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ABC

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Cover photo of the pump motorisation unit of the Poseidon Project.

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Government takes tough line

ENERGY Minister Colin Moynihan has told offshore operators he expects them to have fitted pipeline emergency shutdown valves on platforms by the end of the year.

Mr Moynihan emphasised that the Department of Energy would take a tough line with operators who did not meet the deadline, set out in new regulations which came into force on

12 July last year. The department's inspectors would not hesitate to use their powers to shut down operations, where they considered it necessary on safety grounds.

If, due to disruption caused by industrial action, operators are unable to meet the deadline, the department is prepared to consider requests for exemptions on a *force majeure*

basis. This involves operators submitting a specific case for each pipeline setting out the reasons for delay, the actions proposed to reduce the risk and their plans to comply.

Mr Moynihan said: 'Obviously I regret that, following industrial action in the North Sea, important safety work is having to be postponed. I am making clear the

government's position at this stage, so that operators who feel they can no longer meet the original deadline have a proper opportunity to present their case and put forward proposals for continued safe working. They should be aware that any application for exemptions will be scrutinised and if granted be time limited with rigorous conditions.'

Conoco link-up

CONOCO has announced that three major initiatives have been undertaken in the Soviet Union for the development of oil and natural gas reserves.

Constantine S Nicandros, Conoco president and chief executive officer, said a protocol concerning feasibility studies and joint venture activities had been signed for: a highly prospective area of the Timan-Pechora basin in the north European region of the USSR, an exclusive feasibility study agreement between Conoco and several large regional Soviet organisations — Tyumenneftegas, Tyumengeologia and Noyabrskneftegas — located in the Tyumen, Purpe and Noyabrsk regions of the USSR.

And an agreement with the USSR Ministry of Oil to evaluate the giant Schtockmanskoye gas field in the Barents Sea. The field is believed to have reserves of more than 100 trillion cubic feet of natural gas.

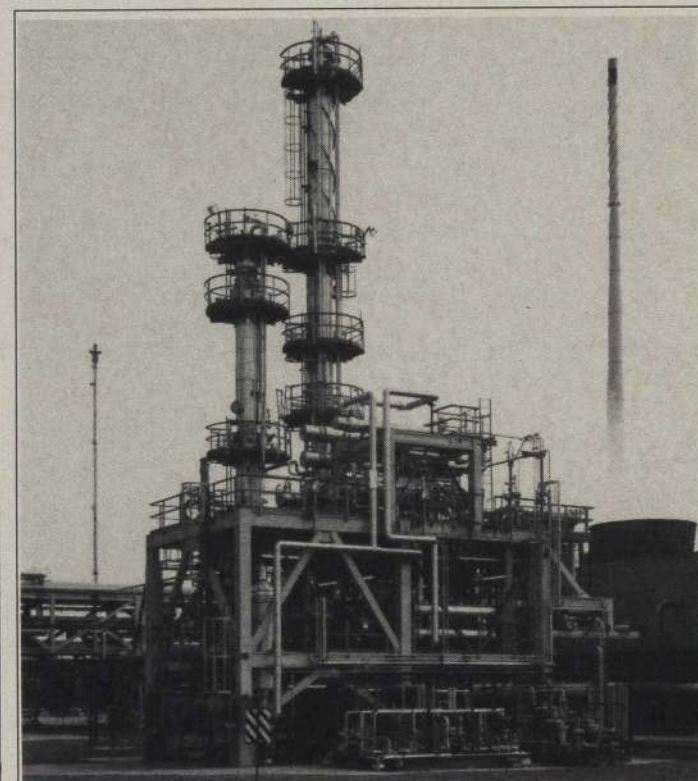
Ofgas warning

THE gas industry's watchdog, James McKinnon, has urged British Gas to 'stop hoarding gas' and accept with good grace the inevitability of competition in the gas supply market.

Mr McKinnon, the Director General of Gas Supply, had calculated that British Gas had unsold reserves of 1.5 billion therms, 15 times greater than the supplies currently available to competitors for sale to the contract market.

Addressing the European Offshore Gas Conference at Wembley, Mr McKinnon said 'In two or three years time, many competing gas suppliers will have access to significant quantities of gas. If all this gas comes into the market in a rush, then British Gas could face volatile trading conditions.'

'Rather than storing up problems for the future by hoarding gas, I urge British Gas to consider a less hazardous approach,' Mr McKinnon added.



COLIN Moynihan, Energy Minister, has welcomed the CFC replacement plant at the Conoco refinery at Killingholme as a prompt response by industry to an environmental issue of global proportions. 'We all have a duty to look after the planet and hand it on in good order to future generations.'

BP sets up office in Moscow

BP's new Moscow office was officially opened by Mr David Simon, the company's Deputy Chairman and Chief Operating Officer, during a ceremony at the Russian capital's Savoy Hotel.

At the ceremony Mr Simon said: 'We have decided to open a representative office

to look after our corporate interests and identify business opportunities for our four main businesses — BP Exploration, BP Oil, BP Chemicals and BP Nutrition.'

In 1989 BP's business turnover with the Soviet Union was around \$1 billion.

Kittiwake safety record

THE excellent safety record achieved during offshore installation work for the North Sea Kittiwake Development operated by Shell UK Exploration and Production on behalf of Shell and Esso has raised a total £41,000 for an Aberdeen charity.

The Kittiwake Project

operates a safety incentive scheme and has as its slogan, 'Safety Is NO Accident'. As a result of last year's accident-free record, a cheque for £18,000 was presented to charity and at the end of the two year contract this has now been more than doubled by an additional £23,000.

Report vindicates oil companies

BRITAIN's leading oil companies are not profiteering from the Gulf crisis by raising petrol pump prices according to the Office of Fair Trading which found that the top five companies were generating a windfall profit at the production side of their businesses, not at the retail stage.

In a report to the Secretary of State for Trade and Industry, Sir Gordon Borrie, Director General of the Office, said one of the ways the government could deal with this unexpected production profit

was to impose a windfall profits tax.

The report said that the companies, BP, Esso, Mobil, Shell and Texaco, had put their petrol prices up merely as a reaction to market forces.

It backed up the finding of the Monopolies and Mergers Commission last February which dismissed allegations of collusion by the oil companies to fix pump prices.

Sir Gordon said the industry's reaction to events in the Gulf has followed a pattern one would expect of an inter-

nationally traded raw material which had doubled its price on the market.

'Excess profits do not seem to be being generated at the retail, wholesale or, to any substantial extent, refining stages. The influence of the Gulf crisis on the demand for oil-derived products, petrol included, is undoubtedly generating windfall profits at the production stage,' he said.

Sir Gordon added 'But there is no reason to believe that this is the result of any failure in the competitive process.'

New oil on stream

THREE new North Sea fields have come on stream — 21 years after they were first discovered.

All three projects, Shell's Kittiwake and Sole Pit fields and Amoco's Arbroath field were discovered in 1969. But complex geological formations and unfavourable market conditions during the 1970s made it uneconomic to develop them.

Now new technology, innovative methods of platform production and improved prices have changed the situation and the three projects have shown the way forward for the development of the smaller marginal fields in the North Sea.

Amoco's Arbroath field, officially opened by Tony Baldry, MP, Undersecretary of State for Energy, last month, is a 'not normally manned' fully automated platform controlled from the company's Montrose field.

Shell's Kittiwake uses the first of a new generation of lift-installed, slimline platform jackets, which weighs 6,000 tonnes. It also features a four-level integrated deck incorporating almost all topside facilities.

Kittiwake has an estimated recoverable reserves of 70 million barrels of oil while the Arbroath field is estimated to produce 42,000 barrels of oil a day for the next 18 years.

Music awards



UP and coming musicians Jennifer Stinton (flute), Gerard Quinn (baritone) and Aline Brewer (harp) were presented cut glass mementoes and cheques by Mr Archie Hamilton, MP (left), for winning the Fina Young Musicians competition. Keith Parfitt (right), Fina's corporate and external affairs manager, looks on during the awards at the Purcell Room.

New Zealand's first horizontals

THE first horizontal drilling programme in New Zealand has added an extra 600,000 barrels of recoverable oil from Petrocorp's McKee field in North Taranaki. Petrocorp Exploration recently successfully completed the programme, involving the McKee-12 and Tuhua-4 horizontal wells and is pleased with the results.

The two wells cost about \$3 million each to drill and test — double the normal cost for

onshore New Zealand — but an additional 600,000 barrels of recoverable oil, at \$US16 per barrel, should net Petrocorp an estimated extra \$15 million in revenue.

Both wells were drilled to a vertical depth of about 3000m but deviated to the horizontal in the last 600m or so. The two wells — both part of the McKee accumulation — are being monitored to evaluate fully their productivity performance.

Gas deals

BRITISH Gas has signed three agreements to transport gas from new fields to industrial and commercial sites in the United Kingdom.

BP Gas Marketing Ltd, Mobil Gas Marketing and AGAS Ltd will all use the Bacton gas terminal to implement the schemes, which all come under government '90/10' rules. John Huggins, British Gas's Director of gas transportation services, said: 'We are doing all we can to promote the use of space in British Gas pipelines by other organisations, encouraging real competition in gas supplies.'

Search for funds

CHIEF executives from eight leading independent US oil and gas companies flew into London with an urgent quest for hundreds of millions of pounds of UK investment money to help finance desperately needed expansion projects covering acquisitions, oil exploration/drilling and increased production in North America.

The companies told a one-day conference attended by 124 British financial institutions that the investment funds were required to bridge the yawning gap that had opened up since the mid-1980s between US consumption and production.

First gas purchase

KINETICA Limited has announced the completion of its first agreement to purchase gas from a UK North Sea field.

This agreement, with four of the partners in the Ranger-operated Anglia gas field, gives Kinetica more than 57 percent of Anglia's production for the first two years of the field's life. The four Anglia partners involved in the gas sale to Kinetica are Ranger, Conoco, Amerada Hess and Triton.

11 September

The Chemical Industries Association has called for a new government body to take charge of environmental policy-making and enforce pollution controls.

12 September

British Petroleum has won approval from the Department of Energy for the development of the Bruce field.

East Germany will begin experiments early in 1991 in the use of rape seed oil to power truck and tractor engines.

Locally incorporated Kuwait Petroleum Singapore Pte Ltd is awaiting recognition that it is the legitimate oil company representing the exiled Kuwaiti government so it can claim oil products refined under crude processing deals in Singapore.

Amoco Oil Co has agreed to store oil spill-response material at four terminals around Michigan Great Lakes shoreline.

The Venezuelan government has asked the US administration to help finance major expansion projects for its petroleum industry and to encourage American companies to invest in the country.

13 September

New Zealand Petroleum Co Ltd will drill an onshore exploratory well near the McKee oilfield in the North Island's Taranaki region.

14 September

Mobil has signed a deal with British Gas covering the transportation of gas from Bacton direct to industrial customers.

The board of Deutsche Shell AG said that East Germany needs to boost its number of petrol stations to 3,000 from the current 1,300 to stop drivers waiting in long queues.

Statoil is going ahead with the construction of a new underground storage area, near Etzel on the North Sea coast, to act as a buffer for additional gas delivery to the continent.

Mexico will reach near self sufficiency in basic petroleum products in the next four years under current investment plans according to Pemex.

European Community governments have decided to encourage the use of natural gas by scrapping a 1974 decision designed to deter states from building gas-fired power stations.

17 September

The Canadian energy minister reported that the Hibernia offshore oil project will be in production by 1996.

Gabon is producing 275,000 b/d because of the Gulf crisis — 80,000 barrels more than its OPEC quota according to the Petroleum Minister.

Amerada Hess has agreed to buy BP's 4.4 percent stake in the Norwegian Brage field.

18 September

PTT, the Thai national oil company, has been given government approval to develop natural gas resources in Myanmar, in cooperation with Unocal.

Norway has received applications for 52 offshore blocks from 24 oil companies for the country's biggest licensing round since 1965.

Exxon Co USA said that major contracts have been awarded to develop its Mobile Bay deep gas reserves offshore Alabama.

19 September

Petrobras has confirmed it is to double investments in 1991 in its effort to produce 1m b/d by 1995.

20 September

Amoco UK and Mobil North Sea are to sell stakes in the North Sea Hutton field.

The Hungarian National Oil and Gas Corporation has secured about 10,000 metric tons of gasoline from Yugoslavia in a barter transaction.

Indonesian Petroleum Co will participate in commercial production of crude oil at the Belida oil field in the southern part of the South China Sea from August 1991.

Iran is considering proposals by various governments and private companies for joint ventures to build storage for Iranian crude in the Far East.

Iran will supply oil to Zimbabwe to replace imports from Kuwait.

21 September

Approval has been given for a £20m power station which will run on chicken droppings to be built at Eye in Suffolk.

Australia is producing nearly 90 percent of its oil needs and despite the Middle East conflict is 'well placed' to meet its requirements, according to the government.

Indonesia has agreed to sell South Korea crude oil on a long term basis at 50,000 b/d.

Chevron Corp said it will accept bids for its oil and gas exploration properties in Spain.

24 September

Santos Ltd reported that it will produce naphtha for Australian and international markets from the beginning of 1991.

Texaco Inc has plans to sell a low emission diesel fuel in California to meet new, strict state requirements which will take effect from 1993.

25 September

Norsk Hydro A/S have found and tested an oil and gas deposit in the North Sea, southeast of the Oseberg field.

Tunisia and Elf Aquitaine signed an agreement for oil exploration at Bor-el-Khadra in the southern-most part of the country.

26 September

Lasmo have announced the go-ahead for the Cohasset and Panuke oilfields development off Sable Island, Nova Scotia.

The government of the Dominican Republic have begun to ration gasoline because of shortages brought on by the Gulf crisis.

27 September

BP Shipping was fined £3000 by Hythe magistrates after admitting discharging oil and water into the sea at Southampton Water after an equipment failure.

British Gas Plc has purchased three oil fields in the San Jorge region of Southern Argentina for \$89m.

The Rotterdam Energy Futures Exchange will close after just under a year of trading.

28 September

Venezuela signed an agreement to finance oil sales of 6,500 b/d to Haiti under the same terms of the San Jose accord given to Caribbean and Central American nations.

British Petroleum Co Plc has received final approval to develop Papua New Guinea's first commercial hydrocarbon project.

Union Pacific Resources has an agreement with Oryx Energy Co to buy producing properties in two fields for a total price of about \$109m.

1 October

Australia has given foreign investment approval for Mobil Oil Australia Ltd's acquisition of the petrol retail and refining interests of Esso Australia Ltd.

Nigerian National Petroleum Corporation gave the go-ahead to plans to refurbish two refineries because the combined capacity of 235,000 b/d was under-utilised because of chronic unreliability.

A Kuwait Petroleum Corp unit will proceed with a plan to open over 100 gasoline stations in central Thailand by the end of 1991 despite problems faced by its parent company after the invasion by Iraq.

2 October

Teredo Petroleum Co is buying British Petroleum's interests in a number of onshore licences in the south of England, including Humby Grove for a total of £3m.

4 October

Water and waste management companies feature heavily among the first renewable energy projects to be supported by a levy on electricity bills in the United Kingdom.

The Algerian Economy Minister said the country will use an oil price windfall from the Gulf crisis to clear \$600m in international debt arrears owed by public and private Algerian companies this year.

Elders Resources has put its 49.6 percent stake in Australia's Bridge Oil on the market as part of an Aus\$1bn divestment programme.

5 October

The UK government has ordered Amoco to improve safety features on the Leman Alpha gas platform by the end of November or face criminal prosecution.

Hungary has purchased about 480,000 metric tons of African light, sweet crude on the spot market to cover the country's energy needs up to mid-November.

Turkey's state oil and transportation company, Botas, is currently carrying out feasibility studies for the storage of natural gas under Lake Tuz.

India, Pakistan and Bangladesh, which had relied heavily on Kuwaiti refiners for oil products, are now turning to Singapore for their supplies.

8 October

British Petroleum have brought in Mobil North Sea as a 50 percent partner in four offshore blocks in pioneering frontier areas in the Rockall Trough area, west of Scotland.

9 October

Chile is to set up a \$130m 'oil stabilisation fund' to protect its economy from the volatility of world oil prices.

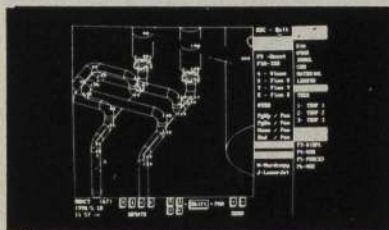
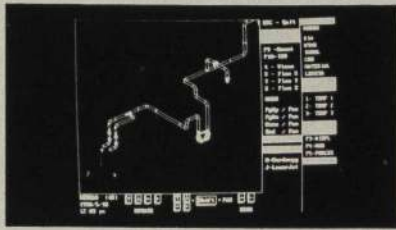
Nigeria has earned more than \$1.2bn in excess oil revenues from high prices caused by the Gulf Crisis.

10 October

An international consortium led by Texaco has made two new finds of crude oil in wildcat wells off the north west coast of Angola.

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The Meaning of 'Independent'

Mr Ettore Garsetti, SGS Redwood, Milan

Commercial Awareness — is it expected/necessary?

Mr Stuart Whitelock, Vitol Trading, London

Interpretation of Analytical Results

Mr John Church, Associated Octel Ltd, Ellesmere Port, Chairman, ST-L3 (IP Precision Evaluation Panel) and Convenor of ISO/TC28/WG2

Functions Expected of the Inspector — can those functions be met?

Mr Nigel Lucas, Caleb Brett International, Chelmsford

General Discussion and Conclusions

Registration Fees: £85.00 plus VAT for IP Members £120.00 plus VAT for Non-Members

For a copy of the registration form, please contact **Caroline Little**, The Institute of Petroleum, 61 New Cavendish Street, London W1M 8AR. Telephone: 071-636 1004. Telex: 264380. Fax: 071-255 1472.

A view on oil's future arising from the Middle East crisis

Dr Paul H Frankel, CBE, is an independent economist who for many years advised oil companies and governments worldwide. He was the founder of Petroleum Economics Ltd, of which he was president on his retirement. Among his many international decorations for his work he has the Cadman Medal, the highest award of the Institute of Petroleum.

In an interview with *Petroleum Review* in early September he provides an analysis, so far as it can be seen, of the effect on the international oil industry of the complex Middle East crisis.

He also suggests that the main oil companies, through their financial muscle, presence and technical expertise, can achieve some sort of stability in oil production in the area.

The event, he suggests, will lead to a building of more refining capacity worldwide.

Geoffrey Mayhew: In oil terms, what was the situation in the Middle East prior to the recent events?

Dr Paul H Frankel: To talk in oil terms, we have first to look at the background of the oil industry in that area. In the preceding period the oil industry was almost autonomous there. Its operations were based on the concessions which were granted originally during periods in which the countries depended, more than they did afterwards, on the main Western colonial powers.

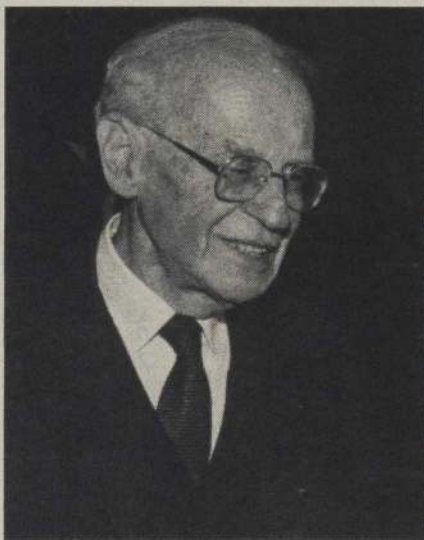
This position was destroyed by the wave of nationalisation, but as time went on the countries which then ruled the area realised that they did need the technical and administrative ability of the oil companies.

We have seen in the last few years a progressive development of contractual relationships which included, in some cases, a direct right to the oil to be produced or to be found.

This creeping return of the oil companies to their traditional habitat has now been interrupted by the political upheaval, and one cannot make a forecast on the development in the long run without looking at the problems which are immediately faced by all concerned.

Will the, by now traditional, structure change?

We have to realise things never go on forever as one was used to see them. Although the declared aim of the United States is the reinstatement of



Dr Paul H Frankel CBE

the *status quo ante*, we cannot believe that with all our Prime Minister's horses and the President's men that Humpty-Dumpty can be put together again.

As we are talking today, it is difficult to be quite sure whether the present situation will have a peaceful or warlike denouement, and to make forecasts in the frame of an interview due to be published in several weeks' time is leading with the chin.

Yet certain assumptions can be made against the background of which some relevant statement about future developments are possible.

It is safe to assume that the current

effort of the United States, endorsed by the United Nations, will, in one form or another, result in a situation in which the peace of the world and the supply of oil will not depend upon the whims of a pocket dictator.

It is also fair to assume that the enormous effort now being made by virtually all members of the UN could not be compatible with anything but the prevalence of a reasonably secure and stable regime in the whole area.

Whether that would mean a complete reinstatement of the several regimes involved is difficult to forecast, but there will be in any case a form of coexistence which will safeguard the political stability of the area and secure access to its resources.

Would security of supply be more important than price?

I do not think that these two elements can be separated. If there is no security in the area, there is the latent fear of shortages, which tends to keep prices high.

The more secure the industrial activities are, the more likely is the development of a situation in which, by competition or otherwise, prices are held and kept at a reasonable level, which before the current crisis would have been in the range of \$18-20 a barrel.

Is the refining situation possibly the most interesting factor?

Well, I have spent most of my active life in the oil industry as a refiner and I

am very impressed by the fact that, whereas refining for decades was a depressed area of the industry, it is likely to develop in the next few years into a kind of bottleneck which would call for substantial investment and meantime involve a premium which the existing refining capacity can expect to earn.

Could this lead to a building of more refining capacity world-wide?

Yes, including, especially, more sophisticated upgrading facilities to meet evolving needs for certain products and their qualities.

Could such changes affect the present Middle East refineries, making them more, or less, attractive?

This depends upon the features of the emerging regimes.

What might we see happening in the downstream market?

High prices may curb demand growth, thus sharpening competition.

You spoke of the increasing return of the oil companies to their traditional habitat on contractual relationships before the current crisis. Do you think that will continue?

Here we should not, in the first instance, look at equipment but at people. Do you really believe that after the experience which they and their families have faced there will be a rush to take jobs in that area, however great

the financial inducements may be? Consider the exodus of the Asian migrants, who on their own decided to quit and without whose work the infrastructure in these countries would probably lack the proper viability?

Thus, we must look at the future from the human point of view, which means it will take some considerable time for working in these areas by foreigners to become a manageable proposition.

What will happen in the meantime? Is it possible for other oil producing areas to increase their production on a long-term basis?

Without going into mathematics, I would be sure that the elimination of Iraqi and Kuwaiti production can be managed by alternative sources of supply as long as Saudi-Arabia and the Emirates are not affected and can increase production according to potential capacity.

Perhaps I should add that the position would be entirely different if Saudi Arabian capacity were to be affected – both in production and refining – a possibility, incidentally, which gives reason to pause to the people who have to decide on the military solution.

The American and the British production is to a great extent limited by the resources available under present technological conditions. The possibility of an increase of Russian exports is certainly well worth investigating, although the current internal developments, in what we still call the Soviet Union, may not be as favour-

able to any rapid development in that direction. Things tend to get worse before they get better.

Is it possible this would lead to a greater development of North Sea resources?

I believe in the worldwide context the opportunities in the North Sea are marginal.

What could all that mean for oil companies involved in the Middle East?

The fate of these companies does not altogether depend on their positions in the Middle East. It is remarkable that most of the big companies involved, even after they lost much of their profits some of them used to earn upstream, have managed to remain profitably operating entities on a global scale. Anyhow, a stable situation in the Middle East, backed by world opinion and American hardware, must provide a sympathetic environment for the oil companies, and, therefore, result in reasonably stable profit margins.

Is it therefore possible that the current crisis situation might lead to some sort of stability for the main operating oil companies?

Probably, because they are really the only ones who have the muscle to do the job, simply because the security of return is, mainly for political reasons, not sufficient to attract altogether new capital. The road is thus being kept open for those with intrinsic knowhow, the fact being that they are already there in the business. ■

Exploration and Production Discussion Group

The next meeting of the E and P Discussion Group will be held at the Institute of Petroleum on **Thursday, 15 November 1990** starting at 5.30 pm. (Tea and biscuits will be available from 5.00 pm.)

Abandonment — A Review of the Current Situation

Speaker: **Mr AD Read**, Deputy Executive Secretary,
The Oil Industry International Exploration and Production Forum (E and P Forum)

If you would like to attend this meeting please contact **Mr AE Lodge**, Institute of Petroleum, 61 New Cavendish Street, London W1M 8AR. Telephone: (071) 636 1004 Extension 236.

Subsea developments

By Steve Sasanow

As the offshore industry moves into the 1990s its fourth decade of activity in the North Sea, the production of oil and gas from underwater well completions, so-called subsea production, once considered to be 'new technology', has become relatively commonplace and almost routine.

This is not to suggest that there are no more challenges, either environmental or technical, to be met by subsea engineers. The deepwater of the Norwegian North Sea and the Haltenbanken region to the north are only just being met head on with the first full-time production in waters beyond 300 metres due to begin early next year. It is only a matter of time, too, until one or a group of operators takes the development 'plunge' into the icy waters of Tromsøflaket.

In the UK sector, deepwater production is certainly much further in the future, although some of the first steps are being taken now. A consortium of operators – BP, Elf and Esso UK – with holdings in Quadrant 206, north-west of the Shetlands, has organised a joint 3-D seismic shoot to better define the Clair field, a giant structure thought to hold several billion barrels of oil, but of a very heavy type that would require special handling, in addition to the inherent problem of being remote from any infrastructure.

BP has also recently spudded a west of Shetlands well, 204/27a-1, in an area where the bathymetry has indicated waters of 200–300 metres. This location is even more remote than Clair.

The real challenge, though, particularly in the British North Sea, is economic, not technical. It is to get the most production with the smallest capital investment, making the best use of the vast and growing infrastructure of platforms with spare processing capacity and pipelines with additional transportation capability. This is how to make the large number of small and marginal oil and gas fields viable and economic.

Just for example, take Phillips' Moira field (16/29a), which came on-stream this summer. It is a small (6 million barrels) oil accumulation sitting on the same block as the operator's Maureen platform. At an isolated location with no mother platform to handle processing and transportation, Moira

would be just another sub-economic find to be filed away. But sitting where it does, 10 kilometres southwest of Maureen which has lots of spare processing and offloading capacity, Moira, at a minimum investment of £19 million, with a single subsea xmas tree and a 6in flowline, becomes instant cashflow.

Nor is Phillips finished in the area yet. It has at least two and possibly three other small finds nearby that it hopes to bring into production via Maureen's facilities. This is one of the key development scenarios of the 1990s – cheap and cheerful.

Tariff wrangles

The Moira example explains, to some extent, why there has been a large amount of asset swapping and buying amongst operators this past year. There seems a keenness – and quite logical, too – by operators to acquire prospective acreage and even known small finds near to their own facilities to ease development and limit wrangling over tariffs.

Just to digress for a moment, tariffs are a very contentious and sensitive issue amongst operators on both sides of the development table. Those with small fields which need to avail themselves of the facilities of other operators want to minimise tariff charges to maximise profits. Those with the facilities want to make the most of them, especially on fields with declining production.



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There are several good examples of how important the tariff can be. Texaco North Sea has been toying with the Strathspey (3/4a) prospect, destined as either a pure subsea development or subsea to a floating production semi, for well over two years, while it has wrangled with Chevron over charges.

If a suitable tariff for processing and transportation can be finally negotiated, then the project will be subsea; if not, Texaco may have to opt for a floater and a lower transportation-only charge.

At the same time that Texaco has been unable to settle with Chevron, which is seeking additional processing for its Ninian facilities, Conoco and Lasmo have been able to negotiate suitable tariffs with the same operator to put subsea production from Lyell (3/2a) and Staffa (3/8b) through Ninian. More about these new developments later.

The tariff issue is as important in Norway. Twice in the last year, energy officials have said in public forums that operators should make their profits from producing oil, not from charging tariffs, and that such charges should not stand in the way of any field developments. Such overt policy statements must be seen as something more than a hint to the oil companies.

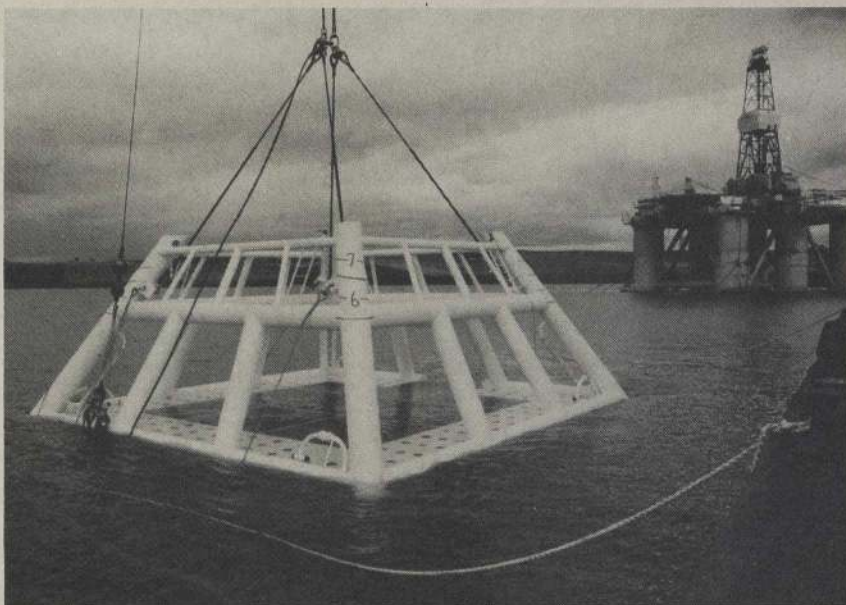
Another operator, like Phillips, who has been attempting to make the most of its facilities is Mobil. In the last year, it has brought on two small subsea satellites, Linnhe and Ness II (9/13A), to its Beryl complex. The latter is a real mini-structure with production of just 2,500 b/d from one well – very low productivity by North Sea standards – although it will double when a second well, for water injection, is brought on later in the year.

Subsea is not only for small projects. To prove just the opposite, two of the UK sector's major new developments, Amerada Hess' Scott (15/21, 15/22) and Shell Expro/Enterprise's Nelson (22/11, 22/6a) have large subsea production and water injection components as part of platform-based scenarios.

Subsea Xmas trees

Amerada Hess, in a relatively short time, has leapt from being an obscure licensee to a major North Sea operator, primarily on the back of subsea technology. Only last year, Amerada brought Rob Roy/Ivanhoe (15/21) into production using a semi-based floating production system processing crude from two subsea manifolds. It was not only the first use in the North Sea of clustered subsea wells to manifolds – previously production had been from template/manifolds or individual wells – but its order for 18 subsea xmas trees from National Oilwell was the biggest ever in the North Sea at the time.

Now with Scott, Amerada will be a frontline operator. When the field



The well-head protection structure manufactured by Cromarty Firth Engineering Co Ltd, being lowered into the water for towing to Texaco's subsea field, Petronella.

comes on in 1993, its production of 181,000 b/d will be the biggest of any field in the UK sector. And its recent order for 24 subsea xmas trees will be the biggest ever placed anywhere in the world.

The field development scenario for Scott shows how much confidence an operator like Amerada has in subsea production. There are to be seven subsea production wells (plus 15 water injectors) which will be pre-drilled and completed ready for production as soon as the platform is installed and commissioned. This will result in peak production being reached almost immediately as the field comes on-stream, creating very strong cashflow early in the project.

Almost as important will be the three water injection manifolds pumping 360,000 b/d of water into the reservoir through 15 wells to keep production high. The water injection programme will begin six months into field life.

Amerada will again use manifolds and clustered wells (for water injection) while the producers will be connected back to the platform by discrete flowlines in order to allow for careful monitoring of reservoir behaviour.

Another technique that will speed the project is the use of a pipeline end manifold, or PLEM. All of the subsea flowlines and the oil and gas export pipelines can be laid and tied into the PLEM before the platform is ever in place. Once the jacket and topsides are installed, it will be a much shorter and quicker job to install the 300 metre jumpers from the platform to the PLEM.

Shell has a strong subsea team work-

ing on the Nelson project. This field, also due to come on-stream in 1993, is expected to be producing 115,000 b/d.

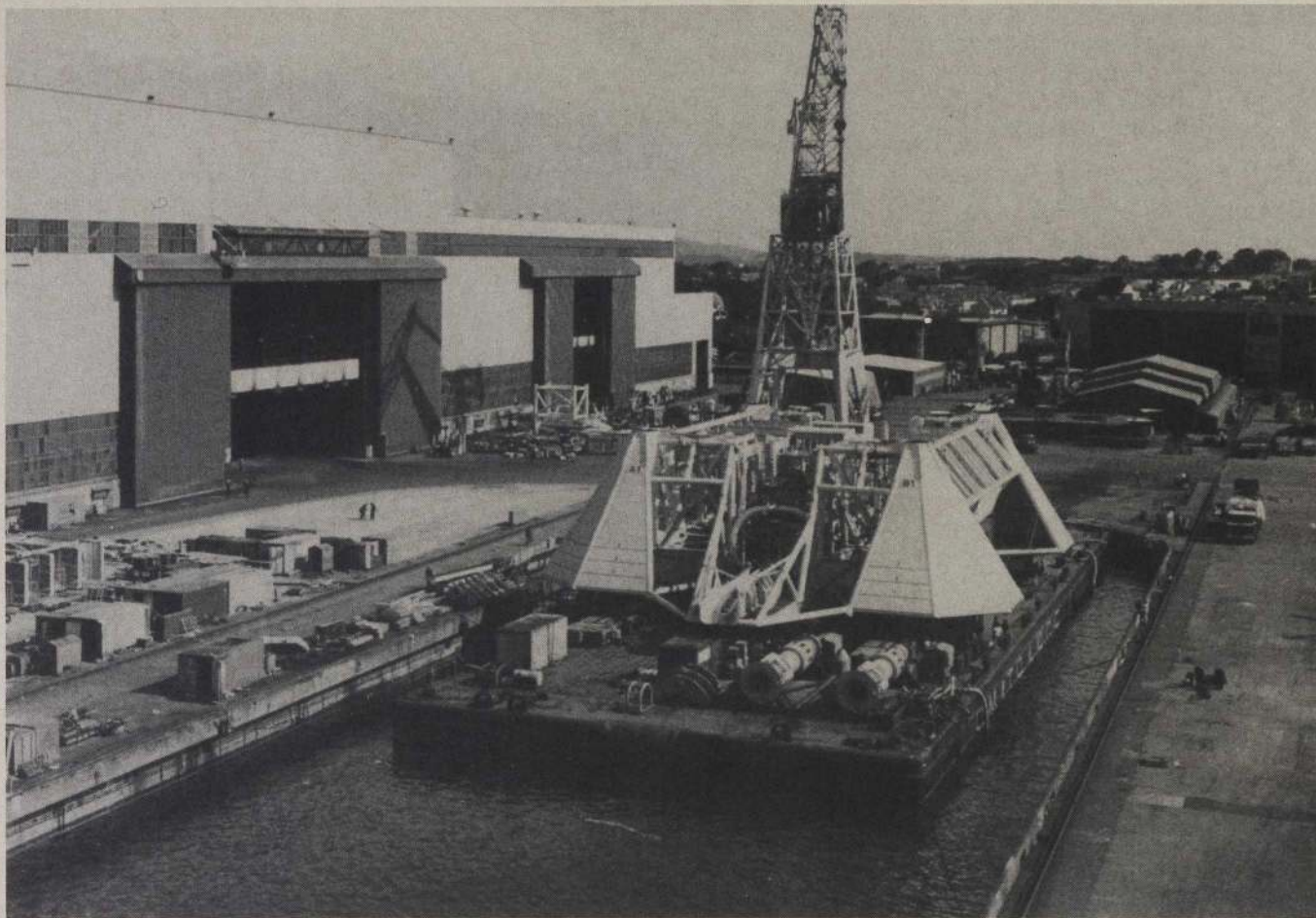
What is known, though, is that Enterprise, which operates the 22/11 block, has made a very good find with appraisal well 22/11-11. It is already saying that this new addition to the known reserves will require four or five extra subsea wells – two or three producers and a pair of water injectors.

Satellite fields

In between the small satellite wells and the mega-projects – Scott with its 450 million barrels of oil is budgeted at more than £1 billion – are several of the classic subsea satellite fields already mentioned – Conoco's Lyell (3/2a) and Texaco's Strathspey (3/4a). Both are in the pre-engineering stage with Brown & Root Vickers and are expected to carry on into detailed design.

Lyell is to be a 13-well development with eight producers and five water injectors producing through a central manifold no more than 30 metres from any well. This is Conoco's first big subsea development in the North Sea – it did have several subsea satellite wells to Murchison but they have all been shut in now. It has another project, Buckland (9/18a), in the conceptual state with Mentor Engineering Consultants plus several other small finds that it is keen to develop soon.

Texaco, on the other hand, has many years' experience subsea. Its Highlander field (14/20) came on-stream in 1985 as one of the first really big subsea field developments in the North and then the firm added the



Norsk Hydro's TOGI subsea station loaded on a barge at Stavanger.

smaller Petronella satellite on the same block a short time later. Both are tied into the operator's Tartan platform.

Strathspey, which has been a long time in gestation, was originally to have been a Highlander Mark II scenario with a large (12-slot) template/manifold with a few satellite wells. But the operator has had time to review the concept and is now possibly thinking in terms of clustered wells and a central manifold, but the final configuration has yet to be decided.

Third party operator

Another new project – with a new North Sea operator – is Lasmo's Staffa (3/8b) field. This development, which is expected to get Department of Energy approval very soon, is of note because it will be the first subsea development in the UK sector in which processing is being handled by a third-party operator.

One project which has only just moved into higher gear is Agip UK's Toni field, being developed jointly with Tiffany on what is known as the T-block (16/17). The significance here is that the contract just won by Cameron Offshore Engineering is the first subsea EPCI (engineering, pro-

curement, construction and installation) award in the UK sector.

Other projects already under development, but not onstream yet, include Shell Expro's Osprey (211/23a) and Gannet (21/25, 21/30, 22/21, 22/26) (see *Petroleum Review*, October 1989) and Total's Alwyn North Extension, while BP's Cyrus (16/28), producing through its mono-hull offshore production vessel *Seillean*, and Marathon's Central Brae (16/7a) are in production. In Ireland, Marathon is also developing Ballycotton (48/20), a single subsea well satellite development to its main Kinsale Head gas complex, Eire's only offshore production to date.

Norwegian projects

In Norway, there are four subsea projects currently under development. Norsk Hydro has a pair at either end of the complexity scale.

At the less complex end is Mime (7/11), a one-well test production project that came out of a study by Hydro on how to cut the cost of subsea production. Several of the early Norwegian subsea projects, specifically Gullfaks and Oseberg satellite well developments, were very expensive

and both of the big Norwegian operators, Statoil and Hydro, instituted major internal cost-cutting reviews that were seen as essential to the future of developments there.

Two of the key design elements of Mime are the use of a flexible (Coflexip) flowline that could be reeled up and re-used after the project is complete and a new lightweight aluminium protection structure that could be installed by a small monohull support vessel.

At the other end is the much talked about Troll Oseberg Gas Injection (TOGI) project (31/5) which features both deepwater (303 metres) and long-distance (48 kilometres) remote production (see *Petroleum Review*, October 1989). It is due on-stream in February next year. There will also be a single satellite gas well, dubbed Gamma North, to the second phase of the Oseberg development.

The third project is Saga's Snorre (34/4, 34/7) which is based on a tension leg platform (TLP) as a field centre in 325 metres with a giant subsea production station that is the latest evolutionary stage of Exxon's Submerged Production Systems (SPS) and Shell Expro's Underwater Manifold Centre (UMC).

Finally, there is Norske Shell's Draugen (6407/9) development, the first in the northerly Haltenbanken region. It is based around a classic Norwegian concrete platform but with several subsea satellite producers and small subsea water injection template. It is in deepish waters (265 metres) and was the first large scale EPC (without installation) contract that was awarded to Kongsberg Offshore with subsea hardware by FMC.

Enormous challenge

One would be remiss in not mentioning Conoco Norway's Heidrum (6507/7, 6507/8). Although the field development will be based around a concrete TLP, there will likely be a large-scale water injection element, which will be done by subsea wells. There may also be a phase II of the

project involving subsea production from the perimeter of the field.

The future in Norway is enormous and challenging. The next project up is Statoil's Statfjord satellite projects – North (33/9) and East (33/9, 34/7). The early conceptual work, like that for Mime, was aimed at finding areas for major cost-cutting and the result can best be described as repetitive engineering, ie five or six small templates of exactly the same design connected via flowline bundles. The projects have been held up by political wrangling over the Norwegian government's share of the licence, but this should be settled by the end of the year.

Beyond these projects are many on the horizon. For Hydro, there is Oseberg Beta and other small structures around the Oseberg (30/6, 30/9) field plus Njord (6407/7, 6407/10) in Haltenbanken, which is expected to

employ a floating production system.

There is also Troll West (31/5), currently the object of test production with horizontal wells by the production ship *Petrojarl I*. Early next year, the same ship will carry out a similar but longer-term test on Esso Norge's Balder (25/10, 25/11) prospect.

Saga is looking closely at Tordis (34/7), for either subsea or a floater. Although it shares the same block at Snorre, production will more likely be processed at Statfjord. Statoil also has Gullfaks South (34/10) and Elf Norge has a number of small finds around its Frigg (25/1) complex.

It is possible that some projects and fields have been omitted in this review and that is indication that subsea production has gone from being a 'special' technology used only on occasions to an everyday tool available to any operator who needs it. ■

Avonmouth and Plymouth Incidents

Proposed Meeting with HSE

FOLLOWING two incidents which occurred in 1988 during the top loading of road tankers at Avonmouth and Plymouth both Shell and the Health and Safety Executive have carried out extensive research into the possible cause of these events.

In both cases middle distillates were being loaded into compartments which had previously contained petroleum spirit, ie switch loading, and the investigators concluded that static electricity was the most likely cause of the incidents.

Because of its effect on the build-up of static charges the conductivity of the middle distillates currently being handled was compared with those available 10 or 15 years ago. For a variety of reasons the conductivity of the current fuels was shown to have decreased significantly.

Dr HL Walmsley of Shell's Thornton Research Centre gave a paper entitled *Electrostatic Ignition Risks in Road Tanker Handling* to members of various technical committees at the Institute on 30 October. The paper, which will be published in the December issue of *Petroleum Review*, investigates the electrostatic risks arising during loading of petroleum products and examines the effectiveness of some measures aimed at reducing these risks, it concludes that the use of antistatic additives in middle distillates is advisable for typical UK road distribution operations.

A meeting is to be arranged shortly with HSE, at their request, to discuss switch loading and precautions against static induced ignition.

Subsea production — a mature technology?

By Steve Sasanow

The maturity of a technology can, without doubt, be determined by the nature of the research and development (R & D) work that is being carried out to advance the state of the art.

Are new grand overall schemes being concocted that would allow quantum leaps into uncharted territory? Or, on the other hand, are the advances seen more as 'fine-tuning', ie attempts to increase the technological efficiency without necessarily breaking new ground.

If one accepts this premise, then it is easy to see why subsea production technology, now accepted as a 'conventional' tool, has gone past the mega-project stage into one of subtle improvements. So gone now are the big conceptual projects — Shell's DIMOS (diverless modular oil production system), BP's DISPS (diverless subsea production systems), Esso's EDIPS (Esso Deepwater Integrated Production System), Statoil/Mobil's UPS (Underwater Production System) and Mobil/Kvaerner's SAS (Single Atmosphere System) — designed to set down the basis, if not the specifics, of what a subsea production system should look like.

Most of these projects were aimed at deepwater, ie 300 metres plus, production, only just becoming a reality in the North Sea on the Norwegian Troll and Snorre fields, and all were conceived in the pre-1986 crude price crash period. At that time of escalating crude prices, it was assumed that deepwater production would become a reality and a standard in the North Sea somewhat sooner than it has. Undoubtedly all of the operators who ran the big projects learned lessons from the work done, which they would be expected to apply when the time comes to develop a deepwater field, even if much of the work were discarded. Some of the ground rules changed, though. Cost efficiency and simplicity, which were not exactly bywords of the big projects, have become paramount. It could be, also, that modular designs, in which large amounts of hardware are packaged and retrieved together based on expected failure rate, are replaced by those employing insert technology, such that individual pieces of high risk equipment can be pulled and replaced, most likely by a remotely-operated vehicle (ROV).

Snorre field

The one project that has seen a long-term concept put into practice is the subsea station portion of Saga

Petroleum's Snorre (34/4, 34/7) field development in Norway. It is a third-generation system, having descended from Exxon's Submerged Production System (SPS), tested in the Gulf of Mexico in the 1960s, and from Shell UK Expro's Underwater Manifold Centre (UMC) of the early 1980s. The influence of Esso Norge, Exxon's Norwegian subsidiary which is acting as technical adviser to Saga, is unmistakable.

Some of the basics of the SPS/UMC concept are there — a big template/manifold with through-flowline (TFL) technology for downhole servicing and a rail network that allows a specially-designed remotely-operated maintenance vehicle (ROMV) to land on the facility to employ insert replacement and retrieval for seabed equipment.

There are also differences, as there are in most concepts, to reflect field specifics. The huge template, currently being built at Kvaerner Rosenberg in Stavanger, has 20 well slots (two rows of five each on either side of a central manifold), although only 10 would ever be used at a time, to accommodate the short well lifespan before watercut exceeds the economic limit. This will allow for an inner row well to be shut in, a new well drilled in the outer slot, the subsea xmas tree to be lifted and shifted to the outer row and re-connected via a new well jumper.

EDIPS successor

At the other end of the concept scale is Esso UK's DMAC, the successor to EDIPS. The latter was not really a concept, but actually a theoretical scenario in which Esso established expected challenges and problems and then set about solving them. Having completed its work on EDIPS, Esso took on board some of the smaller and subtler achievements from the project in terms of ROV tooling development and used them as the basis for developing intervention technology that would be appropriate even for subsea production in shallow water.

If big concepts are out, what is in? There is no doubt that multiphase technology and subsea separation, different solutions to the problem of handling and transporting subsea well-stream fluids containing both oil and gas, remain the focus of much of the industry's attention.

The former is a complex subject that has three distinct areas of study. First, there has been work on better understanding the phenomenon of multiphase flow (MPF) in pipelines. Second, the development of a multiphase meter (MPM) would be seen as a big boost to subsea developments. And finally, there is the multitude of projects on multiphase pumps (MPP).

A good deal of work on MPF in pipelines has been done by a new

number of operators but the most significant and readily applied work has been done in Norway by Norsk Hydro and Statoil. Hydro has advanced the TOGI project in which gas is being transported 48 kilometres from the western flank of the Troll field for injection in the Oseberg reservoir.

Flow problems

Similarly, Statoil, a partner in the multiphase transportation Poseidon project with Total and the Institut Français du Pétrole (IFP), had the responsibility of working on hydrate and MPF problems. It is applying that work on the development of the main Troll gas reservoir, which will see unprocessed gas transported to shore.

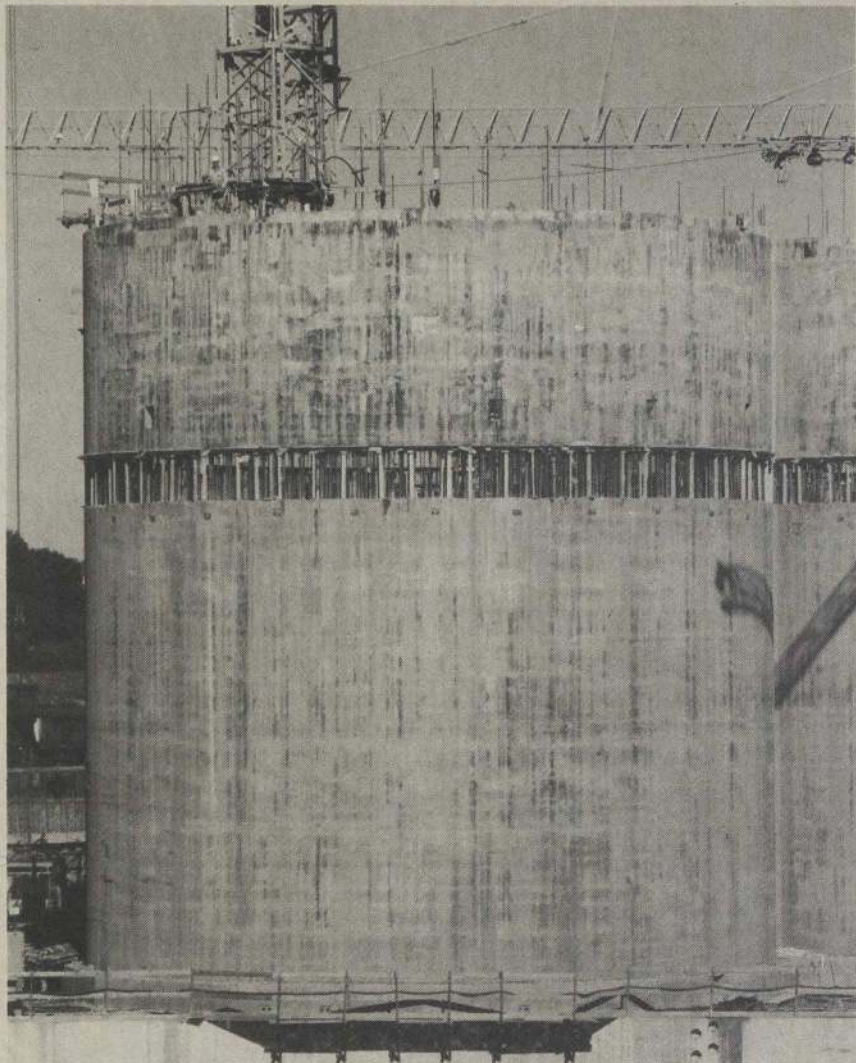
Theoretical work on flow is not as exciting as developing new pieces of hardware and there are handfuls of companies and research institutes working on MPM and MPP.

Texaco North Sea was the first to fully develop a multiphase meter, which could separate liquid from gas and then measure the quantities of oil and water in the liquid phase. But its MPM is called a station, a large one at that too. The real answer is to develop a meter small enough to fit around or in a pipeline without being intrusive. Work being advanced at Norway's Chr Michelsen Institute is on such a device and is being field tested now. Work on meters is also being carried out by National Engineering Laboratory in association with Moore, Redwood & Barret, and Euromatic.

Multiphase pumps

Multiphase pumps have been the elusive device seen as essential to developing deepwater subsea fields long distances from platforms. Testing of pumps developed by Weir and Multiphase Systems goes on but the first application of MPP technology will be at Norske Shell's Draugen (6407/9) development. Shell and Framo Engineering have been developing the SMUBS (Shell multiphase booster station) concept for a number of years. The pump that will be used, built by Pompes Guinard under licence from IFP (from Poseidon), is not the ultimate pump technology but that wasn't Shell's aim. It has other pump developments — by Framo, Bornemann and others — under its gaze but SMUBS was developed to prove installation and design concepts.

Subsea separation is sometimes described as a competing technology with multiphase pumps — split the oil and gas before transportation in order to avoid the problems of MPF. This is not really the case, as most operators will



Concrete foundation template for Snorre

tell you that field specifics will, as with all technology, decide the best development concept.

British Offshore Engineering Technology (BOET) completed testing of its prototype separator at Hamilton Bros' Argyll/Duncan/Innes complex and is now undertaking a study for Marathon on the use of its separation technology for the operator's West Brae (16/7a) prospect. Testing of the Goodfellow Associates' GASP system is also complete, while Kvaerner Engineering is only just now pushing its Kvaerner Booster Station (KBS) concept into the prototype stage. Norsk Hydro has already shown interest in the vertical separation concept.

Aker Engineering also has a design — TSSTS (three stroke separation and transportation system) — which requires more engineering. Possibly the most intriguing, though, is VASPS, being developed by Baker Jardine-Mentor, because the concept which sends well fluid down a vertical spiral separator in a shallow well and pumps the fluids with a downhole pump is very simple.

Umbilical systems

One other area that is attracting attention is the signal and power umbilical as part of the subsea control system. Always seen as expensive and vulnerable to damage, the umbilical is being looked at closely in a study funded by the Department of Energy and several operators for failure rates and types of damage.

The alternative to identifying umbilical problem areas and avoiding them is to eliminate the umbilical. Control specialists FSSL and GEC Avionics have been working on acoustic-based umbilical-less systems for a number of years, although Tecnomare in Italy already has had one in the water and operating for Agip in the Adriatic since 1987.

There are other areas that continue to attract attention — platform inspection techniques that can be carried out by ROVs, the use of composites, new welding technologies and subsea shut-down valves. All are, though, subtle improvements that have proved the notion that subsea production is now a mature technology. ■

The Poseidon Project

By Emmanuel Engelmann, Total CFP, Paris and Tore A Torp, Statoil, R&D Centre, Trondheim

The Poseidon Project started in 1984 with the objective of making multiphase production a normal mode of production for smaller fields, at least for first applications, over distances no longer limited by the field available energy (pressure) but capable of reaching existing distant facilities, or facilities located where the effluent could be treated cheaply.

Statoil, Institut Français du Pétrole (IFP) and Total CFP, supported by EEC funding, took up the challenge of launching what appeared at the outset, to be a wildly optimistic venture.

The project included:

- A multiphase rotodynamic pump for long-distance effluent boosting has been developed and bench tested. It is to be installed on an onshore field by mid-90.
- A subsea driving unit for this pump has been assembled and tested sub-sea, offshore Norway and, as a result, some improvements of this unit are now under final development.
- A fully transient mode computer model has been built, of which further developments are still under study. It is now in the validation phase, using an extensive data bank compiled from several existing multiphase lines.
- A new pipeline concept able to keep the effluents hot and fluid under all operational phases has been sea tested. Field test is imminent in 1991.

After the onshore test, programmed for 1990, a trial will be conducted offshore on a North Sea platform to assess not only the hydraulic performance of the system, but also its long term behaviour in a rough marine environment.

There are clear economic incentives indicating that a wide area of application exists, and will be expanding in the coming years, so that the launching of a first generation of multiphase production developments is imminent, heralding what will become the most common mode of petroleum production.

A quiet revolution

In the field of multiphase production, technology has progressed so fast in

the past five years, that it may soon be quite surprising to hear a development manager say: 'This time we will have to produce monophasic on site.' Because most likely in the very near future, nobody would think of treating fluids on site if this is not required for specific reasons.

The simple words 'multiphase production' will disappear from the petroleum jargon, as the term 'production' will be commonly used to refer to the multiphase concept.

The needs driving it

On-site treatment is essentially required to make fluids transportable to a distant location where they are exported or where they receive final treatment. On field treatment to commercial specifications has been applied extensively, since it is uneconomical to duplicate treatment locations and as fluids have to be separated on the field for easy handling, a simple additional on-site treatment could provide a directly marketable product.

With ever-increasing offshore investments, especially in the North Sea, and as a result of the oil price collapse in 1986, more and more operators have been reducing their on-site facilities as much as possible. Moreover, when we consider the North Sea, the fields' gradual decline and the smaller size of new fields have offered extra treatment capacities at reasonable distances from any new location. This applies to all well-known petroleum regions to a certain extent.

Therefore multiphase production represents a key element in the field developments of tomorrow.

The Poseidon Project

All these considerations encouraged three companies with practical and theoretical expertise in this field of technology, IFP, Statoil and Total, to create a joint research and development programme in 1984, which they named Poseidon.

The principal aim of this programme was to provide answers to the previous questions:

- Is it possible to boost multiphase fluid, and how?
- How, and how far can this fluid be transported?

Probably one of the most particular aspects of the Poseidon Project is the ambitious attitude shared from the outset by all three partners. At the time the project started none of the components involved existed in the form needed to work in the conditions that are the very basis of the project. Instead of fixing intermediate steps, as is usual in such circumstances, the partners decided to proceed directly with extremely challenging objectives:

For subsea applications:

- water depth: 0 to 600 m
- distance to shore: 0 to 300 km
- total flowrate (oil and gas): 40 000 BPD
- gas oil ratio: 300 Sm³/m³
- inlet pressure at the pump: 10 to 40 bars
- full wellstream
- 2 years MTBF.

Now as the research phase draws to a close, it can be said that this decision was certainly the best strategic choice that could have been made.

It is a fact that the main technical options taken during the course of the Poseidon Project would have been

delayed if it had been a staged research and development programme but the approach adopted has forced the project team to review all aspects of deep water multiphase production and provide a specific answer to all questions raised in the overall context.

What has been achieved?

After six years of intensive work, the achievements are as follows:

A. Pumping

A rotodynamic pump, fully marinised, has been developed, built and bench tested by IFP with extremely encouraging results. **Table 1** summarises the results obtained during a year of testing in Solaize, France. In particular it must be pointed out that pure liquid to pure gas (GLR 0 to infinite) has been tested, with or without upstream buffer capacity, *but with no recycling*, and in any type of slugging conditions, including typical severe slugging and well restart conditions.

The hydraulic efficiency was recorded as about 50 percent with a 90 percent gas fraction, which is much higher than is generally observed for this type of pump.

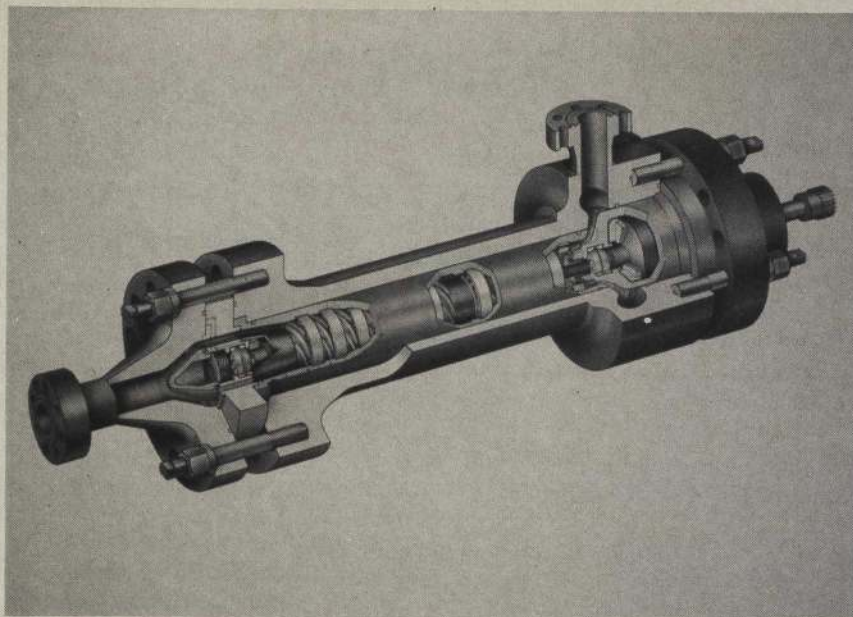
The future prospects of this component are what really count. Keeping the same technology, and with minor modifications, the range of application can be estimated as shown in **Table 2**.

The next step for this prototype pump is to meet real field conditions at Sidi El Itayem, in Tunisia, where the partners have built multiphase testing facilities. Testing should start at the end of 1990, when the hydraulic and endurance trial programme has been completed in Solaize. In the meantime, a volumetric twin-screw type polyphasic pump, manufactured by Bornemann, is being evaluated at the Sidi El Itayem facilities.

Tests are underway, so it is too early to draw any conclusions, although we have observed that performances are what one would expect from this type of volumetric pump. In particular, a high pressure head is easily delivered (40 to 60 bars), but gas pockets cannot be handled without efficient recycling. This is not easy to process remotely. Also, to make sure the pump works smoothly an upstream buffer capacity would be needed.

It must be emphasised that regulation of multiphase flow is difficult to achieve properly and technical solutions should avoid heavy regulation.

Finally, such a pump could be con-



Multiphase pump

sidered for specific surface applications, but must certainly be completely redesigned should subsea applications be contemplated.

B. Driving system

Regarding the driving system, the electric solution was selected. Hydraulic and electric drive assemblies were investigated and compared at an early stage, and the hydraulic driving found to be inapplicable for mid to long distances from the production centre (more than 20–30 km), whereas multiphase boosting is mainly required for long distance transportation.

Consequently, a high voltage, high power subsea-mateable electrical connector had to be developed, control of long distance variable frequency current transfer to be mastered and, of

course, an electric motor to be validated for a continuous subsea run.

A subsea driving station was built and tested in the Fusa Fjord between 1987 and 1988 and resulted in the full validation of a 1 MW subsea connector and the confirmation of our main electrical options on the motor. However the loss of insulation after 4000 running hours led to a redefinition of subcomponents which is now under completion.

In addition the electrical transfer chain has been thoroughly investigated and is being modelised to provide the optimum configuration for each specific case.

C. Fluid flow and properties

One of the most significant aspects of the multiphase fluid transportation is

P300 Pump – results

	Specified	Actual
Pressure head	20 bars	20 bars
Flowrate	25 000 BPD	35 000 BPD
RPM	6500	4500
GLR	10	10 to pure gas
Slugs	N.A.	Easy handling
Dry Gas	No ΔP	15 bars ΔP
Efficiency	?	45% to 25%

Table 1

P300 Pump – potential

Flowrate	Up to 200 000 BPD
Pressure head	Up to 35 bars
GLR	≥ 20 at nominal efficiency
Efficiency	$\sim 50\%$
Inlet pressure	5 bars

Table 2

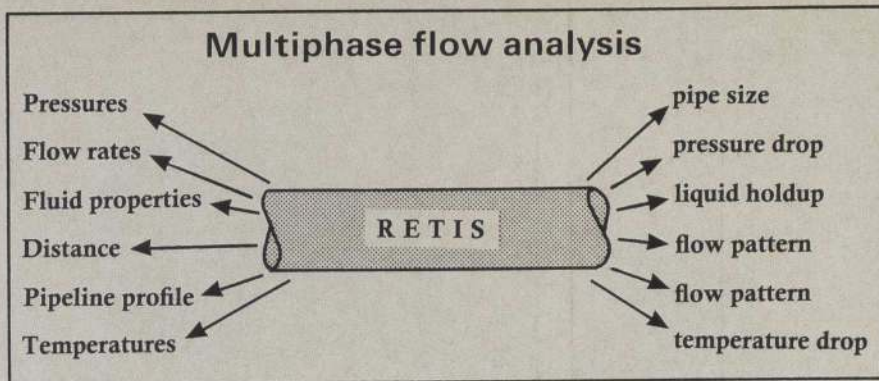


Figure 1

certainly the pipeline transfer, which covers many hydraulic and physico-chemical aspects. The problem can be related to navigation in difficult Norwegian coastal waters — with a good map and an experienced navigator safe planning and operations are not extreme in any way.

Statoil has slowly but with dedication worked towards this goal since 1979. As in general in the oil industry cooperation has been with many partners. Poseidon has put special emphasis on validation with measurement campaigns on existing multiphase pipelines.

Today, we have available a two-phase, transient simulation tool, to draw the necessary 'maps'. Our 'navigators' are becoming increasingly experienced after having studied close to a hundred existing and planned multiphase pipelines. An overview of influencing factors and required simulation results is shown on **Figure 1**.

The Troll project decision to go for the onshore alternative came after thorough simulations and lengthy discussions. Among other things, the question of safe design and operation of the pipelines had to be beyond any doubt to justify the enormous investments. We know the outcome.

Beyond gas with light condensate as with Troll, we need to extend further to incorporate water and possible solids to meet oncoming needs for 'mapping'.

Poseidon also realised that long distance transfer needed better 'navigator' insight into the fluids properties, in pipelines. Since hydrates were the least known and with possibly the gravest consequences for the operations, we concentrated on hydrates.

We clearly recognise the effects of wax, sand, emulsions, etc., and especially their combined ability to create operational problems. Nevertheless, hydrate formation and behaviour in pipelines were scarcely studied and less reported.

Petresco, an innovative specialist

company in Norway gave a most handy tool, a wheel. Under controlled pressure and temperature changes, it allows the study of the hydrate phenomena in flowing conditions that simulate pipeline behaviour. The tests can be run with small samples of the real fluids.

Generally hydrates, like snow and ice, can take on a multitude of shapes and behaviour. That tendency to block a pipeline will increase with increasing water cut, and is probably not so surprising as that of a slow start-up or flow (< 1 m/s) which is very critical.

D. Pipeline concepts

In parallel with the efforts to understand the fluids behaviour, Poseidon needed to develop new concepts to avoid the inherent problems from the cooling along the pipeline. To keep the well fluids hot during all phases of operation, production as well as start-up after long shut downs, demands a pipeline concept with:

1. insulation and
2. a heat up method.

The methods sought for, had to be consistent with economically available

laying methods and be possible to inspect and repair after a possible outer damage. Laying by one of many towing concepts were straightforward. S-laying from a barge with numerous field joints offered nearly impossible obstacles.

The ITTI (Induction Through Thermal Insulation) concept has been developed from theoretical calculations, through laboratory and sea tests and a patent is now pending. The concept combines freedom to use most available insulation and corrosion protection materials and a set of standard electrical sea cables. The prepared pipe sections can be field jointed on a barge in conventional way and continuous long cables put outside the pipe as a piggy-back operation. Supplying the cables with alternating current will then heat the steel pipeline itself by induction.

A first field installation of 8 km of the ITTI concept will probably take place on a Statoil operated field in 1991.

Further work

As can be seen from the above, a tremendous amount of work has been accomplished and thanks to the combined expertise of the three partners, major technological steps have been achieved and 'know-how' accumulated, which place the Poseidon Project partners in a leading position to play a significant role in the coming era of multiphase production.

Still, it must be realised, that if multiphase production is now a fact, it is not yet common practice, especially as far as boosting is concerned, and therefore the industrial support has to be consolidated and grow before such

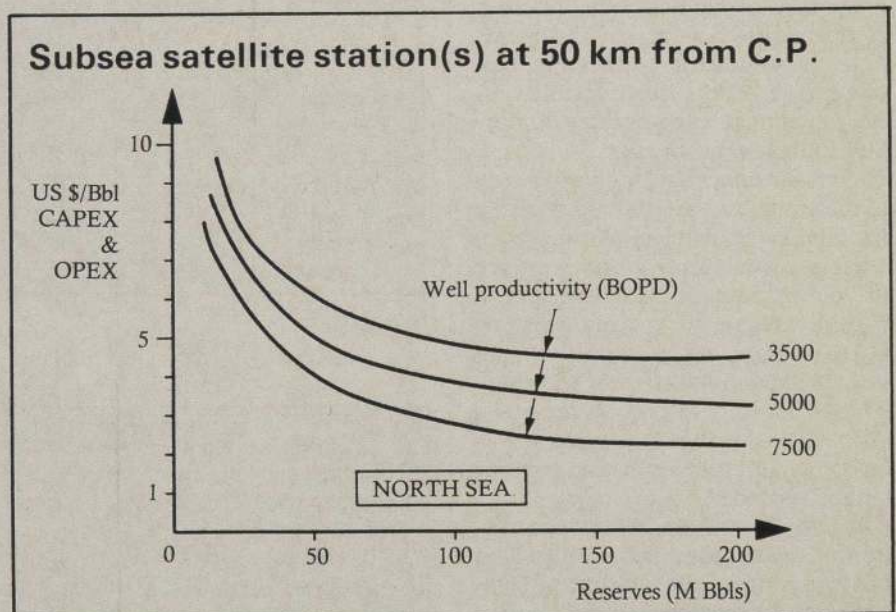


Figure 2

techniques can be considered proven industrial solutions.

Besides, the multiphase technology has to improve and expand its range of applications, thanks to the experience progressively gained, to areas such as gas ratio, or difficult and heavy fluids. In other words, multiphase boosting and Poseidon, of course, are now in a probational, or pilot phase, which is going to last for at least the next three to five years.

Economics

If we consider that multiphase pumping is only one specific component of the system, and may not be required when wells provide sufficient energy for natural fluid boosting, yet the mastery of the transportation parameters makes it possible to control long distance multiphase transfer in any transient operating conditions. This control thus avoids either having to reduce the transportation system's capacity or build excessive slug catching volumes at prohibitive costs, or even arrive at a physical blockage of a line.

As mentioned earlier, the Troll multiphase option, can definitely be said to be the fruit of multiphase research efforts.

When multiphase pumping becomes available, many new production opportunities will open up. Firstly for subsea remote stations, where the economical incentive is by far the greatest because this concept reduces in-situ facilities to the minimum, and gets the most from an existing infrastructure, and because it provides increased recovery by reducing the wellhead flowing pressure. This

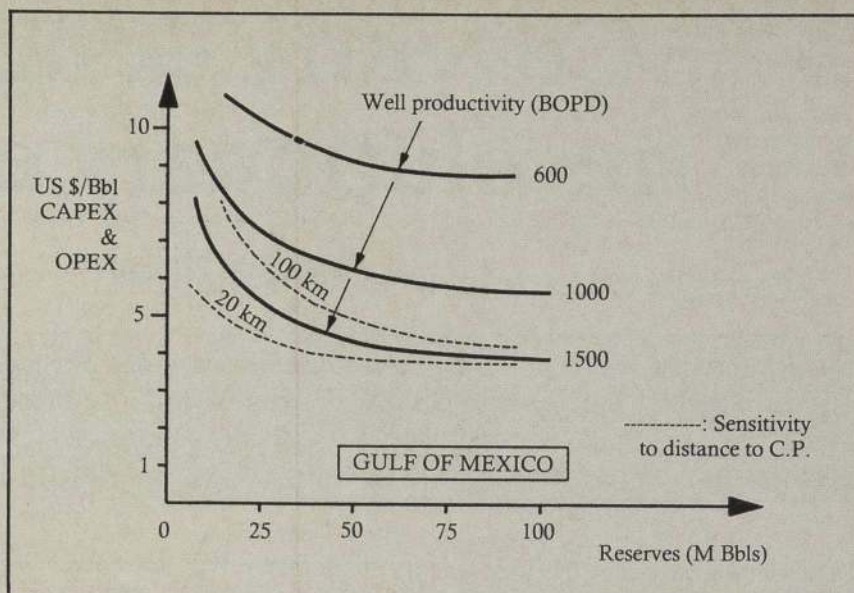


Figure 3

obviously assumes that subsea wells productivity is sufficient to pay back the operating costs; which is true whether subsea multiphase boosting is involved or not.

This is illustrated by Figures 2 and 3. They give, for typical North Sea and North America basins, the overall cost per barrel (CAPEX and OPEX) of a subsea multiphase production station (or a group of subsea stations) located at the average 50 km from the treatment centre. The unit cost is a function of field estimated reserves, and wells productivity. (Boosting if necessary, pipelines and umbilicals, control and energy supply are included; treatment and final export are excluded).

From these graphs, built on parametric studies, it can be seen that above

a minimum threshold of reserves, the economics are little affected by the volume of reserves, but are highly dependent on well productivity.

This is equally applicable if one considers a group of multi-wellhead platforms on a typical Middle East field, where multiphase boosting can be used (see Figure 4).

Conclusions

To conclude on the possible future of multiphase production, a perspective of the potential market must be reviewed in the light of the above considerations. Such perspectives have already been worked out and presented on several occasions.

Most sources agree that 4 to 6 billion barrels of reserves, for the North Sea area only, may be concerned by the multiphase production technique, of which more than 60 percent are in Norway. These accumulations are not too far (generally less than 50 km) from existing treatment facilities which provide more and more extra treatment capacities, now that many North Sea fields are progressively declining.

Moreover, Norway probably offers the best North Sea potential with deep sea prospects where significant sized fields may still be discovered. With an average 30 percent cost reduction (CAPEX and OPEX), when compared with conventional solutions, the multiphase production should offer a huge potential of saving in the North Sea area which would amount to billions of dollars.

This is bound to offer many opportunities for the Northern Europe petroleum industry, and for that of Norway in particular. ■

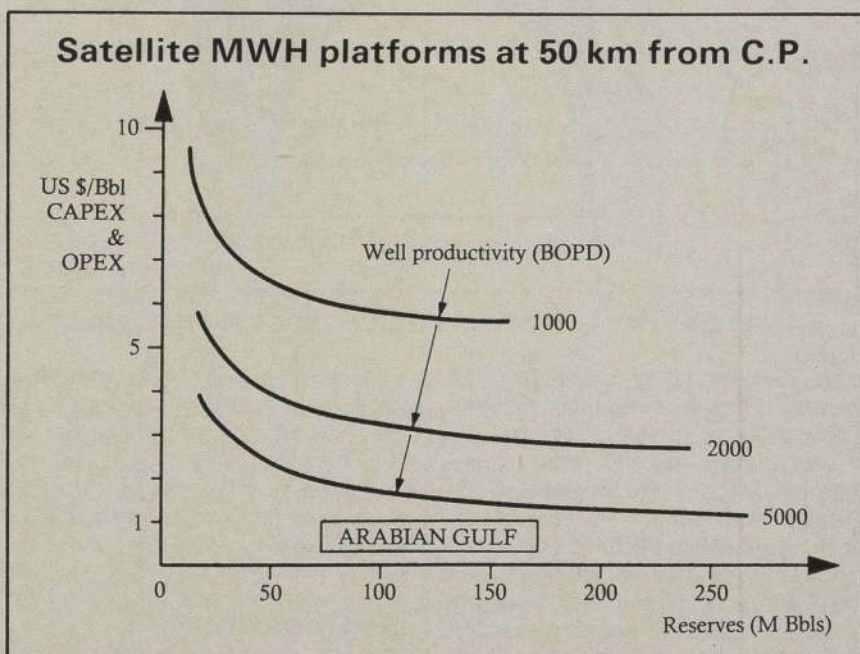


Figure 4

Coventry designer's revolutionary engine

By Carl Nelson

For the last 100 years, the automobile industry has existed within the confines of the Otto (spark ignition gasoline, or SIGE) engine and the diesel engine. All this could change with the arrival of a revolutionary new combustion system for the reciprocating internal combustion engine, invented in Britain by Dr Dan Merritt of Coventry Polytechnic.

Dr Merritt was inspired by the looming energy crisis and growing public concern for the environment and his invention could part answer these two concerns.

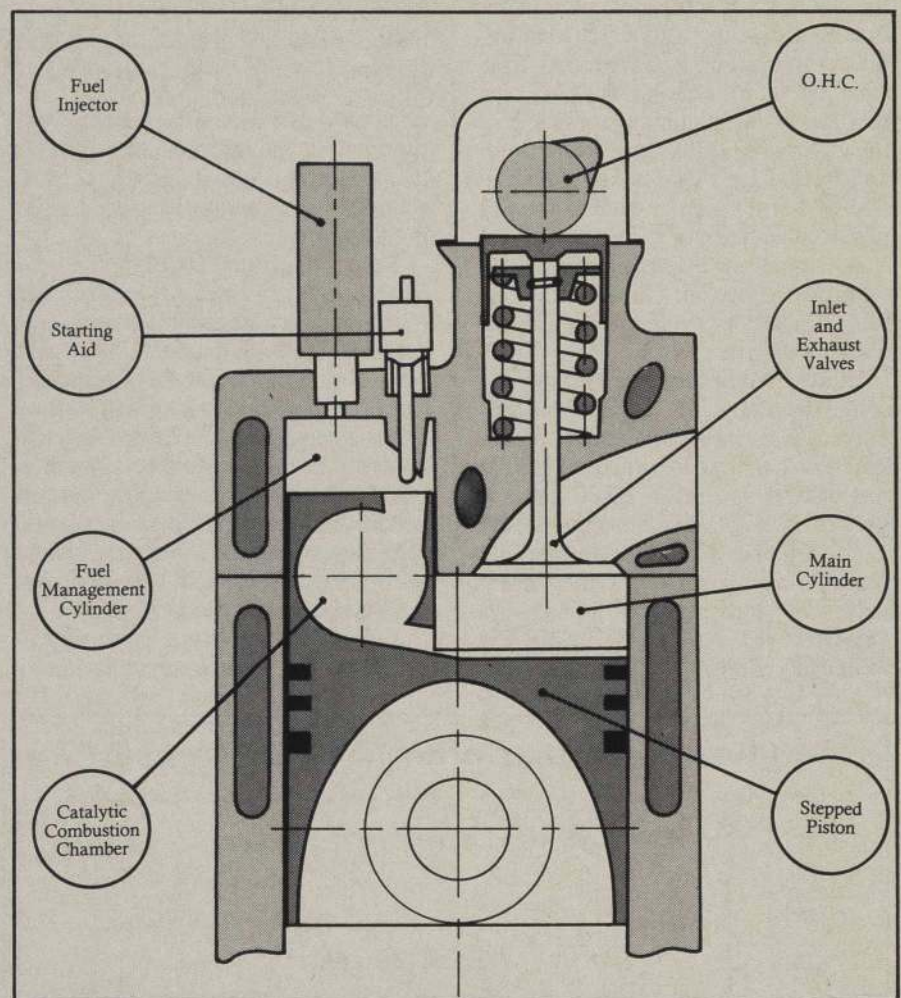
Dr Merritt, a highly qualified thermodynamicist, has taken an overview of both the Otto and diesel engines and combined the most efficient features of both within one system. The product is the result of five years' work, initially funded by Dr Merritt himself and the far-sighted Coventry Polytechnic. The initial success of the project led to interest and investment from Coventry City Council and the Department of Trade and Industry. The DTI awarded Dr Merritt SMART awards on two occasions, totalling some £80,000. The labours of Dr Merritt and his team look set to enjoy the benefits of private investment to be able to take the concept beyond the early prototype stage following recent presentations to General Motors, Ford and Chrysler.

Classic principles

Just how does the Merritt engine deserve the label of 'revolutionary'? The classic principles of the Otto engine, developed in the 19th century, require that the gasoline and air are mixed together, before being compressed inside the engine's cylinder and are then ignited, by spark, to expand and create motion. Spark ignition is very temperamental, requiring a rich fuel air mixture within fairly narrow chemically correct (stoichiometric) proportions so that when fuel intake is reduced, for less power, the air input must also be reduced by the same proportion to keep the mixture the same.

The big advantage of the pre-mixing method is a very fast combustion process leading to high engine speeds and hence high power output.

The diesel engine, on the other hand,



The Merritt 4-stroke catalytic combustion engine

does the opposite by 'segregating' the fuel from the air during the compression stroke. The fuel is injected, as liquid under a very high pressure, into the engine cylinder to be ignited by the very hot compressed air. Segregation and compression ignition allows the diesel to burn small quantities of fuel in a full charge of air producing the highly efficient 'ultra lean burn' combustion process. It also allows the use of high compression ratios, denied to the Otto

engine because of the 'octane rating' limitation of gasoline and this aids thermal efficiency further. In fact diesel engines can halve the fuel consumption of a passenger car when driven around town, as any taxi driver will tell you.

Segregation

The main problem of the diesel engine, however, is the slow combustion

process which results from the initial burning of liquid droplets, a much slower process compared with the burning of the explosive gaseous mixture in the Otto engine.

The Merritt engine is based on a discovery of a new segregation principle which allows the fuel time to vaporise before it enters the combustion chamber, already mixed with some air. The segregation principle depends on a 'gas valve' effect, without moving parts and operates very rapidly. When the prevaporised fuel enters the combustion chamber, it is ignited by a combination of compression ignition assisted by a platinum catalyst deposited on the walls of the combustion chamber.

The segregation principle depends on two pistons, of unequal size, moving in opposite directions towards the combustion chamber. The latest design combines the two pistons in one stepped piston arrangement.

The fuel is injected under low pressure onto the hot head of the smaller fuel management piston and mixed with primary air. This volume acts as a fuel vapour segregation chamber. Inside the larger main piston, unthrottled air is compressed to a higher pressure than that of the fuel and is forced into a circular catalytic combus-

tion chamber so designed as to achieve the best mixture for combustion of fuel and air. This happens when the 'fluid valve' reaches the point when the fuel gas enters the combustion chamber, mixes with the air and ignites. This happens when the pistons reach the end of the compression stroke.

thermal efficiency of the dominant car engine, which averages a shocking 14 percent in urban driving situations (against a figure of some 30 percent predicted for the Merritt engine) but also for the type of fuel used. There is no octane number or cetane number requirement from the fuel which can

'The market potential for the engine is astronomical'

Theoretical performance prediction for the Merritt engine show a promise for halving the fuel consumption of a typical car driven over the urban ECE15 driving cycle, in comparison with a modern Otto engine. Experimental evidence gained on the engine prototype under development has not yet reached this promise but, in view of the small resources devoted to development so far, the results are very encouraging. Since the engine is being developed under strong patents, its performance is a closely guarded commercial secret to safeguard the interests of shareholders and investors.

Exciting solution

Not only does the Merritt engine provide an exciting solution to the poor

be either lead free gasoline, alcohols, LPG (propane, methane) or a mixture of gasoline and alcohols which promise very low levels of harmful exhaust emissions.

Although Dr Merritt believes that 'The market potential for the engine is astronomical,' the need for substantial investment in development to an in-vehicle prototype is not easily fulfilled in Britain where venture capital is not readily available for longer term risk projects and the remaining motor industry is struggling in a very competitive market.

Perhaps the economic pressure of rising fuel prices will save the engine for Britain before Dr Merritt and his team decide to go abroad for its development, a familiar story for many famous British inventions. ■



FUTURES AND FORWARD MARKETS SWAPS AND OPTIONS Which Way Forward?

Friday 16 November 1990

In the current Middle East crisis how useful have these markets been?

The following papers will be presented at this one-day Conference to be held at The Institute of Petroleum in London.

Keynote Address

A Major's Perspective on Risk Management for Itself and Its Customers

Mr Alan Binder, President, Shell International Trading Co.

The Futures Choices: Three Papers

A Second Crude Oil Contract for NYMEX

Mr Patrick Thompson, New York Mercantile Exchange

Do Existing Futures Contracts Meet the Industry's Needs?

Mr Peter Wildblood, IPE, London

A Critical Review of the Existing Futures Contracts

Mr Gordon Watson, Czarnikow Energy

Phibro — A Trader in All the Markets

Mr David Hammer, Vice-President Phibro Energy Inc. USA

Swaps and Options in Risk Management

Mr Christophe Chassard, Elf Trading, Geneva

The Hedging Efficiency of the Russian Gas Oil

Forward Market and the IPE Futures Contract

Mr David Long, Oxford Institute for Energy Studies

Legal Aspects of Risk Management and Forward

Oil Trading

Ms Blanche Sas, University of Dundee

The Problems of Defining the Price of the 'Marker'

Crude Oils and Products

Mr Adrian Binks, Petroleum Argus

The Existing Forward Markets

Mr Nigel Graham, Neste Petroleum (Products) Ltd

For a copy of the registration form, please contact **Caroline Little**, The Institute of Petroleum, 61 New Cavendish Street, London W1M 8AR. Telephone: 071-636 1004. Telex: 264380. Fax: 071-255 1472.

Labour's oil and gas policy

By Frank Doran MP, Labour Party Spokesman on Oil and Gas

Mr Frank Doran spoke at the Institute of Petroleum in September. He said in part:

Events over the past few weeks have shown just how volatile the oil market is. Any politician who talks about the industry without taking this volatility into account is taking a very great risk indeed.

Short term fluctuations do not alter the fact that the oil industry is a crucial part of the UK economy and will be for many years. It is important that we establish the broad principles which a Labour government would apply to the industry, as well of course as the detailed operating rules. I have previously stated these broad principles.

We will seek:

'to manage the national asset of our oil and gas reserves for the long term benefit of the United Kingdom, by encouraging maximum recovery of hydrocarbons, by developing a strong UK based industry and technology and, above all, by preserving the safety of those who work in the industry and conserving our natural environment'.

Let us now consider some of the key issues contained within these principles. The pace of technological development since the downturn in prices in 1985 has been quite staggering, and the industry is to be congratulated on the way in which it has responded to the situation in which it found itself. With the oil price stronger (before August), and with more cost-effective field development now a reality, it is clear that there is a very healthy future for the industry in the North Sea.

The task of government does not change however. In the Labour Party we see that task as creating the correct environment to ensure the maximum recovery of oil and gas, in the interests of the country as a whole.

I think that the field by field approach to taxation is appropriate and will be continued under a Labour government. However, the present emphasis of fiscal policy which treats oil and gas simply as a source of tax revenue will have to change, particularly as the decline in UK reserves

accelerates. A responsible government will have to consider whether it is more appropriate to treat oil and gas as a vital, indigenous raw material, and to tailor the fiscal regime accordingly. A flexible approach to oil and gas taxation must include incentives to develop marginal fields and to encourage the maximum recovery of hydrocarbons from existing fields.

In more specialised areas, it is appropriate to look at the present ring fence rules to see whether these are preventing development of otherwise viable fields. We have still a long way to go before we have properly dealt with the taxation problems of abandonment.

Gas

The gas market has changed quite dramatically over the last year or so. The cause, or culprit, depending on viewpoint is the privatisation of the electricity industry together with tighter regulation of British Gas.

If one were to rely solely on press reports, gas burning power stations are set to mushroom all over the country. The reality is very different. Over the next few years I think that we shall see perhaps half a dozen gas burning stations constructed.

The government now appears to be allowing a free for all in the generation market. The next Labour government will take a very different approach.

We are already committed to bringing the Electricity National Grid back into public ownership — the grid is at the heart of the electricity supply system.

We intend to introduce a new form of regulator which will cover the whole of the energy industry, including the downstream oil industry, and will have considerably increased powers compared to the present regulators. In respect of gas generation, we do intend to review all proposals to construct new gas burning power stations over 10 megawatt.

In each proposal submitted, we will examine:

- the efficiency of the energy conversion. We will be looking to achieve the highest practicable efficiency by means of, for example, combined

cycle generation or combined heat and power schemes;

- the proposed utilisation of the power generated, whether it be for base load or peak shaving, whether it be to supply a dedicated industrial user or the grid and, if the supply is intended for the grid, its geographical location relative to regions which are net power importers.
- the source of gas, whether it be from an existing field, if so what type of field (eg dry or wet gas, sweet or sour gas, condensate or oil), if it be from a new field, what is the type of reservoir, and the field development plan;
- offshore gas flaring and gas gathering where the operator should indicate plans to minimise flaring on all its installations and to promote gas gathering pipelines in the region of the proposed development;
- and the disposition of the gas, where the operator should demonstrate its plan to segregate the components of the hydrocarbons produced and which should reflect the value of higher hydrocarbons as feed-stock for the petrochemical industry.

I believe that this screening process is essential if we are to ensure that only those schemes which genuinely provide a high efficiency, environmentally sound source of power are provided.

Safety

This is probably not the time to say too much about the detail of safety policy — Lord Cullen is expected to report sometime soon. The Labour Party is committed to accept his recommendations.

We are already committed, however, to the establishment of a single agency responsible for all aspects of safety. All safety work will be removed from the Departments of Energy and Transport and transferred to the Health and Safety Executive. However, there is another aspect to safety which is current and which may not be covered by Lord Cullen's report. That is the state of industrial relations offshore.

I have yet to meet any senior person in the industry who does not care about safety. Who does not devote a great deal of his time to safety, and a great deal of his company's money on safety. Yet we still have major safety problems. We still have a substantial proportion of the workforce who are cynical about the efforts of companies, who are afraid to speak out for fear of intimidation or discrimination, workers who do not feel part of the system.

I have no doubt that there are genuine grievances among large sections of the workforce, that there is a real sense of frustration.

I think that the question needs to be asked, why on the one hand do we have companies who care about safety and invest in it and on the other hand, a workforce, a large section of which feels alienated?

You may think I am asking the wrong question, linking safety with industrial relations, but safety, loss control and overall quality of performance depend fundamentally on good management. A vital part of any good system of management is the ability to motivate the whole workforce, to feel a common sense of purpose and commitment to improvement. No amount of capital investment in equipment and safety systems will do the job by itself. Everyone needs to feel involved.

Now compare that to the present situation. Ask yourself how it is that a body like the OILC can come into being. I have been around the labour and trade union movement too long to think that these things happen by accident, that this level of grass roots activity happens without some serious cause.

The truth is that the OILC has emerged to fill a vacuum.

No matter what damage is inflicted on the OILC or its members this time around, it will continue in some form or another, until the root causes of the men's grievances are dealt with. The operators are aiming at the wrong target!

I believe that a better approach, I would even go so far as to say, a much more sensible approach, is available. In the first place, if operators were prepared to examine the reasons for the dispute, not in a defensive or confrontational way, but in a genuine attempt to understand how it is that so many of the workforce have reached the stage where the only option which they see is industrial action. Ask themselves why it is that the OILC exists and why it has been able to speak with such authority on behalf of the workforce.



Mr Brian Goodland, right, Director, Safety and Environmental Affairs, Texaco and a Vice President of the IP, who chaired the meeting with Mr Frank Doran MP.

Why is it that there appears to be no attempt to solve our industrial relations problem with better management?

Why not solve an industrial relations problem with better management? Trade Unions can be a positive force and could assist safety and bring some stability to the North Sea. There is no good reason why the views of the workforce offshore should not be tested. A ballot would confirm one way or the other what the workforce wants. The continuing refusal of all offshore employers to assist in a ballot smacks of fear of the outcome.

I am a member of a trade union. I believe in trade unionism. I believe that it is essential that workers have the opportunity to be represented by a trade union. I will go further and say that I believe that trade unions have a beneficial effect and can be a real asset to management, particularly in areas like safety.

The world is changing. The next Labour government will introduce changes. It is already committed to the European Social Charter, which will give every worker the right to be a member of and to be represented by a trade union. It will remove the barriers to trade union representation in the North Sea. We have possibly a year before the next election. It would be very pleasant indeed if, by the time a Labour government comes into power, the North Sea had got its own act in order and positive action was unnecessary.

Organisation

I have already made it clear that the next Labour government will transfer all responsibility for safety in the

North Sea to the Health and Safety Executive. Details of the transfer will be dealt with in due course.

The Labour Party sees a considerable, and continuing role for the Department of Energy. Where the constituent parts of the Department will be located is another matter however.

I am not without an interest here, of course, but there are very strong arguments for moving the Petroleum Exploration Division (PED) to Aberdeen, the centre of the UK oil and gas industry. There are obviously dangers in any political party making commitments to Departmental change before it assumes power. However there are real advantages, practical and day to day, in relocating the PED in Aberdeen. Unless there are overwhelming arguments to the contrary, that will be done. Likewise there are advantages in locating the safety agency in Aberdeen and indeed in the transitional period of hand over of functions, it makes a great deal of sense to have the two agencies in the same city. Again unless there are overwhelming arguments against, we would seek to have the agency located in Aberdeen.

Outside of questions relating to the Department. I am often asked, usually accusingly, whether the next Labour government has any intention of creating a nationalised oil company. I regret the loss of BNOC. The Labour Party has examined the case for a nationalised oil company. We have looked enviously at Statoil, Elf and Total amongst others. However, we do not believe that at this stage in the development of the North Sea it would be appropriate to create a new state oil company.

There is scope however to replace some of the benefits to government which BNOC provided. When BNOC was privatised, government lost its principal source of independent and technical advice. We have been examining ways in which that loss can be replaced.

The Labour Party envisages the establishment of a centre of academic and technical excellence, in all aspects of oil and gas exploration, production and processing techniques, health and safety, economic and fiscal studies. We have models available to us already in Norway and in France. These are being studied. We are also very encouraged by the progress being made at Heriot Watt and the example of industry involvement which exists at Riccarton is something we would certainly want to follow and encourage.

I believe that if such a centre is created, it will provide a vital public service, at the same time be of considerable benefit to the oil industry and its service companies. It will be a substantial national asset.

The environment

The vast bulk of oil and gas produced in the United Kingdom is extracted offshore in the North Sea, environmentally a very sensitive and overburdened area. There are serious pollution

hazards in all aspects of offshore work, particularly in the use of drilling muds, hazardous chemicals, radioactive materials and produced water. The existing controls are piecemeal.

It is the intention of the next Labour government to undertake a thorough review of the environmental impact of the oil and gas industry, from exploration to production, transportation and refining.

Specific areas of interest include those areas mentioned earlier. In addition there is a firm commitment to introduce tighter regulations for the control of hazardous substances offshore. The present government is looking at this also.

We intend to look closely at gas flaring. We regret that the proposals in the early eighties to build a gas gathering pipeline were killed by the government. In the absence of suitable means to transport the gas, 2.38 billion cubic metres of gas is flared off every year. This is equivalent to 5 percent of UK gas production.

There will be a thorough review of the likely pattern of development of offshore fields over the next decade; an analysis of the volumes of gas arising from the various sectors of the UK Continental Shelf; and planning and economic appraisal for a gas gathering network.

I appreciate that this gas-flaring

problem is not a simple one and that in many cases there are sound technical reasons for flaring. However the waste is on such a scale that we feel very strongly that the problem must be addressed.

Another area which has caused some considerable concern is the problem of oil pollution. In the last year or so there have been a number of incidents. It is important to keep under review the spill prevention and clean up capacity. We intend to undertake a thorough review of all aspects of the transportation of oil and oil products, and the measures necessary to prevent oil spills or to clean up oil spills. Those companies who have become members of the clean up club established by Briggs Marine and Alba are to be congratulated for their foresight.

I've picked out from our programme a few of the more important issues which will affect the industry. Apart from safety, there are very few areas where there will be major changes. That is as you would expect, as the existing legislative framework for the industry was put in place by the last Labour government. All of the changes proposed are intended to ensure that the industry continues to develop in the United Kingdom, plays its proper part in industrial Britain and, at the same time, meets its responsibilities to the community which it serves. ■

New HSE guidance on the construction and operation of petrol filling stations

Guidance on the planning, design, construction, operation and maintenance of petrol filling stations is given in a new guidance booklet published in September by the Health and Safety Executive (HSE).

The guidance was prepared by a working party consisting of representatives of HSE and of bodies involved in different parts of the industry, including the Institute of Petroleum, and petroleum licensing authorities. It supersedes the Home Office Model Code of Principles of Construction and Licensing Conditions (Section 2, Part 1): Petrol Filling Stations.

The guidance seeks to minimise the risks to both operators and the public as well as providing guidance to persons involved in the planning, design, construction and alteration of petrol filling stations on up-to-date safety standards. Also, it informs persons

involved in the operation and maintenance of petrol filling stations of the conditions necessary for the safe keeping of petrol.

It is divided into three parts: Part 1 on general design and constructional matters; Part 2 on operational and maintenance activities; and Part 3 on the specialised design, constructional and testing features for electrical installations at petrol filling stations. All three parts set safety standards and practices for consistent application throughout the country with effect from the date of publication. They do not preclude the use of alternative designs, materials or methods where that use provides equivalent or higher standards of safety. Each case should be considered on its merits. Any variations which appear to be necessary because of special circumstances or developments in technology should be

agreed with the licensing authority.

It is not intended that the guidance on design and constructional matters in Parts 1 and 3 should be applied rigidly to existing petrol filling stations unless redevelopment is taking place or new plant or equipment is being installed. Generally, only alterations which are reasonably practicable would be made, taking into account the risks presented at the filling stations and the cost and feasibility of additional precautions. Nevertheless, it is intended that the guidance on operational, maintenance and testing activities in Parts 2 and 3 will be applied at all petrol filling stations with effect from the date of publication.

'Petrol Filling Stations: Construction and Operation', HS(G) 41, ISBN 0 11 885449 6, is available from HMSO and booksellers, price £4.50.

FORTHCOMING EVENTS

November

2nd
London: Conference on 'North Sea Diving Support Vessel (DSV)', Details: Caroline Little, The Institute of Petroleum, 61 New Cavendish Street, London W1M 8AR. Tel: (071) 636 1004. Fax: (071) 255 1472

5th-6th
Edinburgh: Conference on 'Oil and Gas European Export Technology — worldwide opportunities for industry'. Details: Natalie Cox, IBC Technical Services Limited, Bath House (3rd Floor), 56 Holborn Viaduct, London EC1A 2EX. Tel: (071) 236 4080. Fax: (071) 489 0849.

5th-7th
New York: Course on 'Tanker Ownership, Chartering and Operations — Tactical and Strategic Decision Making'. Details: The College of Petroleum Studies, Sun Alliance House, New Inn Hall Street, Oxford OX1 2QD. Tel: (0865) 250521. Fax: (0865) 791474.

5th-9th
Aberdeen: Course on 'Introduction to Offshore Exploration, Drilling and Production'. Details: Head of Drilling and Production Training, Drilling and Production Training Centre, Blackness Avenue, Altens, Aberdeen AB1 4PG. Tel: (0224) 895504. Fax: (0224) 873221.

6th
London: Conference on 'Safe Road Transport in the Petroleum Industry — The Way Ahead'. Details: Caroline Little, The Institute of Petroleum.

6th
London: Conference on 'The Petroleum Review November 1990

Transportation of Hazardous Substances by Sea'. Details: Linda McKay, Legal Studies & Services Limited, 3rd Floor, Bath House, 56 Holborn Viaduct, London EC1A 2EX. Tel: (071) 236 4080. Fax: (071) 489 0849.

7th-14th
Alfriston: 'Environmental Policy and Management: an international forum'. Details: Courses Department, The British Council, 65 Davies Street, London W1Y 2AA. Tel: (071) 389 7817.

8th
London: Conference on 'Environmentally Induced Weld Failures'. Details: The Meetings Department, The Welding Institute, Abington Hall, Abington, Cambridge CB1 6AL. Tel: (0223) 891162. Fax: (0223) 892588.

8th-9th
London: Conference on 'Environmental Assessment: Theory and Practice'. Details: Liz Hyde, IBC Technical Services Ltd, Bath House, 56 Holborn Viaduct, London EC1A 2EX. Tel: (071) 236 4080. Fax: (071) 489 0849.

12th-13th
London: Course on 'The Economic Evaluation of Projects'. Details: Miss D Hockham, Continuing Education Officer, Institution of Chemical Engineers, Davis Building, 165-171 Railway Terrace, Rugby CV21 3HQ. Tel: (0788) 578214. Fax: (0788) 560833.

12th-14th
Bahrain: Conference on 'New Developments in the Oil Industry'. Details: Conference Section, The Institution of Chemical Engineers, 165-171 Railway Terrace, Rugby CV21 3HQ. Tel: (0788) 78214. Fax: (0788) 60833.

12th-15th
Moscow: Conference on

'Soviet Business and Joint Ventures'. Details: Worldwide Information, c/o STBS Ltd, 42 William IV Street, WC2N 4DE. Tel: (071) 386 9322. Fax: (071) 381 8914.

12th-16th
Winfrith: Course on 'The Basics of Improved Oil Recovery'. Details: Dr NA Bailey, AEA Petroleum Services, Winfrith, Dorchester, Dorset DT2 8DH. Tel: (0305) 202074. Fax: (0305) 203424.

13th
London: Lecture on 'Engineering a Greener Pipeline — A Practical Approach' by M Hadley, Trident Consultants Ltd. Details: Mr A Reed, Secretary, The Pipeline Industries Guild, 17 Grosvenor Crescent, London SW1X 7ES. Tel: (071) 235 7938.

13th
Aberdeen: Conference on 'Maintenance for the Offshore Industry'. Details: Sue Klarfeld, Customer Services Manager, The Industrial Division, IIR Ltd, 28th Floor, Centre Point, 103 New Oxford Street, London WC1A 1DD. Tel: (071) 412 0142. Fax: (071) 412 0144.

13th-14th
Geneva: Conference on 'The Automotive Industry and the Environment'. Details: Helen Conry, Environmental Matters, 43 Manchester Street, London W1M 5PE. Tel: (071) 224 1876. Fax: (071) 224 4961.

13th-14th
London: Course on 'Desert Sediments and the Rotliegend'. Details: JAPEC Secretary, c/o The Geological Society, Burlington House, Piccadilly, London W1V 0JU. Tel: (071) 434 9944. Fax: (071) 439 8975.

14th
Aberdeen: Course on 'Quality Improvement for the Offshore Industry'. Details: Sue Klarfeld, Customer Services Manager, The Industrial Division, IIR Limited, 28th Floor, Centre Point, 103 New Oxford Street, London WC1A 1DD. Tel: (071) 412 0142. Fax: (071) 412 0144.

14th-15th
Frankfurt, West Germany: Conference on 'Investment in Eastern Europe and the Soviet Union: Strategies for the Nineties'. Details: PlanEcon Inc, 111 Fourteenth St, NW, Suite 801, Washington, DC 20005-5603, USA. Tel: (202) 898 0471. Fax: (202) 898 0445.

15th
London: Conference on 'Major Performance Related Clauses for Offshore Oil Construction and Supply Contracts'. Details: Joanna Hulbert, Legal Studies and Services Limited, Bath House, 56 Holborn Viaduct, London EC1A 2EX. Tel: (071) 236 4080. Fax: (071) 489 0849.

16th
London: Conference on 'Futures and Forward Markets — Swaps and Options — Which Way Forward?'. Details: Caroline Little, The Institute of Petroleum.

19th-20th
Egham: Course on 'Modern Developments in Airport Fuelling Operations'. Details: Dr EM Goodger, Route SouthWest Ltd, 78 Church Road, Woburn Sands, Milton Keynes, MK17 8TA. Tel: (0908) 582120. Fax: (0784) 435383.


20th
London: Conference on 'Procurement for the 1990s

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FORTHCOMING EVENTS

— managing complex for profit'. Details: European Study Conferences Limited, Douglas House, Queen's Square, Corby, Northants NN17 1PL.

20th-21st

Aberdeen: Course 'Introduction to Offshore Oil'. Details: Head of Drilling and Production Training, Drilling and Production Training Centre, Blackness Avenue, Altens, Aberdeen AB1 4PG. Tel: (0224) 895504. Fax: (0224) 873221.

20th-21st

Manchester: Conference on 'The Human Factor in Safety: Implications for the chemical, process and offshore oil and gas industries'. Details: Katie Lye, IBC Technical Services Ltd, Bath House, 56 Holborn Viaduct, London EC1A 2EX. Tel: (071) 236 4080. Fax: (071) 489 0849.

21st

Rio de Janeiro, Brazil: 'International Energy and Petrochemical Planning Seminar'. Details: Mr Robert Bauman, Vice President, Chem Systems Inc, 303 Broadway, Tarrytown, New York 10591. Tel: (914) 631 2828. Fax: (914) 631 8851.

21st-22nd

Oslo, Norway: Conference on 'Norwegian Tax Reform and Implications for the Petroleum Industry'. Details: Norwegian Petroleum Society, PO Box 95, N-5049 Sandli. Tel: (47) 5224885. Fax: (47) 5228970.

22nd

London: Conference on 'Offshore Safety — The Way Ahead'. Details: Caroline Little, The Institute of Petroleum.

22nd-24th

Perth, Australia: 'Petroleum

Technology Australia 90'. Details: Energy House, 103 Scarborough Beach Road, Mt Hawthorn, Western Australia 60616. Tel: (09) 443 3400. Fax: (09) 242 1811.

25th-28th

Singapore: 'The Far East Maritime and Offshore Services Show'. Details: Hilal Asian Exhibitions, 50 Jalan Sultan, 20-06 Jalan Sultan Centre, Singapore 0512. Tel: 2939233. Fax: 2970862.

26th-28th

London: Conference on 'Welded Structures '90'. Details: The Meetings Department, The Welding Institute, Abington Hall, Abington, Cambridge CB1 6AL. Tel: (0223) 891162. Fax: (0223) 892588.

27th

London: Lecture on 'Gas Based Chemicals and Fuels — A Technical and Commercial Overview' by Chris Peacock, Principal, Chem Systems Ltd. Details: Mr E Hudson, Chem Systems, 28 St James's Square, London SW1Y 4JH. Tel: (071) 839 4652.

27th-29th

Birmingham: Course on 'Understanding Heat Treatment'. Course Administrator, Wolfson Heat Treatment Centre, Aston University, Aston Triangle, Birmingham B4 7ET. Tel: (021) 359 3611. Fax: (021) 359 6470.

27th-29th

Manchester: Course on 'Waste Water Management for Industry'. Details: Liz Hyde, IBC Technical Services Ltd, Bath House (3rd Floor), 56 Holborn Viaduct, London EC1A 2EX. Tel: (071) 236 4080.

28th-29th

London: Conference on 'Environmental Forces on Offshore Structures and

their Prediction'. Details: Society for Underwater Technology, 76 Mark Lane, London ECR3 7JN. Tel: (071) 481 0750. Fax: (071) 481 4001.

December

3rd-4th

London: Conference on 'Energy and the New Europe'. Details: The Energy Conference Organiser, The Royal Institute of International Affairs, 10 St James's Square, London SW1Y 4LE. Tel: (071) 930 2233.

3rd-7th

Aberdeen: Course on 'Directional Drilling for Engineers.' Details: Head of Drilling and Production Training, Drilling and Production Training Centre, Blackness Avenue, Altens, Aberdeen AB1 4PG. Tel: (0224) 895504. Fax: (0224) 873221.

4th

London: Workshop on 'Crude and Petroleum Product Shipments: Problems encountered during Independent Inspection'. Details: Caroline Little, The Institute of Petroleum.

4th-7th

Amsterdam: 'Gastech 90'. Details: Brian Singleton, Conference Director, Gastech Ltd, 2 Station Road, Rickmansworth, Herts WD3 1QP. Tel: (0923) 776363. Fax: (0923) 777206.

6th

London: Conference on 'Accident Prevention in the Chemical Industries: Using People in the Organisation'. Details: Conference Secretariat, SCI 14/15 Belgrave Square, London SW1X 8PS.

9th-14th

Moreton-in-Marsh: Course

on 'Handling Emergencies in the Oil Industry'. Details: Mr R Ayres, Petroleum Training Federation, Room 326, 162-168 Regent Street, London W1R 5TB. Tel: (071) 439 2632. Fax: (071) 287 5483.

11th

London: Conference on 'Environmental Protection in Practice — The Act, The White Paper and Beyond'. Details: Elaine Hendry, IBC Legal Studies and Services Limited, Bath House (3rd Floor), 56 Holborn Viaduct, London EC1A 2EX. Tel: (071) 236 4080. Fax: (071) 489 0849.

11th-12th

London: 'Subsea 90 — Subsea Achievements and Challenges'. Details: JA McBarnet, Conference Director, Themedata Ltd, PO Box 2, Chipping Norton, Oxon OX7 5QX. Tel: (06884) 700. Fax: (060884) 796.

11th-12th

London: Conference on 'Robotics in the Power Generation Industry'. Details: Katie Lye, IBC Technical Services Ltd, Bath House, 56 Holborn Viaduct, London EC1A 2EX. Tel: (071) 236 4080. Fax: (071) 489 0849.

12th

London: Evening meeting on 'Geological aspects of safety during drilling of deep wells in the Central Graben'. Details: Heide Gould, Petroleum Group, The Geological Society, Burlington House, Piccadilly, London W1V 0JU. Tel: (071) 434 9944. Fax: (071) 439 8975.

14th

London: Seminar on 'Elastomeric Seals for Oilfield Applications'. Details: Sian Tanner PR1, The Plastics and Rubber Institute, 11 Hobart Place, London SW1W 0HL. Tel: (071) 245 9555.

New edition of IP Drilling and Production Safety Code for Offshore Operations

For many years the Institute of Petroleum Model Code of Safe Practice has made a valuable contribution to the safe operations of many sectors of the oil industry in the United Kingdom and overseas.

The Model Code currently comprises fourteen active parts which provide guidance on safe working practices in functional areas of the industry such as:

- Onshore drilling and production
- Refining
- Pipelines etc.

and including cross-functional areas like area classification for:

- Petroleum installations
- Electrical
- Pressure vessel inspection, etc.

Each part of the Code represents an industry consensus view of basic practice and the appropriate standards in a particular activity.

A new edition of the Drilling and Production Safety Code for Offshore Operations incorporating guidance on up-to-date operating practices will be published in December 1990. It will supersede the second edition entitled Drilling and Production in Marine

Areas Safety Code. Compared with the previous edition the scope of the new Code has been widened considerably and a new format has been developed with the aim of making it a more readable and informative document.

New chapters on the following topics have been included in the revised edition:

- Emergency control.
- Pollution prevention and control.
- Noise hazards and control.
- Chemical hazards and control.
- Communications support.
- Onshore support.
- Marine support.
- Diving services.
- Training for offshore operations.

The new Code has been prepared for use on a worldwide basis as a guide to safe practice for those concerned with drilling and production operations for oil and gas in offshore areas. It is intended to provide information and guidance on those offshore drilling, production and support activities which have an impact on safety and therefore require detailed care and attention.

Each chapter of the revised Code covers an important drilling, production or support activity and has an introduction which describes the part each activity plays in the overall offshore operation.

In the national areas where offshore operations are being conducted there will be statutory requirements, regulations and rules, both local and national, which apply to the offshore oil and gas industry. The Code is written in a way which permits it to be complementary to such requirements but not in any way supplanting them.

In order to expedite the production of the new edition of the Code a consultant was appointed to undertake the writing under the guidance of a Code Working Group drawn from the membership of the IP Exploration and Production Committee. The final two drafts of the code were then the subject of rigorous review by operating companies and industry organisations.

A number of organisations produce publications which address some aspects of the activities covered by the Code but, as far as is known, there is no other similar single publication which provides such comprehensive guidance on safe working practices for offshore drilling and production operations.

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An assessment of the environment white paper

By Janet Perkins, Assistant Manager, Government Relations, Texaco Ltd

The government's White Paper on the Environment, entitled 'This Common Inheritance: Britain's environmental strategy', was published at the end of September after a long period of consultation and anticipation.

It is the most comprehensive official document on the environment ever published in the United Kingdom and contains proposals for regulation, guidance and encouragement across the whole range of environmental issues. The role of international co-operation, particularly through the European Community (EC), is broadly welcomed and encouraged. However, it is important to recognise that many of the proposals mentioned in the White Paper have already been announced or brought into action.

The White Paper stresses the role of market forces in encouraging both consumers and producers to take decisions that benefit the environment. The issue of environmental taxes is recognised as a potential longer-term policy. There is also an emphasis on the part played by prevention, particularly in an international context — mainly through the EC.

The main ways that the White Paper identifies as means by which government can encourage industry to act on environmental issues are:

- the development of corporate environmental policies and environmental audits of all aspects of a company's business,
- the introduction of self-regulation and appraisal wherever possible,
- the identification of ways of improving environmental performance; and
- assessing the costs and environmental benefits of all possible actions.

The White Paper covers most aspects of the environment issues from farming and land use to roads and transport. This article summarises the aspects that are of most interest to the oil industry.

As might be expected, there is a lot of emphasis on the European dimension of environmental issues. Plans are set out for the adoption of a European-wide system of integrated pollution control based on the overall effect of the environment as a whole rather than on the individual components — air,

water and land — in isolation. The White Paper stresses that this European system should be based on the system of integrated pollution control in the United Kingdom.

Global warming

The White Paper discusses the causes of global warming and the greenhouse effect and proposes several measures to cut Britain's contribution to the problem. The main means proposed are a longer-term potential for increases in energy prices through taxation and the possibility of environmental taxes or charges directly related to the environmental damage caused by the product. The duty differential on unleaded petrol is cited as an example of the latter policy.

Some action has also already been taken through the tax mechanism to affect the cost of company cars. The government will continue to look at whether similar market-based measures can be applied to fuel or vehicles both to encourage greater fuel economy and to reduce carbon dioxide emissions. This could be achieved through further changes in vehicle excise duties, in company car tax or in duty on petrol or diesel.

As an added contribution to the reduction of the global warming, the Energy Efficiency Office will be strengthened and the issue will be further highlighted through the establishment of a Ministerial Committee on Energy Efficiency and the promotion of energy efficiency in the home.

Public sector energy consumption is planned to be cut by 15 percent.

Combined heat and power (CHP) schemes will be further encouraged with an aim of achieving a further 2,000 megawatts of capacity by the year 2000 from CHP.

Transport policy

One of the main parts of the report concentrates on transport issues. The White Paper states that the best overall reduction in carbon dioxide emissions will be achieved by people using the most efficient form of transport as economically as possible. Research is being carried out into increasing the fuel efficiency of vehicles; action will be taken to improve the fuel consumption of existing vehicles through emissions checks in the MOT test, as already announced by the Department of Transport, and enforcement of speed limits. The government will press in the EC for tighter standards and test procedures for emissions from heavy diesel vehicles which will control levels of smoke.

An integrated approach to fuel standards is set out covering both petrol and diesel. The sulphur content of diesel will be reduced to 'very low levels' to enable heavy vehicles to meet the planned standards described above. The government will continue to press the EC for a commitment on this issue.

On petrol standards, the White Paper notes that pollution from evaporative emissions will be reduced



Janet Perkins

'New targets for air quality will be set in the United Kingdom'

by the proposed EC car standards but adds that the government will work with the oil and motor industries to achieve further improvements. EC agreements will be sought to set new lorry standards to reduce emissions of nitrogen oxides. On roads policy, the White Paper adds that bypasses will be provided where necessary to relieve towns of through traffic and the trunk road network will continue to be extended as already announced by the

Department of Transport. No mention is made of any further addition to the motorway network. The option of road pricing is ruled out, at least for the near future.

Air and water pollution

New targets for air quality will be set in the United Kingdom covering ground level ozone concentrations. The existing standards on smoke and sulphur

dioxide, lead in air and nitrogen dioxide — which are also covered by EC directives — will be more closely monitored, particularly through the critical loads approach, under which the level of pollutant that an area can tolerate is used as the basis for monitoring and control. Tradeable permits for pollution will be considered. Revision of the international standards on sulphur dioxide and nitrogen oxides will be pursued. New EC directives will be sought on toxic and dangerous waste incineration.

Water pollution of rivers and lakes is also given significant coverage, particularly relating to the farming community. Regulations will be introduced to set new standards for the construction of agricultural fuel oil stores. Similar regulations will be considered for industrial fuel oil installations and chemical stores. Maximum fines for water pollution offences will be increased to £20,000.

On North Sea pollution, the United Kingdom will support tighter international standards for chemical and oil discharges. Pollution from offshore oil installations will be reduced through the elimination of discharge of oil-contaminated drill cuttings from single exploration and appraisal wells by 1994 and from all wells as soon as possible thereafter.

Assessment

Many of the policies and proposals outlined in the White Paper are not new. Some have already been announced as part of government policy, others are contained in the Environmental Protection Bill now going through Parliament. Other measures, particularly those on pollution issues, are part of European Community policy on the environment already under consideration in Brussels.

No specific timetable is given for the implementation of most of the new issues described in the Paper. Immediate legislation in the new session of Parliament is unlikely to implement these measures and the legislative timetable for them may not be announced for some time.

In the case of many proposals, the timetable for implementation is driven by European Community schedules rather than by the UK Parliamentary legislative timetable.

While the White Paper may not consist of an extensive outline of entirely new policies and proposals, it does provide a comprehensive agenda for action on all environmental issues, whatever facet of the environment they affect. ■

This Common Inheritance — echoes of the past

By Jim Berreen, Environmental Speaker for the Green Party

The Minister for the Environment has produced a limp and apologetic White Paper (This Common Inheritance, HMSO £24:50). The message is simply that business will continue as before.

This conflicts with the Green Party's analysis of the environmental crisis which is as different as it is simple. We believe that the industrial and economic growth that we have known since the industrial revolution is unsustainable. The costs of resource depletion, energy consumption and pollution are also unsustainable.

The key to sensible management of the environmental crises we now confront is energy policy. As we see it, the first and most important step is for consumers to reduce demand now.

All the Green Party's policies are linked through the principles of sustainable systems, resource conservation and global rights. They are constrained much more by the laws of thermodynamics and ecology than they are by old ideas of wealth generation and distribution. That is why they are radical. But since all our policies relate to the environment through principle we do not have a specific environmental policy. Here, I shall just discuss some of the areas that related to energy policy and its impact, in the light of the White Paper.

Energy conservation is an area where the government's record is lamentable and the intentions in the white paper are scarcely better. The Green Party advocates setting up Energy Authorities at district, regional and national level which would be responsible for developing and maintaining an integrated supply and for



An alternative source of energy

vigorously promoting energy conservation. The funding for energy savings schemes would be provided through natural resource taxes levied on fossil fuels. Incentives would also be given to support combined heat and power schemes (CHP's), and new fossil-fuelled power stations would be restricted to those areas where heat could be used more usefully than by adding water vapour to the atmosphere; (water vapour is an important greenhouse gas).

Increased efficiency

We also have a bundle of policies to introduce energy performance values in building and planning, support for energy recycling schemes and integrated energy reduction programmes. Initially, we would introduce inverse tariffs for electricity users similar to those used in Japan, while providing protection for essential users. The policies of increasing efficiency in design would encourage public promotion and education coupled with sensible labelling and an informed market response. In that at least we concur with the Minister's view.

In relation to power generation the Green Party has good news for the oil industry. We plan to close down

nuclear power stations at the earliest opportunity. For some of us that would be an hour after we stop the reprocessing at Sellafield, but others might wait a day or two. The rest is fairly bad news. The Green economy would reduce its demand for energy to a sustainable minimum and it would obtain that energy from non-polluting, renewable sources. Primarily, we would see most of that renewable energy coming from wind and tidal sources, but we are cautious about estuarine generation because of the ecological impacts. Our decentralist policies would advocate widespread, small-scale generation of power coming under the direct control of local areas, and being a mixture of private and public enterprise.

The White Paper's 'hands-off' approach to transport policy has attracted much criticism, and rightly so.

Transport policy

Green transport policy starts from where we are now. Increased road provision leads to increased demand, and road transport is choking itself and its environment to death. We need an integrated, nodal network of road, rail, barge and sea transport that seeks to

minimise the kilometres per tonne of goods and people. To avoid social upheaval the transition needs to be gradual, and will involve the development of non-competitive *and* efficient public transport, the reduction of travel demanding fossil fuels, much greater provision for pedestrians and cyclists within urban and rural areas, and a redistribution of population.

The Green Party's objective of local production for local need together with resource taxation and fuel tax based on engine size and axle weight will provide a disincentive for inefficient and unnecessary road transport. Those of us who mainly travel by public transport recognise its limitations — it is inefficient, uncomfortable, sometimes unsafe, usually expensive and often missing. That is why public transport policy needs organising in an integrated fashion taking full account of those least able to afford independent travel.

No exclusion clauses

The government's policy on pollution is the same as the Green Party's — to stop pollution at source. However, and in contrast, we see that as being zero emission standards by agreement, regulation, monitoring and public audit in association with Best Avail-

able Technology (BAT). There are no exclusion clauses like the Government's BAT Not Entailing Excessive Cost (BATNEEC). For the oil, petrochemical, coal and power industries under a Green administration, the game would be up. Well and truly up.

energy industry and the Green Party have a lot to discuss.

In developing our economic policies, the Green Party is well aware that the transition to a Green society at a time of increasing energy cost will entail substantial negotiation and

'We recognise that large influential corporations have a view of survival and the future that is not dissimilar in scale from our own!'

In fact, the overall Green view is that long-chain hydrocarbons should be valued as chemical feedstock rather than being oxidised to CO₂, SO₂, NO_x, water vapour and a lot of hot air. But in relation to the leakage of natural gas, oil spillage, rising atmospheric CO₂, acidification, ozone-pollution, particulate lead, heavy metals and organic toxics, forest damage and rapidly changing climate, I guess that the

major changes in accountability in the oil and petrochemical industries. Classically, the Greens oppose the excessive power and influence of the major trans-national companies. The Green Party however, is dedicated to end irrational and confrontational politics, and we recognise that large influential corporations have a view of survival and the future that is not dissimilar in scale from our own. ■



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The UK has the lead in pollution control

Dr Frank Feates, Director, Her Majesty's Inspectorate of Pollution, discusses the principles of 'best available technology not entailing excessive cost' which will soon be fundamental in integrated pollution control (IPC) and give a changed role for its inspectors as required by the Environmental Protection Bill now in its final stages through Parliament.

In an interview with *Petroleum Review* he said that in the past inspectors had to be discharge oriented, whereas in the future they will be looking for the causes as well as the best possible options to minimise pollution.

Geoffrey Mayhew: What is the aim of integrated pollution control?

Dr Frank Feates: Historically, as recognised by the Royal Commission on Environmental Pollution in their fifth report, published in 1976, there were two problems with the traditional methods of pollution control.

There were four independent inspectorates regulating discharges to air, to water, the disposal of solid wastes and radioactive wastes. This created problems for the inspectorates and for industry and involved some duplication. Furthermore, there was no opportunity to look for the best possible environmental option to manage all process wastes because each inspector was trying to reduce the discharge for which he was responsible and not looking for the maximum benefit or minimum detriment to the environment.

In 1986 the government decided to adopt the concept of Integrated Pollution Control in England and Wales with the aim of developing the concept for these processes with the greatest pollution potential of only one regulating body with which industry would need to work — HMIP.

There was a need for legislation. The Environmental Protection Bill was published in late 1989 and includes this concept in Part 1. It will give the inspectorate the powers to undertake total pollution abatement control for processes which are scheduled.

Not all processes will be scheduled, because there are too many of them. The government has classified the ones which have the potential to make the

most pollution. They will be controlled. In total there are 200 different categories and 7,000 processes which will be controlled. The expectation is that the Bill will receive Royal Assent in November.

Will this be a major step?

It is a major step. We have looked at other countries' regulations and none have such a developed concept of an integrated pollution control in looking at discharges in total. We will be in the lead.

Another area here where this country is in the lead is in assessing what technology should be used for pollution abatement.

Indeed, the EC is following our line that industry should be using the 'best available techniques not entailing excessive costs.' This is often shortened to BATNEEC. The EC does recognise that there are financial and commercial restraints.

How is BATNEEC assessed?

The determination of the best available techniques not entailing excessive costs will be interesting because costs must include social costs as well as economic factors. HMIP will be developing this.

The approach we have adopted is to publish guidelines to our own inspectors. These guidance notes will be generally available and should help industries to draw up their applications. They will summarise the sort of techniques which are possible, the maximum reduction levels of dis-

charge which should be achieved and the numerical values for discharges which we would expect to be attained.

In general these are based on processes and techniques which are already being operated on a commercial basis, somewhere in the world.

We will expect industry to work towards achieving these levels in their own way. We do not want to stop them innovating.

There may be reasons why they do not think it is necessary to meet the numerical values that we specify. They may demonstrate to us that because of local factors, for example, BATNEEC in a particular situation is different for the plant considered. There may be social features — the unemployment that would follow, or the inability to make the whole capital investment in one year whereas it could be done in five to 10 years — that we should consider.

But that would be an example of best available technology not entailing excessive expenditure applying for a particular or individual case. It would not be a generic situation.

How will the new arrangements come into being?

If the Bill passes into law in November, then the practical effects will begin early in 1991. The plan is to bring all large combustion plants into integrated pollution control from April 1991. All other new plant or plant involved in substantial improvement will need to apply for authorisation from April 1991. Other existing processes will be brought under IPC over the four year period from April 1992 to April 1996.

Is it urgent?

No, it is not. It cannot be done quickly. It is a massive task for HMIP and industry: 200 guidance notes have to be prepared and industry has to be consulted on them long before processes come into IPC. At least a year's lead time is required.

Because all new plant will come into control, we have produced five notes (for fuel and power industry, metal industry, mineral industry, chemical industry and waste disposal industry), which really set out the parameters industry will need to address when seeking an authorisation for new plant. These are now available for consultation. There are two months for comment on these by the five sectors concerned.

When will advantages from the new structure begin to be seen?

The advantage will be that industry will be dealing with only one pollution inspectorate.

A disadvantage of the Bill from an industrial standpoint is that it institutes charges. We have to relate the charge to the work being done. To do this comprehensively will involve detailed time recording systems which themselves will take time to establish. In the short term we will be defining work in blocks, and there will be a single charge band for one part of a process — one component/per unit charge. If there were, say, six major components on the site work would be charged at six units.

There may be problems as this scheme settles down, but it has to be in place by 1 April, when charging will commence. I hope that within a year or two years it will be possible to rearrange the system of charging industry.

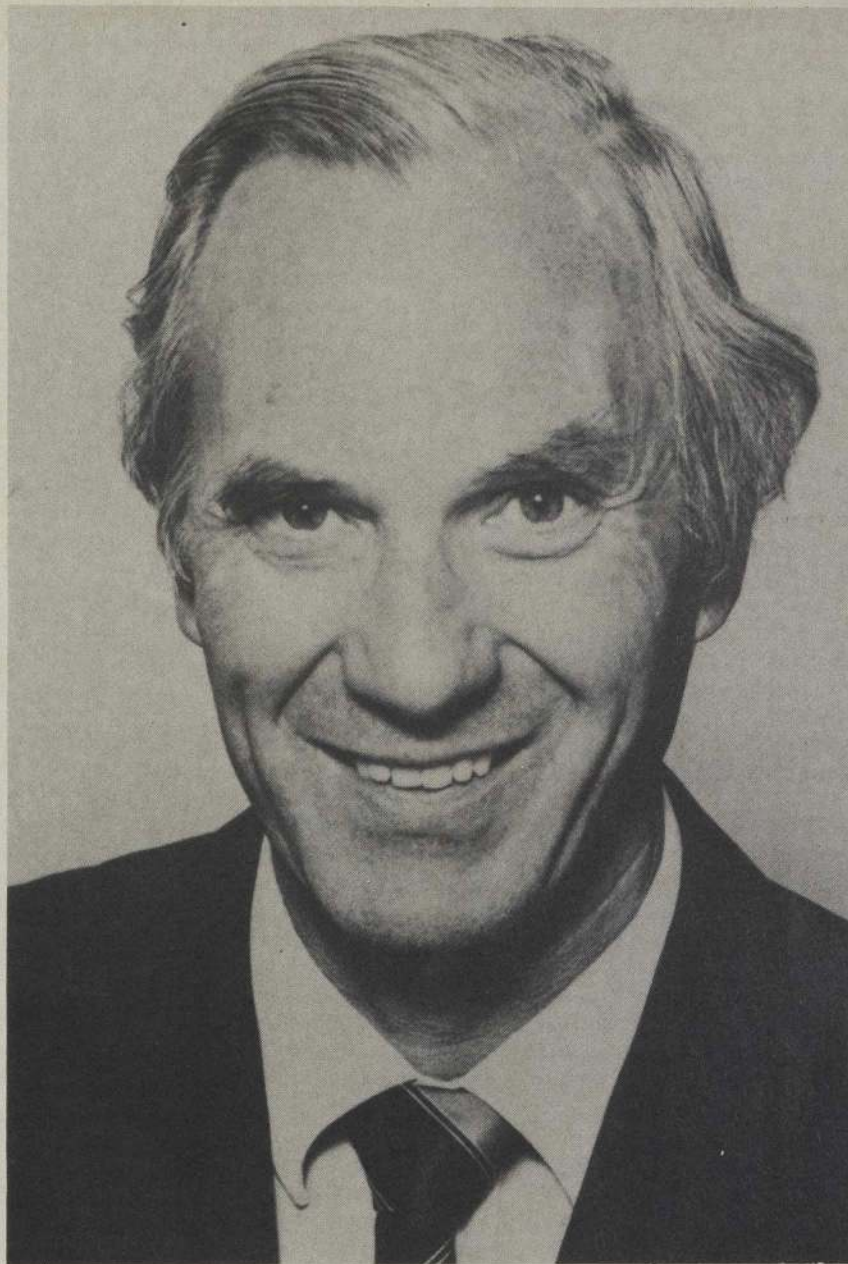
Are there particular aspects in the fuel and power industries?

It is mainly the refining industry that will see the major impact of integrated pollution control.

We will be looking at BATNEEC for discharges from power generation, to air, to water and solid waste generation to determine the best option. Here, the only aspect that is new is the concept of the best practicable environmental option.

I am sure that in the short term it is going to be a minimum change, with ourselves and the industry learning how to develop the concepts.

We have, all of us, a common interest to measure pollution in the air, water and solid waste which is harmful to humans and the environment, and harmful to flora and fauna.



Dr Frank Feates

HMIP has to work with industry and decide how we can go forward in a case-by-case analysis. To quote an unusual example, it may be that dolphins could give rise to special concern in a particular case of a marine discharge.

It has been made clear that industry views will be considered. How will this be done?

We have been having fairly regular meetings with interested bodies. The guidance notes are available for consultation and we welcome views. If applicants for authorisation cannot get satisfaction, they will have the right of appeal to the Secretary of State. There are a number of ways to ensure that views are considered.

When we come to the consultation

we will consider all the representations and we shall publish comments so that everyone can read them.

To assist all this, HMIP has set up industry groups — there is one for the petroleum industry.

Will many or new standards be required?

New or revised standards will not be required simply because IPC has been introduced. We believe that industry has been fairly well regulated in the past. But it may not have been cost effectively regulated.

In the short term, the standards we have will be incorporated into guidance notes.

The only reason for introducing new and more stringent requirements would be if such a move had been

planned, for example, due to changes in facilities. So IPC itself will not cause any changes in standards.

But in the long term, being plant oriented, we will be looking at management of plant, a matter in which we did not become involved in the past.

We may also become concerned with whether internal company management standards are lax. For example, we may consider whether adventitious discharges could have been prevented by better local operations management.

But we will not become trouble shooters. We are not going to be free consultants. We will look at what is offered to us. If necessary we will use our power to change it. Legal redress can involve a prohibition order. The penalties under the Bill are severe.

Yet we shall have failed if an individual company or person appears in court. We are more interested in seeing plants being operated within IPC and the processes which are to be scheduled are those which can be significant polluters.

Will new standards, if required, be difficult to achieve?

There is no reason to believe they would be more difficult than now. IPC will not generate changes overnight.

It should be noted, however, that public reaction will play a larger part. For instance, anyone will be able to initiate a prosecution, not just HMIP. It may be that different standards will be required by the EC.

Shall we see new technology in pollution control and monitoring?

I hope so. That is what this is all about. One reason we intend not to specify techniques of abatement is because we want industry to come up with new concepts. IPC should not close down research programmes and there should be continuing development programmes for improved pollution abatement. We shall be looking for new plant to be progressively operating to higher standards.

There could be new technology in monitoring and we shall be looking at the steps industry is taking in demonstrating compliance.

The oil industry is inventive and may have developments to offer to others. But it cannot be done overnight.

Are you initiating research?

We have a £9 million a year research programme which in the past has been concentrated on radioactive waste matters. We have extended that to cover other waste and we hope to gain

the cooperation of industry with this move, which is part sponsored by the EC.

Are there lessons to be learned from overseas?

Part of the legislation going through Parliament requires us to consider standards adopted in other countries. We are asking consultants to advise us on these, to see if lessons can be learned.

The EC's role is widespread?

The EC has a role in a number of fields where we have to implement as the statutory body. In relation to BATNEEC, the EC, as mentioned earlier, believe in this but have intentions of their own. We support our policy colleagues at international meetings where policy is being developed and feel we are making a positive contribution.

Will HMIP's very much larger role lead to your going about your work in a different way?

Yes. HMIP will go about its work in a way different from that traditionally adopted by the inspectorates from which we have been formed.

In the past we were discharge oriented.

This new approach means we will want to understand the processes and so be able to work in a pollution effective manner to minimise discharges by using the best possible options — as well as satisfying ourselves as to the causes of pollution.

In our work we shall have twice the number of individual processes under our control, double the amount of work and premises but we have not got twice as many inspectors. So we are

planning to work more cost effectively by having a more structured approach to our relations with industry.

We believe our guidance notes will give industry the ability to prepare their applications, for reasonably standard plant so that these can be dealt with and determined expeditiously, so that will enable us to use our skills and time to deal with the non-standard plant which will need much more of our attention.

However, advice for companies should come to them from professional consultants, not from us. In this respect, we are like tax inspectors. We will explain what the legislation is and how we go about our job but if industry wants to get advice on the formulation of their application to satisfy the best possible option, we expect them to carry out the necessary development in-house or through consultants.

A larger role can mean more expertise. Will you need to train people for the work?

We now spend 10 percent of our inspectors' time on training and retraining. We have set up a MSc course in pollution management at UMIST, which we hope will be attractive to industry. It is a part-time, two-year course. We are sending eight inspectors to each of six such courses over the next five years. We hope a similar number of participants will come from industry.

We are currently recruiting more inspectors. We organise a lot of in-house training on how to work with the guidance notes and we are looking to industry to help us with some of that. We have had speakers from the oil industry. And we give inspectors the opportunity to attend conferences to explain what we are up to. ■

ENVIRONMENT DISCUSSION GROUP

The Institute of Petroleum has established an Environment Discussion Group for its individual members. The group will arrange early evening meetings and one-day conferences in London on environmental topics relevant to oil and gas activities.

The inaugural meeting of the new group will be held at the Institute of Petroleum on **Wednesday 28 November 1990** starting at 5.30 pm. (Tea and biscuits will be available from 5.00 pm).

Industrial Pollution in the 1990s — HMIP's Role

Speaker: **Dr Frank Feates**, Director, HM Inspectorate of Pollution.

If you would like to attend this meeting and/or be placed on the mailing list of the Environment Discussion Group, please contact **Mr AE Lodge** at the Institute of Petroleum, 61 New Cavendish Street, London W1M 8AR, Tel: (071) 636 1004, ext 236.

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1991 IP Diary

Orders are now being taken for the 1991 IP Diary. The leather covered diary has the IP crest (as above) reproduced at the top with the date and gives ample space for a company logo to be embossed underneath. The diary will be available in late Autumn.

The colour of the cover will be blue.

The diary contains 32 pages of specially printed copy, including oil industry statistics collected by the Institute of Petroleum.

The cost for a single diary is £6.00 (incl. p&p and VAT) and £7.50 overseas.

Discounts are available for bulk orders on application. Embossing of company logos is available at extra charge. Enquiries and orders should be made to:

Susan Ashton,
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'How I became a greenhouse sceptic'

By Dr Robert C Balling Jr, Director of the Laboratory of Climatology, Arizona State University

The recent Channel 4 television programme, 'The Greenhouse Conspiracy', raised a number of controversial issues. Dr Robert Balling was a contributor to this programme and subsequently gave a talk on 'Greenhouse Gases and Global Climatic Change' at the Royal Society of Arts in London. The conference was sponsored by British Coal and the Watt Committee on Energy.

He said in part:

You will discover that I am presenting my own view of the greenhouse effect. Importantly it shows that there are other views on greenhouse effects. You may already be aware that a debate exists.

At the beginning I will show how I became a greenhouse sceptic.

About 10 years ago I was working on a Ph.D at the University of Oklahoma. At that time all the climatologists were going around telling the world to get ready for global cooling. In 1979 if I had said that we were on the way to global warming, I would have been in the minority. When I was trained, cooling was the gospel. I then went to the University of Nebraska, worked for some colleagues in reconstructing the climate of the near past and became fully aware that certainly with a time-scale of 10,000 years or even 1,000 years, we have seen great fluctuations in climate. We've had cooling; we've had warming many, many times in the past, with really no very great variation in CO₂ levels.

It is clear that man's activities have little to do with this warming — or similarly with this cooling. I became aware that climate fluctuations in the past had occurred and that there was nothing particularly alarming about what we have seen occurring in the last decade or so.

Also at the University of Nebraska I learned a lesson from numerical model work on nuclear winter simulation. Climate models around the world can all sing in harmony. They can all say 'Yes, there will be nuclear winter', as long as everyone inputs the same type of nuclear war. It was no great surprise that all the models had roughly the same answer.

Subsequently many people studied nuclear war in some detail and concluded that the nuclear winter simulations in 1983 had vastly over-estimated the level of cooling. I left that arena altogether and moved to Phoenix.

Minimal urban effect

I arrived in the desert city and became fully aware that Phoenix may have the world's best urban heater — it is a desert city with near 100 percent sunlight, very light winds. The city had grown massively in a short period. We discovered that the central part of the city, like all cities that people have considered, was very much warmer than the surrounding area. Because Phoenix had grown so rapidly it was possible to go back in the weather records to reconstruct the impact of human development on the temperature. I became acutely aware that urbanisation can create a very positive warming trend in the records.

From that base I worked with a colleague of mine, Dr Sherwood Idso to determine the 'urban effect' in a temperature network taken from about 1,000 small towns in America (with an average of 5,800 inhabitants each).

We were trying to determine the

impact of urbanisation on the temperature record of these small towns. The answer was not all that much. There was a temperature trend of the order of maybe a tenth of a degree in the century when urbanisation took place. We published maps showing temperature trends from 1920 to 1984 in the United States.

Inadvertently I got involved in the greenhouse debate because in 1988 we had a tremendously hot summer in the United States and in Europe. Suddenly we saw 'greenhouse' on the front pages of the newspapers. In the meantime I sat in Arizona having just published some maps showing cooling during this century and the 'phone didn't stop ringing with callers who wanted me to say that it is cooler in the United States.

There was no doubt in my mind that cooling had been occurring throughout the century, so I said that it appeared to me that there was cooling on the 1.5 percent of the earth's surface that we had measured fairly accurately.

I'm convinced that these maps are accurate. Suddenly I was asked to debate with people about the greenhouse.

Significant increase in greenhouse gases

From the outset I agree that there is a growth of carbon dioxide in the atmosphere. Every scientist who writes on the issue agrees that the growth curve is accurate.

We keep using the terms 'greenhouse effect and carbon dioxide effect' interchangeably when that is not correct. Carbon dioxide represents only about half of the problem. There are many other greenhouse gases that have also been increasing. Frankly, I see no debate whatsoever in that portion of the literature. It is also worth knowing that the sources of these greenhouse gases are relatively well-known and that the United States has

always been a leader. However, its portion of the pie is continually shrinking, as other parts of the globe, particularly China, the Soviet Union and India, become emitters of carbon dioxide.

We also have a dramatic increase in the amount of methane, nitrous oxide, chlorofluorocarbons. We have taken equivalent carbon dioxide from about 270 parts per million to over 400 parts per million.

Problems from models

I think it is a little more complicated when you start to look at the models. What I discovered in reading the modelling literature was that the numerical modellers are in fact very good scientists. I have the greatest respect for these people and they have developed some fascinating and complex numerical models.

I noticed in all the articles I read that the scientists were very careful to say 'Here are the calculations. If carbon dioxide is doubled we will probably get global warming'. There are a lot of numbers but they are all in the range of 1.5 to 4.0°C or so. However, I am also impressed with the number of statements that caution the reader that the number is still suspect and reasons why you may not want to adopt that number so quickly.

There are many uncertainties with respect to cloud. The researchers are up front, in saying that one of the major deficiencies in the models is the cloud representation. There are many articles that have appeared about the feedback of the clouds. Many of the early models of course had fixed cloud, others had fairly crude cloud effects.

In addition the modellers very carefully detail how they parameterise the oceans. Initially the models had swamp oceans which were very shallow and did very little in terms of interacting with the atmosphere and moving heat around. The researchers cautioned that the oceans would have to be better parameterised to get better estimates.

Also a number of modellers pointed out that there are many other feedbacks, including biological feedbacks, which have not been included in the numerical model.

The bottom line was that you could find the number some place in the article that says a doubling of carbon dioxide would lead to x amount of warming. Yet you would also find in all the documents — and I totally agree with these — that there is still reason to be somewhat cautious about interpreting that number at face-value.



Dr Robert Balling

Value of historical records

When I analyse the historical records, I feel far more comfortable than talking about models or even policies.

What I found were many plots. The now famous global plot from the United Kingdom shows the warming that has occurred. There are many people who argue that they see a trend upward in the data. I agree with them.

I have done the calculation a number of times. I get a number for the last 100 years of around 0.44°C of warming. I don't debate that at all.

'We are moving into a world that is going to be cloudier and wetter'

I am also convinced that there is probably no more than about a tenth of a degree of contamination that is largely attributed to the urban effect.

We know how much carbon dioxide has changed in the last century; we have a pretty good idea of what's happened to the climate. How well do the two match up?

Many numerical models suggest that we should have been observing warming substantially higher than has been observed.

Also, I think there has been a mismatch between what the models say should have happened in the last 100 years, given the known changes to the atmosphere, and what has been observed. We have observed one-third of 1°C of warming and the models that were predicting catas-

trophe say we should have observed maybe 1°C of warming. I would agree that we have got a factor of three to deal with — others have conceded that point in the scientific literature.

If we assume that warming is taking place, it appears that many people would like to assume all of that warming is greenhouse warming.

I have colleagues in the United States who have repeatedly performed analyses and shown that some portion of the variants can be accounted for by things like sun spots or sun output, certainly by vulcanism and it would seem to me that not all of the third of a 1°C should be attributed to greenhouse. It may be that of the order of half the warming can be accounted for by other factors. You begin to reduce the amount of observed warming down to around 0.2°C.

Actually there are people in the United States who show greenhouse disparity and say there hasn't been any warming. I'm not one of those people — I say there has been warming. I'm very much convinced that there has been between a 0.2 or 0.3°C of global warming in the last decade. Carbon dioxide is a very good explanation for that amount of warming.

I have calculated how much warming occurred from 1888 to 1940 — you get something around 0.36°C. If you go on towards the end of World War II, you get 0.40°C.

I have made a few statements saying that apparently a great deal of this warming occurred early in the century. I must say I've been impressed all along that a tremendous amount of warming took place before the end of World War II — before you really see the massive build-up of carbon dioxide.

I see general cooling was the rule from World War II until the 1970s.

Our goal has never been to eliminate the greenhouse from the eyes of the public — it has only been to say these are the climate facts that we need to think about before explaining climate change by numerical models.

North versus South

The numerical models have predicted that the northern hemisphere should

warm up more than the southern hemisphere. Just the opposite has been the case.

The southern hemisphere has shown a fairly steady rise in temperature, very consistent with what I'd expect from a greenhouse world.

When I look at the northern hemisphere, I see that it has moved along to one equilibrium point, then suddenly jumped up in the span of about 20 years, fluctuated, gone down a bit and then moved up again in the 1980s.

I've been fascinated with finding explanations for what has been observed. This explanation has to account for the southern hemisphere's steady rise in temperature, and why the northern hemisphere appears to have fluctuated considerably more than the southern hemisphere, producing less warming where many models suggest the warming should have occurred.

My colleague Dr Richard Lindzen published a paper recently based on four major models used in the United States to study the greenhouse effect. He produced a plot of the temperature change that we would expect at each latitude. The four models Dr Lindzen considered are consistent with other models. They predict that we should be preparing for massive warming on the high latitudes of the northern hemisphere.

If we have a model calculating about a 3°C increase in global temperature, we will probably see almost double that amount in the high latitudes.

It is very reasonable to ask the question 'Where is the warming in the high latitudes?' In the high latitudes we would have expected, without knowing anything else, something in the order of 2 or 3°C of warming to be already present. In fact many Arctic places are cooling.

I would be the first to admit that I could find in some Alaskan records what amounts to warming but be sure there are still massive areas in the

Arctic which show absolutely no warming whatsoever — certainly not anything that would be consistent with what the bulk of the models say we should have been observing.

Hurricanes and drought

We have heard more than once that the greenhouse world will be a place of hurricanes. Actually since 1940 when the temperature warmed, there have been fewer hurricanes.

There are also people in my country who are absolutely convinced that we are on our way to a massive drought in the great plains and I think that, if my analyses are correct, we are getting more rain. Also, if the afternoon temperatures drop and the evaporation rates don't really change very much, you may have even more water. I think it is very likely that in my life-time the great plains will have more water made available to plants than they have today. Yet I don't see people building policy to get ready for that — they all seem to be convinced that we are on our way to drought.

Sulphur is good?

Not only have we increased carbon dioxide that could be warming but we have also put other things in the atmosphere which may retard the warming.

It is worth noting that there is a sulphur connection here with why we are not seeing quite so much warming.

The warming has been affected by the increased amount of cloud. I believe there has been a counteraction of daytime warming because of the increase in clouds, which as mentioned is a deficiency in the computer climatic models.

There is a concentration of these effects in the industrial northern hemisphere which points more and more to industrial emissions, par-

ticularly the sulphate connection. Off the coast of North America, it has been noted that the clouds are very bright and as you get out over the water the clouds decrease in brightness. Sulphates tend to break cloud.

In the southern hemisphere, with a reduction in emissions, you don't see clouds — off the coast of Australia, off the coast of South America — we don't see this brightening close to the continent with less brightening out into the ocean.

The future

I am completely convinced that we are today moving into a world that is going to be cloudier and wetter and we can also expect a reduction in the temperature range.

Things that I've observed that seem consistent with the models are the ideas that the afternoon temperatures will decrease; I'm sure the minimum temperatures are going up; I'm very positive the future is going to be a cloudier world and will probably be a bit wetter.

What has been observed the last 20 or so years may not continue into the future but that is the greenhouse I've been talking about. I don't think it's very different from the greenhouse many other people are talking about. I actually see these views as very much mainstream.

There are people who have talked about ways in which we can increase fuel efficiency. I am confused — why if people have such good policies, why do they have to lock onto the greenhouse effect?

I worry that you could spend a fortune trying to reduce carbon dioxide in the atmosphere. If the same money were spent on attacking something like the chloro-fluoro-carbon problem, you might see more benefits for every pound spent. ■



ENERGY ECONOMICS GROUP

8 November 1990

The Gulf What sort of crisis is it?

Speaker: **Mr Robert Mabro**, Director, Oxford Institute for Energy Studies

Venue and time: Institute of Petroleum

4.45pm for 5.15pm

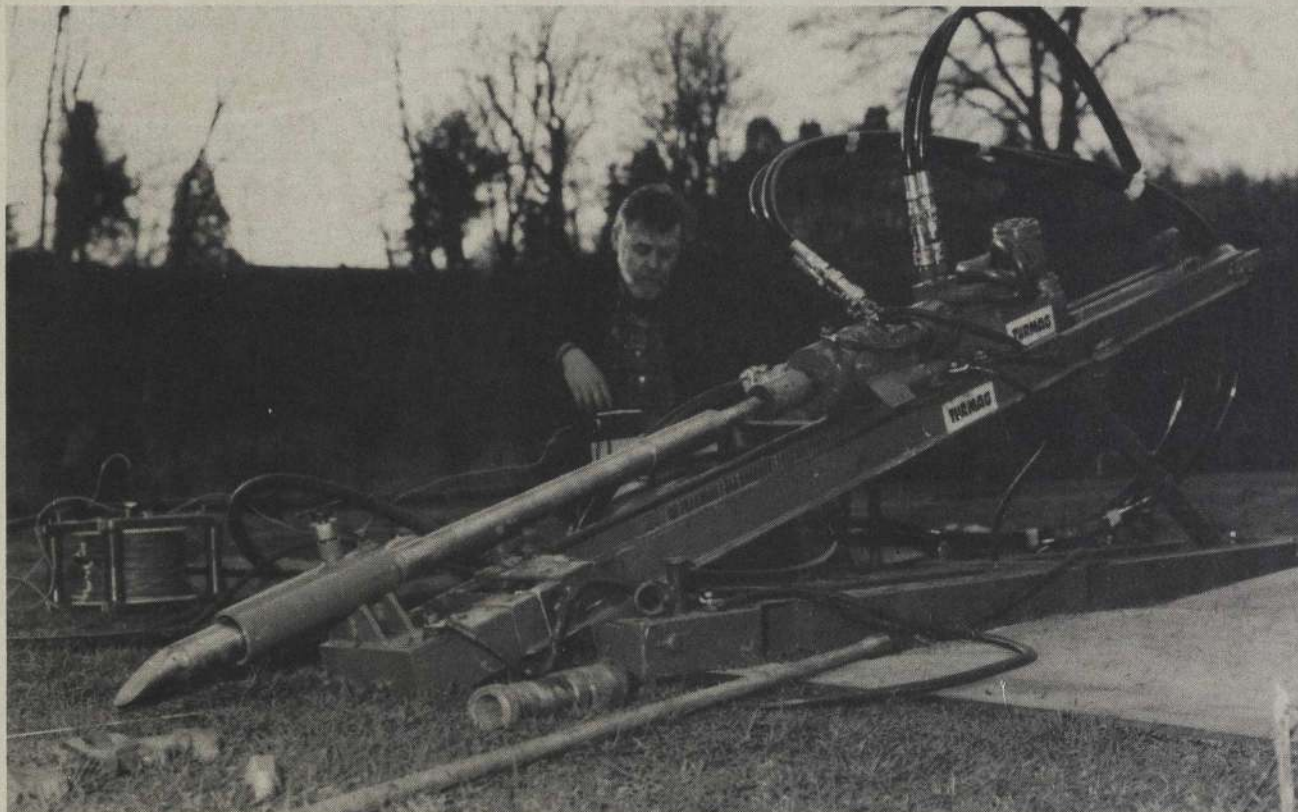
For further information please contact:

Mrs Jane Thompson, Institute of Petroleum, 61 New Cavendish Street, London W1M 8AR. Tel: (071) 636 1004.

Precision mole from British Gas

British Gas is introducing a guided trenchless pipe and cable laying system known as Rotamole, which has been specially adapted from moling technology first invented in Poland in the early 1970s. Since that time a number of industries have realised its potential in the installation and maintenance of underground services where traditional open-cut methods are too costly or not possible.

Rotamole, which is packaged together with a detection and monitoring system called Rotasteer, allows the installation of long lengths of pipes, cables or ducts along accurately guided routes beneath surfaces or structures that cannot be disturbed — such as congested roads, grassed areas or any immovable structure.



Rotamole — British Gas's new guided trenchless pipe and cable laying system

Minimum excavation

British Gas believes that it has developed a system that is convenient and safe. It claims that Rotamole requires a minimum of excavation and re-instatement, thus reducing overall costs.

The pilot boring system employs a 45 mm-diameter percussive impact mole attached to a string of hollow drill rods. The mole is operated with compressed air through these rods. End thrust and rotation is applied to the drill rods using a drill rig with hydraulically powered thrust and torque motors.

Power Pack

A twin tool hydraulic power pack is used to operate the rig; one output for rotation and one for end thrust. This combination of thrust rotation and percussive energy inherent in the mole provides Rotamole with rapid ground penetration ability which enables it to operate in a wide range of ground conditions.

The Rotamole uses an angled front face to generate ground forces which are used to change direction when required. When no steering action is required, rapid forward progress is possible. Should a change in direction be necessary, rotation is

stopped, the angled face correctly orientated and thrust and percussion only applied.

As soon as the pilot bore has been constructed, a pipe of larger bore can be installed using a larger impact mole.

Guidance system

The mole is guided by a detection system, known as Rotasteer which orientates the angled face and the depth and plan position of the mole head by means of a magnet in the head of the mole located by a series of magnetometers. The guidance system incorporates a micro-computer which processes the signals from the magnetometers. The computer advises steering action to keep the pilot bore on its route when deviations in depth and plan occur. This device works up to depths of 1.5 metres. For depths up to 4 metres, another system called Rotasonde is available which is based on a specially designed radio sonde in the head of the mole with an associated receiver.

British Gas say that the new mole is compact and light, requiring no special transport. Installation of the pilot bore is quick — three times faster than with a conventional pneumatic impact mole. Moreover, the new mole makes possible accurate pipe-laying — it is even capable of negotiating curves of up to 20 metres radius.

Institute News

Launch of the Malta Branch

The IP Malta Branch was officially inaugurated on 1 October.

The opening speech was made by Mr Frans H Said who is the Chairman of the new branch. Mr Said, who is also the Chief Executive of Medserv announced four major events with which the new branch is being associated. These are the launching of the Mediterranean Regional Oil Centre in Malta; Clean Seas 91, the first European Marine Pollution Control and Prevention Conference and Exhibition; MOEX 92 which will be the first Mediterranean Oil and Gas Exhibition and the establishment of the Pan Mediterranean Oil and Gas Congress.

Representing the Institute was Dr TH Farmer, Chairman of the Branches Committee and member of the council who also read a message from Mr Basil Butler, the IP President.

Present for the launch were His Excellency Mr Brian Hitch, the British High



Mr Frans Said

Commissioner for Malta who made a short speech and read a message from Mr John D'Ancona, Head of OSO in the UK Department of Energy, and Her Excellency, Mrs Sally Novetsky, US Ambassador to Malta who also gave a short speech.

The event was closed by The Hon Dr Emmanuel Bonnici, Minister for the Tertiary Sector who talked about the Malta government policy regarding oil exploration and planned future activities in oil exploration in Maltese waters.



Malta Branch members at the launch

Around the Branches

Aberdeen

13 November: 'What is the environmental cost of offshore oil?', by Dr John Davies of the Marine Laboratory, Department of Agriculture and Fisheries for Scotland.

23 November: Annual Dinner — Principal speaker Mr John Browne, Managing Director and Chief Executive Officer, BP Exploration.

Edinburgh and South East Scotland

22 November: 'Applications of advanced computing in the petroleum industry' by Dr N Carmichael, Shell Expro at Herriot Watt University, Riccarton.

Essex

28 November: Ladies Evening — 'Christmas Shopping at Sainsbury's' by Mrs C Gillett, Home Economist of J Sainsbury Plc.

Humber

22 November: 'Oil spill response' by a speaker from the Oil Spill Service Centre, Southampton.

London

15 November: 'Never a dull moment — 36 years in petroleum engineering' by Basil Butler, OBE, The British Petroleum Company Plc.

Midlands

14 November: 'The use of SPC in pursuit of continuous improvement in quality' by Mr A Leslie, Ford Motor Company Ltd.

Northern

13 November: 'EMPROX and synthetic metal working fluids' a talk by ICI.

23 November: Annual Dinner Dance, Belfrey Hotel, Handforth. Guest speaker Mr Brian Goodland, of Texaco.

Shetland

2 November: Annual Dinner — guest speaker Basil Butler OBE, Director, British Petroleum and President of the Institute of Petroleum.

South Wales

22 November: 'The Severn barrage project' by Dr TL Shaw, at BP Oil Llandarcy.

Stanlow

8 November: 'Sea transportation' by Mr Andrew Jones, Jo Tankers.

30 November: 'Golden Jubilee' Dinner Dance.

West of Scotland

1991

7 March: Petroleum Dinner.

Yorkshire

13 November: 'Automotive trends' by Mr J Moore, Eythel Corporation.

Shetland branch set sail

The Shetland branch of the IP took a ferry trip from Lerwick to enjoy its September meeting on the Island of Bressay.

The photograph, right, shows some of the members and guests prior to embarkation. Branch Chairman, Captain Jeremy Procter, (fifth from left, front row) stands alongside the Shetland wildlife expert Bobby Tulloch. Mr Tulloch is a founder member of the Shetland Oil Terminal Advisory Group, set up in 1976. He gave an illustrated talk on environmental aspects of his recent travels to such diverse locations as Spitzbergen and the Falklands.



New Collective Members

Anderman & Company was founded over 40 years ago. The company operates from its own offices and warehouse located at Kingston-upon-Thames.

Set up as a manufacturer's agent and distributor, Anderman represents leading suppliers of: labware and laboratory equipment, refractories, metallurgical products and process plant equipment.

In addition to a comprehensive range of filtration products and centrifuges, its Laboratory Supplies Division sells a line of automated petroleum testing equipment to IP & ASTM standards. The activities of its Engineering Division include the sale of steel forgings and castings for offshore applications, heat resisting components for furnaces, pressure vessels, columns, heat exchangers and contracting services for process plants.

Engen Ltd is a fully integrated South African energy company. It is listed on the Johannesburg stock exchange. The Engen Group currently comprises three major activities: marketing of fuels, lubricants and other petroleum products through three independent and competing brand names — Mobil, TREK and SONAP; petroleum refining and the production of chemicals which takes place at the group's Durban refinery, Genref. Engen also manages the Mossgas (oil from natural gas) facility presently under construction off the Cape Coast and exploration interest through contractual arrangements with SOEKOR.

The Engen group has approximately 1,500 service stations and distribution points making it the leading marketer and distributor of petroleum products in Southern Africa.

Plant Safety Limited is a leading engineering inspection and consultancy company (including technical services consultancy) offering its comprehensive expertise to a variety of industrial, commercial and government organisations. The company operates out of Manchester, and offers a wide range of services in engineering inspection and consultancy in the United Kingdom and abroad.

It provides consultancy and practical assistance on a wide variety of matters related to safety at work, quality assurance and risk management.

Multi-disciplined teams work with: boilers and pressure vessels, cranes and lifting equipment, passenger and goods lifts, heating and ventilation systems, air conditioning and refrigeration equipment and mechanical and electrical plant.

Plant Safety laboratories with their mobile units handle chemical, metallurgical and environmental analysis, and offer a range of destructive and non-destructive testing facilities. Laboratory staff also undertake failure investigations and offer consultancy.

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Brown, EC, 14 Braehead Crescent, Edinburgh EH4 6BP
Brunt, KD, Midland Biocides Ltd, 8 Heathcoat Building, Highfield Science Park, University Boulevard, Nottingham NG7 2QL.
Carr, EWR, The Economist, 25 St James's Street, London SW1A 1HG
Clark, WM, 22 Larchwood, Thorley Park, Bishops Cleeve, Shropshire CM23 4JS
Clarke, AJ, 21 Affleck Avenue, Stoneclough, Radcliffe M26 9HN
Cremona, Miss J, c/o 42 Isouard Street, Sliema, Malta
Dorrier, JP, BHP — Petroleum, 90 Long Acre, London WC2E 9RA
Duffy, HV, 22 Davidson Crescent, Tawa, Wellington, New Zealand

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Harrison, TFT, White Bridges Farm, Stiffkey, Norfolk NR23 1QW
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Jawzi, AH, 4A Mostyn Street, Llandudno, Gwynedd LL30 2PS

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Knox, AIW, Kuwait Petroleum Lubricants, Cross Green Industrial Estate, Knowshorpe Gate, Leeds LS9 0NP

Large, ML, 46 St Andrews Close, Moreton-on-Lugg, Hereford HR4 8DB
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Smith, IK, 44 Wellands, Wickam Bishops, Witham, Essex CM8 3NF

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Vega-Olivares, JC, Bahia De Todos, Los Santos 37, Anzures, 11300 Mexico City DF, Mexico

Watson, DB, 7 Dutch Gardens, Kingston upon Thames, Surrey KT2 7TT

Webster, PLT, 78 Cromwell Road, Winnington, Northwich, Cheshire CW9

Wilcox, Miss CI, Denton Hall, Burgin & Warrens, Strand Bridge House, 138-142 Strand, London WC2R 1HH

Wilson, JA, The Reddings, Laidon Common Road, Little Burstead, Billericay, Essex CM12 9TD

Young, GJ, c/o Clyde Petroleum Plc, Coddington Court, Coddington, Ledbury, Herefordshire HR8 1JL.

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.

Institute News

Deliveries into Consumption

UK deliveries into inland consumption of major petroleum products —Tonnes

Products	Aug 1989†	Aug 1990*	Jan-Aug 1989†	Jan-Aug 1990*	% change
Naphtha/LDF	227,240	304,450	2,057,380	2,045,050	-0.6
ATF—Kerosine	656,110	655,780	4,387,920	4,497,380	2.5
Motor Spirit	2,109,510	2,167,010	15,901,420	16,365,210	2.9
of which unleaded	511,350	759,700	2,434,852	4,851,430	99.2
Super unleaded	n/a	88,850	n/a	598,050	
Premium unleaded	n/a	670,850	n/a	4,253,380	
Burning Oil	106,740	186,080	1,162,030	1,359,650	17.0
Derv Fuel	859,450	934,670	6,635,480	7,155,090	7.8
Gas/Diesel Oil	607,140	624,860	5,518,100	5,394,810	-2.2
Fuel Oil	770,530	762,780	6,478,020	8,935,740	37.9
Lubricating Oil	75,690	75,270	595,490	554,050	-7.0
Other Products	560,440	503,640	4,357,190	4,478,480	2.8
Total above	5,972,850	6,214,540	47,093,030	50,562,100	7.4
Refinery Consumption	508,810	501,890	3,883,370	3,969,500	2.2
Total all products	6,481,660	6,716,430	50,976,400	54,531,600	7.0

†Revised *Preliminary n/a not available

CODE OF PRACTICE AVIATION HYDRANT PIT SYSTEMS

Recommended arrangements for: Part I: New facilities Part II: Replacement of obsolete valves in small pit boxes

This code of practice updates and replaces the 1980 edition and incorporates not only the recommended arrangements for new installations, which was the subject of the 1980 edition, but also arrangements for the replacing of obsolete valves in small diameter hydrant pit boxes.

When upgrading old hydrant systems the problem of replacing the small diameter pit box, in which the older type valve was frequently installed, has to be considered. Apart from the expense of breaking out the box from concrete on the apron, airport authorities, given the ever increasing demand for aircraft servicing space on the terminals, are loathe to take valuable space out of service for three weeks to allow replacing of the pit box. As most of the newer hydrant pit valves that were developed to conform to the requirements of the 1980 edition needed to be installed in boxes of at least 18" diameter, an alternative was seen as desirable.

The preferred system for new installations remains that as detailed in Part I of the 1990 edition. However, working with valve manufacturers and the Heathrow Airport Hydrant Consortium Engineering Committee, the Aviation Liaison Sub-Committee of the Institute have introduced a Part II to the new edition which deals with the replacement of the old valves without the need to break concrete.

UK: £10.00 Overseas: £13.00

Please send remittance with order.

This publication is available from the Library, The Institute of Petroleum.

Institute of Petroleum Conference Proceedings

Petroleum Retailing — After the Monopolies Report — The Challenge of the 1990s. 1990. £18. Overseas £21.

Energy Information for 1992. 1990. £18. Overseas £21.

The European Auto Diesel Challenge. 1990. £25.
Overseas £30.

Update II: Aspects of Microbial Control. 1989. £22.
Overseas £25.

Cost Reduction Offshore — The Way Ahead. 1989.
£25. Overseas £30.

Documentation Control in the Energy Industries. 1989.
£13. Overseas £16.

Modern Practice in Handling Aviation Fuel at Airports.
1989. £25. Overseas £28.

North Sea Oil and Gas Beyond 2000? 1989. £12.
Overseas £15.

1992. The Single Europe Act. Business Implications for
Downstream Oil and Gas. 1989. £20. Overseas £25.

Trends in World Natural Gas Trade. 1989. £25.
Overseas £30.

These publications are available from:

**The Library, The Institute of Petroleum, 61 New
Cavendish Street, London W1M 8AR.**

Tel: (071) 636 1004. Fax: (071) 255 1472.



Mr Peter Bigg, above, has been appointed Managing Director of Smith Rea Energy Aberdeen Limited. He was previously a Director of Halliburton Geo Consultants, where he was responsible for strategic planning and marketing of advanced analytical and interpretational consultancy services for the hydrocarbon exploration and production industry. Smith Rea Energy Limited is a newly established member of the Smith Rea group of companies.

John Brown Engineers have appointed **Mr Graham Mead** as Sales and Marketing Director following the promotion of **Mr David Moorhouse** to Managing Director. Previously Associate Director — Defence Projects, Mr Mead joined John Brown in 1974 and has worked on a variety of senior assignments in the offshore and defence businesses.

Mr Barrie Hogarth, below, has been appointed Managing Director at Land and Satellite Surveys Ltd, the company recently set up by Andrews Hydrographics Ltd to take advantage of increasing opportunities for GPS positioning throughout the offshore industry.



Universal Oil Products (UOP) have named **Mr Robert Anderson** as General Manager of Katalistiks International, a unit of UOP with responsibility for its fluid cracking catalyst business worldwide. Previously, Mr Anderson was Managing Director of UOP NV, in Antwerp, Belgium, with responsibility for UOP engineered products in Europe and the Middle East.

Mr Robert Hendrix has been elected Executive Vice President and Chief Operating Officer of Weatherford International. Mr Hendrix began his career in 1969 as a petroleum engineer for Texaco. He joined Weatherford in 1983 as Far East Regional Manager and was later promoted to Vice President, European Operations.



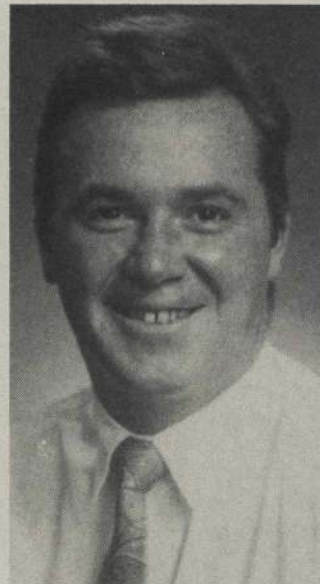
Western Geophysical, a division of Western Atlas International Inc have appointed **Mr Juan Vallhonrat**, above, as General Manager of geophysical software development.

Mr Edmund White, Project Engineer for fuel research at the David Taylor Research Center in Annapolis, Maryland is the 1990 recipient of ASTM's Award of Merit. He was recognised for exceptional leadership and contributions in the areas of fuel specifications and properties.

Stolt-Nielsen Seaway (UK) Ltd, the subsea construction and diving firm, have appointed **Mr Stuart Oakley** as Managing Director and **Mr O C Anderson** as Managing Director of the National Hyperbaric Centre which was recently acquired by the company.

The Petroleum Science and Technology Institute has appointed **Mr Martin Miller** as Assistant Director with responsibility for information and technology transfer. Mr Miller was formerly with BP, Britoil and Mobil. His prime responsibility will be to provide sponsors with the results of the Institute's research and assist with its implementation.

Mr David Jones has been appointed as an Associated Director of CWA Consultants. Mr Jones, an experienced industrial chemist, will lead the technical services provided by the oil and chemical department concerning the resolution of quality problems which occur in the storage, processing and marine transportation of fine chemicals, petrochemicals and liquid petroleum gases.



Genflo Underwater Engineering have appointed **Mr Alex Whyte**, above, as their new Dredging Superintendent. He takes charge of all operational aspects, including the mobilisation of the company's range of diver dredging tools.

Dr Brian Sweeney has been appointed Head of Downstream Oil Industry Practice at Arthur D Little's management consulting group in London. He will be responsible for the company's downstream practice in Europe, Africa and the Middle East which focuses on trading and logistics, refining and marketing. Its services include long term profitability improvement, strategy development, organisational change, and studies on feasibility, environment and pricing as well as litigation support. Dr Sweeney previously worked for Shell.



Kuwait Petroleum Lubricants has been relaunched following the acquisition of Carless Lubricants by Kuwait Petroleum last year. **Mr Alan Tucker**, above, has been appointed Managing Director of the new operation. Mr Tucker has extensive experience of the lubricants industry having worked at Texaco for 20 years. Previously he was Vice President and General Manager of Texaco's Spanish subsidiary and has also been the Manager of its UK lubricants division.

Noble Denton Weather Services Ltd have announced the appointment of **Mr Mike Webb** as Business Development Manager, Environmental Studies Department. Mr Webb has 15 years experience in the offshore industry, having previously worked with Imcos Marine and Oceanroutes.

Mr Robin Burley, below, an oil logistics professional, has recently established an independent consultancy — Kennet Oil Logistics. Mr Burley has over 20 years experience in the oil industry, chiefly in the supply, trading and transportation sectors.



Fibre optics shed new light on subsea ROV control

By Angel Abcede

The next technological breakthrough in the murky, subsea world of remotely operated vehicles (ROVs) may be based on a simple beam of light.

Fibre optics, the lightwave-transmission technology that most people associate with telephone cables, has already improved the efficiency of ROVs in oil rig maintenance. It also promises to increase the accuracy of the movement of remote controlled arms and improve overall vehicle safety in hazardous conditions.

Specialists state that the use of fibre optic cables in ROVs is undergoing rapid development. 'It's like computers,' said Mike Mullin, operations manager for Oceaneering International Inc, an underwater services company based in Houston. 'The fibre optic (cable) you're using today could be obsolete tomorrow.'

Benefits of fibre optics

In today's ROVs, fibre optic communication lines are proving to be a lighter, thinner option to electrical wires. Bound directly into umbilical design, the fibre optic strands—made of transparent glass—replace electrical communication wires normally made of copper. As a result, in Mr Mullin's view, the new, lighter umbilical allows the ROV more freedom and affords operators the opportunity to use lighter equipment in manipulating cables from above.

Other underwater service companies use the lightweight advantage as a means to increase operational depth. With a lighter cable, these companies can add additional electrical wiring to boost ROV horsepower. The added depth comes at no sacrifice to the quality of video signals beamed back from below, specialists say. Where studio-quality video images were impossible beyond 10,000 feet, today's generation of ROVs can transmit such images at depths of 20,000 feet.

'One of the main benefits of fibre optics is studio-quality video at depths of up to 20,000 feet,' Mr Donald Dean, Vice President of Operations, Eastport International.



A ROV at work

While increased capabilities at greater depths have less of an effect on the oil industry (since most oil rig work happens at depths less than 10,000 feet), the ROVs improved subsea mobility and increased video quality do assist in rig maintenance.

Future development

The full impact of fibre optic cables on oil rig work could come in the near future, as underwater services companies realise the additional benefits of the new technology.

Besides their ability to deliver a pure signal, fibre optics are non-conducting, a great safety tool in high voltage environments like those found in offshore rigs, according to Mr Dean. Also, fibre optic cables can carry more

information bits than electrical wiring; as a result many more technical advances in ROVs may well spring from fibre optic use.

To understand the possibilities, one must understand how light travels through optical strands and how that light carries digital information.

Basically, fibre optics refers to the transmission of light through transparent substances, like glass or any other opaque material. An optical fibre is roughly 0.1 mm and 0.2 mm in diameter and consists of a core and what is called 'cladding,' a coating that surrounds the core. When light is sent through the fibre, the glass reflects and refracts the energy in such a way that the light is guided down the strand.

At certain frequency ranges, light

is electromagnetic radiation. So in the same way that metal wires guide electricity, glass fibres guide the electromagnetic radiation in light.

There are differences between metal and glass transmissions. Fibre cables carry digital signals, as opposed to analog signals sent through metal wires. The fibres are also smaller in diameter than metal, lighter and do not conduct electricity.

In the telecommunications industry, undersea fibre optic networks have become the fastest growing communication market in the world, with investment likely to exceed \$8.5 billion by 1996.

Possibly the biggest advantage fibre optics have over metal is the larger potential for data transmission. According to Mr Dean, data rates are much higher with fibre optics. Also, frequency bands can be expanded without distortion of the message. 'With electric telephone cables (beneath the ocean), booster systems were placed five to 10 miles apart, Mr Dean said. 'With fibre cables, they're set 200 miles apart.

Costly cables

Where ROVs are concerned, however, that technology does not come cheap. Fibre optic cables today can cost \$16 per foot, or \$2 per foot more than copper, according to Mr Mullin. A 10,000 feet cable could end up costing as much as \$200,000.

Still, however costly, the promise of fibre optics has provided enough incentive to drive its development in an ROV application since the mid-1980s.

Oceaneering International and its affiliate companies began testing fibres within their cables in 1984. Faith in fibre optics was minimal at the time — so a strand or two was added to the otherwise metal cable. Those strands of fibre optics were thought of as back-up communication lines, so that the fibre optics could be tested without sacrificing the ability of the entire umbilical.

Fibre optics became standard equipment in umbilicus for Oceaneering International as early as 1986. Elimination of copper communication wire in many of their umbilicus has brought a reduction in cable size, going from 2.5 inches in diameter for metal to 1.5 inches for fibre. Fibre optic technology continues to develop. Over the years, generations of fibre optic cables have emerged to combat the problem of 'cracking' within the cable.

One of the main fears of using fibre optics in ROV umbilicus was the physical demand placed on the cable,



Eastport International Inc's ROV curvIII under contract to US Navy

according to Walter Venard, Supervisor of Operations for AT&T. The telecommunications giant had been into ROVs since the early 1970s but only since April began to use a fibre optic unit. 'Fibre optics are quartz glass,' Mr Venard said 'If it breaks in the middle, you've just destroyed a very expensive item — \$200,000 for a 10,000 footer', he added.

In general use, an umbilical will ride over the edge of a boat on a sheave or pulley-type mechanism three feet in diameter. Mr Venard said. From that point, the umbilical is attached to a cage from which the ROV is launched beneath the water. From there, a tether, or additional stretch of cable, attaches the ROV to the cage and ultimately its power source. Umbilicus contain not only communication lines but also electrical wiring. The electricity sent down those cables is used to power the ROV hydraulic system. Mr Venard said that years of testing in the

field have proved the durability of fibre optic cables in an ROV application. Advancements in fibre cladding that allowed fibres to flex without cracking brought fibre optics into mainstream use.

Typical systems

An example of a working ROV equipped with fibre optics is Oceaneering International's HYDRA AT. The ROV system is small and compact, yet rated for 6,100 feet, fitted with two manipulators for effective subsea work and powered by a 20 hp hydraulic power packs. The power packs enable thrusters to push the vehicle along at 3.5 knots forward, 2.5 knots lateral or vertical at nominal depth (100-150 feet), the company claims.

The umbilical incorporates fibre optics with high-density telemetry and video and has a diameter of 1.1 inches. Though manufacturer Vector Cable declined to give design specifications,

the fibre optic cable normally carries three power conductors and nine optical fibres.

In oil rig work, ROVs are used in many different ways, including supervision of diver tasks and surveying undesirable spaces like igloos and complex structures. ROVs also handle maintenance of equipment on the sea bottom.

Sonsub Service Inc of Houston started leasing their first fibre optic ROV last summer, according to Mr BJ Reid, a supervisor with Sonsub. With fibre optic cables being immune to electromagnetic noise, he noted a significant improvement in video images with the ROV.

'Noise from the copper power lines feeding the sub and the cage is injected into the video line,' Mr Reid said. 'But the fibre optics don't pick up that noise.'

Advances in ROV mobility and video quality are achievements that just seem to scratch the surface of fibre optic technology. Mr Dean said that the ability of fibre optics to transmit large amounts of data makes it possible for complex computer messages to travel back and forth.

Future capabilities

He added that developments in improved arm dexterity and the use of three-dimensional video images are just two of the areas that could be affected in the future.

Current three-dimensional video technology still has a way to go before becoming viable, Mr Mullin said. Current equipment according to Mr Mullin, gives operators 'headaches' after 20 minutes. For an ROV operator, 3-D viewing is important in that depth perception is lost in a two-dimensional video screen.

on a reflex arm that will give operators on the surface an indication that the underwater arm has bumped into a solid object. Those knee-jerk response signals, also known as 'force feedback,' from below will one day be instantly felt by the operator using the 'master' arm above.

Mr Mullin said that the master-slave ability could be found in equipment as old as 15 years but that technology is too bulky for today's standards.

Both the 3-D and master-slave efforts will most likely be aided by fibre optics, since both applications will rely on increased data transmission, Mr

'As the umbilical gets longer and longer, the operator can just remain onshore and do everything from the office.'

'Operators get used to working with the flat image but it usually takes a couple of tries to reach out and grasp something' Mr Mullin added.

Master-slave arms that respond with like reflexes is desirable new technology. Currently, work is being done

Dean said.

As fibre optic technology advances, so may the shape of ROV work on oil rigs in general. 'As the umbilical gets longer and longer, the operator can just remain onshore and do everything from the office.' Mr Dean joked. ■



CONFERENCES 1990/1991

1990

- November 6** Safe Road Transport in the Petroleum Industry — The Way Ahead
- November 16** Futures and Forward Markets — Swaps and Options — Which Way Forward?
- November 22** Offshore Safety — The Way Ahead
- November 27** Luncheon — at Grosvenor House Hotel, London
Speaker: Mr Robert Horton, Chairman, The British Petroleum Co. p.l.c.
- December 4** Crude and Petroleum Product Shipments: Problems Encountered during Independent Inspection

1991

- 'IP WEEK'**
February 18 Financing Energy Projects Seminar
- February 19** Oil Price Information Seminar Luncheon at The Inn on the Park Hotel (Distinguished speaker to be announced)
- February 20** Annual Dinner at Grosvenor House Hotel
- February 21** Luncheon at The Dorchester Hotel (Distinguished speaker to be announced)

For further information, 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

Schlumberger launch imaging system

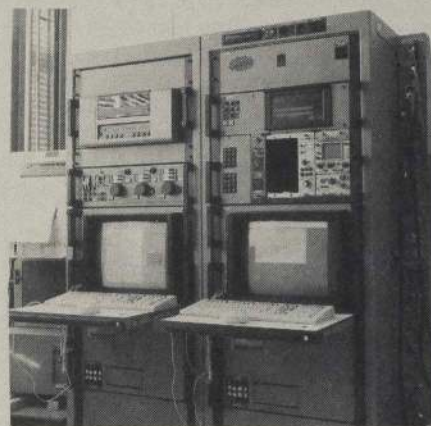
SCHLUMBERGER Inland Services Inc. has launched a new generation of logging equipment designed to reduce oil and gas field development and production costs whilst maximising production from fewer wells.

The MAXIS 500 system, the Multitask Acquisition and Imaging System, has been developed in response to the industry's realisation that reservoirs are complex heterogenous structures and require new measurements to better characterise them.

'In reality conventional logging can identify and quantify hydrocarbons, the Maxis imaging system and its associated measurements will better characterise the reservoir structure and its dynamic

characteristics. In simple terms that means we can better determine how the reservoir will behave which, combined with seismic data, will allow optimum placement of each production well and therefore maximum production from fewer wells,' commented Astley Hastings, Schlumberger UK Marketing Manager.

'Effectively this equipment will reduce field development costs by providing new reservoir information immediately, this was previously unavailable to oil companies. This information will then allow faster and more accurate determination of the number and location of production wells required for a specific field.'



MAXIS 500 system

New stimulation vessel



THE *Western Renaissance* is a 308-foot-long, \$43 million offshore well stimulation vessel being constructed by Western Petroleum Services International (WPSI) for service in the North Sea beginning in the spring of 1992. The vessel's hull integrity is designed to meet the UK Department of Energy's requirements for collision damage stability of offshore installations and Det Norske Veritas' intact and damage stability (SF class notation). When operational, the vessel will be the largest and most advanced of its kind to operate in the North Sea oil fields. WPSI is a subsidiary of the Western Company of North America.

Geoteam first

NORTH SEA oil companies look set to benefit from the latest hi-tech geophysical interpretation service from Geoteam UK Limited, the Aberdeen-based seismic survey specialists.

The company are the first UK site survey contractors to use the £75,000 Sierra 2DI system, and their first project using this advanced system has recently been completed for oil company Unocal Ltd.

'Our new service using this unique analysis equipment means we can now provide our clients with a much faster and more comprehensive interpretation of high resolution seismic data, and as we are the only surveyor specialists operating this facility at present it offers our clients a more efficient service,' said John Morse, Geoteam sales manager.

Heat saver

CONSIDERABLE energy savings are made when energy efficient, purpose designed controls are fitted to new and existing electric heat tracing installations in refineries, power plants, oil terminals and in the food and chemical processing industries.

Results show a 70 percent saving in energy consumption following the retrofitting of a Powermatch Self-Regulating System Controller.

The patented Powermatch Control System supplied by Heat Trace Ltd of Stockport, results in payback periods of only a few months.

New software for accident recording

NORTON-WAUGH Computing announce the release of **ARRAN** — a software package which, by detailed analysis of accident records, is designed to improve safety, productivity and working practices and identify potential cost savings.

The Norton-Waugh Accident Recording & Analysis System has been developed in conjunction with a major manufacturing company and provides the employer with all the necessary prompts for accurate recording of accidents at work and their subsequent reporting to the appropriate statutory authorities.

ARRAN provides an ongoing record for employer and employee alike and offers the facility to analyse a company's records of reported accidents.

Data can be presented historically, by department, machine, process, employee, accident type, or a combination of any or all of these. This provides valuable information for personnel managers, health and safety officers and departmental managers, which can be used to identify areas, processes, working practices and procedures which require attention.

As an example, if the analysis shows a high level of incidents in one particular department, the work practices in that area can be examined to see if modifications to procedure or equipment are called for.

If one employee appears more accident prone than the average, this may highlight the need for better training procedures.

If the rate of accidents has increased

over a set period of time, this can be compared with other relevant data and may indicate a need for revised safety instructions.

The facility for analysing the available data is virtually unlimited, and the package will, say Norton-Waugh, be invaluable to busy managers in reducing the time taken to meet the increasing statutory requirements for records and statistics.

All incidents involving fatalities, personal injury or which cause an employee to be away from work for more than three days have by law to be reported to the Health & Safety Executive on the appropriate official forms. A useful and time saving feature of ARRAN is the automatic production of all the necessary forms in such an eventuality.

Phonecard dispenser

MORE than 25 million British Telecom phonecards were sold last year, and the number of card phones is likely to double over the next year — following on an 80% increase last year.

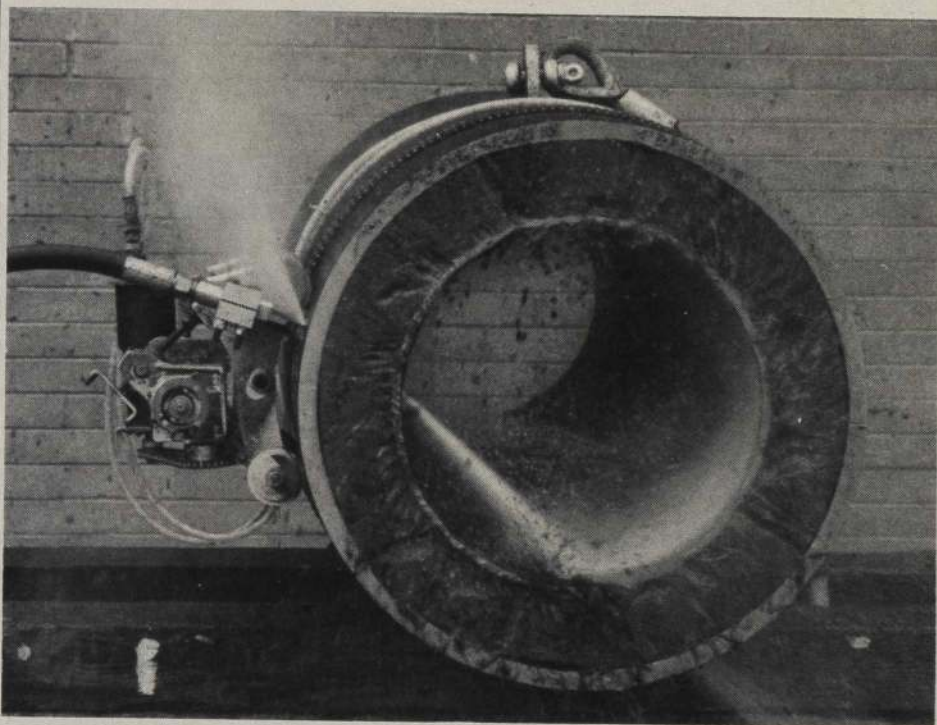
So, phonecard vending machines combine a high volume source of profit with a valued customer service, minimising customer queuing and the distraction of counter staff from higher margin sales.

The new PhoneCard 5000 vending machine from APS StampBank Ltd — which pioneered the use of stamp vending units for retail use — carry a highly visible green livery which clearly echoes the British Telecom Phonecard colours for maximum recognition.

In operation customers simply insert two £1 coins and pull a lever to obtain a phone-card.



Safe cutting technique



UNDERWATER repairs and disinvestment will feature large on the Genflo Underwater Engineering Stand, IRM'90/ROV'90, Aberdeen, 6-9 November, with exhibits for subsea dredging and the removal of underwater structures.

Genflo will exhibit for the first time their Jetcut service, which uses the latest range of second-generation water/abrasive tools for safe cutting in potentially hazardous environments offshore, both underwater and topside.

The Genflo Jetcut cold-cutting service can be far faster and more accurate than earlier cold techniques. It can be applied to almost any type of material from steel to concrete by using standard manipulators or custom-built ones for specific requirements. The system can be used in water at depths to 500m, or in the air up to 500m away from the subject.

A cut can be achieved to weld-prep standard. Almost any size of subject, straight line or circumferential, from 8in diameter pipework to large diameter tanks can be cut. But perhaps the most impressive aspect of the system is its shock-free speed of cut capable of achieving over 8 inches/minute through 1/2inch steel plate and up to 6 inches/minute through 1 inch steel plate.

Ford's re-cycling process

FORD diesel engines are playing a vital role in the protection of the environment by providing the power for a patented British system for re-cycling waste oil sludge.

The heart of Hydrovac International's 'oil-sorb' system is a bank of two Ford Cargo 4.1-litre four-cylinder diesel engines which develop a combined 160Bhp.

A third Ford engine, a six-cylinder 5.9-litre Cargo unit developing 150Bhp, is used to pump the material through the system to be processed.

The system works by mixing the oil sludge with other waste products from the oil-refining process, such as fly ash. The

resulting material is stable and has a sand-like consistency: it won't burn and it won't break down. Consequently, it can be used as a base for road building or for traditional land-fill applications.

Wales-based Hydrovac manufactures specialist cleaning equipment for the oil-refining, chemical and petro-chemical industries and its customers include many household names. Eighty percent of its output is exported.

'The original prototype went from idea to plant in just three months,' said Hydrovac chairman George Wallacy. 'In our business that's almost unknown.'

Master Yeoman navigator

QUBIT has established a breakthrough in marine electronic navigation with the launch of Master Yeoman, the chart table of tomorrow, the technology of which the company predicts, will become a standard fit on at least 30 percent of the world's commercial shipping within the next five years.

Master Yeoman is unique in that it brings the power and versatility of electronic data processing directly to the chart table. By linking the navigator to a selected navigation aid, the system enables him to interact with the chart directly to carry out position fixing, course plotting and to identify and input waypoint coordinates quickly and accurately.



Master Yeoman

Avfuel manager

AVERY HARDOLL FLUID MANAGEMENT, the Hampshire-based fluid handling and metering division of GEC Aerospace Limited, has received its first order for Flow-tran, a new vehicle information and fuel management system, from a major aviation fuelling services company based at London's Heathrow Airport.

Flow-tran is a complete turnkey solution to managing all aspects of fuel distribution, using advanced, specialist software and the latest electronic technology. In this application a realtime link between the British Airports Authority's and British Airways' computer systems provides the aviation fuelling company with a totally integrated system which ensures maximum operational efficiency, error free, computerised administration and maximum, instant return on capital investment.

Low cost greasing automatically

ANY bearing which has to be greased regularly can be fed automatically by a refillable Petromatic grease feeder from Adfield-Harvey Industrial. Once fitted, Petromatics work continuously, automatically and can be moved from one location to another at will.

Periodic visual checking is all that is required and replenishment is from a standard grease gun when the level in the transparent reservoir falls below a pre-set point. Most users find that Petromatics fitted to bearings which would require daily attention from a manual gun will need refilling with grease only about every two or three months.

Petromatics will handle any grade of grease and the operating temperature limits are minus 23° to plus 93° Celsius.

Fuel up-date

A NEW advanced fuel management system, Transit, has been launched by FP & T Systems of Banbury. Based on IBM compatible components and incorporating the latest touch-screen technology it combines simplicity of operation with processing power on a par with most desktop PCs.

A full size 80 column by 25 line backlit touch-sensitive screen enables Transit to provide clear instructions in both icon (pictorial) and text format to enhance error-free data capture.

First aid code

NEW Regulations from the Health & Safety Executive list, which will be enforced by the Petroleum Engineering Division of the Department of Energy, will enable anyone on an offshore installation or pipeline works to benefit from a high standard of first aid provision.

The Regulations require the person in charge to provide equipment, facilities, medication and personnel for first aid and emergency treatment; to ensure that offshore medics and first aiders have received approved training; and provide liaison with an onshore-based doctor.

The Approved Code of Practice covers a number of matters relating to contents and siting of sick bays, and to the number of offshore medics and first aid personnel. It also covers the duty of the person in control to provide information on first aid and medical equipment including the role of offshore medics and first aiders in emergencies.

Tanker filters

A RANGE of easily transportable filter units specifically designed to protect road tankers and storage tanks from product contamination while loading or unloading, filling or emptying has been introduced by filtration specialists Lorn Separation Systems. Units can be supplied trolley or skid mounted for greater mobility and ease of handling.

Blast protection

BOOTH Engineering of Bolton has a contract to design and construct blast resisting walls and doors for the BP Bruce offshore development.

Booth has designed and fabricated blast walls and doors for onshore applications, for Ministry of Defence installations in the United Kingdom and overseas.

EUROPEAN INVESTMENT BANK

The EIB/BEI was created by the Treaty of Rome to facilitate long-term investment financing and to promote the balanced development of the European Community. It also mounts operations in Eastern Europe, in 12 Mediterranean countries and in States signatory to the Lomé Convention.

The Bank is currently seeking, for appointment to its Research Directorate in Luxembourg, an:



Energy Economist (m/f)
(with 5 to 10 years practical experience)

The person appointed will participate in the economic evaluation of energy investment projects submitted to the Bank for financing and perform energy sector work.

Candidates should possess a university degree in economics, a post-graduate qualification in energy economics (MA, MBA or PhD), a strong background in quantitative analysis and experience both in the economic evaluation of energy projects and the preparation of energy sector studies.

Private sector experience in the upstream and downstream hydrocarbon sector would be appreciated.

Candidates must be fluent in either English or French, and have a good command of the other language. Working knowledge of a third community language would be an advantage.

The Bank offers attractive terms of employment, a generous salary and a comprehensive welfare scheme. It is an equal opportunities employer.

Applicants, who must be nationals of an EEC member country and not older than 35 years of age, are requested to send their curriculum vitae together with a photograph to:

EUROPEAN INVESTMENT BANK,
Head of Personnel Dept. (Ref.: ET 9040),
100, boulevard Konrad Adenauer,
L-2950 LUXEMBOURG. Fax: 437704.

Applications will be treated in strictest confidence.

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Fire Safety - North East Area
£18,177 - £19,227

You will have management responsibility for a team of District Inspectors ensuring that the LFCDA's responsibilities under various legislation are carried out. This will include visiting premises either licensed or in need of licensing under the Petroleum (Consolidation) Act 1928, ensuring that petroleum and other hazardous substances are being stored carefully and testing storage tanks, pumps or fittings.

You will be a good communicator with a detailed knowledge of petroleum related legislation, a working knowledge of building construction, electrical engineering, and petroleum technology, and have staff management skills.

For details contact: Bill Anderson on 071-587 2417, North East Area Personnel Office, Area Headquarters, 2 Ferns Road, Stratford, London E15 4LX. Quote ref FB 216. Last date for receipt of application forms: 16th November 1990.



London Fire & Civil Defence Authority

Striving for Equal Opportunities

The Trade Mark set out below was
assigned on 3rd January 1990
by

Voest-Alpine Stahl Aktiengesellschaft,
Linz, Austria

to

Schoeller-Bleckmann Gesellschaft m.b.H.
Postfach 31, Hauptstrasse 2,
2630 Ternitz, Austria

WITHOUT THE GOODWILL OF THE
BUSINESS OF THE GOODS FOR WHICH THE
TRADE MARK IS ASSIGNED.

Trade mark
1304005

Class
8

Specification
Drill collars included in Class 8.