The Environmental Chemistry Subject Group Of The Royal Society of Chemistry

The RSC's Environment Group has recently been renamed the Environmental Chemistry Group and has changed its affiliation within the Society.

Past

From its inception in the early 1970s until 1994, the Environment Group operated as part of the RSC's Industrial Division. During this period environmental chemistry has grown and matured into a scientific discipline in its own right, and many of our 2000+ members are active in developing the chemistry of environmentally-related subjects.

As a reflection of this change of emphasis, in 1993 the Environment Group Committee sought and received the members' approval to change the Group's name to the Environmental Chemistry Group and to switch our affiliation to the Society's Scientific Affairs Board.

Present

Objectives of the Environmental Chemistry Group

- to organise technical symposia on environmental, health, and safety related topics;
- to maintain an awareness of current environmental issues and their underlying macro-chemistry;
- to publish developments in environmental chemistry using the resources of the RSC; and
- to provide technical support and advice to the Society's Professional Affairs Board and its Environment, Health and Safety Committee on environmental chemistry

Organisation of the Environmental Chemistry Group

The Group's activities are supervised by a Committee of around 15 members who are elected at the Group's Annual General Meeting. This is held in conjunction with the Group's Distinguished Guest Lecture in London in late November or early December each year.

The composition of the Committee reflects the academic, industrial, and regulatory work of chemists engaged in environmental chemistry. The current Chairman is **Dr John Holder** of the University of Central Lancashire and the current Secretary is **Dr Robert Gemmill** who works for Her Majesty's Inspectorate of Pollution. The Committee meets four times each year at Burlington House.

Future

The Group seeks the advice and opinions of its members on the topics and locations for future symposia. In addition, ways of encouraging the interest of younger chemists in environmental chemistry are being pursued. This, the first of a regular series of Newsletters, is intended to inform our members of the Group's future plans and to look back at past symposia.

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Environmental Chemistry Group:

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Chairman's Report on Activities during 1994

1994 has been a year of notable landmarks. The Group celebrated its coming of age (in the old fashioned sense) in 1993. Your Committee resolved to review the remit and status of the Group within the Society, and dispatched a questionnaire to the entire membership. The response revealed overwhelming support for a change of name and affiliation.

In with the New

Our twenty-second year has seen these changes effected. The Group's name has been changed to The Environmental Chemistry Group to reflect the growth of environmental chemistry as a discipline in its own right. This change was approved by the Industrial Division Council on 1st February 1994.

The Group's disaffiliation from the Industrial Division and its establishment with independent status under the Society's Scientific Affairs Board was approved by ID Council on 1st February and by SAB on 4th March 1994, and subsequently ratified by the RSC Council. Transfer took place formally on 1st September 1994. The Group still wishes, however, to retain strong links to the Industrial Division and the industrial chemistry community in general.

Remit

The Group's remit has been reviewed by the Committee and re-affirmed as

- to organise technical symposia on environmental, health and safety related topics;
- to maintain and develop awareness of current environmental issues and their underlying chemistry;
- to publish developments in environmental chemistry; and
- to provide technical support on environmental chemistry to RSC senior committees.

Record Membership

The Group's membership surpassed 2000 for the second sucessive year, keeping us well in the lead as the largest subject group in the Society.
Despite this large and growing membership, attendance at symposia, especially early in the year, was disappointing.

Recent Symposia

The 1993 Distinguished Guest Lecture delivered by Sir John Houghton on the topic "Environmental Impact of Transport", with a supporting programme of speakers, provided an excellent scientific meeting which, nevertheless, was relatively poorly attended.

A symposium organised for 13th May 1994, on Sampling the Aquatic Environment had sadly to be cancelled due to low registration.

Things picked up towards the end of the year, however, when a symposium on Acquiring Environmental Data for Legislative Needs attracted a satisfactory audience for a highly relevant topic.

Our 1994 AGM was again organised around a half-day symposium. The subject was "Environmental Criteria - Their Basis of Selection", and its culmination was the 1994 Distinguished Guest Lecture delivered by Dr A.K. Barbour.

The committee were pleased to learn that a past Chairman of the Group, Professor Roy Harrison, has been awarded the RSC's 1995/1996 John Jeyes Lecture. The subject will be the Chemistry of the Urban Atmosphere, and it is planned that the presentation of this lecture will also be the Group's 1995 Distinguished Guest Lecture.

New Contacts

This year, the Committee welcomed for the first time a representative from the Toxicology Group, Dr John Hoskins, and, in turn, a member of our committee attends committee meetings of the Toxicology Group. We also welcomed back onto our committee Mr Chris Hoggart as representative of the Water Chemistry Forum.

Thanks to..

Mr Harry Addicott retired from the Committee and Mr Geoff Dickes steps down as Vice Chairman. I would like to record special thanks to them for the hard work they have put in over the year (and many years previously). I would also like to thank the Secretary, Dr Robert Gemmill, and the Treasurer, Dr Peter O'Neill for their wonderful support during the first year of my Chairmanship.

100th ECG Meeting

A further landmark will be reached in 1995 when the the 100th meeting of the Committee will be celebrated (modestly).

J.V. Holder (Dr)
November 1994

Forthcoming Symposia

The following symposia on environmental topics, organised by the RSC and similar organisations and arranged for 1995, have come to our attention:

Date	Location	Title	Organiser
1st February 1995	London	**CO_2 and Climate Change**	Institution of Mechanical Engineers
1st February 1995	SCI, Belgrave Square, London	**Education and Training of Environmental Scientists and Engineers**	SCI Environment & Water Group
22nd February 1995	Quest International Social Club, Ashford	**Waste Disposal: an Overview**, a talk by Keith Johnson	RSC Environmental Chemistry Group/RSC Kent Section
14th March 1995	SCI, Belgrave Square, London	**Environmental Standardisation: International Developments**	SCI Environment & Water Group
5th April 1995	Scientific Societies' Lecture Theatre,London	**Contaminated Land Remediation in the UK**	Royal Society of Chemistry Environmental Chemistry Group
6th April, 1995, 2.00 pm	Edinburgh	**Recycling - A Waste of Time?**	Organised (in part) by the RSC Environment Health & Safety Committee as part of the Edinburgh Science Festival
11th April 1995	Heriot-Watt University	**Toxicology in Occupational and Environmental Health**	Part of the 1995 Royal Society of Chemistry Annual Chemical Congress.
19th-21st April 1995	University of East Anglia	**Atmospheric Chemistry: Measurements, Mechanisms and Models**	Royal Society of Chemistry Faraday Division
26th April 1995	SCI, Belgrave Square, London	**Integrated Pollution Control**	SCI Environment & Water Group and the IChemE
6th June 1995	SCI, Belgrave Square, London	**Environmental Research Symposium for Young Scientists: Contaminated Land**	SCI Environment & Water Group
15th September 1995	University of Lancaster	**Air Pollution**	RSC Environmental Chemistry Group, NW Region Analytical Division

Details of any future symposia on environmental topics not mentioned here, particularly those which are being organised by other Subject Groups within the RSC, should be sent to the Editors of this Newsletter.

A Brief History of the Environmental Chemistry Group

In 1972 a number of members of the Royal Society of Chemistry's Industrial Division met to discuss the likely forthcoming impact of the Control of Pollution Act, 1974 on the activities of the industries in which they were employed.

That meeting resulted in the formation of a new subject group, the Environment Group, within the Industrial Division. The objectives of this new group were "to promote understanding of the effects, both advantageous and disadvantageous, of chemicals from industry on the environment; to identify areas where solutions to existing problems need to be found; and to promote wider knowledge of the benefits accruing from chemicals on the environment". The methods of achieving these objectives included the organisation of symposia and collaboration with a wide range of bodies interested in environmental matters, *e.g.* The Meteorological Society, Society of Chemical Industry, and the Institution of Chemical Engineers.

The Group had its first committee meeting in 1973 under the chairmanship of Dr Alan Robertson of ICI, who served until 1976. The committee comprised fifteen members, who were drawn from a cross-section of the RSC Membership with environmental expertise, including the chemical and allied industries, governmental departments and agencies, and higher education.

From 1977, successive Chairmen have been:

1977-80
Dr Ivan Dunstan (DTI, London)

1981-83
Prof Ron Hester (University of York)

1984-85
Dr Phil Gilbert (Unilever, Port Sunlight)

1986-87
Mr Harry Shalgosky (UKAEA, Harwell)

1988-89
Dr David Taylor (ICI, Brixham)

1990-91
Prof Roy Harrison (University of Birmingham)

1992-93
Mr Geoff Dickes (County of Avon)

1994-95
Dr John Holder (University of Central Lancs)

The breadth of the interest of the Environment Group Committee is illustrated by the affiliations of its members. There have been industrial representations from ICI, Rio Tinto Zinc, Bechtel, Kodak, Shell, BP, Ciba-Geigy, Clayton Aniline Co, Hickson and Welch, Sir William Halcrow, Thomson-MTS, British Gas, National Smokeless Fuels. From government departments and agencies, members have come from the DOE, DTI, MOD, HMIP, UKAEA, BIBRA, Field Studies Council, Coal Research Council, NERL, Warren Spring Laboratory, National Power, the GLC, County of Essex, County of Avon, Anglian Water, Thames Water, Scottish Development Department, Water Research Centre, Laboratory of the Government Chemist, and the Institution of Chemical Engineers. And the universities have been represented by York, Lancaster, Essex, Birmingham, UEA, Aston, Middlesex, Plymouth, Central Lancashire, de Montfort, Hertfordshire, and Imperial College and Birkbeck College.

Until the mid 1980s, the Group was fortunate in having the assistance of the secretary of the Industrial Division, the late Mr H. L. Bennister (Benn), who also was involved in the administration of our meetings.

During the Group's existence most aspects of environmental chemistry have been covered by more than seventy symposia. Subjects have usually been chosen because of their topicality or where there has been a need for more understanding or training in a particular area.

Symposia held in the 1970s included:

- Environmental chemistry of air pollution (1974)
- Handling toxic chemicals (1975)
- Assessment of risk (1975)
- Toxicology for the industrial chemist (1976)
- Environmental specialists: by training or through experience? (1977)
- Chemicals in North Sea development (1978)

In the 1980s topics included:

- Pollution of the River Mersey (1983)
- Controlling exposure to hazardous substances in the working environment (1983)
- Chemical aspects of acid rain (1985)
- Physicochemical properties: their role in environmental hazard assessment (1985)
- Agricultural chemicals - friend or foe? (1986)
- Aluminium in food and in the environment (1988)

And in this decade some of the subjects chosen have been:

- Indoor air quality (1990)
- PCBs, dioxins and furans (1991/2)
- Environmental fate of chemicals: prediction or measurement (1992)
- The laboratory environment (1993)

Many of these symposia have been held jointly with other subject groups within the RSC or with other organisations such as the SCI and the Institution of Mechanical Engineers.

Although some symposia have been held in the provinces, most take place at the Scientific Societies' Lecture Theatre, London, where subjects such as pesticides, PCBs, and aluminium in food and the environment have drawn large audiences and media interest.

From the early days, the Group made a special feature of its Annual General Meeting, (usually held in November or December), by inviting a person well known in the environmental arena to present a 'Distinguished Guest Lecture'. In 1990, the AGM was further enhanced by adding a supporting half-day programme to the distinguished guest lecture.

In the early 1980s, two notable lectures were given by Sir Derek Ezra and Sir Walter Marshall on the environmental problems relating to the coal and gas industries respectively.

Other recent distinguished guest lectures have been as follows:

The contribution of environmental chemicals to the causes of cancer (Sir Richard Doll, Imperial Cancer Research Fund, 1986)

The work of the Royal Commission on Environmental Pollution (Sir Jack Lewis, Chairman of the Royal Commission on Environmental Pollution, 1987)

The causes and consequences of acid rain (Sir John Mason, Director of the Meteorological Office, 1988)

Reactions of air pollutants in the atmosphere (Professor Brian Thrush, University of Cambridge, 1989)

Professionalism in toxic waste management: aspects of research and training (Professor Roger Perry, Imperial College, 1990)

Global atmospheric chemistry and its relationship to the biosphere, anthroposphere, and climate (Professor Paul Crutzen, Max Planck Institute, Mainz,1991)

Integrated Pollution Control (Dr David Slater, Chief Inspector, HMIP,1992)

Environmental impact of transport (Sir John Houghton, Chairman of the Royal Commission on Environmental Pollution, 1993)

From time to time, the Group has been asked to provide the theme and programme for the Industrial Division's contribution to the RSC Annual Congresses. For example:

- Hazard assessment (1986)
- Chemistry at the biological interface (1987)
- Macro effects from micro quantities (1988)

As part of the RSC's Autumn Meeting in 1987, the Group organised a meeting on the environmental chemistry of aquatic biocides.

In 1979 the Group was asked to represent the RSC on the Federation of European Chemistry's (FECS) Working Party on Chemistry and the Environment. Professor Ron Hester was the first representative and he was succeeded by Mr Geoff Dickes (who chaired the Working Party from 1984 to 1990). The third European Conference on Chemistry and the Environment was held at the University of Surrey in 1988, with the theme "Risk assessment of chemicals in the environment." The proceedings of this very successful conference were edited by Mr Mervyn Richardson, and published by the Royal Society of Chemistry.

Other members of the Environment Group have either written or edited books on environmental topics, based on the Group's symposia, for publication by the RSC, *e.g.*

Understanding Our Environment, by Ron Hester, 1986

Toxic Hazard Assessment of Chemicals, edited by Mervyn Richardson, 1986

Aluminium in Food and the Environment, edited by Robert Massey and David Taylor, 1989

Food Contaminants: Sources and Surveillance, edited by Colin Creaser and Rupert Purchase, 1991

Risk Management of Chemicals, edited by Mervyn Richardson, 1992

The Chemistry and Deposition of Nitrogen Species in the Troposphere, edited by Alan Cocks, 1993

The Laboratory Environment, edited by Rupert Purchase, 1994

The Environment Group has always had a large membership (almost always the biggest Subject Group in the Society). A membership in the 1980s of 1400-1500 and has now grown to more than 2000. It is expected that with a more scientifically-focussed Group name - the Environmental Chemistry Group - a further increase in membership will warrant Divisional status.

Geoff Dickes
December 1994

Environmental Criteria - Science Based or Regulatory Responses to Public Concerns'

RSC Environmental Chemistry Group Distinguished Guest Lecture 1994

This year's Distinguished Guest Lecture was given by Dr A.K. (Joe) Barbour (a former chairman of our Group) at the Scientific Societies' Lecture Theatre, London, on November 23rd 1994.

In a wide ranging talk, Dr Barbour described the complexities and subtleties surrounding the management of environmental issues.

Dr Barbour traced the genesis of environmental issues. He suggested the process began with the views of a few specialists (with views which are unlikely to be held by their peers), who often have access to a compliant 'media'.

Such issues, which at an early (and sometimes later) stage are not susceptible to definition or to quantification, nevertheless will be subject to political scrutiny. Although politicians may adopt views either based on their perception of public interest or influenced by the prevailing regulatory orthodoxy, more stringent regulatory criteria usually follow and often public hostility to the process or product.

Environmental issues may be separated into three categories according to the approaches by which they are controlled or managed:

- the application of numerical emission criteria which are health or technology-based in origin;
- assessments on a technological basis but without the use of numerical emission criteria; and
- issues which arise and are dealt with on a mainly subjective or political basis.

Regulatory Criteria Achieved Through Health- or Process-Based Technologies

In the UK the implementation of IPC (Integrated Pollution Control) requires emissions to the atmosphere ***and*** discharges to rivers, estuaries, and sewers to meet the fixed criteria achieved by well operated and maintained Best Available Technology (BAT). The implementation of such standards at source (point source controls) are thus technology based. These point source controls have so far enabled the UK to comply with internationally-set Air Quality Standards.

Quality Standards applied by the NRA (National Rivers Authority) for river and estuarial pollution have their origin in toxicity evaluations of pollutants, and for the time being both process-based and health-based procedures are operating in parallel in the UK (and in parts of the EU).

Toxicological and epidemiological data also enable quality standards to be applied in occupational health. The use of occupational exposure limits in the workplace, though not without criticism (*e.g.* possible synergistic effects of pollutants are ignored and there is a lack of toxicity data for many substances) is another example of regulatory control through health-based technology.

Environmental Management Based on Non-Emission Criteria

Dr Barbour quoted three examples:

(a) ***Landfill Disposal***

Four factors govern the environmental management of landfill sites: location (determined in part by local public opinion as well as geological suitability); design (clay containment, handling of methane emissions); control of inputs; and remediation. Although emission criteria are often not considered (apart from determing the rate of any leakage towards sensitive areas such as rivers or groundwaters), rigorous control of these four factors should satisfy current environmental controls.

(b) ***Malodours***

Malodours cannot be measured, are subject to weather conditions and individual perception, and are difficult to resolve at plant level. Nevertheless they are a major problem for all process operations and a potential local environmental problem.

(c) ***Noise Emissions***

Similar considerations apply to low level low-frequency noise emissions. They are also difficult to quantify and may not be easy to nullify at plant level.

The application of scientifically-derived emission criteria to these three environmental concerns is therefore unsatisfactory. Public perception, rightly or wrongly, is a major influence for the successful environmental management of these and similar problems such as waste disposal by incineration.

Environmental Management of Subjective Issues and Issues Where Quantitative Criteria are Inapplicable

(a) ***Regulatory Compliance Requirements and the 'Level Playing Field'***

Environmental activists often demand that performance should exceed the standards set by regulatory criteria. Similarly the senior management of multinational companies may decide that the most rigorous environmental standards should be adopted by their organisations internationally, even though local standards do not require this degree of compliance.

Until the creation of such environmental 'level playing fields' becomes more

universal, some with different views on efficient environmental management will continue to exploit health and safety practices in the developing nations where environmental costs are lower.

(b) Major Accident Hazard Policy

Although the CIMAH Regulations govern many aspects of the process industries, much of the risk assessment for large-scale manufacturing remains subjective (*e.g.* location of the plant, potential effects of accidents on workforce and environment, desirability of making a particular product).

Dr Barbour urged that the subjective role of management in major accident prevention should be reduced and that regulatory control should be extended to all plants irrespective of their size and in spite of the extra costs.

Other examples where decision-making may be governed by subjective or political considerations include the supply of raw materials or finished goods from politically and environmentally sensitive areas, the choice of transport, and conservation policies.

The realisation that many areas of environmental management are not based on solely quantifiable targets has implications for auditing environmental systems. An Audit should consider ***performance in all issues,*** quantitative and qualitative.

Dr Barbour concluded his lecture by stressing the balance between using reasonable scientific evidence and accepting economic, social, and political influences in the management of environmental issues. He hoped that the range of issues which could be controlled by exposure criteria would increase, (with more expenditure on the generation of toxicity and epidemiological data if necessary), and that 'activists' would eventually recognise the wastefulness of regulation in the absence of firm scientific evidence.

Dr Barbour's lecture was part of a half-day symposium entitled 'Environmental Criteria - Their Basis of Selection'. Other talks were given by Mike Wright, ICI, on 'Environmental Policy and Performance in the Chemical Industry'; Peter Chave, Head of Pollution Control, NRA, 'Environmental Criteria for the Protection of the Water Environment'; Julie Hill, Director of Green Alliance, 'Environmental Priorities and Sustainable Development'; and Stephan Carlyle, Environmental Assessment Policy Unit, HMIP, 'Environmental Criteria Development in Regulations'.

Rupert Purchase
December 1994

** *COMPETITION* **

This year the Environmental Chemistry Group (ECG) is holding an essay competition for its younger members (those who are 32 years old or less on 1st October 1995).

With the approach of the twenty-first century, you are invited to write an essay of not more than 2000 words on the current ***and*** future roles for chemistry in any environmental topic or problem of your choice.

Two prizes, each of £200.00, will awarded - one to the best entry from a member aged 25 years or less, and the other to the best entry in the 25-32 year age-group.

Prizes have been generously donated by Bechtel Ltd and ICI respectively, and the competition will be judged by committee members of the Environmental Chemistry Group.

All those who enter the competition will be awarded free membership of the Environmental Chemistry Group for 1996, and the two winners will be invited to give a talk based on their essays at a future ECG meeting.

Entries for this competition, together with your date of birth, should be sent by the closing date - ***September 30th 1995*** - to the Secretary of the ECG: Dr R.J. Gemmill, HMIP, Government Buildings, Burghill Road, Westbury-on-Trym, Bristol BS10 6EZ.

This competition will also be announced in *Chemistry in Britain.*

Recent Books on the Environment at the RSC Library

The following books and monographs on environmental topics have been acquired by the RSC library, Burlington House, during the period June - December 1994.

Abandoned Mines and the Water Environment: Report of the National Rivers Authority, (Water Quality Series No. 14, March 1994), HMSO, London, 1994.
46 pp. ISBN: 011886520X, RSC Accession No. 940255

Carbon Dioxide Chemistry: Environmental Issues, RSC Special Publication No. 153, Royal Society of Chemistry, Cambridge, 1994.
405 pp. ISBN: 0851866344, RSC Accession No. 940545

Chemicals in a Green World: Contributions by the Chemical Industries Association to the Debate on the Government's Environmental Protection Legislation Proposals, 1990, 2nd Edition, Chemical Industries Association, London, 1991.
43 pp. ISBN: 0900623756, RSC Accession No. 940444

Chemicals in a Sustainable World, Chemical Industries Association, London, 1993.
40 pp. ISBN: 1858970105, RSC Accession No. 940441

Chemistry of the Atmosphere: Its Impact on Global Change, American Chemical Society, Washington, 1993.
170 pp. ISBN: 084122532X, RSC Accession No. 940277

Digest of Environmental Protection and Water Statistics, HMSO, London, 1994.
204 pp. ISBN: 0117529397, RSC Accession No. 940259

England and Wales Environmental Regulatory Matrix, The Environment Press, Bath, 1994, RSC Accession No. 940501

Environment Industry Yearbook 1995, 3rd Edition, The Environment Press, Bath, 1994.
512 pp. ISBN: 0951909665, RSC Accession No. 940477

Environmental Contacts: A Guide For Business. Who Does What in Government Departments, Department of Trade and Industry, London, 1994.
21 pp., RSC Accession No. 940517

Environmental Epidemiology: Effects of Environmental Chemicals on Human Health, (ACS Advances in Chemistry Series, No. 241), American Chemical Society, Washington, 1994.
266 pp. ISBN: 0841225176, RSC Accession No. 940492

Environmental Hazard Assessment Reports, Nos. 1-20, Toxic Substances Division, Department of the Environment, London, 1994, RSC Accession No. 940297

Environmental Hazard Assessment: Nitrobenzene, (draft for comment), Department of the the Environment, London, 1994.
52 pp., RSC Accession No. 940360

Environmental Health & Safety Year Book 1994, EHAS Group, Woking, 1994.
351 pp. ISBN: 1872645054, RSC Accession No. 940331

Environmental Protection (Prescribed Processes and Substances etc) Regulations 1994, (Amendment), SI 1994/1271, HMSO, London, 1994.
18 pp. ISBN: 0110442717, RSC Accession No. 940261

Environmental Protection Act 1990 (Commencement No. 15) Order 1994, SI 1994/1096 (C.18), HMSO, London, 1994.
6 pp. ISBN: 011044096X, RSC Accession No. 940265

Environmental Protection Act 1990 (Commencement No. 14) Order 1994, SI 1994/780 (C.15), HMSO, London, 1994.
4 pp. ISBN: 0110437802, RSC Accession No. 940268

Environmental Protection Act 1990: Part II Waste Management. Licensing the Framework Directive on Waste, Circular 11/94, HMSO, London, 1994.
199 pp. ISBN: 0117529753, RSC Accession No. 940270

Environmental Reporting, Chemical Industries Association, London, 1992.
7 pp., RSC Accession No. 940442

Environmental Science & Technology Environmental Buyers' Guide Edition 1995, American Chemical Society, Washington, 1994.
206 pp., RSC Accession No. 940512

Flame Spectrometry in Environmental Chemical Analysis: A Practicable Guide, Royal Society of Chemistry, Cambridge, 1994.
108 pp. ISBN: 0851867340, RSC Accession No. 940576

Fundamentals of Environmental Chemistry, CRC Press, Boca Raton, 1993.
844 pp. ISBN: 087371587X, RSC Accession No. 940338

Macmillan Dictionary of the Environment, 4th Edition, Macmillan Press, London, 1994.
384 pp. ISBN: 0333616553, RSC Accession No. 940478

Stratospheric Ozone 1993, HMSO, London, 1994.
38 pp. ISBN: 0117528617, RSC Accession No. 940460

This Common Inheritance: The Third Year Report: Britain's Environmental Strategy, HMSO, London, 1994.
195 pp. ISBN: 010125492X, RSC Accession No. 940251

Transfrontier Shipment of Waste Regulations 1994, SI 1994/1137, HMSO, London, 1994.
10 pp. ISBN: 0110441370, RSC Accession No. 940264

UK Chemical Industry Environmental Protection Spending Survey: 1991, Chemical Industries Association, London, 1991.
10 pp. RSC Accession No. 940445

The UK Environment, HMSO, London, 1992.
258 pp. ISBN: 0117524204, RSC Accession No. 940459

Waste Management Licensing Regulations 1994, SI 1994/1056, HMSO, London, 1994.
49 pp. ISBN: 0110440560, RSC Accession No. 940260