Petroleum review

NOVEMBER 1999

Asia-Pacific survey

- Round-up of regional oil and gas projects (Part I)
- India – projects are looking good

Gulf of Mexico

High hopes for Cantarell pressure maintenance

Supply logistics

Fuelling the front line

Forecourts

Strategy by design

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ABBREVIATIONS

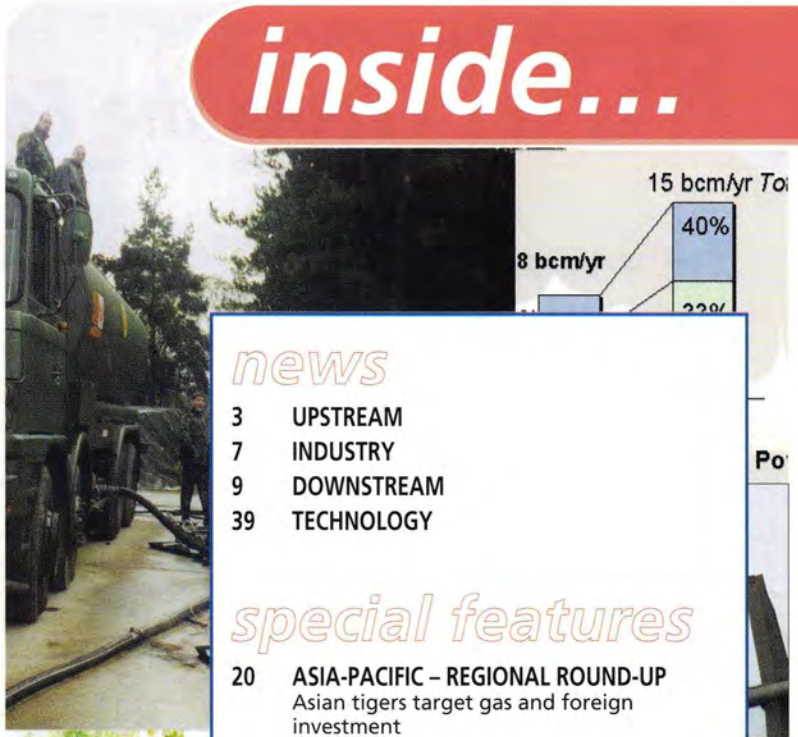
The following are used throughout *Petroleum Review*:

mn	= million (10^6)	kW	= kilowatts (10^3)
bn	= billion (10^9)	MW	= megawatts (10^6)
tn	= trillion (10^{12})	GW	= gigawatts (10^9)
cf	= cubic feet	kWh	= kilowatt hour
cm	= cubic metres	km	= kilometre
boe	= barrels of oil equivalent	sq km	= square kilometres
		b/d	= barrels/day
t/y	= tonnes/year	t/d	= tonnes/day

No single letter abbreviations are used. Abbreviations go together eg. 100mn cf/y = 100 million cubic feet per year.

Front cover: Most of Asia-Pacific onshore production is now pumped. Lufkin pumps operating on Barrow Island, Australia
Courtesy of Wapet Ltd

inside...



From the Editor

Fundamental reasons for firm prices?

Predicting future oil prices may be a 'mug's game' – but oil prices are still the single most important influence on the industry.

This year has been particularly bad for price predictors (although some appear to possess a remarkable talent for reinterpreting what they wrote earlier). Everyone, including this author, were wrong-footed by the strength and resilience of Opec's agreements on production curbs. In self-defence, many would plead that this is the first, and only, time that Opec has increased quota compliance as the month's progressed.

The usual explanation is that Opec looked into the low price abyss, didn't like what it saw and, as a consequence, stuck to its quotas with unexpected determination. The corollary of this is that once prices rise and treasuries refill, resolve will weaken and quota cheating will become the order of the day. September's Opec production figures, which showed declining quota compliance, appear to confirm this analysis. The market took fright on 'black Friday' (8 October) when crude prices fell by nearly $4, bringing the bull run in oil prices to a shuddering halt. This is the conventional explanation. The market rumour – which is more interesting but essentially uncheckable – is that a major house was drastically wrong-footed in the gold market and had to sell a very large long position in crude to cover its losses. The market herd then piled in with sell orders. The fact that crude prices rapidly recovered $2 of the $4 loss suggests there may be something in the story.

Is there another explanation for Opec's quite remarkable cohesion this year? The area of greatest competition is for access to the US market. Mexico, Venezuela and Saudi Arabia are the key suppliers, with roughly equal market shares. Colombia and the North Sea are smaller players. Over recent years the principal tension in Opec has been between Venezuela's ambitions to expand production and exports to the US and Saudi Arabia's reluctance to cede any US market share. Suddenly this year the three deadly rivals signed quota accords and reined in production. Part of the explanation may be quite simple and quite fundamental – problems with production. Earlier this year Mexico experienced a dramatic pressure fall in the offshore Cantarell fields which make up roughly two-thirds of the country's production. As we report (p12) there is now a major reinjection/pressure maintenance programme underway. Interestingly, the Mexicans will use nitrogen injection which has never before been attempted on this scale. Pressure falls and a major workover programme will restrict production in the short-term, even if they expand it in the longer term.

Venezuela also has a capacity problem. Two years ago PdVSA was acting much like a private oil company – aggressively expanding production and seeking to expand market share. Because Venezuelan wells are subject to 15%–25% annual output declines, PdVSA was employing 100–120 rigs continuously to maintain and expand production capacity. Since then a new President has been elected with a nationalist agenda and PdVSA has been reined in and returned to being a more traditional state oil company. Budgets have been slashed and this, combined with recent low prices, means only 50–60 rigs are at work. Production capacity in Venezuela is almost certainly shrinking.

Even the mighty Saudi Arabia with its 2.5mb b/d of spare capacity is, paradoxically, not immune from production problems. There are persistent rumours that Saudi Aramco engineers are keen to 'rest' the southern portion of the Ghawar field, where there are some water incursion problems, while they perform remedial work. This was effectively impossible while Saudi Arabia was committed to producing over 8mn b/d.

So are Mexican, Venezuelan and Saudi cutbacks making virtue of necessity?

Limited quota leakage from Opec is desirable if recovering demand is to be met without an upward price spike. Non-Opec production growth has virtually disappeared over the last two years. Growth is slated for 2000, but if recent experience is any guide it will be much lower than currently expected.

The United Nations has adjusted (for humanitarian reasons) Iraq's financial ceiling on oil exports suggesting that fears about higher prices are starting to be political considerations. Iran's 26bn barrel oil field discovery (see p6) appears almost suspiciously well timed. Oil reserves are a key component in quota setting and Iran is known to be terrified that western investment might go to Iraq rather than itself once embargoes/sanctions are lifted on the two countries. As for oil prices – firm for two quarters and then weaker?

Chris Skrebowski

Web World

The Internet continues to go from strength to strength in terms of its impact on the oil and gas industry. The most straightforward form of usage is to provide information. Sometimes these sites are very extensive and comprehensive, providing users with a valuable information source. Zeolyst International has just launched a redesigned website (**www.zeolyst.com**) which claims to be a complete resource for zeolite information with comprehensive data on Zeolyst powders, catalysts and adsorbents.

Increasingly, sites feature interactivity so that orders can be directly placed. Air Products and Chemicals has just launched a site for users of gas chromatography and other instrumental analytical techniques at **www.airproducts.com/built-inpurifier/** as part of its corporate website at **www.airproducts.com**

The latest and possibly most important web development is the move to provide all or parts of systems that offer paperless procurement and transaction. On p39 we review **Bolero.net** which offers secure Internet-based transactions. In a similar vein, the Denver-based Internet company Wellbid Inc has launched an oil and gas industry procurement website **www.wellbid.com** This offers vendors and engineers an online trading portal through which they can meet, negotiate, advertise and find the information they need 'quickly and efficiently'. Initially, the system will only operate in the US, but the company plans to extend its applicability worldwide.

Another innovative answer to a corporate problem is to be found at **www.ewbanksolutions.com** which gives details of the way this recently formed technical services consultancy can help the oil and gas industry. The five founder members all have considerable oil and gas industry and consultancy experience. *Webworld* was told that they believe the sort of services they are offering and the mode of delivery are an industry first.

Another claimed industry first comes from DNV Petroleum Services (DNVPS) who has recently announced a new service that allows customers to download fuel sample test results from the Internet. Said to be the first online service of its kind, DataAccess will provide test results on the Internet to members of the DNVPS Fuel Quality testing programme within 24 hours of the samples arrival at the DNVPS laboratory.

The best place to start your web-search is still the Institute of Petroleum's site **www.petroleum.co.uk** Often you will need to go no further to get the information you want.

NEWS Upstream

Deepwater semisub

The semisubmersible production platform formerly known as the *Spirit of Colombus* was rechristened *Petrobras 36* at the end of August. It took two years for Davie Industries of Quebec to completely refit the platform, increasing its orginal production capacity by 80% to 180,000 b/d of crude oil and 7.2mn cm/d of gas.

The platform is designed to operate at depths of over 1,350 metres in the Roncador oil field located 125 km offshore the coast of Brazil. It is equipped with 89 underwater extraction flowlines over 1.4 km in length and will supply close to 18% of Brazil's domestic oil production.

Royalty deferrel for Beaver

The British Columbian government has agreed to defer its royalties from the experimental Beaver River gas pool pilot project, located in northeast British Columbia, for a three-year period. Commenting on the decision, Premier Dan Miller, Minister of Energy and Mines and Minister Responsible for Northern Development said: 'We want to make sure the province's oil and gas industry continues to thrive and prosper. We are doing that by working closely with industry to share the risks in developing a natural resource that otherwise would not be recovered.' He continued: 'We encourage companies to look at new and innovative techniques that will benefit the industry as a whole. The knowledge gained from the Beaver River gas pool... has the potential to increase exploration and development in similar pools in the area and could bring economic benefits to northeastern British Columbia.'

Wascana Energy Partnership, in conjunction with Beaver River Resources, United Gunn Resources and Mayan Ltd Partnership, will apply existing technology to an experimental gas recovery project in the gas pool which contains high levels of water.

The Beaver River project contains an estimated 41bn cm of gas, making it the second largest gas reserve in British Columbia and one of the largest in Canada. If successful, it could increase economically recoverable gas reserves in the Beaver River pool by 5.6bn cm and bring in royalties of more than 13 times the net present value of the royalty relief, reports EuroGas, which holds a 15% working interest in the project.

Falling North West European drilling activity

Exploration and appraisal drilling offshore North West Europe during 1999 has continued to fall since the collapse of the oil price in 1998, according to the latest review from the Arthur Andersen Petroleum Services Group.

The report indicates that combined UKCS exploration and appraisal drilling activity is down by over 60% compared with 3Q1998, reaching the lowest level of activity in the first nine months of the year since 1966. In addition, for the first time since 1981, the number of spuds in the UK is lower than that of the combined total for the rest of North West Europe. It also records that there has been only one new discovery announced on the UKCS this year.

Norwegian activity is shown to have remained relatively stable over the year, with eight wells spudded in 3Q1999, just one more than in the same quarter a year earlier. No new Norwegian discoveries were made, but successful appraisals of the Skarv and Yme fields were carried out. Exploration success fell from 100% in the first quarter to 11% in the third quarter of the year.

Just one new well was spudded in the Netherlands in 3Q1999, bringing the total for the year so far to nine. Of the five exploration completions in the Netherlands, three made new discoveries, giving a success ratio of 60%.

In Denmark, four new wells were started during the third quarter, marking an increase in Danish drilling activity, while in Ireland, the southerly extension of the Corrib field was proved and drilling began on the Shannon prospect.

In Brief

United Kingdom

***Elf Aquitaine is understood to be planning** to sell its 10% interest in the West of Shetland Clair field.*

***Amec Process and Energy issued redundancy** notices in October to the 706-strong workforce at its Tyneside yard. The workers are to be laid off from the New Year if no more construction contracts are secured.*

***Kvaerner Oilfield Products has been** awarded a contract by Conoco to supply a single well, multiplexed, electro-hydraulic, subsea control system (with provision for one additional future well) for the Vixen development located in the southern North Sea.*

***Elf Exploration has signed an agreement** in principle to sell its interest in Piper, Claymore, Saltire, Scapa and Chanter fields in the North Sea, together with the associated pipeline network and Flotta oil terminal to Talisman Energy. The proposal has yet to be agreed by field partners Texaco, Lasmo, Arco and Intrepid.*

Europe

***Statoil has sold its 20% interest in the** Trym gas and condensate field to Dong of Denmark. Trym reserves are put at 3bn cm of gas and 4mn barrels of oil.*

***Wintershall Noordzee has begun** drilling two development wells on block A6/B4 in the North Sea. It is planned to connect a production platform to the existing NOGAT pipeline network. First gas is expected in August 2000. The field is predicted to produce 3.3mn cm/d of gas.*

***Esso Norge's Balder field has come** onstream. Developed through 14 subsea wells – including 10 producers – tied back to the 380,000 barrel capacity Balder FPSO, the field is expected to reach a peak production of 100,000 b/d. Recoverable reserves are put at 170mn barrels.*

***Marathon is understood to have produced** first gas from the southwest Kinsale field, offshore southern Ireland, at an initial rate of 58mn cf/d. Gas reserves are put at 30bn cf.*

***Arco British has sold its 40% and 60%** interests in Irish Sea blocks 110/12b and 113/27b to Burlington Resources for an undisclosed sum.*

NEWS Upstream

Opec restraints and past investment bolster prices

The price of Brent continued its rise during August, averaging $19.93 during the month and reaching $24 in September, according to the Royal Bank of Scotland's latest *Oil and Gas Index*. Commenting on the rise, Stephen Boyle, Head of Business Economics, said: 'The success of the Opec production restraints has exceeded all predictions. On top of this, a resumption in demand in East Asia has been gradually feeding through since the early part of this year and is now having a significant effect on prices. Opec has announced its intention to adhere to the cuts at least until March 2000 and such a policy would continue to bolster prices. However, there is some evidence that compliance has been weakening. This is hardly surprising in light of recent strong prices.'

August, like July, was also a record month for UK production of both oil and gas. Oil output rose by 44,000 b/d, over 11% higher than August 1998. Gas production also increased on the year, by 16.6%, although it was down on the month. However, this was not enough to affect combined output which rose slightly on the month.

Boyle commented on the fact that operators were now reaping the benefits of investment over the past few years in, for example, new fields and pipelines. 'The industry is still grappling with the challenges of cost reduction and sharply lower business volumes, but the underlying trend is for strong growth in oil output and investment has played a key role in this.'

The continuing strength of oil prices has led to a further increase in revenues. Oil revenues rose by 4.1% since July to £32.6mn/d in August. Compared with August last year, when oil prices stood at about $12/b, oil revenues are up by 85.5%.

Year Month	Oil production (av. b/d)	Gas production (av. mn cf/d)	Av. oil price ($/b)
Aug 1998	2,379,644	5,640	12.05
Sep	2,573,882	6,394	13.28
Oct	2,600,813	8,832	12.60
Nov	2,612,843	10,738	11.07
Dec	2,715,056	11,123	9.81
Jan 1999	2,664,121	11,532	11.16
Feb	2,678,138	11,532	10.20
Mar	2,679,786	11,107	12.54
Apr	2,717,767	9,863	15.66
May	2,507,093	7,349	15.18
Jun	2,400,277	6,785	15.91
Jul	2,602,363	6,816	18.90
Aug	2,645,910	6,576	19.93

Source: The Royal Bank of Scotland Oil and Gas Index

North Sea oil and gas production

Russian first for Khariaga oil field

TotalFina (operator; 50%), together with partners Norsk Hydro (40%) and the Nenets Oil Company (10%), have commenced oil production from horizons 2 and 3 of the Khariaga field in Russia.

Located north of the Arctic Circle, in the Timan-Pechora Basin in the Nenets Autonomous Territory, Khariaga is said to be the first onshore field to come onstream in Russia within the framework of a production sharing agreement (PSA). Signed in December 1995, the agreement was declared effective on 1 January 1999 by the Minister of Fuel and Energy, the Governor of the Nenets Autonomous Territory, TotalFina and Norsk Hydro.

Plans are to bring three wells into production this year as part of the initial development of horizons 2 and 3. The first well is reported to have a potential output of 7,500 b/d of light, high quality 39° API oil. Workover on two other wells is currently underway. Production during the initial development phase is expected to reach 10,000 b/d.

The three wells are connected to on-site processing facilities built by TotalFina, which can currently handle 10,000 b/d. The crude is transported from Khariaga to Usinsk (150 km) using the KomiTEK collection system and is then transported via the Transneft system over the 2,400 km to the western border of the Russian Federation, from where it is exported to Europe.

In Brief

***Statoil is reported to have made a** new oil find on the Beta-West structure on the Yme field in the Norwegian sector of the North Sea. Exploration well 9/2-9S is expected to enter production soon.*

***Dana Petroleum (15%) has announced** that Dutch North Sea exploration well A15-3 has yielded 'a significant gas discovery'. The well tested at combined rates of 24mn cf/d.*

***The Norwegian government has** awarded the production licence for a previously unlicensed North Sea area containing the Ormen Lange gas field to a consortium comprising Shell (16%), Norsk Hydro (14.78%), BP Amoco (9.44%), Statoil (8.87%) and Esso (5.91%). The Norwegian government is to retain a 45% interest.*

North America

***Mariner Energy of the US is reported** to have made a gas find on the Apia prospect in Garden Banks block 73. Initial production from a single subsea well is due onstream 2Q2000.*

***Shell's deepwater Ursa field in the Gulf** of Mexico is reported to have set a regional record for production from an individual well. Well A-7 produced 39,317 b/d of oil and 60.7mn cf/d of gas in early September.*

***Ocean Energy and Kerr-McGee are** reported to have made a deepwater discovery on the Nansen prospect on East Breaks 602 in the Gulf of Mexico.*

***Shell Canada is reported to be selling** its western Canadian energy producing assets to Apache for C$770mn (US$524mn).*

Middle East

***OMV of Austria is understood to** be in talks with Iranian authorities regarding the $150mn development of the Sarvestan and Saadat-Abad oil fields in southern Iran.*

***Gulfstream Resources has been** granted approval to develop the Hafar block 30 gas project in Oman. Some 85mn cf/d of gas is to be produced from the Hafar, Al Sahwa and Nadir gas fields. First gas is due in 2H2000.*

Weak international market impacts rig demand

Houston-based offshore drilling contractor Global Marine has reported that the company's worldwide SCORE (Summary of Current Offshore Rig Economics) for August 1999 fell 2.5% from the previous month. Declining day rates for semisubmersibles in the North Sea and southeast Asia are said to have offset the 8% improvement in total rig demand in the US Gulf of Mexico.

According to Bob Rose, Global Marine Chairman, President and CEO, Gulf of Mexico demand for premium jack-up rigs capable of working in 250 feet or more of water was particularly strong, with a utilisation rate of about 90% at the end of August.

Commenting on the international rig market, Rose added: 'While strong oil prices tend to lead to increases in capital spending by major oil companies operating in the international arena, we may not see significant response in rig demand until the operators complete their upcoming budget cycles.'

Global Marine's SCORE compares the profitability of current mobile offshore drilling rig rates to the profitability of rates at the 1980–81 peak of the offshore drilling cycle when speculative new rig construction was common. In this period, the SCORE averaged 100% and new contract day rates equalled the sum of daily cash operating costs plus approximately $700 per day per million dollars invested.

Global Marine's findings for August 1999 are summarised in the table below.

	August 99	July 99	% change on month	% change on year	% change on 5 years
By Region:					
G. of Mexico	22.02	20.74	+6.2	–54.0	–37.1
North Sea	21.12	22.91	–7.8	–74.7	–31.0
W. Africa	29.43	29.47	–0.1	–59.2	–23.2
SE Asia	30.43	32.90	–7.5	–55.0	–17.7
Worldwide	23.00	23.60	–2.5	–66.0	–32.8
By type:					
Jack-ups	22.95	22.84	+0.5	–67.8	–40.0
Semisubs	22.96	24.21	–5.2	–64.2	–18.9

Source: Global Marine

Summary of current offshore rig economics (SCORE)

Smit Pioneer to start work on Kuito

Following the successful completion of sea trials offshore the UK's east coast, *Smit Pioneer*, Smit International's new multi-purpose offshore installation vessel, recently set sail for offshore Angola in order to start its first contract. The vessel is to install flexible lines, together with buoyancy tanks and counterweights for mid-water arches, as part of phase one of the Kuito field development.

In Brief

Russia & Central Asia

***Licenses for 10 oil and gas development** projects in the Nadym, Pur and Taz districts of the Yamal-Nenets autonomous areas are soon to be auctioned. Recoverable reserves are put at 20mn tonnes of oil and condensate and more than 100bn cm of gas.*

***Lukoil of Russia is reported to be planning** to form a joint venture with Azeri state oil company Socar to rehabilitate four depleted fields – Sangachal-Deniz, Duvanny-Deniz, Khara and Zyrya – which are estimated to hold 25mn tonnes of recoverable reserves.*

Asia-Pacific

***Statoil is reported to have withdrawn** from the Hainan project in China, declining a 49% stake and operatorship, due to poor profitability.*

***BHP Petroleum is rumoured to be planning** to sell off its non-core oil and gas assets in Papua New Guinea (including its 9.7% stake in the Kutubu field) and the Timor Sea, as well as its Minerva gas field offshore Victoria, Australia, for A$800mn.*

***Unocal is reported to have made two** oil discoveries in Thailand's Pattini Basin. The No. 1 discovery well in block 10A is understood to have flowed 14.8mn cf/d of gas and 250 b/d of condensate. The follow up Yala-3 well on adjacent block A encountered oil and gas pay. In block 11A, a well in the North Trat Graben tested at 18mn cf/d of gas and 675 b/d of condensate.*

***Chevron is reported to have** announced plans to double oil production from the Tantawan, Benchamas and Maliwan fields in block B8/32 in the Gulf of Thailand to about 30,000 b/d by the end of the year.*

***Phillips Petroleum reports that the** results of a third successful well drilled in block 11/05 of China's Bohai Bay indicate potentially recoverable reserves of 400mn barrels in the northern part of the field.*

***China National Petroleum Company** (CNPC) and Shell are to jointly develop the Changbei gas field in the Ordos Basin in Shaanxi and Inner Mongolia Provinces, central China. Reserves are put at 70bn cm. The project is expected to deliver up to 3bn cm/y of natural gas.*

NEWS Upstream

Acquisitions strengthen Paladin's E&P portfolio

Paladin has announced a number of acquisitions costing a total of £33mn, including the takeover of Warrior Oil Company which holds a 3.8% stake in the South East Sumatra production sharing contract (PSC) (in which Paladin already holds a 3.7% interest), a 2.5% interest in the adjacent Offshore North West Java PSC and a 13.3% stake in the Blora PSC.

Paladin is also to purchase from Statoil a 2.4% interest in the North Sea Blake oil discovery, its 15% stake in block 20/4b which contains an extension of the Goldeneye gas condensate field, and a 2.5% stake in block 28/5a adjacent to the North Sea Bittern field in which Paladin already holds a 2.5% interest.

The company is also proposing to acquire Arco Midia, a wholly owned subsidiary of Arco, which holds a 75% operated stake in two offshore Romanian blocks in the Black Sea, one of which contains the Doina gas discovery.

Posting a 97% increase in 1H1999 turnover to £6.9mn compared with £3.5mn a year earlier, Paladin also disclosed plans to dispose of its non-core producing interests in Canada in a move expected to generate gross proceeds of C$15mn.

UK first for CSOL pipe-in-pipe system

Coflexip Stena Offshore Ltd (CSOL) has secured a contract from Enterprise Oil to engineer, procure, install and commission a 12-km 'pipe-in-pipe' production flowline from Enterprise's North Sea Cook field to the Shell-operated *Anasuria* FPSO, together with a 3-inch diameter utility flowline piggybacked to the 12-inch production line, and a 9.2-km control umbilical linking Cook to the existing Teal manifold. It is said to be the first time that the company's pipe-in-pipe system has been used in the UK following successful applications in Australia and Norway.

The production flowline will consist of an 8-inch pipe within a 12-inch pipe, with insulation material applied within the annulus. The product will leave the wellhead at 139°C, where it will enter the manifold cooling loop so as to reduce the temperature to 120°C before it enters the flowline. At various phases of the field's expected eight-year life, when the wellhead temperatures decline, the cooling loop will not be required.

The project is due to be completed by May 2000.

Giant Middle East find

National Iranian Oil Company (NIOC) recently discovered a 26bn barrel oil field close to the Iraqi border in south-west Khuzestan. It is claimed that production from the field will start by 2001, with output reaching between 300,000 b/d and 400,000 b/d by 2004–2005.

The field is called Azadegan ('the freed ones'). As the reserves figure of 26bn barrels refers to oil in place, the new discovery would be the world's 23rd largest field (larger than Prudhoe Bay or Hassi Messouad and only slightly smaller than Agha Jari). The field is very close to Iraq's Majnoon and Nahr Umar fields.

Centrica asset deals

Centrica is to purchase Veba Oil and Gas UK's 4.6% stake in the North Sea Hewett area satellite developments (bringing its total holding to 13.1%) and the associated Bacton Phillips terminal, together with a 10% stake in the Thames area fields. It is also to buy Total Oil Marine's 15% interest in the Victor field, increasing Centrica's stake to 30%.

The £13.35mm deals add 64.5bn cf to Centrica's reserves.

In Salah gas contracts

Fixed-cost contracts have been awarded for the $2.3bn In Salah gas project in Algeria, reports *Stella Zenkovich*. The contract for exploration appraisals and engineering design went to In Salah Gas, a joint venture between local state energy company Sonatrach and BP Amoco, while the Japanese–US JGC Kellogg Brown & Root consortium secured the field facilities contract. Bechtel of the US is to supply all infield and export pipelines. Deco, a consortium of local company Entreprise Nationale des Travaux aux Puits and Deutag of Germany, will be in charge of drilling.

The seven-field project is due onstream in 2003 and is to supply between 9bn and 11bn cm/y of gas to markets in southern Europe.

In Brief

Pertamina has signed an agreement *with Power Gas, a subsidiary of Singapore Power, under which gas will be supplied from the Santa Fe Snyder-operated Jabung licence and Gulf Indonesia's Corridor and South Jambi B blocks. A total of 2.27tn cf of gas will be sold, commencing in mid-2002, beginning at 150mn cf/d and increasing to 350mn cf/d by 2008. Jabung will supply 45% of the first 250mn cf/d for the life of the agreement.*

Latin America

Repsol-YPF has discovered a large oil *and gas accumulation on the Caipipendi block in south Bolivia. The Margarita X3 well flowed nearly 2mn cm/d of gas and 2,300 b/d of oil. Estimated reserves are put at over 300mn boe. The find is close to the Bolivia-Brazil gas pipeline.*

Petrobras is reported to have set a *deepwater drilling world record with its RJS-540 well offshore Brazil which was drilled in 2,604 meters of water, some 160 metres deeper than the previous record also held by Petrobras.*

The Ginta B-4H development well – the *first to be drilling on the Ginta field in block 16, eastern Ecuador – is reported to have flowed at 17,750 b/d of oil.*

Brazil is reported to be planning to auc*tion a total of 23 blocks in its second licensing round due to be launched in 2Q2000. A total of 13 of the blocks will be located offshore, in both shallow and deep waters, and 10 onshore.*

Petrobras is understood to have dis*covered a new oil field in the Santos Basin offshore Brazil. Reserves are put at between 600mn and 700mn barrels.*

Africa

South African state company Soekor *has received government approval to develop the R190mn Oryx offshore oil field to full production by June 2000, allowing the Oribi platform to maintain 25,000 b/d of crude oil output.*

BP Amoco and Burlington Resources *are reported to have agreed the sale of 110mn cf/d of natural gas from the Tao, Kamose and Seti Plio fields – located in the Offshore North Sinai concession in the eastern Nile Delta – to the Egyptian domestic market from January 2004.*

NEWS Industry

Mobil Exxon/BP Amoco Arco merger updates

The European Commission (EC) has given its approval for the $7bn merger between Exxon and Mobil, although it has attached a number of conditions in order to ensure that the merged operation would be too dominant in a number of sectors, damaging choice and competition in the EU economy.

The companies have agreed to:

- sell Mobil's gas trading entity in the Netherlands, although the merged company will continue to compete with main rival Gasunie, in which Exxon has a 25% share;
- sell Exxon's 25% interest in Thyssengas of Germany, a long-distance gas wholesale transmission company, and reduce certain voting rights in Erdgas Münster, a short-distance gas wholesale transmission company in Germany;
- offer for sale certain Mobil rights in depleted reservoirs around Münich;
- sell certain base oil businesses;
- divest Mobil's share in Aral – the German fuel retailing company also operating in Austria and Luxembourg – and the company's interest in the fuels part of the BP/Mobil joint venture which also produces and sells lubricants;
- sell Exxon's aviation lubricants business; and
- offload certain pipeline capacity servicing Gatwick Airport in the UK.

The EC has also cleared BP Amoco's $29bn takeover of Arco, imposing minor conditions, including the sale of certain pipelines and processing assets in order to avoid it gaining a dominant position in the North Sea gas transport and processing sector.

Looking to a Ben-evolent future

Ben, the Motor and Allied Trades Benevolent Fund, reports that its annual report for the year 1998/9 highlighted a dramatic rise in the number of calls for help from people in the community, which resulted in over 1,000 new cases being assisted by Ben during the year. The Fund is now helping over 10,000 men, women and children in the community.

Community Director Geoffrey Atkinson, OBE, believes the future role of the Fund will be to reach out even further to give practical help to more families and those living in difficult circumstances in their own homes.

Ben reports that its four nursing and residential centres continue to provide very high standards of long-term care, and it has been proposed that they could be developed as resource centres offering day care facilities to help people who cannot move into permanent residential care.

Further information is available on Ben's website – **www.ben.org.uk** – or Tel: +44 (0)1344 620191, Fax: +44 (0)1344 622042.

New Shell CD-ROM and Internet service

Shell Renewables has launched a new CD-ROM aimed at helping 11- to 14-year-olds learn about renewable energy and overall energy topics. The REACT (Renewable Energy ACtion Team) CD-ROM is set in the virtual world of a control centre and students take on the role of a new team member. They face 'real-life' energy problems – such as organising a power-station protest, assessing the energy needs of an African village and taking part in a US game show – where they have to select the most suitable form of renewable energy for these and other scenarios.

The programme provides students with a vast amount of technical information for all types of renewable energy, from solar to biomass, to wind, wave and tide, hydro and geothermal.

Available in PC format, it comes with a comprehensive user guide that provides a range of warm-up activities that can introduce a class to renewable energy.

REACT is available online at **www.shell.com/react** A single pack for schools costs £49, with a multi-pack of five priced at £50. A home version is available from Granada Television – on **www.granada-learning.com** – for £19.99.

Meanwhile, Shell Europe Oil Products has unveiled a new journey planning website on the Internet. The free Shell Geostar service at **www.shellgeostar.com** provides access to maps showing street-level detail and allows drivers and passengers to plan their route in great detail. Initially covering 12 European countries – Germany, The Netherlands, UK, Denmark, Sweden, France, Italy, Spain, Belgium, Switzerland, Austria and Luxembourg – the service also provides driving directions and information on services and points of interest in six languages. Plans are to extend coverage across the rest of Europe, including Central and Eastern Europe by early 2000.

In Brief

United Kingdom

BG is understood to be planning to *issue a £500mn index-linked bond as part of a wider restructuring of its corporate and capital structure.*

Shell is reported to be planning to *break into the financial market with a series of joint ventures including a Visa credit card to be launched in association with the Royal Bank of Scotland.*

Europe

Norsk Hydro, which recently acquired *Saga Petroleum, is reported to be planning to sell the UK assets that Saga acquired from Santa Fe in 1996.*

Finnish energy group Fortum is *reported to have sold its Neste chemicals division to Swedish private equity fund Industri Kapital for $542mn.*

Kvaerner is reported to be selling its *Leirvik shipyard to Norwegian shipowner Per Saevik.*

Nova Chemicals is reported to be *buying a number of European chemical manufacturing plants from Shell in a $185mn deal.*

Shell is reported to be considering *more jobs cuts within its E&P division.*

Shell is understood to have become a *'free' Internet service provider (ISP) following the launch of a pan-European joint venture with Netherlands-based Internet services group World Online. Beginner kits for the ISP (called* **12move.com***) are expected to be made available in 750 of Shell's Dutch service stations by the end of October 1999. The service will be launched across Shell's European service station network in the coming months.*

North America

Norwegian oil company Statoil is *understood to be selling its US natural gas and electric power subsidiary, Statoil Energy.*

International engineering contractor *Foster Wheeler Energy Limited (FWEL) and BOC Process Systems, the global industrial gases and technology supplier, have formed a strategic alliance.*

Oilfield and services group Halliburton *is reported to be planning to sell its*

EC Commissioners choose to lose duty free perks

The new-look European Commission under President Romano Prodi is so keen to show off its squeaky clean credentials that its members have promised to forego their rights to claim exemptions from VAT and excise duty on petrol, tobacco and alcohol, writes *Keith Nuthall.*

Neil Kinnock – now Vice-President – recently made the announcement, as part of a package of reforms. His job is to restore Brussels' good name, following the corruption scandals that led to the resignation of the old Commission this Spring.

He said: 'All Commissioners will voluntarily renounce several of the special provisions traditionally granted to them by the Belgian government in its application of the 1961 Vienna Convention on diplomatic relations.'

Kinnock stressed that he and his colleagues would not abandon their right to diplomatic immunity, however, meaning they would not have to pay parking tickets incurred while on official business.

He added that his colleagues' sacrifices would not necessarily be matched by senior officials in other EU institutions or to the diplomatic services. 'The Commission obviously has not got, and does not seek, power over the employment conditions relating to comparable bodies and personnel,' stressed the Commissioner. He also announced that around 60 adviser posts would be abolished as part of a bid to streamline the Brussels bureaucracy.

EC investigates TotalFina-Elf merger

A detailed investigation into the agreed merger between TotalFina and Elf Aquitaine has been launched by the European Commission, which could lead to it blocking the deal, writes *Keith Nuthall.* Brussels is worried that the combined Franco-Belgian group could so dominate a series of sectors in France that fuel prices, which have been kept low by hypermarkets selling petrol, could rise.

The Commission's inquiry will examine the following problems:

- With TotalFina-Elf controlling more than half of refining capacity in France and more than half of French storage and pipeline capacity, it would control independent dealers' access to product.
- The merged company would sell nearly 60% of fuels sold on French toll motorways, exploiting a captive market.
- It would also control more than half of French LPG production, plus most of the important storage sites and bottle-filling centres.
- TotalFina-Elf would enjoy a monopoly over the supply of jet fuels to Toulouse and Lyon airports.

The investigation will last for up to four months, during which time the deal will have to be suspended.

German utilities to merge energy operations

German utilities Veba and Viag are to merge in a deal valued at euro 13.5mn ($8.6bn), creating what is reported to be Europe's largest listed energy group with join annual sales of euro 68bn.

It is understood that Veba shareholders will take a 67% stake in the new energy and speciality chemicals venture, Viag shareholders taking the remaining 33%.

Viag's telecommunications and real estate management interests are expected to be sold off under the tie-up, which is predicted to produce cost savings in the region of euro 800mn/y by 2002.

Trading oil swaps online via the Internet

SwapNet and XMTL of the UK are reported to have developed a system whereby commodity swaps trading in oil can be conducted via the Internet. The companies hope that the 24-hour online trading system will gain 30% of the oil trading market. Bids will be made anonomously and trading concluded in real time.

Around 50 clients are understood to have signed up so far, primarily in south-east Asia. Although the system is initially focusing on trading Singapore gas oil and NW Europe high sulfur fuel oil, plans are to extend it to other derivatives in future, including those where no physical commodity is delivered, such as electricity.

In Brief

interests in its Dresser Rand and Ingersoll Dresser Pump joint ventures to partner Ingersoll-Rand for $1.1bn.

Middle East

***The Saudi Methanol Company has** introduced trial production of chemical grade methanol at its new Ar-Razi IV plant at Al-Jubail.*

Russia & Central Asia

***Surgut has expressed an interest in** developing the Western Siberian Priobskoye oil field, one of Russia's largest undeveloped fields.*

Asia-Pacific

***China National Offshore Oil Corporation** (CNOOC) is understood to have blamed 'adverse market conditions' for the postponement of its planned flotation on the Hong Kong and New York stock exchanges after reducing the size of the share issue by 50%.*

Latin America

***Chevron has acquired Petrolera** Argentina San Jorge for an undisclosed sum. Daily production is 78,000 barrels of oil and 40mn cf of gas,, around 8% of oil production in Argentina.*

Africa

***Angola's state oil company Sonangol** has secured over $18bn of foreign investment over the next four years. Five major projects are planned: a 150,000 b/d to 200,000 b/d oil refinery in Benguela, a Cabinda gas and condensate scheme, a LNG plant south of the River Zaire, a gas pipeline to Luanda, and a gas-fired plant in Luanda.*

General

***Repsol-YPF is selling its UK and** Indonesian oil producing, refining and marketing assets as part of a $2.5bn disposal programme. The assets – which include a 35% and 25% stake in the North Sea Buckland and Harding fields, a 150-plus strong UK service station network, the Harwich refinery in the UK, and the east Sumatra field in Indonesia – are valued between $1bn and $1.5bn.*

Continued growth in non-fuel sales sector

Over the past ten years, declining margins and stagnant demand in the fuel sector has meant that companies operating within the more mature western European service station markets have had to look for alternative revenue streams. With high margins still achievable on non-fuel products, the forecourt shop has been developed to fulfil this role.

UK analyst Datamonitor's latest report – *The Future of the European Forecourt* – reveals that this process is set to continue over the next five years across the more mature markets. The report also offers evidence that even in the most immature western European markets, the forecourt shop is set to show strong growth up to 2003.

According to the study, by 2003, non-fuel sales will comprise over 50% of service station turnover and profits in the UK, France, The Netherlands and Denmark (the only market to have achieved this already). Italy and Greece are predicted to have the least developed forecourt shop sector in 2003, with non-fuel sales accounting for less than 20% of service station turnover.

An interesting point highlighted by the report is that the overall trend will be for growth in the non-fuel proportion of profits to outstrip growth in the non-fuel proportion of turnover. This would appear to imply that margins in the non-fuel sector are set to increase. However, Datamonitor states that this is not the case – instead it is likely that the margins will fall as the non-fuel sector becomes more competitive. The fact that fuel sales are expected to become even less profitable over the next five years will mean non-fuel sales will increase their share of profits regardless of whether or not they actually become more profitable.

Marubeni cuts costs with PAWS

Japanese trading company Marubeni has introduced Saladin's PAWS energy-specific, historical data analysis workstation to its new Petroleum Planning and Coordination department in Tokyo, set up in response to the deregulation of the Japanese oil industry and subsequent increased pressure on profits from the influx of international competition. The PAWS software will be used to analyse refinery yields in an effort to increase these margins. It will also allow Marubeni to identify which crudes are the most profitable to import from the Middle East.

Marubeni has a domestic market capability of 50,000 b/d, with 700 service stations in Japan. Deregulation has meant that companies can save costs by importing products from overseas rather than buying from Japanese oil refineries. Tougher trading conditions for local oil refineries have also given Marubeni new opportunities to sell direct to the domestic market. According to Saladin, PAWS 'will enable Marubeni to make a number of sophisticated prices analyses, including local currency vs US dollars – useful in identifying currency exchange exposure – and domestic vs waterborne – an international price comparison.'

Germany pushes for ban on sulfur in EU fuels

The German government has launched a political campaign to ban sulfur from petrol and diesel sold across the European Union, writes *Keith Nuthall*. It has called on the European Commission to update Directive 98/70/EC relating to the quality of petrol and diesel fuels, by ensuring that sulfur-free fuels are available before 2005 and made compulsory by 2007.

Berlin's proposal was made at this month's EU Council of Ministers (environment) meeting, where Germany was supported by several other delegations. However, the plan was not backed by the European Commission and has alarmed an oil industry that has already been investing heavily in 'green' technologies.

Dr Michael Frend, Director General of the UK Petroleum Industries Association (UKPIA), said the timetable was 'over ambitious'. He added: 'Our position is that it's going to be extremely difficult in the short-term and it should be part of a proper assessment looking to the future.' New Environment Commissioner Margot Wallström also followed this line. Although she is legally duty-bound to propose a reform of the existing Directive by the New Year, she said that the German proposal would not be adopted that early, indicating that it could be taken up 'at a later stage, based on a full environmental and economic analysis'. This year's proposal, she insisted, 'would be limited to the agreed objective of complementing the mandatory specifications for petrol and diesel'.

Germany stressed that sulfur-free fuels are 'necessary for the introduction of innovative engine technologies', including modern diesel engines with new exhaust emission-control technology and direct-injection petrol engines, which would result in lower carbon dioxide and particulate emissions from vehicles.

In Brief

United Kingdom

***The International Petroleum Exchange** (IPE) was reported to have reached a record contract trading level of 180,260 lots on 8 October, said to be the highest in the exchange's 18-year history. The volume of crude oil traded was equivalent to 164mn barrels, more than double one day's worth of world consumption. Natural gas volumes trades amounted to 27mn therms, equivalent to one-third of the UK's daily consumption.*

***New gas trading arrangements for the** UK were launched on 1 October 1999. According to industry regulator Ofgem, the new arrangements address the fundamental inefficiencies in the existing regime and will reduce the costs of balancing the national gas network and, as a result, wholesale gas prices should decline.*

Europe

***Shell's electricity trading division is** reported to have entered the Dutch electricity supply market through a new joint venture with Dutch energy company Eneco.*

***A new bunker fuel supply company has** been established in Istanbul, Turkey. Transbunker Ltd will supply a range of fuels to bunkers in Istanbul via its own floating storage vessel (20,000 tonnes capacity) and barge fleet.*

***The Finnish government is trying to** encourage a switch to natural gas as a motor fuel by scrapping excise duties paid when filling up, reports* Keith Nuthall. *The Council of Ministers is expected to approve the move.*

***The EU Council of Ministers has been** asked to allow Portugal to apply different rates of excise duties on diesel used by commercial vehicles so as to bring rates in line with those charged on unleaded petrol.*

***The Macedonian government is understood** to have approved the sale of a majority stake in the country's only oil refinery, Okta, to a Greek joint venture led by Hellenic Petroleum for $190mn.*

***Gazprom has appointed Centrica as its** agent for operating its capacity in the Interconnector gas pipeline linking the UK to the Continent's gas grid. In addi-*

NEWS Downstream

UK government promotes benefits of CHP

The UK government launched the Small Scale Residential Combined Heat and Power (CHP) Programme as part of its Energy Saving Trust initiative in September. Jointly funded by the UK Department of the Environment, Transport and the Regions (DETR) and Transco, and managed by the Combined Heat and Power Association, the Energy Saving Trust programme provides a comprehensive, integrated package of support for housing providers interested in making energy savings through the use of CHP. Support ranges from over-the-phone advice, to support for project development, through to some grants towards the capital costs of installing residential CHP. While the programme focuses mainly on social housing, it also covers a small number of innovative industrial and commercial schemes.

CHP is a highly fuel-efficient technology which puts to use heat which would normally be wasted to the atmosphere. It is said to increase the overall efficiency of fuel utilisation to as much as 70% to 90% (compared with 30%–50% from conventional electricity generation) and to have the potential to save up to 40% on fuel bills.

The Small Scale Residential CHP initiative aims to:

- help provide more people with affordable warmth and tackle fuel poverty, enabling tenants to save up to 40% on their fuel bills;
- help landlords save on maintenance costs by transferring appropriate risks to an energy services company; and
- help the UK meet its climate change commitments, with expected savings of around 175,000 tonnes of carbon dioxide over its three-year life time.

JAGAL gas pipeline completed

Wingas reports that the JAGAL gas pipeline section of the 4,000-km Yamal gas pipeline network linking Germany to the enormous gas reserves of Russia has been completed. The new 28,000mn cm/y capacity section crosses through the German federal states of Brandenburg, Saxony-Anhalt, Saxony and Thuringia.

(Photo: Section of the JAGAL line under construction in June 1999)

Save outsources fuel logistics to P&O

Save Petroleum, a UK independent fuels retailer, has signed a three-year distribution contract with P&O Trans European's Roadtanks division. The deal covers the supply of diesel and petrol, including Save's lead-free synthetic four star, to more than 400 service stations in the UK.

As the contract is worked out on a delivered price basis, the whole logistics process has been outsourced to P&O Trans European to decide on the numbers of vehicles and drivers to be used. This means that a non-dedicated fleet can be used, giving Save and P&O Trans European greater flexibility and tank utilisation.

P&O Trans European claims to be the largest third-party logistics provider in the petroleum sector, holding 30% of the UK's fuel market. The company comments that although nearly half of the market remains in the hands of the petroleum companies, the figure is reducing as more companies look to outsource non-core activities.

In Brief

tion, Gazprom, Centrica and Wingas of Germany have reached a tripartite agreement entitling each party to use this capacity.

North America

***El Paso Energy is reported to be planning** to sell certain pipeline companies in the southeast US and the Gulf of Mexico in a bid to secure the federal regulator's approval of its proposed merger with Sonat. If successful, the merger will create what is said to be the largest natural gas transport company in the US.*

Russia & Central Asia

***Lukoil has acquired a 58% stake in** Bulgaria's Neftochim refinery, reports the United Financial Group's* Russia Morning Comment. *Lukoil has paid $101mn for the shares with an investment commitment of $401mn for 134,000 b/d of high-quality refining capacity located in a region of strategic interest to the company. The Russian company expects the refinery to generate $800mn of annual sales, but has given no profit forecast.*

***Lukoil has sent the first sea-borne** delivery of crude oil produced in Timan-Pechora to Rotterdam, reports the United Financial Group's* Russia Morning Comment. *The company's brand-new ice-breaking tanker transported 15,000 barrels of crude, delivered to the tanker by barges along the Ob river to the Arctic coast, indicating Lukoil's determination to proceed with this transport route. However, Lukoil will need to invest up to $500mn in developing the port infrastructure before any commercial deliveries become possible, comments UFG.*

***Kazakhstan is understood to have** suspended all oil exports in a bid to ensure that there is enough fuel in the country to meet winter heating needs.*

Asia-Pacific

***China is understood to have signed a** deal with Venezuela under which is will take up to 4mn t/y of Orimulsion starting in 2001. The country currently buys 1mn t/y. It is reported that Venezuelan sales of Orimulsion presently stand at 3.7mn t/y, well short of the 20mn tonne target set for 2000.*

NEWS Downstream

Switching gas supplier

More than 5mn customers on mains gas – one in four gas users in England, Scotland and Wales – have chosen to switch to a new supplier since the introduction of domestic competition, reports Ofgem (The Office of Gas & Electricity Markets).

'As well as delivering choice, gas competition has led to a general fall in gas prices,' commented Callum McCarthy, Director General of Gas and Electricity Supply. 'The National Audit Office (NAO) estimates that the average gas customer can save £78/y by switching from the former monopoly supplier to a different gas company. But even customers who have not switched are seeing savings. Competition has brought down British Gas' prices by more than £40/y. Savings nationally, the NAO says, amount to £1bn annually.'

Cutting fuel poverty

A two-year, £100mn programme of energy efficiency measures targeted at the UK's fuel poor was launched by industry regulator Ofgem in October. Under the programme, which will run from April 2000, Ofgem will set energy efficiency targets for each gas and electricity company. Targets will vary according to the size of the customer base and type of fuel, and will be set next year following advice from the Energy Saving Trust.

Ofgem will set the targets on the assumption that each gas and electricity supplier needs to spend the equivalent of no more than £1.20 per customer per year. Companies will use the funds to help provide energy efficiency measures, such as extra insulation and more efficient appliances.

Repsol-YPF proposals

Repsol-YPF has put forward a proposal to Argentina's national gas regulator Enargas, to reduce by 3% the basic prices at the Neuquina and Austral Basins in Argentina for the period October 1999 to September 2000. The company also plans to speed up the agreed schedule for reducing amounts of gas purchased from third parties and subsequently sold on the market as part of a drive to increase its own production (see table).

Repsol-YPF is also proposing to amend certain clauses currently implemented in natural gas sales contracts, bringing them in line with the best international competitive practices.

Year	Gas purchased
2000	10mn cm/d
2001	9–8mn cm/d
2002	8–7mn cm/d
2003	6–5mn cm/d
2004	0mn cm/d

Indian LPG storage first

Total Gas and Power India (TGPI) and Hindustan Petroleum Company are to jointly develop an LPG import terminal in Andhra Pradesh state on the east coast of India. Scheduled for completion in 2003, the 60,000 tonne capacity storage terminal is expected to handle more than 1mn t/y of LPG.

The LPG will be stored in a cavern at Vishakhapatnam and is said to be the first facility of this type in India. The site will be the largest import terminal on India's east coast and will help meet the country's fast-growing demand for LPG, comments TotalFina. Demand for LPG is predicted to rise from 4.5mn tonnes in 1998 to more than 10mn tonnes after 2005–2006.

In Brief

China National Petroleum Corp (CNPC) *is understood to have purchased a 45% interest in Dutch trader Vitol's 100,000 cm capacity oil storage terminal located at Zhuhai in China's Guangdon province for an undisclosed sum.*

Korea Gas Corporation is reported to *have awarded Daewoo and Daelim a $440mn contract to build a LNG receiving and storage facility in Tongyong, on the coast of southern South Korea. The site is due to be commissioned by October 2000.*

Latin America

Eleven companies are understood to *have bid for the gas transport and distribution concession for Peru's Camisea project which holds 13tn cf of proven gas reserves. The companies include Mobil, Shell, Enron Oil & Gas, and TransCanada Pipelines.*

Africa

Shell Gas and Power reports that the *first cargo of LNG from Nigeria LNG Ltd (in which it has a 25.6% stake) has left the Bonny terminal in southeast Nigeria. The 122,000 cm shipment will be delivered to Italian company Enel at Montoir later this month.*

Foster Wheeler has been selected by *National Petroleum Refiners of South Africa (Natref) to carry out the basic engineering for the expansion of fuel production capacity at its refinery in Sasolburg, South Africa's only inland oil refinery. The $120mn project will boost output by 22% to 105,000 b/d.*

UK Deliveries into Consumption (tonnes)

Products	†Aug 1998	*Aug 1999	†Jan–Aug 1998	*Jan–Aug 1999	% Change
Naphtha/LDF	201,059	285,409	1,961,582	2,138,717	9
ATF – Kerosene	887,145	919,495	5,959,899	6,304,665	6
Petrol	1,833,345	1,809,271	14,402,480	14,204,853	–1
of which unleaded	1,454,069	1,587,956	11,158,420	12,109,664	9
of which Super unleaded	33,822	28,247	276,536	235,966	–15
of which Premium unleaded	1,420,247	1,559,709	10,881,884	11,873,685	9
Lead Replacement Petrol (LRP)	–	–	–	13	–
Burning Oil	242,493	162,863	2,276,077	2,249,496	–1
Automotive Diesel	1,209,903	1,244,348	9,958,364	9,970,881	0
Gas/Diesel Oil	562,776	532,363	4,715,561	4,495,882	–5
Fuel Oil	218,060	132,827	1,892,041	1,402,463	–26
Lubricating Oil	61,430	63,200	554,544	525,107	–5
Other Products	706,583	654,963	5,364,685	5,629,440	5
Total above	5,922,794	5,804,739	47,085,233	46,921,504	0
Refinery Consumption	551,325	519,041	4,347,165	4,161,303	–4
Total all products	6,474,119	6,323,780	51,432,398	51,082,807	–1

† Revised with adjustments *Preliminary

Mexico pins hopes on Cantarell project

The offshore Gulf of Mexico Cantarell fields – which contain the largest known accumulation of petroleum reserves in Mexico – traditionally have provided some 75% of total national oil production. Then early in 1996, well productivity plummeted, in some cases to one-fourth of previous levels, signaling a dramatic decline in reservoir pressure. Mexican national oil company Pemex quickly drew up an enhanced oil recovery plan designed to increase reservoir pressure with massive injections of nitrogen. Although the plan's cost is estimated at more than $10bn over 15 years, Pemex is confident that it will allow the recovery of an estimated 8.4bn barrels of additional oil from Cantarell, covering the investment outlay and also providing a handsome profit. Critics are not so sure, writes *Judith Gurney*.

The Gulf of Mexico, onshore and offshore, is a major petroleum province for both the US and Mexico, with the five main Mexican producing oil provinces located along its coast. Three of these, Tampico-Misantla, Salinas del Istmo and Cordoba, have been in production for many decades and are close to exhaustion. The other two, Reforma and Campeche, are more recent discoveries and although also in decline, they are considered good candidates for enhanced oil recovery systems. Both are located in a basin which extends over an uplift in the southeastern Mexican states of Chiapas, Tabasco and Campeche and into the Gulf's continental shelf in Campeche Sound. Their source beds are mainly Upper Jurassic shales and limestones and they contain both Jurassic and Cretaceous reservoirs. As elsewhere in the Gulf, numerous salt domes are a prominent feature.

Cantarell was discovered in 1976 off the coast of the Yucatan Peninsula, in water depths ranging from 35 to 40 metres, in a large anticline dominated by three salt domes cut by northwest-directed faulting. Estimates of proven and probable reserves vary between 14bn and 21bn barrels, with production, to date, of some 7bn barrels. (These estimates do not include the recently discovered Sihil field lying underneath Cantarell which is said to contain as much as 1.4bn barrels.)

There are four adjacent oil fields, known as Akal, Chac, Kutz and Nohoch. Akal is a supergiant with almost 90% of current Cantarell oil production, while Nohoch produces another 5% of total output. Both of these fields came onstream in 1979. Chac, which began production in 1991, accounts for the rest of production, and Kutz has not yet come onstream. Their Maya oil is sour and heavy, with API ratings ranging from 19° to 22°. It is transported by pipeline to three offshore tanker berths at Cayo Arcas and to storage tanks at Dos Bocas; subsequently it goes to Mexican refineries and to US refineries along the northern Gulf coast.

Construction of most of the existing Cantarell production system was completed by 1982, with a few additional platforms and pipelines, and a gas lift pipeline distribution system, added later. In 1996, its facilities consisted of 16 wellhead platforms, seven of these performing preliminary separation, four production complexes, a pumping platform, a gas compression plant, and two export terminals. Almost all associated gas output was flared.

Once the disastrous fall in Cantarell well productivity was confirmed, Pemex awarded a contract to Bechtel, in conjunction with Netherland, Sewell & Associates, for a field development plan while it pursued short-term goals of upgrading facilities in use or under construction, removing production bottlenecks and improving equipment reliability. It secured some funds for Cantarell redevelopment from foreign banks and appointed Bechtel overall project administrator as well as advisor regarding surface facilities.

The long-term goal for Cantarell involves increasing production from 1.3mn b/d in 1998 to 2.4mn b/d, hopefully by 2001, and maximising ultimate oil recovery. This requires drastic measures to increase and maintain reservoir pressure, especially in the Akal field which Pemex believes could yield an additional 2mn barrels of oil. Pemex rejected an enhanced oil recovery (EOR) system based on water injection when a review of a water injection project in the southwest of Akal indicated a substantial risk of water channneling through the extensive fracturing of the field that could lead to premature loss of producing wells. In addition, there appeared to be danger of water encroachment in the southern edge of the field moving into the northern side.

Pemex decided that gas injection was the only way to achieve optimum pressure levels and to reduce the negative effects of water influx. It considered using produced associated gas for this purpose but rejected this option on the grounds that it would reduce overall Mexican gas production by 31% at a time when gas demand was growing due to increased use in power generation and an expanding residential gas grid in the wake of privatisation of downstream gas distribution. It weighed the choice of carbon dioxide or nitrogen for injection and opted for nitrogen – largely, it would appear, on the grounds of cost.

The selection of nitrogen, which has never been used in a major enhanced oil recovery programme, evoked criticism on the grounds that the injected nitrogen would mix with natural gas in the field and make the latter commercially unsalable unless it underwent separation in expensive facilities. Pemex agreed on the need to remove nitrogen from produced gas but insisted that the cost of doing this would be less expensive than using carbon dioxide for injection. It plans to leave as much gas as it

can in Cantarell until oil production has ended before attempting nitrogen removal.

In order ensure an adequate supply of nitrogen, Pemex called for bids for the construction and operation, over a 15-year period, of a nitrogen plant at Atasta, in the state of Campeche. The plant, ten times larger than any existing nitrogen plant, will generate 1.2bn cf/d of nitrogen to be sent by pipeline to a main injection facility in Cantarell, about 80 kilometres offshore. There will also be a power plant and an air-separation unit. The contractor will be responsible for financing the project and will retain ownership of the plant, with Pemex paying fixed capacity charges for nitrogen under a take-or-pay contract as well as a monthly operation and maintenance charge.

In October 1997 Pemex awarded the nitrogen supply contract to a BOC Group consortium which included Marubeni, Westcoast Energy, Linde AG and ICA Fluor Daniel. The total cost of the project is estimated at $1bn. BOC is responsible for the basic design and operation of the plant which will generate nitrogen by a cryogenic air separation process. ICA Fluor Daniel and Linde are responsible for detailed engineering and construction and Westcoast for the design and operation of the underwater pipeline to Cantarell. The first train of the $1bn plant is required to be in operation by 1 April 2000, providing 300mn cf/d of compressed nitrogen, and the other three trains are to be in production by 1 January 2001.

Project on schedule

For its part, Pemex drew up an extensive field development plan which is apparently running on schedule, despite reports to the contrary. This includes drilling 205 producing wells and eight nitrogen injection wells by 2005. It also includes the enlargement of six existing platforms, the installation of 28 new platforms, three of these concerned with gas production, and 69 new pipelines. And finally, the plan includes the construction of two new production complexes with platforms linked by bridges. Each complex will include a wellhead and primary separation platform, a gathering and riser platform, a fixed production platform, a floating storage and offloading tanker (FSO) and a living quarters platform.

In order to accomplish these projects, Pemex offered 37 engineering, procurement and construction contracts with tight schedules, and 27 purchase orders covering new equipment. All of the purchase orders have been awarded, and all but three of the engineering contracts. The latter cover the construction of drilling, production and living quarters platforms, the laying of pipelines and the services required to accomplish these. The purchase orders cover platform equipment, including compressors, pumps, treatment plants, separators, and electrical generators. Many companies are involved, including Aker Gulf Marine, Cigsa, Enron Offshore Services, Halliburton, and Bufete, and some have several assignments – a partnership of Cigsa and Enron, for instance, has six construction contracts valued at a combined total of $344mn.

Processing and pipelines

One important contract, awarded to a group led by Westcoast Energy, is for the construction of a 250mn cf/d offshore gas compression and liquids recovery facility. Westcoast will operate the plant, after a late-1999 start-up, returning processed, compressed gas and NGLs to Pemex which, in turn, will provide raw, sour gas feed to the plant on a pass-through basis at an agreed daily maximum. Pemex is committed to pay fixed-capacity charges in dollars on a take-or-pay basis as well as an operations and maintenance charge. Contracts have also been signed with Commisa, a joint venture of Brown & Root, the Mexican conglomerate Grupo R and Bufete Industrial, to design, build and install three major offshore platforms dealing with gas output. One will be a producing platform with the capability for gas treating and the other two will be gas-processing platforms with final product either used for reinjection or shipped to shore for use as fuel.

In addition to the main pipeline bringing nitrogen from the Atasta plant to Cantarell, the project calls for 69 new pipelines covering a total length of about 400 kilometres. The five contracts awarded for these pipelines came to about $635mn. The project requires 204 pipeline crossings and Alan Spiers, of Bechtel, has described the process of laying the new lines, which required the burial of many existing Cantarell pipelines, as working in a 'bowl of spaghetti'.

The plan also includes two floating, storage and offloading (FSO) vessels contracted long-term on a build, own and operate basis rather than by direct purchase. One FSO, *TaKuntah*, a converted 350,000 dwt tanker, was installed in 1998 some 30 kilometres north of the Akal field in 82.5 metres of water. It is the first permanently-moored FSO in the entire Gulf of Mexico – FSOs with and without production facilities are not yet permitted in US Gulf waters – with 2.3mn barrels of storage capacity and the ability to offload simultaneously to two export tankers moored in tandem and side-by-side. The second FSO is expected to be a similar type of vessel. The FSOs will supplement existing storage at the export facilities at Dos Bocas and Cayo Arcas, especially when these are forced to close during inclement weather between October and February.

Key development

The size of the Cantarell development project testifies to the importance of oil production for Mexico. Oil exports and the heavy taxes which Pemex pays are important sources of income for the government. The close ties between the government and Pemex, however, profoundly effect the direction taken by the Mexican oil industry. Pemex is forbidden access by the Mexican constitution to private Mexican or foreign equity financing and it must therefore meet its capital requirements entirely with loans or internal cash flow. As it generally needs to offer future production as collateral for loans, Pemex is forced to concentrate on known reserves, such as those in Cantarell, and it is believed to be prone to exaggerating the production potential of these reserves.

What the Mexican oil industry needs, without question, is a focus on exploration. But Pemex lacks both the means to raise the necessary funds, as well as the expertise, for exploration. There are unexplored areas in the coastal plain and along the continental shelf and Pemex has hardly ventured into the deepwaters of the continental slope which has proved to be a rich source of discoveries in the US-controlled waters of the Gulf.

Mexico, along with Saudi Arabia, is one of the few remaining countries with substantial oil reserves which are closed to direct international participation in their oil industries. Despite the trend elsewhere to allow international partnerships – in the last decade the CIS, Venezuela, Iraq and Brazil have been opened for re-development contracts and Kuwait is preparing to do the same – there is little indication at present of a willingness on the part of the Mexican government to allow foreign companies to join Pemex in upstream activities or to privatise Pemex. Although President Ernst Zedillo has gone some way towards privatising public companies and opening domestic markets to foreign competition, presidential elections are due soon and at least one candidate, Roberto Madrazo, Governor of Tabasco state, violently opposes such policies which, he says, make the rich richer and the poor poorer.

A strategy by design

Marcello Minale of Minale Tattersfield & Partners is in a unique position to interpret the needs of his clients as he has developed an understanding of the forecourt industry from the outside looking in. This enables his forecourt design company to have an objective view to realise change and improvements within the forecourt industry. _Emma Parsons_ discusses with him theories of the _fin-de-siécle_ forecourt and his visions of the forecourt of the future.

In spring of next year, Marcello Minale intends to publish a book entitled *How to Design a Successful Petrol Station*. The book will be written with the aid of retail companies in conjunction with Minale Tattersfield Design Strategy. It is aimed at identifying the problems and raising solutions for one of the fundamental problems in the petrol retailing industry – how to make a forecourt pay.

To gain an insight into the forecourt of today and tomorrow one has to delve a little into service station history. The forecourt, less than a hundred years old, initially arose to provide the post-industrial society with a means to fuel the latest fashion in transport machines – the motor car. However, it has become an intrinsic part of the 20th century global landscape, providing a backdrop for existentialist road movies and also immortalised by modernist painter Edward Hopper. Elements of used forecourt paraphernalia have even resulted in a collecting craze known as Petroliana (see *Petroleum Review*, March 1997).

Marcello Minale

History repeats itself...

... According to Karl Marx. However, this saying can also be attributed to the development of the forecourt over the past century. Starting as a way for the local village grocer to gain extra business, it has come full circle with today's dispenser of energy also selling food and other essential items, known as the convenience store (C-store). The cycle of the grocer–forecourt–grocer is not geographically constant. In northern Europe forecourts make little profit selling petrol so they have to subsidise income by branching into other activities. However, in southern Europe there is still money to be made from selling petrol in the forecourt retailing business, so the problems the retail industry faces in northern Europe are not relevant to the southern Europe retail industry.

If forecourts are to be successful they must make a profit as well as providing a service to the community. Marcello Minale's ideas for the forecourt of the future encompasses the problem of loss-making sites. For a forecourt to be a success it should be a multi-user complex surrounded by services that make use of the car's facility to transport, not only people but also goods of many descriptions. In other words, it is to create a complex of essential businesses such as a garden centre, a post office and do-it-yourself (DIY) shops. The petrol station will remain the prime focal point and *raison d'étre* of the complex. This will provide a 24-hour consumer community within the community rather than a specialist retailer adjacent to the community.

However, another fundamental problem with using forecourts as shops is the product that is sold. In one region it might be necessary and profitable to sell grocery goods if the area is not well-catered for in this respect. However if the petrol station is located opposite a supermarket, the benefits of stocking these goods is negligible. Different forecourts have different demands, therefore each forecourt, to maximise its potential, should be treated as an individual site rather than under a universal company umbrella.

Cyber-future

One concept presently pioneered is Italiana Petroli's (IP) solar-powered Planet station which has installed a multi-media information system. The service known as the 'IP Planet' provides an in-store banking service, parcel post, video rental, lottery and touch screen information point. This new cyber-station provides the owner with a new weapon in the battle for customers by being at the forefront of avant-garde

technology as well as embracing the Internet facility as a public relations exercise to attract people in. The concept, recently launched at a motor fair in Bologna, is now on trial in seven of IP's main service stations. It is the next logical step and will soon take off in the UK contends Marcello Minale.

However, the industry has undergone a revolution in the downsizing stakes. There is no expansion of forecourt sites in Europe, companies are into reduction rather than growth. Minale advocates the closure of loss-making stations and the maximisation of consumer potential for the profitable stations. However, this does pose problems with loss of petrol stations leading to isolated communities who have to travel long distances or pay heavily for the fuel that they require.

On the move

A potential solution to this is the transportable service station. Initially designed by Minale Tattersfield & Acton for developing economies, it encompasses the need to meet increased demand from customers as well as incorporating tighter regulations regarding the retailing of fuel. The preliminary concept was developed in 1995 and has been revised and updated to produce the latest model. Called the Mintat G3 it is an easily transportable independent unit with a shop attached. The unit can cope with the use of alternative fuels to petrol and diesel and the regulations surrounding these. For example, fuel such as liquid petroleum gas (LPG) has to be stored separately to petrol and the mobile service station provides the key to this as the design can be easily adapted to clients' requirements. It also overcomes the problems of isolating communities by providing refuelling facilities at certain times and places saving costs on multiple static sites within a certain radius.

Above left: Close-up of Italiana Petroli's multi-media information system designed by Minale Tattersfield, on trial in seven of its service stations and right the multi-media station *in situ*

Initially designed for remote areas, there have been a variety of enquiries for this concept. The obvious one is remote areas with, if necessary, government subsidies to help establish the service within the community. Other enquiries have come from supermarkets that have the space but no money for a service station of their own. By installing a temporary facility in car parks, they can provide a refuelling service on top of their shopping service. Another potential use for the G3 came from the British Army to provide refuelling facilities for the front-line in places such as Kosovo. The G3 is easily transported and installed and can hold up to 30,000 litres of fuel. It is fully operational within 48 hours.

As the tanks are above ground the station is ecologically sound. At present the Swedish Parliament is considering

Left: the original transportable service station designed for Agip. Above: an illustration of the latest version the Mintat G3

Minale Tattersfield's conceptual illustration of the marriage between a forecourt and a high street bank

making the above ground petrol tanks law for all new forecourts – a development Marcello Minale believes will happen to all future forecourts for safety and ecological reasons.

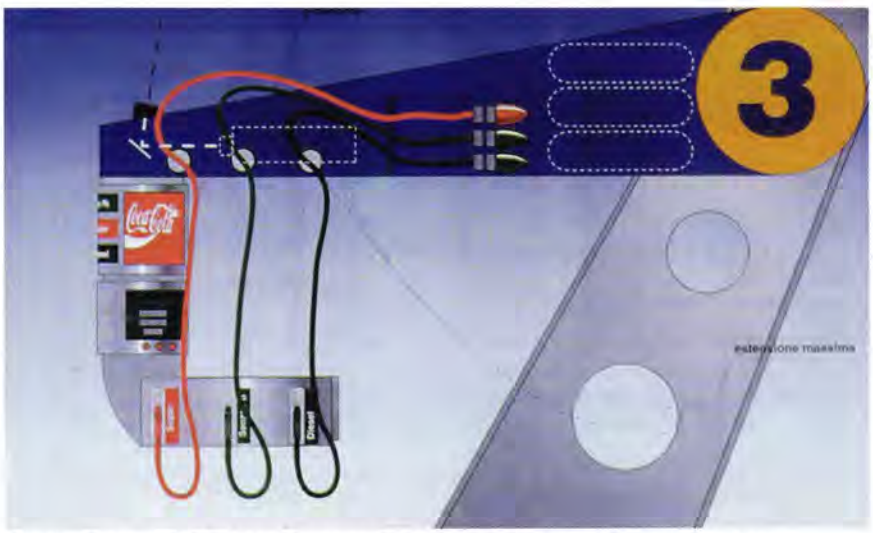
Volume of sales

With the C-store, the reliance on convenience to develop customer loyalty is paramount. To provide a service the retailer has to have goods available at a reasonable price. However, with time-expired items such as bread and milk, it is a case of having to have the stock while anticipating demand from the customer. This can be an expensive way to do business with no guarantee of a required quota of sales to break even. Ultimately, says Minale, it is only service that can inspire customer loyalty, nothing else.

Rather than concentrating on the business of maximising the volume of sales of low price but essential units, another solution to increase profit margins would be to combine the fuel retailing sector with other high price industry's such as the motor retail industry. Bearing in mind the two industries relationship is intrinsic to one another – without one, there would not be the other – and the time and energy invested in selling a car is lower with a higher return than the time and energy required to establish and maintain a C-store in the community. In the car retail market the managers are justified by the amount of cars they sell, however in the retailing of food items there is no requirement for the manager to justify themselves through volume of sales.

Another potentially successful marriage proposal is to combine high street banking facilities with the forecourt. As obtaining cash and filling up with petrol are relatively mundane but essential chores, why not combine the two thus solving such things as parking problems for banking facilities?

An alternative future development could be to incorporate high street bank branches within the forecourt. Incorporating on-hand financial advice from reputed loan providers such as the high street bank would make selling and buying the car easier for both the forecourt manager and the purchaser.



Minale Tattersfield & Acton's suspended pump design which transforms the appearance of the forecourt as well creating numerous possibilities for a revolutionary kind of station decoration as discussed in the article

Spatial distraction

Design is also fundamental in maximising sales with creative use of space. Linear payment points fail to display a variety of goods and limit the ability of the customer to access these goods as well as paying for petrol. Therefore, Minale advocates hexagonal points which give the store three times more surface area and emphasise point-of-sale items coupled with ease of use.

There are also large volumes of unused space in forecourts. For example, the under-canopy area is a vast unused space that has the potential to display advertising to forecourt customers and car occupants. Monitors beside pumps could also be installed to play the latest commercial for soft drinks or film releases or even availability of products instore. At present the forecourt seems to be an underused facility with the potential to become a utopian haven in urban areas.

The future

The car culture is a key denominating factor in maximising the forecourt's potential. The concepts Minale puts forward for the future development of the forecourt point to such sites embracing consumer culture as well as focusing on car usage. The traditional UK high street was not designed with the car in mind and presents difficulties to the car user with parking problems. Therefore out-of-town retail parks with ample parking facilities have proved more popular for regular shopping trips.

Nevertheless, the forecourt can, with investment, exploit this trend. If forecourt companies develop sites by bringing to them the culture of the high street – thus providing an area where people can shop, rest, relax and fill up with petrol – the future of the forecourt can perhaps be more assured than it is at present. In other words, the forecourt of the future has the potential to become an oasis in an urban dystopia.

Fuelling the front line

The UK army's 16 Air Assault Brigade has developed a new, highly portable, fuel transporter and installation package aimed at significantly improving the speed of fuel supply to the front line. *Kim Jackson* reports on a recent training exercise which highlighted the advantages of this new innovation in fuel supply compared with traditional 'static' bulk fuel installations.

The technical field skills training exercise, code-named Exercise Vitaulic Eagle – held at The School of Petroleum, West Moors, Dorset – provided an interesting, if somewhat damp, insight into how the army stores and supplies its fleet with fuel in war and on peace keeping operations.

A number of army petroleum operators in The Royal Logistics Corps, and who also form part of 16 Air Assault Brigade, were put through their paces in installing and dismantling two bulk fuel installations (BFIs) as well as the 16 Air Assault Brigade's new fuel transporter/installation development – the Donaldson Flatrack.

Conventional BFIs

Phase one of Exercise Vitaulic Eagle required the soldiers to set up two bulk fuel installations (BFIs). This involved the deployment of two 136m^3 tank fabric collapsibles (TFCs) – one for the storage of aviation fuel (Avtur), the other for diesel (Dieso) – within a bunded area (see **Figures 1a and 1b**). For the purposes of the exercise, permanently placed concrete bunds were used – in a 'real life' situation, earth bunds would have to be dug. In either case, the bunds are covered by heavy duty plastic sheeting before the tanks are placed on top. These coverings act as a secondary containment to the bunds.

The required piping, hoses and manifolds were then connected, and the tanks filled, in this case with 'training fuel' – poor quality diesel that had been repeatedly used and contaminated and no longer fit for use as a fuel.

A filter water separator is also connected to the fuel outlet hose when handling aviation fuel. This removes any water that may have got into the fuel during storage, and which could then freeze once in the aircraft and cause a potentially fatal accident.

The BFI also requires an emergency water supply (EWS) to be available. In addition a number of 90-litre foam fire extinguishers are strategically located about the site, to be used in the event of a fire – these are tested in the field every two weeks and the soldiers undergo regular refresher firefighting training.

The BFI was filled from a 22m^3 capacity tanker in the training exercise. It took around 40 minutes for the fuel to be transferred to the TFC. However, such installations can also be filled via a pipeline, from ship-to-shore or by a floating 'sausage' tank on inland waterways.

As Captain Toni Martin of 16 Air Assault Brigade explained: 'All the equipment required to set up a BFI is modular in nature and fuel-dedicated in order to avoid contamination. It is

ready to go to wherever it is needed at a moment's notice.' Two sizes of TFC are used – 136m³ capacity and 45m³ capacity – enabling any size of BFI to be set-up. When built in the field during a military campaign, the tanks are placed alongside one another in a long line which is then camouflaged. A number of 'lines' are geographically dispersed in order to minimise losses in the event of an enemy attack.

Once the BFI is set up, the army often secures a contract with a refinery in the host country to provide source fuel. However, in order to ensure security of supply, the army also has to make sure that it still has access to its own fuel supply if required – perhaps if the refinery is bombed, or if the operator decides to renege on the contract.

The BFIs are designed to be 'easily' dismantled after use. Although this can be done with just eight people, ten are usually required – particularly if it is wet and windy as the plastic sheeting covering the bunds is extremely heavy and unwieldy when rain-sodden. The sheeting also has to be regularly pulled out of the bunds to empty out collected rainwater prior to the TFCs arriving and being filled with fuel (see **Figure 2**).

New innovation

'The 16 Air Assault Brigade is an air manoeuvre brigade and as such, its equipment needs to be highly portable,' comments Captain Naomi Wakelin. The Brigade is soon to take delivery of the new Apache helicopter, a move which acted as the catalyst to the development of the Donaldson Flatrack fuelling package which will improve fuel support in the future.

The system comprises essentially the same equipment as that described for the traditional 'static' BFIs – although only 45m³ capacity TFCs are used as these provide more flexible capacity combinations than the larger size. The main difference is that the equipment is 'pre-packed' on a flatbed (see **Figures 3a and 3b**), making it more portable and far quicker to install as it is less cumbersome.

Captain Wakelin claims that the system requires just 10 minutes to set up versus two hours for the BFI demonstrated in Exercise Vitaulic Eagle. Indeed, even though the soldiers in the exercise had never seen the Donaldson Flatrack set-up prior to the exercise it took them just 13.5 minutes to install it first time round.

A pump and filter water separator (left and right on **Figure 3b**) sit at one end of the flatbed, with the hoses, couplings, manifolds etc stored on top in cages. Two TFCs and the plastic sheeting

Figures 1a (left) and 1b (above): The bulk fuel installation's flexible tank was filled from a 22m³ capacity tanker in the training exercise

for placing on top of the bunds are flat-packed in front. The whole package weighs approximately 8 tonnes.

The system can be carried either by a dismountable rack off-loading and pick-up system (DROPE) vehicle (see **Figure 4**) or slung under a helicopter for transport direct to the front line. Once 'dropped' in position, the TFCs are rolled out, the hoses and pump connected, and the system is ready to receive fuel. Fuel can then be dispensed, after passing through the filter water separator, to whatever vehicle requires it – be it direct to a helicopter, or into road tankers or tactical aircraft refuellers (TARs). (It is worth noting that almost all army vehicles are designed to run on aviation fuel in order to simplify the fuelling support process.)

Although trialled successfully with a Chinook helicopter, the Donaldson Flatrack has yet to be used in a military campaign. However, both Captain Wakelin and Captain Martin are confident that it will prove itself in the field. 16 Air Assault Brigade is the UK's only air portable brigade at present. As a result, it is unlikely that other units will have such a need for the Donaldson Flatrack concept, relying more instead on the traditional BFI used for longer-term

Figure 2: The plastic sheeting covering the bunds is extremely heavy and unwieldy, particularly when rain-sodden

Figures 3a and 3b: The Donaldson Flatrack fuelling package with pump (left of photo) and filter water separator (right)

campaigns such as Bosnia. That said, other brigades have expressed an interest in the concept and, as petroleum operators often transfer between units, all will have to be trained in its use.

The concept of flying fuel forward is not entirely new. In the past, air portable containers (APCs) have been used. These big, black, ball-shaped tankers hold up to 2,000 litres of fuel and are carried suspended under a helicopter. However, only four or five can be carried in one flight – limiting the fuelling support capacity to just 10,000 litres.

Future development

Although proved in the field, the Donaldson Flatrack fuel transport/installation concept is to be refined in order to further improve efficiency of fuelling support. The issue of interoperability between hoses and coupling is being addressed and it is planned to physically weld the pump and filter water separator directly to the flatbed in order to facilitate their being directly connected rather than linked by a hose installed in the field. There are plans to increase the number of direct connections in the system in order to minimise the overall weight of couplings and hoses and to reduce further the installation time.

Quality testing

Regardless of which type of fuelling installation is used, fuel is tested prior to entering the TFCs in order to reduce testing requirements before transfer. That said, a minimum number of tests are still required in order to check for water and/or contaminants that may have entered the fuel during storage (this is less of a problem with the Donaldson Flatrack system as the fuel stored in this is unlikely to be standing around for long).

The portable petroleum testing equipment used by the army to test the standard of fuel when on operations is neatly packaged in a trunk and can easily be transported to a fuel installation where it is set up in a 'laboratory tent'. (For the purposes of the demonstration, however, *Petroleum Review* was shown the on-site lab facility (see **Figure 5**).

A chemical laboratory assistant (CLA) usually tests three parameters in the field: flashpoint, density and FSII (fluid system icing inhibitor; a chemical added to aviation fuel used by the military which prevents any water contamination from freezing in the fuel). If any problems are indicated by the tests, the CLA then conducts distillation tests to work out exactly what the problem is and how to combat it.

A number of options are available if the fuel is shown to be contaminated. If sourced from a local contractor, it will be returned and a new supply requested. However, if this is not possible and the fuel is shown to be contaminated with water, it can be left for 24 hours for the water to settle, which can then be drained off. Alternatively, the contaminant can be 'drowned out' (for example by adding more uncontaminated fuel to it) or the fuel can be reblended.

Although more 'sophisticated' test methods have been developed for assessing fuel quality, such as FTIR (Fourier Transform Infra-red) analysis, problems have arisen when used in extremely cold and damp conditions and such tests have yet to be proved on the military field, commented Norman Rake, Chief Chemist in charge of the West Moors lab facility. However, he is confident that such set-ups will become more common once the 'bugs have been ironed out'.

Figure 4: The Donaldson Flatrack system can be carried by a dismountable rack off-loading and pick-up system (DROPE) vehicle.

Figure 5: Field petroleum testing equipment

Asian tigers target gas and foreign investors

The Asia-Pacific region as a whole is a net importer of hydrocarbons, in particular oil. Although various government incentives aimed at encouraging foreign investment in exploration and production – focusing in particular on the search for gas in support of a growing gas-fired power base – have proved successful with a number of finds being made, production growth still tends to fall short of demand in many countries in the region.

The financial problems experienced by the Asia-Pacific countries in 1997/1998 have undoubtedly slowed economic growth in the region – some countries more so than others. Prior to the economic crisis, annual growth was averaging between 6% and 8%. Recent environmental disasters, such as the raging fires in Indonesia at the end of 1998 and the earthquakes in Taiwan a few months ago, have done little to improve matters.

Gas is the key exploration driver in the Asia-Pacific. Analysts believe that significant demand exists, although it is currently suppressed due to the lack of a regional gas grid. At present, gas only accounts for some 10% of the region's primary energy supply, compared with 20% in Europe and 25% in the US.

In an innovative bid to more effectively combine gas assets and meet the growing demands of the Asia-Pacific gas market, Malaysian national oil company Petronas recently unveiled a strategic alliance under which it and Amerada Hess of the US will each take a 25% stake in UK company Premier, which has extensive southeast Asian gas interests. The alliance will allow the three companies to knit together their assets and become a major player in the Asia-Pacific gas arena. According to some industry pundits, the deal illustrates how state-owned companies can diversify internationally and work more closely with western multinationals – a trend that is expected to develop strongly over the next decade.

In preparing this review of recent trends and upcoming oil and gas developments in the Asia-Pacific, we have drawn extensively on recent reports from Edinburgh-based consultant Wood Mackenzie and the UK's Infrastructure and Energy Projects (IEP) Directorate. *Petroleum Review* would like to thank all concerned for their help and assistance.

Bangladesh

Bangladesh has a substantial amount of high quality natural gas reserves (14,114bn cf proved and probable in 1997), mainly located in the east of the country, which supply approximately 70% of domestic demand. The country produced some 275bn cf of gas in 1997.

Country	Oil Res bn b	Change 97/98	R/P ratio Years	Oil Prodn ,000 b/d	Growth 97/98 %	Oil Consmpt ,000 b/d	Growth 97/98 %	Gas Res tn cm	Change 97/98	R/P ratio Years
Australia	2.9	1.1>	13.5	640	–5.4	830	1.1	1.26	0.71	41.4
Bangladesh	–	–	–	–	–	60	3.7	0.3	–0.01	38.4
Brunei	1.4	n/c	24.2	155	–3.8	–	–	0.39	–0.01	35.6
China	24	n/c	20.5	3,205	–0.2	4,110	2.5	1.37	0.21	62.1
India	4	0.3<	14.5	780	–1.8	1,820	3.4	0.54	0.05	22.9
Indonesia	5	n/c	9.2	1,525	–1.8	920	–4.9	2.05	n/c	29.9
Japan	–	–	–	–	–	5,550	–4.2	–	–	–
Malaysia	3.9	n/c	14.8	745	0.8	405	–6.3	2.31	0.05	56
Myanmar	–	–	–	–	–	–	–	–	–	–
New Zealand	–	–	–	–	–	130	0	–	–	–
Papua New Guinea	0.3	n/c	11.5	80	3.9	–	–	0.15	–0.11	100+
Pakistan	–	–	–	–	–	350	6.3	0.61	0.02	38.8
Philippines	–	–	–	–	–	380	–3.2	–	–	–
Singapore	–	–	–	–	–	560	0.5	–	–	–
South Korea	–	–	–	–	–	2,020	–15.4	–	–	–
Taiwan	–	–	–	–	–	765	3.4	–	–	–
Thailand	–	–	–	–	–	720	–8.8	0.35	0.15	23.8
Vietnam	0.6	n/c	6.6	250	24.9	–	–	0.19	0.02	100+
Other[a]	1	n/c	11.6	265	–2.8	320	5.1	0.65	0.01	68.3
Total Asia-Pacific (A-P)	43.1	0.8>	15.9	7,645	–0.4	19,125	–2.7	10.17	1.09	41.4
Total World	1,052.9	6.7>	41	73,105	1.4	71,530	0.1	146.39	1.63	63.4
A-P as % of world	4.09	–	–	10.46	–28.57	26.74	–	6.95	–	–

Asia-Pacific Production, Consumption and Refinery Capacity

Source: BP Statistical Review 1998, *interpreted by* Petroleum Review
[a] Totals for countries not individually itemised

Oil reserves are considered insignificant. According to IEP it has been estimated that a minimum growth rate of about 10%/y in gas production will be required to meet the average gross domestic product (GDP) growth target of 7%/y as part of the country's five-year plan which aims to boost domestic gas production to 1,100mn cf/d in 2000.

Production from Sangu – Bangladesh's first offshore gas field with estimated reserves of 850bn cf – came onstream in June 1998. The $250mn development included the construction of a 45-km pipeline linking Sangu to offshore facilities near Chittagong. Occidental and Unocal produced first gas from the Jalalabad field on block 13 in northeast Bangladesh in mid-1999. Estimated field reserves are 1.6tn cf of gas. The field is understood to supply around 12% of domestic gas demand and is said to have doubled the country's natural gas liquids output.

Future developments include the Shahbazpur field in the south of the country which is due onstream in 2000/2001 as part of US company Unocal's $700mn Western Region Integrated Project. The project involves the development of the 350bn cf gas field in south Bhola and the construction of a 150-km pipeline linking the field to a 350-MW power plant in south Khulan to the southwest.

Brunei

Brunei is a mature oil and gas province and is currently one of the Asia-Pacific's larger oil producers and one of the world's largest LNG exporters. It is said to have one of the highest per capita incomes in the world, based primarily on oil and gas which accounts for approximately 60% of the value of gross domestic product (GDP) and the bulk of the country's exports.

Exploration drilling increased by two wells in 1998 to a total of seven, according to Wood Mackenzie. No significant discoveries were made, although the Meragi-1 ST well drilled in the deep waters of the 3rd Offshore Area was suspended in September as a gas discovery. Two seismic programmes were undertaken during 1998: 3D was shot over the Seria field with the aim of extending field life, the other 3D programme was conducted in the deep waters offshore Brunei.

The bulk of Brunei's hydrocarbon discoveries and currently producing fields are located offshore. In 1998, the Champion field produced approximately 38% of the country's total oil output, Southwest Ampa 30%, Seria 9%, Magpie 7%, Fairley and Fairley Baram 6%, Iron Duke 4.5%, Rasau 3.5% and Gannet 1%. Nearly 63% of gas output was accounted for by the Southwest Ampa field, 11% by Fairley Baram, Champion 9% and Gannet 9%. Other gas producing fields are Peragam and Iron Duke.

Oil production fell by some 8,000 b/d to 157,000 b/d during 1998 compared with a year earlier, while gas output remained at a similar level (1,024mn cf/d) to that seen in 1997.

The Maharaja Lela field came onstream in March 1999 and is expected to reach a peak rate of 9,500 b/d of liquids and 105mn cf/d of gas by 2000. Gas production will be pulled back to a lower plateau level of 72mn cf/d in 2003 under the terms of a gas sales agreement signed in 1997. The field lies in both Brunei and Malaysian waters. However, its compartmentalised nature enables Elf to develop those reserves in Brunei and Sabah Shell those in Malaysia. Reserves are put at 670bn cf of gas, 18.5mn barrels of condensate and 9.2mn barrels of oil. Up to 10 appraisal and development wells may ultimately be drilled on the $247mn project. Both gas and liquids are transported to shore, from where the gas is supplied to the LNG plant at Lumut.

Brunei Shell (BSP) plans to develop the Selangkir and Egret fields by year-end and 2003 respectively. Development of Selangkir will be by a single wellhead platform tied into production facilities at Iron Duke. Gas will be exported via the Champion complex to the Lumut LNG plant. Some 16 wells are expected to be drilled from the Egret oil and gas project. Approximately 80% of Egret output will be gas, although, if demand for gas is not as high as expected, an initial oil phase may be considered, comments Wood Mackenzie.

Other future development prospects include the Mampak and Merpati discoveries.

Cambodia

The disappointing exploration programme seen in Cambodia over recent years continued in 1998 with the drilling of Koah Pring-1 which encountered only shows of oil and gas. The

Country	Gas Prodn bn cm	Growth 97/98%	Gas Consmpt bn/cm	Growth 97/98%	Refinery Cap ,000 b/d	Growth 97/98%	Refinery T'pt ,000 b/d	Growth 97/98%
Australia	30.6	2	20.3	3.4	910	2.1	865*	–1
Bangladesh	7.8	3.2	7.8	3.2	–	–	–	–
Brunei	11	–3.2	–	–	–	–	–	–
China	22	–0.7	19.3	n/c	5,020	10.1	3,220	4.4
India	23.5	13.5	23.2	9.2	1,235	n/c	–	–
Indonesia	68.4	3	31.9	4	930	n/c	–	–
Japan	–	–	69.5	6.7	5,090	0.6	4,210	–2.5
Malaysia	41.3	7.6	20.4	20.1	–	–	–	–
Myanmar	–	–	–	–	–	–	–	–
New Zealand	–	–	4.4	–14.2	–	–	–	–
Papua New Guinea	–	–	–	–	–	–	–	–
Pakistan	15.8	3.1	15.8	3.1	–	–	–	–
Philippines	–	–	0.05	60	–	–	–	–
Singapore	–	–	1.5	n/c	1,245	n/c	–	–
South Korea	–	–	15.6	–6.3	2,315	n/c	–	–
Taiwan	–	–	6.4	24.3	–	–	–	–
Thailand	14.9	5.5	15.7	8	–	–	–	–
Vietnam	–	–	–	–	–	–	–	–
Other[a]	10.5	–3.2	4.6	8.3	2,645	4.8	7,950	–2.8
Total Asia-Pacific (A-P)	245.8	3.8	259	5.4	19,390	3.4	15,380	–
Total World	2,271.8	2.2	2,240.5	1.3	80,440	–	67,490	0.5
A-P as % of world	10.82	–	11.56	–	24.1	–	22.79	0

Asia-Pacific Production, Consumption and Refinery Capacity

Asia-Pacific regional round-up

Country/Field	Operator	Oil or Gas output	Start-up date	Oil Res. (mn b)	Gas Res. (bn cf)	Capex ($mn)	Production system
BANGLADESH							
Semutang	Cairn	gas	2000?	–	400	–	–
Shahbazpur	Unocal	gas	2000+	–	350	255	onshore
Sub Total				**–**	**750**	**255**	
BRUNEI							
Asam Paya*	BSP	oil	2000	20	25		unitisation with Rasau
Maharaja Lela (Blk B)*	Jasra/Elf Aquitaine	oil/gas	Mar-99	28	670	250	plat., gas to Lumut LNG
Bungam	BSP	–	–	–	–	–	–
Egret	BSP	oil/gas	2003	–	–	–	3 plat.
Mampak	BSP	oil	eval	–	–	–	–
Merpati	BSP	–	eval	–	–	–	–
Selangkir	BSP	gas	end-99	–	300	50	plat. via Iron Duke
Sub Total				**48**	**995**	**300**	
CHINA							
Dongfang 1-1	Nanhai West Oil Corp	gas	2001	–	3,000	700	plat.
Huizhou 32-5*	CACT	oil	Feb-99	17	–		subsea to Huizhou 26-1 plat
Ping Hu (Pingu)*	Shanghai Pet/CNOOC	gas	1998	30	210	580	plat.
Qikou 17-1*	CNOOC	oil/gas	1998	–	–	–	Boxi area dvlpmt.
Qikou 17-2	CNOOC	oil/gas	2001	–	–	–	Boxi area dvlpmt.
Qinhuangdao 32-6	CNOOC/Arco/Texaco	oil	2002	200	–	–	–
Nanpu 35-2	CNOOC	oil	2004	100	–	–	–
Suizhong 36-1 (Ph 2)	CNOOC	oil	2000+	212	–	1,300	EWT (98) then 3 plat.
Ursa	Santa Fe		2002	–	–	–	FPSO
Wei 12-1	Nanhai West	oil	1999	50	–	360	plat.
Zhao Dong	Apache	oil	2000	50	–	230	plat.
Sub Total				**659**	**3,210**	**3,170**	
INDIA							
PY-1	Mosbacher	gas	1999/00	–	280	–	plat.?
Sub Total					**280**		
MALAYSIA							
Angsi	EPMI/Petronas Carigali	gas	2002	–	–	–	180-km p/line to Kerteh
Asam Paya	Shell Malaysia	–	–	–	–	–	Extn of Maharaja Lela
B11, off Sarawak	Sabah Shell?	–	2003	–	–	–	–
B12, off Sarawak	Sabah Shell?	–	2006	–	–	–	–
E6, off Sarawak	Sabah Shell Carigali	–	2002	–	–	–	–
E8, off Sarawak*	Shell/Petronas Carigali	–	end-2000	–	–	–	plat. + comp.
F13, off Sarawak	Shell/Petronas Carigali	–	2005	–	–	–	plat. (comp.)
F14, off Sarawak	Shell/Petronas Carigali	–	2004	–	–	–	plat.
F23, Sw satellite	Shell/Petronas Carigali	–	–	–	–	–	–
F28, off Sarawak	Shell/Petronas Carigali	–	2002	–	–	–	plat.
F29, off Sarawak	Shell Malaysia	–	mid-2011	–	–	–	plat.
G7, off Sarawak	Shell Malaysia	–	mid-2011	–	–	–	–
M4, off Sarawak	Shell Malaysia	–	2002	–	–	–	plat.
Belumut	EPMI	oil	2003	40	–	200	plat.
Beryl	Petronas Carigali	oil	2008	–	–	–	–
Bintang	Esso Malaysia	gas	2002	25	1,500	800	plat.
Block P (Tapis E)*	Esso Malaysia	oil	Feb-99	–	–	–	plat.
Blocks PM5,8,9,10*	Esso Malaysia	gas	1998+	–	–	–	Peninsular Gas Util.
Bunga Orkid	Lundin Oil (ex IPC)	–	2005	15	360	–	plat.
Cili Padi*	Occidental	–	end-98	–	800?	–	plat.
Jintan 1 (1st SK8 Dev)	Occidental	–	2001	75(cond)	2,300	–	2 plat.
D35*	Sabah Shell	oil	end-98	–	–	–	2 drilling plat.
Laila	Petronas Caragali	oil	2011	–	–	–	–
Larut Area	Esso Malaysia	oil/gas	2001	75	–	375	plat.
Lawang/Langat	Esso Malaysia	oil	2003	40	–	200	plat.
MAS fields (PM12)	Petronas Carigali	oil	1999	50	–	120	FPSO + 3 w'head plats.
PM3 FFD*	Lundin Oil (ex-IPC)	gas	1997+	110	1,300	720	platform, floater
Resak Beranang*	Petronas Carigali	gas	1Q99	15	1,500	650	3 bridge-linked plats.
SK8 fields	Occidental	gas	2003	80	5,200	700	plat.
SK10 fields	Nippon Oil	gas	2005	50	1,300	477	central plat., subsea
Yong/Raya*	Esso Malaysia	oil	1998	50	–	100	w'head plat, to Seligi A
Serudon/S Raya	Esso Malaysia	oil	2001	12 (liqs)	–	–	tie backs to Yong/Raya
Sub Total				**637**	**14,260**	**4,342**	
MALAYSIA–THAILAND JDA							
A18 Fields	CTOC/Arco	gas/oil	2005	120	7,700	1,750	PH1 Cakerawala dvlpmt.
B17 Fields	Petronas	gas	2005	–	–	–	Muda plat. + p/line link
Sub Total				**120**	**7,700**	**1,750**	
MYANMAR (Burma)							
Yadana*	TOTAL	gas	Jul-98	–	7,300	1,150	8 plat.
Yetagun	Premier	gas	1H-00	50(cond)	1,800	635	2 linked plat., 8 subsea
Sub Total				**50**	**9,100**	**1,710**	

Current and Planned Field Developments in the Asia-Pacific Region

poor results of the well prompted Idemitsu to relinquish blocks III and IV. Enterprise relinquished blocks I and II in the Khmer Trough later that year.

Some operators remain optimistic, however, for example with Woodside Petroleum signing production sharing contracts for blocks V and VI in the Khmer Trough in the eastern part of the Gulf of Thailand in 1998. Under the terms of the $3mn agreement, Woodside is to undertake a 2D seismic acquisition programme on the blocks over two years.

China

In order to speed up the approval and subsequent development of oil and gas projects in China, the government 'split' the country into two specific geographical areas in 1998, each with its own government organisation responsible for sponsorship of projects in both the upstream and downstream sectors. China National Petroleum Corporation (CNPC) was selected to administer to the region covering northeast, northwest and southwest China, while China Petroleum Corporation (Sinopec) was selected to look after southeast China and the region running along the coast down to Guangzhou.

China produces around 3mn b/d of crude oil and imports nearly 400,000 b/d (equivalent to 15% of domestic demand). Oil imports are expected to rise to 1mn barrels by 2000, according to IEP, although it has been reported that CNPC plans to expand its overseas operations to produce between 300,000 b/y and 400,000 b/y of crude oil by 2010. The country has been slow to open up more prospective fields. This, coupled with complaints that CNPC (which is responsible for negotiating new exploration agreements) has been overly selective in providing seismic data, and some poor drilling results over the past few years, has led to some foreign investors being cautious about entering this arena. However, China has been striving to encourage some $2bn in foreign investment as part of its ninth five-year plan (1996–2000).

Offshore China National Offshore Oil Corporation (CNOOC) is the monopoly exploiting China's oil and gas reserves. During 1H1997 it produced 2bn cm of gas and 8.5mn tonnes of oil. The company hopes to boost output to 10bn cm/y of gas and 16mn t/y of oil by 2000 (50mn–60mn tonnes by 2010). There are nine proven fields in the South China Sea, eight of which are already in operation. Of major importance was the discovery of a major gas reserve in the Pearl River Mouth Basin and high quality oil in Bohai Bay in 1997. More recently Phillips Petroleum confirmed a major oil discovery in Bohai Bay. The three wells drilled so far in the northern section of the field indicate potentially recoverable reserves of 400mn boe, the southern end of the field has yet to be tested.

Future prospects to be developed include the Qinhuangdo 32–6 oil field in central Bohai Bay, said to be one of the region's largest fields with an estimated 200mn barrels of recoverable reserves. During 1998 Texaco and Arco reached an agreement with CNOOC to develop Qinhuangdo 32-6. Both Texaco and Arco bring experience of developing heavy oil projects and, according to Wood Mackenzie, success of the project could point the way to an increased collaborative approach to future foreign participation in offshore China. Qinhuangdo 32-6 is due onstream in 2002, with production forecast to reach a plateau of 60,000 b/d.

Some of the largest Chinese reserves are being developed in the Pearl River Mouth Basin – in 1996 some 11mn tonnes were produced in this one area where foreign partner joint venture developments predominate. There has been renewed interest in this region over the past 18 months, with acreage being awarded to Triton, Santa Fe–Snyder, Kerr-McGee and Cairn Energy and Phillips Petroleum.

Much attention is focusing on gas exploration offshore – encouraged by the success of Arco's Yacheng 13-1 field located southwest of Hainan Island which produces nearly 90% of China's 372mn cf/d offshore gas production. Larger gas reserves are thought to exist around the nearby Dongfang blocks. However, in the medium- to long-term, China is expected to be short of energy – it has been predicted that gas consumption will rise from 22bn cm in 1998

Country/Field	Operator	Oil or Gas output	Start-up date	Oil Res. (mn b)	Gas Res. (bn cf)	Capex ($mn)	Production system
PAPUA NEW GUINEA							
Gobe and SE Gobe	Chevron	oil	mid-98	95	–	–	link to Kutubu pline
Sub Total				**95**	**–**	**–**	
PHILIPPINES							
Malampaya	RD/Shell	gas	2001	120 (liqs)	3,400	1,800	385,000 b concrete plat
Sub Total				**120**	**3,400**	**1,800**	
THAILAND							
Benchamas/Pakakrong*	Chevron	gas/oil	Aug-99	38	320	190	4 plat. + FSO
Jakrawan*	Unocal	gas	1998	10	500	–	2 plat. + 10 w'head
Kaphong*	Unocal	gas	1998	–	–	–	–
Maliwan	Chevron	oil/gas	late-2001	–	–	–	–
Pailin phase 1*	Unocal	gas	Aug-99	55	2,300	375	Central plat. + 5 w'head
Pailin phase 2	Unocal	gas	mid-2002	as above	as above	–	Central plat. + 25 w'head
Pladang*	Unocal	gas	1998	5 (cond)	115	–	–
Plamuk*	Unocal	gas	1998	13 (cond)	193	35	2 plat. via Surat field
Ton Sak*	TOTAL	gas	1998	9	500	120	3 w'head plat.
Trat	Unocal	gas	Sep-99	8	500	100	plat.
Sub Total				**138**	**4,428**	**820**	
VIETNAM							
Lan Tay/Lan Do	BP/Statoil	gas	2002	10	2,000	870	plat.
Rang Dong	JVPC	oil	Aug-98	325	–	120 (Ph1)	EPS whead plat., FPSO
Ruby	Petronas Carigali	oil	Oct-98	200	–	65 (Ph1)	Min fac. plat., FPSO
Sub Total				**535**	**2,000**	**1,055**	
GRAND TOTAL				**2,402**	**46,123**	**15,277**	

Key: * – already onstream

Source: Wood Mackenzie and Petroleum Review

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to more than 80bn cm by 2010. LNG imports are expected to be a feasible solution and a number of foreign companies have expressed an interest in developing import infrastructure in areas such as Shanghai and Guangzhou.

New offshore developments coming onstream over the past year include the Ping Hu field in the East China Sea and Qikou 17-1 in the Bohai Gulf. Ping Hu is a gas field with recoverable reserves put at 210bn cf of gas and 30mn barrels of condensate. The Huizhou 32-5 field, with 17mn barrels of recoverable oil reserves, came onstream in February 1999.

Onshore production of liquids fell by 5,000 b/d in 1998 to 2.87mn b/d – the result of a number of wells being shut-in due to summer flooding in northeast China. Low oil prices also led to some wells being shut-in. In the mature fields of the North China Basin and Songliao Basin, enhanced oil recovery techniques continue to limit production declines. Gas production onshore averaged 1,772mn cf/d in 1998, up 25mn cf/d on the 1997 figure. Around 41% of this came from the Sichuan Basin.

A TransAsia pipeline has been proposed by the East Asia Consortium (comprising Exxon, CNPC and Mitsubishi) to import oil and gas from Turkmenistan, Uzbekistan and Kazakhstan. It is believed that the 8,000-km plus pipeline – which will run West–East across China, and then underwater to Korea and Japan – will offer a more politically stable gas route from the Southern Republics than to Pakistan via Afghanistan (see Pakistan review, p25). It is expected that the technically difficult project, carrying up to 30bn cm/y of gas, would cost between $10bn and $14bn and take five years to complete. Recent evaluations, however, have suggested that the pipeline from Kazakhstan is probably uneconomic (see box, p27).

Looking downstream, Sinopec announced in 1998 that no new oil refineries would be built in China for the next three years, instead the emphasis would be placed on the refurbishment, upgrading and modernisation of existing facilities. IEP reports that total investment in technological renovation will exceed that spent on construction over the next four years. Foreign companies have continued to invest in the petrochemicals sector over the past year, including Shell which is building a 800,000 t/y complex at Nanhai – said to be the largest joint venture between China and a foreign company to date.

India

India has had limited success in attracting international oil and gas companies to participate in oil and gas exploration projects in the past. However, it recently changed its fiscal regime in a bid to increase exploration activities, boost domestic production and reduce its dependence on imports, which are sourced primarily from the Middle East under long-term contracts. See the article on p34 for an overview of recent developments in the country.

Malaysia

The economic crisis hit Malaysia hard and its GDP growth was forecast to be around 0.9% in 1999 after having been as high as 9.6% in 1995. The country has significant natural oil and gas reserves and although oil production has begun to decline slightly on an annual basis, gas output continues to increase. The country is a major LNG exporter (currently ranked third in the world), primarily to Japan and South Korea.

Oil is produced from offshore fields primarily located near Peninsular Malaysia. Major projects include the Petronas/Shell-operated Baram, Baronia and Tukau fields, the Petronas/Esso-operated Tapis, Seligi and Guntong fields, and the Petronas-operated Duland field.

Current levels of activity in the oil and gas sector are expected to remain high, in support of the government's plans for full industrialisation and development of gas-based power generation projects. Domestic consumption of both oil and gas continues to increase and in 1997 the government implemented a number of tax cuts in a bid to encourage further foreign participation in oil and gas project developments, in particular on marginal projects. The government hopes that foreign firms will provide 31% of investment in this sector over the next five years.

Despite the difficult economic conditions facing southeast Asia, six new PSCs were awarded in 1998, three in Sarawak and three in Peninsular Malaysia. On a very positive note, there were three new entrants – including Amerada Hess (assuming a 70% stake in PM 304 and an 80% interest in SK 306) and Santa Fe (signing block PM 308) – into the upstream sector that year.

Two oil fields – Yong and Raya – came onstream during 1998, the first to be developed on the EPMI-operated PM 8 block. The fields utilise a 1,250-tonne, unmanned wellhead platform, Raya A, which is tied into the Seligi-A central processing platform via a 26-km, 16-inch production line and 8-inch gaslift line which will also be used for power generation and for future field developments in the area. The Raya platform will also act as a gathering and gas distribution platform for future developments such as the nearby 12mn barrel Serudon and South Raya satellite fields due onstream in 2001. No new gas developments came onstream in 1998.

Three fields were given development approval in 1998: Larut on block PM 5, Shell's F23 SW satellite and Asam Paya which straddles the Brunei/Malay border (see Brunei review, p21). Key developments for 1999 include the Malong, Anding and Sotong (MAS) discoveries in PM 12 offshore Peninsular Malaysia. Combined recoverable reserves are put at 50mn barrels. Development is via the 45,000 b/d capacity *M/T Hitra* FPSO and unmanned wellhead platforms on each of the three fields.

The Lundin Oil-operated PM3 development continued to produce oil from the Bunga Kekwa field under an early production system (EPS). However, Phase II of the project, aimed at significantly increasing liquids production and commencing gas output, has suffered a set-back and first gas has been delayed from the originally planned mid-2000 target.

EPMI and Petronas Carigali signed a new Gas PSC in November 1998, under which EPMI will relinquish the remaining 13 undeveloped gas fields, including Angsi and Bintang, discovered on the 1976 PSC. These fields and nine gas caps from the PM 9 and 1995 PSCs are covered under a new PSC, under which Petronas assumes a 50% share in the fields, operating those in the south while EPMI will operate those situated nearby its existing Jerneh ad Lawit fields.

Recoverable gas reserves for the new PSC are 12.6tn cf and will enable the EPMI/Petronas Carigali joint venture to supply the Peninsular Gas Utilisation (PGU) system with up to 1,300mn cf/d of gas until 2027, thus ensuring long-term security of supply (see *Petroleum Review*, July 1999). Under the terms of the agreement, some 162 new wells will be drilled and 88 workovers conducted. It is also planned to develop the Angsi field, with first production expected in 2002.

In July 1998, Shell and Occidental unveiled plans for a major cross-border oil and gas asset swap. Under the terms of the deal, Occidental acquired Pecten Yeman Masila (a wholly owned sub-

sidiary of Shell) and Compania Shell de Colombia (one of Shell's subsidiary companies in Colombia). In exchange, Shell received all the stock in Occidental Petroleum (Malaysia) and 90% of the stock in Occidental LNG (Malaysia). It also acquired Occidental's subsidiary in the Philippines, which includes a 50% stake in the Malampaya/Camago development (see Philippines review, p26).

The proposed Exxon-Mobil merger also involves assets in Malaysia. Exxon's core producing area in southeast Asia is offshore Peninsular Malaysia, where the company is a major oil and domestic gas producer. Mobil does not hold any commercial assets in the country – the only overlap in the two companies operations being in four deepwater blocks offshore Sarawak.

More recently, national oil company Petronas announced a strategic alliance under which it and Amerada Hess of the US will take a 25% state in UK oil company Premier which has extensive southeast Asian gas interests. The alliance will allow the three companies to knit together their assets and become a major player in the Asia-Pacific gas arena. According to some industry pundits, the deal illustrates how state-owned companies can diversify internationally and work more closely with publicly quoted western multinationals – a trend that is expected to develop strongly over the next decade.

Malaysia–Thailand Joint Development Area (JDA)

This region has recently been an active area for gas exploration and production, with reserves estimated at 10tn cf. The area is governed by the Malaysia-Thailand Joint Authority (MTJA) and contracts are based on the Malaysian production sharing model. Fields discovered to date include Cakerawala, Suirjaya, Bulan, Bumi and Bumi East.

A number of developments in the area were seen in 1998, the key event, according to Wood Mackenzie, being the signing of a Heads of Agreement for the sale of 390mn cf/d and 250mn cf/d of natural gas from the Cakerawala and Muda, and Jengka, fields in blocks A-18 and B-17 to Malaysia and Thailand from 2001 and 2002 respectively. However, given the economic downturn in the region and competition from cheaper sources of gas, timescales for the development of the JDA gas reserves are uncertain.

In September 1999, the Thai government approved a joint venture with Malaysia to build a $1bn, 220-mile gas pipeline linking the JDA to shore in the Songkhla province in southern Thailand. Construction of the pipeline is due to comment in 2001.

Myanmar (Burma)

Upstream activity in Myanmar declined in 1998 with only four exploration and appraisal wells drilled by Premier on its M12/M13 acreage and one new licence award – a consortium of two UK companies, Westborne Oil and A&T Exploration, and Capital Investment Development Corporation of Israel signing a reactivation of suspended fields contract for the RSF-8 onshore block which includes the Yenanama field. The year also saw Arco exit the country's upstream sector.

The key event of 1998 was the coming onstream of the 7.3tn cf Yadana field in July at an initial rate of 5mn cf/d instead of the planned initial rate of 65mn cf/d due to problems installing the first two 200 MW gas turbines at the Ratchaburi power plant in Thailand. Full field production is expected to reach 650mn cf/d, of which 525mn cf/d is contracted to PTT in Thailand. PTT recently agreed a revised gas sales contract with the Yadana partners, under which the company is to take non-enriched gas from August 1999 to December 2006 in exchange for price reductions for the contract gas quantities it was supposed to have received from August 1998 to October 1999 but which it could not accept due to the delayed construction of the Ratchaburi power plant.

Oil production in Myanmar during 1998 averaged 11,000 b/d, in line with the previous year's output, the bulk coming from the MOGE-operated Mann and Ktaukshabin fields. Gas production averaged 177mn cf/d, MOGE producing the majority from its onshore fields, principally Apyuak. Markets include a number of gas power plants and gas-based industries.

More recently, Myanmar Oil and Gas Enterprise made a further oil discovery in the Letpando oil field in Magwe. The find was reported to be producing 300 b/d of oil and 90,000 cm/d of gas.

The Yetagun project is due onstream in 2000. Developed with a twin platform complex, comprising a drilling platform with provision for 20 platform and 8 subsea production wells, bridge-linked to a production/compression platform, the field is expected to produce gas at an initial rate of 200 mn cf/d. Condensate production is expected to peak at around 6,000 b/d in 2001. Gas will be transported via pipeline to landfall at Zadi, from where a 70-km onshore section (running parallel to the Yadana pipeline) will carry it to the Thai border for collection by PTT for onward delivery to the Ratchaburi power plant.

North Korea

Interest in North Korea is beginning to increase as western oil companies advance investment plans in a country whose economy is in desperate need of hard currency and new technologies to search for and exploit oil and gas reserves (see *Petroleum Review*, Feburary 1999). However, interest in the country is tempered by the fact that the US does not encourage openings to trade by maintaining its post-war sanctions, which in turn means its key allies in the region, in particular Japan, are cautious about entering this arena. While European countries are 'free' to do business in North Korea, progress has been hampered by lack of interest shown by the US, Japan, and, until recently, South Korea.

A number of offshore PSCs have been awarded to foreign companies in recent years, including concessions on the West Korean Bay and on the East Sea side. Extremely generous contract terms have been offered in a bid to encourage foreign investment, including no payment of taxes or royalties and a production split in favour of the investor in the early stages of production.

Pakistan

Pakistan's primary gas reserves are estimated at 19tn cf, the bulk of which are located in a few large fields. Potential gas reserves are put at 200tn cf and, although more than 15tn cf have been found in the onshore Indus Basin to date, much of the country is relatively unexplored. The onshore Baluchistan Basin, too, is virtually unexplored and the offshore sector has seen little activity.

Oil and gas currently forms only a small part of the country's economy. It is a net importer of oil, producing less that 20% of its consumption. Currently self-sufficient in gas (producing 0.7tn cf/y), this situation is likely to change with a predicted increase in demand. The major gas fields include Sui (650mn cf/d), Adhi and Khandkot (120mn cf/d), Mari and Lasmo's Kadanwari field. Gas production has increased by more than 5%/y for the past six years.

In a bid to encourage increased levels

of foreign investment, the Pakistan government introduced a new Petroleum Policy in 1997 which included lower taxation rates. The government has also actively pursued a privatisation programme over the past year as another means of bringing western finance into the country.

It is forecast that by 2005 Pakistan will be forced to import gas in order to meet growing demand. Centgas, a Unocal-led consortium comprising the Turkmen government, Cielo, Crescent, Delta, Hyundai and Inpex, has proposed a $1.9bn, 1,300-km long pipeline linking the Turkmen Dauletabad field to Pakistan via Afghanistan. However, a number of political problems have to be overcome as warring factions in Afghanistan continue to make negotiations difficult.

In a bid to streamline E&P efforts, the Pakistan government is privatising the Oil and Gas Development Corporation (OGDC) and Pakistan State Oil (PSO). The government is also offering incentives to private and foreign investors in order to further develop its oil and gas resources, particularly those offshore.

According to IEP, increased investment in areas such as the Ahmadal block could increase oil production to 90,000 b/d by 2000. Priorities for natural gas development include the Qadirpur field (estimated reserves of 3tn cf) and the Bhit, Dhodak, Loti and Tando Adam fields. Pakistan is estimated to hold 21tn cf of gas reserves, concentrated in the Indus river basin.

In early 1998, Hardy Oil & Gas, together with OMV of Austria, discovered gas at the South West Miano concession in Sindh province. The Sawan 1 discovery, the first well to be drilled on the concession, could represent the largest recent gas find in the country and could add up to 25% to the country's reserves. First production is due 2002.

As *Petroleum Review* went to press, the Pakistan government was overthrown by a military coup. It is unclear as yet how this may effect future oil and gas development in the region.

Papua New Guinea

Papua New Guinea has 0.30bn barrels of oil reserves and 0.15tn cm of gas. Oil production rose by 3.9% in 1997/98 to reach 80,000 b/d.

The onshore Gobe oil field came onstream in 1998. Combined recoverable reserves for the Gobe Main and SE Gobe fields are put at 116mn barrels. The fields are being produced via three producers and one gas reinjection well on Gobe Main, and five production wells, one gas reinjection well and one water reinjection well on SE Gobe. Processing is handled by a central, shared facility, with oil transported via a 15-km spurline to the main Kutubu/Kumul terminal export pipeline.

Plans continue by a Chevron-led project that proposed the building of a pipeline system to carry 3tn cf of gas from the PNG Highlands to the Gulf of Papua, from where it would be piped via a 300-km subsea line to Cape York and a 990-km overland pipeline to Townsville in Queensland. Exxon agreed in mid-1999 to integrate its Hides field with Chevron's nearly Kutubu gas field in order to help progress the PNG-Australia pipeline project.

Philippines

Activity in the Philippines in 1998 was considerably up on the previous two years with the signing of two service contracts – one to Arco following its Hippo discovery in the Sulu Sea and the other awarded to a consortium led by Socdet to enable further exploration offshore Palawan – and six geophysical survey and exploration contracts awarded, principally for acreage offshore Palawan. The Philippines government is keen to encourage foreign interest in exploration and development projects as output from its producing Nido and Matinloc oil fields is declining rapidly. Oil production in the Philippines averaged 791 b/d in 1998, a drop of 3% year-on-year. A 'modest' amount of gas (0.33bn cf/y) is produced from the San Antonio field, operated by PNOC-EC.

Although some finds have been made onshore, the main focus of attention has been in the deep waters around Palawan. The most significant find in this region to date has been the Shell-operated Camago-Malampaya field (see *Petroleum Review*, November 1998) with reserves put at 120mn barrels of liquids and up to 3.4tn cf of gas. The field is due onstream in 2002, with gas production forecast at 400mn cf/d in 2003 and peak liquids production of 25,000 b/d in 2007. Development involves subsea completions at 850 metres water depth and a concrete gravity substructure (CGS) riser/processing platform located in shallow water.

It is hoped that the project will reduce the Philippines' reliance on imported fuels by between 20% and 30%. Gas sales and purchase agreements were signed during 1998 between Shell, the Philippine government and power producers Napocor and First Gas Holdings. Gas is to be landed at Tabangao in Batangas City, and will find an exclusive market in domestic power generation, including a 1,200 MW gas-fired facility at Ilijan, Batangas, a 1,000 MW gas-fired power plant at Santa Rita, near Batangas, and a 500 MW plant in the Calabarzon area south of Manila.

During 1998, Shell acquired Occidental's 50% stake in the project as part of a major cross-border oil and gas deal (see Malaysia review, p24). The agreement was of major importance in that it marked the first cross-border swap of assets to be undertaken in the Asia-Pacific.

South Korea

South Korea has only limited natural gas reserves in the Dolphin field offshore Ulsan. It has no indigenous oil production. Demand for gas had been rising rapidly due to the rapid economic growth of the region, however, demand fell during 1998 due to a large reduction in gas used for power generation (see *Petroleum Review*, April 1998 and November 1998), coupled with the impact of the Asia-Pacific economic crisis. Demand for oil fell by 15.4% in 1997/98 to 2,020,000 b/d, while demand for gas fell 6.3% to 15.60bn cm.

Taiwan

Taiwan has few indigenous reserves and relies heavily on imports. Demand for oil rose by 3.4% in 1997/98, the country consuming 765,000 b/d of oil in that period. Demand for gas is rising faster, by 24.3% in 1997/98, consumption reaching 6.40bn cm.

The country's growing use of natural gas for power generation is expected to support a steady increase in LNG imports over the next decade. Indeed, by 2007, gas-fired power plants are expected to account for almost one-third of Taiwan's total installed generating capacity and generate almost one-quarter of all electricity output compared with about 15% of total electricity generation today (see *Petroleum Review*, October 1999).

Thailand

Until the economic crisis in 1997, Thailand had one of the fastest growing economies in the Asia-Pacific – its rapidly expanding manufacturing base driving a substantial rise in energy demand. However, following the rapid

Kazakhstan–China oil pipeline update

In its latest *Central Asian Upstream Report*, Edinburgh-based consultancy Wood Mackenzie has examined the factors constraining the future of the Kazakhstan–China oil pipeline, the feasibility study for which is to be soon to be submitted to the Kazakh and Chinese governments.

The intent by China to construct a Kazakhstan–China oil pipeline was first indicated in June 1997. Early agreements optimistically suggested that construction could begin in 1999 and would be completed by 2005. The Chinese National Petroleum Corporation (CNPC) agreed to guarantee completion of the project within five years from the signing of the final agreement, which is not an impossible target according to Wood Mackenzie. However, the main uncertainty now appears to be when or, indeed, if, the final agreement will be signed. The key conclusions of the study are:

- There are currently too many factors constraining the Kazakhstan–China oil pipeline to realistically allow it to proceed within the proposed timeframe. Neither China nor Kazakhstan is currently demonstrating the level of commitment required for the project to proceed. The reality of poor economics and insufficient potential throughput appears to have overtaken earlier political ambitions.
- Unless new sources of oil are found, it is unlikely that the Kazakhstan–China oil pipeline could be fully utilised. Throughput guarantees still have to be provided. Even Wood Mackenzie's base case assumption of an average 70% utilisation based on reserves at existing fields would require CNPC to secure Uzen and a significant volume of third-party oil from the South Turgai fields. The South Turgai fields could contribute combined peak production of 150,000 b/d post 2003. There is considerable uncertainty surrounding the timing and future of the developments in South Turgai, most of which are operated by Hurricane Kumkoi Munai, which is attempting to restructure its business with new investors.
- Significant investment will be required to raise production from the Aktyubinskneft fields, Uzen and the South Turgai fields from current output of 150,000 b/d to expected peak production of over 350,000 b/d from 2005. CNPC has spent an estimated $160mn at Aktyubinskneft, about one-third of its initial commitment. Uzen constitutes a massive rehabilitation programme with environmental challenges, anticipated to be complex and costly, if production is to be raised to 100,000 b/d from 60,000 b/d. Wood Mackenzie estimates that the cost of developing the Kazgermunai and KAM fields in South Turgai will be $600mn, most of which remains to be spent. Added to that is the cost of the continued development of Kumkoi where Hurricane has spent an estimated $150mn.
- Under the consultancy's base case valuation using the reported tariff of $4/b, the project achieves a real rate of return (RoR) of 9.7% based on the economics of the Kazakh section of the pipeline. In order to achieve a 12% real RoR, a tariff of $4.81/b would have to be charged. Although the pipeline would link with existing infrastructure in northwest China, the main centres of demand are in the east and south and would involve an additional 4,200 km of pipeline.
- Wide-ranging capex estimates have been reported and Wood Mackenzie's base case assumes $2.7bn. The company believes there is substantial risk of the capex exceeding this level, although there is also some scope for low cost construction thanks to CNPC's low labour costs and experience in building pipelines.
- The Kazakhstan–China oil pipeline will face tough competition from the Caspian Pipeline Consortium (CPC). If the Kazakhstan–China tariff is dropped to the same level as CPC, then the real project RoR falls to 6%. This may still provide an acceptable rate of return to the Chinese and a tariff level suitable to upstream Kazakh producers, but is unlikely to encourage foreign investment in the project. As construction of CPC began in May 1999, Kazakhstan can be more confident about the success of its first export pipeline, but the degree to which Russia will influence CPC's progress should not be overlooked.

Parameters	CPC	*Kazakhstan–China
Earliest start-up	2001	2005
Length	1,500 km	2,800 km
Peak capacity	1,340,000 b/d	400,000 b/d
Total capex	$4.5bn	$2.7bn
Tariff	$2.93/b**	$4/b
Project NPV at 10% discount rate	$2,013mn	$65mn
Real RoR	12.9%	9.7%

* Relates to economics of Kazakh section.
** Applies to 76% of throughput (crude entering CPC in Kazakhstan). A tariff of $1.05/b has been assumed for crude entering the line in Russia.

CPC versus Kazakhstan–China pipeline

depreciation of the Thai baht and severe recession, GDP has not grown much over the past year. Demand for power has decreased as a result and a number of power plant projects have been put on hold (see *Petroleum Review*, April 1999).

The bulk of the country's oil production is onshore, while gas and condensate are largley produced offshore in the Gulf of Thailand. The country has a relatively small reserves base and consumption outstrips production. The Sirikit field is the largest source of domestic oil and is also a substantial gas producer. The largest gas field is Bongkot in the Gulf of Thailand with reserves put at 4.5tn cf.

Licensing rounds in 1998 produced disappointing results, indicating the relative maturity of Thailand as an exploration province and reflecting the lack of available acreage, comments Wood Mackenzie. One award was made in 1998 as part of the 17th licensing round – Harrods Energy awarded block B2/38 in the northwest Gulf of Thailand. In light of the disappointing response to license offerings, it has been proposed that prospectors be able to pursue rights in their own time instead of being confined to specific licensing periods.

On a more positive note, a number of gas finds were made in 1998, including Pogo's Jarmjuree-1 on block B8/32, Total's Ton Rang-1XA and -1XB, PTTEP's Pikul field and Unocal's South Gomin field on the No. 3 contract area.

Unocal brought two new fields – Plamuk and Pladang – onstream in 1998, the latter helping to push total liquids production in 1998 to 80,000 b/d, a 12.8% increase compared with 1997. Plamuk is being developed via two platforms tied into the nearby Sarut field and has reserves of 50bn cf. A second wellhead platform is to be installed on Pladang in 2002.

More recently, Unocal's Pailin field has come onstream, with production expected to reach 165mn cf/d by the end of 1999. A second phase of development is due onstream in mid-2002, adding a further 165mn cf/d production. Chevron's Benchamas field in block B8/32 came onstream in August 1999. Initial production of 35mn cf/d of gas and 2,200 b/d of oil were forecast to increase to 75mn cf/d and 25,000 b/d by the beginning of this month. The field is producing from three platforms, with 48 wells. Other satellite production wells are due onstream in 2000.

Gas sales continued to grow during 1998, reaching 1,616mn cf/d, a 5.4% increase year-on-year. The increase was mainly due to the Bongkot field, where output was boosted from 350mn to 550mn cf/d in July 1998. The field is being developed on a phased basis by PTTEP, which took over control of the project from TOTAL in July 1998. Phase IIIB is expected to commence in 2001 and will be followed by Phases IIIC and IIID.

The Thailand/Vietnam boundary claim agreement – encompassing the definition of the border line from the Malaysian-Thailand JDA in the south to the agreed Cambodia-Vietnam boundary in the north – was formally ratified in February 1998. As a result, a 4,100 sq km area adjacent to Unocal's B12/27 and the Bongkot area was recognised as Thai territory. This led to parts of blocks B14, B15 and B16 being reawarded to PTTEP for an eight-year exploration period under Thai terms, the exploration concessions having been suspsended prior to the settlement. Unocal and MOECO have joined PTTEP in the development of the blocks, commiting to an investment of $65mn.

Future planned developments include the Maliwan field due onstream in 2001. The field is located in block B8/32, along with the recently onstream Benchamas field and the currently producing Tantawan field. The block is estimated to hold proved and potential reserves of up to 3tn cf of gas and more than 350mn barrels of oil. Total production from the block is expected to reach 145mn cf/d and in excess of 30,000 b/d by the end of 1999.

Vietnam

Vietnam has proven oil reserves of over 2bn barrels according to IEP, but only 0.6bn barrels according to BP Amoco, and substantial gas reserves, with most activity focused offshore south Vietnam. The government hopes to attract increasing levels of foreign interest in its remaining unawarded onshore and offshore blocks, many of which are located outside traditional exploration areas. New fiscal terms were introduced in November 1998, covering relatively deepwater and remote areas and areas with special geographical, geological, economic and technical difficulties. New measures include a reduction in tax from 50% to 32%, a lowering of remittance tax on post-tax profits from 10% to 5%, the removal of export tax on royalty oil and gas removed, and the potential to increase in cost recovery rate from 35% to 70%.

The Asian economic crisis and low oil prices have reduced exports (oil provides approximately one-third of foreign exchange earnings), factors which have also led to a decline in investments in 1998. Political controversy has created problems for privatisation, which combined with administrative and legal barriers, have caused delays for foreign investors and businesses. Indeed, according to Wood Mackenzie, as commitments signed earlier in the 1990s are fulfilled, oil and gas companies are in the main electing to withdraw rather than commit to expensive and risky second phase exploration programmes. That said, two new companies entered the Vietnam arena in 1998 – PTTEP, which farmed into Fina-operated blocks 46, 50 and 51 in the Malay Basin, and Maurel & Prom, a French company, which farmed into the Hanoi Basin PSC, acquiring a 25% from Anzoil.

A dispute with Thailand over potential oil-bearing waters was settled in 1997 with joint administration of the area (see Thailand review, p26). However, there is an ongoing dispute with China over the border in the adjacent Gulf of Tonkin and with China and four other claimants over the Spratley Islands, an area which is potentially rich in oil and minerals.

All oil production is offshore, including Vietnam's first, and still major, oil field – the Vietsovpetro-operated Bach Ho (producing 223,000 b/d in 1998). There have been onshore discoveries, but with limited potential. The majority of gas production is associated with the Bach Ho oil field, the balance from Anzoil's onshore Song Tra field.

Recent developments include the Japan Vietnam Petroleum Company-operated Rang Dong fields (250mn barrels of oil reserves) which came onstream in autumn 1998 (currently producing 30,000–35,000 b/d) and the Petronas-operated Hong Ngoc (Ruby) field which entered production in early 1999. Both Rang Dong and Ruby have been brought onstream via early production systems (EPS). Full field development of Rang Dong is expected after four years of production. Full field development of Ruby is expected to include tieing in the Topaz, Pearl, Emerald and Diamond satellite projects.

BP Amoco and Statoil are hoping to develop the Lan Tay and Lan Do gas fields, which have combined recoverable reserves of 2tn cf, by 2002. Development is expected to underpin a wider Nam Con Son basin gas utilisation scheme under which a 400-km pipeline will be laid to Phy My, close to Ho Chi Minh City. The pipeline would have sufficient spare capacity to handle gas from other nearby discoveries. Other recent discoveries include the Unocal Kim Long discovery in the Gulf of Thailand and Fina's find in the Malay Basin.

The growth in gas production has been as a direct result of oil production from Bach Ho. Both BP Amoco and Statoil have discovered gas fields offshore Vietnam, which they propose should be developed for domestic power generation and fertiliser production. However, differences between BP Amoco/Statoil and Vietnamese authorities over gas prices are currently stopping development. A major pipeline to shore would need to be developed, which could act as a basis for exploiting other finds.

Russian oil company Gazprom recently announced a new joint venture with Petrovietnam, which is to explore and develop offshore gas reserves in the Gulf of Tonkin, near Hanoi, with the goal of establishing a gas market in the north. The venture is expected to be finalised over the next few months.

Due to shortage of space, Australia, New Zealand, Indonesia, Japan, and the Zone of Cooperation (ZOC) will be covered in our December 1999 issue.

Chances improve for Chevron project

The US Minerals Management Service (MMS) has issued an Environmental Impact Study (EIS) in response to a proposal by Chevron, with partners Conoco and Murphy, to produce natural gas in an offshore area in the Eastern Region of the Gulf of Mexico known as Destin Dome. The EIS will go through a lengthy public review before the MMS makes its final recommendation on the proposal, which many expect will be favourable. *Judith Gurney* reports.

The Eastern Region, which includes 76mn offshore acres under federal jurisdiction, extends along the Gulf's northern coast from 15 miles inside Alabama along the southwest and western Florida coasts. To date, there has never been oil and gas production here except in a small OECD exploration and production project off the Alabama coast. Ten lease sales were held for blocks in the region prior to 1988 but congressional moratoria and executive directives have prevented any work on existing leases and subsequent lease sales up to now due to fears that activities involved in finding and extracting oil and gas would cause serious environmental damage to the Florida coastline.

Chevron believes its Destin Dome project, which involves 11 contiguous blocks leased in the mid-1980s, could produce between 1.3tn and 2tn cf of natural gas. Exploration wells drilled years ago found a large reservoir of natural gas which is believed to be an extension of the Jurassic-age Norphlet Formation that is the focus of a major development project by several companies in Mobile Bay, offshore Alabama. The Norphlet Formation is estimated to contain 7tn cf of sour gas.

Chevron's proposal – contained in an 18-volume development and production plan and a right-of-way pipeline application filed in 1996 and 1997 – involves drilling 20 new wells and producing from these as well as from one of the original exploration wells. The wells, which could produce up to 450mn cf/d under maximum development, would be connected to a number of satellite platforms equipped with primary separation equipment. Output would go from these platforms to two central processing facilities and, eventually, to existing gas processing plants in Alabama.

Environmental impact

The two-volume EIS goes into great detail concerning the possible effects of this proposal on the environment, including danger to beach mice, a species of field mouse with large ears and dark eyes that lives in the coastal dunes of Florida and Alabama subsiding on a diet of beach grass and sea oats. It notes that since high temperatures and high pressures virtually preclude the presence of liquid hydrocarbons in the Norphlet reservoir, the risk of pollution accidents is small and confined to spills of drilling fluids.

The study concludes that the project would not significantly impact air quality, marine life, commercial fishing, the Florida tourist trade, or beach mice. Unless the review process produces strong arguments against the project, final MMS approval seems likely.

Lease auction

Another step in the opening of the Eastern Region is a MMS lease auction scheduled for 2001. The sale area lies along the borders of the Viosca Knoll, Mississippi Canyon and Atwater Valley areas of the Gulf Central Region and includes a 15-mile strip extending out from the coast of Alabama through parts of Destin Dome.

In deference to the wishes of Florida for protection of its coastline, the strip only broadens out beyond 100 miles from the Florida coast to include parts of the DeSoto Canyon and ultradeep Lloyd Ridge areas.

It would be a mistake, however, to expect a lot of activity soon in the Eastern Region. It is primarily a carbonate province lying outside of the Mississippi river basin, with a geology different from that of the rest of the Gulf, and is not believed to contain a lot of oil and gas except in the Norphlet formation and along its western fringes. In addition, a large chunk of the region off the western Florida coast is likely to remain off limits for years to come.

On the other hand, a few companies with leases acquired prior to 1988 in waters off the coast of Alabama may go ahead with development plans now. BP Amoco, for instance, may decide to develop its Kings Peak gas discovery in DeSoto Canyon, and Chevron, Anadarko, Marathon and Conoco may also submit proposals to the MMS.

What could be decisive in the gradual opening up of this region is its apparent reserves of gas. Depletion rates of gas production are accelerating on the continental shelf in the rest of the Gulf, an area which supplies roughly 25% of total US gas production. The continuing decline in gas wellhead deliverability here and elsewhere in the US is expected to be reflected in a sharp spike in gas prices in the coming winter and thereafter. The need for new gas supplies may well be sufficient to overcome Florida's objections to exploration and production in these waters.

Headed for the last roundup?

Firming crude prices have prompted a smart rebound so far this year in the shares of US oil companies. Yet the domestic petroleum industry – in stark contrast with much, if not most, of the rest of America's vibrant economy – stands diminished, irreversibly. Humbled now, the US oil patch seems beyond revival, claims *Peter S Adam* in this individual and thought provoking analysis.

According to the Independent Production Association of America, the US oil industry shrank by 15% in 1998. Domestic petroleum production is off notably, from 6.4mn b/d in 1997 to 5.8mn b/d currently. Since the end of 1997, more than 100,000 oil wells and 50,000 gas wells have been shut in. The US Bureau of Labor Statistics estimates that over the last year or so the exploration and production segment of the domestic industry has lost over 67,000 jobs – 40,000 of these from independent sector companies alone. Only 69 of the US firms comprising the *Oil & Gas Journal's* listing of 200 oil companies posted profits last year, down from about double that, 139, in 1998's ranking.

Sector balance

Balance sheets are strengthening, earnings improving and cash flows becoming more robust across US industry, due to crude's appreciation. But capital spending plans remain modest here, and day rates and rig count figures are nothing to write home about. The bottom line? – The domestic industry has become marginalised, and no one sees the fortunes of the US oil patch reviving significantly any time soon.

Trail of tears

How the US petroleum industry allowed itself to become a shadow of its former self, is something that otherwise perceptive analyses concerning the causes and consequences of 1998's price collapse fail to ask. For example, a study done by the Petroleum Industry Research Foundation, Inc. (PIRAINC) – entitled *Market Factors, Not Price Dumping* – perceptively attributes last year's debacle to:

- The financial crisis and recession in Asia reducing oil demand and prompting large-scale destocking due to currency devaluation.
- Opec's decision to lift production by 700,000 b/d in response to broad-based expectations in late 1997 that additional output was required to meet growth in world oil demand.
- Unusually warm weather through the 1997–1998 winter in North America, Europe and Asia.
- The Russian bond default which cut internal oil demand and prompted an increase in Russian production 4Q1998 by 600,000 to 800,000 barrels above year earlier levels.

'It is highly unusual for the international oil market to experience multiple exogenous shocks during the course of a single year,' the study notes, and furthermore, 'the probability that all of these should would propel oil prices in the same direction is...virtually a "once-in-never" occurrence.'

Never say never

True enough. But this and similar analyses duck deeper, more provocative questions: Why has one unexpectedly bad year so dramatically decimated the US petroleum industry? (After all, for more than two decades now Wall Street and other financial centres have provided oil and gas companies with financial instruments that can hedge all sorts of risks. Prior to last year's collapse the US petroleum industry had experienced wave upon wave of downsizing, rightsizing, partnerings, etc, and had come to consider itself 'lean and mean'.) Furthermore, why, despite a doubling of the price of crude oil since the beginning of the year – which should be raising a chorus of hallelujahs from the domestic oil patch – are many US companies proceeding with plans to toss in the towel? As the *Oil and Gas Journal's* statistics editor, referring to the 1999 *O&GJ* 200 listing, asks: 'This year, 200; next year, 150?'

Blind faith

For many years now it has been an article of faith among US industry participants that innovations such as 3D seismic, horizontal and deepwater drilling technologies and various sophisticated analytical software computer capabilities would enable America to offset the effects of a dwindling resource base and revive its domestic petroleum sector. Research by Stephens Inc., an investment firm heavily involved in domestic oil exploration and production, indicates that lifting costs have indeed fallen sharply worldwide, from about $16/b in 1986 to around $8/b currently. But reducing the cost structure of petroleum production and enhancing the yield of smaller and older fields has failed to bring about the expected revival in US domestic petroleum fortunes. Why?

Technical glasnost

The reasons are fairly straightforward. The aforementioned technical innovations are all attributable, at least in

part, to the opening up of a goodie bag of high-tech wizardry that governments, notably Uncle Sam, lavishly helped finance, but held off limits during the period of intense Free World-Communist international rivalry following World War II. For almost half a century truly big bucks went into developing a wide array of computer and telecommunications capabilities with military, 'race-for-space' and many knock-on applications. All this stuff became widely (and wildly) available when the Berlin Wall fell, socialism in many parts of the world imploded, and governments from all over the political spectrum privatised and deregulated state-held and state-controlled enterprises, most notably in the telecommunications sector.

Many technical innovations developed in the US by Bell Labs and other entities involved in the same lines of research during the Cold War were not implemented aggressively outside of the military and quasi-military spheres. Instead, they were kept under wraps due to the same security concerns that contributed to keeping the US telecommunications system a regulated monopoly, somewhat cordoned off from the workings of the rest of the economy. (It is worth noting that the Internet, which is promoting so much (overblown?) investor and entrepreneurial enthusiasm and transforming the way many industries operate, was originally a multi-polar telecommunications system the US Defense Department devised to withstand a nuclear exchange.)

The widely available now, high-tech, wonders that have helped bring down the cost of finding and producing oil and have enhanced business productivity generally are part of a larger transformation over the last decade in world commerce, geopolitics and energy that have made many traditional ways of doing business in the oil patch, and in many other industries obsolete. But many US oil sector participants have failed to come to grips with other consequences that have followed from the Cold War's end and transformed the industry. This failure has been a costly one.

The sword's other edge

Enhanced technical capabilities are only part of the story. An unrecognised (to some) aspect of the post Cold War is that petroleum is not as militarily and strategically important, at least not in quite the same way it once was. The oil fields of the Middle East remain vulnerable to regional miscreants such as Saddam Hussein. But one feels that Russian tanks or airborne forces are now less likely to threaten the Gulf, or communist agent provocateurs to stir up insurgency among locals. The US government is less concerned about the Middle East and its oil; and the Middle East is somewhat less concerned about the US. Debates on whether it's preferable to drain the Middle East or America first, once a hotly contested subject, now would produce yawns among US politicians.

In this new schema, the fate of the US domestic petroleum industry is of much less concern to the voters, particularly since gasoline prices have remained low and producing countries seem to want to keep them from spiraling out of control. Though the US is increasingly dependent on foreign sourced crude oil, a consumerist orientation continues to prevail generally, worldwide – to the detriment of the generally fairly high cost US industry which has been left on its own to deal with the shifting calculus of political, strategic and economic concerns that make corporate planning so difficult.

New World disorder

What's happened to the US petroleum industry in the aftermath of last year's price collapse has revealed what a poor job it's done in coming to grips with the realities of the disorderly New World. The fact that European companies have for the most part done a better job at accommodating themselves is evident in the pattern of who in the latest waves of consolidation has swallowed up whom (BP-Amoco-Arco, Shell-Texaco, which is a 56%:44% partnering for a number of operators). The Exxon-Mobil deal is the only major US-US partnering, and Mobil, which was supposedly number one among US companies in terms of its Middle East presence was prompted, in the wake of last year's price collapse, to sell itself, lock stock and barrel to Exxon, before crude oil prices started to climb.

The fact is, except for a few bright spots – deepwater drilling in the Gulf and possibly other offshore areas – the US oil sector appears to be going the way of the great buffalo herds. For this, the domestic industry has no one to blame but itself. And as the dollar weakens and foreigners put their capital into bricks and mortar overseas and stop financing the US current account deficit, it may well become apparent that other sectors of the US economy are no more immune to the messiness and unpredictability of the New World disorder than the US oil patch is. In this regard, it is worth noting that the financial forces unleashed 20 years ago this September by the disinflationary monetarist policies of then Fed Chairman, Paul Volker, which bought down inflation worldwide and set the stage for lower oil prices may have run their course.

As Volker pointed out in a recent study, the increase in Americans' wealth over the first half of 1999 equaled the combined total annual income of the 2.5bn people of China, India, Russia and Brazil, a fitting but unsustainable coda to an era his actions helped usher in. No wonder gold and oil prices are up while equity markets are skittish.

Dolphin leaps forward

Just over six months ago, the Dolphin gas initiative was a vision. Powerful, imaginative and practical – but still a vision. Today, as governments and the energy industry increasingly recognise its far-reaching implications for the economic development of the Gulf region and beyond, that vision is being translated into reality, writes *Khaldoon Al Mubarak*, Project Manager, UAE Offsets Group.

Dolphin unites both political and commercial interests under the umbrella of what is said to be the largest energy-related programme ever undertaken anywhere in the world, requiring an investment of between $8bn and $10bn over the next six to seven years.

Launched in March 1999 by the government-sponsored UAE Offsets Group (UOG), the Dolphin strategy is centered on the development of an extensive gas supply and infrastructure system in the Gulf region which will also reach out to the Indian sub-continent and perhaps further.

Unique project

Dolphin is unique, not simply because of its size but also because of its scope – encompassing activity right along the 'gas value chain'. Upstream, it includes the development of gas reserves in Qatar's North Field and elsewhere. Midstream, it involves the construction of a pipeline linking Qatar with the UAE and other key markets in the region and the provision of gas transmission, distribution and storage systems.

But it is the downstream element that makes Dolphin really different. Its 'anchor' market will be within the Gulf region where demand for gas is expected to outstrip the present supply within the next three years – a gap that Dolphin will help to bridge. (see **Figure 1**). In addition to this known market however, Dolphin will actually be creating further markets of its own – through the development of new and existing industrial clusters in the UAE, Qatar and the region; through participation in energy-intensive petrochemicals and other basic industries; and through investment in gas-fed power generation projects and conversion programmes.

The effect that the successful implementation of a programme of this size and scope could have on the economies of the countries it touches is considerable. It will directly affect the job market. It will also open up new business opportunities for contractors and suppliers, both to Dolphin and to the entities it creates. And by constructing reliable power generation and transmission systems, the attractiveness of those countries to international and domestic investors is likely to increase dramatically.

Building partnerships

The key to Dolphin's success, however, is the building of partnerships between governments and the private sector. UOG is strongly positioned to make this happen. On the one hand it is an entity of one of the region's most influential governments. On the other, we at UOG have been creating business investment opportunities for international companies in the UAE for the past eight years, leading us to appreciate fully the needs and priorities of the private sector. And, importantly, we spent two years exhaustively researching and proving the technical feasibility and the commercial viability of the programme before holding any exploratory talks with potential public and private sector partners.

That process of bringing governmental and commercial interests together in an UOG-brokered alliance has been moving forward rapidly since Dolphin was launched in March.

At that time we announced the signing of a preliminary understanding with the Qatar General Petroleum Corporation (QGPC) regarding the supply of gas from that country's vast offshore North Field via Dolphin to the UAE and Oman. This agreement gave substance to UOG's plan to build an 800-km pipeline of between 30 -and 48-inches diameter from Qatar to a landfall on the Abu Dhabi coast with an initial capacity of 3,000 mn cf/d of gas.

It also provided the platform for a series of Memoranda of Understanding with authorities in Oman, Dubai and Pakistan, each agreeing to take large volumes of gas provided through Dolphin totaling up to 3,000mn cf/d.

Even before these agreements were signed, we were being approached by many of the major companies within the energy sector which has for several decades been eyeing the prospects of developing the North Field to supply the market potential of the UAE and south Asia. Then in July, just over three months after the agreement with QGPC, we announced the first private

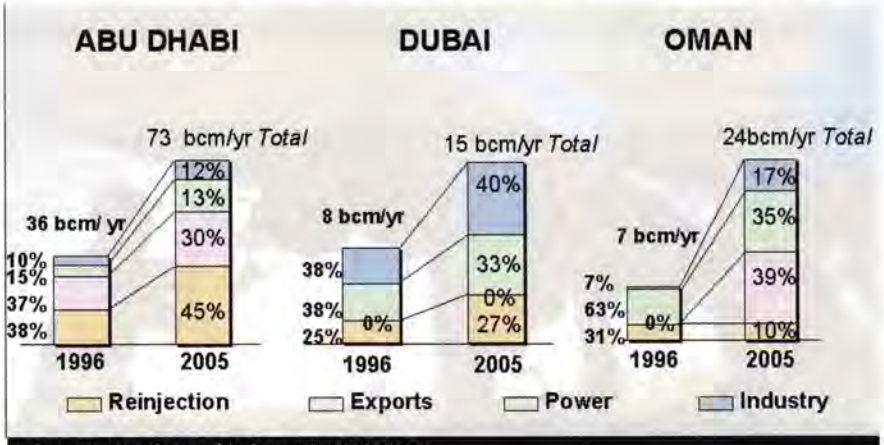

Figure 1: Gas demand in bn cm/y 1996–2005

sector involvement – an agreement on the initial step towards securing the first gas for Dolphin with Mobil Oil Qatar Inc., an affiliate of Mobil Corporation, one of the world's largest energy companies.

Virtually every player of any consequence in the energy sector has been talking to us about becoming partners in the programme and about bringing their expertise to Dolphin. At the time of writing, we are deep in discussions with a number of the major companies about their playing a fully participatory role at the highest level, as strategic partners investing in, and owning equity, in Dolphin.

Opportunities for all

However, the opportunities for the private sector are not confined to the largest players. They exist at every level – local, regional and international – and in all the elements of Dolphin since the initiative covers activity along the whole gas value chain.

Each element – upstream, midstream and downstream – will be developed in parallel steps. We are approaching firm and final agreements on the sourcing and supply of gas. The first spade should be in the ground by the end of 1Q2000. The need for Dolphin gas becomes clearer with every month as major new industrial and business projects start up and more companies announce plans to invest in the region.

Soaring demand

The generally accepted forecast is that demand for gas in Dolphin's three main Gulf markets will outstrip current supplies by the year 2002/3. That prediction seems to be right on track. Abu Dhabi looks set to double its 1996 demand by 2005 – from 36bn cm/y to 73bn cm/y. Dubai used 8bn cm/y in 1996 and is likely to require 15bn cm/y by the middle of the next decade. Oman will move from 7bn cm/y in 1996 to 24bn cm/y in 2005.

A significant contributor to Abu Dhabi's increasing demand is the growing need for gas for re-injection into oil reservoirs to assist in the recovery of oil. In percentage terms, however, the predicted demand from industry and power generation in all three markets is on an even steeper upward curve.

OUG itself has been partially responsible for creating this situation by sponsoring several high-energy use projects which have come to fruition in the last two years. The most notable include two publicly quoted companies – Abu Dhabi Shipbuilding and Tabreed – which has introduced the concept of district cooling to the UAE. Another – Sina'at – the UAE's huge basic industries initiative with which we are closely associated, is due to begin operations shortly. Others which will further increase demand for energy, including an aluminium smelting plant, are in various stages of preparation.

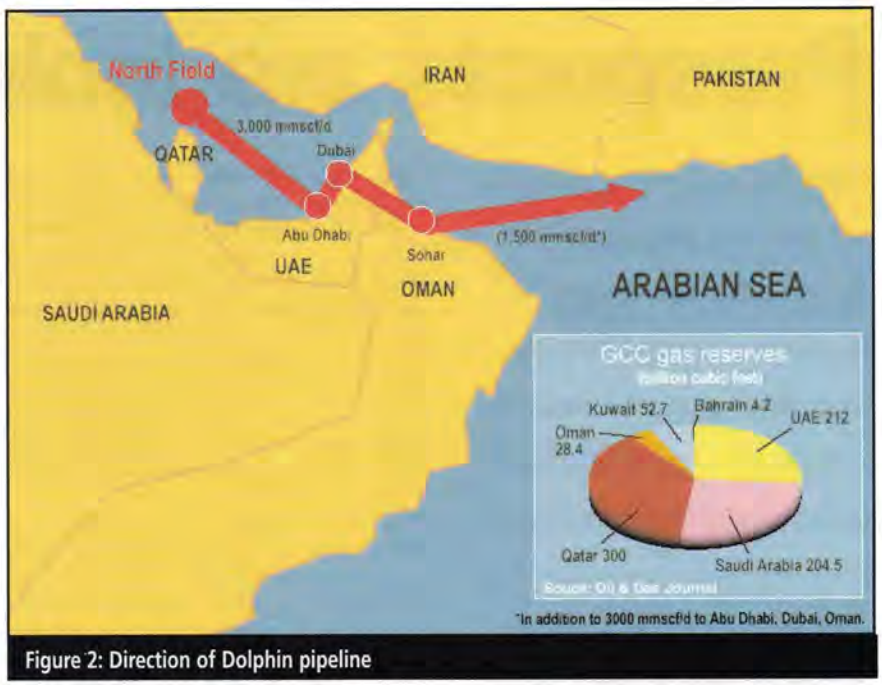

Figure 2: Direction of Dolphin pipeline

Minimising partner risk

The positioning of UOG at each link in the gas value chain carries important implications for potential private sector partners in the initiative. Typically, energy companies are faced with the risk of not having guaranteed buyers for their hydrocarbons while investors in industry are reluctant to build unless they have a guaranteed supply of power. Dolphin solves that 'chicken and egg' challenge because essentially it will be both seller and buyer of its own gas. This, in turn, means that Dolphin will have considerable influence over the pricing of the gas throughout the gas value chain. Risk for partners is thus minimised.

There is a further factor for potential partners to consider. The third party studies on the financial viability of Dolphin, commissioned by OUG and conducted by international consultants, have demonstrated that Dolphin would be commercially successful in each of its component parts – ie, that each part would be a successful standalone business.

With this level of risk control, we are in a very sound position to extend the Dolphin concept, to make markets for our gas in other countries through our own investments. Indeed, we are doing that already, both in the Gulf region and beyond.

The evolving role of UOG

Eight years ago, the UAE Offsets Group (UOG) was founded by the Abu Dhabi government and tasked with leveraging a significant portion of the cost of overseas defense procurements into investments in the economic development of the UAE. Each year since, UOG has set up a number of new commercial ventures in partnership with the country's defence equipment suppliers and the local private sector. Among these ventures are several of the UAE's largest publicly quoted companies. We have now embarked on our most ambitious scheme to date: the largest energy-related initiative ever undertaken – Dolphin.

Dolphin is the logical outcome of an evolutionary process that has seen UOG emerge as an entity combining the entrepreneurial outlook of a venture capital organisation and the carefully researched approach of a 'think tank'. It has done so entirely in keeping with its original brief – the creation of commercial ventures in partnership with the private sector aimed at benefiting the people of the whole of the United Arab Emirates.

Prospects are looking good

India recently changed its oil and gas laws in a bid to encourage foreign investors and reduce its dependence on oil imports. Although a truly world-class oil and/or gas find by a foreign company is still awaited – the odds are in India's favour with so many players exploring and only six of the 26 sedimentary basins currently exploited. *Priscilla Ross* reports.

Since the mid-1980s India has been encouraging foreign oil companies to explore for hydrocarbons. In mid-August this year a joint venture between Shell India and Cairn Energy announced the discovery of oil from the Guda-11 well at a depth of 1,900 metres in the Sanchor Basin, which is onshore the borders of the western states of Gujarat and Rajasthan. The second well drilled by Shell struck a light crude with a flow rate of 2,000 b/d.

A Shell spokesman confirmed the discovery but in typical multi-national conservatism played down the find commenting that 'it was very encouraging but it is premature to draw any conclusions'. He added that testing and analysis is on-going 'but we don't know if it is commercially feasible at this stage'.

Reducing oil imports

Nevertheless, the Shell discovery focuses attention on the Indian subcontinent and its exploration potential. India relies on oil imports to meet 60% of its oil needs – this dependence is projected to ratchet up to 70% in the next five years according to the Indian government's latest five-year plan. As a result, increasing the degree of energy self-sufficiency is one of the main priorities of the government's plan. India consumed 1.82mn b/d of oil in 1998 and this is expected to rise to 2.2mn b/d by 2002. The dependence on foreign oil is putting pressure on India's oil import bill – one-third of the country's foreign exchange is spent on importing petroleum products. It is the fourth largest oil consumer in the Asia-Pacific region. In 1993, it spent $6bn on importing hydrocarbons from the Middle East.

Exploration and production (E&P) of oil and gas in India began in 1889 with the discovery of the Digboi oil field in Upper Assam by the Burma Oil Company. Subsequently oil and gas exploration was mostly controlled by the public sector through companies such as the Oil and Natural Gas Corporation (ONGC). Currently, most of the oil is produced from the Bombay offshore fields. Indeed, oil and gas production comes from only six basins, of which the offshore Bombay (Bombay High) fields produces 400,000 b/d.

Although India ranks among the top-20 oil producing countries in the world, the major petroliferous basins have not yet been tapped to their fullest extent. Natural gas is in a very early stage of development and the incidence of flaring is high – but gas development is very promising for the future.

Change of scene

India was known for its highly bureaucratic system, complex and lengthy negotiations, wide gaps between policies and implementation, and its closed economy. However since 1991, the country has liberalised its traditional outlook by emphasising privatisation of major industries and encouraging foreign participation. Today India offers foreign E&P investors competitive production sharing contract terms with no upfront payment or bonus. In addition, there is no restriction on the repatriation of capital and earnings. The approval process has become relatively simple and transparent, and English is the language for business and the legal process. So keen is the country to encourage foreign participation, that the implementation of deregulation and privatisation policies has not been affected despite the election of three governments in the space of three years.

Shell is not the only multi-national with interests in the Indian energy sector. Enron, the US multi-national was reported to be considering buying stakes in Indian oil and gas fields in southern India and on the western coast with Tata Petrodyne. An Enron spokeswoman confirmed that the country is one of the company's most important markets and that it had signed joint ventures with Tata Petrodyne on two offshore exploration blocks. Enron has 30.5% of the CB-OS-1 block in the Cambay Basin near Gujarat, and a 15% stake in the CJ-OS/2 block in the Cauvery Basin near Tamil Nadin. The company is also involved in oil and gas exploration in Panna Muktatapi on the west coast.

Enron is already involved in the second phase of construction of the Dabhol Power Project, in the western state of Maharashtra. In the first phase of the project, 826 MW went commercially live in May 1999. The second phase involves 1,624 MW and will use natural gas with long-term supplies secured from Oman and Abu Dhabi. Commercial operation of the second phase is scheduled for late 2001.

Natural gas is becoming increasingly important for power generation in India, however, the electricity grid is

severely over-stressed. Since the beginning of 1991, a number of multinationals such as Unocal, Enron, Shell, Occidental, as well as smaller companies Hardy, Cairn, Tullow and Command, are participating in the opportunities for oil and gas exploration, development and electric power generation projects.

Good prospects

India has 26 sedimentary basins of which only six have been exploited and 16 lightly explored. President and CEO of Canoro Resources Donald Staus says: 'India can be considered a new and exciting hydrocarbon frontier, which is just beginning to attract the attention of the Western world. The race to India is on.'

An interesting joint venture was established between Canoro's Canadian consortium and an Indian conglomerate, the Assam Company when in February 1999 a production sharing contract with the government of India was signed allowing the consortium to carry out exploration and development on exploration block AA-ON\7. Canoro's Canadian consortium's interest is 65%.

The company is also at different stages of securing working interests in a number of development fields that present the opportunity of low-risk growth through development drilling combined with huge upside attainable through exploration drilling. These include an exploration block in north-east India in the State of Assam, situated in the middle of a 100,000 boe/d oil and gas producing area. Extensive seismic coverage already exists on the 1,934 sq km block revealing numerous potential oil and gas reservoirs which should enable the consortium to expedite its move into development operations in 2000. The Dergaon 1 well was drilled, tested and cased in 1973 and tested gas from multi-pay zones. Independent engineering reports indicate this well has 43bn cf of proven plus 50% probable marketable gas reserves.

Staus comments: 'Since this block is situated in such a prolific oil and gas fairway, and considering the amount of seismic we have delineating these reservoirs, we are quite confident of being able to attain tremendous future growth in our oil and gas production. This growth will certainly draw increased attention to the immense opportunity awaiting foreign oil companies willing to invest in India.'

Canoro's interest in this hydrocarbon producing province was a logical commercial move as there are 36 discovered oil and gas fields in the Assam Basin, which have been producing over the past 30 years, and an extensive infrastructure of oil and gas pipelines and refineries already in place. Oil gravities in the area range up to 42° API and producers can receive premiums of up to $1.50 above the Brent oil price for higher gravity oil.

The production sharing contract terms are claimed to be competitive internationally with a duration of 25 years extendible to 35 years. Government royalties are nil. The block enjoys a seven-year federal corporate tax holiday. The corporate tax rate is 35%. Sales tax is paid by the government of India, and customs and import duties on equipment and materials for petroleum operations is nil. An environmental impact study is required (baseline and predicted operational impact).

Out in force

The oil majors had been largely ignoring onshore prospects in India but there are now signs of increased interest on the exploration front. Premier, Lasmo, Cairn and Hardy Oil have all reported major gas finds in the Indian sub-continent. Another UK independent, Tullow, is one of the leading foreign acreage holders in India with interests ranging from 25% to 100% in seven blocks. All these interests are focused in areas of existing infrastructure with power generation potential. Tullow will gain a 25% holding in the GK-OSJ-1 block on completion of the first well. The block contains an existing undeveloped discovery of the mid-1980s which tested 10mn cf/d of gas plus 200 b/d of condensate from upper horizons, but no estimate was made of an indicated gas pay of 650 ft. This block is claimed to have potential for 1.5tn cf of gas reserves.

Tullow has been building up its total exploration acreage in the Indian sub-continent and reportedly outranks Shell by one-third and firmly entrenched Unocal by more than two-fold. However it is finding commercial oil and gas that counts. This is not a real estate game and Shell's conservative approach to testing and analysing its 2,000 b/d discovery from Guda-11 proves its expertise in finding the sweet spot in an 11,108 sq km onshore exploration block.

The way ahead

These are early days but interesting times for those with Indian interests. A truly world-class oil and/or gas find by a foreign investor is still awaited – but the odds are improving with so many players now exploring and only six of the 26 sedimentary basins exploited.

IP Awards

Paul Frankel Award winner summarises thesis

The current holder of the Institute of Petroleum's prestigious Paul Frankel award, Dr Erzhan Dosmukhamedov, has kindly written an article summarising his doctoral thesis. Entitled 'Legal regulation of foreign direct investment in transitional countries – A case study of the Republic of Kazakhstan', the text can be found on the IP website at *www.petroleum.co.uk* in the education section.

Dr Dosmukhamedov, who is pictured with Baroness Thatcher following the completion of his doctoral thesis, is uniquely qualified to write on his chosen subject. In addition to being the first Kazakh graduate of the University of Oxford, he is the co-author of a number of the first post-independence laws of Kazakhstan, including laws on foreign investment (1994), petroleum (1995) and subsoil (1996). His first degree was in Law from the St Petersburg Law School. This was followed by a Master in Law degree from the Southern Methodist Law School in the US and then a doctorate at Oxford.

The Paul Frankel award was established in 1989 to honour Dr Paul Frankel CBE, FInstPet, in recognition of his 50 years of service in the petroleum economics field. An award is made every other year to provide a post-graduate scholarship (of £7,000) for the study of subjects which, in the opinion of IP Council, are relevant to the oil and gas industry.

Protecting marine wildlife – improving the science

Major advances have now been made in our ability to use seabed biological data much more effectively for marine environmental management, protection and education. In a new programme, the Marine Life Information Network (MarLIN) is accessing seabed data from a wide range of sources to create information that will be available on the Internet for research, industry and education. *Dr Keith Hiscock*, Programme Director, MarLIN, reports.

The seabed around Britain and Ireland is probably the most researched area of a similar size for its marine biology anywhere in the world. The Marine Nature Conservation Review (MNCR) database alone holds field survey records from over 31,000, mainly inshore, survey stations around Britain and Ireland. The Internet can be used to find out where data on seabed surveys is held by using the European Directory of Marine Environmental Data (EDMED) (**www.nbi.ac.uk/bodc/edmed.html**) while the UK Coastal Directories, which summarise a wide range of information relevant to environmental protection, are now published on CD-ROM.

However, these metadata sources do not enable access to detailed local data or the development of the contextual information that is so important for research and environmental assessment. A significant start to making such survey data available has been made by the UK Joint Nature Conservation Committee (JNCC) through publishing MNCR survey data on the Internet in MERMAID (Marine Environment Research Mapping And Information Database) (see **www.jncc.gov.uk**). One of the main aims of the Marine Life Information Network (MarLIN) is to add much more survey information to that database (visit **www.marlin.ac.uk** for more information).

Making use of survey data for environmental protection and management requires structures, criteria and standards. The MNCR classification of seabed habitats and communities (together called 'biotopes') makes it possible to identify the different types of seabed and to compare species richness within the same sorts, or to identify those biotopes which are rarely encountered and may be worthy of special protection. With appropriate provisos on which

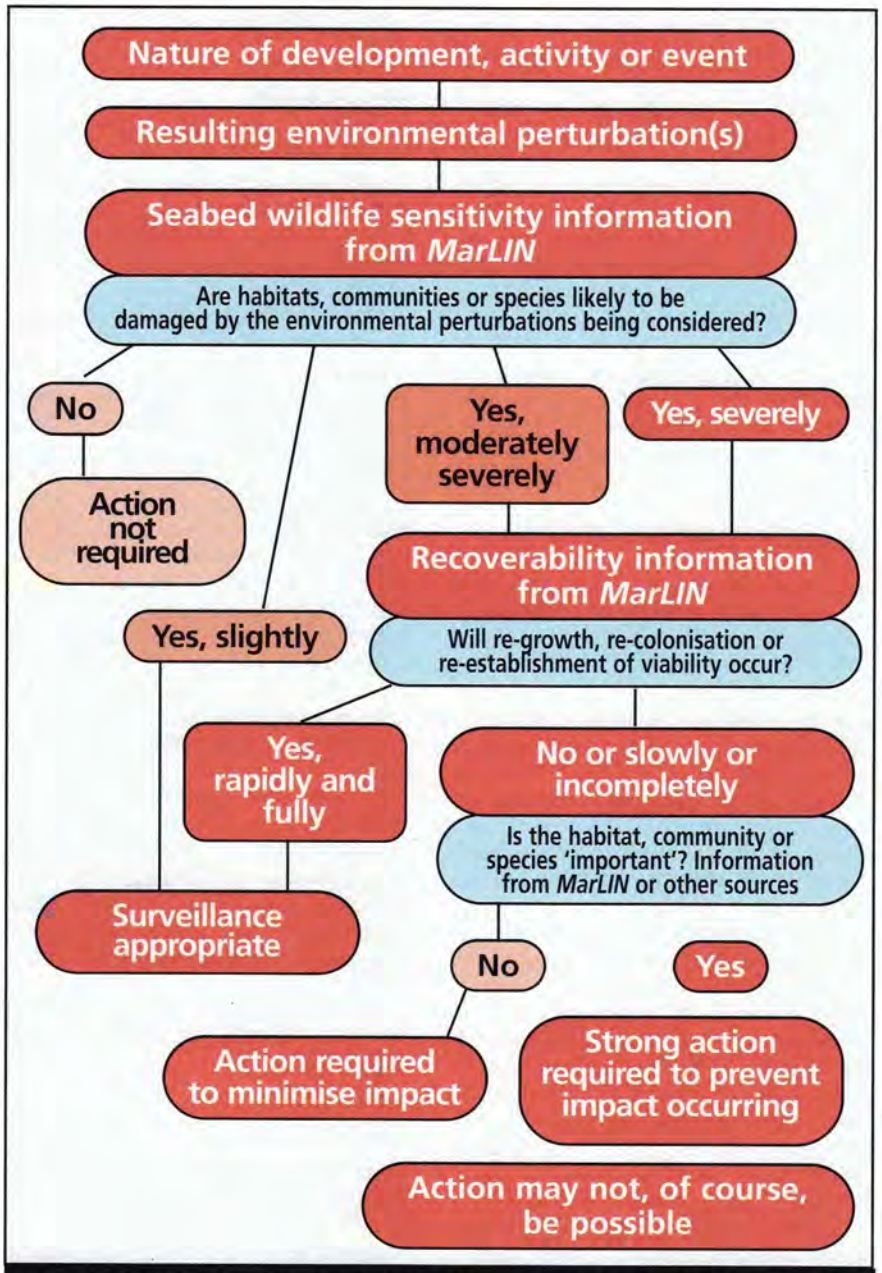

Figure 1: A simplified flowchart demonstrating the way in which information is assessed and action taken in environmental protection and management

species are well enough researched to be included, there are also criteria that have been developed to identify which species are nationally rare or scarce.

Identifying more scientifically based indices of sensitivity for seabed biotopes and species, including those in relation to oil industry activities, is a major focus of the MarLIN programme. These indices use knowledge of the biology of seabed species – in particular lifespan, growth rates, time to reach reproductive maturity and recruitment mechanisms – to identify not only likelihood of death or injury in an incident, but also of recovery. Assessing recoverability potential is important because, in many situations where habitats, biotopes or species are lost following a natural or human-induced perturbation, recovery can be rapid and the perturbation is therefore much less important than if long-lived slow growing species that are unlikely to recover have been affected. (See **Figure 1**.)

Getting it right

It is essential that the MarLIN programme is developed in collaboration with those involved in marine environmental protection and management and with research scientists who can identify key information requirements. Technical groups within MarLIN deal with such issues as data management and criteria for assessing sensitivity key information.

Improving public knowledge

There is a very large public interest in marine life. There is also a need to describe, through formal and informal education, the threats which exist and where the real problems lie for conservation of biodiversity. The MarLIN programme collaborates with the National Marine Aquarium in Plymouth to develop educational packages and provides a marine focus for the UK National Biodiversity Network (**www.nbn.org.uk**) especially to encourage public participation in recording activities.

The way forward

The approaches being developed for MarLIN have been widely embraced by the marine scientific, regulatory and user community. The opportunities to improve our approach to marine environmental protection, management and education are exciting and timely. The basic programme is underway but more support from organisations with vision and a determination to improve prospects for the enjoyment and protection of marine wildlife is needed.

ISO/TC 67 Plenary Meeting in Norway

ISO/TC 67, the technical committee developing international standards on the material and equipment for the petroleum and natural gas industry, held its 19th Plenary Meeting in Oslo on 15 – 16 September. The Norwegian Standardization body (NTS) hosted this meeting which was attended by delegations from 13 member countries. Cheryl Stark, the new Chair appointed earlier this year, noted in her opening address that considerable progress has been made towards meeting the agreed target of publishing 20 standards this year. Six have already been published to date by the ISO Central Secretariat in Geneva and a further six are expected before year end. This is a step change when compared to the disappointing numbers published in previous years.

In addition, all standards on the two-year plan agreed at last year's meeting in Xi'an, China, have made significant progress and it is hoped that some of the delays in meeting this year's targets can be recovered during the year 2000. The two-year plan originally called for the publication of 30 standards next year. The Plenary Meeting agreed the new target list of standards for publication developed at the Management and Executive Committee meetings held in New Orleans in June. The list includes 42 standards and the aim is to have a critical mass of key international standards available for the industry to use in order to realise the benefits of integrity assurance, increased competitiveness and cost savings. It is clear that the UK's proposal to establish specific targets has had a positive effect on focusing efforts and resources. It was therefore agreed that the Management Committee, who are actively tracking progress, should develop publication targets for the year 2001.

The UK delegation at the meeting comprised Graham Thomas from BP Amoco and Sjoerd Schuyleman from the IP. A number of other specific proposals were made to delegates at the Plenary Meeting. The aim was to ensure that there are adequate resources available within the technical committee to deliver against the agreed programme. This applies not just to the experts needed to develop the specifications, but also funding to ensure that the documents are produced in the correct format. Some funds are now available to assist with this work. It was disappointing that the meeting was unable to commit further resources as had been hoped. However, the IP will be taking a very active part next year, with a budget submission that should be more than three times the previously available funding level.

For the last two years, CRINE Network has also provided industry funds towards supporting specific deliverables to the work of ISO/TC 67 supplemented by a contribution from the DTI. CRINE will be disbanded at the end of this year and the activity, plus the surplus funds available, will be transferred to the IP to be amalgamated with our own approved budget. If you are already involved with developing standards for the petroleum industry and have previously received support or need future funding assistance, then please contact the IP. This is a once-only funding effort which aims to provide a 'final push'. Details of the published standards and the work we do are available on the IP website.

IP branches

The IP Branches Committee held a successful meeting in Aberdeen on 16 and 17 September. Following a reception at the Aberdeen Town House hosted by the Lord Provost, the President Chris Moorhouse hosted a dinner attended by, amongst others, the Lord Provost and the Chief Constable of Grampian. John Milligan, Chairman of PGS Atlantic Power addresses the guests emphasising the challenges of recruitment for the Offshore Industry and the importance of education and training. The assembly was also entertained by the Grampian Police Pipe Band.

Left to right: Jeff Pym, IP Director General, the Lord Provost, Chris Moorhouse, IP President

Keeping oil safe

Oil contamination and spillage can be a serious issue for industry, with the greatest risk occurring when oil is transported from bulk storage to the machine in which it will be placed into service. In a bid to minimise such risks, Shell UK Oil Products has launched Oil Safe, a new generation of oil container.

The range has been developed not only to reduce the risk of oil contamination from air-borne pollution, due to particles entering through open spouts and containers, but also to make it easy to deliver precise amounts of fuel via its accurate calibration system.

Made from high-density polyethylene – a highly chemically resistant plastic – the Oil Safe range is designed so that 'one lid style fits all drums and one drum fits all lid styles'. 'This enables any combination of lids and drums to be assembled to suit every need,' comments the company.

Available in three- or five-litre sizes, the see-through containers have measurement gradations to allow fluid levels to be seen at a glance, and strong handles for easy carrying and pouring which double as storage hooks. The large 4.8-inch drum openings are said to make them easier to fill from 205-litre drums and intermediate bulk containers (IBCs) with less spillage.

Tel: +44 (0)500 011 011

Hydraulic wrench speeds tubing manufacture

Parker Hannifin reports that UK manufacturer Hamworthy Belliss & Morcom of Gloucester was the first in the UK to use its new hydraulic wrench for large size tube fittings.

The tool is claimed to have greatly speeded assembly of 1½-inch diameter tubing runs on a compressor destined for an offshore gas platform. Typical assembly times are around two to three minutes per joint, some three times faster than previous manual assembly procedures, comments Compression Section Leader Ted Tedaldi.

The new tool also allows the company to assemble many fittings *in situ*, providing further time savings.

Tel: +44 (0)1271 313131
Fax: +44 (0)1271 373636

Secure trading on the Internet

Minneapolis-based Cargill – the international marketer, processor and distributor of agricultural, food, financial and industrial products and services – claimed to have become the first company to apply to become a **bolero.net** founder user minutes after the system was launched on 27 September at 00:01 GMT. Oil industry usage is also a major target for the new secure data transfer system.

A joint venture between the international logistics and financial communities, **bolero.net** allows for the secure electronic transfer of all documents and data between the parties in the trade chain.

According to Joris Claeys, International Logistics Manager for Cargill Coffee: '**bolero.net** will make shipping transactions faster and more efficient. It is global and applicable to just about any industry sector, allowing all parties involved in the process of buying and selling across borders to benefit.

'On our part, the efficiencies the Cargill Group will see by being "**bolero.net** enabled" easily run into millions of dollars per year.'

Solutions for the oil industry were also launched by **bolero.net** at a presentation in London hosted by Business Development Manager–Energy, Paul Andrews. At the presentation Dagfin Uthang, an advisor to Statoil on operations, supply and trading, explained that studies by the Norwegian oil company on the potential impact of using **bolero.net** on crude oil supply, trading and shipping operations had identified 'potential gross savings of $665,000 and removal of significant liability risk'.

According to Andrews, the annual fee for a company the size of Statoil would be around $150,000/y. This, at least initially, would entitle the company to unlimited transfers of secure data/information via the **bolero.net** network. He also confirmed that **bolero.net** was prepared to guarantee the security and reliability of its system with a contingent liability of up to $100,000 per message.

Tel: +44 (0)171 759 7022

Flame detection

The second-generation Det-Tronics X3300 infrared optical flame detector is designed to sense the smallest fires in process or production facilities, indoor and outdoor plants, oil refineries and offshore platforms. For example, it can sense a 0.1m² gasoline fire at distances over 60 metres, states the manufacturer.

Measuring under 15 cm x 8 cm, the detector is said to be easily retrofitted and requires a low level of maintenance.

Tel: +44 (0)1753 683059
Fax: +44 (0)1753 684540

Accurate dosing for 2-stroke oil mixtures

Englass reports that its 30 ml dispensing pump – the Englass 30 – has been chosen by off-road motorcycling specialist Edmondson Racing which was seeking a new dispensing system for its 2-stroke oil.

The oil is mixed with petrol at various ratios for different 2-stroke engines. Previously it was first poured into a measuring jar and then added to the fuel can. However, this tended to result in inaccurate mixing – either through customer ignorance or lack of care – which could ultimately cause engine damage. There was also a danger of dirt getting into the fuel via grime in the measuring jar, again leading to possible engine wear.

The Englass 30 dispensing system is supplied with alternative doses to provide the various mix ratio options required for different makes of engines. It is said to have not only solved the contamination and dose accuracy problems previously experienced, but is also user-friendly. The dispenser can be used on any closure over 38mm.

Tel: +44 (0)116 233 1100
Fax: +44 (0)116 231 2077

Pocket-sized personal gas protection

Zellweger Analytics recently unveiled its new Neotronics Neotox Mk 5 range of single gas monitors. Designed to monitor and detect oxygen depletion, combustible gases, carbon monoxide, hydrogen sulfide, chlorine, nitrogen dioxide, ammonia and hydrogen cyanide, the units are suited to a wide range of applications, including the chemical, petrochemical and refining sectors.

The pocket-sized gas monitors are said to combine simple operation with comprehensive monitoring protection and low cost of ownership. The cases are colour-coded for ease of identification. Features include a large, clear display, showing gas concentrations and alarm messages. In the event of a potentially dangerous build-up of hazardous gas, a flashing light and high level audible sound alarm immediately alert the user. For operators who are only concerned whether or not an area is safe, a go/no go mode is available.

The units are powered by either dry cell (AA type) or NIMH rechargable batteries. Data logging is standard with exposure data, including alarm events, exposure profiles and session peaks stored on a rotating log.

Tel: +44 (0)1202 676161
Fax: +44 (0)1202 678011

Straight down the line

Micro Motion, part of the flow division of Fisher-Rosemout, has released its first straight tube meter. The T-Series is said to be the shortest, most compact, straight, single tube meter currently available on the market. It offers direct mass flow, volume flow, density and temperature measurement of liquids and slurries.

According to the manufacturer, an 'outstanding' feature of the design is the fact that the bore is identical to the internal bore of hygienic piping. 'This means that unlike some competitors, adapters such as O-rings are not needed and there is therefore much less risk of entrapment and bacterial growth'. The meters can be pigged if necessary.

The T-Series is self-draining, with titanium wetted parts for corrosion resistance. The meters come in $^{3}/_{4}$-, 1-, and $1^{1}/_{2}$-inch bore sizes, covering nominal flow rates of 14,000 to 90,000 kg/h.

Base flow accuracy (liquids only) is claimed to be 0.15%, with a repeatability of 0.05%. Base density accuracy is said to be 0.002 g/cc, with a repeatability of 0.0005 g/cc. The fluid temperature rating is –50°C to 150°C.

As well as displaying a high immunity to field effects, including air entrainment and viscosity, the meters have a tube rating of 100 bar and a 50 bar secondary containment rating. Process connections to suit the various industries and applications are available as standard.

The T-Series flow meter range can be paired with Fisher-Rosemount's ALTUS 3000 electronics platform to give a wide array of measurement and control options, such as mA and frequency/pulse outputs, batch processing and capability, and advanced density measurement.

UK only
Tel: 0800 966180
Fax: 0800 966181

Outside UK
Tel: +31 318 549 470
Fax: +31 318 549 479

Close coupling from new manifold mounting system

In response to requests from some of the major oil and gas companies, Anderson Greenwood has launched SaddleMount – a new manifold mounting system designed to facilitate the close coupling of a pressure transmitter to an orifice flange without the need for NPT threads or impulse lines which are a constant source of leakage and maintenance.

The patented, all-flanged design provides a number of cost and performance benefits, states the manufacturer. These include reduced costs for design engineering, installation and procurement, combined with a reduction in induced measurement errors and leakage, compared with conventional systems using impulse lines.

One of the system's key design features is the saddle mounting plate which provides rigid connection of the isolation module to the orifice flange tappings. It also incorporates a straight-through $^{3}/_{8}$-inch bore (metal or soft seated) directly from the orifice tappings to the transmitter sensing module which reduces pulsation induced error and attenuation, thus ensuring accurate transmitter measurement.

Of modular construction, the system comprises an isolation block module which flanges directly to the tapping connection, an instrument manifold which mounts directly to the block module and pressure transmitter, and the saddle mounting plate which is said to eliminate the bending force on the connection, making bracketing or bracing unnecessary.

The system can be supplied with a block or fire-safe double block and bleed insolation module, and a choice of three or five valve instrument manifolds.

Tel: +44 (0)161 494 5363
Fax: +44 (0)161 494 5672

Joint research into measurement uncertainty

Aberdeen-based flow measurement specialist, Flow Ltd, has unveiled plans to collaborate with the National Engineering Laboratory (NEL) and Strathclyde University on a three-year PhD research project to advance the Monte Carlo Simulation methodology developed by the company to find the uncertainty in measurement systems such as oil and gas metering from platforms.

The simulation method – which is a mathematical technique used to estimate risk for decision making in business, oil and gas drilling and other areas of science and industry – helps oil and gas companies achieve cost savings by optimising the use of plant to minimise capital outlay and operating costs.

Work on the project will be carried out a by student funded under the Postgraduate Training Partnership (PTP) between NEL and Strathclyde University. The PTP is jointly funded by the Engineering and Physical Sciences Research Council and the UK Department of Trade and Industry. Flow has provides an additional £20,000 of funding for the project.

The project will investigate the mathematical and statistical basis for the use of the Monte Carlo Simulation uncertainty, including a mathematical notation to simplify the description of uncertainty for input to national and international standards.

Tel: +44 (0)1224 332250
Fax: +44 (001224 332251

Marine weather service

ABS Nautical Systems and Weathernews Inc have teamed up to add the WeatherLINK Worldwide Marine Weather Information Service as a new module within ABS's SafeNet integrated fleet management software. 'Ship operators and managers now have an all-inclusive, single source, marine weather graphics service on which to base critical routing and operational decisions,' comments Jack Kitchura, ABS Nautical System's President. Weather information is updated every 24 hours and can be displayed in a graphical or text format. Forecasts are updated throughout the day and projected for up to 96 hours.

Tel: +44 (0)207 377 4425 or +1 281 877 5853
Fax: +1 281 877 5801

If you would like your new product releases to be considered for our Technology News pages, please send the relevant information and pictures to:

Kim Jackson
Deputy Editor, *Petroleum Review*
61 New Cavendish Street, London W1M 8AR, UK

NEW Publications and Data Services

Natural Gas in Germany

Sara Knight (FT Energy, Maple House, 149 Tottenham Court Road, London W1P 9LL, UK). ISBN 1 84083 167 7. 185 pages. Price: £395.

This publication describes the new legislation aimed at liberalising the German energy industry and puts the law into the context of the EU Directive on the internal market for gas. It examines the critical issues under debate and the industry reactions as liberalisation becomes a reality. The report covers: the structure of the gas market; natural gas sourcing; gas pricing developments; the gas sector in eastern Germany; national and local pipeline networks; and the structure of gas supply through to the end customer.

Economic Risk in Hydrocarbon Exploration*

Ian Lerche and James A MacKay (Academic Press, 525 B Street, Suite 1900, San Diego, California 92101-4495, USA). ISBN 0 12 444165 3. 404 pages. Price (hardback): $129.

This book provides a framework for assessing the uncertainties associated with exploration risk. Numerous examples with accompanying microcomputer algorithms illustrate how to quantitatively approach economic risk. Assumptions and models of economic risk are also compared and numerical examples are given throughout to facilitate hands-on calculations using PC spreadsheet packages.

Iran's Role in the Caspian

Peter Enav (FT Energy, Maple House, 149 Tottenham Court Road, London W1P 9LL, UK). ISBN 1 84083 147 2. 123 pages. Price: £395.

This report focuses on Iran's role in the development of the Caspian's oil and gas resources. Providing an insight into the political, economic and energy issues, it considers the possibility of Caspian reserves being exported via Iran and the impact of US policy towards Tehran. Non-Iranian export routes are also analysed and the report examines the role of five foreign powers – the US, Turkey, Russia, China and Iran – in the development of a Central Asian transportation network. It also outlines Iran's own oil and gas export strategy and examines how this may conflict with Central Asian development plans.

Surface Production Operations*

Ken Arnold and Maurice Stewart (Gulf Publishing Company, Book Division, PO Box 2608, Houston, Texas 77252-2608, USA). ISBN 0 88415 822 5. 569 pages. Price (hardback): £93 ($115).

This revised edition provides a detailed overview of the equipment and processes used in gas-handling operations and is designed to help production engineers to design, specify and operate a production facility.

Oil and Gas on the Internet

(For more information visit The Competitive Analysis Technologies website at **www.catsites.com/publications.html** or e-mail **info@catsites.com**)

Now in its fourth year, this database – available either as a hard copy directory or as a licence for Intranet or LAN use in various forms – has been updated to include 3,306 sites for oil and gas information and has been split into an Upstream and Downstream version. Updated quarterly in order to ensure that links are kept up to date, the directory provides access to the websites of 808 oil and gas companies, 1,094 companies supporting the industry, 300 industry associations, 184 industry journals, 53 sources for pricing information, 194 databases for industry information and 673 other valuable oil and gas related sites.

** Available for reference only from the IP Library*

Latest from the Library

New library

Our newly refurbished library is now open to visitors. IP Members are invited to try out the new facilities – you will find that there is extra space for each individual visitor, a light for each work area and power points for plugging in your laptop. Everyone who has visited so far has been impressed with how much lighter and more airy the library now seems. Visitors still have access to the Internet, *Telerate*, *Reuters Business Briefing* and all the CD-ROMs we hold for reference. And we still hold all the same periodicals and book stock – with a selection of new additions of course!

New Library & Information staff

We recently welcomed Perry Hackshaw as our new Webmaster who can be contacted on Tel: +44 020(7) 467 7112 or e:**phackshaw@petroleum.co.uk**.

Recent additions to IP Library stock

- *Advanced Process Control and Information Systems for the Process Industries*. Les A. Kane (ed.). 1st Edition. Gulf Publishing, Houston, Texas, US, 1999.
- *ASTM Standards on Assessment and Remediation of Petroleum Release Sites*. Sponsored by ASTM Committee E-50 on Environmental Assessment. American Society for Testing and Materials, West Conshohocken, PA, US, 1999.
- *The Oil Industry in Venezuela: A strategic Analysis of PdVSA*. (A dissertation submitted to the University of Westminster for the Degree of Master of Arts, International Business and Management). Esther Da Silva, London, UK, September 1999.
- *A Pilot Greenhouse Gas Trading System: The Legal Issue*. Richard B Stewart, Jonathan B Wiener and Philippe Sands. (The text, intended for a general audience, is based on *Legal Issues Presented by a Pilot International Greenhouse Gas Trading System*) Robin Clarke, United Nations, Geneva, Switzerland, 1966.
- *The Quality of Aviation Fuel Available in the United Kingdom: Annual Survey 1998*. G K Rickard and J Amero. 1st Edition. DERA/MSS/MSM1/TR990400. Defence Evaluation and Research Agency (DERA), Pyestock Hampshire UK, August 1999.
- *Surface Production Operations: Design of Gas-Handling Systems and Facilities*. Volume 2. Ken Arnold and Maurice Stewart. 2nd edition. Gulf Publishing, Houston, Texas, US, Gulf Publishing, 1999.

Contact details

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  Chris Baker, Senior Information Officer, +44 (0)20 7467 7114
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  Liliana El-Minyawi, LIS Assistant, +44 (0)20 7467 7113
- Careers and educational literature queries to:
  Susan Huang, Information Assistant, +44 (0)20 7467 7116
- Web page queries to:
  Perry Hackshaw, Webmaster, +44 (0)20 7467 7112
- LIS management queries to:
  Catherine Cosgrove, Head of LIS, +44 (0)20 7467 7111

Fax any of the above on +44 (0)20 7255 1472 or e-mail **lis@petroleum.co.uk** Visit our website at **www.petroleum.co.uk**

NEW Publications and Data Services

Petroleum Geology of Northwest Europe: Proceedings of the 5th Conference

Editors: A J Fleet and S A R Boldy (Geological Society Publishing House, Unit 7, Brassmill Enterprise Centre, Brassmill Lane, Bath BA1 3JN, UK). ISBN 1 86239 039 8. 1,408 pages (2 volumes). Price: £112.50 ($187) to IP members (for a limited period); £150 ($250) to non-IP members.

This two-volume publication collates the proceedings of the 5th Conference which was held at the Barbican Centre in London at the end of 1997. It provides an extensive review of the significant advances made in understanding the petroleum geology of the Atlantic Margin of northwest Europe, of the North Sea and of adjacent areas since the last conference in 1992. In particular, the volumes focus on the development and application of 3D seismic, time-lapse (4D) seismic and other innovative seismic tools; the ongoing refinement of sequence and other stratigraphic approaches, including the integration of detailed biostratigraphic data; and the development of modelling at both the reservoir and basin scale which can respond to new data acquisition and be used to assess uncertainties at the reservoir scale and scenarios at the basin scale.

Trends in Oil Discharged with Aqueous Effluents from Oil Refineries in Europe*

(Available, free of charge, from CONCAWE, Madouplein 1, 1210 Brussels, Belgium). 12 pages.

This report (no. 8/98) provides an overview of Western European oil refineries' effluent water quantity, oil content and treatment processes in 1997. It compares 1997 data with the results of previous surveys of this sector to show that the trend in the reduction of oil discharges continued, even though the reported refinery throughputs had increased by 10% since the last survey. The rate of oil discharged to the amount of oil processed has also continued to fall. The report also indicates that nearly 90% of the refineries surveyed now include biological treatment in their waste water treatment facilities.

Octel Worldwide Gasoline and Diesel Fuel Survey*

(The Associated Octel Company Ltd, Suite 2, Fourth Floor, Berkeley Square House, Berkeley Square, London W1X 6DT, UK).

Now in its 49th edition, Octel's annual worldwide survey provides key data relating to gasoline and diesel fuel quality. Listed on a country-by-country basis, data includes octane and cetane numbers, sulfur content in diesel by percentage weight, and domestic sales volumes by fuel type. Comments are also included on diesel fuel lubricity, fuel antistatic safeguarding, Octimise performance additives and the Valemaster™ solution for valve seat protection.

The Seveso 2 Directive and the Oil Industry

(Available, free of charge, from CONCAWE, Madouplein 1, 1210 Brussels, Belgium). 42 pages.

This report (no. 7/98) gives guidance to the management of sites in the oil industry on the interpretation of the Seveso 2 (or Control of Major Accident Hazards (COMAH)) Directive, with particular emphasis on the difference compared with the Seveso 1 Directive. The latest Directive, which applies to establishments which hold more than specified quantities of substances classified as hazardous because of their toxicity, flammability or potential to cause harm to the environment, was implemented in European Union Member States in February 1999. The report provides practical guidance on how to develop a Major Accident Prevention Policy (MAPP) and the Safety Management System, and details the content of the Safety Report.

Well Testing: Interpretation Methods

G Bourdarot (Éditions Technip, 27, rue Ginoux 75737, Paris, France). ISBN 2 7108 0738 6. 350 pages. Price (hardback): euro 53.35 (FFr350).

This volume is designed to help practising engineers and technicians to interpret well testing. A range of testing methods are covered – traditional methods, standard type graphs, computer-assisted graph generation and interpretation with the help of derivatives – together with an explanation of which method is best suited to which application. The text also presents all equations required for the interpretation while avoiding lengthy mathematical developments.

Marinflex 99*

Editor: J A Witz (Bentham Press, Dilke House, 1 Malet Street, London WC1E 7JN, UK). ISBN 1 874612 29 3. 252 pages. Price: £120 UK (£150 overseas).

The past decade has seen a significant growth in both the use of flexible pipes as risers and static flow lines and of dynamic umbilicals in subsea developments using floating production technology. A much older application area is that of marine telecommunications cables which are contributing to a rapid expansion of much of today's global communications infrastructure. At the same time, new applications of these structures, such as in very high voltage dynamic power cables, are starting to radically change hydrocarbon field development techniques and power distribution grids. Two key technical areas currently capture the attention of engineers working in this field. The first is a need for an improved understanding of the effects of arduous operational conditions on the service life of these products. The second is the requirement for extending current capabilities to water depths beyond 2,000 metres. This compilation of 16 papers presented at the Third European Conference on Flexible Pipes, Umbilicals and Marine Cables held in London on 26–27 May 1999, addresses both these issues.

MP Buyers Guide Online

*(Accessed at no charge via NACE homepage at **www.nace.org**)*

NACE International, the Corrosion Society, has released a fully searchable electronic version of the *MP Buyers Guide* on the Internet. Updated continuously, the online guide contains information on more than 1,200 companies offering corrosion products and services worldwide. The database can be browsed using an alphabetical index of product categories, or searched by state, city, country or keywords in the company name and company description.

Wireline Logging/Les Diagraphies au Câble

S Boyer (Éditions Technip, 27, rue Ginoux, 75737 Paris Cedex 15, France). Price: euro 182.94 (FFr1,200)

This CD-ROM, claimed to be the first of its kind, provides a clear, concise description of the wireline logging process which gathers data after drilling to determine the characteristics of the formations drilled and the fluids they contain. Developed with the technical support of Elf and Schlumberger, the CD-ROM was designed to provide a teaching tool for wireline logging training. It is PC and Mac compatible and may be used in French or in English. Navigation through the CD-ROM begins from a detailed table of contents, with stop, forward and return functions. A text print out function is also available. The wireline logging operation is illustrated using video sequences filmed in-situ on a drilling site, while an interactive illustration of the log produced helps users familiarise with the information it contains. A glossary and quiz are also provided to help users assimilate the various concepts covered.

IP Conferences and Exhibitions

Business Seminars on

Opportunities in Canadian Oil and Gas

London: 9 November 1999 and
Aberdeen: 11 November 1999

Supported by

The Canadian High Commission and British Trade

Who should attend?

Business Managers and Technical Specialists, new to, or wishing to update their awareness of the Canadian market and seeking to:

- Identify new strategic opportunities
- Understand the scope and extent of new developments
- Exploit their company's particular expertise gained in the North Sea or elsewhere in new markets
- Hear firsthand from existing practitioners about real experiences in this market

The programme and registration form are now available

Autumn Lunch

Guest of Honour and Speaker: Dick Cheney

Chief Executive Officer, Halliburton Company, Former US Secretary of Defense 1989–93

Savoy Hotel, London: 15 November 1999

It is expected that many companies will purchase tables and maximise the opportunity to entertain guests at one of the key social events in the industry year.

Places are limited and delegates are advised to book soon

The programme and registration form are now available

Training Courses

For further information and a copy of the Programme of 2000 Training Courses which will be available in December, please contact Nick Wilkinson in the IP Conference Department. Tel: +44 (0)171 467 7151 or e: **nwilkinson@petroleum.co.uk**

Programmes and registration forms for all events are available from:

Pauline Ashby, Conference Administrator, at the Institute of Petroleum

Tel: +44 (0)171 467 7100
Fax: +44 (0)171 255 1472
e: pashby@petroleum.co.uk

International Conference and Exhibition on

Developments in Measurement and Loss Control in Oil Refineries

London: 7–8 December 1999

During the six years which have passed since the last IP Conference on Refinery Loss Control, there have been significant changes in technology and management. The main areas of development have been data reconciliation and direct mass measurement. Other changes have resulted from the publication of the *IP Guide to Hydrocarbon Loss Accounting and Control in Petroleum Refinery Operations* and its extending use around the world.

This international two-day conference aims to look at these developments, both the technology and its limits, and to discuss the implications and application of the options that are becoming available to refinery management in the field of refinery loss control. Papers will include presentations from leading researchers and refinery operators detailing their experiences.

The programme and registration form are now available

IP Week 2000: 14–17 February

Events will include:

14 February

International Conference on
Oil and Gas: An Industry Fit for the Millennium

15 February

Seminar on
Restructuring of the Energy Industry
Organised in association with **Wood Mackenzie**

Seminar on
Bunker Trading and Price Risk Management
Organised in association with
The International Bunker Industry Association

Annual Luncheon
Guest of Honour and Speaker: **Lee Raymond Chairman and CEO, Exxon Corporation**

16 February

The 13th Oil Price Seminar and Exhibition on
Coping with Oil Price Volatility – Liquidity in the Pricing Instruments
Organised with the support of **NYMEX**

Annual Dinner

17 February

International Conference on
The Middle East – The Key to Global Oil Supply
Organised in association with the
Centre for Global Energy Studies

The programme and registration form are now available

Membership News

NEW MEMBERS

Dr A A A Abbas, ADGAS
Ms E B Akah, Department of Petroleum Resources
Mr D Armstrong, Armstrong Consulting Ltd
Mr M L Bello, Nigeria
Mr D W Brook, Hull
Mr C C Butters, PricewaterhouseCoopers
Dr P R J Collinson, Oil Spill Response Limited
Mr T Connell, Marlow
Dr W B Dade, Cambridge
Mr T Dixon, Safe Marine Ltd
Mr O R Drennan, Morgan Cole
Mr M Farrugia, Malta
Mr R G Fenner, R G Fenner Consulting
Mr J H Gammage, Wareham
Mr M Ganey, PricewaterhouseCoopers
Ms H V Gaywood, Greenergy Carbon Partners Ltd
Mr S A Glancy, Alan Cobham Engineering Ltd
Ms A Good, Safe Marine Ltd
Mr A Green, London
Ms A Grosso, Egham
Mr P A Hancock, Aberdare
Mr G Harding, Performance Strategies UK Limited
Mr G Hayward, Norwich
Mr J M Hills, Malvern
Dr E M Himsworth, London
Mr R C Huttenbach, London
Mr A F Jackson, PA Consulting Group
Mr A Jefferson, Leigh on Sea
Ms S E Jordan, Korea LNG Limited
Mr L Kyriakides, Cyprus
Mr C Lefevre, France
Mr Y S Loo, Hong Kong
Mr P McMurray, Bromley
Mr C Merentitis, Greece
Dr A R Middleton, Chorleywood
Mr M P Neal, AMEC Process & Energy Ltd
Mr R D Philips, Pan Canadian Petroleum Ltd
Mr E Piercy, Indonesia
Mr P Power, Ireland
Mr M G Shaw, North Thoresby
Mr Y Sindi, London
Mr E P Spearman, Aberdeen
Mr W Stennes, Dubai Petroleum Company
Ms J C Stephens, Ormskirk
Mr S W Suh, SK Corporation
Mr A Vasudevan, Oman Refinery Company LLC
Mr M Von Hirsch, Harrow on the Hill
Ms J West, Basildon
Mr I G Winters, Emirates Bank International
Mr G J Woodall, Offshore Technology Management Ltd
Mr C M Yu, Hong Kong

NEW STUDENTS

Mr O P Agaga, Nigeria
Mr A A Ibrahim, Oxford

NEW FELLOW

Dr E T Libbey FInstPet

Dr Libbey graduated from Cambridge University in 1969 with a BA in Chemistry (Class I). Fourteen years later he graduated from Harvard Business School with a PhD in Management Development programming. Dr Libbey is a Director of Preng & Associates who are an executive search company devoted exclusively to meeting needs of energy and utility (electricity) companies worldwide. Dr Libbey's personal responsibilities are focused on UK and Europe markets. Before joining Preng & Associates, Dr Libbey worked for two years as Manufacturing & Supply Director for BP Oil Europe.

NEW CORPORATES

Pagoda Associates Ltd, 34 Queen Anne Street, London, W1M 9LB UK.
Tel: +44 (0)171 436 9464 Fax: +44 (0)171 436 8081
e:info@pagoda.assoc.co.uk
Representative: Mr S Malin
Pagoda's energy division offers consulting worldwide in oil, gas, coal and power:

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- Risk analysis
- Energy efficiency

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e: angel@ewbanksolutions.com
www.ewbanksolutions.com
Representative: Qasim Shaikh, Director
Ewbank Solutions is a new company delivering tried and tested energy industry expertise via the Internet. The company delivers the high value expertise required by the petroleum industry cheaper and faster than the traditional consultancy approach, via access to it's expert knowledge base. Ewbank Solutions does not have an extensive office structure to support or hidden overheads to service. The relationships established by the company have the minimum of formality and the maximum of value.
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Representative: Mr J Sasserath, Divisional Director
CMG plc is a leading European IT services group, providing business information solutions through consultancy, systems development, software applications and managed services. Established in 1964, CMG operates internationally from its European bases in the UK, The Netherlands, Germany, France and Belgium, implementing and supporting applications for clients around the world. The Group is listed on the London and Amsterdam stock exchanges.
CMG has proven knowledge, products and solutions in the energy, retail, utility, finance, trade transport and industry, telecommunications, media and government markets. The Group also provides managed information services ranging from payroll processing and personnel administration to call centres and networks.

OBITUARY

Mr George Esmond Higgins
1916–1999

The Institute of Petroleum was saddened to hear of the death on 26 August 1999 of Mr George Esmond Higgins, FInstPet. George Higgins was born in 1916 and became a member of the Institue in 1937. He spent several years working in the Trinidad oil industry and latterly in the North Sea. In 1996 he published a book titled *A History of Trinidad Oil* which is available in the IP Library.

EVENTS Forthcoming

NOVEMBER

3–4 November
London: *United States SEC and FASB Accounting and Reporting for Petroleum Companies*
Details: Nick Wilkinson, The Institute of Petroleum

7–8 **Tehran, Iran**
Persian Gulf Gas Resources
Details: Institute for International Energy Studies (IIES), Iran
Tel: +98 21 874 6923
Fax: +98 21 874 8786

7–12 **Cricklade, Wiltshire, UK**
The Gas Chain: From Reservoir to Burner Tip
Details: Esther Musoke, Alphatania, UK
Tel: +44 (0)171 650 1402
Fax: +44 (0)171 650 1401

8–10 **Doha, Qatar**
Oil, Gas & Petrochemicals in Qatar
Details: Sarita Singh, IBC Gulf Conferences, Qatar
Tel: +971 4 362992
Fax: +971 4 362992/360116
e: ibcgulf@emirates.net.ae

8–11 **Dhahran, Saudi Arabia**
4th International Oil, Gas, Petrochemical & Power Exhibition
Details: Odetter Jonkers, ITE Press Office, UK
Tel: +44 (0)171 7596 5000
Fax: +44 (0)171 7596 5111
e: press@ite-exhibitions.com

8–11 **Cairo, Egypt**
3rd Pan-Arab/African Petrochemicals, Refineries, Gas & Oil Exhibition
Details: Peter Moist, The Middle East Association, UK
Tel/Fax: +44 (0)1564 784999

9 November, London;
11 November, Aberdeen:
Opportunities in Canadian Oil & Gas
Details: Pauline Ashby, The Institute of Petroleum

9–10 **Dubai, UAE**
Petroleum Loss Control & Measurement Uncertainties
Details: GHB Consultant, Geneva
Tel: +41 22 348 7378
Fax: +41 22 348 7978
e: ghbconsu@worldcom.ch

9–10 **Aberdeen**
Latest Advances in Offshore Processing
Details: Penny Richards, IBC UK Conferences
Tel: +44 (0)171 7453 5491
Fax: +44 (0)171 7636 6858
e: cust.serv@ibcuk.co.uk

11–12 **Horsley, Surrey**
Structured Project Risk Management
Details: ERA Technology, UK
Tel: +44 (0)1372 367117
Fax: +44 (0)1372 377927
e: conferences@era.co.uk

11–12 **Miami, US**
4th Latin Upstream '99
Details: Global Pacific & Partners, US
Fax: +1 281 597 9589
e: glopacamer@aol-com

14–16 **Abu Dhabi, UAE**
GasTrade 99
Details: GasTrade Secretariat, UK
Tel: +44 (0)1895 454533
Fax: +44 (0)1895 454588
e: a.crisp@turret-rai.co.uk

15–16 **London**
Sakhalin Oil and Gas
Details: Penny, Richards, ICB Global Conferences, UK
Tel: +44 (0)171 7453 5491
Fax: +44 (0)171 7636 6858
e: cust.serv@ibcuk.co.uk

16–18 **Vienna, Austria**
Refining & Petrochemicals in Russia and the CIS Republics
Details: World Refining Association, UK
Tel: +44 (0)1242 529090
Fax: +44 (0)1242 582157

17–18 **Heathrow, UK**
1999 Avionics Conference & Exhibition
Details: Laura Christie, ERA Technology, UK
Tel: +44 (0)1372 367000
Fax: +44 (0)1372 377927
e: laura.christie@era.co.uk

17–20 **Kamayoran, Indonesia**
Oil & Gas Technology Indonesia 99
Details: Heather Edkins, Overseas Exhibition Services, UK
Tel: +44 (0)171 7862 2073
Fax: +44 (0)171 7862 2078
e: heathere@montnet.com

18–20 **Oslo, Norway**
The 21st Century: Turning Point for the Northern Sea Route?
Details: NSR Conference Secretariat, Norway
Tel: +47 6711 1900
Fax: +47 6711 1910
e: Conference@fni.no

20–21 **Safat, Kuwait**
The Role of International Oil Companies in the Development of Oil Fields in Kuwait
Details: Dean Merrion, CWC Associates, UK
Tel: +44 (0)171 704 6241
Fax: +44 (0)171 704 8440
e: dmerrion@cwconferences.co.uk

23–25 **Tripoli, Libya**
Sixth Mediterranean Petroleum Conference & Exhibition
Details: International Energy Foundation, Libya
Tel: +218 21 333 1832
Fax: +218 21 333 1831

25–26 **Birmingham, UK**
Multi-Utility Infrastructure – 20:20 Vision for 2020?
Details: Pipelines Industries Guild, UK
Tel: +44 (0)171 235 7938
Fax: +44 (0)171 235 0074

28–1 December **Amsterdam**
EPCA Logistics Meeting 1999 & MariChem 99
Details (EPCA): EPCA Secretariat, The Netherlands
Tel: +32 2 675 38 00
Fax: +32 2 675 39 40
e: meetings@epca.be
Details (MariChem): MariChem, UK
Tel: +44 (0)1895 454581
Fax: +44 (0)1895 454647
e: info@marichem.com

29 November–3 December
London: *Price Risk Management in the Oil Industry*
Details: Nick Wilkinson, The Institute of Petroleum

30–1 December **London**
Safety on Onshore Installations
Details: The Conference Assistant, ERA Technology, UK
Tel: +44 (0)1372 367021
Fax: +44 (0)1372 377927

DECEMBER

7–8 December
London: *Developments in Measurement and Loss Control in Oil Refineries*
Details: Pauline Ashby, The Institute of Petroleum

IP Discussion Groups & Events

Energy, Economics, Environment

'OPEC's policy dilemmas'

Wednesday 10 November, 17.00 for 17.30 until 19.00

Dr Leo Drollas, Deputy Director/Chief Economist, Centre for Global Energy Studies

IP Contact: Jenny Sandrock

IFEG **Information for Energy Group**

The Internet Part 3 – What, Where, How and Why?

Afternoon Seminar, 1–5pm, Tuesday 9 November 1999
Institute of Petroleum, 61 New Cavendish Street, London W1M 8AR

This afternoon seminar will focus on the development of the Internet; factors to be taken into consideration when planning an Internet or Intranet site; basic web page design and advanced searching of the Internet. Speakers will include: **Sarah Wilson**, Information Researcher, Department of Trade and Industry; **Maru Ririnui**, Information Officer, Shell UK Ltd; **Catherine Cosgrove**, Head of Library & Information Service, Institute of Petroleum; **Perry Hackman**, Webmaster, Institute of Petroleum; and a representative from our sponsors.

Admission free to IFEG members, £20 to non-IFEG members.
A light lunch will be available before the seminar. RSVP.

For more details contact **Sue Tse on +44 (0)171 467 7115** or **Catherine Cosgrove** on **+44 (0)171 467 7111;**
Fax: +44 (0)171 255 1472; e: lis@petroleum.co.uk

Sponsored by
Integrated Intelligence Network plc (IINOIL)

Energy, Economics, Environment

'West of Shetland revisited'

Thursday 18 November, 17.00 for 17.30 until 19.00

John Brooks, Director and Head of Exploration and Licensing, Oil and Gas Directorate, DTI

IP Contact: Jenny Sandrock

London Branch

'Key Stages in Building an Integrated Reservoir Model'

Monday 22 November, 17.30 for 18.00

Professor Paul Worthington

This joint meeting with the Imperial College Student Chapter will be held in Room 131 at the Royal School of Mines, Prince Consort Road, London SW7

Tea will be served beforehand and a buffet and drinks afterwards

Contact: Carol Reader +44 (0)181 852 9168 if you wish to attend the talk

OBITUARY

Mr Francis Ernest Harry Spicer 1927–1999

The Institute is sorry to report the recent death of Mr Francis Spicer, C.Eng, M.I.MechE, a past Chairman of the Test Methods Standardisation Committee.

Francis' engineering career began in 1942 when he joined the Royal Navy by passing a Civil Service competitive entry examination. He then trained and served as an artificer. He left the Royal Navy in 1957 and after a short period with the CEGB, he joined British Petroleum at its Research Centre at Sunbury-on-Thames.

By working on the mechanical testing of lubricants in particular greases he quickly perceived the need to standardise the various methods of testing lubricants in use during the 1950s and 1960s. To this end he cooperated fully with other producer and user companies as well as with organisations such as BSI and ASTM. After a long and effective association with the Panels and Sub-Committees of ST he became Chairman of ST during 1985 and served until he retired in 1986. He was elected a Fellow of the Institute in 1962.

Throughout his life, he was an enthusiastic sportsman specialising in cross-country running and hockey when he was younger, and until recently, tennis and squash. He was also a playing member of Wentworth Golf Club.
In a lay capacity he supported local charities for groups of disabled people as well as the Surrey branch of the Red Cross. He is survived by his is wife Celia, his daughter Alison, his son Phillip and four grandchildren.

MOVES People

Dr Paul Duller has joined library and information specialists Instant Library as Business Development Manager where he is responsible for the company's growing portfolio of oil industry clients. Duller joins Instant Library from Kerr-McGee where he was Data Manager and brings more than 15 years experience of the oil industry.

DA Consulting Group has appointed **John Mitchell** to the position of Executive Vice President of Europe, Middle East and Africa (EMEA). Mitchell will be responsible for the company's sales, operations and other functions throughout the EMEA region.

ANZ Investment Bank, the investment banking arm of Australia and New Zealand Banking Group, has appointed **Patrick Barr** as Head of Oil and Gas, based in London. Barr will be responsible for building on ANZ Investment Bank's franchise in South Asia, South East Asia and the Middle East in project and corporate finance and developing the business further.

Gianmaria Gros-Pietro has been appointed Chairman of ENI by the Italian Government. Gros-Pietro, Chairman of state-owned industrial holding company Iri, will replace **Renato Ruggiero** who resigned last week after four months as Chairman. Ruggiero is former Director-General of the World Trade Organisation.

National Gas Pipeline Company of America has named **Deborah A MacDonald** as President upon the merger of KN Energy Inc and Kinder Morgan Inc. Before joining Kinder Morgan, MacDonald was Senior Vice President, Legal Affairs, of Aquila Energy Corporation.

Jorge Chamot, Chairman of the Peruvian government's Camisea privatisation committee, has been appointed to the role of Energy Minister. Chamot replaces **Daniel Hokama**, who resigned last month after six intermittent years in the role.

Brynjulv Mugaas has been appointed Chief Executive Officer of Harland and Wolff Holdings plc. **Per Nielsen** will continue as President until his retirement in June 2000.

Allister Langlands has been appointed Deputy Managing Director of Aberdeen's John Wood Group. This is a new position within the company. Langlands was previously Group Financial Director. In his new role he will be responsible for assessing and monitoring group business development worldwide.

Nurlan Balgimbayev has resigned his position as Prime Minister of Kazakhstan and returned to his former role as Head of Kazakhoil.

Ira Hall has been named Treasurer of Texaco Inc with responsibility for the company's worldwide banking and finance activities and will also serve as Financial Manager of the company's pensions and benefits plan. Hall will succeed **James Link** who was elected Vice President with responsibility for the finance and risk management departments.

Danish software developer Ødegaard has appointed ex-Shell geophysicist *Dr Dave Davies* as Head of its Aberdeen office. Davies worked for Shell for almost 20 years and has spent the last two years working on a number of geoscience-related projects for major and independent oil companies.

***William Vandenberg* has been appointed as Associate Consultant and Representative for Channoil Consulting Services (UK) Ltd based in the Far East. Vandenberg has spent the last 25 years working in Singapore in oil trading and shipping.**

The New York Mercantile Exchange (NYMEX) Board of Directors recently promoted **Richard Jacobi** to Vice President of Market Data Services and **Arthur McCoy** to Vice President of Financial Surveillance. Jacobi, formerly Director of Market Data Services, joined the Exchange in 1996 and developed policies and procedures for its newly created market data services. McCoy has been with the Exchange since April 1990 as Director of Financial Surveillance. Before coming to the Exchange he was Vice President of the Financial Department for First Boston Corporation and cController of its futures division.

London's International Petroleum Exchange (IPE) has appointed **Richard Ward** to the position of Chief Executive Officer. Ward joined the IPE in March 1995 and in September 1996 became Executive Vice President for Business Development.

***Barry Quinn* has been promoted to General Manager, Marketing, of the new marketing group formed from the alliance of Conoco Ltd and its fuel brand Jet.**

Scott Grant has been appointed Commercial Manager of Aberdeen-based oil and chemical pollution company Briggs Marine Environmental Services. Grant, a chartered surveyor, moved to the company from NG Bailey where he spent eight years in the role of Commercial Manager.

Louis J Painter is the first recipient of the George V Dryoff Award of Honorary Membership in American Society for Testing and Materials (ASTM) Committee D-2 on Petroleum Products and Lubricants. Painter was recognised for his service to the committee over the course of his distinguished career.

Kenneth Toole has been appointed Director of Research for the Balmoral Group. Toole joined the company in a leading role during the early '1990s where he became involved in researching new materials, applications and processes.

The IT Group has announced the appointment of **Chris Wynne** as Managing Director of The IT Group Infrastructure & Environmental Ltd. Wynne joins from PB Kennedy & Donkin Ltd, where he was Director and Business Manager of the environmental services group.

IP

THE INSTITUTE OF PETROLEUM

IP Week 2000

London: 14–17 February

IP Week in February is the focal point in Europe each year when leading figures in the oil and gas industry travel to London for an intensive round of conferences, industry and trade association events, company meetings and social functions. The Institute's own programme of events forms the core of these activities

Monday 14 February

International Conference on **Oil and Gas: An Industry fit for the Millennium?**

The last two years have been momentous ones for the international oil and gas industry throughout the world. Volatile and frequently low oil prices, continuing privatisation in many parts of the world, ongoing cost reduction initiatives, uncertain recovery from economic problems in Asia, Russia and Latin America, a growing convergence of oil, gas and power markets and a revolution in the use of IT to manage complex businesses have all contributed to a period of unprecedented change in the structure and management of the oil industry. This international Conference will address the major issues in the industry today.

Speakers include:

Mark Moody-Stuart (right) *(Chairman, Royal/Dutch Shell Group of Companies)*
Thierry Desmarest *(President-Director General, TOTALFINA)*
Tan Sri Dato Mohammad Hassan Marican *(President and CEO, PETRONAS)*
Rodney Chase *(Deputy Group Chief Executive, BP Amoco plc)*
Gyorgy Mosonyi *(CEO, MOL Hungarian Oil and Gas plc)*

Tuesday 15 February

Seminar on

Towards the Total Energy Company

Organised in association with WOOD MACKENZIE global consultants

Seminar on

Bunker Trading and Price Risk Management

Organised in association with The International Bunker Industry Association

Annual Luncheon

Guest of Honour and Speaker:
Lee Raymond (right) Chairman and CEO, Exxon Corporation

Wednesday 16 February

The 13th Oil Price Seminar and Exhibition on

Coping with Oil Price Volatility – Liquidity in the Pricing Instruments

Organised with the support of New York Mercantile Exchange NYMEX/COMEX. Two divisions, one marketplace

Annual Dinner

The Annual Dinner at the world famous Grosvenor House Hotel will be host to 1,500 of the world's senior oil executives. Tickets are limited so early booking is essential.

Thursday 17 February

International Conference on

The Middle East – The Key to Global Oil Supply

Organised in association with the Centre for Global Energy Studies

Any informed opinion today on the future of oil supply or price must include consideration of the oil, economic and political outlook in the Middle East. This important Conference will address the key issues affecting this complex and frequently volatile region.

Speakers include:

Sheikh Yamani (right) *(Former Minister of Petroleum and Mineral Resources for Saudi Arabia 1962-1986)*
Dr Ghanimi Fard *(Member of the Board and Director, International Affairs, NIOC)*
Steve Ollerearnshaw *(Managing Director of Petroleum Development Oman LLC, Shell, Gas and Power)*
Rosemary Hollis *(Head Middle East Programme, Royal Institute of International Affairs)*

The IP Week 2000 Programme of Events and registration form is available from the IP Conference Department. To receive your copy contact:
Pauline Ashby, Conference Department, Institute of Petroleum, 61 New Cavendish Street, London W1M 8AR, UK
Tel: +44 (0)171 467 7100 Fax: +44 (0)171 255 1472 e:*pashby@petroleum.co.uk*
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