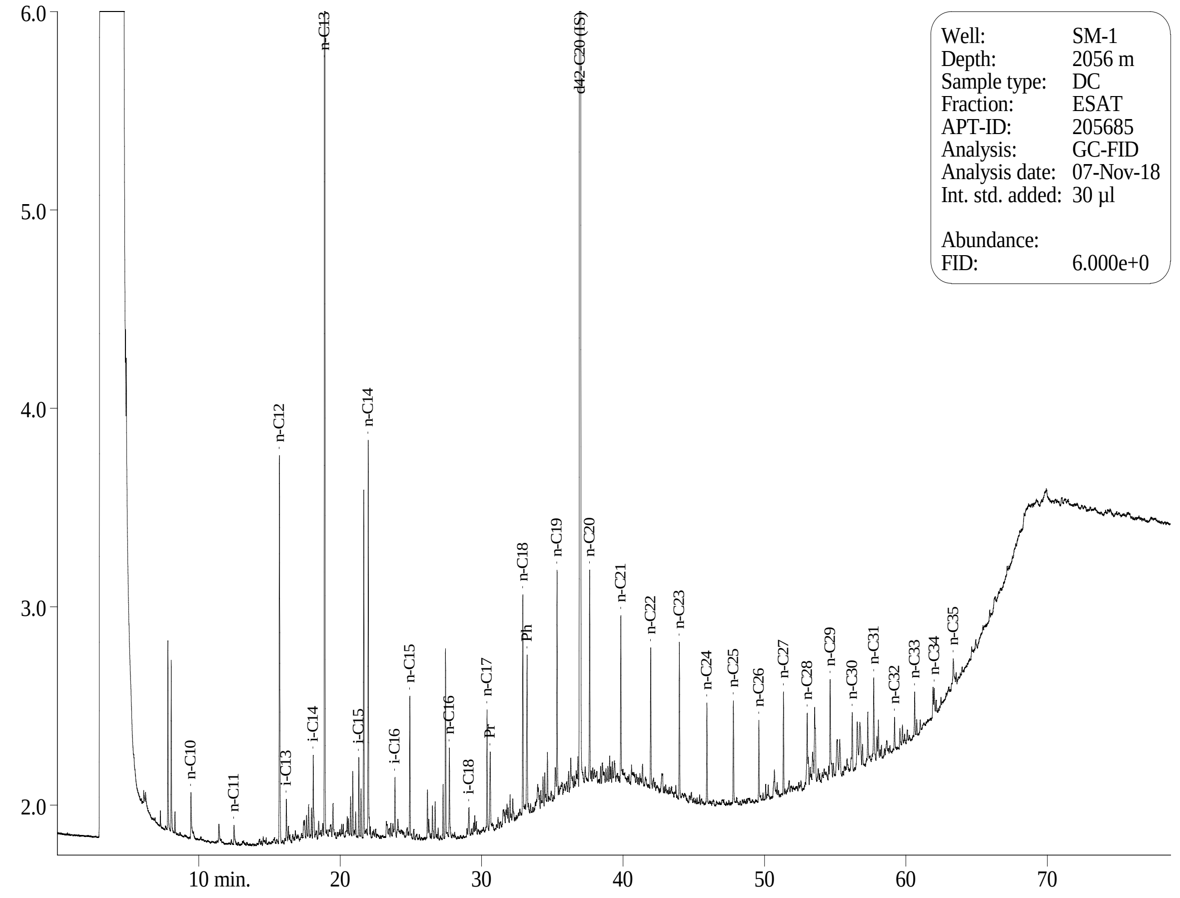

Well: MO-8
Depth: 11975.25 ft
Sample type: COCH
Fraction: ESAT
APT-ID: 205646
Analysis: GC-FID
Analysis date: 07-Nov-18
Int. std. added: 100 µl
Abundance:
FID: 1.154e+2
n-C10
n-C11
n-C12
i-C13
i-C14
n-C13
i-C15
n-C14
i-C16
n-C15
n-C16
i-C18
n-C17
Pr
n-C18
Ph
n-C19
d42-C20 (IS)
n-C20
n-C21
n-C22
n-C23
n-C24
n-C25
n-C26
n-C27
n-C28
n-C29
n-C30
n-C31
n-C32
n-C33
n-C34
n-C35
n-C36
n-C37
n-C38
n-C39
n-C40
n-C41
n-C42
10 min.

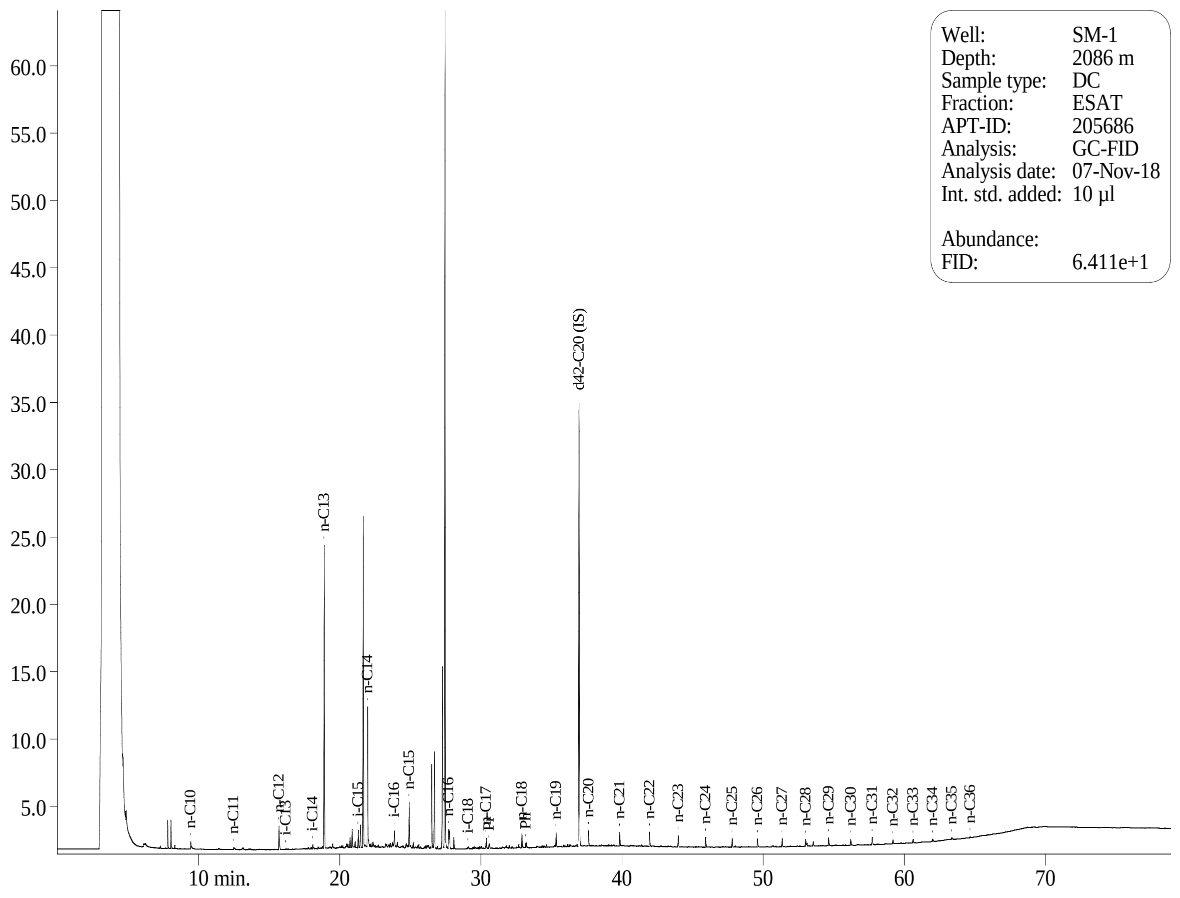

Well: MO-8
Depth: 11975.70 ft
Sample type: COCH
Fraction: ESAT
APT-ID: 205647
Analysis: GC-FID
Analysis date: 07-Nov-18
Int. std. added: 100 µl
Abundance:
FID: 1.284e+2
10 min.
d42-C20 (IS)
Pr
Ph

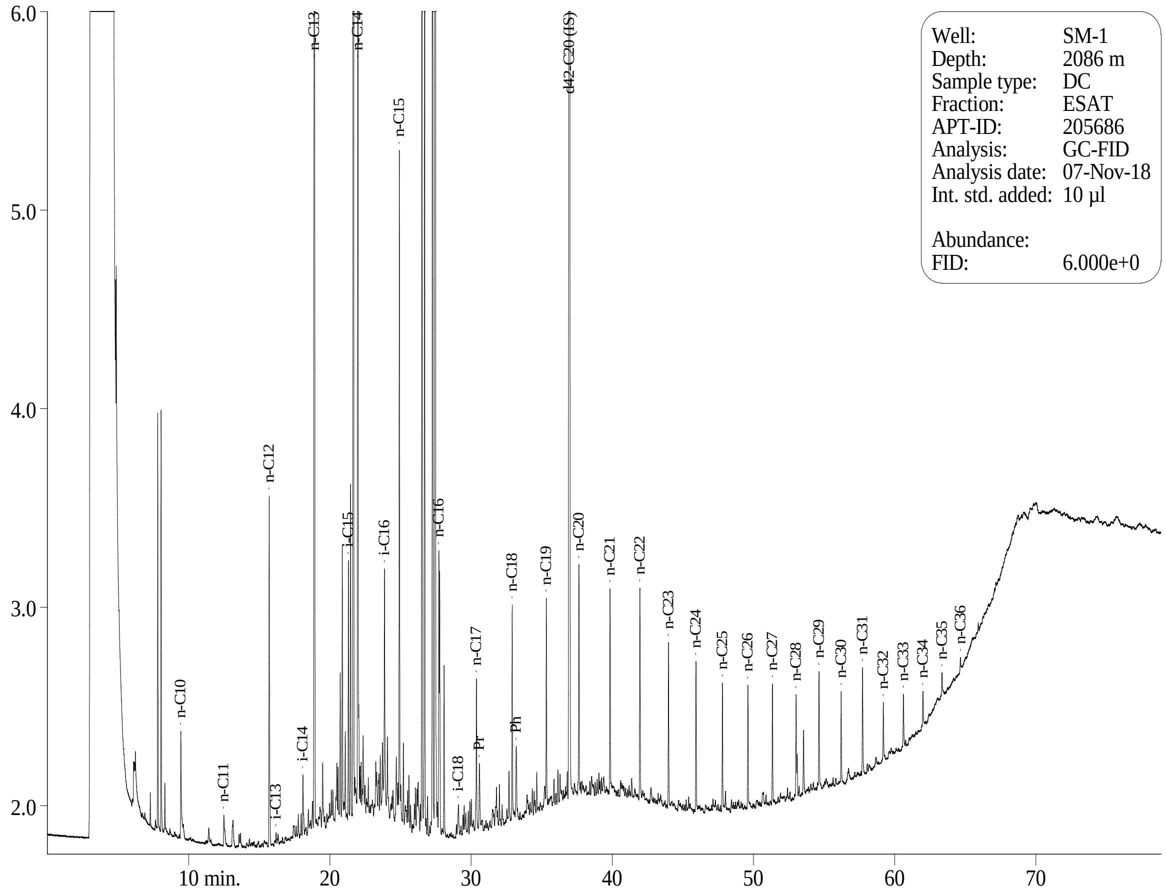

Well: MZ-1
Depth: 6100 m
Sample type: DC
Fraction: ESAT
APT-ID: 205675
Analysis: GC-FID
Analysis date: 14-Dec-18
Int. std. added: 100 µl
Abundance:
FID: 5.439e+2
10 min.
d42-C20 (IS)
Pr
Ph

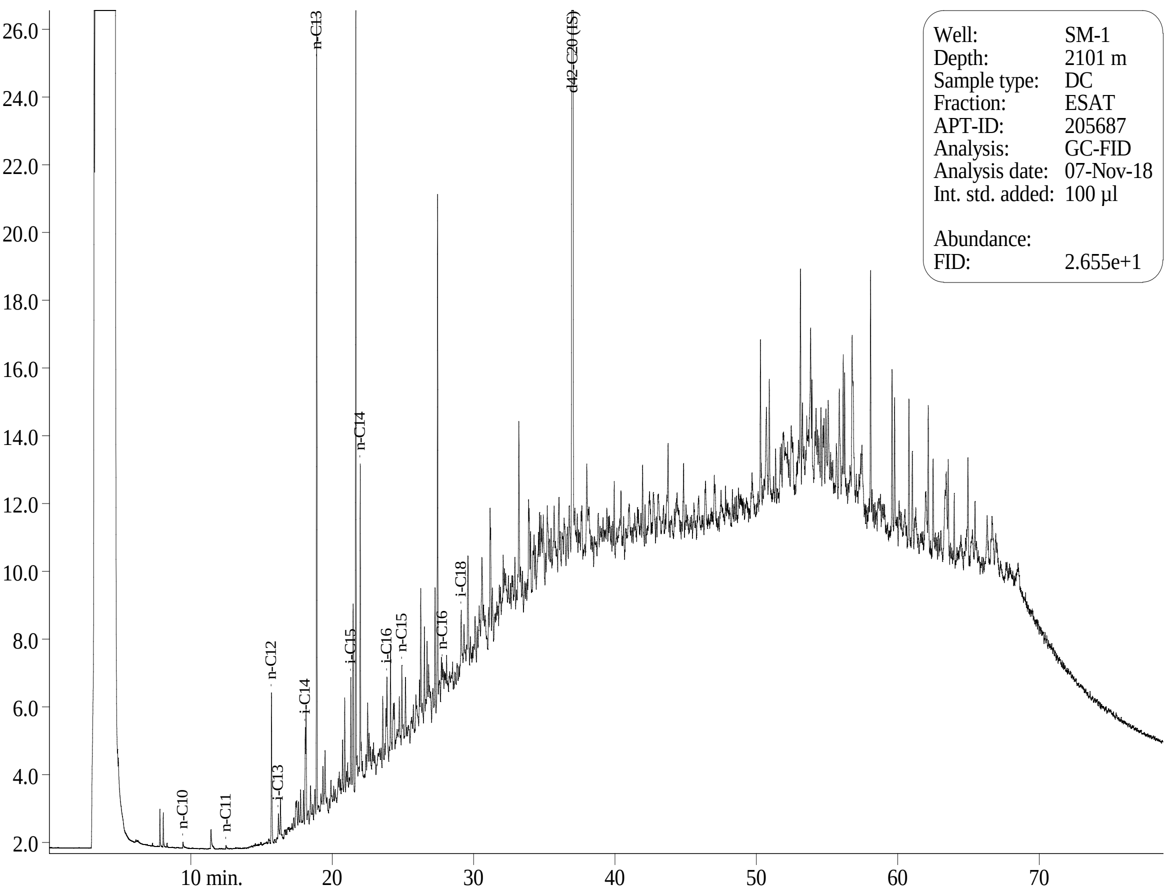

Well: MZ-1
Depth: 6100 m
Sample type: DC
Fraction: ESAT
APT-ID: 205675
Analysis: GC-FID
Analysis date: 14-Dec-18
Int. std. added: 100 µl
Abundance:
FID: 7.000e+1
70.0
65.0
60.0
55.0
50.0
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
10 min.
20
30
40
50
60
70
n-C9
n-C10
n-C11
n-C12
i-C13
i-C14
n-C13
i-C15
n-C14
i-C16
n-C15
n-C16
i-C18
n-C17
Pr
n-C18
Ph
n-C19
d42-C20 (IS)
n-C20
n-C21
n-C22
n-C23
n-C24
n-C25
n-C26
n-C27
n-C28
n-C29
n-C30
n-C31
n-C32
n-C33
n-C34
n-C35
n-C36
n-C37
n-C38
n-C39
n-C40
n-C41
n-C42

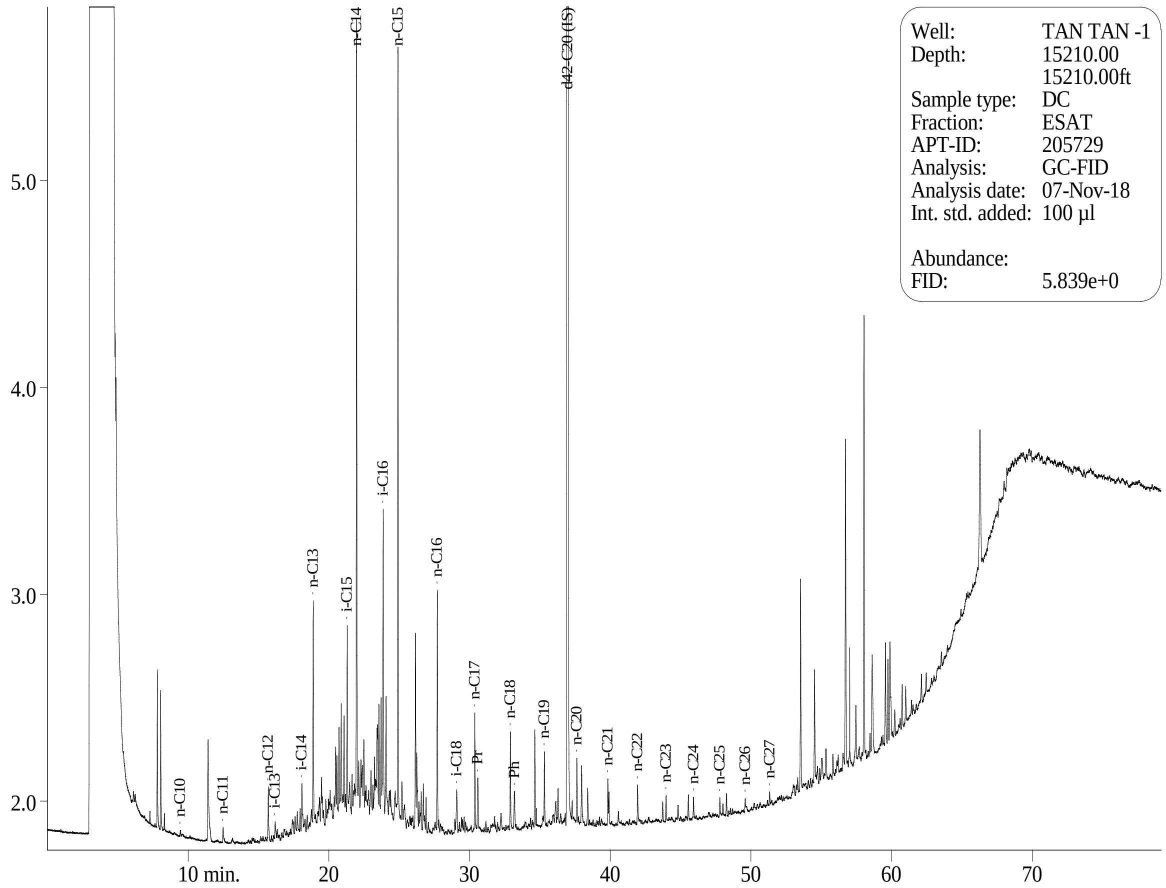

Well: SM-1
Depth: 2056 m
Sample type: DC
Fraction: ESAT
APT-ID: 205685
Analysis: GC-FID
Analysis date: 07-Nov-18
Int. std. added: 30 µl
Abundance:
FID: 9.368e+0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
10 min.
20
30
40
50
60
70
n-C10
n-C11
n-C12
i-C13
i-C14
n-C13
i-C15
n-C14
i-C16
n-C15
n-C16
i-C18
n-C17
Pr
n-C18
Ph
n-C19
d42-C20 (IS)
n-C20
n-C21
n-C22
n-C23
n-C24
n-C25
n-C26
n-C27
n-C28
n-C29
n-C30
n-C31
n-C32
n-C33
n-C34
n-C35

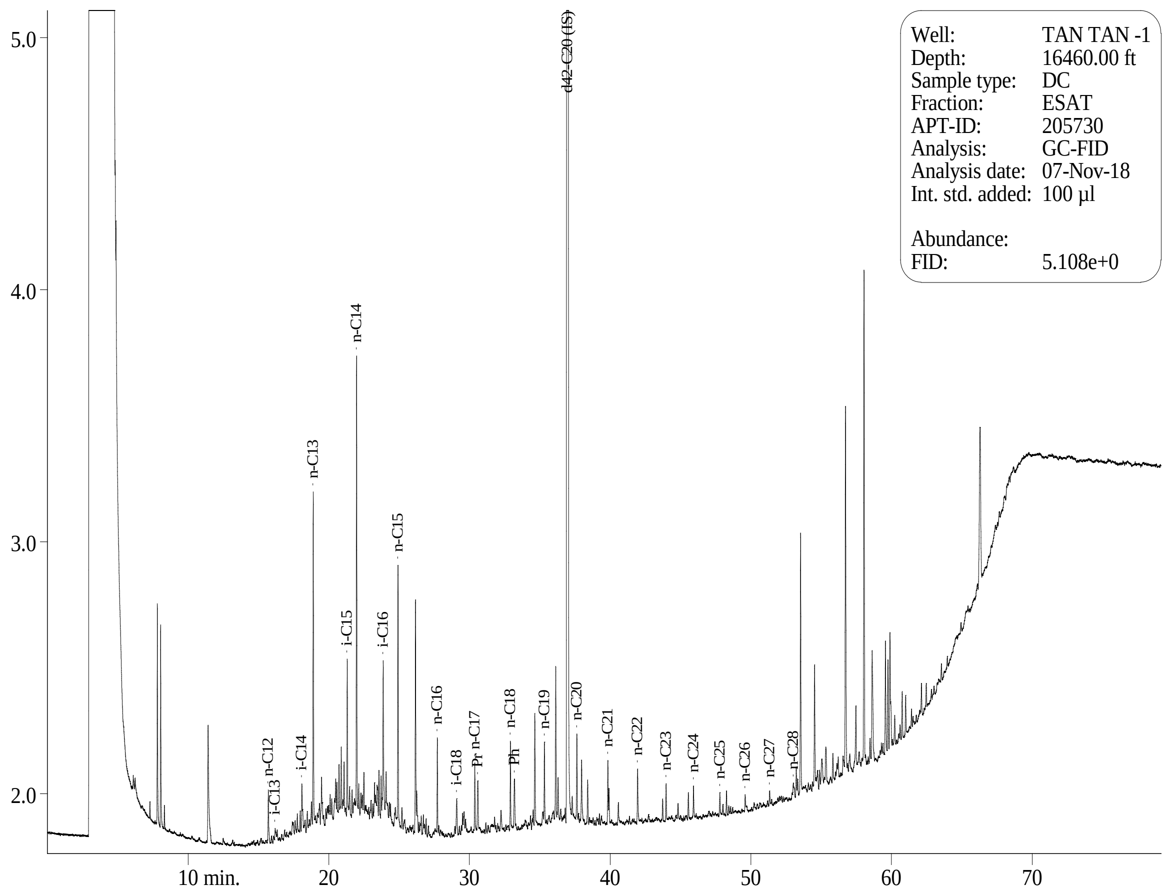

Well: SM-1
Depth: 2056 m
Sample type: DC
Fraction: ESAT
APT-ID: 205685
Analysis: GC-FID
Analysis date: 07-Nov-18
Int. std. added: 30 µl
Abundance:
FID: 6.000e+0
6.0
5.0
4.0
3.0
2.0
10 min.
20
30
40
50
60
70
n-C10
n-C11
n-C12
i-C13
n-C13
i-C14
n-C14
i-C15
n-C15
i-C16
n-C16
i-C18
n-C17
Pr
n-C18
Ph
n-C19
d42-C20 (IS)
n-C20
n-C21
n-C22
n-C23
n-C24
n-C25
n-C26
n-C27
n-C28
n-C29
n-C30
n-C31
n-C32
n-C33
n-C34
n-C35

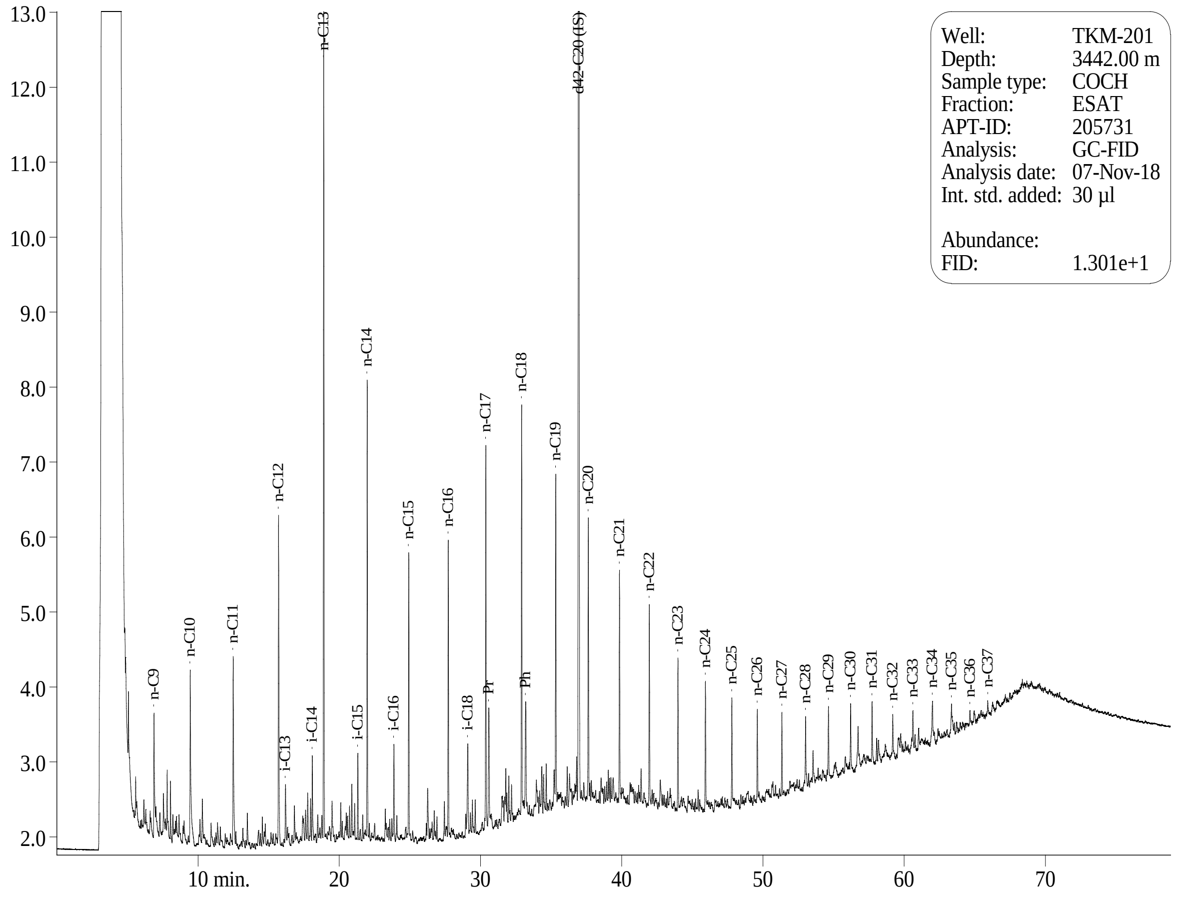

Well: SM-1
Depth: 2086 m
Sample type: DC
Fraction: ESAT
APT-ID: 205686
Analysis: GC-FID
Analysis date: 07-Nov-18
Int. std. added: 10 µl
Abundance:
FID: 6.411e+1
60.0
55.0
50.0
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
10 min.
20
30
40
50
60
70
d42-C20 (IS)
n-C13
n-C14
n-C10
n-C11
n-C12
i-C13
i-C14
i-C15
i-C16
n-C15
n-C16
i-C18
n-C17
Pr
n-C18
Ph
n-C19
n-C20
n-C21
n-C22
n-C23
n-C24
n-C25
n-C26
n-C27
n-C28
n-C29
n-C30
n-C31
n-C32
n-C33
n-C34
n-C35
n-C36

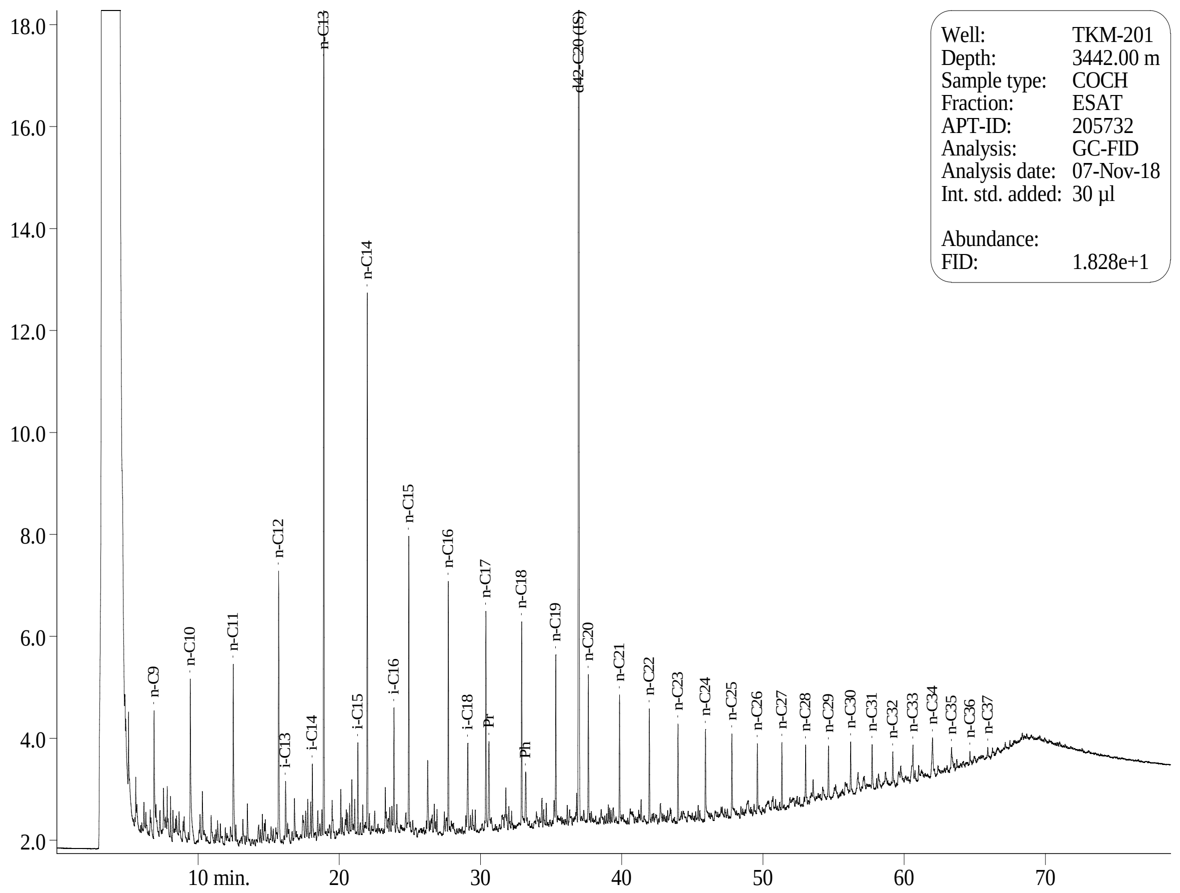

Well: SM-1
Depth: 2086 m
Sample type: DC
Fraction: ESAT
APT-ID: 205686
Analysis: GC-FID
Analysis date: 07-Nov-18
Int. std. added: 10 µl
Abundance:
FID: 6.000e+0
n-C10
n-C11
n-C12
i-C13
n-C13
i-C14
n-C14
i-C15
n-C15
i-C16
n-C16
i-C18
n-C17
Pr
n-C18
Ph
n-C19
d42-C20 (IS)
n-C20
n-C21
n-C22
n-C23
n-C24
n-C25
n-C26
n-C27
n-C28
n-C29
n-C30
n-C31
n-C32
n-C33
n-C34
n-C35
n-C36
10 min.

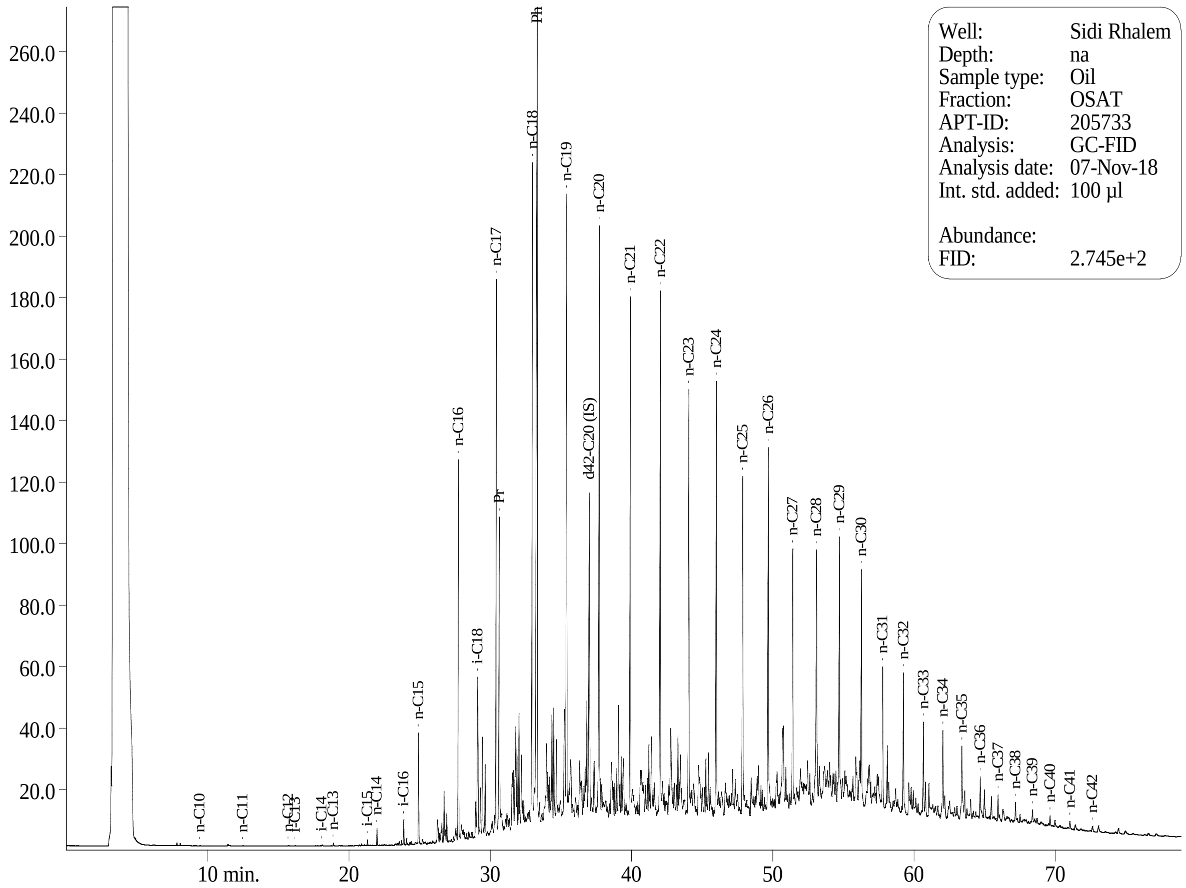

Well: SM-1
Depth: 2101 m
Sample type: DC
Fraction: ESAT
APT-ID: 205687
Analysis: GC-FID
Analysis date: 07-Nov-18
Int. std. added: 100 µl
Abundance:
FID: 2.655e+1
n-C10
n-C11
n-C12
i-C13
n-C13
i-C14
n-C14
i-C15
i-C16
n-C15
n-C16
i-C18
d42-C20 (IS)
10 min.

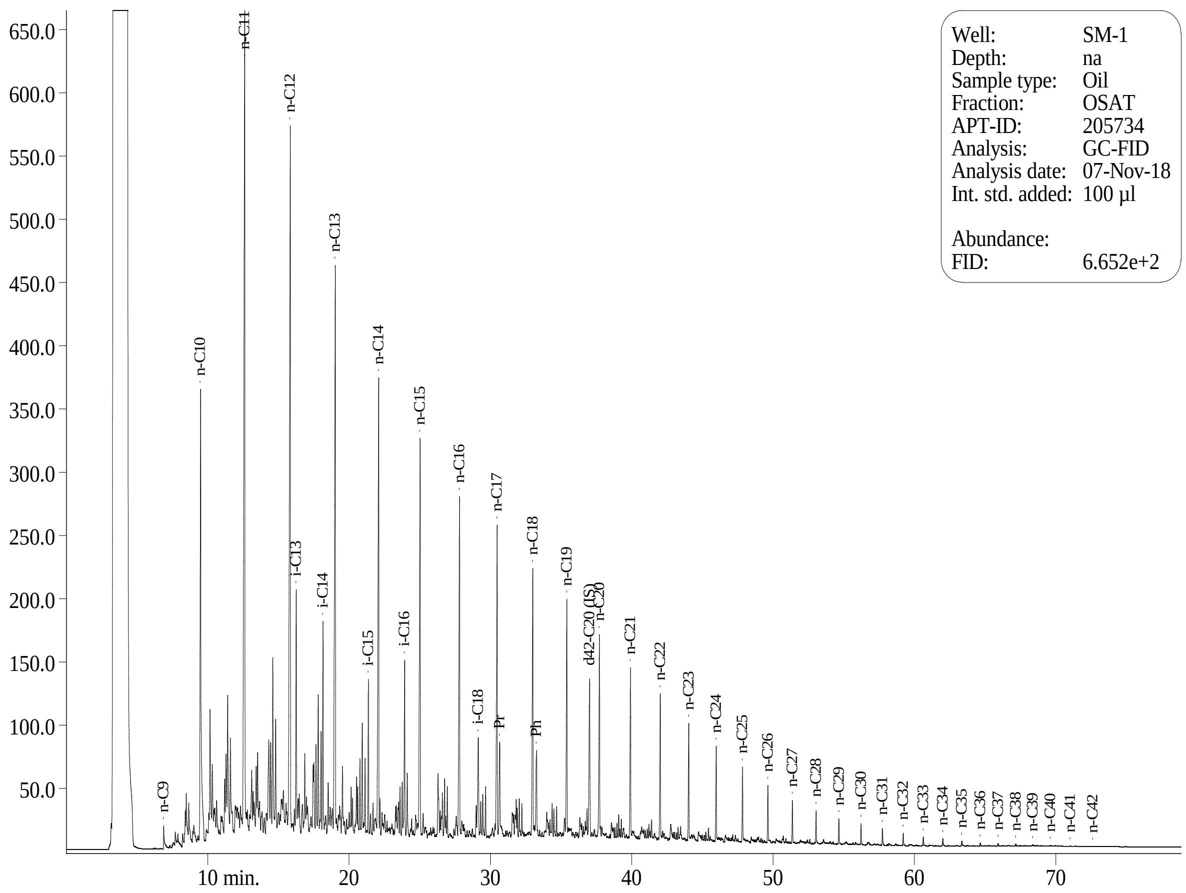

Well: TAN TAN -1
Depth: 15210.00 15210.00ft
Sample type: DC
Fraction: ESAT
APT-ID: 205729
Analysis: GC-FID
Analysis date: 07-Nov-18
Int. std. added: 100 µl
Abundance:
FID: 5.839e+0
10 min.
20
30
40
50
60
70
5.0
4.0
3.0
2.0
n-C10
n-C11
n-C12
i-C13
i-C14
n-C13
i-C15
n-C14
i-C16
n-C15
n-C16
i-C18
n-C17
Pr
n-C18
Ph
n-C19
d42-C20 (IS)
n-C20
n-C21
n-C22
n-C23
n-C24
n-C25
n-C26
n-C27

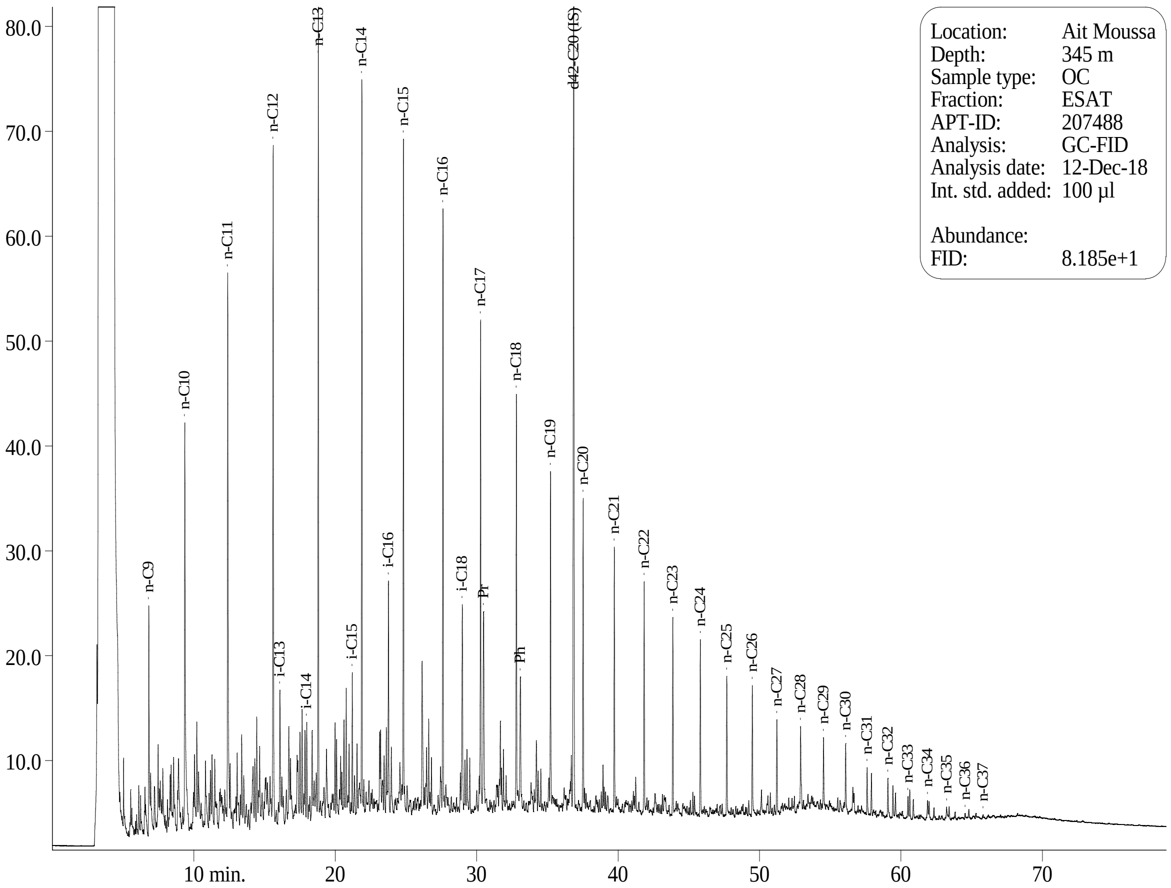

Well: TAN TAN -1
Depth: 16460.00 ft
Sample type: DC
Fraction: ESAT
APT-ID: 205730
Analysis: GC-FID
Analysis date: 07-Nov-18
Int. std. added: 100 µl
Abundance:
FID: 5.108e+0
10 min.
20
30
40
50
60
70
5.0
4.0
3.0
2.0
n-C12
i-C13
i-C14
n-C13
i-C15
n-C14
i-C16
n-C15
n-C16
i-C18
Pr
n-C17
n-C18
Ph
n-C19
d42-C20 (IS)
n-C20
n-C21
n-C22
n-C23
n-C24
n-C25
n-C26
n-C27
n-C28

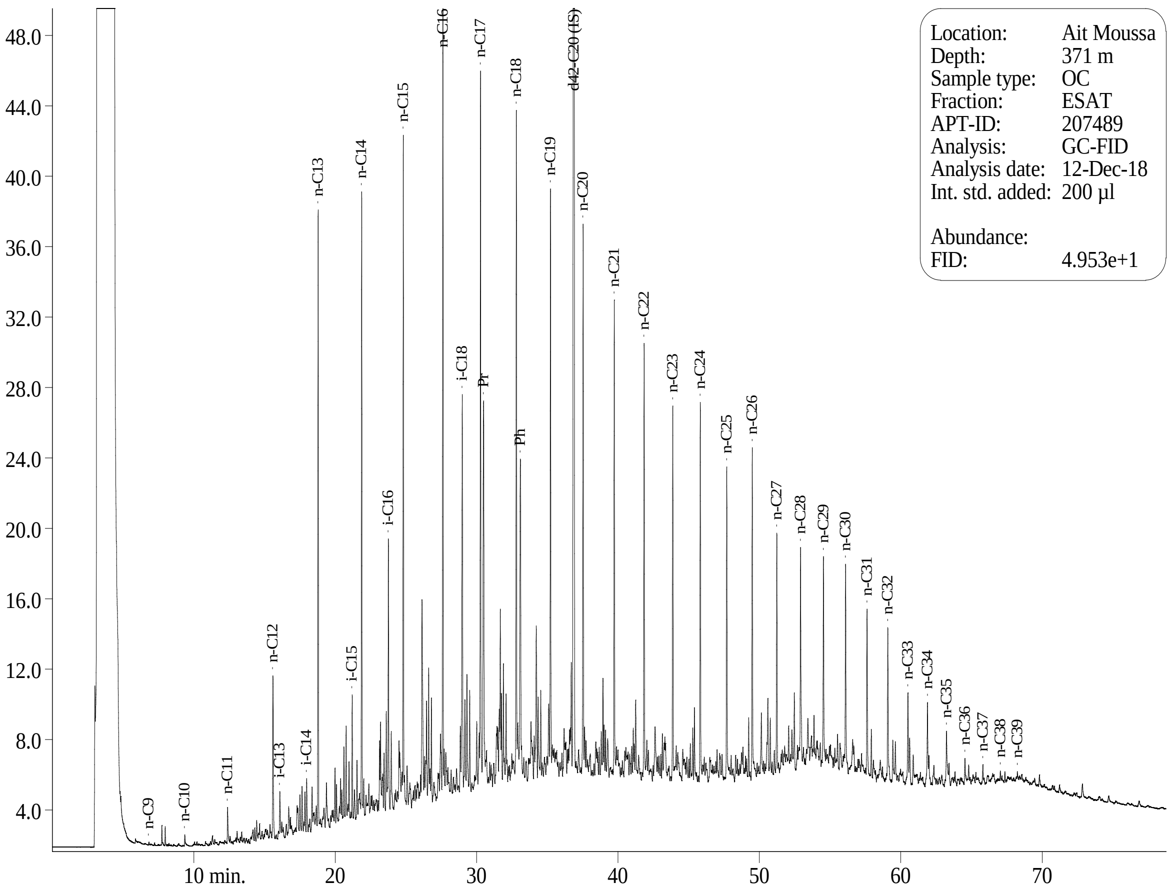

Well: TKM-201
Depth: 3442.00 m
Sample type: COCH
Fraction: ESAT
APT-ID: 205731
Analysis: GC-FID
Analysis date: 07-Nov-18
Int. std. added: 30 µl
Abundance:
FID: 1.301e+1
n-C9
n-C10
n-C11
n-C12
i-C13
n-C13
i-C14
n-C14
i-C15
n-C15
i-C16
n-C16
i-C18
n-C17
Pr
n-C18
Ph
n-C19
d42-C20 (IS)
n-C20
n-C21
n-C22
n-C23
n-C24
n-C25
n-C26
n-C27
n-C28
n-C29
n-C30
n-C31
n-C32
n-C33
n-C34
n-C35
n-C36
n-C37
10 min.
20
30
40
50
60
70

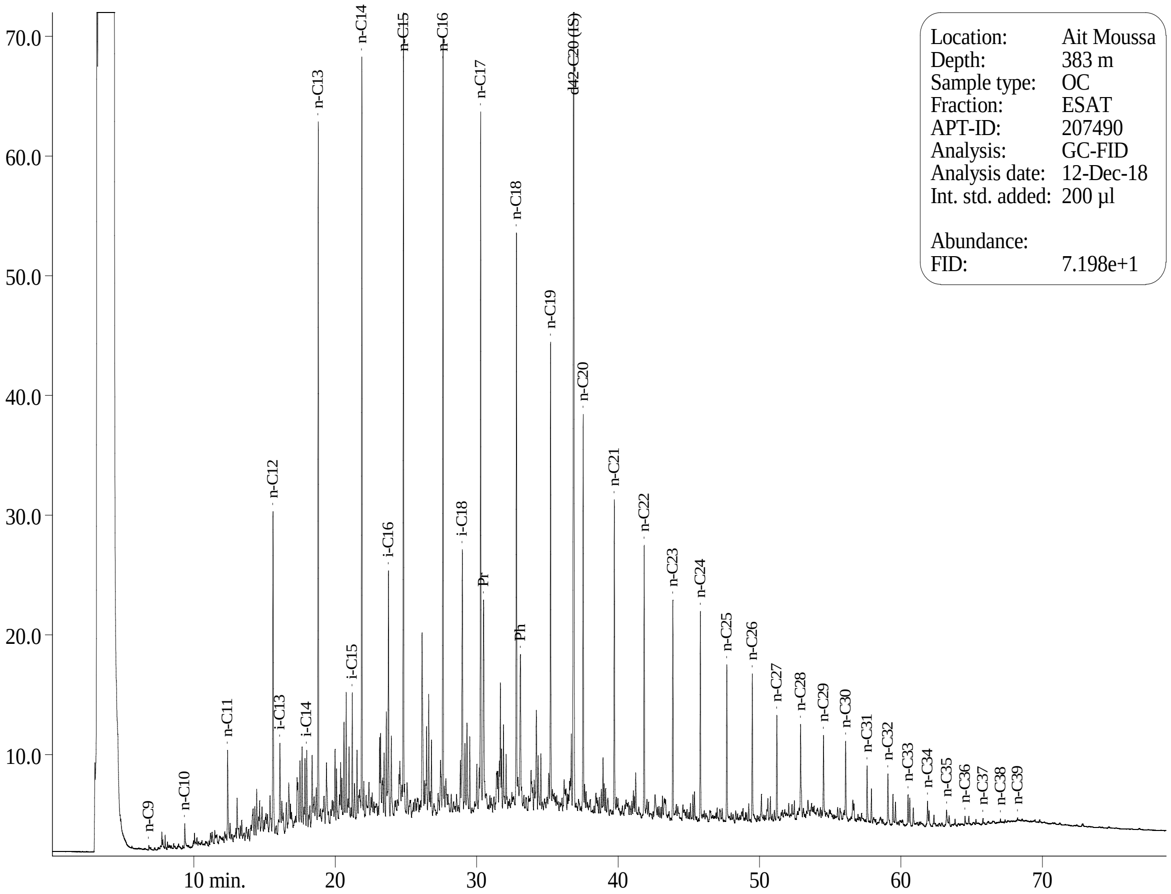

Well: TKM-201
Depth: 3442.00 m
Sample type: COCH
Fraction: ESAT
APT-ID: 205732
Analysis: GC-FID
Analysis date: 07-Nov-18
Int. std. added: 30 µl
Abundance:
FID: 1.828e+1
n-C9
n-C10
n-C11
n-C12
i-C13
n-C13
i-C14
n-C14
i-C15
n-C15
i-C16
n-C16
i-C18
n-C17
Pr
n-C18
Ph
n-C19
d42-C20 (IS)
n-C20
n-C21
n-C22
n-C23
n-C24
n-C25
n-C26
n-C27
n-C28
n-C29
n-C30
n-C31
n-C32
n-C33
n-C34
n-C35
n-C36
n-C37
10 min.
20
30
40
50
60
70


Well: Sidi Rhalem
Depth: na
Sample type: Oil
Fraction: OSAT
APT-ID: 205733
Analysis: GC-FID
Analysis date: 07-Nov-18
Int. std. added: 100 µl
Abundance:
FID: 2.745e+2
10 min.
20
30
40
50
60
70
n-C10
n-C11
n-C12
i-C13
i-C14
n-C13
i-C15
n-C14
i-C16
n-C15
n-C16
i-C18
n-C17
Pr
n-C18
Ph
n-C19
d42-C20 (IS)
n-C20
n-C21
n-C22
n-C23
n-C24
n-C25
n-C26
n-C27
n-C28
n-C29
n-C30
n-C31
n-C32
n-C33
n-C34
n-C35
n-C36
n-C37
n-C38
n-C39
n-C40
n-C41
n-C42

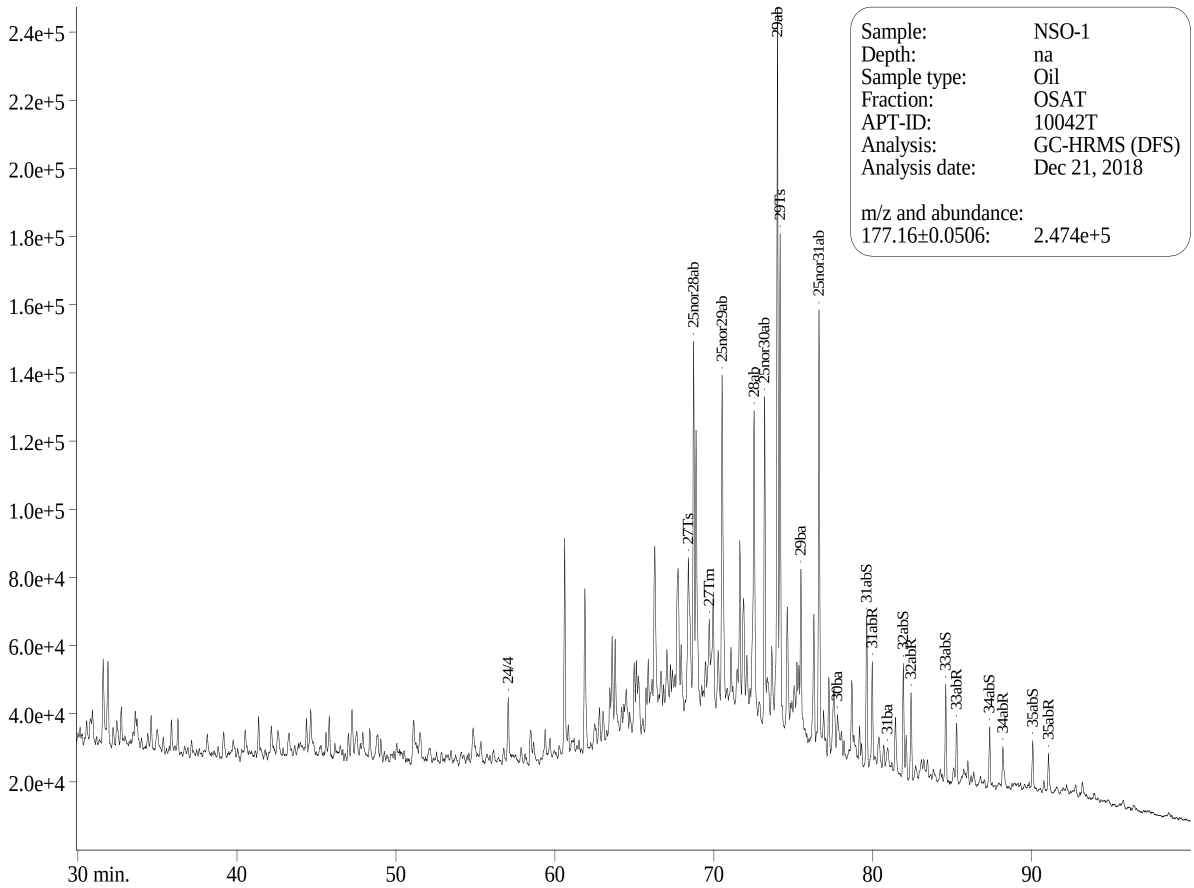

Well: SM-1
Depth: na
Sample type: Oil
Fraction: OSAT
APT-ID: 205734
Analysis: GC-FID
Analysis date: 07-Nov-18
Int. std. added: 100 µl
Abundance:
FID: 6.652e+2
10 min.
20
30
40
50
60
70
n-C9
n-C10
n-C11
n-C12
i-C13
n-C13
i-C14
n-C14
i-C15
n-C15
i-C16
n-C16
i-C18
n-C17
Pr
n-C18
Ph
n-C19
d42-C20 (IS)
n-C20
n-C21
n-C22
n-C23
n-C24
n-C25
n-C26
n-C27
n-C28
n-C29
n-C30
n-C31
n-C32
n-C33
n-C34
n-C35
n-C36
n-C37
n-C38
n-C39
n-C40
n-C41
n-C42


Location: Ait Moussa
Depth: 345 m
Sample type: OC
Fraction: ESAT
APT-ID: 207488
Analysis: GC-FID
Analysis date: 12-Dec-18
Int. std. added: 100 µl
Abundance:
FID: 8.185e+1
n-C9
n-C10
n-C11
n-C12
i-C13
n-C13
i-C14
n-C14
i-C15
n-C15
i-C16
n-C16
i-C18
n-C17
Pr
n-C18
Ph
n-C19
d42-C20 (IS)
n-C20
n-C21
n-C22
n-C23
n-C24
n-C25
n-C26
n-C27
n-C28
n-C29
n-C30
n-C31
n-C32
n-C33
n-C34
n-C35
n-C36
n-C37
10 min.
20
30
40
50
60
70

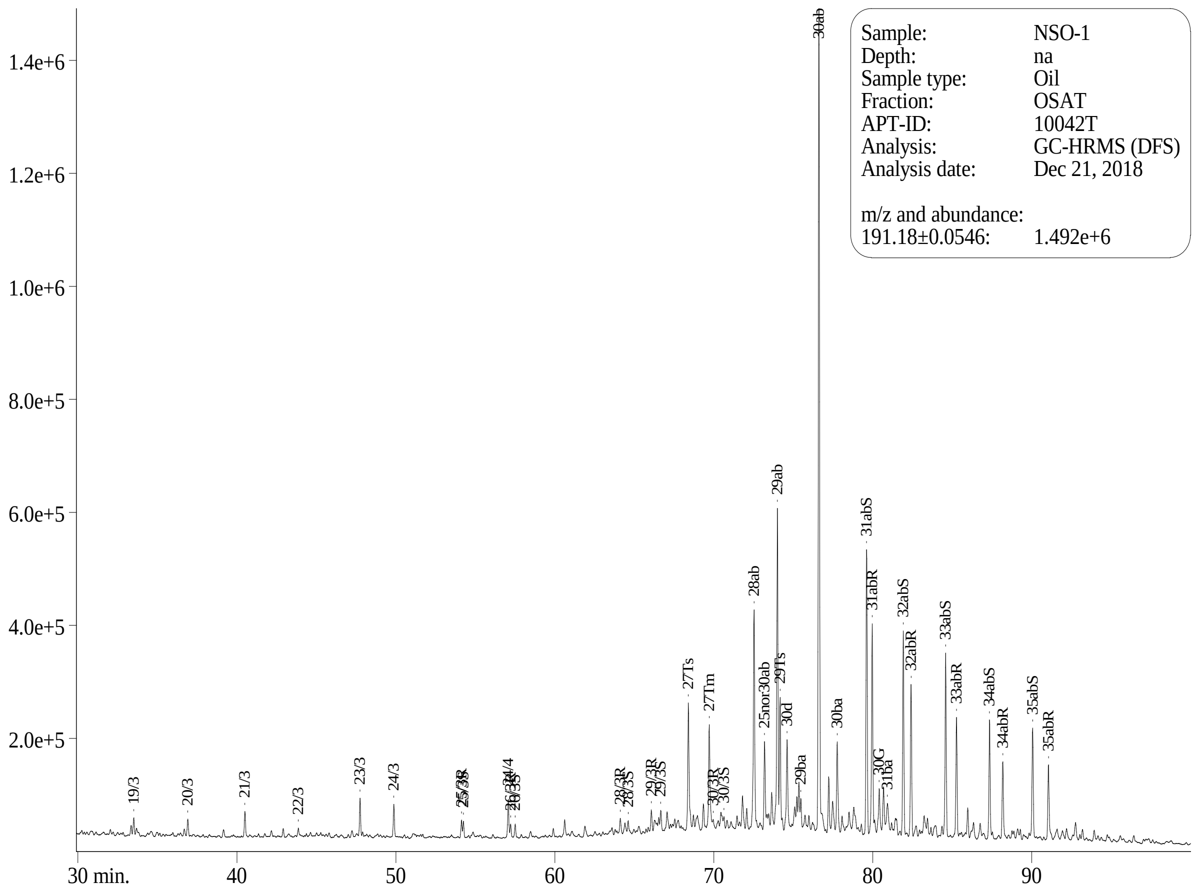

Location: Ait Moussa
Depth: 371 m
Sample type: OC
Fraction: ESAT
APT-ID: 207489
Analysis: GC-FID
Analysis date: 12-Dec-18
Int. std. added: 200 µl
Abundance:
FID: 4.953e+1
n-C9
n-C10
n-C11
n-C12
i-C13
n-C13
i-C14
n-C14
i-C15
n-C15
i-C16
n-C16
i-C18
n-C17
Pr
n-C18
Ph
n-C19
d42-C20 (IS)
n-C20
n-C21
n-C22
n-C23
n-C24
n-C25
n-C26
n-C27
n-C28
n-C29
n-C30
n-C31
n-C32
n-C33
n-C34
n-C35
n-C36
n-C37
n-C38
n-C39
10 min.
20
30
40
50
60
70


Location: Ait Moussa
Depth: 383 m
Sample type: OC
Fraction: ESAT
APT-ID: 207490
Analysis: GC-FID
Analysis date: 12-Dec-18
Int. std. added: 200 µl
Abundance:
FID: 7.198e+1
70.0
60.0
50.0
40.0
30.0
20.0
10.0
10 min.
20
30
40
50
60
70
n-C9
n-C10
n-C11
n-C12
i-C13
i-C14
n-C13
i-C15
n-C14
i-C16
n-C15
n-C16
i-C18
n-C17
Pr
n-C18
Ph
n-C19
d42-C20 (IS)
n-C20
n-C21
n-C22
n-C23
n-C24
n-C25
n-C26
n-C27
n-C28
n-C29
n-C30
n-C31
n-C32
n-C33
n-C34
n-C35
n-C36
n-C37
n-C38
n-C39

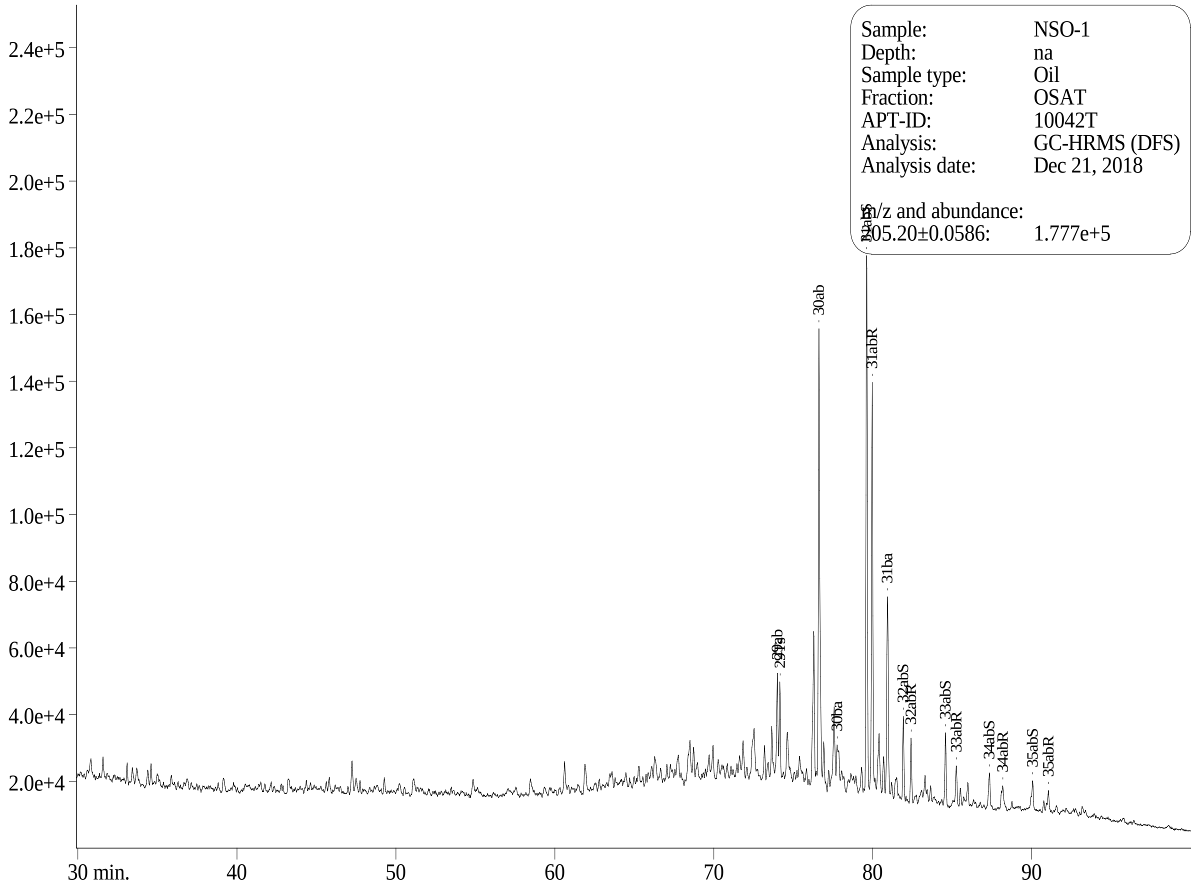
GC-MS Chromatograms of Saturated Hydrocarbons

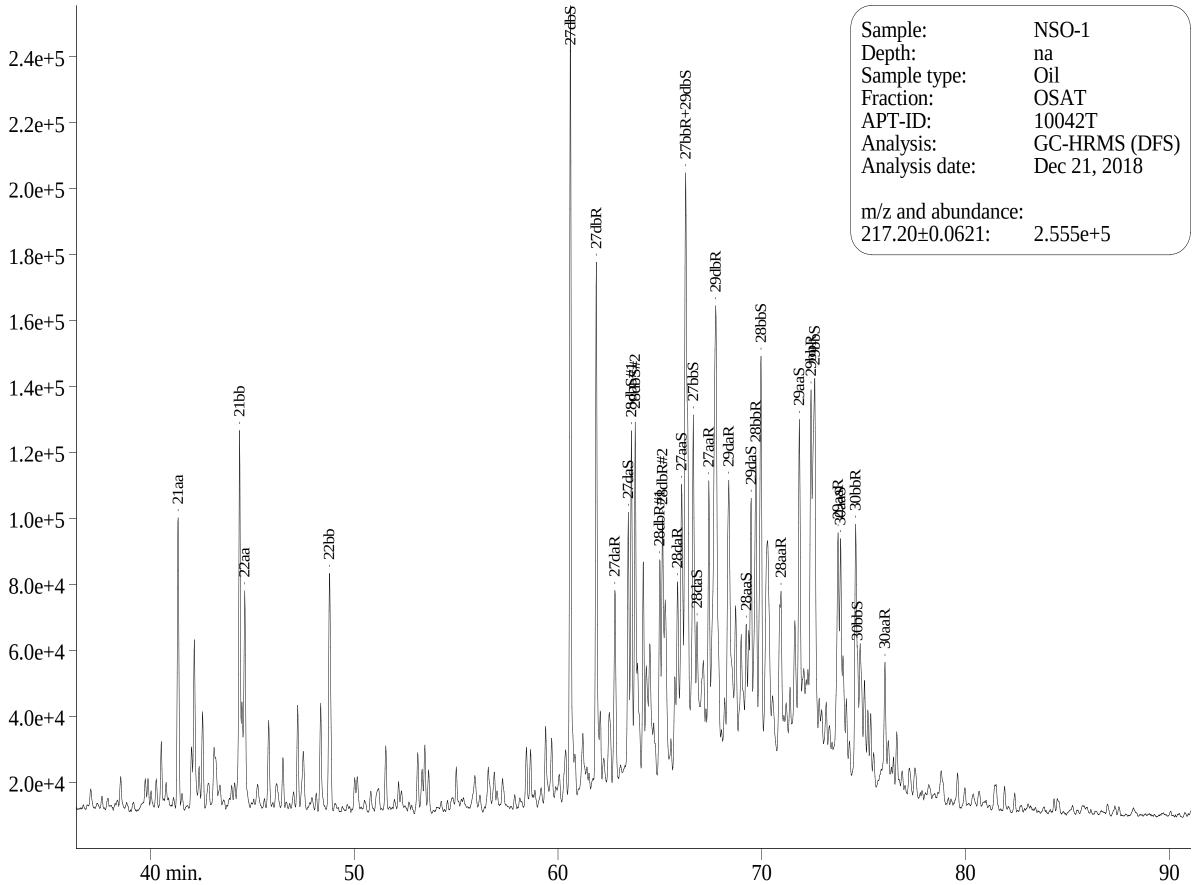


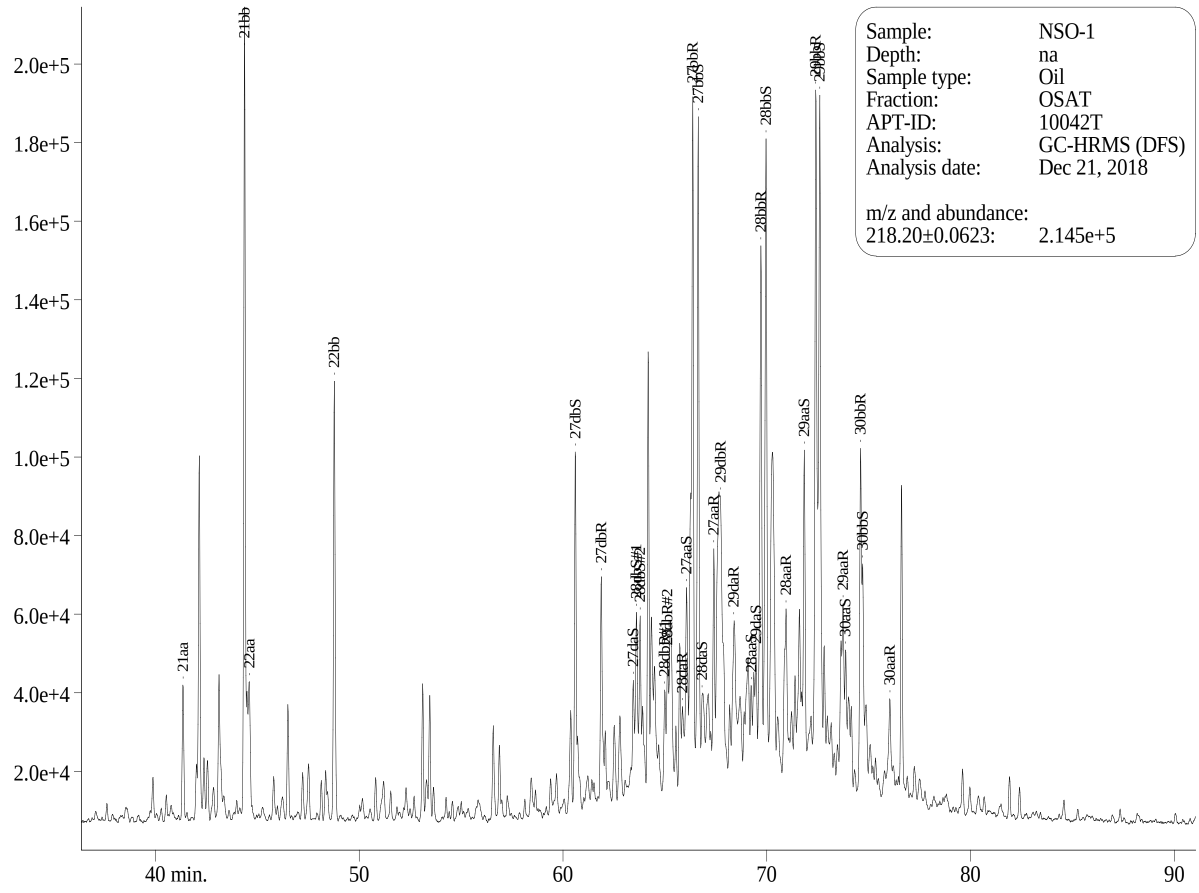
Sample: NSO-1
Depth: na
Sample type: Oil
Fraction: OSAT
APT-ID: 10042T
Analysis: GC-HRMS (DFS)
Analysis date: Dec 21, 2018
m/z and abundance:
177.16±0.0506: 2.474e+5
2.4e+5
2.2e+5
2.0e+5
1.8e+5
1.6e+5
1.4e+5
1.2e+5
1.0e+5
8.0e+4
6.0e+4
4.0e+4
2.0e+4
30 min.
40
50
60
70
80
90
24/4
27Ts
25nor28ab
27Tm
25nor29ab
28ab
25nor30ab
29ab
29Ts
29ba
25nor31ab
30ba
31abS
31abR
31ba
32abS
32abR
33abS
33abR
34abS
34abR
35abS
35abR



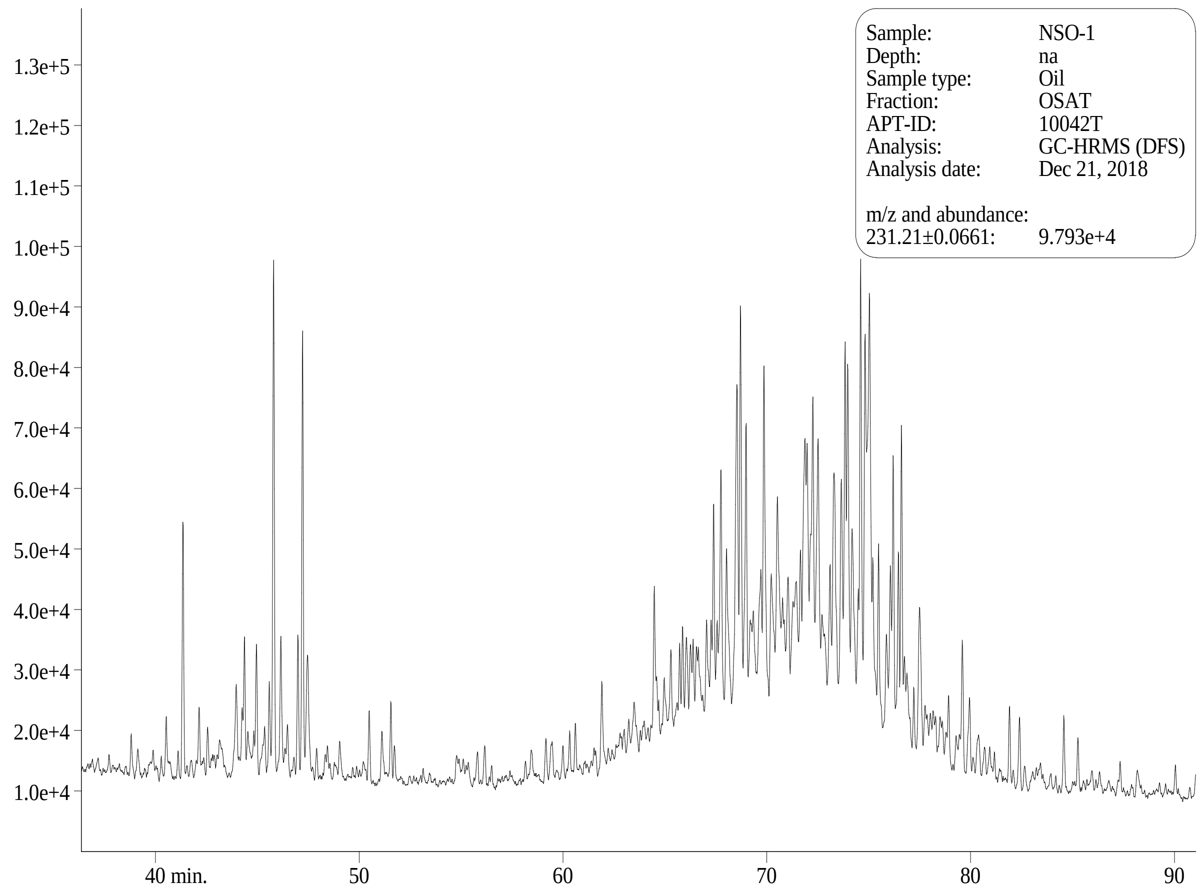
Sample: NSO-1
Depth: na
Sample type: Oil
Fraction: OSAT
APT-ID: 10042T
Analysis: GC-HRMS (DFS)
Analysis date: Dec 21, 2018
m/z and abundance:
191.18±0.0546: 1.492e+6
1.4e+6
1.2e+6
1.0e+6
8.0e+5
6.0e+5
4.0e+5
2.0e+5
30 min.
40
50
60
70
80
90
19/3
20/3
21/3
22/3
23/3
24/3
24/4
28/3R
28/3S
29/3R
29/3S
27Ts
27Tm
30/3R
30/3S
28ab
25nor30ab
29ab
29Ts
30d
29ba
30ab
30ba
30G
31abS
31abR
31ba
32abS
32abR
33abS
33abR
34abS
34abR
35abS
35abR


Sample: NSO-1
Depth: na
Sample type: Oil
Fraction: OSAT
APT-ID: 10042T
Analysis: GC-HRMS (DFS)
Analysis date: Dec 21, 2018
m/z and abundance:
205.20±0.0586: 1.777e+5
2.4e+5
2.2e+5
2.0e+5
1.8e+5
1.6e+5
1.4e+5
1.2e+5
1.0e+5
8.0e+4
6.0e+4
4.0e+4
2.0e+4
30 min.
40
50
60
70
80
90
30ab
31abR
31ba
30ba
32abS
32abR
33abS
33abR
34abS
34abR
35abS
35abR

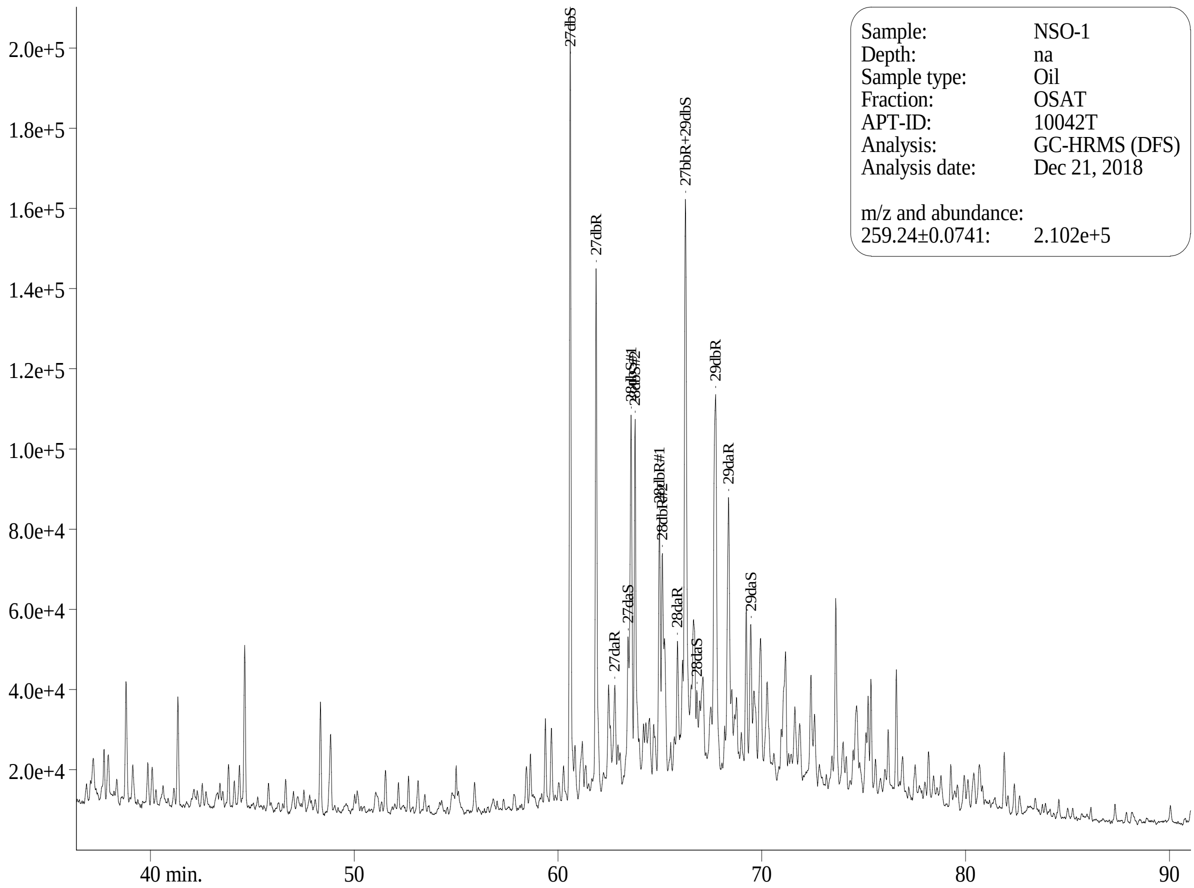

Sample: NSO-1
Depth: na
Sample type: Oil
Fraction: OSAT
APT-ID: 10042T
Analysis: GC-HRMS (DFS)
Analysis date: Dec 21, 2018
m/z and abundance:
217.20±0.0621: 2.555e+5
2.4e+5
2.2e+5
2.0e+5
1.8e+5
1.6e+5
1.4e+5
1.2e+5
1.0e+5
8.0e+4
6.0e+4
4.0e+4
2.0e+4
40 min.
50
60
70
80
90
21aa
21bb
22aa
22bb
27dbS
27dbR
27daR
27daS
27bbR+29dbS
27bbS
27aaS
27aaR
28daR
28daS
29dbR
29daR
29daS
28bbS
28bbR
28aaS
28aaR
29aaS
29bbS
30bbR
30bbS
30aaR



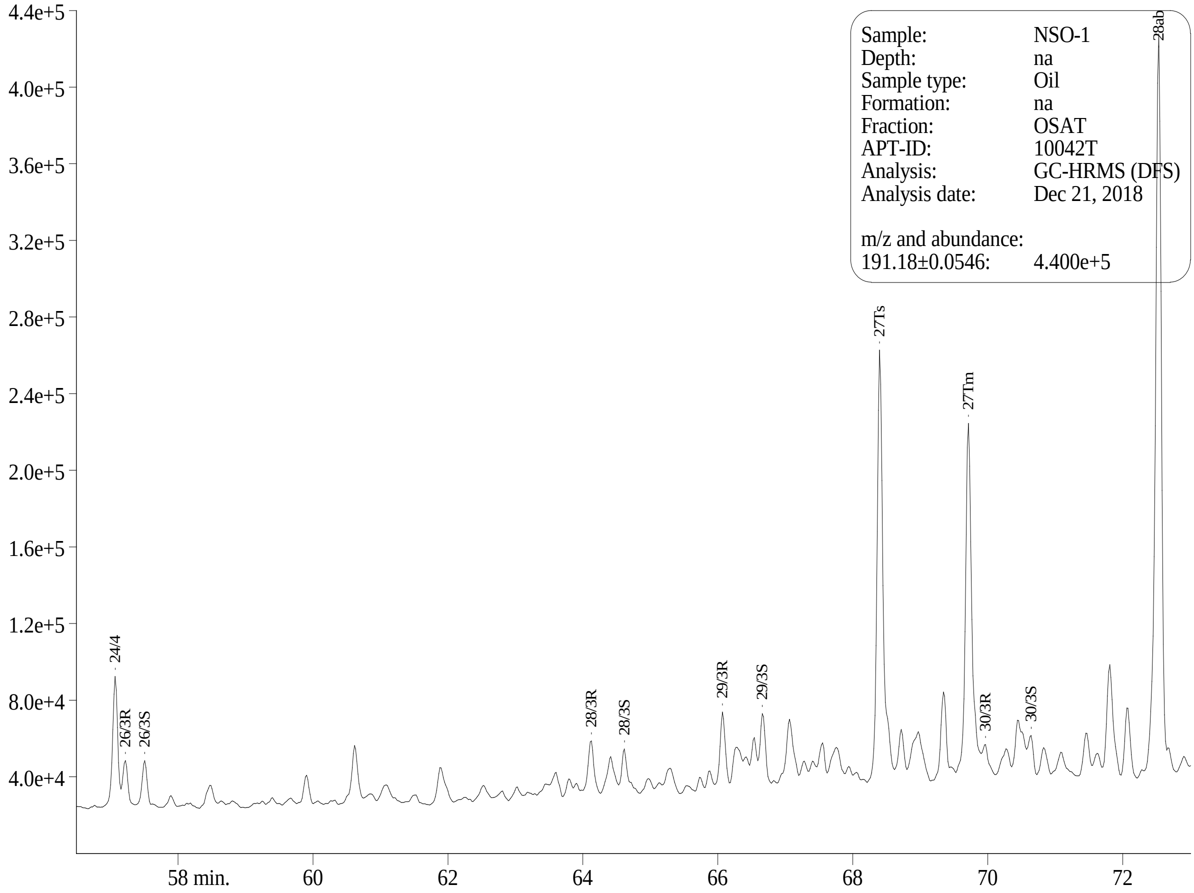
Sample: NSO-1
Depth: na
Sample type: Oil
Fraction: OSAT
APT-ID: 10042T
Analysis: GC-HRMS (DFS)
Analysis date: Dec 21, 2018
m/z and abundance:
218.20±0.0623: 2.145e+5
2.0e+5
1.8e+5
1.6e+5
1.4e+5
1.2e+5
1.0e+5
8.0e+4
6.0e+4
4.0e+4
2.0e+4
40 min.
50
60
70
80
90
21aa
21bb
22aa
22bb
27dbS
27dbR
27daS
27aaS
27aaR
28bbS
28bbR
29dbR
29daR
28aaR
29aaS
29aaR
30bbR
30bbS
30aaS
30aaR
28daS



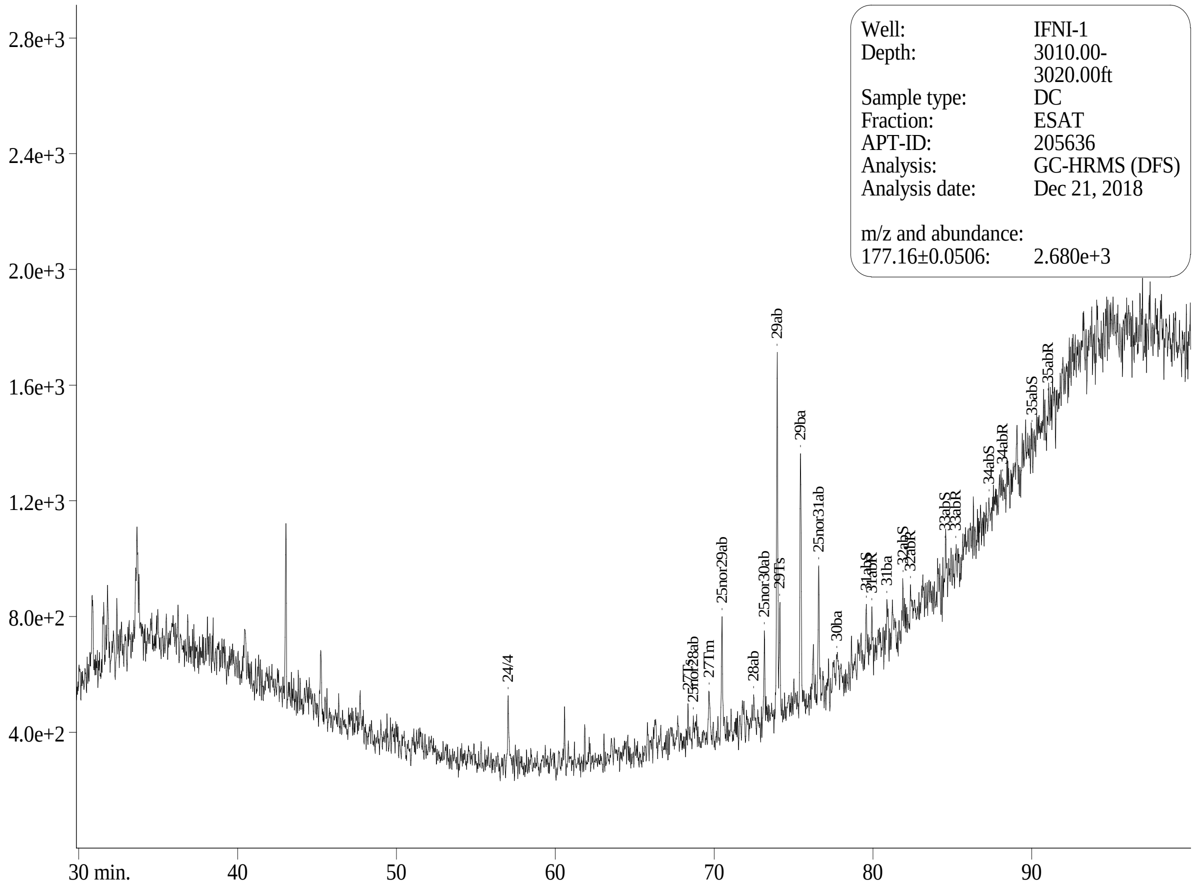
Sample: NSO-1
Depth: na
Sample type: Oil
Fraction: OSAT
APT-ID: 10042T
Analysis: GC-HRMS (DFS)
Analysis date: Dec 21, 2018
m/z and abundance:
231.21±0.0661: 9.793e+4
1.3e+5
1.2e+5
1.1e+5
1.0e+5
9.0e+4
8.0e+4
7.0e+4
6.0e+4
5.0e+4
4.0e+4
3.0e+4
2.0e+4
1.0e+4
40 min.
50
60
70
80
90

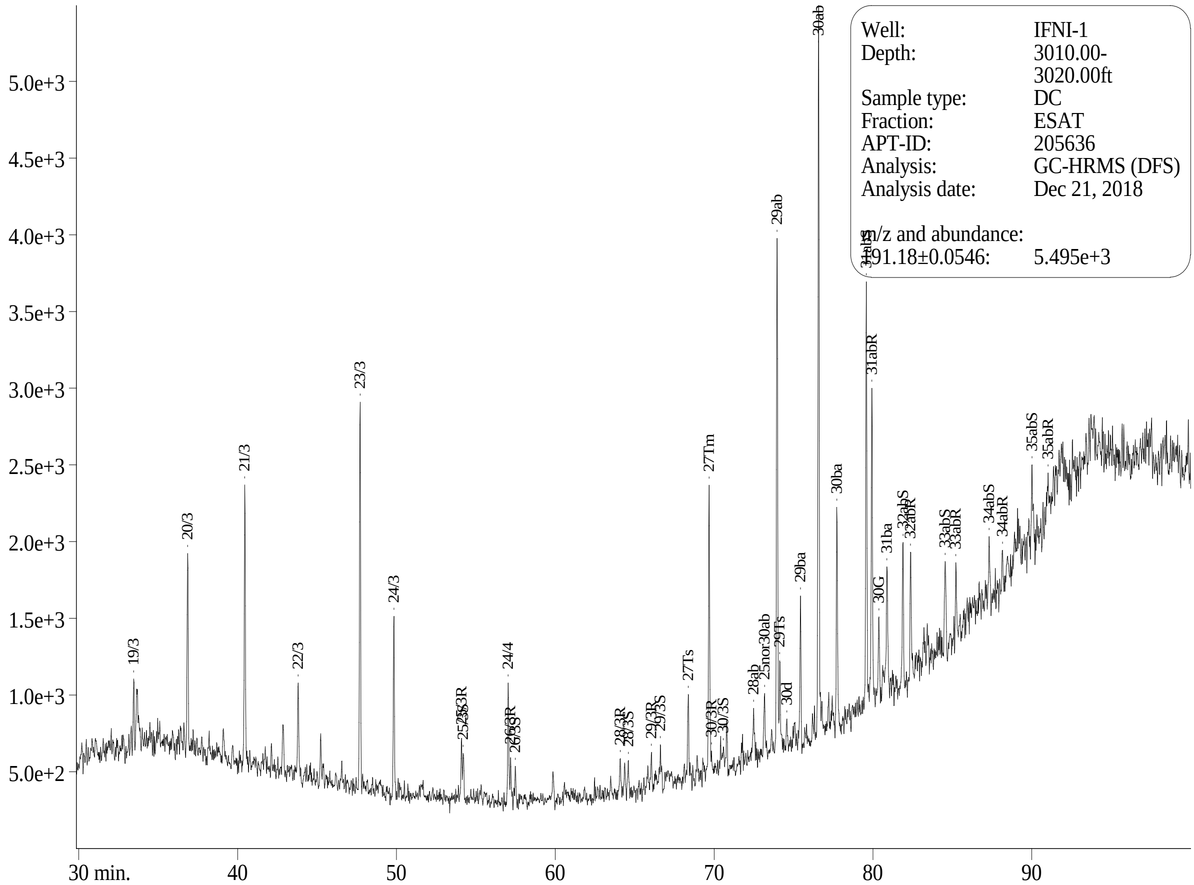


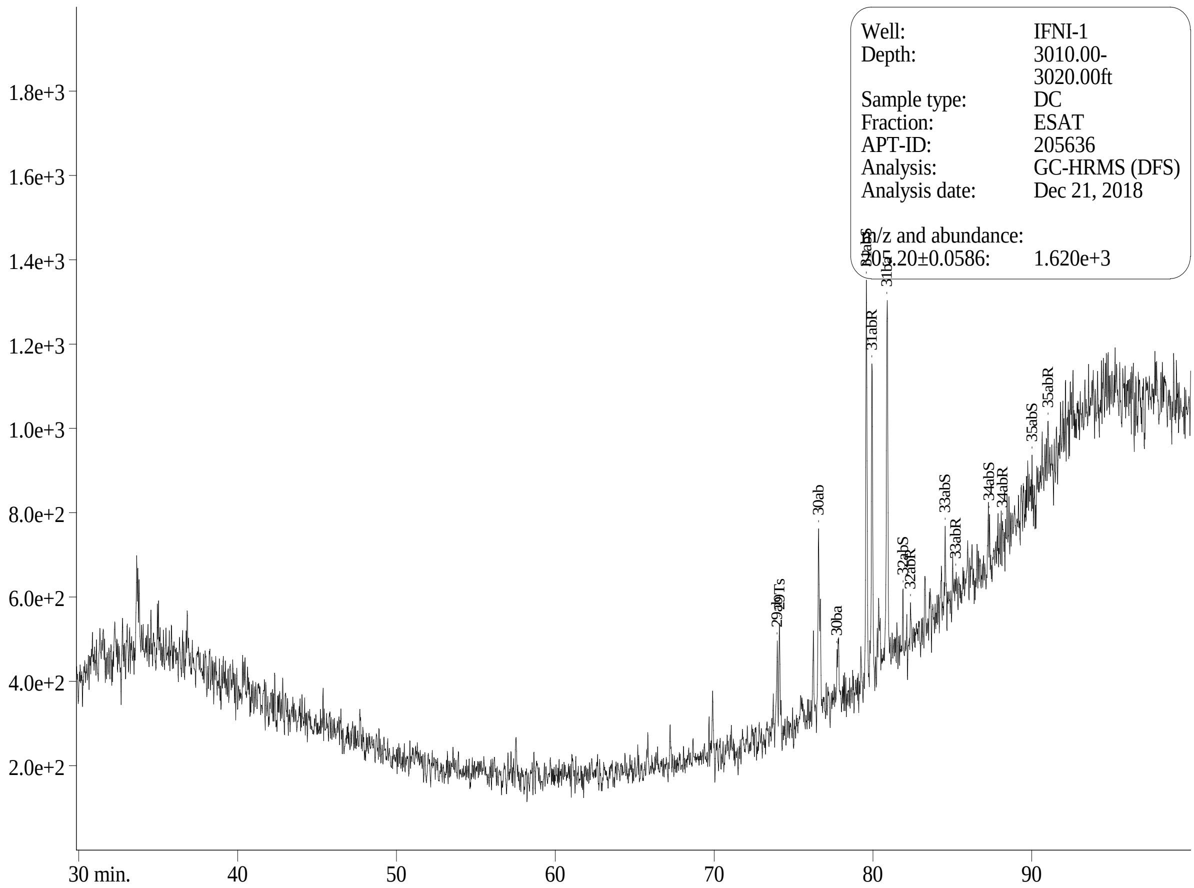
Sample: NSO-1
Depth: na
Sample type: Oil
Fraction: OSAT
APT-ID: 10042T
Analysis: GC-HRMS (DFS)
Analysis date: Dec 21, 2018
m/z and abundance:
259.24±0.0741: 2.102e+5
27dbS
27dbR
27daR
27daS
28daR
28daS
27bbR+29dbS
29dbR
29daR
29daS
2.0e+5
1.8e+5
1.6e+5
1.4e+5
1.2e+5
1.0e+5
8.0e+4
6.0e+4
4.0e+4
2.0e+4
40 min.
50
60
70
80
90

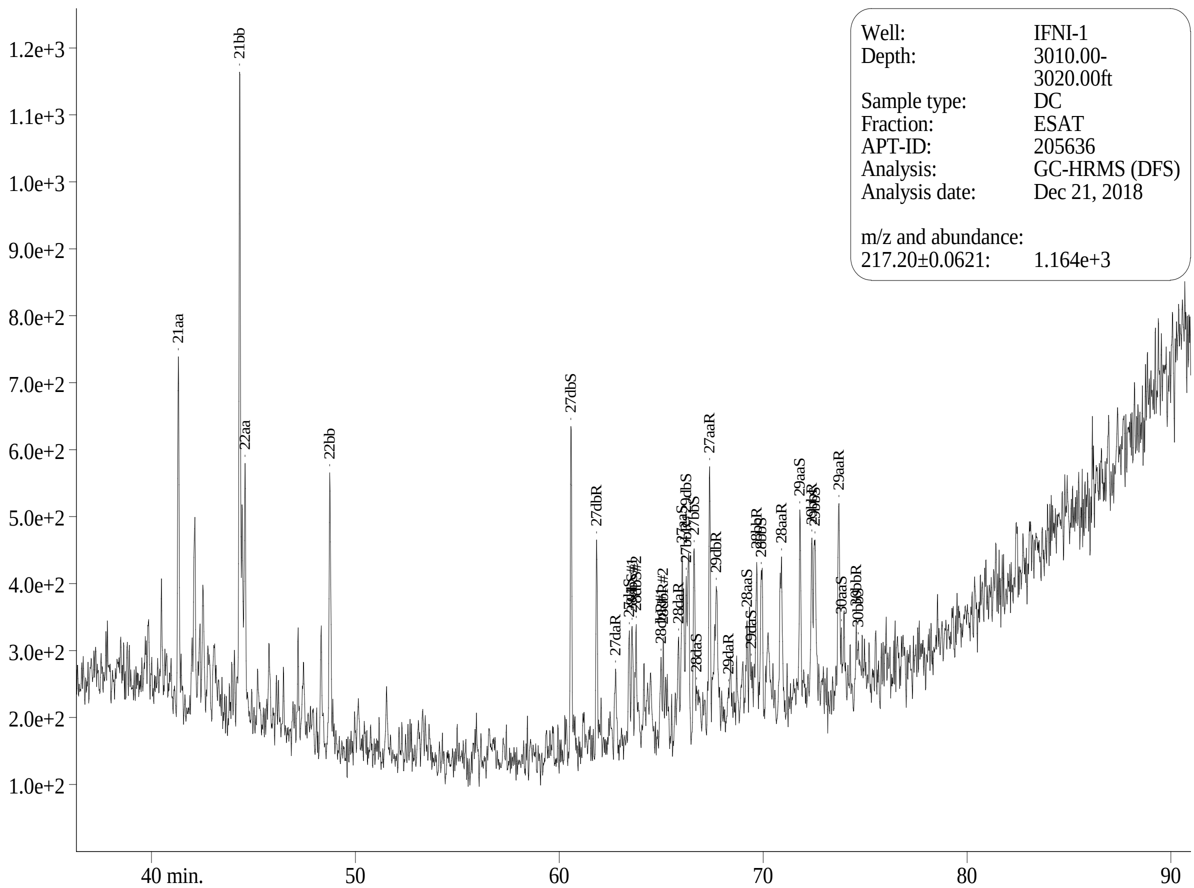


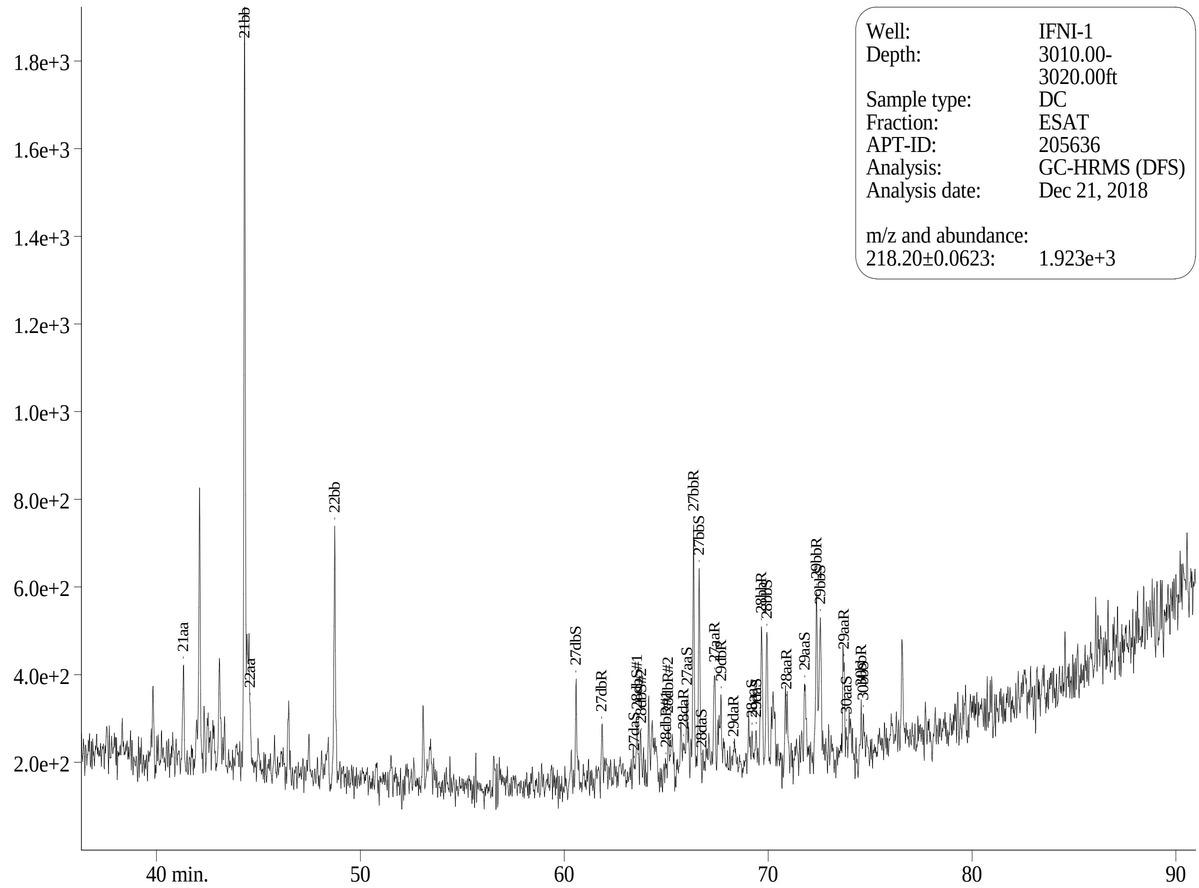
Sample: NSO-1
Depth: na
Sample type: Oil
Formation: na
Fraction: OSAT
APT-ID: 10042T
Analysis: GC-HRMS (DFS)
Analysis date: Dec 21, 2018
m/z and abundance:
191.18±0.0546: 4.400e+5
24/4
26/3R
26/3S
28/3R
28/3S
29/3R
29/3S
27Ts
27Tm
30/3R
30/3S
28ab
4.4e+5
4.0e+5
3.6e+5
3.2e+5
2.8e+5
2.4e+5
2.0e+5
1.6e+5
1.2e+5
8.0e+4
4.0e+4
58 min.
60
62
64
66
68
70
72

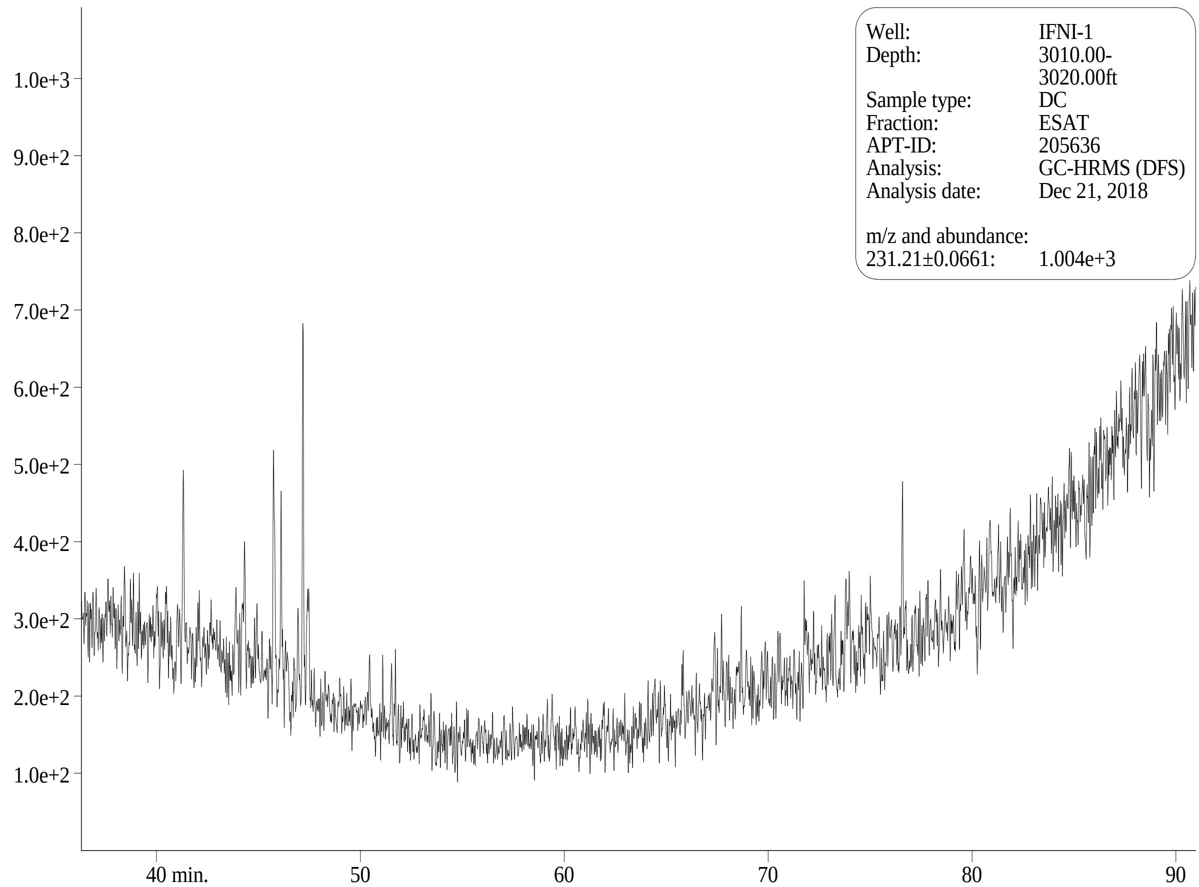

Well: IFNI-1
Depth: 3010.00-3020.00ft
Sample type: DC
Fraction: ESAT
APT-ID: 205636
Analysis: GC-HRMS (DFS)
Analysis date: Dec 21, 2018
m/z and abundance:
177.16±0.0506: 2.680e+3
2.8e+3
2.4e+3
2.0e+3
1.6e+3
1.2e+3
8.0e+2
4.0e+2
30 min.
40
50
60
70
80
90
24/4
27Tm
28ab
25nor29ab
25nor30ab
29Ts
29ab
29ba
25nor31ab
30ba
31ba
33abS
33abR
34abS
34abR
35abS
35abR

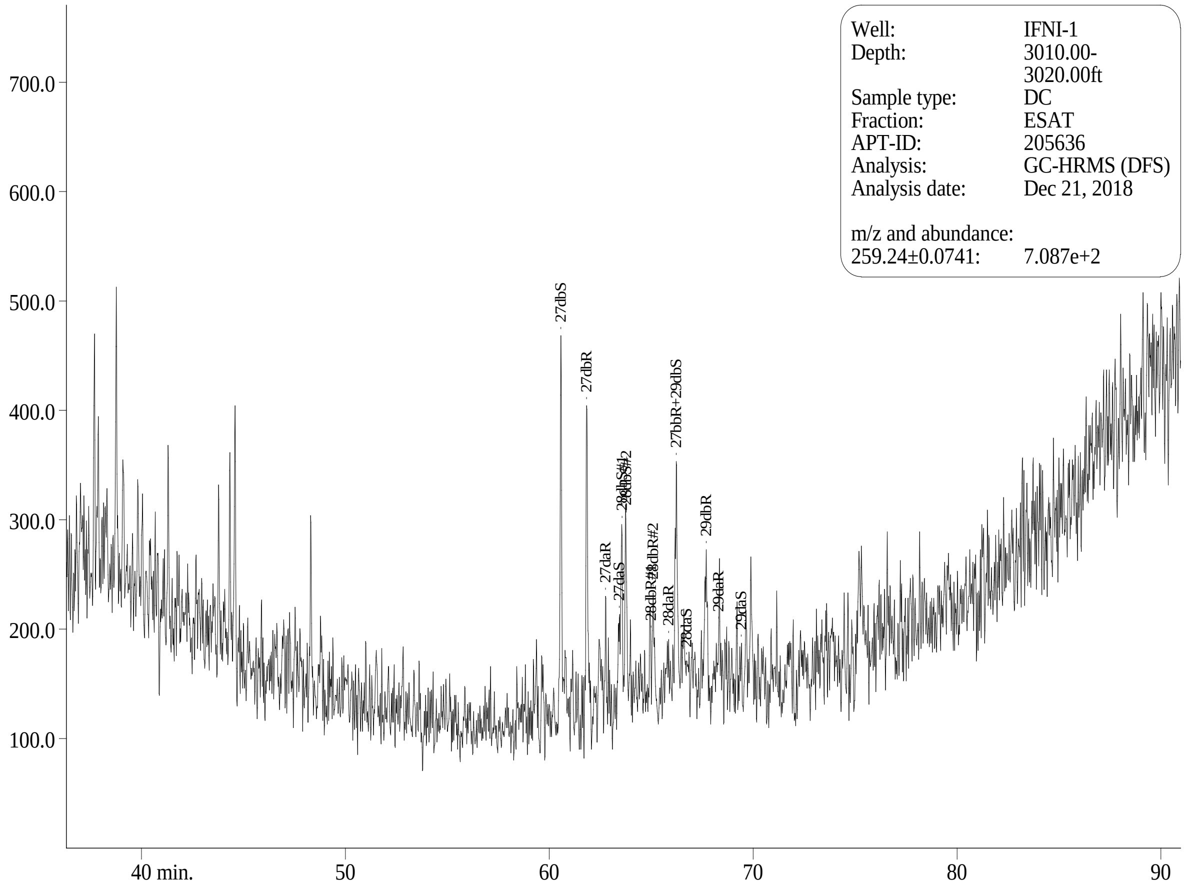

Well: IFNI-1
Depth: 3010.00-3020.00ft
Sample type: DC
Fraction: ESAT
APT-ID: 205636
Analysis: GC-HRMS (DFS)
Analysis date: Dec 21, 2018
m/z and abundance:
191.18±0.0546: 5.495e+3
5.0e+3
4.5e+3
4.0e+3
3.5e+3
3.0e+3
2.5e+3
2.0e+3
1.5e+3
1.0e+3
5.0e+2
30 min.
40
50
60
70
80
90
19/3
20/3
21/3
22/3
23/3
24/3
24/4
28/3R
28/3S
29/3R
29/3S
27Ts
27Tm
30/3R
30/3S
28ab
25nor30ab
29Ts
30d
29ab
29ba
30ab
30ba
31abR
30G
31ba
32abS
32abR
33abS
33abR
34abS
34abR
35abS
35abR


Well: IFNI-1
Depth: 3010.00-3020.00ft
Sample type: DC
Fraction: ESAT
APT-ID: 205636
Analysis: GC-HRMS (DFS)
Analysis date: Dec 21, 2018
m/z and abundance:
205.20±0.0586: 1.620e+3
1.8e+3
1.6e+3
1.4e+3
1.2e+3
1.0e+3
8.0e+2
6.0e+2
4.0e+2
2.0e+2
30 min.
40
50
60
70
80
90
30ab
30ba
31abR
33abS
33abR
34abS
34abR
35abS
35abR

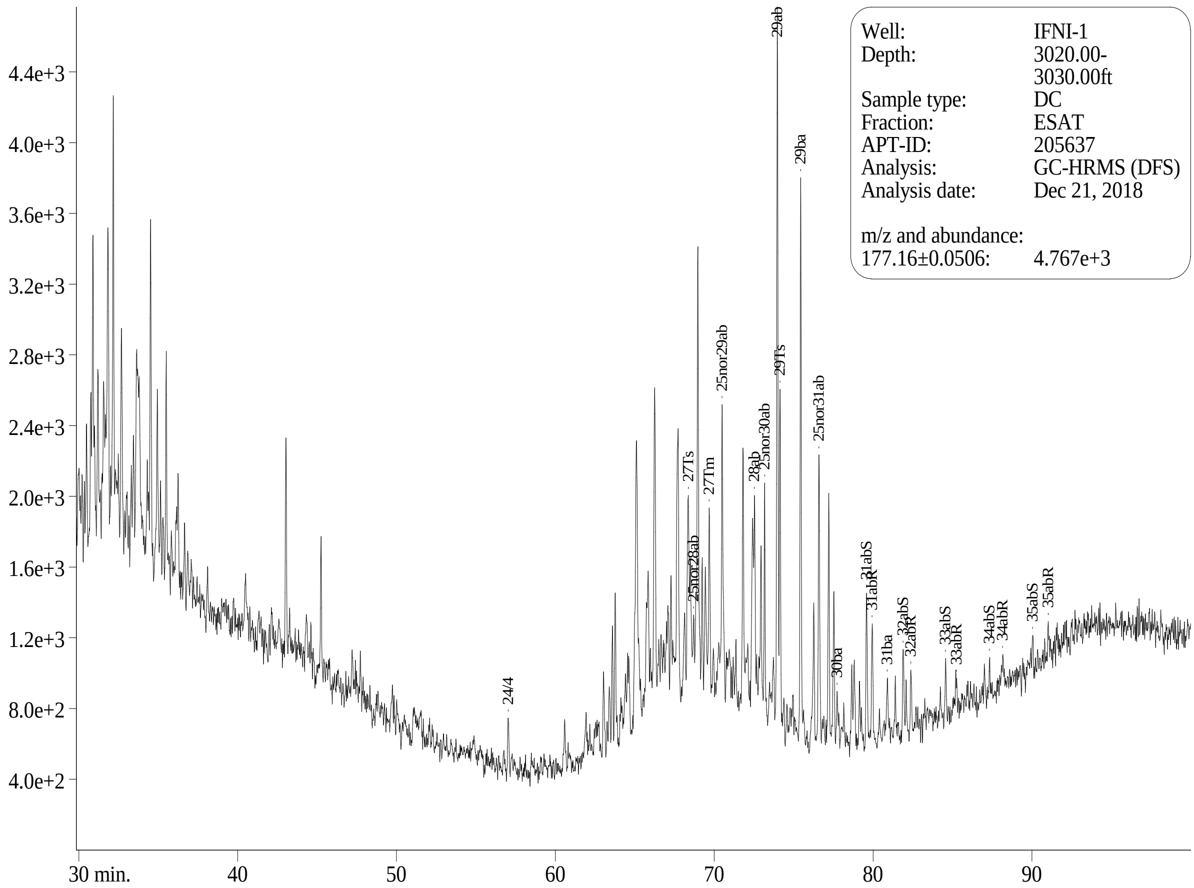

Well: IFNI-1
Depth: 3010.00-3020.00ft
Sample type: DC
Fraction: ESAT
APT-ID: 205636
Analysis: GC-HRMS (DFS)
Analysis date: Dec 21, 2018
m/z and abundance:
217.20±0.0621: 1.164e+3
1.2e+3
1.1e+3
1.0e+3
9.0e+2
8.0e+2
7.0e+2
6.0e+2
5.0e+2
4.0e+2
3.0e+2
2.0e+2
1.0e+2
40 min.
50
60
70
80
90
21aa
21bb
22aa
22bb
27dbS
27dbR
27daR
28daS
27aaR
29dbR
29daR
28aaR
29aaS
29aaR
30aaS

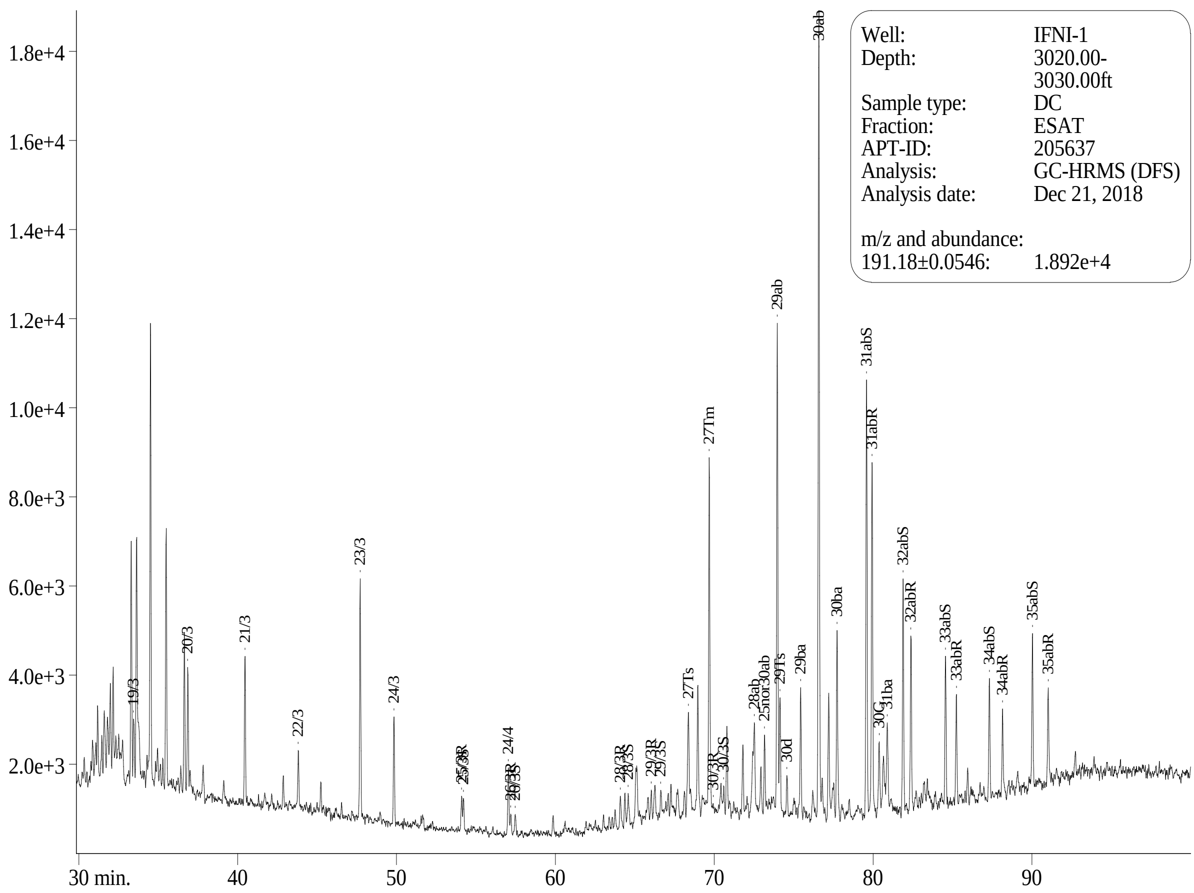

Well: IFNI-1
Depth: 3010.00-3020.00ft
Sample type: DC
Fraction: ESAT
APT-ID: 205636
Analysis: GC-HRMS (DFS)
Analysis date: Dec 21, 2018
m/z and abundance:
218.20±0.0623: 1.923e+3
1.8e+3
1.6e+3
1.4e+3
1.2e+3
1.0e+3
8.0e+2
6.0e+2
4.0e+2
2.0e+2
40 min.
50
60
70
80
90
21aa
21bb
22aa
22bb
27dbS
27dbR
27bbR
27bbS
27aaS
27aaR
29daR
28aaR
29aaS
29bbR
29bbS
29aaR
30aaS

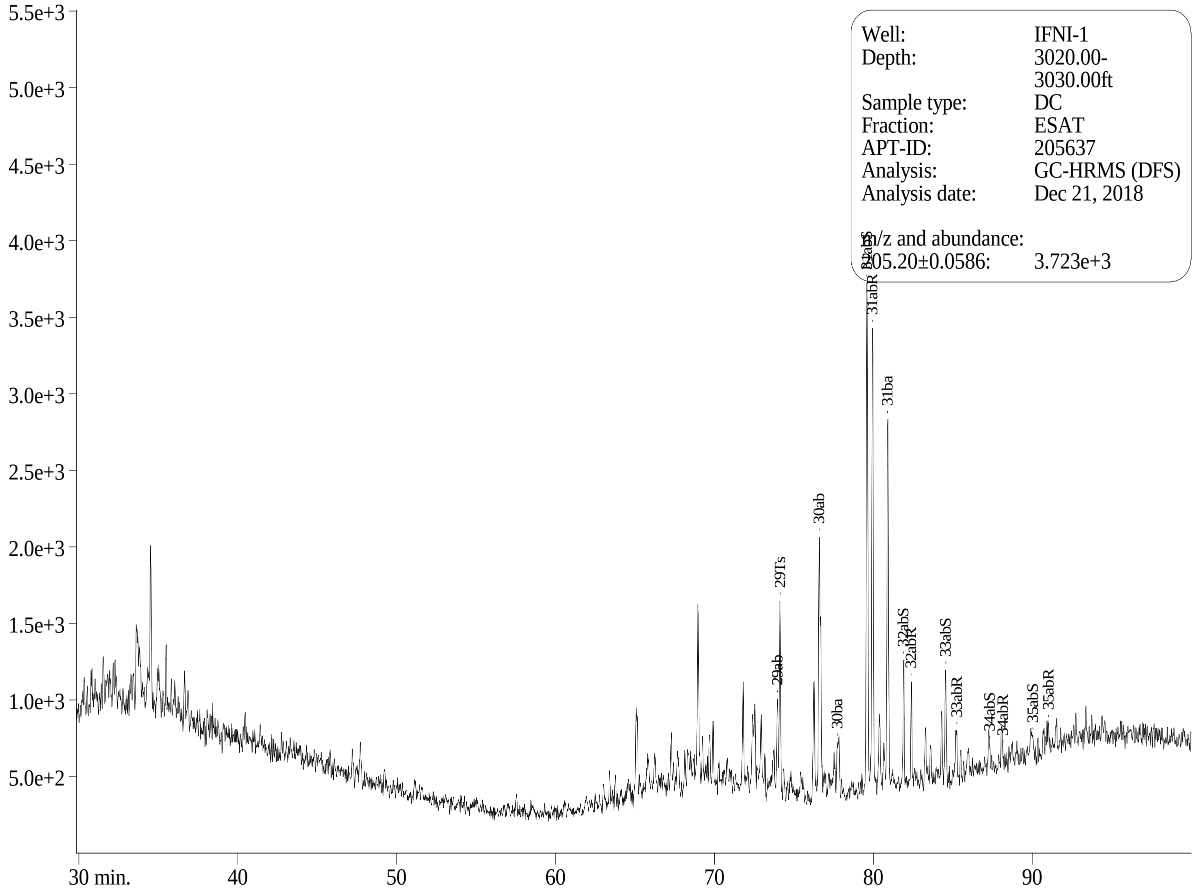

Well: IFNI-1
Depth: 3010.00-3020.00ft
Sample type: DC
Fraction: ESAT
APT-ID: 205636
Analysis: GC-HRMS (DFS)
Analysis date: Dec 21, 2018
m/z and abundance:
231.21±0.0661: 1.004e+3
1.0e+3
9.0e+2
8.0e+2
7.0e+2
6.0e+2
5.0e+2
4.0e+2
3.0e+2
2.0e+2
1.0e+2
40 min.
50
60
70
80
90

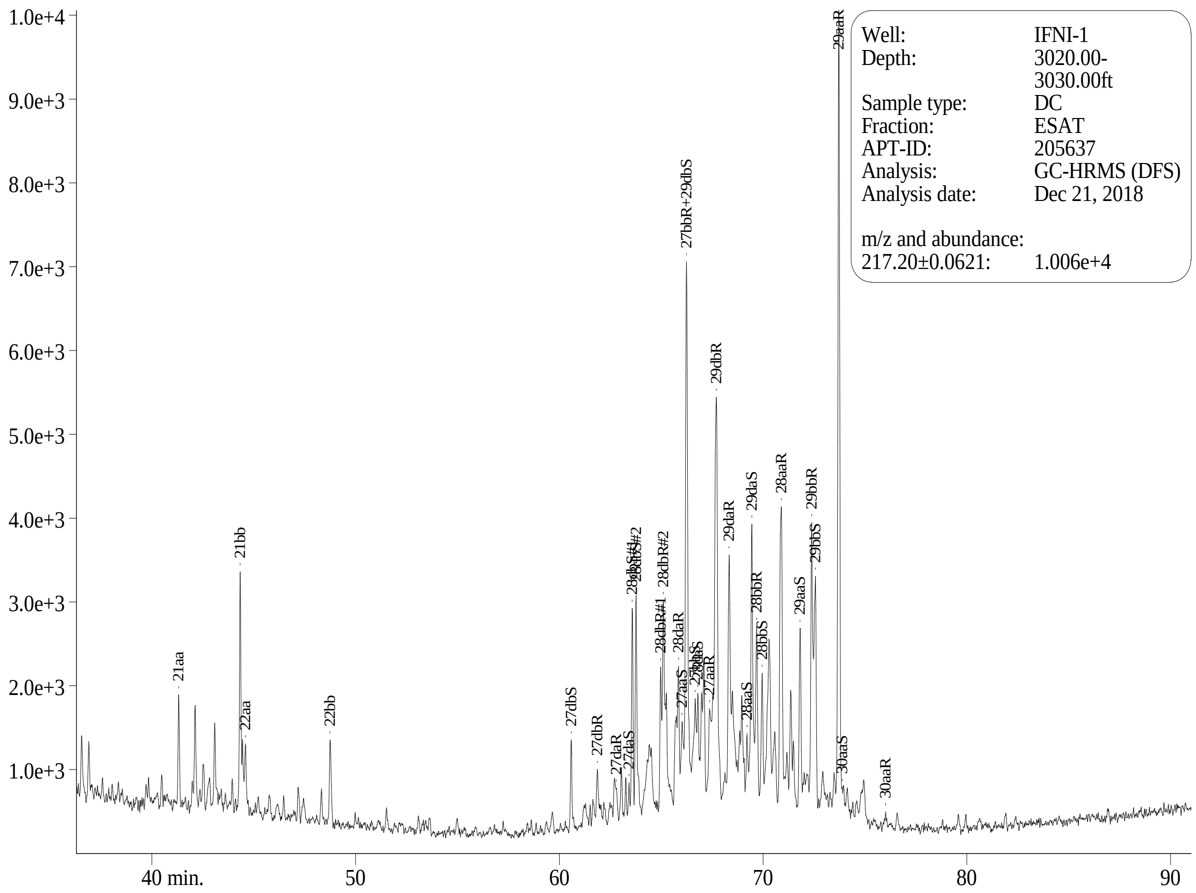


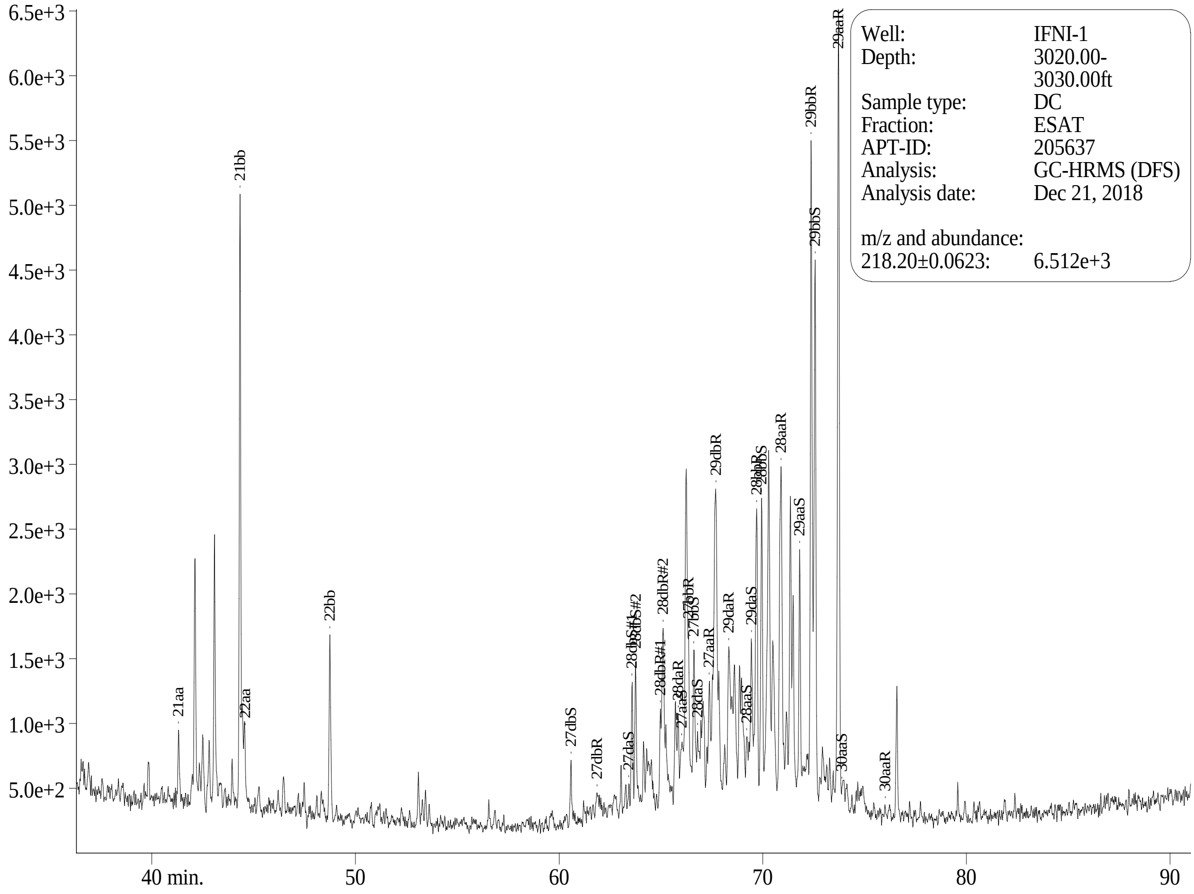
Well: IFNI-1
Depth: 3010.00-3020.00ft
Sample type: DC
Fraction: ESAT
APT-ID: 205636
Analysis: GC-HRMS (DFS)
Analysis date: Dec 21, 2018
m/z and abundance:
259.24±0.0741: 7.087e+2
700.0
600.0
500.0
400.0
300.0
200.0
100.0
40 min.
50
60
70
80
90
27dbS
27dbR
27daR
27daS
27bbR+29dbS
29dbR
29daR
29daS
28daR
28daS

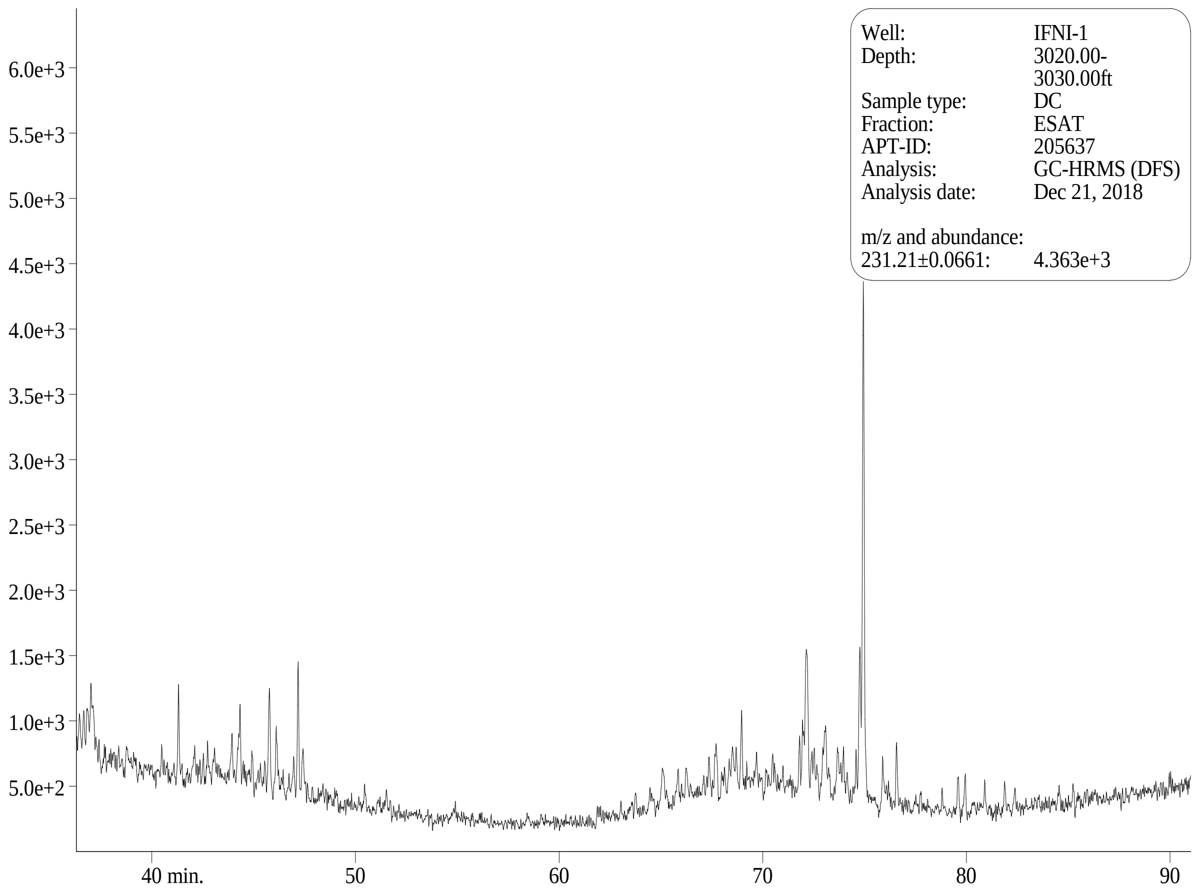

Well: IFNI-1
Depth: 3020.00-3030.00ft
Sample type: DC
Fraction: ESAT
APT-ID: 205637
Analysis: GC-HRMS (DFS)
Analysis date: Dec 21, 2018
m/z and abundance:
177.16±0.0506: 4.767e+3
30 min.
40
50
60
70
80
90

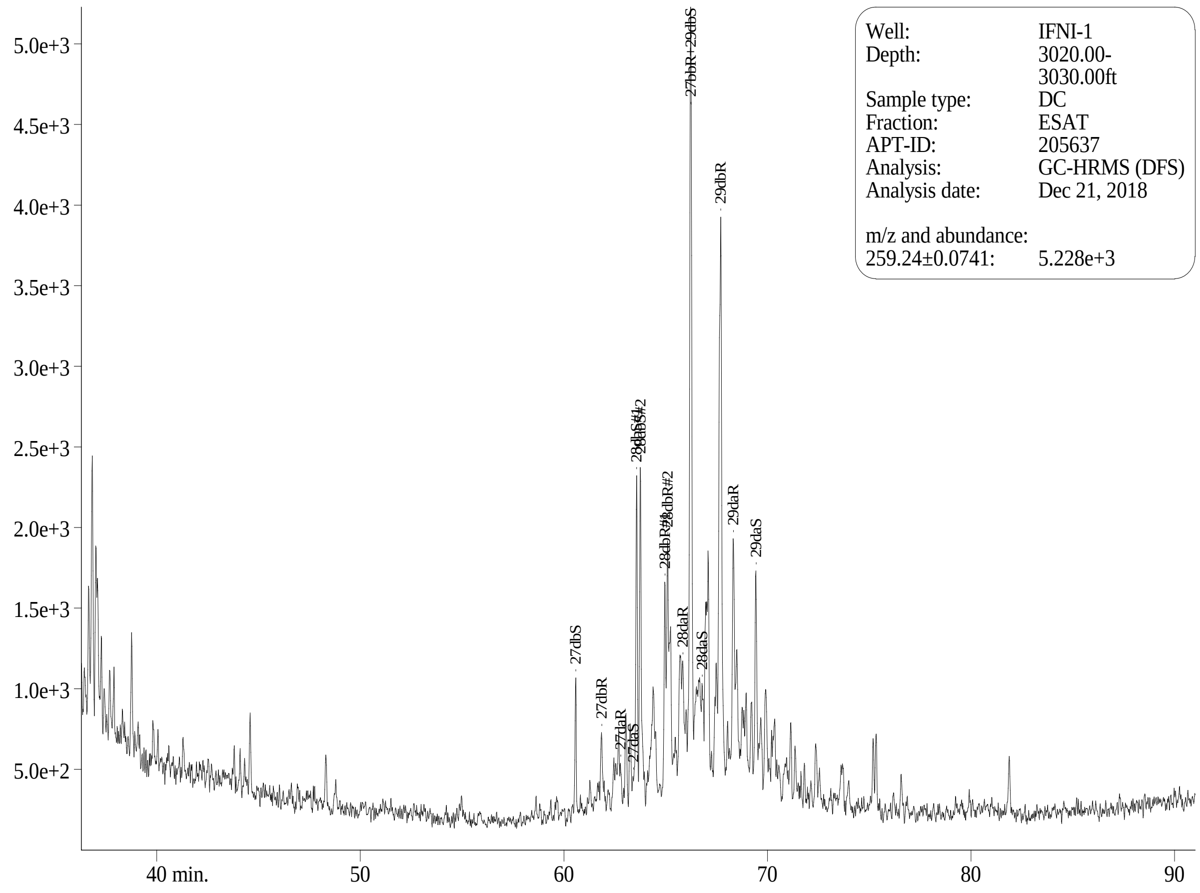

Well: IFNI-1
Depth: 3020.00-3030.00ft
Sample type: DC
Fraction: ESAT
APT-ID: 205637
Analysis: GC-HRMS (DFS)
Analysis date: Dec 21, 2018
m/z and abundance:
191.18±0.0546: 1.892e+4
30 min.
40
50
60
70
80
90


Well: IFNI-1
Depth: 3020.00-3030.00ft
Sample type: DC
Fraction: ESAT
APT-ID: 205637
Analysis: GC-HRMS (DFS)
Analysis date: Dec 21, 2018
m/z and abundance:
205.20±0.0586: 3.723e+3
29ab
29Ts
30ab
30ba
31abR
31ba
32abS
32abR
33abS
33abR
34abS
34abR
35abS
35abR
30 min.
40
50
60
70
80
90

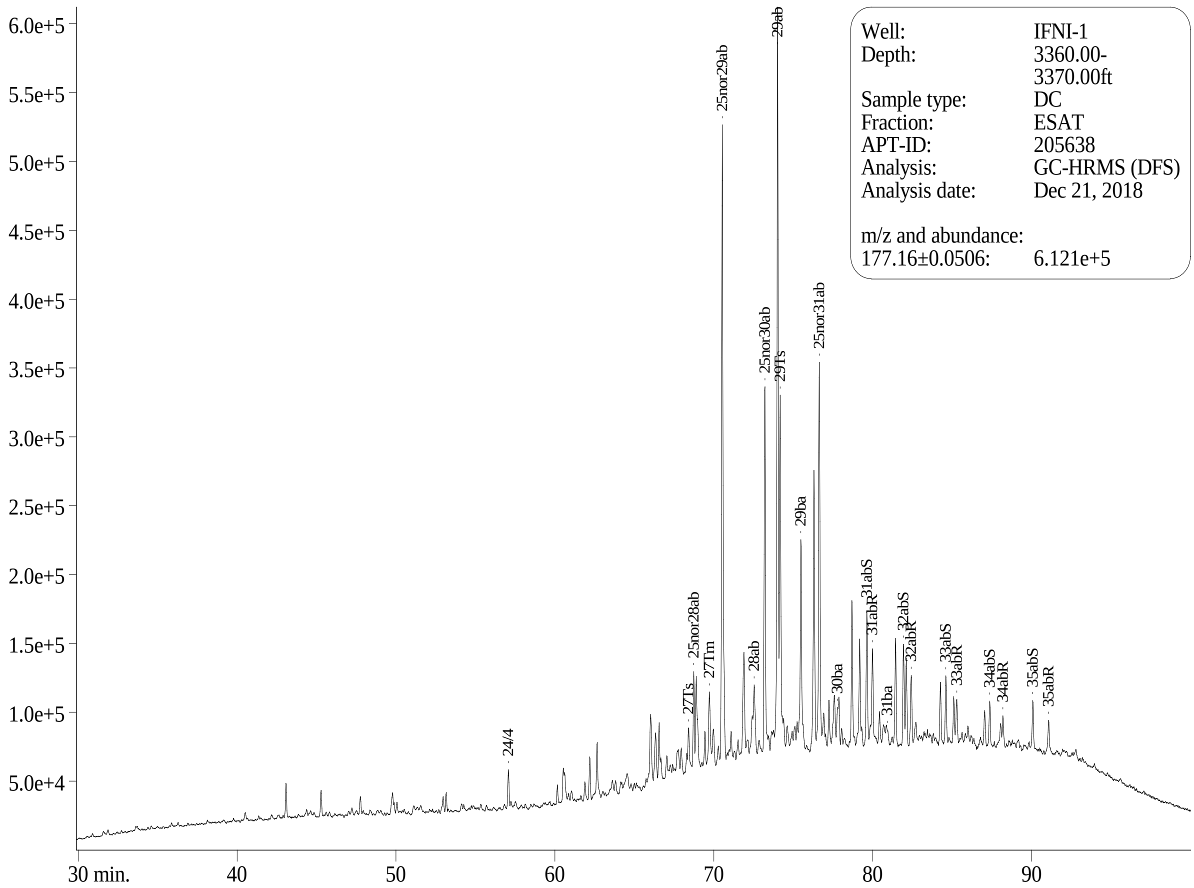

Well: IFNI-1
Depth: 3020.00-3030.00ft
Sample type: DC
Fraction: ESAT
APT-ID: 205637
Analysis: GC-HRMS (DFS)
Analysis date: Dec 21, 2018
m/z and abundance:
217.20±0.0621: 1.006e+4
21aa
21bb
22aa
22bb
27dbS
27dbR
27daR
27daS
28dbR#2
28dbR#1
28daR
27aaS
27aaR
27bbR+29dbS
29dbR
29daR
28aaS
29daS
28bbR
28bbS
28aaR
29aaS
29bbS
29bbR
29aaR
30aaS
30aaR
40 min.
50
60
70
80
90

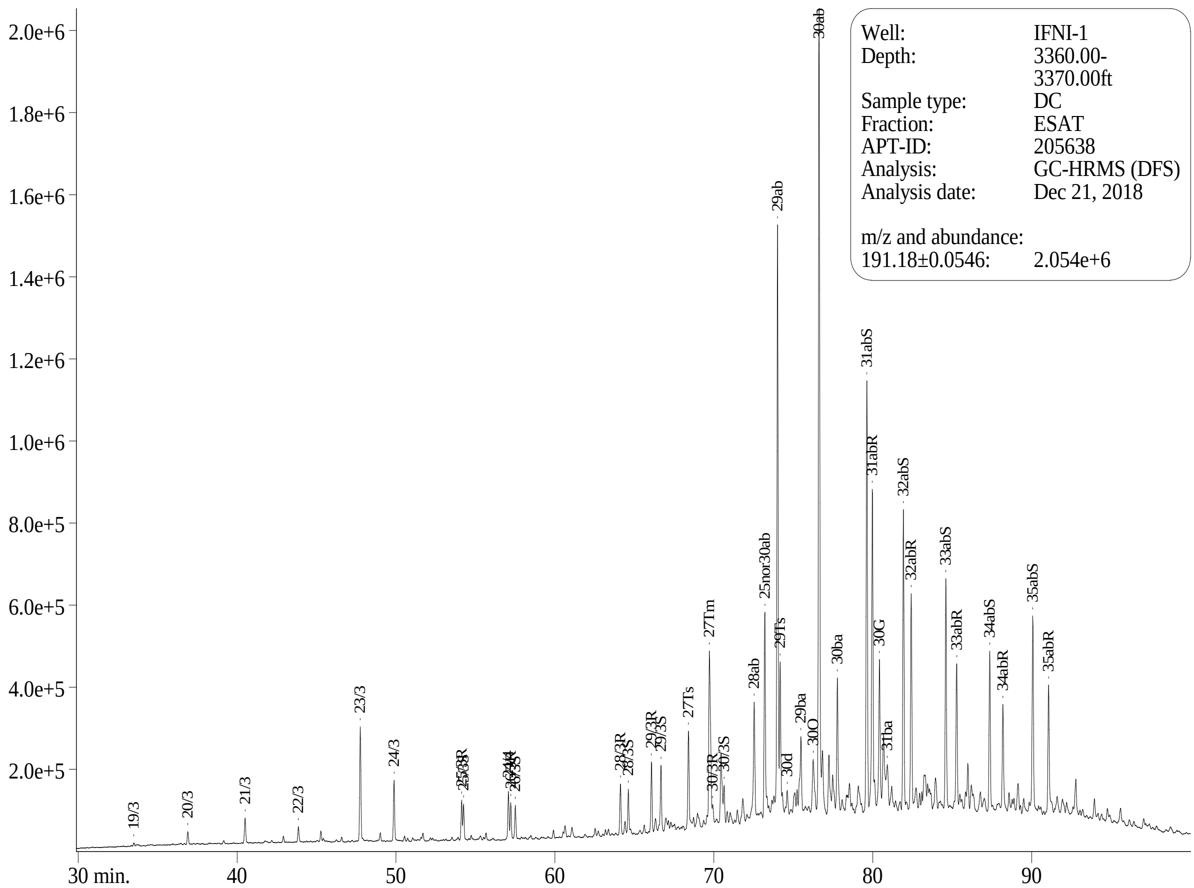

6.5e+3
6.0e+3
5.5e+3
5.0e+3
4.5e+3
4.0e+3
3.5e+3
3.0e+3
2.5e+3
2.0e+3
1.5e+3
1.0e+3
5.0e+2
40 min.
50
60
70
80
90
21aa
21bb
22aa
22bb
27dbS
27dbR
27daS
28dbR#2
28dbR#1
28daR
27aaS
28daS
27aaR
29dbR
29daR
29daS
28aaS
28aaR
29aaS
29bbR
29bbS
29aaR
30aaS
30aaR
Well: IFNI-1
Depth: 3020.00-3030.00ft
Sample type: DC
Fraction: ESAT
APT-ID: 205637
Analysis: GC-HRMS (DFS)
Analysis date: Dec 21, 2018
m/z and abundance:
218.20±0.0623: 6.512e+3

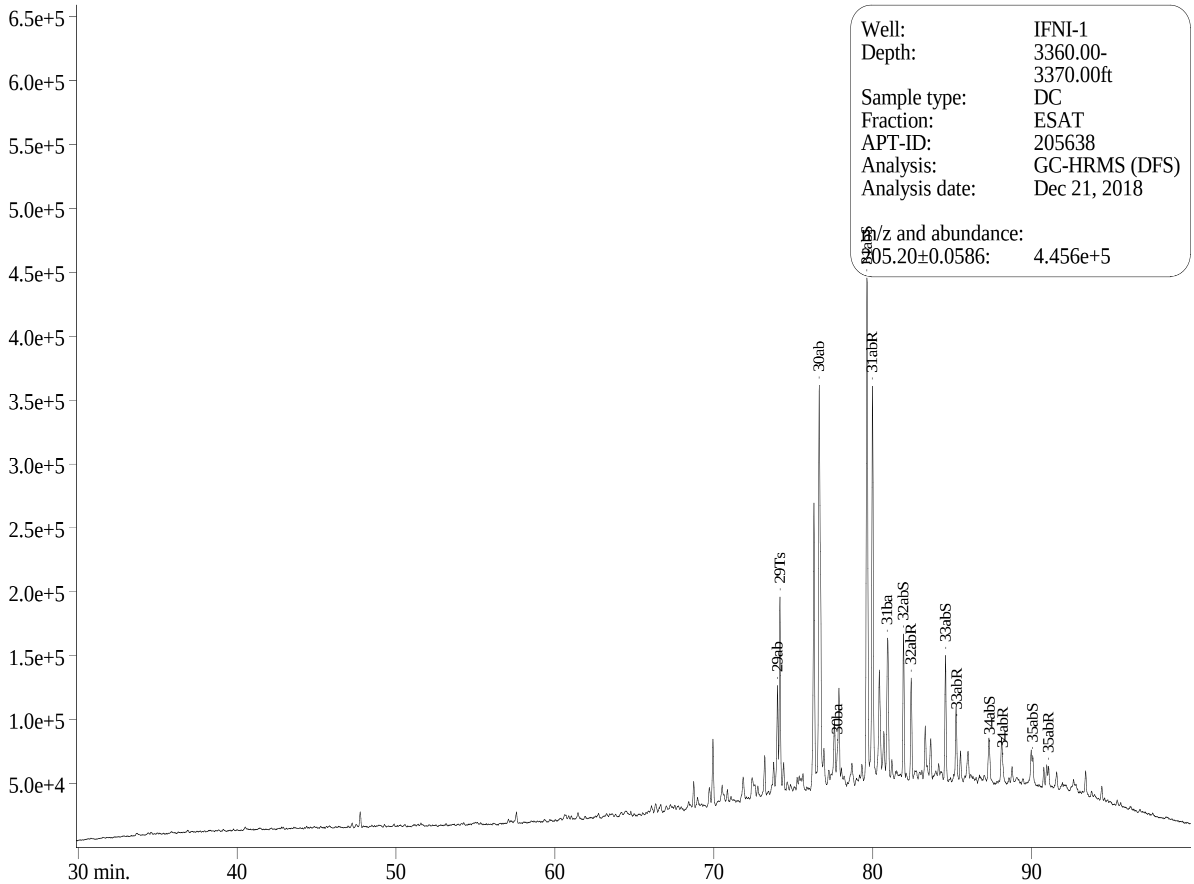

6.0e+3
5.5e+3
5.0e+3
4.5e+3
4.0e+3
3.5e+3
3.0e+3
2.5e+3
2.0e+3
1.5e+3
1.0e+3
5.0e+2
40 min.
50
60
70
80
90
Well: IFNI-1
Depth: 3020.00-3030.00ft
Sample type: DC
Fraction: ESAT
APT-ID: 205637
Analysis: GC-HRMS (DFS)
Analysis date: Dec 21, 2018
m/z and abundance:
231.21±0.0661: 4.363e+3

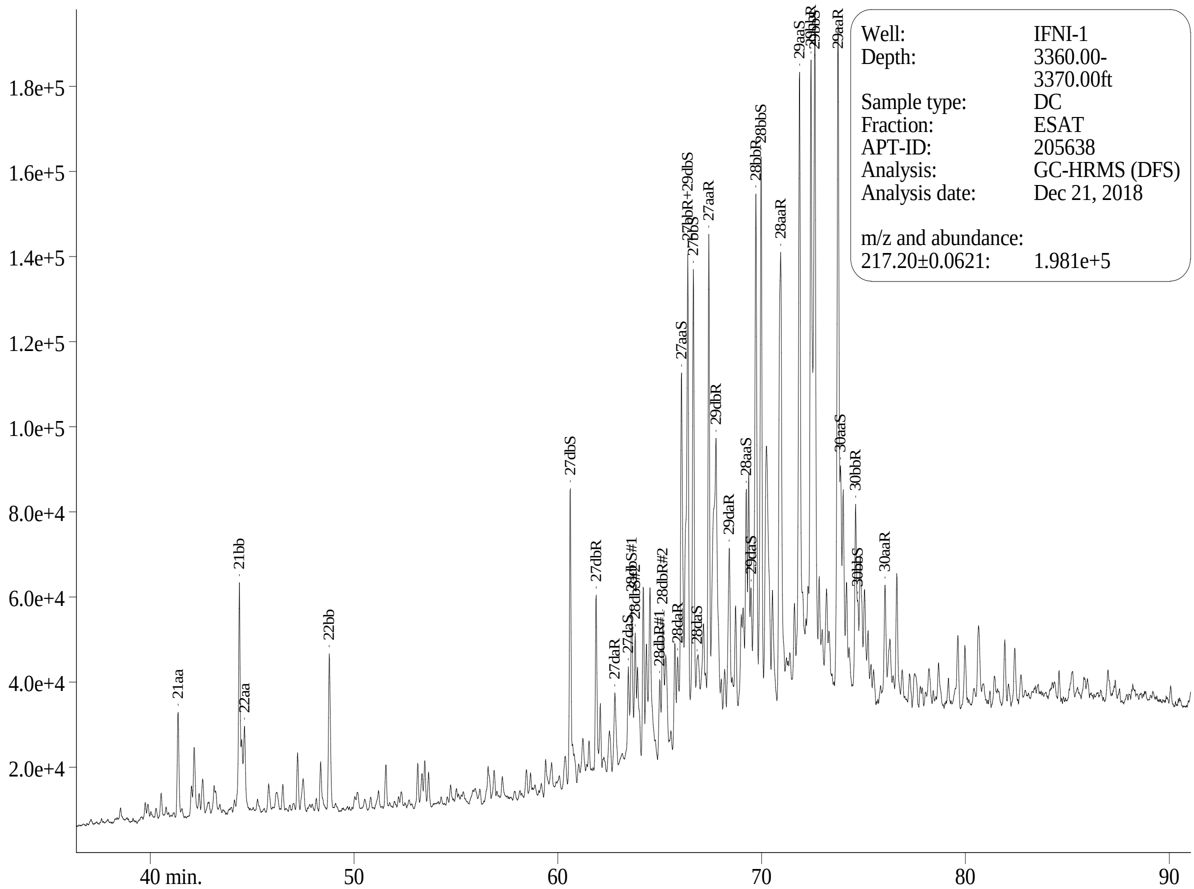


Well: IFNI-1
Depth: 3020.00-3030.00ft
Sample type: DC
Fraction: ESAT
APT-ID: 205637
Analysis: GC-HRMS (DFS)
Analysis date: Dec 21, 2018
m/z and abundance:
259.24±0.0741: 5.228e+3
27dbS
27dbR
27daR
27daS
28dbR#2
28daR
28daS
27bbR+29dbS
29dbR
29daR
29daS
5.0e+3
4.5e+3
4.0e+3
3.5e+3
3.0e+3
2.5e+3
2.0e+3
1.5e+3
1.0e+3
5.0e+2
40 min.
50
60
70
80
90


Well: IFNI-1
Depth: 3360.00-3370.00ft
Sample type: DC
Fraction: ESAT
APT-ID: 205638
Analysis: GC-HRMS (DFS)
Analysis date: Dec 21, 2018
m/z and abundance:
177.16±0.0506: 6.121e+5
6.0e+5
5.5e+5
5.0e+5
4.5e+5
4.0e+5
3.5e+5
3.0e+5
2.5e+5
2.0e+5
1.5e+5
1.0e+5
5.0e+4
30 min.
40
50
60
70
80
90
24/4
27Ts
25nor28ab
27Tm
25nor29ab
28ab
25nor30ab
29ab
29Ts
29ba
25nor31ab
30ba
31abS
31abR
31ba
32abS
32abR
33abS
33abR
34abS
34abR
35abS
35abR


Well: IFNI-1
Depth: 3360.00-3370.00ft
Sample type: DC
Fraction: ESAT
APT-ID: 205638
Analysis: GC-HRMS (DFS)
Analysis date: Dec 21, 2018
m/z and abundance:
191.18±0.0546: 2.054e+6
2.0e+6
1.8e+6
1.6e+6
1.4e+6
1.2e+6
1.0e+6
8.0e+5
6.0e+5
4.0e+5
2.0e+5
30 min.
40
50
60
70
80
90
19/3
20/3
21/3
22/3
23/3
24/3
28/3R
28/3S
29/3R
29/3S
27Ts
27Tm
30/3R
30/3S
28ab
25nor30ab
29ab
29Ts
30d
29ba
30O
30ab
30ba
31abS
31abR
30G
31ba
32abS
32abR
33abS
33abR
34abS
34abR
35abS
35abR


Well: IFNI-1
Depth: 3360.00-3370.00ft
Sample type: DC
Fraction: ESAT
APT-ID: 205638
Analysis: GC-HRMS (DFS)
Analysis date: Dec 21, 2018
m/z and abundance:
205.20±0.0586: 4.456e+5
6.5e+5
6.0e+5
5.5e+5
5.0e+5
4.5e+5
4.0e+5
3.5e+5
3.0e+5
2.5e+5
2.0e+5
1.5e+5
1.0e+5
5.0e+4
30 min.
40
50
60
70
80
90
29Ts
29ab
30ab
30ba
31abR
31ba
32abS
32abR
33abS
33abR
34abS
34abR
35abS
35abR


Well: IFNI-1
Depth: 3360.00-3370.00ft
Sample type: DC
Fraction: ESAT
APT-ID: 205638
Analysis: GC-HRMS (DFS)
Analysis date: Dec 21, 2018
m/z and abundance:
217.20±0.0621: 1.981e+5
1.8e+5
1.6e+5
1.4e+5
1.2e+5
1.0e+5
8.0e+4
6.0e+4
4.0e+4
2.0e+4
40 min.
50
60
70
80
90
21aa
21bb
22aa
22bb
27dbS
27dbR
27daR
27daS
28dbR#2
28dbR#1
28daR
28daS
27aaS
27bbR+29dbS
27bbS
27aaR
29dbR
29daR
29daS
28aaS
28bbR
28bbS
28aaR
29aaS
29aaR
30aaS
30bbR
30bbS
30aaR