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The Institute of Petroleum

PETROLEUM REVIEW

Aftermath

Dr Robin Pellew looks at the environmental pollution in the Gulf after the end of fighting

The International Maritime Organisation coordinates worldwide efforts to clean up the Gulf

Firefighter Neal Adams gives his views on putting out the Kuwaiti oil well fires

United States

Robert Horton comments on US energy policy

Indonesia

Details of exploration activity by David Buckman

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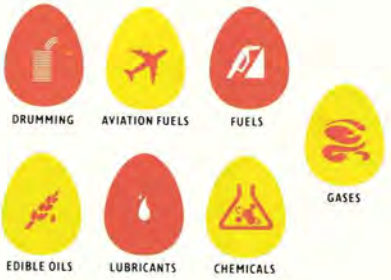

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Contents

Cover photograph of nature reserve at Conoco's Humber refinery.

. . . news in brief

14 February

The UK Energy Minister, Colin Moynihan, gave the go-ahead for the West Firsby onshore oilfield, currently operated by Saxon Oil.

15 February

Exxon Corporation has made an oil and gas discovery 174 miles off the coast of Terengganu in Malaysia.

The European Commission proposed an East-West energy conference in the second half of this year to establish a code of conduct to regulate and encourage the trade in energy between eastern and central Europe and western Europe.

16 February

Spain's state-controlled oil company, Repsol, and savings bank La Caixa have agreed to merge Gas Madrid and Catalana de Gas into a single company.

19 February

Iran has unveiled plans to establish an oil trading company in London.

20 February

Norwegian rig owner Smedvig has acquired an option to buy a significant stake in the Tentech 850 mono-hull oil production vessel being built for the John Fredriksen group in Spain.

The Shell group has signed an agreement with Algeria's Sonatrading for the purchase of LNG which will bring the deactivated Cove Point Terminal back into use.

21 February

President Bush laid out a new energy strategy which emphasised increased domestic production to reduce America's dependence on Middle East reserves.

A subsidiary of Repsol and the Venezuelan government's petrochemical company, Pequiven, have agreed to build a $21m plant in Venezuela for producing specialised waxes for industry.

US oil company Phillips Petroleum has tested oil and gas in the South Umbarka concession in Egypt's Western Desert.

US oil concern Coastal has shut down the Aruba refinery which it brought back on stream last November due to supply problems because of the Gulf War.

22 February

Mobil Corp has agreed a contract with the government of Guyana to explore for oil in a 20,000 square kilometre concession of the country's northwest coast.

Qatar has signed the first major contract to supply natural gas from its North Dome field to a Japanese electricity company.

Total is joining forces with Petrofina and Repsol to search for hydrocarbon resources in the Soviet Union.

Atlantic Resources and a consortium of Australian and Dutch interests is acquiring a half share of blocks 49/9 and 49/10 in the Celtic Sea, previously owned 100 percent by Atlantic and will prepare a development plan for the reserves in the area.

23 February

Gabon has unveiled details of the country's fifth offshore licensing round covering deepwater frontier regions to be offered to oil companies.

The Australian and Indonesian government will each provide a $1m loan to finance the joint authority to oversee the exploitation of minerals in the oil and gas rich Timor Gap.

India's Oil and Natural Gas Commission has made a significant gas discovery at the BS-13 structure next to its major gas producing Bassein field.

The Irish government has begun new negotiations with Agip and Elf about the future of Ireland's oil refinery at Whitegate in Cork Harbour.

26 February

Lasmo has confirmed an encouraging gas find in Pakistan, close to an earlier discovery in Sind province.

In a recent survey British Petroleum remains the leader in North Sea oil and gas with assets worth £7.56 billion.

UK offshore oil production was down to 1.604m bpd in January as shutdowns for safety work and the tie-in for the new Forties pipeline cut output from a number of fields.

NAM, the leading Dutch exploration and production venture, has discovered 24 billion cubic metres of gas in new fields.

The Wareham oilfield in Dorset has begun commercial oil production — initial production is expected to be around 1,000 bpd building up to 3,500 bpd.

27 February

Sasol, the South African fuel group specialising in the conversion of coal to oil and gas, is buying the state-run Central Energy Fund's 50 percent stake in the Sasol 3 synthetic fuels project and redeeming loans to the fund in a deal worth R2.9bn.

28 February

USX Corporation has approved a 1991 capital and exploration budget for its energy business of some $1.3 billion, a 15 percent increase on $1.1 bn spent in 1990.

The UK's National Economic Development Office has forecast that expenditure on North Sea oil and gas projects could reach some £4.7 billion in 1991 and still be rising the next year.

1 March

Norwegian state-owned Statoil announced a 74 percent increase in pre-tax profits as a result of higher oil prices, cost reductions and increased production.

2 March

Sumitomo Corp has agreed to acquire a 10 percent stake in the Petrel natural gas field offshore northern Australia from Cultus Petroleum NL.

5 March

Enterprise Oil Norge has been awarded stakes in three new licences covering five blocks in Norway's 13th licensing round.

6 March

The Oil and Gas Development Corp of Pakistan is planning to develop its Dhodak gas/condensate field 200km northwest of Multan in Punjab.

India's Oil and Natural Gas Commission has made a number of oil and gas discoveries in the Bombay offshore region neighbouring the Bombay High Field.

Enterprise Oil has announced a significant gas discovery 30 miles off the Norfolk coast in block 48/22.

7 March

The IEA has withdrawn its emergency plan to make 2.5m barrels of oil a day available to the market to deal with any shortage of oil during the Gulf War.

9 March

Anglia Energy has abandoned plans to build a 380 megawatt power station at Great Yarmouth after an announcement by British Gas of a 23 percent rise in gas prices for bulk users.

OPEC stabilisation moves

Oil prices moved upwards following the first post-Gulf war OPEC meeting at which plans were announced to reduce oil output to 22.3 million barrels per day (b/d) for the second quarter of the year.

Meeting in Geneva, OPEC ministers agreed to make a 5 percent reduction in current output of 23.4 million b/d in a bid to keep the price of oil at around the pre-war level of $21 a barrel until a further OPEC meeting scheduled for June.

Saudi Arabia, the organisation's largest producer undertook to reduce its output by about 450,000 b/d but this would still leave it at nearly 8 million b/d, substantially higher than the kingdom's pre-war quota of 5.4 million b/d.

Saudi Arabia increased its output last August to compensate for the loss of 4.5 million b/d from Iraq and Kuwait on the world market caused by Iraq's invasion of Kuwait and the subsequent UN embargo on both countries' oil exports.

It will take time for Kuwait to return to its pre-war quota of 1.5 million b/d because most of the operating wells could be ablaze for months. Estimates vary but some experts say that Kuwaiti production could amount to 250,000 b/d by the end of the year.

Iraq's oilfields have suffered less damage than those of Kuwait but Iraq cannot resume exports until UN sanctions are lifted — pre-war it had an OPEC quota of 3.1 million b/d.

Mr Jim Short, of International Petroleum Exchange brokers GNI, said: 'As long as the OPEC countries stick to these quotas I can see prices staying between $17 to $19 a barrel until June.'

(See article on page 166)

Big bird helps clean-up

The world's largest cargo aeroplane, the Antonov AN124, has been chartered by Uckfield-based World Aviation to deliver vital clean-up gear for the oil spill in the Gulf.

The huge aircraft is seen here at London's new Stansted airport en route to Houston to pick up two pieces of equipment weighing 32,000 lbs each.

Budget raises petrol duty

The good news for the oil industry in this year's UK budget is that the laws covering tax relief for abandoning North Sea oilfields have been fine-tuned.

The bad news is the increased duty on unleaded and leaded petrol, derv and on gas oil and fuel oil, with most hit by an extra 2.5 per cent VAT increase.

Chancellor of Exchequer Norman Lamont's move towards a comprehensive definition of abandonment costs was described by analyst Jim Marshall, of Ernst and Young, as: 'Fine-tuning, to make sure that if the money spent on abandonment costs is appropriate for tax relief it will get tax relief. It's all part of an ongoing debate between the industry and the government.'

But leaded and unleaded petrol and derv are all going up by 15 per cent. Leaded will go up 3.9 pence per litre including VAT, unleaded 3.4 pence per litre and derv 3.3 pence per litre.

Gas and fuel oil are to go up by 9.3 per cent, about 0.1 pence per litre, but is exclusive of VAT as domestic users are zero-rated.

Exxon payout

The Exxon Corporation, whose tanker *Exxon Valdez* caused a vast oil spillage off Alaska in 1989, has agreed to pay $900 million to settle all federal and civil claims plus a criminal fine of $100 million.

Exxon have already paid an estimated $2.2 billion to clean up the polluted Alaskan coastline when more than 250,000 barrels of oil was spilt into Prince William Sound.

The $900 million sum agreed for civil damages will be paid over the next 10 years to cover restoration projects in Alaska. $135 million has been earmarked to pay the costs of clean-up operations already carried out and for research.

Wareham oil

The first commercial production of oil from the Wareham oilfield in Dorset has started. Initial production is expected to be around 1,000 barrels each day, building up to 3,500 barrels a day by the beginning of this month, from reserves estimated at five million barrels.

Production is from the Bridport sandstone, at a depth of 2,800 feet, and is expected to continue for about 20 years. There is no significant amount of gas present in the crude oil.

Development work on the field cost £15.7 million.

The wellsites are linked by underground pipelines to the Wytch Farm gathering station at Wytch Heath.

LNG carriers

Gaz de France's naval engineering subsidiary, Gaz Transport, has won a $1.4 billion contract to build the tanks of five giant liquefied natural gas (LNG) carriers for Petronas, Malaysia's national gas and petroleum company.

Gaz Transport's special *Invar* membrane system will enable each tank to carry 130,000 cubic metres of gas. Four of the tankers will ship LNG to Japan, the fifth will transport to Taiwan.

Condensate

Simon Storage Group is to use its Immingham West Terminal to store condensate removed from gas brought ashore from the Amethyst gas field.

To enable the condensate to reach the terminal, British Gas built a new pipeline under the River Humber from its north bank Easington Terminal.

Wasted energy

A Watt Committee on Energy conference has highlighted that the UK industry is wasting vast quantities of energy which could be recovered and put to beneficial use. The results of a two-year study recommend the use of available advanced technology to use heat currently discarded from industrial and other processes.

New gas 'swops deal' for Quadrant

As a temporary arrangement, gas marketeer Quadrant is to buy North Sea supplies from Shell/Esso in a new 'swops deal' with British Gas which will expand the year-old-firm's industrial customer-base.

By releasing Shell and Esso from existing long-term purchase contracts over the next year, British Gas has given Quadrant the means to boost its supply to 150 million therms a year.

The new deal, which will last from May to September 1992, will allow Quadrant, itself a joint venture between Shell and Esso, a five-fold increase in sales to about 100 new customers. At present the company supplies 20 to 30 million therms to about 20 customers.

As part of the 'swops deal', Quadrant will then have to 'pay back' British Gas in kind over the next five to six years.

Quadrant's Managing Director, Fra Cooke, said: 'This additional supply is what we have been waiting for. With 12 months' experience behind us, we are well placed to expand. Our immediate aim is to bring on new customers as rapidly as possible and boost our sales of firm gas to over 150 million therms a year.'

After September 1992 any shortfalls in supply for Quadrant customers will come from Shell/Esso's Gannet and Kittiwake fields.

Because of the new supplies Quadrant hopes to expand into the Midlands as the gas lands at Bacton, Norfolk from the Barque and Clipper, West Leman, Sean and Indefatigable East fields.

Firefighters

Oil companies in the United Kingdom have been approached to provide trained staff to help fight the 500 or so oil installations currently ablaze in Kuwait.

The staff will be part of a fire brigade of 300 men and 60 fire appliances and support vehicles initially being assembled in Saudi Arabia by American construction firm Bechtel.

Bechtel plan to start training and building the team this month to support their 11,000 strong construction workforce contracted to rebuild the oil production facilities.

The brigade will be made up of 25 percent Third World personnel, with senior to junior level officers being drawn from the United Kingdom.

Contracts will be offered on terms between six months to two years on a rotation basis of six weeks in the Gulf and two weeks back in the United Kingdom.

The company hopes this opportunity would help firemen within the oil industry to improve their experience of fighting large-scale oil fires.

Kuwaiti officials estimate that they are losing approximately four million barrels a day because of the fires.

Many fires in the Saudi/Kuwait neutral zone will dry out due to lack of fuel. The northern Kuwait wells could burn indefinitely.

Sakhalin development

Soviet oilmen are seeking Western investors to help to develop the massive oil and gas fields off the coast of Sakhalin Island in the Soviet Union. During a visit to Aberdeen organised by the Scottish Development Agency, a delegation from the island said contracts worth more than $4.5 billion could be spent on developing the new oil, gas and condensate fields.

The four major fields — Odapto, Piltnvno-Astachskoy, Tchivo and Lunskoy — all lie in 30/45 metres of water 20 kms off the north-east coast and have combined proven reserves of approximately 2 billion cubic metres of gas, 630 million barrels of oil and 142 million barrels of condensate.

Mr Anatoly Cherny, Director General of Sakhalin Oil and Gas (right) pictured here with Dr David Curry, MD of the IDDTC and Interpreter Ivor Tolochim, said: 'The field development planned for Sakhalin Island is likely to require four ice resistant platforms, six pipelines to De Kastries and two liquid natural gas plants capable of handling 1.5 million tonnes each per year.'

The main problem facing the development was the harsh conditions. The Sea of Okhotsk has floating ice two metres thick which could exert pressures on equipment of up to 800 tonnes per square metre.

Euro Gas

A European consortium plans to develop a natural gas project in Portugal.

The consortium is made up of the following companies: Enagas (25.5%), Snam (25.5%), Petrogal (15%), Soponata (10%), Elf (10%), Banco Portugués do Investimento (1.5%), Bonança (1.5%), and Sacor Maritima (1%). The remaining 10% of capital shall be reserved for the Portuguese State.

The company which will be entrusted with the project will have to carry out a regasification terminal in Setúbal, a transmission gas pipeline, about 400 km long, from Setúbal to Braga and the supply and distribution of natural gas.

Pay deal

Offshore workers are to receive increases averaging over 10 per cent in their pay and benefits package this year.

Offshore contractors council member companies say typically a skilled offshore worker will now earn over £25,000 annually for 26 working weeks and 26 weeks leave.

Contamination

There is increasing evidence that groundwater is more vulnerable to contamination by pollutants than was previously thought, according to speakers at a conference in London.

The Conference called 'Contaminated Land — Policy Regulation and Technology' looked at the way the land could be reclaimed and the methods for developing a strategy to deal with the problems. Speakers also looked at the way contaminants were transported and the available technology which can be used to combat them.

Copies of the conference proceedings can be obtained from IBC Technical Services.

Gulf pollution — how bad is it?

By Dr Robin Pellew, Director, World Conservation Monitoring Centre

The Gulf War will cause major environmental effects that may be felt well beyond the boundaries of the countries involved. As King Hussein of Jordan warned, hostilities could result in an international environmental disaster affecting the land, sea and atmosphere.

Throughout the Gulf region and specifically the three countries of Kuwait, Iraq and Saudi Arabia there are a total of more than 3,650 animal species. Of these, some 50 are recognised internationally as being threatened with extinction. These include 20 species of bird, 20 mammal species, three reptiles, two fishes, four mollusc and one insect.

The Gulf itself constitutes an almost entirely closed body of shallow water, 1,000km long by 300km wide, with an average depth of just 35m. It is one of the most productive plankton water bodies in the world, but it is also regarded as being one of the most fragile and vulnerable marine ecosystems. Its low tidal displacement means that it has little discharge of its water into the Indian Ocean and thus little opportunity to flush out pollutants.

The spillage of large quantities of oil into this fertile but vulnerable marine environment is likely to create one of the worst marine ecological disasters to date. In size it dwarfs the *Exxon Valdez* spill in Alaska, and because of the biological richness of the Gulf waters it is likely to have much more serious ecological repercussions.

The intention of this article is to provide a more factual base to assess the implications of the oil spill and to identify priority areas for protection.

However, in interpreting this information, care must be taken not to overstate the ecological impacts. In particular, it must be appreciated that:

1. The Gulf is already possibly the most oil-polluted marine area in the world. Its ecology was already at risk from the discharging of ballast water, bilges and slop oil. Many sites therefore already show various stages of oil-induced degradation.
2. The Iran/Iraq war resulted in a total oil spillage of about two million barrels, about one-fifth the size of the current spill. This caused relatively modest ecological damage. The fishing industry was affected, as locally were coral reefs and Dugongs, but little obvious long-term damage occurred.
3. To call this 'the world's worst ecological disaster' is clearly unrealistic. It is likely to be the worst ever oil spill but on a global scale, compared to issues like the destruction of tropical forests or climate change, its effects are reversible. Unlike the forests, the species and habitats in the Gulf, if given the opportunity, will recover.

Saudi desalination plant intake.

There are several oil slicks in the coastal waters of Kuwait and Saudi making if difficult to determine the source without chemical analysis. The main areas of oil are:

- A strip of heavy oil that has either come ashore or is close inshore stretching some 200km down the Saudi coast from Khafji to the west coast of Abu 'Ali island. This probably originates from the discharge of 2.3 million barrels from the Mina al-Ahmadi Sea Island

One victim of the oil slick a Socotra cormorant.

Terminal, Kuwait on 18 January, supplemented by oil from ruptured storage tanks at Khafji.

- Patches of weathered oil and sheen off the Saudi coast, probably originating from the Mina al-Bakr terminal, Iraq, on 29 January. This 'new' off-shore slick, first recorded on 25 February by the US Coast Guard aerial survey and given high media coverage, comprises about 90 percent sheen and only 10 percent emulsified heavy oil. The total oil volume is about 29,000 barrels. It is unlikely to have a serious environmental impact.
- Numerous relatively small patches and strips of weathered oil and sheen off-shore Kuwait. There is a steady slow discharge from several sources, particularly around Bubiyan, in the northern Gulf of about 4–5,000 barrels per day. The extent of oil impact on the Kuwait coast is not known.

The anticlockwise circulation of the Gulf will spread the oil down the Saudi coast towards Bahrain and Qatar. It is difficult to predict how far it will reach but the high salinity of the Gulf waters is likely to keep it afloat for longer than other spills. The slick will also break up into patches as a result of wind and wave action, coming ashore at different places. The mudflats and salt marshes at the head of the Gulf around the Shatt al Arab waterway are not immediately threatened, and the Iranian coast is not likely to be extensively affected unless exceptional westerly winds disperse patches of oil.

Slick degradation

Experience from the oil discharges from Kharg Island and the Nowruz oil loading platform showed how difficult it is to predict the longer-term pattern of oil dispersal. As the slick degrades, it will break up into small patches, begin to emulsify and then sink. However, the high salinity means it is likely to float for longer unless mixed up by the continued action of the strong winds and waves.

The slick along the Saudi coast has shown virtually no movement for the last two weeks. It is now packed into Musallamiyah Bay, held by booms and sand barriers to the south of Abu'Ali — it is present as 'hundreds of acres of solid oil 5–6 inches deep'.

The most severely affected areas with heavy oil are Musallamiyah, Dawhat ad-Dafi, Ras al-Tanaquib, Manifa Bay, and the northern and western coast of Abu'Ali. Light spills and sheens are affecting Ras al Ghar, Saffaniyah, Mishab, Manifa and the area north of Jabail. The off-shore sheens will soon affect the coral islands of Harqus, Kurayn, and al-Jurayd, which are important turtle nesting beaches. Karan and Jana Island have already been oiled.

The effect on wildlife has been surprisingly light. One dolphin, one month dead, has been washed up: one hawksbill and two green turtles have been rescued: one dugong has been seen in the sheen, but there are no known mortalities.

Bird mortalities are estimated at 10–20,000, mainly off-shore sea birds especially socotra and great cormorant, great crested and black-necked grebes. In the last few days, a number of migratory species (mallard, shoveler, curlew, sandplover) have been found oiled: these are the early spring migrants, and numbers of oiled birds will increase with the arrival of passage migrants.

There are 294 birds undergoing treatment at the Jubail Rescue Centre (4 March) of which 114 have been cleaned. The daily rate of collection of oiled birds has fallen to 25 per day. The bird rescue work may be important symbolically but is irrelevant biologically. Beach surveys for fouled birds may actually increase mortality by causing birds to settle on oiled sea.

Smoke production

The predicted environmental effects of the land-based hostilities in the Gulf are already becoming manifest. The smoke clouds from the burning of the Kuwaiti oil installations will have a profound effect upon the marine and terrestrial ecosystems, agriculture, supplies of fresh water and food and human health.

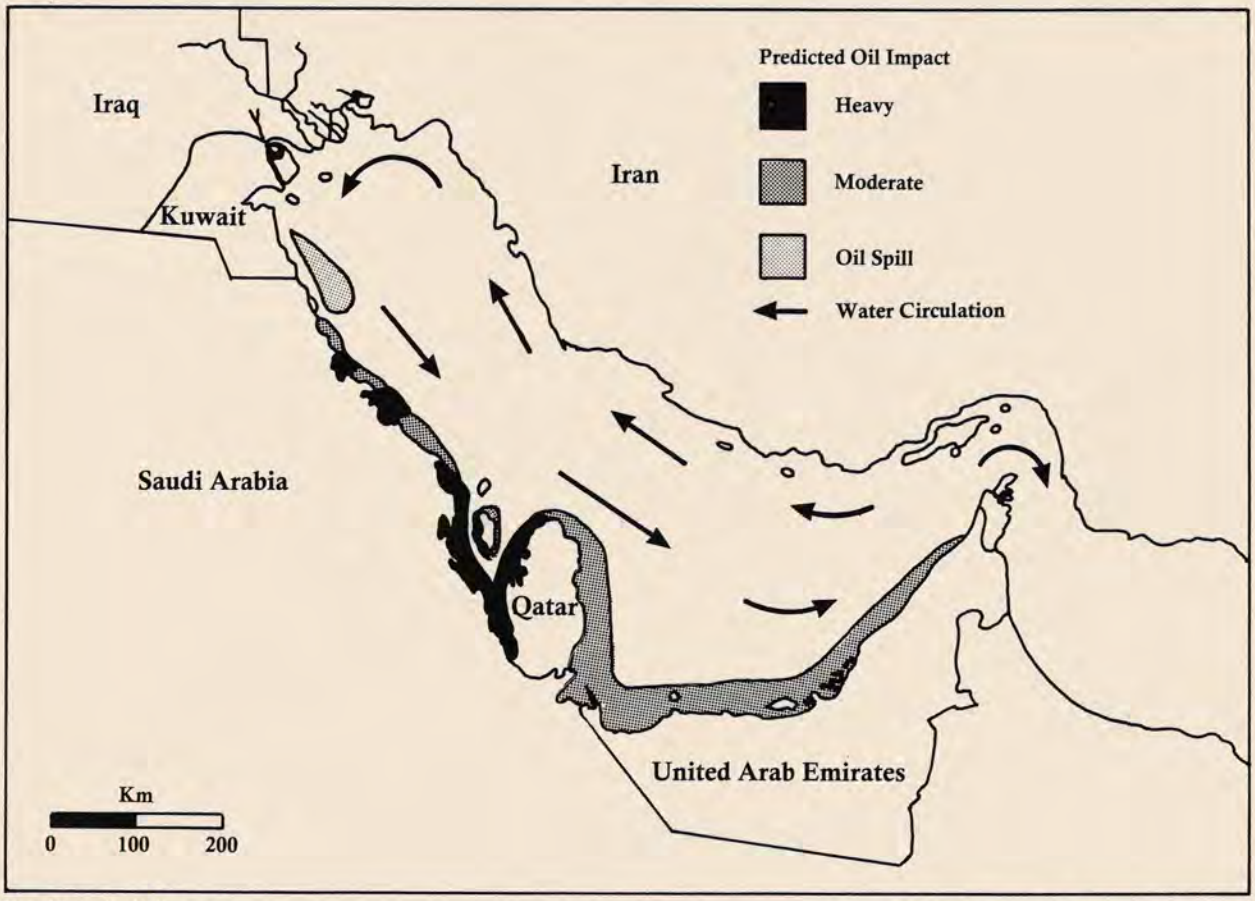
Kuwait has a total of 18 oilfields with 1,116 oil wells. Within the Neutral Zone between Kuwait and Saudi Arabia there are some 100 producing wells with the remainder located in Kuwait. Approximately 500 individual oil-related fires are now burning.

To produce a self-sustaining, long-term burn, the oil must naturally flow to the surface under its own subterranean pressure. Many Kuwaiti oil wells, particularly in the south, need pumping to bring up the oil. Many of the existing fires will therefore be burning surface storage tanks and well-head installations, and are unlikely to last for more than than a few days or weeks.

This currently is the major environmental problem in the Gulf. Some 650 oil fires are burning in Kuwait. The US Defence Department has sent in a

"The species and habitats in the Gulf, if given the opportunity, will recover"

The Saffaniyah/Manifa Bay and the Dawhat ad-Dafi/Musallamiyah/Abu 'Ali areas have extensive seagrass beds, mudflats and salt-marshes with patches of mangrove. Both areas had been proposed as conservation reserves: both have been seriously affected. There are no data about the impact on coral reefs, but some island reefs and off-shore platform reefs are likely to have been oiled.



Predicted oil impact

Source: World Conservation Monitoring Centre

team to identify fire sources, determine the fuel capacity and duration of each burn, estimate smoke volumes, and if possible to analyse the smoke chemistry. The survey is being impeded by unexploded mines and booby-traps. In the meanwhile there is not much hard data: Kuwait is still classed as a War Zone and overflights by non-military are banned.

The smoke cloud is relatively low with a ceiling of 10–15,000ft. This is not high enough to affect stratospheric climate circulation, so predictions of widescale disruptions of rainfall and monsoon patterns are exaggerated, but some local convection effects may already be causing unseasonal winds and rain.

UNEP-Global Resources Inventory Database (GRID) is gathering information and satellite images on the spread of the smoke — this is not yet available. Satellites have detected smoke 750 miles downwind of the war zone in Iran, and 'black rain' has been reported from southern Turkey 600 miles away.

Many of the wells in the Saudi/Kuwait Neutral Zone require pumping to bring the oil to the surface, and these fires have, or soon will, die through lack of fuel. The problem lies with the 500-odd wells in northern Kuwait that will produce a self-sustaining fire that could burn indefinitely.

The primary environmental concern is on the people and land immediately underneath the smoke cloud. This could cover hundreds of thousands of square kilometers of western and central Iran. The main effects could include:

- soot fallout — the soot itself is harmless but black rain frightens people: black snow can affect meltwaters
- acid rain — high sulphur levels in Kuwaiti crude
- phytochemical smog — respiratory problems in babies and the elderly chemical contamination — risk to drinking water and food supplied from hydrocarbon contamination
- reduced solar radiation — surface temperatures could fall by 5–10°C
- disruption of agriculture — spring growing season will be curtailed by low temperatures and sunlight, leading to problems of food production
- soil contamination — risk of contamination by heavy metals and other toxic materials: increased soil acidity.

Depending upon its scale, the smoke could seriously interrupt agricultural production, the productivity of marine and terrestrial ecosystems, and pose a hazard to human health. These cumulative factors will make the land under the smoke cloud unattractive for human habitation. If the fires persist for several months, people could migrate, distrupting socio-economic systems. This blighting of the land will extend well beyond the War Zone, affecting people in no way connected with the hostilities.

Long-term implications

In any warfare, the environment is the inevitable casualty. As Sir Shidrath Ramphal, President of IUCN, The World Conservation Union, stated, 'The environment is the foundation of human well-being and the devastation being wrought today will cast a long shadow over the future of all nations in the region. The more that the waters of the Gulf are polluted by oil, or its land areas are scarred by the other destructive influences of war, the greater the

human cost and the more difficult the work of reconstruction'.

i. Coastal and marine

The most obvious long-term effects will be on the marine and coastal ecosystems. The waters of the Gulf are some of the most productive in the world; the fishing industries are second only to oil in their economic importance. With little tidal discharge into the Indian Ocean, the Gulf is effectively a rich and fertile inland sea which is inextricably inter-related with the development and well-being of the people around its shores. The discharge of vast quantities of oil into this environment, and the potential threat of further releases of toxic chemicals, will have a major impact upon the ecological viability of the ecosystems and the range of human activities they support.

The extent of the impact depends upon the movement of the slick and the amounts of toxic materials discharged. The best scenario is for the slick to disperse in deeper water, kept by wind and current from coming ashore in the ecologically sensitive coastal areas. The worst scenario is that critical habitats such as saltmarshes, mudflats, coral reefs and seagrass beds become heavily coated in oil and that further releases of highly toxic chemicals result in the death of marine life. The eggs and larvae of marine invertebrates are very sensitive to the effects of pollution, so further discharges are likely to severely disrupt the productivity of the marine ecosystems and the fisheries they support.

ii. Terrestrial

On land, the direct consequences within the war zone are likely to be less severe. Apart from the local saltmarshes, sabkas and wadis, which may recover with time, the conservation value of the desert steppe is limited. The most obvious effect is visual for the physical scarring of the surface terrain by tracked vehicles may take decades to recover. However, some disturbance to the steppe may actually be beneficial by increasing the vegetation cover, especially where a previously compact surface has been broken up. Deep ruts may channel moisture and run-off, encouraging the colonisation of desert shrubs. Bomb craters may trap water, creating a greater diversity of habitats.

This recovery of the vegetation may be further encouraged by the presence of uncleared mines and other ordinance which will deter nomadic livestock grazing and hunting parties. Small-bodied animals like dorcas gazelle are too light to trigger landmines, although large livestock such as camels and Arabian gazelle will need to be excluded from mined areas. Comparable desert areas in Sinai have shown how quick the response to restore vegetation can be when human influences are excluded. In the post-war period, these areas are likely to gain both through an increased vegetation cover and through a reduced level of human exploitation.

iii. Atmosphere

It is difficult to predict the long-term effects upon the atmosphere as much will depend upon the volume of the smoke produced. Extensive oil fires may burn for months and will severely disrupt agriculture and the productivity of marine and terrestrial ecosystems. Reduced solar radiation may cause temperatures to fall by 10–15°C, which, with chemical fallout, could make the land under the smoke cloud undesirable for human habitation.

Increased soil acidity and possible heavy metal contamination could have long-term effects on agricultural yields and natural vegetation communities. Contamination of drinking water and food supplies with carcinogenic and other toxic substances could affect the health of current and future generations. Aquatic ecosystems are particularly vulnerable to environmental contamination with toxic materials becoming concentrated in the food-chains, with serious repercussions for fisheries.

The carbon dioxide and other chemicals generated by the burning oil will contribute to the 'greenhouse effect' and climate change. Long-term effects upon regional climate circulation patterns cannot be predicted with any certainty, although the volumes of smoke from the firing of onshore Kuwaiti oil facilities are likely to have only short-term localized effects upon rainfall patterns. Of greater concern is the direct effect upon wildlife, food production and human health in the areas in the shadow of the smoke cloud. ■

Acknowledgement

The photographs accompanying this article are part of a filmed record of the ecological impact of the Gulf War by Michael McKinnon which will be shown on television in both the United Kingdom and the United States and will also appear in a book co-written by Dr Peter Vine.

Co-ordinating the Gulf clean-up

By Mark Scruton

The International Maritime Organization (IMO), the London-based agency of the United Nations responsible for maritime safety and the prevention of pollution from ships, is the co-ordinator of a worldwide bid to help the Saudi Arabian authorities and other Gulf countries to clean up the oil spill now threatening their shores.

Despite a lack of proper funding the IMO brought forward plans devised at a convention last November to deal with just such an eventuality. The first step was the immediate set up of a co-ordination centre to act as a focal point for assistance offered by IMO member states to the Gulf states.

In addition to the centre, the IMO has also set up an international fund to help finance the clean up. The money will be used to buy equipment and services in addition to the help already offered by individual member states to tackle the disaster.

It was because of the worst-ever oil spill after the Iraqis poured millions of barrels of Kuwaiti oil into the Gulf that the IMO went into operation straight away.

'It was felt that the quicker it was dealt with, the quicker it would be cleaned up,' said Mr Roger Kohn, an IMO spokesman.

The organisation of this fund was left to the Secretary General.

'Normally it can only come into force after 15 countries have ratified it. This takes time, because the ratification process needs some form of parliamentary action by member states.'

But he said a resolution was passed in November to implement the convention as soon as possible. It was because they knew of the resolution that a lot of countries contacted the IMO to offer assistance following the start of the slick, and other member states asked for assistance.

The Secretary General of the IMO, Mr William O'Neil, said: 'During the last 10 years or so the measures that have been adopted by the IMO and its 134 member states have led to a remarkable reduction in the amount of oil pollution generated by shipping activities. Nevertheless, it was realised that one area where more could be done was in improving the international system for responding to major marine pollution disasters.'

Mr Kohn said: 'We decided to go ahead and act as though the convention was already in force. But we did not have any money.'

Financial problems

The cleaning of beaches and other areas which have been damaged is likely to be a lengthy and expensive process and the IMO-led operations have so far been restricted because of the shortage of money.

'A lot of oil has gone into inlets and coves on the coast, so we have got a situation where it can be scooped up. But there are cash flow problems. In Kuwait and Saudi Arabia a lot of money has been spent on the war effort, so there is very little left over to spend on the clean up operation.'

Kuwait and Saudi Arabia are not the only countries threatened by the slick. Because of the anti-clockwise current which occurs in the Gulf all the coastal states could be affected.

'Bahrain is next in line, it has some slicks out at sea already and we expect Qatar could be affected too, he said.

Other countries like the United Arab Emirates are also concerned and Iran has already requested help from the IMO to deal with the slick.

International fund

The call for the establishment of an international fund followed discussions between the member states. Mr O'Neil said: 'Although no firm figures have been agreed we are confident that an international fund operated under the auspices of the IMO would attract substantial contributions from governments, industry and other sources and complement efforts already being made in the Gulf. It is vital that international assistance is provided immediately if the operation is to be successful and we believe that once a fund is established many more countries will be anxious to participate.'

It was the UK government which was the first member country to come up with a firm offer, announcing that it will contribute a £1 million.

'This money is the first contribution and will be used to prime the pump', said Mr Kohn.

Help towards the fund does not just have to be in the form of cash. 'If governments are willing to offer training we would be happy to accept that as well as any equipment that is available,' he said.

The convention

The plans for the centre were just the latest of a long list of moves by the IMO to develop a wide range of measures to combat pollution. The driving force behind the move was the International Convention on Oil Pollution Preparedness, Response and Co-operation which met last November.

The idea for a treaty was triggered by the *Exxon Valdez* oil spill which showed that there was a great need for an international system to deal with the tremendous ecological and environmental problems caused by such a disaster.

There were fears that facilities available outside the United States were not of the same standard and

would be unable to cope as well in the event of a similar incident.

'It was one of the biggest conferences ever held, over 90 countries attended, showing how important the countries regarded the problem,' said Mr Kohn.

The convention set up contingency plans, either for individual countries or for groups of countries to combat pollution. It was envisaged that the IMO would play a co-ordinating role within this framework.

Reaction so far

But such was the scale of the Gulf oil spill that immediately after 21 January the centre began operating 24 hours a day to cope with telephone messages of assistance from all over the world.

Because the IMO was very stretched financially a number of governments immediately offered help and staff. The French Ministére de la Mer, the United States Coast Guard, Japanese Maritime Defence Agency and Britain's Department of Transport, all seconded experts to the team.

Within days the new centre, established on the sixth floor of the IMO's Albert Embankment building, grew so large that a partition had to be ripped down to accommodate all the staff and equipment.

Under the direction of the centre's head David Pascoe, a television was installed and tuned to the Cable Network News station (CNN) to keep abreast of the latest information about the Gulf spill. Computers, fax machines and telephones were also brought in.

According to Mr Kohn, the role of the centre is to act as an administrative clearing house, acquiring information about help available and matching that with information about help required. The primary idea is for the centre to catalyze action.

'It is much easier to do it with the IMO acting as the responsible body rather than to leave it to the individual countries in the Gulf. There could be 15 countries all offering help at the same time, and only one person answering the phone,' said Mr Kohn.

At the centre all enquiries are placed on a computer database. On it is recorded the names of countries, companies and organisations offering to help as well as the costs, and a price list of the services and equipment offered.

Cost is an important factor in the centre's efforts. 'There is not much point having a well barge that can clear a kilometre an hour if it costs £20 million per day,' said Mr Kohn.

British companies enquiring are then referred to the UK's own Marine Pollution Control Unit, while overseas companies are referred to their national governments.

Commander David Pascoe

The operation

Among one of the centre's first tasks was to send out circulars to member governments, asking them exactly what equipment they have available.

Mr Kohn said: 'A lot of equipment was sent out to the Gulf and, as a result, desalination plants and key installations were protected. But now the war has stopped, we anticipate a lack of equipment to tackle the clean up operation.'

This help can come in many forms. A lot of countries have already sent out teams of experts, the United States sent out a team to Saudi Arabia from its Environmental Protection Agency, the Canadians sent another to Bahrain. There IMO's Gulf-based liaison officer, Colin Hendry, informs the centre about developments.

The UK Oil Spill Centre has also been active offering assistance, including a whole plane full of equipment, almost as soon as the slick was announced.

Long-term plans

Most of the countries likely to be affected by the oil spill met in Bahrain at the end of February, at the initiative of Dr Badria Al-Awadi, the technical and administrative co-ordinator of the Regional Organisation for the Protection of the Marine Environment. Commander Pascoe was present in the Gulf, not only to attend the meeting, but to assess the situation for himself.

At that meeting Dr Abdulbar Al-Gain, President of Saudi Arabia's Meterological and Environmental Protection Agency (MEPA) said the latest estimates of the oil spill range from 500,000 to three million barrels. Analysis of aerial remote sensing data suggest an estimate of two million barrels.

Although the key installations are now protected, the massive oil slick still poses a threat, as it floats southwards along the Arabian side of the Gulf. Experts claim it will take a long time before it can be totally cleared up.

According to Mr Kohn, some of the slicks are 50 kms off the coast, and have split up into streaks of light and heavy oil, with the heavier concentrations on the coast.

Future plans

So far the centre has been able to perform its task well, and morale in the team is high, something which augers well for the future.

Mrs Aloma White, at the centre said: 'It has gone extremely well, we have got a good team, we all like each other and all help each other out.'

Part of the success so far has been due to the dedication of Commander Pascoe. 'Until he went to the Gulf last week, Commander Pascoe has been here all the time — from seven in the morning till seven at night, and at weekends — He's the driving force behind us, she said.

Once the spill has been cleaned up the staff of the centre will be downgraded. Mr Kohn said: 'Normally the centre will only have two to three people and a couple of secretaries, but in times of crisis we can draft people in.'

But he is confident it has shown its worth in facing a situation as daunting as this. 'We have shown this thing can be done, and it is very much needed,' he said. All they — and the Gulf — need now is money . . . ■

Tintagel excavations

Tintagel, the area most associated with the legend of King Arthur, was the site last year of a Mobil sponsored archaeological dig.

The dig celebrated the bringing on stream of the gas field Camelot in 1989 — the first of a number of Mobil developments to be associated with King Arthur.

The ancient churchyard opposite Tintagel's ruined castle on the North coast of Cornwall, with its mysterious mounds and slate-lined graves, was the site chosen.

The excavations were carried out over a four-week period during Spring 1990 under the direction of Professor Charles Thomas of the Institute of Cornish Studies and Jacqueline Nowakowski of the Cornwall Archaeological Unit.

Their aim was to investigate the churchyard as a site of early Christian activity and the project focused on a mound previously excavated by the local vicar and his group of volunteers in the summer of 1942.

The excavations have revealed two mound graves that could well be unique in Britain indicating that Tintagel was of national or regional importance. Pottery of Mediterranean type was also discovered which suggests international trade.

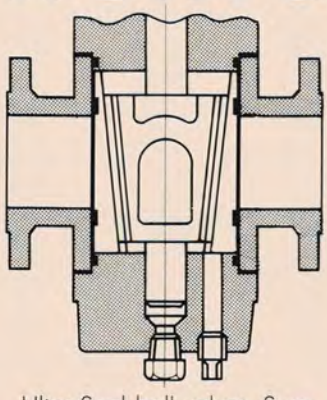
During the 5th to 7th centuries AD, the churchyard appears to have been the focus for intensive early Christian burial, making it one of the very few places in Britain and Ireland where details, dates and external influences can be archaeologically explored or confirmed.

Looking down on Tintagel church where the burial mounds lie clustered around the church. Tintagel island lies in the background. (©CAU 1990, Adam Sharpe)

For the sponsorship of the Tintagel excavations Mobil North Sea have won a Thames Television British Archaeology Award for the best sponsorship of Archaeology in 1990. A full report of the excavations carried out last year is available from Mobil North Sea who have agreed to sponsor a further excavation this year. ■

Jane Thompson

A Double Block and Bleed Thoroughbred from a Famous Stable



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OPEC: the turning point

By John Toalster and Irene Himona, SGST Securities

It is becoming increasingly apparent that a new era has dawned at OPEC and we can visualise a future for the oil industry which is markedly different from the extrapolative expectations of the fashionable breed of 'oil price optimists' of 1989/90. The new critical element in the equation is the volte-face by Saudi Arabia from its supportive role within OPEC, as manifested during the difficult years of 1979 through to 1985, to a more determined stance, characterised by an aggressive assertion of the interests of the Kingdom. Thus, the real turning-point for OPEC can be dated to mid-1985 and we are now seeing clearly, for the first time, the full manifestation and implications of the new egocentric, Saudi Arabian strategy.

This major transformation has evolved, gradually at first but latterly at a rapidly growing rate, to such an extent that it would be fair to state that the Kingdom has exceeded the bounds of reasonable self-interest. There is likely to be a backlash amongst other members of OPEC and the scramble to add productive capacity in several countries should be viewed in the context of the need to protect one's own interests in an oil producing world noticeably lacking in goodwill, compromise and co-operation.

Whilst it is not possible to state with any precision the desired oil price target of the Kingdom, partly because it appears to be subject to fluctuation depending upon political circumstances in the region and the world at large, it is possible to detect an underlying and continuing, moderating influence compared with the hawkish desires and expectations of certain other OPEC members. Thus, it would not be unreasonable to deduce that Saudi Arabia favours an oil price moderately lower than the $21 a barrel target price agreed at the OPEC meeting in July last year. Subjectively, as a guide, an oil price target for the OPEC basket of around $18–19 a barrel may not be too wide of the mark.

The world of *realpolitik* has emerged rapidly in the oil market having been so conspicuously successful in the Gulf war. Accordingly, we see an underlying weakness in crude oil prices and oil shares as and when observers realise that new and powerful forces are at work in the international oil market.

The new perspective

The 1979/80 oil price did not meet with Saudi approval; nevertheless, they supported OPEC and simultaneously acted as a moderating influence on oil price hawks. The Kingdom acquired substantial revenue and it could easily afford to be relatively magnanimous as far as its production was concerned. Indeed, benefits were derived from the adoption of this accommodating attitude with gratitude being felt and expressed by other member states. The Saudi share of OPEC production of both crude oil, natural gas liquids and condensate declined from 37·4 percent in 1980 to an average of 21·5 percent in 1985 touching a low point of under 15 percent in mid-1985. When this stage was reached, the mood inside the country changed. Its patience had been exhausted and in its view, its support for OPEC was not only being taken for granted, but was being exploited.

The reaction witnessed the implementation of netback deals followed shortly afterwards by the inevitable and spectacular collapse of the world oil market and the demise of Sheikh Ahmed Zaki Yamani as oil minister in late-1986. Subsequently, Saudi Arabia became more aware of its own interests and rejected unequivocally the role of swing producer. The Saudi share of OPEC output rose steadily to 26·91 percent in 1990 and the latest data suggest that by February 1991 it had risen to 33·22 percent. Following the OPEC meeting in Geneva last month, it is likely that Saudi Arabia will continue to produce around one-third of the OPEC total in the foreseeable future. Under no stretch of the imagination can this be considered to be fair to other and considerably poorer OPEC members and it represents an about-turn from the excessively accommodative stance of 1985.

To rub salt into the wound, Saudi Arabia plans to raise productive capacity to 11–12 million b/d within a few years to ensure sustainable output of 10 million b/d. Undoubtedly, this will provoke a similar response amongst OPEC members with the potential to grow. Hence, the scene is set for a thinly disguised battle for market share. Beware!

The response

Overall OPEC capacity is planned to increase from some 24 million b/d currently, to nearly 32 million b/d by 1992 and to a massive 38 million b/d by 1995, according to the latest estimates by SGST Securities. Capacity will therefore rise by 50 percent or by some 14 million b/d in four years, which on average represents annual growth of 3.5 million b/d. This rate of expansion will be around four times the annual growth rate in oil demand in recent years.

Obviously, there is no way that oil demand can keep pace and thus the immediate conclusion is that by 1995 — and even 1992 — substantial excess capacity will develop, which is the

Saudi share of OPEC production 1980–91 (million b/d)

	1980	1985	1990	1991
Saudi Arabia[2]	10.26	3.74	6.70	8.40
OPEC total[1]	27.45	17.34	24.90	25.29
Saudi share %	37.38	21.54	26.91	33.22

Note 1: OPEC production includes natural gas liquids and condensate amounting to approximately 1.9 million b/d for OPEC and 0.25 million b/d for Saudi Arabia, in addition to crude oil output.
2: Includes the half share of the neutral zone between Kuwait and Saudi Arabia.

exact opposite of the current situation. Indeed, it is precisely the current position, with Saudi Arabia changing its accommodating, moderating stance, that dictates to the rest of OPEC the need to raise capacity, if only to ensure that they retain some power to control the oil market.

According to our estimates, every OPEC member apart from Indonesia will raise their capacity, the most striking increase being the 42 percent rise of Iran. Bullish commentators will, no doubt, argue that the capacity expansion is necessary in anticipation of the day when OPEC will be in the driver's seat, as rising demand and flat or even falling non-OPEC supply makes the group dominant. Hope springs eternal — it is worth remembering that such expectations have been with us since the early 1980s. A decade of mistakes should persuade even the most bullish of observers to change their stance, at least eventually, and face reality.

Conclusion

With the prospect looming up, within the next one to two years, of a renewed struggle for market share akin to the disastrous experience of early 1986 when the oil price collapsed, confidence in the oil market is likely to ebb away. When this happens, investment plans will be trimmed back with upstream operations bearing the brunt of the readjustment process. Exploratory drilling is expected to decline and take over activity curtailed until the stock-market rating of upstream companies falls to a level reflecting a substantial discount to realisable asset values.

Expansions in OPEC productive capacity of up to 50 percent in the next four years, coupled with the possible stabilisation in Soviet oil exports, following a prolonged period of decline, with weak worldwide oil demand attributable to a combination of sluggish economic growth and renewed emphasis on conservation, create a far from optimistic backcloth to the international oil industry. The depressing truth is that we may be needing another political crisis to breathe life into the oil market. ■

Bulk storage independents face tough times

By Mark Scruton

There are tough times ahead for the UK independent bulk storage market, according to Mr Peter Rendall, Simon Storage's Director of Marketing.

Despite an increase in stock holding at the start of the Gulf War, the industry will now have to look very carefully at the supply situation in the post-war period.

The 'tough times' UK scenario did not happen overnight. For the past five years the market has shrunk by about 10 percent with the result that traditional areas of bulk storage handled by the independents have been gradually eroded away.

But it is not all 'doom and gloom', for Mr Rendall says that as the traditional areas have disappeared other equally important markets have sprung up and he claims the way to face the challenges ahead is to become leaner, greener and to diversify.

'The Gulf crisis caused the oil industry to think very hard about the short and medium supply situation; it made the situation more dynamic but it didn't significantly change our operating policy,' he said.

'Certainly when the crisis started there was an increase in stock holding, but thereafter, in our experience, although activity was high — a function of the cold winter — there were no abnormalities.'

Market change

But he said now the war is over, the market will change.

'First of all the oil stocks market is going to get tougher. The oil companies will prefer to handle their own products, which means in terms of petroleum product it will get harder rather than easier for us to stay in the game,' he said.

Where the independents might benefit is by the oil companies targeting the right yield out of a barrel, so storing products and feedstock with independents if necessary.

In another traditional area, Mr Rendall claims fuel oil storage is fast disappearing.

'Over the last five years the fuel oil market has progressively fallen away. In fact it has almost become a speciality product,' he said.

Mr Rendall is backed up by figures from the United Kingdom Petroleum Industry Association (UKPIA) which show a nationwide drop in consumption in fuel oil of more than 25 percent during that period. (Britain consumed 15,978,778 tonnes of fuel oil in 1985, compared with only 11,802,384 tonnes in 1990.)

But as fuel oil becomes a less important feature of the UK refined production consumption mix, there are other markets which are becoming increasingly significant because of environmental issues.

Green issues

'There is a general trend towards the storage of unleaded petrol, both regular and premium,' he said.

UKPIA figures show that consumption of all types of unleaded petrol in Britain almost doubled last year from 4,647,861 tonnes in 1989 to 7,807,230 tonnes in 1990.

Simon Storage believes it will benefit the independents if they become 'greener', more flexible and concentrate on service quality.

'We are very aware of the environmental issues. To that end we, at Simon Storage, have put in a significant amount of money into floating decks, vapour recovery and road loading improvements,' he said.

Simon Storage also sees a trend towards the increasing storage of 'white' products which need a lot of specialised expertise to look after.

'We are concentrating more on gasoline and jet and aviation fuel, high value areas where stock management techniques are particularly important,' he said.

Gasoline consumption in the United Kingdom has increased by 16 percent since 1985 and jetav by almost 25 percent during the same period.

Simon Storage is also 'diversifying' into a new growth area, the management of fuel distribution operations.

Although this is, at present, only a small part of their business Simon Storage thinks it has great potential.

'We have some airport into plane activities, together with the management of a part of the government owned pipeline system; recently Simon Storage were awarded a contract to manage an onshore crude oil production facility in the south of England,' he said.

Conclusion

So although Mr Rendall is aware that the long-term future of the independent bulk storage market could be tough, he is still optimistic.

The way ahead for independent companies, in his view, is to store and look after an even wider range of more specialised products, with the trend towards 'white' and 'speciality' products rather than 'black' in the petroleum products market.

'As the market gets tougher, the independents will also need to have a balance of product storage from edible oils to chemicals,' he said.

They will also need to become more environmentally aware and invest in the latest 'green' technology to prove attractive to potential customers. ■

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A firefighter's approach to the Gulf

By Iain Lundy

In common with the rest of the world, Neal Adams watched in shocked disbelief the systematic destruction of a great part of the Kuwaiti oil industry. As the scale of the devastation and the enormity of the environmental implications became obvious, thoughts turned to bringing the situation under control. Scores of Kuwaiti oil wells had been set ablaze as part of President Saddam Hussein's 'scorched earth' policy, the thick black smoke blotted out the sun along miles of Gulf coastline and the world's largest-ever oil slick was causing ecological havoc.

Mr Adams knew that, at some stage, he was going to be part of the relief effort. For almost four years now he has been heading up his own team of blowout specialists, rig firefighters of the type made famous by Red Adair. So as he watched the depressing television pictures in his Aberdeen hotel room at the beginning of February — he has spent the past 12 months in Aberdeen at the *Ocean Odyssey* inquiry — was he relishing the prospect of tackling such an awesome assignment? And did he think the Gulf environment would ever recover?

In rather typical American style, he shrugged his shoulders and said, 'It's going to be a big job. We may never know how many wells are on fire. We'll just have to go in there and start putting them out'.

His views on the environmental damage were equally matter-of-fact and — amid the almost hysterical pronouncements of the many doom and gloom merchants — somewhat surprising. He said, 'I truthfully don't think the effect on the environment will be quite as great as we anticipate. I think the pollution issue is going to be a good test . . .. We'll just see how the environment handles its own problems. We've got a situation here where we have a monster oil slick — the largest the world has ever seen — and we can't do anything about it because of the war so this will be the first full-scale test we've had to see if that oil slick will dissipate of its own accord.'

He agreed that it is a dreadful way to test the environment but pointed to the shortcomings of conventional methods of dealing with slicks. Skimmers are only partially effective because they skim only a portion of any given slick, and world governments have placed restrictions on the use of chemicals to disperse the oil into tiny droplets. He said, 'There are many people who say that, since skimmers aren't very effective, and since we're not allowed to put dispersants on in time to be effective, then we think that Mother Nature will just take care of herself. In this situation I guess we're running a full-scale test just to see what will happen.'

Gulf problems

Most offshore firefighters, he felt, will be in the Gulf at some stage during the next few months trying to undo the damage. When they arrive there, they will have to contend, not only with the sheer scale of the devastation but also with a variety of other problems.

One of the biggest difficulties is going to be the fact that the fire-fighting work will be going on during the Kuwaiti summer. He said, 'It's quite commonly 125°F during the day and that hot air burns your lungs and makes it difficult to work, so I think we're just going to have to rotate crews in and out. If you're there more than a month it's going to be very, very tough.'

The actual capping of the wells will be more straightforward than most people think, and will be a case of simply taking one at a time, but there are going to be problems, he said.

'The big problem will be getting all the machinery in that you need to cap each well and, at the end of the day, there will be a fraction of the wells that can't be capped. Then there will have to be a relief well drilled. There are no relief well rigs so those will all have to be transported in and that's going to be a problem in itself.'

'I don't think the effect on the environment will be quite as great as we anticipate'

However, he made the point that the Kuwaiti wells are typically high-producing wells, so it will not need too many back on stream before the industry is back in business. But that, he said, is the easy part.

'They still have to get the refineries working — they have to re-build them

and the loading facilities to get the oil offshore and that's going to take some time. As for some of the other problems, not only are we dealing with an industry in Kuwait that's going to have to be rebuilt — a whole country — but after all the sorties by the coalition air force, there's going to have to be a new industry rebuilt in Iraq.'

'Those two countries are probably going to be like a big sponge with respect to all industrial capability in the world. There are some forward-looking people now who are becoming concerned that the world will be stripped of its industrial capability because of what's going to have to go into the Middle East.'

'All of Kuwait and a greater part of Iraq will have to be rebuilt and people have concerns right now about oilwell firefighters. If they all go to Kuwait, then who is going to handle the rest of the problems throughout the world, such as here in the North Sea? It's all going to have a lot of impact worldwide.'

New generation

Neal Adams is in a tight-knit and extremely tough business. Some would call those in his profession an elite band, whose job has a fair degree of romance associated with it. He himself describes it differently: 'It's just a routine analysis of problems . . . finding a routine solution to these problems . . . helping people out of a bad situation.'

Comparisons with the John Wayne portrayal of Red Adair are inevitable, particularly as Mr Adams comes across as a softly-spoken, studious man. So are he and others like him slowly replacing the old-style, stereotyped, larger-than-life trouble-shooters?

The short answer is 'Yes'. The next oldest is 64-year old Boots Hansen, of Boots and Coots. Red Adair is now 75 and Adams sees himself, at 41, as representing the younger generation with a stronger technical background than the old stagers. 'Up until 1978 there was only one company and that was the Red Adair company. Boots and Coots spun off and now we see quite a few more spin-offs as technology changes.'

'People became aware that well control and blowout control is not a Hollywood problem, but something that is manageable. You just use common sense and good practice to handle the situation. The Red Adair style is disappearing a little bit because the oilfield that Red Adair grew up in is changing. It's becoming much more technical now. Instead of the West Texas cowboy type of oilfield, it's becoming a much more technically complex business so you have to change with the times.'

Neal Adams

He sees his participation in the *Ocean Odyssey* inquiry — as a technical adviser to Shaffer Inc — as an example of how his company is looking to the future and trying to discover how the mistakes of the past can be used to enhance operations in the future.

His company, Neal Adams Firefighters, is currently involved in the management of a joint industry programme entitled 'Floating Vessel Blowout Control', developing new technology or refining existing technology for offshore blowout control. The project will cost in the region of $500,000 and is being funded by Exxon, Shell, Amoco, Mobil, Phillips and a number of other oil companies, as well as the Norwegian, British, US and Canadian governments. The aim of the programme is to develop new technology in three principal areas. Firstly, relief well drilling, particularly for semi-submersibles. Secondly, the technique known as vertical intervention where a rig is moved directly over a large blowout in about 400ft of water. Thirdly, underwater pollution control.

Mr Adams is pleased with the progress of the project and is optimistic that the work will be complete by the end of the summer.

Evacuation procedures

One aspect of offshore safety he feels more strongly about than any other is evacuation in an emergency and his company are inviting the industry to take a serious look at the problems posed by evacuation procedures.

'One point now that's real obvious to us is Piper Alpha. Lord Cullen agreed that evacuation is a problem and what evacuation guidelines should have been, not what was implemented but what they should have been. The gentleman killed on *Ocean Odyssey* was an evacuation issue. The Enchova platform in Brazil where there were 35 or 36 men killed, that was an evacuation issue. Very seldom is there someone killed as a direct result of an explosion. It's generally getting off the platform where the problems occur.'

He was part of the team who helped to control the Piper Alpha well after the disaster. 'Piper Alpha shook the whole world. It was the largest single industrial accident ever, not only in the petroleum industry but worldwide and it shook the world,' he said. 'One of the reasons it did — other than just the obvious tragedy of so many individuals being killed in such a fiery death — is that the North Sea is clearly the technical capital of the world, it has been for about 15 years, and whatever happens in the North Sea sends shockwaves round the world. When something like Piper Alpha occurs, not just the event itself but Lord Cullen's report will have major impact worldwide on safety procedures.'

'Those two countries are probably going to be like a big sponge with respect to all industrial capability in the world'

The North Sea, he insists, has overtaken the Gulf of Mexico as the oil world's technical capital, chiefly because of the environmental regulations, the high cost of the wells, the different working environments, and the advance of technology.

'One thing, it's expensive to drill here so that a few pounds or a few dollars spent on technology development is a very small price compared to what has to be paid for the equipment and the operation itself, so we can afford in the North Sea to be able to do some of the high technology work,' he said. 'It also saves us money at the end of the day to do the technology development. We'll find shorter, faster, more efficient ways of getting things done.' ■

US energy policy — a view from abroad

By Robert B. Horton, Chairman, The British Petroleum Company

In my talk, I'll make various points building on three of my personal beliefs:

- Carrying out US energy strategy on a national scale is not confined to that . . . in fact it involves an international effort.
- Achieving greater diversity — and therefore security and affordability — of oil supply requires government effort to encourage both investment and trade.
- In the wake of the Gulf War, we will have an opportunity to create new international trade relationships, including energy trade.

I'm very glad that the administration talks about energy 'strategy', rather than energy 'policy'. We avoid a lot of political debate this way, including the argument over whether the United States has had an energy policy by default.

For this viewer from abroad, at any rate, that question does not matter.

What matters is America's specific energy aims; the strategies to reach them and the tactics to support those strategies.

The White House was wise to stress the word 'balance' in its strategic document. I cannot think of a single energy issue which operates in a vacuum — with absolutely no fallout on the rest of American life. So balance is important — because every approach will create adverse side-effects elsewhere. If we do not face that fact with honesty, we will not get far.

Moreover, we simply cannot avoid the fact that almost everything in America — including energy — is crucial to the rest of the world. It isn't merely that whenever America sneezes, the world catches cold: some parts catch pneumonia.

You won't find me a merchant of gloom when I talk about oil.

One thing we know is that the world is not running out of petroleum. It is a matter of geological distribution, not of total supply.

Of course saying that does not help the United States as its domestic oil production falls and its imports rise. There is no way for the United States to regain energy independence. It will not happen. When we talk about breakthrough in new energy technologies — the stuff of science fiction — we must remember that using them will also require a brand new industrial and manufacturing infrastructure. Nothing, in a phrase, will eliminate the need for oil for years and years to come.

And since this is the case — since the United States will be importing much of its fuel no matter what — the Bush/Watkins strategies seem very reasonable to me. Who can argue with the basic goals, which I understand to be:

- To encourage ample supplies of energy at a reasonable price.
- To discourage excessive demand without wrecking the economy.
- To promote continuing research and development of promising energy technologies.
- To seek all of these goals in the context of improving the environment.

Scores of specific strategies back each part of this approach. The proof of the pudding will be in the eating. But even as imports rise to about half of all the oil consumed in America, imported oil still amounts to only 18 percent of total US energy use. Keep that thought in mind when things look dark.

Here is another comforting thought. Do not be dismayed, automatically, over importing oil. It is true that the US imports more, in tonnage terms, than any other nation. But the huge demand may be a strength and not a weakness. Consider the usual relationship between any supplier and its more important customer — the customer nearly always calls the tune in the end.

No one is a stronger supporter than I am of every nation developing all the domestic energy sources it can. Nevertheless, I submit that stability of oil price and security of oil supply are even more important to an economy than domestic production, particularly when US domestic production costs more per barrel than production from Saudi Arabia.

Having to import oil does not mean that America must import all its oil from a single source. The world will always be full of risky places.

Even if the world, and the Middle East in particular, is wise enough to grasp the opportunity which the peace will offer, I suspect that the Middle East will continue to be a dangerous place, and no one can foresee a time when this will not be so. Thus, the more oil the United States can procure from outside the Middle East, the easier Americans may feel.

Additional sources

The great Russian oil provinces offer immense opportunity for additional

sources of supply. But there are obvious drawbacks for America there. Who am I to talk of the current political state of the Soviet Union? So I'll stick to oil industry ramifications.

Despite considerable enthusiasm on the part of Western oilmen for the prospects there, it takes a long while to get protocols signed — let alone work actually started. Once at that stage, I am sure we will have to allow for extensive delays and bottlenecks before we complete projects. And, of course, from a US point of view (and I don't talk of US international oil companies), the primary Soviet export markets for oil must be Europe.

With many pipelines in place, the Soviets can sell their oil more profitably closer to home.

But precisely why the Soviet Union is not a particularly likely source of new US oil supply, points clearly to where a likely source would be.

If you cannot get all your oil at home, then get it close to home. For you in the United States, this means the Western hemisphere — particularly Canada, Mexico, Venezuela, Colombia, Peru and just possibly, in the next century Brazil.

Caribou stampede in Alaska

But it is not a coincidence that in every important country in Latin America, there is now a democratic government committed to market-oriented economic reform. Some of these nations have gone farther than others, while some of these are important from the view of oil production and oil exports.

Colombia, already open to foreign investment and already democratic, is gaining market stability despite its well-publicised problems. Peru has taken a turn towards the market. Venezuela and Mexico have completed debt rescheduling.

Mexico, Canada and the United States have begun the process of turning the US/Canadian free trade pact into a tripartite arrangement. Maybe we will soon hear as much of this as we did of EC 1992 a year or so ago!

Venezuela is embarking on an ambitious programme to expand oil production capacity by 1 million barrels a day. Unlike Mexico, they are beginning to talk of using foreign capital, management and technology to reach new petroleum goals. Of course foreign involvement this time will be on different terms than in the past. The leading role of Petroleos de Venezuela, one of the world's most efficient state oil companies, will be essential.

Although it is a most delicate constitutional question, its friends hope that Mexico — with considerable further potential discoveries but facing great technical challenges — will choose a path which accelerates her programmes.

As for Canada, the United States already is the prime trading partner for Canada's oil and natural gas. And in total, those five neighbouring nations I've mentioned — Canada, Mexico, Venezuela, Colombia and Peru — already fill over 20 percent of America's entire need for imported oil. I suspect they might be able to grow to supply well over half. And if Brazil can become self-sufficient in the first instance, that would reduce competing demand.

Energy strategies cannot, of course, be pursued in isolation from the general economic relationship between the United States and its neighbours.

But the risk of interdependence, both for importer and exporter, can be reduced by government agreements not to interrupt or penalise the trade for which an investment is being made.

Governments can make guarantees to each other about expropriation, about dividend remittances, about intellectual and other property. Broader trade agreements can take care of less important things like access to imported equipment, and supplies, where those are cost effective, and the use of foreign employees to carry out managerial or professional tasks for which local manpower is short.

There is a complex agenda of tax matters which can make or mar the developments of investment and trade between two countries. Few people consider this list as strategy — but in the world of energy, it is certainly tactics!

But at least it is likely that these issues will now be dealt with automatically in the course of forging closer and closer economic cooperation in the Western hemisphere.

'There is no way for the United States to regain energy independence.'

I see two thoroughly good American reasons for concentrating on the Western hemisphere. Just as the Soviet Union's key oil export markets are its neighbouring European nations, so is the United States the prime export market of these potential Western hemisphere suppliers because:

- Transport is cheaper, so nearby sellers may make more money and nearby buyers pay less.
- Without harking back to the Monroe Doctrine, there is an undoubted comfort in hemispheric interdependence.
- There has been a transformation in the political attitudes and market orientation of many of your hemispheric friends.

Those who follow such matters have been much encouraged by the recent willingness of oil producing countries to look for dynamic market forces, rather than static national policies, to influence inward foreign investments. In some countries, external debt and the International Monetary Fund have had a role to play in helping governments take difficult steps. The Brady Plan has undoubtedly helped.

But, turning to the US domestic scene, let me applaud the administration for coming down clearly in support of one vital factor — the United States still has lots of its own oil to find and produce not just on your doorstep. No one knows what lies in Alaska's Arctic National Wildlife Refuge (ANWR), the offshore coasts, east, west and north, the Gulf of Mexico, and the lower 48 states.

Exploration at home

But as the administration's strategies propose so sensibly, charity begins at home, so let us now have a rational debate on how exploration can be started, with every reasonable safeguard.

We all know the unassailable fact — if America wants the best chance of more domestic oil quickly, then you must allow ANWR and overturn the Offshore Continental Shelf moratoria.

It is your choice, and yours alone, not to make the most of your domestic resources — but I remind you that the competitive costs of that strategy could be considerable and there is little evidence that my industry has anything but the utmost respect for the fragile ecology of these areas.

US demand

How about the second great US energy goal, discouraging excessive demand? The demand side is just as important.

In spite of the happy failure of the Gulf War to drive up the price of oil, demand is down both in Europe and the United States. Not all of this can be laid at the door of recession or mild winters. The plain fact is that we are taking conservation seriously — but only more or less. The ever-present danger is that cheaper energy works against conservation, even if it does wonders for some economies.

We are already reading an absurdly over-generalised view — that today's lower price for oil bodes well for the world economy in general. It may indeed be the salvation of the Soviet Union's former satellites who now have to pay hard currency for dwindling Soviet oil.

It may even be that in the United States cheaper oil will help pull the economy out of recession — perhaps as soon as the end of this year. I sincerely hope so but I suspect the Fed's monetary policy may have something to do with it as well!

Come what may, there is always talk of taxing oil. When the price goes down, the consumer will not notice; when the price goes up, we have made a 'windfall'. When government coffers have to be fed, when budgets have to be balanced, to fund alternative fuels, to build and repair highways and bridges.

But it is not all bad. I would much rather have energy demand reduction through market mechanisms and fiscal measures than by regulatory decree.

Let me give you an outsider's frank view but one from a devoted friend of America.

The price of gasoline in America has never been cheaper in real terms. Yet, when you consider the rising outlays for gasoline's after-effects and the manufacturing expense of reformulation, petrol is no longer intrinsically cheap. But we are selling it that way. Beer costs about three times as much per gallon, is largely water and certainly is not the product of technical miracles.

Clearly, it is always politically difficult to raise gasoline taxes — after all the myth is that the west was won on cheap energy. But it does seem strange that, all these years later, we are trying to reduce demand on the one hand and avoid a significant gasoline tax on the other.

It is interesting to know that in my own country — already bearing one of the highest petrol tax burdens in the world — we are debating a switch from a yearly flat tax on cars to an even higher tax on gasoline. Another 60 cents or so to the gallon. This is on the premise that the more you drive, and the more gas you burn, the more road work you generate and the more you pollute with your car — the more tax you should pay.

Proponents want that significant 60 cents increase. There will be howls of rage from rural members of parliament — it will be interesting to see if they win.

The difficulty of reducing long-term energy demand can be demonstrated very clearly in the projections issued by the Los Angeles area's South Coast Air Quality Management Board. The whole world now watches Los Angeles to see what happens there because we know that when they have finished their march eastward across your continent, they become amphibious, and end up on our shores!

But there, in California, is an energy dilemma.

Pollution control

One way to fight air pollutants is to reduce energy demand: ergo pollution control.

But that technology nearly always uses additional energy. Thus energy is connected with everything else. Even with immense effort and draconian rules, Los Angeles will barely hold its own on air quality in the next 20 years — given a 40 percent population increase.

The moral is, as Kermit would say 'It isn't easy to be green'.

Shifting to a less energy-intensive civilisation is an extremely costly and time-consuming quest. Political leaders will naturally try to defend their constituents from hardship.

I understand the instinct to live by a kind of political hippocratic oath: 'Do no harm' — or at least, do as little harm as possible. But when it comes to reducing energy demand, there is also some virtue in the American version of my little rubric — 'No pain, no gain.' Since, by and large, your energy is much cheaper than the rest of the world, the pain may not be great, and the gain most considerable.

R & D

Let me be slightly discouraging about your strategic goal of using research and innovation to find a way out. It never has and never will be a quick fix in spite of the boundless ingenuity of the mind. Let's keep going; gas to gasoline; enhanced oil recovery; they are true goals — but let us also beware the false gods.

Brazil, for instance, indeed reduced its imports of crude oil by going to ethanol from plant sugars. Now Brazil has to import ethanol, rather than oil. And it has to import diesel fuel, because Brazil cannot refine enough petroleum to run its trucks. What a disaster and what a lesson!

One person's moral equivalent of war is another person's mental equivalent of waste.

But talking of science, how can I ignore nuclear? Who doubts that a profound improvement in America's energy equation can come from pushing a safe nuclear option for electricity generation.

The nuclear waste disposal problem must be solved. And the shift from site specific A-plant designs to a one-design concept will be crucial for public confidence.

Even before the next generation of fission reactor comes off the drawing board — and long before we reach the dream of safe fusion energy — the best support for this R&D will, without a shadow of a doubt, be a change in the American public's mind to nuclear power. It is a long way away, but if I had one wish it would be that.

Future investment

The character of the 1990s, unlike previous decades with geographical

WARREN SPRING LABORATORY

CONTROL OF OIL POLLUTION COURSE

To be held at Warren Spring Laboratory, Stevenage, UK

20–25 OCTOBER 1991

This course will provide a sound background knowledge of the factors involved in the effective planning and management of clean-up operations following an oil spill at sea or on the shoreline. It is aimed at those with management responsibilities for counter pollution measures either nationally, regionally or in the oil industry. Topics will include:

Contingency planning
Anti-pollution legislation
Compensation and liability
Prediction, detection and modelling
Behaviour of oil at sea
Oil recovery
Use of dispersants
Shoreline clean-up
A simulated oil spill exercise

Warren Spring Laboratory has been involved in marine pollution research for 30 years and experts from the laboratory have participated in the clean-up operations following many recent incidents including the Porto Santo and Rosebay spills in 1990. Therefore the lectures will be given by a highly qualified team with a sound theoretical and practical knowledge of all aspects of oil spill management. Throughout the course, the lecturers will be supplemented by computer and equipment demonstrations as well as films and videos. A full course manual will be supplied.

The course fee will be £825.00 plus VAT per person, excluding accommodation.

For further details which will be available shortly, please contact **Caroline Little, The Institute of Petroleum, 61 New Cavendish Street, London W1M 8AR, UK. Telephone 071-636 1004. Telex: 264380. Fax: 071-255 1472.**

The Institute of Petroleum

BACKGROUND COURSES

INTRODUCTION TO OIL INDUSTRY OPERATIONS

WEDNESDAY 26 JUNE—FRIDAY 28 JUNE 1991

This course is designed as a general introduction to the upstream and downstream activities of the oil industry and may be particularly valuable to companies who do not hold their own in-house induction courses covering these subjects. It is likely to be appropriate for:

Participants from within the oil industry whose experience is limited to one function of the industry and who require a wider perspective of the industry's activities.

Participants from financial institutions, government, other energy industries and the supply and service industries who require to obtain an informed and concise 'bird's eye view' of the oil industry.

Topics to be covered during the three days will include:

Changing Perspectives in the International Oil Industry
Basic Concepts of Drilling
Petroleum Production
Supply
Refining
Petrochemicals
Research Activities in the Oil Industry
Introduction to Marketing and Distribution
The Retail Market

This is a self-contained course but is followed by:

INTRODUCTION TO PETROLEUM ECONOMICS

MONDAY 1 JULY—WEDNESDAY 3 JULY 1991

This course is designed as a general introduction to the economics of the oil industry and may be particularly valuable to companies who do not hold their own in-house induction courses covering this subject. It is likely to be appropriate for:

Participants from within the oil industry whose experience is limited to one function of the industry and who require a broader perspective of the economic factors affecting the industry.

Participants from financial institutions, government, other energy industries and the supply and service industries who require to obtain an informed and concise introduction to the economic and commercial background to the industry.

For copies of the registration forms for both courses, please contact **Caroline Little,** The Institute of Petroleum, 61 New Cavendish Street, London WIM 8AR. Telephone: **071-636 1004.** Telex: **264380.** Fax: **071-255 1472.**

Please note that VAT rate is 17.5 per cent.

selectivity and even retrenchment in oil exploration, is that it promises to be a period of worldwide oil investment in every continent except Antarctica.

Geologically, oil or gas appears in 101 of the 159 countries currently belonging to the United Nations. In the past, less than one-third of the nations with oil were open to investment by the international industry. A year or so ago the pendulum swung rapidly in the other direction, as it did in the world political scene. We glimpsed briefly a utopian match between geological possibilities and political readiness to do business. As is its habit, utopia was not all that it is cracked up to be.

Nonetheless, things are on the move and the future availability of oil supplies to consumers, US or otherwise, depends on the speed with which we can carry out this new investment. On its speed, on its efficiency, and, of course, on the terms under which nations allow this new investment.

A worldwide market?

Moreover, since 2 August last year the world's major oil exporting nations have gone to great lengths to demonstrate their support of the worldwide oil market.

When Iraq first invaded Kuwait, oil importing countries embargoed both Iraqi and Kuwaiti oil. Markets thought that exporting countries would not take action to reduce the impact of the embargo on the market and the price went to $40. Then Saudi Arabia and other oil exporting countries took extraordinary steps to increase production. And the price went back down to around $25.

Then, once Desert Storm actually began in January, for an hour or so, the price of oil went up to $30. At this point, the US Strategic Petroleum Reserve (SPR) announced the release of stocks and the IEA announced the measures it would take. This immediately calmed the market.

Somewhat to my regret, the calm has now grown so intense that the price of oil could actually perk up a bit, in my view!

But seriously, are there some lessons in this for us, after the Gulf War?

The fundamentals are unlikely to change. The exporters want to talk about linking security of supply to security of outlet. They want to talk about a joint, rather than a unilateral, approach to the management of crises. They wish to talk about conditions of investment and the transfer of technology: about increasing production capacity for the long term and the enormous capital costs of doing so.

There is even talk that the agenda might include a meeting of minds on the future direction of oil prices. I hope the world's statesmen do not waste much of their time on this. History shows us that attempts to fix oil prices not only fail — they also bring ugly side-effects and surprises that hurt both producers and consumers. There is no reason to suppose that trying to fix oil prices is any easier than trying to fix the price of grain or tin.

There is absolutely nothing wrong, however, with governments and industry working together to improve the many supply and demand mechanisms. The SPR and the IEA — are now part of that mechanism whether they like it or not. They can help to avoid making volatility worse, but that is a far cry from trying to manage a price.

When you look backward over time at oil price changes, you see them move in a band. The top limit reflects where competing fuels siphon off demand. The bottom limit reflects the point at which oil starts to substitute for other fuels. The band is a measurement, not a reality.

But it does reflect the interests of everybody, showing where a fair reward for producers and exporters meets a fair price for consuming nations. And it provides a stable target for alternative energy sources against which to benchmark their investments and R&D.

You cannot buck the laws of economics. In the end, US oil prices will reflect marginal costs. Yet at any one time, all producers' costs are not equal. So the industry has to live with feast and famine. Volatility may be inevitable, but still, it does not have to be encouraged.

What the oil industry needs is not fixed prices but a sense of global fiscal and regulatory stability — an environment which gives us the confidence to make our long-term investments, but which allows the rewards which come from risks.

We oilmen have always been risk takers, and in the private sector, we've been free marketers. We will take the risks. If we think governments will change the rules of play and take the rewards away, we will go somewhere else, thank you very much.

What governments can do — as governments have every right to do — is to encourage the political and technical connections that make good business possible. Government can remove obstacles and enhance trust.

So, I believe that an adjunct to the Bush/Watkins Energy Strategy for the United States — one which supports all three areas of the energy agenda — will be to build a diplomatic infrastructure, particularly in the Western hemisphere, but not just there.

Oil investments may or may not be made, depending on the terms allowed the investor: the tax regime, production rules, capital repatriation, mobility of expert people and a host of other factors. Rewards must be commensurate with the risks if the market is to function and government-to-government enabling provisions are an important part of the framework.

The national oil companies of Saudi Arabia, Venezuela and Kuwait have demonstrated their interest in creating business ventures to match their customers' need for security of supply, with the producers' own need for security of placement. It is no coincidence that all three are seeking additional downstream integration — in Europe, in the Western hemisphere and in the Far East.

Now that the Soviet Union, Venezuela, Indonesia, Malaysia, to name but a few, are publicly encouraging us to come and set up arrangements of one sort or another, the idea of strategic alliances is on the march.

BP has happily embarked on several of these ventures. One is with Norway's Statoil. Another is with Petroleos de Venezuela. Another is in the Soviet Union.

And all these examples are quite different from the way in which international oil companies were treated by producing nations many years ago.

So though I speak with authority of only one oil company, I am confident that the industry is eager to explore every avenue now available to us. I have a feeling that right now is one of those times in history when a real change can be brought about.

I listened recently to Foreign Secretary Douglas Hurd talking about what comes after the war. He quoted Winston Churchill, likening the war to a flood. When the waters recede, all the old, hidden features begin to reappear through the mud; a bleak view.

But let us be more optimistic. All those old features have been softened by the deluge. Their edges have been eroded. The sharp corners smoothed. Can we not remould those features? We will have to move fast, before everything congeals again and hardens into rock. So time is fleeting. But the time is also ripe. The stakes are high because such new relationships could, hand in hand with your own efforts, go far to reaching your strategic energy goals. ■

Mr Horton gave this address to the Centre for Strategic and International Studies Conference in Washington in February.

'Industry can co-exist with nature'

Red deer are an unusual sight at an oil refinery but at Conoco's Humberside plant on Britain's east coast they are flourishing in a special nature reserve.

Three years ago the area of the refinery known as Houlton's Covert was untouched and overgrown. Bob Hopkins, a shift maintenance supervisor was the first to notice its potential — 'Often during quiet times, I walked through, noticed the abundance of wildlife and realised we had something special', he said.

His idea for a reserve received enthusiastic support from Conoco and resulted in a group of volunteers from the refinery staff, aided by the local Scout group working together at weekends to clear the overgrowth and create footpaths.

The covert includes an area of 15 acres of deciduous woodland and thick undergrowth providing a home to foxes, tawny owls, rabbits, badgers, and a sparrowhawk. To these native inhabitants of the reserve Mr Hopkins added a herd of six red deer acquired from a local deer farmer.

With the arrival of the deer the interest from refinery staff and the local community grew and to accommodate this a mobile classroom has been provided for school parties to use as a base for their nature studies. Picnic tables have been strategically sited on the remains of rides cut through the woods by the original owner of the land, the Earl of Yarborough whose estate surrounds the refinery site.

The local business community in South Humberside has also become involved in the project providing a bird hide and feed store. Flip-over information charts at points of interest are to be provided by the local council.

Involving local children is an important aspect of the reserve. 'We may be in the middle of an industrial area, surrounded on three sides by an oil refinery, but standing in the middle of the wood we are in the wild. All the zoos and wildlife parks in the world are no substitute for that' said Mr Hopkins.

The herd of deer has now increased to 18 and the nature reserve is receiving a great deal of interest. An outstanding photograph of the stag by a specialist wildlife photographer was chosen for Conoco's 1990 Christmas card. Also, in a strong competition, Houlton's Covert nature reserve was awarded fourth place in the final of the nationwide *The Times*/BBC Environment Award.

Mr Hopkins says 'We have shown that industry can co-exist with nature. In addition the very fact that the wildlife is thriving demonstrates the absence of pollution'. ■

Jane Thompson

FORTHCOMING EVENTS

April

8th-11th
Warwick: Course on 'Managing Major Emergencies'. Details: Petroleum Training Federation, Room 326, 162–168 Regent Street, London W1R 5TB. Tel: (071) 439 2632. Fax: (071) 287 5483.

8th-11th
The Hague: Course on 'Corrosion in the Oil and Gas Industry'. Details: The Center for Professional Advancement, Oudezijds Voorburgwal 316A, 1012 GM Amsterdam, The Netherlands.

8th-12th
Leeds: Course on 'Diesel Particulates'. Details: Mrs CP Shirley, Department of Continuing Professional Education, The Adult Education Centre, Springfield Mount, Leeds LS2 9NG. Tel: (0532) 333226. Fax: (0532) 333240.

10th-11th
London: Conference on 'Management of Safety'. Details: Institute of Chemical Engineers, Conference Section, 165–171 Railway Terrace, Rugby CV21 3HQ. Tel: (0788) 578214.

10th-12th
London: Course on 'Land Pipeline Engineering'. Details: IBC Technical Services, Bath House (3rd Floor), 56 Holborn Viaduct, London EC1A 2EX. Tel: (071) 236 4080. Fax: (071) 489 0849.

11th
London: Conference on 'Hedging Petroleum Price Exposure'. Details: Cindy Elliot-West, IBC Financial Focus Ltd, 57/61 Mortimer Street, London W1N 7TD. Tel: (071) 637 4383. Fax: (071) 323 4298.

15th-19th
Oxford: Course on 'Petroleum Resource Financing'. Details: The Registrar, The College of Petroleum Studies, Sun Alliance House, New Inn Hall Street, Oxford OX1 2QD. Tel: (0865) 250521. Fax: (0865) 791474.

16th
Aberdeen: Conference on 'Improving Safety Management Offshore'. Details: The Customer Services Manager, Industrial Division, IIR Ltd, 28th Floor, Centre Point, 103 New Oxford Street, London WC1A.

16th-17th
London: Conference on 'Developing and Financing Profitable Self-Generation Projects'. Details: Industrial Conferences Division, IIR Ltd, 28th Floor, Centre Point, 103 New Oxford Street, London WC1A.

16th-17th
London: Conference on 'Clearing the Air'. Details: Virginia Hopes, Status Meetings Ltd, Festival Hall, Petersfield, Hampshire GU31 4JW. Tel: (0730) 66544. Fax: (0703) 68865.

16th-18th
Harrogate: 'Liquidex 91'. Details: Liquidex 91, The Trinity Group, Times House, Station Approach, Ruislip, Middlesex HA4 8NB. Tel: (0895) 677677. Fax: (0895) 6767027.

17th
London: Conference on 'Information Technology for Offshore Oil and Gas Development'. Details: IBC Technical Services, Bath House (3rd Floor), 56 Holborn Viaduct, London EC1A 2EX. Tel: (071) 236 4080. Fax: (071) 489 0849.

17th
Aberdeen: Conference on 'Getting the Culture Right for Total Quality — Specifically for the offshore industry'. Details: The Customer Services Manager, Industrial Division, IIR Ltd, 28th Floor, Centre Point, 103 New Oxford Street, London WC1A.

17th
London: Conference on 'Energy in Eastern Europe and the Soviety Union: General Trends and Investment Prospects'. Details: Amanda Jenkins, Conference Organiser, DRI Europe Ltd, Wimbledon Bridge House, 1 Hartfield Road, Wimbledon, London SW19 3RU. Tel: (081) 543 1234. Fax: (081) 545 6248.

17th-19th
London: Course on 'Drilling Technology Overview'. Details: JAPEC c/o Geological Society, Burlington House, Piccadilly, London W1V 0JU. Tel: (071) 434 9944. Fax: (071) 439 8975.

17th-19th
London: '12th International Pump Technical Conference — Meeting the Pump Users Needs'. Details: Kay Russell, Elsevier Seminars, Mayfield House, 256 Banbury Road, Oxford OX2 7DH. Tel: (0865) 512242. Fax: (0865) 310981.

18th
London: Seminar on 'Geotechnical Implications of Shallow Gas'. Details: Society for Underwater Technology, 18 Farburn Terrace, Dyce, Aberdeen AB2 0DT. Tel: (0224) 770533. Fax: (0224) 723192.

21st-23rd
Bath: Conference on 'Exploration Britain — Into the next decade'. Details: Heidie Gould, Petroleum Group, The Geological Society, Burlington House, Piccadilly, London W1V 0JU. Tel: (071) 287 1433. Fax: (071) 439 8975.

22nd-23rd
Bergen, Norway: Conference on 'Business Risks in the Oil Industry' Details: The Bergen Conference on Oil and Economics, The Norwegian Petroleum Society, Ms Gerd Jaeger, (Conference Director), PO Box 95, N-5049 SANDSLI, Bergen, Norway. Tel: (475) 224885. Fax: (475) 22 89 70.

22nd-25th
Cranfield: Course on 'Pumps and the Plant Design Engineer'. Details: The Short Course Administrator, Department of Fluid Engineering, School of Mechanical Engineering, Cranfield Institute of Technology, Bedford MK43 0AL. Tel: (0234) 752766. Fax: (0234) 750728.

23rd
London: 'Subsea International '91 — Integrated Approaches to Lower Cost Subsea Systems'. Details: Society for Underwater Technology, 18 Farburn Terrace, Aberdeen AB2 0DT. Tel: (0224) 770533. Fax: (0224) 723192.

23rd-24th
Brussels, Belgium: 'The Second European and Middle Eastern Pipeline Rehabilitation Seminar'. Details: Susan Carradice, Pipeline Integrity Management, The Pipeline Centre, Farrington Road, Rossendale Road Industrial Estate, Burnley BB11 5SW. Tel: (0282) 415323. Fax: (0282) 415326.

23rd-24th
Birmingham: Course on 'Understanding Heat Treatment'. Details: Wolfson Heat Treatment Centre, Aston University, Aston Triangle, Birmingham B4 7ET. Tel: (021) 359 3611 ext. 5212. Fax: (021) 359 8910.

23rd-24th
Aberdeen: Conference on 'Human Factors in Offshore Safety'. Details: IBC

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Technical Services, Bath House (3rd Floor), 56 Holborn Viaduct, London EC1A 2EX. Tel: (071) 236 4080. Fax: (071) 489 0849.

23rd-24th
Glasgow: Conference on 'Safety Developments in the Offshore Oil and Gas Industry'. Details: Julie Brown, Conference Department C407, The Institution of Mechanical Engineers, 1 Birdcage Walk, London SW1H 9JJ. Tel: (071) 222 7899. Fax: (071) 222 9881.

25th
London: Conference on 'Oil Supply and Price'. Details: Caroline Little, The Institute of Petroleum, 61 New Cavendish Street, London W1M 8AR. Tel: (071) 636 1004. Fax: (071) 255 1472.

25th
Cardiff: Conference on 'Computers and Safety in the Process Industries II'. Details: Cynthia Hovord, Brunel House, Health and Safety Executive, Fitzalan Road, Cardiff CF2 1SH. Tel: (0222) 473777. Fax: (0222) 473642.

25th
London: Lecture on 'Piper Alpha, The Lessons to be Learned' by Dr Bryan Taylor. Details: Mr Martin Douglas, Room G01, Department Materials, Sherfield Building, Imperial College, London SW7 2AZ. Tel: (071) 225 8629. Fax: (071) 584 7596.

29th
London: Meeting on 'The International Oil Situation — speaker: Sir Peter Holmes, Chairman, Shell Transport and Trading'. Details: Mary Scanlan, BIEE, 9 St James's Square, London SW1Y 4LE. Tel: (081) 997 3707. Fax: (081) 566 7674.

29th-1st May
Cranfield: Course on 'Pressure Surges in Pipe and Duct Systems'. Details: The Short Course Administrator, Department of Fluid Engineering, School of Mechanical Engineering, Cranfield Institute of Technology, Bedford MK43 0AL. Tel: (0234) 752766. Fax: (0234) 750728.

30th-1st May
Moreton-in-Marsh: Conference on 'Fire and Explosion Hazards: Energy Utilisation'. Details: Judith Higgins, The Institute of Energy, 18 Devonshire Street, London W1N 2AU. Tel: (071) 580 0008. Fax: (071) 580 4420.

May

2nd
London: Conference on 'Information Technology for Offshore Oil and Gas Development'. Details: Natalie Cox, IBC Technical Services, Bath House (3rd Floor), 56 Holborn Viaduct, London EC1A 2EX. Tel: (071) 236 4080. Fax: (071) 489 0849.

6th-10th
Singapore: Course on 'Economics and Operations of Bunkering'. Details: The Registrar, The College of Petroleum Studies, Sun Alliance House, New Inn Hall Street, Oxford OX1 2QD. Tel: (0865) 250521. Fax: (0865) 791474.

6th-9th
Houston, USA: 'Offshore Technology Conference'. Details: Mr F Herbst, Offshore Technology Conference, PO Box 833868, Richardson, Texas 75083-3868, USA. Tel: (214) 669 0072. Fax: (214) 669 0135.

7th-10th
Cranfield: Course on 'Instrumentation Systems for Engineers in the Process Industries'. Details: The Short Course Administrator, Department of Fluid Engineering, School of Mechanical Engineering, Cranfield Institute of Technology, Bedford MK43 0AL. Tel: (0234) 752766. Fax: (0234) 750728.

13th-14th
London: Conference on 'Satellite Developments in the Offshore Industry'. Details: IBC Technical Services, Bath House (3rd Floor), 56 Holborn Viaduct, London EC1A 2EX. Tel: (071) 236 4080. Fax: (071) 489 0849.

13th-14th
London: 'Tanker '91'. Details: Linda McKay, Legal Studies and Services Ltd, Bath House (3rd Floor), 56 Holborn Viaduct, London EC1A 2EX. Tel: (071) 236 4080. Fax: (071) 489 0849.

13th-15th
Singapore: 'Asian Natural Gas III — New Markets and Distribution Methods'. Details: Institute of Gas Technology, 3424 South State Street, Chicago, Illinois 60616, USA. Tel: (312) 567 3650. Fax: (312) 567 5209.

13th-16th
Cranfield: Course on 'Mass Flow Measurement Coriolis and Alternative Methods'. Details: The Short Course Administrator, Department of Fluid Engineering, School of Mechanical Engineering, Cranfield Institute of Technology, Bedford MK43 0AL. Tel: (0234) 752766. Fax: (0234) 750728.

14th
London: Conference on 'The Profitable Forecourt'. Details: Caroline Little, The Institute of Petroleum.

15th-16th
Oslo: 'The Sixth European Gas Conference'. Details: Norwegian Petroleum Society, PO Box 1897, Vika, N-0124 Oslo 1. Tel: (47) 2 43 00 50. Fax: (47) 2 55 46 30.

16th-17th
London: Conference on 'CHP: Creating Higher Profits'. Details: Judith Higgins, The Institute of Energy, 18 Devonshire Street, London W1N 2AU. Tel: (071) 580 0008. Fax: (071) 580 4420.

17th
London: Seminar on 'Flammable and toxic gas detection'. Details: Sira Communications Ltd, South Hill, Chislehurst, Kent BR7 5EH. Tel: (081) 467 2636. Fax: (081) 467 7258.

18th-20th
Dijon, France: Symposium on 'Mesozoic and Cenozoic Sequence Stratigraphy of European Basins'. Details: T Jacquin, Centre des Sciences de la Terre, Universite de Bourgogne, 6, Bld Gabriel, 21100 Dijon, France. Fax: 80395066.

20th-21st
London: Conference on 'Environmental Issues in Future Offshore Development'. Details: IBC Technical Services, Bath House (3rd Floor), 56 Holborn Viaduct, London EC1A 2EX. Tel: (071) 236 4080. Fax: (071) 489 0849.

21st
Chester: Course on 'Classification of Hazardous Areas Containing Potentially Explosive Atmospheres'. Details: Sira Communications Ltd, South Hill, Chislehurst, Kent BR7 5EH. Tel: (081) 467 2636. Fax: (081) 467 7258.

21st-24th
Dunfermline: Conference on 'Advances in Marine Structures'. Details: Elsevier Seminars, Mayfield House, 256 Banbury Road, Oxford OX2 7DH. Tel: (0865) 512242.

New interest in Nigeria

By Maurice Reynard

Even before the Middle East war, the major oil companies were taking a fresh look at Nigeria. They are seeing a country which, for all its notorious government bureaucracy and inefficiency, is distinctly warmer to the multinationals than in the past. The geology is attractive, oil infrastructure is in place and Nigerian crudes find a ready market. Tax terms are reckoned to be tough but, as zealous nationalism softens into pragmatism, the authorities have become more willing to talk.

In view of heightened uncertainties over Middle East sources, it is not surprising that oil companies have been beating a path to Lagos to seek concessions. By a stroke of luck, the authorities had been preparing to offer new territory, and they went ahead last year with the largest round of licensing since the 1960s. A total of 136 blocks, amounting to 241 000 sq km of little-explored territory, was thrown open, with bids due in by 15 November last.

First results of the offer are expected to be announced this spring, but it seems that the door is not closed to companies which have not yet made an approach. This is because — as officials admit — weighing the bids is turning out to be a tricky task. Of the bids submitted so far, interest is focused sharply on the relatively few deepwater blocks which are available. These are off the Niger Delta, not far from known fields in the near-offshore and the onshore swamps, and finds here could be developed relatively easily.

New areas/new terms

Most of the 136 blocks on offer, however, are in new areas — the up-country Anambra, Benin and Chad basins and the Benue trough. The state company, the Nigerian National Petroleum Corporation (NNPC), has been carrying out seismic work in these areas for some years and has drilled a few wells. These have established oil potential, officials, say. But developing fields in these areas will be a much bigger undertaking than bringing on stream new fields in the south. Long pipelines would have to be laid to take the oil either to NNPC's northern refinery at Kaduna, or to the export terminals around the Niger Delta.

Companies have also expressed some reservations about the terms on which the new blocks are offered. Almost all existing production comes from fields held by major companies — Shell, Chevron, Mobil, Agip, Elf and Texaco are the largest operators — under participation agreements but the government says the new concessions will be on a production-sharing basis.

Under the existing participation agreements, NNPC pays 60 percent of the cost of exploration and development work and in return takes 60 percent of production, while the companies pay tax and royalty on their shares of the oil. Production-sharing contracts, however, require the companies to carry all exploration and development costs. If they are successful, they can take 30 percent of production from which to recover their costs. The remaining 70 percent will be split between the state and the companies in the ratio 88.3:11.7.

The authorities say that the overall 'take' will be much the same as for participation contracts but the companies say they will have to carry large up-front risks. They will also have to pay a signature bonus of $2 million per block and must commit to spending at least $15 million per block on exploration over the first two years.

A swamp hoist workover rig operating in the Okopokunou field. **A Shell photograph**

Bonny river — a seismic crew operating in swampland. **A Shell photograph**

Participation

Meanwhile, the companies are in discussion with the government over the operation of their participation contracts. In this case, the issue is the official $2/barrel profit margin which the tax system is supposed to leave them — a figure specified in a Memorandum of Understanding signed in 1986, in return for which the companies agreed to increase their expenditure on exploration and development work. Programmes launched as a result of the memorandum have now been completed, and the companies are pressing for the $2/barrel margin to be increased, at least to compensate for inflation.

The National Association of Petroleum Explorationists, representing the large operators, goes further. Production from Niger Delta fields should attract a $3/barrel margin, the association says, while Delta margin areas should be allowed $5/barrel and up-country and deep offshore areas should be allowed $7/barrel. A side issue is the government's call for the companies to sign joint operating agreements, which set out in detail the companies' obligations and also contain a clause which will allow NNPC to take over as operator. Although NNPC is in no position to act as operator for a major licence, since it lacks the skilled staff and resources, the companies are unwilling to sign away their rights.

Behind the introduction of the Memorandum of Understanding — at a time when oil prices were falling and expro work was being reined in — was the government's wish for a sharp increase in Nigeria's proven reserves and production capacity. As a result of the increased level of work over the past four years, some progress has been made. Reserves are still estimated at about 16 billion barrels but they have not declined as a result of the past four years' production and there are a number of finds awaiting assessment. Production capacity, at just under 2mb/d currently, would have slumped to a much lower level if development work had not been encouraged.

Government targets

Strengthening Nigeria's position in OPEC is one factor behind the government's pressure for an increase in reserves — influence can be measured in barrels, when production quotas are being hammered out. But the government is also concerned that, despite years of trying to develop other facets to Nigeria's economy, oil is still paramount, so it is prudent to establish a large reserve base. This is more difficult than in, for example, parts of the Middle East, as Nigeria's oil comes in numerous small fields instead of in fewer, more easily worked, giants.

The government's latest targets, set out recently by Petroleum Resources Minister Professor Jibril Aminu, are for proven reserves to rise by 25 percent to 20 billion barrels and for production capacity to rise by the same percentage to 2.5 mb/d. Oil companies say that these targets are ambitious but, given the conditions, probably attainable. High production levels have already been achieved — in 1979 an average of 2.3 mb/d was lifted. Good finds are still being made in the vicinity of the early producers, following the adoption of improved techniques such as 3-D seismic.

Exploration successes

An example of the fruits of improved exploration technology is the recent Gbaran-4 discovery made by Shell, the largest operator, which the company is now developing for start-up this year. The field, holding 400 mb of oil and 500 bcf of gas, is the largest Nigerian discovery of the past 10 years and will

Shell Alakiri gas plant. **A Shell photograph**

put Shell well on the way towards its target of raising its production capacity from the present 1 mb/d to 1.2 mb/d by 1995 and 1.3 mb/d subsequently. Four new fields in the South Forcados concession are also being put on stream.

Also spending heavily is Chevron, whose subsidiary, Gulf, is in the course of a five-year investment programme costed at $2.27 billion. One important project is a gas recovery plant and a network of gas pipelines in the Escravos area, which will enable 2.17 bcm/y to be supplied to users near the capital through the Escravos-Lagos pipeline. Mobil is preparing to develop its large Oso condensate field and recently discovered oil at Etoro (1760 b/d on test) and Ekiko (2700 b/d). Elf has an offshore discovery, Okike, under evaluation, and has been finalising the appraisal of the Afia, Ime, Oududu and Edikan fields.

However, old Nigeria hands know that problems can arise to threaten a project even when all concerned are in agreement on it. In the case of Mobil's Oso development, it is the 'London Club' of banks. Oso is a condensate field, some 30 km offshore Eket, which Mobil wants to develop at a cost of $1 billion; it is a particularly attractive proposition because condensates are not covered by OPEC production quotas, so a good revenue stream should be assured. Initial production of 100,000 b/d is expected, from reserves of 445 million barrels.

Project finance has already been agreed: Mobil and NNPC together will put up $345 million, the World Bank $150 million, the International Finance Corporation $60 million, the US Exim bank $270 million, Japan's Exim bank $70 million and the French Export Credit Agency $60 million. The problem is that the Nigerian government has to put up financial security to the World Bank and the government cannot provide such security without the agreement of the London Club of commercial banks. They are not participating in the project but, as they are owed $5 billion by Nigeria from the early-1980s, they told the government in January that consent for security for the World Bank loan would not be given. Until the problem can be resolved Oso seems to be stalled, although some work has begun on the land terminal required for the development.

The same problem could snag the other mega-project which NNPC is involved in — the long-running plan for Nigeria to become a liquefied natural gas exporter. Several LNG ventures in Nigeria have come to grief in the past but the present project, backed by Shell, NNPC, Agip and Elf, has been moving along determinedly so far. The target is to start exporting in 1995, from a plant with a capacity of 4 mt/y (equivalent to 5.5 bcm/y of gas).

With much of the basic planning work for the project completed, the emphasis is turning to marketing the LNG in West Europe and the United States. In February, it was learned that Italy's ENI had agreed in principle to buy 3 bcm from Nigeria 'over several years' but the company would not confirm the news. Sales agreements in place, the banks will have to be tackled for finance. A sign of confidence that, this time, the project will proceed to fruition came recently when Nigeria LNG took delivery of two LNG vessels for the project, *LNG Bonny* and *LNG Finima*. The ships have been time-chartered to an Indonesian and a Malaysian company until they will be needed.

Producing ventures

1) **Shell** 30%, Agip 5%, Elf 5%, NNPC 60%
2) **Chevron** (Gulf) 40%, NNPC 60%
3) **Mobil** 40%, NNPC 60%
4) **Agip** 20%, Phillips 20%, NNPC 60%
5) **Elf** 40%, NNPC 60%
6) **Texaco** 20%, Chevron 20%, NNPC 60%
7) **Ashland***
8) **Pan Ocean** 40%, NNPC 60%
9) **NNPC** 80%, Tenneco 15%, Sun DX 5%
10) **Dubri** 100%

*Production-sharing concession
Operator in **bold**

NNPC's downstream moves

In common with other OPEC countries, Nigeria has been seeking to extend its oil operations downstream — but its success record has been patchy. NNPC now has four reasonably modern refineries, with a total capacity of 430,000 b/d but they have had more than their fair share of operational problems and mishaps of late, with the result that combined output has been running at less than half of nameplate capacity. According to the Central Bank's figures, Nigeria's refineries produced only 199,000 b/d in 1989, so imports are still needed, estimated at 300,000 b/d. This is particularly galling for NNPC, as the newest refinery, the 150,000 b/d Port Harcourt plant, was conceived as an export refinery.

NNPC has therefore changed tack. As part of its recent policy of commercialisation — the state company is, in theory, being restructured into a group of operating units with financial accountability — NNPC is seeking to set up refining and marketing operations overseas. In this it is following the lead of Kuwait and Saudi Arabia.

So far, NNPC has signed a letter of intent covering a joint venture with Farmland, a US cooperative with a 60,000 b/d refinery at Coffeyville, under which Nigerian crude will be supplied to the refinery, while NNPC will participate in refining and marketing profits. Other moves have yet to crystallise into results: NNPC has been negotiating with Spain's Ertoil and with France's Elf over refining joint ventures. But negotiations which could have resulted in access to refining capacity in Ireland and Portugal now seem to have collapsed. ■

The UK Certified Reference Materials Working Group

Accurate analytical measurements depend critically on the use of reliable standard materials. By making regular and careful use of certified reference materials (CRM), analysts can ensure that their analytical data is traceable to well characterised and properly documented standards. CRMs include chemicals of certified purity that are used for calibrating analytical instrumentation and for the reliable quantitation of analytical results. They also include matrix materials, which resemble the sample under test and contain one or more determinands at a certified concentration. Such materials enable an analyst to check the accuracy of an entire analytical procedure from the sample preparation to the final determination stages.

The above aspects of reference materials are encompassed by the formal definitions given in ISO Guide 30, namely:
Reference material (RM): A material or substance one or more properties of which are sufficiently well established to be used for the calibration of an apparatus, the assessment of a measurement method, or for assigning values to materials.
Certified reference material: A reference material one or more of whose property values are certified by a technically valid procedure, accompanied by or traceable to a certificate or other documentation which is issued by a certifying body.

Ideally, all analytical data should be traceable to certified reference materials, so that measurements made in all laboratories worldwide effectively use the same calibration and method assessment systems. However, lack of suitable CRMs (and sometimes lack of awareness on the part of analysts as to their availability and importance) means that they are not used as widely as they should be.

The UK Certified Reference Materials Working Group has been established to promote the widespread use of CRMs within the United Kingdom, principally by identifying requirements for new CRMs and then putting into effect appropriate procedures for their production. The group intends to work closely with the Community Bureau of Reference and it also makes an input into the UK Chemical Measurement Advisory Committee (CHEMAC). This body itself inputs to EURACHEM which is a network of major analytical laboratories in Europe, aimed at providing a focus for developing a pan-European approach to the adoption of the principles of valid analytical measurement.

In order to function effectively, the CRM Working Group needs to be aware of the current requirements of the UK chemical measurement community for reference materials. If you know of any gaps in the supply of CRMs in the area of petroleum products you are invited to contact Mr John Phipps at the IP Tel: (071) 636 1004.

Indonesian search enters expansive phase

By David Buckman

A recent deal by British Petroleum to explore for oil and gas off the west coast of Lombok Island in Indonesia is yet more evidence that during the final decade of the century the archipelago's hydrocarbons search will be extremely busy. State oil company Pertamina said that BP would invest $101.5 million over 10 years to explore 9,825 sq km. The BP deal was announced at about the same time as extension contracts with established searchers Unocal and Total-CFP and followed a highly successful series of deals in 1989 and 1990. In the closing days of 1990 Pertamina president-director Faisal Abda'o said that oil contracts within the year had totalled 17, with a total investment of $3.2 billion. In 1989 Pertamina had inked 19 contracts with a total investment of some $900 million.

Shortly before these end-of-year deals Pertamina was noting that international participation in its oil sector was at a record high. With a few pending by end-1990 the tally was 84 active exploration and production contracts, of which US firms accounted for 52. There were about 40 applications pending, and Mr Faisal Abda'o was poised to announce that Indonesia was to open up nine new areas with a strong emphasis on the huge offshore theatre.

However, Indonesia cannot afford to be complacent about its oil and gas position. In a recent study County NatWest WoodMac (CNWM) forecast that the number of Indonesian wildcat and appraisal wells will rise from around 120 in 1990 to a peak of 190 in 1993 but the drilling rate will then tail off fairly fast unless the impetus can be maintained. Indonesia is hoping that coming finds will close the gap in its production profile from 1992. A rising trend started in 1988 continues, so that total liquids production was expected to grow to 1.426 million b/d in 1990. This year's estimated 1.527 million b/d would be the highest for a decade. CNWM estimates that production from future finds will build to a peak in 1998 before beginning a gentle decline. The overall effect will be to maintain Indonesia's total liquids output at between 1.32–1.43 million b/d until 1998. After that a production drop which actually starts in 1997 becomes more severe, with output falling to about 1.1 million b/d in the year 2000. Domestic demand is set to rise to 900,000 b/d by the same year, however, so that the margin for exports of oil — for long a vital contributor to the Indonesian budget — is going to be badly trimmed in not many years. This is a forecast backed up by Pertamina, it seems, as late last year the Opec news agency, Opecna, reported the state company as saying that Indonesia would cease to be an exporter between the years 2000 and 2007 based on current known reserves.

Rule changes

Indonesia has shown remarkable resilience and flexibility in the past. Its application of the production-sharing contract has been a model for other countries seeking to develop an oil and gas production industry with substantial foreign input. Concerned that contractors moved to develop marginal fields and applied secondary recovery methods, about two years ago the Indonesian government honed the rules to give innovators a bigger take.

Several discoveries and developing plays will be worth watching in the early 1990s. Unocal, long associated with developments off East Kalimantan, has been active onshore in the area. About two years ago it was talking of a 'world-scale gas field' in the Teweh block in remote Central Kalimantan lying under the 11,250 sq km Teweh block. Unocal had success with the Kerenden 1 wildcat which tested gas in 1982. By early 1989 it had accumulated data from nearly 1,150 km of seismic lines and several geological field surveys. However, the prospect lies in 'as remote an area as you can find,' some 225 km west of Balikpapan, so it is clearly a long-term play. Off East Kalimantan Unocal has high-risk exploratory leads in water as deep as about 400 m which have 'good potential.'

There have been encouraging results lately in South Sumatra. Pan Pacific Petroleum Inc, through Enim Oil Company, has been busy with design work on production facilities and a pipeline to connect its Harimau discovery with the nearby Tupai field. Over the past few years Pan Pacific has had a string of discoveries in its Lematang block. Last September Harimau 3A, the fifth well on the Harimau prospect, tested 2,472 b/d of 52° API crude and 52.9 million cu ft/day of gas, bringing the tested oil rate for the field to 9,491 b/d. President and chief executive Lawrence Barker Jr termed the find with the other wells 'of enormous importance to the company.' Several dozen drilling locations have been identified. Other firms have lately been successful in South Sumatra. Canada Northwest and Bow Valley said that Pertamina, operating for a group, had tested 2,612 b/d of oil

from the Air Serdang ASDJ-2 area in the Ogan-Komering Contract Area; Pertamina followed it up with an oil, gas and condensate discovery near Prabumilah soon after.

Off remote Irian Jaya Occidental has made a 'potentially important' find with the Roabiba 1 exploratory well in shallow waters of Berau Bay. It gave a sustained flow of 23 million cu ft/day of gas through a 5/8-in choke and Oxy says that preliminary estimates 'indicate that the reservoir could contain as much as 750 billion cu ft of recoverable gas.' About 18 months ago Nippon and Sun joined Oxy to sink the Roabiba well on acreage covering 10,897 sq km acquired in 1987. Distance from a market could be a drawback with development, however.

Drillship blowout

Off the coast of Mahakam, Kalimantan, the Tokyo-based Indonesia Petroleum (Inpex) has found crude and gas. Just under a year ago the company announced plans to begin production within two years. The field, known as Sisi B, is 30 km offshore where recoverable reserves have been estimated at 1–2 trillion cu ft. It was in 1988 that the Norwegian-owned drillship *Viking Explorer* sank after a blowout while drilling in the Sisi area but this did not deter work. The sunk drillship was then working for Total-CFP/Inpex on the prolific Mahakam permit, where production is well established. Later in 1988 Total made a production-sharing deal with partner Inpex and Pertamina for the adjacent Tengah permit, reckoned to contain an extension of Sisi, first revealed during drilling in 1986.

An outlying play to watch which has enormous potential is the Timor Gap, where Indonesia is to co-operate with Australia. This follows a dispute about a boundary in the area. The Gap has now been apportioned into three zones, is considered to be hydrocarbons-rich and has gained lustre following Australia's success in developing Timor Sea oil in the last few years.

Finally, Asamera has had exploration success in South Sumatra lately with the Gelam 1 well, which turned up a significant gas find in the Corridor Production-Sharing Contract Area. A cumulative 24.8 million cu ft/day of gas was achieved with some condensate. The find is 35 km north of Asamera's Bentayan oilfield. Just under two years ago Asamera was given a 20-year extension on its Corridor Block.

***Maxus Intan* tanker — aiding oil production off south-east Sumatra.**

Sumatra is the location of one of the most remarkable oil production developments now occurring in Indonesia, where in Riau Province veteran producer Caltex is implementaing a steamflood project at the Duri field. It is potentially the largest steamflood in the world, which began in 1984. Pertamina says that the programme to tap potential reserves of 6.5 billion bbl will cost 'approximately $40 billion.' It will be operated for the next 50 years and in the 1990s is expected to yield over 250,000 b/d, against 40,000 b/d earlier achieved with regular pumps. Chevron 'expects a peak 325,000 b/d in 1994.'

Another recent boost to production has been the bringing on stream of Intan and Widuri oilfields in the South-east Sumatra offshore area. The Widuri processing complex will take output from 60 wells on seven remote-production platforms. Oil production, expected initially to top 200,000 b/d, will be pumped for storage in the permanently moored tanker *Maxus Widuri*. Full output is due in the current quarter.

Another field lately on stream is Chevron's Anoa, in the Natuna Sea, close to the median line with Malaysia. A nine-well platform and floating production and storage vessel complex will handle peak output of 20,000 b/d this year. Development cost some $77 million, to tap reserves of up to 25 million bbl.

LNG exports

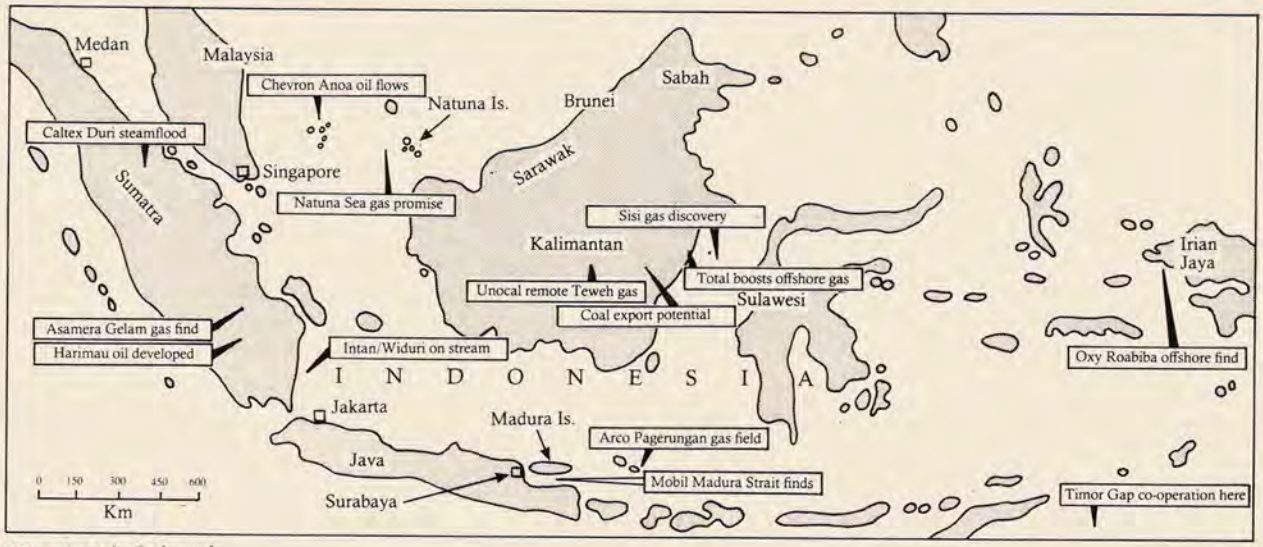
Indonesia is the world's largest exporter of liquefied natural gas, with Japan as the principal customer. Mr Faisal Abda'o said recently that his country would remain the world's biggest supplier by boosting its export capacity almost a third to 30 million tonnes/year by the year 2000. 'The prospects of increasing LNG exports are good, with strong demand from Japan and South Korea,' he said.

Indonesia has plans to export gas from a huge field off Great Natuna Island by the end of this century, which Mr Abda'o noted had proven reserves of at least 28.7 trillion cu ft. This may well turn out to be a conservative figure.

Natuna Sea is the most exciting prospect to be tackled by Indonesian explorers and developers in the next decade or more, especially as a source of piped or liquefied gas. Oil production has gradually built up in the last few years, piloted by Conoco's modest Udang field in 1979. Marathon on the Kakap block began to produce from its KH oilfield in 1986, to which it added the KF reservoir in the closing days of 1989. Meanwhile, Conoco has continued to develop oil production, with more in view. In 1986 it added Kepiting production, like Udang in Block B, and in 1989 the marginal Ikan Pari reservoir. Last year saw Conoco score more successes in prolific Block B, with the Alu Alu (renamed Belida) oil find, the Sembilang oil discovery, the Buntal gasser and, most recently, the Kerisi 1A oil and gas find. One recent report tipped Belida to come on stream in 1991. The latest Natuna Sea oilfield to start production is Chevron's Anoa, in the closing days of last year.

County NatWest WoodMac has spotlighted Belida and another Conoco field, Belanak, as two reservoirs with considerable potential to influence the course of Indonesian production. As long ago as 1986 Conoco said that it was mulling Belanak for development, the field being 'estimated to contain some 50 million bbl of liquids, comprising 22 million bbl of crude, 15 million bbl of condensate and 13 million bbl of LPG.' CNWM says that development of Belanak rests on a gas sales deal being signed with Singapore. If achieved this year peak output of 35,000 b/d could be feasible in 1996.

The Natuna Sea's gas potential is vast, with Conoco's Tembang and Bawal finds and Exxon's reserves in the east of the area all having been considered for exploitation. Several proposals have been put forward to tap Natuna gas. An LNG plant on Great Natuna Island now seems to have been rejected in favour of a line via Batam Island, with a spur to serve Singapore and one to funnel gas to the Duri steamflood and to Arun LNG plant, for



Oil and gas in Indonesia

which existing reserves are declining. Most of Indonesia's gas output of around 4,200 million cfd, which CNWM expects to peak in 1997 at around 4,760 million cfd, goes abroad as LNG.

A burgeoning source of gas, too, is the batch of fields operated off East Kalimantan by Total on the Mahakman permit. This has been a key source of gas for the Bontang LNG plant, where a fifth train went on stream last July. In December Total said that in order to permit Pertamina to honour an LNG sales commitment to Japan, Total would double its capacity to produce gas in Indonesia. Production at the Handil, Bekapai, Tambora and Tunu fields would be raised from 4 milliard cu m/yr (387 MMcfd) to 10 milliard (967 MMcfd) in 1995–97, principally from Tunu. Total will supply 65–70 percent of the gas needed to service the 2 million tons/year deal, covering 20 years, which Pertamina agreed with three Japanese gas companies in October.

Two other offshore gas finds should be mentioned, tipped by CNWM as important candidates for development: Mobil's Madura Strait BD find, and Arco's Pagerungan, northeast of Bali. Indications are that the Madura Strait oil, gas and condensate may progress towards startup this year. In 1989 the well BD-2 found 8,611 b/d of oil, 2,882 b/d of condensate and 65 MMcfd of gas and partner Lasmo said that the group was 'evaluating development options'. Pagerungan 1 well was successful in 1985 and appraisal drilling confirmed gas-condensate. Two years later partner Britoil reported that permission to develop had been sought. *Petroleum Review* learns that approval was granted in January this year, with production to start in 1992.

New refineries

With global demand for refining capacity rising, Pertamina lately said that it was moving forward with a $7 billion programme to add four major plants, potential processing up to 485,000 b/d in all. Contracts for the first of the new plants were signed in 1990. The four will be sited at Balongan, West Java; two in Riau Province in West Sumatra; and the fourth at Sorong, on the west tip of Irian Jaya. About two years ago Pertamina was working on a plan to boost the efficiency of its five refineries. Although they had a combined design capacity of 800,000 b/d their real capacity was said to be just under 735,000 b/d due to inefficiencies, with output then at 710,000 b/d. In another bid for efficiency, later in 1989 Pertamina opened up oil and gas refining to private operators, working under co-operation deals with the state firm. The four new plants are designed to make Indonesia a major products exporter.

In 1989 Indonesia determined that it would invest over $6 billion in the next five years into its basic chemicals industry, to provide up to 35,000 jobs and bring a 13 percent/yr growth rate. Its almost-60 petrochemical, fertiliser and allied complexes in 1988 had yielded just over $3 billion worth of products, of which $550 million was exported. At the end of December the World Bank agreed to lend just over $220 million to the government to improve fertiliser operations.

Solid fuels

Although there is concern that Indonesia's proved oil reserve is only good at the present rate of production for another 15–20 years, gas reserves should be capable of sustaining present demand for 70 years. In addition, there are substantial reserves of coal — conservatively estimated at around 3,000 million tons, two-thirds subbituminous and lignite, the rest anthracite and bituminous — as well as additional power sources awaiting development. Prospects for Indonesia as a major coal exporter are now looking good, and indications are that it is emerging as a rival to the United States, Australia and even South Africa as a source of inexpensive supplies. The quality of coal in Kalimantan, where several export schemes are being forwarded, has been given a more optimistic reassessment, and Kalimantan's capability to export coal in larger ships is advancing. Within about three years Kalimantan should be able to export 20 million tons of coal in ships of over 100,000 tons, with almost twice that by the end of the century. That is about one-third of the present global steam coal market. On the domestic front, whereas in 1985 coal only contributed just over 2 percent of Indonesia's energy mix, by the year 2000 it is expected it will be 15 percent. From about 9 million tons production in 1990, the government expects it to rise to 30–40 million by the year 2000.

Oil use in electricity generation has declined, from 72 percent of capacity in fiscal 1977–78 to a projected 22 percent by 1993–4. By the year 2000 Indonesia hopes to have nearly 27,000 Mw of generating capacity, of which 14,000 Mw will be oil and coal, 7,000 Mw gas, diesel and geothermal energy and 6,000 Mw hydropower. As village electrification expands, more use is being made of solar power, and nuclear energy is being investigated for a 600 Mw plant in Central Java. ■

CHP in new energy era

Combined heat and power is the technology of the 1990s although it is by no means a new technique for conserving energy and costs. The idea of CHP is to make more efficient use of the thermal generation process and hence reduce the colossal heat loss. As much as 50 to 75 percent of fuel delivered to power stations is wasted. In terms of coal in the United Kingdom alone this represents some £2,600 million a year — every year.

Much of this 'waste heat' could be used to provide district heating for industrial, commercial and residential sites near the CHP plant — a policy adopted by some European countries for many years.

But this has not been the case in Britain, where the concept has been actively opposed by the electricity supply industry.

Figures published by the International Union of Heat Distributors — UNICHAL — show that its members have a total CHP capacity of 140,000 MW and a total pipeline route network of 44,000 km. The UK contribution to this figure is very small — Department of Energy estimates show only a total capacity of about 2,000 MW and 2,000 km at the most, of district heating (DH) pipelines.

But now CHP is receiving the recognition it deserves partly due to efforts made by British Gas. Determined to take the lead in re-introducing CHP it has promised feasibility and design studies and financial and even equity participation in proposals for all sizes of schemes including district heating.

Policy change

But only yesterday, it seemed, CHP was anathema; what has brought about this change in energy strategy?

CHP has become directly more interesting to the electricity supply industry because of the economic advantages brought about by the more efficient use of fuel by new technology.

The use of a gas turbine in a combined cycle system, for instance, can raise the efficiency of electricity production to around 45 percent, a considerable advance on conventional generating equipment. With appropriate heat recovery, overall plant efficiency of a thermally integrated gas turbine system with after-firing can be in the order of 90 percent.

New micro-processors can also be used to cater for seasonal or production load demand swings by controlling the conversion of surplus electricity into heat and by the use of heat/steam accumulators.

The reduction in the amount of fossil fuels used also means that emissions which contribute to the 'greenhouse effect' are also cut making CHP an even more beneficial proposition because of the increased concern about the environment.

Interest in CHP/DH has also been driven by companies realising the economic advantages brought about by the electricity privatisation. New deals with PowerGen and National Power mean firms can for the first time generate their own power, use the heat generated and sell surplus electricity to the national grid.

But while the United Kingdom has only just rediscovered CHP it has always been considered a viable proposition in other countries. Some CHP/DH schemes are on the largest scale, with extensive networks of underground distribution pipelines covering many square miles of densely-populated and traffic-congested city streets. Numerous capital cities have enjoyed this type of distribution of heat for many decades, some for as long as electricity has been generated. It is interesting to note that in these countries, none has been discontinued — unlike projects in Britain — and all are expanding rapidly.

Early history

In the United Kingdom, a sprinkling of towns like Bradford, and Barton, Manchester, had early schemes, but all were closed because of the prevailing attitude about energy which considered that the best solution was just to generate electricity. This policy continued although even by the time the British electrical supply industry was nationalised in the 1940s, the average thermal efficiency had only improved to 10 percent. This wastage was accepted because of the promise of cheap electricity, first from oil and then from nuclear fuel — the latter so cheap the cost would be negligible. The implications of this policy marked a distinct move away from CHP. It also meant the electricity supply industry could control the industry on a national rather than a local level. This commercial consideration effectively stopped small CHP schemes stealing their business.

Continental schemes

District heating as part of CHP schemes is well established in many countries in Europe. These countries have taken highly individual directions and shown a number of differences in their approach. A recently completed survey of successful continental examples shows how cities in Sweden, Austria, Germany and Italy used CHP to maximise fuel-use efficiently and to minimise emissions. It also shows how the economic performance of the schemes is of a far higher order than any form of energy utility supply.

Stockholm, with a long history of CHP development, has a wide variety of energy sources it can call on to provide heat and power **(Figure 1).** Although gas has never figured largely in the energy input equation — the primary source of input for Stockholm comes from nuclear power — the Energi Company, the city-owned utility firm responsible also for gas, is currently undertaking far-reaching negotiations to keep control of the situation.

In terms of importance CHP only lies fourth in the energy supply league

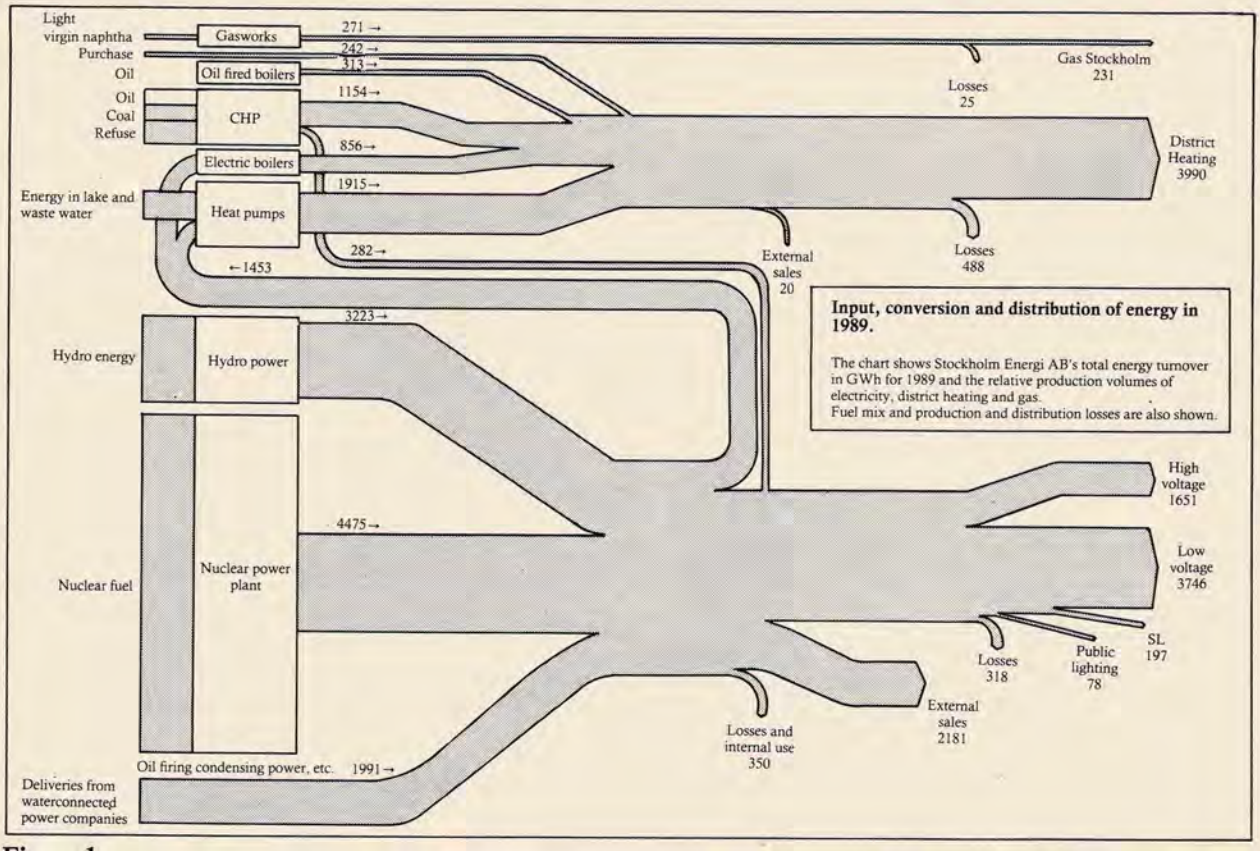


Figure 1

with 1154 GWh after nuclear power (4475 GWh), hydro electricity (3223 GWh) and the energy from heat pumps and electric boilers (2271 GWh). But by using oil, coal and refuse incineration, CHP provides about a third of Stockholm's district heating requirements (3990 GWh). The DH system — which consists of approximately 18 km of tunnels — accounts for about 40 percent of Stockholm's energy needs.

In total Sweden has 146 district heating (DH) schemes with 302 pipeline systems, 28 of them full CHP/DH undertakings.

In what was West Germany there are more — 135 DH systems and 144 CHP/DH schemes. The number of pipeline systems has not been recorded although Germany's heat ouput capacity was said to be 37,670 MW in 1989 — compared with Sweden's 26,214 MW.

German approach

An example of the Germany DH systems is the Berlin Kraft und Licht AG (BEWAG). The scheme has been in existence for some 80 years and still operates at least one of the original turbines.

There are now seven sources of CHP energy in the expanding DH network (400 km) which provides 3,500 MW. A new unit at Reuter West (750 MW) is connected to the city centre by a walk-through tunnel 3·7 km long. New tunnel constructions will eventually double this.

In Austria there are 47 DH schemes with 62 pipeline systems and a further 23 CHP/DH units. The total heat output at 4,030 MW is considerably less than both Germany and Sweden but the growth of individual schemes has been impressive.

Twenty years ago Vienna's heat distribution company, the Heizbetriebe GmbH, had six sources which provided 2·5 GWh. Now the company, part of the Stadwerke, the city's municipal engineering services firm, produces 2,500 GWh from eight sources including refuse incineration and an oil refinery.

With much the same determination as in Stockholm and Berlin large distribution walk-through tunnels have been driven underground including a crossing of the river Danube.

Outstanding example

But of all the schemes in Europe perhaps the most outstanding example of modern thinking in energy planning is to be found in Brescia, an industrial city 100 km east of Milan in Italy. Here the city's Azienda Servizi Municipalizzati, which is entirely independent of the Italian state power board, produces and distributes its own heat and power within the city boundaries.

Such is the design of the system's heat load that there is a surplus of electricity in mid-winter which can be sold to neighbouring conurbations. To further enhance the system Brescia has recently commissioned a multi-fuel unit of two 30 MW back-pressure turbines at its headquarters, Lammamora which can be shut down in the summer because it is so efficient. In 1988 there were 120 km of network mains, a further 4 km is planned by 1996.

In total, Italy has listed some 27 pipeline systems with 39 CHP units and a total installed heat capacity of 1046 MW of which 441 MW is from CHP.

France has 322 pipeline systems, but only six are full CHP/DH. Its total heat distribution capacity is 16,336 MW — 16 times greater than Italy's. Paris contributes largely to this but it is exceptional in that it distributes steam as opposed to hot water systems used elsewhere in Europe.

The system, run by the Compagnie Parisienne de Chauffage Urbain, (CPCU) has been constantly expanded since the 1920s and now shows a large diversity in the range of fuels used. Incineration of refuse from three units accounts for 39 percent of the system, coal 25 percent, gas 21 percent and

heavy oil 14 percent. Geothermal and electricity inputs only account for less than one percent. Altogether more than a quarter of the Paris area's heating needs are covered by CPCU's steam networks of some 320 km.

Ideal CHP/DH users

Crucial to the change in the CHP market in the United Kingdom has been the liberalisation of the supply of natural gas coupled with the repeal of a 1975 EC directive which previously prevented the use of gas in generation.

This has brought British Gas and other gas marketing companies directly into all areas of the electricity generation market. This has opened up enormous potential for CHP which is especially relevant for the larger chemical and other process sites, petrochemical sites, the textile industry, the paper and board industry and urban areas.

Smaller CHP schemes are also suitable for hospitals and other health service buildings, large hotels and leisure facilities, telephone exchanges, office buildings and converted community heating network boilers.

British Gas, in broad terms, sees three ranges of power generation systems. A small-scale CHP scheme of reciprocating engines with a capacity of up to 200 kW of electricity, a medium-scale CHP from 200 kW up to 20 MW, which would include small community district heating schemes, and large-scale power generation schemes.

An example of a small-scale CHP unit set up by British Gas in Scotland is the three 90 kW engines used to provide electrical power to light the Magnum Leisure Centre, Irvine, and drive the centre's ice rink refrigeration pumps and compressors. Here, heat from the engines is used for space heating and to heat the water in the swimming pool.

But the nearest new large-scale approach to CHP/DH practiced by other countries is by the British Gas joint venture with Utilicom Holdings to operate major combined heat and power plants, particularly where these are associated with district heating in city centres. The total energy packages can provide electricity, hot water for heating and chilled water for air conditioning.

The new venture, called Citigen, has already received backing from the Corporation of London for a scheme in the city.

Initially, when it is in operation, the scheme will serve 12 buildings including Guildhall, the Barbican Centre and the Bastion House/Museum of London complex.

A typical combined cycle gas turbine/steam generator

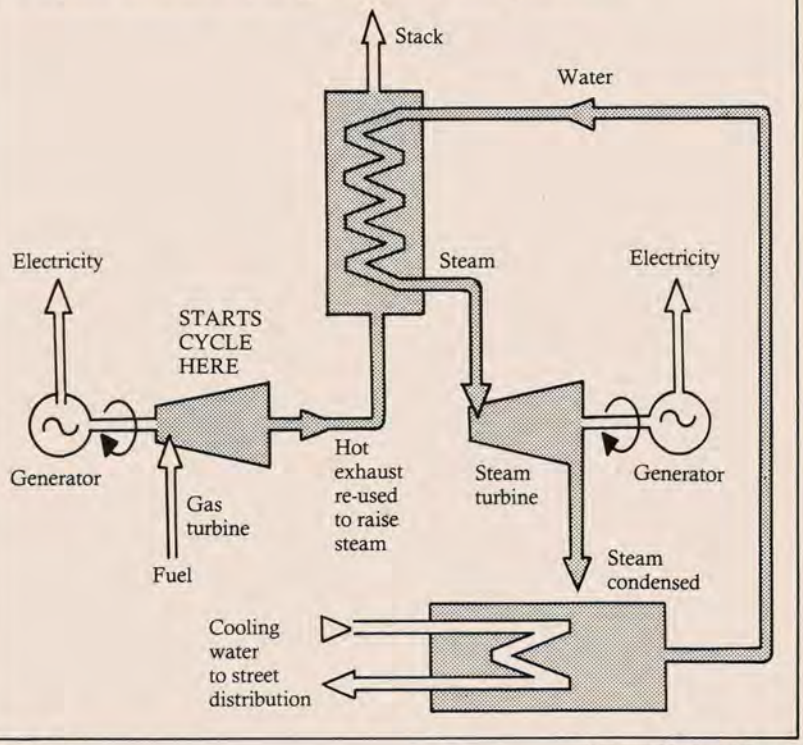


Figure 2 Source: National Power

According to the Corporation the £25 million 30 MW power station will produce cheaper heating and lower electricity bills than any other demonstrable economical alternative. It estimates that the piped district heating scheme will cut electricity and heating bills by about £500,000 a year **(figure 2).**

The heat for the offices and buildings will be carried by water along a common pipeline. Another pipeline will carry chilled water for cooling computer systems.

Scheme expansion

Citigen intends to expand the scheme to about 80 MW and has invited other companies to take advantage of the savings available by joining the scheme. The firm will also be looking at other city centres around the country as well as ways to encourage companies to consider forming associations or joint ventures.

From these examples Britain could develop a new era of low-cost emissions-free energy supply if it followed the European example and established a series of local heat and power production and distribution units.

Dr Eugene Keppler, Secretary General of UNICHAL told a meeting of the British Major Energy Users' Council recently that self-contained units would operate primarily in the consumers' interests.

'It would be an advantage to have in the community one responsible person to ensure that individual requirements for electricity, gas, distributed hot water and heat are given their appropriate priorities,' he said.

No more delay

It is encouraging that British Gas has set its sights on becoming a major force in this market in the United Kingdom.

It is not the only one, other fuel suppliers are also turning towards CHP, British Coal is involved in some 60 major CHP projects and oil companies are planning to build some innovative schemes.

But there is still a lot of work to be done in the United Kingdom before we can catch up with some of our European partners. Obviously Britain cannot continue to be the odd man out. If gas is the flag to follow then we shall have to do so, but we must ensure that other fuels do not lose out. In fact multi-fuel units would be better because they would act as the best insurance policy. But as far as CHP is concerned, fuelled by gas or otherwise, Britain cannot delay any longer. ■

The *Petroleum Review* acknowledges the help of Mr Norman Jenkins a CHP consultant in the production of this article.

Contract energy management

By Geoffrey Mayhew

Like a hand into the correct glove, the developing function of contract energy management fits perfectly into the equally increasing adoption of large and small scale combined heat and power plant by industry and commerce.

The title 'contract energy management', now widely used, was first coined by Emstar Ltd, a subsidiary of Shell UK Ltd, on entering the market in the early 1980s.

Emstar was followed into the business by BP Energy Ltd, an independent company owned by BP, and they have achieved a great deal in the development of contract energy management (CEM) as a speciality.

Both had had experience in energy management, and they work in any fuel.

As experts in the installation and operation of all types of power systems, CEM companies give clients independent advice on their use of energy.

The object is to make the operation more efficient and less costly, and this can be achieved substantially over a wide range of industry through the use of modern technology combined with expert operation and proper maintenance.

CEM companies are prepared to use their own funds to help clients obtain the right type of scheme. The company can then install, operate and maintain under a contract, which is usually for a period of up to 10 years.

Contracts can be for large- and small-scale combined heat and power (CHP) schemes — a growing business — but can also be applied to individual components of a power plant, such as the operation of boilers. A great deal of work is done in boiler operation.

It is usually the case that the user will be able to pay off the capital cost of new equipment within five years from the energy savings which are made. Sometimes this has been achieved in two years. Generally, a four year pay back is claimed.

Categories

There are two broad categories of CEM: the sale or rental of the equipment, which ranges from large scale to small scale combined heat and power plant, insulation, monitoring units, etc. or part of these activities; and also the provision of an agreed service which can include the CEM funded installation of the equipment at the client's premises and its subsequent operation and maintenance for a fixed period of years.

At the end of the contract the equipment which the CEM has put in will become the property of the client at no extra charge.

While Shell and BP acted with foresight in developing the market, CEM began slowly. During the past year, however, references have been made to CEM being 'set to become an industry in its own right' and that it has 'come of age.'

There have been a number of signposts. A most significant one was an instruction from the Minister of State, Department of Energy, in 1990 to government departments. This required them to make CEM proposals for the heating of their buildings, for which the Property Services Agency would no longer be responsible.

The Department's plan is to save energy and reduce the cost of heating by placing the operation and maintenance of plant in the expert hands of a CEM company.

First contracts

During the last year or so there have also been a number of interesting contracts in this speciality. The first industrial combined heat and power plant to be entirely financed, designed, installed

The control room of the power house at Tunnel Refineries.

and commissioned under a CEM contract was brought on stream by BP Energy.

It is at National Standard, Kidderminster, the company being a producer of wire for the manufacture of tyres and hydraulic hoses. BP Energy will be operating and maintaining this plant together with the existing boiler plant for 10 years.

The fuel for the diesel engine for CHP is heavy fuel oil. The existing boilers burn heavy fuel oil or natural gas. Combined with greater flexibility for the plant and improved efficiency, an 8 percent saving is expected in National Standard's energy costs.

Then last October the largest contract energy management scheme to date came on stream. Emstar is providing all utility services, including 14 MW of electricity, to the Greenwich (London) site of Tunnel Refineries Ltd, a part of the Tate & Lyle Group.

This 10-year contract for energy management is based on a combined heat and power plant consuming gas and it will reduce Tunnel Refineries' energy costs by up to 50 percent. The CEM operation will also reduce the risk of expensive production shutdowns in the food processing plant.

The £9 million capital cost of this project includes improvements to the water treatment and compressed air facilities as well as the CHP plant. This has been funded by Emstar, who operate the plant they have engineered and installed through a central control room they have also built in the power house.

Energy savings

The continuous industrial process at Tunnel Refineries is running at a thermal efficiency of more than 80 percent. The consequent reduction in CO_2 emissions is described as a classic example of how substantial energy savings can be accompanied by environmental improvements.

Another big contract energy management job will come into effect this year. From 1 July Cofreth BOM, a CEM company, will provide Scunthorpe General Hospital with its full requirement of hot water for the next 25 years. In doing so the CEM company will be providing a saving of £1.2 million compared with what has been the cost of the conventional method of funding and operation.

Signed last year, this contract was the first energy saving event of its kind in the Health Service. Other than agreed charges for heat supplied, there will be no other costs falling on the hospital from the new plant which is being built by the company.

The CHP power house at Tunnel Refineries during construction.

Prospects

The privatisation of electricity generation and supply has stimulated CEM. Both PowerGen plc and National Power plc are now ready to buy surplus production from private generators or to supply power in an emergency or periods of peak demand.

What has been positive as well in helping CEM to grow is a change in attitude by medium to small companies towards energy saving. Their lack of spare capital, or a reluctance to use capital for such a purpose, is rectified by the CEM company's long term finance arrangements and a short payback period.

Emstar, the largest CEM company, has five regional offices and their customers are in seven categories: industrial, hotels, schools, colleges, health authorities, residential and 'miscellaneous' — which includes the London Zoo.

Depending upon a customer's requirements, Emstar can offer a complete CEM contract or individual services which make up such a contract. These include energy audits, project engineering, computerised building energy management systems, maintenance management and contracting and strategic studies.

Studies over the past five years have indicated that some 10 percent of current annual energy costs can be saved by medium-sized factories through the replacement of the old installation, which would then be operated by an outside firm of experts.

The Energy Efficiency Office of the Department of Energy claims that if local authorities did a once-only investment of 50 percent of their annual fuel bill into new systems there can be a reported 25 percent reduction in energy costs per year.

During the 1990s the Department of Energy has estimated that 2 GW of new CHP capacity could be commissioned. To facilitate this the department is urging industrialists to shift the technical and financial risks from themselves to contract energy management companies. ■

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Booking opens for 13th World Petroleum Congress

Registration has opened for the 13th World Petroleum Congress, to be held in Buenos Aires from 20 to 25 October 1991. The Congress, staged for the first time in South America, is the leading international and interdisciplinary forum for the exchange of information about the petroleum industry.

More than 150 papers and posters will be presented during the Congress, with three concurrent sessions operating for most of the week. 'All the speakers are practising experts in their fields,' says Mr Ted Williams, the Institute of Petroleum's Director General, who has helped to develop the programme. 'The Buenos Aires Congress is unique in that it will cover all aspects of technological and economic change in the oil and gas industries, in the space of a single week. The future of the oil business cannot be understood without a basic grasp of these important factors, eg what can and is being done to develop more difficult sources of oil, to deal with environmental problems of transport fuels, etc.'

The organisers are expecting 1,500 participants from 70 or more countries. 'It is an excellent opportunity for UKCS service companies and contractors to meet a wide range of prospective overseas customers,' Mr Williams points out.

Keynote speakers scheduled for the first day include Mr Allen Murray, Chairman and CEO of Mobil, Mr Lo van Wachem of Shell and Dr Subroto, Secretary General of OPEC. Oil ministers from the USSR and Nigeria will also speak at the Congress, and there will be addresses by Dr Andrés Sosa Pietri, President and CEO of Petróleos de Venezuela SA, Mr Euan Baird, Chairman and CEO of Schlumberger, and Dr Teruo Noguchi, President of Koa Oil.

Dr Saleh Abdulrahman Al-Athel of Saudi Arabia will give the first Thomas Dewhurst Commemorative Lecture, named in honour of the President of the Institute of Petroleum who, in 1933, chaired the first World Petroleum Congress in London. Dr Al-Athel will speak on technical co-operation in the oil industry.

British oil industry expertise will be much in evidence throughout the week. Speakers and papers from the United Kingdom will cover topics ranging from academic research on petroleum generation to current strategies in petrochemical manufacturing. The British stand will serve as an information centre on the UK oil industry, with displays of British technical publications and Institute of Petroleum titles.

'The Buenos Aires Congress is a rare chance to make contacts in a region where British links have been weak,' says Dr Norman White, Chairman of the UK National Committee. 'Recent events have underlined the importance of the search for oil in areas outside the Middle East and continued research on technologies for developing non-conventional oil resources. Congress sessions on those topics will have an added significance.'

The Argentine Organising Committee has put together a programme of technical visits in the Buenos Aires region during the Congress and, in the following week, some more general tours further afield. Its Secretary, Dr Aniceto Torrea, is responsible for local arrangements. 'We have meeting facilities of a very high standard in the Sheraton Hotel,' says Dr Torrea. 'The Congress is priced in US dollars to avoid any problems with inflation. At $870 for a full package of technical sessions, a Trade and Technical Exhibition and many other events running from the opening ceremony on Sunday to the farewell lunch on Friday, it represents good value at today's conference prices. We are confident we can provide a memorable experience for all WPC participants, both inside and outside the session halls.'

Mr Derek Payne, WPC Secretary-General and Secretary of the British National Committee, welcomes the recent restoration of diplomatic links between the United Kingdom and Argentina: 'It makes it easier for British participants to attend the Congress. A visa is not usually needed for UK passport holders, and both British Airways and Aerolineas Argentinas operate direct flights between London and Buenos Aires.'

Brochures and registration forms for the Congress are obtainable from the British National Committee at the Institute of Petroleum.

Statistical surveys

One of the key roles of the Information Department is to carry out statistical surveys on behalf of the oil industry; the two major subject areas for this task being retail outlets and storage. The results of these surveys have always been published in the Institute's journal *Petroleum Review*, with UK Retail Outlets appearing in the March issue and Independent European Bulk Storage in August.

This year in a departure from the usual, the UK Retail Outlets survey was published in a new and expanded format as a separate publication. The 32 page supplement to the March issue of *Petroleum Review* contains tables and graphs providing information on numbers of outlets supplied by each company, number of self service sites, company owned sites, those retailing derv/unleaded petrol, supermarkets, motorway sites and some regional breakdown. Information on the consumption of petrol and derv over the last 10 years is also included (from figures kindly supplied by UK Petroleum Industry Association).

The department is making increased use of its computer facilities to analyse and produce the results. We have access to a number of software packages for database, wordprocessing and spreadsheet applications and have recently acquired a laser printer. Information is collected by sending out questionnaires to each petrol supplier and the statistics received are then fed into the computer. Calculations are made with the aid of the spreadsheet package Supercalc and graphics are also produced, whilst the database package Inmagic allows us to print out tables in chosen formats. The laser printer gives an enhanced quality and choice of options for the final product.

The Retail Marketing Survey which has established itself as a valuable source of statistics and information is a vital tool for market research. Copies may be obtained (price £25) from the Library, Institute of Petroleum, 61 New Cavendish Street, London W1M 8AR.

A selection of new additions to the library

Advances in Underwater Technology, Ocean Science and Offshore Engineering: Vol. 23 Subtech 89: Fitness for Purpose: Proceedings of an International Conference organised jointly by the International Association of Underwater Engineering Contractors and the Society for Underwater Technology, held in Aberdeen, UK, November 7–9, 1989.
INTERNATIONAL ASSOCIATION OF UNDERWATER ENGINEERING CONTRACTORS SOCIETY FOR UNDERWATER TECHNOLOGY.
Dordrecht, Kluwer Academic Publishers, 1990. Class Number: 395

Advances in Underwater Technology, Ocean Science and Offshore Engineering: Vol. 24 Advances in Subsea Pipeline Engineering and Technology Papers presented at Aspect '90, a conference organised by the Society for Underwater Technology and held in Aberdeen, Scotland, May 30–31, 1990.
INTERNATIONAL ASSOCIATION OF UNDERWATER ENGINEERING CONTRACTORS SOCIETY FOR UNDERWATER TECHNOLOGY.
Edited by: Ellinas CP.
Dordrecht, Kluwer Academic Publishers, 1990. Class Number: 615.13

Automotive Fuels Handbook.
SOCIETY OF AUTOMOTIVE ENGINEERS.
By: Owen K, Coley T.
Warrendale, Society of Automotive Engineers, 1990. Class Number: 751 754 Pamphlet

Artificial Intelligence in the Petroleum World.
INSTITUT FRANCAIS DU PETROLE.
By: Braunschweig BL.
Profils IPF, 90.2,
France, Institut Francais du Petrole, 1990. Class Number: 958 Pamphlet

Bitumen Safety Code Model Code of Safe Practice Part 11.
INSTITUTE OF PETROLEUM.
3rd edition. Model Code of Safe Practice,
London, Institute of Petroleum, 1990. Class Number: 935.1 Pamphlet

Changes in the Price of Petrol in the United Kingdom following the Invasion of Kuwait: A Report by the Director General of Fair Trading to the Secretary of State fo Trade and Industry.
OFFICE OF FAIR TRADING.
By: Borrie G.
London, Office of Fair Trading, Sep 1990. Class Number: 922 Pamphlet

Crisis in the Persian Gulf: Political Causes and Oil Market Effects.
SALOMAN BROTHERS INC.
By: Hudson MC, Picchi BJ.
Stock Research/Oils,
New York, Saloman Brothers Inc. Oct 1990. Class Number: 140 900 Pamphlet

Environmental Issues in Eastern Europe: Setting an Agenda.
ROYAL INSTITUTE OF INTERNATIONAL AFFAIRS WORLD CONSERVATION UNION.
By: Russells R.
London, Royal Institute of International Affairs, 1990. Class Number: 769 131 Pamphlet

European Recommended Practices for Use and Installation of Composite Fuel Tanks and Tubulars.
EUROPEAN PROMOTION ASSOCIATION FOR COMPOSITE FUEL TANKS AND TUBULARS EPACT.
Harderwijk, EPACT, 1990. Class Number: 935.1 644 Pamphlet

Hydrocarbon Technology International 1991.
Edited by: Harrison P.
London, Sterling Publications, 1990. Class Number: 720

Information Support for the Energy Industries: An Evaluative Approach Papers Presented at a Conference organised by the Information for Energy Group, 9 Oct 1990.
INSTITUTE OF PETROLEUM.
Edited by: Etherton JJ.
London, Institute of Petroleum, 1990. Class Number: 017 Pamphlet

Oil and Gas International Yearbook 1991.
Financial Times.
1991 edition.
Harlow, Longman, 1990. Class Number: 082 Ref/Directories

Piper Alpha: Lessons for Life-cycle Safety Management A two-day symposium organised by the Institution of Chemical Engineers and held at the Tara Hotel, London, 26–27 September 1990.
INSTITUTION OF CHEMICAL ENGINEERS ICHEME.
Symposium Series No. 122,
London, ICHEME, 1990. Class Number: 935 539

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Model Code of Safe Practice Part 8

This Code is issued for use on a worldwide basis as a guide on safe practice by those concerned with drilling and production operations for oil and gas in offshore areas. It has been developed to provide information and guidelines, regarding the main subjects and support activities with their specific involvements in operations, which have impact on safety and require detailed consideration. The Code has been formulated with the aim that it will also serve as a useful document for informing those involved in support services as well as in drilling or production operations, stressing the impact of their activities on safety and the importance of maintaining good interface communication.

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Institute News

Around the Branches

Aberdeen
9 April: 'Presentation and future applications of MWD', by Mr Tony Moorley, Managing Director, Geolink (UK) Ltd.
14 May: 'North Sea safety' paper to be presented by the Department of Energy.

Humber
11 April: Ladies' Night, Beachcomber, Humberston.
15 April: 'Lubricants and cost effective lubrication' by Mr T Pond, Sovereign Lubrication Ltd. (Joint meeting at the Winter Gardens with the Grimsby Institute of Engineers and Shipbuilders.)

London
12 April: Annual Dinner Dance, Barrington House, London.
17 April: 'UK privatisation — implications for the oil industry' by Mr FG Thackerary, Managing Director, Penspen Economics.

Malta
19 April: Annual Dinner.

Midlands
17 April: 'Manufacture of lubricating base oils', speaker from BP Oil Llandarcy Refinery.

Northern
8 April: Hot Pot Supper.

Southern
16 May: Visit to BP Wytch Farm.

South Wales
18 April: 'The National Rivers Authority' by Mr P Thomas, Divisional Scientist, NRA at Gulf Refinery, Milford.

West of Scotland
12 June: Golf Match.

INFORMATION SUPPORT FOR THE ENERGY INDUSTRIES
An Evaluative Approach

Proceedings of a conference held on Tuesday 9 October 1990

There are many different ways of providing information services in response to industry needs. It is not always easy to ascertain which method of approach would be the most effective or the most economically viable.

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Institute News

Benevolent Fund

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

New Members

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Deliveries into Consumption

UK deliveries into inland consumption of major petroleum products —Tonnes

Products	*Jan 1990†*	*Jan 1991**	*Jan 1990†*	*Jan 1991**	*% change*
Naphtha/LDF	310,250	395,380	310,250	395,380	27.4
ATF—Kerosine	489,790	446,110	489,790	446,110	−8.9
Motor Spirit	1,916,970	1,935,980	1,916,970	1,935,980	1.0
of which unleaded	564,940	737,233	564,940	737,233	30.5
Super unleaded	58,090	85,470	58,090	85,470	47.1
Premium unleaded	506,850	651,763	506,850	651,763	28.6
Burning Oil	213,950	343,130	213,950	343,130	60.4
Derv Fuel	815,120	928,250	815,120	928,250	13.9
Gas/Diesel Oil	767,970	943,900	767,970	943,900	22.9
Fuel Oil	1,068,750	907,370	1,068,750	907,370	−15.1
Lubricating Oil	67,200	72,682	67,200	72,682	8.2
Other Products	522,040	417,138	522,040	417,138	−20.1
Total above	6,172,040	6,389,940	6,172,040	6,389,940	3.5
Refinery Consumption	523,090	541,550	523,090	541,550	3.5
Total all products	6,695,130	6,931,490	6,695,130	6,931,490	3.5

†Revised *Preliminary

Standardization News

IP 235 Density and Relative Density of Light Hydrocarbons by Pressure Hydrometer

This method is currently under revision by the Density Sub-Committee and the views of people involved with light hydrocarbons are being sought, to assist the sub-committee in its decision over the future of this method.

To this end the sub-committee would be most grateful for the following information:

Does the current method fully meet the requirements of industry?

If if does not;

(*a*) would it meet requirements after suitable revision?

or

(*b*) is the method no longer used and thus can be withdrawn?

Replies to the above questions should be sent to John Phipps at the IP.

IP 195 Distillation Range of Volatile Organic Liquids

Notice was given in the 1990 edition of the *Standard Methods for Analysis and Testing of Petroleum and Related Products*, that this method was scheduled for withdrawal in 1992. Following input from users and discussions within STB 9 it has been decided that this method will not be withdrawn in 1992, but that it will be maintained and revised in the near future.

Particulate matter in Aerospace Hydraulic fluids

The following test methods are currently under revision by the Standardization Committee and the views of people handling aerospace hydraulic fluids are being sought to assist the committee in its decision over the future of these methods.

IP 275/1971 (Reapproved 1985) Microscopically Sizing and Counting Particles from Petroleum-Based Aerospace Hydraulic Fluids.

IP 320/1975 (Reapproved 1982) Sampling and Processing Aerospace Hydraulic Fluids for Particle Contamination Analysis.

IP 327/1981 Counting and Sizing Particulate Matter in Aerospace Hydraulic Fluids using an Automatic Particle Size Analyser.

The information required is:

Are the methods currently in use?

If they are: do they fully meet the requirements of industry?

If they do not: would they after suitable revision? Should they be withdrawn?

Replies to the above questions should be sent to John Phipps at the IP.

Karl Fischer methods

It has come to the attention of ST-B-3, the Water and Sediment Panel that there is a possibility of confusion arising when Karl Fischer water in crude oil results are reported. IP 356 presently known as the Volumetric Karl Fischer Method could be confused with IP 386 Coulometric Karl Fischer Annex B which is by volume injection of sample. To avoid possible problems arising from this, it has been decided that IP 356 will in future be called 'Determination of Water in Crude oil by Potentiometric Karl Fischer titration' and IP 386 will be called 'Determination of Water in Crude oil by Coulometric Karl Fischer titration'. If the volume method is used for sample injection the results should be quoted as IP 386 appendix B.

New bitumen panel

A new panel ST-E 6 has been set up to study test methods for modified binders, present bitumen test methods not being ideal when applied to modified materials.

Initially the panel will look at methods applicable to bitumens modified by the addition of polymers but this may be extended to other forms of modification.

The panel held its inaugural meeting on 6 March, chaired by Dr Mike Taylor, which was attended by representatives from producers, government departments and academia. Among items discussed was the 'Mini Fretting Test', which will be the first test method investigated.

Shetland branch

'If there were only trees and sun, no residence could be more pleasant; but if there were trees and sun everybody would wish to go thither, and peace would exist no longer.'

Biot — the celebrated French philosopher on his visit to Shetland 1817.

There are over 100 Shetland Islands and 16 of them, if we include the lighthouse keepers on Muckle Flugga, are inhabited. From Flugga it is a 100 mile journey south to Fair Isle and these two islands mark Shetland's north/south limits, an archipelago created from the drowned peaks of ancient mountains following the Ice-Age.

It was into this area of hostile elements and rugged landscapes that North Sea oil made its entry in the early 1970s. The waters that had scoured the mountain peaks to create Shetland carried the oil and gas bearing sediments away to the east and west Shetland basins. It was in the east that Shell discovered the Brent Field in 1971 and BP the Ninian Field in 1974. In the west BP discovered the Clair Field in 1977.

By 1978 the fields in the East Shetland Basin came on stream via the Brent and Ninian oil pipe-lines to terminate at a terminal next to the largest of Shetland's sea lochs, Sullom Voe.

It was during the peak of construction activity at Sullom Voe that, on 15 November 1979, the Shetland Branch of The Institute of Petroleum was established. Then the youngest of the Institute's branches it quickly became active under the chairmanship of John Manson, recently retired from Esso and with the Shetland Islands Council. Membership, which has hovered around the 50 mark, is comprised of employees of the various oil companies and those working in local businesses, professions and the Shetland Island Council.

Meetings are usually held in Lerwick but at least one is held each year in the area of Sullom Voe and there is a time honoured annual trip by ferry to Bressay for the Ladies Night each September.

There have been many distinguished speakers at the branch Annual Dinner held each November. Particularly memorable was the speech made by Jo, now Lord Grimond, who, in a neat twist to the usual theme in the early 1980s, spoke on, 'The Effect of Shetland on the Oil Industry'. His successor as MP for Orkney and Shetland, Jim Wallace, is an active member of the branch and has also addressed it, giving an enlightening talk on, 'A Westminster Perspective of the North Sea Oil Industry'.

The branch has a solid core of members who are always willing to support meetings despite the weather and some unusual locations which include a floating accommodation rig, the '*SAFE Lancia*', access to which involved an incredible journey in a crude but effective lift. Former chairmen; Lindsay Smith, Kenny Crossan and John Groat have all continued to make significant contributions to the branch through continued service on the committee. John Groat must be unique in the Institute's membership in that he divides his time in managing S & JD Robertson in Shetland and Stanley Services in the Falklands.

The branch occasionally holds joint meetings with the Shetland Oil Industries Group, a group which draws the attention of the oil industry to the harbours, airports, services and facilities available in Shetland.

The branch faces the future conscious of the fact that the days of the mega-fields near Shetland are numbered and that the future developments will involve small and sometimes difficult fields.

Pictured at the Shetland Branch Annual Dinner held on 2 November 1990 in the Lerwick Hotel are; (left to right) Lindsay Smith (former Chairman), Alan Veale, Peter Guy (Secretary), John Groat (former Chairman), Basil Butler (President of the Institute), Jeremy Procter (Chairman), Kenny Crossan (former Chairman), and Chris Noble.

Mr Basil Butler, OBE, a 'Founding Father' of Sullom Voe, returned to Shetland during November to speak as Guest of Honour at the branch Annual Dinner. He expressed his belief that the North Sea and the areas to the west of Shetland still offer great opportunities but that economic success will depend on new technical advances. 'It is vitally important', he said, 'for the industry to remember that it is technologically based and that it must put aside sufficient resources to promote research and development'.

Whatever the future holds the branch will continue to play an active and important role in Shetland, encouraging the bringing together, to their mutual benefit, of all those with a direct and indirect interest in our oil industry in these islands. ■

Rugged pipe protection

Robust environmental protection of infill pipework at the Palmers Wood onshore oil development is being provided by Raychem's Traceclad covering, a product designed to give complete environmental sealing over thermal insulation systems.

External pipelines have been traced with BTV self-regulating heating cable and covered with insulation. Four hundred metres of Traceclad heat-shrink covering has been installed to ensure the polyurethane expanded foam insulation remains dry and free from dirt.

Two 3·5 inch diameter infill pipes are run along the edge of a landfill area at the development's Coney Hill site, where land movement may be possible. To enable inspection the pipes were laid in a precast concrete duct. Protective covering was required to withstand both the elements and the possibility of rubbing against concrete.

Palmers Wood, 25 km south of Central London, is among the most significant onshore oil fields discovered during the exploration of southern England in the 1980s. Estimated recoverable reserves are three million barrels of oil with first year production forecast to be 1350 b/d. Owned by Edinburgh-based Cairn Energy in association with Arco and Monument, Palmers Wood has an expected production life of 13 years of pumping. Two sites — Rooks Nest and Coney Hill — make up the field, with oil brought to the surface by 'nodding donkey' pumping units.

The installation is simple, even around valves, bends and tees which require complicated metal work for the usual cladding systems and, in addition, it will provide a vapour barrier and a degree of mechanical protection in a single layer.

Traceclad covering is composed of an irradiated crosslinked modified polyolefin backing coated with a uniform layer of a specially formulated thermoplastic adhesive.

Raychem's rugged BTV self-regulating heat tracing provides frost protection and low process temperature maintenance. The heating element, a specially blended combination of polymer and conductive carbon, creates electrical paths between parallel bus wires at every point along the circuit.

Air sampling service

Negretti Automation Ltd, based in Aylesbury, and OEH Scientific Ltd, based in Birmingham, have joined forces to provide a full air sampling service to the oil and gas industries.

Companies having to undertake regular monitoring to comply with health and safety legislation such as COSHH, will now be able to use the wide range of air samplers for dusts, fumes and gases supplied by Negretti Automation and have analytical work carried out on samples by OEH Scientific.

Pictured here is an operator using one of Negretti's two litre personal air samplers.

OEH offers a broad base of services in environmental monitoring and occupational hygiene and will use Negretti samplers in its hire service and also offer them for sale.

BP Incineration plans

BP Exploration have specified incineration rather than traditional ground flares for their new Miller Gas Reception Unit at Peterhead on environmental and efficiency grounds. The combustion engineering group Airoil Flaregas have been awarded the £300,000 contract.

The power station is currently being converted from oil-burning turbines to environmentally cleaner gas burning turbines.

The fully automated incinerator — designed and manufactured by Airoil Flaregas at their West Drayton plant — will be ceramic lined to cope with rapid temperature rises after long periods of inactivity. It will be capable of disposing of up to 1·6 tons of sour gas per hour which will be generated as tanks and pipelines are vented during planned maintenance periods.

Environmental grounds played a major part in BP's decision to install incineration facilities in favour of the more traditional ground flare at their new gas reception facility. This unit will receive low pressure gas which has been transported overland the 18km from the St Fergus Terminal to Peterhead in a 26″ diameter insulated pipeline.

Bacterial test

Midland Biocides Ltd, the new East Midlands-based specialist in microbial control systems, has a new field kit to detect and count sulphate reducing bacteria — Midkit SRB.

The kit is very simple and robust, being designed for use in the field. No additional equipment or laboratory facilities are required, although a simple incubator (also available from Midland Biocides) is helpful.

Samples of fluid suspected of harbouring sulphate reducing bacteria are drawn into the syringe provided, and injected into the kit's culture vials.

Mini camera

One of the world's smallest, low cost, complete underwater cameras has been developed by Aberdeen-based Osprey Electronics Ltd.

The general purpose OE1358 black and white mini camera is of special interest to users of underwater trenching equipment, diving bells and manned submersibles.

A compact 140 mm × 53 mm, the 0.6 kg camera weighs 0.3 kg in water and can operate to a depth of 1000 metres.

Kick research

Half a million pounds worth of offshore oil and gas research for petroleum and well-drilling companies is to be undertaken by engineers from AEA Petroleum Services at Harwell Laboratory. The research, known as the mud/gas joint industrial project (JIP), will produce improved designs of mud/gas separators.

Moving safety valves

Glasgow-based engineers Keystone claim their new Manual Operating Verification Equipment (MOVE) can reduce the risk of emergency shut-down valve seizure by increasing the test frequency without disrupting production. MOVE is designed to be permanently mounted directly to Keystone valves and actuators.

Tokheim design standards

Quality has been the cornerstone of pump manufacturer Tokheim's research into product development. With safety a prime customer consideration Tokheim pumps are fully approved to BS7117 requirements with an auto disconnect mechanism and a grade isolation device. Also an optional angle check valve has been fitted to the pump.

The valve is designed to ensure that petrol flows back into the tank in the event of a petroleum leakage.

Uvex put feet first for riggers

Fire-resistant stitching is one of the many safety features incorporated in a new rigger boot designed by Farnham-based industrial safety wear manufacturers Uvex (UK) Ltd. The boot also has a sole made of two different polyurethanes, which makes them friction and anti-static resistant.

Advanced seal

A more economic and safer seal for use in cryogenic pumps has been developed by British Gas.

The new electrical cable seal adaptor (ECSA) is for the submerged motors of cryogenic pumps, essential for the storage of liquid natural gas and liquid petroleum gas. It overcomes the problems of existing seals, which have a nitrogen purging system.

The seal was recently developed at the British Gas Engineering Research Station near Newcastle-upon-Tyne, part of the company's £75m a year Research and Technology programme. It is being manufactured under licence and marketed by CMP Mining Systems Ltd, Newcastle-upon-Tyne.

Pressure test

Hydra-Lok Limited, the Barrow-in-Furness based company, has introduced a pipeline pressure testing service.

The patented system can test pressures of up to 5,000 psi on pipes with bores ranging from 4" to 36".

Emergency shut down valves (ESDV's) are normally situated on the riser pipeline and it is very difficult to test the ocean side connection. With the Hydra-Lok system the test can be done in a couple of hours.

Bounce back

Some 1,400 tonnes of 'bounce back' bitumen is being used to overlay the A45 6 kilometres long dual carriageway by-pass at Bury St Edmunds, Suffolk.

The specially treated bitumen was used because of its elastic properties to reduce cracking over the existing road. A styrene-butadiene-styrene polymer modified version gives the asphalt the 'bounce back' characteristic and should last for 10 years.

Safety rays

Scientists at Shell's Thornton Research Centre have developed an infra-red detector for use on offshore oil platforms which can spot flammable gases.

The detector, expected to cost about £300, will work on the same principle as sonar. Specially selected wavelengths are bounced off reflectors, any gases present affect the waves and set off the instrument's alarm.

Escape harness

An offshore escape system, which the manufacturers believe will replace the knotted ropes and scramble nets currently in use on offshore installations, has been designed by Birkenhead firm R Perry & Co. It comprises 61 metres of high quality rope with the ability to withstand extreme heat, attached to a lowering device and a step-in harness.

Chubb fire hire

Chubb fire have introduced an emergency vehicle to provide a fast response to oil refinery blazes or act as a backup. Available for hire, it carries the latest fire-fighting devices, able to tackle major incidents.

Easy operation and a simple foam-making process enables foam production of approximately 58,000 litres per minute for 20 minutes on one foam tank filling. This may be discharged through a monitor mounted on top of the vehicle, producing a jet up to 30m high or an 80m throw.

The monitor is designed to give a 9:1 expansion when supplied with 6,400 litres per minute solution at 14 bar (200psi). The Godiva single stage centrifugal fire pump has a nominal capacity of 6,800 litres per minute (1,500 imperial gallons per minute) at 10.5 bar (150psi) and is supplied with water from hydrants.

The vehicle incorporates a foam liquid tank with a capacity of 3,850 litres, suitable for all types of foam liquid concentrate, although 3 percent Plus F Fluoroprotein Foam is usually carried.

US 'know-how'

Lectronic has brought in American expertise in oil supply automation technology to Britain as part of a package to supply and install equipment and peripherals for three major domestic terminals.

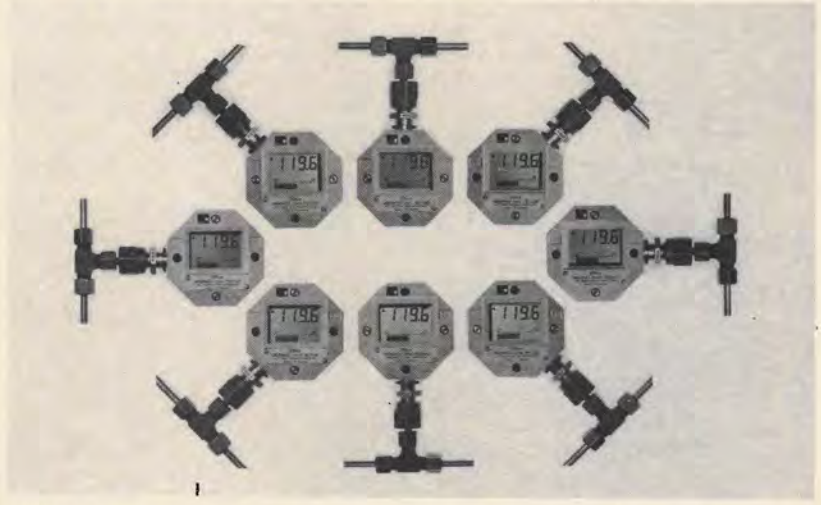
The company, part of the Micrelec group, has used the 'state of the art' Motorola 6800 real-time system made by Engineered Systems Inc of Arizona, to monitor and control access points, loading meters, earthing and overspill devices and temperature probes at Fina's Buncefield terminal and Texaco's at Brighton and Kingsbury.

Core tube

A Raychem fluid-resistant tubing is being put to unorthodox use by Statoil off the Norwegian coast. Heat-shrinkable Viton tubing is used by engineers to encase drilling samples at test wells and hold them together until they can be analysed.

Statoil discovered that Viton tubing made from a cross-linked fluoroelastomer material, has all the properties required to ensure samples reach the laboratory in one piece. After the sample is extracted from beneath the sea bed — down to 3,000/4,000 metres — the tubing is mounted on the drill bit and partly heated over the attached earth sample.

Unique pressure gauge



Differential pressure measurements can be made directly and accurately with the new Differential-Digibar developed by Hottinger Baldwin Messtechnik for use in the oil and gas industries. This unique instrument available from the Bicester-based firm is either battery or loop powered. It acts as an intelligent pressure transmitter, or simple measurement device, and gives highly accurate digital readings of pressure and analogue readings of trend, to enable better control. It is also available as an intrinsically safe device for use in hazardous and explosive environments.

The use of patented analogue/digital conversion technology and a sophisticated microprocessor means that the digibar performs and displays its measurements digitally in a small compact unit, saving space and money over traditional instruments.

Designed with a measuring range of up to 2 bar, the Differential-Digibar has a massive overload capacity of 100 bar, and a burst line pressure of 400 bar.

. . . people

Mr Tony Blevins has been appointed Finance Director for Texaco Limited. Mr Blevins joined Texaco in 1966 as an accountant in Houston.

He succeeds **Mr John Gatens** who has been appointed Fiscal Director of Texaco Europe. In his new assignment Mr Gatens will be responsible for co-ordinating all of the financial, accounting, tax, information technology and risk management functions of the Texaco Europe group of companies.

Mr John Batchelor has been appointed the new UKOOA Director based in Aberdeen. Mr Batchelor was the Chief Representative and General Manager of BP in Egypt until 1990. In this capacity he managed a multi-million pound investment portfolio and a large staff. He was responsible for the close ties which BP established with the Egyptian government and business community.

Ernst & Young have appointed **Mr George Reese** as Managing Partner of the firm's Soviet Union operations. Mr Reese, formerly the partner in charge of Ernst & Young's Houston Energy Group, will spearhead the firm's services to Western energy companies on their projects in the Soviet Union, as well as developing business in other industry sectors.

Mr Stuart Howell, below, manager of BP Oil UK's retail property and development group, has been appointed Manager of the company's retail operation with responsibility for 1,850 service stations. Mr Howell succeeds **Mr Tony Ryde** who is to move to a new retail post within BP Europe.

Coalite Chemicals has appointed **Dr Richard Elsmore** above, to the position of Technical Manager, Biocides Division. Dr Elsmore was previously business manager of Boots Microcheck Contract Laboratory.

Shell International Gas Limited have established a new division operating under the name 'Shell International Gas Trading Company' located in London and involved in the business of trading Liquified Natural Gas internationally. **Mr TW Oerlemans**, a Director of Shell International Gas Limited, has been appointed Director and General Manager of Shell International Gas Trading Company, with **Mr MJ Weston** as Trading Manager.

Mr Ewan Hunter, a former oil and gas market analyst and specialist oil publications editor, has been appointed head of PR Consultants Scotland Limited specialist oil and gas division.

The Board of Shell Transport and Trading Company plc has recommended that **Mr Mark Moody-Stuart** be elected a Director of the company from 1 July. Mr Moody-Stuart will then be appointed as a Managing Director of the company and also a Managing Director of the Shell Petroleum Company Limited, a member of the Presidium of the Board of Directors of Shell Petroleum NV and a Director of Shell Petroleum Inc thereby becoming a Group Managing Director. Mr Moody-Stuart is currently Exploration and Production Co-ordinator for the Royal Dutch/Shell Group of Companies.

. . . appointments

TECHNICAL ASSISTANT

An Assistant is required in the Technical Department of the Institute of Petroleum. He/she will assist Technical Officer — Standardisation and Technical Officer — Measurement, as required, particularly in new British Standards work which is being undertaken by the Institute.
The work will involve semi-technical activities. However, he/she will be working under the supervision of experienced Technical Officers who will explain and assist on any technical points that arise.
Candidates should have a flexible attitude and be self-starters capable of working without direct supervision. Expected educational qualifications to at least A level or equivalent.
Some previous use of a word processing system will be desirable, since PC systems will be used when these can improve the efficiency of operations.
The Institute is situated in Central London, close to Oxford Street underground station. A contributory pension scheme is in operation and benefits package is available.
Starting salary about £14,000 with annual increments depending on performance.

Apply to J Hayes, Technical Director, at The Institute of Petroleum, 61 New Cavendish Street, London W1M 8AR.

EDUCATION SERVICES MANAGER

The Institute of Petroleum invites applications for this new post which is London based, although some travel within the United Kingdom will be involved. The person appointed will take overall responsibility for the management and development of an activity to promote and enhance the profile of the oil industry and its underlying technologies in educational establishments, with a view to promoting oil industry careers as both long term and satisfying.

A good salary and benefits package is available. Candidates should desirably have a technical qualification, a broad-based career in both upstream and downstream sectors of the oil industry, knowledge of the UK education system and an ability to identify opportunities, initiate actions and follow them through.

Resumés should be sent to the Director General, Institute of Petroleum, 61 New Cavendish Street, London W1M 8AR.

The Institute of Petroleum is an equal opportunity employer and the post of Education Services Manager is open to all applicants based on merit.

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