

PETROLEUM REVIEW



THE INSTITUTE
OF PETROLEUM

JANUARY 1998

Construction survey
European fabrication yards
seek more work

Gas development
Gas-to-liquids or LNG for
remote gas discoveries?

Middle East
Gas exports to boost
revenues

Turkmenistan
Part of the new
Middle East?



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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 |
| t/y = tonnes/year | b/d = barrels/day |
| | t/d = tonnes/day |

No single letter abbreviations are used.

Abbreviations go together eg. 100mn cf/y = 100 million cubic feet per year.

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Front Cover: Lewis Offshore's fabrication yard, Arnish Point, Stornoway, Isle of Lewis.

Photo: Angus Smith Photographic

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The Institute of Petroleum as a body is not responsible either for the statements made or opinions expressed in these pages. Those readers wishing to attend future events advertised are advised to check with the contacts in the organization listed, closer to the date, in case of late changes or cancellations.

Look to the East for 1998 outlook

January is normally the time for looking forward into the new year and making some educated guesses as to what 1998 holds for the international oil and gas industry.

Until a month ago the outlook for 1998 appeared fairly clear – oil markets were tightening in the face of the fastest demand growth seen in recent years. By early November 1997 global oil demand was running 2.5mn b/d above year earlier levels. The price of oil seemed certain to firm further and the growth in company profits to continue.

Now the crystal ball has misted and the outlook for 1998 has become uncertain. The greatest imponderable is what happens in the Asia-Pacific region following the recent financial and currency upheavals. The optimists accept that there has been a setback but suggest that these dynamic economies will bounce back quite quickly, aided by the added competitiveness that currency devaluation has brought to most of their economies.

Others are not so sanguine, noting that the Asia-Pacific region has been a key driver in international trade and accounting for a disproportionate amount of the world's economic growth. In terms of oil demand growth the region has also been disproportionate.

In the last decade the Asia-Pacific region has typically accounted for 50% to 80% of oil demand growth. In 1993 when global demand fell by over 200,000 b/d Asia-Pacific demand grew by 655,000 b/d. World growth patterns have in recent years been distorted by the collapse in demand in the former Soviet Union. Excluding FSU demand removes one distortion but still shows the Asia-Pacific region accounting for 40% to 90% of oil demand growth in the world (excluding the FSU) over the last decade.

However, beyond confirming the region's importance to the international oil industry, the statistics give no answers. The optimists see confirmation of economic dynamism and pessimists see the global impact of a demand growth slowdown.

As if that was not enough to give oil analysts sleepless nights, Opec has just announced that it is to increase its production quotas by 9.5% for all members except Algeria which was awarded a 21% uplift in its quota (see p6). Opec quotas are, however, more ignored than adhered to by its members apart from Saudi Arabia, the UAE and Kuwait.

The Centre for Global Energy studies (CGES) confirms this view in its latest issue when it calculates that Iran, Libya, Algeria

and Indonesia will underproduce their new quotas by 260,000 b/d in the first quarter of 1998 while the traditional quota-breakers – Venezuela, Nigeria and Qatar will overproduce their new quotas by 1,231,000 b/d in the same period. Saudi Arabia has already announced that it will make full use of its new quota, Kuwait and the UAE can be expected to follow suit. Iraq having just been granted UN permission to produce \$2bn worth over the next six months is likely to continue producing around 1.3mn b/d. This happens to be the balance between the other members new quotas and the announced quota of 27.5mn b/d from 1 January 1998.

However, over recent months Opec has been producing around 28.6mn b/d. The new higher quotas for Saudi Arabia, Kuwait and the UAE, if fully utilised will raise this by 1.2mn b/d. All other producers are tending to fully exploit new capacity just as soon as it is available. It is hard to avoid the conclusion that CGES comes to, that Brent will average around \$18 in the first quarter, falling to \$15 in the second quarter and then continuing to decline and producing a crisis in Opec.

Against this backdrop, the UK government's decision to re-examine the taxation of North Sea oil and gas production, together with the CO₂ reduction targets agreed at Kyoto, are likely to be minor in their impact on the international oil and gas industry.

Lower oil prices are not however a wholly bad thing. Most development projects are now robust in the face of lower oil prices thanks to the success of cost-cutting initiatives such as Crine and Norsok and a great deal of hard work by all involved. Lower prices would also tend to increase refining and downstream margins. Economic growth remains robust in the US and UK and there are signs that vigorous economic growth is starting to emerge in continental Europe.

The outlook for 1998 may be a little cloudy at present, but there will be positive surprises as well as negative ones.

Over recent months Petroleum Review has been extensively revamped and redesigned, a process which is now virtually complete. Innovations this month are the introduction of an Industry News page which will feature company news and international reviews, and evaluations which don't fit comfortably in Upstream and Downstream News. News items in the 'In Brief' section will now be separated by regions and a new column of Internet information has been introduced on this page.

Web World

The Internet continues to develop as a business tool and from this month we will feature brief reviews of relevant web pages. The Institute of Petroleum's own website continues to expand in scope. Our news pages on the website are longer and more comprehensive than the material in the Review as we are less space-restricted. Similarly the website is able to give greater detail in areas such as standardization (see p16). The web address has been simplified (although the old address will still operate) to www.petroleum.co.uk

The major oil companies have had web sites for some time and all are hot linked to our website. A couple of sites that are worth a visit are China National Petroleum's site www.cnpc.co.cn and Petroleos de Venezuela's one at www.pdvsa.pdv.com

Shell UK recently introduced its own site at www.shell.co.uk separate from the main Shell site at www.shell.com

Increasingly suppliers to the industry are developing web pages. Wayne Dresser UK, the supplier of petrol pumps and services for forecourts, has just started up a site www.dresser.com/wayneuk which it claims is a model of clarity and accessibility. The site currently offers a free guide to keeping petrol pumps in good working order in addition to the information about the company, its products and its staff.

The Offshore Decommissioning Communications project (ODCP) has recently moved address but its website www.oilrigdisposal-options.com provides the details as well as rig decommissioning options.

IBM is offering no less than three websites for the oil and gas industry. In addition to information on industry products, the sites provide online discussion forums, news items and brief descriptions of 700 websites on relevant topics. The three sites are: E&P Connection at www.epconnect.ihost.com Gas Connection on www.gas.ihost.com and the Refining Connection on www.refining.ihost.com which completes the trio.

The Kyoto conference on climate change and global emission controls has produced a number of websites dedicated to giving the 'facts'. Facts, however, are rarely absolute. A highly partial set of facts is to be found at www.climatefacts.org the site of the Global Climate Coalition. Despite the obvious bias it does highlight the immediate cost of preventative action and the degree of uncertainty surrounding the 'scientific facts'.

The Global Climate Coalition is seen by many environmentalists as ...

continued on page 32

Japan picks up North Sea assets

Enterprise Oil is selling a number of its North Sea exploration and development assets to Sumitomo Petroleum Development Company (SPDC) of Japan for £35mn. The deal – which is subject to UK and Japanese government regulatory and co-venturer approvals – includes Enterprise's 40% stake in block 16/6a-N containing the Sedgwick field and its 17.42% interest in block 15/23a containing the Galley field. SPDC is to reimburse Enterprise for all costs incurred in these interests from 1 April 1997.

SPDC has also committed to invest £25mn to farm-in to a package of 18 exploration blocks, most of which are located in the central North Sea. The company will fund an agreed work programme which will result in SPDC earning interests of between 6.25% and 50% in the blocks, representing half of Enterprise's current equity.

According to Enterprise, the sale is expected to result in a profit from the Sedgwick and Galley fields, post tax, of around £20mn in 1997. The field interests represent about 13mn boe of reserves net to Enterprise.

SPDC holds interests in four other

fields, including Balmoral and Nelson.

Enterprise's interests in these blocks are as follows:

| Block | Interest |
|---------|----------|
| 9/27a | 50% |
| 13/16a | 25.76% |
| 14/24aE | 53.64%* |
| 15/11b | 45% |
| 15/12a | 43.82% |
| 15/12c | 45%* |
| 15/13b | 50% |
| 15/13c | 45%* |
| 15/14a | 25% |
| 15/19 | 25% |
| 15/28a | 38%* |
| 16/3d | 30% |
| 16/11a | 100%* |
| 29/19a | 100%* |
| 30/18E | 12.50% |
| 30/18W | 15% |
| 206/9b | 100%* |
| 211/17b | 65% |

Enterprise's equity in these blocks will be half of the percentages listed following the transaction with Sumitomo. (* – operated by Enterprise.)

Curlew onstream

Shell Expro's £300mn Curlew field in central North Sea block 29/7 has produced first oil. Production is expected to peak at 45,000 b/d and 100mn cf of gas in 1998.

The field is being developed by a 560,000 barrels capacity FPSO leased from Maersk Company UK. Field reserves are estimated at 70mn barrels of oil and 240bn cf of gas. Curlew's B and D reservoirs are currently being developed. Two other accumulations, A and C, may be tied in at a later date.

Oil is exported by shuttle tanker while gas is exported via the Fulmar gas pipeline to St Fergus in Scotland.

Field life is estimated at seven years. (See *Petroleum Review*, October 1997)

Green light for Malory

The UK government has approved the development plan for the Malory gas field which straddles blocks 48/12d and 48/12c in the southern North Sea.

The field will be developed through a minimum facilities platform, with initial production from a single development well, the discovery well 48/12d-9. First gas is scheduled for October 1998 at an initial flow rate of 45mn cf/d. Gas will be transported via the Lancelot Area Pipeline System for processing onshore at the Phillips-operated Bacton gas terminal. The terminal will also be responsible for the remote operation of the offshore platform.

Partners in Malory are: Mobil 76% and Brabant Petroleum 24%.

Award for North Sea drilling first

Mobil North Sea has earned a Best Practice Award from the UK Department of Trade and Industry for its southern North Sea Mordred field development well. The 48/12a-G3 well is said to be the first multifractured horizontal borehole to be drilled by any operator in the UK sector of the North Sea.

By applying a hydraulic fracturing process to the horizontal well, Mobil achieved a gas flow rate of 15mn cf/d – around 20 times the non commercial

0.75mn cf/d achieved in testing of the discovery well. Use of this technology enabled an otherwise uneconomic play to be converted into a prospect with real commercial potential, says Mobil.

Production through an extended reach borehole tied back to the Galahad platform began in May 1997 following a seven-month extended well test.

Field partners are: Mobil 91.67%, Chieftain International 5.33% and Premier Oil 3%.

United Kingdom

Shell Expro's Merlin field in the northern North Sea has come onstream. The small field is estimated to contain around 21mn barrels of oil and is producing at a rate of 14,500 b/d. It is being developed via a subsea tie-back to the nearby Dunlin and Osprey field facilities.

Stolt Comex Seaway has secured a \$11mn EPIC contract from Total Oil Marine for the provision of a subsea tie-in facility to the Frigg UK pipeline for Talisman's Ross field development.

Arco British, PanCanadian North Sea and Talisman have increased their interests in the Waveney field by acquiring Oryx UK Energy's 12.5% interest in production licence P780 covering blocks 48/16c and 48/17c. Following the deal, Arco holds a 57.14% stake in the field, PanCanadian North Sea 14.29% and Talisman 28.57%.

Europe

Eni, the Italian energy group, is reported to be planning to sell up to a 26% stake in its drilling subsidiary Saipem. Eni currently holds a 66% interest in the company.

Esso Norge is reported to have discovered oil and gas in block 25/8 of the North Sea, just 10km north of its Balder field. The well tested at 520 cm/d of oil and 23,000 cm/d of gas.

Amec Process and Energy has secured the system engineering phase for the Grane field development from operator Norsk Hydro. The field, which is located 170km west of Stavanger on the Norwegian continental shelf of the North Sea, is reported to have one of the largest undeveloped oil reservoirs – some 600mn barrels – in the North Sea.

North America

Norsk Hydro and three Canadian companies PetroCanada, Chevron Canada Resources and Mobil Oil Canada are reported to be planning to spend \$97.8mn on drilling projects in four areas of the Grand Banks region, offshore Newfoundland, during the next five years.

Foinaven finally enters production

The BP-operated Foinaven field on blocks 204/24a and 204/19 west of the Shetland Islands has come onstream at an initial flow rate of 15,000 b/d. The field is expected to reach a peak production of 85,000 b/d in 1998.

Field partners BP and Shell opted for a fast-track, parallel engineering programme in which the time taken for the three key phases of field development – appraisal, pre-project work (including engineering design) and construction – were shortened and then carried out in parallel in a bid to reduce costs. Traditionally, the three phases run sequentially.

Development is by two drilling centres each using a subsea manifold and well cluster arrangement producing into the dedicated FPSO *Petrojarl Foinaven* with a storage capacity of round 300,000 bar-

rels. Oil will be exported by shuttle tanker every three days during peak production. The use of horizontal drilling reduced the number of wells required from 28 to 14. The FPSO is capable of processing over 100,000 b/d and injecting 165,000 b/d of water into the reservoir.

Reserves are put at 250mn to 500mn barrels with some 200mn barrels expected to be recovered in Phase 1 of the development. Field life is estimated at 12 to 15 years.

Foinaven is the first field to be developed in the deep waters, 400 to 600 metres, of the Atlantic Frontier west of Shetland. Originally scheduled to come onstream in June 1996, start-up was delayed several times by a number of technical problems with the seabed manifold and leaks in five of the field's 11 subsea christmas trees.

Ranger announces record capex budget

Ranger Oil has announced that it plans a \$285mn capital expenditure programme for 1998. Development expenditures will account for two-thirds of the budget, the largest set by the company to date. Major projects include the Banff, Pierce, Columba 'E' and Kyle fields in the North Sea; the Kiame field in Angola; and a number of Canadian conventional and heavy oil projects. These developments are expected to contribute over 40,000 barrels of oil production per day.

The remaining budget will be invested

in exploration, including wells in the North Sea, Angola block 4, Ecuador block 19 and the Northwest Territories in Canada. In addition, over 30 wells are planned in the western Canadian basin and in the Gulf of Mexico. Significant funds are also to be directed at property and seismic acquisition in these and other areas, states Ranger Oil.

The company also plans to dispose of a number of non-core properties, mainly in Canada, by the 2Q1998. Sales proceeds are expected to be in the region of \$50mn to \$100mn.

Arco agrees North Sea asset swaps

Arco British has swapped 17% of its total 50% working interest in tranche 52 in the North Rockall Trough in exchange for a 17% working interest in Amerada Hess' P912 licence covering blocks 214/27a and 206/2 and a 14.81% interest in licence P174 covering block 204/30a.

Arco has also agreed a number of North Sea asset swaps with Talisman North Sea. Under the first of two transactions, Arco is to exchange its 36.13% interest in the Blenheim oil field and its 100% interest in the Bladon oil field in return for Talisman's 25.87% stake in the Waveney gas field and an undisclosed cash consideration. In a separate transaction, Arco will exchange 25% of its 100% working interest in block 14/26a in return for Talisman's 6.375% interest in block 30/2a and its 20% in block 49/29c.

Progress at Poseidon

Spanish oil and gas company Repsol has inaugurated the production and processing facilities at the Poseidon gas field in the Gulf of Cadiz. Repsol is operator and sole concession holder of the field which is estimated to hold around 1,700mn cm of gas.

To date, three wells have been drilled at the Poseidon North and South fields, reaching a production of over 1mn cm/d in production tests. Gas is exported to the Mazagon terminal via a 65-km, two-phase flow pipeline. The processing plant is capable of handling around 1.5mn cm/d of gas. Once processed, the dry gas passes to the Engas main gas distribution network. Sale of this gas is expected to bring Repsol revenues of over 8bn pesetas per year.

The Poseidon field accounts for 80% of Spain's 1.9mn cm/d gas production capacity.

Amoco is reported to have sold some of its Oklahoma-based gas reserves to Gothic Energy Corporation for \$237.5mn in cash and Gothic common stock.

Middle East

Amoco is said to have signed a two-year agreement with Turkish Petroleum, Turkey's state owned oil company, covering oil exploration off Mersin on the southern coast of Turkey.

Gulfstream Resources Canada has announced that two additional wells have been tied-in to existing production facilities in the Al-Rayyan field offshore Qatar, each producing around 18,000 b/d. Six wells are now producing from the field.

Russia & Central Asia

Canadian company Odyssey has sold its 10% interest in block II offshore Turkmenistan for nearly \$7.5mn.

Abbot, the Aberdeen-based oil services group, is reported to have secured a £19mn contract from AIOC (Azerbaijan International Operating Company) for the design, construction and operation of platform drilling facilities offshore Azerbaijan. The contract includes the provision of drilling facilities on two platforms in the Azeri Chirag-Guneshli fields.

Asia Pacific

The Indonesian Government has awarded Santos a 45% stake in the 10-year Sampang production sharing contract in East Java.

Pertamina, Indonesia's state oil company, is reported to have signed seven production sharing contracts with foreign oil companies, including Santos, Talisman Energy, Korea Petroleum Development Corporation, Texas, Unocal and Apex of Japan. The licences cover areas in Irian Jaya, central Sulawesi, offshore East Kalimantan and the Malacca Straits.

Enron Oil & Gas India, operator of the Tapti field offshore India, is reported to have proposed a new development plan for the field. The proposal includes four additional platforms, a new natural gas processing platform and the construction of a 36-inch diameter, 165 km natural gas pipeline to Hazira.

Green light for Arco field developments

Arco British has received approval from the UK Department of Trade and Industry to develop a western extension of the existing Bure field and the new Deben field, both located in block 49/28 of the southern North Sea.

Both developments are due onstream in October 1998. Each will be developed via one subsea well tied back to the new Thames AR platform which will be bridge linked to Arco's existing Thames complex. The AR platform will provide

metering and separation for gas from the two new developments prior to processing and export via the Thames platform's existing facilities.

Drilled in March 1997, some 11km to the northwest of the Thames complex, the well on the western extension of the Bure field will increase recovery by an estimated 31bn cf of gas. Deben, located 6km to the northwest of the Thames complex, has estimated recoverable reserves of 33bn cf of gas.

Tax threat to future UK E&P projects

UK Offshore Contractors' Association (OCA) Chairman Syd Fudge has warned that half of the UK's 140 potential oil and gas projects could be shelved if the UK Government raises tax levels.

OCA, together with Scottish Enterprise, Northern Offshore Federation, the UK Offshore Operators Association (UKOOA) and other related trade bodies have formed a joint industry initiative to advise the government during its current taxation review.

'Industry experts believe that activities which will be hit hardest will be possible new developments in the Atlantic Margin, satellite fields tied back to existing facilities, riskier exploration wells and the re evaluation of the North Sea using 3D seismic techniques to find previously missed oil accumulations,' said Mr Fudge.

He also pointed out that it was vital to

continue to capitalize on the skills and technology that have built up over the years and use them as a launch pad from which to increase export business and extend the industry's contribution to the UK economy.

'Crine has set industry a goal of increasing annual exports from their present level of 1% to 5% by 2001 - an increase in volume of business equivalent to £3.7bn. It is vital that this industry goal is not put at risk,' he said. 'The potential is there. Almost 90% of projected new discoveries worldwide are predicted to be in deepwater. The techniques needed to handle exploration and production at such depths have already been tried and tested in the North Sea and it has to be recognized that any fiscal change which creates instability will have a negative impact on our ability to win work from overseas.'

Atlantic Frontier out of round licence award

The UK Department of Trade and Industry has awarded an 'out of round' licence to explore two blocks next to BP's Suilven oil discovery in the Atlantic Frontier to a consortium of four companies headed by Arco British. The licence covers blocks 204/14 and 204/15. Partners in the consortium are Arco British, Conoco, British-Borneo Oil and Gas and Ranger Oil.

The Danish Government has issued a

Note reserving its position regarding a possible claim to a small part of the northwest corner of block 204/14. The UK Government's response to the Note stated that the UK has no doubts about its sovereign right to licence the block. Both the Danish and Faroese Governments have been kept fully advised about the designation and offer of the area concerned.

Hardy boosts Australian resources

UK independent Hardy Oil & Gas is to purchase a 10% stake in the East Spar gas condensate field in the Carnarvon Basin, offshore northwest Australia, from Apache Corporation. The total consideration for the acquisition is US\$62.5mn, payable in cash.

The acquisition includes a 10% interest in the East Spar pipeline and processing facilities which link the field

to the nearby Harriet joint venture facilities at Varanus Island. Hardy holds an 8.4% stake in Harriet.

The deal increases the company's reserves in the Carnarvon Basin from 5.5mn boe to approximately 15mn boe. The new addition to Hardy's portfolio is also expected to increase the company's Australian production by 70% from 2,000 boe/d to around 3,400 boe/d.

Soco International has been awarded a 30% interest in block 16-1 in the Mekong Basin offshore Vietnam in the South China Sea.

Apache's Jaubert 1 discovery well on the WA-1-P Legendre block offshore Western Australia is reported to have tested at 6,300 bld.

Mobil's Athena-1 discovery well has discovered a gas condensate field offshore Western Australia. It tested at 47.4mn cfd of gas and 2,133 bld of condensate.

Latin America

Kvaerner Oilfield Products Brazil has been selected by Petrobras for partnership of a technical cooperation agreement for the development and delivery of a subsea multiphase booster system. Designed for operation in 1,000 metres of water, the prototype system will be installed in the Campos Basin at host well 7-MRL-7-RJS by the beginning of the 2Q1999. The system is designed to pump a multiphase flow at up to 500 cm/h.

Total has acquired a 50% interest in the Punta Pescador exploration permit in eastern Venezuela from Amoco. Amoco remains the operator and has retained a 50% stake in the 2,000 sq km block which covers an onshore and offshore area in the northern Orinoco delta. Two wells are scheduled for 1H1998.

Guatemala is reported to be inviting bids for seven oil exploration areas, six of which are located in the northern Peten province which contains the country's existing oil field.

Africa

Hungarian oil and gas company Mol, together with partners Deminex of Germany and Union Texas Petroleum, have been awarded a new exploration and production licence for the North Idku block in the Nile Delta, Egypt. Deminex holds a 50% stake in the concession and will act as operator.

PetroCanada's HIM-1 discovery well on the Tinrhert block in Algeria is reported to have tested at 55mn cfd of gas and 4,650 bld.

Australian-owned company Hardman Petroleum Uganda is reported to have been awarded an oil exploration licence in Uganda.

New Opec quotas

Opec's oil production ceiling has been set at 27.5mn b/d for the first half of 1998. The pro rata increment was 9.5% for all countries apart from Algeria which received a 21% increment. Effective from 1 January 1998, the Opec production quota (in mn b/d) will be distributed among member countries as follows:

| Country | New quota | Old quota |
|--------------|-----------|-----------|
| Algeria | 0.91 | 0.75 |
| Indonesia | 1.46 | 1.33 |
| Iran | 3.94 | 3.60 |
| Iraq | 1.31 | 1.20 |
| Kuwait | 2.19 | 2.00 |
| Libya | 1.52 | 1.39 |
| Nigeria | 2.04 | 1.87 |
| Qatar | 0.41 | 0.38 |
| Saudi Arabia | 8.76 | 8.00 |
| UAE | 2.37 | 2.16 |
| Venezuela | 2.58 | 2.36 |
| TOTAL | 27.50 | 25.03 |

Van Ommeren boosts shipping position

Van Ommeren has further strengthened its position in tanker shipping with the purchase of almost all the shares in United Tankers (UT). It acquired the 32% stake in UT through its 34% interest in shipping company Broströms.

The Broströms/UT fleet of 16 product tankers, ranging between 4,000 and 17,000 dwt, focuses on the shortsea carriage of clean petroleum products and chemicals (methanol and MTBE). The company holds a strong market position with 75% of the fleet operating under contracts of at least one year. As part of a fleet modernization/expansion programme, five product tankers between 16,500 and 18,800 dwt are currently under construction.

United Kingdom

Stolt Comex Seaway has expanded its existing fleet with the addition of a ship for the diverless inspection, repair, maintenance and survey market. The 1990-built Seaway Kingfisher will be dedicated to service in the North Sea and is scheduled to be in operation by mid-April 1998. It is claimed to be the first vessel in the North Sea to be solely dedicated to deepwater diverless inspection, repair and maintenance.

UK lubricants company Burmah Castrol is reported to be planning a reorganization of its international operations over the next two years. The restructuring – which will involve the setting up of separate sectors covering consumer, commercial, industrial and marine markets – is expected to cost around £10mn, of which £7.5mn will be charged to the 1997/98 financial year.

Crine standard conditions of contract

The Crine Standard Contracts team has announced the completion of two more contracts for 'Mobile Drilling Rigs' and 'Purchase Order Terms & Conditions (Short Form)'.

'Despite the obvious difficulties in achieving consensus,' said Eric Johnson, Chairman of the Standard Contracts Committee, 'we are happy to report that the final wording has been agreed and that these two contracts will be printed before Christmas and mailed out as soon as possible in the New Year.' The remaining contracts, for 'Marine Construction' and 'Supply of Major Items for Plant & Equipment' are now scheduled to be published in time for the Crine Network Conference on 24 to 25 February 1998.

The new contracts will be published by the Institute of Petroleum, which is responsible for the sale and distribution of Crine publications including the five Standard Contracts published in June 1997.

Industry demand for the contracts has exceeded all expectations. Over 200 sets of contracts and a further 1,000 individual contracts have been purchased by over 500



different companies. The Standard Contracts Committee has been receiving feedback and comments from various parties, including major contractors, operators and trade associations. The Crine Network says: 'This enthusiasm and take-up would indicate that Standard Contracts is a concept whose time has come and will shortly be used throughout the offshore industry.'

The Standard Contracts now available are 'Construction', 'Design', 'Offshore Services', 'Onshore Services', 'Mobile Drilling Rigs', 'Purchase Order Terms & Conditions (Short Form)' and 'Well Services'. They can be ordered from the Institute of Petroleum's official distributors, Portland Press Limited, by telephone on +44 (0)1206 796351 or fax on +44 (0)1206 799331, or by e-mail: sales@portlandpress.co.uk.

Chevron's call to US Congress

Chevron has appealed to US Congress and California regulators to allow cleaner-burning gasolines to be made without requiring oxygenates such as methyl tertiary butyl ether (MTBE). While Chevron believes MTBE is not a public health threat and is safe if handled properly, it made the appeal in response to increasing public environmental concerns

about MTBE in groundwater.

The company has concluded that it may be possible to make a cleaner burning gasoline without oxygenates and still reduce emissions to the same extent achieved with current standards. 'We don't have all the answers yet,' said O'Reilly, 'but with regulatory flexibility, we believe solutions can be found.'

Europe

The European Commission is reported to have adopted an Ecu95bn (\$68bn) plan to double the share of renewable energy sources in total energy consumption to 12% in a bid to cut carbon dioxide emissions. The increased level of renewable resources is expected to contribute to about one-third of the proposed target of reducing greenhouse gas emissions to 15% below their 1990 level by 2010.

Russia & Central Asia

Yukos, Russia's second largest oil company, is reported to have acquired a controlling 54% stake in Eastern Oil Company. It paid \$800mn for 45% of shares in a special cash auction and acquired the remaining 9% on the open market for an undisclosed sum.

Silt NV, the Belgium-based specialist in remediation and disposal of dredged material, is to take part in two exploratory environmental projects in the former Soviet Union which are being part-funded by The Flemish Government.

Asia Pacific

Shell and Saudi Aramco recently met with the Prime Minister of India to discuss the joint development of oil and gas projects in the country. Further discussions are expected.

Ofgas and Offer debate dual fuel supply

UK gas industry watchdog Ofgas and the UK electricity industry regulator Offer have issued a joint consultation paper on the issues raised by the ability of public electricity suppliers (PESs) to offer customers dual fuel gas and electricity supply before gas suppliers are able to do so.

The domestic electricity market is due to be deregulated in 1998 with competition phased in over six months in each PES franchise area. In the gas market, around 4.5mn customers on mains gas in Scotland, northeast, southeast and southwest England can choose their gas supplier now and the market should be fully open by June this year.

Furthermore, while gas meter reading has been open to competition since

1 October 1996, under existing proposals each PES is to retain a monopoly over electricity meter reading in its franchise area until 31 March 2000.

It has been argued that the different timetables will allow PESs to benefit before gas companies from selling both gas and electricity. It is feared that gas suppliers which also want to supply electricity will face higher meter reading charges than PESs which also want to supply gas. It has also been argued that some PESs may be operating a predatory pricing policy supplying gas below cost in a bid to protect their positions in the electricity market and/or the dual fuel market by dissuading customers from going to other electricity suppliers if it meant they lost their cheap gas supplies.

United Kingdom

UK independent bulk storage operator Simon Storage is to invest £1.2mn on the construction of two new 5,500 cm petroleum and chemical products storage tanks and the improvement of the main jetty to speed up vessel discharge loading rates at its Seal Sands Terminal. The project is expected to be completed in the 2Q1998.

Barmac – operator of the fabrication yards at Nigg in Easter Ross and Ardersier, near Inverness – is to launch a £2mn training programme. The initiative, which has been welcomed by the trades unions and is backed by the Highlands and Islands Enterprise network, will involve the company taking on 100 young apprentices on a three-year programme and implementing a trade-based competency programme to national standards for the entire workforce of 2,000 employees over the next two years.

P&O Trans European's Roadtanks Division has secured a contract from Total Oil for the distribution of the company's bulk lubricants products – produced at its lubricants plant in Ferrybridge, Yorkshire – throughout the UK. The five-year contract is worth some £2mn.

Europe

The contract for trench dredging and backfill operations for the Belfast Lough gas pipeline crossing which will bring North Sea gas from north to south Belfast by the end of 1998 has been awarded to Dredging International (UK). Deme Group company Tideway BV will be responsible for project management and on-site supervision.

Lubricants companies Dea Mineraloel and Fuchs Petrolub Oel and Chemie are to establish a 50:50 joint venture in Germany. The new company, Fuchs Dea Schmierstoffe, will focus on the development, production and sale of finished lubricants in the German market. Headquartered in Mannheim, it will have manufacturing facilities in Mannheim, Eschweiler, Hamburg and Kiel. The company will also have use of Dea's test rig facilities in Hamburg.

Q8 unveils new compact fuel oil tanker



Kuwait Petroleum's (Q8) distributor group Q8 Fuelcare has unveiled a new tanker to transport domestic and commercial fuel oil. Claimed to be one of the shortest six-wheeler vehicles ever

built, the 26-tonne tanker's compact design will increase manoeuvrability making it particularly suited to deliveries to farms and smaller industrial and domestic customers.

Concept study for Norwegian LNG plant

Statoil, on behalf of the Snohvit field partners, has selected M W Kellogg as one of two engineering companies to undertake an extended conceptual engineering contract for the proposed LNG liquefaction plant to be located on Melkoya Island near Hammerfest in Norway.

The plant will receive gas, process and then liquefy it prior to export as LNG and condensate. Gas feedstock will initially be supplied from the Snohvit field, with additional supplies coming later from the Albatross and Askelladden fields located

some 150km offshore northern Norway.

The conceptual engineering and cost estimating will include a number of novel technical developments, states M W Kellogg, including a single barge containing process and utilities equipment to reduce site manpower during construction.

The final engineering, procurement, construction and commissioning/start-up management services (EPCM) contract will be awarded once a sales agreement for the LNG has been entered into.

Europe agrees gas market liberalization

The European Union has agreed to liberalize around one-third of the EU's \$100bn/y gas market by the year 2000. Each member country is to open at least 20% of its gas market to competition within two years of the new law being adopted. Some countries, however, may choose to open up more than 20% of their market and, as a result, about 33% of the total EU gas market is expected to open to competition early in the new millennium.

The deal represents a compromise between enthusiastic advocates of liberalization, such as the UK, which with

100% of its domestic gas market being opened to competition had wanted at least 25% of the European market to be liberalized, and opponents, in particular France which was worried about the impact of deregulation on its monopoly Gaz de France, which were reluctant to accept any more than 15%.

Competition is to be barred for 10 years in Portugal and Greece – and limited areas of other member countries with little or no gas supply – in a bid not to deter would-be investors in the gas market in these countries.

BP Chemicals invests in process plant



BP Chemicals in Grangemouth (see photo) has linked a new ion exchange unit to its on-site demineralization plant in order to guarantee that there is always enough boiler feed water available for the manufacture of its chemicals and plastics. The company had found that it could not produce enough

water during a cold spell in winter when the temperature fell to -30°C – frozen pipes made it impossible to regenerate the plant's ion exchange beds which, in turn, greatly reduced the amount of water produced.

The new unit was supplied by Ecolochem of Orton Southgate, Peterborough.

Two-year winter warmer for UK pensioners

UK Chancellor Gordon Brown announced at the end of November that UK pensioners will receive at least £20 towards their heating bills over the next two winters. Around five million households will receive the £20 heating allowance while a further 1.7 million on Income Support will get an extra £50.

The heating allowance, together with the cut in VAT on fuel, announced in the July budget this year, and lower prices following increased competition in this sector means that the average pensioner could be up to £100 better off.

Gas insurance package

Centrica is to extend its financial services portfolio with a home and contents insurance package claimed to offer average savings worth £75.

Offered in partnership with UK general insurance company Privilege, the package will be marketed under both Centrica's British Gas trading brand and the company's financial services Goldfish brand.

The package combines insurance cover with rebates redeemable against gas and gas related services or against a range of household products through Goldfish points.

Conoco has signed an agreement with Nederlandse Gasunie to supply around 1bn cmly of gas to be delivered between 1 April 1999 and October 2007. The gas will be delivered from Conoco's UK offshore gas fields and transported via the Interconnector and the Belgian gas pipeline grid to Gasunie at the Belgium/Netherlands border. Interconnector contracts signed to date are as follows (in bn cmly):

| Seller | Buyer | Vol | Term (y) |
|----------|---------------|-----|----------|
| BG | Elsta | 1 | 8 |
| BG | Wingas | 2 | 10 |
| BP | Ruhrgas | 1 | 15 |
| Centrica | Entrade | 0.7 | 8 |
| Centrica | Thyssengas | 0.5 | 7 |
| Conoco | Wingas | 1 | 10 |
| Elf | Gaz de France | 2.1 | n/a |
| Mobil | Hydro-Agri | 0.8 | 15 |

Each of these contracts is scheduled to being in 1998 except the Elf/Gaz de France contract which will begin in 2000.

Statoil has set up a new environmental technology division that will study ways in which the Norwegian oil company can exploit new renewable energy sources such as biomass and wind.

North America

US companies Marathon Oil and Ashland have been given the go-ahead to create a joint refining and marketing venture. The new venture, Marathon Ashland Petroleum Company, will include seven refineries with a combined capacity of around 935,000 bld, a network of 5,400 service stations, 84 terminals and some pipeline holdings.

Texaco, Brown & Root and Syntroleum Corporation are reported to have signed an agreement for the construction of a 2,500 bld gas-to-liquids plant using the Syntroleum® process. The exact site location will be announced during the 1Q1998 but it is thought that it will be outside the US (see p38).

Russia & Central Asia

Shell is reported to be planning to built around 45 to 50 service stations in Croatia over the next four years. The programme is expected to cost in the region of £70mn. Fuel will be sourced from national oil company INA's Rijeka and Sisak refineries.

European partnership for IFSF

The International Forecourt Standards Forum (IFSF) has adopted the status of a European Economic Interest Grouping (EEIG), effective from 16 October 1997. The current members of the IFSF are: Agip, Aral, BP, Fina, Esso, Kuwait Petroleum, Shell, Texaco and Total.

An EEIG is a form of transitional partnership, introduced into Europe by EC Regulation, which serves as a vehicle to facilitate certain types of cross border cooperation. The partnership is expected to be of considerable benefit

to the IFSF which is working to harmonize connectivity and enhance interworking between forecourt equipment, such as fuel dispensers and car washes, throughout Europe as well as in the US and Far East.

According to IFSF, becoming an EEIG provides it with a robust legal status, similar in many ways to that of a company, while avoiding many of the limitations and reporting requirements that would apply to a profit motivated organization.

New UK gas-fired power stations put on hold

The UK Government announced a moratorium on approvals for new gas-fired power stations in December 1997. The move follows intense pressure for support to be given to the UK's coal industry which has been struggling to cope with smaller than expected coal contracts from the electricity generators in recent months. There are fears that a number of pits could close with up to 5,000 jobs

lost unless demand rises.

UK Science, Energy and Industry Minister, John Battle, stated that the government is to embark on a review of the long-term security of supply and fuel diversity in the power market. He plans to defer decisions on outstanding applications for the construction of new gas-fired power stations until the review is completed.

UK has highest fuel duties in EU

The UK has the highest automotive fuel duties anywhere in the European Union, according to Oil Price Assessments Ltd (OPAL). Excise duties have increased seven times in the four years between mid-March 1993 and the beginning of July 1997 giving a total increase in excise duty for leaded 4-star gasoline of 62%, unleaded gasoline 72%, diesel 76% and unleaded super gasoline 86%.

If VAT is included in the equation, these successive increases amounted to a

price rise of between 20p and 24p/litre.

Excise duty and VAT account for 75% to 80% of the pump price paid by the motorist – more than in any other European country, says OPAL. In addition, in terms of sterling, UK duty on both diesel and gasoline are the highest in the EU.

Currently standing at 40p/litre, UK duty is a penny per litre higher than in France and the Netherlands, 6p/litre higher than in Germany and nearly 17p/litre greater than in Luxembourg.

Centrica renegotiates take-or-pay contracts

Centrica, the supply arm of British Gas, has renegotiated all its take-or-pay contracts, under which it was committed to buying gas well above market prices, with Conoco, as well as the bulk of its high priced gas purchase commitments with Elf and Total.

It has agreed to pay compensation totalling £365mn before tax to the three companies in return for 'substantial price reductions' on long-term contracts covering around 6mn therms. There may be a further payment to Conoco for additional volumes at the end of 2008, depending on the gas reserves then identified. Centrica has made a provision of £75mn to cover this payment.

News in Brief Service

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Access the regularly updated information, listed in chronological order, from the IP Home Page at its new address:

<http://www.petroleum.co.uk>

Romania's energy sector and three US companies – Energy Transportation Group, United Gas Industries and North American World Trade – are reported to be planning to invest \$180mn on a new LPG terminal at the Black Sea port of Constanta. The plant will have a annual storage capacity of around 600,000 tonnes.

Asia Pacific

A seventh liquefaction train has been commissioned at the Bontang LNG plant in Kalimantan, Indonesia, raising French company Total's Indonesian production to 1.5bn cfd. The new Bontang G train has an annual capacity of 2.7mn tonnes and over 70% of its natural gas requirements are supplied by the Total operated offshore Tunu field. An eighth train, Bontang H with an annual capacity of 2.95mn tonnes, is scheduled to come onstream in December 1999.

It has been reported that BP plans to close 180 of its 1,800-strong network of Australian service stations in a bid to save several hundred million dollars over the next five years.

US company Enron is reported to have proposed the construction of a pipeline in east India that will supply gas from either Bangladesh or from the northeast Indian state of Tripura. The company believes that gas demand from the power, fertilizer and steel industries in West Bengal will expand to between 14mn to 30mn cfd over the next decade.

Latin America

Mobil and Alireza of Saudi Arabia are reported to be planning to invest over \$200mn in converting a Panamanian bunker fuel distribution centre into a hub supplying petroleum to Latin America. This will involve the construction of a 3mn barrel capacity petroleum storage centre by the Panama Canal, a 30,000 to 60,000 b/d refinery and a 50 to 100MW power plant.

Africa

Eni subsidiary Snam has joined the Egypt LNG (ELNG) project, a joint venture between Amoco and the Egyptian General Petroleum Corporation (EGPC). Amoco holds a 45% stake in the project, Snam 45% and EGPC 10%. Plans are to begin exporting LNG from Egypt to Turkey beginning in 2001.

Fire related risks associated with large diameter open-top floating-roof tanks

Recognizing the need to have validated data on the risks associated with fires in large, open top floating roof storage tanks, 16 oil companies joined together to form a project group to thoroughly investigate these facilities. The project was known as LASTFIRE, reports **Dr N G Ramsden** the LASTFIRE project coordinator.

The project was initiated due to the oil and petrochemical industries' recognition that the fire hazards associated with such tanks, although known to be relatively low, were insufficiently understood to be able to develop fully justified site-specific fire response and risk reduction policies. Open-top floating-roof tanks, introduced to reduce evaporative losses of product to atmosphere, had always been recognized within the industry as having a relatively good fire incident record when compared to other types of facility. However, the associated risk had not been sufficiently quantified. It was also recognized that when a major incident occurred, such as a full surface fire due to ignition when the floating roof had sunk, control measures, mechanisms for incident escalation and consequential potential damage to life safety, the environment, business interruption and asset value were largely misunderstood.

When such major incidents, albeit infrequent, occur, media interest is high and consequently there is considerable pressure on tank operators to demonstrate that they are taking all reasonable measures to minimize risk. In many cases there has been insufficient data to determine whether some risk reduction measures were truly effective or justified. Often the only information available was from organizations with a strong commercial interest in promoting one particular product or service.

It has thus been difficult for operators and legislative or statutory authorities to base risk reduction requirements on credible scenarios or proven effectiveness of mitigation measures.

When this situation is coupled with a general international recognition that the previous style of very prescriptive standards for fire protection has been shown to be inappropriate, it can be realized that there was a need to investigate, in depth, the fire risk associated with such facilities and develop a methodology by which a cost-effective, relevant

and appropriate site-specific risk reduction policy could be determined.

The 16 oil companies involved in the project are shown in **Table 1**.

Project objectives

The LASTFIRE Project objectives were:

- To determine the current levels of risks associated with fires in large (greater than 40 meters diameter) open top floating roof storage tanks.
- To establish recommended design and operation practice and to make this knowledge available throughout the industry.
- To provide techniques to enable individual operators to determine their level of fire related risk and identify appropriate and cost-effective risk-reduction measures.
- To identify the areas where a poor understanding contributes to the risk and, if necessary, to propose further work to overcome this.

Methodology

A true fire hazard management (FHM) approach to reducing fire associated risk to as low as is reasonably practicable was adopted during the project. This is in line with current regulatory trends towards preparation of 'Safety Cases' whereby all aspects of risk mitigation including incident prevention are reviewed.

Previously, fire hazard management has tended to be very prescriptive and concentrated on firefighting measures rather than incident prevention. As risk

is defined as the product of incident probability and incident consequence, it is as important to reduce incident frequency as it is to minimize or mitigate potential incident consequences.

The FHM approach recognizes that many factors can contribute to reducing risk (see **Figure 1**). All such factors were investigated during the LASTFIRE project. The methodology adopted was scenario based (see **Figure 2**).

From studies of incident histories and industry experience, the credible types of incident scenario were identified along with potential escalation consequences to life safety, the environment, business interruption, asset value or other issues such as public image or insurance costs. All types of risk-reduction measures were investigated and an assessment made of their contribution to risk reduction. The measures investigated included tank design features, operating practices, incident prevention measures, detection systems, fire protection systems and firefighting techniques. In order to develop a site-specific FHM policy, it is also necessary to quantify incident probability and the cost of risk-reduction measures. From this, an assessment can be made of the benefit provided by each risk-reduction measure. The LASTFIRE project, therefore, not only investigated the contribution to risk reduction of each potential measure but also its cost so that a site operator could determine which measures were appropriate and beneficial for their particular situation.

Approach

The sponsoring oil companies directed the work, each company having an equal vote on the Project Steering Group. The Steering Group appointed an independent Project Co-ordinator. This was Resource Protection International, an independent consultancy specializing in fire and explosion hazard management of oil and petrochemical facilities.

The Project Working Group consisted

| | | | |
|----------|---------|----------------|---------|
| • Agip | • Elf | • OMV | • Shell |
| • BP | • Exxon | • PetroFina | • Total |
| • Conoco | • MOL | • Repsol | • Veba |
| • DEA | • Mobil | • Saudi Aramco | • WRG |

Table 1: LASTFIRE Project Sponsors

of Resource Protection International, BP Engineering and Shell Research. The Working Group was responsible for providing the project deliverables:

Incident Frequency Survey

This document reports the finding of a survey of the facilities owned and operated, worldwide, by the Steering Group companies, to establish the number of fire incidents within a large population of tanks thus allowing operators to understand current risk levels. The survey enabled the determination of:

- Dominant ignition mechanisms.
- Frequencies of initial fire events.
- Effectiveness of detection and protection systems and firefighting techniques.
- Estimates of asset loss and incident response.

Review of Escalation

This review provides details of the causes of initial fire events, the mechanisms by which such fires can escalate, factors that affect escalation and the current ability to detect imminent escalation or to predict consequences.

Descriptions of the current understanding of these escalation mechanisms are provided, together with how escalation is affected by tank design, construction, layout, contents and damage mitigation measures.

Risk-Reduction Options

This document reports the findings of a review to assess the effectiveness, efficiency and practicability of fire risk-reduction measures for large open-top floating-roof storage tanks. The information in the report can be used as an input to a site-specific exercise in accordance with the methodology described in the *Risk Workbook* to evaluate the cost benefit of implementing risk-reduction measures at any point during the design and operation of a storage tank.

The risk-reduction options discussed include both incident prevention and damage mitigation measures. All options discussed have been actually implemented or proposed for use on open-top floating-roof tanks at some stage.

The information provided in the document, which includes general design, installation and maintenance considerations for each option, is based on discussions and brainstorming meetings held at various locations internationally involving relevant specialist groups.

Firefighting Foam Review

As foam is currently considered to be the most effective firefighting agent for fighting large tank fires, a thorough



Figure 1: Contributors to Fire Hazard Management

review of the current state of knowledge and experience of foams was carried out and reported as part of the project. This document deals with the properties of finished foams and foam concentrates relevant to the scope of the project and how to evaluate them. As such, it should be read in conjunction with the *Risk-Reduction Options Review*.

Risk Workbook

As part of the fire hazard management philosophy adopted by the LASTFIRE project, a methodology was developed enabling a site-specific quantification and comparison to be made of the potential reduction in fire risk that can be achieved with different risk-reduction options.

The methodology is based on a cost-

benefit analysis framework that involves an assessment of a site's existing level of risk and the potential levels of risk reduction that can be achieved by implementing particular risk-reduction measures. The methodology, described in the *Risk Workbook*, utilizes the information reported in other LASTFIRE documents.

It is intended that this document provides a tool to help identify the most appropriate and cost-effective risk mitigation options, which in itself should be one component of a coordinated FHM process. Thus, the *Risk Workbook* is essentially the main core document of the project into which all other documents have an input.

One of the major conclusions of the project was that policies for FHM of

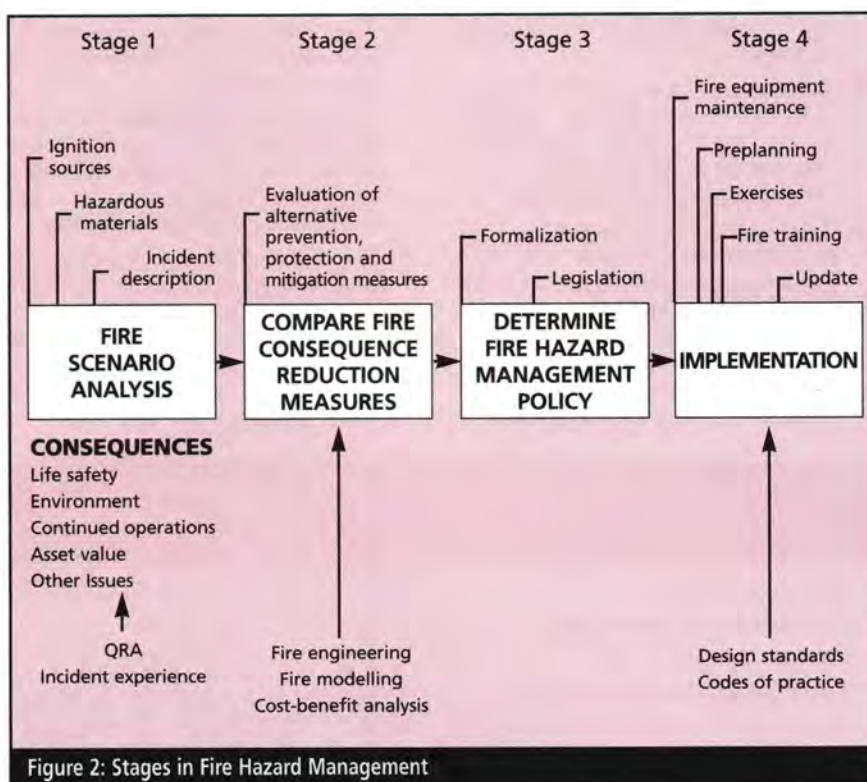


Figure 2: Stages in Fire Hazard Management

large, open-top floating-roof storage tanks should be based on a site-specific risk analysis incorporating cost-benefit analysis of potential risk-reduction options. It is considered that, with good, pre-planned incident management, fires in such facilities should not represent a major risk to life safety or the environment and therefore further risk-reduction measures should be based on their cost effectiveness. The *Risk Workbook* describes and gives examples of the methodology by which this cost-benefit analysis can be carried out.

Conclusions

The LASTFIRE project has, from a comprehensive and independent review of the risks associated with large, open-top floating-roof tanks and associated risk-reduction options, provided a methodology by which operators can select appropriate and justified measures to reduce fire related risk to as low as is reasonably practicable for such facilities.

In order to achieve a full understanding of the current state of knowledge and the methods by which risk reduction can be achieved, it is important to view all the project deliverables and recognize them as complementary documents.

However, some of the main conclusions and results are:

- Storage tank fires of the type under review should not represent a major risk to life safety or the environment provided the fire response is well managed to a pre-planned strategy.
- Prescriptive requirements for provision of risk-reduction options cannot be universally appropriate because each specific facility operates under different conditions.
- The best practice regarding risk reduction in general and fire response specifically is to use a fire hazard management approach throughout the lifecycle of the facility. This will result in a site-specific policy based on cost-benefit analysis of risk-reduction options.



Storage installation with both fixed- and floating- roof tankage

- The statistical analysis within the Steering Group members has shown that the fire incident probability and associated risk is relatively low.
- Rimseal fires are the most likely fire scenario in open-top floating-roof storage tanks. In well maintained tanks it is unlikely that rimseal fires will escalate to full surface fires. (Only one of the 55 rimseal events recorded in the Incident Frequency Survey escalated to a full surface fire.)
- Lightning is the most common source of ignition.
- Correlations between rimseal fire frequency and thunderstorm frequency have been developed from the statistical analysis. Typical sample rimseal fire frequency for Northern Europe was found to be one in a thousand tank years (1×10^{-3} /tank-year).
- The generic event frequencies for fires other than rimseal fires are given in **Table 2**.
- A fire risk related tank inspection programme (and corrective action being taken on identification of a potential problem) is one of the most effective risk-reduction measures.
- The detail design of fire detection and protection systems is often inadequate due to the lack of operational experience and understanding within engineering design houses. Input should be sought from site-experienced fire professionals.

- It is important to develop incident response strategies prior to an incident along with preplanning documentation, regular exercises and appropriate training for all responders.
- It is clearly concluded that fire hazard management policies should be developed from a site-specific analysis, but guidance is provided in the project deliverables on those measures which are most likely to be justified from the analysis.

Future phases

Having identified one gap in knowledge as the lack of understanding of the way in which lightning causes incidents and the methods by which the associated risk can be reduced, a further phase of the project to investigate this has been initiated.

In addition, a training package on response tactics to fire events is being produced.

Any company which considers it has a contribution to make to these phases should contact the Project Co-ordinator at the address below.

Copies of Phase 1 project deliverables are available at a price of £300 (+ VAT to UK companies) to non-project member companies, or £180 (+ VAT to UK companies) to companies which sponsored the project. These can be obtained from:-

Resource Protection International
Lloyd Berkeley Place
Pebble Lane
Aylesbury
Buckinghamshire
HP20 2JH

Tel: +44 (0)1296 399311
Fax: +44 (0)1296 395669
e-mail: ramsden @ resprotint.co.uk.

| Type of Fire | Base Frequency 100,000 tank years ($\times 10^{-5}$ /tank-year) |
|--|--|
| Spill on roof fire | 3 |
| Small bund fire (mixers, pipes, valves or flanges) | 9 |
| Large bund fire (major spillage) | 6 |
| Full surface fire following sunken roof | 3 |

Table 2: Generic Event Frequencies for Fires other than Rimseal Fires

Export drive to boost Middle East revenues

The Middle East is not quite so well endowed with gas as it is with oil, and maybe it is because gas is seen as a more complicated and problematic younger brother to oil that its development was commonly held back. It has taken more than a quarter of a century since Iran's first gas export pipeline, IGAT-1, was completed for the situation to change and for the holders of Middle East gas reserves to decide that their future lies with gas, as well as oil. And, even today, such a major holder of global gas reserves as Saudi Arabia has made it clear that its gas is not for export – or for private sector development. *John Roberts reports...*

The drive to gas has been slow. Iran began constructing IGAT-1, the backbone of its domestic network and still its sole export line, in the 1960s. Algeria began large-scale gas developments in the 1970s, the United Arab Emirates (UAE) in the early 1980s and Qatar in the late 1980s and early 1990s. In 1997, oil producers with more limited gas reserves, such as Oman and Yemen, are developing major liquefied natural gas (LNG) projects, as is Egypt, which is currently wondering whether it has one, or two, sets of world-class gas fields.

There is more to come. Iraq, briefly a gas exporter to Kuwait before its forcefully closed market in 1990–92 is pondering a major export project to Turkey, although implementation will depend, in practice if not in theory, on an end to general UN sanctions. Iran is moving into a new phase of gas-based development, constructing new lines both to export its own gas to Turkey and to use its own network for transit shipments of Turkmen gas to Turkey.

Revised export timetable

Such moves, together with the fruition of several regional LNG projects now under-way, should make the opening decades of the 21st century a boom era for Middle East gas. The key problem, however, is that the timetable for completing some major gas exports projects may have to be revised as a consequence of financial and economic turmoil in the Far East, the main projected market for Middle East gas. Thailand, for example, had until recently projected gas growth of around 10% a year from current demand levels of 1.5bn cf/d. But since the September

1997 collapse, which has prompted the postponement of various electricity generating projects, it has cut gas demand growth projections by half.

This had immediate repercussions for Oman, where Oman LNG announced in November 1997 that it had agreed to suspend an unsigned agreement covering supplies to Thailand. In one of his last statements before resigning as Deputy Prime Minister and Industry Ministry, Thailand's Korn Dabbaransi said: 'We will need to delay buying gas from Oman for another four years as our demand for energy drops in line with the slower economy.'

His comments were a blow to the Omanis, who had previously agreed to defer the start of LNG sales to Thailand from 2001 – the year after Oman's Bimmah plant is due to come on line – to 2003. Now it looks as if it may be 2007 before the Thais receive their first purchase. Sales envisaged under the current draft agreement provided for Thailand to take 1mn tonnes in the first year, around 1.3mn tonnes in the second, 1.7mn tonnes in the third and 2.2mn tonnes in the fourth and thereafter.

Japan may likewise be affected. A recent International Energy Agency (IEA) report, published in October 1997 but prepared before the recent wave of economic shocks, forecast an increase in natural gas imports of around 20% between 1995 and 2000. Total gas imports of 50.5mn toe were expected to reach 60.4mn toe in 2000 before slowing down to 63.1mn toe in the year 2005.

India, which has suffered less from Asia's economic downturn, could be a beneficiary. It has yet to negotiate commercial terms for prospective LNG supplies from Qatar's Rasgas projects.

| Country | Reserves (tn cm) | % |
|------------------------|------------------|-------------|
| Gulf producers: | | |
| Iran | 21.0 | 14.2 |
| Iraq | 3.1 | 2.1 |
| Kuwait | 1.5 | 1.0 |
| Qatar | 7.1 | 4.8 |
| Saudi Arabia | 5.1 | 3.5 |
| UAE | 5.8 | 3.9 |
| Total Gulf | 43.6 | 29.6 |
| Egypt | 0.7 | 0.5 |
| World | 148.2 | 100 |

Source: IEA: Middle East Oil and Gas, 1996, for Gulf and world reserve figures; Amoco, 1997, for Egyptian reserves.

Table 1: Middle East Gas Reserves

However, the Indian power ministry's new 15-member advisory panel, set up to act as a think-tank for development of a coherent energy strategy, concluded at its first meeting in October that the government should take a cautious attitude to private sector power generation projects based on imported fuels. It was important to keep the cost of imported LNG to a minimum by taking advantage of economies of scale. With the panel insisting on the need for a coherent choice of LNG receiving terminals – four sites at Hazira, Cochin, Bangalore and Ennore are under consideration – India is likely to seek to maximize its potential as a major gas importer in order to put pressure on both Rasgas and Enron, which is seeking to develop a third Qatar-based LNG project, to provide it with LNG on more favourable terms than might have been anticipated only a few months ago.

The rumblings have been felt in Qatar, with concern focused on any potential impact there might be on the creditworthiness of the giant Mobil-directed Rasgas project. However, since Rasgas has already signed firm sale-and-purchase agreements to cover its initial output, the worst that can happen, short of a real meltdown in Asia, is a delay in reaching the project's full 10mn t/y capacity.

Production and development

On the production and development side, Qatar remains firmly in the Middle East's driving seat. The country's first LNG project, Qatargas, was formally inaugurated on 24 February 1997, although shipments to Japan from the 6mn t/y plant actually began two months earlier. Sales are guaranteed under two agreements: a May 1992 sale-and-purchase agreement (SPA) for 4mn t/y with Japan's Chubu Electric Power Company for 25 years from January 1997, and a January 1995 agreement with seven Japanese utilities for a further 2mn t/y. The train to serve this contract will be completed in 1998.

In May 1997, the foundation stone for Qatar's second LNG scheme, Rasgas, was laid, with Phase One construction set for completion in 1999. Actual production will start a little earlier – end-1998 is the current target – while first exports should begin in mid-1999.

Phase One will give Rasgas a 5mn t/y capacity while Phase Two will double it. It is the timing of Phase Two completion which is most at risk from Asia's economic troubles. Overall, however, the project looks remarkably solid. Moody's Investor Services, when it decided to downgrade Korea's country rating from A3 to A1, left the Rasgas bond rating unchanged at A3 because of three main

| | 1994 | 1995 | 1996 |
|-------------------|--------------|--------------|--------------|
| Bahrain | 7.1 | 7.2 | 7.2 |
| Iran | 31.8 | 35.1 | 38.1 |
| Kuwait | 6.0 | 6.0 | 6.0 |
| Oman | 3.0 | 3.8 | 4.0 |
| Qatar | 13.5 | 13.5 | 13.5 |
| Saudi Arabia | 37.7 | 38.3 | 41.3 |
| UAE | 25.8 | 29.9 | 35.0 |
| Other Middle East | 4.9 | 4.9 | 5.0 |
| Total | 129.8 | 138.7 | 150.1 |

Source: BP Statistical Review 1997

Table 2: Middle East Gas Production 1994-96 (bn cm)

factors. One was the long-term strength of Qatar's resource base – its estimated 380tn cf of recoverable reserves from the North Field alone; the second was the extent of its partnership with Mobil, which has 30% of the venture; and the third was the fact that Rasgas had already secured a firm 28-year deal to provide 4.8mn t/y to the Korean Gas Corporation (Kogas). From a Rasgas perspective, the sale-and-purchase agreement was only just completed in time since it was only on 30 July 1997, just a few weeks before the Asian financial crisis broke, that Kogas signed an SPA doubling its initial 2.4mn t/y commitment.

Qatar's prospective third LNG project is more problematic. The US Enron has rights to up to 5mn t/y of Qatar's gas for export – but no more. However, a May 1995 Memorandum of Understanding has yet to be transformed into a firm set of contracts, reflecting problems with finalizing agreements with potential customers. Enron's initial thinking was that half would go eastwards to India and half westwards, with Turkey taking 0.5mn t/y, Jordan taking a tiny amount and Israel taking the bulk of the remaining 2mn t/y. But the Israeli deal never gelled and is now dead. But India, where Enron is developing user projects in Maharashtra, may be willing to take up to 4mn t/y – if the terms are right. Turkey also remains a prospective buyer.

Target Asian markets

Most of the Middle East's LNG plants were essentially developed with Asian markets in mind. It will be difficult to plug any immediate gaps that might appear with alternative markets, since Europe looks to be reasonably well supplied with gas from such diverse sources as the North Sea, Norway, North Africa, Russia and, possibly, Central Asia for some time to come. The complexities of developing a market for Gulf LNG in Europe were illustrated by the failure four years ago of an Italian project to develop a third LNG scheme in Qatar, with Italy as the main prospective customer. However, some niche markets

should still be available.

Thus in November 1997, Rasgas signed a letter of intent with France's Elf Aquitaine for a 2mn t/y sale to Lebanon. This is, however, likely to take some time to implement since Lebanon has yet to set up a domestic gas distribution network or LNG regasification plant. But since the bulk of its population lives along the coastal strip, these are relatively low cost operations for a cash strapped country struggling to recover from 17 years of civil war. Elf estimates the cost of an LNG terminal and regasification plant at \$300mn.

Hydrocarbons-short Turkey remains a potential market for both Qatar and, more importantly, Yemen, where Total is developing a 5mn t/y LNG project. The Turks already have one regasification facility and are planning two more, one of which is intended to serve the country's southeastern industrial zone around the port of Iskenderun, and the other which will serve the needs of Izmir and the industrial and agro-industrial complexes of the Aegean coast.

But the main source of gas for these regions is likely to be Egypt, where Amoco is working to develop an LNG project in coordination with the Egyptian and Turkish governments, and with Italy's Agip, its partner in the development of the main Nile Delta offshore gas fields. A Memorandum of Understanding for this project was signed in Cairo in November 1996 and while it has yet to be translated into a firm agreement – Amoco is hoping that this will happen in early 1998 – the key fact is that all the parties required to secure a final accord are already signatories to the initial MOU.

The real reason with regard to this scheme is whether Amoco has really found a way to make LNG truly competitive on the comparatively short haul from the Nile to the Aegean. LNG is usually thought to come into its own on distances of a few thousand miles and, until the LNG scheme was unveiled, it was generally assumed that Egyptian gas would indeed be exported to Turkey – but by pipeline.

Egypt is also looking at various other export options. Amoco is pursuing a proposed project to serve Jordan by pipeline, but this will depend on Jordan developing an accompanying infrastructure for internal gas distribution. Proposals for major gas exports to Israel have come to a halt, ground down by the twin obstacles of disputes over pricing and Israeli obduracy in the Middle East peace process. Fresh discoveries in the Western Desert as well as the Delta make it quite possible that Egypt will in time be found to possess two world-class sets of gas fields. It is still early days so far as Western Desert gas is concerned, but the funds to date are sufficient to encourage Eni, Agip's parent, to envisage a possible pipeline system spreading westwards from the desert across the border to Libya and then under the Mediterranean to form a third North Africa-Europe gasline link.

Gas production

Iran has begun a major expansion of gas production, but the consequences remain unclear. It certainly needs more gas for domestic use but it is also committed to begin supplying gas to Turkey once a new pipeline to Erzurum in Eastern Turkey is connected to the main Iranian distribution system at Tabriz. Actual pipe laying began in 1997 and should complete in 1998 while contracts for construction of an extension to the Turkish capital of Ankara are imminent. The line is being built in defiance of the spirit of US sanctions against Iran, although there is some doubt as to whether the separate Iranian and Turkish contracts awarded to date actually violate the letter of the 1996 Iran-Libya Sanctions Act (ILSA). Although the final 1996 agreement on the pipeline concerned the export of Iranian gas – an initial 2bn cm/y rising to 13bn cm/y – a further tripartite agreement was signed with Turkmenistan in 1997 and it now looks as if it will, in effect, be Turkmen gas that is exported through the line.

The reasons for this are two-fold. The first is that there are severe capacity problems in the 42-inch IGAT-1 and 56-inch IGAT-2 lines bringing gas from southern Iran to the centre and the north, and it will be some time before IGAT-2 is extended to either the Tehran area or to the intersection with the existing lines between Tehran, the Caspian coast and Tabriz. The second is that a new 12bn cm/y capacity gas pipeline has just been constructed from the Korpedzhe gas field on Turkmenistan's Caspian coast down to northern Iran (scheduled to open early December 1997), where it plugs into the line bringing gas from northeast Iran to

Tehran. Either this gas will be piped straight past Tehran and up to Tabriz for export to Turkey, or else it will be used in Tehran, freeing alternative supplies from the south to supply Turkey.

An Iranian project to construct a pipeline to Pakistan has yet to gel and this will impact on Iranian gas development plans. The controversial contract under which France's Total will develop Phases 2 and 3 of the giant eight-phase project to develop the South Pars field is intended to boost availability of gas for domestic use by some 2bn cm/y. The contract was agreed under a buy-back formula and puts Total firmly on a collision course with the US since it appears to flout the principles laid down in ILSA. Whether the US has a right to impose sanctions on third-party deals is, of course, quite another issue.

From an export perspective, it is Phases 4 and 5 which are more important. Shell – in partnership with Gaz de France, British Gas and Malaysia's Petronas – has for some time been pursuing this project, with the gas initially targeted for supply to Pakistan. But Iranian-Pakistani relations are somewhat strained, essentially over Afghanistan, and this may be impeding the consortium's prospects, unless these supplies are also earmarked for the domestic market – or unless the Iranians make a further effort to boost export capacity to the northwest by augmenting or extending the existing IGAT lines.

All this activity suggests the following: that Iran is determined to boost gas production; that foreign companies, despite ILSA, are interested in both securing work in Iran and in working on Iranian gas export projects; that Iran suffers from internal infrastructure problems that are hindering its export capabilities; and that it lacks the cash to resolve major infrastructure problems itself, or, at least, without major dislocation to other sectors of the economy.

Under these conditions, it would appear that Iran and at least some western companies – Shell is already holding talks in this context – will seek to transform the current and projected interconnections between Turkmenistan, Iran and Turkey into a full-fledged system for transporting large quantities of Turkmen gas (around 28bn cm/y) westwards to Turkey, the fastest growing gas market in Europe.

Major gas developments

There are other significant gas development projects afoot in the region. In May 1997, just before it collapsed, the coalition government in Turkey between the Islamist Refah party and the rightwing True Path signed an agreement with Iraq to construct a pipeline to import up to

10bn cm/y of gas. Although the deal is now clearly on ice until general UN sanctions against Iraq are lifted, it is significant that the government team which negotiated the original agreement actively sought to defy the US – and its own foreign ministry – by excluding from the agreement any reference to the possibility that it would only be implemented in a post-sanctions environment. As of now, the deal is dormant, but it does at least show that Baghdad which was, before the Kuwait crisis, actually exporting 3bn cm/y to Kuwait, is now turning its mind to a recovery of gas as well as oil exports. Elsewhere, Qatar is readying itself to pipe gas to Dubai, to help that emirate maintain output from declining oil fields.

Saudi focus on domestic gas

Yet there is a real sense of disappointment that Saudi Arabia has decided against using its plentiful gas reserves for export, or opening up those resources for private sector development. Oil Minister Ali Naimi, at a major conference on Saudi gas utilization in October 1997, stressed that the Kingdom intended to develop its 204tn cf of gas for domestic use, and that it would pursue a policy of switching existing oil-fired power plants to gas to bolster oil exports, a move which could expand Saudi exports by as much as 300,000 b/d.

Although this has long been the Kingdom's de facto policy, there had been hopes before the conference that some limited exceptions might be announced. Italy's Eni has been pushing to develop the northwestern fields, which are for domestic markets in Saudi Arabia but which could be used to bolster development in the Gulf of Aqaba, serving Jordan, Egypt's Sinai Peninsula and, if political circumstances were to change, Israel.

Saudi Arabia does indeed have large domestic gas requirements, as does Iran. And while its funds are more limited these days than most suppose, Riyadh is by no means as cash-constrained as Tehran. Naimi can therefore make a good case for focusing on domestic development and, in light of the downturn in Asian demand, he may well be right in the near future. But in the opening years of the 21st century as new Omani, Yemeni and perhaps Egyptian LNG projects come on line – all of them in countries possessing much smaller gas reserves than the Kingdom – it will be interesting to see whether Saudi Arabia was right to remain the only major Middle East hydrocarbons producer to decide to focus solely on oil for its energy export earnings.

The new launch

We are starting the New Year with a regular, monthly contribution giving the highlights on the development of international standards. Items will be of general interest and cover all aspects of the work being done on behalf of the petroleum industry in both the International Standards Organisation (ISO) and the European Committee for Standardization (CEN). No it is not a spelling mistake – standardization really is spelt with a 'z'.

Nothing is new – *Petroleum Review* used to have a regular feature on the standards and guidelines produced by the IP. For a number of years now, Institute staff have been actively involved with encouraging the petroleum industry to develop standards and guidelines. Self regulation is seen as a preferable alternative to national and international regulation and good standards will increase safety and reduce costs. The Institute currently has two contracts with BSI to provide the secretariat support for coordinating the UK input to ISO and CEN. This is through two main committees: ISO/TC 67 is responsible for developing standards on the materials and equipment for the petroleum and natural gas industries whereas ISO/TC 28 is involved with the test methods for the products we take for granted in our daily lives.

If you would like to find out more about the committees involved and the scope and structure of our work then you may wish to visit the IP web page on the Internet (see below). This also has built-in links to the web sites of ISO, API and the other organizations which are actively involved.



The Focus is on Focus

A delegation from the UK attended the ISO/TC 67 Plenary Meeting, held in Jakarta from 14 to 17th October 1997 and hosted by the Standardization Council of Indonesia (DSN). Graham Thomas (BP) on the right, was pictured with Sjoerd Schuyleman (IP), David Saile (Shell) and Richard Snell (BP and SC7 Chairman) on the left. The meeting was very well attended with six out of the seven subcommittee chairmen and 36 representatives from 12 member countries.

This, however, was no ordinary annual get together as there is growing frustration at the slow progress being made in the development of international standards. These are needed by the petroleum industry to replace and improve on the tried and trusted base API specifications. Since the meeting a year ago, no standards have been published by ISO/TC 67. However, there has been overall progress on the work programme of some 120 standards, but it was agreed that there needed to be more FOCUS. Additional resources are required to ensure that standards are delivered to our customers during 1998. The work was described as being at a 'watershed' – a concept which the non-English speaking delegates had difficulty in translating! The challenge for the next 450 days or so (also called a 'window of opportunity') is to publish the key, short-listed, standards. It is expected that this can be achieved with the continued backing from industry during this period.

ISO/TC 67

Mission: To create value added standards for the oil and natural gas industry
Vision: Global standards used locally worldwide

Cash available for industry participation

Funding has recently been made available to subsidize the technical writing and editing of ISO/TC 67 standards. The DTI Oil, gas and petrochemicals Supplies Office (OSO) has contributed £25,000 of initial funding, to be spent before the end of March 1998, and is expecting a matching contribution from industry. The involvement of more UK technical experts is seen as a successful way of transferring knowledge and having influence – a process which will ultimately improve the competitiveness of UK plc's in the global market.

The plan is to expand the scheme to provide £250,000 for 1998 and industry has agreed in principle to contribute its share. The money is intended to subsidize companies which provide experts to participate directly in international working groups. It is hoped that this will encourage increased industry participation by reimbursing line and asset managers for part of their staff time and associated expenses, where they have no specific budget for such work on standards. Funding will be allocated and managed through the CRINE Network and if you would like to know more, either phone CRINE +44 (0)171 412 4300 or Sjoerd Schuyleman at the IP +44 (0)171 467 7132.

Contribution recognized

Dave Garnham was presented with a Certificate of Appreciation at the recent ISO/TC 67 Plenary Meeting in Jakarta. Dave, who works for Cooper Cameron in Leeds, is the Project Leader responsible for writing the new standard on Subsea wellhead and christmas tree equipment (ISO 13628-4). He is one of only five recipients of this award to date and was nominated by the Norwegian working group Secretariat. Graham Thomas, Head of the UK Delegation to the Plenary Meeting in Jakarta, accepted the award on Dave's behalf. Cyril Arney, Chairman of ISO/TC 67, in presenting the award said: 'Dave has been a role model whose example others should follow. He has canvassed technical input and review from experts in all parts of the industry and reconciled their comments by holding a number of town hall meetings. He is to be congratulated on his achievements.' Unfortunately Dave was unable to make the trip to Jakarta and the above photo shows him being presented with the Certificate of Appreciation by Graham Coe, Cooper Cameron's Human Resource Manager in Leeds.



Web page visited

Since June 1997 a section of the IP's web site has been devoted to its involvement in standardization. There are direct links to many other standardization organizations such as API and ISO/TC 67 as well as numerous other bodies such as NORSOK. Details of the BSI 'shadowing' structure for TC 67 in the UK are presented, and there are further details on the Review Network process which the IP operate. One of the most important aspects of the page is to maintain a list of the TC 67 standards which are currently on distribution to national standardization bodies for comment and voting. If you reside in the UK and would like to review and comment on any of the listed draft standards please contact Martin Hunnybun at the IP +44 (0)171 467 7133. The page is updated upon receipt of new drafts and so is worth checking regularly. So far 375 visits to the page have been recorded.

Our web site can be found at:
<http://www.petroileum.co.uk>

If you go down to the Library today...

...you would probably expect to come into London, if not already based here, catch the tube to either Oxford Circus or Regents Park and have a brisk 10-minute walk through the throngs of tourists to reach the IP's headquarters at 61 New Cavendish Street. However, if this is not convenient for the many of our members who are based out of the city centre, there is an alternative route. The IP Library can now be accessed 24 hours a day, wherever you may be in the world. Thanks to the 'Information Superhighway' the Library is able to open up its extensive information base to all four corners of the globe.

Traditionally, libraries have usually contained booklined walls, silence notices and areas set aside for the perusal of information by their customers. This scenario is still the case for customers able to visit us in person. However, now they will find – alongside the usual library paraphernalia – electronic workstations dedicated to visitors' use.

The story so far ...

For those potential customers, who are unable to make the journey, logging on to the Library could not be easier. All that is required is access to the Internet and the IP web address <http://www.petroileum.co.uk>. Once online to the IP home page, the 'virtual' visitor will find a wealth of information about the library, the IP and the oil and gas industry in general, all at the touch of several buttons.

The Library home page comprises: information about their latest acquisitions; CD-Roms; online databases; data and information sheets; and job vacancies; all of which are frequently updated. The visitor is able to request books, e-mail the Library to renew books and eventually the full IP Library catalogue will be published on the Web.

As well as the Library home page, the IP web site has pages on the various Institute activities. Non-Members, who might be browsing through the IP web site, can access information on becoming a member and find the necessary application forms. Information on *Petroleum Review's* contents pages is available including access to the News in Brief page which is updated daily. Forthcoming conferences are featured with details of dates, times, speakers and costs. Details of Branches and Discussion group meetings can be accessed, including IFEAG.

Visitors requiring lists of IP publications can tap into the Publications catalogue. Information on the Technical Department and its oil industry standards is also published on the Web as well as education and careers information.

Future plans

The IP web site as it stands may seem to cover as many areas as possible, however, there are plans to further develop its functions. These include incorporating password protected areas and setting up discussion groups, thus establishing forums for debate. IP Statistics (IP Stats) will soon be available online even though they will be password protected for subscribers' use only. Relevant hot-links to other oil and gas industry web sites are continually being added with new web sites now being reviewed in *Petroleum Review*.

Visiting the Library

London-based members or visitors to London can access the comprehensive collection of oil and gas information by dropping by in person. The Library and its team of friendly staff – with over 30 years' collective experience within the industry – are on hand to help visitors with their requirements. Increasing numbers of CD-Roms are available on a dedicated visitor workstation, including the SPE paper collection, *Petroleum Abstracts* and the *Encyclopaedia Britannica*, complementing the hard-copy directories still held. There is, as well, an online workstation for which there is a charge of £6 per hour giving full access to the Internet. The Library's access to online databases includes Reuters; Dow Jones; Tulsa (upstream); and Orbit. IP staff are available to do online searches. It is hoped, in the near future, to incorporate several more workstations within the Library for visitors' use.

Some members may feel that gazing at a computer monitor all day is not the traditional way of retrieving information. They will be relieved to hear that the Library still has its vast collection of books, journals and newsletters available to them. For those wishing to give their eyes a break from the printed word or the computer screen, a few minutes gazing up at the splendid painted ceilings would not go amiss.

Emma Parsons

The Library is open from 9.30 – 17.00 Monday to Friday except Bank Holidays. Telephone queries 10.00 – 17.00. A full list of 1998 charges is printed on page 35.

Visitors' work station at the IP Library (right) and a section of the painted ceiling (below)



Electrical management system keeps forecourts operational

Service stations and particularly motorway service areas have become very busy and demanding retail areas over recent years. Any breakdown of service equipment can cause major problems especially where cars are queuing, other vehicles are already being served, and an electrical failure causes a hold up. The provision of peripheral equipment such as jet washes, tyre inflators and vacuum units is equally important. Similar considerations apply to the provision of facilities, such as cool cabinets and food dispensers, within the shop, writes *Tony Tomlyn* of Tomlyn Electrical Development Consultancy.

All this adds up to a continuous demand for the serviceability and safety of all equipment coupled with energy and cost saving. In addition to the serviceability of equipment and manpower saving, there is the general need to know where energy is being used and how individual units of equipment are performing.

The development of purpose-built main electrical control and distribution panels has been progressing for the past 10 years. With the introduction of monitoring systems used by the water authorities, tank gauging and stock control on service stations, it appeared logical to include a method of monitoring electrical circuits within the petrol station.

A system has been devised which can be easily and economically included during the construction of a main electrical control and distribution panel.

Main panels normally include an energy saving lighting control system run by a micro-processor controller. This system switches selected external lighting on and off dependent upon the ambient light level, but allowing for temporary dark periods due to heavy clouds etc. It was found that the system was easily

expandable to cover temperature measurement of cold-cabinets, hot-food systems, room-temperature control and the internal temperature of the actual main electrical cabinet. Additionally the system is able to monitor the condition and energy consumption of selected electrical circuits and detect electrical leakage and fault conditions.

The system in practice

The system has a modem on site which enables this information to be transmitted via a telephone line and displayed on a PC at any location. The information is interrogated under the Microsoft Windows program making it simple and versatile in operation.

At present a small installation is operational and under evaluation at a Mobil Budgen service station and convenience store site in Milton Keynes. In operation since 1995 and with only a limited number of circuits equipped with monitoring equipment, it has shown up areas for energy saving and has signalled significant fault conditions.

The system can be easily configured to call up any of the designated maintenance/repair contractors immediately a



A typical filling station and shop facility, the BP/Safeway service station at Basildon Essex

Photograph courtesy of British Petroleum

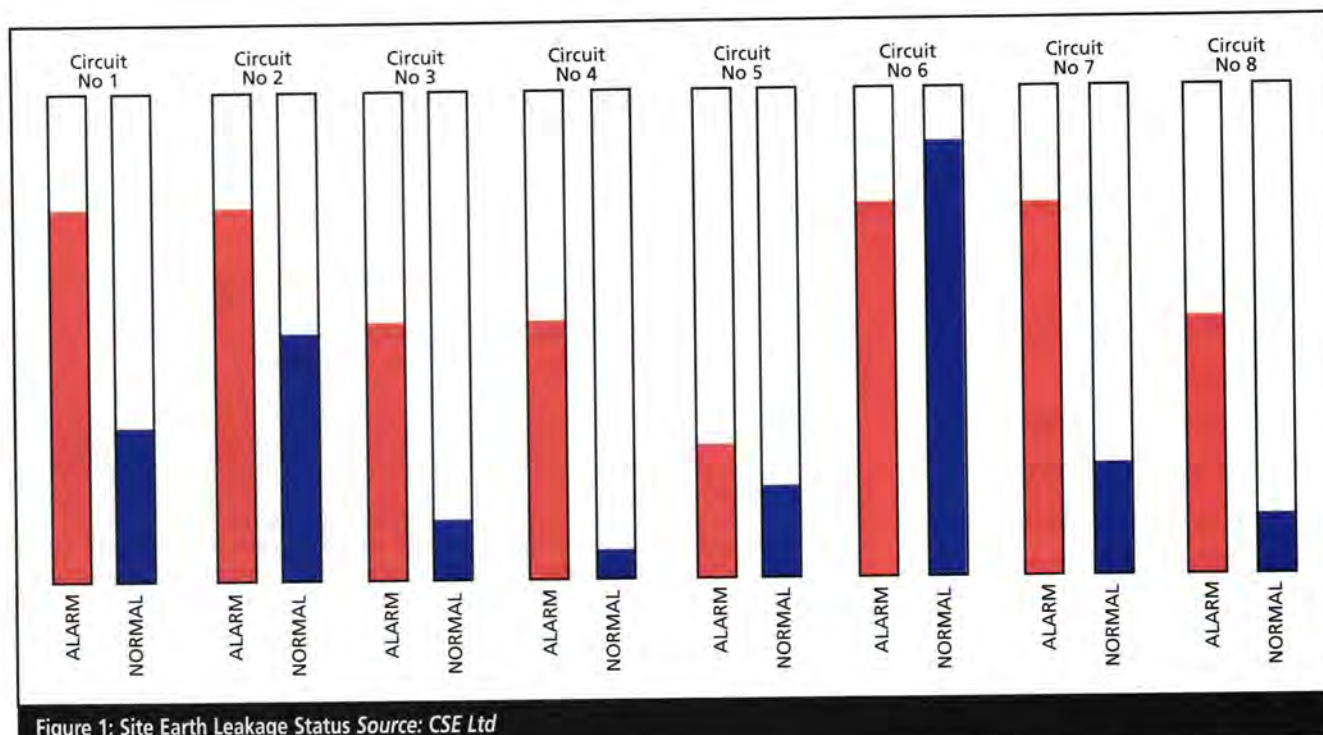


Figure 1: Site Earth Leakage Status Source: CSE Ltd

parameter goes out of spec. The contractor interrogating the information will know exactly what the problem is and can then respond accordingly, taking along the right equipment for the repair.

The operating company's maintenance controller will have knowledge of the fault, the response and the downtime of the equipment. Any maintenance bureau will have a powerful manpower saving tool at their disposal. The service station site will have an event indicator which it can interrogate. Again the site staff will be relieved of having to check temperatures regularly and also from reporting the failure of equipment.

Serviceability will be improved and wasted journeys by repair contractors should not occur. The service station staff will have more time for their customers and will have a further degree of safety and serviceability of their on-site equipment.

Further features are that the system is able to detect failing circuits and equipment and in some cases will be able to detect a fault before it occurs. Continuous monitoring may also relieve some part of the annual testing requirements, again keeping the petrol station open longer for service to the customer. The system is also two way: selected site switching levels and other measured parameters can be reset remotely, saving travelling and time costs.

There is a considerable range of other possibilities such as energy consumption analysis for overall site or individual units of equipment and performance comparisons between

equipment. The monitoring system can be applied to almost any retail requirement.

Interrogation

When a fault occurs the on-site processor will select the designated repair contractor and send a signal through the modem that a fault has occurred. The contractor will then interrogate his PC which will usually hold a display of the overall site layout showing the area of the faulty equipment. The contractor is then able to 'home in' on the fault area and a graph will show exactly what has occurred.

Where electrical circuits are monitored, the equipment measures the leakage current of each circuit (**Figure 1**), which is proportional to the characteristics of the insulation. Where there is a deviation from a set point or previous reading this represents a change in the insulation and indicates a present or forthcoming

problem. The instrumentation can also measure the current for the overall site and selected circuits and will signal any loss or gain. It can also be integrated with other building control systems such as *lonworks*. It will be able to detect the condition of each individual lamp, bulb or tube, measure performance and signal failure or imminent failure. The control of lamplife and the optimization of replacement is becoming an important feature of energy cost saving.

Control Systems and Equipment of Bourne End, Buckinghamshire, manufacturer of main panels and control systems for the water and oil industry, has brought together five companies to produce this facility. The processor used throughout is the Cylon Unitron unit which is widely used in the control and building management sector. The instrumentation systems are by Megacon and the overall software is by both Cylon and E Squared. The system is proven technology using readily available components and software.



Typical shop area with cool cabinets and other electrical equipment

Turkmenistan – part of the New Middle East?

The Caspian Sea is currently seen as a lightly explored but vastly prospective area. With reserves widely estimated at 30bn barrels of recoverable oil, it is being hailed by many as the 'New Middle East'. Initial attention has focused on the very large oil fields lying offshore Azerbaijan. These form part of the prolific Apsheron sill oil trend that extends east from Azerbaijan, across the Caspian Sea, and into Turkmenistan – a country in which an increasing level of interest has been shown in recent years. *Kim Jackson* reports on some of the latest developments in Turkmenistan, including a look at UK independent Monument Oil and Gas's involvement in the recent evolution of Turkmenistan's legal and fiscal regime for oil and gas.

Although the Russians knew of the existence of the vast deposits in the Apsheron trend, the technology available to them, prior to the break-up of the Soviet Union, in 1991 was not advanced enough to make exploitation viable. Western oil companies, however, had both the technology and the capital required and were quick to seize the opportunity of gaining a share of a potentially huge resource base when the Soviet Union broke up and the southern republics of Azerbaijan, Uzbekistan, Kazakhstan and Turkmenistan declared their independence.

The Southern Republics were keen to encourage foreign entrants to the marketplace. Russia had withdrawn its expertise and technology from the region following the break-up of the Soviet Union and had taken much of the area's background technical and geological data back to Moscow. Levels of gas production and consumption, and to a lesser extent oil production/consumption, in the Southern Republics dropped as a result. In Turkmenistan, for example, by 1995 gas production had fallen by almost a third from peak levels recorded in the late 1980s (Table 1) while demand for oil fell by about 20%.

However, despite the region being prolific in resources, the western companies have had to meet the challenge of making money in the face of a serious lack of transport, communications, legal, fiscal and political infrastructure in the Caspian region as a whole. Consortia have proved to be one answer, the first big consortium – the BP-led Azerbaijan International Operating Company (AIOC) which is developing the Azeri-Chirag-Guneshli fields in Azerbaijan – acting as the template for those wishing to do business in the Caspian.

Interest picks up

Azerbaijan and, shortly afterwards, Kazakhstan were the first to attract foreign interest as they had been relatively quick to establish a national hydrocarbon strategy and legal infrastructure. Turkmenistan, however, had no such structure in place and, as a result, little interest was shown in the early 1990s. This began to change in 1995, however, following a UK Department of Trade and Industry (DTI) mission to

the country during which UK independent Monument Oil and Gas decided to grasp what it saw as a major investment opportunity.

The company invested 18 months of time and effort in working with the Turkmen Government to develop a production-sharing style of contract which, together with the production sharing agreement signed with Petronas, will act as a template for all future exploration and production negotiations. The first licence, awarded to Monument in August 1996 and effective as of February 1997, was for a 2,500 sq km area in the Nebit Dag region in West Turkmenistan and included the partially developed Burun oil field, the deep rights to the Nebit Dag and Kum Dag oil fields whose shallow horizons had been virtually worked out, and rights to the Kyzyl Kum gas condensate field and the Kara Tepe gas field.

Recent discoveries

The area requires a whole spectrum of oil and gas activities including the full development of the Burun oil field, some appraisal of recent discoveries and extensive seismic exploration around the Burun, Nebit Dag and Kum Dag fields. Monument's plan is to commence development of Burun, establish a cashflow and, from there, develop into larger scale, higher risk projects within the licence.

The Burun field was initially estimated to hold 700mn barrels of oil in place, of which Monument expected to recover around 150mn barrels. However, recent work in the field has indicated significant additional reserves potential. Production has already begun and Monument is currently running 2D and 3D seismic over the area to establish potential.

According to Monument, modern seismic will be a key to unlocking the potential of the Caspian region as a whole. While most of the area has already been surveyed, the technology used was outdated – as was much of the technology used to develop the Caspian's oil and gas fields. The existing data can be reprocessed and used as a guide to orientate new seismic surveys. It is likely that substantial accumulations of new oil and gas will be identified, in particular peripheral to and beneath existing major fields.

In addition to the major seismic

programme planned, Nebit Dag objectives for 1998 also include:

- A total of 28 workovers by end-1998.
- Water injection pilot scheme to be initiated.
- Burun redevelopment plan to be produced by year-end 1998.
- First pass review of other Nebit Dag fields to be conducted by mid-year.
- Prospect inventory to be produced for remainder of Nebit Dag area.
- Cheleken, on the west coast of Turkmenistan, to be secured as an export point for the near term.
- Infrastructure restrictions to be identified and removed by end 1Q1998.
- Export route to be optimized in order to lower transportation charges.

The first well on Burun, a recompletion of a previously closed-in oil well, tested at 1,000 b/d of oil and 10mn cf/d of gas. Activities on a second oil well are proving equally encouraging. Monument expects to eventually reach a plateau production of around 30,000 b/d, if not significantly more.

Export key to development

Nebit Dag is very much a microcosm of the Caspian region, the wide range of operations to be carried out indicating the sort of projects that are available. As with most of the region, the establishment of export routes has been key to its development. At the start of its Turkmen negotiations, Monument formed an alliance with Russian-British shipping company Volga Sumo Transport and Trading (VSTT) in a bid to secure a viable export route for its Nebit Dag production. The Russian-flagged operator undertook to provide Monument with a guaranteed coastal export operation with up to 16 oil tankers of 4,000 tonnes capacity. The deal ensured that Monument could export oil in the short term while looking for a more economic longer-term solution.

Even before the deal was finalized in August 1996, VSTT had established three viable export options:

- Carriage by tanker up the Volga and down the Don to the Black Sea through a series of

locks. VSTT holds a virtual monopoly on this 30-day round trip.

- Road/rail transport down through Iran to the Gulf.
- Shipping by tanker to Makhachkala and then by rail to the Black Sea.

Monument arranged a swap deal with the local state oil company Turkmenneft in order to avoid the cost of building a pipeline, and associated terminal facilities, linking Nebit Dag to the coast. This ensured that the company could exploit any tanker-based export route. A pipeline linking the two will be constructed at a later date, however.

Springboard to development

For Monument, a medium-sized company capitalized at \$900mn, to develop its activities further, it needed a strategic partner. Mobil was chosen – taking on a 40% stake in Nebit Dag under the agreement – because it had well-established marketing and trading capabilities in the Caspian region following its acquisition of 25% of the Tengiz field in 1996.

Nebit Dag is regarded very much as a springboard for Monument's longer-term future in Turkmenistan. It is hoped that next on the agenda is the exploration, appraisal and development of an extensive area named Zone 1, which includes the Nebit Dag region which includes the area to the west and south of the Nebit Dag region.

Oil in the pipeline

Export routes are key to the successful development of the Zone 1 region. Six

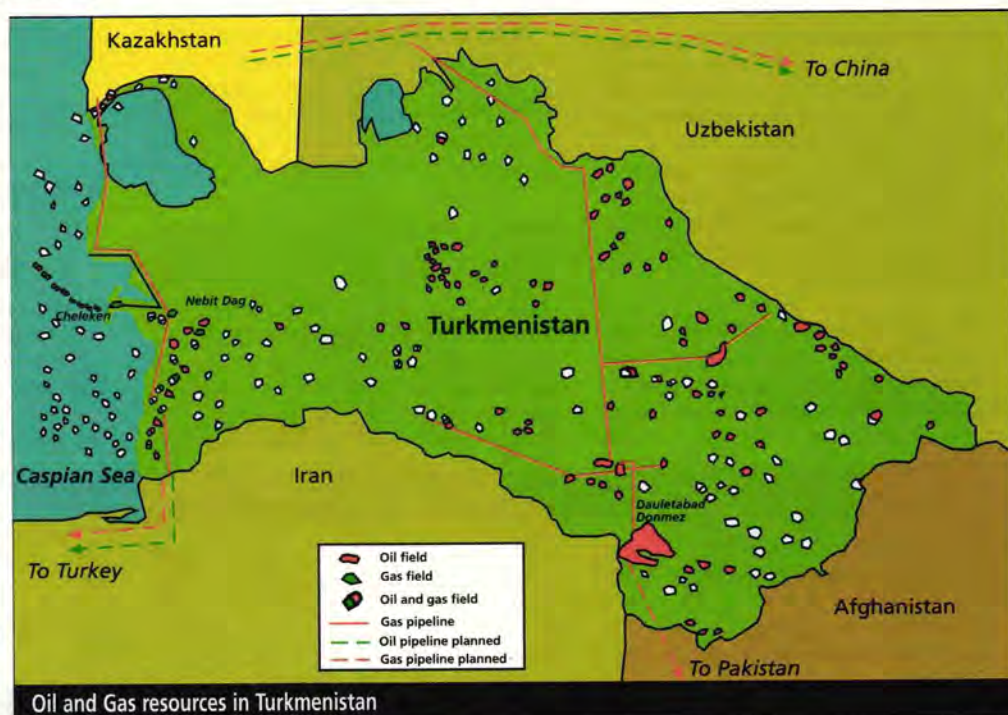
years ago there were no pipeline export routes for the carriage of major volumes of oil into/out of the Caspian. The only existing route was out of Kazakhstan into Russia. All of the limited amount of existing infrastructure at the time was tied into transporting products to Russia. The construction of new pipelines is a crucial issue and whoever owns the pipelines will essentially control the destiny of the area.

As a result, there is much ongoing political negotiation over the three main proposals put forward, the first of which is the Caspian Pipeline Consortium (CPC) pipeline linking the Caspian to the Black Sea port of Novorossiysk. This proposal is being sponsored by Kazakhstan and three/four major western oil companies and is expected to get the go-ahead in the next four to five years.

Because of its geographical location, Kazakhstan has, in the past, been sending its oil across Russia to the Black Sea. However, it is keen to minimize Russia's influence, and is now looking at the possibility of an export route running down the east side of the Caspian to tie in with a proposed Turkmenistan pipeline running south into Iran as well as assessing a trans-Caspian option.

In Turkmenistan, too, there is a huge political push, both from the Turkmen and the foreign investors (in particular the US) to look for routes that will not involve transiting Russia.

The second project under discussion, proposed by AIOC, avoids Russia completely and involves the construction of a 1,000-km pipeline from Baku in Azerbaijan, through Georgia, and on to



the Black Sea at Supsa.

A products pipeline already linked Baku to Novorossiysk via Chechnya, but was in need of refurbishment. Originally flowing in the opposite direction, the flow has been reversed for the carriage of crude oil. First production from the AIOC consortium's Chirag field, which came onstream in November 1997, is being carried by this line.

The third option, and the one that Monument believes holds major potential, is an oil pipeline running south across western Turkmenistan to the Iranian port of Neka, then south along an existing products pipeline route to Tehran and then on to the Gulf. Little additional new pipeline would initially be required for such a project.

Tehran accounts for much of Iran's domestic oil consumption, around 600,000 b/d being shipped from the south. Oil companies argue that it would not be difficult to supply this 600,000 b/d from the Caspian, with the equivalent 600,000 b/d from the Gulf being shipped to other export markets in a swap arrangement. Once the Caspian is producing more significant volumes, a further 600,000 b/d could be shipped through the existing pipeline, south to the Gulf, creating a 1.2mn b/d market for the Caspian region with less capital outlay required compared with alternative export routes.

Timing is crucial however. It is important that Turkmenistan grabs the initiative early on in order to exploit what may not be an unlimited opportunity.

Turkmen gas hub

Reported to contain 21tn cm of gas reserves, of which some 2.8tn cm are proven, Turkmenistan has the fourth largest gas reserves in the world and by far the largest of all the Caspian republics. It is therefore well placed to become the hub of the Caspian's gas pipeline infrastructure.

A number of gas pipeline projects have been on the drawing board for some time but progress to date has been limited. Three main routes have been under discussion:

- The first of these, a pipeline linking Turkmenistan to Pakistan via Afghanistan, was recently agreed between the Pakistan Government, US company Unocal and

Turkmenistan's first offshore licensing round

The Government of Turkmenistan presented its first round of international tendering for oil and gas exploration and production in the Turkmenistan shelf of the Caspian Sea in September 1997. A total of 11 prospective blocks, covering 22,600 sq km and containing an estimated 2.3bn tonnes of oil and 1.8tn cm of gas, were offered.

Under the terms of the round a background data package costing \$95,000, and a seismic data package, had to be purchased by any party making a bid. It is understood that Shell, Mobil, Exxon, Amoco, Unocal, Japan National Oil Company and Lukoil are among the companies to have purchased packages.

Licence awards were originally expected to be announced by the end of January/early February 1998. However, this date has been put back following the Turkmen Government's

decision to extend the deadline for bidding from 28 November 1997 to 15 February 1998. State oil company Turkmenneft will hold a 5% to 15% stake in any consortium awarded acreage in the round.

The state has claimed sovereignty over around 70,000 sq km of the Caspian estimated to contain about 3bn tonnes of oil and 4.5tn cm of gas. However, neighbouring Azerbaijan disputes Turkmenistan's sovereignty over one of the fields – named Serdar in Turkmenistan and Kyapaz in Azerbaijan. Sovereignty over other blocks has also been disputed by other countries bordering the Caspian and in November 1997, the Turkmen Government announced that it was excluding three oil and gas exploration blocks – Lachin, Yelbars and Burgut – from the licensing round. Discussions on development are currently taking place between Turkmenistan and Iran.

Turkmenistan. It is planned that the \$2bn, 1,464-km pipeline will link the Dauletabad gas field in southeast Turkmenistan to Multan in Pakistan. The pipeline will have an annual capacity of around 20bn cm of gas and is due onstream in 2001. However, the project faces problems and possible delays because of the ongoing political unrest in Afghanistan.

- A 250-km line linking central Turkmenistan to Turkey, whose gas market is rapidly expanding, and from there into the European gas pipeline system. Two different projects have been put forward for this route. Shell has been chosen to conduct the feasibility study. Regardless of which project is chosen, the gas will have to transit Iran, a country against which the US has imposed sanctions.

However, the path for pipeline negotiations has been somewhat smoothed by the US State Department giving its tacit approval last year for companies with US interests to be able to ship gas, or oil, through Iran without incurring any penalties under the sanctions so long as the commodity is only transiting the country and makes no major financial

contribution to Iran's economy.

Monument will be well placed to exploit the development of this gas export route, as the pipeline would have to run close to the Zone 1 concession which has significant gas potential.

- The third option is a pipeline linking central Turkmenistan to China. The key proponent of this project is Exxon. It is possible that this proposal may be changed to a pipeline running to Kazakhstan following Kazakhstan's recent signing with China of a \$9.5bn general agreement covering oil and gas development in western Kazakhstan and the Aktyubinsk region. The deal includes the construction of a 3,000-km pipeline linking the two countries.

A bright future

According to Monument, the future for Turkmenistan, and the Caspian as a whole, is bright. It expects that once a pipeline infrastructure is in place and competition established between the various export groups, the costs of transporting oil and gas will drop which, in turn, will stimulate another wave of western companies investing in the region.

| | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 |
|-----------------------------------|------|------|------|------|------|------|------|------|------|------|------|
| Oil production ('000 b/d) | n/a | n/a | n/a | n/a | n/a | n/a | n/a | 87 | 84 | 82 | 110 |
| Oil consumption ('000 b/d) | 70 | 70 | 70 | 70 | 90 | 100 | 100 | 65 | 75 | 80 | 80 |
| Gas production (bn cm) | 79 | 82.2 | 82.4 | 83.9 | 81.9 | 78.6 | 56.1 | 60.9 | 33.2 | 30.1 | 32.8 |
| Gas consumption (bn cm) | 14 | 13.9 | 14.1 | 14.6 | 9.8 | 9.6 | 9.3 | 9.3 | 10.2 | 8.0 | 8.4 |

Table 1: Turkmenistan Oil and Gas Production and Consumption, 1986-96

All systems go for LNG trades

The volume of liquefied natural gas (LNG) carried by sea in 1996, at 72.7mn tonnes, was 7.8% ahead of the volume carried in 1995. Although LNG accounts for only 5% of world gas consumption, the global trade in LNG is expanding even more quickly than the use of natural gas. LNG purchasers have traditionally been willing to pay a premium for this fuel due to its clean-burning characteristics and in situations where pipeline supply is absent or impractical, says *Mike Corkhill*.

The total world demand for gas is expected to reach 145 tn cf in 2015, an 85% increase on the 1995 level, according to US Energy Information Administration forecasts. LNG purchases by Japan, the leading importer, are forecast to expand by 83% over the same 20-year period, while LNG imports into Korea, the second biggest buyer, are projected to grow 175% over the next 15 years. In addition, several industrializing Asian countries, notably India and China, are due to commence LNG imports early in the next decade.

Steady growth in Japan

Asia is the primary destination for LNG shipments. In 1996 just under 77% of all seaborne movements of LNG were discharged at Asian terminals. Japan is the largest purchaser of LNG by a wide margin – four of the world's top five LNG trades involve shipments to Japan (Table 1) – and in 1996 the country took delivery of 44.3mn tonnes of LNG. Although the economy has slowed somewhat, the demand for LNG is expected to continue to increase and reach 55mn t/y by 2000 and 65mn t/y by 2010. New supplies from Qatar are expected to meet much of the additional demand predicted for the years up to the turn of the century.

| Route | Trade |
|-----------------------|-------------|
| Indonesia-Japan | 17.7 |
| Malaysia-Japan | 8.5 |
| Australia-Japan | 7.0 |
| Indonesia-South Korea | 6.2 |
| Brunei-Japan | 5.4 |
| Algeria-France | 5.3 |
| Abu Dhabi-Japan | 4.4 |
| Algeria-Spain | 4.0 |
| Algeria-Belgium | 2.9 |
| Malaysia-South Korea | 2.5 |
| Algeria-Turkey | 1.7 |
| Indonesia-Taiwan | 1.5 |
| US-Japan | 1.3 |
| Malaysia-Taiwan | 1.1 |
| Libya-Spain | 0.8 |
| Algeria-US | 0.6 |
| Others | 1.8 |
| Total | 72.7 |

Source: Gotaas-Larsen LNG World Overview 1997

Table 1: LNG Trade in 1996 by Route (million tonnes)

The nascent Qatargas project, which calls for the delivery of 6mn t/y of LNG from a three-train liquefaction complex at Ras Laffan in Qatar to Japan over a period of 25 years, started up in January 1997 when *Al Zubarah* discharged a full cargo at the new Chubu Electric terminal at Kawagoe. *Al Zubarah* is the first ship in a fleet of 10 135,000-cm LNG tankers that will service the Qatargas project.

Increased exports from existing suppliers are expected to meet much of Japan's additional LNG requirements in the 2000-2010 period. Five leading Japanese electric utilities have expressed a readiness to increase imports of LNG from Western Australia. These companies currently import 7mn t/y of LNG under the 20-year North West Shelf (NWS) contract which began in August 1989 and will run to March 2009.

The companies have indicated that they would not only like to extend the current agreement but start another 7mn t/y contract, beginning in 2004-2005. Another two liquefaction trains would be required to service this NWS Phase 2 project. The NWS partners have submitted a formal proposal to the Japanese buyers for the \$2.9bn expansion of the existing project.

Other possible providers of new supplies of LNG to Japan in the longer term include Malaysia (through the MLNG 3 project), Russia (Sakhalin 2) and Australia (Gorgon).

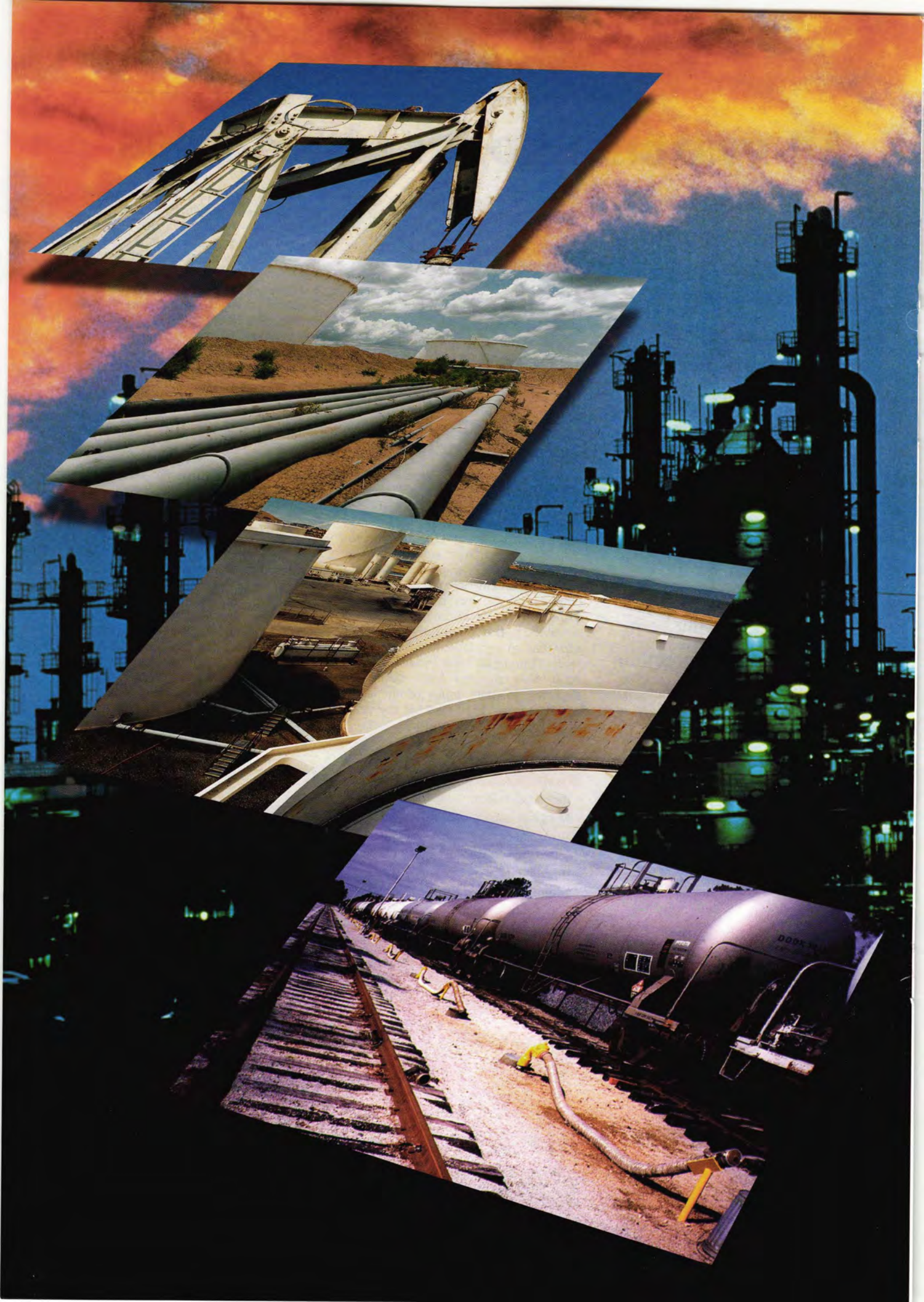
Expansion in Korea/Taiwan

Korea is investing heavily in LNG import infrastructure as part of a \$7bn, 14-year investment programme by the Korea Gas Corporation (Kogas) to cope with the country's burgeoning demand for natural gas. A nationwide gas transmission grid, now under construction, will link Korea's major cities by 2000.

Korea imported 9.3mn tonnes of LNG in 1996 from Indonesia, Malaysia and Brunei. This figure is expected to increase to 13mn tonnes of LNG in 2000 and 24 to 30mn t/y by 2010. The long-term aim is to reduce the country's heavy dependence on imported oil from the Middle East.

In 1996 Kogas signed a contract with Oman LNG for the purchase of 4.1mn t/y of LNG for 25 years commencing in spring 2000. A two-train, \$2bn liquefaction plant, with a capacity of 6.6mn t/y of LNG, will be built at Al Ghalilah near Sur on Oman's northeast coast.

Kogas has also agreed to purchase 2.4mn t/y of LNG from Ras Laffan LNG,



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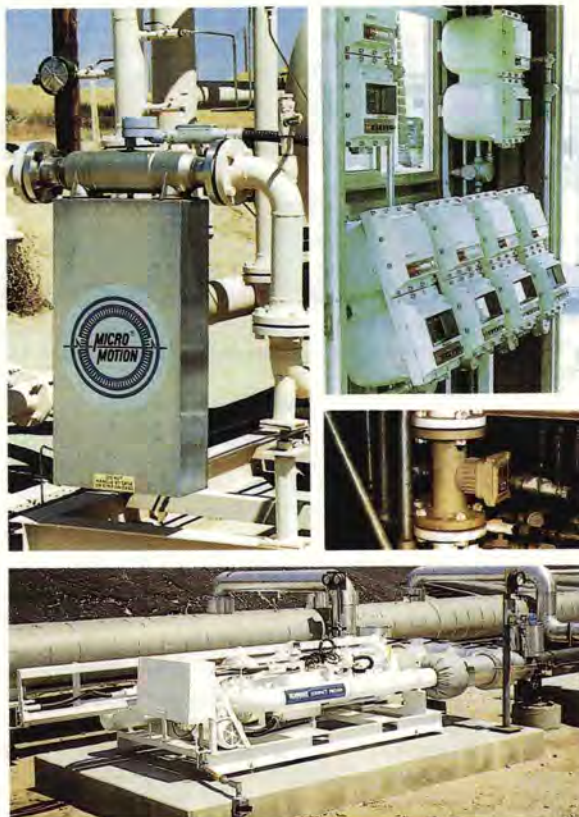
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Qatar's second LNG export project, over 25 years on a fob basis commencing in the summer of 1999. The contract includes an option under which Kogas can purchase an additional 2.4 to 3mn t/y from the year 2000.

Korea is also looking to North America for future supplies of gas. In April 1997 a Phillips Petroleum Canada-led consortium signed a memorandum of participation to establish a 3.5mn t/y LNG export facility near Kitimat in British Columbia. The gas would be piped from Alberta to the Pacific Coast terminal for liquefaction. Subject to final approval later this year, the first deliveries could be made in late 1999.

Korea has signed a memorandum of understanding with Malaysia for the purchase of 2mn t/y of LNG from the proposed third liquefaction complex at Bintulu (MLNG 3) on a cif basis, beginning in 2001. Kogas is also in negotiation with Yemen LNG to buy 2.5mn t/y of product from a country which, if all goes well, could become the fourth Middle East LNG exporter by 2001.

Taiwan imported 2.6mn tonnes of LNG from Indonesia and Malaysia through the Yung-An reception terminal at Kaohsiung in 1996 and expects to be purchasing 7mn t/y by 2002. By 2010 volumes should reach 10 to 12mn t/y. A planned expansion at Yung-An calls for the construction of a subsea gas pipeline to Taipei to enable additional quantities of LNG from Qatar and Indonesia to be directed to the island's second major consuming area.

With agreement to begin importing a further 1.9mn t/y starting in 1998, Taiwan is tied to the delivery of 4mn t/y of Indonesian LNG under long-term contracts. The two countries are in discussions over the purchase of a further 2.5mn t/y. Taiwan also imports LNG from Malaysia's MLNG 2 terminal under long-term contract. More recently, Taiwan's Chinese Petroleum Corporation has provisionally agreed to purchase, from 2001 onwards, 1.5mn t/y of Qatari LNG for 25 years and 2mn t/y from Malaysia's MLNG 3 complex for 20 years.

All eyes on China and India

Studies carried out in recent years have shown that there is good potential for the use of clean-burning LNG in China, especially in power generation plants and as domestic fuel. China's first two LNG import terminals are likely to be built near Shanghai, to supply gas to the Yangtse River Delta area, and in the Hong Kong-Shenzhen region, to meet the needs of the Pearl River Delta. It has been estimated that these two plants, each of 3mn t/y capacity, will be in oper-



Delivered by Kawasaki Heavy Industries in March 1997, the 137,400 cm *Al Rayyan* is in service carrying LNG from Qatar to Japan as part of the Qatargas project

ation in 2005. A third LNG terminal, in Fujian province, with a start-up date of 2007, has also been mooted. Qatar is a possible source of this gas.

Qatar is also due to supply 5mn t/y of LNG to India in 2001, if current negotiations between Qatar, Enron and the Maharashtra state government are successful. The gas would be landed at Dabhol where 2mn t/y of LNG would be used to fuel a new power plant while the remainder would be gasified and piped to another power station project at Hazira in Gujarat state.

Additional Indian LNG import projects, involving a consortium of Indian state energy firms, are under review. Four 2.5mn t/y import terminals have been proposed, with a facility at Ennore in Tamil Nadu state to supply a power plant the most advanced. Enron is among the bidders to supply this gas which, again, is likely to be sourced from Qatar.

Atlantic Basin trades

Commercial movements of LNG began when a cargo of Algerian LNG was discharged by *Methane Princess* to the Canvey Island terminal of the North Thames Gas Board in October 1964. However, after an ambitious programme of US LNG purchases from Algeria fell apart in 1979 just as it was getting underway, the Atlantic Basin LNG trades have been a poor relation to the surging traffic in the Asia-Pacific region. Today, Atlantic and Mediterranean LNG movements represent less than one-third of the volume shipped to Asian destinations.

Nevertheless, there have been strong signs of regeneration of late, notably

the imminent Nigerian and Trinidad projects, the revamp of the Algerian export facilities, the emergence of Turkey as a major LNG purchaser and the restart of Italian imports from Algeria.

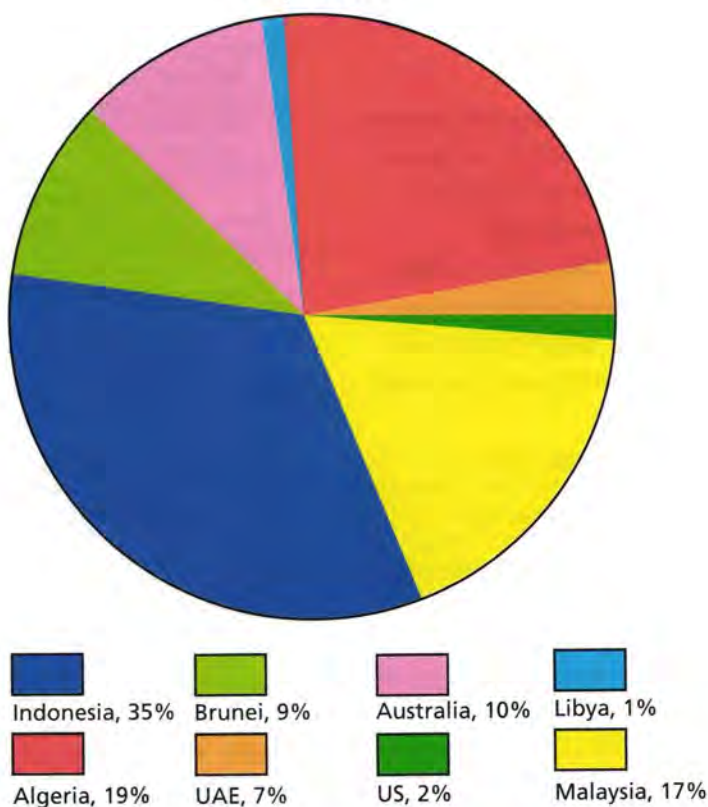
Algeria is the second largest exporter of LNG after Indonesia but sales in recent years have been hampered by the major projects underway to upgrade the country's ageing LNG export facilities. This revamp work is now coming to an end, and in 1996 the country exported 14.5mn tonnes of LNG, up from 12.8mn tonnes in 1995. Once the remaining refurbishment work is complete in 2001, the nameplate export capability will be 21mn t/y.

In June 1997 deliveries of Algerian LNG to Italy recommenced when the newly delivered, 65,700-cm *Snam Portovenere* entered into service. Snam of Italy has a 20-year fob contract to supply 1.3 to 1.5mn t/y of LNG from Algeria starting in 1997. The gas is being delivered to the upgraded Panigaglia LNG terminal near La Spezia which now has the capacity to handle 2.3mn t/y of LNG.

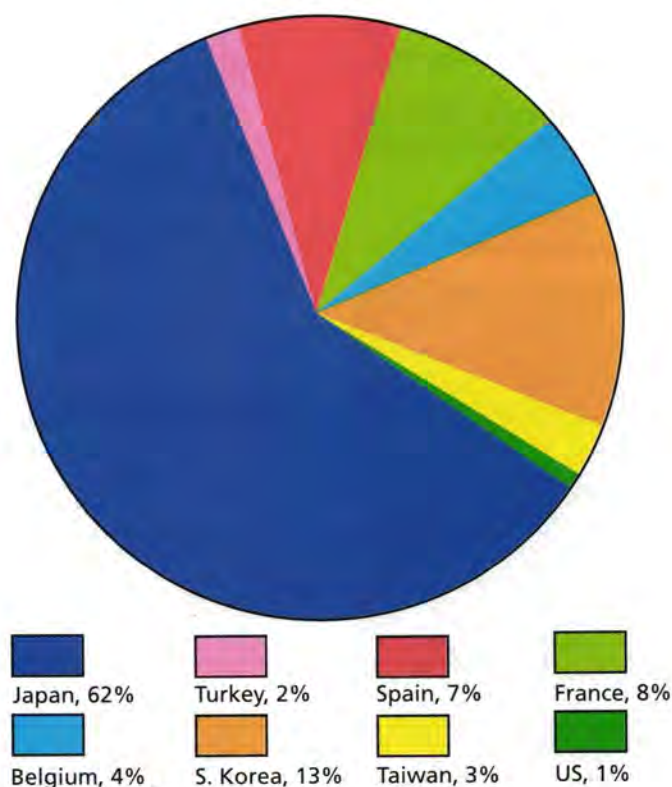
Italy is also one of the purchasers of LNG to be provided by the Nigerian LNG project. This scheme is finally coming to fruition after numerous failed attempts, over a period of 30 years, to make it work. Long-term cif sales agreements, each of 22.5 years duration, have been signed with Italy (3mn t/y), Spain (1.26mn t/y), Turkey (0.84mn t/y) and France (0.4mn t/y).

Deliveries are due to begin in late 1999 from a liquefaction terminal at Bonny Island, near Port Harcourt. All the gas will be delivered to existing reception terminals. After two proposed new

Market Share, % Exporters



Importers



Source: BP Review, 1997

Figure 1: Global LNG Trade in 1996

terminals in Italy to receive Nigerian LNG had been rejected on environmental grounds, it is likely that Italy's share of the Nigerian contract will be discharged at the Montoir terminal in France, while an equal quantity of natural gas will be piped from France to Italy under a swap arrangement.

The new \$1bn, one-train LNG liquefaction plant under construction at Point Fortin in southwestern Trinidad represents the largest single investment in the Caribbean. It is also the first new, baseload LNG project in the Atlantic Basin in 25 years. Due onstream in mid-1999, the 20-year project is being developed on a fast-track basis by Atlantic LNG, an Amoco-led consortium. Atlantic LNG began carrying out engineering work before the final sales contracts were finalized.

Cabot LNG will purchase 60% of the 3mn t/y of Trinidadian LNG production for shipment to its reception terminal in Boston, and Enagas of Spain 40% under a take-or-pay, fob contract. The addition of second and third liquefaction trains at Point Fortin is already under study.

Turkey only began importing LNG in 1994, under a 20-year, 3mn t/y, cif contract with Algeria, but the country has ambitious plans to increase gas purchases and diversify its supply base. Gas import agreements have been, or are in the process of being, negotiated with Russia, Iran, Egypt, Turkmenistan, Nigeria, Qatar and Yemen. The latter three involve LNG and the remainder pipeline gas.

Because deliveries of Algerian and Nigerian LNG will leave Turkey's Marmara Ereğlisi import terminal, as it is currently configured, with only enough capacity to accommodate another 0.7mn t/y of LNG, the initial planned purchase of Qatari gas has had to be scaled down in volume terms.

Under the revised project negotiated with Ras Laffan LNG, it is planned to ship 0.7mn t/y of LNG to the terminal for onward distribution by pipeline to a power plant to be built near Istanbul by Mobil. First deliveries are unlikely before 2000. Further LNG import terminals at Izmir and Iskenderun are under consideration.

In 1996 Botas, the Turkish state gas company, signed a letter of intent for the purchase of 2.6mn t/y of Yemeni LNG over 25 years, beginning in 2001. The Yemen LNG project calls for a two-train LNG liquefaction plant to be built at Bal Haf on the Gulf of Aden. The Total-led consortium behind the Yemen LNG scheme points out that, geographically, it is best placed of all the Middle East LNG projects to supply the European market.

IP Week 1998: 16 – 19 February

The last 18 months have seen an unprecedented number of innovative oilfield developments throughout the world. Many of these have been smaller fields in mature oil provinces or have been in deep water or remote locations where conventional field developments would not have been economic. The industry has met the challenge of developing these fields through innovative technology and a major rethinking of its project organization and management structures, thereby reducing both costs and the lead time in bringing fields onstream.

These developments will be the subject of an **International Conference on Innovations in Offshore Field Developments** on Thursday 19 February 1998 at which a distinguished group of speakers drawn from top management directly involved in these projects will present papers looking at the different alternative schemes for deepwater developments and the state-of-the-art in FPSO technology. The papers will be illustrated by authoritative case studies on major products, such as Hibernia (Canada), West Troll (Norway) and the Campos Basin (Brazil), illustrating both the innovative technology involved and new developments in project organization.

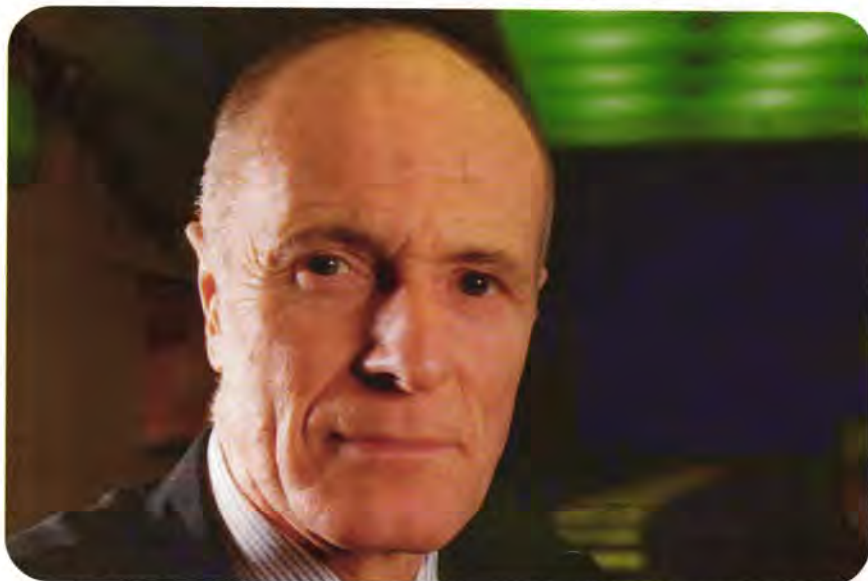
Speakers include: **Harvey Smith** (President, Hibernia Management and Development Company, Canada), **Alan Gaynor** (Chief Executive, British-Borneo Petroleum Syndicate), **Thor Tangen** (Senior Vice President, Norsk Hydro, Norway), **Luiz Eduardo Guimarães Carneiro** (E&P Executive Superintendent, Petrobras, Brazil)

Halfdan Millang (Executive Vice President, Aker Maritime, Norway), **Don Vardeman** (Manager, Marine Facilities and Engineering, Oryx Energy Company, US), and **Dominique Michel** (Chairman and Chief Executive Officer, Doris Engineering, France).

Chaired by **Rex Gaisford** (Director of International Development, Amerada Hess International), this international conference will provide a unique *tour d'horizon* of the latest offshore field developments aimed at oil company senior management, contractors, engineering consultants and project financiers who need to obtain an authoritative overview of these fast developing technologies.

For a copy of the IP Week 1998 Programme and registration form, please contact:

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Rex Gaisford, Director of International Development, Amerada Hess International Ltd

IP Week 1998 Programme of Events

Monday 16 February

International Conference on Oil and Gas after 2000 – Realignment and Restructuring for the New Millennium

Antonio Carlos S de Agostini
(E&P Director, Petrobras, Brazil),
Dr F J Chalabi
(Executive Director, Centre for Global Energy
Studies and Past Deputy Secretary General, OPEC),
Thierry Desmarest
(Chairman and CEO, Total SA),
Richard Giordano
(Chairman, BG plc),
Robert Mabro CBE
(Director, Oxford Institute for Energy Studies),
John Mitchell
(Chairman, Energy and the Environment,
Royal Institute of International Affairs),
Wenent P Pan
(President, Chinese Petroleum Corp, Taiwan),
Richard Schenz
(CEO and Chairman of the Executive Board,
OMV, Austria) and
Peter Sutherland
(Chairman, BP plc and Goldman Sachs
International Ltd).

Tuesday 17 February

Annual Luncheon

Dorchester Hotel, Park Lane, London
Guest of Honour and Speaker
Dr Mark Moody-Stuart
Managing Director, Royal
Dutch/Shell Group

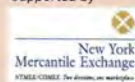
London Branch Evening Discussion Meeting – The Auto-Oil Programme

See page 47

Wednesday 18 February

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Thursday 19 February

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The changing face of Europe's fabricators



The offshore fabrication industry is facing great challenges. Total demand for steel work has dropped following a move away from the use of traditional platform designs to floating production units. These are required for the deepwater developments dominating today's oil and gas E&P sector. Fabricators are also having to offer total turnkey packages to secure major contracts. Jobs are getting smaller with faster turnaround times and yards are having to secure more contracts just to stay in business. *Kim Jackson* reviews the current state of the market and future prospects.

Subsea and floating production systems (FPSs) are increasingly replacing traditional platform designs in development plans for new oil and gas fields. Not only does a combination of subsea units and semi-submersibles provide better technical solutions for marginal and satellite fields, floating production units (FPU) are often the only viable means of exploiting the increasing number of deepwater discoveries that have been made in recent years in the Atlantic Margin, Gulf of Mexico and Africa. FPSs also have the advantage that they can be re-used on a number of projects, thereby keeping development costs to a minimum.

Together with a trend towards minimal facilities lightweight platform designs, overall demand for fabricated steelwork has dropped considerably in recent years. According to the UK Oil, Gas and Petrochemicals Supplies Office's (OSO) August 1997 report on current and future UKCS oil and gas projects, in the peak period of this decade, total fabrication demand was running at around 150,000 to 160,000 t/y of steel work, split about two-thirds on topsides and one-third on support structures. Today, however, the figures are less than half that level and the UK industry is currently running at around 50% of its full capacity.

The picture does not look set to improve significantly in the near future either. 'Based on North Sea forecast developments, the UK/European fabri-

cation industry will be running at below 100% capacity over the next few years', according to a spokesman speaking on behalf of the UK Offshore Contractors' Association (OCA). It is pointed out that the work load may improve if some of the larger international developments, such as Natuna in Indonesia and projects in the former Soviet Union become a reality.

UK taxation threat

However, OCA Chairman Syd Fudge has warned that half of the UK's 140 potential oil and gas projects could be shelved if the UK Government raises tax levels following its review of current taxation laws – an outcome that the UK fabrication sector, as well as the operators themselves, could do well without. He also warns that any fiscal change creating instability would have a negative impact on the UK industry's ability to secure work from overseas (see page 5).

Norwegian stability

Unlike UK yards, and those in most other European countries which are operating under capacity, Norwegian yards are busy. Most are at, or near, full capacity and expect to be so for the next two to three years. This is because of Norway's strict control on exploration and development rates, together with stringent monitoring of gas sales, which have produced a steady influx of business for the Norwegian yards.

Above: Aker Verdal's yard in Norway

However, this pattern may change in light of the recent announcement that new Norwegian gas developments are unlikely to get the go-ahead before 1999. The announcement followed recommendations from the Gas Supply Committee (GFU) that the next gas allocation round be postponed from February until September 1998 as current and developing fields are capable of meeting existing requirements (see *Petroleum Review*, December 1997). It is proposed that recommendations for new supply fields go to the Ministry of Petroleum and Energy in December this year, which would then decide on new developments in the first half of 1999. These projects would probably start in 2002.

If such a scenario does occur, it will mean a slightly reduced workload for Norwegian yards in the short term but does ensure contracts into the new millennium. This is not necessarily bad news for the Norwegian yards which have often had to sub-contract work elsewhere in Europe when operating at full capacity. These European yards, however, may feel the pinch if Norway keeps most of its fabrication work at home.

Turnkey solutions for operators

European fabricators are increasingly having to offer operators turnkey projects in order to secure major contracts. Such turnkey packages involve design, engineering, installation and commissioning capabilities – effectively a one-stop shop for the operator awarding the contract.

Yards also need to be able to offer a range of construction capabilities, including FPSOs as well as the hybrid platform/floating production system solutions required for the development of high pressure/high temperature or heavy oil fields, in order to stay competitive.

Some fabricators are diversifying their base to include civil work as well as fabrication for the oil and gas sector. In some cases, fabricators have teamed up to bid for large, 'one-off' projects. Kvaerner and Umoe Sterkoder in Norway, for example, recently bid for the construction of six frigates for the Norwegian Navy – a contract that would ensure nearly a decade of work up to 2010. According to Umoe, such an 'alliance' approach was necessary as no one yard would have been capable of handling a contract of this size. Kvaerner also recently teamed up with Aker to bid for Saga's Snorre II oil project. However, the general consensus is that such partnerships will not set a precedent for the future.

| Operator | Field* | Work | Delivery |
|----------------------------------|---------------------------------|---|------------|
| UNITED KINGDOM: | | | |
| Aker McNulty | | | |
| Conoco/PGS | Banff | 3,000 tonnes process topsides for FPSO | Jun-98 |
| Kerr McGee | Janice | 3,500 tonnes process topsides installed on FPU | Jun-98 |
| Enterprise/APS | Pearce | 3,000 tonnes process topsides for FPSO <i>Berge Hoeg</i> | Jun-98 |
| Amec Process & Energy | | | |
| Wallsend | | | |
| BP | ETAP | 14,000 tonnes total topsides for Marnock central processing platform and module support frame | Feb-98 |
| Shell Expro | Shearwater | 10,500 tonnes integrated deck | Early 2000 |
| BARMAC | | | |
| (a) Ardersier | | | |
| BP/Rockwater | Bruce II | Towheads and tie-in pipespools – total 32 tonnes | Apr-98 |
| Conoco | Viking Phoenix | Two platforms and module – total 2,450 tonnes | Apr-98 |
| Enterprise | Pierce | Three subsea structures – total 340 tonnes | May-98 |
| Chevron | Alba Southern | Three modules – total 1,700 tonnes | Jul-98 |
| Amerada Hess | South Arne | 7,000 tonnes platform topsides | Apr-99 |
| (b) Nigg | | | |
| Elf | Elgin/Franklin | 36,000 tonnes TPG 500 platform | Aug-99 |
| Amerada Hess | South Arne | 110,000 tonnes concrete gravity base structure and topsides | Mar-99 |
| Brown Brothers | | | |
| Conoco | Banff | 100 tonnes high pressure swivel stack | Mar-98 |
| Consafe Engineering | | | |
| (a) Aberdeen | | | |
| Brown & Root | Conoco Phoenix | Design and construction of two emergency overnight shelters and two local equipment rooms | Jan-98 |
| Bluewater | Bleo Holm | Design and construction of 90-man living quarters and helideck. (Some work to be carried out at Burntisland site.) | Jan-98 |
| Phillips Petroleum | Judy/Joanne | Auxiliary telecommunications equipment room | Feb-98 |
| BP | ETAP | Conceptual and detailed design of 1,000 tonnes, 85-man living quarters and helideck. Construction of modules including hook-up at construction yard. | Mar-98 |
| Rowan Drilling | Gorilla 5 jack-up | Design and outfitting of 120-man living quarters. Undertaken in joint venture with Hopeman Brothers. | Mar-98 |
| BP | Bruce II | 3,000 tonnes compression platform topsides and 500 tonnes bridge (Some work to be carried out at Burntisland site.) | Jul-98 |
| Esso Norge | Jotun | Design and construction of 60-man accommodation module for FPSO, including temporary refuge and helideck – total 850 tonnes | Aug-98 |
| BP Oil G'mouth | Firth of Forth Hound Point | Three-deck, 1,100 tonnes process topsides for marine vapour recovery project at tanker loading terminal. (Some work to be carried out at Burntisland site.) | Nov-98 |
| BP | Bruce II | Phase II modifications to living quarters | Feb-99 |
| (b) Burntisland | | | |
| BP | ETAP | Five subsea manifolds, ranging from 100 to 120 tonnes each. Machar production manifold, Machar water flood manifold and Monan production manifold incorporating duplex pipework. CATS valve and manifold and Machar export wye incorporating carbon steel pipework. | Mar-98 |
| (c) Montrose | | | |
| FMC | Kitina (W. Africa) | Two subsea manifolds | Sep-98 |
| Harland and Wolff | | | |
| Dolphin | Borgland Dolphin | Conversion work including enhanced deck load equipment and new accommodation | May-98 |
| Dolphin | Bideford Dolphin | Conversion work including enhanced deck load capacity, modern drilling equipment and new accommodation | |
| BP | Schiehallion (West of Shetland) | Newbuild, 154,000 tonnes dwt Schiehallion FPSO. Storage capacity – 950,000 barrels. Production capacity – 154,000 b/d at peak | Mid-1998 |
| Global Marine | DP drillships | Bridging contract for design and construction 4Q1999/1Q2000 of positioned deepwater monohull drillships | |
| Heerema Hartlepool | | | |
| Shell Expro | Corvette | Topsides for gas platform – total 2,000 tonnes. 900 tonnes jacket subcontracted to Heerema Havenbedrijf | Jul-98 |
| Shell Expro | Shearwater | 1,500 tonnes wellhead deck | 1Q2000 |
| Kvaerner Oil and Gas | | | |
| (a) Methil | | | |
| Shell | Galleon PG | 760 tonnes jacket and 970 tonnes topsides | Dec-97 |
| BP | Marnock QU | 6,000 tonnes topsides | Feb-98 |
| BP | Mungo | 2,000 tonnes topsides | Feb-98 |
| (b) Teesside | | | |
| Esso Norge | Jotun | Drill package | 1998 |
| Amerada Hess | Bittern, Guillemot West | FPSO topsides | May-99 |
| Lewis Offshore | | | |
| Talisman | Ross Parry | Turret, turntable and spider for FPSO <i>Bleo Holm</i> | 1998 |
| Esso Norge | Jotun | FPSO vessel bearing box | 1998 |
| Esso Norge | Jotun | Turret, turntable, spider, torsion box, gantry and process deck for FPSO | 1998 |
| SLP Engineering | | | |
| Teesside | | | |
| Shell Expro | Shearwater | 2,500 tonnes wellhead jacket | 1Q2000 |
| UIE | | | |
| Talisman | Ross | Conversion to floater process topsides | 1998 |
| Esso Norge | Balder | FPU, process topsides modification | 1998 |

Current Workload at European Fabrication Yards (continued opposite)

| continued Operator | Field* | Work | Delivery |
|--------------------------------|-------------------------|--|--------------------|
| THE NETHERLANDS: | | | |
| Grootint | | | |
| NAM | L/9 | 4,200 tonnes process topsides, 500 tonnes wellhead topsides and bridge | 2Q1998 |
| Heerema Havenbedrijf | | | |
| Verolme Botlek | Neddrill rig | 720 tonnes, four drill rig leg extensions | Feb-98 |
| NAM | K7 | 370 tonnes jacket and 310 tonnes deck for wellhead platform | Mar-98 |
| BP | Bruce II | 3,500 tonnes jacket (subcontracted from Grootint) | May-98 |
| NAM | K8-FD-1 | 350 tonnes module | May-98 |
| Shell | Corvette | 900 tonne jacket (subcontracted from Heerema Hartlepool) | Jul-98 |
| Shell Expro | Shearwater | 5,800 tonnes jacket | Apr-99 |
| Mercon Steel Structures | | | |
| Elf Petroland | K/4A | 600 tonnes platform, 630 tonnes jacket and 540 tonnes piles | Sep-98 |
| SWEDEN: | | | |
| Emtunga | | | |
| Statoil/Dolphin | Borgland Dolphin | 900 tonnes living quarters and helideck | Aug-98 |
| Esso Norge | Jotun | 900 tonnes living quarters for wellhead protection platform | Aug-98 |
| Amerada Hess | South Arne | 700 tonnes living quarters and helideck. Subcontracted from Brown & Root | Nov-98 |
| Statoil | Asgard B | 1,800 tonnes living quarters and helideck | May-99 |
| SPAIN: | | | |
| Astilleros Espanoles | | | |
| Transocean | Discover Enterprise | Dynamically positioned drilling unit | Feb-98 |
| Offshore | | | |
| Petrobras | Roncador | FSO conversion | Nov-98 |
| | (Campos Basin, Brazil) | | |
| Statoil | MST vessel | Conversion to drillship | Jun-09 |
| NORWAY: | | | |
| Aker Stord | | | |
| Statoil | Asgard A | Topsides and integration | 3Q1998 |
| Norsk Hydro | Oseberg South | 14,000 tonnes integrated deck | 2Q2000 |
| Aker Verdal | | | |
| Norsk Hydro | Oseberg East | 7,000 tonnes jacket and 4,700 tonnes piles | May-98 |
| Esso Norge | Jotun | 6,500 tonnes jacket and 3,500 tonnes piles | Aug-98 |
| Norsk Hydro | Oseberg Gas | 8,000 tonnes deck, bridge and flare | Apr-99 |
| Norsk Hydro | Oseberg Gas | 6,000 tonnes jacket and 2,300 tonnes piles | Mar-99 |
| Norsk Hydro | Oseberg S'th | 7,000 tonnes jacket and 4,700 tonnes piles | 1Q2000 |
| Heerema Tonsberg | | | |
| Amoco | Valhall | 550 tonnes equipment module | Sep-98 |
| Esso Norge | Jotun | 3,500 tonnes wellhead protection platform topsides | Sep-98 |
| Kvaerner Egersund | | | |
| Statoil | Gullfaks | 5,000 tonnes equipment modules | Summer 1998 |
| Norsk Hydro | Oseberg East | 7,000 tonnes topsides | 2Q1998 |
| Kvaerner Rosenberg | | | |
| Esso Norge | Jotun | FPSO topsides and turret | 1998 |
| Statoil | Siri | Jack-up production platform | 4Q1998 |
| Statoil | Asgard B | 20,000 tonnes semisubmersible platform | start 3Q2000 |
| Leirvik Sveis | | | |
| Norsk Hydro | Troll C | 4,300 tonnes living quarters and utility module | Sep-98 |
| Umoe Haugesund | | | |
| Norsk Hydro | Visund | 28,000 tonnes semisubmersible | 2Q1998 |
| Norsk Hydro | Troll C | 32,400 tonnes semisubmersible | 2Q1999 |
| ITALY: | | | |
| Belleli Offshore | | | |
| Statoil | Asgard | Four gas compression modules – total 4,800 tonnes | Dec-97 |
| Shell | Ursa (Gulf of Mexico) | 28,000 tonnes tension leg platform hull | May-98 |
| Amoco | Marlin (Gulf of Mexico) | 7,500 tonnes hull for tension leg platform | Sep-98 |
| Intermare Sarda | | | |
| Agip | Regina (Italy) | 800 tonnes integrated deck | Dec-97 |
| Agip | Garibaldi K (Italy) | 400 tonnes, four-legged jacket, 300 tonnes piles | 1Q1998 |
| Saipem | Zatchi 4 (Congo) | 600 tonne wellhead module | 2Q1998 |
| Statoil | Asgard B | 800 tonne stabilization system (module) | 1Q1999 |
| Rosetti Marino | | | |
| Agip | Anemone (Italy) | 450 tonnes integrated deck | Feb-98 |
| Inagip | Ivana (Italy) | 1,000 tonnes jacket, piles, 700 tonnes deck and 400 tonnes living quarters | July/December 1998 |
| Mobil Nigeria | OSO field (Nigeria) | O2Y-2 modules – total weight 3,000 tonnes | July 1998 |
| FINLAND: | | | |
| Kvaerner Masa Yards | | | |
| Esso Norge | Jotun | FPSO hull | Summer 1998 |
| BELGIUM: | | | |
| Bluewater | | | |
| Bluewater | North Sea | Subcontracted to supply FPSO turret mooring system for 100,000 dtw newbuild FPSO – <i>Bleo Holm</i> | 1998 |
| | | Storage capacity – 666,000 barrels. Production capacity – 50,000 b/d | |
| Petrobras | Brazil | Subcontracted to supply FPSO turret mooring system as part of conversion of 1973-built 269,000 dwt tanker <i>Cairu</i> | 1998 |
| | | Storage capacity – 2mn barrels. Production capacity – 130,000 b/d | |
| Petrobras | Brazil | Subcontracted to supply FPSO turret mooring system as part of conversion of 1975-built 269,000 dwt tanker <i>P37</i> | 1998 |
| | | Storage capacity – 2,033,000 barrels. Production capacity – 150,000 b/d | |
| Esso Norge | Jotun | Subcontracted to supply turret mooring system for 92,000 dwt newbuild FPSO. Storage capacity – 585,000 barrels | 1999 |
| | | Production capacity – 80,000 b/d | |
| Petrobras | Brazil | Subcontracted to supply FPSO turret mooring system as part of conversion of 1976-built 280,000 dwt tanker | |
| | | Storage capacity – 2mn barrels. Production capacity – 180,000 b/d | |
| Amerada Hess/Shell | Bittern/ | FPSO turret mooring system subcontracted from Kvaerner Oil & Gas for newbuild 105,000 dwt FPSO. | 1999 |
| | Guillemot West | Storage capacity – 624,000 barrels. Production capacity – 105,000 b/d | |
| Kvaerner | | Supply of 150 tonnes turret mooring system for Aframax tanker being built by Samsung in Korea. | May-99 |
| | | Subcontracted from Kvaerner. FPSO to be outfitted at Kvaerner's Teesside yard. | |

* North Sea fields unless otherwise indicated in brackets

Current Workload at European Fabrication Yards

Acquisition trail

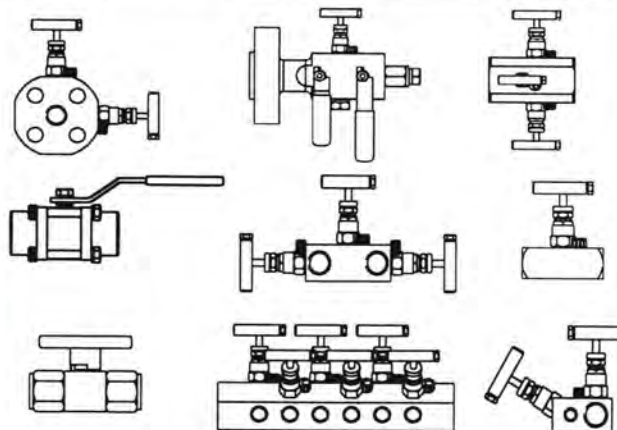
Umoe is also looking to become less reliant on its Norwegian home market and is planning to increasingly focus on the international market. Acquisition of additional yard capacity and skills form part of this strategy. The company is currently in negotiations to take over Germany's MTW Schiffswerft yard in Wismar. If successful, the German yard would provide Umoe with the capability to construct hulls for FPSs. At present, no Norwegian yard has the deepwater docks required for such projects although Kvaerner has the capability at its Kvaerner Masa yard in Finland. Umoe is also considering the potential takeover of a Polish yard in Gdynia.

Umoe is also looking at the leasing market for FPSs and has created a London-based company – Offshore Petroleum Management – to specifically target this market. As indicated earlier, such an arrangement can help to significantly reduce overall project costs. Leasing arrangements are particularly suited to the development of marginal fields with a relatively short life-cycle.



The first newbuilding FPSO vessel to be constructed in the UK was officially named *Schiehallion* at Harland and Wolff's Belfast yard on 5 December 1997. She was named by Paula Browne, mother of John Browne, Group Chief Executive of BP. Specifically designed and constructed for operation in the harsh environment of the Atlantic Frontier, *Schiehallion* has a 950,000 barrel storage capacity and is said to be the largest vessel of its kind in the world. It was constructed in just 20 months from project sanction – the shortest ever build cycle for such a vessel according to Harland and Wolff.

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Web World continued from page 2

...the wrecker of Kyoto. Environmentalist views can be found on various sites such as www.greenpeace.org.uk and www.foe.org.uk among others. Perhaps the most balanced appraisal is to be found on the *New Scientist* site www.newscientist.com. However, the sheer size of the climate change section means the climate change data will only be kept on the site until the end of January. The full academic treatment is to be found at the University of East Anglia's site www.cru.uea.ac.uk which offers hot-links to 36 other climate change sites.

The best start to any data search is the IP's own site at www.petroleum.co.uk

UK Deliveries into Consumption (tonnes)

| Products | †Oct 1996 | *Oct 1997 | †Jan-Oct 1996 | *Jan-Oct 1997 | % Change |
|-------------------------|-----------|-----------|---------------|---------------|----------|
| Naphtha/LDF | 358,780 | 237,045 | 2,468,551 | 1,731,553 | -30 |
| ATF – Kerosene | 723,930 | 752,804 | 6,786,363 | 7,085,790 | 4 |
| Petrol | 1,950,677 | 1,914,198 | 18,475,043 | 18,566,874 | 0 |
| of which unleaded | 1,339,902 | 1,405,350 | 12,445,087 | 13,257,048 | 7 |
| of which Super unleaded | 51,401 | 42,344 | 597,299 | 435,704 | -27 |
| Premium unleaded | 1,288,501 | 1,363,006 | 11,847,788 | 12,821,344 | 8 |
| Burning Oil | 232,536 | 270,845 | 2,579,132 | 2,606,105 | 1 |
| Derv Fuel | 1,276,715 | 1,379,704 | 11,933,705 | 12,500,597 | 5 |
| Gas/Diesel Oil | 611,177 | 633,093 | 6,308,265 | 6,044,365 | -4 |
| Fuel Oil | 612,746 | 291,535 | 5,705,050 | 3,288,683 | -42 |
| Lubricating Oil | 79,352 | 72,257 | 729,486 | 730,246 | 0 |
| Other Products | 733,562 | 759,534 | 7,344,225 | 7,262,860 | -1 |
| Total above | 6,579,475 | 6,311,015 | 62,329,820 | 59,817,073 | -4 |
| Refinery Consumption | 556,977 | 562,532 | 5,456,689 | 5,420,042 | -1 |
| Total all products | 7,136,452 | 6,873,547 | 67,786,509 | 65,237,115 | -4 |

† Revised with adjustments *preliminary

Petroleum geology of north west Europe

The Atlantic Margin from Norway to Ireland was a key focus of the 5th Conference and Exhibition on the Petroleum Geology of NW Europe which took place at the Barbican Centre, London, from 25 to 29 October. The more 'mature' exploration areas of the North Sea and field development and reservoir management were not forgotten, writes Andy Fleet, co-Chairman Technical Committee.

The conference was opened by the President of the Institute of Petroleum, David Setchell. Over 1,300 participants from 19 countries attended, and 96 papers were presented in three parallel sessions. In the exhibition area 51 exhibitors cohabited with another 20 papers presented as posters, a poster display by 16 universities and a discussion forum built around a display of 34 core samples.

This 'Barbican Conference', as it has become known, was preceded by others in 1974, 1980, 1986 and 1992. The length of time between conferences and the fact it is not related to the programme of any professional or learned body mean that past conferences have attracted strong technical programmes and seen the release of significant new data. The 1997 conference was no exception.

The papers were grouped into four themes: 'NW Europe tectonic development/basin evolution', 'Atlantic Margin', 'Mature basins (North Sea) exploration and production' and 'Technology'. The first of these provided the framework for much of the rest of the programme. It was led off by David Roberts (BP) and Tony Dore (Statoil) who separately reviewed the

Atlantic Margin from the Barents Sea to the Bay of Biscay. Both painted pictures of progressive development of this margin, particularly over the last 200 mn years or so, with rifting of the continental lithosphere advancing from south and north and moving oceanwards and culminating in massive volcanism about 50 mn years ago and the separation of Europe from Greenland.

Some other papers in the theme elaborated aspects of these events but the majority focused on the processes which shaped the North Sea basins during and before the development of the Atlantic Margin. Application of knowledge of North Sea development were shown to range from making predictions for exploration to understanding reservoir fracturing and the capabilities of faults to compartmentalize reservoirs.

Understanding the crustal movements, basin development, erosion and sediment deposition along the Atlantic Margin in order to predict reservoir distributions and petroleum occurrence was taken up in a second theme of the conference. Clues to the development and petroleum potential of the margin were presented from Greenland and offshore areas of eastern Canada, both of which had once been contiguous with the European margin, offshore Ireland and, of course, the current centre of activity west of the Shetlands to the Faroes.

Tony Spencer (Statoil) pulled many of these strands together contrasting the 'inboard' basins of the margin which have proven petroleum systems (offshore mid Norway, the northern North Sea, the West Shetland area, the Erris/Slyne Trough, the Porcupine Basin) with the little explored 'outboard' basins (the Vøring and Møre Basins, the Faroe-Shetland Trough, and the Rockall Trough).

Despite the allure of the Atlantic Margin, many of the participants at the conference had their sights firmly fixed on the opportunities still present in the 'mature' basins of the North Sea: opportunities for further exploration, development of existing fields and discoveries, satellite fields and enhanced production. Sessions within this theme looked at the reservoirs of southern North Sea gas fields, subtle

traps for petroleum in the Jurassic, the 'renaissance' of chalk prospects, high temperature/high pressure plays and fields, and the general topic of integrated field development and reservoir management.

The fourth theme of the conference was technology ranging from the applications of geophysics through basin modelling to advances in reservoir studies. The geophysics papers provided two of the highlights of the conference. Patrick Leach (Texaco) won the best paper award for his presentation on the first vertical cable seismic survey in the North Sea which was undertaken around the Strathspey field. Bob White and his colleagues (Cambridge University) and collaborators from Amerada Hess won the best poster award for their presentation of the Faroes Large Aperture Research Experiment (FLARE) which successfully allowed them to map sediments and basement under up to several kilometres of basalt east of the Faroes.

Another clear highlight of the conference was the excellent Core display put on in the exhibition area. This lived up to its purpose of providing a discussion forum as well as a demonstration of topical reservoirs. Core and some outcrop material came from not just the North Sea but also offshore Norway, West Shetlands and Greenland.

Away from the Barbican Centre many of the participants were able to admire the Rubens ceiling of the Banqueting House in Whitehall over the conference dinner. After this they were enlivened by a witty and sometimes passionate and heartfelt performance by Tony Benn who looked back to his time as Minister of Energy and put forward his views on the current petroleum scene.

The efforts of bringing the conference together and support of the four sponsoring bodies (The Geological Society, The Institute of Petroleum, the Joint Association for Petroleum Exploration Courses and the Petroleum Exploration Society of Great Britain), of the endorsing agencies and of the 26 sponsoring companies did not end with the conference. As with past Barbican Conferences the majority of the papers presented will be coming together as a two-volume set of conference proceedings to provide a source of state-of-the-art information for future years.

Global demand stagnates despite new market openings

Over the 10 years to 1995, global demand for lubricants has stagnated, dropping by around 0.5% per annum. However, the deregulation of formerly closed markets to international competition has resulted in a 44% rise in the size of the globally accessible market. Today, around 90% of markets are open to competition. These are just some of the findings of Enerfinance's most recent study of the worldwide lubricants sector.

The results of the Enerfinance study are to be published in three volumes – the first of which was published in July and the second in September 1997. The third volume was scheduled for publication in late December 1997. The following paragraphs highlight the main conclusions drawn from Volume 2 of *Worldwide Lubricants 1997* which assesses lubricant companies' positions in the market place and their various marketing strategies. (Volume 1 covers the recent evolution of the lubricants market and proffers an outlook at future developments. Volume 3 provides a third level analysis of the lubricants sector in some 20 to 25 markets around the world.)

The deregulation of the majority of the worldwide lubricants market has allowed lubricant companies to maintain growth even in the face of a decade-long decline in demand. Indeed, the most dynamic companies, such as Mobil and Castrol, have increased their sales by more than a third in 10 years. In 1986 around 42% of world markets were closed to international competition, a figure that dropped to just 11% by 1995 (Figure 1).

By devoting a large part of their investments and strategic focus on securing additional sales volumes in emerging markets, international operators have been instrumental in maintaining the level of competition in mature markets within certain limits. As the number of closed markets diminish further, so will the competitive environment toughen, both in mature and in recently opened markets.

Lubes and downstream profits

Lubricants represent a major contribution to the profitability of overall downstream operations. Measured as a percentage of the lubricant operating profit to the total downstream profit, this sector contributes around 20% of downstream profits – a figure that is significantly higher in some companies. Yet this sector accounts for less than 2% of oil company sales in volume and less than 5% in value. Based on the financial results of a dozen companies controlling approximately 15% of the lubricants market, the average return on assets can be estimated at 11% in 1996 compared with 6% for the downstream sector in general.

The report also indicates that companies for which base oil production and sales

account for a large portion of total lubricant operations have been particularly vulnerable to the recent downward trend in base oil prices. Exxon, for example – the largest base oil supplier – reported that earnings in the lubricants sector had declined by more than 30% in 1996.

Operating profit

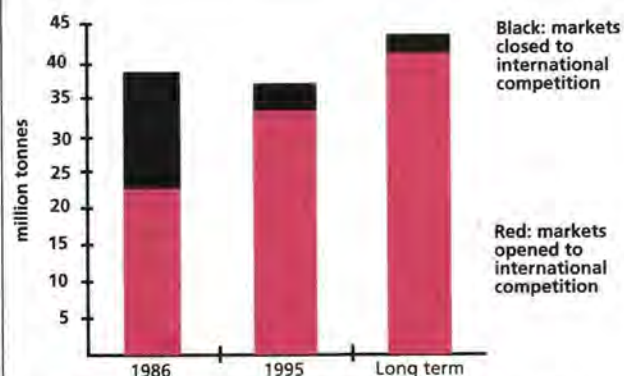
In contrast, the operating profit of net base oil buyers and non-base base oil producers has not risen by as much as the decline in base oil prices might have suggested. Part of the decline may have been passed on to consumers but, in some cases, slower profit growth may also indicate that the aggressive strategies to conquer new markets are becoming more costly.

For an integrated company, taking into consideration the current weakness of base oil prices, two-thirds of profits are coming from marketing and distribution activities rather than from refining. Anticipating that the current base oil surplus may well last at least two to three more years, the quality of such operations has become strategically more important than access to base oil production, a key driver in the past.

The decline in demand in mature markets and the more limited opportunities offered by opening markets indicate that, in the long term, competition can only rise and the number of operators fall. However, the structural characteristics of the lubes market suggest that the restructuring will be made not through a price war, as is often the case in fuel retailing, but through a rise in the share of total costs that is spent on research, distribution and promotion. It is suggested that it will be those companies with sufficient sales volumes to be able to afford higher expenditures in these areas that will have a decisive marketing advantage.

Concentrated capacity

Base oil production capacities are very concentrated. While about 80 companies produce base oils, Exxon alone controls 11.5% of the total. Together, the five leading companies control 34% of the market. The next 20 companies have no more than 25% of world capacity. A major gap exists between Exxon, with a capacity of over 100,000 b/d, and Shell and Mobil, its two closest rivals. The gap is even more significant between these three companies and the remaining operators, the large majority



Note: China, Eastern Europe, FSU, India, Indonesia, South Korea, Taiwan and others were closed to international competition in 1985. Graph assumes 30% of Chinese market open in 1995 and 100% in 2005.

Figure 1: Open Market Growth Relative to World Demand Growth

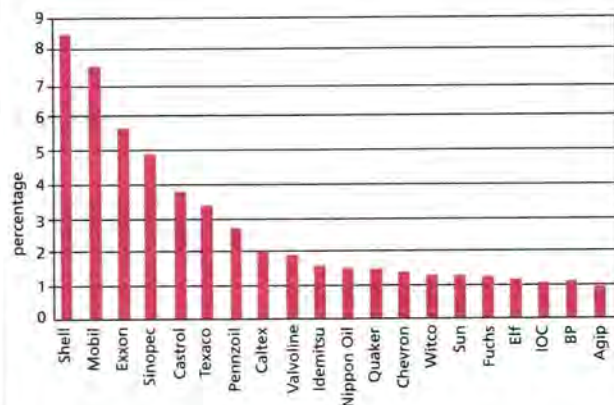


Figure 2: Worldwide Lubricant Market Shares - Finished Products

of which have only one or two sites combining 5,000 to 12,000 b/d.

The study finds that the savings achieved from larger and more concentrated production sites are real – the cost differential between a 6,000 b/d unit and a 9,000 b/d unit is just under 20% or \$3 per barrel. However, both product mix and transport costs can reduce, or even reverse, the advantage of size. In other words, plant size cannot alone assure greater profitability.

Five international majors control a

third of the finished lube market (excluding CIS), and half a dozen of the major lubricants companies control a further 12% (Figure 2). In all, about 12 companies have a combined 40% share. The degree of concentration and the role played by each group of companies vary a great deal from one region to the next.

On a worldwide level, state-owned companies hold 12% of world demand and their positions are concentrated in the Asia-Pacific region, mostly China, Latin America and the Middle East. International majors

are the strongest players in Europe with almost half of the market, and major independent companies hold a full third of the North American market. In the OECD Pacific, private local companies enjoy a significant position. However, ongoing deregulation in Japan and South Korea may bring significant changes in the future.

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Russia's premier oil and gas contractor to launch ADR programme

When the Soviet Union collapsed the ministries which had previously controlled all aspects of the oil and gas industry were disbanded or privatised. The ministry that organized all the pipeline construction and the oil and gas field services became a private company – Rosneftegazstroy (RNGS). Lack of activity (and money) in the early 1990s has meant no real competitors have so far emerged and the company remains the largest and virtually the only oil and gas construction company in Russia. It is now in the process of bringing its accounting procedures and general operations into line with best western practice writes, *Priscilla Ross*.

Rosneftegazstroy (RNGS), the diversified Russian oil and gas pipeline construction and maintenance company, established an American Depository Receipts (ADR) programme on 10 September 1997 with the Bank of New York. RNGS is a joint stock company and the legal successor to the Minneftegazstroy Ministry and Neftegazstroy State Concern. AJG Investments (Hong Kong) Ltd is RNGS's investment banker but no lead manager has as yet been appointed to manage the ADR programme.

In 1995 RNGS had an investment certificates programme. Currently some 14% of RNGS is listed on the Vienna, Berlin and Frankfurt stock exchanges as Global Investment Certificates (GICs) and this foreign tranche was being traded on European bourses and in the US on the OTC (over the counter) market. The GICs will now be converted into ADRs and the intention is to sell a further 10% currently owned by the Russian treasury. Over time it is the intention to convert 30% into ADRs and for the Austrian and German listings to have a Nasdaq quote.

Shareholders

Around 50% of RNGS is currently owned by 192 corporate holders such as Lukoil, Gazprom, Sidanco and Yukos which individually own 3% to 4% of the equity. Currently there is no staff share incentive programme. RNGS exists to assist the 192 oil and gas construction and exploration companies which are shareholders, to lobby for projects, prepare tender documents on their behalf and to co-ordinate sub-contracting.

Around 80% of RNGS's receivables are owed by Gazprom and amount to \$500mn. Typically this debt is owed for three years. Gazprom, in turn, estimates it is owed \$12bn by non-paying consumers.

According to Dr Ivan Mazur, Chairman of Rosneftegazstroy, a typical RNGS contract involves a 35% barter leg, 20% to 25% salaries and the rest is debt.

The company employs 96,000 personnel, substantially less than the 250,000 when it was a ministry and the economy was planned.

The present ADR programme is not linked to a fund-raising exercise. The intention is to establish a presence in the inter-

national capital markets and in the next few years two bond financing issues may eventuate to raise \$50mn and \$100mn. These issues, however, will be project specific.

RNGS has 23mn ordinary shares and two ADRs are equivalent to one ordinary share. In the US some ADRs have been sold at between \$21 and \$23 giving a market capitalization of around \$900mn to the company.

However this was prior to the October 1997 slide in world stock markets when major Russian stocks were marked down by 15% to 20%. The view was that Russian blue chips were becoming over-valued with Lukoil having a price to earnings ratio (PE) of over 30 compared to Shell with a PE of 20. However, Russian stocks do not usually trade on fundamentals.

Accountancy standards

Calculating a net asset value for RNGS is complex, and Coopers and Lybrand has been given a year to gradually bring RNGS accounting up to western standards so that results can be reported on a quarterly basis. According to Dr Mazur, Rosneftegazstroy's 29,000 pieces of plant and equipment have a replacement value of \$2bn.

Coopers and Lybrand has not audited RNGS's historical financial information but has checked that management's future projections for revenue from projects for the five years from 1998 to 2011 have been properly calculated on the basis of management's assumptions.

RNGS's potential to generate future revenues from expected future projects will be included in a prospectus to be distributed by AJG Investments to a limited number of potential investors in RNGS.

In total the future order book contains projects valued at \$76.512bn of which RNGS's share of the project is stated as \$26.847bn. The most valuable project is the \$45bn Yamal-Europe pipeline of which RNGS's 28% expected participation is \$10.519bn.

Essentially RNGS's revenue stream is derived as a project management fee which equates to between 4% and 5% of the total contract value.

A recent contract was the reconstruction of the oil and gas transportation system in Chechnya for which RNGS as general contractor charged 5% of the total budget allocated by the Russian government.

According to RNGS's investment banker, AJG Investments, current profit margins are 12% for projects in which RNGS has secured participation and 'at a discount of approximately 10% to world market prices'.

RNGS's earnings from oil and gas projects are estimated by management to be between \$75mn and \$80mn for

1997, \$195mn for 1998 and \$270mn for 1999 based on profit margins of 12.5%.

In the last five years Russian oil production has slumped almost 50% to 300mn t/y and there has been little capital expenditure on infrastructure. There is, however, some evidence that production is now stabilizing at around 300mn t/y. The oil and gas industry is a key part of Russia's GDP and a major source of export revenue. Large-scale investment in rehabilitating oil and gas infrastructure must occur over the next 10 years, and RNGS with a 70% of the general contractor's market in Russia is banking on being a beneficiary.

Network maintenance

Currently RNGS maintains 8,705 oil wells, 6,800 km of trunk gas pipelines and branches, 30 compressor stations, 568 km of trunk oil and oil production pipelines.

To compete successfully for projects outside Russia and for those inside Russia which are on a contractual basis involving foreign competitors, RNGS is entering into consortia and joint ventures with companies such as Bechtel of the US.

RNGS currently comprises 590 corporations which, collectively, have built over 300,000 km of pipelines. However,

the general view is that some rationalization is needed. There are unbundling possibilities, for instance Transneftgazstroy could be spun-off as a trucking and warehousing service company serving the whole of Russia. For this to be commercially attractive a western partner would probably be needed to provide computerized systems for warehousing and distribution.

All Russian oil and gas pipelines have been built to move oil and gas to the west but in the longer term RNGS and AJG believe that, as China has become a significant net importer of oil, there is considerable potential for pipeline projects to link Russian oil and gas resources to southeast Asia via China.

'My view is that China, Korea and Japan will be Russia's biggest markets for pipelines. There has been intense interest to branch off the Chinese pipeline from North and South Korea,' said Antos Glogowski, President of AJG.

The \$12bn trunk pipeline project linking Russia to China is at the feasibility study stage and could enable China to develop its natural gas industry. At present 77% of the energy consumed in China is coal generated and the country is keen to diversify energy sources particularly to cleaner ones such as gas.

RNGS has been discussing, with the South Koreans, a \$12.5bn gas transportation system from the gas field in the Saha Republic. The line will go from Yakutia to Khabarovsk, then over the border into North Korea and South Korea. RNGS would have a 40% participation interest in the project.

Market presence

By listing Rosneftgazstroy's ADRs on European and North American stock exchanges, a presence is being established in western capital markets. However, given the slide in world stock prices in October last year, it is fortunate for the company that no funding exercise was linked to the ADR programme.

In the longer term, once Rosneftgazstroy has subjected its finances to the scrutiny of a Coopers and Lybrand audit, western investors are likely to be more comfortable with net asset valuations of the company. This should make raising capital on international markets rather easier. Like Gazprom, RNGS has had debt exposure and in both cases this will have to be dealt with expediently if the underlying asset value of the companies is to be fully recognized in western financial markets. ■

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Gas-to-liquids or LNG?

Over recent years large volumes of gas have been discovered in locations well away from the major markets. Companies face considerable challenges in developing these remote reserves if they are to be profitable. However, the environmental attractions of gas as a fuel and the rapid increase in demand provide considerable incentives to bring this remote gas to market.

Where pipeline transport is either too expensive or inappropriate the development choice becomes either an LNG project or one of the new gas-to-liquids technologies currently being developed and promoted, reports *Chris Skrebowski*.

In 1996, global gas demand grew by 7.7% compared with 4.4% for oil. This relationship of gas demand growing roughly twice as quickly as oil has persisted for some years and is expected to continue. Of the 2,231bn cm of gas produced in 1996 around 19% moved in international trade and roughly one-quarter of this, or 102.4bn cm, was transported to its end market as LNG.

In contrast the volumes of liquids produced from gas amounted to around 12,500 b/d of products from Shell's middle distillates synthesis plant at Bintulu in Malaysia and 2,500 b/d from Sasol's plant in South Africa.

The relatively small volumes of liquids produced from gas belie the fact that this technology is currently attracting a great deal of attention around the world with a number of new processes being offered.

In commercial terms LNG technology has considerable advantages. It is an established and proven technology which is already in widespread use around the world. A further advantage is that, unlike pipeline gas, it provides a highly concentrated form of energy which is delivered directly to a customer's facilities without crossing national boundaries and incurring tariffs. The great disadvantage is that the high capital costs involved means that LNG projects only become viable if long-term credit-worthy customers can be found. In addition, economics dictate a minimum train size of 2.5mn to 3.5mn tpy which in turn need proven reserves of 3tn to 5tn cf of gas reserves to support the typical 20- to 25-year sales contracts.

Although LNG facilities costs have fallen by around 50% over the last 20 years, the cost of establishing a full LNG chain – liquefaction and regasification facilities, dedicated tankers and port facilities – is unlikely to be less than \$5-6bn.

As the table of existing facilities (opposite) shows, there have been three main phases in LNG development. In the first, up to the oil price collapse of 1986, there was steady development and expansion of the industry, although there was a notable shift from European and US customers to the Far East markets in Japan and South Korea after the commissioning of the Brunei and then the Indonesian export plants in the 1970s. The Japanese and South Korean markets were effectively captive markets for LNG as there was no practical method of linking them by gas pipeline and no close sources of gas supply.

After 1986 the economics of LNG became generally unattractive and the only new suppliers were Australia in 1989 and Qatar in 1996. However, two new customers emerged – Taiwan and Turkey. Since the mid-1990s there has been a dramatic turnaround in the LNG business and the last two years have seen the go-ahead for Nigerian LNG, Atlantic LNG in Trinidad, at least one additional project in Qatar and one in Oman. New LNG trains are planned for existing facilities in Malaysia, Australia and Indonesia and plans are well advanced for new LNG facilities in Egypt, Yemen, Sakhalin Island, Canada, Irian Jaya (Indonesia) and further units in Australia.

The dramatic turnaround in LNG's fortunes are largely, but not wholly, attributable to the economic attractions of generating electricity using combined cycle gas turbines (CCGT). Overall thermal efficiencies of the latest CCGT units are approaching 60% compared with the 38% to 40% of the best conventional oil or coal-fired units. Rapid expansion of electricity demand, particularly in southeast Asia and in other rapidly industrializing areas, has led to the promotion of large numbers of independent power projects (IPPs) as

the conventional generating monopolies around the world are progressively opened up to private competition.

The CCGT technology offers a generator the lowest capital cost and the shortest construction time for new capacity, and consequently gas demand for generating use is booming. There is a natural fit in that a generating authority can provide the large volume creditworthy custom that is necessary to develop an LNG project.

Over recent years a great deal of effort has gone into refining and improving LNG technologies in order to reduce unit costs. As more and more units are built the construction market becomes more competitive and costs tend to fall as suppliers are in a position to replicate units. As a result most of the currently planned LNG units are likely to be built unless gas-to-liquids technology develops so fast that it provides a practical alternative for developing remote gas fields.

Gas-to-liquids

One of the attractions of gas-to-liquids technology is that it is expected to be rather more flexible in terms of the minimum economic size of the unit and for overall project costs to be significantly lower. Because the existing units are small or pilot-scale it is difficult to gauge how competitive the technology will become. BP claims that its new process, being developed with Kvaerner, offers gas conversion at \$20,000 per b/d of capacity compared with \$30,000 to 50,000 of existing units. The liquids produced are of ultra-high quality, which has enabled existing units to be commercially successful by selling into high-price niche markets such as dry cleaning, solvents and waxes for food containers.

A challenge is that gas-to-liquids plants are likely to be producing very high quality material in the parts of the world that have the least requirement for them. The products are to all intents and purposes free of sulfur and other contaminants as well as being produced with only trace quantities of aromatics. Although superb blend stocks the economic challenge is to get them to the markets, or to create new markets/applications that will pay a premium for the quality.

The basis of gas-to-liquids technology is the Fischer-Tropsch synthesis which was originally developed in the 1920s and gave the world the first large-scale route to convert coal to transportation fuels – the process used in Germany

during the Second World War. The process was further refined and developed by Sasol in South Africa which has been creating liquid fuels from coal since the 1950s. This process was, however, heavily subsidized and uneconomic compared with crude-derived fuels.

The basis of all Fischer-Tropsch reactions is that synthesis gas, a mixture of carbon monoxide and hydrogen, is created and this is then reacted in the presence of catalysts to form paraffinic hydrocarbons. The paraffinic hydrocarbons are then hydrocracked prior to a final conventional distillation stage in which the products are separated into their various fractions. The main focus of the work has been the development of highly selective catalysts capable of providing optimized product yields. Shell's middle distillate synthesis plant uses a metallocene catalyst while Sasol's slurry phase reactor uses an

iron-based catalyst. Both processes use desulfurized natural gas as the starting point. The new BP/Kvaerner process uses a cobalt catalyst.

At the moment both the two commercial operations are able to cherry pick the most attractive end markets. The naptha produced being entirely paraffinic is ideal for ethylene production, as there is no sulfur or other contaminants to poison the catalyst. Middle distillates produced this way have ultra-high cetane indexes (the Shell process in Malaysia gives a diesel with a 70-76 diesel index compared with the usual requirement of 48-50). The gas-to-liquids plants already dominate the market for ultra-high melting point waxes.

Although Sasol and Shell are the primary gas-to-liquids producers Mobil has been operating a slightly different process in New Zealand since 1986. In this, synthesis gas produced from

methane is first converted to methanol and then to gasoline. Over recent years the economics has meant that it was more attractive to sell the methanol into the chemicals market and to produce the gasoline from crude.

Exxon has developed a fluidized bed partial oxidation process to produce paraffins which are then converted using a technology also based on fluidized beds. This has been proved up to 200 b/d at a pilot plant in Baton-Rouge, Louisiana. Syntroleum Corporation has recently announced an agreement with Brown & Root to licence and build gas-to liquids facilities using Syntroleum's proprietary process. This has already been licensed to Texaco, Arco, Marathon and YPF.

BP/Kvaerner is the newest entrant to the market with a refinement of the Fischer-Tropsch synthesis which it claims is fully competitive at current oil prices. ●

| Country | S/U | Name | Companies | Process | No of trains | Capacity (mn t/y) |
|-----------------------------------|-----------|--------------------------|---|----------|--------------|-------------------|
| Plants constructed: | | | | | | |
| Abu Dhabi | 1977 | Das Island | Adnoc (51%), Mitsui (24.5%), BP (16.33%), Total (8.17%) | APCI | 2 | 2.3 |
| | 1994 | Das Island - third train | Adnoc (51%), Mitsui (24.5%), BP (16.33%), Total (8.17%) | APCI | 1 | 2.5 |
| Algeria | 1964 | Arzew GL4Z | Sonatrach | Technip | 3 | 1.1 |
| | 1972 | Skikda GL1K Phase 1 | Sonatrach | Technip | 3 | 2.8 |
| | 1978 | Arzew GL1Z | Sonatrach | APCI | 6 | 7.8 |
| | 1981 | Arzew GL2Z | Sonatrach | APCI | 6 | 7.8 |
| | 1981 | Skikda GL1K Phase II | Sonatrach | Prico | 3 | 3 |
| Australia | 1989 | North West Shelf | Woodside (16.66%), Shell (16.66%), BHP (16.66%), Chevron (16.66%), Mitsubishi (8.33%), Mitsui (8.33%) | APCI | 3 | 6 |
| Brunei | 1972 | Lumut | Government (50%), Shell (25%), Mitsubishi (25%) | APCI | 5 | 5.3 |
| Indonesia | 1977 | Bontang A+B* | Pertamina | APCI | 2 | 3.2 |
| | 1978 | Arun Phase I^ | Pertamina | APCI | 3 | 4.5 |
| | 1983 | Bontang C+D* | Pertamina | APCI | 2 | 3.2 |
| | 1984 | Arun Phase II^ | Pertamina | APCI | 2 | 3 |
| | 1986 | Arun Phase III^ | Pertamina | APCI | 1 | 1.5 |
| | 1989 | Bontang E* | Pertamina | APCI | 1 | 2.3 |
| | 1993 | Bontang F* | Pertamina | APCI | 1 | 2.3 |
| | 1997 | Bontang G | Pertamina | APCI | 1 | 2.7 |
| Libya | 1970 | Marsa El Brega | NOC | APCI | 4 | 2.6 |
| Malaysia | 1983 | Bintulu MLNG 1 | Petronas (60%), Shell (17.5%), Mitsubishi (17.5%) Sarawak government (5%) | APCI | 3 | 6 |
| | 1995 | Bintulu MLNG 2 | Petronas (60%), Shell (15%), Mitsubishi (15%), Sarawak government (10%) | APCI | 3 | 7.8 |
| Qatar | 1996 | Qatargas | QGPC (65%), Total (10%), Mobil (10%), Marubeni (7.5%) Mitsui (7.5%) | APCI | 2 | 9.2 |
| US | 1969 | Kenai | Phillips (70%), Marathon (30%) | Phillips | 2 | 1.3 |
| Plants under construction: | | | | | | |
| Indonesia | 1999 | Bontang H* | Pertamina | APCI | 1 | 2.95 |
| Nigeria | 1999 | Bonny Island | NNPC (49%), Shell (25.6%), Elf (15%), Agip (10.4%) | APCI | 2 | 5.7 |
| Oman | 2000 | Oman LNG | Government (51%), Shell (30%), Total (5.54%), Korea LNG (5%), Partex (2%), Mitsubishi (2.77%), Mitsui (2.77%), Itochu (0.92%) | APCI | 2 | 6.6 |
| Qatar | 2000 | Rasgas | QGPC (66.5%), Mobil (26.5%), Itochu (4%), Nissho Iwai (3%) | APCI | 2 | 5 |
| Trinidad | 1999/2000 | Atlantic LNG | Amoco (34%), BG (26%), Repsol (20%), Cabot (10%), NGC (10%) | Phillips | 1 | 3 |

Notes:

* Bontang is wholly-owned by Pertamina. It is operated by PT Badak which itself is owned by Pertamina (55%), Vico (20%), Total (10%) and Jilco (15%)

^ Arun is wholly-owned by Pertamina. It is operated by PT Arun which itself is owned by Pertamina (55%), Mobil (30%) and Jilco (15%)

Source: Cedigaz and Petroleum Review

Liquefaction Plants Worldwide

New Hydraulic range increases product offering

Parker Filtration has launched a new hydraulic filter range. The new range is said to move closer to Total Filter Management by 25%. The product introduces a host of low, medium and high pressure filters.

The Low Pressure Filter Series provides return-line, tank mounted hydraulic and lubrication filtration, the 1110 Series providing a maximum flow rate of 1,600 l/min at 8 bar. The Medium Pressure Filters offer maximum flow rates of between 220 l/min at 40 bar and 1000 l/min at 30 bar. The high pressure filter aims to give high output with minimum downtime. The 5040 Series provides a maximum flow rate of 80 l/min at 320 bar and the 7000 Series



provides a maximum flow rate of 450 l/min at 420 bar.

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Almost universal safety interlocks

A new 'H' series of interlocks developed by Smith Flow Control has a mounting system designed to fit almost any make and size of valve without modification. Suitable for both lever and handwheel operated valves, the interlocks impose a strict opening/closing sequence on safety-critical valve operations, therefore, it is claimed, eliminating the possibility of human error.

The interlocks retain all the characteristics of the company's original concentric mounting interlocks but eliminate the need to obtain valve manufacturers' dimensioned drawings.

The 'H' series of interlocks are interchangeable with both new or replacement valves and can be removed and installed on valves at other sites if necessary. Their 316 stainless steel construction fully conforms to industry quality standards.

Tel: +44 (0)1376 517901
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The new 'H' series of interlocks

Receiver system soon to be available worldwide

A new Differential GPS system has been launched by Racal Survey aimed at survey professionals working offshore.

The SatFix DGPS receiver is a compact, low-power unit employing a small antenna within a marine housing. It is supplied with an integrated 12-channel survey grade GPS receiver that provides its message output in NMEA data string format. The company claims the system provides positioning accuracies of better than 1 metre within the reference station network.

The receiver is controlled by simple menu-based commands structured for ease of operation. System performance and diagnostic information is output through one of four RS232 ports to enable system test and monitoring. The SatFix service is currently available in Europe, North

America, South Africa, Australia, New Zealand and Indonesia where DGPS corrections are provided by powerful spot-light beams.

Tel: +44 (0)1344 388000
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Cleaner cars on the forecourt



A new type of vehicle wash material has been introduced by Ryko International, which it claims will revolutionize the vehicle wash industry.

Made of Copolymer, FoamBrite is a durable material incorporating a high resistance to chemicals as well as tolerance to ultra violet light. The cell structure of the material is said to help prevent small particles such as dirt and sand from getting lodged in the material, protecting the vehicle's surface from scratches.

Because of this feature, the company claims, FoamBrite will require less maintenance than conventional car wash systems and will outlast both brush and cloth washes.

Tel: +44 (0)1403 240364
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Medical skills video

A medical aid video programme has been produced to enhance the training provided to the crews of standby vessels (SBVs) working in the offshore oil and gas industry. The project has been jointly commissioned and funded by the UK Offshore Operators Association (UKOOA), the Standby Ship Operators Association (SSOA) and the Health and Safety Executive (HSE).

The video, filmed on location in the North Sea, provides the means by which the basic medical skills required by the SBV crew can be continuously revised and practised to maintain competence in the rescue and care of casualties resulting from an offshore incident.

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Scanner offers connectivity to all data terminals

An intrinsically safe, portable laser scanner designed to combine high levels of safety certification, with the ability to interface with all industry standard intrinsically safe data collection terminals, has been introduced by SpectraTek. Designed for reading bar codes in hazardous areas, the device can be used for integration into systems intended for a range of applications.

The scanner carries EEx ia IIB T4 certification and is suitable for use in Zone 0 areas, using built-in rechargeable nickel-hydride batteries. The device generates decoded serial (ASCII) data and is said to be compatible with industry standard handheld IS terminals.

A dual pressure trigger first generates a bright narrow-width scan enabling the operator to aim the gun, followed by a further full-width scan on application of further pressure. A 'clean' read is confirmed with a beep and flashing LED. The scanner has an operating temperature range of -10°C to +40°C. Conforming to FCC Class A and B, and IP64 rated for EMC



emissions, the device will operate in environments of 5% to 95% humidity and tolerates dripping water.

Tel: +44 (0)1653 695551

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New on-site test for micro-organisms in fuel



Microbes in a fuel sample reproduce in SMARTGEL and form coloured colonies which are easily counted

Microbial spoilage of gasoline was first reported in the Journal of the Institute of Petroleum in 1939. However, it was not until 1996 that an authoritative document on sampling and testing was published (*Guide for the Investigation of the Microbial Content of Fuel Boiling Below 390°C and Associated Water*). The Guide incorporated the new IP test methods, IP 385/95 and IP BY/95, which are generally accepted as laboratory reference methods.

These methods, however, are unsuitable for on-site use and in 1995, supported by an EU/WDA grant, ECHA Microbiology started a development programme to produce an on-site test capable of yielding quantitative results equivalent to IP385/95. The development of the test kit, SMARTGEL, has been completed and has been field

proven by major oil companies, fuel distributors and end-users.

A measured fuel sample is measured into 16ml of a nutritive thixotropic gel in a 65 ml rectangular glass bottle. Shaking the bottles liquefies the gel and disperses the fuel; the gel is then allowed to re-set as a flat layer and is incubated for one to four days. Each microbe in the fuel sample reproduces and activates an indicator, thus forming a visible purple 'colony'. A simple count of these colonies equates to the number of microbes originally present in the fuel sample. The testkit is claimed to set up early warning monitoring programmes and to validate avoidance and remedial strategies.

Tel: +44 (0)1222 496321

Fax: +44 (0)1222 493671

Through the Vortex

Danfoss has launched a new generation of Vorflo® vortex flow meters containing the Hart® communication protocol fitted as standard, which, it is said simplifies data transfer and commissioning.

All devices are welded to eradicate many of the problems caused by wear and tear and can be serviced under operating conditions. All electrical parts can apparently be changed in-situ without shutting down or interrupting the flow. The flow meters have an operating temperature range between -40°C and +400°C at pressures up to 100 bar. They have no moving parts and are powered by a standard two-wire 4-20mA, 24V transmitter.

Accuracy of measurement is to within $\pm 0.7\%$ with liquids and $\pm 1.25\%$ with gas/steam, and repeatability is $\pm 0.15\%$ of actual flow. The meters have a wide turn down of up to 25:1 helping to maintain accuracy standards.

The flow meters measure steam, gas and light viscosity liquids and EEx d 1b IIC certificated variants are available for use in hazardous areas. The units can be programmed using a special magnetic pen to avoid having to remove the signal converter cover in hazardous applications.

Tel: +44 (0)181 991 7000

Fax: +44 (0)181 991 7053

Increased productivity for plant design



Cadcentre has announced the availability of version 11 of its Plant Design Management System (PDMS). The new version is said to offer better multi-discipline design support and wider application throughout the plant lifecycle.

In addition to improving productivity for specific design disciplines such as piping, structural design and HVAC (heating, ventilation and air conditioning), it is claimed the new version of the software has been enhanced to optimize the overall management of design projects.

Tel: +44 (0)1223 556655

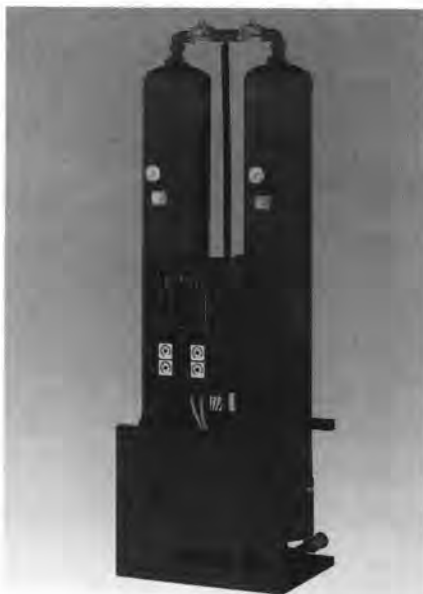
Fax: +44 (0)1223 556666

New energy-saving dessicant dryers

Ecoair UK has launched the new PA and PE ranges of dessicant air dryers, designed for reliable and energy saving operation. The heatless adsorption dryers are available in two series covering air capacities for 0.05 to 67.5 m³/min at 7 bar. The PE heat regenerative dryer range starts at 4.0 m³/min with inlet air capacities rising to 72.0 m³/min at 7 bar.

One of the features of the adsorption dryers is the design of the dessicant vessels. They use a twin tower design with two vessels situated side by side, ensuring a low pressure drop and extended dessicant life. Simple replacement dessicant cartridges are said to provide ease of maintenance and reduced downtime. The large twin tower vessels in certain models combined with the low velocity in the units is claimed to ensure long dessicant contact time to provide continuously dry air.

Continuous switching between the vessels is controlled by an electronic controller in some models, while in others switching is under the control of a CAM timer. These controllers are designed to ensure smooth pressurization of the towers, minimizing the risk of dessicant dust carryover. In the event of a power



interruption the controller restarts the dryer from the correct point in the cycle, to prevent the primary vessel from becoming overloaded and to ensure a constant dewpoint.

Tel: +44 (0)1734 886611
Fax: +44 (0)1734 885757

Environmental safety for interceptors

A new Greenline automatic separator (interceptor) Monitoring and Alarm System from Andel is designed to offer peace of mind to site owners and operators by replacing the inconvenience and uncertainty of visual inspections. The system has a precise early warning of when to empty these units of fuel residues and other light oily liquids.

Separators installed to collect contaminated drainage from forecourts, car parks and oil storage sites are said to protect against accidental pollutant discharge, but to maintain their true effectiveness, manual checks have to be made at regular intervals.

The company's new electronic system constantly monitors the pollutant level within the separator and automatically

provides a positive warning when the pre-set level is exceeded.

The Separator Alarm uses micro electronic technology which, with BASEEFA approved intrinsically safe circuitry allows the system to be used in Zone 0 hazardous locations. It can be adapted to suit any size and make of separator and retrofitted to existing units. It is self-contained, easy-to-use and capable of multi-function adaptability. The system comprises a control panel, suitable for siting in a nearby building or kiosk and a sensor unit which is installed in the neck of the separator. The unit is adjustable and capable of activating in liquids up to 0.95 SG.

Tel: +44 (0)1484 845000
Fax: +44 (0)1484 845222



Backpressure regulator for gas, liquid or steam

Fisher Controls has introduced a new throttling relief valve which is suitable for high temperature and corrosive service applications.

The Type 63EG-98HM backpressure regulator may be specified for use in gas, liquid or steam applications where high temperatures and/or corrosive service exist.

The valve's material construction is said to provide extended benefits to the customer including Elastometer seats providing a class VI shutoff on high temperature applications and a high gain piloting system said to yield a faster response than a standard piloting system. The maximum inlet design pressure (main valve) is 600 psig (41 bar) with a maximum outlet pressure of 450 psig (30 bar). Carbon steel (WCB) and stainless steel (CF8M) standard constructions are available with Hastelloy C and other alloys available on request. The throttling relief valve is a versatile backpressure regulator for use on steam, oil, water, air, process gases and chemical services. A hardened 416 stainless steel trim is standard in steam/water applications.

Tel: +44 (0)1243 863121
Fax: +44 (0) 1243 867554



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

Membership News

NEW MEMBERS

Mr A Adeniji, Adegbite Adeniji & Company
 Mr S Agbara, ITS Intertek Testing Services
 Mr P M Ali, Galfar Engineering & Contracting
 Mr A A Alroumi, Kuwait Aviation Fuelling Company
 Mr N Atkinson, Elf Exploration UK plc
 Mr L Au Yeung, Intertek Testing Services
 Mr K J Baker, Warlingham
 Professor NDP Barltrop, Naval Architecture & Ocean Engineering
 Mr R N Blank, Diamond Offshore Drilling UK Limited
 Mr I R B Booth, Macclesfield
 Mr L Bowerbank, Nalco/Exxon Energy Chemicals Limited
 Mr A Brindle, Dow Jones Markets Limited
 Mr R Brown, Canute Haulage Group plc
 Mr A E A Burwood, Stevenage
 Mr W Byfleet, Lubrizol International
 Mr D Carpenter, Teddington
 Mr P D Carter, Phillips Petroleum Company UK Limited
 Captain M R Castle, Abergelge
 Mr S Chantarasomboon, Associated Cargo Surveyors Company Ltd
 Mr T N Chapman, London
 Mr M Cherif, WEFA Limited
 Mr K W Chong, Hong Kong
 Ms K Clay, Ravenshead
 Mr M J Dyson, Ocean Technical Systems Limited
 Ms T G Earley, Greenery International Limited
 Mrs N El Soda, Arab Petroleum Pipelines Company (Sumed)
 Mr A J Evans, Marketline International
 Mr L Findlay, Tayside
 Mr C A Fletcher, Timperley
 Mr C Gibson, Horley
 Dr C Hobbs, AEA Technology plc
 Mr P L Holstein, Transmeridian Exploration
 Mr P W Hughes, Grimsby
 Mr F Ikier, ITS Intertek Testing Services
 Mr S James, Texaco Limited
 Mr A M Jones, BP Exploration Operating Company Limited
 Mr S O Kenku, Merak Projects (UK) Limited
 Dr S Kewa, London
 Mr A Kulik, London
 Dr R G Landells, Lubrizol International
 Mr J D Lapinskas, DG Environmental Limited
 Dr S P Lennon, Ilford
 Mr S Lowden, Premier Oil plc
 Mr A Matuzny, Winton Line Limited
 Mr P I McClelland, Conoco Limited
 Ms B McClinton, Petrochemics Limited
 Ms K McCreaney, Maidstone
 Mr G Mesellaty, London
 Mr M A Mikati, Conapro SAL
 Mr T D Milne, Aberdeenshire
 Ms D K Neil-Mills, London
 Mr L C Ngai, Maritime Services (HK) Company Limited
 Mr I Nworgu, ITS Intertek Testing Services
 Mr M A O'Neill, Co Meath
 Mr J R Orok, ITS Intertek Testing Services
 Mr H R Parnell, Dresdner Kleinwort Benson Limited
 Mr A J Price, RAF Akrotiri
 Mr J W Reekie, Aberdeen
 Mr M J Roberts, Aberdeen
 Mr R Rosales, Intertek Testing Services
 Mr R Rustom, London
 Mr G Rutter, London
 Mr O Sapronov, Winton Line Limited
 Mr S G Savvides, Electricity Authority of Cyprus
 Mr C Shipman, Sumitomo Bank
 Mr M F Smart, Pontyclun
 Mr M J Stearnes, Offshore Technology Management Limited
 Ms L I Stevens, Gloucestershire
 Ms A L Stow, London

Mr D C Thompson, Hocken Hulls
 Mr R H Thornton, Trans-Tec Services (UK) Limited
 Dr J Toth, Moltrade-Mineralimpex Trading Company
 Mr S Varsani, London
 Mr N Vassiliou, Cyprus
 Mr D S-H Voon, Intertek Testing Services
 Mr J Waudby, Grimsby
 Mr R G J Winchester, Centre for Marine & Petroleum Technology
 Mr C D J Wright, Whittaker Aerospace
 Mr H K Wu, ITS Intertek Testing Services
 Ms T Yamashita, Surrey

NEW STUDENTS

Ms C A Bruce, East Kilbridge
 Mr R Bryden, Aberdeen University
 Mr N Gross, Germany
 Ms J Monkman, Imperial College
 Mr S Sacranie, Dundee

NEW FELLOWS

Mr Graham Ellis FlinstPet

Graham Ellis is Chairman and General Manager, Mobil Oil Company Ltd. He joined the company in 1969 as an engineer and subsequently held a number of senior positions, principally in Fuels and Lubricants marketing. He also worked in New York at the former head office of Mobil Corporation, and in Oslo where he became Managing Director of Mobil Oil A/S Norge in 1990, returning to England in 1992. After the Joint Venture Agreement between BP and Mobil was signed in November 1996 in the UK, Mobil took over responsibility for operation of the Lubricants business on behalf of the Joint Venture which Mr Ellis undertakes as well as his chairmanship of Mobil Oil Company Ltd and its subsidiary in Ireland.

Mr Ellis, who is 52 years old, graduated from Kingston University and Imperial College, London University. Away from the office he enjoys tennis, skiing, music and travel.

Mr Pierre Godec FlinstPet

Pierre Godec started his career with the Elf group in Paris in 1968. He worked in the refining and marketing sector until 1974 on data processing, personnel and information technology. Moving to finance, he was posted to New York as a financial representative from 1975 to 1976, and proceeded as Vice-President of Finance in Calgary, Canada until 1979. He became Managing Director of Elf's affiliate in Nigeria until 1984, and was then appointed Managing Director of Elf Norge, Stavanger, Norway from 1984 to 1987.

On his return to Paris in 1988, Pierre Godec took up the role of Vice President of Downstream Commercial and International Activities until 1990. Following this position, he took up geographical responsibility for the Soviet Union, where a new operation was being set up. Mr Godec was based in Moscow until 1993, and before joining Elf Exploration UK plc in September 1995, he represented the Elf group on European Union matters in Brussels.

Mr Peter H Haar FlinstPet

Mr Haar graduated from Leeds University with a BEng in Chemical Engineering. He is presently Oil Industry Consultant for KBC Process Technology. His current responsibilities are advising Refining Directors on profit improvement strategies as well as implementing new maintenance and reliability strategies. Mr Haar is actively involved in the Institute's Southern Branch becoming Southern Branch Membership Officer for two years as well as the role of Treasurer which he undertook for nine years. Mr Haar is also an IP Council member.

Membership News

NEW FELLOWS

Mr Simon B O'Boyle FlinstPet

Mr O'Boyle is currently Petroleum Risk Management Specialist with the Sales & Marketing Logistics Department of the Saudi Arabian Oil Company (Saudi Aramco) in Dhahran, Saudi Arabia. His responsibilities include the enhancement of loss control procedures applicable to imported, exported and coastal movements of refined petroleum products, and loss control monitoring of crude oil custody transfers from KSA into the Sumed system. He has 27 years hands-on experience which he gained from the operating and management of bulk liquid storage terminals and petroleum inspection organizations; from cargo superintendence and expediting activity; and from quality assurance auditing. Mr O'Boyle is an IRCA Auditor.

Mr Alex Wyllie FlinstPet

Mr Wyllie is a highly experienced and well known Cargo Inspector/Chemist on the Thames where he has worked for more than 20 years. Mr Wyllie has also worked in many countries in Europe, the Mediterranean, Africa and the Middle East, as well as most British ports, and has covered as acting Manager in the UK, Novorossiysk and Port Harcourt. At present, Mr Wyllie is closely involved in setting up local procedures and Quality Systems within Caleb Brett, West Thurrock, which is reportedly the busiest office in the UK. Mr Wyllie is an avid supporter of the Essex Branch of the IP.

NEW CORPORATES

Wintershall (UK) Ltd, The Old Town Hall, Wimbledon Broadway, London SW19 8YA, UK. Tel: +44 (0)181 971 1400 Fax: +44 (0)181 879 1525

Representative: Mr R Schulze, Managing Director
Wintershall (UK) Ltd is involved in the exploration, development and production of oil and gas reserves in the UK.

Freshfields, 65 Fleet Street, London EC4Y 1HS, UK. Tel: +44 (0)171 832 4000 Fax: +44 (0)171 832 7001

Representative: Mr Jon Rees, Partner (Oil & Gas)
Freshfields is an international law firm providing services to corporations, financial institutions and governments around the world. Freshfields also has a dedicated energy group undertaking work for various clients in the oil and gas industry.

W & J Leigh & Company, Tower Works, Kestor Street, Bolton, Lancashire BL2 2AL, UK. Tel: +44 (0)1204 521771 Fax: +44 (0)1204 382115

Representative: Mr Brian Millward, Area Manager
W & J Leigh & Company is a manufacturer of high performance coatings systems for protection against corrosion, fire and chemicals with a long history of supplying major onshore and offshore facilities.

Around the Branches

A full listing of Branch Events is available on the IP web site:

<http://www.petroleum.co.uk>
or, if you require further information please contact your individual Branch Secretary.

Golden anniversary for IP Members

The IP is proud to announce that the following Members have all been awarded a special commemorative tie as a result of achieving 50 years of Membership. Many of the Members were proud that the IP had written to remind them, and others spoke of how they had first been introduced to the Institute. Mr J N Hornibrook and Sir Archibald Forster both wrote to say that they had been introduced to the IP while Freshers at Birmingham University by the 'famous' Professor Gardner. Sir Archibald pointed out that 'he had not the faintest idea what the IP really was!' at that time. Dr Wyllie wrote to say that he had joined the IP on starting at the Admiralty Chemical Department in Portsmouth Dockyard in early 1939 when he was 'trying his hand at the analysis of rubber and studying plain mineral oils'. All the Members mentioned how they used *Petroleum Review* to stay in touch and Mr C R Bryson mentioned that he still attends his local branch functions.

Mr C H Band FlinstPet
Mr J A Brookbank FlinstPet
Mr C R Bryson FlinstPet
Mr R C Cobley FlinstPet
Mr H C Costelloe FlinstPet
Prof W Davey FlinstPet
Mr T A Dent FlinstPet
Mr C M Edghill FlinstPet
Sir Archibald Forster FlinstPet
Mr J N Hornibrook OBE, FlinstPet
Mr P Jenner FlinstPet
Mr A T Langton FlinstPet
Mr A D Makower FlinstPet
Mr R W McFadyen FlinstPet
Mr R E Owens FlinstPet
Mr R G Perry FlinstPet
Mr L A Ragsdale FlinstPet
Mr G W Reed FlinstPet
Mr N E Watson FlinstPet
Mr V B Wright FlinstPet
Dr D Wyllie FlinstPet

The George Sell Prize

This prize, value £250, is awarded periodically to the author of what is judged to be the best original petroleum technical paper of recent publication. The subject matter may relate to any aspect of petroleum technology viz. exploration, refining, chemistry, physics, environmental science etc. Reviews and publications of joint authorship are not accepted. Applicants for the 1997 award should send copies of their papers in English that have been published during 1996/97 with a covering letter to:

Mr John Evans

**The Institute of Petroleum
61 New Cavendish Street, London
W1M 8AR, UK**

IP Conferences and Exhibitions

IP Week 1998

London: 16–19 February 1998

An influential programme of Conferences appealing to an international audience has been planned, which together with the Annual Luncheon and Dinner, means that IP Week 1998 represents an excellent opportunity for delegates to meet and discuss the latest developments with senior executives in the industry today. Please see pages 28 for detailed information on the Programme of Events.

Conference and Exhibition

Oil Spill Response – The National Contingency Plan

Gatwick: 10–11 March 1998

organized with the support of UKPIA, the British Oil Spill Control Association (BOSCA) and the Nautical Institute

In recent years, the UK has suffered two large oil spills. One of these involved the largest shore-line clean-up in the UK since the *Torrey Canyon* incident over 30 years ago. In light of these incidents, the National Contingency Plan has been reviewed and revised.

This Conference will address all the important issues:

- Day 1 – Policy and the National Plan; Role of Local Government, the Environment Agency, Ports and the Spill Response Industry; Funding and Finance
- Day 2 – Media Coverage, Waste Disposal, Health and Safety Issues, Setting-up Shore Line Response Centres and New Clean-up and Monitoring Techniques

Speakers include: **Glenda Jackson CBE, MP** (Parliamentary Under-Secretary of State, Department of the Environment, Transport and the Regions), **David Bedborough** (Chief Scientist, MPCU), **Dr Mike Frend** (Director General, UK Petroleum Industry), **Robin Gainsford** (Director, MPCU), **Chris Harris** (Chief Executive, The Coastguard Agency), **Gordon Johnston** (Executive Director, UKMPG Ltd), **Rear Admiral Michael L Stacey** (Chairman, British Oil Spill Control Association) and **Dr I C White** (Managing Director, International Tanker Owners' Pollution Federation).

Who should attend?

Attendance at this event will be essential for Ports and Harbours Authorities, Shoreline Local Authorities, those responsible for the formulation of contingency plans and those involved in oil spill response and shoreline remediation.

Exhibition

An Exhibition of oil spill response equipment and remediation techniques will be held in association with the Conference. Further information regarding exhibition space is available from the Conference Department.

The Programme and registration form is now available from the IP Conference Department.

International Conference and Exhibition

Metalworking Fluids

Birmingham: 3–4 June 1998

The Programme and registration form will be available in February 1998.

Annual Introduction Courses

The Institute of Petroleum's annual three-day non-residential general Introduction Courses to the oil industry have proved extremely successful and will be repeated again in June 1998. Each Course is self-contained but many participants will find it advantageous to attend both, in which case a special combined registration fee is available at a reduced rate.

Introduction to Oil Industry Operations

London: Wednesday 17 – Friday 19 June 1998

and

Introduction to Petroleum Economics

London: Monday 22 – Wednesday 24 June 1998

The Courses are particularly valuable for:

- Participants from within the oil industry who require a broader perspective of the industry's activities and the economic factors affecting its development
- Participants from financial and commercial companies, supply and service sectors and government organizations who require an informed and concise introduction to the economic and commercial background of the oil industry.

The Programme and registration form will be available in April 1998.

For a copy of the Programme and registration form for the Oil Spill Response Conference or to add your details on to the mailing lists for forthcoming events, please write or fax:

**Pauline Ashby, Conference Administrator,
Institute of Petroleum, 61 New Cavendish
Street, London W1M 8AR, UK**

Tel: +44 (0)171 467 7100

Fax: +44 (0)171 255 1472

**All forthcoming events can be viewed
on the IP Web Page:**

<http://www.petroileum.co.uk>

EVENTS

Forthcoming

January 1998

18-20 Perth
Australasian Energy Pacesetters '98
 Details: Global Pacific & Partners,
 South Africa
 Tel: +27 11 781 3358
 Fax: +27 11 781 3362
 e-mail: global.pacific@pixie.co.za

18-23 Wiltshire, UK
The Challenge of Liberalising Gas Markets
 Details: The Alphantania Partnership, UK
 Tel: +44 (0)171 613 0087
 Fax: +44 (0)171 613 0094

19-20 Stavanger
Advances in Seismic Technology
 Details: IBC UK Conferences
 Tel: +44 (0)171 453 2712
 Fax: +44 (0)171 453 2058
 e-mail: angela.broadhead@incuk.co.uk

21-22 London
Investing in Upstream Indian Oil & Gas
 Details: SMi, UK
 Tel: +44 (0) 171 252 2222
 Fax: +44 (0)171 252 2272

21-22 Aberdeen
Alliancing and Contracting in the Oil & Gas Industry
 Details: Learning in Business, UK
 Tel: +44 (0)181 944 9030
 Fax: +44 (0)181 944 0434
 e-mail: book@learnbus.demon.co.uk

26-27 Istanbul
Mediterranean & Black Sea Oil Markets
 Details: IBC Financial Focus, UK
 Tel: +44 (0)171 453 2703
 Fax: +44 (0)171 323 4298
 e-mail: rebecca.luing@ibcuk.co.uk

27-28 London
Future Exploration Considerations and Strategic Developments in the Atlantic Margin
 Details: SMi, UK
 Tel: +44 (0)171 252 2222
 Fax: +44 (0)171 252 2272

28-29 London
Knowledge Management
 Details: IBC UK Conferences
 Tel: +44 (0)171 453 5494
 Fax: +44 (0)171 636 6858
 e-mail: cust.serv@ibcuk.co.uk

29 Paris
Panorama '98
 Details: Sophie Dekeyser, Institut Français du Pétrole, France.
 Fax: +33 1 47 52 70 36

29-30 Aberdeen
Health & Safety Management for Oil and Gas
 Details: IQPC, UK
 Tel: +44 (0)171 691 9191
 Fax: +44 (0)171 691 9192
 e-mail: safety@iqpcmail.co.uk

February 1998

1-5 Houston
Pipeline Pigging Technology
 Details: Clarion Technical Conferences, US
 Tel: +1 713 521 5929
 Fax: +1 713 521 9255

2-4 London
Petroleum Economics
 Details: IBC UK Conferences
 Tel: +44 (0)171 453 5491
 Fax: +44 (0)171 636 6858
 e-mail: cust.serv@ibcuk.co.uk

4 London
Transforming Indian Energy: Government Policy and the Role of Foreign Investment
 Details: The Royal Institute of International Affairs, UK
 Tel: +44 (0)171 957 5700
 Fax: +44 (0)171 321 2045

5-6 London
Climate After Kyoto: Implications for Energy
 Details: The Royal Institute of International Affairs, UK
 Tel: +44 (0)171 957 5700
 Fax: +44 (0)171 321 2045

5-6 London
Risk Analysis
 Details: IBC UK Conferences
 Tel: +44 (0)171 453 5491
 Fax: +44 (0)171 636 6858
 e-mail: cust.serv@ibcuk.co.uk

10-13 Cairo
Oil & Gas '98
 Details: IIR Exhibitions, UAE
 Tel: +971 4 365161
 Fax: +971 4 360137

11-13 Cardiff, UK
The Sea Empress Oil Spill Conference
 Details: The Chartered Institution of Water and Environmental Management, UK
 Tel: +44 (0)1787 831 3119
 Fax: +44 (0)171 405 4967

13-16 Berkshire, UK
Understanding Oil Supply Logistics
 Details: Petroleum Economist, UK
 Tel: +44 (0)171 831 5588
 Fax: +44 (0)171 831 4567/5313

16 February
London: Oil and Gas after 2000 - Realignment and Restructuring for the New Millennium
 Details: Pauline Ashby, The Institute of Petroleum

16-17 London
Electricity & Gas: Managing Stakeholder Expectations in a Competitive Market
 Details: Nick Tribe, The Economist Conferences, UK
 Tel: +44 (0)171 830 1154

17-18 London
Worldwide Deepwater Technologies 1998
 Details: IBC UK Conferences
 Tel: +44 (0)171 453 5491
 Fax: +44 (0)171 636 6858

17-19 New Delhi, India
The India Oil and Gas Conference and Exhibition
 Details: Dan Lipsher, Society of Petroleum Engineers, US
 Tel: +1 972 952 9306
 e-mail: dlipsher@spelink.spe.org

18 February
London: Price Risk Management: The 11th Oil Price Seminar
 Details: Pauline Ashby, The Institute of Petroleum

18-19 London
Customer Management in Gas & Electricity
 Details: AIC Conferences, UK
 Tel: +44 (0)171 242 2324
 Fax: +44 (0)171 242 1508

19 February
London: Innovations in Offshore Field Developments
 Details: Pauline Ashby, The Institute of Petroleum

Diary Dates

Exploration & Production Discussion Group

'Whose Oil Is It Anyway? – International Boundary Disputes and Hydrocarbon Production'

Thursday 8 January 1998
17.00 for 17.30 until 19.00

Martin Pratt, Research Officer, International Boundaries Research Unit, University of Durham

IP Contact: Jenny Sandrock

London Branch

'The Internet – its Value to the Oil Industry'

Wednesday 28 January 1998, 17.15 for 18.00

Fran Morrison, Media & Communications Manager, Shell UK Ltd, plus an IT Contractor

The presentation will focus on the development of a company web site and the benefits of the Internet to companies in the oil industry. The presentation will feature demonstrations linked to the Internet.

Tea and biscuits will be served at 17.15. Light refreshments, kindly sponsored by Shell UK Ltd will be available afterwards.

IP Contact: Mr J M Wood on +44 (0)171 467 7128

Energy Economics Group

'Climate after Kyoto – Implications for Energy'

Wednesday 14 January 1998
17.00 for 17.30 until 19.00

Dr Michael Grubb, Head of Energy and Environment Programme, The Royal Institute of International Affairs

IP Contact: Jenny Sandrock

All meetings are held at the Institute of Petroleum unless otherwise stated. Please tell the IP contact if you plan to attend any of these free meetings

Tel: +44 (0)171 467 7100

Fax: +44 (0)171 255 1472

London Branch

IP WEEK **98**

'The Auto-Oil Programme – Will Reason Prevail?'

Tuesday 17 February 1998, 17.30

Michel Flohic, Deputy Secretary General, EUROPIA

Auto-Oil, the joint Commission, motor and oil industries technical programme to identify the best vehicle and fuel measures to achieve high quality air standards, is moving to a new phase. High stakes are being played for right now in the European Parliament between those who argue the environment is worth protecting at any price, no matter how marginal the improvement, and those who say we should seek value for money in all things, including delivering on the environment. This will be the theme of Michel Flohic, Deputy Secretary General of EUROPIA, who will present an update of the latest technical and political developments in the Auto-Oil programme.

Tea and biscuits will be served at 17.00. Light refreshments will be available afterwards.

IP Contact: Mr J M Wood on +44 (0)171 467 7128

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<http://www.ogjonline.com>

MOVES *People*

Shell Bitumen has appointed **Dr John Read** as Senior Asphalt Development Engineer, with effect from 1 December 1997. He was previously Technical Manager for Croda Bitumen and will be based at home in Derbyshire.

Roger E. Truitt has been named President of Arco Products Company succeeding Senior Vice President **William C Rusnack** who is retiring after 31 years with the company. Truitt has also been elected an Arco Senior Vice President by the Board of Directors. The changes take effect immediately.

Apache Corporation has promoted **Tim Savoy** to the position of Director of Exploration and Production Services. He will be responsible for natural gas and crude oil marketing, pipe and wellhead purchasing, environmental health and safety and general services.

Conoco's
Co-ordinator
of Public
Affairs

Caroline Churchill has taken up a new position within the organization.

Her new role is Manager, Facilities and Services, also based in Aberdeen.



The Institute of Energy has appointed **Diane Davy** as its new Secretary and Chief Executive with effect from 5 January 1998. She is an Incorporated Engineer who has practised in both industry and research; she has also held the position of Business and Industry Executive at the Engineering Council. Davy is currently Secretary and Chief Executive of IMechE where she has worked since 1994.

Chris Ryan will take up the position of Senior Vice President, Gases, Europe for Air Products plc. Prior to this appointment, Ryan worked in a variety of senior management roles throughout the company – most recently as Vice President, Corporate Planning, based in the US.



Lyn Arscott, shortly to retire as Senior Executive Consultant for Exploration and Production for Chevron Corporation, will become Executive Secretary of the Oil Industry International Exploration and Production Forum (E&P Forum) in March. He will succeed **Mike Cloughley** who has held the position for over three years.

Fluor Daniel has elected **Lord Renwick** to its Board of Directors. Renwick served as British Ambassador to the US from 1991 to 1995 and to South Africa from 1987 to 1991. He has been Assistant Under Secretary of State at the Foreign Office and Head of Chancery in Washington among other positions. Renwick is Holding Board Director of Robert Fleming merchant bank and Chairman of Save & Prosper. He also serves as a director of British Airways, Compagni Financiere Richemont, Billiton plc, Canal Plus and Liberty International.

The Board of Shell Ltd are proposing the appointments of three new directors. **Liz Rayner** is to be proposed as Human Resources Director, Shell UK, **John Mills** as Corporate Affairs Director with responsibility for public affairs and planning, and **Tron Endresen** as Corporate Finance Director.

Mike Press has been appointed Manager for Statoil (UK) Ltd's recently formed Public Affairs and Health, Environment and Safety Department responsible for the activities of Statoil UK. Press was previously Sales and Marketing Manager for Alliance Gas. **Martin Ferguson** has been appointed Manager, Health, Environment and Safety for the Exploration and Production Department. Ferguson joined the company from Amerada Hess where he was Corporate Environmental Adviser.

Michael Knowles has been appointed Assistant Director, Operational and Technical Affairs, of the UK Offshore Operators Association (UKOOA). Knowles joins UKOOA after 30 years experience with BP Exploration where he held senior posts as Chief Petroleum Engineer, Vice President, Production, USA, and Manager of the Forties field.

Dr Peter Hill will join Hardy Oil and Gas plc from Germany's Deminex GmbH, where he has been Managing Director responsible for worldwide exploration and production. In his new role he will become Executive Director of Hardy and Head of Exploration. He succeeds **Dr John Wilson**.

Gary M Briggs has joined TIW Corporation as Technical Sales Manager for the Window Cutting Products Division. Briggs is a petroleum engineer with more than 30 years experience. Prior to joining TIW he was Technical Marketing Manager for Lincoln Composites. He will be based in Houston, Texas.

Kvaerner John Brown has appointed **Alan Thorne** (top), **Ed Cavanagh** (middle) and **Gurdial Singh** (below) to its Hydrocarbons business. Thorne will take up the position of Business Manager – Pipelines, in the company's London office, Cavanagh will become Vice President – Pipelines America, based in Houston, Texas, and Gurdial Singh will take up the position of Business Manager – Pipelines, reporting to Roberto Piriani, Vice President – Pipelines in London.

Thorne joins the company from British Gas, where he was Regional Director of Engineering and subsequently Regional Service Director. Cavanagh joins from Fluor-Williams Brothers where he was Pipelines Department Head, and Singh joins from ABB Lummus Global where he was Pipeline Manager.



Peter C Fusaro will be joining the staff of ABB Financial Consulting as senior vice president, energy consulting. Fusaro is one of the leading authorities on Asia Pacific energy markets.

Alessandro Gilotti, the new Managing Director of Kuwait Petroleum (GB), will be based in the KPGB UK offices at Staines, Middlesex, not in Rome, as reported in our last issue. We apologize for any confusion caused.

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