



AL HAJAR

Geological Society of Oman
Quarterly Newsletter

Tenth Edition

December 2006

President's message

On behalf of the executive committee I would like to congratulate you on this festive season. Many greetings to all the GSO members and supporters and welcome to the second part of the 2006-2007 GSO season. Our year started slowly and quietly and now we look forward to more activities and events. One thing clear from the past five years since the foundation of our society, is that the move from its initial struggle for existence to a more solid position as a leading organisation in the field of geology was a challenge and now we are going to a more challenging time. We must keep up the good work, learn and progress. We need to maintain the momentum and be more creative with our activities. As a step towards this, during the 2006-2007 we have to expand on things we always thought we should work on, such as geological heritage and geo-conservation. Success in these two fronts means victory in using our internal resources and meeting our moral target with society. In this session we are also working on revamping our membership database to align it with our activities. This is part of the much needed house-keeping process we are endeavouring on. By the end of the year we expect to be able to reach all our members to share our progress and work on new plans.

Mohammed Al-Mazrui
GSO President

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Note from the Editor

This edition of Al Hajar marks the beginning of GSO activities for the 2006-2007 season. Our president, Mohammed Al-Mazrui, introduces our activities over the coming months and makes an appeal for members to become more actively involved with the GSO. There is a technical article discussing the development of ideas in geology using the Al Khlata Formation in the South Oman Salt Basin as an example. Additionally, there is a book review of In the Heart of the Desert, the biography of Mike Morton, who was the leader of the Iraq Petroleum Company's field expeditions into Oman in the 1950s. I have read this book and can thoroughly recommend it to you, it is a fascinating and enthralling read about life as an exploration geologist 50 years ago. The author, Quentin Morton (Mike's son) was in Oman in November and gave a joint Historical Association/GSO talk based around the book.

We are currently updating our membership database, which will shortly be based around the Geoscience Directory. When this comes online, please ensure that you check/update your details so that we can remain in contact with you. Membership subscriptions are now overdue, so please ensure that you renew your membership to benefit from the GSO.

Thank you to the contributors to this edition. As always, any comments or articles for publication will be gratefully received.

Eid Mubarak.

John F. Aitken
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2006-2007 Outlook:

Working Together For Geology is Our Heritage!

Mohammed Al-Mazrui (GSO President)

If we consider our calendar for the 2006-2007 session then we are in for a busy year with a variety of talks and fieldtrips. The session began with an intriguing talk titled "How life began on Planet Earth". Attended by 52 people (members and non-members) the talk was an eye opener as reflected by the discussion it generated. We look forward to more of these kind of stimulating talks. I would urge members to come along and share their experiences and knowledge. Our aim is decimate knowledge on the subject of geology and sharing is a powerful tool.

The field trip inventory is richer this year than it has ever been. We plan to start, at the end of November, with a trip to look into the aeolian systems of the Sharqiya, then we tackle the Tertiary on foot till we get to Jabel Sumaini and Nakhal. We then leave the sedimentary rocks to take a deep look into our igneous treasures; the Ophiolites. We then travel back to Cambro-Ordovician time to take a look at our favourite gas reservoirs and seals; the Miqrat Formation, Al-Bashair and Barik Sandstone Members. Finally, as we have done in the past two years, we end with a trip across the Oman mountains with one question in mind: how did the Oman mountains form? The talks and fieldtrips have been our bread and butter activities in the past. This year we are adding meat to them with a core workshop concerning the lower Haima Supergroup (the major gas-producing interval in the Sultanate).

Over the past five years, the talks and fieldtrips have been the main activities that members have participated in. Other activities have been dominated

by members of the ExComm. This has limited the scope of the activities we have participated in and the products we deliver. In addition, it has reduced the influx of information to the society needed for decision making. We would like this to change this year. Our members should contribute ideas and they should take ownership of these ideas. The lack of productivity from the committee formed in 2004 is partially attributed to this lack of ownership. This year we need to work together to deliver results. The Geoscience directory - to be launched soon - is a step towards facilitating more interaction between the members and the ExComm. The directory is also aimed at providing a new database for the society.

Geology is Our Heritage and so it is! To meet our obligation to Oman we need to deliver on this theme. This includes working on the continual education programme and on geological conservation. Raising awareness has been our objective in the past, however, we now need to focus on building a solid knowledge base on the subject of geology. Currently, members of the ExComm are taking a leading role in this front, however, I would urge members with passion for geology to come to the forefront and help. On the geological conservation front, the fact that Oman's geology records the history of hundreds of millions of years during which time our planet took shape necessitates protection of these records. We have started the process of identifying sites and we are building on it. All in all, our measure of success at the end of the year would be how well did we work together to preserve our geological heritage.

Announcement

Subscriptions

Membership subscriptions for the year 2006-2007 are now overdue, in order to continue receiving the benefits of membership of the Geological Society of Oman, please ensure that your subscription is paid within the next few weeks or, in line with the constitution, you will forfeit membership and your details will be removed from the mailing list.

Contact Details

Many of the contact details we hold for members are

out-of-date, please ensure that your contact details are correct so that you can receive the Newsletter and email reminders. Once the GSO Geoscience Directory is fully available this will be the main GSO membership database and you will be able to update your details here.

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Geology an inexact science:

an example from the Permo-carboniferous Al Khlata Formation

John F. Aitken
Petroleum Development Oman

Geology is an inexact science based on interpretation of scattered and incomplete outcrop sections and subsurface data, both physical (core and other subsurface samples) and remotely sensed (wireline and seismic). Interpretation is highly dependent on the geologists experience and knowledge and the state of the science at the time of the interpretation. Consequently, it is hardly surprising that interpretation and understanding of formations change as data is acquired, outcrops discovered and the science of geology moves on. A good example of this is the glacially influenced Permo-Carboniferous Al Khlata Formation in South Oman. In this article, various interpretations of the Al Khlata Formation are reviewed giving an illustration of the evolution of ideas in geology through time.

The earliest published account of the Al Khlata Formation, although not identified as such and only briefly mentioned, is by Thesiger (1948) who, in 1946-1947, travelled via the Huqf depression from Haushi in the North, to Boi (near the Wadi Al Khlata outcrops), in the south. He states, "the infrequent ridges were chiefly composed of limestone, but here, for the first time we found outcrops of red granite and of gabbro, and many fragments of porphyry, jasper, and rhyolite" (Thesiger 1948, p.14). The igneous rocks mentioned are the spreads of Al Khlata boulders, weathered out of diamictites (Fig. 1) that are common in the outcrop area (it is probable that the limestone ridges referred to are the outcrops of the Lower Gharif Haushi Limestone but may also refer to the numerous steps in the Cretaceous Shuaiba Formation in Wadi Boi). Samples collected by Thesiger were described petrographically by Game (1950), although he attributed these to an acid igneous suite that is now known to be non-existent in the area, hence the inference that this is the first description of Al Khlata clasts.



Fig. 1. Spreads of boulder gravels weathered out of Al Khlata Formation diamictites in the southern Huqf, first described by Thesiger (1948)

The Al Khlata outcrops were 'discovered' in the mid 1950s by field geologists of the Iraq Petroleum Company (IPC - the forerunner to PDO). In the IPC April 1954 monthly report a visit to a patch of surface conglomerate and boulder-float near Boi is documented, "including large, well rounded boulders of acid and basic basement rocks. These cannot have traveled far, but no original source has yet been located....it is difficult to visualize any recent history which could have produced well rounded elements of such size". Two years later, in February 1956's monthly, the suggestion is made that the boulder beds are of glacial origin and equivalent to the Talchir Tillite of India. Subsequently, the Al Khlata Formation was discovered in 1956 in Marmul-1H1, by Dhofar Cities Service Petroleum Company (DCSPC), containing heavy oil. DCSPC had great difficulty in understanding the age of the pre-Cretaceous sandstones. Consequently, in March 1959, Hal Knudsen and J. Meier of DCSPC were taken on a tour of the Huqf outcrops by PD(O) geologists that resulted in a sketch of the Huqf area recording the occurrence of (Al Khlata) tillite (Fig. 2).

Geology an inexact science:.....

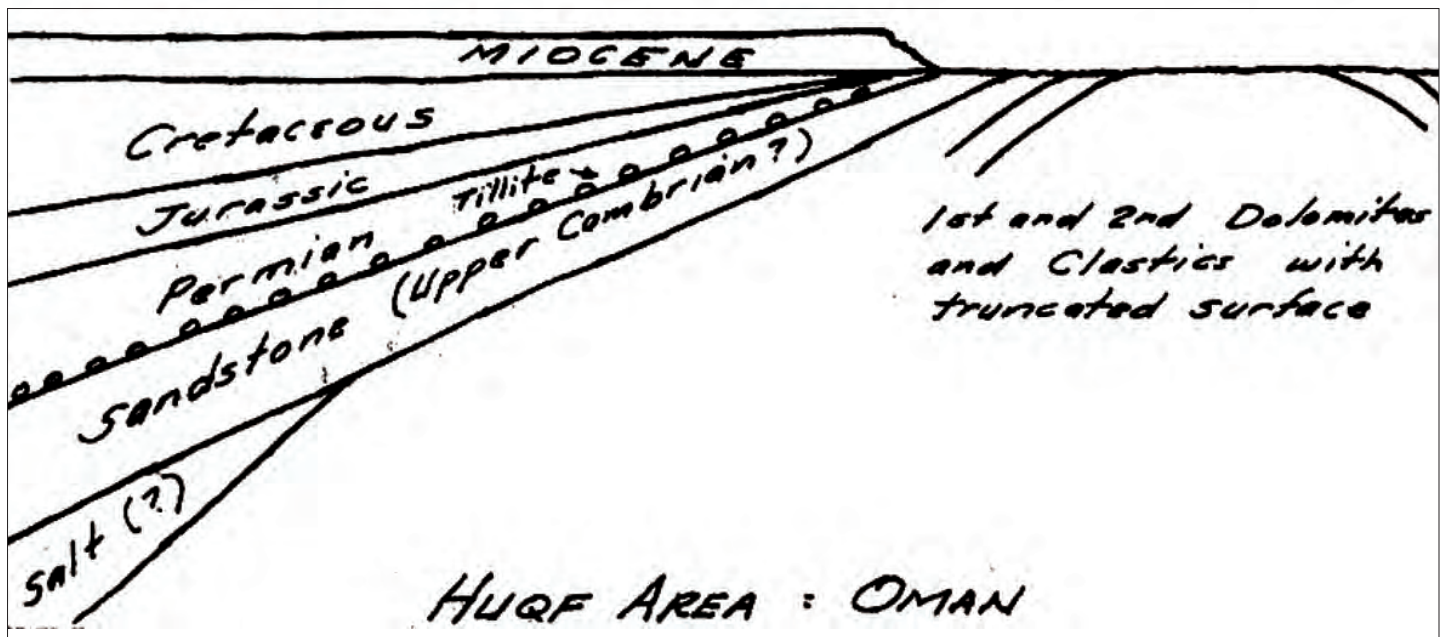


Fig. 2. Sketch of the Huqf area recording the occurrence of (Al Khlata) 'tillite' drawn by Hal Knudsen and J. Meier of DCSPC in 1959.

IPC correctly interpreted these outcropping diamictites (Fig. 3) to be glacially-related in origin, specifically they interpreted them to be subaqueous rain-out deposits (eg. Chatton & Hudson in King 1958), although there may have been disagreement in IPC about this interpretation, as is made clear by Morton (1959, p.286), who reiterated the rain-out interpretation but also states, somewhat enigmatically, that "other explanations are possible".



Fig. 3. Diamictite in Wadi Al Khlata North (southern Huqf) first interpreted to be of glacial origin by IPC geologists in the 1950s (Chatton & Hudson in King 1958, Morton 1959)

During this period the exposures in the southern Huqf were rarely visited, presumably because they had been mapped by IPC in the mid 1950s and focus at that time was largely on the shallower, Mesozoic carbonates. However, in 1965, PDO sent a field party into the Huqf area (Tschopp 1967). The 'Haushi basal conglomerates' were interpreted to be ice-rafted tillites comparable to the Permo-Carboniferous tillites of central Africa. It was further interpreted that these were most likely to be glaciomarine, based on their stratigraphic proximity, in the outcrop, to the 'Haushi marine beds' (lower Gharif Haushi Limestone and marine clastics), a view reiterated by Eyles (1993) based on published descriptions of the Al Khlata Formation and comparison with time equivalent deposits in South America.

The outcrop interpretation appears to have been largely disregarded and in the late 1960s and early 1970s no, or little connection, was made between the outcrop and the subsurface. Consequently, in the subsurface the lower Haushi Member (= Al Khlata Formation and Lower Gharif member) was interpreted to have been deposited under steppe or savannah climatic conditions, between the glacial belt in south Gondwanaland and the humid tropical belt in Europe

Geology an inexact science:.....

and North America. Deposition was interpreted to be by sheetflood processes on alluvial fans and in braided fluvial systems sourced from an ancient land mass to the south and south-east. The first person to identify that the subsurface Al Khlata might be glacial was Arthur van Vliet (of KSEPL, Rijswijk, The Netherlands) who observed 'varved' shales, dropstones and diamictites in an Amal Field core in 1976 (Fig. 4).

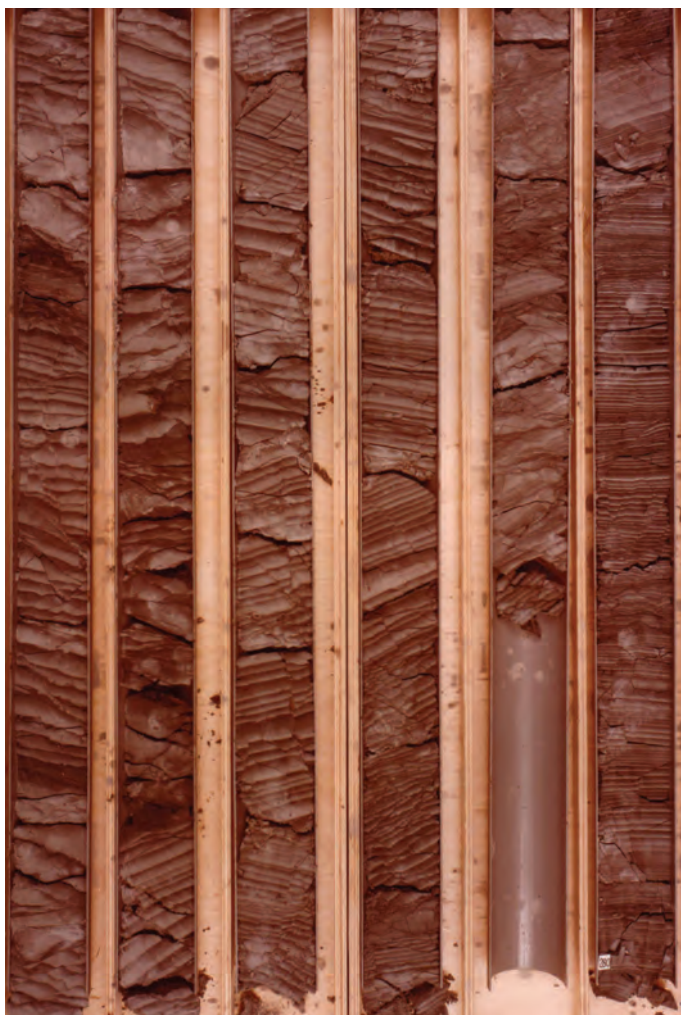


Fig. 4. 'Varve-like' laminated, glaciolacustrine siltstones and sandstones, with dropstones, from a core in the Rahab Field (as published by Levell et al. 1988). The occurrence of similar features in other subsurface cores led Arthur van Vliet to be the first to interpret the subsurface Al Khlata to be of glacially-related origin (core sticks are 1m in length).

In an attempt to understand the complexity of the sediments encountered in an aggressive exploration programme of South Oman in the 1970s a comprehensive review of the Haushi Group was

undertaken by F. Winkler, in 1978. Winkler observed that the majority of the sediments were deposited in glaciolacustrine, glaciodeltaic and glaciolacustrine margin settings, an interpretation that is supported by more recent studies (eg. Osterloff et al. 2004).

The outcrops of the Al Khlata Formation in the southern Huqf were 'rediscovered' about the same time (Braakman et al. 1982) and a further comprehensive review of the Al Khlata Formation was undertaken (Levell et al. 1988), integrating the outcrops with additional subsurface data. Levell et al. interpreted glaciofluvial, glaciodeltaic, glaciolacustrine and glaciolacustrine turbidite depositional environments and interpreted the diamictites to represent tillites, in their strict sense, as having been deposited by the direct action of ice. This interpretation was partly based on the occurrence of diamictite directly overlying glacially striated Precambrian Khufai dolomite in Wadi Al Khlata South (Fig. 5) and the inference that this was consequently a basal tillite (Braakman et al. 1982, Levell et al. 1988).

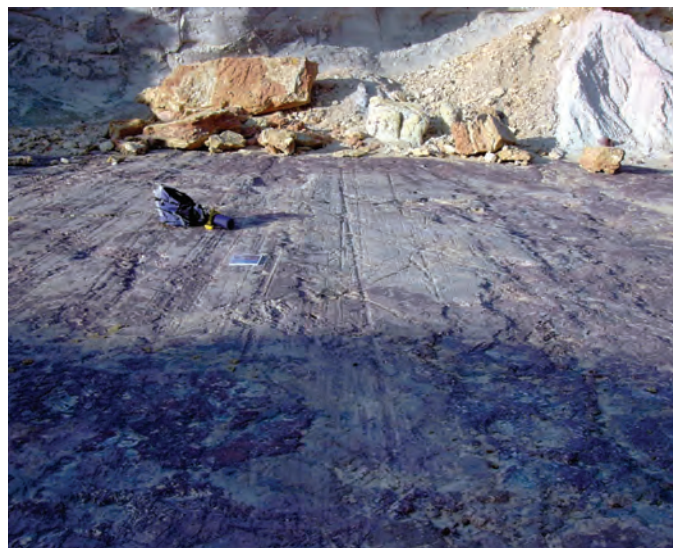


Fig. 5. Glacially grooved Precambrian Khufai Formation dolomites overlain by diamictite, Wadi Al Khlata South, southern Huqf. The occurrence of diamictite resting on this glacial pavement led Braakman et al. (1982) and Levell et al. (1988) to infer that the diamictites represented basal, presumably lodgement and/or meltout tillite.

Geology an inexact science:.....

Over the succeeding 20+ years a considerable amount of work has been undertaken on the Al Khlata Formation, and interpretations of it have swung backwards and forwards, as new ideas and data have become available. Most commonly, diamictites have been interpreted as tillites or 'moraine', sandstones and pebbly sandstones have been interpreted to represent glaciofluvial outwash trains and mudrocks have been interpreted to represent glaciolacustrine deposits. Generally, glaciodeltaic deposits have been considered to be a relatively minor component with most emphasis placed on interpretation of glaciofluvial deposits (eg. de la Grandville 1982, Heward 1990). More recently, there has been increasing realisation of the significance of glaciodeltaic deposition and reinterpretation of diamictites as rain-out glaciolacustrine deposits (eg. Heward 1990, Osterloff et al. 2004). Soft sediment deformation has commonly been ascribed to cryoturbation or 'ice push' (eg. Levell et al. 1988), a view that is not supported by recent studies (eg. Osterloff et al. 2004). Although interpretations of the sediments of the Al Khlata Formation have varied throughout the 1980s and 1990s, one item has remained constant: there is no evidence of marine conditions anywhere in the Al Khlata Formation (eg. Besems & Schuurman 1986, Osterloff et al. 2004, contra Eyles 1993).

Research into the Al Khlata Formation continues and new discoveries, refinements and improved comprehension are still made (eg. Al Belushi et al. 1996, Angiolini et al. 2003, Osterloff et al. 2004). It is now known that the majority of the Al Khlata Formation was deposited in glaciodeltaic and glaciolacustrine settings (Osterloff et al. 2004), as initially proposed by Winkler in 1978. Plus ça change, plus c'est la même chose!

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Acknowledgement

Alan Heward kindly read an early draft of this article and his comments improved the final product.

INTEGRATED PETROLEUM SERVICES COMPANY L.L.C.

A BREATH OF FRESH AIR

Since its formation in 2003, Integrated Petroleum Services Company (IPC) has established itself as the new premier integrated services provider with focus on providing coiled tubing, acid stimulation, cementing, nitrogen lift and other specialized well services, such as the provision of expandable tubular for wells. Within record time IPC has consolidated its reputation as a reliable well services provider with cost effective and quality services.

OMANIZATION AND LOCAL EXPERTISE

The corporate offices are in Muscat and the field operations base at Nizwa Industrial Estate. The location of the base is in line with our mission to develop a new partnership between local industry and oilfield service providers. IPC currently has 45 staff with Omanization at 89%. All new trainees admitted to the company were recruited from Nizwa Technical College in a drive to develop local Omani expertise living in the vicinity of the field operations base and to develop a stronger link to the local community.



IPC strives to develop a world class Health, Safety, Environment and Quality way of life as an integral part of the company and incorporate traditional Omani values into our work culture. Our aim is to create and maintain an environment of moral standing and trust through our attitude and work ethics.

SUCCESSFUL AWARD OF CONTRACTS

IPC has recently been awarded a contract with PDO for the provision of Stimulation Services. IPC is now on course to providing its innovative, out of the box solutions to assist the client in achieving their targets and solving problems. IPC will provide several brand new Coiled Tubing units and Pumping units with a complete professional team to execute its contract which commences during 2007. The design, simulation and analysis of treatments are done in-house with specialized modeling software. All operations are equipped with automated real-time data gathering systems to enhance our services.



Integrated Petroleum Services Company (IPC) has also been awarded a contract for the provision of Expandable Tubular, making it the first local Omani company to offer this specialized technology which is expected to revolutionize well design construction and also provide an alternative means to shut off trouble zones in wells.

THE FUTURE

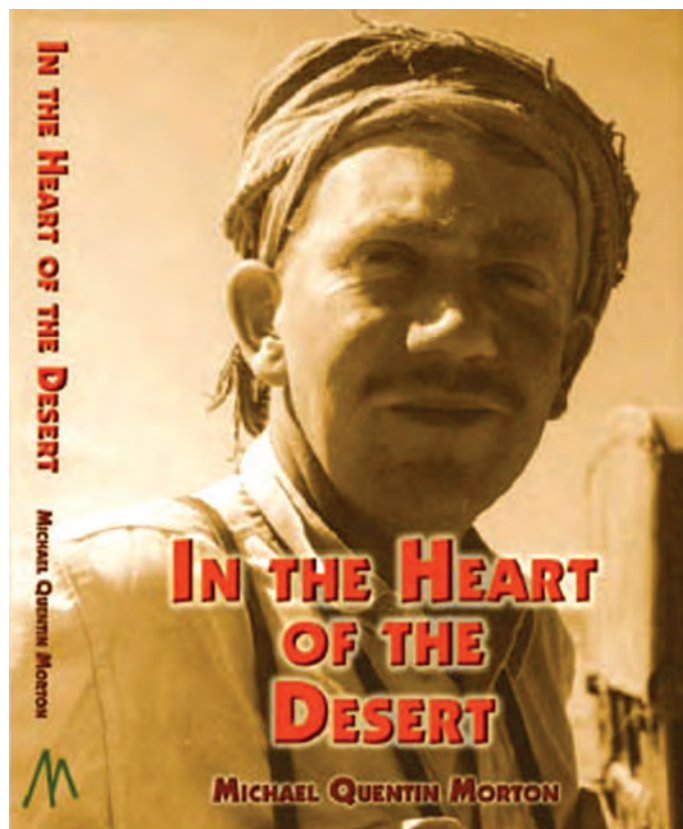
Our vision at IPC is to expand and become a regional leader, providing quality services that add value to the bottom-line concerns of the client. IPC is committed to offering innovative, out of the box solutions which are customized to meet the requirements of the client. We will also remain competitive with our first class equipment, professionalism and the quality of our people. IPC hopes to continue achieving success through exceptional services and a strong relationship with the client.

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Book Review - In the Heart of the Desert,

by Michael Quentin Morton, 2006.

Green Mountain Press. ISBN 09552212-0-X/978-0-9552212-0-0

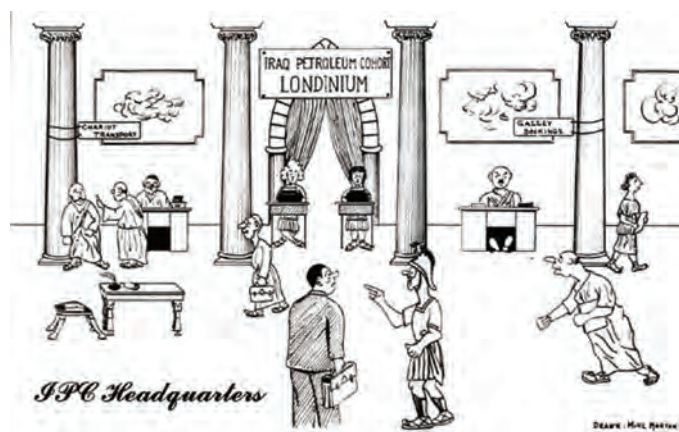


Back in April 2004, Quentin Morton contacted Hisham Al-Siyabi, via the GSO website, for help locating material on Oman by Quentin's father Mike. Hisham forwarded the email to me saying, 'Does this name (Mike Morton) ring a bell?'. It did, I knew of his 1959 World Petroleum Congress Paper on 'The Geology of Oman' and had read about him in Don Sheridan's book 'Fahud – The Leopard Mountain'. I responded to Quentin and was able to help him access material from PDO's photo archive and library. Since then, I have watched this book evolve, commenting on several of the chapters and the DEF article published in November 2004's Al Hajar. We finally met Quentin, and his wife Gill, on the GSO fieldtrip to Fahud earlier this year. The book is a biography of his father, Mike Morton, who was an exploration geologist with the Iraq Petroleum Company (IPC) from 1946-1971. Mike led IPC's field geologists in Oman in the 1950's. As Quentin wrote in his initial email, 'my father had many interesting and happy memories of his time in Oman and I would like to put together this account before it gets lost'. I feel sure Mike would have been pleased with the result!

Exploration geology 50 years ago had the same goal as it has today: to locate oil that can be produced at a profit, but the methods used, the elephant-sized fields waiting to be found and the price of oil, <2\$/barrel MOD, were all very different. Field geology and knowing your fossils were king and

geophysics was still in its infancy. The geology of the Middle East was being progressively unravelled, and the companies involved were subsidiaries of large British, European or American corporations who, with their governments, were competing for oil and influence in the region.

The book is a description of the life of a field geologist sent by the powers that be in London to the ends of the world to hunt for signs of oil. They went for a few weeks, a field season, or a posting and travelled by whatever means was possible.



Often they lived in tents, ate canned food, drank whatever water was available, succumbed to illnesses, were sometimes in danger from hostile tribes, and had many amazing experiences and encountered many colourful characters. Mike's photographs and irreverent cartoons enliven the text.

Mike grew up in Huddersfield and went to Leeds University. Upon graduating he took a job as a field geologist with the IPC in 1945. His first posting was to Palestine where he was involved in fieldwork in the Dead Sea rift valley and Jordan.



Transport was by truck and accommodation was in tents. Their cook 'was damn awful.'

The 1947-48 field season saw Rene Wetzel and Mike off to Yemen and Dhofar, first by motor transport and then by camel. Mike caught malaria in Yemen. In Dhofar, the Sultan arranged for 76 camels to carry representatives from the tribes to accompany them. The geologists were often frustrated by how long everything took as they plodded at 41 camel paces a minute, three miles an hour, from Salalah to Aiyun, Shisur, Andhur and back to Mirbat. They spent several days at Shisur watering the camels and drinking the 'foul mud-choked water' that smelt of H₂S. They watched camel droppings rolling back down the sandy slope into the hole from whence their drinking water came. In six weeks they travelled 600km and, largely as a result of their efforts, Petroleum Development (Oman and Dhofar) would relinquish Dhofar and Petroleum Development (Oman) would come into being.

Northwest Syria, where every jebel appeared to be named Haadhaa (this hill), was the next 'port of call', working out of Aleppo with amongst others, Louis Dubertret and new recruit Ziad (Don) Beydoun.

Then it was to the Gulf, to Qatar to map the geology around Jebel Dukhan, and the UAE and Oman as part of PD(O&D)'s stymied attempts to get to Fahud from the north. Some geological work was managed around Buraimi, although Sheikh Saqr thought that if their rock samples 'were worth sending to London, they must be worth a lot of money' and some arrangement with him would need to be made. Mike also took part in the first motorised journey through Wadi Jizzi from Sohar, in February 1949. The purpose of this was not geological, but to open-up a route for materials, and

The Trek to Buraimi



**IF YOU'VE HEARD OF THE COAST CALLED
BATTINAH AND P.D. (OMAN & DHOFAR),
YOU SHOULD KNOW OF THE TREK TO BIREIMI.
THAT STARTED ONE DAY IN SOHAR**

hopefully oil-export, from Jebel Hafit, or other favourable structures identified in the Dhahira, to the Batinah.

Despite being newly married, it was back to the Hadhramaut region of Yemen for the closing months of 1949. This was a motorised expedition, loaded to capacity and with 15 men of the Hadhramaut Bedouin Legion for protection. Encounters with characters like Colonel Hugh Boustead and Captain Hazim Khalidi and entertainment by gypsy dancing girls



Field geology in Kurdistan ~1950

provided the backdrop to a not obviously prospective geology. The young Emir of Beihan's dreams of rescuing his people from poverty foundered amidst outcrops of basement granite.

In 1950-53 Mike and family were based in Tripoli in Lebanon, and then Kirkuk in Iraq, whilst investigating the geology of NW Iraq, Kurdistan. In the winter of 1953-54 it was back to Eastern Yemen as he 'careered around the Middle East on the exploration carousel'. But SECRET plans were afoot to land a survey party on the coast of Oman. Operation DEF, an expedition to gain access to Jebel Fahud, was being hatched in offices above Oxford Street in London.

And so on 15 February 1954, three landing craft, Jasoura, Jamila and Jawada, beached in the shallow bay between Ras Duqm and 'Stinking Fish Rock'. Equipment was unloaded and the first camp established. The following days saw the geologists find drivable routes up the escarpment of the Jiddat al Harasis, and locate wells for water supply and a landing strip for small aircraft. Then it was time for the first major reconnaissance of the Jiddat, to locate the alphabetically-named landforms, that might be oil structures, which had been spotted from the air. Feature 'K' would turn out to be just that, the surface expression of the Marmul anticline, but it was no longer in PD(O)'s Concession. The geologists made the first vehicle tracks in the desert of Oman! The Sultan's visit to Duqm, in March 1954, ended in great disappointment as the Sultan had hoped to see an oil rig almost ready for drilling and an effective



Mike at Duqm camp, February 1954

military force of 400 soldiers to protect it, and for the time being he forbade travel north of latitude 20°30' (~ Qarn Sahmah). More work in the Huqf and on the alphabeticals kept the geologists busy until the rising temperatures of the summer prevailed. After several months of writing-up reports in Head Office in London, Mike was back to Duqm in October. Within a couple of weeks, the political situation in

Oman changed sufficiently for a convoy of company vehicles to venture out from Duqm for Fahud and beyond, but that is another story. On the 23rd October the geologists paid their first visit on the ground to Jebel Fahud. As Don Sheridan described it 'a creation of God that few humans had ever seen.' Early in November, the geologists moved their camp from Wadi Umayri to the southern side of the jebel and surface mapping and structural surveys began in earnest. These allowed the Fahud-1 well location to be picked by Christmas. Once the decision to drill had been made, there were water wells to locate for the drilling camp and a larger airstrip to mark out. Early 1955 saw the mapping of the Natih anticline and the Maradi area. What a field season they had!



Geologists at Fahud, November 1954

The subsequent field seasons 1955-56 and 1956-57 were less eventful as the geologists consolidated their knowledge of the outcrops of Oman. Fahud-1 was spudded and the initial high hopes turned to bitter disappointment. The areas in which they worked were often unsettled due to the consequences of the Bureimi dispute and the simmering unrest in Jebel Akhdar. The geologists wanted to examine the succession in Wadi Mu'ayidin and for weeks waited near Izki for the representatives of PD(O), the Sultan and Suleiman bin Hamyar to agree to their access. Eventually, in early 1957, Mike was allowed a brief personal visit to the

wadi, but not to sample, and one of Suleiman's sons covered his movements with a gun. Shortly afterwards, Mike left Oman to take a promotion as Head of Department in Dukhan (Qata), though he was still responsible for geological fieldwork and prospect evaluation in Oman.

Years spent in Qatar, Bahrain and Abu Dhabi were the end of a career with IPC, as the company lost its Iraqi heartlands and as partners progressively took over its assets. 'Abu Dhabi became the most brilliant star in the Company's dwindling constellation'. Jebel Hafit became known as Mike's Mountain, but somehow he never conclusively convinced his bosses to drill it. Eventually, in the summer of 1971, he took early retirement to a cottage in Wales.

But not for long, for in the winter of 1971-72 he was off to Musandam as deputy leader of a Royal Geographical Society Expedition. The rather limited scientific outcomes of this expedition had puzzled me until I read Quentin's intriguing account. A year ago, we went looking for the charred remains of the expedition thunderbox in Dib Dibba bay, but alas they must lie beneath the drifting reclaimed sands of Khasab.

From 1972-1984, Mike consulted on Oman, Dhofar, Syria, Turkey and Yemen until he finally hung up his hammer and boots in 1984. He died in 2003. We owe a great deal to Quentin, a barrister with Her Majesty's Courts Service in the UK, for finding the time to journey through his father's papers and photos, at home and in archives, and prompting the recollections of others.

It is good to see this biography published and I especially like the photographs, cartoons and field sketches. I only wish more could have been included. In the Heart of the Desert compliments the dozen or so other books written about Oman in the 1950s, when history was in fast-forward and the die was cast towards the country we know today. The book is available at £20 + p&p from www.greenmountainpress.co.uk (for more details see the advert opposite).

Quentin and Gill returned to Oman after Ramadan and a joint Historical Association of Oman/GSO talk, based around the Oman chapters of the book, was given by Quentin on Tuesday 7th November.

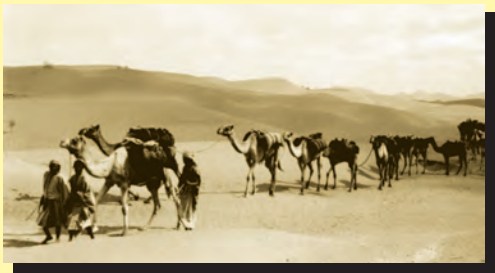
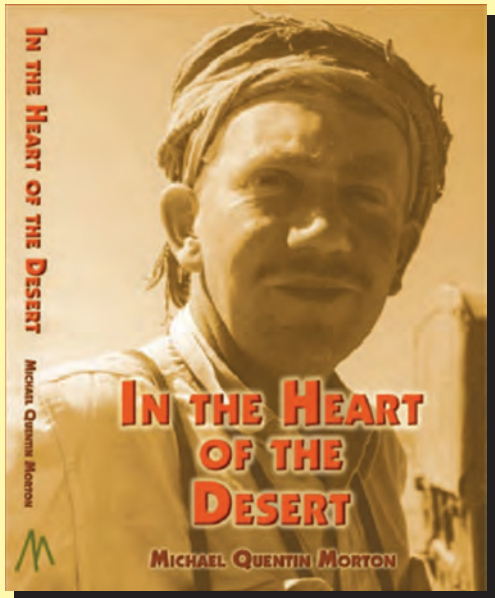
Alan Heward
(Petroleum Development Oman)

Acknowledgement

Thanks to Quentin for permission to use cartoons and photos from the book in this review.



Green Mountain Press



"A map spread across the top of a packing crate or table, its corners secured from the evening breeze by a geological hammer, a rock, a heavy compass and a hissing paraffin lamp; the camp still in some confusion; a generator chugging in the background as men still worked in a patchwork of light from flares and vehicle head lamps; equipment spread about; people coming and going around an open tent, some looking for cutlery and blankets from a crate in the corner of the camp, others dropping off more boxes on the ground. These were the universal images of the start of an expedition..."

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IN THE HEART OF THE DESERT

The Story of an Exploration Geologist and the Search for Oil in the Middle East

by
Michael Quentin Morton

ISBN 0-9552212-0-X

Hardback 282 pages
83 b&w photographs and illustrations, 23 colour photographs

Price: £20 plus postage and packing

The decision of the British Government in 1912 to convert its naval ships from coal to oil set in motion one of the greatest periods of exploration of the twentieth century, the search for oil in the Middle East. In 1945, after a lull caused by the Second World War, exploration was set to expand again and twenty-one year old Mike Morton embarked on an empty troop ship bound for Palestine to begin his career as a geologist with the Iraq Petroleum Company.

Arriving in Jerusalem, Mike soon found himself surrounded by the Arab-Jewish conflict which led to the bombing of the King David Hotel. Then, during a series of ground-breaking expeditions in southern Arabia, he travelled where the famous Arabian explorer, Wilfred Thesiger, had feared to tread: the mysterious Mahra country. He took part in Operation DEF, the "invasion of a foreign land", in which the interior of Oman was opened up to the modern world. Finally, in 1971, he was the deputy leader of a Royal Geographical Society expedition to one of the remotest parts of Arabia, the Musandam Peninsula.

IN THE HEART OF THE DESERT is the biography of Mike Morton written by his son. It describes an extraordinary world and a rich parade of characters: autonomous sheikhs and their fiercely independent tribes, nomadic Bedouins, colourful ex-patriots and a group of intrepid geologists driven by an oil company's search for oil. Mike struck a distinctive figure and, being red-haired with a sometimes fiery temper, the Bedouin called him Shaib al-Ahmar, "Angry Red Man". The author presents a detailed and thoroughly researched account of his father's life which culminates in the story of his own journey to southern Arabia and a poignant meeting of the present with the past.

"A remarkable book..." Huddersfield Daily Examiner

www.greenmountainpress.co.uk



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INDIA



Reliance Industries reports mixed results from the latest two exploration wells to be drilled on the KG-DWN-98/3 (D6) (Krishna-Godavari Offshore) deepwater block. Targeting a separate Cretaceous prospect to the world class D6-MA-1 oil and gas discovery, the D6-MG-1 well is believed to have encountered two new high-potential natural gas zones in Pliocene and Miocene intervals. The well is located in 1,943m of water and was drilled to a total depth of 6,153m using the Transocean "Deepwater Frontier" D/S. The Pliocene and Miocene intervals had not been found in previous drilling and extend the known natural gas further into the deeper waters of the block. Although there were indications of hydrocarbons in the Cretaceous section, it was considered to be non-commercial and was not tested. Not so encouraging is the company's D6-MB-1 for while this is reported to have encountered good quality reservoir sands on reaching a final depth of 3,080m, these were not charged with hydrocarbons and the well has been abandoned. The MB-1 prospect, around 11km east of D6-MA-1, is the shallowest Cretaceous structure identified on the acreage. On completion of its evaluation of multiple Cretaceous oil prospects on the acreage, which continues with the drilling of the MA-2 well, Reliance will turn its attention to evaluating deeper water prospects identified by the 2004 and 2005 3D seismic programs.

IRAN



News is awaited on the outcome of the first well to be drilled by Repsol-YPF on its Forooz Block, Sarv 1 having been completed with the rig off location at the beginning of November 2006. The 8,385 sq km Forooz and 5,092 sq km Iran Mehr blocks were awarded in October 2004 and under the terms of the US\$ 27 million agreement, there is an obligation to drill two commitment wells, one in each block. The contract can be extended for a further year, increasing expenditure to US\$ 39.2 million, and should Repsol-YPF make a commercial discovery it has the option to negotiate development terms. The Forooz

block lies to the south of Kish Island, adjacent to the Sirri fields. Little is known of Sarv 1 but objectives are thought likely to comprise Cretaceous and Upper Jurassic carbonates of the Sarvak, Dariyan and Surmeh formations, with the upper Sarvak (Mishrif equivalent) pinch-out play likely to be the main objective. The well had a planned total depth of 2,500m. The timing of the second well is uncertain as the rig has been released to Petrobras, the company spudding Tattan 1, its first well on the 6,263 sq km Tursan Block on 12 November 2006. Located in 43m of water to the south of Qeshm Island in the East Gulf Sub-basin, the well seeks Cretaceous objectives and has a planned total depth of 4,643m.

At the beginning of November 2006 Mahmoud Mohaddes, the exploration director of National Iranian Oil Company (NIOC), announced, that drilling of the fourth (and final commitment) well on the 3,500 sq km offshore Farsi Block operated by ONGC, had begun four days earlier. The unnamed well has a planned total depth of 3,400m, and is believed to be targeting the 1966 B Structure 1 (FB) gas discovery. The previous three commitment wells appraised the 1972 BB 1 oil discovery, and Mohaddes confirmed that they encountered heavy oil (around 140 API) and their reserves are being assessed. Partner Oil India Limited, has revealed that the block has a reserves expectation of around 370 MMbo and 353 Bcfg.⁴⁶

IRAQ



DNO, currently holding a 40% interest in the Dihok and Erbil Production Sharing Agreements (PSAs) in northern Iraq, has tested 3,840 bo/d from its Tawke 2 appraisal in the Dihok PSA agreement area. The oil was recovered from the same shallow Eocene Pila Spi formation, which flowed 5,000 bo/d from Tawke 1 and Tawke 1A wells. Reserves for the Tawke structure, originally estimated at 330 MMbo in place with 100 MMb recoverable, may now be upgraded subject to the interpretation of the new 3D seismic data and the fact that Tawke 2 has yet to penetrate and test additional shallow reservoir levels. The Early Production Plan for

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the Tawke oil discovery comprising a pipeline and a 50,000 b/d central processing facility has now been approved by the Kurdistan Regional Government and first oil production is planned for the 1st Qtr. '07. The company is utilizing a second rig that is drilling the Khanke 1 wildcat to a depth of 3,000m. The well will be drilled to 3,500m before undergoing two production tests. This seeks a primary objective in the late Permian Chia Zairi Formation. As all the news is positive, DNO plans to accelerate development drilling by introducing a third smaller rig at the beginning of 2007. The unit currently drilling Khanke 1 may also be mobilized into the Tawke area on completion and one further exploration well. Subject to an agreement which is in the process of being finalized with the Kurdistan Regional Government, DNO will be responsible for 100 % of the funding obligations of the PSA's in return for increasing its working interest to 55%. The exploration and development expenditures to date are primarily related to the Dihok PSA, and these costs are expected to be fully recovered in 2007, if first oil is achieved in accordance with the current Tawke early production plan.

QATAR



Before the end of 2006, ONGC Videsh Limited (OVL) is planning to drill two appraisal wells on the Najwat Najeem oil field in its 120 sq km offshore Block 8 concession, also known as the Najwat Najeem Oil Structure Area. Qatar Petroleum signed with OVL in March 2005 for the rights to appraise and develop the Najwat Najeem oil field and explore the Block 8 Najwat Najeem Oil Structure area. Following an initial two-year period of technical studies, seismic reprocessing and appraisal drilling, the contract will be converted to a full development of the Najwat Najeem structure.

SAUDI ARABIA



Saudi Aramco is taking another look at the Dammam field, a 1938 find that is distinguished as being the first oil discovery in the Kingdom. The Dammam field, which lies at a depth of 1,370m and covers 155 sq km, produced oil for many years but in 1997 it was shut-in for infrastructure reasons. To this day the geological

understanding of the Dammam Dome is based on widely spaced 2D seismic lines, old data that is considered of little use now. In order to obtain a more accurate image of the oil reservoirs and maintain production, new 3D seismic data is needed.

During an annual meeting on 18 October 2006, Saudi Aramco's Board of Directors gave its resounding support to the company's 2007 budget and expansion plans and reportedly approved the development plan for the Permian Khuff Formation reservoirs underlying the Karan oil field in the Eastern Province sector of the Arabian Gulf. A gas development and appraisal drilling program is ongoing and production is likely to commence during 2007. Reserves are estimated at 40 Tcf.

LUKSAR Energy is believed to be testing Tukhman 3, its first deeper pool gas exploration well within its 29,900 sq km onshore Contract Area A, in the Central Rub al-Khali Sub-basin. Spudded in January 2006, the well reached a total depth of 4,820m during October 2006. It is located on the dome of the Tukhman (or Takhman) structure, and Tukhman 2 oil/gas discovery, believed to be the largest structure in Area A. The well is targeting gas in the multiple Paleozoic objectives, including the Permian 'Unayzah and Devonian Jauf formations, and Silurian mid-Qusaiba Member sandstones. The drilling of a second well at the Malayha structure in the northern part of the block and seeking similar objectives, started in May 2006. Meanwhile in Contract Area B Sino Saudi Gas Limited is understood to be testing two wildcats, Sheeh 2 and HDOH 2 drilled to 6,071m and 5,646m respectively.

SYRIA



Shell has signed two PSAs with Syrian Ministry of Oil and Mineral Resources and Syrian Petroleum Company (SPC) for the Block XIII (Amoria), along the border with Iraq and Block XV (Adhina), along the border with Iraq and Jordan. In each case the license duration is 20 years, with a possible 10-year extension and the agreement is believed to involve three periods with a commitment to spend a total of US\$ 42 million. In case of a commercial find, the Syrian government will be entitled to 12.5% of all oil produced under the terms of the PSA, and 40% of

GSO INTERNATIONAL NEWS

the production is to be allocated to Shell as cost recovery after deduction of the Syrian government's share (12.5%). The government's share will be 82% if the production rate is lower than 25,000 b/d and will increase to 90% if production reaches 200,000 b/d. Block XIII's PSA stipulates a first four-year exploration period with a commitment to spend at least US\$ 9.1 million on Geology and Geophysical studies. Block XV's PSA comprises also three periods, however the expenditure commitments are as follow: US\$ 10.5 for the first period, US\$ 5.25 for the first prolongation period and US\$ 4.65 for the second prolongation period.

UNITED ARAB EMIRATES



Sharjah-based Dana Gas has entered into an agreement to acquire Calgary-based Centurion in a deal valued at US\$ 1.1 billion. Dana Gas was established in 2005 and is the first regional private-sector natural gas company in the Persian Gulf region. It is headquartered in Sharjah in the United Arab Emirates, trades on the Abu Dhabi stock exchange and has a stock value of about US\$ 2.7 billion. Besides its current pipeline and processing operations and expansion into exploration and production, the company also wants to grow into liquefied natural gas trading and petrochemicals. Centurion, one of several Calgary-headquartered international energy companies with a focus on the Middle East and other parts of the world, has built a reserve base of more than 97 MMboe and had 2005 year-end production of 38,000 b/d of gas and liquids. Centurion has net interests of 19,491 sq km primarily in Egypt.

YEMEN



Vintage Petroleum has encountered oil and gas in its Osaylan West 1 (also known as name Osaylan 2) wildcat in the south-west corner of the 3,363 sq km onshore Damis Block S-1 concession. The well was drilled to a total depth of 1,675m seeking Alif, Lam and fractured Basement play objectives. A drillstem test over a 22m interval in the Upper Jurassic Lam Formation flowed 1,307 bo/d of 42.1o API oil and 629 Mcf/d of gas on a 32/64-inch choke at a flowing pressure of 425 psi. It is located three kilometres to the south of the Wadi Bayhan

2 wildcat, which was suspended by Vintage in September 2006 at a depth of 2,726m as a gas/condensate discovery. The well tested 3.5 MMcfg/d and 35 bc/d through a 28/64-inch choke with a FWHP of 850 psi from a 29m gross section of upper Lam Formation sandstone. A 28m interval of the lower Lam, perforated after logging, indicated the presence of an oil column, but it failed to flow. The Alif and Basement objectives in this well had no hydrocarbon indications. Osaylan West 1 is located 1.2km west north-west of Osaylan 1 which encountered minor oil shows in the Lam formation. It is also just 18km from the An Nagyah central production facility. Subject to the completion of operations, the rig will be moved to drill Al Qurain 1, an Alif/Lam exploration prospect located five kilometers west of the An Nagyah field. Separately, the company reports that the 610 sq km 3D seismic acquisition program scheduled for 2006/2007, on the south-east part of Block S-1, has been postponed pending the resolution of local labour disputes.

Early in November 2006, Dove Energy was preparing to spud the Bayoot South 1A appraisal well, located in the southern sector of the 474 sq km onshore East Sarr Block 53 concession. The well is located 4.7km northwest of Hekma 1 and will test the Madbi carbonates at a down flank location on the Bayoot structure. The company recently brought the Bayoot Southwest 2 wildcat, in the southern sector of the block, onto early production, trucking up to 300 bo/d to the Sharyoof central processing facility.

With thanks to IHS Energy For further information please contact Ken White or Stuart Lewis
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 e-mail : stuart.lewis@ihsenergy.com
 web site : www.ihsenergy.com



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GSO EVENTS CALENDAR

2006

December

7th December

Tackling the Tertiary on foot

Dr. Edward Follows

Petroleum Development Oman

9th December

An evolution of remote sensing data for mapping saline soils and related vegetation in the Batinah coastal region, Oman

Issa Al-Qussaimi

Petroleum Development Oman

16th December

A Bug's Life: The story of microscopic life in Oman, from primordial soup to bioluminescence, red tides & wadi trip hay fever!

Dr. Gordon Forbes

Petroleum Development Oman

2007

January

9th January

Model for carbonate-hosted uranium-rich breccia pipes: global considerations

Dr. Andy Kwarteng

Department of Earth Sciences, Sultan Qaboos University

11-12th January

Geology of Jebel Sumeini area

Dr. John Hurst

Indago Petroleum

23rd January

Small Field Opportunities

Mark Ormerod

Petroleum Development Oman

25th-26th January

A transect through the Oman Ophiolite

Dr. Khalil Al-Riyami

Occidental of Oman

February

6th February

Factors influencing the deposit geometry of turbidity currents: implications for sand body architecture

Dr. Omar Al-Ja'aidi

Shell Representative Office Oman

8th February

Geology of the Nakhl area "Alhasanat"

Dr. Zuwena Al-Rawahi

Petroleum Development Oman

15th February

Core workshop: The Cambro-Ordovician lower Haima Supergroup (Amin, Miqrat and lower Andam Formations)

Drs. John Aitken, John Millson & Raimond Van Der Pal

Petroleum Development Oman

17th February

Umm A Samim: Recent Learnings

Paul Matheny

Petroleum Development Oman

27th February

Sand Beach, Mechanical Rig & Structural Geology

Dr. Badar Al Barwani

Occidental Oman

28th February-2nd March

The Miqrat Formation, Al Bashair and Barik Sandstones Members (Andam Formation), Cambro-Ordovician Haima Supergroup in the Qarn Mahatta Humaid area, Huqf High

Drs. John Aitken, John Millson & Raimond Van Der Pal

Petroleum Development Oman

Mr. Salmeen Al-Marjibi

Aberdeen University

GSO EVENTS CALENDAR

2007

March

6th March

Oman's Geology Through a Geophysicist's Eyes

Mohammad Al-Mazrui

Petroleum Development Oman

8-9th March

Reconstruction of the Jebel Akhdar Tectonics...radical new interpretation

Dr. Mohammed Al-Wardi

Department of Earth Sciences, Sultan Qaboos University

13th March

Reconstruction of the Jebel Akhdar tectonics...radical new interpretation

Dr. Mohammad Al-Wardi

Department of Earth Sciences, Sultan Qaboos University

21st-23rd March

Haima-1 and Qarn Sahmah-Alphabetical A, Salt, the Duru and more

Dr. Alan Heward

Petroleum Development Oman

27th March

Application of stratigraphic forward modeling to carbonate strata – uses for exploration and production

Dr. George Warrlich

Petroleum Development Oman

April

10th April

Sedimentology of the glacially-influenced, Permo-Carboniferous Al Khlata Formation, South Oman Salt Basin

Dr. John Aitken

Petroleum Development Oman

24th April

Application of remote sensing in assessing and mapping sustainable resources. Case study: assessment of vegetated sandy depression "hayla" in stony desert

Rashid Al-Hinai

Petroleum Development Oman

May

29th May

GSO Annual Meeting

Copy deadline for future Issues:

Winter 2006

Wednesday 31st January 2007

Spring 2007

Wednesday 28th February 2007

Summer 2007

Wednesday 30th May 2007

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