Petroleum review

MARCH 2000

IP Week – Keynote speeches – Highlights

- Lee Raymond sees technology as the key
- Helen Liddell praises cooperation with the industry
- Chris Moorhouse reviews the last year

Geophysics – latest developments

Refining the science

Caspian resources

Great potential, but …

Covering the international oil and gas industry from field to forecourt – exploration, production, refining, marketing and e-business

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ABBREVIATIONS

The following are used throughout *Petroleum Review*:

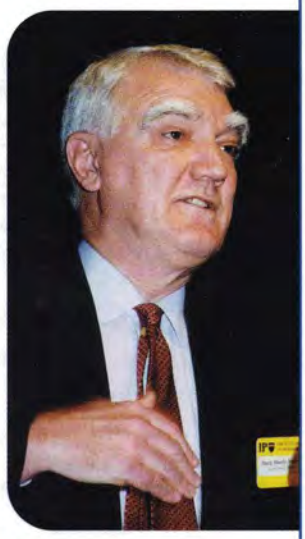
mn	= million (10^6)	kW	= kilowatts (10^3)
bn	= billion (10^9)	MW	= megawatts (10^6)
tn	= trillion (10^{12})	GW	= gigawatts (10^9)
cf	= cubic feet	kWh	= kilowatt hour
cm	= cubic metres	km	= kilometre
boe	= barrels of oil equivalent	sq km	= square kilometres
		b/d	= barrels/day
t/y	= tonnes/year	t/d	=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

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

Front cover: Left: Lee Raymond, CEO ExxonMobil Corporation, at the Dorchester Hotel, London

Right: Helen Liddell, UK Minister for Energy, speaking at the Annual Dinner

inside...



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From the Editor

Ominous but not yet a crisis

With WTI prices nudging $30/b and Brent hovering around $27/b, the Opec countries have (with a little help from some friends) succeeded beyond their wildest dreams in rebuilding their incomes. Opec's – and the world's – problem is how to now increase oil flows enough to take the heat out of the price without collapsing it back down to the pain point.

Western politicians – particularly US politicians in an election year – are, understandably, concerned that high oil prices could re-ignite inflation. As a result, there is considerable pressure on Opec to announce an output increase at its end-March meeting. Increasingly, the more strident voices are being silenced by those pointing out that it is not in Opec's interest to drive prices too high. Stocks are already at 10-year lows in the OECD area and continuing to decline. Opec, still traumatised by the impact of the Jakarta decision to expand production just as the Asia economies collapsed, is reluctant to believe the reports of low stocks. It is still possible that Opec will delay opening the taps or open them only slowly. However, the cynical analysis that the highly indebted have to do the bidding of their creditors is probably correct.

The latest IEA monthly report anticipates demand growth of 1.8mn b/d (or 2.4%) in 2000. It expects non-Opec supply to increase by 860,000 b/d with the lion's share (330,000 b/d) coming from Norway. Recent delays to UK projects now means any gain from the UK sector is most unlikely. Other likely gains are from Australia, Brazil, Africa and the FSU. This, in turn, means that to balance the market Opec production needs to expand by 1–2mn b/d, confirming the analysis by the Centre for Global Energy Studies (CGES) that a 1.7mn b/d increase in Opec production from end-March is needed to rebuild stocks and return oil prices to the early $20s. The clear implication is that any smaller or later increase will produce a tight, high-priced market.

Now e-trading

To date, the focus for e-enablement of the oil industry has focused on e-procurement portals, including BP Amoco's work in this area, Shell's links with Commerce One, Chevron's with Ariba, and Statoil's with **mySAP.com** – covered in the February issue). The latest link-up is Texaco, who has signed a MOU with **TradeCapture.com** to form a strategic partnership for the global trading of energy commodities. Texaco will take a minority equity position in **TradeCapture.com** and use its Internet-based trading platform for its expanding crude oil and refined products trading activities worldwide. The electronic bulletin board system devised and developed by traders and IT specialists, who had originally worked for Phibro, is to go live on 29 February. Initial trials in December and January are reported to have gone well, with market traders able to use the system with minimal training. If the system works as its developers anticipate, significant amounts of the world's crude, product, oil and gas trade could move to being the latest e-business.

A series of key steps can be identified in the Internet-enablement of the oil and gas industry. Initially there is the provision of a website as a low-cost publication route. This then develops interactivity, allowing users to buy, and to provide data or services such as consultancy.

The next stage is the full services portal. The key question here is company portal versus third-party portal with, so far, no clear verdict.

The next stage is likely to be taking control of the whole system from wellhead to forecourt. No one is surprised by the idea that a refinery is run and controlled interactively – like flying a plane. What low-cost Internet communication does is open up the possibility of operating the whole system the same way. Within a relatively short period of time expect to see control rooms where, in response to price and demand signals, wellheads are monitored and controlled, stock levels in all crude and product tanks are monitored, controlled and minimised, refineries are turned up or turned down and all the distribution logistics is monitored and controlled.

All the elements are now in place. Oil and gas companies now have the potential to be controlled and run the way their leaders always hoped they might be.

IP Week success

This year's IP Week was the most successful ever. Record attendance at the lunch, dinner and the various conferences confirmed the value of the events to the industry. We have brief coverage of the conferences on p27, Lee Raymond's address to the Lunch on p19, Helen Liddell (the UK Energy Minister) speech on p22, and Chris Moorhouse, the IP President's speech on p24.

Chris Skrebowski

Web World

A new Internet portal has been launched to help manufacturers working in the petroleum and refined products industries harness e-technology in order thrive in competitive world markets. The **www.e4man.com** site will initially be offering members four services:

- eFair – a permanent virtual trade show displaying and promoting manufacturers' products and services.
- Advantageous purchasing – special discounts and offers for members.
- ebusiness tools: *Store Centre* – allowing manufacturers to trade online; *Supply Centre* – business-to-business purchasing, order processing and invoicing; *Trading Places* – an opportunity to develop more comprehensive e-business trading; *Business Manager* – facility to access centrally-hosted software as and when required.
- Online networking/information.

Oil and gas supply chain management company ASCo Group has taken a 2.44% stake in Internet-based company **sparesFinder.com** and has the option of increasing this up to a 10% interest. **sparesFinder.com** provides a web-based system for the identification, buying and selling of surplus engineering spares and equipment worldwide to a variety of industries (see *Petroleum Review*, December 1999).

IT consultancy Parity Group and e-procurement specialist Infobank Electronic Commerce Systems are to jointly develop an online procurement service aimed, initially, at the utilities sector.

Steelscreen has recently launched an Internet-based market place – **www.steelscreen.com** – for steel and metals which will allow users to trade in stainless products. The scheme is soon to be extended to cover carbon steel and aluminium products. Once fully developed, it is hoped that the scheme will support the whole transaction process from selection of materials and purchase to distribution and financing,

Shell Europe Oil Products and Dutch Internet company World Online are reported to have unveiled plans to formalise their Internet access service – 12move – into a joint venture. Under the deal, Shell will distribute World Online CDs in the UK on an exclusive basis and will hold an equity stake in World Online UK.

Looking to the months ahead, **www.theoilsite.com** – a new independent B2B trading platform for the international oil industry – is to be launched at the end of April 2000. The **OilSite.com** company is hoping to raise £2.06mn to finance the further development of the website and associated trading platforms.

NEWS Upstream

Innovative logging programme on Armada

Well and pipeline services company PSL Group recently completed an innovative coiled tubing logging programme on five wells for BG International's Armada field in the Central North Sea. In addition to providing standard and electric-line coiled tubing, nitrogen and pumping services for the long-reach deviated wells of up to 75° and measured depths of 23,000 ft, the company also utilised its recently developed intervention mast (see photo) in order to minimise the time taken to switch between wireline and coiled tubing, and change from well to well. The coiled tubing supplied by PSL also had to be capable of running both real time and memory logging tools.

According to BG International Well Engineer, Tom Brighton, the primary aim of the project was 'to gather previously unobtained baseline data' which has allowed the company to improve its reservoir model, improve its identification of infill drilling targets and optimise production rates. The field is currently producing 450mn cf/d of gas and provides over 4% of the UK's gas demand.

The intervention mast, designed for use in confined areas, is said to enable the switch between coiled tubing and wireline operations to be completed within one hour. Being independent of any rig activity, self-contained and self-supporting, the mast also allows the intervention operations to continue independently of any other rig activity, facilitating simultaneous drilling operations. Such a system significantly reduces downtime, states PSL.

'Once in place on the Armada platform, there was minimal reliance on platform cranes and it gave us greater control over manoeuvrability and positioning of the coiled tubing injector,' comments Brighton. 'The purpose-built work also avoided the need to erect any scaffolding. Not only was it a means to helping us reduce our costs, it was also a means to ensure that we worked in a safe and efficient manner.'

BP Amoco unveils Shah Deniz plans

BP Amoco has outlined plans for the potential export of Azeri gas to Turkey following the successful drilling of a second well on the Shah Deniz field in the Caspian Sea which confirmed the existence of a 'significant' gas condensate discovery. The plans are in direct competition with Gazprom's Blue Stream pipeline to Turkey as well as the proposed TransCaspian pipeline from Turkmenistan.

The first phase of Shah Deniz development is expected to produce 5bn cm/y, rising to a possible 16bn cm/y. 'There is confidence that the results of the two wells already drilled, combined with those of a third well to be drilled later this year, should enable us to prove first stage resources of 150bn cm of gas and 20mn tonnes of liquids,' commented Andy Hopwood, BP Amoco's Azerbaijan Exploration Business Unit Leader. The company hopes to deliver first gas to market in the winter of 2002-2003.

Shah Deniz partners are: BP Amoco (operator, 25.5%), Statoil (25.5%), Socar (10%), Elf Petroleum (10%), LukAgip (10%), Oil Industries Engineering and Construction (10%) and the Turkish Petroleum Overseas Company (9%).

In Brief

United Kingdom

It is reported that start-up of Elf's *North Sea Elgin and Franklin gas condensate fields has been delayed until the 4Q2000 instead of in July.*

The Faroe Islands has launched its first *licensing round on the Faroese continental shelf. A total of 56 whole blocks and 26 part blocks to the east and south of the Faroe Islands are on offer. The round will close on 17 May 2000, with awards in September.*

Enterprise Oil has begun work to de- *bottleneck production from the Pierce field in the North Sea in order to boost output by 20% to 65,000 b/d.*

Kerr McGee is reported to have signif- *icantly upgraded its reserve estimate for the Leadon discovery in the UK North Sea from 20mn barrels of oil to between 70mn and 100mn barrels.*

Energy Minister, Helen Liddell, has *announced the UK's 9th round of onshore oil and gas licensing. The closing date for applications is 5 May 2000.*

Marathon's Southwest Kinsale gas *field discovery has come onstream at a rate of 58mn cf/d.*

Europe

Norsk Hydro is to offer its stakes on *the UK Continental Shelf for sale. The company's assets include interests in the producing Britannia, Alba and Gryphon fields and several exploration licences.*

A total of 14 oil and gas companies *are reported to have applied for licences in Norway's 16th offshore licensing round. Applicants are understood to be Agip, BP Amoco, Chevron and Conoco, as well as Enterprise, ExxonMobil, Norsk Hydro, Fortum, Phillips Petroleum, RWE-DEA, Elf, TotalFina, Shell and Statoil.*

Norway has added between 130bn *and 150bn cm to its gas reserves through new discoveries and upgrades to existing fields in 1999, according to the Norwegian Petroleum Directorate.*

The Norwegian Government is under- *stood to have granted a production tax exemption to the North Sea Valhall field this year in a bid to provide a boost to the Norway's fabrication sector.*

NEWS Upstream

UK oil and gas output in 1999 at record levels

UK oil and gas output for 1999 was at its highest level since the Royal Bank of Scotland began its records in 1983, reports the group's latest *Oil and Gas Index*. Oil production was up 3.2% on 1998, while gas output was up 12.1% on the year. Longer-term comparisons show oil production up 41% since 1989 and gas output up almost 50% since 1993.

Oil revenues rose by 48% on 1998 to £29mn/d, due to higher oil prices ranging from $9.83/b during February to $26.45/b during December – an increase of 169% over the year. The 1999 oil price average was $17.88/b, an increase of almost 40% on 1998.

Last year saw a record number of 168 fields in production, 17 more than in 1998, states the report. Consequently, gas production during 1999 averaged 9,423mn cf/d, up 12.1% on 1998.

The combined oil and gas revenues averaged £42.2mn/d in 1999, an increase of 24.6% on the previous year.

Year Month	Oil production (av. b/d)	Gas production (av. mn cf/d)	Av. oil price ($/b)
Dec 1998	2,715,056	11,123	9.81
Jan 1999	2,664,121	11,532	11.16
Feb	2,678,138	11,532	10.20
Mar	2,679,786	11,107	12.54
Apr	2,717,767	9,863	15.66
May	2,507,093	7,349	15.18
Jun	2,400,277	6,785	15.91
Jul	2,602,363	6,852	18.90
Aug	2,645,493	6,604	19.93
Sep	2,588,488	7,379	22.83
Oct	2,666,146	9,380	22.03
Nov	2,698,681	11,641	24.64
Dec	2,634,050	13,054	25.64

Source: The Royal Bank of Scotland Oil and Gas Index

North Sea oil and gas production

Smit secures Newfoundland contracts

Multi-purpose offshore installations vessel *Smit Pioneer* has been chartered for trenching and laying flexibles in the Terra Nova field, offshore Newfoundland. In the meantime Smit Transport & Heavy Lift's *Asian Hercules II* 3,000-tonnes lift capacity sheerlegs has secured a contract to perform a series of heavy lifts at the Bull Arm topsides fabrication and outfitting facility in mid-May following the arrival of the newbuild FPSO from Daewoo in Korea.

In Brief

North America

Chevron and Shell are to jointly drill *two exploration wells on Chevron's Hurricane prospect on Ewing Bank block 1010 and its Roy prospect on Mississippi Canyon block 988 in the deepwater Gulf of Mexico. A third well is to be drilled under a joint venture with Texaco on the Poseidon prospect in Mississippi Canyon block 772.*

MCN Energy Group is reported to be *selling its Appalachian natural gas exploration and production assets, and associated pipelines, for $180mn to Consol Energy.*

Texaco has announced plans to spend *$400mn on exploration in 2000, some 50% more than its 1999 exploration budget.*

Cuba is reported to have opened up a *112,000 sq km area in the Gulf of Mexico's Exclusive Economic Zone (EEZ) for deepwater exploration by foreign companies.*

Burlington Resources has outsourced *the operations and maintenance of its 54 manned and unmanned facilities on the Gulf of Mexico's outer continental shelf to Baker Energy. The deal has been valued in excess of £20mnly.*

Aker Maritime and J Ray McDermott *are understood to be dissolving their Spars International joint venture and are to once again compete head to head in the spar fabrication sector.*

Middle East

The $150mn engineering, procurement *and construction contract for the Abu Dhabi-Jebel Ali gas pipeline project has been awarded to a partnership of the local National Petroleum Construction Company (NPCC) and Athens-based Consolidated Contractors International Company (CCIC). The 130-km, 48-inch diameter pipeline is to be operated by Abu Dhabi National Oil Company.*

Petroleum Geo-Services (PGS) is *reported to have been awarded a major contract by Saudi Aramco for a large 3D seismic land survey in Saudi Arabia, to start in summer 2000.*

Russia & Central Asia

Yukos and the Mongolian Government *recently signed an agreement covering 1,000 km of the planned 2,315-km,*

NEWS Upstream

Durability of deepwater fibre tethers

NEL, the UK's National Engineering Laboratory recently launched a new joint industry project, sponsored by a number of major oil and gas operators, on the durability of deepwater fibre tethers. It is hoped that the project will lead to the wider adoption of the technology worldwide and help develop data on the fatigue performance and strength loss of polyester rope for taut leg mooring applications.

NEL is to conduct fatigue tests on polyester ropes in the size range 10-tonnes to 250-tonnes to evaluate rope durability and long-term property behaviour. The test programme is due to begin in February 2000, with project completion planned for the end of February 2002.

Since taut leg mooring systems have a life cycle of 20 years, fatigue performance date on polyester ropes is essential to ensure effective through life service. 'The work will make a major contribution to the development of deepwater fields throughout the world,' comments Bob Holmes, Business Development Manager Oil and Gas.

The project, in conjunction with Tension Technology International, is sponsored by BP Amoco, Chevron, Elf, Norsk Hydro, Shell, US Minerals Management Service, UK Health and Safety Executive, Lloyds Register, Bureau Veritas, American Bureau of Shipping, Marlow Ropes, ScanRope and Quintas Quintas.

North Sea drilling activity on the rise

Consultant Arthur Andersen Petroleum Services reports that – after consultation with the operators in each of the five sectors around the North Sea – between 84 and 101 exploration and appraisal wells will be drilled during 2000. The UK is expected to remain the busiest sector, with approximately half of the total wells being drilled. Despite this increase in drilling activity over the coming year, the company believes it 'unlikely that drilling will increase to mid-1990s levels.'

Several factors will have an impact on the drilling levels, states the consultancy. The most important will be the price of Brent marker crude, which during 1999 ranged from $10/b to $26/b and caused dramatic cuts in exploration drilling. 'The current year has started with prices in the mid-twenties which, if maintained, will provide the industry with the confidence to confirm plans.' Other factors that will affect drilling levels in the region are the amount of new acreage offered during the year and the call on exploration budgets from other parts of the world, such as West Africa and Brazil.

Typhoon field development gets go-ahead

Approval has been given for development of the Typhoon oil and gas field in the Gulf of Mexico. Located in Green Canyon blocks 236 and 237, the field is to be developed via a subsea completion and tie-back of four existing appraisal wells and a new local host facility using a mini tension leg platform (TLP). Oil and gas export will be by pipeline to existing markets.

The field is due onstream in 3Q2001, with output forecast to peak at 40,000 b/d of oil and 60mn cf/d of gas. Commercial field life is put at between five and eight years.

Partners in Typhoon are: BHP (50%) and Chevron (operator, 50%). The project represents BHP's first commercial development in the Gulf of Mexico.

Green light for North Sea Skiff gas field

Shell Expro has been given the green light by the UK Department of Trade and Industry for the development of the Skiff gas field in the southern North Sea. Due onstream in October, recoverable field reserves are put at 290bn cf. The £70mn project includes the fabrication and installation of the Skiff platform offshore the Norfolk coast, a 12-inch diameter, 11-km long pipeline to the nearby Sole Pit Clipper complex and the drilling of four gas production wells.

The platform will be based on Shell's 'Trident' platform concept – a minimum facilities design weighing about 400 tonnes that can be installed by a drilling rig. The project will also make use of underbalanced drilling (UBD) techniques, which allow gas to flow, under control, from the rock formation during the drilling operation. This means that the porosity of the rock is not marred by the infusion of drilling mud, which would happen using traditional methods, resulting in increased production rates from the well.

In Brief

$1.7bn Angarsk–Beijing pipeline which will carry up to 30mn t/y of oil across Mongolia by 2004, writes Stella Zenkovich.

***Kvaerner has been appointed by Yukos** to undertake a field development study on the Priobskoye onshore oil field, which is located in the Khanty-Mansiysk autonomous district in West Siberia.*

***The Duma of the Yamal-Nenets District has** approved the development of the 173mn barrel Romanovskoye oil field under production sharing agreement terms.*

***Kazakhoil Aktobe is reported to be** planning to invest $960mn in developing the Alibek and Kozhasai fields in Kazakhstan over the next six years.*

***Dragon Oil, 69.4% owned by Dubai's** Emirates National Oil Company (ENOC), is reported to have secured a $30mn, two-year loan from ANZ Grindlays Bank to allow development of the Lam and Zhdanov fields in the Cheleken block offshore Turkmenistan.*

***Tyumen oil company TNK is reported to** have been awarded the right to explore and develop the Synatysk oil field in the Komi Republic. Field reserves are put at 10mn tonnes of oil.*

***A number of wells are to be drilled on** the Miaser, Akeser and Porsy oil and gas structures located along the route of the Korpedzhe-Kord-Kui gas pipeline to Iran in order to evaluate their commercial potential. Turkmen exploration company Turkmengeologiya estimates that the structures hold reserves of 8.4bn cm of gas and 3.4mn tonnes of oil.*

***The China National Petroleum** Corporation (CNPC) is reported to be planning to invest up to $130mn in modernising the Aktobemunaygaz joint-stock company in Kazakhstan.*

***Nenets Oil Company of Russia is reported** to have begun production at the Musyurshorskoye and Lydushorskoye oil fields.*

***A joint venture between Russian oil** company Yukos and Mol of Hungary is reported to be planning to develop the West Malobalykskoye oil field in the Khanty-Mansiysk autonomous district. A total of $250mn is expected to be spent on developing the field under a production sharing agreement over a 10-year period. Proven oil reserves are put at 24mn tonnes.*

NEWS Upstream

Russia–China pipeline approval

Yukos, Transneft and Chinaoil have signed a protocol related to the construction of a 400,000 b/d pipeline linking eastern Siberia and China, reports the United Financial Group's *Russia Morning Comment*. The parties agreed to carry out a feasibility study on the project. 'The fact that Transneft is one of the signatories may be viewed as a political achievement for Yukos, as the pipeline company had opposed any direct contacts between Yukos and Chinaoil which might undermine Transneft's monopoly,' comments UFG.

Despite this progress, UFG says that it doubts that the $1.7bn project will ever get off the ground. 'None of the Russian participants have nearly enough free cash available to cover the cost, and Yukos' reputation is likely to repel any potential investors or lenders. Chinaoil, a subsidiary of CNPC and Sinochem, is a producer of speciality chemicals, and the fact that CNPC, a Chinese major, was not directly involved suggests that there is not much commitment on its side,' says UFG. 'Moreover, CNPC itself is notorious for its slow decision making, and by the time the preparatory stage has passed Russia may start importing oil rather than exporting it to China.'

Key drivers for future of North Sea ops

UK offshore oil and gas production will continue well into the 21st century, despite the increasing maturity of North Sea fields and international competition for investment, stated the Director General of the UK Offshore Operators Association (UKOOA), James May, launching the association's *1999 Economic Report*.

The report summarises the key events of the past year which have shaped current activity levels and examines the drivers and obstacles for future developments. According to the review, most estimates of UK reserves indicate that (under optimal conditions) there is about as much oil and gas remaining to be recovered offshore as the 26bn boe already produced by the UK industry in the last 30 years.

However, the extent to which the remaining exploration potential is captured will depend on a number of factors as production costs in the UK sector are high and new field sizes small compared with other oil producing countries.

'Cost reductions and the application of new technology will be key if the province is to continue to attract investment and the UK Government's Oil and Gas Industry Task Force (OGITF) target of 3mn boe/d for 2010 is to be realised,' commented May. The Leading Oil and Gas Industry Competitiveness (LOGIC) initiative was recently launched in a bid to achieve these goals.

Also critical will be the retention of current infrastructure to support further development in existing fields and the recovery of nearby satellite fields.

'The potential remaining in mature fields is large,' stated May, 'about 2bn boe. But the window of opportunity for further investment in these fields is limited, in some cases only three or four years.'

He also pointed out that while the industry had identified 78 projects which could attract such additional investment, further development is discouraged by current tax rates which, for these ageing fields, can be as high as 69%.

The report also indicated that the market for gas, which now accounts for 40% of all activity on the UKCS, remained depressed. The spot price for gas averaged just 11p/therm over the last 24 months – equivalent to $10/boe. 'The recovery of gas prices is being hindered by the Government's stricter consents policy for gas-fired power stations which is reducing future demand and activity levels,' claims UKOOA.

Enterprise expands Frontier interests

Enterprise Oil is to acquire Arco's Irish exploration interests as part of its drive to focus the exploration activity of its UK and Ireland core business unit in the Atlantic Margin.

The acquisition follows on from Enterprise Oil's recent purchase of an additional 3.1% in the Clair field, West of Shetlands, increasing its stake to 18.68%.

The company will also be signing a deal to purchase additional equity in Tranche 4, to the West of Shetlands, increasing its stake by 16.16% to 46.16%, and will assume operatorship subject to government consents. Tranche 4 is located 100 km to the northeast of the Clair field.

In Brief

Asia-Pacific

The United Nations is reported to have *signed the Timor Gap oil and gas exploration treaty with Australia on behalf of East Timor. The signing will allow the Phillips-operated Bayu Undan project to go ahead, with revenues beginning to accrue to East Timor in 2003.*

Kerr McGee and Pendaries Petroleum *are reported to have announced provisional reserve estimates of more than 100mn barrels for their CFD 11-1 oil discovery in block 04/36 in China's Bohai Bay.*

Philips Petroleum and China National *Offshore Oil Company (CNOOC) are understood to be planning to begin development of Peng Lai, said to be China's largest offshore discovery to date, this year. The Bohai Bay field is expected to be producing 30,800 b/d by September 2001, as part of an early production scheme.*

A large gas-rich area is reported to *have been discovered in the Xinjiang Uighur Autonomous Region of northwest China. Located in the Tarim Basin, field reserves are put at 3tn cm of natural gas. Tarim Oil Field Corporation is understood to be planning to produce 30bn cmly from the field by 2002.*

The Gorae-V gas field offshore South *Korea is reported to be due onstream in 2002. It is forecast to produce between 50mn and 100mn cf/d. Reserves are put at between 250bn and 300bn cf.*

Latin America

A group led by Pluspetrol of *Argentina has secured a contract from the Peruvian Government to develop the Camisea gas field onshore south Peru at an expected cost of $1.6bn.*

Africa

TransAtlantic Petroleum of Canada *has announced the start of crude sales from the Hana field in the onshore West Ghareb concession in the Gulf of Suez in Egypt.*

Chevron reports that its Benguela 2A *and Belize 2A wells on block 14, offshore Angola, have tested at 8,400 b/d and 11,000 b/d of oil respectively.*

NEWS Industry

FTC blocks BP Amoco/Arco merger

Following the decision of the US Federal Trade Commission (FTC) to oppose the proposed merger of BP Amoco and Arco, the two companies have now announced that they plan to pursue the issue in court.

The companies said in a joint statement: 'We are surprised and disappointed that the FTC has rejected all efforts for a positive resolution. We have consistently been open to improvement of our original proposal, and we have addressed the concerns of the State of Alaska. We have been, and remain, willing to discuss any reasonable options that might lead to a negotiated settlement.

We regret that the only course now open to us is to resolve the issue through litigation, but we believe we have a compelling case in support of our combination which we will argue vigorously in court.'

The statement added: 'Any suggestion that there is a special West Coast market for Alaskan crude oil that functions independently of world crude prices is without foundation. In fact, the proposed combination of our companies will drive down Alaskan production costs, making Alaskan crude oil more competitive in the world market.' It was also stated that: 'Since there is no refining or marketing overlap between the two companies, there should be no adverse competition issues concerning gasoline prices.'

The proposed merger, announced on 1 April 1999, has been approved by the European Union and shareholders of both companies. An agreement was also reached with the State of Alaska, committing the combined company to reduce its ownership of Alaska North Slope crude oil production as well as exploration acreage and interests in the TransAlaska Pipeline System and marine tankers.

BP Amoco had also assured California Governor Gray Davis that it would maintain Arco's 'low-price gasoline marketing strategy,' remove MTBE from gasoline a year ahead of the state's December 2002 deadline and substantially increase Arco's contribution to $100mn over ten years to charitable and community causes in the state.

Shell to launch share buy back programme

Shell Chairman Mark Moody-Stuart reaffirmed the Group's intention to achieve cost savings of $4bn by 2001 when posting the company's year-end financial results. Full-year adjusted CCS earnings (estimated current cost on supplied basis, excluding special items) were $7,093mn, up 38%.

Exploration and production was shown to be the most successful sector, with profits for 1999 more than doubling to $4.3bn, boosted by 'higher oil prices and significantly lower operating and exploration costs.'

However, rising oil prices were reported to have taken their toll on the refining and marketing sector where collapsing margins across the globe caused profits to fall by 32% to $1.5bn.

In the chemicals sector, major cost reductions, better volumes, lower depreciation and taxation were said to have more than offset the effects of lower unit margins resulting from feedstock price increases – earnings rose by 80% to $813mn. Gas and power profits fell, however, by 36% to $149mn.

Moody-Stuart also indicated that despite the surge in oil prices and the expectation that average prices would remain above $20/b this year, the company would continue to work at getting its business into 'good shape' where it 'makes good money at $14/b and where you can sleep easily at night at $10/b.'

Overall capital expenditure by the Group during 1999 was reported to have been cut by 40% to $9.5bn. Moody-Stuart intimated that this would continue to run in the $10bn to $11bn range over the next few years. The bulk of expediture would be in the E&P sector. Return on capital employed in 1999 was 12% – a figure forecast to rise to 14% in 2001.

Shell also announced that it planned a share buyback when new legislation permitting the Group to buy back without dividend withholding tax from any shareholder is approved by the Dutch Government in January 2001. The legislation will permit Shell to annual buybacks of approximately 25% to 80% of annual cash dividend.

The Group announced two important changes to its Board. Maarten Van den Bergh, Deputy Chairman of the Committee of Managing Directors, is retiring for 'personal reasons', and is to be replaced by current Managing Director, Jeroen van de Veer. Stephen Hodge, Group Treasurer, was named Finance Director, effective from 1 July 2000.

In Brief

United Kingdom

UK-based engineering and services *group Amec and Canadian professional services group Agra are to merge their operations in a cash and share deal that values Agra at C$514mn.*

The Edinburgh-based analyst Wood *Mackenzie, a division of Deutsche Bank, and Merak, a division of Schlumberger's operating unit GeoQuest, have formed a strategic alliance to jointly develop economic analysis and data mapping software for the oil and gas industry.*

Dramatic improvements in air quality *are expected in UK towns and cities over the next five years, according to UK Environment Minister Michael Meacher. Predicted improvements include a 12% reduction in particulate pollution and a 62% fall in benzene emissions. Key will be the transport sector where recent estimates predict over 50% cuts in pollution in the next decade.*

Europe

Elf Aquitaine has posted a 2H1999 *operational profit of $1.1bn compared with $500mn in 2H1998.*

Lukoil is understood to have blocked *the sale of BG's 50% stake in KomiArcticOil to Bitech Petroleum of Canada and Fortum Oil and Gas of Finland, announced earlier this year.*

North America

Logistics and support services provider *ASCo Group has acquired Houston-based transportation company Venture Transport in a bid to boost the Group's logistics capability in the US.*

Halliburton is to acquire from share-holders *the approximately 74% of PES shares that it does not currently hold.*

Chevron and Phillips are to combine their *chemicals operations in a new 50:50 joint venture with more than $6bn in assets.*

BG Group has concluded the sale of its *24% interest in US energy trader Dynegy to Illinova Corporation for $710mn.*

The Board of Anadarko Petroleum has *approved a capital investment programme of $766mn for 2000, 13% higher than the $680mn spent in 1999.*

NEWS Industry

BP Amoco posts record 4Q1999 profits

BP Amoco has posted a record 4Q1999 replacement cost profit, before exceptional items, of $2,123mn after adjusting for special charges of $439mn. This represents an increase of 145% on a year ago. According to Sir John Browne, BP Amoco Group Chief Executive, the 'very strong' fourth quarter result reflected the higher oil price and underlying performance improvements by the company. Full-year profits rose by 40% to $6.21bn, including special charges of $876mn related to merger integration costs, restructuring costs, asset write downs and project costs. Return on capital employed increased three percentage points to 13%.

The recent surge in oil price most benefited the exploration and production division which posted a 4Q1999 profit of $2.63mn, compared with $442mn in the same period a year earlier. Refining and marketing, however, reported an 8% fall in fourth quarter profits to $464mn – although the adverse trading environment was said to have been offset by cost reductions. Chemicals posted a replacement cost operating profit of $266mn, up 38% from the third quarter, 'reflecting cost reductions and some margin improvements.' However, the year's adjusted figure for Chemicals was 19% down on 1998, reflecting the weaker trading environment – although 'significant cost and volume improvements' were reported to have moderated this effect.

The company set itself a new $4bn/y cost saving target in July 1999, including $10bn of disposals. Sir John said that: 'We remain on track to meet the new targets laid out in July of last year, with over half the targeted performance improvement achieved in a third of the time.'

Sir John also confirmed plans for a series of share buybacks and is to seek shareholder approval for the potential repurchase of up to 10% of the Group's share capital at the April AGM.

Shell STEPS into emissions trading

Shell has launched an internal emissions trading system called the Shell Tradeable Emission Permit System (STEPS). Permits, each worth 100 tonnes of carbon dioxide or its methane equivalent, will be traded via a special internal website and managed by Shell Energy, the Group's European energy trading unit.

Each participant in the STEPS scheme will be issued with permits based on 98% of the emissions they made in 1998 (the most recent data available) – thereby committing them to make a 2% reduction over the next three years. The participants can achieve their target in two ways: either by buying permits or by investing in their businesses to reduce emissions and then selling off their surplus permits. As there are a limited number of permits, it is not possible for emissions to increase overall.

The Group has pledged to make an overall 10% reduction in its greenhouse gas emissions, compared with its 1990 levels, by 2002. Participants in STEPS will use the permit trading systems as a method of achieving their contribution to the overall Group target.

'STEPS is going to be a key factor in reaching or exceeding the emissions reduction targets we have set for ourselves,' commented Shell Chairman Mark Moody-Stuart. 'We have always maintained that market mechanisms, such as STEPS, are the best means of reducing greenhouse gases at a minimum cost to society, since they promote the most cost-effective reductions in emissions – wherever they occur.' He also stated that the experience gained with the STEPS initiative, would help the Group 'be an active participant in the design of national emission trading systems.' (Further information about STEPS can be found at **www.shell.com/steps**)

Addendum – Lukoil and Transneft

In the February issue, it was reported that Vagit Alekperov had resigned as Chairman of Lukoil – erroneously giving the impression that he no longer held any position with the company. This is not the case – Alekperov remains President of the company, but has handed over the Chairmanship to Valeri Greifer due to a legal requirement following the reduction of the state-owned share in Lukoil to 15.9% in 1999. According to Russian law, any reduction from 25% of the state-owned share of the charter capital in a private company requires the Board to split the functions of the President of the company and those of the Chairman of its Board.

It was also stated in a separate news item, that Transneft, which controls the Russian pipeline system, is owned by Lukoil. This is not the case – Transneft remains majority state-owned with all 100% of the ordinary voting shares belonging to the Russian State. There is also a certain amount of 'preferred shares' in Transneft distributed among private owners – Lukoil does not hold any of these.

In Brief

***The Houston-based El Paso Energy** Corporation is understood to be buying Coastal Corporation for $16bn in stock and assumed debt, to create what is claimed to be the US's largest gas distributor.*

Middle East

***Iran's 2000/2001 state budget projects** oil revenues of $11.1mn at $13.8/b.*

***The UN Security Council is reported to** have approved plans for Lukoil to export 4.5mn barrels of oil from Iraq under the UN oil-for-food programme.*

Russia & Central Asia

***Gazprom has indicated that it plans to** produce a stable 530bn cm/y of gas for the next five years. However, Gazprom has reported a 5.2% volume increase in sales of gas to its crucial European market. European exports accounted for 22.8% of production in 1999, against 21.8% in 1998.*

***Arco is reported to be abandoning its** investments in one of the Sakhalin projects.*

***The Kazakh Government is reported to** be planning to sell a 30% stake in oil producing company Mangistaumunagaz.*

***Surgutneftegaz is planning to acquire** a 25% plus one share stake in Rusia Petroleum, which has the licence to develop the Kovykta gas field operated by BP, reports the United Financial Group's* Russia Morning Comment.

***Yukos has acquired 10.6mn ordinary** shares (12% of the total) in Orenburgneft for $26mn, putting its total ownership above a blocking minority.*

Latin America

***PdVSA of Venezuela is reported to** have announced plans to invest $32bn in oil, gas and petrochemical projects over the next three years. Some $21bn is expected to be spent on exploration and production.*

***YPF, the Argentinian subsidiary of** Repsol YPF, has terminated its Crescendo Resources joint venture with BP Amoco, a natural gas operation in Texas and Oklahoma, with the sale of the company assets to BP Amoco and Apache for $620mn.*

NEWS Downstream In Brief

Motorists want road taxes spent on roads

Increasing levels of fuel and road tax could cost the UK's Labour Government the support of the motorist at the next election, with one in five of 1,563 UK motorists polled indicating that they would vote for another political party if there were a significant increase in the price of petrol or vehicle excise duty (VED). These are the findings of the recently published *RAC Report on Motoring*.

The study also indicated that 90% of motorists would like to see expenditure from road tax duties spent on road investment. Fewer drivers want to have motoring taxes spent on public transport, with only 14% strongly agreeing and 38% disagreeing.

If the cost of a litre of fuel were to be increased from 75p to £1, four out of ten motorists would not change their driving habits, the report suggests. Under a quarter of motorists would drive fewer miles. For a small minority of drivers, switching to public transport, walking or cycling may be an option (10%), but more would be inclined to joint protests, complain to MPs or vote for a different party at the next election (each with 20% support).

If VED were increased from £155 to £300, more motorists would join protests, complain to their MP and vote for a different party than would change their driving habits. Road tolls also proved unpopular. The report indicated that if motorists were faced with a toll of £5 per 100 miles on motorways or were made to pay a daily toll of £3 to drive into major towns or cities, one in three would simply change the roads they drove on.

The study also suggests that over three-quarters of car-buyers would favour the introduction of environmental star ratings and would take them into account when buying a used car. However, the report also indicated that car buyers currently rate environmental performance as much less important than price, fuel economy, safety and reliability.

While motorists indicated some degree of concern for the environment, only 32% of those polled felt that environmental problems had reached a critical level and required immediate attention. Most were unsupportive of measures that could reduce environmental damage. Raising the price of fuel is particularly unpopular, with only 5% of motorists saying that they would support a doubling of fuel prices over the next five years in order to reduce environmental damage. Electric cars would only be welcomed by 30%, while only 25% want a 70mph speed limiter fitted to cars. Two-thirds of motorists, however, would support the introduction of stricter MOT tests for exhaust emissions, helping target specific vehicles that are responsible for the most damage to the environment.

EC studying German payments to Elf refinery

The European Commission has suspended an investigation of state aid payments given to French oil company Elf by regional German authorities of Saxony-Anhalt in the former East Germany, writes *Keith Nuthall*. The inquiry concerned the amount of money given to Elf for the construction of the Leuna 2000 refinery project. Elf received Dm360mn for the deal, of which Brussels finds two-thirds to be legitimate and not constituted as state aid. However, the Commission has demanded that the remaining amount, Dm120mn, be frozen in a blocked account until it is decided whether the settlement is in line with EU common market rules or not.

EU targets shipping sector safety

The Council of Ministers of the European Union (transport) is to examine in detail possible actions to improve the safety of oil tankers in response to the recent oil spill from the *Erika* tanker which has polluted the coasts of Brittany, France, reports *Keith Nuthall*.

Ministers are to base discussions at their meeting on 28 March on proposals already layed out by the European Commission. These focus on increased security standards for vessels admitted to EU ports; intensified security inspections; and identification of companies financially responsible in a case of pollution.

A statement issued by the Council Secretariat said: 'Following... public emotion on the disastrous consequences of the oil spill caused by the wreck of the tanker *Erika*, the Council expressed its preoccupations concerning both the security of oil tankers and the protection of the marine environment. It stressed the need for measures to be taken at EU and international level in order to avoid such catastrophes in the future.'

The Commission has said that it intends to publish a Communication (discussion paper) on the security of ships in June 2000.

United Kingdom

UK watchdog Ofgem has called for gas *and electricity companies to come up with a method of price comparison so that customers can compare the deals offered by different suppliers. The industry has been asked to devise a price indication code by September 2000, for implementation, provisionally, in October.*

BP is to extend its alliance with Virgin *with a joint promotion offering BP customers the chance to win thousands of Virgin prizes, including luxury holidays, flights, country pursuit days, Virgin Megastore vouchers and baseball caps. Every participating customer will also receive Virgin discount vouchers. Running until 4 April 2000, the scheme is claimed to be the largest of its kind to be run with a prize pot of over £300mn.*

The Petroleum Division of David *McLean Contractors has secured a £3mn contract with Abbey National under which it will build over 250 automatic telling machines (ATMs) at Shell service stations across the UK. Work is due to complete by May 2000.*

As part of its ongoing expansion of the *Q8 Fuelcare distributor business, Kuwait Petroleum has acquired ADM Fuels in Seaford, Sussex, whose operations cover Hampshire, Surrey and Sussex.*

Europe

Repsol YPF's new Cartagena–Puertollano *pipeline in Spain has been commissioned. The 358-km pipeline has been designed to carry 7.5mn tly of oil. It has been built to supply the growing demand for oil products to central Spain and will run at full capacity.*

Centrica of the UK and Dutch company *Essent are to form a 50:50 joint venture to develop wholesale energy trading in the Netherlands, Belgium and Germany. The new company – Access Energy – will be based in the Netherlands and is scheduled to commence trading on 31 March 2000.*

Repsol YPF and RACE (the Royal *Automobile Club of Spain) are to launch a 'SOLRED-RACE' payment card for RACE club members. Cardholders will have exclusive benefits, including a 2% discount on fuel purchased at over 3,400 Repsol, Campsa and Petronor service stations.*

NEWS Downstream In Brief

Exxon and Shell top refining table

Exxon and Shell are the 'clear leaders' in the European refining capacity league table, according to a recent review of Europe's refining and marketing sector in 1999 by Edinburgh-based consultant Wood Mackenzie. The companies have a combined total capacity of 22.4%, followed by BP Mobil* with 8.6% and AgipPetroli with 7%. Overall, the top ten refiners control almost 64% of European capacity.

The report indicates that most integrated downstream companies are surplus product in Europe and therefore have a greater exposure to depressed refining margins than marketing margins. Of the 19 top players, Wood Mackenzie estimates that only Conoco, Norsk Hydro, BP Mobil and KPI operate product deficits. The picture is worse for gasoline, with all profiled companies bar KPI having refinery production in excess of gasoline sales through their own marketing sales channels. This means that there remains a significant gasoline surplus that non-refining marketers, such as hypermarket groups, can exploit.

In terms of market share, Shell and Exxon are leaders in retail and are the only companies with an overall share of more than 10%. BP Mobil follows closely with a retail market share of just less than 10%. Total and Fina's combined market share following their merger is estimated to be nearly 6.5%, just behind AgipPetroli. However, the Elf acquisition would give the new group close to 10%, rivalling Esso. Hypermarket and food retail groups account for 16% of gasoline sales in western Europe as a whole, with three French groups (Intermarche, Leclerc and Carrefour) and one UK group (Tesco) appearing in the top-20 list of European fuels retailers in terms of volume sales.

For the first time since 1993, oil demand in western Europe fell in 1999, comments the report, although at an estimated 0.5%, the reduction was modest. The average rate of growth between 1990 and 1998 was 1.4% per annum. Demand growth is forecast to slow in the future, falling to an average of 0.75% per annum over the five years to 2005, and then gently flattening beyond that date.

* It should be noted that BP Amoco and ExxonMobil were separate companies in 1998, the last year for which full market data were available for Wood Mackenzie to use as the basis for its market share comparisons.

Haulage industry's call to UK government

The Freight Transport Association and Road Haulage Association have made a joint submission to the UK Chancellor of the Exchequer representing the views of road haulage and logistics companies, own-account vehicle operators, manufacturing companies and exporters regarding fuel and vehicle taxes.

The associations argue that although the Chancellor announced in November 1999 the scrapping of the fuel duty escalator, its six-year legacy, 'together with a 114% increase in world oil prices, worsening congestion and intensive competition from foreign truck operators in the UK, has severely damaged the industry and further increases, for whatever reasons, could not be afforded.'

They are calling for the Chancellor to reduce the overall tax burden on goods vehicle operators. In order to achieve this, suggestions include:

- Freezing the rate of diesel duty at its current level.
- Reducing vehicle excise duty (VED) rates, particularly for those vehicles most vulnerable to lower-taxed foreign competition.
- Introducing a mechanism whereby different duty rates can be applied to diesel fuel for commercial vehicles.
- Providing essential vehicle rebates of fuel duty to goods vehicle operators.
- Introducing a vignette system so that foreign operators pay for their use of UK roads.

The FTA and RHA are also calling for specific measures to be taken to help reduce the impact of goods vehicle operations on the environment. These could include:

- Increasing the incentive for the fitment of particulate traps to vehicles by raising the maximum discount available to £1,400.
- Introducing a highly favourable VED rate for all vehicles meeting the impending Euro 3 emission standards to encourage the early ending of production of current vehicles.
- Announcing a VED rate for vehicles running at 44 tonnes on six axles in general operations.
- Amending the legal specification for ultra-low sulfur diesel to avoid undesirable environmental side effects.

Vopak is to acquire GATX's 50% stake *in Tees Storage Company based in Middlesborough, UK, making it the sole owner of the 230,000 cm terminal. In return, Vopak is to sell its 50% stake in Singapore company Tankstore (930,000 cm capacity) and its 50% interest in Gamatex of Belgium (486,000 cm) to GATX. Vopak will receive $53mn once the transaction is complete.*

Promgas, a joint venture between *Gazprom of Russia and Eni of Italy, is reported to have signed a deal to supply Russian gas to Italian power company Edison over a 20-year period. Initially, 1bn cm of gas is to be delivered in 2000, rising to 1.5bn cm in 2001 and 2bn cm in 2002.*

The Turkish Government is understood *to be looking to sell 15% of state oil refiner Tupras in a public offering.*

BP Poland is understood to be planning *to add a further 30 sites to its 116-strong Polish service station network in 2000.*

North America

ExxonMobil has introduced Mobil® *Drive Clean Blend™, a new synthetic blend motor oil that combines Mobil 1 synthetic technology with high-quality conventional oil. It is said to deliver all-season, all-temperature engine protection 'above and beyond the capability of conventional motor oil.'*

Canadian company Suncor Energy is *reported to be planning to invest C$100mn on alternative and renewable energy projects over the next five years.*

Oilfield services company Schlumberger *has recently launched a new website –* **www.IndigoPool.com** *– which will allow companies to market oil and gas properties, as well as data, over the Internet.*

Texas-based Tesoro is reported to have *reached a lease agreement with Wal-Mart stores under which it is to build and operate service stations with a limited selection of C-store goods at selected and future Wal-Mart locations in 11 western US states. Up to 40 sites are planned within the first year.*

Methanex Corporation is to invest *$2mn towards the cost of the engineering work for the Syntroleum's Sweetwater gas-to-liquids plant. After*

Road tankers – for the record

In the February 2000 edition of *Petroleum Review* there was an article in the Downstream News pages looking at the benefits of bottom loading. Reference was made to 'new "sealed parcel" regulations requiring all road tankers to be bottom loading which came into effect in January 2000.' In reality, the current requirements on the industry are that:

- all road tankers that could carry petrol brought into service since September 1996 must be capable of being bottom loaded, and
- the release of vapour due to dipping is no longer permitted on road tankers new since the beginning of this year when petrol is being carried in any of the compartments.

These requirements are set out in the Approved Tank Requirements under the Carriage of Dangerous Good Regulations and the Guidance Note AQ10(99) published by HSE and DETR respectively.

The Petrol Vapour Recovery Regulations 1996 (SI 2678), amending the Environmental Protection Act Regulations 1991 (SI 472), states that petrol will have to be bottom loaded onto road tankers (and other mobile containers) at all non-exempt existing terminals (ie where throughput of petrol exceeds 10,000 t/y) from the end of 2004. None of the requirements for road tankers as set out in the Approved Tank Requirements applies to vehicles first used before September 1996, unless retrofitted for bottom loading and vapour collection. However, effective vapour collection at service stations, as required by the Secretary of State's Guidance PG1/14(96) to the Regulations, can only be achieved using tankers with vapour-tight collection facilities.

The industry is currently having discussions with the National Weights and Measures Laboratory (NWML) on the implications of its proposal to move the point of sale from the delivery point – where dipsticks have been used in the case of petrol filling stations – back to the road loading meter at the distribution terminal. In some cases it is expected that 'sealed compartment delivery systems' will be fitted to road tankers to provide evidence to recipients that the metered volume of product being delivered has not been subject to interference.

Dipping of road tankers brought into service before the beginning of this year may continue throughout the life of the vehicles, even where petrol is carried. Where petrol is not being carried, dipping of new tankers will also be permitted. However, there is an industry drive to remove the need for drivers to climb on top of tankers at delivery points. This would ensure compliance with The Workplace (Health, Safety and Welfare) Regulations 1992. The alternative is likely to be the fitting of handrails on top of vehicle cargo tanks.

Bottom loading does not guarantee a reduction in risk of electrostatic discharge. A central conductor should still be provided in each tank compartment (particularly where greater than 5000 litre capacity) to encourage rapid dissipation of any electrostatic charge generated (a secondary function of dip tubes). Deflector plates on compartment inlet valves also need careful design in order to minimise turbulence during filling.

Andrew Sangster
IP Technical Manager, Marketing & Safety

Utilities Bill cuts costs for UK customers

The UK Department of Trade and Industry has published the Utilities Bill which aims to 'ensure first class utilities for all consumers at lower prices, and put right deficiencies of the present structure which fails to ensure effective competition'.

The new proposals include:

- A new principle objective for regulators to protect the interests of customers.
- A range of reforms to the electricity market – including the establishment of the New Electricity Trading Arrangements – which are hoped to lead to reductions of at least 10% in electricity prices to all consumers.
- Powers to enable fuel poverty to be tackled.
- Tough fines to be imposed on companies found guilty of bad practice or poor performance, such as misselling, interruptions to supplies and the speed of reconnecting customers. There will be no upper limit on the fines the regulator can impose.
- 'One-stop' independent consumer councils to be established for gas and electricity, telecommunications and water utilities to investigate complaints and assist customers.
- Ministers to be given powers to promote energy efficiency and electricity from renewable sources.

completion of the engineering work, Methanex plans to provide $43mn of additional funding for a minority interest in the project. Enron North America is also participating as a minority partner. (See main story p12).

***Fortum subsidiary Neste Engineering** and Kellogg Brown & Root are to jointly market and licence Fortum's NExOCTANE technology to oil refiners and petrochemical companies. The greatest demand is expected be in North America, where there are plans to convert existing MTBE plants to produce iso-octane.*

Middle East

***Saudi Chevron Petrochemical – a 50:50** joint venture between Chevron and the Saudi Industrial Venture Capital Group – has brought onstream its $650mn plant to produce benzene and cyclohexane. The plant is said to be the first, totally private, basic petrochemical enterprise in Saudi Arabia.*

Russia & Central Asia

***Tyumen Oil Company has indicated** that it plans to proceed with the modernisation of the Ryazan refinery despite not receiving a US Eximbank loan guarantee.*

***The Lithuanian Government is** reported to have invited Russian oil companies to take part in the privatisation of Mazheikiu Nafta. It is understood that between 10% and 30% of the refinery's shares may be sold to Lukoil in a bid to ensure crude oil supplies. The companies are understood to have signed a one-year agreement, which allows Lukoil to process 20,000 b/d of crude.*

***The Russian Government has turned** down the proposal of the Ministry of Fuel and Energy to lower the LPG export duty from euro 60/tonne to euro 20/tonne despite a sharp decline in export volumes, reports the United Financial Group's* Russia Morning Comment.

***Lukoil is reported to be trying to** acquire the 380,000 b/d Norsi refinery in Russia. The plant is said to be poorly equipped and its management has led the company to the verge of bankruptcy which led Lukoil to abandon its earlier bid in 1998. According to the United Financial Group's* Russia

Australian GTL coup for Syntroleum

The Pigmy amongst the giants of nascent Fischer-Tropsch gas-to-liquids (GTL) technology looks increasingly like a force to be reckoned with, writes *Fred Thackeray*. In an agreement announced by its Prime Minister on 17 February 2000, Australia has acquired for A$30mn a 'preferred country license' for Syntroleum's gas-to-liquids technology.

This is the first time that such a license has been taken up by a sovereign government for any proprietary GTL technology. The agreement includes a reduced royalty rate for GTL synthetic fuels plants. The Australian Government is also making available a 25-year technology loan of A$40mn to the company. Syntroleum, for its part, has agreed to work with Australian universities and other research institutions for the further development and commercialisation of GTL technologies. It is also to undertake a feasibility study for a large-scale GTL plant in Australia to be based on its 'second-generation' technology. This is the technology developed jointly with Arco, currently being evaluated at a 70 b/d pilot plant near Arco's Cheery Point refinery in Washington state.

Syntroleum followed up the Prime Minister's announcement with the news that it has chosen a location on the Burrup Peninsula in NW Australia for its 10,000 b/d Sweetwater GTL plant. Expected to cost with related facilities about A$600mn (about US$400mn), the plant was originally proposed to be built near Sweetwater in Wyoming. This plan was dropped, however, with a view to obtaining a lower price for gas feedstock in either Australia or Trinidad.

Gas supplies for the projected plant will come from the North West Shelf group – comprising Woodside, owned 34.27% by Shell; Shell directly; BP; Chevron; BHP; and Japanese group MIMI – a major supplier of LNG from its offshore fields to Japan. Sweetwater's supply will be under a 20-year contract for 130TJ/d, at an estimated cost in present-day money of about A$2bn. The gas supply agreement is subject to some conditions which include the closing of debt and equity financing for the plant.

The announced figures on gas supplies imply that the average price will be equivalent to about US$1.40/mn btu. This is around half current prices in the US, but close to three times the US$0.50, which is typically used internationally for preliminary feasibility studies of Fischer-Tropsch GTL projects.

The plant is currently undergoing preliminary design by INA TESSAG, a subsidiary of the major German-based electricity/gas company RWE. It is expected to go onstream towards the end of 2002. The output will be mainly high-margin specialty products, including normal paraffins, lubricants and drilling fluids. Although it will also include some production of synthetic fuels, it will not focus on these as do the principal other GTL plants at present going forward – the plants of 20-30,000 b/d currently in hand by Sasol in Nigeria and Qatar, and Rentech's 800–1,000 b/d Sand Creek plant.

At today's prices, Syntroleum estimates the plant's output over 20 years will yield total revenues of US$4.7bn. Reckoned at 10,000 b/d this is equivalent to as much as $65/barrel. These high prices are, of course, a principal reason for the plant's expected profitability at what appears to be a comparatively high gas supply price for a GTL project.

Another important feature of the agreements made by Syntroleum is that the West Australian Government has agreed to invest A$30mn in an infrastructure package. This will alleviate the size of capital spending on infrastructure which can prove a major item in an undeveloped location. The expenditure will include construction of a desalination plant which will receive steam from Sweetwater and supply it with water.

These favourable prospects for the Sweetwater project rest also on the development just a few weeks earlier that Methanex has signed a letter of intent to contribute $2mn to preliminary engineering costs and to acquire a minority interest in the project for $43mn when it proceeds. As the world's biggest producer of methanol, Methanex will bring its expertise in the production of synthesis gas, the mixture of hydrogen and carbon monoxide which forms the first phase of producing both methanol and Fischer-Tropsch gas-to-liquids. Enron also, already holds a minority interest in Sweetwater.

Morning Comment, *Lukoil has been forced to reconsider the acquisition following the Russian Government placing restrictions on exports and imposing mandatory domestic supplies.*

Asia-Pacific

***Shell Renewables is understood to be** planning to set up 12 solar centres in southern India. The company is also to establish training institutes to help young people in the rural areas acquire skills for setting up photovoltaic systems.*

***PdVSA of Venezuela is reported to be** planning a new 640mn cf/d LNG project to replace the $5bn Cristobal Colan gas extraction plant which has been deemed unfeasible. The company, together with partners Shell, ExxonMobil and Mitsubishi, are understood to be considering a project that will extract gas from offshore Paria Peninsular in eastern Venezuela and liquefy it for export to the US, Europe and Caribbean.*

***Vopak reports that its Korean tank** storage company, a joint venture between Vopak (49%) and Pumyan (51%), has acquired all the assets of Sungshin Tank Terminal (STT) at the port of Ulsan for a total of $12mn (Vopak share: 49%). The deal adds 67,450 cm of chemicals storage capacity to the joint venture's current storage capacity, which it plans to boost by a further 25,000 cm to 197,450 cm.*

The Australian property and fund management company Lend Lease Corporation is reported to have signed a deal under which it will construct 1,300 service stations for BP Amoco across 15 countries over the next five years. No financial details have been released.

***Mobil Australia is reported to be** making immediate payments totaling A$15mn (US$9.9mn) to customers affected by contaminated aviation fuel produced from its Altona refinery between 21 November and 23 December 1999. The company is also understood to be considering making assistance for business losses resulting from light aircraft being grounded due to the tainted fuel, which the national pilots association estimates is costing the sector A$50mn per month.*

Chechnyan project in the pipeline

Deputy Russian Fuel and Energy Minister, Vladimir Stanev, has announced that construction of a 312-km pipeline to carry oil across Chechnya and bypassing Dagestan is due to complete by the end of March 2000. First crude is expected in April or May, reports *Ivan Berenyi*. The pipeline has been built to re-establish the Baku-Novorosiysk pipeline link, which had been cut by violence in Chechnya and the border regions of neighbouring Dagestan.

Originally targeted to cost $100mn, the project was forecast to reach$320mn by late October 1999 and pipeline contractor Rosneftegazstroy was forced into a stop–start mode due to the uneven trickling in of funds. It is reported that Moscow had considered diverting some funds from the Baltic Pipeline System project, but the scheme was abandoned after pressure from companies interested in the development of northern oil routes. As a result, the monopoly pipeline operator Transneft was forced to finance the first phase of the bypass pipeline itself.

The Caspian-Caucasus Pipeline Direction (CCPD), founded by the government to secure financing of the project, invited a number of oil majors to participate in the project. Following a number of rejections, Transneft then announced that it had secured funding approvals from the EBRD and Sberbank – however, both refuted the claim. Russia's attempts to secure an Azeri guarantee to supply 5mn t/y of oil over five years and an unquantified Kazakh side-agreement had appeared to have drawn blanks.

However, Semyon Vainshtok, having replaced Dmitry Savelyev at the helm of Transneft, claimed in November 1999 to have received an Azeri commitment until 2003 and a mooted readiness to increase pipeline capacity to 15mn t/y 'soon'. Transneft, in the same month, also proposed the setting of an added investment tariff on oil exports via the pipeline to the Ministry of Fuel and Energy. It remains unclear, however, whether this idea has been carried through or if Lukoil, which holds 10% equity in CPC's Baku-Novorossiysk oil pipeline, came up with the cash in the end for what is a politically sensitive project.

Statoil expands in Poland

Statoil Polska is to increase its 100-strong Polish service station network from by 20 outlets by the end of 2000, increasing its investment in the network from $220mn to $300mn in the period. It also plans to build a further 100 sites by 2005, writes *Stella Zenkovich*. The company currently ranks fourth behind PKN's 2,001 stations, Rafineria Gdanska's 248 outlets and BP Amoco's 115-strong network. Statoil has also equipped 16 of its Polish service stations with LPG fuelling facilities, and plans to increase this number to 50 by the end of 2000.

Bintulu LNG plant expansion

A third plant is to be built at the Bintulu LNG facility, Malaysia, at a cost of $1.5bn. A consortium comprising Japan-based JGC Corporation, Kellogg Brown & Root, JGC (Malaysia), Kellogg (Malaysia) and Sime Engineering has secured the turnkey EPIC contract for the plant which will house two 3.8mn t/y capacity liquefaction trains. The first train is due to be commissioned by the end of 2002, the second by 3Q2003. Feedstock is to be supplied from the Helang, Jintan and other offshore Sarawak gas fields currently being developed by Petronas Carigali and partners.

***India's sub-panel on oil sector deregulation** has been reported to have recommended that the government privatise all state-run oil companies by 2005. It is proposed that Indian Oil Corporation, Oil and Natural Gas Corporation and the Gas Authority of India be excluded from the first phase of privatisation which would see the government reduce its holdings in state-run companies to 26% by 2002.*

Latin America

***Shell and Petrobras are reported to** be planning to build a $210mn LNG regasification terminal in northeast Pernambuco state in Brazil by 2005. The plant will have the capacity to convert 1.5mn t/y of LNG into 5–6mn cm/d of natural gas which will be pumped to distribution centres in Brazil and a new 480-MW thermoelectric plant to be built by the two companies.*

Africa

***Angola's state-owned Sonangol has** announced a price hike of 1,400% for petrol from $0.04/l to $0.67/l from 3 February 2000, and of 1,900% for diesel from $0.017/l to $0.33.*

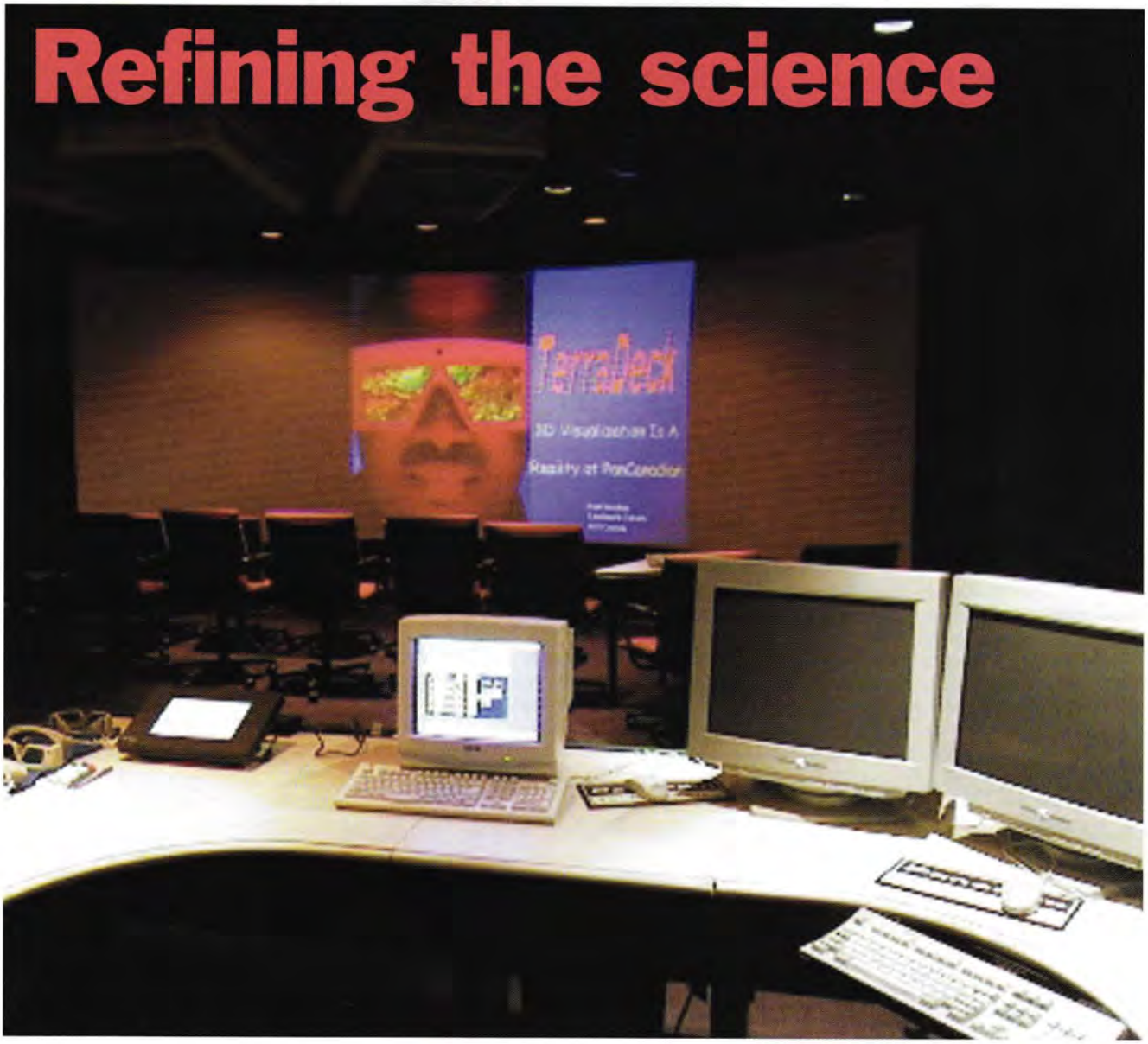
***Agip North Africa has signed a 24-**year contract to supply 4bn cm/y of Libyan gas from July 2002 to Italian power station operator Edison and private customers of Edison Gas. The gas will be supplied via a 600-km export sealine linking the Libyan coast to Sicily.*

UK Deliveries into Consumption (tonnes)

Products	†Dec 1998	*Dec 1999	†Jan–Dec 1998	*Jan–Dec 1999	% Change
Naphtha/LDF	274,010	162,141	2,882,387	2,956,716	3
ATF – Kerosene	698,536	769,866	9,047,860	9,620,566	6
Petrol	1,857,384	1,901,736	21,741,093	21,553,279	–1
of which unleaded	1,525,126	1,755,539	17,085,496	18,806,972	10
of which Super unleaded	34,222	68,751	410,585	466,045	14
of which Premium unleaded	1,490,904	1,686,788	16,674,911	18,340,914	10
Lead Replacement Petrol (LRP)	–	–	–	13	–
Burning Oil	463,028	411,440	3,607,924	3,538,834	–2
Automotive Diesel	1,261,578	1,311,808	15,106,584	15,233,191	1
Gas/Diesel Oil	624,931	598,838	7,238,652	6,731,700	–7
Fuel Oil	269,431	168,001	2,817,655	2,026,976	–28
Lubricating Oil	57,418	69,146	811,838	801,527	–1
Other Products	673,669	654,364	8,199,544	8,447.481	3
Total above	6,180,035	6,047,340	71,453,537	70,910.270	–1
Refinery Consumption	549,384	483,239	6,468,328	6,087,154	–6
Total all products	6,729,419	6,530,579	77,921,865	76,997,424	–1

† Revised with adjustments *Preliminary

Refining the science



As petroleum companies extend their search for oil into the deepest, darkest corners of the planet, researchers are continually refining the science of geophysics, writes *Gordon Cope*.

A number of intriguing new developments have been made in the acquisition, processing and interpretation sectors in recent months – all of which aim to more effectively locate potential hydrocarbon deposits which, in turn, reduces risk and cost for the oil companies. The following not only summarises some of the latest refinements in geophone technology, neural networks, 3D visualisation and immersive technology, and 4D seismic, but also takes a look at a new innovation – the use of passive sonar imaging in geophysics.

Advances in geophones

The technical laboratory for CREWES (Consortium for Research in Elastic Wave Exploration Seismology) is located in the basement of the Earth Sciences building at the University of Calgary. In its 10 years of existence, CREWES has pioneered a wide range of experimental data and innovations, in the fields of multi-component acquisition and processing. But, down in the lab, it is clear that acquisition is king.

Malcolm Bertram is a Senior Laboratory Technician with CREWES. 'Manufacturers of single-component geophones says that they should be within at least 10° of vertical, but that's way out of spec for three-component geophones,' he says. 'They should be within 2° of level, but it's difficult to plant and align the azimuth to those specs and still get a good coupling.'

Bertram digs through a pile of cable until he finds a bright-red, three-component geophone. It contains an awkward levelling device consisting of a metal bead rolling around in a plastic case, reminiscent of a child's toy. 'Try leveling and orienting one of these while maintaining good coupling,' he states. 'You can degrade the quality of shear data otherwise.' He throws the geophone back into

the pile. 'In effect, the juggie determines the quality of your final section.'

Going over to a test bench, Bertram picks up a device recently patented by the University of Calgary. It is a clear, acrylic cylinder, about the size of a large tin of fruit juice. 'We call it the auto-leveling 3C geophone,' he proudly notes. The product of over a thousand hours of research and design by Professor Robert Stewart, Bertram and fellow technician Eric Gallant, the geophone consists of three sensors that are mounted in a ball that floats freely in a liquid within the acrylic cylinder. 'We're ready to try out prototypes in the field now,' says Bertram. 'It can automatically level the elements, even if it's 30° degrees off vertical.'

Geophones that automatically orient themselves are particularly valuable in special application projects, such as ocean bottom cable (OBC). 'Three-component OBC acquisition has great potential because it supplies excellent converted wave data,' says Bertram. 'You don't have the land problem of near-surface weathering that is destructive to the shear wave.'

But it is difficult and/or expensive to position geophones at the bottom of the ocean. 'Some companies actually used robotic vehicles to plant geophones at a depth of 100 metres. However, it was a very tedious process every time they wanted to move the cable.'

Just as it is in surface work, orientation of the geophone is critical to the quality of OBC data. 'Getting the azimuth isn't bad, because it's the direction you're dragging the cable,' says Bertram. 'But the geophone needs to be upright. That's where our system works to automatically level itself.'

Solid-state geophones also hold great promise. IO, a Houston-based firm, recently unveiled its VectorSeis, which is an all-electronics geophone. 'The VectorSeis doesn't care which way you put it on the ground. It is able to detect the vertical direction from gravity, then determine the three axes of orientation,' explains Bertram.

But the University of Calgary device has an advantage in cost. 'We use standard elements, so they'll be quite cheap to manufacture. Our geophone won't cost much more than the standard 3C geophone.'

One hurdle for the unit is finding a liquid that maintains phase stability in temperatures ranging from –50°C to 50°C. 'Our system "as is" will work well on the ocean bottom, where it is at a fixed temperature,' comments Bertram.

Neural networks

A neural network is a software program that mimics the multi-path, interactive nature of the brain to process information on the basis of probabilities, rather than the yes/no, binary-type computing. In geophysics, neural networks are used both in interpretation and processing. In the latter, neural networks have been attempted for activities such as picking first breaks (the first arrival of a reflected signal at a geophone).

In order to programme the neural network, the geoscientist supplies examples of first break arrival times to 'teach' the program what they 'look' like. The neural network computes a series of attributes using a complex series of algorithms, and then tries to apply what it has 'learned' by making its own picks.

Landmark Graphics Corporation, which is based in Houston, uses neural networks in its ProMAX suite of seismic processing tools. 'We have algorithms that attempt to automatically pick a variety of geophysical attributes such as first break arrival times, noisy and/or reversed traces, horizons, and velocity analysis semblance panels.' says Dan Grygier, Product Manager of seismic data processing projects for Landmark.

Grygier admits that, to date, neural network applications have not been wildly successful. 'It has not worked well for velocity analysis, for instance, especially for noisy land data or any area of complex geology. Hardware really isn't the problem; the roadblock is more related to the fact that the neural networks expect things to be very similar. In the presence of noise or rapid variations in lithology or structure, things change very rapidly and unpredictably, making it difficult for the programs to find adequate similarities to make accurate estimates.'

Over the next decade, Grygier predicts a good news/bad news scenario for neural networks. 'There is opportunity for the sophistication of algorithms to increase dramatically and adequate hardware on which to run the programs should be readily available. But it is probable that the noise problem will worsen. With the growing popularity of multi-component data sets, it is quite probable that the mode-converted shear data will have a much lower signal/noise ratio than the conventional P-wave data.'

Migration

In a geophysicist's perfect world, all geological beds lie horizontally, making it easy to calculate their depth and position. In the real world, however, beds are faulted, tilted and folded, distorting the true location of a reflection. Migration is a mathematical technique that restores the reflection on a dipping target to its correct position.

Traditionally, migration has focused on the two-dimensional aspect of the problem, but now academics are busy researching applications in three-dimensions.

'Given today's increased computing capabilities, 3D pre-stack migration is feasible,' says Professor Larry Lines, Chair of Exploration at the University of Calgary. 'Researchers are also examining imaging methods that account for the fact that seismic velocities vary with the direction of wave propagation. Migration can be used to account for anisotropic properties of rock, or the velocity variation with direction.'

Velocity variations in rock can arise due to layering or non-homogenous properties, such as a north–south fracture pattern created by structural deformation. The effect of anisotropy on a seismic image is to systematically distort the true location of reflectors.

One method that researchers are using to solve for anisotropic migration is by using 'movies' to fine-tune velocity parameters. A movie is a series of processed seismic sections in which velocity parameters are experimentally altered to create a subtly-evolving sequence. 'Velocity analysis and migration are closely coupled,' says Lines. 'You find the best movie that's focused.'

Until recently, creating movies was a time-consuming, cumbersome process. 'I was doing some processing of marine 3D data at Hibernia, and it took one Sun workstation one-and-a-half weeks,' says Lines.

Fortunately, recent advances in programming have made the movie technique a great deal more practical. 'A programmer wrote me some code in parallel computing,' says Lines. 'It now allows us to solve computationally intensive problems by using an array of processors to compute simultaneously. It reduced the Hibernia run time to two hours. That's hundreds of times faster.'

The process will allow much better resolution in complex structural areas with problem lithologies, such as shales. 'Ten years down the road, we'll have faster programs and better migration velocity analysis. I foresee the development of a database to allow us to migrate steeply dipping shales.'

As barriers to complex processing procedures are lowered, the focus will shift back to acquisition. 'You still need good data,' says Lines. 'We'll see more multi-component geophones used to get a complete picture of elastic waves.'

3D immersive technology

PanCanadian have recently unveiled Calgary's first major 3D immersive environment. Installed in a 10 x 12 metre

room painted completely black, the huge, 20 sq metre, semi-circular screen fills an entire wall from floor to ceiling, allowing up to 30 people to explore for oil and gas in stereoscopic splendour. 'We call it our TerraDeck,' says Dick Walker, Project Manager. 'It lets your mind go places you couldn't have imagined before.'

Over the last decade, there has been an exponential growth in the size and popularity of 3D surveys, inundating the geoscientist with immense volumes of data. This growth has led to the development of volume visualisation, in which the seismic trace is sampled and converted into a voxel volume, or a 3D, cubic representation of seismic data.

Depending on the user's needs, the seismic trace conversion to a voxel volume can be defined for reflectivity, acoustic impedance or other attributes. 'When combined with log data, it allows you to begin to understand the depositional system,' explains Murray Christie, Manager of Paradigm Geophysical's Canadian operations. 'You can see how a channel was formed, for instance. You can display data based on the rate of change; this allows you to clearly visualise lithological edges.'

Faults, fluids and layers also show up clearly in the data. 'You can start to map out the internal architecture of the reservoir,' says Christie. 'It is so detailed that engineers can do a well-path plan to exploit the sweet spots.

Once the data has been interpreted, it can be displayed in a sophisticated, immersive environment in which geologists, geophysicists, engineers and management can all participate.

Landmark, with their Decisionarium system, is a pioneer in the field of 3D imaging, and assisted PanCanadian with their TerraDeck visualisation environment. 'Management truly appreciates the value of these systems as they can really see what geoscientists are talking about,' says Nick Purday, Product Manager, Volume Interpretation, for Landmark. 'Another advantage is getting the asset team into a single room. Often, it is not until all the team members work in this type of environment that they understand the complex data relationships.'

For explorationists, the potent combination of 3D visualisation and immersive technology heralds a whole new decade of opportunity. 'Fifteen years ago, companies started using 3D seismic as a tool, and there was a tremendous increase in field reserves and drilling success rates,' says Walker. 'I believe this is the next threshold, and we'll see another quantum change. I have no doubt in my mind that it will save lots of money, especially in offshore wells, where it will significantly reduce risk.'

4D geophysics

'4D refers to time-lapse, 3D seismic monitoring, explains Keith Hirsche, a Senior Research Geoscientist at Hampson Russell Software Services. 'However, the name is misleading because the same technique can be applied to well-logs, vertical seismic profiles (VSPs), 2D, 3D or 3-component data.'

Currently, most companies use 4D seismic to explore in mature fields. Using pre-production legacy 3D data as a control, oil producers re-shoot seismic over a field in order to search for production-related changes in the data. 'In its simplest form, when a field is discovered using bright spot techniques, you are looking for the remaining bright spots that might indicate by-passed oil,' says Hirsche.

While time-lapse seismic monitoring is designed to illuminate the production-induced changes in the reservoir, other factors can cause changes in the seismic response.

'Time-lapse differences in the seismic data fall into three major groups, says Hirsche. 'The first group are artificial differences, which are caused by such things as changes in acquisition geometry, processing sequences, and migration velocity.' A second category is referred to as non-critical, real differences. 'You can get real differences that have no relation to the production-induced changes that you are looking for,' says Hirsche. 'Water temperature, tidal fluctuations, permafrost and shallow gas production can all have an effect.' The third category is caused by production-related changes in the reservoir. 'These are the differences that are caused by changes in fluid saturation and pressure in the reservoir. This is what you are interested in.'

A significant amount of 4D research is focused on eliminating changes caused by the first two categories, but a great deal of experimental work involves interpretation. 'When you do see a production-related difference in the seismic, it's simply a blob,' says Hirsche. 'What does it mean? The same seismic response can be caused by a number of production scenarios.'

According to Hirsche, integrating geological, petrophysical, and geophysical information is critical. A consortium of oil companies has sponsored a project at Hampson-Russell to integrate 4D analysis software. 'By bringing all the tools together, you can streamline the process and remove spurious effects,' says Hirsche. 'You can then take your analysis of the production-related difference and check against the engineering data to see if they balance.'

While the current use of 4D is mainly reactive, Hirsche foresees the technique being employed to plan more efficient recovery. 'We'll proactively tie the information into reservoir simulators to design better production programs. This will be especially important in deepwater targets where a field is produced with a small number of wells. In order to achieve optimum recovery, you'll be able to put best production practices upfront.'

And beyond...

'About four or five years ago, there was an article in *Scientific American* about passive sonar imaging, in which they used waves on the surface as the ambient source,' recalls Jim Laing, a Seismic Processor and Programmer at Apoterra Seismic Processing. Laing, who envisions pie-in-the-sky seismic systems as a hobby, was intrigued. 'I realised we could do something similar with seismic. In built-up areas, car traffic and other man-made noise, contaminates the seismic signal; what if we used the contamination as the signal, however?'

Laing's system, which he calls passive seismic imaging, or PSI, would require an innovative gathering device. 'It would be a self-contained sensor with a transmitter to send data real-time. You could use the transmitter to locate the geophones.'

One potential use for PSI is in oilfield monitoring for steam injection. '4D seismic is just repeated 3D, but with PSI, you could do continuous imaging,' says Laing. 'You have a built-in source of noise with the pumps.'

A major problem with PSI, however, is the source of ambient noise. 'Most seismic work is done in the 10 to 80 Hz range,' he notes. 'Ambient noise from natural sources, like earthquakes, is in the 0.01 to 10 Hz range. But wind noise, which is broad-band, might be more useful.'

Another hurdle is that the hardware for PSI currently doesn't exist. 'You could probably take existing components and reconfigure them,' says Laing. 'Solid state geophones are already happening, they're coming off the lab bench.'

The biggest drawback, however, is the processing package, or lack thereof. 'Because the information is in real-time, the software would have to be configured with running windows on the input and correlations on channel-to-channel.'

On the other hand, all that PSI would take to develop is time – and a lot of money. 'If you've got $10mn, then I'm your man,' he jokes.

Wave of the future

As we enter the millennium, pressures continue within the oil and gas industry to lower costs and to be ever more productive with fewer available resources – physical, financial and human. However, the demand for improved performance and profitability can only partially be met by seismic software, underpinned by new web-enabled technology. The industry requires a more holistic approach integrating all relevant exploration and production data. Such a model will not only be maximally effective in predicting where and how to drill, but will also optimise the results of previous and ongoing exploration and production activities, writes *Eldad Weiss*, Chairman and CEO of Paradigm Geophysical.

In the past, the exploration sector of the oil and gas industry has been well served by vendors of seismic data analysis software. We believe that in the future vendors will also need to serve the production sector by offering seismically-driven reservoir characterisation and monitoring solutions that fully integrate wireline and other legacy data. The industry will demand extremely powerful and sophisticated tools – ones that are affordable and easy to use, and that minimise the cost of reservoir development while optimising lifetime productivity.

Next-generation reservoir management solutions are needed to help oil and gas companies determine next-week production requirements, plan for short-term seasonal demands (three to six months), arrive at medium-term (12 to 36 months) field development plans, and determine 'develop or dispose' strategies that optimise income and return on investment from a given reservoir. These solutions will also be required to:

- Provide near real-time responsiveness.
- Integrate diverse databases.
- Integrate diverse geoscience and engineering disciplines.
- Integrate financial investment and operational cost modelling for better decision-making.
- Offer optimal utilisation of computing solutions, from dedicated high-end processing to use of web-enabled technologies.

Enablers of change

Developments in geoscience and in the now allied fields of computing, measurement and telecommunications technologies enable us to provide – and companies to afford to buy – solutions meeting these criteria. These solutions will allow companies to get the most out of existing and newly acquired data, and to create new knowledge from geoscience-based analyses to achieve the ultimate objective of reservoir characterisation, monitoring and forecasting. Advances in computing power have significantly reduced processing time and the cost of equipment has dropped dramatically. With time and cost factors no longer considered serious constraints to reservoir management processes, the industry will expect to move to at least near real-time solutions.

Developments in mathematics and computer science enable computers to manipulate and analyse ever-larger volumes of complex data sets while maintaining data integrity. Advances in data-compression technology allow analysis of compressed data sets with significant savings in processing time, and permit effective transmission of large data and graphic sets across communication links. This in turn leads to expectations for ultimate web-based delivery of solutions.

These advances are critical enablers for handling large seismic data sets and graphic-intensive images of the prospects.

Computing languages and architecture have evolved such that the market can expect a number of advances in the structure and functionality of next generation applications:

- Applications may now be platform-independent. They can seamlessly co-exist between Unix, Windows NT, and Linux operating systems. They can be integrated with web-based applications and installed on systems ranging from laptops to super computers.
- Advances in applications' architecture now permit the development of a modular common infrastructure which, when combined with open systems architecture, become a critical enabler for the seamless integration of diverse applications with legacy databases.
- We can expect continuing advances in visualisation technology that will be critical for the imaging of complex multi-attribute geoscience data sets. In particular, this will advance the imaging of high-resolution and complex prospect modelling.

Taken together, these advances enable the development of new graphics-intensive multi-application solutions with unprecedented levels of geoscience integration and with uniform functionality across all computing environments.

Rapidly developing web technology is creating a paradigm shift in how we can provide IT-based services. The web removes location and access barriers, and permits outsourcing of IT systems management. This means that IT resource-intensive geoscience applications will be deliverable over the web, reducing or even removing the burden of data base management, applications and IT systems maintenance from the oil and gas industry. Web-enabled geoscience applications will become easily accessible globally – a critical efficiency factor for the worldwide operations of the oil and gas sector.

The global oil and gas industry is experiencing human resources attrition

as industry-wide downsizing together with changing education and career trends result in fewer geoscience professionals doing more work. The knowledge drain is expected to become an increasingly serious management issue for many companies. Solutions providers such as Paradigm, with extensive experience in the field, will become logical repositories for geoscience knowledge, able to leverage their research and development expertise to deliver further geoscience advances.

The Paradigm vision

To respond to these challenges, in 1998 Paradigm embarked on a strategy to be the leading geoscience knowledge company with the broadest and most effective range of integrated productivity offerings for the oil and gas industry. The desired impact of this strategy on the industry can be summarised as follows:

Asset teams and new workflows

The asset team approach has increasingly been adopted by the oil and gas industry. The need to reach more accurate and less risky decisions in less time and with fewer resources can be met by ensuring that different geoscience disciplines work well together in the asset teams. To make these teams more effective in achieving the reservoir lifecycle optimisation goal they need a new set of tools and associated workflows to facilitate and integrate this interdisciplinary approach.

Mega-applications, which are supported by the shared-earth model, redefine the workflows for the asset team. They enable simultaneous analysis by each of the disciplines of a common data set. This is a significant benefit, since each specialist will have real-time information on results from the rest of the asset team's analyses. An asset team's joint output and decisions will be significantly improved and results will be achieved in a far shorter time.

Deployment of new technologies

Next-generation software solutions will provide real-time refinement of the sub-surface prospect model, the drilling programme, and well-path engineering using drill rig data obtained during drilling and changes in the fluid flows of the reservoir. These solutions will allow for improved high-resolution prospect modelling and be tied to surface utilities modelling to ensure a balanced system with predictable and manageable results.

Embedded solutions in new integrated mega-applications will complement the knowledge and experience of company geoscientists and engineers who must handle more work than ever before. These solutions will then enable optimal use of scarce human resources, allowing them to apply their skills to interpretation of results and decision making, rather than to the management of data and its analysis.

Next-generation geoscience knowledge solutions will give asset teams access to a shared-earth model for the asset, allowing team members to work together more effectively and efficiently. These solutions will also deliver more sophisticated decision-making tools with financial scenario modelling capabilities.

Integrated mega-applications

The oil and gas industry is struggling to cope with both stand-alone geoscience and engineering solutions and too many micro-applications, each focusing on a niche in the overall workflow. The sheer volume of professional software programs used in the industry has ballooned in response to the demand for highly specialised niche applications. The average geologist working today is expected to be familiar with as many as 22 different applications. Geophysicists and engineers must each deal with more than 40 different applications in order to do their jobs. Fifteen years ago, these same professionals worked with fewer than 10 applications.*

Embedded solutions that feature in mega-application sets, with scientifically valid links between them, will allow company geoscientists, engineers, asset teams and other professionals to actually share a common-prospect model. This re-integration of disparate geosciences will be accomplished by incorporating the latest advances in relevant oil and gas fields (for example, the complete seismic data analysis process using time, depth, AVO (amplitude variation offset) and rock physics). The embedding of the geoscience linkages represents the biggest challenge to achieving reservoir optimisation; it can best be accomplished with such next-generation geoscience solutions.

Decision tools

Oil and gas corporate decisions on reservoir exploitation are now-a-days informed by the output from the geoscience applications. These applications do not provide decision analyses, but are only geoscience descriptors of the prospect and a range of possible scenarios. Operations and investment decisions ideally require knowledge and an analysis of options, and a financial evaluation of alternatives. Today, neither decision valuation tools nor the risk evaluation of the prospect are integrated with the geoscience descriptor tools. Next-generation geoscience solutions must address the decision issues, providing both qualitative and quantitative outputs that are fully integrated with risk assessment, and cost-benefit valuations of alternative scenarios and solutions.

Looking ahead

Paradigm's vision is to provide the oil and gas community with solutions that are integrated and holistic, and span a myriad of disciplines. Every aspect of reservoir management will be at the fingertips of each and every member of the asset team. Results of analyses performed by geoscientists and reservoir and engineering specialists – all aimed at optimising the reservoir lifecycle – will be immediately available to all team members. Delivery of a shared-earth model will give the total picture, moving reservoir management solutions into the next generation of efficiency and ease of use.

* Pohlman, J. 'Geoscientists coping with more work, less training, more software, less help.' *Offshore*, October 1999, p 175.

Technology, technology, technology

Addressing the annual IP Luncheon at the Dorchester Hotel *Lee Raymond*, CEO of ExxonMobil, told his audience of senior oil industry executives about his optimism for the future. He noted in particular the way that new technology can deliver the cost reductions and new opportunities needed to give the oil and gas industry a bright future.

Chris Moorhouse, IP President; Lee Raymond CEO, Exxon Mobil Corporation and Jeff Pym, IP Director General at the Dorchester Hotel

He said:

We come together at the start of a new century and, more importantly, to think a little bit about where it is that we in this industry are going. At the outset I must say I am optimistic about the future of our industry. I see many opportunities for it to contribute to the well being of people around the world.

My optimism is no doubt affected by the recent combination of two great companies into ExxonMobil. In addition, one of the main reasons why my optimism is a subject I would like to talk about is the important role that technology will play in the future of our industry and the world economy. I believe our industry needs to shine the spotlight on the huge role technology plays in our business and the amazing technological progress we have made.

Shaping life as we know it

We might begin by thinking for a moment about how technology has shaped our lives in the past. During the past century alone we have gone from the horse and buggy to the age of the automobile, the jumbo jet and the space shuttle. Humans have travelled to the moon and back and are probing further and further into outer space. Modern medicine has improved our health and advances such as fibre-optic cable, computers, telecommunications technology and the Internet have increased our ability to learn, to communicate, to solve problems and, ultimately, have drawn everybody around the world closer together.

Many young people today are fascinated by science and technology. In fact, in one recent survey in America, almost 50% of boys and 40% of girls (which I think is a striking number) were interested in pursuing a scientific discipline. But I am afraid that today some students, as well as adults, see our industry as a sunset industry run by old dinosaurs and not an essential partner in the new network, global economy.

It is true – we are a relatively old industry compared to wireless 'phones and the Internet, but we are also as up-to-date as the latest satellites or the largest computers used in exploration, or the leading edge technologies we use to produce cleaner and more efficient fuels and lubricants. This industry was using computers before it was cool and hi-tech. Our dependency and development of this technology has led to greater efficiencies and safer operations. Consider for just a moment the process controls and warning systems we have today in a modern refinery, a natural gas facilty or a chemical plant. Or for that matter, even at our marketing terminals.

Look at the way technology has revolutionised our industry from the latest 3D visualisation techniques used in exploration to the newest metallacene catalysts that are changing the world of plastics by creating molecules so perfect that manufacturers can design major improvements in everything from diapers to food packaging.

Those of us in this room marvel at the astonishing complexity of deepwater drilling in producing, with skyscraper-sized platforms that float in waters nearly a mile deep. There is no question that an offshore oil producing platform in the North Sea is every bit the technological marvel as a project by the US National Aeronautics and Space Administration or the European Space Agency. It isn't outer space, but it is deep water in a hostile and unforgiving environment where leading-edge technology meets complex geophysical conditions from extreme temperatures and water pressure to ocean currents and marine life.

In fact, using robot submarines ExxonMobil has even produced video tapes of rare sea creatures in action, including the first ever live images of an octopod, a relative of the octopus that lives only at extreme depths in the ocean. Millions have watched space launches, but how many people will ever experience the wonder of being on an offshore platform? Very, very few.

In marketing, our customers want to get gasoline faster and easier than ever before. Our competition became the supermarkets that began selling gasoline with groceries. We had to team up with fast food franchises in order to offer busy customers both conveniences. Our stores had to become just that – a convenient place to get fast, fresh food and fill your gasoline tank. With technology we can offer faster fill ups than ever before. Radio waves and encrypted codes turning on the pump when you pull up. All you have to do is fill up and go. With robotic technology soon you may not even have to get out of your car.

So technology is one of the key reasons I am excited about the prospects for our industry. Our raw resources may be the same, but our processes and technology are truly state-of-the-art. The result is that we are able to find more oil and gas at

Left: Top table: (L–R) Chris Moorhouse, Lee Raymond, Ansel Condray, John Mills, Terry Moore, Jeff Pym, Gary Jones, Peter Newman and Mark Moody-Stuart. Right: Guests enjoying pre-lunch drinks at the Dorchester

lower cost than ever before and produce an amazing array of cleaner and more efficient fuels and improved products.

The upshot of this technological revolution is that oil use is much higher than it was forecast to be some years back. For example, 15 years ago the IEA projected Free World (and that's another phrase from the past) oil usage of 54 million barrels a day, but the actual number will be about 67 million barrels a day this year, about 25% higher.

In looking into the future, we see oil consumption in 2020 being some 50% higher than was forecast just 15 years ago. Natural gas consumption is expected to grow even more rapidly, with coal and nuclear having much lower shares of the energy mix than we thought of about 15 years ago.

Technological change has been a key factor in maintaining oil and natural gas as the world's energy mainstays and that means that continuing research and development will have to be a core function of the oil companies. You know me and my company well, and know that we will consider every means to reduce costs, increase efficiency and boost shareholder return. That includes out-sourcing non-critical functions – but in my view, research and development are critical functions.

As I told our worldwide senior managers just a couple of months ago, technology is our lifeblood and the key to our future competitiveness. I am sure that many of you feel the same way. At ExxonMobil we do not believe we can afford to look outside for the leading edge technology we need to succeed.

During the recent merger and resultant reorganisation, we continued our research and development efforts in every business unit – upstream, downstream and chemicals. A feature of our approach to technology is we bring together the developers and the users. That way, when people and operations run into a problem, they know who to call.

We focus our research and development efforts on oil and natural gas and that raises a question in some people's mind as to why we aren't doing more work on so-called energy alternatives. I realise that some companies have begun to explore such options and we wish them well. What many don't realise is that our company was significantly involved with alternatives forms of energy, including solar and nuclear, some 20 to 30 years ago.

After considerable expenditure – in today's dollars, I think it's billions – we decided again and again when we revisited this issue, that it made better sense for us to concentrate on our core energy and petrochemical business. That continues to be our decision, though we encourage the economic and environmentally sound use of any energy resource, including hydrocarbons. With today's developments, renewables like wind, solar and biomass can be players only in niche markets when they don't have to compete with abundant, affordable and efficient fossil fuels. They appear to have potential, but costs must be reduced significantly and performance dramatically improved to be competitive. It would have to take a large, dramatic breakthrough in technology to make them fully competitive.

Nor do we expect battery and fuel-cell cars to become dominant in the next twenty years if the free market is left to decide. No one with today's technology has produced a battery with anything close to acceptable performance for widescale use. As for fuel cells using hydrogen, safety remains a serious, unresolved issue, as does the lack of infrastructure.

We do need attractive alternatives and those that meet these criteria will succeed in a free marketplace. However, we are opposed to mandates and subsidies that distort energy markets, decrease the efficiency and ultimately raise costs to consumers.

So, excluding a major technological breakthrough with a significant short to medium-term impact, oil and natural gas appear to be the energy sources the world will depend on for the foreseeable future. This brings me to two additional reasons why I'm optimist about our industry's role in the new century.

Thanks in part to technology, we are in a good position to fulfil two fundamental human aspirations – economic progress on the one hand, and a safe, healthy environment on the other. As I look at the world economy, I see good prospects for healthy growth in the years ahead.

Although it's difficult to quantify, I believe that ever broader and deeper penetration of information technology is boosting productivity more than we had expected. This development is spurring economic growth in the US and I foresee it doing the same in Europe and Japan in time. Since World War II periods of economic expansion have grown longer in the developed countries and down turns shorter, with the US now in its longest post-war expansion. It is also good news that Asia appears to have turned the corner from its economic difficulties of the past couple of years and recovery is underway.

I expect that region, and to a lesser extent Latin America, to lead global growth rates over the next 20 years. That's very positive for the oil and gas industry, but we must continue to work for a safe, clean environment. I believe that all of us in this industry, ExxonMobil and all of our competitors, want the same thing as responsible environmentalists because, in fact, we are responsible environmentalists and we have a great, unacknowledged environmental record to prove it.

Our achievements rarely get the headlines because they are the exception not the rule. We want, and strive for, clean air, soil and water for our children, for our grandchildren and for ourselves. The history of major industrial economies tells us that we can have both economic and environmental progress at the same time. Since 1970 emissions of major air pollutants in these countries have decreased sub-

Left: (L–R) Pierce Riemer, Director General, WPC; Chris Hopson, London Editor, *Upstream*, with Angelo Iannelli also from *Upstream*. Right: The Annual Luncheon, an ideal meeting place for business contacts and associates

stantially, despite increases in population, gross domestic product and vehicular miles travelled.

Over this same period, our industry has produced progressively cleaner burning motor fuels on both sides of the Atlantic. With new fuels from the petroleum industry and new technology from the auto industry we have reduced tailpipe emissions from new cars by 95% – I am sure we will make further progress in the years ahead. Economic studies also support the notion that environmental improvement and economic progress requiring energy go hand in hand.

For example, a study at Princeton a few years ago found that, after an initial decline, a nation's environmental improvement grew as its economy grew. We agree with this, based on the experience we have seen around the world. Moreover, we observed that this is now taking place sooner and sooner in the development cycle and is being facilitated by the very sorts of technology we encourage and by the easier availability of technology through international trade.

The prerequisite is growth, but the solution is technological improvement and free markets. So I think the notion that we need to choose between economic and environmental progress is in fact wrong. Combined with technology, the two actually complement each other. But this is not the conclusion drawn by some people who are concerned that rising carbon dioxide and other emissions from fossil fuel use will cause global temperatures to climb with serious consequences.

As with all the other subjects I have discussed today, I believe that science and technology are the keys to resolving this issue. Understanding the Earth's climate is one of the most difficult challenges humans have ever attempted, involving myriad, complex variables. We don't pretend to have all the answers and we don't believe anyone else does either. However, we recognise the potential for climate change caused by elevated levels of $C0_2$ in the atmosphere is a legitimate concern and reducing the scientific uncertainties is in fact very important. So we are working to improve scientific understanding.

We have funded studies at numerous major research centres, such as an MIT, Carnegie Mellon and the Hadley Centre for Climate Prediction and Research here in the UK, and many others. As with other challenges our industry has faced, progress will require the development and application of new technology. The Business Roundtable, an organisation representing some 160 leading US companies, believes that over the long term the deployment of more energy efficient technologies and the development of new and breakthrough technologies constitute the most effective responses to concerns about possible changes in our climate – we agree.

For its part, ExxonMobil is playing a leading role in research to develop and apply technologies that reduce energy use and emissions. Our partnerships with General Motors and Ford to develop fossil fuel powered fuel cells for automobiles are a prime example. We have also formed a long-term alliance with Toyota to develop environmentally friendly, next generation automotive systems and fuels with significantly lower emissions and improved efficiency.

I am optimistic that technology can lead the way to the resolution of this environmental challenge, as it has with so many other challenges our industry has faced. With the aid of technology we can protect our environment, sustain economic prosperity in the developed world and provide economic opportunity for the developing world. We must remember that eradication of poverty and achieving minimal health standards are some of the world's top priorities. Economic growth, which requires access to energy, is the key.

We also need to do a much better job at communicating, especially about technology. We must not forget that the very concept conjures up fear in some people. Technophobes see threats where we see opportunity. It is true that this discipline occasionally has its setbacks and disappointments, but I believe we need to get out the message and show people that we are using innovation for the betterment of people and for the betterment of the environment.

Satellite technologies enable us to explore with great precision before we ever touch the Earth. Horizontal drilling has revolutionised the extraction process, reducing impacts to surface areas. Fuels today are cleaner and more efficient than ever before, minimising humans' impact on the planet. Over time, we are learning more and more about how to safeguard the Earth and increase the well being of the people who live on it.

With sensitive stewardship and technological innovation we are finding ways to advance both causes. We in this industry bring big projects, capital, technology, employment and educational opportunities to development and production locations around the world. We are used to working with local people to get the job done right. Sometimes this involves providing assistance with the water supply, hospitals, schools, and much, much more.

In closing, let me say simply that I have a great expectation for the oil and gas industry in the century ahead. With continued technological improvements I know we can meet the challenges that lie ahead and move to a more prosperous future.

Our industry's technology benefits people and nations around the world. If together we do a better job of explaining our industry and its technology, we will increasingly gather the support we need to progress this industry further than any of us think possible today. Who knows which one of us will discover the next technological breakthrough? I certainly don't, but I am confident that whatever it is, we in this industry will employ those breakthroughs ultimately for the benefit of mankind.

Cooperation to improve competitiveness

The Rt Hon *Helen Liddell*, MP, the UK Government's Minister for Energy and Competitiveness in Europe, described the close and cooperative relationship between the government and the industry and the move to more open and competitive energy markets in Europe. Both developments that were to the benefit of the UK and its citizens. The following are edited highlights of her speech.

I am delighted to look round this room and see so many happy, smiling faces. I suspect it is not unconnected with Brent, which at $26 per barrel is making things a lot more prosperous for you than they were this time last year. I care very deeply about the future of this industry – its success is important to the whole country. The need for major investment in the North Sea and the business, and the national case for making that investment, remains as powerful as ever. However, I want also to talk about the wider economic and political context, in particular, about the major effort we are making to open up energy markets in Europe. I am very much aware of the extent to which developments in the United Kingdom are being watched with very, very close interest internationally and I hope that the United Kingdom will continue to be talked about as we go on setting the pace, working in partnership together.

I am enormously grateful to the men and one or two women who have contributed to the Oil and Gas Industry Task Force. I think that the partnership was a very effective demonstration of what a new Labour Government can do working in partnership with the industry. I am conscious that much was achieved, but a huge amount remains to be done – so tonight, I want to give you what is very much my personal vision of the future as the Minister, not just for Energy, but also for Competitiveness in Europe.

Energy policy

We want diverse, secure, sustainable supplies of energy at competitive prices – supplies which are available to business and consumers through competitive and well-regulated markets, both here, and abroad. Turning to my European responsibilities, I am the first Minister to be responsible both for energy and for competitiveness in Europe. UK energy markets are already among the most open in the world and the legislation that I am piloting through Parliament – the Utilities Bill – will make them even more competitive. I am not satisfied with that – and neither should you. Regulation and liberalisation are not domestic issues. Markets, especially for this industry, are no longer local and when we talk about the single market in Europe, that single market should in theory mean that UK companies can develop markets as easily across Europe as they can here in the United Kingdom. The reality is that although some of our colleagues in other member states are swift to break into the United Kingdom market, the political will to see competi-

tion flourish is stronger in some countries than it is in others. That is part of the reason why the cost of energy in Europe is still much higher than in the United States and elsewhere. That is why I say my twin responsibilities for energy and competitiveness come closely together, because competitive energy prices are critical to competitive industrial performance.

The Electricity and Gas Directives have put the framework for market opening in place throughout the European Union. Pushing for more open markets across Europe is a top priority, not just because I want to see UK-based energy companies succeed in Europe, but because by trying to protect their energy markets against competition some European countries are preventing other industries from competing effectively in global markets.

Businesses need the benefits of modern, dynamic, competitive energy markets if they are going to compete globally.

Europe needs these reforms if it is going to catch up and leave behind world-beating economies like the United States. By creating strong, flexible and open markets we will help our companies to compete, to prosper and to create new opportunities for all our people. I am confident that pressure from the market and support from our European Union partners who increasingly see the benefits which liberalisation delivers, supported by the European Commission, will lead to a full, open energy market in Europe, even faster than the directives demand.

A true, single market in energy would be a classic example of Europe working for people – and that is an important objective of this Government. It will deliver the competitive energy prices that extend access to energy, it will boost small firms and those small firms provide two out of three jobs in Europe. It will help them to expand, to take on more people and to create new opportunities.

I become very disappointed when I hear some of those organisations which purport to represent small businesses don't have a good word to say about Europe. Now that in itself is very strange when 60% of UK exports flow into European Union markets and many small firms depend on the work that is generated through the supply chain from inward investors who settle here to access the single market. Even these could not argue with the principle of lower energy prices through European reforms. So there is an opportunity through energy prices to make the case for a single market in Europe, a market that has at the moment 380 million consumers and, after enlargement, will have 500 million consumers.

We have clear social and environmental objectives that we must deliver. Ensuring that offshore oil and gas industries are conducted sustainably, without harm to the marine environment, is an aim we should all share. Through the work of Pilot – the successor of the Oil and Gas Industry Task Force – the work and sustainable development going on there will give us a vision of an industry progressively improving its environmental performance and delivering it cost-effectively.

Environmental concerns

Since the beginning of last year, we have introduced regulations to strengthen the rules on environmental assessment and we are soon to bring in regulations implementing the Integrated Pollution Prevention and Control Directive. We have also started work on statutory controls for the use and discharge of chemicals offshore and on regulations to follow up Lord Donaldson's report on oil spills.

The Habitats Directive will not be easy legislation to implement offshore, but I am committed to ensuring that our activities are compatible with it. To do that, to be effective, we need to engage all stakeholders.

As with competition and regulation, this dialogue has to be international and, with the Task Force's encouragement, we are looking at how we can extend it to other countries, particularly those in OSPAR and the European Union.

Pilot role

My closest contact recently with your industry has been through chairing the meetings of the Oil and Gas Industry Task Force, now renamed Pilot. Pilot is a model of how partnership works and I expect it to be an exemplar of how best to develop a government–industry relationship in pursuit of a common objective. Last year, through the Task Force, we worked together to identify the problems which faced the industry and the UK Continental Shelf in general. Together we sort out the solutions. Now we need to focus on delivery, on maintaining partnerships and on sustaining industry-wide commitment to increased competitiveness, exports, investment and new business.

The Logic initiative aims to improve the supply chain network and will deliver the enhanced competitiveness we need if we are going to survive. The new, more user-friendly licence process, together with the Lift and Deal websites will make it easier to do business. The acceleration and the development of new technology through the industry technology facilitator will give us the best possible chance of developing more world class suppliers.

The oil and gas fabrication support group will ensure the full involvement of the fabrication sector, a sector that is increasingly attracting attention because of the lack of orders and the anxiety that we must all have to ensure that we do not lose skills in that vital industry. British Trade International, which has brought together for the very first time all of the Government's trade promotion activity in a single body will help UK-based companies maximise their potential overseas.

This week we published figures showing that production of crude oil from the UK Continental Shelf reached a record level of 137 million tonnes last year. Production of natural gas has also reached a new record high and exports are continuing at record levels last seen in 1986. I was pleased to read in the European Commission's economic report last week that there is still significant remaining potential in the UK Continental Shelf; that remaining reserves are likely to equal the amount already produced and that production will continue well into the new century. Kerr McGee's announcement, a few days ago, of a 70-100 million barrels of oil equivalent prospect shows that larger accumulations still continue to be found in the North Sea.

New development projects are being launched and I want to see more coming forward. I announced a new onshore licensing round this month and we'll push on with the new offshore licensing round once the Habitats Directive is implemented. In future we intend to hold annual licensing rounds to stimulate exploration.

Investing in the future

This industry has to sustain itself and that means it needs to explore and it needs to invest. Levels of exploration and development were understandably very low last year, but we need to reverse that trend if we are to bring about the positive future we all want to see. It is as much about recovery skills as keeping company accounts healthy.

Finally Mr President, I should not finish without acknowledging the part which organisations like the Institute of Petroleum have to play. My department and I greatly value the corporate membership that we have of the Institute. Your work in advancing technical and economic knowledge, in sponsoring research and supporting best practice in standards and safety and providing training and information services are very much in line with my own objectives and with the actions we have taken in partnership with the industry.

IP President reviews the year

Chris Moorhouse (right), President of the Institute of Petroleum, addressing the annual IP dinner at the Grovesnor House Hotel examined the various challenges facing the industry. He noted the achievements of the industry and the IP in last years difficult low oil price environment and looked forward to future growth and development. The following is a shortened version of his speech. The full text, including jokes, is available on the IP website *www.petroleum.co.uk*

I would like to start by thanking you all for supporting the IP. A sell-out crowd listening to me speak proves that masochism is rife in our industry. More importantly, thank you for your support for all the events of IP Week, which I hope you will agree, have been outstanding. Congratulations to the organisers and our especial thanks to the various speakers.

Now, let's turn to our industry. The recently re-launched UK Upstream Task Force, now named Pilot, has many challenges ahead. The gas side of the industry in particular faces significant political, regulatory and technical hurdles if it is to deliver its long-term potential. Cooperation between the industry and Government through Pilot must be the way forward. Amongst the issues to be addressed in the next year or two are: how we achieve maximum recovery of oil and gas in mature fields and how the long-term decline of the industry is viewed by key players, in particular the commercial, technical and political issues around decommissioning. That is a heavyweight agenda.

Safety, as always, remains at the top of the industry's agenda. The Step Change Initiative is now in its third year and beginning to show strong, positive trends again showing the benefits of all parts of the industry working together. There can be no room for complacency, however, and more remains to be done this year and in the future.

Downstream, the industry has also moved forward in 1999. Lead in petrol was banned from January 1st. New specifications for petrol and diesel, together with changes in vehicle technology, will very significantly reduce emissions from cars, vans and trucks. Meanwhile, lead replacement petrol has been introduced to keep the older cars chugging along and with possible legislation in the air for the motor industry to dispose of abandoned cars, old cars are not given much respect at the moment.

What is true is that UK oil companies began to provide ultra-low sulphur diesel during 1999. There is now virtually 100% use of this special diesel fuel for road transport, well ahead of legislation. This provides an enabling fuel for particle traps and filters which the motor industry intends to take up. It is very important that the oil and car industries work together in conjunction with government to get things right for the benefit of the motoring public and society and to avoid unnecessary costs.

We need to evaluate well-to-wheels for conventional pollutants and fuel efficiency and hence carbon dioxide reductions. We need to do so against realistic timescales, through well-focused programmes, if we want to find the best solutions. We now live in a time when only full cooperation will achieve our mutual goals.

Of course the focus has been on automotive fuels and vehicles, and the changes taking place are very significant. These will yield improvements in

air quality of the like never seen before in such a short time period. This in itself raises some interesting issues on the need and speed of change. Emissions from motor vehicles are plummeting. Government forecasts that the rapid decline will continue and vastly improve air quality. This follows from substantial investment by both the oil and motor industries.

Other sectors are also working hard, but the decline in emissions from transport is so large that by the end of the decade other emissions will be the main contributors. The EC Clean Air for Europe Programme considers multi-sector effects and finds the most cost-effective solutions. This enables pollutants, which move across national boundaries, to be properly tackled as well, and moves from the piecemeal to an integrated approach.

Role of the IP

This is a time of change for all industry – a time when we are facing the fundamental technical and environmental issues our industry has to tackle on behalf of society as a whole. The voice of our industry is vital if we are to get the right solution at the right time, and that takes me to the Institute of Petroleum. Our voice continues to be heard and continues to carry weight when the agenda for our industry is being set. In 1999 the Institute published 20 guidelines and codes, the highest number ever. It also issued five research reports, two papers for medical journals, two volumes of test methods, held 11 technical workshops and published a book on risk assessment for the water, environment and operational fuel storage and dispensing facilities jointly with PESGB and the Geological Society. The quality of our Institute's publications is being taken ever more seriously. Sales of publications to Europe are growing. The IP has frequent consultations with regulators, and its role in maintaining self regulated status for the industry is vital. It needs to remain a technically credible, reputable, knowledgeable and independent institute, well versed in the details of the technical issues confronting the petroleum industry.

1999 saw the IP establish its Scientific and Technical Advisory Committee (STAC). I am pleased to tell you it is a profound influence on the way the IP does its work. Most visible is the massive simplification it has facilitated, slicing through the bureaucracy built up over eight decades of the IP, leaving it fit to serve the needs of the industry in the new millennium.

In spite of the difficulties of the $10 barrel early last year, the IP reached a new high in its corporate membership and it maintains its excellent record for recruiting new individual members. True, there has been an increase in the rate of individual members retiring from the IP, reflecting the shakeout in the industry itself. Nevertheless, the Institute ended the year in good shape and it ran some impressive events.

At the second Autumn Lunch last November, Dick Cheney gave us a splendid broad review of the global geo-political scene. That lunch, and of course IP Week, were both sell-outs. The IP also held several other successful conferences during the year, including a Retail Conference in March and the Offshore Marine Support Conference in October.

Clockwise from top left: Chris Moorhouse, IP Chairman; Helen Liddell, MP, UK Minister for Energy and Jeff Pym, IP Director General. The Toastmaster leads the guest down to the Great Room. Charles Smith, former IP President, Charles Henderson and Derek Payne. Chris Skrebowski (Editor, *Petroleum Review* and Carol Reader (retired Editor, *Petroleum Review*) talking to Anthony Levy.

It takes an organisation confident of its abilities to embark on new enterprises during a year like last year, but that is just what the IP did. It launched its new training portfolio, increasing the number of training courses from two to 12. In spite of the market, this initiative succeeded and most courses were very successful, so this year the number will double again.

In the wider arena of education the Institute remains very active, directly in contact with schools, colleges and universities and indirectly through organisations like the Association for Science Education. We hope to give a new generation a balanced view of the contribution our industry makes to society and it might encourage a few more

Clockwise from above: The full length of the top table. Colin Quinney and Pierce Riemer, Director General, WPC. Sir Nevil Macready (left) IP past President, talking to Alan Gregory, CBE (right) IP past president. Andy Hall, Noel Tierney and Mike Ward.

young talented people to come into the oil industry.

We have made other improvements to the IP. Our Head Office in New Cavendish Street now has a wonderful new library and a new reception area. Unseen, the IP has a new local area network with much upgraded capabilities and capacities to meet its members needs. You will have noticed the changes to *Petroleum Review*, the IP journal. Now in full colour, it continues to improve in both style and content.

I recommend you all to visit the IP's prize-winning and easy to use website. It has grown and now has over 500 pages and over 300 page-links. No surprise then that it gets an average of 14-15,000 hits each week. Work is starting now to improve further on an already good site to make it even more accessible and more user friendly.

These successes don't just happen. They are created by a skilled and dedicated team of true professionals. A particular vote of thanks should go to the team under Marta Kozlowska who organised this dinner – as usual, excellent, with painstaking attention to detail. I would also ask you to join me in thanking all 38 members of the IP's permanent staff.

IP awards launch

Clearly, the IP is going for change and there is more to come. Its business plan is to serve its membership ever better and to grow. For example, the IP is pleased to announce for the first time tonight the launch of the IP Awards, a suite of annual awards acknowledging outstanding achievements and examples of good practice within the international oil and gas industry. We will be presenting the IP Awards for the first time at our Autumn Lunch in November 2000 and we are delighted that Wood Mackenzie, the global consultantcy, has joined the project as the frontline sponsor.

We are also now offering special sponsoring opportunities to other organisations. This is an exciting new venture for the IP and for industry. We are launching a new website for the Awards to attract international interest and anticipate a lively response from entrants and sponsors. I urge you all to participate. The IP is at a decision point where it has to choose how to evolve into its future role.

Facing the future

What the future role will be remains the subject of much debate in the IP – but a number of strands are emerging. As an information based organisation, the IP will remain at the front in the use of IT and web networks in our industry. It is certain that the IP has a strong brand, witness the range of people who enjoy IP Week. It needs to enhance its strong brand values and position itself for future growth. All that means understanding what its members want.

I'm sure the IP will thrive under Geoff Pym's guidance. He likes change so he's arrived at the right time.

But even with Jeff and the help of the 38 talented, enthusiastic people in the Institute, there is only so much that they can do. This is our Institute I am talking about. It is up to us all to help the IP to help us – and I'm not talking just about money. Support for the Institute is just as important. Therefore, I want to thank all those people who generously give up their precious free time to help the Institute and I want to thank the companies who give up the time of the volunteers to participate on committees. I cannot stress how important this is to the vitality of our IP and we should not underestimate the value these volunteers create for the industry.

Brian Abbott, IP Technical Director and Fergus B Cahill, Chairman, Irish Branch

Improved oil prices boost industry confidence

Chris Skrebowski briefly reviews the highlights of the first day's conference during IP Week.

It is virtually impossible in a brief commentary to cover all the many events, conferences, seminars and exhibitions that made up a highly successful IP Week 2000. This year's events attracted record attendance and there can be little doubt that Brent at $27 engendered a much more positive approach than last year's $10.

The Monday conference on 'Oil & Gas: An Industry Fit for the New Millennium?' brought out a number of the industry's most senior figures. The first speaker was Dr Shoki Ganum, Head of Opec Research, who gave the audience a considerable insight into the Opec Secretariat's current thinking.

He started out by noting that at the end of 1998 the value of the Opec barrel had fallen to $9.69, with the value for the year averaging $16.97. A year later sentiment had totally changed, with the December 1999 barrel averaging $24.77. For the whole of 1999, however, the average was only $17.47, or just 50 cents above the year before. Ganum explained that Opec had a difficult balancing act to perform – prices needed to be high enough to meet social requirements and encourage investment, but not so high at to encourage a move to less efficient alternative energies.

Opec producers already accounted for 40% of world production, 60% of world oil trade and 75% of world oil reserves. Opec's modelling anticipated that oil demand would rise from 76.2mn b/d in 2001 to 88mn b/d in 2010, and that Opec could be producing 52mn b/d in 2020.

Ganum stated that the organisation was committed to global stability and believed that this could best be achieved by stabilising oil prices. The group's modelling suggested that the ideal level was in the $16.70–$20.70 range (current prices). To achieve this, Opec would need to improve its monitoring of the market so that prices could be held in the suggested price band by linking output levels to inventory levels in order to avoid the market upheavals of the last two years.

Meeting the challenge

The next speaker was Mark Moody-Stuart, Chairman of the Committee of Managing Directors of the Royal Dutch/Shell Group. His theme was the constructive response to challenges. Noting the vital contribution of energy supplies to living standards, he explained that companies exist to meet the needs of consumers and to create wealth. To achieve the latter, companies must constantly seek new ways of satisfying differing and changing needs, he explained, stressing that company reputation is a vital commercial asset.

Shell scenarios indicate that energy needs will expand 60% by 2020, with rapid demand growth in developing economies and a slow-down, or even decline, in developed economies. These trends suggest that by 2020 developing countries would account for over half of the world's energy consumption. The Shell view of ultimately recoverable conventional oil are close to those of the US Geological Survey, with around one-third of reserves having already been produced. Gas resources, where exploration has been more limited, are assessed as being slightly lower with only 20% having been produced.

Shell believes that these resources are adequate to meet expected growth until at least 2020 and that prices will be restrained by competition as costs continue to be driven down. The size of unconventional oil resources would also exert influence – Shell Canada's Athabasca oil sands development being an example of competitive supply from unconventional sources.

He observed that: 'Our investments will only be sustainable if people believe we really do contribute to their well-being.' He also noted the way that pollution by oil products had been effectively tackled and the enormous progress made. He said he had 'every confidence' that the challenge of greenhouse gas emissions could also be met – not by curbing the market, but by using the drive, creativity and responsiveness that the market engenders to achieve the desired result.

With billions of people depending on existing energy systems, an abrupt change was not possible and the whole system needed to evolve to a lower carbon basis by means of increased gas use, decreased coal use and the commercialisation of renewable energies. Shell companies were actively involved in these developments. He noted that at the moment 'There is already a ferment of innovation. The question is, how best to push it forward.'

Moody-Stuart completed his presentation with a plea to avoid prescriptive regulation and to harness the creativity and flexibility of markets to achieve the ends required by society.

Mega-mergers

In considerable contrast, in the next presentation Thierry Desmarest, CEO of the newly-merged TotalFina/Elf, explained the logic of his company's mergers and the way they had propelled Total from being the 14th largest oil company in early1990 – with a market capitalisation of $3.6bn – to TotalFina/Elf becoming the fourth largest oil company by end-1999, with a market capitalisation of $99bn.

In terms of strategic benefits and rationale, the mergers had produced a complementary geographic coverage for exploration and production, with a very competitive project portfolio. On the refining and marketing side, the new group would have the leading market share in Europe and Africa, with large potential synergies. In the chemicals area, Desmarest saw a good fit between the various chemical activities, together with new opportunities for integration between refining and petrochemicals. He anticipated that a combination of the synergies and asset disposals would lead to improved financial results and enhanced shareholder value.

He drew particular attention to the group's deepwater assets and its involvement in cutting edge development technology, as well as its involvement in no less than five LNG projects around the world. He also expressed great confidence in the outlook for petrochemicals and showed the way that close integration of refining and petrochemical assets could produce synergies and enhanced returns.

Time of change

Professor Peter Davis of BP Amoco then discussed the changes in the industry over the last few years. He started by asking why there had been so much change after 70 years of relative stability. His first point was that the boundaries had changed – notably with the close link between gas and power – and second, the emergence of the three super-majors and TotalFina/Elf.

He suggested that the seeds of change went back to the 1970s – the fragmentation of the supply chain, the new producing areas such as Alaska and the North Sea, and the impact of deregulation and the rising power of spot markets. The actual trigger for the mergers was the low returns relative to indices

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The Caspian riddle – as many questions as answers

The Caspian is beginning to yield some answers to the host of questions posed about its development in recent years. But almost every answer turns out to involve a whole lot of fresh questions, writes *John Roberts*.

The answers that have been forthcoming are, in the main, positive. At least one major discovery has been made in the post-Soviet era, and at least one major new pipeline is under construction. In addition, some smaller new lines have actually been opened and some small oil and gas field developments have started to bring western expertise to bear on a raft of problems left behind when the Soviet Union collapsed.

But there are a few problems as well. The major find turned out to be gas, not oil. So BP Amoco and its partners at the Shakh Deniz field in the Caspian Sea, offshore Azerbaijan, now have to start developing an expensive gas export programme for Azerbaijan (see p3) in addition to the oil export programme associated with the BP Amoco-led development of the giant Chirag-Azeri-Guneshli deepwater complex.

Then there is the pipeline question. The major line under construction is one which passes through Russia, and so fails the key US diplomatic test of ensuring multiple pipeline development to help the Caspian producers get their oil and gas to market without reliance on either Russia or Iran. The smaller lines, which are already open for use also, raise a number of questions. The 10bn cm/y gas line which Iran constructed from the Turkmenistan Caspian coast gas field of Korpedzhe to Kurt-Kui on the existing east–west Iranian gas line, provides the Turkmens with their first non-Russian system for export of their biggest resource. But the line does not serve the major existing gas fields which lie in eastern and central Turkmenistan, and is as nothing compared to the former lines which, in the Soviet era, carried as much as 80bn cm/y north into Uzbekistan, Russia and the main export system from Siberia to Western Europe. While the Iranians would love to see the gas line used as an element in a new world-class gas export system for Turkmenistan, international efforts for such a line are still firmly focussed on a transCaspian gas line that would transit Azerbaijan and Georgia, rather than Iran, in order to reach the all-important Turkish market.

Then there is the other new line, the 115,000 b/d oil line built by Azerbaijan International Offshore Company (AIOC) to carry crude oil from the Chirag-Azeri-Guneshli complex to the Georgian port of Supsa. The Baku-Supsa line opened early last year, with the first tanker loadings taking place at Supsa in April. With the persistent interruptions on the Baku–Novorossiysk line, previously the mainstay of Azerbaijani exports, The Baku–Supsa pipeline has incontrovertibly proved its worth. However, prospects for using the line as the core of a main export pipeline to carry much larger volumes – around 1mn b/d from Azerbaijan and Kazakhstan – have diminished as the US Government has piled on the pressure for a longer pipeline to terminate at Ceyhan on the Mediterranean, thus avoiding the need for increased tanker traffic through the congested Turkish straits.

In a sense, however, the Baku–Supsa line has proved its worth. It has shown that it is possible to pipe hydrocarbons out of the Caspian region to commercial western markets without transiting either Russia or Iran. Its smooth functioning in the midst of the Chechen crisis has also pointed up the contrast between the unexpected relative stability of both Azerbaijan and Georgia – although this should not be taken for granted – when set against the persistent interruptions to supply on the Baku–Novorossiysk line and its closure from late June onwards as Transneft and the Russian authorities decided to sever the connection across Chechnya.

The Russians claim that a bypass pipeline around Chechnya is now roughly half complete, and that the major pipelaying work might be completed by the end of March. This may be slightly optimistic – there are suggestions that they have yet to construct the section in the Daghestan mountains, for example. But the main point is that the bypass is being built and that it can expect to secure some Azerbaijani input.

Kazakh developments

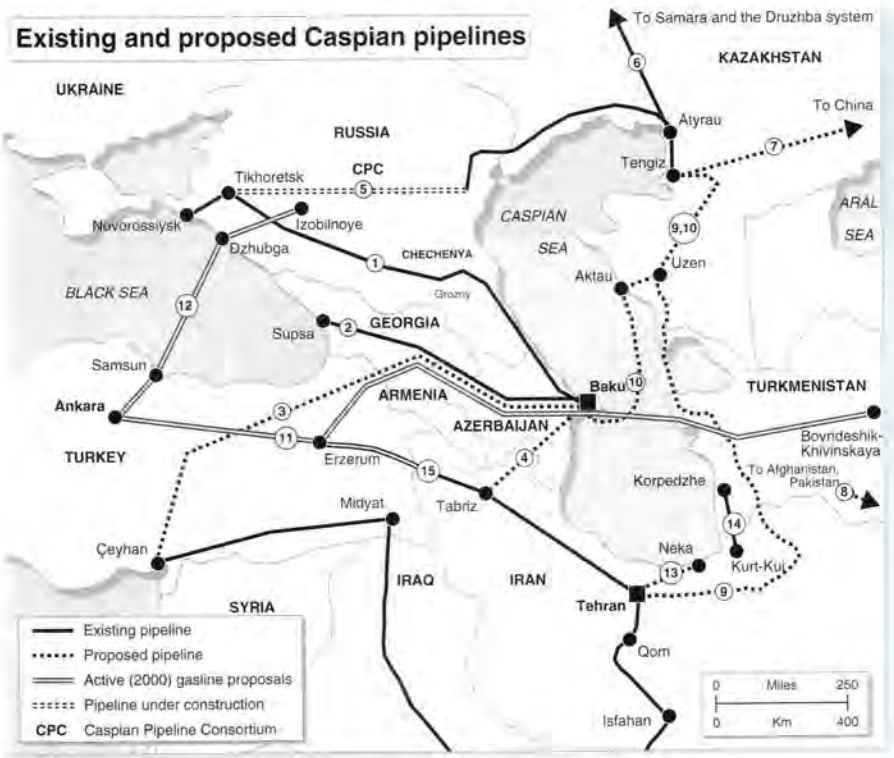
In Kazakhstan, Chevron has long been the principal western partner engaged in developing the supergiant Tengiz oil field. The company and its private sector colleagues have taken a significant stake in the Caspian Pipeline Consortium (CPC) which is building a line from Tengiz and its adjacent fields to the Russian Black Sea port of Novorossiysk. However, until this project comes to fruition, the Tengiz partners are having to use an imaginative series of export ventures – including shipment by railcar to Finland and China, and a combination of tanker traffic across the Caspian and railcar through the Caucasus to Georgia to take the crude output to market. Costs for such transport have been high and these routes have merely served to keep Tengiz alive until it could utilise a major export line on essentially commercial terms.

That goal is now in sight. A mass of procurement and construction contracts for the $2.2bn CPC project were awarded in 1999 and it now looks as if the 567,000 b/d, 1,500-km line will be ready for filling at some point in 3Q2001.

CPC's success has also been a spur for the BG/Agip/Texaco venture at Karachaganak in northwestern Kazakhstan to unveil plans in January for a $440mn pipeline to carry condensate and natural gas liquids from Karachaganak to CPC's Tengiz–Novorossiysk line.

In parallel with these developments, output at the Tengiz field itself is set to rise. Chevron has been steadily increasing output in recent years, and it was largely as a result of Chevron's activities at Tengiz and the work of western companies at the Karachaganak complex that Kazakhstan last year saw its oil and condensate output rise 15.8% from 25.9mn tonnes to 30.04mn tonnes. Tengiz output rose 13.2 % to 9.6mn tonnes.

Regional gas production is also rising. Kazakhstan produced 7,173mn cm in 1999, 30.4% more than in 1998, with



1. Baku-Novorossiysk. In existence; used by AIOC.
2. Baku-Supsa. 'Early Oil' line for AIOC fully operational March 1999; possible route for Azerbaijan's Main Export Pipeline (MEP).
3. Baku-Ceyhan. Designated by governments of Azerbaijan, Georgia, Turkey and US as MEP route in a series of agreements signed in Istanbul in November 1999. But financing still required.
4. Baku-Iran (possibly Tabriz); possible Azerbaijan option, studied by TOTAL, 1998.
5. Atyrau-Novorissiysk. Project now under construction, with completion scheduled for 2H2001.
6. Atyrau-Samara-Druzhba system. Line exists; Kazakhstan would like to see its capacity increased.
7. Tengiz-China. Under study by China National Petroleum Corporation. Not likely for several years.
8. Chardzou-Pakistan. With possible tie-in from Turkmen and Kazakh fields on/near the Caspian; former Unocal/Delta proposal.
9. Tengiz-Uzen-Kharg. Preliminary proposal by TOTAL.
10. TransCaspian Oil. (Tengiz/Uzen-Aktau-Baku). Alternative proposals by BP-Amoco, Texaco and Turkish government.
11. TransCaspian Gas. PSG appointed by Turkmen government in February 1999 to lead the development of this project. Shell took half-share in project in August 1999 and in December signed agreements for field development to serve TCP gasline.
12. Blue Stream Russia-Turkey gasline. Italy's Saipem has pipelaying contract for subsea section. Major works due to start early 2000 but some financing issues not finalised.
13 Neka-Tehran. Financing being sought for line which could constitute major element in swaps/pipeline export system from Caspian to Gulf.
14. The KKK gasline. Opened in 1997, this is Turkmenistan's only current export line that does not transit.
15. Tabriz-Erzerum gas connector. Iran completed Iranian section by end-1999 but Turkish section not ready for use.

Karachaganak alone producing 3,603mn cm, 55.4%, up on 1998.

Political hurdles

However, although oil output is rising, there are various political hurdles to be overcome. At the end of 1999, the Kazakh Government announced that in order to ensure delivery of oil to local refineries (which do not pay full commercial prices for oil received), it was limiting exports to just 22mn tonnes, the anticipated total for 1999 exports. Kanat Bozumbayev, Head of Oil and Gas at the Ministry of Energy, said the country's refineries needed to process at least 9.5mn tonnes of crude oil in order to produce enough gasoline to meet domestic demand. But in the first 11 months of 1999 they had received only 5.35mn tonnes of oil, almost a third down on 1998 levels.

Meanwhile, one of the country's three refineries, Pavlodar, remains virtually idle, a victim of its reliance on oil piped south from Siberia. The refinery issue impacts directly on foreign producers since their requirement is to be able to maximise commercial production – limits on their exports, or required sales of subsidised crude to domestic refineries, has the potential to play havoc with oil field development budgets.

Kashagan prospects

More than $600m has already been spent on the Caspian Sea's Kashagan prospect, on which the first test well is currently being drilled. The Offshore Kazakhstan International Operating Company (OKIOC) is a consortium of six western companies who pooled their respective blocks for a share in a cooperative venture to develop the most likely prospect.

The first test well has so far been drilled to more than 3,000 metres, more than half its intended depth. But drilling may well be halted as winter in these shallow reaches of the northern Caspian prompts the sea to freeze over.

Kashagan provides the next chance for the Caspian to yield what it has so far failed to provide – a post-Soviet proven offshore oilfield. Two international consortia, CIPCO at the Karabagh prospect and NAOC at Ashrafi/Dan Uludzu, wound up their operations in 1999 after failing to strike commercial volumes of oil off the Azerbaijan coast. So far, the only significant new strike has been at Shakh Deniz, where BP Amoco's SDX-1 well found gas. Its SDX-2 well also found gas, and the result is that both company and Azerbaijani officials are talking of a possible gas reserve of some 1tn cm. The Shakh Deniz partners (see p3) are currently planning to start commercial production around the end of 2002 or the start of 2003, with export to Turkey via a mixture of old and new pipelines.

The old lines will require some revamping and construction to take them across Azerbaijan and eastern Georgia to the Georgian–Turkish border, at which point Turkey's Botas is expected to be responsible for constructing a line to take the gas onwards to Erzurum, the eastern focal point of Turkey's evolving gas pipeline network.

TransCaspian Pipeline

Like so much else in the region, the development of Shakh Deniz poses questions while furnishing at least a partial answer to Azerbaijani energy development. The new line that would be used to carry the gas to Turkey is generally taken to be the Caucasus leg of the TransCaspian Pipeline (TCP) for which Turkmenistan, Azerbaijan, Georgia and Turkey have signed a number of agreements. The pipeline was initially intended to carry some 16mn t/y of Turkmen gas to Turkey and a further 14mn t/y onwards through Turkey to markets in southern or central Europe. It was always intended that there would be an element of common carriage to make allowances for possible Azerbaijani and Georgian use, but the Shakh Deniz strike is of such a magnitude that eventually Azerbaijani exports to Turkey of around 15mn t/y are not out of the question.

Recently, there have been some indications that Turkmenistan's President Saparmurat Niyazov may be focusing more on efforts to revive the gas export system via Russia than on the TCP line – even though the TCP project is being backed by Shell. It may be significant that an expected signing of a PSA with Shell for development of specific gas fields to use as sources for TCP gas exports has just been deferred; it is certainly important that President Clinton

IP Week highlights

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such as the FTSE, Dow Jones or NASDAQ, and the realism that the benefits of reorganisation were 'prizes larger than previously thought'. The synergies of removing overlaps, which is greatly facilitated by new and developing IT solutions, have proved to be very large and have acted as the driver in the recent reorganisations of the industry.

Davis concluded on a very positive note, explaining that the new companies were spoilt for choice in terms of the resources they could command and were now set to focus on growth.

Other senior executives threw light on the Central European market, the recovery in the Far East, the development of new pipelines in the Former Soviet Union, and the way that service companies are now becoming the repository of the industry's key subsurface knowledge and technology.

The Bunker Trading and Risk Management Seminar was well attended and gave insights into what is an increasingly competitive market still dominated by large numbers of relatively small players. The parallel seminar, organised in association with Wood Mackenzie, examined moves 'Towards the Total Energy Company'. The possibility of integrating into the power sector via gas was examined, as was the idea of getting much closer to consumers and their requirements. There was a great deal of interest in the concept, or concepts, of a total energy company. However, there are other views and Lee Raymond's keynote speech to the Luncheon (see p19) could be interpreted as advocating 'sticking to the knitting'.

The 13th Oil Price Seminar and Exhibition examined from a number of perspectives how to best cope with the industry's biggest single risk – price volatility. It was a sobering reminder that virtually no other industry has to cope with the price of its basic commodity varying by a factor of three within a year.

The final all-day conference on the 'Middle East – The Key to Global Oil Supply' was generally very positive about prospects. Among a range of speakers covering all aspects of the region, Richard Fowler, Managing Director of Robertson Research, showed that Middle East resources are much larger than usually allowed, while Sheik Yamani demonstrated the benefits to all of stable oil prices in the $16–20 range. Dr Fard, on the Board of NIOC, explained the potential to invest in Iran, and Steve Ollerearnshaw, MD of PDO, showed how large-scale Omani production had been achieved.

Above: Thierry Desmarest, CEO, TotalFina Elf. Below: Mark Moody-Stuart, Chairman, Royal Dutch/Shell

Central Asia developments

himself wrote in early February to Niyazov to urge him to maintain his commitment to the TCP.

For much of its route – around 490 km in Azerbaijan and some 300 km in Georgia – the proposed TCP (which Shell and co-developers PSG would like to see open by the end of 2002) follows the intended line of the most famous unbuilt pipeline of all: the Baku–Ceyhan line.

Support for Baku–Ceyhan

Baku–Ceyhan has many advantages, not least of which is its ability to carry crude oil from the Caspian direct to an deep, open water port capable of handling 300,000-tonne tankers. But it is an expensive project – the Turks cost it at $2.4bn, and western companies likely to use it at anything from $3.3bn to $4bn – and it has yet to secure firm financial support. Last November, at the Istanbul Summit of the Organisation for Security and Co-operation in Europe, the leaders of Turkey, Georgian and Azerbaijan – under the aegis of President Clinton – signed a cluster of agreements necessary for the line's construction. These agreements made one extremely powerful point – that the pipeline's construction requires political as well as commercial support. Not least because of the Chechen crisis, that political support is most firmly in place.

But for the Baku–Ceyhan line to be commercially viable, it will have to carry around 900,000-1,000,000 b/d – and that means it will not only have to carry oil from Azerbaijan, but also from Kazakhstan. The Kazakhs have indicated their willingness to provide crude, but their current priority, quite naturally, remains CPC. And while Chevron would dearly like to have multiple options for the safe export of major volumes, what is really required to guarantee Kazakh input into a Baku–Ceyhan line is a major oil strike by OKIOC.

This, of course, raises the billion-dollar question: What happens if OKIOC fails at Kashagan or, in a further twist to the Caspian saga, strikes gas instead of oil? But then that's still the nature of the Caspian conundrum – the region just keeps on throwing up as many questions as answers.

E-volution gathers pace

The oil sector has often been accused of being a dinosaur in terms of e-business, compared to the fleet-footed efforts of the financial services sector, IT industry, and business-to-consumer markets. Now there are signs of a stampede of new initiatives – but there are still no sure-fire solutions, reports *Chris Skrebowski*.

This dramatic mood change was marked by fierce debate at the recent 'Electronic Commerce for Oil and Gas' conference in London, organised by First Conferences. Here, the likes of Chevron, BP Amoco, Shell and Amerada Hess set out their e-business stalls, while e-solution suppliers IBM, Sema and new Internet-based players such as **Sparesfinder.com** and **Wellfind.com** made their play for a game which is changing the way the energy sector will do business.

There was much discussion as to whether oil companies would ever consider sharing a so-called 'independent' e-procurement marketplace actually set up by a fellow oil company, or strike out for themselves with an online e-business site. This followed in the wake of Statoil's recently announced plans to develop an 'open', global, online marketplace for the oil and gas industry in a joint venture with SAP using its **mySAP.com** infrastructure.

Statoil has promised that its new **mySAP.com** oil and gas industry marketplace – due onstream in 2Q2000 – will be independent and open to all members of the industry. As a company, it hopes to slash procurement costs that reached $4bn in 1999, by using the new online marketplace. Previously, Shell announced a major e-commerce marketplace venture with Commerce One, for which it is currently seeking joint venture partners (see *Petroleum Review*, February 2000). Chevron also has e-procurement plans based on Ariba architecture.

Here to stay

David Clementz, President of Chevron IT and e-business development claimed: 'E-business is the business. It's here to stay and is a fundamental discontinuity in the energy industry.' As a capital intensive, technology intensive, commodity business, he argued that e-business offered the only way forward to control costs.

Estimates of US business-to-business (B2B) e-commerce growth ranged from $1.3tn to $3tn by 2003, depending on the consultant concerned (Forrester, Boston Consulting *et al*), while the rest of the world is forecast to spend $1.8tn on B2B transactions. However, several speakers insisted that the real scale of B2B e-commerce is likely to be anybody's guess.

Clementz pointed to the numerous opportunities for squeezing costs using the Internet in the energy sector. These include retail, procurement, product and trading exchanges, information, finance, human resources, asset management and trading. However, he also recognised that there is a lot of hype, stating that 'developing an e-commerce strategy is a complex business, and will only work if it is integrated with a sound existing business strategy.'

Chevron actually began trading electronically back in the 1980s with electronic data interface (EDI) and now has 2,200 trading partners linked by EDI, out of 35,000 suppliers. 'Though that's the limit using EDI, as it is an expensive option,' admits Clementz. Since 1997, Chevron has brought in Intranet-based systems called CBEST and CRA to track lubricant and gasoline sales. High-speed links have been established with 8,000 service stations mostly in the US and Canada, and more recently via the Internet. This allows service stations to order fuels and promotional materials, but it is not linked to the end-consumer.

Recently Chevron announced the creation of **Petrocosm.com** – a full Internet-based digital marketplace. This is being developed with e-business experts Ariba, Requisite Technology and Hewlett-Packard. It will be an independent operation that will handle procurement and supplier services, trading exchange, financial services and logistics. It is due online in 2Q2000.

Chevron is looking to cut $200mn of costs from its purchases of materials and services – based on a spend of about $10bn/y – using this Internet hub. Deliberately designed to be 'easier than using the telephone,' **Petrocosm.com** will also decrease the transaction costs for suppliers, allow for self service according to the individual's status for orders, rationalise processes, improve logistics and help create an online community.

Clementz stressed the importance of the digital marketplace being a shared ownership. 'It cannot be seen as being dominated by one major oil company. It must be open to all in the supply chain, and driven towards industry standards.' **Petrocosm.com** is currently being piloted internally at Chevron, where SJV BU at Bakersfield, California, currently purchases 80–90% of its materials and services via the Internet on an $80mn/y annual spend. The system will soon be expanded to cover the Gulf of Mexico and other international sites.

Several challenges still lie ahead, according to Clementz. 'This doesn't work without a robust, reliable and secure backbone and infrastructure. Although

bandwidth is increasing rapidly, and computer power continues to grow in line with Moore's Law (that computer power doubles every 18 months), there are still technical issues around standards and transaction processing protocol. But the biggest challenge is cultural. Is the industry ready for it?'

E-commerce development

Bill Payne, IBM's principal e-commerce Manager for EMEA (Europe and Middle East Area) petroleum and chemicals, reckoned that most forecasts for growth of e-business are meaningless, as companies transform from asset-based (for example, petroleum, manufacturing or agriculture) to knowledge-based businesses (such as the finance, insurance and telecoms sector).

According to Forrester research, 50% of companies anticipate improved sales from e-commerce. About 48% expect improved service, 52% look forward to reduced costs, 14% see it as a marketing tool and 10% expect other benefits. Payne argues that the 'networked era' will impact on all industries, but the petroleum sector has been extremely slow to respond and adapt.

He considers that there are four stages in e-commerce development, with increasing benefits but also associated costs:

- Publishing stage – developing a web site.
- Interaction – where you start selling things on the Internet.
- Transaction.
- Integration.

'Although the benefits actually dip during the early online publishing stage, the net returns rapidly increase as e-business evolves,' says Payne.

He stressed the importance of branding for the Internet, citing how Prudential's online **Egg.com** generated $5bn of transaction in just six months. 'At a time of mass customisation for products and services, innovation will be a key to success online. The oil industry could also learn a lot from the collaborative strategy of the aerospace sector, which recognises the need for integration, using the Internet as the glue between supply chain management, enterprise resource planning and customer relationship management. The three vital "e's" are e-procurement, e-commerce and e-care.'

Payne saw both threats and opportunities in the Internet Age. He was dismissive of companies like ICI that entered the publish stage and created about 75 independent websites offering great confusion to clients and customers. He felt that Shell Chemicals was making strong moves in the transaction stage, and saw initiatives like **PlasticsNet.com** and **ChemWeb.com** as the keys to future integrated sites. In the oil sector, he felt that Shell and BP Amoco have entered the interact phase, while ENI's Agip Petroli was even more advanced, letting motorists select lube oils via the Internet for home delivery. Now new outfits such as **Bunkerworld.com** are changing the traditional business model, while new players such as **PetitOil.com**, which offers to sell petroleum products over the Internet, uses logos of established majors to give them credibility.

Payne admitted that the picture could look very different in six months' time and suggested companies should start by researching their competitor's position on the web. He went on to note that: 'When I look at the speed of thinking in the oil business compared to other sectors, it's a bit worrying. So, be fast, be bold and be ahead of your competitors.'

New e-business portals

John Coghlan, Vice President of Schlumberger Omnes presented its new e-business portal **SWPS.com**, developed with Commerce One. The SWPS system is a desktop web procurement system, which will be used as a repository of multi-media catalogues for quick and easy placement of orders. But it is a relatively closed system, linked only to its suppliers and used internally. Coghlan insisted: 'E-procurement sites have to be rolled out carefully. You can't let everyone use it immediately in a large organisation or there will be anarchy. So there have to be individual constraints.'

Schlumberger also recently launched **IndigoPool.com**, which offers a global gateway to link buyers to sellers for buying tracts of the North Sea, with online access to advanced data services, technical and related political information. The site is linked to the UK LIFT initiative, which is sponsored by UKOOA, the DTI, OGITF and Schlumberger. This offers a web-based toolkit for promoting or identifying North Sea asset opportunities, linking buyers to sellers through an asset criteria knowledge toolkit. The aim is to accelerate UKCS development at maximum cost effectiveness (**www.uklift.co.uk**). As a mark of its early success, the **IndigoPool.com** site had 60,000 hits in its first day of business.

Royce Bell, Partner in Anderson Consulting, predicted that new third parties will begin online operations such as spot trading. 'Because at the end of the day the oil industry is shifting information as well as commodities. There is a big opportunity for change and the spot market is becoming very transparent. New spot markets will begin to appear, maybe in areas like transportation.' As to the question 'Will the existing markets survive?' Bell thought that was very questionable!

The way ahead

Some delegates felt that the oil and gas industry was still searching around for what the Internet could do for them. Online seismic interpretation was seen to have great potential but, on reflection, the web opportunities seem limitless. The big question is will the oil majors initiate the change, or will newcomers create entirely new dot.com offerings that reshape the business?

David Clementz suggested: 'People with the broadest networks will move forward fastest,' while Stephen Birrell, Chairman of Granite Rock, suggested that 'Oil companies will go back to being people with a lot of money and the ability to develop assets around the world.'

Chris Miller, Global Practice Leader for e-commerce at Shell Services International, posed the question: 'What if online catalogues could talk to each other? And what if there was a web of trading exchanges linked to each other's sites around the world?' In the light of its recent announcement of an e-procurement exchange with Commerce One, Shell is eager to get other major players in the industry onboard. Miller suggested that current transaction costs of several hundred dollars or more, could be cut to just 25 cents to $1 per transaction providing savings for both suppliers and buyers, with additional earnings from value-added services online.

However, he then poured salt on the wounds by pointing out: 'We've had 90 years during which oil companies haven't worked well together. Yes there is competition, but we all have tremendous networks and numerous joint ventures. People need to relax into the Internet.'

Shell hopes that new oil and gas industry exchanges will evolve around the world, allowing buyers and sellers to communicate through a new exchange network, possibly built around their **Marketsite.com** hub. By 31 March 2000, Shell and Commerce One plan to offer five fully functional Internet market sites located in Africa, US, UK, Canada and Malaysia. Miller claims he's not afraid of competition. 'People will join which ever exchange gives them the best business. But it will change the way we relate to each other in business-to-business interactions.'

BP Amoco's e-procurement project was well received, and some delegates felt the group was ahead of the field in e-business. Development of its online **Buysite.com** received powerful backing

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Proposals in the pipeline

An international network established by the European Union and former eastern bloc countries to help build export systems for Caucasian and central Asian oil and gas is focusing on attempts to build a pipeline running beneath the Caspian Sea. *Keith Nuthall* reports.

The Second Workshop of the INOGATE 97.04 Project recently discussed proposals for a multi-modal oil transportation system running from Kazakhstan, and possibly Turkmenistan, through the Caspian and Azerbaijan, to Georgia's Black Sea ports. If successful, the transport system would be the first tangible fruit of the INOGATE Umbrella Agreement signed last year, which is an attempt to forge a management procedure for international oil and gas distribution in a region that is beset by political instability and rivalry (see box).

The roll call of the workshop was a positive sign in that it included Socar, Azeri Railways Department, Caspian Shipping Company, and Baku International Sea Trade Port from Azerbaijan; as well as the Georgian Railway Department from Georgia; and KazTransOil and Aktau Sea Commercial Port from Kazakhstan.

The Umbrella Agreement was signed at a special summit in Kiev, the Ukrainian capital, by Armenia, Azerbaijan, Belarus, Bulgaria, Georgia, Kazakhstan, Kyrgyzia, Moldova, Romania, Tajikistan, together with Turkmenistan, Ukraine and Uzbekistan. Signatories promised to cooperate over the establishment of pipelines crossing their territories. In particular, they agreed to back the setting up of a 'common operator' to oversee the running of an oil transportation system, 'agreeing by separate protocol, the rules and procedures according to which a Common Operation Entity is to be established or selected.'

Given that Russia was not among the signatories, geography dictates that the agreement will not cover a number of routes. However, enough states have signed up to smooth the path of creating new pipelines or multi-modal systems from the region, aimed at supplying western Europe.

The agreement has been hailed as a success by the EU, which has promoted the deal as part of its INOGATE initiative, which aims to foster cooperation amongst former Communist countries in the region. Since the break up of the Warsaw Pact and the USSR, ideology has ceased to weld the region together. Successor states have been squabbling and, in some cases, been riven by internal discord, and in one case – Armenia and Azerbaijan – fighting has broken out.

Pipeline options

These political rifts have not eased progress towards the creation and operation of international pipelines in the region. There are currently two pipelines – running from Baku to Supsa, the Georgian Black Sea port, and from Baku to Novorossiysk, in Russia. If the Caspian yields as much oil as the more optimistic prospectors hope it will, more capacity will be needed.

A number of alternative projects have been proposed, although none are yet being built. These include:

- *Baku–Ceyhan.* On the Turkish Mediterranean, this pipeline is currently under examination by Turkey, the US and the BP Amoco-led Azerbaijan International Operating Company (IOC).
- *Baku–Iran.* A route which is likely to run through Tabriz, and which is being studied by TotalFina of France.
- *Chardzhou-Ras Malan.* An effectively abandoned plan to build a pipeline from Turkmenistan and Kazakhstan through Taliban-controlled Afghanistan.

Given the political complexities present in the region, reaching agreement on setting up international pipelines was never going to be easy and it is against these difficulties that the Umbrella Agreement was promoted and signed. In particular, the EU has been concerned that such unstable prospects have stymied the amount of money that finance houses have been prepared to provide to underwrite new pipelines. However, it is hoped that with a single operator, there would be more stability, making cautious investors more likely to back projects.

This credo was underlined at the summit by the former European Commissioner for External Relations, Hans Van den Broek. He said that the agreement 'responds to a need which investors identified directly after the dissolution of the Soviet Union. That need was to create a single legal and administrative framework within which all countries involved in energy transit, and notably the newly independent countries from Central Asia right across Europe, can cooperate. A possible trust fund, as mentioned in the Declaration could provide guarantees for those who are prepared to invest in energy networks. We are prepared to use our assistance to help explore such a possibility.' A small Secretariat is to be set up in Kiev to help oversee future pipeline projects.

Commercial common operator

The workshop which was held in Athens discussed in the detail the role of a commercial common operator for INOGATE projects, focusing in particular on the trans-Caspian multi-modal oil transportation system. Options included:

- The common operator being a corporation, in which the states involved in a project will participate equally.
- Its role will be limited to coordination of any transportation assets, including financing, rail-tank cars and tanker vessels, to maximise commercial efficiency and minimise operational, commercial and environmental risks. The common operator would not own these assets. They would remain the property of the companies which contributed them.
- The operator would enter into a single transportation agreement with clients and freight forwarders, involving a unified tariff for using the multi-modal transportation system. The common operator would transfer income to participating companies, according to a pre-arranged procedure.
- The operator will coordinate the rehabilitation, construction and acquisition of the pipelines and other transportation assets.

International cooperation

The INOGATE process was established in 1995 and has expanded westwards from central Asia and the Caucasus to Romania and Bulgaria. Its main aims are to bring oil and gas from the Caspian Basin to customers in Europe and around the Black Sea, and to attract international investment into the modernisation, the rehabilitation and extension of oil and gas networks.

The way the Commission hopes INOGATE will help achieve this is by international cooperation – uniting experts from the EU and countries in the region, to create solutions to the difficulties impeding these goals.

Great potential, but...

In the first few months of 1999, Kazakhstan continued to be hit by the Russian financial crisis. Towards the end of the year, however, with the rise in crude prices and other developments in the region, the climate in Kazakhstan regarding oil production became much more favourable. The reasons behind these changes ranged from personnel, to consortia, to a war, writes *Alastair Goode*, reporting from Kazakhstan.

As Prime Minister of Kazakhstan, Nurlan Balgimbayev faced an uphill battle to balance payments, and trying to maintain the stability of the national currency – the tenge, through selling the country's reserves. While fighting to achieve this, inflationary pressure and the substantial decline in the hard currency reserves forced the National Bank to float the tenge, which went overnight from 85 per dollar to 120 per dollar in the spring of 1999 (it is now at 140 to the dollar).

Balgimbayev made a number of unpopular decisions as Prime Minister. He consequently lost the support of Parliament, as well as that of the pensioners and the poorer sector of the community, and resigned. His decision to resign was also prompted by the departure of the Kazakhoil President, Nurlan Kapparov – not even 30 years old at the time. On several occasions, Kapparov had contradicted himself, showing his youth and inexperience – this was seen as a weakness and led to his eventual replacement. Kapparov is now Vice-Minister of Energy, Industry and Trade.

Tengizchevroil consortium

Just one year ago, the Tengizchevroil consortium – which is making use of approximately 6,300 railcars to transport 75% of oil from the Tengiz field – was running into severe problems because the oil price had dropped to under $10/b. Although no public comment was made, there were rumours that Tengiz would have to cut production as well as jobs.

However, the economic viability of the Chevron/Mobil-led project has been transformed in the last six months following the recent surge in world oil prices. With crude prices currently at their highest since the Gulf War, Tengiz production is continuing uninterrupted and profit margins are buoyant.

Tengizchevroil produced approximately 9.6mn tonnes of oil in 1999, an increase of 1mn tonnes from 1998. There has been a steady growth in the number of railcars being used to transport production since 1998 (5,000 to the present 6,300). In addition, an increase in the volume allowed into the Russian pipeline system for Kazakh oil (from 7mn t/y to 8mn t/y) has allowed Tengizchevroil to export more oil via Russia.

The exported oil consists of two types – either Pure Tengiz (light, with good gasoline or diesel fuel yields), or blended Urals (a higher density crude). Generally speaking Pure Tengiz crude is sent out through Georgia and Ukraine. Each contract is carried out through a freight forwarder. The oil that goes north through to Russia and enters the Russian pipeline system, operated by Transneft, is blended with heavier Russian crude in Samara and is then sent through to Europe via the Druzhba pipeline. Oil mixed in Russia is sold for approximately the cost of a barrel of Urals in the market, less one dollar. Pure Tengiz crude sells for approximately the price of Brent plus one dollar.

The main destinations for Tengiz oil are: Odessa, Ukraine (by pipeline and rail) and Feodossia, Ukraine (by rail). When Batumi in Georgia is the destination, the route is by rail to Aktau, by ship to Baku, and then by rail to Batumi. From there it is exported by ship across the Black Sea to a number of world destinations.

State oil company Kazakhoil is a 25% shareholder in the Tengiz field, having sold half of its 50% stake in Offshore Kazakhstan International Operating Company (OKIOC) to Mobil in 1998. There was a strong rumour last year that, again because of budget problems, Kazakhoil would sell its remaining 25% share in the project. Later speculation was that only 10% would be offered. At the time, Chevron was thought to be very interested – any such purchase would have been made it a majority stakeholder in the consortium (it now owns 45%).

Talk of selling the stake has now subsided substantially. With oil prices at record highs, the Kazakh Government apparently feels that it can hold onto its share of Tengizchevroil and that selling it now would be premature.

OKIOC consortium

The OKIOC consortium is the child of KazakhstanCaspishelf, which is the consortium that carried out the seismic assessment of the northeast Caspian in the mid-1990s. The seismic programme cost approximately $300mn, while the following two years, which saw the establishment of OKIOC, have seen investments of $180mn and $150mn in 1998 and 1999 respectively.

The consortium comprises Agip, British Gas International, BP Amoco, Inpex, Mobil, Phillips Petroleum, Shell, Statoil and Total. Phillips and Inpex are the most recent members of the group, having split the Kazakhoil portion of 14.29% in 1998. This was sold by the government because of a gaping budget shortfall.

OKIOC hopes that the East Kashagan structure in the northeast portion of the Caspian Sea will prove to be as large as the Tengiz fields. The consortium agreement stipulates that six wells are to be drilled in the region over the next six years. Currently, the first well is being drilled in East Kashagan by Parker Drilling. It is thought unlikely that the reservoir will be reached until drilling has got to about 4,500 metres, probably by April 2000. Reservoir data will then be analysed, with results expected to be released in May or June. The second well will be drilled in West Kashagan.

While there has been significant speculation in the local, and some international, media concerning the winter conditions surrounding the drilling programme – the northern Caspian usually freezes over in winter – drilling has not stopped at any time during the colder months. OKIOC has been fortunate that this winter was not as severe as previous ones.

Questions of quantity

For the first few months of 1999, there was a substantial shortage of aviation fuel in Kazakhstan. While this shortage (which affected nearly all national airlines, furthering speculation that Air Kazakshtan would declare bankruptcy) was at first unexplainable, it soon

became apparent that the Russian military was buying all the aviation fuel it could obtain. The Kazakh Ministry of Energy, Industry and Trade estimates that from October 1999, the import of petrol from Yugoslavia, Latvia, Russia, Turkmenistan and Azerbaijan increased 4.5 times, and for diesel 2.5 times. The shortfall in local production appears to reflect pressures to export crude at the expense of running it in local refineries.

The recent increase in the Kazakh quota for oil transiting the Russian pipeline, agreed to in the New Year, is one possible explanation. Of the 11.5mn tonnes of exports agreed with the Ministry of Oil and Gas, some 3mn tonnes will be sold within the CIS, the remainder going to western Europe. It is suspected that the Russian military will be a large buyer of the Kazakh quota.

The Kazakh Government also recently announced a target of 30mn tonnes of crude production in the year 2000. While no export limit was ever placed on the international consortia working in the country, it seems that in order not to repeat the fuel shortages of autumn 1999, the government has stated that 8mn t/y will have to remain in Kazakhstan, particularly during the winter months. This restriction has probably been applied in order to ensure that supplies to Kazakhstan's three refineries in Atyrau, Pavlodar and Shimkent are maintained throughout the year.

The Kazakhstani Petroleum Association, grouping 30 international energy companies with several of their local partners, was created several years ago to discuss issues affecting their work in Kazakhstan. The newly-appointed Chairman of the Association, Edward Verona (who represents Texaco International in Kazakhstan) felt that the decree to keep 8mn t/y of oil in the country could affect the economics of certain projects. He explained this was because Kazakhstan does not pay as much per tonne of fuel as the other countries, notably in western Europe.

Verona stated that in the contracts that have been concluded with the government, there is no indication as to how much oil should remain in the country. This type of clause in the various PSAs does not even exist. Verona feels that should the government attempt to enforce this law, then the foreign investment climate could be severely darkened, driving away potential investors. He claims that if foreign companies did have to sell their crude to the state, then they should receive the same amount per tonne as they would receive abroad.

This is not to say though that foreign investors will be penalised. It is probable that a compromise will soon be reached – this could either severely reduce the volume of oil that Kazakhstan wants to keep in the country or force the state to keep some of its oil in the country which it would have preferred to sell abroad.

The final word

While the reputation of Central Asia generally, and Kazakhstan specifically, has been somewhat damaged lately, it still has a chance to redeem itself through OKIOC. However, should this consortium fail to find commercial amounts of oil, then the myth of the new 'Great Game' will be shattered, leaving a great deal of embarrassment on the part of Western governments who have attached so much importance to the region. It may also further the general feeling that had been developing over the past year – that Central Asia is a prime candidate for future social unrest.

Internet e-commerce

... *continued from p32*

from Chief Executive Sir John Browne, who ardently believes that 'the web is changing the nature of the marketplace.' The group anticipates saving $200mn/y as a result of its e-business initiatives.

According to Andy Robert, Upstream Lead for the Global e-Procurement Project at BPAmoco: 'Our procurement is a sea of complexity, from stationery to high value oilfield products. The grand plan is to put 95% of all catalogue buying through the e-procurement system by the end of this year. It will give us a level of management information that is unbelievable.' Speed is of the essence in the e-world, and the pilot site was set up in 90 days, with four sites online by the end of October and 26 targeted within six months. By March 2000, the second phase of e-development will also see launch of six reverse auctions sites.

Roberts said there had been a number of key lessons. 'First there's the culture. How often do you change your company's accounting practices, let alone introduce an e-commerce strategy? Second, we trawled round numerous Internet service providers, and only one actually mentioned having a portal market site available for fast deployment. Our people are also very pragmatic and insisted: "Show me that it works..." repeatedly. Then we put out a bid list. Finally, we stressed that if anything threatened to stop our supplies for even a day, then it'll be dead.'

In Roberts' opinion, 'Open systems are essential on the Internet. Switching to web-based cataloguing, you also want to avoid errors when countless people touch the system – from Mom and Pop stores to big suppliers. Finally we wanted the system to go from birth to maturity in just 18 months.' But, 'the Devil is in the details,' he observed.

New niches

It was not all big e-procurement portals at the conference. **Wellbid.com** presented a new, secure online application service, targeted at e-procurement for US oil and gas upstream drilling and workover groups. Launched in October 1999 – and based in Denver, Colorado, and Houston – this privately financed site demonstrates how new niche areas can be developed online. The site is aimed at petroleum engineers, producing companies or independent operators drilling or completing wells, and has already recruited 300 members, with a nationwide network of 1,650 vendors.

The user logs on to **Wellbid.com** with a secure ID and password, and uses Wellbid to design a well project using a set of templates, identifying all the necessary drilling and completion processes, products and services required. Vendors log on with a private ID and password, where they can view a summary page of all the requests received and status, and make a private bid for services or supplies. The system currently serves only onshore fields in the US and Canada, but there are plans to roll it out internationally mid-2000, with an offshore option to follow.

And the winner is...?

With such a choice of new online exchanges on view and emerging, which model is likely to succeed – those launched as spin-offs by the oil majors such as Shell or Statoil, or completely new players like **Wellbid.com** in niche areas? Some analysts predict that there will be new virtual organisations that completely rewrite the rules – the **AmazonOil.com**'s of the future. As BP Amocos Andy Martin remarked: 'I don't know which of these online exchanges will succeed. It's rather like the competition between Betamax and VHS in Internet terms.' Only time will tell.

Sable Island – a milestone for Canada's gas industry

Canada's natural gas industry recently took a major step in diversifying from its western base, with the recent start of production from the Sable offshore project. The delivery of gas in late December 1999 set a milestone for the industry, as it marks the first time in over 20 years that a new natural gas supply basin in North America has been brought to market. ***Gavin Will*** **reports.**

The three fields, which make up the first tier of the Sable field development are located off the coast of Nova Scotia, and include Thebaud, Venture and North Triumph. Combined with future development of another three fields in tier two – Alma, Glenelg and South Venture – Sable has a reserve potential of 99bn cm of natural gas and will be produced over a period of 25 years.

A consortium led by ExxonMobil, which controls 59.8% of the project, owns the fields, together with a 225-km long offshore pipeline. Other partners include Shell with 31.3%, Nova Scotia Resources (a Nova Scotia provincial government crown corporation) 8.4%, and Mosbacher Operating, a holding company, with 0.5%.

A 1,050-km pipeline is transmitting gas to key markets in the New England states, with the Canadian portion crossing Nova Scotia, New Brunswick and into Maine through the Maritimes and Northeast Pipeline. The pipeline ownership group includes Westcoast Energy and Duke Energy, both holding 37.5%, as well as ExxonMobil and Nova Scotia Resources with 12.5% each.

The gas is processed at a newly constructed plant in the Nova Scotia community of Goldboro, with natural gas liquids sent by a 60-km pipeline to a facility in the deepwater port of Point Tupper. At peak capacity this facility will process 3,000 cm/y of liquids, which is exported to markets by tanker.

Despite some teething problems this winter, including freezing of liquids within the offshore pipeline and a gas leak on the Thebaud offshore central processing platform, early production points to an impressive future for Sable and possibly the entire east coast Canadian gas sector.

Initial development

Over the first and second quarter of this year Sable's production is scheduled to increase to 15.6mn cm/d (inclusive of natural gas and natural gas liquids), as the first six wells come onstream at the three offshore facilities of Thebaud, Venture and North Triumph. Another three or four production wells are planned for tier one, with production expected to rise by 25% in 2001, when lateral gas lines are completed in Nova Scotia and New Brunswick.

Preliminary tests of the first six wells have resulted in production rates ranging from between 1.4mn cm/d and 2.8mn cm/d, results which have vaulted Sable to becoming one of the best producers in Canada. 'Some of these wells are proving to be world class in terms of productivity,' said Sable spokeswoman, Kim Gildner. 'In this industry there is a tendency to be conservative, but production is certainly exceeding our expectations.'

Making moves in Nova Scotia

The successful start to tier one of Sable is undoubtedly good news for the industry, but other hopefuls did not wait for first gas to come ashore before making their moves in Nova Scotia. Expenditure commitments for offshore land sales in 1999 reached almost C$600mn, with 11 leases awarded in the Sable Island region. This marked a six-fold increase over commitments made in 1998 offshore land sales, and included a rash of new entrants in the Nova Scotia offshore such as Marathon, Canadian 88 and Murphy Oil.

Several of the 1999 leases include deepwater regions of the Scotian Slope, with water depths ranging between 1,000 metres and 2,000 metres. One of the longest serving players in the Nova Scotia offshore, PanCanadian Petroleum, is preparing a

Slugcatcher Goldboro gas processing plant

drilling programme beginning this spring. The company holds exploration rights, wholly or in part, to 1.8mn hectares of offshore land and has built a large inventory of geological information about the region.

PanCanadian is in the midst of decommissioning facilities used for its Cohasset-Panuke oil fields, following a planned permanent shutdown of the project in December. Cohasset-Panuke, which was Canada's first offshore oil project, began operations in 1992 and throughout its life produced 44mn barrels of light sweet crude.

The Rowan *Gorilla 3* jack-up rig, which was used on Cohasset-Panuke, may be employed for this year's exploration programme, said PanCanadian spokesman, Alan Boras. 'We haven't finalised well locations, but they may be in the vicinity of Panuke,' Boras said, adding that other exploration drilling programmes are also being considered. 'We've built up a large land position and have compiled a great deal of seismic information, and we expect to be very active this year,' he said.

In advance of possible drilling, extensive seismic exploration has been undertaken throughout several basins in offshore Nova Scotia. Since 1998, seismic vessels have surveyed a wide swath of offshore territory, stretching from the Gulf of St Lawrence, along the Laurentian sub-basin and southwest to the Scotian Shelf.

In 1999 seven major seismic programmes were started, with one survey comprising the largest single 3D effort in Atlantic Canada. This will be followed-up during the coming summer, as well as a possible announcement on a deepwater drilling programme.

Phased development

Due to the success of Sable's first phase, there will not likely be a need for early production from tier two. If flow rates from tier one had proved below expectations, Sable's owners were prepared to embark on developing the latter three fields prior to the planned time frame of 2004–2007. Now this fallback may not be necessary, although Gildner said preliminary work had been started on assessing the viability of tier two fields. 'We have to look at market demand, as well as actual production rates from tier one, in order to determine the timing of tier two,' she said. 'There is a team in place looking at these issues.'

Although much of the Sable gas will be exported, a domestic supply of natural gas will become available to consumers throughout Nova Scotia. the California-based company, Sempra Energy recently won exclusive rights to distribute gas throughout the province, with them planning to spend US$700mn to meets its commitments. The 25-year franchise is the largest new North American natural gas distribution system to be awarded in 30 years, and Sempra is expected to make natural gas available to three-quarters of the 350,000 households in Nova Scotia within seven years.

North Triumph is to be developed during phase one of the Sable offshore project

Progress at Sable is providing the impetus for greater exploration in Nova Scotia's waters, but does little to help the cause of those hoping for development of more isolated natural gas fields off the coasts of nearby Newfoundland and Labrador.

Gas potential

Proven gas reserves at the Hibernia oil fields, combined with projected reserves at Husky Oil's North White Rose prospect, may equal Sable in size. These fields, combined with other proven reserves on the Grand Banks, hold four 118bn cm of gas (4.2tn cf). Another 11bn cm (0.42tn cf) was discovered during exploration on the Labrador Shelf during the 1980s.

According to estimates of discovered and undiscovered reserves derived by the Federal Department of Natural Resources, the Newfoundland and Labrador region could hold 1.7tn cm of natural gas (60tn cf) – although little of this has actually been proven and is based purely on projections.

A Texas-based company, Tatham Offshore, has been promoting a submarine pipeline network stretching all the way from the Grand Banks to Newfoundland, with an extension to Nova Scotia and the northeastern United States. This would be a 2,400-km pipeline project, costing up to C$3bn to build and install.

Besides the cost factor, Newfoundland and Labrador is still very much a green field region as far as natural gas is concerned, which makes early development of proven reserves highly questionable. Established producers of oil, most notably ExxonMobil and Petro-Canada, have thrown a damper on Tatham's dreams, pointing out the enormous capital outlay would make Newfoundland gas uncompetitive with other existing sources, such as Sable.

The proposal has also come under attack by environmentalists, who suggest large icebergs could tear a pipeline off the ocean floor. The iceberg risk forced construction of a massive concrete ring around the Hibernia fixed gravity oil platform. However, pipeline proponents believe the iceberg risk is highly exaggerated, particularly in the shallow waters of the Grand Banks where the largest icebergs are unable to pass.

Despite such challenges to natural gas development, the provincial government of Newfoundland has suggested incentives could be offered to developers, in the form of royalty rollbacks or tax breaks. Such options have the support of local business, which sees natural gas as the key to long term viability of the region's petroleum industry.

Technology targets improved marginal field economics

Most oil occurs in known reservoirs, but estimated recovery percentages are typically only 25% to 35%. Although there are some notable exceptions, including the efficiently produced North Sea sandstones which typically recover 45–60% of known reserves, there is plenty of room for improvement. The impact of technology on improving marginal field economics was highlighted in a speech by Victor E Grijalva, Vice Chairman of Schlumberger at the Indonesian International Oil & Gas Conference in Bali in September 1999. *Priscilla Ross* reports.

Even a marginal improvement in field reserves recovery can bring major economic returns to an operator. It is estimated that a mere 10% additional recovery from the known reservoirs outside the Middle East (that is from 36% of the current world reserves – see **Table 1**) would result in $950mn revenue at a $25/b oil price.

According to Grijalva: 'Currently, worldwide proven crude oil reserves are estimated at just over 1tn barrels. The Middle East, of course, represents the majority of the total with 64%. Over the past decade, estimates of global proven reserves have increased by almost 15% due to new discoveries and upgraded estimates of reserves in existing fields.' (See **Table 2**)

He continued: 'As shown in this table, if we exclude the Middle East and concentrate on the rest of the world, the potential revenue gain resulting from a 10% increase in recovery is nearly $800bn. Certainly, this is a financial objective worth pursuing, and a compelling case for using advanced technology to increase recovery. For natural gas, the outlook may well be even brighter.'

Recovery patterns to date

The question is, however, how successful has the oil industry actually been in increasing reserve recovery? **Table 3** shows five selected fields where recovery percentages have been established with a high degree of accuracy. The range is 38% to 59%. These fields have typically benefited from the application of the latest technologies during their lifetimes.

Recovery percentages for Asian fields are not as well established. Best estimates place the average range between 20% and 35%, with some fields performing better and some poorer. In many countries recovery has been impeded because of the lack of access to the latest technology. Grijalva commented: 'In particular, Indonesia can benefit tremendously from efforts directed at recovery improvement, since it has a relatively low reserve to production ratio. We are aware of various government initiatives to increase recovery, and applaud these efforts.'

Middle East	675	(64%)
Central/South America	90	(8.5%)
North America	85	(8%)
Africa	75	(7%)
FSU	65	(6.2%)
Asia/Pacific	45	(4.3%)
Europe	20	(2%)
Total proven reserves	**1,053**	

Source: BP Amoco

Table 1: Worldwide proven oil reserves (bn barrels; percentage world reserves)

Integrated reservoir optimisation

According to BP Amoco, total world proved reserves increased by 6.7bn barrels in 1998, leaving the R/P ratio unchanged at 41 years at the end of the year. In contrast, Indonesia's R/P ratio was only 9.2. Schlumberger takes a 'life-of-reservoir' perspective – called Integrated Reservoir Optimisation (IRO) – which takes a closed-loop process for optimising the performance of oil and gas fields, thereby maximising financial return and asset value. IRO is based on four key, interrelated elements:

- reservoir characterization,
- development planning,
- field implementation,
- reservoir monitoring and control.

The goal of IRO is to enhance asset value at every stage in the reservoir's life. During field appraisal, value is added by reducing the amount and duration of a negative cash flow. For new fields, accelerated production yields early positive cash flow, while, for existing fields, the process can arrest production decline via interventions at the well and reservoir levels. IRO – which relies on a complete spectrum of oil field technologies – can also extend the economic life of both new and existing fields.

Optimising reservoir exploitation depends on the ability to locate by-passed pockets of oil. Repeat 3D seismic surveys are being used to create snapshots of the reservoir to track fluid movement over time. This time-lapse, 4D technique, combined with advances in seismic acquisition and interpretation, are painting a much clearer picture of the reservoir's evolution to help guide future investment decisions.

In Indonesia, 4D techniques have been applied on land. Future

improvements will make land acquisition technology much more cost effective and permit wider deployment. Such advances and expanded use of 4D offshore offer the potential for significant increases in recovery. Through-tubing and casing evaluation tools are also being used successfully to locate by-passed oil and recently introduced upgrades have greatly improved the functionality and accuracy of such tools. For quantifying by-passed oil, saturation measurements are now five to seven times more precise. In Nigeria's Niger River Delta, new logging techniques have pin-pointed by-passed oil which was later produced at very low cost. More than 70% of the logs that gave indications of unswept reserves were proven valid during re-completion.

Future opportunities

According to Grijalva there are two exciting opportunities for the future. First are new-generation, deep-reading measurement techniques that will monitor fluid movements and detect by-passed oil accumulations deeper in the formation. Second, there are tools designed to drill through casing, cement, and into the formation that will sample reservoir fluids and monitor reservoir pressure with special probes for additional analysis of producing oil deposits.

Data on by-passed oil and newly defined productive zones provide a basis for optimising reserve recovery and extending field life by applying the latest well construction techniques. Today, there is growing use of extended-reach, horizontal and multilateral well technology in a bid to reduce the number of wells required to optimally redevelop a field. This, in turn, offers construction, operating and intervention cost savings. These are the first steps towards reservoir plumbing – a technology that is rapidly achieving special significance. Major strides in directional drilling and logging-while-drilling technology not only supply more accurate information about the near-well-bore formation, but also allow targets to be reached with pinpoint accuracy.

Recent technological innovation has achieved records not even dreamed of a few years ago, such as drilling an extended reach well further than 10 km and maintaining a horizontal well within a one-foot vertical deviation. There has been a back and forth, extended reach well competition between BP Amoco's Wytch Farm field offshore Poole Harbour in the UK and Total Austral and its partners' Ara field in Tierra del Fuego. Recently, the record was re-captured by BP Amoco with a step-out of 10,728 metres at Wytch Farm, beating Total Austral's earlier Ara record of 10,585 metres.

Area	Reserves (bn barrels)	Revenue addition +10% recovery ($bn)
Central/South America	90	180
North America	85	170
Africa	75	150
FSU	65	130
Asia/Pacific	45	90
Europe	20	40
Total	**380**	**760**

Table 2: Revenue potential – additional recovery from existing reservoirs (at $20/b crude price)

Improving well productivity

Less dramatic, but equally important, achievements are advances in scale removal. Most fields experience some degree of scale deposition in the production tubing, severely restricting the flow area. Replacing scaled-up production tubing is often prohibitively expensive. Conventional jetting to clean out deposits uses abrasive sand and is impossible to tell when the scale has been fully removed. As a result, the tubing wall is often severely eroded, incurring safety risks and remedial costs. However, a new technology using specially designed beads to remove the scale has been developed. The beads are harder than scale, but softer than steel, eliminating potential tubing erosion. The result is a safe, effective clean-out at minimal cost.

Hydraulic fracturing is a common method for improving well productivity and recovery. Traditional treatments are costly, however, because a workover rig is needed, the production tubing must be pulled, and the well must first be 'killed'. Advances in coiled tubing and fracturing fluids technology are revolutionising fracturing practices. With coiled tubing there is no need for a workover rig or tubing removal. Operations are performed on live wells, and multiple zones can be fractured in a single pass. The ability to fracture down coiled tubing depends on the use of novel fluids that are solids-free, clean up rapidly and maximise the conductivity of the resulting fracture. The benefits are significant time and cost savings and an order of magnitude increase in well productivity. Coiled tubing also offers other advantages. For example, in Venezuela, it is being used to drill appraisal wells to generate the data required for field development decisions at a fraction of the cost of drilling conventional wells.

A straight-forward, cost-effective way to increase well productivity and reserve recovery is by re-perforating existing zones or perforating new ones. Today, there has been a quantum improvement in performance as well as safety with deep-penetrating, shaped charges that provide record-setting 20% to 30% increases in penetration distance, effectively shooting past existing formation damage and greatly improving well productivity. Oriented perforating is a way to maintain perforating integrity and provide high-rate, essentially sand-free production by choosing the optimal perforation direction. In Lake Maracaibo, Venezuela, wells were producing about 1,500 b/d with 10 lb of sand per 1,000 barrels. The use of oriented perforating technology increased production to 4,000 b/d, with a 20-fold reduction in produced sand.

Working together

It is crucial that the oil and gas industry leverages its technological knowledge base, including participation in focused joint R&D programmes. However, it will take a synergistic combination of team-work, advanced technology and knowledge management tools to realise future growth objectives.

Field name	Field location	Reserves recovered
Statfjord	Norwegian North Sea	59%
Brent	UK North Sea	57%
Prudhoe Bay	Alaska	54%
Forties	UK North Sea	39%
Ekofisk	Norwegian North Sea	38%

Table 3: Selected recovery percentages

The proper application of best-in-class technology leads to customised solutions which, in turn, reduce cost and increase oil field efficiency, well productivity and reserve recovery. There needs to be a full-field, cradle-to-grave approach adopted for reservoir exploitation as embodied in the IRO process. Closer business relations between oil and gas companies and service suppliers can reap great benefits – but the roles of each party must be clearly defined to avoid overlap.

Schlumberger believes that service companies should treat all clients equally and be rewarded for the value their services and solutions provide. 'Risk rewards should be shared as appropriate, but equity positions should be strictly avoided to eliminate potential conflicts of interest,' said Grijalva. He cited three instances where the application of integrated technologies was successful in Indonesia.

The world's largest steamflood in Duri had left by-passed oil due to poor sweep efficiency. Unproductive steam was driving operating costs up. Saturation monitoring a means to see what oil has been produced and what remained was used to track steam and oil movement. Reservoir simulation then optimised injection patterns and rates, leading to higher recovery at reduced operating cost.

In one Indonesian field, wells were being abandoned because of the high water/oil ratios caused by water coning. Lifting costs had become prohibitive, despite significant remaining reserves. Re-perforating with deep-penetrating charges equalised water and oil drawdowns to mitigate coning. Consequently the oil rate in seven wells tripled and the water rate declined by an average of 27%.

Bima, an advanced, self-propelled, multi-purpose jack-up was designed as a multi-purpose service vessel fit-for-purpose in Indonesian offshore conditions. Its integrated capabilities include a full array of workover services, and conventional and coiled tubing drilling. Currently, it is drilling slimhole, expendable wells to verify targets. It has established records for low drilling costs per foot and brought significant field development savings, achieved by verifying targets with low-cost wells thereby eliminating expensive dry hole directional wells from a platform.

The way forward

Technology has been, and continues to be, the key to increasing production and recovery from existing reservoirs. Future improvement of marginal field economics will depend on technology in Indonesia and elsewhere. A structured approach to reservoir optimisation will provide the vehicle, supported by knowledge management systems that offer best practices and multi-disciplinary expertise to solve oil field problems. Finally, successful implementation will depend on a synergistic merging of team-work and technology by oil and gas companies and service companies. Without this, the future growth and profitability of the exploration and production sector look uncertain.

Letter to the Editor

Dear Sir

I have been a member of the Institute of Petroleum for some years now, and I have always found the magazine most informative, keeping its members up to date with projects, market trends, and new technology. However, I was most disappointed with the article entitled 'Lessons learnt from the Longford explosion' in your December 1999 issue.

After an initial introductory paragraph, the article goes on to summarise the loss caused by the accident: 'The accident at the Esso Australia-operated plant resulted in the loss of gas supply to 1.4mn domestic and industrial customers in the State of Victoria and severe business disruption. Crude oil production from the Bass Strait was also shut down as a result.'

What it failed to mention was the human factor – the loss of life of two employees, and injuries to eight others. The paragraph should have begun something like: 'The accident at the Esso Australia-operated plant resulted in the loss of life of two employees and injuries to eight others, and disruption of gas supply to 1.4mn domestic...'

I am a loss prevention engineer working on the detail design of a large offshore petroleum facility, where the safety of personnel is of the utmost importance. The loss prevention/safety systems are primarily for personnel protection; asset protection is normally a secondary consideration.

I would think any family, friends or work associates that read the article would have found it upsetting and cold as it was purely business oriented. Assets can always be replaced. Life cannot.

Andrew Spear

***We fully accept this criticism of the lack of the 'human factor' and apologise to those affected.* Ed.**

Speedy on-site soil analysis kit

A portable soil analysis kit has been developed by Azur Environmental, in conjunction with Shell Research, to allow the on-site determination of total petroleum hydrocarbons across a wide range of soil types and petroleum products.

The patented RemediAid test kit is claimed to offer greater flexibility than existing portable systems and show a good correlation with the standard infra-red method.

The kit enables the user to run 10 tests concurrently, providing the potential to run 25 tests in just one hour. It can also be calibrated to measure quantitative amounts of specific petroleum products such as leaded and unleaded gasoline and polyaromatic hydrocarbons (PAH).

The system has been designed to ensure that operator contact with reagents is kept to an absolute minimum. It is supplied complete with specially designed ampoules and pre-measured reagents, eliminating the need for pipetting skills and measuring flasks.

The test is based upon the Friedel Crafts reaction, but with one fundamental difference – the intermediate remains in the solvent which allows the colorimetric analysis of the sample to take place, comments the manufacturer. 'Other systems and methods rely on the comparison with a colour chart to give semi-quantitative results or the measurement of turbidity of the final solution. The use of a colorimetric end-point means that RemediAid can be calibrated to determine various types of specific fractions, as well as allowing total petroleum hydrocarbons to be screened, where accuracy is not essential.'

The system is said to provide a quicker alternative to the standard laboratory method which is both costly and labour intensive, because only the contaminated samples need to be sent to the laboratory for confirmatory testing. This allows faster decisions to be made during site investigations and site remediation, as RemediAid eliminates delays between sampling and sample analysis. It also allows a more comprehensive survey of the site as more samples can be analysed and processed than would normally be possible.

Tel: +44 (0)118 927 7000
Fax: +44 (0)118 927 2842

Enviro-friendly water-based coatings

A new range of high performance water-based epoxy coatings has been launched by International Protective Coatings in a bid to help the coatings industry meet increasingly stringent legislation aimed at minimising the impact of solvent-based products on the environment.

The range, which took 10 years to develop, is designed to provide the same levels of long-term performance as solvent-based epoxies without sacrificing performance.

Three new coatings have been developed: a zinc phosphate epoxy primer (Intergard 270), a zinc-rich epoxy primer (Interzinc 280), and a high-build epoxy intermediate (Intergard 401).

Tel: +44 (0)20 7479 6000
Fax: +44 (0)20 7479 6555

Innovative safety solution

Process safety company Smith Flow Control has been commissioned by Norsk Hydro to design an innovative interlocking system for the change-over sequence between relief valves on the cooling water system at its Rafnes refinery in southern Norway.

At the refinery, change-over of the relief valves is achieved using handwheel-operated, three-way diverter globe valves, which divert the process flow from one relief valve to another. Under these conditions, partial valve operation to its mid-position must be strictly controlled. Previously, the two diverter valves were linked by a chain wheel operator, which meant that operation of one valve caused simultaneous operation of the other. The drawback of this system, however, was that it was liable to failure if the chain on the wheel slipped or broke. The consequences of such a failure were potentially very serious and could have resulted in fugitive emissions, or even an explosion.

In this closed system – with diverter valves located both upstream and downstream of the relief valves – it was decided to install a safety interlocking system which would ensure the downstream valve was always operated first. Smith Flow Control devised a process which utilised a custom-designed hybrid GLM/QLA interlock on the downstream valve and a standard GLM interlock on the upstream valve.

The system works as follows: a key is issued from the permit control authority to initiate the sequence. When inserted into the GLM unit of the hybrid interlock on the downstream valve, it allows the valve to be operated, but only to a mid-position. This releases a second key from the QLA unit, which is used to unlock the GLM interlock on the upstream valve, allowing its full operation. This, in turn, releases a third key, which is returned to the QLA unit of the downstream valve, enabling further operation to complete the changeover. This fool-proof system ensures a safe operating mode at all times and eliminates any scope for operator error, states the company.

The interlocks are manufactured from 316 stainless steel and are said to be capable of withstanding the most arduous of conditions, both on and offshore. Depending on the process, or required level of sophistication, they can be customised with switches, sensors or microchips in order to interface with stand-alone or mainframe process management systems.

Tel: +44 (0)1376 517 901
Fax: +44 (0)1376 518720

Safeguarding wireline operations and equipment

In a bid to improve safety on drilling rigs, Sigma Controls has developed a Prosafe key interlock which is claimed to enable overriding tasks in wirelining operations to be performed 'safely and without damage to expensive equipment'.

Wirelining is the process of suspending tools, measuring, monitoring and logging equipment inside the production tubing of a well by means of a spooled wire. Entry and assembly of tools/equipment is undertaken in a connected chamber – the lubricator – on top of the well. The assembly is then pressure tested and the top-most manual valve on the well (the crown valve) is opened, together with the upper master valve, which is usually an automatically-operated, reverse-acting gate valve fitted with a fail-safe hydraulic spring-loaded actuator.

The lower master valve is opened (usually manually) and the tool string dropped into the production tubing. A downhole safety valve (DHSV) is also fitted in-line to the production tubing as a 'last resort' valve to close the well if there is a serious problem at the surface. The DHSV is kept open by maintaining hydraulic pressure from the surface. It is also fitted with a spring to close it upon loss of this pressure.

Thus, the tool string usually has to pass through four valves (two manual and, in most cases, two automatic) before it can be suspended into the well or can reach its 'producing part'. The manual valves cause the wireline crew no problems as they are in (or above) the wellhead area and can be controlled locally. However, problems can arise with the automatically-operated valves – the hydraulic upper master valve and the DHSV. If these valves are closed remotely, or automatically (for example, if there is a fire alarm on the platform), they could close onto the tools or wire passing through them. This, in turn, could cause the DHSV to jam open. In addition, the upper master valve has enough spring force on the gate to actually cut the wire, allowing the tools and wire to drop into the well. In a bid to avoid such problems, the wireline crew prefer to 'take control' of the automatic valves locally by maintaining a connected supply that they operate themselves to the upper master valve and DHSV. The wireline override assembly allows separated supplies to be applied to the automatic valves at the wellhead without having to disconnect the primary automatic supplies. Diverting valves are used to allow two separate supplies to be connected to one actuator (the DHSV, or the upper master, or both valves). The actuator can be opened on the normal primary supply and then switched over to the wireline supply once the correct key is inserted into the Sigma Prosafe interlock and turned. Other keylock combinations are also available to allow locking in both positions and the key to be removed in either the normal flow condition or the wireline position. In an emergency the valves can be switched back easily to the primary normal control system and the automatic system and solenoid valves will then take control of the well actuators. The keys with the Prosafe interlock assembly can also be part of a sequence system that prevents inadvertent operation without pre-set authority.

Tel: +44 (0)1942 257112
Fax: +44 (0)1942 523111

Synthetic fibre ropes for deepwater mooring

A partnership of Scottish oil and gas consultancies has completed a £300,000 fibre rope-testing project which could 'revolutionise how drilling and production platforms are moored to the seabed', reports the Dundee & Angus Oil Venture Group.

Commissioned by operators and contractors including Amerada Hess, Bluewater Engineering, BP, Chevron, Conoco, Elf, Norsk Hydro, Saga, Shell and Statoil, the two-year study was undertaken by Arbroath-based Tension Technology International and the National Engineering Laboratory in East Kilbride.

Conventional steel mooring ropes are heavy and cause excessive platform motion in severe weather – especially when moored in deepwater. The new study – which evaluated polyester, Kevlar and high molecular weight polyethylene (HMPE) ropes ranging from 600- to 1,500-tonne breaking load – is said to 'prove beyond doubt' that synthetic fibre ropes are suitable for deepwater mooring and provides valuable data regarding their strength, resistance to stretch, and durability. In addition, synthetic fibre ropes are said to present a much lower risk of damage to pipelines and risers, cause lower platform motion, do not rust and can be installed more easily.

Further information available from TTI.
Tel: +44 (0)1241 430084
Fax: +44 (0)1323 732094

Removing oil from water

Twin Filter has launched a new range of oil adsorption filter cartridges. Based on a modified cellulose media, the new filters are claimed to be capable of removing between 70% and 95% of total hydrocarbons (dispersed and dissolved) from water in a single pass. The cartridges are also said to be able to reduce hydrocarbon contamination in water down to less than 5mg/l and to hold nearly three times their own weight of oil burden. The filters are suitable for use within the oil and gas production industry, marine bilge and ballast water treatment systems and many other industrial applications.

Tel: +31 (0)75 6555 000
Fax: +31 (0)75 6555 025

NEW Publications and Data Services

How to Buy Signs*

(Available, free of charge, from Forge The Signmakers, Darby Studios, 12B Sun Street, Waltham Abbey, Essex EN9 1EE UK).

The European fuel retailing industry is estimated to spend more than £180mn on signs every year. This document, from Forge The Signmakers, which has three factories in Yorkshire and a sales and marketing base in Waltham Abbey, puts buyers behind the scenes, giving 50 'no-nonsense' questions that it believes customers should ask before appointing a sign company or commissioning sign work. It also outlines what answers buyers should hear and, in a more light-hearted tone, gives the answers that they might hear. The booklet is divided into sections, covering health and safety, quality, value for money and service.

The Emerging Energy Company

Owen McQuade (FT Energy, Maple House, 149 Tottenham Court Road, London W1P 9LL, UK). ISBN 1 84083 197 9. Price: £395 ($632; euro 604).

This report presents the current state of play on the convergence of the natural gas and electricity value chains. Covering other key areas of the energy sector – including upstream oil and gas, and downstream oil – it reviews the significant progress seen in the sector and reveals the driving forces behind developments. The report also provides industry models for energy companies to consider in the future, and assesses the variety of strategies that energy utilities have followed in such times of change. The text is supported by seven in-depth company case studies.

Oil Company Profits and Benchmarks 2000

Gilbert Jenkins (Sunningdale Publications, 1 Hamilton Drive, Sunningdale, Berkshire SL5 9PP, UK). ISBN 1872546 96X. Price:£48.

This publication lists key statistics and ratios for 370 UK oil companies grouped by activity (E&P, refining, storage, distribution, retailing, lubricants, petrochemicals and transportation) and for the UK oil market by product. It acts as a comprehensive reference source and provides benchmarks on competitors, suppliers and customers. Based on bulk market prices for crude oil and refined oil products, estimates are made of the profitability of oil company activities by sector in 1999, with forecasts for 2000. Details of company turnover, profits, and numbers employed are also listed while more detailed data such as distribution costs, salaries and exports are provided for some businesses. An analysis of BP's UK operations on a quarterly basis from 1983 is also included – the company has recorded a loss in 23 out of 66 quarters listed, but has not made a loss since the 2Q1996. Average prices and profit margins (quarterly from 1993) for sales of motor gasoline, gas oil and residual fuel oil are also listed.

Aviation Fuels Business Worldwide

Gilbert Jenkins (Sunningdale Publications, 1 Hamilton Drive, Sunningdale, Berkshire SL5 9PP, UK). ISBN 1872546 919. 154 pages. Price:£95.

Now it its eighth annual edition, this book provides a detailed analysis of the aviation fuels business. It includes 90 tables, including detailed comparisons of prices the airlines pay for fuel, the prices oil marketing companies receive and independent estimates of jet fuel prices. The hedging of activities of the airlines are also reported and analysed.

** Held in IP Library*

Latest from the Library

Information for Energy Group (IFEG)

This year IFEG has plans for seminars on Electronic Journals and on Continuing Professional Development, as well as a social event in the summer. The directory of members will also be available, for IFEG members only, via the IP website. For more information about IFEG please contact Sue Tse or visit our website at **www.petroleum.co.uk/ifeg**

New Editions to Library Stock

Oil Trading Law 2000. Mankabady, Prof Samir. 2nd Edition. Petroleum Economist, London, UK, January 2000.

Spindletop: Special Centennial (1901–2001) Edition: The True Story of the Oil Discovery that Changed the World. Clark, James A; Halbouty, Michael T. 3rd Edition. Gulf Publishing, Houston, Texas, UK, 2000.

Stratigraphic Systems: Origin and Application. Visher, Glenn S. 3rd Edition. Academic Press, San Diego, California, US, 1999.

Databases on the IP website

First, an apology for those of you who have experienced faults using our databases. This was due to an incompatibility between Internet Explorer5 and our database software. The problem is now sorted out, so please access our databases again. They consist of:

- Library monographs database
- Periodicals holdings database
- IP Consultants database
- IP Publications for Sale database
- News In Brief database (IP Members only)
- International Petroleum Abstracts (IP Members only)

If you have any comments or queries, please contact Catherine Cosgrove.

International Petroleum Abstracts

IPA has ceased publication – but all is not lost. The IP library staff are continuing to add to the database, albeit with shorter abstracts than the printed version. The database, with records from 1985, is available to IP members via the IP website. If you need a password please e-mail **ip@petroleum.co.uk** giving your name and membership number.

Contact details

- Information queries to:
  Chris Baker, Senior Information Officer, +44 (0)20 7467 7114
  Sue Tse, Information Officer, +44 (0)20 7467 7115
- Library holdings and loans queries to:
  Liliana El-Minyawi, LIS Assistant, +44 (0)20 7467 7113
- Careers and educational literature queries to:
  Jasmine Gavhure, Information Assistant, +44 (0)20 7467 7116
- Website queries to:
  Perry Hackshaw, Webmaster, +44 (0)20 7467 7112
- LIS management queries to:
  Catherine Cosgrove, Head of LIS, +44 (0)20 7467 7111

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

Membership News

NEW MEMBERS

Mr R D F Apthorp, Abco Electric Service Limited
Mr R L Arscott, OGP-Int Association of Oil & Gas Producers
Mr M Aslanoglou, London
Ms J Birnie, Lasalle Products and Services
Mr J Brocas, ISIS Limited
Mr K Callaghan, Gerrards Cross
Mr J W Calvert, Conoco International Inc
Mr A L Clarke, Infineum UK
Mr M A Clarke, New Malden
Professor T L Coe, University of North Texas
Mr A J Coles, Callington
Mr K Conly, Equiva Trading International
Ms D Cox, London
Mr W H Coxon, Rolls Royce plc
Mr M Dajani, Arthur Anderson
Mr A Daley, Royal & Sun Alliance Engineering
Mr P J Davies, Hampton Hill
Mr E M Debashi, Umm Al-Jawaby Oil Service Co
Mr R Deurwaarder, KPMG
Mr K R Doble, Ashbourne
Mr A M Dols, ABN AMRO Bank
Mr P J Dowsett, Stanford-le-Hope
Dr M F Elkady, Sultan for General Construction & Development Group
Eng H T Elzakzoki, Tijan Petroleum Company Limited
Ms N Ford-Hoon, Central Energy Fund (Pty) Limited
Mr D J Francis, Tanknology (UK) Limited
Mr D Gauci, Omnitec Limited
Ms L Gibson, KPMG
Mr M W Gosney, North Tawton
Ms R Gourdin, BP Amoco
Mr A Gravell, Llanelli
Mr T D Hancock, Chelmsford
Mr D Hanna, ABN Amro Bank
Mr A-Z Hayal, SOCAR
Mr G Howorth, Billericay
Mr P Huisman, KPMG
Mr D A Johnson, Woodside Energy Limited
Mr D Jonker, Central Energy Fund (Pty) Limited
Mr D Joshi, Arthur Andersen
Mr A Juell-Skielse, SEB Merchant Banking
Mr A A S Khayat, Tijan Petroleum Co Limited
Mr A S T Khayat, Tijan Petroleum Co Limited
Mr C J Kjellberg, GAC Services Limited
Ms P Knight, Equiva Trading International
Mr J Knudsen, A/S Dan-Bunkering Limited
Mr A Korteweg, KPMG
Mr S Liden, Preem Petroleum AB
Mr J A MacGill, Aberdeen
Mr F Malatesta, London
Mr C Malone, Warburg Dillon Read
Mr E Manole, Concept Limited
Mr G Maranus, KPMG
Mr N Marchant, Aberdeen
Ms A Matytsina, Ukrtat Nafta
Ms O Matytsina, Ukrtat Nafta
Mr V Matytsyn, Ukrtat Nafta
Mr P D McCullough, London
Mr W G McGilvray, DeGolyer and MacNaughton
Mr J D Modine, American Petroleum Institute
Mr S O Moju, Special Piping Materials Nigeria Limited
Mr P J Murfitt, Bedford
Mr J Murray, Murray Consultants Limited
Mr R Myers, Talisman Energy (Asia)
Mr H O'Donnell, Saipem UK Limited
Mr R Panai, Delek The Israel Fuel Corp Limited
Mr R Pawmbo, Andersen Consulting SPA
Mr N Perry, HSBC Investment Bank plc
Mr P C Rees, Barron-on-Humber
Mr G S Rettie, West Indies
Ms D M Rose, South Croydon
Mr U Samto, Pertamina
Mr K C Saunders, Aberdeen
Mr C Shaw, Schroder
Mr F Sidani, Arthur Anderson
Mr R Smeets, KPMG
Mr A Soemarno, Pertamina
Mr J A Spencer, Reserves Management Limited
Mr J F Stone, Dewitt and Company
Mr E K Thomson, Fluor Corporation
Mr B Titov, Solvalub Limited
Captain K A Tucker, Ilkey
Mr J-P Van Der Ende, Casella Science & Environment Limited
Mr U van Zessen, KPMG
Mr B A Ward, Redding
Mr A S Whyatt, London
Mr A B F Williams,Grimsby

NEW STUDENTS

Mr A Aziz, London
Mr O Akanusi, Nigeria
Mr F Al-Kharusi, Imperial College
Mr A Ekwueme, London
Mr O Okeowo, London
Ms T O Okeyale, London
Mr D G Pfleger, Orpington

NEW CORPORATES

Nigerian National Petroleum Corporation, London office, Capitol House, 159 Hammersmith Road, London W6 8BS, UK
Tel: +44 (0)20 8735 9600, Fax: +44 (0)20 8748 1015
Representative: Mr Anesu Garba
NNPC London Office gathers, analyses and disseminates oil and gas market information to the NNPC Group in Nigeria. It also provides material procurement support to the E&P, refining, distribution and product marketing subsidiaries in Nigeria.

Investec Henderson Crosthwaite Securities, 2 Gresham Street, London EC2V 7QP, UK
Tel: +44 (0)20 7597 5000, Fax: +44 (0)20 7597 5090.
E-mail: talves@investec.co.uk
Representative: Mr Tony Alves, Research Director Investec Henderson Crosthwaite Securities is a sector focused institutional stockbroker, offering a research, sales and trading service to major institutional fund managers.

It has a long established track record as a research based broker focusing on a broad range of companies. It acts as corporate broker to over 50 companies in its targeted sectors.

JSC "AK Transneft", 57 Bolshaya Polyanka, 109180 Moscow, Russia
Tel: +7 950 81 10, 953 87 10, Fax: +7 953 55 25, Telex: 911560 Bolid RU
Representative: Mr V. Izbitskikh, Vice President
This state-owned company operates the Russian integrated oil pipeline system, totalling over 46,000 km, and transports 99.6% of the oil produced in Russia to meet internal demand, as well as for export.

It has particular expertise in design, construction, updating, monitoring, telecommunication support of oil pipelines and tanks, as well as all related services.

Electronic Data Systems Ltd, Energy Division, Wavendon Tower, Wavendon, Milton Keynes MK17 8LX, UK
Tel: +44 (0)1908 284094, Fax: +44 (0)1908 281098.
E-mail: jbrown@eds.com
Representative: Mr Shaun Haydon, Project Manager
The Energy Division of EDS (UK) develops and integrates soft systems for use in both upstream and downstream applications. Particular areas of expertise are oil logistics, accounting planning & scheduling, optimisation and all areas of offshore.

IP Discussion Groups & Events

Energy, Economics, Environment

'Drilling for Oil on Wall Street – An Alternative Exploration Strategy'

Thursday 9 March, 17.00 for 17.30

Dr Rob Arnott, Morgan Stanley Dean Witter

IP Contact: Jenny Sandrock

Energy, Economics, Environment

'Managing Political Risk for E&P in a Post-Sanctions World'

Thursday 30 March, 17.00 for 17.30

Charles Gurdon, Managing Director, Menas Associates

IP Contact: Jenny Sandrock

London Branch

AGM followed by 'Energy and Emissions Issues'

Thursday 27 April, 14.15 for 14.30
Park Royal Brewery, London NW10

David Parker, Power Station Manager, Guinness

Numbers will be limited

Contact: Carol Reader Tel: +44 (0)20 8852 9168

Energy, Economics, Environment Discussion Groups

Please notify the contacts if you plan to attend any of the advertised events

All events will take place at the IP unless stated otherwise

Institute of Petroleum
61 New Cavendish Street
London W1M 8AR, UK
Tel: +44 (0)20 7467 7100
Fax: +44 (0)20 7255 1472
e: jsandrock@petroleum.co.uk

IP THE INSTITUTE OF PETROLEUM

Branch Activities

Aberdeen
Contact: *George Wood Tel: +44 (0)1224 205736*
14 March: Future UKASE Activity Levels, by Prof Alex Kemp of Aberdeen University
11 April: Alternative Energy Resources by Prof Bryden, Robert Gordon University

Essex
Contact: *Arnold Carlson Tel: +44 (0)1268 794615*
8 March: The Future of Packaging by Ian Robinson of IK Robinson Associates, P Peuch of BP Chemicals, and Tony Hancock of Plysu Containers
17 March: Annual Dinner and Dance

Humber
Contact: *David Hughes Tel: +44 (0)1469 555237*
3 March: Annual Dinner
13 April: Ladies' evening. Antiques Roadshow

London
Contact: *Carol Reader Tel: +44 (0)20 8852 9168*
27 April: AGM and visit to Guinness Brewery

North East
Contact: *John Sparke Tel: +44 (0)1642 546411*
21 March: Visit to Northumbrian Water Ltd. Bran Sands Treatment Plant
20 April: The Work of the Environment Agency, discussion led by Sarah Gayton, Environment Agency

Northern
Contact: *Alan Holt Tel: +44 (0)161 875 3242*
28 March: Grease, by a speaker from Axiel Christienson

South Wales
Contact: *Steve Vines Tel: +44 (0)1646 600679*
14 March: *Sea Empress* Follow-Up, by Robin Crump at Elf Refinery, Milford Haven
24–26 March Weekend in Hereford

Southern
Contact: *Veronica Cloke Browne Tel: +44 (0)1703 896303*
15 March: Ford advanced fuels and lubricants
(April): Future of chemical engineering (jointly with IChemE)

Stanlow
Contact: *John Wellsteed Tel: +44 (0)151 479 4962*
9 March: Calibration and Measurement of Storage Tanks, by John Miles of SGS
13 April: The Oil Industry and the Environment by Martin Maeso, IP Environment Manager, and a speaker from the Environmental Agency

West of Scotland
Contact: *Allan Lawson Tel: +44 (0)1738 456701*
9 March: The Petroleum Dinner, Glasgow

Yorkshire
Contact: *Ivor Bennett Tel: +44 (0)1484 713201*
14 March: Vauxhall V6 Engine, by Ken Davies of Vauxhall Motors. (Joint meeting with The Institute of Energy)

IP Conferences and Exhibitions

European Conference on

Transport 2000 and Beyond – Alternative Fuels in the 21st Century

London: 23–24 March 2000

- New improved engine technologies
- The development of 'cleaner' fuels
- Using gas and gas-derived products
- Daimler-Chrysler's commercially available fuel cell car in 2003

These are just some of the developments that indicate the timeliness of this IP European Conference which is organised in association with AFTP (F), DGMK (D), CEP (E), RBPI (B) and ECN (NL).

Bringing together governmental and supranational authorities, suppliers of fuels and both fuel and engine technologies, evaluating the pace and direction of the development of transport fuels, this important European Conference will also consider how choices are made and the levers that can be used to direct public policy. These factors will dictate the strategic future of transport fuels and be of interest to suppliers of fuel, technologies and equipment, motor manufacturers, their customers and others interested in transport policy.

The programme and registration form is now available.

International Conference on

'Digital Black Gold' – E-commerce in the Oil and Gas Industry

London: 11 April 2000

'E commerce has saved the corporation $1bn'
Jack Welch CEO of General Electric

Maybe you purchase books from **amazon.com** or groceries from Tesco on the Net, but how does this relate to making the oil and gas industry more efficient, cost effective and competitive in managing the supply and customer chain?

The IP Conference 'Digital Black Gold' brings together expertise from industry users, the facilities and services available from specialist Internet companies, analysis of financial and legal obstacles and initial findings of energy companies.

This conference is aimed at managers who need to understand the implications of e-commerce for their business and those involved in implementing e-commerce strategies, rather than IT specialists.

Sir John Browne has said that 95% of BP Amoco's procurement will be via the Internet by the end of 2000! Perhaps you should be there!

The programme and registration form is now available.

International Conference on

INTERSPILL 2000

Brighton, UK
28–30 November 2000

A major conference and exhibition featuring the activities of the European spill response industry, both at sea and on land, under the direction of the **British Oil Spill Control Association** and organised by the **Institute of Petroleum**. It is planned that **INTERSPILL 2000** will be the first in a regular series of such events.

Topics to be covered

The topics to be discussed during the conference sessions, and through the exhibition and its associated poster presentations, will include:

- nature of the response problem in all its aspects
- avoidance of secondary releases in marine casualty situations and the implications for response provision
- influence of shoreline and inland characteristics, and the different response requirements for water and solid surfaces
- strengths and weaknesses of available techniques and equipment in respect of operational factors
- waste disposal options and the impact of regulations on option choice, storage, handling, and transportation
- need for ways of minimising the amount of waste arising from pollutant clearance operations resulting from limited capacities of authorised waste disposal facilities
- means by which pollution response can be improved through the pooling of all available expertise and resources within governments and the private sector, and
- scope for further innovation in equipment, techniques, and operational planning

Who should attend?

INTERSPILL 2000 will be of interest to all who are concerned about the environment and involved in its protection, including:

- national and international environmental agencies
- oil, chemical, and transport industries
- port and harbour authorities
- offshore oil field operators
- central and local authorities
- emergency services

The programme and registration form will be available in March.

A Trade Exhibition will accompany this event.

To add your details to the mailing lists, please contact:
Pauline Ashby, Conference Department, Institute of Petroleum,
61 New Cavendish Street, London W1M 8AR, UK
Tel: +44 (0)20 7467 7100 Fax: +44 (0)20 7255 1472 e: **pashby@petroleum.co.uk**

or view the IP Web Page: www.petroleum.co.uk

EVENTS Forthcoming

MARCH 2000

14-16 **Aberdeen, UK**
2nd International Workshop, Conference and Exhibition on Evacuation, Escape and Rescue Offshore
Details: Energy Logistics International Ltd, UK
Tel: +44 (0)1628 671717
Fax: +44 (0)1628 671720
e: enquiries@energylogistics.co.uk

16 **London**
Perspective 2000 Conference: Informative Insights into Global Exploration & Production Opportunities
Details IHS Energy Group, UK
Tel: +44 (0)1666 501806
e: conrad.odell@ihsenergy.com

16-17 **Ashgabat, Turkmenistan**
5th Turkmenistan International Oil and Gas
Details: Ingram Liberman, UK
Tel: +44 (0)20 7596 5077
e: ingram@ite-exhibitions.com

20-21 **Aberdeen, UK**
8th Annual International Conference: Minimising the Environmental Effects of Drilling Operations
Details: Penny Richards, IBC Global Conferences Ltd, UK
Tel: +44 (0)20 7453 5491
Fax: +44 (0)20 7636 6858
e: cust.serv@ibcuk.co.uk

20-24 **Oxford, UK**
International Oil Supply, Transportation, Refining and Trading
Details: Shareena Butt, College of Petroleum and Energy Studies, UK
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21 **Houston, Texas**
Perspective 2000 Conference: Informative Insights into Global Exploration & Production Opportunities
Details IHS Energy Group, UK
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23 **Aberdeen, UK**
Valve Workshop Seminar
Details: Stephen McCrossan, for National Engineering Laboratory, UK
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23 **London**
Monitoring and Control by Internet
Details: ERA Technology, UK
Tel: +44 (0)1372 367000

28-31 **Oxford, UK**
Trading Skills to Enhance Commercial Refinery
Details: Shareena Butt, College of Petroleum and Energy Studies, UK
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23-24
Alternative Fuels
Details: Pauline Ashby, The Institute of Petroleum

MOVES People

CheMatch.com, a real-time online trading exchange serving the global chemical industry, has announced a new Vice-President and General Manager, International, **John G Sharum**, based in San Ramon, California, and a new Vice-President, Europe, **Bob Lee**, to be based in Manchester, UK. These additions to the company's management team bring more than 60 years' combined experience of international sales, marketing and general management in the petroleum and petrochemicals industries.

Peter Brice has moved with the Army's Fuel Management Cell from Headquarters Land Command to merge with the Defence Fuels Group at West Moors. He will now be responsible for the supply of ground fuel to all MOD units.

Cinergy Corp. has announced that **Vicky A Bailey** has been appointed President of PSI Energy Inc, at its Indiana operating company. Bailey is also a member of the US Federal Energy Regulatory Commission.

Saudi Arabian monarch **King Fahd bin Abdulaziz** has issued a decree creating a new Supreme Council for Petroleum & Minerals, under his chairmanship.

The IT Group is pleased to announce the appointment of **Bruce A Gordon** as Director, Europe, Africa and the Middle East. Gordon joins from PB Kennedy & Donkin Ltd, where he was the Technical Director, responsible for Environmental Management Services of its Environment Division.

Andrews Survey has appointed *Chris Wilkes* as its Business Development Manager to promote the company's range of offshore survey and positioning services to oil and gas companies. Wilkes has over 20 years offshore experience and has worked for several of the major survey companies.

Stuart Oakley has been appointed Director of Oil, Downhole and Subsea at Weir Pumps.

Inge Hansen has joined Statoil as Chief Financial Officer in charge of its impending privatisation. Hansen previously headed corporate finance, brokerage and financial research house Orkla Finans.

Algeria's state-owned oil and gas company Sonatrach has appointed **Abdelhak Bouhafs** as its new Chairman.

Lukoil has elected **Valery Graifer** to the position of Chairman. Graifer currently holds the office of General Director of the company Ritek.

Mikhail Gutseriev, newly re-elected Deputy in the Russian State Duma, was elected President of oil company Slavneft at a shareholders' meeting held in Moscow.

MDC Technology has announced that **Greg McCormack** will take up the position of Business Development Director for the Hydrocarbon Industry for the company in Houston, Texas. McCormack was previously Director of Global Downstream with Cambridge Energy Research Associates.

***Susan Archer* has been appointed Marketing Co-ordinator by bursting disc manufacturer Elfab Ltd. In addition to providing support for both the British and overseas sales teams, Archer will also identify and develop new marketing opportunities.**

Chevron Corporation has recently announced the appointments of two senior oil executives to the Board of Directors of Caltex Petroleum Corporation. They are Chevron Corporation Vice President **John Watson**, who heads strategic planning, and Chevron Products Co Vice President **Peter McCrea**, who oversees worldwide lubricants and technology marketing activities. The appointments took effect 1 February 2000.

Total Oil Marine plc, the UK exploration and production subsidiary of the TotalFina Group has announced the following management changes: **Chris Allen** has been appointed as their Safety and Environment Manager, replacing **David Henson** who has taken up secondment with the Health & Safety Executive. **Arnaud Breuillac** has taken over as Alwyn Area Manager from **Ian Dundas** who will be in charge of the co-ordination and preparation of the merger project within Total Oil Marine. **Jean-Claude Pinsonnat** has joined Total Oil Marine as a Finance Manager, replacing **Jean-Marie Bonnet** who has returned to a TotalFina position in Paris.

The Society of Petroleum Evaluation Engineers has welcomed the following new Board Members for 2000: **M Fred Duewall** (William Cobb & Associates, Dallas TX); **Charles W Gleeson**, Midland, TX) and **Larry T Nelms** (Ryder Scott, Littleton, CO).

Rick Hill has been appointed President and Chief Executive of Houston-based JP Kenny Inc.

As a result of the merger of Exxon Corporation and Mobil Corporation in November 1999, a number of senior management changes have been announced in ExxonMobil affiliates in the UK. **Keith Taylor**, Chairman and Chief Executive of Esso UK plc and its subsidiaries will retire with effect from 30 April 2000 after more than 35 years service. **John Cousins**, formerly Chairman of Mobil North Sea Ltd has been appointed Executive Vice President of ExxonMobil Exploration company located in Houston. **Ian Upson**, currently Managing Director of Esso UK and Esso Petroleum Company Ltd will retire with effect from 31 March 2000. **Ansel Condray** has been appointed Chairman of ExxonMobil International Ltd as well as Chairman of Esso UK plc, Esso Petroleum Company Ltd, Esso Exploration and Production UK Ltd along with Mobil North Sea Ltd. Other senior appointments in the UK upstream sector are: **John Genova**, formerly Vice President, Gas, Exxon Company International, who will become International Gas Marketing Director in ExxonMobil International Ltd, the Chairman of Mobil Gas Marketing (UK) Ltd and also Director of other upstream Esso and Mobil companies in the UK; **Rick Vierbuchen** becomes Exploration Director, ExxonMobil International Ltd and will also continue as Director of Esso Exploration and Production UK Ltd. Senior appointments in the downstream side of the business include **David Carr**, Director of Logistics and Refining and **Steve Polkey**, Director of Fuels Marketing to the Boards of Esso UK plc and Esso Petroleum Company Ltd.

IP THE INSTITUTE OF PETROLEUM

Training Courses

Investment Profitability Studies in the Petroleum Industry (INV)

ensPM

IFP

organised in association with ENSPM Formation Industrie and Institut Français du Petrole

20–23 March 2000 The Institute of Petroleum, London

Course Objectives
To give participants the ability: to understand and practise the standard methods of investment analysis used in industry; to undertake oil industry investment profitability studies, taking into account the financial position of the company, fiscal aspects, inflation and risk analysis; to make a critical analysis of such studies and the interpretation of their results.

Who should attend?
Managers and staff concerned with decisions affecting medium and long-term cash flows, such as investment, disinvestment and acquisitions of leasing, who need to improve their understanding of the theory and practice of investment analysis.

Economics of the Oil Supply Chain (ESC)

INVINCIBLE

organised in association with Invincible Energy

27–31 March 2000 (5 days) Cambridge

Delegates will examine the various activities of the fictional Invincible Energy Company to explore the economic forces which drive the oil supply chain. They will concentrate on the main areas of risk and opportunity from the crude oil supply terminal, through transportation, refining and trading to the refined product distribution terminal.

During their time in Invincible's refinery, delegates will learn about the quality aspects of product supply. They will study refinery process economics and the effects of upgrading. Blending to meet quality requirements at optimal cost will be examined. Delegates will construct and negotiate a processing deal. They will then follow the crude oil and the refined products from the refinery and look at the economics of various alternatives. International markets and trading will be studied, together with the various methods of price risk management.

Who should attend?
This course is the essential foundation for people entering the oil industry or for those with single function experience. It is ideal for those:
● new to the downstream oil industry ● with single function experience in supply, transportation, refining or trading ● in the E&P, finance, downstream marketing or IT departments of oil companies ● working in energy-related government departments ● writing about the industry ● bankers, accountants, auditors and others associated with oil companies and oil financing.

Aviation Jet Fuel

DERA

organised in association with DERA

12–14 April 2000 (3 days) The Institute of Petroleum, London

This new 3-day course is designed to provide a technical overview and to introduce delegates to the many facets of the Aviation Jet Fuel business – a business which operates at a truly global level. It will not only examine the workings of the modern jet engine, but will build the picture as to why, unlike some fuels, jet fuel specification, production and handling is critical to the continuing success of the aviation industry. It explores components of the business from several key perspectives, including oil company fuel suppliers and civilian and military users.

Speakers include: John Tiltson – Air Systems, DERA; Peter David/David Smelgrove, BP Amoco; Andy Clifford, Esso; Paula Carberry, DERA FLC

Course includes:
● Jet engine – how it works – why fuel parameters are critical ● Production of fuel – sources (current and possible future) ● Storage and distribution – filtration – outline the systems in use – problems: static, drag ● Oil company perspective – examples of refinery to wing – problems to overcome ● Microbiological contamination

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