

PETROLEUM REVIEW



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OF PETROLEUM

January 1996

Aviation

Aircraft fuelling issues
Schiphol's fuel handling facilities

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regulations

West of Shetland

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Romania

Restructuring of the oil and
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COVER PHOTO

Refuelling at Schiphol Airport, Amsterdam
Photo courtesy of British Petroleum.

News in Brief

14 November

Chevron has made a new discovery in the Haute-Mer concession, 9 miles west of the N Kossa field off the coast of the Republic of the Congo. Two production tests in the Moho Marine 1 exploratory well produced 3,500 b/d and 2,200 b/d respectively.

16 November

British Gas announced that the provision of £83m made against the company's 'take or pay' prepayments on long-term gas purchase contracts contributed towards increasing net losses for the three months to 30 September from £149 to £181m on a historic cost basis. Turnover fell from £1.3bn to £1.1bn.

Agip, Conoco and Royal Dutch/Shell have signed a binding agreement which sets out how key issues relating to the planned purchase of a 49 percent stake in Czech Refineries, including environmental liabilities and future control of the refineries, will be treated. The proceeds of the acquisition will help fund a \$480m five-year modernisation programme at Czech Refineries' two plants which is itself part of a wider restructuring of the Czech refining and petrochemical sectors.

Kerr-McGee is to divest a large proportion of its onshore US and Canadian oil and natural gas producing fields. The move will involve the restructuring of the company's exploration and production division.

17 November

Lasmo is to sell its Canadian interests to PanCanadian Petroleum for C\$60m before working capital adjustment. The sale is expected to produce a net profit of £25m.

Premier Oil has signed its first Indonesian production-sharing contract with Pertamina for the Halmahera block located east of Sulawesi.

Norsk Hydro has formed a joint company, Forbrico, with OSCA, a wholly owned subsidiary of Great Lakes Chemical Corp of the US. The new UK-based company will manufacture chemicals for completion and drilling fluids for the oil and gas industry.

18 November

British Gas has gone into partnership with Indonesia's Sapta Patra Wisesa to search for oil in the Malanging block, southwest of Java.

North Star Shipping has been awarded a multi-million pound contract by British Petroleum for a new multi-purpose standby and support vessel to be used on its Foinaven field, west of Shetland.

Shell Pacific Enterprises plans to invest some \$2m in the building of an oil storage and supply system in North Korea's Rajin-Sonbong free trade zone.

20 November

The European Union has rejected calls for an oil embargo against Nigeria in protest against the executions of nine political activists last month. Foreign ministers agreed instead to an arms embargo and continued visa restrictions for members of Nigerian military and security forces.

21 November

Chevron Overseas Petroleum (Peru) Ltd has signed a licence contract with Perupetro to explore more than 1.77 million acres on block 52 located in the Peruvian highlands some 250 miles east of Lima.

State-owned Indian Oil Corporation has announced that it is to float a further 10 percent of its equity on the market after March 1996 in a bid to finance new projects.

Bitor Europe has signed a contract to supply 500,000 tonnes of Orimulsion to Italy's state-owned power utility ENEL for use at the new Brindisi South power station in southern Italy. Bitor plans to negotiate a long-term supply of some 2m tonnes per year starting in 1997, with the prospect of additional supplies by the end of the century to other ENEL power stations.

22 November

Phillips Petroleum's Dawn field in the UK southern North Sea has produced first gas. Up to 50m cuft/d of gas is to be processed at Bacton, bringing Phillips' total gas throughput at the plant to a potential 1.2bn cuft/d, a figure equivalent to 10 percent of supplies to the national grid during a typical winter.

23 November

Amoco is to develop the Beaufort gas field, offshore East Anglia, using extended reach drilling to achieve early production. First gas is scheduled next month. The field is expected to produce a maximum of 30 mncft of gas per day over a period of some four years.

The Clinton administration has decided against imposing a ban on imports of Nigerian crude oil, stating that such an embargo would be 'counter productive'.

British Petroleum is to spend some £50m on upgrading its Grangemouth refinery's hydrocracking plant. The programme includes the construction of a new sulfur recovery unit.

OPEC has agreed to roll over its current production ceiling of 24.54 mmb/d for the first half of 1996 in a bid to 'stabilise prices'.

24 November

Statoil has signed its first contract to export oil to Spain. The contract, signed with Cepsa, is initially for the delivery of some 1m barrels of oil per month for the next six months.

27 November

Saigon Petro is to build a \$26m oil terminal, catering for 50-100,000 tonne vessels, in the southern Vietnamese province of Bai Ria Tai.

Her Majesty's Inspectorate of Pollution (HMPiP) has been approved to the ISO 9001 international quality assurance standard by Lloyd's Register Quality Assurance.

A consortium comprising Italy's Snam and Italgas have been awarded the tender to purchase Tigaz, the largest of Hungary's regional gas distribution companies.

28 November

Some 29 applications have been made for 127 blocks in the 7th UK onshore licensing round. A quarter of the applications are to extract coalbed methane.

The Spanish government has given the go-ahead for up to 21m shares in Repsol to be placed on the market as soon as market conditions permit and new statutes regarding state involvement are implemented. The fifth stage in a privatisation process that began with the sale of a 26 percent block in May 1989, the sale will reduce the public sector holding from 21 percent at present to 14 percent.

The North West Shelf Gas Project joint venture has announced start-up of crude oil production from the Wanaea and Cossack oilfields, located 130km off the northwest coast of Australia. With estimated reserves of some 200m barrels of recoverable oil, the fields are expected to produce some 115,000 b/d by the end of 1995.

Oryx Energy has sold its 33.6 percent interest in UK block 48/15a to PowerGen for some £120m.

Texaco and Gulf Oil are to be prosecuted over the explosion and fire at their Milford Haven refinery in July 1994. The HSE said that the companies, as partners in Pembroke Cracking Company, would face two charges of contravening the Health and Safety at Work Act by failing to ensure, so far as was reasonably practicable, the safety of employees, subcontractors and the public. Twenty-six workers were slightly hurt and nearby properties were damaged by the blast.

Shell Offshore Inc is to spend some \$240m on developing the Enchilada prospect area in the Gulf of Mexico. A platform with field production facilities is to be installed this year on GB block 128 and is due onstream in early 1997. A second platform, with hydrocarbons routed to the first platform for processing, will be installed in GB block 172 at a later date. Ultimate reserves are estimated at over 100m barrels of oil and gas equivalent.

30 November

North Sea oil output last month reached its highest for almost a decade, averaging 2.7m b/d, according to new figures from the Royal Bank of Scotland.

China National Offshore Oil Corporation and Cairn Energy have signed an oil exploration contract for the 23/10 block in the Tonkin Gulf.

News in Brief

Statoil reports that output from the Heidrun field is ahead of schedule. Daily output is already past the 100,000 b/d mark and is expected to reach 200,000 b/d by the end of this year.

Stirling Shipping Company Limited has won a multi-million pound contract for the charter of a large platform supply vessel to Shell UK Exploration and Production. The newbuilding is due to be launched at the Kvaerner Govan yard in Glasgow in March 1996 for delivery in June.

Conoco (UK) has announced that development of the Banff field, some 200km east of Aberdeen, has begun. Estimated to have reserves of some 20 to 110 million barrels of oil, the field is scheduled to enter production in August.

1 December
An Azerbaijani-British Trade and Industry Council has been established to provide a bilateral forum for developing commercial relations between the two countries and encouraging UK investment in Azerbaijan.

A consortium of US firms plans to build a \$1bn oil refinery near the southern Pakistani port of Karachi. The plant will process up to 125,000 barrels of crude per day.

Orcol Fuels, the UK's largest oil recycling company, has contracted Ryder to provide a preventive maintenance service for its 20 tankers in Scotland. The agreement covers both the tractor units and tanks as well as all associated equipment.

A subsidiary of Oceaneering International has been awarded a contract by Mobil Equatorial Guinea to provide a floating production, storage and offloading system for the Zafiro field in block B offshore Equatorial Guinea.

2 December
Gaz de France and Gazprom have established a new joint venture in a bid to improve the use of gas and the ecological situation in Russian companies.

Woodside Offshore Petroleum has announced its first 666,000 crude oil shipment from the recently-commissioned Wanaea and Cossack oilfields. The consignment is heading for an oil refinery in Japan.

4 December
Shell Petroleum has agreed the sale of 100 percent of its shares in NV Turkse Shell (NVTs) to Perenco. NVTs holds exploration acreage and producing assets in southeast Turkey where it operates some 27 fields from its base in Diyarbakir. Current production is 13,400 b/d, which represents some 20 percent of total oil production in Turkey.

5 December
Petrobangla, Bangladesh's state-owned energy company, has announced that it has made a very significant gas discovery at Bhola in the south islands on the tip of the Bay of Bengal. This is the first gas find in the area.

Texaco has laid off nearly 10 percent of its Pembroke refinery workforce because of the current overcapacity in Europe's oil refining industry.

The UK government has sold its last remaining 1.8 percent holding in British Petroleum, raising over £500m towards public funds.

6 December
The average price of gas for UK business customers fell by some 40 percent in the year to September, according to the latest report from National Utility Services. The UK gas prices were the lowest out of 13 countries surveyed. Finland saw the highest price rises - up by more than 17 percent against an inflation rate of less than 2 percent.

Colombian state-owned oil company Ecopetrol has signed an agreement that extends Texaco's operatorship of three gas fields in the Guajira region by 12 years to 2016.

7 December
French company Total has made its first step into the British domestic gas market, a British Gas monopoly until April, with the signing of its first household customer at a price said to undercut British Gas by up to 16 percent.

Expro Group has won two large oilfield service contracts worth a total of £4m. The first is for the provision of management, maintenance and personnel for wireline and sybline services on Elf Enterprise Caledonia's Claymore 'A', Salthire 'A' and Piper 'B' installations as well as all Elf Enterprise-operated mobile drilling units within the UKCS. Kerr McGee Oil (UK) awarded Expro the second two-year contract to provide surface well testing, downhole data acquisition, slickline and wireline services to all its operations within the UKCS.

US oil refining and marketing group Caltex Petroleum is reported to be pulling out of its joint venture with Nippon Oil, Japan's largest oil products distributor, because of the huge problems the Japanese oil market is facing at present (see page 5). The two companies first began working together some 50 years ago.

BP has announced that production from the Foinaven field is now due in the second quarter of this year and not the first. The field has estimated reserves of some 200m barrels and will contribute 4 to 5 percent of UK production.

8 December
Occidental LNG (Malaysia) Ltd, Petronas, Nippon Oil Corporation and Shell Gas BV have signed a joint venture agreement to construct and operate Malaysia's third LNG gas plant at Bintulu in the state of Sarawak. The 6.8 million tonne plant is targeted for start up in the year 2000.

Victoria Petroleum reports that following the plugging and abandoning of Spider-1 in the Carnarvon Basin off Western Australia, further exploration activity will now focus on the White Opal prospect in the western portion. A seismic programme is planned in mid 1996.

11 December
Elf Aquitaine and Electricité de France have signed a co-operation agreement that includes the establishing of a 50:50 joint venture company which will develop projects for electricity production from hydrocarbons.

The Omani government has signed a production-sharing agreement with a consortium that plans to invest some \$41m on oil and gas exploration in block 33 in the west central region of the country. Participants in the joint venture are Elf Aquitaine, Sumitomo Petroleum Development Company and Wintershall.

Shell has paid some \$37m for a 51 percent state in Sri Lanka's Colombo Gas Company. It is reported that the sale represents the largest foreign exchange inflow to date under the government's privatisation programme.

A new liquefied petroleum gas storage and distribution facility has opened in southern Vietnam. Funded by Thai and Japanese investors, the joint venture will import gas from Thailand, Malaysia and Indonesia. The gas will be distributed in bottled form.

Total plans to sell its 56,000 b/d capacity refinery in Ark City, Kansas, or turn it into a blending and storage facility this year as part of a move to reduce refining capacity.

12 December
British Energy has announced that it is abandoning plans to build two new nuclear power stations, at a cost of £4.9bn, at Sizewell in Suffolk and Hinkley Point in Somerset because of the current uncertainty about UK energy prices and the need to concentrate on next year's privatisation programme in which it will take over Nuclear Electric and Scottish Nuclear.

The board of AMEC has stated that Kvaerner's recent takeover bid undervalues the construction group and has written to shareholders urging them to join the Board in rejecting the £1 per ordinary share and £1 debt swap per preference share offer. Meanwhile Indonesia has written to the UK government expressing concern that a takeover of AMEC may prejudice existing joint ventures with Indonesian companies.

Alberta Energy has made a C\$915m friendly bid for Conwest Exploration. If successful, the merged company would be one of Canada's biggest oil and natural gas producers.

Newsdesk

Amoco goes underground in the Netherlands

Amoco has teamed up with Veba Oil Nederland, Dyas and Energie Beheer Nederland to create underground gas storage facilities in the Netherlands in order to provide a buffer against Continental gas market fluctuations.

The \$255 million project involves converting the largely depleted Alkmaar gas reservoir in the western part of the Netherlands. It is the first peak-shaving gas storage project of its kind in the country.

Because of the decline of peak capacity from the Groningen field, Amoco is working on a fast-track schedule in order for the Alkmaar facility to be operational by the 1997/98 winter

heating season. Six wells are to be drilled with injection and production facilities constructed in parallel with the drilling programme.

The project is to serve Gasunie, the Dutch transmission and gas marketing company, and will be capable of delivering up to 24 million cubic metres of gas per day with an annual working capacity of 250 mncum.

According to Amoco Netherlands' General Manager Mr Van Whitfield, the Alkmaar project is just one part of the company's plan to raise its profile in the Netherlands. He added that further gas storage projects of this kind will be needed as Continental Europe increasingly comes to rely on

imported supplies from remote sources.

The Amoco project is one of three currently being developed in the Netherlands. Taken together, they will provide more than 8 billion cubic metres of storage and 180 million cubic metres of daily withdrawal capacity.

Pieter Bakker of Gasunie expects that the three facilities, once completed, will help the company to 'maintain reliable and flexible supplies to national and international customers'. In 1994 alone the gas transmission company had total sales of some 82 bncum of gas of which about 44 bncum were for the domestic market, the remainder for exports.

Project study in the pipeline

On behalf of the German North Sea Consortium, Wintershall has awarded Aker Engineering a cross-median pipeline study for a pipeline from block A6/B4 in the German sector of the North Sea to the new Valhall wellhead platform in the Norwegian sector.

The proposed route takes the pipeline through German, Danish and Norwegian territorial waters and across several licences. The objective of the study is to highlight the different regulations and requirements for each sector and their implications for the development of the pipeline project with respect to schedule, cost and procedures.

A contractor in the Europe project, which lies along the proposed route of the A6/B4 pipeline, Aker Engineering plans to utilise personnel recently demobilised from the project to execute the new study.

UK fuel users pay the price of the budget

The UK Chancellor of the Exchequer raised petrol and diesel tax by 3.5 pence per litre in last November's budget. Mr Kenneth Clarke also increased tax on super unleaded fuel by 3.9 pence per litre because of 'its higher emission of pollutants such as benzene and the dangers to the revenue of switching from leaded petrol'. However, this price increase will not be implemented until May.

The news disappointed many environmentalists who had hoped for higher price hikes in a bid to curb the use of diesel in particular which was shown by two recent government reports to be a major contributor to particulate pollution (see *Petroleum Review*, December 1995). The two studies indicated that such pollution could further impair the health of those people already suffering from lung and heart disease.

On a more positive note, tax on compressed natural gas and liquefied petroleum gas, considered to be 'relatively cleaner' alternative fuels, was cut by 15 pence in a bid to encourage increased use.

Transrail contract on the right track



Transrail, claimed to be the largest UK rail freight operator, has signed a £12.5 million, five-year contract with Murco Petroleum.

The deal secures the movement of an additional 300,000 tonnes of petroleum products from Milford Haven in West Wales to petroleum terminals at Westerleigh, in Avon, and Theale in Berkshire.

The traffic, part of which was previously fed by sea into Avonmouth, will be transported on 11 trains per week using Transrail locomotives and privately-owned wagons. Murco is constructing an additional 2,800 tonnes of tank storage

at Westerleigh and is to extend rail sidings at Theale in order to accommodate the increase in volumes.

'We have worked hard to make rail a competitive option and viable alternative to road and sea transport,' says John Bates, Transrail's Commercial Director, 'and are hopeful that future volumes will grow'.

Transrail currently moves some two million tonnes of petroleum products on behalf of Shell UK, BP and Murco, amongst others. A subsidiary of the British Railways Board, Transrail is expected to be privatised sometime this year (see *Petroleum Review*, December 1995).

LPG focus in India

India's LPG requirement is growing steadily and there is potential for a sizeable increase in demand in the industrial and commercial sectors.

With this in mind, Total and Hindustan Petroleum Corporation signed a Memorandum of Understanding (MOU) last November for a co-operation agreement aimed at the joint development of downstream petroleum projects in India.

A new 50:50 joint venture company will focus initially on the development of infrastructure for the import and marketing of LPG in India. It will also study opportunities available in downstream petroleum marketing and aims to develop import terminals at port locations, bottling plants and other distribution facilities to be used for parallel marketing of LPG.

Fortunes of Japanese oil industry hang in the balance

Japan's plans to lift oil import restrictions in April is unlikely to lead to a significant increase in the absolute volume of import gasoline, says a recent report from Moody's. Gasoline prices are, however, declining even before the start of full deregulation.

Volumes of imported gas are expected to remain modest because of a number of factors which make the Japanese petroleum market unattractive to potential importers:

(a) Japan's oil demand is expected to remain flat over the intermediate term;

(b) a 70-day stockpiling requirement discourages entry; and

(c) there is fierce competition in this market sector.

Furthermore, while UAE, Singapore, Indonesia and Korea are the most likely countries to export gasoline to Japan, their capacity to export will remain limited as domestic oil consumption continues to grow rapidly.

According to the report, entitled 'Moody's Assesses Possible Impact of Japan's Oil Import Liberalization', Japan is plagued by an excess number of service stations and

the resulting price war has adversely affected the financial performance of Japanese oil companies.

Some 80 percent of Japan's 59,000 service stations are independently owned and it has therefore been difficult to reduce their numbers. However, many are not expected to survive the competition which may also force oil companies to restructure their dealership network in order to reduce distribution costs.

Moody's also reports that over time gasoline imports are expected to help remove

distortions in the pricing structure of Japan's oil products and more accurately reflect international market price movements.

Unfortunately, lifting the oil import ban will also have a negative impact on Japan's oil refining, marketing and retail activities and temporarily set back the industry.

Lower oil product prices should enable Japanese businesses to regain their competitive edge, however, which will, in turn, provide real benefits to the consumer.

Smooth moves at lube oil industry annual dinner



RIS Meadows OBE (left) hands over the Presidency of the British Lubricants Federation to John Barnes of Millers Oils Ltd. The hand-over took place at the Annual Dinner held recently at Grosvenor House in London.

In his address Mr

Meadows emphasised the aim of the Federation to take the lead in matters affecting the UK lubricants business, in particular the constant need to be innovative in order to maintain its reputation as a high-tech industry producing a

very wide range of high-quality lubricants. The BLF membership includes all the leading lubricants producers as well as independent blenders, who jointly represent over 90 percent of total UK lubricants production.

Rod Parker, BLF Executive Director, proposing the toast of guests and visitors, outlined the organisation's aims for 1996: a new code of ethics, improvements in communications, an NVQ for lubricant operators, an eco-label for lubricants and developments in waste control, packaging and recycling.

Awards of Council for long and active service were presented to J Glenister, BLF Secretary 1973-94, and to JF Vickers, BLF President 1975-77.

British Gas and YPF target Falkland Islands

British Gas and Yacimientos Petroliferos Fiscales (YPF) of Argentina have signed an agreement to study jointly the hydrocarbon potential of exploration blocks around the Falkland Islands.

The agreement was signed in London last November by Howard Dalton, Executive Director of British Gas and Nels Leon, President of YPF. The two companies will work together on the evaluation and may bid in the licensing round launched by the Falkland Islands government last October (see *Petroleum Review*, November 1995).

British Gas will head the study group, and both companies will share equally the costs of evaluating the seismic data.

Research project to develop 3D seismic data processing package of the future

Ensign Geophysics recently embarked upon a two-year research programme to develop an integrated system for the management and control of 3D seismic data processing, performed in the field or at a remote site.

The programme is supported by the Oil and Gas Projects and Supplies Office of the Department of Trade and Industry (OSO), Shell UK Exploration and Production

and Texaco Britain Ltd. Other oil companies are also being encouraged to become involved in the project.

"Although the computational requirements of offshore or remote sites data processing are now realisable through the use of a new generation of parallel computer systems, there remain a number of important issues to be addressed," states Ensign. For example, since

current processing methods rely heavily on human intervention and analysis, faster computer processing is worthless if it cannot be matched by faster quality control, parameter decision-making and data management. This is especially critical for the field environment where backup support is limited.

The project is to look at the building of modules to automate analysis, parameter

selection and data management. Such modules will also provide real-time and background quality control during acquisition. Linked through a comprehensive database of seismic data and attributes, the system's structure will enable various expert system techniques, including neural networks and fuzzy logic, to be exploited in order to develop decision-making software tools.

UK offshore safety case reviews complete

All 216 safety cases for existing offshore installations were accepted by the UK Health and Safety Executive (HSE) last November.

Under regulations introduced in 1992 implementing Lord Cullen's recommendations following the Piper Alpha disaster, a safety case is required for every fixed oil and gas installation operating on the UK Continental Shelf and any mobile installation moving into UK waters. It became illegal to operate such installations in UK waters without an accepted safety case with effect from the end of last November.

Each case must demonstrate that there is an effective health and safety management system, that all major accident hazards have been identified and that controls have been put in place to reduce risks to the workforce as far as reasonably practicable.

The cases were assessed by the HSE Offshore Safety Division (OSD). 'As a result of our assessing and challenging the evidence in safety cases, many changes have been made to installations and the way they are managed,' said Dr Allan Sefton, OSD Director of Operations. 'These improvements focus on fire and explosion protection, emergency procedures and reducing the effects of plant damage that could lead to major accidents by improved ways of working and better management.'

The HSE is now encourag-

ing offshore operators and owners to ensure that each safety case remains at the heart of a company's future plans for further improvements in safety standards and the safety representatives and all offshore workers play a full part in the process.

At the launch of the HSE report entitled *An Interim Evaluation of the Offshore Installations (Safety Case) Regulations 1992*, which presents the findings of two HSE and three independent research studies carried out in 1995, Frank Davies, HSE Chairman, said 'The indications are that the new regulations are having a positive impact on the industry's approach to the management of safety.' The report states that not only is there a more focused awareness of risk and better targeting of safety-related expenditure following implementation of the safety case regime, overall safety management systems have also been improved. Workers, too, are reported to be feeling more confident about offshore safety now that safety cases are a



mandatory requirement.

However, the report also highlights industry concerns that the safety case preparation, submission and acceptance process is too bureaucratic and that it represents a drift back to prescriptive legislation.

It has been estimated that the offshore industry spent some £1.2-1.4 billion in 1995 on complying with the safety case regulations.

UKOOA has said that the changes resulting from safety cases have led to a 44 percent reduction in injury frequency over the five year period 1988/89 to 1993/94 and that the risk of a major disaster offshore has been reduced by 90 percent.

Government tells gas producers that its good to talk

UK Industry and Energy Minister Tim Eggar has urged North Sea gas producers to enter 'sensible commercial renegotiation' of their take or pay gas contracts with British Gas so as not to disrupt plans to introduce competition in the domestic market from April.

Speaking to the Association of British Independent Exploration

Companies (BRINEX) last November, Mr Eggar stated that he felt such a move would 'result in a far better outcome for all' and emphasised that discussions and negotiations among the involved parties must be open and realistic.

'At the moment I get the impression that there is a fair amount of generalised posturing, and not enough

detailed discussion,' he said. 'There is rumour, suspicion and even the occasional outrageous claim about the government's position.'

The issue is not whether some North Sea take or pay contracts are renegotiated, but when and how,' stated Mr Eggar. He also made it clear that he did not expect to see price rises for domestic consumers as part of the equation.

Frontier focus in 17th UK offshore licensing round

A total of 275 blocks in 68 tranches is being offered by the UK Department of Trade and Industry in the 17th offshore licensing round. Applications are required by noon on 27 November and awards will be announced in the spring of 1997.

A total of 41 of the tranches are in the Rockall Trough, to the southwest of recent discoveries in the West of Shetland area. Others are being offered in the southwest approaches, off the coast of Devon, west of Shetland and the northern North Sea, the mid-North Sea High and the southern North Sea.

Tranches vary from two to 13 blocks depending on perceived prospectivity, location and water depth, and have been chosen so that companies can consider all of the different areas available. Blocks are being offered in groups because relatively little is known about the area, much of which is undrilled and untested.

Junior UK Energy Minister Richard Page stated that this was a 'frontier round'. Considered impossible areas just 10 years ago, the blocks are now of interest to operators following recent advances in technology.

Because the areas offered are relatively unknown, companies have been given a year in which to prepare applications in order to give them time to acquire seismic data during the 'weather window' in summer and to process and analyse data before committing themselves.

In addition, they will be permitted nine years in which to carry out their agreed work programmes, instead of the usual six years. 'At this stage, I am asking companies to commit to a programme for the first three years only because of the uncertainties of exploring such new areas,' said Mr Page.

Newsdesk

Vapour recovery arrives on UK doorstep

The first phase of Stage 1 of the Vapour Recovery Directive, adopted by the European Parliament and Council a year ago and now embodied in national legislation, comes into effect on 1 January. The timetable comprises three phases of three years each, starting now.

This Directive mandates vapour emission controls during the storage and handling of motor gasoline in the supply chain from refinery finished product storage, through primary

supply by road, rail or barge to distribution terminals, and up to and including offloading at service stations. Shipfeeding is excluded at present. However, volatile products other than motor gasoline are not included in the scope of this Directive. The timetable for the introduction of these measures is dependent on the annual throughput of each site. The timetable comprises three phases of three years each, starting on 1 January.

For storage, external floating roof tanks require a secondary seal whilst fixed roof tanks require either an internal floating roof or have their vapour spaces connected to a vapour recovery unit. The

throughput thresholds for the first phase is 50,000 tonnes annually. All motor gasoline storage requires controls by the end of the third phase (end-2004).

For rail, road and barge loading at terminals the throughput thresholds for the first phase is 150,000 tonnes annually. At impacted terminals, at least one bottom loading gantry must be provided, with all motor gasoline being bottom loaded by the end of the third phase. These gantries have to be connected to a vapour recovery unit with an emission limit (average over a one-hour period of 35 grams/cubic metre).

At service stations the throughput threshold for the first phase is 1,000 cubic metres annually. Derogations will be given for sites below 500 cubic metres annually in certain areas, according to a means yet to be determined by the Department of the Environment. Sites with the tanks and dispensers below living or working areas will need controls in this first phase.

Service stations, in the terms of the Directive, means all facilities for fuelling motor vehicles and not just sites retailing motor gasoline. At impacted sites 'balancing' (Stage 1b) of the vapours displaced from the underground storage tank during offloading back into the delivery tanker will be required.

Henceforth new road tankers or tankers retrofitted to bottom loading will need to be fitted with a plate specifying the maximum number of loading arms that can be used simultaneously, at a set back pressure in the vapour line, before the tanker compartment pressure relief valves begin to lift. These tankers will also need to be vapour tightness tested at regular intervals.

It is mandated that emissions due to dipping operations will not be allowed from new tankers after 1999. Though this is presently the legal measuring device under UK Weights and Measures legislation, new measuring devices will have to be developed.



A typical vapour recovery unit

Fast track schedule for MacCulloch development

Operator Conoco (UK) Ltd is aiming to bring the MacCulloch field into production on a fast track basis. First production is scheduled for next December.

The close liaison between companies and the Department of Trade and Industry has enabled MacCulloch to be one of the fastest field developments from conceptual engineering through to first oil, said George Watkins, Chairman and Managing Director, Conoco (UK) Ltd.

Located in block 15/24b around 250 kilometres north-east of Aberdeen, the small marginal field will be brought on stream with a floating production system.

Conoco and its partner LASMO North Sea plc have now signed a production ser-

vices contract with a new company, North Sea Production Co Ltd, which will provide and operate the system, based on a converted oil tanker. This company is a joint venture between The Maersk Co Ltd and SLP Engineering Ltd.

The contract is for two years and, according to Brian Rossiter, Agreements Manager, is the 'first arrangement that is exclusively by tariff.' This means that the contractor gets paid for each barrel delivered, while the operator can extend or terminate the contract at will.

A floating production system has been decided on because of the size of the field - recoverable reserves total only some 58 million barrels. Development using a conventional platform would

not have been economic.

The vessel which will be converted is the *Dagmar Maersk*, a product tanker built in 1985. It will be converted at a UK yard into a floating production system with processing facilities of 60,000 barrels per day, water injection and gas lift facilities for the production wells.

Crude will not normally be exported by shuttle tanker but rather by pipeline to the Flotta terminal via the Piper B platform, some 30 km to the northwest. Associated gas will also be exported to Piper B for transmission by the Frigg pipeline to St Fergus.

The MacCulloch facilities will have surplus capacity which may be taken up by a new well now being spudded is successful.

Poseidon pipeline

Allseas Marine Contractors has been awarded a contract by Repsol Investigaciones Petroliferas for the design, procurement, construction and installation of pipelines system and manifolds as part of the Poseidon Project in the Gulf of Cadiz.

A 24km trunkline between the landfall and the central manifold, a flowline of 18km between the central and north manifold and a 21km flowline between the central and south manifold, all of 10-inch diameter, will transport gas from the Poseidon North and South reservoirs to a processing plant located 500km inshore.

The project also includes the installation of the landfall site.

Pipeline installation is scheduled for early 1997.

Romania: going private

By Peter Adam

Romania, before Marxists turned it into a 'workers' paradise,' was a prosperous country, thanks to its ample oil and gas reserves, its world-class refining industry and a favourable location along the Black Sea. Romania now seems destined, in short order, to regain a significant measure of its former status.

Well-conceived development plans, political support from abroad and significant financial commitments from the World Bank and others will enable Romania to restructure, augment and co-ordinate the extensive, though imbalanced, mismatched and, until recently, mismanaged segments of its hydrocarbon sector – thereby transforming it into the region's pre-eminent oil and gas powerhouse. This was the well-orchestrated pitch a delegation from Romania led by President Ion Iliescu made at a US Trade Development Agency sponsored conference 'Petroleum Business Opportunities in Romania' held in Houston last October.

Favourable attributes

Romania's hydrocarbon resources are significant; its geographic position favourable; its technological capability advanced; its size manageable; its population of 23 million people homogenous, well-educated and work-oriented; its experience in the petroleum business extensive and broad-based; its government stable and now committed to an open, democratic society and a market-oriented economy; its legal system and regulatory apparatus (under construction) hospitable to foreign investment; its wage rates competitive and its commercial tradition strong.

The country has what it takes and in a short time has started to get its act together. To top it off, the World Bank is underwriting a \$175 million Petroleum Sector Rehabilitation Project which could really put Romania's turnaround efforts in TO high gear. Other multilateral financial institutions have also expressed their interest in following suit.

Also, the United States is strongly committed to Romania generally, and this project specifically, for a variety of reasons: US firms stand to benefit from

its rejuvenation. Situated north of the Balkans and west of the Turkic former-Soviet republics, Romania could be an anchor of stability. As a formerly socialist state, its revival would showcase a successful transformation from socialism to free enterprise democracy.

The Romanians and US government officials saw to it that none of these factors was lost on those who came to this well-attended meeting in Houston.

Romanian destiny

President Iliescu set the tone for the conference in his introductory remarks by pointing out that Romania's involvement in the oil industry goes back to the 1850s. It was one of the first oil producers and became for a time, along with Texas and Azerbaijan, one of the world's top producing regions. Romanians built the first refinery in Europe at Rafcov, near the city of Ploietst. Commissioned in 1857, it supplied Bucharest with sufficient kerosene to become the first city in the world to have a centralised lighting system.

Currently, Romania possesses about 70 percent of Eastern Europe's oil reserves, or about 1 billion barrels. It also has gas reserves of about 4 trillion cubic feet (tcf). Nevertheless, Romania imports both oil, 8 million tonnes a year (mty) – while domestic production runs at just under 7 mty – and gas, 4.6 billion cubic metres a year (bcm/y) – while producing just under 19 bcm/y.

And downstream the disparity between Romania's potential and its current capabilities is even more pronounced. Its five major and five smaller refineries, whose total capacity approaches 500,000 b/d, run at only about 50 percent of potential throughput.

Romania embarked on an ambitious programme of refining expansion in the 1970s and 1980s when oil prices were high and then let crude produc-

tion, languish due to insufficient investment and field mismanagement. When prices crashed and the world had plenty of oil and surplus refining capacity, Romania had to start purchasing crude from Russia, Egypt, Iran and the Arab states in the Gulf while at the same time mothballing some of its refineries.

But that was then. Times have changed.

Opportune time

As former US Deputy Secretary of Energy William White perceptively pointed out, the timing of Romania's re-emergence into the new world oil order could not be more propitious. Although Romania's oilfields are mature, he explained, their prospects are excellent; new technologies have demonstrated great success in boosting extraction capabilities considerably. A lot of oil that has been left in the ground for decades may not be there much longer, both in Romania and elsewhere.

Mr White said, 'With prospective areas in Iran and Iraq off limits to many major foreign companies, it creates opportunities for countries like Romania to attract international oil and gas investment.' And, he could have added, Romania may offer a viable alternative to involvement in Russia and the former states of the Soviet Union where, because of major and persistent political, legal and regulatory uncertainties, oil and gas development have proven far more difficult than expected.

From communism to capitalism

Apart from such geopolitical and technological considerations, another significant development is helping to prop open the window of opportunity for foreign oil companies in Romania. Successful international direct corporate investment has already begun, spearheading a full fledged economic breakthrough.

The immediate success of Coca Cola, an early foreign investor, has prompted support for government actions to encourage further foreign investment and a return to the type of co-operation which characterised relations between foreign companies and Romania before World War II, a state of affairs which older Romanians still remember.

Legal framework

Romania's Parliament is now working on comprehensive legislation to establish more firmly the legal basis for foreign investment in oil and gas. Final passage is expected this year. Meanwhile recent legislation to create a vertically integrated state oil company has been dropped and the sector will probably for the most part be privatised eventually.

In the meantime, the government has already established two entities which together oversee all petroleum-related activities:

The National Agency for Mineral

CANADIANOXY NORTH SEA PETROLEUM LTD

has changed its name to:

CANADIAN PETROLEUM UK LIMITED

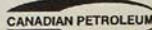
and has moved to:

Mallard Court
Market Square
Staines
Middlesex TW18 4RH

Telephone: 01784 429500

Fax: 01784 429550

Telex: 911785 CANPET G



A subsidiary of Canadian Occidental Petroleum Limited

Resources (NAMR) is Romania's regulatory agency responsible for monitoring and co-ordinating all mineral activities. With regard to oil and gas, NAMR negotiates exploration contracts, oversees all national data on mineral resources, establishes fees and royalties and sets common carrier tariffs.

The Ministry of Industries (MOI) formerly had overall policy-making and regulatory responsibility for the entire petroleum sector and represented the government's interest in the various state-owned enterprises. The Romanians created NAMR to separate the regulatory authority from the state's ownership interests in order to eliminate potential conflicts of interest but the Ministry is still involved in various petroleum related matters, particularly downstream.

Areas of oil and gas activity are delineated among various entities:

- Petrom RA, the principal oil and gas exploration and production enterprise;
- Romgaz RA, a vertically-integrated state-run gas enterprise;
- Conpet SA, which transports and stores all domestic and imported crude oil and natural gas liquids as a common carrier;
- Rompetrol SA, which provides prospecting, drilling production and services, primarily abroad;
- Peco SA is the state-owned retail petroleum company;
- Atlas G.I.P.-S.A. which provides wire-line services.

With regard to downstream facilities, each refinery seems to be a separate company, although various activities, such as crude oil purchase and international sales/bartering of refined products, are co-ordinated through the Ministry of Industries.

As Romania develops its legal and regulatory framework for foreign investment and privatisation, the country is trying to avoid some of the prob-

lems that have plagued Russia. Environmental liability is one area where concern is particularly keen. Romanian-foreign joint ventures will have to operate in an environmentally sound manner but panelists suggested that, unlike Russia (and some of the formerly-Soviet states) joint ventures and foreign companies will not be held liable for damage done by previous operators entities.

Sector rehabilitation

So, with the foundation more or less ready to be put in place, the Oil Sector Rehabilitation Project should facilitate full-blown sector rejuvenation. It provides opportunities for foreign involvement in the areas of exploration and production, field rehabilitation and extraction enhancement, retail augmentation, oilfield manufacturing and services and refinery upgrading and privatisation.

Exploration: New blocks will be available later this year. Bid rounds for additional exploration blocks, using international tendering practices, are planned. The potential areas meeting geological criteria favourable for oil and gas generation and accumulation cover about 125,000 sq. km onshore and 16,000 sq. km offshore on the Black Sea continental shelf. Amoco, Shell and Enterprise have all been exploring in Romania since 1992.

Field Rehabilitation and Enhancement: A significant portion of the World Bank's financial commitment is earmarked for field rehabilitation and production enhancement projects. Romania's oil and gas enterprises lack the resources to apply modern enhanced recovery techniques and other technologies to maintain production from geologically complex fields. Efforts are underway to promote co-operative arrangements, including development of model production sharing agreements.

Retail Distribution: With only 800 service stations to meet the estimated domestic need for 1,600-2,000, Romania presents an attractive retail distribution opportunity. Amoco, Shell and Agip are already investing in this

sector, with almost 300 service stations expected to be foreign sourced. Lack of a common carrier for refined products also offers an excellent entry opportunity for distribution companies.

Oilfield Manufacturing: Romania's key suppliers of material, pumps, meters etc require foreign capital and marketing outlets. They are intent on increasing sales to western markets. These entities have been among the most successful in the country in adapting to the demands for free markets and open competition. Romanian equipment manufacturers have already penetrated markets in the Middle and Far East and provide entry into the states that were formerly part of the Soviet Union.

Privatisation of the Refining Sector: The Romanian government is currently working with the US Agency for International Development to develop a strategy for rationalising capacity and developing avenues for private sector participation.

As of now, each of Romania's five main refineries has submitted upgrade plans totalling \$115 million, \$80 million of which is expected to come from foreign sources. Nearly half of the projects are aimed at improving efficiencies of existing plants. An additional 40 percent are upgrades for new construction of catalytic cracking units that will increase the yields of gasoline. Remaining projects involve desulfurisation and environmental upgrades. Generally, the refineries will contribute engineering and construction, while the foreign companies are being asked to contribute equipment, technical assistance and financing. The precise structure and management of such efforts are yet to be determined.

Oilfield Services: Here various services are being unbundled from state enterprises in preparation for eventual privatisation. Increased exploration and development by western operators will generate demand for quality performance. As Romanian providers generally lack modern technology and standards, opportunities exist for foreign service suppliers.



INFORMATION FOR ENERGY GROUP

9th Oil Price Seminar Managing the Long-term Risk

Tuesday 20 February 1996

To be held at the Cavendish
Conference Centre, London

Many billions of dollars can be committed to major oil projects, be they the exploitation of a reservoir in deep water, the instatement of a continental pipeline or the upgrade of a refinery to meet new environmental requirements. Such projects take years to plan and execute but the price of oil, on which the return on this investment ultimately depends, can not even be predicted reliably a few months in advance.

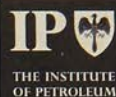
This seminar will look at the means available to investors to handle the risk associated with long-term uncertainties in the revenue from their projects. Firstly we will hear from an integrated oil company how it copes with the risk exposure of different parts of its business. Then an investment banker will look at the problems currently facing the refineries sector, which traditionally has not looked very far ahead in hedging. Finally the approach available to governments will be analysed, including planning and strategy and how to overcome administrative and political inertia.

IFEG is indebted to NYMEX for its long-standing support of the Oil Price Seminar

Exhibitors will include:

- Dow Jones Telerate
- Knight-Ridder Financial
- Nymex
- Petroleum Argus
- Saladin
- SHL Systemhouse Corporation

For a copy of the registration form, please
contact Catherine Cosgrove,
The Institute of Petroleum,
61 New Cavendish Street,
London W1M 8AR UK
Telephone: 0171 467 7100
Fax: 0171 255 1472
e-mail: InstPet@cityscape.co.uk



Luncheon

**Guest of Honour and Speaker
Sir David Simon CBE,**
Chairman, The British Petroleum Co plc

***'A time of change ... and a
time to change'***

Tuesday 20 February 1996

To be held at the Dorchester Hotel,
London

Over the last century the oil industry has survived and prospered despite dramatic technical and political changes, as well as significant shifts in patterns of supply, demand and trade. The industry has demonstrated its ability to adapt – avoiding rigidity and responding with speed and confidence to each successive challenge.

The 1990s are a period of further rapid change. Energy demand is growing in line with population and the spread of prosperity and within the total the geographical and sectoral pattern the demand for oil and gas is also changing. Political change is gradually providing access to areas previously closed to international investment, and is altering the relationship between the public and private sector on an international scale. Political change is also reshaping the climate in which the industry operates – placing a higher premium on the ability to balance commercial objectives with the maintenance of the required environmental standards.

Beyond the issues specific to the energy sector, technical change and shifts in patterns of management and organisation are affecting all large organisations.

The speech will discuss these challenges and the ways in which our ability to change in response will impact on the culture and performance of individual enterprises and the industry as a whole in the years ahead.

For a copy of the ticket application form, please
contact Conference Department,
The Institute of Petroleum,
61 New Cavendish Street,
London W1M 8AR UK
Telephone: 0171 467 7100
Fax: 0171 255 1472

Environmental protection systems for the petroleum industry

Whilst the storage and transportation of petroleum products and chemicals is closely controlled, spillage and leaks do occasionally happen, often caused by human error. Typical areas where spillage may occur are the loading of road tankers and, less obviously, consumers refuelling cars and trucks at service stations. These areas are not neglected, because run-off channels and water/fuel separators are standard features of service stations and terminals above ground. Secondary containment is normal for tank farms and chemical storage areas. However, seepage,

**By Dr GB Lowe,
Technical Marketing
Manager, Morton
Polymer Systems**

particularly of less volatile products, such as diesel, does occur, for example through permeable concrete and through discontinuities in structures (eg expansion joints in concrete).

It is stated that one litre of diesel can spoil 1 million litres of drinking water. Thus this gradual, almost imperceptible infusion into the water table can have serious consequences for the community.

A range of products has been developed which will minimise or help to eliminate the problem. Based on a polymer called polysulfide, the products are coatings and sealants which stick tenaciously to concrete and steel and resist

attack by fuels, oils, solvents and a wide range of chemicals. This article describes these systems.

Polysulfide polymers

Although polysulfide polymers were first synthesised in the 1920s, it was not until the 1940s, when commercial quantities of the liquid polymers were available, that their special properties were fully explored.

Because polysulfide polymers have good fuel and oil resistance, they have been used extensively as a sealant in aircraft fuel tanks. All modern aircraft with integral wing tanks, commercial and military, use sealants and coatings based on the polysulfide polymer.

In a separate development polysulfides found an extensive market as sealants in building construction where durability and weather resistance were the main criteria.

It is only recently that technologies have been developed bringing both sets of properties together to produce environmental protection sealants and coatings.

Tables 1 and 2 give some indication of the fuel resistance of polysulfide polymers, in both high aromatic and alcohol modified systems.

Liquid Composition (% by volume)			
Iso Octane	Toluene	Methanol	Volume Swell % 7 days at 23°C
60	40	—	7.9
45	45	10	17.2
42.5	42.5	15	17.6
40	40	20	16.6
50	30	20	9.3
75	15	10	3.3

Table 1: Polysulfide coating volume swell

Diary Dates



Exploration and Production Discussion Group

A Review of the Old Year and Predictions for the New

Thursday 11 January, tea at 17.00 for 17.30, until 19.00

By Steve Sasanow,
Subsea Engineering News

IP contact: Sjoerd Schuyleman



Environment Discussion Group

'Biotechnology Means Business'

Thursday 18 January, tea at 17.00 for 17.30, until 19.00

By Alison Mo and Keith Cowey, DTI

IP contact: Jenny Sandrock



London Branch/Energy Economics Group joint meeting
(previously advertised as London Branch meeting)

'Back to Basics - Refining for Petroleum Products'

Tuesday 23 January 1996, tea at 17.15 for 18.00

By John Christy, Technology Manager,
Shell Haven Refinery
He will outline complex processes in refineries and recent adaptation to changes in demand and environmental concerns.

and

Phil Trimmer, Strategy & Forecasting
Manager, BP Oil
He will address the 'refining conundrum' - how can the refining industry fund its future, given current poor margins and excess capacity?

Light refreshments will be available afterwards.
IP contact: Mike Wood or Mrs E Walker, Hon
Secretary, London Branch.
Tel: 01926 404768



London Branch

'Interrelationship between Fuel Quality, Engine Design and Air Quality - Outcome of the European Auto-Oil Research Programme'

Tuesday 20 February 1996, tea at 17.15 for 18.00

By Mr F H Palmer

Before recently taking up his post with CEC as Technical Director, Frank Palmer was the consultant co-ordinating production of the final EPEFE report on behalf of both motor and oil industries as input to the Auto-Oil Programme. The EPEFE programme, initiated in 1993 and completed in 1995, is a major part of the technical basis behind the drafting of European legislation to limit vehicle emissions from the year 2000. Mr Palmer will trace the history of EPEFE and show how its results fit in with Auto-Oil programme on which the Draft Fuels and Emission Directives are based.

Light refreshments will be available afterwards.
IP contact: Mike Wood or Mrs E Walker, Hon
Secretary, London Branch.
Tel: 01926 404768

**All meetings are held at the Institute of Petroleum
Please tell the IP contact if you plan to attend any of these free meetings
Tel: 0171 467 7100 Fax: 0171 255 1472**

Table 2: Comparative fuel resistance for rubber compounds

Rubber compound based on	% Vol change in alcohol modified fuel* (3 days @ 23°C)
Chloroprene	72
Fluorocarbon	4.4
Fluorosilicone	19.5
Low nitrile	74
High nitrile	31.5
Epichlorhydrin	24.4
Polysulfide	9.3
* Iso-octane 48, Toluene 32, Ethanol 20	

Sealants for forecourts

Following studies in Germany⁽¹⁾ it has been estimated that approximately 4,000 tonnes of petrol and diesel are spilled every year in the area of service stations. Whilst the majority of this will evaporate into the atmosphere, a significant volume of low volatile residues will permeate into the ground. Where no special controls are built, the permeating products can accumulate and be transported with rain water over considerable distances, so contaminating the water-table.

Thus ground-water contamination has become an issue, especially in areas where the water-table is near the surface, for example in the Netherlands. Following extensive trials there and in

Germany, a system was devised whereby the ground-water could be better protected from this type of pollution.

A construction specification was devised for the technology by the Dutch organisation KIWA. The preferred flooring for the forecourt consists of precast concrete hexagonal blocks, with a density which makes them impermeable to fuels and lubricants. These are laid in a regular pattern with a uniform gap between

each block. Dry sand is blown into the gaps and compacted to an established depth. After priming the concrete, the hydrocarbon resistant sealant is applied. To ensure the effectiveness of the flooring, which has to withstand almost continuous vehicular traffic, a high standard of workmanship is essential.

The sealant/primer system is specified in the KIWA standard C50⁽²⁾. It contains a number of standard sealant tests. However, it also includes tests for resistance to hydrocarbons:

- Tensile adhesion and volume swell after immersion in standard petroleum and diesel fuels at 50°C
- Resistance to shear. The test piece is subjected to 100 cycles through 100 percent extension in shear (simulating traffic movement).

Several proprietary polysulfide sealants manufactured in Europe meet the requirements of KIWA C50. It is estimated that about 1,200 service stations have been sealed with this technology in Holland. In Germany, which is committed to seal all its forecourts by 1996, 500 have been sealed so far.

What happens to the spilled fuels and oils now lying on the sealed surface? The answer lies in good housekeeping. The



Application of a polysulfide sealant at a service station

Table 3:
Properties of a
polysulfide
coating

Properties of a polysulfide coating	
Hardness, Shore a	41
Tensile Strength, MPa	2.5
% Elongation at Break	490
200% Modulus, MPa	1.2
Permeability (gasoline) cm/sec	1.23×10^{-9}
% volume swell 72 hours at 23°C	
ASTM Fuel D	15
Methanol	0.6
Toluene	120
MEK	62
Ethyl acetate	42

surfaces are washed down daily and the washings channelled into separators for later disposal.

Coatings for secondary containment

Loading of tankers for transport can result in minor spillage, often seen as inconsequential. At the other extreme a major failure of a storage tank could result in the loss of a considerable volume of petrol or diesel.

Legislation in many countries requires that tanks, above or below ground, have secondary containment to control spillage. It is customary to put a bund wall around the tank or tanks with a capacity to contain the total contents of the liquids stored. These are usually concrete or brick walls built on a concrete floor. Whilst adequate when first built, there is a tendency, with time, for brickwork to deteriorate or concrete to develop cracks. It has been proven that a cost-effective way to make the containment viable once more is to overcoat the surfaces with a membrane coating. A suitable coating has the following characteristics:

- flexible, to bridge over cracks
- durable, ie remain flexible and not itself crack, over a period of many years
- resistant for at least 72 hours to the fluids contained in the tank. (The 72 hours is required to take account of unnoticed spillages, plus enough time to pump spillage to another container).

A system which meets these requirements is an elastomeric coating based on a combination of liquid polysulfide polymer with a reinforcing carbon black. The inherent durability of the polysulfide polymer is enhanced by the presence of the carbon black, which supplies toughness and UV stability. After 10,000 hours under

an 800W tungsten UV lamp such a coating exhibited no deterioration.

Prior to application of the coating, defects in the concrete or brickwork are repaired. Cracks are 'cut back' and sealed with an elastomeric sealant with resistance to the stored fluid. It is normal to prime the surfaces with an epoxy-type primer prior to applying the coat. The coating, which can be solvent free, is applied either using conventional airless or air assisted spray equipment or by brush. The system takes about two hours to cure to a seam-free elastomeric membrane. Final coating thickness is typically 1mm to 2mm obtained with two coats. The properties of a polysulfide polymer coating are shown in Table 3. A volume swell of less than 150 percent after 72 hours is acceptable.

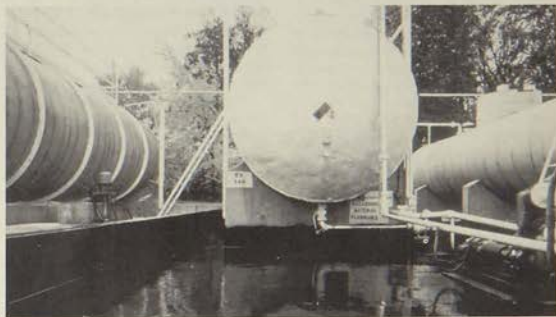
This technology, developed in the United Kingdom, has found widespread application in the United States

and is specified for fuel and chemical containment in several states.

It can be seen that polysulfide technologies exist to help those engaged in petroleum fuel storage and distribution in their environmental endeavours. The systems meet the requirements of known European legislation and that predicted to be enforced in the United Kingdom in the future.

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- (1) Deutsche Wissenschaftliche Gesellschaft für Erdöl, Erdgas und Kohle, ev, DGMK, Steinstrasse 7, 2000 Hamburg, Germany. Project 422, January 1989.
- (2) Keuringsinstituut Voor Waterleidingartikelen nv, KIWA, 2280 AN Rijswijk, Netherlands, Criteria No 50, Criteria for Channel Sealants, July 1989.



Polysulfide coating – a completed application

Qatari gas for Israel?

By John Roberts

An ambitious project is being developed by the US Enron Corporation to sell Qatari liquefied natural gas (LNG) to Israel. And while the long-term gas requirement of Israel, Jordan and the Palestinians make it possible so that these three countries might constitute an eventual market for both Egyptian and Qatari gas, the prevailing view amongst energy executives is that at present they are definitely in competition with each other.

In November Enron announced a \$5 billion project to transport 2.5 million tonnes per year (mtpy) of LNG from Qatar to markets in Israel and Jordan, part of a project under which an additional 2.5 mtpy would be supplied to India. This was widely reported as if it were a firm contract, although an Enron statement made it clear that the US company had yet to conclude a formal joint venture agreement with the Qatar General Petroleum Company. Equally, Enron has yet to translate possible interest in purchases by Israel, Jordan and India into firm agreements. In its statement, Enron said that 'Construction of the facilities is expected to begin in 1997, with expected delivery of the LNG to commence in 2001.'

Rebecca Mark, the Enron executive heading the Qatar project, told *Petroleum Review* that detailed negotiations on all project details should be completed in the next few months. 'We're waiting to clear up the final issues,' she said. But Ms Mark declined to discuss the key issue of financing, saying only: 'That's an issue you'll have to put to the Qatari authorities.'

As for the Qataris, they seem to be taking a surprisingly laid back attitude to the project. Energy Minister Abdullah bin Hamad al-Attiya told *Petroleum Review*: 'What you have to remember, is that it's an Enron-Enron deal - Enron as joint venture partner (in Qatar) and Enron as buyer (for Israel). We will wait and see.'

One international oilman with con-

siderable experience of Qatar commented: 'What it means is that Qatar is perfectly happy with Mobil.' Mobil is currently making steady progress on two major LNG projects. The first, in which it is a junior foreign partner, is due to come on stream in 1997 and the second, in which it is the major foreign partner, looks set to export its first gas in 1999.

Mr al-Attiya himself notes that for the first 'Qatargas' project 'the port is completed, and we're waiting for the first shipment in January 1997. That is only a year away.' The Qatargas project was recently broadened from 4.0 to 6.0 mtpy as a result of increased Japanese demand, with Japan's Chiyoda securing a \$600 million contract last September to construct the third 2.0 mtpy train.

The second 'Rasgas' project recently gained momentum when Korea agreed to purchase gas from the project in October. Both Qatargas and the main Mobil Rasgas project are geared to Asian markets. So far, one recent attempt by a European consortium to develop LNG markets in the Mediterranean and southern Europe failed because of cost issues. Despite the hype, Enron's prospects of succeeding where the Eurogas Consortium failed, remain strictly limited, not least because its agreement with Mobil on access to gas resources initially allocated by QGPC to Mobil limits the project's maximum size to just 5.0 mtpy - and the destinations to India, Israel, Jordan and the Palestinians.

PFEER and arrangements for recovery and rescue – implementation

**By Robert Paterson,
Offshore Safety
Division, Health and
Safety Executive**

It was just over two years ago that we released a consultative document on a set of draft regulations covering prevention of fire and explosion, and emergency response offshore. There have been a number of developments in legislative review and reform during the intervening years and I am delighted to have the opportunity to update you on progress. This paper will focus on the post-implementation aspects of the Prevention of Fire and Explosion and Emergency Response Regulations (PFEER), with particular reference to standby vessels.



It is difficult to talk about the review of offshore legislation without also mentioning the tragedy of *Piper Alpha* and the subsequent publication of Lord Cullen's Report. As we all know Lord Cullen was highly critical of the existing regime, which failed to address the management of health and safety, or to promote a safety culture. He endorsed the goal-setting approach of the Health & Safety at Work Act 1974 which derives from the conclusions of the Roben's Report. The review and reform of offshore legislation has been taken forward with this aim. In developing goal-setting legislation for offshore, the HSE is committed to the following objectives, which are applied here to PFEER, although they can be applied just as easily to any of the new sets of regulations:

- The regulations are expressed as far as possible in terms of requiring that stated objectives are to be met, rather than prescribing detailed measures to be taken;
- They implement fully, or in part, or confirm implementation of, 38 of the 106 recommendations made by Lord Cullen; they also implement the one recommendation addressed to the Health & Safety Commission (relating to operators adverse weather policies) in the Report of the Department of Transport's Air Accident Investigation Branch on the 1992 *Cormorant Alpha* helicopter disaster;
- They implement, or contribute to the implementation of, 34 of the provisions of the Extractive Industries (Boreholes) Directive;
- One of the main objectives of the review was to simplify and rationalise existing offshore legislation and replace existing prescriptive legislation with goal-setting regulations. The PFEER Regulations revoked three sets of existing prescriptive regula-

tions which dealt with emergency procedures; fire fighting equipment and life saving appliances, as well as revoking parts of other regulations.

The regulations

I would now like to move on to the PFEER Regulations themselves and go through the requirements of the Regulations in more detail, since there have been a number of changes as a result of the consultation process.

PFEER applies to fixed and mobile installations, to existing and new installations throughout their life-cycle and to attended and normally unattended installations.

Turning now to **Regulation 4**, the first substantive duty. This is a general duty to take appropriate measures with a view to protecting persons from fires and explosions, and securing effective emergency response. PFEER covers all aspects of both fire and explosion protection and of emergency response. It deals with all emergency responses and not those solely in relation to response to fire as in explosions (eg helicopter ditching would require an emergency response).

Regulation 5 is a requirement to undertake and record assessment of major accident hazards arising from fire and explosions and of those events which may require evacuation, escape and rescue to avert a major accident. The regulation is clear as to what the assessment should cover. It is intended that it should be the basis for determining the detailed measures for preventing, controlling and mitigating fires and explosions, and for evacuation, escape and rescue; that is for meeting the requirements or the goals expressed by the PFEER Regulations. The assessments will also feed into the Safety Case. The information about fire

Britannia Endeavour standby vessel

and explosion, major accident, hazards and those events requiring evacuation, escape and rescue will contribute to the demonstration required by **Regulation 8** (1)(c) and (d) of SCR; and the measures taken to reduce risks will contribute to the demonstration required by **Regulation 8**(1)(d).

Regulations 6 to 8 deal with emergency preparedness. They effectively require an organisational structure to exist in advance of, and during, an emergency and specify some essential elements of that structure, including appointment of persons competent to undertake emergency duties and command during an emergency and for personnel to receive appropriate information and training on what to do in an emergency. The arrangements made for emergency response should be set out in a document referred to as an emergency response plan prepared in consultation with those who have a role in implementing the plan eg standby ship operator and coastguard.

Regulations 9 to 13. This group of regulations, in respect of protection against fire and explosion, is intended to reflect a hierarchy dealing first (and foremost) with prevention in **Regulation 9**, detection in **Regulation 10**, controlling and combating fires in **Regulation 12** and mitigating their effects in **Regulation 13**. The prevention requirements of **Regulation 9** are intended to cover design or inherent safety measures, as well as prevention by engineering or procedural measures.

Regulation 11 is all about ensuring that there are arrangements in place

for alerting persons in the event of an emergency, including those off the installation who may need to know, such as rescue and recovery services, standby vessel operator etc.

The regulations also prescribe the type of acoustic signal and colour of lights required for giving emergency warning on the installation. This is to foster alarm harmonisation within the industry. There is a 30-month lead-in period for existing installations to meet this particular provision.

Regulations 14 to 17. This group of regulations reflect a kind of hierarchy – mustering, evacuation, escape, recovery and rescue. In line with the general objective-setting approach, these regulations do not specify the hardware required for these purposes. For example, **Regulation 15** contains no requirement for a specific evacuation method. Duty holders should select the methods of evacuation which may include helicopters, direct sea transfer, bridge links and TEMPSC, on the basis of their contribution to achieving the regulatory goal, ie safe evacuation. **Regulation 15** is also worded to ensure that when using some means of evacuation, in particular TEMPSC, further arrangements have to be made to recover personnel so that they can reach a place of safety.

In general this is indicated in the ACoP, there should be a preferred and an alternate means of evacuation available to personnel on any installation in the event of an emergency, with TEMPSC as an alternative in most cases. However there is flexibility within the requirements (due to their goal-setting

nature) for equally effective measures for meeting the goals of the regulation.

Regulation 16 requires means of escape to be provided, to ensure that personnel can as far as is reasonably practicable escape from the installation safely if there should be any failure of the evacuation arrangements. The regulations distinguish evacuation and escape. Evacuation is leaving the installation and its vicinity in an emergency in a systematic manner and without directly entering the sea. Escape is therefore a last resort. Again it is for the duty holder to select the means of escape, including items for controlled descent into the sea which should be associated where possible with life rafts to reduce the need to directly enter the sea.

Clearly personnel who have evacuated or escaped from an installation will need to be recovered and there is a requirement in **Regulation 17** for effective arrangements to be made to this end and for taking such persons to a place of safety. It also provides for rescue and taking to a place of safety, people who may be in the sea near the installation – for example, following a helicopter incident. Arrangements made under this regulation are required to secure a good prospect of recovery, rescue and being taken to a place of safety. Lord Cullen recommended that standby vessel provision be considered as part of a package of rescue and recovery arrangements. HSE consider that there are many circumstances where only a standby vessel will provide effective arrangements under this regulation and in these circumstances such a vessel should be provided. I should point out, however, that this does not necessarily mean there has to be one standby vessel per installation.

Regulation 19 requires the duty holder to ensure that plant provided in compliance with the regulations is both suitable for its purpose and properly maintained. In addition duty holders have to ensure that a suitable written scheme is prepared for systematic examination – by a competent and independent person – of certain of the plant provided under PFEER (largely life-saving appliances and fire-fighting equipment). The scheme is above and



The Gramplan Orcades



Scott Guardian standby vessel

beyond any checks carried out as routine maintenance and testing programmes.

Regulation 24 amends the Safety Case Regulations to require a summary of the assessment under **Regulation 5** to be included in the Safety Case submitted for acceptance by HSE. This applies to all Safety Cases submitted after 20 June if there has been time to reasonably perform the assessment.

Relationship with safety case regulations

The PFEER Regulations are designed to complement the Safety Case. To use Lord Cullen's words, 'The regime should not rely solely on the Safety Case The regulation requiring the Safety Case should be complemented by other regulations dealing with specific features.'

....These regulations would complement the Safety Case by setting intermediate goals and would give the regime a solidity which it might otherwise lack.'

It is important that this relationship between the Safety Case Regulations and the PFEER Regulations is understood. Even in the few months since PFEER came into force, inspectors are realising that there are some duty holders who do not understand the relationship, nor why it is necessary to have PFEER at all. The Safety Case provides documentary evidence that duty holders can effectively manage safety on their installations and that they have management systems in place which will ensure compliance with the statutory provisions, identify hazards with major accident potential, evaluate risk and reduce these to as low as reason-

ably possible. In addition they must have arrangements for audit.

The organisation and arrangements provided to meet the PFEER requirements form a part of that safety management system. PFEER defines some specific intermediate goals for the preventive and protective measures necessary for managing fire and explosion hazards, and for emergency response.

Offshore Installations and Pipeline Works (Management and Administration Regulations 1995 (MAR))

These Regulations came into force on 20 June 1995 and are particularly important for all the offshore specific legislation. The regulations reform the existing legal requirements relating to the management and administration of offshore installations and related activities, they remove certain unnecessary and outdated requirements and simplify those which remain and ensure that they are relevant to the maintenance of an effective health and safety management system offshore. These regulations have, for example, modernised into goal-setting form important existing provisions such as the appointment of installation managers and the use of permit-to-work systems.

I would like to draw particular attention to one of the new duties contained in these regulations and one that is of particular significance to everyone involved in work offshore including those working on standby vessels. **MAR Regulation 8** requires every person to

co-operate with the Installation Manager and every person on whom a duty is placed by these regulations to enable them to comply with all of the relevant statutory provisions. Safety requires co-operation between everyone who has a contribution to make to ensuring health and safety on an offshore installation or in activities involving the installation. The scope of the regulation is therefore very wide and includes owners, employers, employees and people in charge of visiting vessels or aircraft. In cases where another person has agreed in advance with the duty holder to provide assistance on which the duty holder depends, that other person will be bound by the duty.

This links back to the requirements of PFEER Regulation 8 and the ACoP and guidance which gives further advice on the co-operation necessary in respect of emergency response arrangements set out in the emergency response plan and in which the standby ship could play an important role.

Enforcement strategy

Our enforcement strategy has been based upon normal HSE practice. Wherever practicable compliance with new legislative provisions is secured through the giving of advice. Nevertheless when giving advice, inspectors endeavour to leave each duty holder in no doubt that they must achieve compliance within a reasonable time.

In developing an enforcement strategy for a new set of regulations, it is important to remember that regulations, such as PFEER, are not developed in isolation but in full consultation with all parts of the industry. In this case, consultation took the form of informal meetings throughout the development of the regulations, and a formal consultation period which finished in December 1993. All the responses to the formal consultation document and the results of discussions were taken into account in producing the final set of regulations. The regulations therefore represent a consensus view to which all sides are signed up to achieving compliance.

Apart from the requirements of

Regulation 11(2) [Alarms] there were no transitional provisions in PFEER; duty holders therefore were required to be in compliance with PFEER on the day on which they came in to force. There was a three-month period between the regulations being made and their coming into force. However, the industry did indicate concern that it might not be in a position to be in full compliance with all the requirements on 20 June 1995.

We too recognised the possibility of less than full compliance with the regulations on the date on which they were to come into force. This was identified as most likely where requirements were new, or provided clarification of previous requirements. The industry's concern centred particularly on the assessment requirements of **Regulation 5** and in particular the requirement to establish performance standards for measures to prevent, detect, control and mitigate fire and explosion, and for evacuation, escape and rescue.

These regulations, like all other offshore specific regulations, fully embody the life-cycle concept for offshore installations. A duty holder has to ensure that the measures taken for the protection of persons and for securing effective emergency response should be suitable for their purpose. In deciding what measures are appropriate, duty holders have to consider the stage in the life-cycle. For example **PFEER Regulation 5**, requires amongst other matters that a duty holder establishes performance standards as indicated previously. It is axiomatic that such performance standards will vary throughout the installation's life; a performance standard which is appropriate during hook-up and commissioning will be different from the standards which are appropriate when hydrocarbons are present.

The examination of the duty holder's performance standards by inspectors is proving to be an extremely effective way of testing compliance with PFEER. In particular inspectors are probing the justification

for the standards set, examining the decision-making process and questioning whether the standard is appropriate and (most importantly) is the performance standard achievable in practice.

Standby vessel operations

For standby vessel operators there are a number of key regulations in PFEER and MAR. Primarily these are as follows:

- **PFEER Regulation 17**—arrangements for recovery and rescue
- **PFEER Regulation 8**—emergency response plan
- **MAR Regulation 8**—co-operation.

PFEER Regulation 17 requires a duty holder to ensure that effective arrangements are made, which includes such arrangements with suitable persons beyond the installation, for:

- (a) recovery of persons following evacuation and escape from the installation
- (b) rescue of persons near the installation
- (c) taking such persons to a place of safety and for the purposes of this regulation arrangements shall be regarded as being effective if they secure a good prospect of those persons being recovered, rescued and taken to a place of safety.

The arrangements for recovery and rescue should take into account other factors which could affect the availability of the measures or arrangements. Amongst other matters this would include sea states and weather condi-

tions and any consequential limitations on operational activities.

A duty holder has to put these arrangements into an emergency response plan and **PFEER Regulation 8** specifically recognises the need for consultation in this process. This consultation has to take into account the views of those who are likely to have a role in implementing the plan—including the standby vessel. This links back to the assessments which were required to be undertaken under **PFEER Regulation 5** and to the performance standard developed for ensuring effective evacuation, escape, recovery and rescue to avoid or minimise a major accident and for the selection of appropriate measures.

This in turn will link back to the duty of co-operation under **MAR Regulation 8**. Where you have agreed in advance with the duty holder to provide assistance on which that duty holder depends, the standby vessel operator will be bound by that duty and with **PFEER Regulation 11** concerning the arrangements for alerting persons of an emergency.

We have now entered into a two-stage inspection project. The first six months of that project is aimed at seeing all duty holders and ensuring that they have plans aimed at achieving compliance with PFEER within a reasonable timescale. The second stage, which begins early this year, will be aimed at testing compliance in greater depth.

Conclusion

We are well on our way to completing Lord Cullen's vision of a new goal-setting regulatory regime. PFEER and MAR have now been in force for six months and we are already testing the impact of these new regulations. From personal experience in an inspection team we are finding few problems.

This paper was given at an IP conference on issues relating to standby vessels held last November.



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Setting New Standards in Safety

Fuelling aircraft at Schiphol

The IP Netherlands Branch recently organised a visit to Schiphol airport to view its aircraft fuelling activities first-hand. Klaas Winters, Plant Manager of Aircraft Fuel Supply (AFS) BV, played host to the 35 visitors and outlined recent and future developments in the company's operations which aim to meet Schiphol's ever increasing aircraft fuelling needs. The fourth largest airport in Europe, Schiphol handles some 800 flights every day, a figure expected to rise to 1,000 by the turn of the century.

Although the oil companies at Amsterdam's Schiphol airport are competitors when it comes to selling aviation fuel to the airlines, they work closely together on the receipt and handling of the fuel at the airport through AFS.

Comprising representatives from 10 oil companies - British Petroleum, Chevron, Elf, Esso, Fina, KPN, Mobil, Shell, Texaco and Total - and the Dutch airline KLM, the AFS joint venture is responsible for both the construction and operation of all the fixed fuel supply facilities at the airport. 'By working together, the participants in AFS can achieve significant economies of scale

while maximising operational efficiencies,' Mr Winters told his guests. 'Furthermore, the joint venture company also optimises the use of land at the airport which is in scant supply.'

Supply and demand

Fuel is supplied through the Defence Pipeline Organisation (DPO) pipeline, which became operational in 1995, and by barge via the Ringvaart canal in the Haarlemmermeer polder. AFS operates three unloading jetties on the canal, pumping fuel to two receiving tanks of 1,500m³ and 2,000m³ capacity, respectively, in Schiphol-East. The receiving tanks are not used for long-term storage purposes but merely serve as buffers to compensate for irregularities in the speed with which the fuel is delivered. Booster pumps then transport the fuel at a rate of 8,500 litres/minute to the Rijk storage depot. Fuel transported via the DPO pipeline is also delivered direct to this point.

The Rijk depot handles some 3 million cubic metres of fuel per year for Schiphol airport, storing it in four 6,800m³ and six 12,500m³ capacity storage tanks until needed. The latter six tanks entered service last year and are dedicated to the reception of fuel from the DPO pipeline.

Fuel is pumped, as required, from the depot to both the seven aircraft refueller vehicle uplift gantries in the centre of the airport and the underground hydrant system where 12 hydrant pumps deliver it to the pipelines beneath the aprons at a rate of some 5,000 litres/minute each.

AFS is not responsible for the actual loading of the fuel onboard the aircraft, however. This is handled by two other joint ventures formed by the oil companies - Combined Refuelling Service (CRS) and Gezamenlijke Tankdienst Schiphol (GTS) - and KLM-operated refuelling services.

Quality focus

AFS strictly adheres to the rules governing the supply, storage and delivery of Jet A-1 aviation fuel (kerosene) to jointly-operated facilities (three or more oil companies) which have been drawn up by the Joint Inspection Group (JIG), an organisation comprising representatives from 11 international oil companies.

'Our aim is to supply top-quality aviation fuel,' said Mr Winters, 'and, to this end, the fuel passes through a multitude of microfilters and filter water separators and is constantly monitored for quality right from the start of the supply process through to delivery to the aircraft.'

Each individual barge consignment of fuel arriving at the AFS jetties is accompanied by a certificate detailing the fuel's characteristics in the minutest detail. Samples are taken and analysed for density, degree of electrical conductivity and levels of 'free water' to confirm these details are correct. Only after the quality of the fuel has been approved is it pumped to the receiving tanks at Schiphol-East, passing through a number of filters on the way. Flow meters in the piping system measure the exact quantity of the shipment, while a control room at Schiphol-East checks fuel density in the pipeline network every five minutes. If the values exceed the limits set, the entire fuelling system automatically shuts down.

The DPO pipeline supply system works in the same way, although in this case additional analysis is carried out to determine the turbidity of the product supplied.

Fuel quality is also constantly monitored at the Rijk storage depot. Here fuel is allowed to settle for two hours before density and levels of free water are checked. As it is heavier than the fuel, any water that is present sinks to the sloped bottom of the storage tank and collects in the sump. This sump is connected to a control tank for sampling by a glass pipe that allows visual

checks for contamination. Only when the quality of the fuel has been approved is it pumped to the hydrants. Because solid contaminants, as well as free water, sink to the bottom of the tank, the fuel is siphoned off from the top by a floating suction pipe.

The quality and safety of the pipelines and the tanks themselves are also under scrutiny at all times. Pipeline sections outside the valve chambers are welded together to avoid the use of flanges, which are prone to leaking, and all welds are checked by X-rays to ensure no fractures or cracks are present. The conduit pipes of the hydrant system also undergo pressure tests each night. In addition, the concrete valve chambers of the hydrant system are automatically checked for the presence of 'free' liquids and as soon as 2-3cm of liquid is detected in a chamber the systems operator is alerted. These deep valve chambers can only be entered when the presence of flammable gases and oxygen have been measured and levels have been deemed safe. 'At present this is done manually,' said Mr Winters. 'In the future it will be automatically monitored from a central point.'

Safety of service

All AFS staff have to meet stringent safety training standards as laid down by the JIG. AFS checks at least twice a year that these requirements are being met and these checks are themselves verified by independent third-party specialists. Rules set by the Dutch Commission on the Prevention of Disasters are also observed as are all other international safety training requirements.

Emergency response training, in which AFS staff and the airport fire-fighting department take part in simulated aircraft fuelling incidents, is carried out on a regular basis. Into-plane staff at the airport also undergo intensive safety training. All the refuelling tankers and dispenser cars are equipped with a deadman's control, which must be kept depressed for fuelling operations to take place, and there are additional emergency buttons



to cut off fuel supply at each aircraft stand. In the event that the process control computers detect a malfunction during the fuelling process, operations can also be halted by pushing an emergency button in the central control room.

In a bid to improve safety further and to protect equipment from damage, AFS has also developed special synthetic lids for the hydrant system's fuel pits that are capable of withstanding the pressure of the nose wheel of a Boeing 747. 'Schiphol is currently the only airport in the world to be equipped with these synthetic lids,' claimed Mr Winters.

Environmentally aware

AFS also makes every effort to ensure that its fuelling operations have as little impact on the surrounding environment as possible. For example, water filtered out of the fuel is collected and taken to an accredited waste disposal site. The Netherlands Water Control Board strictly controls levels of industrial waste and the waste water from Schiphol can only be discharged if it contains less than 10ppm fuel. The AFS sites at Schiphol-East automatically shut down if the oil detection system detects that this level is exceeded.

Other measures include the construction of concrete pits under all the tanks at Schiphol-East during renovation of the site in 1989 which prevent any spills from getting into the surrounding soil. Each pit is capable of containing the entire contents of the largest fuel tank plus 10

percent of the remaining tank capacity.

AFS went one step further during the construction of its dedicated storage tanks, placing absorbent bentonite clay-mats underneath the pits as secondary spill protection. A leak-detection ('tightness control') system was also installed to check for leaks in the steel bottom of the tanks.

Facing the future

Schiphol airport and AFS are currently searching for a new central location for transferring fuel to aircraft refueller vehicles following increased air traffic through the airport and the resultant surge in demand for aviation fuel.

Furthermore, in a bid to improve the operational reliability of the fuelling system, a new 12-inch pipeline linking Schiphol-East direct to the hydrant system around the piers at Schiphol-Centre has been constructed and is to be equipped with a tightness control system by the end of this year. All other hydrant lines around the piers are already equipped with such a system.

Planning ahead, AFS has also laid the foundations for three additional fuel tanks with a capacity of 12,500m³ each. In addition, provision has been made in the hydrant system's valve chamber at pier G to allow an extension of fuel supply to a future handling area west of the airport, opposite the A4 motorway.

Kim Jackson

Filtering aviation fuels

By Kim Jackson

Handling of aviation fuel at airports is one of the most demanding operations in the oil marketing business with large volumes of fuel having to be delivered quickly and safely to aircraft of varying sizes whilst meeting exacting quality standards.

The existing standards for aviation fuel filters, which are published by the Institute of Petroleum (IP) and the American Petroleum Institute (API) are currently undergoing an industry-wide review which, once complete, may result in some fundamental changes to the requirements. Recognising the importance of fuel cleanliness and dryness to the aviation industry and the ensuing fuel filtration standards debate, the IP Aviation Committee, with the support of the Aviation Technical Services Subcommittee of the API, held a conference addressing this topic last November.

Entitled 'New Developments in Aviation Fuel Handling', the one-day conference focused on several key issues of current interest to airlines, air-

craft and engine manufacturers, oil companies and other interested parties involved in the provision of supplies and services to the worldwide aircraft refuelling industry, including a review of the current state of play for fuel filter standards and a look at the industry's efforts to minimise the environmental effects of airport operations and reduce the risk of failure of critical fuelling components during apron operations. Chaired by Simon Shimmin, Manager Aviation Technical Services, Shell International Trading and Shipping Company, and Chairman IP Aviation Committee, the conference ran in tandem with an exhibition of aircraft refuelling equipment.

In the beginning

Murray McDonald, Aviation Operations Manager of Mobil International Aviation & Marine Inc and Chairman Designate of the API Aviation Technical Services Subcommittee, kicked off the day's presentations with an historical review of aviation fuel filtration standards.

The first filtration specifications were issued by the US Military during World War II and periodic revisions since have strongly influenced the development of both military and commercial specifications around the world. In a bid to rationalise the resulting plethora of standards developed by oil companies in the 1960s, API issued Bulletin 1581 in

1973 which was widely adopted as the non-military standard. In 1980 and 1989, later editions of API 1581 were issued and in 1994 a revision was made to the third edition. A fourth edition is now under discussion.

The current third edition of API 1581 defines three classes of applications in which aviation fuel filtration is required. Each class represents the successive stages through which the fuel passes as it moves downstream: A - refineries/pipelines where higher dirt and water levels are expected; B - bulk storage with lower dirt and water levels; and C - mobile equipment where minimal dirt and water levels are expected. It also provides for two 'groups' of qualification tests. Group I is carried out using Jet A or Jet A-1 fuel without additives, while for Group II, the bulletin introduces two additives. The first, Stadis 450, is the static dissipator permitted in commercial fuel specifications; the second is a corrosion inhibitor, Hitec E-580, introduced to represent the effect of surfactant contaminants which can be carried over from refining or from non-aviation grades sharing multi-product pipelines.

API 1581's performance standards for effluent are 15 parts per million water, 0.25 mg/litre solids (red iron oxide being the test dust), and 10 fibres per litre media migration, these levels falling within the range developed in earlier oil company standards. Solids holding for Classes A, B and C are 4.0, 2.6 and 1.3 gram/litre/min rated flow respectively, again reflecting levels developed previously in qualification tests where red iron oxide was the contaminant.

Qualification for Group II filter separators requires three sets of tests. The first series is run in a single element test rig and water contamination is followed by solids injection. Influent water rates are 0.01 percent, 0.5 percent (Class C only), 3 percent and 10 percent (Class A only), and red iron oxide rates are 18 mg/litre for Class C, 35 mg/litre for Class B and 53 mg/litre for Class A. (The same contaminant concentrations are used in all subsequent test runs).



Conference Chairman Simon Shimmin (left) finds time to sample the wares at the exhibition.



The second series of tests are performed on a full-scale filter. In this case solids injection is followed immediately by water. The fuel used in the first two sets of tests for Group II contains static dissipator only. The final set of tests for Group II is in the single element rig with the test fuel dosed with both static dissipator and corrosion inhibitor additives. The test begins with red iron oxide injected, followed by water injection.

The next step

The existing requirements of API 1581 are, once again, under review and much of the conference focused on the changes likely to be implemented in the fourth edition of the standard. The revision is part of a continuous improvement process aimed at correcting weaknesses in previous editions of the standard. However, changes to API 1581 to date have not yet tried to recognise changes in fuel handling systems over the years. Furthermore, the nature of the standard's qualification system and the high cost of testing a new product line tends to create a disincentive for manufacturers to introduce new products prior to the next revision. Many of the speakers emphasised that these issues must be addressed by the next revision of the standard, as must other problems such as the variable agglomeration of the red iron oxide test particulate and the use of additives that do not reflect the real world situation.

Don Feeney from Exxon Company International and Chairman of the API

1581 Revision Working Party explained that the Working Group, comprising operations and research representatives from API, IP and the airlines (through the Air Transport Association - ATA), had defined a broad objective for the latest revision to API 1581 - namely to rewrite it so that the document 'recognises the needs of today's filter/separators users.'

'The new document should address the presence of surfactants in jet fuel and require filter/separators to perform satisfactorily in that environment,' said Mr Feeney. 'Elements should also be more efficient in terms of increased service life and/or lower unit cost. Furthermore, the qualification process should remain rigorous enough to ensure that elements are of high quality and that filter/separators will perform reliably in the field but should also be simple enough to enable manufacturers to introduce new products without undue financial burden.'

Mr Feeney went on to explain that the Working Party has laid down some critical guidelines with regard to the types and concentrations of additives and contaminants used in the API 1581 qualification in order to achieve these objectives. 'The additives and concentrations should be realistic,' he stated. 'Furthermore, with respect to contaminants, what we actually test should concern either the effects of the contaminants on the performance of the filter/separator or their effects on the aircraft's fuel systems or engines.' He also emphasised that good test control and reproducibility are of 'critical' importance.

Greg Sprenger of Velcon Filters, too, outlined a number of key issues under consideration in the latest review of API 1581, some of which are summarised below:

New solid test contaminant Red iron oxide (RIO) has been the primary solid contaminant used for fuel filter testing over the past 30 years and has been specified by API 1581 from the beginning. However, its use is no longer considered satisfactory as changes in fuel and particularly fuel additives have uncovered some inherent problems with RIO in the past few years. For example, RIO has been shown to have a varying dispersibility with naturally occurring agglomerations breaking up when tested with some of today's aviation fuel additive packages. In contrast, silica dust dispersibility has been shown to be independent of the fuel additives tested and is therefore considered to be a more suitable test media. Furthermore, unlike RIO, silica dust has a consistent particle size distribution which is fundamental to reproducible filter testing.

Groups, classes and test series As explained earlier in Mr McDonald's presentation, the API 1581 specification consists of a variety of parts. Mr Sprenger said that, in his opinion, some of the current specifications are unnecessary and could be removed from the fourth edition of API 1581. 'The experience at Velcon indicates the lack of need for Group I within the specification,' he began. 'We have had only a handful of requests in the last decade for equipment meeting only Group I requirements. Most customers, by default, requesting equipment that meets Group II.'

Above: The earliest fuel filtration method relied on chamois leather

Within Group II, all tests use the static dissipator additive while only the third series tests requires a corrosion inhibitor. 'For Class A applications such as pipeline and marine terminals, the use of two additives for the Series 3 test forces filter/separators designs to utilise tighter media to remove fine oxide and water dispersions,' stated Mr Sprenger. 'If the use of the corrosion inhibitor in this series of tests was eliminated, these Class A designs could be made a bit more open. This would conceivably increase field life, since the designs could be tailored to the removal of larger contamination, such as pipescale, which is predominant at these locations. The removal of finer solid contaminant would occur downstream by the Class B filters.'

'Furthermore, Velcon's experience for over a decade is that Series 1 testing, which does not stress the coalescer designs, is unnecessary. It is our opinion that Series 3 is the key test to evaluate the coalescer design and if Series 3 is passed, Series 1 is always easy to pass.'

Three-stage vessel The increasing use of twin-engine jets for ocean-crossing flights (ETOPS) has required increased reliability of all twin-engine jet equipment, including the fuel onboard. While the use of monitors in fuelling equipment has provided an increased level of fuel quality, airlines flying ETOPS continue to request and convert filter/separators to three-stage operation. Such units contain monitor cartridges within the separator cartridges.

'API 1581 does not currently address this three-stage design but only requires slight modifications to do so,' stated Mr Sprenger. For example, the specification would have to increase the start-up pressure drop across the filter/separator by approximately 5 psi (34.5kPa) to take into account the addition of monitor cartridges while an additional valve in the differential pressure lines to the gauges would allow the reading of differential pressure across the coalescers and monitors separately. The latter change would only need apply to Class C specifications which use monitors during fuelling operations.

Pre-filter and filter/separator combination

In certain applications, in particular Class A, coalescer life is a key concern. Filter/separators are complex units, having effectively to remove both solid contaminant and water and, as a result, they are costly to make. Indeed, this fact is reflected in their purchase price. In many cases most of the contaminant in such applications is solid contaminant, such as fine silt and pipescale. Mr Sprenger argued that operating costs could be reduced if the user could replace only the solid contaminant filter part of the coalescer. He supported his statement with the results of a sequence of experiments comparing the use of a prefilter vessel upstream of the filter/separator and a filter/separator by itself which showed that the use of a prefilter increased both effluent fuel quality and operating economics.

While the idea of a prefilter and filter/separator combination would add complexity to the fourth edition of API 1581 and associated approval documents, the cost benefits to be accrued make this an important issue for consideration in the review process.

Micro changes for consideration A number of other changes are deemed necessary to update the API 1581 standard and offer better standardisation to the fuel handling industry. These include a suggestion that effluent water limits for Class A should be raised to 15ppm average, 30ppm maximum individual sample, in order to bring the fourth edition into better alignment with other fuelling specifications such as ATA 103. Furthermore, it has also been recommended that Class C should require 15 ppm maximum as into-plane filter/separators and monitors should not routinely filter contaminants from the fuel but rather act as a final 'insurance' filter.

Research review

Vic Hughes from Shell Research Ltd's Thornton Research Centre and Chairman of the IP Filtration Sub-Committee, provided much food for thought in two presentations which reviewed recent research into jet fuel, surfactants and fuel filters.

His first presentation addressed the issue of surfactants and their effects in jet fuel.

Surfactants are molecules which possess ionic groups (polar) in a molecular structure which is predominantly organic (non-polar). They are naturally present in jet fuel in the form of, for example, phenols, amines, naphthanates and sulphonates. Surfactants are also deliberately introduced into the fuel in the form of anti-oxidants, static dissipators, metal deactivators and corrosion inhibitors. Because of their polarity, surfactants are attracted to any water or solid contaminants that are present in the fuel, at which point they change the surface energy of the water and solid phases to form stable emulsions and dispersions of materials.

Surfactants affect jet fuels in a number of ways, some of which are outlined below:

- **Coalescer disarming** Immediate coalescer disarming takes place once a surfactant reaches a certain concentration. Tests indicate that this is not due to adsorption onto the coalescer's fibres but rather to the fact that a very fine emulsion is formed in the fuel. The surfactant lowers interfacial tension between the water and fuel to such a degree that fine water droplets, less than a micron in diameter, are produced which pass straight through the coalescer. A longer term disarming mechanism is related to progressive surfactant adsorption onto coalescer fibres.

- **Formation of stable water hazes** Water hazes can occur in areas of high local humidity and large diurnal range of temperatures and, if they occur in storage tanks, can cause long fuel delivery delays as the haze must clear first. For a water haze to clear, the water droplets must aggregate to form a droplet of at least 40 microns in diameter. In order for this to happen, the thin film interfaces between them must drain and rupture. Surfactants affect this process in a number of ways - not only do they reduce water droplet size so as to inhibit aggregation but they also also hinder the rupturing process at the interface when particles finally do try to coalesce.

- **Increased levels of dissolved**

water There is typically some 50-70 ppm of water actually dissolved in fuel at normal temperatures. Surfactants can push this up to 70-80 ppm. Tests have shown that this problem can be eliminated by clay-treating the fuel which brings the level of surfactants down.

- Finer dispersion of solid contaminants** Tests with RIO dispersed in jet fuel with additives have shown that the greater number of surfactants added, the smaller the mean particle size of RIO with time. Today's fuel handling systems are experiencing increased levels of finer solid contamination as surfactants levels increase.

Other surfactant effects include lower thermal and storage stabilities, a sensitised additive response and improved fuel lubricity.

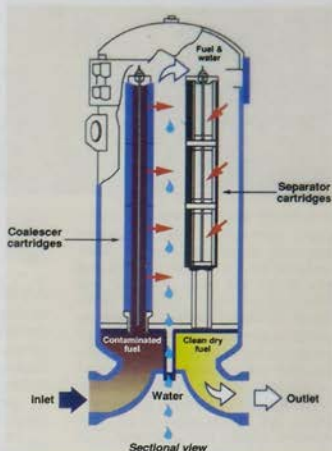
Mr Hughes also outlined methods for the detection and measuring of surfactants, including the use of interfacial tension (IFT) measurements, water shedding tests, ion exchange resins and microseparometry. In discussing removal techniques,

he explained that if there is a problem relating to the presence of a surfactant, it should, if possible, be eliminated at source. If this is not possible, as is often the case, the use of a clay treatment, such as Fuller's Earth or Attapulugus Clay, alumina adsorbents or acidic or basic water washes followed by a salt-treatment may provide a solution. However, he pointed out that the growing use of 'effect chemicals' such as static dissipator additive and corrosion inhibitors in fuels means that the aviation industry should learn to accommodate surfactants and their effects. This requires both good house-keeping, ie the elimination of water and solids, and the use of filter monitors.

In the opening comments of his second pre-

sentation, Mr Hughes stated that, 'It is reasonable to assume from knowledge of surfactant/additive behaviour, that fuel type might indirectly influence filter performance.' The internationally accepted aviation jet fuel checklist of properties does not, as yet, specifically consider such a possibility. However, tests recently conducted by Shell Research on behalf of the IP Fuel Filtration Sub-Committee (the results of which have yet to be endorsed by the Institute of Petroleum) have shown that jet fuel does indeed have effects on parameters relating to aviation fuel filter performance, a fact which may well need addressing in the fourth revision of API 1581.

Tests were made on fuels from refinery run-downs, including seven wet-treated (Merox) and seven hydro-treated fuels. The properties of



Top: Typical cross-section of a filter water separator.

Bottom: Major airline aircraft are equipped to handle solid contaminants with onboard fuel filters.



conductivity, water separability, water-in-fuel emulsion stability and water/fuel interfacial tension were measured for the fuels as received and once Stadis 450 static dissipator and Hitec 580 corrosion inhibitor were added. A model surfactant, sodium naphthasulfonate (SNS), typical of species present after refining, was also used to probe any synergistic effects of trace polar species in the finished fuel. No full scale filter element testing was carried out in the study as it is an expensive activity best addressed after a laboratory-based study.

Three main conclusions were drawn from the research programme:

- Significant differences in the surface chemical properties of fuels within a process type and between the processes themselves (hydro and non-hydro treatment) were found.
- Surface chemical differences across the whole range of fuels begin to disappear when combinations of surfactants are added.
- There are no statistically significant surface chemical differences between any of the fuels when they contain the combination Stadis 450 +

Hitec 580 + SNS at the dosage levels used in the study.

'In developing a qualification test protocol which accommodates variations in base-fuel chemistry, it should be possible to ensure consistency in equipment development and testing so

that industry-qualified filtration equipment will meet the future needs of all field operations,' concluded Mr Hughes.

An airline perspective

Moving away from the laboratory and into the 'real world', Steve Casper, Manager Fuel Technical Services at United Airlines, outlined his company's view of aviation fuel filtration standards and where it believed filter water separators and filter monitors should fit into the picture.

He explained that United Airlines felt it was more vulnerable to a major inflight safety incident from ingesting gross amounts of free or undissolved water than solid particles. While most, if not all, major airline aircraft are equipped to handle solid contaminants with onboard fuel filters, most do not have onboard free-water sensors or detection devices to protect against receiving gross quantities of free water during ground servicing.

'We do not have the trust, faith and confidence that filter/separators will provide 100 percent protection against gross water contamination while refuelling aircraft,' stated Mr Casper. 'We are particularly concerned that if coalescer cartridges become disarmed or do

not allow free water to drop into the vessel sump where the water defense devices are located, water will continue downstream and enter aircraft without the fuelling operator's knowledge. Furthermore, for airport refuelling vehi-

cles that do not have water defense devices, the responsibility of water detection rests solely with personnel performing planeside visual and chemical free-water detection testing, a procedure that has also been known to fail. We are aware of new additives and potent surfactants that can have a significant detrimental impact on the coalescing capability of filter/separator cartridges. With these issues in mind, we feel that the use of full flow fuel filter monitors with the current water absorbing media are essential in providing improved protection against gross water contamination while refuelling aircraft now and in the future.

'Indeed, it is our view that the primary removal of jet fuel contaminants, both water and solids, should be by filter/separators installed at airport storage facilities discharging fuel into hydrant distribution systems or to aircraft refueller loading facilities and not downstream while refuelling aircraft. In this way, full flow fuel monitors can provide maximum aircraft fuelling safety and the necessary protection if water or solid contaminants become a problem'.

Such is United Airlines' belief in this operating ethos that it started the transition from filter/separators to full flow jet fuel monitors on aircraft refuelling vehicles in 1970 and now operates over 100 aircraft refuelling vehicles equipped with filter monitors only.

Hydrant leak detection

Moving away from fuel filtration in the afternoon session, Albert Bates from Air BP and Chairman IP Leak Detection Sub-Committee, gave a presentation on recent developments in hydrant leak detection and containment measures.

Mr Bates explained how the subject fits within a typical life cycle for a hydrant (the underground piping network between the storage depot and the apron areas). He highlighted the effort that goes into the various stages of a hydrant project, from design, specification and purchasing of materials through construction and operation, to minimise the occurrence



Top: United Airlines believes that the primary removal of jet fuel contaminants should be by filter/separators installed at airport storage facilities discharging into hydrant distribution systems or to aircraft refueller loading facilities.

Bottom: Fuel monitors are increasingly being used onboard aircraft refuelling vehicles.

of any defect which could otherwise give rise to a loss of hydrant integrity.

He then summarised the techniques currently available for hydrant leak detection and location and outlined the key points included in a guideline for hydrant leak detection, recently endorsed by the IP Aviation Committee, which is expected to be made available later this year.

To conclude his presentation, Mr Bates looked at an associated development in hydrant pit box design.

What can, and does, go wrong

No matter what measures the aviation industry employs in a bid to achieve a 100 percent safety record during aviation refuelling operations, things can and still do go wrong! Incidents vary from total loss of aircraft or fuel gushers several metres into the air to a minor leak that can be fixed instantly. Andy Holden from British Airways concluded the day's presentations with a look at some of the more recent incidents that have occurred during such

operations, none of which resulted in loss of life but did cause lengthy and costly delays to operations.

He stated that in 1994 alone there were some 319 ground incidents worldwide involving damage to a British Airways aircraft. Some 2 percent of these were the result of 'acts of nature', 10 percent were due to 'unsafe conditions' and 88 percent due to 'unsafe acts'. Whilst most of these did not occur during refuelling operations, the statistics are still frightening and should be highlighted to all involved in the industry.

Some 43 aircraft refuelling incidents have been reported by a number of airlines worldwide in recent years. The causes and consequences of these incidents are varied and some are summarised below:

- Hoses have ruptured and hose connections, couplers and nozzles, and virtual-joint have failed leading to fuel spills.
- Aircraft refuelling vehicle safety devices have failed and, in some instances, units have driven away

whilst still attached to the aircraft.

- Peripheral aircraft service vehicles have damaged hoses, bonding wire and equipment by driving over them.
- Operators have failed to follow proper procedures resulting in damaged equipment and/or fuel spills.
- Fuelling vehicles have caught fire during fuelling operations.
- Fuel has been released into the surrounding fuelling area and been ignited by hot aircraft and vehicle engines.
- Filtering systems have failed leading to water contaminated fuel being taken onboard aircraft.
- Insufficient fuel loads have resulted in aircraft running short/out of fuel.

Mr Holden emphasised the need for constant vigilance in order to maintain and improve fuelling safety. In conclusion, he stated that there was 'no room for complacency' in the aviation fuelling industry - fine words indeed to close the day's proceedings!

Fuel hoses, nozzles, couplings and fittings

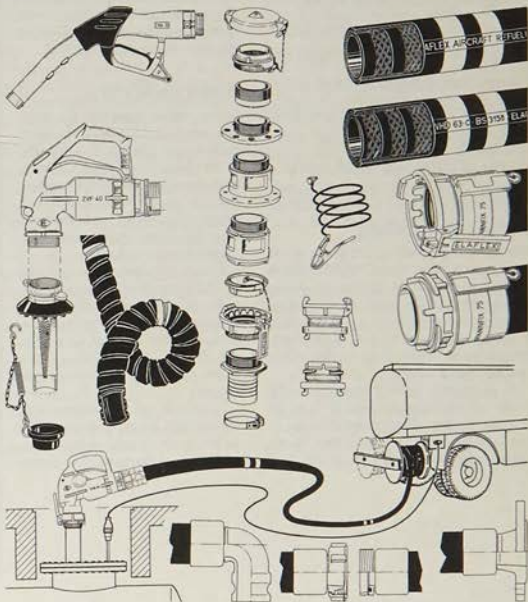
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Elaflex Ltd manufactures a very wide range of equipment for fuel transfer systems, only a small selection of which is shown here.

High-quality automatic fuel nozzles Type ZVA and overwing refuelling nozzles are available for refuelling aircraft, tanks, trucks and other vehicles, all made to appropriate standards. Aviation refuelling hoses fully conform with British Standard BS 3158 and are now used on most international airports, by the British Ministry of Defence and other NATO countries.

A comprehensive range of hose fittings, couplings and adaptors is also available to permit the construction of any fuel transfer line. Hoses, couplings and fittings are also made for the transfer of other liquids.



Mobil plans to go deeper and deeper...

By Jeremy Cresswell,
Press and Journal

Mobil North Sea is preparing to strike westwards out into the very deep waters of the Faroe-Shetland Channel. While exploration activity is hotting up at various locations along the Atlantic Margin stretching from northern Norway to southwest Ireland, the west of Shetland portion of the UK Continental Shelf remains the main focus of attention. While BP Exploration has the highest profile, Mobil looks set to take the laurels in terms of the deepest water drilling yet attempted in the sector.

Deep water drilling

Using the big Reading and Bates semi-submersible Jack Bates, the company intends to drill at least one, probably two and hopefully more, precision targeted exploration wells in Tranche 6 in a water depth of about 4,500 feet, though parts of the 11-block parcel are deeper than 5,000ft.

To put this into perspective, BP Exploration's Foinaven field is in 1,800 ft - the deepest development so far in the UKCS; Mobil's North Sea Beryl Alpha platform stands in 340ft and

Brazilian state operator Petrobras is producing fields in 3,000ft of water.

'All our blocks are in the deepest area,' said Mobil asset team leader Iain Graham. 'Our neighbours are Conoco in Tranche 7. Their deepest is next to our shallowest. We're right in the Faroe-Shetland Channel.'

Of course Mobil has drawn on its harsh environment experiences of the North Sea and elsewhere as it prepares for the Tranche 6 project, which will cost around £22 million by the time the first well is completed. Of that sum, approximately £7 million is earmarked for upgrade-work on the Jack Bates, which is one of about four semi-submersibles anywhere in the world that can cope with very deepwater drilling in the harsh North Atlantic where currents are both fierce and complex.

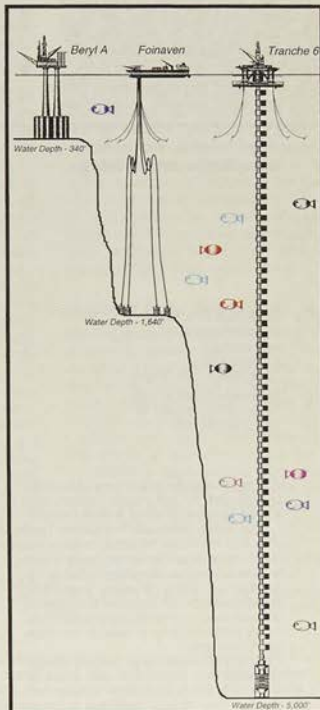
Harsh conditions

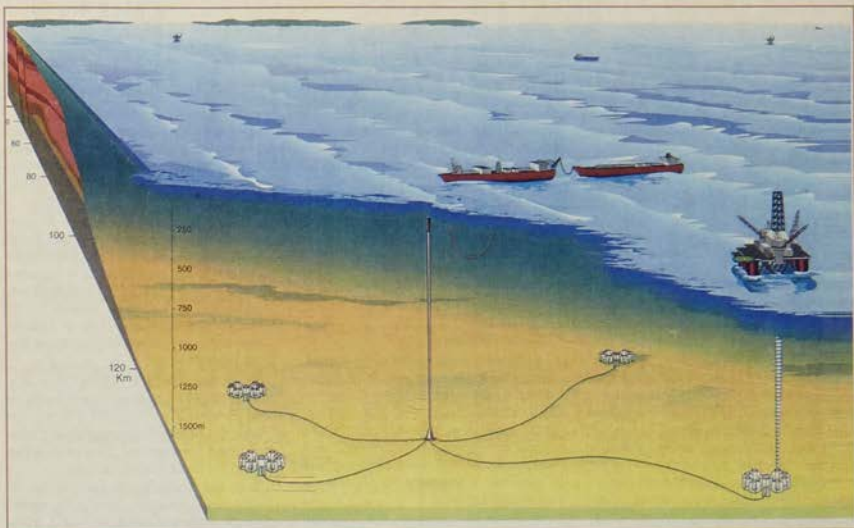
In the Faroe-Shetland Channel, the warm Gulf Stream (otherwise known as the North Atlantic Drift) flows southwest - northeast, while cold Arctic waters tumble northeast - southwest, producing high near-bottom ocean currents and considerable temperature gradients.

Oceanographers have calculated that the Gulf Stream transports a staggering 50 million tonnes of warm water per second near the US East Coast. By the time it reaches Ireland it is down to 10 million tonnes per second.

Overflows of very cold Arctic waters with a temperature of 2°C or less occur in various locations, including between the Faroe

Bank and the Faroes and down the Faroe-Shetland Channel, clipping past the Rockall Bank. These overflows are intermittent, move swiftly and can cause trouble for trawlers, which have been persecuting North Atlantic fisheries since the early 1900s. The devastating impact of overflows on fish stocks in various locations including Newfoundland and Bear Island has been known about since 1924.





The situation in the Faroe-Shetland Channel is further complicated by routine diurnal tidal current cycles.

Any one of the above-mentioned currents, acting on its own, with others and in various directions can produce velocities capable of making drilling operations tough, even nightmarish if the sometimes hair-raising experiences of big, ultra-sophisticated Dutch and Irish pelagic trawlers of up to 6000bhp hunting west of Shetland are anything to go by.

Tough challenge

Mr Graham frankly admits the challenge is a tough one. 'The question being asked was: could we maximise the efficiency of the drilling operation, both through the rig maintaining its position over subsea wellheads, and controlling drag and vibration effects on the drilling riser, which would otherwise fail in such challenging conditions.'

It was clear that more data on Faroe-Shetland Channel conditions was needed before pushing forward with the project. Wind and wave information was already available; ocean current data, however, was not. This is curious given the aforementioned fishery-relat-

ed work on overflows.

To plug the knowledge gap, Mobil deployed two mooring systems in depths of about 4,000ft through the summer of 1992 with meters which measured and recorded water current profiles throughout the water column. A second set of moorings was set down last year to discover if the earlier data was representative.

The results of this work showed that, although drilling operations were feasible, modifications would be required to standard floating drilling systems.

In particular, the drilling riser connecting the rig's drilling systems to the seabed would have to be protected from drag and vibration forces caused by high currents of up to three knots. There can be serious vortex problems too and these are known to have already led to wellhead failures west of Shetland.

Vessel mooring analyses indicated that there were few semis capable of keeping station over Tranche 6 well sites under such severe conditions. The ideal unit would ideally have a large hull displacement to help minimise motion and provide the maximum of consumable storage space.

'We needed a rig with DP (dynamic

positioning) capability or a chain/wire mooring system with thruster assist,' said Mr Graham, pointing out that azimuthing thrusters were needed rather than the more common in-line type.

'Even the four identified needed upgrading, but Jack Bates needed the least. She will need more chain to avoid anchor uplift and it will be necessary to change the anchor fairleads and carry out winterisation work,' he said.

The four candidates comprised Jack Bates, Ocean Alliance, Sonat Rather and Sonat Geo. But the Sonats had been booked by Shell for Gulf of Mexico operations, while the Bates had advantages over Diamond Offshore's Alliance.

Jack Bates'...

The Reading and Bates semi has been fixed on a 15-month contract starting in the second quarter of 1997, reputedly at \$115,000 a day. Upgrades will cost about £7 million and during this year a joint Mobil/Reading and Bates project team is going to get down to the detailed upgrade design work.

Some £1 million has already been spent on the drilling technology side to tackle the thorniest problem of all

– how to minimise drag and fatigue and therefore risk of damage to or even destruction of the drilling riser system. Extensive studies have already been conducted on riser protection systems and a self-orienting fairing of floating symmetrical aerofoil (wing-like) shape has been designed and tested. The system has already been shown to be capable of reducing drag by a factor of four.

... riser problems

There is nothing all that new about the concept of riser fairings as they were used west of Shetland by Esso on a drillship operating in 2,600ft of water. However, there was no discussion between Mobil and Esso about the experience.

Earl Shanks, who leads Mobil's deep-water drilling technology effort, said developing the fairing system was essentially the heart of the project because so much else would depend on achieving an effective solution. Results so far have been very encouraging.

'We came up with a revolutionary new design for a riser fairing intended to reduce running and retrieving time, as well as to allow efficient storage on board,' Mr Shanks said.

'Protecting 4,500ft of riser leads to massive storage problems. One we developed earlier for a planned US project - Manteo - would not do from this point of view.'

'Each fairing will measure about 48 inches wide and near 10ft long and will probably be made from fibreglass. Right now we're looking at eight units per 60ft joint covering approximately 55ft. These things will weigh maybe a tonne each. Once they're installed there should be no problem. They will have slightly negative buoyancy.'

Positive buoyancy has been rejected to avoid risks associated with a free-standing riser, which could damage the rig itself or even a surface vessel if there was accidental contact. Mobil is currently researching which companies might be capable of turning out a large number of the fairing units.

'We hope to run full-scale tests in the first quarter of 1996, get results and

hopefully go into manufacture after that,' said Mr Shanks.

The trial will include placing a prototype vane out in the field, most probably aboard a rig in the UKCS.

Successful modelling trials have been carried out by Battel at the University of Washington in Seattle. This included wind-tunnel testing at velocities of up to 200mph.

Future plans

It was mentioned earlier that a combined Mobil/Reading and Bates team would carry out detailed design work. Complementing this, equipment procurement will start in the second quarter of the year and run through into 1997 when the rig will be put into a shipyard for the necessary modifications.

All things being equal, the first well will be drilled in 1997 before the winter sets in, to be followed by a second at least the following year. Cost per well will be about £15 million, which is about the same as a Central North Sea high temperature/high pressure borehole.

Mobil says it has done its homework thoroughly to ensure risks are minimised. But Tranche 6 remains commercially very risky. Assuming hydrocarbons are found, how will they be extracted at such a depth?

Research by Mobil and tranche partners Elf Enterprise Exploration (42.5 per cent) and Lasso North Sea (17.5 per cent) in the 1980s showed the best options to be either a floating production and storage system tied back to subsea wellheads, or a tension leg platform with the wellheads located at the surface (dry riser).

Shuttle tankers would be necessary given the total absence of pipeline infrastructure now or possibly ever.

Options under consideration

Production risers present one of the most difficult challenges and there are two main contenders at present. They are:

- A hybrid riser comprising a rigid riser from the seabed and buoyed below

the sea's surface potentially offered the best solution, though it would need further work before becoming acceptable for North Atlantic conditions.

- A novel concept developed in conjunction with BAeSEMA where risers for production, gas lift and water injection are pre-installed in a carrier pipe which can be fabricated onshore and surface towed to its location before upending and hooking up to a pre-installed plinth on the sea floor.


Once set up, the whole assembly would bear an uncanny resemblance to a witch's hat.

While Mobil says work on the BAeSEMA concept has gone well, it has not so far been tested for real.

But the company is further on in terms of subsea trees. A great deal of work was done with FSSL (now Kvaerner FSSL) with regard to diverless subsea trees and the concept was completed in 1992-93.

Then there is the question of installation and follow-on intervention work on subsea structures at such depths. Mobil says it has the answer in the shape of an ROV-deployable intervention system capable of carrying out much of the underwater work from a dynamically positioned support vessel. Some of the technology is being used in the North Sea in the Nevis field, which is itself within diver range. The system can perform various tasks including control pod/umbilical installation, flowline installation and choke valve fitting and removal.

The 11 blocks of Tranche 6 are, for now, Mobil's Atlantic Frontier. The gamble is a big one but Mr Graham told *Petroleum Review* that the company is keen to build a new UKCS core area west of Shetland. This could well include venturing into the Faroese sector, should the dream of oil also turn into a reality on that side of the Faroe-Shetland Channel.

Jeremy Cresswell won the Energy section of the 1995 Industrial Journalism Awards, organised by the Industrial Society, and sponsored by Texaco. 

Minimising the Impact of Decommissioning

Thursday 22 February 1996

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

This IP conference is jointly sponsored by The Offshore Engineering Society and The Centre for Petroleum and Mineral Law at Dundee University

Decommissioning has become an emotive and contentious public issue with governments and the industry at a critical stage in a programme to prevent international bodies like the London Convention, the OSPAR Commission or the EU from agreeing a total ban or moratorium on disposal at sea.

Public concern for the environmental issue has become paramount but how can this be balanced against the competing factors of safety and cost? What advances in technology are required to provide acceptable solutions? This conference will concentrate on the key technical issues affecting the decommissioning of offshore installations presented by renowned speakers from government, the industry and academia who will cover the topics of greatest interest. These issues will be discussed in their global perspective in order to achieve the desired balance.

The programme also includes two case studies which illustrate the detailed work that has been carried out by the operators to prepare for responsible disposal of redundant structures. The conference will again bring together a unique team of experts and delegates who will be able to debate openly the issues involved. The 'bottom line' will have an impact on everyone. Early registration for this popular conference is advised.

*For a copy of the registration form, please contact the Conference Department,
The Institute of Petroleum,
61 New Cavendish Street,
London W1M 8AR UK
Telephone: 0171 467 7100
Fax: 0171 255 1472*

Oil and Gas in the Global Economy The Outlook to the Millennium

Monday 19 February 1996

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

The conference will provide an authoritative view of the vital global, political, economic and environmental issues, forming the background to the business and investment decisions that need to be taken, determining the shape of the industry to the year 2000 and beyond.

Topics on the following subjects will be presented:

- An overview from a major player
- The North American perspective
- The role of an emerging giant
- Financing the future
- Environmental factors – the European Union posture
- Stabilising in the Middle East
- Prospects in the Asia Pacific Region
- Making it flow – a trader's vision

*For a copy of the registration form, please contact the Conference Department,
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Fax: 0171 255 1472*

First production from Liverpool Bay

By Carol Reader

Production was expected at the turn of the year from Liverpool Bay, the huge complex oil and gas development in the Irish Sea. This represents a 'major milestone', according to Roger Pearson, Project Manager for operator BHP Petroleum Ltd., as this will be the first oil to be produced off the west coast of Britain. The project, with development costs of over £1 billion, ranks as the

largest development in the United Kingdom at the present time. With some spare capacity engineered into its facilities, further expansion is possible at a future date.

As can be seen from the map, the project comprises four offshore fields. The Douglas oilfield, the hub of the complex which will control and monitor the operations of all four fields in Liverpool Bay, lies some 24 kilometres from the North Wales coast. The other three are Hamilton and Hamilton North gas fields and the Lennox oil and gas field. Recoverable reserves from all four fields are estimated at 150 million barrels of oil and 1.2 trillion cubic feet of gas. Field life is approximately 20 years.

The Douglas complex, with an accom-

modation and utility support platform, a central processing deck and a well-head tower, serves as the centre of the offshore development. Here oil and gas from all the fields will be received and partly processed. Oil from Lennox and Douglas will be despatched to an oil storage barge, located at a distance of 17 kilometres away from the shipping routes into Liverpool.

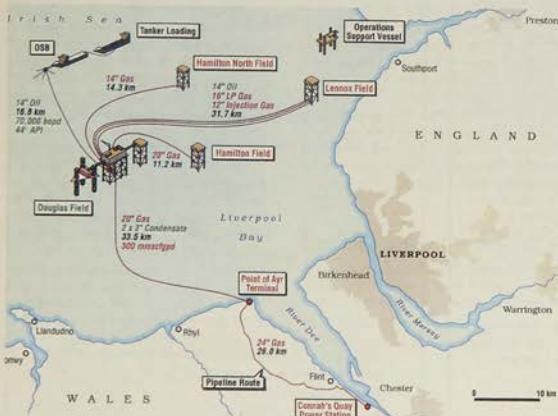
The 870,000 barrel oil storage barge was built in Brazil and then moved to Belfast for the fitting of the rigid arm (catenary anchor leg rigid arm mooring or CALRAM) with which the vessel is moored. This offshore loading enables production from the two oilfields, Douglas and Lennox, to be continuous and aims to minimise shutdown time.

Shuttle tankers will load oil from the storage barge, now in place.

After initial commissioning, the first crude is scheduled to be loaded early in the New Year. The first two cargoes, comprising 500,000 tonnes each, are destined for refineries in Northwest Europe.

Hamilton, Hamilton North and Lennox are small satellite platforms which will normally be unmanned. Lennox is unusual because it is in very shallow water (7.2 metres) only 8 km from the Lancashire shore. At the outset they will have an attendant drilling rig while all the wells needed to produce the reserves are drilled.

The satellite platforms will be serviced by an Operations Support Vessel which was named in a traditional ceremony in Langton Dock in Liverpool last November. Called *Irish Sea Pioneer* and built in Louisiana, the self-propelled jack-up vessel is owned by Halliburton and will in future be managed by Seaforth Maritime Services during a 15-year contract with BHP to supply main-



Wellhead platform (left), processing platform (centre) and accommodation unit (right) of the Douglas complex, Liverpool Bay

tenance and well servicing to the three satellites. The first of its type to operate in UK water, it is an adaptation of the self-elevating workover platform technology already used successfully in the Gulf of Mexico and in West Africa. The *Irish Sea Pioneer* was scheduled to leave Liverpool last month to start work.

BHP is the operator of the Liverpool Bay development, with a 46.1 percent interest. Its partners are LASMO North Sea plc (25 percent), Monument (Liverpool Bay) Petroleum Ltd (20 percent) and PowerGen (North Sea) Ltd with 8.9 percent.

Gas

Initial gas production, from Hamilton North, is being used to commission plant and pipelines both on and offshore. The gas is carried by a 20-inch pipeline to a £250 million terminal at Point of Ayr, where liquids and sulfur are removed. It is then taken by a 24-inch pipeline a distance of 27.5 km to PowerGen's new 1,400 MW combined cycle gas turbine power station at Connah's Quay on the Dee estuary. The contracted supplies of gas to PowerGen are scheduled to start this summer.

The route of the onshore pipeline was carefully chosen after a detailed Environmental Impact Assessment had been carried out. Once the pipeline was laid, reinstatement of the sand dunes and fields was carried out and already the route is almost invisible from the air. In addition at Point of Ayr attractive landscaping together with a small freshwater pond provides a new home for birds and screens the gas terminal from residential housing and holiday homes in the nearby village of Talacre.

BHP management is delighted that the project has been completed on



time and within budget. In fact the interval between the discovery of oil and coming on stream was a mere 31 months. Setting out to 'fast track' the development stages, the construction team have also managed to 'save' £55 million from the original cost estimate. This sum has been put towards the cost of the storage barge and its mooring system which were not part of the original estimate.

John Wils, Vice President North West Europe Operations, BHP, said,

'The Liverpool Bay development has been very much a team effort, with contractors, suppliers, local authorities and other organisations, our partners and our own staff all working together to ensure a successful project brought into production on time and on budget....Throughout, the highest priority has been given to the safety of operations and the protection of the environment, and this will continue to be the emphasis in the production phase.'



Point of Ayr gas processing terminal

Contaminated land – a discussion of risk, standards and ‘trigger values’

**By Dr RJ Watkinson,
Shell Research Ltd**

In the last two decades there have been some prominent cases where chemical wastes have contaminated sites (Love Canal and Lekkerkerk in The Netherlands). These incidents have focused attention on the issue of risks associated with the exposure of humans to polluted soil and the need to protect this environment. Because the understanding of the air and surface water environmental compartments has increased there has been some harmonisation and international consensus on air and water pollution policies. However, it is only recently that some consensus on the approaches to soil and groundwater issues has been reached and effort is targeted

at reflecting this in the various national and international contamination policies. This situation arises in part from the later development and consideration of soil and groundwater issues but also reflects the inherent variety and complexity within the subterranean environment.

Definition of contaminated sites

There has been a trend in the evolving debate over how best to define contaminated sites. It has taken us from fixed standards of contaminant concentrations that demand some clean-up, through the concepts of best available technology and more recently to some consideration of health and environmental risk assessment.

The main drive behind this trend is the realisation that real environmental benefit should ensue from the financial investment being made and that resources should be targeted at the priority problems. A risk-based approach can assist in assessing which sites and conditions represent priority cases and also assess what environmental benefit may arise from different corrective actions.

In order to understand the potential impact of substances on human health and the environment we need to know the chemical nature and quantity of the contaminating substances and their

point of entry into the environment (ie the SOURCE). We also have to understand the routes by which the contaminants then travel into the wider environment (Transport PATHWAYS). The distributed material may then interact with some environmental RECEPTOR or TARGET via an exposure pathway.

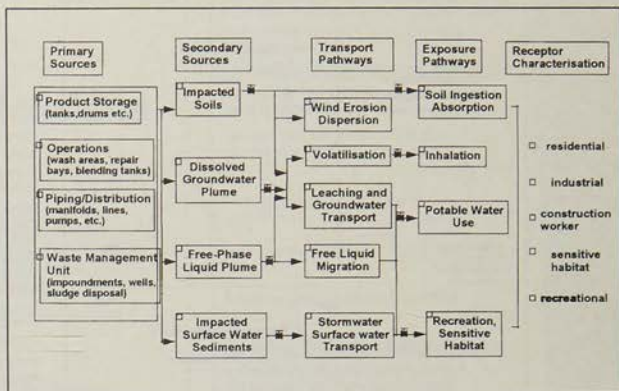
This conceptualisation of assessing contamination in terms of SOURCE, PATHWAYS and RECEPTORS/TARGETS forms the basis of defining the nature of the problems and assessing the risks and can lead to options for possible corrective actions.

Some quantitative description of these processes forms the basis for assessment of risk to human health and the environment from the contamination present. **Figure 1** shows schematically how one can simply analyse the sources, pathways and receptors. One can qualitatively decide which pathways are likely to be operating and which receptors may be vulnerable. The ‘valves’ indicate points of intervention where one might effect a remedial action and thus reduce the risk. It can be seen that, depending upon which pathways may be operating, for any one source and receptor, there may be several different points for, and kinds of, corrective action (see **Figure 3**).

Trigger values

The assessment of sites to determine their environmental status can be based on some reference to acceptable concentrations of substances which, if exceeded, indicates a degree of risk from the contamination. These values can be derived using pathway specific risk assessment models, with conserva-

Figure 1



tive assumptions built in, to provide 'generic' values which are protective in almost all situations. Problems arise with the application and interpretation of these generic 'trigger' values (ie they trigger some further action) used as 'fixed standards' that some further remedial activity must meet. This overly conservative approach can lead to corrective actions that may not reflect any environmental benefit but can lead to excessive expenditure. Guidance values used for assessment purposes are not directly equivalent to 'clean-up targets' or remedial objectives.

The guidance concentrations of contaminants (provided by whatever mechanism) would normally be protective of human health and the environment in most situations. This objective itself needs some terms of reference that relate to 'normal behaviour and acceptance.' Thus in terms of human health one might consider background cancer rates as being the acceptable limit and thus not to add significantly to them is a 'reasonable' objective. There needs to be similar criteria for other aspects of human health and the wider environment (ecotoxicity, toxicity, aesthetics etc).

There is some perception that if these guideline values are exceeded this fact should 'trigger' some corrective action or amelioration of the 'contaminated' area. However, the variety and diversity of sites and surrounding environments makes it impossible to set a unifying 'standard' other than some ultra-conservative value that protects the worst case scenario. This would not be economically

sustainable for all sites and thus there is a need to develop a more 'reasonable' approach to individual site assessment that still reaches these same objectives of protecting human health and the environment. One could consider a constant risk evaluation as being the driver and target for remedial actions. **Figure 2** demonstrates that a 'fixed standard' in truth implies a variable risk since it needs to be protective of human health and the environment for high risk scenarios and thus for low or negligible exposure it is overprotective.

Varying risks

An example may be a substance that is highly sorbed to soil and is non-volatile which has a trigger value of 1,000 mg/kg soil. If the substance occurs at this concentration in a surface soil on a site that may be used for domestic gardens, it represents a high risk situation. If the same concentration of the substance occurs on a site but at 10 metres depth, where the non-potable water table is at 100 metres and the surface soil is clean,

then obviously this is a low potential exposure and low risk scenario. Both sites have the equivalent amount of material present so the question is whether we treat the sites as the same or different based on a risk analysis.

One should first test the validity of the underlying assumptions in the 'generic model' by incorporating some site-specific data into the analysis. This 'second pass' evaluation leads to a multi-tiered approach. On the other hand if there is no possibility that observed values will exceed generic values, then savings in further site assessment can be made. This approach makes for cost-effective solutions. In the most recent review of their contaminated land policy the Dutch allow for site-specific risk assessment but since multi-functionality is required (land should meet any future use requirements) all the pathways have to be considered to be potentially operational. However the Dutch regulators accept that multi-functionality does not have to be implemented immediately.

In our normal lives in order to achieve some perceived benefits, we accept

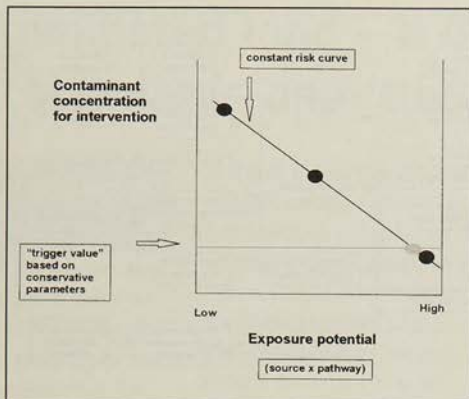


Figure 2

certain risks (eg smoking cigarettes, travelling by car). Thus the perception of risk associated with some hazards should not be alien but we have to be more conscious of the process and procedures for establishing risk-based approaches. To build these concepts into regulations and policy,

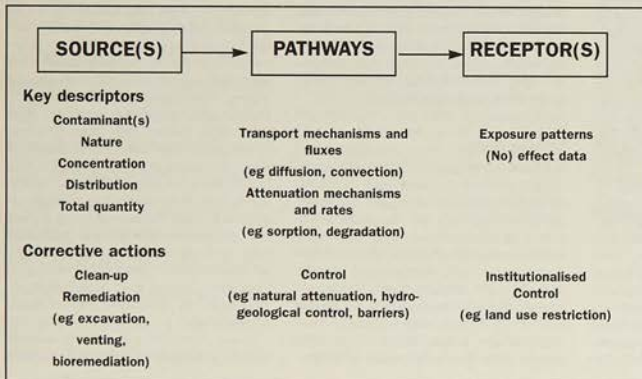
the process of justifying and rationalising these judgements needs to be transparent. In many areas, particularly in safety assessments, the concepts of risk assessment have been developed and generally accepted. The application of these ideas to areas of environmental concern is a fairly recent phenomenon and is slow in finding some acceptability across a broad audience.

The American Standards for Testing and Materials (ASTM) has approached the evaluation of contaminated petroleum retail sites from the perspective of risk-based corrective action (RBCA, referred to as 'Rebecca'). By integrating risk assessment and corrective action this standard goes a little further than basic risk assessment. Even in a screening process some evaluation of the likely pathways for transport and exposure are assessed. The approach still provides 'triggers' for

further action that may lead to more extended risk assessments or directly to some remediation action. However the decision is based on some evaluated environmental risk that is relevant to the specific site and should lead to more consistent decisions and outcomes for site evaluations. It also allows for flexibility in the selection of remedial options to achieve the same risk reduction and a cost-effective solution providing measurable environmental benefit.

Acknowledgement to the members of the IP Environment - Contaminated Land Sub-Committee for their help.

Figure 3



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Trinidad exploits gas reserves

By David Renwick

Trinidad and Tobago has traditionally been known to the energy world as a small oil producer but in recent years has been quietly, though aggressively, building up a reputation for itself as a centre of gas-related activity.

The conversion from an oil-based to a gas-based economy will be dramatically confirmed this year when work begins on the first liquefied natural gas (LNG) export project.

When the plant goes into production in mid-1999, it will boost gas output by 400 million cubic feet per day (mcf/d) to a total of over 1.1 billion cubic feet per day (bcfd), maintaining the country's position as the world's third largest per capita gas producer, behind only Qatar and Canada.

Dr Ken Julien, Chairman of the state-owned National Gas Company (NGC), which has a mandate to promote the widest possible use of local natural gas reserves, estimates that TT\$6 billion (US\$ 1 billion) will be invested in gas development in Trinidad and Tobago up to the year 2,000, including LNG.

Switch to gas

How was this switch to natural gas as the country's dominant hydrocarbon accomplished so quickly and with such relative smoothness?

The short answer is because gas is what the oil companies have been discovering during their exploratory drilling programmes over the last 20 years and the government has recognised the need to exploit this resource as a substitute for the national income and tax revenue no longer obtained from oil.

Since 1978, Trinidad and Tobago has lost about 96,000 barrels a day (b/d). In the same period, it has gained about 250 mcf/d of natural gas production. The Energy Ministry calculates that gas reserves are equivalent to about 270 million tonnes of oil, while proven oil reserves stand at less than 70 million tonnes.

Proven oil reserves will last for only another nine years at current extraction

rates, while natural gas output could continue for at least 30 years. If probable reserves are also considered, oil would have a total life span of 25 years, compared with 55 years or more for natural gas.

Emphasis on gas

It was clear since the late 1970s where the emphasis should be placed. The only question was how to go about successfully exploiting all this gas?

Amoco Trinidad Oil Company, which had discovered extensive reserves in east coast offshore fields, was the first to get the gas to shore. The government provided a market through the state-owned electricity company and by embarking on a programme of petrochemical plant construction.

In the late 1970s and early 1980s, it was government finance which established a methanol plant, a urea plant, three ammonia plants (51 percent state-owned) and a steel mill (using gas to produce directly reduced iron).

In the 1990s, the government has backed off and encouraged foreign private investors to take up the running in gas-based industrial development. Some of the companies that have come into the picture recently include: Arcadian of the US, which bought the government's interest in an ammonia plant and then added another 255,000-tonne plant of its own; Ferrostaal of Germany, Methanex of Canada and C L Financial (a local conglomerate) came together to build the 500,000 tonne Caribbean Methanol Company; Ferrostaal and Helm of Germany have joined forces to fund another 500,000-tonne methanol plant, linked to the original government-owned Trinidad and Tobago Methanol Company (in which the two German firms have bought a control-

ling interest) and Farmland Industries and Mississippi Chemical Corporation will soon start construction of a 675,000-tonne ammonia plant.

A fourth methanol plant, again primarily funded by Ferrostaal and C L Financial, has just been approved and Saturn Methanol Company of Houston is interested in building a fifth plant.

When all these plans materialise, Trinidad and Tobago will be the world's biggest methanol exporter. It is already the world's second largest ammonia exporter. Nucor of the United States is using Trinidad and Tobago gas to enable the country to chalk up yet another record – that of being the first commercial exporter of iron carbide.

With the market for gas expanding rapidly, other companies have moved to start extracting their gas reserves. Enron brought a gas platform on stream in 1994. British Gas and Texaco will initiate a 20-year contract to supply up to 275 mcf to the buying company,

NGC, from their Dolphin field off the east coast, starting this year. British Gas also has several gas fields off Trinidad's north coast ready for development.

There is now a self-generating momentum to the gas industry that shows no sign of slowing down. After LNG, will come an ethylene complex and the development of downstream products, using gas liquids, such as MTBE from butane. Linkages to methanol include acetic acid, formaldehyde resins and melamine.

NGC officials are busy flying round the world encouraging investors in gas-based products to look to Trinidad and Tobago and the response, from all accounts, is encouraging.

LNG plant

The LNG plant is the biggest feather in the NGC cap and will become the single largest user of natural gas.

Amoco, the major local gas producer

(62 percent of the existing daily supply of 580 mcf of high pressure gas) was attracted to the project as an outlet for some of its substantial gas reserves, currently estimated at 5.5 tcf. British Gas wanted a customer for its north coast reserves, when they come on stream. Cabot, a leading US gas distributor, needed gas for its customers in New England.

These three, plus NGC, have established the Atlantic LNG Company of Trinidad and Tobago to fund the US\$1 billion liquefaction project.

Perhaps as an indication of Trinidad and Tobago's desire to exploit the gas reserves as quickly as possible, the LNG partners have overcome all hurdles and after a mere two and a half years will be in a position to award a construction contract for the plant in the next three months.

As David Wight, president of Amoco Trinidad, says: 'I'll challenge anyone to show me an LNG project anywhere in the world that has been done so fast'.



East Anglia Branch

Inaugural Meeting

'The oil and gas industry in Britain – today and tomorrow'

Thursday 18 January, 19.00 for 19.15

By Colin Harvey, Managing Director, Shell UK

The inaugural meeting of the IP East Anglia Branch will be held at the Nelson Hotel, Prince of Wales Road, Norwich (5 minutes walk from Norwich BR station – abundant parking). Members from Norfolk, Suffolk, Cambridgeshire and North Essex are invited to attend.

Contact: Chris Kemp, Programme Secretary,
East Anglia Branch Tel: 01508 480800



Energy Economics Group joint meeting

'The Middle East Peace Settlement and Iraq's Re-entry into the World Petroleum Market'

Tuesday 20 February, 15.15 at The Caledonian Club, 9 Halkin Street, London SW1

By Pierre Shammam, President APS Group

Arranged by the British Institute of Energy Economics

Contact: Mary Scanlan, 37 Woodville Gardens, Ealing, London W5 2LL. Fax: 0181 566 7674

Education and Training

Industry recruits more graduates

The Institute of Petroleum has continued informing young people of the opportunities within the oil and gas industry. Last year information was published to help children, both in primary and secondary schools.

A further leaflet *The Oil and Gas Business: Careers at the Heart of the World Economy* has been distributed to careers advisers, university lecturers and undergraduates. Available from the IP Information Department, the leaflet contains information from

recruiters regarding the challenges and opportunities in this industry. The Institute has received many replies from universities and we plan to develop closer relationships with the university departments during this year.

Following consultation with the main recruiters of graduates into the oil and gas sector, it became apparent that careers advisers and hence students were not up-to-date on the opportunities for graduates.

The Institute conducted

a survey of many of the oil companies and contractors which recruit graduates. It emerged that last year both oil companies and contractors expected to recruit 10 percent more graduates than in the previous year.

The IP leaflet outlines the results of the survey in detail and provides up-to-date information on the numbers of graduates joining the industry through recruitment programmes, the qualities employers look for, and where most of the opportunities lie.

Helping developers become more effective

Roffey Park Management Institute is providing an MSc in Management Development in conjunction with Salford University.

The MSc programme is designed for experienced in-house developers and is focused on enhancing the value of training and development within the organisation.

The two-year part-time MSc combines self-managed learning with three-day residential periods at Roffey Park and a series of one-day set meetings. This structure enables students to continue in their career, make the learning relevant to their own organisation and to put it into practice at work. The content of the programme helps participants to:

- Learn how to link management development to organisational strategy
- Learn how to make best use of your experience in your work
- Learn how to get effective management development implemented.

The next intake for the MSc course starts this month.

Careers events

Students from Harrogate, Ripon and surrounding areas, preparing for their GCSEs, visited the IP stand at a major careers fair held in Harrogate last November.

Students from nearly 20 schools in North Yorkshire, as well as their parents, talked about their future studies and careers with IP staff and Yorkshire Branch members.

The North Yorkshire area has one of the highest proportions of 16-year-olds continuing in full-time education and going on to university.

There was particular interest in the wide opportunities available in the oil



IP stand attracts interest

industry from those studying science. Geology is not widely taught in schools nowadays but there was a surprising number of students studying the subject who were interested to know about opportunities

in the oil industry.

The Institute of Petroleum has a wide range of careers information. This year we plan to participate in more career events, both for pupils and teachers.

Safe working in potentially explosive atmospheres

A new training course is now available for operatives installing and maintaining electrical equipment in hazardous areas.

The *Health & Safety at Work Act 1974* places an obligation on employers to provide training to ensure the health and safety of their employees. The Act also makes it the duty of every employee to ensure the health and safety of themselves and other workers who may be affected by their acts or omissions at work.

The appropriate British Standards and Codes of

Practice, and more particularly the *Electricity at Work Regulations 1989*, recognise that the specification, installation, maintenance and repair of explosion protected equipment are specialised activities. As such they require a higher level of competence than similar activities on normal industrial electrical equipment.

Until recently, no national standard has existed for this training.

The Engineering Equipment and Material Users Association and the Electrical Installation Engineering Industry Training

Organisation (EIEITO) have co-operated to produce a National Training & Certification scheme for operatives who wish to work for companies installing and maintaining electrical equipment in potentially explosive atmospheres. The Health & Safety Executive supports this development.

EIEITO is the lead body for this scheme and JT Ltd is the awarding body for certification.

It is intended that the certificate awarded for successful completion of this training programme will ultimately form part of the National Vocational (NVQ) framework.

It is foreseen that the petrochemical and offshore industry employers will make it a requirement for all relevant staff to demonstrate successful completion of the training programme.

The Pegasus Training Centre has now been established which has been accredited and licensed to deliver the new training and assessment scheme. An advanced simulated work area has been built for the practical competencies of the training and the facility will be operated by staff experienced in the specialist training required.

Education and Training

'Plenty of work but no jobs'

Last year over 140 senior executives attended a forum sponsored by GHN and *Human Resources Magazine*, which focused on the concept promulgated recently that not only are jobs-for-life dead but the job is dead.

Will the vision of teams of mobile professionals being assembled, re-deployed and reconstituted in a different framework to meet new business goals be a regular feature of all commercial enterprises? The media business has operated like this for many years, which perhaps is not a very good recommendation for other industries. Sir Bob Reid said at the forum 'Employers should be helping employees to become more employable'.

Organisations can help by providing a framework for individuals to discover their full potential. Many differ-

ent views on the issues were aired and the following suggestions were made on how to manage in a world without jobs.

Select people on the basis of their suitability and desire to do the work, not for their qualifications, past experience, or where they come from.

Pay them fees of some sort and give them a share of the profits. Tenure and seniority-based salaries are out.

Create new personnel policies. Even core employees will become suppliers of services requiring special contracts, portable benefits and personal pensions. Today's personnel policies are obsolete: they focus too narrowly on permanent core workers, while marginalising more flexible, temporary, workers. This attitude needs to shift. Leading-edge companies will create

policies modelled to fit the flexible employee seen as a supplier of services.

Manage and motivate differently: you cannot tell a strategic partner what to do. Often the best workers will be presenting you with proposals on how your business should progress. Your leadership may come down to deciding which of the competing proposals are most worthy of your investment, or it might be to coax extra commitment out of suppliers who could easily take their services elsewhere. This calls for leadership which is fully and finally divorced from the weight of positional authority.

Create a culture where it is OK to ask for help. Provide access to external wisdom by encouraging networking. Offer both internal and external mentoring schemes. These will provide individ-

uals with a personal coach as well as friendly support. If the mentor is external they will benefit from a 'safe ear' and an objective sounding board.

Help employees maintain their employability. Employees with no jobs to aspire to, only their own businesses to develop, need to learn how to create work for themselves. Creating work is an entrepreneurial task, not an old-fashioned government job creation scheme. Careers will now become more like the work histories of professionals such as doctors, lawyers or management consultants. Many 'staff' employees already see themselves as internal consultants. A career of this sort does not advance up a managerial hierarchy but through a growing professional reputation.

US interest in UK standards

The US Departments of Labour and Education have established a National Skills Standards Board (NSSB) which co-ordinates the pilot development of skill standards in occupational sectors. The NSSB has its authority from the 'Goals 2000 Educate America Act'.

The UK system is still seen as being a particularly relevant model for the United States, with key factors being:

- Comparable economic requirements

- Bi-partisan and longer-term commitments
- The new process must integrate with and be incremental to those already established
- Government-primed but independent and voluntary structure
- High level of industry involvement/leadership
- Industry sector leadership
- Similar issues in actual leadership

The NSSB has not developed its structure nor detailed work-plans but will include actions to reform education based on previous published studies.

Discussions and exchange of information took place last year between NSSB officials and staff developing National Vocational Qualifications in the United Kingdom. The role and place of knowledge and understanding in competence standards is an area of strong mutual interest.

Improving the quality of NVQs

A major study is being undertaken to enhance the quality of the evolving framework of qualifications by reviewing a sample of 100 NVQs/SVQs already established in a variety of industries.

Reviews of all NVQs/SVQs will be based on the new NCVQ and SCOTVEC Criteria and Guidance.

For the in-depth reviews, focus will be on their practical application with particular reference to breadth, knowledge and understanding, and the cost-effectiveness of assessment processes. The qualifications to be reviewed are being selected to ensure coverage of the framework of NVQs/SVQs, evaluation of a range of assessment methods and inclusion of a range of awarding bodies.

The reviews will be guided by an independent Evaluation Advisory Group. The findings were scheduled to be reported to the Secretary of State for the Department for Education & Employment (DFEE) last month.

VOQAL spreads the word

If you want to raise the efficiency and skills of your staff and workforce, and would like to know how other organisations in the oil industry are raising the standards of their workforce, and what is available to help you, make sure you receive the next copy of VOQAL, published in January by PESC, the organisation run by the downstream oil and gas business.

Previous issues of VOQAL have included information on how refineries and distributors are using vocational qualifications to help operators and staff improve their skills, as well as telling of the experiences of some companies who have introduced N/SVQs, together with more information about how you can join. The qualifications are not only just

for specialist technical staff but include a comprehensive range of many occupations such as purchasing and supply, information technology, information, accounting, clerical or supervisory management, warehousing, as well as personal training.

To make sure you get your copy of VOQAL, please contact PESC on 0171 257 5151

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- *Standards Infodisk (ILI)*

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If you cannot visit the library in person, we will undertake research on your behalf for a fee. For more information contact Lyn Nevin or Deborah Ansell.

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on the technical side of the upstream oil industry.

We now have access on-line to Reuters Business Briefing to find articles appearing in the press and leading journals dating from today's papers back through the last five years. For a fee we can search for you or you may come and use the system for yourself. For more information contact Deborah Ansell on 0171 467 7114.

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Technology News

Going solo with memory pressure

The quartz-based pressure gauge provides highly accurate pressure data and, thus, is the tool of choice for reservoir engineers. However, the high cost of trained staff to run such memory gauges, the bed space restrictions on offshore platforms and remote well sites often make the prospect cost prohibitive.

Such constraints have often forced the reservoir engineer to make do with low quality data collected by strain gauges or mechanical gauges, sometimes with no recent calibration or verification.

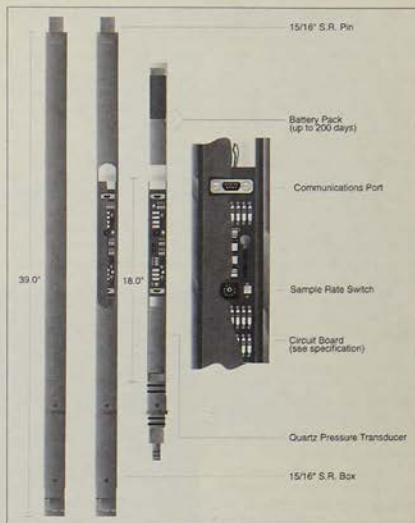
In a bid to resolve this problem, the Expro Group has developed a new quartz, 100,000 data set memory gauge, the 'Exal Solo Gauge', specifically for use by wireline personnel with no previous electronic pressure gauge experience. The gauge requires no computer to set it up for operation -

the user simply removes the housing, sets the programme switch, attaches the battery, checks the confidence tester and re-fits the housing.

The tool's quartz transducer is virtually drift free, less than 2psi per year, and produces reliable data for up to 200 days without the need for recalibration at a service centre.

Rated to 300°F, the gauge can be read at the well site on any PC with a standard RS232 port. The accompanying software allows the user to plot, print, view and edit the pressure data and to produce an ASCII file for further analysis.

According to the manufacturer, the gauge's short, one-metre length coupled with its small battery pack size, which has been kept to a minimum through the use of ultra-low power consumption components, makes wireline rigs 'far easier to perform in remote locations and on production platforms'.



Exal solo gauge

Tough tachograph regulatory requirements

As of the first of this month, European Union (EU) legislation requires all new vehicles over 3.5 tonnes gross vehicle weight to be fitted with a tachograph that records any interruption of power supply.

According to Veeder-Root, its 8300 Series tachograph is the only UK-manufactured

tachograph capable of meeting this requirement. It also has British Approvals Service for Electrical Equipment in Flammable Atmospheres (BASEEFA) safety standard approval for use on UK road tankers carrying petroleum spirit or other flammable products.



The 8300 Series tachograph

New methanol to olefins process available for licence

UOP and Norsk Hydro have announced the immediate availability for licensing of a jointly developed process for converting methanol to olefins (MTO).

Developed to function as a second step in a two-step process to convert low-cost natural gas to ethylene and propylene, two major petrochemical feedstocks, the UOP/Norsk Hydro MTO process features a fluidised-bed reactor and regenerator with a highly selective molecular sieve catalyst capable of

handling multiple regenerations.

'When combined with any commercial methanol-production process, the MTO process provides an economical way to complete the conversion of natural gas to olefins, especially in areas with abundant natural gas,' state UOP and Norsk Hydro.

A demonstration plant, based in the Norsk Hydro facility at Porsgrunn, processed a half-ton of methanol feed per day during trials last year.

Marine fuel management video

The latest video to augment Det Norske Veritas Petroleum Services' (DNVPS) fuel management video training series has been designed specifically for those personnel concerned with the selection and purchasing of fuels for ships.

Entitled The Selection and Use of Marine Fuel Specifications, the video provides step-by-step instruc-

tions on the building up of a fuel specification and its relation to the ISO fuel standard.

The video is accompanied by a Fuel Management Guidelines booklet and a diskette featuring programs for a wide range of calculations associated with bunkers, including volume and weight calculations, blending and useful conversions.

Technology News

New compressed seismic data technology cuts time to field production

Increased use of 3D seismics over the years has brought escalating costs, lengthened turnaround times between data acquisition and processing – sometimes as long as a year – and created difficulties in handling and storing the huge volume of data produced.

However, Chevron Petroleum Technology Company (CPTC) believes that its new seismic data compression technology marks a 'breakthrough in seismic acquisition' by significantly reducing the cycle-time in the exploration phase of hydrocarbon development and allowing fields to begin production earlier. The company also expects its new technology to 'help establish a new industry standard'.

Capable of compressing 3D marine seismic datasets to less than one percent of their original size, CPTC's computer software allows satellite transmission of compressed data from a seismic survey vessel to an onshore processing centre to complete the same day it is acquired without any loss to data integrity and quality.

A field test conducted on

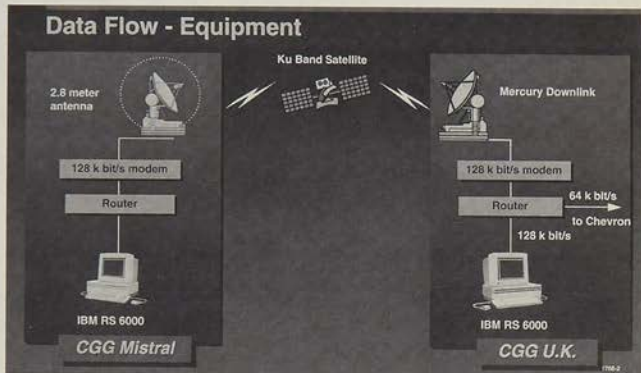
the Ninian Field last summer showed an average turnaround time from data acquisition to decompression of just 30 hours. Data were compressed in a 60:1 ratio – until now, geoscientists could attain compression ratios no better than 20:1 – using the Chevron workstations onboard the seismic vessel CGG Mistral. This information was then transmitted through a wide band satellite

link to Brechin in Scotland, and via a land line to the processing centre for decompression (see diagram).

The field trial proves that real-time seismic exploration, in which processing and interpretation of data takes place while a seismic vessel is still on prospect, is possible, says Chevron. Indeed, the company plans to use the technology in support of several seismic surveys over forthcoming

months, including a survey of the West of Shetland area.

Chevron also reports that research on the technology is continuing to reveal new applications, including the potential to keep entire 'prestack' surveys on-line in disk storage, to store data compressed and kept in RAM for high-speed access and to reduce tape volume to save both storage and regeneration costs.



Schematic of data transmission process during Ninian Field trial

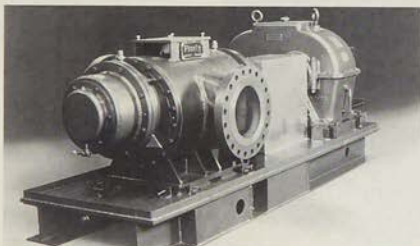
High capacity pump for high viscosity fluids

Plenty Mirrlees has developed a positive displacement vane pump capable of handling 500 cubic metres per hour of high viscosity fluids, such as lube oils, bitumen and resins. Designed for viscosities between 2 and 75,000 centistokes, the new 'G2000-500' pump is the largest capacity unit produced by the company to date.

As with other designs in the G2000 range, the new pump features a rotating assembly consisting of eight working blades made up as two sections set 45° apart, each section consisting of two half blades and one 'H' blade. The eccentricity between the shaft and rotors causes the chambers formed between the rotors and blades to vary in size as the pump rotates.

Liquid entering the pump is split into two streams and guided into the ends of the rotors and then back into one stream and out through the discharge port. The eight bladed design smooths out the flow pattern resulting in a low pulse, vibration free pump generating low noise levels.

According to the manufacturer, further advantages of the design include the reduction of wear at the blade tip reducing maintenance and ensuring high volumetric efficiency together with a low shear rate virtually eliminating emulsification of the pumped liquid.



The G2000-500 positive displacement vane pump

Offshore data transfer service

Offshore units requiring speedy, high-volume data-file transmission can now access a new high-speed, 64kbit per second data-transfer service on Inmarsat B from Eik Land Earth Station in Norway.

Inmarsat B is a digital system enabling video and audio broadcasts, multiplexed channels and videoconferencing. User terminals and charges for this system are cheaper than those for the Inmarsat A analogue system.

Operated by Telenor on behalf of a Nordic joint venture, the Eik Land Earth Station is said to be the largest and most advanced earth station in the Inmarsat system. It has direct access to three of the four Inmarsat satellites covering the globe.

Technology News

Cushioned protection for oil spills

Darcy Products' 'Drizit' oil absorbent cushions are now available in two sizes. The first, of 50cm x 50cm x 5cm dimensions, is capable of absorbing up to 12.5 litres of oil while the second 50cm x 10cm x 7.5cm cushion can soak up to 6 litres of oil.

The Drizit cushion comprises a lightweight, close-mesh net bag filled with highly absorbent fibrous polypropylene. The larger sized cushion is also offered with a hydrophilic absorbent filling for dealing with most acids, alkalis, solvents and other chemicals with the exception of hot fuming acids and strong oxidising agents.

The cushions are particularly suited for use in sumps and deep gulleys where access is via a manhole and where the location of the spillage neces-

sitates operating from steep river banks, quaysides and lock chambers. The incorporation of a mooring eye and lowering rope facilitates deployment and retrieval.

The cushions can also be used to prevent spillage from flowing into sewers via drains and gulleys and preventing leakages from drums, faulty valves and machinery from spreading further. Less affected by wind and current than flat type absorbents, the cushions are also effective in flowing water and can be placed behind absorbent booms to provide an additional barrier and speed the rate of absorption.

The cushions can also be cut open and the absorbent employed as a loose particulate for dealing with small spillages in difficult to reach areas.



Drizit oil absorbent cushion

Micro-machined sensor chip enhances pressure transducer specifications

The latest family of pressure sensors to be released by EG&G IC Sensors incorporates a sealed, micro-machined silicon strain gauge transducer

which, the company claims, results in 'significantly better performance and 50 percent lower unit cost than previous industry norms'.

The unit's 'Ultra chip' design is said to have reduced transducer non-linearity to ± 0.1 percent and expanded the temperature compensation range to -20°C to 85°C for working pressure ranges of 0-1 bar up to 0-35 bar and 0-70 bar up to 0-350 bar.

The compact and rugged design of the new sensors makes them particularly suited to embedded applications such as process instrumentation pressure and liquid level transmitters.



Pressure sensors

Lumark cleans up with new spray nozzle

Lumark has augmented its tank and drum cleaning equipment portfolio with two new rotational spray heads.

Suitable for the cleaning of oil and chemical residues, the 360° rotating head container rinse nozzle (model 01510110) is designed for use in containers up to 20 litres in capacity. The nozzle has a pressure rating of 1.5 to 5 bar and outputs between 18 to 31

litres of water per minute at 2,000 rpm at 3 bar pressure. An optional safety valve is also offered.

The model 01510120 rotating head tank rinse nozzle is designed to rinse tanks of up to 1,000 litres capacity. Recommended pressure ratings are from 1.5 to 5 bar with an output of 41 to 77 litres per minute at 220 rpm and 3 bar pressure.

Ultra-sensitive metering valve

Parker Hannifin has developed a new valve – the 'HR Series' – for precision liquid and gas metering.

Precision-ground spindle pins replace the machined needle traditionally used in fine metering valves to provide precise flow control rates from 0.09 to 0.00034 gallons per minute. Unlike most other fine metering valves, the spindle pin does not rotate with the handle, allowing a smooth and predictable control characteristic. Combined with an O-ring pin seal, the valve is also capable of bubble-tight shut-off – a feature not often

found with such equipment.

The valve can be fitted with a turns counter handle for fine, repeatable setting and is offered in versions with 1/16, 1/8 and 1/4-inch or 3 and 6mm end connections.

Available in 316 stainless steel or brass body construction with O-ring seals manufactured from Buna-N, Viton, ethylene-propylene or neoprene elastomer, the valve is capable of handling almost any type of media. Two options of connection pattern, angled or in-line, plus a choice of tube connection further extend the tool's range of applications.

CONTACTS

The Expro Group	01734 591341
Veeder-Root	01382 833033
UOP	00 1 708 391 2000
Norsk Hydro	00 47 22 43 21 00
DNVPS	00 21 10 479 8600
CPTC	00 1 713 596 3045
Plenty Ltd	01635 42363
Telenor Satellite Services	00 47 22 77 79 50
Darcy Products	01732 843131
EG&G IC Sensors	00 1 408 432 1800
Lumark	01954 260245
Parker Hannifin	01271 22591

Membership News

NEW MEMBERS

Mr H Z Abubakar, Nigerian National Petroleum Corp, Pipeline & Tank Construction Div, Plot 308, Adeola Odeku Street, Victoria Island, Lagos, Nigeria.

Mr R D Anderson, Facet International Inc, 9910 E 56th Street North, PO Box 50096, Tulsa, OK 74150-0096, USA.

Ms R P Baillon, 32 Algar Road, Old Isleworth, Middlesex, TW7 7AG.

Mr M K Bashir, 34 Townshend Road, St Johns Wood, London, NW8.

Mr D Beardshall, 44 Claygate Lane, Hinchley Wood, Esher, Surrey, KT10 0AQ.

Mr D R Blakemore, Conoco Limited, Conoco Centre, Warwick Technology Park, Gallows Hill, Warwick, CV34 6DA.

Mr M Born, 15 Parallelvej, DK-2800 Lyngby, Denmark.

Mr C J Brown, Golden Row, Whipsnade Green, Whipsnade, Beds, LU6 2LQ.

Capt J Bryn Williams, Suite 31/B Hoi Yat Court, South Horizons, AP Lei Chau, Hong Kong.

Mr D Buckland, Aircraft Service Limited, Unit 19, Britannia Industrial Est, Poyle Road, Colnbrook, Berkshire, SL3 0BH.

Mr T Dandutse, National Maritime Authority, No 4 Burma Road, Apapa, Lagos, Nigeria.

Mr E Edozien, Vitol SA, London Branch Office, Bowater House, 68 Knightsbridge, London, SW1X 7LT.

Mr S W Foster, 51 Brunswick, Hanworth, Bracknell, Berks, RG12 7YF.

Mr D Haidar, Falcon International, Petro Store Terminal, Bahsas, Tripoli, Lebanon.

Mr D G F Hekelaar, Viking Standby Limited, Annat House, South Quay, Ferryden, Montrose, Scotland, DD10 9UB.

Mr R Hestenes, Royal Norwegian Embassy, Charles House, 5-11 Lower Regent Street, London, SW1Y 4LR.

Dr M R C Itavaara, VTT-Biotechnology and Food Research, Biologinkuja 1, PO Box 1500, FIN-02044 VTT, Finland.

Mr J H Joseph, 22 Penn Road, London, N7 9RD.

Mr S Kanani, 1 Templars Drive, Harrow, Middx, HA3 6RX.

Mr J C Khajenouri, 5 Purbeck Gardens, Felton Road, Parkstone, Poole, Dorset, BH14 0QS.

Mr P S Kwan, Ocean Man Consultants Ltd, Flat 408 Yue Fung Ind Centre, 35-45 Chai Wan Kok Street, Tsuen Wan New Territories, Hong Kong.

Mr K L S Law, Ocean Man Consultants Ltd, Flat 408 Yue Fung Ind Centre, 35-45 Chai Wan Kok Street, Tsuen Wan New Territories, Hong Kong.

Mr J Loppenthien, Cowiconsult, 15 Parallelvej, DK-2800 Lyngby, Denmark.

Mr D A Luke, Castrol (UK) Ltd, P O Box 14 Bridges Road, Stanlow Works, Ellesmere Port, South Wirral, L65 4ES.

Mr D Mann, 47 Hazel Avenue, Evesham, Worcestershire, WR11 6XT.

Mr D J McDonald, FMC Corporation (UK) Ltd, Pitreavie Business Park, Dunfermline, Fife, KY11 5PU.

Mr J D Miles, 5 Chalton Mill, Chalton, Chichester, West Sussex, PO18 0HY.

Mr A I More, British Sulphur Publishing, 31 Mount Pleasant, London, WC1X 0AD.

Mr D J Mowatt, 22 Eyam Road, Hazel Grove, Stockport, Cheshire, SK7 6HP.

Mr G Neill, Aircraft Service Limited, Unit 19, Britannia Industrial Est, Poyle Road, Colnbrook, Berkshire, SL3 0BH.

Mr A Proffitt, Sakura Bank, Ground Floor, 6 Broadgate, London, EC2M 2RQ.

Mr P J Radcliffe, 19 Oak Court, Oak Close, Moreton, Wirral, L46 0UH.

Mr James Reeve, Middle East Consultants, Glassmill, 1 Battersea Bridge Road, London, SW11 3BG.

Mr D A Robbins, 61 Drayton Road, Boreham Wood, Herts, WD6 2DA.

Mr B Rogers, Embassy of the USA, 24-31 Grosvenor Square, London, W1A 1AE.

Mr H G Rushford, Shell UK Ltd, St Fergus Gas Plant, P O Box

20, Peterhead, AB42 6WJ.

Mr J D Ryan, Texaco Risk Management Ltd, 1 Westferry Circus, London, E14 4HA.

Mr C R Scott, 10 The Farthings, Marcham, Oxon, OX13 6QD.

Mr H Skjoldager, Kai Dige Bach A-S, Gl.Klausdalsbrovej 480, 2730 Herlev, Denmark.

Mr L M Skuse, MAST International Organisation Ltd, Leornian House, Midland Way, Thornbury, Bristol, BS12 2BS.

Mr R Slape, Charles Stanley Ltd, 25 Luke Street, London, EC2A 4AR.

Mr R V Sykes, Lambert Smith Hampton, 6A Campo Lane, Sheffield, S1 1TP.

Mr M Tuft, Herzog, 14A Lichfield Close, Beverley, East Yorkshire, HU17 8PX.

Mr K Y Yu, 8A Block 28, Greenwood Terrace, 28 Sui Wo Road, Shatin, Hong Kong.

Miss V A Collyer, 17 Springhaven Close, Guildford, Surrey GU1 2JP.

Mr W H R Macpherson, Ferryton, Hillside Road, Forfar, Angus DD8 2AY.

Mr A Rao, 81 Warren Road, London NW2 7NH.

STUDENT PRIZEWINNERS

Mr H K Malik, Dept of Earth Resources Engineering, Imperial College, RSM, Prince Consort Road London SW7 2BP.

Mr J W Pye, 5843 Southwell Hall, 51-60 Evelyn Gardens, London SW7 3BH.

STUDENTS

Mr I J Richardson, 54 Alexandra Road, Mutley, Plymouth, Devon PL4 7LT.

Mr J M Williamson, 18 Derwent House, Stanhope Gardens, London SW7 5BJ.

Mr S M Yadun, 253 Seven Sisters Road, London N4 2DD.

NEW COLLECTIVE MEMBER

Deborah Mills & Associates,

Tamsin House,

4 Chapel Street,

Marlow,

Bucks, SL7 1DD.

IP nominated representative: Ms Deborah Mills
Deborah Mills & Associates are advisers to the energy industry. All of the solicitors have inhouse oil and gas experience with the leading major oil companies.

Fifty Year Members

This year a small number of our long-standing members have completed 50 years in membership. In recognition of this achievement, Ian Ward, IP Director General, has sent each of the members a special tie and awarded each with free IP membership. The members who have achieved this milestone are:

Mr A S Cutlett F Inst Pet

Mr F F D Edwards F Inst Pet

Mr A H R Grimsey F Inst Pet

Mr T F Perry F Inst Pet

Mr R S Burgess F Inst Pet

Mr A L Wachal F Inst Pet

Membership News

The New Database

Have you failed to receive important communications in the past?

Are you fed up with getting the wrong information?

In recognition of these 'gaffes', the IP launched a new database in March 1995. We started to scrutinise the material we were sending to members about the IP to put our mistakes right. We could now see on screen the job titles and other information we held about our members and found it was limited. So we are now writing to members and asking them to confirm or correct their details. So far this has been highly successful and we now have better quality information on our database for use when publicising events at the IP. We intend to build on this in 1996, so if you haven't received a ques-

tionnaire yet, you are probably on our next mailing! Although still not perfect we are making every effort to improve the services we offer to our members to keep them within the IP and to help us to recruit for the future.

Benevolent Fund

The Institute of Petroleum has a Benevolent Fund for the provision of financial and other relief or assistance to necessitous persons who are or who have been members of the Institute and the necessitous wives, widows, families and dependent relatives of such persons as the Management Trustees in their absolute discretion think fit. If members of the Institute are aware of any such necessitous persons, even if their membership of the Institute has ceased, they are asked to inform the Institute. Applicants would be asked to complete a form giving details of their financial circumstances which would be treated in strict confidence. Help might be given for temporary difficulties, such as the cost of convalescence following illness.

Membership Progress Report

For the fifth year the IP has achieved a record total of individual members with the year-end total heading for 8,100. This is the second time that the IP has secured a membership over 8,000. Our number one objective is to achieve 10,000 members by the end of the decade. This year we hope to move

towards this by becoming even more effective in retaining our existing membership. This will involve communicating with them more frequently and effectively, researching their needs, recognising them with our new membership card and continuing to improve the services we provide for their benefit.

AROUND THE BRANCHES

ABERDEEN

9 January:

The Life Project

13 February:

Tim Kieft, Project Manager for Life Project
AGM, Shell UK Offshore Co-ordination Centre,
1 Altens Farm Road, Aberdeen.

12 March:

Impact of Innovation on Future Prospects for the Norwegian Sector
Dr Arid Nystad, Director Petroleum Resource
Management Division, Norwegian Petroleum Directorate.

EDINBURGH & SOUTH EAST SCOTLAND

12 January:

AGM, No speaker - buffet to follow meeting.

8 February:

Annual Student Lecture
The Role of Technology Licensing in a Major Company
Martin Howard, General Manager, Licensing
Business, BP Chemicals.

February (tbc):

West of Shetland Projects
Speaker from BP Exploration (joint meeting with
Institution of Chemical Engineers).

ESSEX

10 January:

National Vocational Qualifications in the Petroleum Industry
Mike Wood, Health and Safety Manager, Powell
Duffryn Storage Ltd.

14 February:

Automotive Fuels for the Future
Andrew Harrison, Shellhaven Oil Refinery, Shell UK
Ltd, Downstream Oil.

HUMBER

18 January:

Impact to Condam Regs
David Warden of National Power.

1 February:

Visit to the Grimsby Evening Telegraph.

1 March:

Annual Dinner, Beachcomber Club, Humberston.

28 March:

Ladies Night, Beachcomber Club, Humberston.

MIDLANDS

17 January:

Under Pressure Engineering
A presentation by Allan Pettie of Furmanite Ltd at
the Moathouse Hotel, West Bromwich.

21 February:

AGM - details to be circulated

20 March:

Multi Product Pipeline and Distribution Control Systems
A presentation by Alan Senior, Group Manager of
the Pipelines and Terminal Automation Group of
Salem Automation Ltd at the Moathouse Hotel,
West Bromwich.

NORTH EAST

31 January:

AGM, followed by presentation on *Transport of Heavy Loads*
Wind Energy
Dr G Jenkins, Northern Energy Associates.

6 March:

NORTHERN

6 March:

Developments in Fuel/Fuel Additive Technology
David Blackmore, Shell Research at the Queen
Hotel, Chester

SOUTHERN

23 January:

Remote Sensing
Nigel Robbins, BP Oil Landarray Refinery Ltd

23 February:

AGM and Flower Pressing, Mrs Enid Wade, Savoy
Country Inn, St Clears

22/23 March:

Weekend visit to Telford

28 March:

Performance Additives
Bill Bayfleet, Lubrizol, ELF Refinery,
Milford Haven

WEST OF SCOTLAND

28 March:

Petroleum Dinner (by ticket), Hospitality Inn,
Glasgow (not 7 March, as previously advertised)

YORKSHIRE

9 January:

Automobile Engine Lubrication - some research issues and needs
Dr Chris Taylor, Head of Mechanical Engineering,
Leeds

13 February:

AGM/Hot Pot Supper - Sporting Moments -
Guest speaker John Morgan, Sports Journalist
and Broadcaster

People

Western Hemisphere sales vice president, **Mr C Ray Hyatt**, has taken a medical leave of absence from the company. **Mr H D (Dave) Brown, Jr.** formerly marketing director has assumed the role of Western Hemisphere Sales and Service Director. Mr Brown previously worked at Baker Oil Tools before joining the TIW Corporation. **Mr Sam Baker** moves from Engineering Manager to Marketing Director for the company.

Ranger Oil Ltd has announced the appointment of **The Honourable Colin B Moynihan** to its Board of Directors, filling the vacancy created by the death of **The Rt Hon Sir Peter H Morrison**. Mr Moynihan was a Member of Parliament in the United Kingdom for 10 years, and most recently served as Parliamentary Under Secretary of State for Energy from 1990-92 in the governments of both Ms Margaret Thatcher and Mr John Major.



Mr W 'Max' Maxwell has been appointed to the role of Business Development Manager for Cegelec Projects, the project engineering arm of Alcatel Alsthom. Mr Maxwell, with 20 years experience with Brown & Root, Wood Group Engineering and later with ABB, will be responsible for expanding the company's involvement in the worldwide oil and gas market.

Bechtel Group Inc has elected **Mr Frederick W Gluck** Vice Chairman and **Mr Adrian Zaccaria** president and Chief Operating Officer. **Mr Riley P Bechtel** will continue to serve as Chief Executive Officer and is additionally becoming Chairman. Mr Bechtel has been serving as President of Bechtel Group since 1989, and as Chief Executive Officer since 1990. The three new positions became effective on 1 January.

A new Managing Director has been appointed to thermal imaging specialists, AGEMA Infrared Systems. **Mr Arne Almerfors**, former President of CE Johansson, replaces Leif Bergström who has been promoted to Senior Vice President and Business Group Head of Spectra-Physics Industrial Measurement Group.

AMEC plc has appointed **Mr Peter Mason** as its new Chief Executive. Mr Mason is currently Chairman and Chief Executive of Balfour Beatty Ltd and a main board director of BICC plc. His position became effective on 1 January.

George Payne, Chairman of AMEC Process and Energy Ltd (part of AMEC plc) has announced the appointment of **Mr Mike Straughen** as Managing Director of Operations. Mr Straughen's responsibilities have increased from the Aberdeen, Newcastle and Norwegian oil and gas business stream to cover all process and energy operations worldwide. Mr Straughen has also appointed **Mr Odd E Arnesen** as managing director of AMEC Process and Energy A/S, the company's Norwegian subsidiary. Mr Arnesen has nearly 20 years experience in managing offshore North Sea operations and takes over from the founder, **Mr Roald Hoff**.

Following British Gas Executive Director **Mr Norman Blacker's** decision to resign from the company board, **Mr Roy Gardner** will take responsibility for British Gas supply, service retail and accord whilst Chief Executive **Mr Cedric Brown** will take over responsibility for Europe and **Mr Philip Rogerson** will take over information services, research and technology. Mr Blacker will work on a number of projects, including the restructuring of gas business operations, until his retirement in May.

Mr Nigel Higgins is to succeed **Dr David Tomlinson** as Managing Director of Redpath Engineering Services Ltd, a member of Trafalgar House plc. Mr Higgins has been employed by Trafalgar House plc since 1983 and in 1986 was appointed Finance and Commercial Director of Redpath Engineering Services Ltd. He will also join the board of Trafalgar House Offshore Holdings Ltd. Dr Tomlinson has taken up a new post for Trafalgar House Corporate Development in Malaysia.



Mr Daniel Ramirez-Isava has succeeded **Dr Manuel De Oliveira** as President and Chief Executive Officer of Bitor Europe Ltd. Mr Ramirez-Isava has 26 years experience in the Venezuelan oil industry and was formerly Director and board member of Petroquímica de Venezuela SA. De Oliveira has been appointed Executive President of Petróleos de Portugal, PETROGAL SA.



Mr Will Crocker (above), previously Managing Director of Amot Controls Ltd, has taken up the new position of President, Amot Controls Corporation, a subsidiary of Roper Industries Inc and will be based in Richmond, California. He will be replaced by **Mr Scott Spratte**, presently Sales & Marketing Director of Amot Controls Ltd, appointed to the combined role of Executive Vice President, Operations and Sales & Marketing Director. The new position will place him as General Manager of the entire UK operation.

Mr Steven Benz is to succeed **Vice-Admiral John Costello** as President of the Marine Spill Response Corporation (MSRC). Mr Benz, presently Vice-President for trading and transportation of British Petroleum Oil Company was selected by MSRC after a six-month search and will take over the position on 6 January from Vice-Admiral Costello who is retiring.

INTERTANKO has employed **Mr Svein Ringbakken** as Attorney and Manager of INTERTANKO's Legal and Documentary System, with effect from 1 December 1995. Mr Ringbakken, who was employed as General Manager of the Norwegian marine claims handling firm MICC AS in Oslo will be responsible for the company's legal and documentary work and has previously worked as Legal Consultant with INTERTANKO.

Forthcoming Events

January

15th-16th

Aberdeen: 'Economically Exploring and Developing The Atlantic Frontier'. Details: Claudia Stokes, EuroForum, 14 Bowden Street, London SE11 4DS.
Tel: 0171 793 1230
Fax: 0171 793 8544

16th-18th

Bahrain: 'Middle East Petroleum and Gas Conference 1996'. Details: Ms Sharmela Binwani, 151a Thomson Road, Goldhill Centre, Singapore 1130.
Tel: 65 356 0960
Fax: 65 356 0962

16th-18th

Houston: 'The NACE International Storage Tank Conference & Exhibition'. Details: Gina Covell, NACE International, PO Box 218340, Houston, Texas 77218-8340.
Tel: 1 713 492 0535
Fax: 1 713 492 8254

16th-18th

Hanoi: '3rd Vietnam Oil and Gas Expo '96'. Details: CP Exhibition, Rm 2801, Tung Wai Commercial Building, 109 Gloucester Road, Wanchai, Hong Kong.
Tel: 852 2511 7427
Fax: 852 2511 9692
Telex: 76270 CHOCH HX

18th

London: 'Biodegradable Petroleum Products and the Environment Conference'. Details: Caroline Little, The Institute of Petroleum.

22nd-23rd

London: 'Bulk Liquid Storage Tanks'. Details: IIR Ltd, 6th Floor, 29 Bressenden Place, London, SW1E 5DR.
Tel: 0171 915 5055
Fax: 0171 915 5056

24th-25th

London: 'Refinery Loss Control'. Details: The Bookings Department, IBC Technical Services, 57-61 Mortimer Street, London W1N 8JX.
Tel: 0171 637 4383
Fax: 0171 631 3214

24th-26th

London: 'Using Derivatives to Manage Energy Risk'. Details: Financial Training, 57-61 Mortimer Street, London W1N 8JX.
Tel: 0171 637 4383
Fax: 0171 636 2330

26th

London: 'The Future for a European Gas Company'. Details: Zelda Stewart, The Economist Conferences, 15 Regent Street, London SW1Y 4LR.
Tel: 0171 830 1008
Fax: 0171 931 0228

29th-31st

Aberdeen: 'Deeptec '96'. Details: IIR Ltd, 6th Floor, 29 Bressenden Place, London, SW1E 5DR.
Tel: 0171 915 5055
Fax: 0171 915 5056

29th-31st

Singapore: 'Annual Fuels and Lubricants Asia Conference'. Details: Vicky Villena-Denton, Fuels and Lubricants International, PO Box 1200, MCPO, 1252 Makati, Metro Manila, Philippines.
Tel: 632 807 0807
Fax: 632 807 5490

31st-1st

London: 'CRINE 1996 Conference: Learning to Survive'. Details: Conference Registrar, Crine 1996 Conference, Conference Associates and Services International Ltd, 4 Cavendish Square, London W1M 0BX.
Tel: 0171 499 0900
Fax: 0171 629 3233

31st-1st

Aberdeen: 'Safety and Environmental Management in Abandonment'. Details: Claudia Stokes, EuroForum, 45 Beech Street, London EC2Y 8AD.
Tel: 0171 878 6886
Fax: 0171 878 6889

February

5th-6th

London: 'Successful Market Development for Utilities'. Details: AIC Conferences Ltd, 2nd Floor, 100 Hatton Gardens, London EC1N 8NX.
Tel: 0171 242 2324
Fax: 0171 242 2320

13th-14th

Houston: 'Global Energy Strategies: Looking Over the Horizon'. Details: Cambridge Energy Research Associates, 20 University Road, Cambridge, MA 02138, USA.
Tel: 1 617 497 6446
Fax: 1 617 497 0423

15th-16th

Amsterdam: 'Offshore Pipeline Technology'. Details: Helen Smith, The Bookings Department, IBC Technical Services, 57-61 Mortimer Street, London W1N 8JX.
Tel: 0171 453 2128
Fax: 0171 631 3214

25th-29th

Tehran: '1st Oil, Gas and Petrochemical Fair'. Details: Andy Maclean, Orient Exhibitions, Unit A9, Chaucer Business Park, Kemsing, Sevenoaks, Kent TN15 6PW.
Tel: 01732 763344
Fax: 01732 763606

26th-27th

London: 'Worldwide Deep Water Technologies'. Details: The Bookings Department, IBC Technical Services, 57-61 Mortimer Street, London W1N 8JX.
Tel: 0171 637 4383
Fax: 0171 631 3214



Learning to Survive

31 January and 1 February 1996

At the Queen Elizabeth II Conference Centre, London

With well-known industry leaders as speakers, this conference will debate the future of the offshore oil and gas industry and shape the direction and role of CRINE. It will provide a major forum for interactive discussion of issues critical to the industry's future.

For full details, please contact:
Conference Associates and Services International Ltd
CRINE 1996 Conference
Tel: 0171 499 0900
Fax: 0171 629 3233

Financial Risk Management in the Oil and Gas Industry

An important series of seminars for treasury specialists or anyone with profit responsibility in the petroleum industry.

11 March 1996 The role of corporate treasury

1 April 1996 Identification and reduction of financial risk

29 April 1996 Management information systems in the treasury environment.

3 June 1996 Trading and misuse of derivatives

Speakers will be experts from within the industry and Price Waterhouse's specialist groups.

All seminars 17.00 - 19.00

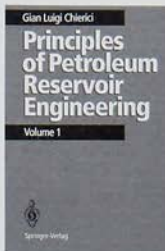
Details from Jenny Sandrock at the IP
Tel: 0171 467 7104 (direct line) Fax: 0171 255 1472
or from Iain Fidler at Price Waterhouse
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UK Deliveries into Consumption (tonnes)

Products	†Oct 1994	*Oct 1995	†Jan-Oct 1994	*Jan-Oct 1995	% Change
Naphtha/LDF	248,326	219,828	2,291,880	2,351,526	3
ATP - Kerosene	640,755	694,205	6,212,433	6,456,903	4
Petrol	1,886,553	1,878,878	18,915,424	18,077,834	-4
of which unleaded	1,124,756	1,198,344	10,831,615	11,318,935	4
of which Super unleaded	114,597	78,265	1,173,828	796,242	-32
Premium unleaded	1,010,159	1,120,079	9,657,787	10,522,693	9
Burning Oil	213,728	198,825	2,113,704	2,114,004	0
Derv Fuel	1,131,716	1,173,659	10,592,069	11,078,418	5
Gas/Diesel Oil	628,508	584,271	6,280,908	5,965,715	-5
Fuel Oil	823,270	615,804	7,672,788	6,633,953	-14
Lubricating Oil	65,331	77,969	668,051	752,311	13
Other Products	825,608	759,525	7,229,393	7,417,699	3
Total above	6,463,795	6,202,964	61,976,650	60,848,363	-2
Refinery Consumption	499,032	563,825	5,166,057	5,335,796	3
Total all products	6,962,827	6,766,789	67,142,707	66,184,159	-1

† Revised with adjustments *preliminary NB: The 1995 figures for lubricating oil are significantly higher than those reported in 1994. This is the result of the introduction of a new reporting format, which aims to achieve greater accuracy.

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