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N o r w a y Emerging markets for Troll gas

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S a f e t y Striving for zero accidents

United States Legislation backs sanctions against Iran and Libya

E u r o p e Moves towards improved air quality

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ITTELLING.

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Oil Spill Response Workshop:

THE INSTITUTE

OF PETROLEUM

The *Sea Empress*, a case study

Tuesday 17 September

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

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

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

Discussion papers will be presented by representatives from:

Marine Pollution Control Unit Ministry of Agriculture, Fisheries and Food AEA NETCEN

Pembrokeshire County Council

Environment Agency Countryside Council for Wales European Environmental Management Institute Ltd

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



1996 Safety Conference

People & Changes, Costs & Challenges

Thursday 26 September 1996

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

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

Areas to be covered will include:

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

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

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COVER PHOTO Troll production platform Photo by Statoil

News in Brief

17 July

Elf is converting its Saltire platform to mini-manned production in a move that will save the company E4m per year. The platform will be operated by just seven personnel once the drilling programme is completed.

Wayne Dresser has acquired certification from the Japanese approval authorities to install its pumps in Japanese service stations.

18 July

Statoil has awarded a \$200m services package to the Baker-Halliburton joint bid for Åasgard well services. Field development plans include a total of 60 wells to be completed in three different reservoir structures, 40 of which require hydraulic fracturing in order to produce economically.

John Brown Engineers & Constructors, UK Operations, part of the Kvaerner group, has secured the Western Route pipeline project engineering, procurement and construction management contract from the Azerbaijan International Operating Company. The pipeline will carry early oil production from Baku to the Georgian coast of the Black Sea.

The Algerian government

has issued Lasmo a provisional authorisation for initial crude oil production from wells in the Hassi Berkine and Hassi Berkine South oilfields located in block 404 in the Ghadames Basin.

19 July

Dana Petroleum has acquired a 5 percent holding in Evikhon, a Russian company with interests in several West Siberian oilfields.

The damaged Sea Empress oil tanker, which ran aground off the Pembrokeshire coast in February, is to be scrapped.

22 July

Brown & Root AOC has been awarded the £5m preoperations engineering support contract for BP's Schiehallion development. The agreement, which runs until first oil in 1998, includes the intention by the two companies to agree a full five-year operations support contract later this year that will take the form of a performancebased alliance between Brown & Root AOC, BP and other operations contractors.

A Snamprogetti/Foster Wheeler Italiana joint venture

vincent tailara joint ventue is to construct an integrated gasification combined cycle complex at Priolo Gargallo, Syracusa on the island of Sicily. The Lira 1,100 billion complex, built on behalf of ISAB Energy, a recently formed joint venture between ERG Petroli and Edison Mission Energy, will have a capacity in excess of 500 MW.

A joint venture between

Brown & Root Energy Services and Monenco Agra has been awarded a Can \$9m contract for the Sable Offshore Energy Project off the Nova Scotia coast. Work will include frontend engineering design, the selection of alliance partners and the preparation of contractual and alliance agreements. First gas is scheduled for late-1999.

23 July

Enron is to merge with electricity producer and generator Portland General to form the largest integrated gas and electricity company in North America.

24 July

Elf Petroland has begun production on the L7H South East gas field on the Dutch continental shelf, six weeks after the completion of the exploratory discovery well L7-15. The well is producing 2 mncum/d. This is the second gas field that the company has brought into production directly on discovery in 1996, the first being the J3 Charlie field this January.

25 July

Conoco is to extend the productive life of the Viking B gas complex in the southern North Sea by converting it to a not-normally-manned installation by October 2000. Some £5m will be invested on upgrading the complex over the next two years. Production operations will be monitored and controlled from the Theddlethorge gas terminal.

Halliburton and Cairn Energy

have entered into a contractto-produce agreement to develop the Sangu natural gas field located in Bangladesh's offshore block 16. Halliburton is to acquire a 25 percent interest in the field as part of the arrangement which is conditional upon approvals by the government of Bangladesh and stateowned company PetroBangla.

British Gas plans to issue a writ against the UK Department of Trade and industry (DTI) in an attempt to recover £1bn of gas levies wrongly paid under the Gas Levy Act 1981. In turn, the

DTI is issuing writs claiming gas levies from a number of licensees or ex-licensees of certain UKCS fields in order to protect the taxpayer in the event that British Gas' claim is proved correct.

26 July

Fluor Daniel and its Polish subsidiary Prosynchem have secured a design, engineering, procurement and construction contract for the revamp of part of the crude distillation plant at Petrochemias Plock refinery. The project, which includes energy conservation measures to re-use heat, will increase plant capacity and yields and improve product quality while reducing emissions.

Russian oil producer NK

Surgutneftegaz is to set up a joint venture with its Kirishineftekhimeksport subsidiary to build a new oil export terminal near St Petersburg on the Gulf of Finland, reports *Lloyd's List*.

29 July

Amoco has announced that the Akhen-1 well in the Ras el Barr offshore concession in the Nile Delta has flowed gas at a rate of 36 mncuft/d and 2,074 barrels of condensate per day.

Exxon Azerbaijan Limited is to acquire from Penzoil Caspian Corporation a 3 percent interest in the joint development and production sharing agreement covering the estimated 5 bn barrel Azeri, Chirag and Guneshli fields in the Azerbaijan sector of the Caspian Sea. The purchase increases Exxon's total stake to 8 percent.

30 July

The UK Department of Trade and Industry has decided not to renew Canuk Exploration's six-year licence covering the grounds of Windsor Castle. The first exploration well was due to be sunk this summer.

Aberdeen-based International

Offshore Chemicals is to build a 2,500 tonne per day methanol plant at a site near Peterhead. The \$250m facility will consume some 75 mncuft of gas per day in feedstock and fuel gas. Some 80 percent of production will be shipped to Rotterdam.

Secretary of State for Wales William Hague has blocked Pembrokeshire County Council's decision to grant Milford Haven Port Authority planning permission for a special jetty intended for imports of Orimulsion for National Power's Pembroke power station.

Mitsubishi Oil is to begin production of natural gas at the 15-2 block offshore southern Vietnam in 1999, reports *Reuters*. Natural gas will initially be sold to electricity generators in Vietnam.

Occidental Petroleum Corporation has sold its royalty oil interests in the Congo for \$215m to the Republic of Congo. Occidental continues to hold exploration rights to two blocks in the country.

News in Brief

Esso China Upstream Limited has signed an agreement to explore block 02/16 in Liaodong Bay located 250 miles northeast of Beijing in the northern Bohai Sea.

31 July

Ofgas has permanently removed the requirement on British Gas Trading to price according to published schedules in the large firm contract market (above 25,000 therms per year) following a review of the competitive gas market. However, the requirement to price according to the published schedules in the small firm market (2,500 to 25,000 therms/yr) and the interruptible market, a less well established market at present, will remain suspended until the end of July 1997.

Amerada Hess-operated exploration well 20/5c-6, southwest of its lvanhoe field, has tested at a rate of of 8,647 barrels of light hydrocarbons per day through a two-inch choke.

1 August

Conoco (UK) is to farm into four blocks operated by Total in the Porcupine Basin, offshore Ireland. The company will earn a 30 percent interest in blocks 35/17, 35/23, (western half) and 35/28. Total retains a 50 percent stake and operatorship in the area.

Kvaerner Oilfield Products

has secured a \$23m order from BP for the supply of 73,000 metres of steel tube umbilicals for the operation of the Machar, Mojnan and Mungo fields, part of the Eastern Trough Area Project.

3 August

Colombian-based oil consultant Dr Keith Hewitt has become the largest shareholder in Emerald Energy after the purchase of 26 million shares representing 7.49 percent of the company.

5 August

Atlantic Power & Gas has been awarded the operations, maintenance and services contract for the operational phase of the Britannia gas field. The contract is for seven years with further options to extend through field life.

6 August

Louisiana Land and Exploration Co has completed the sale of its 74,000 b/d refinery and terminal near Mobile to Shell Chemical Co, reports *Lloyd's List*.

Rockwater has secured a

£29m engineering, procurement, installation and commissioning contract to supply three flowline bundles for Shell UK Exploration and Production's latest Gannet development (see Newsdesk).

The Qatar Liquefied Gas Company has signed a \$550m loan agreement with Export-Import. Bank of Japan to finance a third gas train at Ras Laffan, currently under construction by Japan's Chiyoda Corporation, according to the *Financial Times*.

Saudi Methanol Company, a joint venture between Saudi Basic Industries Corporation and a consortium of Japanese companies, has signed a \$160m loan agreement with the Export-Import Bank of Japan to finance Its expansion programme.

BP has renewed its Memorandum of Agreement with the Kuwait Oil Company to provide technical advice and assistance in the development of Kuwait's oil production operations.

7 August

Conoco reports that a sixmonth early production programmic on the Banff field is to begin shortly using a floating production unit with shutthe tanker offtake. Two wells will produce at a combined rate of 35,000 b/d during the early production phase which will assess field performance. Field development is due to begin in the first half of 1998.

8 August

The United States has finally approved the distribution and monitoring procedures for the UN oil-for-food deal which will allow the sale of up to \$2bn of Iraqi oil in return for humanitarian supplies (see *Petroleum Review*, June 1996).

Brown & Root and Conoco have formed an operations alliance in support of the oil company's Grand Isle field production facilities in the Gulf of Mexico. Operations and maintenance services will be provided for a total of 54 platforms on the field

British-Borneo Oil and Gas, Santa Fe Exploration (UK) and Seafield Resources have jointly purchased from BHP Petroleum the whole of the latter's equity in UK North Sea blocks 21/12 (41.73 percent) and 21/13a (44.99 percent).

OIS International Inspection's Canadian joint venture company OIS-Fisher has secured a contract for the provision of inspection services during the drilling and production phase of the Hibernia field.

Chevron has announced that the Moho Marine 2 appraisal well offshore the Republic of Congo has tested at a flow rate of some 4,700 b/d.

9 August Mobil Asia Pacific has submitted a proposal to the government of Pakistan to build a \$45m LPG terminal at Port Qasim, reports Lloyd's List. The company is also seeking permission to build a Lubricant oil blending plant.

Irish oil exploration company

Bula Resources has signed an exploration and production sharing agreement with Libya's National Oil Corporation for three onshore blocks, two of which lie in the Sirte Basin and one in the Ghadames Basin.

12 August

Monument Oil and Gas has signed an exploration and production sharing agreement for three oilfields with the government of Turkmenistan. The company has pledged a minimum financial commitment of \$50m over a number of years.

Weir Engineering Services has announced that it has signed total vendor maintenance contracts covering pumping systems with Amerada Hess (for Scott and AH001 assets), Texaco (Captain), Shell Exploration (Brent, Central and Northern), Agip (Tiffany) and Maersk Olie og Gas (offshore Danish interests) which could be worth E14m over the next five years.

13 August

Repsol Exploración has discovered a new gas and condensate field on the Khalda concession in the Egyptian Western Desert. The Shams NE-1X discovery well tested at 40 mncuft of gas and 1,177 barrels of condensate per day.

Shell and Mobil have selected intergen, a consortium of US independent power producers, to construct a thermal power plant of up to 600 MW capacity in the department of Cuzco in Peru, reports the *Financial Times*.

Elf Exploration UK has awarded the contract for the design, fabrication and installation of the wellhead jackets for its Elgin and Franklin fields development to Saipem UK.

14 August

Eastern Natural Gas has signed a £100m deal with Lasmo and British Borneo to buy gas from the Boulton field in the North Sea for the duration of its 16-year life. First oil is expected in the second quarter of 1998.

Shell Expro has published a

list of outline proposals for the disposal of the Brent Spar as put forward by 19 offshore contractors and consortia. A total of 30 schemes had been submitted. Over half the outline proposals suggest onshore dismantling or scrapping schemes. A short list of six or so contractors/consortia is to be selected in due course (see next month's issue for more details).

Newsdesk

Support for phased development of Sakhalin II project

The government of the Russian Federation and the administration of the Sakhalin region have given their support to a plan for the development of the Piltun-Astokhskoye (PA) field, part of the Sakhalin II project, offshore the east coast of Sakhalin Island in the Sea of Okhotsk.

The plan is based on a phased development which could lead to first production of oil in 1999, considerably earlier than under other development options. Such early economic production could be made possible through the use of an existing mobile drilling and production facility known as the *Molikpaq*.

It is proposed that this large ice-dass drilling unit – which has been successfully deployed in Arctic drilling operations and which has been designed for operating conditions significantly more severe than those experienced offshore Sakhalin – produce oil from the Astokh feature in the PA field. Oil would be transported via a short pipeline to a single anchor leg mooring buoy and a storage tanker for subsequent loading onto tankers.

Technical approval for the plan is now required from the appropriate Russian regulatory authorities. Further progress also depends on achieving legal stabilisation prior to final shareholder commitment.

According to Frank Duffield, President of Sakhalin Energy, now that the Russian Presidential elections have completed, legal stabilisation should proceed positively. We anticipate that key enabling legislation will be reintroduced and passed early in the new session of the Federal Assembly,' he said. 'This will expedite future decisions about the project.'

The Russian Federation and Sakhalin region will benefit

BP/Mobil venture

The European Union has given BP and Mobil the go-ahead to combine their European refining, marketing and lubricants businesses (see *Petroleum Review*, April 1996).

Local partnership agreements reflecting regional legal, fiscal and social circumstances will be established in each of the countries covered by the venture.

It is envisaged that several of the partnerships will be operational by the end of this year. All will be completed by the end of 1997.

Loophole in UK PRT law blocked

The UK government is to introduce new legislation in the next Finance Bill to prevent companies from exploiting a loophole in the Petroleum Revenue Tax (PRT) rules.

The new legislation will mean that firms can no longer claim PRT relief on non-field expenditure incurred by an unrelated group that continues to hold North Sea licence interests.

OCA optimism on prospects

The Offshore Contractors' Association (OCA) has made 'rosier' forecasts than last year.

Traditional fabricating contracts and UK work is expected to drop but the shortfall will be more than made up from other work, particularly in other sectors of the North Sea, and from the expanding market for floating production systems which could represent up to 30 percent of OCA business by 2000. Svd Fude. OCA Chairman

and Managing Director, Trafalgar John Brown Oil and Gas, said, 'UK yards are as

New Exxon/Shell joint venture

Exxon Chemical Company, Shell International Chemicals Limited and Shell Chemical Company have signed a nonbinding letter of intent to form a worldwide petroleum additives venture.

The joint venture will be developed from Exxon's Paramins division and Shell's combined petroleum additives businesses across the globe. Total revenue for the two sets of businesses in 1995 amounted to over \$1.5 billion out of a total estimated industry demand of more than \$6 billion.

Pending the completion of definitive agreements between Exxon and Shell and receipt of government and regulatory approvals, the new company is scheduled to start up during 1997. The planned joint venture will provide significant enhancements and efficiencies in research and development, technical services, manufacturing, marketing and distribution, 'asvs Shell.

Life after Maureen?

Phillips Petroleum has announced refloating and re-use as its preferred option for the Maureen platform, although it continues to study the full range of decommissioning options.

Describing the platform as 'unique', the company has asked for bids for the 110,000-tonne steel gravity production platform, built in the late 1970s. It has advertised in the Official Journal of the European Union for contractors to submit proposals for its complete onshore disposal or re-use in a non oil/gas environment.

Maureen was designed and built with refloating and re-use in mind. This was most unusual at the time but characteristics specific to Maureen were responsible. In particular, its location was distant from existing infrastructure and its reserves were too small to justify the construction of a pipeline.

The gravity base consists of three huge 74-metre high storage tanks, each with a storage capacity of 220,000 barrels. Studies by Phillips and consultants Offshore Design Engineering and Reverse Engineering have shown that refloating by filling the storage tanks with air is perfectly feasible technically.

Ideally Phillips would have preferred to make use of the platform itself but a water depth of 90-98 metres is a constraint. Because it has no suitable location, it is offering to sell the redundant platform to others who are working in similar water depths.

In announcing these plans, Phillips is looking ahead. The actual decommissioning timetable is not yet fixed, partly because a well currently being drilled may extend the life of the field beyond the forecast 1998-2000. Whatever the date, Maureen could enjoy a lengthy reincarnation – it is good for another 25-30 years, according to Phillips.

offshore Sakhalin (the second part of the Sakhalin II project), are estimated to contain recoverable reserves in the region of most

immediately once the project

begins with the payment of a

development bonus of \$15

million and the establishment

of a Sakhalin development

fund building up to \$100

million over five years. This

would be used to improve the

Sakhalin Energy shareholders

are Marathon Sakhalin (30 per-

cent interest), McDermott

Sakhalin (20 percent), Mitsui

Sakhalin Development Co (20

percent), Shell Sakhalin Holdings

(20 percent) and Diamond Gas

Sakhalin, a wholly owned sub-

sidiary of Mitsubishi Corporation

the Lunskoye oil and gas fields

750 million barrels of hydro-

carbon liquids and 494 billion

competitive as any in Europe,"

thanks to CRINE and improve-

ments in skills and working

Extra work, not included in

the OCA forecast, is expected

to follow the construction of

the Interconnector pipeline.

Decommissioning should also

generate additional work for

UK yards both in the break-up

and refurbishment of facilities.

optimism, the OCA still

believes that further rationali-

sation of the UK offshore

fabrication business is likely.

However, depite the current

cubic metres of gas.

practices.

The PA field, together with

(10 percent).

island's social infrastructure.

Newsdesk

UK government reshuffle

A number of new appointments were made in John Major's government reshuffle in July. The changes include the appointment of **The Rt Hon The Lord Fraser of Carmyllie QC** as Minister for Industry. Together, they take on the responsibilities of the former UK Industry and Energy Minister Tim Eggar who announced his plans to resign earlier this year.

John Bowis OBE MP is the new junior Transport Minister.



Lord Fraser

Renewed call for action on global CO₂ emissions

Global carbon dioxide (CO₂) emissions from fossil fuel combustion rose by 12 percent over 1990-95, excluding the Former Soviet Union (FSU) and Central and Eastern Europe, according to a recent survey from the World Energy Council (WEC).

Based on current trends, it seems unlikely that commitments under the UN Framework Convention on Climate Change (UNFCCC) by industrialised countries to return their fossil fuel emissions to 1990 levels by the year 2000 will be met in most cases.

The key findings of the study are summarised as follows:

- Total OECD CO₂ emissions rose 4 percent in the 1990-95 study period. North America's emissions rose by nearly 6 percent while Japan's and Australia's emissions increased by 12 percent and 8 percent, respectively.
- While the European Union's CO₂ emissions in 1995 were slightly down

on those recorded in 1990, due mainly to falls in Germany, the United Kingdom and France, these three countries recorded increases in their emissions in 1995 compared with the previous year.

- The Asia/Pacific, excluding Japan, Australia and New Zealand, showed a 30 percent increase in CO₂ emissions over 1990-95, the Middle East a 35 percent rise, Africa 12.5 percent and Latin America 8 percent increases.
- In contrast, CO₂ emissions in the FSU and in Central and Eastern Europe were 70 percent and 75 percent of their 1990 levels, respectively, because of economic decline.
- Including the FSU and Central and Eastern Europe, global CO₂ emissions increased 3 percent over 1990-95.
- In 1995 the OECD countries continued to account for about 50 percent of global CO₂ emissions

from fossil fuel use, whilst the share of the FSU and Central and Eastern Europe fell from 21.4 percent in 1990 to 14.4 percent in 1995. Meanwhile, the share of developing countries rose from 29 percent in 1990 to 35 percent in 1995.

WEC expects rising population and economic development in developing countries to push global CO₂ emissions higher over the next few decades and is calling for action, starting now, based on the 'minimum regrets' principle to mitigate and adjust to the possibility of climate change.

However, the council does not believe that tougher targets for CO_2 emissions is the answer bearing in mind the likely failure to meet current targets set for 2000.

Instead, WEC suggests that measures to be taken should include improving energy efficiency, accelerating the development and use of alternative non-fossil fuels and cleaner fossil fuel conversion and use.

Strategic alliance and development application for Terra Nova

Norsk Hydro and Petro-Canada have signed a letter of intent to form a long-term strategic alliance which will offer both companies opportunities for exploration and development in the Jeanne d'Arc Basin off the southeast coast of Newfoundland and provide Petro-Canada entry into the Norwegian sector of the North Sea.

The alliance involves the swap of certain Petro-Canada oil reserves in the Grand Banks for a 9 percent working interest in Norsk Hydro's Veslefrikk field and 7.5 percent stake in the Njord development. Petro-Canada also acquires some 35 million barrels and 29 billion cubic feet of proved and probable reserves in the two Norwegian fields.

In return, Norsk Hydro will receive working interests of 5 percent in the Hibernia development and 15 percent in the Terra Nova project as well as 30 percent of all major significant discovery areas in the Jeanne d'Arc Basin. Some 94 million barrels of proved and probable reserves in Hibernia and Terra Nova will be transferred to the company which is also to contribute approximately Can\$80-90 million to Petro-Canada's share of capital costs for the two projects.

The transaction – which is conditional on a number of items, including approvals from regulatory bodies and other third parties – should be finalised before end-December.

Meanwhile, a consortium led by Petro-Canada has reached agreement with the government of Newfoundland and Labrador on benefits principles and fiscal terms, including key elements of the royalty and tax regime, for the Terra Nova olifield development.

Terra Nova is located 350 km

off the Newfoundland coast and 35 km southeast of the Hibernia development. It is estimated to contain 406 million barrels of light, sweet crude oil and is due onstream by 2001. Production through a floating production platform is expected to average 100,000 barrels per day with a field life of 15 to 18 vears.

The consortium has filed a development application which includes a number of environmental and regulatory reviews. A final decision on construction is expected in about a year's time once the review process is completed.

Total capital and operating costs for the development of Terra Nova are estimated at Can\$4.2 billion excluding transportation costs. Unlike the nearby Hibernia field, Terra Nova will be developed without government grants or loan guarantees.

North Sea sale

Onx Energy is to purchase Chevron's interests in the Ninian, Hutton, Lyell and Murchison fields for 5140 million. Some 35 percent of the interests will be assigned to Ranger Oil, subject to partner pre-emption, for 549 million.

The sale also includes Chevron's non-producing interests in the Columba B and E Terraces, the Brent and Ninian pipeline systems, the Sullom Voe terminal and some exploration acreage. Chevron retains its interest in the Statfjord field and will continue as interim operator of Ninian until Oryx obtains the necessary approvals required to take over.

Onyx plans to implement cost reduction initiatives at Ninian similar to those implemented at Hutton, tyell and Murchison, of which it is operator. This is expected to reduce direct operating expenses by over 15 percent by the end of 1996.

Newsdesk

UK government gives green light for fast-track development of Curlew

The UK government has given Shell UK Exploration and Production the go-ahead for the £300 million fast-track development of the Curlew field in block 29/7 in the Central North Sea.

The project will involve the conversion of the 100,000 tonne Maersk Dorset tanker into a floating production, storage and offloading (FPSO) facility with a storage capacity of 560,000 barrels of oil. First production is expected in autumn 1997 with a peak production of 45,000 barrels per day and 100 million cubic feet of gas per day. Oil export will be via shuttle tanker, while gas will be exported via the existing Fulmar pipeline to the St Fergus terminal near Peterhead.

Estimated field reserves are around 71 million barrels of oil/condensate and 244 billion cubic feet of gas.

MAS Production company, a business division of Maersk Company Ltd UK, has secured the contract for the provision of the leased FPSO. In turn, Maersk has subcontracted on an engineering, procurement, installation and construction (EPIC) basis to the MAS Alliance – a joint venture between Amec Process and Energy, SBM of Monaco and Maersk Contractors.

Tanker conversion work will be undertaken by A & P Tyne on the Tyne and topsides fabrication and installation handled by Amec's Tyneside yard. The mooring turret will be supplied by SBM. Coflexip Stena is to install the gas export pipeline. The drilling contract has been awarded to Borgland Drilling.

The timetable for the Curlew project – less than 18 months from award of contracts to first production – is believed to be among the fastest for any major project in the North Sea to date, says Shell Expro.

The FPSO is the second to be used by the company in the Central North Sea. The first, the Anasuria, is scheduled to enter operation at Guillemot and Teal later this summer (see Petroleum Review, July 1996).

New pipeline in Gulf of Mexico

Marathon Oil Company, Shell Oil Company and Leviathan Gas Pipeline Partners are to build and operate a \$220 million natural gas pipeline system in the Gulf of Mexico that will serve the growing number of production areas in the Green Canyon region.

The Nautilus project involves the construction of a new 30-inch diameter pipeline running some 87 miles from Ship Shoal block 207 to the gas plants in the South Bend, Louisiana area. The pipeline will transport up to 600 million cubic feet of gas per day.

The project will also expand the existing Manta Ray gas gathering system offshore Louisiana into a broader gathering spine that will serve both shelf and deep water production around Ewing Bank block 873 to the east and Green Canyon block 65 to the west.

Marathon and Shell have a number of deep water acreage positions in the area, including the recently announced Troika field in Green Canyon block 244.

The two companies will provide the bulk of the capital funding required for the project, the balance to be provided by Leviathan.

Marathon will oversee the construction of the new Nautilus transport line while Shell will oversee the Manta Ray expansion. The new gas gathering system is expected to be operational in the third quarter of 1997.

British gas targets German market

British Gas has signed a longterm contract with Wingas, the Wintershall/Gazprom joint venture, for the longterm supply of natural gas.

The agreement provides for the supply of a total volume of approximately 20 billion cubic metres of natural gas for an initial term of 10 years.

First supplies will flow in 1998 once the Interconnector pipeline linking the British gas grid with the European continent is completed. Construction of the pipeline, in which British Gas holds a 40 percent interest, is scheduled to begin this autumn.

Wingas will market the gas via its own pipeline system which the company is currently expanding with the construction of the WEDAL pipeline which will branch off from the existing MIDAL pipeline in the vicinity of Bielefeld.

The new pipeline will run for approximately 300 kilometres to the German border near Aachen at which point the British gas will be fed into the German grid.

Underground disposal of CO₂ gases

The British Geological Survey (BGS) has said that the deep underground storage of carbon dioxide (CO₂) could be used to reduce emissions of what is a major greenhouse gas.

According to BGS scientists, this process is the most practical method of CO_2 disposal currently available in the United Kingdom.

The permeable rocks underlying the North Sea are considered an 'ideal' reservoir. The CO₂ extracted from the flue gases of power stations would be compressed into a supercritical fluid and piped to a disposal area where it would slowly dissolve over thousand of years, reacting with the water in the pore spaces of the rock and the rock itself.

Safely contained storage would be assured for at least tens of thousands of years, probably millions of years, says BGS.

Gas could also be pumped into depleted oilfields to enhance oil recovery.

Other methods of safely disposing of CO₂ gases investigated by BGS scientists included:

 deep ocean dumping – a method deemed inappropriate for European countries because of the distances and costs involved in transporting the gas to an appropriate site in the Atlantic

absorbing the gas

biologically, for example into trees and foliage which could then be used as an alternative fuel – inappropriate in western Europe because of the lack of available land required for the scale of plantation needed

 underground disposal in old mine workings etc – also deemed impractical because there is not enough gas-tight storage space available.

Meanwhile, Statoil has announced that it is to inject CO_2 into the rocks under the North Sea when its Sleipner southwest field enters production in October. The field is expected to produce 20.5 million cubic metres of gas per day. The gas has a high content of CO_2 of 4-9.5 percent.

The CO₂ will be removed by a processing unit onboard the Sleipner production platform. According to Statoil, it will be the first time such a process has been done offshore.

Sales specifications require gas from the field to have no more than 2.5 percent by volume of CO₂. This means that some 1 million tonnes of CO₂ will be injected into the underground aquifer every year.

Injection of the CO₂ will not only significantly reduce emissions of the greenhouse gas to the atmosphere but also reduce Statoil's carbon tax levies.

Diary Dates



Exploration & Production/Energy Economics Discussion Groups

'Extending the commercial life of mature fields'

Wednesday 18 September, tea at 17.00, start at 17.30

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

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

IP contact: Jenny Sandrock

London Branch

DH. INSTITUT

'Back to Basics' - Supply and Distribution

Tuesday 1 October, tea at 18.00

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

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

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



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

'The new ACEA engine oil quality system'

Wednesday 18 September, at 19.00

To be held at The Stakis Bromsgrove

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

Please note change of venue.

Branch Contact: Mike Ward, Tel: 01299 896654 Fax: 01299 896955



Exploration & Production Discussion Group

Mr John Wybrew.

Executive Director, British Gas, will address an Exploration & Production Discussion Group meeting.

Tuesday 15 October, tea at 17.00, start at 17.30

Chaired by Mr David Upton

Wine and cheese will be served after the meeting. IP contact: Jenny Sandrock

Newsdesk.

BP Gas and Alliance Gas begin trading

Alliance Gas Limited (AGL), 100 percent owned by Statoil, and BP Gas, 100 percent owned by BP, began trading as separate gas marketing companies on 1 August. The two businesses were formed by restructuring Alliance Gas, the former joint venture company between BP, Statoil and Norsk Hydro, earlier this year (see Petroleum Review, June 1996).

BP Gas announced on the day that it had signed two new major gas supply deals with ICI. The first is for the supply of gas worth over £100 million to ICI's share of the Rocksavage power station. Currently under construction, the power station will be owned and operated by Intergen. The combined cycle gas plant will supply electricity to the Castner Kellner Chemicals plant near Runcorn, Cheshire from early 1998.

The second contract, worth £10 million, is for the supply of gas to the Castner Kellner plant to be used in the production of steam and electricity and for the production of various halogenbased chemicals.

Oil Taxation Office wins IIP award

The Inland Revenue's Oil Taxation Office joined the ranks of an increasing number of organisations in the oil and gas sector to receive an Investors in People (IIP) award earlier this year. The department is the third Inland Revenue Executive Office to achieve the award – which was presented at Melbourne House in London by Gwyneth Flower, Chief Executive of CENTEC.

BP posts record half-year profits and delays at Foinaven

British Petroleum posted record half-year results with a 23 percent increase in profits, compared with the same period in 1995, to £1.281 million.

According to Chief Executive John Browne, the improvements, while aided by higher oil prices, were largely due to 'selfhelp'. The group also raised its second quarter dividend by 18 percent to 5 pence per share.

Exploration and production profits rose 39 percent to £751 million, helped by stronger oil prices and a 7 percent increase in production – some of which is accounted for by the start-up of the Harding, South Magnus and Andrew fields.

Oil production was reported to be well on course to reaching the company's 1.8 million barrels per day target by the year 2000. Indeed, BP said new developments might even allow this figure to be raised to 2 million barrels per day.

Improved margins helped to push half-year refining and marketing profits from £176 million in the first half of 1995 to £365 million this year, despite a '£50 million hit' from the petrol pump price war in the United Kingdom. Chemicals, however, did not perform so well, with net profits of £114 million slightly down from the £128 million in the previous guarter.

BP also reported a six-month delay in the start-up of production from the Foinaven field west of Shetlands. A few weeks had been lost by a strike at the Astano yard in Spain where the floating, production, storage and offloading vessel Petrojarl Foinaven is being constructed. Cracks were then discovered in one of the field's two subsea manifolds during routine pressure testing. The unit has been lifted off the seabed and is currently being analysed onshore.

The delays mean that it is unlikely that installation work can be completed before the onset of winter weather conditions. This means completion will have to take place next year, with production likely in spring.

Technological milestone for Shell Expo

Shell UK Exploration and Production proposes to use the remote deployment of an electrical submersible pumping system in the development of two new satellite fields linked to the existing Gannet platform in the Central North Sea.

According to the company this 'technological milestone' will, 'once proven, have major implications for the development of many small fields, which, because of the characteristics of the oil or the particular geology, are difficult to produce and are substantial distances from existing infrastructure.'

Gannet, located some 180 km east of Dundee, already has three satellite fields feeding into its production. The two new satellites – Gannet E and Gannet F, both of which are 14 km from the platform – are scheduled to come onstream next July.

It is the Gannet E satellite field which contains estimated recoverable reserves of 23 million barrels of relatively thick and heavy crude oil that will use the new pumping system. Gannet F has much lighter crude more typical of North Sea reservoirs and thus does not require such a system. It has estimated recoverable reserves of 19 million barrels.

Total cost of the project is estimated at £90 million.

Future of Sullom Voe terminal secured

The 28 oil companies which jointly own the Sullom Voe Terminal in Shetland have accepted an offer from the Shetland Islands Council which halves the £7 million rent it receives from the terminal, backdated to April 1995, and relates it to actual rather than forecast throughput. The deal also reduces other charges such as those levied for the use of councilowned tugs and jetties. The land lease covers the next 25 years. However, the oil companies can stop using the terminal's services at any time by giving two years' notice.

According to Terry Kirchin, Sullom Voe Terminal Manager, the agreement has been 'carefully crafted to create the maximum possible alignment between

Elf moves in on UK retail sector

Elf Oil UK is hitting back at the supermarkets which have secured almost a quarter of the UK petrol retail market with plans to expand its network of Le Shop forecourt stores and to investigate several stand-alone convenience stores.

The company hopes to open Le Shop stores at 50 of its 650 service stations by the end of this year. According to Alain Dujean, Elf's Marketing and Commercial Director, the shops will 'offer up to 2.500 lines at the industry and the Shetland Islands Council'.

With its future secured into the next millennium, the council can now bid for new contracts from the frontier oil province west of Shetland. It has already lost the Foinaven oil storage contract to the Flotta terminal but is unconcerned, viewing such work as less attractive than the potential business associated with production from major discoveries arriving by pipeline.

Sullom Voe terminal came onstream in 1978 and at peak throughput in January 1985 it handled some 1.5 million barrels per day. Current throughput is some 800,000 barrels per day – a figure forecast to fall to 450,000 b/d by 2000.

competitive prices."

Business at three flagship stores at Cardiff Gate on the M4 motorway, Ducklington in Oxfordshire and Flamstead End in Hertfordshire has more than doubled in the last three months and the Ducklington branch was recently granted an alcohol licence.

Elf has also announced an alliance with Somerfield that will see the development of Somerfield supermarkets at selected service stations.

Safety: striving for zero accidents

O il companies realise the necessity of safety at work. However, because of the risks involved, excellence is not good enough for them and they all strive to reach zero accidents. This has also been the goal of DuPont de Nemours and the worldwide safety record of their group is currently 0.5 lost-time accidents (LTAs) per 1,000 employees.

Conoco, which is part of the DuPont Corporation, also has a long and solid tradition of safety at work. Last year, the goal of 'zero accidents' came true for the 425 employees of Conoco UK. Not only had there been zero lost-time accidents but also zero days of restricted activity and zero medical treatment cases – in other words, the total recordable rate was 0.00.

This safety record is the result of a number of basic principles:

 All injuries and occupational illnesses can be prevented.

 People are the most important element in an effective safety programme

 All employees are responsible for their own and their colleagues' safety.

• The entire management line has a special responsibility for preventing injuries. The Conoco approach to safety focuses on people because a parent company study has shown that unsafe acts underlie 96 percent of all accidents at work, while only 4 percent are related to technical causes. Because the attitude of employees is essential to safe working, it is necessary to demonstrate the company's commitment to safety and make employees adopt this commitment as their very own. At Conoco UK, safety is placed at the top of the agenda of every staff meeting and all employees onshore and offshore as well as contractors participate in regular safety meetings.

Improved communication

Alaister McIntosh, Manager for Safety, Environment and Quality Assurance of Conoco UK's Upstream Operations, points out that these safety meetings have greatly contributed to improving communication between managers, employees and contracting companies. Mr McIntosh explains, 'We have a structure of safety representation that works all the way through the company. On an offshore platform, it starts off with the Platform Individual Constituency Safety Meetings. Matters which are not resolved at that level cascade up into the Platform Safety Committee, the Safety and Environmental Action Committee, and finally the Central Safety and Environmental Committee, which is our management team. It is chaired by our Managing Director, George Watkins."

Because of management's special responsibility for preventing injuries, all supervisors are personally involved in safety training and safety audits. These audits are an integral part of safety management on platforms and contractor-operated drilling units. During such an audit, a manager will stop and talk with an employee, rather than rush by. This demonstrates the manager's concern for safety. In a DuPont-style safety audit, the auditor's attention focuses on employees. Where an unsafe act is observed, both auditor and employee jointly try to determine the reason for this at-risk behaviour and discuss a safer way of doing the job.

In addition, the observation skills of employees are trained with the help of employees are trained with the help of Programme (STOP). This behaviour modification programme is founded on basic safety principles and proven observation techniques. Its objective is to enable all employees to recognise and eliminate unsafe acts and at-risk conditions in the workplace. STOP uses self-study workbooks, videos, group discussions and field audits that allow participants to apply what they have learned to their own job.

Particular attention is given to the observation of unsafe acts because, if they go unnoticed, they will sooner or later lead to accidents. This is also the reason why, at Conoco UK, not only accidents but also incidents and nearmisses are reported and investigated. Mr McIntosh points out, 'We classify incidents into four categories, dependent on their severity. Incidents of all four categories are reported, and our aim is to see the severe ones reducing in percentage terms of the total number. We have a vision for the year 2000 that we want to be able to look back and see five years with no losttime accidents."

Customising safety knowhow

Other companies can also make use of DuPont's experience in the field of



safety – the Safety and Environmental Management Services (SEMS) offer consultancy services, training materials and seminars to any interested organisation aiming to improve safety.

A new safety culture

One of SEMS dients is BP Exploration (BPX). In the North Sea, the company is split into 19 assets. The manner in which DuPont's safety management principles and training materials have contributed towards reducing the accident rate of both employees and contractor personnel is best shown by the BP mature asset team MAST. This group consists of four oil production fields – Beatrice, Buchan, Clyde and Thistle. Some 700 people work for MAST, of which roughly 80 percent are contractor staff. Together, all MAST employees and contractor personnel have totalled more than 1.45 million manhours without a single lost-time injury since June 1995, a BPX worldwide record.

Through a compliance approach introduced by BP, the number of accidents among employees and contractor personnel had been reduced from 37 in 1991 to 6-8 in 1993-94, but had reached a plateau. One of the main reasons for this levelling-off was that 'A powerful safety culture was missing from the organisation,' as MAST Deputy Asset Manager Alan C Johnson of BP Exploration points out. Safety was seen as the province of the safety professional and not as a line accountability - which meant that management's commitment to safety was not demonstrated in such a way as to convince employees and contractors of its importance. Hoping for a new orientation, MAST had a Safety Management Evaluation carried out in December 1994.

This was followed by a series of safety management seminars for managers, where BP executives and managers were familiarised with the idea that accidents are not 'inevitable' and 'part of the job' but that employee actions determine whether accidents happen or not. Steve Flynn, Health, Safety and Environment Manager of MAST, explains that These seminars set the tone for the management style that was expected and subsequently adopted.'

Translating this new safety culture into a hands-on approach, BP MAST introduced the Safety Training Observation Programme (STOP). Today, one of the conditions of allowing contractors onto the platforms is how active they are in safety and to what extent they use STOP among their own personnel,' Peter Solomon, SEMS UK Manager states. When the contractors' employees come onto the platform, the Offshore

Roughly 700 people work for MAST: they have accumulated more than 1.45 million man-hours without a single lost-time injury (LTA) since June 1995.

Installation Manager talks with them and explains the basic safety principles. He also reviews the daily STOP tours with the supervisors.

Summarising the reasons for the success of the new safety culture, Mr Johnson states: The step change in MAST safety performance is starting to appear as we review our 1996 performance. I believe two key areas have brought about this success: Firstly, strong committed leadership from the top to set challenges and, secondly, involvement of the workforce in all business activities.⁴

Today, the safety performance of MAST is 20 percent better than that of the average BP asset. The Buchan platform holds BP Exploration's record of the longest time without a lost-time injury – over two years. BP's goals for the future, as stated in the company's new Safety Policy, are: 'No accidents, no harm to people and no damage to the environment.'

Audit training for safety

Another good safety record has been achieved by the Compagnie Rhenane de Raffinage (CRR) in Reichstett in France which did not record a single lost-time accident in the last 10 years. However, Safety Manager Jean-Luc Robert believed that there still was some potential for improvement of contractor-personnel safety, because they had chalked up 10.77 LTAs as well as 25 medical treatment cases (without lost time) per 1,000 employees in 1994. Audit-training by SEMS experts and the ensuing inhouse audits reduced contractor-personnel accidents across the board and brought the refinery's own employees' medical-treatment accidents down by three-quarters within a year.

Two-thirds of the contractor personnel at the refinery (which belongs to the Shell group) are engaged in maintenance, handling 90 percent of all tasks in that sector. Some 70 percent of the companies contracted by the Alsatian refinery for this work have had a long-standing relationship with CRR. The remaining third of CRR contractors are involved in the construction of new facilities. These projects are for the most part handled by French specialist companies.

In late 1994, some 100 CRR personnel and 20 contractors' employees were given safety audit training. The cost of this training was paid by each participant's own employer.

As a result of this safety training, 1995 was the first year that contractor personnel had not recorded a single losttime acident. What is more, the number of acidents without lost time fell to 2.45 per thousand employees or onetenth of the previous year's level. A significant reduction in the number of accidents without lost-time was also achieved by CRR's own employees in the wake of the audit training: the rate per thousand employees had been 7.8 in 1994 but dyindled to a mere 2.22 the following year.

All CRR line supervisors down to foreman level conduct audits in their own department. Interdepartmental safety audits also take place throughout the plant. A committee consisting of all senior managers as well as department heads audits one of the eight areas of the company each week. This means that in a period of eight weeks, every area of the refinery (including the administration) has been audited by the management committee at least once. If safety shortcomings are identified in one or more areas of the plant, supplementary audits are conducted. 'When we noticed that some of the workforce were not wearing the full required personal safety equipment, the management committee conducted four audits in a single day, one in each of four areas of our refinery,' Mr Robert reports.

After each audit, a written record is kept of observations and, wherever applicable, of proposals for safety improvements. Supervisors take part in the regular meetings of the safety committee, so that they can see for themselves that the audits are taken seriously by senior management. The safety committee examines the consequences to be drawn from audit observations and decides whether further investigation is required to determine the causes of a particular incident or unsafe situation. Mr Robert explains what has to be kept in mind when carrying out effective audits: It's not a case of putting the blame on employees but of stressing the progress that has been achieved. We don't want to be schoolmasterish but make every effort to listen to our employees and we are prepared to learn from them.'

Audit training was not only given to all levels of management but also to technicians and engineers who have no managerial function. Mr Robert reports that 'Following DuPont audit training, we conducted 180 audits with our own personnel in 1995. Since contractors were also included in the audits, communication between our own employees and those of the contractors has improved significantly, providing us with an added benefit.'

In addition to audits, CRR applies a host of other management tools to enhance the safety performance of its contractor personnel. New contractor employees are given their works ID card only after having undergone safety training. This access card is renewed annually, provided that they attend a refresher course. The safety training, given by CRR's own experts, is regularly updated and makes use of a wide range of audio-visual methods. All safety training activities at CRR stress the importance of environmentally-minded and health-conscious attitudes. 'Our aim is to develop an allround sense of responsibility.' Mr Robert concludes.

European forecourt safety

Werner Buschke, Esso Germany's Safety Manager in charge of service stations, has also achieved a significant reduction in accidents with this management system. He says 'It can be effectively introduced in any workplace because it targets human behaviour rather than focusing merely on technical aspects. Obviously, job-site instructions had to be fine-tuned to the particular requirements encountered in service stations. The basic principle, however - the conviction that people are the key to good safety management - holds true for all kinds of companies.'

In January 1996, Esso AG's service stations totalled five million man-hours without a single lost-time accident. This record was achieved by 300 Esso employees and 1,500 contractors' employees working on 500 building sites and carrying out maintenance work at 2,200 service stations. The safety concept involves the service station tenants and their employees (some 10,000 in total) and encompasses the operations in Germany, Switzerland, Austria and eastern Europe. 'The service station business. in which both maintenance and construction work is carried out by contractors, is part of what is now the safest division within Esso AG,' Mr Buschke reports.

He explains, The construction of service stations as well as the cleaning and modification of fuel tanks are potentially hazardous activities. That is why we have focused on the safety training of the contractors' employees involved in these tasks. The approach followed was the top-down method: First, the contractors' management was trained. Then they in turn passed on what they had learned to the next level of their line organisation.'

Some 150 key people were given audit training, an essential element of the service station personnel's safety training activities. Echoing what Mr Robert stated on the subject, Mr Buschke stresses, We insisted particularly on the practice of the "positive dialogue" technique.' This technique is now applied in the audits conducted at Esso's service stations by the contractors' management as well as by Esso managers. During the construction of a service station, safety audits take place twice a week.

Permanent communication is necessary to instil the safety consciousnes. For this purpose, Esso AG uses a newsletter which is sent regularly to all personnel. The newsletter informs about at-risk behaviour and unsafe conditions and offers suggestions on how to avoid them. Mr Buschke states: 'As we are determined to reduce the accidents of our contractors' employees, it is crucial that we communicate this objective to them and show them ways of achieving it. Our ultimate aim is to achieve zero accidents.'

Apart from the reduction of the accident rate, which had been 45 per million manhours in 1988. Mr Buschke sees additional benefits resulting from the latest safety drive: 'We are convinced that an accident-free environment leads to better quality and strengthens the commitment and motivation of our employees as well as of our contractors' personnel. I have also noted that communication and teamwork have improved, and people are more ready to take over responsibility. All this has had a positive effect on the corporate culture at all sites."



The German Esso AG's service station business has totalled more than five million man-hours without a single lost-time accident.

Questions concerning the US Strategic Petroleum Reserve

vents at home and Cabroad may well, before too long, spark an energy debate - possibly an intense and contentious one concerning growing American dependence on crude oil from Middle East countries. For now, oil supply security draws only yawns from the US public. And many experts, somewhat complacently. contend that the markets. aided by Uncle Sam's policies, are capable of ensuring that Americans have as much oil as they want at prices they like, for as far into the future as anyone cares to gaze.

But lately terrorist bombings, which seem to be increasing in tandem with US foreign crude oil imports, are having a dramatic and unsettling impact, at least on public perceptions. This, to some extent at least, is part of the cost of the US involvement in Middle East affairs that the country's thirst for foreign crude oil, which has been growing more rapidly than many expected, demands. Americans are likely to start taking a closer look at their oil dependency, particularly if the recent crash of TWA flight 800 is found to be the work

By Peter S Adam

of terrorists who may, perhaps, be somehow associated with the same group that killed 19 US military personnel in Saudi Arabia earlier this year and if oil becomes more expensive. These are distinct possibilities.

Political opportunism?

Politicians' reactions, as well as experts' comments on a recent sale of crude oil from the US Strategic Petroleum Reserve (SPR), the federal government-owned and controlled crude oil stockpile, indicate that many among the current crop of US policy-makers and some of the oilmen here may well, as the expression goes, be driving using only their rearview mirrors.

On 29 April, in response to a rapid but relatively modest 20 cent per gallon increase in gasoline prices nationwide, President Bill Clinton directed Energy Secretary Hazel O'Leary to start selling approximately 12 million barrels of crude oil (less than one day's domestic requirement) from the SPR. Earlier that month Congress had approved such an action in order to help to balance the Federal government's budget. Authorisation for the sale was contained in the 1996 Omnibus Appropriations Act.

While the sale may or may not have had much of an impact on gasoline prices nationally, it raised eyebrows among petroleum experts, who generally charged the administration with political opportunism and pointed out, correctly as the Department of Energy report (*An Analysis of Gasoline Markets Spring 1996*) later affirmed, that the price increase was the result of a combination of temporary factors which quickly dissipated, causing gasoline prices to drift back down to low, by historical standards, levels.

Success of past policy

For two decades US petroleum policy has rested on two pillars:

- the ability of the military to protect, defend and, if necessary, take back the oilfields of the Gulf states
- the SPR, set up in 1974, which acts as an insurance policy to mitigate the impact of a supply disruption on the economy.

These twin pillars have ensured a plentiful and uninterrupted source of oil for the United States, and the world.

The policy worked. During the Gulf War in January 1991 – the only time it was specifically used for the purposes it had been designed to serve – SPR sales provided an instantaneous counterforce to an expected market panic that could have taken place at the outset of Operation Desert Storm during which the US military effectively led the Allied forces' drive to ous the Iraqi army from Kuwait.

Following the Desert Storm sale, the pressure of mounting US federal government budget deficits began to offset, though, a standing legislative requirement to fill the SPR to 750 million barrels at the rate of 7,500 barrels per day. The last purchase of oil for the SPR was made in 1994. Then, last April Congress passed the Omnibus Appropriations Act which directed the Department of Energy to sell \$227 million worth of oil to allow the achievement of the overall budget target for the year. Also contained in the Bill, as part of the 1997 Administration Budget, was a proposal that the reserve sell \$1.5 billion of oil in 2002.

Debate on SPR future

On 8 May the House of Representatives' Committee on Commerce's Subcommittee on Energy and Power conducted hearings on the future of the Strategic Petroleum Reserve.

Kyle Simpson, Associate Deputy Energy Secretary, affirmed that rising gasoline prices were responsible for the timing of the President's action and noted that the sale had been conducted in an orderly manner, consistent with congressional authorisation. He stated that the SPR was an essential element of US energy policy and noted that DOE recognized that 'With world dependence on oil exports from the Middle East forecast to grow significantly, our oil stocks will take on everincreasing strategic value.'

He added however that the SPR cover, which is calculated in terms of the number of days' imports that it holds, had been declining in the face rising oil imports and attributed this to fiscal pressures.

He noted that private industry crude oil stocks had also been declining recently but for different reasons. The adoption of just-in-time' inventory management techniques by the oil industry had led to a reduction in private stocks that amounted to 100 million barrels between 1995 and 1996 alone.

He assured the committee though that the combined government and private crude oil stock holdings, which at the time of the hearings supplied 164 days of import coverage (74 public and 90 private) was sufficient to meet IAE requirements - 90 days of import coverage in combined government and industry inventory. The current SPR holdings, about 575 million barrels, were sufficient to satisfy domestic legislative requirements; the reserve has to be at least 530 million barrels in order for the president to maintain his authority to utilise drawdown mechanisms as authorised by Congress.

Mr Simpson warned that if imports continue to rise, as most analysts predict, the effectiveness of the SPR will decrease further and, at some point, decreasing stock levels will undermine US advocacy that other governments should build and hold strategic oil stocks. He added: 'We must periodically reconsider both the risks we face, and how much insurance we can afford.' However, they are difficult to assess.

An Energy Information Administration presentation revealed little that was new. Imports account for more than half of US crude supply; 61 percent of imports come from Saudi Arabia, Venezuela, Canada and Mexico and 50 percent from OPEC countries. Although there has been some diversification in supply sources, early in the next century imports will account for 56 percent of domestic crude requirements. With regard to products, only 9 percent is foreign sourced.

Constructive criticism?

At the committee's hearings industry representatives criticised government moves and called for a bigger, taxpayersupported reserve.

Charles DiBona, President of the American Petroleum Institute (API), said that 'Using the SPR to attempt to mitigate short-term price increases is inadvisable because it reduces incentives to hold private stocks.' API believed that the SPR oil should be made available when an emergency exists but should not be used to dampen price increases.

Noting that the SPR's holdings, about 592 million barrels of crude oil at the time represented only 67 days' supply of imports (by API calculations), Mr DiBona suggested that the SPR be increased to 90-day coverage. He affirmed that it should be operated by the federal government and funded from general revenues.

A Federal cookie jar?

Philip K. Verleger Jr's colourful testimony characterized the history of the reserve as 'deplorable', adding that the government was treating it like a 'federal cookie jar.'

'Is there a role for the Strategic Reserve?' he asked. The temptation is to say no...' Resisting it, Mr Verleger explained that the SPR should be maintained to tide consumers over during certain severe disruptions. However, it should be managed in a way that does not undermine the incentive firms have to manage their own risk properly, presumably by hedging inventories in the futures markets. He believed that this enhanced the insurance provided by the SPR and suggested that overall coverage could be enhanced by integrating the SPR into the futures market. He also proposed that firms should be able to borrow oil from the SPR and pay the loan back with oil. Among other things, he contended, this would allow consumers to ascertain the cost of government energy price insurance and would 'enable size of the reserve to be increased with no further outlay of government funds for the oil.'

John Lichtblau, Chairman of Petroleum Industry Research Association (PIRA), described the 12 million barrel sale as 'a costly and misguided precedent.' He took issue with Mr Verleger's approach, saying, 'Some analysts have theorised that the SPR could be replaced by the diligent use of the now-mature futures market. Vital as they are to the current oil market, (futures are) no substitute for the SPR because physical volumes are the only salve to an overheated market during a supply crisis.'

Whereas other witnesses had focused on the cost of having an SPR, Mr Lichtblau tried to calculate the cost of not having an SPR, which, he claimed, would be enormous. PIRA estimates that a supply disruption would cost the economy hundreds of billions of dollars. And the cash infusion provided by selling the reserve would come to only \$8 to \$12 billion. 'Establishing and maintaining the SPR is a perfect adjunct to our appropriate free market policy,' Mr Lichtblau said. But then he went on to warn that 'Even if SPR volumes were to remain at present levels, they will be sufficient to cover less than 60 days of the Energy Information Administration's projected net imports in 2000. This declining trend could impair the effectiveness of the SPR if it makes policy-makers reluctant to use the reserve early and decisively during a crisis.' He went on to note, 'Raids on the SPR for budget revenue and/or for market manipulation cripple the programme further."

Mitigating supply crises

Since 1950 there have been 13 oil supply interruptions equal to 1 percent or more of free-world oil consumption. All but three have centred around disputes or conflicts in the Middle East. The longest, lasting 44 months, from March 1951 to November 1954, followed nationalisation of Iran's oilfields. The two most severe took place during the Suez War of 1956 and 1957 and the Iranian Revolution in 1978 and 1979: these reduced oil supplies (expressed as percentages of free-world consumption) by 11.43 percent and 5.7 percent respectively. While those testifying before the committee acknowledged that over the last 20 years the SPR has proved itself capable of offering effective insurance against the economic impact of supply disruptions for short periods, no-one ventured to guess the likelihood of a prolonged disruption.

Government officials, private industry representatives and experts alike steered clear of commenting on the other, complementary pillar of US crude oil security – America's military capability. This is the key to evaluating the twin-pillar approach's continued effectiveness, which is far from assured.

As G Henry Shuler, Chairman of the Energy National Security Programme at the Centre for Strategic and International Studies, pointed out recently in an article in Oil and Gas Investor, the US demonstration of its capacity to defend one country against external military aggression in the Gulf War has led to overconfidence about Middle East oil supplies.

We have lost the perception, which was sound because it was based on experience, that the biggest problems (there) come from internal upheaval,' Mr Shuler wrote. 'We're going to have that complacency shattered,' he predicted, 'as rudely as in the 1970s when those upheavals took place.'

What if a prolonged supply disruption took place? This is something most US political leaders and policy-makers as well as many of their colleagues in the analytical community would prefer to ignore.

Call for energy policy

But, in addition to Presidential action and Congressional hearings, the 20 cent increase in gasoline prices earlier this year prompted the magazine Consumer Reports to publish an article 'Does America Have an Energy Strategy?' The piece mentioned neither the SPR nor the US military. It made note, however, of the growing need for crude oil imports and America's backsliding in the area of energy efficiency. The article went on to discuss rapid transit and fuel-efficient cars. The unchecked growth of US automobile use could undermine American national security because it will significantly increase US dependence on foreign oil.' And it concluded 'A long-term energy strategy that's good for the economy and the environment will also be good for consumers."

Perhaps terrorist bombs, symptomatic of continued unrest in the Middle East, will prompt Americans to start pressing for a bona fide energy policy.

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US sanctions and election year politics

The recently enacted US Iran and Libya Sanctions Act started out in Congress as a bill designed to weaken the Iranian government by deterring non-US companies from investing in the Iranian energy sector. It was strongly endorsed by AIPAC, the powerful American Israel Public Affairs Committee which believes that Iran supports Hezbollah, the Lebanon-based terrorist group. Supporters pointed to Conoco's plans, later cancelled under government pressure, to develop two large Iranian offshore oilfields and to reports of subversive activities in Teheran. They suggested that Iran had been involved in the bombings in Saudi Arabia.

By Judith Gurney

The Clinton administration initially opposed the bill, worried that it would result in bitter disputes with Western Europe. It then decided that economic sanctions were preferable to the alternative option proposed by House Speaker Newt Gingrich to designate funds in the intelligence budget for the purpose of destabilising the Iranian government through covert measures. In the meantime, Congress was into sanctions in a big way, mindful of influential voter groups in an election year. In March it passed the Helms-Burton Act threatening actions against foreign companies that engaged in commerce in Cuba. This dramatic tightening of a 34-year old trade embargo was backed by the large Cuban-American community in voter-rich Florida and New Jersey and its passage was assured after the downing, near Cuba in February, of two planes belonging to an anti-Castro group.

Targets Iran and Libya

As the Iran Sanctions Act was making its way through Congress, it was amended to cover sanctions against companies investing in Libya. The rationale for this addition was not the small Libyan-American vote but the lingering legacy of the bombing of Pan Am Flight 103 over Lockerbie in 1988, for which Libyans were said to have been responsible. There was no compelling reason for the government to call Libya to account at this time but, as one Congressional aide noted, Congress 'was certainly not afraid of taking a shot at Libya. It's a convenient target.' The success of the amended bill was

sealed by the explosion, on 17 July, of TWA Flight 800 off Long Island. The media immediately compared the explosion, and the search for its cause, with what happened at Lockerbie. Now the focus was on Libya, not Iran. The bill passed the Senate on 24 July and the House on 25 July. President Bill Clinton signed it on 5 August in the presence of the relatives of Pan Am flight 103, claiming that the legislation would deny Iran and Libya the money they needed to finance international terrorism and to obtain weapons of mass destruction.

The bill in its final form requires the president to impose two or more of six optional sanctions on foreign companies which invest \$40 million or more in new investment in the energy sectors of Iran and Livba. These sanctions include:

- prohibition of loans and credits over \$10 million from US financial institutions
- denial of US Export-Import Bank credits
- prohibition of participation in US government procurement projects
- restrictions on exports to the United States
- ban on procurement of licences for specified US goods or technologies
- denial, for financial institutions, of dealing in US government debt instruments or funds.

The main issue, which applies mainly to Libya where foreign companies such as Agip, Total, Repsol, Petrofina, OMV, Veba, Wintershall and others have ongoing projects, is whether the United States will regard funds spent on these projects as 'new' investment. This applies less to Iran, where there is currently very little large-scale involvement by foreign companies - with the exception of Total. On the other hand, the potential for investment in Iran is huge, as Iran has the second largest gas reserves in the world, which are largely undeveloped. A number of companies and governments in Europe and Asia, including many former Soviet Republics, are interested in getting access to this gas as well as to Iranian oil.

European worries

The reaction in Europe, still festering over US sanctions regarding companies dealing in Cuba, was immediate. Individual governments saw the United States as indulging in extra-territoriality and trying to regulate the policies of other countries to its own purpose, an aim which the US media openly admitted. The governments of Britain, France, Russia, Spain, Japan and other nations rejected the right of the United States to impose domestic laws internationally. One diplomat went on record as saying that it was a completely unacceptable form of conducting trade and foreign policy.

The European Union made a formal complaint, suggested it would take the matter to the new court of international trade disputes at the World Trade Organisation in Geneva and began drafting retaliatory measures. Its foreign ministers planned to discuss these measures at a meeting in Ireland early in September and to agree them later that month or in early October.

US reaction

In the United States, many domestic companies also are not happy with the new law, especially those with large overseas operations which fear retaliation from foreign governments. In addition, there are some that would like a piece of the action in Iran and Libya. But the lobbying clout of these companies in an election year was

Effects of US sanctions

After the bill became law last month, it was not immediately clear which investments would be involved. It was generally assumed that the sanctions would affect companies undertaking new investment in either Iran or Libya and that previously announced projects would escape. Deliveries of equipment were likely to be hit but no immediate effect on oil and gas trading was expected.

The European Commission has already drafted anti-boycott legislation, following earlier US moves against companies that invest in Cuba. Fortuitously, this legislation has been made sufficiently flexible to be used in other instances and can therefore be applied in the current case.

European companies with interests in Iran and Libya include Total, Elf, Repsol, Petrofina, OMV, Veba and Wintershall. Agip produces over 100,000 barrels a day of oil in Libya, principally for refineries in Italy, and has plans for a significant investment in a gas project in Libya.

insufficient to change the course of events. Congressmen felt that they must go with the tide. One senator, sympathetic to business interests but attuned to voter pressure, was reported as advising his colleague to 'hold your nose and vote.'

Many theories have been advanced to explain the US love affair with economic sanctions which history has shown to be rarely effective. These Lasmo is engaged in both on and offshore exploration in Libya but its operations are relatively small and not likely to be affected.

A Total spokesman said that the sanctions would not concern his company which is the largest foreign player in Iran, with a \$600 million contract to develop the Sirri offshore fields signed last year.

Shell also is involved in Iran, currently undertaking a feasibility study into the South Pars gas field and as yet has not further investment plans.

Immediately after the US legislation was passed, Turkey and Iran signed an agreement under which Turkey will buy large quantities of gas worth \$20 billion from Iran and build the necessary gas line to connect the two countries' networks (at a cost of some \$2 billion). Concern whether this investment would be affected by the US legislation may well prove irrelevant, since the Turks face considerable difficulties in securing funds for the project.

cite such causes as isolationism, belief in economic self-sufficiency, the legacy of the immigrant melting-pot culture, emigré politics and national pride. The reasons are undoubtedly complex and strong. What worries the rest of the world is not just the ease with which economic sanctions become law but the apparent impossibility of reversing the process and bringing them to an end.

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Central Europe – a land of opportunity

The economic and sociopolitical transformation of Central Europe following the disintegration of the former Soviet empire has opened up enormous opportunities for trade and investment in the region's energy sector by foreign companies. The opportunities in the refining. marketing, transport and distribution sectors of the Czech Republic. Slovakia. Poland and Hungary were addressed by a conference. organised by the Institute of Petroleum in association with the UK Department of Trade and Industry.

'The Czech Republic, Slovakia, Poland and Hungary are clear leaders in the economic, social and political transformation process of this region', commented Sir Norman Wooding, Conference Chairman and Chairman of The East European Trade Council. 'Both economic restructuring and economic growth have taken place at a rapid pace, inflation has been brought under control, unemployment is being coped with despite its recent increase, the national debt is being handled, privatisation has gone forward, currencies are de facto transferable and there are plans to become part of the European Union,' he continued. 'However, the transformation has been uneven and

By Kim Jackson

jerky and is still far from complete.'

While such developments have indeed created enormous opportunities for trade and investment by foreign companies, a number of obstacles remain as the legal infrastructure and level of financial services, telecommunications and transport infrastructure are inadequate for the planned task. 'Foreign investors require patience, long-term commitment and partnerships [with each other and indigenous organisations] in order to add to, and share in, the wealth of the region,' he cautioned.

Suppliers of choice

Tim Eggar, then Minister of Industry and Energy, UK Department of Trade and Industry, also emphasised the importance of partnershipping, but on a person-toperson, networking basis. He maintained that such a business approach was 'especially important' in this region of the world and stated that 'more application and determination' was required if UK companies were to take advantage of this 'major market opportunity'. He warned British companies not to neglect the rapidly developing energy markets of Central Europe and stated that their wealth of experience in refining and petrochemical equipment, chemical process technologies, design, feedstock and product storage and handling meant UK companies were well placed to become 'the suppliers of choice'.

Refining review

There are 15 active oil refineries in the Czech Republic, Hungary, Poland and Slovakia with a total crude oil distillation capacity of 45.5 million tonnes per year (see map and table). These refineries vary immensely in terms of technical sophistication, ranging from simple crude oil topping operations to a large, complex refinery similar to those in western Europe.

The industry is under pressure from a number of directions – in many ways related to the requirements of European Union (EU) alignment, according to David Murdoch of Wood Mackenzie Consultants who presented an overview of the structure and development of refining in the region. In particular there is pressure to:

Improve competitive position -The refining industry in all of these countries is protected to an extent by import tariffs. However, pressure is increasing from the European Union to set a timetable for removal of these tariffs and to open up the market for oil product imports. For several refineries, economic survival in such a climate will require major investment in upgrading plant together with measures to improve efficiency and reduce manpower. Indeed, this process is already underway in the main refineries. The long-term viability of other refineries is debatable.

Meet new quality/environmental standards and increased demand - Convergence with EU product quality and environmental standards, including reductions in sulfur dioxide, nitrous oxides, volatile organic compounds and particulate emissions and a move towards the production of lower sulfur diesel and lead-free gasoline, is already rapid but significant progress and investment is still required. It is unrealistic to assume that the expected substantial growth in demand for transport fuels could be satisfied by imports alone.

 Attract funds to finance the required investments – Resulting directly from the previous two points and based on announced plans, direct refinery investment over the next 5-10 years could exceed \$5,000 million. To attract the necessary funds, there will be a need to continue with the privatisation programmes and restructuring that are now, after several false starts, becoming a reality.

Despite the need to upgrade facilities and close inefficient capacity, the refining sector of the Czech Republic, Hungary, Slovakia and Poland does have some key factors working to its advantage. For example, comparatively cheap crude is available from Russia, while the Druzhba pipeline running through Poland offers lower stock losses, less stockholding requirements and less environmental risk compared with shipping. Indeed, Central Europe is well-connected to extensive product pipeline systems, including the Druzhba pipeline, which offer low-cost means for product despatch. However, this is not without its problems.

Developments in corporate structures

Privatisation and the restructuring of the refining sector in Central Europe has been driven by a need to increase levels of investment and improve commercial awareness by moving away from the effects of state control in order to ensure long-term survival. Furthermore, such restructuring will allow refiners to withstand competition from new entrants to the market-place, particularly when import tariffs are removed, and to open up opportunities in other countries, both east and west.

While progress has been somewhat slower than forecast, the pace of change has accelerated over the past year.

Interestingly, each of the four countries covered by the conference has adopted a different approach to the



privatisation and restructuring of their respective refining industries. These can be summarised as follows:

The Czech Republic The Czech Republic was the first Central European country to attract and accept strategic investors in its refining sector. The IOC Consortium comprising Agip, Conoco and Shell acquired a 49 percent stake in the two main refineries at Litvinov and Kralupy earlier this year for \$173 mil-

Iotal Crude Distillation Capacity of Refineries				
Country	Capacity (mmt/yr)	Main refineries (capacity mmt/yr)		
Czech Republic	9.3	Litvinov 5.0, Kralupy 3.3		
Hungary	11.5	Danube 8.0		
Poland	17.2	Gdansk 3.0, Plock 12.6		
Slovak Republic	7.5	Bratislava 7.4		
Total	45.5	7% of OECD Europe capacity		

mmt: million metric tonnes Source: Wood Mackenzie Consultants Ltd

lion, with a commitment to future investment of \$480 million. Unipetrol, which is 60.3 percent state-owned and 39.7 percent owned by private Czech citizens, holds the remaining 51 percent. Negotiations on the 'Framework Agreement' signed by the parties in July 1995 continue.

While there is limited scope for major change in the current structure of the Czech refining sector, it is possible that Unipetrol may eventually be privatised.

At present the industry is protected to some extent by import tariffs on product – 7 percent on gasoline and 8 percent on diesel.

Hungary The refining industry in Hungary is dominated by former stateowned MOL, a vertically integrated company. At present it is the only refiner in Hungary.

In June 1993, the first allocation of shares (1 percent) were offered to the public, with a further 7 percent offered

to local municipalities. Further local equity and international offerings have since been made and today the state holds a 58.6 percent stake in MOL through holding company APV Rt plus one 'golden share', while foreign shareholders have a 28.7 percent interest, employees 4.9 percent, domestic citizens 5.3 percent and local councils 1.7 percent.

Further privatisation of MOL is expected this year and strategic partners may be sought for the Danube refinery during 1996/97.

Hungary's refining sector is currently protected by an 8 percent import tariff on product.

Poland Poland partially privatised its refining sector with the formation of a vertically integrated oil company Nafta Polska in May. The restructuring creates a clear ownership structure for the refineries at Gdansk and Plock which is vital for raising funds on international markets and attracting stategic investors. A 20 percent interest has been reserved for employees and 5 percent for a special compensation fund.

Strategic partners may be sought for the Gdansk refinery during 1996/97 and the Plock refinery in 1997/98 as part of the next step in the privatisation process. It is likely that Nafta Polska will eventually be fully privatised. Foreign investors in the refineries may gain access to stateowned retailer/distributer Centrala Produktow Naftowych Pans (CPN) in the future. However, any break-up of CPN is being opposed by its management.

Poland has high import tariffs at present – 15 percent on gasoline and 25 percent on diesel product.

Slovakia Slovnaft dominates Slovakia's refining, petrochemicals, marketing and distribution sectors. It owns the Bratislava refinery and has a 51 percent interest in marketing company Benzinol. Following an international flotation last year, the state now holds just a 25 percent stake in the company, while management and employees have a 39 percent interest, institutions and private citizens 26 percent and the European Bank for Reconstruction and Development 10 percent, which may well reduce its stake in the future. The privatisation process in Slovakia has been somewhat disappointing, with only minor interest from the West.

Slovakia currently imposes a 6-8 percent import tariff.

Investment plans

The Czech Republic has announced a commitment to invest in upgrading its refineries at Litvinov and Kralupy but no firm plans as yet. According to Mr Murdoch, it is unlikely that crude capacity will be increased. However, the programme could include the addition of new visbreakers and a hydrocracker debottleneck.

Hungary, too, has yet to announce definite plans but major yield shift investments are being examined. A coker may be constructed at the Danube refinery but it is thought unlikely that major investments will be made at the other refineries – leaving their long-term future in doubt.

Meanwhile, Poland is to upgrade the Gdansk refinery in a two-phase development plan. Phase 1, which will be implemented over the next three years, will increase capacity by 30,000 barrels per day and improve product quality. Operating costs are to be reduced by increasing energy efficiency and fuel oil production curtailed from 19.1 percent to 10.6 percent of output. A new crude processing train with additional capacity of 60,000-80,000 barrels per day will become operational in Phase 2 (after 2000) and production of heavy sulfur fuel oil will be halted altogether. A new mild hydrocracker unit is currently under construction at Plock. There are also plans to install a residue conversion unit together with various associated units. A feasibility study is also being conducted, funded by the US Trade Development Agency, looking into the possibility of building a new 6 million tonne per year refinery in the south of Poland.

Slovakia has unveiled plans to build new continuous catalytic reformer, LC-Finer, fluid catalytic cracking unit, alkylation and methyl tertiary butyl ether units at the Bratislava refinery.

The total investment is estimated at over \$5,000 million. However, this figure represents the upgrade alone and does not include funding for environmental considerations.

The polluter pays

Environmental issues and considerations were addressed by Barrie Mould from the Environmental Management Division of WS Atkins Consultants. He stated that the countries of both Central and Eastern Europe have had comprehensive environmental legislation for many years, applying the 'Polluter Pays Principle' since the 1980s. The problem, however, was enforcement, particularly for state enterprises which were quite often working to their own agenda. Nevertheless, changes have been, and continue to, take place rapidly as restructuring of the energy sector gathers pace.

Mr Mould used Poland for illustrative purposes in his presentation but stated that the developments are similar in the Czech Republic, Hungary and Slovakia. The main environmental issues facing the oil and gas sector centre on:

 Further sulfur and nitrogen oxide emission restrictions post-1997

 Increasing pressure by the regulatory authorities on volatile organic compounds (VOC) emissions to the atmosphere

 Limited disposal facilities for hazardous wastes including oil/water emulsions

 Protection of surface and ground waters from accidental spillages of oils and chemicals.

The basic principles of the emissions legislation for discharges are that the enterprise pays a fee for the use of the environment, for each mass unit of emission according to its degree of environmental harm. For example, a kilogramme of sulfur dioxide emitted is deemed more environmentally harmful and is thus more expensive than a kilogramme of emitted VOCs.

The permitted emission from any source is calculated from an area air quality study – or in the case of surface waters, the classification of the waterbody – and set out in a 'decision' permit in terms of mass, eg grammes per second and/or tonnes per year. Some of these documents are surprisingly detailed. Penalties are charged for the excess emission. In Poland, the penalty rate for emission to air is charged at 10 times the level of the normal emissions. In the past, enterprises were often set very lenient standards and these were not enforced. This is no longer the case and for some industries the environmental charges account for a significant percentage of the cost of production, with enforcement agencies ensuring fees are charged and paid.

Interestingly, in Poland, fees and penalties for environmental use are being, in part, returned to industry/public sector service operations in the form of grants and cheap loans via various 'Environmental Funds' and a bank set up for this purpose. The aim is to encourage capital investment in new 'cleaner' technology or advanced/ appropriate pollution control technologies. Certain penalty payments may also be deferred for up to five years and later offset against agreed relevant capital investment.

Alignment with EU policy

New environmental legislation shaped to meet the possible entry into the European Union is already in place or in the pipeline. For example, in Poland a new planning law has been introduced which is supported by a comprehensive Environmental Impact Assessment (EIA) regulation. Although not identical to EU regulation, it is sufficiently close to be considered acceptable. Similarly, considerable work is being undertaken on waste disposal legislation, one of the weakest areas in the old legislative framework.

The old legislative system, coupled with limited enforcement, has left environmental problems, particulary in areas of heavy industry and military bases. However, there is usually a pragmatic way forward and, where revised conditions are set, there is often a negotiation of the timescale for the new standard.

Gas distribution – an investor's perspective

Clive Nicholas, Project Development Manager, Europe, British Gas, provided a comprehensive overview of gas distribution in the Czech Republic from an investor's perspective.

He explained that under the Communist regime, it was not the lack of infrastructure investment that was the problem but rather its 'inefficient and over-planned implementation which led to ineffective investment.' For example, Central European infill projects, main extensions or refurbishment projects were frequently completed which would not have been considered economically viable in the West. This in turn led to an extensive but poorly maintained network.

While the injection of new capital is indeed important, in Mr Nicholas' opinion, it should not be over-emphasised. 'What is probably more relevant is the introduction of new technology, techniques and management which a strategic investor brings to upgrade networks, provide proper maintenance, or complete life extensions' he said.

The indigenous companies often lack certain specialist skills which were not required under the old regime marketing, public relations and treasurv skills. This is where the strategic investor can add value. Opportunities are particularly interesting in the domestic gas sector where in the past the domestic customer often had no choice on what fuel was used as he/she was being supplied by district heating, 'As these district heating plants come up for refurbishment, there are strong environmental and economic reasons why they should be replaced with individual gas systems." stated Mr Nicholas.

Fuel diversification is a key issue. The countries of Central and Eastern Europe are heavily reliant on gas supplies from Russia. This puts their supply security at risk – from problems not only in Russia but also in transit countries. In the past, revenues derived from transit fees in their own countries have compensated for the risk. However, with alternative routes under construction to western Europe, the earning potential may decrease and so supply diversification is increasingly an issue.

Focus on the Czech Republic

Central Europe represents an important potential market for British Gas which will soon have direct access to the continent via the Interconnector. The company has witnessed a number of changes in the Czech Republic including the break-up of the former integrated gas company CPP. Today, a transmission company, Transgas, is responsible for the transit of Russian gas to western Europe and for the sale of gas to eight distribution companies. Transgas remains in state ownership but is expected to gain some commercial freedom following the passing of the State Enterprises Act. The distribution companies are joint stock companies with the majority share remaining in state ownership. Some 34 percent is held by the municipalities, whilst 15 percent was included in the second voucher privatisation scheme and are now publicly traded. When the shareholdings were established, it was the intention that 20-34 percent of the remaining government interest would be sold to a strategic investor - it is this stake that British Gas is interested in purchasing.

However, according to Mr Nicholas, a number of steps need to be taken to increase the attractiveness of this potential market. Establishing an economic price for gas is the first priority. Historically all Central European countries energy prices have been heavily subsidised. While prices in the Czech Republic have increased by over 300 percent since 1990, most of this increase has been eroded by inflation and today domestic prices remain heavily subsidised. Domestic tariffs need to double approximately to reach an economic level.

The government has acknowledged this and there is a policy to increase prices by 15 percent per year. This is a good start', commented Mr Nicholas. At present prices are ultimately set by the Ministry of Finance and there is no published mechanism on how these prices are established.

The size of shareholding on offer and the associated rights are of concern to the strategic investor. British Gas would

Amoco targets Eastern Europe

Amoso recently opened its first service station in Poland – at Wal Miedzeszynski Street in the Wawer district of Warsaw. A network of up to 150 service stations incorporating convenience stores is planned. Thirteen further outlets, including two in central Warsaw, will open before the end of the year.

"Gustomers in Poland and the other countries we're targeting have the same priorities as customers the world over," explained Valit Knacke, Amoco's Brand Manager for Central Europe. "Customers also want new products and services as well as triandly service, a pleasant environment to make their purchases in and value for morey."

Supplied from both Polish and foreign refinences, three grades of gasoline will be on sale – unleaded 98 and 95 octane and leaded 94 octane – as well as diesel.

Photograph by Andrzej M Bogusz & Anna M Francman

like to see the full 34 percent interest in Transgas available as a share sold in one tranche, as opposed to the purchase of 20 percent with an undefined mechanism for increasing the share.

These issues are not unique to the Czech Republic. They are the same in almost every Central European country with the notable exception of Hungary which has already completely privatised its gas and electricity distribution under a Socialist government.

Words of warning

While Central Europe remains a highly attractive market, Mr Nicholas cautioned



that the limited number of opportunities, the number of foreign companies interested in purchasing the indigenous companies and the lead times prior to privatisation can mean that the bid price offered by some companies in order to secure a stake in the market is somewhat out of touch with reality.

The road ahead

The pace of change within the downstream industry in Central Europe will continue to accelerate as the new millennium approaches. Major investment programmes will continue to be needed as will further restructuring and privatisation. Inevitably, this change will also lead to the closure of some refineries and businesses but this will leave a leaner and meaner industry capable of handling competition on the open market once protective import tariffs are removed.

While all the speakers were in agreement that the region represents an enormous opportunity for trade and investment, anyone wishing to embark on such projects will need, in the words of Guenter Binder, Managing Director, Conoco Central and Eastern Europe, 'patience, flexibility and lots of staminal'

Cornerstone of Norwegian gas supplies

By Frank Frazer

O nly a few months after being awarded a licence to explore in Norway's block 31/2, Shell discovered a deep-water gas field with such a prolific flow that a rig had to be fitted with two flare stacks for testing.

That was in 1979. It has taken the 17 years since to solve the technical challenges of achieving commercial production from the discovery which appraisal drilling showed extended into three adjacent exploration blocks.

But it is expected to be at least another 50 years before the field named Troll disappears from the map of active North Sea projects. In the interim it is destined to be a major component in European energy supply not only because of the volumes it produces but also because of the way it will be used in furthering Norway's ambitions to consolidate its role as a gas producer.

Troll bounty

Troll is different from other North Sea fields in many ways. Its special features include the flexibility which Norway's gas marketers have gained from the volumes of gas it contains.

Rather than dedicating output from Troll under a pre-arranged contract with a group of buyers, as with most earlier North Sea projects, a decision was made early on to use it as the basis for a new type of long-



term supply commitment with guaranteed customers regular deliveries of specified volumes.

With Troll reserves estimated at near-

ly 1,300 billion cubic metres, it was not considered either necessary or practical for the gas to be sold under a normal field-depletion contract – despite the readiness of buyers in Germany, France, the Netherlands, Belgium, Austria and Spain to sign up in the mid-1980s for extra supplies which Norway could promise within a decade as plans were being drawn up to develop Troll.

Deliveries of 24 billion cubic metres per year from the first phase of the project will cover about 10 percent of present gas consumption in Western Europe. There is also provision to increase the flow to an annual 30 billion cubic metres at relatively low additional cost.

Present commitments, however, will only use about half of Troll's known reserves. Additional development could expand annual production to 50 billion cubic metres, according to estimates by Statoil which took over operatorship of the field after Shell which managed the initial \$4.6 billion development phase.

Faced with the challenge of pushing offshore engineering to new limits to tackle water depths of more than 300 metres at the Troll location, Shell and its partners examined about 80 possible development concepts before plans for the field were finalised.

Onshore processing

Originally it was proposed to install a platform with a fully integrated deck containing processing facilities to dry the gas by removing liquids before it was piped south to link with the Norwegian trunk lines to European terminals. But the plans were changed later when a bold decision was made to latch on to advances in multi-phase flow technology to pipe the raw output from the wells for onshore processing in Norway.

The option had both safety and economic attractions. It reduced the size and weight of the deck unit required to house equipment and also meant fewer people would be required to maintain and operate the platform.

The decision to locate the main treatment and compression facilities onshore at Kollsnes, north of Bergen, also gave the partners more time to plan for the expansion of Troll output to meet rising European gas demand.

The terminal, covering an area of 230

hectares, has initial capacity to handle 89 million cubic metres a day of gas piped ashore through twin 36-inch pipelines. About 3,000 tonnes per day of condensate is stripped from the gas for delivery by pipeline to the oil terminal at Stura, nine kilometres to the north.

When the gas has been processed to customer specification, it is compressed for transportation by pipelines connecting with Norway's existing network of lines delivering gas to terminals at Emden in Germany and Zeebrugge in Belgium.

Strategic role questioned

A total of four export routes from Kollsnes provides flexibility on delivery options which will ensure Troll can fulfil its strategic role as the cornerstone of Norway's future gas supply commitments.

Output from the field will enable the country to increase its gas exports from 30 billion cubic metres a year at present to 62 billion cubic metres in the year 2005. New sales contracts could subsequently raise annual guaranteed deliveries to between 70 billion and 80 billion cubic metres.

Much play is made of the environmental card in the Norwegian approach to marketing its gas resources – understandable perhaps given the problems which the country has experienced in the past from acid rain polluting its rivers and lakes through pollutants which drift into the upper atmosphere from coal-burning power stations in other parts of Europe.

There has been some controversy over the fact that the process of extracting and transporting Norwegian natural gas to Europe also increases the country's own emissions of carbon dioxide – with the oil companies having to pay their share of the carbon tax which the government levies on all such emissions.

But it is also pointed out that the positive environmental effects on the countries receiving the natural gas as a substitute for other fuels far outweighs the negative impact on Norway. In particular, the use of some of the Troll gas to generate power in the Netherlands and Belgium is expected to cut carbon dioxide emissions in those countries by 10 million tonnes a year, matching nearly 30 percent of Norway's total carbon dioxide emissions.

As well as seeking outlets to substitute gas for coal burning in power plant, the Norwegian marketers are keen to expand the use of natural gas in place of town gas produced from coal in the former East Germany. It is also pointed out that Norwegian gas is 'cleaner' than Russian gas which offers an alternative source of supply for Europe.

Another idea mooted in Norway is the possibility of setting up gas-fired power stations near Kollsnes which would send energy by wire to other European markets, given that Norway has an abundance of hydro-power to meet its own electricity needs.

But the possibility of high-voltage transmission lines being routed near communities has caused fears about possible cancer risks from the radiation which would be emitted – an issue which led to protests by local children bearing placards along the route which King Harald took to carry out the formal inauguration of the field at Kollsnes.

Revenue source

Whatever the market for Troll gas developments, its impact on the Norwegian economy will be significant. As production builds up, the field will be the most important contributor to more than S6 billion a year in oil and gas revenues the state expects to collect early next century.

In the first moves to save some of the benefits of depleting resources for future generation, the state has set up a petroleum fund in which it plans to deposit more than \$3 billion from revenues this year.

People born the year Troll was discovered may be among the first beneficiaries of the sums being set aside. Although the field is still likely to be producing at reduced rates when those Norwegians are due to start drawing pensions, the fund is seen as a way of maintaining a high level of social security provision as annual contributions from the petroleum sector dwindle over time.



Why join the Institute of Petroleum?

Individual members continue to join the Institute of Petroleum despite the continuing downsizing of the oil and gas industry. Last year was our sixth continuous year of growth.

Each year more people recognise that IP membership offers a range of benefits and services that helps them to understand and work more effectively within the industry, aids their personal and professional development and provides extraordinary opportunities to meet, listen to and talk with the most prominent leaders and opinion formers in oil and gas.

Help us to recruit new members

Most new recruits come to us through personal recommendation by existing members. Why not share these ideas with colleagues, friends and business contacts, whether at home or abroad? A growing membership strengthens the Institute, securing its independence and widening its base of knowledge and experience – factors that will enhance the value of your own membership.

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At this time of year there are special incentives for recruitment:

For the proposer:

If you propose an applicant for membership before the end of October, we will present you with an elegant, leather-bound 1997 IP diary, packed full of essential information on the oil and gas industry.

For the new member:

Anyone joining before the end of September will receive 15 months' membership for the price of 12 and <u>IF</u> paying by direct debit he/she will also receive a 1997 diary.

Why not pass this application form to a friend or colleague and propose him/her for membership today?

The Benefits of Individual Membership



- Association with Europe's leading independent technical body.
- Enhancement of personal development.
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- Contacts with industry leaders and opinion formers.
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- Entitlement to use the suffix 'M Inst Pet' (Member of the Institute of Petroleum).
- Free entry in the IP's Consultants Handbook.
- Receipt of the respected monthly journal Petroleum Review.
- Access to our Library & Information Service, and the IP's extensive range of technical and other publications.
- Participation in conferences, workshops and seminars.
- The opportunity to establish contacts through discussion groups and branch meetings.

All these opportunities are available to members either free of charge or at substantially discounted rates.

More than 8,000 members from a wide variety of professions have already recognised that the IP offers a range of benefits and services which help them to understand and work more effectively within the oil and gas industries.



Type of company for which members work

Consultants	24%
Engineering contractors/ manufacturers and suppliers	15%
Major oil companies	23%
Other oil companies	9%
Inspection/laboratory services	5%
Investment/finance/banking and legal	4%
Other	20%

61 New Cavendish Street, London W1M 8AR. Tel: 0171 467 7100. Fax: 0171 255 1472. E-mail: InstPet@cityscape.co.uk

Application for Individual Membership

7 IS/WAS YOUR WORK PRIMARILY:

Please complete both sides of this form and return to: Membership Administration, The Institute of Petroleum, 61 New Cavendish Street, London W1M 8AR Tel: 0171-467 7121 or (+44) 171-467 7121 Fax: 0171-255 1472 or (+44) 171-255 1472 E-mail: InsPte@cityscape.co.uk



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Surname		do not know one, a letter of recommendation from someone who knows you professionally		
First Name(s)		BROBOSED		
Mr/Mrs/Miss/Dr etc		I, being an individual member of the Institute of Petroleum		
Date of Birth		(membership no) or nominated representative		
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Postcode. Country		as they may hereinafter be altered. I agree that the informatio given on this form may be held at the IP and its branches an		
		that my name may be published in Petroleum Review.		
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PAYMENT

Applications for the year commencing 1st January 1996 must be accompanied by payment, as follows: Applicants of 25 years of age or more - £49.00 Applicants of under 25 years of age - £10.00

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DATA PROTECTION ACT 1984

Any information provided by you may be held by the IP in its computer records. Please tick the box if you do not want to receive details of products or services from other organisations with whom we may associate.



Code of Practice for a Product Identification System for Petroleum Products

This revised Code of Practice describes a product identification system comprising tapes, stencils, tags or signs, for marking equipment used in the storage and handling of petroleum products downstream from refinery process plants.

The purpose of this code is to offer a standard method of identifying equipment according to the products handled in order to avoid accidental mixing and contamination of product.

Although the code highlights the identification of equipment at road tanker loading and unloading points, the system is suitable for use throughout all product storage and handling systems. Such applications are recommended.

This is the second edition of the Product Identification System, first published in 1988. Changes introduced include the different colour for unleaded super grade petrol.

ISBN 0 85293 165 4

Price £20.00 (25% discount to IP members)

Available from The Library, Institute of Petroleum, 61 New Cavendish Street, London W1M 8AR, UK. Tel: 0171 467 7100 Fax: 0171 255 1472 E-mail: Lis@petroleum.co.uk

IFEG

Towards the Millennium – new technology for the upstream oil industry

Thursday 14 November

In the North Sea, the days of giant new oil discoveries and limitless development budgets have gone for good. The slimmed down oil industry of the next millennium will look quite different from that of a quarter a century ago. It can be difficult for people working in a single segment of the industry to gain an overall insight into the changes that are proceeding so rapidly.

The IFEG autumn conference will present an overview of some of these key transitional features:

- the CRINE initiative
- data management for ETAP
- partnering and alliancing
- decommissioning
- goal-setting regulation
- emerging technology in the Schiehallion project.

The day will be useful for information specialists, engineers, managers and relatively new entrants to the industry

For further information please contact: Pauline Ashby, The Institute of Petroleum, 61 New Cavendish Street, London W1M 8AR UK Tel: 0171 467 7100 Fax: 0171 255 1472



Heavy oil from Captain coming on stream

f there is a single word that characterises the Captain development project, that word has to be "innovation,"' says Peter Bijur, Chairman and Chief Executive, Texaco Inc. 'Innovation not only in technology, but also innovation in the way business is conducted.'

By Neil Potter

First oil from the £500 million A project was originally scheduled for January 1997. It is now expected in November this year but Shah Etebar, Project Manager, is confident that it could be a month earlier. Development is by a wellhead protection platform (WPP) tied back to a floating production, storage and offloading (PFSO) with export via shuttle tanker.

There are 1.5 billion barrels of oil in place. Recoverable reserves are now put at more than 300 million barrels of oil and 53 billion cubic feet of gas. Peak production is expected to be 60,000 b/d of oil but is likely to reach at least 70,000 b/d in 1998 and forecasts indicate it could reach 100,000 b/d in the future. Gas production of 6.6 mncuft will be used for fuel.

It has been a long journey from discovery to first oil. Captain, in 104 metre water depth, was discovered in the Inner Moray Firth block 13/22a, 144 km northeast of Aberdeen, in 1977. The oil is heavy (19° API), viscous, with low GOR (85-130 standard cubic feet per barrel). The reservoir is shallow and cool with unconsolidated sand and covers a large area – 10km x 4km.

Economic viability proved

It was clear that producing the oil would be a big challenge economically. In effect, at that time it was, to put it bluntly, regarded as a 'dead duck'. So it was put on the shelf and stayed there for 12 years.

In 1990 an appraisal well was drilled, which contained a 1,000 ft horizontal section, which showed a productivity of nine times greater than a conventional vertical well. Further evaluation confirmed the difficulties but also suggested the rewards that development would bring. This provided the encouragement to keep the project alive, even though there was no local infrastructure.

Mr Bijur says, 'However, it took a further two years for the right set of conditions to turn the field's development into commercial reality. In 1992 Texaco's UK upstream organisation made some sweeping changes. We created multidiscipline teams and we gave them responsibility and authority to move projects forward and bring them on production as quickly as possible.

'One team's challenge was to prove Captain's economic viability and put together a development plan leading to commercial development.'

In November 1992, Texaco revealed its preliminary plans for a stage-by-stage development, which included a wide variety of options. These ranged from a subsea development with a semi-submersible, floating production and storage system to a production jack-up with oil exported via a CALM buoy.

A £10 million contract was awarded to Oceaneering International Services for an appraisal programme of one horizontal and two vertical wells.

A 90-day extended well test was carried out on the horizontal well, drilled with the John Shaw and process equipments leased from Shell Expro. This produced 600,000 barrels and showed that the oil was not as viscous as expected.

Mr Bijur has said, 'The result of the team's thinking was a development plan that will see the field produced entirely through horizontal wells. It is a daring course of action, given the nature of the reservoir.'

Using conventional technology, Captain would have required 300 wells and 10 drilling centres.

'Texaco's innovative approach to the technical difficulties was matched in parallel with an equally innovative approach to facility design and contracting strategies,' says Mr Bijur. 'This parallel approach shortened development time a great deal and had a positive impact on the economics of the project.'

Mr Etebar has itemised the bidding progress. There were 81 replies to the expression of interest letter sent out. Twenty-nine companies were invited to qualify. After the qualification response evaluation of 17 companies, there were three left.

In December 1993, Texaco announced the award of parallel frontend design contracts for differing concepts to three consortia headed by: ABB Global Engineering/Stena Offshore; Brown & Root Marine and Hyundai; and Odfjell Drilling.

In October 1994, a preliminary alliance, ASAU, was formed with ABB Lummus Global, Coflexip Stena Offshore, Astano and UIE. This was finalised with a £300 million contract in January 1995 for the design, procurement, construction and installation of the facilities. The alliance did not include the building of the shuttle tanker at Astano's Stesao yard near Bilbao.

Under the alliance, members share in

the profits if they deliver the project under budget and on time. They will also receive a bonus should the project be delivered ahead of schedule, and a penalty if it is delivered late.

'Innovative strategy-proven technology'

Development, once determined, has been fast-track with the Annex B being granted only in February 1995. But, as Mr Etebar, has said, There were times when some of the team, even experienced people, would turn to me and say "It can't be done". I was determined to prove that, with the alliancing and the spirit which we had generated, it would be done.'

ABB Lummus Global's role was to provide project management, design of the WPP and of the process topsides of the FPSO and to supply all drilling and process equipment.

Astano is responsible for the design, construction, hook-up and commissioning of the FPSO at its yard in Ferrol in northwest Spain. This is Astano's first offshore project to include all aspects of



construction including fabrication and commissioning of the process facilities, as well as building the turret.

The design of the hull, machinery and outfitting was performed in-house with assistance from Senermar, a Madridbased engineering company. Assembly of the five process units was sub-contracted to Dragados in Cadiz.

The £175 million FPSO, of a Tentech 7000 design, has the capacity to process 60,000 b/d and handle up to 140,000 b/d of produced water and storage for 550,000 barrels. It has been constructed with spare capacity for tying in future reserves.

The hull and the modules were constructed in parallel. The process and water treatment equipment was built at various locations and the completed units shipped to Dragados, where they were connected together into large preassembled units. These were shipped to Ferrol, and lifted on while the ship was still under construction. This is thought to have saved six months.

When the unit, which was launched in July, arrives in the field in October it will be fully commissioned. The process, begun when it was on the slipway, was completed at the quayside.

The vessel will have a crew of 36, of whom one-third will be Texaco personnel.

John Sutton, Texaco's Senior Project Process Engineer, who was seconded to ABB Lummus Global, says, 'The most significant part of the surface facility is the process separation plant. The system makes good use of the three standard separation techniques. These include a long separation time, a lot of heat to make the oil less thick and a proper application of chemicals to help break down the emulsions." Astano built the 80.000-tonne, double-hulled shuttle tanker, Aberdeen, at its yard near Bilbao. This is equipped with a bow-loading system which can load from a 300ft, 20-inch diameter hose linked to the FPSO. It will come to the field approximately every nine days.

Mr Etebar says that he does not think there will be any difficulty in selling the heavy Captain crude. It can be marketed as a premium fuel oil with the minimum of processing. Demand for fuel oil is rising in both the United States and northwest Europe.

The £124 million WPP, with 4,500 tonne jacket, 3,000 tonne of piles and 6,500 tonne topsides with 28 well slots, was built at the UIE yard on the Clyde in a record 15 months. To achieve this UIE used the world's largest crawler crane, with a 1,300 tonne lift to maximise the size of packages and reduce hook-up costs. There is accommodation for 70 people. It was loaded out in July. Hookup and commissioning took place in August with the tie-back of the predilled wells in September.

There will be 16 producers, five water injectors and one aquifer water supply well on Area A. Water injection technology with polymerised flooding will be used for the first time in the North Sea to improve the efficiency of water injection and increase the oil recovery. This is in line with the government's desire to maximise recovery from the North Sea.

The subsea drilling template, fabricated by UIE, was installed in April 1995. Seven wells have been pre-drilled, five producers, one water injector and one water source. These were drilled by the John Shaw with horizontal sections 4,600-6,000ft long and screen-cased 136 days ahead of schedule and \$6 million under budget.

The reservoir sand is narrow, ranging between 20-40 ft in height. Because of the soft nature of the sand, the sections will be supported by a 6 5/8 inch screen.

To produce the oil effectively, the wells will be equipped with electrical submersible pumps (ESPs). These have been supplied by Centrilift under a five year, incentive-based contract, covering installation, with maintenance technicians integrated into Texaco's operations team. The ESPs will be located in highly deviated sections of the wells, up to 85° from vertical. Each pump is designed for long life (in excess of two years) and is made with high strength materials to reduce erosion caused by the produced sand. Each well has its own ESP designed to lift up to 20,000 b/d of fluid using a 456-horsepower motor.

Platform drilling will be by Noble and will last for three to four years.

Coflexip Stena Offshore's (CSOL) responsibilities include design, supply

and installation of subsea pipelines, risers, including tie-in and testing; the tow-out and installation of the WPP (subcontracted to Saipem); tow-out, mooring installation and hook-up of the FPSO

From the WPP to the FPSO the pipelines are: 16inch production fluids; 10 inch well test fluids; 14 inch water injection: 3 inch auxiliary injection and electrical power/communication and controls umbilical. Lengths of pipe were welded together in 1.5km lengths at the CSOL pipe base near Inverness and then were rolled onto a reel on the CSOL pipelay vessel Apache.

In 1992 Texaco, which had 100 percent of Captain, said that it would be looking for outside investment. It has agreed to sell 15 percent of the field, for \$210 million, to the Korea Captain Company, formed by the Korea Petroleum Development Corporation (Pedco) and Hanwha Energy.

Production hopes

But Captain is not the end of the story. Mr Bijur says, 'The Captain experience has unleashed a wave of creative thinking in Texaco's UK upstream, which we anticipate will double our 1995 production by the year 2000.'

Two years ago Texaco's aim was to increase production to 200,000 b/d by 2000. This will now be almost reached in 1997 and the target for 2000 has become 300,000 b/d.

Future prospects

Texaco is already carrying out studies for the development of the Area B of its heavy oil Captain field in block 13/22A even before Area A comes on stream. A decision on Area B could be made within six to nine months of production start-up. Options being considered include a subsea satellite production manifold or a wellhead protection platform development tied back to the FPSO on A. Further into the future there are two other areas, C and D, which will eventually be developed as satellites early in the next century.



Seminars in association with

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Law and practice: current issues

in oil and gas

Please note revised programme

23 September

The move from monopoly and closed markets to competition in a liberalised market

14 October

Legal aspects of financing oil and gas projects

4 November Public procurement and third-party access

25 November

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Prior registration essential. Details from Jenny Sandrock Tel: 0171 467 7104 (direct) Fax: 0171 255 1472





Waves of Fortune

The Past, Present and Future of the United Kingdom Offshore Oil and Gas Industries

by David Upton, Stirling Reid Ltd, Teddington, Middlesex, UK

Waves of Fortune describes the offshore oil and gas industry: one of Britain's most important and most neglected industries. David Upton's book begins with a historical overview of Britain's early experiences, and the growth of industry and regulatory structures. It examines the technical and economic face of the offshore industry in the mid 1990's, including new exploration techniques, the rise of greater commercial interdependence, and the drive toward increased cost



effectiveness. It looks at changes the industry is now experiencing, and towards the future.

Waves of Fortune derives from a scenario planning workshop, held at the Institute of Petroleum in 1995, which the author organised and chaired, and which was attended by some of the most senior and influential figures in the industry. The workshop identified 14 key 'drivers' that will shape the future of the industry. Each of these drivers is examined in turn.

David Upton's book is essential reading to specialists seeking a broader understanding of the offshore oil and gas industry, or to anyone concerned with the future of the British economy and the energy supply of the Western World.

0471 96341 0 254pp pr July 1996 £22.50

The Institute of Petroleum

Model Code of Safe Practice, Part 16 Tank Cleaning Safety Code 2nd Edition

2nd Edition

This Code covers the precautions that should be observed during the cleaning of fixed bulk storage tanks operating at near atmospheric pressure. It incorporates those types commonly encountered in petroleum refineries, installations, depots and terminals, used for storage of erude oil, and refined or intermediate petroleum products. It also covers horizontal cylindrical tanks and tanks used for the storage of process water and ballast water. The Code provides guidance on how a safe method of

work can be devised and on safety aspects of equipment and its use. Recommendations are given for the limits of hazardous substances in tank atmospheres during entry for normal tank cleaning operations. Guidance is provided on the potential hazards of product groups normally present in tanks, together with advice on chemical and other hazards that may be encountered, including microbial and radioactive contamination.

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Forthcoming Events

September

6th-9th

Surrey: 'Practical Techniques of Shipping Finance'. Details: Hilary McCann, Euromoney Training, Nestor House, Playhouse Yard, London EC4V 5EX Tel: 0171 779 8427 Fax: 0171 779 8315

9th-10th

Aberdeen: 'Offshore Installation Abandonment in Practice'. Details: ICM Marketing Ltd,5 Cavendish Square, London W1M 0BX Tel: 0171 436 5735 Fax: 0171 436 5741

11th-13th

Tampa, Florida: AIENG 96. 'Applications of Artificial Intelligence in Engineering'. Details: Wessex Institute of Technology, Ashurst, Southampton, SO40 7AA Tel: 01703 293223 Fax: 01703 292853

17th

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

17th-18th

Brussels: '4th International Conference on the Automotive Industry and the Environment'. Details: Automotive Matters International Ltd, Europower House, Lower Road, Cookham, Berks SL6 9EH. Tel: 01628 526960 Fax: 01628 521928

17th-19th

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

16th-17th

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

16th-19th

Aberdeen: 'Operation and Decommissioning of Offshore Facilities'. Details: Fleur Heapy Conference Assistant, The Institute of Marine Engineers, 76 Mark Lane, London EC3R 7JN Tel: 0171 481 8493 Fax: 0171 488 1854

18th-19th

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

18th-19th

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

18th-20th

South Africa: 'Africa Upstream '96 -International **Exploration & Production-Business** Strategy and Oil & Gas **Opportunities'**. Details: **Global Pacific & Partners** Pty Ltd (Africa) Tel: 27 11 886 4053/4 Fax: 27 11 789 5057 18th-20th Maastricht, Netherlands: Apex'96 Conference. Details: Tim Whiteman, KHL International Ltd. Southfields, Southview Road, Wadhurst, East

Sussex TN5 6TP Tel: 01892 784088 Fax: 01892 784086

21st-23rd

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

22nd-24th

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

22nd-25th

Alberta, Canada: 'AIPN Fall Conference 1996 – Managing Risks in the Next Millennium'. Details: PanCanadian Petroleum International Ltd, 1 Palliser Square, 900, 125 Ninth Avenue SW, Calgary T2P OP6, Canada. Tel: 403 268 7712 Fax: 403 268 7906

23rd

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

23rd-24th

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

24th-27th

Singapore: '11th Offshore South East Asia '96 Conference'.Details: Bob Goh, Singapore Exhibition Services Pte Ltd, 2 Handy Road, 15-09 Cathay Building, Singapore 229233. Tel: 65 338 4747 Fax: 65 338 45651

26th-27th

Singapore: '3rd Annual Asia Pacific Lubricants Conference'. Details: Kathleen Ho, 140 Robinson Road, #06-03 Chow House, Singapore Tel: +65 227 6772 Fax: +65 222 6869

26th

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

30th

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

30th-2nd October

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

30th-3rd

Houston: 'International Houston Tanker Event'. Details: Jane Markussen, Intertanko, PO Box 2829 Solli, Gange-Rolvs gate 5, N-0204 Oslo, Norway. Tel: +47 22 12 2652 Fax: +47 22 12 26 41

October

2nd

Budapest: 'Financing Energy Efficiency Investments in Central & Eastern Europe & the CIS'. Details: Sarah Ritchie, Bookings Department, IBC Financial Focus, 57-61 Mortimer Street, London W1N 8JX Tel: 0171 453 2703 Fax: 0171 323 4298

Forthcoming Events

2nd-4th

Barcelona, Spain: 'Urban Transport and the Environment for the 21st Century'. Details: Helen Fisher, Wessex Institute of Technology, Ashurst, Southampton SO40 7AA Tel: 01703 293223 Fax: 01703 293285 E-mail: hfisher@wessex. witcmi.ac.uk

2nd-5th

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

6th-9th

Denver: 'SPE Annual Technical Conference and Exhibition'. Details: Registrar, Society of Petroleum Engineers, PO Box 833836, Richardson, Texas 75083-3836 USA. Fax: 214 952 9435

7th-8th

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

8th

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

13th-16th

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

14th-15th

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

16th-17th

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

16th-17th

Vienna: 'The 3rd International Conference on Trading and Transportation of Oil and Gas in the Former Soviet Union'. Details: Business Seminars International, Susex House, High Street, Battle, East Sussex TN33 OAL. Tel: 0171 490 3774 Fax: 0142 4773334

16th-17th

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

18th

Paris: 'Safety Performance Measurement', Details: IChemE, Davis Building, 165-189 Railway Terrace, Rugby, Warwickshire CV21 3HQ Tel: 01788 578214 Fax: 01788 560833

22nd-24th

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

22nd-24th

Venezuela: Investment Forum '96'. Details: Nick Williams. Fax: 01243 372284

23rd-24th Oslo: FPSO World

Congress and Technology Exhibition. Fax: 01224 708080

23rd-24th

Lyon: '3rd European Congress on Lubricants Re-refining'. Details: Philip Butler, Pace House, Hanley Street, Aston, Birmingham B19 3SP 29th-30th

London: 'Seatrade

Convention'. Details:

Vanessa Stephens, The

Seatrade Organisation,

42 North Station Road.

International Offshore

Contracting and Subsea

Engineering Exhibition

Details: Maura Ross,

Baudygaun, Midmar,

Aberdeenshire AB51

E-mail: ioce@spearhead.

Paris: 'Gas & Electricity

Galeza, Euroforum, 35

'96 - Deregulation'

Rue Greneta, 75002

Tel: 33 1 44 88 14 98

Fax: 33 1 44 88 14 99

30th-1st November

Gas Exhibition and

Bogota: 1st Colombian

International Oil and

Conference. Details: EJ

Hrause & Associates,

Maryland, US.

Paris, France

Details: Alexandra

Colchester C01 1RB.

Tel: 01206 45121

Fax: 01206 45190

and Conference

Tel: 01330 833381

Fax: 01330 833505

29th-31st

7NO.

co.uk

30th-31st

Aberdeen:

Tanker Industry

28th-29th

Aberdeen: 'Alliancing in the Oil and Gas Industry'. Details: Anna Totten, Bookings Department, IBC Technical Services Ltd, 57-61 Mortimer Street, London W1N 8JX Tel: 0171 453 2712 Fax: 0171 453 2058 E-mail: anna_totten@ibcuklon.cc mail.compuserve.com

28th-2nd November Bombay, India:

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

28th-30th

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

Seminars in association with

ARTHUR ANDERSEN

Tax and accounting issues in the oil and gas industry

Please note that this series has been postponed.

Developments in the drafting of ambient air quality standards

By Dr Suzie Baverstock, Technical Co-ordinator – Air Quality, CONCAWE

Air Quality Framework Directive

Until now, control of the quality of ambient air (the troposphere, excluding workplace and indoor air) in the European Union has been by four individual directives - for sulphur dioxide and black smoke (suspended particulates), nitrogen dioxide, lead and ozone. However, a proposed directive on ambient air quality assessment and management (96/C59/102), which has been adopted as a Common Position by the European Council, will provide a framework for the comprehensive control of future air quality in Europe. The general aim of this Air Quality Framework Directive (AQFD) is to define the basic principles of a common strategy for application across the European Union in order to:

 define and establish objectives for ambient air quality designed to avoid, prevent or reduce harmful effects to human health

 assess the ambient air quality in member states on the basis of common methods and criteria

 obtain adequate information on ambient air quality and ensure that it is made available to the public, inter alia by means of alert thresholds

 maintain existing good ambient air quality and improve it in areas where it is less than satisfactory.

The Directive covers the broad principles of assessment, setting limit values and alert thresholds for pollutant concentrations in ambient air and the measures applicable in zones where the concentrations exceed limit-value levels, the requirements to maintain air quality where levels are below limit-values and measures applicable in the event that alert thresholds are being exceeded.

AQFD Daughter Directives

'Daughter' Directives will be drafted covering a range of pollutants. The current timetable for these Daughter Directives is given in **Table 1**.

Work on the Daughter Directives for Sulfur Dioxide (SO₂), Nitrogen Dioxide (SO₂), Particulates (PM₁₀) and Lead (Pb) are all underway. A steering group with an overall policy and management function oversees working groups for each of these pollutants. Representation on steering group and working Groups is drawn from the Member States and includes both industry and non-governmental organisations. The elements of the task of the working groups as originally specified by the Commission are summarised in Figure 1.

Risk assessment

The pollutants addressed in the AQFD occur naturally in ambient air. It is known that there are health and envi-

ronmental hazards linked with elevated levels of these pollutants but this, by itself, tells society nothing definitive about whether or what action should be taken. Put simply, life cannot ever be made hazard-free; only the level of risk can be reduced.

Thus risk assessment is essential, and the concepts of risk characterisation and risk management are introduced. The Commission has prepared an 'issues' paper which sets out these factors and recognises the need to establish the dose-response relationship for each pollutant. Taken together with the costs for compliance with various levels in the range of the dose-response curve, these would enable the risk manager to be in a position to determine an appropriate standard by comparing levels of risk reduction with the associated costs.

An unavoidable complication inherent in the risk relationships is that the risk manager should include the consideration of a range of specific sensitive exercise). Thus the process must be extended to include target groups to be protected. The dose response curves for both the sensitive population, together with the factoring in of the relevant risk management procedures (eg reschedul-

List 1 by 31 December 1996 (*21/3/98)	List 2 by 31 December 1999 (**1/1/98)
sulfur dioxide nitrogen dioxide fine particulates (including PM ₁₀) suspended particulate matter lead ozone*	benzene ** polyaromatic hydrocarbons carbon monoxide** cadmium arsenic nickel mercury

Note: PM₁₀ = particulate matter with average diameter below 10 microns

Table 1: List of Pollutants and Current Deadlines for New Directives

Figure 1: Elements of the tasks of Working Groups



ing exercise routines, self-medication), all have a part to play in setting appropriate air quality standards.

Limit values/alert thresholds/percentile compliance

The function of a limit value air quality standard (AQS) is to provide continuous protection of the target group based on an assessment of risk and cost. Compliance with a limit value in the European Union will generally be based on an emission reduction strategy, eg implementing control measures.

The alert threshold concept recognises that for infrequent occurrences (eq when a severe atmospheric temperature inversion episode traps high pollutant levels) general emission control approaches are extremely costinefficient and specific risk management schemes are more appropriate, eq requiring local plants to switch to 'less polluting' fuel types or restricting traffic on a local basis. Thus alert thresholds open up practical approaches to avoid spending a great deal of society's money on reducing emissions to meet conditions that only occur for a few hours/days in a given year at any one location. This means managing rather than controlling the problem.

Percentile compliance setting serves to address two aspects. The first recognises that apparent total compliance, as distinct from almost total compliance, can result in significant increases in compliance costs for little or possibly no additional protection. The second aspect is that there is some optimal split between control strategies and management strategies in providing the most cost-effective protection of the target group. Here, the nature of the exceedances of the relevant AQS needs to be understood. For example, are the exceedances confined to discrete ongoing 'pollution episodes' or short daily events spread over long time periods? Analysis of data from short-term continuous measurements (as available in Germany) will provide some guidance to the process.

Industry is concerned that they, and hence their customers – the general public, will be unfairly penalised for exceedances of Air Quality Limit Values (AQLVs) that are due to: measurement or modelling error, emission sources outside the geographical boundaries of the European Union, or natural phenomenon such as rare weather conditions. As a result, industry is concerned that AQLVs should not be set without careful consideration of percentile compliance requirements and means of providing derogations in appropriate circumstances.

Initial proposals

Each working group has recently proposed limit values for each pollutant. The values are based upon the World Health Organisation's European Air Quality Guidelines as required by the EU Fifth Action Plan. Discussion between the various interested parties and review of other information and advice has resulted in tentative proposals for a range of AQUs, percentile compliance levels and proposed years by which the AQUs should be attained.

The working group proposals are just the first step. Annex II to the AQFD Directive requires economic and technical feasibility to be taken into account when setting limit values. The proposed Limit Values will now be analysed to determine the benefit to society which would be derived from their attainment, compared with the costs to society in doing so. The Limit Values will be analysed as a range of scenarios in an ambitious cost-benefit analysis and a revised set of Limit Values may be proposed as a result of this work.

DGXI cost/benefit study

The proposal to carry out the cost/benefit analysis is very enlightened. Careful assessment of the costs and benefits of environmental policy are essential components of rational costeffective environmental decision-making to meet real environmental needs at minimum cost to society. However, there have been some considerable delays in the work schedule. It now appears that the results of the cost/benefit study cannot be produced in time for them to be fully taken into account if the original timetable for producing the Daughter Directives is to be followed. As a consequence, industry and other interested parties are seeking revision of the original political timetable. At the same time, relevant experience from the Auto-Oil Programme (see Petroleum Review, April 1996) is being shared in an attempt to help resolve some of the issues facing the cost/benefit analysis consultants and to maximise the value of the cost-benefit study within its existing time constraints.

Industry is encouraging DGXI to use a consistent basis for selecting scenarios for the cost/benefit analysis and to ensure that there are a sufficient number of scenarios to explore cost sensitivity of the limit value, percentile compliance and year of compliance. Only if these are achieved will the cost/benefit analysis adequately guide policy-makers in determining both:

• the level of protection for the various sub-populations and ecosystems in Europe



Figure 2

• the time period allowed before these AQLVs are to be met.

Industry's input

The co-ordinating body for the involvement of industry is Union of Industrial and Employers Confederations of Europe (UNICE) An industrial representative to act as rapporteur was agreed for each of the four pollutants to provide an overall industry input to the working groups:

Sulfur Dioxide:	Ron Barnes, CBI
Nitrogen Dioxide:	Mike Hawkins, ACE

Particulates:	Suzie	Baver	stock,
	CONCA	WE	
Lead:	David	Wilson	Lead

David Wilson, Lead Development Association

The four Rapporteurs draw on a wide range of specific industry expertise from 'Shadow Groups' made up of experts from the various industries in the European Union which have specialists involved with the particular pollutant. The overall organisation is illustrated by Figure 2.

UNICE has offered to contribute to the cost/benefit work by co-ordinating the input from its various member industry Associations. Industry has already done a considerable amount of work to model and understand its contributions to ambient air quality and the costs of potential control measures. Certain industry sectors have indicated their willingness to provide data for use in the study, including work carried out in the development of BAT (Best Available Technology) notes and permit issuing under the IPPC (Integrated Pollution Prevention and Control) Directive, and information based on their own atmospheric dispersion modelling. Active dialogue between DGXI, its consultants and industry needs to be encouraged and the consultants need to specify their data requirements so that industry can target its efforts in contributing to the success of the cost/benefit analysis.

Co-ordination with other DGXI initiatives

The signs are that DGXI aims to co-ordinate the AQFD work with other initiatives. For instance, the base case for the cost/benefit analysis includes measures included in the Auto-Oil proposals, Offroad Vehicles Directive, Second Sulfur Protocol and existing Large Combustion Plant Directive. However, industry is still seeking clarification on the how the future implications of the Integrated Pollution Prevention and Control Directive will be taken into account.

Future controls on emissions

It is possible that the cost/benefit work being carried out under this initiative suggests further emission controls for industry. Industry believes that any further controls will need to be considered and justified in the context of:

source/receptor relationships

• measures already taken and investments made to control emissions from the source/sector of interest

 measures still to be taken and investment still to be made in meeting the future obligations within the

base case (eg under IPPC and Auto-Oil)

 the cost-effectiveness of any further controls

 the lead time needed for the source/sector to modify its emissions

• the benefits that might accrue to public health from an alternative allocation of societal resources such as improved diet, housing or medical care.

Conclusion

The AQFD and its future Daughter Directives will be key drivers for the future. They will define our current views on what the maximum ambient atmospheric concentrations of pollutants should be in the air that we breathe in the early half of the next century. In defining these limits they will influence European guality of life and the economic activity within Europe in many ways. While the improvements in air quality may not be very apparent to the average European citizen, it is intended that the more sensitive populations and ecosystems will benefit. The negative effects will be felt through the measures that will be taken to ensure that the air quality limit values are met. The choice of measures may influence the economic position of individuals, companies, industry sectors, Member States and Europe as a whole.

A major challenge and opportunity therefore lies in understanding the current situation, in setting appropriate air quality standards for the future and in choosing a range of measures to be taken. In rising to this challenge it is crucial that Europe's overall social, economic and environmental needs are kept in balance with each other.



Figure 3

Consequences of IMF loan to Russian Federation

The award of a \$10.2 billion credit by the International Monetary Fund stipulated the abolition of export duties on all goods except oil from 1 April. Duties on oil were reduced from 20 to 10 Ecu per tonne and then finally abolished on 1 July. The oil industry should benefit. firstly from the general improvement to the economy as a result of the reduction of the state budget deficit. where the IMF credit resources are directed: and secondly, as the result of the abolition of export duties, which were one of the main costs for oil exporters - accounting for one-quarter of the oil export price. Since the level of export duties was set in fixed monetary terms and was the same for all exporters, irrespective of individual field characteristics. economy of scale, price fluctuations caused by market condition changes, this cost was particularly burdensome for exporters.

By Dr AA Konoplyanik Adviser to the Russian Minsitry for Fuel and Energy

Likely economic consequences

According to estimates from the Ministry of Fuel and Energy, export duties on oil currently provide 8 trillion roubles towards the annual budget revenue. Calculations by the budget subcommittee of the Budget and Economic Committee of the State Duma estimate that they account for more than 2 percent of federal budget revenues. Given the disastrous shortage of budget revenues, the crucial point was not the abolition of export duties (as the condition for granting the IMF credit) but their replacement with other ways of providing adequate, alternative budget revenues.

The government decided to increase excise duties on oil and selling prices for gasoline and electric power as the main compensatory mechanism in order to maintain the level of budget revenues. The tariffs for oil transport by pipeline were also increased.

On 1 April excise duties on oil were raised from 39,400 to 55,000 roubles per tonne and from 1 July to 70,000 roubles per tonne. The selling price for motor gasoline (less excise duty and VAT) was increased by 29 percent. Electric power selling price for the material production sphere will rise by 12 roubles per kWh and the effective tariffs for oil pumping, transhipment and filling by 73 percent.

Effect on oil companies

For Lukoil, estimates show that the abolition of export duties will result in a gain of 1,420 trillion roubles (US\$1 equals approximately 5,000 roubles). On the other hand there will be an increase in oil excise duty (1,364 billion roubles), transport tariff for oil pumping to the company's oil refineries and for export (714 billion roubles), electric power tariffs (92 billion roubles) and gasoline tax (1,375 billion roubles). Thus, 'compensating' payments will total 3,545 billion roubles, exceeding the amount of savings of export duty payment by two and half times.

So, for Lukoil the balance from the introduction of new taxation terms initiated by the award of the IMF extended credit will be negative and totals minus 2,125 billion roubles. Thus, the abolition of export duties will not improve the economic situation of companies but will make it considerably worse.

In 'replacing' export duties with increased excise duties, two aspects should be distinguished: methodological and quantitative.

From the methodological point of view, a substitution of one 'state take' by another was done in a correct direction. Export duties with fixed absolute value, common all over the country for all commodities were replaced with 'mining excise payments'*, the absolute value of which is calculated for oil companies/associations individually. Thus, instead of extracting (through export duty mechanism) a price rent which is common to all producers and is calculated as the difference between export and domestic price and thus does not take into account the differential rent resulting from the individual characteristics of the deposits and the E & P projects. the 'rough' procedure of differential rent extraction was applied to the producers (through mining excise mechanism).

More not less taxes

However, the state's fiscal needs have overturned any chance of an equivalent replacement for export duties, leading to the tightening of fiscal pressure on the fuel industries.

Figure 1

Apparently, attempts to ensure the balanced replacement of certain payments with other payments have never been made. Rather on the contrary, the terms accompanying the award of the IMF loan were used as grounds for a tightening of tax pressures on the oil industry. The incumbent administration, the only one among the election candidates, has the ability to secure economically, in some way or other, their socially oriented pre-election promises. The easiest way is to increase even further the tax load on those who are making the lion's share of payments to the budget (121 trillion roubles or around 35 percent of the total revenues of the federal budget in 1996 is estimated to come from fuel and energy enterprises).

Moreover, in the Russian government, as elsewhere, there is a natural conflict between departments. The Ministry of Finance usually stands up for increasing the tax burden on the oil industry, while the Ministry of Fuel and Energy wants to reduce it. As a result the figures and calculations of these departments frequently differ.

The Ministry of Finance calculations are unknown but, according to the estimates of the Ministry of Fuel and Energy, the additional 'tax' burden on the oil industry will be 21 trillion roubles, as the taxable base expands by three times because it applies to all oil production, not just to export deliveries

Thus, using the IMF 'requirements' as a cover, the government is planning to obtain an

additional 13 trillion roubles for budget revenue as a result of this simple manipulation. But in reality will the Russian budget receive this money?

The current tax system in Russia is already prohibitive – the percentage of tax in the wholesale oil price without VAT exceeds 60 percent (see **Table**). According to Lukoil, current taxes and charges in the sales price of the company



oil equals 67 percent, though their effective level need not exceed 25-35 percent.

Less revenue?

Under such conditions, the behaviour of tax-payers essentially differs from their behaviour under a 'favourable' tax environment. In the global economy, this effect is described by the 'Laffer's curve' which shows that tax hikes for manufacturers and service providers first leads to an increase in tax revenues, while further rises over a certain critical point cause a totally different effect.

With taxes rising above the optimal level, many manufacturers will be either broken resulting in a reduction of the number of tax-payers, or squeezed out to the area of 'grey' business where taxes are not paid at all. As a result, instead of tax revenue increasing, the state faces a reduction in tax collection, an increase in non-payment and consequently a reduction in budgetary revenues (see Figure 1).

In addition the main tax-payers are a large number of small enterprises and companies, which are very difficult to control and often able to dodge taxes. Meanwhile, large companies are always 'at the centre of attention', they are subject to permanent tax control and thus the problem of tax collection is resolved, with the main tax burden falling on such companies as Lukoil. Yukos, Surgutneftegas etc. This is why the 'excessive' tax pressure falls primarily on their shoulders.

However, on the ot companies are the on main investment load ones that implement t intensive investment shouldering the main ment obligations, the even if it might seem i may find themselves in cult situation because of the so-called abolition of export duties.

The conclusions of the Budget and Finance Committee of the State Duma (budget subcommittee) on the consequences of the proposed tax changes are fairly realistic, as they correspond more to economic theory. O Dmitrieva, Chairman of the subcommittee, calculated the budget losses from export duty abolition as 17 trillion roubles. This was higher than the Ministry of Fuel and Energy's figure because the subcommittee made a comparison with the draft budget for 1996 in which it was decided to retain export duty rates and to increase gas export duty rates.

Moreover, the decision to increase excise duty rates on crude oil, gasoline prices, as well as to introduce increased tariffs for pipeline transit will result not in the growth of budget revenues but, according to Ms Dmitrieva, in the growth of non-payment and consequently in a reduction of budget revenues by 20 trillion roubles. As a result, instead of an increase of 13 trillion roubles, the budget will fall by 37 trillion roubles, which, on the basis of the subcommittee's calcula-

her hand, these as that bear the l; they are the	Property tax	up to 2% of fixed assets value
	Profit tax (to the local budget)	up to 22% of balance profit
projects. Thus, load of invest-	Profit tax (to the federal budget	13% of balance of profit
y are the ones, paradoxical, that the most diffi-	tions, accounts for mo of the federal budg about 70 percent of t	pre than 10 perce get revenues – he IME loan.

Type of Tax

Royalty (for the

rehabilitation of

mineral resources

resources)

VAT (value

added tax)

Tax for

Excise tax

Export duty

use of underground

Major taxes paid by Russian oil companies

1995

proceeds

6-16% of the

total proceeds

(average - 8%)

21.5% of the total

10% of the total

proceeds less VAT,

20,000-50,000 per

- 39,200 roubles

20 ecu per toppe

up to 2% of fixed

tonne (average rate

special tax and

excise duty

per tonne)

assets value

balance profit

13% of balance

up to 22%

of profit

1994

6-16% of the

total proceeds

(average - 8%)

proceeds

23% of the total

10% of the total

proceeds less VAT,

0-25,000 roubles per

tonne (average rate

special tax and

- 14 750 mubles

30 ecu per tonne

excise duty

per tonne)

percent - or

Reduced investment?

This is the negative fiscal effect of excessive taxation pressure on producers. But there is a negative investment effect as well which implies that an increase in excise duties and tariffs for oil pumping, increasing the tax burden on producers and refiners, which becomes even higher with bigger volumes of production and refining, will lead to decreased production and refining volumes.

As a result, the oil industry might fail to reach the 301 million tonne production target forecast for 1996. This would mean that exports would also fall. As a result, prospects for budget revenue arowth would be damaged at the expense of external borrowings from the IMF.

A decline in exports will reduce resources for the industry's self-financing in foreign currency and lessen its financial standing. It has already caused the appearance of comments 'in defense of the industry' aimed mostly not against the IMF credit but against the fund itself which is considered responsible for the government's plans to replace export duties with other forms of taxation. Observers believe that the IMF proposals are aimed at undermining the Russian oil industry. weakening its competitive position and ousting its oil from the world market. The government is scarcely interested in feeding suspicions for further development of this theme, as the parallels between the government actions and the IMF requirements disclosed in these comments are too transparent.

1996 (Forecast)

6-16% of the

total proceeds

(average - 8%)

proceeds

20% of the total

10% of the total

proceeds less VAT,

30,000-70,000 per

tonne (average rate

ment of export duty

up to 2% of fixed

assets value

balance profit

13% of balance

up to 22%

of profit

- 55,000 roubles per tonne);

will grow after abolish-

10 ecu per tonne; will be

abolished after 1 July 1996

special tax and

excise duty

When there is a lack of co-operation and even mutual understanding between the executive and the legislative, and especially in the situation when the majority of the State Duma consists of nationalistically-oriented opponents to the government, the charge that the government does not provide an independent economic policy but has just been following the 'obligatory demands' of the IMF does not improve the investment climate in this country and has been slowing down the transition to economic growth.

* In Russia a special 'mining excise payment' exists as a type of producer tax. This is not to be confused with the use of excise in other countries as a form of consumer tax

Venezuela – responding to the future

By Jeremy Cresswell

Pressure is mounting on the Venezuelan government to privatise, at least partially, state oil and gas company Petroleos de Venezuela (PdVSA) as free market policies backed by the International Monetary Fund take a grip.

But, while company President Luis Giusti recently spoke of floating some 15 percent of the group's stock on the market, he has stopped well short of calling for privatisation of an organisation whose assets are valued at \$40 billion.

Energy and Mines Minister Erwin Arrieta has a different viewpoint. He does not believe that the sale of any part of PdVSA should be included in Venezuelan oil industry strategy.

There is at least a third viewpoint which belongs to former presidential candidate Eduardo Fernandez who believes that PdVSA should be privatised. He argues that selling the company would not compromise sovereignty.

He also wants OPEC to allow greater flexibility in its production quotas – here he occupies ground common with Mr Giusti. In other words, where Venezuela was once a 'dove', it is increasingly becoming more of a hawk.

This is reflected in the ambitious plans to raise output through massive investment, both by PdVSA and, once again, the multi-nationals through the so-called Apertura process – re-opening the oilfields to outside participation.

The world's second largest oil corporation has already embarked on a \$60 billion, 10-year investment campaign to lift hydrocarbon production dramatically. Indeed the targets are quite staggering:

• Raise light/medium crude output from 2.5 million barrels per day (b/d) to 4.3 million b/d

 Increase natural gas production from 4.3 billion to 9 billion cubic feet per day

• Effectively double heavy oil output from 5.4 million tonnes a year to 11.1 million tonnes

• Take synthetic crude production from zero to 491,000 b/d. Conoco, Arco, Total and Mobil will achieve this target using heavy crudes as feedstock.

 Output of Orimulsion is also expected to increase significantly on the 3.7 million tonnes produced last year, though this hinges on clients like the United Kingdom, Denmark, Canada and Japan agreeing to buy the fuel.

There is no doubt that Venezuela has ample reserves to enable such ambitious targets to be met. Estimates currently point to possible recoverable reserves of 286 billion barrels of very heavy crudes/bitumen, 66.4 billion barrels of conventional crudes and 140 trillion cubic feet of gas.

Lack of funds

But the hydrocarbon and mineral-rich state is short of money. Proof of the poor state of the economy is plain to see. The smart downtown facades of Caracas quickly give way to shanty towns of tightly packed shacks tumbling down the mountains that provide the city with its spectacular setting. The International Monetary Fund was called earlier this year to help to reduce the mountain of debt accumulated by a country whose foreign income is 90 percent dependent on oil.

The serious need to restore the impoverished economy is one reason why the current regime has reopened the door to the big multi-nationals thrown out 20 years ago.

The Caracas government put acreage up for sale earlier this year, claiming a successful auction for the 10 areas put up for bid (see *Petroleum Review* March 1996).

Multi-national money and expertise is essential if the ambitious targets are to be achieved. PdVSA also needs service companies and has expressed a preference for those that can point to North Sea experience and working in a CRINE-style environment where the accent is on a fit-for-purpose approach and relationships founded on alliancing and gain-sharing arrangements.

To quote the Caracas-based Daily Journal: 'Operations were then transferred to PdVSA and its affiliates, which turned the debilitated industry they received from foreign concessionaires into a top-notch oil corporation, the second in the world according to international independent analysts.'

Need for outside help

But Venezuela again needs the outside world if it is to expand its oil and gas industry as swiftly as intended. This participation is required despite PdVSA's present status as a global giant in its own right.

This is why the multi-nationals have been asked back. Amoco, Atlantic Richfield, Shell, BP, Conoco, Chevron, Elf, Excon, Mobil, Occidental, Total and a host of others have already secured operating and reactivation deals, many of them focused on the heavy to very heavy rudes to be found in the Orinoco Belt.

Other players like Enron Oil and Gas, Maxus, Norsk Hydro, Pennzoil and Tecpetrol are also in there, with many more queuing up to gain access to the pickings on offer.

Blocks taken up in the two sales to date comprise: East Guarico, Quiamare,



Ortupano Leona, West Guarico, Jusepin, Monagas South, Pedemales, Quiriquire, Urdaneta Oeste, Zulia Oeste, Colon, Falcon Oeste and Falcon Este. A third sale of a further 12 or so blocks is planned towards the end of this year.

PdVSA Exploration and Production Director Jorge Carnevali commented: 'Despite traumatic moments in many Latin American economies, the results of the round also suggest a broad vote of confidence in the ability of the Venezuelan government to continue its course of market-oriented reform and restructuring.'

New players moves in

Among the big names now making headway, BP is particularly interesting. Pedernales and Quiriquire are the main focus of the BP reactivation programme. The semi-submersible *Falcon* 203 is currently working Pedernales with a bargemounted early production system close alongside.

BP Venezuela started re-opening Pedernales knowing remaining proven reserves were at least 60 million barrels. But General Manager Greg Coleman told the author that the potential was

Lake Maracaibo

200-500 million barrels, once fully appraised.

While the multi-nationals now have an increasingly important role in Venezuela, contractors arguably hold the real keys to modernisation at PdVSA, both upstream and downstream.

It is acknowledged that there will be a huge need for the services of contractors with North Sea expertise and management skills, a fact confirmed by Andres Revesz, who is in charge of industrial development and promotion for PdVSA and its operating subsidiaries through Venezuelan Export Promotion of Petroleum Industry Goods and Services (VEPROX).

Outlining PdVSA's aspirations for the future, Mr Revesz said a big change was needed. He added that in the mid-1970s it was estimated that light/medium oils would last about 10 years and 30 years for heavy crudes. 'Since then there has been a huge recovery in our position, such that we now have three to seven centuries of oil in reserves ... with known technologies,' said Mr Revesz. 'And we have become a vertically integrated corporation with over 80 percent of production going to final products markets.

'A new stage began in the Venezuelan industry about four years ago in the upstream area through the creation of joint ventures with the multi-nationals, starting with what we then called marginal fields – big producers and now supposedly played out,' he added.

The initial focus was a portfolio of 14 'reactivation' onshore and offshore Lake Maracaibo fields. The second phase, known as the Apertura, covers eight deals currently being finalised. This refers to the February round when 10 blocks were put up for bid and eight taken up. In the future the large multinationals would be both partners and competitors of PdVSA.

On very heavy crudes/bitumens, Mr Revesz admitted that the company faced a massive challenge with its vast reserves, even though it ranked alongside the Canadians in terms of expertise. He added that the group was

Venezuela takes the CRINE road

After CRINE was launched some three years ago, it was realised that the concept could have export potential. Lessons from the North Sea could be applied to other oil provinces.

Among those observing the North Sea revolution has been PdVSA, which is constantly striving to be more efficient. At the same time it is re-opening the door to foreign companies, inviting them to become partners.

Company representatives have been studying not only CRINE but its Norwegian equivalent, NORSOK, as well. A template has been drawn up and the Venezuelan version, ECO (Shared Optimisation Efforts), is being developed.

Mr Revesz commented, 'The whole industry is going through changes technically and managerially. But it is more than just cost reduction. It's about new ways of learning, new ways of sharing and doing business... management for unprecedented gains in a regular manner.

'Instead of trying to get a big contract and nice one-time relationship, the idea is to establish a longer-term

working with both the United States and Canada on relevant research into tar sands and the ultra-heavy crudes used in manufacture of Orimulsion.

Changing approach

'If you look at the 10-year investment profile of PdVSA as set four years ago, you would see that the plan was to spend \$45 million over the period ... 100 percent PdVSA basically. Today it is \$60 billion for the next 10 years and 42 percent will come through alliancing. Of the balance, an unknown percentage will be done through out sourcing, co-sourcing and integrated services,' said Mr Revesz.

North Sea management practices originating in the UK Cost Reduction Initiative for the New Era (CRINE) and alliance and allow for a different way of getting a return on the asset base. Profits may not necessarily lie in getting the final user to use as many manhours as the company can sell but what it focuses on is how you make the operation more efficient and lean.

'We are trying to get people together with a sense of urgency. The market is changing tremendously. And the experience that the North Sea has to bring to the petroleum world in terms of managing the business in a different way is crucial in terms of coping with such change.

'PdVSA has been watching the changes very carefully and our teams have travelled extensively – from the North Sea to Abu Dhabi. Each of our subsidiaries is trying at least three or four pilot schemes to learn different ways of conducting their business.'

Mr Revesz went on to say that noone should be in any doubt as to the important contribution UK and other European companies that had honed their business skills in the CRINE and NORSOK-driven North Sea could make to the future success of the Venezuelan oil industry.

Norwegian counterpart, NORSOK, are now being adapted to Venezuelan needs under the name ECO (Shared Optimisation Efforts). 'However, it's more than just cost reduction. It's about learning new ways of sharing and doing business. All PdVSA subsidiaries are now experimenting (see box).

'As PdVSA starts concentrating on its core business, it is demanding that the services surrounding it be done in a better, shared or co-sourced manner. The stage we are at now is how to become a lean, efficient system which embraces about 40 major alliances;'said Mr. Revez. He foresees the day when some 200 contractor alliances will probably underpin oil company activity.

Technical Report

UPSTREAM

The Institute continued to manage the UK input to international upstream standardization activities. The United Kingdom has raised three new work items on piping systems, plate and frame heat exchangers and whole life costing. If approved, the United Kingdom will provide project leaders.

The IP offer to the CRINE committee to provide permanent office accommodation for the Secretariat has not been accepted.

AEA Technology has completed its analytical investigation into the phenomena and probable fluid dynamic interactions that occur inside an exchanger as a result of a tube failure. The final report 'Structural Integrity Assessment of Heat Exchangers following a Tube Rupture' is now available in the IP Library.

REFINING AND MARKETING

The consultation draft of the Industry Technical Guidance for the Design and Operation of Petrol Filling Stations (HS(G)41 replacement) was issued for comment to members of the Technical Co-ordination Body in mid-June.

The specialist workgroup for Environmental Risk Assessment at Service Stations, which now includes a representative from the Environment Agency, is aiming to complete the development of a methodology by the end of this year. This will be similar in scope and objectives to the safety risk assessment in HS(G)146.

The LACOTS/HSE/IP Advisory Committee has published its recommendations for adoption of the IP Performance Specification for Underground Pipework at Petrol Filling Stations including a timetable and an initial list of recognised certifying agencies.

Contacts have been made with DoE and the Environment Agency with regard to industry involvement in the development of environmental risk assessment techniques for large process and storage sites. This follows on from the IP involvement in the CIRIA report on secondary containment measures.

A cross-industry risk assessment of access to top of road tankers has demonstrated that comparison of results with nationally recognised acceptance criteria indicates that there is no justification for the fitting of handrails to trucks involved in mainline distribution operations. It is now planned to discuss the results with HSE. If the principle is accepted, it would be a matter for individual operators to carry out assessments of their own operations.

A working group including manufacturers and equipment suppliers has been set up to generate recommended methods for road tanker testing required in the new Approved Tank Requirements which forms part of the Carriage of Dangerous Goods Regulations that come into force in September.

Second editions of the IP Code of Practice for a Product Identification System for Petroleum Products and the IP Tank Cleaning Safety Code have been published.

IP Guidelines for the Control of the Use of Potentially Dangerous Portable Electrical Apparatus in the Petroleum Industry have been drafted. The document is shortly to be issued for final committee approval.

ENVIRONMENT

The Oil Dispersants Working Group have organised a workshop for 'Oil Spill response - The *Sea Empress* incident, a Case Study' to be held in September.

A Working Group has been set up to develop a Sector Application Guidance for oil terminals. An outline of contents of the guide has been agreed and it is planned to complete this document in 1997.

AVIATION

The Aviation Committee now reports directly to Council. Terms of reference accommodating the committee's change in status have been prepared and ratified by members.

The IP/API joint research programme is currently undertaking work on two of the three agreed work items for 1996. Surfactancy Effects on the Water Removal Performance of Aviation Filters' is almost complete, with 'Investigation of the Levels and Types of Dirt Found in Aviation Fuel Distribution Systems' at the test programme stage, following placement of equipment at several worldwide locations. Work on 'Development of a Dirt Removal Test Protocol' will proceed on completion of an API paper survey of available test dusts.

An IP workshop on 'Fuel Contamination Problems in Major Hydrant Systems' was held in July, resulting in a number of recommendations which may lead to future research.

HEALTH

Management Guidelines on the Implementation of the EC Pregnant Workers Directive has been published.

Information for physicians on 'Medical Standards for Fitness to Wear Respiratory Protective Equipment' has been reviewed by an expert in this field and will be published shortly.

An invitation-only workshop on 'Environmental Epidemiology Strengths and Weaknesses' is scheduled for October.

MEASUREMENT

The new document on 'Calibration of Horizontal, Cylindrical Tanks at Service Stations' has been published.

The new document 'Guidance on the Installation of Turbine 'Meters in Loading Racks' should be published shortly.

A new Code of Practice 'Calibration of Reference Meters Used for Gantry Meter Proving: Small Volume Prover Method' is being prepared for publication.

A new draft document providing guidance for the Calibration of Additive Injection Systems on Road-Loading Gantries will be issued shortly for ballot.

MICROBIOLOGY

Final editing is being carried out on the Guidelines for the Investigation of the Microbial Content of Fuel Boiling below 390 °C and Associated Water.

A joint IP/IBRG working group has been set up to develop guidelines for the microbial evaluation of metalworking fluids. These guidelines will be produced specifically for end-users with limited microbiological expertise and limited laboratory facilities.

TEST METHOD STANDARDIZATION

A CFR Gasoline and Diesel Fuel Engine Workshop has been arranged in October when a group of American engine experts, who have been involved with the major developments of CFR engine technology over the past 45 years, together with others involved in future developments, will give presentations.

A replacement Technical Assistant is now providing the secretariat services for the BSI PTI/13 Petroleum Testing and Terminology Committee.

John Hayes Technical Director

Technology News

Real-time monitoring of bioremediation processes for BTEX contamination

Steptech Instrument Services Limited UK has designed and delivered a turnkey measuring system for a gas works remediation site in Dusseldorf on behalf of Stadtwerke Dusseldorf AG. The site, which was decommissioned 20 years ago, is contaminated with benzene, toluene, ethylene and xylene (BTEX) compounds from over 100 years of gas processing.

The full scale bio-reactor replaces a pilot bioremediation plant put into operation to determine the effectiveness of such a cleanup technique for the site's contaminated aquifer.

The bio-reactor treats some 20m³ of contaminated water per hour. Two borehole pumps deliver the polluted water, one stream from the heavily contaminated end of the aquifer and one from the less contaminated end, to the bioreactor. The two streams are mixed to control the total BTEX loading. Once through the bio-reactor, the sample passes to a sand filtration system for the removal of iron and then through two series of activated carbon filtration systems.

An eight stream sampling system, designed around Steptech's OIW2200 BTEX monitor, continuously measures input to the reactor and the various processes in the remediation chain. The system has a wide dynamic measuring range of 100 mg/litre to 50µg/litre and monitors the raw influent and the final clean effluent in real-time. Data is recorded for each sampling stream. The system provides real-time mimic displays and data logging, as well as trend graphs for both historical and real-time data view. Automated alarms can be set for each stream.

The control system can also be expanded for automated logging of other parameters such as pH, conductivity and temperature.

Additional electron acceptors are used to enhance the bioremediaton process.

The total project is expected to last five years.



Eight stream sampling system

Fast-track patent for subsea dredger and trench cutter

A new underwater excavation tool – the Hydrodigger – has been patented just 10 months after the application was made. According to the UK Patent Office, this is the fastest patent award ever made in the industrialised world.

Developed by Nick Sills, Director of James Fisher and Sons (Seafloor Dynamex), the Hydrodigger uses a novel technology to drive a propeller which forms a column of water to blast away material from the seabed in a technique known as 'hydrodynamic underwater excavation'.

The system can be used at depth to prepare the seafloor for the installation of oil and gas related structures, excavate or bury pipelines and cables, remove drill cuttings and clean up seabed structures, bury redundant structures in the seabed and to excavate structures for decommissioning.

Being water driven, the system is said to suffer none of the disadvantages of electrically or hydraulically powered systems. The propeller is mounted in an annulus or 'polo' shaped motor which uses variable geometry pistons to gain power. Power is distributed to the propeller via its blade tips.

Recent trials have shown the system to use five times less power than existing reaction turbine types and only requires a low pressure water pump to drive it, says the Patent Office.

This, in turn, reduces the size, cost and complexity of the onboard support

equipment required.

 The UK Patent Office launched its new fast-track service to make it possible, in certain cases, to obtain a patent within about a year year of filing.

The service was introduced to serve small businesses and individual inventors wishing to make use of patents to secure licence agreements or access to venture or development capital funding.



The Hydrodigger

Pump programme

Belzona has launched a performance improvement programme (PIP) that identifies the critical factors affecting the operation of centrifugal pumps, both old and new, and recommends solutions to restore original performance and/or enhance efficiency.

The pump is evaluated on-site – a computer generated engineering specification identifying techniques to increase performance and reduce operating costs. According to the manufacturer, the system can increase pump performance by up to 40 percent.

Ultrasonic gauge

The new Sonagage II multipurpose ultrasonic thickness gauge and corrosion meter from Sonatest has a resolution of 0.01mm. Other features include one point instrument and transducer calibration and retention of last reading and calibration.

Powered by a PP3 replaceable alkaline battery, the gauge can provide up to 55 hours of continuous use.

Technology News_

Offshore crane safety improved by new monitoring system

A new offshore crane safety indicator which utilises digital signal processing techniques to increase its capabilities both in terms of capacity and speed of operation has been unveiled by Wylie Systems, The system also provides a means of monitoring the wear on slew bearings to help reduce the need for, and cost of, regular inspections.

The WW650 system provides full data recording and condition monitoring of the crane, including details concerning the life of the crane. its condition, how much load it has been subjected to during its life and the wear on critical components. At the same time it is able to monitor the load on other parts of the structure to see whether specific components have been overloaded.

The percentage of safe working load is displayed on a dominant analogue indicator, backed by a large digital indication of the load on hook, radius and permitted safe working load. A separate alpha numeric display continuously shows the current programmed condition, including wave state, main/auxiliary hoist and falls setting. All electronic modules are fully potted for environmental protection and system longevity.

The system has been specified for a new range of marine cranes being manufactured under licence from SeaTrax of Houston, Texas, a number of which have recently been supplied to Phillips Petroleum in Norway



The WW650 offshore crane safety indicator uses the latest digital signal processing techniques

Valve melt-down

Valve caps that melt can provide a reliable and economic way of isolating 'volatile' pipelines from fire and overheating according to alloys manufacturer Mining and Chemical Products. The company has developed screwon caps made in low-melting-point alloy that can be incorporated into process, gas or oil lines. The cap holds the valve open against spring pressure at normal working or ambient temperatures. If the local temperature exceeds the alloy's melting point, the cap dissolves allowing the spring to close the valve. This action can be used to open other routes to divert or contain the product.

The alloys can be formulated to melt repeatably to within a few degrees across a range of temperatures, typically from 70°C to 250°C. and are easily machined, cast and formed into caps of any size and shape, says the manufacturer.

High and low flowrate measurements

Endress + Hauser has extended it Promass range of coriolis meters to include several new sizes capable of accommodating flowrates as low as 1 kg/hour and up to 180 tonnes/hour.

The sensor is immune to external stress and vibration and needs no special supports or brackets to locate it into the process pipeline, says the manufacturer. Furthermore, as with the existing Promass series, the sensor can be combined

with the cost-effective 60 Series electronics or be provided with the high functionality of the 63 Series.

The new range includes the 'A' sensor for low flowrates which is available in 2 and 4 mm sizes and the 80 mm 'M' sensor for flowrates of up to 180 tonnes/hour. New coriolis flowmeter

Pressure drops are kept to a minimum, the straight tube design of the sensor exhibiting pressure drops some 40 percent less than previous designs, according to the manufacturer. The straight tube design also keeps overall sensor size and weight to a minimum.

Both the A and M systems are available with remote electronics if required and can be provided with EExd certification for use in hazardous areas



Rupture discs take on new shape

Computer modelled finite element analysis (FEA) of stress concentrations to small sections of rupture discs has been used by Fike (UK) Limited to develop a new range of reverse acting rupture discs.

The Contour Modified™ disc comprises a double bulged design with a perimeter score-line located in the low stress effected area while additional support to the high-stress effected area is provided from a central bulge diverting line.

The new range was developed as part of a programme aimed at reducing fatigue and stress corrosion effects on such discs, particularly at low pressures, thereby improving operational performance. This, in turn, improves environmental protection, personnel safety and equipment protection, says the company.

The discs are fully vacuum

resistant, can achieve full opening and can be made to non-fragmenting. be Supplied with 'O' ring seals for fugitive emissions if required, they are available in a range of standard or exotic materials to suit a range of applications.

According to the manu-facturer, the new rupture discs have a superior life in heavy cycling or pulsating conditions and provide relief at much lower pressure than other reverse scored disc designs.



FEA enabled the prediction of stress distribution associated with various rupture disc designs.

Technology News_

Reduced manifold leakage

The new range of flanged enclosure manifolds from Anderson Greenwood is said to offer reduced leakage and increased integrity compared to traditional NPT screwed connections used in process applications.

The manifold features full process and vent connections located in the unit's base for ease of installation into an enclosure. An integral breakaway joint simplifies the addition and removal of the unit for calibration or replacement. Traditionally this procedure would have required extensive welding, incurring costly NDT procedures and possibly

causing heat damage.

Available in two, three and five-valve models, the manifolds are pre-assembled into the enclosure to reduce on-site installation time and costs.

Installation only requires simple instrument mounting and process/electrical connections to be made on site.



Flanged enclosure manifold

Emergency planning on the Internet

The development of the Internet has improved the speed and efficiency by which emergency response documentation and procedures can be disseminated to emergency response personnel.

A new system developed by Vector Business Communications allows information for internal use by company personnel to be held on a password protected 'Intranet' area of the company's Web site.

All emergency related policies, plans and procedures can be posted on this Intranet and visited by suitably authorised personnel across the organisation. regardless of time zone or geographical location.

E-mail links can provide a mechanism for feedback on revisions and improvements while other 'hot' links can take the visitor to related information such as the response procedures of an operating partner or one of the emergency organisations.

Information can be accessed on demand or periodically downloaded to hard copy as required.

Information for external consumption by partners, shareholders or regulatory authorities can also be posted to non-restricted areas of the company's Web site.

Frigg takes personnel tracking and helicopter logistics package onboard

A new fully automated combined personnel tracking and helicopter scheduling system using Texas Instruments' TIRIS radio frequency identification transponders has been introduced on Elf Norge's Frigg platform in the Norwegian sector of the North Sea. The field comprises three platforms linked by bridges and a number of remote satellite platforms.

Pairs of flameproof readers incorporating radio frequency identification technology are located in each bridge with additional units in muster areas. The system tracks individual personnel wearing a transponder tag with a unique tamper-proof identification code as they move about the platform and allows an accurate assessment of personnel present at muster areas in the event of an emergency.

The readers are linked via a modem to a tracking and logistics package which operates on a duty/standby basis with all functions available from all networked computers.

The logistics package allows the platform operator

to schedule all helicopter passengers and freight movements between Frigg, the mainland and surrounding platforms. The system logs all flight details including weight, equipment manifests and stock lists.

Personnel details such as full work experience, survival and medical certificates as well as expiry dates and even a photograph can also be stored and called up on screen on entering a password. Once on board, the system provides a continuously updated list of personnel and their whereabouts.



Frigg field

Instant flammable gas detection

The Pax Ex personal flammable gas detector from Draeger has been designed to provide an immediate warning of the presence of flammable gases. Said to be one of the smallest such devices currently available on the market, the handheld units can be calibrated for petrol, diesel and other flammable gases.

Weighing just 370 grammes, the detector has both audible and visual alarms and is suitable for use in extreme and hostile environments. It can be configured for operation as a direct reading instrument or as a simple Go/No Go warning device. The detector provides 10 hours of operation before recharging of the nickel cadmium batterv pack is required.

The password-protected unit has two low battery alarms and four user adjustable alarm levels. Individual identification numbers can be allocated and the display of measured value, confidence bleep and switch-off override can be turned on or off.

Contacts

Steptech Instrument Services	01438 312425
The Patent Office	01633 814555
James Fisher and Sons	
(Seafloor Dynamex)	01224 680330
Belzona	01423 567641
Sonatest	01909 316345
Wylie Systems	01424 421235
Mining & Chemical Products	01256 897200
Endress + Hauser	0161 286 5000
Fike (UK)	01622 677081
Anderson Greenwood	0161 494 5363
Vector Business Communications	01442 877167
Texas Instruments	01604 663071
Draeger	01670 352891

Institute News

NEW MEMBERS

Mr T Andersson, Kungsors Plast AB Ms D A Beggs, McKenna & Company Mr R P Cuckow, Farnham Mr P J Cummins, Irish Shell Limited Mr D L M de Reijer, Core Lab Refinery Systems Mr V Djondo, Sterling Publications Limited Mr N Donald, Southern Counties Fuels Limited Mr A J Dorken, London Mr D J Durham, Belper Mr J R Edwards, Spot Petroleum (North West) Limited Ms E J Feiler, Lubrizol International Mr P Greenwood, Inchcape Testing Services UK Limited Mr J C Gunn, Price Waterhouse Captain A Gupta, Sharaf Group Mr J P Hartmann, Hartmann Management Services Inc Mr J W Henry, Ripon Mr J Hudson, Prime Safe Limited Mr J R Hutton, BP Exploration Operating Company Limited Mr I Idiens, Huntingdon Mr C L Jones, Crowthorne Mr S M Joyner, Natwest Markets Mr J Knight, The Chase Manhattan Bank NA Mr A G Kroon, Aircraft Fuel Supply BV Mr C R Kukielka, Faithful & Gould Limited Dr I M Lancaster, Nynas UK AB Mr C G Lindgren, London Mr A C Lumb, Norway Mr A D MacDonald, Laurencekirk Mr C Manoli, Manolis & Socratous Marine Services Limited Mr C E Marr, Transmitton Limited Mr H Mato, Kashima Oil (UK) Limited

NEW COLLECTIVES

Hardy Oil & Gas plc, Commonwealth House, 2 Chalkhill Road, London W6 8DW

Representative: Ms Frances Roche

Hardy Oil & Gas plc is an independent upstream oil and gas company active in exploration on a worldwide basis.

Natwest Markets, 135 Bishopsgate, London EC3M 3UR

Representative: Mr S J McTiernan

The global Natwest Energy team consists of 120 oil and gas specialists. It includes Wood Mackenzie Consultants and the advisory expertise of Glencher Natwest. The team is backed up by strong global equities, capital markets, treasury, project finance and advisory, financing positions and offers an integrated approach to the industry with an extensive project range.

European Gas Turbines Ltd, PO Box 1, Thorngate House, Lincoln LN2 5DJ

Representative: Mr J Braithwaite

European Gas Turbines Ltd is the supplier of gas turbines in the 2-200 megawatt power range for use driving compressors, pumps and electrical generators.

Mr D J Millar, Westhill Mr A R Newberry, Liss Mr P R Newman, Berkhamsted Mr S O'Len, New Era Oil Company Limited Mr R S Raja Muda, Malaysia Mr S Ramage, Oceonics Group plc Ms S A Read, Milton Keynes Mr J S Rowley-Conwy, ETI Investments Limited Mr D N Small, Olney Mr A H D Smith, Leighton Buzzard Mr A Spence, Lerwick Mr J E Staples, Salisbury Mr I Taylor, Hytek (GB) Limited Mr D J Thorp, TEP Designs Mr A J Walls, Edinburgh Mr J C Watt, Severn Glocon Limited Mr D J Webster, NationsBank NA Ms B Wedekind, Ricardo Consulting Engineers Mr D L Williams, Leigh-on-Sea

STUDENTS

Ms T Adeniji, London Lt-Commander R L Perks, Middlesex Mr S R Province, Kent Mr G Salles, USA Mr A Tahghighi, London

STUDENT PRIZEWINNER

Ms A E Hewitt, Sheffield

CPS Fuels Limited, Old Sale Yard, Forncett St Peter, Norwich, Norfolk NR16 1JB

Representative: Mr Stephen Pipe

CPS Fuels Limited are distributors of fuel oils, lubricants, pre-packed solid fuel, bulk and cylinder LPG and natural gas.

Union Bank of Switzerland Limited, 100 Liverpool Street, London EC2M 2RH

Representative: Mr Craig Pennington

Union Bank of Switzerland Limited is an integrated investment bank with operations throughout the world.

Delta Petroleum Products Trading Co, Piyalepasa Bulvari, Kastel Is Merkezi, A Blok 80379, Istanbul, Turkey

Representative: Mr Kelvin Aldus

Delta Petroleum products Trading Company is principally involved in trading, transportation, distribution and storage of crude oil, refined products and LPG at Dörtyol (Iskenderum). Facilities include 19 oil storage tanks with a capacity of 300,000 cubic metres and 15 spheres and 12 cigars for propane/mixed LPG storage (capacity 64,500 cubic metres). The terminal has berthing facilities to accommodate four vessels simultaneously up to a limit of 75,000 cubic metres.

Institute News_

AROUND THE BRANCHES

ABERDEEN

Secretary:	Dr George Wood, J P Kenny Caledonia Ltd, Engineering Centre, Greenbank Crescent, East Tullos, Aberdeen AB1 4BG Tel: 01224 851038
1996	
8 October:	Technical and Environmental Aspects of Onshore Drilling Operations in the UK, Peter Redman, Midmar Energy
12 November:	Eastern Trough Area Project (ETAP), Charlie Cosad, ETAP Wells Alliance Team Leader, BP
29 November:	Annual Branch Dinner
10 December:	Atlantic Frontier Developments (speaker from BP)
1997	
14 January:	Standby Safety Vessels – the New Concept, John Martin
11 February:	Annual General Meeting
11 March:	The Captain Development, Texaco, Ralph Sinclair
8 April:	Advances in Extended Reach Drilling, David Adams, Baker Hughes
13 May:	1996 Technology Award Winner

EAST ANGLIA

Secretary:	David Mills, P&O Roadtanks Ltd, Victoria Road, Stanford-Le-Hope, Essex SS17 0JB Tel: 01375 676121
1996	
24 October:	Oil Trading, Speaker
21 November:	The Eastern Group
1997	
16 January:	Upstream Subject
20 March:	Alternative Fuels
15 May:	Field Visit
June:	Summer weekend social visit

EDINBURGH & SOUTH EAST SCOTLAND

Secretary:	Dr Roddy Hutchison, Polyethylene Group Offices, BP Chemicals Ltd, PO Box 21, Bo'ness Road, Grangemouth, Stirlingshire FK3 9XH Tel: 01324 493339
1996	
4 September:	HSE Pipeline Regulations, speaker from Health and Safety Executive (Joint meeting with Pipeline Industries Guild)
10 October:	Cargo Inspection & Verification Techniques, Mr Peter Williamson, Area Manager, SGS Redwood (Joint meeting with Inst. of Measurement & Control)
5 November: November:	Young Students' visit to BP Grangemouth Annual Student Lecture Oil Exploration in Colombia, speaker from BP Exploration
1997	
13 February:	Energy Efficiency Best Practice in the Refining and Petrochemicals Industries, speaker from Dept. of the Environment, Annual General Meeting
March:	Joint meeting with Inst. of Chemical Engineering
May:	Annual Spouses' Event, Visit to Tullialan Police College

ESSEX

Secretary:	Arnold Carlson, 471 Kents Hill Road North, Thundersley, Benfleet, Essex SS7 4AD Tel: 01268 794615
1996	
9 October:	Energy Efficient Separations Technologies, Michael Morrell, Project Manager of the Energy Efficiency Best Practice Programme, ETSU, Harwell
13 November:	Ladies Evening: Christmas Shopping at Sainsbury's, Mrs Janice Trevillion, Home Economist, J Sainsbury plc.
1997	
8 January:	Guns and Hoses – the largest Fire-Fighting System in the World, Kevin M Hardingham of Essex Fire and Rescue Service
12 February:	Annual General Meeting, followed by Vapour Recovery – from Terminal to Service Station, Paul Chawner, Sales Engineer, Purfleet Commercials Ltd
12 March:	Aspects of Marine Safety and Transportation, Captain Bev Beale, Marine Superintendent, Shell UK Oil
4 April:	Annual Dinner/Dance
20 May:	Visit to Gatwick Airport Refuelling Service
HUMBER	
Secretary:	Phil Ronson, List Design Group, RJA House, Manby Road, Immingham, South
4000	Humberside DN40 2DW Tel: 01469 571888

1996	
12 September:	Visit to Conoco Humber Refinery
10 October:	Humber Estuary Management Strategy, Mr
	John Sweeney, Environmental Agency
	Resources Manager
25 October:	Annual Dinner and Dance
28 November:	Humber Pilots Service, Captain P P Hames
1997	
23 January:	Development of an Oil Field, Mr J Tetlow,
	Britannia Development Director
20 February:	Hydro Skimming, Refinery Front End
	Processing, Mr R Brown
7 March:	Annual Dinner
17 April:	Ladies Night
15 May	Visit to Bateman Brewen

LONDON

Secretary:	Edith Walker, Conoco Ltd, Conoco Centre, Warwick Technology Park, Gallows Hill, Warwick CV34 6DA Tel: 01926 404768
1996	
1 October:	Back to Basics – Supply and Distribution, Trevor Mallinson, Texaco
12 November:	The Business Development Manager in Exploration & Production, Graham Lyon, Deminex UK Oil & Gas Ltd
1997	
21/22 January:	HFO – An Essential Element of the Industrial Fuels Portfolio, Mike Drew, Consultant
18 February:	Transport for the Millennium, Freight Transport Association & Transport 2000
25/26 March:	Back to Basics – Bitumen, Martin Heslop, Acland Investments, on Applications, plus ONO on Manufacturing, Branch AGM
22/23 April:	Fuel Retailing - The Hypermarket Perspective
20/21 May:	Back to Basics - LPG, David Hepworth, Conoco
17/18 June:	Annual Visit: The Royal Mail Sorting Office, Mount Pleasant

Institute News____

MIDLANDS

Secretary:	David Johnson, Houghton Vaughan plc, Legge Street, Birmingham, West Midlands B4 7EU Tel: 0121 359 6100
1996	
18 September:	The New ACEA Engine Oil Quality System, Ms Alexandra Cole, Industry Co-ordinator, Ethyl Petroleum Additives Ltd (Joint meeting with BLF).
16 October:	Future Petrol Retailing Legislation in the UK
20 November:	The Need to Protect Petrol Retailers from Unfair Practices, Mr Bruce Petter, Director, PRA
6 December: 1997	Christmas Social Evening
17 January:	Annual Dinner Dance
19 February:	Annual General Meeting
19 March:	The Future of Chlorinated Paraffins in Metalworking Lubricants – An Update, ICI
16 April:	Special Waste Regulations 1996, Mr Martin Millward of Orcol Garage Services
18 June:	Tour of Severn Trent's Sewage Treatment Plant at Minworth

NETHERLANDS

Secretary:	Ferry A. Van Eykel, Det Norske Veritas Industry A/S, PO Box 9599, 3007 AN Rotterdam, Netherlands Tel: 00 31 10 479 8600
1996	
20 September:	Social gathering
24 October:	Decommissioning and Disposal of Offshore Platforms
21 November:	Employment in the Oil and Gas Industry

NORTHERN

Dr Mike Minett, FMC Additives, Tenax Road, Trafford Park, Manchester M17 1WT Tel: 0161 872 2323
Coal Liquefaction – Principles, Techniques and Economics, Mr S A Moore
Liverpool Bay Oil and Gas – A North West Special, Mr C Grenz
60th Annual Dinner Dance
Transport in Bulk, Mr D Mills
Victuals for the Prancing Horse – Shell/Ferrari motor racing Mr R Lindsay
Compressor Lubrication
Hot Pot Supper

NORTH EAST

Secretary:	John Sparke, Phillips Petroleum Co UK Ltd, Seal Sands, Middlesborough, Cleveland TS2 1UH Tel: 01642 546096
1996	
25 September:	Oil Spill Recovery, Phillips Petroleum
18 October: 1997	PITANE Quiz and Members Social Evening
29 January:	Annual General Meeting followed by a speaker
March (tbc):	Clean-up of Hazardous Spills From Road Tankers, Environment Agency
April (tbc):	Visit to Cleveland Potash's mine at Boulby

SOUTHERN

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Secretary:	Maurizio Malpiedi, Esso Petroleum Co Ltd, Fawley Refinery, Fawley, Southampton SO4 1TX Tel: 01703 896021	
1996		
21 September:	Annual Ball	
9 October:	Heathrow visit	
SOUTH WA	LES	
Secretary:	Steve Vines, Pembroke Cracking Company, PO Box 10, Pembroke, Dyfed SA71 5SJ Tel: 01646 641531	
1996		
24 September:	Electric Vehicles, Powergen	
22 October:	Sea Empress Aftermath, Dr Robin Crump and Mr Stuart Walder	
11 December:	Refinery Maintenance, IEE and BP (joint meeting with the Institute of Electrical Engineers)	
1997		
21 January:	Visit to Milford Haven Port Authority	
21 February:	Annual General Meeting and Grandad	
	Movies, Mr John Haggar	
28/29 March:	Weekend visit to Birmingham	
24 April:	Biological Refining, BMB/DTI	
STANLOW		
Secretary:	John Wellstead, Castrol UK Ltd, PO Box, 14	

	Bridges Road, Ellesmere Port, South Wirral L65 4ER Tel: 0151 355 3737
1996	
25 September:	Works visit to PowerGen's Connah's Quay Plant, followed by buffet dinner
October:	The History of Lower Reaches of the Manchester Ship Canal
15 November:	Dinner/Dance
Late November:	Lubrication of Constant Velocity Joints, Senior Tribologist from GKN

WEST OF SCOTLAND

Secretary:	Allan Lowson, 2 Wylie Avenue, Newton
	Mearns, Glasgow G77 6AX Tel: 0141 639 4716
1997	
6 March:	Branch Petroleum Dinner
7 August:	Branch Golf Tournament

YORKSHIRE

Secretary:	Ivor Bennett, Millers Oils Ltd, Hillside Oil Works, Brighouse, West Yorkshire HD6 3DP Tel: 01484 713201				
1996					
3 September: 8 October:	Treasure Hunt and Barbecue Automotive Fuels for the Future, David Blackmore, Shell Research & Technology Centre				
12 November: December: 1997	Energy Efficiency, Mr J Ward, ETSU Chairman's Evening				
14 January:	The Cable Revolution: Your Connection to the Future, Mr N Embleton, Bell Cable Media				
11 February:	Annual General Meeting/HotPot Supper				
11 March: March:	Joint meeting with The Institute of Energy Social evening				

Appointments



Two vacancies will arise shortly at the Institute of Petroleum.

Senior Information Officer

Duties will include answering a wide range of technical and commercial enquiries; online and CD-Rom literature searching; and the production of various statistical publications concerning the oil industry. The post also involves the supervision of junior staff.

The successful candidate will be a graduate with at least three years' professional library or information work experience in the oil or energy industries and a working knowledge of computers. The ability to understand written French or German would be a distinct advantage.

A pleasant personality; ability to work under pressure, as part of a team, but with minimum supervision; and good communications skill are essential.

Salary dependent on skills and experience in the range of £17,000 – £20,000

Apply to Catherine Cosgrove, Head of Library and Information Service. Closing date 12 September 1996

Technical Officer

A vacancy has arisen in the Technical Department for an officer to assist IP Managers who have specific areas of technical responsibility. In particular the successful applicant will have responsibilities for upstream BSI committees currently developing standards for materials, equipment and offshore structures, for which the IP provides the Secretariat. The work will involve administration and other areas of technical activities within the Institute. He/she will be working under the supervision of technical managers who will explain and assist on technical points.

Candidates should have a flexible attitude and be self-starters capable of working without direct supervision. Expected educational qualifications are a scientific degree or equivalent. Some previous industrial experience preferably in the upstream oil industry would be an advantage and previous use of PCs and word-processing systems will be desirable.

Starting salary circa £15,000 with annual increments depending on performance

Apply to John Hayes, Technical Director

Benefits include a pleasant working environment, a contributory pension scheme, central location, 25 days holiday and subsidised lunches.

Letter and CVs should be sent to: Institute of Petroleum, 61 New Cavendish Street, London W1M 8AR

CFR engine workshop

Thursday 17 October

The workshop will include presentations by experts from the United States who have been involved with the major developments of Co-operative Fuel Research (CFR) engine technology over the past 45 years and are involved with future developments.

This workshop will provide an opportunity to meet these experts and will be of interest to all those involved with octane and cetane rating using the CFR engine.

Ample time will be allocated for questions and discussion and there will be displays of equipment and an opportunity to meet the representatives from the engine manufacturers.

In addition the US experts will attend the IP Motor and Aviation Fuel CFR Experimental and Operators Panel, which will meet on the day after the workshop. All delegates will be cordially invited to attend the morning part of this meeting.

For a copy of the programme and registration form please contact: Pauline Ashby, The Institute of Petroleum, 61 New Cavendish Street, London W1M 8AR UK Tel: 0171 467 7100 Fax: 0171 255 1472



THE INSTITUTE

Energy issues in Central Europe: fuel retailing

Tuesday 19 November

The second of two IP conferences in association with and supported by the Department of Trade and Industry on the new developing energy markets of Central Europe, focusing especially on the 'new economic tigers', the Czech Republic, Slovakia, Poland, Hungary and the Baltic states.

This event will concentrate on the opening of new opportunities in fuel retailing to serve the rapidly developing consumer markets of the region and will include the views of major international oil companies, the domestic players, their suppliers and partners.

This is an important event for people and companies seeking to understand these new markets, especially contractors, equipment suppliers, consultants and service companies for which openings may arise as existing facilities are upgraded by indigenous organisations or with the involvement of major international investors.

For a copy of the programme and registration form please contact: Pauline Ashby, The Institute of Petroleum, 61 New Cavendish Street,London W1M 8AR UK Tel: 0171 467 7100 Fax: 0171 255 1472

UK Deliveries into Consumption (tonnes)

		1. C			
Products	tJun 1995	*Jun 1996	tJan-Jun 1995	*Jan-Jun 1996	% Change
Naphtha/LDF ATF - Kerosene Petrol of which unleaded of which Super unleaded Premium unleaded Burning Oil Derv Fuel Gas/Disel Oil Fuel Oil Lubricating Oil	225,700 688,520 1,818,610 1,178,341 78,229 1,100,112 139,588 1,137,313 530,545 604,961 80,372	177,412 719,370 1,818,670 1,213,237 55,244 1,157,993 138,216 1,170,938 536,728 592,070 69,379	1,567,420 3,496,778 10,693,274 6,668,610 483,415 6,185,195 1,490,220 6,568,287 3,745,953 4,242,769 448,288	1,465,955 3,766,250 10,860,097 7,259,546 383,857 6,875,689 1,788,535 7,006,381 4,004,070 3,583,138 433,478	-6 8 2 9 -21 11 20 7 7 7 .16 -3
Other Products	799,981	691,849	4,548,664	4,328,976	-5
Total above	6,035,590	5,914,632	36,801,653	37,236,880	1
Refinery Consumption	534,180	538,710	3,125,588	3,254,393	4
Total all products	6,569,770	6,453,342	39,927,241	40,491,273	1
t Revised with adjustments *preliminary					



OF PETROLEUM

Consultants Handbook 1996-97

NEW EDITION Members of the Institute of Petroleum offer consultancy services in a wide range of petroleum industry areas. Currently about 400 members offer 65 different categories of expertise.

A handbook of all consultants indexed by category is available from the Institute for £15.

- ▲ Additives Technology
- ▲ Allocation
- ▲ Arbitration Services
- A Aviation
- ▲ CAD (Computer Aided Design)
- ▲ Corrosion Technology
- ▲ Custody Transfer Arrangements
- ▲ Economics & Pricing
- ▲ Energy Efficiency
- ▲ Environment General
- ▲ Environment Marine Pollution
- ▲ Expert Witness Services
- ▲ Finance
- ▲ Fuels & Fuel Technology
- A Gas
- ▲ Government & EC Relations
- ▲ Health & Hygiene
- ▲ Heat Transfer
- ▲ Human Resources
- ▲ Industrial Relations
- ▲ Information Services
- ▲ Information Technology
- ▲ Installation Security
- ▲ Laboratory & Test Method Advice
- ▲ Legal Advice
- ▲ Loss Prevention
- ▲ Loss Prevention Marine
- ▲ Lubricant Technology
- ▲ Maintenance & Inspection
- ▲ Management Organisation
- ▲ Marine Operations
- ▲ Market Research & Analysis
- ▲ Marketing General

- ▲ Marketing Operations
- ▲ Measurement & Fluid Flow
- ▲ Microbiology
- ▲ Oil & Gas Allocation
- ▲ Oilfield Chemicals
- ▲ Oilfield Development
- ▲ Oilfield Machinery & Equipment
- ▲ Oilfield Subsea Development
- ▲ Petrochemicals
- ▲ Pipeline Planning & Management
- ▲ Planning & Economics
- ▲ Plant Design
- ▲ Platform Decommissioning
- ▲ Production
- ▲ Project Services & Engineering
- ▲ Public Relations
- ▲ Quality Management & Assurance
- ▲ Refinery Operations
- ▲ Reliability
- ▲ Retail Outlets, Valuation/Management
- A Risk Analysis
- A Risk Analysis Financial
- ▲ Road Transport
- ▲ Safety
- ▲ Safety Critical Systems
- ▲ Site Selection & Investigation
- ▲ Storage Facilities
- ▲ Supply & Distribution
- ▲ Technical Writing
- ▲ Telecommunications & Networks
- ▲ Trading & Shipping
- ▲ Training

Anyone interested should contact the IP Library, or send a request for the handbook, together with a cheque for £15 to: The Library

Institute of Petroleum, **61 New Cavendish Street.** London W1M 8AR Tel: 0171 467 7100 Fax: 0171 255 1472 E-mail: Lis@petroleum.co.uk