

PETROLEUM REVIEW

An aerial photograph of an industrial facility, likely a refinery or storage terminal. In the foreground, several large, cylindrical storage tanks are visible, some with green roofs and others with grey. To the left, there is a large paved area with numerous stacks of lumber or logs. In the background, there are industrial buildings, including a large blue one, and a residential area with houses and trees.

THE INSTITUTE
OF PETROLEUM

August 1996

Independent Bulk Storage

A survey of European
bulk storage capacity

Tank coatings

Developments designed to
minimise environmental
impact

United States

Exploration still banned
in some offshore areas

Safety

Electrostatic hazards in
meter proving

THINK TANK



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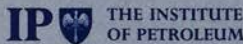
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COVER PHOTO

Storage at Nordenham, Germany.
Photo courtesy of Weser Petrol

News in Brief

17 June

Eastern Natural Gas has signed gas purchase contracts with Shell and Esso for an additional 4.5bn therms of gas, worth over £850m when added to existing purchase arrangements for gas from the Schooner field, over the next 15 years. The contract is for gas from the £1.6bn Eastern Trough Area Project which was granted development approval earlier this year.

18 June

Arco's Wiriagar Deep-3 appraisal well in the Berau block of Bituni Bay, Irian Jaya, in eastern Indonesia has tested at a cumulative rate of over 36 mncuft of gas daily.

19 June

A consortium of Unocal, Total and Statoil have been awarded a three-year natural gas exploration concession in the Andaman Sea in Thailand, reports the *Financial Times*.

20 June

The initial keel section for the Schiehallion floating, production, storage and offloading vessel has been laid at Harland and Wolff's building dock in Belfast. The 950,000 barrel storage capacity vessel is the world's largest new-building FPSO.

Arco and its partner Agip have signed an agreement with the government of Ecuador for the construction of a 170-km secondary pipeline to transport crude from the Villano field to the Transecuadorian Pipeline System. Due for completion in 1999, the pipeline is designed to carry 80,000 b/d, although it will transport just 30,000 b/d initially.

21 June

Statoil and Linde have announced a long-term collaboration agreement that aims to improve technology for natural gas liquefaction. Work will cover the whole LNG chain, including storage facilities, transport by sea and re-gasification at the reception site.

The pilot of the Sea

Empress at the time she grounded on rocks off Milford Haven in February has been found guilty of incompetence and banned from piloting such large vessels in the port. John Pearn is now authorised to handle vessels under 90,000 dwt (instead of 150,000 dwt previously).

Tenneco has sold its natural

gas division to El Paso Energy for \$4bn. El Paso bought Tenneco Energy for \$750m and assumes \$2.65bn of Tenneco debt and a further \$600m in liabilities and other considerations.

Atlantic LNG Company of

Trinidad and Tobago is to construct a \$1bn LNG plant at Point Fortin to supply LNG to markets in the northeast United States and Spain. Shipments from the three-million tonne per year facility will begin in mid-1999. Cabot LNG Corporation of Boston and Enagas of Spain have bought 100 percent of the plant's output.

24 June

Arco has reached agreement with the government of the State of Qatar for development of the offshore Al Rayyan field. The field is expected to start crude production in early September with an output of approximately 35,000 b/d. The company has also signed a production sharing contract with the Ministry of Petroleum and Minerals for block 32 in the Sultanate of Oman. The agreement calls for Arco and its partner Partex to spend \$41m implementing an exploration programme over a seven-year period.

25 June

Total is to acquire BHP's 12.43 percent interest in blocks 22/20 and 23/16c in the Mungo and Monan fields in the central North Sea. The fields are part of the Eastern Trough Area Project which comprises a total of nine oil and gas fields and is scheduled to enter production in mid-1998.

26 June

The UK Office of Fair Trading has rejected petrol retailers' appeals for an investigation into the petrol pump price war initiated by Esso. While retailers fear that the outcome will be service station closures, OFT says that it sees no evidence of predatory behaviour by Esso.

27 June

Amoco Trinidad Oil Company has amended its natural gas contract with the National Gas Company of Trinidad and Tobago to provide up to 350 mncuft/d of additional gas until 2019 to meet rising demand from new industry locating in Trinidad during the next few years. The increase brings Amoco's total gas sales in Trinidad to 1.1 bncuft/d.

Owners of the Central Area

Transmission System (CATS) and J-block in the North Sea have been granted a permanent injunction by the High Court of England and Wales prohibiting Enron from pursuing its Capacity Reservation and Transportation Agreement (CRTA) case against the CATS owners in the Texas courts. Legal action for non-payment of monies by Enron subsidiary Teesside Gas Transportation Limited, under the terms of the CRTA, is due to be heard in the High Court of England and Wales later this year.

ABB Offshore Technology

of Norway has secured two three-year contracts worth NOK720m, including options for three extensions of two years apiece, for maintenance and minor modifications on the Troll and Sleipner fields from Statoil. The Troll contract covers the gas treatment plant at Kollsnes and the A platform.

Lasmo Oil (Egypt) has

acquired a 36 percent interest in the North Red Sea Area Block 1, El Quseir, concession offshore Egypt from British Gas Exploration and Production. British Gas retains a 44 percent stake in the acreage and Edison International the remaining 20 percent interest.

28 June

The Kuwait Petroleum Corporation is to sell its Santa Fe Exploration (UK) Ltd subsidiary. The sale will not involve Santa Fe Drilling.

M-I Drilling Fluids, part of

Smith International, has completed the acquisition of Anchor Drilling Fluids, a subsidiary of Transocean ASA of Norway. According to M-I, the \$750m combined revenues of the two companies will make M-I the largest supplier of drilling fluids and allied products and services.

1 July

Chevron officially became operator of Venezuela's Boscan oilfield today. Through its new role as a service contractor, the company is now the largest private oilfield operator in the country.

2 July

Statoil has awarded contracts worth NOK1.3bn to Services Dowell Schlumberger and Baker Hughes Inteq for drilling fluid, completion and cementing services on the Norwegian continental shelf.

Gazprom is to sell its 15

percent stake in the Karachaganak project in Kazakhstan to LUKoil, reports *Lloyd's List*. The remaining 85 percent is split between Agip and British Gas.

Shell and its partners have

finalised development plans for the \$1.45bn Ursa project in the deepwater Gulf of Mexico. The second largest discovery in the area to date, Ursa will be developed with a tension leg platform in approximately 4,000 feet of water. The field is expected to achieve production rates of 150,000 b/d of oil and 400 mncuft/d of gas. Ultimate recovery is estimated at 400 million barrels of oil and gas equivalent.

4 July

Turkmenistan has set up four state companies to develop hydrocarbon reserves and construct oil and gas facilities, according to *Lloyd's*

News in Brief

List. A new ministry for the oil and gas industry and mineral resources has also been established, with a state fund to develop the sectors. The ministry replaces the former Oil and Gas Ministry.

The Falkland Islands government has received applications for 10 tranches offered in last year's licensing round (see *Petroleum Review*, November 1995). Fourteen companies, comprising six groups from 10 different countries have submitted offers. Awards will be announced later this year.

Lasmo has acquired the Aliano exploration permit in southern Italy. The block lies in the southern Apennines, some 5 km southeast of the Tempa Rossa oilfield and the appraisal well Gorgoglione-1 currently being drilled by the company. Lasmo holds a 40 percent interest in the block and will act as operator. Other participants are Enterprise Oil (33.33 percent), Fina (13.33 percent) and Mobil (13.33 percent).

Total is to acquire 38 service stations owned by Shell in western Germany in exchange for 44 Total service stations in eastern Germany. The agreement, which is subject to approval by the Kartellamt, Germany's anti-trust office, will increase Total's regional market share to more than 4 percent.

8 July
Conoco has been awarded a refinery-related technical services agreement by the Kuwait National Petroleum Company to act as a consultant on a broad range of refinery operation matters including safety and occupational health, maintenance and inspection, project development and process technology.

Ranger Oil has announced that oil production has begun from an extended well test in the Pierce field in the UK sector of the central North Sea. Well 23/27-10z flowed at rates in excess of 19,000 b/d.

Barmac has received formal approval for a loan of £3.3m of Objective 1 European Regional Development Funding for the upgrade of its Nigg dock facility. The upgrade will allow the company to move from its traditional business of constructing fixed offshore structures into the growing markets of floating production systems and production jack-up rigs.

9 July
The Meteorological Office is expanding its network of specialist centres to serve the offshore industry. New account managers in Southampton, Glasgow and Norwich will support the main Aberdeen-based operation. The new services will cover the developing oil frontiers of the Falklands and the North West Approaches west of Shetland.

A joint venture between India's MA Chidambaram Group and Van Ommen Tank Terminal Asia is planning to build a specialised natural gas and petroleum product terminal on the country's southeastern coast, reports *Lloyd's List*.

Enterprise Oil has entered into its first Middle East venture by agreeing to provide \$25m initial funding for exploration and production relating to a Buttes Gas & Oil Co International licence offshore Sharjah in the United Arab Emirates. The deal entitles Enterprise to a 40 percent share of production from new wells drilled in the Mubarak field.

Marathon Oil and Amec Process and Energy have set up a Brae Projects Alliance. The five-year agreement covers EPIC services for topside modifications to the Brae platforms, in particular new field, step-outs.

10 July
Norsk Hydro, operator of the Visund field, has awarded DSND Subsea of Norway a NOK\$57m contract for the installation of anchors and

anchorlines for the field's floating production platform. DSND will also undertake the tow-out of the platform from Haugesund.

Enterprise Oil and Elf Petroleum have completed the unwinding of their North Sea joint venture operation Elf Enterprise Petroleum (see *Petroleum Review*, March 1996).

11 July
British-Borneo Petroleum Syndicate has acquired the entire issued share capital of Unocal North Sea Exploration Limited from Unocal International Corporation for a total consideration of \$23.75m.

Shell and Exxon have agreed to combine their petroleum additives businesses in a 50:50 joint venture. The move will give them a 25 percent share of the \$6bn/yr market.

12 July
Kvaerner Oil and Gas Norway has secured a NOK1.4bn engineering, procurement and construction contract for the Oseberg East development's topsides from Norsk Hydro. The topsides, which will include quarters and facilities for processing and drilling, will weigh 6,600 tonnes and are scheduled to be installed in May 1998.

13 July
Hungarian oil and gas company MOL and US-based Swift Energy and McDermott Holding have formed a consortium to explore for oil and gas in Siberia, according to *Lloyd's List*. The joint venture will set up a company with Russia's Senega Co, which holds a 25-year exploration right for the west Siberian Samburg oil and gas field.

TransCo, the pipeline distribution arm of British Gas, has written to shippers proposing an average 2.7 percent increase in gas transportation charges next year.

15 July
Ramco Oil & Gas has announced an alliance agreement with Schlumberger Logelco Inc to manage the proposed development of the Muradhanli field onshore in the Azerbaijan Republic. Ramco is also negotiating a joint venture agreement with Socar for the development of the field.

The Expro Group has secured a contract for the supply of a complete well testing package and surface and bottomhole sampling services for Amerada Hess' platforms and mobile rigs in the UK North Sea. The company is also to provide wireline services for Amerada Hess-operated installations in this sector.

16 July
Hardy Oil & Gas has announced that the Bayu-4 appraisal well in the Bayu field in the Timor Sea between Indonesia and Australia has tested at a combined rate of 14 mncu/d of gas and 530 b/d of condensate.

Finnish-Russian joint venture A/O Pechormorneft has been issued an exploration licence for the Pomorskoye and Kolokolomorskoye structures in the Pechora Sea, reports *Lloyd's List*.

National Power has acquired a 26 percent strategic interest in Kot Addu Power Company, established by the government of Pakistan to own the 1,600 MW multi-fuel combined cycle power station at Kot Addu in the Punjab Province, for \$215m.

17 July
Shell is investing £18m in a new Shell Claus Offgas Treating (SCOT) unit at Stanlow in a bid to improve local air quality by cutting emissions of sulfur dioxide.

18 July
Douglas Gas in the Isle of Man has been taken over by Channel Islands-based International Energy Group for £15m.

Andrew onstream ahead of schedule and under budget

The strong alliance forged between British Petroleum and its seven contractors on the Andrew development enabled the project to come onstream on 26 June some six months earlier than originally planned and well under budget – perhaps by as much as £83 million, according to Paul Bibby, BP's Deputy Project Manager for Andrew.

Spanning licence blocks 16/27a and 16/28b, about 230 km northeast of Aberdeen, the Andrew field was discovered in 1974 and has estimated recoverable reserves of 119 million barrels of oil and natural gas liquids and 134 billion cubic feet of associated gas.

The field was considered too marginal to develop at the time and it was not until 1990 that the project was considered again (see *Petroleum Review*, January 1995). Traditional attitudes had begun to change with 'partnershiping' increasing in popularity. BP had estimated that using a traditional approach, Andrew would cost some £450m to develop.

However, after six months of discussions with contractors this figure was reduced to £373m – a figure BP felt was acceptable. Savings included eliminating duplication of positions within the alliance, the use of functional specifications and standardised products and forging contractor-supplier partnerships.

Further savings have been made as the project progressed. For example, £2m was saved by reducing the number of pilings in the jacket and almost £20m was saved offshore through the virtual 100 percent completion of the integrated deck onshore. As a result of this onshore work, hook-up took just seven days as opposed to a few months.

The Andrew alliance comprises BP, Brown & Root, Santa Fe, Saipem, Highlands Fabricators, Allseas, Emtunga and Trafalgar House. Financial rewards are firmly linked to the final cost of the project. BP and its partners Lasmo, MOC Exploration, Clyde Petroleum and Talisman Oil will share 46 percent of any savings

while the contractors share out the remaining 54 percent. Of this, Brown & Root will take 22 percent, Trafalgar House 12 percent, Saipem and Hifab six percent apiece, Allseas four percent, Santa Fe 3 percent and Emtunga one percent.

Andrew consists of a single fixed platform (6,500 tonne jacket and 10,400 tonne integrated deck) with production, drilling and accommodation facilities for 72 people. The topsides include facilities to operate the nearby Cyrus subsea satellite development.

Up to 14 horizontal producing wells and one gas reinjection well will be drilled on Andrew. The field is expected to produce around 55,000 b/d and 41 mncuft of gas per day. Oil will be exported to the Brae-Forties pipeline system and the gas to the Central Area Transmission System.

Field life is estimated at 17 years.

Project costs for Cyrus, not part of the Andrew alliance, have also been reduced, from £24m to £21m, via a gainshare partnership with Rockwater. Production is expected to peak at 12,000 b/d.



Installing Andrew's integrated deck

French see a future in LPG as an automotive fuel

French sales of LPG as an automotive fuel have leapt by around 50 percent on 1995 levels since fiscal changes in its favour were introduced on 1 January, according to trade association, Le Comité Français du Butane et du Propane, CFBP.

Tax cuts on LPG, amounting to one cfr/litre, have reduced its retail price at the pump to 2.60 cfr/litre compared with six cfr/litre for petrol and 4.20 cfr/litre for diesel.

'While it would be nice to think that motorists were making a conscious choice in favour of LPG solely because it is an environmentally "clean" fuel, clearly economic factors are playing an important role in its surge in popularity,' a CFBP spokesman explained.

The CFBP forecasts an increase in the number of vehicles, private and commercial, equipped for LPG, to rise from 20,000 currently to around 400,000 by the year 2000.

The cost of adapting a vehicle to run on LPG varies from

FFr10,000 to FFr15,000.

Having incurred heavy financial losses in the 1980s, running into hundreds of millions of francs, when tax increases on LPG forced them to dismantle half their sales outlets, distributors are seeking guarantees that the new fiscal advantages are here to stay – at least for the next five years.

'We are optimistic that these can be obtained given that a major aspect of a Clean Air Act currently being debated in parliament is devoted to combatting pollution from automotive fuels,' said Joël Pedessac, Project Manager of Shell-Butagaz.

'Secondly, LPG only contributes FFr1 billion to annual taxes on fuels totalling FFr150 billion so it would probably not be a prime target in the event of the government deciding to increase levies,' he added.

Even taking into account CFBP's strong growth forecasts, LPG sales would still only represent approximately 1.4 percent

of France's global automotive fuel sales at the beginning of the next century. However, despite LPG's 'marginal' status, distributors are likely to invest up to FFr1 billion over the next five years in doubling or even tripling their retail networks which currently stand at around 700 outlets nationwide, Mr Pedessac said.

As well as the distributors, French car manufacturers Renault and Peugeot-Citroen appear convinced that LPG has a future, albeit limited. Both companies now offer vehicles which can run on LPG.

Because of economies of scale, LPG distributors pick out company and public authority vehicles as their principal market.

The cost of adapting a 100-strong fleet to LPG and installing a private supply station is estimated at FFr800,000, an outlay paid off in two to three years if each vehicle clocked up 10,000 kilometres annually.

Interest in Conoco platforms

Conoco is selling its Kotter and Logger platforms and facilities located in the Dutch sector of the North Sea. The four 12-year-old oil platforms have been advertised as being available for re-use in late 1997 to to early 1998.

Sales information has appeared in the trade press and on the Internet, backed up by a stand at this year's Offshore Technology Conference in Houston.

Some 20 companies have expressed an interest in purchasing the facilities so far, including a number of brokers with worldwide contacts in the industry. Conoco (UK) is also understood to be considering the platforms for its Banff field.

Any buyer will be responsible for the removal, seafastening, refurbishment and re-installation of the facilities.

Study to unlock seabed secrets

A detailed survey of the seabed of the northeast Atlantic and its related environment across an area the size of Wales is scheduled to complete this month. The study focuses on the region to the west of Shetland where the 14 oil companies who initiated and funded the £1 million co-operative project are currently active in searching for and developing new reserves.

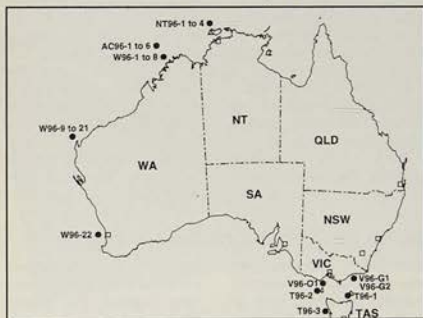
The programme has been designed in collaboration with the UK government and will not only provide information required by the partner oil companies but also information that will support regulatory policy while stimulating wider oceanographic research.

Work is being carried out by the Southampton Oceanographic Centre and a number of other marine experts using advanced

sonar imaging, remotely operated cameras and new coring techniques. The data produced will provide a detailed overview of the whole region and identify habitats which will be targeted for further investigation. The survey involves two cruises between June and August, the first of which involved a sidescan sonar survey of the region to provide information essential to the effective planning and targeting of the next stage which involves collecting and analysing biological and chemical samples from the key areas.

This study marks a new way forward for the environmental management of oil and gas activities in deep water areas worldwide, said Martin Ferguson, Chairman of the Atlantic Frontier Environmental Network.

Release of Australian exploration areas



Thirty-eight vacant areas offshore Australia have been released for work programme bidding in 1996. The areas centre on the Bass Strait region off the coast of Victoria and the North West Shelf off the coast of Western Australia (see map). Applications must be lodged by 30 January 1997.

Some of the areas offered may be located close to, or contain, the habitats of endangered species protected under Australian law. Permit holders will be required to submit details of drilling proposals, a descrip-

tion of the environment (both in the permit and adjacent) which is likely to be affected by drilling, a description of the potential impact of drilling operations, an outline of an environment protection plan and a copy of the operator's approved oil spill contingency plan in order to assist the exploration drilling application approval process.

Australia produced about 70 percent of its oil needs and all of its gas needs in 1995. The value of oil and gas production was A\$8 billion with exports valued at over A\$4.5 billion.

Green light for Genesis project

Chevron, Exxon and Fina are to go ahead with the \$750 million Genesis deepwater oil and gas project in the Gulf of Mexico.

Formerly called 'Vancouver' or 'Green Canyon', Genesis is located about 150 miles south of New Orleans on Green Canyon federal lease blocks 160, 161 and 205 in waters about 2,600 feet deep. It is scheduled to begin production in late 1998, peaking in 2000 at about 55,000 barrels of oil and 72 million cubic feet of natural gas per day. Recoverable reserves are estimated in excess of 160 million barrels of oil equivalent over 15 to 20 years.

Spars International Inc (SII), a 50:50 joint venture between J Ray McDermott and Aker Oil and Gas Technology, is to design, build and install a 'spar' based drilling and production structure for the project. According to Genesis project leader Scott Young of Chevron, the design will save money and time during development while performing as well as other deepwater production systems. 'These kinds of projects are costly and technically complex, so we've spent more than a year on front-end work,' he explained.

The development concept employs a cylindrical steel structure floating upright to support both drilling operations and production facilities. Air-filled compartments on the

upper portion of the cylinder provide buoyancy while seawater-filled tanks on the bottom give weight and stability. The Genesis hull, measuring 122 feet across and 705 feet tall, will be moored to the sea floor by 14 anchor lines. A drilling and production deck similar to a traditional shallow-water platform will sit atop the hull and allow conventional access to production wells. Treated oil and gas will be piped to shore.

Aker Rauma Offshore in Pori, Finland will provide the hull and anchor system. Topsides will be fabricated in Morgan City, Louisiana, by J Ray McDermott, who is also to install and assemble the Genesis facilities. Nabors Industries Inc will supply a modified platform drilling rig for full drilling capability.

Chevron holds a 56.67 percent interest in Genesis and will act as operator. Exxon holds a 38.38 percent stake and Fina 4.95 percent. Although, Genesis is Chevron's first operated deepwater development, the company participated in three exploratory wells operated by other companies in other areas of the deepwater Gulf last year.

Genesis will be the second production platform to utilise spar technology. The first is now nearing completion for Oryx Energy Company's Neptune field in the Gulf of Mexico.

Bid to speed up exploration unveiled

The UK government has unveiled plans to introduce competitive bidding for offshore licences in mature areas of the North Sea in a bid to speed up exploration activity.

Tim Eggar, UK Industry and Energy Minister, has proposed that the 'traditional basis of obligatory work programmes' be replaced by 'competitive bids which would probably take the form of upfront payments, but might include enhanced licence fees or royalty payments'. He also proposes that licences be awarded for a shorter initial term than under the present system, say between three and six years.

Mr Eggar envisages such a system being applied in the 18th North Sea licensing round to 20 to 30 blocks in selected areas. The new procedures would only apply to mature fields, the 'old' system being retained for the 17th round.

The initiative follows the recent UK Department of Trade and Industry review of fallow blocks in the UK sector. Of 115 blocks identified as fallow, 72 have plans in place for activity in the next 12 months. Fourteen more are to be relinquished in the near future at which point they will become available for licensing to other companies.

Trent and Tyne development on time

Arco's Trent and Tyne fast-track development looks set to complete on time and within budget with first oil expected on 1 October.

The front end design and fabrication contract was awarded to an SLP Engineering/Granherne partnership in January 1995 and Arco has worked in close collaboration with all its Trent and Tyne contractors in a bid to maximise efficiencies and eliminate duplication of work.

The two not normally manned platforms, one installed on each field, will be remotely controlled from Arco's Great Yarmouth base. Gas from the Tyne field will be exported wet to Trent via a 56 km, 20-inch diameter pipeline, for processing prior to export by the East Anglia Gas and

Liquids Evacuation System (EAGLES) to Amoco's onshore reception facilities at Bacton. The Tyne pipeline has sufficient capacity to handle future third-party gas while the Trent platform has been designed with extra processing capacity for any other fields bought onstream in the area. Trent has space in hand for additional compression facilities.

The Trent field, located in UK block 43/24, has recoverable reserves estimated at 190 billion cubic feet, while Tyne, in UK block 44/18, has an estimated 250 bnct of gas.

All of Tyne gas and 50 percent of Trent gas were sold to Eastern Natural Gas and an unnamed buyer, respectively, before the market collapsed. Discussions continue for the sale of the remaining Trent gas.

Ample energy reserves for the future

The world's proven oil and gas reserves are more than adequate to meet foreseeable needs – so said BP Chief Economist Peter Davies presenting the annual 'BP Statistical Review of World Energy' in June. Current world proven oil reserves are in excess of one trillion barrels, sufficient to meet current levels of oil consumption for the next 43 years, while gas reserves total 139.7 trillion cubic metres, enough to last for 65 years.

The Middle East accounts for 65 percent of the world's total proven oil reserve base at 660 billion barrels – Saudi Arabia alone having proven oil reserves of over 260 billion barrels. In contrast, the region as a whole produces less than 30 percent of world oil output. The Former Soviet Union has reserves of 57 billion barrels and the rest of non-OPEC just over 180 billion barrels.

Russia, Iran, Qatar, the United Arab Emirates and Saudi Arabia hold 63 percent of the world's gas reserves, of which Russia has the lion's share. Despite rapid growth in world gas consumption since 1975, the proven gas reserve base has more than doubled, 3 billion cubic metres of gas added to reserves for every 1 billion cubic metres used.

World coal reserves are even more plentiful than oil and gas. In aggregate the world has

reserves of some one trillion tonnes. In energy terms this is around five times the amount of oil reserves, enough to last over 200 years. The US holds 23 percent of reserves.

Mr Davies also reported that world energy consumption patterns had now stabilised and are now driven largely by economic and population growth.

The world's consumption of energy grew by 1.8 percent in 1995 – more than double the average rate of growth seen over the past five years.

This overall figure was strongly influenced by a marked slowing in the rate of decline in the Former Soviet Union. The FSU consumption of energy fell by only 5.9 percent in 1995 compared with more than 10 percent the previous two years.

Growth in demand in the Asian Emerging Market Economies remained strong at 5.7 percent while demand in North America eased back slightly after strong growth in 1994. European demand grew by 2 percent in 1995, in contrast to the declining demand recorded since 1990.

The year also marked the end of seven years of falling energy demand in Central and Eastern Europe with growth in Hungary, Slovakia and Romania offsetting small declines in Poland the Czech Republic.



Trent and Tyne decks under construction at Lowestoft

Phillips in Oman

Phillips Petroleum and the Sultanate of Oman have signed an exploration/production sharing contract covering 4.5 million acres in southern Oman.

The contract area, block 36, is adjacent to the borders of Saudi Arabia and Yemen and flanks the prolific Rub Al Khali Basin in Saudi Arabia and the United Arab Emirates.

Field operations have commenced already and Phillips plans to establish an office in Muscat, Oman's capital, next month. An aeromagnetic survey is scheduled to complete by the end of the year with a seismic programme to begin in early 1997.

Petrol put under pressure as CNG promotion steps up

British Gas has launched a new initiative aimed at promoting the use of gas as a motor fuel. Targeted specifically at fleet operators, the 'Gas Station' project involves British Gas NGV (natural gas vehicles) financing the construction and operation of compressed natural gas (CNG) refuelling stations, with the operator only paying as gas is dispensed. The package includes all elements from layout design, through planning and construction, to the operation, maintenance and management of the site.

CNG has a number of environmental advantages

over petrol and diesel, its use reducing or eliminating harmful emissions such as benzene, sulfur, nitrogen oxides, carbon dioxide, lead and particulates.

There are currently over 450 natural gas-powered vehicles in the United Kingdom and 12 CNG refuelling stations. Bus companies and refuse collection companies have been amongst the first to utilise such vehicles. British Gas has pledged to increase its 300-strong fleet of vehicles running on gas to 900 by the end of the year.

Elsewhere in the world, the use of natural gas as a

fuel is well established, particularly in Russia, Italy, New Zealand, the United States and Canada, with over one million vehicles in operation.

Although the government's 15 percent reduction in duty on CNG in the last budget, at the same time increasing duty on petrol and diesel, was an important step in promoting the wider use of CNG as a motor fuel, Tom Gorman, General Manager of British Gas NGV, says industry is calling for a more substantial cut in duty to 'offset the costs of vehicle conversion and dedicated vehicle development'.

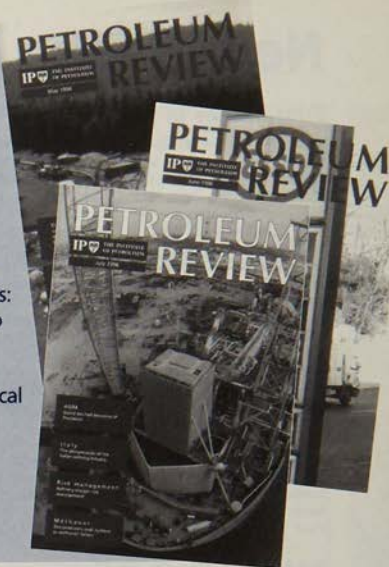
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First stages in production of Australian syngas get underway

Australian companies South Pacific Petroleum and Central Pacific Minerals have taken the first step towards development of their Stuart oil shale deposit near Gladstone on the central coast of the northeast state of Queensland. The move involves the construction of a demonstration plant capable of treating 6,000 tonnes of shale per day to produce 4,500 barrels/day of shale oil. It follows an agreement with Suncor of Canada on a 50:50 joint development programme. Suncor pioneered oil production from tar sands at Fort McMurray in north Alberta and will take over operatorship of the

Queensland project.

The joint venturers have been engaged in the pre-construction phase which includes getting satisfactory financial commitments from leading institutions and confirmation of costs by Bechtel of the construction as well as final government approvals and permits.

The initial demonstration plant will cost about A\$217 million, mitigated by an excise exemption for petrol produced from shale oil as well as a tax deduction under the Federal Government's Industrial Research and Development R&D scheme. If construction starts later this year, the plant will open in 1998. The

feedstock will be mined using open cut methods from the rich central Kerosene Creek lens which has been delineated within the Stuart deposit.

In the fourth year of the project, an additional 25,000 tonnes of intermediate grade oil shale per day will be mined from the Kerosene Creek lens and the plant will be scaled up to a commercial module capable of producing 14,800 b/d. In the eighth year, full scale production will lead to the mining of the main Stuart deposit at the rate of 125,000 tonnes/day and construction of two similar plants to produce a total of 65,000 b/d.

The Stuart deposit is estimated to contain 3 billion barrels of shale oil in situ and when fully developed, it could be capable of producing 250,000 b/d of light 42° API sweet crude – a production similar to the current total production from Bass Strait fields. If successful the Stuart operation will be the first Australian production of oil from shale since the World War II production at Glen Davis in the Blue Mountains of New South Wales.

The joint venture has estimated an average cash operating cost per barrel initially at US\$11.50 a barrel, declining to US\$6.50 when full production is reached.

BAA goes green at Heathrow Airport

The 250-strong landside-based motor fleet operated by BAA at Heathrow Airport has switched to the use of Greenery City Diesel – an ultra-low sulfur diesel claimed to reduce particulate emissions by up to 85 percent.

City Diesel costs some 3.5 pence per litre more than ordinary diesel. BAA has pledged to subsidise the price differential of the fuel by over 50 percent. No vehicle conversions or

adjustments were required to accommodate the switch.

BAA currently sells to 23 fleet customers at the airport and Greenery is hoping that the BAA move will act as a springboard for other vehicle operators to adopt the new fuel. The potential market at the airport is considerable. At present, 17 million litres of diesel are used every year by almost 9,000 resident airport vehicles.

Stoke on-line with new waste oil refinery

Last month Interline (UK) Ltd officially opened a new waste oil refinery at Stoke-on-Trent.

The company uses a new solvent extraction refining process which, it claimed, is economically and environmentally sound and complies with new EC laws on the collection and disposal of waste oil. The new process, originating from the United States, enables smaller quantities of waste product to be cleaned than conventional methods. The plant has a capacity of 30,000 tonnes of waste oil per annum. This yields 75 percent base lubricating oil, 8 percent fuel oil, which will be reused in the process, 12 percent asphalt extender, to be sold to the bitumen industry, and 5 percent water which will be cleaned and recycled. The company hope to triple the

capacity in 1997.

The UK company is 60 percent owned by waste management firm Whelan Environmental Services and 40 percent by US company Interline Resource Corporation (IRC) which acquired and patented the process in 1993.

Mike Williams, IRC President, said that the process was 'environmentally pure. All waste product is put to its best use and with the dry-cleaning process the molecular compound of the oil is unchanged.'

IRC's first plant went on-line in January in Salt Lake City, Utah. Stoke's £3 million plant was partially constructed on-site with the control process shipped from Salt Lake City and skid-mounted into position, taking approximately six weeks to assemble.

Record breaking Troll inaugurated

King Harald V of Norway inaugurated the US\$5 billion Troll project, Europe's largest gas field, on the 19 June. At the same time, the project development operator Norske Shell handed production control to state-owned company Statoil.

Troll has 1,300 billion cubic metres of recoverable gas reserves and is capable of supplying 10 percent of Europe's gas demand over the next 50 years. Initial production is 46 million cubic metres/day. Peak production will be some 90 mcm/d. The project has been designed to extend its lifetime to 70 years.

The project comprises the platform, a pipeline and tunnel system to bring the gas ashore, and a gas processing plant at Kollsnes, 60 km north of Bergen. The development is the first in the North Sea to separate production and processing in such a manner and reflects recent advances in multiphase fluid transport technology which allows untreated gas and liquids to be transported along the same pipeline. The platform is also the first in the North Sea to be powered from land via a subsea power cable. This enabled a reduction in the size of topsides and will also reduce maintenance needs.

The project is remotely controlled from a central control

room at the Kollsnes processing plant. Gas is received through two 36-inch diameter, wet-gas pipelines from the Troll 'A' offshore platform and passes through three process trains and five compressor trains. It is then sent at 170 bar pressure via a new pipeline to Sleipner where it joins trunk lines to Germany, Belgium and France.

Some 40 wells will be drilled using a fully automated drilling rig installed on the platform which is 472 metres high – approximately one and a half times the height of the Eiffel Tower – and stands in 303 metres water depth. The world's largest ever concrete gravity base structure, the platform displaced over 1 million tonnes of water at towout.

According to Statoil, the Norwegian authorities are keen to use Troll as a guarantor of Norway's gas deliveries. Slightly less than 50 percent of Troll's gas reserves have been committed under sales agreements to date to major gas buying companies in Germany, Holland, Belgium, France, Spain and Austria. Initially some 14 billion cubic metres/year will be sold, a figure rising to 24 billion cubic metres/year by the year 2000. Norway will become western Europe's most important gas supplier alongside Russia.

Diary Dates



Exploration & Production/Energy Economics Discussion Groups

'Extending the commercial life of mature fields'

Wednesday 18 September, tea at 17.00, start at 17.30

By Mr John S Leggate, former Asset Manager of the Mast Fields, BP Exploration

The speaker will outline the changes made in the management philosophy for a group of mature North Sea fields operated by BP and quantify the improved profitability and the recoverable reserves. What are the lessons that can be learned to maximise production to meet commercial and national needs?

IP contact: S F Schuyleman, Tel: 0171 467 7132 or Jenny Sandrock, Tel: 0171 467 7104



Midlands Branch
Joint Meeting with British Lubricants Federation (Midlands Branch)

Wednesday 18 September, at 19.00

To be held at
The Moat House Hotel, West Bromwich
(just off junction 1, M5 motorway)

'The new ACEA engine oil quality system'

by Alexandra Cole, Industry Co-ordinator, Ethyl Petroleum Additives Ltd

IP contact: Mike Ward, Tel: 01299 896654 Fax: 01299 896955



Energy Economics Group

Evening discussion group meetings are planned for 24 September, 10 October, 28 October, 13 November and 4 December.

Titles and speakers will be announced later.



London Branch

'Back to Basics' - Supply and Distribution

Tuesday 1 October, tea at 18.00

By Mr T Mallinson, Supply Manager, Texaco Ltd at the Institute of Petroleum.

Supply and distribution are key operations in the chain from crude oil to finished product. Trevor Mallinson will explain how S&D operate to keep refineries running and product supplied to consumers at all times, using ship, pipeline, road and rail transport. He will also explore the economics of these logistics activities and the way they have adapted to changing circumstances.

Tea and biscuits will be served at 17.15. Light refreshments will be available afterwards. Enquiries: Mrs E Walker, Hon Secretary, London Branch Tel: 01926 404768 or Mr J M Wood at the Institute, Tel: 0171 467 7128



Southern Branch

IP Southern Branch 1996 Annual Dinner

To be held on **Saturday, 21 September** at the Winchester Guildhall, Winchester

Music and dancing, extended Casino and additional entertainment

Tickets cost £27.50 each

Tickets available from: R. Gupta - FMTIC, Gibson CCR 5, Esso Petroleum Company Ltd, Fawley Refinery, Fawley, Southampton, SO45 1TX Tel: 01703 89-6241/6969

Oil companies barred from much of US OCS

The US government still prevents oil companies from undertaking oil and gas exploration and production in 266.5 million acres of its Outer Continental Shelf (OCS). Some 121.9 million of these acres lie off the Pacific Coast, 56.3 million off the western Florida Coast in the Gulf of Mexico, 55.8 million off the Atlantic coast and 32.5 million in the Alaskan North Aleutian Basin. A small portion of this acreage has been off limits to oil companies since 1982; none is included in the government's proposed programme for lease sales between 1997-2002.

Companies which had been awarded leases in offshore acreage that became proscribed instigated legal action to obtain compensation from the government for their bonus and rental payments and, in some cases, investment expenses. Some claimants have relinquished their leases following settlements but others are still negotiating final terms.

By Judith Gurney

Root cause

These prohibitions are the result of a long-standing, and still smoldering, controversy between coastal states and the federal government over the control of offshore activities. As early as 1921, California began to issue leases for offshore exploration and production following the discovery of oil along its southern coast. This was the first move in a battle over offshore jurisdiction which twice reached the US Supreme Court, with the federal government at one point denying any state jurisdiction beyond the shore line and the state of Louisiana, at another point, claiming state ownership out to 27 miles. Finally, in 1953, Congress passed a law limiting state jurisdiction to three miles from the coast. A few years later, however, the US Supreme Court ruled that the boundary for Texas and for Florida's west coast was 3 marine leagues - 10.4 miles - on the grounds that these states had held this territory as sovereign nations at the time of their admission to the Union.

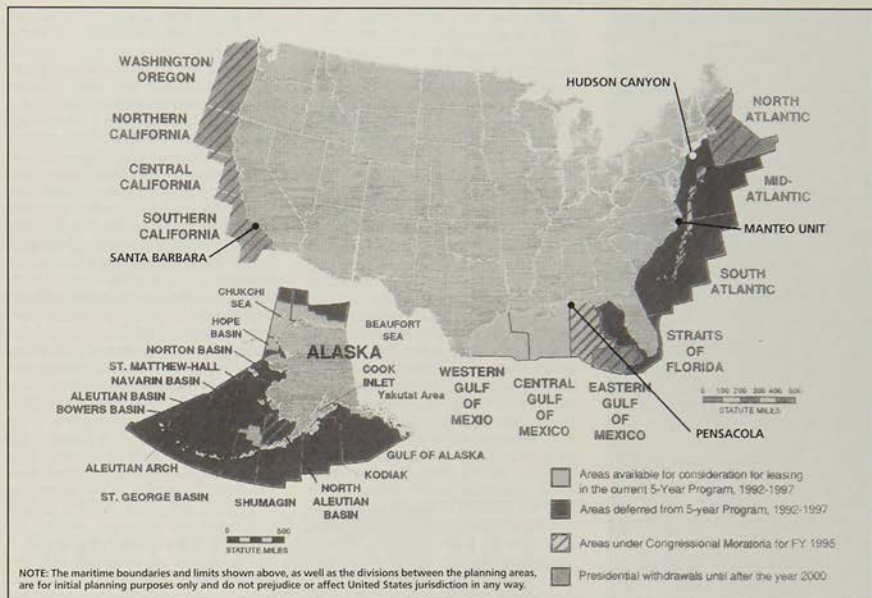
With its title to the Outer Continental Shelf definitely confirmed, the US Department of Interior (DOI) began to schedule lease auctions regularly. These resulted in the development of an active offshore industry, especially off the coast of California where a significant oil find was made near Santa Barbara. Then, in 1969, a blowout and an oil spill from a production platform offshore Santa Barbara caused significant environmental damage which attracted national attention. The first groundswell of opposition to offshore oil and gas development found its expression in the National Environmental Policy Act of 1969.

New battle lines

The oil price shocks of the 1970s convinced the executive branch of the government - that is to say, the President and his administration - of the need for more offshore activity in the hope of increasing domestic oil production and reducing dependence on oil imports. Environmentalists, especially those in California, a politically powerful state, turned to the legislative branch, Congress, for help. In 1982, they persuaded Congress to enact the first of a series of one-year moratoriums covering offshore activities in particular areas as part of the Department of Interior's annual appropriations bill.

Other coastal states considered their coastlines just as unique and valuable as that of California, and equally entitled to the same protection. Their representatives in Congress successfully lobbied for inclusion of additional offshore acreage in the moratoriums of the annual DOI appropriations bills. By fiscal year 1993, the acreage covered by these moratoriums had increased from 0.7 million acres off California to a total of more than 266 million acres off the Pacific and Atlantic coasts, the Eastern Gulf of Mexico and Alaska. In addition, their terms had expanded from restricting the issuance of new leases to prohibiting pre-lease seismic studies and activities by existing leaseholders.

The executive branch of the government protested against these moratoriums, arguing that the OCS Lands Act of 1953, as amended in 1978, covering offshore activities provided sufficient environmental protection for the marine ecology and onshore repercussions. It cited regulations regarding the discharge of liquids and solids, including: drilling muds, into the ocean; the emission of gases; tanker service vessel and



helicopter operations; construction, operation and removal of facilities offshore and onshore; and the disposal of trash and debris originating from OCS facilities. It also cited measures designed to prevent, and deal with, accidents such as oil spills. The state environmentalists retorted that these regulations were insufficient to protect the aesthetic beauty of coastlines with recreation and tourism uses, sensitive marine life, and commercial fish and shellfish industries.

Negotiations between federal and state authorities in California, Alaska, Florida and North Carolina failed to bring the two sides closer. By 1988, the issue of offshore leasing had become a presidential campaign issue, with the Exxon Valdez oil spill the following year greatly strengthening those opposed to offshore oil and gas production.

As a consequence of pledges made during his election campaign, President George Bush changed the executive branch position. In 1990, he issued a directive cancelling all scheduled lease sales off the Pacific and Atlantic coasts and off the southern Florida coast and withdrawing those areas from leasing until after 2000, stipulating that leasing might begin on completion of certain scientific studies. Members of Congress demonstrated their distrust of the executive branch by continuing to include a moratorium for areas covered by the presidential directive in the annual DOI appropriations bills. The studies called for by the presidential directive were not done in some cases and not completed in others, largely because of budgetary constraints. In 1992, a number of companies holding leases they could not work joined Conoco in a law-

suit filed in the US Court of Claims alleging breach of contract by the government in preventing them from exercising their interests. Many of the leases in proscribed areas have been relinquished subsequently as a result of out-of-court settlements.

Proscribed areas

Atlantic OCS. The Department of Interior, for administrative purposes, has divided the Atlantic OCS into North, Mid- and South Atlantic regions. Although the industry estimates that there may be some hydrocarbon reserves in the North Atlantic in the Georges Bank Basin, exploration in this area is unlikely in the foreseeable future because of the fishing interests connected with Georges Bank. One North Atlantic lease sale was held in 1979 but

OCS ACREAGE NOT AVAILABLE FOR LEASING DUE TO CONGRESSIONAL MORATORIUM

Fiscal Year	Area	Acres
1982	California	0.74
1983	California	35.0
	Atlantic	0.3
1984	California	36.8
	Atlantic	9.3
	Eastern Gulf of Mexico	7.4
1985	California	36.8
	Atlantic	9.3
1986	Atlantic	7.5
1987	Atlantic	7.5
1988	Atlantic	7.5
1989	California	1.1
	North Atlantic	12.2
	Eastern Gulf of Mexico	19.9
1990	California	7.8
	Atlantic	23.8
	Eastern Gulf of Mexico	19.9
	North Aleutian Basin	32.5
1991	California	74.0
	Washington & Oregon	47.9
	Atlantic	60.5
	Eastern Gulf of Mexico	69.1
	North Aleutian Basin	32.5
1992	California	74.0
	Washington & Oregon	47.9
	Atlantic	55.8
	Eastern Gulf of Mexico	56.3
	North Aleutian Basin	32.5
1993-96: Same as fiscal year 1992		

there were no commercial findings and all these leases were subsequently relinquished. The entire region has been under congressional moratorium since 1984 and was also included in the 1990 presidential directive.

There has been much more activity and industry interest in the Mid-Atlantic region, where five lease sales were held between 1976 and 1983. Two areas have been identified as promising gas-prone prospects: Hudson Canyon off New Jersey and the 21-block Manteo Unit off North Carolina. There was a major gas discovery in the late 1970s in Hudson Canyon but this was not developed because of its complex geology and expensive infrastructure needs. Hudson Canyon is estimated to contain 230 billion cubic feet (bcf) of unproven gas reserves and another 60-400 bcf of potential resources in untested traps.

The Manteo Unit is estimated to contain up to 5 trillion cubic feet (tcf) of natural gas. It spreads across the Mid- and South Atlantic OCS regions, making this administrative division somewhat meaningless. Five lease sales were held in the mid-Atlantic between 1976 and 1983 and four in the South Atlantic between 1978 and 1983, with leaseholders concentrated off the North Carolina Coast. Mobil Exploration and Producing, and its partners, planned to drill an exploration well in a Manteo block 45 miles east-northeast of Cape Hatteras, North Carolina, in 1990. Although the companies were reported to have spent more than \$3 million on a comprehensive environmental study including sea-bottom surveys using remotely controlled submersibles and extensive evaluation of current patterns over time, local environmentalists were able to delay drilling until congressional moratoriums and the 1990 presidential directive effectively prevented any activity in the Manteo unit until at least 2000. Mobil abandoned its drilling plans and in March 1996, the US Court of Claims ruled in favour of its claim for compensation from the US government, leaving the amount to be settled later. In the meantime, the governor of North Carolina has called for areas off the state shoreward of the 200-metre isobath to be permanently excluded from leasing, drilling and production in order to preserve the ocean and coastal environment from potential adverse impacts of these activities.

Pacific Coast. The DOI has divided the Pacific OCS into four regions, Washington together with Oregon and Northern, Central and Southern California. There is only slight industry interest in the Washington plus Oregon OCS. A lease sale there in 1964 resulted in some exploration but no commercial findings. There are no existing leases in this area which has been under congressional moratorium since fiscal year 1991 and it is also covered by the 1990 presidential directive. The picture is not much different for the Northern and Central California regions where leases awarded in 1963 resulted in exploration but no commercial discoveries. There continues to be some interest in this region, however, although it has been under a congressional moratorium since fiscal year 1982 and was cited in the 1990 presidential directive.

The industry has no doubts about the existence of oil and gas reserves in the Southern California OCS region. Ten lease sales between 1963 and 1984 resulted in the drilling of more than 900 wells. Some 600 million barrels of oil and 687 bcf of gas were produced from this region by the end of 1993 and it holds many more undiscovered reserves as well as unproduced proven reserves. More and more of the area went under annual congressional moratoriums after 1985, however, and it was cited in the 1990 presidential directive. There are no lease sales planned in the 1997-2002 programme although studies are currently underway regarding environmental concerns and talks are being held between representatives of the DOI Minerals Management Service and state officials. Severe state restrictions are another obstacle to current as well as future oil and gas offshore activity in this region. The California Coastal Sanctuary Act of 1994 prohibits leasing in almost all state waters and many local ordinances prohibit construction of onshore support facilities or require that these are approved in local elections.

Gulf of Mexico. The DOI divides the Gulf of Mexico into three regions. Leasing continues, and is scheduled to

continue, in the proposed programme for 1997-2002, in both the Central and Western Gulf where oil and gas production is active. There has never been as much going on in the Eastern Gulf, however, primarily because it lacks the sedimentation deposited over millions of years in the Central and West Gulf by the Mississippi River and its tributaries. Ten lease sales have been held in the Eastern Gulf, the last in 1988, and significant natural gas discoveries have been made in the northwest, notably in the Pensacola and Destin Dome areas off the Florida Panhandle. The Norphlet Formation, which is the focus of a major development project by Exxon in Mobile Bay, offshore Alabama, in the Central Gulf of Mexico, extends into the Eastern Gulf. It is estimated to contain 7 tcf of undiscovered natural gas.

The Eastern Gulf has been under congressional moratorium since 1991; the portion south of 26° N latitude and east of 86° W longitude was cited in the 1990 presidential directive.

Leaseholders in this southern portion became involved in the litigation in the US Court of Claims alleging breach of contract by the government. No lease sales are scheduled in the 1997-2002 proposed programme since the Eastern Gulf and Florida state law prohibits oil and gas leasing, exploration and development in waters under state jurisdiction. The State of Florida has petitioned the federal government to impose a permanent ban on new leasing within 100 miles of the coast and an indefinite delay on further work on existing leases within these limits. Exploration has continued, however, in the northern Destin Dome blocks.

Alaska North Aleutian Basin (Bristol Bay). Wells drilled onshore on the Alaska peninsula suggest potential reserves in this sediment-filled basin. A single lease sale was held here in 1986 and 23 leases were issued, but work on these was effectively suspended when some of the area was included in congressional moratoriums in fiscal year 1990. Although this basin was not cited

in the 1990 presidential directive, no lease sales are scheduled in the proposed 1997-2002 programme.

Future prospects

In June, the DOI Minerals Management Service estimated the undiscovered conventionally recoverable reserves of oil, assuming a price of around \$18/barrel, as 5.3 million barrels (mb) in the Pacific OCS and 400,000 barrels in the Atlantic OCS, and those of natural gas, assuming a \$2.11/mcf price, as 8.3tcf in the Pacific OCS and 5.2tcf in the Atlantic OCS. Yet despite these prospects, there is little likelihood of exploration for these reserves in the near future, even in the face of increasing oil imports. As in the case of sanctions, the political system makes it very difficult – some would say almost impossible – to remove restrictions which have been imposed as a result of pressure by a powerful, and vocal, segment of the electorate on its congressional representatives and on presidential candidates.



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IP Annual Dinner 1997

The IP Annual Dinner will be held at Grosvenor House, Park Lane, London W1 on **Wednesday 19 February**.

The ticket application form will appear as a page of *Petroleum Review* in the October 1996 edition.

However, because of possible postal delays, non UK/European members who wish to apply for tickets should contact **Pauline Ashby** (in writing) at **The Institute of Petroleum, 61 New Cavendish Street, London W1M 8AR**, fax number **+44 (0) 171 255 1472** as soon as possible and an application form will be forwarded during late September.

The closing date for receipt of ticket application will be **Friday, 25 October 1996**



New petroleum storage terminal

The demand for petroleum storage capacity in the United Kingdom has continued to decline this past year as oil companies have further rationalised their operations and increasingly turned to joint ventures and product exchange arrangements in a bid to minimise their storage requirements and hence reduce costs. Bearing in mind this downward trend, coupled with the

heavy expenditure that storage terminal operators have faced in recent years to upgrade facilities to meet increasingly stringent environmental legislation, it may seem somewhat risky to embark on a completely new petroleum product storage venture at this time. However, that is exactly what GATX Terminals has done with the opening of its Clydeport terminal in June.

Based on the River Clyde, the new terminal is furnished with 16 tanks of sizes varying between 50 to 8,835 cubic metres, with a total capacity of 56,956 m³. Costing some £7 million to build, the facility has a new jetty with an 11.9 metres draught and unrestricted beam and is capable of handling vessels of up to 18,000 dwt with a maximum length of 200 metres. The site is also equipped with fully automated top and bottom loading facilities and has been

designed to meet all current and pending regulatory requirements. Indeed, according to Richard Kellaway, Managing Director of Maidenhead-based GATX Terminals Limited, the Glaswegian terminal will act as a role model for any newbuilds and/or upgrades that the company undertakes in the future, not just in the United Kingdom but anywhere in the world.

The first shipment of over 3,100 m³ of jet aviation fuel came ashore at the site

By Kim Jackson

last month. Destined for Glasgow airport, the fuel arrived from Merseyside onboard the tanker Braebourne and was stored at the Rothesay dock terminal for Statoil.

The company hopes to handle some 200,000 m³ of such fuel per year. However, as Mr Kellaway pointed out it will take time to build up a continuous demand for the new storage facility. 'The oil companies require some time to adjust to a new element in their logistics pattern and take stock of where the benefits lie, trading off shipping rates and trucking economies against storage charges.'

Opening the market

Acquired in 1993, the Glasgow site was deemed a 'prime' location as the area surrounding the city held approximately two-thirds of the Scottish west coast population and hence a large proportion of the demand for petroleum product. Indeed, the terminal is playing a vital role in encouraging competition in the region. Mr Kellaway explained: 'The west of Scotland region has only one other storage terminal owned by a mini-

major and one oil refinery. Furthermore, since we opened our terminal, both Esso and Shell have closed their storage sites in favour of product exchange arrangements. Thus, the Glasgow terminal not only provides competitors with the only opportunity to enter the Scottish market from the west by sea but also allows customers to draw on more than the only other two available sources. Without our terminal, the market would be severely restricted, which in turn, would hinder rather than encourage competition.'

While on the topic of competitiveness in the market-place, Mr Kellaway considered the impact of the price war currently being waged at the UK petrol pumps on the storage terminal sector. 'The current price war is shaking out the petrol retailing sector and if it continues for another 18 months or so the inevitable result will be fewer people marketing product. This may well, in turn, lead to companies drawing back from product exchange arrangements which do not offer a guaranteed supply source, and a move back to companies supplying localised regions directly out of their own refineries. This may create a need for more storage again especially if the customer's duty point reverts to the terminal gate.'

An act of folly or pure genius?

'Many would say that in today's market-place the opening of our Glasgow storage terminal is either an act of folly or an act of extraordinary brilliance,' Mr Kellaway told *Petroleum Review*. 'Obviously we hope it will be the latter but it is more likely to be a case of "doing alright" at the end of the day.' Indeed, while the site currently focuses on the petroleum product storage sector, it is possible that GATX will expand the site to provide storage for other products in order to ride out demand fluctuations in specific markets. 'The terminal is well placed with short dock lines to serve the storage needs of the chemicals sector or other products - whisky springs to mind - as and when the demand is there,' he commented.

Meeting the regulations

As already mentioned, the Glasgow terminal is the most modern of the GATX facilities and well placed to meet all current and pending European Union environmental and safety regulatory requirements under the EC Gasoline Directive, Stage 1 of which was implemented into law in the United Kingdom at the end of last year under the Prescribed Processes Regulations of the Environmental Protection Act (EPA).

Gasoline handling at refineries is regulated under Part A of the EPA and the Prescribed Processes Regulations, while such operations at non-refinery storage terminals and service stations are regulated by a Part B process under the control of the local authority environmental health officer (EHO). Terminal throughput determines the timetable for installation of vapour emission reduction equipment under the auspices of the Directive and can be summarised as follows:

Storage terminals exceeding 150,000 tonnes per annum (tpa) gasoline throughputs

- Floating tank roofs are required by 31/12/1998
- A vapour recovery unit is required by 31/12/1998
- A minimum of one bottom loading gantry is required by 31/12/1998 and all gantries to be bottom loading type by 31/12/2004

Storage terminals exceeding 50,000 tpa gasoline throughputs

- Floating tank roofs are required by 31/12/1998
- A vapour recovery unit is required by 31/12/2001
- A minimum of one bottom loading gantry is required by 31/12/2001 and all gantries to be bottom loading type by 31/12/2004

Storage terminals exceeding 25,000 tpa gasoline throughputs

- Floating tank roofs required by 31/12/2001
- Vapour recovery unit required by 31/12/2001

- A minimum of one bottom loading gantry is required by 31/12/2001 and all gantries to be bottom loading by 31/12/2004

Storage terminals exceeding 10,000 tpa gasoline throughputs

- Vapour balancing is required by 31/12/2004
- All gantries to be bottom loading by 31/12/2004

Throughput banding will be determined by the highest throughput recorded in a three-year period starting 1 January 1996. If the highest throughput is recorded in 1998, the terminal would have just one year to install equipment relevant to its banding.

According to Mr Kellaway, the Directive will create the most stringently controlled storage operations in the world. 'The requirements are even more stringent than those in the United States,' he said.

He pointed out that although the storage industry is obviously required to follow developing legislation, economic incentives have played an important factor in the early uptake of vapour emission control equipment due to a 'quirk in the UK law relating to custom duty'. At present, when a ship leaves a UK refinery en route to its next location, duty is paid on the whole shipload. The oil company is therefore paying duty on some cargo that will be 'lost' by vapours escaping during both transit, loading/und-loading and storage. Thus, there is a financial incentive to reduce these losses through the use of equipment such as floating roofs and blankets at storage terminals. According to Mr Kellaway, the current duty arrangement quadruples the cost of losses for the oil company.

'If the current law changes, there will be no economic incentives to invest in such equipment and industry will merely follow the legislative timetable,' he said.

'If changes were made, it would mean that no revenue would be coming in until the gasoline left the terminal in road tankers. The government has yet to work around this to get a continuous stream of revenue coming in.'

Oil Spill Response Workshop:

The Sea Empress, a
case study

Tuesday 17 September

**To be held at the Cavendish
Conference Centre, London**

The *Sea Empress* incident off the coast of Wales was one of the 10 largest oil spills to have occurred in European waters. The response to the resulting pollution included the largest-ever application of dispersants anywhere in the world and the largest-ever shoreline clean-up in the United Kingdom.

The workshop will use the *Sea Empress* incident as a case study to consider the technical aspects of:

- Responding to an oil spill at sea
- The clean-up of an oil contaminated coastline
- The environmental monitoring of a clean-up operation and the long term recovery of the environment

Discussion papers will be presented by representatives from:

Marine Pollution Control Unit Ministry of
Agriculture, Fisheries and Food
AEA NETCEN
Pembrokeshire County Council
Environment Agency
Countryside Council for Wales
European Environmental Management
Institute Ltd

A copy of the programme and registration form will be available shortly from Conference Department, The Institute of Petroleum, 61 New Cavendish Street, London W1M 8AR UK. Tel: 0171 467 7100 Fax: 0171 255 1472

1996 Safety Conference

People & Changes, Costs & Challenges

**Thursday 26 September
1996**

It has been nearly six years since the public inquiry on the Piper Alpha accident made its report and recommendations. Since 1988 there has been a revolution in the management and regulation of safety on the UKCS, and the methods adopted are increasingly finding favour in other operating areas of the world and other industries.

This conference has been designed to meet the needs of a wide audience concerned with all aspects of safety and will look at current and developing practice, at what has been achieved by the industry since 1988 and how its performance compares with others.

Areas to be covered will include:

- The Changes since Piper Alpha
- The Cost of Failure
- The Human Factor
- Safety in the New Era

A copy of the programme and registration form will be available shortly from Conference Department, The Institute of Petroleum, 61 New Cavendish Street, London W1M 8AR UK. Tel: 0171 467 7100 Fax: 0171 255 1472

BULK STORAGE '96

Petroleum Review has revised its annual survey of independent bulk storage in Europe. This is only possible with the help of all the companies listed in these pages. We are most grateful to them for taking the time to answer our requests for information. Any company, which was not contacted and wishes to be included in next year's survey, is asked to contact *Petroleum Review*.

This year's survey shows that this sector of the industry does not stand still and that it is essential to keep a balanced portfolio of storage facilities in order to ride out the fluctuations in demand from the various market sectors. Volumes and destinations do change, requiring the closure of some terminals and the opening of others.

It is very clear that facilities at storage terminals are becoming increasingly sophisticated, partly driven by regulatory requirements dictated by the European Union and others. This is leading to the introduction of vapour emission reduction equipment, floating tank roofs and bottom loading gantries.

In addition, revised MARPOL regulations may well necessitate further investment in equipment at storage terminals to control VOC emissions during vessel loading/unloading operations.

Some companies are also building treatment plants to clean up oily water to levels which are expected to be demanded by the EU and other regulatory bodies.

Likewise environmental risk assessments are now considered good practice – they will soon be required under a Directive for the Control of Major Accident Hazards, known as COMAH, which will replace the Control of Industrial Major Accident Hazards (CIMAH) Regulations.

Country	Capacity Cubic metres	% of total
Belgium	1,656,000	4.53
Denmark	359,000	0.98
Eire	84,000	0.23
France	6,909,000	18.85
Germany	7,307,000	19.94
Italy	210,000	0.57
Malta	359,000	0.98
Netherlands	14,325,000	39.09
Portugal	90,000	0.25
Spain	426,000	1.16
Sweden	1,013,000	2.76
Switzerland	346,000	0.94
UK	3,563,000	9.72
Total	36,647,000	100.00

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Fax: +44 (0)1372 745474

BULK STORAGE '96

Barrow Storage Co. LTD

Head Office: 15 Fitzwilliam Square, Dublin 2, Eire.

Tel: (353) 1 6763524. Fax: (353) 1 6614704.

Three installations: One at Marshmeadows, New Ross, Co. Wexford, Eire. Storage for 16,000 cubic metres of petroleum products, including LPG. The berth on the River Barrow provides for vessels up to eight metres draught. Tankage includes 4,500 cubic metres tank which is heated and insulated. One at Dundalk with 2,500 tons of gasoil 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.

Bominflot Tanklager GmbH

Tankweg 1, 21129 Hamburg, Germany.

Tel: (49) 40 740007 0. Fax: (49) 40 740007 32.

Seventy-five tanks with a gauging volume of 240,000 cubic metres available for storage of mineral oils, chemicals, alcohols, vegetable oils, greases, paraffins, waxes and fertilizers. The A1 tank space is equipped with security devices to prevent overfilling and is provided with double bottoms. The A111 tank space is equipped with heating coils, security devices to protect from overfilling, partly with double bottoms and in most cases it is insulated. The size of the tanks is between 50 and 25,000 cubic metres.

There are six berths with maximum tonnage at 80,000 dwt, maximum length is 260 metres and maximum draught is 9 metres. There is a discharging and charging station. For tank vehicles there are six platforms with volume meters, scales and four other discharging/charging stations.

BTP Storage LTD

Hayes Road, Cadishead, Manchester M44 5BX, UK.

Tel: (0161) 775 3945. Telex: 669938. Fax: (0161) 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 cubic metres with a range of tanks up to 6,000 cubic metres capable of handling most types of petroleum and chemical products. Blending, drumming and weighbridge facilities available. Rail sidings for up to 1,400 tonnes. Berth: maximum draught 24.5ft approximately 6,000 tonnes. Easy access to the M6 and M62 motorways.

Chemical Manufacture & Refining LTD

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

Tel: (0191) 565 4018. Fax: (0191) 565 6121.

The terminal can receive ships of up to 6,000 tons dwt capacity and has mild steel and stainless steel import lines. 36,000 cubic metres of storage are contained in 20 tanks. Products stored include petroleum refinery products, petrochemicals and chemical solvent by-products. Nearby associated company has large distillation units for processing of specification and contaminated cargoes. Drumming off facilities, drum storage and bonded facilities also available.

Compagnie Industrielle Maritime (CIM)

36, rue de Liège, 75008 Paris, France.

Tel: (33) 1 43 87 33 49. Telex: 280330 CIMDGP. Fax: (33) 1 43 87 43 08.

Contacts: Mr B. Salaün (Sales Manager) Direct Line: (33) 1 43 87 43 14. Fax: (33) 1 42 94 02 81.

Mr C. N. Malcolm (UK Representative), Tel: (01235) 763005. Fax: (01235) 768687.

CIM is an independent French company which owns and operates a modern and highly sophisticated storage, transshipment and break-bulk facility capable of handling crude oils, distillates and all clean petroleum products. The complex, which is situated in France at Le Havre and Antifer, has a total capacity of some 5.2 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 Warehouse and CIM prides itself on maintaining its clients' confidentiality.

CIM now owns all equipment at the Antifer Terminal, which consists of four tanks of 150,000 cubic metres each, and two of 22,500 cubic metres each with an overall capacity of 645,000 cubic metres. Access is by sea. Sea berths with draughts of 98ft and 82ft respectively. Facilities for discharging ULCC-type vessels up to 550,000 MT and for transshipments.

Comos Tank BV

Octaanweg 14, 1041 AN Amsterdam, The Netherlands.

Tel: (31) 20 587 2121. Telex: 13121. Fax: (31) 20 587 2150.

A subsidiary of VTG Vereinigte Tanklager und Transportmittel GmbH. Operates a terminal with an overall capacity of 700,000 cubic metres for storing all petroleum products and bulk chemicals. Tanks range from 3,500 to 40,000 cubic metres, some coated or insulated and equipped with heating-coils. Blending facilities for gasoline, heavy fuel oil and gas oil and facilities for loading, product washing and butanising are available. Three jetties for seagoing vessels and eight jetties for barges. Distillation towers for processing are available to ensure efficient storage and transfer.

Dupeg

Terminal: Tankweg 4, D-21129 Hamburg, Germany.

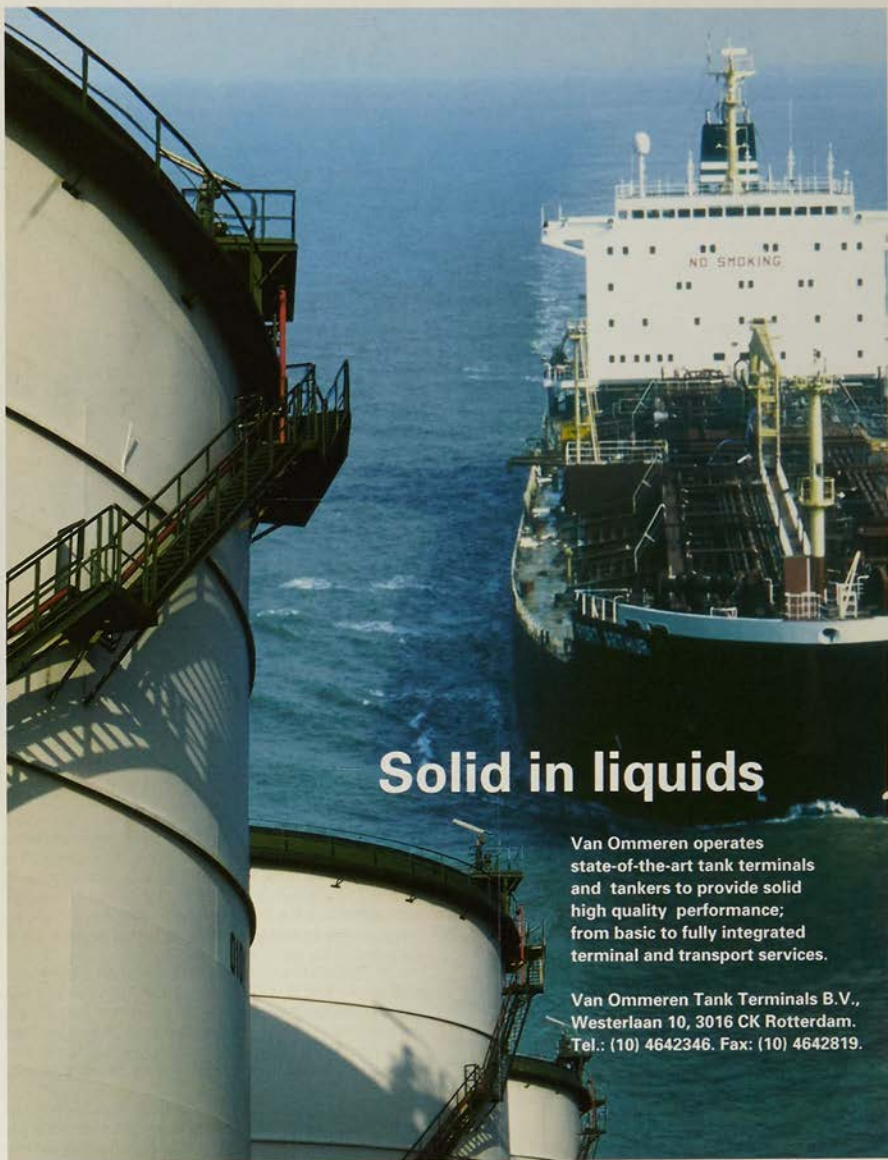
Tel: (49) 40 740 440. Telex: 0217656. Fax: (49) 40 740 1703.

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 130,000 cubic metres is fitted out with special linings and the qualitative treatment of products, eg mixing, filtering, clarifying or standardising, is part of the service Dupeg Tank-Terminal offers.

Individual tanks of 20 to 10,000 cubic metres, including 26 stainless-



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Van Ommeren operates state-of-the-art tank terminals and tankers to provide solid high quality performance; from basic to fully integrated terminal and transport services.

Van Ommeren Tank Terminals B.V.,
Westerlaan 10, 3016 CK Rotterdam.
Tel.: (10) 4642346. Fax: (10) 4642819.



Van Ommeren
Transport & Terminals

BULK STORAGE '96

steel tanks totalling 17,500 cubic metres.

Dupeg's management system is accredited 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 DWT (depth of water: 13 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.

Felixstowe Tank Developments

FTD House, The Dock, Felixstowe, Suffolk, IP11 8SE UK.
Tel: (01394) 676112. Fax: (01394) 673590.

Ninety-two mild and stainless steel tanks, totalling 64,000 cubic metres storage capacity equipped to handle a comprehensive range of liquid, edible, chemical and petroleum products. Road and Container tank load and discharge. Tank capacities 30-2,800 cubic metres, product heating, steam, hot water and electric. Lined and insulated tanks, stainless steel pipelines, gas purging, water cooling. Alcohol, hydrocarbon and IDA bonds available. Tanker berth 9.1 metres draft - 180 metres length. With additional services including drumming, methylation, dilution, blending and public weighbridge 50,000 kgs capacity.

FETSA

Federation of European Tank Storage Associations, 1-5 Avenue de la Joyeuse Entrée 1, B-1040, Brussels, Belgium.

Tel: (32) 2 285 00 22 Fax: (32) 2 285 00 24

Postal Address: c/o VOTOB PO Box 443 2260 AK Leidschendam, NL. Tel: (31) 70 337 8750. Fax: (31) 70 320 3903.

FETSA embraces national associations of independent tank storage operators in seven EU member states, representing a total of 70 companies - with affiliates - owning 168 terminals with a total volume of about 36 million cubic metres of storage capacity.

FETSA is active in the interface with international government institutions and other federations with relevant adjacent interests.

Fox Petroli SPA

Via Senigallia N. 29, 61100 Pesaro, Italy.

Tel: (39) 721 403465. Fax: (39) 721 403505.

Total storage capacity of about 130,000 cubic metres of oil products (clean and dirty). Terminal in Pesaro Harbour for loading and discharging vessels. Services available: Tank-Truck loading/unloading, heated and insulated tanks and pipes, tanks equipped with recirculating systems, petroleum products dyeing, blending of oils and fuels, heat supply, tank-truck weighing, bunkering of barges with tank-trucks and custom services.

Gamatex N.V.

Head Office: Haven 623, Scheldelaan 450, B-2040 Antwerpen, Belgium.

Tel: (32) 3 561 15 00. Telex: 32459. Fax: (32) 3 561 15 27.

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

Antwerp: The terminal offers 143 tanks with a total capacity of 486,100 cubic metres for mineral oils, petrochemical liquids and chemical gases. There are five jetties for seagoing vessels (draught 44ft) and five for barges. Access is by sea, rail and road and pipeline. Tankage is insulated, coiled, coated, mild steel as well as stainless steel. Heating possibilities are steam, warm-water and electrical tracing. Tanks for chemical products are equipped with dedicated productlines and pump and most of them with vapour return. Pre-pump, blending, drum filling and nitrogen blanketing are also available.

GATX Terminals LTD

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

Tel: (01628) 771242. Fax: (01628) 771678.

A wholly owned subsidiary of GATX Terminals Corporation of Chicago. GATX Terminals Limited operates eight terminals in the United Kingdom. Subsidiary: Manchester Jetline Limited. Associates: Tees Storage Company Limited; Unipen Limited; Wymondham Oil Storage Company Limited. GATX is BS 5750 part 2/ISO 9002 accredited.

Avonmouth, Bristol: Twenty-six tanks with a total capacity of 83,369 cubic metres, from 1,346 to 6,924 cubic metres in size, for high and low flash petroleum products and chemicals. Dock facilities comprise seven berths at the Royal Edward Dock (depth 9.8m, maximum length 210m, maximum beam 29m), five pigable docklines (three 10 inch lines, one 24 inch line and one 8 inch stainless steel line). Distribution is through fully automated top and bottom road loading facilities. Wensat pipeline connection. Easy access to M4 and M5 motorways.

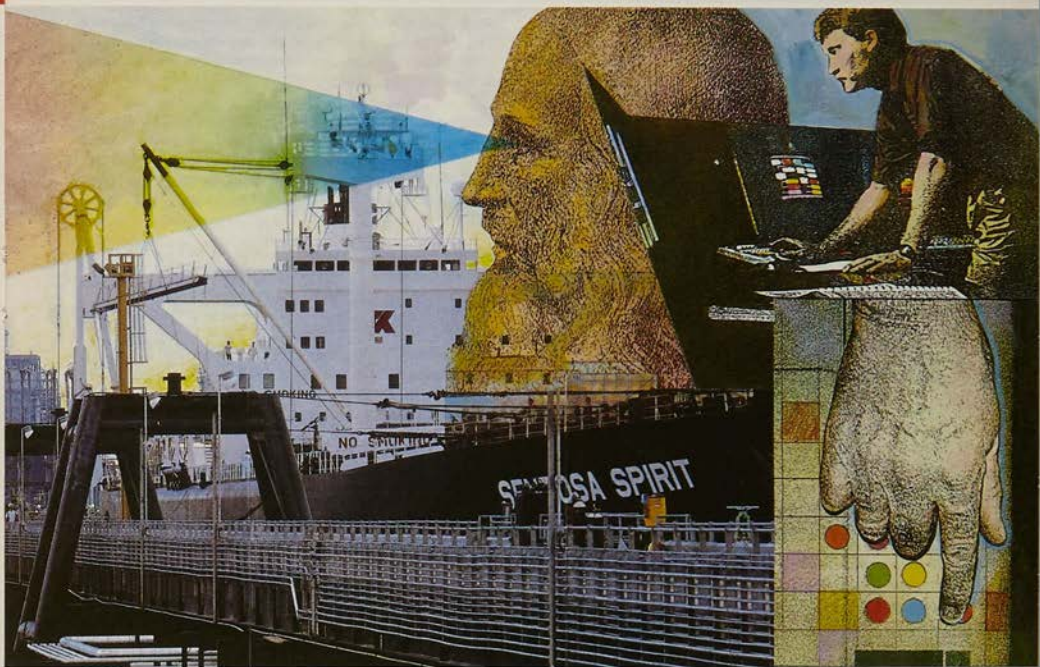
Belfast: Thirty eight tanks with a total capacity of 50,116 cubic metres from 498 metres to 5,000 cubic metres in size for high and low flash petroleum products, chemicals. A new jetty capable of handling vessels with 18,000 tonne cargoes is now operational (overall length 150m, maximum beam 29m and depth 9.5m). There are two 8 inch stainless steel and one 6 inch mild dockline. All docklines are pigable. Distribution through fully automated top and bottom loading facilities. Easy access to M1 and M2.

Eastham: (Sites 1 and 2) Merseyside: Site 1: Seventy-eight tanks with a total capacity of 261,988 cubic metres in tanks ranging from 35 to 10,800 cubic metres in size, suitable for high and low flash petroleum, lubricating oils and chemical products. Mild and stainless steel tankage, with and without coils and lagging. There are seven pigable docklines (two 6 inch stainless steel lines, one 10 inch stainless steel line, one 10 inch mild steel line, two 12 inch and one 14 inch).

Site 2: Eighty five tanks with a total capacity of 91,407 cubic metres in tanks ranging from 30 to 3,950 cubic metres in size, suitable for high and low flash petroleum, lubricating oils and chemical products. Mild and stainless steel tankage, with and without coils and lagging. There are 12 shipping lines on site (seven mild steel and five stainless steel, ranging from 6 to 10 inch). There is also a semi-automatic drum filling facility.

Dock facilities consist of three berths in the QEII Dock (depth 10.1 m, length 204m, beam 27.4 m) and one berth bank of the Manchester Ship Canal for high flash products. Both sites are capable of receiving and re-delivering product by road, rail, barge and sea vessel. There is easy access to M53, M56, M6.

Grays, Essex: Fifty two tanks ranging in size from 1,700 to 20,800 cubic metres capacity and providing a total capacity of 310,749 for high and low



WE WOULDN'T MIND IF DA VINCI PAID A VISIT.

In fact, we think Leonardo would be quite impressed with the new technologies of today's Oiltanking terminals. Since he foresaw automation, we'd show him the hydraulic, articulated loading arms. And point out the advantages of our computerized control rooms: better in/out efficiencies, contamination-free product handling. Then we'd invite him to sit in as our professional engineering teams explore even more ways to customize the best of modern science to better serve our customers. Da Vinci might admire Oiltanking technology. You, however, can profit from it.

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FAX: 49-40-370-99199

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TEL: 713-457-7900
FAX: 713-457-7991

FAR EAST
TEL: 65-473-1700
FAX: 65-479-4500

BULK STORAGE '96

flash petroleum products. There are two jetties (Wouldham Nos. 1 and 2, draught 11.3m, length 229m and unrestricted beam) with five piggyback docklines (three 10 inch, one 12 inch and one 14 inch). Distribution through fully automated top and bottom road loading facilities. Easy access to M25.

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

Leith, Scotland: Thirty four tanks with a total capacity of 72,902 cubic metres in tankage ranging from 55 to 13,400 cubic metres capacity in size for both high and low flash petroleum products and chemical products. Dock facilities comprise one berth (max. length 198m, max. beam 30.5m, draught 9.5m). There are two new 10 inch mild steel petroleum docklines and two stainless steel docklines. Road loading is being upgraded to allow fully automated top and bottom loading facility. Access to M8, M9 and M90.

Glasgow, Scotland: This new GATX site opened on 1 June 1996 for Jet fuel and is available for other clean petroleum products from 1 July. GATX Glasgow has 16 tanks for high and low flash products and a total capacity of 54,685 cubic metres which is distributed through fully automated top and bottom loading facilities. There is one jetty with draught 11.9 m, length 200 m and an unrestricted beam and there are six wet docklines dedicated to each product. Easy access to M8, A8.

Wymondham, Norfolk: Joint venture between Mobil Oil and GATX Terminals Limited. Eight tanks with a total capacity of 39,200 cubic

metres ranging in size from 4,100 to 5,200 cubic metres. This terminal is pipeline fed and stores high and low flash petroleum products on a commingled basis. Distribution through fully automated road loading facilities. Easy access to A11.

Manchester Jetline Limited: Joint venture between GATX Terminals Limited and Pensen Engineering Consultants. The MJL pipeline system allows jet fuel to be transported to Manchester Airport. It started operating at the beginning of 1994. The system is such that most UK refineries could pump fuel to Manchester Airport if required.

General Tank Storage nv

Haven 275, Leon Bonnetweg 28, 2030 Antwerpen, Belgium.

Tel: (32) 3 543 0505. Telex: 31643. Fax: (32) 3 543 05 00.

General Tank Storage NV (G.T.S.) a member of the LB Chimie group, is a BSI 9002 qualified company situated in the Port of Antwerp 4th Dock.

G.T.S. specialises in storing liquid chemical and mineral and vegetable oils either in bulk or in drums and IBCs. Its total tank capacity is 185,000 cubic metres. On a 30 acre site with 1,854 ft of waterfront, 6,560 ft of rail and direct access to the motorway system, all forms of transport are catered for.

Together with on-site customs and control bodies, our own forwarding department provides quick and efficient completion of all formalities. Substantial investment in recent years, including the construction of a new, ultra-modern tank farm has enabled G.T.S. to take up a position at the forefront of the tank storage firms. With regard to safety and environment too, G.T.S. has acquired a leading position in the Port of Antwerp. Its efficient water purification plant includes high-tech treatment of Marpol I&II waters as well as water from inland navigation and from industry.

The central position of G.T.S. permits problem-free distribution throughout Europe by road, rail and water transport.

Haltermann GMBH

Head Office: Ferdinandstraße 55/57, 200 95 Hamburg, Germany.

Tel: (40) 33318-0 Telex: 2161815 Fax: (40) 33318-214

Operates four terminals in Europe.

Hamburg-Wilhelmsburg: Total capacity of 120,000 cubic metres, with tanks varying in size from 50 to 5,000 cubic 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.

Haltermann NV (Belgium): Ketenislaan 3 B-2748 Beveren/Kallo Linker Oever.

Tel: (32) 3 750 02 11. Telex: 33705. Fax: (32) 3 775 02 61.

All petroleum products, solvents, chemicals and vegetable oils can be stored in this 60,000 cubic metre capacity terminal. Tanks



GATX' new terminal in Glasgow

BULK STORAGE '96

vary in size from 300 to 3,000 cubic metres. Some are stainless steel and coated with heating coils and insulation. Drumming and blending facilities are available, as is an associated custom processing plant. Access by road, rail and sea for vessels up to 28ft draught.

Haltermann AIS (Denmark): Søndre Møllevej, DK-4600 Køge (near Copenhagen).

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

Tanks ranging in capacity from 20 to 4,000 cubic metres make up this 15,000 cubic 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 cubic metre capacity terminal has tanks ranging in size from 20 to 2,000 cubic metres for all petroleum products, solvents and chemicals. Some tanks are stainless steel, coated, heating-coiled and insulated. Distribution by road, rail and sea.

IBL Bulk Liquids

110 Lime Street, Hull HU8 7AS, UK.

Tel: (01482) 320736. Fax: (01482) 226162.

132 storage tanks ranging from 50 to 830 cubic metres with a total capacity of 25,000 cubic 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.

Alexandra Dock, Hull

First phase of new terminal opened late 1995 at East Quay, Alexandra Dock, Hull. Tanks from 600-1760 cubic metres with a current capacity of 8,000 cubic metres. Heated, coated and insulated tanks suitable for import and export cargoes. Priority berthing for vessels up to approx. 7,500 DWT. Under cover vehicle loading and dedicated pipelines for receipt and redelivery of products.

The Independent Tank Storage Association (ITSA)

Executive Secretary: J.G. Wort, 58 Harnham Road, Salisbury, Wilts SP2 8JJ, UK.

Tel: (01722) 415572. Fax: (0900-1800hrs) (01722) 415572.

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 industry. 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 cubic metres is required for full membership and all companies with over that amount are currently members of ITSA. Associate membership is available to those with less than 50,000 cubic metres capacity. ITSA is a founder member of the Federation of European Tank Storage Associations (FETSA) aimed at representing the industry and its particular characteristics in discussions with the EC on developing legislation.

King's Lynn Storage LTD

Head Office: PO Box No. 2, Melton Constable, Norfolk NR 24 2QR, UK.

Tel: (01263) 860812. Fax: (01263) 861491.

Terminal: Estuary Road, King's Lynn, Norfolk PE30 2HH, UK. Tel: (01553) 764382. Telex: 817018. Fax: (01553) 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, it manages the 15,000 cubic metres terminal on behalf of KPGH.

2. King's Lynn Storage Limited operates another terminal comprising 10 storage tanks ranging from 55 cubic metres to 2,200 cubic metres with a capacity of 4,000 cubic metres. It is served from Bentineck Dock, King's Lynn, where KLS has access to three berths by agreement with Associated British Ports. The port can accommodate vessels up to 3,000 tonnes 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. Office and warehouse space is available to meet customers' requirements.

La Petrolifera Italo Rumena spa

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

Tel: (39) 51 331567. Telex: 511549. Fax: (39) 51 332451.

Terminal: Via Bajona, 260 - Porto Corsini-Ravenna, Italy. Tel: (39) 544 538497. Telex: 550122. Fax: (39) 544 531535.

Total storage capacity for petro-chemicals and bulk liquids 80,000 cubic metres. 57 tanks ranging from 250 to 5,000 cubic metres for high and low flash products. Some tanks in stainless steel, some rubber or specially coated; nitrogen blanketing facilities; 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 180 metres in length and up to 8.5 metres (28 ft) draught. 16 pipelines, between 6 inches and 12 inches diameter (some insulated and of stainless steel) from berths to the storage tanks.

MAVRAC

Route du port pétrolier, 13117, Lavera, Marseilles, France.

Tel: (33) 04 42 44 42 44. Fax: (33) 04 42 44 42 20.

A subsidiary of the LBChimie Group

MAVRAC operates two terminals:

Lavera:

120,000 cubic metres capacity for chemical storage and blending. Tanks between 500 and 15,000 cubic metres for low and high flash products. Tanks between 350 and 6,000 cubic metres for low and high flash products. Some tanks of stainless steel, some 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 200 metres in length and up to 11.6 metres draught. Several 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. Access by rail, road and sea (two berth 11.8m draught -

BULK STORAGE '96

200m length – drumming facilities). Certified ISO 9002 by Lloyd's Register Quality Assurance.

Port-Saint Louis du Rhône:

No 1: 20,500 cubic metres capacity for chemicals, petrochemicals, animal and vegetable oils. Access by road, rail (1,000 tonne block trains) and sea (7.9m draught).

No 2: 43,000 cubic metres capacity. All with internal floating roofs. Specialised for petroleum and alcohols products. Maritime reception by pipelines to a berth with private loading arms. 12m draught: 300m length. Road and rail reception.

Noord Natie Terminals nv

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

Tel: (32) 3 232 99 40. Telex: 31677. Fax: (32) 3 233 39 36.

Situated in the port of Antwerp. There are 189 tanks ranging from 30 to 8,300 cubic metres, with a total capacity of 225,000 cubic metres for various bulk liquids including mineral and lubricating oils, vegetable and animal oils and fats and non-dangerous chemicals. Tanks are or can be equipped with heating coils, insulation and nitrogen blanketing facilities. Three mooring berths for seagoing vessels and a special dock for handling barges. Direct road and railway connections. Weighbridges up to 100 tonnes.

VO – Nordic Tank Storage AB

S-403 30 Gothenburg, Sweden.

Tel: (46) 31 616190. Telex: 27696 NORDIC S. Fax: (46) 31 616170.

Nordic Tank Storage AB operates five terminals in Sweden.

Gothenburg: 113 tanks from 50 to 25,000 cubic metres with a total capacity of 541,000 cubic metres for petrol, gas oil, light and heavy fuel oils, bunkering oils, lubricating oils, chemicals, vegetable oils etc., blending and conditioning, as well as the storage of international oil consignments in transit. Access by sea, road and pipeline. Five tanker berths. We can handle vessels up to 280 metres in length with a draught of up to 13 metres. Our network of pipes is connected to the pipeline system of the refineries and the oil companies.

Gävle: 24 tanks from 25 to 35,000 cubic metres with a total capacity of 196,000 cubic metres for petrol, gasoil, light and heavy fuels, bunker oil, lubricating oils, chemicals, vegetable oils, etc., blending and conditioning, as well as the storage of international oil consignments in transit. Access by sea, road and pipeline. We can handle vessels up to 200 metres in length with a draught up to 10.4 metres.

Heisingborg: 12 tanks from 50 to 10,000 cubic metres with a total capacity of 34,000 cubic metres for petrol, gasoil and vegetable oils etc. Access by sea, road and pipeline. We can handle vessels up to 200 metres in length with a draught up to 10.4 metres.

Norrköping: 36 tanks from 30 to 3,000 cubic metres with a total capacity of 14,000 cubic metres for chemicals, petrol, gasoil etc. Access by sea, road and pipeline. We can handle vessels up to 190 metres in length with a draught up to 8.4 metres.

Trelleborg: 9 tanks from 20 to 3,500 cubic metres with a total capacity of 12,000 cubic metres for gasoil, fuel oil, lubricating oils, chemicals, molasses etc. Access by sea and road. We can handle vessels up to 175 metres in length with a draught up to 7 metres.

Nordic Tank Storage AB has an exclusive marketing agreement regarding the following terminals for petroleum products and chemicals:

Kalmar	33,000 cubic metres
Nynäshamn	40,000 cubic metres
Söderhamn	26,000 cubic metres
Sundsvall	16,000 cubic metres
Umeå	13,000 cubic metres
Västerås	12,000 cubic metres
Härnösand	8,000 cubic metres

Oikos Storage Ltd

Hole Haven Wharf, Canvey Island, Essex SS8 0NR

Tel: (01268) 682206. Fax: (01268) 510095.

Oikos operates Hole Haven Wharf, the most seaward liquid bulk storage installation in the Port of London. The terminal is connected to the United Kingdom oil pipeline networks (UKOP and GPSS), delivering product throughout the UK including the three major airports (Heathrow, Gatwick and Stansted).

The 200 acre Hole Haven Wharf site has total capacity of 300,000 cubic metres with a variety of tankage, ranging from 50 to 20,000 cubic metres including coiled, lagged and lined tanks. The site is licensed to store low-flash product (with no night time restrictions), treat and transfer hydrocarbon and other liquid wastes.

Three jetties, capable of handling vessels up to 220m LOA and 11.5m draught (at low water), serve the site and are linked to the storage facilities by more than 20 lines – including stainless steel, lagged and traced.

Recently, Oikos has invested in a state-of-the-art oily water treatment plant which will process oily water to levels well within current and expected parameters proposed by the EU and other regulatory bodies. Construction of the new plant has now begun and it is scheduled to be on line later this year.



Hole Haven Wharf site belonging to Oikos Storage Ltd

UNIQUE
WORLDWIDE
LAUNCH



-the answer to your problem, ...Sludge Profiler for Oil Tanks

The new S.P.O.T. system solves the major problem of accurately quantifying the volume of sludge in oil storage tanks.

Sludge settles unevenly in the tank base with varying peaks and troughs. This unevenness leads to major discrepancies when tank operators use only two or three available dip points to calculate their sludge volumes. The best current alternative is to remove all the roof legs and use up to eighty points, dipping through a depth of oil trying to feel for the sludge, relies totally on the varying skill of the operator. This method is time consuming, potentially hazardous and still leave large areas between the dip points that are unmeasured.

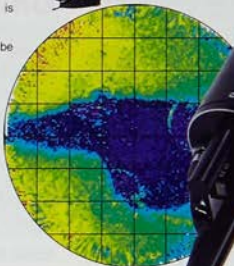
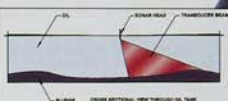
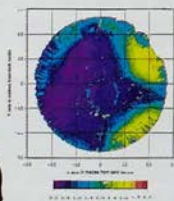
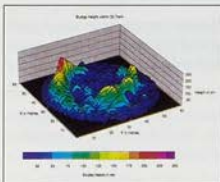
S.P.O.T. solves the problem using sensitive sonar to locate the sludge / oil interface. The transducer is lowered into the full tank of oil, in most cases, in a single position in the centre of the tank. The transducer is rotated 360° the beam sweeping the sludge surface with up to 240,000 soundings. The acoustic echoes are processed to give a far more accurate profile and sludge volume than is currently available.

The survey information is built up, as the transducer rotates, in real time on the computer display screen mounted in the survey vehicle. The acoustic transmission is transferred to the computer and is combined to produce a display of sludge heights colour coded to represent different levels. The display also gives a cross section of the sludge profile along the direction that the transducer is pointing. Once the sweep is complete a hard copy of the colour profile can be printed.

The S.P.O.T. system can be mounted in a small vehicle and can quickly be moved from tank to tank.

Need for SPOT system

1. Accurately assess sludge volumes and its position.
2. Safe roof landing when sludge banks are present.
3. Allows side manways to be removed safely without spillage due to unknown banks.
4. Stock of oil in tank not liability in sludge for accounting purposes.
5. Mixer efficiency can be monitored.
6. Allows sludge management, planned maintenance and for the first time based on accurate information of how much sludge the tank contains.



1 An electronics pod connects via a short (5m) umbilical cable to the sonar probe. The pod contains the acoustic transmitter, receivers, power supply, motor drive and digital signal processing (DSP) computer. Echoes from the sludge are amplified, digitised and processed before being passed to the main survey computer, through a 200m umbilical cable, for display generation.

2 The tube length of the probe is adjusted by the addition of extension tubes so that the transducer protrudes from the base of the roof leg support tube and is around 1m below the underside of the tank roof.

3 The entire lower section of the sonar probe is rotated over a range, programmable from the main survey computer, up to 360° in 1° increments for each sweep.

4 The transducer head may be inserted through a roof leg support tube as small as 100mm (4") internal diameter. Once in the oil the head is remotely deployed to a horizontal position. After completing a sweep the head is retracted back to an in-line position for recovery.

Willacy Group

Willacy Oil Services Ltd.,

Whittle Close, Engineer Park, Sandycroft, Deeside, Flintshire CH5 2OE, U.K.

Tel: 01244 520122 Fax: 01244 520283 Int. 44 1244 520122 Int. Fax: 44 1244 520283

BULK STORAGE '96

Oil Tanking GMBH

Admiralitätsstraße 55, D-20459, Hamburg, Germany.
Tel: (49) 40 370990. Fax: (49) 40 37 099499.

Oil tanking has a total storage capacity of 5.6 million cubic metres. The company operates eight seaport terminals, designed for rapid handling, in Amsterdam, Ghent, Copenhagen, Hamburg, Houston, Malta, Singapore and Argentina. All terminals occupy key positions in the international oil storage business and are backed by a dense network of nine 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 United Kingdom. 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, upgrading and downgrading of gasoline are also available.

The Malta facility with 359,000 cubic metre tank capacity 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 United States and the Black Sea. Oil tanking Malta is located in the Malta Freeport complex on Marsaxlokk Bay, so in-route products may be shipped in, stored, blended and shipped out duty-free at Malta.

Taking into account the importance of Ghent concerning the storage of chemicals, the storage capacity at our Ghent terminal for such clean products will be increased by 93,000 cubic metres. Installation of the tanks varying from 800 to 12,000 cubic metres was completed and first operations started mid-1994.

Further investments are being made in the German market.

The location of Oil tanking Gera in Thuringia/East Germany affords good storage opportunities in this region. The storage capacity has been increased by 90,000 cubic metres for gasoline and 28,000 cubic metres for gasoline/gasoline, totalling up to 168,000 cubic metres by early 1997.

Germany

Hamburg: Fifty four tanks, sizes 2,000 to 50,000 cubic metres. Total capacity 600,000 cubic metres. Low/high flash petroleum products and heavy fuel oil storage. Sea, barge, rail and road. Berth for tankers up to 85,000 dwt.

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

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

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

Frankfurt: Twenty five tanks, sizes 95 to 5,000 cubic metres. Total capacity 600,000 cubic metres. Low/high flash petroleum products and chemical products. Barge, rail and road.

Honau: Twelve tanks, sizes 5,000 to 20,000 cubic metres. Total capacity 115,000 cubic metres. Low/high flash petroleum products. Barge, road and pipeline.

Duisburg: Six tanks, sizes 5,000 to 20,000 cubic metres. Total capacity 35,000 cubic metres. Low/high flash petroleum products. Barge, rail and road.

Hamm: Eight tanks, sizes 3,000 to 15,000 cubic metres. Total capacity 76,000 cubic metres. Low/high flash petroleum products. Barge, rail and road.

Gera: Four tanks, sizes 10,000 cubic metres. Total capacity 40,000 cubic metres. High flash petroleum products. Rail and road. Increased by 90,000 cubic metres for gasoline and 28,000 cubic metres for gasoil.

The Netherlands

Amsterdam: Fifty three tanks, sizes 690 to 40,000 cubic metres. Total capacity 800,000 cubic metres. Low/high flash petroleum products, heavy fuel oil, crude oil, components, feedstocks and molasses. Sea, barge, road, rail and pipeline. Berth for tankers up to 85,000 dwt.

Belgium

Ghent: Fifty five tanks, sizes 800 to 47,250 cubic metres. Total capacity 700,000 cubic metres. Low/high flash petroleum products, feedstocks, chemical products, fertilisers and edible oils. Sea, barge, rail and road. Berth for tankers up to 65,000 dwt.

Denmark

Copenhagen: Thirty nine tanks, sizes 1,600 to 16,500 cubic metres. Total capacity 339,000 cubic metres. Low/high flash petroleum products, heavy fuel oil and slop oil. Sea, coaster and road. Berth for tankers up to 40,000 dwt.

Malta: Seventeen tanks, sizes 500 to 35,000 cubic metres. Total capacity 359,000 cubic metres. Low/high flash petroleum products, components and feedstocks. Berth for tankers up to 120,000 dwt.

Omni Tank GMBH

Marienstraße 20 40212 Düsseldorf, Germany.

Tel: (49) 211 93699-0 Fax: (49) 211 9369930

Breisach: 23,400 cubic metres. 15 tanks ranging from 100 to 5,000 cubic metres for storing petroleum products. Access for barges and road tank cars.

Essen: 112,000 cubic metres. 39 tanks ranging from 600 to 12,000 cubic 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 cubic metres. 23 tanks ranging from 360 to 3,750 cubic metres for gasoline, gas oil, jet fuel and petrochemical liquids. Blending facilities are available. Access by road, rail and barge.

Karlsruhe: 51,000 cubic metres. 19 tanks ranging from 650 to 3,000 cubic metres for petroleum products and petrochemical liquids. Access by road and rail tank cars (liner trains) and barges.

Speyer: 796,000 cubic metres. 57 tanks ranging from 2,000 to 60,000 cubic 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 Chemical Nederland bv

Chemieweg 13, Portnumber 4212, 3197 KC Botlek Rotterdam, The Netherlands.

Tel: (31) 10 472 4400. Telex: 28507. Fax: (31) 10 472 4903

Paktank Chemical Nederland bv, a 100% subsidiary of Royal Pakhoed NV., operates five ISO9002 certified terminals in the Netherlands: four

BULK STORAGE '96

terminals within the Port of Rotterdam and one terminal at the adjacent Port of Dordrecht.

Products stored:

Chemicals, lubricating oils, edible oils & fats and oleochemicals.

Terminals and capacities for these products:

Rotterdam:

Paktank Botlek terminal: 550,000 cubic metres
Paktank TTR terminal: 325,000 cubic metres
Paktank Chemiehaven terminal: 200,000 cubic metres
Paktank Pernis terminal: 350,000 cubic metres

Dordrecht:

Paktank Dordrecht terminal: 200,000 cubic metres
Available tankage: Mild steel, stainless steel, aluminium, coated, heated, insulated.

Tanksizes: from 300 to 40,000 cubic metres.

Access: Ships, barges, road, rail.

Other facilities: Dedicated and multi-purpose pigable lines, drumming and blending, nitrogen blanketing, custom processing.

With the multi-terminal structure within the Rotterdam/Dordrecht harbour, Paktank offers maximum flexibility to their customers.

Paktank International bv

PO Box 7300, 3000 HH Rotterdam, The Netherlands.

Tel: (31) 10 400 2911. Telex: 22163. Fax: (31) 10 413 9829.

The world's largest independent tank storage company, providing bulk storage and related facilities to the chemical and oil industries. Around 13 million cubic metres of tank storage capacity at terminals in Western Europe and further capacity in the United States, Tunisia and Singapore (including capacity of partners). All Panoean terminals with the exception of those in the United Kingdom are now owned by Royal Pakhoed NV, our parent company. Broere and ACS Antwerp are also 100 percent owned by Royal Pakhoed NV.

The Netherlands: Botlek (Rotterdam): 1,576,000 cubic 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 cubic metres; sea, pipelines; 68ft; crude oils and petroleum products. Able to receive vessels up to 72ft via the Maasvlakte terminal.

Laurensdijk (Rotterdam): 926,000 cubic metres; river, pipelines; petroleum products.

NOM/Pernis (Rotterdam): 150,000 cubic metres; sea, road, rail; 38ft 10in; petroleum products, chemicals, aromatics.

Maasvlakte Oil Terminal CV (Rotterdam): 4,400,000 cubic metres; sea, pipelines; 72ft; crude oils.

Sweden: Goteberg: 75,000 cubic metres; sea, road, rail; 36ft; petroleum products, chemicals, lubricating oils, molasses, latex.

Sodertälje: 117,500 cubic metres; sea, road, rail; 32ft; petroleum products, asphalt, chemicals, vegetable and animal oils and fats.

Malmö: 24,000 cubic metres; sea, road, rail; 36ft asphalt, petroleum products, chemicals.

Germany: Neuss: 58,000 cubic metres; river, road, rail; petroleum products, chemicals.

Tollerort and Hohe Schaar (Hamburg) and Kiel: See under VTG Paktank Hamburg GMBH.

USA: 1,350,000 cubic metres; chemicals.

Singapore: 830,000 cubic metres; oil storage.

Estonia (Tallinn): 57,000 cubic metres; oil storage (construction completed 1st phase), 40,000 cubic metres; oil storage (to be completed end of 1994).

Thailand: 87,000 cubic metres; chemical and naphtha storage (operational), 40,000 cubic metres; chemical and naphtha storage (to be completed end of 1994).

Tunisia: 300,000 cubic metres; oil products.

Pinnacle Storage

Choats Road, Dagenham, Essex RM9 6PU, UK.

Tel: (0181) 593 7211. Fax: (0181) 593 1632.

Owned by Transport Development Group plc (TDG) and formerly known as London & Coastal Oil Wharves Ltd.

Dagenham terminal: Situated between London and Dartford River Crossing. The nearest major privately-owned storage terminal on the Thames to London and has direct access to M25/M11/M1/M20/M2 networks. The terminal operates 236 tanks with a total capacity of 115,000 cubic metres and these include mild, stainless steel and epoxy lined tanks, suitable for storage of all chemicals, edible oils, lube oil and pharmaceutical products. The site is operated 24 hours a day at no extra charge.

Jetty facilities include 42 segregated jetty lines (pigged stainless and mild steel), and berthing facilities for vessels of up to 228 metres LOA and 40,000 tns dry weight with 10m of water at low tide.

Blending facilities for lubes, anti-freeze and other products are available and a recent investment in a computerised drumming facility guarantees containers are drummed off overnight.

The terminal has a modern workshop, weighbridge, radio communications and fully computerised stock accounting.

The site is certified to BS EN ISO 9002 and has its own NAMAS accredited laboratory which offers independent ASTM, IP and BSI standards of testing for petroleum, chemical and water products.

Powell Duffryn Terminals LTD

Commercial Enquiries: C. Scott, Commercial Director, Powell Duffryn House, London Road, Purfleet, Essex, RM19 1PR UK.

Tel: (01708) 865701. Fax: (01708) 868983.

Operates three terminals in the United Kingdom, all registered to BS: EN: ISO 9002.

Barry (South Wales): High and low flash tankage, for petroleum and chemical products, with a total capacity of 113,000 cubic metres. Tanks constructed in mild steel and sized from 20 to 14,400 cubic metres - many lined, lagged and coiled, using stainless steel fittings when required. Three tanker berths with a minimum depth of 9.8 metres (32ft), served by over 15 pipelines in stainless or mild steel, lagged and traced as required. 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 for petroleum and chemical products; tanks from 50 to 10,000 cubic metres with a total capacity of 89,000 cubic metres. 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. Road

BULK STORAGE '96

loading bays serving co-mingled white oil tanks being upgraded to include bottom loading facilities.

Purfleet (Essex): Two jetties: the main six berth private jetty with a minimum depth of 10.5 metres (35ft) can accept vessels of up to 45,000 tonnes displacement and a maximum length of 800ft; a smaller upstream jetty is dedicated to carbon gas tankers. High and low flash tankage for petroleum and chemical products, with a total capacity of 269,000 cubic metres. Tank sizes from 50 to 15,000 cubic metres, stainless or mild steel; many lined, lagged and coiled, using stainless steel fitments when required. Fourteen stainless and mild steel fully piggable shipping lines; many are lagged and traced for heated products. Rail siding accepts up to 13,100 tonne railcars.



Powell Duffryn terminal

Propetrol

Head Office: 65 Quai Jacoutot, BP 13, 67015 Strasbourg Cedex, France.
Tel: (33) 88 45 90 10. Telex: 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 (two locations), Village Neuf (near Basle), Gergy (near Chalon-sur-Saône), Villeneuve-La-Garenne (8 km north of Paris) and Salaise-sur-Saône (southern end of the Rhône's chemical corridor). Together these terminals represent a total storage capacity of about 200,000 cubic metres of bulk petroleum products, 60,000 cubic metres of bulk liquid chemicals and petrochemicals and over 6,000 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.

As regards the Salaise-sur-Saône Terminal, the first units, comprising five mild and stainless steel tanks ranging in capacity from 365 to 4,080 cubic metres, entered service in March this year. It is anticipated that a second development will eventually be undertaken involving the addition of a further 6,400 cubic metres in six tanks sized between 650 and 1,470 cubic metres.

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.

Pusback u.Morgenstern Petrotank

Neutrale Tanklager-Ges.m.b.H. u. Co. KG, Barkhausenstraße, 35-43 D-27568 Bremerhaven.

Tel: (49) 471 9 46900. Fax: (49) 471 9 4690-90.

Petrotank is an independent company in northern Germany, which owns and operates storage installations at Bremen, Bremerhaven, Nordenham-Blexen, Oldenburg (river Weser), Hanover, Hildesheim, Braunschweig (Mittelland-Kanal) and Trier (river Mosel). Total capacity about 176,000 cubic metres. Seagoing vessels are possible at: Nordenham-Blexen: draught max 32ft, LOA 170m. Bremen: draught max 31ft, LOA 150m.

There are barge, rail and truck facilities available in the other terminals. Storage of heavy fuels, gas oil, urea and other liquid products.

Ross Chemical & Storage Co LTD

Grange Dock, Grangemouth, Scotland UK. FK3 8UD

Tel: 01324 474774. Fax: 01324 485476.

Grange Dock, Grangemouth: Sixty tanks ranging from 800 to 2,650 cubic metres for fuel oils, motor spirits, petrochemicals, aviation fuel and molasses. Served by a common user jetty with mild and stainless steel jetty lines. The jetty is capable of handling ships up to 20,000 tonnes dwt. Distribution by road from both top and bottom loading racks.

Simon Storage Group

Priority House, 60 Station Road, Redhill, Surrey RH1 1PH UK.

Tel: (01737) 778108. Telex: 58218 SSSSTOR G.

Fax: (01737) 778112.

Simon Storage manages storage investments in the United Kingdom and Eire for Simon Engineering plc. With the exception of the Seal Sands terminal these are in joint venture with Koninklijke Van Ommeren NV.

Simon Management: Simon Storage also provide comprehensive facilities management services for the oil industry including aviation into plane services, terminal, oil and gas pipeline management, and onshore oilfield operation. The company now has in excess of 1,200,000 cubic metres under its management.

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

Tel: (01900) 605151. Telex: 64331 CSTORR G.

Fax: (01900) 67986.

31,581 cubic metres for petroleum products and chemical storage. Transport by road, rail and sea. Ships Agency: Workington - can

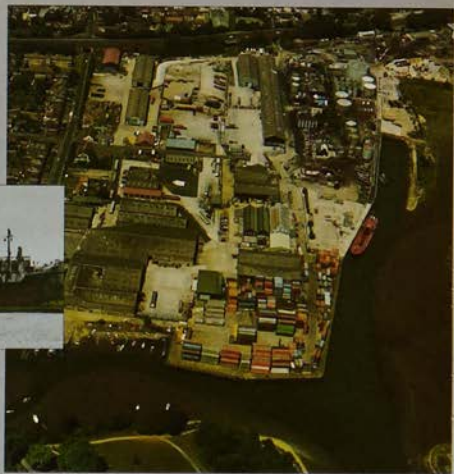
Bulk Liquid Storage Blending, Drumming & Chemical Handling

South Western Tar offer a comprehensive range of services including short and long-term hire of tanks up to a sophisticated liquid blending, drumming and chemical manufacturing service. The facility covers clean products including low flash and black product fuels and bitumens. Aqueous mixtures, solvents and a wide range of chemicals can also be handled on site.

Located on the northern tip of Southampton water SWTD's site at Totton covers 40 acres with 125 storage tanks ranging in size from

7,000 cubic metres down to 50 cubic metres, with a total storage capacity approaching 40,000 cubic metres.

The site is fully equipped with its own rail sidings and wharf capable of handling vessels with a cargo capacity of up to 2,000 tonnes including low flash cargoes.



For further information and a colour brochure please contact:

SWTD



**South Western Tar
Distilleries Limited**

High Street, Totton,
Southampton,
Hampshire SO40 9TN
Tel: +44 (0)1703 663444
Fax: +44 (0)1703 873429



IFBSA

BULK STORAGE '96

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: (01469) 572615. Telex: 52291 ISCOL G. Fax: (01469) 577019.

East: Tel: (01469) 571241. Telex: 527931 ISCEA G. Fax: (01469) 41012.

Simon Storage operates two installations at Immingham Dock (East and West). More than 300 tanks with a total capacity of 570,000 cubic metres, making it the largest independent bulk storage terminal in the United Kingdom. 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 two jetties: Eastern and Western. 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 tonnes 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 Immingham. New tankage under construction together with new road loading facilities designed to meet current and future VOC legislation.

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

Tel: (01642) 546775. Telex: 58218 SSTOP G. Fax: (01642) 546076.

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

dled. Two new bottom loading facilities have been constructed for petroleum handling.

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

Tel: (00 353) 69 65506. Fax: (00 353) 69 65601.

One installation. 14,000 cubic metres for petroleum and chemical products on the River Shannon. The jetty can accommodate 20,000 tonne 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: (0191) 296 0999. Telex: 53180 VELVA G. Fax: (0191) 258 6996.

Total capacity 54,704 cubic metres. Fifty mild steel tanks, ranging in capacity from 300 to 8,600 cubic metres for chemicals, gasolines and oils. Blending facilities. Many tanks are cooled. 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 Gontreville l'Orcher, France.

Tel: (33) 3553 3770. Telex: 190582. Fax: (33) 3553 3694.

Jointly owned by the SOGESTRAN Group and LBChimie.

Two terminals, with a total capacity of 340,000 cubic 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. Tanks from 5,000 cubic 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 cubic 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 cubic metres including nine tanks from 315 to 2,200 cubic metres of stainless steel. Three jetties, draught of 38ft for 40,000 tonne 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: liquid chemical containers heating area. The terminals are both certified ISO 9002 since February 1992 by Lloyd's Register Quality Assurance.

Sotrasol

157, avenue Charles de Gaulle, 92521 Neuilly Sur Seine, France.

Tel: (33) 1 47 47 15 08. Fax: (33) 1 46 41 03 27.

A subsidiary of LBChimie Group, SOTRASOL operates two terminals:

Tarnos (Port de Bayonne): 101,000 cubic metres capacity for chemical liquids, crude oil, liquid fertilisers, animal and vegetable oils and fats. Seventeen tanks from 640 to 15,000 cubic 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). The ter-



Simon Storage's Tyne Terminal

The 1st Middle East - International Summit for Oil & Gas Ministries,
Oil Industry Executives, Project Developers & Financial Institutions

INTERNATIONAL JOINT VENTURES IN OIL & GAS



Project Finance, Structuring and
Management of **\$20.8 Billion** in
EPC/EPCM Investments

KEYNOTE SPEAKERS

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BIN FAISAL BIN TURKI
AL SAUD**

The Chairman

**THE JUBAIL & YANBU
ROYAL COMMISSION
(SAUDI ARABIA)**

**H.E. HUMAID BIN
NASSER AL OWAIS
THE MINISTER OF
ELECTRICITY & WATER
(UNITED ARAB EMIRATES)**

REBECCA P. MARK
*The Chairman &
Chief Executive Officer
ENRON DEVELOPMENT
CORPORATION (USA)*

The most prestigious international gathering of experts include:

- **H.E. Saleh Al Omair**, Vice Minister of Finance & National Economy 1986 -1995, Saudi Arabia
- **Charles Kline**, President and Chief Executive Officer, EQUATE Petrochemical
- **Dr Fareed M. Zedan**, Chairman of the Official Study into Power Restructuring in Saudi Arabia
- **Dr Henry Azzam**, Chief Economist, The National Commercial Bank (Saudi Arabia)
- **Michael Kappaz**, Chairman & Chief Executive Officer, K & M Engineering(USA)
- **Mukhtar Hussain**, Chief Executive Officer, HSBC Investment Bank Middle East
- **Wael Al Mazzeedi**, MENA Task Force for Private Infrastructure Finance, The World Bank
- **William D. Trammell**, Vice President: Project Finance, Fluor Daniel Inc (USA)
- **George Peat**, Vice President, Kellogg Middle East
- **Alastair McKechnie**, Private Sector Development & Infrastructure, The World Bank
- **Robin Claridge**, Project Manager, Foster Wheeler Energy Limited(UK)
- **Mike Major**, Director, Costain Oil, Gas & Process Ltd (UK)

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BULK STORAGE '96

terminal is certified ISO 9002 since July 1992 by Lloyd's Register Quality Assurance.

Le Havre: One hundred tanks from 30 to 5,000 cubic metres, with a total capacity of 105,000 cubic 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). Certified ISO 9002 by Lloyd's Register Quality Assurance.

South Western Tar Distilleries LTD

High Street, Totton, Southampton SO40 4TN UK.

Tel: (01703) 663444. Fax: (01703) 873429.

Located at Totton in the Port of Southampton, SWTD has over 125 tanks in a range of sizes up to 7,000 cubic metres. Total storage capacity is 36,000 cubic metres with planning permission for further expansion. Some tanks are stainless steel and a wide range of chemicals and oil products are handled ranging from low flash products including crude oil up to and including fuel oils and bitumen. Many tanks are insulated and heated. A comprehensive blending service is also offered for aqueous and solvent products together with a complete high flash/low flash drumming service.

The site has its own rail sidings and jetty facility with capacity to take up to 2,000 tonnes of high or low flash products and is immediately adjacent to the M27 with direct links to the M27 and M3 motorways. The terminal is quality approved to BS EN ISO 9002:1994 and has a waste transfer licence.

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

Tanquipor, LDA

Head Office and Installation: Parque Industrial do Barreiro, Caixa Postal 5158 - 2830 Barreiro Portugal.

Tel: (351) 1 2060348. Fax: (351) 1 2078577

A subsidiary of LBChimie Group, TANQUIPOR operates a terminal located in the Port of Lisbon, with a total capacity of 90,000 cubic metres for storing ammonia, chemicals and petroleum products. Tank capacity varies from 1,600 to 30,000 cubic metres. All tanks are equipped with fire fighting system and dedicated pipelines.

The terminal can offer a full range of services including receipt and despatch by ship, pipeline, barges and road tankers. Pre-pumping, fresh water, steam, truck weighting and nitrogen blanketing are also available. All docks lines from 6" to 10" are pigable and from 6" to 14" are flushed and all are dedicated. Maximum draught at the jetty is approximately 32ft at high tide.

Tanklager Gesellschaft Mannheim GMBH

Essener Str. 64, D-68219 Mannheim, P.O. Box 81 04 06, D-68204 Mannheim, Germany.

Tel: (49) 621 89 98 5 Fax: (49) 621 80 14 17

The Tanklager-Gesellschaft HOYER mbH, Mannheim, was founded in 1959 and operates large scale, modern, independent tank depots at Mannheim-Rheinau and at Mannheim-Handels Hafen.

Mannheim, the second largest river port in Europe, lies in the heart of Germany - ideally situated for inland tank storage. Apart from the Rhein-Main area in South Germany, Mannheim allows economical access to Eastern France and North Switzerland and since the opening of the Rhein-Main-Donau-Kanal also to the Donau and South-eastern Europe.

Both the tank storage depots have access to waterways, rail terminals and the motorway network.

The tank storage depot at Mannheim-Rheinau has a total of 230,000 cubic metres tank space, and the storage depot at Mannheim-Handels Hafen has over 78,000 cubic metres. The tank space of both of these can be extended by a further 50-80,000 cubic metres.

The capacity of the individual tanks is between 50 and 22,000 cubic metres.

Modern cargo handling area with 8,000 sq. metres storage space at Mannheim-Handels Hafen are particularly suitable for the storage and transhipment of bulk and IBC packed chemicals and other goods. Large open plan storage areas with ramp access are available for the storage of drums.

All tanks are equipped with a separate pipeline system, which ensures the independent treatment of each product to a high standard. Besides black steel tanks, the TLG storage depots at Mannheim-Rheinau and at Mannheim-Handels Hafen can also offer stainless steel tanks with a capacity of 10,500 cubic metres, tanks with special cladding, insulation and facilities for nitrogen supply.

In addition to expert storage of a wide variety of products, such as petrol, chemicals and solvents, high inflammable products, gasoline, aromatics, industrial



South Western Tar Distilleries, Totton

BULK STORAGE '96

alcoholics, glycols, plasticisers, additives, acrylate, detergent products, vegetable oils, organic acids, resin dispersions, TLG offers all other services connected with its handling and transportation: customs clearance, quality control, weight control, tank checking and drum filling.

Delivery and despatch can be made by ship, rail or road. TLG offers direct transshipment by ship/tank car as well as a complete rail service.

Ever since the opening of the storage depots, special attention has been paid to safety aspects. The most modern facilities guarantee swift and safe transshipment.

The years of experience which the TLG team have in handling a variety of products, together with modern technology, ensures safety – safety for the products and safety for the environment.

Well trained staff deal with even the most unusual problems in a professional manner.

Tees Storage Company LTD

Seal Sands, Middlesbrough, Cleveland TS2 1UA, UK.

Tel: (01642) 546767 Telex: 584777. Fax: (01642) 546222

Jointly owned by Royal Pakhoed NV and GATX Corporation. Operates a terminal at Seal Sands.

137 tanks from 55 to 8,500 cubic metres, with a total capacity of 200,000 cubic metres. Mild steel coated and stainless for petroleum and chemicals. One sphere of 6,650 cubic metres for Vinyl Chloride Monomer. Road, sea and pipelines to neighbouring plants. Provision for rail. Drilling facilities. Three jetties for ships up to 40,000 dwt. Maximum length 760ft, maximum draught 36ft. 55 docklines (36 stainless steel).

Terminales Portuarias SA

Muelle de Inflamables, s/n, 08039 Barcelona, Spain

Tel: (34) 3 223 52 02/223 52 22 Fax: (34) 3 223 45 79

TEPSA is a joint venture with equal shares held by GATX Terminals Corporation and Petrofrance Chimie SA. Owns and operates liquid bulk chemical terminals in four major Spanish ports: Barcelona, Tarragona, Valencia and Bilbao.

Barcelona

Ninety-six tanks with a total capacity of 83,690 cubic metres, from 50 to 7,690 cubic metres in size, for chemical products, oils, acids and petroleum products. There are two jetties (draught 39 ft). Access is by sea, rail and road. Services available: Mild steel, stainless steel and coated tankage, storage, loading and unloading of vessels, tank trucks and rail cars; weighing and drumming, nitrogen blanketing and warehousing. Heating possibilities are steam with warm water. Tanks for chemical products are equipped with dedicated product lines and pumps. Terminales Portuarias, SA owns 100% of: Proquímica SA. One hundred and nineteen tanks with a total capacity of 60,000 cubic metres from 50 to 3,000 cubic metres in size for chemical products. There are two jetties (draught 39 ft). Access by sea and road. Services available: Mild steel, stainless steel and coated tankage, storage, loading and unloading of vessels and tank trucks, transshipment facilities, refrigerating, blanketing and drying, drumming, blending and covering warehousing. Heating possibilities are steam with oil. Tanks for chemical products are equipped with dedicated product lines and pumps.

Tarragona: Thirty tanks with a total capacity of 28,280 cubic metres from 650 to 1,305 cubic metres in size for chemical products, acids, oils and others (soda, fertilizers...). There are two jetties (draught 41ft). Access is by sea, rail and road. Services available: Mild steel,



Puerto de Barcelona owned by Terminales Portuarias SA

stainless steel and coated tankage, storage, loading and unloading of vessel, tank trucks and rail cars, weighing and nitrogen blanketing. Heating possibilities are steam with warm water. Tanks for chemical products are equipped with dedicated product lines and pumps.

Valencia: Twenty-four tanks (dedicated pumps and lines for each tank) with a total capacity of 36,765 cubic metres from 305 to 3,050 cubic metres in size, for chemical products, petroleum products, nitrogen fertilizers and oils. There is one jetty (draught 39ft). Access is by sea and road. Services available: storage, loading and unloading of vessels and tank trucks, weighing and nitrogen blanketing. Tanks for chemical products are equipped with dedicated productlines and pumps.

Bilbao: Forty-one tanks (dedicated pumps and lines for each tank) with a total capacity of 49,840 cubic metres from 460 to 5,650 cubic metres in size, for chemical products, petroleum products, acids and others. There are two jetties (draught 52ft). Access is by sea and road. Services available: storage, loading and unloading of vessels and tank trucks, weighing and product heating and nitrogen blanketing. Tanks for chemical products are equipped with dedicated product lines and pumps.

Terminales Quimicos de Santander, S.A.

Santa Cruz De Marcenado, 31-1° 28015 – Madrid, Spain.

Tel: (34) 1 547 30 27. Fax: (34) 1 542 13 91

Operates one terminal in Santander (Spain). 75 tanks from 100 to 2,500 cubic metres. High and low flash chemicals, petroleum products and vegetable oils. Heating: N₂ blanketing, insulated and coated tanks. Total capacity 65,000 cubic metres. Access by rail, road and sea with 40 ft draught private jetty.

Terminales Quimicos, S.A. (Terquimsa)

Plaza de Colon Nr.2. Torre-I 9° - A 28046 Madrid, Spain.

Tel: (34) 1 310 11 76. Fax: (34) 1 308 33 04.

Located at Tarragona Port with a capacity of 130,000 cubic metres for chemical and petroleum products, vegetable oils. Automatic drumming, bonded storage. Heating, refrigeration, gas blanketing, coated and SS tanks. Transshipment facilities.

BULK STORAGE '96

United Storage

Athel House, 167 Regent Road, Liverpool L20 8DD UK

Tel: (0151) 933 1010 Fax: (0151) 933 7434

United Storage as part of the UM Group within Tate & Lyle Plc, operates seven terminals in the UK and also runs its own fleet of bulk liquid tankers under the name of Transtore. All terminals can be supplied by sea along short piggyback docklines.

Liverpool: Two terminals for the storage of vegetable oils and molasses with access to the deep water of the Mersey estuary. One terminal for the storage of liquid fuel again with deep water access. Total capacity - 144,000 cubic metres, tanks ranging in capacity from 120 cubic metres to 10,800 cubic metres.

Birkenhead: One terminal for the storage and processing of vegetable oils and fats. Alongside this terminal the processing division offers the facility to separate, filter and acid refine vegetable oils and fats for the food industry. One terminal for the storage of chemicals, lube oils/additives. Total capacity: 144,000 tanks ranging in capacity from 50 cubic metres to 10,000 cubic metres.

Hull: One terminal for vegetable oils and molasses; another for lube oils/additives, chemicals and low flash products. Batch and in-line blending facilities are also available. Total capacity: 58,000 cubic metres, tanks ranging in capacity from 65 cubic metres to 9,800 cubic metres.

Van Ommeren Bragtank AG

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

Tel: (41) 61 631 44 22. Fax: (41) 61 631 16 92.

Van Ommeren Bragtank AG, 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 cubic 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.

Van Ommeren Tank Terminals (vott)

Head Office: 10 Westerlaan, 3016 CK Rotterdam, The Netherlands.

Tel: (31) 10 464 2430. Telex: 21435 VONL. Fax: (31) 10 464 2819.

VOTT is part of Royal Van Ommeren NV, with a worldwide capacity of 13,461,000 cubic metres. It has 39 terminals situated in 19 countries.

THE NETHERLANDS:

Botlek (Port of Rotterdam): 940,000 cubic metres capacity; access by road, rail, sea, inland waterways and pipeline; 41 ft 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): 905,000 cubic 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 Botlek and adjacent refineries.

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

BELGIUM

Antwerp: Gamatex is a 50/50 joint venture between GATX Terminals and operates one terminal in Antwerp, Belgium. The terminal offers 147 tanks with a total capacity of 486,000 cubic metres for clean mineral oils, chemicals and pressurised gases. There are five berths for barges and four berths for seagoing vessels. Access is by sea, rail and road. Pipeline access is available. Tankage is insulated, coiled, coated, stainless steel and heatable. All chemical tanks are equipped with dedicated lines, pumps and loading racks for railcars and trucks. Pre-pump, blending, drumfilling and nitrogen blanketing are available.

FRANCE

Fos-sur-Mer: DPF, a company in which Van Ommeren has a share has one installation in France, at Fos-sur-Mer. The terminal has 40 tanks with a total capacity of 780,000 cubic metres. All mineral oils can be stored. There are five jetties for seagoing vessels (up to 72ft) and one for coastal vessels (21 ft). Access is by sea, rail, pipeline and road. Blending facilities are provided (MTBE, lead, butane).

GERMANY

Hamburg: The terminal has 300 tanks with a total capacity of 711,000 cubic metres for storing mineral oils, petrochemical liquid, liquid fertilisers, animal and vegetable oils and fats, and molasses. There are four jetties for sea-going vessels and barges (draught up to 44ft), eight 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, drumfilling plant, blending and dyeing facilities for gasoline and fuel oil and molasses are also available.

SPAIN

Barcelona: Located at the Port of Barcelona's Flammables Area, it has access by road, sea and rail. Operates with 63 tanks ranging from 30 to 2,000 cubic metres, total capacity 35,000 cubic metres, equipped for practically any kind of chemical and petrochemical product. Drumming facilities available. Suitable for transit operations and ship to ship transfers, using the free zone facilities.

UNITED KINGDOM

London: This terminal on the river Thames has 125 tanks with a total capacity of 348,000 cubic metres suitable for storage of clean low flash petroleum products and chemicals. Access is by sea (draught 36 ft) and road (bottom loading facilities).

VOTOB

Vereniging van Onafhankelijke Tankopslagbedrijven, Vlietweg 16, Leidschendam. Postal address: PO Box 443, 2260 AK Leidschendam, The Netherlands. Tel: (31) 70 337 8750. Fax: (31) 70 320 3903.

VOTOB embraces four member companies in the Netherlands, active in the storage of bulk liquid commodities and products. Together the members offer 12 installations in the ports of Amsterdam, Dordrecht and Rotterdam.

VOTOB is active in the interface with national government and with other professional associations with relevant similar interests. VOTOB is an active member of FETSA (Brussels) the European umbrella organisation which consults government on international scale: EU-Commission, IMO, CCR, ECE.

BULK STORAGE '96

VTG-Paktank Tanklager Hamburg GMBH

Blumesand 38, 21107 Hamburg, Germany.

Tel: (49) 40 75 60 34 51. Fax: (49) 40 75 60 34 89.

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

VTG Vereinigte Tanklager und Transportmittel GMBH

Head Office: Nagelsweg 34, D-20097 Hamburg, Germany.

Tel: (49) 40 23 54 0. Fax: (49) 40 23 54 27 00. 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 cubic metres. Storage facilities are complemented by 25,000 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: 225,000 cubic metres, 85 tanks ranging from 50 to 20,000 cubic metres for all petroleum products, solvents and petrochemicals; access for barges, road and rail tank cars and liner trains.

Cologne: 101,000 cubic metres, tank volumes range from 50 to 25,000 cubic metres.

Duisburg Ölsinsel: 270,000 cubic metres, 212 tanks varying in size from 100 to 9,000 cubic 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 and pipeline.

Duisburg Parallel-hafen: 38,000 cubic metres. Tank volumes 15 to 4,500 cubic metres for all petroleum products and chemicals. Access by tanktrucks and barges.

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

Hanover: 320,000 cubic metres. 22 tanks ranging from 500 to 70,000 cubic metres for crude oil, petroleum products, chemicals and solvents. Access for road and rail tank cars, liner trains and barges; crude oil pipeline.

Hünxe: 900,000 cubic metres (568,000 for A1/332,000 for A11) for storing petroleum products. 51 tanks ranging from 1,000 to 55,000 cubic metres. Access for road and rail tank cars, barges and pipeline.

Munich: 155,000 cubic metres, ranging from 30 to 45,000 cubic metres for storing petroleum products,

chemical and petrochemical liquids and solvents. Blending facilities for gasoline are available. Access by railtank cars and tanktrucks.

Regensburg: 70,000 cubic metres, 60 tanks varying in size from 100 to 9,000 cubic 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.

Mainz-Gustavburg: 256,000 cubic metres, 33 tanks ranging from 8 to 40,000 cubic 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.

Weser-Petrol Seehafentanklager GMBH & Co. KG.

Cuxhavener Str. 42/44, PO Box 106149, D-28061 Bremen, Germany.

Tel: (49) 421 396 99-0. Fax: (49) 421 396 99-79. Telex: (41) 246 448 dsd.

Weser-Petrol, part of the DIERSCH & SCHRÖDER group of companies, operates storage installations in Bremen and Nordenham at the river Weser with a total capacity of 180,000 cubic metres. These modern facilities offer every possibility for a comprehensive distribution system for mineral oil products, mainly middle-distillates and molasses. In addition Weser Petrol operates 50,000 cubic metres storage capacity for middle-distillates in Greifswald and Wismar on the Baltic Sea.



Weser-Petrol tank storage facilities in Bremen

Brent Spar still awaits its fate

More than 12 months have passed since Shell UK Exploration and Production was forced by Greenpeace and public opinion to abandon its plans to sink the 141 metre high, 14,500 tonne Brent Spar oil storage and mooring buoy in the Atlantic and to rethink its options.

Progress in the search for the Best Practicable Environmental Option for the giant structure is now being made, albeit slowly. Last month Shell announced that 21 engineering contractors have been chosen and are now engaged in drawing up plans for alternative uses or disposal. Confidential outline concepts had to be submitted by 31 July. After appraisal, the 21 will be narrowed down to a short-list of around six proposals which will then be developed as detailed concepts.

The 21 contractors from eight countries have been selected by Shell from the 450 suggestions that were received from round the world (see box). The proposals contained a variety of options – a floating hotel, a casino, a wind turbine, a fish farm, refurbishment as a storage/loading buoy, even a bridge to span the entrance to Poole Harbour.

Shell is still intending to look at a range of options. Eric Faulds, Decommissioning Manager, Shell Expro, said, 'We would not like to arrive at a Short List of six very similar onshore scrapping options. We are looking for a spread of realistic disposal options which can compete strongly with each other.'

He went on to acknowledge that there was still the possibility that deepsea disposal could be one of the final options to be considered.

This view was reinforced by Heinz Rothermund, Managing Director, Shell Expro, who said, 'Deepsea disposal is currently the option approved by government and they have made it clear that any new option must be at least as good or better. We will therefore assess it closely in comparison with the six detailed options that are to be developed, at the stage of choosing the BPEO to propose to the government.'

'However, we believe that the combination of innovative work by world class contractors, creative thinking from all over the world, and the open dialogue process should enable us to identify whether there is a solution at least as good as, or better than deepsea disposal.'

Whatever option is the final choice, UK government approval will be required before it can be implemented.

Contractors' challenge

Would-be contractors have the benefit of data and surveys already undertaken by Shell and others including a recent report from WS Atkins. These consulting engineers have just completed a structural analysis which shows that it would be far from straightforward merely to reverse the original installation of the structure and that there are structural limitations and safety risks in raising the Spar out of the sea. In fact raising the Spar from the sea presents a 'huge' engineering challenge, because while the tanks are full of sea water, the difference in pressure between the contents of the tanks and the seawater is very small. If the tanks were emptied for removal, dismantling or whatever, the difference in pressure between the water inside the tanks and the seawater outside would increase, thus increasing the differential load that the tank walls would have to withstand. In any of these manoeuvres, the damaged tanks would add to the problems.

Atkins' analysis also showed that if the Spar were rotated to a horizontal position, the draught would have to be 9.2

metres – restricting its final destination.

Not surprisingly the analysis revealed that the storage tanks walls are thin (and two of the six tanks are damaged from incidents during its operating life). It is concluded that the tanks walls might buckle or collapse without the external water pressure. Non-linear analysis indicated that the water level inside the Spar could only be lowed by 24.5 metres before the structural integrity of the outer tank walls was jeopardised. This figure would be even lower when a safety factor was taken into consideration.

The 21 contractors have been given Atkins' results as guidance: at the short-list stage they will need to undertake structural analysis of their own proposals. 

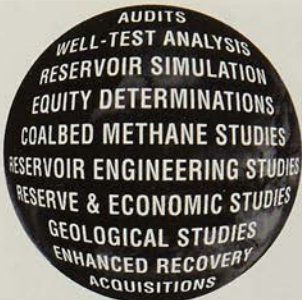
Carol Reader

Contractors to submit outline proposals for disposal of Brent Spar

Hollandia BV
Ramboll/Monberg and Thorsen
Consortia
Rhodes Offshore Partners Inc
ROS Holland BV
Thyssen Stahlunion GmbH
Wood GMC
Aker Offshore Partner AS
AMEC Process and Energy
Brown & Root Energy Services
Kvaerner Installasjon AS
McDermott Marine Construction Ltd
Heeremac vof
Stolt Comex Seaway Ltd
Mayer Parry Recycling
Hollandsche Staalbuw Maatschappij
Land & Marine Engineering Ltd
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For further information contact: Lyn Nevin (0171 467 7114), Rajindra Multani (0171 467 7115) or Catherine Cosgrove (0171 467 7111).

The Institute of Petroleum, 61 New Cavendish Street, London W1M 8AR
Fax: 0171 255 1472 E-Mail: InstPet@cityscape.co.uk

Increasing interest in offshore Ireland

Iwould like to refer to the general petroleum situation in Ireland and briefly dwell on the current position. An oil discovery in the Celtic Sea, the Helvick Field, is being evaluated to determine its commerciality. In the Porcupine Basin, the Connemara oilfield, with almost 200 million barrels of oil in place is being appraised. Two wells will be drilled by Enterprise and partners in the Erris and Slyne Troughs this year and I expect that at least three wells will be drilled in the Porcupine Basin next year.

We are now recognised as having one of the most attractive exploration investment regimes in the world. The number of major petroleum companies which have recently shown interest in offshore Ireland is very encouraging and augurs well for the future of exploration. Following the two successful rounds in the Slyne/Erris and Porcupine Basin, I announced in March that a further Frontier Licensing Round was being held in the Rockall Trough. The Round covers some 615 full and 35 part blocks. Its closing date is 26 March 1997. This area could emerge as one of the

**By Emmet Stagg TD,
Minister of State,
Irish Department
of Transport, Energy
and Communications**

most exciting in our offshore programme and the high level of interest in exploration surveys in the Rockall Trough is most encouraging for the outcome of the round there. A technical evaluation of this area is currently being prepared by my department in conjunction with Robertson Research International. It will be on sale shortly.

Refining

The Whitegate refinery, operated by the Irish National Petroleum Corporation (INPC), plays an essential strategic role in the security of supply of oil products within the state. In response to the Culliton/Moriarty reports, the government announced in 1993 that the mandatory off-take regime at the refinery would terminate at the end of 1996. The removal of the mandatory regime does not in any way diminish the strategic significance of the refinery. However, its cessation does mean that the refinery faces a new commercial challenge.

In facing this, the INPC have adopted a vigorous marketing approach which focuses on the needs of their customers, while at the same time cutting their costs to the bone. As a result, INPC have increased throughput at the refinery from 30,000-35,000 barrels a

day to 52,000 barrels a day and have plans to achieve a targeted output of 65,000 barrels a day over the next couple of years.

The restoration of the oil terminal at Whiddy Island will assist greatly in the effectiveness with which the National Oil Reserves Agency can discharge its function of maintaining strategic oil stocks. The terminal will shortly resume operational status following the installation of a single point mooring for the discharge and loading of crude oil. Work on this project has recently been completed and it is hoped that the new facility will become operational during the coming summer months. It will provide speedy access to oil stocks already stored at the terminal in the event of a supply disruption and will enable the stocks there to be augmented. In addition, it will enhance the terminal's attractiveness for possible additional storage and oil trading activities by third parties on a commercial basis including oil produced from the Irish offshore.

Gas developments

The past year has been a milestone in the development of the Irish natural gas industry. Bord Gais Eireann completed the provision of a gas interconnector to the United Kingdom and that interconnector is already in commercial operation. There are now some 250,000 residential customers and 9,000 industrial/commercial customers served by natural gas with the result that natural gas now accounts for nearly 20 percent of our total primary energy requirements.

The interconnector, therefore, gives us invaluable security of supply. When the United Kingdom/Belgium intercon-



Photo:

Mr Emmet Stagg presented the Bryony Berry Prize to Des Devine and Noel O'Boyle, two transition-year students in St. Murcadach's College, Ballina. The title of their project was 'Lime v slime - a means of reducing the phosphate problem in Irish lakes.'

Bryony Berry was one of the founding members of the IP Irish Branch. In recognition of his enthusiasm and his commitment to the Institute, an annual prize has been developed within the framework of the Aer Lingus Young Scientists Exhibition. This All-Ireland competition is directed at second-level students.

The prize covers three weeks' work experience at Whitegate refinery, sponsored this year by the Irish National Petroleum Corp.

Brendan Sheehan, Chairman, IP Irish Branch, said, 'The Institute was keen to be associated with this celebrated event devoted to challenging the talents and energies of young scientists, their teachers and their parents. It was also our wish to encourage more young people to consider the option of pursuing energy-related studies when considering doing full-time third-level courses.'

nector is completed, Bord Gais will then ultimately have access to gas markets not only in the United Kingdom but also as far away as Siberia and Algeria. In the event that further natural gas resources are discovered off the Irish coast, the interconnector will be available for the export any surplus supply.

In order to further enhance security we are also looking at a number of other supply options. One of these is

the question of an interconnector between Dublin and Belfast and it is the subject of a joint South/North feasibility study.

The European natural gas industry is now at a critical stage of development with a number of challenges to be faced and opportunities to be grasped. I am confident that BGE will successfully meet these further challenges in the open and competitive gas market. ♡

1995 survey of the average lead & sulfur contents of petroleum products delivered into the UK market

YEAR	LEAD CONTENT in g/litre			SULFUR CONTENT in % mass										
	Motor Spirit			Motor Spirit			Kerosine			Fuel Oil				
	4Star	Premium	Super	4 Star	Premium	Super	Premium	Regular	Aviation	Auto	Gas Oil	Light	Medium	Heavy
	Leaded	Unleaded	Unleaded	Leaded	Unleaded	Unleaded	Kerosine	Kerosine	Kerosine	Diesel		Fuel Oil	Fuel Oil	Fuel Oil
	Lead g/l	Lead g/l	Lead g/l	%wt	%wt	%wt	%wt	%wt	%wt	%wt	%wt	%wt	%wt	%wt
1989	0.143	0.002		0.05	0.03			0.04	0.03	0.19	0.21	1.8	2.2	2.2
1990	0.143	0.002		0.05	0.04			0.04	0.03	0.19	0.21	1.7	2.2	2.2
1991	0.145	0.001		0.04	0.03			0.03	0.04	0.19	0.21	1.4	1.8	2.1
1992	0.143	0.001		0.05	0.03		0.01	0.04	0.05	0.19	0.20	1.8	2.2	2.4
1993	0.143	0.001	0.001	0.04	0.02	0.02	0.01	0.04	0.04	0.19	0.20	2.3	2.5	2.8
1994	0.140	0.001	0.002	0.06	0.03	0.02	0.01	0.03	0.05	0.17	0.18	2.0	2.2	2.4
1995	0.137	0.001	0.001	0.05	0.03	0.01	0.01	0.02	0.04	0.13	0.14	1.9	2.0	2.2

Based on weighted average figures provided by the UK Petroleum Industry Association

Fuel oil figures exclude deliveries for export, bunkers and electricity generation

Source - UK Petroleum Industry Association

Electrostatic hazards in meter proving

In 1992 and 1993 three ignitions occurred during meter proving operations at UK distribution terminals. A programme of research (Project Thor) conducted by the companies that suffered the accidents (BP and Texaco) together with Esso and Total, showed that the ignitions were probably initiated by electrostatic discharges and that the principal cause was the generation of excessive electrostatic charge in the meter proving rigs as a result of the presence of fine filters which had been recently introduced to prevent damage to the reference meters. This article summarises the conclusions from further experiments conducted by Shell and Esso to augment the Thor work.

With the removal of the filters, the main additional hazard associated with meter proving was eliminated. However, the laboratory tests carried out during Project Thor showed that a meter prover without a filter produced more electrostatic charge than the laboratory test rig alone. If applicable to terminal operations, this result would suggest that even without the filters, there would be a greater risk of electrostatic ignition during meter proving than in normal loading and, con-

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Shell Research Ltd,
Thornton Research Centre

sequently, that additional precautions over and above those associated with normal loading would be necessary.

However, Project Thor compared the current generated by a meter prover with that generated by a laboratory simulation test rig which lacked several potentially charge-generating elements that would be present on a loading gantry. The normal baseline charge generated by a typical gantry would be expected to be higher than that of the Project Thor test rig and it was not clear whether a meter proving rig without a filter would create more charge than this higher baseline.

Shell and Esso have subsequently carried out new measurements that extend the Project Thor data by comparing the charges and potentials generated when loading tank vehicles from real gantry systems with and without meter provers to see whether a prover produces any more charge than normal gantry equipment.

The new work also compares the potentials generated during meter proving with and without anti-static additives to facilitate comparison of the benefits of additive use with the benefits of other possible meter-proving safeguards such as the avoidance of switch loading.

During meter proving there are usually delays of 30 seconds or more between successive product batches. An aspect of the ignitions that initially puzzled investigators was that at least one of the ignitions occurred within a few seconds

of the commencement of the second batch into a vehicle compartment. It was thought that this timing required specific explanation because the liquid in the compartment would be discharged between batches and consequently the potential generated at the start of the second batch would be expected to be low because of dilution of the incoming charge. We have also addressed this issue both theoretically and experimentally.

This article gives a brief outline of our measurements and conclusions. Full details of the work have been published in a separate document.

Outline of measurements and calculations

The measurements involved loading a vehicle both normally and through a meter prover and measuring, in each instance, both the streaming current to the vehicle and the potential that developed as a consequence inside the compartment being loaded. Measurements were carried out at two sites. One handled a high conductivity product containing anti-static additive (conductivity $\sim 190 \text{ pS m}^{-1}$), the other handled a relatively low conductivity product without anti-static additive (conductivity $\sim 7 \text{ pS m}^{-1}$). Typical potentials recorded as a function of time from the commencement of filling with the low conductivity product are shown in **Figure 1** which shows that the potential rises rapidly on commencement of the second batch of a fill.

The measurements were supported by theoretical calculations showing how the potential in a tank would vary during a two-stage filling process. **Figure 2** shows both the tank current assumed in the model and the calculated tank potential. The results confirm that the

rapid potential rise observed experimentally is to be expected on theoretical grounds. Thus, on re-starting a fill, potentials should be expected to rise rapidly to the values encountered in the previous batch. This result is applicable to all stop-start loading practices (eg load-on-top) not just meter proving.

Conclusions

From the work we were able to draw the following conclusions:

- 1) The meter proving equipment did not generate any more charge than the normal gantry equipment at either of the two sites tested.
- 2) The maximum potential generated in the tests was -2.5 kV. In a properly earthed system, ignitions cannot occur until the potential exceeds the threshold for incendive brush discharges which is about -65 kV.
- 3) The use of antistatic additives reduced the measured potentials by more than two orders of magnitude to less than -10 V. Under these conditions, the risk of incendive discharges is incalculably small and the overall ignition risk reflects the probability of an undetected failure to achieve the required product conductivity rather than the residual risk of ignition with additive present.
- 4) When a compartment was loaded directly from the gantry in a stop-start fashion, short-lived (1–2 s) current surges occurred at the start of each batch when the full flow was established. The surges were too brief to have any measurable impact on the maximum potentials. They occurred because the automatic flow control system produced a temporary overshoot in the flow rate.
- 5) The current surges were eliminated when loading via the prover because the flow rate was then manually, rather than automatically, controlled.
- 6) Experimental results, confirmed by theory, demonstrate that in a multi-stage filling process, such as meter proving or loading on top, the time required to re-establish high potentials at the start of a second or subsequent stage, is of the order of the charge relaxation

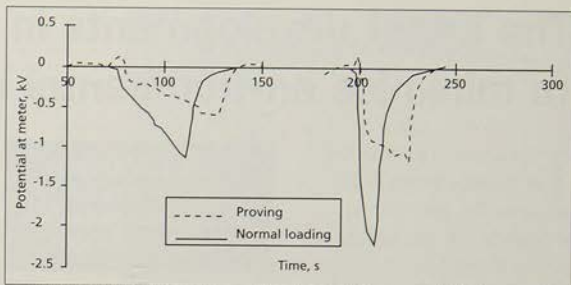


Figure 1 Average internal compartment potentials generated during normal loading and meter proving (product conductivity 7 pS m^{-1})

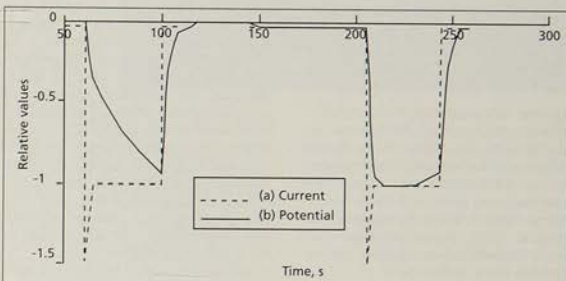


Figure 2 Application of the theoretical model: specified current and calculated potentials in a two-batch load (product conductivity 7 pS m^{-1})

time of the product. This time is often relatively short (seconds or less).

7) After the short-lived initial surge, there was a sustained decline in the current generated as each fill progressed. Interrupting the fill allowed a recovery from this decline and resulted, on average, in about a 20 percent increase in the current. This increase produced higher potentials in interrupted loads than in loads that were completed in one continuous fill. As a result we estimate that the risk of hazardous potentials is several times greater in a stop-start loading operation (either proving or topping-up during normal loading) than during a continuous fill. As very few stop/start fills are carried out rela-

tive to the number of uninterrupted fills, the overall annual risk of ignition at a terminal is not materially increased by stop-start loadings.

The full paper, entitled 'Electrostatic Hazards in Meter Proving Operations,' is available from the Library, The Institute of Petroleum, 61 New Cavendish Street, London W1M 8AR. Price: £10 (25 percent discount for IP members).

Acknowledgements

The author would like to thank K Gerald (ex Shell UK, now Montell) and T Ramsey of Esso for their assistance in making effective on-site measurements.



The latest developments in tank coatings to minimise environmental impact

The control of corrosion of storage tanks is an issue at the tank farms, refineries and petrochemical plants throughout the world, not only in terms of costly maintenance and repair but also with the environmental effects related to leaking bulk liquid storage tanks.

Storage tanks can suffer both internal and external corrosion. For internal corrosion, water collected in the bottom of the tank is the most significant part of the corrosion mechanism. However, the internal lining of storage tanks for corrosion control has been successful for over 30 years, provided proper coating/lining selection and proper application has been performed.

The lining of the tanks containing any type of product is in itself an expensive procedure. Selection of the wrong lining could increase costs by several orders of magnitudes. The correct lining type for each particular situation is essential.

The possibility of leakage and the concern regarding environmental contamination by toxic and dangerous chemicals has become an important concern and much legislation has been passed on the subject especially in the United States. Proper design, engineering, construction and maintenance of storage vessels can go a long way in preventing leaks and spills, but accidents happen. When leaks and spills happen, there must be plans to contain and hold the spilled product until it can be recovered, preventing chemical release to the environment. The most effective and reliable means of

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preventing chemical release is a secondary containment system, typically, a concrete structure surrounding the storage tank. This is a back-up system that only functions when there is a leakage. Chemical exposure is anticipated to be infrequent and short term, not continuous exposure like the internal lining. However, the secondary containment area needs to be protected to avoid the rapid deterioration of concrete that the spillage of corrosive solutions can cause and also to prevent leakage from the containment system. Consequently, secondary containment linings must provide a high degree of chemical resistance and impermeability but do not have to equal that of an internal lining.

External corrosion of storage tank shells and roofs can present problems. Ponding of rainwater on floating roof tanks coupled with poor protective coating systems can lead to corrosion. Weld seams of roofs and shells where it can be difficult to apply adequate paint film thickness can be susceptible to localised attack. Poor selection, application and maintenance can enhance the corrosion problems resulting in costly maintenance. However, experience over the years has demonstrated that with correct surface preparation, paint selection and quality control, satisfactory long-term protection can be achieved.

This paper details the environmental and health and safety issues affecting the selection of coatings for bulk liquid storage tanks for both internal and external application. This is followed by details on the types of systems used for internal linings, secondary containment linings and external coatings.

Environmental issues

Solvent emissions

The environmental impact created by the emission of solvent, volatile organic compounds (VOC) has become more prominent with current and proposed legislation to restrict VOC emissions.

Current coating limits are presently as low as 340 grammes/litre (g/l) (California), while levels in the United Kingdom will be 250g/l by 1998. Legislation already exists in a number of countries regarding solvent emission reduction.

Health & Safety

The move to increasingly higher solids materials for the internal and external coatings of storage tanks has significant benefits to the applicators' health. Application of paint, if proper precautions are not taken or if prescribed protective measures are not adhered to, presents health hazards, especially with spray application.

This can result in inhalation of solvent vapour through the mouth into the lungs and stomach or absorption through the skin. Several years of constant exposure to paint mist can result in the so-called 'Painters Syndrome' disease. The move to higher solids coatings reduces the exposure to solvent vapour and limits the health risk.

Health and safety hazards are not limited to the solvent component of a paint. The other two major components, binder and pigment, also present hazards. In terms of binders, a number of constituents which have historically been used in heavy duty coatings are now recognised as hazardous. For example:

- a) Coal Tar is a recognised skin carcinogen
- b) Aromatic amine-based epoxy curing agents are also widely recognised as being a potential cause of liver and kidney disorders
- c) Isocyanates are recognised as particu-

larly hazardous to the respiratory system and over-exposure can result in sensitisation and reduced lung capacity d) Reactive monomers, such as styrene, are receiving negative health and safety reports in certain countries.

Lead and chromate pigments, the backbone of anti-corrosive primer pigments, have come under increasing scrutiny.

Consequently, new product developments which concentrate on achieving performance at least equal to their predecessors, have a high solids content or be solvent free and utilise raw materials identified as less hazardous.

Coatings for storage tanks

Internal linings

Lining types are largely determined by the type of material to be stored and the condition of the steel. The chemical generic types typically used are subdivided by film thickness into thin film, heavy duty and glass reinforced systems.

i) **Thin Film** These are usually solvent containing materials of around 50 percent volume solids and applied at dry film thicknesses of 200-300 microns in two or three coats.

Typical thin film linings are epoxies, epoxy phenolics and zinc silicates.

Epoxies are used for crude oils, jet fuel storage and many other reactively unaggressive white oil type products.

Epoxy phenolics utilise higher functionality resins, resulting in much more densely cross-linked systems which are consequently resistant to unleaded gasoline, hot oils and hot water.

Zinc silicates can be used for pure solvents (ie neutral with no water present) which would destroy most organic coatings.

These materials, due to their high solvent content, have been known to give contamination of products stored in tanks, because of retained solvent in the film. Careful control of film thickness and good ventilation (which is required from a health and safety point of view), can help to minimise solvent retention. It is necessary to have constant ventilation over the following seven days after application of a solvent borne lining in order to reduce solvent retention.

Solvent entrapment can lead to blistering or contamination of the cargo.

ii) Heavy duty linings

These materials are typically high solids coatings, ie greater than 90 percent volume solids, and are applied at film thicknesses between 400-1000 microns in one or two coats. Glass flake is often used to improve the

abrasion resistance and may improve the coating's strength.

Typical heavy duty linings are vinyl esters which offer excellent acid resistance even at elevated temperatures, and epoxies which offer general chemical resistance. This makes these linings suitable for water treatment, jet fuel, unleaded gasoline and many hydrocarbons.

The advantage of this type of system is reduced solvent emission or no solvent emission, resulting in reduced likelihood of contamination. There is also an improvement in the coverage of defects in the steel, allowing the coatings to be used on both new steel work and on slightly pitted old steel.

iii) **Glass reinforced systems** These products are solvent-free and are applied at film thicknesses between 1,500-3,000 microns. Typical resin types are epoxies or polyesters which are glass filled for reinforcement.

Thin films of solvent-free epoxies have relatively low flexural strength, and movement in the tank or underplate corrosion would lead to leakage. This is alleviated by incorporating chopped glass into an epoxy system, thus giving high flexural strength which then prevents future leakage in heavily pitted tanks.



These reinforced laminates applied by spray or hand lay are widely used for liquids from crude oil through to unleaded gasoline and other related pure products such as benzene.

The main advantage of the spray applied systems is that they give fast and thorough application. The caulking material applied prior to the laminate is applied by spray which gives efficient coverage of weld seams, rivets and chime areas. The laminate is applied by simultaneous spraying of chopped glass and solvent-free epoxy, allowing pre-wetting of the substrate before glass reaches the surface. Following this spray application, thorough rolling allows the glass to be aligned and wetted out to allow later application of the final sealing gel coat.

Hand lay up systems are best for small tanks where access is difficult with spray equipment. Fibreglass is provided in pre-chopped rolls which are manually laid into resin and rolled to form a laminate. The mat is fully saturated by rolling, preventing the possibility of osmotic blistering.

Coatings for steel depend on the condition. For good new condition/light rusting only/no pitting corrosion, any of the three types of coating can be recommended. For slightly pitted, only

heavy duty glass reinforced linings can be utilised. For severely corroded/heavy pitting, only the glass reinforced system could be recommended and only then when the tank is structurally sound. If this is not the case, engineering work is needed to produce structural soundness.

Secondary containment system

As for internal lining, secondary containment linings are determined by the material which they are expected to contain and the condition of the concrete that is to be coated.

(i) **Heavy duty system** These are usually high solids or solvent-free material and are typically epoxy coatings normally applied at dry film thicknesses of 300-600 microns in one or two coats.

These are unreinforced, non-elastomeric systems designed for low-risk situations. They offer good chemical resistance and an economical route to protection.

(ii) **Glass flake systems** Again, these materials are high solids or solvent free material and can be either epoxy, polyester or vinyl ester. Glass flake filled systems provide reduced permeability due to the orientation and packing of the glass flake in the dry film. These coatings offer an added dimension of chemical resistance over the heavy duty systems.

Heavy duty and glass flake systems are non-reinforced and are consequently appropriate for stable concrete with no moving cracks. If the concrete cracks, the lining in each of these cases may crack.

(iii) **Glass fibre reinforced systems** These systems are solvent free and typically epoxy, polyester or vinyl ester. The resin system is reinforced with glass mat to increase cohesive strength and enable the system to bridge non-moving cracks. If the concrete moves or cracks, the lining may detach but a continuous film can be maintained.

External coatings

The external coating of storage tanks can be considered in two separate sections – new construction and maintenance. For new construction, a typical

paint specification for shells and roofs would be:

75 microns: zinc epoxy

125 microns: high build MIO epoxy

50-75 microns: polyurethane finish

However, health and safety pressure has resulted in the development of high performance non-isocyanate finish coats as an alternative to isocyanate containing polyurethanes with these types of coating becoming more prominent.

Good surface preparation is essential if long-term protection by a coating system is to be achieved. However, for maintenance painting specifically on refineries and petrochemical plants, external blasting has been restricted and rules have been imposed to collect and treat the waste as toxic material. In these situations, where it is not possible to blast clean, alternative coatings technology is used to maintain the shell externally which results in the use of surface tolerant coatings.

In most cases, when a maintenance paint is required, it is due to the breakdown of old coatings, eg alkyd/chlor rubber. Surface tolerant coatings are able to overcoat a wide variety of systems. Also, if the original system has failed through corrosion due to chemical attack, then the surface tolerant should have chemical resistance. One of the biggest problems with overcoating existing and over-applied coatings is the amount of solvent in the coating used. Strong solvents will attack alkyd coatings and cause wrinkling, swelling and detachment of the film. Also, as on crosslinking conventional coatings, which create stress in the coating, this could cause the existing system to detach. Consequently, a surface tolerant coating contains minimal solvent levels as well as being flexible so as not to create stress in underlying aged coatings.

Good corrosion protection is offered by surface tolerant coatings on rusty steel surfaces due to barrier protection created by the use of lamellar pigments. This barrier effect increases the diffusion path through which water and oxygen can travel and decreases film permeability. This feature coupled with the inherent low viscosity nature of surface toler-

ant coatings, which allows penetration into porous corroded surfaces (very much the same way as traditional red lead paints), make these coatings particularly suitable for hand or power tool prepared surfaces (Swedish St2 standard) typical of situations where blasting is not permissible.

A typical system for use in the maintenance of an external shell could be as follows:

75 microns: surface tolerant aluminium epoxy (patch prime)

100 microns: surface tolerant epoxy

100 microns: surface tolerant polyurethane

A future development in the external coating of bulk liquid storage tanks will be caused by the draft EC directive (92/C 227/03) which relates to the control of VOC emissions resulting from the storage of petrol. This indicates that the external wall and roof of tanks above ground shall be painted in a light colour with a total radiant heat reflectance of 70 percent or more. Consequently, future new construction or maintenance work will require a light coloured, highly durable finish coat to be applied to all petrol storage tanks, be it generically a polyurethane or a new generation non-isocyanate high performance finish.

Conclusion

Today's and future coatings and linings developments are being driven by the health and safety of the manufacturer and the applicator as well as environmental considerations – solvent emissions and pollution.

Consequently, the greatest change in the protective coating and lining industry since the introduction of grit blasting is taking place. As tighter health and safety legislation is implemented, the necessity to avoid the use of 'toxic' material becomes greater and paint coatings which have been established for a number of years will become obsolete.

Further VOC emissions legislation will result in driving future coatings down the route of solvent free or water-borne technology. Indeed, water borne paints have already been used on the externals of tanks.

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Details from Jenny Sandrock Tel: 0171 467 7104 Fax: 0171 255 1472

UK Deliveries into Consumption (tonnes)

Products	†May 1995	*May 1996	†Jan-May 1995	*Jan-May 1996	% Change
Naphtha/LDF	213,465	113,614	1,331,720	1,167,917	-12
ATF - Kerosene	667,040	695,287	2,808,258	3,044,144	8
Petrol	1,875,915	1,953,148	8,874,664	9,009,412	2
of which unleaded	1,187,526	1,319,198	5,490,269	5,954,686	8
of which Super unleaded	85,386	65,015	405,186	322,006	-21
Premium unleaded	1,102,140	1,254,183	5,085,083	5,632,680	11
Burning Oil	171,639	233,304	1,350,632	1,631,930	21
Derv Fuel	1,141,745	1,248,009	5,430,974	5,833,386	7
Gas/Diesel Oil	562,880	585,875	3,215,408	3,453,802	7
Fuel Oil	571,761	580,890	3,637,808	3,016,885	-17
Lubricating Oil	77,273	77,920	367,916	364,837	-1
Other Products	756,340	836,732	3,748,683	3,731,365	0
Total above	6,081,097	6,324,779	30,766,063	31,253,678	2
Refinery Consumption	496,887	546,969	2,591,408	2,717,803	5
Total all products	6,577,984	6,871,748	33,357,471	33,971,481	2

† Revised with adjustments * preliminary

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The Institute of Petroleum
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W1M 8AR
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Forthcoming Events

August

22nd-23rd

Moscow: 'The Automotive Industry in the Former Soviet Union'. Details: Business Seminars International, Sussex House, High Street, Battle, East Sussex TN33 0AL. Tel: 0171 490 3774 Tel: 01424 773334

27th-30th

Stavanger, Norway: 'Offshore Northern Seas 1996 - 12th International Conference and Exhibition'. Details: ONS Conference Secretariat, PO Box 175, N-4001 Stavanger, Norway. Tel: 47 51 53 55 45/46 Fax: 47 51 55 22 70

September

9th-10th

Aberdeen: 'Offshore Installation Abandonment in Practice'. Details: ICM Marketing Ltd, 5 Cavendish Square, London W1M0BX. Tel: 0171 436 5735 Tel: 0171 436 5741

11th-13th

Tampa, Florida: AIENG 96. 'Applications of Artificial Intelligence in Engineering'. Details: Wessex Institute of Technology, Ashurst, Southampton, SO40 7AA. Tel: 01703 293223 Fax: 01703 292853 E-mail: hfisher@wessex.witcmi.ac.uk

23rd-24th

London: 'Emergencies'. Details: IBC Technical Services, 57-61 Mortimer Street, London W1N 8JX. Tel: 0171 637 4383 Fax: 0171 631 3214

17th

London: 'Oil Spill Response Workshop'. Details: Pauline Ashby, The Institute of Petroleum.

17th-18th

Brussels: '4th International Conference on the Automotive Industry and the Environment'. Details: Mrs F Webb, Automotive Matters International Ltd, Europower House, Lower Road, Cookham, Berks SL6 9EH. Tel: 01628 526060 Fax: 01628 521928

17th-19th

Cranfield: 'Calibration of Flowmeters'. Details: Short Course Administrator, Department of Fluid Engineering & Instrumentation, School of Mechanical Engineering, Cranfield University, Cranfield, Bedford MK43 0AL. Tel: 01234 754766 Fax: 01234 750728

16th-17th

London: 'Static Measurement of Bulk Liquids'. Details: Abacus International, 214 Inchbonnie Road, South Woodham Ferrers, Essex CM3 5WU. Tel: 01245 328340 Fax: 01245 323429

18th-19th

Aberdeen: 'Fast Track Field Development'. Details: Debbie Graham, IIR Ltd, 6th Floor, 29 Bressenden Place, London SW1E 5DR. Tel: 0171 915 5055 Fax: 0171 915 5056

18th-19th

London: 'Flow Metering and Meter Proving'. Details: Abacus International, 214 Inchbonnie Road, South Woodham Ferrers, Essex CM3 5WU. Tel: 01245 328340 Fax: 01245 323429

18th-20th

South Africa: 'Africa Upstream '96 - International Exploration & Production-Business

Strategy and Oil & Gas Opportunities'. Details: Global Pacific & Partners Pty Ltd (Africa). Tel: 27 11 886 4053/4 Fax: 27 11 789 5057

18th-20th

Maastricht, Netherlands: Apex '96 Conference. Details: Tim Whiteman, KHL International Ltd, Southfields, Southview Road, Wadhurst, East Sussex TN5 6TP. Tel: 01892 784088 Fax: 01892 784086

21st-23rd

Kuwait: 'The Globalisation of Arab Business'. Details: First Annual Middle East Business Conference, University of London, Egham, Surrey TW20 0EX. Tel: 01784 443780 Fax: 01784 439854

22nd-24th

Sile, Turkey: '2nd Symposium on the Petroleum Geology & Hydrocarbon Potential of the Black Sea Area'. Details: Mr Sami Derman, TPAO, Turkey. Tel: 90 312 286 9040 Fax: 90 312 286 9049

22nd-25th

Alberta, Canada: 'AIPN Fall Conference 1996 - Managing Risks in the Next Millennium'. Details: PanCanadian Petroleum International Ltd, 1 Palliser Square, 900, 125 Ninth Avenue SW, Calgary T2P 0P6, Canada. Tel: 403 268 7712 Fax: 403 268 7906

23rd

London: 'Ivory Coast - Deep Water Exploration Opportunities'. Details: Cathy Noguez, First Conferences, 85 Clerkenwell Road, London EC1 5AR. Tel: 0171 404 0424 Fax: 0171 404 7733

24th-27th

Singapore: '11th Offshore South East Asia '96 Conference'. Details: Bob Goh,

Singapore Exhibition Services Pte Ltd, 2 Handy Road, 15-09 Cathay Building, Singapore 229233. Tel: 65 338 4747 Fax: 65 339 5651

26th

London: 'Safety Conference - People and Changes, Costs and Challenges'. Details: Pauline Ashby, The Institute of Petroleum.

30th

Houston: 'Ivory Coast - Deep Water Exploration Opportunities'. Details: Cathy Noguez, First Conferences, 85 Clerkenwell Road, London EC1 5AR. Tel: 0171 404 0424 Fax: 0171 404 7733

30th-2nd October

London: 'Offshore Pipelines'. Details: Customer Services Manager, IIR Ltd, 6th Floor, 29 Bressenden Place, London SW1E 5DR. Tel: 0171 915 5055 fax: 0171 915 5056

October

2nd-4th

Barcelona, Spain: 'Urban Transport and the Environment for the 21st Century'. Details: Helen Fisher, Wessex Institute of Technology, Ashurst, Southampton SO40 7AA. Tel: 01703 293223 Fax: 01703 292853 E-mail: hfisher@wessex.witcmi.ac.uk

2nd-5th

Almaty: Kazakhstan Oil and Gas Exhibition. Fax: 0171 286 0177

7th-8th

Aberdeen: 'Offshore Safety Legislation'. Details: Customer Services Manager, IIR Ltd, 6th Floor, 29 Bressenden Place, London SW1E 5DR. Tel: 0171 915 5055 Fax: 0171 915 5056

Forthcoming Events

8th

Aberdeen: '3rd Atlantic Margin Conference'. Details: Sharon McCarten, The Offshore Management Centre, Viewfield Road, Aberdeen AB9 2PW. Tel: 01224 263102 Fax: 01224 263100

13th-16th

Abu Dhabi: 'The 7th Abu Dhabi International Petroleum Exhibition & Conference'. Details: ADIPEC Conference Secretariat, ADCO, PO Box 270, Abu Dhabi, UAE. Tel: 971 2 6043960 Fax: 971 2 669785

14th-15th

London: 'Automotive, Aviation and Marine Fuels'. Details: Abacus International, 214 Inchbonnie Road, South Woodham Ferrers, Essex CM3 5WU. Tel: 01245 328340 Fax: 01245 323429

16th-17th

London: 'Petroleum Trading and International Law'. Details: Abacus International, 214 Inchbonnie Road, South Woodham Ferrers, Essex CM3 5WU. Tel: 01245 328340 Fax: 01245 323429

16th-17th

Vienna: 'The 3rd International Conference on Trading and Transportation of Oil and Gas in the Former Soviet Union'. Details: Business Seminars International, Sussex House, High Street, Battle, East Sussex TN33 0AL. Tel: 0171 490 3774 Fax: 01424 773334

16th-17th

London: 'Gas Transportation and Transmission Pricing'. Details: AIC Conferences Limited, 2nd Floor, 100 Hatton Garden, London EC1N 8NX. Tel: 0171 242 2324 Fax: 0171 242 2320

22nd-24th

London: 'IMAS 96. Shipping and the Environment: Is Compromise Inevitable?'. Details: Fleur Heapy, The Institute of Marine Engineers, 76 Mark Lane, London, EC3R 7JN. Tel: 0171 481 8493 Fax: 0171 488 1854

23rd-24th

Oslo: FPSO World Congress and Technology Exhibition. Fax: 01224 708080

28th-2nd November

Bombay, India: 'Chemtech Triple Expo '96'. Details: Derek Williams, Association of British Offshore Industries. Tel: 0171 928 9199 Fax: 0171 928 6599 E-mail: 100574.645@compuserve.com

28th-30th

London: 'The European Refining Technology Conference'. Details: ICM Consultants Ltd, Weavers House, Woodland Way, Kingswood, Surrey KT20 6NW. Tel: 01737 830068 Fax: 01737 359366

29th-30th

London: 'Seatrade Tanker Industry Convention'. Details: Vanessa Stephens, The Seatrade Organisation, 42 North Station Road, Colchester CO1 1RB. Tel: 01206 45121 Fax: 01206 45190

29th-31st

Aberdeen: 'International Offshore Contracting and Subsea Engineering Exhibition and Conference'. Details: Maura Ross, Baudygau, Midmar, Aberdeenshire AB51 7NQ. Tel: 01330 833381 Fax: 01330 833505 E-mail: ioce@spearhead.co.uk



1996 Conferences

September 17	Oil Spill Response Workshop - based on the <i>Sea Empress</i> experience
September 26	1996 Safety Conference
October 17	Gasoline and Engine Workshops
October 30 or November 7	Political Risk Conference
November 14	IFEG Conference
November 19	DTI Conference on Retailing in Central Europe
November 21	Diesel Conference
November 28	Microbiology Conference on Biodegradability
December 16/17	Upstream Standardisation Workshop

For further information, please contact Pauline Ashby

The Institute of Petroleum
61 New Cavendish Street
London W1M 8AR UK.
Telephone: 0171 467 7100 Fax: 0171 255 1472

Technology News

New facilities planned at Immingham terminal

Simon Storage is investing some £1.2 million on a state-of-the-art bottom loading facility at its 330,000m³ capacity storage terminal at Immingham following increased throughput of petroleum products at Immingham West.

The upgrade will also ensure that the terminal, one of four joint venture companies between Simon Engineering and Van Ommen Tank Terminals, will comply with future European legislation on the prevention of volatile emissions to the atmosphere.

The new facility, to be constructed on undeveloped land, will comprise two bottom loading gantries, tanker parking and assembly points linked into existing tankage. Safety features will include overspill protection, automatic earthing and a vapour

return system which will be linked into a vapour recovery unit in Phase 2 of the project.

Commissioning of the new facility is scheduled for the first quarter of next year.

The company states that the Immingham project builds on the experience gained at its Seal Sands terminal at Teesside where similar facilities were recently constructed and where gate-to-gate times have been reduced to as little as eight minutes for maximum gross vehicle weight road tankers (see *Petroleum Review*, July 1996).

Simon Storage has also opened a new specialist bulk storage facility at its Tyne Terminal that will provide secure, temporary storage for ISO tank containers and road tankers.

The new 1,200m² storage



New bottom loading facility at Immingham

area is believed to be the only such specialist site in the United Kingdom to

meet CIMAH (Control of Industrial Materials and Hazards) requirements.

New deepwater diving bell meets latest Norwegian regulatory requirements

A diving bell meeting the latest Norwegian Petroleum Directorate requirements as well as UK Department of Transport, UK Health and Safety and Statoil specifications has been developed by Mara Engineering.

The three-man bell has a large internal volume of over six cubic metres to allow the carriage of additional survival equipment and emergency gas supplies thereby providing an improved and safer working environment for divers. The bell design will also ensure better handling during launch and recovery operations and enable diving to be undertaken in very poor weather conditions, states the manufacturer.

Designed and built for Brown & Root Engineering Services of Norway at a cost of some £450,000, the bell was recently installed onboard the *MSV Regalia* and will be used on deep diving contracts in the British and Norwegian sectors of the North Sea.

It replaces an existing smaller bell onboard the vessel and thus had to meet strict all-up weight requirements of 12 tonnes on the vessel and 2 tonnes in the water to allow the use of existing handling equipment.

The bell features a number of innovative features, including insulation, advanced gas management panels, heaters and carbon dioxide scrubbers, buoyancy and a range of aluminium bronze cable glands fitted to the electrical junction box.

It can operate at water depths of up to 450 metres.

This is the second such diving



New deepsea diving bell offers improved diver safety

bell that Mara has designed and built. The company also received an order from another Norwegian company for the major upgrading of two existing diving bells.

The oil game

A new computer game which aims to teach oil industry executives how to make a success of running an exploration and production company has been unveiled by Hoskyns.

Developed in liaison with Enterprise Oil, 'The Oil Game' mimics the running of an oil company over a five to 10-year period during one to two days of actual playing time.

Each team starts with £100 million and must then acquire and manage a portfolio of oil assets. The objective of the game is to maximise the share price of the organisation over a period of time.

The game takes account of the financial, operational and geological risks involved in the oil industry in real life to provide key personnel in the oil industry – from management trainees to senior directors – a global perspective on the business as a whole and an insight into the opportunities and risks which can help or hinder success.

Technology News

Selective solution to thread galling

The growing use of special duplex and austenitic stainless steels to combat corrosion in applications in the offshore oil and gas industry has solved many problems. However, the use of such materials has also created problems including the ready galling of threaded components and cathodic corrosion if the materials come in contact with a dissimilar metal.

SIFCO Selective Plating has developed a coating process that eliminates such problems and recently used the concept for IMI Bailey Birkett-manufactured safety relief valves that are to be supplied to Statoil for fitting to oilfield water injection lines in the North Sea.

The valves are manufactured from duplex and 6 Mo materials. Some of the main components are threaded for assembly. Copper is selectively deposited on the valve nozzles' external threads to provide a barrier that prevents contact between the duplex and 6

Mo steel threads on tightening thereby eliminating the risk of galling. The copper acts as a lubricant - being softer than the steels it 'flows' on the surface of the threads.

Selective plating is the most cost effective method of plating the threads only, states SIFCO. 'Batch plating would have required expensive and complex masking of each component or post-machining to remove the build up of copper from surfaces where it was not desirable.'

Selective copper plating can be applied to other components such as drill string connectors and high pressure ball valves.



Selective plating of safety valves

Pig sampling in the pipeline

Pipeline Engineering & Supply Co Ltd has launched a new range of pipeline pigs capable of acquiring a sample of the medium flowing in the pipeline.

The hollow tubular body of the pig is fitted with an adjustable over-pressure relief valve at either end. The in-line valves allow a measured flow of the medium to pass through the pig body during the pigging

operation. Upon depressurisation, the valves close and store a sample.

The new pigs have recently been supplied to Halliburton for use in deep water pipelines offshore Brazil.

End-user Petrobras required a sample of the pigging medium, in this case water, to confirm the concentration of glycol in the system.

A real time window on the weather

Offshore operators can now assess forthcoming weather conditions and make cost-effective operational decisions by using real time images from satellites.

Developed by Polaris International, WinSat Pro automatically receives, processes, displays and stores full resolution and infra-red live images from geostationary satellites, such as Meteosat, GOES and GMS, and polar-orbiting satellites, including NOAA and Meteor, to show

weather systems, cloud formations, fronts and other information in real time at any location worldwide.

The system takes GPS data from onboard instruments, overlays synoptic weather charts from meteorological monitoring stations and outlines geopolitical and other boundaries. A number of images, weather pattern animations and text windows may be displayed simultaneously and can be tiled, stacked, reduced or enlarged as required.

North Sea first for ocean-bottom cable seismic technology

Western Geophysical's first ocean-bottom cable (OBC) seismic acquisition crew to be based in the North Sea is to undertake a survey in the Central North Sea for Enterprise Oil.

The data collected will generate high-resolution images of the reservoir and may serve as a possible basis for future time-lapse 4D surveys to monitor fluid movements in the reservoir.

According to Western, OBC technology will become increasingly important in mature provinces such as the North Sea, where the emphasis is now on maximising production from existing reservoirs and marginal new fields.

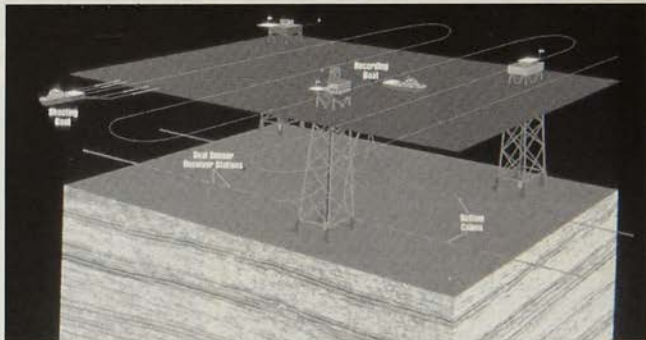
OBC receiver cables deployed on the seabed allow operations to continue in sea states that would shut down a conventional streamer crew. Data are also

unaffected by 'smearing' due to streamer feathering in towed streamer acquisition and survey geometries can be designed to ensure that 'dipping reflectors' are fully illuminated.

Western's Dual SensorSM technology, which sums data from pairs of hydrophones and geophones, eliminates the short-period multiple energy generated by the water column to provide

high quality data. This method also eliminates time-consuming and costly calibration shooting.

The OBC technology can be used in water depths of up to 150 metres.



OBC seismic acquisition is ideal not only for congested nearshore areas but also in harsh sea states that would shut down a streamer crew, and for surveys that require very high-resolution data.

Technology News

Well tractor offers reduced costs

A new downhole tractor developed by Statoil is said to offer simpler servicing of oil wells which, in turn, reduces the time required for maintaining extended-reach and horizontal wells. The new device is expected to save the oil company up to NOK50 million per year on the wells it currently operates.

The tractor is powered by an electric cable and pulls downhole tools through horizontal well sections to perform maintenance work. This is far less expensive and time-consuming than the traditional method of

using pipe to drive tools through the well, says Statoil.

Developed by the oil company in cooperation with Welltec of Denmark and Maritime Well Service, a subsidiary of Maritime Group in Norway, the tractor was successfully trialled on Statoil's Gullfaks field earlier this year.

Maritime Well Service will operate the three tractors already produced on a service contractor basis. Statoil is the only company to have used the equipment on the Norwegian continental shelf to date.

Database details UK shipping routes

A new Windows-based database detailing some 3,500 shipping routes around the United Kingdom has been developed by Dovre Safetec. Jointly sponsored by the UK Department of Transport, the UK Health & Safety Executive and the UK Offshore Operators Association, the 'COAST' database is expected to be particularly useful in the safe siting of offshore oil and gas installations.

Said to be the first overall assessment of shipping in UK waters using informa-

tion about the routes ships take between ports, the database provides information for any location in UK waters, giving details of all routes within a chosen radius of that point. Numbers of vessels and their distribution by ship size, age and flag are also given.

Surveys were carried out at over 60 offshore installations and reports compiled from all passenger ferry, shuttle tankers and support vessel operators with additional data from ships masters and deep sea pilots.

Transient dangers in the pipeline

Pressure transients and surges can cause fractures in oil and gas pipelines. Radcom Technologies has developed a new pressure transient analysis system (TAS) that can take pressure readings at a rate of 20 measurements per second to allow the full impact of transients to be monitored.

'By accurately measuring the effects of valves and pumps, TAS can be used by design engineers to design out, or at least greatly reduce, transients and surges resulting in less pipeline damage and minimising the chances of transients adversely affecting instrumentation elsewhere

in the line', states the manufacturer.

An external transducer with quickfit connector provides sensor input to TAS. Unit sensitivity can be selected so that only pressure drops or surges greater than a preset minimum, between 10 and 400 mbar, are recorded. Advanced data compression allows up to two million readings to be stored. This represents 48 hours of continuous sampling at 10 samples/second.

Data is downloaded onto a PC. The TAS software allows information to be displayed in tabular and graphic format in a Windows environment.

Safe disposal of drilling cuttings

Amec Process and Energy recently delivered an advanced processing module that enables contaminated mud and cuttings produced by well drilling operations to be reinjected back into the well to MSD for installation on Maersk's Guardian drilling unit.

Capable of handling up to 40 tonnes of cuttings per hour, the new module is fully computerised. Cuttings are separated out and added to water, the resulting mixture crushed and ground in centrifugal pumps fitted with grinders. Once the slurry reaches the correct consistency, high pressure injection pumps force the processed cuttings back down into the well to an appropriate depth.

'The module offers a cost effective means of disposing of contaminated drilling mud and cuttings in an environmentally responsible way', explains Amec.



Portable processing module

'Traditional transfer of contaminated waste to land requires chartering vessels, paying for handling and discharge facilities and paying the significant costs attached to disposing of waste in a land repository. It is expensive and yet is still not the best environmental solution.'

According to the company, the process module offers additional cost savings since it is portable and can be moved from rig to rig as required. The module can also be hired on a rental basis.



The module is fully computerised for ease of use

Contacts

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Hoskyns	0171 434 2171
SIFCO Selective Plating	01527 68008
Pipeline Engineering & Supply	01748 818341
Polaris International	01452 380000
Mara Engineering	01562 861193
Statoil	00 47 51 80 69 46
Dovre Safetec	01224 648651
Radcom Technologies	01703 760733
Amec Process and Energy	0171 574 3159

Institute News

NEW MEMBERS

Dr W N Al-Rafai, Ashtead
Mr E N Aliev, Azerbaijan International Operating Company
Mr K Barnard, Forecourt & Convenience Services Limited
Mrs M A Barton de Mayor, Spain
Mr J R A Bellamy, Graypen Limited
Mr M Bird, Shildon
Mr L G Blackledge, Chalk Hill Garage Limited
Mr W R Cardwell, Cobham
Mr R Carter, Petro-Man Limited
Mr T D Crawford, Terling
Mr L Cremer-Evans, Dawcul Limited
Mr M D Crooks, Southampton
Mr H Cubby, Hydrocat Energy
Mr G W Davies, Stafford
Mr S Dawoud, Saudi Arabia
Mr N B de Mello, Spain
Mr J B Denham, Maidenhead
Mr P Denny, SKS (Plant & Equipment) Limited
Mr G Finnie, Prestaroy Limited
Mr T Forster, Hythe
Dr C J Freeman, Gaffney Cline & Associates
Mr N I Fulcher, Overseas Consultants
Mr C W Gakuru, Kenya Petroleum Refineries Limited
Mr B V Garcia, Repsol Commercial S.A.
Mr J-M A Gilles, Belgium
Mr P A Hodges, De Witt & Company
Mr M Hogg, Bridgewater
Dr P W W Kirk, CH2M Hill International Limited
Mr J D Malhotra, Schroders Investment Banking
Mr J A McInnes, Global Marine Drilling Company
Mr J McLoughlin, J D Edwards (UK) Limited
Mr L Moret, Netherlands
Mr K A Morris, Middlesbrough
Mr T Mowbray, Edinburgh
Mr K M Muegge, Central Europe Trust Company Limited
Mr T Nakamura, Japan Petroleum Exploration Company Limited
Dr P S Nmadu, Nigerian National Petroleum Corporation
Mr M J O'Donnell, Aviation Fuel Services Limited
Mr J O'Shaughnessy, Conshare Limited
Dr F A Othman, Turkey
Mr C A Owens, O.J. Williams Group
Mr E Patenaude, Westech Industrial Limited
Mr J Perraudea, London
Mr J Phillips, London
Ms L M Pszon, Coastal States Petroleum (UK) Limited
Mr R J Quarmby, Leicester
Mr A J Riddell, Gold Logistics International Limited
Mr J R Ritzema, Darlington
Mr J Robertson, EDS
Mr E M Samy, London
Mr A F Schmitt, Blackwell's
Mr B Scott, Petroleum Training Federation
Mr N E Somerfield, Walsall
Mr P Spyrides, Dem G.Spyrides S.A.
Mr J B Stenning, Peterborough
Mr G J Stuart, Petroconsultants (UK) Limited
Ms J Tharratt, Phillips Petroleum Products Limited
Mr E Thomas, London
Mr H Tozuka, Nichimen Europe plc
Mr P D Tymn, Tymn's Petroleum Services
Mr G van Lammeren, Belgium
Dr K G Vlahadakis, The American College in London
Capt K Vlamis, Greece
Mr S G Warner, Norway
Dr R J Watkinson, Sittingbourne
Mr T Williams, Aberdeen
Mr T F Williams, Enron Engineering & Construction
Mr S D Withers, Haywards Heath
Mr A Wostmann, Netherlands

NEW FELLOW

Mr C M Thompson

Charles M Thompson joined Gulf Oil Corporation at Pittsburgh in 1973. His work centred on Gulf Oil's international activities in marketing, trading and transportation and his assignments took him to Houston, London and Tokyo. After the Gulf Oil merger with Chevron Corporation, Mr Thompson headed Chevron's crude oil trading activities in London. In 1988, he helped to establish Saudi Aramco's overseas marketing centres. At present he is Manager of Marketing Services for Saudi Petroleum Overseas Limited based in London. He is responsible for the marketing of crude oil, petroleum products and LPG in Europe and Africa. Mr Thompson holds a BSc in Petroleum Engineering from the University of Pittsburgh and an MSc in Industrial Administration from Carnegie-Mellon University. He is a Member of the Chartered Institute of Arbitrators.

OBITUARIES

Mr M Northover BSc, MInstPet

The death of Mike Northover is reported with much regret.

Following graduation from Southampton University, he spent two years with the British Antarctic Expedition before joining Esso at Fawley refinery. He later moved to Esso's Milford Haven refinery. Subsequent managerial posts included Purfleet Lubricants Distribution Department and Abingdon Research Centre.

In 1990 he was appointed Esso's Environmental Co-ordinator, with responsibility for industry and government liaison for environmental and oil spill response activities. The latter covered Europe, Africa and the Middle East.

Following the Braer emergency, he helped to launch an initiative to provide a joint industry response to major pollution incidents – in particular the Marine Pollution Control Unit in Southampton.

An active member of the Institute of Petroleum, he was a longstanding member of the IP Environment Committee and also Chairman of the IP Oil Dispersants Working Group. In addition he was Chairman of the Environmental Health Committee at the UK Petroleum Industries Association and oil industry representative on the BSI Environment Management Systems Committee (ES1) and ISO TC 207.

Mr N L Falcon FRS, FGS, FInstPet

We report the death of Norman Falcon at age 92 with great regret.

Educated at Exeter School and Trinity College, Cambridge, he joined the Anglo-Persian Oil Co as a field geologist in 1927. During World War II his skills in air-photo interpretation, acquired for the purpose of geological mapping, were utilised by the Intelligence Corps.

After the war he rejoined the oil industry and from 1955 to 1965 he was Chief Geologist, British Petroleum, continuing as adviser until 1972. During this period the first serious interest was given to exploration in the North Sea and he played a large part in leading those exploration activities. In the same years BP carried out other successful exploration in Libya, Abu Dhabi, Dubai and Alaska.

After his retirement in 1965, he continued to contribute to numerous publications and conference papers – on Iran, on the petroleum geology of the Middle East and on the underground structure of Britain. His standing and reputation were recognised by his election to fellowship of the Royal Society and by the award of the Murchison Medal of the Geological Society and the Founder's Medal of the Royal Geographical Society, amongst others.

CORRECTION

In the July issue it was incorrectly stated that Mr M Griffiths had just joined the Institute, whereas he has been a member since 1985. We apologise to him for this error.

Appointments

Nigerian College of Petroleum Studies, Kaduna

We are a major UK based international training organisation specialising in the petroleum and energy sector. We have been working with the Nigerian National Petroleum Corporation (NNPC) to establish a Staff College in Kaduna, Northern Nigeria for senior NNPC employees. Under our agreement we wish to employ two senior managers from the oil/gas industry to work in Nigeria, assisting in the successful running of the College.

Deputy Director - Studies

The Deputy Director - Studies will report to the NNPC Director of the College. Together they will be responsible for programme development and delivery. Strong managerial skills, tact and patience are required for this position, together with a knowledge of energy sector training environment.

Assistant Director - Training and Facilities

The Assistant Director - Training and Facilities, will report to the Deputy Director - Studies and will be responsible for ensuring the smooth running of all aspects of the College, from training administration to the quality of the staff, the premises and the equipment.

Experience of working in a developing country is essential as well as a thorough knowledge of the oil/gas industry. However, the allocation of responsibilities between the two positions will be developed in more detail and will reflect your particular skills.

Salaries will be paid in the UK in pounds sterling. Free married (or single) accommodation, a car and security will be provided in Kaduna. The positions of Deputy Director and Assistant Director are initially for one year but the Deputy Director may be extended to three years. Successful applicants will be required to start as soon as possible.

CV's together with details of how you would meet the challenge of these positions, your availability and present salary, should be sent to Lisa Monteith, Personnel Advertising Limited, 30 Farringdon Street, London EC4A 4EA, quoting ref PR/LM/01 on both envelope and letter. Alternatively, fax your CV and covering letter to her on 0171 329 1231.

PERSONNEL ADVERTISING LIMITED

All replies will be passed to our client unless we are advised of companies to whom you do not wish your CV to be given.



Conference Manager

The Institute is seeking an experienced Conference Manager to take responsibility for the planning, development, scoping, marketing and profitability of the events programme (conferences, seminars, workshops, training courses, Annual Lunch and Dinner) working alongside an accomplished administrator.

The job requires:

- a graduate level of education
- a least two years of experience in conference promotion and administration
- familiarity with appropriate marketing techniques and skills
- proficiency in direct mail and database management
- computer literacy - wordprocessing, database, spreadsheets
- communication and selling skills
- ability to work under pressure as part of a team

Above all, a self-starting capability and a strong commercial and entrepreneurial attitude is needed. Knowledge of the oil industry is desirable but not essential provided the holder has an enquiring mind, keen and capable of developing the necessary understanding.

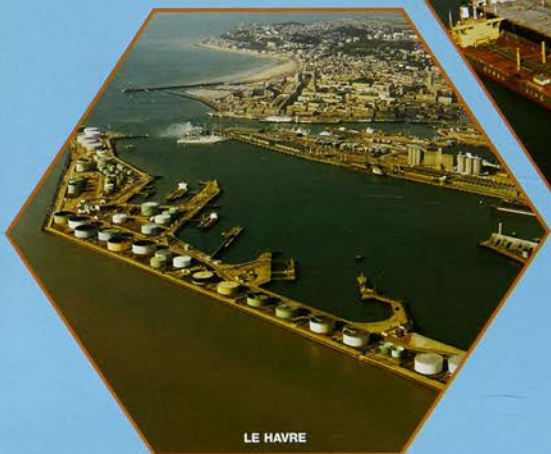
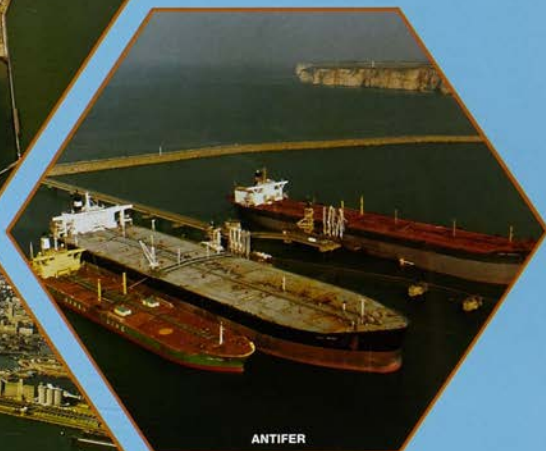
Covering letter, full CV and current salary details to Jenny Sandrock at
The Institute of Petroleum, 61 New Cavendish Street, London W1M 8AR.
Closing date 9 August 1996

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Fax (914) 762-4905

CIM Location	Total Capacity m ³	Tank size range m ³	Number of tanks	Products stored	Comments
LE HAVRE	3 085 000	60 000 to 150 000	33	Crude oils	9 jetties. Max Draught 70 ft. VLCC up to 250 000 MT Barge and pipelines Transhipment - Reloading. Direct link to open sea.
ANTIFER	655 000	20 500 to 151 000	2 4	Crude oils	2 jetties. Max Draught 98ft and 82ft. ULCC up to 550 000 M.T. Transhipment. Relay connected to Le Havre facilities above through pipeline. Re-loading on site.
LE HAVRE	1 400 000	600 to 61 000	87	Refined Products Petrochemical Feedstock	Naphta. G.O. Gasoline. Premium Jet. Kerosene. Deballasting equipment. Connected with TRAPIL pipelines.

density

TANK DETAIL 01

Gauging Details

Level 2.418 m
Water level 2.000 m
Temp. 12.6 °C
Ref. Dens 844.0 kg/m³

Volume Details

Volume 1.706 m³
Mass 1.7132 kg
GSV 138.782 m³
TOV 301.211 m³
4.489 m³

volume

temperature

Block

Lock

Test

Unlock

ALL

GROUP

CLOSE

liquid

Tnk_01 Lev L

Quiet

Ack

mass

radar

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