The Institute of Petroleum

CONJUNCTIONE POTIORES

MARCH 1991

PETROLEUM REVIEW

IP Week

Douglas Hurd addresses the Annual Dinner

Sheikh Ali Khalifa al Sabah gives a Kuwaiti view of the current situation in the Gulf

OPEC

A survey of future oil export capacity by Naji Abi-Aad

Iran

Hopes for the revitalisation of the Iranian oil industry by Hormoz Naficy

Vapour recovery

An authoritative guide to Stage 1 vapour recovery by Andrew Sangster

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Contents

Cover photo of The Rt Hon Douglas Hurd, CBE, MP, Secretary of State for Foreign and Commonwealth Affairs (Photograph by Jon Whitbourne)

. . . news in brief

11 January

The small Crawford field is the first North Sea oilfield to be permanently shut down.

Amoco has reached an agreement to sell its 8.63 percent interest in the UK North Sea's Hutton field to an undisclosed buyer.

Ercros, Spain's largest chemicals producer, has sold its petrochemical division, Ertoil, to the Luxembourg-based investment group, General Mediterranean Holding.

12 January

Shell has formed a new company in the Philippines to handle gas exploration and development projects in the country.

Hamilton has extended its run of UK sector discoveries with the announcement of a gas/condensate find in block 9/29a.

ACT Operators Group has made its third major offshore discovery of oil in the South China Sea, midway between Hong Kong and Guangzhou.

14 January

US construction yard Sabine Heavy Industries has won a $130 million order to build a deepwater drilling and production jack-up rig for the North Sea.

15 January

Australia's BHP Petroleum has concluded a production sharing contract with the Vietnamese national oil company covering two offshore areas.

The Japanese trading house C Itoh & Co will invest a total of $100 million in the renovation of the Lenin oil refinery in Ufa, USSR.

Indonesian state energy corporation Pertamina has signed a production sharing contract with British Petroleum to explore for oil off the west coast of Lombok Island.

19 January

BP and Esso are among leading oil companies who have opted out of an oil and gas licensing round designed to encourage exploration in frontier areas in northern North Sea waters.

Iran is to supply Yugoslavia with 1 bn to 1.5 bn cubic metres of natural gas a year.

21 January

Seven people were injured in a weekend explosion at BP's oil refinery in Ferindale, Washington state.

28 January

The USSR will give Japan total control over oil pumped from a field off the Soviet's Sakhalin Island if the two countries proceed with a joint development project.

29 January

The Lyell oilfield in the North Sea is to begin producing late next year, almost 17 years after it was discovered.

Occidental have won approval from the £430 m development of the Saltire field in UK block 15/17.

1 February

West African oil production is expected to reach 1.12 million barrels per day in 1992 and investment this year will reach $1.1 billion.

BP's new £162 million oil transportation system for the Forties Field is now ready for service.

India's Oil and Natural Gas Commission has made four hydrocarbon discoveries in the area of the Bombay High field.

Thailand and Vietnam are considering jointly developing oil and gas production on 6,000 square km of disputed territory in the Gulf of Thailand.

2 February

Benton Oil and Gas Co has signed a letter of intent to pursue a joint venture to explore, develop and produce oil and natural gas reserves from the North Gubkinskoe and Prisklonovoe Oblast area of the USSR.

6 February

China has discovered a large field in the Xinjiang region, in the country's north west, which it says will produce 2 m tonnes of crude annually within a few years.

Conoco and British Petroleum have discovered gas in the UK southern North Sea, some 75 miles off the Lincolnshire coast. The prospect lies to the north of the Audrey gas field.

14 February

The European Commission have proposed target rates for excise duties on petrol and diesel that could involve large rises in the tax on petrol in most EC countries after 1992.

UK oil services company The Blystad Group is to diversify into ship repair and rig building through a complex arrangement to buy a Mexican company shipyard.

A new 171 mile pipeline to carry oil from Chevron's giant $2.5 bn Point Arguello offshore project to its Los Angeles refinery has been proposed by Pacific Pipeline.

BP has bid for a deep offshore exploration plot in Nigeria — ten years after its interests in the country were nationalised.

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North Sea optimism

Record North Sea exploration levels have raised optimism that Britain will remain a major oil and gas producer until the middle of the next century.

Energy Secretary John Wakeham, said the 224 exploration and appraisal wells sunk by oil companies on the UKCS in 1990 had been so successful that the UK Offshore Operators Association estimates up to 300 new fields could be developed over the next 25 years.

Mr Wakeham said these estimates contradict reports that assumed UK oil production had already peaked at the 1985 figure of 2.5 million barrels a day and was steadily declining.

'An unexpectedly high level of continued discoveries — and a series of technological breakthroughs in the North Sea which have made smaller oilfields considerably more economic — have now helped to change that scenario out of all recognition,' he said.

New seismic, computerised reservoir modelling and subsea techniques — especially satellite fields connected by pipeline to existing platforms — have all played their part.

Typical future satellite schemes just announced include: Occidental's £450 million development of its Saltire field — estimated to have reserves of 140 million barrels — with its own 33,500 tonne four-legged platform linked to Piper Bravo.

Conoco's £156 million Lyell field subsea development — with reserves of 400 million barrels — connected to the Chevron-run Ninian Southern platform.

Texaco's Strathspey field development is planned to be linked via a subsea system to the sister platform, Ninian Central, but is still subject to government approval.

Aberdeen visit by HSE

Dr John Cullen, Chairman of the Health & Safety Commission said the 'over-riding' concern of the HSE is to carry out Lord Cullen's recommendations on Piper Alpha as quickly and effectively as possible 'because that is the best way that safety in the North Sea can be assured.'

He said the Offshore Directorate's three main objectives were (1) to establish an organisation for the acceptance of safety cases, (2) to develop new legislation for offshore Health & Safety based on goal-setting rather than detailed prescription and (3) to increase the size and effectiveness of the Health & Safety Executive.

During a visit to Aberdeen, he declined to pinpoint the location of the new safety inspectorate headquarters after its transfer from the Department of Energy to the Health & Safety Executive.

'There is going to be a significant increase in the number of inspectors in Aberdeen' he said, 'but nothing has been decided yet. The decision about the positioning of the staff in the new offshore directorate is still being examined.'

Speaking at the conclusion of a two-day visit Dr Cullen said he and his colleagues had listened to all that had been said to them by the offshore industry.

John Rimington, Director General of the HSE said: 'We attach a great deal of importance to being seen by the workforce of the industry and to being seen to be effective.'

Oil workers — safety report

Construction workers are 40 percent more likely to have a fatal or major injury at work than an oil worker, according to a report published by the Health and Safety Executive.

In figures just released, only 190 oil workers in every 100,000 employees suffered a fatal or major injury last year against a rate of 316 in every 100,000 for construction workers.

The report also shows that the number of deaths offshore last year fell to only two, but during the same period the number of people with major injuries increased by more than 10 percent.

Gulf oil slick

Oil pollution experts have gone to Saudi Arabia to help tackle the world's largest-ever oil slick caused by oil flowing from pipelines in Iraqi-held Kuwait into the Gulf.

Metre-deep booms have already been deployed to protect key installations from the oil slick, such as water desalination plants, but a major clean-up operation will have to wait until the end of the war.

Among the European efforts to help are the crew of the Norwegian anti-pollution tanker, the 1,650 tonne *Al Waasit*. This specially designed vessel can deal with 1,000 cubic metres of slick an hour. On-board separators extract the oil from the water and the oil waste is stored in tanks.

British help includes equipment from the Southampton-based Oil Spill Centre and a team from the Royal Society for the Protection of Birds.

After the war, firefighters will also be needed to extinguish the well heads and oil installations set alight by the Iraqis in Kuwait.

More than 600 oil wells are said to be alight in Kuwait and many oil facilities have been destroyed as a result of Saddam Hussein's 'scorched earth' policy.

The five leading firefighting teams in the United States are currently on standby to fly to the Gulf to tackle the problem once the war is over.

The Aberdeen-based engineers, the John Wood Group, which previously held the maintenance contract for all Kuwait's wells has offered help to restore oil production.

Offshore safety

Energy minister Colin Moynihan has said every employee working on an oil or gas rig offshore has a right to be represented on a safety committee but he said it was simplistic and erroneous to equate that trade union recognition would enhance safety.

Orimulsion

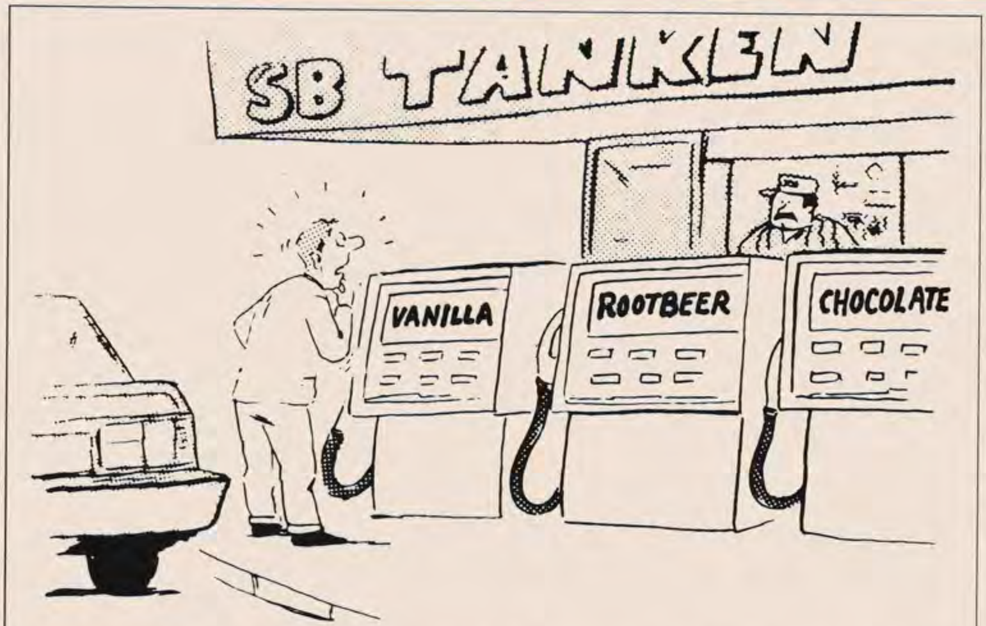
National Power is to convert its 2,015 MW capacity oil-fired power station at Pembroke to run on Orimulsion, the new fuel from Venezuela's Orinoco river basin.

Following trials in the United Kingdom and Canada, outlets are being sought for Orimulsion. The Venezualans are hoping to develop large markets.

No to carbon tax

Basil Butler, President of the Institute of Petroleum, has urged environment ministers from the industrialised world not to think of carbon tax as a 'quick solution' to pollution.

In Paris, Mr Butler told a meeting of the Organisation for Economic Co-operation and Development, that extra taxes on industry would be counterproductive: 'Industry and governments must talk together to find solutions and not go down blind alleys.'



West Germans, who for years have turned up their noses at the stink of diesel, might soon find that the fuel they love to hate will flow from pumps smelling of roses. According to Scantel, a Manchester-based research group the inventive Germans, less than 10 percent of whom actually profess to liking the smell of diesel, reckon that scenting derv makes it more acceptable to private motorists.

Miles safer

Esso Petroleum have launched an innovative incentive scheme to increase the company's commitment to promoting safety at work.

The programme, initially to run for 12 months, is aimed at improving the safety performance of Esso operations staff and tanker drivers.

Esso will offer 'Air Miles' as the reward for incident-free safety performances. They will be awarded every three months provided no incidents have occurred.

Car wash

Fast expanding Margram PLC's Dudley service station has won the 'Car Wash of the Year' award 1990.

David Davis Chairman of the 25-site group recognised the importance of car washes during the 1980's. 'A high throughput reliable car wash is now fundamental to our profitability and we would not contemplate developing a site without a car wash.'

Job losses

Occidental Petroleum Corporation has announced that it expects to reduce employment by at least 1,000 jobs as part of the company's recently announced restructuring plan.

As a first step in this program, Occidental will reduce employment at its corporate offices by 25 per cent, or about 200 employees.

Dr Ray R Irani, chairman, president and chief executive officer of Occidental, said he expects the employee reductions will be completed by the end of September. 'The savings from these reductions along with related auxilliary savings will total $100 million on an annual basis.'

Tanker security 'beef-up'

Security has been beefed up in many sectors of the UK petroleum industry because of the Gulf War. For instance United Transport Tankers, has initiated stringent security measures to counter threats of terrorist attack.

All of the Chepstow-based firm's drivers and vehicle maintenance staff are being issued with security tags rather like a conventional identity card which must be worn on the uniform at all times.

The cards, which will be issued by the management of UTT's 13 depots around the British mainland, show the driver's name, photograph, his home base depot and a unique security number. The cards also include an emergency telephone number.

Furthermore, all fitters will wear security tags, especially if called to customer premises to undertake repair and maintenance work.

'We are taking the Gulf War and its possible consequences very seriously indeed. The security tags will help us and our customers fight the threat of terrorist attack. If anyone is seen around depots or the tankers themselves without a tag, they will automatically fall under suspicion,' said Phillip Greenfield, operations director of UTT.

United Transport Tankers carry more than two million tonnes of bulk chemicals, oils, powders and edible products annually.

SGS Redwood

SGS Redwood Geneva's senior vice president Dr Michel Gisiger is seen here being presented with a certificate of registration to BS 5750, by Mr Trevor Nash, director of certification and assessment, British Standards Institute, for the company's 12 UK oil cargo test and inspection sites.

Q8 strengthens IDS network in UK and Italy

Kuwait Petroleum has strengthened its pan-European International Diesel Service (IDS) network of automatic fuelling stations for fleet operators with new sites in Italy and the United Kingdom.

With the addition of six new sites in the United Kingdom and 12 in Italy, there are now over 200 IDS stations in nine European countries.

In the United Kingdom, there are 31 IDS strategically situated sites. In Italy, Kuwait Petroleum's acquisition of Mobil Oil Italiana last year, brought 12 ex-Mobil truck centres sites, located on the autostrada network.

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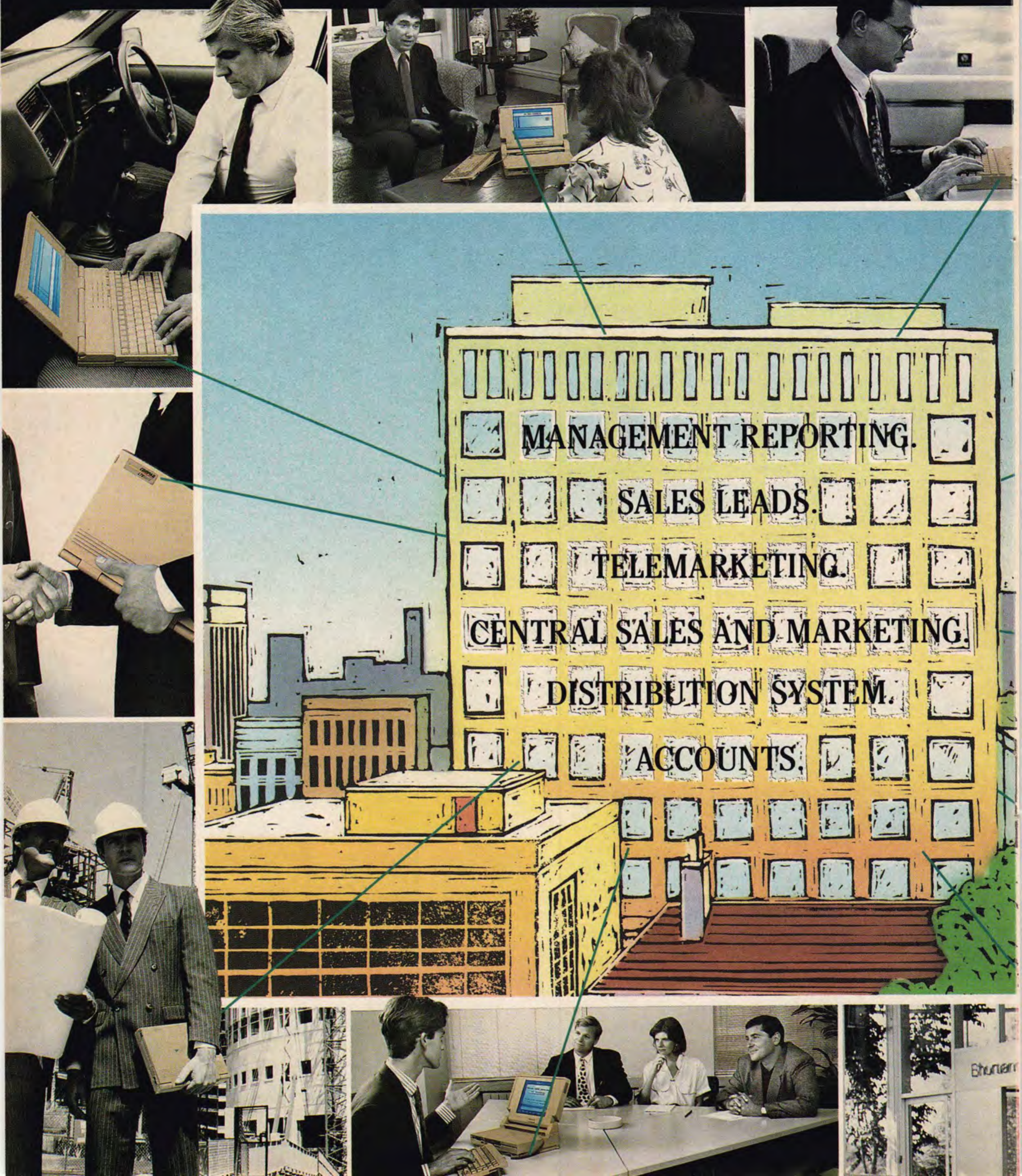
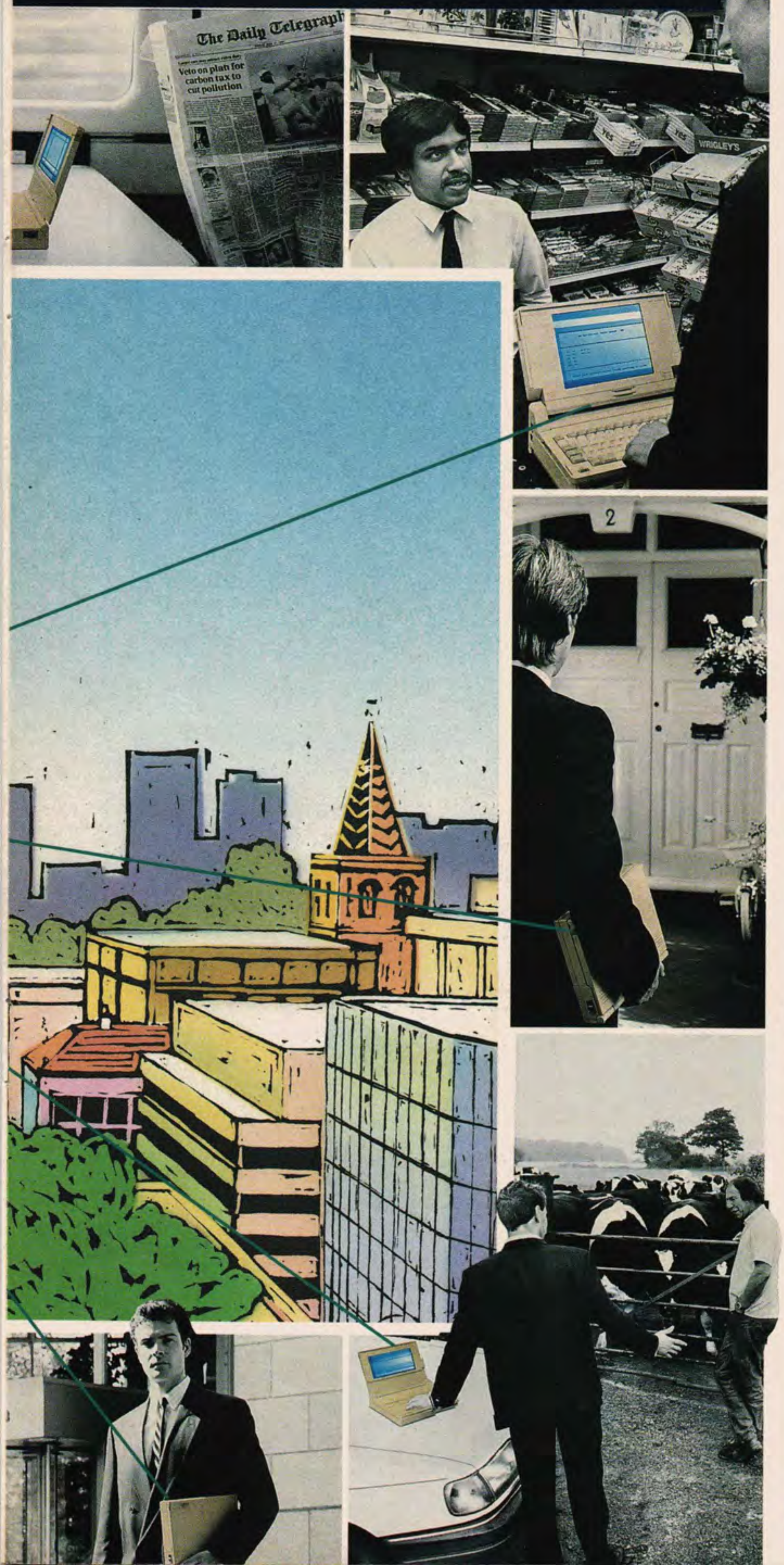


The Theory.



The Facts.

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- **Customers' delivery times cut from weeks to days.**

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'We are meeting towards the end of a war'

The Right Honourable Douglas Hurd CBE MP, Secretary of State for Foreign and Commonwealth Affairs, proposed the toast of the Institute of Petroleum at its annual dinner in London last month. Speaking at a crucial time in the Gulf War following the initiation of a peace plan by President Mikhail Gorbachev, he emphasised that this war will reverse Iraq's aggression against Kuwait. He believed that an end to the war was approaching but that this would not solve the problems of the Middle East. He stressed two principles — collective security and burden-sharing.

IP President B R R Butler OBE replied to the Minister's toast, expressing his support for the British government and its allies in the conflict with Saddam Hussein. He commented on the usefulness of IP activities and on the good working relationship with government departments and industry bodies, describing the Institute as a 'reliable and independent voice of the industry'.

Rev W Andrew Wylie, Chaplain to the Oil Industry from his base in Aberdeen, gave an entertaining and appropriate reply on behalf on the guests.

Mr Hurd said:

I am very conscious that we are meeting this evening towards the end of a war in which you are all strongly interested. I don't primarily mean as members of the Institute of Petroleum — I mean primarily as citizens of the world in which we live.

It is a war that is particularly poignant for some of us — for you, Sheikh Ali Khalifa, whose country has been oppressed and undergoes hour by hour, day by day sufferings of which yet we have only the slightest account because of the way in which censorship and the media work and have to work. We only have the faintest inkling by a few scattered anecdotes of what you and your fellow citizens, members of your families have been going through in Kuwait all this time.

But a war also which is poignant for us in this country where more than 40,000 of the armed servants of the Crown are now engaged in the Gulf. A smaller contribution, of course, than that of the United States, a bigger contribution than that of any other of the allies and a contribution of which I think everybody here in Britain is rightly proud.

(L to R) The Rt Hon. Douglas Hurd, CBE, MP, Secretary of State for Foreign and Commonwealth Affairs, Mr Robert Horton, Chairman, The British Petroleum Co plc and Mr Basil Butler, OBE, President, The Institute of Petroleum and Managing Director, The British Petroleum Co plc.

I said that we are meeting towards the end of a war. I hope and believe that is right. I do not myself think that this war is going to drag on for very long now. What I cannot say to you tonight is how it is going to end. It is conceivable, though to judge by today's broadcast from Baghdad not very likely, it is conceivable that it will end by a complete Iraqi withdrawal short of a land battle. I discussed various ideas on that score this morning with the Soviet ambassador to London and what has been taking place on that front at the Soviet request has been and remains confidential.

But I would just like to say that, in considering ideas on the questions of ceasefire and withdrawal, of course we must be reasonable but it is not reasonable in these circumstances and with this opponent to take anything on trust. We have to be clear; we have to be complete in our ideas, we have to be united among the nations and we have to be very determined. And all these things are happening.

I think it is perhaps more likely that the aggression has to be ended by military means. We all know the consequences of that and none of us takes them lightly. I think that is the more likely outcome. But in one way or another Kuwait will be freed and I would like to congratulate you, Sheikh Ali Khalifa, and through you the members of your family, your government, your nation, for the steadiness and dignity with which you have borne these last few months.

You, Mr President, have spent many years in Kuwait. Many of us have had the opportunity to visit Kuwait, in my case several times over the last 20 years, always with pleasure, always in friendship, never for one moment imagining that this tragedy would overcome such a kindly, small, peaceful community. I think it is partly for this reason that we feel so strongly that what has been done goes beyond the ordinary comings and goings of international life and justifies the effort which we and others have made.

(L to R) Mr Alan Gregory, CBE, Past President, The Institute of Petroleum, Mr Basil Butler and Mr Ted Williams, Director General, The Institute of Petroleum.

Let me just look into the background and to the lessons which I think we all have to learn. When Saddam Hussein invaded Kuwait, he sowed the wind — he refused all offers, temptations to leave and now he is reaping the storm — the desert storm. The rule of law and the authority of the Security Council of the United Nations are being upheld and what we are trying to do and this gives great force and strength to our efforts is to fulfil resolutions, aims not laid down by us, not laid down by President Bush, not laid down by any of the allies but laid down in concert in the Security Council of the United Nations.

Now, of course, there is an argument in this country. We wouldn't be a democracy and all the countries of the alliance would not be democracies if there was not an argument. When there is a war, there is anxiety, there is worry, there is suffering and it is perfectly right that the issue should be discussed. But one of the things that has been most striking here, and perhaps more striking here than in any other allied country, is the solid way in which public opinion, whether recorded in parliament, in opinion polls or in whatever way, is actually supporting across party lines what we are trying to do.

Some people in this argument claim that wars settle nothing and of course, wars don't settle everything but this war will settle something. It will reverse Iraq's aggression against Kuwait and Iraq will be forced out of Kuwait. In that way we will create the conditions in which, as the Security Council has laid down, the legitimate government of Kuwait can return.

So that tired old phrase which trips off the tongue that 'war settles nothing' will be repudiated again, as it was repudiated in the Second World War. But you will forgive me as Foreign Secretary, as a former diplomat, as somebody who is concerned with before and after the war, if I mention what happens afterwards.

Of course, there will be problems of reconstruction — Sheikh Ali and I have been talking about those. They will be difficult, they will be arduous, they will be under the direction of the Kuwaiti government but we in this country and all the allies will be doing our best to help with the reconstruction, as we have with the liberation.

Then we have to cope with the problems of the Middle East. I was reading the other day Winston Churchill's account of the First World War. He compared the turmoil and upheavals of war with a great flood; when the war is over, the flood waters recede but the same old problems, the

(L to R) Mr Douglas Hurd, Mr Basil Butler and Rev Andrew Wylie, Chaplain to the Oil Industry, who replied to the toast of the guests.

same old landscapes are once more revealed.

So war will reverse the aggression. That is crucial but it won't solve all the problems of the Middle East. What it will do, if you think of the Middle East as a kaleidoscope, it will give the kaleidoscope a shake but the pattern will be different, the problems will remain. I would hope that the shock, the anxiety, the tragedy of what has occurred will stimulate all of us and in particular those who live in the region to fresh thoughts, to fresh acts of imagination, fresh acts of political courage so that the Middle East actually emerges eventually as a place of greater stability, greater security, greater prosperity, more widely shared than it has been up to now.

The countries in the region will, I hope, be impressed by this practical demonstration of the commitment to collective security. We have had over 30 countries now contributing to the multinational force.

You, Your Excellency, have been travelling round black Africa and I happen to have seen in the last few weeks several foreign ministers and ambassadors from black African countries. You wouldn't necessarily understand from some of the arguments going on in this country how solid is the support in the Third World for the collective security operation; not all but many small Third World countries know aggression when they see it. They have seen a small country obliterated in a day. They can imagine that happening to themselves and so countries thousands of miles away from Kuwait can recognise the danger to themselves of what has happened to Kuwait and are willing to put their voices, their votes and in some cases their troops at the answer of that call. And many countries which are not contributing troops are

Dr A Grieve, Chief Medical Officer, Shell UK and Chairman, Advisory Committee on Health, The Institute of Petroleum.

(L to R) Mr Raymond Bloch, President, European Petroleum Industry Association and Mr John Collins, Chairman and Chief Executive, Shell UK Ltd.

contributing financial and logistical support.

So if the peace is to be just and lasting, we have to make the most of the opportunity which will be presented by the end of the war. That opportunity will be fleeting, a moment when it is possible to do and think new things. Therefore, we need to be in a position to act as soon as the hostilities are over.

We in this country have been putting forward certain ideas about the future. I would like to make one point. We are not producing a blueprint, because I am perfectly sure that there is no future in solutions which are simply dreamed up in the gilded corridors of the Foreign Office or indeed the turrets of the Kremlin, or neon passage-ways in the United Nations in New York. Solutions which are imposed from outside don't easily take root: they tend to be artificial.

We know the problems which have to be tackled. There is the problem of security — what happened was the collapse of a system of security, a system which was not strong enough to save Kuwait. What happened also illustrates the great danger in that area as in others of the presence of weapons of mass destruction in hands which are irresponsible — to use a very mild word.

We also have of course to tackle again, not because of Saddam Hussein, not because of the invasion of the Kuwait, that ancient and poisonous Arab/Israel dispute which everybody here with knowledge of the region knows infects other matters as well. So long as it continues without a solution, it will prevent the Middle East from becoming the stable, secure and prosperous place we want it to be.

So we will be listing these elements which have got to be discussed and decided. But our ideas, our contribution to the wider debate, they are a checklist of the issues we believe have to be addressed. Others are putting forward their ideas — for a great mediterranean conference which would follow the kind of precedents set by the big conferences on security and cooperation in Europe. There are other ideas but I am quite clear that local thinking is what counts and that the states in the region must be the main architects of a lasting Middle East settlement.

That is why I am so glad that, in these last weeks particularly, the states in the region are beginning to turn their attention to security arrangements after the war. There are the six states of the Gulf Cooperation Council (GCC) which are already considering how they can cooperate in a friendly way with other Arab countries. Of course this is natural because Egypt, Syria and Morocco are fighting in the Saudi desert and last week, on 15 February, the Egyptian, Syrian and the six GCC ministers including the foreign minister of Kuwait met in Cairo and they made a sound start and decided to meet again. I hope that out of these meetings will come the core and the heart of new ideas which we can perhaps help to underpin. But we are thus responding to the ideas of our friends rather than supposing that we can impose solutions from the West or indeed from the East.

Before I close, I would like to refer to two of the principles which underlie all this. First, there is the principle of collective security. The world has been groping for this for many years now, certainly since the start of the last century. We have all the time been looking for ways — none of which hitherto has worked — by which nation states, now 160, can live together with some kind of assurance. The rule of law is essential for international peace and order. Sometimes this can be enforced by economic sanctions and measures can be taken so that those sanctions are enforced. But sometimes such is the nature of the world that economic sanctions are not sufficient; sometimes you have to be prepared to use force. Sometimes you have to accept that if there is to be collective security, if nation states are not to be obliterated in an afternoon, then countries right across the world, hundreds of thousands of miles away, have to be prepared to use force collectively.

If you are a pacifist, you dismiss that. But if you are not a pacifist and if you believe in collective security, maintaining that this is the best way of ensuring the safety of the world, then it follows absolutely that you must be prepared to do what you can when the need is there to contribute to that security. The kind of critic who believes and argues passionately in easier times for collective security but when the chips are down is not actually prepared to make any contribution to it is really not in any way helping the process.

Now, there are problems — we have two large and prosperous countries, Germany and Japan, which because of their constitutions which have emerged from their past, are debarred from taking part in the military action. Since we, the Western countries, had a large part in framing those constitutions, it really is not for us to say that they should break with their recent past and should once again become powers capable of making military contributions. These are debates that are going on but it is not for us to predict or prescribe the results of those debates.

But I believe this illustrates the second principle I want to mention — that of burden-sharing. Because not all countries can help in the military effort, it is reasonable that countries which cannot should contribute financially to the burden. That is a principle which is now becoming accepted. The German government for example has given a substantial total, £5 billion, to the international effort including a generous contribution of about £300 million to our British costs. Japan has also given something and we are discussing the question further with them.

Kuwait has been in a very special position and I must say I was very moved when in Taif the other day I pursued this matter with his Highness and the Kuwaiti government. There was no hesitation whatever and we received from the Kuwaiti government a remarkably generous contribution to the effort which we British are making on behalf of the liberation of Kuwait.

This concept of burden-sharing is relatively new; it is not precise; there is no computer which churns out the answers and induces everybody to abide by them. But most countries have shown that they are prepared to lend a hand according to their ability to contribute. So I believe that out of this crisis and out of all the suffering which flows from it, I hope that there will be impetus towards a sane, stable Middle East.

But I hope that going even beyond the Middle East these two principles will be more firmly established. The lesson must be that countries should know that they cannot infringe the basic underlying rules of international order and expect to get away scot free with the booty which they have seized. All countries now should know that the charter of the United Nations, the resolutions of the Security Council, are not just the weary outcomes of fruitless discussions; they actually have some hard, practical meaning in the real world. If those lessons can be learnt, retained and consistently applied, then the suffering and the fighting in the Gulf will not have been in vain.

Diplomatic assistance — Sheikh Ali Khalifa Al Sabah, Kuwaiti Minister of Finance and Mr Douglas Hurd.

The President

When we invited the Foreign Secretary to speak to us, we had, of course, no idea that the situation would be so tense as we find it tonight. As everyone knows, our industry has for many years been inextricably involved with the Middle East and many of us know the area and its problems well. May I take the opportunity of saying, on behalf of the industry, how much we admire the resoluteness and skill which Her Majesty's Government and our allies have brought to the problems of the area created by President Saddam Hussein. May I say also, in the presence of His Excellency Sheikh Ali Khalifa al Sabah, Minister of Finance of the Kuwait government, how much we deplore the sad events which have befallen his country over recent months and to say how devoutly we hope that we may shortly see the liberation of Kuwait and the restoration of its rightful government without undue damage or loss of life. I think the industry would wish me to express also our admiration of the forces of the alliance deployed against the Iraqi military regime.

I would like to welcome all of you who are present at this dinner, which is the high point of the IP week in 1991, and to thank particularly those who have travelled from afar to be with us. It will not surprise you to learn that the Institute gave some thought as to whether it would be appropriate to cancel the IP Dinner this year but our view was that we were not going to be deflected from our normal course of business by the threats of the Iraqi dictator. This is not a feeble industry or one which is easily deterred by problems, and the Council of the Institute, representing the industry, resolved that it should be 'business as usual', though, as you will have seen, security has been much increased but not, I hope, to an extent which has caused undue inconvenience.

It is disconcerting for me as the new President of the Institute to find the numbers at our dinner so reduced from recent years. I do not think that this is entirely due to my assuming the Presidency. Nor indeed to the international situation. The fact is that the fire authorities of the City of Westminster have judged, and I have to say with some reason, that the numbers attending this dinner should not exceed 1,500. All of us who have attended previous occasions here will remember the problem of having many more people in this room. We realise, however, that the reduction in numbers has caused some disappointment amongst those excluded but we hope you will understand that this matter was out of our control.

On a happier note, let me say that as a long standing and sometimes long suffering member of the IP, it has given me particular pleasure to become its President. Shortly after I joined the industry it was made very clear to me by my boss at the time, that I would never get anywhere in my company without being a member of the Institute. Whilst that advice may be slightly wide of the mark, I think it is a good message that should be promoted amongst the younger staff of the companies in support of the initiative

(L to R) Mr C Carr Jr, President, Amoco (UK) Exploration Company and Mr Basil Butler.

Sir Archibald Forster, Chairman and Chief Executive, Esso UK plc, and Immediate Past President, The Institute of Petroleum.

instituted by my predecessor, Sir Archie Forster, last year. He asked the Chief Executives of companies to promote membership amongst its younger staff and we are grateful for the response this initiative received but it is a continuing task.

Normally at this stage one would be tempted to recite the many good things done by the Institute during the past year across a wide field but some among you will welcome my commitment to brevity. Suffice it to say that I have been surprised by the breadth and usefulness of the IP's activities and by the good working relationship with government departments and industry bodies, such as trade associations. Together we have all welcomed the authoritative report by Lord Cullen and are determined to continue to implement its recommendations. I think of particular interest to me is the extent to which the Institute is being regarded by government as a reliable and independent voice of our industry, both upstream and down, and I would like to extend the reputation of the Institute not only in government but in other institutions worldwide so that people may recognise that it speaks with an authoritative voice and one unbiased by the interests of any particular company. I am struck by the depth of real knowledge and experience made available to the Institute by the many individuals who work very hard on its behalf and on behalf of the industry. I think the time has come when the IP should review its relationship with other bodies such as the UKOOA, the UK Petroleum Industry Association and its European counterpart, so that we may reduce duplication and ease the burden for us all. I look forward to discussions with these various other bodies during the next 12 months.

I think that if you were to check comments made by my predecessors over the past several years at this occasion, and I may say I have not done so, I believe you would find that they have commented upon the problems caused by the instability of the Middle East. It seems irrelevant for me to return to this topic this year, particularly after the comments we have had from the Foreign Secretary but let us hope that out of the current conflict some arrangement may result which leads to greater justice, stability and peace in the region. This, I believe, will be in the interests of the countries of the region and of the oil producing and consuming nations. It must also be in the interest of our industry which requires stability to permit the forward planning of its capital programmes.

It is also traditional at this dinner to snipe at some aspect of government policy which affects our industry adversely. This year it seems somewhat churlish to do so at a time of national unity and when the government is engaged on the task to be performed in the Middle East and against terrorism. In any case I perceive that Whitehall and our industry are well able nowadays to engage in constructive dialogue together, and this I very much welcome.

May I finally take this opportunity of thanking the Director General and his hard working staff at the Institute for all their efforts during the year and I would also like, on your behalf, to thank the Management Committee and Council and not least the many members of our participating committees for their great efforts to continue the important work of this Institute. Let me not forget also the far flung branches whose work is of such huge importance. I have been impressed since taking over as President to find how vibrant and lively your Institute is and in what good shape I inherited it from my predecessor, Sir Archie Forster. I thank him indeed for leaving me with such a smooth running institution. ■

The liberation of Kuwait: force may be the best solution

His Excellency Sheikh Ali Khalifa al Sabah, Kuwaiti Minister of Finance, was the guest of honour at a special IP luncheon, held at the Inn on the Park Hotel in London during IP Week last month. Addressing a large gathering just days before the Allied coalition forces started the ground war, Sheikh Ali Khalifa expressed his confidence that his country would soon be liberated. He described his sympathy for the people of Iraq who would continue to suffer if Kuwait were now liberated by peaceful negotiation and Saddam Hussein remained in power and in charge of a bankrupt economy.

He said in part:
The 25 years I spent in the oil industry, in addition to being stimulating, have enabled me to get to know a lot of you at very close hand and have allowed me the pleasure and honour of creating thousands and thousands of friendships over six continents. As I see the familiar faces here, I am very pleased. And I don't say this only as a compliment to you. I say it with sincerity because, if anything, that would have saved my country. In addition to its just cause, it is the many friends that Kuwait has in the many parts of the world who during these difficult times stood by it. For this we are forever grateful.

I would like to take a little time in order to discuss the current situation. The invasion, or the justifications for the invasion that were given, in addition to not being true — and some of you in the oil industry would be the first to realise that they were not true — were a mechanism to hide a larger tragedy that was taking place in Iraq. That tragedy was the repression of the noble people of Iraq and the rape of the Iraqi economy.

Iraq, because of its natural resources, is perhaps the richest country in the Arab world, even the richest country in the region. It has two rivers that divide the country; it has mineral resources of all sorts in addition to the oil potential of which you are very well aware. However, over a 20-year period, or perhaps I should say a 30-year period, the current Iraqi regime was ingenious in finding ways of running its economy into the ground. Whether by diverting those resources into building an incredible war machine with which we all have to deal today, or whether by depriving the Iraqi people of the right to free enterprise, not because the government wants to hold everything from an economic point of view, but because

'If I were an Iraqi, I would prefer Kuwait to be liberated by force.'

(L to R) Mr BS Goodland, Director, Safety and Environmental Affairs, Texaco Ltd, and Vice-President, The Institute of Petroleum, Sheikh Ali Khalifa al Sabah, Minister of Finance, Kuwait, with Mr Basil Butler, OBE, President, The Institute of Petroleum and Managing Director, The British Petroleum Co plc.

the government wanted all the people of Iraq to be eating from its own hand and, therefore, controlled politically.

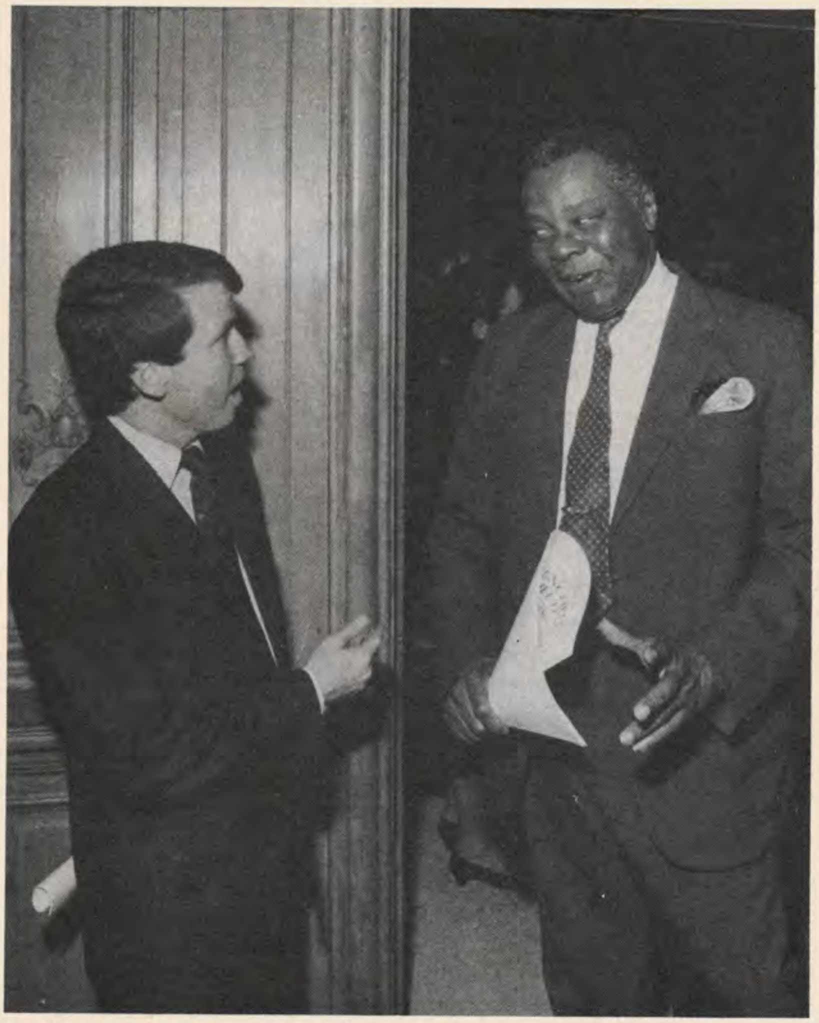
The situation in Iraq, perhaps, reminded me of the time I first got interested in economics and started reading a book by Frederick Hayek, linking capitalism to freedom. I said, in my own naivety at the time, 'Where does the economic system relate to the political system?' But in Iraq they adopted socialism, not because it would bring justice, but because it was an excuse to take on Iran and to control the Iraqi people.

As a result of using these huge resources to go to war and to build up the military, the Iraqi economy was more than bankrupt by the end of last year. It had huge debts. The ambitions were there.

It was really a pitiful experience to be living in Baghdad — an ordinary manager of an enterprise or a senior civil servant had to spend the equivalent of 10 days' earnings in order to buy a third-rate pair of pyjamas. People had to spend the equivalent of two days' earnings to buy a kilo of meat. This is indicative of the amount of deprivation that the regime was bringing to Iraq.

As a result, facing bankruptcy and seeing people beside him who were enjoying relative political freedoms, enjoying the prosperity of the resources that God had given them, the prosperity resulting from good sensible management, (I am talking about not only Kuwait but also the whole of the

(L to R) Sheikh Ali Jaber al Sabah, Managing Director, Kuwait Petroleum Co., Mr Brian Raggett, Membership Services Director, Institute of Petroleum, Mr Butler and Mr Ted Williams, Director General, Institute of Petroleum.



The Hon. Colin Moynihan, MP, Parliamentary Under-Secretary of State, Department of Energy, with His Excellency G Dove-Edwin, Nigerian High Commissioner.

Dr Alirio Parra, formerly Managing Director, Petroleos de Venezuela Europe SA.

Sheikh Ali Khalifa (left) with Mr AS Blouki, Kuwait Petroleum Co, London.

Gulf region), it was inevitable that a dictator like Saddam would think that the way to solve his problem was to occupy Kuwait and to threaten other countries.

We had the first inkling of it, perhaps, during the June OPEC meeting two months before the invasion, where in front of all of you in the oil industry the Iraqi delegation tried, by threatening and other means, to force everybody in the Arab delegations to adopt their point of view. I know all the delegations although I was not present at that meeting — I had already changed portfolios — but I know from my many friends at that meeting how much the other delegations resented what happened.

Today we are coming to a crossroad. My country, I am sure, is going to be liberated and liberated very soon. Will it be liberated by a land action against the Iraqi forces, or will it be liberated on the basis of some of the diplomatic efforts that are being tried? As a Kuwaiti, I would hope that my country will be liberated peacefully through the full implementation of the UN resolutions, because that would minimise the destruction that will occur to my country — by nature we are not war-loving people.

However, I have been trying to put myself in the shoes of an Iraqi. If I were an Iraqi, I would prefer Kuwait to be liberated by force because that would shorten the number of days when this dictator is ruling. A few months ago I was giving a talk, when an Iraqi came to me after the speech and said, 'As an Iraqi I am confident that you will get rid of Saddam. Will we in Iraq be as lucky?'

Mr Nader Sultan, President, Kuwait Petroleum International.

Mr SJ Chalabi, Executive Director, Centre for Global Energy Studies (left), with Mr Peter Ellis Jones, Tawe Energy Management and Honorary Editor, Petroleum Review.

(L to R) Mr Ian Fotheringham, formerly Shell UK Oil and Honorary Secretary, The Institute of Petroleum, Mr Goodland and Mr Roger Colomb, Managing Director, Texaco Ltd.

Unfortunately, if this situation is resolved peacefully, the Iraqi people with whom I and many others have sympathy will be stuck with that regime — which was bankrupt even before the war. Now, with the amount of destruction, with the amount of additional obligations that they have accumulated during the last six months, their economic situation will be even worse. But to prevent the Iraqis revolting because of the economic conditions, the regime would have to resort to even further repression of its people.

So, unfortunately for the Iraqis, I think a peaceful resolution, or a peaceful liberation of my country, would be the worst of possible ways. I still pray for peace, that we will be able to liberate our country peacefully. At the same time the Iraqi people have my sympathy. ■

Oil and gas exploration in Iran: prospects and problems

By Hormoz Naficy, Managing Director, Hydrocarbons Venture Ltd

In 1978, at the onset of the Islamic Revolution and prior to the supply disruptions caused by the striking oil workers operating the oilfields, Iran's production of crude oil averaged 5.2 million barrels per day (b/d). Yet by July 1988, the month Iran accepted UN Resolution 598 resulting in the cessation of hostilities in the Iran–Iraq war, this figure had dropped to an estimated 2.3 million b/d. War damage to the oilfields — especially offshore — to the pipelines, pumping stations, other associated oil installations and to the country's refining capacity together with the concomitant marketing constraints can partly explain this significant reduction in Iran's capabilities to produce crude oil. Throughout this devastating eight-year war with Iraq, Iran's oil personnel worked long and hard to maintain as much production as possible. However, repairs were hampered by hostile aircraft activity and by the equally detrimental effects of the 'on-again off-again' embargo imposed on the export of essential equipment and parts to Iran.

The oil industry also suffered the consequences of the mass exodus of industry personnel. Some of Iran's best oil industry managers, engineers and technicians had left the country either for imposed or voluntary exile. In the post-revolution era the new managers of this giant industry were for the most part those rapidly promoted from the lower and mid-level management of the National Iranian Oil Company (NIOC). Appointments were also made from outside the industry where political credentials mattered more than technical competence. This new team, with a much reduced pool of technical expertise, had its hands full with the operations of the country's most vital industry during classic wartime conditions.

A brave effort had been made but it is no wonder that under these circumstances scant attention was paid to pure exploration. Until the revolution just about every major oil company and many of the major independents were active in Iranian exploration. A variety of agreements had been signed between them and NIOC. Fourteen companies were part of the so-called 'Consortium' (BP, Shell, Exxon, Gulf, Mobil, Chevron, Texaco, CFP, Arco, Aminoil, Getty, Signal, Continental and Standard Ohio). Others were signatories of the 'joint structure' agreements, or service contracts. A complete list of these is given in **Table 1**. By September 1981 Iran had cancelled all these agreements and NIOC took over all operations, including the exploration/production work of the foreign oil companies.

1. IMINOCO	*(NIOC/ENI/Phillips/Indian Govt.)*
2. NIGC	*(National Iranian Gas Co)*
3. LAPCO	*(NIOC/Arco/Union of California/Murphy/Sun)*
4. IROPCO	*(NIOC/Getty/Skelly/Superior/Sun/Kerr McGee/Cities Service/Arco)*
5. BUSHCO	*(NIOC/Amerada Hess)*
6. IPAC	*(NIOC/Pan American)*
7. SIRIP	*(NIOC/ENI)*
8. SOFIRAN	*(NIOC/Elf-ERAP/Aquitaine)*
9. PHILRAN	*(NIOC/Phillips)*
10. EGOCO	*(NIOC/Elf-ERAP/ENI/Hispanoil/Petrofina/OMV)*
11. HOPECO	*(NIOC/Mobil)*
12. INPECO	*(NIOC/Mobil/Japanese Consortium)*
13. NIOC	*(National Iranian Oil Company)*
14. Deminex	
15. AGIP	
16. Ashland/Pan Canadian	
17. CFP	
18. Ultramar	
19. Oil Service Company of Iran *(BP, Shell, Exxon, Gulf, Mobil, Chevron, Texaco, CFP, Arco, Aminoil, Getty, Signal, Continental and Standard of Ohio)*	

Table 1: Companies active in pre-revolutionary Iran

A review of the modest exploration programme undertaken by NIOC subsequently, a programme which has nevertheless resulted in a number of significant gas and heavy oil discoveries in recent years, is beyond the scope of this paper. Suffice it to note here that whereas in the 1970s Iran had at least 50 rigs operating both on and offshore, the average number of active rigs dropped to only 18 for the second half of the 1980s and only recently have tenders been placed for new rigs.

Gas injection

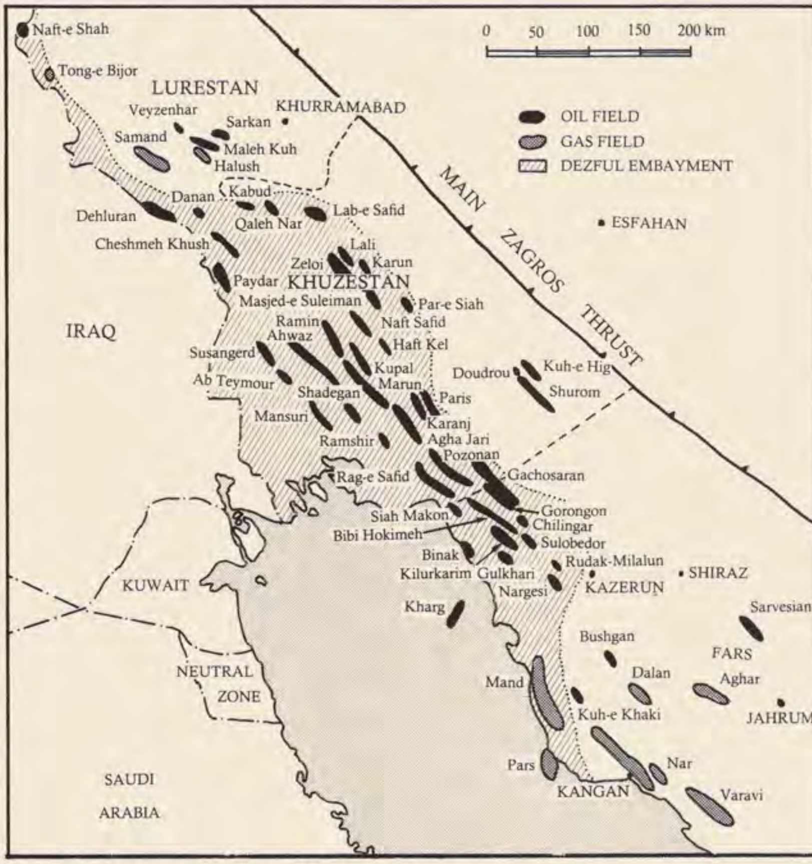
Even more detrimental to the long-term health of this industry was the neglect of the reservoirs. For some 15 years Iran had failed to carry out essential work to maintain its key onshore reservoirs and many of these may have been irreparably damaged. A major gas injection programme had been postponed on several occasions. In the mid-1970s there was already a strong concern amongst the more conscientious and dedicated oil personnel that major gas injection projects would have to be carried out within five to 10 years for some of the major fields such as Aga Jari, Bibi Hakimeh, Gach Saran, Paris and many of the major Asmari fields of the Zagros basin. It was in this connection that these same Iranians objected to the wasteful flaring of gas in the 1970s. As Iran's main producing fields are dependent almost exclusively on hydrostatic and/or gas pressure, some experts now believe that due to these delays billions of barrels of reserves may have been lost as a result of water flooding. Somewhat belatedly, efforts are now being made to make up for the neglect of the 1980s. (**Table 2**).

The initial phase of NIOC's current gas injection programme involves one of the oldest major oilfields, Gach Saran, where over 1.0 billion cubic feet per day (cfd) of gas is now being injected into the reservoir. A second major project is at Marun where some 700 million cfd of gas is to be injected initially, increasing to 1.2 billion cfd in the second phase, thereby increasing recoverable reserves by an estimated 2.5–3.0 billion barrels. The reinjection programme will most certainly be extended to at least two other fields, Paris and Karanj in the next phase.

Proven reserves

Iran's oil potential is well known. With proven crude oil reserves of some 93 billion barrels (9 percent of the world total) it remains one of the world's major oil provinces.

With respect to gas the potential is even more exciting. Iran is second only to the Soviet Union in terms of proven recoverable reserves with over 600 trillion cubic feet or some 14 percent of the total world proven reserves. To grasp the real magnitude of the gas reserves, it should be noted that Iran's



Map 1: Onshore Zagros sector oil and gas fields, present day

reserves are 3.6 times the reserves of the United States or 3.4 times the reserves of the whole of Western Europe (**Table 3**).

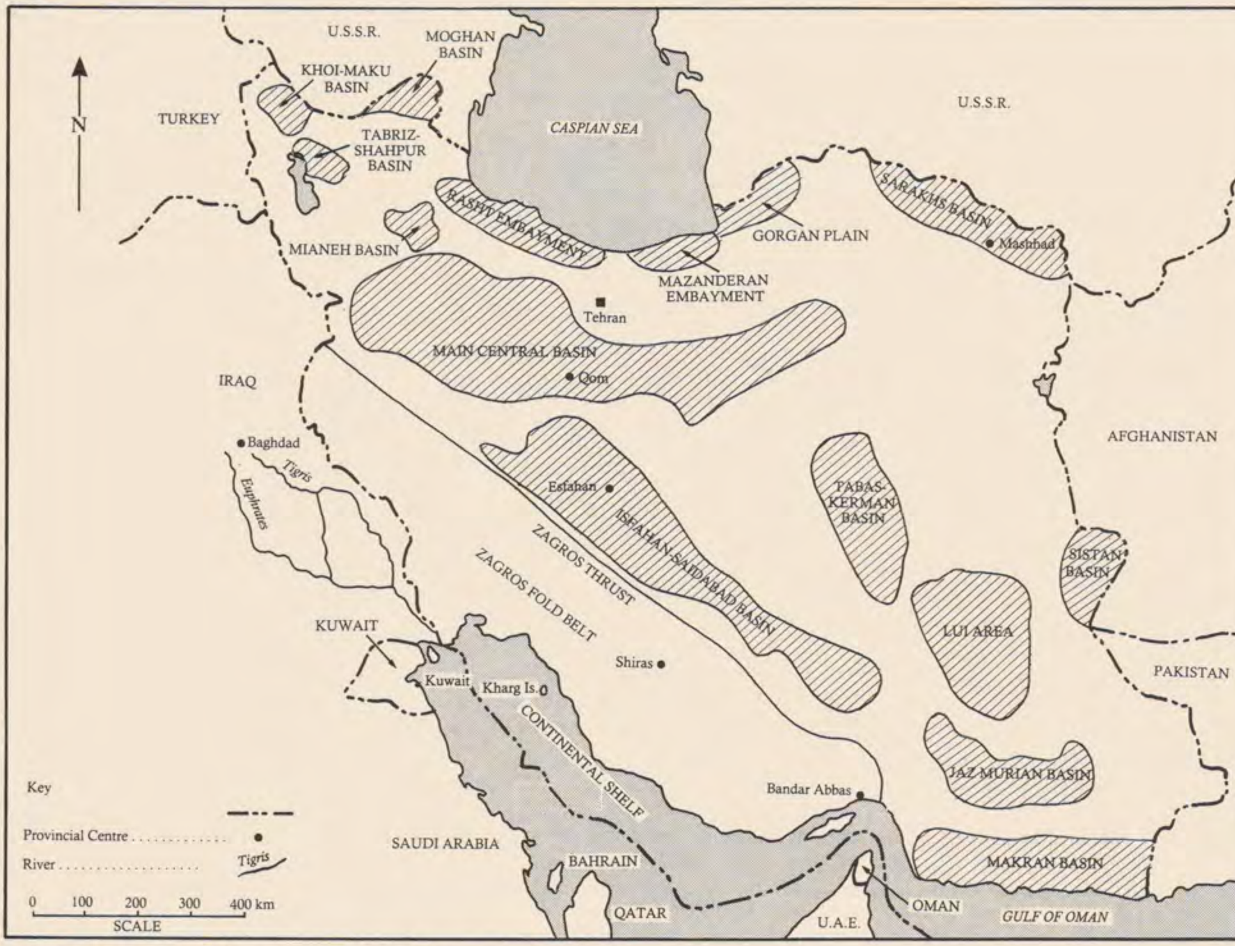
These reserves are in the form of both associated and non-associated gas. The associated gas reserves include gas dissolved in crude oil (approximately 700 cubic feet/barrel) and gas found in gascaps above oil bearing reservoirs, which could arguably be exploited independently of oil. Iran has some 16 broadly defined main sedimentary basins. Of these only one, the Zagros Fold Belt in southwest Iran, has been properly explored and is where almost the entire exploration effort has been concentrated since first commercial discovery back in 1908 (Masjid-i-Suleiman). Since then some 70 major onshore and offshore discoveries have been made in this area alone and of these 13 have reserves of over one billion barrels.

In the Zagros Fold Belt the main (and youngest) exploration target was initially the folded and fractured Asmari limestones, where geologists have often commented on the excellence of the reservoir itself and the seal provided by the Gach Saran formation. In total some eight of the major fields discovered in the earlier phases of Iranian exploration produced from the Asmari formation. Deeper limestones of the Cretaceous Bangestan Group (Sarvak formation), the Jurassic lower Cretaceous of the Khami Group (oil and gas play) and the fractured carbonates of the Permo-Triassic Deh Ram Group (gas play) are all considered to be exploration targets and oil and/or gas bearing.

Geologists maintain that onshore

Field	Discovery date	Total ultimate recoverable reserves (1986) (10^9 barrels)
Agha Jari	1936	9.00
Ahwaz	1958	10.16
Bibi Hakimeh	1961	2.20
Gachsaran	1928	8.50
Karanj	1963	1.65
Marun	1964	9.50
Paris	1964	3.00

Table 2: The major oil producing fields of Iran



Map 2: The main sedimentary basins of Iran

the Zagros basin less than one half of the over 150 drillable prospects have been properly tested. Furthermore that the potential of the deeper horizons below the currently known oil-bearing zones has not been tested in many of the discovered fields.

Potential fields

Elsewhere in Iran the hydrocarbon potential of only three of the 15 other major sedimentary basins have been proven to any degree. Oil and gas were discovered in the Oligo-Miocene limestones of the Qom formation in the central Iranian Basin. This was a pioneering effort carried out by NIOC's own exploration teams in the 1950's. The Alborz field (113 km south south-west of Tehran) was discovered in 1955. Gas and condensate was discovered in 1958 at Sarajeh in the western part of the same basin. The reservoir is a marly fractured limestone of the upper part of the Qom formation as at Alborz. Deeper targets in this basin remain to be tested and add to its prospectivity. In northeast Iran, gas was discovered at Khangiran (1967) and oil at Gonbadli (1982) in the Sarakhs Basin. In the mid-1980s NIOC made discoveries in the Gorgan Basin. Seismic coverage is inadequate and drilling density remains very low for a proper evaluation of the three basins.

The status of these basins can be designated as greatly under-explored, whereas the remaining basins are truly unexplored. Iran is a very large country with a total area of some 1.6 million square kilometres. The broadly defined main sedimentary basins referred to here cover a major part of the total land mass. The main sedimentary area is some 985,000 square kilometres. To

Field	Discovery date	Total ultimate recoverable reserves (1986) (TCF)
	Zagros	
Agha Jari*	1936	17.95
Aghar	1974	20.00
Ahwaz*	1958	12.00
Bibi Hakimeh*	1961	6.59
Gachsaran*	1928	21.00
Kangan	1973	50.00
Marun*	1964	40.16
Nar	1975	14.00
Paris*	1964	9.00
Pars	1966	30.00
Pazanan	1936	15.11
Rag-e Sefid*	1964	9.84
Salakh	1961	11.25
Sarkhun	1973	7.00
	Central Iran	
Sarajeh	1958	5.00
	North East Iran	
Khangiran	1968	6.00

Table 3: The major gas accumulations of Iran **Associated Gas*

this must be added the remaining vast potential of the continental shelf in the Gulf. The shelf area to a water depth of 200 metres is 92,000 square kilometres. The Iranian government has recently stated that it envisages a sustainable production of 5.0 million b/d by 1993 (compared with a current production estimated at 3.4 million b/d). Not until a major portion of the vast reconstruction programme has been completed will funds be available for enhanced oil recovery projects and eventually a comprehensive exploration effort. Iran has had some lean years (**Table 4**) and has chosen not to borrow internationally against a truly impressive collateral of oil and gas reserves. It has chosen to tread carefully and rely on indigenous resources and abilities.

The much-heralded ascendancy of the moderates in post-Khomeini Iran may finally give the more pragmatic elements within the Oil Ministry and NIOC the opportunity to push for the long awaited opening to the West.

Future plans

Iran, however, will continue to shy away from granting outright exploration rights to the foreign oil companies in the near future. Current legislation and the political climate does not permit foreign 'equity' participation in any project related to exploration and the exploitation of Iran's natural resources. Foreign participation could be politically palatable if the foreign entity entered into a 'service' type contract and carried out, on behalf of NIOC, a specific exploration programme. Furthermore, the foreign entity would be expected to accept all 'up-front' risks and provide the funds for the exploration phase. In recent tentative discussions with foreign oil companies regarding the development of Pars and South Pars, two major offshore gas finds, NIOC has indicated the possibility of finding a formula within the context of a service contract, whereby the foreign party would recover its exploration costs and receive a 'reasonable' profit element out of production.

Iran will need to attract foreign participation not only on the reconstruction programme but also in meeting the crucial challenge of regaining its rightful place as OPEC's traditional second major producer. Iran is committed to increasing production significantly and will have to win the undeclared race for higher OPEC quotas, as the current parity with Iraq is a historical abnormality and a penalty for having lost political clout with fellow OPEC members. ■

Year	Exports (million $)
1974	20,904
1975	19,634
1976	22,923
1977	23,599
1978	21,684
1979	19,186
1980	13,286
1981	12,053
1982	19,233
1983	19,225
1984	12,255
1985	13,115
1986	7,183
1987	10,515
1988	8,170
1989	12,500
1990	15,500 (estimate)

Source: OPEC Annual Statistical Bulletin (Except for 1990)

Table 4: Value of petroleum exports

Author's note:
Except for Table 4, all maps and tables in this article are adopted from the Robertson Group's recently completed multiclient report on the Petroleum Geology and Hydrocarbon Potential of Iran. Hydrocarbons Venture Limited were consultants to this Report.

Oil export capacity in OPEC countries: constraints and prospects

By Naji Abi-Aad, Energy Consultant

To take advantage of the expected upturn in demand for their crudes through the present century, OPEC countries plan to boost their oil output capacity, estimated at 27.3 million b/d in 1990. Their aggregate production capacity is forecast to reach 34.4 million b/d in 1995 and 36.7 million b/d by the year 2000.

Production capacity is defined as output which can be sustained over a maximum three-month period, considering that, for practical purposes (need of maintenance, limited storage and export facilities, operational problems), it is virtually impossible to produce at more than 90 percent of the full capacity over a one-year period.

On average, OPEC production capacity is estimated to expand annually by 1.4 million b/d from 1991 through 1995, and by 460,000 b/d between then and the year 2000. The increase is accounted for largely by the rapid recovery of parts of the Saudi Arabian, Iraqi and Iranian producing systems. Indeed, the capacity expansion projects currently planned by the OPEC Gulf countries alone will, if they go ahead, add some 6.05 million b/d of new capacity by 1995 and a further 1.9 million b/d by the end of the century. The Gulf countries' share in overall OPEC output capacity will thus amount to around 72 percent during the 1990s, compared with 68.5 percent at the beginning of the decade.

Nevertheless, while production capacity in most OPEC countries, especially those in the Gulf, is not limited by the physical constraint of reserves, the recently large increases in oil reserves announced in some of these countries (Saudi Arabia, Venezuela, Iran, Iraq, Libya and the United Arab Emirates), following the reassessment of their resources, cannot be directly translated into proportionate capacity increases, since they are not related to new field discoveries, with the exception, maybe, of Iraq. In fact, in Iraq and Saudi Arabia, large future capacity expansion is predicted for undeveloped fields and reservoirs already discovered but held in reserve.

Outside the Middle East, the other OPEC member countries are currently producing close to full capacity and have, therefore, very little margin for increasing their output potential. Altogether, these countries could install some 900,000 b/d of additional production capacity between them by 1995. That increase would essentially be concentrated in only two producers — Venezuela and Nigeria. In the second half of the 1990s, the capacity of the non-Middle East OPEC countries is expected to rise by some 300,000 b/d, amounting to about 7.4 million b/d by the year 2000. The share of these countries will decrease however from 23.1 percent of total OPEC capacity in 1990 to around 20 percent in 1995.

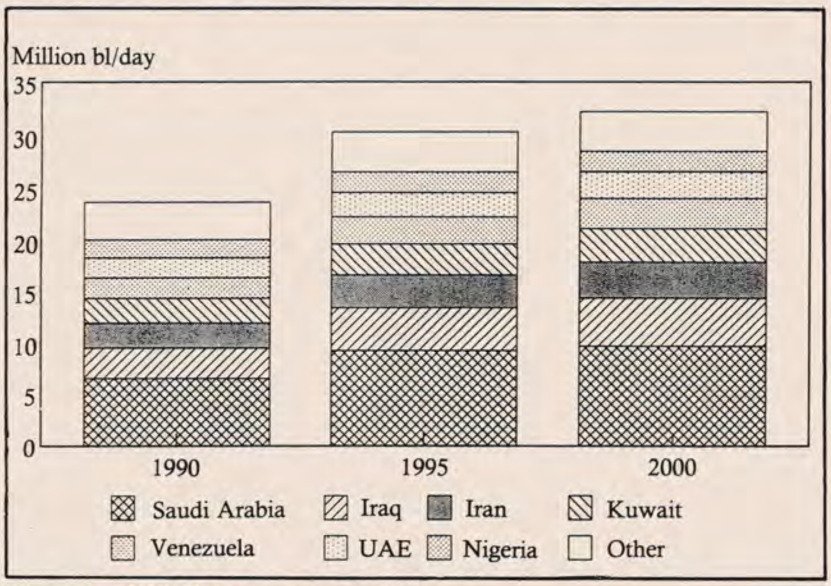


Figure 1 OPEC oil export capacity

Availability of Oil Exports in OPEC Countries

	1990 (1,000 b/d)	Export/ Production (%)	1995 (1,000 b/d)	Export/ Production (%)	2000 (1,000 b/d)	Export/ Production (%)
Iran						
Production	3,200		4,000		4,500	
Consumption	800		900		1,000	
Export	2,400	75.0	3,100	77.5	3,500	77.8
Iraq						
Production	3,300		4,500		5,000	
Consumption	300		340		370	
Export	3,000	90.9	4,160	92.5	4,630	92.6
Kuwait						
Production	2,500		3,200		3,400	
Consumption	100		130		150	
Export	2,400	96.0	3,070	95.8	3,250	95.6
Qatar						
Production	400		550		550	
Consumption	14		16		19	
Export	386	96.5	534	97.1	531	96.5
Saudi Arabia						
Production	7,200		10,000		10,500	
Consumption	760		830		910	
Export	6,440	89.4	9,170	91.7	9,590	91.3
UAE						
Production	2,100		2,500		2,700	
Consumption	120		140		155	
Export	1,980	94.3	2,360	94.4	2,545	94.3
Algeria						
Production	850		850		850	
Consumption	185		205		225	
Export	665	78.2	645	75.9	625	73.5
Libya						
Production	1,450		1,700		1,800	
Consumption	120		135		150	
Export	1,335	91.0	1.565	92.1	1,650	91.7
Ecuador						
Production	300		350		300	
Consumption	75		85		100	
Export	225	75.0	265	75.7	200	66.6
Gabon						
Production	250		300		300	
Consumption	9		12		14	
Export	241	96.4	288	96.0	286	95.3
Indonesia						
Production	1,350		1,250		1,200	
Consumption	550		655		725	
Export	800	59.3	595	47.6	475	39.6
Nigeria						
Production	1,900		2,200		2,200	
Consumption	220		250		270	
Export	1,680	88.4	1,950	88.6	1.930	87.7
Venezuela						
Production	2,400		3,000		3,400	
Consumption	420		460		500	
Export	1,980	82.5	2,540	84.6	2,900	85.3
TOTAL OPEC						
Production	27,200		34,400		36,700	
Consumption	3,690		4,150		4,590	
Export	23,510	86.4	30,250	87.9	32,120	87.5

Constraints

Production capacity in most OPEC countries is limited only in relation to short- and long-term political, social and fiscal requirements. Output potential in those countries is determined by national security arguments, physical ceilings owing to technical field characteristics, conservation of resource concerns, world demand for oil (and especially OPEC crude) and investment capital availability.

No doubt most OPEC countries have enough reserves to be able, with adequate investment, to increase their production capacities and meet world demand. However, the question is whether some of these countries are able to cover the costs of the expansion projects and if the indebtedness crisis in several member states would slow the initiation of planning and construction of new capacities. In fact, the expected growth in new oil output facilities in OPEC countries needs substantial capital to be funded, which could turn out to be around $60 billion for OPEC altogether, or 10 percent of the members' annual revenues.

Whereas the average cost of adding production capacity varies widely between OPEC countries from $0.4/b to $5.4/b, although it may be under $1/b in most of the Middle East members, oilfield development costs, which were relatively low in the 1960s and 1970s, are currently estimated to be five to eight times greater for new fields. The main reason is the complexity of the new production facilities and the fact that fields left to be developed now, tend to be deeper, lower productive and to require initial pressure maintenance, as compared with the large, high productive first-to-be-developed fields. The development cost of new Saudi Arabian oilfields are now estimated to average some $2,500 per b/d, those of Iraq at $5,000 per b/d and Iran at $10,000 per b/d. The reason for the high average cost of developing new Iranian fields is the complexity of the onshore reservoirs and the need for separate sophisticated gas injections systems for each one.

While only little doubt can be raised concerning the ability of Saudi Arabia to finance the huge expansion programme of its production capacity, Iran will have to pay dearly for much more modest increases. In addition, the Islamic Republic as well as some other members would require foreign assistance and support from expatriate skilled staff to design and manage the gas-injection systems.

Other cash-strapped OPEC countries may meet their ambitious investment targets of increasing oil output potential only by introducing significant changes in the current tax system, and new foreign investment mechanism in order to bring in the necessary capital, as in Iraq, Libya, Nigeria and Venezuela. In fact, the multinational corporations and the governments of oil consuming nations, on which Dr Subroto called to make direct investment in OPEC countries, need to be provided with the necessary incentives and encouragement by the member states.

On other hand, as a result of the Iraqi invasion of Kuwait in August 1990 and the subsequent war in January, plans for expanding oil production capacity in the Gulf may be either cancelled or delayed, even in the event of a quick settlement of the crisis. This would call for a downward revision of the expansion forecasts.

Moreover, the effect of a long-term shut-in of Iraqi and Kuwaiti production, the damage to wells resulting from the simple act of non-producing, let alone the damage to fields and export outlets caused by military hostilities, need to be calculated.

Domestic demand

The oil output of OPEC countries cannot be entirely exported. Part of it must meet the domestic demand which rose fast during the previous two decades. Through the 1990s, however, oil consumption in OPEC member countries is expected to witness a relatively moderate increase — 2.2 percent on average annually. A number of reasons support this estimate:

- The greater awareness of the need to rationalise and conserve energy, and the adoption of some such policies by a number of governments, ie substantial increases in the prices of local petroleum products.
- The improvement in energy efficiency in consuming sectors and the greater utilisation of natural gas (and hydroelectricity in some places) as a substitute for petroleum products.
- The need to prolong export potential in some countries which have limited reserves.
- The relative decline in crude oil prices and its effects on economic growth.
- The degree of saturation reached, due to extremely high rates of growth of the 1970s.

Availability for export

In 1995, net oil available for export in OPEC as a group is estimated to amount to 30.25 million b/d, compared with some 23.5 million b/d in 1990. This quantity would rise by the year 2000 to around 32.1 million b/d. The share of oil exports in production would also grow from 86.4 percent to 87.9 percent in 1995, but decline slightly by the year 2000 to 87.5 percent. These figures include both crude exports and refined product exports which are likely to increase from their present level (14 percent of OPEC total oil exports) as more and more refinery construction and expansion projects are undertaken.

Through the 1990s, the Middle East OPEC countries (the Gulf and North Africa) will play an essential role in fulfilling the world demand for oil. Our forecasts show that these countries would be able to export more than 24.6 million b/d in 1995 and around 26.3 million b/d by the year 2000, over 80 percent of OPEC total oil supply. The share of the Gulf countries would be around 74 percent of total OPEC oil exports in 1995 and would increase slightly by the end of the century.

With the exception of Iran and Algeria, all Middle East OPEC countries would be able to export more than 90 percent of their oil production in the years 1995 and 2000, when Qatar would record the highest rate of around 97 percent. The share of Iranian oil exports in output would be around 77 percent whereas Algeria's exports would represent 75.9 percent and 73.5 percent of its oil production in 1995 and by the end of the century respectively.

The availability of oil exports in the non-Middle East OPEC countries will eventually be marginal, amounting to only some 5.64 million b/d in 1995 and about 5.8 million b/d by the year 2000, or around 18 percent of total OPEC oil. In 1995, some 45 percent of this export capacity would be supplied by Venezuela and other 35 percent by Nigeria, leaving only 20 percent or some 1.2 million b/d exported by the three remaining countries, Indonesia, Ecuador and Gabon. By the end of the century, Venezuela would alone export somewhat more than the half of the non-Middle East OPEC countries' crude, while its combined production with Nigeria would amount to some 4.83 million b/d, or 83 percent of the group's export availability. On the other hand, Indonesia would see the share of its oil exports in production decreasing sharply to 39.6 percent by the year 2000 from 59.3 percent in 1990 and 47.6 percent in 1995, because of the growth in domestic oil demand and the simultaneous decline in crude output. ■

FORTHCOMING EVENTS

March

12th-14th
London: '14th National Maintenance Show'. Details: The Conference Manager, Conference Communication, Monks Hill, Tilford, Farnham, Surrey GU10 2AJ. Tel: (02518) 3111. Fax: (02518) 3143.

13th
London: Seminar on 'Use of Computers in Health and Safety'. Details: SCI Conference Secretariat, 14/15 Belgrave Square, London SW1X 8PS. Tel: (071) 235 3681. Fax: (071) 823 1698.

13th
London: Conference on 'Where are we now on Nuclear Power?'. Details: Judith Higgins, The Institute of Energy, 18 Devonshire Street, London W1N 2AU. Tel: (071) 580 0008. Fax: (071) 580 4420.

18th-22nd
Zurich, Switzerland: Course on 'Multiphase Flow and Heat Transfer: Bases, Modelling and Applications in a) The Nuclear Power Industry and b) The Process Industry'. Details: Professor G. Yadigaroglu, ETH-Zentrum, CH-8092 Zurich, Switzerland. Tel: (41) 12564615.

19th-21st
Edinburgh: Conference on 'Effective Industrial Membrane Processes — Benefits and Opportunities'. Details: Conference Department, Membrane Conference, BHRA, The Fluid Engineering Centre, Cranfield, Bedford MK43 0AJ. Tel: (0234) 750422. Fax: (0234) 750074.

20th
London: Seminar on 'OIL IT: Understanding and managing your IT spend'. Details: Libby Gallagher, SD-Scicon UK Ltd, Sanderson House, 49 Berners Street, London W1P 4AQ. Tel: (071) 580 5599. Fax: (071) 580 7716.

20th-22nd
Gaithersbury, Maryland, USA: 'International Workshop on Reliability of Offshore Operations'. Details: Lori Phillips, National Institute of Standards and Technology, Building 101, Room A902, Gaithersbury, MD 20899, USA.

22nd
London: Workshop on 'Environmental Litigation and Advocacy'. Details: Alison Jones, Legal Studies & Services Ltd, Bath House, 56 Holborn Viaduct, London EC1A 2EX. Tel: (071) 236 4080. Fax: (071) 489 0849.

25th
Washington DC: Conference on 'Energy from Biomass and Wastes XV'. Details: Susan Robertson, Institute of Gas Technology, 3424 South State Street, Chicago, Illinois 60616-3896. Tel: 312 567 3881. Fax: 312 567 3857.

25th-27th
Aberdeen: Workshop on 'Risk Analysis in the Offshore Industry — After Piper Alpha'. Details: IBC Technical Services, Bath House (3rd Floor), 56 Holborn Viaduct, London EC1A 2EX. Tel: (071) 236 4080. Fax: (071) 489 0849.

25th-27th
Oxford: Course on 'Joint Interest Ventures for Oilfield Operations'. Details: The Registrar, The College of Petroleum Studies, Sun Alliance House, New Inn Hall Street, Oxford OX1 2QD. Tel: (0865) 250521. Fax: (0865) 791474.

26th
Aberdeen: Conference on 'Planned Maintenance and Repair of Offshore Oil and Gas Facilities'. Details: Rita Parsons, Henry Stewart Conference Studies, 2/3 Cornwall Terrace, Regent's Park, London NW1 4QP. Tel: (071) 935 2382. Fax: (071) 486 7083.

26th-28th
Nottingham: 'Methane: Facing the Problems'. Details: Westrade Fairs Ltd, 28 Church Street, Rickmansworth, Herts WD3 1DD. Tel: (0923) 778311. Fax: (0923) 776820.

April

3rd-5th
London: Conference on 'Coal in the Environment'. Details: World Coal Institute, Conference and Exhibition Secretariat, 8 Cotswold Mews, Battersea High Street, London SW11 3JE. Tel: (071) 937 4600. Fax: (071) 376 0453.

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

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

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

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

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

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

16th
Aberdeen: Conference on 'Improving Safety Management Offshore'. Details: The Customer Services Manager, Industrial Division, IIR Ltd, 28th Floor, Centre Point, 103 New Oxford Street, London WC1A 1D. Tel: (071) 412 0112. Fax: (071) 412 0144.

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

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

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

FORTHCOMING EVENTS

17th
Aberdeen: Conference on 'Getting the Culture Right for Total Quality — Specifically for the offshore industry'. Details: The Customer Services Manager, Industrial Division, IIR Ltd, 28th Floor, Centre Point, 103 New Oxford Street, London WC1A 1D. Tel: (071) 412 0112. Fax: (071) 412 0144.

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

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

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

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

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

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

23rd-24th
Aberdeen: Conference on 'Human Factors in Offshore Safety'. Details: IBC Technical Services, Bath House (3rd Floor), 56 Holborn Viaduct, London EC1A 2EX. Tel: (071) 236 4080. Fax: (071) 489 0849.

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

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

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

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

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

May

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

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

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

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

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

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

14th
London: 'Petroleum Retailing'. Details: Caroline Little, The Institute of Petroleum.

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

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

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

Vapour recovery from gasoline distribution

By Andrew Sangster, Esso Petroleum Co Ltd

In December last year the European Commission published a working document prepared by the Urban Development Unit describing a directive proposal for controlling the emission of volatile organic compounds (VOCs) in the distribution chain for motor gasoline. It covers all activities following production in the refinery up to delivery into the customer's storage tank; this part of the chain is known as Stage 1. The publication had been expected for some time and, indeed, CONCAWE had provided most of the technical data and costings on which the proposal is based. Industry now knows that once the directive is adopted, and assuming there are no significant changes, emission control facilities will have to be installed in a phased programme at nearly all distribution terminals and service stations within the next nine years. Because there has been much rationalisation of facilities in the United Kingdom a very high percentage of sites here will have to be equipped within the next five years.

VOC emissions

It is estimated that man-made evaporative losses of VOCs in Western Europe are about 10 million tonnes. About 40 percent comes from solvents in both industrial and domestic use; exhaust gases from uncontrolled gasoline cars contribute 25 percent, with car evaporative and running losses adding another 10 percent. Car refuelling contributes 2 percent and gasoline distribution 3 percent; oil refining accounts for 3 percent, leaving approximately 17 percent from other sources such as natural gas distribution and other industry.

Reasons for limiting VOC emissions

The Commission's working document notes that VOCs are among the precursors of photochemical oxidants such as ozone and that ozone in sufficient concentrations can impair human health; this is particularly noticeable in congested urban areas. At these same levels of concentration it is claimed it can also damage forests and other vegetation, reducing the yield of crops; ozone is also a recognised 'greenhouse gas'. The photochemical reactions taking place are complex, and there are in any case emissions of natural VOCs on a similar scale, making it difficult to predict the effect of legislative changes. The Commission concludes, however, that in general a reduction could reduce the formation of ozone and that there is a clear case for a coherent and planned approach at a large regional level.

Transport sector

One of the largest contributors to VOC emissions is the transport sector. The main sources are tail pipe exhaust gases and gasoline evaporative emissions from motor vehicles. The Commission has already submitted to the Council a proposal for the decrease of emissions from these sources which would bring about an expected reduction of some 80–90 percent over a 10–15 year period. This directive would introduce the fitting of catalytic converters on all gasoline cars to deal with exhaust gases and small carbon cannisters to capture evaporative losses from vehicle fuel systems.

The next area to be addressed by legislation is the gasoline distribution chain, which represents only a small percentage of emissions. However, the technology to deal with it already exists and is proven in use. The working document now published covers all distribution but expressly excludes controls on the refuelling of cars, ie large carbon cannisters on cars or Stage 2 at service stations. These are still under consideration and will be the subject of a separate directive. In discussing Stage 1 controls it is convenient to subdivide the distribution chain into two parts, Stage 1A covering primary distribution from refinery, storage and loading at terminals and Stage 1B covering deliveries into service stations.

Gasoline distribution losses/potential savings

Report No 90/52,* published last year by CONCAWE, sets out in detail evaporative losses in the distribution chain for different volatilities of gasoline. For typical current UK volatilities losses from terminal storage tanks vary between approximately 0.01 percent of throughput for external floating roof tanks with secondary seals, 0.03 percent for fixed roof tanks fitted with internal floating covers (IFCs) and 0.27 percent for standard fixed roof tanks fitted only with PV valves.

Where there are still gasoline bulk storage tanks without emission control there is clearly a strong incentive to limit losses in future. This can either be done by retro-fitting IFCs or by linking the tanks to a vapour recovery system.

Losses from loading of road tankers is about 0.08 percent where top loading is employed, this reduces to 0.07 percent where bottom loading is installed. The figures for loading rail cars are slightly higher and those for barge and ship loading 20 to 30 percent lower.

Evaporative losses at service stations which are emitted to atmosphere during product deliveries are of the order of 0.22 percent of throughput. For many parts of the distribution chain there is no economic justification for installing emission controls in Stage 1 distribution. However there are savings to be made which will make a significant contribution to offsetting the cost of installing and operating such controls. The CONCAWE report concludes that 75 to 81 percent of vapour currently lost in road loading and service station delivery could be captured by using proven equipment, this is equivalent to 0.162 to 0.175 percent of throughput.

Existing legislation

A number of countries already have legislation of varying severity controlling emissions of hydrocarbon vapour. The best known is the so-called Environmental Protection Agency (EPA) controls in the United States, these cover Stage 1 operations and were first enacted in 1970. The limit on emissions from the processing equipment used to convert recovered vapour into liquid form was originally set at 110 grams of hydrocarbons for every cubic metre loaded for distribution. This was based on the performance capability of then current equipment. The limit has successively been reduced to 80 grams and then 35 in 1983 as recovery technology has improved. Recovery efficiencies have improved from 90 to 97 percent as the limit has been lowered.

Japan was another early entrant into control of vapour emissions but there the limit is only equivalent to a processing efficiency of 85 percent. In 1980 Australia introduced legislation covering certain metropolitan areas based on the original US emission limit. Italy and Austria have had limited controls in place for some time covering the return of vapours from service station deliveries.

But the first major legislation in Europe was the TA Luft enactment in Germany in 1986; this is very wide-ranging requiring controls on almost all industrial air pollutants. For the gasoline distribution business emissions from individual sources, ie the processing unit vent stack, must not exceed 150 mg per cubic metre which is equivalent to 90 mg per cubic metre loaded at 40 percent concentration or about one four hundredth of the US figure. The alternative is to limit total emissions from the terminal to less than 3 kg per hour; it is worth noting that only the very smallest operations in the United Kingdom could meet this requirement throughout the day. These restrictions mean that the final processing equipment has to have an efficiency in excess of 99.99 percent. Various attempts have been made by adding further stages to existing processes but to date none has been successful in continuously meeting the emission limit. The German legislation also limits emissions of benzene.

The only other country in Europe to adopt legislation is Switzerland but the limits on hydrocarbon emissions have yet to be determined by the various cantons; the limits are likely to be the same as in Germany.

In some countries, notably Sweden and Denmark, the oil industry has voluntarily installed Stage 1A and 1B facilities, possibly to pre-empt perceived legislation. Generally the performance of the equipment used meets the current US limit.

Proposed EC directive

Although the European Community has taken a major step to limit VOC emissions with its proposals for controls on vehicles, the political pressure remains to tackle all forms of such emissions. Following two years of investigation and consultation, the Commission's Directorate DG11 has produced the working document on the directive proposal referred to in the introduction. It sets an optimistic programme for adoption and implementation that will be a challenge to the oil industry and suppliers alike. The document was first presented to government representatives from member states in December last year, with preliminary comment requested in less than six weeks. Although no timetable is mentioned it is understood that the target for adoption by the Council is Spring 1992 at the latest.

It proposes a 12 month period following adoption for enactment by member states. Hence Day 0 for the implementation stage would be in Spring 1993 and Phase 1 would last for three years and the second phase for a further four years. By the end of Phase 1 all terminals with a combined gasoline throughput loaded to road and rail of more than 50,000 tonnes per year and all service stations with an annual throughput of more than 500 cubic metres would have to have Stage 1A and Stage 1B emissions controls fitted respectively. Phase 2 draws in remaining terminals with annual throughputs of more than 25,000 tonnes and service stations with more than 200 cubic metres. It also includes all marine loading facilities with an annual throughput of greater than 25,000 tonnes.

Above ground storage tanks (without any indication of a lower capacity limit) will either have to be fitted with a floating roof with primary and secondary seals, an internal floating cover with primary seal or vapour lines connecting to a vapour recovery unit. External painting will have to be in light colours. Terminals will have to be equipped with vapour collection facilities together with a vapour recovery unit capable of controlling VOC emissions to a maximum of 35 grams/cubic metre of effluent. As an alternative, incineration is permitted.

Once Phase 1 has started, all new trucks will have to be capable of being bottom loaded and bottom loading of gasoline will become compulsory at all installations by the end of Phase 2; there appears to be no similar constraints on rail-cars. Service stations will have to be fitted with pipework to enable the collection of vapour displaced during gasoline delivery and the return to the delivery truck. Any stations located under living or working premises will have to be equipped regardless of throughput.

The limit of 35 grams/cubic metre of effluent from the vapour recovery unit is equivalent to 21 grams/cubic metre loaded to distribution assuming an hydrocarbon inlet concentration of 40 percent. This is some 60 percent of the US EPA limit but more than 200 times higher than the TA Luft limit in Germany. The Commission takes the view that their proposed limit represents the best continuously achievable performance from current single stage recovery technology, and that the addition of a second stage would only raise recovery rates by 2 percent but with a penalty of a 50 percent increase in energy used and the associated additional CO_2 pollution in its production. They also note that the operation of a second stage is significantly more complex and requires more extensive surveillance and maintenance, resources less readily available on distribution terminals. A limit on final effluent concentration is preferred to the EPA approach because it can be measured directly. With Stages 1A and 1B installed, this limit will require a 98 percent efficiency in the vapour recovery process.

No mention is made of a limit on benzene emissions but it is recognised that the process technologies available will give recovery rates for benzene as good as, if not better than, the rates for all hydrocarbons.

The working document notes that the emission of VOCs from gasoline is related to its volatility in terms of Reid Vapour Pressure (RVP) but makes no proposals to reduce maximum RVPs. Instead it states that when the proposed Stage 1 emission controls are applied, the RVP effect on VOC emissions will be significantly reduced.

Under the terms of the proposal, small distribution plants will not have to be equipped with vapour recovery units, provided it is possible to return the vapour in the delivery container for recovery at the original supply point. Mobile vessels returning vapours to terminals must hold the vapour until it is collected for recovery. This will also apply to ships and barges and could cause difficulties in ballasting operations and any local requirements for gas-freeing of cargo tanks.

It is recognised that implementation of the directive could increase operating hazards at terminals and will introduce new ignition sources. Member states will be required to satisfy themselves that safety standards are being maintained when the directive comes into force. There is particular concern that air/vapour mixtures generated by loading of marine vessels will remain for long periods in the explosive range, thereby requiring special design measures to limit damage in the event of ignition. This is an issue currently being addressed in the United States but so far there has been very little operating experience. The proposal recognises that any legislative requirements in Europe would need to be consistent with US practice but may be delayed if there is difficulty in setting safety standards. In this event a derogation would be granted for marine loading for two years beyond the end of Phase 2.

Equipment breakdowns and measurement and monitoring of performance are discussed in the document but no specific proposals are made. In the case of breakdowns it would be left to the competent national authorities to require the operator to take suitable measures should the VRU be out of operation for a significant length of time; these could include reduction in throughput or even complete shutdown of loading operations. It is however recognised that there will have to be equipment shutdowns for maintenance but that there is no justification for stand-by facilities. Member states would be encouraged to set up performance monitoring procedures in order to report to the Council on the effectiveness of the directive.

Finally member states would also be

Formation of vapour recovery panel ENG-4-D

The recent publication of the EC document proposing a Stage 1 directive comes at the end of a period of increasing interest by both authorities and the oil industry in vapour emission controls. It is expected that the EC will also shortly announce plans to reduce car refuelling emissions.

Both Stages 1 and 2 are new issues to most of the UK oil industry, with only a few vapour recovery units installed to date, but with a growing trend towards vapour balancing (so called Stage 1B) at retail sites. Because of the considerable impact the EC directive would have on the UK oil industry, it was decided last summer to set up a panel to form a focal point within the IP on vapour emission control issues. This panel will report back through the Engineering Marketing Sub-Committee ENG-4.

Members of IP Vapour Recovery Panel ENG-4-D

The main objectives of the panel are:

- To monitor the development of VOC control legislation in Europe, the United States and the United Kingdom.
- To assess the impact of any legislation on the operations of the UK oil industry.
- To co-ordinate formulation of industry technical responses to any proposed legislation.
- To liaise with UKPIA and other interested bodies to provide technical briefing for the political debates and to help assess the commercial impact of systems and solutions.
- To ensure that where equipment chosen has an impact on exchange deals that suitable arrangements are made to ensure compatibility.
- To ensure that specialist issues, such as measurement, emission monitoring, revenue claw back and safety are discussed with the appropriate IP/UKPIA Committees.
- To develop installation and operating guidelines for vapour recovery equipment.

The last objective is being pursued with much urgency and it is hoped to publish guidelines by this summer. These will particularly assist those companies which are setting out on the installation of vapour recovery for the first time.

The panel consists of members of the Engineering Marketing Sub-Committees. It is chaired by Brian Smithers from BP Oil Europe; the other members are Tony Hall (Mobil), Robert Harris (Shell), John Morgan (Esso), Andrew Sangster (Esso) and Henk van Wouw (Shell International), with Eric Whitford as Secretary. These members also sit on CONCAWE, UKPIA and Department of Transport Committees dealing with emission controls, thus ensuring liaison on this important issue.

encouraged, where vapour returns into bond, to exempt product recovered from duty and other taxes in order to avoid double taxation.

Industry concerns

Apart from the need for clarification of some of the proposals, there are several main areas of concern. The first is the ability of equipment suppliers and installation contractors to meet the timetable for the first phase. At present there are only three suppliers of single stage VRUs capable of meeting the emission limit and proven in use. These three represent two of the technologies currently available and there are two other technologies which might eventually meet the limit with consistency. But it is possible that three small companies might be asked to supply 400 units in a three year time span. Experience to date indicates that it takes well over 12 months to purchase, install and commission a VRU because each one has to be carefully engineered to suit the service conditions on site. During this time span many road loading facilities would have to be converted to bottom loading and it is estimated that some 70 percent of service stations in the United Kingdom would have to be fitted with vapour collection facilities. Given the scale of work required the Institute has recommended that Phase 1 be extended to five years.

The second concern is that the terms of the legislation bear unfavourably on the UK oil industry. Because there has been major rationalisation in this country into larger operating units, investment in excess of 70 percent of the total would have to be made in Phase 1. This is believed to be more than in other member states of the Community.

The third major concern is that some government representatives at the meeting to unveil the working document suggested a lower, more challenging emission limit should be set. The Commission has deliberately adopted a policy of single stage units as representing best available technology not entailing excessive cost (BATNEEC). It recognises that for a single stage unit the proposed limit will be a testing requirement. US experience has shown that it is more effective to start with a limit which is known to be achievable and to reduce that limit if there is a demonstrable benefit as technology improves. In the view of the Institute, any move to reduce the emission limit below the proposed figure should be vigorously opposed.

The remaining concerns centre around collection facilities for rail and marine loading operations. There is already extensive experience with the design and use of vapour collection and recovery facilities at service stations and road loading stands. It is already obvious that it will be some time before marine facilities will be required, but it is known that some rail loading operations will have to be equipped in Phase 1. To date there is limited experience of converting and operating rail loading facilities; one of the major difficulties will be the sealing of top loaded rail cars to enable effective vapour collection. Clearly such a conversion, particularly on a modern single point loading operation, will present a major challenge.

Control technologies

There are already a number of VRU installations in the United Kingdom using the two technologies known to be capable of meeting the proposed directive. The first is carbon adsorption, a process widely used in many industries and currently favoured by the oil industry in the United States. Twin carbon beds are used to intercept hydrocarbon molecules in the vapour stream, these are then removed by vacuum pump for subsequent reabsorption in a stream of gasoline circulating from bulk storage. While one bed is in operation, the other is being regenerated.

The second system, lean oil absorption, has been specifically developed for hydrocarbon recovery. Cold kerosine working in a closed cycle absorbs the hydrocarbons in the vapour stream; the gasoline elements are then recovered in a splitting process for reabsorption in a gasoline circulation stream from main storage. The kerosine is recovered for reuse. The efficiency of this method can be improved by using a solvent in place of the kerosine.

Refrigeration condensation systems have been widely used in the past and second generation designs using off-peak storage of cooling capacity are significantly more cost-effective than the earlier systems. However, neither can achieve the emission limit proposed in a single stage unit, and the addition of a second polishing stage adds to the complexity of the unit.

Membrane interception of the hydrocarbons is a technology recently tried out in Germany. To date there is insufficient information on performance of fully operating units to be certain that it will play a major role in the first phase.

Bottom loading of gasoline trucks has been installed at many locations in the United Kingdom within the last five years. It is now widely recognised as a standard for loading rack design on grounds of safety, speed and convenience, and offers the only effective and efficient means of recovering vapour. Industry set the change in motion when it agreed the parameters for layout of bottom loading equipment on trailers in 1985.

Recovery of vapour from rail cars presents a totally new problem. Bottom loading with associated vapour collection facilities can be installed but much of the existing rail car fleet would have to be modified at not inconsiderable expense; and this solution could be inconsistent with the retention of modern lance loading facilities. Rail bottom loading would also involve moving up to 6 inch equipment from the 4 inch widely used for road loading.

The latest service station layouts where vent lines are placed close to offset fill pipes to the underground tanks lend themselves readily to conversion to provide a vapour collection facility. The simplest method is to manifold the tank vents (excluding auto-diesel) above truck height and to run a vapour header back to the vicinity of the fill pipes. This is then coupled to the vapour manifold on the truck. But the majority of service stations have a number of below-ground fill points scattered about the forecourt. In each case a decision will have to be taken whether to convert to the design described above or whether to provide single or multiple vapour connection points. This will involve digging up forecourts and in many instances installation of over-fill protection devices to prevent product crossovers through manifold vapour vents. Considerable work will be required at many locations if multi-hose discharge of road tankers is to be maintained.

Costs

The CONCAWE report concludes that the average investment at 1988 prices to achieve a reduction of one tonne in VOC emissions at Phase 1 terminals and associated service stations is \$2,630, but ranges from \$1,300 for equipping the largest terminals to \$9,000 for terminals at the 50,000 tonnes per annum lower limit. What is of more immediate interest to an industry faced with investment driven by legislation is the cost of typical installations. Experience suggests that vapour recovery facilities in the UK will cost in the range

£600,000–1 million depending on service requirements. Bottom loading bay conversions cost between £70,000–100,000 depending on the number of arms involved. Truck conversion is not a very attractive option at £20,000–25,000. The most difficult cost to assess is service station conversion. A site equipped with off-set fills and adjacent vent pipes could cost as little as £1,000, but where underground fill points are involved costs could rise to £10,000 or more.

Operating costs will not only include energy demand but must take account of the cost of the technical expertise needed to maintain the vapour recovery unit in operation and the performance within legislative limits. Typically operating costs will fall in the range of £25,000–50,000 per unit annually.

Issues

As a result of this legislation, there are a number of issues to be addressed. Performance measurement to date has usually involved checks over short periods of one or two days, but it is not known yet whether it will be necessary to provide continuous measurement of emissions for reporting purposes. But it is known that present techniques for measurement of liquid returns would not give results with sufficient accuracy for duty reclaim purposes at bonded installations. In these cases it might be necessary to rely on a formula approach, as currently used in Germany, until accurate measurement techniques are developed, possibly involving direct measurement of hydrocarbons in the two vapour streams.

Breakdowns are not uncommon. Equipment reliability will have to be improved along with response times for carrying out repairs. Within the near future it will have to be agreed with the government what are acceptable periods for maintenance and breakdown repairs, what minimum service factor per year is acceptable and what actions operators will have to take if agreed periods are exceeded.

Rail and marine facilities will each bring challenges to the ingenuity of the industry to design and install effective systems which will be safe and will cause minimum disruption to operations.

Industry action

In the preparation of the working document, the Commission used technical data provided by CONCAWE, with a large contribution from the UK oil industry.

Both the Institute of Petroleum and UKPIA have set up specialist vapour recovery committees. Both responded to the government on the EC working document in impressive detail, given the limited time available. The IP committee is producing as a matter of some urgency guidelines on the design and installation of vapour recovery facilities.

UKPIA has a separate working group negotiating with HM Customs and Excise for repayment of duty on recovered product at bonded locations. Both committees expect to be heavily involved in lobbying and providing constructive comment as the Stage 1 legislation is developed. Liaison contacts exist between the two committees. The oil industry is also represented through the IP on the Department of Transport's committee on dangerous cargoes which is considering the issues involved in vapour recovery from marine loadings.

Conclusion

It is now evident that vapour collection and recovery systems will have to be installed at most terminals and service stations in the near future. It is important however that Industry continues to play an active role in the final formulation of the Stage 1 directive, arguing the case for adoption of timing and performance limits that are realistically achievable. Once legislation is passed the oil industry will have to demonstrate its ability to implement efficiently and expeditiously a major investment programme that will make a positive contribution to improving the local environment. ■

Reference

*CONCAWE Report No. 90/52: VOC emissions from gasoline distribution and service stations in Western Europe — control technology and cost-effectiveness.

IP Safe Loading Pass Scheme (SLPS)

In the April and September 1988 issues of *Petroleum Review* we published the text of this scheme which is continually under review by the Institute's Road Transport Panel.

From 1 April oil companies may require bottom-loaded vehicles loading at their terminals to have either non-pressure balanced footvalves or pressure balanced valves with a sensing system which in the event of loss of air pressure will activate the loading stand 'shutdown' before the footvalves close.

As a result of this requirement, Panel C has adopted two blue and white plastic label designs, as shown below, to be incorporated in the SLPS.

EUROPE: Growth of unleaded petrol

In the first three quarters of 1990 the uptake of unleaded petrol available in European petrol stations continued to grow. During that time it accounted for more than one third of all gasoline consumed — compared with 25 percent in the same months of 1989.

The Western part of Germany was the trailblazer with two thirds of petrol sold being unleaded. In the United Kingdom the unleaded figure matched the European average but was considerably more than the 19 percent the previous year.

1990 sales of Premium unleaded in the United Kingdom actually out-sold those of Western Germany and in terms of total consumption Britain ranks second only to the Germans.

In general, the percentage sales of unleaded petrol rose more in the non-EC European countries — 48 percent in Jan–Sept 1990 compared with 40 percent in the same period in 1989 — than in the EC (only marginally higher than the previous year). But in terms of consumption EC countries far outstripped the non-EC with 24 million tonnes of unleaded petrol against 5 million.

Table 1: Availability of Unleaded Petrol in Europe

Country	**Availability at Service Stations (%)** *Regular*	*Premium*	*Super*	**Total** *retail outlets*
Austria	100	100	0	4,021
Belgium	25	100	25	5,030
Denmark	N/A	85+	N/A	3,100
Finland	0	100	N/A	1,937
France	0	←—40—→		25,000
Germany*	100	100	40–60	19,000
Greece	0	11	0	6,500
Ireland	0	50	N/A	3,173
Italy	0	64	0	33,800
Netherlands	0	85+	32	7,000
Norway	0	100	30	2,463
Portugal	0	4	0	1,800
Spain	0	19	0	5,025
Sweden	0	100	N/A	4,204
Switzerland	0	100	0	3,939
United Kingdom	0	98	N/A	19,756

Notes: N/A, Not Available
***Former West Germany only.**

Source: UK Petroleum Industry Association

Table 2: Petrol Grade Splits and Unleaded Uptake in Europe — (January-September 1990)

Country	*Leaded* '000 tonnes	%	**Unleaded** *Regular (91)* '000 tonnes	%	*Premium (95)* '000 tonnes	%	*Super (97/98)* '000 tonnes	%	*Total Petrol* '000 tonnes	*Unleaded Penetration* %
Austria	978	49·8	602	30·6	385	19·6	—	—	1,965	50·2
Belgium*	1,052	76·2	8	0·5	296	21·4	26	1·9	1,382	23·8
Denmark	508	43·0	88	7·4	407	34·4	180	15·2	1,183	57·0
Finland	724	48·3	—	—	771	51·4	5	0·3	1,500	51·7
France	12,115	87·2	—	—	89	0·7	1,684	12·1	13,888	12·8
Germany†	6,460	32·4	6,958	34·9	5,225	26·2	1,306	6·5	19,949	67·6
Greece	1,798	98·3	—	—	32	1·7	—	—	1,830	1·7
Ireland	550	81·5	—	—	125	18·5	—	—	675	18·5
Italy	9,569	95·1	—	—	494	4·9	—	—	10,063	4·9
Netherlands	1,333	52·0	—	—	973	37·9	259	10·1	2,565	48·0
Norway	1,193	65·1	—	—	594	32·4	46	2·5	1,833	34·9
Portugal*			—	—	2		—	—		Neg.
Spain	5,774	99·1	—	—	51	0·9	—	—	5,825	0·9
Sweden	1,541	48·0	—	—	1,669	52·0	—	—	3,210	52·0
Switzerland	1,378	50·1	—	—	1,376	49·9	—	—	2,754	49·9
United Kingdom	12,291	67·2	—	—	5,328	29·1	671	3·7	18,290	32·8

Weighted average: 34%

Notes: *January–June only
†Former West Germany only.

Source: UK Petroleum Industry Association

A fireman's view of forecourts

By Roger Marris, Petroleum Officer, West Yorkshire Fire Service

Effective control of the forecourt is an essential part of the day-to-day running of a petrol filling station. Drive-offs are almost commonplace in certain areas and the antics of some motorists when dispensing petrol is almost beyond belief. One licensee told me of a middle-aged lady who walked onto the forecourt with a plastic bag which she intended to use for carrying petrol back to her car that had run out of fuel a short distance away. The mind boggles to think how she proposed to transfer the petrol from the bag to the fuel tank. Young children are sent with 5-litre containers, approved or otherwise, to purchase petrol for the family lawnmower. I have had to personally intervene on one site to prevent an attendant from selling petrol to a child who I estimated to be around 7 years old. My only thanks on this occasion was a torrent of abuse from the disgruntled customer. The number of motorists who smoke whilst filling their vehicles would lead one to believe there is an epidemic of word blindness in view of the proliferation of warning notices on forecourts. Customers filling or attempting to fill 5-litre plastic detergent/soft drink containers is a regular occurrence. With such foolish and irresponsible acts, it is imperative that the forecourt is properly supervised if serious accidents or cases of product theft are to be avoided.

The question is, 'Are all forecourts properly supervised?' In my experience the answer is a resounding 'no'!

There are two main factors which govern the effective control of the forecourt. One is the active day-to-day supervision which is dependent on the training and ability of staff — the human factor. The second and equally important factor is the forecourt design. No matter how well-trained and enthusiastic staff may be, they can only exercise control over the pumps and dispensing areas which are visible from the control-point. Clearly both factors are inextricably linked.

It is the latter point which I believe deserves far greater consideration at the planning stage by oil company retail engineers and the architects.

There are many influences which will determine the architect's final design, starting with the oil company standard layout, the land available, mandatory safety distances and, of course, the ancillary money spinners car wash, jet wash, car vacuum cleaner and the ubiquitous convenience 'C' store. The architect will have to take account of the requirements and preferences of the various interested parties such as the planning/building authority, drainage authority, licensing authority and the oil company retail engineers and sales representatives, all of whom will be preoccupied with their respective individual disciplines. Inevitably differences of opinion will arise and compromises will have to be made before the final plan is agreed. The one casualty of any concessions that have to be made, especially in favour of the design and position of the 'C' store, is forecourt control. Surprisingly, this particular aspect may even go unnoticed by the local authority Petroleum Officer who should, after all, be mindful of his own authority's Licensing Conditions relative to attended self-service operation, when discussing or approving proposed forecourt layouts. Here again there is an apparent pre-occupation with the structure both above and below ground, safety distances and ingress/egress for the road tanker and customer vehicles. The actual operation of the site tends to be neglected. This point is abundantly evident on many new sites where one or more dispensers are hidden from the direct view of the control point.

It must, therefore, be fully appreciated by designers that the forecourt controller has a number of safety points to check before commissioning a pump and a responsibility to monitor the same during the whole of the dispensing activity. As an example, the following safety list is extracted from a draft Health and Safety Executive (HSE) guidance booklet for petrol filling station employees.

- 'Before you commission the dispenser you must make sure there is no danger. Control has to be constant to prevent dangerous situations occurring'.
- 'All vehicles using the dispensers can be seen and your view is not obstructed by equipment, window stickers or shop goods.'
- 'The engine of the vehicle at the pump is switched off'.
- 'Persons apparently under the age of 16 do not obtain petrol'.
- 'No one is smoking in the vicinity of the pump'.
- 'No one is using portable electric/ electronic equipment such as a CB

radio, portable telephone etc.'

- 'Customers wishing to fill containers with petrol are using those which are approved'.

How many forecourts are there where constant supervision of all the pumps can be achieved for all of the time as is suggested by the guide and required by most licensing authorities' Conditions of Licence? I would suggest very few indeed! More often than not there will be an obscuration problem either by the vehicle being fuelled, other vehicles driving onto the forecourt or even the dispensers themselves.

It is, therefore, important in any development or redevelopment that the forecourt layout is designed in such a way that it provides the control point with the maximum possible viewing range of all the pumps and their respective dispensing areas. Consideration must be given to the inevitable obscuration created by the vehicles themselves when parked at the refuelling points, one correctly parked vehicle may well wipe out the vision of one or more pumps. The recent innovation of multi-product dispensers (MPD) and twin pumps, where product can be dispensed simultaneously into two vehicles, has highlighted the obscuration problem, especially on existing sites which are repumped with these units. Forecourts designed on the one popular horizontal principle, where the pump islands and vehicles are parallel to the control point, are particularly unsuitable for use with MPDs and twins. It is now generally accepted within the industry that this layout is no longer apposite for the modern self-service forecourt.

The 'starting grid' layout where the pump islands and dispensing areas are in line with the control point is now preferred by most oil companies. However, this principle will not always afford the desired control-point viewing range if for instance there is more than a four-lane configuration. Also the widespread use of MPDs and twins, for reasons previously mentioned, will only exacerbate an inadequate viewing range. The installation of a suitable closed-circuit television system to cover the obscured areas may prove a satisfactory alternative where complete direct vision cannot be achieved. My own authority has required the provision of a CCTV system on a growing number of recent developments and I would expect that other authorities may also find it necessary to take a similar course of action where they deem a forecourt layout to be unacceptable. Licensing authorities must, therefore, be mindful of their licensing conditions relative to the actual operation of attended self-service when approving planning applications. It is clearly pointless in giving tacit approval to a proposed forecourt layout when all the pumps are not within the viewing range of the control-point.

When I query a particular feature of a plan with the engineer or architect, be it forecourt layout or the size of the petrol interceptor vent pipe, the predictable and inevitable remark is, 'When will the Licensing Authorities get their act together and adopt a common standard for the whole of the country. An identical scheme to this was approved by the Petroleum Officer in . . .' The long awaited HSE booklet HS(G)41 'Petrol Filling Stations: Construction and Operation' was heralded by many as the document that will standardise the industry. If this is to be the case, I would draw the attention of those concerned with filling station design to the following points in paragraphs 39, 41 and 126 of HS(G)41.

> 'At attended self-service stations, metering pumps and dispensers should also be located where vehicles etc being filled from them can be adequately viewed and supervised from the control point';
>
> 'Any building intended for use as a control-point at an attended self-service filling station should be located where an attendant at the control-point can exercise adequate supervision over dispensing activities. The view from the control-point necessary to ensure adequate supervision of dispensing activities should, therefore, not be obscured by other buildings or structures';
>
> 'Adequate supervision of all dispensing activities at an attended self-service filling station should be exercised by a trained attendant or attendants at a suitably located and equipped control-point or points.

If these recommendations are read in conjunction with the controller's responsibilities, as they should be, there will be no alternative but to review the approach to forecourt design.

I forsee a change of emphasis on the part of enforcing authorities towards environmental and immediate safety considerations. Vapour recovery and secondary containment are now on the horizon, active forecourt safety is just around the corner. ■

The elusive prize — stable oil supply

Daniel Yergin, President and founder of Cambridge Energy Research Associates, is a distinguished author and an influential analyst and commentator on world oil. He was in London at the end of January for the UK launch of his new book, *The Prize,* a much-acclaimed history of the world oil industry which is already a best-seller in the United States and London. (Reviewed in last month's *Petroleum Review*).

In the following interview *Petroleum Review* questioned him about *The Prize* and asked his views on the war with Iraq.

Carol Reader: Did the timing of the release of your book affect its final chapters?

Daniel Yergin: About 16/17 months ago I came to the conclusion that I really ought to get this book finished because it was becoming clear to me that the oil market was tightening and crisis problems were developing again. Then in the spring the signals mounted about Saddam Hussein in Iraq.

I finished the epilogue to the book on 28 July and said four things — the oil markets looked more like the early 1970s, watch Saddam Hussein, keep your eye on the Soviet Union and find a way to deal with these energy environmental trade-offs. Of course, I had to do a little revision after 2 August but not much because the book covers all the 135 years the modern oil industry has been in existence.

Did the US administration not believe that the Iraqis would invade Kuwait?

I think that the administration was still torn between thinking 'Was there or was there not a new Saddam Hussein'. The 'surprise' was a classic thing that goes back to Pearl Harbour and all those other times.

The administration was focused on other matters — on the reunification of Germany, Eastern Europe and the Soviet Union — despite the signals of growing trouble and tension from Iraq. Then there were the personal assurances from King Hussein and President Hosni Mubarek; and apparently the Russians had been assured by Saddam Hussein that he was not going to invade.

President Bush puts a lot of stock in personal relations and took these assurances seriously, putting aside, according to later analysis in the media, the intelligence reports which said that something serious was going to happen. It just did not seem rational to invade Kuwait . . .

Why do you think the oil markets reacted differently in January compared with last August?

I think that there was a supply situation that had been steadily improving since last August — measurably better than it was last August — and considerably better than it was even in November. In addition, it was a different season; from the oil industry perspective, the winter was virtually over.

In London you were probably all asleep and woke up to the war. I was on the West Coast, so it was 4.10 when I heard. By about 9 o'clock, the oil market decided from its perspective that the war was over. Until then you had this tug-of-war between war, fear and anxiety and insecurity on the one hand together with the unknown — would the Saudi oil facilities be damaged — and on the other hand you had the improving supply position.

All previous post-war scenarios began with shortages and ended with surplus. It is pretty evident that under most scenarios we would end up with a surplus anyway and so the oil market decided that the war was over.

What is your view of current IEA policy? It appears to be a complete U-turn of staggering proportions.

The IEA decided to release stocks. It thinks it was wise to get the oil price off the table. I remain convinced that the emergency machinery was set up in the 1970s not only to deal with physical shortfall, a measuring concept, but with economic growth and the threats to it.

I think that in the first month or two of the crisis there was an underestimation of a) how high the price would go and b) people forgot the lessons of the economic cost of an oil shock.

I think the progressive weakening of the US economy really made the United States much more aware. What the United States is concerned about is not merely making sure that there are enough supplies but making sure that its banking system doesn't collapse because of a deep recession. I think that was very much in the mind. For instance, there was a pretty extensive debate in the United States before the war about the Strategic Petroleum Reserve.

The unspoken aim, and the aim that President George Bush dare not voice, is oil security. Is that so?

There is a fairly consistent policy going back to the late 1940s, aimed at not allowing a hostile power to dominate the resources of the Gulf. If you go back to the Carter doctrine, Jimmy Carter didn't have any difficulties talking about oil and the oil dimensions of the whole thing, but now it has been the dog that hasn't barked — the word 'oil' doesn't get spoken very much. Americans tend to be followers of Woodrow Wilson and prefer ideals rather than self-interest in the expedition of foreign policy.

But if you read the section in my book about the Bush trip to Saudi Arabia in 1986, you will see that he got so badly burned talking about oil that I think that, combined with the fact that he is from Texas and from the oil industry, has meant that he has gone out of his way to avoid such comment. Jimmy Carter could talk about oil in a way George Bush couldn't, because the only oil business that Jimmy Carter had been in was the peanut oil business!

How much do you think President Bush's attitude towards the present situation has been coloured by the fact that he was an independent Texan oilman?

I think the essential thing is that he believes there is a connection between oil and the prosperity and security of the western world. The other aspect is that, because of his background, he is a lot less willing to talk about it than I think other presidents would have been. In President Carter's time they were always putting out what percentage of oil reserves were in the Gulf — and Afghanistan was one step removed . . .

How big was the internal wrangling between the OPEC members? How much did that affect Iraqi policy — that Kuwait wanted to keep oil prices low?

I think that was more than irritating, but I don't think that Kuwait was primarily doing this to starve Iraq of weapons. Primarily, Kuwaiti policy was based on its own economic motives and interests.

Where does that leave OPEC now? Some reports say that OPEC has outlived its usefulness.

One of the things I have noticed, on looking back, is that ever since the 1860s those who have the oil are always looking for some way to tame this extremely wild and bucking bronco of a commodity — to find a framework, OPEC is just the latest form of that. I think that the main producers are going to continue to want a forum or framework in which to deal with those questions.

Do you believe that the Gulf producers might split away from the rest of OPEC?

I think OPEC — or an OPEC-like organisation — will still be there in some form, but not with the same orientation.

Is there a new moderation in Iran? Do you think there is a possibility of Iran and Saudi Arabia being a main force in OPEC and controlling the direction that OPEC takes?

I think that if Iraq is out of the picture, you could have a re-establishment of the twin pillars — Iran and Saudi Arabia. Of the other OPEC countries, Venezuela is the only non-Gulf state that is likely to have interests similar to those of the main Gulf producers — but obviously with a very strong Western Hemisphere orientation.

That is why I think that the producers want to have a means of talking to each other and a framework that gives them a mandate to do that.

So OPEC is not dead?

No. Before 2 August OPEC was not a tremendously powerful organisation — it was just a framework for people to meet their objectives.

Would OPEC be powerful if the Soviets joined or the Russian Federation?

It would be the second largest oil exporter in the world and it would be pretty interesting. I remember in May 1986 when oil prices were low, I was in the Soviet Union and I saw one of the senior decision-makers and he said that the Soviet Union would never co-operate with OPEC. Three months later the Soviet Union at least

Daniel Yergin

rhetorically was co-operating with OPEC when it was in their self-interest. So the Soviet Union one way or the other is going to have a lot of influence, have a lot of impact on the oil market in the 1990s, as it has had since the 1870s in one form or another.

What do you think about the apparent instability in the Soviet Union at present? Do you think it will have an effect on oil supplies?

Yes, absolutely. I think what happens to the oil supply is really going to be affected by what happens politically — whether they move to a market system or to chaos. Is capitalism coming in, is technology going to come in, is it going to come in expeditiously? I think those are all unanswered questions — the political risk is very high. That is why the surprise I sketched out in one place in my book is really a double surprise — you start to lose significant exports over the next few years and maybe at the end of the decade you start to have a resurgence of Soviet oil exports. They are not going to disappear, because of the hard currency involved. The big issue for companies is who do you deal with.

It seems that you have to deal with everyone — local mayor to President Gorbachev

And the local environmentalists, who in some cases resemble those in California, except they have a more slavophile, nationalistic element.

What about the United States, there is a constant theme that we're running out of oil. Do you think the Arctic National Wildlife Refuge (ANWR) will ever open up?

It is beyond energy policy. It is about nature and the last pure unspoiled part of the world, even though you are only talking about a small part of it.

We have done a new multi-client study on future world oil supplies and we see a million barrel a day swing in the United States in the year 2000, depending on whether there is or is not environmental restrictions. Not even counting ANWR the dilemma for the United States is that all prospective areas happen to be in the most controversial areas. In general, if you look at the oil industry in the United States, at every segment of the industry, it is highly constrained by environmental pressure and there is a sense of discouragement that runs throughout the industry — you can't explore, you can't produce, you can't transport, you can't refine, and the service stations are pretty vulnerable too.

Do you see more co-operation developing between consumers and producers after the war?

Absolutely, yes. Firstly, the consumers worry about the security of supply; then in the 1980s the producers worried about the security of demand. Now they are concerned about the security of themselves. I feel that it is in their long-term interests to have more durable and less confrontational relationships.

It has never come to anything before but do you think it could now?

It has come in the sense of downstream integration. It is an interesting question — will we see grand concords between producers and consumers? I suppose people have been seeking such concords since the late 19th century and so they sound familiar. Anyone who has been an observer for a long time is pretty sceptical about them though, but will matters change? After all, dialogue can be informal as well as formal. ■

The BP Super European New Tanker

BP Europe has taken delivery of a new design of low height tanker developed in co-operation with LAG of Bree, Belgium.

The LAG trailer tank which will operate in Belgium with a capacity of 40,000 litres in six compartments is constructed in aluminium to European ADR requirements covering road transport and the construction methods used have enabled the ADR lateral protection to be integrated into the design.

Tri-axle suspension is used and the braking system incorporates an anti-lock system — ABS. The tank shell is of triple conical form and the new design has reduced the centre of gravity by 400 mm over the previous model, giving the trailer an overall height of 2920 mm.

The tank is constructed for bottom loading and vapour recovery, and delivery is by means of the HAAR — PRECIFLOW system. A Scandanavian SAM system on-truck computer system is installed which incorporates a Vehicle Information System (VIS), Point of Sale System (POS), Sealed Delivery System (SDS) and Cross Over Protection (COP). The SAM system is controlled by as cab-located PORTAMAT and a printer is incorporated in the cab. The SAM system records all the delivery functions of the vehicle and can be extended to cover mechanical aspects of vehicle performance with regard to the tractor, which is a Mercedes Benz model 1933 which is also equipped with ABS.

Institute of Petroleum Student Prizes

The Institute of Petroleum has been awarding Student Prizes in recognition of outstanding performance on petroleum-related courses for over 15 years.

Whilst the IP Student Prize initiative is intended to recognise high academic achievement, there is also the hope that long-term membership of the Institute will result from the scheme. Consequently, the budget available to the Student Prize Fund has been directed to selected petroleum-specific courses from which newly qualified graduates are likely to seek employment in the oil industry.

Prize Allocation

Prior to 1985, IP Student Prizes were awarded each year at the following educational establishments:

Aberdeen University	*MSc in Petroleum Geology.*
Heriot-Watt University	*MEng in Petroleum Engineering.*
Royal School of Mines, Imperial College	*MSc in Petroleum Geology and MSc in Petroleum Engineering in alternate years.*
Robert Gordon's Institute of Technology	*Postgraduate Diploma in Offshore Engineering (subsequently MSc in Offshore Engineering).*

In 1986, four further Student Prizes were made available as follows:

Durham University	*MSc in Geophysics.*
Imperial College	*MSc in Petroleum Engineering (to provide a separate prize for both Petroleum Engineering and Petroleum Geology Departments).*
South London College	*BTEC Higher National Diploma in Geological Technology.*
Strathclyde University	*MSc in Petroleum Engineering.*

An IP Student Prize has been awarded to Paul O'Neill (centre) for his performance on the MSc course in Geophysics at the University of Durham in the 1989/90 academic session. His prize was presented by Chris Willy, Chairman, Exploration and Production Discussion Group Committee (left). Also present was Tony Read, Deputy Executive Secretary, E and P Forum (speaker at the meeting).

John Harris (second from right) recently received an Institute of Petroleum Student Prize in respect of outstanding performance on the MSc course in Petroleum Geology at the University of Aberdeen in the 1989/90 academic year. Also present (left to right) were Mr Phil Dimmock, Manager BP's Forties Field (speaker at the meeting), Mr Ramsay Spence OBE, Aberdeen Branch Chairman, and Professor Brian Williams, Department of Geology and Petroleum Geology, University of Aberdeen.

Subsequently the Strathclyde University course was closed down and from the 1988/89 academic year, the Student Prize was reallocated to:

Dundee University	*Postgraduate Diploma in Petroleum Law.*

Up until 1985 the student prize consisted of a cheque for £125. In 1986 the prize was expanded to include:

- Cheque for £125.
- Three years' free membership of the Institute of Petroleum.
- An inscribed certificate to commemorate the award.

The Institute's Education and Training Committee is currently reviewing the Student Prize Scheme with the intention of making recommendations about its status, scope, functional split, and geographical spread.

Personnel, Education and Training Discussion Group

The next meeting of the Personnel, Education and Training Discussion Group will be held at the Institute of Petroleum on **Tuesday, 19 March 1991** starting at 5.30 pm. (Tea and biscuits will be available from 5.00 pm.)

EDUCATION AND TRAINING

THE EUROPEAN DIMENSION

Speaker: **Mr Ian Williamson,** Director, The College of Petroleum Studies

If you would like to attend this meeting please contact **Mr A E Lodge,** Institute of Petroleum, 61 New Cavendish Street, London W1M 8AR. **Telephone 071-636-1004 ext 236.**

Attracting the right graduates

The IP Personnel, Education and Training Discussion Group is organising an Executive Review Meeting at the Institute of Petroleum on the morning of Thursday, 21 March 1991. The purpose of this meeting will be to review the results of the 1990 MORI survey of the attitudes of final-year undergraduates to industry in general and to the upstream and downstream sectors of the oil industry in particular, and to discuss a number of initiatives relating to the education, training, recruitment and retention of engineers.

The Institute of Petroleum has bought into the MORI survey, which is now in its nineteenth year, for three years. Additionally twelve petroleum-specific questions have been sponsored by the IP. The 1989 survey results represented a one-off snapshot of the perceptions that undergraduates had of the oil industry in that year. Clearly the 1990 results provide a second plotting point as far as trends are concerned.

Mr **J R O'Neil,** Vice-President, Administration, Mobil Europe and Vice-President, Institute of Petroleum, will be chairing the meeting which will have the following format:

9.30 Registration and Coffee

10.00 **1990 Results of the MORI Survey of the Attitudes of Final Year Undergraduates**
Michele Corrado, Associate Director, MORI

12.00 **National Engineering Audit**
Bruce Hepburn, Managing Director, Industry Ventures Ltd

13.00 Buffet Lunch

If you are interested in attending this Executive Review Meeting please contact **Mr A E Lodge,** Institute of Petroleum, 61 New Cavendish Street, London W1M 8AR, Tel: **(071) 636 1004 ext 236.**

Tony Fox Memorial Award

Gareth Henderson (centre front row) is the recipient of the Tony Fox Memorial Award for 1990/91 which has enabled him to take the MSc course in Petroleum Geology at The Royal School of Mines. Also in the front row are John Hayes, IP Technical Director (left) and Brian Raggett, IP Membership Services Director (right). In the back row are Bob Stoneley (centre), Professor of Petroleum Geology, Royal School of Mines, Geoff Pryke (left) and Douglas Hobson (right) who are members of the IP Selection Panel for the Tony Fox Memorial Award.

An oil industry first

An open learning training package for petrol station sales attendants has been initiated by Conoco Limited at its company-owned JET filling stations. Successful completion of the distance learning package, named 'On Stream', leads to formal qualifications in the form of City and Guilds of London Institute (CGLI) Retail Certificates at Levels I and II.

The objective behind the scheme is that customers will receive efficient and friendly service from knowledgeable and helpful sales attendants at consistent and high standards at each outlet in respect of product knowledge, cash control, health and safety matters, customer service and hygiene.

In large retail organisations, the training department is often centrally located which can present difficulties in providing an easy to administer training service to individual outlets which are scattered nationwide. The open learning delivery system ensures that there is no dilution of training effectiveness which can occur if the conventional approach to the training of sales attendants is adopted which involves cascading training through the line management communication chain.

The open learning training package, which has been introduced at 300 JET petrol filling stations, comprises a series of booklets on subjects such as induction, forecourt and product safety, lubricants, car valeting, merchandise management, and customer contact skills. The sets of booklets are being produced by JET in association with CGLI, and are issued free to sales attendants.

Those taking the training package have the opportunity to read and learn from the booklets and to complete both written and practical exercises which cover the whole range of skills and knowledge that sales attendants need in order to carry out their jobs to high standards. Each individual is appraised by the site operator and the company's area manager to ensure that their performance is of a high standard and worthy of CGLI accreditation. Training is given to site operators and area managers on how to administer the scheme and how to appraise trainees.

'On Stream' has several advantages over conventional training methods. It allows the sales attendants to complete the learning package at their own pace at a time and place that suits them and the business; it communicates consistent standards of operation and procedures and once the package is completed the booklets act as a useful source of reference for staff; the problems relating to geographical location in running formal training courses are eliminated; it is easy to administer; it creates job interest; the material is easily updated; it recognises the importance of the sales attendant's job role; and it produces a formal retail qualification for sales attendants which is recognised throughout the retail industry.

Careers in oil — a booklet

The Institute's Education and Training Committee's booklet 'Careers in Oil' contains a great deal of useful information on how the oil industry operates together with details of job opportunities and qualifications required.

The booklet has been produced in a very attractive format which should appeal to young people.

Copies may be purchased from the Information Department at the IP at £1 each. Discounts are available on bulk orders of 100 or more. Further details from Information Dept at the Institute of Petroleum Tel: **071 636 1004.**

Dunclare's built-in asset

Dunclare Dispensers (UK) Ltd, now part of the Retail Petroleum Systems Division of Schlumberger, point out a built-in asset of their Foreman Pump Control system. In the event of rationing like that during the Suez crisis in 1956 the Dunclare 'Foreman' self service equipment can deal with rationing in a complete and comprehensive manner. The possibility of further petrol rationing has always been remote, but the prospect is now being revived during this present Gulf War.

The operator of the 'Foreman' system can enter via the keyboard the details of the pre-payment petrol sale in multiples of one litre volume or £1 cash, as appropriate, having collected the cash from the motorist customer and issued a receipt.

The customer will then go to the pump which will dispense the exact amount of fuel as shown on the receipt. This mode of selling has other advantages other than during possible petrol rationing since the system is an ideal method for night operation. It also avoids 'drive offs' where the vehicle leaves without payment being made.

Dunclare dispensers only recently became part of Schlumberger last year.

Recycled plastic containers

Right at the start of the 1990s, a major breakthrough in plastics packaging has been achieved by Plysu Containers Ltd. A significant proportion of recycled plastic is being used by Plysu in manufacturing 5-litre containers for packaging Esso Extra motor oil. Initially, the new packs will be on sale to the public at Esso service stations in the south of England.

These new bottles are the first plastics containers in the United Kingdom utilising this concept for packaging.

The structure of the containers — which are produced utilising the latest co-extrusion technology — consists of three layers. The inner layer is virgin high density polyethylene. So, too is the outer layer. Recycled material is used in the central layer.

In touch with prices by video

Belgian Shell are using touch screen technology to set petrol pump prices and stay ahead of the competition. With prices constantly changing Shell saw the need for an automated system which could help up-date prices daily.

Its solution was an interactive video technology and computer mapping system provided by Wiltshire-based Action Information (Management) Ltd.

The 'ActionPlan' software package was tailored to meet the special needs of Belgian Shell. A laser-vision video-disk was produced exclusively, containing maps of Belgium provided by the Institut Géographique Nationale and photographs of Shell petrol stations.

Real-time seismic

Simon-Horizon Ltd of Swanley, has developed a real-time short offset 3D processing capability as an integrated part of its on-board ULTRASEIS marine 3D seismic data acquisition system. The system provides powerful features for 3D quality control and will enable fast turnaround 3D processing.

Master system

The Micrelec group has recently launched its 'Master Series' pump control and point-of-sale system. The forecourt system has been designed to be linked to a number of fuel dispensers popular in Europe.

Peripherals such as bar-code readers, tank gauges, microcomputer-based software packages and other manufacturer's point-of-sale terminals can also be interfaced to the system.

Mud sensor

Holledge, the Sussex-based process control engineers claim they have come up with a solution to a problem faced by every drilling operations manager — an accurate and reliable method of checking the weight of mud available in the pits.

A tough and dependable portable mud weight system has been developed using two Holledge PBR pressure transmitters fitted to an assembly that provides a fixed vertical separation of 10 inches between them.

The system works on the principle that the pressure difference between two points in the liquid with a fixed vertical separation stays constant, irrespective of the absolute depth of the two points. This differential pressure is directly related to mud weight, the greater the weight the greater the differential pressure.

New Edacom terminal

An Advanced Forecourt Payment Terminal (FPT) from Edacom Data Systems, is set to give petrol filling stations operators the opportunity of offering even higher levels of customer service.

The Edacom FPT enables fuel-only customers to pay for their purchases without having to go into the forecourt shop. This is now being seen as having the advantage of actually increasing shop sales.

By reducing congestion at the checkout and giving customers the opportunity to browse without the pressure of queues, shop sales tend to increase.

One major advantage of the Edacom FPT is its ability to accept and process all major credit, debit and fuel cards. This has been achieved by developing the FPT to operate as a peripheral of the proven Edacom Adastra POS terminal.

By using the intelligence and processing power of the Adastra terminal, hot card checking and validation is possible. Even mileage and registration numbers can be entered via the FPT for special payment card applications.

By using an Edacom FPT, 16 hour sites can easily be converted into 24 hour sites, with no additional staff overheads. The FPT can also be linked to more than one pump.

Ergonomic in design and of modular construction, the Edacom FPT is fully weatherproof and also suitable for wall mounting.

Brainy tank gauge

It is now possible to achieve accuracies in liquid level gauging in petroleum and oil storage tanks to better than plus or minus one millimetre. The Intelligent Tank Gauge, from Whessoe Systems and Controls Ltd, achieves this by a combination of precision electro-mechanical engineering and microprocessor technology.

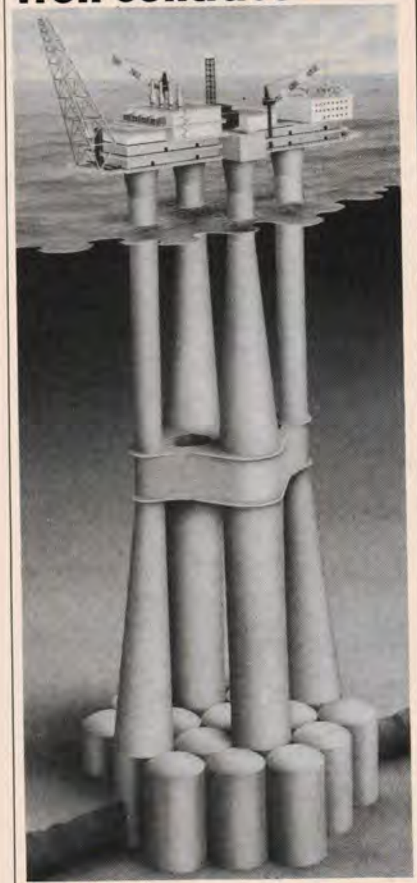
At the heart of the gauge, is a compact servo-system which measures by a capacitance-sensing head suspended at a constant height above the liquid surface. The sensing circuit in this head can detect level changes of 0·1 mm.

The head is suspended from a rugged stainless steel tape which is coiled on a drum above the storage tank within the housing.

Green combustion analyser

A portable and comprehensive Combustion Management System has just been introduced by Billericay-based Allison Engineering Ltd. Known as the Enerac 2000, this briefcase-sized instrument allows for a considerable improvement in both combustion performance and emission monitoring/control.

Troll contract



Norske Shell has awarded Aker Engineering the contract for pre-engineering of the topsides for the Troll platform. The contract has a value of over 65 million NOK and the project — which already started in January — will last until October 1991.

Phase 1 of the contract includes preliminary engineering employing approximately 130 people.

The Troll platform will be located in 310 metres water depth, currently the greatest water depth for a fixed platform.

Lead-free aid

A gas chromatograph system which overcomes problems associated with the measurement of additives in lead-free petrol has been developed by Philips Analytical Chromatography.

The Cambridge-based company has introduced a gasohols analyser which can measure oxygenated compounds by capillary gas chromatography.

The call for such a system stems from the widespread introduction of lead-free petrol, which has brought increasing demand for octane-enhancing chemical compounds to replace lead alkyls.

Institute of Petroleum introduces a new consultancy service

John Hayes, the Institute's Technical Director outlines the role of his department's contact list of oil industry experts.

Carol Reader: Why has the Consultant List been started now?
John Hayes: The IP Technical Department is periodically asked to provide names of consultants or expert witnesses. In the past there has been no list or directory, although we were aware of experience and knowledge within the membership of the Institute. Also we believe there is a latent demand for this service.

How has the list been put together and what does it provide?
Membership Department supplied a list of 500 members who had expressed interest in consultancy. About 200 asked to be placed on the new IP Consultant List.

An entry in the Consultant List will provide a contact name and address and a maximum of 10 lines of information about the service offered by each consultant (written by the member).

An enquirer will be provided with a list of consultants who offer expertise in a particular category of work. Most members on the list have identified several categories of expertise. Currently the list contains 36 different categories ranging from health and hygiene to subsea development. With experience these categories may be increased or amended.

The enquirer will normally provide us with the location of the work and any member not wishing to work in country 'A' will not be included in the list provided.

We aim to keep the list continuously updated and members will be able to make changes to their entries in the list by writing to 'The Technical Department — Consultancy List' at the Institute. Any member interested in joining the Consultant List should also make contact through this address.

Is there any Consultant evaluation?
The Institute cannot make any recommendation or any evaluation of consultants, nor accept responsibility for any work undertaken. The Institute reserves the right to withdraw names from the list in exceptional circumstances.

Are there plans to develop this system further?
A service such as this can only realistically be provided through a computer system. Fortunately we have been able to develop this in-house, using existing Technical Department equipment and manpower. The presentation of the list is professional and should create a good impression.

It is planned to publicise the service, initially through *Petroleum Review* and IP conferences and possibly other relevant magazines.

Future development will be shaped by experience. We are already considering the production of a book providing details of members in the list in alphabetical order and indexing their areas of expertise. Produced annually in a handy size, this could be sold as a worthwhile reference book. One disadvantage of the book format compared with the computer listing is that consultants providing services in a particular category would be scattered throughout the book.

We are looking for ideas on the development of this service and would be interested to hear any views or comments. ■

CONSULTANT LIST

Members of the Institute of Petroleum offer consultancy services in a wide range of petroleum industry subjects. This new list is now available free of charge. The list currently contains 36 different categories within which we can identify other areas of expertise.

Additives Technology
Corrosion Technology
Custody Transfer Arrangements
Energy Efficiency
Environment — Marine Pollution
Environment — General
Expert Witness Services
Health and Hygiene
Industrial Relations
Laboratory & Test Method Advice
Legal Advice
Loss Prevention
Lubricant Technology
Maintenance & Inspection
Management Organisation
Marine Operations
Marketing — General
Marketing — Operations
Measurement & Fluid Flow
Microbiology
Oilfield Development
Oilfield Sub-sea Development
Oil & Gas Exploration
Oil & Gas Production
Petrochemicals
Pipeline Planning & Management
Planning & Economics
Plant Design
Project Services & Engineering
Public Relations
Quality Management & Assurance
Refinery Operations
Risk Analysis
Safety
Supply & Distribution
Training

(Requests for more than two categories may involve an administrative charge)

Anyone interested in obtaining this list should contact
Jo Howard-Buxton at the IP. Tel: 071 636 1004

. . . people

Mr Alistair Fleming has been appointed to the Board of the Weir Group. Mr Fleming will become Chairman of Weir Westgarth and Liquid Gas Equipment and will be the Weir Group Director responsible for the operation of Strachan and Henshaw.

Acme Signs plc have recently appointed **Mr John Spring**, below, to Marketing Manager with responsibility for both divisions of the company — Acme Signs and Displays and Movitex Signs.

Spurnair, the airfreight and aircraft handling company have appointed **Joanne Ainsworth** as Freight Manager, based in their Cargo centre offices. Aircraft handling and offshore support services are a significant part of the company's business.

Inspectorate, the international services organisation, has acquired the environmental consultancy operations of Casella London Limited. Staff from Casella will be joining the existing environmental services division of Inspectorate in the United Kingdom and **Mr Will Pope**, below, currently a Director of Casella, will become the Divisional Director at Inspectorate.

Mette Nielsen, a Chemical Engineer from Denmark, has joined North East Corrosion Engineers (NECE) in an overseas industrial placement scheme set up to give recently qualified graduates experience in particular skills.

With the arrival of Miss Nielsen the company now has a 25 percent female team of engineers — four times the national average.

NECE's women engineers, from right to left: Lesley Shirriffs, Mette Nielsen, Kate Barron, Irene Hannah, Elizabeth Murphy.

Mr John Banfield and **Mr Mike Churn** have been elected to the Board of Mobil Oil Company Limited.

Mr Banfield who has been appointed Director, Lubes and Commercial Marketing, joined Mobil in 1969; his early career was spent in a variety of functions including distribution terminal operations, the lubricants blending plant at Birkenhead, supply operations, planning and retail marketing. He worked at the then headquarters of Mobil Corporation in New York in 1985 before moving to Cyprus to become General Manager of the local Mobil company, and then to Rotterdam where he was Sales Manager of Mobil Oil BV. He returned to Mobil Oil Company Limited in 1990 as General Manager Lubes and Commercial Marketing.

Mr Churn has been appointed Director, Retail Marketing. He joined Mobil in 1967 and worked on a number of research projects in the automotive and industrial lubricants field and in metalworking fluids. These projects led to managerial assignments at Mobil Research laboratories around the world. In 1984 he returned to London as General Manager, Public Affairs and was appointed General Manager Commercial Marketing in 1986 and General Manager Retail Marketing in 1990.

Flexitallic Gaskets Limited, part of the engineering conglomerate T&N Plc, have appointed **Mr Tony Seall** as Director and General Manager, with overall responsibility for sales, both home and overseas including international distribution and agent networks, marketing and production. The company specialises in the design, development and manufacture of static seals for a wide range of industries including oil and gas exploration and production, refining and petrochemicals, power generation and distribution.

Bechtel Petroleum, Chemical and Industrial Co (BPCI) and PMB Engineering Inc, both units of Bechtel Corporation, have announced the formation of PMB/Bechtel, a team responsible for the development and execution of all offshore projects for both companies. Large projects, facilities design, procurement and management are under the direction of **Mr John Scott,** Manager Offshore. Study assignments and all structural work will be the responsibility of **Mr Nick Bradshaw,** who will manage offshore engineering.

Mr Alastair Woodrow has been promoted from General Manager to Managing Director of Aran Energy Exploration Ltd.

Mr Michael Laurie has been appointed Manager of The Salvage Association's cargo department in their London head office.

Conoco (UK) Limited has appointed **Mr Bob Irelan**, below, as Director and General Manager — Production. Mr Irelan moves from Houston, where he was Manager — Production and Project Engineering for Conoco Inc to Aberdeen where he succeeds **Mr John Kemp** who has been appointed President and Managing Director, Conoco Norway Inc in Stavanger.

Mr David Rae, below, has been appointed Manager of Kuwait Petroleum (GB)'s retail marketing division. In this role, he will be responsible for overseeing the day-to-day running of the company's nationwide network of Q8 service stations. Mr Rae was previously Manager of Kuwait Petroleum's retail customer services and General Manager of M Kamper Services following its acquisition by the company in 1990. Prior to joining Kuwait Petroleum in 1989, Mr Rae was Station Shop Development Manager for Heron Services. He takes over his new position from **Mr Tony Baccus** who has joined Kuwait Petroleum (Benelux BV) as Manager for its retail division.

Institute News

Around the Branches

Aberdeen
12 March: 'An overview of the Beryl field and its extensions' by Mr Howard Paver, Technical and New Development Manager, Mobil North Sea.
15 March: Dinner and Dance at Dyce Skean Dhu Hotel.
9 April: 'Presentation and future applications of MWD', by Mr Tony Moorley, Managing Director, Geolink (UK) Ltd.

Edinburgh and South East Scotland
14 March: Spouses' evening: 'Is Malt Whisky green?' by Mr J McColl, Morrison Bowmore Distillers Ltd.

Essex
13 March: 'Refinery construction and maintenance' by Mr GA Walley and Mr P Tarran, Shell UK Oil.
15 March: Annual Dinner Dance at the 'De Havilland Suite', Airport Moat House, Southend-on-Sea, Essex.

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

London
13 March: 'Eastern Europe — a new market for the oil industry' by Mr D Schultz, Consultant.
12 April: Annual Dinner Dance, Barrington House, London.
17 April: 'UK privatisation — implications for the oil industry' by Mr FG Thackerary, Managing Director, Penspen Economics.

Malta
19 April: Annual Dinner.

Midlands
13 March: 'Industrial Dermatitis' by Dr IS Foulds, The Skin Hospital, Edgbaston.
17 April: 'Manufacture of lubricating base oils', speaker from BP Oil Llandarcy Refinery.

Northern
12 March: Joint meeting with the Stanlow Branch 'Waste Management' by Mr John Lynch of Cleanaway.
8 April: Hot Pot Supper.

Southern
12 March: 'Coastal Defence for the 1990s' by Mr Paul Sedgwick, Bafti-Dobbie, at ECL Training Centre.

South Wales
21 March: 'The role of the Independent in the marketing of gasoline'. Speaker to be announced, at BP Oil Llandarcy.
18 April: 'The National Rivers Authority' by Mr P Thomas, Divisional Scientist, NRA at Gulf Refinery, Milford.

Stanlow
12 March: 'Waste Management' by John Lynch, Cleanaway. Joint meeting with Northern Branch.

West of Scotland
7 March: Petroleum Dinner.

Yorkshire
22 March: Dinner Dance.

Deaths

We report with much regret the deaths of the following members:

	Born
J Black, Esher, Surrey	1903
RH Cummings, Deganwy, Gwynedd	1923
J Hughes, Pulborough, Sussex	1917
JW Mackay, Seaview Crescent, Edinburgh	1915
RM Phillips, Callow Street, London	1908
RF Sanderson, Surbiton, Surrey	1917
R Venis, Chorlton, Manchester	1905

New Members

Akinsipe, WA, Department of Petro Resources, 44 Eric Moore Road, PMB 12650, Lagos, Nigeria
Archibald, G, 58 Loveday Road, West Ealing, London W13 9JX
Arnold, DM, 44 Marlborough Drive, Areley Kings, Stourport-on-Severn, Worcs DY13 0JH
Attellesey, MK, 14 Eressos Street, Apt 401, Nicosia, Cyprus
Bailey, ND, 5 Crewe Road, Haslington, Crewe, Cheshire CW1 1NX
Barber, C, 32 Browning Avenue, Boscombe Manor, Bournemouth, Dorset BH5 1NN
Barkhordar, S, 22 Cadogan Place, London SW1X 9SA
Barrie, J, 22 Osney Road, Maidenhead, Berks SL6 7UQ
Bowkett, MA, 34 Goldcrest Drive, Kidderminster, Worcs DY10 4HQ
Bradshaw, RKJ, 19 Grange Avenue, Spofforth, Harrogate, N Yorks HG3 1HH
Brennan, Capt J, Mai-Gida, Main Street, Bonby, Brigg, S Humberside DN20 0PL
Brown, MG, 46 Cormorant Drive, Grimsby, S Humberside DN40 1RB

Institute News

Buddin, AE, The Gables, 319 Rectory Road, Hawkwell, Hockley, Essex SS5 4JX
Carley, KA, Ministry of Defence, Petroleum Laboratory, RAOC, BFPO 17, Germany
Chessum, CF, 164 Ashford Road, Iver Heath, Bucks SL0 0QE
Clews, MR, 115 Grayswood Drive, Mytchett, Surrey GU16 6AS
Clydesdale, Capt AN, 4 Petroleum Depot, Warendorf, BFPO 17
Cobbett, JS, 4 Arundel Close, Passfield, Liphook, Hants GU30 7RW
Cole, TM, 8 Claire Court, Rawmarsh Road, Rotherham, S Yorks S60 1RU
Downes, SJ, 15 Regent Park, Fulwood, Preston, Lancs PR2 4WX
Drury, CEH, Rye House, Brent Eleigh, Sudbury, Suffolk CO10 9NP
Englefield, G, C/- Department of Geography, Int'l Boundaries Research Unit, University of Durham, Durham DH1 3LE
English, CP, 72 Cromwell Tower, Barbican, London EC2Y 8DD
Eroas, C, 21 Piados, Mesayitonia, Limassol, Cyprus
Fricker, R, 16 The Meades, Dormansland, Lingfield, Surrey RH7 6PZ
Fullelove, GW, 14 Bromley Gardens, Shortlands, Bromley, Kent BR2 0ET
Garde-Hansen, H, 210-1001 13th Avenue SW, Calgary, Alberta, Canada T2R OL5
Gell, AW, 20 Marshall Avenue, Willerby, Hull HU10 6LL
Glass, J, 63 Ennerdale Road, Kew, Richmond, Surrey TW9 2DN
Glennon, G, 13 Hambledon Close, Aylesbury, Bucks HP21 9TY
Graham, DJ, 10 Leadhall Road, Harrogate, N Yorks HG2 9PE
Green, SSgt P, 15 Fitzmaurice Weg, 4400 Munster, W Germany
Hamer, CJ, The Oxbyre, Lower Chedworth, Near Cheltenham, Glos GL54 4AN
Hanlan, PA, 10 Halford Road, Fulham, London SW6 1ST
Hickey, PJ, 7 Chapel Road, Alderley Edge, Cheshire SK9 7DX
Hovring, MK, 26K Marywell Street, Aberdeen, Scotland AB1 2JR
Hudson, TT, 56 Reigate Road, Ewell, Surrey, IT17 3DR
Kandasamy, M, Jardin Surveying Services (M) SDN BHD, 145 Bangunan NG Chin Chye, Persiaran Raja Muda Musa, 42000 P Klang, Malaysia
Kearney, JD, 7C Pinos de Calahonda, Mijas Costa Malaga, Costa Del Sol, Spain
Keeton, PA, 8 Dolcliffe Road, Mexborough, S Yorks S64 9AZ
Kemp, SJ, Esso Petroleum, Fawley Refinery, Fawley, Hants SO4 1TX
Lamb, G, 3 Ashton Way, Sunderland SR3 3RX
Lyne, PM, 3 Burley Way, Blackwater, Camberley, Surrey GU17 0HQ
Maguire, JR, 78 Clarendon Road, London W11 2HW
McIntosh, D, 10 Wentworth Road, Swinton, Manchester M27 3BB
Millyard, CC, 15 Chaucer Court, Lawn Road, Guildford, Surrey GU2 5DB
Mulcare, A, Director, Oil & Gas Business, Amerada Hess Ltd, 2 Stephen Street, London W1P 1PL
Naylor, PM, 76 Lambton Road, Raynes Park, London SW20 0LP
O'Brien, MJ, Manweb, Room 1, South 1, Sealand Road, Chester CH1 4LR
Opoku, K, 127 Knatchbull Road, London SE5 9QY
Pogson, Dr M, 140 Coleridge Way, West Drayton, Middlesex UB7 9HS
Rankin, OB, 1 Long Craigs Terrace, Kinghorn, Fife KY3 9TA
Regester, M, Managing Director, Regester PLC, 40 Bowling Green Lane, London EC1R 0NE
Riby-Smith, MC, PO Box 234, Cato Ridge, 3680 South Africa
Robertson, JA, Islescape, Ollaberry, Shetland ZE2 9RT
Robins, Dr GV, 26 Elms Lane, Sudbury, Middlesex HA0 2NN
Howell, AW, 55 Stanford Road, Friern Barnet, London N11 3HY
Salmon, RMC, Esso Petroleum Co Ltd, Fawley Refinery, Fawley, Southampton SO4 1TX
Sandeman, CIR, 94 Kingsmead Avenue, Worcester Park, Surrey KT4 8UT
Searle, GP, Durris Cottage, Woodlands of Durris, Kincardineshire AB31 3DR
Sewell, C, 1 Cedar Drive, Melton Mowbray, Leicestershire LE13 0PA
Shahridan, M, Jardine Surveying Services (M) SDN BHD, 145 Bangunan NG Chin Chye, Persiaran Raja Muda Musa, 42000 P Klang, Malaysia
Simpson, Dr SR, 38 Bramble Way, Leavenheath, Colchester CO6 4UN
Sparrow, JG, Flat 2, 19 Lansdown Terrace, Malvern Road, Cheltenham, Glos GL50 5JP
Styles, CW, 20 Chillerton Road, Tooting, London SW17 9BG
Van der Steeg, SP, Flat 2, 10 Thornton Hill, Wimbledon, London SW19 4HS
Tochikawa, T, 95 Chanctonbury Way, Woodside Park, London N12 7AA
Westlake, SM, Culzean, 46 Green Curve, Banstead, Surrey SM7 1NY
Wheatley, RW, 48 Hertford Avenue, East Sheen, Richmond-on-Thames, London SE14
Whitmore, CJ, Yew Tree Cottage, N Gorley, Fordingbridge, Hants SP6 2PB
Wilson, RI, 39 Dunstan Road, London NW11 8AG
Yonezawa, K, 9 Elmwood Avenue, Kenton, Harrow HA3 8AJ

Student Prize Winner

Harris, JRB, Eden House, Winkworth Hill, Godalming, Surrey GU8 4AD

Students

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Deliveries into Consumption

UK deliveries into inland consumption of major petroleum products —Tonnes

Products	*Dec 1989*†	*Dec 1990**	*Jan–Dec 1989*†	*Jan–Dec 1990**	*% change*
Naphtha/LDF	309,110	247,410	3,386,060	3,039,430	−10.2
ATF—Kerosine	481,540	478,030	6,573,710	6,591,700	0.3
Motor Spirit	1,962,810	1,946,370	23,927,630	24,307,600	1.6
of which unleaded	556,240	725,760	4,638,552	7,807,230	68.3
Super unleaded	n/a	81,800	n/a	925,370	
Premium unleaded	n/a	643,960	n/a	6,881,860	
Burning Oil	256,200	262,350	1,936,920	2,057,330	6.2
Derv Fuel	787,700	796,200	10,117,960	10,641,020	5.2
Gas/Diesel Oil	746,020	734,720	8,321,330	8,047,660	−3.3
Fuel Oil	1,473,410	732,050	10,772,400	11,802,384	9.6
Lubricating Oil	60,270	51,900	877,560	822,284	−6.3
Other Products	488,440	372,680	6,544,100	6,261,692	−4.3
Total above	6,565,500	5,621,710	72,457,670	73,347,740	1.2
Refinery Consumption	506,700	600,370	5,815,840	5,910,690	1.6
Total all products	7,072,200	6,222,080	78,273,510	79,258,430	1.3

†Revised *Preliminary n/a not available

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