PETROLEUM REVIEW

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May 1994

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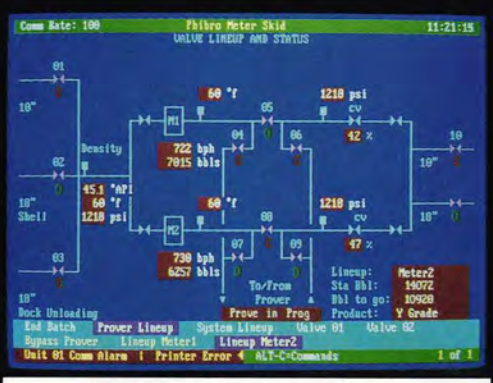

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PETROLEUM REVIEW

MAY 1994 VOLUME 48 NUMBER 568 • £6.00 • SUBSCRIPTIONS (INLAND) £65.00 (OVERSEAS) £80.00

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Published Monthly by
INSTITUTE OF PETROLEUM
A charitable company limited by guarantee

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For details of membership, including Petroleum Review at no extra cost, please apply to the Membership Department.

Printed by Eyre & Spottiswoode Ltd, London and Margate.

US MAIL: Petroleum Review (ISSN 0020-3076 USPS 006997) is published monthly for US$130 per year. Second class postage paid at Middlesex, New Jersey.
Postmaster: send address changes to C&C Mailers International, PO Box 177, Middlesex, New Jersey 08846, USA.

ABC BUSINESS PRESS ISSN 0020-3076 MEMBER OF THE AUDIT BUREAU OF CIRCULATIONS

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COVER PHOTO
Channel Tunnel portal
Photo courtesy of QA Photos Ltd

NEWS IN BRIEF

25 March
Shetland Islanders and environ-mental pressure groups reacted with fury to a decision by the Crown Office that there would be no criminal proceedings over the *Braer* incident.

27 March
Turkey has charged the master of the *Nassia* for his part in the Bosporus tanker disaster, which killed as many as 24 seamen in March. Mr Spyros Gorgiou was charged with 'causing death through negligence at sea', a crime which can lead to a prison sentence of up to five years.

29 March
The US authorities have freed the Liberian-flagged tanker *Diana*, although investigations into whether the vessel violated a US trade embargo on Libyan-connected oil continues.

30 March
A collision between two tankers, the 293,238 dwt *Seki* and the 57,211 dwt *Baynunah*, has created a 16,000 tonne oil slick in the Gulf of Oman. As much as 25km of United Arab Emirates' coastline has been affected.

31 March
Enterprise Oil has agreed to sell for $1.5m its 60 percent share in the Bawean Production Sharing Contract to a consortium of Australian companies, comprising Stirling Resources, Hardman Resources and Russell Oil and Gas. The deal includes the small offshore Camar field in Indonesia.

1 April
The European Union is earning three times OPEC's own income from oil exports as a result of increases in its energy taxes, according to a new OPEC study.

4 April
The Manchester electricity supplier, Norweb, has set up a new, nationwide gas company, which plans to undercut British Gas by 10-15 percent.

5 April
Chairman of Phillips Petroleum, CJ Silas, has warned Norway that a harsher tax regime could act as a deterrent against the redevelopment of Ekofisk. Comparing the country's offshore licensing regime with that of the UK, he said that Britain was far more willing to make modifications and changes.

Brazilian oil unions, opposed to the break-up of Petrobras' monopoly, have threatened to strike if the government brings forward a long-delayed Congressional debate over the issue.

6 April
The Indian Minister of Petroleum and Natural Gas, Satish Sharma, has offered new exploration incentives to foreign oil companies by opening up the country's most promising areas and abolishing duties on equipment. India is currently able to meet only half its domestic requirement of 1.2m b/d.

Trinidad's LNG export project, which is expected to produce 300m cu ft per day, has been given a boost by a $700,000 grant from the United States.

7 April
Chevron International has sold its shares in two Nigerian downstream trading operations to Vitol. Chevron owned 49 percent of Calson and 40 percent of Hyson as joint ventures with the NNPC.

The Saudi tanker charterer, Vela, has placed a 20-year age limit on charter vessels. The only exception to this new ruling, which comes into effect next year, will be for tankers which achieve a high rating on one of the Condition Assessment Programmes (CAPs) offered by the major classification societies.

British Gas is to close 190 of its 430 high street showrooms, with the loss of 1,700 jobs. Customers will now be able to pay their bills through post offices or by direct debit instead.

BP has survived strongly hostile opposition from small shareholders over plans to extend its executive share option scheme. One-third of the 1,000 attending the company's annual meeting voted against the scheme, which was nevertheless supported by the larger institutions.

8 April
Maple Resources Corporation of Texas has signed a contract with PeruPetro to develop the Aguaytia natural gas field in the eastern jungle of Peru. The deal involves the Texan company investing between US$120m-$150m in the scheme.

Indonesian Mines and Energy Minister Ida Bagus has called upon Britain and Norway to cut back on production and help prevent a further drop in oil prices.

10 April
The President of Kashima Oil has resigned after accepting responsibility for the company's $1.5bn loss in foreign exchange forward transactions.

11 April
Iraq's rehabilitation into the marketplace could bring oil prices crashing down to $10 per barrel, according to a former Saudi oil minister. Sheikh Ahmed Zaki Yamani warned other OPEC countries to be ready to compensate by cutting production.

Chief Executive of British Gas, Cedric Brown, has urged the US to free its gas industry up to foreign competition.

12 April
Norway has struck three separate export deals worth NKr8bn to supply a total of 13bn cubic metres of gas to Germany, Spain and Britain. The buyers are Mobil Erdgas-Erdol, Enagas and Scottish Power.

13 April
Ranger Oil has announced that eight out of the nine wells drilled during the company's first year of exploration and development in the US offshore Gulf Coast region have been a commercial success. Four additional development wells are now planned in 1994 to exploit the discoveries.

14 April
History professor and liberal opposition member of parliament, Abdulmohsen al-Mudej, has been appointed as Kuwait's new oil minister. He succeeds Mr Ali Ahmad al-Baghli, who resigned after a Cabinet reshuffle.

Yorkshire Electricity became the latest regional electricity company to move into the UK's domestic gas market when it purchased a near seven percent stake in the North Sea Armada field for £27.2m.

Oil output from the North Sea reached a record 5.2m b/d in February, according to Wood Mackenzie.

130 oil workers were airlifted from Shell Expro's Brent Alpha platform after pressure built up in the well casing. 39 essential crewmen stayed on board to 'kill' the well. A full investigation into the cause of the incident is now underway.

15 April
Trading in Brent crude oil futures contracts at the IPE has been extended from nine months to 12 months forward.

The BSI has confirmed it will change the rules for smaller companies wishing to gain BS5750 in order to make the standard both simpler and cheaper to obtain.

A bill making owners of larger container or passenger vessels liable for oil pollution in the same way that oil-laden oil tankers are has been approved by the UK House of Commons.

The Norwegian offshore union, OFS, confirmed it will stage a political, four-hour strike on 5 May. The action is in protest at the government's decision to allow oil companies to employ more contract labour.

16 April
The founder of the Body Shop, Ms Anita Roddick, has appealed to Foreign Secretary Douglas Hurd to intervene in a conflict between Shell and the Nigerian Ogoni tribe.

Enterprise Oil's first 'wildcat' testing well in the Angkor exploration project offshore Cambodia has tested positive for both oil and gas.

17 April
Italian petrol station operators began a three-day strike in protest at what they allege is inadequate protection against price changes. The oil companies are claiming that the action is really a reaction against efforts to liberalise opening hours and operating conditions.

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Leuna oil refinery to go ahead after Elf reduces stake

Eastern Germany's Leuna oil refinery project has been saved from collapse after a late compromise allowing Elf to reduce its interest in the venture to 43 percent.

As *Petroleum Review* went to press, construction was due to begin on the much-delayed 200,000 b/d refinery which is set to become the most modern in the area.

The compromise between Elf and the Treuhand privatisation agency gives Russian state oil companies, Rosneft, Surgutneftegaz and Megionneftegaz, a 24 percent interest in the refinery project. The agreement will allow Russia to regain an important foothold in eastern Germany's oil industry and provide it with facilities far superior to those at home.

Elf had originally hoped to reduce its stake in the refinery down to a third and, according to industry sources, ideally wanted a Western buyer who would offer a cash deal. Payment from the Russians is likely to be in crude oil deliveries.

However, the agreement also relieves Elf of its original commitment to take over Thyssen Handelsunion's 33 percent stake in the consortium should the German company leave the project. As the chances were that Thyssen would decide to exit once the refinery was built, the entire agreement effectively reduces Elf's interest in the project by over half, from 100 percent to 43 percent.

Thyssen's stake will now be taken over by Buna GmbH, which was set to lose heavily if the project failed. The eastern German chemicals company is situated close to Leuna, which will supply it with refinery products.

Once Buna has taken over Thyssen's stake the firm will be eligible to purchase a 33 percent interest in Minol, eastern Germany's much-coveted network of up to 600 petrol stations. According to industry sources, it was the inclusion of Minol in the original refinery deal which spurred Elf into becoming involved in the first place.

An Elf spokesman spoke out against recent press reports that this latest agreement means surrendering part of the network. 'If Buna decides it would be advantageous to acquire a stake in Minol, it will have to wait for three years, it will also have to pay for that stake, and Elf will still be left with a controlling 66 percent share.'

Construction of the £1.75 billion refinery, which it is hoped will help create a viable eastern German chemical sector, is due to take three years. Elf won its bid to build the refinery back in 1992.

Western oil companies link up for Arctic venture

Four Western energy majors are to brave the freezing temperatures and lack of infrastructure of Arctic Russia in order to develop potential oil reserves.

Texaco, Exxon, Amoco and Norsk Hydro have formed a new limited liability company, Timan Pechora (TPC), to assess and develop as many as 11 proven oilfields in 7,300 sq km of the Timan Pechora basin.

TPC will act as the operating company for the project, which is located 1,771km northeast of Moscow above the Arctic Circle on the Pechora Sea. The contract area contains estimated recoverable resources of more than 2 billion barrels of oil. Previous Russian exploration has shown a success rate of more than 60 percent and an initial output of 120,000 b/d could be reached by the turn of the century.

Texaco and Exxon both have a 30 percent working interest in the project, and Amoco and Norsk Hydro a 20 percent stake each.

Texaco has spent the past four years researching and negotiating on the project's behalf. Senior Vice President, Peter I Bijur, described the basin as 'one of the most challenging and attractive hydrocarbon prospects in the world today.

'Further successful development of Timan Pechora, with its lack of infrastructure, severe climate, complex geology and unique environmental constraints, will require significant proficiency under adverse conditions.'

The companies expect to spend more than £100 million in the first stage of the planned programme, which includes appraisal of the Roman Trebsa field. They plan to work in the area for approximately 50 years.

The production-sharing agreement awaits approval from the Russian authorities, which will require legislative action in the country's Federal Assembly.

Morecambe Bay contract for AMEC

AMEC Process and Energy of Aberdeen has won a major two-year contract for work on British Gas's Morecambe Bay field.

Rumoured to be worth over £25 million, the deal could also be extended for a further three years. It involves engineering, procurement, modification and maintenance contract activities and will employ up to 140 people.

The contract reflects the growing industry trend towards performance-based alliances. 'Throughout the duration, we will be encouraged to introduce innovative techniques and methods in order to effect long-term savings in British Gas's operating budget,' said AMEC.

Heseltine inaugurates Scott field

President of the Board of Trade Michael Heseltine inaugurated the Scott oil field in the central North Sea on 20 April.

Scott is the largest oilfield to come on stream during the 1990s and provides the equivalent of 10 percent of the United Kingdom's oil requirements, making Amerada Hess the third largest oil production operator in the UK North Sea.

The twin platforms and extensive undersea facilities took four years and £1.4 billion to build. Over 5,000 were directly employed during the construction period of Scott, which now employs a team of about 200.

BP sells New Zealand forestry

BP is selling its interests in the Hikurangi forest estate in New Zealand to its joint venture partner, Fletcher Challenge Limited.

The $71 million deal covers nearly 36,000 acres of the 58,000 acre estate, which grows radiata pine.

BP originally acquired its interests in Hikurangi to absorb cash surpluses from its holdings in the Maui and Kapuni gas fields, which could not be repatriated prior to deregulation of the New Zealand financial markets. However, both stakes, along with BP's other New Zealand exploration interests, were sold in 1990.

Total investment in the estate from BP has amounted to some $24 million.

North Sea drilling survives Budget changes

Drilling levels in the North Sea fell 27 percent in the year following former Chancellor Norman Lamont's 'bombshell' Budget announcement – a smaller drop than anticipated by the industry.

'Although activity has decreased, it has not plummeted as expected', according to a new study from energy analysts Arthur Andersen.

A total of 111 exploration and appraisal wells were spudded in the 12 months following the March 1993 changes, says their report.

Whilst exploration was extremely tentative immediately after the Budget, with only nine wells drilled in the first three months, the summer witnessed a resurgence in exploration, followed by even more activity in the autumn.

Nor can the overall decrease in exploration be blamed solely on the tax changes, says the report. The most dramatic fall in rates took place before the Budget changes were announced when between March 1991 and 1992 exploration fell by almost 50 percent.

The general decline in activity since the high of 1990 is due to the maturity of the region, with the dramatic fall in oil prices within the past year only adding to the oil companies' problems. 'During the post-Budget period the marker Brent blend oil price dropped 28 percent', says the report.

The success ratio of wells has actually increased since the taxation changes to almost 40 percent (ignoring tight hole status wells). However, this may simply reflect an increased cautiousness within the industry, revealed in the fact that only 40 percent of exploration wells in the past year have been true wildcats.

The report strikes a cautious note for the future, warning that the true impact of the tax changes has yet to be felt. Transitional relief, which has so far helped to cushion operators and sustain interest in the UK Continental Shelf, is currently due to expire at the end of the year.

Texaco launches 'the next generation of petrol'

There has been little response so far from the other major oil companies to Texaco's recent announcement of a 'unique' new fuel – CleanSystem^3.

Branded the 'new generation of petrol', the key claim of this new fuel is a detergent additive that cleans not only the intake valves and fuel injectors of a car, but actually reaches inside the combustion chamber, the very heart of the engine.

According to Mr Wilson Berry, Managing Director of Manufacturing and Marketing at Texaco, the fuel will give the company a unique advantage over its competitors.

A spokesman for Shell said detergent additives had been added to all their grades of fuel for some time, but via the inlet system not the combustion chamber. He was unable to comment further because Shell had not been provided with any test data by Texaco.

BP said its detergent additives performed 'clean-up and keep clean' tasks via the inlet system extremely well. 'We've only heard about Texaco's new fuel through press reports', said a spokesman, 'so we can't make comparisons'.

A spokesman for Texaco said in response: 'It's up to the other companies to find out how we've done this.'

Texaco claims the new petrol can help both new and older cars achieve greater economy, lower exhaust emissions and improved performance. It is available in all petrol grades, both leaded and unleaded, at no extra cost to the motorist.

Tests were carried out both by Texaco and UK independent consulting engineers, Ricardo.

'In tests, the product reduced emissions by up to 22 percent when compared with those of petrol using current additive technology,' said Texaco.

International energy spy rings pose growing threat

International spy rings are a growing threat to the energy industry, according to an article in Conoco's inhouse magazine.

'Recent court cases, involving so-called "information brokers", have revealed the existence of sophisticated spy rings specialising in the oil and gas industry,' says the report. In one case, two men received prison sentences after a Shell employee received $45,000 for inside information from another broker.

'With millions of dollars at stake in an increasingly tough competitive environment, the temptation on some companies to use the services of information brokers or for insiders to supply information can be overwhelming.'

The brokers are able to pressurise vendors and contractors, according to the article, by showing convincing evidence that they have inside knowledge and then threatening to go to competitors unless they are paid a 'fee' for information. A fee can be as much as four percent of a final contract.

The article warns Conoco employees to be on their guard when discussing work outside the office and to ensure that all discarded confidential information is shredded.

Conoco International Security Manager David Munday said he had received no reports of attempts to target the company.

Santa Fe sets new drilling record

Santa Fe Drilling Company has broken a new world drilling record, after reaching a depth of 7,255 feet in just 24 hours on the North Sea Judy platform.

Contracting for Phillips Petroleum, the 12.25 inch hole was drilled using the heavy-duty jack-up rig, Galaxy 1.

This is the fourth North Sea footage record set by Santa Fe and Phillips on the Judy development.

It was accompanied by another new North Sea record for the longest continuous bit run of 9,285 feet in 44 hours.

The speed at which the wells are being drilled is saving Phillips as much as $3 million per well. The platform is expected on stream in April 1996.

Germany bans 'monopolistic' deal

A deal between Thyssengas and Ruhrgas to co-operate over supplying energy to four major German cities has been blocked by the country's Federal Cartel Office.

The agreement between Germany's largest gas supplier and gas distributor respectively, has been banned on the grounds that it breaks European monopoly regulations.

The companies can now appeal to the Berlin courts.

Charringtons in Anglo buy-out

Charrington Fuels, one of the UK's leading independent suppliers of refined petroleum products, is being acquired from Anglo United in a £41.5 million management buy-in/buy-out.

The transaction, led by former Shell UK Oil director Howard Birtwistle and arranged by 3i, will allow Charringtons to regain its independence from Anglo, which is seeking to concentrate on its core business.

Asia's Garden of Eden

By Susannah Cardy

Is Singapore's bulk storage boom finally under threat from the new and explosive powerhouse economies of China, Thailand, Malaysia and Vietnam? Not according to the operators, who continue to back their 'artificial garden of Eden'.

There have been some signs lately that traders and bulk storage companies operating in the Far East are trying to cut out the middleman. Coastal Corporation, for example, recently acquired over 2 million barrels of storage capacity in the Philippines after taking over part of an old US navy base. Traders are beginning to set up floating storage facilities closer to the markets themselves, while the construction of new refineries in the areas surrounding Singapore continues to escalate. Even the largest companies such as GATX are 'actively considering developments in areas such as China, Vietnam and Indonesia'.

This trend towards regionalisation is hardly surprising when one considers the economic explosion taking place in the newly-industrialised Pacific Rim countries. Growth in parts of the Chinese coastal areas has been as high as 20 percent per annum, according to Mr Ken Young, GATX's director in the Pacific. Thailand, Malaysia, Indonesia and Vietnam are all experiencing sustainable growth rates of between 8-12 percent each year. In Australia and Korea, the rate is around four percent per annum, and even Japan, supposedly still fighting its way out of a recession, is experiencing a growth of between two and three percent a year.

Highly sophisticated

The major independent bulk storage operators, however, do not believe that Singapore is under any real threat. 'Singapore's big advantage is that it is a highly sophisticated, extremely well-run country so people are very happy to invest their money there,' said one major operator. 'We're considerably less sanguine about investing money in any of the other surrounding countries – and I mean any of them.' According to Mr Young, 'GATX could be involved in the Chinese petroleum storage business as early as next year, but not in a big way'. One of the major problems, he says is cost. In Singapore, land is leased for around $85 per square metre and comes complete with an efficient infrastructure. Land prices in China, on the other hand, can be anything from $25 to $125 per square metre, but added to that is the cost of building up the surrounding transport links, telephone network etc. 'In Singapore you get the finished product', said one operator. 'In some parts of China you even have to bring in your own water.'

The independent bulk storage operators argue that the growth explosion in the East simply adds to the boom in Singapore. Situated at the crossroads of several shipping lanes and with deep-water access, its distinct geographical advantages mean it is the natural international centre for redistribution to the surrounding hinterland. 'As China grows', said another operator, 'Singapore grows too'.

Tankstore Phase III expansion completed

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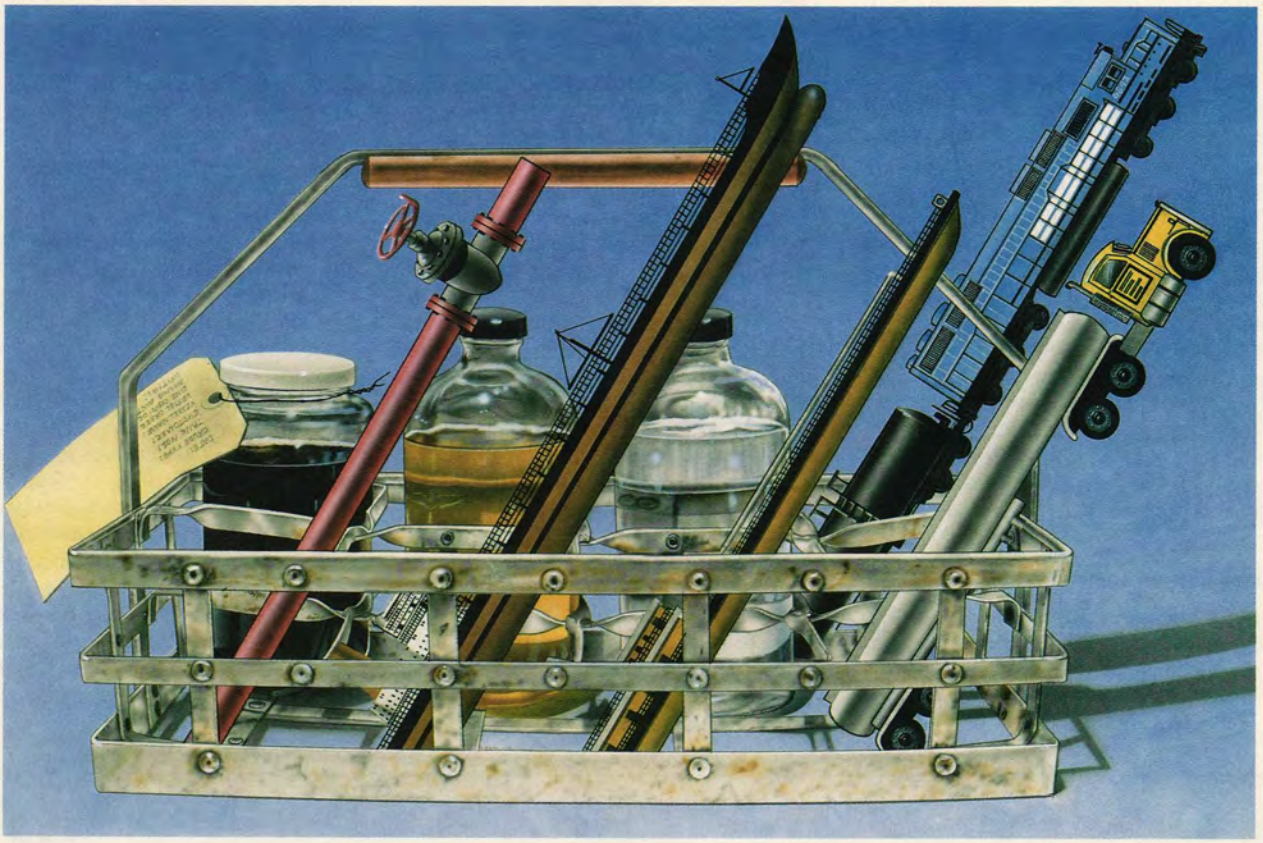

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This is not to say that China won't get more of its own storage too, but it is still extremely early days. According to Mr Young, it currently has no purely third-party petroleum storage. And even if China or any of the other Pacific Rim countries were to drastically develop their own capacity, most see this as little reason to panic. 'That would be like saying that Rotterdam would suffer if tanks were built in Barcelona,' said Mr G Stofriegen, President of Paktank in Asia Pacific.

Meanwhile, Singapore continues to thrive. Tank rates, although not strengthening at present, continue to be the highest in the world. Capacity is at 90-95 percent. GATX says that 60 percent of its business is currently 'long-term', in other words tied into contracts of more than one year. Another operator said that the average length of contracts had increased over the past six months.

Ambitious construction

The confidence of the operators in the region is reflected by their ambitious construction projects. Last October, Tankstore Singapore (a joint venture between GATX, Paktank, and Chicago Bridge & Iron), completed phase III of its expansion programme on the island of Pulau Busing. This added 180,000 cubic metres of petroleum product storage, bringing total capacity to over 800,000m^3. Since its inauguration four years ago, the island terminal has increased its total capacity by 50 percent and Tankstore still plans to expand by another 50 percent. The next phase of construction is due to start in 1995.

Besides opening a new 35,000m^3 chemical storage terminal on the island of Palau Sakra, Van Ommeren Tank Terminals (VOTT) is also involved in expanding its existing terminal at Pulau Sebarok. Due for completion by the end of the year, this will add another 60,000m^3 to the island's existing capacity of over 700,000m^3. 'We also have further plans to expand into the island's remaining available land space', VOTT's commercial manager, Mr Tay, told *Petroleum Review*. 'That adds up to another 150,000 cubic metres – but then that's it, unless we move into land reclamation.'

A severe shortage of land is, of course, the one major stumbling-block for Singapore. So far this has been overcome by ingenuity. Pulau Sakra and Pulau Sebarok, for example, are part of a cluster of seven islands which lie to the western end of Singapore port. The government is currently planning to connect all seven by landfill and turn the area into a major petrochemical complex. A causeway will link the complex to the mainland. 'The project will take us into the year 2025 but it's bang on schedule so far,' said Mr Young. 'The Singaporeans are really very, very good at long-term planning and then successfully following up those plans.' If this wasn't enough, the energetic government is also discussing plans for a second causeway linking the western end of Singapore with Malaysia.

But how long can energy and ingenuity last? Land shortage in Singapore is the one issue which leaves the independent bulk storage companies sounding unconfident. Asked when the space would run out, one operator said: 'I don't think I can answer that question – it's very speculative.

Another replied: 'We do still have quite a few islands which can be reclaimed but whether it's economically feasible to do so is another matter.'

DATES FOR YOUR DIARY

IP THE INSTITUTE OF PETROLEUM

Monday 9 May 1994
5.00 pm for 5.30 pm – 7.00 pm

'Bitumen – Designer Product or Product Dustbin?'

By Michael Downes, *Consultant*
and
Terry Fabb, *Refined Bitumen Association*

The speakers will address the current status of the bitumen market worldwide, the size and value of trade in geographic markets and likely product developments from the paradoxical viewpoints of 'bottom of the barrel' and 'top rate technology'.

Organised by Energy Economics Discussion Group

IP Contact: Pauline Ashby

Thursday 16 June 1994
5.00 pm for 5.30 pm – 7.00 pm

'West European Refining in a Global Context – Is a Decade of Restructuring About to Pay Off?'

By Chris Brown, *Senior Consultant, Chem Systems Ltd*

The West European refining industry has for several years suffered from over-capacity and hence poor margins. This talk will analyse how much this reflects a global problem and whether the major restructuring it has undertaken now sets the foundation for better years ahead.

Organised by the Energy Economics Discussion Group

IP Contact: Pauline Ashby

Thursday 12th May 1994
5.00pm for 5.30 pm – 7.00 pm

'Safety Cases: Use or Ornament?'

By Dr Don Lloyd, *Manager Technical Services, CIGNA Insurance*

The 'goal-based' regulatory regime introduced following the Piper Alpha disaster required offshore operators to prepare a Safety Case and submit this to the Health & Safety Executive by 30 November 1993.

The aim of the presentation is to provide an overview of the Safety Case requirements, discuss their preparation and address some of the important issues raised. It will also discuss the HSE/operator interface, outline the current (post-submission) situation and explore how the information generated will be used. It is hoped that the presentation will stimulate an open discussion on how to prevent Safety Cases 'gathering dust' until the next stipulated re-submission date.

Don Lloyd has 20 years of industrial experience including 10 years involvement in Safety Case preparation with the Nuclear Industry, CIMAH and Offshore. He was formerly Head of Loss Prevention with Total Oil Marine plc and a member of the UKOOA Safety Assessment Workgroup. In addition to his present position as Manager Technical Services with CIGNA Insurance, he is a Visiting Professor in Risk Management with the Liverpool Business School.

Organised by Exploration and Production Discussion Group
IP Contact: Sjoerd Schuyleman

All meetings are held at the Institute of Petroleum. Please tell the IP contact if you plan to attend any of these free meetings.
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New technologies for efficient refining in the environmentally conscious 1990s

By FM Hibbs, UOP Ltd

The European refining industry operates in a free-market situation as the closure and decommissioning of many European refineries during the 1980s illustrates all too clearly. However, despite the reduced capacity of the industry today, European refineries still face an oversupplied and competitive marketplace for petroleum products.

The supply of crude oil feedstock is also a problem for European refineries because North Sea crude is insufficient to supply the whole of Western Europe even if all this crude were refined in Europe. European refineries continue to be critically dependent on imported oil supplies, especially from Middle Eastern oil producers in the Organization of Petroleum Exporting Countries (OPEC). However, most Middle Eastern crude is high in sulphur and heavier than North Sea crude. This situation creates great difficulties when the demand for low-sulphur distillates is increasing and the demand for high-sulphur heavy fuel oil is dropping. European refineries will be forced to buy more expensive low-sulphur lighter crude or else invest heavily in desulphurisation and bottom-of-the-barrel conversion facilities.

The European refining industry is also being challenged as never before by a multitude of new and costly regulations and directives. Liquid effluents, gaseous emissions, solid wastes, as well as a range of health and safety issues are all being addressed by various local, national, and European Economic Community (EEC) authorities. In addition, the requirement to use the best available technology not entailing excessive cost (BATNEEC) will be applied in new facilities. Relatively few such regulations are being faced by refineries outside the United States and EEC as yet. European and US refineries can thus be undercut and put in jeopardy by low-priced imports in their home markets. In the United States, import tax increases of 15¢/bbl of crude and 42¢/bbl of gasoline are currently being considered to protect the domestic industry and to raise additional tax. However, small independently owned refineries will still be vulnerable at a time when large investments are required just to stay in the oil refining business.

Survival in the refining business will be ensured only if fixed costs are minimised and if some of the investment aimed at complying with regulations can also be made to yield significant efficiency improvements. However, revamping or replacing a 25-year-old process unit to solve an environmental problem also provides an opportunity to utilise state-of-the-art refining technology. Profitability can be improved at the same time as the environmental issue is addressed. This paper presents several examples of how the environmental and economic performance of refinery units can be simultaneously improved.

More efficient secondary processing

Updating the secondary processing units such as the catalytic reformer and fluid catalytic cracker can be profitable to the refinery. Revamping to increase capacity, improve the yields of more valuable products and address environmental issues obviously requires investment but the benefits of using state-of-the-art technology can be surprisingly large. Refining technology is still being rapidly developed and improved.

UOP* CCR* Platforming* Process Improvements

The UOP CCR Platforming process provides a good example of the pace at which technological developments have been commercialised during the last 30 years to meet the evolving needs of the oil refining industry, such as the need for additional hydrogen for desulphurisation. Major improvements have been the introduction of more stable bimetallic catalysts in the 1960s, continuous catalyst regeneration in the 1970s, much faster catalyst circulation in the 1980s and ultra-low-pressure new units in the 1990s.

On average, the yield of C_5+ reformate has increased despite its research octane number (RON) having risen 12 numbers. The new units in the 1990s achieve yields that are close to the theoretical maximum possible from reforming. However, a study done in early 1993 found that 70 percent of European reforming capacity is currently using the semi-regenerative technology of the 1960s and operating at 15 kg/cm^{2}g or higher. In these units, the yield of 100 RON C_5+ reformate is about 10 percent less than the 1990s state-of-the-art capability.

The economic penalty of allowing a catalytic reformer to hydrocrack some of the naphtha feedstock to low-value liquefied petroleum gas (LPG) is quite severe: the economic performance of the reformer can look poor or even marginal. The way back to profitability is to reduce the pressure down to 7 kg/cm^{2}g or even lower. Revamps of existing semi-regenerative units to CCR units can go a long way in terms of reducing pressure. Revamps can also provide increased capacity and a higher octane product. As of April 1994, 124 CCR Platforming units are in operation, and another 42 low-pressure CCR units are under design and construction.

New catalysts that have been commercialised since 1990 increase the efficiency of the Platforming process. The new R-132 catalyst for units with continuous catalyst regeneration and the R-56 catalyst for older sem-regenerative units provide higher catalytic activity and longer life.[1] Both catalysts are particularly

good for revamps aimed at higher severity operation or increased throughput.

A 1990s-style low-pressure continuous Platforming unit can also provide a much higher yield of hydrogen than a high-pressure semi-regenerative reformer of the 1960s. For reforming naphtha from Middle East crude to produce 102 RON clear reformate, the hydrogen yield difference is a factor of two. When more and more hydrogen is required for desulphurisation, this additional hydrogen is extremely valuable. The extra hydrogen yield may be sufficient to meet the refinery requirements and avoid the high costs of building and operating a hydrogen plant even though the sulphur content of the diesel product has to be reduced to 0.05 wt- percent from 1 October 1996. A multi-client study by Chem Systems has confirmed that reducing reformer pressure and maximizing subsequent hydrogen recovery are the most economic sources of additional hydrogen for processing high-sulphur Middle Eastern crude to produce low-sulphur products.[2]

Balancing the supply and demand of hydrogen is far easier when processing North Sea crudes instead of Middle Eastern crudes. The naphtha from North Sea crudes contains more naphthenes, which yield more hydrogen in the reformer; and the heavier fractions of North Sea crudes contain less sulphur that needs to be removed by hydrotreating. However, the quantity of North Sea crude available is limited, and it is more expensive. Another concern with North Sea crudes is that although the reformer yields more hydrogen, it also yields more benzene in the reformate and in the final gasoline product. This issue is addressed later in this article.

Fluid catalytic cracking of residue

The other secondary processing unit that now exists in almost all European refineries that survived the economic shakeout of the 1980s is the fluid catalytic cracking (FCC) unit. The use of FCC for conversion of vacuum gas oil (VGO) combined with visbreaking of vacuum column bottoms was the economic salvation of European refineries during the 10-year period when the demand for heavy fuel oil fell by more than 50 percent because of competition from cheaper fuels. Although the decline in demand for heavy fuel oil has slowed, it seems set to accelerate again because of the increased availability of natural gas and low-cost low-sulphur coal from overseas, the recent developments in the electricity-generating industry throughout Europe, and the all-important directives from the European Commission in Brussels with respect to sulphur oxide (SO_x) emissions and the sulphur content of fuels.

Although the FCC process was first developed 50 years ago during World War II to make high-octane gasoline, it is still being developed and improved in the 1990s. The FCC units built in Europe in the late 1970s are no longer state-of-the-art in 1994. Many new features have been introduced to FCC reactor-regenerator designs to increase the yield of more valuable products.[3] In several units, gas is now injected at the bottom of the riser reactor to preaccelerate and passivate the catalyst, while the oil feed plus atomising steam is now injected higher up the riser through a new feed distributor design. At the top of the riser reactor, quick disengagement systems have been commercialised to separate catalyst from reactor products as rapidly as possible to minimise further cracking. The catalyst then flows through a high-efficiency stripper to a fast-fluidised recirculating combustor regenerator, which burns the coke on the catalyst more completely than in older units. Thus, catalyst activity is higher when the catalyst flows back to the riser reactor.

New technology has also been established during the 1980s for removing heat from FCC regenerators. Cooling the catalyst and generating high-pressure steam allows FCC units with a single regenerator to process feeds containing up to about 6 percent Conradson carbon; such feeds could be mixtures of VGO with some proportion of atmospheric residue depending on crude oil quality. For greater flexibility or for feeds containing more than 6 percent Conradson carbon, a two-stage regenerator with catalyst cooling and a carbon monoxide (CO) boiler is required. Two UOP catalytic crackers with two-stage regenerators have been running since the 1980s, and as of early 1994 another eight are under design or construction. All the new technology is available for revamps when appropriate.

The FCC process converts less than half of the feedstock sulphur into H_2S. The remaining sulphur is transferred to the liquid products and some emerges as SO_x in the regenerator flue gas. In future, in Europe, all these streams will need to be treated to remove sulphur if FCC units are to process high-sulphur feedstocks. The alternative of either hydrotreating or hydrocracking some of the FCC feedstock not only eliminates downstream treating but also substantially improves the yields of more valuable FCC products. Hydrotreating or hydrocracking the VGO can 'make room' in the FCC for a certain proportion of low-sulphur residue. The benefit of cracking crude oil residue is a reduced yield of unwanted heavy fuel oil from the overall refinery.

The data presented in **Tables 1 and 2** provide a side-by-side comparison of the FCC process yields and FCC product properties for a straight-run (SR) Arabian Light VGO feedstock and a 70-30 blend of heavily hydrotreated (HT) or partially hydrocracked (HC) VGO with straight-run Brent atmospheric column bottoms. Despite the presence of 30 percent residue, the low-sulphur feed provides the higher yield of olefinic LPG and gasoline. Although the higher Conradson carbon in the feed increases the coke yield by about

Table 1: FCC Process Yields

Process Yields	*Arab Light SR VGO*	*70% HT/HC VGO and 30% Brent Residue*
C_3-C_4 olefinic LPG, wt-%	16.0	17.6
C_5-215°C gasoline, wt-%	48.4	50.4
215-350°C cycle oil, wt-%	16.1	14.5
350°C+ clarified oil, wt-%	10.5	7.6
Coke, gas, and H_2S, wt-%	9.0	9.9

Table 2: FCC Product Properties

Product Properties	*Arab Light SR VGO*	*70% HT/HC VGO and 30% Brent Residue*
C_5-215°C gasoline		
MON unleaded	80.5	81.0
Sulphur, wt-%	0.33	0.05
215-350°C light cycle oil		
Cetane index	24.0	26.0
Sulphur, wt-%	3.2	0.4
Density at 15°C, kg/l	0.953	0.967
350°C+ clarified oil		
Viscosity at 99°C, cSt	9.0	10.3
Sulphur, wt-%	6.0	1.5
Regenerator flue gas		
Sulphur oxides, mg/Nm^3	5,000	1,250

20 percent and requires a catalyst cooler, the higher hydrogen content facilitates a higher severity operation. The sulphur content of all products (including fuel-oil cutter stock) is reduced: only the light cycle oil (LCO) needs hydrotreating for use as a component of low-sulphur diesel. The 215°C endpoint gasoline contains about 0.05 wt-percent sulphur. The gasoline octane and LCO cetane index are just slightly higher. However, the most important benefit of hydroprocessing 70 percent of the FCC feedstock in the Europe of tomorrow is that the SO_x in the regenerator flue gas has been brought down to below the proposed environmental compliance level of 1,700 mg/Nm^3.

Meeting the gasoline requirements

Harmonisation of the European specification for unleaded gasoline (EN 228) is an established reality. The selection of Reid vapour pressure (RVP) and volatility classes for summer and winter in each country is still an issue but limits for all other properties are now agreed.

The most important change is that the maximum sulphur content of unleaded gasoline is to be 0.05 wt-percent from 1 January 1995. Because almost all the sulphur in gasoline comes from the heavy fraction of FCC gasoline, FCC operations are most affected. Heavy FCC gasoline can be hydrotreated but this treatment reduces its octane. An inexpensive approach is to lower the gasoline endpoint to divert the sulphur compounds into the LCO. The problem then is that even after hydrotreating, the density and cetane index of LCO make it a poor component for blending diesel. The need for low sulphur gasoline is thus another reason why hydroprocessing of FCC feedstocks will be attractive in the late 1990s.

Isomerisation for unleaded gasoline

The reduction and elimination of lead from European gasoline is already well advanced. Most European refiners now have the ability to produce a high proportion, if not all, of their gasoline without lead. Some are dependent on the market for petrochemical naphtha as the outlet for low-octane light straight run (LSR) naphtha but many have installed a C_5-C_6 isomerisation unit to maximise the production of unleaded gasoline per barrel of crude.

The UOP Penex* process for C_5-C_6 isomerisation is a low-temperature, medium-pressure, fixed-bed catalytic system. A completely dry chlorided environment is used to maximize product octane. **Table 3** provides a summary of the process yield and product quality obtained from once-through Penex processing of either a C_5 or C_6 rich hydrotreated LSR naphtha from North Sea crude. However, in Europe, most of the large C_5-C_6 isomerisation units include facilities for recycling low-octane isomers and producing 88 to 90 RON and 87 to 88 motor octane number (MON) isomerate. Up to 92 RON and 90 MON are possible with additional equipment.

New technology for more efficient refining has also been incorporated into the Penex process. The patented hydrogen once-through (HOT) flow scheme, which was first commercialised in 1987, is now the standard. Eliminating the hydrogen recycle gas compressor and its associated equipment reduces the cost of construction by 15 percent, provides a major saving of utilities when operating and makes the Penex unit even easier to maintain. The Penex process is so flexible that several revamps of existing equipment, for example, redundant high-pressure reformers, have been performed. In three units operating in 1993, the feedstock includes C_4 as well as C_5-C_6 naphtha. Other innovations include the new SafeCat P* system for reducing feed pretreatment costs and the Penex-Plus* process, in which a benzene saturation section is closely integrated.

Table 3: Penex Process Performance

North Sea HT LSR feedstock	*C_5 Rich*	*C_6 Rich*
Feedstock Composition:		
C_4, wt-%	1	1
C_5, wt-%	59	41
C_6, wt-%	39	57
C_7, wt-%	1	1
Benzene, vol-%	1.2	5.1
Process yield once-through:		
C_5+ product / C_5+ feed, LV-%	99.5	101.2
Penex product once-through:		
RON unleaded *	84.5	83.5
MON unleaded *	82.0	81.0
Benzene, vol-%	0.0	0.0

** Up to 92 RON and 90 MON unleaded isomerate is possible by recycling low-octane isomers.*

Table 4: Advanced Control for CCR Platforming

Process Parameters and Performance	*Before Advanced Control*	*After Advanced Control*	*After APC and On-line Optimisation*
Feed rate, m^3/h	133.2	139.1	139.1
Reactor pressure, kg/cm^{2}g	9.14	8.79	7.73
H_2/HC ratio	2.6	2.4	3.3
C_5 + product octane, RON	96.0	96.0	98.0
C_5+ product yield, LV-%	83.85	83.93	82.56
Hydrogen yield, Nm^3/m^3	199.8	201.9	225.9
Operating margin, $/day	58,866	61,649	63,367

Reduction of benzene

The Penex-Plus process can reduce the benzene content of gasoline by taking high-benzene (>5 vol-percent) feedstocks into the isomerisation unit. The integrated benzene saturation section provides good control of the highly exothermic reaction with hydrogen and uses a well-proven catalyst. Saturating benzene represents a loss of octane but because of the subsequent isomerisation of all C_6 material, the Penex-Plus unit yields an increased octane product. The low cost of the saturation section for processing a light reformate stream makes this option attractive for meeting the reformulated gasoline requirement in the United States of 1.0 vol-percent maximum benzene starting 1 January 1995. As of early 1994, five Penex-Plus units are under design and construction.

Several other processing options are available to reduce the benzene content of light reformate, for example, the BenSat* process for simply saturating the benzene to cyclohexane, the Alkymax* process for alkylating it with propylene in the FCC C_3 stream and the Carom* process for extractive distillation. The Alkymax and Carom processes have the advantage of not requiring hydrogen. Although extrac-

tive distillation also has the advantage of yielding valuable benzene as a by-product, it requires more investment (in both on-sites and off-sites) and more consumption of utilities.

Production of ethers

The reformulated gasoline requirements in the United States specify a minimum oxygen content in gasoline of 2.7 wt-percent in CO non-attainment areas in winter months and 2.0 wt-% in severe ozone nonattainment areas year-round starting 1 January 1995.[4] Farm-derived ethanol will continue to be blended into gasoline, particularly in areas with a state as well as federal subsidy. However, the high-blending RVP of ethanol may be a severe problem vis-à-vis the low RVP limits now being mandated in the United States during summer months and the abolition of the 1 psi RVP waiver for gasoline containing ethanol. Blending alcohols into gasoline also creates other problems if the gasoline distribution system is not completely dry. Refiners have a strong incentive to convert methanol (which is relatively cheap) and ethanol (provided it is subsidised) to ethers that are fully compatible with the existing gasoline storage and distribution systems.

UOP has formed an alliance with Hüls AG in Germany and Koch Engineering Inc. in the United States to offer the Ethermax* process for the production of ethers from isobutene and reactive isopentenes plus either methanol or ethanol. The process achieves 100 percent conversion of alcohol and high conversion (up to 98 or 99 percent) of olefin by placing a resin catalyst within a structured packing contained in the fractionator that separates unconverted C_4-C_5 compounds from the ether product. The production of all four ethers (MTBE, TAME, ETBE, and TAEE) has been demonstrated in a semi-commercial Ethermax unit using Koch's RWD* technology. Four full-size commercial MTBE units are on-stream with KataMax* packing containing resin catalyst installed inside the C_4 fractionator. As of early 1994, several more new units based on RWD technology and KataMax packing are in construction. The new technology can also be applied to revamps to maximize MTBE unit throughput and isobutene conversion.

Another new technology currently being developed by UOP is the Butesom* process for the isomerisation of butene-1 and butene-2 to isobutene. The isobutene can then be recycled to the Ethermax process to more than double the yield of MTBE from a typical FCC C_4 LPG stream. A similar process for the isomerisation of C_5 olefins, called the Pentesom* process, has already been introduced in the United States by UOP.[5]

Ethers are more difficult to make with propene. However, here again, UOP has just announced the availability of a new process to produce diisopropyl ether (DIPE) from propene and water.[6] The technology uses resin catalyst and is based on the established liquid-phase RWE-DEA process for isopropanol. High conversion of propene and high selectivity to DIPE are possible. At locations that have no other high-value use for propene, producing DIPE can significantly boost the refinery's in-house production of oxygenates having high RON and MON. These oxygenates can be used advantageously for blending high-octane, unleaded gasoline or in the blending of reformulated gasoline for sale in the United States.

Blending US-style reformulated gasoline will not be easy. The equations constraining the RVP, sulphur, benzene, aromatics, olefins, oxygenates and distillation characteristics of reformulated gasoline starting 1 January 1998 are complicated.

Advanced process control

Refinery operation is destined to become more difficult, especially in the United States and Europe. Tighter product quality specifications, such as lower sulphur limits for almost every product, will require more accurate and reliable operation of the entire refinery. The new regulations with respect to safety and environmental issues, for example, SO_x and volatile organic compound emissions, will also require more careful monitoring and control of refinery operations to ensure compliance.

Computer control of refinery units is evolving fast. UOP and SETPOINT Inc have agreed to co-operate long-term in the area of advanced process control (APC). Several levels of computerised process control are being actively developed by UOP and SETPOINT Inc. for incorporation into new designs. The close integration of the computer control hardware and software with the fundamental technology of the process is important for achieving maximum profitability. Given appropriate on-line instrumentation, the computer systems can also monitor the process effluents and emissions. Operating staff can thus be given early warning of an upset and take remedial action more quickly than in the past.

Advanced process control increases refinery efficiency in two different ways. The first benefit of APC is that variations of the process outputs, for example, reformate octane or RVP, are reduced. The process can then be operated more profitably at a point closer to the limit dictated by equipment limitations or the specification set by overall refinery requirements. The second benefit of APC is that the computer can select the most profitable mode of operation from hour to hour. Steady-state on-line optimisation of a process unit, or better still a whole group of process units, has been shown to significantly improve their profitability.[7] The payback time for investments in APC projects is often measured in months rather than years. **Table 4** shows an example of the improvement that can be achieved with APC and on-line optimisation.

In the highly regulated world of the future, refineries will rely more and more on computers to optimise refinery performance and to operate process plants as efficiently as possible. Protecting the environment by monitoring effluents and emissions will be essential in the European refining industry of the future. Advanced process control is thus another example of a new technology that is able to improve both the environmental and the economic performance of a refinery.

This article is based on a paper presented to an IP conference 'What the Environment is Costing the European Refining Industry', held in late-1993.

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LNG and the electricity supply industry in Japan

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The increased use of LNG since it was first introduced in Japan has been closely related to the growth of our electric utilities. I would therefore like to look more closely at the reasons for this rapid increase.

In doing so I shall refer to some of the particular characteristics of our own power industry, such as environmental protection, power demand and the structure of power generation. I would also like to mention some of the longer-term issues concerning the use of LNG, which we believe are particularly relevant to Japan.

My company, Tokyo Electric Power Company, or TEPCO as we are commonly known, is the largest electric utility in Japan and the second largest in the world. We are a vertically integrated organisation operating in electricity generation, transmission and distribution. We have 40,000 employees, assets of around £77 billion and a generating capacity of 48 Gigawatts. We have approximately 24 million customers to whom we supply some 230 Terrawatt-hours of electricity. This of course means that we use a lot of fuel, including liquefied natural gas.

Rising LNG usage

Japan is an island country and does not receive any piped gas from outside sources. Natural gas is therefore imported from producing countries in liquefied form.

It was first imported from Alaska through a joint initiative by TEPCO and Tokyo Gas in 1969. Imports have since steadily increased, reaching approximately 40 million tons in fiscal year 1992. Today our supply sources include Brunei, Abu Dhabi, Indonesia, Malaysia, and Australia. TEPCO was in fact the first Japanese electric utility to import LNG which means that this fuel has played a vital role in electricity generation.

In fiscal year 1992, LNG-fired power stations supplied 22 percent of Japan's total annual electricity production of 788.3 TWh. This made LNG one of the three key energy sources for power generation, together with nuclear power (28 percent) and oil (25 percent). In TEPCO's case LNG accounted for 30 percent of the total generated power output in the same year, with nuclear power providing 34 percent, oil 23 percent and hydro power 8 percent of the total.

Japan is the world's largest LNG importer, with an import share of some 65 percent of the world total in 1992. In Japan 74 percent of LNG imports are used for power generation. Any hiccup in Japan's electric utilities will therefore cause major indigestion in the global LNG markets.

Broadly speaking, I believe that there are two reasons for the dramatic growth of LNG consumption in Japan. Firstly, the use of LNG as a substitute for oil. Both LNG and nuclear power have been growing rapidly since 1973 to provide new energy sources. Secondly, LNG was regarded as 'clean' and it was this quality which initially prompted its use. LNG consumption has been boosted by the need to comply with the very strict environmental protection measures which have been introduced to reduce atmospheric pollution in urban areas. Both reasons have also influenced the operation of the Japanese electric utilities.

Substitute for oil

Japan has very limited indigenous fossil fuel resources – just small quantities of coal and natural gas.

Following economic growth during the 1960s, many industries switched their main fuel from coal to oil which was economic and easier to handle. The power utilities were no exception and in 1973 61 percent of all thermal power generation was oil-fired. But oil prices went up sharply and in addition there were repeated problems with Middle East producers in 1973 and 1979. Supplies seemed less secure and as a result of these developments attitudes to oil changed. Step-by-step the utilities moved away from over-dependence on one single energy source. The reduced dependence on oil has since become the main pillar of Japan's energy policy.

The IEA agreement of 1980 stipulates that all member countries should, in principle, refrain from building new power plants which burn oil exclusively, and all electric utilities in Japan have adhered strictly to this agreement.

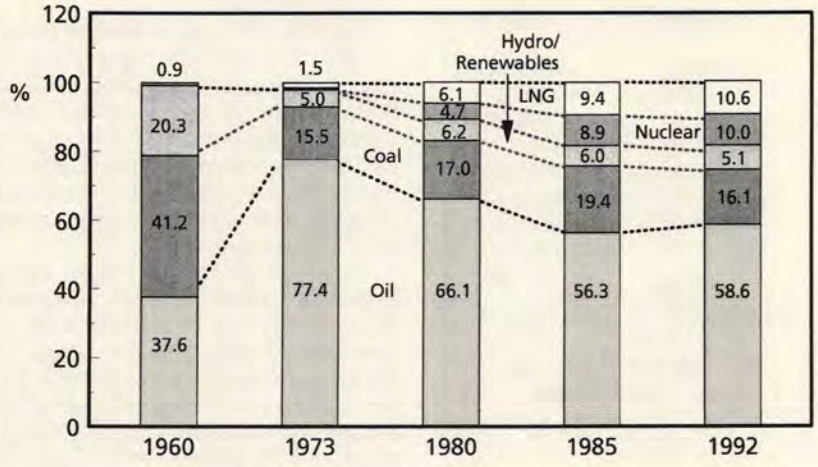
As a direct result, new power generation technologies using other fuels such as coal and LNG, regarded as the two primary substitutes for oil, have been actively developed together with new domestic or quasi-domestic energy sources such as nuclear, hydro and geothermal power.

Figure 1 illustrates the transition of the primary energy supply in Japan. Since 1973 the decline in oil has been offset by the increased use of nuclear power and LNG. The use of LNG and nuclear power in electricity generation has grown dramatically in a single decade.

Since 1986 oil prices have been low, except for a brief period in 1990 when prices shot up during the Gulf crisis. They have also been particularly low since the end of last year. Twenty years after the Middle East oil crisis, this critical awareness of the importance of energy diversification which was gained at the time, could have been long forgotten.

Figure 2 indicates Japan's extremely vulnerable position in relation to the security of its energy supplies. Developing energy sources which substitute oil remains very relevant for the Japanese economy.

Figure 1: Share of Primary Energy



A stable and reliable energy supply can also be ensured by diversifying the national sources of supply. Japanese electricity and gas utilities now import LNG from Brunei, Abu Dhabi, Indonesia, Malaysia and Australia. Of the total of 40 million tons, 82 percent comes from the ASEAN region (Indonesia – 47 percent; Malaysia – 19 percent and Brunei –14 percent).

Clean energy source

A further important characteristic of LNG is its ability to supply 'clean' electricity. In the post-war period, Japan made vigorous efforts to rebuild and modernise its industrial base and manufacturing infrastructure and as a result the country has achieved remarkable economic growth. At the same time, there was a noticeable demographic shift towards urban areas and energy demand in these centres of population increased significantly.

However, little attention was paid to the environment and as a result major environmental damage was done. A large number of people suffered from pollution related illnesses which in turn caused serious social problems. The government was forced to introduce drastic legislation to control pollution.

By this time TEPCO had already started to reduce emission levels of atmospheric pollutants from its power stations. The strategy consisted of three main components. Firstly, the substantial reduction of coal in electricity generation. The laws regulating the emission of sulphur dioxide and particulates had become tougher and tougher and coal had also lost its competitive advantage with other fuels. By 1973 TEPCO had phased out all its coal-fired power stations.

Secondly, the introduction of low sulphur crude oil. TEPCO started to use Minas oil from Indonesia at power stations in the Tokyo Metropolitan Area.

Thirdly, the introduction of LNG as a major fuel source. At this time, gas utilities in Europe used LNG only for peak shaving and not as an alternative source of energy in its own right. However, Japan recognised the environmental advantage of LNG as a low sulphur fuel.

In 1966 TEPCO entered into a joint venture with Tokyo Gas and concluded a long-term contract with Phillips Petroleum and Marathon Oil to import 960,000 tons of Alaskan LNG. The first shipment was delivered in 1969 – an historic event in the fight against pollution. The introduction of LNG in Japan made it possible to build power stations in densely populated areas and gave a new impetus to the development and exploitation of natural gas resources worldwide.

As I mentioned earlier, Japan since diversified its import sources for LNG to include Brunei and other countries. The use of LNG for power generation in Japan has increased from 2 percent in the financial year 1973, to 22 percent in 1992. For TEPCO, consumption has increased from 7 percent to 30 percent over the same period. The $S0_2$ and NOx emission levels per kWh of electricity generated in Japan currently stand at 0.379 and 0.41 g respectively.

The graph indicates that $S0_2$ and NOx emission levels in Japan are approximately one-thirtieth and one-eighth respectively of those in the United Kingdom. This, of course, is not surprising because coal-fired power stations still produce the bulk of the UK electricity supply. Nevertheless, if we compare Japan's environmental performance with other industrialised countries, we will see how much Japan has achieved.

Best mix strategy

I would now like to turn to the future role of LNG in Japan's total energy supply. The importance of LNG as an alternative to oil will remain unchanged. Forecasts show that the absolute volume of LNG consumed will increase during the next two decades but the percentage share of LNG in the total energy supply will remain relatively constant.

In the so-called 'Outlook for Japan's Primary Energy Supply', it is estimated that the percentage use of LNG will only increase from the current 10 percent to 11 percent by the year 2000 and to 12 percent by 2010.

The share of LNG in power generation will actually decrease from the current 21 percent to 20 percent by the year 2000 and to 18 percent by 2010.

For TEPCO itself, the percentage of LNG consumption will increase slightly from 30 percent at present, to 32 percent by the year 2000, remaining static through to 2010. These figures may seem somewhat paradoxical but let me try to explain what they really mean.

Given Japan's specific energy supply conditions, the over-riding concern of our electric utilities is to achieve the most efficient combination of power generating sources, the best energy mix. Nuclear power has so far proven to be excellent in terms of a stable energy supply, economic stability and environmental protection. Our future strategy will therefore give nuclear power the central role and increase its share to around 40 percent of the total

Figure 2: Energy Security Indicators

All figures in %

	Dependence on Imports	*Dependence on Oil*	*Dependence on Oil Imports*	*Dependence on Hormus Strait*	*Dependence on OPEC Oil*
JAPAN	83.4	57.0	99.7	65.4	77.8
USA	15.3	38.4	43.0	28.8	57.0
UK	2.0	37.8	13.6	18.9	29.8
GERMANY	52.1	38.2	96.8	12.4	46.0
FRANCE	52.9	39.7	95.9	42.3	62.5
ITALY	83.4	58.5	95.1	33.7	73.4

Source: IEA Quarterly Oil Statistics and Energy Balances 2Q93

Figure 3: Outlook for Japan's Primary Energy Supply

	FY 1989	FY2000	FY2010
New energies (million kl)	6.5 (1.3)	17.4 (3.0)	34.6 (5.3)
Hydro-power (billion kWh)	8.8 (4.6)	91 (3.7)	105 (3.7
Geothermal (million kl)	0.4 (0.1)	1.8 (0.3)	6.0 (0.9)
Nuclear Power (billion kWh)	183 (8.9)	330 (13.3)	474 (16.9)
	(29.4 GW)	(50.5GW)	(72.5 GW)
Natural gas (million kl)	49.9 (10.0)	65.0 (10.9)	80.0(12.2)
Coal(million tonnes)	113.6 (17.2)	142(17.5)	142 (15.7)
Oil (million kl)	289 (57.9)	305 (51.3)	298 (45.3)
Non-fossil total	14.9	20.2	26.8
Total Supply	499 million kl	594 million kl	657 million kl
Growth/year	← 1.6%/year →	← 1.0%/year →	
	← 1.3%/year →		

Source: MITI 1990 (Percentage share in parentheses)

electricity generated. The remainder will be supplied by LNG, coal, oil and hydro power.

From the viewpoint of achieving the best energy mix, LNG does not necessarily have an advantage over other energy sources. The capital investment required for LNG projects is huge and accordingly trading conditions are not flexible. And in addition, over-dependence on one single fuel is an unacceptable risk considering Japan's requirement for security of supply. This shows that there is a limit to our dependence on LNG.

Changing role of LNG

Another problem relates to the changing role of LNG in power generation. While in the past LNG was used for baseload generation, it is now moving up to the middle and peak load range. Electricity demand itself fluctuates increasingly. A demand analysis for the financial year 1992 showed that the domestic sector stood at 26 percent, the commercial sector at 16 percent, while the industrial sector took the remaining 56 percent. The commercial sector was growing the fastest but it is largely restricted to daytime working hours which makes the load profile much more volatile.

The use of air conditioning systems is almost universal which means that the electricity demand gap between seasons and between hours, has widened enormously. Today, electric utilities in Japan experience the annual peak load during daytime in summer. In the case of my own company, electricity load on a summer night goes down to as low as 40 percent of the peak day time load. Similarly, peak demand in spring and autumn is equivalent to 70 percent of the summer peak.

It is, of course, vital that we have power generating facilities which can be used flexibly to respond to such wide demand variations. A combination of nuclear and hydro power provides the base load in Japan. Accordingly, it is neccessary to use LNG-fired power stations to cover the mid-range and peak load.

Not a universal solution

As I mentioned earlier, LNG does have advantages over other fossil fuels in pollution control. It is true to say that LNG is an excellent source of energy but it is not neccessarily the universal solution to all environmental problems associated with the generation of electricity.

Today Japan has introduced highly advanced environmental technologies such as desulphurisation and de-nox systems which have been installed at coal- and oil-fired power stations. This has now reduced S02 and NOx emissions to the extent that there is currently no practical difference between emission levels from LNG and other fossil fuels. The emission volume of carbon dioxide per kWh generated by LNG is about two-thirds of that of coal and about 90 percent of oil. However, it is still a fossil fuel and when it is burnt it will inevitably produce some 'greenhouse' gases.

These observations would all seem to suggest that the volume of LNG used for electricity generation can be expected to increase just in line with, and not faster than, the increase in demand. One thing does appear to be certain. Under severe competition with other energy supplies, the future trend of demand for LNG will be determined by careful comparison of economics, security of supply and environmental impact.

Response to new development projects

It is reasonable to assume that up to the turn of the century Japanese demand for LNG can be met through increased production levels and extention of current contracts at existing sites. Only one new supply source will be brought on stream – Qatar.

However, if we look further ahead, we will see that the possibilities of existing sites will be rather limited, both in terms of the size of available resources and their production capacity. In order to meet future requirements, the development of new projects will therefore be neccessary in the early 21st century.

There are, of course, major drawbacks associated with new LNG projects. Firstly the increasing costs of development and extraction under difficult and adverse geographical and geological conditions. Secondly, the increase in capital expenditure on plant and equipment, and thirdly the financial risks associated with such huge projects. The oil price continues to be low and it is used as the index for LNG trading. This presents a serious problem in terms of ensuring the profitability of any new LNG development project. There is growing concern among suppliers over the ever-increasing financial burden that they face from such enormous investment risks. Electric utilities, the end-users in this context, are also forced to face this burden. Recent projects show that capital investments in plant and equipment by the Japanese utilities actually rival the size of the investment made by the suppliers themselves.

The long-term LNG demand will be largely decided by the Japanese power development programme. Lead times for new power generation schemes are becoming longer and longer. The start-up timing of new LNG development projects must take this into consideration.

Electric utilities are faced with a situation where investments in energy supplies with longer lead times, like LNG, must be made well in advance. The problem is that future demand and project profitability cannot be assessed accurately. This is a real risk and it is extremely difficult to achieve the right supply levels for demand. All major players in this field are trying to minimise the risk in one way or another.

Cost reductions required

It is essential for both suppliers and consumers to make maximum efforts to reduce their costs. LNG is a valuable resource and TEPCO has introduced the highly efficient Combined Cycle Gas Turbine (CCGT) system in order to reduce generating costs.

The thermal efficiency of our average thermal power stations has improved from around 30 percent in the 1970s to 39 percent in the 1990s. The No.1 and No.2 units at our Futsu power station,

which uses the LNG-based single-shaft type, have a thermal efficiency as high as 43 percent.

Despite such high thermal efficiency, the actual capacity factor of LNG-fired power stations is now lowered because they are used to provide peak demand. Therefore it is by no means certain whether or not the CCGT system is cost-competitive with other forms of power generation. As the environmental impact of LNG and other energy sources is almost the same, LNG has no specific edge over nuclear power, coal or oil and is therefore facing harsh economic competition.

The bulk consumers of LNG in Japan are predominantly the power and gas utilities which have a social responsibility to the consumers to provide a stable energy supply at reasonable prices. LNG producers must take this into account.

Energy supply security

LNG is normally traded in a closed market in which the identities of the suppliers and users are well established. This poses a risk to users because it is difficult to secure alternative sources of supply. All electric utilities in Japan have been trying to achieve the best energy mix and to diversify their power generation sources to maintain a secure energy supply and minimise the risks involved in fuel procurement. In the future we have to look for further diversification to compensate for the negative aspects of LNG such as inflexible trade conditions and difficulty of finding alternative sources. At the same time, we have to continue to utilise the positive features of LNG in the overall supply of energy.

As well as trying to find the best energy mix, electric utilities are also currently working to convert former oil-fired power plants to dual fired plants which can use both LNG and oil.

Conclusions

LNG is a commodity which is traded through direct negotiation between buyer and seller, so the idea of an open market is therefore simply not possible.

There is a real risk of mis-match between the start-up of supply of new developments and the actual demand requirements of the end-user, depending on the future supply and demand scenario within the broader energy market-place. I understand that the early history of multinational LNG development projects was fraught with problems, such as language and differences in customs and values. The parties involved in these early LNG projects of course had their own vested interests. But today the problems have been solved and the barriers largely broken by the conscious efforts on all sides to work towards the high degree of mutual trust and understanding.

Although the development and utilisation of LNG may well be at a turning-point, it is my belief that such mutual trust will pave the way for more effective and efficient use of this vital fuel for the future.

This paper is based on an address given to a meeting of the Energy Economics Group earlier this year.

What lies in store?

Panocean, Unitank and London & Coastal are the latest casualties of the rationalisation fever currently sweeping through bulk storage. *Petroleum Review* talks to two very different companies about takeovers, tougher environmental legislation and 'ludicrously' low tank rates.

Susannah Cardy: How much of a threat does impending environmental legislation pose to GATX?
Richard Kellaway: It's both a threat and an opportunity. To some extent environmental legislation is helpful in the long term. For example, the most important piece of forthcoming legislation is the Stage 1 directive on gasoline emissions which on the latest thinking would have to be in place in 1998. This is going to be very expensive – involving bottom loading, floating blankets and so on. I believe that the smaller storage terminals, whether independent or oil company-owned, will decide not to carry on as a result. GATX, on the other hand, is a $4 billion company, committed long-term to the business.

Rationalisation within the industry is continuing at a relentless pace. GATX has acquired Unitank and Paktank has absorbed Panocean. Within the next decade, are we going to see the demise of all but the top two or three independent storage operators?
There are really only three companies – ourselves, Paktank and Van Ommeren – which are really committed long term to storage and which have the necessary financial resources to stay in the business. I think rationalisation will just continue.

Do you have plans for more takeovers?
If they come along, yes. We have no immediate plans, partly because we react to events but it's fair to say that GATX is in an expansionist mode.

Is GATX going to take over the whole UK market within the next few years?
I wouldn't say that. Each storage location has its own strategic benefits and advantages and should be looked at separately. We're certainly not monopolistically inclined. In fact we compete as much with the oil companies' terminals and refineries as with the independent storage companies.

Richard Kellaway is chief executive of GATX Terminals Limited, operator of eight terminals in Britain and a wholly-owned subsidiary of Gatx Terminals Corporation, one of the three largest independent storage companies in the world.

We do have the advantage of being strategically located though. We're in most areas in the UK and we store for everyone you could possibly name somewhere in the world.

Do you have any plans to expand into Eastern Europe?
We're looking at Poland at the moment and with luck should have a terminal operating there within two or three years. We're also looking at other countries in the Former Soviet Union, although plans in these areas are not so far advanced.

Unfortunately, although there are very definite physical requirements for storage, the politics of Eastern Europe are so complicated. So much of the product comes out through the Baltic States which are vulnerable, and supply is also difficult because the companies have all changed ownership. The people aren't used to business, they're very suspicious and very slow to take decisions.

Has your customer base changed over the past few years?
The main change from, say, a decade ago is that we're now storing for the major oil companies. Last year, Esso closed Tyneside, Shell closed Avonmouth, Shell are about to close Bishopbriggs in Glasgow and Murco closed Grays in Essex. Some of the smaller bulk plants inland have also been closing. It's part of the trend amongst the major oil companies to stick to their core activities and abandon the bits in between – whether that's trucks, rail cars, pipelines or storage.

But haven't the oil companies been resisting this move?
What seems to happen is that each oil company will think that a certain area is highly strategic to them and that they have a particular advantage in being there. I think that in the States they're a bit more ruthless in saying they don't want to be in storage anyway. In the UK, they're more nervous of being totally reliant on other people.

So you're saying that in the end the oil companies will be forced to abandon storage?
Economics pushes them to it. Even the grandest companies have dropped any hang-ups they may have had. And I mean the grandest.

'It would be fair to say that GATX is in an expansionist mode'

Are UK storage terminals set to revert to bonded warehouse status?
We hope so. The UK is the only country in the European Union not pursuing this policy and so HM Customs and Excise are now considering reverting back to bonded facilities. They are nervous about increases in staff to cope with the changes but nevertheless we think the change will take place this year.

Is this good news for the industry?
It will be very beneficial, yes. The Oil Warehousing Review of 1985 (which was motivated by a desire to reduce customs officers) has made it very unattractive to store home-produced product in the UK. Not only are you paying duty on the whole cargo well in advance, but you're also paying duty on the shipping losses and the losses of product in tank from evaporation. Previously, all that was duty free. The whole tendency, therefore, has been to reduce shipping sizes and get the product moving through the tank as quickly as possible. If this change is made, it will become much more attractive to take a position and store product again.

GATX Eastham Terminal showing the recently-acquired Panocean Terminal in the background

Are contracts changing in length?
Since the Oil Warehousing Review, the storage element has been very slight, with almost all contracts geared to distribution business. We have had very little seasonal demand for years and years but it is just conceivable that, if the duty point now changes and it becomes cheaper to store product, we may have some long-term, seasonal storage again.

We understand there are moves by certain trading companies to turn the Thames into a more active trading area?
Both Vitol and Blue Ocean are apparently planning to start blending gasoline on the Thames. We're unclear about their strategic thinking on this, because in the past this has never been a terribly economic activity in the UK.

It would be nice if the Thames became a more active trading area, because it's always been rather inactive compared to Rotterdam. We have no idea at this stage what impact a successful start up would have on gasoline supply on the Thames. I'd guess, however, that a large proportion of the product would be exported.

'There are only really three bulk storage companies which have the necessary financial resources to stay in the business'

How are rates faring?
There has been very little change in the past couple of years. The rates are of course far too low. In terms of profit, we hardly make more than .02p per litre and the only way we survive is by continuing to be more and more efficient. The problem is that it's a small country and there are so many alternative supply sources.

Utilisation, however, is good – our tanks are around 85-90 percent full. We've achieved this by being large and having many locations. If one location is losing business, frequently another is gaining business. So, although the overall return may not necessarily be glamorous, its solid and steady.

Have there been significant product shifts within the last few years?
Fuel oil has been in fairly continuous decline – although oddly enough we do store quite a lot ourselves. We've also noticed an increase in bunkering, some of which is fuel-oil based. That's one little niche market we might expand. Apart from that, any other changes are purely consistent with the market generally – more super unleaded, a slight increase in diesel at the expense of gasoline and so on.

You wear two hats because you're also the Chairman of FETSA (the Federation of European Tank Storage Associations), set up just last year. How is the organisation developing?
We have a membership of seven countries, including all the major ones, but we're talking to the smaller countries now because there is something to be said for speaking for all twelve when dealing with the European Commission (EC). We're also busy building up our contacts with the EC, so that when the next relevant directive comes along we'll be in a good position to put our case across.

Within FETSA itself, I'm bound to say that we get a lot more co-operation and a lot more coherent policy from the chemical side than from the oil side. However, we have now got a common view on the customs position within the oil companies in the UK, which is to go for bonding of everything.

Overall, how rosy does the future look for GATX?
I think we see a fairly reasonable future, but its our business – we're dedicated to storage. We store for literally everyone you can think of, so we are getting the benefit of all those wonderful companies' experience. As a consequence of that, I do think we do it better than most people.

We've expanded in the past year. We bought the Panocean terminal at Eastham and started up Manchester Jetline and we're working on a project at the moment to develop a brand new storage terminal in Glasgow which will incorporate all the latest environmental requirements – including Stage 1 gasoline emissions requirements.

Storage is not particularly high-tech, of course, but in as much as it is, I think that's where we see our future. And we're prepared to spend the money to have the right facilities.

Solid in liquids.

Our facilities are as steady as a rock. We're solid in liquids. It means we are a partner you can rely on. We meet your requirements in the storage and handling of petroleum products, chemicals, molasses and edible oils and fats. But there's more. Solid in liquids also reflects our drive to achieve higher standards in our service to you. Some are clearly visible. Others hide from sight. You won't be surprised to hear that we are annually investing a great deal of time and money in safety and environmental measures.

Solid in liquids also implies being where you expect us to be. With a total terminal capacity of over 10 million cbm in Europe, North America, Mexico and Asia, we provide a global network with a local touch.

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Van Ommeren
Tank Terminals

Tony Pollitt is managing director of BTP Storage, which owns two UK sites in Manchester and Leeds. They operate a total of 100 storage tanks.

Susannah Cardy: Tough new environmental legislation, takeovers, and low tank rates are all combining to make life tough for smaller independent storage companies like yourself. How are you surviving?

Tony Pollitt: By being flexible. Adaption is the name of the game. None of the independents are tied up solely with the petroleum industry. Our Manchester site, for example, is involved in petrols, middle distillates, residual fuel oils, lubricants, lubricant blending, chemical storage, chemical blending, antifreeze manufacture, and added value operations such as drumming and packaging. Storage terminals prefer to be known as liquid storage terminals rather than oil terminals or chemical terminals because they'll store anything within their capabilities.

Why are storage rates so low?

Despite inflation, rates per tonne across the industry are the same as they were 20 years ago. They've been driven down largely because the major oil companies have closed down their uneconomic terminals, combined their operations, thus lowering their unit costs. When they then come out into the marketplace, their starting point for negotiations with the independents is their own cost of operations – in round figures, £2 a tonne.

In real terms I can see the rates going down even further because there are a number of major customers who have contracts in which the rate is escalated at a percentage of RPI, which means that you are on a declining rate per tonne.

Eventually there will need to be a recognition by the owners of the product that if environmental requirements have a cost implication, that cost implication must be passed on to the customer. Storage companies don't own the gasoline – they're simply the warehouse. To finance the environmental upgrading, I would say that the price has got to go up to £4 a tonne – ie double the existing rate.

How could this be achieved?

I believe there should be a supplemental charge for upgrading. Once that has been recovered then the price could come back to a more reasonable level. Sadly, we have not as yet found any customers willing to enter into those kinds of arrangements and, on the gasoline side, I think time is running out for us although we would welcome any enquiries.

Is environmental legislation going to eventually close down the smaller outfits?

The proposed EC directive on VOCs relating to gasoline emissions is certainly the death-knell of small storage operations in gasoline because there simply isn't the revenue there to justify the capital investment. On this site, it would be a 12-15 year payback on investment. Most projects are rejected if they come out longer than a three-year payback. It means that in the foreseeable future we will probably go out of gasoline storage, although we'll still be there on middle distillates and on residual fuel oils as long as there is a market requirement.

'Rates per tonne are the same as they were 20 years ago'

The directive requires a capital investment in the order of £500,000-£750,000, whereas the revenue from storing the products associated with the directive would be in the £150,000 a year category. It means we won't do it – we will pull out of those products.

'The cost of environmental legislation must eventually be passed on to the customer'

My own personal concern with these directives is that experience tells me that drastic changes usually start out by being somebody's pet hobby. I think that if one took a cost-benefit approach, the figures would be very different – at the moment they're ludicrous.

We, like many other industrial sites whose drainage system passes to waterways, will also need to find capital and improvements to meet NRA requirements arising from the Environmental Protection Act and the water quality directive. The Manchester Ship Canal, historically an industrial waterway , is now classified as a class 2 waterway which means that in theory it has to come up to a standard that will support life.

Overall, the future for the smaller terminal solely associated with gasoline storage is limited. Hopefully that limited future can be used to educate the product owners on the economics of storage.

How old are your tanks?

They vary from 20 to 60 years, with the older ones built like battleships.

How high are your utilisation rates?

Over the past five years, we have had 100 percent utilisation at our Leeds operation and 90-95 percent here in Manchester but only because of our willingness to change tank usage. This means that one is constantly spending money simply in order to store a new product and accommodate the current customer list. In the long term, this is redundant investment.

Customers rarely last more than five years. This year, for example, one of our major customers is pulling out of our Manchester site, which will bring utilisation down to 75 percent. The problem is getting a replacement customer. We have a number we are currently courting, but no company of that size can realistically change its operations within less than about 18 months.

How long is the average contract?

They can vary from one month to evergreen, but few last longer than five years. We used to have 10 year contracts but they no longer seem to be in the offering. That is the whole point nowadays about coming to an independent company – it gives the customer the chance to pull out of a venture that's not proving viable.

Has your customer base changed over the years?

On our Manchester site in the '60s, our customer list consisted of major oil and chemical companies. Now, it has changed to smaller refiners, tied distributors and 'traders' – comparatively a less secure revenue base. We have also seen our major gasoline storage customers' throughput reduce from 180,000 to 60,000 tonnes per annum with the prospect of further reductions.

If our customer base were to consist solely of traders, our revenue base would obviously become less secure because they're not normally interested in hiring tankage. If they can't make a margin on their sales, they don't move the product and there's therefore no guarantee of income.

Where do you see this site (Manchester) in five years' time?
In mainly lubricants, middle distillates, residual fuels and chemicals. Eventually they too will be subject to more stringent environmental legislation, but at this stage, they are at a lower priority than the gasoline directive.

And in a decade's time?
I suppose if one looked 10 years ahead from here, I would think that this site could disappear as a petroleum storage company. It's a chemical manufacturing site as well and the BTP group are now heavily into manufacturing pharmaceutical chemicals. As the margins are that much greater, capital investment is being made to upgrade the facilities in line with pharmaceutical requirements.

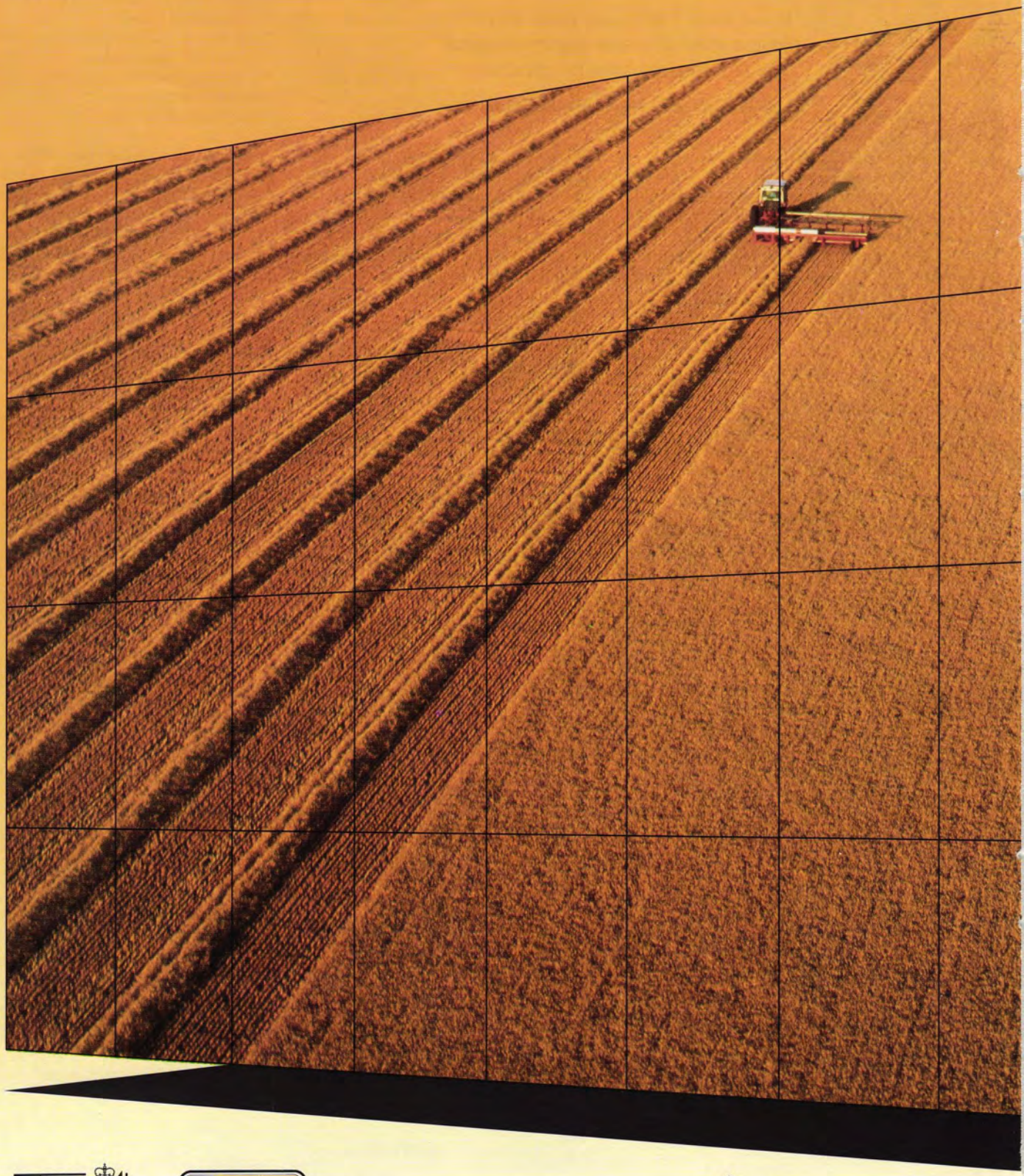
'If one looked 10 years down the line, I would think this site could disappear as a petroleum storage company'

Our Leeds site, however, is a far more modern location, rail-fed and with easy access to motorways. It was also built specifically for petroleum fuel storage, whereas this site evolved out of a tar distillation works. I believe it will still be there in 30 years' time as long as local political issues don't force industry out of inner city operations.

But isn't the storage business essentially a local operation and therefore protected to some extent from economies of scale?
Local factors will only delay the demise of the small independents. They survive by offering the lowest cost distribution scenario but this is a small country which could manage on coastal terminals.

And what about other sites in the UK?
Most of the medium-sized terminals have been up for sale at one stage or another. At the moment, there are about 35 terminals in the UK. Within a decade, I could see that figure coming down to about 20.

KEEPING A NATURAL BALANCE



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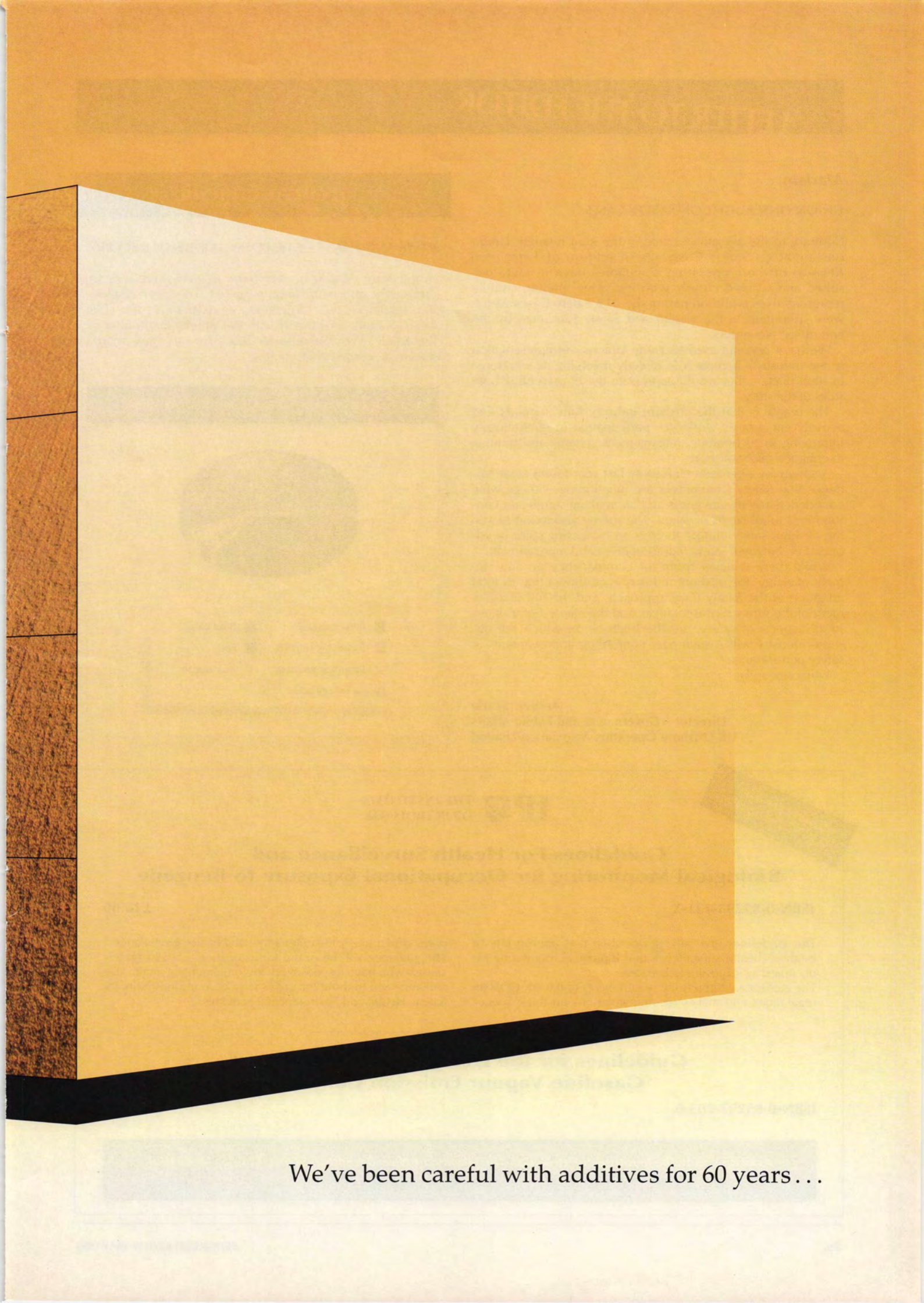


We've been careful with additives for 60 years . . .

LETTER TO THE EDITOR

Madam,

UNION ONSLAUGHT ON SAFETY CASES

Contrary to the allegation made in the item headed 'Union onslaught on Safety Cases (April edition of *Petroleum Review*) offshore operating companies have in fact consulted and worked closely with individual platform safety representatives while preparing the 215 Safety Cases which were submitted to the Health and Safety Executive by the end of last November.

We have become used to Trade Unions misrepresentation of the industry's approach in directly involving its workforce in such matters, but would appreciate the IP presenting both sides of the story.

The reality is that the offshore industry fully supports and actively encourages workforce participation in continuously improving its technology, management systems and training to enhance safety offshore.

A survey by Aberdeen University last year found clear evidence that Safety Committees are functioning with growing confidence and effectiveness and are making significant contributions to all facets of safety. The survey also found that in the offshore safety culture there is an increasing spirit of co-operation between safety representatives and management.

While there is never room for complacency on any element of safety, the offshore industry is confident that its total adoption of the Safety Case approach, and the full involvement of the safety representatives and the Safety Committees in all aspects of safety, are the bedrock on which the offshore industry will sustain ever-continuing improvements in safety performance.

Yours sincerely,

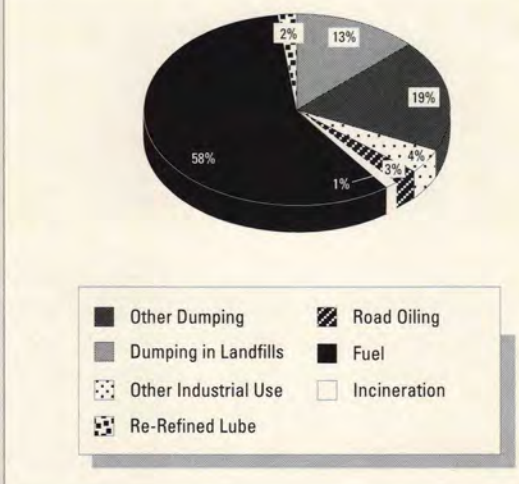
Andrew Searle
Director – Government and Public Affairs
UK Offshore Operators Association Limited

CORRECTION

WAYS AND MEANS OF DISPOSING OF USED LUBE OILS

In the April edition of *Petroleum Review* there was an error in the above article on page 164. The graph displaying figures for the 'Disposition of used oil in the USA 1988' should correspond with the figures mentioned in the article. We apologise for this error and have reproduced the correct graph below.

FIG 3 – DISPOSITION OF USED OIL IN THE USA 1988



US operators adapt to environmental legislation

By Bryon K Fortney, Executive Vice President, Oiltanking Houston

Stricter environmental legislation can lead to the problem of increasingly segregated storage and a shortage of tanks. However, operators in the United States have largely overcome these difficulties through cooperation, innovation and exchanges.

In an effort to reduce air pollution in major metropolitan areas, the US government has enacted key environmental regulations that both reduce emission amounts and require the use of cleaner burning fuels. The effects of the Clean Air Act Amendment of 1990 (CAAA), along with the federal RVP controls (1992), federal oxygenated fuel program (1993) and the low sulphur diesel program (1993) have had, and will continue to have, significant impacts on the storage and transportation of refined petroleum products throughout the United States. Given the environmental climate throughout the world, regulatory changes similar to those being experienced in the United States are likely and one should study both its past experiences and its current situation.

In the past, companies in the United States have benefitted from efficiencies created by minimising transportation and distribution needs. This was achieved by the use of fungible product systems that allowed for common terminal and transportation assets. One of the best examples of this was the use of common carrier pipeline systems, whereby several marketers and refiners (M/Rs) supplied like products into a system, relieving the need for each to have its own. A Houston company would therefore supply products to a New York company in Houston and the New York company would supply the Houston company with product in New York to reduce transportation costs. This system has worked well in the past but increased federal regulations resulting in turn in an increased number of product grades has caused major disruptions to traditional distribution systems.

'The industry has managed to adapt to meet these changing regulations'

However, the industry has managed to adapt to meet these changing regulations as reactions to the phasing out of leaded gasoline and the RVP regulations show. In the late 1980s, when leaded gasoline was being phased out, the common distribution facilities were faced with two problems. Firstly, when to totally phase out leaded products and, secondly, what the 'standard' mid-octane grade should be. In an attempt to plan ahead, customers were surveyed about their plans. Note that the problem was not the system's total capacity, but the need for more tankage due to increased segregation needs or, more precisely, decreased fungibility.

'To study what has happened in the United States would be advisable for all'

Solution

The solution was found to be common facilities setting timetables for lead phase-out and mid-grades by taking into account major customers and past distribution patterns. M/Rs responded by taking additional spot tankage and then went to work on how to minimise this additional tankage. The practice of exchanges then increased, with some refiners producing leaded product exchanging with non-leaded producing refiners. The market became efficient again and incremental tankage decreased to slightly above previous levels.

The federal RVP program created a similar set of circumstances with similar results. The RVP program set standards for the maximum vapour pressure of gasolines in the north and south regions of the United States. In addition to north and south grades, RVP maximums changed in summer, creating summer and winter grades. The problem of sufficient capacity, but not enough tankage, along with reduced fungibility, presented itself again. The industry adapted by using splash blending at the rack and mixing low and high octane gasoline to produce a mid-grade to maximise the use of existing tankage. In other words, common facilities and M/Rs again met this challenge by cooperating with one another through innovation and exchanges, resulting in minimal amounts of new tankage.

The efficiencies created by using common storage transportation assets have proven economical and efficient in the past. Disruptions to traditional patterns as a result of environmental

regulations have caused only momentary 'blips' in the storage and transportation industry, which has returned to near normal operation within a short time period. To this point, the industry's ability to absorb such blips has allowed the common system to remain economical. However, 1995 brings new reformulated gas (RFG) regulations to the United States.

Uncertainties

Uncertainties about the regulations include:

- Pending regulations require ethanol or an equivalent to be 30 percent of the oxygenate requirement. A governmental decision is not expected until June 1994.
- The amount of RFG required is unknown. 25 percent of the nation is required to use RFG while another 35 percent could or could not opt-in and require RFGs in their area. This matter is still unresolved.
- The number of gasoline grades is expected to triple to an estimated 30 grades.

On the eve of the new regulations coming into effect, M/Rs have yet to make specific plans to accommodate these changes. Because of the far-reaching effects of the new regulations and efficiencies gained previously, how and what type of changes will be made cannot be predicted. However, it is expected, as in the past, that there will be problems at the beginning but the system will function well with time.

What holds true for the United States should be a good case study for others. Globally, environmental concerns are becoming more important every day. Storage and transportation systems that previously met users' needs will need to be re-evaluated and changes will occur. To study what has happened in the United States and to monitor changes there in 1995 would be advisable for all.

Oiltanking's Houston terminal

'It is a very prestigious 20-year contract'

Christian Clérét, Managing Director, Elf Oil UK Ltd, talks to *Petroleum Review* about the contract his company has secured to operate service stations at both ends of the Channel Tunnel. He describes the success of Elf's outlet on the M25 and outlines further plans to improve the company's refining and marketing business in the United Kingdom.

Carol Reader: You have secured the contract for service stations at both ends of the Channel Tunnel. Is this important for Elf?

Christian Clérét : This is a tremendous achievement for Elf against very stiff competition from other companies. It is a very prestigious 20-year contract which we are delighted to be awarded.

We shall have five service stations near the exits of the Channel Tunnel complex – three at Calais and two at Folkestone, including one truck stop just outside on the M20 at Ashford. We shall also supply petroleum products for Le Shuttle rolling stock and support vehicles.

We have already started construction of the service stations which will be ready for the inauguration on 6 May by HM The Queen and President Francois Mitterrand. The sites will open for business a little later in the year when the Channel Tunnel passenger and freight services begin.

Winning the exclusive supply contracts for the Channel Tunnel will help Elf considerably to raise its profile in the UK where we have been active since 1974. In 20 years, we have achieved steady growth in our sales volumes and market share by purchasing several companies, more recently Amoco downstream in 1990 and the Heron network in 1991. We are now a notable force in this market, so Eurotunnel's choice of Elf reflects our dynamic position in the UK market and of course our strength in Europe.

Is Elf still buying petrol stations?

Yes we are. There are two kinds of growth – what we call organic growth through increasing volumes at our existing service stations where we aim to offer the best service to our customers, best products and attractive promotions. There is also what we call external growth through buying service stations in strategic areas which enables us to increase our market share and keep operating costs to the minimum. It has certainly proved to be an effective way of increasing our importance in the UK market.

Are you pleased with your Clacket Lane service station on the M25?

We are extremely pleased with the Clacket Lane which opened last year. This is another tremendous achievement for Elf. It is a very high volume site because it serves the enormous number of commuters using the M25 each day as well as people travelling to and from the Continent. The achievements of this station which is a partnership with Roadchef are far beyond our expectations in terms of volume and we are delighted.

I saw it described as one of the busiest service stations in Europe. Is that correct?

Yes – in terms of volume it is probably the second or third biggest in Europe. We are at present achieving volumes in the region of 850,000 litres per week. It has 180 pumps on both sides of the motorway. It is very impressive – a sort of cathedral to service stations working alongside the comprehensive, high quality facilities – three restaurants offering different cuisines, post office, shops etc – set up by our partner.

Do you have problems with your Optimate agreement?

Well, over 96 percent of our operators have signed Optimate contracts. Our objective is to achieve a major breakthrough in our relationship with our commission operators who represent over half of our retail network. We are implementing a transparent agreement which will enable Elf and our operators to manage business more efficiently by monitoring and controlling costs more effectively. You usually get some adverse reaction if you try to implement something innovative; but after some initial scepticism, the vast majority of operators have shown they are prepared to support the Optimate

Elf's glass 'sculpture' on Eurotunnel's Folkestone site

scheme. Other oil companies have encountered similar problems when renegotiating agreements with their operators – in many ways it is part of the process.

Do you see Optimate being beneficial for both sides?
Yes of course. It helps our 500 operated service stations to run their businesses more profitably by having improved systems and technology for monitoring costs and sales. There are still one or two problem to be ironed out but I'm confident that people will realise the benefits of Optimate after they've been working with it for a while. We have made a considerable investment in new IT systems and a new accounting system which we are in the process of introducing.

Another company caused a surprise by saying that it was considering service stations without petrol. What do you think of that?
Hypermarkets provide very strong competition in European markets. They are extremely aggressive and efficient people; they have enjoyed success from sales of food and now they seek to develop new business from sales of petrol. Hypermarkets are extremely powerful in France representing about 50 percent of the petrol market and they have made significant progress in the UK as well.

All oil companies are in the business of satisfying customers' needs. It is understandable that a number of companies are considering moving into the food sector and to transform some of their unprofitable petrol stations into mini-food outlets.

The margins in the food sector in the UK are much higher than they are in France and it might prove to be profitable for those companies who decide to experiment. We've decided to concentrate on the business we know best. But if you're faced with closing down an unprofitable petrol station, why not consider re-opening it as a mini-food store.

Were you surprised to hear of this plan?
A lot of people have been thinking about the idea for some while. In France, some companies already have agreements with hypermarket chains where service stations are complemented by convenience stores belonging to or operated by the hypermarket company. So why not ?

Elf is clearly here to make a profit in order to play a role as a successful commercial company – so mini-stores are another alternative we could consider but not for the time being.

Is your refinery at Milford Haven big by Elf standards?
With a throughput of 100,000 barrels per day, I would rank it as one of our medium-sized refineries. It is very advanced in terms of technology since we have most of the conversion units you would expect to find in a modern refinery. The operating costs of Milford Haven compare very favourably with refineries elsewhere in the UK and Europe.

Elf and our partner Murco, with a 30 percent interest in Milford Haven, have recently decided to invest £70 million in a new HydroDe-sulphurisation plant for Milford Haven which demonstrates our commitment to the future of our refinery and our future in South Wales. The new plant will enable us to stay abreast of continuing changes in European environmental legislation.

Mr Christian Clérét, Managing Director, Elf Petroleum UK

How many people work for your company?
Elf employs 635 of whom 312 are working at the refinery. We are relatively light structurally on European standards – even by UK standards; in my opinion it is very efficient.

Are those numbers going up or down?
We don't envisage making any significant cuts in our workforce because we are already a very light structure. New job opportunities might become available as we continue to grow in this market; of course we plan to remain competitive. Our people are very high calibre; who are performing well with a strong commitment to the company. This is one of the secrets of our success.

Does Elf Aquitaine have non-core activities in this country?
We are essentially an oil group which has diversified successfully into chemicals and pharmaceuticals. I'm not qualified to talk to you on behalf of Elf's chemicals and pharmaceutical subsidiaries but they are very well established companies in this country.

Do you have research centres in the United Kingdom?
The main research centre supporting our refining and marketing operations is at Solaize which is near Lyons in France. They develop new fuels and oils for Formula 1 motor racing teams using their mini-refinery. They're researching different types of fuel for different motor racing teams. Elf's products are currently being used by eight Formula 1 teams – that's 16 out of 26 cars on every Grand Prix starting grid.

Has privatisation of the Elf group affected your company?
The most satisfying effect of privatisation on our company has been the subscription rate among our employees which was very high indeed. Over 80 percent of our employees are now shareholders and that demonstrates the strong commitment of our people to the future success of the company.

How do you view the future?
We are really committed to the UK market. We have grown considerably over the past three years and we now look forward to continuing with our improvements to the Milford Haven refinery, strengthening our retail network still further and enjoying the increased revenues which will follow the start-up of operations at the Channel Tunnel.

India seeks outside help to avert crisis

By David Buckman

These are critical times for India's energy planners. Domestic crude output remains severely short of demand, oil product use seems likely to go on outstripping capacity to manufacture by the end of the century, gas and electricity shortages blight industry and cause blackouts and the coal business is frequently criticised for the quality and supply of its products.

Having largely spurned the foreign private sector for years, India is now turning to it increasingly to try to alleviate its problems, with a more liberal attitude to licensing and imports. Big imports of gas in several forms have exciting potential in the sub-continent, which promises enormous investment opportunities for the astute in the coming decade.

Exploration activity

Readers of the international business press have in the last year seen evidence of India's new thinking on oil and gas. First, there is exploration. Realisation in the mid-1980s that five-year plan goals for hydrocarbons could not be achieved by state firms Oil and Natural Gas Commission (ONGC) and Oil India Ltd (OIL) alone spurred the authorities to offer increasing swathes of the Indian offshore to foreign searchers. But by the time, in mid-1990, that the Petroleum Ministry was assembling plans for a fourth licence round it had to be admitted that results until then were not great. The third round of 27 blocks had only lured six overseas companies to sign nine contracts, spend just over $50 million and sink a handful of dry holes.

The fourth round, in 1991, offered 72 blocks, including for the first time 32 onshore, plus deepwater areas in the prolific Bombay High. Terms, which had been so stiff in the second round in 1982 that nobody responded, were improved. Even so, government had to extend the bidding deadline, and the result was still a disappointing 24 bids from 31 companies for 13 blocks. A few awards have been made, the winners tending to be smaller foreign and local companies. The four rounds of 1980, 1982, 1986 and 1991 led to no foreign operator finds of commercial oil or gas. In June last year, about six months after the fifth round of 45 offshore and onshore blocks had been thrown open, Satish Sharma, India's Petroleum Minister, said that in future there would be a rolling programme of a round every six months.

Results of the fifth round, which closed end-June 1993, are said to have been encouraging, and recently bids – due in by December 93 – opened for a sixth. Among its 46 blocks – 17 offshore, 29 onshore – are 23 fifth-round tracts up for offer again. Encouraging is that further contracts remain to be signed for fourth-round blocks, with Shell among the possible takers. A series of 35 speculative blocks has also lately been made available onshore and offshore with flexible rules on data reprocessing and acquisition.

In addition to these exploration areas India in 1992 began inviting bids for development of known fields. This was a recognition that just as the state firms were short of exploration dollars they also lacked cash to exploit what had been found. By end-1992 bids had to be in for 43 oil and gas reservoirs, 12 of medium size and 31 small. In the medium fields ONGC/OIL would have a joint venture role to play but a private company might, depending on the nature of the contract, have up to a 60 percent stake. In smaller fields the production-sharing contract would be with the government.

A similar offer was made in October 1993 on eight medium- and 33 small-size fields, deadline end-March 1994. Response to the first round has been good, 56 companies making 117 offers on 31 fields, according to one report.

Broad terms on the offer are that signature and production bonuses will be payable by companies, as will all statutory levies, including royalty and customs duties; the government has first right of refusal on oil or gas produced; there will be preferential treatment for companies taking up exploration blocks; the government will pay an

Indian Oil Corporation's hydrocracker reactor at Hazira Works

international price for oil; and negotiations will be flexible. It is understood that foreign companies will be levied income tax at 50 percent without surcharge, as opposed to 65 percent in other lines of business. Local firms will also get lower tax rates.

Budget deficit

India's need for more energy must be set against a budget deficit in 1993-4 likely to approach $45 billion, a steadily rising population of just over 860 million and a fast-declining hydrocarbons reserves base. In 1992 the Planning Commission estimated that domestic oil and gas would last under 25 years at the present consumption level. Drafting the Eighth Five-Year Plan (1992-97), the Commission warned that an uncontrolled growth in demand for petroleum products would make the balance of payments position unmanageable. It called for strict monitoring of demand during the Plan period and beyond. Whereas product use in 1990-91 was 55 million tons, then 57 million in 1991-92, the Commission foresaw 81 million for 1996-97 and a daunting 125 million for 2006-07. Oil production was forecast to go up to 50 million tons/year by 1996-97 – the achieved figure was 28.7 million tons in 1992 – if development plans by government proceeded on schedule.

The Commission recommended expansion of existing refineries and adoption of conservation measures, demand management and substitution development. Natural gas could be used in fertilisers, petrochemicals, power generation and for extraction of LPG for use as a household fuel.

Oil supply

The Ministry of Petroleum has estimated that India will import about 29 million tons of crude and 13.7 million tons of products in 1993-94 at a cost of $6.8 billion. This compares with 29.4 million tons of crude and 9.8 million tons of products in 1992-93, cost around $5.8 billion. The estimates are based on the assumption that demand will go up by about 5 percent during the year. As local refinery capacity stands around 52 million tons a year, the volume of crude that can be imported is limited, so India will have to import a higher volume of costly products.

The general manager of Indian Oil Corporation (IOC), Suresh Chand Mathur, sees the country's refining capacity increasing to 82.55 million tons a year by 1997. He envisages product imports rising a third, maybe more, until new refinery capacity comes on stream but sees crude imports remaining stable. To cope with rising product demand the government recently cleared the way for nine new refineries with a total capacity of 60 million tons a year. Of these, three refineries of 9 million tons a year each will be set up in Gujarat, one of 9 million tons will be in Maharashtra, while one 6 million-ton facility will be in Orissa. Haryana and Madhya Pradesh will each have a 6 million-ton unit, while Assam and Karnataka will each have a refinery with a capacity of 3 million tons a year.

There is thus no shortage or proposals for new refineries, and the geographical spread is wide. To further ease the production situation, in line with a new policy of liberalisation and privatisation promised for the petroleum industry generally, about a year ago the Petroleum Ministry approved a plan to allow private firms to import kerosene, LPG and fuel oil direct without going through IOC. They could also sell products without price controls.

As part of its drive to cut government subsidies and the fiscal deficit, about 18 months ago it raised petroleum prices about 18 percent. Only kerosene, cooking fuel for the poor, was exempt. Recently Asian Development Bank (ADB) made a veiled threat that it would cancel the last $125 million of its energy loan to India unless the country followed a timetable for reforms. India has agreed that timing of reforms – abolition of price controls and divestment of up to 20 percent in ONGC – has not strictly been followed, explaining that 'reforms take time to implement.'

India is heavily dependent on the efficiency of ONGC, developer of the Bombay High oil and gas area off the west coast, responsible for much of the approximately 45 percent of oil needs produced domestically. ONGC has plans to invest $2.1 billion to develop new oilfields off Bombay. It has begun to exploit three new reservoirs which could produce 9.3 million tons a year by 1995, says official Mohan Reddy.

A recent advance has been the bringing on stream of Neelam field's number 2 platform. Contracts continue to be awarded for Neelam, one of the largest satellite fields in the Bombay High area. When it reaches full production it will supply 65 million tons a year of oil and 90 MMcfd of gas. Total cost of the development, which was approved in 1990, is $1.2 billion. Some 100 wells will be tied back to 12 wellhead platforms, processing and initial water injection being provided by a central complex. A separate water injection with a capacity of 230,000 barrels a day is planned later.

In addition to Neelam, work continues of three other satellites, Panna, Mukta and R-15A, an extension of Heera. Mukta and Panna, the R-series fields, D-l and Mid & South Tapti in the Bombay High basin were among medium-size fields offered in 1992. Recently Essar Oil and Hyundai Heavy Industries, of South Korea, announced that they had joined to develop Mukta and Panna. ONGC estimates that oil and gas reserves in the fields approach 270 million tons, and it has been considering a second trunkline from Bombay High to the coast to connect new fields by the end of 1996. By that time oil production might top 35 million tons a year. It would relieve pressure on the first line, which often could not be regularly maintained because of pressure by government to produce more oil. Australia's BHP Petroleum is bidding to develop the Tapti gas field, where reserves could be 1 Tcf.

HBJ's microwave tower controlling gas trunkline operations.

The Krishna-Godavari basin in the east is also a developing area, attracting foreign interest. The Ravva field there was offered for development in 1992. The Public Investment Board approved ONGC's development plans there about two years ago, the shallow-water field having estimated reserves of 12.2 million tons of oil and 113 Bcf of gas. The basin has yielded many prospects and finds. By the end of the Eighth Plan period oil output should reach 4 million tons a day plus over 115 MMcfd of gas, against 60 tons a day of oil and 40 MMcfd of gas last year.

Gas plans

In the Bombay High area a huge programme to cut gas flaring is under way. This and gas from reservoirs elsewhere could play a vital role in reducing oil dependence. Like other developing countries, such as Indonesia and Egypt, India is realising that gas has enormous power generation, industrial and domestic potential. According to Dr Avinash Chandra, government Director-General of Hydrocarbons, India needs around 9.20 Bcfd of gas but domestic availability is only 1.75 Bcfd, and by 1996 it will rise to a mere 2.3 Bcfd. Once more gas can be provided, Dr Chandra envisages demand soaring as much as 15 times over what can be supplied. 'Indian industry is absolutely hungry for gas,' he says. 'Anyone who is willing to sell to us will be encouraged.'

ONGC's first fixed platform under construction at Mazagon Dock

An important source of domestic gas is the South Bassein field off the west coast, from which a second trunkline to the Hazira onshore treatment plant is now to be laid. The 250-km, 42-inch artery will essentially parallel the existing line. Permission for the second was granted in 1992 by the Public Investment Board, which also agreed a 140-km line to link the ICP platform in the Bombay High oilfield area to Hazira. Some funding is coming from ADB, some from the World Bank, more from Japan's Exim Bank and ONGC funds. John Brown Engineering won a contract from Samsung Heavy Industries, of South Korea, for detailed engineering and procurement assistance for the $70 million BE wellhead platform in South Bassein to boost gas throughput by about 175 MMcfd. The project includes a four-leg jacket, pipelines and modifications to existing platforms. An earlier contract, to supply line pipe for the South Bassein-Hazira trunkline, was granted to Saw Pipes of India, ILVA of Italy and Europipe of Germany. Capacity of the Hazira terminal will also be raised from 705 MMcfd to 1.45 Bcfd by 1995-96, another essential component of the government's zero-flaring gas aim.

Hazira is the western terminal of the 1,900-km Hazira-Bijaipur-Jagdishpur (HBJ) overland trunkline which went on stream to serve industry in 1987. About 18 months ago the Gas Authority of India (GAIL) requested a technical assistance grant from ADB to boost HBJ's capacity from around 650 MMcfd to 1.15 Bcfd. More ambitious gas line plans have been considered for the sub-continent. Although in 1992 an expert committee determined that a gas grid to serve southern India was not viable – it would cost $750 million to move the 350 MMcfd of gas required, and gas was not immediately available – Petroleum Minister Sharma lately indicated that such a grid might be finished within a few years. As long ago as the mid-1980s a national gas grid was proposed, which could cost $6 billion.

Joint venture

An important move towards the gasifying of urban India was the setting-up early in 1993 of a joint company by British Gas and GAIL to supply natural gas to Bombay, with the government of Maharashtra as a shareholder. Over the next decade $150 million will be invested towards a distribution network to serve more than 600,000 commercial, domestic and industrial users in the Bombay area, drawing on western waters gas. GAIL has since been asked by the Petroleum Ministry to consider a piped supply to 250,000 households in New Delhi, taking gas from the HBJ line.

Imports could transform India's gas scene. Early in 1993 New Delhi lifted government's monopoly on LPG, permitting the private sector to import, bottle and market it. The authorities in mid-1992 agreed that private and foreign firms could set up refineries to make LPG among other products. Liberalisation has led to a spate of developments. Already IOC had decided to establish a new LPG terminal at Kandla port in Gujarat to handle 600,000 tons a year. Since then IBP has announced it will enter the business, estimating that about 800,000 tons a year more LPG than was imported by government was needed to meet the waiting list for it, put at nine million. Parmar LPG Bottling said it would import 1 million tons a year, with a port to be developed at Pinjarat, near Surat, in Gujarat. Hindustan Petroleum has been given permission for facilities at Mangalore port in the south to handle 600,000 tons a year. A new jetty has been proposed, too, for Visakhapatnam port, capacity 450,000 tons a year, on the eastern coast. This is one of two ports, the other being Bombay, able to import LPG, but both near saturation point. In addition, the Shri Shakti LPG group plans facilities at Kakinada port in Andhra Pradesh to eventually handle 100,000 tons a year.

Officially it is hoped that indigenous LPG output will rise from about 2.30 million tons in 1992 to almost 3 million in 1994-95. Imports in 1992 were restricted to 500,000 tons.

LNG imports are in mind for electricity generation. Blackouts plague India, which has installed capacity of 72,000 Mw, planned to be raised to 100,000 by 1997, but even that will be up to 20 percent short of needs. Almost 50 new coal, gas and hydro-electric projects are being discussed, but the 25,000 Mw involved will cost $25 billion. Hope stems from the spate of private proposals such as US firm Enron Power's projected 1,905-Mw, LNG-fuelled power station at Dhabol, in Maharashtra state, a first phase due on stream in about two years. Eventually it will use LNG imported from Qatar.

India is also hoping for piped gas imports. Several trunkline options are in mind, with Iran, Qatar, Oman and even offshore Yemen being tipped as possible sources. They may eventually spawn two trunklines. A pipeline from Central Asia to Karachi for transhipment is said to make sense for Turkestan, Uzkebistan and Ukraine, reducing dependence on Russia by being routed through northern Iran and Pakistan. Supply availability, price and technical and economic aspects and political factors have all to be considered.

Bulat D Yelemanov speaks out

***Petroleum Review* correspondent Juliette Rossant interviewed Bulat D Yelemanov, president of Munaygaz, state holding company in Kazakhstan. They discussed the timetable for the introduction of a new oil and gas law, current developments involving foreign oil companies, in particular the Caspian Pipeline Consortium.**

Juliette Rossant: What will be in the new oil and gas law?
Bulat D Yelemanov: The foreign companies have a draft of the new law. It is not a state secret. They are providing expertise. I don't know what will be in the law when the Supreme Soviet finally adopts it. When they discuss it, everything will become clear.

What foreign firms are advising Kazakhstan on the law?
There are a few foreign firms like Bechtel and US's Wilbros.

Some of the foreign oil companies negotiating with the Kazakh government have said that President Nursultan Nazarbayov will issue a decree on oil and gas in lieu of a law before the new parliament convenes on 18 April. Is this so?
I don't think there will be a separate decree on oil and gas operations.

What is the situation with talks between the Caspian Pipeline Consortium (CPC) and Chevron ?
Talks are going on in London. Minister Baikenov is attending them and the representatives of the Russian Federation and Oman as well. There is no change so far. We are still negotiating.

The Russian oil company Lukoil now has 10 percent of the Azeri deal and there has been talk in the press about routing the Azeri pipeline through Russia as a result of political pressure. Is there similar pressure on Kazakhstan to route the pipeline through Russia?
No. It is the economics that we find attractive in the Novorossisk route, not the politics.

How will you finance the pipeline?
Kazakhstan is planning to get a loan of $1 billion to complete the pipeline. It will cost $1.9 billion in total. The pipeline from Tengiz to 300 kilometres beyond Astrakhan is already built. There is another 1,000 km to complete. The $1.9 billion will cover the remaining pipeline, a terminal at Novorossisk and the compressor stations. The route of the pipeline is Tengiz to Artrau, through Astrakhan, Kalmyki, Stavropol region, Krasnodar region and finally to Novorossisk, avoiding Chechenia.

What is Chevron's equity stake?
The Russia government will hold 25 percent, 25 percent for Kazakhstan, 25 percent for Oman and we offered 25 percent to Chevron. And if the talks are successful, the distribution of shares will look like this.

What is your schedule for a new pipeline?
It will take 36 months to complete a new pipeline from Astrakhan to Novorossisk if we conclude an agreement with Chevron.

How much oil is being produced by Kazakhstan?
We hope to produce 20 million tons of crude in 1994. Last year, without Chevron and other foreign companies, it was 19 million tons excluding gas condensates. We produced 4.5 million tons of gas condensates, which was sold to Russia.

When do you need the new export pipeline?
We need a pipeline today. Chevron can produce 3 million tons a year at the moment. The Samara pipeline can take 3 million tons but Russia won't let it through because of the mercaptans. So we need it now. We are only exporting 1 million tons now from Tengiz. The rest of our 19 million tons is going through the Samara pipeline and some remains at our refineries. We have another pipeline to Orsk. The capacity of the Samara pipeline is 10.5 million tons – it's filled – about half our oil goes to Samara. Some oil is being sent to an oil refinery in Guryev and some to Baku by tankers and a refinery in Aktubinsk. Around 1.5 million tons is going to Astrakhan now in a swap.

Chevron said they have built a plant to take out mercaptans from Tengiz oil. Will they be exporting more oil to Russia now?
They have built only a small experimental facility for demercaptanization and it is operating successfully. They will now build a large plant – it is one of Russia's demands that mercaptans are removed from oil.

Will the cost of the plant be included in the $1.9 billion pipeline figure?
No, this is something else. It is not included.

Why is Russia reacting to the mercaptans now? Hasn't everyone known about mercaptans in Tengiz oil for years?
It's Russia's problem, not mine. Russia is a sovereign country. They have the right to make such demands. There are no technical problems – the whole world works like this. Perhaps they don't like the smell.

How does the recent accident on the Bosporus involving a Russian oil tanker affect Kazakhstan's plans for a pipeline to the Black Sea?
We asked Lloyd's Register to look at the Bosporus situation and Lloyd's has concluded that there should be no problem in shipping oil from Kazakhstan through the Bosporus. We are only planning a pipeline to Novorossisk, not bypassing the Bosporus and the Dardanelles. Other routes through Azerbaijan and Iran are more expensive. In the future, it might be worth building another route also. We may need a southern route in time. But now we are only in discussions about the Novorossisk pipeline.

Are any Russian companies getting involved in deals in Kazakhstan?
We don't need another Russian company. We have the Russian government, it's enough for us. The Russian government will make a profit off the pipeline passing through its territory – not a Russian company.

What is the situation with negotiations with Oryx Energy?
We are having talks with Oryx. A production contract is being negotiated and will be signed soon. There are still a few things to sort out before they sign. We are going to insist on our terms. We have no reason to hurry. We aren't going to hand over fields just like that.

Right now Kazakhstan's refineries process Russian oil. Is Kazakhstan planning on building an internal pipeline from the western centres of production to the refineries in the east?
We have tried to transport some oil by railroad but its too expensive. Kazakhstan is planning to build a pipeline from the west to supply Chimkent and Pavlodar refineries. It will be 1,200 kilometres in length and cost $1 billion. We have already begun to build it – it is one of our priority projects. We are building it slowly without foreign help.

Conference report

Western Australia – another Gulf of Mexico?

By William A Scholes

Forty years ago geologists and petroleum companies downcried the possibility of finding oil or gas in Australia. Some experts said the geology was too old to find any worthwhile deposits in the vast continent, while some oil companies held that it was much cheaper to import petroleum into Australia than spend money on exploration.

But in 1994 an American oilman at the Australian Petroleum Exploration Association (APEA) Conference in Sydney likened the Carnarvon Basin offshore Western Australia to the oil and gas rich Gulf of Mexico.

The Carnarvon Basin oil and gas province could become the next Gulf of Mexico, where nearly 850 oil and gas fields have been discovered contended Chairman and Chief Executive Raymond Plank of Apache Corp.

He told the 800 conference delegates: 'I have often thought of the Carnarvon Basin as being about where the Gulf of Mexico was 40 years ago. The opportunity to get in early and establish a position in a promising basin that might one day become a world-class producing province does not come along very often'.

Through subsidiary Hadson and from its own acreage acquisitions, Apache is the largest corporate owner of exploration territory in the Carnarvon Basin.

In all, 52 oil and gas fields have been found in the Carnarvon Basin. These include the highly productive Barrow Island and Harriet fields and, more recently, Ampolex Ltd's Wandoo discovery, BHP Petroleum's Griffin Field, now producing 80,000 barrels a day, and Western Mining Corporation's Stag oilfield. Mr Plank said that, of the 52 discoveries, 29 have been or appear to be economic prospects for development with total resources of 1.1 billion barrels of oil and 28 trillion cubic feet of gas.

This contrasts with the Gulf of Mexico where so far 11 billion barrels of oil and 103 trillion cubic feet of gas have been found. It produces 26 per cent of total US gas production and 11 per cent of total oil production.

Mr Plank said to date 350 million barrels of oil and 1.4 trillion cubic feet(tcf) of gas had been produced in the Carnarvon Basin which was about two-thirds the size of the Gulf of Mexico.

'Although it may be far-reaching to suggest that its discoveries may one day rival those in the Gulf, it's apparent that the Carnarvon Basin is in the very early stages of development that is likely to accelerate as markets are found and additional discoveries made,' he said.

Development costs

The Chief Executive of BHP Petroleum (BHPP), Peter J Wilcox, told delegates that the cost of developing Australia's huge offshore gas fields was too great and there were better opportunities to be found overseas.

He said forecasts from some industry bodies suggested Australia could benefit from the significant demand for liquefied natural gas in coming decades from the expansion of economies in Asia, particularly India and China.

But Australia was too far away to pipe the gas to Asia and the cost of shipping greenfield LNG was too expensive. Local markets were too small to provide the economy of scale needed to justify the billions of dollars required to develop the untapped fields off the coast of Western Australia. Existing projects such as the A$12 billion North West Shelf operation already have the infrastructure in place and could expand with relative ease.

But greenfield LNG required high capital investment and the economics of LNG projects outside the Middle East were marginal. The cost of a single LNG train was A$1 billion.

Mr Willcox was also pessimistic on the expansion of domestic gas demand. While confident that state laws, which prevented gas flowing over the borders, would eventually be removed, he said it would be difficult for state governments to give up the power and revenue they got from local gas monopolies. BHP and Esso Australia were eager to supply Bass Strait gas to South Australia.

But while Australia's population and distance stunted its growth potential, other areas in the world were crying out for gas development.

Overseas investment

Industry figures released at the conference show that the drain of capi-

tal expenditure overseas by Australian petroleum explorers and producers is continuing.

APEA said that A$1.388 billion was spent overseas by Australian companies in 1992-93, representing about one–third of all capital exploration and production.

The latest figures represented an increase of A$450 million over the previous year. It continued the trend of recent years of the industry's capital increasingly being directed away from Australia, according to APEA Executive Director Dick Wells.

In the five years since 1988/89, overseas spending by Australian companies as a proportion of total expenditure had risen from 14 percent (A$310 million out of A$2.163 billion) to 33 percent of (A$1.388 billion out of A$4.183 billion).

Mr Wells said the increasing expenditure overseas was not all bad news. 'It's a sign of the maturation of an industry spreading its risks and following opportunities in other countries,' he said.

However, he warned that a continuation of the spending trend would 'further reduce the availability of exploration and development capital in Australia and this needs to be closely monitored.' A continuing outflow of capital would affect the level of local exploration and also the opportunities for oil and gas discoveries.

Mr Wells said governments could not afford to ignore the root causes for outflow of some of the Australian petroleum exploration and development money.

'Government policies, particularly relating to tax regimes and questions of access, are crucial factors in a company's decision as to whether its capital will stay in Australia or go overseas,' he said.

Oil output

Petroleum currently contributes more in gross value production than any other commodity, he said. Latest Australian Bureau of Statistics figures show oil and gas production was worth A$7.8 billion in 1991/92 – more than coal (A$7.2 billion), livestock ($5.7 billion), gold ($3.5 billion), wool ($2.9 billion) and other commodities.

Discoveries of petroleum in recent years have not kept up with production. The Bureau of Resource Sciences has forecast that oil output from known and undiscovered reserves in the four main basins – Gippsland, Carnarvon, Bonaparte and Eromanga – will decline from 532,000 barrels per day currently to 224,000 by 2004-05.

Including other smaller oilfields, the median production forecast is for national output of 266,000 bbl/d in 2004-05, with a possible maximum of 400,000 bbl/d and a low of 169,000.

'The BRS predictions underline the need for Australia to remain competitive as a destination for investment by Australian and international oil companies,' Mr Wells said. 'Clearly we need to do everything possible to maintain an attractive risk-reward balance in Australia.'

Philippines surge

The conference heard that an aid programme designed to help the Philippines increase its oil and gas production was about to generate a new exploration drive involving millions of dollars.

A joint paper by 14 co-authors said a consultative group of 17 Australian and 17 Philippine companies had the first go at analysing newly available marine seismic data shot by the Australian Geological Survey Organisation (AGSO). Bids for these areas were opened to other international bidders after 1 April.

Following the discovery of significant oil and gas deposits in the offshore Palawan area – West Linapacan, Malampaya and Octon – the Philippine government decided to promote exploration in 13 underexplored offshore basins.

A joint programme was conducted involving AGSO and the Philippine Department of Energy. It spent A$5 million on a sophisticated data collection programme.

A total of 2,750 km of seismic and magnetic data was obtained along with 3,000 km of geochemical, gravity and bathometry data in four prospective areas – Northeast Palawan shelf, Cuyo Platform, Tayabas Bay and Raga Gulf.

Carnarvon Basin

This basin continues to be the focus of Western Australian exploration and development activity.

Stag-1 (Hadson Energy Ltd, WA-209-P) discovered oil 23 km southwest of the Wandoo oilfield. Wireline tests (SFT/FET) recovered liquid hydrocarbons and confirmed by West Muiron-4 and West Muiron-5 but these wells also confirmed the geologically complex nature of the area.

BHP Petroleum has now recognised the Pyrenees and Macedon fields in the area and further follow-up drilling will take place this year.

East Spar-1 (WMC, WAA-214-P) discovered gas and condensate west of Barrow Island. DST 1, a restricted test, flowed gas at 957,000 m^3 per day and condensate (58° API) at 272.5 kl per day through a 32mm choke. DST 2 flowed 623,000m^3 of gas per day through a 19mm choke, together with 239.4 kl of condensate.

The discovery is significant in that the structure does not show up on seismic sections and only becomes apparent after depth conversion. The discovery was further appraised by the East Spar-2 and East Spar-3 wells.

Kufpec's Nebo-1 is the first oil discovery in the Beagle Sub-basin and should provide an important stimulus to exploration of the region. Oil flowed from thin sands in the Calypso Formation: DST 1 flowed oil (42° API) at 292.5 kl per day and gas or 3,398 m^3 per day through a 12.7 mm choke. Department of Minerals and Energy assessment indicates an in-place resource of 80 million barrels of oil.

Woodside's West Dixon-1 was drilled to test the hydrocarbon potential of sands of the Late Triassic Mungaroo Formation and discovered oil in Late Jurassic sands. Production Test 2 flowed at a stabilised rate of 2,040 barrels of 32° oil per day and Production Test 3 flowed oil at an average of 2,600 barrels per day through a 12.7 mm choke.

The basin also dominated in terms of new seismic data, accounting for 88 percent of acquisition in the past year.

Of the 36 surveys, 31 were 3D and five were acquired in the onshore section of the basin.

During the year some 135,000 line km of high-resolution aeromagnetic data were collected as part of the Barrow-Dampier Project (Durrant and Associates).

This major scientific undertaking will integrate this new data with existing seismic, well and other geological data to produce a new geological model for the area and also attempt to prove the usefulness of high resolution aeromagnetics as an aid in prospect definition.

Australian petroleum exploration and production Capital spending in Australia and overseas

A$million

	87/88	88/89	89/90	90/91	91/92	92/93
In Australia	1537	1853	1873	1303	1919	2795
Overseas	261	310	433	654	930	1388
Total	1798	2163	2306	1957	2849	4183

The paper highlighted the Ragay Gulf area in southeast Luzon as being of particular interest because of the existence of a thick sedimentary basin.

'The basin is about 150 km long and 50 km across, with the bulk of it offshore. There are numerous onshore oil and gas seeps on both sides of the basin and exploration wells have had initial flows of up to 200 barrels a day,' said the co-authors.

The Tayabas Bay area is just to the north of Ragay Gulf. In view of the power shortages being suffered in the Philippines, any significant gas discovery is likely to be developed rapidly.

New releases

A total of 13 exploration areas are being made available for competitive bidding under the Petroleum (submerged Lands) Act 1967, announced Federal Resources Minister David Beddall. All of the areas will be subject to the work programme bidding system.

The acreage release comprises:

- two areas in the Bonaparte Basin, and
- one area in the Vulcan subbasin, all three areas offshore from Northern Territory
- four areas in the Dampier subbasin offshore Western Australia
- two areas in the Otway Basin, and
- three areas in the Gippsland Basin all offshore Victoria, and
- one area in the King Island subbasin offshore Tasmania.

Mr Beddall, only recently appointed to office, said he would continue exploration acreage releases every six months. He added that he had recently sent a discussion document to APEA and Ministerial counterparts in the States and the Northern Territory dealing with a review of the Petroleum (Submerged Lands) Act 1967.

He was conscious of the importance of maintaining an internationally attractive taxation regime for petroleum exploration and development in Australia to encourage the further testing of the geological formations. 'This is especially important as new exploration areas are opening up in places such as China, Vietnam, Russia and South America, and competition internationally for the exploration dollar is strengthening,' he said.

'I would be therefore very concerned about any change in government taxation or other imposts which would put at risk the current levels of offshore exploration we have all worked so hard to build up,' he added.

Taxation burden

The APEA Chairman, Dr Alan Power, said that, since oil was discovered, over 5.6 billion barrels of oil and gas equivalent have been produced. At the average 1993 dollar value (A$27.22) this is worth over A$153 billion dollars.

In today's dollars over A$84 billion in excises, royalties, PRRT and company tax have been paid to governments.

Offshore wildcat drilling declined from 47 to 32 wells in the past four years. Although forecast offshore activity for 1994 was relatively high, at between 51 and 69 wildcats, this estimate was unlikely to be achieved if the current low oil prices continue or deteriorate.

Mr Power said a particularly disturbing trend was to force industry to fund government programmes which industry did not use to any great extent.

The offshore petroleum exploration industry was a victim of misrepresentation in the 1993-94 budget which announced a decision to raise half the cost of the AGSO Continental Margins Programme (A$10 million in 1993-94) from the oil industry through an annual charge placed on all Federal offshore exploration permits and retention leases commencing in 1994-95. This represented an average cost per permit of about A$100,000.

APEA members have carefully considered the costs and benefits of the Continental Margins Programme (CMP) and despite supporting the concept of the programme, they concluded that it was not of sufficient direct benefit of the exploration industry to justify such a charge. Thus APEA proposed that CMP be curtailed to exclude oil industry specific elements for which the proposed charge is to apply.

Annual survey of the average lead and sulphur contents of petroleum products delivered into the UK market

	Lead Content (g/l)			*Sulphur Content (% mass)*										
	— Motor Spirit —			*— Motor Spirit —*			*— Kerosene —*					*— Fuel Oil —*		
Year	*4-Star Leaded*	*Prem U/leaded*	*Super U/leaded*	*4-Star Leaded*	*Prem U/leaded*	*Super U/leaded*	*Prem Kero*	*Reg Kero*	*Av Kero*	*Auto Diesel*	*Gas Oil*	*Light*	*Medium*	*Heavy*
	Led g/l	*Lead g/l*	*Lead g/l*	*S %wt*	*S %wt*	*S %wt*	*S %wt*	*S %wt*	*S %wt*	*S %wt*	*S %wt*	*S %wt*	*S %wt*	*S %wt*
1989	0.143	0.002	–	0.05	0.03	–	–	0.04	0.03	0.19	0.21	1.8	2.2	2.2
1990	0.143	0.002	–	0.05	0.04	–	–	0.04	0.03	0.19	0.21	1.7	2.0	2.2
1991	0.145	0.001	–	0.04	0.03	–	–	0.03	0.04	0.19	0..21	1.4	1.8	2.1
1992	0.143	0.001	–	0.05	0.03	–	0.01	0.04	0.05	0.19	0.20	1.8	2.2	2.4
1993	0.143	0.001	0.001	0.04	0.02	0.02	0.01	0.04	0.04	0.19	0.20	2.3	2..5	2.8

Note: Fuel oil figures exclude deliveries for export, bunkers and electricity generation.
Source: Based on weighted average figures provided by the UK Petroleum Industry Association.

IP INFORMATION SERVICE NEWS

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BOOK LOANS

By popular demand IP Members may now borrow up to four items from the library, at one time, for up to three weeks. We will send items to you by post – we only ask that you refund the cost of postage. We will lend any non-reference publications, including books, pamphlets and some API standards. Many of the new additions to stock listed below are available for loan. For further information contact Margaret Whellams.

SELECTED ADDITIONS TO LIBRARY STOCK

This list represents only a fraction of the additions to Library stock since the last Information Service News in January. Most of the items, other than directories, are available for loan to IP members. Please note all the items were published in 1993 or 1994.

DIRECTORIES

Motor industry press and PR guide 1994. SOCIETY OF MOTOR MANUFACTURERS AND TRADERS LIMITED
Forecourt news directory 1994.
Environment Business directory 1994. 3rd edition. Information for Industry.
World energy yearbook 1994. 1st ed. Petroleum Economist.

FORECAST/ OVERVIEW

Crude and product market perspective. CHEVRON INTERNATIONAL OIL COMPANY Process industries investment forecasts 1993 - 1997. 28th edition. Volume 28, CFR.
Recent studies in the demand for energy in the UK. Surrey energy economics discussion papers no 72.
Oil and gas in Europe: An industry overview: A white paper. EUROPEAN PETROLEUM INDUSTRY ASSOCIATION; OIL INDUSTRY INTERNATIONAL EXPLORATION AND PRODUCTION FORUM.
LNG world overview June 1993. GOTAAS – LARSEN SHIPPING CORPORATION.

UPSTREAM OIL INDUSTRY

MOEX 94: The Mediterranean oil and gas exhibition and conference: Commercial opportunities in the Mediterranean; Held 25-27 January 1994, Naxxar Malta.
Recommended practice for analysis, design, installation and testing of basic surface safety systems for offshore production platforms. AMERICAN PETROLEUM INSTITUTE. 5th ed. API RP 14C.
Draft offshore installations and pipe-line works (management and administration) regulations: Draft consultative document. HEALTH AND SAFETY COMMISSION. CD 70.
Guidance notes on procedures for regulating oil and gas field development. DEPARTMENT OF TRADE AND INDUSTRY.

BRAER

Report of the Chief Inspector of marine accidents into the engine failure and subsequent grounding of the motor tanker Braer at Garths Ness, Shetland on 5 January 1993. DEPARTMENT OF TRANSPORT – MARINE ACCIDENT INVESTIGATION BRANCH HMSO
The Braer incident Shetland Islands January 1993. DEPARTMENT OF TRANSPORT – MARINE EMERGENCIES ORGANISATION, MARINE POLLUTION CONTROL UNIT HMSO.

PIPELINES

Design, construction, operation, and maintenance of offshore hydrocarbon pipelines. AMERICAN PETROLEUM. 2nd ed. API RP 1111.
Performance of oil industry cross-country pipelines in Western Europe: Statistical summary of reported spillages 1992. Report 2 / 93. Concawe.

ENVIRONMENT

Environmental protection act 1990: Guidance on effective flaring in the gas, petroleum, petrochemical and associated industries. HER MAJESTY'S INSPECTORATE OF POLLUTION. Technical guidance note (abatement) A1, HMSO.
Environmental protection act 1990: Monitoring emissions at source. HER MAJESTY'S INSPECTORATE OF POLLUTION. Technical guidance note (monitoring) M2 , HMSO.
Part of a sector application guide for BS 7750 for oil refineries, dealing with environmental effects assessment. Contract no 7127. WATER RESEARCH CENTRE; INSTITUTE OF PETROLEUM. By: Johnson C A; Hunt D T E. CO 3370/3. WRc plc.
Specification for environmental management systems. 2nd ed. BS 7750 1994. BSI, Benzene. DEPARTMENT OF THE ENVIRONMENT – EXPERT PANEL ON AIR QUALITY STANDARDS. HMSO.
Final report: Atmospheric emissions from UK oil and gas exploration and production facilities in the UK Continental Shelf area. BROWN AND ROOT ENVIRONMENTAL; UNITED KINGDOM OFFSHORE OPERATORS ASSOCIATION LIMITED. HN08-007.REP. Brown & Root Environmental.
North Sea produced water: Fate and effects in the marine environment. E & P FORUM. no 2.62/204.

AVIATION FUEL

Specifications for aviation fuel (DERDS various). MINISTRY OF DEFENCE PROCUREMENT EXECUTIVE.
The quality of aviation fuels available in the United Kingdom: Annual survey 1992. Fuel and lubricants technical paper FLT/3/93. DEFENCE RESEARCH AGENCY – QUALITY ASSURANCE TECHNICAL SUPPORT.

MAPS

Energy map of Central Asia. 2nd ed. Petroleum Economist.
Frontier and underexplored basins of the world. Petroleum Economist.

INSTITUTE NEWS

AROUND THE BRANCHES

Aberdeen
10 May: 'The Nelson Field', Mark Hope, General Manager Northern Operations, Enterprise Oil.

Humber
11 May: 'The MaK Engine', P D Coates, Krupp Mak (London) Ltd.

London
18 May: 'The Independent Petrol Retailers' Viewpoint', C K B Petter, Petrol Retailers Association.
9 June: Annual Visit – Stansted Airport.

Southern
17 May: 'Explore it, Refine it, CERTIFY IT?', Esso Research Centre.
21 June: Field visit to BP Directional Drilling – Wytch Farm.
19 July: Review of the State of the Art Technology to make high octane components.

Yorkshire
15 June: Golf Tournament.

DEATHS

We regret to announce the deaths of the following members :-

		Born
J A Bunker,	Wimbourne, Dorset	1914
C P Garner-Richards,	Lowestoft, Suffolk	1922
D Greenaway,	USA	1934
N G Gullick,	East Sussex	1908
R V Hornby,	Wokingham, Berkshire	1920
H T Ihre,	Sweden	1947
P F Jones,	Gloucestershire	1928
J B Kenworth J B Dr,	Aberdeen	1938
G R Mitchell,	East Eussex	1915
F I A Munro,	Staffordshire	1954
E J Sims,	West Sussex	1905
K C Teasdale,	Cheshire	1915
J T Warde,	Hertfordshire	1905

CHARITY FUND RAISING EVENT

At the recent IP Southern Branch AGM,Mr I Ward presented funds raised from the 1993 Summer Ball event to The Rainbow Trust (family centred care for children with life threatening or terminal illnesses) and Solent Dolphin (a charity providing free boat trips for the disabled).

From L to R: Phil Marriott (Chairman, IP Southern Branch), Joan White (Domiciliary Carer for the Rainbow Trust), David Lamb (Organiser for Solent Dolphin) and Ian Ward (Director General, IP)

AWARD OF SPECIAL IP TIES

Special ties, commemorating 50 years membership of the IP have been awarded to 12 members and fellows:

Mr E Bowes
Mr C Brewer
Mr A Cluer
Mr B Faulkner
Mr W Ferguson
Mr J Fisher
Mr M Gardiner
Mr G Rose
Mr R Shearn
Mr R Smith
Mr F Stephens
Mr C Windebank

UK Deliveries into Consumption (tonnes)

Products	*†Feb 1993*	**Feb 1994*	*†Jan-Feb 1993*	**Jan-Feb 1994*	*% change*
Naphtha/LDF	220,518.0	250,135.0	554,123.0	550,043.0	-1
ATF - Kerosene	452,722.0	473,842.0	946,258.0	1,005,550.0	6
Petrol	1,827,950.0	1,732,982.0	3,619,327.0	3,447,767.0	-5
of which unleaded	919,160.0	966,391.0	1,816,874.0	1,916,480.0	5
of which Super unleaded	112,328.0	107,404.0	221,726.0	211,412.0	-5
Premium unleaded	806,832.0	858,987.0	1,595,148.0	1,705,068.0	7
Burning Oil	258,587.0	357,397.0	547,333.0	647,777.0	18
Derv Fuel	913,804.0	970,045.0	1,787,017.0	1,886,620.0	6
Gas/Diesel Oil	696,453.0	728,507.0	1,426,339.0	1,405,568.0	-1
Fuel Oil	997,963.0	838,003.0	1,928,056.0	1,700,040.0	-12
Lubricating Oil	64,544.0	60,390.0	129,985.0	122,397.0	-6
Other Products	682,736.0	605,135.0	1,292,704.0	1,182,479.0	-9
Total above	**6,115,277.0**	**6,016,436.0**	**12,231,142.0**	**11,948,241.0**	**-2**
Refinery Consumption	489,884.0	485,094.0	1,039,149.0	1,064,549.0	2
Total all products	**6,605,161.0**	**6,501,530.0**	**13,270,291.0**	**13,012,790.0**	**-2**
*+Revised with adjustments *Preliminary*					

INSTITUTE NEWS

NEW FELLOW

Mr A Ward
Since graduating with a degree in Chemical Engineering, Mr Ward has been solely employed within the petroleum industry. He has wide experience in refining, shipping terminal activities and exploration and production.

In 1987 he joined Amerada Hess as General Manager, Production Business, and is responsible for all exploration, appraisal and development, drilling and operated production operations in the North Sea. He is an active member of the Upstream Operations Committee.

NEW MEMBER OF STAFF

From left to right: Mr Andrew Sangster and Mr Eric Whitford

Andrew Sangster joins the Institute at the beginning of May as Technical Manager Marketing and Distribution.

For the past 23 years he has worked for Esso Petroleum in the Distribution Department. Most of the time was spent on managing the construction of pipelines and new terminal facilities, with a spell in planning. Major projects included the new Consortium Fuel Farm at Gatwick and the Vapour Recovery programme covering all major terminals and the development of a prototype balancing system for service stations.

For the past three years he has been the Environmental Manager for his department, responsible for developing a strategy for compliance with policy, legislation and consents, with particular emphasis on improving environmental performance.

He was, until his transfer, Chairman of Panel B of DOC4 Marketing Committee, developing a replacement for Chapter 3 of the Marketing Safety Code, and Chairman of Panel E, developing Environmental Guidelines for Terminals. He also contributed to the recently published 'Guidelines for Gasoline Vapour Emission Controls'.

He has also been active on behalf of UKPIA, recently negotiating with HM Customs & Excise for an extra-statutory class consent for the crediting of duty on recovered vapour at bonded installations.

Mr Sangster replaces Eric Whitford, who retired at the beginning of April after 10 years with the IP. He joined the staff at New Cavendish Street after spending the early part of his career with Shell Mex & BP.

His job title job was Manager – Marketing and Distribution. He was a secretary for a number of IP technical committees in the marketing operations area – Marketing, Service Stations, Bulk Storage and Vapour Recovery. In addition, he was Secretary to the Electrical Committee, the Aviation Committee and the LPG Committee. He has also been a member of the Safety Committee, having previously served as its Chairman.

NEW MEMBERS

Mr I M Alexander, Emerald Energy plc, 2 Ashley Avenue, Epsom, Surrey KT18 5AL
Mr P Aspinall, 76 Bristol Road, Chippenham, Wilts SN15 1NS
Mr W J Barrie, 95 Burnieboozle Crescent, Craigiebuckler, Aberdeen AB1 8NS
Mr P R Betteridge, 11 Sunnyside Avenue, Drumoak, Kincardineshire AB31 3EF
Miss M M Blakely, Montagu-Smith & Company Limited, 11 Maunsel Street, London SW1P 2QL
Dr B J Botter, Shell Expro, 1 Altens Farm Road, Nigg, Aberdeen AB9 2HY
Mr A J Brookes, Oakdene, 21 Brookfield Ride, Oxshott, Leatherhead, Surrey KT22 0LP
Mr P Dunn, 105 Warrens Hall Road, Dudley, West Midlands DY2 8DB
Mr R B Eley, 5 Beira Street, Clapham, London SW12 9LJ
Dr C E Fay, Shell UK Limited, Shell-Mex House, Strand, London WC2R 0DX
Mr C G E Fotheringham, Sheffield Insulations Limited, Righead Industrial Estate, Bellshill, Lanarkshire M14 3NA
Mr A Gebbia, Saipem UK Limited, 7-8 Lygon Place, Ebury Street, London SW1W 0JR
Mr N M Harrison, 613 London Road, West Thurrock, Grays, Essex RM16 1BJ
Mr M A Hayward, Mobil Oil Company Limited, Coryton Refinery, Stanford-Le-Hope, Essex SS17 9LL
Mr J M Hughes, Global Maritime Limited, 27 King Street, Aberdeen AB2 3AA
Mr B J Jeffers, Rocol Limited, Rocol House, Swillington, Leeds LS26 8BS
Mr W Johnstone, 26 St Crispins Road, Newtonhill, Stonehaven, Kincardineshire AB3 2PS
Mr G B Katznelson, 58a Aerodromnaya Street, Samara, 443074, Russia
Mr N Lang, 10 Manor Park, Redland, Bristol BS6 7HH
Mr T Mather, KSR International Limited, Sandiron House, Beauchief, Sheffield S7 2RA
Mr P F Matthews, Coopers & Lybrand, 32 Albyn Place, Aberdeen AB1 1YL
Mr B Mortimer, Gas Allocation Systems Limited, 32 Eastgate, Louth, Lincolnshire LN11 9NG
Dr T M Moynehan, 3 Coombe Lea, Bromley, Kent BR1 2HQ
Mr H Olmez, Atlantic Marine Survey Limited, Sanayi Sitesi 317, Sok No: 22, 31300 Iskenderun, Turkey
Miss A O Onadeko, 38 Sura Mogaji Street, Ilupeju Estate, Lagos, Nigeria
Mr A F Potter, Blacksmiths Cottage, Browston Green, Browston, Great Yarmouth NR31 9DW
Mr J Read, 12 Wincanton Close, Alton, Hants GU34 2TQ
Mr D Rees, D.M. Petcon Limited, Tanglewood, Cwmynysminton Road, Llwydcoed, Aberdare, Cardiff CF44 0UP
Mr G F Roberts, Geoventures Limited, 14 Caves Lane, Bedford MK40 3DR
Mr J A Rouse, 20 Church Lane, Gawsworth, Macclesfield, Cheshire SK11 9QY
Mrs B M Smith, On Yuen Industries Limited, Block C, Lot 328 DD 224, Clear Water Bay, Kowloon, Hong Kong
Miss J A Smith, Aberdeen University, EFISO, 23 St Machar Drive, Aberdeen AB2 1RY
Mr S C Spelman, 2 Swallow Court, Uckfield, East Sussex TN22 5YB
Mr W D Stutesman, Muse, Stancil & Company, 3 Berkeley Square, London W1X 5HG
Mr C Sykes, Thistle Fuels Limited, Clarence House, Shielfield Terrace, Tweedmouth, Berwick-Upon-Tweed TD15 2EE
Mr M J Wilson, Meadow Cottage, Inchmarlo, Banchory, Kincardineshire AB31 4BS
Mr R Wispelwey, Servo Oilfield Services Limited, Kirkhill Place, Kirkhill Industrial Estate, Dyce, Aberdeen AB2 0ES

STUDENTS

Mr J B Paterson, 2 Langham Mansions, Earls Court Square, London SW5 9UH

Corrosion-free storage tanks

The problems of corrosion in underground fuel tanks are normally associated with steel. But according to Klargester Environmental Engineering of Aylesbury, Buckinghamshire, these problems can now be eliminated by using its range of GRP (glass reinforced polyester) tanks.

The single-wall or double-wall tanks are manufactured under BS5750 quality assurance procedures. Lightweight and easy to install, they are available in sizes from 18,000 to 55,000 litre capacities.

The tanks are designed to provide a corrosion-free, highly-durable, rot and leak-proof fuel storage solution on garage forecourts and vehicle refuelling points.

Installation of a glass-reinforced polyester storage tank on the M4

Two new IBC containers

Two intermediate bulk containers (IBCs) from the T&D Bison range are designed specifically for the transportation and on-site storage of diesel fuel and other water-polluting, potentially hazardous liquids.

Type DST comprises a stainless steel container housed in a heavy, protective, robust and galvanised mild steel frame, providing handling, stacking and inspection facilities. The equipment specification includes a 460mm hinged manway cover with bolted closures, filling equipment, level indication equipment, and a metered pump with hose nozzle for controlled discharge.

The Type LPT is available in either 304 or 316 grade stainless steel. Design features include a 460mm manway cover with a clamp band closure, a filling point, level control equipment, a dip pipe for attaching discharge equipment such as pumps, a pressure/vacuum relief vent, and a handling pallet.

Both types are approved to UN and IFBT regulation standards and each has a capacity of 1,000 litres.

The manufacturer's complete range of IBCs encompasses 26 design types. This includes containers made from a variety of materials: plastic, mild steel, stainless steel and aluminium.

Fire protection for bunded areas

The new Angus Fire Anderson Pourer is designed to protect bunded areas around bulk fuel storage.

A semi-fixed medium expansion foam bund pourer, it is designed for rapid deployment in the event of a spillage or fire in a bund. Highly flexible in use, its lightweight and compact design allows firefighters to carry it to the most appropriate position on the edge of the bund.

Once deployed, its arrangement of legs is designed to ensure reliable operation without any further supervision. While operating at low pressures that minimise pumping capacities and water requirements, the largest model can deliver 72m^3/min of high quality medium expansion foam.

'There is no doubt that many of the world's most devastating storage tank fires either originated or escalated in the bunded or diked region,' said Angus Fire. 'Bund firefighting is fraught with difficulties, and traditional techniques involving the use of low expansion foam monitors and hand-held branchpipes have frequently proven both ineffective and dangerous for fire crews.'

The pourer, claims the company, is designed as an easy-to-handle, low-cost alternative which has exceptional fire-fighting performance.

Double-resistance bitumen

A new bitumen, designed to reduce traffic congestion dramatically, has been launched in Britain by Shell.

Shell Multiphalte has been developed to have a higher stiffness than conventional bitumens under heavy traffic loads and at high temperature, resulting in increased resistance to rutting.

Its performance was monitored over six years - from 1987 to 1993 – on a test stretch of the A38 near Burton in Staffordshire by the Transport Research Laboratory (TRL), an executive agency of the Department of Transport.

Comparing its performance with that of conventional bitumen, the TRL said: 'The resistance to permanent deformation in the wheeltrack is generally improved by a factor of between two and three.'

Before its launch in the United Kingdom, the bitumen was extensively tested both in laboratories and in 17 separate road trials. It has already been applied to over 1,000 km of road in France, Denmark, Holland, Belgium, Sweden, Norway, Australia and Canada.

The CBI estimates that congestion costs Britain £15 billion a year – much of it caused by essential maintenance of its road network. One of the main reasons for premature road failure is rutting, caused by increasingly heavy axle loadings and resulting in a rougher ride for drivers and increased risk of structural failure of the road base.

Mr David Weston, Managing Director of Shell Bitumen, said: 'By the year 2000, Britain's car traffic is set to rise by at least 18 percent and lorry traffic by about 24 percent. It will be vital for Britain to have a strong and durable road network that can resist the deformation and cracking threatened by these increased loads.'

An alternative method of fire protection for bunded areas

Emission monitoring system for Conoco

An emission monitoring system incorporating zirconia, paramagnetic and chemiluminescence analysers to measure oxygen and nitrogen oxides has been supplied by Servomex to Conoco's South Humberside refinery.

Features of the system include a specially-designed heated sample probe and heated pipes, all manufactured in 316 stainless steel, and a permeation dryer.

The system is part of a coker expansion project being carried out by Conoco. Four model 700B zirconia analysers measure the oxygen content in flue gases from process heaters. A model 1400B paramagnetic analyser and a model 1491 chemiluminescence analyser then monitor oxygen and NO/NOx emissions respectively in a common outlet stack from the process heaters. Features of the instruments include high and low level oxygen alarms and a high NOx alarm.

New monitoring system part of Conoco's coker expansion project

Fitted with 1,000°C sampling probes, the zirconia analysers measure the oxygen content and transmit the readings to control units located in the analyser house.

Accurate data with shallow seismic

A new shallow seismic processor has been launched by TSS (UK) Ltd. The 360 Series is a new operator-friendly digital signal processing unit for use with any single channel shallow seismic system, which also provides an affordable route to digital Seg-Y data storage.

Designed to provide a cost-effective solution to the problems of acoustic data collection caused by attenuation, noise-interference, motion distortion and seabed absorption, the system is said to be suited to a wide range of environments, from simple open-boat operation to larger surveys requiring quality monitoring during digital data logging.

Commenting on the new series, Mr Philip Goymour, Managing Director of TSS, said: 'Survey operations such as pre-drilling, sewage out-fall construction, pipeline route and aggregate surveys, can now benefit from more accurate data. Specifically designed for use anywhere from the shoreline up to the edge of the Continental Shelf, the 360 Series offers a highly flexible operating capability in a cost-effective unit.'

Integrated into the new design are many of the features of the original 300 Series units, improved by the latest digital processing techniques. The system incorporates a number of important features including: time variable gain, time varied stacking, time varied bandpass filter and swell filter.

Molecular sieves dry natural gas

Brownell offers a range of molecular sieves adsorbents, said to be capable of both reducing potentially damaging moisture levels in products and processes to a safe or acceptable level and then maintaining those levels.

The sieves dry out more completely than other adsorbents, claims the manufacturer, and remain effective at relatively high process temperatures. They can dry mixed streams without altering stream composition. In addition, they selectively adsorb other contaminates, which, according to the manufacturer, demonstrates the advantages of molecular sieves as an alternative to silica gel and activated alumina. Molecular sieves also purify and dry in one step and provide high product recovery and separations.

The sieves are available in the principal grades of 3A, 4A, 5A and 13X.

Sieves reduce product moisture

New battery testing technique

A new technique for testing UPS system batteries has been developed jointly by AEG's UK Engineering facility and the University of Manchester Institute of Science & Technology (UMIST).

The technique is designed to allow batteries to discharge their stored energy back into the mains supply, without polluting the quality of the supply and without wasting valuable stored energy by discharging batteries into dummy loads.

AEG claims that Battery Discharge Testing (BDT) will save up to 94 percent of stored battery energy, while testing the UPS system to full load during substantial test programmes.

The BDT technique utilises a simple theoretical principle. In essence, the output of the UPS is easily connected to the mains supply via an inductor and the flow and direction of current regulated by using a phase shift control circuit. Thus battery energy is fed back into the mains while the inductor creates a built-in immunity against short circuits.

The phase shift control allows mains 'pollution' to be totally avoided, claims AEG. A further benefit is that both UPS systems and the load are protected from risk should a malfunction occur during the test procedure.

Under normal UPS operation the load is fed from the mains, via a charger and inverter circuit, and the batteries are thus kept fully charged. When testing is required, the inverter circuit is switched off, transferring the load automatically via a load switch to the bypass mains supply with no break in load power.

'We are convinced that as environmental considerations become more important , any energy saving technique will be welcome,' said Mr Jim Barnard, AEG UK's UPS Engineering Manager.

TECHNOLOGY NEWS

Ethernet link cuts cost of process system

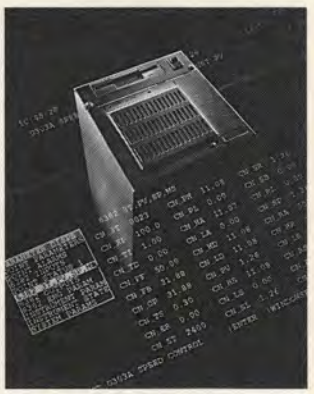
Eurotherm Process Automation announces the T215 LINserver, a communications interface that provides an Ethernet link from the company's Maxi-Vis T4000 computer system to the Network 6000 local instrument network (LIN).

By allowing plant control units to be connected to an Ethernet network at any convenient point, LINserver has enabled Network 6000 VAX based process management systems to be implemented on lower-cost, high performance desktop workstations 'resulting in a significant price reduction'.

The interface utilises the TCP/IP network protocol and a standard interface to permit real-time open access to all process data on the LIN by host computer systems as well as the manufacturer's Network 6000 Maxi-Vis.

Connections to points in the distributed LIN database are established dynamically in response to requests by client nodes, eliminating the need for configuration. The LIN is described as 'a secure, deterministic, industrial network backbone' with redundant cabling up to one km.

'Open software and communications environment and use of the X-Windows display standard make Network 6000 Maxi-Vis a sound choice for users needing to integrate islands of automation into a coherent system structure with a consistent operator interface,' according to Eurotherm.



The T215 LINserver link

New pump valve improves stability

Roper Pump has fitted to its 'C' series range of rotary gear pumps a new high performance relief valve to give more accurate pressure relief and stability.

The new valve employs a quick-opening design which reduces valve overpressure and prevents pressure fluctuations in the system. It is easily adjustable and may be assembled for reverse rotation.

The 'C' series range of pumps are manufactured from 316 stainless steel or cast steel. The helical gears are bi-directional and are designed to give quiet, smooth operation. Models are available with capacities up to 45m^3/hr and pressures to 15 bar.

Designed to meet the stringent demands of the chemical and petroleum refinery industries, they feature a modular seal housing design which can accommodate virtually any type of shaft seal.

Two standard types of mechanical seal housings are available: a mono-modular seal housing and a gland stuffing box. Both versions provide a multitude of seal options for various applications. Environmental controls are offered to guard against toxic leaks and to extend seal life.

LPG safety video

A new video, entitled 'Fill Safe', has been produced by the Health and Safety Executive. It looks at the precautions necessary at premises where liquefied petroleum gas (LPG) cylinders are filled for commercial re-sale, lease or hire.

Available from CFL Vision, it examines cylinder design and identification, as well as fire precautions. It also covers the Pressure Systems and Transportable Gas Containers Regulations 1989 and appropriate codes of practice and British and European standards.

Fluorination process for IBCs

Manufacturer and supplier of intermediate bulk containers (IBCs), Schutz (UK) Ltd has developed a new off-line fluorination process (Surface Modified Plastics) which provides a double permeation barrier to reduce losses through the HDPE walls of a container.

The process exposes both inner and outer surfaces to fluorine gas, creating a double barrier layer. The coating intensifies chemical resistance against highly-flammable, toxic and caustic material and a protection layer is created which is similar to PTFE. Originally developed for the automotive industry, the treatment builds an odour barrier for gasoline, diesel oil and fuel oil.

Treatment with fluorine only changes the polymer molecules on the surface of the container. As the chemically-changed areas are only one part of the total wall cross-section, the treated container does not therefore experience a measurable change in terms of surface tension, impact resistance or strength.

Re-connection winch

NIM Winches recently delivered its largest single winch order for offshore use in the oilfields of the South China Sea.

The winch was designed for the re-connection of an offshore loading facility. It has a rated pull of 400 tonnes on one drum with an adjacent drum lifting 135 tonnes. The unit is hydraulically-powered, while the two drums are designed to allow for continuous pulling with the load being transferred from synthetic rope to steel automatically.

Winching in the South China Sea

CONTACTS

Klargester Environmental Engineering	0296 630190
T&D Bison	0274 728285
Shell Bitumen	0932 568211
Angus Fire	0844 214545
Servomex	0892 652181
AEG (UK)	0734 698330
TSS (UK)	0869 343666
Brownell	081-965 9281
Eurotherm Process Automation	0903 205277
Roper Industries (Europe)	0284 760406
CFL Vision	0937 541010
Schutz (UK)	0909 478863
Nim Group	0773 608915

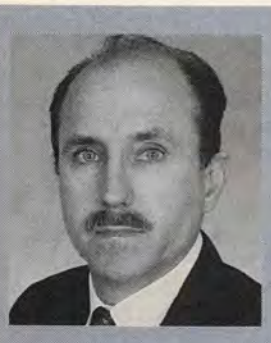
PEOPLE

Mr Peter Willcox, Chief Executive of BHP Petroleum will retire with effect from April, after six years with the company. During this time, he was responsible for the development of three separate groups within the petroleum division: the Australian exploration and production business, the Asian operations and Hamilton Oil in the UK.

Mr Ron Wheeler has taken-over as Managing Director of Simon Access from **Mr John Barke**r who has resigned from main board of Simon. **Mr Tom Neville**, a Non-Executive Director, has also resigned after six years on the board. Mr Wheeler joined Simon in 1988 after it took over Telelect.

Mr David Parker has joined the Confederation of British Industry's National Council as Director-General of the UK Petroleum Industry Association based in London.

Clyde Petroleum plc has named **Mr Malcolm Gourlay** to succeed Dr Colin Phipps as Executive Chairman in July. Mr Gourlay is at present Chief Executive. **Mr Roy Franklin** currently Managing Director of the UK and International Regions will become Group Managing Director. Mr Franklin joined



Mr Larry Sullivan has been appointed Director of Marketing for Chemstar Products Company. Sullivan was previously Manager of special product development with Conoco Limited in the UK.

Mr Kourosh Bassiti has been named Head of Energy at Scottish Enterprise National (SEN). He joins SEN from his previous position as Director of the Aberdeen Offshore Technology Park.

Clyde in 1991 from British Petroleum.

Mr Mike Saunders has been appointed Managing Director of Repsol. He was previously retail marketing director at Elf UK Ltd.

M-I Drilling Fluids Company, L.L.C., has named **Mr Loren K Carroll** President and Chief Executive Officer.0 Meanwhile, at Smith International, former treasure **Mr John Kennedy,** takes over as vice president and chief accounting officer.

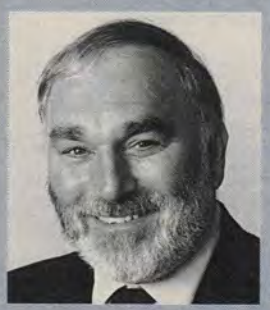
Mr Frederick W. Hadfield has been appointed President of the Ingersoll-Dresser Pump Company, a joint venture between Ingersoll-Rand Company and Dresser Industries Inc. He was most recently Chairman of Ingersoll-Rand.

Mr Charles M. Carr, Jr formerly of Amoco Production Company, and **Mr John E Fletcher** have been appointed to the Board of Directors of Ranger Oil Ltd. Mr Fletcher is Ranger's Vice President, Legal and Corporate Secretary.

Mr Reg Jones has been appointed Director, Northern Division of P&O Roadtanks, based in Middlesbrough. He will be responsible for Stallingborough, Hull, Middlesbrough and Felling.

Mr Rudolph Agnew will take over from Lord Rees as Non-Executive Chairman of LASMO this month. Most recently, Agnew was Chairman and Chief Executive of Consolidated Gold Fields plc.

Following recent restructuring at OMV (UK) Ltd, **Mr Martyn David** previously Managing Director is now Executive Chairman. **Mr Gerhard Schneider** replaces David as Managing Director.



Chemicals distributor Ellis & Everard has appointed Mr Bob Walker UK Business Manager for its alkoxylates business in Middlesbrough responsible for the marketing and distribution of non-ionic surfactants, polyethylene glygols and ethanolamines.

The International Association of Geophysical Contractors has named **Mr H H Hamilton, III,** current Geco-Prakla Vice President and General Manager for North and South America, the new Chairman. **Mr Robert E Lowe** has been elected Vice Chairman and Chairman-elect in 1995.

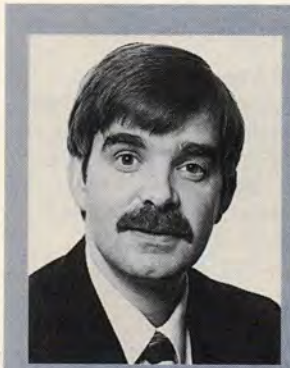
Oceaneering International Inc has appointed **Mr Dick Frisbie** the new Senior Vice President Marketing and Technology. He will continue his responsibilities as director of Oceaneering's remotely operated vehicle (ROV) capabilities.

Mr Michael C Small takes over from **Mr Robert Sorrentoin** as General Manager of Emerson and Cuming Inc. **Mr Billy Nitsche**, formerly US sales manager for offshore oil buoyancy, has been appointed Sales Manager, Energy Products worldwide.

Mr Jeff Howell has been appointed Manager of Health/Safety/Environment for Western Geophysical, a division of Western Atlas Inc. He will be based in Houston.

Former Executive Vice President, **Mr K Clark Christensen** has been named President and Chief Operating Officer of American Gilsonite Company.

Mr Andy Henderson has bee appointed Project Engineer for Centrilift's involvement in the Chevron operated North Sea Alba development.



Mr Craig Sommerville joins Polaris International, as navigation manager. He will promote SeisNet, a state-of-the-art integrated navigation and survey control system for seismic vessels. He joins Polaris from Halliburton Geophysical Services.

FORTHCOMING EVENTS

May

2nd-5th
Houston: '1994 Offshore Technology Conference'. Details: Offshore Technology Conference, P.O. Box 833868, Richardson, Texas 75083-3868, USA.
Tel: 1 (214) 952 9494.
Fax: 1 (214) 952 9435.º

5th
Aberdeen: Fifth Mike Adye Lecture: 'New Frontiers'. Details: Marine Technology Directorate, 19 Buckingham Street, London WC2N 6EF.
Tel: (071) 321 0674.
Fax: (071) 930 4323.

5th-6th
Istanbul, Turkey: '3rd Mediterranean Gas Market Conference'. Details: Overview Conferences, 82 Rivington Street, London EC2A 3AY.
Tel: (071) 613 0087.
Fax: (071) 613 0094.

7th-10th
Cairo: 'Fifth Arab Energy Conference'. Details: OAPEC, P O Box 108 Maglis Al Shaab, 11516 Cairo, Egypt.
Tel: (202) 354 2660
Fax: (202) 354 2601.

9th-12th
Birmingham: 'IFSEC 94'. Details: Richard Pegler, IFSEC, Blenheim Group plc, 630 Chiswick High Road, London W4 5BG.
Tel: (081) 742 2828.
Fax: (081) 994 9735.

9th-12th
London: 'THERMIE at CEETEX 94'. Details: European Commission, Directorate-General for Energy, 200 rue de la Loi, B-1049 Brussels.
Fax: 32 (2) 295 0577.

10th-11th
Aberdeen: 'Information for Offshore Engineers'. Details: IBC Technical Services Ltd, Gilmoora House, 57-61 Mortimer Street, London W1N 7TD.
Tel: (071) 637 4383.
Fax: (071) 631 3214.

10th-12th
Birmingham: 'Control and Instrumentation Exhibition'. Details: MGB Exhibitions Ltd, Marlowe House, 109 Station Road, Sidcup, Kent DA15 7ET.
Tel: (081) 302 8585.
Fax: (081) 302 7205.

10th-13th
Singapore: 'Disaster at Sea: Preparing for and Managing Oil Spill'. Details: Institute of International Research, Suite 0803, Golden Wall Centre, 89 Short Street, Singapore 0718.
Tel: 65-338 3521.
Fax: 65-336 4017.

11th-12th
London: 'Structural Materials in Marine Environments'. Details: The Institute of Materials, Conference Department, 1 Carlton House Terrace, London SW1Y 5DB.
Tel: (071) 235 1391.
Fax: (071) 823 1638.

11th-12th
London: 'Terminal Operation and Dynamic Measurement'. Details: Abacus International, 214 Inchbonnie Road, South Woodham Ferrers, Essex CM3 5WU.
Tel: (0245) 328 340.
Fax: (0245) 323 429.

11th-13th
Beijing: '1994 China Summit – The Socialist Market Economy of the PRC, 1994-2000'. Details: International Herald Tribune Hong Kong Office.
Tel: 852- 9222 1176.
Fax: 852- 9222 1190.

12th-13th
Aberdeen: 'Advances in Subsea Pipeline Engineering and Technology'. Details: Society for Underwater Technology, PSTI House, Exploration Drive, Offshore Technology Park, Bridge of Don, Aberdeen AB23 8GX.
Tel: (0224) 823 637.
Fax: (0224) 820 236.

16th-17th
London: 'Oil and Gas Software Development '. Details: The Braithwaite Group, Oil Soft House, 1 Gorse Road, Cookham, Berks SL6 9LL
Tel: (0628) 525492.
Fax: (0628) 521928.

18th-19th
Gatwick: 'Oil Pollution Control Conference'. Details: Trevor Holburn, Conference Secretary, Room 1/04A Spring Place, 105 Commercial Road, Southampton SO1 0ZD
Tel: (0703) 329 317.
Fax: (0703) 329 440.

19th
London: 'Clean Fuel Technology'. Details: IBC Technical Services Ltd, IBC House, Gilmoora House, 57-61 Mortimer Street, London W1N 7TD.
Tel: (071) 637 4383.
Fax: (071) 631 3214.

19th-20th
London: 'Optimum Logistics in Oil Supply and Distribution'. Details: IIR Ltd.,Industrial Division, 28th Floor, Centre Point, 103 New Oxford Street, London WC1A 1DD
Tel: (071) 412 0141.
Fax: (071) 412 0145.

20th-23rd
Surrey: 'The Mechanics And Operations of Oil Trading'. Details: Petroleum Economist, P O Box 105, 25/31 Ironmonger Row, London EC1V 3PN.
Tel: (071) 251 3501.
Fax: (071) 253 1224.

23rd-24th
London: 'Frontier Exploration'. Details: Petroleum Economist, P O Box 105, 25/31 Ironmonger Row, London EC1V 3PN.
Tel: (071) 251 3501.
Fax: (071) 253 1224.

24th
London: 'All at Sea with Fuels and Lubes'. Details: Caroline Little, The Institute of Petroleum.

24th-26th
Edinburgh: 'International Conference on Pipeline Systems'. Details: Miss Tracey Peters, BHR Group Ltd., Cranfield, Bedford MK43 OAJ
Tel: (0234) 750 422.
Fax: (0234) 750 074.

24th-28th
Baku, Azerbaijain: 'The International Caspian Oil and Gas Exhibition and Conference'. Details: Spearhead Exhibitions Ltd., 55/59 Fife Road, Kingston upon Thames, Surrey KT1 1TA.
Tel: (081) 549 583.
Fax: (081) 541 5657.

25th-27th
Stavanger, Norway: 'International Energy Conference' Details: IAEE, Bennett Reisebureau A/S, P O Box 6827 - St Olavspl. N-0130 Oslo, Norway.
Tel: 47 (22) 94 36 00.
Fax: 47 (22) 20 23 80.

26th-27th
Paris: 'The Future of National Oil Companies in Exporting Countries'. CGEMP, Universite Paris-Dauphine, Place du Marechal de Lattre de Tassigny, 75775 Paris.
Tel: 33 (44) 05 44 85.
Fax: 33 (44) 05 44 84.

28th-31st
Istanbul: 'International Petrol Station Exhibition'. Details: Expoconsult B.V. Industrieweg 54, PO Box 200, 3600 AE Maarssen, The Netherlands.
Tel: 31 (3465) 73777.
Fax: 31 (3465) 73811.

29th- June 1st
Stavanger, Norway: '14th World Petroleum Congress' Details: WPC, 61 New CavendishStreet,

FORTHCOMING EVENTS

London W1M 8AR
Tel: (071) 636 1004.
Fax: (071) 255 1472.

June

3rd-5th
Lae, Papua New Guinea: 'PNG Geology, Exploration and Mining Conference'. Details: Organising Committee GEM '94, PNG Geological Survey, Private Mail Bag, Port Moresby Post Office, Papua New Guinea.
Tel: (675) 212 422.
Fax: (675) 211 360.

6th-7th
Prague, Czech Republic: '1994 Central/East European Gas Conference'. Details: Overview Conferences, 82 Rivington Street, London EC2A 3AY.
Tel: (071) 613 0087.
Fax: (071) 613 0094.

7th-8th
London: 'Negotiating Gas Contracts'. Details: IIR Limited: Industrial Division, 28th Floor, Centre Point, 103 New Oxford Street, London WC1A 1DD.
Tel: (071) 412 0141.
Fax: (071) 412 0145.

7th-9th
Birmingham: 'Forecourt Marketing and Equipment Show'. Details: Blenheim Events, Blenheim House, 630 Chiswick High Rd, London W4 5BG.
Tel: (081) 742 2828.
Fax: (081) 994 9735.

8th-9th
London: 'Petroleum Trading and Measurement Accuracy'. Details: Abacus International, 214 Inchbonnie Road, South Woodham Ferrers, Essex CM3 5WU.
Tel: (0245) 328 340.
Fax: (0245) 323 429.

8th-9th
London: 'The Financing and Economics of Gas and Electricity Projects'. Details: IBC Financial Focus Ltd, 57/61 Mortimer Street, London W1N 7TD.
Tel: (071) 637 4383.
Fax: (071) 323 4298.

8th-10th
London: 'Financial Management & Accounting for the Oil & Gas Industry'. Details: Tom Jones, MD Consultancy, 18a Carden Place, Aberdeen AB1 1UQ.
Tel: (0224) 626268.
Fax: (0224) 626950.

8th-10th
Birmingham: 'Forecourt Shop & Convenience Retailing'. Details: Blenheim, 630 Chiswick High Road, London W4 5BG.
Tel: (081) 742 2828.
Fax: (081) 994 9735.

9th
Aberdeen: 'Introduction to Oil and Gas Subsea Engineering'.Details: I Mech E, 1 Birdcage Walk, London SW1H 9JJ.
Tel: (071) 222 7899.
Fax: (071) 222 4455.

9th -10th
London: Border and Territorial Disputes in the Energy Sector Conference. Details: Petroleum Economist, P O Box 105, 25/31 Ironmonger Row, London EC1V 3PN.
Tel: (071) 251 3501.
Fax: (071) 253 1224.

10th-13th
Newbury: 'Understanding Oil Industry Fundamentals'. Details: Petroleum Economist, P O Box 105, 25/31 Ironmonger Row, London EC1V 3PN.
Tel: (071) 251 3501.
Fax: (071) 253 1224.

12th-15th
Denver, Colorado: 'Analogs for the World - AAPG Annual Meeting'. Details: American Association of Petroleum Geologists, P O Box 979, Tulsa, Oklahoma 74101-0979, USA.
Tel: 1 (918) 584 2555.
Fax: 1 (918) 584 2274.

13th-16th
The Hague: '39th ASME International Gas Turbine & Aeroengine Congress'. Details: IGTI, 5801 Peachtree Dunwoody Road, Suite 100, Atlanta, Georgia 30342-1503.
Tel: (404) 847 0072.
Fax: (404) 847 0151.

14th
Aberdeen: 'Pipeline Emergency Shutdown Valves'. Details: IBC Technical Services Ltd, IBC House, Gilmoora House, 57-61 Mortimer Street, London W1N 7TD.
Tel: (071) 637 4383.
Fax: (071) 631 3214.

15th-16th
Aberdeen: 'Preventing oil Discharge From Drilling Operations' Details: IBC Technical Services Ltd, IBC House, Gilmoora House, 57-61 Mortimer Street, London W1N 7TD.
Tel: (071) 637 4383.
Fax: (071) 631 3214.

15th-16th
London: 'World Energy Outlook 2000'. Details: Petroleum Economist, P O Box 105, 25/31 Ironmonger Row, London EC1V 3PN.
Tel: (071) 251 3501.
Fax: (071) 253 1224.

20th-21st
Aberdeen: 'Optimising Your Reservoir Management'. Details: IIR Limited: Industrial Division, 28th Floor, Centre Point, 103 New Oxford Street, London WC1A 1DD.
Tel: (071) 412 0141.
Fax: (071) 412 0145.

20th-23rd
Milan:'19th World Gas Conference'. Details: Snam S.p.A.,Ufficio Stampa, Franco Perugia, Piazza Vanoni, 1, I 20097 San Donato Milanese MI.
Tel: 39 (2) 520 5457.
Fax: 39 (2) 520 23030.

22nd-23rd
Aberdeen: 'Floating Production Systems'.IIR Limited: Industrial Division, 28th Floor, Centre Point, 103 New Oxford Street, London WC1A 1DD.
Tel: (071) 412 0141.
Fax: (071) 412 0145.

22nd-24th
London: 'Introduction to Oil Industry Operations Course'. Details: Caroline Little, The Institute of Petroleum.

23rd-24th
Noordwijk, The Netherlands: '1994 European Oil Refining Conference and Exhibition'. Details: WEFA Ltd, Mappin House, 4 Winsley Street, London W1N 7AR.
Tel: (071) 631 0757.
Fax: (071) 631 0754.

24th-3rd July
Manchester: 'EnviroMan '94 – Exhibition and Conference'. Details: Rebekah Farr, Marstonbury Ltd.,12 Alban Park, Hatfield Road, St. Albans, Hertfordshire AL4 OJJ.
Tel: (0727) 831 337.
Fax: (0727) 841 694

27th-29th
London: 'Introduction to Petroleum Economics Course'. Details: Caroline Little, The Institute of Petroleum.

July

3rd-6th
Birmingham: 'LNG 11'. Details: The Event Organisation Company, 8 Cotswold Mews, Battersea Square, London SW11 3RA.
Tel: (071) 228 8034.
Fax: (071) 924 1790.

IP THE INSTITUTE OF PETROLEUM

London Branch

'Competition and the Environment – The Independent Petrol Retailer's Viewpoint'

By Mr C K B Petter, *Director, Petrol Retailers Association*

at the Institute 6.00 pm, Wednesday 18 May 1994

Bruce Petter is well known for his forthright views about petrol retailing. The independent retailer is faced today with new constraints. Despite the deregulation initiative, controls are increasing, not least environmental pressures from bodies such as the NRA. How will this impact on licensing? The recent DTI ruling regarding restrictions on the sale of goods at leased sites is a radical change for licensees. Hear what the PRA has to say on these issues.

Tea and biscuits will be served at 5.15 pm and the meeting will be preceded at 5.30 pm by the Branch AGM. Light refreshments, kindly sponsored by Mobil, will be available afterwards.

Enquiries: Mrs E Walker, Hon Secretary, London Branch
Tel: 0926-404257

IP THE INSTITUTE OF PETROLEUM

INSTITUTE OF PETROLEUM

NEW TELEPHONE NUMBER

From 16 May the IP will have a new telephone number for its main switchboard:

(071) 467 7100

For the time being calls made to the present number (071 636 1004) will be automatically diverted to the new number.

Individual members of staff will also have their own direct lines – these numbers will be announced shortly.

The present fax number remains unchanged –

(071) 255 1472.

IP THE INSTITUTE OF PETROLEUM

London Branch

Annual Visit – Stansted Airport

9 June 1994

The Annual Visit of the London Branch will be to Stansted Airport, Essex, on Thursday, 9 June 1994.

Branch members will be privileged in having an in-depth look behind the scenes of a busy international airport, including terminal systems, track transit, baggage handling and building services. Every effort will be made to show visitors specific areas of interest. Duration – about 2 hours.

Numbers will be restricted to 26 on a first-come-first-served basis.

For further details and registration please contact:

Mrs E Walker, Hon Secretary, London Branch
Tel: 0926-404257

As soon as possible, but not later than 23 May.

LE HAVRE - ANTIFER

CRUDE OILS AND PRODUCTS BULK STORAGE

Compagnie

Industrielle

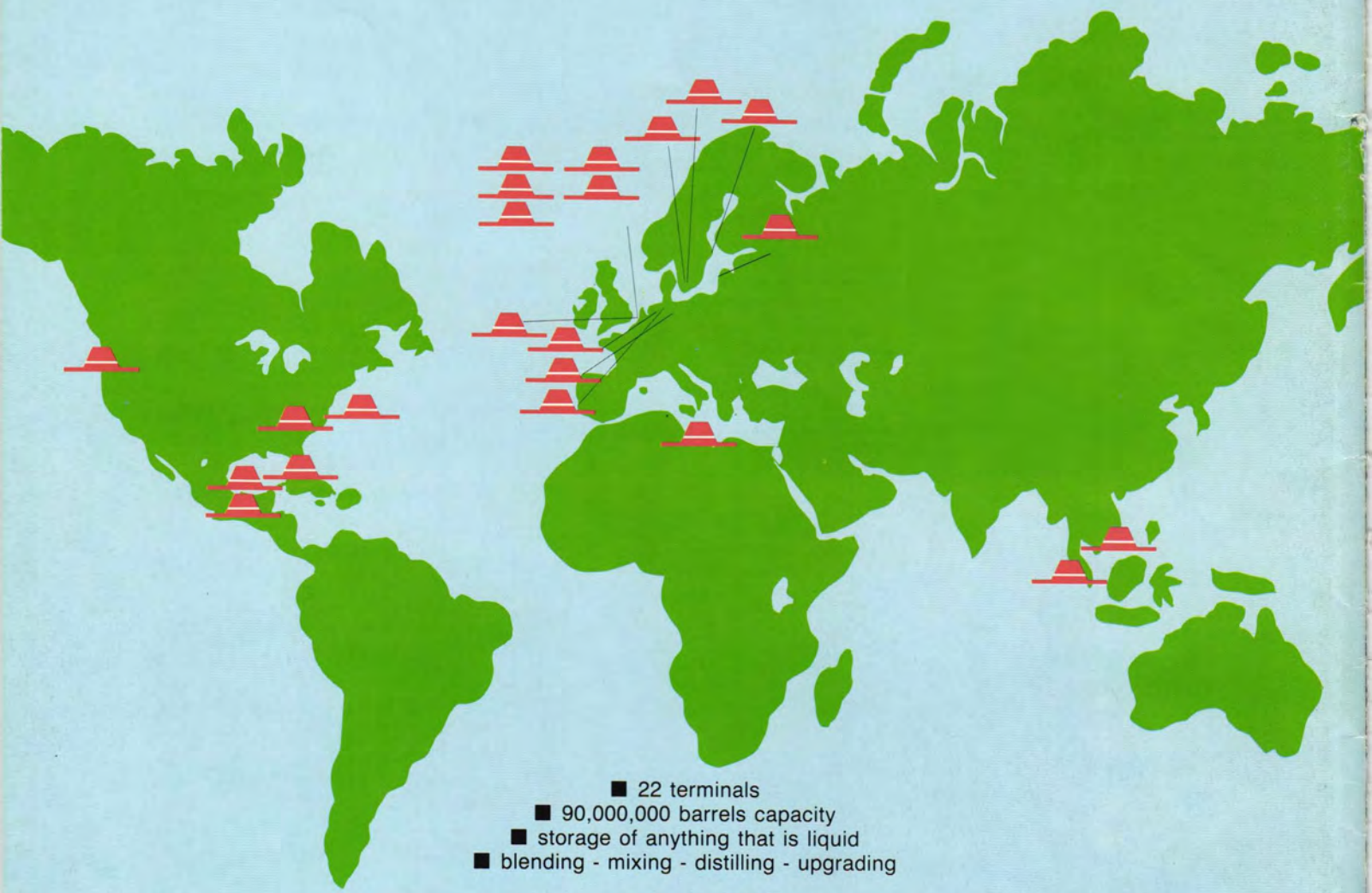
Maritime

CIM - 36, rue de Liège
75008 Paris - France
Tél. (33.1) 43 87 33 49
Telex 280330 F CIMDGPA

Commercial Enquiries
B. Salaün - Sales Manager
Direct Line (33.1) 43 87 43 14

CIM Locations	Total Capacity m3	Tank size range m3	Number of tanks	Products stored	Comments
LE HAVRE	3,320,000	60,000 to 150,000	38	Crude oils	9 jetties, Max Draught 70ft. VLCC up to 250,000 MT Barge and pipelines Transhipment. Direct link to open sea
ANTIFER	655,000	20,500 to 151,000	2 4	Crude oils	2 jetties. Max Draught 98ft and 82ft. ULCC up to 550,000 M.T. Transhipment. Relay connected to Le Havre facilities above through pipeline. Re-loading on site.
LE HAVRE	1,165,000	600 to 61,000	83	Refined Products Petrochemical Feedstock	Naphta. G.O. Gasoline. Premium. Jet. Kerosene. Deballasting equipment Connected with TRAPIL pipelines.

PAKTANK-tankstorage



- 22 terminals
- 90,000,000 barrels capacity
- storage of anything that is liquid
- blending - mixing - distilling - upgrading

PAKTANK-offices:

Paktank AB
Baldersgatan 4
S-411 Gothenburg
tel. (31) 803950
telex 20894
fax (31) 159000

Pakterminal Ltd.
Port of Muuga
Maardu TEE 57
EE0103 Tallinn
Estonia
tel. (372) 6-319733
fax (372) 5-249694

Paktank GmbH
Duisburgerstrasse 15-17
41460 Neuss/Rhein
tel. (2131) 91000
telex 8517726
fax (2131) 910099

VTG-Paktank Hamburg GmbH
Brandsende 2-4
2000 Hamburg 1
tel. (40) 322843
telex 2163506
fax (40) 322630

Paktank Méditerranée S.A.
B.P. 87, 2048 Ariana, Tunisia
tel. 216-1-885534-885679-885900
telex 14895
fax 216-1-885860
tel. Rotterdam (10) 4002130/
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Paktank Corporation
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