JANUARY 1993

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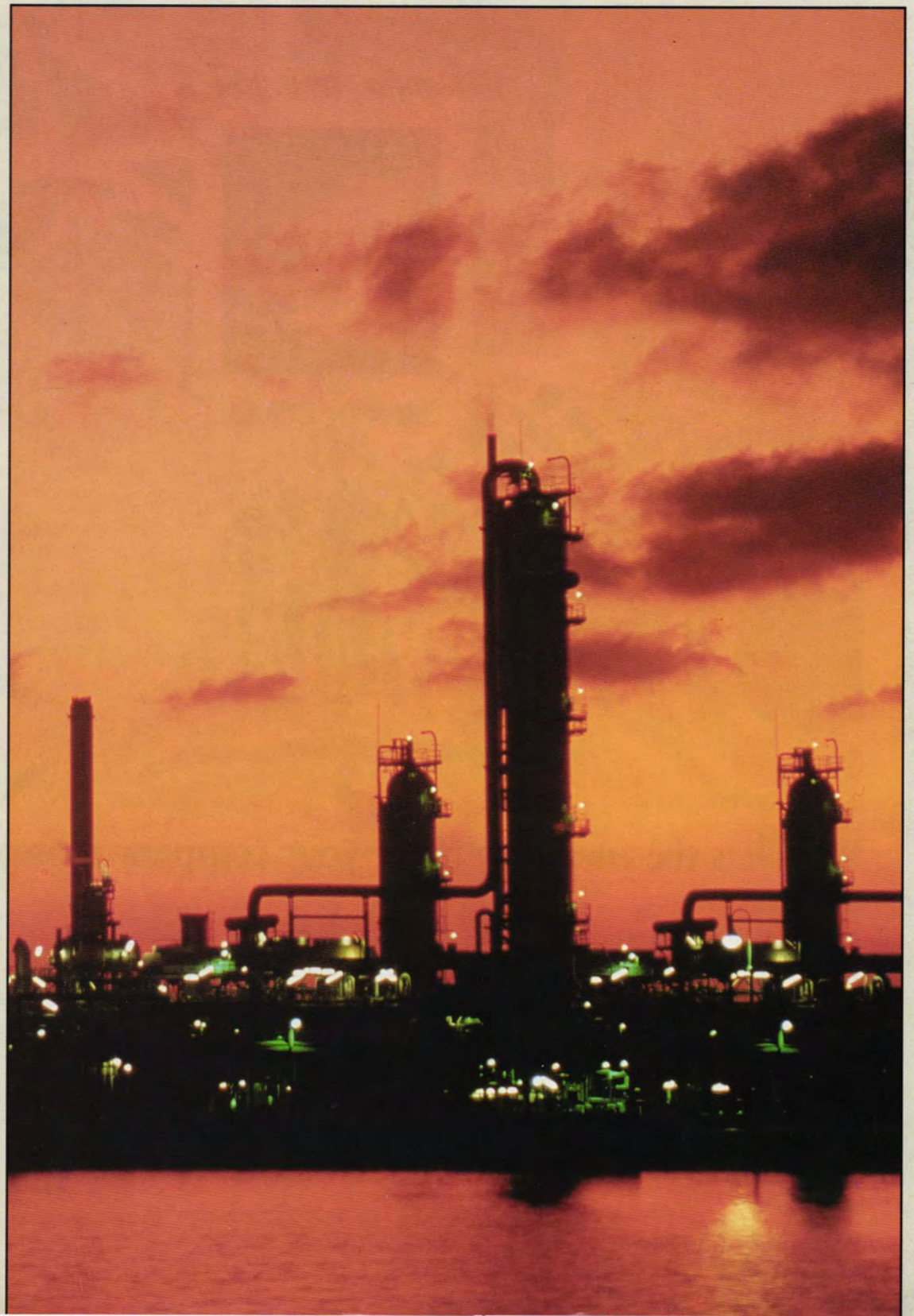
Lubricants

The European market and the role of independent manufacturers

Thailand

Analysis of potential energy problems



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January 1993 Volume 47 Number 552 £6.00

Subscription (inland) £65.00 (overseas) £80.00

PUBLISHERS

Published Monthly by
INSTITUTE OF PETROLEUM
A charitable company limited by guarantee

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Membership Services Director: *Roger Sparrow*

61 New Cavendish Street,
London W1M 8AR
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For details of membership, including Petroleum Review at no extra cost, please apply to the Membership Department.

Printed by Eyre & Spottiswoode Ltd, London and Margate.

US MAIL: Petroleum Review (ISSN 0020-3076 USPS 006997) is published monthly for **US $160 per year.** Second class postage paid at Middlesex, New Jersey.
Postmaster: send address changes to C&C Mailers International, PO Box 177, Middlesex, New Jersey 08846, USA.

ABC AUDIT BUREAU OF CIRCULATIONS BUSINESS PRESS

ISSN 0020-3076
MEMBER OF THE AUDIT BUREAU OF CIRCULATIONS

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17 November

Monument oil and gas company has reached an agreement with Arco to exchange several minor gas properties in the central North Sea for an increased share in the Johnston and Ettrick fields.

Esso said that unleaded petrol had claimed half of total sales at its UK petrol sites.

Lasmo has cut its London staff by 10 percent as part of a continuing effort to reduce costs.

18 November

Deputy Ukranian Prime Minister Yuli Yuffe said preliminary assessments by BP indicated that the reserves in eastern Ukraine could satisfy annual needs of 715 billion cubic metres.

Kuwait will proceed with plans to build a $2bn petrochemical complex even if it cannot find a foreign partner, Mr Ali al-Baghli, the Gulf state's new oil minister said.

Investment manager JP Morgan believes the Clinton administration will introduce an oil tax but not in 1993.

19 November

Enron Oil and Gas of Texas has joined a state-owned consortium in Trinidad and Tobago to invest US$250m over five years to develop natural gas fields and produce gas off Trinidad's south-east coast.

Elf Norway has awarded two major contracts for work on the Froy platform and will also charter the second jack-up rig being built at FELS for AP Moller on the development.

Mr Joel Mendes Renno has been named as the new president of Brazilian state oil company Petrobras by the country's new president Itamar Franco.

21 November

UK Customs Officers seized 10 tonnes of cannabis, the second largest haul ever, when they boarded a British-registered oil rig support vessel in the North Sea.

The wholly-owned subsidiary of Canada's Saskoil, Wascana Exploration, has signed an exploration contract with Algeria.

Phillips Petroleum has received the go-ahead to develop the Ann gas field, 80 miles off the Humber estuary.

24 November

Activity among very large crude carriers has fallen in the last three months and in tonnage terms has nearly halved from levels a year ago, according to figures from EA Gibson Shipwise.

25 November

Aberdeen's Expro Group has won a $750,000 six month contract from Conoco USA to provide oilfield wireline services in Western Siberia.

The UK Department of Trade and Industry is planning to put Petroleum Engineering Directorate officials into key new UK Continental Shelf oil and gas projects to help speed up and simplify the planning stage.

LASMO North Sea is to shelve the Columba project indefinitely due to expectations of a marginal economic yield from the field.

Phillips Petroleum is confident that the closure threat to its Ekofisk tank has been lifted although the Norwegian Petroleum Directorate is sceptical that safe operations can be sustained on the installation up to 1997.

Shell is cutting 500 jobs from the 1,850 workforce at its Stanlow refinery.

27 November

The southern port of Abadan in Iran, which was badly damaged during the 1980–88 war with Iraq, will reopen in February.

The energy division of South Africa's Gencor group, Engen, is still searching for upstream opportunities but currently has no intention of increasing its North Sea interests, according to chief executive Rob Angel.

The UK Department of Trade and Industry has given formal Annex B consent for the development of Total's Dunbar field.

28 November

Boris Yeltsin has ordered the privatisation of all Russian state oil enterprises in a move aimed at reversing the slide in output from the country's oilfields.

The Russian consortium which won the contract to develop the Shtokman field in the Barents Sea will need western partners to exploit the 3tcm of gas reserves, according to Finnish group Neste Oy.

Phibro Energy, one of the world's largest oil traders, has laid off 65 employees at its products trading department in London.

Oil production in northwest Europe, excluding the United Kingdom, hit an all-time high in October, according to County NatWest WoodMac.

The Argentinian government is to offer shares in the state-owned oil company Yacimientos Petroliferos Fiscales early in 1993 as part of its wide-ranging privatisation programme.

Five people were killed and 19 injured when a flash fire broke out on the Bahamas-registered tanker *Indiana* while she was under repair in a Singapore shipyard.

OPEC members agreed to reintroduce an oil production quota system and set a production ceiling of 24.582m bpd for the first quarter of 1993.

30 November

The operator of the trans-Alaska pipeline has agreed to pay the state of Alaska and the federal government $32m to settle outstanding lawsuits related to the 1989 oil spill off the Alaska coast by the *Exxon Valdez*.

A £1.5 billion project to develop oil and gas reserves in Liverpool Bay has been stalled by the UK government's review of energy policy.

5 December

Gas has been found near Walney Island, off the Cumbrian coast, two months after Amoco began drilling.

Russia will develop 456 new oil deposits by the end of the century and will restore 12,000 wells by the beginning of 1995, according to the Chairman of Mintopenergo, the oil industry commission.

UK power generator National Power has confirmed the purchase of a 10 percent share in the North Sea's Victor gas field but will gain no additional gas from the purchase.

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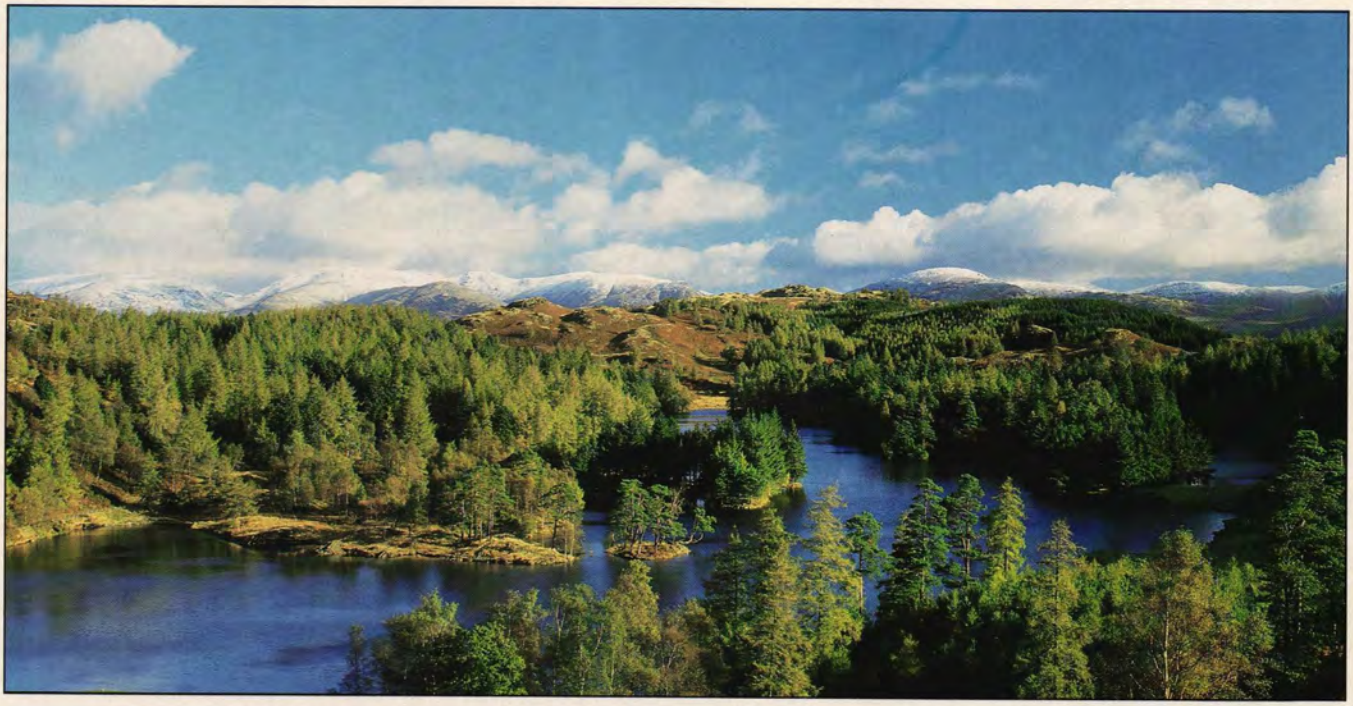

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OPEC agrees production ceiling for first quarter

OPEC has agreed a production ceiling of 24.582 million barrels of oil a day for the first quarter of 1993, slightly lower than the most recent production levels but well above the previous quota — particularly since Ecuadorian production is no longer included in the figures. . .

The temporary allocation level, agreed at the OPEC conference in Vienna in late November, was, according to a communique issued by the organisation, made with 'the full support of member countries, except Iraq, and will be strictly adhered to'.

The conference had set out to arrest the fall in the OPEC basket price which had shrunk from $19.90 a barrel in the second week of October to $18.80 in the first week of November.

'In order to arrest this trend,' the communique noted, 'and restore order in the market, the conference unanimously agreed to a production ceiling of 24.582 mb/d for the first quarter of 1993'. The member countries agreed to apply the quotas from 1 December 1992.

OPEC production ceiling: Jan–Mar 1993

Country	Ceiling (mb/d)
Algeria	0.764
Gabon	0.293
Indonesia	1.374
I R Iran	3.490
Iraq	0.500
Kuwait	1.500
S P Libyan A J	1.409
Nigeria	1.857
Qatar	0.380
Saudi Arabia	8.395
United Arab Emirates	2.260
Venezuela	2.360

OPEC production in recent months has been variously estimated at between 25.04 and 25.25 mb/d.

However, with the removal of Ecuadorian production — its previous quota had been 273,000 b/d — OPEC's maximum production 'target' of 25 mb/d appears to have been maintained. Production quotas set early last year put the ceiling at 22.982 mb/d.

The agreement has been seen as a 'breakthrough' for OPEC as it is the first time since July 1990 that all member countries agreed to uphold their allocations. In addition, while Saudi Arabia achieved recognition of its gains in market share since the Gulf War, Iran was able to increase its production quota relative to that of Saudi Arabia.

The problems for OPEC, according to Petro Finance Market Intelligence, could come in the second quarter this year when seasonal demand for OPEC crude may well drop by up to two mb/d and capacity continues to expand. It is during the same period that member countries will probably have to come to terms with the possible accommodation of Iraq into the market. Unless quotas are re-adjusted, there could be serious downward pressures on prices.

The Centre for Global Energy Studies estimates that OPEC capacity (including Ecuador) stands at 26.6 mb/d and is set to rise to 29.4 mb/d by the end of the year. World demand, however, is set to increase by only 500,000 b/d to 67.5 mb/d over the same period.

The conference 'regretfully accepted' Ecuador's wish to suspend membership, hoping that it would rejoin once its 'economic difficulties' had been rectified.

The governments of Russia and Kazakhstan have requested information regarding joining OPEC.

Companies gain right of appeal for safety cases

The Health and Safety Executive (HSE) has laid before Parliament the Offshore Installations (Safety Case) Regulations, requiring the submission of safety cases for existing installations by 30 November.

The regulations will come into force for new installations on 31 May.

Industry associations have won a valuable concession in the regulations with the implementation of a right of appeal against the rejection of a safety case.

If the Offshore Safety Division rejects a safety case, the company can ask for a review by the statutory Executive — the director general of the HSE, Mr John Rimington, and his two deputies.

The details of the appeal procedure are still being negotiated and it remains unclear whether, after a rejection of a safety case by 30 November 1995, the company could continue to operate while the appeal is heard.

Industry sources indicate that 'acceptance of operations continuing during the appeal would be the case'. However, a spokesman for the HSE rejected this assumption adding 'companies would not be able to operate after 30 November 1995 without an approved safety case'.

Further changes to the regulations during the consultation stage include the deletion of the requirements for safety cases for heavy lift vessels and individual well operations and further flexibility on the requirements for temporary safe refuge in the event of an emergency.

In some cases, evacuation may be the best solution and a shorter minimum time may be appropriate for certain small installations with few personnel.

Guidance on the regulations has been issued by the HSE.

Rig demand

Rig demand in the North Sea has made a hesitant step towards recovery from the deep slump of the third quarter of 1992, according to analysts Petrodata.

Growth, however, will be 'too uneven and too slow' to bring aggregate demand this year above the 1992 total.

The report also found that more modern rigs are taking an expanded share of the market and owners of older rigs would hold little prospect for bringing many of these rigs out of stack.

The downturn in exploration work has accounted for almost all the present slump.

Tanker spill off Spanish coast

A 1973-built double-bottomed tanker ran aground off the coast of Galicia in north-western Spain causing major environmental damage when it suffered a series of explosions and broke in two, spilling part of its load of North Sea crude.

The ore-bulk-oil carrier, the *Aegean Sea*, was carrying almost 80,000 tonnes of crude loaded at Sullom Voe and bound for the Repsol refinery in La Coruna. It ran aground just outside the harbour and suffered the explosions when trying to move off the rocks under its own power.

Weather conditions and visibility were reported to have been poor at the time of the accident. One report suggested the vessel was faced with six-metre waves when trying to enter the harbour. The ship grounded on rocks and then tried to use its own power to shift itself off. A pilot was not on board at the time but was in constant contact with the bridge.

The oil slick, which spread quickly, was initially held away from the coast by onshore winds but the risk to the shellfish grounds was believed to be considerable as weather conditions worsened and the wind changed direction. The Spanish government immediately halted all fishing activities for at least two weeks after the accident.

La Coruna harbour was evacuated and although initial reports suggested up to 10,000 residents were evacuated from the city, several hundred families were moved away and schools were closed when the wind changed direction.

Although the vessel was 19 years old, she recently passed inspection by Lloyd's Register and had been subject to an upgrading and steel renewal in 1991. Repsol indicated that the vessel was considered a 'green tanker'.

The vessel is linked to the London Greek Coulouthros brothers.

The captain of the vessel was detained by the authorities for questioning. He was later release on a Ptasl million ($8,000) bond.

Liability claims on the London insurance market would be limited to $10 million for the vessel and $11 million for the cargo under an international treaty to which Spain is a signatory. Early estimates have put total damage at around $440 million.

Engineering survey computer breakthrough claim

A development in computer technology and software could pave the way for fields currently considered uneconomical to be developed through the cost-effective modernisation of existing infrastructure.

Reductions in costs of 50 percent for upgrading and modifications to onshore and offshore installations as a result of enhanced engineering survey techniques have been claimed by engineering group, Kvaerner H&G Offshore (KHG).

Computer Aided Photogrammetric Engineering (CAPE) has been developed in partnership with photogrammetric specialists, Offset Services, by combining computer aided design techniques with photogrammetry through a specially developed software package and hybrid computer system.

In one of the first applications of the technology, the company surveyed a Saudi pipeline pumping station in under 12 hours for a project to refit gas turbines to handle natural gas liquids. Engineers then programmed the specific tasks required to refit the fuel skids without interfering with normal functioning which was then given to on-site fitters to carry out the work.

The new system was designed, built and electronically inserted into the modified image to ensure the unit fitted properly before shipping to the Middle East. Step-by-step instructions programmed into the image then enabled on-site fitters to complete the job.

KHG chief executive Dan Murphy said that the original contractor had been unable to come up with a solution that would have prevented major downtime using current design and engineering methods. 'The technology we have developed solved the problem in a matter of days', he said.

According to Mr Jim Randall, manager of Kvaerner Surveys, another client in the North Sea incorporated data from a photogrammetric survey into a 3D interactive engineering model and ensured all prefabricated pipework fitted exactly, eliminating wastage and rework at the site. More importantly, installation time was reduced to two days from the expected 20 days.

TOTAL launches local business account programme

TOTAL has launched a new local business accounts programme for its operators to help them develop and retain business customers but without the risk of bad debts, the burden of administration or any detrimental effects on cash-flow.

The programme, called TOTAL 4-COURT, is based on the use of a 64K smart card and allows the customer to choose the type of service he requires for his business. A range of options are available including the purchase of petrol, diesel, lubricants, shop goods, car wash or cash withdrawal.

The customer selects the monthly spend on each product and can decide whether his drivers will sign for goods, give an order number, use a Personal Identity Number or a specific vehicle registration number.

The customer is then invoiced every two weeks and receives a detailed statement which can be used as a single VAT return and as a management information system to help him manage his fleet effectively.

OPEC appoints new executive

Dr Alirio A Parra (right), the Venezuelan Minister of Energy and Mines has been elected as OPEC President.

Dr Parra was previously Managing Director, PdV (Europe) SA, the European arm of the Venezuelan national oil company, president of the International Association of Energy Economics and vice chairman of the British Institute of Energy Economics. He is a senior adviser to the Centre for Global Energy Studies.

The Nigerian Minister of Petroleum and Mineral Resources, Dr Chu S P Okongwu, has been elected as Alternative President.

Mr Ali Aissaoui of Algeria and Mr Samuel Dossou-Aworet of Gabon were elected as Chairman and Alternate Chairman of the Board of Governors.

Thailand: Economic expansion highlights potential energy problems

By Philip Algar

The view from the 14th floor of Bangkok's Central Plaza Hotel must make oilmen, especially those from the United States, feel welcome. Several hundred feet below, a giant and permanently busy freeway stretches into the distance. By the sides of the congested route, flashing neon signs blink regularly, whilst many lanes distant, on the opposite side of the road, lies the head office of the Petroleum Authority of Thailand, (PTT). The scene is reminiscent of the Katy freeway in Houston.

This is busy Bangkok, conforming so obligingly to the stereotyped view: elsewhere the streets are narrower and even more crowded, smelling of diesel and cooking. There is hectic activity, pollution and people, buying, selling, cooking and eating by the side of the road but, above all, meandering, seemingly anxious to be elsewhere, but unsure of the intended destination. Yet, as the friendly Thais readily point out, there are two Thailands and this distinction is important. One is Bangkok, one of the world's largest and fastest growing cities, characterised, at once, by poverty and offices, hotel skyscrapers and department stores that would grace any western capital, and the other is outside Bangkok. About eight million live in the city, the centre of all commercial, financial and industrial activity, and a further 49 million live in the remainder of the country. In the decade to 1990, total population increased by about 25 percent and is now similar to that of the United Kingdom but Thailand covers an area twice that of the United Kingdom.

Sirikit oilfield **A Shell photograph**

Thailand's economic advance through the 1980s, led by a diversity of exports, was one of the fastest in the world, although the pace has moderated in the last two years. Between 1980 and 1989, annual real growth of gross domestic product averaged 7.3 percent, per capita gross national product more than doubled, exports quadrupled and private investment increased by more than a factor of six. Official reserves trebled and since 1985, inward investment has been some $8 billion, half of which came from Japan and Taiwan.

The Thai infrastructure, patently inadequate, having failed to keep pace, must be improved, if progress is to be sustained and major investment, in roads and telecommunications, is now under way. New highways, with fly-

overs, a high speed monorail and a larger, more efficient airport are planned.

Another ingredient in economic expansion, conspicuous for its absence in OECD countries, is confidence. If Thailand is to fulfil its ambition to become a financial centre in Asia, it must re-create the confidence that it has lost of late. Leading Thai businessmen told *Petroleum Review* that, following the latest coup in 1991 — one of 18 actual or intended in the last 60 years — and the subsequent bloodshed and restoration of democracy, confidence had to be re-established rapidly to encourage overseas investors. Never colonised, Thailand has no inherent fears of foreigners, so business was very concerned by the reaction of the outside world to the deaths in May. The current administration, which consists of a five party coalition, including the leading four democratic parties, appears popular, with Prime Minister Chuan Leekpai widely respected for his integrity. Understanding the imperative need to restore confidence, it recently revoked laws that allowed the military to mobilise and to initiate operations throughout the country. The government is committed to policies which include a free market system, the liberalising of trade and looser control on money and capital markets. It opposes monopoly and unfair competition.

The energy scene

Further sustained economic expansion could pose energy supply problems for a nation that remains dependent on imports. Between 1980 and 1990, per capita energy consumption, notwithstanding the dramatic rise in population, soared from 1.76 barrels to 3.58.

In 1990, indigenous energy sources met only 37 percent of demand for primary energy, but this is projected to decline to 32 percent by the end of the decade, as demand overall rises dramatically, from 557,000 barrels a day of oil equivalent (b/doe) to 1.276 mb/doe. In 1990, oil provided 71.3 percent of total energy supplied, compared with 15.6 for natural gas, 9.3 percent for solids and 3.8 percent for hydro electric power. By the year 2000, oil's contribution may fall to 68.7 percent, although volumes could grow from 397,000b/d to 877,000b/d. The share of natural gas will be 10.5 percent, whilst that of solids, reflecting higher local lignite production, will have gone up to 18.5 percent, with total volumes expanding from 52,000b/doe to 236,000b/doe. The share of hydro will ease from 3.8 percent to 2.3 percent.

In 1990, transportation accounted for 39 percent of total energy consumption, followed by industry, with 21 percent, the commercial sector, with 24 percent, and agriculture, with the remaining six percent.

Thailand's current reserves of oil and condensate, at 231 million barrels, are modest, as are the gas reserves of seven trillion cubic feet. Dr Sippanondha Ketudat, chairman of the PTT, said recently that the growing demand for natural gas for the power generation, industrial and residential sectors would strain domestic production and transportation facilities, leading to early imports. Thailand has agreed, provisionally, to import gas, much favoured for environmental reasons, from Vietnam. Agreement has also, reportedly, been reached on the importation of liquefied natural gas from Indonesia.

The possibility of oil imports rising from 366,000b/d in 1990 to 818,000b/d by 2000, has spurred regular licensing rounds, easier conditions and a determination to secure both investment and expertise from overseas companies. Dr Sippanondha warned that the terms for the next round of licensing must be competitive with those offered by neighbouring countries, keen to win foreign support. Doubtless, he was concerned that only two exploration wells were drilled last year, although this partly reflects the completion of work commitments on current licences and a delay in the awards for the next round.

Upstream

At the end of July last year, four rigs were at work in Thailand, all offshore. Analysts County NatWest WoodMac expect 55 exploratory wells to be drilled over the next six years, with a peak of 16 in 1994. They predict that some $900 million will be invested over the next six years.

Agreements already exist or are expected to be signed with many of the international companies, including Unocal, the leading gas producer; Shell, who made the first discovery of oil offshore; Texaco, committed to spend at least $40 million over the next six years, on five concessions; BP, allegedly seeking to sell its assets; Esso; British Gas, expected to spend more than $110 million in gas exploration and development in the Gulf of Thailand; Sun; and Total.

The 13th round, in 1990, offered 109 blocks, of which 88 were onshore. Over 60 applications were received and 17 companies were awarded 33 concessions. Since the licensing rounds were initiated, 49 groups have been allocated acreage in 63 concessions. The 14th round may be delayed until 1994, as the multinationals contend that they have had insufficient time to analyse earlier data.

In 1991, crude oil production averaged 23,120b/d, with Shell's Sirikit field providing 97 percent. Natural gas output was 767.1mmcfd, about 140,000b/doe, with Unocal also contributing 97 percent, whilst condensate extracted averaged 21,581b/d.

Recent developments in the upstream sector include a significant upgrading of Shell's reserves in the onshore Sirikit field and new finds by the company in the Nang Nuan area, discussed below. Premier, the UK independent, is hoping that the results of an appraisal well will justify development of finds named Sonkhla-1 and Bua Ban-1, which flowed at a total of 2,268b/d.

British Gas have a stake of 20 percent in the very large Bongkot gas field, currently being developed by operators Total in the southern part of the Gulf of Thailand. Total hold 30 percent, Statoil 10 percent and PTT have 40 percent. First gas is expected in March. Initial production will be 150 million cubic feet per day (mcfd), rising to 350mcfd. The gas will be sold at the well-head to PTT and moved through a 240-mile line to Rayong, for processing before being sold to Egat, the state-owned electricity generating company.

British Gas is involved in a major co-generation project at Map Ta Phut, some 120 miles from Bangkok, on the eastern seaboard in an area officially selected for industrial development. A

MR Sarisdiguna Kitiyakara, chairman, The Shell companies in Thailand.

partnership, led by British Gas, with partners Tractebel of Belgium, has been selected to develop a project to build, own and operate a combined utilities plant, which will sell electricity, steam and de-mineralised water from a combined gas cycle turbine plant. The £175 million plant is expected to come on stream at the end of 1994 and, currently, the contracts to buy gas from state company PTT and to sell electricity, steam and treated water to the Thai Olefins company, who are building a petrochemical complex, are being discussed. Subject to final agreement on gas supply and distribution, the project will have a Thai shareholding of 51 percent. The remaining 49 percent will be divided 80/20 between British Gas, with the larger share, and Tractebel.

The jetty at Sriracha Chonbure.

Downstream

The main challenge is to meet increasing demand and to substitute local product for imports, thus improving trade balances, noting the change in the cut of the barrel. In 1985, gasoline and diesel accounted for 17 percent and 45 percent respectively, similar to the projection for the year 2000, but fuel oil's share will sink from 18 percent to nine percent.

Currently, there are three refineries, operated by Thai Oil (49 percent owned by PTT), BangChak (30 percent owned by PTT) and Esso, with a combined capacity of 352,000b/d. Shell intend to construct a new $2 billion 145,000b/d plant, at Rayong, due on stream in 1995, whilst Caltex will start production from their 130,000b/d refinery in the same year. In both instances, state group PTT is a partner. Esso, whose plant has a capacity of 63,000b/d, is expanding to reach 185,000b/d by 2000, when national capacity should be 749,000b/d.

In the retail gasoline market, PTT leads with 883 sites, or 26 percent of the total of 3,362, and 31 percent of sales, followed by Shell, with 822 sites and 22.4 percent of sales. Similar figures for Esso are 695 sites and 23.4 percent. Caltex are in fourth place, with 496 sites and 13.1 percent. Retail gasoline prices have been recently de-regulated.

Shell service station **A Shell photograph.**

The company view

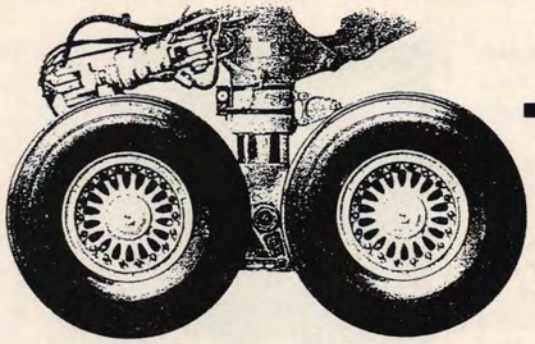
In an exclusive interview with *Petroleum Review*, the chairman of the Shell group in Thailand, MR Sarisdiguna Kitiyakara, agreed with the general industry view that it was too soon to hold a new licensing round, as the last one was held in 1991 and only a small percentage of the area under offer was taken up.

Shell's onshore Sirikit field came on stream in 1982, when it was thought that total recoverable oil would be 40 million barrels; 65 million have been extracted so far and the latest estimate, with a water flood system being introduced this year, is 106 million barrels. Production, originally expected to fade, is now peaking at 24,000b/d, at which level it will be sustained for up to four more years but output should continue until 2010.

Offshore, Shell's Nuang Nuan oil find, on stream in 1988, produced a total of 500,000 barrels before watering out. Last July, a new well, Nuang Nuan B-Ol, about 22 miles from Chumpong province, and close to the original well, tested at 4,700b/d. According to the Shell chairman, the new well is in a different structure but 'there is every possibility' that the same problems could be encountered so a different kind of recovery will be attempted and production, via a small platform, will be off-loaded by tanker. When the well waters out, it will be left alone, whilst the original well will be re-entered. The reservoirs will be drained in turn, every few months, allowing maximum recovery.

Shell have signed concession agreements to explore eight areas,

SMOOTH



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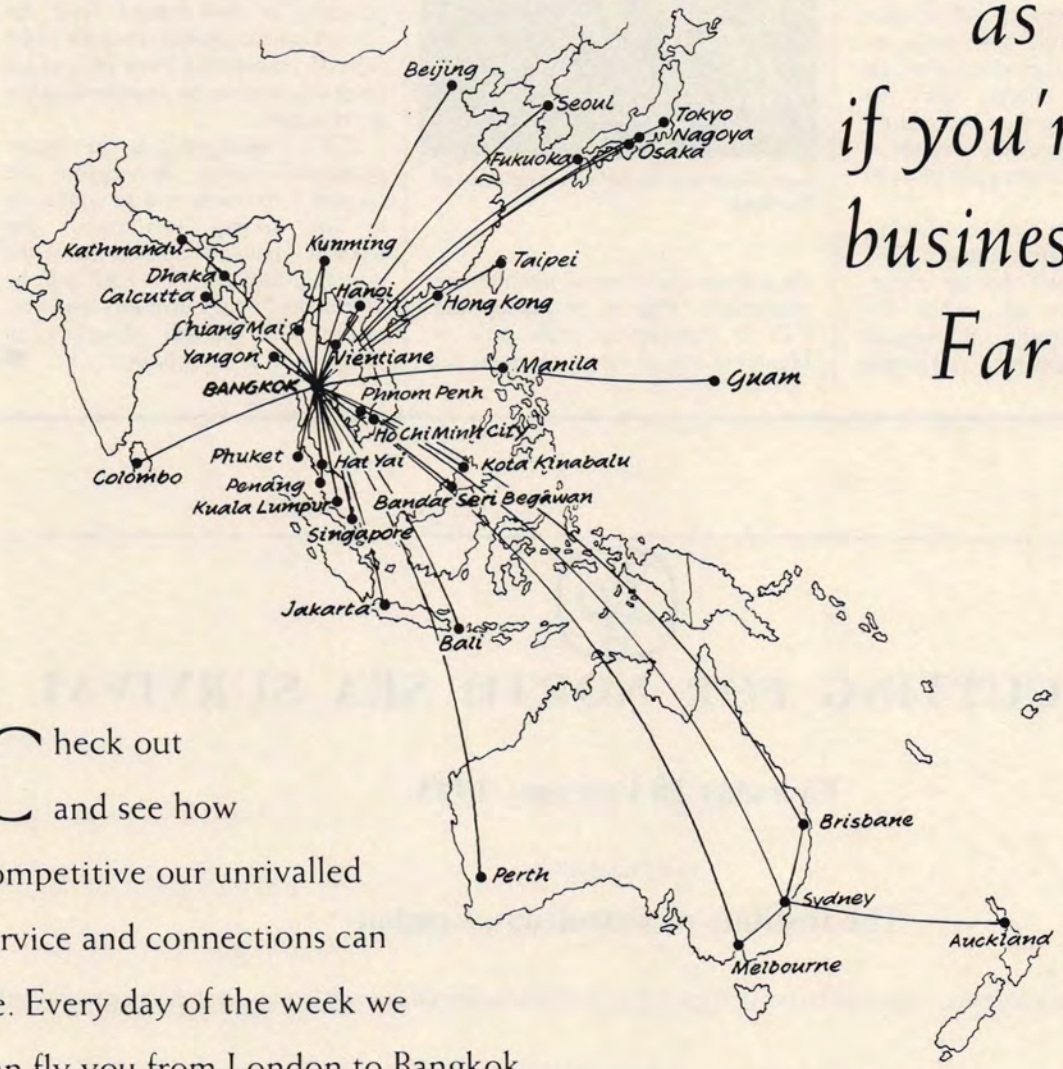

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Thai

onshore, in the northeast and are planning to drill two wells next year in the six areas for which they are the operators.

MR Sarisdiguna Kitiyakara expects that the pace of increased oil demand might moderate over the next three years, reflecting improved efficiency. He said that construction on the new refinery could start in 1993 but he argued strongly that the imposition of a two percent levy on products originating from privately owned refineries put the companies at a disadvantage and discouraged investment. All refiners should be put on the same basis, especially as imported products were not subjected to the charge. Shell are currently celebrating their 100th birthday in Thailand, which the Shell chairman described as 'a very good place to do business in'.

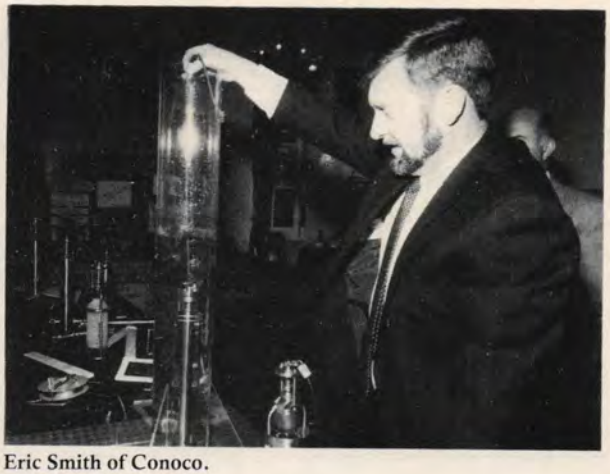
Also speaking to *Petroleum Review*, the governor of state company PTT, Luen Krisnakri, said that the group, founded 14 years ago, when the implications of relying on overseas interests became apparent, was intent on gradual and eventual international expansion, after a re-organisation. PTT is considering exploration in Myanmar, whilst a joint company has been set up in Cambodia, where PTT is already selling to a government agency from a depot near the border. Laos and Vietnam are other areas in which PTT could be interested. The possibility of exploration onshore China was also mentioned but PTT is not intending to set up offices in the Middle East and in Europe, as widely reported.

Luen Krisnakri, Petroleum Authority of Thailand.

The Thai government must have the opportunity to be involved in oil projects but PTT is not automatically the vehicle, although it is involved in upstream and downstream. PTT has to generate its own budget from the market, where it has to compete, and it pays 35 percent tax. New investment proposals have to be approved by the government.

PTT's objectives are to secure petroleum supply, to enhance the country's economy and to contribute to Thai society. Privatisation has reached Thailand: 30 percent of the upstream affiliate PTT E&P will be offered to foreign investors and corporate and private investors in Thailand in the near future. ■

Conference chairman Simon Shimmin of Shell International



Eric Smith of Conoco.

Developments in aircraft fuelling

The IP Aviation Committee organised a one-day conference 'Developments in Aircraft Fuelling' on 19 November 1992 at the Cavendish Conference Centre. A wide range of current topics in the aircraft fuelling business was covered by an international cast of speakers representing aircraft manufacturers, fuelling equipment suppliers, the airlines and major oil companies. Despite the present difficult business environment, the conference was well attended and the presentations generated lively discussion, chaired by the IP Aviation Committee chairman, S J Shimmin of Shell International. An exhibition by major equipment manufacturers was staged at the Institute of Petroleum to coincide with the conference.

In the first presentation R L Cisco of The Carter Ground Fuelling described his company's development of an electronic system to replace traditional mechanical devices to monitor and control the pressure of fuel delivered to aircraft. This was followed by a review of developments in the metering of aviation fuels by S T Woolcock of Avery Hardoll.

There then followed contrasting views on recent developments in fuel supply arrangements from a major airline and an oil company, with S E Casper describing the United Airlines perspective and I N M Hardy of Shell International describing how developments appear from a fuel supplier's viewpoint. These papers are reproduced on the following pages.

After lunch P V Roos of British Aerospace Airbus presented a fascinating paper on developments in the fuelling requirements of future aircraft types which also appears here.

The final sessions concentrated on airport hydrant system integrity monitoring. A Bates of Air BP reviewed current developments and described the work of the IP Leak Detection Working Group and the final presentation was made by T Larsen of the Danish company, Oil Consult, which has specialised in the development of on-line systems to confirm that airport hydrants and supply pipelines are leak-free.

At the exhibition.

At the exhibition.

Developments in the fuelling requirements of future aircraft types

By PV Roos, Principal Fuel Systems Engineer, British Aerospace Airbus Ltd

In the early design of Concorde, and that was 30 years ago, we fondly imagined that a special aircraft would have special ground servicing facilities. There was even talk of the refuelling control panel being part of the ground equipment. It was intended that the aircraft would only operate into a limited number of major airfields and that the special equipment (and even special fuel) could be provided at all the chosen sites.

Such thoughts were quickly dispelled by talking to the potential operators and to the oil companies.

Despite its novel features, the requirements for ground handling were such that it had to be fully compatible with existing services.

And so it must be with today's and tomorrow's aircraft.

Aircraft designed 40 years ago must be capable of being refuelled by new ground equipment; modern aircraft must be capable of being refuelled by ground equipment that may be many years old.

The introduction of computer controlled ground equipment and computer controlled aircraft fuel systems suggests that the next logical step will be for one microprocessor to talk to the other. Any such advances can only be regarded as an alternative to, not a replacement for, the traditional methods of control and indication.

Specification requirements

The requirements for refuelling a civil airliner have not changed significantly for many years.

The basic requirements are stated in the Aircraft Specification which forms the basis of a contract between the constructor and the operator.

A typical specification might say:

- Two standard 2.5 inch refuel/defuel couplings shall be provided under each wing
- It shall be possible to completely refuel the tanks from empty in approximately 30 minutes with a pressure of 50 psi (3.45 bar) applied at the couplings.
- All refuel/defuel switches and indicators and the fuel quantity preselector shall be mounted on a single refuel/defuel panel located . . .

The number of couplings will vary according to the fuel capacity of the aircraft; for a small aircraft there may be only one coupling and the required time may be only 15 or 20 minutes. For a very large aircraft we may be allowed 45 minutes.

What is important to the operator is that the time taken to refuel should not be the critical path in the turn-round of the aircraft (**Figure 1**). It should not take longer to refuel than it does to disembark and embark the passengers or to perform the many other ground servicing functions.

At a dedicated refuelling stop, the refuel time clearly is critical and should therefore, be minimised.

Airworthiness requirements

JAR 25.979 Pressure Fuelling System

For pressure fuelling system, the following apply:

(a) An automatic shut-off means must be provided to prevent the quantity of fuel in each tank from exceeding the maximum quantity approved for that tank. This means must:
  (1) Allow checking for proper shut-off operation before each fuelling of the tank; and;
  (1) Provide indication, at each fuelling station, of failure of the shut-off means to stop fuel at the desired level.

(b) A means must be provided to prevent damage to the fuel system in the event of failure of the automatic shut-off means prescribed in sub-paragraph (a) of this paragraph.

Fuelling system design

A typical system (Figure 2)

The system comprises:

(i) The couplings that interface with the ground equipment.
(ii) A galley pipe.
(iii) On some designs, an isolation valve between the couplings and the gallery.
(iv) A branch pipe into each tank, each controlled by a tank inlet valve.
(v) A control system that commands each valve to close when the required fuel level is reached. This derives information from:
(vi) Tank quantity measurement and level sensing systems.

The couplings are usually located about half way out along the wings. From system design considerations it would be better for them to be on the fuselage side. This minimises the length of gallery pipe that has to carry high fuel flows.

However, the large number of vehicles concerned with other aircraft services dictate that the hoses should be kept well clear of the fuselage, perhaps the wing tip would be ideal from this point of view. On a small aircraft the outer wing is not deep enough (and maybe not strong enough) to carry the couplings. A mid point on the wings is a fair compromise provided that it is not too close to an engine.

Some aircraft utilise the fuelling system pipes and valves for in-flight transfer of fuel, either to control the aircraft centre of gravity or to bring the fuel to the tanks that feed the engines.

The tank inlet valves may be either of two types.

Most are servo operated and will open when fuel pressure is applied if a solenoid operated pilot valve is open. The solenoid valve is spring loaded to the closed position so that in the event of loss of electrical power during refuelling all valves will close. This type of valve usually includes a surge relief feature.

Where the refuel galley and inlet valves are also used in flight the relatively high pressure loss of the servo type valves is unacceptable and ball valves controlled by electrical actuators are used instead. An isolation valve is provided between the couplings and the gallery so that the integrity of flight use is not dependent on the self sealing couplings. If electrical power is lost during refuelling the motorised valves will remain open but the isolation valve will close.

In order to achieve the required refuel time it is necessary to refuel all tanks simultaneously. For part-full loads, however, the tanks cannot be filled pro rata.

Structural loading considerations may demand that for part loads certain tanks may have to be full while others remain empty. For example, it is usual that no fuel is loaded into a fuselage tank unless the wings are going to be full.

The fuel load may be as much as 50 percent of the total aircraft weight, hence its distribution is very significant in terms of aircraft centre of gravity.

Some aircraft have tanks in the tail plane or fin and without proper safety features to prevent incorrect distribution it may be possible to overbalance the aircraft.

For a given total fuel there is often a unique requirement for its distribution (**Figure 3**).

Whilst the minimum rate at which we refuel is determined by the available time, the maximum rate is limited by other design considerations:

(i) Weight of pipes and valves.
(ii) Electrostatic charge.
(iii) Surge Pressures.
(iv) Tank pressures and structural strength, especially in the event of a tank overflow.

Electrostatic charge is controlled by limiting the rate of flow in the gallery to a level that gives a reasonable time for charge relaxation, by distributing the fuel into several structural bays and by careful design of the inlets to prevent misting and foaming. The latter is also important to enable accurate fuel quantity measurements to be made.

Refuelling surges are produced as each of the tank inlet valves closes and can be particularly high if all valves are permitted to close simultaneously. The magnitude of the surge depends on the closure characteristics of the valve and the distance between the valve and the point of reflection of the pressure wave. Theoretical prediction of surge pressures is possible in simple systems. The pipes of a typical aircraft system, however, contain numerous bends, junctions and changes of diameter and have various degrees of flexibility and clamping. We depend, therefore on ground testing to measure the surges and if problems are found, the remedy is to change the closing time of the valves or introduce relief valves with very low inertia of their moving parts.

In the event of failure of the shut-off device in a tank (which may be failure of the signalling system or a failure of a valve to respond to a signal) an overflow will occur through the tank venting system (**Figure 4**).

The discharge will usually be from an open vent at the wing tip. This system has to be of sufficient size to ensure that at the maximum possible filling rate for that tank, the back pressure in the vent piping does not exceed the permissible structural design pressure.

Clearly an overboard discharge of this sort has to be a very rare event.

The isolation valve provides further protection against refuelling overflow. The tank inlet valve is controlled by a high level sensor in the tank and the isolation valve is controlled by either an overfull sensor above the high level or an overflow sensor in the vent tank.

The closing characteristics of the isolation valve are a

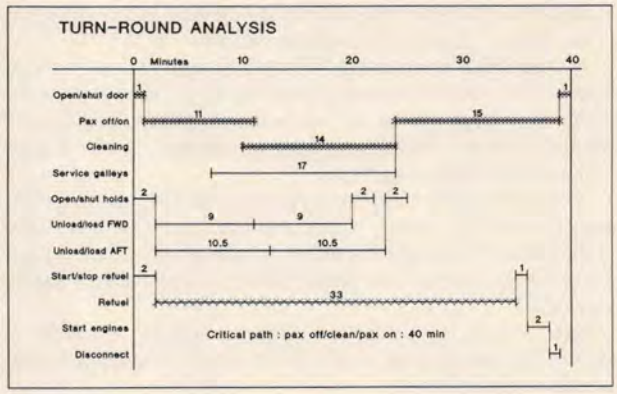


Figure 1

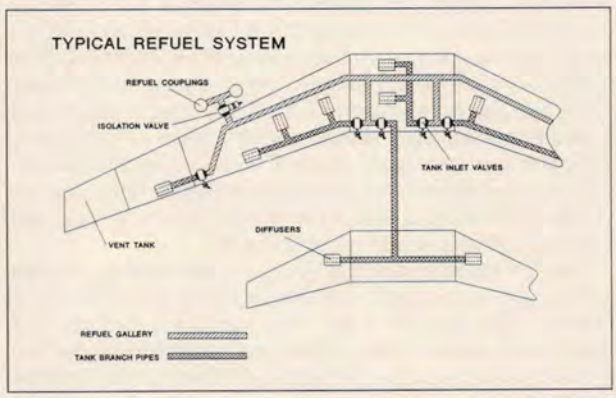


Figure 2

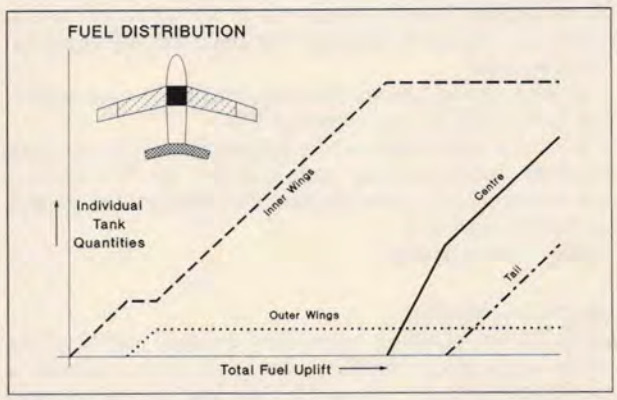


Figure 3

compromise between rapid closure to prevent an overflow and slow closure to minimise surge pressures.

Having built in secondary shut-off systems, I don't believe there is a lot more that we can do in the design of the system to reduce the frequency of an overflow still further. Perhaps we should consider if there are ways of sending signals to shut down the ground equipment?

The most likely remaining cause of overflow is incorrect selection on the panel. There are too many switches and indicators on the refuel control panel which could be set incorrectly thereby overriding some of the built-in safety devices.

Let us look closer at the way in which refuelling is controlled and the way in which the necessary precautionary checks are performed.

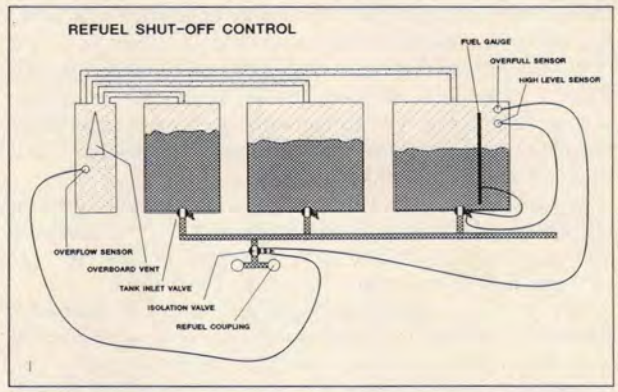


Figure 4

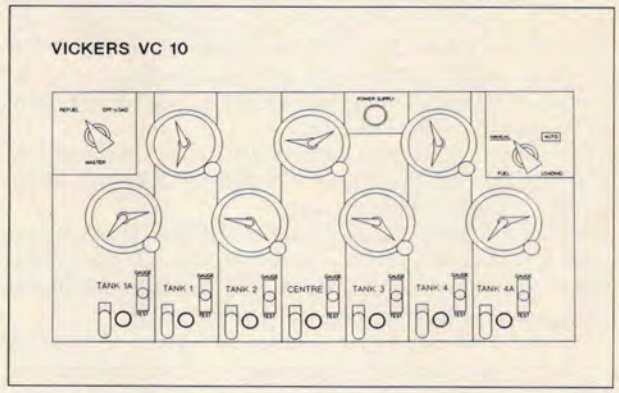


Figure 5

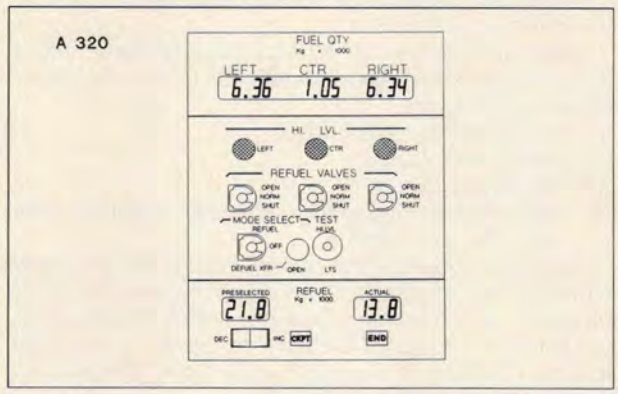


Figure 6

Control of fuel quantity

In order to control the refuelling to distribute accurately the required quantities into each tank, it is first necessary to have a means of measuring accurately the quantity in each tank. This problem has stretched the ingenuity of engineers for many years and the achievement of a reliable and accurate fuel quantity measurement system probably takes as much time and effort as is spent of the whole of the rest of the fuel system.

If you consider the awkward shapes of some tanks and the variety of attitudes in which the aircraft can fly, you can get some idea of the complexity of this task.

The fuel quantity gauging system is also used to provide data for the determination of aircraft centre of gravity (CG). During flight the fuel is the only significant variable and consequently the CG can be optimised by careful usage of fuel from the various tanks and indeed by deliberate transfer from tank to tank.

On Concorde the trim transfer system is of vital importance in moving the CG back during acceleration in order to match the movement of aerodynamic lift as the aircraft becomes supersonic. It is even more vital to bring it forward again for subsonic flight!

Modern subsonic aircraft can also benefit in a less dramatic way from deliberate movements of CG.

Whereas older aircraft have a flight engineer who, amongst his other duties, controls and monitors the fuel system, current aircraft have only the two pilots and the fuel system has to look after itself.

Hence the computer!

Control of refuelling

Control of the refuelling to a required fuel load is achieved by setting a pre-selector for the tank so that when a balance is reached between the actual fuel load and the pre-selected value, a signal is generated to close the tank inlet valve.

This is known as Automatic Refuelling.

The alternative, known as Manual Refuelling refers to the manual switching of the tank inlet valves rather than the use of pre-selectors.

The required fuel load is determined by a dispatch officer and confirmed by the captain. Customarily it is provided on a load sheet (presumably a computer print out) which is handed to the person in charge of the refuelling.

I'm sure the technology exists to transmit the information on a magnetic card; this would eliminate the risk of human error in setting the aircraft instruments.

Pre-refuelling checks

The maximum permitted load for a tank is two percent below the point at which it will flood its vent pipe. This two percent space allows for an expansion of the fuel due to 20°C rise in temperature. Shut off at the maximum level is by a means that is usually independent of the gauging system. In older aircraft electro-mechanical float switches were used; we now use thermistors whose resistance changes due to the sudden cooling effect of submersion in fuel. It is this circuitry, as well as that of the inlet valve itself, that has to be checked to comply with the Airworthiness Requirement that said 'Allow checking for proper shut off operation before each fuelling of the tank'.

This check can be performed by operating test switches or buttons on the refuel control panel and refuelling should not proceed unless the tests are satisfactory. However there is not usually any interlock which prevents refuelling if the test is not performed or the results are wrong.

GOVERNMENT OF INDIA
NOTICE INVITING OFFERS FOR DEVELOPMENT OF OIL AND GAS FIELDS IN INDIA

EXTENSION OF BID DEADLINE

The Government of India had earlier announced the offer of twelve medium-sized and thirty-one small-sized discovered fields for development under joint venture/ production-sharing arrangements. In order to enable companies to carry out a thorough evaluation of the voluminous data on these fields, it has been decided to extend the last date for receipt of offers in respect of both the medium-sized and small-sized fields to **Wednesday, 31st March, 1993.**

Companies wishing to submit offers for development of fields should ensure that these are sent so as to reach latest by **3.00 P.M.** on **Wednesday, 31st March, 1993** to :

Mr. Naresh Dayal,
Joint Secretary (Exploration), Government of India,
Ministry of Petroleum & Natural Gas,
Room No. 211-'A' Wing,
Shastri Bhavan, Dr. Rajendra Prasad Road,
New Delhi-110 001, INDIA.

Refuel control panels

Location

The location of the refuel control panel is a matter of customer preference. In Airbus we have always positioned the panel on the fuselage side so that it is accessible by a person standing on the ground. Various customers have requested that the panel should be in the wing close to the couplings. This is clearly the logical arrangement if the panel is controlled by the person who connects the hoses.

How do we set up and control refuelling?

Let us look at the Refuel Control Panels of several aircraft.

Vickers VC (1963) (Figure 5)

Each of the seven tanks has its own analogue gauge and pre-selector needle. There is a control switch, a test switch and a magnetic indicator for each tank.

To set up this panel, the operator needs to know the required fuel load for each tank. Seven settings to be made to match seven figures presented to him on a load sheet.

The required tests and switching operations mean that the operator must have an understanding of the system and be trained in the use of this panel.

Since the days of the VC 10 almost every new aircraft has had a new presentation on the panel.

Instruments have progressed to digital displays, the method of preselection has changed from dials to thumb wheels, to rocker switches and spring loaded toggles.

The difficulty has been to find an arrangement of controls that is logical and compact and yet can be handled wearing Arctic gloves.

On some aircraft the so-called automatic refuelling may still involve 20 or more manual operations.

From the first Airbus, the A300, we have always favoured a single preselector with logic in the fuel quantity gauging system that determines the correct distribution. This does reduce slightly the number of manual operations.

A320 (1988) (Figure 6)

There are three tanks, three quantity displays incorporated into a single replaceable instrument. A single preselector and a total fuel indicator. The fuel quantity computer is programmed to ensure that the single quantity selected is distributed correctly. In this case the law is very simple — no fuel in the centre tank if it will all go in the wings.

The required pre refuel check is by a single test switch and a row of blue lights will indicate all is well.

At the end of refuelling, correct load and distribution is indicated by a steady green END light. A flashing light indicates that something is wrong.

We have gone part way to simplifying the operation. The four switches are not required for Automatic Refuelling and should be left in their guarded positions; they are only required for manual control and for defuelling or re-distribution.

In my opinion, however, there are still too many switches and indicators.

Some airlines have asked for automatic refuelling to be possible from the flight deck. To do this we have provided a simplified version of the panel (**Figure 7**).

The same pre-selector and total fuel quantity instrument is fitted together with just two push buttons, one to provide power and conduct the necessary tests, the second to initiate valve selection and illuminate a Ready for Fuelling light adjacent the coupling. A steady green END light will indicate satisfactory completion.

We have not provided individual tank quantity indication as this is already available elsewhere in the cockpit. Indeed,

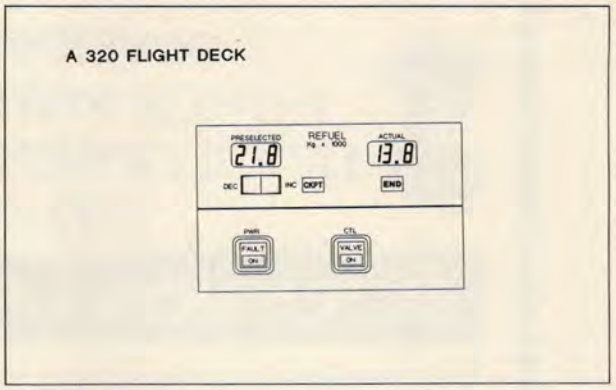


Figure 7

with a total fuel indicator and an END light indicating correct distribution, individual tank quantity indication is not necessary.

This, perhaps, is the clue to further simplifying the external panel.

If we were to separate the minimum controls necessary for an automatic refuel (as shown in **Figure 7**) from the other switches and indicators that are only required for manual control, defuelling, transfer or maintenance purposes then the need for a skilled operator would be diminished.

A340 (1992)

The latest Airbus, the A340, has a fully computerised Fuel Control and Management System which:

- Controls the fuel to the engines.
- Controls tank to tank transfers to optimise the aircraft CG.
- Provides fuel temperature data.
- Provides independent warning of low fuel state.
- Computes fuel quantity data.
- Controls refuelling.
- Performs automatic test procedures, detects failures and generates warnings for flight deck display.

There are, of course, various provisions for manual override.

The A340 external panel is shown on **Figure 8**. It is very similar to that of the A320 except we now have six tanks and the preselected and total contents indications are combined with the six tank indicators into a single unit.

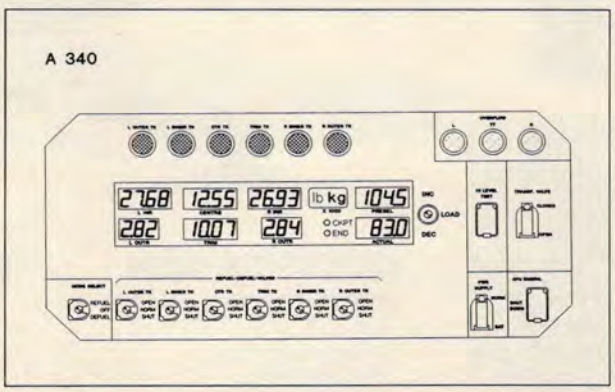


Figure 8

It appears that very little benefit has resulted from the Management System. This is because this panel is also used for manual refuel, defuel, and inter-tank transfer. It is a necessary maintenance tool.

It is when we look at the flight deck refuel control panel for A340 that the benefits of computerisation become apparent (**Figure 9**).

Just one push button!

Of course there is also a need for quantity pre-selection but this is available through the FMS — the Flight Management System which can be entered by one of the flight deck Multipurpose Control Display Units.

The pre-refuel tests can be conducted using the maintenance facility of the MCDU.

The single push button is sufficient to instruct the Fuel Control Management Computer to initiate refuelling. As before the END light provides the reassurance that the task is complete. We are studying proposals that the single push button should automatically perform the checks and only allow refuelling to proceed if the tests are good.

Figure 9

New developments

Other facilities already exist although we have not fully developed them for the refuelling application. The Aircraft Communications Addressing and Reporting System (ACARS) is a means by which an aircraft can transmit and receive data. The aircraft can maintain contact with its base throughout operation receiving updates on, for example, flight plans and predicted wind data and sending information on, for example, engine performance, fuel state and any equipment malfunctions that will require attention at the next landing.

Perhaps the next step is to use ACARS to input the required fuel load for the next mission, thereby eliminating the need for this data to be transferred by means of a load sheet (**Figure 10**).

The external refuel panel for normal automatic refuelling may need to be no more than the single push button, all the other controls necessary for non-standard operations could be hidden behind another door to which access would be limited to the trained maintenance engineer.

Use of ACARS may not be acceptable as the only means of passing fuel load information to the aircraft.

The captain is ultimately responsible for ensuring he has adequate fuel and unless the integrity of the ACARS link is sufficiently high, the captain will need to obtain his information by an independent route. Currently the links between the various computers may not have a level of integrity adequate for information relating to flight safety.

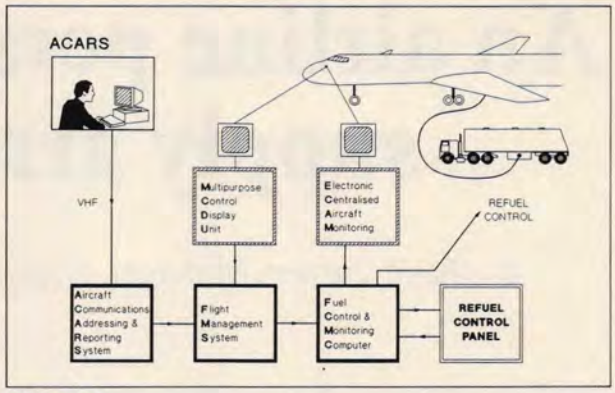


Figure 10

As I stated earlier, the use of computers in the ground equipment offers other possibilities of links with the onboard systems. To achieve the maximum benefit from these developments it will require close co-operation between all the interested parties. We must be quite sure that the application of high technology to the refuel operation will really benefit the operator. We should not use the technology just because it is there for other reasons. It must be cost effective. ■

An airline perspective on fuel supply arrangements

By Steve Casper, Manager, Fuel Technical Services, United Airlines

The primary responsibility of Fuel Technical Services within United Airlines is to provide our company with technical and operational support to ensure the safe and dependable flow of quality jet fuel to our aircraft in the most cost effective manner. This responsibility includes coordinating and setting of jet fuel specifications; overseeing jet fuel storage and distribution operations at airports; and ensuring that United's aircraft are being safely refuelled at all times.

United's recently published international aircraft fuelling procedures have caused concern in the industry. In particular the company is asking others to perform aircraft fuelling tasks that have been traditionally performed by airline personnel. These changes in traditional fuelling procedures have left many feeling uncomfortable, uneasy and in some cases, reluctant in committing themselves to perform them. I hope to help clear away some of these concerns.

What are the procedures? Currently, we have four categories or levels of service covering fueller's responsibilities when refuelling United aircraft. In summary, the four levels of service consist of:

Category A – Fueller does everything . . . The properly trained and qualified fueller has complete authority and responsibility to refuel our aircraft safely at wing control panel covering both normal and alternative fuelling procedures, including the completion of aircraft Fuel Servicing Forms, with a minimum of on-site airline supervision.

Category B – Fueller fulfils all normal fuelling functions at the aircraft wing control panel, including the completion of aircraft Fuel Servicing Forms. The fueller does not do any alternative fuelling procedures as the result of primary fuel quantity indicator system failure. Any alternative aircraft fuelling tasks will be handled by others. It is possible that United Airlines may request Category 'B' level of service for most major airport locations.

Category C – Fueller fulfils all normal fuelling functions at the aircraft wing control panel but does not compile or compute fuel quantities to be boarded into aircraft or sign aircraft Fuel Servicing Forms as in Category 'B' or do any 'alternative' fuellings as covered in Category 'A' levels of service. Fuel quantity calculations and final sign-off of aircraft Fuel Servicing Forms will be completed by United Airlines personnel or our contracted representatives, who are handling aircraft ground servicing in preparation for departure and flight.

Category D – Minimum level of service. This category basically covers 'up-to-plane' fuelling functions that essentially include operating the fuel truck; making necessary nozzle connections to fuel pit and aircraft; and handling of the deadman control devices. This category does not allow the fuel truck operator to handle the aircraft wing panel control functions; compile fuel quantities to be boarded on aircraft; or complete and sign Fuel Service Forms. Category 'D' level of service has been traditionally provided outside the United States and requires airline personnel, or their contracted representatives, to provide all 'into-plane' fuelling functions. Category D level of service does not require United Airlines 'fueller' training.

Areas of concern?

We believe the biggest concern that most oil companies may have in providing United Airlines with any level of service, other than Category 'D', is what happens if the aircraft fueller is asked to perform a fuelling function that he is not properly trained or qualified to do?

Shall we, United Airlines, expect the fueller to take total and sole responsibility for ensuring that an aircraft will be safely refuelled by use of 'alternative' procedures in case of a fuel quantity gauge system failure? What happens if the fueller makes a mistake and his faulty actions result in an accident causing damage to the aircraft or injury to passengers?

What about indemnity? Insurance? Is United's fueller training programme sufficient to keep aircraft fuellers safe and current? These are only a few of the concerns that many of the oil companies have if they commit themselves to do more aircraft fuelling functions than they have been accustomed to do in the past.

The primary reason for these procedures is to have fuel people fuel airplanes; mechanics maintain and fix airplanes and our customer service personnel sell tickets and handle passengers. We do not believe it is necessary, in most cases, to require mechanics or our customer service agents to refuel aircraft since this function is usually in addition to their normal work load assignments and is a poor allocation of labour for station operations. It is our opinion that it does not require an engineer or a technician

with some special licences or credentials to be taught to refuel commercial jet aircraft safely. As a point of interest, refuelling newer commercial jet aircraft is becoming simpler; the onboard fuel quantity indicating systems are becoming more accurate; and the latest generation of aircraft fuelling components are more reliable and less prone to break down.

Another major reason for these four categories is to define clearly aircraft refuelling responsibilities between the jet fuel supplier, the person actually refuelling aircraft or the into-plane fueller and our station operations personnel. It is important to determine, as soon as possible, the aircraft fuelling responsibilities during negotiations so that relevant training can be scheduled and conducted prior to commencement of airline service. This is in compliance with Federal Aviation Regulations covering training and qualification requirements. The requirement to refuel aircraft is constant, the question becomes, who will be doing it?

Background

After we started airline services into Europe a few years ago, it became readily apparent to us that there were basic differences between United Airlines and our prospective jet fuel suppliers in defining service levels covering refuelling procedures. In essence, there was only one level of service and it did not include refuelling the aircraft.

Since we were accustomed to having differing levels of service with our contracted fuelling agents within the United States without any difficulty, we expected that similar aircraft refuelling procedures would be readily available to us elsewhere in the world. Not so . . .

It is our opinion that the main problem has been definition of terms and the words used in describing the operational requirements in performing 'into-plane' versus 'up-to-plane' refuelling functions. It was not initially apparent to us that subsequent problems would arise covering these differences in level of service from what we expected versus what the oil company was willing to perform. As a result, we believed we were asking for one thing and, somehow, would end up with something different when the stations opened for business.

This problem surfaced initially in our training department responsible for instructing our aircraft fuelling procedures to the appropriate airport

Steve Casper

fuelling staff at the station. Historically, United Airlines fuelling trainers have been accustomed to instruct 'into-plane' fuelling procedures to the person directly responsible for refuelling aircraft. Their aim has been to teach all aspects of aircraft fuelling functions, both normal and alternative methods, to all fuelling personnel at the station but the international oil companies said no. They did not want the direct responsiblity to 'refuel aircraft'. They felt that responsibility rested with the airlines.

In other words, it became readily apparent to us that we were not communicating on the same channels during our negotiations. We believed we were getting one level of service, when in fact, we were getting something different. This misunderstanding needed to be resolved. We needed to clarify, 'Who does what . . .'

To achieve a solution, it was our decision to try to clearly describe United's 'into-plane' fuelling requirements step-by-step to our prospective jet fuel suppliers. The aim was to provide oil companies with a clearer understanding of these procedures prior to submittal of their fuel supply proposals during contract negotiations with United's Petroleum Administration group in Chicago. The new programme was intended to be that simple.

Since the four service level programme has been put into place, we have received favourable comments from most prospective jet fuel suppliers. Initially, there had been some concern focusing on changes to traditional procedures but after a while, it had become apparent that these changes allowed the fuel suppliers flexibility in manpower allocation and in some cases, provided them with a competitive atmosphere on airports with more than one fuelling agency. Based on location, oil companies are in the best position to determine which level of into-plane fuelling service they can safely provide at each airport. We acknowledge that they can have various conditions at each airport that can greatly impact their operational capabilities and their decision in proposing which level of service they are capable of safely providing to United Airlines.

Factors such as company policies, personnel skill levels; language difficulties, local customs, rules and regulations, cultural differences and others, can greatly influence the level of service they feel comfortable in safely providing United Airlines. It should be the oil companies' decision which level of service they propose to United Airlines. It remains United's final decision to accept and approve the category of aircraft fuelling service being proposed. It may also be necessary to lower the level of service if we elect to do so because of extenuating circumstances. We could not increase the level of service without a fuel supplier's agreement and approval.

Training and qualifications

We have found over many years that refuelling does not require two people. United Airlines feels a properly trained and qualified individual can safely and efficiently refuel commercial aircraft with no difficulty. In the United States, we safely operate at some very small airports with minimum facilities and equipment. The local airport fixed base operators, commonly referred to as FBOs, have full responsibility in performing all fuelling functions, both normal and abnormal tasks, without on-site supervision of a United Airlines representative, and they continue to safely fuel our airplanes. In most cases, the FBO has only one fuelling person assigned to handle our flights.

We also have one-man aircraft fuelling capability at the world's largest and busiest airport, Chicago's O'Hare. Every size aircraft built operates in-to and out-of O'Hare without fuelling difficulty. It can be safely and efficiently done with one fueller and the person does not necessarily have to be an airline employee.

The aircraft fueller's qualifications to safely perform his contracted responsibilities is a major concern to us. It is extremely important that the fueller be properly trained when he first starts fuel servicing United aircraft and remains qualified for the tasks that are expected of him in the performance of his fuelling assignments in the future. Based on Federal Air Regulations (FAR's), United Airlines will not allow an untrained or unqualified person to refuel our aircraft. Therefore, it is in just as much our interest to ensure the fueller remains skilled and qualified to perform his work safely as it is a concern to his employer. Our training programme includes both classroom and flight line practical training; requires the student to satisfactorily pass a written examination; and in order to maintain these skills in the future, to pass an annual re-qualification review and test each year. If United Airlines changes or adds different fleet types into an airport, the fueller must be trained accordingly to meet these different aircraft requirements.

It is important to note that United Airlines has final responsibility for the correct fuel quantity boarded for safely dispatching the aircraft for flight. On each flight, the flight crew must review, check and accept the quantity of the fuel boarded the aircraft prior to taxiing away from the gate. As may be expected, the flight crew do not want to run out of 'gas' before they get to their destination. They also have operational rules that require them to take on additional fuel to ensure a safe flight that will allow them to divert enroute or upon arrival at destination because of adverse weather conditions. Flight safety is paramount.

We have taken the initiative, with many jet fuel suppliers, to provide their operational management people with our aircraft fuelling manuals. We hope this process will allow them a better understanding of our airline fuelling procedures. In most cases, our 'into-plane' fuelling requirements differ from other United States and international carriers. We have offered a standing invitation for any prospective jet fuel supplier to spend time with us in providing hands-on experience to their operational management people in going over, step-by-step, each of our primary and alternative fuelling procedures on an actual aircraft. We hope this process and hands-on experience will make it easier for oil company management to have a better understanding of what is involved in performing these aircraft fuelling functions.

We would like to emphasise that aircraft fuelling systems are becoming simpler for the fueller to operate and the fuel quantity indicating systems are becoming more reliable on new generation aircraft. There is less chance for fuel quantity error with the use of digital read-out gauges versus the old circular analogue units. The older fuel quantity gauges are not as accurate or reliable as the newer electronic units. Fortunately, older airplanes with these unreliable gauging systems are quickly disappearing. Most major airlines have a current replacement programme to reduce the age of their fleets and to reduce airframe maintenance costs. In addition, there is an economical need to reduce fuel consumption and costs by having more fuel efficient engines.

New technology has vastly improved onboard fuel quantity indicator system accuracy [one percent versus 3 percent) and has greatly reduced the complexity of aircraft refuelling on the newer built commercial aircraft. At this time, United Airlines is actively considering retrofitting our older 'classic' B747-100 and SP series aircraft with the new one percent accuracy systems. This upgrade is expensive but will provide precision fuellings similar to the newer aircraft and will allow greater confidence for flight crews in reducing onboard fuel load requirements to safely meet long range, over-water missions.

The operational cost of ferrying excessive fuel aboard aircraft is expensive and can be safely reduced with the new fuel quantity indicator systems. As an example, we estimate that every 100 pounds of fuel saved per flight equals approximately 7.5 million US dollars of operational cost saved per year. These fuel savings can greatly help in keeping the price of passenger airfares down. Accurate and reliable fuel gauging systems on aircraft have no value if flight crews do not trust them or do not have the confidence that they are providing correct fuel tank quantity information.

Since most airlines are going to Extended Two Engine Operations commonly referred to as ETOPs, covering long range flights over water, it becomes more and more apparent that they do not want to have any fuel related problems on these schedules.

In case of emergency?

We do not want the aircraft fueller, or his employer, to feel that they will be faced with fuelling tasks that they are not properly trained or qualified to handle. If an unusual fuelling situation does come up, the fueller will be under the direction of a United Airlines representative having full responsibility on providing direction in the performance and outcome of a possible non-routine fuelling task.

If needed, United Airlines may request the fueller's assistance, with his concurrence, to help refuel an aircraft with alternative procedures in isolated incidents where a United Airlines representative may not be available on-site or the flight crew is unable to perform these functions. In many cases, our flight crews do not have current aircraft refuelling experience and they may need the assistance and expertise of the local jet fuel supplier to get the job done. In essence, the local oil company personnel may be the only people at the airport with sufficient knowledge and skills necessary to take direction from a remote United Airlines representative located elsewhere, or from an aircraft flight crew member, to safely get the aircraft refuelled in an emergency.

In San Francisco, California, we have an organisation known as SAMC, an acronym for System Aircraft Maintenance Control, that has the capability to be in direct communication contact with each aircraft anywhere in the world when the need arises. In an emergency, flight crews, while airborne or on the ground, can request assistance or help to resolve aircraft operational or maintenance problems that they are not prepared to handle. Abnormal aircraft fuelling procedures fall under SAMC's control and responsibility if the flight crew requests their assistance. This continuous service is available to United's flight crews 24 hours a day, 7 days a week.

Since fuelling United Airlines aircraft is a 'team' effort, along with SAMC's help in an emergency, we hope we have answered many of the outstanding questions and concerns the industry has in soliciting United's aircraft fuelling business.

Providing jet fuel to airlines is 'BIG' business as our airline alone spends on average over $3100 a minute every day of the year. Based on average fuel costs, we estimate a penny saving per gallon of consumption or use equates to approximately $20 to $25 million a year projected savings. At United Airlines, jet fuel is currently our largest cost centre in the operation of the airline. ■

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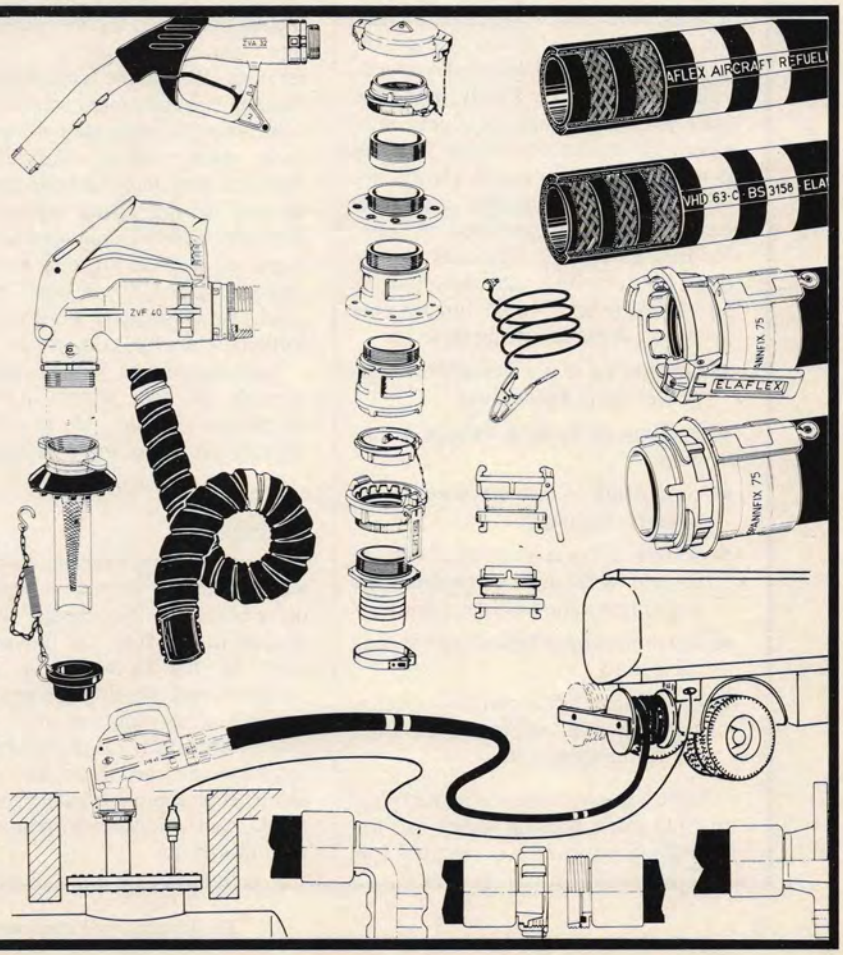
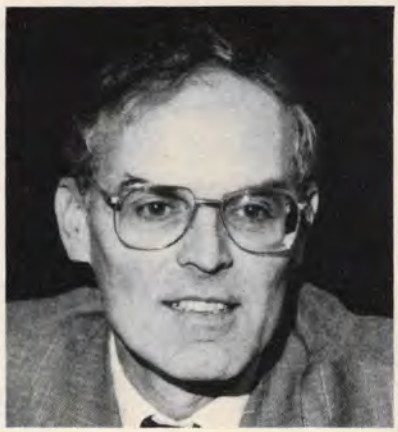


Aircraft refuelling: extended apron services

By INM Hardy, Manager, Aviation Technical Co-ordination, Shell International Trading Company

At most major US and Canadian airports the airlines themselves own the fuel facilities, often in a consortium. These facilities are usually operated on a contract basis by one of several companies who specialise in this activity. There are thus generally two contracts associated with fuel supply, the first with the oil company into airport storage, often in conjunction with a pipeline carrier, and the second with the operator of the facilities, for the storage and handling of fuel into-plane. Many North American airlines have established their own quality control and operating procedures which govern the operation of these into-plane facilities.



Outside North America, jet fuel supply arrangements are very different: here the oil companies generally own the airport storage and hydrant systems, either separately or jointly, and contract with the airline to supply into-plane. The operation of these facilities is normally carried out in accordance with the oil companies' own procedures or those governed by joint industry guidelines. Typically, a contract for refuelling activities outside North America would incorporate provision of the following services:

- positioning of the refueller or dispenser ready for fuelling;
- bonding of fuelling vehicle to aircraft;
- connection of delivery hoses to the aircraft couplings;
- delivery of specification fuel volume in line with airline requirements and confirmation of fuel quality;
- disconnection of hoses and bonding cable; and
- completion of a delivery receipt, showing total volumes delivered, for airline retention.

Any additional tasks associated with this into-plane fuelling activity — for example, the operation of switches and valves in the fuelling panel and completion of the fuel service record — fall into the category of 'extended services'. Within the United States and Canada it is customary for the fuelling contractor to undertake a variety of such tasks, whilst outside North America they have hitherto been performed by the airline ground staff. Recently, however, requests have been made at specific airports by several carriers, both US and non-US domiciled, for these tasks now to be performed by the fuel companies.

Acceptance of these extended services by fuel supply companies operating outside North America raises a number of important issues.

Scope

The airlines vary considerably in the scope of their extended service requirements. In its simplest form the process may involve the fuelling company in the operation of aircraft switches and reading gauges at the underwing fuelling panel, together with completion of the fuel service record at the end of the delivery. An airline representative would take over in the event of any malfunction of the aircraft system.

At the other extreme, some airlines expect the fuel company to have considerable knowledge of the aircraft systems so that the fuelling operator could handle various non-routine situations. These might include, for example, the fuelling of an aircraft with defective gauges (which requires suitable equipment to gain access to the dripsticks along the wing) or the need to establish aircraft power to operate the fuelling system in the wing (which requires the operator to leave his vehicle unattended on the apron whilst entering the cockpit to operate the appropriate switches).

In most cases it is normal for the airline to require the completion of some form of fuel service record. For reference purposes a simple layout of a fuel service record, in this case applicable to B.727 aircraft, is shown (figure 1), for larger aircraft with differently sized tanks a similar record is used but more calculations are involved. This form shows details of the weight of fuel on the aircraft before the delivery starts (taken from the aircraft gauges), the final fuel load required (provided by the airline) and estimates the volume of fuel to be delivered (by calculation, usually using an assumed fuel density).

This estimated requirement is then

compared with the actual volume delivered (as recorded on the fuel company's meter) to reach the final fuel load (as indicated on the aircraft gauges). Provided the difference between these two volumes does not exceed a specified tolerance, the fuel service record is signed, confirming the aircraft has sufficient fuel for the next sector. These calculations appear complicated, but the opportunity for error is minimised by the check system built in.

A major difficulty is that the operation of the aircraft fuelling systems varies significantly between one aircraft type and another; moreover, each airline tends to adopt differing procedural requirements. The effect of these differences is to make the fuelling operator's work more complicated, for obviously it is incumbent upon him to ensure that the correct procedures are followed for both the aircraft and airline.

Training

With differing aircraft fuel system designs, different methods of operation, and individual airline requirements, it is clear that a detailed training programme for operator and supervisor is required — in conjunction with the airline — and it is necessary that each be formally certified for each aircraft type before extended services are provided. Experience to date indicates that airlines will co-operate fully in such training programmes and contribute to the associated expenses.

Costs

It should not be overlooked that costs are likely to rise when extended services are provided.

The time associated with the additional training that is required, both initially and in the form of continuing training once the services are in place is an obvious source of extra cost. Rather less obvious, but in some companies' experience more important, is the extra time taken during each delivery when extended services are provided. As an example, some airlines require the fuel company providing extended services to collect the fuel load information from an office remote from the aircraft parking position.

At a large airport this can be a time consuming task, especially if a load change during the delivery necessitates a return to the office. There are also potential hidden costs associated with the non-routine duties which are difficult to estimate — how can it be foreseen, for example, at what point and with what frequency a customer's aircraft will have a defective gauge?

In effect, the transfer of these extended service tasks does not significantly reduce the total costs involved, but gives rise to a shift of costs from the aircraft operator to the fuelling company. Until experience has been gained with a particular airline's operating requirements, it is difficult to quantify these extra costs; what is certain is that they will not just disappear and hence there will be a need to recover them through normal contractual arrangements.

Liability

In the traditional relationship between a fuel company supplier and an airline customer, the fuel company is responsible for the quality of the fuel supplied, and for the third party risks associated with handling the fuel in the vicinity of the aircraft.

Thus in the event of a delivery of off-specification fuel or a spillage from the supplier's equipment, the fuel company is held responsible for any damage caused to the aircraft and its passengers. The major oil companies carry significant insurance to cover these risks and liabilities. It need hardly be stated, for example, that within Shell, by establishing and maintaining high standards of operation and quality control, we work diligently not only to minimise aircraft fuelling risk but also to protect this insurance cover and we do not enter lightly into areas of additional responsibility which may effectively increase liability

JET FUEL SERVICE RECORD (EXAMPLE)

After fuelling Tank	Stick	Pounds		Before fuelling Pounds	Stick	Tank
1	.....	9937	LBS after fuelling	..*.*.*..	.....	1
2	.....	9937	29811	..*.*.*..	.....	2
3	.....	9937	Minus	..*.*.*..	.....	3
	.....	0	LBS before fuelling	.....	.....	
	.....	0	..... * * *	.....	.....	
	.....	0		.....	.....	
	.....	0	Equals	.....	.....	
		29811	LBS to be added ..... * * *	* * *		

Divided by density from truck equals

* * * gallons to be added

Gallons added from truck meter

LW.....RW.....—.....* * *.....Total gallons added

Actual difference—.....*.*.*.....Gallons

Allowable difference—.....300.....Gallons

Fueller signatures LW.....RW.....

"Oil added-pints" 1–..... 2–..... 3–..... 4–.....

Serviced by .....

Numbers shown above provided by Airline.
* * * Denotes completion required by fuel supplier.

Figure 1

exposure, particularly in the current climate of litigation.

Traditionally, therefore, all liabilities associated with the operation of aircraft systems are carried by the aircraft operator and most fuel companies require indemnification against any liabilities arising, for example, from the occasional non-contractual operation of aircraft switches.

The possible introduction of extended services, however, contractually involves the fuel supply company in the operation of aircraft systems, with associated additional non-standard responsibilities. It is therefore deemed essential that the airline fully indemnifies the fuel company against all liabilities arising from the performance of these tasks.

Appropriate indemnification clauses are a matter between each fuel supplier and its airline customer, but full consideration needs to be given to the legal and jurisdictional issues involved. It is also worth noting that, as with any indemnity arrangement, until the indemnification clauses have been formally tested, there can be no guarantee that they will provide the full protection that is desired.

Joint ventures

Particular difficulties may arise when the oil company offering extended services operates via an into-plane joint venture. It is usual in such joint ventures for costs to be shared on a throughput basis. However, if one of the joint venture partners offers a customer extended services, the effort involved in delivering to this customer may be substantially higher than for a conventional delivery of the same volume. Joint venture organisations have thus tended to move rather cautiously in this area, although it must be said that this situation is now changing as joint venture partners are beginning to address the cost and liability issues involved.

Summary

Until recently fuel supply companies outside North America have been performing extended services only in a very limited way. Economic pressures are now compelling airlines to change their operating methods and it is likely that fuel companies will be requested to participate more extensively in these activities.

In view of the potentially serious implications, the delegation of such tasks should only be accepted after the various issues outlined above have been fully considered and revised contractual arrangements between fuel supplier and airline formally concluded. ■

FORTHCOMING EVENTS

January

11th–13th
Dubai: 'The First Annual Middle East Petroleum and Gas Conference'. Details: IBC Technical Services Ltd, 545 Orchard Road, #12–01, Singapore 0923. Tel: (65) 732 1970. Fax: (65) 733 5087.

13th–14th
Houston: Conference on 'New Directions in Petrochemicals'. Details: Dr Charles Winnick, Chem Systems Inc, 303 South Broadway, Tarrytown, New York 10591, USA. Tel: (914) 631 2828. Fax: (914) 631 8851.

14th
Rugby: 'Heart of the Industry Conference'. Details: Shirley Slaughter, BEN, Lynwood, Sunninghill, Ascot, Berkshire SL5 0AJ. Tel: (0344) 20191. Fax: (0344) 22042.

21st
Melton Mowbray: '3rd Annual Seminar of the Society of Industrial Emergency Services Officers — Industry and the Environment'. Details: SIESO (EM), 22 Mourne Terrace, Lincoln LN5 9AY. Tel and Fax: (0522) 721432.

18th–19th
London: Conference on 'Understanding and implementing business process restructuring'. Details: IIR Industrial Ltd, 28th Floor, Centre Point, 103 New Oxford Street, London WC1A 1DD. Tel: (071) 412 0141. Fax: (071) 412 0145.

19th–20th
London: Conference on 'Not Normally Manned Facilities'. Details: IIR Industrial Ltd, 28th Floor, Centre Point, 103 New Oxford Street, London WC1A 1DD. Tel: (071) 412 0141. Fax: (071) 412 0145.

20th–21st
London: Conference on 'Assessing your Opportunities in the Developing UK Gas Market'. Details: IIR Industrial Ltd, 28th Floor, Centre Point, 103 New Oxford Street, London WC1R 1DD. Tel: (071) 412 0141. Fax: (071) 412 0145.

25th
London: Conference on 'Complying with Offshore Health and Safety'. Details: Susan Coulston, IBC Legal Studies and Services Ltd, Gilmoora House, 57–61 Mortimer Street, London W1N 7TD. Tel: (071) 637 4383. Fax: (071) 631 3214.

25th–29th
London: Course on 'Exploration, Appraisal and Marginal Field Economics'. Details: DCA Consultants Ltd, Haughend Farm, Bridge of Earn Road, By Dunning, Perthshire PH2 9BX. Tel: (0764) 84664. Fax: (0764) 84665.

28th
London: Conference on 'Methane Emissions'. Details: The Conference Administrator, Watt Committee on Energy, 40 Grosvenor Place, London SW1X 7AE. Tel: (071) 235 2565. Fax: (071) 235 1960.

February

10th–11th
Aberdeen: Conference on 'Emergency Planning and Response — Offshore Operations'. Details: Langham Oil Conferences, 37 Main Street, Queniborough, Leicester LE7 8DB. Tel: (0664) 424778. Fax: (0664) 424832.

11th
London: Conference on 'Carriage of Goods by Sea Act 1992'. Details: Athina Peters, IBC Legal Studies and Services Limited, Gilmoora House, 57–61 Mortimer Street, London W1N 7TD. Tel: (071) 637 4383. Fax: (071) 631 3214.

11th–12th
London: Conference on 'The Russian Oil Industry: Foreign Investment Opportunities'. Details: The Conference Department, The Royal Institute of International Affairs, Chatham House, 10 St Jame's Square, London SW1E 4LE. Tel: (071) 957 5700. Fax: (071) 957 5710.

16th–18th
Monterrey, Mexico: Symposium on 'Air Pollution'. Details: Pamela Spalding, Wessex Institute of Technology, Ashurst Lodge, Ashurst, Southampton SO4 2AA. Tel: (0703) 293223. Fax: (0703) 292853.

March

16th–18th
Manchester: Course on 'Safety of Electrical Equipment in Potentially Explosive Atmospheres'. Details: Sira Communications Ltd, South Hill, Chislehurst, Kent BR7 5EH. Tel: (081) 467 2636. Fax: (081) 467 7258.

16th–19th
London: Course on 'Offshore Pipeline Engineering — Level 1'. Details: Sarah Peace, IBC Technical Services Limited, 57–61 Mortimer Street, London W1N 7TD. Tel: (071) 637 4383. Fax: (071) 631 3214.

16th–21st
Lagos: 'The World of Oil in Nigeria 1993'. Details: Carolyn Anderson, Project Manager — Glahe International Group Ltd, Woodcroft, Pebmarsh Road, Bures Hamlet, Suffolk CO8 5DU. Tel: (0787) 228086. Fax: (0787) 228164.

17th–18th
London: Conference on 'Certification Standards for Non-Destructive Testing'. Details: PCN, 1 Spencer Parade, Northampton NN1 5AA. Tel: (0604) 30124. Fax: (0604) 231489.

18th–20th
Wiesbaden: '3rd International Petrol Station Fair, Tankstelle '93'. Details: MMS Expoconsult GmbH, Postfach 4266, Abeggstr. 2, DW-6200 Wiesbaden, Germany. Tel: (06 11) 52 70 17. Fax: (06 11) 52 70 10.

22nd–24th
Cranfield: Course on 'Pressure Surges in Pipe and Duct System'. Details: The Short Course Administrator, Department of Fluid Engineering and Instrumentation, School of Mechanical Engineering, Cranfield Institute of Technology, Bedford MK43 0AL. Tel: (0234) 752766. Fax: (0234) 750728.

22nd–26th
Zurich: Course on 'Multiphase Flow and Heat Transfer: Bases, Modelling and Applications in the Process Industries'. Details: Professor G Yadigaroglu, ETH-Zentrum, CH-8092 Zurich, Switzerland. Tel: 41 1 256 4615. Fax: 41 1 262 2158.

23rd–25th
Birmingham: 'Environmental Technology '93'. Details: Showcase Communications, 36 Earls

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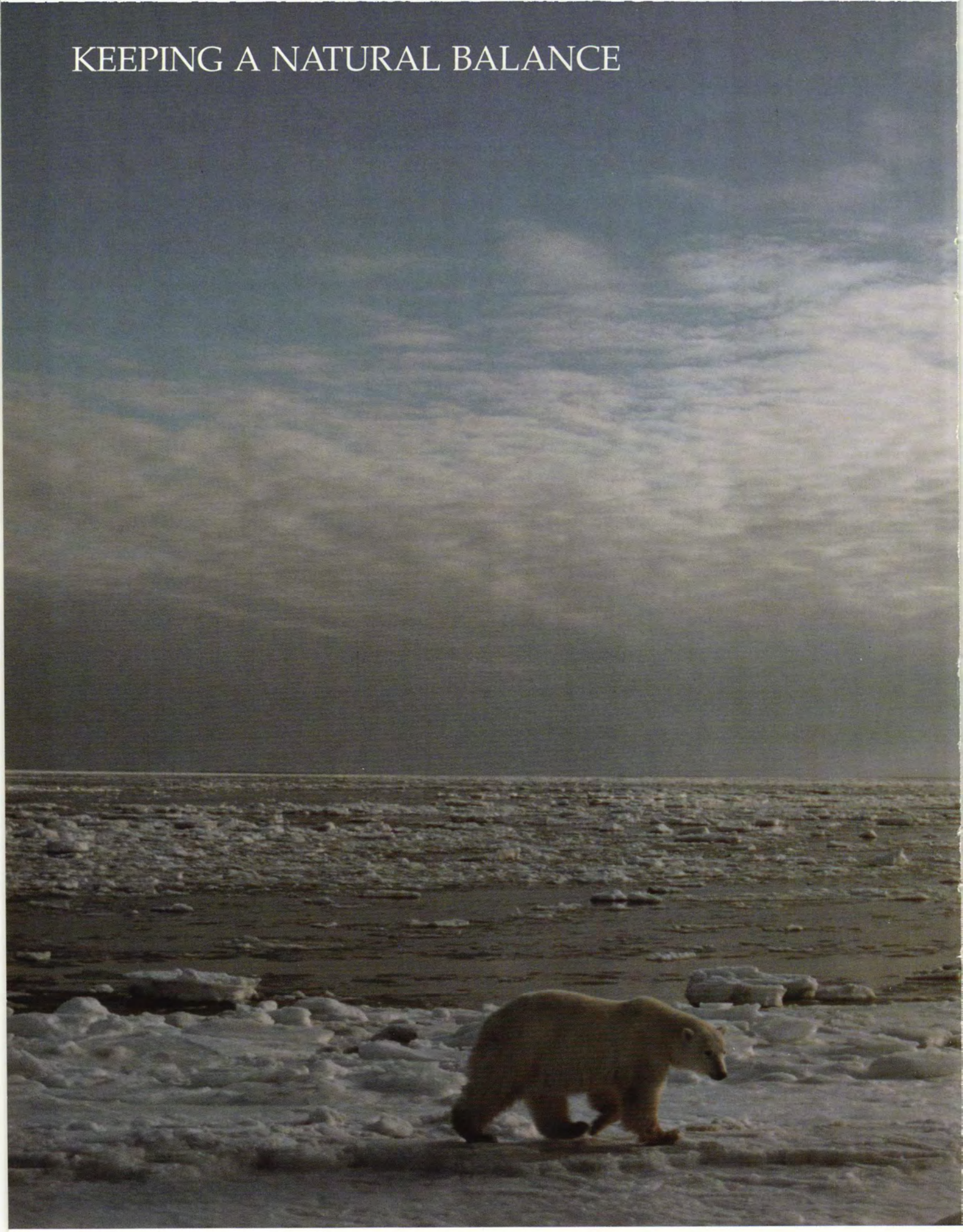

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FORTHCOMING EVENTS

Court Square, London SW5 9DQ. Tel: (071) 373 8711. Fax: (071) 835 2081.

April

3rd–6th
Bahrain: '8th Middle East Oil Show and Conference'. Details: Stephen Key, Arabian Exhibition Management, PO Box 20200, Manama, Bahrain. Tel: 973 550033. Fax: 973 553288.

17th
London: Conference on 'Installation of Major Offshore Structures and Equipment'. Details: Ms Rhian Bufton, Conference Organiser, The Institute of Marine Engineers, The Memorial Building, 76 Mark Lane, London EC3R 7JN. Tel: (071) 481 8493. Fax: (071) 488 1854.

18th–19th
Amsterdam: Conference on 'Offshore Pipeline Technology'. Details: Sarah Peace, IBC Technical Services Limited, 57–61 Mortimer Street, London W1N 7TD. Tel: (071) 637 4383. Fax: (071) 631 3214..

23rd
London: Conference on 'Energy Choice'. Details: Monique Quant, IBC Financial Focus Ltd, 57–61 Mortimer Street, London W1N 7TD. Tel: (071) 637 4383. Fax: (071) 323 4298.

23rd
London: Seminar on 'Microbes in Fuels, Lube Oils and Bilges'. Details: The Conference Department, The Institute of Marine Engineers, The Memorial Building, 76 Mark Lane, London EC3R 7JN. Tel: (071) 481 8493. Fax: (071) 488 1854.

23rd
London: Conference on 'Practical Non-Destructive Testing in Process Plants'. Details: IIR Ltd, Industrial Division, 28th Floor, Centre Point, 103 New Oxford Street, London WC1A 1DD. Tel: (071) 412 0141. Fax: (071) 412 0145.

24th–26th
Abu Dhabi: 'The Fourth European and Middle Eastern Pipeline Rehabilitation Seminar'. Details: Susan Carradice, Pipeline Integrity Management, The Pipeline Centre, Farrington Road, Rossendale Road Industrial Estate, Burnley, Lancashire BB11 5SW. Tel: (0282) 415323. Fax: (0282) 415326.

28th–29th
Istanbul: Conference on 'Black Sea Oil and Gas: Emerging Opportunities'. Details: Verna Cappuccio, Europe Energy Environment Ltd, 49 Hay's Mews, Mayfair, London W1X 7RT. Tel: (071) 355 4918. Fax: (071) 355 1415.

29th
Aberdeen: 'The Second Offshore Installation Management Conference — Managing Safety'. Details: Dr R Finn, Director, Business Research Unit, The Robert Gordon University, Kepplestone House, Viewfield Road, Aberdeen AB9 2PW. Tel: (0224) 208856. Fax: (0224) 208947.

IP WEEK 1993

MONDAY FEBRUARY 15

OIL INDUSTRY TAXATION — A GLOBAL VIEW
Conference organised by the IP's Energy Economics Group
To be held at The Cavendish Conference Centre, London

TUESDAY FEBRUARY 16

Morning OIL PRICE INFORMATION Seminar
To be held at The Institute of Petroleum
(With relevant Software Exhibition)

TUESDAY FEBRUARY 16

LUNCHEON at The Dorchester, London
Guest of Honour and Speaker: Mr AC DeCrane, Jr Chairman, Texaco Inc. who will speak on **'Back to the Future' — Petroleum's contributions to progress in the 20th century are prologues to its prospects in the century ahead**

TUESDAY FEBRUARY 16

EVENING DISCUSSION MEETING of the IP's London Branch at The Institute of Petroleum, London
'Environmental Management Systems — An Update'
Speaker: Mr M Gilbert, BSI

WEDNESDAY FEBRUARY 17

IP ANNUAL DINNER at Grosvenor House, London

THURSDAY FEBRUARY 18

Morning Conference organised by the IP's Exploration and Discussion Group: **'COST CUTTING FOR NORTH SEA SURVIVAL'** at the IP

THURSDAY FEBRUARY 18

EVENING DISCUSSION MEETING of the Environment Discussion Group at the IP **'Clouds and Climate Change'. Speaker: Dr GJ Jenkins, Head of Meteorological Research Flight, Royal Aerospace Establishment, Farnborough**

For further information on any of the above events, please contact The Institute of Petroleum, 61 New Cavendish Street, London W1M 8AR, UK. Telephone: 071 636 1004. Telex: 264380. Fax: 071 255 1472.

A substantial increase in gasolines with clean-up additives

By Geoffrey Mayhew

At a total cost to themselves of several million pounds, mini-majors in the United Kingdom are preparing to follow the majors – Shell, Esso, BP and Mobil – by injecting high quality detergent additives into their gasolines.

The purpose of the detergent additives will be to keep the intake system, inlet valves, the injection system and the carburettor clean of carbon deposits so that over a long period the engine will operate at peak performance. This will assist in maintaining fuel economy and minimising exhaust emissions.

Additives used will meet the AA performance specifications. The Engineering Research Department of the AA reports it has examined a number of additive packages submitted by an additive manufacturer, who has been informed by them that these meet quality requirements.

The next step, which has begun to take place, is the submission by the marketing companies of gasolines containing their additive, together with details of their injection procedures, to obtain endorsement with the AA's Seal of Approval.

The companies are formulating their own brand additives and as a result of these improvements the differences in the qualities of various gasolines on the retail market will be greater.

Sophisticated injection equipment which delivers the precise amount of additive at distribution locations is in the process of being installed. The development of this specialist equipment in recent years has played a part in the approaching wider availability of gasoline with detergent additives.

This equipment has the facility to print instantly a record of the injection. Proof is provided of quality control and also, where exchange arrangements exist, ensures that the brand's own detergent additive, in the correct volume, has been put into the gasoline.

Such an injection system can cost £100,000.

Marketers whose object is to sell cheap gasoline will be noting the effect in the market place of this change — although gasoline retailers generally do accept that in the United Kingdom the motorist has not yet shown the perception or interest in engine cleaning additives of, say, the German motorist who often has a detailed knowledge.

A Sainsbury spokesman said: 'Our gasoline does not contain detergent additives. We are watching developments.'

Economic factors

The choice of additive and decisions on the location at which it will be injected are matters which have many factors, economic and organisational, for a mini-major and a number have been discussing their plans throughout 1992.

Many months have also been spent in designing and testing additives in order to select the one considered best for a brand's market.

However, a number of companies report they are 'well down the road' towards introduction having chosen their additive, the injection method and equipment, its location and additive storage for the operation.

The dates in 1993 when the further top quality detergent gasoline, of which car manufacturers approve, will appear at outlets is something which the gasoline marketers prefer to keep to themselves.

'The treatment of fuels with additives is not a new concept and historically it has been found necessary to use additive technology to solve certain fuel related problems,' said Arthur Hampton, Product Quality Adviser, Total Oil Great Britain.

'For example, the problem of icing in carburetted vehicles was resolved by the inclusion of a low concentration of alcohol or surfactant. Anti-icing additives still have a part to play,' said Mr Hampton.

'In recent years additives have become widely recognised and accepted by motorists and some vehicle manufacturers, notably BMW and now Ford, recommend petrols which have detergents. One of the reasons is that although gasoline quality is controlled very carefully and gives a reliable consistency, passenger car tech-

nology has been evolving at a furious rate and the present working environment for the engine under the bonnet is the most hostile every known,' he added.

Mr Hampton told *Petroleum Review* that 'the drive for increased fuel economy, performance and noise reduction had seen manufacturers improving car drag coefficients, resulting in smoother lines and therefore less wind resistance. This tended to result in a lesser degree of cooling through a lesser airflow through the engine compartment. At the same time that compartment was filling up with extra components and insulation material to dampen noise.'

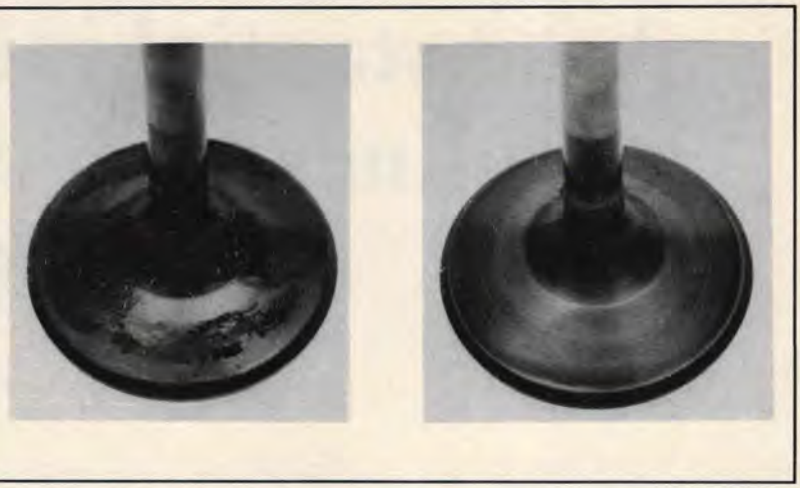
He said, 'Exhaust gas recirculation (EGR), extended oil drains, improved performance by use of multi-point fuel injection and electronic engine management systems all add to the very different environment in which the fuel has to perform. In an environment which is hotter than before, EGR introduces potentially deposit forming fumes into the intake system. The car's working environment has changed as well. It has to spend more and more time in traffic jams. Then it is being driven fast along a motorway. These circumstances combine to cause a situation during periods of low thermal transfer — at extended engine idle and especially during switch-off — when heat soak promotes gum and deposit formation.'

Commenting on the introduction of unleaded petrol, he said that it coincided with some increased incidence of deposit related complaints and it is thought that the different formulation of unleaded gasoline and, perhaps, the absence of the lead scavenger (ethylene dibromide), had resulted in fuels which, in certain passenger cars, show increased deposit tendency.

He added, 'Today's fuels therefore require the assistance of a multi-functional additive to overcome the foreseen problems and that is what Total will be introducing in the near future. Our additive has been formulated in conjunction with an additive manufacturer and the Total Research Centre at Le Havre, where it was proved during long trials that the additive provided the performance required.

'We have already had experience in additive formulation and use in France where DHYCA has a performance programme for fuels similar to that of the AA in the United Kingdom. I think the AA specifications are a little more stringent.'

Total will put their additive package into all grades.



These two photographs of inlet valves were taken after industry standard M 102E tests, and show carbon deposit on the valve on the left when a gasoline without detergent additive was used. The valve on the right, which is clean, was subjected to a test in which a gasoline with a detergent additive was used.

Sophistication

Jet also referred to the increasing sophistication of the modern gasoline engine which has resulted in increased sensitivity to deposit build-up both within the fuel metering system (carburettor or fuel injection) and on inlet valves.

Modern multi-functional gasoline additives were formulated to prevent deposit build-up and because they cleaned up the metallic surfaces they also gave anti-icing protection in carburettor equipped vehicles.

These benefits promoted engine efficiency and thereby reduced fuel consumption and motoring costs. An additional benefit of the additive was the protection of the fuel system from corrosion.

The additive will gradually remove existing deposits thus giving a clean-up effect with the actual deposit particles being held in suspension to prevent them from reforming elsewhere until they are burned with the fuel in the combustion process.

'Jet is currently testing the additive BASF Keropur ES3222 S7 in all its grades of petrol,' continued a Jet spokesman. 'This particular additive has been selected by Jet because it meets all performance standards and is also one of the most environmentally friendly additives available.

'The injection of additives into Jet gasoline will be by one of two methods: the additive will either be injected into the product at the terminal or will be injected from the tanker on delivery to a filling station. Costs will determine which method is used at each terminal.

'If the test is successful, BASF Keropur ES3222 S7 will be injected into all Jet four star and unleaded gasoline from 1993. An additive for Jet diesel is also being evaluated and may be introduced at a later date.'

Fina used its company research centre in Belgium to produce an approved formula for the additive they will begin to use in their petrols in the United Kingdom this year. This will be made for Fina by additive suppliers in the United Kingdom.

'That method gives us a flexibility in our purchasing,' said Fina. 'It is a multi-functional, all-in-one, fourth generation additive.'

Elf were expecting to make their final decision on the timing for the introduction of their detergent additive at the end of last year.

They have a company in France which produces additives but were thinking they might turn to an additive supplier in the United Kingdom for the formulation they want.

'Quality has governed our decision,' said Elf. 'We want to be seen as a high quality brand. There is a need to do this on that basis.'

Endorsement

When a gasoline is considered for endorsement within the AA's Seal of

Approval scheme it must reflect current improvements in technology with respect to additives, particularly those used to control fuel system cleanliness and aspects likely to affect driveability and maintenance of the vehicle exhaust emission standards.

The AA require that when such a gasoline is being considered for approval the marketer must use an additive which demonstrates substantial improvements in engine cleanliness compared to a non-additised fuel across a range of standard industry performance tests.

'Petrol additives have reached the point where, like lubricants, there are standard tests for performance requirements,' said Paul B Mabley, Ethyl Petroleum Additives International. 'A small level of additive makes a big difference.

'There is an expansion in the use of additives which is being driven by three factors: competitive activity; requirements of the engine manufacturers; and an increased perception of quality — if the motorist believes the petrol is of better quality he will buy it.

Test programmes

'Detailed test programmes lasting up to one year, which involve many engine tests, are required to develop the proof of our additive performance.

'That is followed by the customer's own field trials. He carries out these himself because he stands behind the fuel. This is one of the reasons why all companies are determined to retain their independence in the formulation and injection of their additive, including, of course, injection at locations where multi-injection systems are necessary because more than one brand operates there.

'We also liaise closely with injection equipment manufacturers. They will consult us on technical matters, for example on the viscosity of an additive in relation to its use in their equipment. For our part, we would not wish to use solvent systems in our additives which would adversely affect the seals of their equipment. The formulation of an additive and its injection has to be a closely controlled professional activity.'

Composed of purpose built molecules a detergent additive must operate effectively in carburettors, injectors and inlet valves. Product typically contains a high temperature solvent that ensures the detergent reaches all of the critical valve surface.

'In buying petrol with an additive the consumer is getting today a very much better product than he had three or four years ago,' continued Mr Mabley. 'Car manufacturers are pleased about this because the use of petrol containing additives enables the new car to operate at its best.

'Nevertheless the general knowledge about the advantages of additives is low. Multi-national companies such as Shell and Esso have taken the lead in actively marketing premium quality fuels. They have been able to demonstrate that additives are necessary to get the best performance, reduce consumption and cut emissions. Due to them, to a degree, the use of additives will soon be commonplace in petrol.'

Hyrolec, of Fareham, Hampshire, is an additive injection equipment manufacturing and servicing company which has become a world leader in this field since 1985, when they developed this type of specialist engineering and began to grow with the market.

Its products range from a self powered turbine injector capable of handling large product flows and injection rates from 0.2 ppm to 2000 ppm, to multi-phase multi-user systems which provide precise accuracy in the injection of additives at the loading arm.

Carried out by positive displacement injection, the multi-user system ensures total control and surveillance of the required fuel quality control programme, together with a record.

'Having obtained BS5750 companies in the United Kingdom not only wish to ensure quality — and to be able to prove it with documentary evidence in the smallest detail — they do not wish to waste additive,' said Phil Armstrong of Hyrolec.

'Additives are expensive and companies naturally do not see sense in injecting more into the fuel than is required. Precise injection of the required amount is necessary, and our equipment is produced on that principle.

'At one distribution terminal in Europe four companies with 12 brands of petrol wished to ensure there would be no error or waste in injecting the individual additives into the different petrols at the loading arms. The installation by ourselves of a multi-user plant ensured that took place.

'In addition to the United Kingdom and Europe, new markets for additives and additive injection are opening up in South Africa, Argentina, Brazil and the Far East. Privatisation is also helping because new methods of marketing are being allowed. Better performing petrols will become more widely available.'

As BP has reported, the oil industry for many years had detergency additives in gasoline but the usefulness of these low treat rate first generation detergents was confined to the basic inlet system. They were not capable of meeting the demands of the modern engine.

A high performance, high treat rate additive package, with an active detergent component as the principal ingredient, was then developed by BP and is used in all its gasolines.

Esso, Shell and Mobil also each have high performance detergent additives. Shell, BP and Esso have them in all grades. Mobil's package is in its premium unleaded gasoline.

Shell ASD, introduced in 1971, was among the first gasolines to have a detergent additive with the object of controlling carbon deposits in the carburettor area and throughout the fuel inlet system.

Following the introduction of engines with fuel injection systems, leaner fuel-air ratios and higher engine temperatures, in which even small deposits of carbon could affect performance, Shell launched its Advanced Petrols in 1988.

These contain a detergent which provides a 'keep clean' performance for new engines and a 'clean up' performance for engines with existing deposits.

Shell report that these tests have shown that fuel economy is increased by three percent and carbon monoxide emissions are reduced by 13 percent when Shell Advanced Petrols are used compared with gasolines which do not have modern detergents. The engine operates at optimum performance and has a longer life, with lower maintenance costs.

'We introduced our Esso Performance Fuels in 1990 in response to need,' said Esso. 'These prevent carbon deposit and reduce emissions. If an engine already has carbon deposits an Esso Performance Fuel will stop further deposit and reduce what there is in time.'

Dr Cathryn Hickey, Retail Technical Fuels Manager, Shell UK Downstream, said: 'We are aware through enquiries to ourselves of an increasing interest by consumers in our Advanced Petrols. It is also interesting that 22 car manufacturers, and in particular BMW, Ford and Rover, are now saying that they recognise and want for their engines the benefits of detergent additives. Until now, only 40 percent of the petrols sold in the United Kingdom have such high quality detergent additives.' ■

1993 oil supply and price scenarios

By Mr David Simon, Group Chief Executive and Deputy Chairman, British Petroleum

In an address to delegates at the Institute of Petroleum's Oil Supply and Price conference last November, Mr Simon indicated that while companies may set oil price scenarios and margins by which to plan their businesses, other factors — including environmental pressures and government policy — can have just as great an effect on the long-term viability of the industry.

Let me make it clear at the outset that I do not intend to state what the price of oil will be in 1993.

There are two reasons for this which actually count.

First, any prediction I make now could well be wrong.

And second, I do not — and never have — believed in single point forecasts in our industry. Companies will have their own benchmarks for planning purposes. But that is what they are for — planning. More importantly they will ask themselves what margin structures will apply at given price sets. For it is margins not prices that ultimately decide competitive performance. We should always remember the cost functions in line with the price sets.

Naturally, we have in mind an oil price and margin set which is realistic and against which — all things being equal — investments must be profitable. But our strategy does not assume that this price will prevail throughout the year. Indeed, we would be surprised if it did. Besides investment criteria for 75 percent of our budget is governed by at least five to seven years of prices, not one. So one year looks like a trading assumption, vital for analysts, short-term markets and confidence but not much good for investment planning.

However, it is not enough to leave the matter there. Clearly, we in the oil industry are expected to have 'a wide view' on what is likely to happen to the oil price.

One way of arriving at a judgement is to draw up a number of scenarios with comfort ranges for both the 'up' and 'downsides'; and then sit back and wait to see which set of assumptions proves to be nearest to the truth.

Now the problem here is that it is so easy to overlook an event or changed circumstance which is capable of having profound consequences for the business or for the energy outlook in general for the famous short-run period.

So, this cop-out is not available either. Instead, most of us seek to proceed on a set of assumptions which are both realistic and have a reasonably high likelihood of occurring.

One of these assumptions inevitably includes a judgement of the future oil price. In BP, we are trying very hard to adopt 'conservative' assumptions — with a small 'c'. In other words, if events change our expectations, we hope at least that it is a change for the better, rather than for the worse. This mood seems to be the result of a year, for the industry, of mainly unfulfilled expectation — which is about right for 1992.

Provided we do not bank on oil prices rising much above $21, or falling below $18, I think we are unlikely to shed too many tears during 1993 — at least on this score.

That is not to say that prices outside this range could not be sustained for a period. Remember volatility and the 'event' driven change. We need to take into account the potential return of Iraqi oil; the evidence suggests that they have the capacity to put at least one million barrels of oil a day onto the market very quickly, if the UN embargo were to be lifted.

And of course, political instability within the Middle East still has the potential to move prices in the other direction. As do major political risks in Russia.

However, being politically influenced it looks as if the chances of the oil price falling unexpectedly are currently greater than their increasing. While the 'call' on OPEC may be just about to reach a 10-year 'high', its job for the next three or four years will still be directed at managing a 'surplus' — and that's even without the return of Iraq.

The political element in all these uncertainties is extremely important, which is another reason why forecasts are so difficult.

But there is some comfort to be had from the fact that nobody appears to want to see a price collapse; and with very good reasons.

For example, from the perspective of most Middle East producers, prices below $18–20 are barely adequate, given their financial positions. Saudi Arabia, for example, needs to produce around eight million barrels a day at around $20 Brent in order to feel financially comfortable. Prices below $20 begin to 'hurt'.

And not just Saudi Arabia. They hurt the oil industry, too. We have seen evidence of this already during 1992 as private sector expenditure, through cash constraints, is cut. In time, of course — and if prolonged — this will have a detrimental impact upon supply as well. Capital investment by the majors was probably at least 15 percent down in 1992.

Environment

In weighing all these factors, we must not forget the environment. It has always been a primary concern and I needn't rehearse why the oil industry takes its environmental performance so seriously.

However, I believe that the public issue has assumed new and difficult implications in recent years; and that these are not yet fully appreciated.

The fact is that environmental policies are now having a substantial effect upon pricing decisions; upon

what can and cannot be passed on to the consumer; and hence, ultimately, on what the industry can afford to invest in securing future oil and gas supplies.

Following the earth summit at Rio, and despite the recession, we must expect new environmental initiatives to be launched which will have a significant impact upon the bottom line of each and every company.

We should not assume that this is necessarily against the interests of our industry. For example, if British consumers are as 'green' as they are supposed to be, they will not allow a sentimental attraction to coal to overturn the environmental advantages of gas. I fear, however, that the environmental debate is not always as objective and rational as we might wish. Even the energy experts gathered at the WEC in Spain last summer seemed to feel the luxury of cheap surplus energy about them.

Certainly, the election of President-elect Bill Clinton confirms that the environment will rank more strongly on the US political scene. And in Europe, the European Community's proposals for a Carbon Tax — would that it *was* a genuine carbon tax, rather than a revenue-raising device — is a further reminder of how the environment will feature in future pricing decisions.

My worry is that the lessons of such initiatives — and, in particular of the so-called 'polluter-pays' principle — have not been properly thought through.

Projected environmental compliance costs for the European Community are estimated to rise to nearly $10 billion a year; that would be almost sufficient to eat up sufficient cashflow equivalent to worldwide profits of Europe's top seven oil companies in 1991 — a bad year, admittedly, but it gives an idea of the sums involved.

But it is not just the total burden of costs. So often environmental 'initiatives' have commercial effects which had either not been initially expected or had been severely underestimated. For example, in the United States the introduction of reformulated gasoline has added eight percent capacity to gasoline supply (MTBE and agricultural ethanol) at a time of low demand growth. The consequence has been to depress still further already weak refining margins.

For our part, we must demonstrate that the oil industry is ready and anxious to be part of the solution to our environmental problems. But we must also point out that *sharing* a problem is not the same as *owning* it.

The capital scrabble

For the fact is that however hard we strive to improve our own environmental performance — and however much we try to help our customers to *use* energy more efficiently — our customers are still asking us to provide more energy. And we are expected to undertake the massive investments which alone make this possible; the investments, indeed, which will supply the world's energy needs for the rest of this century and for well into the next.

Each company will come to its own conclusions how best this is accomplished. But I suspect that all of us are in agreement that greater focus, productivity and teamwork — in addition to an increasing number of company alliances or partnerships (hence teamwork) — will feature prominently in many strategies.

By focus, I mean concentrating on what you are best at — and for most of us, that probably means concentrating upon hydrocarbons; upstream — upon exploring in a very carefully chosen set of target areas; and downstream, on concentrating on areas where there is a real long-term competitive advantage through a material presence.

Productivity is all about extracting more, for the same input; or better still, getting more for less. For example, technological advances allow for the cracking of dirtier and heavier feedstocks; there are now ways to minimise refinery waste, with precision measurement of leaks and emissions; and we have made great strides in the disposal of cuttings offshore. By grinding the oil-contaminated cuttings into a very fine paste and then injecting them back into the earth, a cost-effective and simple solution has been found. New means of building with contractors and designers in close partnership, new discoveries in deviated drilling — all will help decrease the capital scrabble.

Teamwork is all about drawing together a series of skills, all of which are individually excellent, and creating something more in the process.

Alliances

Competition between our companies is essential, but there are areas of activity where alliances can bring benefits which no single player in the industry can achieve on its own. My own company's very successful alliance with Statoil is a case in point, which now covers exploration-related research; international exploration; and a gas trading business.

I would also include under 'alliances' relations with contractors; or developing common interests with governments. The fact that sometimes we have divergent interests should not conceal the many other areas where we have identical objectives and where cooperation will act for both our private interests and the public good.

It is through focus, productivity, alliances and teamwork that the full potential of areas such as the North Sea can be developed. And already, we see — through such an approach — North Sea production increasing to two million barrels a day in the last quarter of 1992. This is the highest level of production for three years.

This area still holds out great promise for the UK economy as a whole. Over the next few years, UK production is set to increase; indeed, by the middle of this decade it may exceed the 2.5 million barrels a day which were produced in the mid-1980s.

However, I must point out that governments have it in their power to smother new growth, as much as they have to fertilise it. And while I understand the political attraction of milking the North Sea for every pound that it is worth, I must say that if fiscal policy ignores the pricing and environmental realities which I have already mentioned, we will risk damaging what is, and has been, the most successful section of British industry.

We are doing everything in our power to reduce costs to a bone — even though we are incurring additional costs both for environmental and safety reasons which, for the most part, we accept as inevitable and worthwhile.

But we must have flexible taxation policies which reflect the realities of the industry which no government — either here or abroad — has the power to overturn.

We cannot bank on our job becoming any easier. Uncertainty is the name of the game. And we cannot expect to be baled out by economic growth. In the past, difficult choices and decisions were made easier — or even unnecessary — by expanding economies and ever-rising demand.

Those days are over — at least, we must assume that they are over. We cannot now escape from the tough options which face us — any more than governments can. Our challenge is to learn to live and prosper in an atmosphere where — as I said earlier — our best hope is that surprises will be pleasant. That will be difficult; is it too much to ask of governments not to make it any more difficult than it is already? I hope not. ■

The European lubricants market and the role of the independent lubricant manufacturers

By Dr Manfred Fuchs, Chairman, Fuchs Petrolub

Among the world's big regional markets, the West-European lubricants market represents one of the most important potentials. In 1991, it had a volume of about 5.2 million tons so that it accounted for approx 14.7 percent of the worldwide lubricants market (without bunkering demand).

The region includes 17 countries: However, over 90 percent of the lubricants demand stems from the 12 nations of the European Community and more than two thirds from the four biggest national markets — Germany, France, Great Britain and Italy.

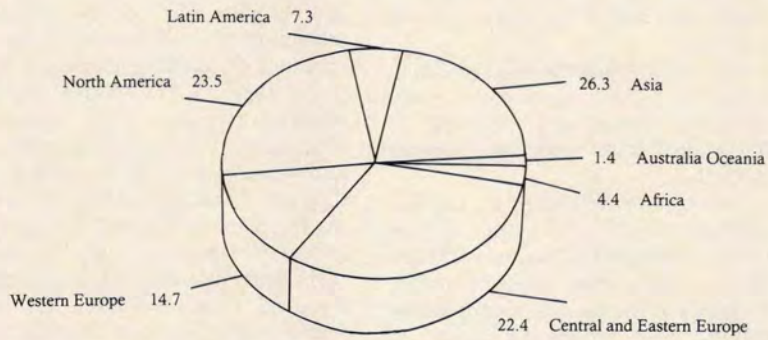
Looking at the development of the West-European lubricants market over a longer period, one sees that demand is stagnating as far as volumes are concerned. It took over 10 years until the demand in 1990 with 5.7mn tons exceeded for the first time the 1979 level; one year later, in 1991, this changed and demand dropped by 8.2 percent — even though primarily for inventory cycles as well as for structural and economic reasons; this tendency continued in 1992, however with a slight decline only.

Also for the rest of this decade, we think that the trend until 1995 will at best show annual increases of an average of 1.5 percent and afterwards of 1.0 percent, ie we would then only reach or slightly exceed the 1990 level in Western Europe.

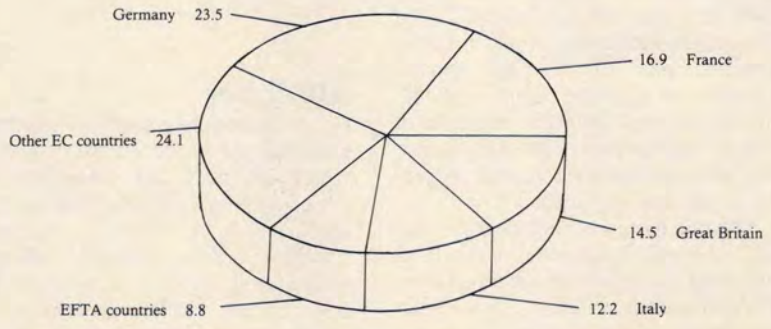
The specific lube consumption in Western Europe has been declining for several years. Calculated in per-capita consumption, it went down by nearly 14 percent to 13.9 kg from 1979 to 1991. Similar developments, however, can be proven for engine oils per kilometre driven as well as for industrial lubes and metalworking fluids by means of improved product quality and more economical materials management.

Nevertheless lubricants in Western Europe do not represent a 'mature' market in the common meaning of stagnating and highly saturated markets. They rather show an unusually high and ever increasing innovative momentum and this in spite of the high quality level already

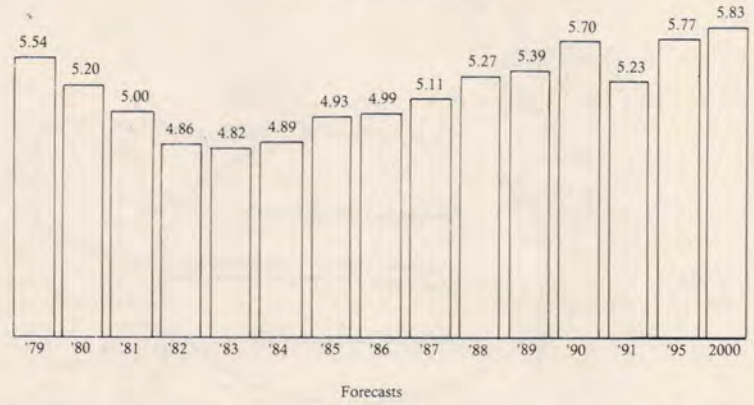
1991 World Lubricant Demand by Regions (in %)



1991 Western European Lubricant Market (in %)



Development of Western European Lubricant Demand (in mn tons)



held by Western Europe in the world's advanced lubrication. The West-European lubricants market shows considerable dynamics in terms of quality.

Diversity and specialisation

At the same time, however, it is certainly the region with the highest level of national diversity, with the highest degree of specialisation and the most distinctive segmentation. The 17 West European countries have seen very different developments with regard to national economies to the degree of motorisation and industrialisation, to industry structures, vehicle population and industrial equipment, climate and traffic situation, ecological requirements and consumer behaviour.

The main types of blended lubricating oils — engine and hydraulic oils, but also gear oils and many different industrial lubricants — amount to 66–79 percent of the demand.

Contrary to this, lube specialties and the so-called 'niche' products play a relatively small role in terms of volume. Here, we refer to most of the metalworking fluids, corrosion preventives, lubricating greases as well as special and high performance lubricants. In the most important markets in Western Europe, they volume-wise amount to 11–15 percent of the total potential and to some 30 percent in terms of value.

All of this leads to a very distinctive segmentation of the West European lubricants and specialty market which thus proves to be a lot less homogeneous than might be the case for North America.

Similar to the world lubricants market, automotive lubricants dominate in Western Europe. In 1991, they represented 51.5 percent of total demand.

Unblended lubricating and process oils amount to nearly 14 percent in Western Europe so that some 35 percent are left for blended industrial lubricating oils and greases.

Commercial use

Over 50 percent of engine oils in Western Europe are consumed in the commercial area. Therefore, trucks, buses as well as agricultural and construction and earth moving equipment, stationary and barge engines make up nearly two thirds of demand.

Of course, in terms of volume, the most important raw material for the production of lubricants are base oils. In 1991, they were produced in 30 lube refineries in Western Europe having a name-plate capacity of approximately 7.5 million tons per year.

Components of lubricants

It is a known fact that blended lubricants and particularly specialties include not only different conventional virgin petroleum-derived base oils (the classical solvent refined paraffinic and naphthenic base stocks) but sometimes are partly or even completely made of unconventional base oils formulated with hundreds of different additives and chemical components. Furthermore, re-refined base oils have their share though by and large they hardly play a primary role.

The share of all these ingredients amounts to 13.1 percent and might rise up to 16 percent until 1995 and probably even to 19.5 percent by the year 2000 gaining thus an even greater importance for the raw materials bill and pricing of lubricants.

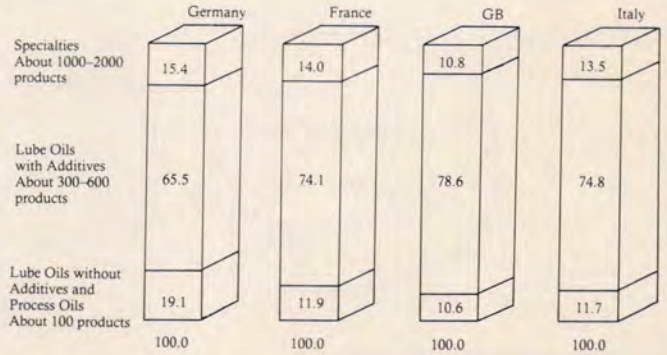
Solid basis

It is obvious that this West European lubricants market with its great potential, geographic and sectoral diversity as well as distinctive specialisation represents a solid basis for efficient independent companies. The market needs these suppliers having different sizes and functions.

In the West European lubricants market, there are a large number of independent lube suppliers. We estimate their number to be approximately 700 although a little more than half of them might only be lube jobbers. The number of 'relevant producers' in the field of independents amounts to some 300–320 companies.

Therefore, at least with respect to their number, they have an advantage in Western Europe compared to the vertically integrated oil companies because there are only some 25 of the

Lubricant Demand by Product Types (in %)



latter working in the West European lube business.

The 300–320 manufacturing independents operate about 280 blending and 70 grease plants in several West European countries, whereas major oil companies own some 100 blending and less than 30 grease plants.

In terms of their activities, functions and product ranges, most of the independents have much more variety than major oil companies. This is undoubtedly one of their decisive opportunities for a continuing successful future.

The considerable difference in size existing among the independent lube companies in Western Europe is remarkable. The 1980s, during which the number of middle-sized producers declined, have led to an increasing polarisation. There is a relatively small number of large or very large-sized independents with a global West European presence, whereas the others are mostly smaller and operate nationally or even regionally, but often with excellent performance in their special working fields.

With regard to their functions, the independents show a considerable diversity. There are 'full range suppliers' as well as real 'niche specialists'. Other companies have specialised in the field of engine oils with a professional marketing concept, taken over the role of specialised suppliers for other lube producers or concentrate on the production of re-refined base oils.

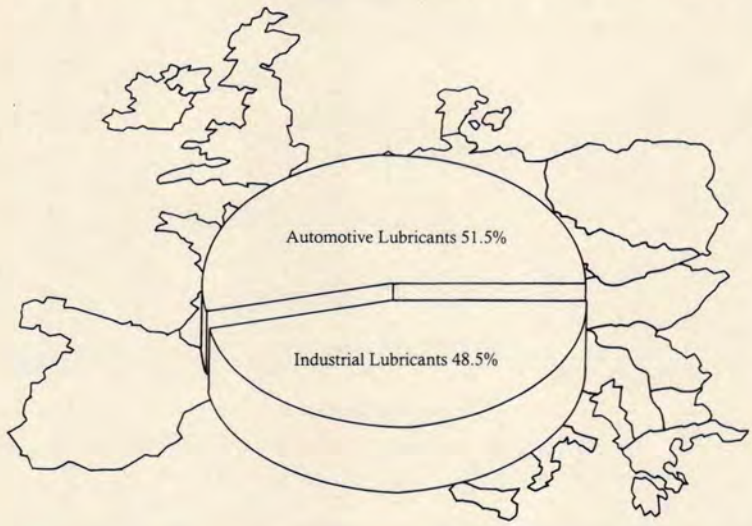
Market share

According to our investigations, the global market share of independent lube companies in Western Europe amounted to approximately 28 percent of total 1991 lube sales. Five years earlier, we still stated 31 percent. Therefore, it seems that the independents have lost some ground, whereas throughout the 1960s and 1970s and until 1986/87 they covered an increasing part of the total West European demand. Competition and concentration during the second half of the 80s show their effects with some of the independent suppliers having fallen under the influence of major oil companies.

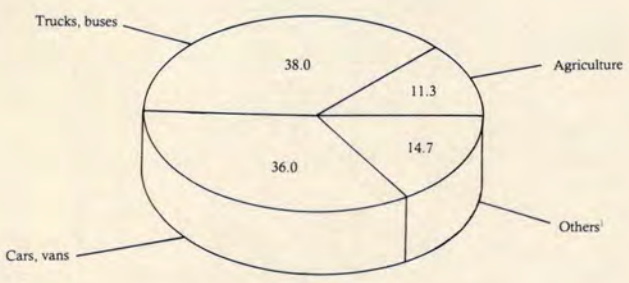
The supply share of independent lube companies differs partly in their share of direct sales. In some West European countries, they produce particularly; lubricating greases and specialities, but also blended lubricating oils for the majors which, for example, in Germany increased continuously during the last six years.

The situation is quite different for specialities, both in terms of the supply and sales market shares. This is particularly true for metalworking fluids, corrosion preventives, lubricating greases as well as special and high performance lubricants. Here, the independents are the market leaders and hold — depending on product groups — approximately 50–75 percent of the total West European volume.

1991 European Lubricant Demand by Product Groups



Western European engine oil consumption by sectors (percentages)



[1] Construction, mining, government, inland shipping, stationary engines, etc.

Strategic success factors

This leads us to an essential aspect of the role of independent lube companies. As all types of companies, they have certain strengths and weaknesses and will only continue to be successful in concentrating on their strategic success factors. Let's begin with the weak points:

- In general, the independents are small or middle-sized companies so they have only limited possibilities for economies of scale. Therefore, they can hardly achieve the position of 'cost leadership' and thus are vulnerable in the field of price-determined standard qualities or simple lubricants at least in cases of high demand.
- They are not vertically integrated so they continue to depend on the

Western European Lube Refineries 1991

Country	*Number*	*Name-plate capacity in 1,000 t p.a.*
Germany	6	1,280
France	5	1,840
Great Britain	5	1,165
Italy	4	1,455
Other EC countries	8	1,520
EFTA countries	2	200
Western Europe	30	7,460

Components of Western European and World Lubricant Volumes (in %)

	Western Europe	*World*
Additives (Effective substances only)	3.8	2.8
Synthetic oils	2.9	1.4
Vegetable oils	0.2	—
Water	1.3	0.9
Re-refined oils	4.9	3.9
	13.1	9.0
Virgin base oils[1]	86.9	91.0
Lubricant demand (Domestic markets incl bunkering)	100.0	100.0

1) Paraffinic solvent refined and naphthenic base oils, VHVI base oils and process oils

Independent Lube Companies — Share of National Sales (in %)

	1986	*1991*
Germany	40[1)]	40[2)]
Italy	35	25
France	33	30
Great Britain	33	28
Spain	25	20
Others	22	18
Western Europe	31	28

1) West Germany only
2) East and West Germany

willingness to supply and the prices of base oil refiners which at the same time are their competitors.

- Europe can become a challenge of size and resources for the independents.
- The brand issue and global presence will increasingly become the strategic success factor in the European engine oil business which weakens some of the independents.
- The ever increasing requirements for environmental and health protection lead to investments and expenses which — given their size of operation — puts medium-sized companies into a structural disadvantage. In this respect, one also has to consider the high replacement cost for old facilities. Competitive disadvantages for smaller and medium-sized independents, however, can also result from the OEM's conditions for product approvals as well as from the changed purchasing methods and the extremely demanding quality assurance systems of major industrial accounts.

But there are also clear strengths of independent lube companies:

- They can provide excellence in the quality and service competition and keep pace with their big competitors.
- They can be 'innovation leaders' and above all keep or even strengthen their leadership in the field of specialisation, tailormaking and servicing.
- By means of specialisation both in product and service, they can also reduce risks which might result from a changing situation in the European and international base oil market.
- They often have the advantage of operating regionally and are then better performing than major oil companies 'in the widely spread business' with regard to being close to clients, efficiency, flexibility and service.
- They can use their smaller company and plant size as a strategic success factor and systematically go for a niche policy.
- Following a selective product and marketing policy, they can organise themselves based on their own means or through cooperation and strategic alliances for the challenges of the European market and thus enter a new dimension.
- And finally, the independents can — compared to the majors — balance some of their missing economies of scale by their generally lower overheads and a sometimes more moderate level of compensation.

This analysis of strategic success factors of independent lube companies undoubtedly shows that this group of suppliers will also have its opportunities in Europe in the future. It fulfils important functions in Western Europe and will in the years to come have the same starting conditions as its competitors from among the major oil companies. It is only important that the independents focus on their strategic strengths and use their opportunities as well as their generally greater entrepreneurial freedom. ■

This paper was presented at the International Congress of the Union Européenne des Independants en Lubrifiants (UEIL) in Brussels in October 1992.

Letters

Madam — It was with great interest that I read the article 'Contaminated gasoil disrupts the market,' which appeared in the November edition of the *Petroleum Review*. As outlined in the article, in recent months there has been much concern and debate surrounding reported incidences of microbial contamination in gasoil cargoes.

It should be noted however that the article, whilst both timely and interesting did contain some fundamental inaccuracies. Given the highly specialised nature of the issues with which it dealt it is understandable how these might arise. The aim of this letter is to clarify some of the issues relating to the treatment of microbial contamination and spoilage of middle distillate fuels.

Although it is not a trend that I have detected, it was stated in the article that biocide treatment is finding less favour. A variety of reasons for this were suggested. It should be pointed out that these suggestions were both misleading and in some cases wholly incorrect.

In Germany waste handling laws demand that *all* water bottoms, regardless of whether or not they contain biocides, be disposed of through officially recognised methods of disposal and/or recycling. This is not restricted to chemical incineration.

The marketing of biocide containing fuels in Germany is not subject to specific regulation. The so called 'scavenger directive' (from the Federal Emissions Law) restricts the addition of chlorinated and brominated additives to automotive fuels. Although aimed at halogenated lead scavengers in gasoline, this legislation presently applies to all chlorinated and brominated additives, including biocides, in all automotive fuels.

It is not automatically a criminal offence if there is an infringement of either the Waste or the Federal Emissions laws. Any infringement is evaluated in terms of its effect upon health, environment and property. If these effects are judged to be severe, the infringement may be classified as a criminal offence.

David Greener,
Biocides Marketing,
Rohm and Haas

Madam — As a company specialising in microbiological problems in the oil industry, we have been active for several years in monitoring and control of bacterial and fungal growth in fuel storage and distribution systems.

I read with interest, therefore, your excellent article in November's *Petroleum Review* of the current 'hysteria' on this phenomenon. Your article reflects exactly the day-to-day comments and questions which arise again and again when dealing with fuel analysis and highlights what our company feels is the crux of the matter — the problem of interpretation of test data. Some of the points raised in your article are typical.

Firstly, the report that a gas oil sample was reported to have 10^5–10^6 fibres per ml (10^8–10^9 per litre) and then the same sample reported to have 10^4 fibres per litre; a difference of seven orders of magnitude. As one with hands on experience of these analyses, it is clear that the former result would be impossible to report from a standard laboratory test and that the methods of that testing house should be questioned. Although there are a number of specialised microbiology laboratories performing these analyses, samples are also tested in chemistry laboratories by staff with no microbiological training.

Secondly, the 1,000 organisms per litre (one organism per ml) limit stated by SGS Redwood. We feel this figure is too low, by at least 100 fold. To put the SGS limit in context, it is even more stringent than the EEC regulation for drinking water which is no more than 20 organisms per ml (20,000 per litre) — and that is in water which has been treated with biocide (chlorination)! Furthermore, in microbiological terms, the difference between 1,000 cells and 5,000 cells is insignificant and realistically, order of magnitude differences in the scale of contamination are required to have any significance.

Thirdly, fibre counts. Well, what can I say? Despite our best protestations, all our clients insist on having this done. Rather than merely counting the fibres, however, we attempt to make an assessment of the overall solids contamination and address the result in terms of the likelihood of the suspended material to cause filtration problems rather than merely stating × thousand fibres per litre.

Lastly, your closing paragraph sums up our company's philosophy in a nutshell. This is the point we constantly stress to all our clients.

Dr Stephen Maxwell,
Managing Director,
Oilfield Microbiological Services

Madam — With reference to Newsdesk article November issue, 'British Gas plans CNG vehicle network'.

I was surprised to learn by inference, Mr Keith Nelson's (British Gas) suggestion that in the past LPG fuelled vehicles had been either unsafe or there had been a question mark over their safety, which the future presented him with a problem to overcome in convincing consumers of the safety of future NGVs.

Whilst I would accept that a possible perception of carrying any gaseous fuel on a road vehicle might give cause for some safety concerns, the facts if properly presented belie such beliefs. Risks for LPG fuelled vehicles are far less than with liquid fuel vehicles.

Regarding collisions there is a considerably greater resistance than with usual petrol systems. If in a collision there was a fracture of pipework causing a leak LPG evaporates quickly. Where fears of fire occur, in a fire, pressure safety relief valves open to release the pressure; modern tank installations are covered with heat insulating and fire resistant coatings; and in the event of a serious fire, it does not necessarily result in an explosion.

Stringent tests carried out throughout the world have always proved the safety arguments in favour of LPG over liquid fuels.

Autogas as LPG for automotive purposes is most widely referred to, has been in use for well over 50 years with a proven safety record. The facts and experience are rather greater than that of British Gas and CNG.

So please Mr Nelson don't knock LPG; it has many advantages over CNG and actually we are really on the same side and support the case for the greater use of alternative automotive fuels in contributing to the reduction of air pollution from road transport in the urban environment and in this both LPG and CNG can do much, but require government recognition of their values and encouragement by reducing the excise duty levied.

RA Holder
Director General
LP Gas Association

Book reviews

Managing Industrial Emergencies

By Philip Algar

Published by FT Business Enterprises, 1992, ISBN 1853341 67 3

In an increasingly congested market of crisis management publications the latest offering, 'Managing Industrial Emergencies', by energy journalist Philip Algar is as thorough and comprehensive as any yet produced.

Drawing heavily on his experience of the oil and gas industries, Algar offers sound advice for those charged with the daunting task of managing a corporate reputation during a crisis. He argues that damage to a company's reputation by mishandling an emergency is commercial damage. 'A poor reputation will weaken sales, investor confidence and employee morale, and planning approvals for a range of industrial activities may well be denied, jeopardising the company's future', he states.

His guide effectively offers a blueprint in planning, setting up and maintaining a trained, professional emergency response machine to those companies who have yet to recognise the need. For those who have invested in emergency response Algar's report is a useful checklist and a reassuring reminder of the value of their expended time and effort.

The guide covers every aspect of an emergency, often laced with the knowing humour of one who has chiselled away at entrenched and blinkered attitudes. The detail of his knowledge and advice is impressive; a quick read through the index will satisfy even the most meticulous that no stone has been left unturned. From the basics of defining an emergency and drawing up an emergency plan to the skills of writing press releases, handling press conferences and technique for television interviews, Algar has clearly done his homework.

He has delved behind the scenes to find the anecdotal that supports the point he makes — often to the embarrassment of some luckless, unnamed executive. 'Six people have been killed, but I suppose that's life' typifies the unfortunate remark made under acute pressure.

The attention given to emergency response and crisis management by the oil and gas companies are highlighted by quotes from leading managing directors and chief executives. BP, Chevron, Gulf, Shell and Total are all on record as recognising and supporting the function.

As the guide examines each facet of an emergency situation, the complexities and pitfalls of managing a corporate response become increasingly all too clear. Algar stresses the importance of proper planning and good communications and rightly ridicules the notion that slick, articulate words can be a substitute.

If there is a criticism, it is that the report relies almost exclusively on examples and case histories drawn from the oil and gas sectors. Its appeal to other industries may therefore be limited; however, emergencies and disasters do not recognise sectoral differences.

In today's demanding and unforgiving business climate, no company can afford to neglect its reputation, particularly when faced with an emergency. Algar's report is a salutory insight to the warning that 'those who fail to prepare, prepare to fail'.

Roger Williams,
Chevron UK Ltd

Motor Fuels Business in the UK 1991/1992 — Market Shares, Supplies, Profitability

By Gilbert Jenkins

June 1992, ISBN 1872546 10 2

Cars and petrol are topics of perennial interest. Cars are often pulled apart in great detail by the motoring magazines. This report pulls petrol apart into its economic components showing how the price of petrol responds to changes in the price of crude oil, refining profitability, stocks of refined products, international trade and competition.

In the United Kingdom, the price of petrol, net of duty and value added tax, is the cheapest ever in real terms. The statistically minded will spend some time mulling over the table of petrol prices with and without taxes, in money of the day and in constant terms, every year from 1912 to 1992.

Whilst petrol is certainly cheap, the report is not convinced that diesel fuel is cheap in the United Kingdom compared with other countries and concludes that automotive engine oils in small packs are very highly priced.

The report is structured in seven sections; market size, supplies, market shares, pricing, price comparisons (UK and EEC countries), profitability and costs, and futures trading.

This report will appeal to the general reader who wishes to have a detailed understanding of the motor fuels market in the United Kingdom and of the pricing of oil products. The specialised readers will include those who work for the oil companies on fuel supply and marketing, the independent marketing companies and industrial buyers of fuel.

The report is available, price £29 post free, from Sunningdale Publications, 1 Hamilton Drive, Sunningdale, Berkshire SL5 9PP.

AFG Scanlan

Mexican oil: poverty issue will force a change

By Maria Kielmas, Editor, LATOIL

The political charade which has protected Mexico's state-owned oil industry is crumbling rapidly. A decade of economic reform, and the recent North American Free Trade Agreement (Nafta), left the constitutional monopoly of Petroleos Mexicanos (Pemex) untouched. Years of lobbying on the part of the international oil industry have also had little effect. Even Mexico's rapidly depleting, though always politically over-stated, oil reserves have prompted little serious reflection. But the crunch has arrived as the Mexican government is forced to confront the fact that 49 percent of the population live below the poverty line. The stark choice is tackling poverty, which if unattended would lead to the country's disintegration, or fund the investment budget of an inefficient bastion of privilege such as Pemex.

Reform of the Mexican oil industry is a process which has already gathered its own momentum. There is little evidence that the government of President Carlos Salinas de Gotari has a grand plan for this purpose but more a calculated response to ongoing events. In this context, the monopoly position of Pemex under the constitution is an irrelevance. The Mexican government has changed the constitution to accommodate banking privatisation and land tenure reform and when expediency dictates it can change the constitution to accommodate foreign investment in oil. For the moment the constitution is a useful government alibi for not giving too many hostages to fortune.

Need for change

The disputes settlement procedures within the Nafta accord, rather than anything in the energy chapter, provided the most important step forward for this process of oil sector change. For the first time in history a Mexican government has recognised the concept of international arbitration. Disputes among the Nafta partners may be adjudicated under a commission representing Nafta members or even under the umbrella of the General Agreement of Trade and Tariffs (GATT). This is both a fundamental and a monumental change which puts Mexico way ahead in accommodating future oil investors than, say, Venezuela. Up to now oil companies have argued that at least Venezuela has done a little, if not very much, to introduce foreign investment into its oil industry, whereas Mexico has done nothing. But now in Venezuela potential foreign investment is stalling because there are no investment guarantees, while for Mexico the Nafta accord has substantially eased a future, full bilateral treaty with the US Overseas Private Investment Corporation (OPIC) and full guarantees for foreign investors.

The reform of Pemex as an institution has been publicised internationally to great effect. This announcement came in the wake of an explosion in Mexico's second city, Guadalajara, which killed over 200 people and devastated homes and businesses in the city's low-income districts. Gasoline from a faulty pipeline had leaked into the city sewers which subsequently exploded. Pemex at first denied negligence and tried to pass the blame onto a local cooking oil factory. It later conceded that it might have been responsible and contributed $33.4 million to disaster relief. But even if an ongoing judical inquiry goes against Pemex, the company will not be liable for much. Under Mexican law, liabilities for bodily injury are strictly limited to any geographical area's minimum wage and as far as property is concerned, people in this part of Guadalajara were mostly too poor to afford insurance.

Clearly recognising the political fallout from such a disaster the government ordered a re-organisation of the company within 30 days. Thirty days later the plan appeared. In fact, the reorganisation had been under consideration for over one year and waiting for an opportunity to be publicised. The Guadalajara disaster offered just such an opportunity and, even more importantly, the re-organisation itself gave the government an excuse to dissociate itself from Pemex negligence by establishing the so-called 'independence' of the company.

Reorganisation of Pemex

The grand plan re-organises the company into four subsidiaries: Pemex Exploration, Pemex Production, Pemex Refining, Pemex Gas and Basic Petrochemicals, and Pemex Secondary Petrochemicals. The company's international marketing arm, Pemex International (PMI), continues as before. Under the plan all of these subsidiaries are supposed to be autonomous business units thus making the future Pemex an 'independent' company. But this is just a public relations show. Pemex, as a political institution,

cannot be 'independent' of government. As most state oil companies, it has managed to exist financially because it did not charge transfer prices between subsidiaries. Once this is introduced, the organisation is impoverished.

The government also says it aims to make Pemex more 'accountable'. But by increasing 'accountability' the questionable history of state oil company accounts comes to the fore. This process has been politically destabilising, or at least extremely embarassing, in every single country which has experienced it. So if the Mexican government intends to shed more light on the workings of Pemex, it has first to engage in the re-writing of history, to reduce Pemex's hitherto heroic image as the guardian of national sovereignty. In a strategy of Kremlinological proportions, this process has already begun in school history books with the slow rehabilitation of the Porfirio Diaz presidency, the last period when the Mexican economy was really open to the outside world, and the toning down the rhetoric on the history of oil nationalisation under President Lazaro Cardenas.

Funding crisis

A real financial reckoning is now looming. In September 1991 Pemex signed an agreement with the US Eximbank for loan guarantees of $1.3 billion. It has been paying a commitment fee of one eighth of 1 percent on this figure ever since. One year later these guarantees were still unused, as indeed were a further C$500 million from Canada. In both cases the guarantees were earmarked for certain appraisal and development drilling projects in the Campeche Sound. In the intervening period Pemex has called two service contract bidding rounds for drilling in Campeche, neither of which have been tied to these guarantees.

For these to be taken up the government would have to agree to borrow the funds in the first place, which it clearly is unwilling to do because of foreign debt repercussions. Now half of the $1.3 billion has been cancelled, ostensibly because Pemex wished to switch projects for which the funds were earmarked. Under Eximbank rules, the whole thing would have to be renegotiated.

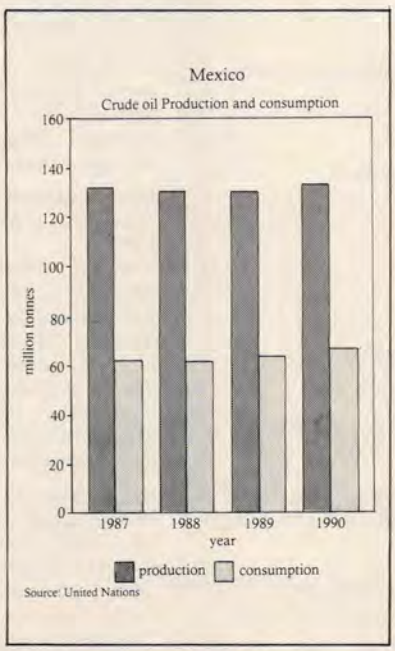
Pemex has said it needs to raise $8 billion of its $20 billion five-year investment budget on the international markets. These funds could be used to increase refining capacity by between 150,000 b/d and 300,000 b/d. There have been suggestions that the company could get a foreign contractor to build the plant on a build-lease-transfer basis, a formula used earlier for petrochemical plants, and which managed to circumvent the constitutional ban of foreign investment in oil. These suggestions have been reinforced by other notions circulating around the industry that the US Eximbank would guarantee loans to a US contractor for such projects.

However, state export credit agencies as a whole are becoming more nervous about projects where a state concern such as Pemex would be the direct obligor and guarantor. And the whole economic viability of any such project depends on Pemex's ability to supply the raw materials and then market the final products.

Size of reserves?

This throws open the sensitive issue of Pemex' ability to supply. The official estimate of reserves is 65 billion barrels of oil equivalent, enough for 70 years at current production levels of 2.6 million b/d, Pemex says. It is common currency that this figure has been politically contrived and was set on its head in December 1991 with an unprecedented outburst by the former Pemex vice president for exploration and production, Francisco Inguanzo Suarez. Interviewed in the Mexican press, he said that oil reserves only amount to 29.9 billion barrels of oil equivalent and that the official figure has been 'a great deception' used to justify a 'wasteful oil policy.'

Pemex management has been keen to downplay these remarks. It has had a measure of success in this effort because he is a diehard nationalist who refuses to entertain any notion of a foreign presence in the oil sector and even in Pemex is viewed somewhat as an anachronism. But the fact remains that Mr Inguanzo is the only individual, Mexican or foreign, to express a public opinion on the subject of Mexican reserves who has both the first-hand knowledge of the situation and, most importantly of all, who is technically qualified to be able to make a valued judgement.



Mexico is in dire need of a major new exploration programme to maintain its oil production. But under the present situation, this would have to be financed by the government since Pemex, like other state oil companies, does not manage its own oil revenues. It receives a budget from the government. In the last months, the company successfully averted a bid by finance minister Pedro Aspe to cut Pemex $3.2 billion 1993 exploration programme by half. Mr Aspe said he wanted to move funds earmarked for Pemex into a social programme aimed at alleviating poverty resulting from the latest economic slowdown.

Poverty – crucial

Pemex has won the battle so far to keep its investment programme intact but it will lose the war. Contrary to assertions that Mexico brings a market of 82 million people into the Nafta partnership with the United States and Canada, 49 percent of the population live below the poverty line and Mexico is among the 10 worst cases of poverty in Latin America. The government, no longer able to camouflage the situation with talk of an 'economic miracle', has openly admitted its vast scale and allocated funds to tackle it. For 1992 this allocation was $2.2 billion, the second largest item on the government's budget. And in 1993 it could be greater than Pemex' exploration budget.

But even this only represents one half of the minimum wage per person under the poverty line. The dilemma is that the government faces a greater danger from not tackling the poverty issue than a rear-guard action from the beneficiaries of maintaining Pemex as a national icon. Thus the necessary constitutional changes which will preface an opening of the Mexican oil sector will be timed according to political expediency, if that opportunity arises, but as in the former Soviet Union, they are more likely to be as a reaction to a system which is disintegrating from the inside. ■

IP Information Service News

Statistical information

Our aim is to provide a broad collection of statistical information from which the information team can answer questions.

The Information Department regularly compiles statistics on many aspects of the oil industry in the United Kingdom and worldwide: UK deliveries of major products are published monthly in *Petroleum Review* with year to date statistics. The *Retail Marketing Survey* is issued annually in March and provides both tables and text detailing the current UK petrol market by brand and supplier. A series of 20 data sheets and a number of booklets are also produced. Some data sheets have been designed to provide timely, up-to-date information — these are available on subscription with regular update services by post or fax as required.

We maintain a large collection of published data from a number of agencies. For example *OPEC, American Petroleum Institute, International Energy Agency, United Nations*. This ensures that we have a wide variety of sources for purposes of comparison which also cover a range of time periods.

The department has bibliographies, guides and source books to help locate statistics, and staff are always available to show members around the collection or offer advice. Queries can be conducted by telephone or fax. Some charges may be incurred for detailed work, but all IP members are encouraged to use the statistical publications we have in stock.

Please call **Julia Clark** or **Lyn Nevin** on 071 636 1004 if you have any questions or wish to come and use the statistics collection.

1993 pricing for information services

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All IP members	*Free*
Non-member	*£10.00 for up to 3½ hours* £15.00 for a full day
Students	£1.00 for one day on production of Tutor's letter and Student ID card

Photocopy cards

	Members	Non-members
10 copies	£1.70	£3.20
20 copies	£3.00	£5.60
50 copies	£6.50	£12.00
100 copies	£11.00	£20.00

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	Members	Non-members
per page	20p + VAT	40p + VAT

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£4.00 + VAT £8.00 + VAT

Desk research carried out by IP staff on behalf of members: £30 per hour + VAT; non-members: £60 per hour + VAT (10 minutes time given free!)

The above are samples of our charges. For a complete list of services and charges please contact the Library on 071-636 1004.

Selected additions to Library stock

Directories and bibliographies

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The Use of Foam Against Large Scale Petroleum Fires Involving Lead-Free Petrol. HOME OFFICE FIRE RESEARCH AND DEVELOPMENT GROUP. By: Foster J A. Pub No 5/92. London, Home Office, 1992.

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Energy Related Carbon Emissions in Possible Future Scenarios for the United Kingdom. DEPARTMENT OF TRADE AND INDUSTRY. Energy Paper No 59. London, HMSO, 1992.

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ENVIRONMENT DISCUSSION GROUP

26 January — 'Forthcoming environment legislation' — Dr David Fisk, Chief Scientist, Department of the Environment

18 February — 'Clouds and climate change' — Dr Geoff Jenkins, Head, Meteorological Research Flight, Royal Aerospace Establishment, Farnborough

All members of the Institute and their guests are invited to the above meetings, which commence at 17.00. However, for catering purposes it would be helpful if members could inform **John Phipps** if they plan to attend the meeting.

John Phipps, Institute of Petroleum
61 New Cavendish Street, London W1M 8AR
Telephone: 071 636 1004. Fax: 071 255 1472.

EXPLORATION AND PRODUCTION DISCUSSION GROUP

A meeting of the Exploration and Production Discussion Group will be held at the Institute on **Thursday, 21 January 1993** starting at 5.30 pm. (Tea and biscuits will be available from 5.00 pm).

RESERVOIR SUBSIDENCE

Speaker — Mr G H Landa
of Phillips Petroleum Company Norway

If you would like to attend this meeting please contact Mr J Hayes, Institute of Petroleum, 61 New Cavendish Street, London W1M 8AR. Tel: 071-636 1004.

Open Forum on Power Generation

Wednesday 6 January 1993
4 pm–7 pm

at the Institute of Petroleum

Should more coal mines be kept open? Why have plans for eight gas fired power stations been cancelled or postponed? Is nuclear power green or dangerous? What is holding back renewable energy? Can we generate the power we need without destroying the environment?

In the chair will be Dieter Helm of OXERA, and a case will be put:

- for gas — Malcolm Peebles, consultant
- for coal — David White, consultant
- for nuclear — Malcolm Grimeston, British Nuclear Forum
- for renewable resources — Stewart Boyle, Greenpeace
- John Lemlin of IPIECA will speak on behalf of the environment.

The issues raised will then be thrown open for general debate.

Free. All welcome. If you would like to come, please contact Catherine Cosgrove on 071-636 1004.

PETROLEUM REVIEW

INDEX

The 1992 annual index to *Petroleum Review* is now available.

Please apply to:

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Telephone: 071 636 1004.

How to find the right training for oil and gas industry professionals

Over the past decade significant changes have been taking place in the availability of specialist short courses, covering all aspects of the oil and gas industries. Additionally companies are becoming better focused on their needs and are demanding higher levels of quality from training providers. There is a growing move towards the production and availability of distance learning packages, where employees can study in their own time, without leaving their workplace. Distance learning is particularly suitable for offshore and isolated locations, where attendance on courses at fixed times and places may be impossible. For overseas participants, the distance learning package may cost less than the air-fare!

Whilst the companies' objectives are to secure improved levels of staff efficiency and performance, the individual is seeking recognised qualifications, in return for the time and effort which he or she might put into a particular programme. Hence more and more training providers and universities are moving towards modular courses leading to qualifications: thus meeting the aims of both companies and individuals.

The overiding cry from everyone is the need for flexibility, effectiveness and coherence, within the content of continuing professional development of individuals. This need is leading to several new developments in training provision. For example the Institute of Petroleum collaborated with the Offshore Petroleum Industry Training Organisation (OPITO) and Petroleum Employers Skills Council (PESC) on the recent launch of NVQ's in Bulk Liquid Warehousing and Refinery Process Operations — which will be followed by others early in the new year. Additionally, on the management side, a new diploma in management (petroleum management) will be available this year, where flexible study is possible, through both formal courses and distance learning. This is accredited by Henley, and has been prepared using the guidelines of the Management Charter Initiative (MCI).

In the early 1970s the main training providers for the North Sea were American companies crossing the Atlantic with their programmes; companies such as IHRDC, Rike Services and OGCI. Since then, British training provision has risen significantly and organisations such as The College of Petroleum and Energy Studies, Simon Robertson Group and The Petroleum Economist have entered the market. There has also been a number of successful UK collective efforts, such as the Joint Association for Petroleum Exploration Courses — JAPEC — which are active.

There is no central list of all the programmes which are now available, but the National Training Index maintains a log of individual courses available each year, by subject. Additionally the Institute of Petroleum has a list of training providers which is available from the library and information department at no cost. This list of providers is updated regularly and is a useful start-point for oil and gas companies researching the market for new courses, or trying to locate a particular course to solve a training problem.

Contact addresses:

PESC, Morley House, 314/322 Regent Street, London W1R 5AB. Tel: 071-255 2335.

MCI, Russell Square House, 10–12 Russell Square, London WC1B 5BZ. Tel: 071-872 9000.

National Training Index, 25/26 Poland Street, London W1V 3DB. Tel: 071-494 0596.

European advanced training in marine technology 1992–93

A wide range of short degree and MSc courses on ships and floating systems, subsea systems, safety and environment, offshore hydrocarbons as well as design and management of these technologies provided by universities throughout Europe are listed in a new brochure.

Detailed information on over 100 courses directly relevant to the offshore industry is provided in a new European Advanced Training Brochure prepared by the University Enterprise Training Partnership (UETP) in Marine Science and Technology.

UETP embraces industry, academic institutes and research associations and represents the interests of over 100 companies and 30 universities, learned institutes and classification societies.

The courses are aimed at either practising engineers as part of their continuing professional development or graduates and students who are looking for a qualification in a specialised area higher than a normal degree.

For futher information contact: Mr JAT Grant, Manager Education & Training Division, c/o The Marine Technology Directorate Ltd, 19 Buckingham Street, London WC2N 6EF. Tel: 071-321 0674.

New flexible degree programme in petroleum law, policy and economics

The University of Dundee's Centre for Petroleum and Mineral Law & Policy has now set up an innovative interdisciplinary graduate degree and training programme focusing on oil and gas investment. Law and policy, economics and finance and environmental regulation are being taught by senior staff. The new degree programme is geared towards the needs of professionals in the oil and gas industry to develop a specialised and recognised qualification to upgrade their professional skills. The course programme is tailored to allow working professionals to acquire their degree in a flexible way: Credit courses can be completed either in a nine-month period, a 10-week period, or even in a one-week intensive seminar schedule over a period of five years. Credits are available for study, completed or in course, at other academic institutions deemed equivalent.

For further information contact: Executive Director Professor Thomas W Wälde, University of Dundee, DD1 4HN. Telephone: (0382) 307300, Fax: (0382) 22578.

Foreign Office supports oil and gas scholarship scheme

A new jointly funded scholarship scheme has been launched by the Foreign and Commonwealth Office and The College of Petroleum and Energy Studies (CPS) in Oxford, to take effect from 1 January. The aim will be to bring decision makers from overseas national oil and gas companies to the United Kingdom for specialised training in the management and economics of the petroleum and energy industries.

The target countries which will receive the awards are in Asia, Eastern Europe, Africa and the Middle East. Funding will be on a three-way basis, between the Foreign Office, the overseas national oil and gas company and also, hopefully, British oil and gas companies operating in the particular country from where the candidate emanates.

In principle, the awards will be for the 12 month MSc courses which CPS operates in conjunction with Imperial College (petroleum production), Leeds University (energy economics) and Salford University (natural gas engineering and management) however, in addition the new six month Diploma in Management (petroleum management), accredited by Henley, may be considered.

Are you prepared for 1993 ?

If you are not familiar with certification practices in the EC, then the answer is probably 'no'.

The free circulation of workers between member states of the European Community often depends on mutual recognition of qualifications.

***Certification Practices in the European Community* by Len Bill, City and Guilds Consultant for the EC, provides an up-to-date survey of qualifications in all the EC member states. It is an invaluable source of reference for employers, personnel managers, those working in education and training and others who need clear and practical guidance on certification in Europe.**

The book can be purchased for £15 (inclusive of postage and packing) from City and Guilds of London Institute, 76 Portland Place, London W1N 4AA.

Student Prize Awards

IP Director General Ian Ward recently presented Institute of Petroleum prizes before two branch meetings at Stockton and London.

Pictured here is Nigel Bruguier showing both the certificate and cheque he received in recognition of his work on the MSc course in Geophysics at Durham University.

Albert Caruana was awarded his prize for work on the MSc course in Petroleum Engineering at Imperial College.

New career information available

The Institute of Petroleum now has available colour career leaflets and career sheets on the oil industry to help school-children choose the subjects they will study at GCSE/ Standard and A/Higher levels, with the emphasis on encouraging young people to keep up their studies in science and engineering.

The literature has been distributed to all secondary schools and careers offices in the United Kingdom. It includes more detailed information than the brochure, 'Careers in Oil', already published.

The new leaflets will be widely distributed. They will be sent out with the Institute of Petroleum's replies to the hundreds of enquiries received on education and training matters; they will also be available at career's fairs.

Petroleum Review readers who because of their personal interests or company/professional interests believe that the career literature could help them and further encourage young people to understand that the oil industry can offer them a long-term and fulfilling career should contact the Education Liaison Manager at the Institute of Petroleum.

Rebuilding exploration maps

Rockall Magna Scan, part of the Rockall Group, has been applying the latest image processing techniques to scan and enhance a Russian exploration data package consisting of previously unreleased maps, lithological columns, tables of reserves and associated documentation.

Due to the low quality of the original material used for the data package, the information had become severely distorted and consequently had lost much of its commercial value. The highly specialised and delicate process of electronically capturing and rebuilding the information was carried out by Rockall Magna Scan on behalf of JEBCO Seismic Limited, which is now able to market the rebuilt data to international oil and gas companies.

'The low quality of the original material used had resulted in discolouration and marking of the maps, making them difficult to read', explained Jeffrey Maskell, Rockall Magna Scan's general manager. 'By applying the latest scanning and electronic processing techniques, we have been able to rebuild the maps — creating a valuable source of information that complies with the high standards expected by western oil and gas exploration companies.'

Rockall Magna Scan electronically scanned the maps — converting the data into a raster image. This was processed, enabling background noise, paper fold lines and other unwanted marks to be eliminated. Any faded information was enhanced using raster editing. Information that had become distorted through stretching or shrinkage was warped to scale and skew corrected. Legend boxes and keys annotated in Russian were translated into English and fitted into position alongside the original Russian text. New drawing borders, side labels and legends were created in vector mode and added to the final product. On completion of the process, the new hybrid raster vector image was ready for plotting onto conventional material.

Personnel monitoring system

A new Movements and Personnel System (MAPS) has gone into live operation at offshore installations of Shell Expro and BP. A phased implementation programme will ensure that early next year the system covers all platforms operated by the two companies throughout the UK sector of the North Sea.

MAPS, which was developed by Logica to meet a common requirement of Shell Expro and BP, provides fast efficient planning and recording of the location of employees, contract staff and visitors at offshore sites and in transit.

MAPS has replaced TRACE as Logica's personnel monitoring product. Its functionality includes:

- **flight planning and administration;**
- **personnel onboard lists down to platform, flotel and drilling rig level;**
- **validation of personnel training and safety certification status at travel booking and flight check-in;**
- **cabin and lifeboat allocation;**
- **integrity in the event of communication downtime.**

Running on Digital Equipment VAX hardware and the Oracle relational database management system, MAPS can be adapted to suit all sizes of offshore operation.

NIR on-line analysis

Stringent environmental legislation combined with increased consumer demand for higher octane products are forcing refiners worldwide to change their processes. As a result, refiners are looking for ways to increase octane number without using lead.

Changes in feedstock and product composition, such as reformulated gasoline, require improved on-stream analysis methods. Constant and more precise measurement and monitoring instrumentation is needed because of stricter environmental and safety regulations. Effective predictive maintenance techniques require more sophisticated testing, analysis and monitoring instruments. Near infrared (NIR) spectroscopy has been demonstrated by Bran + Luebbe to be such an effective technique.

On-line octane number analysis permits control of gasoline endpoints to increase the yield of the more valuable products, or to balance the inventories in the blend pool.

There is a trade-off between octane number and gasoline yield. Other benefits of on-line analysis at the cracker are:

- Increase unit severity conditions without overcracking (ie. catalyst activity, circulation rate, reactor temperature);
- minimum unit variability and better control of equipment condition;
- maximisation of resin in feedstocks;
- longer catalyst life.

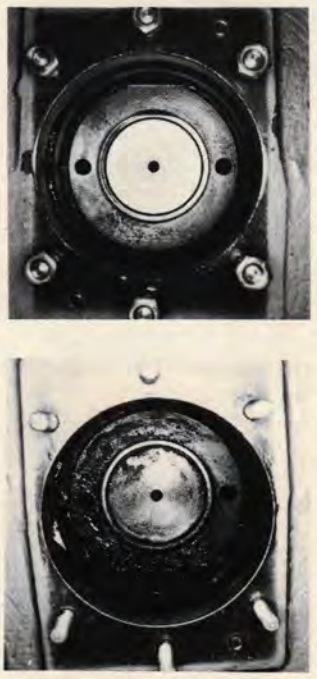
Synthetic oils

Shell Oils has launched Shell Madrela Oils AP, a range of synthetic oils designed to tolerate extremely high air discharge temperatures and pressures in reciprocating air compressors.

The synthetic oil properties of Shell Madrela Oils AP mean that the oils take over where mineral oils tail off. Composed of specially selected Ester fluids, Shell Madrela Oils AP outperform both mineral oils and other synthetic oils.

Shell Madrela Oils AP result in very low carbon deposit formation reducing the fire hazard caused by 'choked up' air outlet pipes, and have very high rust prevention and wear resistance properties. In addition Shell's advanced synthetic oil technology, as shown in Shell Madrela Oils AP, also extends oil life from 1,000 hours to 2,000 or even 4,000 hours.

John Scott, industrial product development manager for Shell Madrela Oils, comments: 'The introduction of Shell Madrela Oils AP is significant for two reasons. Firstly, we believe the oils are the best of their type on the market, and the tests that we have conducted have served to confirm this view. Secondly, it means our customers can now specify Shell lubricants for all their air compressor oil needs.'



Shell Oils carried out a rig test against a rivals equivalent product (bottom) and Madrela Oil (top).

Contaminated ground water pump

The Solo is a low-cost remediation (cleanup) pump with a 'brain', introduced by Geotechnical Instruments of Leamington Spa for recovering ground water containing spilled fuel oils, solvents and other contaminating fluids.

It is a pneumatically driven pump which is self-controlling insofar that an onboard magnetic 'brain' is activated by a float switch as liquid fills, thereby controlling the air supply in accordance with the amount of water in the pump. No other equipment is needed and the pump requires no attention other than occasional maintenance. It adjusts itself to well recovery rates and also switches itself off automatically if the water level drops below the pumping level. The brain is a small cartridge which can easily be replaced in the field.

Recovery rates of up to 20,000 litres per day total fluids are possible. A well size of 10 centimetres is needed, and the only other requirement is a compressed air supply.

The pump is submerged in the liquid layer in a well. Liquid fills the bladder from the bottom of the pump under hydrostatic pressure during the exhaust cycle, with a ball check valve closing off the discharge path to prevent discharged liquid from falling back into the pump. The entering liquid lifts a float which eventually trips a magnetic switch in the 'brain' at the top of the pump once the bladder is full.

This allows a pulse of air to enter the pump, opening the upper ball check valve and discharging the liquid. A ball check valve in the inlet path closes to prevent back pumping. A similar trip switch is located in the base so that the float eventually cause the air supply to shut off. The pump thus constantly fills and discharges as long as water is present.

Pipeline pressure testing

The launch of Pipeline Engineering's (PE) range of internal joint testers now makes unnecessary the time-consuming and expensive procedure of completely water-filling pipeline systems in order to hydrostatically test pipeline joints and components.

Saving valuable down-time and labour costs these specially developed tools are easily installed and removed by a single operator and can be used for testing welds, flanged joints and valves on pipelines up to 52in. NPS and ANSI Class 2500 pressure rating.

Ideal for either liquid or gas test mediums, the PE Internal Joint Tester comprises two high grade elastomeric seals which are expanded radially against the pipe bore. The resulting sealed annulus is remotely pressurised and monitored through the fill/pressure umbilicals. Furthermore the tool's ability to perform localised pressure testing enables additional operations to be undertaken in separate areas of the same system.

Hydraulic actuation allows the tool to be operated in either horizontal or vertical pipelines and specially designed insertion apparatus facilitates the negotiation of bends.

PE maintain that the price of the tool will be recovered in the savings accruing from just one test. Far more cost-effective than current hydrostatic testing methods, purchase of the tester is also an investment against future emergency repairs, maintenance schedules, periodic testing and local integrity checks according to the company.

The tool can be supplied ready for use upon its arrival on site. Pipeline Engineering provide the 'complete kit' — including hydraulic pump umbilicals and lifting straps for the larger units. The company carries extensive stocks of spares including elastomeric seals.

Surveillance data logger

A long-term surveillance data logger for the remote sensing of possible toxic gas emissions has just been announced by MST (UK) of Ferndown, Dorset.

With freedom from the need for costly cable runs, the MST Sentinel provides up to three months monitoring data without the requirement for mains power.

The Sentinel comprises a standard FMK 9002 sensor unit for the gas to be monitored coupled to a data logger — easily programmed for a variety of operational modes. The sealed lead-acid battery has a cut-off circuit preventing possible damage from deep discharge.

All component parts are housed in a rugged IP67 all-weather fibreglass enclosure.

Suitable for producing long-term emissions data on the boundaries of plant, the Sentinel requires low maintenance. The MST Sensor Cell service can maintain accurate gas calibration whilst a simple battery exchange is carried out at service intervals.

NOx reductions

Ionic Fuel Technology (IFT), a British based company specifically formed to develop, manufacture and market innovative fuel technology solutions, has developed a new unit which it claims can reduce toxic emissions at no cost in most cases.

IFT's claimed benefits of reduced costs and reduced emissions are particularly relevant in light of economic community directives that come into force next year. Britain will be required to reduce Nitric Oxide (NOx) emissions 15 percent in 1993 and by a further 15 percent in 2003. To do this industry will have to learn to burn more efficiently.

The key to the new generators is the liquid vibration system. This further enhances the efficiency and reliability of IFT's unique patented process that delivers OH negative ions into the primary combustion air of any heating system using fossil fuel — coal, oil or gas. The introductions of these ions increases flame temperature, which subsequently leads to an increase in combustion efficiency and a consequent significant saving in fuel cost.

The IFT ion generator is a 'stand alone' unit that can be easily installed with existing fossil fuel heating systems — there is no need for replacement of current boilers or burners and there is little or no downtime.

Analytical balance

The new HA-200A Analytical Balance from A&D Instruments is an advancement of the HA Series. Not only is this instrument easier to use, but it is also the first HA balance which can be incorporated easily into automated weighing systems.

The most striking features of a HA-A Balance are the exclusive, cylindrical and pillarless weighing chamber (which has been motorised) and the new display pod, incorporating many features from the HX Series. The weighing chamber has three circular side doors, each of which will rotate to open any amount and any degree (permitting the user an outstanding 200° panoramic access), and an additional top entry door.

In the HA-M Balances, doors are operated manually. In the HA-200A, the tinted glass side doors are automatically-controlled by means of a one-touch key.

Ergonomic innovations in the HA-200A include a new, dual-colour detachable display; new keyboard design; fully automatic and intelligent self-calibration; and increased weighing capacity, expanded to 210g. New weighing functions have been introduced, including counting, percent and comparator mode.

Microwave oil detector

The Microwave Oil Detector (MOD) is a device which utilises microwave transmissions to detect the presence of an hydrocarbon film on the surface of a body of water. It is the result of collaboration between Oil Pollution Environmental Control (OPEC) and the scientists in the Instrumentation Department of AEA Technology at Harwell laboratory who have applied microwave technology to the problem of detecting surface films.

The production model has been subjected to an extensive trial and development programme in a variety of practical situations and not only is it able to detect the presence of an oil film but can also indicate predefined film thickness within given limits.

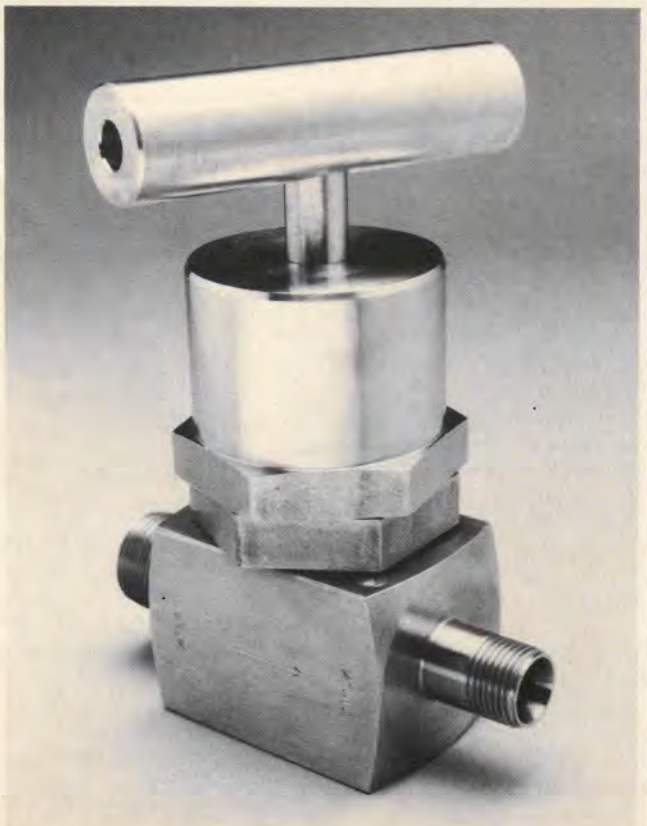
There are no moving parts in the system which utilises readily available commercial components combined with solid state electronics and this coupled with the fact that it is unaffected by fouling or floating debris such as weed, leaves, twigs, plastic, etc, or by ripples, small waves, currents, makes for a rugged and robust system.

The sensing head consists of a sealed module with the transmit and receive antenna which is carried on a corrosion resistant tubular aluminium floating raft provided with a weather cover. The raft also carries the fixed reflector.

Valve for remote subsea operation

Sabre Instrument Valves Limited has developed a range of hand valves for installation and actuation underwater.

Sabre Sub-Sea Valves have been designed for operation by either Remotely Operated Vehicles (ROVs), or by hand. The head unit features a large 'T' bar handle or drive actuator, ensuring precise location by robotic systems and deep-sea divers alike, whilst a two-part stem means that the handle does not move vertically in relation to the valve body when actuated. It can therefore be found in the same place at all times, regardless of valve status.



Infra red temperature measurement

AGEMA Infrared Systems has set a new standard in IR temperature measurement by launching the first thermography system with 12-bit resolution to combine high image quality with true one percent accuracy.

The ERIKA Thermovision 900 Series is a stand-alone infrared measurement system which successfully combines an enhanced optical scanning module with a purpose built real-time system controller, lenses, keyboard, mouse and VGA monitor, all in a lightweight modular unit.

Designed specifically for advanced R & D work in both military and industrial applications, for example in thermographic inspection of PCBs, materials testing and target signature analysis, ERIKA uses an advanced version of the proven LK4 scanning module to achieve high rates of data acquisition and quality images. By digitising the incoming signal close to the detector and using an improved method of compensating stray radiation, the amount of data deterioration is significantly reduced.

Light and weathering system

Heraeus has launched the Xenotest Alpha, a new series of modular units enabling test conditions to be matched with specifications and ensuring purchasers obtain only the test features required.

Combining excellent correlation with natural weathering results and a new control and measurement system, Xenosensiv, the Alpha comes with a range of modular options to enable virtually any test specification for light and weather-fastness to be met at an economic price.

The Alpha is suitable for a variety of test applications in the automotive, plastics, surface coatings, textiles, packaging and pharmaceutical industries.

The Xenosensiv® multisensor measuring system controls broadband ultra violet irradiance as well as black standard temperature at sample level, enabling precise control and calibration of the test to be performed.

Xenochrome® is a spectrum absorption filter system which meets the revised ISO and DIN test standards. Filters are also available to simulate and compare tests done in other Xenotest cabinets.

Microprocessor controls enable standard test specifications to be programmed according to users' requirements. An interface to either a PC or thermal printer provides an easy way of recording test parameters and data.

Humidification is provided by an aerosol-free ultrasonic system which can produce an environment with up to 95 percent relative humidity. A sample spray system for rain simulation is also an option.

Contact List

Rockall	081 848 0226
Ionic Fuel Technology	0702 603306
Bran & Luebbe	0604 880751
Heraeus Equipment	0277 231511
Logica	071 6379111
MST	0202 875753
Geotechnical Instruments	0926 338111
Pipeline Engineering	0748 818341
Oil Pollution Environmental Control	0924 442701
Shell Oils	061 488 3000
A & D Instruments	0235 550420
Sabre	061 928 4287
Agema	0525 375660

. . . people

Mr Bill Payne, above, has been appointed Commercial Director of KBC Process Technology Limited where he is responsible for KBC's sales and marketing worldwide outside the Americas. Mr Payne was previously Simulation Business Manager for KBC.

William Steward Northern Ltd has appointed **Mr Stuart Bolam** to the Board of Directors. Mr Bolam was previously Director Designate. He will continue to be responsible for seeking new business for the company's marine and offshore division — Sunderland Forge Services.

Sir Archibald Forster, below, Chairman and Chief Executive, Esso UK plc is to retire from the company in February. Sir Archibald, President of the IP from 1988–90, joined Esso in 1951 at Fawley Refinery and in 1964 was appointed refinery manager. He was logistics director of Esso UK in 1971 following which he undertook assignments with Exxon in the United States. Returning to London in 1975 as Vice President of Esso Europe he was appointed Managing Director Esso UK in 1978. In 1979 he took up his present position as Chairman and Chief Executive of Esso UK.

Mobil Oil Company Limited has appointed **Mr Geoffrey Cardinal** as Chairman to succeed **Mr Brian Davis** who has retired after 34 years with the company. Mr Cardinal joined Mobil in 1971 as a Planning Analyst and held several positions in the planning, marketing and analysis functions. In 1975 he moved into retail marketing and was appointed General Manager of Prime Garages Ltd. In 1982 he moved to Mobil Europe as Manager, Market Analysis and subsequently Manager, Public Affairs. In a series of moves he has worked as General Manager of Mobil's marketing and refining businesses in Cyprus, Norway and Austria. In 1991 he took a position in the newly formed Mobil Europe in London, responsible for all marketing services activities.

Expro International Group Limited have appointed **Mr Alan Binder** as Non-Executive Chairman. Mr Binder retired as President of Shell International Trading Company in 1991 after 34 years service. He is also Chairman of United Communications Ltd and a Non-Executive Director of New Frontiers Development Trust.

Mobil has appointed **Mr John Lay** as Manager, Lubes Operations at Mobil's Birkenhead plant. Mr Lay has worked for Mobil since graduating in Civil Engineering in 1979. He succeeds **Mr Phil Docherty,** Manager Lubes Operations for the past three years, who has been appointed to the position of Operations Manager, Mobil Oil Portugesa Lda.

Mr Derrel Baker, below, Engineering Manager for Oryx UK Energy Company won the 1992 UK Oil Industry Golf Championship.

Mr Tom Edmondson has been appointed General Manager, Production for Chevron UK Limited based in Aberdeen. He succeeds **Mr Greg Matiuk** who has moved to the United States as Vice President and General Manager Western Business Unit, Chevron USA. Mr Edmondson is responsible for Chevron UK's drilling and oil and gas production activities and interests, including the operation of the Ninian oilfield and the Ninian Third Party satellite programme. He will assume responsibility for Chevron's new Alba oilfield when it comes onstream towards the end of the year. Since May 1990 Mr Edmondson has been General Manager, Production for Chevron Nigeria Limited.

Brown & Root have appointed **Mr Odd Arnesen** to the position of Senior Manager Norway in its new Norwegian office. His responsibilities include marketing the company's marine capability and looking after client relations. Mr Arnesen will report to **Mr Larry Farmer,** Managing Director of Brown & Root Marine based in London.

Dr Leonard Magrill has joined the board of directors of Texaco Ltd. Dr Magrill joined Texaco in 1973 as an economist. In 1978 he was appointed Manager, Research and Planning and in 1984 was appointed Assistant General Manager, Systems Operations. Moving to General Manager of Supply Operations and Trading in 1989. In 1992 he was appointed as General Manager for the newly formed department, Strategic Planning and as Director, Strategic Planning, he continues to have responsibility for that function.

Mr Brian Goodland, above, has retired from the board of directors of Texaco Ltd. Mr Goodland began his career in the merchant navy, serving his apprenticeship with the Stanhope Steamship Company of London. He sailed with a number of other companies before joining Texaco in 1961. Mr Goodland joined the Texaco Ltd board of directors in 1983 and became Director, government relations in 1985. He has held his latest position as Director, safety and environmental affairs since 1989. Mr Goodland is a Fellow of the IP and Chairman of both the Membership and Environment Committees.

Kvaerner Oil and Gas have appointed **Mr Fredrik Behrens** as Director responsible for the company's international activities in the development of industrial infrastructure and yard development of oil related industries. **Mr Tor Aamodt** has been appointed Managing Director of Kvaerner Røsenberg AS and **Mr Jan Elverhaug** appointed as Technical Director of Kvaerner Engineering AS.

Institute News

Certificate of Appreciation Awards

David Soul
David joined the Hydraulic Fluid Test Panel STF-4F in 1972. He was chairman of this panel from 1979 to 1990. He became chairman of the Mechanical Test of Lubricants Sub-committee in 1989 and held this office until a change in job responsibilities forced him to relinquish it in 1991. He represented the IP on a number of BSI Technical Committees and has been an official IP delegate to the ASTM DO2 meeting. As well as his IP and BSI work he has been involved in a number of CEC committees and he is a recognised expert on lubricant testing.

Mr Mike Taylor, Chairman of subcommittee E, left, presenting the award to Mr Frank Wadelin.

Frank Wadelin
Frank joined the IP Bitumen Emulsion Panel ST 7B in 1959. He became chairman of the now termed ST E-4 panel in 1964, a post he held until 1975. He joined the main Bitumen Sub-committee ST E in 1961 and chaired it from 1966 until 1975. On retiring as chairman he continued to serve until finally retiring in 1985. During the period 1959 to 1985 he represented the IP on various BSI committees. He was an accredited expert on Bitumen Testing and outstanding in his service to both the IP and the bitumen industry.

Mr Mike Taylor, left, and Mr Bob Searby.

Bob Searby
Bob joined the IP Bitumen General Tests Panel ST E2 in 1983. He became chairman in 1986 a post he held until 1991. In 1988 he was appointed chairman of the Bitumen Sub-committee STE, a position he held until 1991. As well as his IP work he represented the IP on various BSI committees. He is a recognised expert and has done much to further the standardisation of bitumen test methodology in the industry.

Institute of Petroleum Irish Branch annual dinner

At the Institute of Petroleum Irish Branch annual dinner, Chairman Duane Deines addressed representatives of the petroleum industry in Ireland. While welcoming the new fiscal conditions set out in the 1992 petroleum taxation provisions of the Finance Act, and noting that competition was flourishing in the retail sector, in the wake of the withdrawal of restrictive legislation, Mr Deines sounded a cautionary note for 1993 with regard to issues such as excise arrangements, duty harmonisations proposals, point of entry VAT, and EC environmental legislation.

Pictured prior to the dinner are Mr John Loughrey, Secretary, the Dept of Energy and Mr Duane Deines, Chairman, Irish Branch.

Institute News

Launch of IP code

The latest IP code, *Well Control during the Drilling and Testing of High Pressure Offshore Wells,* was launched at the Altens Skean Dhu Hotel in Aberdeen last month.

Forming Part 17 of the IP Model Code of Safe Practice in the Petroleum Industry, it was welcomed by representatives of operating companies, contractors, equipment manufacturers and academia. Also present were members of the press, the IP Upstream Committee and the Aberdeen Branch as well as members of the committee whose hard work enabled the code to be produced.

Presentations were made by AEH Williams, former IP Director General and chairman of the code committee, who outlined the background to the new publication, and RW Eads, Esso Exploration and Production UK Ltd, who highlighted key parts of the code. They were followed by TAP Hamilton, who provided an HSE view on the code's importance and likely future improvements.

Copies of the code are available from the IP Library, price £60.

Around the Branches

Aberdeen
12 January: 'Oil Prospects in the Commonwealth of Independent States', S Kemp, Ramco.

Edinburgh and SE Scotland
21 January: 'Impact of SOx/NOx on Fuel Oil Sales', speaker from BP Oil.

Essex
13 January: 'The safety consultant — a necessary evil or an evil necessity', R Turner, Consultant, RT (Health and Safety) Associates.

Humber
21 January: 'The Killingholme Powergen CCGT Powerstation', G Miles, General Manager, Powergen.

London
19 January: 'European unity — a time for change and challenge', J Dean, Shell UK Downstream Oil.

Midlands
13 January: 'Waste Minimisation — A Novel Technology', P Howard, Leigh Environmental.

Northern
12 January: 'Processing Waste Oils,' Dr John Parker, Lanstar.

North-East
26 January: 'Cleveland County Emergency Plan', P Taylor, County Emergency Planning Officer.
9 February: AGM.

Shetland
9 February: AGM.

South Wales
19 January: 'Partnering — A Total Care Concept', C Smith, Market Development Manager, Furmanite Engineering Ltd.
18 February: AGM and 'Medieval dyes', D Redpath.

Southern
1 February: Annual General Meeting: Guest Speaker — Mr Charles Smith, President of the IP.

Yorkshire
12 January: 'Health and Safety — the Environment and Industry', DW Brown, BP Oil Europe.
9 February: AGM followed by Hot Pot Supper and guest speaker.

New Collective Members

Nabarro Nathanson
50 Stratton Street, London W1X 5FL. Telephone: 071-493 9933.
IP Nominated Representative: Mr Mark Saunders, Partner — Energy Department.

Nabarro Nathanson is an international law firm engaged in aspects of energy and natural resources law, including oil, gas, coal and power generation. The firm also has expertise in related legal fields, such as corporate, commercial, environmental, litigation, banking, competition law, construction and planning.

Utilicorp (UK) Ltd
21 Tothill Street, St James's, London SW1H 9LL. Telephone: 071-222 1288.
IP Nominated Representative: Mr Roger G Turner, Managing Director.

Utilicorp is the UK subsidiary of Utilicorp United, the midwest United States Gas and Electric Utility. Utilicorp (UK), through its operating company, United Gas, and its association with a number of regional gas companies, provides gas to a large number of UK industrial and commercial consumers.

UK Deliveries into Consumption

October 1992 — Tonnes

Products	*Oct 1991†*	*Oct 1992**	*Jan–Oct 1991†*	*Jan–Oct 1992**	*% change*
Naphtha/LDF	270,309	253,055	2,733,244	2,732,883	0
ATF—Kerosine	559,467	579,078	5,212,363	5,717,303	10
Motor Spirit	2,087,834	2,049,252	20,030,571	19,943,536	0
of which unleaded	896,297	996,392	8,143,862	9,250,771	14
Super unleaded	108,792	125,892	963,300	1,168,770	21
Premium unleaded	787,505	870,500	7,180,562	8,082,001	13
Burning Oil	219,463	223,772	1,879,082	1,938,632	3
Derv Fuel	986,597	976,487	8,928,970	9,199,765	3
Gas/Diesel Oil	650,812	671,283	6,553,113	6,439,621	−2
Fuel Oil	929,338	903,089	10,084,506	9,137,364	−9
Lubricating Oil	69,099	71,937	638,984	676,824	6
Other Products	670,050	606,147	6,063,697	5,819,764	−4
Total above	6,442,969	6,334,100	62,124,530	61,605,692	−1
Refinery Consumption	517,893	518,622	5,041,399	5,042,124	0
Total all products	6,960,862	6,852,722	67,165,929	66,647,816	−1

†Revised with adjustments *Preliminary n/a Not Available

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