The Institute of Petroleum

AUGUST 1992

PETROLEUM REVIEW

Independent bulk storage

A survey of European bulk storage capacity

Paint

Experiments with 'green' paint

Kazakhstan

Western interests sign up new deals for Tengiz and Karachaganak

Philippines

Recent discoveries raise hopes of substantial find

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Cover photo: Robert F Bauer drilling ship in Philippine waters

... news in brief

18 June

Burmah Castrol has formed a wholly-owned subsidiary in Argentina, Castrol Argentina, through the purchase of the share capital of its local agent for £1m.

Lasmo announced the sale of its UK onshore exploration and production assets to the Scottish oil company Pentex for $8m.

19 June

Russia plans to put up for tender stakes in three major oilfields in western Siberia, according to acting Russian prime minister Yegor Gaidar.

20 June

Aviva Petroleum, the Dallas-based energy exploration and production company, is to launch a US equity issue and seek a listing on a US exchange in addition to its existing London listing.

Enterprise Oil raised £81m via the issue of fixed-rate US dollar preference shares. Enterprise is the first UK non-bank company to raise equity capital through preference shares in the United States.

23 June

Maersk Oil Qatar, an affiliate of Maersk Oil and Gas, has signed an exploration and production sharing agreement with the Qatari government covering some 3,500 square kilometres in the Gulf.

24 June

The French government put a price of FFr230 on Total's shares to raise FFr5.3bn from the sale of its 22.9m shares in the company.

Shell has awarded Aker Stord a NKr1.5bn contract to build the deck for its giant Troll field gas production platform in the Norwegian sector of the North Sea.

25 June

Chevron is to join a joint venture consortium planning to build an oil pipeline linking Kazakhstan with Oman at a cost of up to $1.6 billion.

Royal Dutch-Shell plans to build a joint venture oil refinery costing at least $3bn in China's southern province of Guangdong.

Deminex was Germany's leading international oil producer in 1991, with 6.7m tonnes of crude oil lifted — an increase of 1.5 percent on the 6.6m tonnes in 1990.

BP announced plans to cut its American workforce by up to 700 to make annual savings of £67m.

26 June

Texaco is delaying a decision on whether to move 1,000 staff to Canary Wharf in London's Docklands.

30 June

A group of companies led by Elf Petroland has discovered gas in the Dutch sector of the North Sea about 80 miles north-west of Den Helder. The well tested at up to 18.4 million cubic feet of gas a day.

1 July

Colombia's Senate has approved a controversial new tax reform bill that, if passed by both Houses of Congress, would require oil companies to pay additional taxes on oil exports to help the country's finances.

2 July

Agip is pursuing a subsea development concept for the Thelma and Thelma South East prospects in the same UK North Sea block.

4 July

Pipelaying work has been completed by European Marine Contractors on Statoil's giant Zeepipe project which stretches from the Sleipner area in Norway to the Zeebrugge terminal in Belgium.

6 July

Private foreign companies have been given the go-ahead to drill for and refine oil in India. At least 28 oilfields are to be made available, according to government financial adviser AN Saksena.

10 July

British Gas and Rhone-Poulenc have formed a jointly managed company to provide combined heat and power to selected Rhone-Poulenc manufacturing sites in the United Kingdom.

11 July

British Gas has retained the confidence and support of its major industrial customers despite criticism of its domestic pricing policy and difficult relations with Ofgas, according to a survey by Ernst and Young.

Alaska's Court of Appeals has overturned the conviction of *Exxon Valdez* Captain Joseph Hazelwood over the 1989 oil spill in Prince William Sound.

Any UK offshore or onshore worker claiming unfair dismissal for raising health and safety issues is to have the right to an industrial tribunal hearing regardless of length of service or hours worked, under a new Bill to be presented by Employment Minister Michael Forsyth.

Norsk Hydro has awarded a NKr220m contract to Saipem for the transportation and installation of the three modules and flare tower for the Troll oil platform.

13 July

Royal Dutch Shell Group, with a market valuation of $77.82 billion, has moved to the top of *Business Week's* league table of the top 1,000 companies around the world.

First studies of the Mersey barrage project, the £880 million proposal to convert the estuary's tidal flow into a power generator, have shown the scheme to be feasible.

Lasmo has succeeded in selling its last ship, the 148,500 dwt Suezmax tanker *Citadelle* still under construction, to Texaco.

14 July

A Turkish group has signed a $1.7bn deal with the government of Kazakhstan to construct a power plant, financing the project by using export revenues from the joint development of a nearby oilfield.

1993
IP Annual Dinner

The Institute of Petroleum's Annual Dinner in 1993 will be held at Grosvenor House, Park Lane, London W1, on **Wednesday, 17 February.**

IMPORTANT — PLEASE NOTE

Ticket application forms will be sent to all UK/European individual and collective (company) members as a loose-leaf insertion in their OCTOBER copy of Petroleum Review. Non-UK/European Members who wish to apply for tickets should contact **Caroline Little** at the IP at 61 New Cavendish Street, London W1M 8AR, **as soon as possible.** Tel: **071-636 1004.** Telex: **264380.** Fax: **071-255 1472.**

The closing date for receipt of ticket applications will be FRIDAY 23 OCTOBER 1992.

Bid to retain energy select committee

A cross party group has launched a campaign for the retention of the House of Commons Energy Select Committee. The group is led by former Committee Chairman, Dr Michael Clark (MP for Rochford), Alex Salmond (SNP MP for Banff & Buchan) and John McAllion (MP for Dundee East).

Dr Clark said, 'Energy, generating almost a fifth of the UK's Gross Domestic Product is a significant sector in the modern economy, and represents a coherent policy sphere.

'The record of the Energy Select Committee, by focusing on specific energy issues and areas, has been one of success and influence. In the 12 years of its existence it has produced 72 reports and achieved a number of notable successes. For instance, the Committee's influence secured changes in North Sea taxation and the creation of an Energy Efficiency Office.

'Given the current state of almost unprecedented flux in the energy sector, the Energy Select Committee clearly has a continuing and important role to play in ensuring adequate scrutiny of decisions being taken now, which will have long-term and serious consequences, and in provoking the development of a coherent energy policy across all sectors.'

Mr McAllion continued, 'There is still plenty of work for an Energy Select Committee to do in terms of monitoring the evolution of the privatised electricity supply industry; the proposed privatisation of coal; the review of nuclear power in 1994; the need to reduce CO_2 emissions; and the role of government-funded R & D in the energy sector as the newly-privatised utilities reduce their R & D spending, to name but a few.

'Since the incorporation of the Energy Department into the Department of Trade & Industry, our concern has been that there will be inadequate scrutiny of such energy matters if they fall within the remit of an all-encompassing Committee, which is primarily interested in other areas.'

BRS Tankfreight has signed a new contract with Phillips Petroleum.

Delivery precision is an important aspect of the Phillips Petroleum operation and BRS Tankfreight responded to this by installing a sophisticated electronic system which will increase the accuracy of quantities delivered. The AD 800 discharge system is manufactured by Drum Engineering and ensures a precise metering of each delivery.

Running from BRS Tankfreight's Cardiff operation to customers in South Wales and the South West, the contract includes one 38 tonne artic, two 30 tonne rigid vehicles and three drivers. Additional vehicles are available so that peaks can be met during the winter period.

Horton resigns

Differences in management style as well as on policy positions may have contributed to the enforced resignation of BP chairman and chief executive, Mr Robert Horton at the end of June. His position is to be split between Lord Ashburton, previously a non-executive director who now becomes chairman, and Mr David Simon.

Although the suddenness of the announcement caught the markets by surprise, there had been persistent worries about BP in the City, particularly after the announcement of its results earlier this year when the company steadfastly refused to cut its dividend of 4.2 pence a share despite rising debt burden, low oil prices and the stubbornness of the recession.

Mr Horton's robust style suited him well when he took charge of BP's US operations in Cleveland, Ohio in 1986. When he took up the top position in London in 1990, he launched a comprehensive review to transform the unwieldy giant.

The work involved in Project 1990, as the review was called, will continue with further contraction likely but the new chief executive, Mr Simon, will be seen to add a change of style to the leadership.

Mr Simon, 52, has previously been chief financial officer and chief executive officer of BP Oil and before his appointment as chief executive, was chief operating officer.

The company's next set of results are due to be released this month.

Vietnam

British Gas Exploration & Production and Petro-Vietnam, the state oil company, have signed a 'Heads of Agreement' for a block of oil exploration acreage just north of the Dai Hung field. The agreement is subject to the negotiation of a production sharing contract.

New BP statistics

Last year saw energy demand worldwide grow by only one percent as the effects of the recession in the industrialised countries continued, according to the latest edition of the *BP Statistical Review of World Energy*, the invaluable source of statistics which is published annually.

As in earlier years the review covers oil, natural gas, coal, nuclear energy, hydroelectricity and primary energy in considerably more detail than is available elsewhere.

This year's edition reflects the changes that took place in the former Communist world. Now Europe is divided into OECD and non-OECD; the latter includes the newly independent republics of the former Soviet Union and the countries of Central Europe as well as Malta, Cyprus and Gibraltar. The new edition also includes, for the first time, consumption data for Czechoslovakia, Hungary and Poland as well as Mexico, Brazil, Venezuela and Argentina.

According to Mr Peter Davies, Chief Economist, The British Petroleum Co Ltd, '1991 was a somewhat unusual year' but nevertheless there was remarkable stability. The statistics showed that there was an increasing role for natural gas and a temporary reduction in dependence on Middle East oil evident during 1991. The recession had led to retrenchment in 1991; the challenge for the future was how to manage the upturn.

Elf contract

Elf Oil has awarded Pearce Nim a major contract to re-sign 150 UK retail petrol stations with its corporate livery.

Pearce Nim, a joint venture between the Pearce Signs Group and Nim Neon in Holland, manufactures and installs petrol forecourt signs and the £1m order was won in competition with leading sign companies from continental Europe and the United Kingdom.

Baltic storage terminal development

A new joint venture company has been set up to build and operate an independent tank terminal in the Baltic republic of Estonia.

Tallinn-based N-Terminaal Ltd and Paktank International BV of The Netherlands have entered into an agreement to incorporate on a 50/50 basis a joint venture company, Pakterminal Ltd.

The terminal will be constructed in stages to reach a capacity of 125,000 cubic metres and will handle a full range of oil products. The first phase is scheduled to be in operation by the end of this year.

Situated in the new Tallinn commercial harbour where the draught of the sea berth is 34 feet, the terminal will serve customers such as exporting Russian oil refineries and Estonian and Western companies trading in the region.

This is the first investment by Paktank International in the former Soviet Union and the company has no immediate plans for further investment in the region. It has cited the favourable investment climate in Estonia as a major factor in its decision to proceed with this development.

The company has examined other terminals in the former Soviet Union and a spokesman for the company said that those it had seen were located close to urban areas and, in terms of technology and environment, could 'hardly meet' the standards set in the West. Paktank insists that the new terminal will meet the latest environmental and safety requirements.

Poland announces coalbed methane tender

Poland's Environment Ministry recently announced the timing for the first bidding round for coalbed methane exploration licenses in the Upper Silesian coal basin.

International gas and oil exploration companies have until 1 October 1992 to submit proposals, for what is believed to be one of the world's most commercially viable coalbed methane sites.

Comprehensive geological and borehole test data has been compiled for interested companies, by Poland's State Geological Institute. The bidding round itself is being conducted by Poland's Bureau of Geological Concessions; and the marketing and distribution of all data is being carried out by Kingsgate Communications in London.

Earlier this year Frankie Howerd recorded a half-hour comedy show for Central Broadcasting Ltd at the Fire Service College in Moreton-in-Marsh. The performance was one of a series of four filmed in unusual locations prior to the death of this well-loved comedian and shown recently on television in the United Kingdom.

Exxon chief's death confirmed

The death of Mr Sidney Reso, Exxon Company International chairman, has been confirmed after a bungled kidnap attempt allegedly carried out by a former employee. Nothing was heard of Mr Reso since his car was found with its engine running and door open at the foot of his driveway on 29 April.

Mr Reso, 57, had worked for Exxon since 1957 after graduating from Louisiana State University with a degree in petroleum engineering. He held a number of positions in the company, including chief engineer with Esso Standard Oil (Australia) Ltd in 1965, operations manager for Exxon's East Texas Production Division in 1969, vice-president of Esso Europe in London in 1975 and president of Exxon Company International in 1988. As head of the international division he was responsible for all Exxon's oil and gas operations outside the United States and Canada.

Mr Reso was a member of the Society of Petroleum Engineers and the American Petroleum Institute. He is survived by his wife of 37 years, Patricia Reso and four children. The Sidney J Reso Memorial Scholarship Fund has been established at his former university.

Cuban licensing round

Comercial Cupet, the Republic of Cuba's oil exploration and production arm, has announced its intention to hold the first round of licensing in Cuba. The round is part of Cuba's new policy to attract foreign investment to its petroleum industry and follows agreements already signed or in negotiation with Total, Canada Northwest, Taurus and Petrobras.

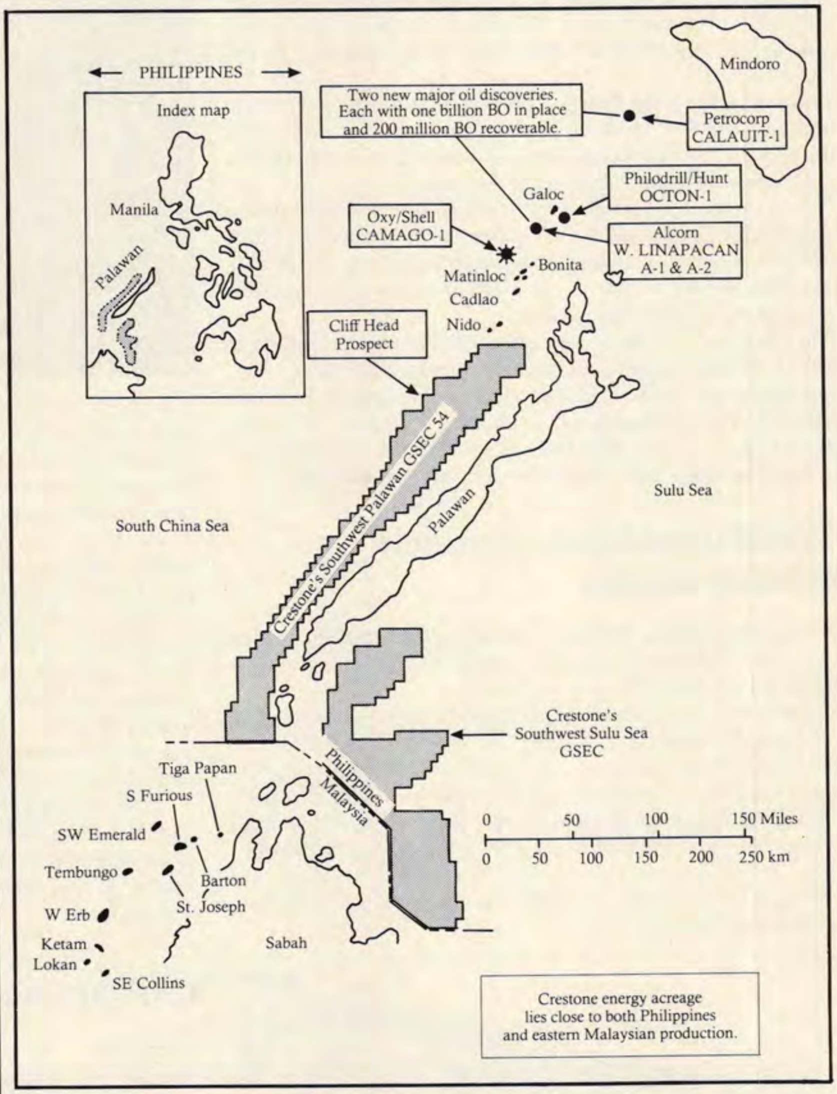
The round will involve a minimum of eight exploration blocks each with an area between 2000 and 6000 sq km. Cuba's present production comes from four onshore fields and the first round acreage is considered to be highly prospective.

Comercial Cupet is preparing geological reports and technical data packages to assist companies. It intends to hold international promotional presentations in London and Calgary within the next few months at which full details of the applicable legislation, fiscal framework, model contract, bid procedures and schedules will be made available.

Finds rekindle Philippines search hopes

By David Buckman

Several recent discoveries in the Philippines have revived hope of a substantial find of oil or gas. The huge archipelago, with its impoverished economy and massive dependency on imported energy, needs a reliable, long-term source of hydrocarbons. What has been found in recent years has lifted hopes, then dashed them as reservoirs have failed to match early expectations.



Crestone energy acreage lies close to both Philippines and eastern Malaysian production.

A pickup in drilling has occurred in the last few years, following a complete lack of exploration wells in 1986. There was a revival of international interest in prospects after results of a four-year study of 13 sedimentary basins was promoted in September 1987. Several dozen firms paid $25,000 for a copy of the study. Last year 16 wells — nine exploration and seven development — were expected by official sources in Manila. For such a huge onshore and offshore area so few wells can make little impact and it will probably take confirmation of a major development to excite real explorer-interest.

The latter half of the 1970s kindled hope of oil prosperity in the Philippines but a few years dashed those hopes and now a mood of realism has set in. It was early in 1976 that Cities Service, a US independent, found oil within Nido 1 well off the northwest of Palawan Island. Developments over the next few years prompted the acting energy minister, Gabriel Itchon, in 1979 to forecast oil self-sufficiency for his country by 1985. The volume of oil needed to attain that goal was in world terms quite modest — at the time Itchon made his prediction demand in the Philippines was averaging around 225,000 b/d — but oil self-sufficiency has remained only a dream. The area where Nido was found has remained the target exploration area but its story since the mid-1970s is a warning to incoming searchers to proceed to development plans with caution. Reservoirs discovered have been highly unpredictable.

Cities Service's Nido 1 proved non-commercial but it prompted more drilling. In the summer of 1977 the US company found 7,343 b/d of crude with South Nido 1, a good flow by world standards. However, realising that this was a remote, relatively untried area, Cities Service waited for West Nido 1, which yielded 9,540 b/d early in 1978, before it gave the nod to production, which it set for late in 1979. With the cost of oil rising, the Philippines government urged the company to haul back production startup, and in the end one well was flowing 5,000 b/d in early 1979. By August that year five wells were on stream, making 40,000 b/d achievable.

Cities Service set the pattern for the region by deciding against a pipeline to shore. Instead, it constructed three platforms for fairly shallow water and brought in a single-point mooring system and a storage tanker which separated oil and water and transferred crude to export tankers.

Prospects that Nido would make a big dent in the Philippines' oil imports in 1980 were soon dashed when it was found necessary to shut down one well and reduce output at the others because of the high percentage of water being drawn. Additional blows were the need to shut down the whole Nido complex to repair the mooring system, then the realisation that remaining reserves were much less than earlier expected. Whereas it had been expected that Nido might contribute over 15 percent of the Philippines' oil needs in 1980, in the event the figure was probably not much more than 5 percent. Eventually output settled down at a few thousand barrels daily.

Other fields gradually came on stream, mainly Cities Service discoveries, although Amoco also had some success. After the Cadlao field discovery well in October 1977 had tested 3,630 b/d of 47.7° API oil, just under two years later Cadlao 3 clinched the success with 8,000–10,000 b/d, prompting development with an early production system. Single Buoy Moorings Ltd provided an FPSO system which enabled Cadlao to start up in 1981 with a potential of 30,000 b/d. Initial output was 2,000 b/d, rising eventually to 9,000 b/d. Matinloc was the next field on stream, in 1982, and it has been one of the most notable oilfield developments in recent years. Cities Service found Matinloc, just northeast of Nido, late in 1978 when a pilot well flowed 7,075 b/d of oil and just over 2 MMcfd of gas. Despite official euphoria about likely production, Cities proceeded cautiously, and it took a good second well in 1980 to make the company seriously consider development plans. Matinloc was eventually streamed in 1982 at 13,500 b/d.

Recent developments

Early in 1986 Alcorn International, of Houston, took over Amoco's shares in its local producer, which meant that Alcorn — as Alcorn (Palawan) Production — had direction of Cadlao. Shortly after, the company set in motion plans to link Matinloc and Cadlao by pipeline, on the grounds that a joint facility would be cheaper to run and field life would be extended. Alcorn has now become the dominant oil producer in the Philippines, working alongside Filipino companies.

Important in recent years has been development of North Matinloc by Alcorn (Production) Philippines. In May 1988 Alcorn completed North Matinloc 1, intended as a final test of the Matinloc field, which flowed at a maximum over-6,000 b/d. More work was done on North Matinloc and after well 3 in 1989 was successful the field was put on permanent-production status in September, with a couple of wells able to tap around 2,000 b/d eventually. The oil was processed on the rig *Palawan Princess* and then went into a transfer line to storage.

One of Alcorn's successes in the Palawan area has been with the Galoc reservoir. Galoc was found by Cities Service in the early 1980s. A second well, put down by Occidental, which had acquired Cities, then found that the reserve was thinner than hoped, so it postponed development. Originally, it had been hoped that Galoc would be on stream in 1984 at up to 3,000 b/d. In 1988 a Filipino group led by Alcorn re-entered the discovery and completed Galoc 1, so that by mid-1988 it was producing well over 4,000 b/d into an extended well test system engineered by McDermott and leased to Alcorn for six months. In 1989 Alcorn said that a horizontal well on Galoc had tested 3,360 b/d of oil, 840 b/d of basic sediment and water and just over 2 MMcfd of gas. The horizontal hole added a new twist to Philippines drilling.

A further oilfield which has lately produced in the Palawan region is South Tara. It was discovered in 1987 by a group led by Trans-Asia Oil & Minerals, a flow of 700–1,000 b/d being disclosed by official sources. Cities Service had originally detected the Tara reservoir's potential in 1982 but had surrendered the prospect. In 1987 the Trans-Asia group decided to resume development of Tara linking it to Matinloc. Tara is another field that has been subject to decline, however. In 1990 it averaged under 50 b/d.

Late last year it was decided that three out of the four commercial oilfields off the Philippines were to be shut down. These were Matinloc, worth 700 b/d; North Matinloc, at 800 b/d; and Cadlao, with 950 b/d. By then Galoc had long been closed down, having test-produced about 383,500 bbl. Tara had been off-stream effectively for a couple of years, with about 90,000 bbl produced. By the time of the multiple-field shutdown decision Nido was already off-stream. It had produced about 565 b/d in 1990 and it was then decided to let pressure build-up so that the reservoir could be tapped for a while every few months.

Future prospects

The most immediately exciting production prospect at present is Alcorn (Production) Philippines' West Linapacan 1 find, made in the closing days of 1990. The well revived exploration, which had been sluggish for some time, and it sparked hopes of holes able to produce at North Sea levels. Within a few months British firm Wellstream gained a turnkey contract for three 5-

Nedrill 2 drillship

in. diameter flow-lines and three 5-in. dynamic risers for 1,150 ft of water. The field would be developed in stages with subsea completions and a FPSO, with an initial three wells on stream. Early in 1992 Clough Stena (Asia) won the job of relocating the FPSO system from the depleted Cadlao field to West Linapacan. Target production 15,000–20,000 b/d was set to begin around the middle of this year.

find, San Antonio 1A, on Luzon, in Isabela Province. Philippines National Oil Corporation reported 3.24 MMcfd of gas with a high proportion of methane. Gas had been found at San Antonio about a dozen years before. In 1991 reserves were estimated at 10 Bcf and it was hoped that the San Antonio 1A well might initiate enough gas to supply several power stations. Gas has also been found onshore in Luzon at

'Oil self-sufficiency has remained only a dream'

Early this year Fletcher Challenge Petroleum of New Zealand completed tests on another promising prospect, Calauit. Two wells flowed oil, 1A and a better 1B which gave 3,200 b/d. The official view was that the discovery could be part of a complex which could hold over 100 million bbl of recoverable oil, with additional reserves possible at the nearby Busuanga structure. The Petrocorp find had originally flowed oil early in 1991 in block GSEC 49 in 425 ft of water west of Palawan. This is a new pay for the area, christened the Calauit Limestone. Global Marine Drilling's *Robert F Bauer* was engaged for the drilling.

Also off northwest Palawan Occidental has the Camago find, which it has evaluated at 700 Bcf. Camago 1 tested good gas and condensate in 2,416 ft of water in October 1989. Studies were set in train to develop Camago's gas, maybe with a 270-km line to Luzon, to the northeast, the largest Philippine island, but it was realised that it would be a costly project, calling for innovative deep-water technology. In mid-1990 Shell took a 50 percent stake in the venture. Now Shell has had further success with the Malampaya 1 well in block SC38, again in deep water. The first of three tests has indicated flow rates of over 2,300 b/d, this time of oil. The Ross Offshore *Pelerin Explorer* has been used by Shell off the Philippines.

A further watchable play is that of Philodrill, which with the Octon well early last year tested 1,037 b/d of condensate and 13 MMcfd of gas not far from Camago. Early this year Hunt Petroleum moved in on the search, agreeing to spend $15.5 million on two wells in the northern part of Octon prospect. More recently, Philodrill says Octon II wildcat flowed 519 b/d of condensate during a final drill stem test through a 24/64-in. choke.

Last year saw a promising onshore the Victoria prospect in Tarlac Province. A deep well, Victoria 2, was put down in 1988, following a 1979 find abandoned due to high pressures but no commercial announcement followed Victoria 2.

A company which has garnered large swathes of prospective acreage offshore is Crestone Energy Corporation, of Denver. Not long ago it reacquired operatorship of exploration contract block GSEC 54 off the western coast of Palawan. For a while BP was active with Crestone, drilling a hole, Sarap 1, with the drillship *Neddrill 2* last year. To the north of Crestone acreage lies the Philippines' offshore oilfields, to the south productive fields off eastern Malaysia.

Import dependency

The Philippines' costly dependence on imported oil for its energy needs is graphically indicated in recent figures from the Office of Energy Affairs (OEA). These show the country's total crude supply in 1991 at 213,205 b/d, of which 98.5 percent had to be imported. The imports currently meet nearly 60 percent of the country's needs, with hydropower, geothermal and coal making up the balance. A newly drafted 10-year energy plan says that imported oil will supply only 51 percent of the archipelago's total needs in the year 2000, domestic oil one percent, and the remaining 48 percent will stem from other sources. Chairman of the National Power Corporation Wenceslao de la Paz in announcing the $15-billion plan, foresaw about $8.4 billion of its cost being negotiated with the World Bank, Asian Development Bank (ADB), Japanese and other foreign creditors.

The Philippines' demand for refined products fell in 1991 to 226,740 b/d, and this 3.2 percent drop the OEA attributed to economic contraction for the first three months of 1991. On a per-product basis the use of diesel oil showed growth, rising to 72,685 b/d from 69,000 b/d in 1990. Fuel oil demand continued to make up the largest share of petroleum products used last year, at 78,274 b/d, or 34.5 percent of the total.

Other energy sources

According to figures supplied by ADB, Philippines generation/demand for electricity in 1990 was 25,895 gigawatt hours. Of this, 13,891 gw/hr was supplied by thermal power stations, the

Pelerin Explorer

balance being made up by hydropower, geothermal and a small volume of non-conventional dendrothermal sources. Blackouts and brownouts plague the efficient running of the economy.

Coal remains an essential part of Philippines electricity generation but coal output cannot match demand. The government has encouraged its use since the first oil crisis of the early 1970s. Mining local coal has proved costly, however, and quality varies. The country is reckoned to have good reserves but in 1990 imports were still well in excess of the 1,150,000 tons of local production.

Although hydropower is a valuable energy source which the government would like to exploit further, its reliability has been undermined in recent years by drought. In addition, hydropower installations are seen as fundamentally rather costly.

A boost to geothermal power occurred recently with the opening of a just-over-$85 million complex on the island of Negros. This is a joint project of the National Power Corporation (Napocor) and Philippines National Oil Company and it is hoped that it will make Negros self-sufficient in electricity by early 1993. The plant will supply geothermal steam to an 80-Mw unit, yet to be installed by Napocor. Commercial production of geothermal power in the Philippines did not begin until 1979 but in recent years the country has ranked as an important exploiter of this energy source. However, there are problems. The Negros plant was under threat from guerrilla attacks and a recently proposed geothermal plant on Mount Apo, inside a national park, has met environmental objections. Geothermal power now accounts for just over a fifth of Philippines electricity, just below the contribution of hydropower, and the government would like to see its contribution at 30 percent by end-decade.

The Philippines has been unlucky with its nuclear programme. Its only plant was completed in 1985 but since then the $2-billion, 620-Mw Westinghouse-built installation on the Bataan peninsula has lain idle. In 1986 the government of President Corazon Aquino said that it would not accept the plant. It has been argued that it would be too costly to operate, that there are defects. There have lately been proposals to convert it to gas-fired combined-cycle operation.

On a more modest scale, the government last year revived a proposal for a gasohol programme, using domestic sugar. Arsenio Yulo, head of the Sugar Regulator Administration, said that the high oil import bill and the depreciation of the Philippines peso against the dollar had promoted the scheme again.

One development that would help overcome the Philippines' energy problems is a regular supply of natural gas. There is a modest demand for LPG, mainly for residential and commercial use, but of the 4,607,000 bbl used in 1990 over 40 percent had to be imported, local refineries producing the rest. The most promising likely local source of natural gas is the Camago field discovered by Occidental. Another long-term source could stem from the trans-ASEAN trunkline, a $10 billion scheme now being studied by European experts, funded by EC aid. Their findings are expected early next year. The plan remains sketchy but basically it involves laying a new line and/or connecting the existing domestic transmission lines to form a regional grid linking the six ASEAN states. Thailand's Interior Ministry has put the line's length at 6,378 km over land plus 1,095 km subsea. With Thailand, Malaysia, Indonesia and Brunei having rich reserves of gas, gasless Singapore and the Philippines would stand to benefit. (See *Petroleum Review*, November 1991). ■

A taxing problem

by Robert McLeod

The fiscal regime in the UK sector of the North Sea has long been held up as a model of stability, encouragement and reward. However, one oil major feels that unless changes are brought in immediately and more flexibility is shown in applying the rules, the long-term future of the province is less assured and substantial reserves could be left in the ground.

Chevron UK Ltd has 'stuck its head above the parapet' and issued a position paper on modifying the current UK fiscal regime which it feels is 'not entirely appropriate' in the present circumstances.

The company has also warned that smaller fields will be left undeveloped and larger fields closed before reserves have been fully recovered if action is not taken to alleviate some of the taxation pressures facing operators in the region. Against 'difficult' operating conditions including low oil prices and deep world recession, companies are also facing increased operating costs from environmental and safety legislation.

Mr Charles Smith, Managing Director of Chevron UK, stressed that radical restructuring of the North Sea fiscal regime was not being sought, nor did the company believe that a regime 'devoid of discretionary powers' would be helpful. 'What we would like to see is an evolving regime in which barriers to maximising economic recovery are reduced.'

The changes outlined by Chevron do not purport to be an industry view and have been formulated outside the United Kingdom Offshore Operators Association (UKOOA) — a forum which in the past has represented the industry-wide views of the operators to the government.

Chevron has a huge interest in seeing modifications to the fiscal regime with their fixed investments in the declining Ninian field. A series of smaller satellite fields are currently being tied into the existing platforms and it is the company's belief that these reserves could not have been economically developed but for their proximity to the existing infrastructure. Further fields in the area could be found and developed, the company confidently predicts, only if the suggested changes are swiftly implemented.

'It is important that the fiscal regime does not discourage the use of facilities or encourage the early abandonment of such facilities thereby making them unavailable to satellite fields,' added Mr Smith.

Key aspects

The company has identified six key aspects of the existing regime that it believes will have 'exactly those effects' and where modifications are required:

- Tariffs charged for the use of facilities on existing fields are protected from high PRT charges by the Tariffs Receipts Allowance (TRA) which can be 'severely' reduced by the inclusion of water 'won and saved'. The company advocates that produced water not be deemed part of the substances won and saved for TRA calculating purposes.
- The costs of negotiations relating to potential tariff deals should be made allowable against PRT even when such negotiations are abortive.
- The application of royalty charges can push a field into a loss making position while additional reserves remain in place. The company 'strongly advocates' the abolition of royalty or at least moving it to the same profit related basis as PRT to enable large installations to remain operating past their initially projected abandonment date and facilitate satellite field tie-ins.
- The offshore oil industry should be exempt from the imposition of a 'carbon tax' as charges for hydrocarbons being used for secondary recovery would lead to poorer economics.
- Current Corporation Tax rules mean that abandonment losses can only be carried back three years. Where abandonment is postponed to allow for satellite field development prior period profits may not be available. Chevron is calling for indefinite Corporation Tax or more generous carry-back for abandonment losses.
- The costs of abandonment buy-outs — where one party pays a party with an ongoing interest in a facility to take over the interest and responsibility for abandonment — should be made allowable as if it was an abandonment expense at the time of payment.

The company also advocates that where a field has paid PRT those payments should be available to relieve abandonment.

Chevron's position paper also includes several changes aimed at maximising recovery from mature fields and encouraging new developments. The company believes that incentives for research into enhanced oil recovery methods should be provided and an uplift on expenditure of up to 35 percent should be available to allow the exploitation of marginal areas of a field. Uplift should also be available on safety and environmental protection equipment.

Projects that are competitive on a pre-tax basis should not be made uncompetitive by the application of taxes particularly where the company insists that the 'windfall profits' and the subsequent imposition of PRT in the early years of North Sea development are no longer available.

Incremental prospects could also be developed if the 'ring fence' status of developments was discretionally exercised providing a more lenient approach to separate status for satellite prospects.

Chevron state in their paper that some of the measures suggested, including changes to TRA, uplift for reservoir development costs and relief for additional expenditure on equipment and negotiations, require immediate attention while other issues need to be resolved within the next two to three years.

'Timely' proposals

Professor Alex Kemp of the Economics Department at the University of Aberdeen described Chevron's paper as 'timely' in view of Treasury preparations for next year's budget. In particular, he views the issue of incremental investment in mature fields as the most important issue Chevron has raised.

'The fact that some projects might be deterred under the current arrangements is a distinct possibility,' said Professor Kemp. 'It deserves examination and I hope that the government will pay more attention to the problems.

'The government last year announced discretionary relief in royalty remission for the Columba project but to do this on a case by case basis is not the best way. They should make publicly available the formula showing the criteria by which royalty remission is available to create a level playing field.'

Professor Kemp added that incremental gas projects in mature fields could also be deterred by the gas levy as well as royalties and taxes.

Although the Department of Trade and Industry (DTI) welcomed Chevron's contribution to its 'on-going monitoring' of the taxation regime the paper is only helpful in so far as 'understanding the company's thinking' and does not contain the necessary detail to convince the government of the need for change. DTI has limited powers with regard to discretionary relief and it will be up to the Treasury — where the proposals have been passed and are now being considered — to sanction any amendments. The energy minister, Mr Tim Eggar, has stated that he is willing to consider oil and gas tax concessions but warned the industry against moving too far towards a discretionary fiscal regime.

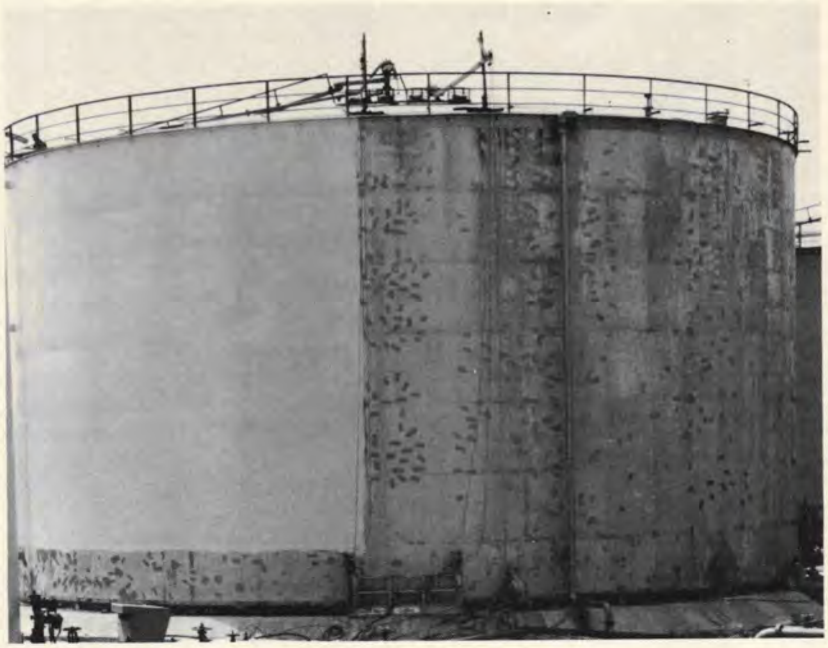
Such a discretionary regime could signal a move away from the stable taxation system operating at present which has often been cited, particularly by independents, as one of the more desirable qualifications for attracting investment. ■

Trials with 'green' paint

By Geoffrey Mayhew

In a fabric maintenance programme on four of its refined product storage tanks at Hamble Oil Terminal this summer, BP Oil is using two types of paint which substantially reduce volatile organic compounds (VOC) emissions to atmosphere when the work is being done.

These paints fall into the new categories of environmental friendly coatings and are part of an extensive 'greening' programme at the terminal.



Spot primed tank shell and partial application of polyurethane epoxy coating.

At the same time the adoption of new developments in painting technology, combined with specialist inspection, have made it possible to paint a 60 percent larger area at the terminal for the same price.

The evaporation to atmosphere from one of the protective coating systems being applied consists only of water. BP Oil has taken the initiative in trying out an environmentally harmless water-based paint on exterior surfaces.

New paints

When the water-based paint is used, no changes are necessary in relation to the current ambient condition requirements during painting; for example, the maximum relative humidity remains 85 percent, steel temperature 3°C above dew point and minimum air temperature 5°C.

The water-based coating is being applied to the surface area of one 3,500 tonnes capacity petroleum spirit tank. This part of the programme follows an earlier trial on smaller units at the terminal. Like all painting, it will be carefully monitored for ease of application, efficiency and durability.

The total emissions of VOC to atmosphere from the act of applying the second new protective coating system, which is a high volume solids content epoxy, is estimated at less than 20 percent compared with the 50–60 percent which takes place when traditional industrial coatings are used.

The improvement has been made possible by a revolutionary change in the composition of available industrial paints. Under the Environmental Protection Act (EPA), which takes effect this year, material containing VOCs must be reduced to a specific quantity during industrial cleaning or painting in factory units.

The preparation of exterior surfaces for painting are already covered by regulations protecting the environment and the operative — for example COSHH and the Duty of Care Act, 1992.

The EPA does not apply to exterior painting operations but it is generally expected that more control of emissions will come in the foreseeable future.

When the paint manufacturers were starting their own developments to meet the 1992 requirements, BP Oil was also engaged in a study of new painting systems for exterior work at its Hamble terminal — including experiments on the feasibility of various 'green' painting systems.

It was decided to put a large-scale programme into effect, using Seddon (Stoke) Limited as coating contractor, in which one of the protective coatings used would have a higher volume solids content than previously. This significantly reduces VOC and also the number of coats required. It also increases the durability of the system.

The second system decided, the water-based, was chosen in order to eliminate any possibility of harmful emissions.

The volume solids content of the epoxy paint being used this summer on three 10,000 tonnes capacity spirit storage tanks is 83 percent. Although not specifically relevant, the water-based system has solids of 60 percent. These compare with a volume solid content of between 40–50 percent in traditional paints.

Vapour reduction

BP Oil's adoption of the protective coating system from which there is a reduced or nil environmental risk conforms with the progressive development of vapour reduction and vapour recovery processes at the terminal.

During the past three years Hamble has been expanded to receive by pipeline the production of crude oil from the Wytch Farm oilfield in Dorset, the largest onshore field in Europe. The crude oil is stored and then exported by sea from Hamble's jetty. Hamble also provides refined products storage and a large distribution terminal for southern England.

These two responsibilities are carried out with an exceptionally low level of emissions to atmosphere. Vapours arising from the 35 storage tanks do not reach the atmosphere. They are collected through a vapour recovery system which returns them to the tank, or directs them elsewhere for safe disposal.

The vapour emissions which occur when road tankers at the gantries are filled with product for delivery do not go into the atmosphere. They are recovered by the bottom loading system for road tankers which ensures that the vapours are directed back into the storage tanks.

Painting schedule

The object of painting the tanks at Hamble is to prevent or reduce rusting and deterioration. At the same time painting provides the plant with a tidy and efficient appearance.

Traditionally, storage tanks have been painted each year. However, improvements in painting technology, which include a higher degree of preparation of the steel surface for painting, have shown that painting at intervals of five years can be achieved without rusting being excessive.

The epoxy resin system being applied to Hamble tanks this summer promises to double that interval at least. The expectation is that the three 10,000 tonnes capacity tanks being painted with the epoxy system will not need repainting for another 10 to 15 years, although remedial work may be carried out in localised areas of breakdown.

The long-term durability of the water-based system is not known but in tests has shown to be superior to some alkyd resin systems. It is possible that re-painting may be required in five years.

'But we believe the initiative is well worth taking in the light of environmental considerations and our own large use of storage tanks, not only here but in other areas,' said Gerry Bashan, BP Oil, Hamble Terminal. 'The tests carried out justify the investment,' he added.

In addition to the drive to develop new paint systems by manufacturers through laboratory research, BP Engineering at its Uxbridge laboratory also prepared painting specifications for Hamble's use. BP Engineering is responsible for giving advice on changes in legislation.

Atmospheric corrosion can appear anywhere water or condensation form.

Vacuum spot blast cleaning tank shell from a 6 metre length cradle.

In storage tanks this is in the top rims, the long rim, the stairway, the water bottoms of the tanks and their shells.

'While the choice of the right paint system for a particular work is of prime importance, it is also vital to ensure the preparation is properly carried out,' said Jerry Moody, BP Oil. 'These two factors have led us to appoint specialist inspectors. The result has been an increase of some 60 percent in efficiency in fabric maintenance. This means that 60 percent more work is being carried out this year without an increase in cost. We are pleased to be saving money while doing more work on the fabric.'

Application

Exterior painting of plant and equipment at Hamble begins as temperatures rise above 10°C, generally between April and October each year. However, work has been undertaken between November and March over the past two years on a trial basis using materials which will cure at low temperatures.

Spray application at height has previously been prohibited at Hamble to eliminate contamination of the surrounding area by wind-borne paint droplets (paint overspray). Materials generally are applied by brush or roller but because of the quick-drying properties of the water-based materials, spray application is to be re-introduced on a trial basis this year. This will reduce the application time and result in a more uniform coating application.

Manufacturers of protective coating systems have recognised the necessity for an efficient technical and practical back-up service to promote the new paint technology.

Croda and International Paints Ltd, two leading exponents for technical back-up and whose materials were selected for use at Hamble, both provided technical and practical advice in the planning stages of the project.

International also undertook a detailed survey of the terminal which illustrated how the new systems will compare in performance and cost against traditional types. The terminal

High volume solid content epoxy coating system.

was examined in detail and from this technical report recommendations were made on priorities and problem areas.

Advice was also given on long-term maintenance and cost savings to be expected. Advances in coating technology were also reported. This increased the choice of the materials available.

Feasibility trials at Hamble before tendering confirmed the workability of the intended preparation methods and that where the existing protective coatings were sound, the new systems could be satisfactorily applied with no difficulties in compatibility, adhesion or lifting of edges to the prepared areas.

The new painting technology avoids the expense of scaffolding. Self-contained cradle systems, installed on each tank by the contractor for a re-paint, are removed when the job is done.

Findings

The fabric maintenance at Hamble this year has implications for other BP storage terminals. If, as expected, the trials are satisfactory, they will be considered for other terminals. Hamble is classed as an inland terminal. The next step could be the application of these environmental paints at installations where the corrosive effect of salt in the air is more threatening.

One of the results of the high competition in the industrial preparation and coating industry has been limited resources for training among contractors' personnel.

'If the industry is to rise to the challenge of the technical and environmental requirements of today it must generate greater funds and time for training.' said Brian Connell, Protective Coatings Inspector, ITI Anti-Corrosion Limited, which provides an independent third-party inspection service worldwide for industrial painting projects.

DeVilbiss Ransburg, a leading manufacturer of industrial paint coating equipment, has been briefing the contracting industry on paint spraying in relation to the EPA. It believes that the impact of the EPA will go beyond its definitions of 'harm' — caused to living organism and ecological systems — and 'the environment' — as consisting of the air, water and land.

'Environmental management is probably best considered as taking environmental factors into account in all management decisions from product design to ultimate waste disposal and including product life-cycle,' its spokesman said. 'A 'green' company is one which integrates environmental considerations into all its policies, plans and practices.' ■

Photos by Mike Insall.

Moves on Tengiz oilfield development

By Judith Gurney

On 18 May Chevron Chairman and CEO Kenneth T Derr and President Nursultan Nazarbayev of the Republic of Kazakhstan signed a preliminary accord in Washington, D.C., outlining the principles of cooperation for a 40-year project giving Chevron a 50 percent interest in a joint venture to develop the Kazakh Tengiz and Korolev oilfields. The accord also permits exploration for oil in a 1,500 square mile area around these fields. Chevron will invest an estimated $1.5 billion in the venture over the first three years and investment over the life of the project is estimated as high as $20 billion. The target date for the final operating agreement, which will signal the commencement of one of the most ambitious deals between a former Soviet republic and a major oil company is 1 January 1993.

According to the agreement, Tengizchevroil, the joint venture formed by the Chevron Overseas Company and the Kazakh production association Tengizneftegaz, will develop and operate some 600 deep wells in the Tengiz and Korolev fields, located near the Caspian Sea. Their combined oil reserves are estimated to be in the vicinity of 25 billion barrels, some 2.5 times larger than those of Alaska's Prudhoe Bay. Estimates of recovery range from three to nine billion barrels. Their reservoirs are estimated to hold 46 trillion cubic feet (tcf) of natural gas, which is said to contain some 25 percent hydrogen sulphide.

The potential of these reservoirs has been known for some time. The discovery date of Tengiz has been reported variously as 1976 and 1979, but no testing was done until 1981 due to a lack of equipment to handle high hydrogen sulphide wellstreams. Production was delayed until an oil and gas processing plant was constructed to do separation and stabilisation, gas purification, sulphur production and gas liquids recovery. This was built in stages by a contract group made up of Partco Lavalin of Canada, Lurgi of Germany and Litwin of France, reportedly with the help of 80 brigades of Hungarian workers. By 1991, Tengizneftegaz had drilled 60 wells and was producing about 60,000 barrels a day.

The Korolev field, just north of Tengiz, is much smaller. Exploration began there in 1982 and commercial oil was found in 1984 above the salt layer, at about 1,804 feet. In late 1986, a well drilled below the salt level found oil in a thick deep Carboniferous formation similar to that of Tengiz. Korolev production is not expected to start until 1999. The joint venture hopes to increase production in both fields to more than 700,000 barrels a day by the year 2010 and to generate annual revenues of $6 billion at today's oil prices. Taking taxes and royalties paid to Kazakhstan into account, distribution of income over the life of the project will average close to 80 percent for Kazakhstan and 20 percent for Chevron.

Early negotiations

Chevron Corporation, based in San Francisco, ranks high in the list of major world oil companies and is considered the largest gasoline refiner and marketer in the United States. In 1991, it reported worldwide sales of $40.1 billion and a net income of $1.3 billion, considerably reduced from a $2.1 billion net income in 1990. Like most major and many independent US oil companies, Chevron is investing an increasing amount of its development and exploration capital overseas. This strategy is in response to the restrictions placed by federal and state governments, for environmental reasons, on exploration in the only remaining major known US oilfields in Alaska and off the Atlantic and Pacific coasts. Chevron owned about 3,400 US oilfields in 1985. By the end of 1992, in accordance with its plans to reduce the number of its ageing domestic oil fields, this total will be reduced to about 400. About 60 percent of the company's exploration and development budget is currently allocated outside the United States in such areas as Papua New Guinea, Indonesia, Angola, Nigeria, Australia and the North Sea.

Chevron started looking for a major oil project in the Soviet Union in 1987 and signed a general trade agreement with the Soviet government on 30 May 1989. On 2 June 1990 it signed an accord with the Soviet Ministry of Oil and Gas Industry for exclusive exploration and production rights in the region of the Caspian Sea. This accord called for a feasbility study to determine if Tengiz should be included in the proposed SovChevroil joint venture which would involve an area of about 8,900 square miles in the Pre-Caspian oil and gas province. An investment by Chevron of $1 billion was apparently discussed and construction of oil and gas processing plants with special desulphurisation capabilities. Chevron was optimistic over the success of the negotiations at this point and predicted that a contract would be signed, and exploration started, by the end of 1991.

Accord unravelled

The proposed agreement, by then focused on Tengiz, was derailed as the Soviet Union dissolved into a collection of independent republics. When Kazakhstan nationalised its resources in the fall of 1991, the authority to conduct negotiations was shifted entirely from Moscow to Alma-Ata. The Kazakhstan government, fearing it would be shortchanged in negotiations and facing public criticism, particularly in the Moscow press, over proposed terms allegedly too favourable to Chevron, hired consultants and advisers who kept raising the ante. The future of the accord was in doubt and there was talk of both sides pulling out.

By March of this year, the project seemed doomed. Chevron admitted that the parties were 'having trouble coming together on terms' but insisted that the 'deal was not dead in the water'. There was no question that, given the remote location of Tengiz, its lack of infrastructure and the extremely sour crude involved, huge amounts of capital would be required to produce oil in any quantity. The Soviet experience over the previous decade proved that Kazakhstan could not hope to develop these fields to their full potential without the help of a major oil company. There were hints that the Kazakhstan government would put the exploration of Tengiz out for a new international tender. Other oil companies were showing interest in Kazakhstan resources. Last February, for instance, the Kazakhstan government signed an exploration and production-sharing agreement with Société Nationale Elf Aquitaine for a region southwest of the city of Aktyubinsk.

Both sides, however, were pressed to come to an agreement. Chevron needed to reverse the troubling decline in its crude oil reserves and Tengiz offered the biggest prospective addition to these since the company's \$13.3 billion purchase of Gulf Corporation in 1984. If completed as outlined, the project would more than double Chevron's overseas reserves and substantially boost Chevron's 2.71 billion barrels of total reserves. Kazakhstan, the second largest of the former Soviet republics, had an economy primarily dependent on agriculture. The Tengiz project represented one of the few ways by which it could quickly earn the hard currency needed to develop an industrial sector based initially on food processing, petrochemicals and metallurgy.

A deal was finally struck with the aid of third parties, including the government of Oman, J.P. Morgan, Oman Oil, and Slaughter & May. Both parties agreed to a 50 percent equity stake in the venture. In the face of Kazakhstan's demand for 87 percent of the revenues and Chevron's insistence on 50 percent, a compromise was reached at 80 percent for Kazakhstan. Oman apparently agreed to assist in finding capital for an export pipeline. Chevron apparently agreed to make investments in, and supply technology for, Kazakhstan's tiny petrochemical industry and to assist with infrastructure improvements including not only roads but also schools and hospitals. Chevron, it is said, does not expect to recoup its initial investment for at least seven years. Its primary role is not exploration but field development.

'It is difficult to determine which is the chicken and which is the egg'

Production challenges

The Tengiz and Korolev fields are located in a desert area near the north eastern shore of the shallow Caspian Sea. Tengiz, one of the deepest supergiant oilfields ever discovered, spreads over some 200 square miles in the so-called Pre-Caspian basin, a huge oil and gas province covering an area of 193,000 square miles. Exploration of this basin began late in the last century and its first commercial field was discovered in 1911. Until 1969, however, almost all discoveries were small and mainly confined to formations above the salt layers. Deeper subsalt drilling in the late 1970s located several oil/gas/condensate fields in the southwestern, northern and eastern flanks of the basin and spurred interest in the superdeep sediments of its central sector. Both Tengiz and Korolev will produce from pre-salt. Paleozoic carbonate reservoirs which are extremely sour and corrosive and which therefore require high-quality downhole equipment, tools and pipe. Their temperatures are about 225° Fahrenheit. Hydrogen sulphide permeates the reservoirs and presents a hazard that must be managed throughout operations. It must be contained and, like the oil, must be treated on site to remove large amounts of sulphur.

Another problem could lie with the Caspian Sea whose water level was noted in 1989 to be rising, after receding for many years. If the water level continues to rise, as many expect, the Tengiz field could be flooded, as it had been for many years in the past. A dike, and perhaps other engineering projects, would be necessary to prevent this.

Exporting the oil

One of the key issues which the preliminary agreement did not resolve is the logistics of exporting oil from Tengiz. Kazakhstan is a landlocked country with no seaport. Initially, Chevron planned to ship Tengiz oil to Russia and other republics which, in turn, would deliver oil from other fields to Chevron tankers at a Black Sea port. There is no doubt, however, that the success of the project depends on the construction of an export pipeline for Tengiz.

The first move towards an export pipeline came on 18 June when Kazakhstan and Oman signed a consortium agreement to form a joint venture to design, finance, lay and operate a

The Tengiz field will probably not be sufficiently developed to permit an accurate determination of its reserves and composition until 1995. At a meeting of the American Association of Petroleum Geologists in San Francisco, officials from the Soviet Institute of Geology and the Oil and Gas Ministry reported that Tengiz is divided into an upper section at depths from 4,000 to 4,700 metres and a lower section from 4,700 to 5,400 metres. The field covers 200 square miles. There is no gas cap on the reservoir which is extensively fractured. Reservoir pressure is 11,100 pounds per square inch at 12,000 feet; temperatures are about 225°F and bubble point pressure is 3,070 pounds per square inch. Porosity averages 6.3 percent and is as high as 25 percent and permeability averages 10 md. The crude has a 46° API gravity with 5.8 percent paraffin and 0.7 percent sulphur content. Viscosity is 0.27 cp pour point minus 36°C. The gas contains 18 percent hydrogen sulphide and 5 percent carbon dioxide. The gas-oil ratio is 2,150 scf/st-tk barrel.

pipeline from Tengiz and other sites in western Kazakhstan to present and future deepwater export terminals. The joint venture is said to be considering at least eight possible routes for the pipeline to export sites southeast in the Gulf, southwest in the Mediterranean Sea, or west in the Black Sea. Final selection will depend on economic factors, including construction costs and the market value of oil at each terminal, and on negotiations with right-of-way owners which could include Russia, Georgia, Azerbaijan, Turkmenistan, Iran and Turkey.

The project is expected to take about three years to complete and to reach its 1.5 billion barrels a day capacity within 12 years of start-up. Estimated construction costs range from $700 million to $1.6 billion, depending on the route selected and the extent to which present facilities can be used. Oman is to provide or arrange financing as required and credit support will be provided by Kazakhstan, which will contribute petroleum resources to the venture. Oil sale revenues will be used as partial repayment of debt incurred to finance the system and Oman will provide technical, design, operating and marketing assistance. The arrangements are designed to be modified as and if additional members join the consortium. The pipeline could serve other parties outside of Kazakhstan and could provide crude oil to refineries or other processing plants along the route or at the terminal site.

On 22 June, Chevron signed a memorandum of understanding with the Omani consortium in a move which, according to a Chevron spokesman, stated its 'desire to obtain priority access' to the line for Tengiz and Korolev crude and 'expressed Chevron's interest in participating in the consortium once a pipeline has been constructed'.

On 6 July, it was reported that Azerbaijan had agreed to become the consortium's third founding partner, taking an equal interest with Oman and Kazakhstan. The venture will operate as a limited liability company under the name of the Caspian Pipeline Consortium. The addition of this second former Soviet republic enlarges the scope of the pipeline system to include oilfields in Azerbaijan, possibly the major field in Azerbaijan's territorial waters in the Caspian Sea which a group headed by Amoco hope to develop. It also brings Azerbaijan credit support as financial backing.

Others may join the consortium, although additional members will probably be restricted to oil producing countries whose territories may be crossed by the pipeline system and to oil companies producing within those countries. In the final analysis, the construction of the pipeline depends on the development of Tengiz; the latter depends on the construction of an export pipeline. It is difficult to determine which is the chicken and which is the egg. ■

Open-minded Kazakhs capture Western oil investment

The scramble for precious natural resources tucked away in previously unknown former Soviet republics like Kazakhstan is bound to take off following the recent victory of British Gas and Agip in the tender to develop the 'supergiant' Karachaganak oil and gas field, located in the northwest corner of the country.

The government of Kazakhstan, through its determined and capable leadership is quickly establishing itself as a country able to secure significant deals with major Western companies. In May, Kazakhstan awarded Chevron the rights to develop and operate the huge Tengiz oilfield (see page 375). Following the two large deals, the image of Kazakhstan as a resource rich and open-minded partner is beginning to crystallise.

'The Kazakh organising committee, (responsible for arranging the deal), chaired by KK Baikenov, Deputy Prime Minister, was very professional. All the competitors commented on how well the tender was handled, particularly the schedule — a feat in itself,' said Peter Dranfield, British Gas area manager for the Commonwealth of Independent States.

The Karachaganak field is estimated to hold more than 20 trillion cubic feet of gas, equivalent to Britain's total needs for more than a decade. Its reserves of oil and gas condensate are put at 2 billion barrels, equal in size to the Forties field in the North Sea.

The British-Italian partnership expect to reach a final agreement for a production-sharing contract with the Kazakh authorities by next summer. British Gas said the share of profits going to the Kazakh government would gradually increase, eventually tipping the balance in favour of the Kazakhs. If requested, British Gas may assist the Kazakhs in marketing their share of the products.

The new venture has set out an ambitious schedule, with plans to begin exporting gas to Europe by 1994. 'The Kazakhs are very keen to get the deal started as soon as possible,' said Mr Dranfield. 'Based on their determination during the competition, I am convinced we can see the same commitment to reach a final agreement by next year,' he added.

The Kazakh parliament will debate new petroleum legislation in September. British Gas officials say they have been asked to be involved in the negotiations. 'We have already had some impact on the legislation, and the Kazakhs have sought assistance around the world — we are confident there will be nothing unexpected,' said Mr Dranfield.

Compared with the other resource-rich republics of the ex-USSR, Kazakhstan appears to be taking a more aggressive approach to attract foreign investors. After Russia, Kazakhstan is the second largest oil producing region. Located at the southeastern edge of the former USSR, it borders Russia to the north, China to the east and the central Asian republics of Turkmenistan, Uzbekistan, and Khirgizia to the south.

The appeal of the country's abundant resources, including coal, copper, zinc and silver is enhanced by a stable government, largely made up of the former communist leadership. A peaceful co-existence which was maintained during Soviet rule between the ethnic Russian majority (41 percent), Kazakhs (36 percent), and small numbers of Tatars and Ukrainians will most likely endure.

British Gas officials say transport and logistics, guaranteed to be an obstacle for any Western firm operating in the old Union, do not pose major hurdles. 'It is nearly part of mainland Europe,' said Mr Dranfield, of the Karachaganak field, situated near the city of Uralsk, 25 km south of the border with Russia. 'Rail and road links to Kazakhstan do exist — the town of Uralsk is a half hour flight from Moscow,' said Mr Dranfield.

The new venture intends to use the existing Russian pipeline system to export crude and gas to Western Europe, although some construction may be necessary. The Karachaganak field, first discovered in 1979, is already producing gas and liquids. The project envisages building oil and gas processing plants. The Kazakh authorities are considering several proposals for export pipeline routes (see page 380).

British Gas says its initial financial commitment is around $20 million. Following final agreement, both countries are expected to invest over $3 billion each over 10 years.

Oil analysts praise the Kazakh government, which kept tender competitors in suspense until the 'eleventh hour', for obtaining favourable contract conditions for exploitation of the Karachaganak field, including a stipulation to provide funds to develop the remote Ural region. Many also believe it was British Gas' financial strength and attractive development programme which helped it beat off the British Petroleum/Statoil consortium, the other major bidder for the Karachaganak field.

'The terms under which they will continue the development of the Karachaganak oil and gas condensate field will bring great benefits to the republic of Kazakhstan, and most importantly to the people of the Uralsk Oblast,' reads a press release of 1 July from the Kazakh government.

The contract calls for investment in the republic's infrastructure and social programmes, including environment measures to protect the Ural region. British Gas officials emphasise that the Kazakhs will play a large role in technical and environmental studies, to which the British-Italian alliance has allocated $40 million.

The Kazakh deal not only has significant implications for the European gas market but is also a major boost to British Gas activities in an increasingly competitive international market. With a relatively early foothold in Kazakhstan, whose rich energy resources are still largely unexploited, British Gas is well ahead of its competitors.

'For now British Gas' focus is on Karachaganak, but clearly there is potential for further development. British Gas will not want to turn its back on new opportunities,' said Mr Dranfield. The group is already involved in a joint venture project with Gulf Canada for development of an oilfield in the Komi region in central Russia, and its downstream unit, Global Gas, is looking at business opportunities in Russia and the Ukraine. ■

Laura Le Cornu

Progress on CIS pipelines

The Turic republics of the former Soviet Union are moving to solve jointly the largest stumbling block to economic development: transportation of raw materials. A series of proposals for gas and petroleum pipelines are entering the feasibility study stage as the governments of four republics, Azerbaijan, Uzbekistan, Turkmenistan and Kazakhstan, sign protocols to line up financing.

Three main projects cover Central Asia and the Caucuses. The first is a pipeline from Kazakhstan through Turkmenistan and Uzbekistan through the Caspian Sea and across Azerbaijan and Armenia ending in the Turkish Black Sea port of Trabzon. This proposed pipeline would cover all major oil and gas producing regions including the Tengiz and Korolev field in Kazakhstan. It was given backing by the Turkish company Atilla Dogan Petrosan earlier this year when relations between Armenia and Turkey seemed to be thawing. Armenia was under pressure economically to improve relations with Turkey, its only access to the west. However, as a result of the continued war in Nagorno Karabak between Armenia and Azerbaijan it looks unlikely that this pipeline project is feasible.

A second proposed route is extending and expanding the existing gas pipelines through Georgia to the Black Sea. Initially, Georgia was demanding a 25 percent duty on any goods including oil and gas, transported across its territory. However, these charges have been reduced and tension in the republic has lessened in recent months, making this a viable economic alternative.

A third proposal is to route the pipeline through Turkmenistan and northern Iran to Turkey's Mediterranean ports or alternatively to the Gulf. Turkmenistan has been lobbying for this alternative which would free it from ties to other CIS countries. Turkmenistan is also considering an additional gas pipeline to India and Pakistan with which it has strong relations.

All three of the projects are estimated by Turkmen oil and gas experts to take approximately three years with 15 billion cubic metres of gas transported annually the first year, 28 billion cubic metres the second year and 76 billion cubic metres at completion. A total estimate of 2,355 kilometres of 56 inch diameter pipe would be needed.

Azerbaijan signed an agreement to join a consortium with Oman and Kazakhstan for a project that would service the oil rich Caspian Sea region through pipelines to either terminals in the Gulf, the Mediterranean or the Black Sea. The consortium, called the Caspian Pipeline Consortium Limited, said the project would cost approximately \$1.6 billion. Chevron signed a memorandum of understanding to join the consortium later (see page 375). Oman will arrange for credit for the project while Kazakhstan and Azerbaijan will contribute petroleum resources to provide credit support.

Several shorter stretches of consumer pipeline distribution networks are closer to finalisation. In Uzbekistan a 31 kilometre stretch of pipeline in the Tashkent region has been provisionally awarded to the Turkish firm Merka. A second 360 kilometre stretch for petroleum and diesel fuel from Turkmenistan refineries to Uzbekistan is also nearing contract finalisation.

Turkey's President Suleyman Demirel signed a memorandum of understanding with all the Central Asian republics on pipeline projects to link Turkey with these new republics. However, despite an enthusiastic start no major pipeline project is competing with the existing pipelines through Russia and the Ukraine.

Prime Minister Demirel signed a letter of understanding with the Kazakh government in late April to transmit Kazakh crude oil mainly from the large Tengiz field to Turkey's Mediterranean or Black Sea ports. Technical meetings have followed and a round table meeting between the private companies exploring in Kazakhstan and potential buyers will take place in Turkey in the autumn.

The general manager of the state pipeline company Botas, Mete Gurknel, is in favour of a pipeline running from the Tengiz field through either the Caspian Sea, Armenia and Azerbaijan to the Mediterranean or through Georgia to the Mediterranean as opposed to pipelines to the Black Sea. The Mediterranean port of Dortyol already has terminal facilities and the risk of further polluting the Black Sea is great. He also noted that Bosphorus traffic was already heavy without extra oil tankers, and the cost at Dortyol would be less.

Mr Gurknel suggested that the pipeline financial arrangements could be agreed upon as early as 1993 so that construction could start by mid-1993. Azerbaijan's crude oil would be transported along with Kazakh.

Prime Minister Demirel also signed a joint statement in Turkmenistan agreeing to facilitate the transmission of Turkmen natural gas to Europe across Turkey. Kazakhstan's Deputy Prime Minister and Minister of Energy, Kadir Baikanov signed a memorandum on natural gas field work, exploration and technical assistance. ■

Juliette Rossant

LONDON BRANCH — FORTHCOMING EVENT

Kuwait — Extinguishing the Oil Well Fires and Restoring Production

by Mr J Newman of Bechtel

at the Institute, 6.00 pm, Tuesday 22 September 1992

Mr Newman will describe the enormous task of extinguishing the Kuwait oil well fires in the aftermath of the Gulf War and the restoration of the Sheikhdom's oil production. The talk will be backed by a video which dramatically illustrates the difficulties that were faced and the techniques adopted to overcome them.

European capacity continues to grow

The last year has again seen a small increase in the total amount of tank storage space in Europe, according to figures supplied by the companies that replied to the 1992 Independent bulk storage survey.

However, the small increase masks some large falls in many countries, including the United Kingdom. Reasons for the falls are numerous, including takeovers and rationalisations, a heavy recession and the selling of storage tanks to oil companies attempting to gain entry into the European market.

The next few years could see the development of independent tank farms in the Baltic states such as that under construction in Estonia by Paktank International. It is unlikely that this will have a major impact in the short or medium term but the eventual development of the Russian oil and gas reserves could provide a challenge for the future.

Statistics of Petroleum Bulk Storage Owned by Independent Companies in Western Europe

COUNTRY	CAPACITY (m^3) 1992	% OF TOTAL	CAPACITY (m^3) 1991
Belgium	2,261,500	7.1	2,226,100
Denmark	354,000	1.1	344,000
Eire	34,500	0.1	25,500
France	6,420,000	20.2	6,464,000
Germany	5,464,400	17.2	5,456,400
Italy	112,500	0.4	112,500
Malta	419,000	1.3	245,000
Netherlands	11,736,600	36.9	10,200,977
Portugal	87,000	0.3	87,000
Spain	158,955	0.5	207,761
Sweden	236,500	0.7	1,636,500
Switzerland	346,000	1-1	346,000
UK	3,638,427	11.4	4,351,895
TOTAL*	**31,794,382**	**100.0**	**31,706,633**

*Percentages may not add up to 100 due to rounding off.

INDEPENDENT STORAGE

This year, 46 companies have replied to *Petroleum Review's* independent storage survey

ALDER SpA

Riva Cadamosto 6, 34147 Trieste, Italy.

Tel: **(040) 820290/822220.** *Telex*: **460374 Alder I.** *Fax*: **(040) 815365**.

The chemical terminal nearest to Central Europe on the Adriatic Sea. Thirteen tanks for flammables, total 6,500 cu. metres and eleven tanks for corrosive chemicals, total 6,000 cu. metres. Private berth for up to 10,000 tons dwt tanker ship, 24 ft. Access by road, rail. Out of custom area.

ANTWERP GAS TERMINAL N.V.

Land Van Waaslaan 3, 9130 Kallo, Belgium.

Tel: **(3) 755 10 09**. *Telex*: **73153**. *Fax*: **(3) 755 03 25**.

The terminal is situated on the left bank of the River Schelde behind the Kallo Lock. Four berths are provided, two for ships and two for barges. Vessels up to 75,000 cu. metres can be accommodated. Tankage consists of two fully refrigerated tanks of 50,000 cu. metres each, designed to handle propane and butane and eight pressurised spheres of 3,300 cu. metres each, designed to handle propane, propylene, butanes, butadiene and butylenes.

The terminal can offer a full range of services including receipt and despatch by ship, pipe, barge, rail and road tanker, ship to ship transfers and refrigerated to pressurised movements via fired heaters.

The terminal is strategically positioned to give ready access to a large market area via road, rail, canals, rivers and coastal movements.

BARROW STORAGE CO LTD

Head Office: 25 Fitzwilliam Square, Dublin 2, Eire.

Tel: **(010) 3531 763524**. *Fax*: **(010) 3531 614704**.

Three installations: One at Marshmeadows, New Ross, Co. Wexford, Eire. Storage for 16,000 cu. metres of petroleum products, including LPG. The berth on the River Barrow provides for vessels up to eight metres draught. Tankage includes 4,500 cu. metres tank which is heated and insulated. One at Dundalk with 2,500 tons of gas oil and kerosene. A sea fed chemical storage plant in Tivoli, Cork with 2,000 tons of caustic liquor soda and plans for further chemical, oil and LPG extensions.

BRAGTANK AG

Head Office: Westquaistrasse 12, CH 4019 Basle, Switzerland.

Tel: **(61) 65 44 22**. *Telex*: **963180**. *Fax*: **(061) 651692**.

Bragtank, a member of the Van Ommeren Group, has one installation in Switzerland.

Basle: The terminal has 63 tanks with a total capacity of 346,000 cu. metres. All mineral oils can be stored. There are six jetties for barges. Access is by river, road and rail. Steam and oil heating is provided and there are bunkering facilities for barges.

BRITISH FUELS LTD

Daniel Adamson Road, Weaste, Salford M5 2DX, UK.

Tel: **(061) 736 8111**. *Telex*: **668620**. *Fax*: **(061) 745 8162**.

Provides storage facilities of 12 tanks, each of 2,000 tonnes, with a total capacity of 24,000 tonnes, for residual and distillate oils. Mild steel tanks, lagged tanks with coil heating and facilities for storing low flash point liquids. Access by road (into standard or specialised petroleum liquid storage); rail (offloading of 1,000-tonne liner trains); and sea (offloading of up to 6,000 tonnes from sea-going tankers).

BTP STORAGE LTD

Hayes Road, Cadishead, Manchester M30 5BX, UK.

Tel: **(061) 775 3945**. *Telex*: **669938**. *Fax:* **(061) 775 3970**.

Part of the BTP plc group of companies. The installation occupies a 20-acre site on the north bank of the Manchester Ship Canal. Total tank capacity of over 100,000 cu. metres with a range of tanks up to 6,000 cu. metres capable of handling most types of petroleum and chemical products. Blending, packaging, drumming, and weighbridge facilities available. Rail sidings for up to 1,000 tonnes. Berth: maximum draught 24.5ft. approximately 8,000 tonnes. Easy access to the M6 and M62 motorways.

CHEMICAL MANUFACTURE & REFINING LTD

Sunderland Tank Storage Division, Hendon Dock Sunderland, Tyne & Wear, SR1 2ES, IS

Tel: **(091) 564 1889.** *Fax:* **(091) 514 0628.**

The terminal can receive ships of up to 6,000 tons dwt capacity and has mild steel and stainless steel import lines. 36,000 cu. metres of storage are contained in twenty tanks. Products stored include petroleum refinery products, petrochemicals and chemical solvent byproducts. Nearby associated company has large distillation units for processing of specification and contaminated cargoes. Drumming off facilities, drum storage and bonded facilities also available.

COMOS TANK B.V.

Octaanweg 14, 1041 AN Amsterdam, Netherlands.

Tel: **(20) 587 2121**. *Telex*: **13121.** *Fax*: **(20) 587 2150**.

A subsidiary of VTG Vereinigte Tanklager und Transportmittel GmbH. Operates a terminal with an overall capacity of 700,000 cu. metres for storing all petrochemical liquids and solvents. Tanks range from 3,500 to 40,000 cu. metres, some coated or insulated and equipped with heating-coils. Blending facilities for gasoline and gas oil and facilities for leading, product-washing and butanising are available. Three jetties for seagoing vessels and eight jetties for barges, together with rail and road tanker filling platforms, ensure efficient storage and transfer.

INDEPENDENT STORAGE

COMPAGNIE INDUSTRIELLE MARITIME (CIM)

36, Rue de Liège, 75008 Paris.

Tel: **Paris (1) 43 87 33 49**. *Telex*: **280330 CIMDGPA**. *Fax*: **Paris (1) 43 87 43 08**.

Contacts: Mr B Salaün (Crude Oil and Marketing Manager) *Direct line*: **Paris (1) 43 87 43 14**. Mr CN Malcolm (CIM UK Representative) *Tel*: **(071) 491 3911**.

CIM is an independent French company which owns and operates a modern and highly sophisticated storage, transhipment and break-bulk facility capable of handling crude oils, straight run fuels, distillates and all clean petroleum products. The complex, which is situated in France at **Le Havre** and **Antifer**, has a total capacity of some five million cubic metres. At Antifer, only crude oil tonnage in excess of 250,000 tons dwt is handled with the port being able to handle the world's largest tankers. At Le Havre, the smaller crude oil carriers (under 250,000 tons dwt), light distillates and all other clean petroleum products are handled.

There is a pipeline link allowing cargo to be transferred from Antifer to Le Havre (where it can be back-loaded after storage if required). All cargoes stored and handled are in a Customs Bond and CIM prides itself on maintaining their clients' confidentiality. CIM now owns all equipment at the Antifer Terminal, which consists of two crude oil terminals with an overall capacity of 955,000 cu. metres. Six tanks of 150,000 cu. metres each, and two of 22,500 cu. metres each. Access is by sea and pipeline. Seaberths with draughts of 98ft and 82ft respectively. Facilities for discharging ULCC-type vessels up to 550,000 MT and for transhipments.

DEPOTS PETROLIERS DE FOS SA

2.1 Secteur 81-Audience 818, Fos-sur-Mer, 13270 France.

Tel: **(33) 42 47 65 00**. *Telex*: **430235**. *Fax*: **(33) 42 05 11 54**.

DPF, a company in which the Van Ommeren-Ceteco Group has a share, has one installation in France, at Fos-sur-Mer. The terminal has thirty-six tanks with a total capacity of 719,000 cu. metres. All mineral oils can be stored. There are five jetties for sea-going vessels (up to 72ft) and one for coastal vessels (21ft). Access is by sea, rail, pipeline and road. Blending facilities are provided (MTBE, lead, butane).

DUPEG

Terminal: Tankweg 4, D-2103 Hamburg 95, Germany.

Tel: **(+49 40) 740 440**. *Telex*: **0217656**. *Fax*: **(+49 40) 740 1703**.

DUPEG Tank-Terminal in the Port of Hamburg specialises in handling liquid cargoes. The handling facilities at Waltershof Petroleumhafen are some of the most modern in Europe.

On average, some 150 different liquid cargoes are stored each year in more than 100 tanks which can take virtually any kind of cargo, eg petrochemicals, chemicals, turpentine products, industrial alcohol, alcoholic beverages, acids, alkalis, vegetable and animal oils and fats.

One third of the total tank capacity of 102,000 cu. metres is fitted out with special linings and the qualitative treatment of products, eg mixing, filtering, clarifying or standardizing, is part of the service DUPEG Tank-Terminal offers.

Individual tanks of 20 to 10,000 cu. metres, including 26 stainless-steel tanks totalling 17,500 cu. metres. By the end of 1994, on completion of the second stage, another 10 tanks with a capacity of about 13,200 cu. metres will have been added to a total of 36 stainless-steel tanks with 30,700 cu. metres.

DUPEG's operational management system is designed to comply with the DIN ISO 9002 quality control standards. In accordance with the terms of the International Marine Pollution Convention MARPOL, DUPEG Tank-Terminal serves as the recipient for chemical slops from ships calling in at the Port of Hamburg.

Transport links include: Two pontoon bridges for ocean-going ships of up to 35,000 GRT (depth of water: 10 metres). Container ramps and lighter berths for handling barrelled cargoes. Own sidings complete with tank wagon filling station. Linked to European motorway system via neighbouring A7 Autobahn.

ENEMALTA CORPORATION

Petroleum Division, PO Box 6, Hamrun, Malta.

Tel: **871443.** *Telex:* **1735/1219.** *Fax:* **243055.**

Twenty-four tanks with a total capacity of 245,000 cu. metres. Eight tanks ranging in size from 10,000 to 20,000 cu. metres and 16 tanks from 5,000 to 10,000 cu. metres. Reception tank for clean ballast, maximum 4,500 tons. Gas oil, jet/kerosene, low viscosity fuel oil. Three berths for vessels up to 50,000 tons dwt; maximum draught 36ft; maximum length 750ft. Separate pipelines for each product,

Oiltanking Singapore terminal.

12-inch to 18-inch. Simultaneous receipt/loading of products possible. Twenty-four hour, seven day service. Centrally situated in the Mediterranean. State-owned. Responsible for all import storage and distribution of petroleum products in Malta.

EUROGAS TERMINALS CV

Head Office/Terminal: P.O. Box 410 4380 AK Vlissingen, The Netherlands.

Tel: **(0) 1196 12820**. *Telex*: **55684**. *Fax*: **(0) 1196 13444**

A subsidiary of Thyssen Bornemisza Group, Monaco.

The terminal has 130,000 cu. metres capacity for storage of LPG and chemical gases, six spheres of 3,369 cu. metres each, and two refrigerated tanks of 55,500 cu. metres each. There are three jetties for seagoing vessels and barges (draught up to 52ft). Board/board operations for a wide range of gases for vessels/barges are possible. Furthermore, there are facilities for the purging of vessels/barges/trucks/trains with nitrogen including flaring off. There is an open connection to the sea via the Westerschelde and there are good connections to the hinterland by rail, road and water.

Eurogas has expanded its services with the possibility of a practical and theoretical training at the terminal and with a consultancy for design/engineering/operations/start-up.

The pipeline project, started in 1991, has advanced well during 1992.

FELIXSTOWE TANKSTORE

FTD House, The Dock, Felixstowe, Suffolk IP11 8RY.

Tel: **(0394) 676112.** *Telex:* **98341.** *Fax:* **(0394) 673590.**

One hundred and eighty-one tanks, mild and stainless steel, totalling 105,000 cu. metres storage capacity equipped to handle a comprehensive range of liquid, edible, chemical and petroleum products. Alcohol, hydrocarbon and IDA bonded areas.

GAMATEX NV

Head Office: Scheldelaan, Kanaaldok B 2, B 2040 Antwerp (Lillo), Belgium.

Tel: **(3) 5684511**. *Telex*: **32459**. *Fax*: **(3) 5684595**.

Gamatex is a 50/50 joint venture between GATX Terminals Corporation and Van Ommeren-Ceteco and has one installation in Belgium.

Antwerp: The terminal offers 143 tanks with a total capacity of 486,100 cu. metres for mineral oils, petrochemical liquids and chemical gases. There are four jetties for seagoing vessels (draught 43ft) and two for barges. Access is by sea, rail and road. Tankage is insulated, coiled, coated and stainless steel with steam, warm-water and oil heating. Tanks for chemical products are equipped with dedicated pipelines and pump and most of them with vapour return. Prepump, blending, drum filling and nitrogen blanketing are also available.

GATX TERMINALS LIMITED

Nicholson House, High Street, Maidenhead, Berks SL6 1LQ, UK.

Tel: **(0628) 771242**. *Telex*: **847862**. *Fax*: **(0628) 771678**.

A wholly owned subsidiary of GATX Terminals Corporation of the USA. Operates eight terminals in the UK. Subsidiary: Manchester Jetline Limited. Associates: Tees Storage Company Limited; Unitank Pencol Limited; Wymondham Oil Storage Company Limited.

Avonmouth, Bristol: Fifty-three tanks with a total capacity of 135,232 cu. metres, from 311 to 6,900 cu. metres in size, for high and low flash petroleum products, chemicals, molasses and oils and fats. Dock facilities comprise seven berths at the Royal Edward Dock (depth 32ft, maximum length 690ft, maximum beam 95ft), five piggable docklines (three 10 inch lines, one 24 inch line for molasses and one 8 inch s/s line) and 18 dedicated m/s lines. Distribution is through fully automated top and bottom road loading facilities. Wensat pipeline connection. Access to British Rail network. Easy access to M4 and M5.

Belfast: Forty tanks with a total capacity of 50,290 cu. metres from 95 cu. metres to 5,000 cu. metres in size for high and low flash petroleum products, chemicals, latex and oils and fats. There is one jetty on the Musgrave Channel (depth 30ft, maximum length 600ft, maximum beam 100ft), two 8 inch s/s docklines and separate lines for fuel oil, latex and tallow. All lines are piggable. Distribution through fully automated top and bottom loading facilities. Easy access to M1 and M2.

Bromsgrove, Worcestershire: Rail-fed terminal. Nineteen tanks ranging in size from 35 to 1,350 cu. metres with a total capacity of 16,000 cu. metres, for high flash petroleum products. Capable of handling 1,400-tonne block trains. Distribution through self-service road loading facilities. Easy access to M5 and M6.

Eastham, Merseyside: Seventy-nine tanks with a total capacity of 276,700 cu. metres from 50 to 10,800 cu. metres in size in mild and stainless steel and aluminium, for high and low flash petroleum products and chemicals. Dock facilities consist of three berths in the QEII Dock (depth 33ft, maximum length 670ft, maximum beam 90ft) with seven piggable docklines (two 6 inch s/s lines, one 10 inch s/s line, one 10 inch m/s line, two 12 inch and one 14 inch). Distribution is through self-service road loading capable of handling 550 gallons per minute and rail sidings capable of loading and discharging 1,000-ton block trains. Easy access to M53, M56 and M6.

Grays, Essex: Fifty-two tanks with a total capacity of 311,000 cu. metres from 1,700 to 20,800 cu. metres in size, for high and low flash petroleum products and some chemicals. There are two jetties (Wouldham Nos. 1 and 2, depth 37ft at low water, maximum length 750ft, beam unrestricted) with five piggable docklines—three 10 inch, one 12 inch and one 14 inch. The road loading facilities are currently being converted to a fully automated system and a new vehicle marshalling area is under construction. Rail sidings capable of loading 1,000-ton block trains. Easy access to M25.

Runcorn, Cheshire: Four tanks with a total capacity of 40,000 product tons for heated liquid sulphur. Dock facilities comprise one jetty on the Manchester Ship Canal. Distribution is through road loading on two automatic weighbridges. Easy access to M53, M56 and M6.

Leith, Scotland: Thirty tanks with a total capacity of 67,900 cu. metres, from 55 to 13,400 cu. metres in size for high and low flash petroleum products and chemicals. Dock facilities comprise one berth (depth 31ft, maximum length 650ft, maximum beam 100ft) with three mild and two stainless steel docklines. All lines are piggable. Distribution is through self-service road loading and rail. Access to M8, M9 and M90.

Wymondham, Norfolk: Eight tanks with a total capacity of 39,200 cu. metres from 4,100 to 5,200 cu. metres in size. High and low flash petroleum products on a co-mingled, throughputting basis. Distribution through fully automated road loading gantries at 55 GPM. Easy access to A11.

Manchester Jetline Limited: is proceeding with a project to supply Manchester airport with jetfuel by pipeline. The pipeline has already been laid. Once the project is complete the majority of UK refineries will be able to pump to the Airport.

GEBR BROERE BV

PO Box 150, 3300 AD Dordrecht, Netherlands. A division of Royal Pakhoed N.V., Rotterdam.

Tel: **(78) 528528**. *Telex*: **29024/29393**. *Fax*: **(78) 179141**.

Operates two storage terminals in the Netherlands.

Dordrecht: 200,000 cu. metres capacity for chemical and petroleum products; tank sizes from 150 to 6,600 cu. metres. Tankage is mild steel, some insulated and coated; nitrogen blanketing facilities. Access by road, rail and sea via three deep-sea tanker jetties and four coastal tanker and barge jetties.

Rotterdam-Botlek: (*operated by Tank Terminal Rotterdam BV, daughter company*): 325,000 cu. metres capacity for the storage of chemical and petroleum products; tank sizes from 670 to 15,000 cu. metres. Tankage is mild steel, stainless steel, some insulated and coated; nitrogen blanketing facilities. Two deep-sea jetties for tankers up to 60,000 tons and two jetties for barges and coastal tankers up to 5,000 tons complement the road and rail access facilities.

GENERAL TANK STORAGE NV

Kaai 275-4de Havendok, 2030 Antwerp, Belgium.

Tel: **(3) 541 12 80**. *Telex*: **31643**. *Fax*: **(3) 541 31 63**.

General Tank Storage NV is a storage company for liquid chemicals, mineral and vegetable oils, specialised in storage of high-heat products, storage of oil additives, storage of sensitive chemicals, filtering/blending, drumming and waste water treatment (marpol or industrial).

GTS has at its disposal about 200 tanks with capacities ranging from 120 to 3,300 cu. metres, made out of stainless or mild steel (with special coating on request). Most of these tanks are provided with heating, nitrogen blanketing, mixing equipment.

GTS can handle all means of transport. The terminal covers an area of 11.5 ha including 568 metres of wharf (safe draught of 36 feet) more than 1,800 metres of railway line, numerous loading points and five weighbridges.

An extensive network of loading points allows handling of up to 50 roadtankers simultaneously.

The customs and independent surveyors have offices at GTS and the company has its own forwarding department.

The high priority accorded to quality control is evidenced by the achievement of the ISO 9002 certificate.

HALTERMANN GmbH

Head Office: Ferdinandstr 55/57, D2000 Hamburg 1, Germany.

Tel: **(40) 33380**. *Telex*: **2161815**. *Fax*: **(40) 3338214**.

Operates five terminals in Europe.

Hamburg-Wilhemsburg: Total capacity of 150,000 cu. metres, with tanks varying in size from 50 to 5,000 cu. metres, for all vegetable oils, petroleum products, solvents and chemicals. Some tanks are heating-coiled and insulated. Drumming and blending facilities are available. Access for ships, barges, road and rail tank cars and liner trains; two berths including a 33ft draught jetty.

Speyer/Rhine: Total capacity of 100,000 cu. metres, with tanks ranging in size from 250 to 3,000 cu. metres, for all petroleum products, solvents, chemicals and vegetable and edible oils. Some tanks stainless steel and coated; some with heating coils or insulation. Blending facilities and an associated custom processing plant available. Distribution by road, rail, liner train and barge.

Haltermann N.V. (Belgium) Ketenislaan 3 B-2748 Beveren/Kallo Linker Oever

Tel: **(3) 7500211**. *Telex*: **33705**. *Fax*: **(3) 7750261**.

All petroleum products, solvents, chemicals and vegetable oils can be stored in this 60,000 cu. metre capacity terminal. Tanks vary in size from 300 to 3,000 cu. metre. Some are stainless steel and coated with heating coils and insulation. Drumming and blending facilities are available, as is

GATX's Grays terminal.

an associated custom processing plant. Access by road, rail and sea for vessels up to 28ft draught.

Haltermann A/S (Denmark) Søndre Molevej, DK-4600 Køge (near Copenhagen)

Tel: **(53) 653370**. *Telex*: **43565**. *Fax*: **(53) 657009**.

Tanks ranging in capacity from 20 to 4,000 cu. metres make up this 15,000 cu. metres capacity facility. All petroleum products, solvents and chemicals can be stored. Some tanks heating-coiled and insulated; drumming facilities. Distribution by road, rail and sea, with berths for 12,000 tons dwt tankers.

Haltermann A/B (Sweden) Petroleumgatan 5, S-21124 Malmö

Tel: **(40) 181220**. *Telex*: **32544**. *Fax*: **(40) 938485**.

This 20,000 cu. metres capacity terminal has tanks ranging in size from 20 to 2,000 cu. metres for all petroleum products, solvents and chemicals. Some tanks are stainless steel, coated, heating-coiled and insulated. Distribution by road, rail and sea.

HANSAMATEX KÖHN & KUYPER (GMBH & CO)

Head Office: Rethedamm 15, D 2102 Hamburg 93, Germany.

Tel: **(40) 751960**. *Telex*: **2163363**.

The major shareholder of Hansamatex is Van Ommeren Germany and a minority share is held by the Ulrich H Kohn GmbH.

Hamburg: The terminal has 300 tanks with a total capacity of 758,000 cu. metres for storing mineral oils, petrochemical liquids, liquid fertilisers, animal and vegetable oils and fats, and molasses. There are four jetties for sea-going vessels and barges (draught up to 44ft), seven berths for barges and coasters. Access is by road, rail and sea. Product lines are partly stainless steel. Tankage is insulated, coiled and coated, provided with steam and oil heating and partly equipped with nitrogen blanketing. Pre-pump facilities, drum filling plant, blending and dyeing facilities for gasoline and fuel oil and molasses are also available.

IBER TANK SA

Moll d'Inflamables, 08039 Barcelona, Spain.

Tel: **(3) 335 4066**. *Telex*: **53975**. *Fax*: **(3) 335 6283**.

Located at the Port of Barcelona's Flammables Area, it has access by road (Highway A-2), by sea (two 33-foot jetties), and, in the near future, by railroad. Operates with 71 tanks, ranging from 30 to 2,000 cu. metres, total capacity 28,500 cu. metres, equipped for practically any kind of chemical and petrochemical product. Drumming and warehouse facilities available. Suitable for transit operations and ship to ship transfers, using the free zone facilities.

Name change

Our new name will be Van Ommeren Tank Terminal Barcelona S.A. from July 1992.

IBL BULK LIQUIDS

110 Lime Street, Hull HU8 7AS, UK.

Tel: **(0482) 20736/7**. *Telex*: **592230**. *Fax*: **226162**.

132 storage tanks ranging from 50 to 830 cu. metres with a total capacity of 25,000 cu. metres. Specialises in the storage of non-hazardous chemicals, lubricating oil, additives and vegetable oils. The wharves are situated on the Hull river at Hull Forge Wharf and at 50–52 Lime Street, Hull. Facilities for receiving ex-road tankers or containers and good access to main roads leading to the M62. A 20 metre public weighbridge platform for weighing up to 60 tonnes and a road tanker steam-heating and cleaning service available on site.

KING'S LYNN STORAGE LIMITED

Head Office: P O Box No 2, Melton Constable, Norfolk NR24 2QR. *Tel*: **(0263) 860812**. *Fax*: **(0263) 861491**.

Terminal: Estuary Road, Kings Lynn, Norfolk PE30 2HH. *Tel:* **(0553) 764382**. *Telex:* **817018**. *Fax:* **(0553) 767942**.

The activities of King's Lynn Storage are twofold:

1. Having sold its main storage terminal to its principal customer, Kuwait Petroleum (GB) Ltd during 1990, it manages the 15,000 cu. metres terminal on behalf of KPGB.
2. King's Lynn Storage Limited's own terminal comprises 10 storage tanks ranging from 55 cu. metres to 2,200 cu. metres with a capacity of 4,000 cu. metres. It is served from Bentinck Dock, King's Lynn, where KLS has access to 3 berths by agreement with Associated British Ports. The port can accommodate vessels up to 3,000 tons dwt. One 6-inch fully pigged product line leads from the berths to the terminal which is approved for the storage of petroleum products and chemicals. There are facilities for the discreet delivery of all products to road tank wagons. There is available office and warehousing space to meet customers' requirements.

LA PETROLIFERA ITALO RUMENA SPA

Head Office: 40136 Bologna, Viale Aldini 190, Italy.

Tel: **(51) 331567**. *Telex*: **511549**. *Fax*: **(51) 332451**.

Terminal: Porto Corsini—Ravenna: Total storage capacity of about 100,000 cu. metres for petroleum products. Tanks between 500 and 15,000 cu. metres for low and high flash products. Storage and handling facilities for lubricants. Total storage capacity for chemical products 70,000 cu. metres. Tanks between 250 and 5,000 cu. metres for high and low flash products. Some tanks of stainless steel, some rubber or specially coated; nitrogen blanketing facilities; modern hot water system for accurate temperature control. Each tank has its own pump and line to loading racks and its own loading point, to avoid any risk of mixing or contamination. Two vessel berths, both of which can accommodate vessels up to 190 metres (623ft) in length and up to 8.5 metres (28ft) draught. Twenty-five pipelines, between 6 inches and 12 inches diameter (some insulated and of stainless steel) from berths to the storage tanks. Vessels can discharge several products simultaneously.

LONDON AND COASTAL OIL WHARVES LTD

Head Office: Hole Haven Wharf, Haven Road, Canvey Island, Essex SS8 0NR, UK.

Tel: **(0268) 682206**. *Telex*: **99104**. *Fax*: **(0268) 510095**.

Canvey Island Terminal: More than 100 tanks ranging from 45 to 20,320 cu. metres with a total capacity of 305,000 cu. metres. The full range of petroleum products is stored, including fuel oil, lubricating oils and automotive products. Jetty facilities are capable of handling vessels of up to

219 metres LOA. Delivery can be made from any tank to road tank wagons, water-borne vessels or drums. The installation is connected via UKOP to North London, London Airport (Heathrow), Birmingham and to the Government Pipeline and Storage System (GPSS). A large part of the company's throughput of gasolines, gas oils, aviation fuels and kerosenes is despatched by pipeline. Chemical storage facilities include stainless steel pipelines, lined, insulated and heated storage tanks and inert gas blanketing.

Dagenham Terminal: Situated between London and the Dartford Tunnel, this is the nearest major public storage terminal to London. The terminal now operates 236 tanks with a total capacity of 110,900 cu. metres. As well as the 26 new tanks commissioned in 1987, the company has recently acquired additional capacity at Dagenham including 58 tanks of less than 100 cu. metres capacity. Jetty facilities for vessels up to 228 metres LOA with additional berths for smaller vessels and barges. Full range of chemical storage facilities includes stainless steel tanks and pipelines, lined, insulated and heated tanks, and inert gas blanketing. The terminal handles a wide range of vegetable oils, edible oils and technical oils as well as chemicals and fuels. Facilities for bunkering vessels, blending products and filtering.

Both terminals have modern workshops, weighbridges, radio communications, fully computerised stock accounting and easy access to the M25.

Chemical analysis services: Include the testing of petroleum and chemical products to ASTM, IP and BS standards, now available at both terminals.

NOORD NATIE TERMINALS NV

Stadswaag 7-8, B-2000 Antwerp, Belgium.

Tel: **(3) 232 99 40**. *Telex*: **31677**. *Fax*: **(3) 233 39 36**.

Situated in the port of Antwerp. There are 188 tanks ranging from 30 to 8,000 cu. metres, with a total capacity of 225,000 cu. metres for various bulk liquids including mineral and lubricating oils, vegetable and animal oils and fats and non-dangerous chemicals. All tanks equipped with heating coils. Three mooring berths for sea-going vessels and a special dock for handling barges. Direct road and railway connections. Three weighing bridges. Drumming installation.

OILTANKING GMBH

Admiralitätstraße 55, D-2000 Hamburg 11, Germany.

Tel: **(40) 37 0990**. *Telex*: **2163232**. *Fax*: **(40) 37 099 199**.

Oiltanking has a total storage capacity of 4.4 million cu. metres. The company operates seven seaport terminals, designed for rapid handling, in Amsterdam, Ghent, Copenhagen, Hamburg, Houston, Malta and Singapore. All terminals occupy key-positions in the international oil storage business and are backed by a dense network of seven German inland terminals. Deepwater terminals and inland storage facilities can be combined, permitting a wide variety of solutions for individual problems. The Amsterdam terminal in particular plays an important role in the distribution of high and low flash products in North-West Europe and the UK. Vessels up to 85,000 dwt are handled at this terminal and their cargoes redistributed on coasters and barges. Extensive product treatment facilities for the blending, leading and up- and downgrading of gasoline are also available.

The Malta facility is the first public terminal to be located so near to the primary trade route between the Suez Canal and Gibraltar, with connections to ports in Europe, the Middle East, Africa, the US and the Black Sea. Oiltanking Malta is located in the new Malta Freeport complex on Marsaxlokk Bay, so in-route products may be shipped in, stored, blended and shipped out duty-free at Malta. The first of three terminal phases is completed with 174,000 cu. metres for clean products while the second phase with 135,000 cu. metres of black products and an extra 50,000 cu. metres of clean products is scheduled to go on-stream end-1992/early 1993.

GERMANY

Hamburg: Forty-one tanks, sizes 2,000 to 26,000 cu. metres. Total capacity 418,000 cu. metres. Low/high flash petroleum products and heavy fuel oil storage. Sea/barge/rail/road. Berth for tankers up to 85,000 dwt.

Berlin: Thirty tanks, sizes 1,600 to 25,000 cu. metres. Total capacity 349,000 cu. metres. Low/high flash petroleum products. Barge/rail/road.

Karlsruhe: Thirty-nine tanks, sizes 600 to 20,000 cu. metres. Total capacity 177,000 cu. metres. Low/high flash petroleum products and LPG storage. Barge/rail/road.

Bendorf: Twenty-two tanks, sizes 2,000 to 20,000 cu. metres. Total capacity 145,000 cu. metres. Low/high flash petroleum products. Barge/rail/road.

Paktank's Europak terminal.

Frankfurt: Twenty-six tanks, sizes 95 to 5,000 cu. metres. Total capacity 50,000 cu. metres. Low/high flash petroleum products and chemical products. Barge/rail/road.
Honau: Eleven tanks, sizes 5,000 to 20,000 cu. metres. Total capacity 115,000 cu. metres. Barge/road/pipeline.
Hamm: Eight tanks, sizes 3,000 to 15,000 cu. metres. Total capacity 76,000 cu. metres. Low/high flash petroleum products. Barge/rail/road.
Gera: Four tanks, sizes 10,000 cu. metres. Total capacity 40,000 cu. metres. High flash petroleum products. Road.
THE NETHERLANDS
Amsterdam: Fifty-three tanks, sizes 690 to 40,000 cu. metres. Total capacity 800,000 cu. metres. Low/high flash petroleum products/heavy fuel oil/crude oil/components/feedstocks/molasses. Sea/barge/road/rail/pipeline. Berth for tankers up to 85,000 dwt.
BELGIUM
Ghent: Forty-five tanks, sizes 3,000 to 47,250 cu. metres. Total capacity 600,000 cu. metres. Low/high flash petroleum products/feedstocks/chemical products/fertilisers/edible oils. Sea/barge/rail/road. Berth for tankers up to 65,000 dwt.
DENMARK
Copenhagen: Thirty-nine tanks, sizes 1,600 to 16,500 cu. metres. Total capacity 339,000 cu. metres. Low/high flash petroleum products/heavy fuel oil/slop oil. Sea/coaster/road. Berth for tankers up to 40,000 dwt.
MALTA
Malta: Nine tanks, sizes 5,000 to 35,000 cu. metres. Total capacity 174,000 cu. metres. Low/high flash petroleum products/components/feedstocks. Berth for tankers up to 120,000 dwt.

OIL RAIL TERMINALS (LEEDS) LTD

South Accommodation Road, Leeds LS9 0RT, UK.
Tel: **(0532) 480574**. *Telex*: **55435**. *Fax*: **(0532) 400762**.
Head Office: Hayes Road, Cadishead, Manchester M30 5BX.

Part of the BTP plc group of companies. Thirty-two acre site only one mile from the M1 and M62 motorways. Liner trains of up to 2,000 tonne are received in modern sidings and discharged at 500 tonne per hour. Equipped with high-speed, self-service road vehicle loading bays. Products stored in mild steel tanks ranging from 600 to 6,000 cu. metres, with a total capacity of 21,000 cu. metres. Complete range of low and high flash petroleum fuels.

OMNI TANK GMBH

Marienstraße 20 D-4000 Düsseldorf 1
Tel: **(0211) 350515**. *Fax*: **(0211) 357697**.

Breisach: 23,400 cu. metres. 15 tanks ranging from 100 to 5,000 cu. metres for storing petroleum products. Access for barges and road tank cars.
Essen: 112,000 cu. metres. 39 tanks ranging from 600 to 12,000 cu. metres for petroleum products, chemical and petrochemical liquids and solvents. Insulated, coiled and coated tanks are available and equipped with dedicated pipelines, heating and blending facilities. Access by road, rail and barge.
Hanau: 48,000 cu. metres. 23 tanks for gasoline, gas oil, jet fuel and petrochemical liquids. Blending facilities are available. Access by road, rail and barge.
Karlsruhe: 51,000 cu. metres. 19 tanks ranging from 650 to 3,000 cu. metres for petroleum products and petrochemical liquids. Access by road and rail tank cars (liner trains) and barges.
Speyer: 796,000 cu. metres. 57 tanks ranging from 2,000 to 60,000 cu. metres for all petroleum products, chemicals and petrochemical liquids, liquefied gases and solvents. Blending facilities are available. Access by road, rail (liner trains), barge and pipeline (CEPS).

PAKTANK INTERNATIONAL BV

PO Box 7300, 3000 HH Rotterdam, The Netherlands.
Tel: **(10) 4002911**. *Telex*: **22163**. *Fax*: **(10) 4139829**.

The world's largest independent tank storage company, providing bulk storage and related facilities to the chemical and oil industries. Around 13 million cu. metres of tank storage capacity at terminals in Western Europe and further capacity in the USA, Tunisia and Singapore (including capacity of partners).
THE NETHERLANDS
Botlek (Rotterdam): 1,576,000 cu. metres capacity; access by sea, road, rail and pipelines; 39ft 6in draught sea berths; storage for petroleum products, chemicals and specialised liquids.
Europak (Rotterdam): 1,973,000 cu. metres; sea, pipelines; 68ft; crude oils and petroleum products. Able to receive vessels up to 72ft via the Maasvlakte terminal.
Laurenshaven (Rotterdam): 926,000 cu. metres; river, pipelines; petroleum products.
NOM/Pernis (Rotterdam): 150,000 cu. metres; sea, road, rail; 38ft 10in; petroleum products, chemicals, aromatics.
Maasvlakte Oil Terminal CV (Rotterdam): 4,400,000 cu. metres; sea, pipelines; 72ft; crude oils.
SWEDEN
Goteberg: 75,000 cu. metres; sea, road, rail; 36ft; petroleum products, chemicals, lubricating oils, molasses, latex.
Sodertalje: 117,500 cu. metres; sea, road, rail; 32ft; petroleum products, asphalt, chemicals, vegetable and animal oils and fats.
Malmo: 24,000 cu. metres; sea, road, rail; 36ft; asphalt, petroleum products, chemicals.
GERMANY
Neuss: 58,000 cu. metres; river, road, rail; petroleum products, chemicals.
Tollerort and Hohe Schaar (Hamburg) and Kiel: See under VTG-PAKTANK HAMBURG GMBH.
USA: 1,350,000 cu. metres; chemicals.
SINGAPORE: 650,000 cu. metres; oil storage.
ESTONIA (Tallinn): 50,000 cu. metres; oil storage (under construction).
THAILAND: 10,000 cu. metres; chemical storage (under construction).

PANOCEAN STORAGE & TRANSPORT LTD

Head Office: Chester House, Chertsey Road, Woking, Surrey GU21 5BJ, UK.
Tel: **(0483) 726241**. *Telex*: **859343**. *Fax*: **(0483) 725459**.

Provides storage and transportation services for handling and distribution of liquid products in bulk.

Operates bulk liquid storage installations in Belgium, Holland and UK, and the USA, with a total capacity of some 1.51 million cu. metres, handling chemicals, petroleum fuels, lubricating oils, latex and vegetable and animal oils. Has its own access by sea, road and rail as well as ancillary service possibilities in supplying nitrogen, large-scale drumming and canning.

BELGIUM

Eurotank (Antwerp): 469,000 cu. metres capacity. Tanks range in size from 100 to 50,000 cu. metres; stainless steel, aluminium, heated, coated and insulated. Facilities for blending and drumming together with dry cargo warehouse space.

Hemiksem (Antwerp): 120,000 cu. metres capacity. Tanks range in size from 33 to 5,500 cu. metres; stainless steel, aluminium, heated, coated and insulated. Facilities for blending, drumming and canning together with dry cargo warehouse space.

NETHERLANDS

Botlek (Rotterdam): 206,600 cu. metres capacity. Tanks range in size from 365 to 10,000 cu. metres. Specialised tankage includes various categories of coated and insulated tanks with both mild steel and stainless steel heating coils.

Pernis (Rotterdam): 350,000 cu. metres capacity. Tanks range in size from 15 to 7,300 cu. metres. Specialised tankage includes aluminium, heated and coated tanks. Facilities for drumming, blending and clarifying.

UNITED KINGDOM

Birkenhead (Merseyside): 45,000 cu. metres capacity. Tanks range in size from 50 to 2,000 cu. metres; heated, coated and insulated. Facilities for blending and drumming.

Eastham (Merseyside): 85,000 cu. metres capacity. Tanks range in size from 50 to 3,500 cu. metres. Specialised tankage includes coated and temperature controlled tanks.

Hull (North Humberside): 14,520 cu. metres capacity. Tanks range in size from 20 to 1,200 cu. metres. Carbon steel insulated tanks.

PL TRANSTORE LTD

Riverside House, East Street, Birkenhead, Wirral, Merseyside L41 1BY, UK.

Tel: **(051) 647 4111**. *Telex*: **9312134171**. *Fax*: **(051) 666 2136**.

Independent company situated on the River Mersey within the Birkenhead Dock System with a total capacity of 20,000 cu. metres.

Installation can accommodate ocean-going vessels and with the aid of three piggable discharge lines and can handle a maximum of 20,000 tonnes.

All tanks are lagged and served by individual line, heating is by low pressure steam coil.

Also operate a modern fleet of stainless steel roadtank cars, fitted with pumps and compressors for both contracts and spot hire.

Small company able to offer a variety of specialist services to suit the needs of customers.

POWELL DUFFRYN TERMINALS LTD

Commercial enquiries: C Scott, Sales Manager UK, Powell Duffryn House, London Road, Purfleet, Essex RM16 1PR.

Tel: **(0708) 865701**. *Telex*: **21725**. *Fax*: **(0708) 868983**.

Operates three terminals in the UK as follows:

Barry (South Wales): High and low flash tankage, for petroleum and chemical products, with a total capacity of 205,000 cu. metres. Tank sizes from 60 to 14,400 cu. metres; mild steel—many lined, lagged and coiled, using stainless steel fittings where required. Eight tanker berths with a minimum depth of 9.8 metres (32ft), served by over 20 pipelines in stainless or mild steel, lagged and traced as required. Blending and drumming; weighbridge; road and rail facilities. This location is ideal for supplying the industrial areas of South Wales, the South of England, the Midlands and the North-West.

Ipswich (Suffolk): High and low flash storage; tanks from 50 to 10,000 cu. metres with a total capacity of 89,000 cu. metres for petroleum and chemical products. Many tanks lined, lagged and coiled. Three tanker berths with a minimum depth of 7.9 metres (26ft), using both stainless and mild steel pipelines; blending; road facilities.

Purfleet (Essex): Two jetties: the main seven-berth private jetty with a minimum depth of 10.6 metres (35ft) can accept vessels of up to 45,000 tons displacement or a maximum length of 800ft; a smaller chemical jetty upstream. High and low flash tankage for petroleum and chemical products, with a total capacity of 269,000 cu. metres. Tank sizes from 50 to 15,000 cu. metres; stainless or mild steel; many lined, lagged and coiled, using stainless steel fitments when required. Fourteen stainless and mild steel main pipelines; many are lagged and traced for temperature control. Full trainloads on 100-tonne rail cars and all types of road tankers; weighbridge; blending and drumming.

All three terminals offer terms for dedicated or commingled petroleum product storage.

PROPETROL

Head Office: 65, Quai Jacoutot, BP 13, F-67013 Strasbourg Cedex, France.

Tel: **(33) 88 45 90 10**. *Telex*: **890619** and **880078**. *Fax*: **(33) 88 45 90 20** and **(33) 88 45 90 30**.

Contact: Mr E Elkouby (Directeur Commercial).

Propetrol, a subsidiary of the Petrofrance group of companies, is an independent petroleum and chemical storage company with terminals in: **Strasbourg** (three locations), **Village Neuf** (near Basle), **Gergy** (near Chalon-sur-Saône) and **Villeneuve-La-Garenne** (8 km north of Paris).

Together these terminals represent a total storage capacity of about 200,000 cu. metres of bulk petroleum products, 32,000 cu. metres of bulk liquid chemicals and petrochemicals and over 7,000 sq. metres of warehousing for the storage of drummed and packaged chemicals.

All terminals are located on major waterways: Rhine, Saône and Seine Rivers, with complete rail and motorway access.

Services available: Tank-truck loading/unloading, heated and insulated tanks and pipes, tanks equipped with recirculating systems, tanks equipped with innerfloating screens, inert gas blanketing (nitrogen), petroleum products dyeing, blending of oils and fuels, heat supply, tank-truck weighing, bunkering of barges with tank-trucks and customs services.

SIMON STORAGE GROUP LTD

Knowles House, Cromwell Road, Redhill, Surrey, RH1 1RU, UK.

Tel: **(0737) 778108**. *Telex*: **888744 SIMONSTO G**. *Fax*: **(0737) 778112**.

Simon Storage manage storage investments in the UK and Eire for Simon Engineering plc and the Royal Van Ommeren Group. All enquiries regarding the operating companies should be addressed to Simon Storage.

Aviation and Plant Services:

Simon Storage also provide aviation refuelling, into plane services, together with terminal and pipeline management on a contract management basis.

Simon Storage is part of Simon, the environmental, engineering and industrial services group.

INDEPENDENT STORAGE

Cumbrian Terminal:
Prince of Wales Dock, Workington, Cumbria.

Tel: **(0900) 605151**. *Telex*: **64331 CSTORR G**. *Fax*: **(0900) 67986**.

31,581 cu. metres for petroleum products, liquid sulphur and chemicals storage. Transport by road, rail and sea. Ships Agency: Workington — can handle 10,000 tons dwt vessels and provides excellent port facilities for deliveries to or from North West England and Southern Scotland.

Immingham Terminals:
Immingham Docks, Nr. Grimsby, South Humberside.

West: *Tel*: **(0469) 572615**. *Telex*: **52291 ISCOL G**. *Fax*: **(0469) 577019**.

East: *Tel*: **(0469) 571241**. *Telex*: **527931 ISCEA G**. *Fax*: **(0469) 571037**.

Killingholme: *Tel*: **(0469) 40381**. *Telex*: **52291 ISCOL G**. *Fax*: **(0469) 41012**.

Operates three installations: two at Immingham Dock (East and West) and one at Killingholme. More than 300 tanks with a total capacity of 570,000 cu. metres, making it the largest independent bulk storage terminal in the UK. Included in this figure are pressure storage for gases, stainless steel, lined, lagged and steam heated tanks. More than 60 jetty lines, including six stainless steel, provide for excellent segregation of grades. Use is made of three jetties: Eastern, Western and one at Killingholme. The terminal is connected to the Humber refineries and chemical plants by pipelines. The jetties have 35ft draught and can accommodate up to 35,000 tons dwt tankers, coasters or barges. Transport by road, rail, sea and pipeline. The company has land available for expansion to meet customers' special requirements at both Immingham and Killingholme. New tankage under construction.

Seal Sands Terminal:
Seal Sands, Middlesbrough, Cleveland TS2 1UB.

Tel: **(0642) 546775**. *Telex*: **58218 SSTOR G**. *Fax*: **(0642) 546076**.

Over 100 tanks with a total capacity of 196,400 cu. metres for petroleum products, chemicals including molten sulphur, VCM and propylene and a wide range of edible or specialist products. Two jetties, one taking vessels up to 30,000 tons dwt. The terminal is connected to local chemical plants by pipeline. Transport by road, rail and sea. Block trains handled.

Shannon Terminal:
Foynes Harbour, Foynes, Co Limerick, Eire.

Tel: **(010 353) 69 65506**. *Fax*: **(010 353) 69 65601**.

One installation. 14,000 cu. metres for petroleum and chemical products on the River Shannon. The jetty can accommodate 20,000 ton tankers and facilities are included for the loading to road tank wagons and the supply of products to barges at the jetty. Land available for expansion of the terminal.

Tyne Terminal:
Northumberland Dock, North Shields, Tyne and Wear NE29 6DY.

Tel: **(091) 296 0999**. *Telex*: **53180 VELVA G**. *Fax*: **(091) 258 6996**.

Total capacity 54,704 cu. metres. Fifty mild steel tanks, ranging in capacity from 300 to 8,600 cu. metres for chemicals, gasolines and oils. Blending facilities. Many tanks are coiled. Ethanol bonded storage available. Some tanks are coated with epoxy or phenolic resin-based paints. Additional land is available for further development and construction to suit particular client requirements. Access by sea and road. Three berths at North Shields provide for vessels up to 10 metres draught. There is rapid access to major road networks for road tankers. Licences to handle chemical wastes. New tankage under construction.

SOGESTROL

Head Office: Route de la Chimie, 76700 Gonfreville l'Orcher, France.

Tel: **(3) 3553 3770**. *Telex*: **190582**. *Fax*: **(3) 3553 3694**.

Two terminals, with a total capacity of 340,000 cu. metres, located in the industrial area of **Le Havre Port**, near chemical and petrochemical plants, and reserved exclusively for chemicals and petrochemicals and all dangerous liquids. Tanks are insulated, coated, heated, refrigerated, of mild and stainless steel, with traced insulated lines. Nitrogen facilities into each tank. Tanks from 5,000 cu. metres have a floating roof. Access by road, rail, sea, river. Connections with certain local plants.

Terminal No.1: 161 tanks from 50 to 15,000 cu. metres, with a total capacity of 230,000 cu. metres. Three jetties, draught of 38ft. for 50,000 ton ships, length 250 metres. Reception from and delivery to ships, barges, road containers, rail cars and drums. Drumming and pipelines to local industries.

Terminal No.2: 52 tanks from 315 to 4,900 cu. metres, with a total capacity of 110,000 cu. metres included 7 tanks from 315 to 2,000 cu. metres of stainless steel. Three jetties, draught of 38ft. for 40,000 ton ships. Reception from and delivery to ships, barges, road containers and rail cars. Drumming station connected to tanks; facility to drum directly to road containers and rail cars. The terminals are both certified ISO 9002 since February 1992 by Lloyd's Register Quality Assurance.

SOTRASOL

36 rue de Liège, 75008 Paris, France.

Tel: **(45) 22 22 70**. *Fax:* **(45) 22 14 70.**

Tarnos (Port de Bayonne): 101,000 cu. metres capacity for chemical liquids, crude oil, liquid fertilisers, animal and vegetable oils and fats. Seventeen tanks from 640 to 15,000 cu. metres, some stainless steel, some with heating coils or insulation. Nitrogen blanketing facilities. Access by road, rail and sea (two jetties with draught up to 28ft).

Le Havre: One hundred tanks from 30 to 5,000 cu. metres, with a total capacity of 105,000 cu. metres for mineral oils, chemical products with a flash point of over 100°C, liquid fertilisers, molasses, natural and synthetic latex and vegetable and animal oils and fats. Tanks are partly stainless steel, some heated and insulated. Access is by road, rail and sea (three berths, maximum draught 38ft).

SOUTH WESTERN TAR DISTILLERIES LIMITED

High Street, Totton, Southampton, SO4 4TN.

Tel: **(0703) 663444**. *Telex:* **47355 BURBOS G**. *Fax:* **(0703) 873429.**

Located at Totton in the Port of Southampton, SWTD has over 125 tanks in a range of sizes up to 7,000 cu. metres. Total storage capacity is 36,000 cu. metres with planning permission for further expansion. Some tanks are stainless steel and a wide range of products are handled ranging from low flash products up to and including fuel oils and bitumen.

The site has its own rail sidings and jetty facility with capacity to take up 2,000 tonne vessels and is immediately adjacent to the M27 and M271 motorways.

A smaller storage facility (5,000 cu. metres) is also available at Hertford.

TANQUIPOR, LDA

Head office and Installation: Parque Industrial da Quimigal Lavradio—2830 Barreiro—Portugal.

Tel: **(01) 2073794**. *Fax:* **(01) 2075941.**

Office: Avenida Infante Santo, 23-1 Esq., 1300 Lisbon, Portugal.

Tel: **(01) 3969117**. *Fax:* **(01) 3970717.**

The tank terminal, located in the Port of Lisbon, has a total capacity of 87,000 cu. metres for storing ammonia, chemicals and petroleum products. Maximum draught at the jetty is approximately 32ft at high tide.

TEES STORAGE CO LTD

Erimus House, Queen's Square, Middlesbrough, Cleveland TS2 1QX, UK.

Tel: **(0642) 230000**. *Telex:* **58477**. *Fax:* **(0642) 230107.**

Jointly owned by Pakhoed Holding NV and GATX Corporation of Chicago. Operates two terminals in the UK.

Middlesbrough: Fifty-eight tanks from 30 to 6,500 cu. metres, with a total capacity of 80,000 cu. metres. Mild steel coated and stainless for petroleum and chemicals. Road, rail and sea. Jetty facilities at South Wharf for ships up to 7,500 tons dwt. 12 dock lines (six stainless steel). Based at the Middlesbrough terminal is a 1,500 tonne chemical tank-barge for inter-river transfers and overside cargo.

Seal Sands: 110 tanks from 55 to 8,500 cu. metres, with a total capacity of 175,000 cu. metres. Mild steel coated and stainless for petroleum and chemicals. One sphere of 6,650 cu. metres for Vinyl Chloride Monomer. Road, sea and pipelines to neighbouring plants. Provision for rail. Drumming facilities. Three jetties for ships up to 40,000 tons dwt. Maximum length 760ft; maximum draught 36ft. 24 docklines (15 stainless).

TERMINALES PORTUARIAS, S.A.

Port of Barcelona. Muelle de Inflamables. 08039 Barcelona. Spain.

Tel: **(3) 3350500**. *Telex:* **54061**. *Fax:* **(3) 3358529**.

Installations in the ports of **Barcelona, Tarragona, Bilbao** and **Valencia** for the storage of chemical and petrochemical products and vegetable oils. A joint venture between GATX Terminals Corporation and Petrofrance.

Barcelona Terminal: 49,530 cu. metres capacity in ninety-one tanks ranging in size from 50 to 2,650 cu. metres. Two berths with 39ft (13 metres) draught. Services include drumming, liquid and dry goods storage (1,080 sq. metres of dry storage), heating, refrigeration, nitrogen blanketing and coated and stainless steel tanks. Surface access via Barcelona Expressway system. Rail side access to the Installation.

Bilbao Terminal: 18,930 cu. metres capacity in 51 tanks ranging in size from 50 to 890 cu. metres. One berth with 20ft (6.1 metres) draught. Services include heated and coated tanks, nitrogen blanketing. Surface access via E50 Coastal Highway.

Valencia Terminal: 33,715 cu. metres capacity in 23 tanks ranging in size from 305 to 2,150 cu. metres. One berth with 39ft (12 metres) draught. Services include nitrogen blanketing. Surface access via E101 Valencia-Madrid Highway and E26 Coastal Highway.

Tarragona Terminal: 28,280 cu. metres capacity in thirty tanks of 650 to 1,305 cu. metres. Two berths with 41ft (12·5 metres) draught. Services include heated, coated and stainless steel tanks, nitrogen blanketing. Surface access via local major arteries. Rail side access to the Installation.

THE INDEPENDENT TANK STORAGE ASSOCIATION (ITSA)

Executive Secretary: H.H. Cail, 24 Chiswick Quay, London W4 3UR UK.

Tel & Fax: **(081) 995 3393**.

The Association exists to give information and advice to government and other regulatory bodies in connection with the practical, safety and environmental health aspects of the bulk liquid storage business. Membership is open to all companies operating in the United Kingdom whose main business is storage of bulk liquids for third parties. A minimum capacity of 50,000 cu. metres is required for full membership. Associate membership is available to those with less than 50,000 cu. metres capacity, and the Association recently enrolled its first Associate member. All companies with over that amount are currently members of ITSA.

THE ROSS CHEMICAL & STORAGE CO LTD

Dock Road, Grangemouth FK3 8UB, Scotland.

Tel: **(0324) 474774**. *Fax:* **(0324) 485476**.

Grange Dock, Grangemouth: Sixty tanks ranging from 800 to 2,650 cu. metres, with a total capacity of 100,000 cu. metres, for fuel oil, motor spirit, petrochemicals, aviation fuel and molasses. Served by a common-user oil jetty with mild and stainless steel jetty lines. The jetty is capable of handling ships up to 20,000 tons dwt. Distribution by road. Office facilities and land available for expansion.

VTG-PAKTANK TANKLAGER HAMBURG GMBH

Brandsende 2–4 2000 Hamburg 1, Germany.

Tel: **(40) 322843**. *Telex:* **2163506**. *Fax:* **(40) 322630**.

Hohe Schaar (Hamburg): 427,000 cu. metres; sea, road, rail; 48ft; crude oils, petroleum products, chemicals.

Tollerort (Hamburg): 32,000 cu. metres; sea, road, rail; 29ft; petroleum products, chemicals, lubricating oils, latex, vegetable and animal oils and fats.

Kiel: 8,000 cu. metres; sea, road; 30ft; petroleum products.

VTG VEREINIGTE TANKLAGER UND TRANSPORTMITTEL GMBH

Head Office: Neue Rabenstrasse 21, 2000 Hamburg 36, Germany.

Tel: **(40) 441910**. *Telex:* **2170080 vt d**.

VTG, a member of the PREUSSAG Group, is one of the largest independent tank storage companies in Europe. VTG operates large modern tank installations at seaports and inland with a total capacity of around 4 million cu. metres. Storage facilities are complemented by 22,000 rail tank wagons, special purpose wagons and tank containers for the transport of petroleum products, chemicals, gases and bulk goods. An inland tank shipping service operates on all major European waterways.

Berlin: 221,000 cu. metres, 79 tanks ranging from 10 to 20,000 cu. metres for all petroleum products, solvents and petrochemicals; access for barges, road and rail tank cars and liner trains.

Duisburg: 300,000 cu. metres, 212 tanks varying in size from 15 to 9,000 cu. metres. Insulated, coiled, coated and aluminium tanks are available and equipped with dedicated pipelines, heating, blending, nitrogen blanketing, vapour-return and dry air ventilation facilities. Petroleum products, chemical and petrochemical liquids, liquefied gases and solvents. Distribution by road, rail, barge, pipeline.

Ebrach: 5,000 cu. metres for storing petroleum products. 12 tanks.

Hanover: 314,000 cu. metres. 22 tanks ranging from 500 to 70,000 cu. metres for crude oil, petroleum products, chemicals and solvents. Access for road and rail tank cars, liner trains and barges; crude oil pipeline.

Munich: 155,000 cu. metres, 49 tanks ranging from 50 to 47,000 cu. metres for storing petroleum products, chemical and petrochemical liquids and solvents. Blending facilities for gasoline are available. Access as above.

Regensburg: 77,000 cu. metres, 60 tanks varying in size from 100 to 9,000 cu. metres. All petroleum products, chemical and petrochemical liquids and solvents. Heating, blending and mixing facilities. Distribution by road, rail and barge. Operation of the BP terminals.

Köln: 101,000 cu. metres, 31 tanks ranging from 25 to 25,000 cu. metres for storing petroleum products, chemicals and solvents. Access by road, rail, barge and pipeline (RMR).

Mainz-Gustavsburg: 256,000 cu. metres, 33 tanks ranging from eight to 40,000 cu. metres for all petroleum products, solvents and petrochemicals. Access by barge, road, rail tank cars, liner trains and pipeline (RMR).

Amsterdam: Comos Tank BV
Düsseldorf: Omni Tank GmbH
Hamburg: VTG-Paktank Hamburg GmbH

Further details of these three companies are given under their separate headings.

VAN OMMEREN TANK TERMINALS (VOTT)

Head Office: 10 Westerlaan, 3016 CK Rotterdam, The Netherlands. *Tel*: **(10) 464 2346**. *Telex*: **21435** VO NL. *Fax*: **(10) 464 2819**.

VOTT is part of Royal Van Ommeren NV, with a worldwide capacity of 10,395,000 cu. metres. It has 31 terminals (3 under construction) situated in 16 countries. The following terminals are all approved under ISO 9002.

THE NETHERLANDS

Amsterdam: 600,000 cu. metres capacity; access by road, rail, sea and inland waterways; 41 feet draught berths; storage for petroleum products, molasses and animal and vegetable oils and fats.

Botlek (Port of Rotterdam): 940,000 cu. metres capacity; access by road, rail, sea and inland waterways and pipeline; 41 feet draught; storage for chemicals, petrochemicals and petroleum products; pipeline connections to adjacent refineries, CEPS and Van Ommeren tank terminal at Europoort.

Europoort (Port of Rotterdam): 750,000 cu. metres capacity; access by road, inland waterways, sea and pipeline; 71 feet draught; storage for petroleum products; pipeline connection to CEPS, Van Ommeren tank terminal at Botlek and adjacent refineries.

Vlaardingen (Port of Rotterdam): 435,000 cu. metres capacity; access by road, rail, sea and inland waterways; 40 feet draught; storage for animal and vegetable oils and fats, oleochemicals and molasses.

Effect of Algerian political crisis

By John Roberts, Editor, *Middle East Monitor*

Algeria's oil prospects have to be seen against a background of appalling political problems — the assassination of the country's President followed just a week later by the resignation of its Prime Minister, Sid Ahmed Ghozali, on the grounds that the country's governmental structure was rotten to the core. Thus a nation which vitally needs Western investment, particularly in the energy sector, finds itself in the kind of turmoil which is most likely to ensure that any potential investor will think twice, if not thrice, before committing hard cash to a country faced with a very real prospect of civil war.

When he resigned, he launched a sweeping attack on 'the most noxious and devastating forces of evil who act perfidiously for parties in sectors of the administration, economy, media and politics'. It is a warning which bodes ill for Algeria's political prospects and for the foreign oil and gas companies which had placed their trust in the prospect that a modern, technocratic government could not only come into office but exercise real authority in a society riven by intense political hatreds.

Before the crisis brought on by the assassination of President Mohamed Boudiaf on 29 June and by Mr Ghozali's resignation nine days later, Algeria was making some progress in revitalising its oil sector, primarily through the opening up of its resources to exploration and production-sharing by foreign companies. The aim was straightforward. Faced with the need to reverse several years of stagnation and with real incomes slashed from \$2,200 to just \$1,600 per capita in 1991 alone, the essentially technocratic government of President Boudiaf and Prime Minister Ghozali looked to increased Western investment in hydrocarbons as the solution to Algeria's serious financial problems.

Because both oil and gas were to be developed, this means, of course, that international funding for Algerian gas projects, notably the construction of a new gas pipeline to Morocco and Spain and the expansion of the existing line to Tunisia and Italy account for much of the country's foreign aid. Development of the oil sector thus has to rely on direct foreign private investment.

Expansion planned

At present, Algeria still produces rather more oil than gas but if the growth rate for these two commodities over the last five years were to be repeated over the next five years, then by 1997 gas production (measured in physical terms of millions of tonnes of oil equivalent) would have easily outstripped oil output. In 1991 oil output totalled 1,310,000 b/d (of which around 500,000 b/d was natural gas liquids or condensates). By comparison, gas production for sale (much is reinjected) reached 45.1 million tonnes of oil equivalent (mtoe) last year.

Mr Ait-Laoussine, a renowned energy economist and former head of the state-owned Sonatrach, has spoken of raising the combined target of oil and gas exports from around 85 to 120 million tonnes by the year 2000. He envisages a temporary slowing-down of the rate of gas output expansion to keep gas exports at 60 billion cubic metres (54.5 mtoe/year) and would thus appear to be planning for oil to remain the lead export item at least until the next century.

But he has had to contend with a very sluggish record. Last year's oil production was the country's best result for 10 years. Yet, despite the opportunities offered by the absence of Iraq and Kuwait from the market, it was only 25,000 b/d up on 1990's level of 1,285,000 b/d.

The government would like to raise crude oil output from around current levels of 780,000–800,000 b/d to 1.0 million b/d in the short term and to 1.2 million b/d in the medium term. It believes that can only be done with foreign investment and, in particular, through enhanced recovery techniques. 'Our oilfields are mature fields. They are on average about 30 years old. Some of them are doing well — some are faltering — so they need help', Mr Ait-Laoussine has said. Current recovery rates, he added, of the fields currently on offer to foreign companies are around 23 percent. The minister believes it will cost \$14 billion over the next 10 years or so to raise this level to 30 percent. Including the need for fresh investment by Sonatrach, he considers Algeria will need to find some \$20 billion in oil-sector investment funding by the year 2000.

The minister's strategy was detailed in a substantial amendment to the country's basic hydrocarbons law approved by parliament last December, just before its final dissolution in the face of a surging tide of pro-Islamic and anti-establishment feeling. The new legislation provided for international companies to explore for gas and benefit from discoveries through improved production-sharing agreements. In view of the likelihood of discovering gas as well as oil, participation in gasfield development was made possible. Previously, this had been the sole preserve of Sonatrach. The legislation also provides for companies to buy into existing fields, although Sonatrach must keep at least a 51 percent stake.

After coming into office a year ago, Mr Ait-Laoussine pursued a multi-track approach. There would continue to be direct opportunities for exploration and production, while concessions would also be made available through competitive bidding. By June, some 21 agreements had been signed, rather less than the government had in fact hoped. But there were also half a dozen more in train and, the minister said at the OPEC meeting in Vienna in May, 'our objective is to be able to conclude 100 exploration and production deals within the next few years'.

Last year witnessed Sonatrach's best exploration results for three years. But the results were not good enough. The state giant is currently drilling only 20–30 exploratory wells a year. Given current recovery rates, this means Sonatrach would be unlikely to meet the expected 20 million tonnes/year demand from local refiners estimated for the year 2005. Mr Ait-Laoussine's objective is to get well drilling up to the 100-a-year level, primarily through increased drilling by foreign companies.

Ten of the 25 wells Sonatrach drilled in 1991 proved positive. Four of them were recorded as significant oil finds, adding 51 million tonnes to reserves, while a fifth well added 46,000 million cubic metres to gas reserves. The company also shot 7,300 km of seismic. Foreign companies, who appear to have drilled no more than eight wells in 1991, are however adding substantially to the country's reserves. Two companies, Agip-Africa and BHP Petroleum-Algerie, have so far added 111 million tonnes to proven oil reserves.

Agip-Africa in March announced its fourth find, an oil strike at Zemoul el Akbar in the Eastern Erg. The well yielded an oil flow of 4,600 b/d and 355,000 cubic metres per day of natural gas. Oil was found at 3,950 metres in the Triassic and Devonian reservoirs.

On 10 May, Arco signed a 10-year production-sharing agreement to undertake oil exploration worth $65 million. Previously, only two other companies had signed such accords: Anadarko, in which Sonatrach anyway has a stake because of its gas business, and Occidental. Arco's agreement is for an initial five year period, with renewability clauses for further three and two-year periods. Its concessions cover three blocks in the Guerrera area, east of Hassi R'Mel. Two other blocks, covering 4,945 sq km, are in the Ghadames region. The proximity to the major gas fields at Hassi R'Mel could prove important as the new legislation means Occidental stands to gain from gas as well as oil discoveries.

On 16 June, Mobil signed to look for petroleum in four blocks northeast of the Hassi Messaoud field near Touggourt. It will begin by reinterpreting previously-shot seismic data and then go on to shoot its own data and drill five exploration wells. Hassi Messaoud is Algeria's biggest field, producing around 400,000 b/d.

Licensing rounds . . .

But the most important contemporary element, particularly in view of current political uncertainties, concerns the outcome of the first round of direct bidding for E&P licences. On 17 May, Sonatrach announced it had received bids from 15 oil companies to buy into eight fields already in production. One aim was to attract companies who could propose enhanced recovery systems for fields or modifications to existing recovery programmes undertaken by Sonatrach.

But the first round is also a test of Algeria's strategy to generate cash from front-end bonuses and other fees. The government currently has a regular $2–3 million annual financing shortfall, and either needs sustained oil prices in excess of $21 a barrel for its Sahara Blend or else an increase in front end-fees to cover the financing shortfall. Increased borrowing is not favoured, since some 70 percent of the country's $12–13 billion annual income from hydrocarbon exports already goes on debt servicing.

Sonatrach says first round replies were better than expected. A cross-section of major and secondary companies — from the United States, Europe and Japan — responded, coming up with proposals for a total investment of between $3.7 billion and $4.2 billion for six fields. The two fields for which no bids were received will be included in the second bidding round, promised for around the end of the year.

The first round is intended to attract companies with expertise in enhanced oil recovery so that between 1993 and 2013 output from the fields can be raised by 1,000 million barrels over Sonatrach's original estimate. In terms of daily production, the goal is to raise output from the eight fields by 200,000 b/d by the year 2000. Nineteen blocks were offered. Four of them, totalling 13,394 sq km, are in the Ghadames region near the Algerian/Tunisian/Libyan tri-border point. Three blocks, covering 12,080 sq km, are near the Tunisian border in the Dahar Dome geological region. The other 12 blocks are in the western section of the Tindouf basin, towards the Moroccan and Mauritanian borders, and embrace 126,961 sq km of relatively unexplored terrain. So far, only 15 wells have been drilled in this region, although there are indications of both oil and gas.

Some companies, say Algeria, have already proposed 'substantial front-end bonuses,' while others want to negotiate bonus details later. Ait-Laoussine has said Algeria will be flexible on the bonus issue and will agree to large front-end bonuses being paid in instalments. 'We believe these are preliminary offers,' the minister said. 'Thirty five days after the negotiations start the companies will be allowed to make their final offers. This will take a bit of time.

The dilemma for the companies is that the negotiations set in train by their offers come at a time when the political future of Algeria, and thus the security of their potential investments, have never been more in question. It cannot be assumed that a government or minister in power today will still be in office in six months time.

Under proposals announced before the crisis broke, Sonatrach intends to issue tenders every six months. The second tender, for a further 10 oilfields as well as the two left over from the first round, is thus envisaged as taking place around the end of the year. Both large and small fields will be on offer.

Should all go well, then a third round devoted to small, marginal fields which the authorities have either shut in or which require maintenance and further investment will go ahead. The fields have bout 1.5 million barrels of oil in place and Algeria is looking to recover 10–30 percent of that.

In February, Mr Ait-Laoussine delivered a series of comments which summarised the country's position under an essentially secular government which espoused the principle of free market reforms even if it also remained reluctant to abandon its socialist tradition of centralised planning. 'The EC and other international institutions should take initiatives to support financially — or by other means, for example by enhancing the conditions in which companies can come and invest in our country — the economic and social reforms now under way in Algeria. Only successful economic reforms can lead to authentic democracy and ensure stable Algerian oil and gas exports to the consuming states'.

He was speaking after the annulment of elections and the banning of the victorious Islamic fundamentalist movement which had won the first round in the aborted general election. On that occasion, the minister sought to attract renewed foreign oil company interest in Algerian exploration and production with the following assurance: 'The current political risk should not be exaggerated, and in any case is certainly less than the geological risk'.

The problem for Algeria right now is that the geological risks are probably more quantifiable than the political. ■

Privatisation opens up huge areas of Argentina

By John Cranfield

After decades of virtually complete state control, Argentina's oil industry is being turned over to private enterprise. Eventually, everything will be moved into private hands but the government is moving a step at a time with a steady transfer rather than a precipitate switchover that could be hopelessly disruptive. For the aim is to build on Argentina's virtual self-sufficiency, cutting costs and improving the oil industry's ability to generate a useful income. In the past, much of the benefit has been lost in the ever-increasing web of bureaucracy so that the nation's undoubted hydrocarbons wealth has been largely squandered. Spearheading the move to private enterprise is the exploration sector.

A two-pronged attack is being mounted by the government on upstream transfer to the private sector. Both have been steadily improved upon since the basic concepts were introduced in the mid-1980s. At the same time, efficiency within the state oil company, Yacimientos Petroliferos Fiscales (YPF) is being improved such that, sooner rather than later, it will be able to compete on fully equal terms with companies in the private sector. Ultimately the aim is transfer of YPF to the private sector forming in effect a powerful up-to-date Argentine oil company but without state backing or control.

At present, however, the two-pronged move is seen as best. On the one hand, the private sector is being invited to buy into or completely buy out YPF properties, so far mostly marginal producing fields that need further development before they reach full potential. The other prong involves the granting of new search concessions to the private sector, covering vast tracts of territory that have long been reserved to YPF but which the state firm has had neither the resources nor the time to investigate. Much of the new territory being opened up is totally virgin but a lot is available in sedimentary basins where oil and gas have been proved to be prolific.

The result of the two-fold process is that newcomers can take three bites of the cherry:

- By farming into proved oil and gas fields, where they can bring their production expertise to bear — and earn a fairly certain return
- By taking up search concessions in

BASINS, FIELDS & PIPELINES

areas known to be petroliferous but as yet unproved

- By gambling on concessions in territory that has hardly been looked at by the geologist, let alone the drilling crew, and where the financial reward may be anything from zero to massive.

How it began

This range of options largely reflects Argentine history. With a land area of well over a million square miles, Argentina is the second-largest country in South America and the eighth largest in the world. But with a population of under 30 million, vast areas are almost empty, have never been fully explored for mineral wealth and have almost unknown potential. And for most of the last century, a mixture of state control, uncertain political stability and sheer distance from markets has conspired to lead investors to put their money only into the less risky agricultural sector. Even so, the Argentine oil industry has a lengthy history.

Oil was first found in 1907, when water engineers found commercial volumes of heavy oil around Comodoro Rivadavia in the San Jorge Basin on the Atlantic coast. Oil seeps had been known for centuries but the area at that time was still very much on the frontier of *terra incognita*. Development was initially by a state firm but, when money proved to be too tight, private firms were allowed in. Other basins were explored at varying times, with Neuquen proved commercial in 1918, Salta in 1923, Mendoza in 1932, Santa Cruz in 1946, Tierra del Fuego in 1959 and Jujuy as recently as 1969. The search has spasmodically moved into other areas but most of the effort has been concentrated on developing what had already been found rather than on seeking more.

YPF was established in 1922, henceforth holding a monopoly on exploration. Private firms were restricted to developing their existing holdings and although at odd times private companies were able to take on service contracts with YPF that remained the basic state of affairs until the 1980s. Not surprisingly, given the size of the country and the state firm's limited financial resources, YPF naturally concentrated on production to earn itself cash, exploration being generally restricted to a gradually widening perimeter around known fields.

Production boost

Self-sufficiency in oil has been near but never quite achieved since the early 1970s, 97 percent being the best attainment in 1972. It has since hovered around 90 percent but needed a political change of heart if Argentina was ever to be totally free of imports, possibly becoming an oil exporter. That change of heart came with the return of democracy in the aftermath of the disastrous Falklands adventure. In January this year, production was the highest ever, at 525,781 b/d, having grown well over 10 percent in the

Under new rules, pipelines become common carriers available to explorers who find oil in new blocks now on offer.

previous seven months. The upwards leap has come about almost entirely from the change of policy.

Just three years ago, YPF produced 62.2 percent of total oil, old concessions 2.4 percent, and companies operating service contracts with YPF 35.3 percent. In 1990, the service contracts were scrapped in preparation for a totally new approach, so the balance was 2.5 percent old concessions, 97.2 percent YPF and an initial 0.4 percent from marginal fields where private firms had been invited to buy out YPF. Last year, YPF's own operations produced 77.5 percent, old concessions still 2.4 percent, marginal fields 3.2 percent, but major fields transferred to new joint ownership between YPF and the private sector contributed 4.8 percent of the total. A further 12 percent came from service contracts converted to equity stakes, while the 0.2 percent balance came from fields transferred from YPF to provincial authorities.

Behind this surge was the removal of price control. For decades, private producers had to sell crude to YPF at prices fixed well below world-market levels. Investment in improved productivity was largely seen as a waste of money. Secondary recovery was almost entirely unknown since YPF could not earn enough at the controlled prices to reinvest in its own fields. Now marginal fields are seen as potentially very profitable once new technology has been installed, old-style concessions may become money spinners, while even the four large fields partly sold off by YPF to new joint ventures should become profitable investments. At least, the private sector companies hope so: the bids have generally been high.

The removal of price control was paralleled by the removal of export control. As a result, although Argentina has long exported surplus products (and imported varying amounts of crude), crude exports have become a regular feature over the last two or three years, with neighbouring countries the natural market. That is not to say that Argentina is now a net exporter, but the recession and higher production have combined to bring the country within a whisker of permanent self sufficiency.

Also just starting to feature in production statistics last year was crude from new-style concessions, granted under the 1985 Houston Plan. This was a sort of half-way house between the old concessions under which YPF had virtual control and a free market. Many of the old restrictions were removed for Houston Plan permits but some remained. Now,

Search blocks on offer under Plan Argentina.

with the passing of new laws in October 1991, vast new areas are being opened up under the Plan Argentina. This is claimed to offer the most favourable concession terms ever offered in the western hemisphere and to which Houston Plan concessions are being converted.

New acreage offer

Under Plan Argentina, 145 blocks on- and offshore are on offer. Each onshore permit will run for three search periods, the first covering two or three years. The second period runs one year less than the first, the third for two years less. At the end of each period, 50 percent of the acreage must be given up. Offshore, the terms are similar except that the first period can run up to four years. Further extensions, up to four years, are possible. Any one company or group may hold up to five blocks, though individual firms with stakes in varying groups can hold interests in more than that. Each block onshore is 10,000 sq km in area: offshore, each tract is 15,000 sq km.

Should oil or gas be found, the fact must be announced within 30 days, after which the finder has a year to determine whether or not the discovery is commercial. A declaration of commerciality, in effect a development plan, must then be made within 30 days if the find is deemed commercial.

area, or 250 sq km. The production permit also allows negotiation for transport through either existing pipelines or, if none is available or capacity is insufficient, through a new

'Vast new areas are being opened up under the Plan Argentina'

That is for oil: if gas is found the permit holder has five years to come up with a development plan. After that, a production permit is available, for 25 years initially, with a 10-year optional extension. This covers just the field line built by the producer.

Royalties, local and national taxes total around 55–57 percent. But taxes can be offset by operating and development costs, royalties and dry-hole costs. And there is no ring fence. On the other hand, bidding involves agreement on a detailed exploration plan, with notional cash values set against each activity. Should the licencee fail to meet the agreed obligations, cash will have to be paid instead. In that way, the government hopes to get real exploration going, not only in the proven oil provinces but also in virgin areas. For, although blocks in 14 basins are on offer, only six have producing oilfields in them. As the then head of YPF said just two years ago, 'In all the areas where there may be oil, we have explored perhaps 3 percent. Nobody knows what's in the other 97 percent.' Now maybe Argentina will find out. ■

. . . technical report

Exploration and Production

The Code of Practice on Well Control during the Drilling and Testing of High Pressure Wells has been sent to the printers with publication scheduled for August.

W S Atkins has been selected as the contractor for examining the structural and pressure integrity of subsea pressure containing systems in the majority of operational conditions when drilling a subsea well.

A successful conference entitled 'Offshore Safety — the response to Cullen' was held on 16 June. The conference studied the implications of the Draft Offshore Installations (Safety Case) Regulations and the steps which had been taken in implementing the recommendations of the Cullen Report.

Refining and Marketing

Following review of the draft Fire Precautions Code early in the year, a new Working Group was formed to consider two issues, fire protection and tank and equipment spacings. This new group has met on several occasions and has considered the results obtained by one of the participating companies using computer modelling techniques. Following these meetings, IP staff are drafting new sections on Fire Precaution and Tank Spacing for issue to Working Groups for comment.

The Electrical Committee has produced a specification for the installation of radio telephones in petroleum road tankers. An explanatory article by the Chairman appeared in the July edition of *Petroleum Review*.

With other interested bodies, Conveyance Panel C is challenging the enhanced standards for sideguards on road tankers being demanded during annual HGV tests.

Guidelines for the design and operation of gasoline vapour emission controls covering all downstream activities from refinery to service station including stage 2 (customer filling of cars) were published in May and are available from the library. Meetings were held with representatives of local petroleum authorities and HSE to discuss the implementation of these guidelines and the problems related to pressure drop during operations at service stations.

A draft Code on floating decks in fixed roof tanks produced by a consultant on behalf of a manufacturer is being considered for adoption, after revision, as an IP Code.

Measurement

The final draft of Petroleum Measurement Paper No 5: *Guide to Coriolis Direct Mass Flowmeters* has been issued for general ballot and will be published in the fourth quarter following consideration and resolution of ballot responses.

A Committee ballot has been completed on a new section of PMM Part II, Section 7: *Calibration of Vertical Cylindrical Tanks by the Optical Reference Line Method* dealing with Guidelines for Tank Recalibration. The whole standard will shortly be issued for final ballot.

Final editing and compilation of figures and drawings of PMM Part XIV: *Statistics for Static and Dynamic Measurement* is almost complete. Publication should be early in the fourth quarter.

A working document on *On-Board Truck Computers*, describing the requirements for and implementation constraints of such systems for petroleum and road tankers, was issued for comment to the oil industry and equipment manufacturers throughout Europe. Following an excellent response, the decision has been taken to draft a Guidelines document for OTC systems.

A meeting has been held with NWML to discuss the draft European Directive for the Legal Control of Measuring Instruments. Contact with the appropriate EC department to put the oil industry case for a derogation for bulk petroleum measurement was recommended.

Test Method Standardisation

Eighteen IP test methods and two new proposed methods have been revised for publication in 1993. Work progresses for the 1993 edition of the IP Test Method Book.

The text for two IP methods, IP 170 Flash Point by the Abel Method and IP 123 Distillation of Petroleum Products, were editorially revised into ISO/CEN format. The former for submission as a new work item in ISO/CEN; the latter for submission as the text for a revision of ISO 3405.

The recommendations of the CEN TC 19 Flash Point Task Group were well received at the recent TC 19 meeting. Their implementation will simplify the various European specifications and legislative documents which call up flash point methods.

Discussion has taken place with BSI to approve the format of BS 2000 methods to be published by the IP and designs have been drawn up for consideration.

A study has been compiled of BS 2000 standards comparing them with their corresponding IP test methods. Much alignment is required and plans have been made to update these methods in accordance with BSI procedures.

International (ISO) Standards on the PTC/13 work programme have been assessed and a number will be considered for adoption as test methods for the 1993 standards book.

A meeting was held at the IP to brief the UK delegation attending the International Standards meeting on petroleum products and lubricants, ISO/TC 28, in Philadelphia in June.

Health and Environment

A layman's briefing document 'Benzene and Petrol — Health Aspects' has been produced and will be published in *Petroleum Review*.

An independent technical review of the large number of published technical papers on the effects of benzene exposure has been commissioned.

The second year of the IP Bioavailability research project has been reviewed. A layman's guide to this work is being prepared for *Petroleum Review*.

Discussions were held with DoE and NRA representatives on the draft code being developed for the investigation of possible contamination of land by petroleum products. ■

John Hayes, Technical Director

IP Information Service News

Need to know?

Do you need to know what has been written or published in your field?

If you are doing research and need to trace papers, patents, books or conference proceedings already published we can help!

By accessing a variety of databases we can produce lists of document references tailored to your specific requirements.

Amongst the data bases we access most frequently are:
TULSA for upstream technical information, eg petroleum and reservoir engineering, platform construction, crude oil production, etc.
APILIT for downstream technical information, eg on refining, transportation, fuels, etc.
APIBIZ for business and commercial articles about the petroleum industry.

Costs depend on the complexity of the query, connect time and the number of references retrieved. We charge a minimum of £35 per search but IP members can expect to pay about £50 for 50 references or £60 for 70 references.

We are trained and experienced in the use of these data bases and use specialised software to speed up searches and thus keep costs as low as possible.

For more information contact Lyn Nevin, Julia Clark or Catherine Cosgrove on 071-636 1004.

Book loan period extended

Personal members, and employees of corporate member companies, can now borrow up to three books at a time for up to three weeks. The loan is free but any costs incurred in sending the books must be reimbursed. (No loans are available to non-members.)

IFEG

Dates for your diary

2 September — Afternoon visit to Imperial College Library
20 October — *Business Information Services in the Oil Industry — working for success.* Full day conference
2 November — Oracle Software Products for the Exploration and Production Industry, evening meeting
10 December — AGM and Wine & Cheese Party

For further information about IFEG and its activities contact Catherine Cosgrove on 071-636 1004.

Times of service

Visitors welcome 9.30 am to 5 pm
Telephone queries 10.00 am to 5 pm
Monday to Friday except Bank Holidays

Selected additions to Library stock

Directories and bibliographies
International Energy Statistics Sourcebook. PennWell, 1991.
Scottish Petroleum Annual 1992. Aberdeen Petroleum Publishing Ltd, 1992.

Petroleum Industry — general
UK Oil Taxation. Bland D. 3rd ed, Longman, 1991.
Guide to European Oil Taxation. Arthur Anderson, 1992.

Upstream — general
DEPT OF TRADE AND INDUSTRY. *Development of the Oil and Gas Resources of the United Kingdom: The Brown Book.* DTI, 1992.
LLOYD'S OF LONDON. *The International Law Relating to Offshore Installations and Artificial Islands.* Honein SE. Lloyds of London Press Ltd, 1991.
Pipe Provers: A Users Manual. Hayward ATJ. CUP, 1991.
Pipeline Pigging Technology. 2nd ed, Tiratsoo JNH. Pipes and Pipelines International Scientific Surveys Ltd, 1991.
WORLD PETROLEUM CONGRESS. *Proceedings of the Thirteenth World Petroleum Congress, held in Buenos Aires in 1991. Volume 2: Exploration and Production. Volume 4: Reserves, Management.* John Wiley & Sons, 1991.
API Spec 17D. *Specification for Subsea Wellhead and Christmas Tree Equipment.* 1st ed, API, 1992.

Upstream — exploration, geology, reservoir engineering, etc.
Carbonate Reservoir Characterisation: A Geologic — Engineering Analysis, Part 1. Chilingarian GV, Mazzullo SJ, Rieke HH, Elsevier, 1992.
Geology and Potential — A Plate Tectonic Approach. Beydoun ZR. AAPG, 1991.
91.3, INSTITUT FRANCAIS DU PETROLE. *Improved Oil Recovery in the Global Energy Perspective: Communication presente lors du "6th European Symposium on Improved Oil Recovery";* Stavanger, 21–23 May 1991, Jacquard, P.
A Practical Companion to Reservoir Stimulation. Economides MJ. Elsevier, 1992.

Upstream — safety
API RP 54. AMERICAN PETROLEUM INSTITUTE. *Recommended Practices for Occupational Safety for Oil and Gas Well Drilling and Servicing Operations.* 2nd ed, API, 1992.
OIL INDUSTRY ADVISORY COMMITTEE. *Guidance on Permit-to-Work Systems in the Petroleum Industry,* HMSO, 1991.
Guidelines for Emergency Drills & Exercises on Offshore Installations. UKOOA, 1991.
Guidelines for Medical Aspects of Fitness for Offshore Work: A Guide for Examining Physicians. UKOOA, 1991.
Guidelines for Offshore Emergency Training. UKOOA, 1991.

Downstream — Fuels
BS 7800: 1992 *Specification for High Octane (Super) Unleaded Petrol (Gasoline) for Motor Vehicles.* BSI, 1992.
US DEPARTMENT OF ENERGY. *Proceedings of the 4th International Conference on Stability and Handling of Liquid Fuels: Volumes 1 and 2: held in Orlando, Florida, USA on November 19th to 22nd 1991.* Giles HN. US Dept of Energy, 1992.

Environment
BS 7750: 1992 BRITISH STANDARDS INSTITUTION. *Specification for Environmental Management Systems.* BSI, 1992.
INSTITUTE OF PETROLEUM. *Guidelines for the Design and Operation of Gasoline Vapour Emission Controls.* IP, 1992.
CONCAWE. *Gasoline Vapour Emissions — A European Concern.* Concawe, 1992.
91.3, INSTITUT FRANCAIS DU PETROLE. *Le Raffinage et la Qualite de L'Air.* Raimbault C. Institut Francais du Petrole, 1991.

Maps
Energy Map of the CIS (Commonwealth of Independent States). Petroleum Economist, Price Waterhouse, 1992.
Energy Map of the Far East. Petroleum Economist, 1992.

FORTHCOMING EVENTS

August

19th–20th
Aberdeen: Course 'Subsea Well Control & Refresher'. Details: The Drilling and Production Centre. Tel: (0224) 895770. Fax: (0224) 895770.

25th–28th
Stavanger, Norway: 'Offshore Northern Seas Conference'. Details: Offshore Northern Seas Conference Secretariat, PO Box 175, N-4001 Stavanger, Norway. Tel: +47 4 55 81 00. Fax: +47 4 55 22 70.

September

1st–3rd
Houston, Texas: 'The 6th Congress and Exposition — Gas Turbines in Cogeneration and Utility, Industrial and Independent Power Generation'. Details: The American Society of Mechanical Engineers, 6085 Barfield Road, Suite 207, Atlanta, Georgia 30328, USA. Tel: (404) 847 0072. Fax: (404) 847 0151.

7th–9th
Birmingham: 'Distillation and Absorption '92'. Details: IChemE Conference Section, 165–171 Railway Terrace, Rugby CV21 3HQ. Tel: (0788) 578214. Fax: (0788) 577182.

9th–11th
London: Course on 'Offshore Pipeline Engineering'. Details: Nadia Ellis, IBC Technical Services, 57/67 Mortimer Street, London W1N 7TD. Tel: (071) 637 4383. Fax: (071) 631 3214.

13th–25th
France: 'International Petroleum Executive Seminar'. Details: Dr R L Gale, Seminar Manager, Petroleum Economics Limited, Piercy House, 7 Copthall Avenue, London EC2R 7BU. Tel: (071) 638 3758. Fax: (071) 638 3708.

15th–17th
Maastricht, The Netherlands: 'Energy Economy 1992'. Details: Energy Economy 1992, RAI Gebouw bv, Europaplein, 1078 GZ Amsterdam, The Netherlands. Tel: 31 (0) 205491212. Fax: 31 (0) 206464469.

16th–18th
Brussels: Conference on 'Lubricants of the Future and Environment'. Details: BfB Consultant, DPT Congress, 23 Rue Haigneaux, 5300 Nameche, Belgium. Tel: 32 (0) 8151177. Fax: 32 (0) 81581179.

20th
Moreton-in-Marsh: Course on 'Handling of Emergencies in the Petroleum Industry'. Details: Mr R Cameron, Marketing Manager, The Fire Service College, Moreton-in-Marsh, Gloucestershire GL56 0RH. Tel: (0608) 52156. Fax: (0608) 51788.

21st–22nd
Aberdeen: Conference on 'Practical Approaches to Implementing Successful Quality Management Systems for Offshore Contractors and Suppliers'. Details: IIR Industrial Ltd, 28th Floor, Centre Point, 103 New Oxford Street, London WC1A 1DD. Tel: (071) 412 0141. Fax: (071) 412 0145.

21st–23rd
Cambridge: 'Oil and Gas Tariff Workshop'. Details: Langham Oil Conferences Ltd, 37 Main Street, Queniborough, Leicester LE7 8DB. Tel: (0664) 424776. Fax: (0664) 424832.

21st–25th
Glasgow: Course on 'Advanced Design for Ships and Offshore Floating Systems'. Details: Mr J A T Grant, The Marine Technology Directorate Limited, 19 Buckingham Street, London WC2N 6EF. Tel: (071) 321 0674. Fax: (071) 930 4323.

22nd–23rd
London: Conference 'Tanker 92 — Elusive Profitability Amidst Quality Constraints'. Details: Susan Coulston, IBC Legal Studies and Services Limited, 57–61 Mortimer Street, London W1N 7TD. Tel: (071) 637 4383. Fax: (071) 631 3214.

22nd–24th
London: Conference on 'Offshore Site Investigation and Foundation Behaviour'. Details: Society for Underwater Technology, PSTI House, Exploration Drive, Bridge of Don, Aberdeen AB23 8GX. Tel: (0224) 823637. Fax: (0224) 820236.

23rd
Leeds: Meeting on 'Fundamentals of Combustion in Reciprocating Engines'. Details: Professor D Bradley, Department of Mechanical Engineering, The University, Leeds LS2 9JT. Tel: (0532) 332117. Fax: (0532) 424611.

23rd–25th
Southampton: '4th International Conference on Hydrocyclones'. Details: Mrs K Stones, Conference Organiser, Hydrocyclones, Cranfield, Bedford MK43 0AJ. Tel: (0234) 750422. Fax: (0234) 750074.

27th–29th
London: Course on 'Introduction to Petroleum Exploration for Non-Geologists'. Details: The Administrative Secretary, JAPEC, c/o The Geological Society, Burlington House, Piccadilly, London W1V 0JU. Tel: (071) 434 9944. Fax: (071) 439 8975.

28th–29th
London: Conference on 'The Business Implications of Public Access to Environmental Information'. Details: IBC Technical Services Ltd, 57–61 Mortimer Street, London W1N 7TD. Tel: (071) 637 4383. Fax: (071) 631 3214.

28th–30th
Nicosia: '6th Annual APS Conference — Middle East Strategy to the Year 2005'. Details: APS Group, PO Box 3896, Nicosia, Cyprus. Tel: 02 351778. Fax: 02 350265.

30th–1st October
Aberdeen: Conference on 'Cost Effective Topside Maintenance'. Details: IIR Industrial Ltd, 28th Floor, Centre Point, 103 New Oxford Street, London WC1A 1DD. Tel: (071) 412 0141. Fax: (071) 412 0145.

30th–1st October
Aberdeen: Course 'Subsea Well Control & Surface Refresher'. Details: The Drilling and Production Centre. Tel: (0224) 895504. Fax: (0224) 895770.

30th–1st October
Aberdeen: Conference on 'The Practicalities and Realities of Human Factors in Offshore Safety'. Details: Business Seminars International Ltd, 56–60 St John Street, London EC1M 4DT. Tel: (071) 490 3774. Fax: (071) 490 2296.

October

1st
Aberdeen: Conference on 'Subsea Standardisation — 1992 Update'. Details: Knighton Enterprises Limited, 2 Marlborough Street, Faringdon, Oxfordshire SN7 7JP. Tel: (0367) 242525. Fax: (0367) 241125.

6th–8th
London: 'Interspill '92''. Details: Xponent Ltd, The Courtyard, 98 High Street, Bedford MK40 1NN. Tel: (0234) 212988. Fax: (0234) 271157.

8th–9th
Oslo: Conference on 'Floating Production Systems'. Details:

FORTHCOMING EVENTS

Conference Officer, OCS, 34–36 Apsley End Road, Shillington, Hitchin, Hertfordshire SG5 3LX. Tel: (0462) 712049. Fax: (0462) 711889.

8th–9th
London: Conference on 'Assessing your opportunities in the developing UK gas market'. Details: IIR Industrial Ltd, 28th Floor, Centre Point, 103 New Oxford Street, London WC1A 1DD. Tel: (071) 412 0141. Fax: (071) 412 0145.

9th
Teddington, Middlesex: Open day at the National Weights and Measures Laboratory. Details: National Weights and Measures Laboratory, Stanton Avenue, Teddington, Middlesex TW11 0JZ. Tel: (081) 943 7272. Fax: (081) 943 7270.

13th–15th
Manchester: Course on 'Incineration Technology: Equipment Selection and Operation'. Details: Liz Hide, IBC Technical Services Ltd, Gilmoora House, 57–61 Mortimer Street, London W1N 7TD. Tel: (071) 637 4383. Fax: (071) 631 3214.

14th–16th
Athens: Conference on 'Natural Gas Policies and Technologies Part II: Technologies'. Details: LDK Consultants, 7, Sp. Triantafyllou Str. GR 113 61 Athens. Tel: 30 1 8629660. Fax: 30 1 8617681.

15th
London: 'UK Coat '92' '. Details: Institute of Energy Conference Department, 18 Devonshire Street, London W1N 2AU. Tel: (071) 580 0008. Fax: (071) 580 4420.

15th–16th
Lisbon, Portugal: 'First European Oil and Gas EDI Group Conference'. Details: Tessa Berry, Bellatrix Associates, Brooke House, Market Square, Aylesbury, Buckinghamshire HP20 1SN. Tel: (0296) 89911. Fax: (0296) 641726.

15th–20th
Perm/Ural: Trade Fair 'Energy and Ecology 92'. Details: Glahe International KG, Herler Strasse 103, D-5000 Koln 80, Germany. Tel: 0221 62 43 00. Fax: 0221 62 56 90.

18th–23rd
Rio de Janeiro, Brazil: Rio Oil and Gas Expo '92, and 5th Brazilian Petrochemical Congress. Details: Goal Promocoes E Feiras, Rua Conde de Lages, 44 -s/1301, CEP 20241, Rio de Janeiro, Brazil. Tel: 55 21 221 8086. Fax: 55 21 221 3804.

20th
London: Conference on 'Business Information Services in the Oil Industry — Working for Success'. Details: Miss C Little, The Institute of Petroleum, 61 New Cavendish Street, London W1M 8AR. Tel: (071) 636 1004. Fax: (071) 255 1472.

In situ flue gas probes

Ametek Thermox has introduced what is claimed to be the first ever *in situ* oxygen cell flue gas probe to offer field maintenance and repairability in minutes, as a development of the proven Model WDG-Insitu flue gas analyser system.

The installed probe is simply withdrawn from its mounting for the fast replacement of any internal component — oxygen cell, heater and thermocouple — an operation that with traditional probe designs involves considerable downtime, inconvenience and often the expense of total probe replacement.

Ametek's probe, supplied by Hobre Instruments, also provides a zirconium oxide cell with 300 percent more active surface area than conventional probes and is available in five different standard lengths, with a range of options to suit virtually any process. Fast response and high accuracy is claimed even in wet, dirty conditions, at temperatures up to 675°C without the need for a reference air supply.

Concrete FPSO

INTEC-GIBB has made a joint industry proposal to carry out additional research on a special form of ship-shaped hull construction which is claimed to offer significant economic and technical advantages for floating storage and production purposes. A design having up to one million barrels of storage capacity is proposed.

The proposal was presented at the Institute of Marine Engineers on 5 May to pre-invited oil company participants and was followed by a question and answer session which confirmed a high level of interest in the potential advantages of the proposed system.

Extensive analysis and structural testing had already been completed over the past six years on the concrete/steel sandwich design and INTEC-GIBB is now inviting the oil industry to participate in research directed at potential applications.

Lower construction costs coupled with rapid and simple construction at non-shipyard sites are key advantages identified for the design.

Other advantages include minimal segregated ballast and dry docking requirements, ease of tank inspection and maintenance, and high impact and damage resistance.

INTEC-GIBB is a joint venture established in 1991 by the British engineering consultancy Sir Alexander Gibb & Partners Ltd and Intec Engineering of the United States.

Compact heat exchanger

IMI Marston has launched its major new range of high quality stainless steel and nickel alloy compact heat exchangers.

The units will be marketed under the brand name of Marston Compact Exchangers and are designed for a wide range of high temperature, high pressure and harsh environmental operating conditions. Principal applications will be in the energy, chemical, petrochemical and offshore industries.

The new advanced design exchangers offer significant advantages over 'shell & tube' and other conventional heat exchangers and can be supplied in accordance with all recognised international design codes.

Purge gas savings

Recent welding trials conducted in conjunction with Bunting Titanium Limited of Birmingham using a Huntingdon Fusion Techniques Limited Argweld purge bladder system have shown that possible savings in the purge gas volume used and purge time can be made when welding and fabricating modules for the petroleum, gas, chemical and processing industries.

A critical area within the trials was to show that the purge bladder created a perfect air tight seal to ensure that there was no internal weld bead oxidisation.

Trials were conducted on eight-inch diameter titanium, typically when welding two three-metre sections together using only end caps for purge dams (ie: purging a six-metre total length) the client's purge times had been in the region of 25–30 minutes.

The eight-inch tandem Argweld purge bladder provides a localised purge area of eight inches either side of the weld.

With the bladders inflated and sealed the internal purge was monitored using the Argweld purge monitor by inserting the probe of the monitor through the root gap.

Within five minutes the monitor was showing a reading of 0.1–0.0 percent of oxygen within the purged environment and the tack weld procedure commenced, followed by a root run with wire feed and then a capping run.

Once completed, the weld was inspected by Bunting Titanium Limited's Quality Control Manager who passed the weld and approved the purge and purge monitoring techniques.

Revolutionary advertising medium

A new advertising and promotional medium aims to utilise the time spent by petrol station customers whilst they fill up their vehicles.

The Revolution Spreader Box is a pump island lighting unit that incorporates a three sided 'Rotavision' display. Clip-in preprinted plastic strips enable the display to be changed quickly and easily.

The Revolution Spreader Box provides petrol companies with the opportunity to promote their other products or services such as oils or car washes. It can also be used to highlight promotions including free gifts or vouchers.

For potential advertisers the product provides an opportunity for point of sale advertising in the fast growing sector of non-petrol forecourt retail such as sweets, groceries, cigarettes, etc. Likewise advertising using this medium can be utilised to reach a specific target market.

John Spring, Marketing Manager for Acme Signs, states 'the tremendous interest shown in the product both from UK and overseas petrol companies, confirms the trend of rapid expansion in products and services offered on the petrol forecourt.'

Several options can be incorporated into the 'Revolution Spreader Box' including uplighting, static graphics or roller blind type displays. The principle can also be extended by ACME to be incorporated into an existing lighting unit.

Corrosion problem solution

The elimination of corrosion in oilfield equipment from fabrication to commissioning is a standard headache for design, site and commissioning engineers.

Unitor Offshore Services, part of the Norwegian Unitor AS group, has developed a solution to the problem.

Mr Stuart Rennie, Unitor Offshore's Aberdeen sales manager explained: 'The most prevalent of these problems lie in piping systems, vessels and valves.

'We were asked if we could implement effective internal corrosion control for piping systems for the Bruce project, based on previous work on the Miller Project.'

Following comprehensive testing, BP decided to incorporate a water-soluble vapour phase inhibitor into all hydrostatic testing to eliminate the need to force-dry or nitrogen purge to remove residual water after the testing programme.

'Vapour Phase Inhibitor (VPI) works by creating a protective monomolecular film which is transformed by vapour from its carrier, in this instance, the hydrostatic test water.

In other words, the residual water is used to protect rather than be the cause of the corrosion problem,' added Mr Rennie.

High efficiency hydrodynamic pump

Jet pumps, also known as ejectors, are used extensively for pumping, boosting, flow induction, thrust augmentation, mixing and deep well or downhole pumping. The drive energy is supplied through a high pressure fluid. Construction is simple and advantages lie in their flexibility of operation and the low level of maintenance required.

A major disadvantage with jet pumps, however, is the low operational efficiency. Maximum jet pump efficiencies are usually less than 35 percent and this limits their use in many applications. Jet pumps have many attractive features but in multiphase operations, for example, they need to be less sensitive to flow fluctuations and less susceptible to loss of efficiency due to surges in pressure and flow.

A novel High Efficiency Hydrodynamic (HEH) pump is currently being developed by CALtec, part of the BUR Group. Using the same source of drive energy as a jet pump, namely a high pressure fluid, the HEH pump utilises a different method of energy transfer and achieves higher efficiencies. Experimental results have shown that efficiencies of two times that of conventional jet pumps are achievable.

Using the different method of energy transfer, the HEH pump is not vulnerable to surges in pressure or flow rates in both the driver and driven flow. Experimental results have also revealed that the HEH pump is highly efficient in multiphase operations. In addition, the HEH pump has also been found to be an excellent in-line mixer.

With efficiencies of twice that of conventional jet pumps, a number of interesting applications become apparent:

- Pressure boosting of single and multiphase mixtures;
- Flow induction and thrust augmentation of single and multiphase mixtures;
- Multiphase pumping systems;
- Downhole pumping systems;
- High efficiency in-line mixing.

The development and application of this novel pump forms the basis of the next phase of work.

Prince of Wales Award for Innovation

The University of Southampton Department of Mechanical Engineering's Professor Martin Thew and Dr Ian Smyth have been presented with the special category Prince of Wales Award for Innovation 1992 for the development of the Vortoil hydrocyclone unit.

The hydrocyclone unit was originally developed by Professor Thew, Dr Ian Smyth and Dr Derek Colman (now with BP Research) as a research programme at the University of Southampton. It is used in the offshore oil industry to clean up the oily water produced from the wells. Professor Thew was inspired to set up the programme after the Torrey Canyon oil disaster of 1967.

The product is now manufactured and marketed by Vortoil Separation Systems, an affiliate of Conoco. Over 150 installations are now operating throughout the world, cleaning up eight million barrels of oil-contaminated water a day before returning it to the sea.

Gauge for underwater monitoring

Strain and load measurement specialist, Strainstall Engineering Services Limited, has developed a new configuration of strain gauge designed for the cost-effective monitoring of the structural integrity of the underwater supports of offshore platforms.

The Strainstall underwater strain gauge measures strains and the dynamic loading on supports and nodal joints to pinpoint areas which will require remedial work.

The company gave particular attention to devising methods of installation which would minimise the high costs of diving as well as the need for a reliable long-term installation.

Typically, one diver can install eight strain gauges in 30 minutes on pre-cleaned supports using the magnetic fixing system developed by Strainstall. The system also incorporates expoxy resin seals which contribute to the long-term integrity of the completed strain gauge installation.

The gauges collect measurement data which is gathered and processed from the underwater installation.

Daily, weekly or monthly reports can be made either on-site or via a modem satellite link to allow remote on-shore monitoring.

Safety shields

A new addition has been made to the Ramco Vue-Guard range of 'see-through' Teflon Safety Shields.

The existing range of shields manufactured from a wide variety of materials are ideally suited to containing the spray-out of dangerous chemicals from pipe joints and flanges. The new model is designed to contain leakages from liquid sight glasses and flow indicators located in pipelines whilst allowing easy viewing of the sight window and its retainers.

A special feature of the new safety shields is the over-lap design which allows them to be wrapped completely around the fittings. This provides complete protection against lateral spray-out and contributes to ensuring a safe working environment. The shields are available in the United Kingdom from Allison Engineering.

Contact List

Strainstall	0761 414939
Huntingdon	0480 412432
Intec-Gibb	0734 261061
BHR	0234 750422
IMI Marston	0902 397777
Allison	0268 526161
Unitor	0224 782882
Hobre Instruments	0249 444133
Acme Signs	0992 719662

Esso Engineering Teaching Fellowships

Esso Engineering Teaching Fellowships are now available to selected young lecturers at UK Universities and Polytechnics in chemical engineering, petroleum engineering, and mechanical engineering.

The Fellowships are in the form of a personal award of total value £9,000 over 4 years.

The scheme is funded by Esso UK plc to encourage able young lecturers to remain in higher education in their early years, to teach the next generation of engineers.

It is administered by The Royal Academy of Engineering.

Up to six Fellowships will be awarded each year for the next 5 years.

The closing date for applications in 1992 is 1st November.

For further details and an application form please contact:

Esso Engineering Teaching Fellowships
Education Affairs Department (quoting Ref PR)
The Royal Academy of Engineering
2 Little Smith Street London SW1P 3DL.

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Fax 071 233 0054

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The Institute of Petroleum

LIFE CYCLE ANALYSIS AND ECO-ASSESSMENT IN THE OIL INDUSTRY

Thursday 26 November 1992

A one-day Conference to be held at
The Cavendish Conference Centre, London

The oil industry is accustomed to paying great attention to the energy balances of both new and existing processes since refinery energy has always been a key element of a downstream company's cost structures. Now, however, it is not merely consumed energy which is at issue but the pollution and waste created during the integrated activities from well-head to final use and/or disposal of the oil product.

The use of Life Cycle Analysis (LCA) or Cradle-to-Grave Analysis to assess the total environmental impact of products or activities is still in its infancy. Nevertheless, LCA is an essential tool in the investigation of products seeking an 'eco-label'. Although some oil products are held as too dangerous to be considered for eco-labelling as such, the LCA techniques for assessment and comparison of the different oil products are of critical importance in guiding the decision-making processes both at the energy/environment interface and in the product formulation.

This conference will examine the general status of LCA and its relevance and application in the oil industry both in the context of the European Commission's Eco-labelling Directive proposals and the environmental impact of automotive fuels and lubricants.

For further information, and a copy of the registration form which will be available shortly, please contact
Caroline Little, The Institute of Petroleum,
61 New Cavendish Street, London W1M 8AR.
Telephone: 071 636 1004. Telex: 264380. Fax: 071 255 1472

Institute News

New Collective Member

Minster Fuels Ltd
Gundrymor Trading Estate, Three Cross Road, West Moors, Wimborne, Dorset BH21 6QW. Tel: 0732 351 358. IP Nominated Representative: Mr BT Osborne, Operations Manager.

Minster Fuels Ltd specialises in fuel and lubricant distribution, servicing the south of England. The company also offers a contract haulage service to other oil distribution companies. Minster Fuels Ltd incorporates Hall (Fuels) Ltd, PDS (Fuels) Ltd, John Flint & Son and FuelFleet.

New Members

Mr PA Allen, 21 Downsview Drive, Wivelsfield Green, Haywards Heath, Sussex RH17 7RN.
Mr F Allsworth, 64 Kenton Way, Westview Park, Laindon, Basildon, Essex SS16 6RY.
Mr A Ashby, 39 Hamble Lane, Hamble, Southampton SO3 5JR.
Mr PN Bamber, Briggs Oil Ltd, North Road, Eastham, Wirral, Merseyside L65 1AJ.
Mr A Bermingham, Montreux Energy, 1001 E Bayaud Ave, Suite No 1703, Denver, Colorado 80209, USA.
Mr AH Brown, Mobil Oil Co, Coryton Refinery, Coryton, Stanford-Le-Hope, Essex SS17 9HH.
Mr ME Burch, Genesis Engineering Consultants, 20–22 Stukeley Street, Covent Garden, London WC2B 5LR.
Mr GJ Button, Barrel Consultants, 121 Gloucester Place, London W1H 3PJ.
Mr MH Case, Calypso, 30 The Spinnaker, South Woodham Ferrers, Chelmsford, Essex CM3 5GL.
Mrs JH Clark, 4 Aran Heights, The Lagger, Chalfont St Giles, Buckinghamshire HP8 4DZ.
Mr G Cooke, Corriecraig, Raemoir, Banchory, Kincardineshire AB31 4EB.
Mr P Corbetis, 26 Derwent Road, Egham, Surrey TW20 8JP.
Dr P Datta, 25 Lindisfarne Road, West Wimbledon, London SW20 0NW.
Dr PA Dawson, Hydraulic Analysis Ltd, Mill House, Hawksworth Road, Horsforth, Leeds LS18 4JP.
Ms V Draper, SD-Scicon, Wavendon Tower, Wavendon, Milton Keynes MK17 8LX.
Mr CF Duggan, 74 Brampton Close, Corringham, Stanford-Le-Hope, Essex SS17 9LL.
Mr AARH Epskamp, Flothuisstraat 6, 'S-Gravenzandl 2692 CM, The Netherlands.
Mr P Estienne, LM Chemicals Ltd, 7 Neville Court, Abbey Road, London NW8 9DD.
Mr CJ Fister, CMG, Westblaak 226, 3012 KP Rotterdam, The Netherlands.
Mr GS George, Mobil Oil Co Ltd, 54/60 Victoria Street, London SW1E 6QB.
Mr DM Giles, Contracts Consultancy Ltd, 68 Upper Richmond Road, London SW15 2RP.
Mr B Gill, Marathon Int Petroleum (GB) Ltd, 174 Marylebone Road, London NW1 5AT.
Mr SA Harrington, 16 Broadlake, Willaston, South Wirral L64 2XB.
Mr CC Harrison, CMG (UK) Ltd, Telford House, Tothill Street, London SW1H 9NB.
Mr DT Harrison, Esso Petroleum Co Ltd, Esso House Mailpoint 22, Ermyn Way, Leatherhead, Surrey KT22 8UX.
Mr M Hengari, 45 The Avenue, Oxford OX1 5PP.
Mr MF Henthorn, 125 Broadway, Chadderton, Oldham OL9 0EL.
Mr CF Hicks, 89 Arundel Avenue, South Croydon, Surrey CR2 8BI.
Mr AM Higgs, Davies Arnold Cooper, 6–8 Bouverie Street, London EC4Y 8DD.
Mr B James, Kelt UK Ltd, 130 Jermyn Street, London SW1Y 4UJ.
Mr LF Johnson, 61 Elgin Crescent, London W11 2JD.
Mr P King, 63 Gladstone Street, Bourne, Lincolnshire PE10 9AY.
Mr TA Knott, Knott Associates, 47 Lodge Close, Cobham, Surrey KT11 2SQ.
Chief SA Latinwo, 25 St James Mansions, West End Lane, West Hampstead, London NW6 2AA.
Mr AHI Lonie, 21 Taylors Ridge, Leighton Buzzard, Bedfordshire LU7 7JW.
Mr DW Mackay, 204 Headland Court, South Anderson Drive, Aberdeen AB1 7HZ.
Mr DP Maley, 50 Greyhound Road, London W6 8NX.
Mr PT Maltby, Contracts Consultancy Ltd, London House, 68 Upper Richmond Road, London SW15 2RP.
Mr K Matsell, CMG, Telford House, Tothill Street, London SW1H 9NB.
Mr G McIntosh, 10 Pilgrims Hill, Linlithgow, West Lothian EH12 9DN.
Dr R McKean, Montreux Energy, 11 Route de Drize, 1227 Geneva CH, Switzerland.
Mr A Meiklejohn, 65 Lily Loch Road, Stonehaven, Kincardineshire AB3 2WA.
Mr DL Morgan, Flat 2, Intercon Plaza, 5 Inverness Place, London W2 3JF.
Mr JE Nicholson, 69 Wavertree Road, South Benfleet, Benfleet, Essex SS7 5AW.
Mr A Ogunbufunmi, Dunia Oil & Technical Services, 40 Abinger Mews, London W9 3SP.
Eur Ing AM Pardo, 88 Newlands Park, Sydenham, London SE26 5NB.
Mr DJ Phillips, 49 Riccarton Road, Linlithgow, West Lothian EH49 6HX.

UK Deliveries into Consumption

May 1992 — Tonnes

Products	*May 1991†*	*May 1992**	*Jan–May 1991†*	*Jan–May 1992**	*% change*
Naphtha/LDF	265,817	262,563	1,488,513	1,434,480	−4
ATF—Kerosine	515,514	580,672	2,200,247	2,555,027	16
Motor Spirit	2,127,901	2,013,749	9,808,619	9,803,158	0
of which unleaded	865,597	929,159	3,864,635	4,423,998	14
Super unleaded	102,938	117,554	449,959	552,605	23
Premium unleaded	762,659	811,605	3,414,676	3,871,393	13
Burning Oil	154,491	125,561	1,118,965	1,156,127	3
Derv Fuel	907,123	885,091	4,398,541	4,478,783	2
Gas/Diesel Oil	625,515	543,958	3,639,944	3,418,450	−6
Fuel Oil	1,083,205	762,921	5,154,300	4,896,477	−5
Lubricating Oil	66,859	63,031	315,753	326,896	4
Other Products	632,223	571,631	2,840,294	2,814,757	−1
Total above	6,378,648	5,809,177	30,965,176	30,884,155	0
Refinery Consumption	525,919	500,737	2,497,337	2,478,813	−1
Total all products	6,904,567	6,309,914	33,462,513	33,362,968	0

†Revised with adjustments *Preliminary

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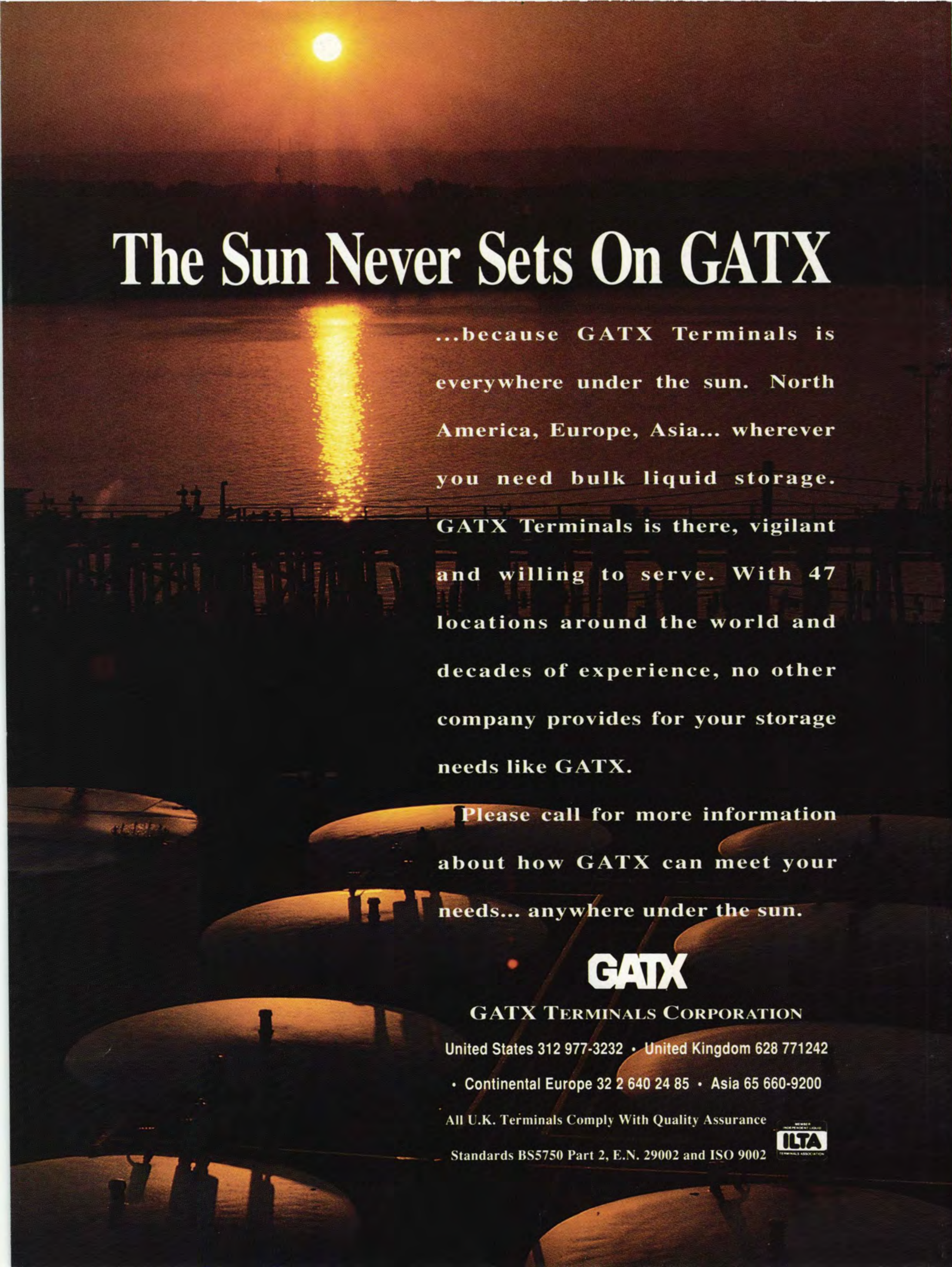
CIM Locations	Total Capacity m^3	Tank size range m^3	Number of tanks	Products stored	Comments
LE HAVRE	3,380,000	60,000 to 150,000	40	Crude oils	9 jetties, Max Draught 70ft, VLCC up to 250,000 MT Barge and pipelines Transhipment. Direct link to open sea.
ANTIFER	655,000	22,500 to 150,000	4 (at 150,000) 2 (at 22,500)	Crude oils	2 jetties, Max Draught 98 ft and 82ft. ULCC up to 550,000 MT. Transhipment. Relay connected to Le Havre facilities above through pipeline. Re-loading on site.
LE HAVRE	925,000	600 to 30,000	69	Refined Products Petrochemical Feedstock	Naphta. G.O. Gasoline, Premium, Jet, Kerosene, Deballasting equipment. Connected with TRAPIL pipelines.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