



# AL HAJAR

Geological Society of Oman  
Quarterly Newsletter

Seventh Edition

January 2006

## President's message

Firstly, as we will soon be celebrating and reviewing with you five years of the Geological Society of Oman achievements, it is clear that throughout the years, the GSO has created a strong family of geoscientists, who have worked closely with the society and concerned ministries. The GSO and its members have strived for professional ethics which has been important for the image of the GSO both locally and internationally. We hope that you will continue to support your society by taking part in 2006 activities.

Secondly, I am very keen to see our Newsletter, Al Hajar, being enjoyed and read by the largest number of people, members or not. As a consequence: 1) we have made the newsletter available on the revamped Society web site, so that anyone can download it, but most importantly, 2) we need to keep the Newsletter attractive, interesting and if possible out of the ordinary. To this end we need help. Remember that the newsletter is our main way of communicating in an informal manner, and to pass on noteworthy information that could otherwise go amiss. You can drop a note to the Editor about a conference/workshop report or a small story on a geoscience's topic/field trip.

Finally, I commend the Executive Committee members, and those GSO members all of whom worked tirelessly and with care in making the GSO activities a success. Our target has been to continue our most important services with undiminished quality, given our reduced resources. This is no small task. It is, in fact, impossible to achieve with respect to every service. At this point I would like to thank and also urge our generous sponsors to come forward with their contributions and together with our members make 2006 a year to remember for the Geological Society of Oman.

Omar Al-Ja'aidi  
GSO President

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## Note from the Editor

Welcome to the winter edition of Al Hajar and welcome back to Oman to all the expatriates who disappeared to all parts of the world for the festive season. In this issue, alongside our regular field trip reviews there is a review of an event attended by the GSO, held at the Crown Plaza, Muscat, in early December and a listing of Oman geoscience publications for 2005. Additionally, there are two technical articles, one describing the almost unique origin of Oman's hydrocarbons and the other dating Permian Brachiopods using isotope geochemistry from the Haushi Limestone (Gharif Formation).

The next edition of Al Hajar will be a special issue for the Geo2006 Geosciences Conference and Exhibition to be held in Bahrain in March. We are keen to truly make this a special edition and we are actively seeking contributions from the membership to make this so. This edition will have a far wider readership than normal and so if you want your thoughts about the geosciences in Oman distributed widely, please put pen to paper, or fingers to keyboard, and send me your contributions. Deadline is Wednesday 22nd February.

John F. Aitken

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# Oman's Unique Oil

Alan Heward (PDO)

Most readers will appreciate the important role that oil has played in 'fuelling' Oman's Renaissance, but less will realise how special and unusual the bulk of Oman's oil really is. Yes, much of it looks and smells as you would expect oil to do, but some is quite light coloured and some rather black, tarry and sulphurous. Most formed from some of the earliest forms of life and



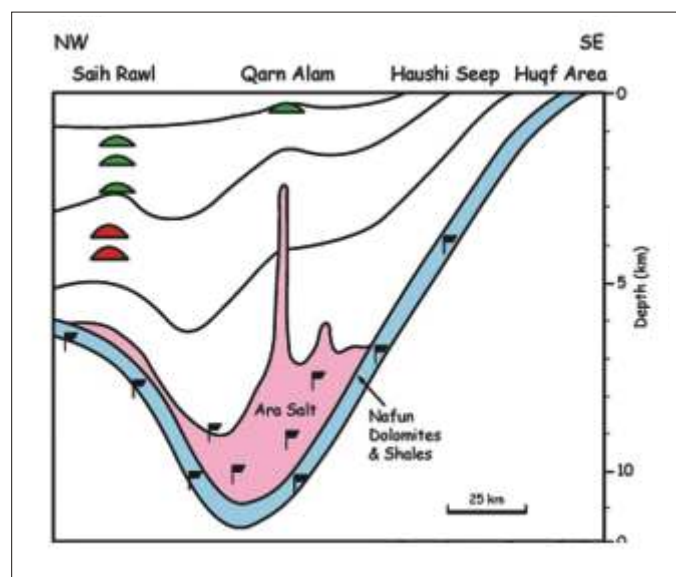
**Thin brown layers of Natih source rock in a wadi cutting Jebel Madmar, near Adam. If you hit such a rock it smells of oil and if you heat it you can distil-off oil. GSO field excursion October 2005.**

as a result Omani oils have strange chemical compositions or fingerprints. It is different to the oil and gas in UAE and Saudi Arabia and there are few areas in the world where hydrocarbons originate from such old accumulations of organic matter. In Oman, oil and gas have probably been generated, trapped, leaked, more generated, mixed, overflowed and leaked to the earth's surface many times in the past half billion years of history. What has been discovered to date is just a fraction, probably less than 5%, of what may have been formed.

Oil and gas form when sediments rich in the remains of organisms are buried to depths of several kilometres where the temperature is hotter and the pressure greater than at the earth's surface. Such organic

sediments are known as source rocks. Once the temperature rises above about 90°C, the organic matter is slowly 'pressure-cooked' and turned into hydrocarbons. The buried sediments are still saturated with water, so the hydrocarbons, being lighter than water, float upward through the water-saturated rocks. The oil or gas continues to move upwards until it either escapes at the earth's surface or is trapped by an impermeable layer that it cannot pass through.

The main source layers in Oman are in rocks 500 to 600 million years old. On the geological time scale, these are the Ediacaran and Cambrian periods. This was a time when the oxygen in the earth's atmosphere was increasing towards present levels and there was an



**A simplified section through the rock layers underlying the desert of Interior Oman. The black flags are the symbols for source rocks and the green and red semi-circles are oil and gas traps (draughted by Anwar Al-Balushi, PDO).**

explosive growth and development of plants and animals. Initially these organisms were entirely soft bodied, but eventually they developed with hard parts such as shields and shells that could be preserved more readily as fossils. Apart from the high carbon content of

## Oman's Unique Oil...

some source intervals (up to 10%), the only visible signs we have of this abundant life are algal/bacterial growths like stromatolites and thrombolites, and rare fossils like *Cloudina* and *Namancalathus*. In the later Cambrian of the Huqf there are also trilobite fragments and trails that get a mention in Richard Fortey's popular science writings<sup>1</sup>. The oil that was to play a major part in Oman's future prosperity probably began life as a



**Oil seeping to the surface at Haushi in the northern Huqf. The only modern seep in Oman, discovered by field geologists Don Sheridan and Tom Jameson in 1956.**

thick soup of algae, bacteria, fungi, jellyfish, worms, frond-like creatures, with maybe the odd trilobite, which settled onto a stagnant seafloor, became part of the sediment and eventually the rock. These early forms of life result in hydrocarbons that petroleum geochemists find have rather odd chemical fingerprints, 'X' peaks on gas chromatograms, more carbon<sup>12</sup> than usual, curious biomarkers and various pristine/phytane ratios. The latter are products from the breakdown of chlorophyll, that key to plants turning carbon dioxide, water and sunlight into foodstuff.

In most parts of the world, ancient sedimentary rocks have been buried deeply, fashioned into mountain chains, metamorphosed, eroded and often ended up as grains in younger sediments. Their organic richness

has long since been exhausted. This is not the case in Oman, Australia and large parts of Russia and Siberia. Although some of the ancient sediments in Oman have been buried and heated so much that they are 'overcooked' and have lost all of their hydrocarbons, other sediments of similar age have never been buried deeply enough to reach the critical temperature of 90°C and have not even started to yield their riches. In some



**A layer of giant oval structures made by algae, stromatolites, in the Ediacaran sediments of the Huqf. GSO members, on a field excursion in April 2004, for scale.**

areas, the source sediments have been buried, then uplifted and then buried again several times and each time the rocks have yielded more oil or gas as they spent millions of years buried at various critical temperatures.

Oman's first oil probably was formed more than 500 million years ago. Some of it was trapped in salt and preserved to be discovered today, whilst more will have trickled and seeped away. The periods when Oman's oil and gas was formed were times when great layers of sedimentary rock were added. The process was reduced or stopped at times of uplift and erosion. Each new pulse of oil and gas often mixed with earlier formed fluids, changing their properties or displacing them wholesale. Sometimes oil already trapped became the food for microbes that feasted on the best

<sup>1</sup>e.g. Fortey, R. 2001. *Trilobite! Eyewitness to Evolution*. Harper Collins.



# GSO field trip to Jebel Madar, the Shuaiba Formation

7-8 December 2005

**Excursion Leader: Zuwena Al Rawahi (PDO)**

Seventeen enthusiastic geologists and two geologist's wives met at the car park of the exclusive Yemeni Restaurant in Sinaw, for a feast of rice, fish, chicken (Yemeni style) and hot vegetable curry (Indian style). Hilal, a Sinaw local, entertained us with stories of the Sinaw Butcher, and various stories from around town.

We were all up by 6:45am the next day for the trip, followed by omelet with porotta (Indian bread) for breakfast. Zuwena Al Rawahi the field leader started the morning by enlightening us with a generalized picture of the geology and the agenda for the day. Jebel Madar is a salt related structure, cut by many faults that

segment the jebel and hence limit car access. The Shuaiba and the Natih are the main rocks outcropping in the area.

The first two stops were spent looking at the Shuaiba. The first controversy of the day started as soon as we reached the base of the Shuaiba, where do you place the boundary between the Kharaiib and the Lower Shuaiba? Where is the transgressive surface? Why do we have rudists in the Kharaiib? The next half an hour was spent trying to find nice orbitolina fossils (aka Chinese hat). Another interesting thing we saw during the trip is huge hydrothermal barite deposits in the core of the jebel Madar anticline, why it is there and how far does it extends is still debatable. Complex fault patterns with even more complex calcite infills were also observed, with everyone having a different interpretation regarding the nature of the fault whether it is extension, transgression or compression, unfortunately JP Breton couldn't make it to the trip, otherwise we might have a new fault interpretation that we never heard off. The third stop was spent looking at Natih outcrops.

The trip was extremely good, benefiting from Zuwena's knowledge of the area, and Alan's encyclopedic knowledge of Oman geology and the input of various participants. Thanks are extended to GSO and Badar for organizing the trip.

**Badar Al Barwani (Occidental)**



## Oman's Unique Oil...

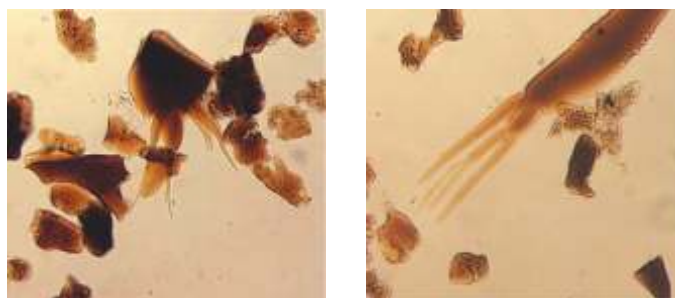


**Black pebble of solid oil (pitch) in a glacial tillite at Al Khlata, southern Huqf. The pitch fragment was carried by ice from a 300 million year old oil seep in South Oman.**

bits and left tarry 'left-overs.' All this makes for wonderful puzzles for petroleum geochemists to unravel if they wish to understand quite how and when a particular accumulation formed. If you can understand such things, then hopefully you can predict what may be found by the next exploration well. Despite the fact that much oil and gas will have escaped, there is little evidence for all this wastage in the rocks itself. One small pebble of solidified oil

though, from the Huqf, presents a snapshot of an escape 300 million years ago in which arthropods, plankton living in the icy waters, became entombed.

Elsewhere in the Middle East, such ancient sources are long since exhausted and it is younger ones, about 100-150 million years old, which have yielded the region's vast richness of hydrocarbons. But next time you look seawards from the Qurum - Darseit highway and see tankers loading up at Mina Al Fahal, just remember they are filling up with an abundance of life in Oman more than half a billion years ago! Unique indeed.



**Small arthropods, possibly copepods, were caught-up in this ancient seeping oil (photos courtesy Mike Stephenson, BGS). These fragments are residue when the pitch is dissolved away. The larger ones are about 1 mm in size.**



**Tanker loading oil at Mina Al Fahal, filling-up with the products of ancient life.**



# Geology of the Muscat area

17th November 2005

Mia VanSteenwinkel (PDO)

Coffee and cake while contemplating Mia's question – what are the three rock packages we can see around us? Our location - a small hill facing a road cutting at Qantab, 8:30am.

For a change we had met at the Qurum Shell Station parking lot for this field trip. National day was the following day, and near the Ras Al Hamra parking lot there were firework preparations going on. Mia gave us a quick run-down of the day ahead, awareness of safety, and off we went to our first stop.

Brown-green stuff, grey stuff and pebbly stuff. That's what we could see from our relaxed, easing into the day, stop 1 at Qantab. The Ophiolite sequence was eroded by the Tertiary pebbly sediments, while across the wadi we could see the Mesozoic platform carbonate beds. Mia gave us a brief overview of the current ideas of how these distinctly different rocks that were formed during significantly different ages, came to be so closely related. The ocean spreading created the Tethys Ocean, with the Hawasina sediments being deposited over the oceanic crust. As the Eurasian Plate started moving to the SW, the Hawasina sediments were scraped in front of the Eurasian oceanic crust. However, be aware, the continental crust on the Oman side was pulled down by the older (and heavier) oceanic crust that it was attached to, rather than being pushed down by the incoming younger (and more buoyant) oceanic crust, merci very much!



Breakfast stop over, we headed to the Curry House. On the way we had a quick stop at the Sports Ministry in Ruwi. Jebel Misht is a long way away to demonstrate an exotic, so the slab of marble embedded within the melange at the ministry had to do. Overlying radiolarite cherts in the section illustrated the deep-marine setting.

At the Curry House we witnessed the heavily tectonised deep-marine sediments. Very much like a rogan josh. Here the Hawasina basin sediments were squashed between the ophiolite and the carbonates.

A quick drive up to Wattayah and we were at the next outcrop, all along the back of the car dealerships along the main road to Ruwi. I had driven past this area numerous times, occasionally contemplating stopping and having a look. It's worth the stop. These are Late Paleocene channel fills and palaeosol deposits. You can see faint cross-bedding in well-defined channel deposits and rootlets within palaeosols.

Before lunch we paid a visit to Spinney's Quarry, at Ras Al Hamra, another one of those places that I frequently go past and never stopped at. The large-scale cross bedding of the aeolianites are impressive, and well lithified for Quaternary sediments. Tree-root holes mostly follow cross-bedding surfaces, possibly following the higher permeability surfaces where water would have flowed more abundantly. Other



## Geology of the Muscat area...

holes that do not follow bedding surfaces are interpreted to have been formed by tree roots that were primarily used for anchoring the tree.

Lunch was a half hour drive away, past the Sultan Qaboos University. Our first post-lunch stop was a road cutting along the main road. High barriers protected us from passing traffic and we had a good look at some amazingly textured foraminifera of the Jafnayn Formation, and a good whiff of the Rusayl Formation, both Tertiary deposits.

The stop at the Nummulite deposits of the Seeb Formation was brief but rewarding. In some areas the foraminifera were so thick that it looked

like a dhal soup. These rocks represent a carbonate shelf during the Middle Eocene.

For the final stop we came into shallower water at the Mam Reef in the Mawaleh area, on the left hand side of Sultan Qaboos Road, before the turn-off to SQU. You don't need much imagination for this one – just add water. A number of small hills define clearly the layout of the coral reefs. The question was is it in-situ or was it an olistolith (An exotic block or other rock mass that has been transported by submarine gravity sliding or slumping and is included in the binder of an olistostrome – McGraw-Hill Encyclopedia of Science & Technology Online)

Thanks Mia for a great day. The drive to Ruwi and RAHRC will not be the same again. And thanks to Badar Al-Barwani for organising the day, again, and with Ed Follows for providing the photos.

**Paul Grech (Baker Atlas)**





## SULTANATE OF OMAN GEOSCIENCE PUBLICATIONS 2005

A list of peer reviewed Oman geoscience publications from 2005 is provided here. This bibliography covers geology, palaeontology, petrology, geophysics, hydrogeology and geomorphology. It is hoped that this will be an annual feature in Al Hajar that will build into a valuable bibliographic dataset. Omitted are annual reviews, papers dealing with the entire Arabian Peninsula, regional summaries and articles in trade publications. Also excluded are conference abstracts (even if published in respected Journals; e.g. American Association of Petroleum Geologists Bulletin and GeoArabia) and papers that do not undergo peer review (e.g. Society of Petroleum Engineers Papers), although these may contain valuable contributions to the understanding of the Sultanate's geosciences.

This bibliography has been compiled using internet search engines and the browsing of Journals available to the compiler. It is believed that this is a complete listing for 2005, however if anyone notices any omissions, please contact the editor (editor@gso.org.om) and these will be published in the next edition.

A full bibliography of the Sultanates geosciences (1824-2005) is currently being compiled and will be published in 2006, as the first GSO Occasional Publication.

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# Dating the Permian limestones of Oman and Saudi Arabia

## Using the strontium in the shells of fossil brachiopods

Mike Stephenson (British Geological Survey) & Lucia Angiolini (University of Milano, Italy)

Brachiopods that lived in the Permian oceans of Oman and Saudi Arabia took in elements from the surrounding seawater to make their shells; in the process they 'froze' the seawater chemistry into the minerals that formed their shells. A team from the UK's national British Geological Survey, and the University of Milano, Italy, are studying the chemical composition of these shells to determine the exact time within the Permian that these brachiopods lived.



**Brachiopods of the Saiwan Formation chosen for analysis**



**A single brachiopod specimen from the Saiwan Formation. Information about the chemical composition of the sea in which it lived is 'frozen' in the calcium carbonate that forms the shell.**

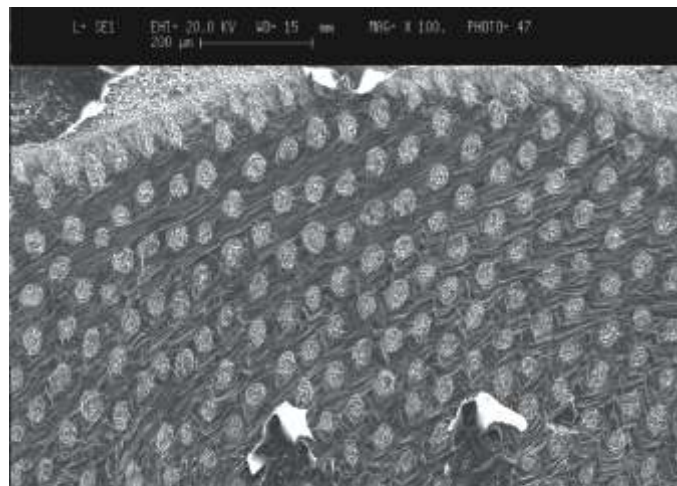
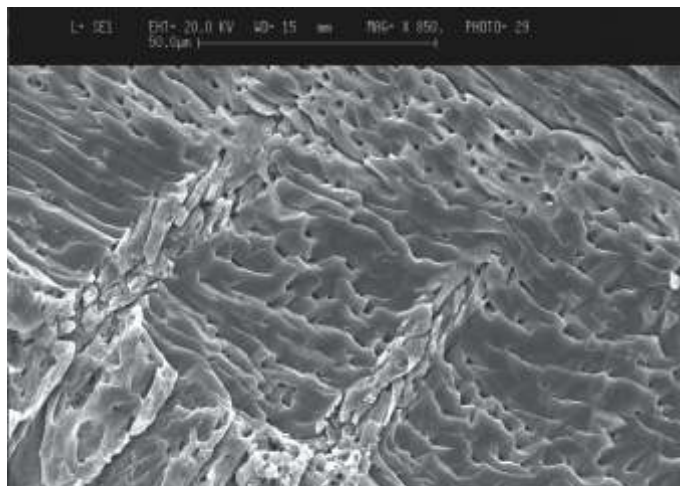
Brachiopods from the Saiwan and Khuff formations in the Huqf outcrop area, Oman, and from the Khuff Formation in central Saudi Arabia were collected and then crushed and analysed in very clean conditions to avoid contamination.

The elements we are interested in are oxygen, carbon and strontium, in particular the ratios of isotopes of these elements. The most useful for dating is strontium (Sr). We measured the ratio of the isotopes  $^{87}\text{Sr}/^{86}\text{Sr}$ . Why measure such an esoteric chemical ratio? The answer is that over the last twenty or thirty years, isotope geochemists have been constructing curves of  $^{87}\text{Sr}/^{86}\text{Sr}$  ratios for parts of the geological record. This information comes from thousands of studies of belemnites and brachiopods in well-dated limestone all over the world and means that we know precisely how the ratio of  $^{87}\text{Sr}/^{86}\text{Sr}$  changed in the seas of the world through most of geological history. We know, for example, that the  $^{87}\text{Sr}/^{86}\text{Sr}$  ratio was highest in the Cambrian and lowest in the Jurassic. In the Permian,  $^{87}\text{Sr}/^{86}\text{Sr}$  ratio varied; it was lowest in the Late Permian and highest in the Early Permian, but this variation helps us to date brachiopods quite accurately.

Before we could be certain that our brachiopods reveal the true ancient Permian ocean, and still contain the same  $^{87}\text{Sr}/^{86}\text{Sr}$  ratio as when the shells grew, we had to be sure that the structure of their shells had not been altered by millions of years of burial in the rocks. We made some geochemical tests that indicated that the chemistry of the shells was consistent with other data from Permian seawater. Also we looked at the shells using a scanning electron microscope (SEM) at the University of Milano. The pictures we took show that the structure of the brachiopod shells is pristine and untouched by later diagenesis in the rocks. We believe our brachiopods should therefore precisely reflect Permian seawater chemistry.



## Dating the Permian limestones of Oman and Saudi Arabia...



**An SEM picture of the crystal structure of calcium carbonate forming the brachiopod shell. In these images the structure is pristine and unaltered from the time of shell formation.**

Our results show that the brachiopods of the Saiwan Formation are Early Permian in age because the  $^{87}\text{Sr}/^{86}\text{Sr}$  ratio of their shells is about 0.708. The Khuff Formation brachiopods have ratios of about 0.707, showing an age of Mid Permian. These dates confirm what other palaeontological and palynological evidence says about the age of these rocks. One interesting thing is that these results suggest that the lowest parts of the

Khuff Formation in Oman and Saudi Arabia are of slightly different ages, perhaps due to the gradual transgression, from the southeast, of the sea that formed the Khuff Formation limestone.

*Mike Stephenson publishes with the permission of the Director of the British Geological Survey.*

## Geo2006: 7th Middle East Geosciences Conference and Exhibition

GSO is on the organizing committee for the Geo2006 Conference and Exhibition to be held in Bahrain, March 27-29, 2006. Additionally, GSO will have a booth in the Exhibition Hall, in order to promote the society, its activities and the geology of the Sultanate. Members attending the meeting can meet the Executive Committee, discuss the activities of GSO and some items will be available for purchase at the stand. We will also be actively recruiting new members.

Although not being organised by the GSO a core workshop will also be held at the Conference featuring some of Oman's geology.



**The Permo-Carboniferous Reservoirs of The Arabian Peninsula, from Glaciers to Dune Sands Dahrhan Geoscience Society, Saudi Aramco, Petroleum Development Oman core workshop. 26 March 2006, 08.00-17.00 hrs**

Organised by Chris Heine, Ronald Sprague and John Melvin of Saudi Aramco, and Alan Heward, John Aitken, Dawood al Qassabi and Yaqoob al Hosni from PDO.

Expect to be able to view several hundred metres of core slabs from the Unayzah A, B, C and Basal Khuff Clastics of Saudi Arabia and Al Khlata, Gharif and Basal Khuff from Oman.





## GSO INTERNATIONAL NEWS



### INDIA



With the offshore Krishna-Godavari Basin fast becoming an important gas province for India, BG has moved to consolidate its position by agreeing to jointly operate three deepwater blocks with ONGC. Covering a combined area of 3,090 sq km off the east coast, the three blocks are KG-OS-DW, KG-OS-DW Extn and KG-OS-DW-III. It is understood that BG and ONGC will each hold a 50% interest in the three blocks subject to the finalization of farm-in arrangements/government approval. BG has agreed to pay US\$ 5 million for each block immediately upon approval, with additional considerations to be paid towards exploration costs and in the event that a discovery is made. The two companies have also agreed to explore other mutually beneficial opportunities in India and overseas.

### IRAN



During the 10th IIES Iran & Middle East Oil & Gas Forum, NIOC General Manager Mehdi Mir-Moezzi commented that Iran's oil reserves, up to end-2004, had increased year-on-year by 5%. Specifically recoverable oil and condensate reserves now stand at 137.5 billion barrels with recoverable gas reserves rising by 7 Tcf to 943 Tcf.

Now the Minister of Petroleum following the rejection of the third nominee, Kazem Vaziri Hamaneh, announced in mid-November 2005 that three new reservoirs have been discovered in deeper layers of the Mansuri field in the Zagros Fold Belt. According to the minister, there are 767 MMbo of in-place reserves, and production of 16,000 bo/d and 28 MMcf/d could be achieved from the new find. Discovered in June 1963, the Mansuri field is a super giant multi-reservoir oil field and part of NIOC's Bangestans project. Production started in 1974 from the Asmari reservoir and was halted in 1980 at the onset of hostilities with Iraq. Production is believed to have resumed in 1988 and in October 1992, the field was reported to be producing at 68,000 bo/d. In 1991 production began from the Bangestan reservoir, with surplus associated sour gas flared. Press reports from

April 2004 indicated that redevelopment of Mansuri could raise production from 60,000 b/d to 150,000 b/d and eventually to 200,000 b/d.

### IRAQ



Petrel Resources has formally signed the Subba and Luhais oil field development services contract with the Iraq Ministry of Oil. This US\$ 197.4 million contract is intended to increase production from the current 50,000 bo/d to 200,000 bo/d, in addition to 120 MMcf/d of natural gas within a three year period. Site surveys will be conducted early in 2006. Degassed crude from the Subba oil field, located in the south of Iraq, is transported 39km to Luhais Central station via an existing 10-inch pipeline. The tender includes the expansion of Subba North degassing station and installation of a new Subba Central degassing station. Degassed crude from the Luhais oil field is transported via pipeline to an oil depot some 57.5km to the north-east while gas is piped to a treatment unit at North Rumaila. The tender includes the installation of a new degassing station and expansion of the existing degassing station.

DNO says it has commenced drilling the Tawke 1 wildcat, its first well within the Kurdish Region of Northern Iraq. The well has a planned total depth of 3,000m and will investigate three prospective reservoir zones. In June 2004, DNO entered into a Production Sharing Agreement (PSA) with the Kurdistan Regional Government to be the operator and contractor of oil and gas exploration and development activities in an area of northern Iraq. Issues related to the proposed constitution, which was to clarify the role and the power limits of the Kurdistan Regional Government, deepened sectarian divisions between Iraqi leaders. However, according to Helge Eide, managing director at DNO, Iraq's new charter allows companies to strike deals with regional governments, and so far there had been no formal protests over the DNO deal. Earlier in 2005, the company acquired 440km of 2D seismic in the area.



## GSO INTERNATIONAL NEWS

### PAKISTAN



Two onshore exploration wells in Pakistan are being tested by OGDC. In the Potwar Basin, testing has begun at Saba 1 in the Rajian D&PL. Spudded in the final days of 2004, it reached a total depth of 4,110m in October 2005. The original proposed total depth was 4,250m in the Pre-Cambrian Salt Range Formation. Saba 1 is on a 39.09 sq km lease, south of the one-well Rajian field which produced an average of 1,300 bo/d during 2004. Meanwhile, OGDC is testing good gas shows at an exploration well in the Ziarat EL in the Sulaiman Foldbelt. Originally projected to a total depth of 2,000m in the Jurassic, Ziarat 1 reached a total depth of 1,080m in early November 2005. It is on a 2,443.9 sq km that has only seen one well drilled to date, Premier-Kufpec's Zarghun North 1. That 3,631m well was abandoned in mid-2002.

### QATAR



Maersk Oil and Qatar Petroleum have concluded a US\$ 5 billion agreement concerning the further development of the Al Shaheen field in Block 5, offshore Qatar. The field development plan involves drilling more than 160 production and water injection wells over the next six years and installation of a further three offshore platform locations with production and accommodation facilities. Total oil production from the field is expected to increase steadily from 240,000 b/d in 2006 to 525,000 b/d from the end of 2009. The Al Shaheen field, located at the northern end of the Qatar Arch within Block 5, holds recoverable reserves of 400 MMbo of 30-32° API oil and 500 Bcf of gas from five pay zones in the Cenomanian to Barremian carbonates and sandstone (Nahr Umr Formation), between 760m to 1,040m. In the early 1970s, Shell explored the northern extension of the Khuff reservoir in the North field and found traces of oil and gas in the Cretaceous. In the early 1980s, Qatar General Petroleum Corp. started to explore the Cretaceous oil-bearing horizons and flowed oil in production tests from the Middle and Lower Cretaceous formations. But these tests were considered non-commercial and the structure was classified as a

marginal discovery. In July 1992, Maersk acquired the right to explore the Cretaceous oil-bearing formations and drilled its Al Shaheen 1 in June 1993.

### SAUDI ARABIA



Saudi Aramco, according to Abdulla Al Al-Naim, the company's director of exploration, is undertaking an extensive transition zone 2D seismic survey to cover a total of 6,250km when completed in 2006. This survey is parallel to one recorded in 2004 further offshore to cover the whole of Saudi territorial waters up to the Iran/Bahrain/Neutral Zone borders.

### SYRIA



Subject to the necessary approvals, Stratic Energy has agreed to farm out a 31.67% interest in the production sharing agreement (PSA) for Block XVII to fellow Canadian explorer Dual Exploration. On completion of the deal, Stratic will remain as operator with 35% with the remaining 33.33% held by Kufpec. The PSA for Block XVII located in the south-west of Syria, was ratified by the Syrian Cabinet on 25 October 2005. The contract carries a first exploration term of three and half years with a work obligation comprising the acquisition of 625km of 2D seismic and the drilling of one exploration well with a corresponding financial commitment of US\$ 5.2 million. Two optional extension periods comprising a further four years and three years respectively, with additional seismic and well commitments, will also be considered for an investment of US\$ 9.2 million. According to Stratic, the license holds potential for gas in the northern portion and oil in the southern portion, of which the former that is of prime interest with individual prospects having mapped potential in the range of 100 to 500 Bcf. Established in July 2005, Dual is a small oil and gas company with production operations in Alberta and in the Lusitanian Basin in Portugal.

Petro-Canada has accepted a bid of US\$ 578 million from the China National Petroleum Corporation (CNPC) and India's Oil and Natural Gas Corporation (ONGC) for its shares in four Production Sharing Contracts.

## GSO INTERNATIONAL NEWS

Specifically these are Ash Sham (33.33%); Dier EZ Zor (old) (37.5%); Dier EZ Annex IV (37.5%); Gas Utilisation Agreement (36%), covering 36 producing fields in Syria. These fields have been producing for over last 15 years. Al-Furat Petroleum Company (AFPC) is the operator for the asset, whose shares are held by Shell (31.25%), SPC (50%) and Petro-Canada (18.75%). The purchase is retroactive to 1st July, 2005. The fields held under this asset are the major oil producers in Syria yielding an average rate of 187,350 b/d during the first half of 2005. The remaining recoverable reserve potential of the asset is estimated to be more than 300 MMb. Several companies had expressed an interest in the stake, including firms from Russia, and it is understood that eight bids were made. Petro-Canada acquired the stake in AFPC as part of its US\$ 2 billion acquisition in 2002 of Veba Oil & Gas GmbH from E.ON AG and BP Plc. Petro-Canada advise these interests account for 24.2 MMboe proved reserves after royalties.

### TURKEY



On 9 December 2005, Erdine Energy, a subsidiary of Australian explorer Ottoman Energy spudded Bati Umur 1, the company's first well on block 3839, District 1 in the gas prospective onshore Thrace Basin. Highlighted by strong amplitude anomalies on seismic, the well has a planned total depth of 1,000m and at last report was being prepared for testing. A second well, Arpaci 1 will be drilled back-to-back but on a separate structure. A third prospect, Koyustu, is ready for drilling should the first two wells prove successful. In November 2005 Ottoman farmed out a 15% interest in this license to Incremental Petroleum, who funded a future exploration program to a total value of US\$ 2.23 million.

### YEMEN



Early oil production has commenced from the Hiswah field in Malik Block 9 operated by Calvalley Petroleum. First oil is being achieved from the Hiswah 6 well flowing at a constrained rate of 2,000 bo/d, with oil being delivered by truck to the Safer operated Alif field central processing facility (CPF) in Block 18, 225km to the west.

The company anticipates production to climb to 10,000 bo/d by the end of February, once the off-loading capacity of the CPF is de-bottlenecked. In addition, an early production facility (EPF), currently under construction at Hiswah, is scheduled to be operational before 31 March 2006. Block 9, formerly known as Al Hajar, had been relinquished by British Gas and partners Crescent and LL&E in September 1996, at the end of the first exploration period (plus extension). The contract termination followed the drilling of three wells of which Qarn Qaymah 1 was a gas/condensate discovery and Hiswah 1 was an oil discovery. The current rightholders to Malik Block 9 are Calvalley (operator 46.75%), Hoodoil (21.25%), Reliance (17%) and The Yemen Company (15% carried interest).

Total has started 2006 on a high announcing that its Jathma 1 wildcat in the 1,060 sq km East Shabwah Block 10 (Development Area) is an oil discovery. Spudded in October 2005, it is the first of a three-well exploration program targeting a new prospective area in the northern part of Block 10. It reached a total depth of 3,175m and on test flowed in excess of 1,900 b/d of 35o API oil through a 56/64-inch choke. Total believes the result confirms the block's potential for sustained production over an extended period of time. Jathma 1 is located 3km west of the Wadi Taribah oil field which came onstream in January 1998. A second rig is currently mobilizing into the block in preparation for drilling a second Basement exploration well.

With thanks to IHS Energy For further information please contact Ken White or Stuart Lewis  
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# World Volunteering Day

Rifaa and Raif Al-Harthy



The Geological Society of Oman took part in the World Volunteering Day held at the Muscat Crown Plaza on the 5th of December, 2005. A number of other volunteering associations namely the Society of Petroleum Engineers, Health Awareness, the Libyan Society and the Omani scouts training program also took part in presenting their vision, mission and activities for the first time in such a forum.

Dr Mohammed Al-Mazrui (GSO Secretary) was responsible for organizing the GSO stand where a variety of fossils, minerals and rock samples found in Oman were displayed.

As active GSO student members, we had the role of manning the GSO booth and explaining the basic geology to the visitors. Managing the booth and talking to visitors was a great experience. Having participated

in several field trips and attended presentations in the past, we have acquired the basic knowledge of geology through those events. Although we had some idea of the types of fossils on display, the challenge was to tell a good geological story to the visitors.

The event was opened by H.E. Ali bin Masoud Al Sunaidi, Sports Affairs Minister. His Excellency visited the booths followed by an entourage of press personnel with cameras and microphones. When we realized that we were going to have to talk real geology, Dr. Omar Al-Ja'aidi (President of GSO) came to the rescue and provided us with the information we needed to get through our presentation.

Lunch was later served and provided a good opportunity to network and exchange ideas with members from the different societies. Presentation sessions kicked off after lunch whereby Mr. Adil Al-Kiyumi (GSO Executive committee member) presented the fundamental role of GSO in educating the Omani public on the conservation of Oman's geological heritage, as well as its future plans of establishing a museum and promoting Geo-tourism in the Sultanate.

We are grateful for the opportunity to participate in this event and we hope that we managed to add value through our participation.

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## Erratum

On page 8 of the last edition the following caption was erroneously omitted from the photograph:

### Seif dunes north-east of Rustaq

(Photo taken by Ken Glennie, March, 1968, taken from the Ken Glennie photographic archive)

## Copy deadline for future issues

### Spring 2006:

Wednesday February 22nd, 2006  
(Special Issue for Geo2006 Conference)

### Summer 2006:

Wednesday May 24th

# GSO EVENTS CALENDAR

## 2006

### January

#### 17th January 2006

"Preserving the Huqf"

**Mike O'Dell**

Petroleum Development Oman

#### 19-20th January 2006

"Spudding in of Fahud-1, 18th January 1956: 50th anniversary field trip to Jebel Fahud"

**Dr Alan Heward<sup>1</sup>, Dr. Volker Vahrenkamp<sup>1</sup>, Prof. Peter Homewood<sup>2</sup>, Dr Martine van den Berg<sup>1</sup>, Dr. Mohammed Mazrui<sup>1</sup> & Dr. Ed Follows<sup>1</sup>**

<sup>1</sup>Petroleum Development Oman, <sup>2</sup>Independent Consultant

#### 24th January 2006

"Factors influencing the deposit geometry of turbidity currents: implications for sand body architecture in confined basins"

**Dr. Omar Al-Ja'aidi**

Sultan Qaboos University

#### 25-27th January 2006

"Huqf field Excursion"

**Dr. Alan Heward**

Petroleum Development Oman

### February

#### 21st February 2006

"Sand Beach, Mechanical Rig & Structural Geology"

**Dr. Bader Al Barwani**

Petroleum Development Oman

#### 28th February 2006

"The search for petroleum in Oman- further twists in the tale"

**Dr. Alan Heward**

Petroleum Development Oman

#### 8-10th February 2006

"The Geology of the Bar El Hikman Area"

**Dr. Volker Vahrenkamp & Pof. Peter Homewood**

Petroleum Development Oman & JVRC Centre

#### HAO-GSO Oman study day

8th Feb

### March

#### 21st March 2006

"Reconstruction of the Jebel Akhdar Tectonics...Radical new interpretation"

**Dr. Mohammed Al-Wardi**

Department of Earth Sciences

Sultan Qaboos University

#### 28th March 2006

"Mud Volcanoes: why can you not find them in Oman?"

**Dr. Ray Archer**

Consultant Organic Geochemist

#### 23-24th March 2006

"Reconstruction of the Jebel Akhdar Tectonics..."

**Dr. Mohammed Al-Wardi**

Department of Earth Sciences

Sultan Qaboos University

### April

#### 25th April 2006

"Climate Changes, Methan Burbs, Funny Waters and the Shuaiba Formation – A Geochemical Story"

**Dr. Volker Vahrenkamp**

Petroleum Development Oman

### May

#### 30th May 2006

GSO Annual Meeting

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