Petroleum review

MAY 1998

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Booming gas, dwindling oil

North Sea pipelines
Busy season ahead

Arctic oil and gas
Finnish companies look north

Low oil prices
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Petroleum review

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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: *LB200* laying the NorFra pipeline
Photo: ETPM International

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Opec – the final chapter?

The recent agreement between all the members of Opec except Iraq to reduce output to strengthen oil prices (see box) was effective for a little more than three days. Just about time for oil traders to make a turn on the price rise and another on the subsequent price fall. *Petroleum Review*'s editor takes a very personal look at the short-term prospects for higher oil prices and concludes that not only are low (under $15/b) oil prices likely to persist for some time but more importantly the major impact will be on the Opec countries. The cost of prolonged low prices to a group of countries still overwhelmingly dependent on oil revenues is likely to mean that large-scale inward investment by the oil majors will become not just acceptable but will be actively encouraged.

This year marks the 25th anniversary of the date when Opec seized the pricing initiative from the international oil companies and forced a doubling and then a quadrupling of oil prices. There is a certain irony that this year has seen oil prices, in real terms, moving back to the levels of early 1973 when Opec was little more than a theoretical threat to the ordered world of oil supply.

In fact the Opec members had to save up from the organisation's inception in 1960 until 1973 in order to risk a unilateral price rise. Having capitalised on the Yom Kippur war to make their demands stick, the organisation then went through what might be described as its 'golden period' from 1973 to 1981. A period in which all the major oil company concessions were fully or partly nationalised and oil prices rose inexorably culminating in Opec's exploitation of fears about lack of supply following the Iranian revolution of 1979 to raise prices from $14/b to $30/b.

The contrast between 1981 and 1998 could not be greater. In 1981 Opec appeared to be an invincible cartel that had reversed the power relationship between the raw material producers of the third world and the rich consumer countries of the first world. With Opec controlling over two-thirds of the world's oil reserves and with no real alternative sources of supply, western and Japanese consumers seemed destined to pay ever more dearly for their oil supplies. Following the nationalisations the international oil majors had little equity oil and were reduced to the role of middlemen paying Opec's price for supplies, refining it and passing the costs on to the consumer.

Two things broke Opec's emerging stranglehold – the dramatic fall in oil demand induced by the oil price rises and the opening up of new oil supplies, notably in the North Sea. From 1981 to late 1985 the illusion of the cartel was maintained by the simple expedient of Saudi Arabia progressively cutting output. A process that was only halted when production was reduced to levels so low that the country was unable to operate its desalination plants for lack of associated gas from the oil fields.

The events that followed have uncanny echoes of recent events although the outcomes are likely to be very different. In late 1985 the Saudis abruptly changed policy from defending prices to defending market share. By pricing their crude attractively they rapidly rebuilt market share but at the expense of prices which fell steadily, reaching a record low of $9/b in August 1986. Although at this date all the main Opec producers had built up massive financial surpluses they were having difficulty in spending, prices of under $10/b effectively forced them into adhering to quotas.

A combination of renewed Opec quota discipline and a deal in which the Aramco partners agreed to expand liftings from Saudi Arabia effectively rebalanced the market at rather higher prices. It should, however, be remembered that at this date western governments were still more concerned with supply security than with inflation.

In 1998, however, western governments are rejoicing that low oil prices are 'bearing down on inflation' and there is no suggestion that supply is in any way constrained. There is unlikely to be western political help to raise oil prices as there will be little loss in tax yield from oil product taxes while only a few governments have significant yields from oil production taxes.

The fundamentals also appear unfavourable to any rapid return to higher prices. Over recent years the oil companies have been incredibly successful in expanding production and reducing the cost of supplies directly under their control. For several years in the early nineties the expansion of North Sea production accounted for virtually all the growth in world oil demand. However prices remained fairly firm and the emergence of Far East markets as areas of vigorous demand growth allowed Opec countries to expand their production levels, taking the pressure off their finances.

What the economic implosion in the Far East has done is provide a direct competition between the steadily expanding non-Opec supplies and the desire of the Opec countries to increase revenues by either making use of their existing

Cutting back on worldwide oil production

Opec Member Countries have voluntarily agreed to cut their oil production in order to help stabilise the world oil market (see table below with cuts based on February production figures).

Some non-Opec members are also joining the cut-back initiative. Mexico is to reduce output by 100,000 b/d while Norway plans to cut its production by 100,000 b/d, spreading the reduction equally over all its fields.

	Agreed cut (b/d)	Feb production (,000 b/d)	%
Algeria	50,000	868	5.8
Indonesia	70,000	1,380	5.0
Iran	140,000	3,623	3.9
Iraq	–	1.6/1.7	–
Kuwait	125,000	2,205	5.7
Libya	80,000	1,453	5.5
Nigeria	125,000	2,258	5.5
Qatar	30,000	700	4.3
Saudi Arabia	300,000	8,748	3.4
United Arab Emirates	125,000	2,382	5.2
Venezuela	200,000	3,370	5.9
TOTAL Opec	**1,245mn**	**26,987***	**4.6**
Norway	100	3,250	3.3
Mexico	100	3,200	3.2
Oman	30	910	3.2
Yemen	10	390	2.6
TOTAL non-Opec	**240**	**7,750**	**3.1**
TOTAL	**1,485mn**	**34,737***	**2.3**

** Excluding Iraq*

capacity or increasing capacity. It is notable, however, that most recent capacity expansions have relied on the direct involvement of the oil companies. Examples are Venezuela, Qatar, Nigeria and, despite US sanctions, Iran and Libya.

Driving prices ever lower is an outcome that would benefit neither group as neither can afford a significant loss of market share. There is likely to be some sort of unofficial agreement not to push prices below $10/b, simply because the financial pain becomes just too great for all parties below this level. Agreement, official or unofficial, to raise prices, however, is likely to prove much more difficult.

The key question is which group is better able to withstand a prolonged period of low oil prices? The unequivocal answer is the oil companies. *In extremis* the oil companies do not have to pay their shareholders dividends but if the Opec governments are unable to pay their civil servants and security forces they are unlikely to remain in power for long.

Some Opec countries necessarily have very short time horizons. 'Jam tomorrow' is of no interest to military dictators trying to stay alive and in power. The need is cash today – even if this means reneging on quota agreements.

Only stable governments with cash in the bank have the luxury of long time horizons. Even the richest of the Opec producers are approaching a real pain threshold. Saudi Arabia has been running budget deficits for over a decade. The Gulf War massively depleted regional finances. Although financial affairs in the region are usually secret, the indications are that many Opec governments are doing little more than cover current expenditures once Brent prices move below $12/b.

The quota agreement contains a massive flaw. Because the countries want to maintain trading relationships with the oil companies and wish to avoid breaking contracts all the cutbacks fall on the state oil companies. Where the oil companies have significant volumes of production as equity or PSAs we have the absurdity that every extra barrel produced by a private oil company forces the state company to cut production by a barrel.

Taken literally this would mean that, for example, the oil companies operating in Venezuela could slowly bankrupt PDVSA by expanding their production. This is clearly a nonsense and the oil companies would be unlikely to force the issue. However, the quota system is going to create intolerable strains on Opec's state oil companies in several ways, intensifying trends that have been apparent for some time. Either they are competing for a diminishing supply of state investment funds or exchequers under financial pressure are likely to pre-empt even more of their income. The net effect is the same. State oil companies will find it difficult to invest enough in exploration and development and particularly cutting costs enough to make a low price environment tolerable.

This logic is not new. Venezuela and Qatar have in recent years encouraged oil company investment and have been richly rewarded in terms of expanded production. Iran and Libya have also accepted the logic although oil company investment has been restricted by US sanctions. The limited amount that has occurred has brought rewards in terms of expanded production and new discoveries. Expansion of Nigerian production has been consistently inhibited by the government's inability to fund its share of new developments. Iraq and Iran and their number of potential investors are just waiting for sanctions to be lifted.

The progressive opening of countries to oil company investment has reached the point where there are now only two totally closed countries – Mexico and Saudi Arabia – and two mostly closed – Kuwait and Abu Dhabi. The exact terms on which the US bailed out Mexico in 1995 have never been disclosed but are rumoured to involve access to Mexican oil.

The attractions of investing in the Opec countries are two-fold. They still contain two-thirds of the world's conventional oil reserves and with the exception of Norway they have the most productive fields. Individual well productivity is a rough but useful measure of the attractiveness of an area (see table). The world currently averages 70 b/d per well. The Opec countries average 760 b/d per well. Perhaps the single most attractive country after Saudi Arabia with its 5,600 b/d per well is Iran with 3,300 b/d per well. As little investment has been made in the Iranian fields in the last 20 years the potential is very large.

Just at the moment it might be thought that the last thing Opec countries need is investors who can expand production. However, by cutting costs and rationalising investment to the lowest cost sources of supply the oil companies could offer Opec governments a predictable income and a dynamic oil sector. A partial reintegration of the industry would do the same for consumer governments. But it would mean recognising that Opec had failed.

Perhaps it is no coincidence that the largest oil companies currently have huge cash mountains ready to invest. ●

Country	Production (mn b/d)	Exports (mn b/d)
Saudi Arabia*	8.9	6.5–7.0
Norway	3.3	3.0–3.1
Iran*	3.7	2.9–3.0
Russia	6.0	2.0–2.2
Venezuela*	3.1	2.2–2.5
United Arab Emirates*	2.6	2.0–2.2
Nigeria*	2.2	1.9–2.0
UK	2.7	1.8–1.9
Mexico	3.3	1.5–1.6
Canada	2.4	1.1–1.4

**Opec member*

Top 10 crude oil exporters in 1996

Country	b/d per well
Norway	5,890
Saudi Arabia*	5,640
Iran*	3,310
Kuwait*	2,310
Qatar*	2,160
Iraq*†	2,080
UK	1,650
Abu Dhabi*	1,670
Denmark	1,500
Angola	1,400
Nigeria*	1,125
Mexico	820
Libya*	760
Algeria*	668
Venezuela*	220
Indonesia*	160
Azerbaijan	85
Russia	60
Canada	47
Kazakhstan	40
US	11

Region	b/d per well
Middle East	1,800
W Europe	1,000
Africa	860
Asia-Pacific	80
E Europe & FSU	52
N & S America	26
Opec	760
World	70

** Opec member, † at full 3.5mn b/d capacity*

Source: Oil & Gas Journal *with calculation by* Petroleum Review

Major oil producers' average oil well productivity end 1996

NEWS Upstream

Galley field comes onstream

Texaco's Galley oil and gas field in block 15/23a of the North Sea has come onstream 12 months after the UK Department of Trade and Industry (DTI) gave the go-ahead for the two-phase field development. Final development costs were £120mn, £20mn above the original budget because of drilling problems.

Galley phase one, which has an expected field life of four years, will develop the field's north and south accumulations using Seatanker's *Northern Producer* floating production facility which has a processing capacity of 55,000 b/d. Produced oil and gas are being exported via pipeline to Texaco's nearby Tartan A platform. From there, oil is piped to the Flotta terminal in the Orkney's and gas to the St Fergus terminal in Scotland. Peak production from phase one development will be 35,000 b/d of oil and 50.74mn cf/d of gas (43,000 boe/d).

Texaco holds a 67.41% stake in the project and acts as operator. It is currently seeking approval from partners Summit Oil (17.42%) and Lasmo (15.12%) and the DTI, to begin development work on phase two which will eventually add a further 15,000 b/d of oil to Galley production.

Estimated reserves in place are 57.5mn barrels and 80.4bn cf of gas while recoverable reserves are put at 28mn barrels of oil and 40.2bn cf of gas.

North Sea asset swaps

Shell UK, Esso Exploration and Production UK, and Arco British recently completed two North Sea asset deals.

Under the terms of the exchange Shell and Esso have acquired Arco's 50% interest in blocks 49/8a (licence P523) and 49/14a (licence P024). In return Arco acquired 100% equity from Shell and Esso in blocks 47/20 and 48/16b (licence P898). The asset exchange is effective from 1 January 1998.

In a second transaction, Shell, Esso and Arco have acquired half of BG Exploration and Production's interest in blocks 14/27a (licence P252) and 14/26b (licence P731). These interests will be shared between the three companies pro rata their existing equity. The transfer has been approved by the DTI and is effective from 10 November 1997.

Heather spreads its roots

DNO Heather Ltd has acquired block 210/29a in the North Sea. The block lies less than 9 miles north west of its Heather field. The wholly owned subsidiary of Norwegian independent oil company DNO ASA has taken over the block, which is part of licence P250, from Elf Exploration UK and partners Enterprise Oil Production, Texaco Britain and Union Texas Petroleum.

The transaction, effective from 1 February, comes only seven months after the creation of DNO Heather. The new venture took over the operation of the Heather field in block 2/5 from Unocal Britain, a company in which DNO has had a shareholding since 1972.

DNO and co-venturers Texaco Britain and BG Great Britain have identical interests in block 2/5 and in the undeveloped West Heather accumulation in adjacent block 2/4.

BHP to pull out of Bayu-Undan project?

It was strongly rumoured in April that BHP was looking to sell its 23.5% stake in the Bayu-Undan gas/condensate field in the Timor Sea. Field development would have cost BHP around A$460mn out of a total project cost of A$2bn.

A difference of opinion between co-owners Phillips Petroleum and BHP over how Bayu-Undan's gas is to be converted into liquefied natural gas is thought to have influenced the latter's decision to withdraw from the project. BHP wanted to build an offshore processing plant using its own patented technology while Phillips proposed an onshore LNG plant in Darwin linked to the field by a 500-km pipeline.

It was also rumoured that the Australian company is under pressure to increase its cash flow as its mining businesses have been hit by a number of project cost overruns and delays in recent months.

BHP's stake in Bayu-Undan is estimated to be worth A$300mn to A$460mn. Likely buyers include Phillips Petroleum or Santos.

It was also reported that BHP Chief Executive John Prescott's resignation, tendered in March, had been declared effective early in April.

It was originally announced that he was to continue in his role until a replacement had been found. Executive Director Ron McNeilly is to assume day-to-day responsibilities while the search for a permanent replacement continues.

In Brief

United Kingdom

***Halliburton Energy Development** (HED) is to take over Amoco's 25.77% interest in, and operatorship of, the mature North West Hutton field in the northern North Sea.*

***UiE Scotland has signed a contract** worth $100mn for further work on Esso Norge's* Balder *floating production unit.*

***Mobil North has awarded a five-year,** £110mn contract to Asco UK to provide a fully managed logistics service for the oil company's UK operations. The deal, which begins this month, includes an option for future extensions.*

***New regulations on 'diving at work'** prepared by the UK Health & Safety Commission and Executive have come into force, together with five supporting Approved Codes of Practice.*

***Rockwater has secured a £10mn contract** from EMC to provide the offshore oil loading facilities for Amerada Hess's South Arne development in the Danish sector of the North Sea. It has also won a contract from Phillips Petroleum for the subsea construction work associated with the company's North Sea Renee and Rubie fields.*

Europe

***Eni of Italy is reported to have brought** its southern Adriatic Sea Aquila field onstream. Recoverable reserves are put at 22mn barrels. The field is expected to produce an average 17,000 b/d of light crude over its six year life time.*

***Harland and Wolff of Belfast has** entered into a contract with Global Marine International Service Corporation for the construction of a second Glomar 456 design drillship at a cost of more than $300mn. The vessel is to be taken on charter by Exxon Exploration and will operate in the ultra-deep water offshore the west coast of Africa.*

***Norsk Hydro is reported to have** increased Troll oil field reserve estimates by 10% to 1.2bn barrels.*

***Algerian state oil and gas company** Sonatrach is reported to have signed an agreement covering the supply of 1.5bn cm of Algerian gas by Gaz de France to Ente Nazionale per l'Energia Electtrica of Italy.*

NEWS Upstream

Subsea pigging for the new Millennium

The Subsea Pigging Unit (SPU) developed by Copipe Systems Limited (CSL), a subsidiary member of the PSL Group of well and pipeline service companies, has been selected as a 'Millennium Product' by the UK Prime Minister Tony Blair.

Millennium Products is a UK initiative to promote innovation through new products and services for the Millennium. Products are chosen by a series of judging panels for being 'creative, forward thinking and pioneering in their field'. All products are already available on the commercial market.

Launched in August 1997, the SPU has been used to pig and flood pipelines in the North Sea and is now available to the global oil and gas industry. As a Millennium Product, it will be showcased in trade shows and exhibitions around the world.

All newly constructed submarine pipelines are built on the surface and are therefore at ambient atmospheric pressure when sealed and laid on the seabed. The pipelines are then flooded with seawater to allow pressure testing, cleaning and connection to platforms and subsea facilities.

Traditionally, power for pigging and flooding a subsea pipeline has been provided by surface vessel support. However, Copipe Systems' SPU has been developed to harness the natural hydrostatic pressure difference between the pipe interior and the ocean to its advantage in pigging and flooding applications while also meeting filtration, chemical injection and flow rate specifications. In doing so, the seabed unit significantly reduces the need for surface support and the associated costs, states the company. At a maximum weight of seven tonnes, the unit is claimed to be easily deployed anywhere in the world by small survey vessels or similar. It is suitable for shallow, deepwater and diverless operations.

Mallard field enters production

Shell Expro's Mallard oil field in the central North Sea has come onstream. It is the fifth field to be brought into production in the area by the company within the past 10 months – the others being Kingfisher, Gannet E, Gannet F and Curlew.

Mallard, which is jointly owned by Shell (38%), Esso (38%) and TOTAL Oil Marine (24%), has estimated reserves of 25mn barrels of oil and 17bn cf of gas. It is expected to reach a daily production rate of 16,000 b/d of oil and 11mn cf of gas.

The field is one of the first in a new generation of high pressure/high temperature (HP/HT) projects to be developed by Shell Expro. It has been developed using two subsea wells tied back via a 15-km pipeline system to the company's existing Kittiwake platform. The existence of Kittiwake's infrastructure aided the speed and economics of the Mallard development which, in turn, will help extend the life of Kittiwake, reports the company.

Approximately 40% of the total Mallard project budget of £100mn is to be spent on drilling. Produced oil and gas is processed by a new 450-tonne module installed on Kittiwake and shares the platform's existing production facilities. Oil is exported from Kittiwake via tanker while gas is piped to St Fergus in Scotland.

Nigerian developments coming onstream

The 40:60 Chevron/Nigerian National Petroleum Corporation (NNPC) joint venture's Gbokoda oil field in the western Niger Delta has come onstream. Production is expected to reach 40,000 b/d of oil by the end of 1998. The field is the second of four news fields scheduled to begin production this year under the Chevron-operated joint venture. The first, Opolo, offshore Nigeria, came onstream in February 1998 and is currently producing 23,000 b/d of oil.

According to Richard Matzke, Director Chevron Corporation, 'by the year 2000, Gbokoda's output will increase the joint venture's total production by more than 85,000 b/d of oil. This will be a significant contribution towards Chevron's goal of producing an annual average of 600,000 b/d of oil by the year 2000.'

The Gbokoda project is also reported to be the joint venture's first 'zero flare' oil field development in Nigeria. Associated gas is processed for commercial use through the Escravos Gas Project inaugurated in May 1997.

Gbokoda is one of three adjacent oil fields located in the OML-49 concession. The Benin River field, brought onstream in 1996, currently produces 49,000 b/d while the Dibi field, discovered in 1995 and significantly extended in 1997, will be brought into production later in 1998. Production from Dibi is expected to reach 65,000 b/d by the year 2000.

Oil and gas production from the three fields are tied into a combination of new and existing facilities, and transported via pipelines to the joint venture's tank farm and export terminal at Escravos.

In Brief

North America

Elf Exploration has secured 15 blocks *in the Gulf of Mexico offshore Louisiana following bids submitted in the OCS Sale 169. The blocks have water depths ranging from 3,000 to 8,300 ft.*

Middle East

Canadian Occidental Petroleum is *reported to have acquired a 47.5% stake and 43.75% interest in Yemen blocks 50 and 51 respectively from Kerr-McGee Yemen. Block 51 lies adjacent to the western boundary of the Canadian Occidental-operated Masila block, while block 50 lies in an underexplored area to the northwest of Masila.*

Russia & Central Asia

Arctic Pacific Contractors – a 50:50 *Fluor Daniel/Brown & Root Energy Services joint venture – is reported to have secured a $40mn contract to provide project engineering, procurement, construction planning and support services for the basic design concept and definition phases of the Sakhalin II project.*

Ramco Energy has announced it is *close to signing a production sharing agreement with Azerbaijan state oil company Socar for the redevelopment of the shallow-water Guneshli field in the Caspian Sea.*

Monument Oil and Gas, Mobil *Exploration and Producing Turkmenistan and Burren Energy/VSST have reported that their first 4,700 tonne cargo of Turkmen oil was transported by ship across the Caspian Sea from the port of Aladja in Turkmenistan and arrived at the port of Baku in Azerbaijan on 20 March 1998.*

French oil company Elf Aquitaine is *reported to have acquired a 5% stake in Russian company Yuksi for $528mn. Initially, the strategic alliance will develop western Siberia's Sugmut field which has estimated proven reserves of 700mn barrels.*

Schlumberger is reported to be planning *a strategic alliance with Russia's largest oil company Yuksi which will give the international oil services company a significant interest in developing Russia's oil reserves.*

NEWS Upstream

Namibia opens up unlicensed offshore region

The Ministry of Mines and Energy in Namibia has announced that its third offshore petroleum exploration licensing round will open on 1 October 1998. The whole of the unlicensed part of the Namibia offshore, including deep-water areas, will be opened for bidding. The proposed closing date for bids is 31 March 1999. Whereas the offshore areas will be licensed during the official round, applications for onshore licences can be submitted at anytime.

The Namibian Government has proposed a number of amendments to the country's Petroleum Acts in a bid to attract further investment. The new proposals to be submitted to the Namibia National Assembly for approval are:

- a reduction of royalty from 12.5% to 5%;
- a reduction of petroleum income tax (PIT) from 42% to 35%;
- enlargement of the ring-fence on exploration expenditure to include any licence in Namibia for PIT purposes; and
- the establishment of trust funds to cover decommissioning of facilities on cessation of production (contributions to the funds will be tax deductible).

New seismic data includes 1,000 km in the Luderitz Basin and, in deep-water areas to 2,500 metres water depth, 1,200 km in the Namibe Basin and 5,000 km offshore the Walvis and Luderitz Basins. An additional 1,000 km around the Kudu gas field has also been acquired. Several major prospects have been revealed by the existing deep-water seismic database while recent drilling and other geological information has confirmed good marine oil-prone source rocks in Aptian and Cenomanian/Turonian intervals.

Brent Spar dismantling site chosen

Shell UK is to apply to the Norwegian authorities for permission to move the Brent Spar storage and loading buoy to Yrkjefjorden, located 60 km northeast of Stavanger, for dismantling.

Three sites – Amoyfjorden in Stavanger, Erfjorden in Suldal and Yrkjefjorden in Vindafjord/Tysvaer – were reviewed as potential dismantling sites by Wood-GMC, the British/Norwegian consortium whose re-use proposal was selected as Shell UK's preferred choice of 'disposal' solution for Brent Spar in January. Cleaned slices of the Spar will form the supporting pillars of a new quay extension at Mekjarvik near Stavanger.

The deep-water site of Yrkjefjorden was chosen because of its good infrastructure. The site has quay facilities to moor barges, a large onshore work area, electrical power supply, a quick road connection to Stavanger and proximity to the town of Haugesund.

Irish oil terminal re-opens after 19 years

Irish National Petroleum Corporation (IPNC) has recommissioned the 1mn tonne oil terminal at Whiddy Island, Bantry Bay, Ireland with a delivery of 70,000 tonnes of Oseberg crude by the Norwegian tanker *Prospect* from the Sture terminal in Norway. The 105,000-tonne vessel was moored to a newly installed £IEP18mn, single point mooring, one mile north of Bantry Bay terminal and unloaded within 24 hours.

This first delivery, purchased by the National Oil Reserves Agency (NORA), was due to be followed by another as *Petroleum Review* went to press, adding 140,000 tonnes or 20 days worth of national reserves to Irish strategic oil reserves.

INPC Chairman Ed O'Connell said that the company's goal is to develop a commercial break bulk terminal at Bantry Bay Terminal Ltd to exploit opportunities in the movements of crude stocks and, if Irish offshore oil is discovered, enhance the logistics and distribution costs for oil companies. Bantry Bay Terminal Manager Seamus O'Conner and INPC will jointly market the 12-tank recommissioned terminal.

The oil terminal at Whiddy Island was formerly operated by Gulf Oil/TOTAL until the Betelgeuse tanker fire disaster at the oil jetty on 8 January 1979 when 51 French and Irish oil workers lost their lives after the tanker buckled due to a seriously weakened hull.

Chevron agrees Qatari exploration deal

Chevron has signed an exploration and production sharing agreement with Qatar General Petroleum Corporation to explore for hydrocarbons in the Qatar peninsular. The 10,900 sq km onshore acreage, designated as Block 2, lies to the east of the Dukhan oil field and south of the North Dome gas field. A 2D and 3D seismic survey is to be undertaken by year-end and exploratory drilling is planned in 1999.

In Brief

***BP Exploration (Shah Deniz) has** awarded the Caspian Resource Development (CRD) joint venture study to undertake conceptual engineering services for the Shah Deniz Exploration Project. Located in water depths between 50 metres to 600 metres in the south Caspian Sea, Shah Deniz reserve estimates range from 1.5bn to 3bn barrels of oil and between 2tn to 4tn cf of gas.*

***Petronas of Malaysia is reported to** have announced plans to invest $70mn on the development of several offshore fields in the Cheleken-1 block in the Turkmen sector of the Caspian Sea shelf. Reserves are estimated at 600mn barrels of oil.*

Asia-Pacific

***UK company Cairn Energy's RX-3** exploration well in its existing Ravva field in India has tested in excess of 45mn cf/d of gas and 400 b/d of liquids.*

***Apache Corporation is reported to be** planning to acquire a 50% stake in offshore blocks 09/18 and 11/19 in Bohai Bay, China from Texaco.*

Latin America

***Shell and Texaco have signed two offshore** exploration contracts with Colombia's state-owned oil company Ecopetrol. The Macuira and Nazareth blocks cover shallow and deep-water acreage offshore Colombia's northern Guajira province.*

***Lasmo has announced the establishment** of its first oil production in the Dacion Area in eastern Venezuela. The current gross production rate is 11,650 b/d of oil.*

***Repsol affiliate Astra has made a large** oil discovery in the Quiamare-La Ceiba area in the east of Venezuela. The Tacata Tag 12 E discovery well tested at 16,000 b/d of oil. Production is expected to start within two months.*

Africa

***Elf Petroleum Nigeria is reported to** have commissioned its $300mn Orphan development project offshore southeast Nigeria. Field reserves are put at 160mn barrels with production estimated at 60,000 b/d of oil over a 15-year period.*

Ministerial call to global energy industry

The G8 Energy Ministerial Business Consultative Meeting, held in Moscow on 31 March 1998 and organised by the World Energy Council (WEC), called on governments to increasingly rely on the private sector to provide the energy supplies to meet the expected 55% growth in global energy consumption between now and 2020. It also called for improved access to commercial energy for the two billion people, mainly in South Asia and sub-Saharan Africa, who are currently without it.

The growth in energy consumption is expected to be concentrated in the developing countries and to be met predominantly by fossil fuels.

The major trend over the last decade has been of progressive liberalisation in the global energy sector with governments quitting being producers of energy to concentrate on core responsibilities such as providing transparent, effective, fair and stable commercial, regulatory and environmental legal frameworks and the maintenance of a healthy economy.

Diversity of energy supply in a market-oriented environment should provide adequate security of supply in most circumstances, it was stated at the meeting.

John Baker, Chairman of the WEC Executive Assembly and Joint Chairman of the Consultative Meeting explained that a constructive partnership was required between the public and private sectors of the energy industry in order to address the challenges facing the global energy sector.

'Although global energy resources are more than adequate to meet the expected 55% growth in energy consumption to 2020, accessing remoter resources, lengthening supply lines, increasing dependence on energy trade, increasing environmental impacts such as possible climate change, and the changing geographical patterns of use threaten geopolitical instability if the major challenges they bring are not met,' he said.

'We need international dialogue and agreements to avoid arbitrary political interventions, the removal of barriers to international trade, timely action bearing in mind the long lead times for many energy projects and the development of new technology, conditions which will allow the mobilisation of finance and sustained attention to environmental issues.'

Kazakhs halt privatisation process

Kazakhstan has announced that it plans to suspend further oil and gas industry privatisation for the next two generations.

The government has already secured foreign investment in its largest energy projects: Chevron and Mobil have stakes in the giant Tengiz field in western Kazakhstan; Agip. BG, Texaco and Lukoil have stakes in the Karachaganak gas condensate field to the north; and CNPC holds interests in a number of fields in the northwestern Aktyubinsk region. According to Kazakh Ambassador Kanat Saudabayev the country's economy is now firmly on the track of real growth, having achieved a 2.5% growth in GDP in 1997, and some 72% of the economy is now privatised. The country has attracted some $7bn of direct investment in recent years, a large percentage of which has been directed to the oil and gas upstream sector. The government now wishes to encourage foreign companies to target the downstream sector, in order to develop its pipeline and telecommunications infrastructure among other projects.

BP targets $6bn annual profit growth

BP reports that it aims to boost its underlying annual profitability by a further $2bn within the next five years to at least $6bn a year by 2002.

Announcing that the company would deliver its current financial goals at least a year ahead of schedule, 'even if prices and margins stay at current levels', Chief Executive John Browne said it was 'now time to look further ahead and set some fresh targets to take the company beyond the Millennium.'

Speaking to oil analysts in London, Browne confirmed a commitment to a strong financial framework including a plan to distribute $2bn in cash to shareholders in 1999 in a share buy-back. He also said that BP would hold to its current assumptions about the external environment – a Brent oil price averaging around $16/barrel, mid-cycle conditions for chemicals and a refining margin of $2/barrel – but would remain ready to adjust to a sustained period of lower oil prices.

Browne stated that the company had concluded that it would be able to boost profitability, perhaps with a small timing adjustment, even if oil prices remained at around $14/barrel. He stressed that BP had already responded to current low oil prices with a rapid action plan based on proposals from 350 managers across the Group to focus spending and reduce costs.

United Kingdom

Shell has published, for the first time, *an integrated report covering the combined effects of its financial, social and environmental performance. Entitled* Profits and Principles – does there have to be a choice?, *the report also breaks new ground by inviting readers to 'Tell Shell', via reply-paid cards or to the Internet, how they would deal with the sort of dilemmas faced by a multinational group.*

Ramco Energy has reported that 1997 *Group turnover fell to £6.2mn from £8.2mn in the previous year largely as a result of Pennzoil completing its scheduled payments to Ramco in 1996. Pre-tax profit for 1997 was £484,000.*

The Save Group has announced a 1997 *turnover of £420.6mn compared with £429.7mn in 1996. Profit before tax and exceptionals was £9mn and profit before tax £7.32mn.*

News that Burmah Castrol planned to *return at least £250mn to shareholders prompted a sharp rise in the company's share price at the end of March. Burmah stated that the move would probably be after the abolition of advanced corporation tax in April 1999.*

Chevron has announced plans to sell *its former Gulf Oil (Great Britain) headquarters building in Cheltenham, 161 km west of London.*

Monument Oil & Gas has announced a *Group profit of £19.6mn for 1997, a 59% increase compared to the previous year. Turnover of £89mn included a contribution of £67.3mn from the Liverpool Bay fields. Cost of sales totalled £22mn, a rate of £2.79/b compared to £2.39 for 1996.*

Europe

Spanish oil and gas company Repsol *has reported a net income after tax for the 1Q1998 of Pta38.2bn, a rise of 23.3% on the Pta31bn recorded in the same period a year earlier.*

A new seismic data acquisition and *service company, Aker Geo, has been formed as a joint venture between Aker Maritime and Aker RGI. The new company will be based in Oslo and led by John Reinhardsen, currently Executive Vice-President at Aker Maritime.*

Qualified dangerous goods safety advisers

The UK Health and Safety Commission (HSC) has published a consultative document setting out proposals for regulations implementing the DGSA (Dangerous Goods Safety Adviser) Directive in the UK. The DGSA Directive requires those who transport dangerous goods by road and rail, or inland waterway, to appoint vocationally qualified safety advisers and ensure that the advisers carry out the functions required by the Directive.

The consultative document forms one part of a two-pronged approach to implementation of the Directive. The other part – establishing a system by which prospective safety advisers can sit approved examinations and, if successful, be issued with vocational training certificates – is being carried forward by the UK Department of the Environment, Transport and the Regions. Safety advisers must pass an approved examination in order to obtain the vocational training certificate they need before they can be appointed.

As well as providing advice on the safe transport of dangerous goods and the loading/unloading of such goods, the adviser is also required to monitor compliance in health and safety law and related practices and procedures, as well as ensure the preparation of annual reports. They will also have a specific duty to produce a report whenever an employer's vehicle carrying dangerous goods is involved in an accident and those goods affect the health and safety of people or damage property or the environment.

The Directive is due to be implemented by 31 December 1999. In order to allow time for advisers to become qualified, the aim is to implement regulations by early 1999. Comments on the proposals should be sent no later than 3 July 1998 to Geoff Lloyd at the HSE, Tel: +44 (0)171 717 6201 Fax: +44 (0)171 717 6670.

Top marks for Imperial College

Imperial College, London, claims to be the first UK 'Materials Technology' education and training provider to have scored top marks in a Quality Assurance Agency (QAA) teaching quality assessment. The assessment was conducted by QAA, which has the responsibility to secure value from public investment by ensuring that all higher education is of an approved quality, in March 1998 on behalf of the Higher Education Funding Council for England (HEFCE).

The College's MEng undergraduate and MSc postgraduate programmes in Petroleum Engineering were part of the assessment unit 'Materials Technology', together with other courses in the Department of Earth Resources Engineering (now part of the T H Huxley School), the Department of Materials, and the Centre for Composite Materials. The group was awarded the maximum mark of 24 points.

The standard of petroleum engineering teaching and research at Imperial was also recently recognised in a recent HEFCE Research Assessment Exercise. Petroleum engineering, together with the mining engineering and environmental engineering research groups in the Department of Earth Resources Engineering, were awarded a Grade 5 score with over 95% of the staff having been submitted for assessment.

BP Exploration turns to computer-based training

Simulation is increasingly used in the offshore sector to provide training in a range of areas, from equipment and plant maintenance to health and safety. One of the latest packages to be developed by multimedia and computer-based training company Sanderson CBT is the 'Well Discovery Game' produced for BP Exploration.

The new software package enables those involved in prospecting to experience the challenges and complexities of making major decisions about whether and where to drill for oil. At the heart of the simulation are realistic geological maps, each of which is generated spontaneously at the beginning of the 'game' to ensure that each simulation is different. On entering the simulation, the user is presented with a prospecting map, together with a time limit and a budget. The user then has to consult with colleagues and commission research, such as gathering more seismic data or initiating geological surveys.

The user then has to decide which resources to deploy and in what sequence to use them. He or she must consider the impact of these decisions on the risk of drilling a dry well, estimate the cost of resources compared with the reduction in risk and consider the importance of time factors. As the user progresses through the simulation and makes decisions, performance is measured using a range of criteria. Exercise feedback is provided at the end.

In Brief

***The Ministry of Transport for the** Netherlands has announced plans to significantly reduce the amount of illegal oil discharge from ships in its region of the North Sea by 2010. This will be achieved by a new internationally agreed system where ships make direct payment upon disposing of waste. This will eliminate one of the reasons for dumping at sea being that shore-based disposal of waste is expensive.*

North America

***Occidental Petroleum has reported a** 1Q1998 net income of $177mn, a drop of $2mn compared with the same period a year earlier.*

***Dallas-based Aviva Petroleum and** Garnet Resources Corporation of Houston have signed a Letter of Intent to merge their two businesses.*

***Occidental Petroleum reports that it** has completed transactions valued at $376mn as part of its programme to divest or redeploy non-strategic properties.*

***Global Marine has announced that its** US turnkey subsidiary, Applied Drilling Technology Inc (ADTI), drilled more wells than any other drilling team in the Gulf of Mexico in 1997 and 75% of the Gulf of Mexico turnkey wells. ADTI drilled 103 turnkey wells, compared to Chevron's 96 wells, Shell's 82, Vastar's 52 and Texaco's 42. ADTI's turnkey competitors only drilled 34 wells combined.*

***Texaco and Chevron Corp have signed** an agreement to establish a joint venture of their global marine and industrial fuels and marine lubricant businesses.*

***Unocal is reported to have announced** plans to defer $250mn in capital spending projects in 1998 as a result of the continued drop in oil price.*

***Houston-based drilling contractor Global** Marine's European turnkey subsidiary Global Marine Integrated Services–Europe has been certified to the BS EN ISO 9001 quality assurance standard.*

Russia & Central Asia

***It is reported that the private Russian oil** group Evikhoven is to be floated on the Russian stock market by the end of the year. Two UK companies hold interests in Evikhoven – Dana Petroleum has a 10% stake and Sibir, which is to merge with its UK parent Pentex, holds a 20% interest.*

ROV training courses come of age

Since the introduction of Scotland's first independent remotely operated vehicle (ROV) training course two years ago, Aberdeen-based Stenmar reports that demand for ROV training has gone from strength to strength with the 21st course recently starting at Fort William.

The courses were developed as a response to industry realisation that there were no recognised ROV qualifications available in Scotland. Previously ROV pilots and technicians had to travel outside of the region for training. The need for such courses is not confined to Scotland, reports Stenmar. Its sister company, The Underwater Centre has a base in Tasmania and has run courses for the Royal Australian Navy and Asean Cableship.

The ROV courses range from basic induction level up to supervisory level, from one to four weeks in duration. Students are taught using workclass and observation ROVs, taking advantage of two wrecks, platform section, pipeline and wellhead guide base all located close to an 800-metre pier. Lectures are also run on fault-finding, maintenance and theory.

Pipeline project funding

Tyne & Wear-based Macaw Engineering recently obtained funding for a two-year project, worth £170,000, from the UK Department of Trade and Industry.

The project is to develop a Pipeline Technology Training Package aimed at improving the international competitiveness of oil and gas companies by replacing technical skills lost as a result of recent downsizing operations.

Macaw Engineering is a member of the Pegasus Pipeline Engineering Group. Other members contributing to the project are ISD, Plastic Pipes, RSD and Advanced Training Solutions.

Once completed, the training package will be marketed by TWI North which will also use the program to set up courses in pipeline technology.

The training package will be contained on a CD-ROM which can be used for face-to-face or distance learning. The World Wide Web will be used to carry out tutorials for people studying in remote locations.

Free standards training for BSI members

The British Standards Institute (BSI) is offering its committee members free training until March 1999 in a bid to increase knowledge and understanding of the standards making process. A variety of courses on BSI, IEC/CENELEC, CEN and ISO standards are offered.

The majority of the training courses, which are funded by the UK Department of Trade and Industry (DTI), take place at BSI House in London, although some will be run at Birmingham and Manchester University later this year.

Anyone interested in the courses, which are allocated on a 'first come, first served' basis, should contact Schula Byrne, Course Administrator, Tel: +44 (0)181 996 7612 Fax: +44 (0)181 996 7249.

FPSO training first

The Montrose Fire & Emergency Training Centre (MFETC) claims to have become the first company in the UK to offer simulator training for the floating production vessel market. Using a new software package developed by Aberdeen-based Pisys, the MFETC provides realistic training for FPSO managers, or 'captains', in a variety of emergency situations – such as gas leaks, valve failures and total loss of power – in a risk-free environment.

The Pisys system is said to allow companies to cost-effectively invest in simulator training, as after the initial capital outlay for the simulator 'engine', software can be developed to run different scenarios as required. This eliminates the need to purchase a complete new simulator package each time.

The Millennium Bug

A Year 2000 Support Centre has been launched in a bid to help small and medium-sized enterprises (SMEs) beat the Millennium Bug computer problem. The Centre is run by a consortium including Cambridge Publishers Ltd which publishes the official Year 2000 guidance for larger organisations written by CCTA – the UK Government's IT agency.

The Centre publishes guidebooks and 'survival packs' which are being supported by the Department of Trade and Industry, and have been endorsed by CCTA which is also recommending them to Government departments for use with their own SME suppliers. Action 2000, the body set up by the UK Government to help business beat the Year 2000 problem, has also placed the Centre on its list of approved sources of guidance.

The Centre operates a fax-on-demand service on 0870 908 2000 which supplies Year 2000 information and articles 24 hours a day. It also has a comprehensive website at **http://www.support2000.com/**

In Brief

***Two of Russia's largest energy** companies – Gazprom and Yuksi – have been indicating that they regard the $2.1bn starting price for the sale of the Government's 75% holding in Rosneft as too high. The starting price was fixed after Dresdner Kleinwort Benson valued the stake at $2.3–2.4bn. The Government has indicated that it regards the price and the required commitment to invest $400mn in Rosneft over the next three years as fair. The auction closes on 26 May 1998. Gazprom has announced that it will bid for the Rosneft shares in alliance with Lukoil and Royal Dutch/Shell.*

***Elf Aquitaine is reported to have** agreed a number of joint exploration and marketing projects in Russia with Russian company Yuksi in which it acquired a 5% stake last month. The two companies will develop a long-term strategy to develop Yuksi's service station network and its refining and marketing activities. They are also to jointly develop the Sugmut oil field in western Siberia and evaluate the Yurubcheno-Tokhomo gas field in eastern Siberia. They are also said to be discussing possible ventures in the North Sea and Africa.*

Asia-Pacific

***Gas Authority of India (GAIC) has** reported a 61% rise in after-tax profits to Rs10bn ($253mn) against RS6.2bn last year.*

***Oil and Natural Gas Corporation** (ONGC) of India has reported a 19% rise in net profits to Rs24.2bn ($613mn) compared RS20.3bn last year.*

***TOTAL of France is reported to be** planning to invest $2bn on the Sincor extra-heavy oil project and development of the Jusepin and Punta Pescador areas in Venezuela over the next five years.*

Africa

***South African oil company Engen has** reported a 34% increase to R217mn in replacement cost net income for the six months ended 28 February 1998. Turnover rose by 2.6% to R6.481bn.*

***South Africa is reported to have sold** the bulk of its remaining strategic oil reserves, some 25mn barrels, in a bid to reduce its government borrowing requirements. Only 10mn barrels of stocks are thought to remain in government hands.*

Centrica losing hold on UK industrial gas market

More than five years since the small-firm gas market was opened to competition and almost a decade since the liberalisation of the large-firm gas market, competition is still gaining on British Gas (now Centrica), according to analyst Marketline's latest report on the UK industrial gas market.

While Centrica is still the major gas supplier, its dominance has fallen significantly since 1997 (dropping from 28.5% to 26.5% today) when it was three times the size of the largest independent supplier. Today, it is just over twice the size of its next largest competitor ENG which holds over 12% of the UK industrial gas market. Mobil Gas Marketing is the second largest independent, with a 10.3% market share.

The market has attracted a number of new entrants and there has been some repositioning among the 10 key players over the past year.

Kinetica's position has fallen from fourth largest independent to sixth following the PowerGen buyout. The company has lost a 1.5% market share during a period when the norm has been for suppliers to gain it. The loss has been across all sectors of the market – small firm, large firm and interruptible – and is the direct result of PowerGen's policy of discarding Kinetica's unprofitable business after taking full control last year.

Certain smaller companies have also been taken over and joint ventures initiated in response to the tough trading conditions facing suppliers. Marketline expects this to continue into the future, but at a slower rate. It also points out that consolidation is being further encouraged as certain companies, mainly the subsidiaries of the regional electricity companies (RECs), begin to focus primarily on the domestic sector of the market. This trend is expected to continue, increasing in turn, the dominance of the current 'big ten' in the industrial market.

The report also predicts that total gas consumption by industrial and power generation customers is set to increase by 86%. Industrial consumption is forecast to rise 21% from 150,889 GWh in 1997 to 182,591 GWh in 2005 while power generation consumption will increase 153% to reach 368,541 GWh in the same period.

The low prices which have, to date, been the main driving force behind growth in gas consumption will have less influence in the future, states Marketline.

The spot price of gas is expected to rise by 60% by 1999, and there will be fewer one-off price gains from competition, as the markets have been effectively liberalised for over five years, Instead, external factors are forecast to be the main drivers to further growth.

Government policy will be a critical influence in the power generation sector. Tighter environmental regulations and a continued refusal to subsidise clean coal technology will put more responsibility for electricity generation on the shoulders of gas-fired stations. This will be offset to an extent by the moratorium on new gas-fired generating capacity, but the moratorium will only bite after 2003 due to the long lead times needed to build new stations.

Industrial customers too will be affected by tightening environmental regulation. The recent expansion of gas demand in combined heat and power (CHP) is likely to intensify further with the introduction of more measures to protect the environment. Combined with the expansionary effects of economic growth, this should offset the depressing effect of rising gas prices on the spot market and increase industrial consumption.

Company	Large-firm	Small-firm	Interruptible	Total
Centrica	17.6	39.0	30.0	26.5
ENG	11.7	6.0	17.0	12.1
Mobil Gas Mkting	15.1	8.2	5.0	10.3
BP Gas	7.5	8.4	14.5	9.9
Other	12.7	6.4	5.0	8.8
Alliance Gas	6.0	6.5	12.0	8.0
Quadrant	5.5	9.8	4.5	6.2
Kinetica	9.6	6.5	0.0	5.8
Amerada Hess	7.8	3.5	4.0	5.6
Agas	4.9	2.7	4.8	4.4
Total Gas Mkting	1.6	3.0	3.2	2.4

Market shares (%) of main suppliers in UK industrial gas markets in Feb 1998

United Kingdom

***US electronics retailer Tandy and** Yorkshire Electricity are reported to have agreed a deal under which UK consumers will be able to arrange their gas supply through one of Tandy's 269 stores. Customers will be offered discounts of up to 21% on their gas bills if they switch from British Gas.*

North America

***Pennzoil has merged its motor oil,** refined products and franchise operations with Quaker State Corporation to create a new publicly traded automotive aftermarket products and consumer care car company. Pennzoil and Quaker State shareholders will own, respectively, 61.5% and 38.5% of the new company which is expected to have annual sales in excess of $3bn.*

***Amoco Pipeline Company and** Oiltanking Houston have formed a new partnership to own and operate a 4.9mn barrel capacity independent bulk storage terminal in Beaumont, Texas. The new company, Oiltanking Beaumont Partners LP, will serve both spot and contract business.*

Middle East

***Dublin-based oil and gas exploration** group, Dragon has struck an agreement with the National Iranian Oil Company (NIOC) to swap defined quantities of Caspian crude delivered to NIOC for equal quantities of Iranian light crude lifted from the Persian Gulf.*

Asia-Pacific

***Woodside Petroleum and Shell are** reported to be planning to go ahead with their A$10bn LNG project in Darwin having confirmed that the Evans Shoal deposit in the Timor Sea – which is the source of the 7.5mn tly project – contains 6.5 tn cf of gas. A further 5 tn cf of gas will be sourced from the Sunrise-Troubadour-Sunset-Loxton Shoal field.*

***Madras Refineries, Indian Oil** Corporation and Petroleum National of Malaysia have teamed up to market liquefied petroleum gas in southern India.*

Tax shock for UK company car drivers

Company drivers were hit by tax increases hidden in the small print behind the UK Chancellor's Budget statement in March 1998, according to the latest *PHH Allstar Fuel Report*. The Government wants to discourage free fuel as it feels this will cut private miles driven and so reduce emissions, states PHH. As a result, tax will increase by a massive 20% (plus inflation), year on year, for the next five years on over 810,000 company drivers who receive free fuel for private use.

To illustrate these tax increases, the impact on a driver of a two-litre company car, paying 40% tax, whose car package includes fuel for private use, is outlined. Currently, that driver must drive 6,448 private miles a year just to break even. With the proposed increases being over-indexed by 20% for the next five years, by tax year 2002/3 the break even point will be 15,460 private miles per year. Once looked on as a perk, these new measures mean that, in some cases, it will prove cheaper (depending on private mileage done) for employees offered free fuel for private mileage to instead reimburse their employers for private mileage done in company vehicles.

PHH says that companies would be best advised to continue to pay for all fuel, business and private – ie the normal procedure for most company fleets. Costs for submitted private mileage can then be taken from salaries or expenses at source. This will lessen the extra administration involved for accounts departments and prevent them being swamped with business mileage claims.

To minimise the cost to companies of these new measures, the report suggests that efforts must be made to maximise fleet cost savings wherever possible. One way would be to instigate a corporate fuel policy considering such factors as fuel efficient fleet purchase, correct maintenance and servicing, environmental considerations, driver training and a lowest price fuel buying policy. The use of corporate fuel cards to pay for fuel, oil and other associated services across an entire fleet also offers a cost effective fuel policy, states PHH.

March fuel prices

	Pence per litre
Diesel	
Lowest: Stoke-on-Trent	60.64
Highest: Inverness	65.82
National average	63.66
Unleaded petrol	
Lowest: Stoke-on-Trent	60.44
Highest: Dover	66.12
National average	63.40
Four-star petrol	
Lowest: London	66.91
Highest: Inverness	71.39
National average	69.13

Source: *PHH Allstar Fuel Report*

Latin America

***TOTAL (37.5%, operator) and its partners** in the Cuenca Marina Austral-1 consortium (Deminex 37.5%, Pan American Energy 25%) are to build an LPG extraction plant in Argentina. The facility will handle natural production from the companies' Canadon Alfa/Ara fields in Tierra del Fuego. Scheduled to be commissioned in 1999, the plant will produce 250,000 t/y of LPG and 60,000 t/y of gasoline.*

***Petrobras and southern Brazil's** government are reported to have agreed guidelines for the construction of a 500 km to 700 km gas pipeline linking Uruguayana in Argentina to Porto Alegre in Brazil.*

***Repsol and Mobil have agreed to** found a 50:50 joint venture to produce, import and market lubricating oils manufactured by both corporations in Argentina, using the Eg3 sales network as one of their main channels. Eg3 has an 11.6% share in the Argentine fuel market and an annual turnover of $800mn.*

Africa

***A British Gas led consortium is** reported to have signed a $220mn, 25-year contract with the Egyptian General Petroleum Company to supply up to 4.4bn cm of Egyptian natural gas to consumers in the central and southern regions of the country. A 270-km pipeline linking Beni Suef to Asyut will be built under the agreement. There are also plans to extend the pipeline 530 km to Aswan.*

UK Deliveries into Consumption (tonnes)

Products	†Feb 1997	*Feb 1998	†Jan–Feb 1997	*Jan–Feb 1998	% Change
Naphtha/LDF	142,060	179,751	315,673	495,927	57
ATF – Kerosene	577,839	612,746	1,177,586	1,257,025	7
Petrol	1,696,881	1,667,028	3,413,468	3,407,160	0
of which unleaded	1,184,146	1,266,634	2,382,099	2,578,854	8
of which Super unleaded	44,996	33,848	86,284	67,885	-21
Premium unleaded	1,139,150	1,232,786	2,295,815	2,510,969	9
Burning Oil	370,894	351,907	807,759	711,415	-12
Derv Fuel	1,173,434	1,203,098	2,338,940	2,414,527	3
Gas/Diesel Oil	618,501	604,146	1,453,371	1,255,914	-14
Fuel Oil	600,669	250,909	1,146,520	565,904	-51
Lubricating Oil	69,757	68,469	142,396	140,233	-2
Other Products	688,132	682,367	1,403,558	1,373,579	-2
Total above	5,938,167	5,620,421	12,199,271	11,621,684	-5
Refinery Consumption	521,610	446,764	1,087,252	1,017,085	-6
Total all products	6,459,777	6,067,185	13,286,523	12,638,769	-5

† Revised with adjustments *preliminary

How sensitive are oil company earnings to oil price changes?

At a time of low oil prices one of the most important questions is what will be the impact on oil company earnings? A recent survey by Petrocompanies attempts to answer the question.

The Petrocompanies survey concludes that pure upstream companies will lose up to 20% of their net income for every $1 drop in the oil price. The impact on individual companies varies greatly but is largely determined by the degree of integration and the importance of gas to the company's operations.

Mainly due to the 'Goldilocks Effect' of three bearish factors – reduced demand in the Far East, OPEC overproduction, and uncertainty over Iraq's oil for food programme – oil markets have slumped dramatically since late 1997.

The Brent price has fallen by over 25% since late 1997, to a 5-year low of under $14/barrel. Much recent attention has, therefore, been directed towards the oil sector and the effect that any continuation of these low oil prices will have on oil company performance.

In the recent Petrocompanies survey of the world's leading oil companies, the companies were asked what effect a $1/barrel change in the oil price (over a full year of operations) would have on net income. A number of the companies provided information based on 1996 figures, whereas others based their estimates on projected 1998 performance.

In all cases the estimates assume constant tax and exchange rates, and those companies that provided data for 1998 based their figures on oil prices in the $18–20/b range.

It should be noted that in order to facilitate comparison between companies, and to provide an indication of the effect on underlying performance, the absolute sensitivity figures obtained in this study have been calculated as a percentage of the 1996 normalised net income (**Table 1**).

Ranger, Lasmo, and Talisman have unusually high sensitivities that are greater than 50% of 1996 normalised net income. Talisman's sensitivity appears high as the absolute figure provided by the company is based on projected 1998 production levels, and when recalculated using consensus earnings forecasts for 1998, the normalised sensitivity decreases to 35%.

A similar picture emerges with Ranger, whose high percentage of oil in the production mix (particularly heavy oil)

Sector	Company	Absolute Sensitivity ($mn)	Sensitivity as % of 1996 Normalised Net Income	1996 % Operating Earnings – Upstream	Gas Production as % of Total Production
Upstream	Ranger	15	84%	100%	49
Upstream	Lasmo	40	83%	100%	55
Upstream	Talisman	28	55%	100%	53
Upstream	Cairn	1.2	20%	100%	26
Integrated	Pennzoil	14.1	19%	60%	62
Upstream	Hardy	1.6	18%	100%	44
Upstream	Enterprise	34	17%	100%	21
Integrated	Murphy	17	15%	90%	44
Upstream	Union Texas	20	13%	98%	54
Upstream	Oryx	20	12%	100%	42
Integrated	Occidental	46	9%	43%	29
Major	Texaco	140	9%	70%	30
Integrated	Marathon	40	9%	73%	53
Integrated	Petro-Canada	16.3	9%	61%	45
Integrated	Total	74	8%	69%	31
Integrated	ENI (AGIP)	195	6%	51%	36
Integrated	Arco	100	6%	60%	32
Integrated	Unocal	32	6%	81%	57
Major	BP	250	5%	86%	17
Major	Mobil	155	5%	63%	47
Major	Shell	350	4%	57%	38
Downstream	Lyondell	0	0	0	0

Table 1: Oil price impact on company earnings

coupled with high PRT charges, give it a high normalised sensitivity. Both Ranger and Talisman are typical of many developing upstream companies, in that they are more concerned with their cash flow position rather than earnings *per se*. Lyondell's zero sensitivity is the result of a very long-term contract with LCR, shielding it from adverse price impacts.

Clearly, there is a strong correlation between increasing upstream bias (represented by the percentage of 1996 pre-tax earnings derived from upstream operations) and increased sensitivity (**Figure 1**).

The companies with the greatest sensitivities are the pure upstream players such as Cairn, Enterprise and Hardy, whose normalised sensitivities of 12 to 15% of after-tax earnings are more than twice that of the Majors and other integrated companies.

The sensitivities of integrated companies are lessened by the antithetic relationship between upstream and downstream earnings, with a fall in the oil price benefiting downstream profits but having a negative impact on upstream earnings.

Although a detailed study of the impact of oil price variation on upstream margins is beyond the scope of this study, a fall of $1/barrel in upstream margins (pre-tax) equates to a 12 to 30% fall in margins for upstream companies, which is comparable to the effect on overall net income. Another interesting finding is that the line of best fit through the data points suggests an optimum mix of approximately 50:50 between upstream and downstream operations to achieve a zero sensitivity, and that companies' sensitivities increase by approximately 3% of net income for every 10% increase in upstream bias.

The importance of gas in these companies production mix is also an important factor in determining these companies sensitivities. Gas is often sold under long-term fixed or semi-fixed price contracts, and gas prices also tend to lag changes in the oil price. **Figure 2** shows that for companies such as Enterprise and Union Texas, which are of comparable size, a sizeable proportion of gas in the production mix will lower sensitivities.

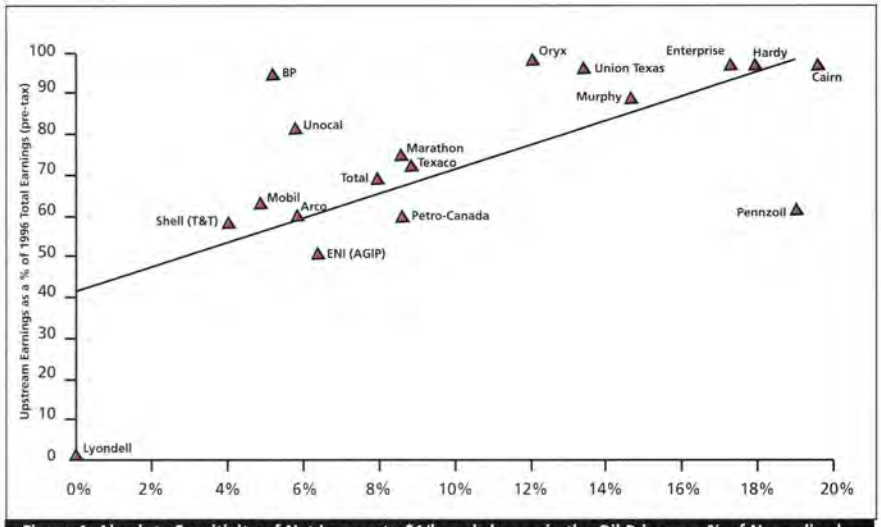


Figure 1: Absolute Sensitivity of Net Income to $1/barrel change in the Oil Price as a % of Normalised 1996 Net Income

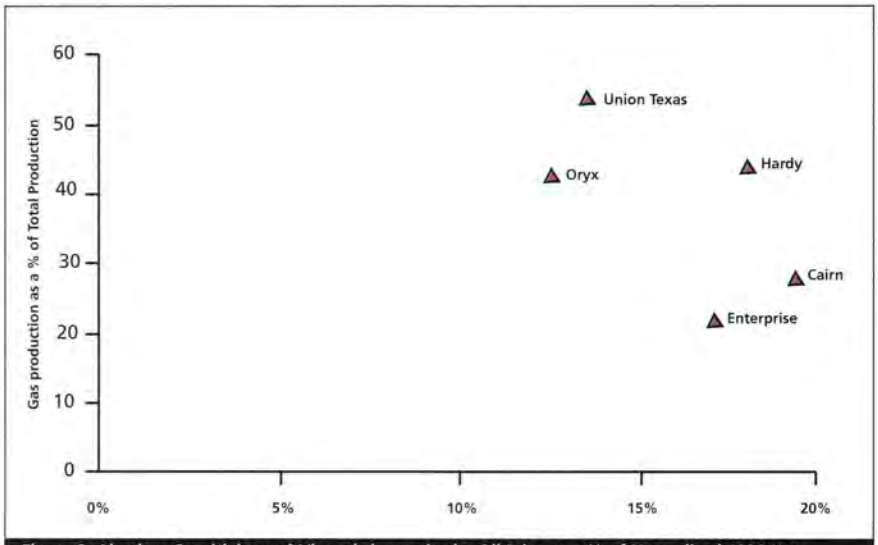


Figure 2: Absolute Sensitivity to $1/barrel change in the Oil Price as a % of Normalised 1996 Net Income

The driving factors, therefore, behind the sensitivities of oil companies to oil price variations are upstream bias and proportion of gas production. Income tax rate also has an effect on sensitivity, with higher tax rates providing a shield against changes in net income. However, as a result of the normalisation procedure used in this study, tax rate is virtually immaterial to normalised sensitivity. Another factor which can help to lessen the impact of oil price volatility is hedging, although for the companies surveyed, this is not an important strategy.

UK offshore operators beset by new challenges

The international oil industry is currently facing a period of great uncertainty: over-production and the search for price stability, the Asian crisis and its effect on demand growth and possible changes to UKCS taxation being some of the major areas of concern. Consequently projects are being delayed or even abandoned. Meanwhile the UKCS industry is being castigated by Crine Network surveys for continued wasteful practices, including operators' internal performance, which inhibit export competitiveness, writes *Mike Wells*.

New uncertainties about the UKCS, stemming from the Chancellor's decision, in his recent Budget, to delay possible changes to the UK offshore tax regime and go for a consultation paper offering various possible options, has presented the industry with a 'what if crude prices do go up?' situation.

The decision is likely to exacerbate the current fall in activity and many project decisions have now been put on hold. In particular, it is a likely clincher to delay the heavy investments called for in the further development of the West of Shetland/Atlantic Margin. In any case, apart from BP's long-discovered Clair field, where production difficulties have put off any development, there seem to be no other development projects for the West of Shetland in the foreseeable future.

A recent London conference organised by SMi discussed future exploration considerations, strategic developments in the area, and pointed up many of the challenges facing the industry. Some in the industry are already starting to question whether, on experiences to date, the West of Shetland is all it was cracked up to be.

Just three years ago the West of Shetland was being hailed as a 'new North Sea', and the industry was predicting that it would be producing around 500,000 b/d from the area by 2000. Subsequent events, including the 17-month delay and the budget overruns in the Foinaven field coming on stream, have meant that actual production in 2000 is more likely to be in the region of 240,000 b/d.

BP Chief Executive John Browne has reasonably pointed out that Foinaven was, a pioneering deep-water field in a new (and hazardous) area brought onstream in half the normal time and only three years after financial sanction. Lessons learned are being applied to the Schiehallion development, due onstream later this year at an estimated capex of £950mn.

Extent of Atlantic Margin

But Foinaven came in 20% over budget and that, together with the problems encountered in the conversion of the FPSO facility and the installation and operation of the subsea drilling centres, has brought home to the industry the true magnitude of the Atlantic Margin's challenges.

Tony Mackay, of Mackay Consultants, told the SMi conference that his company estimates that Foinaven's pre-tax internal rate of return from now on, based on an oil price of even $18/barrel (constant in real terms) was only 8%, and that for Schiehallion would be around 13.5%, whereas Brent was estimated at 18.9%. The first two figures compare with the international oil industry's historical average of about 11%, but where the 'test' rate of return or discount rate is now an average of 15%.

However, although BP and Shell are undeniably finding the development of Foinaven and Schiehallion very costly, it has to be seen in the context of the experience they have gained. The area is probably the most difficult deep-water area among current global prospects, and they will be able to use the techniques and technologies perfected in other more benign deep-water licences around the world.

Other speakers called for both a more realistic reassessment of equipment requirements and techniques, and for greater, more focused cooperation among operators in the area.

Other challenges

The area's natural challenges include seabed temperatures as low as an average 1.5°C and sometimes a transient -5°C, which makes for fluid production problems and the possible need to heat pipes. The low gravity crude found in the area exacerbates the low temperature problems, and the typical low gas/oil ratios make for low energy reservoirs, which are also frequently shallow. The result is low production rates and productivity, so a large number of wells are needed to achieve appropriate drainage.

All these features create a requirement for a great deal of heavy equipment, located on big platforms and with large-scale power sources – all extremely costly.

Dr Andy Tilbrook, Amerada Hess' technology coordinator, suggested that many technical decisions were being made without allowing for the strategic setting, and consequently going down the wrong avenues. The Atlantic Margin required a greater attention of the usability of individual items of offshore equipment. More robust structures were needed than for other offshore areas and overheads would be higher. 'Reliability and simplicity are more important than technical efficiency, and the fewer components in a system the higher the degree of reliability is likely.' The industry, he said, needed much more work on this, although few technological developments were unique to deep waters.

Experience to date suggests that most fields in the area will be small to medium size. So the industry needs to

make small fields as economic as possible. Relatively small accumulations could be developed in clusters feeding into a single production facility. This would call for more appraisal wells and would apply mainly to water depths of less than 800 metres. New technical developments allowing FPOs to be reused on a number of fields should cut costs substantially and reduce the risk of reservoir uncertainty. It is even possible that some operations such as power generation and water injection could become contractor-provided utilities.

The Atlantic Margin Joint Industry Group (AMJIG), now comprising 22 companies, is coordinating much of the technological studies. But UK operators point out the comparative lack of focus in much of the work of the Joint Industry Groups, including AMJIG, and compare them unfavourably with the Norwegian Deepwater Programme (NDP) in its organisation of resources and budgets.

Failures in UKCS industry

The inadequacies in other sector interfaces in the UKCS industry also came under fire at Crine Network's recent annual conference in London. Delegates were told the urgent requirement for the UK offshore supply industry to raise its competitiveness to achieve 5% of world total business instead of its current 1 to 2%, was seriously hampered by failings in all sectors of the supply chain, and a key part of the blame lay with internal practices within operators.

Martin Stanley, head of the DTI's new Infrastructure & Energy Projects Directorate –IEP– (a merger of most of the Projects Export Promotion Directorate with the OSO to include all power, plus other, industries) revealed a litany of inefficiencies from the DTI's own report on the UKCS supply chain.

About 40% of suppliers do not trust their customers, the contractors, and about the same proportion of contractors agreed this was probably justified. Suppliers believe that contractors use their own subsidiaries where possible without looking elsewhere for value for money; and some 40% of contractors admitted that this was exactly what they did.

Only 50% of operators and contractors actually managed their supply chain, even though it can amount to 90% of their costs, and is thereby the essential avenue for adding value and improving performance. Only 43% of suppliers, as opposed to operators and contractors, felt positively about Crine Network despite all its sensible actions and advice. Alliancing is all very well, commented Stanley, for those at the top of the supply chain 'but the old ways of working live on for the smaller fry'.

Stanley described how the DTI teams had too often visited firms with dismal working areas, old-fashioned management practices, and little long-term commitment at all levels to their employers. Despite the UK having all the ingredients for a world-beating performance, there was little sign of its supply industry getting its act together: very little collaboration between UK firms, and every interaction between individual companies seemed to be characterised by attempts to get one over the opposition. 'It would be a great step forward if we began to recognise that the opposition is in America, not further along the Tyne.'

He emphasised that downsizing and lean supplies of the past few years had changed the way the supply chain operated, and those further down the chain didn't know how to respond, who to speak to and what is required. This was reflected back up the chain, reducing the performance and competitiveness of the whole industry.

Throughout the survey the overriding view was that the changes had badly affected communications between those at the top and those at the bottom of the chain. In particular the view was that the shift in responsibility from operators to contractors had reduced innovative ability. SMEs disbelieve contractors' claims that they want long-term relationships with suppliers, but the majority also admit their own inadequacies in marketing.

Both SMEs and contractors felt that the operators were no longer able to evaluate new technologies, but only 23% of operators had said they would allow contractors to carry out the task.

As a result of the study the DTI will be helping the trade associations to achieve better capabilities both within and between the suppliers. It will provide a resource directory to help suppliers get the right assistance, identify important issues and use Internet information.

Future plans

The Centre for Marine and Petroleum Technology (CMPT) and the DTI will help to fill the operator/contractor technology gap and there are plans to launch educational initiatives on modern management processes for the supply chain. Crine Network is also planning an Innovation Fund with particular encouragement for SMEs.

The oil operators are a main target when the UKCS industry is aiming to reduce well costs by 50%. Mike Salter, CEO of Abbot Group and Chairman of the Wells–Double the Value work group, pointed out that if current well costs dictate a threshold for field development of around 40mn barrels, such a cost reduction would halve the threshold and open up the development of additional marginal fields.

He said the key issue in achieving this step change has been identified as improving the process that underlies well construction. And here one of the main obstacles was getting proper internal customer involvement: persuading oil companies to involve all the relevant technical disciplines, an area where many operators were said to be woefully weak.

Oil company customers, said Salter, must learn to cooperate both externally and internally. The industry now required a major shift in improvement emphasis from relationships between contractors and clients to internal relationships within oil companies.

Both he and John Dewar, a senior well engineering manager in Shell Expro, gave examples of wasteful operator practices, as well as another operator which had introduced a new internal regime and then achieved a 30% saving on its first well cost, despite mechanical problems in the drilling.

Call for change

Dewar reported on the highlights of his Waste and Best Practice Group's industry study that is soon to be published. He said its conclusions for the industry are that 'we are downright dreadful', with enormous inefficiencies remaining in this area across the total process. The response to the Group's detailed questionnaire of 2,000 copies sent to 150 UKCS companies elicited a response of only 20%, and of this a 'very healthy' 63% came from service companies. The poor response was despite a publicity campaign, charity payments as response inducement and reminders.

Replies had shown 'that there was a crying need for change in contracting business'. The main findings from the questionnaire, Dewar summarised as: too much documentation and bureaucracy, complication and duplication; and too much lip service to HSE; too many people in the process and involving themselves too late; too much junk e-mail; too little use of standardisation and standard contracts (even by many who had signed up to those of Crine Network); and too little listening, effective communication and lateral learning.

But at least the quality of responses, he said 'showed enthusiastic energy in all companies to create a case for change'.

Increasing caution about Kazakh boom

Eighteen months ago observers were very optimistic about the oil and gas potential of the central Asian republics, predicting that by 2010 Kazakhstan and Azerbaijan would be producing 2mn b/d or 44% of the former Soviet Union's production. The question now is, with the oil price heading south, can the bankers be cajoled into syndicating a wall of money into Kazakhstan? Chevron was talking of investing $1bn in Kazakhstan by June 1997, $1.5bn by 1998 and $20bn over 40 years excluding the Caspian Pipeline Consortium's Tengiz pipeline, writes *Priscilla Ross.*

Now the outlook for Central Asian investment has completely changed with surplus supply overhanging the market and prices 40% lower than at the start of the year.

Most of the world-class oil companies have responded to oil fever in the Kazakh capital, Almaty by establishing representative offices. Western investment has begun to move into joint ventures established for the further development of the Tengiz and Karachaganak oil and gas fields.

The challenge of exporting production from the region appears to have been met and overcome with the commitment to and the start of work on building the $2bn, 900-mile Caspian Pipeline Consortium's line from the Tengiz field to the Russian Black Sea port of Novorossiysk. However, there is still a long way to go before the hoped for 2010 production levels are reached. Most western observers think that 1999 is an extremely optimistic date for the CPC pipeline to be operational.

According to BP, Kazakhstan has proven oil reserves amounting to 8bn barrels and proved gas reserves of 65.1tn cf. The Tengiz field has estimated recoverable reserves of between 6bn and 9bn barrels of oil and the nearby Korolev field has reserves of some 1.8bn barrels. Originally reserve estimates for these two fields were put at 25bn barrels.

Tengiz production has taken some time to meet its early promise primarily because of Russia's determination to maintain a role in oil projects beyond its territorial jurisdiction. Russia's ability to constrain the development led to its inclusion with the largest single (24%) stake in the CPC. The Kazakh Government has a 19% stake and Oman has 7%, and the largest foreign interest is held by Chevron at 15% despite it being the field operator.

Missing stakeholders

Russia is not alone in wanting control of regional pipeline routes. In March 1998 the Turkish foreign minister called a meeting with his ministerial opposite numbers from Azerbaijan, Turkmenistan, Kazakhstan and Georgia to build support for a proposed $2.5bn, 1,700-km pipeline linking Ceyhan, the Turkish oil terminal and Baku, the Azerbaijan capital.

As a first stage the Ministers agreed to back an underwater pipeline to transport Turkmen and Kazakh oil and gas from the eastern shores of the Caspian Sea to Baku.

The US, apparently, lends support to these pipeline initiatives as an alternative to Russian pipeline control. The route to Turkey also has the advantage, from the US perspective, of not crossing Iran, where US nationals are barred from working. However, the competition for oil export routes will continue to pit Russia, Georgia, Turkey and Iran against each other.

The original plan was for Tengiz oil to be transported via Russia utilising the Transneft system but Russia imposed limits on the amount of Kazakh oil being exported on the grounds that it contained significant amounts of mercaptans. To overcome this the operator has had to invest in desulfurisation capacity to reduce the mercaptans.

As a result large volumes of sulfur are reported to building up around the Tengiz field. Building a dedicated plant to process the sulfur into pellets seems to be the only way to dispose of it.

A reputation for environmental responsibility and expertise in handling crude oil high in hydrogen sulfide were said to be key drivers in Kazakhstan's selection of Chevron as a partner and field operator in 1993.

The Karachaganak field discovered in 1979 and partially developed before the split-up of the FSU has estimated reserves of 2.4bn barrels of oil and condensate and 16tn cf of gas. Planned production by 2001 is 175,000 b/d of liquids and 500mn cf/d of gas. Later phases of the development envisage expansion to 260,000 b/d and 1.4bn cf/d.

The partners in the Karachaganak project are British Gas Exploration and Production (BG E&P) joint operator with Agip both having a 32.5% holding. Other shareholders are Texaco with 20% and Lukoil with 15%.

A BG spokesperson told *Petroleum Review*: 'Kazakhstan is a key part of our future growth on the back of Karachaganak and the North Caspian is a whole new dimension.'

The Caspian basin is said to offer massive potential. The region is estimated by some to contain 50bn barrels of oil and a similar quantity of gas. Estimates as high as 200bn barrels of oil have been made but should be treated with some caution. However enthusiasm for the area may be tempered by the fact that with oil prices low, and virtually all the world now open to exploration, the

attractive reserves potential of the area may be offset by other areas where access and ownership are easier.

Geologically, the North Caspian Offshore embraces the southern rim of the PreCaspian Basin, which has, around its margin onshore, a number of already productive very large fields, including the Tengiz oil field, the Karachaganak gas/condensate field and the Astrakhan gas field.

In 1993, the Republic of Kazakhstan selected six international oil companies (Agip, British Gas International, the BP/Statoil Alliance, Mobil, Shell and TOTAL), with KazakhstanCaspishelf (KCS) as operator, to conduct in the North Caspian Sea one of the world's most challenging seismic exploration surveys.

In August 1996, the seismic survey was completed ahead of schedule and under the anticipated budget. A total of 26,186 km of 2-D data were recorded in the deep marine, shallow water and transition zone areas. In return for funding these activities, the international companies were entitled to negotiate production-sharing terms for 12 blocks.

In November 1997, these six foreign companies in association with KCS signed a production sharing agreement with the Government of Kazakhstan covering about 6,000 sq km. As part of the PSA commitments the signatories are obliged to complete an aggressive work programme consisting of seismic surveying, exploration drilling, environmental studies and the provision of social payments to the Republic of Kazakhstan.

A new entity has been formed, Offshore Kazakhstan International Operating Company (OKIOC) which, on behalf of its shareholding companies will operate the exploration drilling operations. If these operations are successful, OKIOC will act also as operator for the development and production phases.

A spokesperson for OKIOC told *Petroleum Review* that OKIOC is currently 'working towards spudding the first well in October 1998'. He commented 'that first oil from a commercial discovery on the shareholders' acreage could flow as early as 2004. However, the very challenging nature of drilling in this technologically demanding province makes the date for first oil production uncertain.

The consortium will spend around $400mn to explore the Kazakhstan sector of the Caspian of which $150mn will go towards construction costs this year. Kazakhstan is one of five nations bordering the Caspian Sea and may have half of Central Asia's estimated 100bn barrels of oil. Kazakhstan has already attracted over $7bn of direct investment largely for onshore oil, gas and metals.

	2000 b/d	2010 b/d
Kazakhstan	800,000	1.5–2m
Azerbaijan	300–400,000	1–1.5m

Baltabek Kuandykov, head of the state oil company Kazakh Oil says: 'Kazakhstan's part of the Caspian Shelf holds 10bn tonnes of oil and 2tn cm of natural gas'. He thinks the northern Caspian accounts for the lion's share of these reserves.

Kazakh officials have indicated that the 40-year project would need $28bn in investment with about $3bn for oil and gas exploration.

Kuandykov said the first well will be drilled on Kashagan which is believed to be the largest hydrocarbon structure of the 6,000 sq km area acquired by the consortium.

Kenzhebek Ibrashev, President of KCP (KazakhstanCaspishelf JSC) told Oil and Gas of Kazakhstan in February 1998 that six oil wells will be drilled at a total cost of $280mn.

He was asked to estimate the total reserves of the Kazakhstan sector of the Caspian offshore. 'Before drilling exploration wells, we can use only the prognoses, which are already available: 8bn tonnes of oil and 2tn cm of gas. These prognoses will be corrected after drilling.'

He explained that these estimates were not made by Kazakhs but also by Russian and Western geologists.

He added that KCP and KazakhOil are preparing an application for a loan from the World Bank to finance preparation of a feasibility study for specific facilities to support offshore operations.

According to Richard Hepworth, Marketing Manager and researcher at the Oxford Institute of Energy Studies: 'Some 30bn to 40bn barrels of recoverable oil reserves for the Caspian region is likely to be closer to the mark.'

What is the prognosis for the Caspian in general with the oil price around $12 to $13? Can it be profitably extracted? Hepworth says: 'even with the recent rise in oil prices, the exploitation of Caspian oil remains a low profit operation in the current market climate. It would take a rise in the oil price to around $20 to begin to make Caspian oil attractive.'

Switching back to the onshore play he comments that the maximum oil flow historically achieved for Karachaganak was 85,000 b/d in 1991 and since then there have been problems with getting it out. Firstly there have been pipeline problems with Russia's stranglehold on the oil transport infrastructure. Problems have also arisen at the condensate processing plant in Russia that is owned by Gazprom and apparently charges exorbitant processing fees.

Transit fees via Russia are expensive and are currently estimated at $6/barrel. Mention Kazakh oil and there are a multitude of ifs and buts.

The first well is scheduled to be drilled in the North Caspian this summer. Of the original 200 licence blocks allocated by the Kazakh authorities western partners took up 15 and a further 185 are left for bidding by other participants.

The North Caspian is a demanding operating environment with the sea frozen for several months of the year. Lack of infrastructure in the region has an adverse impact on production and therefore Hepworth says: 'I doubt whether we will see output of over 100,000 b/d for the foreseeable future'. From the first 12 blocks first production is likely to flow only by 2004.

A medium-term problem for the Caspian is the increasing level of the sea, which has risen noticeably in recent years.

According to the Oxford Institute of Energy Studies' estimates taking into account all of the main projects at maximum performance Kazakhstan could produce 800,000 b/d by 2000 and optimistically 2m b/d by 2010 and pessimistically 1.5m b/d. Azerbaijan is expected to produce 300–400,000 b/d by 2000 and 1–1.5mn b/d by 2010. Combined the two countries could be producing 2.5–3.5mn b/d by 2010. The Tengiz and Karachaganak fields are likely to be the only two major projects contributing to the total output for the foreseeable future.

According to BP, Kazakhstan produced 480,000 b/d in 1996. Realistic pipeline projects will lend weight to the argument for developing the Caspian basin. Transport costs will be as important as development costs with one possible exception, China, which is known to be looking for extra reserves in Central Asia.

The Chinese have taken over operating the Uzen oil field in Central Kazakhstan, which has reported reserves of 1.5bn barrels. In Western Kazakhstan the Chinese are operating the Kenkiyak and Zhanazhol fields, which have reserves amounting to 860m barrels.

The Chinese also have the controlling

Key oil and gas developments in Caspian region

interest in big production companies such as Aktyubinskneft which has a current output of 50,000 b/d.

So a reasonable guesstimate for Kazakh oil output from Chinese joint ventures is 200,000 b/d especially as they do not apply the same economic parameters to their investments abroad as western oil companies. A Kazakh oil pipeline travelling east is therefore a possibility. The Chinese are already associated with a 3,000 mile Kazakhstan pipeline project which has capital costs of $3.5bn and would take six to eight years to implement.

Chevron has been in Kazakhstan for 10 years and has had a difficult time getting oil flowing to export markets. Karachaganak had existing prospective infrastructure. But in Kazakhstan there is always political uncertainty about who is in charge and the manoeuvring of different interest groups that swing from favouring privatisation to backing state control. Chevron has been quite innovative in Kazakhstan using barges and rail to transport oil abroad.

The Azerbaijans are regarded as having a less labyrinthine political process in their relationships and having a more open and westward looking perspective. Their oil production is regarded as having bottomed out in 1995 and 1996 and last year output rose slightly reaching 190,000 b/d with the start up of AIOC offshore production in November. Azerbaijan has many mature fields but there is also some fields and exploration acreage that is quite prospective.

Political risk in Azerbaijan is very real. Fighting over the enclave of Nagorny Karabakh involved the young Azerbaijan nation into a six year war shortly after independence. The region is estimated to have oil reserves of 4bn barrels. Hostilities ceased in May 1994 but could flare up again. Similarly Chechnya is also unstable but strategically placed on the pipeline linking Azerbaijan to the Russian border and politically hard to call.

But on balance Hepworth is 'fairly optimistic about the oil output future of Azerbaijan and reasonable volumes are expected'. He says Kazakhstan has been 'hyped up probably in terms of reserve potential and there have been claims of major fields in the Kazakh sector of the North Caspian, as well as onshore Kazakhstan, as yet unproven'.

From an economic perspective Caspian oil is expensive to develop, reserves are probably exaggerated and transport to export markets is expensive and difficult. Although the region has promise it has been talked up a lot and the estimates now being made for its future reserve and production potential are more modern because they are motivated by western parameters and the logistics of western pipeline economics.

Currently there are a number of international oil projects that are about to come onstream with operating costs of $5/b or lower. The low oil prices that currently prevail mean that a number of oil producing countries, traditionally hostile to oil company investment, are becoming rather more welcoming towards inward investment. It seems logical that potential access to low cost Gulf oil will take precedence over rather more expensive Kazakhstan oil unless a spectacular commercial discovery is made in the Caspian.

Oil mixes with art but not through a tube of paint

Contemporary art in the early part of the 20th century had a very different connotation than it has today. Nowadays, one has to visit art galleries, mainly based in London, to view the latest offerings from artists such as Damien Hirst *et al*. However, this has not always been the case. In the early part of the century, road tankers belonging to oil company Shell became the 'mobile art galleries' which provided many British people with their only view of contemporary art.

These images have been collected by the company into a book, *The Shell Poster Book*. Compared with modern day images of road tankers the book dramatically highlights the difference in road transportation of oil, and also, it could be argued, the difference in moral values between now and then. For example, images of the Cerne Giant or 'fertility giant', as he is often known, can be purchased in all his glory from most tourist outlets in Dorset. As you can see from the picture, the artist or the company felt it wise at the time to hide a certain aspect of his anatomy.

The early days

In the 1920s, with the advent of mass motoring, the company's press advertisements used powerful images created by artists coupled with witty memorable slogans to establish Shell as a household name. The adverts were designed to promote the product as a good value, quality product which also reflected imperialist ideology of the time. Images of rural Britain were also used, encouraging motorists to visit beauty spots promoted by Shell by, hopefully, using Shell product.

In the 1930s, under the auspices of the new publicity manager Jack Beddington, Shell advertising cemented its place in art history.

Beddington, complaining that the advertising campaign had become too dull, was allowed to experiment by turning each delivery truck into a mobile art gallery and each lorry bill into an art form. The resulting diverse images ranged from the avant-garde to work by more traditional artists such as Rex Whistler, Dacres Adams and Lord Berners. These artworks resulted in bringing contemporary art to the masses as they were viewed by the public up and down the country as the trucks made their deliveries.

The idea of using lorry bills also pleased early conservationists, who congratulated Shell on its decision not to take roadside advertising, thus spoiling the landscape. In the latter part of the 20th century, one does not expect to see anything on road tankers other than the oil company's corporate identity and a hazard warning. The Second World War and changes in the design of lorries unfortunately spelt the end to this distinctive poster phase.

Petroliana enthusiasts (see *Petroleum Review,* March 1997) will be pleased to know that Shell UK has revived its tradition of commissioning fresh new poster work to mark the publication of *The Shell Poster Book*. First-year illustration student Allan Sanders at the Royal College of Art, won £1,000 for creating a new limited edition poster, 'Readers Prefer Shell' to promote the book in bookshops nationwide.

The Shell Art Collection is housed at the National Motor Museum in Beaulieu. The size of the collection means that only a fraction can be exhibited at the Museum at any one time, so the works are displayed in permanent rotation in a purpose-built exhibition area. Shell UK has also donated Hans Schleger's 1938 lorry bill 'Journalists – You can be sure of Shell' to the Victoria and Albert Museum. The V&A's current Power of the Poster exhibition also features several historic Shell posters.

Compiled by Emma Parsons

For more information on the Shell Art Collection contact Heather Butler at Beaulieu on +44 (0)1590 612734. *The Shell Poster Book* is published by Profile Books Ltd, ISBN: 1 86197 061 7 Price £14.99

Left, the Cerne Giant, Cerne Abbas, F Dobson, 1931, and right Hans Schleger's 1938 lorry bill donated by Shell to the Victoria and Albert Museum

Booming gas to replace dwindling oil

The world's fourth most populous country is in the doghouse, berated by the 'western' world for corrupt governance and inefficiency in managing its financial affairs. But as a centre of action in the international oil and gas industry Indonesia is flourishing. The most important evidence of this is the success of state oil company, Pertamina, in attracting oil companies to take up new PSCs (production sharing contracts). In 1997, 29 new PSCs were signed against 13 in 1996 and 19 in 1995. The contracts committed the companies to exploration expenditures during the next ten years of about $1.5bn. In the first two months of 1998 a further six PSCs were signed with related ten-year expenditures of $223mn. These outlays will further boost exploration expenditures that were budgeted by the oil companies during last year alone at a total of about $1.7bn, writes *Fred Thackeray*.

The readiness of oil companies to explore in Indonesia reflects an encouraging record of success in recent years, coupled with comparatively favourable tax terms and a regime that recognises the need to encourage the development of natural gas. According to Migas (Directorate General of Oil & Gas), out of 472 wildcat and appraisal wells drilled in the past five years (1993–97), 182 or 39% were successful in finding either oil or gas. Strict exploration drilling within these totals was even more successful in the three-year period 1994–96. Eighty-one wildcats out of 179 drilled, or 45%, were successful, 41 finding oil and 40 finding gas. Wildcatting and appraisal drilling together is expected to double in 1998 to over 200 wells against 103 in 1997.

More gas than oil

The outlook for indigenous oil production in Indonesia is not favourable. It is at least 20 years since it first became clear that the country was likely to become a net oil importer in the foreseeable future. This is now a near-term probability. Proven crude oil reserves are currently estimated at around 5bn barrels or the equivalent of less than 10 years' production at the present rate of 1.4mn b/d (plus 0.2mn b/d of condensates).

Government policy has recognised this prospect. While promoting exploration for oil as well as gas, it has emphasised the importance of sustaining Indonesia's role as the world's leading exporter of LNG through the development of new projects. It is also encouraging the substitution of gas – and indigenous coal – for oil, as shown in **Table 1** forecasting the growth of Indonesia's energy consumption to 2010.

Caltex – which accounts for almost half the country's total oil production – announced last year that by the intensive application of EOR (enhanced oil recovery) techniques it expects to be able to postpone to 2015 the date when Indonesia will become a net oil importer.

The company hopes to improve its recovery of oil in place from a present typical 28% to as much as 50% in some fields. This includes steam flood recovery from the large heavy oil Duri field in Central Sumatra. Initiated many years ago using oil to generate the steam, this recovery project will soon be switched to using natural gas when a 540-km, 28-inch pipeline is completed from a gas field at Grisik in southern Sumatra. Overall, by the application of EOR in its 10 largest fields, including Duri and Minas, Caltex expects to increase its oil production by end-1998 to 800,000 b/d as compared with an average 710,000 b/d in 1996. However, short of the unexpected – never to be wholly discounted in oil exploration – official policy to emphasise gas looks indisputable.

Natuna postponed

Currently, the country's proved natural gas reserves have been put as high as 3tn cm (106tn cf). These comprise 945bn cm in the East Kalimantan Basin, 450bn cm in the North Sumatra Basin and 1,600bn cm in the Natuna Sea Basin. The last-named of these reserves include the much publicised giant gas field in Exxon's D-Alpha Block, lying some 400 km offshore from the northern tip of Kalimantan and more than 200 km from the possible site for a liquefaction plant on Natuna Island. The field is estimated to contain 6.3tn cm of gas, including, however, 4.5tn cm of CO_2.

	1995	% share of total	2010	% share of total	% change 1995–2010
Oil	306.8	61.5%	727.2	49.0	137%
Natural Gas	104.8	21.0%	341.3	23.0%	226%
Coal	52.4	10.5%	311.6	21.0%	495%
Hydro	29.9	6.0%	81.6	5.5%	173%
Geothermal	5.0	1.0%	10.4	0.7%	108%
Nuclear	0.0	–	11.9	0.8%	–
TOTAL	498.9	100%	1,484.0	100%	197%

Source: MIGAS

Table 1: Indonesia's Primary Energy Demand (mn boe)

Timor Gap – LNG development

The Timor Gap area of 62,000 sq km lying between Australia and Indonesia is believed to hold substantial reserves of crude oil, natural gas and condensates.

A Treaty between the two countries promulgated in January 1991 governs development of the area, pending agreement on the boundary in negotiations which commenced in 1979. In the Treaty the Area is divided into three zones. Most of the exploration activity so far has been in the central zone designated as the Zone of Co-operation Area A (ZOCA) which is controlled by a Joint Authority (JA) answering to both governments. Zones B and C are subject respectively to the Australian and Indonesian governments.

At end-1997, there were 13 PSCs in effect in ZOCA, with contracting companies BHP, Phillips Petroleum, Shell, Mobil, Woodside, Enterprise, Boral and Moondance. This year the JA intends to put out to tender areas relinquished under existing PSCs.

There have been two exploitable discoveries, each in the south-western part of ZOCA. The principal discovery is two fields, Bayu and Undan, on a single structure, in 250 ft water depth. These are estimated to contain condensates and LPG of over 300mn barrels and about 90bn cm of natural gas. The development and operation of th fields has been unitised under the operatorship of BHP, which holds the Undan rights with partners Santos, Inpex Sahul, Petroz and Emet. Bayu was discovered by Phillips Petroleum which holds the majority percentage with partners Oryx (25%) and Hardy (15%).

Feasibility studies envisage development of both the liquids and natural gas. An LNG plant of 2 to 3mn t/y is planned to process about 70bn cm of gas over 20 years. Onstream dates of 20–2002 are mentioned.

The other, much smaller discovery comprises two oil fields, Eland and Kakatua, expected to go on-stream this year at a peak rate of 33,000 b/d with a producing life of up to only four years. These fields are also operated by BHP with the same partners as at Undan.

The CO_2 will have to be stripped and reinjected in a highly costly operation. Of the 1.8tn cm hydrocarbon content of the gas about 75% or 1.3tn cm is expected to be recoverable.

The project company for developing D-Alpha is now owned 50% by Exxon, 26% by Mobil and 24% by Pertamina. Negotiations for Pertamina's share to be reduced to allow participation by a group of 11 Japanese companies have not been brought to fruition. Likewise, plans for participation by Thailand's PTT coupled with a project for a 1,600 km pipeline to export the gas to Thailand have been postponed. Postponement followed Thailand's financial difficulties and a re-assessment of its needs for gas imports. In a recent statement, Piyasvasti Amranand, the Secretary General of Thailandís National Energy Policy Council, speaking at a Financial Times power in Asia' Conference in London, said that imports of Natuna gas may now be postponed to 2010, as compared with previous plans for 2003.

New gas prospects

Pertamina's attention has now turned to three other major natural gas prospects, which offer the potential for quicker and less expensive development. On the basis of early estimates of proved and possible reserves, the three prospects between them may hold some 700bn cm of recoverable gas or the equivalent of more than 20% of Indonesia's present proved reserves of 3.0tn cm. These estimates comprise (after rounding from estimates in tn cf):

- 370bn cm proven plus 200bn cm possible in Irian Jaya
- 70bn cm committed for development at West Natuna
- 90bn cm (shared with Australia) in the Timor Gap.

The leading companies in Irian Jaya are groups headed respectively by Arco and by British Gas.

The Arco group holds two blocks – Wiriegar and Berau. The British Gas group – whose reserves estimates have not been published – holds the neighbouring Muturi block. The two groups are collaborating in conjunction with Pertamina in plans for a two-train 6mn t/y LNG plant, named the Tangguh project. As we note below, the outlook for all new LNG developments is currently somewhat dimmed. Subject to this, however, the project is being given a fair wind by Pertamina. Arco, for its part, is extremely bullish about the development. It made a further discovery in December, named Ubadari #1, some 50 km away from existing finds. This led Leon Codron, President of Arco Indonesia, to declare that Ubadari 'accentuates the fact that we are developing the next great gas basin for Indonesia'.

West Natuna gas does not suffer the CO_2 disadvantage of the D-Alpha gas. A letter of intent was signed in April last year for the sale over 20 years of 2.5tn cf (70bn cm) to the Sembawang Engineering and Construction Company of Singapore. Final agreement was expected this March following negotiations over the delivered price. The gas will be produced in PSC blocks held by Premier Oil, Conoco and Gulf Canada. Premier, when announcing its annual results in early March, said it had made two additional finds in the area during 1997, named Gajah Puteri and Pelikan and that it plans six more wells this year. It expects to supply about 28% of the total contract. The project will require construction of a 525-km pipeline. Supply is planned to commence in 2000–01 at an initial rate of 65mn cf/d, building up quickly to 325mn cf/d.

The Timor Gap proposals envisage the development of the Bayu-Undan field discovered in the Cooperation Zone A (ZOCA) between Indonesia and Australia. The discovery was made by BHP and Phillips Petroleum on neighbouring blocks, now unitised under BHP operatorship. The field could be linked either by a 350-km submarine line to an Australian landfall near Darwin or by a 500-km submarine line to Indonesia's Timor Island. Either way the intention is to build an onshore LNG plant, although an innovative alternative of a floating LNG plant has also been suggested. If the LNG plant is located in Australia, it has been proposed to Indonesia by the Australian government that the two countries should share in the tax revenues. In addition to its gas reserves, the Bayu-Undan field is estimated to hold some 400mn barrels of natural gas liquids, which may significantly enhance its prospects of economic development.

A tiger again by 2001?

A fundamental cause of Indonesia's current financial difficulties is that much unhedged short-term debt had been built up in dollars which became impossible to service in the face of the catastrophic fall of the exchange rate. As panic spread the rate dropped from Rupiah 2,450:$ in July last year to a rate of around Rupiah 10,000:$. Key participants in this scenario were the nationally owned gas and electricity companies, PGN (Perusahaan Gas Negara) and PLN (Perusahaan Listrik Negara). Their revenues are in depreciated Rupiah, but their debts are

Figure 1: Exploration Areas Offered by Indonesia

nominated in US dollars. Pertamina has not faced the same difficulties since much of its revenue is in dollars.

Indonesia's problems were also exacerbated last year by widespread forest fires. Now, they are worsened further by the slump in international oil prices. However, compared with other OPEC countries it is fundamentally in better shape to cope. During the past 15 years, the country has sharply reduced its relative dependence on oil and natural gas. In 1996–97, exports of oil and natural gas accounted for only 25% of the total value of all Indonesia's exports.

Significantly, LNG exports yielded 37% of this total of all oil and gas exports. In the short-term the growth of the country's LNG exports will be checked. This will occur due to increasing competition in international LNG supplies coupled with the impact on demand of the current economic downturn in Japan, South Korea and Thailand. Beyond the immediate difficulties Indonesia is very fortunate. In an era when natural gas is rapidly increasing its share of world energy supplies – in Asia even more than elsewhere – Indonesia can turn to a rich endowment of gas as its oil resources begin to run out.

How soon then should we expect Indonesia to regain its past ebullient growth of 7% or more per year? As good a guide as any at this time comes from a conference presentation in March by Dr Yogo Pratomo, Indonesia's Director of Electric Power Planning. His 'high scenario' foresees resumption of real GDP growth at 7% by 2001; his 'low scenario' foresees it in 2003.

	1992	1997	% changes
Population in millions	186.0	201.9	av. 1.7% pa 1992-97
Gross Domestic Product per head in 1990 dollars	–	$919	5.0% 1996-97 (5.5%) in 1998
Oil in mn b/d			
Crude & condensates production	1.6	1.6	Static 1992-97
Crude & condensates capacity	–	1.7	–
Gross oil exports in 1996	–	0.989*	
Gross oil imports in 1996		0.363	
Net oil exports in 1996	–	0.626	
Oil consumption in 1996	–	0.845	
Crude refining capacity	0.815	0.930 (1/1/98)	14% 1992-98
Natural Gas in bn cm (approx)			
Production	54.3	67.4 ('96)	av. 4.4% pa 1992-96
LNG Exports	31.6	35.9 ('96)	av. 2.6% pa 1992-96
Exports converted to mtpa	22.5	25.6 ('96)	av. 2.6% pa 1992-96
Flared or vented	n.a.	5.0 ('96)	
Apparent Consumption incl. reinjection	–	26.5 ('96)	
Apparent consumption incl. reinjection in mn boe/d	–	0.43('96)	

** Comprising 0.77 mn b/d crude oil and 0.212 mn b/d products. Additionally 2.7 mn tonnes of LPG were exported (say 90,000 b/d approx.).*

Sources: US Embassy Jakarta; BP; Cedigaz

Table 2: Key Statistics on Indonesia

Stop Press

As *Petroleum Review* went to press, rumours were circulating that BHP Petroleum was planning to pull out of the Bayu-Undan gas/condensate project in the Timor Sea (see p4). The company neither confirmed or denied the speculations.

It has also been recently reported that BHP is considering withdrawing from the Prirazlom(noye) project in the shallow waters of the Pechora Sea in arctic Russia

Busy season ahead for pipelay fleet

The beginning of 1998 saw two important developments in the pipelay market. These were the major shake-up among pipelay companies with the break-up of the McDermott-ETPM joint venture after nine years and the delayed completion of the conversion of Allseas' huge pipelay vessel *Solitaire*. *Neil Potter* reviews the impact of the break-up and the work programme for this summer in the North Sea.

The break-up of the McDermott-ETPM joint venture involves the two big pipelay barges, well known and with a fine reputation in the North Sea – *DLB 1601*, which was owned by ETPM and leased to McDermott-ETPM West, will now go to McDermott on completion of current North Sea contracts, and the *LB200*, currently owned by J Ray McDermott and leased to the joint venture, which will now go to ETPM which has also acquired McDermott Subsea Constructors in the UK, bringing in the *Norlift* and the *Northern Explorer*.

The joint venture covered three regions. West, which included the North Sea, Africa, the Mediterranean and South America, managed by ETPM with a 66.7% stake. East and Far East were managed by McDermott with an 80% interest. McDermott has taken over the East and Far East joint venture until contracts already committed have been carried out. ETPM will handle the contracts backlog of the West joint venture.

The two big laybarges will be involved this year in two major trunklines – one in the Norwegian sector and the other in UK waters.

The *LB200* will lay the Åsgard area transport in water depths that reach 370 metres in parts of the route. This 42-inch, 697-km long, concrete coated pipe, with a capacity of 20bn cm/y, will run from the location of the Åsgard B semi-submersible gas production unit to the Karstø terminal

In view of the difficult seabed conditions along the route, the pipeline will comprise heavier tubes. This has necessitated a fifth tensioner being added to the laybarge.

The Åsgard line will have a number of T-junctions to allow production from other fields to be transported. One of these could be a 62-km line from Shell's Draugen field once a gas sales contract has been finalised,

In July last year, Elf awarded McDermott-ETPM West two pipelaying contracts for the Central Graben area development which includes the Elf-operated Elgin/Franklin fields and the Shell-operated Shearwater.

The first EPIC contract covered the 470-km, 34-inch diameter gas trunkline that will link Elgin/Franklin/Shearwater

Vessel	Contractor	Field	Operator
Lorelay	Allseas	Janice oil and gas lines	Kerr-Mcgee
		Ketch/Corvette	Shell
Solitaire	Allseas	Europipe 11	Statoil
Apache	Coflexip Stena	Gullfaks Sats 11/	
		Åsgard	Statoil
		Ross gas export	Talisman
		Machar water flood	BP
		K4	Elf Petrolan
Fennica	DSND Oceantech	Oseberg East Oil export	Norsk Hydro
		Q16	NAM
Castoro 6	EMC	Galleon 11	Shell
		ETAP	Shell
		Siri	Statoil
		Arne South gas export	DONG
		Arne South oil offloading	Amerada
DLB 1601	McDermott/ETPM*	Viking Phoenix	Conoco
		Shearwater/Elgin	
		gas export	Elf
		Elgin condensates export	Elf
Norlift	McDermott Subsea*	Kraka gas lift	Maersk
		Jotun	Esso
Seaway Falcon	Stolt Comex Seaway	Deben-Thames	Arco
		Bure West-Thames	Arco
		Waveney-Lancelot	Arco
		Renee/Rubie	Phillips
LB200	McDermott/ETPM*	Ekfisk By-pass	Statoil
		Åsgard transport	
		system	Statoil
Various vessels	Rockwater	Gullfaks S bundles	Statoil
		Bruce 11 bundle	BP

**ETPM will handle the contracts backlog following the split between McDermott and ETPM*

Source: Britboss

1998 Schedule for North Sea area pipelayers

to the Shell/Esso terminal at Bacton. At £200mn, Elf claims this is the largest pipeline contract in the UKCS. This SEAL (Shearwater Elgin Area Line) pipeline will be owned by the co-venturers in Elgin/Franklin and Shearwater projects in the ratio 55.725%/44.275%.

The line will originate at the Shearwater platform with the Elgin/Franklin production tied in via a subsea 'T' connection. It will be laid by the *DLB 1601* which, after working at the landfall at Bacton, switched for a short spell, to lay Conoco's Phoenix Viking lines in April. Elf is the operator of the pipeline during the construction phase and Shell will assume operatorship when the fields come into production.

The second EPIC contract was for the 46-km, 24-inch diameter liquids export line, the Southern spur, from the Elgin PUQ platform to a subsea 'Y' piece close to BP's Marnock platform where it will be tied in subsea to the liquids pipeline that will connect ETAP to the BP Forties system. Liquids from the Shearwater platform will also be transported through this spurline via the Shearwater spur that will be tied in at a 'Y' piece about 2 km north of the PUQ platform.

First export of gas and condensate through these lines is expected in 2000. Provision has been made to accommodate a new link for a third light hydrocarbon output stream from the processing facilities should favourable commercial conditions arise.

In 1999, a joint venture of Smit, Land & Marine Engineering and Coflexip Stena Offshore will carry out the Elgin/Franklin inter-field pipelay. This involves the installation of two, 6-km, 12-inch pipelines as a bundle connecting the Franklin wellhead platform to the Elgin PUQ.

At Bacton the gas can be exported either via the Transco onshore transmission system in the UK or into the Interconnector system for onward transmission into Europe.

Indeed, as field analyst Britboss has pointed out, the Interconnector acted as a spur for Elf to initiate the Elgin/Franklin development. This 223-km, 40-inch line with a capacity of 20bn cm/y, runs from Bacton to Zeebrugge and is due to be operational in October 1998.

The line was laid last year by EMC's *Semac 1* with the flat-bottomed *Castoro 2* laying the shallow-water approach to the Belgian coast. The two barges linked up 15 km north of Zeebrugge. Only about one third of the capacity has so far been taken up.

In Denmark the 300-km, 24-inch concrete weight coated, carbon steel gas line from Amerada Hess's South Arne field to the west coast of Jutland will be laid for DONG by EMC's *Castoro 6*.

The first task for the Allseas' dynamically positioned *Solitaire*, which began in April, is the laying of the 623-km, 42-inch Europipe 11 gas trunkline. This will run from Karsto to Dornum in north Germany. Statoil says that the work started in the Danish North Sea, will advance south to the German coast, where the line will be tied to the extra length of pipe laid in 1994 parallel to Europipe 1 through the environmentally sensitive Wattenmeer wetlands.

Once this section is completed, pipelaying will begin this summer from Vestre Boken island, north of Stavanger, through the Karm Sound and south to the Danish sector. The work should be completed in the autumn and the line is scheduled to be onstream in October 1999.

The *Solitaire* is 300 metres long and will be able to install up to 60-inch diameter pipelines in extreme water depths at a high lay speed. The initial conversion of the former bulk carrier was carried out at the Sembawang shipyard in Singapore. In 1995 the contract was terminated because of unacceptable delays.

The ship was moved to the Swan Hunter yard on the Tyne, where work ran behind schedule and the vessel did not leave for sea trials until February this year.

It had been scheduled to carry out the Ekofisk bypass pipelay for Statoil. This work was reallocated to McDermott-ETPM. At the beginning of April the *LB200* was mobilised to lay the 16-km, 36-inch line. This will skirt the new Ekofisk facilities and be connected to Norpipe, the gas line to Emden, about 8 km south of the Ekofisk complex. During the August shutdown of Ekofisk, (to be covered in the June issue) this line and a new line from the new platforms will be connected into Norpipe.

The Netherlands

Pipelay activity offshore the Netherlands is in for a surge which could open up the development of several new fields. Wintershall is out to bid for the laying of 120 km of 24-inch line from the A6/B4 development in

Norwegian Lines and Europipe 2 Routes

German waters to the F/3 platform on the NOGAT system.

This 450bn cm gas field could be onstream in 2000 using a production platform. The consultant Wood Mackenzie, in its latest survey, says the line could be routed to allow later development of NAM and Wintershall's technically challenging low pressure tertiary gas fields in the A and B quadrants.

Bids have gone in to Noordgastransport for pipelay of 140 km of 36-inch pipe from Wintershall's D/15-FA platform to the NGT trunkline at L/10. Wood Mackenzie says that this pipeline and the ability to add processing modules to D/15-FA may allow a number of nearby discoveries in the Netherlands and the UK to be developed, some of which have lain fallow for some time. The line could be linked to the UK infrastructure providing a basis for cross-border sales.

Gasunie has for some time been conducting studies into the economics and practicality of laying a line to the UK.

The outlook

The effect of the Norwegian Government's edict for the 12-month postponement of some projects on pipelaying activity is as yet uncertain. In February, Statoil awarded Allseas Marine Contractors a NOK530mn pipelay contract involving 360 km to be laid in 1999 and 2000, subject to official approval of each project.

The pipelay work is to be carried out by the *Solitaire* and the *Lorelay* and includes the fjord crossings for the Vestprocess onshore lines between Mongstad, Sture and Kollsnes; Gullfaks and Huldra and Norne and Heidrun.

Statoil has also awarded long-term frame agreements, estimated to be worth NOK 2.2bn, to companies in Japan, Italy, Germany, Argentina and Mexico for steel to be used in gas pipelines and field developments. The steel is for Troll Oil 11, Åsgard subsea Phase 2, Gullfaks satellites Phase 2, Vestprocess, Heidrun satellites and Sygna.

Norsk Hydro's Oseberg D platform is due to start gas treatment in October 1999 with gas export by October 2000. The gas will go via a 108-km, 36-inch line either to the Heimdal platform or tie directly into the Statpipe line.

Norsk Hydro, which has taken over from Elf as operator of the ageing Heimdal platform, has plans to upgrade it to become a central hub for exporting gas from Oseberg. New pipeline connections would include Oseberg and Huldra, a spur line into the Norwegian Frigg line for export to the UK, and a line for gas injection to Grane.

But the whole scheme depends on the authorities agreeing to Huldra production going to Heimdal rather than to Kollsnes, as preferred by Statoil.

If none of this comes to pass, Heimdal will have to be shut down by 1 April 1999 says Frank Pedersen, Norsk Hydro's Vice-President Exploration and Production (North and South).

In the UK BP has entered into exclusive negotiations with Sullom Voe over the possible construction of an oil pipeline to the terminal from the Clair field, which is expected to be onstream mid-2001, if it gets the go-ahead.

BP, Mobil and Shell have joined Texaco, Conoco and TOTAL in the Aurora joint study which is looking at the gas infrastructure opportunities for potential field developments on the Atlantic Margin. Elliott Dubuisson, Project Manager, said: 'We can now go forward with a common goal – to assess the potential for implementing a regional gas infrastructure system, including identification of viable routes for delivery of the gas to the market'. Clearly a pipeline system is one of the potentials.

Amoco is still pondering the expansion of the CATS line and whether there is sufficient business of its own and from third parties to warrant it. There could be a second pipeline to Teesside or the tie-in of a loop line.

Elsewhere the battle is on to supply Sweden and Denmark, as gas demand grows there. Statoil, fighting to maintain the status of Norwegian gas, believes a link could be laid from the Europipe 11 trunkline through Denmark and on to Sweden, through existing Danish pipelines.

But Russia is also keen to supply this growing market and wants to supply it from fields in the Barents Sea and the Yamal Peninsula. Neste and Gazprom are studying a new gas line to bring up to 30bn cm/y of gas from Russia via Finland to Sweden and Denmark and on into western Europe.

What the survey actually said...

This year's *Retail Marketing Survey* has attracted a great deal of interest and comment as it produced findings that many regarded as unexpected. Here we provide more information on the way the survey is prepared by answering the most frequently expressed questions and concerns.

Q: How is the *Retail Marketing Survey* prepared?

A: Questionnaires are sent to all the retailers of gasoline in the UK that we know of asking a series of questions about their operations. To date the questions and answers have been based on the branding. For example the number of stations selling gasoline under the particular company's brand name or brand names.

Q: How do you ensure that the data supplied is accurate and that there is no double counting?

A: Until this year we had to rely on the accuracy of the replies (partly determined by the clarity of the questions), our own knowledge and our industry contacts as there were no other reliable sources of information. When known marketers failed to provide information we had to use year earlier data, appropriately modified. If a company failed to make a reply over a number of years and no other information was available then it was assumed to have gone out of business. The emergence of Catalist as a commercial company researching forecourt data provided an alternative source of information, allowing us to cross check information. This ability to cross check means that we believe the 1998 survey to be the most accurate and comprehensive to date.

Q: Do you believe the Catalist data to be accurate?

A: Yes. Its data is consistent with our data where we have information. Catalist's data is partly based on credit card usage, a data source that accurately reflects which stations are in commercial operation. The company's success depends on the accuracy of their information and there is no commercial or other benefit to it in exaggerating or minimising the number of stations in operation (see letter).

Q: What is the major difference between the 1997 and 1998 surveys?

A: Both were carried out in exactly the same way except that in the 1998 survey 871 other/unbranded sites identified by Catalist were included and, in the absence of replies from Somerfield, Proteus and Port the Catalist numbers were used and indicated.

Q: Why did you break an established series making year-to-year comparisons difficult and providing misleading information?

A: Our aim and objective is to make the survey as accurate and comprehensive as possible within the limited resources available to us. We drew attention to the change in the editorial, unfortunately many readers appear to have missed it. Similarly we drew attention to the changes in a press release which also appears to have been ignored. Direct comparison with the earlier years simply involves deducting 871 from the total. It will then be seen that UK forecourt total declined by 795 sites in 1997 or roughly half the closure rate of 1996. This dramatic slowing in the rate of closure appears to have taken a number of commentators by surprise.

Q: Which are the 871 sites that you are now including and why were they not included in earlier surveys?

A: By never replying to our questionnaires or by re-opening after closure without our being aware that the site was back in operation, large numbers of sites were either never on our database or dropped off it. According to Catalist all 871 sites are in active operation and it has the names and addresses which they will supply on normal commercial terms. These sites are typically small and in remote, usually rural, locations. The average number of fuelling positions is under three compared with the national average of around five and a half. The sites are also rather smaller in area averaging two-thirds of the national average.

Q: What is the explanation for the dramatic increase in Texaco's numbers from 778 in 1996 to 1,147 in 1997?

A: The numbers printed (in the RMS) are those supplied in reply to our questionnaire. Texaco advises us that in the course of 1997 it acquired a number of groups of forecourts including some of the Gulf sites that were rebranded to Texaco (the remainder of the Gulf sites continued to operate under the Gulf name in 1997 and were only transferred to Shell at year end;

consequently these appear in the survey as Gulf). Other acquisitions were BECA's 60 sites. Texaco has correctly included the 64 sites in the Morrisons supermarket chain as the fuel on those sites is branded Texaco.

Q: Do you know of any errors in the 1998 survey?

A: Yes, 64 of Morrisons sites have been included as a separate brand when they actually sell under the Texaco brand. This means that 64 sites have been double counted. Morrisons has been included since 1996 in the main branded suppliers' table. In addition NWF brand 19 of its sites Texaco and WCF brand 17 of their sites Texaco. These are correctly included under Texaco but should not have been counted a second time. This is an error that will be rectified in next year's survey. It means the actual forecourt total for 1997 is 14,724 (14,824 – 100).

We are always pleased to hear from readers about potential errors or omissions as well as any suggestions for improving or extending the survey. Our aim is to make the survey as accurate and comprehensive as possible in order to maintain and enhance its reputation as the key source of data on the UK retail market.

Hopefully we will see fewer of these in future years

Letters to the Editor

Dear Sir

The Institute of Petroleum's annual Retail Marketing Survey *has always been regarded as the most accurate information available about the UK retail petrol market at a given point in time. Whilst it is accepted that it is an impossible task to gain a 100% accurate picture of such a dynamic market, the IP's figures are respected on account of its unique position as the primary organisation representing every aspect of the industry. The main source of data must always be the returns from the individual gasoline retailers with changing company and dealer owned sites. The IP has an impossible task turning this into a consistent 'snapshot' of the market at a given point.*

We recognise that the IP is constantly seeking ways to improve the quality and creditability of the data published in the annual survey as witnessed by the references and commentaries from many organisations and individuals involved in the industry. Clearly site numbers is one of the most emotive of these and for many reasons of commercial, fiscal and legislative importance it is vital to ensure that these are as accurate as possible. In support of the IP's objective to publish the most accurate figures available Catalist were pleased to supply a comparison of site numbers from our own surveys with the numbers obtained by the IP from all other sources. The IP used Catalist figures in association with all other figures it was able to obtain to arrive at the information that is most representative of the UK network at the end of 1997.

Catalist figures are quality controlled by constant cross reference to as many sources as possible including daily fuel card transaction data at over 10,000 sites plus oil company, petrol retailer and other petrol station supplier lists. Most important of all though is the fact that Catalist regular on-site surveys have been completed at over 99% of all open sites so that the number of duplicate and 'out of industry' sites are kept to a minimum. The 1% of unsurveyed sites are mostly in the Shetlands, Outer Hebrides and Isle of Man. These will be surveyed with the next three months along with the whole of Scotland and a digital photograph will be taken of every site. This will provide an interesting comparison with the IP 1997 figures for Scotland and also provide speculators an opportunity to compare their estimates with the facts.

Yours sincerely
Nigel Lang, Managing Director, Catalist

Dear Sir

I have always accepted that, in the absence of any formal licensing policy, absolute numbers of filling stations that are trading will be difficult to fix at any moment in time. The annual Institute of Petroleum numbers have always been accepted as the most informed. However, with such a high number of site closures over recent years and one supplier acquiring the interests of another, there was always going to be a time when numbers would be contested for their accuracy.

With the added benefit of Catalist's input, now there is at least another source of information for the IP. And as those involved with production of the numbers now seem 'comfortable', we perhaps do have an audit point from which we can work in future.

If I have a doubt, it is because I count myself amongst those who have queried the rate of closures during last year. The worst effects of the price war were slowing in the latter part of 1997 but, personally, I think the figure for closures is too low.

Yours sincerely
Ray Holloway, Director, Petrol Retailers Association

Testing passive fire protection systems

In the year that sees the tenth anniversary of the Piper Alpha disaster, some of the resulting research, is likely to bear fruit as an international standard test. *Judith Mirzoeff* reports on developments in passive fire protection systems and how they are tested.

The scale of the Piper Alpha disaster, which killed 167 people and totally destroyed the production platform, highlighted the need for better methods of protecting vital equipment against fire, and for adequate test methods for assessing fire protection.

The fire protection standards of the 1980s were based on hydrocarbon pool fires, such as occur when a standing pool of spilt petroleum is accidentally ignited. Far more damaging is a jet fire that may follow rupture of a pipeline or a vessel under pressure, when the fuel will have a high release rate. A jet fire has a much higher heat flux than a pool fire, with a faster build up of heat and additional erosive forces.

A typical offshore jet fire has a high pressure, high velocity vapour jet, while onshore it is more likely to be fed by a relatively low pressure, flashing liquid jet. Jet fires certainly exacerbated the Piper Alpha disaster and also an earlier gas fire in Mexico City that killed over 500 people.

One of Lord Cullen's recommendations in his Piper Alpha inquiry was that tests should be developed to find ways to assess the effectiveness of currently available fire protective coatings in protecting vulnerable equipment and structures on offshore installations. Clearly if a shut-off valve fails to operate in a fire, the consequences can be drastic.

The first collaborative response to Lord Cullen's recommendation was a programme of large-scale testing at the British Gas (now BG Technology) test facility at Spadeadam in Cumbria, to evaluate jet fires and their effects. It built on earlier work there funded by the CEC, the UK and Norwegian authorities (the Health and Safety Executive and the Norwegian Petroleum Directorate), together with some North Sea operators.

This work was designed to characterise realistically sized jet fires using a range of gaseous fuels based on methane and propane. Typical gas flow rates were up to 20 kg/sec, producing free flame temperatures of 1,000 to 1,300°C and average heat fluxes at the target of the order of 300 kW/m^2.

The research identified the test at 3 kg/sec and 60 bar as the most practical for long duration testing. Models for calculating radiant heat transfer and describing the convective heat flux were also developed and are used in assessing compartment fires as well as jet fires.

Burning fuel at this rate, and other features, make large-scale testing expensive. Moreover, the high hills of Cumbria are not on everyone's regular route. The Jet Fire Test Working Group (JFTWG) set up by the HSE and NPD in 1992 therefore aimed to develop a reduced scale test that would be reproducible at different sites and could be used for more routine screening of fire-protective materials. A passive fire protection system consists of a coating or barrier that absorbs heat and protects the underlying structure or equipment for long enough to avoid the risk to life, normally taken to one to two hours.

The small-scale test originated in work for Shell at the SINTEF laboratory in Norway, which showed that the benchmark conditions of large-scale tests could also be obtained at a much smaller scale. The Health and Safety Laboratory at Buxton in Derbyshire and the Southwest Research Institute at San Antonio, Texas also have the facility to perform this test. A demonstration of even the small-scale test at HSL's site in the Derbyshire hills can be a fairly daunting experience. The jet fire springs to life with a roar and even though it is much smaller than the 30 metre flame obtained at Spadeadam, it gives a graphic illustration of the importance of fire protection.

The small-scale jet fire test measures the thermal gradient in the samples exposed to the heat source, which depends on the convective and radia-

A jet fire engulfs a protected LPG tank

tive heat flux from the flame. The characteristics of an impinging jet fire depend on the geometry of the test set-up. A pipe will block part of the flow, while a flat plate will deflect it. The procedure therefore defines four standard test arrangements based on a standard 1.5 square metre box with 0.5 metre sides. The configurations are:

- panel test, with the back of the box replaced by a flat plate of the material being tested, and including preformed components which can stand alone
- planar steelwork test, a coating applied to the inner surfaces of the box
- structural steelwork, such as an I-beam, represented by a central web in the box, with the edges carefully coated
- tubular sections representing pipework up to 0.3 metres in diameter.

The fuel is commercial propane gas released at a rate of 0.3 kg/sec through a standard nozzle one metre from the target. A defined array of thermocouples measures the rise in temperature throughout the test, which can be continued either until a given temperature is reached or for a fixed time. The resulting time/temperature curve can be used to determine the thickness of material needed for protection. It should be stressed that the jet fire test is a test of the material and not of the assembly it is in, so that it cannot give a universal fire rating.

The reproducibility of the reduced scale jet fire test has been confirmed in tests by BG Technology. It constructed six instrumented test boxes, identical in shape but three having one intumescent coating and three another. One box from each set of three was tested at each small-scale test facility with generally good agreement between the results. Large-scale tests are still needed to evaluate passive fire protection on more complex configurations such as protective enclosures. The full small-scale test procedure is given in Jet-fire resistance test of passive fire protection materials, OTI 95 634, published by HSE.

What types of passive fire protection are being tested and how effective are they? They include coatings, claddings and free-standing systems that reduce the transfer of heat to the plant requiring protection. There are two main types of coating. Intumescent coatings, usually based on epoxy resin, char and swell on being heated and form a hard protective layer. Cementitious coatings, containing physically and chemically bound water, consist of lightweight concrete applied by spray. A different method is the use of barrier fire protection in the form of panels, which can be made of mineral wool, ceramic fibre or composites such as glass reinforced polymers.

These materials are used to protect pressure-liquefied gas storage tanks, which can go up in flames in the most spectacular way. A half-inch hole in a tank containing a pressurised liquid such as propane is sufficient to cause an explosion if the escaping gas ignites and reaches an adjacent tank. This is what happened in a US rail accident when one tank overrode another and gas was released through a pressure relief valve.

With sponsorship from the CEC and HSE, HSL at Buxton has investigated the hazard consequences of jet-fire interactions with vessels containing pressurised liquids (JIVE). The tests entailed engulfing unprotected cylindrical 2-tonne propane tanks with a jet fire until they failed. In one failure mode, the tank goes off like a rocket and the endcap circles away like a Frisbee. The diameter of the fireball for a 2-tonne tank is of the order of 120 metres.

Small-scale jet fire testing at small scale at HSL, Buxton

This work also evaluated protection systems for propane tanks. The method in use then was a deluge system applied through sprinklers, with the deluge rate based on the standard pool fire test rather than jet fire characteristics. The HSL team looked at the effectiveness of such a system, including the consequences of blocked nozzles, a frequent problem, and of delay in turning the water on.

This study showed that passive fire protection systems could provide adequate protection to a 2-tonne LPG tank in a jet fire. Whereas an unprotected tank failed in 4½ minutes, a tank protected with an epoxy tumescent coating was able to survive intact for 90 minutes.

The small-scale jet fire test is routinely used by operators and by the manufacturers of passive fire protection. Its results contribute to safety cases and risk analyses, and the test is often required by certifiers and insurers, in the US for example. Confidence in the ability of materials to withstand the anticipated jet fires has improved enormously since the small-scale test was introduced. Testing at all three centres has shown that the application method of protection systems is an important step that affects their ultimate performance.

At its most recent meeting in January, the JFTWG agreed that the small-scale jet fire test procedure ought to become a recognised standard, and it will probably be submitted to the International Standards Organisation for adoption. The Chairman of the working group, Dr Tariq Al-Hassan of HSE, says that the group is confident that the small-scale test represents accurately the large-scale test for flat panels and I-beams. 'The correlation is much less certain in the case of tubulars, particularly those of larger diameter,' he points out. 'JFTWG is now commissioning a Computational Fluid Dynamics study to model the velocity of the jet as it hits the pipe, which cannot be directly measured. We are also working on an applicability statement to amplify the quantitative aspects of the small-scale test and describe in an empirical way the kind of situation in which it is useful.'

Eyeing the Arctic's oil and gas resources

Finland has had to develop and apply a range of special skills and techniques to successfully operate in an arctic climate. This expertise means that the country is well placed to help exploit the massive oil and gas resources of Russia's Arctic seas particularly those in the Barents Sea, Siberia, and the Yamal and Gydan peninsulas. Neste, the state oil and gas company is actively involved in Russia as a developer of resources, as a partner in transporting and supplying hydrocarbons, and as a seller of oil products. All are areas that the company is keen to expand. The country is also strategically placed on the route between the Arctic resources and the consuming centres of Western Europe. Following a recent visit to Finland *Chris Skrebowski* reports on the latest energy developments and the determination of Finnish companies to exploit their expertise in operating in cold climates to the full.

All Finnish ports are icebound every winter. As late as April around 0.7 metres of ice cover the waters of the Gulf of Bothnia even in a normal winter. Despite this ships trade in and out of the area's ports largely unhindered as a result of the activities of the fleet of nine icebreakers operated by the Finnish Maritime Administration. Through the winter months which, in terms of ice cover, runs from late November to early May, the icebreakers are in continuous operation keeping the country's 23 largest ports in operation. This has been a major factor facilitating the industrial and economic development of central and northern Finland and facilitating a tripling of maritime trade since 1960.

Icebreaking operations are funded by a levy on every vessel that enters a Finnish port (charges are lower for ice classified vessels that can icebreak on their own account).

Ice breaking operations, however, are expensive and under the dual pressure of a government keen to make the operation self financing and shipowners' reluctance to pay higher port dues, great efforts have been made to reduce the costs of icebreaking operations. Icebreakers are only required for six months of the year and although some are regularly used for survey and maritime mapping operations most are inactive in the summer months.

Icebreakers need to be extraordinarily powerful, the two vessels normally deployed in the Gulf of Bothnia each have the same power as a supertanker and although the power is variable, as any number of the five engines can be used, these shallow draught vessels have little alternative employment. The latest generation of icebreakers has, however, been designed to operate as North Sea support vessels in the summer months. The two existing vessels – the Ugland operated *Nordica* and the *Fennica* – have successfully operated in the North Sea over recent seasons. A third identical vessel, the *Baltica,* is currently under construction and should be in operation by 1999.

The most important single feature of these vessels is the Azipod propulsion and steering system. Originally developed by ABB and Wartsila (subsequently the Kvaerner Masa-Yards (KM-Y) in Helsinki) the Azipod features an electric motor driving a very short propeller shaft mounted in a rotateable

pod (illustrated above). This in turn allows a very manoeuvrable vessel to be designed without a rudder.

Azipods are now produced in a wide range of sizes and are finding application in everything from the massive 80 to 100,000-tonne cruise liners being built by KM-Y in Helsinki to the two 1,350-tonne icebreaking supply vessels currently being built in the same yard for Wagenborg Shipping of the Netherlands and destined for operations in the northern Caspian.

KM-Y holds the patent on the Azipod but is actively looking at new and unexpected applications for a technology that removes many of the traditional constraints on naval architects. A large tanker will normally require two icebreakers as the channel they cut is too narrow for the tanker. KM-Y designers have designs for an asymmetric or oblique icebreaker, essentially triangular in design and powered by three Azipods. The advantage is that depending on the angle it presents itself at it can cut a narrow or wide channel.

Neste, the state oil and gas company, has operated a fleet of icebreaking tankers in order to supply and service its main refineries at Porvoo and Naantali since its formation and probably has more operational experience with this type of tanker than any other company. A relatively recent development is the setting up of a joint venture – ZAO Arctic Shipping Company – with Russian companies to deliver oil products and fuel in the Russian Arctic region.

Neste's Nemarc shipping subsidiary operates two 16,000-dwt tankers – the *Uikku* and the *Lunni* – in the Arctic/Siberian trade supplying fuel to the area and bringing condensate back from the Ob River.

In 1993 and 1995 respectively the vessels were retrofitted with Azipod propulsion. Subsequent trials and operating experience showed that the tankers could successfully employ the practise of dedicated icebreakers of running astern in thick or difficult ice conditions. Tests have shown that resistance is reduced by

up to 50% when running astern rather than ahead (illustrated right).

KM-Y has developed the principle with the development of the so-called double acting or DAT tanker design. The main advantage claimed is that the tanker can be designed for efficient open water/light ice conditions while still providing the capability to deal with the most severe ice conditions. A letter of intent has now been received by the yard for a 90,000-dwt tanker to service the progressive opening of the North-East Passage between the Atlantic and the Pacific.

Over recent years the Russians have been encouraging the use of the north east passage drawing attention to the fact that, for a voyage between Scandinavia and Japan, the northern route is around 4,500 miles shorter. While sufficient trade to warrant the cost of winter icebreaking operations will take some time to build up there is increasing interest in developing all year supply routes to Timan-Pechora and western Siberia.

All year access is widely seen as a key requirement for the development of the oil and gas resources in the area. An alternative export route to the existing pipeline system would make a number of developments more rewarding to western investors and could help regenerate the investment interest.

Neste and its partner KM-Y in the Nemarc Shipping Corporation that operates the icebreaking tankers *Lunni* and *Uikku* have done a lot of work to demonstrate the practicality of Arctic supply. In the summer of 1993 the *Lunni* inaugurated the Arctic Shipping Service with a number of trips to the Yana River estuary in Eastern Siberia. In 1994 her sistership *Uikku* brought cargoes from the Yenisey estuary to central Europe and the following year showed that all-year exports of condensate from the Ob River area were possible (illustrated below).

In 1996 the *Uikku* navigated the whole North-East Passage taking 13,500 tonnes of Arctic grade diesel from Murmansk to Pevek in eastern Siberia and then cutting through into the Bering Strait in mid-September. The entire North-East Passage is 3,454 nautical miles and the *Uikku* completed the passage in two weeks. In the same year tests showed the vessel could cope with ice ridges 4 metres in height and 15 metres in depth.

Neste has a direct interest in opening up access to northern Russia as it has interests in a number of consortia operating in Timan-Pechora. Neste's current production assets – predominantly in Norway and Oman – are expected to reach their production peak in 2002. Russian production is the logical replacement as existing assets deplete.

According to Neste CEO, Jaako Ihamuotila, Russia, because of its massive reserves (48.1tn cm compared with Norway's 3.5tn cm and Algeria's 3.6tn cm) is set to become an increasingly important supplier of gas to Europe. Neste has formed a 50:50 joint venture with Gazprom called Northtransgas to investigate a northern supply route through Finland.

The two main options are to go directly under the Baltic to Germany or to go undersea from Finland to Sweden and then a second undersea crossing to Germany. The former appears to be the cheaper option but seabed surveys of the potential routes are to be carried out this summer with the feasibility study to be completed by early 1999.

The unstated prize is the development of the Shtokman gas field in the Russian Barents Sea. The field with four Jurassic reservoirs extending over 1,400 sq km has reserves of 3.2tn cm making it the sixth or seventh largest gas field in the world and significantly larger than the giant Troll field in the Norwegian sector of the North Sea. Although the development of the Shtokman field would further delay the development of the gas fields on the Yamal peninsula it could be very profitable as development would only involve a 500-km pipeline to Northern Russia (Kola peninsula), the crossing of Finland from north to south and then the sub-Baltic transit to Germany. In addition there is proven Murmansk field and a whole series of prospective structures all the way up to Nova Zemlya.

Another potential area of cooperation is the Baltic Oil Pipeline System (BOPS). Russia is keen to develop an oil export terminal at the head of the Gulf of Finland at Primorsk to the north of St Petersburg. The terminal would provide an alternative to Ventspils in independent Latvia. The BOPS consortium Transneft, Rosneft, KomiTek, British Gas, Conoco, Elf, IPL/Williams, Neste and TOTAL are planning to build a new pipeline from the Kharyaga field in Timan-Pechora to join the existing pipeline at Usinsk and then to extend the pipeline that feeds the Kirishi refinery to the south east of St Petersburg on to Primorsk and Neste's Porvoo refinery in Finland. The whole project would cost up to $2bn and would not be ready until early in the next century. Neste has proposed that as a stage one while the new Primorsk port was being built Russian crude could be loaded out at Porvoo as well as supplying the refinery.

Neste is becoming increasingly involved in the Russian industry operating filling stations in St Petersburg and supplying bulk products into the Russian market and taking increasing amounts of Russian oil and gas.

There seems little doubt that Finnish companies are successfully becoming involved in exploiting Russia's outstanding oil and gas wealth.

Data to monitor competitors

Petrocompanies began with one simple idea: the oil and gas industry is global and monitors its competitors across international boundaries; a service that gathers and presents financial, operating and strategic company information in a structured and easy-to-use way will add value. The form and the scope of the service has changed dramatically over the years but the basic purpose remains the same: to save our clients time in gathering and analysing oil and gas company information and to give them an edge in coming to the right decision faster, writes *Richard Krijgsman*, Managing Director, PetroCompanies

The days of each company having to collect its own published competitor data are over. Petrocompanies captures virtually every significant strategic, financial and operating item published by 230 oil, gas and power companies worldwide and delivers this information via its proprietary software package Petrocompanies for Windows (PCW3).

The combination of the right data and easy-to-use software is a powerful one, literally cutting from months to minutes the amount of time it takes to analyse company performance or assess industry trends. It is like having a team of analysts working for you day and night. The service in no way replaces the need for good competitor analysts or planners within the companies. It just means that they can spend their time doing more qualitative, value-added analysis and less time on the mechanical tasks of collecting and analysing the published data.

Taking this one step further, we are now working with a number of major companies to customise the software to produce their annual or quarterly competitor data at the push of a button.

Petrocompanies differs from other information providers to the oil and gas business in a number of ways. Its principals have practical industry experience which puts them in a stronger position to understand the industry's information needs. It has a strong international focus that gives clients a window on the global oil business unlike providers that take a more regional approach. It is independent. It controls its software as well as its data, which allows the company to respond more directly, and quickly, to client needs. Perhaps above all, the company is concentrating its efforts strongly on its core business of giving a first-class information service to the international oil and gas business.

In terms of company coverage, our strength has lain in supplying hard-to-find company information on the international oil and gas companies. Three years ago we added the top 100 North American upstream and downstream players and two years ago started tracking 50 of the world's top natural gas transmission and power companies. The additional North American coverage was driven by demand from those companies for a service that not only covered their own immediate peers but also exposed them to the international companies we already covered. The addition of the transmission and power companies sprang from the demands of our upstream clients who are looking further and further downstream to capture more of the value chain and to secure an outlet for undeveloped gas reserves.

The nature of the business has changed dramatically in the past two to three years as the adoption of new information technology allowed us to deliver a more continuous service. We have moved from being a small publisher that produced reports on an annual basis to a group of some 20 people that give clients access to a database who is being updated on a daily basis. The transition has not been easy because the information needs of our clients are growing and changing at the same time. Some of the waters we are entering are uncharted. The growth of the WorldWide Web has led to more rather than less demand for our services. The reason appears to be that as more information is dumped on to the Web, companies have a growing need to filter out the unwanted noise to focus in on their requirements. We of course use the Web extensively to sift through the wealth of information available there, and our clients benefit from this 'intelligent filtering' to cut through to the information that is relevant for them. Actually, that is where we started.

Clients

Our clients include competitor/financial analysts and corporate planners within most of the leading international oil and gas companies together with top consultants and a growing number of major investment banks and equity analysts. They use the service to run competitor analysis, get a quick understanding of the financial and operating performance of the industry and groups of companies within it, search for partners, compare strategies, assess merger opportunities, and keep on top of the latest quarterly trends. All of this can now be done in a fraction of the time it used to take. The users generally have a keen understanding of the information they are accessing and keep us on our toes with regard to data quality, new ways of looking at information and changes in the industry.

Data quality and timeliness

The data itself is only valuable if it is accurate (our first priority), timely (our immediate second priority) and focused on our clients' needs. Maintaining accuracy is a problem that plagues

every information provider. Scratch the surface of just about any corporate database and you will either be unable to figure out the source of the information, or you will find errors. We have gone beyond the traditional approach to ensure accuracy in our database. Of course we employ the traditional range of built-in spreadsheet checks, but have found that we needed to go much further to get it right. Employing the right number of people with the right qualifications and the right attitude towards data is also one of the keys to a clean database so we set our staff numbers at levels commensurate with getting the job done on time and with a high degree of accuracy. Every analyst has a degree or PhD and is trained in accounting. Oil industry knowledge tends to be accumulated quickly on the job and in the process of doing company analysis. The open culture of the company also appears to be accelerating the learning process. We have built a number of unique features into the software that gives our users unparalleled data transparency. For example, not only is each data item carefully defined but we show how each data item ties back to the original company data item too. The whole system is designed to support the accuracy and transparency of the data content.

In terms of timeliness we now have the capacity to update our core companies within two weeks to one month of the availability of their annual report and within one week of the availability of their quarterly data. We are working with some clients to prioritise delivery still further.

Petrocompanies has developed a unique methodology to portray what financial markets were saying about the future financial performance of leading oil and gas companies. The Forecast Service allows clients to immediately assess the financial significance of brokers' forecasts. For example, the forecasts reveal the free cash flow and returns on capital for the companies and thereby give insights into future performance. Our analysts are now tracking the strategic outlook for these 50 companies on a monthly basis, generating new insights into the future of the industry.

Alongside the information, the software – PCW3 – forms the other part of the service. PCW3 is special because it contains some uniquely useful ways of retrieving, analysing and customising the data – all tailored to the specific oil and gas information we cover. The data becomes more valuable when it is put through the software because users can access it, analyse it, customise it to their own requirements – and then share it with their colleagues. Updating takes place over the Web on a monthly basis so clients are kept up to date.

For the future, Petrocompanies is looking to expand its company coverage further, improve its customer service and work with clients to customise its software and data to meet their needs more precisely. The software will be developed in a number of useful ways that will ensure our clients are benefiting from the latest changes in information technology and getting the best information faster.

If you would like to know more about Petrocompanies, please e-mail the author at **richard@petco.co.uk** or visit the companies website at **www.petrocompanies.com**

Origins of the company

The company was formed by Richard Krijgsman and Robin Hooper just over a decade ago. They met at London-based consultant Petroleum Economics where they were engaged in tanker demand supply analysis and short term market forecasting. Robin had an oil industry background including experience in Shell's planning group and went on to become an oil analyst at Laurence Prust. There he developed an extensive oil company database that formed the starting point for the Petrocompanies service. Richard joined James Capel as an Energy Economist and followed this with a stint at *Petroleum Intelligence Weekly* where he analysed oil and gas markets. He went on to head BP's Investor Relations effort when John Browne was Treasurer and had started introducing some of the radical changes that have turned the company into what it is today. Shortly after leaving BP, Richard and Robin decided to form Petrocompanies.

No of Employees – year end unless otherwise stated	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
Shell Group (RD) (Average)	149,000	142,000	138,000	136,000	134,000	135,000	137,000	133,000	127,000	117,000	106,000	104,000	101,000
Elf	-	-	-	-	72,183	78,179	89,000	86,900	87,922	94,253	89,500	85,500	85,400
ENI (AGIP)	-	-	-	-	-	135,462	130,745	132,9911	25,554	108,556	91,544	86,422	83,424
Exxon	150,000	146,000	135,000	100,000	101,000	104,000	104,000	101,000	95,000	91,000	86,000	82,000	79,000
BHP	-	-	-	-	-	-	-	-	49,000	47,000	48,000	49,000	60,000
Total (Average)	-	-	-	-	-	41,200	46,024	49,365	51,139	49,772	51,803	53,536	57,555
BP	-	-	-	-	128,450	119,600	116,750	111,900	97,650	72,600	60,000	56,650	53,150
PdV	-	-	-	-	-	-	-	50,137	50,506	49,218	49,218	48,109	46,543
Mobil	102,300	95,000	71,100	68,200	69,600	67,900	67,300	67,500	63,700	61,900	58,500	50,400	43,000
Amoco	53,581	49,545	46,775	46,774	53,423	53,653	54,524	54,120	46,994	46,317	43,205	42,689	41,723
Chevron	-	-	-	-	53,675	54,826	54,208	55,123	49,245	47,576	45,758	43,019	40,820
Sonatrach	-	-	-	-	-	-	-	-	34,578	n/a	n/a	37,717	38,362
BG Plc	-	89,700	86,100	82,300	79,900	79,200	85,000	84,500	82,100	76,500	60,800	49,100	36,600
Ashland	-	-	-	-	-	-	33,400	32,900	33,700	31,800	31,600	34,500	36,100
Norsk Hydro	-	-	-	-	-	-	33,042	34,957	30,086	32,455	32,416	32,416	35,400
Texaco	-	-	-	-	41,820	37,067	39,199	40,181	34,852	32,514	29,713	28,247	28,957
Tosco	-	-	-	-	-	-	905	920	994	2,962	3,613	4,024	24,317
Arco	37,800	31,300	27,000	26,300	27,500	26,900	27,800	27,700	26,800	25,100	23,200	22,000	22,800
Marathon (Average)	-	-	-	-	23,772	25,762	26,200	24,762	22,810	21,963	21,005	21,015	20,461
Chinese Petroleum	-	-	-	-	-	-	-	-	22,106	21,780	21,231	20,770	20,322
Repsol	-	-	-	-	18,716	19,171	21,284	20,848	19,632	18,797	18,272	18,878	19,701
Phillips	-	-	21,800	22,500	21,000	21,800	22,400	22,700	21,400	19,400	18,400	17,400	17,200
Ultramar Diamond Shamrock	-	-	-	-	-	-	-	-	-	-	-	-	17,200
Statoil	-	-	-	-	-	11,023	13,222	13,943	14,338	14,560	12,630	12,630	15,000
Coastal Corp	-	-	-	-	-	19,500	16,100	16,500	16,600	n/a	16,300	15,500	14,700
Occidental	-	-	-	29,740	30,760	26,080	25,960	21,650	20,820	19,860	19,660	17,280	14,270

Petrocompanies employment data

Tough stance taken on EU fuel quality directive

The second reading in the European Parliament of the Fuel Quality Directive took place on 17 February 1998. There was a majority vote in favour of tougher specifications than those agreed by the Council of Ministers in June 1997 (sometimes referred to as the 'common position') which were themselves tougher than the original EC proposals that emerged from the Auto-Oil 1 Programme. Wood Mackenzie Global Consultants looks at the impact the latest proposals will have on the European refining sector.

The failure of the European Parliament and Council to agree the proposals put forward (see **Table 1**), means that the process has now gone to a conciliation phase – on which the EC is to draft a paper. Once the differences have been reconciled and agreement reached, individual countries will negotiate on derogations if they are unable to meet the required legislation by the deadline imposed.

Refining impact

The European Parliament's proposed transport fuel specifications for 2000 would have a significant effect on Europe's refiners both in terms of operations and costs versus current specifications. Furthermore, the mandatory standards recommended for 2005 will involve very significant investment by the industry and represent a much tougher stance than the Council's indicative figures which implied some further debate. Coming in a climate of poor refining margins, overcapacity and a misalignment of the supply barrel with the demand barrel, the specifications would put yet more pressure on a hard pressed industry and the European refiner is likely to be faced with increasing operating costs and may well have to invest in process plant.

In addition, with tighter standards likely for 2005 the refiner is faced with the choice of doing the minimum necessary to comply with 2000 specs with the prospect of more pain to come or going the whole hog and making substantial investment which will secure the refinery's future for the longer term.

The processing options and technology for meeting the new specifications for 2000 are available and proven and are indeed currently being used by some refiners. However, it is the economics rather than the technology which is the problem.

The main refinery streams which contain the problem elements for gasoline are cat-cracked gasoline, containing aromatics, olefins and sulfur, and reformate containing aromatics, particularly benzene. Refineries relying heavily on cat-cracked gasoline may have a problem meeting sulfur and olefin specifications, whereas hydroskimming and hydrocracking refiners, which rely heavily on reformate, have to deal with high aromatics and benzene. For diesel, the problem is 'cracked' gasoil streams which have a higher density and tend to be high in sulfur and aromatics. Hydroskimming and hydrocracking refineries are advantaged in this scenario.

There are a number of ways for refiners to meet the new specifications including feedstock selection, changed product routings, process 'disoptimisation' (for example, downgrading of products) and investment.

In its analysis of the European refining industry, Wood Mackenzie has placed refineries in five broad categories with regard to new specifications for the year 2000. Some refineries (category 1) will face no additional costs as they have very complex refining systems which are capable of complying with the new specifications. At the other end of the scale (category 5) are refineries which will have to invest in major process plant such as hydrocracker in order to comply. Categories 2 to 4 will cover the bulk of refineries which will have to undergo varying degrees of disoptimisation or make smaller investments to meet the new specifications. This group of refineries is likely to incur additional costs varying from 25 cents/barrel (c/b) to 75 c/b to comply depending on the actions taken.

Scandinavian countries, known for their environmental credentials, are already producing 'clean' fuels and will not have much of a problem complying with the new specifications. Similarly Germany and the UK, with their sophisticated refining networks, should not suffer unduly although there will be considerable differences from refinery to refinery. Southern European refiners in Greece, Spain, Portugal and southern France are likely to be hardest hit, although the impact will vary from company to company.

Change at what price?

The costs facing the industry for this first phase of reformulation are significant, especially given the current economic climate of the refining sector. Costs for the second phase of reformulation in 2005 will be far higher. In

	Council of Ministers Proposals (Common Position) 2000	2005*	European Parliament Proposals (2nd Reading) 2000	2005**
GASOLINE				
Benzene (%)	1	1	1	1
Aromatics (%)	42	35	35	30
Olefins (%)	18	18	14	14
Sulfur (ppm)	150	50	150	30
Oxygen (%)	2.3	2.3	2.7	2.7
Leaded gasoline	Ban from 2000 Derogation until 2005		Ban from 2000 Derogation until 2005	
DIESEL				
Cetane number	51	51	51	58
Density (kg/m³)	845	845	845	825
Polyaromatics (%)	11	11	11	1
Sulfur (ppm)	350	50	200	50

** Indicative; ** Mandatory*

Table 1: EU Fuel Quality Directive proposals

reality each refiner will have to look at his own set of circumstances and decide the best course of action: investing now, choosing to live with higher costs and lower margins, or exiting refining altogether. This may lead to further restructuring within the industry, especially if margins stay at levels which do not support these types of investment.

Industry disappointment

The Auto-Oil 1 programme was originally set up on the basis of sound science and a cost/benefit analysis of the impact of specification changes. The new proposals, in particular the indicative values for 2005, throw into doubt the framework surrounding the Auto-Oil study. The additional improvements in air quality which will result from the tighter specifications are not proportionate with the additional costs.

The industry is disappointed with the new proposals as it will mean considerable capital expenditure in many instances. Although European downstream profitability may not be sufficient to fund the required investment, major oil companies have reported record profits in recent months. Furthermore, experience in the US also suggests that the actual cost of the RFG programme has been significantly lower than the original claims – when it comes to the crunch refiners find ways of innovating and reducing costs and this is also likely to be the case in Europe.

The final specifications will undoubtedly influence the industry in terms of 'buying into' the second phase of the programme, Auto-Oil 2, as they may feel that emotion and politics have overcome science for the first phase and may well do the same again. Various estimates of the cost of implementation have been made, although the number is difficult to forecast due to the number of different options open to refiners. Some estimate the total cost of compliance at around $20bn for the Council's proposals to around $60bn for the Parliament's proposals.

With sales of gasoline and diesel within the EU totalling around 240mn t/y, an increase in the end-user price of between 1.5 cents/litre (c/l), for a compliance cost of $20bn, or 4 c/l for a compliance cost of $60bn would pay back the above costs assuming a payback period of five years. Of course, price rises of this nature may not stick as refiners who are already able to produce products to the new specifications try to gain an advantage.

A breath of fresh air

The UK National Air Quality Strategy sets air quality objectives for 2005 (see Table 1) and notes the important role played by traffic-related pollution. Although emissions from new vehicles are generally set to continue falling, the Strategy makes it clear that current policies will not be sufficient to ensure that the objectives for nitrogen dioxide and fine particulate matter are met everywhere in the UK. A range of further measures – such as the use of cleaner fuels – will be needed to reduce air pollution, particularly in urban hotspots where road traffic is largely responsible.

The National Society for Clean Air (NSCA) Cleaner Fuels Forum recently published a report outlining the potential for such fuels to improve air quality, the main findings of which are summarised here.

The UK Government estimates that meeting the air quality objectives in urban areas requires a reduction in emissions of 45% to 60% for nitrogen oxides, 60% for fine particles, and a similar figure for volatile organic compounds in relation to regional ozone. Taking into account the new vehicle emission and fuel quality standards currently being negotiated with the European Union (see page 34), road traffic emissions of nitrogen oxides and fine particles in urban areas are predicted to be reduced by about 50% between 1995 and 2005. For the key road transport pollutants nitrogen dioxide and PM10, present estimates therefore point to a gap of up to 10% between the reductions required to meet the objectives and those likely to be achieved by measures so far agreed.

The NSCA Cleaner Fuels Forum was established in June 1997 to seek consensus among the major oil companies, the motor industry, consumer and environmental groups as to what benefits – if any – those cleaner fuels currently on the UK market could offer in the drive to improve air quality. The Forum's aim is to provide information for local authorities assessing the role of clean fuels in air quality management, confused consumers and fuel retailers planning future product mix.

The report – entitled *Cleaner Air: the Role for Cleaner Fuels* – was written as the technical report to the Forum and was published in February 1998. A series of shorter publications summarising the information for specific target audiences are also planned for publication.

Petrol and diesel

The NSCA report concludes that the use of those cleaner gasoline and diesel products already on the market could reduce overall urban vehicle exhaust emissions by up to 5% for nitrogen oxides and 15% for fine particulate matter. However, for some classes of vehicle – such as light-duty vans and buses – particle emission reductions from individual vehicles may be as high as 30% or more.

A further advantage of cleaner fuels in the longer term is that they allow the introduction of advanced emission control systems, such as particulate traps for diesel engines, enabling them to be introduced to key fleets well before they are likely to become generally mandated. Oxidation catalysts and particulate traps used with low sulfur diesel can reduce fine particulate emissions by over 80%. Emissions are similar to those obtained with compressed natural gas (CNG) and liquefied petroleum gas (LPG).

In addition, cleaner diesel products significantly reduce the visible smoke and characteristic diesel odour from heavy duty vehicles and buses.

Gaseous fuels

CNG and LPG offer substantial reductions in emissions of both nitrogen oxides and fine particulate matter in comparison with standard diesel. Particulate emissions are similar to those from ultra low-sulfur diesel with particulate traps. While they do produce increased hydrocarbons emissions, these are largely unreactive and contribute little to ozone formation.

An additional advantage of gaseous fuelled vehicles is that they are quieter than diesel vehicles, making them especially suitable for night-time urban deliveries.

Gaseous fuelled vehicles are currently much more expensive than conventional vehicles, but this is predicted to decline as the market grows. The cost of conversion is much less for an LPG vehicle than a CNG-powered vehicle. LPG also appears to offer some advantages for operators of small commercial vehicles as it can be cheaper to use than conventional fuels. However, the use of gaseous fuels, in particular CNG, is likely to be restricted because the volume and weight of the fuel storage tanks affect the vehicle payload.

Impact on air quality

Air quality is already expected to improve substantially thanks to planned changes in vehicle technology and fuel quality. However, cleaner fuels could provide an additional bonus. Assuming that all vehicles in an area use cleaner gasoline and diesel, their potential impact would be to further reduce overall urban traffic emissions of nitrogen oxides by up to 30% and fine particulate matter by up to 2% over the period 1995 to 2005.

Although this indicates the potential overall contribution of cleaner fuels to ambient air quality, their actual contribution in some areas could be higher, depending on the composition of local fleets and the proportion of total emissions in an area deriving from vehicles. Generally speaking, for a real impact on local air quality, more than half the fuels used in an area would have to be cleaner grades.

The overall conclusion of NSCA is that the use of cleaner grades of gasoline and diesel, CNG and LPG could make a small but significant contribution to improving air quality in the UK. They could be particularly effective in pollution hotspots where diesel fleets of buses, taxis and delivery vans currently make a large contribution to urban pollution.

Opportunities for action

Fuel retailers, motor manufacturers, local authorities, public transport and fleet operators should cooperate to facilitate the targeting, supply and use of cleaner fuels in those areas of poor air quality where their environmental and health benefits can be maximised, states the report. In light of this, NSCA is calling for the following action:

- The government needs to continue the process of adjusting road fuel duties to encourage the uptake of cleaner alternative fuels. It also

Pollutant	Objective concentration	Measured as
Benzene	5 ppb	Running annual mean
1,3-butadiene	1 ppb	Running annual mean
Carbon monoxide	10 ppm	Running 8-hour mean
Lead	0.5 µg/m^3	Annual mean
Nitrogen dioxide	150 ppb	1 hour mean
	21 ppb	Annual mean
Ozone*	50 ppb	97th percentile of running 8-hour mean
Fine particulates (PM10)*	50 µg/m^3	99th percentile of running 24-hour mean
Sulfur dioxide*	100 ppb	99.9th percentile of 15 minute mean

** provisional objectives*

Note: These objectives are to be met at non-occupational, near ground-level outdoor locations where a person might reasonably be expected to be exposed over the averaging time of the objective.

Table 1: UK National Air Quality Strategy Objectives

needs to promote early agreement with the oil industry, motor manufacturers, fuel suppliers, local authorities and other air quality management interests on what action can be taken to encourage the effective use of cleaner fuels.

It should continue to stimulate the use of cleaner fuels where necessary and address price disadvantages which inhibit the application of such fuels in polluted areas.

Information on cleaner fuels should be included in the advice given to drivers in official publications.

- Local authorities have a duty to lead the development of local partnerships and strategies to improve air quality. They need further guidance on the role of cleaner fuels in local air quality strategies and on measures likely to encourage the use of cleaner fuels. Such measures might include local information campaigns and voluntary agreements with local fuel retailers, public transport and fleet operators.

Cleaner fuels could also be introduced into niche markets such as urban buses, taxis and delivery fleets if local authorities were empowered to set environmental performance criteria for some vehicle fleets.

In addition, local authorities should consider the use of cleaner fuels in their own fleets and in the fleets of contractors.

- Fuel suppliers could provide consumer information about cleaner fuels at their filling stations. They could also enter into local agreements to supply geographic regions or specific fleet sectors with cleaner fuels.
- Motor manufacturers should provide good, clear recommendations to their customers as to the benefits of cleaner conventional fuels. They could provide consumer information about such fuels for use in showrooms, in vehicle handbooks and at routine services.

For gaseous fuels they have a clear role to play in developing improved technologies. Consideration should also be given to adding alternative fuel vehicles to their product line-up.

Motoring organisations have an

Driving into the future

The UK Government launched a Foresight Vehicle LINK programme in November 1997. The project aims to develop technologies for use in mass-market vehicles. Research will focus on the development of vehicles that are environmentally friendly, make the best use of limited fuel resources, are lightweight and use less energy, can communicate with other vehicles and the transport infrastructure, are safer and able to avoid collisions and can be manufactured competitively.

Speaking at the launch, UK Science, Energy and Industry Minister John Battle explained that the initiative forms part of a wider UK Foresight programme which brings together business, the science base and Government to identify and respond to future opportunities in markets and technologies. 'The Foresight Vehicle is about creating new technology options which will underpin our future transport policy and our need for sustainable development,' he said.

The LINK programme is jointly sponsored by the Department of Trade and Industry (DTI) and the Engineering and Physical Sciences Research Council. Around £5mn of Government funding has been made available for research partnerships that will create components and systems for the vehicle of the future. It is expected that at least the same level of funding will be matched by industry. Additional support from the Ministry of Defence and the Department of Environment, Transport and the Regions may also be available for individual projects.

Research will focus on four main areas of development:

- Hybrid electrically powered and alternatively fuelled vehicles that will lead to far better emissions performance than found with today's vehicles.
- New materials applications to produce lightweight alternatives to present structures. A 10% reduction in vehicle weight results in a fuel saving of 6% and the same reduction in toxic and carbon dioxide emissions, according to the DTI.
- Advanced, never-fail electronics with higher functionality replacing heavier mechanical systems and making driving easier for the ageing population.
- Telematic systems giving the driver information to increase journey efficiency and allowing smoother traffic flow, reducing accidents and congestion, easing energy losses from repeated breaking and increased pollution from idling engines.

Over 60 outline proposals were put forward for project funding following the launch of the initiative, 15 of which were selected to put forward full proposals. A total of 12 projects have been selected, details of which were scheduled to be announced shortly after *Petroleum Review* went to press. These 12 projects are not evenly spread across the four research development areas outlined above, with the development of hybrid electrically powered and alternatively fuelled vehicles being underrepresented. However, it is hoped that this pattern will change when the next call for projects is made in September/November this year. ●

important role to play in explaining to their members the role of cleaner conventional fuels in their members' handbooks, newsletters and other publications. They could consider undertaking joint information campaigns with the suppliers of cleaner fuels.

- Fleet operators should respond positively to requests from local authorities to use cleaner fuels.
- Bus operators in particular should look at the potential for using cleaner fuels and retrofitting traps or catalysts where these will have an impact. They should also respond positively to requests from local authorities to meet improved environmental performance criteria for buses.
- Consumers should consider using cleaner fuels to reduce emissions from their cars, particularly if they mainly drive around town. However, cutting down on trips overall, particularly short trips, will have a bigger impact on air quality than switching fuels. Keeping vehicles well maintained should also be a priority – badly tuned vehicles will always be a source of pollution, no matter what fuel they use. ●

Compiled by Kim Jackson

Photo: Emma Parsons

Urban hotspot – Oxford Street London

Diesel looks to greener future

In the March 1998 Budget, UK Chancellor Gordon Brown widened the duty rates applying to conventional EN590 diesel and ultra low-sulfur diesel by 2 pence per litre in a bid to encourage the uptake of the latter cleaner fuel (see *Petroleum Review*, April 1998). The fuel specification was also tightened with respect to density and distillation end point to ensure that this fuel continues to offer 'significant improvements in urban air quality'. The Chancellor also made it clear that the differential will be widened again in future budgets to encourage further uptake of the fuel.

Independent company Futura Petroleum – a 51:49% joint venture between Neste of Finland and UK company Blue Ocean Associates – has been supplying ultra low-sulfur CityDiesel to the UK market since August 1997 (and reformulated low benzene gasoline since 1995). The ultra-low sulfur fuel is not new, Neste has been marketing it in Scandinavia for seven years and today, some 95% of the Finnish domestic diesel market has converted to the cleaner product.

Futura CityDiesel is manufactured using nearly the full diesel fraction, rather than including part of the kerosene fraction, which is refined further to remove much of the sulfur and the aromatic content. Many of the poly-aromatics in the heavier end of the diesel distillation range are reported to cause respiratory diseases and contain known carcinogens. These are extracted, but the paraffins and napthenics (also inherent in the same distillation range) are retained to preserve the performance qualities of the fuel.

According to the company, its CityDiesel has a number of advantages over competing kerosene-based products with lower distillation points which have experienced difficulties with lubricity and whose viscosity levels have occasionally led to hot start problems, predominantly in older engines. Futura claims that it has maintained lubricity levels in its fuel through the use of additives while its higher viscosity level helps to eliminate hot start problems. The fuel is also said to have retained good cold temperature characteristics, with cloud point and CFPP specifications suitable for year round use. Furthermore, it is said to offer additional emissions reductions compared with kerosene-based ultra low-sulfur diesels. The accompanying table compares emissions from a Volvo B10M (Euro-2) bus using three forms of diesel – conventional EN 590 diesel, kerosene-based ultra low-sulfur diesel and Futura CityDiesel.

Bob Haynes, Commercial Director, also points out that Futura's CityDiesel has the advantage that it is price sensitive to diesel, which is the basis of its composition, rather than to the price of kerosene (jet fuel) which is currently in short supply in Europe with demand rising by 4% per year. ●

	Standard EN 590	Kerosene-based	Change vs EN 590 (%)	Futura	Change vs EN 590 (%)
Physical properties					
Density	0.8514	0.8215		0.8273	
Sulfur (Mg/Kg)	380	3		28	
Aromatics	29.1	15.1		15.5	
Tri-aromatics	1.3	<0.1		<0.1	
90% distillation (deg C)	328	284		305	
Final boiling point (deg C)	358	310		340	
Carbon % (m/m)	86.2	86.2		86.9	
Hydrogen % (m/m)	13.7	13.7		13.1	
Net calorific value	43.16	43.2		43.2	
Emissions results					
Hydrocarbons (g/Km)	0.89	0.82	-8	0.78	-12
Carbon monoxide (g/Km)	1.99	1.65	-17	1.66	-17
Nitrous oxides (g/Km)	14.03	12.88	-8	12.34	-12
Carbon dioxide (g/Km)	1,326.45	1,291.84	-3	1,260.08	-5
Particulate matter (g/Km)	0.26	0.21	-19	0.2	-23
Fuel consumption (volume 1/100km)	49.05	49.9	2	48.24	-2
Fuel consumption (carbon balance 1/100km)	49.37	49.82	1	48.24	-2

Millbrook London bus diesel emissions testing on Volvo B10M (Euro-2) bus, 12 December 1997

Racal launches Sea Serpent ROV

Racal Survey recently unveiled its new Sea Serpent ROV (remotely operated vehicle). The unit is able to dive to 2,500 metres and can perform a wide range of survey, inspection or construction tasks. It weighs 2,500 kg out of water.

Four vertical thrusters and four horizontal vectored thrusters deliver in excess of 160 hp, giving the vehicle exceptional manoeuvrability and a through frame lift of 5,000 kg.

The unit has been developed to quickly accommodate a number of different work modules. Unlike conventional ROVs that might require particular tools or sensors to be fitted in the workshop, the Sea Serpent simply acts as the motive power for the tooling package. It can be quickly fitted with any one of a range of modules which are all provided with their own independent 50 hp hydraulic power supply motor. Modules can, for example, be specific to survey, cable burial, manipulator tasks, cleaning or they can be designed to contain a combination of tools or sensors needed for a particular task. The system also means that Racal is able to design and build specialised modules to the customer's specifications without needing the ROV present and is able to send a specifically designed module out to a project if the scope of the work changes.

The ROV is connected to the surface by two independent fibre optic telemetry links within the vehicle's umbilical. One serves the work module and controls any associated sensors, the other provides the control linkages with the vehicle itself.

Tel: +44 (0)181 391 6511
Fax: +44 (0)181 391 1602

Vapour recovery pumps on the forecourt

ASF Thomas has developed a range of vapour recovery pumps specifically designed to allow service station operators to comply with European legislation which requires all gasoline pumps to be equipped with a vapour recovery system to eliminate the escape of gasoline vapour into the atmosphere.

The company claims to be the only one to offer vapour recovery pumps built around three pump technologies – diaphragm, Wob-L piston and rotary vane – to provide the ideal solution for any working environment.

The diaphragm pumps are said to offer high efficiency and low noise levels as well as assured leak tightness. A moulded diaphragm with Teflon coated surface ensures resistance to gasoline vapour. The Wob-L piston construction provides a high flow rate at maximum back pressure. The flexible cup of Teflon compound expands with use to maintain a good seal and is said to provide a high level of efficiency and consistent performance even in extreme ambient conditions.

The rotary pumps in the range are compact and easy to install designs which offer high flow rates. The precision machined surfaces provide close tolerance alignment of moving parts to guarantee optimum performance. Self-lubricating, self-adjusting vanes are said to guarantee excellent sealing and optimise pump efficiency.

Tel: +44 (0)1420 544184
Fax: +44 (0)1420 544183

New bulkmeter for fuel/oil loading depots

Avery Hardoll's new DM Series bulkmeter is designed specifically for fuel and oil tanker loading depots. It has a flow rating of 2,500 metres per minute and a working pressure of 150 psi.

The unit's body and integral flanges are manufactured from carbon steel, making it suitable for additional applications in the chemical process industries.

The meter provides a high level of accuracy and repeatability combined with minimal downtime without the inconvenience and cost of double casing, states the Fareham, Hampshire-based manufacturer.

The DM Series is available with both mechanical and electronic registers via a range of pulse transmitters. It can be supplied with a pre-set valve and a variety of other accessories.

Tel: +44 (0)1329 853000
Fax: +44 (0)1329 853797

A disc for all reasons

A range of bursting discs offering the user compatibility with liquids as well as gases is now available from Elfab.

The Omni-Guard range's peripherally scored reverse bursting discs reverse through and open along scored lines when the set burst pressure is reached. The units' high working pressure capability and liquid compatibility make the range suitable for use in heat exchangers and surge protection in the oil and gas industry, while their smooth operating face makes them ideal for use within polymerisation systems and hygienic applications. The non-fragmenting design also makes the discs ideal for relief valve isolation, states the company.

Available in diameters ranging from 50 mm to 500 mm, the Omni-Guard range has burst pressures varying from 2 to 120 bar g. The discs operate in temperatures over 300°C and are designed to withstand a high number of pressure cycles. The range is offered in a variety of materials including nickel, stainless steel and inconel.

Tel: +44 (0)191 258 1188
Fax: +44 (0)191 296 0219

ISO enviro-management certification for Saab

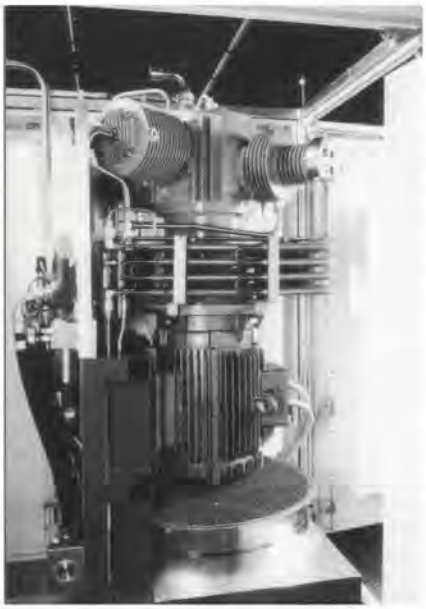
Saab Tank Control, a division of Saab Marine Electronics, claims to be the first tank gauging supplier to be certified to the ISO 14001 environmental management standard.

The company offers a range of radar-based, contact-free tankgauging products for use in storage and process tank applications within the oil, gas and chemicals industries. Its systems protect the environment by monitoring tank levels to prevent overfill and pollution.

Tel: + 46 31 337 00 00
Fax: +46 31 25 30 22

Enviro-friendly refuelling of gas powered vehicles

A new pressure-tight, high-pressure DM compressor has been developed by Sulzer Burckhardt to help with the environmentally-friendly operation and refuelling of vehicles with natural gas.



DM compressor with Scotch joke drive

Together with other new elements, the oil-free compressor forms the core module of a new generation of natural gas refuelling stations.

The S100 natural gas fuelling system's modular design allows a refuelling station to be 'tailor-made' to a customer's requirements. The DM compressor is rated up to 30 MPa and operates oil-free. With a single drive size, and depending on the gas supply pressure and the selected number of cylinders and cylinder dimensions, three-, four- or five-stage compressors can be built to cover a wide range of throughputs (50 to 110 Nm^3/h). Newly developed multi-function blocks for process control purposes minimise the material and space requirement as well as the leakage risks, states the manufacturer.

Sulzer Burckhardt only employs piston compressors for natural gas refuelling stations and claims to be one of only a few manufacturers to offer pressure-tight compressors which ensure that gas cannot escape during operation or when the installation is shutdown.

Tel: +41 (0)52 262 65 54
Fax: +41 (0)52 262 00 25

Cutting back on fugitive emissions

Flexitallic of Cleckheaton, West Yorkshire, has developed a valve stem sealing system which is claimed to exceed the most stringent requirements for petrochemical plant fugitive emissions and provides a high level of seal without incurring excessive stem friction. It has been estimated that around 65% of such emissions emanate from the stems of control and isolation valves.

The five component graphite system, Enviroflex™ 500, comprises two header rings which are braided from high quality graphic filament yarn, impregnated with a high temperature blocking agent plus a high temperature/high viscosity lubricant. Between these are positioned three sealing elements, die formed from very high purity exfoliated graphite. The system is suitable for both linear and rotary valves which may be control or hand operated.

Tel: +44 (0)1274 851273
Fax: +44 (0)1274 851386

Lubricants first for Fina

Fina reports that its fully synthetic technology engine oil specifically developed for commercial transport vehicles – Fina Kappa First – is the first lubricant of its kind to exceed rigorous new ACEA (Association des Constructeurs Europeans d'Automobiles) E4-98 specifications.

The new ACEA specifications are intended for EURO 2 engines used in the most extreme conditions. They are based on Daimler-Benz 228.5 specifications for the cleanliness of pistons and protection against wear. Today's low emission engines produce high levels of soot and manufacturers have requested the inclusion of a supplementary engine test, MACK T-8, which evaluates the oil's resistance to the thickening that soot can cause. Fina states that it will become increasingly important for a lubricant to retain its properties when polluted by very high levels of soot as the probable adoption of exhaust gas recirculation in future EURO 3 engines could further exacerbate the problem. EURO 3 anti-pollution legislation is expected to be implemented in 2000. The specifications also take into account the extended drain intervals of today's commercial vehicles.

According to Fina, very few lubricants have passed the MACK T-8 test within the very strict specifications imposed by ACEA E4-98, and it states that Fina Kappa First is the first lubricant based on renewable synthetic base stocks to 'significantly exceed' the specifications.

The newly developed 5W/30 lubricant is said to enable a reduction in fuel consumption of up to 3% on long-haul journeys, around 4% in local traffic, and a higher percentage when vehicles are subject to frequent stop-start city driving conditions.

Tel: +44 (0)1372 726226
Fax: +44 (0)1372 744769

Addendum: Please note that Fina's new synthetic lubricant for passenger cars is claimed to offer up to a 30% reduction in *oil* consumption and not fuel consumption, as published in the March 1998 edition of *Petroleum Review*.

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

Kim Jackson

Deputy Editor, *Petroleum Review*

61 New Cavendish Street, London W1M 8AR, UK

ISO/TC 67 targets in sight

The development of ISO/TC 67 standards for materials, equipment and offshore structures used in the drilling, production, refining and transport by pipelines of petroleum and natural gas is gaining pace. Following renewed focus at the 1997 Plenary meeting in Jakarta (reported in *Petroleum Review*, January 1998) Committee Drafts (CDs) and Draft International Standards (DISs) are being issued from subcommittees and the ISO Central Secretariat on an almost weekly basis. The challenge is to ensure these drafts are reviewed by technical experts within the UK to solicit their comments and support.

A list of drafts available for comment can be found on the IP website, or can be obtained from Martin Hunnybun, Tel: +44 (0)171 467 7133. Some of these standards could effect your business, and are being reviewed by your competitors!

European workshop

In order for some of ISO/TC 67's International Standards to be adopted in Europe through CEN a 'parallel enquiry' procedure is followed, which is referred to as the Vienna Agreement. The CEN Enquiry stage is initiated by CEN Central Secretariat at the same time that ISO Central Secretariat issues the document as a Draft International Standard. This results in a single set of technical and editorial comments from each of the member countries, and ultimately a single standard which can be labelled an EN ISO. However, recent parallel voting in ISO/TC 67 and CEN/TC 12 has highlighted several problems. There have been concerns that the International Standards conflict with European Directives and these concerns have resulted in delays in standards production.

To combat misconceptions, and to ensure that the standards being developed in ISO do not conflict with any relevant European Directives, CEN/TC 12 European Project Leaders were established for as many of the Standards currently being drafted as possible (appointing EPLs is an ongoing task!). A workshop was held in Brussels on 17 and 18 March, to explain the role of European Project Leaders and offer technical support for their important tasks. The Workshop was attended by 40 delegates (11 from the UK) and provided background information on many of the relevant Directives. An explanation of the tools that are available to the Project Leaders was also given and 'break-out' sessions provided more details on specific Directives. Information on the Workshop is available from Martin Hunnybun at the IP Tel: +44 (0)171 467 7133.

Our website can be found at:
http://www.petroleum.co.uk

Test Method Standardization ... the bottom line

Active participation in the development of standards through the IP Test Method Standardization Committee (ST) can significantly reduce the resources required to customise and maintain in-house standards.

The aim of ST is to be a major and respected force in international petroleum test method development. Industry standardization can realise substantial cost-benefits in national and international trading.

In the past much trading was carried out using in-house and national standards. Recently emphasis has moved towards International Standards such as those produced by the International Standardization Organisation (ISO) and the European Committee for Standardization (CEN). This process has been accelerated by EU legislation and the ISO/CEN co-operation. In general ISO and CEN do not develop standards, they adopt the best industry standards available. The IP has adopted a proactive policy towards ISO and CEN, via its direct link with BSI in the UK and its historic connection with ASTM in the US.

Support for, and participation in, the work of ST is thus an efficient and cost-effective way to influence the development of International Standards. This will enable companies to achieve the following benefits:

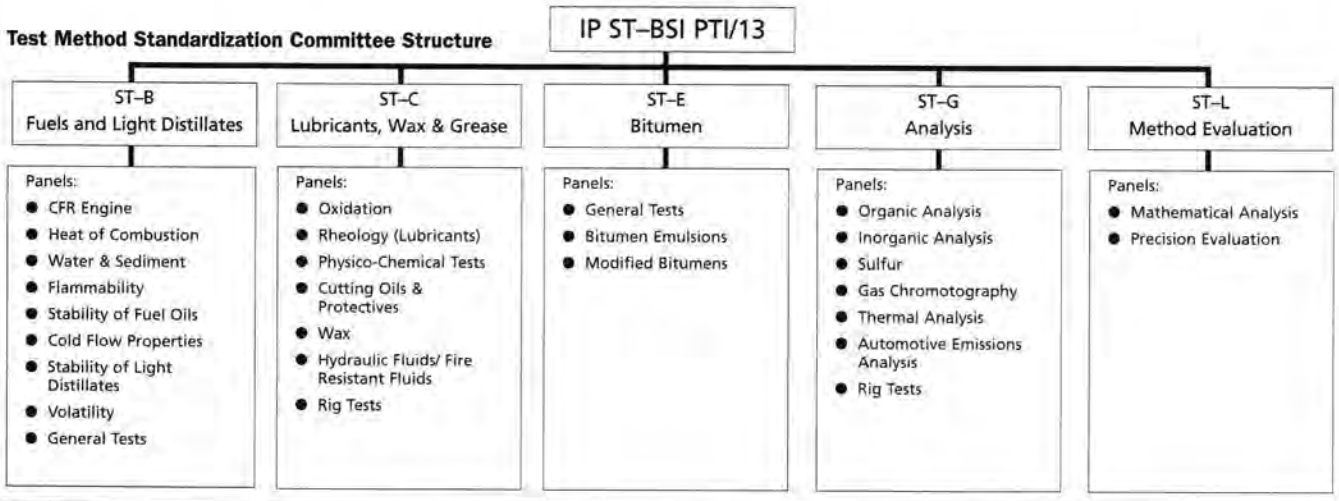
- Standards which are fully validated and accepted by the International Oil Industry and its customers world-wide;
- Reduce costs by supporting development of test methods which use more efficient techniques and instrumentation;
- Maintain, promote and defend Health, Safety and Environment interests;
- Be aware of industry developments and share best practice with industry colleagues.

Participation in the work of ST will also:

- Help reduce product quality give-away by participation in inter-laboratory trials and correlation schemes;
- Assist accreditation to quality standards such as NAMAS and ISO 9000.

With industry's active participation ST is in a unique position of strength to influence future and existing standards for the better. However we cannot do it without the UK oil industry's support.

Test Method Standardization Committee Structure



Membership News

NEW MEMBERS

Mr C B A Alalade, Nigeria
Mr S B A Candide-Johnson, S. B. Candide-Johnson & Company
Mr M J Connolly, Northampton
Mr D J Corfield, Marlow
Mr O O Debayo-Doherty, Nigeria
Mr F M E Donagher, Allvac-SMP UK
Ms S Edwards, Logica
Mr N M Harper, London
Mrs D Headley, SBC Warburg Dillon Read
Mr R Holmes, National Engineering Laboratory
Mr M Huntley-Robertson, Surrey
Mr M T Innes, Newbury
Mr P A Johnson, National Engineering Laboratory
Mr N Kovalev, Transcity
Mr T R Lester, Orsett
Mr J W Love, Aberdeen
Miss C Matthews, AMEC Process & Energy Limited
Mr S Mehta, Netherlands
Mr V Melnyk, Newglobal Business Contacts Limited
Miss C Melville, Aberdeen
Mr D J Moulding, DM Design
Mr J G Mumford, BP Oil UK
Mr R Nunez, London
Mr P A O'Sullivan, London
Mr W Osaro, ITS Caleb Brett Limited
Mr G O Osiname, Jimioil Limited
Dr S Pariente-David, Hagler Bailly
Mr F W Peebles, Peebles Consultancy
Mr L J Power, The Robert Gordon University
Dr J F Rees, Celtic Technologies Limited
Mr N Rees, Llwydcoed
Mr W A Reid, Servo Oilfield Services Limited
Mr M Roberts, BP Middle East Limited
Mr P D Rugen, Shell Research Limited
Mr D K Shikhule, Kenya
Mr S G Smith, Corringham
Mr D L W Taylor, Montrose Fire & Emergency Training
Mr V E Thomas CBE, West Clandon
Mr M S White, Ringwood
Mr P W Willett, Smethwick Heating
Mr T G Williamson, Linde Gas UK Limited
Mr R J Wright, Voelcker Science

NEW STUDENTS

Mr K Belimpasakis, Plymouth
Ms D Duee, London
Mr J Miller, Leeds

NEW CORPORATES

Oil & Natural Gas Corporation Ltd, Tel Bhawan, Dehradun, India
Fax: +91 135 755211

Representative: Mr Sh R C Gourh, Director

Oil & Natural Gas Corporation Ltd (ONGC) is poised to become a global giant following the Government's decision to notify the company as a Navaratna. ONGC has made significant headway in the economic development and industrial growth of the country during the last four decades of its existence. Today it ranks among the top 25 oil companies of the world in reserves and production of oil and gas. It has approximately 1.216bn tonnes of recoverable oil and oil equivalent gas and has produced more than 500mn tonnes of oil and oil equivalent gas to date. Furthermore, it is the highest profit making company in the country with a net profit of Rs20.337bn.

The company has performed impressively on various fronts in 1996/97 including the increase in its sales revenue to Rs13.89bn crores and registering an all time high LPG production record of 1.128mn tonnes. It has supplied 17.22bn cm of natural gas to consumers in various parts of the country, thus registering 104% achievement of its target.

To face new challenges and to seize opportunities from the emerging market economy, ONGC has taken several measures to strengthen itself. The company has engaged the services of McKinsey & Co., an internationally reputed management consultancy firm to bring about desired organisational transformation. Concurrently the upgrading of the financial management system in consultation with Price Waterhouse is still under progress.

The Energy Exchange Ltd, 25 St Georges Road, Cheltenham, Gloucestershire, GL50 3DT, UK
Tel: +44 (0)1242 529090 Fax: +44 (0)1242 529060

Representative: Mr Vincent Sevilla-Rebelderia

The Energy Exchange Ltd is a company providing a global information service for the Downstream oil sector, particularly oil refining and petrochemicals. The World Refining Association (WRA), which is part of the company, organises high level international conferences covering all aspects of the Downstream sector. In addition the WRA also publishes newsletters and directories and carries out market research.

Oil and Gas industry – the future challenge

Oil and gas – the future challenge, was the theme of a seminar attended by more than 80 young people from universities ad colleges in the Liverpool area, organised by the Stanlow Branch on 19 March 1998.

Bob Hooks, Stanlow Branch Chairman, opening the event, outline the Branch's mission to create a greater awareness of today's oil and gas industry among young people and to ensure that the contribution of hydrocarbons to our lives and wellbeing is better understood. He described the programme as a 'journey' from exploration for oil to its use by the consumer.

It began with an industry overview by Ian Ward, Director General of the IP, and then, through a series of presentations, demonstrated how oil was found, produced, refined, marketed and distributed, stopping along the way to understand how products were researched and developed.

The event was a new initiative developed by Stanlow Branch, but entirely in line with the Institute's role in disseminating knowledge and information about the industry, in this case to an important constituency who could well be its geologists, engineers, or marketers, in the next century.

The Stanlow Branch committee should be well satisfied by this successful venture which, it was felt, represents a model that could be usefully replicated elsewhere around the country.

Around the Branches

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

http://www.petroleum.co.uk

or, if you require further information please contact your individual Branch Secretary.

Membership News

Update on the 1998 Membership Challenge Competition

It proves that recruiting Members can pay dividends! At the recent Essex Branch Annual Dinner, Ian Ward, Director General of the IP awarded Don Garwood with the first prize of two British Airways Business Class tickets to the Cayman Islands.

How did Don win his prize?

Don was duly announced as the winner after storming ahead in the competition and recruiting 19 Members between September and December 1997. Don, an active Member of his local Essex Branch dominated the competition from the early stages, going as far afield as Switzerland to recruit Members and persuading an Inspector from Milton Keynes on business in Essex to join! The rest of the competitors could not keep up! Don was delighted to receive his prize and has said that he intends to take his wife Mavis away towards the end of this year.

How many Members were recruited?

The Institute was delighted to receive so many new applications from Don and from all the other Members who actively took part in the first stage of the competition in 1997 as it helped move the IP towards and past its target figure of 8,350 Individual Members for the first time. We are always pleased when Members actively recruit their colleagues to membership as we believe you are the best people to promote the IP and its membership benefits. This is why we are taking this page in the magazine to remind you of the awards on offer for your efforts.

Can I win a prize?

If after reading about Don and his prize you are envious – don't forget there is still time to get yourself into the hat and enter the next stage of the competition to try and win two first-class tickets from London to Paris on Eurostar. Please remember that all Members who have recruited at least one Member during the last 12 months will be entered into a prize draw. The winner will be announced at the end of August.

I know someone who wants to be a Member, what should I do?

An additional application form is printed in the middle of this edition of *Petroleum Review*. Please have your colleague complete the application form and remember to include your details as the proposer. We will then enter your name into the draw that will take place at the end of August.

Can I have more than one go at the competition?

And, if like Don you think you can recruit more than one Member, you can have more than one go! If you can recruit more than one Member, we will enter your name for each application on which you are named as the proposer.

Who should I contact at the IP?

If you would like more than one application form, please call Tracey Connellan, Membership Manager at the Institute. Tracey's direct line number is +44 (0)171 467 7121 or you can e-mail Tracey at **tconnellan@petroleum.co.uk**

EVENTS Forthcoming

MAY

4–7 **Perth**
12th International Conference & Exhibition on Liquefied Natural Gas
Details: LNG 12 Conference Secretariat, Australia
Tel: +61 2 9262 2277
Fax: +61 2 9262 2323

8–11 **Surrey, UK**
The Fundamentals of the Oil Industry
Details: Petroleum Economist, UK
Tel: +44 (0)171 831 5588
Fax: +44 (0)171 831 4567

10–12 **Dublin**
European Lubricating Grease Institute AGM
Details: Carol Koopman, ELGI, The Netherlands
Tel: +31 (0)20 67 16 162
Fax: +31 (0)20 67 32 760

11–12 **London**
Emerging Markets for Emissions Trading: Opportunities from the Kyoto Protocol and the Implications for Business
Details: Pauline Ashby, The Institute of Petroleum

10–13 **Damascus, Syria**
6th Arab Energy Conference
Details: OAPEC, State of Kuwait
Tel: +965 4844500
Fax: +965 4815747
e-mail: natinto@Kuwait.net

11–13 **France**
International Refining Economics
Details: ENSPM Formation Industrie, France
Tel: +33 1 47 52 72 93
Fax: +33 1 47 52 70 66

11–14 **Oxford, UK**
Planning and Optimisation of Refinery Operations
Details: College of Petroleum and Energy Studies, UK
Tel: +44 (0)1865 250521
Fax: +44 (0)1865 791474

11–15 **Budapest**
Terminal Operation and Bulk Liquid Measurement
Details: Mike England, Abacus International, UK
Tel: +44 (0)1245 328340
Fax: +44 (0)1245 323429

12–15 **Budapest**
2nd International Pipeline Rehabilitation & Maintenance Conference & Exhibition
Details: Energy Logistics International, UK
Tel: +44 (0)1628 525492
Fax: +44 (0)1628 521928

12–15 **Frankfurt**
Power Plant Management, Operations and Maintenance
Details: IBC UK Conferences
Tel: +44 (0)171 453 5491
Fax: +44 (0)171 636 6858

13–14 **Bucharest**
5th Annual Central/East European Gas Conference
Details: Overview Gas Conferences, UK
Tel: +44 (0)171 613 0087
Fax: +44 (0)171 613 0094

17–20 **Utah, US**
AAPG Annual Convention
Details: AAPG Convention Department, US
Tel: +1 918 560 2679
Fax: +1 918 560 2684
E-mail: convene@aapg.org

17–21 **Aberdeen**
ConSoil '98
Details: Environmental Business Communications, UK
Tel: +44 (0)121 693 8338
Fax: +44 (0)121 693 8448

18–19 **Oxford, UK**
Fundamentals of Oil Refining
Details: College of Petroleum and Energy Studies
Tel: +44 (0)1865 250521
Fax: +44 (0)1865 791474

19–21 **Birmingham, UK**
Pipelines '98
Details: Donna McDowell, Pipelines '98, UK
Tel: +44 (0)171 505 6625
Fax: +44 (0)171 505 6600

20–21 **London**
Response of the Earth's Lithosphere to Extension
Details: The Royal Society, UK
Tel: +44 (0)171 451 2574
Fax: +44 (0)171 451 2693
e-mail: n.boross-toby@royalsoc.ac.uk

20–21 **Aberdeen**
Progress in HP/HT Fields
Details: IBC UK Conferences
Tel: +44 (0)171 453 5491
Fax: +44 (0)171 636 6858
e-mail: cust.serv@ibcuk.co.uk

23–29 **Sydney**
AIEE '98
Details: Reed Exhibition Companies Ltd, UK
Tel: +44 (0)181 910 7743
Fax: +44 (0)181 910 7749

24–29 **Montréal**
8th International Offshore and Polar Engineering Conference
Details: ISOPE, US
Tel: +1 303 273 3673
Fax: +1 303 420 3760

26–27 **Singapore**
MariChem Asia 98
Details: Julie Barrett, Turret RAI, UK
Tel: +44 (0)1895 454545
Fax: +44 (0)1895 454647
e-mail: 100730.1313@compuserve.com

26–28 **Paris**
European Gas Deregulation Summit
Details: AiC Conferences
Tel: +33 1 41 06 69 36
Fax: +33 1 41 06 69 37

26–29 **Russia**
Chemilog '98
Details: International Trade & Exhibitions Group, UK
Tel: +44 (0)1787 372345
Fax: +44 (0)1787 372275
e-mail: info@ite-king.co.uk

27–28 **Aberdeen**
Project 2000 in Oil and Gas
Details: IQPC Ltd, UK
Tel: +44 (0)171 691 9191
Fax: +44 (0)171 691 9192
e-mail: anita@iqpc.co.uk

27–28 **Norway**
Forum on Production Separation Systems
Details: IBC UK Conferences
Tel: +44 (0)171 453 5494
Fax: +44 (0)171 636 6858
e-mail: cust.serv@ibcuk.co.uk

27–29 **Oxford**
Natural Gas – The Technical Issues: An Introductory Course for the Non-Technical Professional
Details: The College of Petroleum and Energy Studies, UK
Tel: +44 (0)1865 250521
Fax: +44 (0)1865 791474

28–29 **Portugal**
Managing the Future Growth of Cogeneration in Europe
Details: IBC UK Conferences
Tel: +44 (0) 171 453 5491
Fax: +44 (0) 171 636 6858

EVENTS Forthcoming

JUNE

1–3 **Oxford**
The 'Gas Chain' Concept – Industry Structure, Economics and Pricing
Details: The College of Petroleum and Energy Studies, UK
Tel: +44 (0)1865 250521
Fax: +44 (0)1865 791474

2 **London**
Countdown to COMAH
Details: IChemE, UK
Tel: +44 (0)1788 578214
Fax: +44 (0)1788 577182

2–3 **Aberdeen**
Continuous advances in Mooring & Anchoring
Details: IBC UK Conferences
Tel: +44 (0)171 453 5491
Fax: +44 (0)171 636 6858
e-mail: cust.serv@ibcuk.co.uk

2–4 **Birmingham, UK**
Eurochem 1998
Details: Kay Liversage, Reed Exhibitions Companies, UK
Tel: +44 (0)181 910 7859

2–5 **Stockholm**
ASME Turbo Expo Land, Sea & Air 98
Details: International Gas Turbine Institute, US
Fax: +1 404 847 0151

2-5
Fifth International Caspian Oil & Gas Exhibition & Conference Incorporating Refining & Petrochemicals
Details: Spearhead Exhibitions, UK
Tel: +44 (0)181 949 9222
Fax: +44 (0)181 949 8186
website: http://www.spearhead.co.uk

3–4 **Aberdeen**
Advances in Rider Technologies
Details: IBC UK Conferences
Tel: +44 (0)171 453 5491
Fax: +44 (0)171 636 6858
e-mail: cust.serv@ibcuk.co.uk

7–12 **Wiltshire, UK**
The Challenge of Liberalising Gas Markets
Details: The Alphatania Partnership, UK
Tel: +44 (0)171 613 0087
Fax: +44 (0)171 613 0094

9–10 **London**
The 1st International Conference on Oil and Gas Trading and Shipping Operations
Details: Sarah McKenzie, Asdem UK
Tel: +44 (0)171 493 0973
Fax: +44 (0)171 499 5270

IP Conferences and Exhibitions

International Conference

Emerging Markets for Emissions Trading – Opportunities from the Kyoto Protocol and the Implications for Business

London: 11–12 May 1998

Sponsored by the United Nations Conference on Trade and Development (UNCTAD) and supported by the Department of Trade and Industry and the Department of the Environment, Transport and the Regions.

The year 2000 will see the creation of a new greenhouse gas emissions trading market which was agreed in principle at Kyoto in December 1997. This Conference will address the implications for energy providers of a new emissions market and assess the potential opportunities in emissions trading and joint implementation.

Speakers include: The **Rt Hon John Prescott MP** (subject to confirmation) Deputy Prime Minister, **Adair Turner** (Director-General CBI), **John Guinness** (Chairman, British Nuclear Fuels plc), Chris Moorhouse (Chief Executive, BP Oil International) and **Ken Newcombe** (Division Chief, World Bank).

The Programme and registration form is now available.

International Conference and Exhibition

Metalworking Fluids

Birmingham 3–4 June 1998

Organised in association with The British Lubricants Federation and PERA Technology

This Conference will provide a significant insight into the future development of the Metalworking Fluids market. Emphasis will be placed on the impact of legislation and environmental concerns and how these differ through the geographical regions of Europe. The Conference will not only focus on the fluids themselves, but will include sessions on machine tool design, novel methods of in-line analysis, new test methods and the future role of biocides.

Speakers include: **Pat Ruane** (Castrol Industrial), **Cliff Lea** (Fuchs Lubricants), **Bob Howard** (Polartech), **Dr Steve Mosley** (PERA Technology), **Dr Rob Walter** (IBS Viridian), **Wallace MacDonald** (Castrol Industrial), **Dr Ian Liddle** (Rolls-Royce), **Michael Kohut** (Lubrizol International Laboratories) and **Mikael Olsson** (Volvo Technological Development Corp).

The programme and registration form is now available.

Annual Introduction Courses

Introduction to Oil Industry Operations

London: Wednesday 17–Friday 19 June 1998

and

Introduction to Petroleum Economics

London: Monday 22–Wednesday 24 June 1998

The programme and registration form is now available.

International Conference

Aviation 2000 – Safety and Operations

London: 1–2 October 1998

There is increasing emphasis on Ramp Safety within the aviation industry, both in terms of fuelling questions and other ramp users. This topic, together with the new issue of the IP Aviation Model Safety Code will be fully reviewed. The new developments in filtration and related test procedures will also be discussed and linked with the broader issue of fuel quality impacts on jet engine performance. This important Conference will be of interest to all involved in aviation fuelling together with those with a broader interest in Ramp Safety. An Exhibition of equipment linked with aviation fuelling will be held in association with the Conference.

The programme and registration form will be available in May 1998.

For a copy of the programme and registration form for any of the above or to add your details to the mailing lists for forthcoming events, please write or fax:

Pauline Ashby,
Conference Administrator,
Institute of Petroleum,
61 New Cavendish Street,
London W1M 8AR, UK
Tel: +44 (0)171 467 7100
Fax: +44 (0)171 255 1472
e-mail: pashby@petroleum.co.uk

All forthcoming events can be viewed on the IP website:
http://www.petroleum.co.uk

Diary Dates

Exploration & Production Discussion Group

'The Institutions of the European Union – a Way to the Federal State?'

Thursday 7 May 1998, 17.00 for 17.30 until 19.00

Eckhard Wiemann, Senior Advisor EU Affairs, Mobil Europe, Brussels

IP Contact: Jenny Sandrock

Midland Branch Luncheon

Wednesday 13 May 1998
Walsall Football Club, Walsall

Professor Stephen Littlechild,
Director General of Electricity Supply

For more information or to apply for an application form please contact: Mr Mike Ward, IP Midlands Branch
Tel: +44 (0)1299 896654 Fax: +44 (0)1299 896955

London Branch

'The Future of Packaging'

Thursday 14 May 1998, 18.00

Ian Robinson, Consultant, **Ian Dent,** BP Chemicals, and **Tony Hancock,** Plysu Containers

Current and proposed legislation, both in Europe and in other world areas, relating to the packaging of manufactured goods is having a major impact on industry. The presentations will examine the significance of packaging in the petroleum industry and the potential effects of this legislation on the marketing of petroleum products. A range of ecologically acceptable technical, environmental and political solutions to the problems raised, including the relative economics, will be reviewed.

The presentation will be preceded at 17.30 by the Branch's Annual General Meeting.

Tea and biscuits will be served at 17.15.
Light refreshments will be available afterwards.
Enquiries: Mr J M Wood at the Institute,
Tel: +44 (0)171 467 7128

Recruitment

IP THE INSTITUTE OF PETROLEUM

Information Officer

Applications are invited for the above position within a highly active team providing information and library services to the oil industry.

Duties will include handling a wide range of technical and commercial enquiries, online and Internet searching, and developing and maintaining in-house databases using DB Textworks, Excel and WordPerfect and/or Word.

The successful candidate will probably be a recently qualified graduate with professional library or information work experience, preferably in the oil and energy industries, and a working knowledge of computers. A pleasant personality and communication skills are essential.

Salary £14,000 – £15,000 with 25 days holiday pa plus benefits of a daily three-course lunch for a nominal charge and Season Ticket loan after one months service.

Please send CV with covering letter *by 11 May 1998* to: Catherine M Cosgrove, Head of Library & Information Service, Institute of Petroleum, 61 New Cavendish Street, London W1M 8AR.
Tel: +44 (0)171 467 7111 Fax: +44 (0)171 255 1472
e-mail: ccosgrove@petroleum.co.uk

IFEG

Visit to
The British Library
St Pancras, London
Friday 26 June at 14.30

We are visiting the new British Library on 26 June. There will be a tour, of the building and services lasting approximately one hour. Priority will be given to fully paid-up IFEG members.

Please contact Catherine Pope, Secretary, IFEG ***before 22 May*** if you want to join the visit at the:
Institute of Petroleum, 61 New Cavendish Street, London W1M 8AR
Tel: +44 (0)171 467 7112 Fax +44 (0)171 255 1472
e-mail: **cpope@petroleum.co.uk** *(preferably e-mails please)*

All meetings are held at the Institute of Petroleum unless otherwise stated. Please tell the IP contact if you plan to attend any of these free meetings.
Tel: +44 (0)171 467 7100
Fax: +44 (0)171 255 1472

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In return, we offer a highly competitive package with a negotiable salary and the benefits you'd expect from a large and successful organisation. Prove your ability and there is plenty of potential for career progression.

Interested? Then please send your CV and current salary details to Bal Jacob, Human Resources, Calor Gas Ltd, Athena Drive, Tachbrook Park, Warwick CV34 6RL.

Closing date: Friday 29 May 1998.

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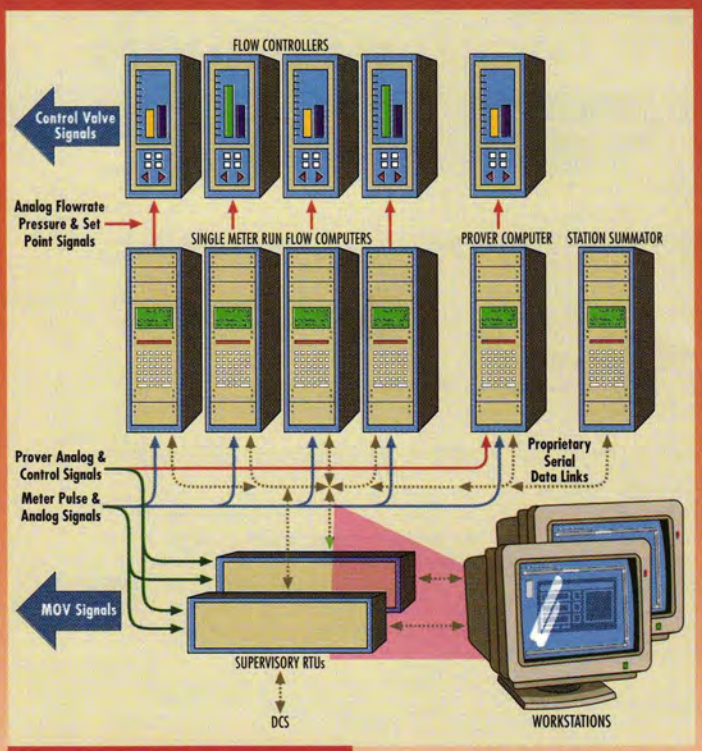

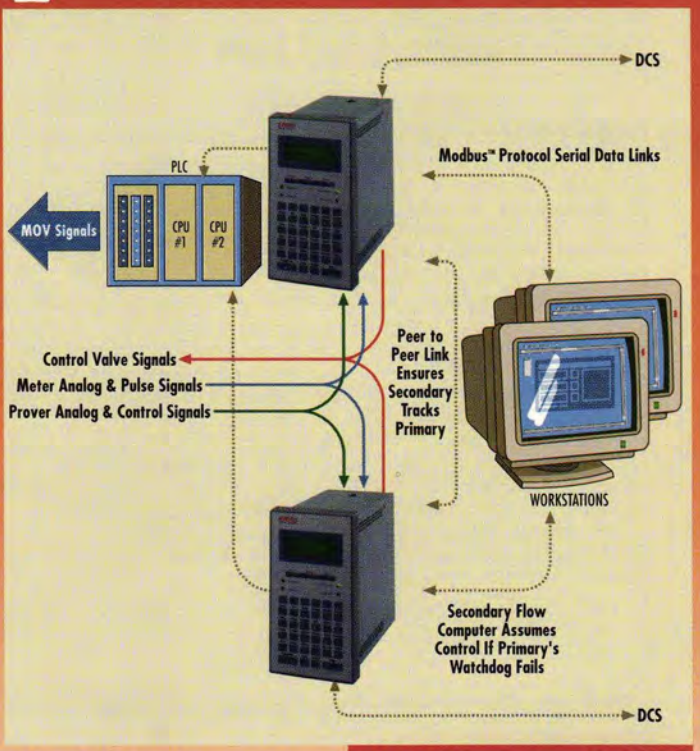

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Website: http//www.omniflow.com

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