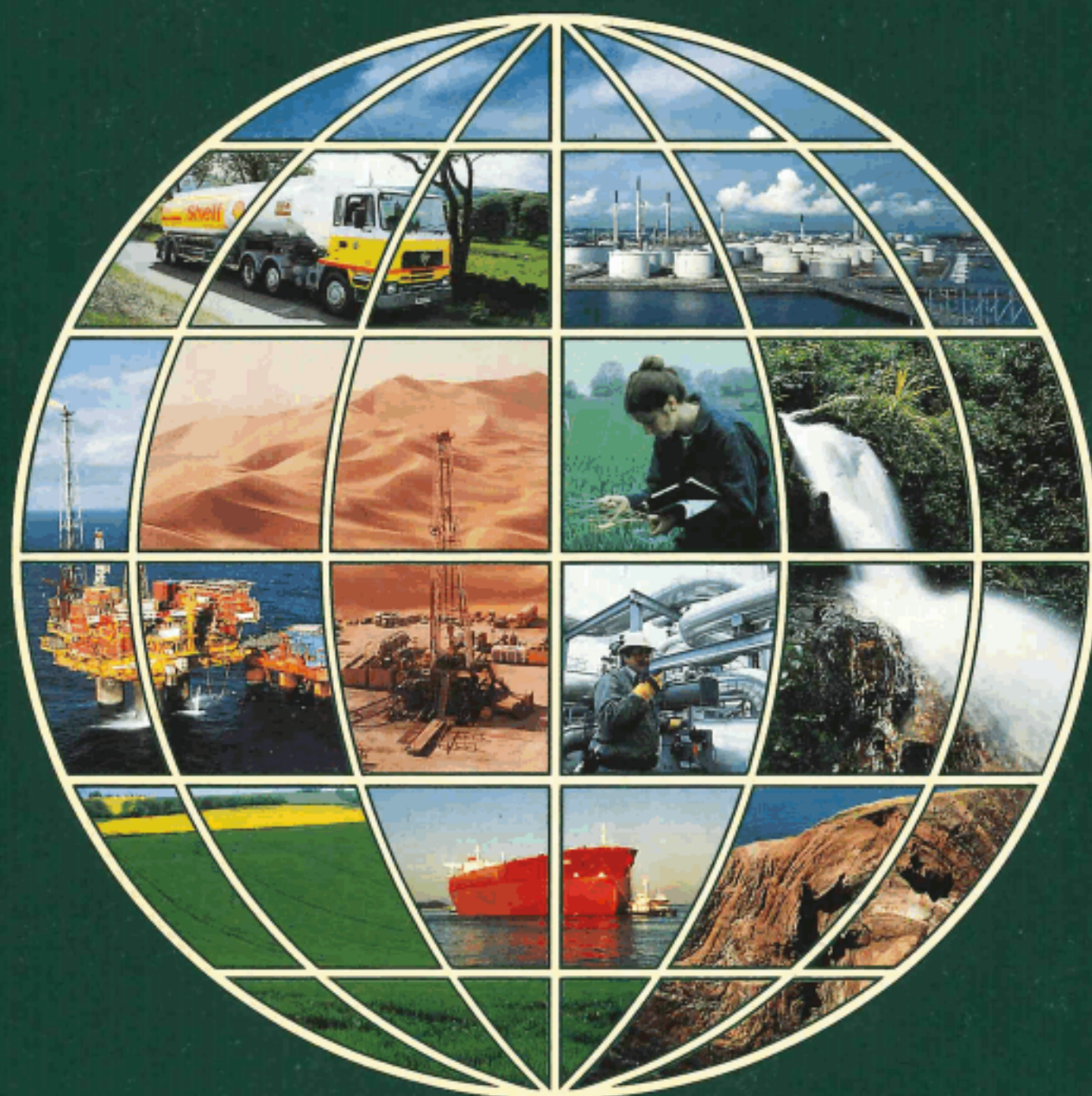




Shell and the environment



Shell and the environment

<i>It is the prerogative and responsibility of society to decide how best to reconcile economic growth and environmental protection.</i>	<i>Governments must interpret society's wishes through the policy options open to them. For long-term, sustainable environmental improvement to be achieved,</i>
<i>Environmental considerations must be weighed alongside other pressing social and economic requirements and objective judgements must be made about costs and benefits of environmental measures.</i>	<i>governments should aim to encourage the creativity and ingenuity of industry since self-regulation and market instruments are likely to be more effective than legislation and regulation in bringing this about.'</i>

Cor Herkströter,
president of Royal Dutch Petroleum Company
and John Jennings,
chairman of The "Shell" Transport and Trading
Company, p.l.c.
(from the Annual Reports, 1993)

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Shell companies have their own separate identities. In this briefing the collective expressions 'Shell' and 'Group' and 'Royal Dutch/Shell Group of Companies' may be used for convenience where reference is made to companies of the Royal Dutch/Shell Group in general. Those expressions are also used where no useful purpose is served by identifying the particular company or companies.

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Introduction

People need energy. They may not consciously need oil, gas and coal but they do need heating, lighting and transport. Energy is essential to economic development. At the same time, people demand that economic development is environmentally sustainable. Achieving the right balance between environmental and other needs of society (such as health, education and housing) or between international environmental goals and national economic priorities is a matter of continual public debate.

Industry's contribution lies in its technical and managerial expertise and its ability to find innovative solutions to balancing customer and environmental needs. This requires flexibility of action but also a constructive, responsible attitude towards the environment. This is not a new challenge. For many years, the very nature of their businesses has meant that Shell companies have sought to exercise good environmental stewardship. This has evolved as new tools, standards and management systems have been developed in line with increased knowledge and expectations. Shell companies have had a written environmental policy since 1969.

This edition of 'Shell and the Environment' (first published in 1992) describes the policies, with their emphasis on continuous improvement, which underpin the environmental strategies developed by Shell companies. It outlines the evolution towards an integrated health, safety and environmental

management system. Many case studies are included to illustrate the variety of ways in which Shell companies around the world are putting the policies into practice. This edition also features some of the industry associations through which Shell staff contribute to public policy debate on environmental issues and help to formulate standards and guidelines.

Data on environmental performance have most value at a national or site specific level and much information is provided by Shell companies to governments and the public. Shell companies also produce a number of publications which can be obtained directly from them. In addition, a list of Shell International publications is given on page 16. For more general background, some Shell videos on environmental and developmental issues are also listed.

<i>'Our objective is always to apply the best standard appropriate to the needs, priorities and development of the area concerned, meeting or exceeding local regulatory requirements, and placing emphasis on continuous improvement in environmental performance.'</i>

Cor Herkströter,
president of Royal Dutch Petroleum Company
and a Group managing director,
Royal Dutch/Shell Group of Companies, 1995

Comments on this publication are welcome and should be addressed to your local Shell company or to Group Public Affairs in London.

Managing the environment

'We do not apply different standards in the dishonest or cynical sense, but neither do we pretend that we operate in an identical manner around the world. Rather, it is a matter of aiming to improve each operation in the light of its own individual circumstances.'

Mark Moody-Stuart,
a managing director of The "Shell" Transport
and Trading Company, p.l.c.
and a Group managing director,
Royal Dutch/Shell Group of Companies, 1994

'Environmental protection should be an integral part of any responsible business strategy.'

John Jennings,
chairman of The "Shell" Transport and Trading
Company, p.l.c. and a Group managing director,
Royal Dutch/Shell Group of Companies, 1994

Figure 1 HSE policy development and review in the Royal Dutch/Shell Group of Companies

Changes to the Shell organisation were announced in March 1995. While these may lead to modifications of management structures and mechanisms, the principles underlying the management of HSE will not be affected.

Like health and safety, environmental management is first and foremost a responsibility of line managers and an integral part of business strategy. This involves finding practical ways of meeting responsibilities to shareholders, employees, customers and society.

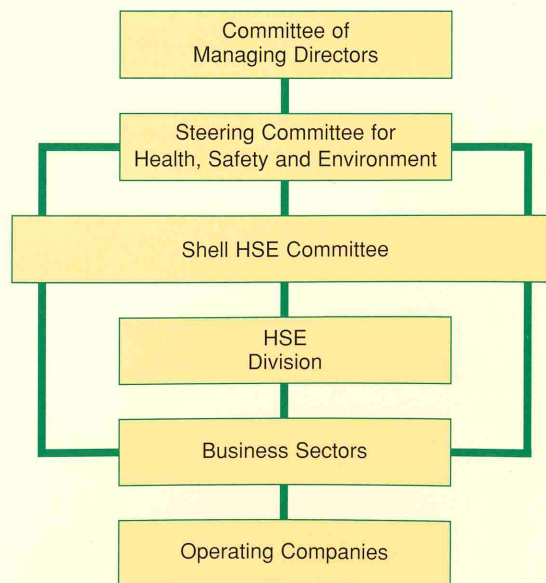
Within the Shell Group, businesses are managed in a decentralised manner, in which Shell companies have their own legal and national identities, together with responsibility for their performance and the long-term viability of their operations. Thus, in environmental matters, individual Shell companies set their own detailed goals and targets, reflecting the national, legal and cultural background in which they work. However, individual Shell operating companies seek the advice and support of the service companies (page 5) who offer policy, strategy and technical guidance and also conduct annual appraisals of their environ-

mental performance and plans. The service companies thus ensure that the combined experience and knowledge of Shell companies are available to local management when needed.

Shell companies' environmental policies and practices are governed by the principles outlined in two key policy documents. The Statement of General Business Principles (page 14), first published in 1976, states:

'It is the policy of Shell companies to conduct their activities in such a way as to take foremost account of the health and safety of their employees and of other persons, and to give proper regard to the conservation of the environment. Shell companies pursue a policy of continuous improvement in the measures taken to protect the health, safety and environment of those who may be affected by their activities.'

Shell companies establish health, safety and environmental policies, programmes and practices and



integrate them in a commercially sound manner into each business as an essential element of management.'

The Policy Guidelines on Health, Safety and Environment (page 14), first published in 1977, have been revised from time to time to reflect increasing knowledge and changing public expectations.

The management structure for developing and reviewing health, safety and environment (HSE) policies is shown in Figure 1. The Committee of Managing Directors (CMD) considers and develops overall objectives and long-term plans for recommendation to the operating companies. The Steering Committee, chaired by a Group managing director, reviews annually Shell policy and its world-wide implementation. This committee is supported by the interfunctional Shell HSE committee which brings together the managerial and technical resources of the service companies and provides advice and guidance to assist operating companies in implementing their HSE policies and programmes. The business sectors provide more specific advice and manuals. The HSE division coordinates matters affecting more than one business and maintains databanks of environmental and toxicological information on products. Specialists provide advice on environmental aspects of operations and products.

An integrated approach

Effective HSE management is more crucial than ever. Legislation is becoming more stringent and public expectations are high. Within Shell, individual management tools and systems have evolved over many years. These now need to be integrated into the business in a more structured way to provide managers with the assurance that they are discharging their responsibilities effectively. As a result, HSE Management System guidelines have been developed in Shell which

Case study – Research and the environment

Shell companies spend almost \$800 million a year on research and development, employing some 6000 people in 12 laboratories around the world. Significant effort is devoted to environmentally related research to provide the technology for improved environmental performance and to meet market needs for 'cleaner' products. Research also provides the technology base to ensure compliance with regulations and to meet possible future legislative and market requirements. Activities fall into four categories: assessment (testing, monitoring, modelling and evaluation), replacement (new or improved products or processes), treatment (effluents, soil and ground-water remediation) and waste processing (for recycling or disposal).

The fruits of such research include:

- a mobile unit for monitoring air quality in large areas such as oil field facilities and refineries
- the development of a system of 'artificial streams' for measuring the environmental impact of chemicals which has been accepted by authorities for regulatory risk assessment
- new tool kits for assessing and evaluating contaminated sites which involve novel analytical methods and data interpretation as well as selection and optimisation of remedial techniques
- the development of slimhole drilling techniques and water based drilling fluids for exploration and production activities, especially in environmentally sensitive areas
- a reduction or elimination of volatile organic compounds in

resins applications (eg. water-borne coatings and powder coatings)

- a 'denox' catalyst system to remove nitrogen oxides from combustion flue gases and other gas effluent streams at low temperatures. Applications include industrial furnaces, chemical manufacturing plants, gas turbines, waste incineration plants and nitric acid plants. The system has won several environmental awards
- a mobile biotreater for the optimisation of waste water treatment at manufacturing and production sites.

'The challenge for the fossil fuel industry is to continue to invest and provide for the future energy needs of society in an environmentally acceptable manner while maintaining the economic viability of the industry.'

Cor Herkströter,
president of Royal Dutch Petroleum Company
and a Group managing director,
Royal Dutch/Shell Group of Companies, 1993

provide a framework for integrating HSE matters into the business. They build on experience with management systems in a number of Shell companies. Key elements include:

- integration throughout the business with accountabilities defined at every organisational level
- a focus on the hazards and effects of the business to ensure the identified risks to health, safety and the environment are adequately addressed (the Hazards and Effects Management Process)
- the application of Quality Management principles which will facilitate possible certification against quality standardisation bodies such as ISO 9000.

One of the aims of the system is to give ownership of standards and procedures to all concerned, including contractors working on behalf of Shell companies. This will result in each person being accountable for maintaining these standards and implementing procedures within his or her area of responsibility.

Implementing HSE Management Systems throughout Shell companies will require considerable effort and will take time. However, the result will be not only improved health, safety and environmental performance but also an enhancement of overall business efficiency.

HSE training developments

HSE training in Shell is changing to meet the needs of integrated HSE management. The goal is to define

HSE competencies – or skills – for appropriate jobs. The aim is to foster a culture in which all those who are able to influence environmental performance are familiar with overall Shell environmental goals and practices and are able to make positive individual contributions.

Environmentally related expenditure

The costs of preventing, controlling or reducing emissions, discharges and wastes at operating facilities are regarded as a normal part of conducting business. These amounts are thus not accounted for separately. However it is estimated – based on allocations and managerial judgement – that Group companies in Europe and North America incurred amounts of the order of £950 million in 1994.

Capital expenditure to limit or monitor hazardous substances or releases include both remedial measures on existing plants and integral features of new plants. Some environmental expenditures are readily identifiable: others must be reasonably estimated or allocated based on technical and financial judgements developed over time. Against this background, it is estimated that Shell companies with major capital programmes spent some £580 million in 1994. It is likely that they will spend at least a further £500 million a year in 1995 and 1996.

In addition, substantial sums have been set aside for expenditure on decommissioning and site restoration, including oil and gas platforms.

The Royal Dutch/Shell Group

The Royal Dutch/Shell Group of Companies has grown out of an alliance made in 1907 between Royal Dutch Petroleum Company and The "Shell" Transport and Trading Company p.l.c., by which the two companies agreed to merge their interests on a 60:40 basis while keeping their separate identities.

The parent companies, Shell Transport and Royal Dutch, do not engage directly in operational activities. They are public companies, one domiciled in the Netherlands and the other in the UK. The parent companies own, directly or indirectly, the shares of the three Group holding companies, but are not themselves part of the Group. They appoint directors to the boards of the Group holding companies, from whom they receive income in the form of dividends.

Two Group holding companies, Shell Petroleum N.V. (based in the Netherlands) and The Shell Petroleum Company Limited (in the UK), between them hold all the shares in the service companies and, directly or indirectly, all Group interests in the operating companies, other than those held by a third Group holding company, Shell Petroleum Inc. in the USA.

The main business of the service companies is to provide advice and services to other Group and associated companies, excluding Shell Petroleum Inc. and its subsidiaries.

The management of each operating company is responsible for the performance and long-term viability of its own operations, but can draw on the experience of the service companies, and, through them, of other operating companies.

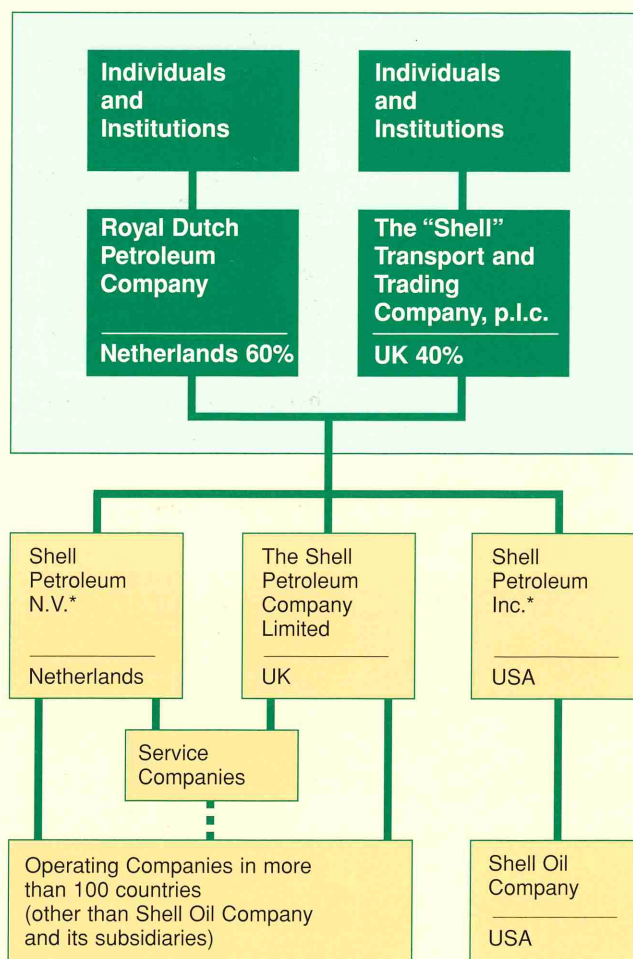
Today, Shell companies have interests in more than 2000 companies in more than 100 countries around the world. They are involved in oil and gas exploration and production ('upstream' activities) and refining, transportation and marketing ('downstream'

activities). Their world-wide chemicals operations place them among industry leaders and the Group also has interests in coal and other businesses such as forestry and solar power.

Some 106 000 people work for Shell companies, supported by contractors and their employees, and more than 70 nationalities are on the international management staff, spending some of their working lives in countries other than their own.

Figure 2
Structure of the Royal Dutch/Shell Group of Companies

— Shareholding relationship
- - - Advice and services



* Shell Petroleum N.V. holds equity shares in Shell Petroleum Inc. which are non-controlling but entitle it to the dividend flow from that company.

The role of industry associations

'Economic growth provides the conditions in which protection of the environment can best be achieved, and environmental protection, in balance with other human goals, is necessary to achieve growth that is sustainable.'

Introduction to the ICC Business Charter for Sustainable Development

Shell staff are actively involved in a range of national and international associations through which they contribute to public policy debates on environmental issues and help to formulate standards and guidelines. The international ones include:

APME (Association of Plastics Manufacturers in Europe):

Founded in 1976 to handle polymers industry interests including the development of a European strategy for the polymers industry in health, safety and environmental matters. A key project is its European Strategy for Environmental Policy of Resource Optimisation which demonstrates commitment to cradle-to-grave responsibility for polymers from production through to recovery and final disposal.

BIAC (Business and Industry Advisory Committee to Organisation for Economic Cooperation and Development – OECD):

Constituted in 1962 as an independent organisation officially recognised by OECD as representing business and industry. Environmental activities are covered by its environment committee, chemicals committee and task force on hazardous wastes.

CEFIC (European Chemical Industry Council):

Founded in 1972 to represent the European chemical industry to European and international authorities and organisations. Projects include promotion of Responsible Care programmes and environmental reporting and studies on waste management, risk assessment and life cycle assessment (LCA).

CONCAWE (The Oil Companies' European Organisation for Environment, Health and Safety):

Founded in 1963 to study environmental issues of refining. Its reports

(eg. on refinery emissions and waste, pipeline spills, auto emissions and effects on air quality) provide technical, scientific and economic information to enable regulatory authorities to make balanced decisions.

E&P Forum (The Oil Industry International Exploration and Production Forum):

Founded in 1974 to represent the interests of the upstream oil and gas industry with international regulatory bodies. It also contributes to continuing improvement in industry operating practices which enhance safety and health and minimise impact on the environment, and provides technical advice to industry and other bodies. Publishes guidelines on operating in environmentally sensitive areas such as Arctic and sub Arctic areas, mangrove wetlands (jointly with The World Conservation Union) and rain forests.

EUROPIA (European Petroleum Industry Association):

Founded in 1989 to promote understanding of the oil industry's contribution to technological, economic and social progress, to contribute to the study and solution of issues arising from the manufacture and use of petroleum products and to offer views on proposed European Union (EU) regulations or directives concerning the oil industry.

ICC (International Chamber of Commerce):

Founded in 1919. Now represents more than 7000 companies and business associations in 140 countries. Has consultative status with the UN. Set up Commission on Environment in 1978 to help industry formulate environmental policies and prepare business input to intergovernmental and other international projects. Environmental issues addressed within the ICC include climate change, environmental management standards,

environmental labelling and waste management. Published and promoted the Business Charter for Sustainable Development – a 'green code' for business.

IPIECA (International Petroleum Industry Environmental Conservation Association):

Founded in 1974 to provide an industry perspective on environmental issues on a global basis. Is the oil industry's main channel of communication with UNEP (United Nations Environment Programme). Ran a series of influential seminars on climate change and oil spill contingency planning.

OCIMF (The Oil Companies' International Marine Forum):

Formed in 1970 to promote the safe conduct of tanker and terminal operations and pollution prevention. Produces codes of practice and guidelines used as reference by industry, governments and regulatory authorities. Has consultative status at International Maritime Organisation (IMO) – the specialist UN agency dealing with marine issues.

WBCSD (World Business Council for Sustainable Development):

Formed at the beginning of 1995 as a result of a merger between the World Industry Council for the Environment (WICE) and the Business Council for Sustainable Development (BCSD). It aims to be a catalyst for change within industry, ensuring that international business has an effective voice on key environmental and sustainable development issues.

International codes and guidelines with which Shell companies' policies are consistent include the ICC Business Charter for Sustainable Development, the E&P Forum's series of guidelines and the chemical industry's 'Responsible Care' programmes.

Case study – An environmental programme in Nigeria

Shell Petroleum Development Company (SPDC) of Nigeria is the operator of a joint venture on behalf of Nigerian National Petroleum Corporation (55 per cent), Shell (30 per cent), Elf (10 per cent) and Agip (five per cent), producing about half of Nigeria's total production of oil. It operates in the Niger Delta in a variety of extreme habitats, including humid swamp forest, mangrove swamp, seasonally-flooded forest and sea.

Practices today are very different from those applied when most of SPDC's facilities were constructed between the 1960s and early 1980s. They were acceptable then and in line with standards of technology then prevalent, but they would not be built that way today. SPDC's environmental effort has evolved since the early 1980s and is focused today on a detailed programme of continuous improvement. The drive is to make the environment central to all activities within SPDC and build more awareness among staff.

Programmes and plans include:

- replacement of ageing facilities – eg. flowlines and flowstations
- improvement of operating and maintenance practices
- improvement of oil spill response and clean up
- a waste management programme with targets for reductions
- minimisation of land use by eg. horizontal drilling, well 'clustering' and low intrusion seismic techniques
- reduction of gas flaring. This depends on national energy policy – there are no instant solutions. Projects will take time to develop. These include supplying gas to

the Nigeria liquefied natural gas plant, a project being developed by Nigeria Liquefied Natural Gas Limited at Bonny in the Niger Delta.

In addition, a major independent environmental survey is being sponsored to evaluate the physical and biological diversity of the Niger Delta. The results will help federal and state governments and industry to plan development better and minimise impact on the environment. The survey complements SPDC's environmental programme which will be modified where necessary as results become available.

Putting the policies into practice

'Continuous improvement in environmental protection simply is good business: prevention pays, and is superior to end-of-pipe solutions.'

John Jennings,
chairman of The "Shell" Transport and Trading
Company, p.l.c. and a Group managing director,
Royal Dutch/Shell Group of Companies, 1994

Environmental auditing and impact assessment

Environmental auditing has long been recognised by Shell companies as a valuable internal management tool to help assess management controls, systems, procedures and responsibilities. It forms an important element in a comprehensive approach to managing environmental activities. Shell companies regularly carry out such environmental or HSE audits, including larger audits every one to five years under the direction of experts from the service companies.

Environmental assessment (EA) is a procedure for identifying, assessing and controlling the effects of an activity on the environment. It is a useful planning tool, both for new activities and where modifications are planned for existing facilities. An EA enables environmental acceptability to be built into a project right from the outset

ensuring, for example, that any damage caused, such as the necessary felling of any trees, is kept to the minimum and that the area will be restored where possible when operations have ended. Shell companies have conducted EAs for many years, often in association with external organisations such as universities, scientific institutes and, on occasion, environmental and conservation groups.

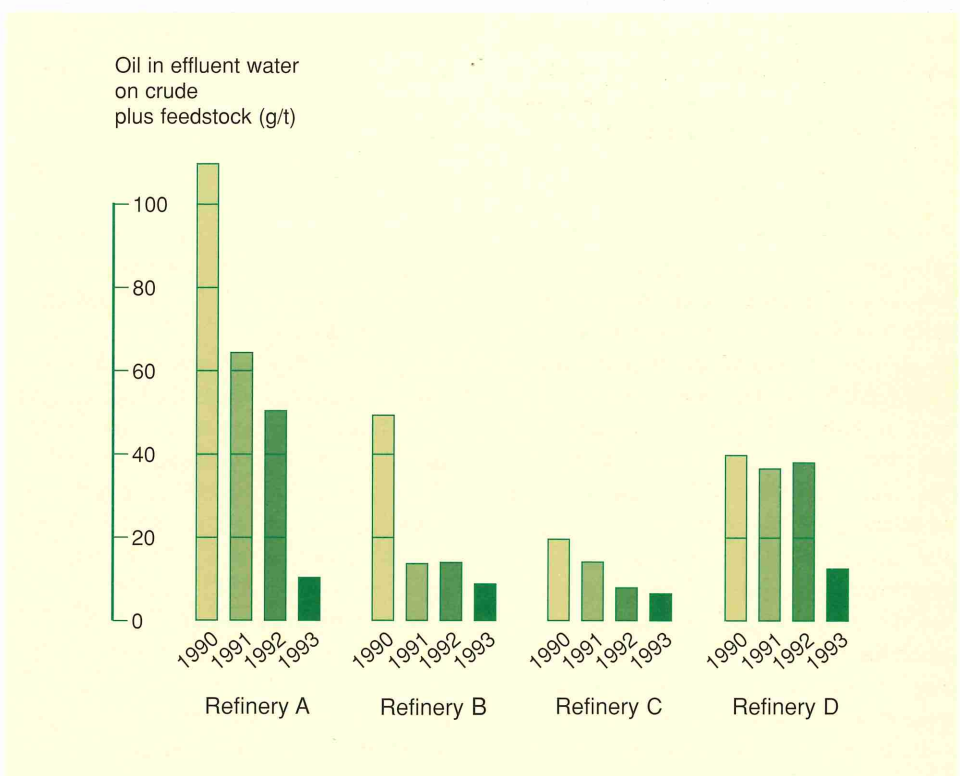
Emissions and effluents

In line with the strategy of continuous improvement in environmental performance, Shell companies prepare quantitative inventories of current emissions, effluents and discharges from each Shell operation. In line with the well established practice of setting targets for safety, many Shell companies are setting quantitative targets for reducing emissions, discharges and wastes as part of their

'Good intentions are not enough; companies must be open and forthright about problems and responses.'

John Jennings,
chairman of The "Shell" Transport and Trading
Company, p.l.c. and a Group managing director,
Royal Dutch/Shell Group of Companies, 1994

Figure 3
**Effluent water
quality trend
from Shell refineries**



environmental management plans. The main discharges from Shell companies' operations are:

- sulphur dioxide (SO₂) – mainly from refineries during heat and power generation
- nitrogen oxides (NO_x) – at refineries and production locations
- volatile organic compounds (VOCs) and methane – mostly from oil and gas production, from refineries and during distribution and retail operations
- halons and CFCs – used mainly in offshore fire fighting and refrigeration equipment and in plastics processing (These are being progressively eliminated.)
- oil discharges in water – from oil production and refinery operations
- solid and liquid wastes.

Significant improvements have been made in reducing oil and other discharges to surface water. Figure 3 shows the improvements over the last four years in effluent water quality from four Shell refineries as a result of both improved management and capital investment. (The case studies 'Refining and the environment' and 'Research and the environment' give further examples of how Shell companies are reducing effluents and emissions.)

Shell companies have actively promoted the development of scientifically based systems to assess risks related to soil and groundwater contamination. Programmes are underway to prioritise work to be carried out over the next few years. For example, in The Netherlands, Nederlandse Aardolie Maatschappij (NAM) began a study of the soil beneath its 800 sites in the mid-1980s. The study resulted in a priority ranking, with decontamination work having been started on the highest priority cases. In the UK, a risk assessment programme of Shell retail sites known as 'HEAL' has been undertaken (see Case study, page 15).

Marine pollution

Reducing oil pollution from offshore production facilities or tankers, whether from routine operations or from accidents, demands adherence to high management standards within the industry. Prevention is accepted as the best of all oil spill responses, and Shell companies put considerable effort into training and establishing high standards of operations aimed at reducing the risk of incidents occurring. Over the years, Shell companies have led the way in many operational and technical developments to minimise pollution from all sources and to raise general standards within the industry.

Ships likely to be chartered by Shell companies are inspected regularly. More than 3000 separate inspections are made a year under the 'SAFE' (Ship Assessment For Employment) inspection scheme which in 1992 was enhanced to embrace the principles of 'positive vetting'. Shell is also an active participant in an industry 'Ship Inspection REport' (SIRE) programme to which reports submitted by member companies are made available to members and certain third parties.

Regrettably, accidents happen and comprehensive contingency planning is essential to minimise the effect on the environment. Oil spill response plans for Shell companies are developed on the basis of the accepted 'tiered' philosophy, whereby the extent of resources mobilised depends on the severity of the spill. An oil spill advisory service provides advice and training to assist operating companies in developing, refining and exercising their emergency response arrangements. In the event of a major spill, Shell companies have access to the extensive clean-up equipment provided by the global and regional industry-managed Tier three response centres based in Southampton, Singapore and the Caribbean. ►

Case study – Improving techniques in the upstream

Low intrusion seismic surveys and modified drilling techniques are among the ways of reducing the environmental impact of exploration and production activities. For instance, in seismic surveys through forest areas, cuts have been typically reduced from an average of six metres to one to two metres in width.

- **In Brunei**, the 1992 three-dimensional seismic survey for the Lumut and Rasau regions started with an environmental assessment to understand the environment through which the seismic lines would pass and specify guidelines for the whole survey. The area included coastline, light residential areas, coastal jungle, two forest reserves and many plantations. Measures included the banning of heavy equipment, the use of small or specialised rigs, hand cutting only, camps in areas already cleared, holes flushed rather than drilled and the monitoring and recording of all wastes. A special condition in the more sensitive areas was to preserve young trees which were more than one centimetre thick.

- **In The Netherlands**, Nederlandse Aardolie Maatschappij (NAM) has developed special measures for drilling in a populated area where houses may be only 50 metres from the rig. These include a heavily insulated rig and 10 metre high screens to reduce noise levels, asphalt covered drilling sites with concrete gutters to collect water for use in operations or for treatment before discharge and 'production clusters' – deviated wells drilled from a single location rather than spreading them across the countryside. Drilling rigs are in place for a short while only and are removed once the exploration activity is complete.

Other Shell companies are applying similar techniques to enable them to operate in areas of environmental sensitivity.

'It is of no help to overlook the choices that society has to make. Insisting on solutions in one area without recognising their impact elsewhere is not useful.'

Lo van Wachem,
president of Royal Dutch Petroleum Company,
and Sir Peter Holmes,
chairman of The "Shell" Transport and
Trading Company, 1992

'Environmental problems require governments, environmentalists and industry to unite in partnership, not in confrontation.'

Lo van Wachem,
president of Royal Dutch Petroleum Company,
and Sir Peter Holmes,
chairman of The "Shell" Transport and
Trading Company, 1992

Waste

Shell companies recognise that proper waste management is good business as well as being environmentally responsible. A detailed Waste Management Guide helps Shell companies to produce policies and procedures on waste management for themselves and their contractors. Emphasis is placed on reducing waste at source through fine-tuning or re-designing industrial processes. For instance, waste disposal from Shell chemical plants – especially disposal to landfill – has been progressively reduced.

In the management of post-consumer waste, plastics are often highly visible because of their heavy usage in packaging. Landfill has been the most common method of disposing of plastic waste but this is increasingly viewed as a loss of valuable raw material or energy. Mechanical recycling (converting used plastic products into recycled plastic products) is becoming more widely practised and research is underway to find means of expanding its use. However, recycling is limited by collection, market and economic constraints. Energy-from-waste plants – where the energy content of the waste is used to generate heat or electricity – are useful means of exploiting the high energy content of plastics. **Any waste disposal option must form part of an integrated programme of waste management, which also includes options for reduction at source.**

Life cycle assessment (LCA) – a process used to evaluate all environmental burdens associated with a product, process or activity – is an approach which provides a factual basis on which decisions affecting the use of plastics and other products can be made. The technical and environmental centre of the APME (set up in 1990 with Shell support) has been a leader in applying plastics life cycle assessment

studies. Shell companies are participating in the development of life cycle analyses in several product areas.

Product stewardship

Defined as 'the responsible and ethical management of a product during its progress from inception to its ultimate use and beyond', product stewardship is used by Shell companies as an important element of HSE policy. A 'product', as a chemical or mixture of chemicals, can range from an oil product to a speciality chemical. Product stewardship is essentially about managing the risks associated with a product. Risk is a function of the product hazard and exposure to the product. Many products have intrinsic hazards associated with them, including flammability, toxicity or persistence in the environment. Hazards must first be identified and quantified. As little can be done to reduce the intrinsic hazards, the focus is on reducing the likelihood, degree and time of exposure to people and the environment.

Product stewardship embraces all activities associated with a product, aimed at ensuring that products are developed, produced, packaged, transported, marketed, used and disposed of safely without damaging health or the environment.

The main source of stewardship information on a product is the Safety Data Sheet. These are available for all hazardous oil and chemical products and work is in progress to make them available with verified data for all products marketed or used in operations. To support this, the central databank is being enhanced to provide a more comprehensive and accessible source of HSE information. These initiatives will help to meet a growing requirement for HSE information on products which in many cases is becoming a condition of their sale.

Climate change

The possibility of climate change caused by an enhanced greenhouse effect is probably the most prominent global environmental issue of today. Action to strengthen efforts to combat the rise in greenhouse gas concentrations was taken at the Earth Summit in Rio de Janeiro in 1992 with the signing of the Framework Convention on Climate Change which came into force in March 1994. The first meeting of the signatories to the Convention took place in Berlin in March 1995. Shell companies are actively involved in the public policy debate on this issue, with national governments and through bodies such as IPIECA and the ICC.

Despite the scientific uncertainty associated with this issue, **Shell companies accept that there is enough indication of potential risk to the environment for governments to address the issue.** Any actions need to be based on sound science with due regard for costs and benefits and must take account of the economic needs and aspirations of both the developing and developed world. Policies beyond 'no regrets' measures could be premature, divert economic resources from more pressing needs and further distort markets. The energy industry will continue to be driven by markets towards improving supply costs and energy efficiency to meet long-term demand.

Shell companies are making their own contributions in a number of ways.

- The use of CFCs (in refrigeration equipment and in the manufacture of polyurethane foams) and halons (in fire fighting equipment) is being progressively eliminated.

- Energy efficiency in Shell-operated refineries has doubled in the last 30 years and further improvements are being made. For example, at Shell Haven refinery in the UK

Case study – Refining and the environment

The environmental performance of many refineries is being improved to comply with increasingly stringent legislation. This applies to many Shell refineries which were built decades ago when environmental awareness was not what it is today. Many are therefore undergoing retrofitting programmes, the costs of which are higher than the cost of incorporating the same environmental protection measures in new designs. Examples include:

- At the Pernis refinery in The Netherlands, a \$1.7 billion rejuvenation programme is underway to construct new units which will enable the refinery to meet the demand for lighter and environmentally cleaner transportation fuels and help to reduce emission levels. A further \$0.5 billion will be spent over the next 10 years mainly on environmental improvements of existing facilities.

- High efficiency sulphur recovery systems have recently been installed at refineries in Sweden, Australia and France and are shortly to be started up in plants in New Zealand and Argentina.

- Advanced type biotreaters which also de-nitrify the water effluent have been installed at refineries in Sweden, Germany and Thailand and are planned for other locations.

- Stanlow refinery in the UK and Pulau Bukom refinery in Singapore have built enhanced water treatment facilities to upgrade their effluent water quality. Both refineries have received environmental awards for their efforts.

Conservation projects on refinery sites also help to improve the environment. Examples include the establishment of a waterbird reserve on wetlands at the Clyde refinery near Sydney, Australia and the identification of more than 400 species of flora and fauna at the Stanlow refinery in the UK, confirming it as an important wildlife reserve.

Case study – Site restoration in Australia

When the Yellow Rock Colliery in New South Wales closed in 1987 after 17 years of operations, Shell Australia undertook to restore the site to its original condition. A rehabilitation plan was submitted to the government and the local council for approval. The main objectives were to return the site to its pre-mining land capability, stabilise disturbed areas within the site and prevent any contamination of nearby water catchments. The programme involved:

- transporting recoverable coal offsite. (The fine coal was sold and the coarse reject coal was used as waste covering and landfill by local councils)

- recontouring the site to suit the local topography

- stabilising coal fines ponds and reject emplacements

- drainage and erosion control

- water treatment and pollution control

- revegetation, including pasture and rain forest trees.

Among the innovative features of the programme were the application of special biodegradable matting for erosion control and the use of duck boards to enable heavy earth moving equipment to enter the ponds to excavate material.

The site was inspected by the authorities in mid-1994 and the rehabilitation was pronounced a great success. It received High Commendation in the competition for the prestigious Award for Environmental Excellence in the New South Wales Minerals Industry.

'A company's environmental programme can only be built around 'doing it right', integrating technological, economic and managerial aspects to yield demonstrable cost-effective environmental benefits.'

'Environmental programmes must reflect the fact that expectations have changed dramatically over the past decade, and are continuing to change.'

Mark Moody-Stuart,
a managing director of The "Shell" Transport
and Trading Company, p.l.c. and
a Group managing director, Royal Dutch/Shell
Group of Companies, 1994

energy management initiatives resulted in savings of more than £500 000 in 1993. Improvements are due to investment in a new power generation system and better monitoring and targeting of fuel usage, steam production and electricity consumption and generation.

- The Shell Coal Gasification Process technology can be used to generate electricity with lower carbon dioxide emissions compared to conventional coal fired plants.

- Energy can be used efficiently in waste heat to power schemes or combined heat and power projects. In Sweden, waste heat from the Shell refinery at Gothenburg is fed into the city's central district heating system, saving the city around half a million barrels of oil a year and improving the refinery's efficiency by about 25 per cent. In Denmark, gas from the Shell refinery at Fredericia is burned in a turbine, producing electricity; the hot exhaust gas is used to heat crude oil, and additional heat is recovered and used in the local district heating system.

- Shell companies give financial support to the Global Change Forum of the Massachusetts Institute of Technology, have sponsored research into cloud processes at the Meteorological Office in the UK and into ocean/atmosphere exchange at the Lamont Doherty Observatory in the USA.

Renewable energy

Some renewables offer environmental benefits over fossil fuels but their use on a commercial scale has been limited by cost, except in some 'niche' developments such as rural electrification schemes using photovoltaics. However, the technologies are improving and for some the costs have already fallen significantly. The trend of learning by

experience is set to continue and over the next decades, some of these may well become commercially competitive, earning their share of the energy mix through market mechanisms, as oil did at the end of the 19th century. This would allow energy supplies to be sustained at a time when the contribution from fossil fuels reaches a plateau and then starts to decline.

The most promising markets for renewables are in heat and power generation either directly (using photovoltaics) or indirectly via biomass gasification. Studies into the use of liquid biofuels have shown that there is little or no gain to the environment or national economies from their use in automotive fuels, and that they are some four to six times more expensive than conventional fuels.

In the past 20 years, Shell companies have spent some \$100 million on renewable energy projects and R&D. Today the main focus is on photovoltaics and biomass. For example, Shell is involved in a project in Brazil to generate electricity from wood using Biomass Integrated Gasification/Gas Turbine technology, (see Case study opposite).

Forestry

Shell forestry operations are limited mainly to tree plantations for supplying raw materials to wood processing industries. They do not involve the tropical timber trade. They are conducted in accordance with environmental guidelines laid down for all Shell forestry projects. For instance, environmental assessments and consultations with interested parties, including local people, are essential parts of the planning process. Tree plantations are established only on non-forested land which studies have identified as suitable. Sensitive or valuable ecosystems, such as natural forests, are conserved. The effects of a

plantation on its environment – including social, economic and physical impacts – are monitored throughout the life of the project.

As a contribution to the debate on the environmental and social acceptability of tree plantations for wood production, SIPC together with the World Wide Fund For Nature (WWF), has produced the Tree Plantation Review, a series of eleven independent reports on a range of economic, social and environmental issues which affect development of forestry plantations. These studies have been used to develop a set of guidelines for best environmental practice in plantation forestry.

Case study – Closing the loop – recycling plastics products

Shell has a 50 per cent share in Wavin, Europe's largest processor and recycler of plastics products. Based in The Netherlands, the company manufactures plastic pipe systems, film, crates and extruded profiles, employing some 6000 people in 18 European countries.

The company has more than 25 years experience of recycling – turning waste into high quality products. About half of the bags and film which Wavin manufactures is made from recycled material. The company is also a market leader in the manufacture of returnable plastic crates – an example of 'closing the loop'. It has set up collection schemes for excavated plastic pipes which are then recycled into pipes for use in non-pressurised applications such as sewage systems.

Wavin has introduced an Environmental Care System throughout Europe which covers production processes, materials and products as well as research into improved recycling techniques. For example, Wavin Films has developed a technique for turning recycled material into high-quality film packaging with reduced wall thickness.

Case study – Electricity from wood

Biomass Integrated Gasification/Gas Turbine (BIG/GT) technology depends on the efficient combustion of wood grown on a farming basis to generate hot fuel gases used to drive a gas turbine which in turn generates electricity. The process is 'carbon neutral' to the atmosphere as the carbon dioxide released in the combustion process is, in net terms, absorbed by the new growth in the plantation which replaces the wood burned in the power plant.

Shell companies are involved in the development of a commercial BIG/GT demonstration project in Brazil, a world first. The project has financial support from the UN Global Environment Facility (GEF), which funds projects deemed to benefit the global environment. In this context the GEF has identified an important role in bringing forward the development of renewable energy technologies which appear close to commercialisation and which are suited to widespread dissemination.

The technical uncertainties associated with the BIG/GT technology have largely been resolved and discussions are now underway on the commercial arrangements. A two stage joint venture may be set up with Shell Brasil having an equity stake.

The project is an example of technology transfer and promotes sustainable development. In the longer term, biomass power generation could provide a market for Shell companies' forest plantations.

Appendices

Policy Guidelines on Health, Safety and the Environment

It is the policy of Shell companies to conduct their activities in such a way as to take foremost account of the health and safety of their employees and of other persons, and to give proper regard to the conservation of the environment. They aim to be among the leaders in their respective industries in these matters.

From the starting point of full compliance with legislative requirements, Shell companies pursue this policy through company strategies and action plans, through visible management commitment and through the individual contributions of their employees, supported by education and training.

1. Health

Shell companies seek to conduct their activities in such a way as to avoid harm to the health of their employees and others; and to promote the health of their employees.

2. Safety

Shell companies work on the principle that all injuries should be prevented, and actively promote amongst all those associated with their activities the high standards of safety consciousness and discipline that this principle demands.

3. Environment

Shell companies pursue in their operations progressive reductions of emissions, effluents and discharges of waste materials that are known to have a negative impact on the environment, with the ultimate aim of eliminating them.

They also aim to provide products and services supported by practical advice which, when used in accordance with this advice, will not cause injury or undue effects on the environment.

Furthermore, Shell companies promote protection of environments which may be affected by the development of their activities and seek continuous improvement in efficiency of use of natural resources and energy.

4. Common Aspects

Shell companies assess health, safety and

environmental matters before entering into new activities and reassess them in case of significant change in circumstances.

They require contractors working on their behalf to apply health, safety and environmental standards fully compatible with their own.

They recognise the concerns of shareholders, employees and society on health, safety and environmental matters; provide them with relevant information and discuss with them related company policies and practices.

Shell companies develop and maintain contingency procedures, in cooperation with authorities and emergency services, in order to minimise harm from any accidents.

They work with governments and others in the development of improved regulations and industry standards which relate to health, safety and environmental matters.

They conduct or support research towards the improvement of health, safety and environmental aspects of their products, processes and operations.

They also facilitate the transfer to others, freely or on a commercial basis, of know-how developed by Shell companies in these fields.

Steering Committee for Health, Safety and Environment, June 1991

Statement of General Business Principles

1. Objectives

The objectives of Shell companies are to engage efficiently, responsibly and profitably in the oil, gas, chemicals and other selected businesses and to participate in the search for and development of other sources of energy. Shell companies seek a high standard of performance and aim to maintain a long term position in their respective competitive environments.

2. Responsibilities

Four areas of responsibility are recognised:

a) To shareholders

To protect shareholders' investment and provide an acceptable return.

b) To employees

To provide all employees with good and safe conditions of work, and good and competitive terms and conditions of service: to promote the development and best use of human talent and equal opportunity employment; and to encourage the involvement of employees in the planning and direction of their work, and in the application of these principles within their company. It is recognised that commercial success depends on the full commitment of all employees.

c) To customers

To win and maintain customers' support by developing and providing products and services which offer value in terms of price, quality and safety, and which are supported by the requisite technological, environmental and commercial expertise.

d) To society

To conduct business as responsible corporate members of society, observing applicable laws of the countries in which they operate and giving proper regard to health, safety and environmental standards.

These four areas of responsibility are seen as inseparable. Therefore, it is the duty of management continuously to assess the priorities and discharge its responsibilities as best it can on the basis of that assessment.

3. Economic Principles

Profitability is essential to discharging these responsibilities and staying in business. It is a measure both of efficiency and of the ultimate value that people place on Shell products and services. It is essential to the proper allocation of corporate resources and necessary to support the continuing investment required to develop and produce future energy supplies to meet consumer needs. Without profits and a strong financial foundation it would not be possible to fulfil the responsibilities outlined above.

Shell companies work in a wide variety of social, political and economic environments over the nature of which they have little influence, but in general they believe that the interests of the community can be served most efficiently by a market economy.

Criteria for investment decisions are essentially economic but also take into account social and environmental considerations and an appraisal of the security of the investment.

4. Business Integrity

Shell companies insist on honesty and integrity and fairness in all aspects of their business and expect the same in their relationships with their contractors and suppliers. The direct or indirect offer, payment, soliciting and acceptance of bribes in any form are unacceptable practices. All employees are required to avoid conflicts of interest between their private financial activities and their part in the conduct of company business. All transactions on behalf of a Shell company must be appropriately described in the accounts of the company in accordance with established procedures and be subject to audit.

5. Political Activities

a) *Companies*

Shell companies endeavour always to act commercially, operating within existing national laws in a socially responsible manner, abstaining from participation in party politics and interference in political matters. It is however their legitimate right and responsibility to speak out on matters which affect the interests of employees, customers and shareholders, and on matters of general interest where they have a contribution to make based on particular knowledge.

b) *Political payments*

Shell companies do not make payments to political parties, organisations or their representatives.

c) *Employees*

Where employees, in their capacity as citizens, wish to engage in activities in the community, including standing for election to public office, favourable consideration is given to their being enabled to do so where this is appropriate in the light of local circumstances.

6. Health, Safety and the Environment

It is the policy of Shell companies to conduct their activities in such a way as to take foremost account of the health and safety of their employees and of other persons, and to give proper regard to the conservation of the environment. Shell companies pursue a policy of continuous improvement in the measures taken to protect the health, safety and environment of those who may be affected by their activities.

Shell companies establish health, safety and environmental policies, programmes and practices and integrate them in a commercially sound manner into each business as an essential element of management.

7. The Community

The most important contribution that companies can make to the social and material progress of the countries in which they operate is in performing their basic activities as efficiently as possible. In addition the need is recognised to take a constructive interest in societal matters which may not be directly related to the business. Opportunities for involvement – for example through community, educational or donations programmes – will vary depending upon the size of the company concerned, the nature of the local society, and the scope for useful private initiatives.

8. Competition

Shell companies support free enterprise. They seek to compete fairly and ethically and within the framework of applicable competition laws; they will not prevent others from competing freely with them.

9. Communication

Shell companies recognise that in view of the importance of the activities in which they are engaged and their impact on national economies and individuals, there is a need for open communication. To this end, Shell companies have comprehensive corporate information programmes and provide full relevant information about their activities to legitimately interested parties, subject to any overriding considerations of business confidentiality and cost.

10. Joint Ventures

Shell companies participating in joint ventures will promote the application of these principles in the management of the joint venture operation. The ability to do this effectively will be an important factor in the decision to enter into or remain in any joint venture.

July 1994

Case study – Assessing risk

Physician – HEAL thyself

Shell UK is carrying out a comprehensive programme of risk assessment of its retail site network nationwide. It is known as HEAL which stands for History, Engineering, Aquifer and Location, the four main areas of investigation in the evaluation of a retail site. The history traces any leakages or spills which may have occurred in the past to contaminate the ground. The engineering phase reviews the site facilities such as the age of the site, the fuel tanks and other infrastructure. The aquifer information determines the geology of the site and identifies how vulnerable the aquifer beneath the site is to an incident. For example, is the site on a water table used for drinking water and likely to contaminate it? The location covers information on surrounding land use and properties.

This data is collected from a range of sources including the National Rivers Authority, the Department of the Environment and various regulatory bodies. It is then fed into a computer which ranks the risks and divides the sites into high, medium and low risk sites. This information can be used to target investment at those sites in greatest need of attention. It also helps in the long-term planning process for site re-development. The company is using this risk assessment tool to prioritise environmentally related investment in existing and new sites as well as in sites which are being upgraded. The HEAL programme has revealed that about a third of Shell UK's retail sites have contamination problems to a greater or lesser extent. These problems are not unique to Shell but they begin to give an indication of the environmental investment required by the entire UK petrol retailing industry.

Other Shell companies with retail outlets also conduct environmental management programmes – including risk assessment – in accordance with the Shell guidelines.

Related publications

'As an industry, we have an essential role in the environmental debate – by continuing to demonstrate our commitment to genuine environmental improvements, by clearly articulating the implications of proposed measures, and by harnessing our economic and technical expertise to offer innovative yet practical solutions.'

Maarten van den Bergh,
a managing director of Royal Dutch Petroleum
Company and a Group managing director,
Royal Dutch/Shell Group of Companies, 1992

Shell companies provide a wide range of environmental information in a manner suited to local audiences and needs. Shell International publications (see inside front cover for how to order) which may be of interest include:

Selected Papers

- Double hull tankers – are they the answer?
by Michael Osborne
- Protecting engines with unleaded fuels
by Steve McArragher, Lionel Clarke and Holger Paesler
- Replacing CFCs – an industry success
by Peter Appleyard, Kees Bleijenberg and Sonja Thijs
- Energy for development
by Peter Kassler
- The test of tomorrow
by Koos Visser
- Meeting the demand for mobility
by Roger Rainbow and Henry Tan
- Biodegradable lubricants
by Jim Baggott
- Plastics: a reusable resource
by Martin Dennison
- Sustainable biomass energy
by Philip Elliott and Roger Booth

Shell Briefing Service

- Renewable energy
- Prospects for plastics
- Motoring and the environment
- Managing energy efficiently
- The tanker industry in the 1990s

Speeches

- The energy industry and government – partners in progress
by Cor Herkströter

- New frontiers
by John Jennings
- Fossil fuel energy – today and tomorrow
by Cor Herkströter
- Environmental action – a shared responsibility
by Mark Moody-Stuart
- The three-cornered challenge – energy, environment and population
by Lo van Wachem
- Challenges and opportunities in a changing world
by Maarten van den Bergh

Briefing Notes

- Managing air quality and vehicle emissions
- Leaded or unleaded gasoline – which one to choose?
- Technology transfer – a wider perspective
- Environmental education and training in Shell
- The future for fossil fuel energy
- Oil spills at sea – prevention and response

Other publications

- Royal Dutch Petroleum Company and The "Shell" Transport and Trading Company, p.l.c. Annual Reports, 1994
- The Shell review (a companion volume to the Royal Dutch and Shell Transport Annual Reports)
- A matter of commitment (Exploration and Production)
- Environment related research and development (Research)

Film and Video

- Climate of concern
- A stake in the soil
- Fate of the forests
- Hidden factors
- The river must live
- Escape from hunger
- Thirsty world
- Energy everlasting

Case study – Environmental conservation

In 1993, Shell companies spent some £41 million on corporate donations and social sponsorships which included environmental conservation projects. This includes support for international agencies (eg. the Royal Geographical Society's Expedition advisory centre and the International Institute for Environment and Development) as well as initiatives in many countries around the world. Examples include:

In Europe, Shell International Petroleum Company (SIPC) supports the Royal Botanical Gardens Kew, England, in a project investigating the sustainable use of semi-arid lands. Shell UK's Better Britain campaign has supported community-based environmental projects for the past 30 years. Shell Nederland has contributed to the construction of a new greenhouse in Amsterdam's botanical gardens to be used for environmental education.

In the Middle East, in the United Arab Emirates, a scientific study of coastal mangrove forests and the marine and bird life they support is being sponsored by Shell Dubai and co-ordinated by the Desert and Marine Environment Research Centre of the Emirates university. The company is also involved in the Arabian Leopard Trust.

In Africa, Shell South Africa sponsors a network which encourages resource development and activities among local communities and by conservation and environmental education agencies such as the National Botanical Institute. Shell Namibia runs an annual environmental art competition in conjunction with the country's Desert Ecological Research Unit and others, while Shell Botswana supports the Mokolodi Environmental Education Centre and the production

of Shell guides on important indigenous flora and fauna.

In the Far East, Brunei Shell has helped to fund the new Kuala Belalong Field Studies Centre, a base for scientists to identify and study the flora and fauna of the Brunei rain forest, which is second only to the Amazon in terms of species diversity. A new nature education centre has been built in Malaysia to encourage young people to take an active interest in nature studies. Other initiatives in this region include a Shell Better Environment Awards programme (Hong Kong), an international environmental control conference (Shell Taiwan), the Earth Day festival (Shell Japan) and a Neighbourhood Nature Watch Programme (Shell Singapore).

In North America, Shell Canada donated almost 9000 hectares of land in British Columbia which is benefiting the work of the Nature Conservancy of Canada while the Shell Environmental Fund supports individuals, schools, community groups and environmentalists in projects around the country.

In South America, Shell Brasil sponsors the work of the Rio de Janeiro Botanical Garden's Atlantic Rain Forest programme while the Fundación Shell Guatemala para la Ecología continues its environmental education work.

