PREM 19/1477

3

CONFIDENTIAL FILING

Royal Commission on Environmental Pollution.
Effects of Acid rain
Agriculture and Conservation

ENVIRONMENTAL AFFAIRS

PART 1 SEPT 79
PART 3 NOV 84

Referred to	Date	Referred to	Date	Referred to	Date	Referred to	Date
6.11.84		13.7.85					
9.11.84		14.3.85					
13.11.84		18.3.85					
16.11.84		21.3.85					
19.11.84		28.3.85					
27.11.84		23.4.85					
28/11/84		13.5.85					
30/11/84		30.5.85					
12.12.84		— PART ENDS					
18.12.84							
9.1.85							
17.1.85							
22.1.85							
23.1.85							
25.1.85							
11.2.85							
13.2.85							
20.2.85							
22.2.85							
26.2.85							
1.3.85							

PART 3 ends:-

RTA to FERB (AD85/1461) 30.5.85

PART 4 begins:-

DTI to Environment 18.6.85

TO BE RETAINED AS TOP ENCLOSURE

Cabinet / Cabinet Committee Documents

Reference	Date
CC(85) 11th Meeting, item 3	21/03/1985
CC(85) 9th Meeting, item 3	14/03/1985
CC(85) 5th Meeting	01/03/1985
E(A)(85) 12	25/02/1985
CC(84) 41st Meeting, item 3	13/12/1984

The documents listed above, which were enclosed on this file, have been removed and destroyed. Such documents are the responsibility of the Cabinet Office. When released they are available in the appropriate **CAB** (CABINET OFFICE) CLASSES

Signed J. Gray Date 5/12/2013

PREM Records Team

Published Papers

The following published paper(s) enclosed on this file have been removed and destroyed. Copies may be found elsewhere in The National Archives.

Department of the Environment – Acid Rain: The Government's reply to the fourth report from the Environment Committee. Session 1983-84, HC446-1. Published by HMSO - ISBN 0 10 193970 1

Signed J. Gray Date 5/12/2013

PREM Records Team

1. FCSB to note
2. NBPM
AT 31/5

Ref. A085/1461

MR BUTLER

The Industrial Air Pollution Inspectorate was transferred from the Department of the Environment to the Health and Safety Executive (HSE) when the HSE was set up in 1975. Policy responsibility for the control of pollution rests with Department of the Environment Ministers, and it is to them that the Health and Safety Commission reports in respect of its responsibility for the control of air pollution from certain industrial processes.

2. The Department of the Environment, and particularly its Parliamentary Under Secretary of State (Mr Waldegrave) would like to take the Industrial Air Pollution Inspectorate back into the Department of the Environment. The CBI are also pressing for the Inspectorate to go back to the Department of the Environment. The Prime Minister may therefore be receiving a minute from the Secretary of State for the Environment proposing the transfer. The proposal is very likely to be strongly resisted by the Secretary of State for Employment.

3. This is simply to give you advance warning that this proposal may be reaching the Prime Minister, and suggest that, if it does, the Prime Minister should refer the matter to me for advice.

Approved by
ROBERT ARMSTRONG
and signed in his absence

30 May 1985

X-MY

file

10 DOWNING STREET

From the Private Secretary

13 May 1985

I enclose a copy of a letter the Prime Minister has received from the Secretary General of the European Assembly about a Resolution adopted by the Assembly on the approximation of the laws relating to the noise emission of rail-mounted vehicles. I have acknowledged the letter and do not suppose that a substantive reply is required.

I am sending copies of this letter to Sue Vandervord (Department of the Environment) and David Williamson (Cabinet Office).

CHARLES POWELL

Colin Budd, Esq.,
Foreign and Commonwealth Office.

Brl

10 DOWNING STREET

From the Private Secretary

13 May 1985

I am directed to thank you for your letter of 2 May to the Prime Minister enclosing a Resolution of the European Parliament on the approximation of the laws relating to the noise emission of rail-mounted vehicles.

The Prime Minister was grateful to receive this.

CHARLES POWELL

Mr. H. J. Opitz.

85 12389

no relevant pps

EUROPEAN PARLIAMENT

THE SECRETARY-GENERAL

R11

Strasbourg, -2. V 1985

encl to

Rt. Hon. Mrs Margaret Thatcher MP
Prime Minister
10 Downing Street
London SW1

Dear Prime Minister,

On the basis of a report by its Committee on the Environment, Public Health and Consumer Protection, the European Parliament has adopted

a resolution winding up the procedure for consultation of the European Parliament on the proposal from the Commission of the European Communities to the Council for a directive on the approximation of the laws of the Member States relating to the noise emission of rail-mounted vehicles

and decided to forward the text to the governments of the Member States.

On behalf of the President of the European Parliament, I enclose an extract from the minutes of the relevant sitting, with Parliament's resolution.

The minutes will be published in the Official Journal of the European Communities pursuant to Rule 89(4) of Parliament's Rules of Procedure.

Yours sincerely,

H.-J. OPITZ

Enclosure

Ordinary written for Tues 23 April. A

DRAFT PARLIAMENTARY QUESTION (WRITTEN) Mrs Elizabeth Peacock

Can the Prime Minister report on the progress made by the Technology, Growth and Employment Working Group in considering the environmental matters referred to it by the London Economic Summit, and reported in the Communique following that Summit?

DRAFT REPLY BY THE PRIME MINISTER

The Technology, Growth and Employment Working Group, chaired by my Chief Scientific Adviser, Sir Robin Nicholson, completed its Report on the Environment as requested by the end of December 1984. This report will be considered in the context of the Economic Summit to be held in Bonn this May, and I have today placed a copy of the report (Cmd 9500) in the Library of the House.

Prime Minister.
Content with the draft reply? (A)
You saw the earlier draft of the report in December; Robin Nicholson covering minute on that occasion, to refresh your memory, is at B. Final recommendations are summarised on p. 11, at C. MCA 15/4

C 094

MR ADDISON

cc Sir Robin Nicholson
Mr Hatfield

Yes
MT

19 April 1985

REPORT ON THE ENVIRONMENT - PARLIAMENTARY QUESTION ON 23 APRIL

1. I have discussed with Miss Roach the arrangements for a written parliamentary question, to be answered by the Prime Minister, announcing the publication of the Environment Report prepared by the Technology, Growth and Employment Working Group. I attach the text of a draft Written PQ, to be asked on 23rd April, a draft reply, and a copy (uncorrected proof) of the Report itself.

2. The Prime Minister saw a draft version of this report before Christmas, and since then, Sir Robert Armstrong has been keeping her up to date with preparations for the Bonn Economic Summit. This report will be received at the Bonn Economic Summit by Heads of State or Government. It is probable that a passing reference will be made to it in the Communique.

3. Publication in advance of the Summit has been approved by Personal Representatives. Other Summit countries are making similar arrangements for its publication.

4. Previous reports from the Technology, Growth and Employment Working Group have been presented to Parliament by the Prime Minister, and have been released following a Written PQ. I have written separately to Bernard Ingham concerning press arrangements, but briefly, the Press Office in the Cabinet Office will make the report available to the specialist Press and handle other Press enquiries.

5. Twelve advance copies of the Report will be sent by HMSO direct to Miss Roach on Monday 22 April.

ELIZABETH RANSOM

2333535

OLD

Spec CF

MEA

(4)

Prime Minister.
You may like to express a "well done", particularly to Mr. Waldegrave, in response to this.
MEA 28/3

P A over taken NFA
SC

SECRETARY OF STATE FOR THE ENVIRONMENT

PRIME MINISTER

Yes - albeit would be premature

VEHICLE EMISSIONS

Since we discussed at Cabinet on 21 March the outcome of that morning's Environment Council agreement on vehicle emissions, I have seen the reporting telegram and had a word with William Waldegrave.

I share his assessment that the agreement, while still only the framework of a package, is a substantial step forward because it spells out very fully that the standard set for medium (and a fortiori, small) cars must be achievable by lean burn techniques as we have defined them. The detailed emission limits for the Directive will now need to be worked out in the expert level within the terms of the agreement. As a first step I understand that officials from the Departments concerned are seeing our own car industry this week.

For my part, I am grateful to Nicholas Ridley, Norman Tebbit and Geoffrey Howe for the help which they, their Ministers and their officials have given us.

This progress on vehicle emissions completes a period during which worthwhile progress on environmental issues has been made at the EC Council. (Community Environment Ministers have this month reached agreement on directives on unleaded petrol, on environmental impact assessment and on the recycling of beverage containers; steady progress is being made on water pollution; and the Community's representatives, including the UK, have played a leading role in successfully negotiating a United Nations Convention for the protection of the ozone layer). However, assuming that the vehicle emissions Directive is satisfactorily finalised in June, the focus will now shift both inside and outside the Council to the proposed Large Plants Directive and acid rain. Since Britain is now alone amongst the larger Community countries in opposing action on this, environmental peace is likely to be short lived.

I am sending copies of this minute to colleagues named above, to other members of E(A) and to Sir Robert Armstrong.

for PJ

28 March 1985

Approved by the Secretary of State and signed in his absence.

BRIEFING FOR THE PRIME MINISTER FOR QUESTION TIME
PROVIDED BY MR N BROWNE UKREP OVER THE TELEPHONE FROM BRUSSELS

LINE TO TAKE

PLEASED THAT ENVIRONMENT COUNCIL HAS JUST REACHED AGREEMENT IN PRINCIPLE FOR NEW DIRECTIVE TO LIMIT VEHICLE EMISSIONS.

WE HAVE ALWAYS INSISTED ON IMPORTANCE OF BALANCING INDUSTRIAL AND CONSUMER FACTORS WITH THE NEED FOR INCREASED ENVIRONMENTAL PROTECTION. AGREEMENT ACHIEVED THESE OBJECTIVES. VEHICLE EMISSIONS WILL BE CUT BY 60% COMPARED TO 1975 LEVELS. EXPENSIVE 3-WAY CATALYSTS WILL BE REQUIRED ONLY FOR LARGE VEHICLES OVER 2000 CC. EACH CATEGORY OF VEHICLE WILL HAVE DIFFERENT STANDARDS DEPENDING ON DIFFERENT IMPACT ON ENVIRONMENT. The lean burn option for medium and small cars is guaranteed, as UK wanted.

NOW LOOK FORWARD TO CO-OPERATION WITH COMMUNITY PARTNERS IN COMPLETING WORK ON DIRECTIVE BY NEXT ENVIRONMENT COUNCIL IN JUNE.

21 March 1985

BACKGROUND

Environment Council on 20/21 March achieved UK's objectives after difficult discussions lasting until 8 a.m. Member States agreed that there should be a different approach for each category of vehicle, so that medium vehicles (1400 cc - 2000 cc) will be treated differently from large vehicles. Also agreed that for medium vehicles European standards should be achievable by simple lean-burn technology combined with oxidation catalysts (not three way catalysts) or comparable cost-effective technology. In return Germans will be able to start a limited fiscal incentive scheme from 1 July. Also all Member States have accepted the principle that European standards will be fixed so that the effect on the European environment should be equivalent to that produced by USA standards.

Next step will be for the High-Level expert group in Brussels to agree on standards for each category of vehicle. There is still room for disagreement with the Germans over medium sized vehicles. But it should be possible to draft new Directive for consideration at the next Environment Council in June. Council also finally adopted Directive removing lead from petrol.

BY HAND

DEPARTMENT OF THE ENVIRONMENT

Mr Fisher

PRIVATE SECRETARY TO THE
PARLIAMENTARY UNDER-SECRETARY
OF STATE (Mr Waldegrave)

Point

Principal Press Secretary to the Prime Minister
10 Downing St.

I attach a copy of the letter which my Minister has this afternoon sent to the Editor of 'The Guardian' in response to this morning's letter from Friends of the Earth about vehicle emissions and the forthcoming EC Council of Ministers.

Barbara Jones

BARBARA JONES
PS/Mr Waldegrave
18 March 1985

BY HAND.

Dept: Mr Reynolds
cc letter only: Dr Fish
Mr. Griffiths-Jones
Mr Gee
PS/Secretary of State

18 March 1985

When he says (letters, 18 March) that British policy on vehicle emissions is "both economically misguided as well as environmentally disastrous", Dr Russell Jones is wide of the mark.

I agree with him that hydrocarbons as well as oxides of nitrogen (NOx) have been implicated among the possible causes of forest damage in Germany. For this reason, we would like to see lean burn technology combined with a simple "oxidation" catalyst, which will control hydrocarbons in exactly the same way as the "3 way" catalyst does.

We want to see the lean burn engine developed for two reasons. One is the significant potential for energy saving - at least 10%.

The second is the reduction in NOx emissions. Although on a test basis NOx emissions from a lean burn engine are marginally higher than those achieved by a "three-way" catalyst system when it is new, over the whole lifetime of a car they will be the same or perhaps even lower because of the greater inherent robustness of the lean burn technology.

So in environmental terms, we are convinced that this technological approach is one effective solution for Europe. And in terms of resource costs to the Community, the difference is enormous - not just in energy terms, as I have said, but also in the cost of a new car to the consumer. The additional cost of a "three way" catalyst system would be £400 - £600. (Dr Russel Jones' figure of £50 ignores the complex additional controls needed for a "three way" catalyst). By contrast, the additional cost of a lean burn engine equipped with a simple oxidation catalyst would be about a quarter of this.

Dr Russell Jones himself sees "no reason why catalytic converters cannot be combined with lean burn engines to produce vehicles which are both pollution free and economical to man." This is indeed true for the simple oxidation catalyst I have mentioned. It is not true for the "three way" catalyst system, which is incompatible with lean burn because lean burn engines run on too weak an air-fuel mixture for the NOx - reduction element of a "three way" catalyst to operate.

WILLIAM WALDEGRAVE

The Editor, The Guardian

Ow.

(2)

2 MARSHAM STREET
LONDON SW1P 3EB
01-212 3434
My ref:

Your ref:

14 March 1985

Dear Mark

My Secretary of State has asked me to circulate the attached FCO telegram, which outlines the Environment Commissioner Mr Clinton Davis's plans for the next few years. This was raised at Cabinet today.

I am copying this to the Private Secretaries of all Members of the Cabinet, and Richard Hatfield at Cabinet Office.

Yours ever

Andrew

Prime Minister

CDP
15/3

A C ALLBERRY
Private Secretary

Mark Addison Esq

RESTRICTED

RESTRICTED

FRAME GENERAL/SOCIAL
FM UKREP BRUSSELS 111933Z MAR 85
TO IMMEDIATE F C O
TELEGRAM NUMBER 921 OF 11 MARCH,
INFO COPENHAGEN THE HAGUE ROME DUBLIN PARIS BONN
LUXEMBOURG ATHENS LISBON MADRID,
INFO SAVING BRUSSELS.

COMMISSION PROGRAMME FOR 1985.
ENVIRONMENT, TRANSPORT AND CONSUMER PROTECTION.

SUMMARY

1. PROGRAMME CONFIRMS HIGHER PROFILE FOR ENVIRONMENTAL POLICY. PROPOSAL TO DESIGNATE 1987 EUROPEAN ENVIRONMENT YEAR. DIRECT LINK IDENTIFIED BETWEEN COMPETITIVENESS OF EUROPEAN INDUSTRY AND ABILITY TO MATCH HIGHEST ENVIRONMENTAL STANDARDS. TRANSPORT SEEN AS CONTRIBUTING TOWARDS ECONOMIC GROWTH THROUGH MORE OPEN AND EFFICIENT SYSTEM AND DEVELOPMENTS OF LARGE SCALE INFRASTRUCTURE PROJECTS. VARIOUS NEW PROPOSALS PROMISED. ACTION ON MAJOR INFRASTRUCTURE PROGRAMMES FOR PRIORITY PROJECTS. RECENT COMMISSION STATEMENT ON CONSUMER PROTECTION IS REPEATED.

DETAIL

ENVIRONMENT.

2. PROGRAMME EMPHASISES COMMISSION'S INTENTION TO BUILD ENVIRONMENTAL POLICY INTO ITS ECONOMIC AND SOCIAL STRATEGY BECAUSE OF ITS INCREASING POLITICAL IMPORTANCE, ROLE IN SPEEDING UP INDUSTRIAL CHANGE, AND JOB CREATING POTENTIAL. ANALYSIS AND IMPLEMENTATION OF ENVIRONMENTAL POLICIES ARE BEST CARRIED OUT AT COMMUNITY LEVEL. 1987 SHOULD BE DESIGNATED EUROPEAN ENVIRONMENT YEAR. ACTION TO IMPROVE QUALITY OF LIFE THROUGH POLLUTION PREVENTION WILL CONCENTRATE ON SECURING AGREEMENT TO PROPOSALS ON THE TABLE PLUS DEVELOPMENT OF NEW PROPOSALS ON WASTE MANAGEMENT, INCLUDING RECYCLING, DUMPING AT SEA AND NUCLEAR WASTE. NEW AREAS OF EXAMINATION INCLUDE ENVIRONMENTAL CO-OPERATION WITH ACP AND THIRD WORLD COUNTRIES AND EXAMINATION OF ANIMAL EXPLOITATION IN ALL ITS FORMS. ON LINK BETWEEN ENVIRONMENTAL AND INDUSTRIAL POLICY, PROGRAMME EMPHASISES THAT EUROPEAN INDUSTRY'S COMPETITIVENESS WILL DEPEND ON MATCHING STANDARDS OF PRODUCTS FROM ELSEWHERE. IT CONCLUDES THAT IMPROVING THE QUALITY OF THE ENVIRONMENT CREATES NEW JOBS AND PROTECTS EXISTING ONES.

RESTRICTED

/TRANSPORT

TRANSPORT.

3. PROGRAMME IDENTIFIES A MORE OPEN TRANSPORT SYSTEM AND LARGE SCALE INFRASTRUCTURE PROJECTS AS MAIN WAYS OF HELPING TO ACHIEVE ECONOMIC GROWTH THROUGH TRANSPORT POLICY. MORE ACTION BY COUNCIL IS CALLED FOR ON PRESENT PROPOSALS. ON SEA TRANSPORT, PRIORITY IS GIVEN TO HALTING THE DECLINE OF THE COMMUNITY FLEET BY MEASURES AGAINST UNFAIR PRACTICES, RATHER THAN BY LIBERAL POLICIES. ON AVIATION, THE COMMISSION ''WILL DEFENDS ITS PROPOSALS''. NEW PROPOSALS PROMISED TO PHASE OUT ROAD HAULAGE QUOTAS, TO HARMONISE WEIGHTS AND DIMENSIONS OF LORRIES AND TO SIMPLIFY BORDER CONTROLS. COMMISSION ALSO PROMISES IDEAS ON METHODS OF FINANCING INFRASTRUCTURE. COMMUNITY AGREEMENT ON MEDIUM-TERM PROGRAMME FOR MAJOR INFRASTURE IS TOP PRIORITY AND PROPOSALS WILL BE READY IN 1985.

CONSUMER PROTECTION.

4. AS SPELLED OUT IN COMMISSION'S RECENT STATEMENT, COMMISSION SEEK DECISIONS ON PRODUCT LIABILITY AND TOY SAFETY. THEY WILL PRESENT PROPOSALS ON CONSUMER PROTECTION AND INFORMATION, AND ON PREVENTION OF HOME AND LEISURE ACCIDENTS.

BUTLER

FRAME GENERAL/SOCIAL

ECD (1)

CONFIDENTIAL

cc PW.

Environment Secretary reported on this to Cabinet. NBPT CDP 14/3

Prime Minister

VEHICLE EMISSIONS: ENVIRONMENT COUNCIL, 7 MARCH

As you will know, the Environment Council meeting on 7 March was unable to reach agreement on vehicle emissions. Despite concessions offered by other Member States and a constructive approach by the UK, the FRG made virtually no movement from its rigid stance. The meeting ended with an impasse in which William Waldegrave refused to accede to German insistence that after two years medium-sized cars should be treated in the same way as large cars - ie US standards requiring 3-way catalysts. The Council will meet again on 20 March.

This outcome is not unsatisfactory for us. The UK avoided being wholly isolated, although the FRG and the Commission may claim otherwise in public and the French did indeed begin to weaken. Nonetheless, our resolute stand brought it home to the Germans, the Presidency and the Commission that our objections to wasteful technology are fundamental and not a bargaining posture. But there is still a long way to go, and the likelihood that the matter will come to the European Council is now greater.

I have discussed the next steps with William Waldegrave, John Butcher and Lynda Chalker. We have concluded that, in order to emphasise the UK's resolution on this question, we should continue to make a strong public case for our position, and for the time being we should not make any further overtures to other Member states. On the other hand, we should certainly listen to any overtures made to us; Commission officials are meeting ours in London on Friday.

CONFIDENTIAL

Meanwhile we need to impress on the Commission at the highest level that the Community is in danger of an outcome which could be much more serious than a failure to reconcile differences on an environmental problem. The Treaty's provisions on the free movement of goods are at risk if an agreement is not reached; but we cannot appear to allow one country to extract concessions which legitimise its own unilateral decisions in order to maintain the free market at all costs. This would be an appalling precedent for all such future negotiations. The way in which the Commission does or does not carry out its role as initiator of genuine compromise between the (partly presentational) needs of Germany and the substantive problems of the UK is therefore critical. It has not been well done so far. I am therefore asking the Foreign Secretary if he would take the opportunity of next week's Foreign Affairs Council to explain to M. Delors the urgency and importance of the achievement of such a compromise which cannot be founded simply on concessions by the UK.

We will, of course, continue to seek a formula ourselves. I am not entirely without hope that it will be possible to reach agreement at the resumed Environment Council on 20 March within the terms of the recent E(A) conclusions; but if it becomes clear during the meeting that such an agreement is not within our reach, our objective will be to leave room for manoeuvre at the European Council.

I am sending copies of this minute to the Foreign Secretary, to the other members of E(A), to Lynda Chalker, John Butcher and William Waldegrave, and to Sir Robert Armstrong.

Andrew Turnbull (Private Secretary)

for P J

13 March 1985

(Agreed by the Secretary of State and signed in his absence)

Env. Affairs: Acid Rain Pt 3.

RESTRICTED

Bit much that they should gang up. CDP.

GRS 160
RESTRICTED
DESKBY 011700Z
FM BONN 011606Z MAR 85
TO IMMEDIATE FCO
TELEGRAM NUMBER 174 OF 1 MARCH
AND TO IMMEDIATE PARIS, UKREP BRUSSELS
INFO PRIORITY ATHENS BRUSSELS COPENHAGEN DUBLIN LUXEMBOURG ROME
THE HAGUE

PARIS TELNO 159 TO FCO
FRENCH/GERMAN SUMMIT 28 FEBRUARY: VEHICLE EMISSIONS

1. THE FRENCH/GERMAN WORKING GROUP (REFERRED TO IN PARA 4 OF TUR) IS EXPECTED TO MEET ON MONDAY 4 MARCH. THE WORKING GROUP IS TO BE AT MINISTERIAL LEVEL AND WILL PROBABLY INCLUDE BOUCHARDEAU (FRENCH ENVIRONMENT MINISTER) BANGEMANN (FEDERAL ECONOMICS MINISTER) AND ZIMMERMANN OR SPRANGER (INTERIOR MINISTRY).

2. THE SPECIFIC ISSUES TO BE ADDRESSED ARE:

I. DEFINITION OF SMALL, MEDIUM AND LARGE CAR CATEGORIES:
II. SPECIFICATION OF STANDARDS TO BE APPLIED PARTICULARLY TO SMALL AND MEDIUM CATEGORIES:
III. DATES FOR IMPLEMENTATION:
IV. FISCAL INCENTIVES.

3. FCO PLEASE ADVANCE TO:
FCO - SAWERS, EDWARDS
DTI - LACKEY
DTP - LYNESS
DOE - GRUFFYDD JONES
CAB - STAPLETON

MT

BULLARD
FRAME ECONOMIC/EXTERNAL
ECD(I)
ECD(E)
MAED

RESTRICTED

CONFIDENTIAL

Qz.04260

MR POWELL

EUROPEAN COMMUNITY VEHICLE EMISSION STANDARDS

I attach a brief for the Prime Minister on E(A)(85) 12 for the meeting of the Ministerial Steering Committee on Economic Strategy, Sub-Committee on Economic Affairs at 11.30 am on 1 March.

I am sending copies to Sir Robert Armstrong, Peter Gregson and Sir Robin Nicholson.

D F Williamson

D F WILLIAMSON

28 February 1985

MINISTERIAL STEERING COMMITTEE ON ECONOMIC STRATEGY, SUB-COMMITTEE ON ECONOMIC AFFAIRS

EUROPEAN COMMUNITY VEHICLE EMISSION STANDARDS (E(A)(85) 12)

Brief for the Prime Minister for meeting at 11.30 am on 1 March

PURPOSE OF MEETING

1. To decide the United Kingdom line on the proposed Vehicle Emissions directive at the Environment Council on 7 March.

BACKGROUND

2. E(A)(84) 28th meeting on 28 November 1984 decided that the United Kingdom should insist that the proposed new directive providing for tighter vehicle emissions should be permissive - ie it should set maximum standards which individual member states need not apply in their own markets if they did not wish. E(A) also agreed that for cars over 2 litres the United Kingdom could accept permissive maximum standards equivalent to United States standards ie requiring 3-way catalysts. For all other cars, however, the United Kingdom should oppose standards requiring 3-way catalysts, even on a permissive basis.

3. Since the United Kingdom does not intend to require 3-way catalysts for any cars in its own market, what is in issue is not United Kingdom car production or sales but United Kingdom car exports to Western European countries. More specifically, as we have already decided that we could accept US emission standards for large cars (over 2000 cc) and, if we negotiate firmly, we should be able to get agreement to standards for small cars (below 1400 cc) not requiring catalysts, the issue could narrow down to the formulation of improved permissive emission standards which could affect our exports of medium cars (1400 - 2000 cc). Although these cars are important in the home market, our exports are small.

/4.

4. As a result of subsequent negotiations by a High Level Group of officials in Brussels, there are now two options on the table which member states will be asked to consider at the 7 March Environment Council. These are set out in the annex to E(A)(85) 12. Any decision will need to be taken by unanimity. Both options propose US standards as the permissive maximum for large cars, ie a position which is in accordance with the conclusions of E(A), and there is unlikely to be any disagreement within the Community on this point.

5. For small cars (below 1400 cc) and medium cars (1400 - 2000 cc):

Option 1 provides for US standards to be the ultimate aim, in the case of medium cars not later than 1992, and in the case of small cars by a date to be decided later.

Option 2 provides for the adoption of tighter standards (not yet precisely defined) in a two stage approach but with no decision to go beyond standards which can be achieved without 3-way catalysts.

6. The Germans, supported by the Danes, oppose both options as not tough enough; they want US standards introduced for all cars by 1989. The French and Italians prefer option 2. Unlike the United Kingdom (for whom the main Community markets are France, Italy and the Republic of Ireland), France and Italy are chiefly interested in the German market, especially for small cars. Therefore, both are showing signs of readiness to do a deal which goes some way towards the German position on medium cars - ie by accepting option 1 or a variant of it for cars in the 1400-2000 cc range - in exchange for option 2 for small cars. The French and Italian desire to seek a compromise acceptable to the Germans has been increased by a German threat to introduce unilaterally in July 1985 fiscal incentives for the purchase of cars of all sizes which meet US emission standards. Other member states are likely to fall in with whatever solution is acceptable to the big four.

/7.

7. Further background, including the volume of United Kingdom car exports and the specific emission standards under discussion, is contained in the attached note by officials (flag A).

MAIN ISSUES

8. In E(A)(85) 12, the Minister of State, Department of Trade and Industry (Mr Lamont) proposes that at the 7 March Environment Council the United Kingdom should reject option 1 for both small and medium cars and support option 2. The main issues for consideration are:

(i) whether option 2, or a variant of it, should be the United Kingdom's position for both medium and small cars;

(ii) the implications of blocking a decision at the 7 March Council;

(iii) whether at the end of the day the United Kingdom would be better off with no directive rather than an unsatisfactory one;

(iv) what, if anything, can be done about German fiscal incentives.

Should the United Kingdom support Option 2?

9. Option 2 is basically the United Kingdom's own option for lean burn and not 3-way catalysts, and there is certainly no chance of negotiating any less rigorous standards than those proposed in it. Ford (UK) have indicated that they can accept option 2. Although the Chief Executive of British Leyland has expressed a marginal preference for turning down even option 2, there is no real indication that British Leyland have thought through the cost of the alternative of no directive. Most members of E(A) are therefore likely to accept that option 2, as it does not involve 3-way catalysts but could be met by lean burn, is in line with the previous conclusions of E(A) and should be supported.

/10.

10. Option 2 may prove negotiable for small cars, as there will be strong French and some Italian support for the United Kingdom position and the Germans have indicated that they are prepared to show some flexibility on small cars. If so, we should pocket this as soon as possible. Both France and Italy, however, are likely to move towards option 1 for medium cars, if they get option 2 for small cars. If so, they may seek the longest negotiable deferment or a commitment to US levels but with a decision on the timescale deferred to a later date.

Implications of blocking a settlement on 7 March

11. There will be considerable pressure for a settlement at the Environment Council on 7 March. The support which the United Kingdom has received from France and Italy will probably not be sustained for medium cars. It is possible that we may be faced by some sort of deal done between the French and Germans at the Franco-German summit involving German concessions on small cars in exchange for US standards on medium cars. If so, the United Kingdom may find itself isolated in blocking agreement. In these circumstances the matter is likely to be taken to the European Council on 29-30 March, where we shall come under pressure to accept a deal which departs from option 2. Other heads of government will stress that, as the directive is permissive, we shall not ourselves be obliged to impose the new standards in our own market and our export interest (particularly in medium cars) is small. It is unlikely that the Germans will take any unilateral measures to introduce US standards in their market before the European Council.

Unsatisfactory directive or no directive

12. If agreement is not possible on the basis of option 2, it will be within our power to block a directive, as it must be adopted by unanimity. It is a fine judgement whether or not we would be better off with no directive or with a directive which was acceptable for large and small cars but allowed US standards on a permissive basis for medium cars. In either case there could be a divided market as some countries would be likely to impose US standards and some not.

/a.

a. No directive: the Secretary of State for Transport (his letter of 26 February at flag B) expresses the view that, in the absence of a directive, the Germans would not act unconstitutionally by unilateral imposition of US standards. Most other observers, both here and in France and Italy, believe that the Germans will feel politically obliged to act unilaterally, probably imposing US standards at an early date for all cars. Denmark and most EFTA countries would be likely to follow suit. It would be open to the Commission or another member state to bring a case against Germany in the European Court. Any such case would take some time, during which the new standards would become well established. Such a case might serve to deter France and Italy from following the German lead.

b. An unsatisfactory directive: insofar as a directive either delayed the imposition of US standards or avoided their imposition for small cars, it could have advantages over no directive as it would restrain the Germans and other Community members from early introduction of US standards for all cars. On the other hand, insofar as a directive did allow the imposition of US standards, a larger number of Community members than otherwise might adopt these standards. It is still uncertain, however, whether they would be imposed in the important French and Italian markets. In view of the very high political importance of this issue to Chancellor Kohl, a unilateral United Kingdom blockage of a permissive directive would probably spill over into other areas of our bilateral and Community relations.

13. As for the views of the United Kingdom industry, Ford, while preferring option 2, have said that they would nevertheless tool up for the divided market which would be created by either an unsatisfactory directive or no directive; they have not, however, expressed a preference between the two alternatives. British Leyland have indicated that they would prefer no directive. Either way, they are likely to argue that changes will need to

be made to their corporate plan; however, the £250 million figure mentioned in E(A)(85) 12 has not been backed up by any supporting evidence. Their position in favour of no directive may be partly an attempt to improve their bargaining position for extra funds should the Government accept a directive which is not totally satisfactory.

German fiscal incentives

14. The Germans propose to introduce fiscal incentives for all cars meeting US standards from July 1985. The effects of these incentives are not easy to judge. The Secretary of State for Trade and Industry is likely to argue that they will result in the de facto introduction of US standards throughout the German market. The Secretary of State for Transport believes that they will work badly.

15. The United Kingdom has already asked the Commission to take action against the German measures under Articles 92 and 93 of the EEC Treaty (which forbid state aids except in certain closely defined circumstances). Whether these incentives are in fact illegal state aids in terms of Articles 92 and 93 is, however, uncertain, and there may be no way of preventing their introduction. Clearly, the United Kingdom should press ahead with its opposition to the German incentives. But if the Germans appear ready to accept a reasonable Community directive provided they can introduce their fiscal incentives - possibly with a delay for small cars - a deal of this sort might be worth considering. Although it would mean that a large part of the German market would be lost except for cars with 3-way catalysts, it could be argued that this would be bound to happen anyway and that we should at least be better off vis-a-vis other more important European markets.

HANDLING

16. The Secretary of State for Trade and Industry and the Minister of State (Mr Lamont) will introduce their paper. The

/Secretaries

Secretaries of State for Transport and the Environment will also wish to give their views. The Minister of State, Foreign and Commonwealth Office (Mr Rifkind) may wish to comment on the likely German reactions to any blocking of agreement on a directive, and on the implications of the matter coming to the European Council. The Chancellor of the Exchequer may wish to comment particularly on the possibility of British Leyland seeking extra funds. The Secretary of State for Energy may point out that the proposed directive also lays down dates for the introduction of cars which can run on unleaded petrol; if, therefore, it falls, this will have to be covered in some other way.

CONCLUSIONS

17. You may wish to reach conclusions on the following points which are directly relevant to the United Kingdom's position at the March European Council -

(i) that the United Kingdom will only accept a directive if it is permissive, not mandatory;

(ii) whether the United Kingdom should support option 2, (possibly with minor changes) for

(a) small cars and

(b) medium cars

even if isolated at the Environment Council;

(iii) whether, while maintaining our declared opposition to German fiscal incentives, we should explore informally the possibility of a deal on fiscal incentives in exchange for a reasonable Community directive.

18. If, as seems possible, we can get option 2 for small cars but not for medium cars, it may be desirable to give to United Kingdom Ministers at the Environment Council some discretion on the wording on medium cars, in case there should

/be

be an opening for agreement. If there is no agreement, it would be necessary to decide later, after the Environment Council, whether the United Kingdom's interest would best be served by continued blocking of the directive or by negotiating the best available deal on medium cars.

Cabinet Office

28 February 1985

VEHICLE EMISSION LIMITS: STATE OF THE NEGOTIATIONS

Note by Officials

I. BACKGROUND

1. Since 1970 the Community has increasingly tightened permissible levels of emission from new car exhausts. The last harmonised standard directive was adopted in 1983 and provides for standards close to the limits of current technology excluding catalysts by 1986 (line A of Annex I). In June 1984, in response to German pressure, the Commission proposed the two stage application of still tighter Community standards. Stage 1, beginning in 1989, was to involve standards which all major European manufacturers had said they could meet in the timescale (line B of Annex I). Limits equivalent (taking account of Community conditions) to United States Federal emission standards, requiring 3-way catalysts, would then be introduced in 1995 (line C of Annex I). This did not, however, satisfy the Federal Republic of Germany, which in October 1984 announced its intention to introduce US emission standards from 1988 for new cars of 2 litres or more, and from 1989 for all other new registrations; and to introduce fiscal incentives in 1985 to encourage purchase of cars conforming to those standards.

United Kingdom approach

2. In the view of the United Kingdom a cost-effective reduction in European vehicle emissions would be environmentally prudent. We are therefore strongly in favour of the development of lean burn engines which combine better fuel savings with lower emissions. We do not consider that the expensive addition of 3-way catalysts, which raise costs for the consumer by incurring fuel penalties and reduce vehicle efficiency, are the right way forward.

3. E(A)(84)28th Meeting on 28 November 1984 agreed that the United Kingdom's objective in the Community should be to move towards a tightening of vehicle emission standards by cost-effective means, without damaging the development of lean-burn technology and without any mandatory requirement for 3-way catalysts. E(A) agreed, however, that the United Kingdom could accept non-mandatory Community standards involving 3-way catalysts for cars over 2 litres (the range at which US standards would cause least problems for the British industry, and at which lean burn would be least capable of substantial emission reductions).

4. United Kingdom officials, with French and Italian support, therefore evolved a compromise two-stage proposal which it was hoped could form the basis for Community agreement. For cars below 2 litres, introduction by 1989 of the Commission's stage 1 standards was proposed, followed by the introduction in the mid 1990s of further improvements, the details to be decided but capable of being met without 3-way catalysts (lines D and G of Annex I). For cars over 2 litres the United Kingdom compromise provided for introduction by 1989 of US emission levels, in accordance with the E(A) decision. All these standards, however, would be permissive and member states could set less stringent levels for their own markets.

5. There is some pressure now to make mandatory any standards which may be agreed. This would be a sticking point for the United Kingdom, as we do not want 3-way catalysts to be compulsory on any cars in our market. It is important to keep in mind that, provided that the permissive character of the directive is maintained, what is in issue in this debate is a decision on stricter Community standards which will be applied in Germany, Denmark, Netherlands, possibly Belgium and Luxembourg, and the EFTA countries. They may also be applied in France and Italy. They will not be applied (unless the Government rules otherwise) in the United Kingdom.

Position of other member states

6. There have been continued negotiations in the High Level Official Group in the Community on both the British approach and other proposals with a view to the drafting of a Presidency paper with recommendations for the Environment Council on 7 March 1985. The Germans, supported by Denmark, have continued to press for introduction of US standards for all cars by 1988 or 1989. The French and Italians have broadly supported the United Kingdom approach. However, whereas the United Kingdom's chief export markets in the Community are France and Italy (see Annex II) and our main interest is in maintaining these markets open, the important export market for France and Italy is Germany. They are therefore both ready to move nearer to the German position in different respects. The French are particularly keen to ensure that cars below 1400 cc should be subject to standards which can be met without catalyst technology and are less concerned about larger cars. In the last resort, therefore, they will be prepared to make concessions to the Germans on medium cars in the interests of an acceptable deal on small cars. They will have been encouraged by the fact that the only area where the Germans have shown any hint of flexibility is the small car range (where 3-way catalysts make least economic sense). The Italians are also mainly interested in small cars and are most concerned that the delays for adoption of US emission standards should be as long as possible. While, therefore, it is clearly in our interest to maintain as effective an alliance as possible with the French and Italians, this may not be sustained. Other member states will probably accept whatever is agreed by the big four.

II. CURRENT STATE OF THE NEGOTIATIONS IN THE COMMUNITY

7. Member states generally consider that different approaches should be adopted for large, medium and small cars.

Large cars

8. There is general agreement that the big car range should be defined as cars of 2000 cc and above, despite German pressure for the minimum to be lowered to 1800 cc. In this range, it is also agreed that standards equivalent to current (1985) United States Federal emission standards - ie necessitating the use of 3-way catalysts - should be introduced as part of an acceptable overall package. This position is in accordance with the conclusions of E(A). The only outstanding point of disagreement is over the date of introduction of the new standards. Germany is pressing for 1988; the rest of the Community would agree to 1989. There are signs that France would be prepared to concede the German demands on this point in the context of a satisfactory final package. We should continue to seek agreement on 1989 as the year of introduction for these standards for cars over 2000 cc, but this is not a sticking point for us.

Small cars

9. A consensus may be within sight on small cars. There is still disagreement as to whether the top of the small car range should be 1100 cc (as proposed by Germany and the Netherlands) or 1400 cc (as proposed by the UK, France and Italy). The Germans have given some indications that they would be prepared to agree to 1400 cc as part of a package. Given that the standard for small cars is likely to be less rigorous than for medium cars, there is clearly advantage in aiming for the top of the small car range to be set as high as possible.

10. As for the standards to be set for small cars, there is general agreement on a two stage approach. Agreement is also within sight that the first stage should begin in October 1989, and that standards should by then correspond at least to those in Stage 1 of the Commission approach (line B of Annex I). Such standards could be achieved without catalyst technology of any kind, and are acceptable to both British Leyland and Ford (UK).

11. There is still disagreement on the second stage. The two options currently on the table (although they may be modified before the Environment Council) are:

Small car option 1:
"before the end of 1987 the Council will take a decision on the basis of a Commission proposal and in the light of technological developments, on as early a date as possible for the application of standards equivalent to United States emission standards" (line H of Annex I);

Small car option 2:
"as soon as possible and taking account of technological development, the Council will decide on a date, not later than 1.10.1994, for the application of a substantial new reduction in pollutant standards" (line I of Annex I);

12. The United Kingdom, France and Italy support option 2. For the French this is likely to be a sticking point. Italy will waver and could almost certainly accept option 1. Germany regards neither option as tough enough but would probably agree to option 1. A crucial question is whether at the end of the day Germany will agree to option 2 in exchange for deals in other areas.

Medium cars

13. This is the chief area of disagreement. Germany is likely to stick to its demand for application of US standards as soon as possible. France and Italy seem prepared to concede US emission standards for medium cars as a quid pro quo for a reasonable deal on small cars. The Italian and French judgement seems to be that Germany is determined to have US emission standards for medium cars but will accept a permissive short-term derogation allowing these standards to be introduced earlier in Germany. They therefore seem to accept that, given the importance of the German market for them, they might as well accept a directive on these terms and concentrate on negotiating as late a date as possible for introduction of the new standards.

14. Following discussions in the High Level Group, two options are now on the table:

Medium car option 1: application by either 1 January 1989 (the German position) or by 1 October 1992 of standards equivalent to US emission standards.

Medium car option 2: application by 1 October 1989 of the Commission's stage 1 approach, followed by application not later than 1 October 1994 of improved standards achievable in effect by lean burn engine plus simple oxidation catalyst (line F of Annex I).

15. Option 2 is acceptable to Ford (UK). It is opposed by British Leyland senior management. Germany and Denmark have rejected option 2. France and Italy have so far joined the United Kingdom in supporting option 2. But Italy has already indicated that it would also be prepared to accept option 1 if the 1992 date is used, and France may do likewise in exchange for a deal on small cars and German fiscal incentives (see paragraphs 18-20 below).

Derogation for old models

16. There is also disagreement between member states on the length of the derogation for the applications of the new standards to "old model" cars, ie new cars of models already introduced before the introduction of the new standards. Most member states want a 1 or 2 year derogation; Germany would prefer no derogation. The United Kingdom has been pressing for 2 years, but this is not a sticking point for us.

IV. FISCAL INCENTIVES

17. The German proposal to introduce fiscal incentives from 1 July 1985 for all sizes of cars conforming to US emission standards, regardless of what standards the Community has decided to set, could tend in practice to make such standards the norm in the German market, at least for new models. Thus even if the standards finally agreed by the Community were less strict than US standards, there would nevertheless be a risk of a de facto divided internal market.

18. It is arguable that the German proposals for fiscal incentives are contrary to the Articles 92 and 93 of the EEC Treaty which ban state aids to industry except in certain defined circumstances. The United Kingdom has already made representations to the Commission urging them to take action against the German measures under Article 93. But the legal case for doing so is not watertight, and the Commission may decide not to implement the necessary procedure. It would then be open to the United Kingdom to take the matter to the European Court; the chances of winning the case are, however, uncertain.

19. There may also be scope for negotiating with the Germans some modification of their proposals for fiscal incentives. The French seem keen to proceed along this path. Their objective would seem to be to negotiate a delay in the impact of fiscal incentives for small cars conforming to US standards or to remove small cars altogether from this device. In exchange they would accept the early introduction of fiscal incentives for other cars as part of a package involving German acceptance of a reasonable deal on Community standards. We do not know whether the Germans, if they were allowed to achieve the de facto introduction of US standards in their own market by means of fiscal incentives, with possibly a delay for small cars, might be prepared to be flexible on Community standards.

IV. OPTIONS FOR THE UNITED KINGDOM

20. The main battle on Community standards is likely to be over Options 1 and 2 for small and medium cars (set out in Annex III for ease of reference); ie over whether current US emission standards should be accepted as the objective for small and medium cars as well as for large cars. At the end of the day the United Kingdom may have to choose between vetoing a new directive (which can only be adopted by unanimity); or joining the majority in accepting that permissive US emission standards should be set for medium cars (although with French support we should be able to avoid this for small cars), albeit over a long time-scale. The latter course would mean that at any rate medium cars not complying with US emission levels would be deflected from markets where such standards were mandatory (eg Germany) to elsewhere in the Community, including the United Kingdom. Apart from Germany, Denmark, Netherlands, possibly Belgium and Luxembourg, and the EFTA countries would mandate the new standards for medium cars. France and Italy might also follow suit if the majority of their main markets did. For all countries, however, as 3-way catalysts are poisoned by leaded petrol the mandating of US emission standards could only take place once an adequate network of unleaded petrol stations was in place, and this could take some years in the case of in particular the Southern European countries.

21. In the absence of a new directive, any countries which imposed standards tighter than those in the existing (1983) Community directive would be in contravention of Community rules. A case could therefore be brought against them in the European Court, although this would take several years. Political realities in Germany are such that the Germans will probably seek to go ahead one way or another with the introduction of US standards if a Community directive acceptable to them is not agreed soon, although Departments differ in their assessment of whether the Germans would flout Community rules. Most EFTA countries would probably also go ahead with the introduction of US standards.

22. The Chief Executive of British Leyland has expressed a preference for no early directive rather than an unsatisfactory one involving US emission standards. Ford (UK) have made clear that they would strongly prefer a directive based on Option 2, although they would tool up, despite the considerable cost, to meet the requirements of a divided market if the outcome of the current negotiations involved US emission standards in some countries.

Detailed points on which decisions still need to be taken

23. The following summarises the main outstanding points in the negotiations:

a. Permissive or mandatory directive: the United Kingdom must have a permissive directive; the German proposal for a mandatory directive is not acceptable.

b. Date of introduction of US standards for large cars: the United Kingdom supports 1989; Germany is pressing for 1988. An early date could be accepted in an otherwise satisfactory package without major damage to British interests.

c. Definition of small cars: the United Kingdom position is that small cars should be defined as those below 1400 cc. Germany is pressing for 1100 cc but might accept 1400 cc at the end of the day. As any deal on medium cars is unlikely to be better than for small cars, there is a very strong case for insisting, with French and Italian support, on 1400 cc.

d. Stage 2 standards for small cars: the United Kingdom is pressing for standards which can be met without 3-way catalysts. We should stick to option 2 (no reference to US emissions standards) and should have support from the French.

e. Standards for medium cars: the United Kingdom is pressing for a two stage approach involving the ultimate achievement of standards which could be reached without 3-way catalysts. If isolated, the United Kingdom would need to consider whether it could afford to accept a target of US standards from a date not be before 1992 (ie option 1 in the form which the French and Italians might accept).

f. Derogation for old models: the current United Kingdom position is that new cars of old model ranges of all sizes should be given a two year derogation for the application of new standards. The Germans would prefer no derogation. This is a point on which the United Kingdom could compromise without major damage as part of a final package.

g. German fiscal incentives: the United Kingdom opposes these incentives, the chief objective of which is to advance the introduction of the new standards on the German market. If a reasonable package on Community standards were to emerge, it would be for consideration whether a careful gesture in this area might clinch the deal, eg a short term programme of fiscal incentives or immediate introduction on the German market of US standards for large cars.

h. Unleaded petrol: the present draft directive also includes dates by which new cars/new models must be capable of running on unleaded petrol. The setting of such dates is a United Kingdom objective. If the draft directive is vetoed, therefore, some other way would have to be found of legislating.

European Secretariat of Cabinet Office
25 Februrary 1985

COMPARATIVE TABLE OF PROPOSED VEHICLE EMISSION STANDARDS

Proposal	Pollutant Level (Mass in g per ECE test)				Date of Application
	Hydrocarbons	Nitrogen oxides	Hydrocarbons plus nitrogen oxides	Carbon monoxide	
ALL CARS					
A. Current Community standard					
Now	16.3	10.2	26.5	87	Since 1981 (all cars)
1983 Directive	12	8	20.5	67	October 1986 (all cars)
B. Commission Stage 1 proposals	--	6	15	45	1989 new models; 1991 all cars
C. US standards (estimated equivalents)	3	3	--	15	
MEDIUM CARS (1.4 - 2 litres engine capacity)					
D. UK proposals (January 1985)					
Stage 1	--	6	15	45	1989 new models; 1991 all cars
Stage 2	--	6	11	35	
E. High Level Group "Option 1"	Application by 1989/92 of US equivalent standards				
F. High Level Group "Option 2"					
Stage 1	--	6	15	45	1989 new models; 1991 all cars
Stage 2	7 3-6	4-6 12	--	30-35	By 1994 all cars

/SMALL CARS

CONFIDENTIAL

COMPARATIVE TABLE OF PROPOSED VEHICLE EMISSION STANDARDS (cont)

Proposal	Pollutant Level (Mass in g per ECE test)				Date of Application
	Hydrocarbons	Nitrogen oxides	Hydrocarbons plus nitrogen oxides	Carbon monoxide	
SMALL CARS (under 1.4 litres engine capacity)					
G. UK proposals (January 1985)					
Stage 1	--	5	13.5	40	1989 new models; 1991 all cars
Stage 2	--	5	9	30	
H. High Level Group "Option 1"					
Stage 1	--	6	15	45	1989 new models; 1991 all cars
Stage 2	Council to decide by end 1987 on date for application of US equivalent standards				
I. High Level Group "Option 2"					
Stage 1	--	6 or lower	15 or lower	45 or lower	1989 new models; 1991 all cars
Stage 2	Council to decide by October 1994 on substantial further reductions				

ANNEX II

UK CAR EXPORTS TO EUROPE 1983

(Manufacturers' Exports of Cars Produced in the UK)

Destination	Number of Cars
Belgium and Luxembourg	8,010
Denmark	416
France	34,337
Germany	7,999
Greece	4
Irish Republic	15,258
Italy	16,584
Netherlands	7,201
Total to EC member states	89,809
Portugal	6,822
Spain	2,846
Switzerland	1,746
Other	2,704
	103,927
Rest of the world	129,731

Source: SMMT

CONFIDENTIAL

ANNEX III

Options currently on the table for small and medium cars

Option 1:

Medium cars: Emission limits equivalent to US limits would be applied from 1 January 1989 (German position) or 1 October 1992 (alternative date likely to be accepted by French and Italians)

Small cars:

First stage to begin on 1 January 1989 with the application of standards at least at the level proposed in the Commission's stage 1 approach (ie standards not involving 3-way catalysts which all major European manufacturers have said they could meet in the timescale).

Second stage: before 31 December 1987, the Council, on the basis of a Commission proposal and in the light of technological developments, will decide on as early a date as possible for the introduction of emission limits equivalent to US limits.

Option 2:

Medium cars:

First stage: from 1 January 1989, the adoption of the standards contained in the Commission's proposed Stage 1 (ie not involving 3-way catalysts and which all major European manufacturers could meet in the timescale).

Second stage: not later than 1 October 19~~84~~89, improved standards, within reach of US standards, which may be obtained by advanced combustion systems. It would be noted that further technical work would be required to define exact figures, but that these would be likely to find expression in a range from CO 35; HC 6; NOx 6 to CO 30; HC 3-4; NOx 4.

12 7-8

Small cars:

First stage: from 1 October 1989, the adoption of standards at least corresponding to those in the Commission's proposed stage 1.

Second stage: as soon as possible, and taking account of technological development, the Council will decide upon a date, not later than 1 October 1994, for the application of a substantial new reduction in pollutant emissions.

DEPARTMENT OF TRANSPORT
2 MARSHAM STREET LONDON SW1P 3EB
01-212 3434

The Rt Hon Norman Tebbit MP
Secretary of State for Trade and Industry
Department of Trade and Industry
1 Victoria Street
LONDON
SW1H 0ET

26. February 1985

Dear Norman

VEHICLE EMISSIONS

In your letter of 12 February you drew attention to the possibility of a compromise standard agreed between the French, Italians and Germans, being unsatisfactory to us because it would involve US limits (3 way catalyst technology precluding lean burn) for the important sector of medium sized cars between 1.4 and 2 litres engine capacity.

I can see that this is a danger, but for a number of reasons I think it should not deter us from remaining firm in our opposition to US standards for medium size cars. The first reason is that only the Germans (with the Danes) actually want US standards at all. Our opposition would continue to be in line with majority opinion on the substantial point. Secondly, I believe that time is on our side in helping to win the argument, and that we should not be rushed into concessions merely to stop the Germans introducing fiscal incentives - which seems to be France's main objective at the present time.

Although fiscal incentives are clearly undesirable in principle, the evidence is that they will work badly and cause confusion from which German consumers and manufacturers will be the main sufferers. This in itself will increase internal pressures on the German Government to accommodate our views so as to obtain an agreed amendment to the Directive which they can then enforce as a mandatory requirement. Without an amendment to the existing Directive any new requirement would be in clear breach of the Treaty - and I do not believe the Germans would take plainly unconstitutional action for the sake of the marginal gains obtained from implementation of US standards for medium size cars, as compared with a regime allowing these cars to exploit lean burn technology, which they are in sight of obtaining by negotiation.

I am copying this letter to the Prime Minister, Members of E(A) Committee and Sir Robert Armstrong.

Yours ever
Nicholas

NICHOLAS RIDLEY

W.0206 28 February 1985

PRIME MINISTER

E(A) MEETING ON VEHICLE EMISSION STANDARDS

There are three comments I would wish to make on the proposals made by the Minister of State for Industry: there is real danger of the original environmental need being lost altogether, a tendency to forget the magnitude of the costs involved, and a lack of realisation that "presentational" concessions could be very expensive if they result in a move from one technology to another.

2. The United Kingdom's policy on acid deposition and associated environmental problems recognises the importance of a reduction in motor vehicle emissions as part of an integrated programme. One of the reasons for favouring lean-burn technology over three-way catalysts is that we have serious reservations about the effectiveness of the latter in achieving the desired environmental improvements under European conditions. In order to avoid the impression that we are dragging our feet on the environmental issue, the UK's negotiating position can and should be presented as one which is based on environmental as well as economic and technical considerations.

3. On costs, Europe's politicians should be aware that if the full German proposals are eventually implemented throughout Europe, then a new cost burden equivalent to that of the Common Agricultural Policy will have been imposed by Governments on Europe's consumers. Since this burden will fall directly on individual consumers rather than indirectly via tax or utility prices, the Treasury and the Finance Ministers of Europe seem unconcerned. When the consumers realise that this has happened, they will expect a real environmental improvement to have resulted, which is a further reason to ensure that the measures agreed are both effective and cost-effective.

4. When considering 'concessions' on the present options it is important to recognise that concessions within a technology may be relatively cheap to implement whereas concessions beyond the compatibility of a given technology may be very expensive. The precise performance limits of the newer technologies, such as lean-burn, are presently difficult to quantify but will become better defined as they are developed. For this reason, if the Minister of State is given authority to make "limited and essentially presentational" concessions in the critical medium car category, these concessions should not be such as to bring forward decision points to dates before there is better understanding of the capabilities of the newer technologies.

5. Finally, on the domestic front, you should be aware that the House of Lords Select Committee on the European Communities will be publishing their report on the EEC proposals and advocating a rapid move (1991) to US equivalent standards which necessarily would involve three-way catalysts throughout. Unsurprisingly the Committee's report does not indicate that their Lordships gave careful thought to the cost implications of their advocacy.

6. I am copying this minute to Sir Robert Armstrong.

RBN

ROBIN NICHOLSON

Cabinet Office
28 February 1985

FOR E(A) meeting 11.30 1.3.85

MR TURNBULL 28 February 1985

EC VEHICLE EMISSION STANDARDS

Robin Nicholson's note has dealt with, inter alia, the environmental aspects, this note looks at the economic ones.

In 1984 BL sold 85,000 cars into Europe plus 310,000 in the UK. 19,000 were sold in Italy and 33,000 in France, but only 9,000 went to Germany. These European sales were made at prices some 20% lower than BL's UK selling prices, more than half were Minis and Metros, and little more than 10% Montego and Rover. By contrast, the UK imported some 135,000 cars from Germany, 130,000 from France and 55,000 from Italy, and this excludes imported cars badged as Ford or GM products.

The average UK content of GM cars is around 20% and of Ford's 45%. Their decisions on vehicle emissions will be taken at a European level and will not be signicantly influenced by the UK. From a manufacturing standpoint therefore, BL's interests equate to those of the UK.

The EC's option 2 emission levels are just about achievable by lean burn technology on all save large cars, but any toughening is likely to require expensive three-way catalysts on medium cars as well. Lean burn and three-way catalysts are radical alternatives and there is no half-way house between them.

Given our low exports and high imports, a sustained free-for-all would be best for the UK. Unfortunately the House of Lords Select Committee on the Environment is just about to publish a report essentially advocating three-way catalysts. This would increase car prices by £500 and would

miss out on the 15% energy saving that lean burn should achieve. The higher car prices would be unwelcome to the consumer and the reduced demand could cost 50,000 jobs all told.

On balance Norman Lamont has it about right. We should be seen to be constructive by supporting the introduction of the more permissive option 2, but if this fails we should opt for a free-for-all rather than compromise.

Peter Warry

PETER WARRY

SECRET

2

EMBASSY OF THE UNITED STATES OF AMERICA
LONDON, ENGLAND

CHARLES H. PRICE II
AMBASSADOR

February 26, 1985

Dear Prime Minister:

I have been asked to deliver the attached message to you from President Reagan, which was received at the Embassy this afternoon.

Sincerely,

Charles

Enclosure:

Secret

The Rt. Hon. Margaret Thatcher, M.P.
Prime Minister,
10 Downing Street,
London, S.W. 1

CONFIDENTIAL

DEPARTMENT OF TRANSPORT
2 MARSHAM STREET LONDON SW1P 3EB

01-212 3434

The Rt Hon Norman Tebbit MP
Secretary of State for Trade and Industry
Department of Trade and Industry
1 Victoria Street
LONDON
SW1H 0ET

NBIM
COR
26/2

26. February 1985

Dear Norman

VEHICLE EMISSIONS

In your letter of 12 February you drew attention to the possibility of a compromise standard agreed between the French, Italians and Germans, being unsatisfactory to us because it would involve US limits (3 way catalyst technology precluding lean burn) for the important sector of medium sized cars between 1.4 and 2 litres engine capacity.

I can see that this is a danger, but for a number of reasons I think it should not deter us from remaining firm in our opposition to US standards for medium size cars. The first reason is that only the Germans (with the Danes) actually want US standards at all. Our opposition would continue to be in line with majority opinion on the substantial point. Secondly, I believe that time is on our side in helping to win the argument, and that we should not be rushed into concessions merely to stop the Germans introducing fiscal incentives - which seems to be France's main objective at the present time.

Although fiscal incentives are clearly undesirable in principle, the evidence is that they will work badly and cause confusion from which German consumers and manufacturers will be the main sufferers. This in itself will increase internal pressures on the German Government to accommodate our views so as to obtain an agreed amendment to the Directive which they can then enforce as a mandatory requirement. Without an amendment to the existing Directive any new requirement would be in clear breach of the Treaty - and I do not believe the Germans would take plainly unconstitutional action for the sake of the marginal gains obtained from implementation of US standards for medium size cars, as compared with a regime allowing these cars to exploit lean burn technology, which they are in sight of obtaining by negotiation.

I am copying this letter to the Prime Minister, Members of E(A) Committee and Sir Robert Armstrong.

Yours ever
Nicholas

NICHOLAS RIDLEY

010

~~CCPC~~

~~DER BOTSCHAFTER~~
DER BUNDESREPUBLIK DEUTSCHLAND
Chargé d'Affaires a.i.

London, 22 February, 1985

Pt. copy to
Private Secretaries FCO & DoE
& Mr. Hatfield (Cabinet Office)
CDP
22/2.

Dear Prime Minister,

It gives me great pleasure to transmit to you the enclosed letter by the Chancellor of the Federal Republic of Germany.

A courtesy translation is attached.

I am, dear Prime Minister,

Yours sincerely,

Frhr. v. Stein

Frhr. v. Stein

The Rt. Hon. Margaret Thatcher, MP
Her Majesty's Prime Minister and
First Lord of the Treasury

10 Downing Street

London SW 1

Translation attached.

BUNDESREPUBLIK DEUTSCHLAND
DER BUNDESKANZLER

Bonn, den 11. Februar 1985

Ihrer Exzellenz
Frau Margaret Thatcher
Premierminister des
Vereinigten Königreichs
Großbritannien und Nordirland

London

PRIME MINISTER'S
PERSONAL MESSAGE
SERIAL No. T24 AB/85

Sehr geehrte Frau Premierminister,
liebe Margaret,

für die Übersendung der Ergebnisse des Umweltministertreffens vom 17. Dezember 1984 in London danke ich Ihnen.

Wie Sie wissen, ist mir sehr daran gelegen, die Zusammenarbeit zwischen unseren Ländern in der Umweltpolitik voranzubringen. Als Gastgeber des Wirtschaftsgipfels 1985 in Bonn werde ich mich daher mit aller Kraft für Fortschritte auch auf diesem Gebiet einsetzen. Ich bin wie Sie der Auffassung, daß die Konferenz der Umweltminister unter dem Vorsitz von Herrn Patrick Jenkin nützliche und wichtige Beiträge dazu geleistet hat.

Mit freundlichen Grüßen

Helmut Kohl

Translation

Federal Republic of Germany
The Federal Chancellor

Bonn, 11 February 1985

The Rt. Hon. Margaret Thatcher, M.P.,
Prime Minister of the United Kingdom
of Great Britain and Northern Ireland,

London

PRIME MINISTER'S
PERSONAL MESSAGE
SERIAL No. T24AB/85

Dear Prime Minister,
Dear Margaret,

Thank you for sending me the results of the meeting of ministers responsible for environmental questions held in London on 17 December 1984.

As you know, I deem it most important that co-operation between our countries in the field of environmental policy should be intensified. As host to the 1985 Economic Summit in Bonn I shall make every effort to achieve progress on these matters. I share your view that the ministerial conference chaired by Mr Patrick Jenkin has made useful and important contributions to this end.

Yours sincerely,

(sgd.) Helmut Kohl

CONFIDENTIAL

PRIME MINISTER

VEHICLE EMISSIONS LIMITS IN THE EC

I agree with Norman Tebbit's suggestions, in his minute of 12 February to you, that an E(A) meeting should be held to review our current position on vehicle emissions in the light of recent developments in the EC negotiations. The meeting should, I suggest, be held well before the Environment Council meeting on 7 March, when the issue will next go before EC Ministers.

The Society of Motor Manufacturers and Traders have recently written to William Waldegrave expressing concern at some of the possible compromise solutions that might emerge in negotiations. I have asked him to meet the industry to discuss this further, and to invite Norman Lamont and Lynda Chalker to join him.

I am copying this minute to Norman Tebbit, other members of E(A) and to Sir Robert Armstrong.

PJ

P J

20 February 1985

ENVIRONMENTAL AFFAIRS

Acid rain

Part 3.

10 DOWNING STREET

From the Private Secretary

19 February 1985

CONSERVATION

Thank you for your letter of 19 February. I am most grateful for your advice.

The Prime Minister will wish to consider the suggestions in your letter when she next reviews her forward diary. This may not be for a little while, but I will let you know the outcome as soon as possible.

David Barclay

Andrew Allberry, Esq.,
Department of the Environment.

2 MARSHAM STREET
LONDON SW1P 3EB
01-212 3434

My ref: J/PSO/10707/85

Your ref:

19 February 1985

Dear David

CONSERVATION

I am sorry not to have replied sooner to your letter of 25 January, but officials have been making discreet inquiries about possible events, without revealing the No 10 interest, and this has taken a little time.

The National Trust Lake District Appeal has been launched, but it is of course continuing and my Secretary of State thinks it would be an excellent initiative with which the Prime Minister could associate herself. Moreover the Countryside Commission and the Council for National Parks are launching a major campaign promoting the National Parks on 25 September. We assume the Prime Minister is not free on that date to launch the campaign herself but if she did favour the idea of a Lake District visit, we think a date either soon after the launch or in the spring of next year would be suitable. Such a visit could enable her to link very effectively the initiatives taken by Government agencies as well as the National Trust.

Ministers here have considered other possibilities, but have concluded that a National Park event might be the best opportunity for a conservation engagement. However, an alternative might be an event organised by the British Trust for Conservation Volunteers, which could involve young people.

If you are interested in either of these, perhaps you could let me know and I will ask our officials to provide further details of the two possibilities, and investigate dates.

Mr Waldegrave has discussed separately with Mr Hartley Booth the idea of a lunch or reception with leading figures from the statutory conservation agencies and the responsible voluntary bodies which the Prime Minister might host. This would provide her with a different occasion for a useful discussion. We shall be providing further advice on this soon.

Yours ever

Andrew

A C ALLBERRY
Private Secretary

David Barclay Esq

file

CONFIDENTIAL

10 DOWNING STREET

From the Private Secretary 13 February 1985

Dear Callum,

Vehicle Emission Limits in the EC

The Prime Minister has noted the Trade and Industry Secretary's recent minute on this subject and agrees to discussion at an early meeting of E(A).

I am copying this letter to the Private Secretaries to members of E(A) and to Richard Hatfield (Cabinet Office).

Yours sincerely

Charles Powell

Callum McCarthy, Esq.,
Department of Trade and Industry.

CONFIDENTIAL

Dub 13/2

GRS 88
UNCLASSIFIED
FM STOCKHOLM 121400Z FEB 85
TO ROUTINE F C O
TELEGRAM NUMBER 042 OF 12 FEBRUARY 1985
INFO ROUTINE HELSINKI, OSLO, COPENHAGEN, REYKJAVIK, UKREP BRUSSELS

YOUR TELNOS 09 AND 10: ACID RAIN

1. WE SHALL ALL ISSUE THE PRESS STATEMENT FIRST THING ON WEDNESDAY MORNING, INFORMING MFA'S AND OTHER RELEVANT AUTHORITIES THIS AFTERNOON.

CORMACK

LIMITED
MAED
WED
ECD(I)
PS
PS/MR RENTON

COPIES TO:-
MR BURGESS } DOE
MISS MCCONNELL } ROMANEY MSE
MR BARCLAY NO 10 DOWNING ST

OW

CC PC

(1)

Prime Minister
Agree to discussion in E(A)?

CDP 12/2

CONFIDENTIAL

PRIME MINISTER

VEHICLE EMISSION LIMITS IN THE EC

Yes

I am writing to bring you up-to-date with the present state of negotiations on the question of vehicle emissions in the EC, and to suggest an E(A) meeting to discuss our position in the light of recent developments.

2 As you know, the FRG have decided to introduce:

(i) US vehicle emission standards from 1988 for cars of two litres and more, and from 1989 for all others;

(ii) fiscal incentives to encourage the purchase of cars conforming to those standards from the beginning of 1986.

JH3BJB

3 The FRG proposals require three-way catalyst technology, which we regard as costly and inefficient. Our preference is for the development of lean-burn engines which should be in mass production by the end of this decade. Although they will not achieve US standards, they will be rapidly approaching them.

4 However the FRG decision is likely to split the Western European car market in two by 1989 because the Nordic countries, Switzerland, Austria, Denmark and possibly Benelux will follow FRG.

5 We therefore agreed at E(A) in November that we would work with other Member States and try to formulate an approach which would leave FRG isolated. The reasoning was that, if isolated, FRG would be less likely to take unilateral action, and might instead settle for a compromise expressed in a "permissive" Directive. The possibility of a challenge to the Federal Government's original plans in the European Court would provide it with a way of countering domestic criticism of such a compromise.

6 It soon became clear in subsequent negotiations at Brussels that any compromise on an EC standard was likely to entail permissive approval of US emission standards for vehicles of two litres and above from 1989. This is

certainly not something which we would agree to accept willingly, but it would be a great deal better than conceding indefinite partitioning of the internal market in vehicles. And it would be worth accepting if it would leave out from US emission standards the middle section of the market - i.e. from 1.4 to 2 litres - which is the section of most importance to BL and to the other UK vehicle manufacturers.

7 Our aim has been to preserve a united front with France and Italy, and to try with them to reach a joint compromise with FRG which would not involve US emission standards for vehicles of below two litres. However, FRG now appears to be trying to buy off the Italians and the French by offering concessions to them at the lower end of the market - i.e. up to 1.4 litres - which is of prime importance to them. In exchange, it would expect them to accept US standards for the middle range.

8 There is therefore a risk that the UK will find itself isolated on this issue at the Environment Council on 7 March, and that the subject will then feature prominently at the next European Council on 29-30 March.

9 I think that we have now to decide what our negotiating tactics should be. I understand that an inter-departmentally agreed report should shortly be produced by officials in E(QS) on the options that face us, and I suggest that we should then discuss the matter at an early meeting of E(A).

10 I should be grateful for your agreement to this course of action.

11 I am copying this minute to other members of E(A) and to Sir Robert Armstrong.

NT

N T

12 February 1985

Department of Trade and Industry

JH3BJB

Rte 881

10 DOWNING STREET

From the Private Secretary

11 February 1985

ECONOMIC SUMMIT: METTING OF ENVIRONMENT MINISTERS

I enclose an excerpt from a recent message from President Reagan to the Prime Minister dealing with the meeting in London of the Environment Ministers of the Economic Summit countries.

I am copying this letter and enclosure to Colin Budd (Foreign and Commonwealth Office), Rachael Lomax (H M Treasury), and Richard Hatfield (Cabinet Office).

C D POWELL

John Ballard, Esq.,
Department of the Environment

cc

EMBASSY OF THE UNITED STATES OF AMERICA
LONDON

February 11, 1985

T21/A/85

Dear Prime Minister:

I have been asked to deliver the enclosed letter to you from President Reagan, which was received at the Embassy this morning. A signed original will follow.

Sincerely,

Charlie

Charles H. Price, II
Ambassador

Enclosure:

SECRET

The Rt. Hon. Margaret Thatcher, M.P.,
Prime Minister,
10 Downing Street,
London, S.W. 1.

PP STOCKHOLM

GRS 249
RESTRICTED
FM FCO 081245Z FEB 85
TO PRIORITY STOCKHOLM
TELEGRAM NUMBER 10 OF 8 FEBRUARY
AND TO REYKJAVIK, OSLO, COPENHAGEN, HELSINKI
INFO SAVING UKREP BRUSSELS
MIPT : ACID RAIN
TEXT OF PRESS RELEASE IS AS FOLLOWS :
BEGINS 1. FOLLOWING NORDIC COUNCIL MEETING HELD IN REYKJAVIK ON 12-13 DECEMBER 1984, THE NORDIC PRIME MINISTERS SENT A COPY OF THEIR STATEMENT ON ACID RAIN TO THE BRITISH PRIME MINISTER.
2. IN HER REPLY, MRS THATCHER MADE THE FOLLOWING POINTS :
UK SHARES CONCERN IN NORDIC COUNTRIES TO INTENSIFY EFFORTS, BOTH NATIONALLY AND INTERNATIONALLY, TO SOLVE AIR POLLUTION PROBLEMS.
UK HAS PROUD RECORD OF ACHIEVEMENT IN TACKLING DOMESTIC AIR POLLUTION.
TOTAL UK EMISSIONS OF SULPHUR DIOXIDE HAVE FALLEN BY 40 PER CENT SINCE 1970 AND OVER 20 PER CENT SINCE 1980.
UK WILL MAINTAIN EFFORTS BOTH DOMESTICALLY AND INTERNATIONALLY TO FIND COST-EFFECTIVE SOLUTIONS.
WE AGREE EMISSIONS OF SULPHUR DIOXIDE AND NITROGEN OXIDES SHOULD BE REDUCED. OUR AIM IS TO REDUCE TOTAL EMISSIONS OF THESE GASES FROM STATIONARY AND VEHICULAR SOURCES BY 30 PER CENT FROM 1980 LEVELS BY THE END OF THE CENTURY.
AT THE SAME TIME, WE PROPOSE TO MAINTAIN THE ATTACK ON OTHER EMISSIONS. THE RECENT DECISION OF THE EUROPEAN COMMUNITY TO INTRODUCE UNLEADED PETROL NO LATER THAN 1989 RESULTS FROM AN INITIATIVE TAKEN 18 MONTHS AGO BY THE BRITISH GOVERNMENT.
THE UK WILL CONTINUE TO COOPERATE CLOSELY AND FULLY WITH THE NORDIC GOVERNMENTS IN INTERNATIONAL DISCUSSION OF AIR POLLUTION AND ACIDIFICATION. ENDS.

HOWE
NNNN

DISTRIBUTION
LIMITED
MAED
WED
ECD (I)
PS
PS/MR RENTON

COPIES TO:
MR BURGESS DOE ROMNEY HOUSE
MISS MCCONNELL '' ''
MR PASH D/EN
MR BARCLAY NO 10 DOWNING STREET

Acid Rain

Please keep.

DMB
11/2

RESTRICTED

5387 - 1

PP STOCKHOLM
GRS 200
RESTRICTED
FM FCO 081235Z FEB5
TO PRIORITY STOCKHOLM
TELEGRAM NUMBER 9 OF 8 FEBRUARY
ANDO TO REYKJAVIK, OSLO, COPENHAGEN, HELSINKI
INFO SAVING UKREP BRUSSELS
OUR TELNO 2 TO REYKJAVIK: ACID RAIN

1. NO 10 RECEIVED A REQUEST FROM THE SWEDISH EMBASSY HERE LAST WEEK TO MAKE PUBLIC THE PRIME MINISTER'S REPLY TO THE PRIME MINISTER OF ICELAND ABOUT ACID RAIN.

2. WE AND DOE SAW MERIT IN PUBLICATION BUT THE PRIME MINISTER WISHES TO ADHERE TO THE CONVENTION THAT MESSAGES BETWEEN HEADS OF GOVERNMENT ARE PRIVATE. SHE RECOGNISES NONE THE LESS THAT THERE MAY BE ADVANTAGE FOR THE UNITED KINGDOM IN MAKING PUBLIC IN THE NORDIC COUNTRIES THE MAIN POINTS OF HER REPLY AND HAS ASKED FOR THIS TO BE DONE BY MEANS OF PRESS STATEMENTS ISSUED SIMULTANEOUSLY BY OUR EMBASSIES IN THE NORDIC COUNTRIES.

3. HM AMBASSADOR AT REYKJAVIK HAS CONFIRMED THAT THE ICELANDIC PRIME MINSTER HAS NO (NO) OBJECTION TO PROPOSED PUBLICATION. GRATEFUL IF YOU WOULD ARRANGE TO ISSUE PRESS RELEASE ON LINES OF TEXT IN MIFT LIAISING DIRECT WITH OTHER POSTS ON TIMING AND INFORM MFA OF INTENDED ACTION. WE ARE INFORMING SWEDISH EMBASSY HERE OF NO 10'S DECISION AND THAT IT IS NOT (NOT) INTENDED TO RELEASE STATEMENT IN THE UK.

4. SEE MIFT.

HOWE

NNNN

DISTRIBUTION
LIMITED
MAED
WED
ECD(I)
PS
PS/MR RENTON

COPIES TO
MR BURGESS, DOE, ROMNEY HOUSE
MISS MCCONNELL, DOE, ROMNEY HOUSE
MR PASH, D/ENERGY
MR BARCLAY, NO 10.

RESTRICTED

SUBJECT

a. Master
Ops

SECRET

Prime Minister

CDP
11/2

PRIME MINISTER'S
PERSONAL MESSAGE
SERIAL No. T214/85

February 7, 1985

Dear Margaret:

Thank you for your recent letter and the accompanying report from last month's meeting in London of the Environment Ministers of the Economic Summit countries. Our representative, Mr. Fitzhugh Green, gave us a very favorable account of the discussions. He also praised the excellent organization and administrative arrangements.

With the report by the Summit Working Group on Technology, Growth and Employment on Environmental Research Priorities also in hand, the two tasks we agreed to undertake last June in London in the environmental area have now been successfully completed. Therefore, let me extend my congratulations to you, and through you to Mr. Patrick Jenkin and the other officials of your Government, for carrying out the leadership role you assumed over the past year with such dedication, skill and accomplishment.

On a separate matter, thank you as well for your letter on the arms negotiations. I am delighted to hear that Bud McFarlane and Jim Abrahamson's session with you went well. We agree that consultations have played a key role in consolidating Alliance solidarity, and that it is important that we not slacken our efforts in this regard.

I look forward to continuing our discussions at the White House on February 20th.

Sincerely,

/S/

Ron

SECRET

THE WHITE HOUSE

WASHINGTON

February 7, 1985

Dear Margaret,

Thank you for your recent letter and the accompanying report from last month's meeting in London of the Environment Ministers of the Economic Summit countries. Our representative, Mr. Fitzhugh Green, gave us a very favorable account of the discussions. He also praised the excellent organization and administrative arrangements.

With the report by the Summit Working Group on Technology, Growth and Employment on environmental research priorities also in hand, the two tasks we agreed to undertake last June in London in the environmental area have now been successfully completed. Therefore, let me extend my congratulations to you, and through you to Mr. Patrick Jenkin and the other officials of your Government, for carrying out the leadership role you assumed over the past year with such dedication, skill and accomplishment.

On a separate matter, thank you as well for your letter on the arms negotiations. I am delighted to hear that Bud McFarlane and Jim Abrahamson's session with you went well. We agree that consultations have played a key role in consolidating Alliance solidarity, and that it is important that we not slacken our efforts in this regard.

I look forward to continuing our discussions at the White House on February 20th.

Warm regards,

Sincerely,

Ron

The Right Honorable
Margaret Thatcher, M.P.,
Prime Minister,
London

Environmental Affairs
Acid Rain
Pt 3

FILE

Ruy

10 DOWNING STREET

From the Private Secretary

4 February, 1985

ACID RAIN: PRIME MINISTER'S REPLY TO THE PRIME MINISTER OF ICELAND

Thank you for your letter of 1 February about the request we had received from the Swedish Embassy to make public the Prime Minister's reply to the Prime Minister of Iceland about acid rain.

The Prime Minister wishes to adhere to the convention that messages between Heads of Government are private. She recognises none the less that there may be advantage for the United Kingdom in making public in the Nordic countries the main points of her reply. She would be grateful if this could be done by means of press statements issues simultaneously by our embassies in the Nordic countries.

I am sending a copy of this letter to Colin Budd, with the request that he should take the appropriate action; and also to John Neilson (Department of Energy) and to Henry Derwent (Department of Transport).

SWH

(David Barclay)

A. Allberry, Esq.,
Department of the Environment.

Acid Rain file.

CCNO

RESTRICTED

2 MARSHAM STREET
LONDON SW1P 3EB
01-212 3434

My ref:

Your ref:

B/f to me on Monday pm.

1 February 1985

Dear David

I understand that the Swedish Embassy have sought permission from your office to publish, in Sweden, the Prime Minister's letter of 11 January.

The Prime Minister's letter was a response to one from the Icelandic Prime Minister which enclosed a statement from the Nordic Prime Ministers. There was no indication that the statement had been published, although we were aware that Nordic newspapers had reported it, or that a public response was sought from the Prime Minister. Further, there was no reason then, nor is there now, to publish the letter in the UK. We therefore offered no advice on publicity when we submitted the draft reply to you.

The request from the Swedish Embassy is slightly unusual, but we see some merit in agreeing to publication, because if the Swedish press discovered that it had been refused they might misinterpret the decision in a way inimical to British interests. And there is nothing in the substance of the Prime Minister's letter which has not already been published in ths country.

Whether there would be a minor impropriety in agreeing to publication of a letter addressed to the Icelandic Prime Minister is a point you might consider. Our view is that as Mr Hermannsson wrote on behalf of all the Nordic Prime Ministers and as the PM's reply was clearly addressed to the Prime Ministers collectively, no offence would be given or take if we agreed to publication in Sweden.

Finally, you might ask the Swedes to inform our Embassy in Stockholm how and when the letter will be published.

Copies of this letter go to Colin Budd at FCO, John Neilson at Department of Energy and Henry Derwent at Department of Transport.

Yours ever

Andrew

A C ALLBERRY
Private Secretary

David Barclay Esq

RESTRICTED

Env. Affairs: Acid Rain A3

CF: pps pse

1. MR. POWELL

2. PRIME MINISTER

I agree with Mr. Barclay. It is important to preserve the convention that such messages are confidential, even if the substance is published.

CDP 1/2.

Acid Rain: Your reply to the Nordic Prime Ministers

You will recall that the Nordic Prime Ministers sent you a statement towards the end of last year, under cover of a letter from the Prime Minister of Iceland, about air pollution and acidification. The statement was published.

You replied on 11 January (copy attached). The Swedish Embassy have asked whether your reply can be treated as a public document. The Department of the Environment would see positive advantage in this, since your letter sets out very clearly the British Government's case, and the Foreign and Commonwealth Office would also see no difficulty.

But I am not sure that you would welcome publication of a message from you to a fellow Head of Government, even in reply to a published statement. Instead, we might ask our Embassies in the Nordic capitals to issue press statements reproducing the main points of your reply.

Yes please

Content?

DAB

1 February, 1985.

file

DSG

bc: Mr. Booth
cc SS.

10 DOWNING STREET

From the Private Secretary

25 January 1985

CONSERVATION

I have sent you separately a record of the meeting which the Prime Minister held on 23 January to discuss agriculture and conservation.

In the margins of the meeting, your Secretary of State asked the Prime Minister whether she would consider undertaking a speaking engagement connected with conservation later this year or early in 1986. The Prime Minister welcomed this idea in principle.

One possibility mentioned at the time was that the Prime Minister might launch the National Trust's Lake District Appeal in the autumn. I should be grateful if you would let us have further details of the timing and nature of this event. I should say, though, that the Prime Minister's diary for the period between the Party Conference and Christmas is already very congested. It would therefore be helpful if you could include in your advice suggestions for alternative engagements with a conservation flavour which the Prime Minister might consider for 1986 - I believe that Mr. Waldegrave has in mind a speech to the RSPB, for example.

BF

David Barclay

Andrew Allberry, Esq.,
Department of the Environment.

DSG

MAFF.

C. DOE
MS/WO
PGO
CS, MAFF
SO.
LPO

CO.
bcNowm

cc MASTER SET

10 DOWNING STREET

From the Private Secretary

23 January 1985

Dear John,

Agriculture and Conservation

The Prime Minister chaired a meeting this morning to discuss agriculture and conservation. Those present in addition to your Secretary of State were the Lord President, the Secretary of State for Scotland, the Minister of Agriculture, the Chief Secretary, the Paymaster General, Mr. Stradling-Thomas (Welsh Office) and Mr. Waldegrave (Department of the Environment). The meeting had before it your Secretary of State's minute of 30 November, to which was attached a report by officials; his further minute of 11 January; and minutes from the Chief Secretary (21 December), the Minister of Agriculture (9 January), the Secretary of State for Scotland (17 January) and the Secretary of State for Wales.

Your Secretary of State said that the Government's record in promoting a sensible balance between agriculture and conservation was a good one. The Wild Life and Countryside Act had worked a good deal better than its critics alleged, and had been widely welcomed. The Minister of Agriculture had taken initiatives in the European Community designed to place greater emphasis on conservation; and there had been a marked change in attitude among members of the National Farmers' Union and the Country Landowners Association.

These successes had been based on the voluntary principle, which he hoped would remain the cornerstone of the Government's policy. The alternative approach of expanding detailed planning control to agriculture would be bitterly resented by those who had so far offered their willing co-operation; and it would risk imposing additional costs and delays on the agricultural industry.

Against this background your Secretary of State recommended a study by consultants of the financial guidelines underpinning the present compensation arrangements; a new Landscape Special Development Order to extend certain controls to environmentally sensitive areas; further work on the possibility of providing Landscape Conservation Orders and Nature Conservation Orders with permanent effect; and an experimental scheme of grazing grants to preserve the Broads' landscape.

In discussion, the progress made under the voluntary principle was acknowledged: it would be wrong to hazard these gains by departing widely from it. Nevertheless, many people found it hard to understand why so much agricultural development was free from controls which applied to manufacturing industry. One possible counter to this argument was that argriculture was a non-mobile activity, involving land itself, whereas industrial activities were mobile and could reasonably be directed to particular sites. Even if this was accepted, however, there remained the difficulty of what to do in the last resort, where the voluntary principle failed to deliver an agreement on reasonable terms. The majority of those present favoured a study of the possibility of introducing compulsory stop powers along the lines discussed in the report by officials. The Minister of Agriculture expressed serious reservations about the wisdom of such legislation.

In discussion of current compensation arrangements, concern was expressed about the costs of site safeguard, which were running ahead of earlier expectations, and would undoubtedly rise further. On the other hand, it was argued that the cost was not disproportionate when compared with other programmes such as support for the arts, or indeed with total expenditure on agricultural grants. If the Government wished to respond to political pressure for effective conservation, then some expenditure was inevitable. Aspects of the present regime were hard to defend, particularly the payment of compensation to farmers for agricultural grants foregone.

In further discussion, there was clear support in principle for the extension of planning controls over farm and forestry buildings and roads to the remaining 7 national parks not already covered. But before the Government committed itself to such an extension the expenditure implications should be more thoroughly assessed.

Opinions were divided on the question of extending controls also to Areas of Outstanding Natural Beauty (AONB). If this were not done, some very attractive landscape would be left vulnerable to insensitive agricultural development. On the other hand, the farming community would be deeply opposed to planning control in AONB's, especially if the compensation provisions which applied in the national parks were not also extended to them. Local feeling, and pressure from within the NFU and the CLA, could be equally effective in persuading farmers to be reasonable. The Minister of Agriculture drew attention to certain controls which already applied nationally to large or high agricultural buildings. Planning permission was required for buildings or works greater than 465 square metres in area, 12 metres in height, or within 25 metres of a trunk or classified road.

As regards the proposed experimental scheme of grazing grants for the Broads, some doubts were expressed about the uniqueness of the site and consequently about your Secretary of State's ability to withstand demands for similar schemes

elsewhere. For this reason, the Chief Secretary said that he would prefer 90 per cent grant-in-aid to a specific grazing grant. This however would create a precedent of a different sort.

Summing up the discussion, the Prime Minister said that the Government's approach to matters of agriculture and conservation should continue to be based so far as possible on the voluntary principle. Nevertheless, the cost of compensation under management agreements, and the financial guidelines on which compensation was calculated, gave cause for concern. The proposed study by consultants of possible changes in the financial guidelines should proceed; and further work should be undertaken by officials on the possibility of providing for Landscape Conservation Orders and Nature Conservation Orders with permanent effect. It was agreed in principle that planning controls over farming and forestry buildings and roads should be extended to all 10 national parks, by means of a Landscape Areas Special Development Order, subject to a more detailed assessment of the costs involved. The case for extending these controls also to AONB's had not been fully made out. The Minister of Agriculture - in consultation with colleagues - should review current controls on large scale agricultural development to see whether they might be made more stringent either in AONB's only, or generally. In carrying out this review, he should take full account of the implications for UK manufacturers of, for example, grain silos. The Experimental Grazing Grant Scheme for the Broads was approved, subject to agreement being reached with the Chief Secretary on the terms of the grants and the provision of resources. The scheme should provide for an overall limit to be set on the money which could be made available for grazing grants in any one year.

I am sending copies of this letter to the Private Secretaries to those Ministers who attended the meeting, and to Richard Hatfield (Cabinet Office).

Yours ever,

David

John Ballard Esq
Department of the Environment.

CONFIDENTIAL

K01054

PRIME MINISTER

AGRICULTURE AND CONSERVATION
Supplementary Brief

The Broads

In my brief of 18 January I suggested that on this topic Mr Jenkin might be asked to give further consideration (with Mr Jopling and Mr Rees) to the best way forward in the light of the discussion of the more general issues before the meeting. This was partly on the assumption that the earlier discussion might well affect the best course of action on the Broads, and partly because there is likely to be little time left to consider this item properly.

However, I now understand that Mr Jenkin is likely to say that a decision on this is essential before the next meeting of the Broads Authority which is at the end of next week (1 February). I also understand that the Chief Secretary may be less resistant to the experimental scheme of grazing grants than he has so far implied. If this is so, it may be possible to agree the experimental scheme as the immediate way forward provided that this is consistent with the tenor of the earlier part of the discussion. On the face of it, because it is avowedly experimental, it may create a less unfortunate precedent than the alternative of 90% grant. It will, however, still be necessary for the Ministers concerned to work out for the future the best permanent approach to cases such as this one where 75% grant is argued to be inadequate. This might best be done when the further work proposed on compensation reaches fruition.

C J S BREARLEY

22 January 1985

10 DOWNING STREET

Prime Minister

You read these papers last weekend, except for the minutes from Mr Younger (flag E) and Mr Edwards (flag F) which arrived subsequently.

DMB
22/1

10 DOWNING STREET

Prime Minister (3)

I am afraid that this one got left behind when you signed messages to Summit colleagues about the environment.

GR

Please get FCO to send by the quickest available means - telegraph in advance.

DMB 21/1

DMB 22/1

IN CONFIDENCE

F

010

CCNO

PRIME MINISTER

AGRICULTURE AND CONSERVATION

I much regret that I shall be unable to attend your meeting on 23 January about the proposals in Patrick Jenkin's minute of 30 November, because of a meeting of the Welsh Grand Committee that day. I have asked John Stradling Thomas to represent me at your meeting. It may be helpful if I, as a Minister with responsibilities for agriculture and forestry as well as for planning and countryside matters, make some comment in advance.

Like Michael Jopling, I strongly support the voluntary principle, and believe that we should not be deflected from it by a few, admittedly alarmingly expensive, cases. In my experience many farmers and landowners in Wales, large and small, are promoting good conservation in the normal course of events, and without our having as it were, to pay twice for it. Michael refers to taking account of conservation requirements in future farming support measures. I do not rule that out, but consider that decisions about the grant regime should be taken in the light of a more general appraisal among ourselves of agricultural policy in the long term (which no doubt will need to come before issuing a White Paper). I see little or no merit in moving against capital grants now specifically to achieve conservation objectives. The recent reductions in grant and the general change in the prospects for agriculture, certainly so far as marginal, upland and hill land in Wales is concerned, will in themselves greatly reduce the incentive to invest in land reclamation and new roads.

We should wait to see and observe the effect of these changes. In this context, Patrick Jenkin's proposal for a consultancy would be helpful, and I would go along with it.

In my view it is a fallacy to suppose that a sure way of reducing expenditure would be to impose planning controls over agriculture. This is merely likely to replace one form of economic distortion with another, which is bound to have some economic cost. It would also bring a substantial new administrative burden to local and central government.

That is not to say that planning controls should be ruled out entirely or indefinitely. There may be a case for using them to secure specific environmental benefits in especially sensitive areas. I would be prepared to consider proposals for that. But I am at present very sceptical. There are special sensitivities in Wales because, a very high proportion of the land area, compared to England, is designated is one way or another for conservation purposes. There are three national parks, one of which (Snowdonia) forms a very large part indeed of one county (Gwynedd). The imposition of restrictions on people making their living in those areas is very unpopular, and can give rise to political difficulties as we found when the Nature Conservancy Council sought to designate 53,000 areas in the Berwyn mountains, not in a national park, as a Site of Special Scientific Interest. I have little doubt that Patrick's proposal to introduce a landscape areas special development order will also be strongly criticised, and could be said to place a disproportionate burden on agriculture and forestry in Wales. It is not helpful that the proposal seems to be in a state of evolution. Officials proposed controls on roads and buildings in

national parks, but this was extended in Patrick's minute of 30 November to "other sensitive areas". William Waldegrave, in his letter of 14 January, wanted the control to apply not only in areas of outstanding natural beauty (as well as to national parks) but also to the siting and construction of forestry roads. This would be seen as a significant move towards much tighter planning controls in upland areas. Can we be sure that it will stop there? I doubt it. The gesture on its own may serve to whet the appetite for more. The obvious target would be the less favoured area, which now covers most of rural Wales. I need not dwell on the political effects of any concession of that kind. I am very far from convinced that we should now announce a proposal to introduce such an order.

As for the proposed landscape conservation orders, I have serious doubts about feasibility. How could so sweeping a scheme be dealt with without engaging expensive additional staff? How would it be intended to deal with local authorities or national park authorities that were reluctant to introduce such orders? What provisions would there be for compensation? What general effect would this move have on our wish to foster conservation through the voluntary principle? What would be the role of Ministers: would we not burden ourselves with many difficult decisions of detail? I must question whether these issues have been thought out carefully enough to warrant consultation, and I would strongly argue against any promise of such proposals or of legislation until some fundamental questions can be answered. Even Michael Jopling's counter-proposal for temporary arrangements seems to me to need clarification.

In short, I believe that our present policies are already moving towards a better balance between agriculture, agricultural development and conservation. The idea of a consultancy to clarify our thinking about covering conservation in future grant regimes and refining the management agreements to give value for money is good. But the case for extending planning or other controls is not made out, and I see risk that in taking small steps down that road we may find ourselves pushed hard to take much larger ones.

I am sending copies of this minute to members of H, to Geoffrey Howe and Sir Robert Armstrong.

RNE

PRIME MINISTER 18 January 1985

AGRICULTURE AND CONSERVATION

Is Further Legislation Needed?

There is a danger that further legislation would encourage even closer scrutiny of our conservation policies and provoke a clamour for more measures than we want to undertake.

How anxious need we be on these two counts? We have a good story to tell. Even the nature lobbies grudgingly accept, if pressed, that our policy is protecting natural habitats pretty well. More generally, farmers are being won over, often at no cost at all, to conservationist practices. The NFU and the CLA have both proposed changes in grant regimes in order to defuse the provocative question: why subsidise operations damaging to our heritage, in order to produce more unwanted food?

On the positive side, legislation could solve the main difficulty about our arrangements:

- their success in protecting natural habitats underscores their failure to protect landscapes

- Planning Authorities, and ultimately the Government, can be held to ransom by a few obdurate and greedy farmers who, in the last resort, cannot be stopped from destroying cherished features of the landscape

- the long-stop power is the missing element in the structure. Its absence prevents us getting the credit which we deserve for our conservation policy.

E.R.

We could also head off arguments for full-scale planning controls on agriculture.

Landscape Conservation Orders (LCOs)

These were recommended by the Countryside Commission when the Wildlife and Countryside Bill was being passed. With hindsight, it was perhaps a mistake not to take this advice. LCOs need not, as Michael Jopling fears, lead to major interference with farming practices if the experience with Nature Conservation Orders is any guide. Only five of these have been imposed but their existance has a useful effect. The National Park Authorities who have these powers find that farmers are more cooperative and the costs of management agreements are reduced because farmers know, in the end, that they have to strike a deal.

One defect in the LCO proposal is that they would be restricted to areas 'specified by Ministers'. What about those many pockets of landscape close to towns and villages which are precious to local residents? Don't we want to give local planning authorities some freedom to protect these landscapes, without the need for Ministerial approval in each case?

Costs

Retaining the voluntary principle, we will have to pay more to preserve our landscape. But it is worth it because so many people care deeply about the landscape. The additional costs could easily be met by any of several ways within agriculture and forestry. Wasteful arterial drainage schemes in rural areas (£60 million) could be lopped back. Public funds are badly misapplied here, and are justified with largely specious "cost-benefit" analyses commissioned by Water Authorities and Inland Drainage Boards. Alternatively, we could discontinue funding new planting by

the Forestry Commission, which has no economic point at all. Or reduce or abolish the contentious field drainage grants, (32½% in the lowlands, 50% in less favoured areas).

Halvergate Marshes

If LCOs could be agreed in principle at your meeting, Patrick Jenkin could plan his holding operation on the Marshes, confident that help will be on its way. This is for H, but you may wish to express a view. We are doubtful about grazing grants. Grants of this kind are difficult to remove and easy to extend. They would be made available to many farmers with no intention of converting to arable. Why not let the Broads Authority deal with the hard cases with 90% grant aid from DoE? No precedent would be set. We already give 90% grant-aid to protect Exmoor.

Nicholas Owen

NICHOLAS OWEN

CONFIDENTIAL

K01048

PRIME MINISTER

AGRICULTURE AND CONSERVATION

1. The Secretary of State for the Environment sent you in July a paper by officials. You asked for further work to be done on the compensation principle, in particular the removal of compensation for grants foregone, and the possibility of replacing annual with one-off payments, and on the possibility of "stop" powers to be used when owners or occupiers will not consider a Management Agreement (or will only do so at excessive cost). The Secretary of State has reported further with his minute (and attached report) of 30 November. Subsequently the Chief Secretary (21 December) and the Minister of Agriculture (9 January) have commented and the Secretary of State has also sent a further minute (11 January).

2. The Secretary of State feels strongly that the "voluntary" approach (with compensation) of the Wildlife and Countryside Act 1981 should be maintained, especially given increasing signs of co-operation by farmers. Costs of site safeguard are running at £15.7 million per annum at present and are expected to flatten out at about £35 million per annum in the mid 1990s. While not large in relation to, say, support for the arts, they are a cause for concern. It is too soon, however, to make clear recommendations for cost saving and Mr Jenkin recommends that consultants should be employed to examine, by September, the expenditure and conservation implications of possible changes in the financial guidelines. He also proposes that planning controls should be extended over farm and forestry buildings and roads in sensitive areas, and that proposals for permanent landscape and nature conservation orders should be developed for legislation (thus providing the "stop" power mentioned above). Finally Mr Jenkin wishes a decision to be reached on the steps to be taken to preserve the Broads landscape in the immediate future.

The Minister of Agriculture generally gives strong support to Mr Jenkin's proposals though he thinks the extension of planning controls should be limited to National Parks, and is opposed to permanent landscape conservation orders. By contrast, the Chief Secretary believes that Ministers should now decide to move away from the voluntary principle down the route of extending planning powers (not necessarily with a built in right to compensation), though it is not clear how far he thinks the Government should move in this direction.

MAIN ISSUES

3. I suggest that discussion should concentrate on the central issue:

(a) Do Ministers want -

(i) to continue the present policy mix?, or

(ii) to make relatively modest adjustments either under existing legislation (eg. restricting the availability of farm capital grants, extending the planning regime slightly) or with minimal new legislation (eg. for landscape conservation orders)?, or

(iii) to go for much more sweeping changes (further away from the voluntary principle, no doubt involving contentious legislation)?

Subject to Ministers' views on this, and if there is time, the discussion could go on to -

(b) Action to reduce compensation payments,

(c) Extension of planning controls,

(d) the introduction of permanent landscape and nature conservation orders

(e) the Broads.

If time does not permit these supplementary issues could be remitted

to H (under the Lord President's chairmanship) with guidance on which of the main options at (a) above is to be pursued.

The Main Thrust of the Policy

4. Whether the present policy is on the right lines must depend on a judgment between on the one hand the cost and success of the present policy and on the other the likely difficulties generally, with the Government's supporters, and in Parliament in pursuing a significantly different approach. On the face of it the present policy is reasonably successful and fairly modest in cost (though future increases are not covered in PESC). However, on the basis of what has happened so far, there must be a probability that there will be increasing pressure for wider and stricter conservation measures and that compensation costs will be greater than presently envisaged. Equally the agricultural lobby are likely to be strongly resistant to any significant change of direction and there are likely to be substantial Parliamentary problems with legislation. Apart from objections of principle, a major difficulty with the compulsion /planning control road is that effective conservation requires a positive contribution from the owner/occupier, that is to say it depends to a large extent on things being done (eg. land being cultivated in a certain kind of way) as well as on things not being done. Planning control is notoriously deficient at achieving positive results. On balance, the present approach is probably not so defective that it requires to be replaced by something radically different.

Compensation

5. Assuming that compensation is to be retained, the question is how it can be contained or reduced. Officials considered three possibilities - (i) that the number of sites to be safeguarded should be restricted, (ii) that the funds available to the Nature Conservancy Council should be restricted, (iii) that the amount of compensation payable in individual cases should be reduced (a number of options for doing this are in paras 19-26 of the Officials' report). The

first 2 possibilities would be presentationally very difficult (except at the margin). On the third possibility Mr Jenkin and Mr Jopling recommend that more work should be done, including the use of consultants, with a view to making decisions by September. Mr Rees argues that consultants should only undertake work with a clear remit to produce significant savings and to complete earlier than September. It might be sensible to put consultants to work in a fairly swift timescale and to ask Mr Jopling to bring forward as soon as possible recommendations on any relevant changes to agricultural grants and subsidies.

Extension of Planning Controls

6. Assuming that significant extension of planning control into the agricultural area has been ruled out earlier, there remains Mr Jenkin's proposal to extend planning control over farm and forestry buildings and roads in sensitve areas (by means of a Landscape Areas Special Development Order (LASDO)). Mr Jopling has indicated that this would be acceptable provided it is confined to National Parks. It is not quite clear whether Mr Jenkin has wider application in mind.

Landscape Conservation Orders

7. Mr Jenkin proposes legislation to provide for new Landscape Conservation Orders and permanent Nature Conservation Orders (temporary ones are provided for under the 1981 Act). These would respond to the pressure for better measures to protect the landscape and stop destructive action. Present arrangements certainly seem defective in this respect on the landscape side. Mr Jopling is opposed to permanent landscape orders as representing a serious step away from the voluntary approach and likely to prove costly. He is, however, willing to see provision for temporary (eg. 12 month) orders. There is no point in considering this unless Ministers are prepared to contemplate legislation (with the danger of finding in Parliament that it is not completely under their control).

10.000

30.000.000

h

The Broads

8. H Committee considered in November, a proposal from Mr Jenkin and Mr Jopling to authorise an experimental scheme of grazing grants to encourage farmers in the Halvergate marshes and similar areas of the Broads to keep their land under grazing rather than to drain and plough it. The main alternative would be 90% grants from the Countryside Commission to the Broads Authority to assist management agreements with the same objective. (The Broads Authority have already said that the normal level of grant-aid, 75%, would be inadequate). The two ministers prefer the former approach as creating less of a precedent for 90% grants elsewhere (and arguably on financial grounds). The Chief Secretary dislikes the experimental scheme because of the precedent it would create. H Committee declined to come to a view in advance of your meeting. The decisions your meeting may have reached earlier will be very relevant to a solution to the immediate Broads problem eg. if landscape conservation orders are not agreed, then an enduring rather than a stop-gap solution is required. I suggest that your meeting should not seek to reach a conclusion. It might invite the 3 ministers concerned (Mr Jenkin, Mr Jopling and Mr Rees) to consider the best way forward in the light of the more general decisions reached by the meeting and to bring the matter back, if need be, to H Committee.

HANDLING

9. You will wish to ask the Secretary of State for the Environment to introduce his proposals. The Minister of Agriculture and the Chief Secretary are the other main protagonists but both the Secretary of State for Scotland and the Minister of State, Welsh Office are likely to have significant views. The Lord President of the Council will have a view on any course involving legislation as well as more generally.

CONCLUSIONS

10. You will wish the group to reach conclusions on -

(a) whether there should be any significant change in Government policy on agriculture and conservation (if so you will wish to commission work from the Ministers concerned).

and if there is time

(b) how work is to be carried forward on compensation.

(c) whether planning controls on farm buildings and roads should be extended - in the National Parks or more widely.

(d) whether legislation should be planned for landscape conservation orders (permanent or temporary) and permanent nature conservation orders.

On the Broads you may wish to ask Mr Jenkin, Mr Jopling and Mr Rees to consider further what would be the best course in the light of the other decisions, and if necessary to bring the matter back to H.

C J S BREARLEY

18 January 1985

ENV.
AFF.
Acid Rain
PE3

E

CONFIDENTIAL

SCOTTISH OFFICE
WHITEHALL, LONDON SW1A 2AU

Please copy to NO & b/f with other pps for meeting.

DJS 18/1

PRIME MINISTER

AGRICULTURE AND CONSERVATION

I have seen Patrick Jenkin's minute of 30 November and Peter Rees' of 21 December and Michael Jopling's of 9 January.

I agree with Patrick and Michael that it is of the first importance to maintain the voluntary approach and that radical options such as a major extension of planning controls should be avoided. There is also a particular Scottish dimension to these questions. The paper proceeds from the popularly held view that much in current agricultural practice is damaging to landscape and conservation. There may be force in this so far as large areas of the lowlands are concerned but I would dispute that it is generally true of Scotland. Although the environmental and conservation pressure groups continue to level criticism at us they are in my view often motivated by a desire not to be outdone by their southern counterparts. The traditional pastoral agriculture that predominates in the Scottish hills and uplands - the less favoured areas constitute 75% of the land area of Scotland - poses little threat to nature conservation and none at all to the landscape and is, indeed, in many places a necessary condition for the survival of that which is most worthy of conserving. It is also in the hills and uplands that the assistance provided by grants is of greater importance for the continuing viability not only of agriculture but of whole communities. For all those reasons I would be strongly opposed to any suggestion that agricultural grants in those areas should either be further reduced for conservation reasons or that compensation for activities foregone in the interests of conservation or landscape should automatically exclude the value of grant.

Subject to those points I am broadly content with the specific proposals in Patrick Jenkin's minute. Insofar as they concern Scotland, I accept that the Financial Guidelines might usefully be reviewed. I also agree that we should not contemplate any major extension of existing planning controls over agriculture,

CONFIDENTIAL

particularly since this would have considerable financial implications in Scotland, especially for planning authorities, where all agricultural buildings are in general free from such controls whereas development control is applied to large buildings in England and Wales. We have not seen a need to make any Special Development Orders imposing additional controls in sensitive areas in Scotland, and I would, therefore, want to consider carefully the case for any further planning restrictions on these lines. We might also explore further the proposals for landscape conservation orders and making permanent the existing nature conservation orders but without any commitment to legislation, which would undoubtedly be controversial. I have however no evidence of any need for the former in Scotland and their introduction would in any event involve additional compensation as well as added administrative responsiblities and costs for local authorities.

I have some sympathy with Michael's concern over the number of SSSIs - the continuing creation of SSSIs in parts of Scotland where the proportion of the land so designated has already reached 15% is causing public disquiet in areas where the opportunities for economic development are in any event limited.

I am copying this to members of "H", to Sir Geoffrey Howe, and to Sir Robert Armstrong.

G.Y.

GY

Scottish Office
17 January 1985

Foreign and Commonwealth Office

London SW1A 2AH

14 January, 1985

14/1

Dear David,

Message from the Icelandic Prime Minister

I enclose for your records the signed original of the Icelandic Prime Minister's letter to Mrs Thatcher reporting a statement by the Prime Ministers of the Nordic countries on air pollution at a meeting in Reykjavik on 12/13 December. (My letter of 18 December). Mrs Thatcher has already replied.

Yours sincerely,

Colin Budd

(C R Budd)
Private Secretary

David Barclay Esq
10 Downing Street

Subject "master" eff.

No RM.

PC
FCO
DOE
D/Transport
D/Energy

10 DOWNING STREET

THE PRIME MINISTER

11 January, 1985

PRIME MINISTER'S
PERSONAL MESSAGE
SERIAL No. T4A/85

Dear Prime Minister,

Thank you for your letter of 17 December 1984 enclosing a statement by the Nordic Prime Ministers' about air pollution and acidification.

We share the Nordic countries' concern to intensify efforts, both nationally and internationally, to solve air pollution problems. The United Kingdom has a proud record of achievement in tackling domestic air pollution. It has always been our practice to take firm and effective pollution control measures when circumstances warranted such action. By 1983, our total emissions of sulphur dioxide had fallen by 40 per cent from the peak level and by 20 per cent from 1980 level. Similarly, in the case of the long term international air pollution problems which now concern us all, I confirm that the United Kingdom Government will maintain its efforts both domestically and internationally to find cost-effective solutions.

Pending the development of these solutions, we share the view of the Nordic Prime Ministers that emissions of both sulphur dioxide and oxides of nitrogen should be reduced. We believe that in present circumstances we would not be justified in committing the United Kingdom to a specific target date or percentage for these reductions. We therefore intend to reduce our total emissions of these gases from stationary and vehicular sources aiming for a reduction of 30 per cent from 1980 levels by the end of the century.

At the same time, we propose to maintain our attack on other emissions. For this reason, I welcome the recent decision by the European Community that unleaded petrol should be introduced throughout the Community no later than 1989; this is an excellent result of an initiative taken by the United Kingdom Government 18 months ago. I am also pleased to welcome the decision of the Nordic countries to make measures to market lead-free petrol as soon as possible.

Finally, I assure the Nordic Prime Ministers that the United Kingdom always stands ready to take action on pollution problems in the light of scientific evidence and will continue to co-operate closely and fully with their Governments and with other Governments in international study and discussion of air pollution and acidification.

Yours sincerely

Margaret Thatcher

His Excellency Mr. Steingrimur Hermannsson

CONFIDENTIAL

D

CNO

Blt for meeting pm.

Dms 14/1

PRIME MINISTER

AGRICULTURE AND CONSERVATION

I have seen a copy of Peter Rees' minute to you of 21 December about the report on Agriculture and Conservation which we are to discuss on 23 January.

It would be wrong, I think, to comment in any detail on his points in advance of that meeting. Nevertheless, as silence might be construed as tacit agreement, I must put three of my reservations on record.

First I have strong objections to the full use of conventional planning powers to control agricultural operations. It would represent a new and intrusive load on local authorities, and an attempt to deny compensation would prove extraordinarily contentious. I think our aims would be much better served by the sort of balanced and selective extension of powers, eg over a Landscape Areas Special Development Order and positive Landscape Conservation orders to which my note of 30 November referred.

Secondly, I have reservations about 90% grant-aid to the Broads Authority. It would be more repercussive (on National Parks) than embarking on a special experiment, and the experiment offers a new and potentially effective way of going for positive conservation grant as well as being cheaper in the long run.

Lastly, Peter Rees' assumption about my capacity to contain the public expenditure consequences of my proposals is incorrect. Annex B of the paper by officials sets out the Agencies' estimates of the future costs of site safeguard. Although highly speculative for later years, the rising profile of

NCC expenditure is clearly indicated and this cannot be contained within my present forward PES lines, which were cut back severely in last year's Survey.

Copies go to Members of H, Geoffrey Howe, Michael Jopling and Sir Robert Armstrong.

PJ

P J

11 January 1985

ENV ATTACKS
Acid Rain Pt 3

file

ECL

10 DOWNING STREET

THE PRIME MINISTER

10 January 1985

Dear M. President,

You will know that in response to their remit from the London Economic Summit, Environment Ministers and officials representing the summit countries (with the exception of France) and the European Commission met in London on 17 December, under the chairmanship of the British Secretary of State for the Environment, Patrick Jenkin. I understand that the meeting was generally agreed to have been useful, and I am grateful for the helpful contribution made by the Commission's representative, Mr Andreopoulos, Director-General of the Environment Directorate.

I have sent a copy of the report which was agreed at the meeting to Chancellor Kohl as the Chairman of the next Economic Summit in Bonn. I have pleasure in enclosing a copy for your own information.

With best wishes.

Yours sincerely

Margaret Thatcher

M. Jacques Delors

KOT

10 DOWNING STREET

THE PRIME MINISTER

10 January 1985

PRIME MINISTER'S
PERSONAL MESSAGE
SERIAL No. T 4/85 cc MASTER OPS

Dear Ron.

You will know that in response to their remit from the London Economic Summit Environment Ministers and officials representing the summit countries (with the exception of France) and the European Commission met in London on 17 December, under the chairmanship of the British Secretary of State for the Environment, Patrick Jenkin. I understand that the meeting was generally agreed to have been useful, and I am grateful for the helpful contribution which your own representative, Mr Fitzhugh Green of the Environmental Protection Agency, made to the discussion.

I have sent a copy of the report which was agreed at the meeting to Chancellor Kohl as the Chairman of the next Economic Summit in Bonn. I have pleasure in enclosing a copy for your own information.

With warm best wishes,

Yours ever

Margaret

The President of the United States of America

10 DOWNING STREET

THE PRIME MINISTER

10 January 1985

Dear Prime Minister,

You will know that in response to their remit from the London Economic Summit, Environment Ministers and officials representing the summit countries (with the exception of France) and the European Commission met in London on 17 December, under the chairmanship of the British Secretary of State for the Environment, Patrick Jenkin. I understand that the meeting was generally agreed to have been useful, and I am grateful for the helpful contribution which your own representative, Madame Blais-Grenier, made to the discussion.

I have sent a copy of the report which was agreed at the meeting to Chancellor Kohl as the Chairman of the next Economic Summit in Bonn. I have pleasure in enclosing a copy for your own information.

With best wishes.

Yours sincerely

Margaret Thatcher

The Rt. Hon. Brian Mulroney, PC, MP.

10 DOWNING STREET

THE PRIME MINISTER

10 January 1985

Dear Prime Minister,

You will know that in response to their remit from the London Economic Summit, Environment Ministers and officials representing the summit countries (with the exception of France) and the European Commission met in London on 17 December, under the chairmanship of the British Secretary of State for the Environment, Patrick Jenkin. I understand that the meeting was generally agreed to have been useful, and I am grateful for the helpful contribution which your own representative, Vice Minister Shoda, made to the discussion.

I have sent a copy of the report which was agreed at the meeting to Chancellor Kohl as the Chairman of the next Economic Summit in Bonn. I have pleasure in enclosing a copy for your own information.

With warm regards.

Yours sincerely

Margaret Thatcher

His Excellency Mr. Yasuhiro Nakasone

10 DOWNING STREET

THE PRIME MINISTER

10 January 1985

Dear Prime Minister,

You will know that in response to their remit from the London Economic Summit, Environment Ministers and officials representing the summit countries (with the exception of France) and the European Commission met in London on 17 December, under the chairmanship of the British Secretary of State for the Environment, Patrick Jenkin. I understand that the meeting was generally agreed to have been useful, and I am grateful for the helpful contribution which your own representative, On. Ad. Alfredo Biondi, made to the discussion.

I have sent a copy of the report which was agreed at the meeting to Chancellor Kohl as the Chairman of the next Economic Summit in Bonn. I have pleasure in enclosing a copy for your own information.

Yours sincerely

Margaret Thatcher

His Excellency Onorevole Bettino Craxi

10 DOWNING STREET

THE PRIME MINISTER

10 January 1985

Dear Mr. President,

As you know, I was disappointed that France did not feel able to be represented at the meeting of Environment Ministers of the Summit countries which was held in London on 17 December 1984. I understand that the meeting, under the chairmanship of the British Secretary of State for the Environment, Patrick Jenkin, was generally agreed to have been useful, although participants expressed their regret that your Environment Minister, Madame Bouchardeau, was not present.

I have sent a copy of the report which was agreed at the meeting to Chancellor Kohl as the Chairman of the next Economic Summit in Bonn. I am enclosing a copy for your own information and hope that you will find the conclusions consistent with French environmental policy.

Yours sincerely

Margaret Thatcher

His Excellency Monsieur Francois Mitterrand

file

LPO

cc: FCO

10 DOWNING STREET

THE PRIME MINISTER

10 January 1985

Dear Helmut,

You will know that in response to their remit from the London Summit, Environment Ministers and officials representing the Summit countries (with the exception of France) and the European Commission met in London on 17 December, under the chairmanship of the British Secretary of State for the Environment, Patrick Jenkin. I understand that the meeting was generally agreed to have been useful, and I am grateful for the helpful contribution which your own representative, Herr Carl-Dieter Spranger, made to the discussion.

I have pleasure in conveying to you, as the Chairman of the next Summit in Bonn, the accompanying copy of the report which was agreed by the London meeting.

I am sending copies of this letter and the enclosure to all our Summit partners.

Yours sincerely

Margaret

His Excellency Herr Dr. Helmut Kohl.

Bal

C

MINISTRY OF AGRICULTURE, FISHERIES AND FOOD
WHITEHALL PLACE, LONDON SW1A 2HH

From the Minister

(1) cc Policy Unit
(2) B/f for meeting on 23 Jan, with
(3) Cabinet Office brief requested by 18 Jan for w/e box. 9/1

CONFIDENTIAL

PRIME MINISTER

AGRICULTURE AND CONSERVATION

1. I have seen Patrick Jenkin's minute to you of 30 November, commenting on the options paper prepared by officials. I have also seen Peter Rees' minute of 21 December. It may be helpful if I give my comments before your meeting on 23 January.

2. I very strongly endorse the broad conclusions which Patrick has drawn from the paper. We must retain uppermost in our minds the very real advantages which are offered by the voluntary approach in achieving positive land management in the interests of conservation. I do believe that it is an approach which offers excellent value for money. As a government, we are heavily committed to it. We must not start thinking of throwing it over, unless we are certain we have found something better. All the evidence is that the alternatives to the voluntary approach would be less effective or more costly, or perhaps both.

3. I believe therefore we would be right, as Patrick suggests, to reject the more radical options outlined in the paper by officials (such as the major extension of planning controls, or far-reaching changes in the compensation arrangements). So far we have only limited experience of the 1981 Act. It is being criticised by some of the more vocal elements but the view of the more responsible - in particular the statutory agencies - is that we should give the Act time to work.

4. I must admit that I paused for a long time over the idea that there should be some limit on the number of SSSIs. Already 1.4 million hectares (some 6% of our total land area) are within SSSIs. The NCC has said publicly that it is aiming for 10% of the country to be so designated which means another million on the present 1.4 million hectares. I am convinced that in principle it is wrong that it should be able to take whatever decision it likes without any opportunity for appeal by the parties affected, or without any involvement of Ministers. However, I accept that to restrict it in any formal way would require primary legislation which I am sure we should not contemplate at this stage. So I am prepared not to ask for a formal change (though perhaps informally the NCC should be asked to be more self-restraining) until such time as primary legislation is being considered.

/5. On specific ....

5. On specific issues, I fully support Patrick on his proposal for early action on Halvergate. I would also be happy with Patrick's proposal for an examination by consultants of the effects of the financial guidelines provided we could agree on terms of reference which were consistent with the general aims and approach of our conservation policy. It would in my view be quite wrong to prejudge the outcome of the study in the way suggested by Peter Rees. I would also be content in principle for us to go out to consultation on the proposal for extensions to the existing Landscape Areas Special Development Orders. This approach might help us achieve a better balance between on the one hand the necessary control of intrusive development in the National Parks, and on the other the avoidance of expensive and bureaucratic controls on economically essential farm and forestry improvements. We could usefully present this as an appropriate response to the Countryside Commission's recommendation in their Uplands Report for extended controls on agricultural development in the Less Favoured Areas. I would not, however, be prepared to see these additional controls extended beyond the National Parks (which cover some 9% of England and Wales). Moreover, before deciding on whether to go out to consultation, we should be certain that this can be achieved without recourse to primary legislation.

6. I must however repeat the reservations which I expressed in my minute to you of 23 July about the proposal for a new system of landscape conservation orders, with permanent effect. My fear is that if we were to give this power to local authorities - even subject to a right of appeal to the Secretary of State - we could be faced with a major extension of the areas of the country subject to formal procedures for notification of routine farming operations. The expenditure implications of this could be very considerable as would be the scope for attracting controversy over individual sites. Moreover, it would represent a major departure in conservation policy and severely dent our commitment to the voluntary approach. Nevertheless, I recognise the need to provide some long-stop measures and believe that we should consider something on the lines of the time-limited Nature Conservation Order mechanisms (with limited backup compulsory purchase powers). They appear to be working well and I am sure parallel powers could be made available for landscape conservation in the National Parks and the Broads.

7. The assistance available to farmers under the capital grant schemes has received close attention in the paper by officials, and Patrick has suggested in his minute that we should consider further tightening of the schemes. As you are aware, we have recently cut back this assistance very severely; the reductions over the last two years amount to £70 million, which represents a third of the total. There have been reductions of a similar order in the assistance for arterial drainage schemes.

8. Those items which can cause concern to conservationists have been either reduced considerably or eliminated entirely, while the assistance to environmentally-friendly work has been maintained and even slightly increased. These changes have been warmly welcomed by the conservation lobby. We will be introducing completely new grant schemes during the course of this year, and before doing so will be consulting with the statutory conservation bodies. Our aim will be to ensure that in the administration of our schemes we are better able to take due account of conservation interests while at the same time maintaining an effective system of aids for improving farm efficiency and viability. We have already moved a long way in this direction, and our proposals in the context of the draft EC Structures Regulation for a new 'conservation' title will be of further assistance and even if we do not get what we want in Brussels, we shall want to do something similar nationally. All this was agreed in the recent PES round. The reductions now made in the capital

/grant schemes ....

grant schemes are as far as we can go while still meeting the bare essential requirements of the new Regulation, and there is therefore no prospect of further major reductions simply to satisfy the conservation lobby. While I am prepared to look further at the idea contained in para 24(iii) of the paper (the assessment of compensation following a Ministerial decision to withhold grant) in the context of the forthcoming review of the capital grant schemes, I cannot agree with Peter Rees that this is a straightforward issue on which decisions can be made immediately. There are in fact a number of objections to withholding compensation for grant forgone in these circumstances, and these need to be given careful consideration.

9. Returning to the central issue, it is essential that we affirm our conviction that the most effective way of achieving the right balance between agriculture and conservation is through the voluntary principle. We should as a government also seize every suitable opportunity to explain the many advantages of the voluntary approach. If we do find it necessary to provide new forms of statutory control, we must only do so if we can be convinced that this does not undermine the voluntary policy or create unnecessary expense and bureaucracy.

10. I am copying this minute to members of H, to Geoffrey Howe and Sir Robert Armstrong.

MJ

MICHAEL JOPLING
9 January 1985

ENV. AFFAIRS: Acid Rain: Pt 3.

SPC

LCF
Pse check that other depts are content.
DWB
8/1

2 MARSHAM STREET
LONDON SW1P 3EB
01-212 3434

My ref:

Your ref:

8 January 1985

Dear David

In his letter of 18 December, Colin Budd said that the FCO was considering the Nordic Prime Ministers' message on air pollution and acidification and would advise the Prime Minister about a reply.

After discussing the message with FCO we agreed to take on the drafting of a reply to the Prime Minister of Iceland and I now attach a draft which has been agreed at official level with FCO. My Secretary of State has also seen the draft and is content.

I understand that there are delays in the bag service to Reykjavik. You may therefore like to consider sending the Prime Minister's reply by telegram, to be followed by the signed original in due course.

Copies of this letter go to Colin Budd at FCO, John Nielson at Department of Energy and Henry Derwent at Department of Transport.

Yours ever,

Andrew

A C ALLBERRY
Private Secretary

1) Mr Powell: Other depts are content, subject to the amendments shown.

2) GR: Pse type for PM's sig.

DWB
10/1

David Barclay Esq

DRAFT REPLY TO MR STEINGRIMUR HERMANNSSON, PRIME MINISTER OF ICELAND

RAMACL

Thank you for your letter of 17 December 1984 enclosing a statement by the Nordic Prime Ministers' about air pollution and acidification.

We share the Nordic countries' concern to intensify efforts, both nationally and internationally, to solve air pollution problems. The United Kingdom has a proud record of achievement in tackling domestic air pollution. It has always been our practice to take firm and effective pollution control measures when circumstances warranted such action. By 1983, our total emissions of sulphur dioxide had fallen by 40% from the peak level and by 20% from the 1980 level. Similarly, in the case of the long term international air pollution problems which now concern us all, I confirm that the United Kingdom Government will maintain its efforts both domestically and internationally to find cost-effective solutions.

Pending the development of these solutions, we share the view of the Nordic Prime Ministers that emissions of both sulphur dioxide and oxides of nitrogen should be reduced. We believe that in present circumstances we would not be justified in committing the United Kingdom to a specific target date or percentage for these reductions. We therefore intend to reduce our total emissions of these gases? gases from stationary and vehicular sources aiming for a reduction of 30% from 1980 levels by the end of the century.

At the same time, we propose to maintain our attack on other emissions. For this reason, I welcome the recent decision by the European Community that unleaded petrol should be introduced throughout the Community no later than 1989; this is an excellent result of an initiative taken by the United Kingdom Government 18 months ago. I am also pleased to welcome the decision of the Nordic countries to take measures to market lead-free petrol as soon as possible.

Finally, I assure the Nordic Prime Ministers that the United Kingdom always stands ready to take action on pollution problems in the light of scientific evidence and will continue to co-operate closely and fully with their Governments and with other Governments in international study and discussion of air pollution and acidification.

ENV. AFFAIRS

Acid Rain

pt. 3.

1) Mr Powell: to see
2) CTR pr to you

2 MARSHAM STREET
LONDON SW1P 3EB
01-212 3434
My ref:

Your ref:

8 January 1985

Dear David

MEETING OF ENVIRONMENT MINISTERS OF SUMMIT COUNTRIES: 17 DECEMBER 1984

Thank you for your letter of 4 January.

I enclose drafts of letters for the Prime Minister to send to her Summit colleagues (other than Chancellor Kohl) reporting on last month's environment meeting. These have been discussed with FCO and agreed by my Secretary of State.

A copy of this and of the drafts goes to Peter Ricketts at FCO.

Yours ever

Andrew

A C ALLBERRY
Private Secretary

David Barclay Esq

Bid Plan

EL3ACJ

DRAFT LETTER TO: THE RT. HON. BRIAN MULRONEY, PC, MP - OTTAWA

MEETING OF ENVIRONMENT MINISTERS

You will know that in response to their remit from the London Economic Summit, Environment Ministers and officials representing the summit countries (with the exception of France) and the European Commission met in London on 17 December, under the chairmanship of the British Secretary of State for the Environment, Patrick Jenkin. I understand that the meeting was generally agreed to have been useful, and I am grateful for the helpful contribution which your own representative, Madame Blais-Grenier, made to the discussion.

I have sent a copy of the report which was agreed at the meeting to Chancellor Kohl as the Chairman of the next Economic Summit in Bonn. I have pleasure in enclosing a copy for your own information.

With best wishes.

CR

DRAFT LETTER TO: ON. BETTINO CRAXI, PRIME MINISTER OF ITALY

MEETING OF ENVIRONMENT MINISTERS

You will know that in response to their remit from the London Economic Summit, Environment Ministers and officials representing the summit countries (with the exception of France) and the European Commission met in London on 17 December, under the chairmanship of the British Secretary of State for the Environment, Patrick Jenkin. I understand that the meeting was generally agreed to have been useful, and I am grateful for the helpful contribution which your own representative, On. Ad. Alfredo Biondi, made to the discussion.

I have sent a copy of the report which was agreed at the meeting to Chancellor Kohl as the Chairman of the next Economic Summit in Bonn. I have pleasure in enclosing a copy for your own information.

GD

DRAFT LETTER TO: H.E. MR YASUHIRO NAKASONE, PRIME MINISTER OF JAPAN

MEETING OF ENVIRONMENT MINISTERS

You will know that in response to their remit from the London Economic Summit, Environment Ministers and officials representing the summit countries (with the exception of France) and the European Commission met in London on 17 December, under the chairmanship of the British Secretary of State for the Environment, Patrick Jenkin. I understand that the meeting was generally agreed to have been useful, and I am grateful for the helpful contribution which your own representative, Vice Minister Shoda, made to the discussion.

I have sent a copy of the report which was agreed at the meeting to Chancellor Kohl as the Chairman of the next Economic Summit in Bonn. I have pleasure in enclosing a copy for your own information.

With warm regards

MT.

DRAFT LETTER TO: THE PRESIDENT OF THE UNITED STATES OF AMERICA

MEETING OF ENVIRONMENT MINISTERS

You will know that in response to their remit from the London Economic Summit, Environment Ministers and officials representing the summit countries (with the exception of France) and the European Commission met in London on 17 December, under the chairmanship of the British Secretary of State for the Environment, Patrick Jenkin. I understand that the meeting was generally agreed to have been useful, and I am grateful for the helpful contribution which your own representative, Mr Fitzhugh Green of the Environmental Protection Agency, made to the discussion.

I have sent a copy of the report which was agreed at the meeting to Chancellor Kohl as the Chairman of the next Economic Summit in Bonn. I have pleasure in enclosing a copy for your own information.

With warm best wishes

GR

DRAFT LETTER TO: M. JACQUES DELORS, PRESIDENT OF THE COMMISSION OF THE EUROPEAN COMMUNITIES

MEETING OF ENVIRONMENT MINISTERS

You will know that in response to their remit from the London Economic Summit, Environment Ministers and officials representing the summit countries (with the exception of France) and the European Commission met in London on 17 December, under the chairmanship of the British Secretary of State for the Environment, Patrick Jenkin. I understand that the meeting was generally agreed to have been useful, and I am grateful for the helpful contribution made by the Commission's representative, Mr Andreopoulos, Director-General of the Environment Directorate.

I have sent a copy of the report which was agreed at the meeting to Chancellor Kohl as the Chairman of the next Economic Summit in Bonn. I have pleasure in enclosing a copy for your own information.

with best wishes.

GH

ELSACK

DRAFT LETTER TO PRESIDENT MITTERRAND

MEETING OF ENVIRONMENT MINISTERS

As you know, I was disappointed that France did not feel able to be represented at the meeting of Environment Ministers of the Summit countries which was held in London on 17 December 1984. I understand that the meeting, under the chairmanship of the British Secretary of State for the Environment, Patrick Jenkin, was generally agreed to have been useful, although participants expressed their regret that your Environment Minister, Madame Bouchardeau, was not present.

I have sent a copy of the report which was agreed at the meeting to Chancellor Kohl as the Chairman of the next Economic Summit in Bonn. I am enclosing a copy for your own information and hope that you will find the conclusions consistent with French environmental policy.

CR.

CF file

DRAFT LETTER TO CHANCELLOR KOHL

MEETING OF ENVIRONMENT MINISTERS

You will know that in response to their remit from the London Summit, Environment Ministers and officials representing the Summit countries (with the exception of France) and the European Commission met in London on 17 December, under the chairmanship of the British Secretary of State for the Environment, Patrick Jenkin. I understand that the meeting was generally agreed to have been useful, and I am grateful for the helpful contribution which your own representative, Herr Carl-Dieter Spranger, made to the discussion.

I have pleasure in conveying to you, as the Chairman of the next Summit in Bonn, the accompanying copy of the report which was agreed by the London meeting.

I am sending copies of this letter and the enclosure to all our Summit partners.

Ke VC

10 DOWNING STREET

From the Private Secretary

4 January 1985

Meeting of Environment Ministers of Summit Countries, 17 December 1984

The Prime Minister was grateful for your Secretary of State's minute of 21 December, with which he enclosed a draft letter for her to send to Chancellor Kohl.

The Prime Minister is broadly content with the draft, but feels that she should in addition write individually to her other Summit colleagues. I should be grateful if you could provide appropriate drafts as soon as possible. We will hold the letter to Chancellor Kohl meanwhile.

Could you please consult the FCO about the terms of the drafts, particularly the one to President Mitterrand.

I am sending a copy of this letter for information to Peter Ricketts (Foreign and Commowealth Office).

(DAVID BARCLAY)

Andrew Allberry, Esq.,
Department of the Environment.

RN

Noted. Thanks.
DJS
2/1

10 DOWNING STREET

DB

message from Colin Budd, FCO.

Re minute 21/12 mr Jenkin to PM.
Summit of Environment ministers on 17/12.
Advised PM to send letters to Herr Kohl, and others.
Request that we delay this action as FCO will have comments to make.

Julie
2/1/85.

B/c: McOwen

file

10 DOWNING STREET

From the Private Secretary

MR BREARLEY

CABINET OFFICE

AGRICULTURE AND CONSERVATION

As you know, the Prime Minister will be chairing a Meeting of Ministers on Wednesday, 23 January to discuss agriculture and conservation. It would be most helpful if the Cabinet Office could provide a brief.

(David Barclay)

2 January, 1985

JR

MR. BARCLAY

Chase FCO
Await FCO comments

Attached is a minute from Patrick Jenkin about a report of a meeting of Environment Ministers of Summit countries. The Prime Minister has approved the letter to go to Chancellor Kohl covering the report. I have asked for advice from the Foreign Office on whether the Prime Minister ought not to write herself to Heads of Government of Summit countries rather than, as DOE propose, copy her letter to Chancellor Kohl to them. This is not exactly a major issue, and I suggest, therefore, that you chase the Foreign Office either on Monday or Wednesday. We ought not to delay beyond that.

I have asked DoE to submit separate drafts, in consultation with the FCO.

AD
4/1

28 December 1984

 file ecu

DR R B NICHOLSON
Cabinet Office

This is simply to record that the Prime Minister has seen and noted your minute of 13 December about the Technology, Growth and Employment Working Group. She was grateful for this account.

Timothy Flesher

24 December 1984

TNS.

Prime Minister:

Agree to write to Chancellor Kohl with a copy of the Summit report and, in addition, to the other Summit heads of Government rather than, as proposed, copying it to them

21/12

SECRETARY OF STATE FOR THE ENVIRONMENT

PRIME MINISTER

MEETING OF ENVIRONMENT MINISTERS OF SUMMIT COUNTRIES, 17 DECEMBER 1984

You will recall that the London Summit last June invited Environment Ministers to identify areas for continuing cooperation; and that we decided to call a meeting of the Ministers concerned in order to discharge this remit.

The meeting was duly held under my chairmanship at Lancaster House on 17 December. All the Summit countries, except France, were represented, together with the European Commission: Germany, Italy, and Canada by Ministers; the USA, Japan and the Commission by senior officials because, in each case, pressing domestic committments had detained their respective political masters.

As you know, the French Minister's absence - which we all regretted - had no significance for our bilateral relationships but arose from French insistence that political discussion in the Summit context should take place only at Head of State or Government level.

The meeting produced an agreed report to Heads of State or Government, for consideration at the next Summit in Bonn. I attach a copy. It is, inevitably, couched in the inelegant composite language of international meetings, but I think that it represents a useful achievement on our part in steering the discussion towards constructive strategic ideas and away from the more immediate and partisan preoccupations of some of our partners. In particular, it stresses the fundamental links between environmental and economic policies; the importance of collaboration in dealing with longer-term problems (such as those of climate) as much as with more immediate ones; the need for industrialised countries to help in finding

solutions to the very severe environmental problems of the developing world; and the need to harness to all these efforts the forces of the market and of competition. The report also stresses the primacy, for the Summit countries, of OECD as a forum for developments in the relationship between environmental and economic policies; and, more generally, the need to work through existing international institutions rather than seek to create new ones. Finally, it invites Heads of State or Government to affirm their commitment to the wise management of environmental resources, the integration of environmental policy into other policies, the importance of market forces and the 'polluter pays principle'.

The meeting briefly discussed the question how the report might be conveyed to the Bonn Summit. My colleagues expressed the hope that it should go as it stands and should not be subject to alteration or gloss on the way. I have heard subsequently that Chancellor Kohl, who has apparently received a favourable account of the meeting, would be pleased if you were to send him a copy of its report. I suggest that it would be right for you to do so, with copies to your other Summit partners. If you agree you might care to write on the lines of the accompanying draft. Agreed NT

I am grateful to Dr Nicholson for giving the meeting, by way of background, an oral report on the work which the Technology, Growth and Employment Working Group have been doing under his chairmanship, in response to our own, related but separate, remit from the London Summit.

I am sending copies of this minute and the enclosure to members of the Cabinet and to Sir Robert Armstrong.

PJ

P J

21 December 1984

MEETING OF ENVIRONMENT MINISTERS OF SUMMIT COUNTRIES: LONDON 17 DECEMBER

"THE WAY FORWARD"

"We recognise the international dimension of environmental problems and the role of environmental factors in economic development. We have invited Ministers responsible for environmental policies to identify areas for continuing co-operation in this field".

Extract from Communique from Heads of State or Government at the London Economic Summit, June 1984.

Conclusions by Environment Ministers of Canada, the Federal Republic of Germany, Italy, Japan, the United Kingdom and the United States of America together with the Commission of the European Communities.

1. At the invitation of the Heads of State or Government we have considered a number of areas of environmental concern in which international action is currently being undertaken. We have sought to identify themes which should be the mainspring of our continuing co-operation in the future.

2. At our informal meeting in London on 17 December 1984 we agreed that co-operation on individual issues of environmental concern has recently increased at all levels. We stress however that we must intensify this work and keep under continual review its principles and contents so as to ensure that both new and existing concerns are tackled, and changed perceptions are taken into account.

3. We recommend that the next Economic Summit should endorse the basic principle that the fundamental role of the environment should have a central place in our national and international policies. In this context we particularly stress the importance of good husbandry of natural resources to safeguard the basis of production of our economy and to conserve an environment worth living in.

4. We have made encouraging progress in reducing the pollution of air, water and the land. Nevertheless, in spite of these achievements, there is still a need for additional, more effective measures and further efforts. The conclusions reached in 1984 at major international and multilateral conferences with regard to environmental issues should be rapidly put into effect. But we must not neglect the environmental problems which are less visible and more difficult to comprehend. In many cases the impacts of environmental pollution may be subtle, and may become obvious only in the long run. Moreover, the transfer of polluting substances from one sector of the environment to another creates new problems. This phenomenon should be given particular attention.

5. Other major problems are becoming increasingly acute in developing countries, and are in some cases influenced by our own policies. It is essential, in both developing and developed countries, to manage sustainable resources wisely, and to this end we emphasise that prevention of damage is better than repair. This principle is fully effective only in the framework of intensive international co-operation because many of these problems range far more widely than any one of our countries.

6. The appropriate international bodies are already dealing with subjects such as the use of toxic chemicals, management and disposal of hazardous wastes and marine pollution. But there is scope for more urgent and more effective co-operation. There has been a major improvement in international co-operation on air pollution control in the last few years; measures are being taken against acid rain in particular; it continues to be the subject of our intense efforts to ward off threatening dangers. Serious attention is being given to the depletion of the ozone layer and the increased build up of carbon dioxide. But, in the future, we

need to analyse these three problems in their interdependence and, if necessary, devise alternative energy policies. Similarly we believe that some problems arising out of modern agricultural practices need further study and should be treated on a broad international basis. In our own countries, notwithstanding systems for planning and regulating land use, more should be done to balance agricultural development with the sometimes conflicting needs of conserving our natural environment. In developing countries our aim in this respect should be to help to develop environmentally sound agricultural systems as a basis for sustainable development, and we should ensure that our own policies, wherever relevant, are consistent with this. We should give a lead to greater international co-operation on these issues.

7. The tragedy in India, which occurred only a few days before our meeting, emphasised the problems that can attend the transfer of the technology or of hazardous chemicals to developing countries. We are clear that this must be an area for continuing co-operation among our own and other industrialised nations in consultation with developing countries, and we welcome action being taken by OECD to draw up possible guidelines. One suggestion is that there might be jointly agreed government-industry monitoring teams to assess such operations. Further study and discussion are required, but we are clear that our efforts must be directed towards reinforcing the co-operation between developed and developing nations to the mutual benefit of both.

8. We believe more needs to be done to develop new concepts for careful environmental resource management. Risks have to be assessed by appropriate methods; the environmental impacts of our actions should be evaluated. Damage resulting from pollution should be analysed as well as the costs of measures to protect the enviroment; the results should be taken into account when decisions on environmental policies are taken. Considerable progress has been made by OECD in evolving guidelines to help its members, and we believe that OECD remains the primary place for us to seek to develop further our understanding of the interaction

between economics and environment. The forthcoming Ministerial meeting of the Environment Committee offers a major opportunity for a review of policy.

9. We also recognise that as industrialised countries we have experience and skills in the reduction of environmental pollution which should be shared with those who are only now confronting environmental problems. We acknowledge that the exploitation of the world's resources has to be sustainable in terms of both industry and trade. The need to conserve plant and animal species makes sense in economic as much as in ecological terms. The potential of the countries of the western world must continue to be used as an example for the conservation of an environment worth living in. We need to provide appropriate assistance to developing countries in managing their natural resources and development in a sustainable way. We also need to consider environmental impacts of our own activities in these countries and work actively with them on the wide range of environment/development issues.

10. We invite Heads of State or Government to affirm their commitment to the following main principles for continued co-operation.

(i) The resources of the environment constitute both the basis and the limits of economic development; and their wise management is one of the most important components of national and international policies.

(ii) Accordingly, environmental policy should be integrated fully into other policies. It should be considered as a fundamental factor when economic decisions are taken. In this context we stress the importance of sustainable development; prevention rather than cure; environmental impact assessment; setting environmental standards on the basis of best technology; and development of less polluting and more cost effective technologies, including those for controlling emissions at source.

(iii) The mechanisms of the market economy and the forces of competition should be harnessed to solve environmental problems effectively. Environmental protection is feasible only in co-operation with the economic and technological sectors and not in conflict with them.

(iv) The 'polluter pays principle' is of key importance in ensuring that environomentally correct price and market signals are given, and should be developed and applied more widely.

11. We recommend specific action on the following issues:

(i) We should intensify co-operation, especially within OECD which we see as the primary instrument of industrialised countries for stimulating work on the relationship between the environment and the economy. In particular we look forward to the Ministerial meeting of OECD's Environment Committee in June 1985 where we will endeavour to secure agreement to progress in deciding the thrust of future environmental policy, including policies for natural resource mangement.

(ii) We recognise the major environmental problems faced by developing countries - including rapid population and urban growth, desertification, deforestation, and risks from hazardous chemicals and industrial installations. Our policies and interests interact with theirs and we must work with them for constructive programmes of environmentally sound development and the avoidance of environmental damage and disasters world-wide.

(iii) We should continue to co-operate actively, bilaterally and in appropriate international bodies, to solve our current preoccupations, notably acid deposition, the possible depletion of stratospheric ozone, the management of toxic chemicals and hazardous wastes, the prevention of

freshwater and marine pollution, the conservation of flora, fauna and genetic resources, and the interactions of industrial, agricultural and conservation policies. But we must also be more forward-looking in addressing emerging environmental issues such as possible climatic changes resulting from human activities, the need to examine alternative energy strategies, and the environmental impact of new forms of industry including biotechnology. Most of these will have to be tackled internationally and on a cross-sectoral basis.

12. We strongly advise against creating new institutions. The emphasis of our work is on continued and improved co-operation within the existing appropriate international bodies. We note the need for these bodies to have unambiguous priorities and effective channels for the implementation of decisions. We welcome the work of the United Nations World Commission on Environment and Development.

014/105

CONFIDENTIAL

FROM: CHIEF SECRETARY
DATE: 21 December 1984

CF Pse copy to Policy Unit & b/f with pps for Mtg on 23 Jan

PRIME MINISTER

AGRICULTURE AND CONSERVATION

Before any meeting in the New Year to discuss the report by officials on agriculture and conservation, you may like to have my preliminary views.

2 Patrick Jenkin's minute of 30 November shares my concern about the costs of site safeguard; but argues that it is too early to make cost saving recommendations. Patrick also takes the line that we should stick to the voluntary principle.

3 I am sure that we all agree on the importance of getting our policy right in this area, which is attracting increasing public concern, not least among our own supporters. As the report by officials points out, the arrangements under the 1981 Wildlife and Conservation Act are being criticised both because it is doubted whether a policy which is wholly reliant on voluntary co-operation can succeed in its objective and because of the costs in terms of high compensation payments.

4 I believe that we should decide now to move down the alternative route of extending conventional planning powers (not necessarily with a built in right to compensation). Although a decision to make a change will be unpopular with agriculturalists, it will attract strong support from some other equally important interests; and if we are to alter

direction this is the time to do it. The present arrangements leave us with an open-ended public expenditure commitment (the costs have already risen astronomically since the £600,000 to £700,000 forecast when the 1981 Act was passed). Pressure for conservation is bound to grow and extend beyond the land already designated (one quarter of England and Wales). In due course, this will lead to further expensive demands from agriculture for assistance with conservation; but we would by then find it more difficult than now to change the voluntary approach. Both the Country Landowners Association and the NFU have recently issued policy statements which recognise the need for a shift of emphasis towards conservation objectives. Although the farming community will not welcome a more restrictive approach, it is unlikely to surprise them.

5 Turning to Patrick's specific proposals I agree that some of them could be adapted to fit the change which I am advocating. We have already agreed that we should act to block the so-called 3 month loophole. I also agree with Patrick that the time has come to remedy the anomaly that we use public funds to compensate farmers for not receiving a capital grant which has been refused on conservation grounds. I see no reason why this relatively modest change could not be announced immediately, even before Michael Jopling circulates his proposals for further changes to the capital grants scheme.

6 I am less sure about the suggestion that we should set up a study by consultants to consider the implications of possible changes to the financial guidelines on compensation. I could only agree to such a study if the terms of reference made it clear that the objective was to recommend changes to the guidelines which would produce significant public expenditure savings. In addition to well defined terms of reference, the study would need to be completed before September to enable adequate consideration during the PES discussions.

7 Patrick suggests that we should now take a decision on the proposals in H(84)40 for an experimental scheme for

offering "grazing grants" for a three year period in the Norfolk Broads. I still have serious doubts about the wisdom of this proposal. It seems to me that it will in practice be impossible to confine such an experiment to the Broads alone, as there are many other areas of the country which could make a similar claim for resources to protect outstanding landscape features. Moreover, as I understand it, the suggestion is that full-scale management agreements should continue to be available alongside grazing grants: so the prospect of saving public expenditure by this means even in the longterm seems remote. If colleagues consider that some positive action is necessary in advance of introducing some more effective "stop" powers, I should much prefer the alternative option of increasing the grant in aid from the Countryside Commission to the Broads Authority from 75% to 90%. This would certainly be cheaper and in my view less likely to lead to unwelcome repercussions.

8 Finally, I assume that, as Patrick does not seek to quantify the cost of his proposals, he sees no problem about containing any public expenditure consequences within the agreed provisions for the relevant programmes.

9 I am copying this to members of H Committee, Geoffrey Howe, Michael Jopling and Sir Robert Armstrong.

for **PETER REES**

[Approved by the Chief Secretary]

Caroline

done

Could you pl fix this – but only when you're feeling strong.

10 DOWNING STREET

DMS
11/10

Meeting: early/mid-January: 1 hour

- Lord President ✓
- S/Env ✓
- MAFF ✓
- S/Scotland ✓
- S/Wales ✓
- S/NI (if he wants) ✗
- Ch Secretary ✓
- S/TI (in person preferably)
- Mr Brearley (Cabinet Office)
- Mr Owen ✓ (Policy Unit)

Subject: Agriculture & Conservation

Wed: 23 JAN
1000

CR
19/1

CONFIDENTIAL

CC/C

Foreign and Commonwealth Office

London SW1A 2AH

18 December, 1984

Await FCO advice

Dear David,

DMB 18/12

Message from the Icelandic Prime Minister

The Icelandic Ambassador asked at short notice on 17 December to call on an FCO Minister to deliver a message from his Government. In the event, he handed over to Mr Renton a copy of a letter from his Prime Minister to Mrs Thatcher reporting a statement made by the Prime Ministers of the Nordic countries on air pollution at a meeting in Reykjavik on 12 and 13 December.

I enclose the message. The Ambassador said that the original would be delivered direct to No 10 Downing Street when it arrived from Reykjavik.

We are currently considering the message and will in due course advise the Prime Minister as to how she might reply.

I am sending a copy of this letter and the message to John Ballard (DOE).

Yours Sincerely,

Colin Budd

(C R Budd)
Private Secretary

David Barclay Esq
10 Downing Street

MEETING OF ENVIRONMENT MINISTERS OF SUMMIT COUNTRIES: LONDON 17 DECEMBER

"THE WAY FORWARD"

"We recognise the international dimension of environmental problems and the role of environmental factors in economic development. We have invited Ministers responsible for environmental policies to identify areas for continuing co-operation in this field".

Extract from Communique from Heads of State or Government at the London Economic Summit, June 1984.

Conclusions by Environment Ministers of Canada, the Federal Republic of Germany, Italy, Japan, the United Kingdom and the United States of America together with the Commission of the European Communities.

1. At the invitation of the Heads of State or Government we have considered a number of areas of environmental concern in which international action is currently being undertaken. We have sought to identify themes which should be the mainspring of our continuing co-operation in the future.

2. At our informal meeting in London on 17 December 1984 we agreed that co-operation on individual issues of environmental concern has recently increased at all levels. We stress however that we must intensify this work and keep under continual review its principles and contents so as to ensure that both new and existing concerns are tackled, and changed perceptions are taken into account.

3. We recommend that the next Economic Summit should endorse the basic principle that the fundamental role of the environment should have a central place in our national and international policies. In this context we particularly stress the importance of good husbandry of natural resources to safeguard the basis of production of our economy and to conserve an environment worth living in.

4. We have made encouraging progress in reducing the pollution of air, water and the land. Nevertheless, in spite of these achievements, there is still a need for additional, more effective measures and further efforts. The conclusions reached in 1984 at major international and multilateral conferences with regard to environmental issues should be rapidly put into effect. But we must not neglect the environmental problems which are less visible and more difficult to comprehend. In many cases the impacts of environmental pollution may be subtle, and may become obvious only in the long run. Moreover, the transfer of polluting substances from one sector of the environment to another creates new problems. This phenomenon should be given particular attention.

5. Other major problems are becoming increasingly acute in developing countries, and are in some cases influenced by our own policies. It is essential, in both developing and developed countries, to manage sustainable resources wisely, and to this end we emphasise that prevention of damage is better than repair. This principle is fully effective only in the framework of intensive international co-operation because many of these problems range far more widely than any one of our countries.

6. The appropriate international bodies are already dealing with subjects such as the use of toxic chemicals, management and disposal of hazardous wastes and marine pollution. But there is scope for more urgent and more effective co-operation. There has been a major improvement in international co-operation on air pollution control in the last few years; measures are being taken against acid rain in particular; it continues to be the subject of our intense efforts to ward off threatening dangers. Serious attention is being given to the depletion of the ozone layer and the increased build up of carbon dioxide. But, in the future, we

need to analyse these three problems in their interdependence and, if necessary, devise alternative energy policies. Similarly we believe that some problems arising out of modern agricultural practices need further study and should be treated on a broad international basis. In our own countries, notwithstanding systems for planning and regulating land use, more should be done to balance agricultural development with the sometimes conflicting needs of conserving our natural environment. In developing countries our aim in this respect should be to help to develop environmentally sound agricultural systems as a basis for sustainable development, and we should ensure that our own policies, wherever relevant, are consistent with this. We should give a lead to greater international co-operation on these issues.

7. The tragedy in India, which occurred only a few days before our meeting, emphasised the problems that can attend the transfer of the technology or of hazardous chemicals to developing countries. We are clear that this must be an area for continuing co-operation among our own and other industrialised nations in consultation with developing countries, and we welcome action being taken by OECD to draw up possible guidelines. One suggestion is that there might be jointly agreed government-industry monitoring teams to assess such operations. Further study and discussion are required, but we are clear that our efforts must be directed towards reinforcing the co-operation between developed and developing nations to the mutual benefit of both.

8. We believe more needs to be done to develop new concepts for careful environmental resource management. Risks have to be assessed by appropriate methods; the environmental impacts of our actions should be evaluated. Damage resulting from pollution should be analysed as well as the costs of measures to protect the enviroment; the results should be taken into account when decisions on environmental policies are taken. Considerable progress has been made by OECD in evolving guidelines to help its members, and we believe that OECD remains the primary place for us to seek to develop further our understanding of the interaction

between economics and environment. The forthcoming Ministeri[illegible] meeting of the Environment Committee offers a major opportunity for a review of policy.

9. We also recognise that as industrialised countries we have experience and skills in the reduction of environmental pollution which should be shared with those who are only now confronting environmental problems. We acknowledge that the exploitation of the world's resources has to be sustainable in terms of both industry and trade. The need to conserve plant and animal species makes sense in economic as much as in ecological terms. The potential of the countries of the western world must continue to be used as an example for the conservation of an environment worth living in. We need to provide appropriate assistance to developing countries in managing their natural resources and development in a sustainable way. We also need to consider environmental impacts of our own activities in these countries and work actively with them on the wide range of environment/development issues.

10. We invite Heads of State or Government to affirm their commitment to the following main principles for continued co-operation.

(i) The resources of the environment constitute both the basis and the limits of economic development; and their wise management is one of the most important components of national and international policies.

(ii) Accordingly, environmental policy should be integrated fully into other policies. It should be considered as a fundamental factor when economic decisions are taken. In this context we stress the importance of sustainable development; prevention rather than cure; environmental impact assessment; setting environmental standards on the basis of best technology; and development of less polluting and more cost effective technologies, including those for controlling emissions at source.

(iii) The mechanisms of the market economy and the forces of competition should be harnessed to solve environmental problems effectively. Environmental protection is feasible only in co-operation with the economic and technological sectors and not in conflict with them.

(iv) The 'polluter pays principle' is of key importance in ensuring that environmentally correct price and market signals are given, and should be developed and applied more widely.

11. We recommend specific action on the following issues:

(i) We should intensify co-operation, especially within OECD which we see as the primary instrument of industrialised countries for stimulating work on the relationship between the environment and the economy. In particular we look forward to the Ministerial meeting of OECD's Environment Committee in June 1985 where we will endeavour to secure agreement to progress in deciding the thrust of future environmental policy, including policies for natural resource mangement.

(ii) We recognise the major environmental problems faced by developing countries - including rapid population and urban growth, desertification, deforestation, and risks from hazardous chemicals and industrial installations. Our policies and interests interact with theirs and we must work with them for constructive programmes of environmentally sound development and the avoidance of environmental damage and disasters world-wide.

(iii) We should continue to co-operate actively, bilaterally and in appropriate international bodies, to solve our current preoccupations, notably acid deposition, the possible depletion of stratospheric ozone, the management of toxic chemicals and hazardous wastes, the prevention of

freshwater and marine pollution, the conservation of flora, fauna and genetic resources, and the interactions of industrial, agricultural and conservation policies. But we must also be more forward-looking in addressing emerging environmental issues such as possible climatic changes resulting from human activities, the need to examine alternative energy strategies, and the environmental impact of new forms of industry including biotechnology. Most of these will have to be tackled internationally and on a cross-sectoral basis.

12. We strongly advise against creating new institutions. The emphasis of our work is on continued and improved co-operation within the existing appropriate international bodies. We note the need for these bodies to have unambiguous priorities and effective channels for the implementation of decisions. We welcome the work of the United Nations World Commission on Environment and Development.

PRIME MINISTER
ICELAND

Subject cc master
aft

PRIME MINISTER'S
PERSONAL MESSAGE
SERIAL No. T211/84

17 December 1984

H.E. Margaret Thatcher, Prime Minister
London.

Dear Prime Minister,

At a meeting of the Prime Ministers of the Nordic Countries, held in Reykjavik on 12 and 13 December, the attached statement regarding air pollution and acidification was agreed upon. As the meeting was held in Iceland, I was entrusted with the task of submitting this statement to the Government of the United Kingdom.

The Nordic Prime Ministers urge the British Government to adhere to the proposals contained in the statement.

Yours sincerely,

Steingrimur Hermannsson
Prime Minister

Statement by the Nordic Prime Ministers
on air pollutants and acidification

---

1. The Nordic Prime Ministers, meeting in Oslo in Autumn 1982, expressed their concern about the damage to human health and to the environment caused by emissions of air pollutants, in particular sulphur and nitrogen pollutants.

2. Since then the damage has further increased in a serious way. New reports disclose extensive forest damage, acidification of ground water and increased risks of damage to human health. Reports of this kind have been published in a number of the Nordic countries as well as in other European and North American countries. Together these reports show that air pollution emissions and acidification constitute one of the most serious environmental problems of the industrialized world today.

3. The reports also emphasize the need to intensify efforts, both nationally and inter-nationally, to solve these serious problems.

4. Internationally the Nordic countries have, ever since the question of air pollutants was brought up at the United Nations Conference on the Human Environment in Stockholm 1972, through active cooperation been able to play a most active role. Most recently these countries have taken the initiative within the framework of the UN ECE Convention on long-range trans-boundary air pollution regarding an agreement on a reduction by 1993 of sulphur emission, as a first step, of a minimum of thirty percent.

5. The Prime Ministers note with satisfaction that twenty countries have so far adopted the Nordic proposal. At the same time, it is regrettable that several of those countries with considerable emissions, which affect environmental conditions in the Nordic countries, have not considered themselves able to achieve this target and have thus not been able to endorse the proposal. The Prime Ministers urge the British Government to accept the Nordic proposal.

6. The Prime Ministers consider that it is now important that the negotiations that are taking place within the framework of the UN ECE Convention on a protocol on reduction of a minimum of thirty percent by the year 1993 can be concluded as soon as possible in accordance with the Nordic proposal.

7. In the light of the role of nitrogen oxides as a cause of forest damage, both directly and indirectly, in connection with ozone formation, it is imperative that early agreements can also be reached on considerable reductions in these emissions. Such reductions in emissions must include emissions from stationary plants as well as from vehicles.

8. Against this background, the Nordic Prime Ministers note with satisfaction that the European Community, as a first step towards more stringent requirements for car exhausts,now appears to be aiming at introducing obligatory legislation on lead-free petrol as from October 1989, with the possibility for member states to introduce lead-free petrol on a voluntary basis at an earlier date. It is the hope of the Prime Ministers that as many countries as possible, within the EEC as well as outside, will introduce lead-free petrol as soon as possible and well before the year 1993. The Nordic countries will, on their part, take the required measures to make it possible to market lead-free petrol in the Nordic countries as soon as practically possible.

In this context, it is of great importance that the international cooperation at expert level, that was started in Summer 1984 in Stockholm between the Nordic countries and six other countries, can continue. The aim of this cooperation is to try to reach a harmonization of the practical introduction of stricter control of car exhaust in the countries concerned.

9. In conclusion, the Prime Ministers note that the Nordic countries have taken or will take extensive measures to reduce emissions of air pollutants. In order to find a solution to the serious environmental effects caused by air pollutants it is, however, necessary that all countries take action as soon as possible to reduce the total amount of sulphur and nitrogen compounds. The Nordic countries will continue their close cooperation inter alia in their preparations for and during the third meeting with the Executive Body of the UN ECE Convention as well as in other international bodies.

Prime Minister (2): To note. This summarises the work on technology and the environment which Dr Nicholson has been leading, as agreed at the London Economic Summit.

Dub 18/12

W0935

THE PRIME MINISTER

13 December 1984

TECHNOLOGY, GROWTH AND EMPLOYMENT WORKING GROUP - FULFILMENT OF ENVIRONMENTAL REMIT TO THE GROUP FROM THE LONDON ECONOMIC SUMMIT

1. The Technology, Growth and Employment Working Group was invited by Heads of State and Government at the London Economic Summit to prepare a report on the current state of scientific and technical knowledge in the environmental area, and in particular, to comment on the scope for international collaboration, including industrial collaboration. You will recall that this request was made principally on the initiative of the United Kingdom, partly because we were anxious that the political pressure for international environmental action was ill-supported by scientific and technical knowledge.

2. The Group was asked to report by the end of December 1984, which ensured that the work was conducted under UK Chairmanship. I have convened the Group on three occasions since the London Economic Summit, and I am pleased to report that we are very near to concluding our work, and that a report will be in Sherpas' hands by the date requested.

(Conclusions only - the report is very long) Dub 18/12

3. I attach a copy of the latest draft of the Report which I expect will be modified only slightly before constituting the final report. The Report consists of a general section and then a group of six Technical Reports on key environmental topics identified by the Working Group, namely atmospheric pollution, toxic and radioactive wastes, marine pollution, pollution of soils and waters, appropriate land husbandry and climatic change.

4. In each area, the Technical Reports provide a synopsis of the state of current scientific knowledge drawing on the most up-to-date research in the Summit countries and elsewhere, a summary of current international collaboration and a series of specific research areas where international collaboration could be developed. United Kingdom experts together with two of my own staff were responsible for the initial drafting of these reports, and, although the material is necessarily in condensed form, they have been widely

acclaimed by experts in our partner countries as excellent summary documents. My own view is that they will form valuable reference material for some time to come.

5. The general Report draws on the Technical Reports, but does not confine itself to a summary of those reports. Rather it sets environmental policy issues within a wider context by considering the relationship between technology, growth and employment in the environmental field. The general Report, concluding that science and technology is a crucial element in environmental policy making, explains how science and technology can forge a link between economic goals, such as growth and employment, and goals of environmental protection. In commenting on the complex nature of many environmental problems currently facing policy makers, the Group recognises that there are few if any easy solutions, and, because of this, considerable stress is laid on the importance of education and communication in this field.

6. On the specific aspects of the Technology, Growth and Employment Working Group's remit, the Report draws attention to the conclusions about international research collaboration in each of the Technical Reports. Rather than isolating just a few of these for special recommendation, the Group proposes that international organisations already active in environmental research and development should study the Technical Reports with a view to incorporating the relevant recommendations within their own forward plans. However, there is one specific area on which the Group focussed, that is the improvement of the accuracy and comparability of measurement techniques, where it felt there might be a need for a fresh initiative. The Group has devised draft terms of reference for such a study, and suggests eliciting the responses of international organisations to the proposal, prior to consideration of establishing the study as a project of the Working Group. The Working Group intend returning to these matters when international organisations have had the opportunity to comment, so that it can assess what, if any, further action is required.

7. The overall conclusions and recommendations of the Group are set out in paragraph 47 and 48 of the Report, and as an Annex to this minute.

8. I am copying this minute only to Sir Robert Armstrong.

RBN

Dr R B NICHOLSON
Chief Scientific Adviser

135 JOB D5266-0303-00 HMSO D1-1 SIZE 29,2
REV:04-10 EXP:04-10 KB SIZ: 29.02

C

The Technology, Growth and Employment Working Group was established by Heads of State or Government at the 1982 Economic Summit in Versailles. It has since presented two general reports on technology, growth and employment, published in the United Kingdom by HMSO as Cmnd 8818 and Cmnd 9269. The Working Group's members are drawn from senior scientific and technical advisers to Heads of State or Government from the Economic Summit countries. During 1984, the Group was chaired by Sir Robin Nicholson, Chief Scientific Adviser, Cabinet Office.

Enquiries arising out of this Report should be made to the Science and Technology Secretariat, Cabinet Office, 70 Whitehall, London SW1A 2AS.

136 JOB D5266-0304-02 HMSO D1-1 SIZE 37,3
REV:04-11 EXP:04-10 MD SIZ: 37.03

CONTENTS

138 JOB D5266-0501-01 GALL 0001-01 HMSO D1-1 SIZE 48,0
REV:04-11 EXP:04-10 MD SIZ: 48

REPORT ON THE ENVIRONMENT BY THE TECHNOLOGY, GROWTH AND EMPLOYMENT WORKING GROUP

Preface

i. In its report to the London Economic Summit in 1984, the Technology, Growth and Employment Working Group identified environmental protection as one of the key science and technology areas which relate to economic growth and employment.

ii. The Heads of State or Government accepted the importance and timelinesss of the issue and invited the Working Group to undertake a special study of the role of environmental factors in economic development. The communique of the London Summit contained the following passage:

> "We recognise the international dimension of environmental problems and the role of environmental factors in economic development. We have invited Ministers responsible for environmental policies to identify areas for continuing co-operation in this field. In addition we have decided to invite the Working Group on Technology, Growth and Employment to consider what has been done so far and to identify specific areas for further research on the causes effects and the means of limiting environmental pollution of air, water and ground, where existing knowledge is inadequate, and to identify possible projects for industrial cooperation to develop cost effective techniques to reduce environmental damage. The group is invited to report on these by the 31 December 1984."

iii. In fulfilling its remit, the Technology, Growth and Employment Working Group not only focused on environmental science and technology, but tried to set this in its broader context, that is its relationship to economic growth and employment.

iv. The Working Group met three times since the London Summit to undertake this study. Our findings are set out in this report.

Introduction

1. Environmental protection is a necessary and vital concern of Governments. Giving environmental policy its due political weight is essential because the successes and failures of environmental protection are so far reaching. Successes can be spectacular. Learning the lessons of the dust-bowl, the extraordinary growth in agricultural output in our countries has been achieved without creating problems on a comparable scale. Equally, there have been dramatic reductions in many of the more severe forms of pollution, for example smog and heavy contamination of freshwaters and the sea. But failure to consider or appreciate the environmental consequences led to the gross pollution during the first half of this century associated with industries such as coal and steel, the legacies of which we live with today in the form of scenes of ladscape devastation in areas of heavy industry, continuing air pollution, and damage to historic monuments, despite major campaigns to restore the landscape and clean up the environment. And there continue to be pollution problems, relating to current patterns of energy consumption, transport and manufacturing processes.

140 JOB D5266-0502-03 GALL 0001-01 HMSO D1-1 SIZE 48,0
REV:04-11 EXP:04-10 MD SIZ: 48

2. Environmental policy making is a complex area, where economic, social and scientific factors must be balanced. Moreover, environmental problems are, themselves, inter-related, and call for a comprehensive and anticipatory approach to policy making so that the problem is not transferred from one domaine to another. The relationship between man's economic activities, in the form of exploitation of natural resources and manufacturing, and possible environmental damage as a result of these activities, demands systematic and rigorous decision making in all economic areas. While it is unrealistic to hope to eradicate all environmental hazards, a comparison of competing options in terms of relative effects on the environment helps pinpoint which options are least damaging. Decision making in the energy field illustrates this point well, since one man's energy availability is often another man's pollution.

3. A further reason for giving environmental protection high priority is that many forms of environmental pollution are readily observable, have a discernible effect on people's livelihood, health and amenity and, understandably, give rise to public concern. This places a special responsibility on policy makers to communicate with the public, but the difficulty of conveying the complexity of environmental processes and the uncertainty of the efficacy of abatement actions mean that political decisions often have to be made in an emotionally charged atmosphere, or on the other hand, in advance of widespread public concern in order to avoid future economic and social costs. The paper, thus, argues for a continuing active role by the international science community in providing the knowledge and technological tools required by decision-makers to anticipate and address environmental problems through enlightened and effective policies and programmes.

4. Giving environmental policy due prominence on the political agenda is likely to put Governments in a stronger position to anticipate difficulties and take preventive action to avoid environmental damage rather than to respond to the damage once it has occurred. Many problems are readily soluble if tackled at an early stage. It will also be vital if effective international action is to be agreed upon. It is becoming clearer that a global approach is needed in order to combat environmental deterioration, so international consensus about the importance of the environment is an essential prerequisite to the coordination of national policies which will have necessarily been developed initially in accordance with national needs.

The Environment, Economic Growth and Employment

5. The protection of the environment and the development of the economy are frequently, though mistakenly, regarded as competing goals. The Working Group's view is that it is possible to achieve and reconcile both economic and environmental goals through the medium of the proper use of science and technology. In effect, science and technology can provide a bridge between policy in the two areas.

6. Questioning the value of the industrial society because of environmental problems leads us to no easy solutions. A return to more simple forms of life does not offer any realistic alternative, because satisfactory human living

91 JOB D5266-0503-01 GALL 0001-00 HMSO D1-1 SIZE 48,0
REV:04-10 EXP:04-10 XX SIZ: 48

conditions—this means work and prosperity for everybody—could not be ensured. On the other hand, there is nothing to be gained from closing one's eyes, for narrow economic reasons, to the implications of human activities for the environment. In turn, environmental improvement or deterioration has an impact on the individual and on society. Long-term economic growth will only be possible if we protect and conserve the resources which underpin prosperity. Economic and ecological interests must and, we believe, can be reconciled.

7. One reason why the environment is abused is that it is a commodity for which people have not had to pay, and do not have to pay, either at all or not very much, because there is no market for it. Thus, environmental policy has to set high levels of environmental quality, which will then give rise to high barriers—particularly economic barriers—for an abuse of environment. Under these conditions, economic growth is not opposed to environmental protection; on the contrary, it makes easier an increase in the amount of resources devoted to environmental protection.

8. The grosser forms of environmental damage, largely starting with the energy-greedy industrial processes of the late 19th and early 20th century, and the costs associated with remedying that damage, must not be taken as inevitable events which will continue after improved and energy-saving industrial processes for the existing production and manufacturing sectors are introduced, and which will be repeated as new industrial processes are developed. Traditional industrial sectors can be made compatible with good environmental practice. And as far as new industries such as information technology, biotechnology and electronics are concerned, even whilst they are in their infancy, we should be considering their environmental consequences and, without stifling their development, explore and design a regime which will be compatible with sustained high environmental quality.

9. The way ahead is for high environmental quality objectives to provide the incentive for innovation and for the development of techniques which are clean and, at the same time, efficient in the use of resources. Equally, it will be possible to establish those objectives because of the contribution to our understanding of processes and technical development made by research and development. Environmental policy making is a prime example of an area in which both social and economic goals can be reached on a sound scientific base. Although the policies and standards must be the responsibility of each government, and will be based one each country's unique characteristics, circumstances and stage of development, the nature of environmental issues is such that they affect the environment and economies of other countries, and must be based on shared international scientific knowledge and agreed common principles.

10. Stricter environmental protection regulations have an impact on individual companies, on their employees, and on the costs of producing goods. The additional costs which may result from production methods which are environmentally sounder must be borne by the polluter and financed by way of prices. There is no doubt that, in some cases, we are talking about major structural change and the transitional period requires careful management. It is important to pursue an economic policy which provides companies with the necessary latitude so that they can adjust without a large degree of friction.

97 JOB D5266-0504-01 GALL 0001-00 HMSO D1-1 SIZE 48,0
REV:04-10 EXP:04-10 XX SIZ: 48

11. In the conclusions of the Conference on 'Environment and Economics' (June 1984), the OECD quoted examples of growth sectors such as regular plant maintenance, employment in monitoring services and production and export of environmental protection equipment. But, given the extremely complex processes of adjustment, it is difficult to draw up a balance sheet of the positive and negative structural effects of environmental policies. We conclude that we need not be pessimistic about employment effects. The better the political framework for industries affected by tighter environmental controls to adjust positively to structural changes, the less will be the negative and the stronger the positive employment effects on industries providing environmental protection goods and services. Also, because the consequence of well-founded environmental practices will be a more efficient net use of land and resources, the long-term effects on the economy will be beneficial.

The Role of Science and Technology

12. In calling for an assessment of environmental research in their Communique from the London Economic Summit, the Heads of State and Government gave recognition to the important role science and technology must play in finding solutions to environmental problems. In the previous section, science and technology were referred to as a bridge between the environment and economic growth because they lead to an understanding of cause and effect, and the development of cost-effective means to intervene successfully, through preventive or remedial action. An essential feature of a policy based on anticipation and prevention is an active research and development programme. Further, improved cost-benefit analysis techniques, deriving from inter-disciplinary research, are important tools of environmental policy.

13. It is clear that the Economic Summit nations have a strongly shared interest in this sector. Historically, our nations have been at the forefront of developing the knowledge, the technologies and the methodologies that have been applied throughout the world in addressing environmental threats, through strong national research and development programmes and institutions. We also maintain a broad range of bilateral agreements, under which the tools and results of these national efforts are exchanged; and we support and are active in a range of multilateral institutions which carry out programmes of a scientific nature.

Current State of Scientific Knowledge

14. The Working Group agreed its central task was to assess the state of scientific knowledge in six key areas which it identified:

atmospheric pollution
toxic and radioactive wastes
marine pollution
pollution of soils and waters
appropriate land husbandry
climatic change

This assessment has elucidated the degree of present understanding about the processes of environmental damage, which fields of research are currently the

98 JOB D5266-0505-01 GALL 0001-00 HMSO D1-1 SIZE 48,0
REV:04-10 EXP:04-10 XX SIZ: 48

most significant, and where the principal gaps in our knowledge are. The Working Group went on to document some of the most important examples of current international collaboration in these areas. The detailed presentation of these matters are to be found in the Technical Reports 1-6, which represent the backbone of the Working Group's study and on which this brief report is founded.

15. The Working Group noted, with satisfaction, that there was considerable agreement between specialists in our countries on the state of scientific knowledge and the important scientific priorities, which is an encouraging sign for future collaboration.

16. Although in all the fields considered by the Working Group there are active research programmes which are continuing to add to the fund of scientific and technical knowledge, there are considerable differences in the depth of our understanding of different environmental problems, of the nature and timescales of the problems, of the technical means of overcoming them, and hence differences in the relationship between science, technology and policy making. This reflects variation not only in the extent of our scientific knowledge, but also in the perceived complexity of the problem. As scientific knowledge of a particular problem increases, an increased understanding of its nature will normally narrow but may sometimes widen the perceived gap between solving the problem and current knowledge, revealing wider ramifications and increased complexity.

17. The problems which have received the most attention are those where the environmental damage is already taking place, but where there are appreciable gaps in our scientific knowledge of the processes, and inadequate development of the technology to mitigate the damage. Many examples of these problems, involving pollution of air, land and water, can be found in the Technical Reports; a good example is the problem of air pollution, particularly acid deposition, which is associated with damage to the natural and built environments (Technical Report 1). There is scientific uncertainty about the physical, chemical and biological processes leading to the observed damage, and lack of agreement about the most appropriate technologies to overcome the damage. These uncertainties and disagreements do not remove, however, the need for decisions on action, but illustrate the importance of risk assessment as a tool in environmental decision making.

18. In contrast are problems not of today, but of tomorrow, where the uncertainty is either over the processes and effects, or over the technology to overcome the effects. Of particular concern to the Working Group in this regard, is the prospect of inadvertant, irreversible climatic change. There is now scientific agreement that carbon dioxide in the earth's atmosphere is already increasing at such a rate that towards the end of the next century its concentration will be double that at the start of the industrial revolution (Technical Report 6). It is believed that this will lead to a warming of the earth's atmosphere, but scientific knowledge does not yet provide confident predictions of the details of the effects on climate, sea level and agriculture. There may be a temptation to ignore the need for decision making and action as there are, as yet, no palpable effects. However, present information suggests

99 JOB D5266-0506-01 GALL 0001-00 HMSO D1-1 SIZE 48,0
REV:04-10 EXP:04-10 XX SIZ: 48

that, by the time changes in climate from this cause is clearly evident, the processes leading to further change may well be irreversible. There is an appreciable possibility that the environmental effects will be of such a nature and magnitude that the whole international patterns of settlement, agriculture and trade are altered. There is also concern about the depletion of the stratospheric ozone layer which shields the earth from harmful ultraviolet radiation (Technical Report 1). In another area, the rapid growth in the development of biologically engineered products promises to bring benefits, but we will want to analyse in advance of their widespread use any possible health and environmental risks of these agents. Problems such as these are complex and far reaching, and, while every effort must be made to increase scientific certainty, action may well be needed before there is full scientific knowledge.

19. Some environmental problems are well understood scientifically, but are legacies of past actions and their solutions are hindered by the lack of suitably developed technology or by cost. Problems in this category, which the Working Group have considered, include the inadequate disposal of some kinds of toxic wastes (Technical Report 2) and the use in public and private buildings of asbestos (Technical Report 1). In general, once the existing environmental damage has been overcome the same problem should not arise again, so long as education, communication and political will allow countries to benefit from the lessons of the past.

20. Most of the environmental problems which the Working Group has studied, however, concern environmental damage which exists today and is likely to continue. Our knowledge of the science of the processes involved and of the technology necessary for abatement is sufficient to indicate the broad approach of action needed but insufficient for confidence that the problems can be solved. Many examples are discussed in the Technical Reports and include the contamination of groundwaters (Technical Report 4) the inappropriate disposal of wastes (Technical Report 2) and many forms of pollution of the air (Technical Report 1).

21. In some areas discussed in the Technical Reports, the state of scientific knowledge, though still being improved, is sufficiently advanced to propose solutions, but decisions or action may be inhibited by political, social or economic factors. Examples are provided by some of the failures of land husbandry (Technical Report 5) where the main barriers to overcoming them are not primarily a lack of understanding the scientific processes or of appropriate technology but a combination of economic judgements, social patterns and lack of understanding by decision makers. Another example is the pollution of coastal and estuarine waters (Technical Report 3) where the main impediments to progress are often the high cost of abatement technology and a lack of awareness by the public or the authorities of the hazards.

22. With regard to human health, the focus has changed from the immediate effects of pollutants to subtle effects which may become apparent only after relatively long-term exposure. It is often extremely difficult to establish the causal links between pollutant exposure and chronic effects with any great certainty. Epidemiology, though an extremely important discipline, does not

100 JOB D5266-0507-01 GALL 0001-00 HMSO D1-1 SIZE 48,0
REV:04-10 EXP:04-10 XX SIZ: 48

necessarily provide the sensitivity needed to establish causal relationships, whilst direct toxicological testing is sometimes impractical or unethical. For this reason, there is a need to develop better methods of predicting the toxicity of and exposure to, for example, chemicals to provide accurate and inexpensive ways of determining water quality. Especially in complex experimental areas such as these, the sharing of national research results and the avoidance of duplication is a valuable step forward. And yet, decisions on control measures may have to be made, not on the basis of full scientific knowledge, but of risk assessment and political judgement. The importance of encouraging advances in risk assessment techniques is underlined by the fact that even in fields where scientific data gathering is less constrained, decision making in environmental policy also involves the management of uncertainty.

23. The magnitude of some environmental problems is partly determined by public perception. As is shown in Technical Report 2, the scientific issues associated with the disposal of toxic and radioactive wastes are broadly similar. However, the public perceptions of the problems associated with these classes of wastes are very different and are appreciable factors in environmental decision making.

24. The Working Group concludes that the state of scientific and technical knowledge varies greatly between environmental issues. This does not so much reflect differences in quantity or quality of research so much as in the nature and complexity of the different issues and their environmental effects.

International Research Collaboration

25. In all the areas of environmental research considered by the Working Group there is extensive international research collaboration. This can be at many levels: from bilateral programmes involving individuals in two countries to major programmes involving international organisations such as agencies of the United Nations. The Working Group has concentrated on the latter end of the spectrum.

26. International bodies may foster international research collaboration by the direct funding of research programmes, or by the encouragement of cooperation and the exchange of national research results. An example of direct funding is provided by the Environment Programme managed by the Commission of the European Communities. An example of the latter is the World Climate Programme (Technical Report 6) in which several international agencies organise meetings for the exchange of scientific information and coordinated planning of their respective projects. Different international research programmes have different underlying objectives which depend on the nature of the scientific problems, the organisation of national research problems, and factors of history.

27. The international nature of environmental problems makes international collaboration especially important. Its review of international research has convinced the Working Group of the value of international cooperation to enhance environmental research and make it more useful. There is no substitute for the exchange of information and experience in understanding,

101 JOB D5266-0508-02 GALL 0001-00 HMSO D1-1 SIZE 48,0
REV:04-10 EXP:04-10 XX SIZ: 48

and then combating the global, regional and transboundary problems mentioned above. But even on issues that are confined within one nation's boundaries, the benefit of information exchange is clearly evident for expanding scientific knowledge, methodology and approaches for finding alternative solutions or eliminating duplicatory work and saving precious financial and manpower resources.

28. The Working Group has noted the extent of international effort represented by the many existing international science and technology programmes documented in the Technical Reports. Partly for this reason, we have not proposed new institutional forms of collaboration, but we advocate the fuller and better use of existing international organisations and their programmes. The interrelationship of environment problems means that there will necessarily be some overlap between the work of international organisations. However, it is important to work to reduce unnecessary duplication, to ensure the effective use of limited resources. This will involve the periodic re-examination of international activity. From the Working Group's scan of current programmes, there seems to be scope for greater concertation between the bodies concerned.

Areas for Further Research

29. The Working Group was invited to consider areas for further international cooperation. Each of the Technical Reports discusses in some detail the need for further international research. In sum, the Working Group has identified 69 areas of research, where greater international cooperation is justified. The proposals are made in the Technical Reports and would, in most cases, represent natural developments of current programmes in such bodies as OECD, UNECE, UNEP and ICSU. They might usefully be treated as items for consideration on the scientific agenda of such bodies. All are priority areas, but the degree of priority attached to them by different countries, or by different international groupings will depend on differing perceptions of their policital sensitivity, the urgency of the problem and their scientific importance.

30. The Working Group therefore proposes that international bodies dealing with science and technology collaboration in the environmental area should have the opportunity to study our full report and, subsequently, convey their reactions to the Working Group. In many cases, international bodies may wish to signal which of the priority areas in the Technical Reports have special relevance to their own programmes and the prospect for incoporating such priorities into their forward plans. The Working Group, confident that existing international bodies will respond positively to most of the suggestions, will be interested to receive such reactions and then to decide if any further action ought to be taken on a Summit-wide basis.

31. In addition, the Working Group invites comments from international bodies concerning the measurement practices and techniques fundamental to all environmental research.

32. The Working Group noted a consistent theme in the Technical Reports, which is the importance of having available appropriate internationally recognised measurements in which they could have confidence. In several scientific

141 JOB D5266-0509-01 GALL 0001-01 HMSO REPORT D1-1 SIZE 48,0
REV:04-11 EXP:04-10 MD SIZ: 48

areas, the interpretation of data is severely hampered by uncertainty about the compatability or robustness of the measurements made in different parts of the world. In others, in order to reach conclusions about action, there needs to be improved accuracy of measurement.

33. This is far from a glamorous area of research, but it is one in which serious international study might be of enormous value. It is a theme which may be of interest to more than one international group, and the Working Group has discussed setting up a study-group, on the understanding that it would relate closely to all interested bodies and would make its findings freely available. Proposed terms of reference are attached at Appendix A. As part of its preparations for setting up this study group, the Working Group invites comments on the suggestion, particularly how worthwhile this would be, and how the interests of international organisations can be fully taken into account.

Areas for Industrial Collaboration

34. At one level, the remit to consider industrial collaboration might be interpreted as spotting opportunities for companies in different countries to pool their efforts in working up technologies and products associated with environmental protection. The issues discussed in the Technical Reports clearly cannot be dealt with unless we have cost-effective technical means to deal with waste and pollutants and to prevent bad resource management. Whilst the Technical Reports refer to many areas within which there may be opportunities for international industrial cooperation, the choice of those areas, indeed the choice to collaborate, rests with industry. Moreover, the pressure to collaborate must be balanced against the need to promote competition.

35. Therefore, the Working Group considered it appropriate to look particularly at the relationship between Government and Industry, and how collaboration there might set the scene for effective invironmental policies.

36. Governments are responsible for setting environmental quality standards, and industry must develop techniques which enable it to meet those standards. It is imperative that standard setting should proceed in the knowledge of the implications for industry, and against a timetable which gives industry space to adapt to new standards taking account of industrial renewal cycles. This calls for an active dialogue between Government and industry.

37. In this framework the Working Group agrees that the market and industrial competition can provide appropriate and effective mechanisms for the pursuit of environmental goals, given a structure which allows a realistic value to be placed on environmental resources and which encourages the profitability of good environmental practices. In this way, industry will control its harmful environmental practices not only when it is forced by public pressure or by law to do so, but because its economic interests also lie in sound environmental practice.

38. Some of the success stories in environmental protection reflect the value of effective collaboration between Government and industry. The participation

113 JOB D5266-0510-01 GALL 0001-00 HMSO D1-1 SIZE 48,0
REV:04-10 EXP:04-10 XX SIZ: 48

of small and large firms in regional planning, land zoning, and in taxation and land valuation schemes can parallel discussions at a national level about the implementation of standards. Industrial participation in long-term planning is equally desirable, eg in managing energy use and conservation through advances in construction practices, developing modes of transport etc.

39. The international dimension of environmental protection measures makes the collaboration between Government and Industry all the more important. The Group agree that harmonised international approaches are vital, and that their framing should leave room for industrial competition and be designed to take sufficient account of particular characteristics of individual countries, in terms of their resources, demography etc. In effect, decisions on such matters should take into account best practicable environmental options.

40. The Working Group noted the relevance of the conclusions of the recent World Industry Conference on Environmental Management (November 1984). This Conference examined the scope for international coordination involving the private sector, arriving at broadly similar conclusions to this report about the necessity of interaction between Governments and industry on an international basis, and identifying a number of priority areas for future collaboration.

Education and Public Opinion

41. An essential element in effective environmental policy is education. This means, not simply the accumulation of environmental information by the public, but the development of an awareness of the environmental aspects and consequences of almost all activities, the creation of an intelligent attitude to the environment as a necessary but not invulnerable support base for the economy and a realization that environmental systems are inter-related and affected by individual as well as corporate and Government actions.

42. Environmental education will be all the more important in years to come because the environmental challenges of the 1980s are more complex than those addressed in previous decades. There is a need to inform the public about the evidence of contamination, the assessment of risk, the correction of damage, preventive measures and the cost, but these are all difficult areas of science, technology and public policy. We are frequently operating at the frontiers of knowledge, and critical decisions for governments may rest on controversial scientific judgements. Decision making also takes place within limited time constraints, which, in a democratic society, calls for a ready appreciation of the issues on the part of the public. The education and research enterprises must be part of an iterative process. Significant research findings, as well as up to date material on the monitoring of environmental hazards, should be widely available and in a form accessible to the public.

43. The formal education sector must play a significant role in this matter. In schools, colleges and universities there is a need to place the economy and social development in an environmental context. For those with a continued professional involvement, including engineers, economists and agriculturalists, in-service training is needed to support decisions which take into account,

114 JOB D5266-0511-01 GALL 0001-00 HMSO D1-1 SIZE 48,0
REV:04-10 EXP:04-10 XX SIZ: 48

not simply the more obvious forms of environmental impact, but the more subtle inter-relationship between industrial operation and the environment and its reactions.

44. The role of the media is also crucial. The practice whereby environmental reporting is confined to sensational events undermines the growth of critical awareness of the interplay between man's economic activities and the environment. But inexplicit and incomplete reporting of Government material on environmental hazards has possibly undermined confidence in Governmental bodies as interpreters of relevant material. Insofar as much of this material is generated within Government sponsored programmes, agencies must continue to be active communicators, and maintain confidence through a record of open and intelligible reporting. Industry, too, must pay attention to communication, and learn from those companies which engage in effective and open dialogue, listening to the environmental concerns of those affected by new plans, and benefit from public confidence in their care for the environment.

45. It would be desirable for the planning of international programmes of research and development to take account of the importance of educational aspects, through incorporation of training elements, where appropriate, in the programme and by giving sufficient priority to dissemination of results.

46. The benefit of such an educational effort will be realised in increased public understanding of environmental policy decisions, and more effective and informed participation in the decision making process.

Conclusions and Recommendations

47. The Working group has concluded that:

1. economic and environmental policy can be brought closer together, through the medium of science and technology,

2. long term economic growth is only possible if we protect and conserve the environmental resources which underpin prosperity,

3. economic policies should provide companies with the necessary latitude so that they can adjust to stricter environmental regulations without a large degree of friction,

4. placing an appropriate and realistic value on environmental resources can provide the framework for achieving environmental quality objectives within the context of a market economy,

5. high environmental quality objectives provide a valuable incentive for innovation in science and technology,

6. continuing high priority must be given to science and technology in relationship to the environment, in order to provide a sound basis for environmental policy making,

7. international cooperation in environmental science and technology is essential, not simply to avoid duplication and to make the best use of financial and manpower resources, but because the nature of many environmental problems demands an international approach to research development,

115 JOB D5266-0512-01 GALL 0001-00 HMSO D1-1 SIZE 48,0
REV:04-10 EXP:04-10 XX SIZ: 48

8. existing international organisations engaged in sponsoring such collaboration are well-placed to undertake the work that is needed, and no new institutions are needed, but there is scope for greater concertation between the bodies concerned,

9. internationally consistent techniques and practices of environmental measurement are necessary if research results are to be truly comparable and if environmental standards are to be effectively maintained,

10. education has an important role in environmental policy, which places special responsibility on Governments, industry, educational institutions and the media.

48. The Working Group, while drawing attention to its conclusions and commending them to Heads of State and Government, has confined its recommendations to its specific remit on science and technology. We recommend that:

1. relevant international organisations study the list of priority topics in the Technical Reports, with a view to establishing these in their forward plans, as appropriate,

2. the Working Group reconvenes in due course to consider and determine what future action is necessary in the light of the responses of the international organisations to the priority topics and their comments on the proposed study group on the techniques and practices of environmental measurement.

116 JOB D5266-0513-01 GALL 0001-00 HMSO D1-1 SIZE 48,0
REV:04-10 EXP:04-10 XX SIZ: 48

APPENDIX A

PROPOSAL FOR A STUDY OF THE IMPROVEMENT AND HARMONISATION OF TECHNIQUES AND PRACTICES OF ENVIRONMENTAL MEASUREMENT

Background

There are two reasons for suggesting the establishment of a study in this area. At a scientific level, the adoption of internationally consistent techniques and practices ensures that research results are comparable, which is particularly important in understanding cause and effect and in monitoring change. At a political level, accurate and compatible measurements are vital for the setting and monitoring of environmental standards.

Work Programme

The focus of the study would be to consider where there is a scientific requirement for improvement and harmonisation of the techniques and practices of environmental measurement, in particular where use should be made of new and sophisticated methodology. The study group is expected to identify those areas in which there is cause for concern about the accuracy, precision and sensitivity of measurements (physical, chemical or biological) and then to consider how best to encourage improvements so that these measurements are internationally compatible and recognised as authoritative.

Timescale

The study group would be asked to complete its work within two years and to make an interim report to the Technology Growth and Employment Working Group after one year.

Relationship with Other Nations and Organisations

As with several of the Technology Growth and Employment Working Group's existing areas for collaboration, non-Summit members may seek affiliation to the study group. The group would be expected to liaise with those international bodies which have a major interest in this field, in particular the United Nations Environment Programme and the International Council of Scientific Unions. Because of the wider international relevance of its work, the group would be asked to publish its final report and to bring it to the attention of bodies concerned with international norms of environmental protection, for example the United Nations Economic Commission for Europe.

123 JOB D5266-0514-01 GALL 0001-00 HMSO REPORT D1-1 SIZE 48,0
REV:04-10 EXP:04-10 XX SIZ: 48

TECHNICAL REPORT 1

ATMOSPHERIC POLLUTION

Introduction

1.1. The initial stages of industrialisation often gave rise to incidents of gross air pollution with correspondingly large ecological and health effects. Such locally concentrated air pollution, at least for the Economic Summit Countries, is now rare, due both to the installation of appropriate abatement technology and to more efficient dispersal of pollutants so as to minimise ground level concentrations.

1.2. Attention is now turning to questions of possible long-term environmental effects of exposure to the currently relatively low levels of contaminants which arise from natural and, in particular, anthropogenic sources. Furthermore, as analytical techniques have improved, it is becoming increasingly possible to detect and measure in the air low concentrations of a number of chemicals from which there is experimental evidence of a hazard, under certain circumstances, to man or to the environment.

1.3. There is concern about atmospheric pollution from a long and varied list of chemicals. Of particular international importance are the sulphur and nitrogen oxides which, together with hydrocarbons (in particular halogenated and aromatic hydrocarbons), photochemical oxidants, metals and other substances, are the pollutants responsible for the various processes known as acid deposition which causes damage to a range of ecosystems (1, 2). Some atmospheric pollutants, for example lead, asbestos, and certain organic chemicals, still give rise to concern primarily on human health grounds. Another concern is about long-term changes to the atmosphere, such as the depletion of the stratospheric ozone layer. The issue of increasing carbon dioxide concentration in the atmosphere is addressed in Technical Report 6. At the other end of the scale, there is growing attention paid about air quality within buildings, where certain contaminants can reach concentrations far higher than in the open air. Atmospheric pollutants, when deposited, may also make a major contribution to the pollutant load of marine environments (see Technical Report 3).

1.4. This Technical Report concentrates on those air pollution problems which have a major international dimension. Those which involve long-term changes to the atmosphere are clearly of concern to all countries. More immediate problems such as acid deposition are of an international nature as the pollutants emitted to the atmosphere in one country may be transported to another country where there are adverse effects.

Atmospheric Pollution and Human Health

1.5. Although the main atmospheric pollution problems addressed in this Technical Report involve damage to the built and natural environments, it should not be forgotten that there are still instances of atmospheric pollution presenting a hazard to human health.

147 JOB D5266-0515-01 GALL 0001-01 HMSO D1-1 SIZE 48,0
REV:04-11 EXP:04-10 MD SIZ: 48

1.6. Within the Economic Summit Countries, it has been demonstrated that the clear-cut acute effects of air pollution on health, linked with the former high concentrations of smoke and sulphur dioxide in towns, have been largely eliminated. For example, within the European Communities (EC) the limit values set for these pollutants in the 1980 Smoke and Sulphur Dioxide in Air Directive were based largely on findings from research work in the 1950s and 1960s, and they were designed to avoid both acute and chronic effects. In most areas these limits are being met, and the absence of frank health effects is a tribute to the success of both national and EC measures. There may, however, be chronic effects on health arising from long-term exposure to low doses. There are other pollutants in urban atmospheres derived from both stationary and mobile sources that can damage health at relatively high concentrations; but concentrations are rarely such as to suggest the likelihood of significant effects. However, there are some instances of contamination of the atmosphere where government action needs to be considered on a precautionary basis. Examples include lead derived from additives in petrol, indoor pollution from radon gas, dioxin from industrial or combustion processes, and asbestos dispersed accidentally in the work place or from building materials or from improperly controlled industrial wastes.

1.7. The prediction and detection of slight increases in the rates of common diseases, or of subtle changes in bodily functions, are matters of the greatest scientific difficulty; this is particularly the case with long-delayed effects and with any effects from complex mixtures of agents, each at a very low dose. Much fundamental research is required and there are difficulties to overcome before our understanding will make a major advance.

The Origins of Acid Deposition

Sources of Emissions

1.8. Although there are a large number of atmospheric pollutants which are implicated in the various processes described as 'acid deposition', the two most important acidifying agents are considered to be sulphur dioxide (SO_2) and nitrogen oxides (NOx). (NOx is defined as the sum of nitric oxide (NO) and nitrogen dioxide (NO_2).) It is a matter of considerable scientific and international importance to have data on the emissions of these pollutants for each country. However, as the methods of preparing emission data vary from country to country, a high priority is to produce accurate and comparable data for international comparison.

1.9. The main sources of SO_2 emissions are fossil fuel power stations, industry, oil refineries and commercial and domestic heating. The most recent SO_2 emission data for the Economic Summit Countries (3) are given in Table 1. In most cases reductions have taken place since about the middle 70s, with the United Kingdom, France and Canada showing the greatest decreases in emissions. SO_2 emissions from fossil fuel burning are a function of the sulphur content of the fuel.

1.10. The main sources of emissions of NOx are fossil fuel power stations, motor vehicles, and commercial and domestic heating. Data for NOx emissions in Economic Summit Countries (3) are shown in Table 2. The United Kingdom

has shown little change in emissions over the past ten years but there is some evidence of increases in France, the Federal Republic of Germany, the United States of America and Canada. NOx emissions from fossil fuel burning are a function of the combustion technology, in particular temperature.

1.11. Hydrocarbons (HCs), which are another important component of the acid deposition processes, are emitted from a variety of sources, including distribution systems (for example for natural gas), motor vehicle exhausts, solvent evaporation, and miscellaneous industrial processes. Other organic compounds are emitted to the atmosphere from various industrial processes. Quantitative data on HCs, and other organic, emissions depend on different national data collection methods and are less readily available than data on SO_2 or NO_2.

Atmospheric Reactions and Transport

1.12. The environmental impact of air pollution can come either from the direct effect of primary pollutants (in particular SO_2, NOx and HCs) or from secondary pollutants formed by their subsequent transformation. Sulphuric and nitric acids (the principal constituents of 'acid rain'), and ozone (O_3) are examples of such secondary pollutants. Their formation is a complex combination of chemical and meteorological processes. Although research has greatly increased our knowledge in this field, there is still much to learn (4).

1.13. When mixtures of HCs and NOx are exposed to sunlight, HCs react with hydroxyl radicals (OH) to give organic free radicals (highly reactive chemical species). These then react with NO to form NO_2, re-generating OH and so continuing the reaction cycle. In sunlight NO_2 is itself dissociated to give NO and an oxygen atom (O), the latter then combining with ordinary oxygen to give O_3. The OH radical needed to start this process is formed in sunlight either from O_3 already present (from previous pollution or natural sources) or from minor constituents of vehicle exhausts, such as aldehydes.

1.14. Overall the photochemical process is fuelled by HCs and sunlight, and the NOx have both a catalytic and a terminating role. The latter results from the fact that NOx also react with the free radicals, terminating the O_3-forming cycle and being oxidised to nitric acid in the process. In addition, NO destroys O_3 in the dark giving NO_2 and ordinary oxygen. The overall effect of these photochemical processes is not only to form environmentally active NO_2 and O_3, but also to oxidise NOx and SO_2 to nitric and sulphuric acids respectively, through reactions with hydroxyl, O_3 and hydrogen peroxide.

1.15. It is important to appreciate that the reactions leading to the formation of secondary pollutants can take place over a period of time as an air mass moves, and that a pollutant such as O_3 can be formed many hundreds of kilometres away from the sources of the primary pollutants. It is also possible that secondary pollutants are formed from primary pollutants each of which is derived from a different country.

1.16. The complex chemical and meteorological processes involved in these atmospheric transformations can best be addressed by the construction of

computer-based mathematical models, and by the verification of these models using tracers such as sulphur hexafluoride. Such models have an important role in developing a better scientific understanding of the basis of possible control options. For example, the model developed at the Atomic Energy Research Establishment (Harwell), using data pertinent to conditions in the United Kingdom, indicates the importance of controlling HC emissions if the formation of photochemical pollutants is to be minimised. Indeed reducing the NOx to HCs ratio (for example, by selective control of NOx emissions) can lead under certain circumstances to an increase in O_3 formation. In contrast, models developed in the United States of America, using data relevant to local conditions, place greater emphasis on the need for NOx emission control. The development and validation of such models is vital both to obtaining satisfactory understanding of the atmospheric chemistry concerned and to developing effective emission controls relevant to local conditions and needs.

1.17. The European Air Chemistry Network (EACN), now superseded by the Monitoring and Evaluation of Pollutants in Europe Group (EMEP) of the United Nations Economic Commission for Europe (UNECE), has provided a long run set of data on precipitation acidity. Of 120 EACN sites 29 have shown a statistically significant increase and five a decrease of overall acidity. In Scandinavia during 1956-75 there was a 7% *per annum* increase in hydrogen ion concentration in precipitation, as compared with a year-to-year scatter of 50-100%. However, there has been criticism of the EACN results, mainly because of uncertainties in the measurement of pH in low ionic strength media, particularly with regard to the older data on which trend analyses depend. (Similar criticisms have been made of the measurement of pH of surface waters.) More detailed information on acid deposition in the United Kingdom has been published recently by the Warren Spring Laboratory (5); information on the acidity of precipitation has been published also in the United States of America and Canada. Comparison of these data sets can be difficult because of differences in measurement method.

The Environmental Effects of Acid Deposition

1.18. At pollutant concentrations normally encountered it is difficult to disentangle the relative roles of deposited acidity from the direct toxicity of atmospheric pollutants in gaseous form, such as SO_2, NOx or O_3, and other environmentally relevant factors such as land use changes and natural processes in soils and aquatic ecosystems. The position is further complicated as the environmental effects can either be direct, such as when dry deposition affects crops and trees, or indirect, such as when acidity influences fish through changes in the water chemistry or trees through soil characteristics. It is important to stress that acid deposition is not a uniform process; a wide range of different processes may be involved.

1.19. The scale of the problem is enormous, economically and socio-politically. The main areas of concern are the effects of acid deposition on forests, agricultural crops, freshwaters and buildings.

Effects on Forests

1.20. Although it is well established that high concentrations of SO_2, and other pollutants such as O_3, cause damage to vegetation, it is a relatively recent

127 JOB D5266-0518-01 GALL 0001-00 HMSO D1-1 SIZE 48.0
REV:04-10 EXP:04-10 XX SIZ: 48

development to ascribe serious vegetation damage to current environmental levels of SO_2, NOx and acid deposition. Of particular interest has been the increasing evidence of serious forest damage in the Federal Republic of Germany (6) and in other countries such as Austria, Switzerland and, more recently, Sweden. Forest damage also occurs in some areas of the United States of America and Canada. It is not possible to ascribe this forest damage to any single cause: viral, fungal and insect attack and extremes of climate are all likely to play either a primary or secondary part. The obseved forest damage has been reported from such a large area and wide range of ecological conditions that air pollution is believed to play a significant role.

1.21. Acid deposition was first considered as a likely cause of the observed tree damage in the Federal Republic of Germany. One hypothesis involves damage to leaf tissues by the direct effect of SO_2 (or O_3) which renders them more liable to the leaching of magnesium and calcium by percolating acidified rainwater. Another hypothesis considers the direct effect of acid deposition to the soil, which eventually liberates aluminium ions from soil minerals. This aluminium is highly toxic to root systems and inhibits the uptake of divalent cations. This could explain the observed magnesium deficiency in the needles. However, this hypothesis is not applicable in all cases, although it may explain what happens in some areas.

1.22. Greater weight is now being given to the direct role of gaseous pollutants, particularly NOx and O_3. Thus concentrations of O_3 measured in the Black Forest (Federal Republic of Germany), in areas where damage has been occurring, are not only comparable to those observed in the United States of America where O_3 is known to cause forest damage, but also match concentrations observed in laboratory experiments which produce vegetation damage. Also the O_3 concentrations are consistently greater at higher altitudes in both the Federal Republic of Germany and the United States of America, and in both countries forest injury is observed to increase with altitude. There is as yet little direct experimental evidence to support the O_3 damage mechanism; the fact that similar forest damage has not been observed in the United Kingdom or Norway may be important in this connection.

1.23. Deposition of NOx and nitrates may also affect forests, in combination with the leaching of magnesium and calcium ions associated with acid deposition, by leading to nutrient imbalances which weaken the health of the trees.

Effects on Agricultural Crops

1.24. Although the impact of high concentration of SO_2, NOx, and O_3 on a range of crops is well established, the situation is less clear with respect to exposure at ambient levels (7). Not only are any effects small—much less than the effects of weather variation—but the results obtained from open top exposure chambers do not always reflect what happens in open field conditions. There is also some evidence of synergistic effects when mixtures of pollutants are present; for example the effect of O_3-SO_2 mixtures may be greater than that of O_3 of SO_2 alone. It is important to resolve these scientific uncertainties as even small yield reductions can translate into large costs on a national basis.

128 JOB D5266-0519-01 GALL 0001-00 HMSO D1-1 SIZE 48,0
REV:04-10 EXP:04-10 XX SIZ: 48

Effects on Soils

1.25. There are many processes within soils and their vegetation cover that can increase their acidity (and therefore that of run-off). The decomposition of plant material or humus releases nitrogen compounds which are converted to nitric acid, and the application of nitrogenous fertilisers to soils of limited neutralising capacity (for example, as a prelude to afforestation) can have the same result. The organic acids produced by the decay of leaf litter and plant residues can also contribute to soil acidity and the reduction of neutralising capacity. The bacterial oxidation of mineral and organic sulphides in the soil is yet another source of acidity.

1.26. Acidification of soils is a natural long-term process. The retreat of the glaciers at the end of the last Ice Age left soils that were high in unweathered minerals. Weathering and the continual percolation of naturally acid rain has oxidised and altered these minerals releasing acidic ions and removing some of them. This natural trend in acidification is most prevalent in areas of high rainfall, of geology which provides soils of only low neutralising capacity, and of poor drainage and low temperatures where organic matter, rich in humic acid, accumulates. This trend would be expected to accelerate if the acidity of the rainfall increased.

1.27. Forests act as an effective trap for acidic emissions, and it is found that water falling through the leaf canopy (throughfall) or passing down the main stem (stemflow), especially of old coniferous trees, is likely to be more acid than the incoming precipitation. Tree growth itself leads to the removal of metallic cations from the soil, which are replaced by hydrogen ions giving increased acidification. There are thus a wide range of factors involved in the acidification of soil which affect the significance of the deposition of sulphuric and nitric acids resulting from human activities, although the latter are considered to be the main component in the complex situation.

1.28. Chemical reactions between acid rain or snow melt and the soil are important. If the neutralising capacity of the soil is high, calcium and magnesium will be dissolved, but if the neutralising capacity of the catchment is low, for example being made up of hard granite rocks or sandy base-poor soils, then acidity can be sufficiently high for aluminium (which is toxic to fish) to be brought into solution.

Effects on Freshwaters

1.29. Many freshwater ecological systems are undoubtedly sensitive to acidification. Such effects were first claimed in salmon fisheries in Southern Scandinavia in the early part of the present century, and there is now extensive damage to freshwaters particularly in Norway and Canada. There is general agreement that acidification reduces the hatching rate of fish eggs, the survival of fry and the continuance of fish populations; it causes changes in the freshwater flora and fauna and so affects the food chains of the fish. In general the more valuable fish, such as trout and salmon, are more susceptible to acidity than are coarse fish.

1.30. Aluminium compounds, which may be released from certain soils subject to acidic inputs, are toxic to fish, but this toxicity is reduced if calcium ions are also present. There are strong seasonal variations in both the acidity and metal content of surface waters. Pulses of acidity occur in both the spring from snow melt and rain, and in the autumn especially after long periods of drought; such acidity pulses may be particularly damaging to fish. The correlation between acidity (or sulphate content which is sometimes used as a surrogate for acidity) of freshwaters and fishery status is neither simple nor direct.

1.31. Diatom analysis provides an important method for studying acidification of lakes over relatively long time scales, depending upon the observed relationship between the occurrence of different diatom species and lack of acidity. Such measurements may provide a definitive method for determining the effect of anthorpogenic emissions of SO_2 and NOx on freshwater acidity. Such diatom analysis of lake sediments on resistant base-poor rocks in North West Europe and North America shows that acidification has indeed occurred in the last 150 years, ie since the start of the industrial revolution. For example, the results obtained from four acid lakes in Galloway (United Kingdom) show that the beginnings of acidification varied from ca. 1840 for one lake to 1925 for another. Obviously there are significant local factors affecting the onset of acidification. Studies of the chemistry of annual layers of ice of Arctic glaciers, distant from any source of industrial emissions, show that precipitation has become distinctly more acidic at high latitudes on a circum-polar basis after about 1920.

Effects on Materials and Buildings

1.32. The corrosion and erosion of buildings and constructional materials by air pollution is a long standing environmental problem. It can be particularly severe in the cases of uncoated metals and of buildings constructed from limestone and other alkaline rocks. However, modern constructional practices—such as the use of concrete, metals, wood protectives, and antioxidants—all tend to lower the impact of air pollution. In general the effects on materials are related to air pollutant concentrations and therefore are principally a local problem. Thus anything which reduces local concentrations of air pollutants or improves dispersion will reduce building corrosion and erosion.

1.33. There is particular public concern about damage to unique historic buildings and cultural monuments which are likely to be vulnerable because of the wide use of acid sensitive materials in earlier years.

1.34. There are still, however, substantial uncertainties concerning the role of air pollutants in causing damage to materials and buildings. It is important to the development of control policies to clarify, and distinguish between, the effects of wet (sulphuric and nitric acids) and dry deposition, and of local as against long-range emissions. In turn these effects must be distinguished from the impact of carbon dioxide attack on concrete. With the exception of the latter problem, research in these areas has been limited.

Control Technologies for Acid Deposition

1.35. The main sources of pollution rising from the combustion of fossil fuels are: motor vehicles (NOx, carbon monoxide (CO), HCs and particulates),

stationary combustion plant burning coal or residual fuel oil (SO_2, NOx and particulates) and stationary combustion plant burning gas oil or gas (NOx). Stationary fossil fuel combustion sources make the largest single contribution to SO_2 and NOx emissions. Many technologies to control emissions of SO_2 and NOx exist or are being developed, and these may be considered conveniently in three groups: conrtrol of SO_2 emissions, control of NOx emissions, and alternative energy sources which are low- or non-polluting.

Motor Vehicles

1.36. Motor vehicles can contribute to the production of acid compounds in the atmosphere by providing acid precursors and oxidant precursors (NOx and HCs). There is no simple relationship between the fuel burned by a motor vehicle and the emissions of NOx, CO and HCs. Emissions vary with engine parameters and driving factors, and are usually measured during a test cycle intended to simulate urban driving using a standard reference fuel. Different test cycles are employed in Japan, the United States of America and in countries using UNECE emission control specifications, reflecting the different driving conditions in each country. The use of different text cycles is justified on technical grounds, but it does lead to problems when comparing motor vehicle emissions from different countries. Most data on vehicle emissions relate to new cars and standard test cycles. Actual emissions, particularly under non-urban (that is rural and motorway) conditions, and changes through the life cycle of vehicles under typical private maintenance, are not well known, although some measurements are being made in the United Kingdom for both gasoline- and diesel-engined vehicles.

1.37. Emissions from motor vehicles can be reduced by controlling the composition of the fuel (for example, the sulphur and lead contents) or by changing vehicle design. Platinum group metals are used in the United States of America and elsewhere to catalyse the breakdown of exhaust gases. Several motor companies are developing the 'lean-burn' engine which, using higher compression ratios and lower ratio of fuel to air, attains greatly improved fuel economy and reduced emissions of CO and NOx; emissions of HCs also can be reduced by using an oxidation catalyst. There are other approaches to making fundamental changes to the internal combustion engine, which may result in reduced gaseous emissions; these are, however, at an earlier stage of development.

Control of Sulphur Dioxide Emissions

1.38. The simplest method of reducing SO_2 is to use coal or oil of low sulphur content. However, indigenous sources of coal often have to be used whatever their quality (the transport or importation of low sulphur coals may be expensive or unfeasible) whilst on a world-wide basis there is a large surplus of reserves of high sulphur crude oil. The change of feedstock can usefully reduce emissions in some countries but it is not a world-wide panacea.

1.39. In the case of hard coal, partial removal of sulphur can be achieved by cleaning processes. Maximum application of conventional coal cleaning techniques may reduce sulphur by up to 30% for high (above 2%) sulphur coals and by up to 20% for low (below 1%) sulphur coals. Advanced techniques for coal cleaning are being developed for finely ground dry coals which might be used at

power stations. Super-clean coals are also being investigated for manufacturing coal-liquid slurries to displace fuel oil.

1.40. Fuel oil can be desulphurised, but at relatively high cost. However, oil companies are increasingly modifying refineries so as to increase petrol at the expense of fuel oil production. The resultant residues are difficult to desulphurise and consequently, with falling volume, it is unlikely that substantial investment aimed at the desulphurisation of fuel oil will be undertaken.

1.41. In principle SO_2 can be captured during combustion; fluidised-bed combusters to which limestone is added are potentially effective. For power stations, pressurised fluidised-bed combusters may permit the removal of up to 90% of the SO_2, without the loss of efficiency associated with the use of flue gas desulphurisation (FGD), by combining gas turbines with conventional generating plant. Alternatively the coal may be gasified, with sulphur removal, and the gas used to fire turbine generators. FGD has been demonstrated on power stations in the United States of America, Japan and the Federal Republic of Germany. Proven commercial processes are available and removal efficiencies of 90% can be achieved. Retrofitting of enough plants to have an appreciable effect on air quality is enormously expensive.

Control of Nitrogen Oxide Emissions

1.42. Several denitrification processes have been developed to remove the NOx products of combustion, either alone or simultaneously with SO_2. However, the most widely used process involves the addition of ammonia gas and its reaction with NOx over a catalyst bed to form nitrogen and water. Alternatively, and probably preferably, low NOx burners may be employed which reduce formation of NOx during combustion. Up to 40% reductions in NOx emissions can thus be achieved on new plant with low NOx burners; the greatest success has been with large burners. With catalyst beds a reduction of up to 90% is possible and retrofit is likely to be feasible.

Non-Polluting Energy Sources

1.43. The greatest scope for the displacement of fossil fuels—and the consequent reduction in the emission of pollutants which accompanies their combustion—lies with nuclear power. Thus one Pressurised Water Reactor may displace about 3M tonnes of coal a year and the associated SO_2, NOx and dust emissions. However, nuclear power has its own environmental problems, in particular the disposal of radioactive wastes, which generate their own public concern. These are considered in Technical Report 2. The question of public acceptability is one of the main constraints on the expansion of nuclear power in the Economic Summit Countries.

1.44. With the exception of hydro-electric energy, non biomass renewable energy forms are likely to provide only a small contribution to power generation in the medium term: the Organisation for Economic Co-operation and Development (OECD) estimates that they will account for 1% of primary energy by the year 2000. However, their longer term contribution to power generation in some countries, including developing countries, may well be greater. Such renewable energy sources as biomass are not necessarily pollution-free.

1.45. Although not considered further here, the importance of energy conservation should not be underestimated as another approach which can make a contribution to the reduction of polluting emissions from combustion processes.

Stratospheric Ozone Depletion

1.46. Stratospheric ozone (O_3) acts as a filter for solar ultra-violet (UV) radiation, so that any reduction in the O_3 column will result in an increased flux of UV-ß radiation, several adverse effects on human health and the environment are predicted from an increase, including higher skin cancer rates (approximately 2-4% increase of non-melanoma for every 1% depletion of total column O_3), possible supression of the human immune response, decreased productivity of some commercially important crops (food and fisheries), and degradation of materials. It is therefore important to draw attention to any actions which might cause depletion in the O_3 layer.

1.47. The natural stratospheric O_3 production/destruction cycle involves the photochemical destruction by solar radiation of both oxygen (O_2) and O_3 molecules to give (O), and (O) + O_2 respectively; the (O) then reacts with either O_2 to give O_3, or with O_3 itself to reform molecular oxygen. The result of the cycle is to provide a steady-state concentration of O_3. There are also chemical processes which destroy O_3:

$$X + O_3 \rightarrow XO + O_2$$
$$XO + O \rightarrow + O_2$$

This chain sequence (which is more complex in its details) occurs when X = H, HO, NO, Cl or Br, with NO and Cl being particularly important.

1.48. The NO is introduced into the stratosphere by diffusion of nitrous oxide (N_2O) from the troposphere (arising from the earth's surface) or from NOx emissions from aircraft flying in the stratosphere. In the presence of UV radiation the N_2O reacts with oxygen atoms to form NO which then takes part in the O_3 destroying reaction. The NO is removed from the stratosphere by oxidation first to NO_2 and then to nitric acid by the reaction:

$$OH + NO_2 \rightarrow HNO_3$$

Nitric acid is eventually transported down to the troposphere where it is removed in rain.

1.49. Reactive chlorine species are produced by the photolysis of chlorine containing compounds, particularly chlorofluorocarbons (CFCs) which have sufficiently long life to allow them to diffuse from the troposphere into the stratosphere; reactive chlorine species are removed from the stratosphere by the formation of hydrogen chloride. CFCs are an important group of industrial chemicals used as solvents in the microelectronics, refrigeration, air conditioning, plastic foam blowing and aerosol industries. Overall, the steady state concentration of O_3 in the stratosphere is governed by the occurence and rate of the various photochemical processes involving O_3, and the rate of introduction of key reactive species into the stratosphere and their removal.

150 JOB D5266-0524-03 GALL 0001-01 HMSO D1-1 SIZE 48,0
REV:04-11 EXP:04-10 TC SIZ: 48

1.50. Although there have been notable advances in the ability to measure stratospheric O_3 concentrations, it is uncertain whether predicted variations in O_3 concentration due to the above causes are sufficiently large now to be detectable against the variations in O_3 concentration due to nature and to other perturbing influences of man (such as the production of carbon dioxide or methane). Experimental confirmation of any change in stratospheric O_3 probably will not be possible until O_3 changes reach or exceed 2%; this is not expected to happen for at least a further 10–15 years. In the meantime it is necessary to rely on computer-based mathematical models to predict future O_3 levels and the possible effect on them of current CFC emissions. There are several types of model, some one-dimensional and some two-dimensional, the latter providing information on O_3 depletion at different latitudes. Of probably more immediate importance is the identification of the various chemical reactions involved in the destruction and/or production of O_3, and in the measurement of the relevant reaction rates. Such data form an essential input to the models. The predicted O_3 levels vary with changes in our understanding of the basic chemical processes involved. Thus recent calculations indicate an eventual reduction in the steady state O_3 concentration of 3–5%, for no growth in CFC emissions, as compared to the 16–18% predicted in 1979.

1.51. Recent work in the United States of America (8) and other countries, however, has drawn attention to the possibility that relatively rapid O_3 depletion may occur if the concentration of chlorine in the stratosphere increases from its present level of about 3 parts per billion (ppb), up to a value of about 16ppb. In the presence of nitrogen chemical entities which contain unpaired electrons (such as NO or NO_2) the free chlorine atoms become bound into compounds of limited life (such as $ClONO_2$ which overall reduce the availability of free chlorine atoms to destroy O_3. However, once total chlorine levels exceed those of the nitrogen entities, the inhibiting effect of the nitrogen entities would be swamped, and an increasingly rapid chlorine catalysed decomposition of O_3 would follow. The reaction rate of concern is being refined and validated, but the best present estimation is that it would give around a 15% reduction in the O_3 concentration. Such a depletion could occur over the next 50 years if the growth in chlorine emissions reaches 5% a year. However, the timing of this effect is believed to be modified by any changes in reaction rates and by the presence of other chemical species.

1.52. The issue of stratospheric O_3 depletion should not be confused with that of increasing O_3 in the lower atmosphere—the troposphere—which is one of the factors in the processes of photochemical smog and oxidant formation and effects.

International Collaboration

1.53. The need for accurate and comparable national inventories for SO_2, NOx and reactive HCs has been recognised by a number of international organisations. Work is at present underway in the OECD, EC, UNECE and the Executive Body of the Long Range Transboundary Air Pollution Convention. The possibility of defining a standard emission inventory suitable for use by all these organisations was discussed at an OECD meeting in Paris in 1984. OECD recently held a workshop on the compilation of emission inventories and emission factors.

1.54. The role of photoxidants, their formation, long-term transport and impact on the environment are currently being explored by the OECD Air Management Policy Group. A programme to study the long-range transport and deposition of SO_2, sulphates, NOx and nitrates across Europe is currently being undertaken by EMEP. On the basis of data supplied by member countries, EMEP (which includes all the Economic Summit Countries except Japan) produces an annual assessment of national 'exports' and 'imports' of SO_2 and sulphate. As more countries are making NOx returns it is hoped to extend this coverage to NO_2 and nitrate. Research on the chemistry of atmospheric pollution is coordinated in Western Europe by the Commission of the European Communities (CEC) under the CEC COST 611 programme.

1.55. European research on the effects of atmospheric pollution on crops and forests (including Scandinavian countries) is to be coordinated by the CEC under a new CEC COST 612 programme. A great deal of work has been done on studying the impact of acidification on freshwater biota in national programmes and in some cases through multi-lateral exchanges, for example between Canada and the Federal Republic of Germany, and the joint United Kingdom-Scandinavian rresearch programme. No general international collaborative programme has been contemplated in this area until now; this contrasts with the recent UNECE Effects Working Group meeting on forest damage. However, the UNECE Effects Working Group is now proposing to undertake an international collaborative programme to identify lakes currently undergoing acidification throughout the UNECE region, and to attempt to predict the location and number of lakes likely to become acidified in the future. The programme will call for standard methods of acidity measurement in low conductivity waters and the development of protocols for evaluating environmental damage.

1.56. The UNECE Working Group on Specific Agreement on Emission Reductions is preparing a Draft protocol on the Reduction of Sulphur Emissions or Their Transboundary Fluxes to the Convention on Long-Range Transboundary Air Pollution. This Protocol is expected to embody the commitment, already made by 20 UNECE members, to reduce their annual national sulphur emissions or their transboundary fluxes by 30% by 1993, using 1980 levels as the basis for the calculation of reductions.

1.57. The UNECE Effects Group programme also includes a survey of buildings monuments at risk with estimates of the costs of renovation; the survey includes artifacts such as stained glass, murals, paintings and fabrics. In addition the Group is concerned with developing an international collaborative programme on establishing exposure and measurement protocols for a range of buildings and structural materials. Other international initiatives in these areas include an CEC Co-ordination Group and a North Atlantic Treaty Organisation (NATO) Committee for the Challenges of Modern Society (CCMS) study concerned with the effects of atmospheric pollution on ancient monuments and methods for their protection.

1.58. Current international activity on motor vehicle emission technology is centred on the UNECE which is the principal forum within which standards for emissions are agreed in Europe and the EC. The CEC recently made a major

152 JOB D5266-0526-01 GALL 0001-01 HMSO D1-1 SIZE 48,0
REV:04-11 EXP:04-10 TC SIZ: 48

study 'Evolution of Regulations—Global Approach' (ERGA) to assess the environmental need, technical potential and economic consequences of further vehicle emission controls. The OECD, at its conference on Environment and Economics 1984 (9), reviewed future vehicle emission scenarios and the potential costs of their control. In addition to these activities, the Government of Sweden hosted two meetings on the subject of vehicle emissions. The text of a declaration on the technical aspects of vehicle emission control is to be considered by participating countries in the coming months.

1.59. Experimental work on fluidised-bed combustion in power generation has been undertaken in several countries, notably under the auspicies of the International Energy Agency (IEA) at Grimethorpe (United Kingdom). Exchange of information on the technology of SO_2 and NOx emission control takes place internationally through NATO-CCMS and there have been several OECD studies relating to pollution aspects of combustion systems.

1.60. International collaboration in the fields of renewable energy sources and energy conservation takes place through the IEA, the United Nations Environment programme (UNEP) and the CEC.

1.61. There is considerable sophisticated research on the stratospheric O_3 problem, financed by governments, the CEC and industry. A Co-ordination Committee for the Ozone Layer has been set up within the framework of UNEP and there are negotiations for a global convention on the protection of the ozone layer and on a proposed protocol for cooperation in reducing worldwide CFC emissions.

Scope for Further International Collaboration

1.62. International collaboration should be encouraged on obtaining accurate and comparable national emission data, and on the forecasting of emissions, of gases which give rise to acid deposition, on a national, regional and global basis. Energy usage and fuel mix forecasts up to the year 2000 and beyond could also provide a valuable baseline on which to make decisions on long-term control strategies.

1.63. Coverage by the United Nations Economic Commission for Europe Monitoring and Evaluation of Pollutants in Europe Group (EMEP) should be extended to include data on ozone, hydrocarbons and particulate matter. Work being undertaken by EMEP and in North America on long-range transport and deposition of air pollutants should be extended to give a model covering the Northern Hemisphere, with the object of improving understanding of the source, fate and effects of the large amounts of pollutants unquantified in current models.

1.64. There should be a feasibility and design study for an international dry deposition monitoring network for aggregating dry acid deposition loadings. Such a network would develop a comprehensive picture of dry deposition loadings across the industrialised regions of the world, including deposition velocities for the range of conditions in North America, Japan and Europe. Results could increase confidence in atmospheric models and give better insights into deposition processes.

154 JOB D5266-0527-02 GALL 0001-01 HMSO D1-1 SIZE 48,0
REV:04-11 EXP:04-10 PC SIZ: 48

1.65. Further collaborative research on fundamental processes that control the chemical composition and cycles of the global troposphere should include evaluating biological sources (for example, forests, grasslands and marshes), determining the global distribution of trace gases and airborne particles, investigating the wet and dry removal processes for these substances, and developing large- and small-scale models as well as instrumentation.

1.66. There is an urgent need for further international collaboration on the effects of atmospheric pollution on agricultural crops and forests. Studies are urgently needed to test the several hypotheses concerning the causes of forest damage by acid deposition (including ozone), either as a primary agent or in conjunction with other natural and anthropogenic factors.

1.67. Research in needed on methods of determining residual buffering capacities of soils and waters on local and meso- (watershed) scales.

1.68. The potential for sediment core (including diatom) analysis as a means of measuring the change of acidity of freshwater lakes with time, and the use of such information to get direct evidence of the impact of anthropogenic acidic emissions, should be explored on an international collaborative basis.

1.69. The uncertainties still surrounding understanding of the effects of air pollutants on materials, building and ancient monuments should be resolved by means of a collaborative international research programme.

1.70. There should be international collaboration on the effects on health and the environment of increased levels of UV-β radiation due to a possible decrease in strataspheric ozone.

1.71. International collaboration is needed on the control of the production and release of chlorofluorocarbons.

TABLE 1

Sulphur Dioxide Emissions from the Economic Summit Countries

Year	*Canada*	*FRG*	*France*	*Italy*	*Japan*	*United Kingdom*	*USA*
			SO_2 Emissions in M Tonnes				
1970	6.4	3.950	2.659			6.09	28.700
1971		3.800	2.966			5.83	
1972	6.3		3.493	3.200		5.64	
1973	7.037	3.928	3.703	3.169		5.80	30.126
1974	5.6	3.750	3.711			5.35	
1975		3.550	3.145			5.13	27.300
1976	5.274		3.605			4.98	26.600
1977			3.208		1.780	4.98	26.400
1978	4.5	3.550	3.385	3.3		5.02	(27.000 (24.800
1979			3.529			5.34	25.300
1980	(4.770 (4.752	3.580	3.262	3.4	1.314	4.67	(25.200 (26.100
1981			2.504			4.23	
1982		3.0	2.378			4.04	
1983						3.72	

Source: Reference (3)

158 JOB D5266-0528-01 GALL 0001-02 HMSO REPORT D1-1 SIZE 48,0
REV:04-11 EXP:04-10 TC SIZ: 48

TABLE 2

Emissions of Nitrogen Oxides from the Economic Summit Countries

Year	*Canada*	*FRG*	*France*	*Italy*	*Japan*	*United Kingdom*	*USA*
			NOx Emissions in M Tonnes				
1970	1.4	2.450					
1971			1.170				
1972	1.5		1.248			1.728	
1973			1.346			1.854	
1974	1.6	2.70	1.312			1.76	
1975			1.256			1.70	19.6
1976	1.6	2.9				1.739	20.9
1977	1.832		1.367		1.677	1.771	21.3
1978	1.8	3.0	1.43	1.27		1.796	21.5
1979			1.481			1.893	21.5
1980	1.8		1.455		1.435	1.785	20.7
1981			1.369			1.714	
1982			1.337			1.666	

Source: Reference (3)

References

(1) Ott, H. and Stangl, H. (1983). Proceedings of the Symposium: Acid Deposition—a Challenge for Europe. Commission of the European Communities, Directorate General for Science, Research and Development.
(2) Ministere de l'Environnement (1984). Livre blanc sur les 'pluies acides': Premiere approche scientifique du probleme en France. Paris.
(3) Data produced by national authorities and either published or supplied to international organisations, mainly the United Nations Economic Commission for Europe, or to the Working Group.
(4) Ministere de l'Environnement (1981, 1982). Recherches francaises dans le domaine de la physico-chimie de l'atmosphere (stratosphere et tropo sphere). 1er et 2eme volumes. Paris.
(5) UK Review Group on Acid Rain (1983). Acid Deposition in the United Kingdom. Warren Spring Laboratory, Stevenage.
(6) Federal Minister of Food, Agriculture and Forestry (1984). 1984 Forestry Damage Survey. Bonn.
(7) Unsworth, M. and Ormrod, D.P. (eds) (1982). *Effects of Gaseous Air Pollutants in Agriculture and Horticulture*. Butterworth Scientific, London.
(8) Prather, M.J., McElroy, M.B. and Wofsy, S.C. (1984). Reductions in ozone at high concentrations of stratospheric halogens. *Nature 312* , 227–231.
(9) Organisation for Economic Co-operation and Development. International Conference on Environment and Economics, 18–21 June 1984, Paris.

164 JOB D5266-0529-01 GALL 0001-00 HMSO_REPORT D1-1 SIZE 48,0
REV:04-10 EXP:04-10 XX SIZ: 48

TECHNICAL REPORT 2

TOXIC AND RADIOACTIVE WASTES

Introduction

2.1. The term 'hazardous waste' includes many types of waste, including those that are toxic, radioactive, explosive or corrosive. The bulk of potentially hazardous wastes arises from a wide variety of industrial processes, and the wastes themselves are correspondingly diverse. A universally acceptable and comprehensive classification has not been established because suitable common parameters are difficult to identify without reference to the circumstances in which the hazard might arise (1).

2.2. The management of hazardous wastes, whether they are toxic, radioactive or otherwise hazardous, involves a common concern to reduce the amounts of hazardous substances in the wastes, and to protect the environment and public health. For example, toxic, radioactive or corrosive chemicals may be leached from the wastes and may contaminate water resources or food chains, or may be released to the atmosphere. However, no single disposal practice would be appropriate for all categories of wastes, or even for all wastes within a particular category.

2.3. This Technical Report is concerned with those wastes which may cause pollution through toxicity or ionizing radiation. Despite the many similarities of principle in managing wastes in these two categories, most national and international bodies concerned with waste management or public health draw a firm distinction between them. For reasons of practicality, the two categories are therefore considered separately here.

Toxic Wastes

2.4. The particular properties of toxic wastes that are of concern are toxicity, corrosiveness, flammability and explosiveness. The list of potentially hazardous wastes is extensive and includes:

Acids and alkalis
Asbestos
Biocides, including pesticides
Highly reactive chemicals
Heavy metal compounds (including contaminated mine wastes)
Inorganic compounds containing halogens and sulphur
Organic compounds containing oxygen, nitrogen and sulphur
Organic halogen compounds (excluding inert polymeric materials)
Polycyclic aromatic hydrocarbons
Tarry materials and residues from industrial processes.

2.5. With appropriate management and treatment, some toxic wastes can be transformed into relatively harmless materials. Others contain immutable hazardous components and their nature cannot be changed. Their management must then ensure that the concentration in the environment, the mass-flow through food chains, and the potential accessibility are minimal and at levels which are harmful neither to public health nor to the environment.

165 JOB D5266-0530-01 GALL 0001-00 HMSO D1-1 SIZE 48,0
REV:04-10 EXP:04-10 XX SIZ: 48

2.6. Uncontrolled releases from toxic wastes on a large enough scale may be such that natural processes are unable adequately to disperse and dilute toxic constituents: water resources may be rendered unpotable or unable to support life, and land may be rendered unusable for agriculture, domestic or industrial development.

2.7. If significant contamination does occur, the potential hazard is related to the properties of the waste, the routes of transport and exposure to the receiving organisms or community, the transformations along the route, the sensitivity of the receiving organisms or community, and the persistence of contaminants in the environment. Health effects on man are as various as the wastes, and range from an increased incidence of minor disorders to increased mortality and long-term effects. Few chemicals cause characteristic diseases at low levels of contamination; more commonly the effects cannot be distinguished from similar effects of other causes.

2.8. The environment itself can be affected in complex ways. Many toxic substances occur naturally at low concentrations (and in certain soils in elevated concentrations), and all species are able to tolerate a certain level of some contaminants. However, the presence in the environment of toxic substances above certain concentrations can result in various changes, ranging from alterations in species composition of a plant community to morbidity or death of plants and animals. For example, vegetation on toxic waste tips may be absent or impoverished. The reproductive systems of some animal species are impaired by toxic pollutants such as polychlorinated biphenyls and cadmium, particularly if there is bioaccummulation and if mass-flow is more important than dilution. Such effects may not be apparent immediately.

The Quantities of Toxic Waste Produced

2.9. The total quantities of wastes, contaminated with toxic substances, which are produced are large. For example, in the United Kingdom alone, some 200 million tonnes per year of contaminated aqueous material are discharged to sewers and surface waters, and out of about 50 million tonnes of solid industrial waste, about 5 million tonnes have the potential for causing damage to the environment. Mainly because of differences in definition used, estimates of the annual *per capita* production in industrialised countries of toxic wastes which have the potential directly to damage human health range widely—from 15kg to 600kg. For example, the United Kingdom produces about 1.5 million tonnes per year (30kg per person).

2.10. The trend in arisings of toxic wastes is related to the level and nature of industrial activity. The increase in arisings can however be expected to fall below a *pro rata* increase with industrial activity because of the development and exploitation of improved processes which avoid the significant cost of waste disposal, and because new high-technology industries and service industries generally give rise to smaller quantities of wastes, although these may be more complex.

Storage and Disposal Options

2.11. Wastes that arise in a large volume, such as most mining spoil, must be disposed of as they arise. It would not be practical to store such wastes for any length of time with the intention of subsequent transport and disposal.

2.12. Many toxic wastes are susceptible to treatment which changes the nature of the waste, or separates the bulk of the harmless component. Treatment options include incineration to destroy organic compounds, chemical and electrochemical oxidation of cyanides, reduction of chromium compounds, precipitation of metals from solution, neutralisation of acids and alkalis, and incorporation of toxic materials in stable solid matrices. Volume reduction is possible for some toxic wastes, and in some circumstances this can facilitate storage and disposal.

2.13. Such treatment of wastes may not only reduce the hazards of toxicity, but provide economic and environmental benefits through the potential for recycling and the recovery of valuable components. An example is the recovery of valuable metals from the growing volumes of wastes from electronic components. Hazardous components of domestic and trade wastes, such as glass and motor oils, may also be recycled.

2.14. In some circumstances storage can play an important interim role in the management of toxic wastes, allowing a sufficient accumulation for the industrial viability of metal recovery, treatment or recycling. Such processes may be preferable to immediate disposal. In a few cases interim storage may be a necessity until suitable disposal facilities are available. When wastes are stored, surveillance and monitoring are necessary.

2.15. Disposal options are distinguished by the likely duration of waste isolation that they can provide. Controlled release to the environment involves no isolation, and relies on dispersion to reduce concentrations of pollutants to acceptable levels. This must be very carefully done and rigorously monitored. A full understanding of the local conditions of the receiving environment is essential, or there will be the risk that dangerous levels of toxic substances may build up over a period of time.

2.16. Disposal near the surface in landfills can isolate some wastes until they degrade. For other wastes, not susceptible to degradation by natural processes, it can only be assumed to provide isolation from the environment for a few years, after which leaching by groundwater or disruption by excavation may occur. Large volumes can nevertheless be accommodated. The degree and duration of environmental protection achieved by this disposal option depends critically on the local geological and hydrological conditions which should be understood with respect to the type of waste to be disposed, before a site is selected and used.

2.17. Near-surface disposal, but with an engineered structure or liner to contribute to containment of the wastes, can give isolation for a hundred years or more, provided controls ensure the site is not disturbed and provided that there is rigorous monitoring of leachate during and after the operational phase. Large volumes can be accommodated by this option which is adopted for many toxic and mine wastes.

2.18. Disposal into deep oceans by sea dumping of waste relies on dispersion in a very large volume of water and sometimes takes advantage of slow release. The inaccessibility of the ocean bed provides some isolation from man's

167 JOB D5266-0532-01 GALL 0001-00 HMSO D1-1 SIZE 48,0
REV:04-10 EXP:04-10 XX SIZ: 48

environment. However, monitoring is extremely difficult and a better understanding is required of ocean processes and dynamics before the possibility of long-term damage to the marine environment can be discounted.

2.19. Whatever disposal action is adopted, there is a need for careful management and control. Incidents of localised environmental pollution are more frequently associated with poor control of procedures than with inherent shortcomings in the disposal option or failures of engineered facilities. Any method which detoxifies the waste prior to disposal is preferable, as the long-term effects of environmentally unsound disposal cannot yet be calculated.

International Collaboration in Research and Development

2.20. The United Nations Environment Programme (UNEP) takes the lead amongst United Nations organisations for matters related to toxic waste storage and disposal. A limited budget is available for research, but the programme is more concerned with reviewing, synthesising and transmitting information from existing national research activities with a view to developing meaningful initiatives. The World Health Organisation (WHO) has commissioned some research on toxic waste disposal in the context of water supply studies.

2.21. The Organisation for Economic Co-operation and Development's (OECD) Environment Directorate has commissioned research on the management of wastes from the petro-chemical industry and on methods of incineration and treatment of wastes. Initiatives have been made concerning the usage and disposal of some toxic wastes in the OECD countries, notably for mercury and polychlorinated biphenyls.

2.22. Exchange of information has taken place in the context of the North Atlantic Treaty Organisation's Committee on the Challenges of Modern Society ((NATO-CCMS). A major study has been finished on hazardous wastes and a pilot study on the problems of contaminated land had recently been completed.

2.23. The Commission of the European Communities (CEC) commissions research on a wide range of topics. Principal areas of interest are the clearing-up of abandoned disposal sites, monitoring and optimisation of disposal facilities and the detoxification and solidification of wastes. This programme of research is now leading up to a fourth phase, although many of the results of earlier research are yet to be published and assessed (2).

2.24. The Man and the Biosphere programme (MAB) of the United Nations Educational Scientific and Cultural Organisation (UNESCO), together with the International Institute for Applied Systems Analysis (IIASA), have completed the first phase of a joint study of environmental perception and social values, based on case studies of hazardous (toxic and radioactive) waste management.

2.25. The Scientific Committee on Problems of the Environment (SCOPE) of the International Council of Scientific Unions (ICSU) since 1975 has been

undertaking an integrated international project on biogeochemical cycles, which has examined the effect that industrial activities and biological processes modified by man (as in agriculture) have had on the movement and accumulation of chemicals in the environment. Changes in major cycles of carbon, nitrogen, phosphorus and sulpher are important to the containment and dispersal of toxic substances (3).

The Current State of Scientific Knowledge

2.26. Although the technology for safe storage of toxic wastes is well advanced, storage, other than for accummulation of economic loads for transport or treatment, is not practised to any significant extent.

2.27. Because of the length of time for which some wastes will remain hazardous, the long-term safety of disposal cannot be directly demonstrated. However, the ability to design, construct and operate disposal facilities near the surface of the ground is well established. Facilities for disposal in deeper geological formations have been designed, though few are in use. Procedures which incorporate environmental protection measures for the sea dumping of industrial wastes have also been developed, and for some there is about a decade of operational experience in their use, although there is little information on their environmental effect. For mine wastes, methods of short-term management are technically and economically established.

2.28. Safety requirements for the disposal of toxic wastes have been developed over the last decade. These embody the principle that best practicable means should be used to protect health and the environment. Evidence from past and present activities indicates that disposal systems presently used are safe when properly managed. The long-term impacts of non-degradable toxic materials at low levels of environmental contamination are far from fully understood and are the subject of continuing research.

2.29. Understanding the link between the levels of contamination in the environment and the impact on public health involves modelling the transfers of toxic substances through food chains and the assessment of other pathways by which pollutants could be inhaled or ingested. There are many gaps in our knowledge here, and assumptions have to be made about the biological effects of low levels of contamination.

2.30. Understanding of environmental effects of low levels of contamination rests on extrapolation from data on high levels at which effects are immediate and readily apparent. Acute and short-term effects are generally well understood. Possible chronic effects of low levels of contamination are less well understood, particularly for the so-called man-made toxic substances. For naturally occurring elemental toxic substances, such as mercury and cadmium, some evidence can be drawn from nature, although epidemiological studies are often inconclusive.

2.31. The areas where scientific progress is most needed are in understanding and modelling the potential transport of pollutants in groundwater and the marine environment, and in assessing potential impacts of contamination.

176 JOB D5266-0534-01 GALL 0001-00 HMSO D1-1 SIZE 48,0
REV:04-10 EXP:04-10 XX SIZ: 48

Although the technology for waste disposal is generally well developed, there are many areas where better technology is needed, for example the complete destruction of complex organic waste into non-toxic compounds. Recycling and waste-reduction technologies are often specific to individual industries, and need to be further studied. More need to be known of emissions from waste incinerators.

2.32. There is a need to understand better the dynamics of ocean and sea-bed processes, especially the non-steady-state processes, to assess ocean disposal options for hazardous wastes. In particular, there is a need to compare different models of ocean mixing and circulation and the natural turnover of materials. As more sophisticated models are developed, it will be important to compare results with those of previous models and to validate results against observations.

2.33. The degradation and dissipation mechanisms by which toxic substances reach the environment from disposal sites need to be better understood. There is scope for better site-specific data on geochemistry, hydrogeology and waste degradation. More information is needed on the relationship between an apparently satisfactory short-term and local impact and long-term consequences of some activities over wide areas, both on land and in the marine environment. Dispersal and bioaccumulation in food chains and long-term effects of very low levels of contamination need further study.

The Scope for Further International Collaboration

2.34. The main need is to strengthen, and make more effective, the existing international organisations and programmes. Much of the information on toxic wastes has not yet been properly assessed and reviewed, and priority should be given to support for international programmes concerned with the review and assessment of research results.

2.35. Changes in industrial activities and in the levels of non-degradable toxic substances in household wastes (such as heavy metals in batteries and 'stable' plastics) will have consequences for waste disposal practices. International collaboration on this subject is needed to anticipate situations for which remedial action could be difficult.

2.36. Research is needed on remedial action for decontaminating toxic waste sites without disturbing the materials to be treated. Such *in situ* treatment methods have the advantage that the hazardous materials do not have to be moved and handled, processes which are often associated with high cost and risks to man and the environment. Examples of where such an approach would be desirable include disused coal gas manufacturing plants and sites with quantities of asbestos.

2.37. Options for the reduction in the volume, toxicity and hazards of wastes, and for recycling and the recovery of valuable constituents, should be further investigated as a means of protecting man and the environment from the problems of very large volumes of toxic wastes, and of realising economic benefits from materials already produced.

2.38. Comparative or cooperative studies should be made of the methods of determining the costs and benefits of various types of waste disposal, and of ensuring that the costs of waste and its management are properly assessed and paid for by those parts of industry or society that benefit from the processes which lead to the production of the waste. Such studies and assessment should include the development of cost-effective practices for site enhancement and environmental improvement.

2.39. Social studies of the public acceptability of technically viable and safe disposal options will be necessary complement to scientific research. These should assess the public perception and media presentation of apparent problem areas. Public acceptability will be vital to the continued assurance of disposal routes for some wastes. A study should be made of ways to mitigate public concern about the effect on the environment and public health from waste disposal activities. In this connection, collaboration should be maintained with the Man and the Biosphere Project 13 'Perception of Environmental Quality'.

2.40. International collaboration could ensure that the best use is made of the few opportunities that might arise for validation of models of groundwater movement and migration of pollutants, including natural analogues to disposal site behaviour. The objectives of validation exercises should be reviewed and recommendations made about the possibility of, and mechanism for, setting-up internationally funded or co-ordinated research.

2.41. Collaborative research on biological monitoring is needed to provide risk assessment data for environmental health policies and decisions. The direct measurement of chemicals in biological tissues and fluids provides actual measurements of relatonships between body burden and response that cannot be obtained in other ways.

2.42. Further attention should be given to the field of trans-media analysis of risk from toxic waste substances. Risk-based trans-media strategies offer an opportunity for pollution control agencies to provide the maximum protection from environmental risks, taken across all routes of exposure, for any given level of expenditure.

Radioactive Wastes

2.43. Radioactive wastes are readily defined and classified in terms of their radioactive emissions and half-life, and chemical and physical properties. There are differences in handling needed for wastes of high and low activity.

2.44. Radioactive wastes arise from the use of radioisotopes in hospitals and research laboratories, the use of radioactive materials in industrial processes and the defence industry, and the generation of electricity by nuclear power. The nuclear fuel cycle generates the largest quantity: from mining, nuclear reactors and fuel reprocessing. The mining of uranium results in accumulations of very large volumes of mine wastes and mill tailings—a sand-like material containing naturally-occurring, long-lived elements of low radioactivity (radium, thorium and unextracted uranium). The operator of nuclear reactors

gives rise to wastes contaminated with radioactivity: materials used to remove radioactivity from cooling circuits, storage areas and ventilation systems. Reprocessing of fuel allows recovery of most of the usable radioactive energy, and over 99% of the residual radioactivity in spent fuel to be concentrated in a small volume of high-level waste, but also gives rise to other wastes containing lower levels of contamination. Spent fuel, if not reprocessed, must itself be considered as waste.

2.45. Decommissioning nuclear installations will also give rise to substantial volumes of material with a wide range of radioactive contamination, varying from the barely detectable on much of the dismantled structures to high levels on some components of the reactor containment structures and machinery.

2.46. The principal concern with radioactive waste is that exposure to increased levels of radioactivity in the environment could increase the incidence of cancers in the population. However, the types of health effect associated with low levels of radiation exposure cannot be distinguished from those which arise from other causes. Exposure to ionizing radiation may also cause a lowered resistance to diseases other than cancers. The overall effect on a population can only be investigated by a statistical analysis of the incidence of cancer and of infectious disease over time.

2.47. Radiation of natural origin pervades the environment and, for most people (and other organisms), natural radiation is the greater source of exposure. Levels of natural radiation are extremely variable and depend on factors such as altitude and local geology. All species, therefore, are able to tolerate a certain level of radiation. The sensitivity of species to radiation appears to increase with their complexity and man may be one of the most radiation-sensitive species. Therefore, measures taken to protect human health are considered generally to provide adequate protection for other species.

The Quantities of Radioactive Waste Produced

2.48. The quality of radioactive waste associated with the nuclear fuel cycle is small in comparison with the quantity of potentially hazardous waste from other industrial activities. The rate of generation is almost directly proportional to the amount of electrical power generated and to the quantity of spent fuel reprocessed. Variations exist between ore bodies and reactor types, but the generation of 1 GW(e) for one year generally gives rise to 0.1-0.5 million tonnes of mine wastes with a low concentration of radioactive minerals, about 0.1 million tonnes of uranium mill tailings, about one thousand tonnes of other low-level radioactive waste, about one hundred tonnes of intermediate-level waste requiring radiation shielding, and 30 tonnes of spent fuel or 10 tonnes of high-level waste for which heat generation is also a consideration.

2.49. In 1983 there were 243 operable nuclear reactors in the OECD area with a total installed generating capacity of 160 GW(e) contributing about one sixth of all electrical power. By 2000, the installed capacity is projected to rise to 392 GW(e) (4). The annual rate of spent fuel arising will then rise to about 10,000 tonnes. The cumulative stock of spent fuel will be about 157,000 tonnes by 2000. Other lower-level wastes will be produced in proportion.

Storage and Disposal Options

2.50. Storage of radioactive wastes can provide a supervised period during which radioactive decay can reduce the potential hazard of radionuclides with short half-lives and rate of heat generation facilitating eventual disposal. However, this involves continuing radiation exposures to operational staff.

2.51. The same considerations that apply to the disposal of toxic wastes apply to the disposal of radioactive wastes. Uranium mine wastes, mill tailings and most low-level radioactive wastes arise in large volumes and need to be disposed of as they arise. Near-surface disposal, with engineered containment, is suitable for some low-and intermediate-level radioactive wastes.

2.52. Disposal into continental geological formation can provide a very long period of isolation when groundwater movement is very slow. However, there is growing concern about the dangers of pollution of groundwaters (Technical Report 4) and there is often very little knowledge of the rate of groundwater movement or of its susceptibility to disturbance. The duration of isolation will depend on a number of barriers to the transport of leached elements, and could be many thousands of years depending on the site and depth. The volume of waste that could be accommodated is limited by economic constraints so this option may only be appropriate for some long-lived wastes. Control of the overlying surface would not normally be necessary because of the low risk of intrusion.

2.53. Disposal into continental geological formations may be appropriate for high-level and long-lived radioactive wastes. Another option, which is at an early stage of investigation, is the disposal of high-level radioactive wastes into geological formations under the deep ocean floor. It would involve similar considerations to disposal in continental geological formations, with the additional factor that sedimentation and geological processes might naturally enhance the entombment and, when containment is breached, dispersion in the ocean might provide further protection for man.

2.54. Other disposal options such as disposal into the sun or transmutation of long-lived radionuclides into non-ionizing species have been considered and are the subject of on-going research. They are not likely to be practicable options for many decades.

International Collaboration in Research and Development

2.55. The International Atomic Energy Agency (IAEA) has taken the lead amongst the United Nations organisations for matters related to radioactive waste management. The IAEA has a continuing programme on safety and regulation of radioactive waste disposal. The preparation of advice and regulations is supported by co-ordinated research programmes which promote collaboration between research institutes. Recent examples have concerned the behaviour of long-lived radionuclides released from deep ocean dumping activities, and modelling the distribution of radionuclides in shelf seas. The IAEA is also mandated by the contracting parties to the London Dumping Convention (5) to define what radioactive waste should not be dumped at sea, and to make recommendations on the basis for issuing special permits for

165 JOB D5266-0538-01 GALL 0001-01 HMSO D1-1 SIZE 48,0
REV:04-11 EXP:04-10 TC SIZ: 48

dumping other radioactive materials. This work is supported by nationally funded research on the behaviour of radioactivity in the oceans. UNEP is consulted in IAEA activities and has recently taken an interest in radioactivity in the South Pacific, including consideration of the possible sea disposal of radioactive waste in that area. The OECD Nuclear Energy Agency (NEA) also has a role in this field.

2.56. The United Nations' Scientific Committee on the Effects of Atomic Radiation (UNSCEAR) undertakes a continuing review of scientific information on health effects of radiation. Particular emphasis is placed on the properties and effects of the radiation. Particular emphasis is placed on the properties and effects of the radionuclides involved in, or generated by, the nuclear fuel cycle including radioactive waste management. The last comprehensive report was published in 1982.

2.57. The WHO is regularly consulted in IAEA activities and an independent review of the management of high-level radioactive waste was published in 1982. No research is currently sponsored or co-ordinated.

2.58. The NEA has sponsored numerous reviews of technical and scientific developments in the field of radioactive waste management and some policy reviews, notably on radiation protection objectives. In addition there are a number of activities sponsored by the NEA that involve arrangements for co-ordination of national research programmes.

2.59. The NEA and IAEA have jointly sponsored international symposia and reviews of the management of wastes from uranium mining and the milling and processing of uranium minerals, with the objective of developing economically practical and environmentally acceptable technologies and codes of practice (6).

2.60. The International Stripa project involves jointly funded experimental research in a disused mine in Sweden on the disposal of high-level radioactive waste in granite. Nine countries participate.

2.61. The Seabed Working Group (SWG) coordinates national research into the feasibility and safety of disposal of high-level waste into the deep ocean floor. Nine countries and the CEC are involved.

2.62. The International Sorption Information Retrieval System (ISIRS) involves compilation, comparison and review of information pertinent to the movement of radioactivity in groundwaters. Twelve countries participate.

2.63. The Co-ordinated Research and Environmental Surveillance Programme (CRESP) is concerned with research and monitoring related to sea dumping of radioactive waste in the North Atlantic. It operates in four main areas of research: modelling, physical oceanography and geochemistry, biology, and radiological surveillance (7). Eight countries participate. The scientific results are fed into the five yearly review of the site suitability in the framework of the OECD consultation and surveillance mechanism for sea dumping. A review is currently underway.

162 JOB D5266-0539-01 GALL 0001-01 HMSO D1-1 SIZE 48,0
REV:04-11 EXP:04-10 PC SIZ: 48

2.64. The CEC conducts a research and development programme in almost all disciplines of radioactive waste management. These programmes are undertaken in the laboratories of the Joint Research Centre at Ispra and Karlsruhe, as well as by numerous specialised organisations and laboratories in Member States. The main subjects of research are waste storage and disposal, waste treatment and conditioning, and testing and characterisation of conditioned waste forms. Important underground experimental facilities are sponsored by the CEC programme, for example in the Federal Republic of Germany and in Belgium. Recently, two major coordinated programmes have been established: PAGIS (the assessment of safety and performance of geological isolation systems for the final storage of high-level waste in salt, clay and granite formations on land and in sediments of the deep ocean) and MIRAGE (the migration of radionuclides in the geosphere surrounding potential waste repositories).

2.65. Research also takes place in the context of international treaties and *ad hoc* bilateral and multilateral co-operation agreements. A review of the environmental impact of sea dumping of radioactive waste is being sponsored by the contracting parties to the London Dumping Convention (5), and is carried out by experts appointed by the IAEA and ICSU. The contracting parties to the Paris Convention on marine pollution from land-based sources are revising arangements to keep radioactivity releases in effluents under review, in collaboration with the NEA.

2.66. A large number of contacts, mainly at scientific levels, have been established under multi-lateral co-operation agreements. Most are concerned with exchanges of information, but some involve co-ordination of research. INTRACOIN and HYDROCOIN are computer modelling exercises, organised by the Swedish Nuclear Power Inspectorate. They compare the results of computer model predictions of radionuclide migration in groundwaters and of predictions of groundwater flows. The NEA is involved with the HYDROCOIN exercise. The United Kingdom, Japan and Australia are jointly funding research on SYNROC, a possible future matrix for immobilisation of high-level wastes.

The Current State of Scientific Knowledge

2.67. The technology for safe storage of radioactive wastes is well established. Considerable quantities of spent fuel are stored at nuclear installations and projected total storage capacities in all OECD countries more than match projected arisings, although logistic problems may occur at some installations. One technology for storage of vitrified high-level waste is being tested on a pilot industrial scale in France.

2.68. It has been suggested that the 'demonstration' of safe disposal of radioactive wastes should involve two steps (8). The first is to show that disposal facilities can be built, operated and closed safety and at acceptable cost; this may involve designing and building one or more experimental facilities. The second involves indirect demonstration of long-term safety consisting of an evaluation of the disposal systems' performance on the basis of predictive analyses confirmed by a body of technical and scientific data. Within this

framework, research on the records of the natural isolation capability displayed by geological formations in the course of millions of years may represent the best tool in evaluating the reliability of the geological media as a permanent and long-lasting barrier against radionuclide migration.

2.69. For the first step, the current understanding for radioactive waste disposal has been recently summarised (9). There appears to be adequate knowledge and the ability to design, construct and operate facilities for disposal of waste near the surface. Geological disposal systems have been designed although none yet exists for radioactive wastes and there are very few for toxic wastes. Existing technology is adequate for safe excavation of shafts, cavities and vaults in many potentially suitable geological media, and for emplacement of wastes. Operating procedures which incorporate environmental protection measures for the sea dumping of industrial and solid radioactive wastes have been proposed and used. For mine wastes, including uranium mill tailings, methods of short-term management are technically proven and the costs are known. The environment can be protected while institutional control is maintained.

2.70. A generally agreed basis for an indirect demonstration of the long term safety of radioactive waste disposal now exists. Suitable predictive risk-assessment methodologies exist. The computer modelling techniques are still evolving, but the basic procedures have been demonstrated. However, these predictive methods still depend upon assumptions regarding hydrogeological pathways and the behaviour of materials over time; and they must be followed up and checked by environmental testing and monitoring. Consistent and practical radiation protection objectives exist (10), and conceptual studies have assessed the degree of confidence with which these objectives can be met using existing treatment technologies and appropriate disposal options.

2.71. Uncertainties remain in prediction of future radiological impacts. Some will always exist, for instance in predicting future land use and populations, but there is scope for improvement in the site-specific geochemical, hydrogeological and waste degradation data that are the basis of predictions. Further validation of computer models against large-scale, or extended duration, experiments is desirable.

2.72. As with toxic wastes, the areas where scientific understanding is most needed are in understanding and modelling the potential transport of pollutants in groundwater and the marine environment, and in assessing potential impacts of contamination. For individual land disposal sites, it is essential to understand the local groundwater flow system. Techniques must be further refined for monitoring and predicting movements in the areas with very low groundwater flows typical of potential disposal sites. Modelling predictions can be very uncertain and there is a need to validate results against actual observations at specific sites, each of which will have distinctive geological and hydrological characteristics. Access to sites selected for investigation is essential.

2.73. Similarly, the modelling of pollutant movements within groundwaters will need to be validated against observations. There is an abundance of

laboratory data in some areas, much of it not critically reviewed, but limited data from environmental studies. large-scale, long-term experimental validation exercises or studies of natural analogs to disposal sites may both be necessary.

2.74. Thee are now extensive data on transfer factors in the main food chains for the most important radionuclides in radioactive waste. For example, the IAEA has produced a comprehensive review of concentration factors of radionuclides in fish, shellfish and seaweeds. Concentrations of radioactivity in most foods can now be estimated to within a factor of five for these radionuclides. Greater uncertainties are associated with transfers within the human body and with calculations of doses to particular organs. Estimates of the biological effects of low levels of radiation are based on extrapolation from effects observed at much higher radiation doses. This extrapolation relies on the results of basic research in radiobiology. There is very little information on the effects of low doses of radiation received at low dose rates. A linear relationship between radiation levels and the risk to health is normally assumed and represents a cautious assumption. nevertheless, research is continuing and the situation is periodically assessed by UNSCEAR and the International Commission on Radiological Protection (ICRP).

2.75. In the context of sea dumping relatively small quantities of low-level radioactive waste, a suite of mathematical models has been developed in the CKESP programme from which representative predictions can be made of the radiological impact on both man and the marine environment of dumping low-level waste. These include a model estimating the release from various packages, benthic boundary layer and ocean dispersion models estimating the physical transport of radionuclides throughout the ocean; geochemical models simulating sedimentation processes and the scavenging of radionuclides by particulate materials; and biological and dosimetry models looking at potential pathways to man and the effects on the marine biota in the vicinity of the dump site.

2.76. A great deal has already been learnt, particularly of the long-term average horizontal transport processes in the ocean, but a number of gaps in knowledge remain (7). In particular, we know little of the variations in transport, and it may be that transport is much less steady than had earlier been assumed. Safety assessments of the low-level dump site incorporate a safety factor to cover the degrees of uncertainty by making pessimistic assumptions about the values of parameters used in the models. More research is needed to refine these estimates and the associated modelling suite. For example, better estimates are needed for medium space and time scale mixing processes, vertical advection and diffusion in the ocean, the importance of chemical specification of radionuclides, and how this affects uptake into the ecosystem, scavenging, sedimentation and re-entrainment processes and deep ocean food webs.

2.77. While the understanding from scientific research will allow the acceptability of particular disposal sites to be judged, there is not yet a sound basis for optimising the number and location of storage and disposal sites for radioactive wastes. Information would be useful on the transport implications,

197 JOB D5266-0542-01 GALL 0001-00 HMSO D1-1 SIZE 48,0
REV:04-10 EXP:04-10 XX SIZ: 48

the relative environmental impacts and the costs and benefits of regional or centralised disposal strategies. The advantages and disadvantages of using the same disposal facilities for radioactive and toxic wastes has not yet been studied in detail.

2.78. It will also be necessary to validate and substantiate models of radionuclide uptake. There are few data available on the levels of uptake of radioactivity in members of the general public, particularly in children. A number of studies have drawn attention to this deficiency and recommended research to develop methods of measuring the amount of radioactivity taken up by the human body as a result of exposures to environmental contamination as well as routine monitoring of populations near nuclear installations. Particular attention needs to be given to gut transfer factors for actinides, and effects of prolonged exposures to persistent but low levels of environmental contamination.

2.79. The uncertainty about uptake of radiactivity that a number of potential pathways be assessed. Concentrations of radioactivity along hypothetical food chains originating in the deep ocean are pertinent to assessments of ocean disposal options for radioactive waste and more information is still needed in this area.

Scope for Further International Collaboration

2.80. The main need is to strengthen, and make more effective, the existing international organisations and programmes. The general recommendations made on the scope for further international collaboration is research and development on toxic wastes also apply to radioactive wastes. In particular, there is a need for further studies on public acceptance of risk and of confidence in control and disposal schemes. There are, in addition, a number of points specific to radioactive wastes.

2.81. Encouragement should be given to the international groups concerned with asessments of ocean disposal options for radioactive wastes to increase the research on biocumulation effects in food chains originating in the deep ocean, and to organise comparisons of ocean mixing and circulation models. Validation of these should be encouraged.

2.82. Encouragement should be given to national authorities to increase the amount of data on levels of radioactivity in populations which may have been exposed to unusual levels or forms of radioactivity in the environment. This data could then be reviewed, with particular attention being given to transfer factors for actinides and other long-lived radionuclides.

2.83. An existing international scientific organisation should be asked to review available information to assess the merits of a policy of optimising the number of storage and disposal sites for radioactive wastes from the points of view of cost, environmental impact and logistical considerations. This review could be combined or co-ordinated with on-going studies by the Commission of the European Communities and a similar initiative under discussion at the Nuclear Energy Agency.

198 JOB D5266-0543-01 GALL 0001-00 HMSO D1-1 SIZE 48,0
REV:04-10 EXP:04-10 XX SIZ: 48

References

(1) Yakowitz, H. (1984). Harmonisation of specific descriptors of special wastes subject to national controls for 11 OECD countries. Seminar on the legal and institutional aspects of transfrontier movements of hazardous wastes. Organisation for Economic Co-operation and Development, Paris.

(2) Sheils, A. K. (1983). Developing trends in the management of wastes within the EEC. Developing issues and new legislation in environmental affairs, Brussels.

(3) Bolin, B. and Cook, R. B. (eds) (1983). The major biogeochemical cycles and their interactions. SCOPE Report 21.

(4) Organisation for Economic Co-operation and Development (1984). Nuclear power and fuel cycle data in OECD Member Countries.

(5) Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, London 1972.

(6) International Atomic Energy Agency (1984). The management of wastes from uranium mining and milling. Proceedings of a symposium organised jointly by IAEA and HEA. *STI/PUB/622*.

(7) Nuclear Energy Agency (1984). Co-ordinated Research and Environmental Surveillance Programme related to sea disposal of radioactive waste. Progress report at the end of 1983.

(8) Organisation for Economic Co-operation and Development (1983). Long term management of high-level radioactive waste: the meaning of a demonstration.

(9) Organisation for Economic Co-operation and Development (1984). A technical appraisal of the situation in the field of radioactive waste management by the RWMC (Draft).

(10) Orgainisation for Economic Co-operation and Development (1984). Long-term radiation protection objectives for radioactive waste disposal.

TECHNICAL REPORT 3

MARINE POLLUTION

Introduction

3.1. The marine environment is subjected to inputs of a very wide range of pollutants, including metals and toxic chemicals from industrial processes, oil, nutrients and pesticides from agriculture, radioactive wastes, nutrients and pathogenic micro-organisms from sewage, and solid waste (such as plastic bags and soft drink cans). These pollutants reach the marine environment by many pathways: from rivers, by coastal discharge, from ships and by atmospheric deposition. There is growing concern that marine pollution is resulting in the depletion of resources which are useful to man and in harm to public health. Marine resources are of importance to industry, recreation and amenity, in addition to providing sources of food.

3.2. The marine environment is not uniform in its characteristics, in its vulnerability to environmental abuse or in its pollutant loads. Considering the oceans as a whole obscures the local or regional seriousness of ocean environment problems. Nevertheless, even in the most remote oceans contaminants can be detected which originated many thousands of kilometres away.

3.3. There is particular concern about the effects of pollutants on coastal and estuarine waters and on semi-enclosed regional seas, such as the mediterranean Sea and Hudson Bay. Not only are these areas usually more vulnerable to pollution, but there is uncertainty about the presence and effects of pollutants in, and release from, continental shelf seabed sediments. Furthermore, changes in environmental quaity in some coastal areas, while limited geographically, have a very great social and cultural importance for societies, particularly those in developing countries whose life and traditions are tied to the sea.

3.4. Most chemical elements are present naturally in marine waters. However, in the case of some non-radioactive elements (for example, cadmium, arsenic, lead, mercury and carbon), the fluxes of anthropogenic origin approach or exceed those of natural origin. Some radioelements within the marine environment are man-made (for example plutonium, americium, neptunium and curium). Many elements are distributed widely in the atmosphere, and enter the oceans via the air-sea interface, and some are spread over great distances by oceanic mixing processes, although usually over long time scales. In some cases the atmosphere is the primary source of input. Evidence exists of very widespread occurrence of certain of these substances, for example, radionuclides, lead and persistent halogenated hydrocarbons.

3.5. In recent years, there have been a number of attempts to assess the scale of the problem, the need for control or remedial action and, where damage has occurred, the likelihood of the recovery of the marine environment once action has been taken. A co-ordinated scientific approach to the assessment of the marine pollution problem has been taken by the Inter-Governmental Oceanographic Commission (IOC) (1). The most thorough and wide-ranging

assessment of the state of the oceans is that undertaken recently by the Group of Experts on the Scientific Aspects of Marine Pollution (GESAMP) entitled "The Review of the Health of the Oceans" (2). This identified the needs for future action and concluded that in the open sea no significant effects on the ecosystems have been detected, and that effects of pollution have not so far been detected on a global scale. However, general trends of increasing contamination can be observed in some areas, and these should be regarded as warning signs. These warning signals are noticeable mainly in the marine areas most used by man, ie, coastal and estuarine waters and regional seas; indeed in some areas of West Africa and South East Asia fisheries have either been wiped out or become so contaminated as to render the products unsafe for human consumption. Elsewhere the role of pollution has been implicated in the decline of some marine bird and mammal populations; the number and extent of the areas affected, however, is small. Sewage is highlighted as the most common cause of pollution globally. The Review concluded that the oceans are capable of absorbing limited and controlled quantities of wastes, but that careful control of this resource is essential. Such control, however, is a major undertaking and many be beyond the present capabilities of many countries. The GESAMP Review also emphasised that the effects of pollution need to be carefully monitored and our understanding of the fate and effects of pollutants, including new substances, in the ocean must be improved.

3.6. Similar reviews, albeit less wide-ranging geographically, have been undertaken both before and since the GESAMP activity, for example under the United nations Environment programme (UNEP) Regional Seas Programmes and by the International Council for Exploration of the Sea (ICES) in the North Atlantic and Baltic Sea. A detailed appraisal of the information on the current status of the North Sea has been undertaken in connection with a Conference on the North Sea which was held in November 1984, and a review of the health of the northwest Atlantic has been prepared by the Government of Canada. Reviews of the effectiveness of international regulations, for the protection of the marine environment, have been undertaken for the Law of the Sea Conference (LOSC).

3.7. The general picture to emerge is that the most serious pollution problems affecting the marine environment concern the coastal and estuarine seas, and the largely land-locked waters. Those pollutants which cause the greatest anxiety are of high toxicity, persistence or bio-accumulation. The emphasis of concern is less on the acute short-term effects of pollutants, but on the effects of long-term exposure about which much less is known. All the reviews emphasise that pollution can be detected and should be interpreted as a sign of a situation which will deteriorate if not arrested and brought under control. They also suggest that in many areas it is impossible to state accurately the scale of an area affected or the extent of an effect, or to state what are the actual present effects of the various contaminants of concern.

3.8. The Arctic Ocean presents a distinctive and potentially serious problem of marine pollution. It receives residual pollutants from industrialised North America and Europe through transport by the Gulf Stream and North Atlantic Drift, and by long-range air transport from Europe and Western Asia. At the same time its waters are highly stratified, with much less internal mixing than in

168 JOB D5266-0546-01 GALL 0001-01 HMSO D1-1 SIZE 48,0
REV:04-11 EXP:04-10 PC SIZ: 48

other oceans, and the persistent ice cover and low temperatures reduce photosynthesis and biological or chemical breakdown or interaction of contaminants (3). Petroleum resource development on Arctic continental shelves adds further to the potential problem. The prospect of accumulated pollution in the Arctic as a result of industrial activities in distant regions is already causing concern among those dependent upon its limited biological resources.

3.9. The need to investigate the effects of contamination of the marine environment is well recognised, and steps have been taken, both nationally and internationally, to establish a better understanding of the sources, effects and fate of contaminants. There has been a series of comprehensive research programmes, over the last 30 years, in the more developed parts of the world, to investigate the distribution and uptake of radionuclides within the water, ecosystems and sediments, and to predict their long-term fate. Steps are now being taken in the developing areas, particularly under the UNEP Regional Seas Action Plans, to investigate the more immediate problem areas (4). Work is also under way in UNEP to develop general principles for the control of marine pollution from land-based sources.

Research Collaboration

3.10. There are a number of international programmes on radioactive contamination of the marine environment, which are carried out under the auspices of several international organisations. These are not considered further here, but in Technical Report 2.

3.11. ICES has been active in the Baltic (5) and the North Seas (6) and in the North Atlantic (7). It has two working groups charged specifically with the investigation of the levels, sources and effects of pollution in the Baltic Sea and North Atlantic, and a number of specialist working groups which look at particular aspects of marine pollution, for example the effects on marine mammals, the association between pollution and fish diseases, and the use of marine sediments in pollution monitoring studies. Following two earlier and major baseline studies in 1972 and 1975/76, ICES will undertake a major survey in 1985 to establish the current levels of contamination by metals, petroleum hydrocarbons and certain chlorinated organics in fish and shellfish in the Baltic Sea, North Sea and North Atlantic, and of the levels of metals in coastal and offshore waters of countries bordering these seas. This survey will bring up-to-date the information previously available on fish and shellfish and provide for the first time a comprehensive picture of trace metals in sea water. Participants from the 17 member states will take part in a series of calibration exercises to ensure that the analytical data from each country are comparable.

3.12. The results of these investigations so far suggest that, with the exception of some coastal areas, there have been no serious problems caused directly by pollution. There is evidence that the numbers of seals in the Baltic have declined, but although pollution may be a factor, hunting and general disturbance by man is probably more important. The association of pollution and fish diseases is still uncertain, but it is clear that the relationship is complex, and that diseases occur in significant numbers of fish in areas which are not

171 JOB D5266-0547-01 GALL 0001-01 HMSO D1-1 SIZE 48,0
REV:04-11 EXP:04-10 TC SIZ: 48

seriously contaminated. Similarly, it is apparent that there is no simple link between nutrient addition and/or presence of excessive or unusual plankton blooms. Methods of assessing trends in contaminant levels have been improved, and it is now apparent that levels of DDT and PCB are declining in the Baltic and probably also in the North Sea. However, in other areas, such as the western Arctic Ocean and the Mediterranean Sea, there is no sign of a decline. Levels of mercury are declining in all the areas which previously suffered serious contamination. This shows that recovery, even from the effects of highly persistent subsistent substances, may take place in response to remedial action or to change in industrial practice. Studies are being promoted of the effects of contaminants at other than the lethal level. These should lead to a better understanding of effects, and to controls which can be applied on the basis of more confidently derived standards.

3.13. ICES undertakes a consdierable amount of applied research in support of regulatory actions or to investigate the need for such action. A joint monitoring programme is undertaken with the emphasis on coastal waters and estuaries. At present this is directed only at mercury, cadmium and PCBs, but may be extended shortly to other substances. A major contribution by the Oslo and Paris Commissions is the collection of data on inputs of contaminants via dumping and direct discharges. As the quality of these and other data improves, it should be possible to assess, not only the sources and direct effects of the inputs, but also their fate and less direct effects. The need to consider inputs via the atmosphere has also been noted, and steps are underway to supplement existing data. Similar activities are underway in the Mediterranean, under the auspices of the Barcelona Convention and other Regional Seas organisations of UNEP. In the case of atmospheric inputs advice and assistance has been sought from GESAMP; a pilot study is underway for cadmium.

3.14. The Commission of the European Communities (CEC) promotes marine research through the Third Environment R & D Programme (1981-85). Within this programme the CEC has part-funded research on marine environmental quality, including the fate and effects of pollutants, on clean-up techniques for hydrocarbon pollution, and on biogeochemical cycles. In addition, the CEC co-ordinates nationally funded research on benthic coastal ecology (COST 47). These studies aim to establish the natural variability in species numbers and composition for selected coastal habitats as a 'baseline' against which man-induced changes (pollution effects) can be judged. Research is also co-ordinated through the CEC on the analysis and behaviour of organic micropollutants in the aquatic environment, though the emphasis is on fresh rather than marine waters. The research programme is complemented by work at the CEC's own Joint Research Centre (ISPRA) aimed at developing remote sensing techniques for the detection of marine pollution.

3.15. On a wider gographic scale the MAPMOPP Pilot Project on Marine Pollution (Petroleum) Monitoring Programme of the World Meteorological Organisation (WMO)/IOC has produced information on the incidence of marine pollution by petroleum, particularly visible surface slicks, for much of the world's sea areas. Undertaken initially to test the efficiency of the IGOSS (International Global Ocean Station System) data gathering system for marine

172 JOB D5266-0548-01 GALL 0001-01 HMSO D1-1 SIZE 48,0
REV:04-11 EXP:04-10 TC SIZ: 48

pollution data, it has proved particularly successful, and a reasonably comprehensive and accurate picture of a petroleum pollution of surface waters has emerged. The results (8) show the surface slicks are much more likely to be encountered in particular areas (essentially those along or downwind of the major shipping lanes).

3.16. A Marine Pollution Monitoring Programme (MARPLMON) under IOC's GIPME (Global Investigation of Pollution of the Marine Environment), includes petroleum, organochlorine compounds and metals. The monitoring component of the programme is barely operational; however, considerable progress has been made on the development and testing of methods of sampling, preservation and analysis via the GEMSI (Group of Experts on Methods, Standards and Intercalibration) sub-group of GIPME. Another sub-group of GIPME, responsible for examining biological effects with a view of developing standards (GEEP-Group of Experts on the Effects of Pollution), is at present being set up.

Potential for Further International Collaboration

3.17. A considerable amount of work on marine pollution and its control continues to be done, and a number of topics are being pursued with varying degrees of activity and success. The technical co-ordination of international collaboration is satisfactory; what is needed is continued government support for the existing international organisations. Those fields of research which are least understood at present deserve the greatest measure of support and are discussed below. In the majority of these areas substantial co-ordination already exists within the International Council for the Exploration of the Sea or the Working Committee of the Global Investigation of Pollution in the Marine Environment. Continuous review and evaluation is also undertaken on behalf of the United Nations Environment Programme, the Group of Experts of Scientific Aspects of Marine Pollution and other United Nations organisations.

3.18. There should be international co-operation in identifying the threatened areas of the marine environment, specific attention being paid to the problems of semi-enclosed seas and shallow waters. Identification is needed of the centres of alleged hazard from pollution, and research on the vulnerability of these areas particularly to eutrophication.

3.19. A research priority is the assessment of the distribution, fate and scale of pollutant inputs to the marine environment. International collaboration is needed in determining the amounts and changes over time of contaminants delivered to world oceans and regional seas by various pathways (rivers, atmosphere, land, ships), through development of internationally agreed or compatible monitoring techniques (see also Technical Report 1).

3.20. Increased coordinated attention should be given to obtaining data on the long-range transport of pollutants within the ocean system, and to the processes of interaction or change on route or in residence, in order to identify areas, such as within the Arctic Ocean, where persistent pollutants may accumulate, and to assess the seriousness of the potential problem.

177 JOB D5266-0549-02 GALL 0001-01 HMSO D1-1 SIZE 48,0
REV:04-11 EXP:04-10 TC SIZ: 48

3.21. Remote sensing techniques have a major potential for ocean monitoring and management, for example detecting oil slicks and plankton blooms. Continued research and testing of these techniques would be greatly facilitated by international collaboration, including field studies in various ocean environments coordinated with the remote-sensed imagery to provide 'ground truth'.

3.22. Studies of the long-term impact of sub-lethal effects of contaminants, and of possible synergistic effects, on marine biota are needed, including an examination of how data from these experiments can be used to predict effects on the natural ecosystems and provide information on the assimilative capacity of marine waters.

3.23. Further studies of vertical and medium-scale horizontal physical transport processes are needed, together with a better understanding of sedimentary processes and deep ocean food webs.

3.24. A better understanding of the ecology of faecal viruses in sea water and shellfish is essential to allow proper protection of man through his consumption of shellfish and exposure to sea water during bathing and other water sports.

3.25. The provision and centralisation of standard reference materials for analytical measurements of metals and petroleum hydrocarbons in seawater, biota and sediments is a priority and would be advantageous if at an international level.

3.26. There should be coordination of national and international data gathering and monitoring programmes, and dissemination of information on marine environmental quality in forms that are useable by resource and environmental managers. The World Oceanographic Data Centres should receive continued support and should include environmental quality data and information about contaminants on a systematic basis.

3.27. There is a need for the better international exchange of data on the marine environments by marine research stations throughout the world.

References

(1) United Nations Educational Scientific and Cultural Organisation (1976). A Comprehensive Plan for the Global Investigation of Pollution in the Marine Environment and Baseline Study Guidelines. Inter-Governmental Oceanographic Commission, Technical Series No 14.

(2) Group of Experts on the Scientific Aspects of Marine Pollution (1982). The Review of the Health of the Oceans. GESAMP Reports and Studies No 15.

(3) Rey, L. (ed)(1982). The Arctic Ocean: the Hydrographic Environment and the Fate of Pollutants. Comite Arctique International.

181 JOB D5266-0550-01 GALL 0001-03 HMSO D1-1 SIZE 48,0

REV:04-11 EXP:04-10 AT SIZ: 48

- (4) United Nations Environment Programme (1982). Achievements and planning development of UNEP's Regional Seas Programme and comparable programme sponsored by other bodies. UNEP Regional Seas Reports and Studies No 1.

- (5) International Council for the Exploration of the Sea (1974). Report of Working Group for the International Study of the Pollution of the North Sea and its Effects on Living Resources and their Exploitation. ICES Co-operative Research Report No 39.

- (6) International Council for the Exploration of the Sea (1977). Studies of the pollution of the Baltic Sea by the ICES Working Group on the Study of the Pollution of the Baltic. ICES Co-operative Research Report No 63.

- (7) International Council for the Exploration of the Sea (1977). A baseline study of the level of contaminating substances in living resources of the North Atlantic. ICES Co-operative Research Report No 69.

- (8) Levy, E. M., Ekrhardt, M., Kohnke, D., Sobtchenko, E., Suenoki, J. and Tokuhiro, A. (1981). Global Oil Pollution, Results of MAPMOPP, the IGOSS Pilot Project on Marine Pollution (Petroleum) Monitoring. Inter-Govermental Oceanic Commission.

3 JOB D5266-0551-01 GALL 0001-00 HMSO D1-1 SIZE 48,0
REV:04-10 EXP:04-10 XX SIZ: 48

TECHNICAL REPORT 4

POLLUTION OF SOILS AND WATERS

Introduction

4.1. The pollution of soils and natural waters is a matter of growing concern not only in industrialised but also in developing nations. Chemicals introduced into the agricultural environment, or into the general environment by agricultural practices, may have adverse effects on human health, principally through food or water, or on the natural environment, for example by affecting the long-term productivity of soils and waters.

4.2. The main classes of chemicals which are hazardous in this way are fertilisers, pesticides and metals. Fertilisers and pesticides are deliberately applied to vegetation, soil and water, and have an enormously beneficial effect to secure human and animal nutrition. The use of other pesticides has also brought very great benefits of public health. Nevertheless, these chemicals can cause harm when they are present in the environment in excess quantities or under adverse conditions. Other chemicals, particularly metals, are produced as a result of industrial and other processes and may find their way to the agricultural or natural environments by a variety of pathways. As with pesticides, the hazard which they can present is often related to their high toxicity or accumulation within the soil or biota. Pollution of soils and waters by salination is considered in Technical Report 5.

4.3. Although there are hazards from the pathways of some of these chemicals to man though the air, such as following careless spraying of pesticides, the greatest concern is about the contamination of the inter-related media of soils and natural waters. These chemicals can reach the soil by a variety of pathways, including aeriel deposition, agricultural practices, decomposition of organic matter, leaching of wastes and sedimentation from waters. They can enter water either by direct means (as in spraying pesticides, some of which are specifically used for water) or by leaching from soil which acts as a reservoir for, for example, metals, nitrate or persistent pesticides. Water can transport pollutants through the environment and also permit direct ingestion by man, so the contamination of water can have more immediate or farther reaching effects than the contamination of soil. Most developed countries have extensive programmes of monitoring water which is used for human supplies.

4.4. To determine whether contaminants in soils and waters are at concentrations approaching those which are hazardous to the environment, it is necessary to monitor the concentrations in, and effects on, biota and to establish environmental quality criteria. Effects on man must be assessed by less direct means which are more difficult and provide less scientific certainty.

4.5. Trans-frontier problems may be minimal in countries such as the United Kingdom and Japan, but they can be appreciable in North America, continental Europe and elsewhere where countries share common watersheds. However, there are also indirect trans-frontier problems due to international trade in agrochemicals and waste chemicals. For these reasons the issue is one which merits international attention.

176 JOB D5266-0552-05 HMSO D1-1 SIZE 48,0
REV:04-11 EXP:04-10 PC SIZ: 48

State of Scientific Knowledge

Fertilisers

4.6. Adequate mineral nutrients, particularly potassium, phosphate and nitrogen, are essential if agricultural land is to yield an optimal crop. Potassium and phosphate are normally absorbed to particles in the topsoil and create no direct environmental problems, although excess potassium in herbage induces magnesium deficiency which can affect lactating cows and ewes, and phosphate in run-off from soil, and from other sources, can be a major cause of eutrophication. However, there are certain conditions under which there may be problems associated with the use of phosphates. The solubility of phosphates is pH-dependent, and it is possible that acid precipitation may increase the release of phosphates from soil and consequently the loading in receiving waters. Extremely heavy fertilization may overburden the soil's adsorptive capacity, again resulting in heavy phosphate runoff. Heavy phosphate loadings have been shown to be detrimental to the overall health of aquatic ecosystems. An additional hazard is that most phosphate fertilisers contain cadmium, and this can give rise to the possibility of a slow build-up of cadmium in the soil.

4.7. Nitrogen is an essential plant nutrient, and is required in relatively large amounts. Unless sufficient is available, plants may become stunted and yields lower than optimal. Nitrogen is unique in its immediate and obvious effect on harvests. The main reserve of nitrogen in the soil is in the form of organic matter accumulated from plant and animal remains, both fresh and old, and from applied nitrogen fertiliser whether organic or inorganic. Well-managed soils contain up to 100 times the total nitrogen needed for one year's optimal cropping. When organic matter is broken down by soil bacteria some nitrate is released, but the amounts are usually insufficient for optimal growth of crops and therefore extra nitrogen must be applied as fertiliser.

4.8. Fertilisers usually supply nitrogen in the form of nitrate or ammonia and it is the fate and effects of nitrate about which there is concern. Studies of the effects of fertilisers on the content of nitrate in vegetables suggest that changing fertiliser input has a relatively small effect on the nitrate content of the harvested crop, and that the source of nitrogen—organic or inorganic—is irrelevant.

4.9. Concentrations of nitrates in water have been increasing in many developed countries along with the intensification of agriculture and a greater use of synthetic nitrogen fertilisers (1). Other factors, such as the rate of draw-off from aquifers and the release of sewage effluent, may contribute in particular circumstances.

4.10. Nitrate in water can cause methaemoglobinaemia (blue baby syndrome) in young infants and, for this reason, the World Health Organization (WHO) has established two levels of nitrate above which use for infant feeding should be monitored or stopped (2). At these levels other factors such as intercurrent disease or poor nutrition also contribute to the incidence of methaemoglobinaemia. It has been shown, in animals, that nitrate can be transformed to nitrosamines in the stomach and that some nitrosamines are powerful carcinogens. More recent epidemiological studies of human cancer have cast

doubt on any simple relationship between nitrate in water and the occurrence of cancer. However, there are severe inherent limitations in each of the methods at present available for detecting whether substances are harmful to humans:
in direct measurement of disease rates in populations (epidemiology), in extrapolation from experiments on animals (toxicology), and in *in vitro* systems (for example, mutagenicity). The difficulty in determining which substances contribute to the burden of disease in the general population lies more in the present state of development of basic knowledge in medical science than in failures in the conduct of applied research.

4.11. Although immediate risks are not apparent of methaemoglobinaemia or of cancer at levels of nitrate in water currently experienced in developed countries, concentrations in domestic water supplies, in certain areas and particularly in times of low rainfall, may approach the WHO limits. Furthermore, there is considerable concern about the movement of nitrate through the soil and lower levels into groundwater where it may accumulate (3). Where groundwater is used as a major source of potable water, it is important that nitrate concentrations in water should be controlled at levels below which any serious effects become apparent.

4.12. In connection with agricultural practice as a source of nitrate, past work has often assumed that much of the nitrogen fertiliser not accounted for by content of crops or incorporation in the soil reservoir is leached out in water. Recent work (4) has shown that about one sixth of the applied nitrogen can be released as gaseous nitrogen, whereas little more than a twentieth is leached into water. These studies were with a barley crop on light soil, and extension of these studies to a wider selection of soils and crops is needed.

4.13. More important are further studies of the movement of nitrate through the unsaturated zone to improve the understanding of changes in nitrate concentration in groundwater aquifers (1). Present evidence suggests that changing agricultural practice could affect aquifer nitrate levels only on a timescale of decades. Such changes would not make a rapid reduction of nitrate levels in potable water, but could be an effective method of preventing an irreversible accumulation over a period of time. In the shorter term, consideration may sometimes need to be given to other approaches such as nitrate removal or blending of different water supplies.

4.14. Eutrophication of waters is a serious problem in some areas, such as Japan, Canada and Scandinavia. Phosphates, nitrates, organic chemicals and metals are involved in the complex processes. In some curcumstances nitrogen may be a critical factor, and in Japan there is under consideration a regulation to control nitrogen, as well as phosphorus, discharges into lakes. In other circumstances nitrogen concentration does not appear to be critical and fixation by certain algae can occur. Despite uncertainties about which particular fertilisers are primarily responsible in individual cases, it is apparent that agricultural run-off is a major cause of eutrophication. In some cases phosphates from synthetic detergents are also a major cause. Experience in North America has shown that cooperative action by two countries to improve industrial and agricultural management of phosphate can have a significant effect in arresting the progressive eutrophication of a major body of water such as Lake Erie.

8 JOB D5266-0554-02 HMSO D1-1 SIZE 48,0
REV:04-10 EXP:04-10 KB SIZ: 48

Pesticides

4.15. Pesticides are synthetic or natural chemical products for the control of vertebrate pests, micro-organisms and weeds. They are widely used in agriculture, particularly for the protection of plant crops. Less attention is given here to pesticides than to fertilisers because of the generally greater attention which the former have already received. Pesticides fall into a number of different classes which show different properties and behaviour in the environment. Research into new pesticides and their mode of action is intense, and is mainly funded by commercial firms. Considerable effort is put into improving the efficiency of pesticide use; this will reduce the amount released into the environment, but not necessarily the associated hazards as smaller quantities of a more toxic chemical can have greater side effects than a large quantity of less toxic material.

4.16. The effects of pesticides within the soil environment are related to their persistence, toxicity and the range of organisms which they affect. It is notable that the newer pesticides tend to be less persistent and that many of the most persistent compounds are being phased out. However, some pesticides still remain in the soil for several years, and persistence in the soil has been shown often to be longer than laboratory studies have predicted. Althought narrow-spectrum pesticides are likely to have fewer adverse effects in the environment, there is little economic encentive for private industry to develop them.

4.17. Pesticides can have a variety of effects on communities of soil organisms. Chemicals affect different soil organisms in different ways. The stucture of the communities changes partly because of the differential toxicity of the pesticides and partly through indirect effects, for example the increase of dead plant material following application of herbicide. Some pesticides have been shown to change the structure of soil communities temporarily, while others change it on a long-term basis. Some soil micro-organisms can react by increasing the breakdown of pesticides which are applied repeatedly, thus leading to the need for higher rates of application. The long-term implications for soil fertility of pesticide usage are not well understood.

4.18. There is a potential long-term effect of pesticide residues which are bound to the soil. The extent to which adsorption prevents environmental damage, or degradation, is not always clear. It is possible that these residues are chemically changed by interaction with the soil and become more persistent. Environmental conditions also exist which can cause desorption and subsequent degradation of the residues. It is therefore necessary both to monitor the effects on the environment of the substances and to disentangle the physical and chemical reactions which they might undergo.

Metals

4.19. The main pathways of metals to soils and waters are from leaching of wastes and aerial deposition. In addition, cadmium is a common contaminant of phosphate fertilisers and of sewage sludge.

4.20. The potentially toxic metals of concern are zinc, copper, nickel, lead, cadmium and (of lesser importance) molybdenum, and mercury (5). Arsenic

179 JOB D5266-0555-02 HMSO D1-1 SIZE 48,0
REV:04-11 EXP:04-10 TC SIZ: 48

and fluorine, while not metals, display similar characteristics in the natural environment and are also considered here. Zinc, copper and nickel are classed as phytotoxic elements, that is they affect plant growth, whereas the remainder are zootoxic, that is they may affect human or animal health via food crops or by direct ingestion of soil. The key problem is the ingestion by animals of plants which have accumulated quantities of the metals into their edible portions. The United States Environmental Protection Agency, for example, regulates the spreading and cadmium content of sewage sludge on the basis of the degree of cadmium uptake form the soil by spinach. Toxic effects on grazing livestock are due mainly to the ingestion of metal rich soils; the eating of soil by young children is the most obvious immediate risk to human beings.

4.21. Plants need a low concentration of some elements, for example copper and molybdenum, but excessive concentrations are phytotoxic; the situation is complicated both for plants and for animals by interactions between metals, for example, zinc, molybdenum, manganese and copper.

4.22. The extent to which toxic elements are taken up by plants or leached into water systems depends on a number of factors, such as the original source, the acidity and the organic content of the soil. For example, whereas the 'total' soil concentrations of lead, zinc, flourine and arsenic in areas contaminated by mine spoil can be very high, their availability to plants is frequently lower. Much work is being done worldwide on the forms of elements in the soil (speciation) and their availability to plants. On reaching groundwaters, metals (and organic chemicals) may affect porosity and reduce the capacity of the aquifers.

Internation Collaboration

4.23. There is extensive international research collaboration on nitrates and human health, including work on gastric and othe cancers and nitrates and nitrosamines, and of the meaurement of *in vivo* production of nitrosamines and their levels in body fluids. The Commission of the European Communities (CEC), WHO, the United Nations Economic Commission for Europe (UNECE), the Organization for Economic Co-operation and Development (OECD), the Council of Europe, and the North Atlantic Treaty Organization Committe on Challenges to Modern Society (NATO-CCMS) are all involved in, or exchange information on, nitrates research, in either the planning of the research or in the assessment of the results.

4.24. The Food and Agriculture Organization (FAO) European Co-operative Network on Farm Wastes provides a valuable means of exchanging information and ideas on the effective use of farm manures, on problems of overloading soils with manure, and on odour.

4.25. A manual on field testing and control of eutrophication of slow-moving surface waters, based on experience and research in several countries, is being prepared by the Man and the Biosphere Programme (MAB) of the United Nations Educational Scientific and Cultural Organisation (UNESCO), under its study theme of the Effects on the Environment of Industrialisation and Intensification of Agriculture.

13 JOB D5266-0556-01 HMSO D1-1 SIZE 48,0
REV:04-10 EXP:04-10 KB SIZ: 48

4.26. Concern about the impact of pesticides on the aquatic environment has engendered considerable international activity, both at government level and in industry. An important activity has been the formulation of detailed information requirements on the chemical, physical and biological properties of new pesticides so that a valid initial hazard assessment can be made. This has been co-ordinated by the FAO (for example, the Second Government Consultation on International Harmonisation of Pesticide Registration Requirements, 1982). Further international activity is being undertaken by the FAO European Co-operative Network on Pesticides, with Special Reference to their Impact on the Environment, Sub Network on the Effects of Pesticides in Water. The European Inland Fisheries Advisory Commission (also an FAO body) is reviewing the scientific methodology employed in Europe in assessing the hazards to aquatic life from the use of pesticides. These initiatives are aimed at improving the control of pesticides and some research programmes may emerge which require international co-operation. There has been general interest in promoting integrated pest management through demonstrations and training of farmers and operators, in order to reduce the use of pesticides. MAB has been a focus for much of this work, particularly in developing countries (6).

4.27. A report in preparation for OECD (7) has reviewed the effects of pesticides in the freshwater environment and has identified the need for research on: (a) metabolism, degradation, synergism and effects of pesticides in soil and water systems; (b) dynamics of movement of pesticides from soil to water; (c) continued monitoring of water to establish trends in pesticide residues; (d) identification of any pesticides which other studies suggest should be more closely monitored; and (e) monitoring any indication of environment effects of recently cleared pesticides. Agreed, reliable methodologies are essential, and the FAO study mentioned above will be crucial.

4.28. Much research is being undertaken worldwide on the speciation of metals in soils and their availability to plants. For example, the COST 68 action, initiated by the CEC, is concerned mainly with the use of sewage sludge in agriculture. The CEC is also studying means of reducing the input of cadmium to soils from phosphate fertilisers.

4.29. The concentration of metals in waters has attracted a great deal of effort both nationally (8) and internationally (9). The European Inland Fisheries Advisory Commission of FAO, and Canada and the United States of America through the International Joint Commission, have produced critical reviews of the literature on the effects on aquatic biota of those metals which have been shown to cause harm to such biota, including zinc, copper, cadmium, chromium, nickel and aluminium. Water quality standards proposed by the FAO Commission are used by the CEC and hence in many European countries, and are compatible with national standards produced by other countries.

Scope for Further International Collaboration

4.30. In view of the international dimension of the problems, international collaboration should be directed at harmonising methods to ensure that data on the different national situations are comparable, at facilitating the exchange of

15 JOB D5266-0557-02 HMSO D1-1 SIZE 48,0
REV:04-10 EXP:04-10 KB SIZ: 48

information, and at developing agreed environmental objectives and mechanisms for the resolution of issues.

4.31. International collaboration on the effects on human health of nitrates should be strengthened, but there is scope for rationalisation of the current international activities. There is need for greater exchange of information on nitrate content in relation to differences in crop type, farming practices and geology, involving services such as those of the Commonwealth Agricultural Bureaux.

4.32. Continued international collaboration is needed in determining the substances responsible for eutrophication, their sources, and procedures for reducing inputs into threatened water systems.

4.33. A high priority for international collaboration is further research on the movement of nitrates, and other pollutants, to groundwater aquifers, and on technologies for protecting groundwater from pollution. Improved instrumentation is needed for detecting and monitoring pollution in groundwater.

4.34. Continued research is needed on the effects of different levels of fertiliser application on various crops, comparing short-term gains in productivity with possible long-term reductions in soil fertility.

4.35. There is a major need for international evaluation of existing data on pesticides to clarify effects on non-target organisms, including migratory wildlife, and to define conditions which would require additional tests to be made by the industry. Continued research is needed to develop new pesticides which have a lower toxicity to non-target organisms, and to develop further integrated forms of pest management.

4.36. Monitoring systems should be used more widely to give early warning of any significant increase in pesticide in human fats, and for research on the dynamics and persistence of polychlorinated biphenyls in the environment from old disposal sites.

4.37. Research on the bioavailability and interaction of different metals and other contaminants in aquatic ecosystems should be pursued within the framework of an international programme.

4.38. Exchange of information, and harmonisation of analytical methods, is important for metals in soils, water, sediments and biota.

4.39. International cooperation to develop more effective and agreed technologies for monitoring and reporting changes in soil and water quality should be encouraged.

References

(1) Department of the Environment and National Water Council (1984). Standing Technical Committee Report No 37. DOE, London.

185 JOB D5266-0558-02 HMSO D1-1 SIZE 48,0
REV:04-11 EXP:04-10 PC SIZ: 48

(2) World Health Organisation (1984). Guidelines for Drinking Water Quality, Vol I. WHO, Geneva.

(3) Royal Society (1983). The Nitrogen Cycle of the United Kingdom. Royal Society, London.

(4) Dowdell, R. J., Webster, C. P., Hill, D. and Merser, E. R. (1984). *J Soil Science 35,* 169; and *35,* 183.

(5) Department of the Environment and National Water Council (1981). Standing Technical Committee Report No 20: Report of the Sub-Committee on the Disposal of Sewage Sludge to Land. DOE, London.

(6) Man and the Biosphere Programme (1974, 1982). Ecological assessment of pest management and fertiliser use on terrestrial and aquatic ecosystems. Reports No15 (Fertilisers) and 24 (Pesticides).

(7) Organisation for Economic Co-operation and Development (1983). Pesticides: Problems Posed by their Residues in the Freshwater Environment. ENV/WAT/82.1(3rd Rev).

(8) Royal Commission on Environmental Pollution (1979). Lead in the Environment. Ninth Report. HMSO, London; and Pollution Paper No 19: Government Response to the Ninth Report.

(9) International Council for the Exploration of the Sea. Co-operative Research Report No 77: Input of Pollutants to the Oslo Commission Area.

61 JOB D5266-0559-03 HMSO D1-1 SIZE 48,0
REV:04-11 EXP:04-10 RW SIZ: 48

TECHNICAL REPORT 5

APPROPRIATE LAND HUSBANDRY

Introduction

5.1. The advance in agriculture and, in particular, food production has been one of the major success stories of the present century. on a global basis it has outpaced population growth, but there have been continuing failures to utilise and distribute food to the benefit of all nations. Nevertheless, despite the real achievements in agriculture, many parts of the earth suffer from poor land management and insufficient regard for the husbandry of renewable resources.

5.2. Failures of appropriate husbandry of natural resources have resulted in dereliction of land resources on a scale which has never previously affected mankind. The demand for renewable resources of food, fibre and fuel cannot be fulfilled in some parts of the world. Economic pressures have resulted in shifts in land use to produce products for exports to the detriment of sustaining local requirements. Techniques apposite to developed countries, mostly in temperate regions, have proved on many occasions to be inappropriate or directly damaging when applied in tropical regions. Gains have often been offset by the disadvantages when insufficient note of social and economic factors has been taken by the governments of the countries where these problems occur and sometimes also by the governments of countries providing aid.

5.3. The consequences of this combination of factors are desertification, aridification, deforestation, landslides and other earth movements, soil erosion and loss of fertility, with the associated human traumas. These changes threaten to reduce the effectiveness of, or in some places overwhelm, the gains in productivity that have been achieved in the recent past.

5.4. There is widespread recognition of the problems and a vast input of words, money and effort has been applied by many national and international organisations in attempts to find solutions. Comprehensive studies in many parts of the world have been undertaken by the Man and the Biosphere Programme (MAB) of the United Nations Educational Scientific and Cultural Organisation (UNESCO), the United Nations Environment Programme (UNEP) and the Food and Agriculture Organisation (FAO). A world review by UNEP, the International Union for the Conservation of Nature and Natural Resources (IUCN) and the World Wildlife Fund (WWF) identified inappropriate land husbandry as a prime problem in maintaining planetary and regional productivity and, through the World Conservation Strategy (WCS), made proposals for national and international action that have been endorsed in principle by the governments of more than thirty countries. Recently these problems were considered by the Global Possible Conference (1) where they were translated into a positive Agenda for Action in which the initiatives in science and technology are integrated into a wider plan of social and economic action.

5.5. These problems are not only the concern of developing countries or of tropical regions. At a recent Workshop of the Organisation for Economic

63 JOB D5266-0600-01 HMSO D1-1 SIZE 48,0
REV:04-11 EXP:04-11 RW SIZ: 48

Co-operation and Development (OECD) (2), several reasons were given why developed countries should concern themselves with such problems. First, there are many serious cases of inappropriate land husbandry in developed countries and in all environmental zones. Many developed countries have regional development schemes that encourage more intensive use of lands of marginal productivity, and this can lead, unless great care is taken, to subsidised poor husbandry. Secondly, aid from, and trade with, developed countries is influential in both creating and helping to solve such problems in developing countries. Finally, developed countries can provide both experience and skills to assist developing countries overcome problems of land husbandry.

Characteristics of the Problem

Deforestation

5.6. The area of closed forest in the world is currently about 2,500m ha covering 20% of the land surface. The forest area in Europe, North America and the developed countries of the Pacific (1,500m ha) is changing little through concerted policies of afforestation and re-afforestation. However, reforestation schemes are most common on poor land, and the former best forests are not being replaced. In contrast the remaining 50% of the world's forest in the developing countries of latin America, Africa, Asia and the Pacific is being reduced by about 4–20m ha per year. Estimates vary considerably but the recent comprehensive FAO/UNEP assessment project indicates losses at the lower end of the range (3). Realistically, of the 1,100m ha of moist forests of the tropics, 10–20% will be permanently destroyed or severely modified by the turn of the century, with similar losses in the less well defined open dry forests.

5.7. Deforestation is primarily through expansion of agriculture to meet increasing food demands, including extension of shifting cultivation to marginal lands. Demand for selected species of wood for export and to meet increasing industrial needs may result in further losses through selective or clear felling which are not compensated for by planting or natural regeneration. These changes in forest area and composition represent losses of timber for world markets and national income, loss of essential fuelwood for rural and urban populations, and severe soil erosion, flooding and loss of fertility in some areas. In addition potentially valuable genetic stocks are lost.

5.8. There is a good general understanding of the main causes and effects of deforestation. However, the biological and architectural diversity of many tropical forests is complex, and there is a need for improved knowledge of the ecological processes within forest ecosystems to ensure efficient management of the remaining forest and its expansion. Following selective or clear felling, or burning, the rate and type of natural regeneration vary with local climate, soil conditions, vegetation cover, seed sources and subsequent management. Thus the resultant composition of the forest and its value to man are variable and, because of limited knowledge and experience, can rarely be predicted with assurance. The alternative of plantation forestry is being rapidly developed using a variety of indigenous and exotic species and genotypes, but experience is limited. In both natural and plantation forestry the largely

unresolved challenge to science and technology is to select management systems which can sustain productivity and, in the case of natural regeneration, can control the composition of the forest. The requirement is to optimise growth rates and cropping regimes to the nutrient, water and biological dynamics of the forest, whilst retaining the soil fertility and structure.

Loss of Agricultural Land

5.9. Agricultural land is being lost continuously to industry, urbanisation, construction of roads, reservoirs etc, and by soil degradation. There are about 4,000m ha of arid and semi-arid lands of the world which are, or are likely to be, affected by soil degradation in one form of another, resulting in the partial or complete loss of biological production (4, 5). Degradation can be attributed to soil erosion by wind and water, to waterlogging, to the accumulation of salts and to decreased fertility because of the loss of nutrients and organic matter. The annual loss of productive land has been estimated as 3m ha by erosion, 2m ha by desertification and 2m ha by toxification. These problems are widespread. For example, large areas of the Sudan, Ethiopia, Somalia, Senegal, Brazil, Iran, Pakistan, Afghanistan and the Middle East have been lost to effective agriculture in the last decade.

5.10. Whilst many problems of erosion are undoubtedly related to climate, a basic contributory cause is reduction in vegetation cover which exposes the soil surface, reduces soil organic matter and leads to substantially increased run-off. Primary causes include over-grazing, conversion of range to arable cultivation on sensitive marginal land and removal of vegetation for fuel. Apart from the immediate loss of previously useful land through extension of deserts, the same processes are reducing the long-term production capacity of semi-arid areas.

5.11. Desertification and erosion represent terminal processes which can be reached through a network of pathways, varying in both environmental and management characteristics. For example, one major set of pathways is associated with overgrazing. Although social and economic factors control stock numbers, it is the succession of vegetation resulting from changes in grazing which is central to the understanding of desertification. The physiological, phenological and rooting characteristics of the vegetation determine its ability to withstand normal and exceptional climate conditions, maintain ground cover and control moisture. These characteristics are dependent on the species composition of the vegetation and are strongly influenced by the type and intensity of grazing and by soil conditions. Thus it is the quantitative variations in the complex dynamics of plant-herbivore-environment interactions which determine the susceptibility to, and control of, desertification and which require improved understanding. Other pathways to desertification are initiated by arable cultivation or fuel gathering, but again the environmental conditions determine the rate and type of change in soil stability.

5.12. The problems of soil toxicity are also widespread and are related, at least partly, to attempts to improve productivity through water management. Thus 0.5m ha of recently reclaimed land in Egypt are showing effects of increased salinity and waterlogging, adding to an existing 0.8m ha of traditionally farmed

land already affected. Similar problems affect half the irrigated soils of the Euphrates Valley in Syria and much of the 13m ha of irrigated land in Pakistan.

5.13. In approximately 35% of tropical soils, plant growth is inhibited by some form of naturally occurring chemical toxicity, mainly from excess aluminium. Important advances in dealing with high-aluminium soils are being made in the Amazon basin. Toxicity results from a number of processes acting singly or in concert, in particular high element concentrations in soil water associated with certain parent minerals, upward movement of solutes, and concentration in surface horizons through high rates of evapotranspiration. Through artificial irrigation the hydrochemical processes are altered and under certain soil conditions toxicity may develop, in some cases through inefficient management of the irrigation system. Effects may be localised but, particularly where drainage is impeded or irrigation excessive, run-off can affect adjacent surface or groundwater systems. Additional side effects can include raising of the water table and associated waterlogging, solute movement and oxygen depletion detrimental to crop growth.

5.14. The sequence of events and interactions in the surface hydrochemistry are difficult to predict in relation to particular soil/water conditions. An additional complication is the incomplete knowledge of aquifer dynamics. Much of the water used by man today may have been within the aquifer for 20,000 years or more. Aquifers are recharged by slow drainage from the surface, combined with slow movement below ground laterally and between aquifers. The dynamics of groundwater recharge in response to varying degrees of withdrawal are particularly difficult to predict. Even with good hydrological and geological information there is uncertainty about water movement from adjacent aquifers and about changes in recharge from the surface following alterations in land use.

Land Use Interactions

5.15. Part of the failure in land husbandry results from inadequate understanding of the interactions between land uses, and of appreciation of the need for land use planning to optimise the use of land resources to meet demand. Land husbandry problems such as deforestation and desertification are too often perceived and tackled in isolation from other land uses. One fundamental interaction between uses is through hydrology. The type and intensity of land use, whether arable cultivation, irrigation, range management or forestry, influence evapotranspiration, throughfall and soil water dynamics with consequent, and often far-reaching, effects on other land uses through the amount, timing and quality of run-off and drainage.

5.16. A different type of interaction occurs when changes in one use result in changed demands on the other land. This is seen where intensification of agriculture on the more productive land types has resulted in increased fuel wood and grazing demand on more marginal land and in further pressure for deforestation. Another example is where provision, by non-integrated development projects, of water by well-digging or of fuel by afforestation attracts more people and finally hastens land degradation. Multiple land use options, such as agroforestry, have the capacity to improve supply of the

73 JOB D5266-0663-01 HMSO D1-1 SIZE 48,0
REV:04-11 EXP:04-11 RW SIZ: 48

material needs of local populations and can be manipulated to minimise some of the environmental hazards of more intensive management for single uses.

5.17. The effects of inappropriate land husbandry can have effects at a considerable distance or after a considerable time. For example, poor husbandry practices in stream headwaters in Nepal can eventually have serious effects downstream in Bangladesh. There is therefore a need for co-operation to ensure that long-term management economy is not destroyed by actions which are taken in ignorance of, or without due concern for, the effects on distant areas or the future.

5.18. Thus, in addition to the introduction of appropriate agricultural policies to provide incentives to farmers, there is a need to: (a) improve understanding of the quantitative interactions between uses, (b) develop options for multiple land use, and (c) develop methods and information to assist in planning the optimum distribution of land between uses, based on criteria of land potential, environmental sensitivity and demand for products.

General Factors

5.19. Pressure on the land increases as demand levels and actual populations expand. Long established, previously successful systems of land husbandry fail when the restorative capacity of the system can no longer make good the effects of increasing land pressure. New systems seek to resolve the various problems by technical means but fail if their design takes inadequate account of the environmental characteristics, the resource base or the socio-economic context.

5.20. The technical challenge is to achieve integrated management of the soil, water and biological resources appropriate to the local human situation. Failures have occurred where intensification of management has not fully recognised the interactions between component resources and the feedback effects. Short-term gains have turned into long-term losses. The variety of soil and water conditions in relatively extreme environments demands sensitive use of the existing wide variety of crop species and genotypes, in both forestry and agriculture. These principles are well known. They are fully expounded in, for example, the WCS (6), the World Soil Charter (7), the Plan of Action to Combat Desertification (PACD) (8) and the Global Possible (1). Many of the successes, although they have required sophisticated development, have been characterised by their small scale and simple application, for it is at this scale that local conditions, both environmental and social, can best be taken into account.

5.21. Sound land husbandry, in a broad sense, implies that different kinds of land are used in the most appropriate way to meet the requirements of the population. Suitable production methods as well as objectives need to be chosen. National or regional land use planning is essential. Soil mapping and land evaluation, extensively developed by FAO and others, provide critical bases for such planning and for exchanging experience (9, 10). Techniques suited to many physical environments are already well tested but their successful application remains dependent on their integration into the socio-economic

75 JOB D5266-0664-01 HMSO D1-1 SIZE 48,0
REV:04-11 EXP:04-11 RW SIZ: 48

context which itself is dynamically changing. Many failures in land husbandry have resulted from the introduction of methods inappropriate to local social practices or economic patterns. Improvement in land husbandry often requires greater co-operation in research from different disciplines, close contact with local conditions, and education programmes. There has also been failure by governments to carry out proper land use and agricultural pricing policies. The resulting disincentives for farmers and foresters thwart the best infusion of outside technical assistance and technology.

5.22. Assessments of the 'human carrying capacity' of land at different levels of technical input serve to underline the hazards associated with population growth and may offer a means of warning government where land husbandry failures are imminent and remedial measures urgently required. FAO is engaged in a global study of this nature and investigations with a similar objective but at village level have been undertaken, for example, in Tanzania by the Land Resources Development Centre of the United Kingdom (11, 12).

5.23. In many countries the need to survive economically forces land users to carry out practices for short-term cash profit which they are aware will damage future productivity, but they have no option. Financial and marketing systems, and government development programmes, encourage short-term maximisation of productivity, and the user who practises good long-term husbandry is penalised. Because this applies mainly to the economically developed and major food-exporting countries, it may also have important implications for the world food situation and the socioeconomic and physical survival of developing countries.

Current International Research on Key Problems

Soil Erosion

5.24. The United Nations Plan of Action to Combat Desertification (UNPACD) (8) presented extensive experience of the problems of desertification and identified the key actions required. Subsequent limitations to its success have been identified as: (a) insufficient priority given by governments faced with desertification problems; (b) gaps in understanding of integrated inter-disciplinary approaches, including socio-economic aspects; (c) inadequate transfer of knowledge to potential users; (d) lack of co-ordination and combination of effort: and (e) insufficient funding to assist anti-desertification projects. UNEP has recently adopted a World Soils Policy and Strategy.

5.25. Technology to combat soil erosion includes the maintenance of grass or cover crops on exposed ground, control of grazing, establishment of windbreaks and shelter belts, sustained input of organic matter, contour tillage and strip cropping. Research on the integration of such procedures to match local environment and socio-economic conditions is currently active, for example at the International Centre for Agricultural Research in the Dry Areas (ICARDA), and the International Crops Research Institute for Semi-Arid Tropics (ICRISAT). Whilst these centres focus on both animal and plant crop production, the integration of agriculture and forestry, with its considerable

77 JOB D5266-0665-02 HMSO D1-1 SIZE 48,0
REV:04-11 EXP:04-11 RW SIZ: 48

potential for provision of both food and fuel and of minimising soil degradation, is also being developed at, for example, the International Council for Research in Agroforestry (ICRAF) in Nairobi.

5.26. Analysis of the wider interrelationships between management practices and human populations has been extremely limited, although the importance of such knowledge is fully recognised both by government and by non-governmental agencies. The Integrated Project in Arid Lands (IPAL) in northern Kenya is one example, developed under the auspices of MAB and sponsored by the Federal Republic of Germany. It is centres such as ICARDA, ICRISAT, ICRAF and IPAL, located within the environment under stress, which provide essential bases for international exchange of knowledge, and its integrated development. These centres also provide a focus for the demonstration and training networks which are critical to the successful application of improved techniques.

5.27. A number of centres were established in the 1970s and their continued existence is important. The value of continuity is seen in the Central Arid Zone Research Institute, established in the late 1950s at Jodphur, India where dune stabilisation has succeeded through management of a combination of grasses and trees. Grasses can be harvested after two years and trees *(Prosopis spicigera)* from the tenth year onwards. Rotational felling can be initiated after 16 years, management showing a net profit and providing employment (13). Similarly, extensive screening of species has allowed selection of species and provenances, such as *Acacia tortilis*, with qualities of drought resistance, habitat versatility, fuel production and fast growth which are ideal for dune stabilisation programmes. A similar approach using *A. albida* is being developed by the United Nations Sudano-Sahelian Office (UNSO).

Marginal Lands and Shifting Cultivation

5.28. Extension of agriculture onto marginal lands with soils of intrinsically low fertility (oxisols and ultisols) is occuring in the arid savanna-like tropics (for example in Asia and Africa, cerrado of Brazil and the llanos of Colombia) and in the humid tropics, for example in the Amazon basin and Indonesia. The major expansion of agriculture expected during the remainder of the century must be reflected in increased areas of permanent cultivation where the aim will be to get the maximum effect by optimizing different combinations of multiple uses. The ancient systems of shifting cultivation are well understood but require conditions of land availability and population mobility which are rapidly disappearing throughout the humid tropics. The new restrictions and local concentrations of population lead to acceleration of land degradation particularly on poorer soils. For example, swidden is held responsible for an annual increase of 1–2% in the 42m ha of waste land (22% of the total area) of Indonesia (14). Successful management, particularly in the fallow phase and in fire control, can reduce dramatically the length of the cycle and provide practices intermediate between shifting and continuous cultivation. For example a 1–2 year fallow under the legume kudzu *(Pueria phaseoloides)*, a nitrogen-fixing vine from Korea, can substitute for a 25 year period of forest fallow in the Amazon basin. This, and other examples, have been developed through a Tropical Soils Research Programme in Yurimaguas, Peru, involving

183 JOB D5266-0666-02 HMSO D1-1 SIZE 47,1
REV:04-11 EXP:04-11 TC SIZ: 47.01

North American scientists and linked to other international centres such as the Centre Internacional de Agricultura Tropical (CIAT) in Colombia (15).

5.29. The problems of management in shifting cultivation highlight the key requirements for management of marginal soils which are susceptible to degradation: maintenance of vegetative cover to conserve soil and water, and sustained nutrient capital. The nitrogen (and soil organic matter) status of infertile soils can be enhanced through manipulation of symbiotic nitrogen fixation, particularly through associations of *Rhizobium* with legumes and *Frankia* with non-legumes. There is the additional potential of enhanced phosphorus uptake where mycorrhizal species are involved, recognising that fixation of fertilizer phosphorus in soils high in iron and aluminium oxides is a major constraint to development of about 100m ha of land in acid savannas and humid tropics (16, 17).

5.30. Technical innovations of this type, as developed at the office de la Recherche Scientifique et Technique Outre-Mer (ORSTOM) and the Institute de Recherche Agronomique Tropicales et des Cultures Vivrieres (IRAT) in Senegal and major international institutes such as ICRISAT and ICARDA, are essential to improve production on marginal lands. However the understanding of the combination and interaction of crop biology with soil, nutrient and hydrological conditions is equally important. Principles of minimum cultivation, developed in traditional husbandry practices, can be usefully transferred to modern husbandry. At the International Institute of Tropical Agriculture experiments have shown that under local conditions soil loss, when virgin forest is brought into cultivation by modified traditional slash-and-burn methods, was only 1% of that from aparently more sophisticated contour banking. These experiences emphasise the need for multi-disciplinary approaches and centres such as ICRISAT and ICARDA could benefit from strengthening by, for example, soil science expertise (18).

Range Lands and Overgrazing

5.31. Soil and range degradation, leading to impoverishment of vegetation, soil erosion and loss of livestock, is widely accepted as a major problem in semi-arid regions of developing countries. Overgrazing is the central problem but the solutions, initially and ultimately, must be social. As a result, research on the methods of improvement management of grazing lands has been very limited. Although the principles of sound management are generally well understood through research in north America and Australia, definition of the potential carrying capacity of different types of rangeland in developing countries remains an important requirement for any socially acceptable stock control. While the problems of the Sahel will not be solved until numbers of domesticated animals are decreased, the apparently beneficial supply of watering points has discouraged the development of rational methods of increasing the net benefits to be gained from fewer animals. Promotion of research in range management is developing through the FAO/UNEP programme on Ecological Management of Semi-Arid Rangelands (EMASAR) and the UNESCO MAB Programme is stimulating multdisciplinary studies of IPAL in Kenya and Tunisia (13).

81 JOB D5266-0667-02 HMSO D1-1 SIZE 48,0
REV:04-11 EXP:04-11 RW SIZ: 48

Soil Degradation and Water Management

5.32. Soil toxicity and other forms of degradation have minimised the beneficial effects of the major financial input to irrigation schemes—an example of development outstripping understanding even in developed countries. At the 12th Congress on Irrigation and Drainage (ICID) in 1984, the case study of the history of irrigation in the Mexicali Valley, Mexico highlighted the need for thorough feasibility and planning studies to define the scope of groundwater development before a project is implemented (19). International collaboration is usually well developed in the pursuit of major irrigation schemes because of their scale and engineering complexity, but more interdisciplinary collaboration is needed—a feature emphasised in sessions on 'difficult soils' at the same Congress.

5.33. The International Hydrology Programme (IHP), under the auspices of UNESCO and the World Meteorological Organisation (WMO), provides another important forum for dissemination of ideas and development of understanding of the processes relating climate, hydrology, ecosystems and human activity. Much of the international research collaboration is through the planning and development of irrigation schemes, often multi-national and with funding from, for example, the World Bank.

5.34. Expansion of water supplies—often an obvious development need—can exacerbate the toxicity problem. The engineering capability for large and small scale schemes undoubtedly exists but international collaboration is required to provide detailed analysis of aquifer characteristics in many parts of the world. The assessment of aquifers requires intensive geological, hydrological and engineering skills which are limited in many developing countries. The understanding of dynamics of aquifer recharge and discharge, based on theory and on the observation from existing schemes, provides a major international challenge. Investigations and planning for the supply of water should be coordinated with planning for disposal of toxic wastes (Technical Report 2). The sequence of events at the surface once irrigation has begun is still poorly understood. The hydrology in this zone is complicated by the variations in soil physical characteristics and is modified by vegetation, management and climate. These dynamics also require a thorough understanding of the chemical processes in the surface horizons to allow assessment of the irrigation effects on soil fertility.

5.35. Ameliorative practices to rehabilitate land affected by toxicity include the use of salt-tolerant plants to initiate revegetation, but control or subsequent hydrology can help in the removal of toxic elements and is critical in water table control. Fortunately some important crop plants are reasonably tolerant of high salinity and can be planted given initial reduction in toxicity, whilst fertilizers can reduce toxicity, for example of aluminium, by enhancing solute movement down the soil profile.

5.36. Continued improvement of irrigation practice is a major requirement, building on experience at many experimental stations. There is need, for example, to avoid excessive use when irrigation water is available, as this creates problems. Conservation techniques such as drip or trickle irrigation

83 JOB D5266-0668-03 HMSO D1-1 SIZE 48,0
REV:04-11 EXP:04-11 RW SIZ: 48

characteristically minimise the development of toxicity and reduce plant damage in areas where drainage is restricted.

Deforestation and Reforestation

5.37. Many of the causes and effects of deforestation are clearly understood. The thrusts in reforestation are designed to replenish stocks and increase supplies of commercially important species, to increase sources of wood energy for rural and urban populations, to rehabilitate areas suffering from desertification and soil degradation, to control hydrology of sensitive watersheds, to enhance agricultural production and conserve remaining forest resources. Thus there has been a marked broadening in the requirements for research and development in forestry in response to a variety of pressures.

5.38. In leading a review of international action related to tropical forestry, the FAO Committee on Forest Development in the Tropics has identified concerted efforts at various levels (20): (a) international government organisations (FAO, UNEP, UNESCO etc); (b) regional financing organisations (World Bank, International Fund for Development (IFAD), African Development Bank (ADB) etc); (c) international non-governmental organisations (ICRAF), International Union of Biological Sciences (IUBS), International Union of Forestry Research Organisations (IUFRO) etc; and (d) bilateral arrangements.

5.39. There are many small and large-scale initiatives for afforestation in tropical areas including various emergency measures, for example through UNSO. Main research requirements were identified at the IUFRO Congress in Kyoto in 1981 and efforts to co-ordinate international action to meet the research requirements are being made through IUFRO with support from the World Bank, FAO and others. Broadly, research initiatives are similar in different tropical regions and are concentrated on: (a) monitoring changes of forest resources, for example through the Global Environmental Monitoring System (GEMS); (b) national and regional planning to locate reforestation in relation to land quality and other land use requirements; (c) inventory of existing forest resources mainly to identify potential crop species; (d) screening and selection of indigenous and exotic species for particular environments and uses; and (e) management experiments and trials particularly oriented towards fuel needs, land rehabilitation, agroforestry, and plantations with reduced rotation time.

5.40. There are also initiatives in non-tropical regions. For example, the MAB Northern Network has established projects on northern birch forests and on land use and grazing, involving Nordic countries, Iceland, Canada and the United States of America.

5.41. The International Institute for Applied Systems Analysis (IIASA) is coordinating a study of the network interactions and the structure of the forestry sector at provincial, national, regional and global levels, in order to assess future developments as a basic guide to current management.

187 JOB D5266-0669-02 HMSO D1-1 SIZE 48,0
REV:04-11 EXP:04-11 TC SIZ: 48

Scope for Further International Collaboration

5.42. The greatest need for further international collaboration is in evaluating how the products of science and technology can be transferred and applied more effectively to the solution of land husbandry problems, rather than to the development of new scientific understanding and tools. For example, for reforestation, the task is to select management systems which can sustain productivity and, where there is natural regeneration, control the composition on the forest. It is essential, however, that undue emphasis is not put on forms of advanced technology which may be inappropriate for the circumstances. Techniques which minimise management and put local, traditional experience into the context of scientific knowledge and the international standards of land use will be particularly valuable in future, especially on marginal lands. Within the development of technology, greater collaboration between disciplines is essential to solve existing problems and reduce the risk of future failures. Most failures have resulted from unexpected side-effects.

5.43. There are, however, areas of scientific research which would benefit from increased international collaboration. Areas of particular importance are: desertification and salination in non-tropical regions; soil stability; maintenance of fertility, especially in irrigated areas; land husbandry in areas of mixed land use; deforestation; and the effects of extreme weather or of climate change on land husbandry. The scientific background to many of these studies can usefully be related to the basic research on global change and regional dynamics coordinated under the International Geosphere-Biosphere Programme of the International Council of Scientific Unions.

5.44. There is an urgent need for a greater understanding of the social and economic aspects of the problems, and in particular on the effect of regional economic development planning on long-term land husbandry. There is room for international collaboration in a study of factors such as marketplace incentives, technology transfer mechanisms, and education and training programmes.

5.45. International organisations could play a valuable role in assessing the environmental impact, on developing countries, of foreign aid development programmes. The focus of present concern is on past failures. In the need to solve the urgent and immediate needs of many countries, international action is needed to reduce the risk of future, and even more damaging, failures. Such action should be based on the careful study of successful projects, not to copy them directly, for successful actions can rarely be transferred successfully, but to increase understanding of the ways in which foreign aid can be of both immediate and long-term environmental benefit.

5.46. Because similar problems exist in a wide range of countries, the benefit of localised research can be maximised by improved information exchange and establishment of international centres which maintain and supply material, for example potentially useful strains of micro-organisms or crop species. Research and demonstration centres within developing countries, although limited, can be successful in providing foci for research, development and training programmes, for example the existing centres of the Consultative Group on

90 JOB D5266-0670-02 HMSO D1-1 SIZE 45,3
REV:04-11 EXP:04-11 RW SIZ: 45.03

International Agricultural Research, and recent proposals from the United Nations Environment Programme (21) and the International Union of Biological Sciences/United Nations Educational Scientific and Cultural Organisation (22). These networks of field-orientated centres increase the efficiency of transfer of techniques between countries and their translation into practice.

5.47. Support for integrated planning of land uses and management has been increasingly successful through bilateral arrangements and should be strengthened. Analsyis of trends and examination of options, whilst given low priority against immediate repair strategies to solve practical problems, are important as an essential component in longer term planning and monitoring and can be developed efficiently through international initiatives such as those of the International Institute for Applied Systems Analysis, in particular its project on the Sustainable Development of the Biosphere.

5.48. The transfer and adaptation of technology for aplication in developing countries needs to be greater than hitherto and is particularly appropriate to international collaboration. Examples are the application of remote sensing to resource monitoring and assessment as in the Global Environmental Monitoring System, the geological and hydrological survey of aquifers, the selection and manipulation of the natural genetic variation in potential crop plants, animals and micro-organisms.

References

(1) World Resources Institute (1984). The Global Possible: Resources, Development and the New Century. WRI, Washington.
(2) Organisation for Economic Co-operation and Development (1984). Workshop on Critical Issues in Natural Resources Management. Paris, 11–12 October, 1984.
(3) Lanly, J. P. (ed) (1981). Tropical forest resources assessment project (GEMS): Tropical Africa, Tropical Asia, Tropical America. FAO/ UNEP, Rome.
(4) Holdgate, M. W., Kassas, M. and White, G. F. (1982). The World Environment 1972–82. A Report to the United Nations Environment Programme. Tycooly, Dublin.
(5) Desertification and soils policy. Symposium papers III of the 12th International Congress of Soil Science, New Delhi, India, 1982.
(6) International Union for Conservation of Nature and Natural Resources (1980). World Conservation Strategy. IUCN/;UNEP/WWF, Geneva.
(7) Food and Agriculture Organisation (1982). World Soil Charter. FAO, Rome.
(8) United Nations Environment Programme (1977). Desertification: its Causes and Consequences. UNEP, Nairobi.

86 JOB D5266-0671-01 HMSO D1-1 SIZE 48,0
REV:04-11 EXP:04-11 RW SIZ: 48

(9) Food and Agriculture Organisation/United Nations Educational Scientific and Cultural Organisation (1971–79). Soil map of the world. Vols I–XI. UNESCO, Paris.
(10) Food and Agriculture Organisation (1976). A Framework for Land Evaluation. Soils Bulletin No 32. FAO, Rome.
(11) Food and Agriculture Organisation (1982). Potential Population Supporting Capacities of Land in the Developing World. FAO, Rome.
(12) Mitchell, A. J. B. (ed). Land Evaluation and Land Use Planning in Tabora Region, Tanzania. Land Resources Study No 35. Land Resources Development Centre, Tolworth, UK.
(13) Di Castri, F., Baker, F. W. G. and Hadley, M. (1984). Ecology in Practice. Tycooly, Dublin and UNESCO, Paris.
(14) United Nations Educational Scientific and Cultural Organisation and United Nations Environment Programme (1983). Swidden Cultivation in Asia (2 vols). UNESCO, Bangkok.
(15) Sanchez, P. A. et al. (1982). Amazon basin soils: management for continuous crop production. Science *16*, 821–827.
(16) Dommergues, U. R. D. and Diem, H. G. (eds) (1982). Microbiology of tropical soils and plant productivity. Nijhoff/Junk, Hague.
(17) Sanchez, P. A. and Nicholaides, J. J. (1982). Plant nutrition in relation to soil constraints in the developing world. TAC Secretariat, FAO, Rome.
(18) Hallsworth, E. G. (1982). World Soils Policy. In: Desertification and Soils Policy. 12th International Congress of Soil Science, New Delhi, India.
(19) Eng, E. P. Arellano, and hamdan. L. S. (1984). A case study: Development impacts on ground water levels and quality, Mexicali Valley, Mexico. General reports. Question 38, 12th Congress on Irrigation and Drainage, Fort Collins. International Commission on Irrigation and Drainage, New Delhi, India.
(20) Food and Agriculture organisation (1984). National and international activities and co-operation in tropical forestry. FAO Misc 84/3. FAO, Rome.
(21) United nations Environment Programme/ISEB Workshop on uses of microbiological processes in arid lands for desertification control and increased productivity. October 1983. New Mexico, USA. Recommendation to UNEP.
(22) Swift, M. J. (1984). Soil biological processes and tropical soil fertility: a proposal for a collaborative programme of research. Biology International. Special Issue 5. IUBS.

TECHNICAL REPORT 6

CLIMATIC CHANGE

introduction

Climate and Climatic Change

6.1. Climate is of fundamental importance as a major influence on human activities. It determines which parts of the earth are habitable and many of the characteristics of civilization in a particular region, such as water and energy supplies, agriculture, trade and patterns of desease. Climate change, whether natural or influenced by human activities, is therefore of major concern.

6.2. Climate is the synthesis of weather over a period, conventionally 30 years but in practice often of a shorter or longer period. The characteristics of climate are most concisely expressed in terms of their statistical properties, but may also be described usefully in terms of integrated environmental effects, such as vegetation zones. No matter what period is chosen, climate displays a degree of variability. Examples of such variations are the warming of about 0.5°C in northern hemisphere mean air temperatures during the first half of this century (Figure 1) and the period of relatively low rainfall in the Sahelian region of Africa starting in the 1960s and continuing into the 1980s. On much longer timescales (10,000–100,000 years) there is clear evidence from many sources of larger variations in mean temperature, for example between glacial and interglacial periods over much of the last million years.

6.3. The many components of the global climate system include the atmosphere (with its loading of dust and aerosols), solar radiation, the oceans, sea-ice, land ice and snow, and surface vegetation. All of these components may interact to influence the weather and therefore the climate. The degree and rapidity of response to changes is very different for the different components. Thus the temperature of a land surface may adjust to changes in the atmosphere (for example, cloud cover) within an hour or less, whereas anomalies in the ocean surface temperature may persist for several months because the mixing within a relatively deep layer of water gives the ocean a much greater thermal inertia. The seasonal warming of the tropical Pacific (El Nino) and the effects of a single anomalous event on the atmosphere (the Southern Oscillator) over more than a year have received attention recently. Perturbations of the ocean temperature at depths of 1km or so may persist for many years while for the deep ocean the corresponding timescale may be 1000 years or more. The global climate may be expected, therefore,to show variations on many timescales due solely to interactions among its components.

6.4. Other natural causes of climatic variability are volcanic eruptions and perturbations of the earths orbit. The more intense volcanic eruptions such as those of Krakatoa (1883) and El Chichon (1982) inject large quantities of aerosol in the stratosphere where they may remain in significant quantities for several years. Stratospheric aerosols reduce solar radiation reaching the ground and therefore lead to cooling of the surface and lower atmosphere. Variations in the earths orbit occur with periods of about 20,000, 40,000 and 100,000 years and longer, and these lead to variations in solar energy received.

There also are variations, apparently cyclic, in solar activity. The combined magnitude and climatic significance of these extra-terrestrial variations are unclear, but there is a possibility that they are principally responsible for the oscillations between glacial and interglacial periods. The associated energy variations on timescales of a century or less are very small.

6.5. While major changes in climate are significant only in terms of centuries or longer, the progressions are not smooth, and symptoms of the change, in terms of severe weather or ocean perturbations (as El nino), may occur suddenly, and have severe short-term economic or social effects.

6.6. Recent discussions of climatic change have been focussed increasingly on the effects of human activities. Humans affect climate principally through changes to the land surface or to the chemical composition of the atmosphere.

6.7. Solar radiation reaching the earths surface may be reflected or absorbed. Most of the energy absorbed at the earth's surface is transferred to the atmosphere either directly as heat or (following evaporation) as water vapour. Changes in the vegetative cover of the land surface can change the amount of energy available to the atmosphere or vary the fractions absorbed as heat or water vapour. The amount reflected depends on the material of which the surface is composed and also on the complexity of its structure. Thus the reflectivity of dry bare soil is mainly higher than that of a vegetated surface and forests generally absorb more solar radiation than simple structures, because radiation passing through the uppermost layer may be trapped within the canopy. On a bare soil, there tends to be less evaporation and a greater proportion of the fainfall runs off the surface. There is evidence from numerical climate models that this in turn tends to reduce rainfall. This process may will be important in such phenomena as the recurrent droughts in the Sahel.

6.8. There is considerable concern over the climatic effects of the increasing atmospheric concentration of carbon dioxide (CO_2). Measurements over the last 25 years indicate the amount of CO_2 in the atmosphere has risen steadily (Figure 2). Estimates of the concentration before regular observations began suggest that concentrations in 1860 were about 260-290 parts per million volume (ppmv) compared with the 1982 value of about 340 ppmv. This increase is attributed principally to the burning of carboniferous fuel (coal, gas, oil) which releases CO_2 into the atmosphere directly. There has also been a substantial contribution from the reduced storage of carbon in the biosphere due to deforestation and similar influences. Only about half of the CO_2 released in the burning of fossil fuels appears to have remained in the atmosphere; the remainder is believed to have been absorbed by the ocean and other minor sinks.

6.9. Raising CO_2 concentrations tends to warm the lower atmosphere and the earth's surface. It may also lead to changes in global patterns of temperature, precipitation and winds. These changes in climate could be serious for many nations and catastrophic for some, in particular through effects on agriculture and trade. For example, some parts of the earth which are at present inhabited might become unfit for human settlement, and the world's main regions of

grain production might become short of water. In any case, the disruption to the world's economy would be enormous.

6.10. Another concern is that the sea-level might rise and flood very large areas of low-lying land, as a result of the melting snow and ice and the thermal expansion of the upper layer of the oceans. Some calculations, based on the CO_2-induced warming for a doubling of the concentration, have estimated a rise of a few tens of centimetres due to ocean expansion; but there are large uncertainties, particularly because it is not known to what depth the ocean warming will penetrate. If the Antarctic and Greenland ice sheets were to be melted by a change in climate, world sea level would undoubtedly rise by several tens of metres, provided that all other factors remained the same (1); but there are many uncertainties concerning the rate and possible degree of response to any given change of climate, and the net effect cannot be predicted with present knowledge. It has also been suggested that climatic warming could lead to increased precipitation, snow loading and activity of the West Antarctic ice sheet, which would then become detached from its rock base, producing a relatively sudden rise in sea-level of a few metres. Such an event, however, now appears to glaciologists highly unlikely in the next one or two centuries.

6.11. Although the most attention has been given to the effects on climate of increasing CO_2 concentration, there are other gases which are released to the atmosphere by man's activities and which may have effects on climate. In particular, increasing concentrations of trace gases such as methane and chlorofluorocarbons may have effects on climate similar to those of CO_2. Many scientists believe that the combined effects of these other gases in increasing atmospheric temperature could equal that of CO_2. The postulated effects of chlorofluorocarbons on the extent and vertical profile of the stratospheric ozone layer are considered in Technical Report 1.

6.12. There are other effects of human activities which could change the climate. These include increases in tropospheric aerosol due to agricultural 'slash and burn' practices, to the increased use of large agricultural machinery, to land degradation and large-scale fires resulting from nuclear bombing ('nuclear winter'), and the modification of Arctic sea-ice through changes in the ocean salinity resulting from diversions for hydroelectric and irrigation purposes of rivers flowing to the Arctic. At present, however, despite extensive study and preliminary modelling, the understanding of these complex processes is limited, and conclusions about the likelihood or consequences are largely conjectural. Furthermore, there is insufficient knowledge of the latitudinal or zonal distribution of atmospheric perturbations caused by human activities, and of the effect that zonal variations of atmospheric composition will have on climate.

6.13. Many of the aspects of investigating climate and climate change can be illustrated by the present research on the effects of the increasing atmospheric concentration of CO_2 which is accepted as one of the most likely causes of climatic change in the next century. Much of the work in this area (such as monitoring by satellites, research on processes in oceans, clouds and land surfaces, development of numerical models to simulate climate,

94 JOB D5266-0675-02 HMSO D1-1 SIZE 48,0
REV:04-11 EXP:04-11 RW SIZ: 48

palaeoclimatology, exchange of climatic data, and assessment of impacts on agriculture and on other forms of life) is necessary in any investigation of world climate and climate change. If present estimates of the effects of increasing CO_2 are correct, changes in climate from this cause should be detectable in the next few decades. Consequently much of the recent research on climate has been stimulated by the CO_2 problem. This problem presents a unique scientific challenge, in that by the time there is incontrovertible evidence of climate change it will likely be too late to halt that change. This is a prime reason why research is so important.

State of the Science

Research on Climate

6.14. Research on the climate system falls naturally into three sections: (a) estimating future concentrations of the contributing gases; (b) estimating the climatic effects due to the changes in concentrations (and to the other natural and anthropogenic influences); and (c) estimating the impact of climatic changes on conditions at the earth's surface and, in particular, on human activities.

6.15. Attempts to forecast changes in the concentration of atmospheric CO_2 over the next 100 years or so have been made in several ways. Predictions based on extrapolation of trends of the past few decades face obvious difficulties, not least of which are the paucity of stations with long-term records and the limited ability to take into account changes in use of energy. Another method is first to estimate the world's energy requirements over the next century. Since this involves accurate forecasting the state of world economy—an almost impossible task—it also leads to great uncertainties in the prediction of future CO_2 concentrations. Given the future energy demand, the fraction supplied by fossil fuels is postulated and the resulting concentration of atmospheric CO_2 is usually estimated by assuming that a fixed concentration remains airborne. However, as living organisms both absorb and release CO_2, this may be too simple an approach and, alternatively, one can attempt to predict the uptake of CO_2 by the oceans and the biosphere in detail. This approach also leads to problems because of uncertainties of both the processes and quantities. Given the large uncertainties in the projected use of fossil fuels and the possible inaccuracies in the partition of the resulting CO_2 between the atmosphere and other sinks, it is not surprising that there is a wide range of concentrations predicted for future atmospheric CO_2. Predictions of the date at which CO_2 concentrations will reach 600 ppmv (just over a doubling of the estimated pre-industrial level) have varied considerably, with the most recent suggesting some time in the third quarter of the next century.

6.16. The lack of data has not yet allowed equivalent predictions for the other gases which may have effects similar to CO_2.

6.17. Before discussing the response of climate to CO_2 (and other perturbations), it is helpful to consider the earth's heat balance. The earth receives energy in the form of short-wave radiation from the sun, some of which is reflected back to space by clouds or the surface, or is absorbed directly by the atmosphere (Figure 3). The remainder is absorbed by the surface and is

189 JOB D5266-0676-03 HMSO D1-1 SIZE 48,0
REV:04-11 EXP:04-11 PC SIZ: 48

transferred to the atmosphere by conduction, radiation or released latent heat. Clouds, CO_2, ozone, water vapour and other atmospheric trace gases absorb and emit long-wave radiation. They absorb or 'trap' much of the radiation from the earth's surface, re-emitting both upwards to space, and back downwards to the surface. As a result, the earth's surface is some 20°C warmer than it would be without an atmosphere, a phenomenon popularly known as the 'greenhouse effect'.

6.18. The direct effect of increasing CO_2, or other trace gases, is to enhance the greenhouse effect, warming both the atmosphere and surface. Doubling CO_2 concentrations from 300 to 600 ppmv would raise the temperature of the lower atmosphere and surface by about 1°C due to radiative changes alone. The warming would allow the atmosphere to hold more water vapour, itself a 'greenhouse' gas which, in the case of doubling CO_2, might increase the warming to about 2°C. Changes in atmospheric heating would give rise to changes in the atmospheric circulation and the patterns of temperature, cloudiness and precipitation which in turn would lead to changes in conditions at the earth's surface, including snow and sea ice, and eventually the circulation of the oceans (Figure 4). All of these might enhance or diminish the initial response to the perturbation. There are two methods by which we can study these complex interactions: by looking for analogues of warmer or colder climates in the earth's past, and by using three-dimensional numerical models of climate.

6.19. It is known that atmospheric CO_2 levels have varied in the past. Data from ice cores indicate that the values fell to about 200 ppmv during the last ice age which reached a maximum about 18,000 years bp (before present). Present evidence suggests that the reduction in CO_2 levels may have enhanced the severity of the ice age but is unlikely to have initiated it. The most recent analogue of past warm climates is the mid Holocene (8,000-4,000 years bp), which probably was not more than 1.5°C warmer than present and for which changes in precipitation and temperature have been approximately determined. For example, the Sahara is known to have been wetter during this period. The usefulness of analogues from past climates is limited by the uncertainties in determining the climate from proxy data, and the possibility that more than one factor may have been responsible for the changes in climate.

6.20. Numerical models of climate have been developed from atmospheric general circulation models. In a numerical model of the atmosphere values of temperature, humidity and wind are stored at points on a horizontal grid, typically 200 to 500 km apart, at several levels in the atmosphere. These values are allowed to evolve in time by solving the equations of motion and thermodynamics at each point. Many of the physical processes such as radiation, precipitation and the exchange of momentum, heat and moisture at the surface have to be represented statistically ('paramaterizations') using observations made in the real atmosphere or the laboratory, or numerical experiments with more detailed mathematical models. Once certain boundary conditions, including the distribution of sea surface temperatures and sea ice, orography and the time of year have been prescribed, the atmospheric model can be stepped forward in time over the period of interest, which may be a month or more.

191 JOB D5266-0677-03 HMSO D1-1 SIZE 48,0
REV:04-11 EXP:04-11 TC SIZ: 48

6.21. The quality of the simulation may be assessed by comparing the model data with climatological data for the relevant time of year. A more stringent test is to proceed through one or more annual cycles, to ensure that the parameterizations are valid over a range of climatic regimes. This is particularly useful if the model is to be used to assess changes in climate which are relatively small compared with the changes in the seasonal cycle. Present models simulate the large scale features of the observed circulation well but regional details are often inaccurate.

6.22. A climate model should include all the elements of climate appropriate for the timescale of interest (Figure 4). Thus, clouds, the land surface and snow cover, sea ice cover and the ocean must all be taken into account if climate change over several decades is being considered. Three-dimensional models analogous to those used for the atmosphere have been developed to simulate the circulation of the oceans. However, to date, studies of the global effect of CO_2 concentrations have not been able to incorporate the changes in the oceans realistically. For reasons of complexity and extent of the computations involved, models cannot go beyond a certain degree of detail in simulating the physical and chemical processes. Furthermore, some scientists believe that the deterministic approach to prediction may have intrinsic limitations.

6.23. Experiments to date have used atmospheric models with prescribed sea surface temperatures or a highly simplified but interactive representation of the oceans. Simulations with and without the appropriate CO_2 perturbation are run to obtain the equilibrium climates and the differences between them are studied. In order to obtain changes which can be distinguished above the inherent variability of the simulated climate, the perturbations applied are often exaggerated. These experiments are useful to indicate the sensitivity of climate to certain types of perturbations. Latest results suggest at least a global mean surface warming due to doubling CO_2 of 1.5-4.5°C, with much of the enhancement due to the reduction in highly reflective snow and sea ice cover and changes in cloudiness. These simulations produce a surface warming which in winter is most pronounced in high latitudes, and least in the tropics, a general reduction in sea ice and snow cover, an increase in run-off in high latitudes and, in most cases, a drying of the land surface in northern mid-latidutes in summer. Although the large scale changes are generally consistent from model to model, there is little agreement on the regional details.

6.24. In reality, perturbing factors would probably change gradually and the evolution of the climate response with time becomes important. For example, the concentration of atmospheric CO_2 has increased by 8% since 1958, which on the basis of recent model estimates would be expected to produce an equilibrium increase of about 0.2-0.45°C in global mean temperature. Such an increase is not evident in the recent instrumental record (Figure 1), possibly because of temperature variations of similar magnitude which may be due to other causes. Furthermore, one might expect any atmospheric warming to be delayed by the large thermal inertia of the oceans. This depends critically on the rate at which heat is mixed downwards in the deep ocean (and is closely related to the problem of determining the rate at which CO_2 is absorbed by the oceans). Results from idealised coupled ocean-atmosphere models and

99 JOB D5266-0678-02 H.M.S.O. D1-1 SIZE 48,0
REV:04-11 EXP:04-11 RW SIZ: 48

calculations using simpler models suggest that the ocean may slow the response of the atmosphere. As a consequence, much of the response of climate to the estimated 30% increase in atmospheric CO_2 since about 1860 may not yet be apparent.

6.25. It has been argued that the thermal inertia of the ocean will vary with latitude so that the response of climate to gradually changing perturbations may differ substantially from that found in equilibrium. Should this be the case, one will need to know the evolution of the perturbing influence with time and use it in a fully coupled dynamical model of the ocean and atmosphere in order to forecast changes in climate.

6.26. The world climate is not homogeneous. There are regional and latitudinal-zonal variations of climate, of CO_2 concentration and of other relevant variables. These factors are of great importance in determining the response of climate to increases in CO_2 and other atmospheric gases.

6.27. An increased atmospheric concentration of CO_2 may also have a direct economic impact by, for example, enhancing the growth or increasing the resistance to drought of some crop plants.

6.28. The predicted changes in climate accompanying increases in atmospheric concentrations of CO_2 and other gases will have widespread and possibly catastrophic impacts on agriculture, energy supply and demand, sea-defences, etc. Until reliable predictions of regional climates are available, evaluation of the impact of climate change will be on a generalised level. However, by specifying scenarios, or using the estimated results from present climate models, predictions of the likely magnitude of impacts have been made and the methodology for assessing the impact is being developed. Even if the changes in climate were known exactly, there would, for example, be considerable uncertainty in determining the precise effects on agriculture, given the present shortcomings in the state of modelling crop growth.

Research on Aerosols

6.29. Aerosols are released to the atmosphere from many processes, including industrial activity, land clearing and machine-tillage agriculture. The effect of aerosols on climate depends on a number of factors, including the distribution of particle sizes and their optical properties, their concentrations and their vertical and horizontal distribution. Attempts have been made to quantify the relative contribution of past volcanic eruptions to the loading of stratospheric aerosols. These studies have been useful in indicating the three-dimensional spread and distribution of aerosols from a single point source, and the residence time in the atmosphere of particles of different sizes; however they are insufficient to allow, for example, detailed calculations of the associated radiative perturbations and hence their effect on climate.

Changes in Surface Vegetation

6.30. The extent of changes in vegetation has been gauged from past records of land use and, in recent years, from satellite data. Experiments with numerical

102 JOB D5266-0679-01 HMSO D1-1 SIZE 48,0
REV:04-11 EXP:04-11 RW SIZ: 48

models indicate that climate is sensitive locally to changes in land surface properties, though the imposed changes have been larger than those observed.

Areas of Uncertainty: Research Needs

Assessment of Perturbing Influences

6.31. There is a need for improved monitoring of factors known, or likely, to perturb climate including changes in land use and surface properties, the concentration of trace gases and aerosol loading. Further information is required on the formation, distribution and radiative properties of aerosols so that their effect may be incorporated faithfully in climate models. In order to account for the effect of recent increases in CO_2, a more accurate determination of the role of the biosphere and the rate at which CO_2 and other trace gases are mixed down into the deep ocean are needed.

Climate Effects

6.32. Many of the processes affecting climate are poorly understood and are represented inadequately in models, including the hydrology of the land surface and the effects of vegetation, clouds, snow and sea ice cover and the ocean circulation. Further studies are needed before reliable parameterisations can be introduced in large-scale models. There is a requirement for continuing observational data on which to base and test numerical models. At present many data, particularly over the ocean, are limited to specific regions or limited periods, and may be unrepresentative. Thus there is a need for regular global monitoring of certain quantities, for example sea surface temperatures and sea ice extents, as well as more intensive data gathering during events of particular interest. Regular long term monitoring of climate variables is also a prerequisite for determining the inherent variability of climate and detecting climate change.

6.33. Further refinement of numerical climate models is essential to improve the simulation of regional climate which at present is inadequate for most impact studies. There is much to be done in the interpretation of model data and comparison with observations. The effort to understand the model results, in terms of the physical processes represented and of the discrepancies in results from different climate models, should be intensified.

6.34. There is an urgent requirement for a careful and comprehensive estimate of the scale and rate of response of climate to the increase in CO_2 (and other trace gases), and to other anthropogenic perturbations, over the last few decades and the projected increase in the near future so that the model predictions can be verified against observed data. This will also require the isolation of changes due to factors other than trace gases.

Impacts

6.35. Research on the evaluation of impacts is of great importance, but is heavily dependent on more reliable predictions of regional changes in both mean and extremes of climate. Nevertheless, there is scope now for developing methods to use when improved forecasts become available. There is also

104 JOB D5266-0680-02 HMSO D1-1 SIZE 48,0
REV:04-11 EXP:04-11 RW SIZ: 48

considerable uncertainty on the effects of changes in temperature, precipitation and atmospheric CO_2 on agriculture and a need to extend present research over a wider variety of plants and habitats. Research on non-agricultural aspects, including flood forecasting and winter weather analysis is also needed. Finally, attention should be given to the overall effects on world economics and trade of all these aspects.

International Collaboration

Organisation of Research

6.36. The problem of the increasing concentrations of CO_2 and other trace gases in the atmosphere illustrates the global nature of both the cause and effect of changes in climate. Climate research involves many disciplines and the resources required are generally beyond the means of any one nation. A framework for international co-operation is provided by the World Climate Programme (WCP). This involves several international agencies such as the World Meteorological Organisation (WMO), the International Council of Scientific Unions (ICSU) and the United Nations Environment Programme (UNEP). The WCP represents an attempt to produce a co-ordinated programme of research to understand climate and climate change and their impacts, to identify weaknesses and shortcomings in that programme, to exchange information on existing climate data and to emphasise priorities. The WCP operates not by the direct funding of research, but by encouraging international co-operation and the exchange of scientific information through meetings and conferences. Most research is funded nationally and many countries have their own national climate programmes which contribute to the WCP. Because of the large computing resources required, detailed numerical modelling of climate is largely confined to government laboratories; other research may be carried out by government laboratories, universities or, in some cases, private industry.

6.37. The Commission of the European Communities (CEC) funds research in Member States through its climatology programme; much of this work is directed towards the needs of the European Communities (EC). The international space research programmes contribute to climate research by their climate satellites which observe the atmosphere, land surfaces and oceans.

Potential for Further International Collaboration

6.38. The activities of the World Climate Programme, the programmes of the Commission of the European Communities and the programmes of satellite measurements should be supported so that individual nations can match their own expertise with the particular needs of the research programme, rather than fragment available resources on a wide range of problems. Further bilateral cooperation between countries having national climate programmes would also provide a useful mechanism for advancing climate research and services (such as experimental climate forecast studies).

6.39. A high priority in climate research is to increase precision, accuracy, resolution and coverage of climate observations. These involve ground, ship and satellite observations, in addition to routine determinations of basic quantities.

106 JOB D5266-0681-02 H.M.S.O. D1-1 SIZE 48,0
REV:04-11 EXP:04-11 RW SIZ: 48

Satellite observations, in particular, provide a unique capability for the global monitoring of climate. Meteorological satellites provide global data on the earth's radiation balance, the distributions of atmospheric temperature, humidity and clouds, and land, sea and ice surface temperatures. Land satellites monitor changes in land surface properties, and ocean satellites provide data on ocean currents, ocean surface winds and ice coverage. The Technology Growth and Employment Working Group's area for collaboration on Remote Sensing from Space has endorsed the recommendation by the International Union of Geodesy and Geophysics and the International Council of Scientific Unions that the existing and future satellites of the United States of America, the USSR and the European Space Agency obtain, on a continuing basis, laser- and radar-altimeter profiles of the surface of the Antarctic and Greenland icecaps. Changes in the surface elevation of ice caps, measurable with equipment now available, should give a signal of global response to climate change that is more sensitive and significant than any other planetary-scale indicator known.

6.40. Advances in climate prediction require improvement of climate models and the development of reliable forecasting techniques of climate variables, primarily temperature and precipitation, at least on one- to three-month timescales. Two key elements for urgent attention are the role of clouds in the earth's radiation balance and the role of oceans in near- and long-term climate. Both processes will require years of study by the scientific community, ideally within the World Climate Programme framework, and particularly by countries with the necessary computer capability. In this context support should be given to three new international collaborative projects: the International Satellite Cloud Climatology Programme (under the World Climate Programme), the Tropical Oceans Global Atmospheric Project and the World Oceans Circulation Experiment.

6.41. One of the objectives of the World Climate Programme is to warn governemnts of forthcoming climate changes which may significantly affect human activities. International bodies involved in the World Climate Programme also have an important role in making governments and nations aware of the consequences and risks of these change, in particular the potential economic impacts.

6.42. Co-operation between the different disciplines involved in various aspects of the problem should be encouraged so that each is aware of what is required and what can (or cannot) be provided. For example, the determination of the effect of increased carbon dioxide involves palaeoclimatolgy, glaciology, biology, chemistry, meteorology, oceanography, agriculture, economics, etc. Ways should be found for the present climate programmes to involve specialists in these disciplines to a greater extent.

6.43. Cooperation should be encouraged between climate modellers and the modelling studies of future food production on a global and regional basis, by the Food and Agriculture Organisation, to ensure that factors of climatic variation are taken into account in predictions or scenarios of world food production.

193 JOB D5266-0682-02 HMSO D1-1 SIZE 48,0
REV:04-11 EXP:04-11 PC SIZ: 48

6.44. The exchange of scientists, the exchange of data and information, and the comparison of results between different countries should be encouraged to foster the development of new ideas and to extend the use of the available data. Data should be gathered, whenever possible, in common formats and in central locations where the data can be made available at reasonable cost to research scientists. The three World Climate Data Centres should be continued and strengthened.

6.45. Given that the importance of a full understanding of climate change and its impact is essential to the well-being of all nations, it is necessary to accept that the achievement of this degree of understanding requires the commitment of significant resources for a long period of time for the necessary progress to be made. National research programmes contributing to the World Climate Programme should be accorded a high degree of priority and continuity in the allocation of national funds over the next decade. There is also room for further European cooperation within the framework of the European Communities.

Figure 1 — Changes in surface air temperature, 1880-1980 (Reference 2) (Copyright 1981 by the American Association for the Advancement of Science)

Figure 2 — Changes in concentration of atmospheric CO_2 (parts per million) at Mauna Loa, Hawaii, 1958-82 (Reference 3)

Figure 3 — Heat balance of the atmosphere (Reference 4)

Figure 4 — Physical processes and properties that govern global climate and its changes (Reference 4)

References

(1) Allison, I. (ed)(1981). Sea level, ice and climate change. International Association of Hydrological Sciences Publication No 131.

(2) Hansen, J., Johnson, D., Lacis, A., Lebedel, S., Rind, D. and Russell, G. (1981). Climate impact of increasing atmospheric carbon dioxide. Science, *213*, 957-966.

(3) Keeling, C. D. (1982). The global carbon cycle: what we know and could know from atmospheric, biospheric and oceanic observations. (Review paper presented at US Department of Energy meeting, Carbon Dioxide, Science and Consensus, held at the Coolfont Conference Center, West Virginia, 19-23 September 1982).

(4) United States National Academy of Sciences (1975). Understanding climatic change: a program for action. Washington, National Academy of Science, National Research Council, US Committee for GARP.

Printed in the U.K. for Her Majesty's Stationery Office by Metclafe Cooper Limited London
Dd 0501 PS 5351607 C /85

192 JOB D5266-0683-02 HMSO D1-1 SIZE 48,0
REV:04-11 EXP:04-11 TC SIZ: 48

HER MAJESTY'S STATIONERY OFFICE
Government Bookshops

49 High Holborn, London WC1V 6HB
13a Castle Street, Edinburgh EH2 3Ar
Brazennose Street, Manchester M60 8AS
Southey House, Wine Street, Bristol BS1 2BQ
258 Broad Street, Birmingham B1 2HE
80 Chichester Street, Belfast BT1 4JY

Government publications are also available through booksellers

ISBN 0 10 000000 0

W.0934 13 December 1984

MR BARCLAY, NO 10

This minute and attachments need not trespass on the Prime Minister's valuable time in the next few days, but I felt I should, as a courtesy, send a copy of our report before it goes to the Summit countries generally through the Sherpas. The conclusions and recommendations are reproduced in Annex A of my minute.

RBN.

ROBIN B NICHOLSON

FROM:

THE RT. HON. LORD HAILSHAM OF ST. MARYLEBONE, C.H., F.R.S., D.C.L.

HOUSE OF LORDS,
SW1A 0PW

PRIME MINISTER

12 Dec: 84

BH 19/12/84 to establish whether Lord Chan wishes to attend mtg.
Dwg 12/12

AGRICULTURE AND CONSERVATION

1. In his minute of 30th November 1984 to which he attaches a paper prepared by officials, the Secretary of State for the Environment leads further detailed discussion on this area for which you commissioned further work.

2. The proposals would involve primary legislation amending the Wildlife and Countryside Act 1981 beyond blocking the "three months' loophole". As controversy on such matters has proved so rife in the past with all that means to the progress of our business, I incline towards his first alternative on handling, that is to say that collective consideration (possibly in H Committee) could prove valuable at this stage.

3. I am copying this minute to colleagues on H Committee, to Geoffrey Howe, Michael Jopling, Grey Gowrie, David Young and John Gummer and to Sir Robert Armstrong.

H. of S. M.

12 December 1984

cc MAFF
FCO
Capt Gen at Arms
CO
CDLO
PGO
CS, HMT
DTRANS
CWO
DM
WO
SO
NIO
DES
HO
DHSS
LCO
LPSO
LPO

10 DOWNING STREET

From the Private Secretary

10 December 1984

Agriculture and Conservation

The Prime Minister considered over the weekend your Secretary of State's minute of 30 November, with which you circulated a report by officials on the subject of agriculture and conservation.

The Prime Minister agrees that these issues need to be considered by Ministers collectively, and she wishes to take the chair herself at an initial discussion. Because of the Prime Minister's forthcoming overseas visit, it will not be possible to arrange such a meeting before the New Year. We will be in touch with those concerned to identify a time.

I am sending copies of this letter to the Private Secretaries to members of H Committee, to Colin Budd (Foreign and Commonwealth Office), Ivor Llewelyn (Ministry of Agriculture, Fisheries and Food) and Richard Hatfield (Cabinet Office).

David Barclay

Andrew Allberry Esq
Department of the Environment.

10 DOWNING STREET

Prime Minister ①

Agree to take this forward as recommended on page 4?

AT

2/12

PRIME MINISTER 7 December 1984

AGRICULTURE AND CONSERVATION

Patrick Jenkin has provided a well-documented paper which offers a range of feasible options. The problems we face are:

(1) The voluntary principle of the Wildlife and Countryside Act, 1981 is landing us with hefty bills (£18 million this year) whose growth (£49 million expected in 1989/90) is likely to be high. Although £49 million is not a high price to pay for our landscape (less than we spend on arterial drainage) its growth needs to be limited in some way.

(2) Payments in return for not doing something is repugnant to most people, particularly when the recipients happen to be prosperous.

(3) Capital grants for environmentally harmful farming operations are red rags to the large and growing conservationist sentiment; they also drive up the cost of "compensation".

(4) The present arrangements simply do not provide adequate, and in the last resort, assured protection for the countryside. Farm buildings (below a certain, large size) and farm roads are totally exempt from planning

controls; they are not covered by management agreements, either. Land use in designated parts of the country is covered by these agreements, but in the last resort, if money fails to dissuade farmers, there are no powers to restrain them doing as they please with their land.

Planning controls over all aspects of agriculture - buildings, roads, land use, farming operations such as drainage, afforestation projects - would solve all four problems. But they would create others - administrative costs, wasted time on enquiries, inefficiency. They would be deeply unpopular with farmers and could forfeit their goodwill towards conservation, on which any conservation policy ultimately relies. The officials' paper offers planning controls as an option but Patrick Jenkin discards this in his covering letter, quite rightly in our view.

Selective planning controls and reserve powers make much more sense however. The paper offers two suggestions:

(1) planning controls over farm and forestry buildings and roads in sensitive areas;

(2) powers to apply Landscape Conservation Orders (LCOs) by local planning authorities, in consultation with the Countryside Commission, as a long-stop.

The first is a sensible extension of planning control. It is anomalous that farmers are free, under present

arrangements, to blight landscapes by insensitive positioning of buildings and roads just because these have a farming function, whereas non-farm building is closely controlled.

The second measure would be able to resolve situations like Halvergate where the Broads Authority is having to pay up to £160 an acre per year to conserve the characteristics of a landscape which is internationally famous. The Authority is having difficulty in committing these sums, with 75% or even 90% grant aid. The local authorities which constitute the Broads Authority baulk at paying wealthy farmers substantial sums for "doing nothing" at a time when LAs are having to make savings by, for example, reducing teaching posts.

The key decision at this stage is whether to go down the selective controls and reserve powers route, or whether to throw more money at the problem. MAFF will resist the controls option and argue that it is the thin end of a long wedge, which will threaten the voluntary principle. In our view, there has to be some reserve power to guarantee uniquely attractive landscapes. Because we are powerless to guarantee the preservation of landscape, we are failing to gain the credit we deserve for the Wildlife and Countryside Act, which is having a beneficial effect on farming attitudes and which contrasts to Labour's complete indifference to the trend towards prairie farming in the 1970s. Reserve powers will also condition and limit the cost of management agreements, which will remain the standard approach, which will increase in number and which can be excessively costly individually

(around 40% of the gross revenue from an acre of good cereal land).

Agreed

We recommend that you chair a short meeting, at which you could, if you agreed with the approach above, steer the Departments concerned firmly along the limited planning control route. Without this steer, H could get bogged down on this issue, and there is not time for this. H could then deal with the arrangements for extending the holding operation on Halvergate on the basis that reserve powers would be available from 1985-86. Without this prospect the costs of preserving Halvergate will be that much higher, if indeed it is possible at all. We will brief in more detail prior to the meeting, at which you may also wish to give a steer to two other live conservation topics:

- making capital grants more environmentally sensitive (unanimous agreement here in principle by the Countryside Commission, the National Farmers Union and the County Landowners Association);

- the Government response to the Countryside Commission's thoughtful policy document "A Better Future for the Uplands".

Nicholas Rathbone

NICHOLAS OWEN

H Booth.

HARTLEY BOOTH

cc TF
Questions
Pers

COUNCIL OF ENVIRONMENT MINISTERS - 6 DECEMBER 1984

STATEMENT

WITH PERMISSION, MR SPEAKER, I SHOULD LIKE TO MAKE A STATEMENT ABOUT THE MEETING ON 6 DECEMBER OF THE COUNCIL OF ENVIRONMENT MINISTERS, AT WHICH I WAS ACCOMPANIED BY MY HON FRIEND, THE HON MEMBER FOR COVENTRY SOUTH WEST, PARLIAMENTARY UNDER SECRETARY AT THE DEPARTMENT OF TRADE AND INDUSTRY. THE COUNCIL EXPRESSED ITS SENSE OF SHOCK AT THE RECENT DISASTER IN BHOPAL, AND CONVEYED ITS DEEPEST SYMPATHY TO THE GOVERNMENT OF INDIA AND THE PEOPLE AFFECTED. THE COUNCIL DISCUSSED LEAD IN PETROL, OTHER VEHICLE EMISSIONS, THE LIMITATION OF NO_2 IN THE ATMOSPHERE, THE ESTABLISHMENT OF A COMMUNITY INFORMATION SYSTEM ON THE ENVIRONMENT, AND DRAFT DIRECTIVES ON EMISSIONS FROM LARGE COMBUSTION PLANTS, EMISSIONS FROM TITANIUM DIOXIDE PLANTS, AND THE RECYCLING OF BEVERAGE CONTAINERS.

ON LEAD IN PETROL, THE COUNCIL REACHED AGREEMENT ON A DIRECTIVE WHICH PROVIDES FOR THE INTRODUCTION OF UNLEADED PETROL THROUGHOUT THE COMMUNITY NOT LATER THAN 1989, OR EARLIER IF INDIVIDUAL MEMBER STATES WISH. THE MINIMUM OCTANE LEVELS OF PREMIUM GRADE UNLEADED PETROL WILL BE 95 RON, 85 MON, AT THE PUMP. THE OCTANE NUMBER OF ANY ADDITIONAL UNLEADED REGULAR GRADE WAS LEFT FOR MEMBER STATES TO FIX. FORMAL ADOPTION OF THIS DIRECTIVE MUST NOW AWAIT RECEIPT OF THE OPINION OF THE EUROPEAN PARLIAMENT.

ON POLLUTING EMISSIONS FROM PETROL-ENGINED VEHICLES, THE COUNCIL AGREED TO ESTABLISH A HIGH-LEVEL WORKING GROUP OF OFFICIALS TO REPORT BY THE END OF JANUARY ON THE ALTERNATIVE ROUTES AVAILABLE TO SECURE REDUCTIONS IN THESE EMISSIONS. THIS WORK WILL PROVIDE THE COUNCIL WITH AN ASSESSMENT OF RELEVANT TECHNOLOGIES AND EXAMINE WHETHER THERE SHOULD BE DIFFERENT SOLUTIONS FOR DIFFERENT SIZE CARS. IT WILL TAKE INTO ACCOUNT ENERGY AND PRODUCTION COSTS AND EUROPEAN TRAFFIC CONDITIONS.

A DIRECTIVE ON AIR QUALITY STANDARDS FOR NITROGEN DIOXIDE WAS AGREED WITH MINOR AMENDMENTS, AND SUBJECT ONLY TO A PARLIAMENTARY RESERVE BY THE UNITED KINGDOM. AGREEMENT WAS REACHED ON THE WORDING AND LEGAL BASIS OF THE FIRST PHASE OF AN INFORMATION SYSTEM ON ENVIRONMENTAL DATA IN THE COMMUNITY.

THE THREE OTHER PROPOSED DIRECTIVES - ON EMISSIONS FROM LARGE PLANTS, EMISSIONS FROM THE TITANIUM DIOXIDE INDUSTRY, AND THE RECYCLING OF BEVERAGE CONTAINERS- WERE NOT AGREED. THE UK HAD OBJECTIONS TO ALL THREE; IN NO CASE WERE WE ALONE IN HAVING SUCH OBJECTIONS.

THE COUNCIL ENDORSED A PROPOSAL BY THE UNITED KINGDOM THAT THE COMMISSION SHOULD BE INVITED TO CONSIDER, AND REPORT ON, WAYS OF ENSURING THAT ENVIRONMENTAL CONCERNS ARE TAKEN INTO ACCOUNT IN THE COMMUNITY'S AGRICULTURAL POLICIES. I ALSO RECORDED OUR CONCERN THAT THE COMMISSION'S RECENTLY PROPOSED DIRECTIVE ON MOTORCYCLE NOISE DOES NOT GO FAR ENOUGH IN DEALING WITH THE SMALLER ENGINE CAPACITY MACHINES OR IN SETTING A SUFFICIENTLY EARLY TARGET FOR REDUCTIONS.

010

2 MARSHAM STREET
LONDON SW1P 3EB
01-212 3434

DMB
30/11

My ref:

Your ref:

30 November 1984

Dear David

GOVERNMENT RESPONSE TO SELECT COMMITTEE REPORT ON ACID RAIN

On 9 November 1984 I wrote to you seeking the agreement of the Prime Minister and Cabinet colleagues to the publication of the Government's response to the House of Commons Environment Select Committee's report on acid rain.

I now enclose a copy of the final printed version. My Secretary of State intends to announce publication to the House in answer to a Parliamentary Question on Monday 3 December. The contents of the response should of course be regarded as strictly confidential until then.

Copies of this letter and the accompanying document go to the Private Secretaries to members of the Cabinet, the Paymaster General and Sir Robert Armstrong and to Bernard Ingham.

Yours ever

Andrew

ANDREW ALLBERRY
Private Secretary

David Barclay Esq

010

CC NO

A

Await Policy Unit

Prime Minister

AGRICULTURE AND CONSERVATION

You commissioned further work on this area, especially over the compensation principle underlying management agreements for conservation and on the definition of a back-up "stop" power. I attach a paper prepared by officials which examines the issues involved.

In general, the Wildlife and Countryside Act appears to have substantially strengthened the well-established voluntary approach to the safeguarding of important sites. This approach is working satisfactorily and reasonably inexpensively in most parts of the country, subject however to some provisos below. Given the encouraging signs of increasing co-operation by farmers, it would, in my view, be quite wrong to abandon the voluntary principle to which we are strongly committed. After our previous meeting, you endorsed the need for us to accept one immediate amendment - namely the blocking of the so-called " 3 month loophole ". Government time was not available for this, and the achievement of this objective now rests on the fortune of a Private Member's Bill - not all of which we can support, introduced by David Clark MP.

I do, however, share the Chief Secretary's concern, expressed in his minute to you of 27 July, about the costs of site safeguard. Officials have looked carefully at the financial implications both of the present regime and of the main options for change; it is, however, clear that on the basis of the available information it is too soon to

make clear recommendations for cost saving. Although disappointing, this is hardly surprising - the Act has been in effect for too short a time for any firm extrapolation from the relatively few agreements to be made. More work needs to be done on this as the facts become known.

The critics who suggest that it is indefensible to pay out public money for positive conservation to match amounts that would be paid for under the agricultural grants schemes have a valid point. Some tightening of the grants scheme is therefore necessary, though the effect of this would be more in terms of removing an embarrassing anomaly than of saving significant sums of money.

We should also take immediate steps to guard against important landscapes being destroyed wilfully. The inter-Departmental group which has been considering the Countryside Commission's latest report on the uplands is likely to recommend that the Landscape Areas Special Development Order should be amended to control the design and location of farm and forestry buildings and roads in National parks and other sensitive areas; I think we should accept this modest tightening.

I should like also to pursue the proposal for landscape conservation orders, with a view to primary legislation in the 1985/86 session.

As we carry matters forward we will need to see what the Select Committee on the Environment concludes about the operation of the 1981 Act. I think we must accept that whatever we do the costs of site safeguard will rise in the next few years and that we must make appropriate provision for the agencies concerned. The heartland of the natural heritage if lost can never be replaced. (The sums involved are not in themselves overwhelming, peaking at some £35m at the end of the decade compared with the provision of £15.7m which we have now agreed for 1985/86.) We must, however, have a clearer idea of longer term consequences, and how costs could be kept down against a developing situation: and we must also ensure that the expenditure results in adequate protection. I therefore propose:

i. that consultants are employed to examine, by next September in time for the PES round, the expenditure and conservation implications of possible changes in the financial guidelines. MAFF should also be asked to bring to a head their work on agricultural grants and subsidies;

ii. that a new Landscape Areas Special Development Order should be made to extend control over farm and forestry buildings and roads in sensitive areas, as suggested in paragraph 30 of the Report.

iii. that legislative proposals providing for landscape conservation orders and nature conservation orders with permanent effect should be developed further, for consideration for introduction in the 1985/86 session, as suggested in paragraph 28 of the Report.

iv. that we reach a decision on the proposals for Conservation of the Broads landscape, set out in my paper H(84) 40 which was discussed at H on 13 November. H concluded that it would be preferable to reach conclusions on that specific issue when the report attached had been considered. The matter is becoming very urgent if we are to avoid another year of conflict over Halvergate.

Finally, I should be grateful for your guidance on handling. I hope we shall be able to discuss these matters soon since decisions are now needed on a number of issues. The Report itself has been extensively discussed by the relevant Departments, but if you wish, it would be possible for Ministers collectively (possibly in H) to consider the issues and report before any meeting with you. Alternatively, and following the earlier precedent, if you prefer we could go straight to a meeting with you and colleagues most closely concerned.

/ / I am copying this minute and the attached paper to colleagues on H, Geoffrey Howe, Michael Jopling and Sir Robert Armstrong.

PJ

P J

30 November 1984

RESTRICTED

AGRICULTURE AND CONSERVATION

REPORT BY THE DEPARTMENT OF THE ENVIRONMENT OF THE FINDINGS OF AN INTER-DEPARTMENTAL WORKING GROUP.

INDEX

INTRODUCTION

1. In July the Secretary of State for the Environment submitted to the Prime Minister a report by officials on agriculture and conservation. Further work was commissioned and the Department of the Environment set up an Inter-Departmental Working Group, on which MAFF, Treasury, DAFS, SDD, the Welsh Office and the Forestry Commission were represented. This report of that Working Group looks first at the general effectiveness of the compensation arrangements under the Wildlife and Countryside Act 1981; then examines ways in which changes might be made; and finally defines a "stop power" under the 1981 Act, describing how compulsory controls could also be introduced under planning legislation. The Group has sought not to shirk possible radical options, while drawing attention to some of the more serious practical and political objections to their adoption. Because the Act has been in operation for such a short time - the financial guidelines, for example, have been in effect for less than two years - and management agreements usually involve lengthy negotiations, there is insufficient data on which to base any costing of some options. The implications of these options can therefore only be described in general terms, making assessment difficult and risky.

ECUTIVE SUMMARY

The compensation principle underlying management agreements.
(paras 11-17)

2. The protection of key areas of the natural heritage currently relies on "**the voluntary approach**" : the willingness of landowners and tenants to maintain the wildlife or landscape interest of their land, if necessary through entering into management agreements with a conservation agency. The Wildlife and Countryside Act 1981 was a major step forward and has led to a substantial increase in the number of important sites brought under protection. From the demand for agreements and for conservation advice from ADAS and from the public pronouncements of representative organisations, such as the National Farmers 'Union and the Country Landowners' Association, it is evident **that owners and occupiers are becoming increasingly willing to co-operate** with conservation interests.

3. Since the Wildlife and Countryside Act came into effect, interest in environmental issues has grown. These issues have, for example, been debated at all the major Party conferences this year; the Select Committee on the Environment is holding an inquiry into the workings of the Act this autumn; and environmental pressure groups are steadily increasing in size and becoming better informed. Given this background, it is not surprising that there is mounting concern about landscape and habitat protection.

4. Criticism has focussed on two aspects of the present arrangements: (i) the extent to which a policy largely dependent on **voluntary co-operation** can succeed, particularly in the face of opposition from a minority of farmers; and (ii) **the rising costs** of maintaining such a policy. As one critic of the Act put it: "By

ing on the compensation system, the Government traps itself between a rock and a hard place - either it pays out large sums of public money or it allows nationally important sites to be lost."

Cost-cutting changes in the compensation arrangements (paras 18-28)

5. The Group has considered the following options:

(i) **limiting the number of SSSIs (para 19)** Would limit the number of site acquisitions and management agreements. Selection of sites would be difficult and the existing criteria for selection are widely regarded as identifying only those areas which it is essential should remain inviolate as an adequate sample of habitats. NCC unlikely to co-operate. Very controversial primary legislation necessary;

(ii) **limiting the funds available to the NCC (para 20)** Would lead to considerable criticism initially. Subsequent destruction of a succession of sites would result in repeated bouts of controversy and criticism;

(iii) **changes in agricultural subsidies (paras 21-24)** Long-term effects unpredictable and difficult to promote conservation-oriented changes. MAFF already pursuing with EC question of support for farming by traditional methods in environmentally sensitive areas;

(iv) **changes in the agricultural grant system(paras 25-27)** Reductions in capital grant payments could help to reduce pressure for and cost of compensation, especially in the long-term, but any savings are likely to be small in relation to the total costs of site safeguard. Variety of options;

Could lead to discrimination against farmers in designated areas, and consequently to pressure for a right of appeal against designation. Could make farmers hostile to conservation. Would be likely to cause particular problems in upland areas;

(v) **replacing annual payments with one-off payments related to net income foregone over a limited period (para 27)** Long term savings, but high costs initially. Would reduce the attractions of the voluntary approach. Some valuable landscapes would be lost, with obvious political implications;

(vi) **withdrawal of annual payments option (para 28)** Simpler and cheaper than option (v) but again high initial costs. Would need compulsory back-up if landowners still to enter into agreements;

Definition of "stop" powers (paras 29-32)

6. The Wildlife and Countryside Act 1981 already provides "stop" powers to safeguard sites on nature conservation grounds: damaging operations may be prevented by order for up to 12 months and the NCC can then buy the site. There are two ways of introducing compulsory landscape protection powers:

(i) **amending the Wildlife and Countryside Act to enable landscape conservation orders to be made on the same lines as nature conservation orders under section 29 (paras 30-31).** Would require primary legislation. Would increase local authorities' administrative costs. Appeal provisions necessary with consequential staff implications for Government departments. Would almost certainly increase the demand for management agreements but threat of compulsion might reduce costs of individual agreements;

(ii) **imposing more planning controls on agricultural and forestry uses (para 32)** Measures under existing legislation could only bring more building and engineering operations under control. Primary legislation necessary to control the use of land for agriculture and forestry: would be against Government planning policy generally,less flexible than management agreements, involve definitional problems, and might lead to high administrative and compensation costs.

Conclusions

7. The broad choice before Ministers is whether to:

- continue the present policy mix, which, despite its shortcomings, is not without defenders;
- seek to make relatively modest adjustments under existing legislation, essentially limited to restricting the availability of farm capital grants and extending the planning regime slightly; or
- go for much more sweeping changes.

Any major changes would, undoubtedly prove highly contentious. They would almost all involve primary legislation, quite likely leading to a re-run of the debates over the Wildlife and Countryside Bill. Significant cost savings could not be easily delivered and some changes, given the complex links in the present system, could have untoward effects such as driving upland farmers out of business.

8. If Ministers indicate the general direction in which they wish to move, officials will work up possibilities as necessary. Further work is anyway likely to

-- needed fairly soon, in response to the Select Committee report on the operation of the Wildlife and Countryside Act or perhaps in the course of preparing a possible MAFF White/Green Paper on agricultural policy. It is certain that the whole question of the relationship between agriculture and conservation - which was too large for the Working Group to consider - will not go away.

THE COMPENSATION PRINCIPLE UNDER THE WILDLIFE AND COUNTRYSIDE ACT 1981

Background

9. The background to the principle of generous compensation for not undertaking environmentally damaging operations is described at Annex A.

Effectiveness

10. The system of site safeguard under the Wildlife and Countryside Act is, at this early stage, generally proving effective. Unlike many other types of control, management agreements may be positive, **requiring certain activities to be undertaken as well as preventing others. Habitats usually depend on the maintenance** of existing agricultural practices; allowing sites to return to their natural state can be as harmful as more intensive agricultural use,so that some sort of positive encouragement is necessary. The NCC's management agreements already protect over 12,000 hectares and the 600 now under negotiation will cover a further 54,000 hectares; farmers and other landowners are becoming increasingly co-operative. Although some proposed and existing SSSIs have been damaged (156 in the twelve months to the end of March 1984), most of the damage has not been serious. The NCC has requested Environment Ministers to use their "back up" powers to make nature conservation orders to delay potentially damaging operations in only ten cases and the Council has not had to purchase sites compulsorily at all since the Act came into effect. Landscape conservation measures have also been successful: the potential loss of grazing marshes in the Broads, for example, received considerable publicity but most of the sites have been safeguarded, at least temporarily, through management agreements. Perhaps the most important contribution of the Act is a **heightening of awareness** among landowners and tenants of the importance of conservation.

oblems

11. In recent years interest in environmental issues has mounted throughout the world. The "green lobby" has grown substantially, into political parties in some countries or, as in the United Kingdom, as responsible and well-informed pressure groups, supported by a significant part of the population. There were debates on the environment at all the Party conferences this year; newspapers have pursued prolonged environmental campaigns; and the Select Committee on the Environment is undertaking a major inquiry this autumn into the operation of the Wildlife and Countryside Act.

12. The site safeguarding provisions of the Act are so significant that they have inevitably atracted attention. Criticism has focussed on two aspects:

(i) the inability of the voluntary approach to protect sites of great landscape value if their owners are unwilling to co-operate There is a danger that owners will refuse to co-operate and will instead completely destroy the landscape value of certain areas. Means of introducing an element of compulsion to prevent damage are described in paras 29 to 32;

(ii) the rising costs of site safeguard Because many more management agreements are being made than was originally expected, the additional costs of site safeguard attributable to the Act are likely to rise well above the £600,000 to £700,000 estimated when the Bill was first presented. The potential costs are described in paras 15 to 17 below and ways of reducing them are examined in paras 18 to 28.

ts

13. Because the NCC does not expect to complete the task of notifying all owners and occupiers of SSSIs until 1988 and because management agreements often involve lengthy negotiations, **the costs of site safeguard have not yet risen substantially above those originally envisaged.** The NCC's 154 agreements since the Act have cost over £400,000 in lump sum payments and about £70,000 in annual payments. Site acquisitions have cost about £2,750,000. As for agreements made by other authorities, by 1 September National Park Authorities, the Broads Authority and local planning authorities had concluded 19 agreements involving some financial consideration, costing £75,000 in lump sum payments and (with two earlier agreements) £70,000 in annual payments; they were negotiating agreements which would cost a further £100,000. (They had also made more than 30 agreements involving no financial consideration.) Annex B shows the present and forecast costs of site safeguard in relation to the total costs of the main agencies involved.

14. Although the current estimates of the total costs of site safeguard payments are higher than those made when the Bill was introduced, **individual agreements have generally not been expensive.** Table I below shows, for example, that more than half the NCC's agreements are costing less than £30 a hectare a year in payments. The NCC keeps down costs wherever possible: it is often able to secure the future of important sites without formal agreements and, as already explained, many agreements involve no expenditure. All formal agreements and site acquisitions involving substantial sums of money are scrutinised by the District Valuer; ADAS is consulted, and the District Valuer is often involved in detailed negotiations with owners. **A few payments, generally relating to lowland sites, have, however, attracted considerable publicity because of their high costs;** in his letter of 30 July, the Prime Minister's Private Secretary drew attention to four of these, of which details are given in Annex C.

TABLE 1

ANALYSIS OF THE COST OF NCC MANAGEMENT AGREEMENTS

ANNUAL PAYMENTS PER HECTARE	£ 0-10	£ 11-20	£ 21-30	£ 31-40	£ 41-50	£ 51-60	£ 61-70	£ 71-80	£ 81-90	£ 91-100	£ Over 100	Total
% OF AGREEMENTS	37	6	10	10	6	6	3	2	0	1	19	100

15. As Annex B shows, costs are not expected to increase indefinitely but to "plateau out" at about £35 m or possibly rather more in the mid 1990s of which about a quarter would be compensation in respect of management agreements. Costs of this order to safeguard key parts of our natural heritage need to be seen in the context of other items of public expenditure. MAFF estimate that CAP price support was worth some £2½ billion to British agriculture in 1982; capital grants cost about £180 million, with some £60 million spent on arterial drainage in rural areas. Private sector forestry is encouraged by favourable tax treatment, while the Forestry Commission receives £60m a year. The Arts Council costs about £100m a year; the Royal Opera House alone receives a grant as large as the NCC's entire budget. Public expenditure on listed buildings (grants and administrative costs) is about £25 m a year.

OPTIONS FOR REDUCING COSTS

Range of Options

16. As explained above, the amount spent on site safeguard is determined by the number of sites safeguarded and the size of payments to protect individual sites. Maximum payments are currently determined by financial guidelines which take account of profits foregone so that landowners will be prepared to undertake conservation measures voluntarily. Reductions in the costs of site safeguard might be sought by:

(i) reducing the number of sites safeguarded This might be achieved either directly, by limiting the number of SSSIs, the main type of protected site, or indirectly, by reducing the funds available to the NCC, the body which spends most on site safeguard;

(ii) changes in the level of payments The profits forgone element in payments under management agreements could be reduced by changes in agricultural subsidies. Alternatively, the financial guidelines might be made less generous by: withdrawing compensation for capital grants foregone; replacing annual payments with one-off payments related to net income foregone over a limited period; or by the withdrawal of the annual payments option.

Each of these options is considered below.

Reducing the number of sites safeguarded: limiting the number of SSSI.

17. There were already 4,000 SSSIs in Great Britain, covering 1.4m ha, 6% of the total land area, when the 1981 Act came into effect, and there are a further 1200

s..es, covering some 179,000 ha, which the NCC intends to notify. The NCC considers the damage that has already taken place has reached crisis point and is opposed to letting any more important wildlife habitats be lost. Sites used to be graded according to their importance and the NCC still recognises that some are more significant than others, to be protected by purchase or the threat of purchase if necessary. The Council is, however, opposed to a more detailed grading sysem since the relative importance of sites varies over time with general changes in habitats. Further, because of the extensive destruction of significant habitats which has already taken place, the NCC argues publicly that it is **essential to protect those which remain.** DOE Ministers have sympathised with the Council's stance; in June, for example, launching the NCC's nature conservation strategy for Great Britain, the Secretary of State for the Environment said "I accept that the safeguarding of sites is vital". Without the NCC's co-operation on the restriction of sites, which would not be forthcoming, **primary legislation** would be needed; such legislation would have to be passed against a **background of criticism from the conservation lobby** in which the NCC would join.

Reducing the number of sites safeguarded : limiting the funds available to the NCC

18. Limiting the funds available to the NCC to a level less than that currently sought (which is above the PES provision) would mean that the Council would be unable to protect as many sites as it has declared is necessary. A reduction of £1m in the annual budget for management agreements would, if the present costs and distribution of agreements were maintained, result in about 250 fewer agreements each year, with an additional 21,100 ha. left unprotected. There would be **continuing criticism** from the conservation lobby that the NCC was being starved of funds to do its job and as each site was damaged there would be fresh criticism of the Government.

nges in the level of payments : changes in agricultural subsidies

19. The Common Agricultural Policy (CAP) provides the basic framework within which the agricultural industry operates in this country. The CAP has, since its inception, encouraged **increases in agricultural production** and has thus been a major element in the pressure for more intensive (and sometimes more environmentally damaging) farming. The CAP is beginning to change, and pressure to reduce the level of support given could reduce the pressure for intensive farming. Any major changes will, however, take a long time to negotiate and some of the changes in prospect seem likely to make conservation **more difficult** (for example, if the livestock sectors are more harshly treated than arable sectors). It is, in any case, by no means certain that an overall downward pressure on farm incomes will be helpful to conservation; the view of both the NCC and the Countryside Commissions is that an efficient and prosperous agricultural industry is essential for effective conservation.

20. EC policy towards agriculture structures is broadly directed towards supporting the family farm and the proposed EC Structures Regulation includes no measures to encourage the current general trend on the continent towards less fragmented and larger units. The UK has proposed **amendments to the draft Regulation** which would allow payments to encourage traditional farming methods in environmentally sensitive areas and permit the withholding of grant on conservation grounds. It is not yet clear whether the amendments will be accepted. **An experimental scheme in the Broads** (where farmers would be given headage payments for cattle, to maintain existing pasture) is regarded as urgent by DOE and MAFF but Treasury has not so far agreed to it.

21. In addition to CAP market support, the Government provides direct assistance to farmers in the United Kingdom through capital grants (an estimated £140 m in 1985/86 following reductions of £30m in last year and £40 m in the latest PES round) and hill livestock compensatory allowances (£100m). In Treasury's view, as a general principle, the continued payment of capital grants conflicts with the objectives of conservation policy. One of the objectives of the capital grants schemes is to encourage additional output; by definition they also increase the incentives towards capital - intensive agriculture and the pressure on the rural environment and landscape which intensive agriculture brings with it. Even the NFU policy document "The Way Forward" and recent work carried out by the Country Landowners Association recognise the need for some reform of the grant system to take more account of environmental factors. Treasury considers that conservation policy strengthens the case for a significant reduction in capital grants generally.

22. The Agriculture Departments take a different view. While accepting that in certain individual cases the availability of grant aid might encourage a farmer to undertake an investment which could have damaging environmental consequences, the capital grant system itself is not in principle hostile to conservation. It can and does produce environmental benefits, for example by encouraging investment to control pollution and assisting measures (such as hedge planting and the building of stone walls) which enhance the landscape and wildlife interests. More importantly, it helps to maintain agriculture in a state which enables it to make its essential contribution to conservation.

Changes in the level of payments: changes in the agricultural grants system

23. There has been more detailed criticism of the relationships between capital grants and management agreements: for example, of the provision whereby a farmer who is refused a capital grant on conservation grounds must be offered a management

eement which includes a payment incorporating an element in respect of capital grant foregone. No reliable estimate can as yet be made to the extent of the savings in the cost of site safeguard which removal of this element might produce. Although most NCC agreements which include provision for payments based on capital grant foregone, details are available in only eight cases. Of these, the capital grant element accounts for, an average, about 17% of the total annual payments. Only one of these eight cases relates to an agreement in the uplands, where the capital grant element represented over 80% of the total compensation.

24. A number of ways of removing this element fall to be considered:

i) **removal from the grant schemes of items deemed to be environmentally damaging.** Certain categories of grant aid expenditure have caused particular adverse comments from the conservation lobby. Over the years changes have been made in the schemes to remove a number of such items (eg grants for hedge removal and more recently for land improvement in the lowlands); but drainage grants remain the subject of adverse criticism. MAFF are about to issue a consultation paper on the future administration and finance of arterial drainage and changes may be in prospect. In respect of field drainage, on which expenditure in 1983/84 is likely to be some £55-60m, the CLA Advisory Group on the Integration of Agricultural and Environmental Policies have recently suggested that schemes should be subject to prior approval. On the other hand, grants for both field and arterial drainage are being substantially reduced (in certain cases by as much as half) following the latest PES round. More generally, few if any of the items currently eligible for grant could be said always to be environmentally damaging. Many could lead to damage in particular cases, but it would be impossible to remove all of these from the schemes without defeating their overall objectives.

ii) **withdrawal of grant in sensitive environmental areas (eg SSSIs, National Parks, AONBs)** The Agriculture Departments' view is that this option would lead to unreasonable discrimination against farmers in these areas, in return for very little environmental gain. Recent figures in National Parks for instance showed out of 2,757 notifications by farmers with intention to claim land, only 6 gave rise to objections by the National Park Authority which could not be satisfactorily resolved between the applicant and the Authority. On the other hand, the Treasury argue that the environmental gains from the withdrawal of grant in sensitive areas cannot easily be assessed from the recent experience in National Parks. Removing capital grants would they feel shift the balance of negotiating advantage between the individual farmer and the National Park Authority. Officials do, however, agree that by discriminating between farmers inside and outside the designated areas, this option could attract pressure for an appeals procedure against the notification of SSSIs. And DOE and the Agriculture Departments believe that it could also seriously affect the viability of farming enterprises in those parts of the less favoured areas which fall within National Parks, AONBs and SSSIs.

iii) **withholding grant aid on individual projects following a Ministerial decision** In SSSIs, National Parks and AONBs, grant aid could be withheld in those individual cases where, in Ministers' view and following an objection from the NCC, the National Park Authority or the local authority, the environmental cost outweighed the agricultural benefit. This would mean that following such a Ministerial decision, any subsequent management agreement would not take account of the grant element in the assessment of the compensation payable. This change would thus remove one much criticised aspect of the present arrangements: namely, that a farmer should be entitled to receive public money, from one source or another, in respect of work which is environmentally damaging. On the other hand the financial savings arising from this change would be likely to be small in relation to total expenditure on

site safeguard, and the additional administrative cost would be significant owing to the need to consider every case individually (it would be quite impracticable to try and devise criteria for general application). There would also be the risk that the arrangement would lead to greater conflict between farmers and the conservation agencies, and in turn between the conservation agencies themselves and Ministers. In political terms, this could well lead to public disputes between different Governmental agencies.

Changes in the level of payments: replacing annual payments with one off payments related to net income foregone over a limited period

25. Management agreements typically run for 20 years; relating payments under management agreements to profits foregone in a shorter period would inevitably produce savings. The savings would depend on the period chosen which, for agreements to be attractive to landowners and tenants, would have to be fairly long. In practice, for public expenditure reasons and to avoid recipients being heavily taxed on their capital receipts, the lump sum would need to be spread over a number of years. Arrangements would have to be made to "claw back" payments made to tenants if tenancies changed hands. Although there would be overall savings in the long term, this option would not reduce the costs of agreements in the next few years.

Changes in the level of payments: withdrawal of annual payments option

26. The existing lump sum alternative offered to owners and occupiers, under the guidelines, based on the loss in capital value of the land caused by the management agreement, is consistent with the usual principles of land compensation. This is a cheaper option than annual payments for loss of profits because market value takes into account additional factors such as supply of land, yields in property markets

a tax incentives relating to agricultural land. District Valuers have examined twenty (not necessarily representative) agreements on which the annual payments are about £129,000 in total. Lump sum payments for the same agreements would amount to just over £273,000 so that, although initial costs might be higher, there would be substantial savings in a relatively short time if this method were adopted. It would also be a **very much simpler system** for the NCC and other authorities to operate. In practice, for the reasons given in paragraph 29, the lump sum would need to be spread over a number of years and special arrangements would have to be made for tenants. There is, however, the big drawback that **the lump sum is already perceived by owners as the less attractive alternative**; if it were the only option, farmers would be less likely to enter into management agreements and, **without some form of compulsory back-up, valuable landscape would be destroyed.**

INTRODUCING COMPULSORY MEASURES TO PROTECT SITES ("STOP" POWERS)

27. Rural areas of outstanding landscape value are uniquely vulnerable, dependent on their owners and occupiers for protection. Similar areas of outstanding wildlife interest may, as a last resort, be compulsorily acquired by the Nature Conservancy Council, while important "townscapes" are subject to strict planning controls. Additional safeguarding of country landscapes might be achieved either under the Wildlife and Countryside Act or under planning legislation.

Extending the safeguarding provisions of the Wildlife and Countryside Act 1981

28. Under Section 29 of the Wildlife and Countryside Act, **a nature conservation order** may be made to prevent potentially damaging operations being carried out on an SSSI for up to twelve months and the NCC has reserve powers to **compulsorily purchase** sites when no agreement can be reached. **Primary legislation** would be necessary to provide comparable powers to protect sensitive landscape areas. The most suitable pattern would probably be a power given to local planning authorities to make landscape conservation orders prohibiting the carrying out of potentially damaging operations,as previously defined by the authority in consultation with the Countryside Commission. **A right of appeal** to Ministers would be necessary, with Ministerial power to amend or revoke an order following an appeal. Such orders could be made **without any limit to their duration,** subject to provision for compensation to be payable which would obviate the need for any back-up powers of compulsory purchase to be provided. A skeleton frame-work of the possible statutory provisions is at Annex D. (At the same time, to strengthen the powers to protect SSSIs, section 29 of the Act could be amended to make nature conservation orders applicable permanently.)

29. The advantage of extending the existing "stop" powers under the Act in this way would be that local planning authorities would have the ability to impose safeguarding requirements instead of depending on the co-operation of owners and occupiers. It would avoid, for example, some of the problems which have arisen from well-publicised proposals to plough in the Broads. If the provisions were to be made comparable with those for nature conservation orders, allowance would need to be made for compensation. There would, however, be administration costs for local authorities and appeals and consequent inquiries could be expensive for Departments to operate. Further, the notification arrangements would amost certainly substantially increase the demand for management agreements and hence costs. Finally, "stop" powers do not themselves secure the sympathetic management of land by farmers in the conservation interest. This can only be achieved by positive incentives.

Imposing more planning controls on agricultural development

30. Compulsory site safeguarding could also be introduced through the planning system. The existing planning controls on agriculture in England and Wales and ways in which they might be extended are described at Annex E; a separate, but broadly comparable, planning system operates in Scotland. The main options are either to bring, by order, more building and engineering operations under control or to amend the primary legislation to cover the agricultural and forestry use of land. Both options might involve compensation and would run counter to the Government's policy of relaxing planning controls. Again, they would do little to encourage positive, sympathetic land management. A new Landscape Areas Special Development Order to cover the design and location of form and forestry buildings and roads in National Parks would, however, be both popular with landscape conservationists and inexpensive in that compensation rights would be avoided; although National Park Authorities could use their existing powers to pay discretionary grants in suitable circumstances.

CLUSIONS

31. The present principle of compensation for not undertaking operations which would damage sites of wildlife or landscape value is a fundamental part of the voluntary approach to conservation. This approach was adopted in the immediate post-war period, but demand for compensation has grown sharply as a result of the notification arrangements in the Wildlife and Countryside Act. Site safeguarding costs have consequently increased but the voluntary approach has generally been successful in protecting important sites. There could, however, be difficulties if owners of outstanding landscapes are not prepared to reach agreement on reasonable terms and there have been criticisms of the overall costs and individual amounts of compensation. Nevertheless, most agreements so far have been inexpensive and the total costs, although very much higher than expected, are not huge in absolute public expenditure terms. The voluntary approach has widespread support, as well as some critics, and farmers and other landowners are becoming increasingly co-operative. The Government - and individual Ministers - have frequently voiced their commitment to it.

32. There is scope for some action to reduce costs without primary legislation. A limit could be placed on the funds available to the NCC, although this would provoke strong criticism from the conservation lobby. The financial guidelines which determine payments under some management agreements may be readily altered, but to make agreements less attractive without introducing more compulsion into conservation would make the destruction of important landscapes much more likely. Changes in the system of farm capital grants, and in particular a reduction in the overall level and rate of grants, could, especially in the long term, reduce the pressure for and costs of compensation, although the implications for the viability of farms in upland areas would need to be carefully considered. In the long term, changes in the Common Agricultural Policy may reduce costs but these are still

unpredictable. Most compulsory measures to protect landscapes would require primary legislation, although more building and engineering operations carried out on agricultural or forestry land could be brought under planning control by amendments to the General Development Order or the Landscape Areas Special Development Order.

33. If Ministers were prepared to countenance primary legislation - which would undoubtedly prove as highly controversial as the Wildlife and Countryside Bill - there are further options. The number of SSSIs, for example, could be made subject to Ministerial control; compulsory measures to protect sites of outstanding landscape value, comparable to those which already exist for sites important for wildlife, could be introduced; or agricultural and forestry uses of land could be brought within the ambit of planning controls. As well as being contentious, such legislation might, however, give rise to its own substantial compensation liabilities and would be unlikely therefore to produce any overall cost savings. Moreover, it might well fail to secure the sensitive management of sites which is necessary for effective conservation.

34. Ministers will, therefore, wish to consider:

(i) maintaining the existing policy;

(ii) making changes which do not require primary legislation, essentially limiting the funds available to the NCC; reductions in capital grants; other adjustments to the farm capital grants regime; and extending planning controls slightly over building and engineering operations carried out on agricultural and forestry land;

(iii) amending primary legislation, particularly the Wildlife and Countryside Act itself.

35. When Ministers have decided which of these broad options they favour, officials will need to examine the possibilies within it in more detail. Many of the issues involved are already being considered in other contexts; a Government response to the Countryside Commission's report on the uplands is being prepared; discussions on the draft EC Agricultural Structures Regulation raise questions of the effects of agriculture on the environment; and the report of the Environment Select Committee on the operation of the Wildlife and Countryside Act is certain to give rise to more debate and will probably need a detailed Government response. Public interest in the relationship between agriculture and conservation seems certain to grow, so that further work done now will be useful preparation for the future.

BACKGROUND TO COMPENSATION PRINCIPLE

1. The approach to site safeguarding in the Wildlife and Countryside Bill when it was first presented to Parliament was very similar to that of earlier legislation. The basic principle was already that protection is best achieved through the voluntary co-operation of farmers and landowners. The NCC and National Park authorities had powers to make management agreements, which had not proved unduly expensive; the NCC, for example, was making less than 50 agreements a year. The NCC had back-up powers of compulsory purchase but there were no comparable powers for authorities concerned with landscape conservation. The Bill was, however, substantially amended during its passage through Parliament so that the NCC was given a new duty to notify owners and occupiers of Sites of Special Scientific Interest (SSSIs) on their land and to provide them with full details of potentially damaging operations requiring prior notice. Notification by the NCC has triggered a large number of management agreements: 154 have been concluded since the Act came into effect and another 600 are being negotiated.

2. The 1981 Act required payments under NCC and some other management agreements to be made in accordance with guidance given by Ministers. This guidance is contained in DOE/MAFF Circular 4/83 (Welsh Office Circular 6/83) "Financial Guidelines for Management Agreements". In accordance with the voluntary approach, the compensation arrangements are designed to encourage farmers to enter into management agreements, with the financial guidelines intended to ensure that the conservation option is no less financially attractive than the potentially damaging agricultural operation. An owner-occupier may choose between two methods of compensation: a lump sum based on the difference in the capital value of his land with and without the restrictions imposed, or annual payments related to the amount of profit foregone by accepting

restrictions. Tenants are only offered annual payments. National Park authorities are not bound by the financial guidelines exce t insofar as agreements are offered following a successful objection to an application for farm capital grant (there are no such agreements to date); nor are the Broads Authority or other local planning authorities.

COSTS OF SITE SAFEGUARD 'BASED ON THE AGENCIES' ESTIMATES; COSTS FOR LATER YEARS INEVITABLY HIGHLY SPECULATIVE)

1. NCC

£m CASH PRICES

	1984/85	1985/86	1986/87	1987/88	1988/89	1989/90
TOTAL EXPENDITURE						
Estimates	15.6*					
Additional	2.55					
Total	18.15	23.69	29.86	35.92	43.2	48.6
of these totals:						
SITES SAFEGUARD						
Site purchase	2.0	2.1	3.7	6.6	9.6	11.5
Grant for land purchase	0.4	1.0	1.1	1.1	1.1	1.2
Management agreements and other leases**	2.1	3.3	4.6	6.1	7.6	9.4
Staff and other Revenue costs	7.2	9.5	10.2	10.2	10.8	11.2
Total	11.7	15.9	19.6	24.0	29.1	33.3

*Includes £1.25m for move to Peterborough
**Estimates based on the costs of agreements currently under negotiation

2. NATIONAL PARKS

£m CASH PRICES

	1984/85	1985/86	1986/87	1987/88	1988/89	1989/90
TOTAL EXPENDITURE	10.00	10.49	11.05	11.63	12.27	12.98
SITE SAFEGUARD						
Management agreements*	0.15	0.25	0.40	0.55	0.75	1.00
Other conservation expenditure**	1.44	1.50	1.56	1.62	1.68	1.75
Total	1.59	1.75	1.96	2.17	2.43	2.75

*Based on experience of the special fund for first year, costs estimated by the Countryside Commission. Includes administrative costs at 30-40%.
**Extrapolated from NPAs' forecost outturn for 1984/85, assuming an annual 4% cash increase Includes administrative costs of about 50%.

3. BROADS AUTHORITY

£m CASH PRICES

	1984/85	1985/86	1986/87	1987/88	1988/89	1989/90
TOTAL EXPENDITURE						
SITE SAFEGUARD						
Management agreements*	0.05	0.2	0.3	0.4	0.5	0.6

*Assumes no experimental headage scheme which could lead to higher costs initially but possible long-term savings.

4. LOCAL AUTHORITIES

Negligible expenditure on site safeguard because of public expenditure constraints.

5. FUTURE TOTAL COSTS

Costs are not expected to rise indefinitely. The NCC has recently drawn up a **ten-year programme of site protection:** the most important sites, which cover about 180,000 hectares, would be bought, leased or made subject to nature reserve agreements, while management agreements are expected to be required on only about one-third of the area of the remaining SSSIs. The expected costs of this programme have been estimated on the basis of current land values and the present average cost of safeguarding the sites (£30/hectare). Agreements will continue to be the subject of consultation with ADAS in each case and to require the agreement of The District Valuer. Expenditure has been phased to take acount of a gradual increase in the NCC's staff. There will be a continuing requirement for expenditure on site safeguard beyond the NCC's current programme as agreements come up for renewal and **changes in farming practice necessitate the re-negotiation of agreements. By the mid-1990s expenditure on site safeguard, including staff and ancillary costs, is expected to stabilise.** Estimates this far ahead are necessarily tentative but on present indications the figure then will be about £35m a year (of which a quarter would be on management agreements). It could be rather more if, for example, the demand for management agreements were to be greater than expected or if the average cost were to increase; on a "worst case" assumption, the cost could be 30-40% higher. Elsewhere, **agreements in National Parks are likely to remain relatively inexpensive** because uplands have less agricultural potential than lowlands; the costs of agreements made by the Broads Authority may rise to £½m a year.

BLAR NAM FAOILEAG

SSSI Details

1. The site covers 4600 ha and in the opinion of the NCC is the most outstanding representative of the eastern type of blanket bog in Northern Scotland and the largest single expanse of actively growing blanket bog in Britain. Its intact stte and rich shrub and lichen communities caused the NCC to give it Grade 1* (internationally important) status in the 'Nature Conservation Review" which identified key sites for conservation in Great Britain. The site was in 3 different ownerships of which Lord Thurso's interest was the most extensive (2,263 ha) and scientifically the most important.

Negotiations

2. Lord Thurso notified the NCC in 1980 that he had applied for a Forestry Commission grant to afforest 228.5 ha of the site. He also proposed to begin a peat extraction scheme and additionally had applied to the Department of Agriculture and Fisheries for Scotland for an agricultural drainage grant. Lord Thurso was uncooperative in negotiations, at one time refusing NCC staff access to the site to arrive at a valuation.

Financial Settlement

3. Lord Thurso was eventually persuaded to accept an agreement that the site should be managed as a National Nature Reserve in return for a lump sum payment of £250,000 which was the District Valuer's assessment of the losses occasioned by the owner. This sum was based on a notional annual payment of £24,500; the agreement lasts for 99 years, costs £117.59 per acre, and is renewable at no extra cost after that

period. (A contribution of £100,000 was made by the National Heritage Memorial Fund.) The cost attracted attention because of the size of the one-off payment (which cleared the debt immediately and would have aroused much less interest if the compensation had had to be paid on an annual basis). In return, the safety of the site is now guaranteed in perpetuity.

Other means of safeguard

4. Negotiations over the site were carried out prior to the passing of the 1981 Wildlife and Countryside Act. The compensation was paid under section 15 of the Countryside Act 1968. The NCC's compulsory purchase powers could only have been used if it had not proved possible to negotiate a voluntary agreement.

BOULSBURY WOOD

SSSI Details

1. The site is a large varied area of woodland lying astride a high ridge between Dorset and Hampshire. It is mentioned in the Domesday Book and has 58 plant species associated with ancient woodlands, including several rare tree and flower species. The 121 ha site was renotified in November 1983.

Negotiations

2. The NCC sent the owners, Viscount Cranbourne and his father the Marquess of Salisbury, notice of their intention to notify the site as an SSSI in December 1982. Parts of the wood had already been felled and replanted with conifer - a policy in direct conflict with the maintenance of the scientific interest - and the owners intended to continue felling and replanting. The NCC offered to enter into a management agreement to preserve the majority of the wood and to ensure that the very limited areas felled were replaced with hardwoods. The company negotiating on Viscount Cranbourne's behalf initially claimed double the amount that was finally agreed after tough negotiation by the District Valuer.

Financial Settlement

3. The District Valuer agreed a compensation payment of £20,750 per annum for 65 years over an area of 121 hectares. The payment reflects both the value of the standing timber (the felling of which is delayed by the agreement), the potential loss of revenue from growing conifers and an element to pay the estate for positive

conservation measures over and above the growing of hardwood on fallow areas. The District Valuer did not think the payment excessive in relation to the capital value of the woodland.

Other means of safeguard

4. NCC suggested to the estate during negotiations that NCC might lease the wood and purchase the timber, in order to ensure that an ideal management plan would be pursued. That proposal was rejected by the estate who wished to retain control of the wood. Since the estate were (reluctantly) willing to negotiate over the site, there was no case for the imposition of a Nature Conservation Order. The District Valuer advised the NCC that they would in any case achieve better value for money by entering into the management agreement than by any form of site purchase.

KINGS SEDGEMOOR

SSSI Details

1. The 1620 acre site is an area of typical wetland within the Somerset levels. The greatest interest of the central portion of the site where the land in question lies is in the overwintering and breeding bird populations; the site is of 'Nature Conservation Review' (NCR) status. The NCC intend to establish a National Nature Reserve (NNR) within the area.

Negotiations

2. The owner of 88 acres of land within the central part of the site contacted the NCC in July 1983 to discuss plans to drain his holding to establish a vegetable-growing enterprise. NCC explained that to do so would seriously damage the wildlife interest and offered a management agreement. However, they found it impossible to persuade the owner to accept any such agreement; he wanted to farm unfettered or otherwise wished to sell the land. The NCC offered to buy the land to form the core of the proposed NNR.

Financial Settlement

3. The District Valuer was called in and negotiated an agreed purchase price of £178,000 for the site. An additional payment of £5000 was to be paid as compensation for profits foregone by the owner for his voluntary restraint over the preceeding year. The amount paid represents the 'going market rate' for agricultural land in this area and was the lowest price that could be negotiated.

Other means of Safeguard

4. The owner flatly refused to enter into a management agreement, so this was not an option. As an alternative to negotiated purchase, it would have been possible to place a Nature Conservation Order on the site. This would have empowered the NCC to negotiate a management agreement (of no use in this case due to the owner's intractability), to negotiate purchase or to compulsorily purchase the site. There would have been no saving under a compulsory purchase, which would have been subjected to the District Valuer's assessment. The only other possible advantage of an NCO would have been as a delaying tactic since it provides for an extended negotiating period. This would have been pointless, however, as the owner was not prepared to negotiate a management agreement. Moreover the further delay would have led to larger compensation backpayments.

THE SWALE

SSSI Details

1. The Swale SSSI is a complex of mudflats, saltmarsh and freshwater grazing marsh. It is particularly noted for the wintering and passage of wildfowl and waders that are present in numbers which are considered to be of national and international importance; the NCC have proposed the site for listing as a Wetland of International Importance under the Ramsar Convention. The SSSI was first notified in 1968 but was renotified this year to exclude 14774 acres that had been agriculturally improved, leaving 6185 acres.

Negotiations

2. Mr Merricks has been the tenant of some 2000 acres of Elmley Marshes since 1973. He soon started exploring the possibilities of under-draining the land, but improvements to the Internal Drainage Board dykes and outfalls were an essential pre-requisite. These works having been carried out in 1978/79, Mr Merricks sought grant-aid for drainage work on the schemes in February 1980. NCC objected to the part of the scheme relating to the marshland and Mr Merricks refrained from draining the major portion. In the spring of 1982 Mr Merricks indicated plans for substantial further drainage to be carried out over a 3 year period, and in July 1982 the NCC began negotiations for a Nature Reserve Agreement over 1800 acres.

3. Negotiations continued slowly, principally due to disagreements about the amount which could be drained and the speed with which work could have been carried out. MAFF have now said that it would be technically possible to drain all 1800 acres.

Financial Settlement

4. The terms of the compensation payments to be made to Mr Merricks are based on the Government's Financial Guidelines. The provisional assessment is that the back payments allowed for by the Guidelines will amount to £533,806 by the end of the current financial year. Annual compensation thereafter is calculated at £315,426 (both figures are subject to the District Valuer's approval). The payments are based on a rate of £170 per acre per annum and reflect the high profitability of good quality land in the Swale area.

Other Means of Safeguard

5. NCC investigated the possibility of purchase, but the owners (Oxford University Chest) were unwilling to sell. Both owners and tenant were willing to enter into a management agreement and have already undertaken voluntary restrictions during the negotiation period. Under the legislation NCC may only use their compulsory purchase powers if an agreement cannot be concluded on reasonable terms. Although the compensation payments to be made may look high, they are a reflection of the value of land if put to profitable agricultural use, and, being based on the Financial Guidelines, cannot be said to be unreasonable. The management agreement was therefore the only way of safeguarding the wildlife interest.

ANNEX D

POSSIBLE STATUTORY PROVISIONS FOR LANDSCAPE CONSERVATION ORDER POWERS

1. To be applied in primary legislation to all National Parks, AONBs and any other areas to be specified by Ministers (Secretary of State for the Environment and Minister of Agriculture, Fisheries and Food acting jointly in England) by Order subject to negative resolution.

2. Local planning authorities (lpa's) to be under a duty to prepare and publish (within 12 months of enactment or subsequent Order in the case of any other specified area), after consultation with the Countryside Commission, lists of potentially damaging operations (pdo's) in those parts of each area that they regard as particularly important to conserve (chosen areas).

3. Lpa's to be under a duty to inform owners and occupiers of all properties within chosen areas of list of pdo's.

4. Owners and occupiers to be required to notify lpa if they propose to carry out a pdo within chosen area.

5. It is to be an offence to begin such a pdo without such notification or within 3 months of notification without the consent of the lpa. No compensation to be payable for the delay imposed by this requirement.

6. Lpa's to have power, following notification, to make Landscape Conservation Order (LCO) prohibiting carrying out of pdo indefinitely without their consent.

7. Right of appeal to Ministers against making of LCO.

8. Power for Ministers to revoke or amend LCO following an appeal, after consultation with the Countryside Commission.

9. Provision for compensation to be payable where LCO is made or amended to anyone with interest in the land at time of making of the Order. Payment to be limited to the difference in value of the land with and without the Order but to include compensation for any abortive expenditure.

10. Powers of entry to be provided to Ministers and lpa's for purposes of asertaining whether an Order should be made, the compensation payable and whether an offence has been committed.

EXISTING PLANNING CONTROLS OVER AGRICULTURE AND WAYS IN WHICH THEY MIGHT BE EXTENDED

EXISTING CONTROLS

1. This Annex describes the major features of the planning system in England and Wales as it affects agriculture. There is a separate, though generally similar, system in Scotland. Under the Town and Country Planning Act 1971 all building, engineering, mining or other operations in, on, over or under land, or the makings of any material change in the use of any buildings or other land, constitutes 'development', and as such requires planning permission. However, S22(2)(e) of the Act excludes the <u>use</u> of land for agriculture or forestry or the use of buildings occupied together with agricultural/forestry land, from the definition of development, thus exempting such land and buildings from planning controls.

2. The erection of new buildings for agriculture or forestry does, however, constitute development. Many such buildings benefit from the general planning permission given by the General Development Order 1977 (the GDO) and therefore do not need a specific application. Class VI of the GDO gives permitted development rights to building and engineering operations carried out on agricultural land of more than one acre, comprised in an agricultural unit, and which are 'requisite' (a notoriously contentious phrase) for the use of that land for agricultural purposes. It does <u>not</u> cover dwellings. Further qualifications on the GDO permission are that the building erected under it must not be more than 465 sq m in ground area, and that buildings/works must not be higher than 12m, or within 25m of a trunk road or classified road. Buildings or works exceeding these limits require planning permission. Extraction of minerals for use on the farm is also covered by the GDO. Other forms of development besides agricultural ones enjoy GDO rights although Class

VI is somewhat unusual in permitting erection of new buildings without specific permission. Industrialists, by contrast, may extend their premises (up to 20%) under the GDO but cannot erect new buildings.

3. There is thus an important distinction between activities exempted from the definition of development, which cannot be brought into planning control under the Planning Acts as they stand (eg bringing unfarmed land into agricultural use; changing crops, agricultural practices, or intensifying existing uses), and the developments which are within the scope of the Planning Acts but enjoy permitted development rights (ie creation of buildings, and engineering operations eg constructing hardstandings, roads, lakes, reservoirs, drains etc).

Article 4 Directions

4. Under the GDO a local planning authority may, if it considers it expedient to do so, make an 'Article 4' direction to remove permitted development rights from a particular class or classes of development, so that specific planning applications are required. But directions relating to most GDO classes (including agriculture and forestry) must be confirmed by the Secretary of State before they can take effect. The Secretary of State also has power to make Article 4 directions himself, but this is only used very exceptionally. If, following an Article 4 direction, a planning application is made to the local planning authority and is refused, the applicant is entitled to compensation. The Department of the Environment generally takes the view that directions removing permitted development rights from a wide area are undesirable: directions should only be imposed where there is a specific threat to the amenities of an area.

5. Article 4 directions can be imposed only on activities controlled by the GDO (eg building or engineering operations): they cannot be imposed on activities which do not constitute 'development' (ie the use of land for agriculture).

Landscape Areas Special Development Order 1950 (LASDO)

6. This order applies only to specified areas in part of the original National Parks (the Lake District, the Peak District and Snowdonia National Parks). Within these areas it requires developers who wish to erect buildings under Class VI and VII (agriculture and forestry) to give notice to the local planning authority before they do so; and the authority are then entitled to require the developer to obtain their approval of design and external appearance before the building is started. LASDO thus acts, in effect, as a condition upon the GDO permission in the areas which it covers but it does not remove GDO rights.

The National Parks, Areas of Outstanding Natural Beauty and Conservation Areas Special Development Order 1981 (the SDO)

7. This SDO came into force at the same time as amendments to the GDO in 1981 which relaxed planning controls on dwelling-houses and industrial buildings, mainly by increasing the size of extensions permitted under GDO rights. The SDO however disapplied these relaxations from those National Parks, AONBs and conservation areas in existence on the date when it came into force. Nothing in the SDO bears on Class VI development.

Development Control Policy

8. With the limited exceptions of LASDO and the 1981 SDO, the range of permitted development is the same throughout England and Wales. Development not covered by

The GDO requires a specific planning application to the local planning authority, who will assess the application on its merits and in the light of Government policies (as set out in DOE circulars) and the development plan for the area. Government policy, as set out in DOE circular 22/80, is that planning permission shoul always be granted, having regard to all material considerations, unless there are sound and clear cut reasons for refusal. But the same circular also specifically states the Government's commitment to the need to conserve and improve the countryside, natural habitats and areas of natural or scientific interest: to policies on national parks, AONBs and conservation areas; stresses the importance of the green belt; and reiterates that the Government will not allow more than the essential minimum of agricultural land to be diverted to development, nor allow land of higher quality to be used where land of lower quality could reasonably be used instead. The aim of all these policies, and the major function of the planning system, is to strike a balance between the protection of the natural and the built environment and the pressures of economic and social change.

POSSIBLE EXTENSIONS

Amendments to the General Development Order and Landscape Areas Special Development Order

9. Under existing legislation, it would be possible to bring more building and engineering operations carried out on agricultural land under planning control by amending the General Development Order 1977. This might be done nationally or in certain designated areas, extending the restrictions in the present Landscape Areas Special Development Order. For example, permitted development rights for farms and forestry buildings, farm and forest roads and other engineering operations for agriculture and forestry purposes could be removed in National Parks, Areas of Outstanding Natural Beauty, National Nature Reserves, and Sites of Special

Scientific Interest. This would enable local planning authorities to fully control such development and their additional administration costs would be partially offset by planning application fees. The net costs to local authorities would depend on the extent of the changes. Further, the removal of permitted development rights could give rise to compensation liabilities.

10. A less draconian measure would be to continue the permitted development rights under the General Development Order for farm and forestry buildings and roads in sensitive areas but to make a new Landscape Areas Special Development Order applying only to their design and siting. This half-way house would enable local planning authorities to influence details without preventing construction, and appeal against the reasonableness of conditions imposed would be available. Discretionary payments for extra costs incurred would be possible but there would be no compensation as of right.

11. Extensions of the restrictions under either the General Development Order or the Landscape Areas Special Development Order would be popular with conservationists. Such changes could not, however, enable the agricultural or forestry uses of land to be controlled and it is these uses which give rise to the bulk of complaints on conservation grounds.

Primary legislation to control agriculture and forestry uses

12. To control the use of land for agriculture and forestry, primary legislation would be needed to amend the definition of development in the Town and Country Planning Act 1971. At the same time, development orders would have to be made to give permitted development rights to such uses and in such areas as seemed

propriate. In theory, this would give local planning authorities powers to give full consideration to proposed uses of land and to serve 'stop notices' when there were breaches of planning control. There would, however, be serious drawbacks. First, **the Government is committed to a relaxation of planning controls** generally and a significant extension would be highly controversial. Second, it would be **very difficult to define and classify agricultural land uses.** Third, depending on the extent of permitted development rights, there could be a **substantial increase in bureaucracy.** (On various crude assumptions, the extra administrative costs for local authorities could range between £80,000 pa and £12.5m net in England and Wales with consequential costs for central government although these would not be excessively onerous). If sufficient additional staff were not obtained by local authorities, agricultural operations and other planning applications could be seriously delayed. Fourth, the biological interest of Sites of Special Scientific Interest depends **on the detailed control of operations** which it would be difficult to bring within the scope of planning, without enormous problems of enforcement. Finally, the precedents would point generally to **compensation** being paid for the loss of development rights although the primary legislation could be drawn up to avoid this.

13. Some - but not all - of the problems of introducing full controls over the agricultural and forestry uses of land could be overcome by **selective controls.** For example, new primary legislation could empower the Secretary of State to designate areas within which selective controls might be applied and the possible scope of these controls; local authorities would then be able to prepare schemes to apply such controls in particular areas. Such changes would take considerable time to implement. Selective controls would allow more flexibility than blanket controls but would introduce additional complexity into the planning system by treating activities as development only in some parts of the country. Again if precedent were followed, compensation would be payable. In practice, amendment of the definition of development in the 1971 Act, with carefully tailored development orders, could achieve as much selectivity as a special new scheme, but within a coherent planning framework.

COSTS OF EXTENDING PLANNING CONTROLS TO AGRICULTURAL USES

1. Any estimate of cost must be highly speculative as much will depend upon the extent of activities controlled and the numbers of applications and their complexity. The figures below attempt to give a very broad brush assessment of the possible effects on costs in England and Wales and many figures have been rounded for simplicity. Extension of the planning system to forestry, and the application of either change in Scotland, would increase the costs further from those suggested here.

Effect on local authority staff.

2. This paper assumes that if planning controls were extended to agricultural uses the **district** council would normally be responsible for determining them (in line with the normal allocation of most development control responsibilities). Special arrangements might apply in National Parks but the question of who determines the application should not significantly affect the overall costs.

3. CIPFA provide information about **actual** numbers of development control applications decided and **estimates** of budgetted numbers of employees for development control functions. These show that the non-metropolitan districts in England decided some 300,000 applications in 1982/3 and budgetted for 3432 development control staff in 1983/4. Leaving aside the slight discrepancies involved by using figures from different years this implies that non-metropolitan districts generally considered that 1 development control officer is needed for every 87 applications. Metropolitan districts have been ignored; they would be unlikely to deal with agricultural applications on any significant scale and generally seem to have a higher ratio of staff to applications (perhaps reflecting the greater complexity of urban proposals).

4. Districts in mainly rural areas require fewer staff per application: eg in Lincolnshire the ratio equalled 1 staff member per 100 applications; in Norfolk, 1 member per 115 applications. But in non-metropolitan districts in Wales 325 staff were budgetted as against some 25000 applications in the previous year: 1 staff member for every 77 applications.

Overall then 1 member of staff needed for every 90-100 applications per year in rural areas.

5. Extending planning controls to agriculture would require (a) handling of more planning applications (b) consultation with appropriate bodies eg the NCC and ADAS (c) enforcement and monitoring effort eg to ensure that activities requiring planning consent do not take place without it. It might be argued that complex agricultural proposals would require more staff effort (including enforcement effort) than, eg proposals for building of dwelling-houses or changes of use. Figures below therefore postulate two staffing assumptions: a high one, whereby 1 member of staff is needed for 75 applications, and a low one, whereby 1 member of staff can cope with 100 applications.

Costs to local authority

6. These again are difficult to assess because so much will depend upon the complexity of the applications. The paragraphs below give ranges of different assumptions about the possible number of applications which would result from planning applications and the number of extra staff needed to cope with them over the country as a whole. Likely effect on local authority costs has been estimated assuming a flat-rate cost of £13,500 per additional member of staff to cover salary and overheads.

The results are shown in the table at the end of the paper.

How many farmers would be involved:

7. Agricultural census for June 1982 shows:

England - 155608 agricultural holdings on 9.4 m hectares

Wales - 29508 " " " 1.5 m hectares

Agricultural land represents about 72% of the total land area of England: probably a greater proportion in Wales.

8. **Designated areas** (National Parks, AONBs, NNRs, SSSIs) now cover approximately ¼ of the country. On the very broad assumption that the designated areas will also cover approximately ¼ of the farmers in England and Wales, some 46500 holdings might be involved.

9. **SSSIs** alone cover approximately 6% of the country; on the same broad assumption, they might affect 11,000 farmers.

How many planning applications

10. This depends entirely upon what kind of controls were introduced and in which areas they applied. This paper assumes that, even if S22 of the TCPA 1971 were amended to bring agricultural uses into the definition of development, wide GDO permitted development rights would be granted so that controls would in practice be selective in their application. The assumptions below give a range of options relating to the geographical application of controls and the number of applications

needed. It concentrates on applications needed following amendment of S22, and ignores applications needed for eg agricultural buildings which could be controlled by amendment of the GDO under present legislation.

11. <u>Assumption I:</u> Planning applications required for agricultural activities on all designated areas (NPs, AONBs, NNRs, SSSIs): 46500 farmers potentially affected in England and Wales. Within this might be different orders of magnitude:

A. Assume each farmer needs to make three applications per year on average for eg the following operations on his land:

- bringing new marginal land into cultivation
- ploughing of wetlands
- change of land from predominantly livestock to predominantly arable cultivation.

It seems unlikely however that except in very environmentally sensitive area controls over use of agricultural land would need to be such as to require all farmers to make that number of applications. Alternative assumptions might be:

B. Assume that each farmer need make only planning application each year for one of the activities covered by control.

C. Assume that each farmer needed to make only one application every 5 years for new activities covered by control, and that these applications were received in equal numbers every year.

12. Assumption II: Planning controls bite only on SSSIs, but in those areas activities are controlled in more detail. 11000 farmers in England and Wales

potentially affected: but since SSSIs are generally small in area only half those farmer's operations might be affected, and this might halve the number who needed to make applications to say 5500.

Within this framework the ranges of applications might be, depending on the activities controlled and the extent to which those activities were carried out:

A. Farmers need to make 4 applications per year on average to cover ploughing of wetland; planting or removal of hedges; planting of moorland; conversion of pasture to arable.

B. Similar range of activities controlled, but only 1 application needed per year on average.

C. Only 1 application needed every 5 years.

13. Estimated effects of these assumptions in terms of numbers of applications in non-metropolitan districts, numbers of additional planning officers, and consequential staff cost are shown on the attached table. The consequential burden on the appeals system is also covered on the assumption that 80% of planning applications will succeed and that 30% of those which are rejected will be followed by appeals; and that each appeal might cost £1000 to process (these assumptions are necessarily very crude: although the 80%/30% figures reflect the present position for planning applications in general, it is possible that refusals of agricultural applications might produce a higher appeal rate, at least until new controls had settled down. And appeals will of course vary widely in complexity and cost.)

CONFIDENTIAL

cc Mr Owen pse

K01016

NOTE FOR THE RECORD

cc Mr Hatfield
Mr Gregson
Mr Watson
Mrs Ransom
Mr Barclay (No. 10)
Mr Hickson

Dub 28/11

AGRICULTURE AND CONSERVATION

The Secretary of State for the Environment is expected to circulate the further paper on compensation principles (commissioned by David Barclay's letter of 30 July) within the next few days. We (Secretariat and No. 10 Private Office) had provisionally agreed that, at least in the first instance, collective discussion might best take place in H Committee, not least because of the pressures at present on the Prime Minister's time.

DoE are resistant to this. Their view is that as the Prime Minister has strong views on the subject, as it is far from certain that H would be able to arrive at agreed conclusions, and as the urgency is now considerable, it would be far preferable to go straight to a Prime Minister's meeting.

Following further discussion with Mr Barclay, I have told DoE that their Secretary of State should send the new material forward to the Prime Minister as soon as possible (copied as before). The Prime Minister can then take a view on whether she wishes to chair a meeting, or discussion to take place in H, in the light of its content and perhaps, if it seems appropriate, advice from Sir Robert Armstrong.

C J S BREARLEY

28 November 1984

CONFIDENTIAL

Qz.04065

MR POWELL 27/4

MINISTERIAL STEERING COMMITTEE ON ECONOMIC STRATEGY
SUB-COMMITTEE ON ECONOMIC AFFAIRS, 28 NOVEMBER

I attach a brief for the Prime Minister on European Community standards for vehicle exhaust emissions (E(A)(84) 65). The Chief Scientific Adviser is minuting separately on certain scientific and technical aspects.

I am sending copies to Sir Robert Armstrong, Dr Nicholson and Mr Gregson.

D F Williamson

D F WILLIAMSON

27 November 1984

CONFIDENTIAL

Prime Minister

VEHICLE EMISSIONS

This is a very complicated subject, which will come up again in Paris and Dublin.

Ideally we want lean-burn, but the Germans are impatient and are ready to go for 3-way catalysts.

DTI propose a compromise with EC partners which effectively isolates Germany. We would concede 3 way catalysts on large cars (above 2 litres) for those countries which wanted them. But for smaller cars the standards would be such as to encourage lean burn.

DMB
27/4

PRIME MINISTER 27 November 1984

EC STANDARDS FOR VEHICLE EXHAUST EMISSIONS

We are faced with the question of how to respond to today's environmental pressures (notably in West Germany) without being pushed precipitately, and very expensively, into today's technology when a superior new solution is already in sight.

Panicked by the Greens, the West German Government proposes to advance the introduction of stringent new vehicle emissions controls from the mid-1990s to 1988. On that timescale, the only solution available is the three-way catalytic converter. Accordingly, European car manufacturers have been spurred into implementing this inferior technology - at an estimated cost of £12.5 billion to European consumers. It is understood that only BL, Renault and Peugeot remain firmly opposed to the catalytic converter solution.

We cannot wish away the case against more stringent emissions standards; there is too much evidence of the dangers. However, the better way to comply is the lean-burn engine which operates with air/fuel ratios 60% higher than an engine fitted with a catalytic converter. The cost is lower. Moreover, compared with the catalytic converter, the fuel consumption would be reduced by 15-20%. (The widespread view in the oil industry is that by the 1990s, supplies of oil will again be tightening and prices will be hardening in real

terms.) Further improvements are in prospect. One American company believes that ignition by microwave will enable engines to burn an air/fuel mixture 50% leaner than the initial lean-burn engines.

The snag is that the lean-burn engine is not a realistic contender for the West German's accelerated programme of emissions control. That opens the unpalatable prospect of the European car industry either joining ranks to provide the consumer with expensive old technology or of falling into two camps serving a fragmented market out of step on emissions control. Either would be damaging to Europe's competitive position relative to Japan and the US.

Conclusion

We support DTI's proposal on handling and the recommendations in Point 10 of their memo.

JOHN WYBREW

MINISTERIAL STEERING COMMITTEE ON ECONOMIC STRATEGY
SUB COMMITTEE ON ECONOMIC AFFAIRS, 28 NOVEMBER

EUROPEAN COMMUNITY STANDARDS FOR VEHICLE EXHAUST EMISSIONS

FLAG A

(E(A)(84) 65)

Brief for the Prime Minister

Purpose of meeting

1. To decide the United Kingdom line at the 6 December Environment Council on the Commission's proposed revised standards for vehicle exhaust emissions, in the light of the German announcement that it will apply stricter standards nationally.

Background

2. Vehicle exhausts emit harmful gases in the form of carbon monoxide (CO), hydrocarbons (HC) and nitrogen oxides (NOx). These emissions increase with the size of the engine and the speed of the car. Both nitrogen oxides and hydrocarbons are now considered to be factors in forest damage from "acid deposition". The most effective current means of reducing them is an additional piece of equipment known as a "three way catalyst"; these are used in the United States and Japan, but they only work with unleaded petrol; they are also vulnerable to damage, particularly at high speeds, inefficient in European driving conditions, impair performance, and result in a waste of fuel. European manufacturers are developing the "lean burn" engine which should be available in the early 1990s; this will lower NOx and HC emissions, remain robust in use, cut petrol consumption and be able to approach the reductions achieved by the three way catalyst. For particularly stringent emission standards it will be combined with a simple one way oxidization catalyst to reduce HC emissions further.

3. There has been a series of Community directives since 1970 harmonising emission standards for vehicle design. The most recent directive, agreed in 1983, enables standards close to

/the

the limits of current technology, and varying for different weight categories, to be applied to new models from this year and new cars from 1986. The Commission's latest proposals would involve a further tightening of emission levels in 1989 for new models and 1991 for all new cars (Stage I), and the more stringent US standards by 1995 (Stage II). A very important feature is that this directive, like its predecessors, would be permissive, enabling member states to set lower, though not higher, standards nationally. The major impact for us therefore would not be on our own market but on our Community export market, which represents 55 per cent of our total car exports. United Kingdom manufacturers could meet the Stage I standards, albeit at some cost in terms of smaller fuel savings for medium and small cars and the fitting of three way catalysts to large and automatic car exports, but meeting the Stage II standards would at present require three way catalysts on all exported cars.

4. Discussion in the Community has been complicated by the Germans' decision, in response to political pressure to do something about the damage to their forests, to introduce the US standards for new large cars from 1988 and for all new cars from 1989, and to offer fiscal incentives from the beginning of next year to encourage the purchase of cars meeting these standards. Since this would require the use of three way catalysts, it would break up the common market for cars because it would not be economic to do a special production run for the markets in Germany and those countries like Denmark which are expected to follow her; the action could therefore effectively close them to car manufacturers in the United Kingdom, France and Italy. This would not only put at risk up to 30 per cent of our total car exports and divert frustrated French and Italian supplies into other markets, including our own, but could pressurise the Community into opting for the expensive and inefficient three way catalyst as the means of achieving further reductions in vehicle emissions, increasing motorists' costs in the Community by up to £12.5 billion a year.

5. It was the disadvantages of three way catalysts which led Ministers, when this subject was last discussed at your meeting on 19 June (flag B), to agree that the United Kingdom should

FLAG B

/negotiate

negotiate positively for the early introduction of unleaded petrol and for stricter emission standards provided that these could be achieved by lean burn technology and would not require three way catalysts.

6. The Minister of State, Department of Trade and Industry, notes that, while the Germans have so far been intransigent, their position has legal and commercial weaknesses, and he therefore proposes that we should use the Environment Council to explore possibilities for a compromise which could effectively isolate Germany and so improve the prospect of using the judicial weapons offered by the Treaty to bring them into line. He envisages working with France and Italy to prepare a two-stage proposal which would establish emission standards in 1989 in some respects more rigorous than those currently proposed, and a further improvement in the early 1990s that would be less stringent than the US standards, but which could be satisfied by lean burn engines, with one way catalysts where necessary. Since the formulation of such a compromise will depend upon complex manoeuvring on the dates for implementation, the levels to be achieved, and differentiation between different sizes of car, the intention is that the Council should commission a detailed report with a view to decisions in February/March 1985.

Main issues

7. The main issues seem to be:

(i) what the United Kingdom's objectives should be;

(ii) how far we should go to secure German endorsement of a compromise;

(iii) what steps we should take if no accommodation can be reached.

The United Kingdom's objectives

8. There is unlikely to be any disagreement that the United Kingdom's objectives should be -

(i) to reduce the level of vehicle emissions in this country, especially of nitrogen oxides;

/(ii)

(ii) not to accept any directive that would force us to impose standards nationally which are not economically achievable by British industry within the intended time-scale (ie which imposes catalysts on British motorists or prevents the development of lean burn);

(iii) to ensure that as many Community countries as possible adopt standards that keep their markets open to British car exports;

(iv) if it can be done consistently with (ii) and (iii), to find a Community compromise which the Germans can also accept.

9. All member states have accepted that the directive should be based on optional harmonisation. We must insist on this because the United Kingdom could then set acceptable standards in our own market. It would also, however, be in our interest to keep the maximum standards towards the lower end of the negotiable range in order to keep as many as possible of our car export markets open and to improve the chances of the standards being met by lean burn technology when it becomes available. Care will however be needed in formulating our target, since if we try to insist on maxima that are too low, France and Italy, who are already showing signs of wobble under German pressure, may not be able to support them and there would be no chance of Germany doing so. The compromise suggested in E(A)(84) 65 envisages standards for small and medium cars at Stage I which could be met by lean burn engines. For large cars above 2 litres member states would be permitted to set standards which would require three way catalysts but would not be obliged to do so.

10. The Foreign and Commonwealth Secretary may argue that the French and Italians have a much greater commercial interest in the German motor market than the United Kingdom and that, given the Germans' importance to us as allies on other Community issues, it would be appropriate for France and Italy to take the lead in emphasising to the Germans that their proposals could fragment the internal market on cars. The Secretary of State for Transport and the Trade and Industry Minister of State may argue that, if

we are to keep the door open for the adoption of the best available technology at Stage I, and avoid the serious implications of three way catalysts for motoring costs and the motor industry, we need to win the arguments in favour of the lean burn engine, particularly since both Austin Rover and Ford, who supply UK-made engines for their other European companies, are basing their plans on lean burn technology. These Ministers are therefore likely to argue for a positive presentation of our position. E(A)(84) 65 proposes that we should work with the French and Italians in promoting a compromise.

A compromise acceptable to Germany?

11. The Sub-Committee will need to be clear whether the purpose of the proposed trilateral plan of action is to formulate a compromise which the Germans can accept, or to isolate them. Mr Lamont's judgement is that the prospects for a unanimous agreement are bleak. There is unlikely to be any quarrel with this, given the problems of finding a compromise which will address the environmental difficulties, the industrial engineering problems and the coherence of the internal market in a very difficult political time-scale. There may, however, be just a chance that the Germans would be prepared to accept a compromise if it were sufficiently attractive and if the alternative was legal proceedings before the European Court. It would accordingly be desirable to seek Dutch concurrence on the proposed plan of action, since they have put forward an - over-ambitious - compromise of their own for a single stage tightening of emission levels in the early 1990s to a level between the Commission's Stage I and US standards. It should be noted, however, that any compromise is still likely to involve a two-tier market, with three-way catalysts being unavoidable in large car exports to Germany and like-minded countries. It would be in our interest to ensure that this was restricted to the luxury end of the market - ie to cars above 2 litres.

Alternatives to a compromise

12. Just as there can be no certainty that the Germans will go along with any generally acceptable compromise, so we cannot be

/sure

sure that they will be moved by the legal risks involved in rejecting one. The Commission already seem unwilling to take action on the Germans' fiscal incentives, even though these breach the competition rules. The Germans' proposed emission limits will, once published, be in breach of the current directive. Not only, however, may member states be reluctant for political reasons to press openly for legal proceedings, but, as Mr Lamont notes, a Community failure to reach agreement on new standards might well undermine the chances of the European Court outlawing the German measures.

13. It is important to emphasise that our priorities should be our own market, other markets in Western Europe (particularly France and Italy) and only lastly Germany which is not a big market for our cars. If no agreement proves possible, therefore, the United Kingdom's interest would lie in protecting our home market and keeping open the French, Italian and, if possible, Benelux markets. Steps we could take to this end would include introducing - perhaps in concert with other member states - counter-requirements which would exclude vehicles not fitted with lean burn engines; this might be justified on the grounds that it was legitimate to ignore auxiliary devices which could easily be misused, damaged or removed. We should in any case seek to maintain the provision in the current directive which provides for emission limits to be achieved with leaded petrol - with which three-way catalysts are useless. We could also advocate other measures in the Community to control emissions, such as the adoption of speed limits. The Sub-Committee will not need to consider such ideas in detail, but it may like to instruct officials to do contingency planning.

Handling

14. You will wish to ask the Minister of State, Department of Trade and Industry, to introduce his proposal. The Secretary of State for Transport, who has policy responsibility for the directive, will wish to comment on the interests of motorists

/and

and the motor industry; the Secretary of State for the Environment on the environmental aspects; and the Foreign and Commonwealth Secretary on the relationship between this and other Community matters in which we are involved with the Germans. The Chief Scientific Adviser may wish to comment on the technical aspects of the proposals.

Conclusions

15. You may be able to reach conclusions on the following -

- confirmation that the United Kingdom's overall objective should continue to be, as decided by your meeting on 19 June, to move towards a tightening of emission standards provided this can be achieved cost-effectively, without damaging the development of the lean burn engine and without any mandatory requirement for three way catalysts

- that every suitable opportunity, including the Anglo-French summit on 29-30 November, should be taken to present this positively

- that we should work with the French, Italian and Dutch to construct a compromise which might persuade the Germans to change to less rigorous standards on a Community basis

- failing German agreement, that we should work for the endorsement of the compromise by the largest possible number of member states, and

- that officials should make contingency plans for further action to safeguard our markets.

27 November 1984

European Secretariat
Cabinet Office

CONFIDENTIAL

W.0900 27 November 1984

PRIME MINISTER

EC STANDARDS FOR MOTOR VEHICLE EXHAUST EMISSIONS

FLAG B

At your meeting on 'Acid Deposition' on 19 June, the Secretary of State for the Environment proposed that he should "support stricter emission standards for petrol-engined cars - but ensure that the latter do not require 3-way catalysts". This was agreed with the proviso that a specific reference to the advantages of lean-burn engine technology should be added.

2. Since 19 June there have been no significant changes in the science or technology of vehicle emissions or their effect on forest damage. But Germany, alarmed by reports of increasing forest damage, has acted unilaterally and imposed standards which can only currently be met by 3-way catalysts. Emission figures for current and proposed standards and current performance tests are summarised in the Annex.

3. The rest of the EC has the option of seeing the internal market for cars fragmented or trying to reach a compromise with Germany which preserves the internal market without making needlessly expensive and ineffective concessions to environmental concern. The paper by the Minister of State for Trade and Industry suggests the basis for such a compromise.

4. The Germans favour the use of 3-way catalysts because they are available 'off the shelf' but their disadvantages cannot be over-stressed. From the technical standpoint they are inferior to lean-burn technology in nearly all respects. They are 'add-on' devices which impair performance and raise fuel consumption, and are much more susceptible to deliberate or accidental damage and to poor maintenance. Not surprisingly their effectiveness in the United States has been shown to be

CONFIDENTIAL

poor, and in the quite different European driving conditions they are likely to perform even less well. Furthermore, their use for smaller cars could be self-defeating: the resulting loss of performance may cause motorists to move to larger cars with greater emissions! Finally, virtually the entire world supply of the platinum group metals needed for 3-way catalysts has to come from South Africa and the USSR.

5. To these technical and strategic disadvantages of going the German way must be added the substantial cost burden of £12.5 bn pa for the European consumer - effectively a second CAP. Nevertheless if Ministers decide that an attempt to reach a compromise is worth while to preserve the internal market, the following points should guide the negotiating group proposed by Mr Lamont:

(a) 3-way catalysts for large (more than 2 litre) cars are the lowest cost (only 10 per cent of the market) and most sensible concession since lean-burn technology is a long way from meeting even Stage I limits for this engine size;

(b) a reduction in the 2 litre break-point must be resisted since one quickly gets into large segments of the market;

(c) care should be taken to limit the downward negotiation of emission limits from small and medium sized cars to figures achievable with lean-burn technology without oxidation catalysts. The latter are of unknown cost and performance and will remain so for some time;

(d) the use of lean-burn technology on below 2 litre cars should be mandatory in the UK market so that the development of sensible emission control technology is encouraged for all manufacturers in Europe.

6. I am copying this minute to Sir Robert Armstrong.

RBN

ROBIN B NICHOLSON
Chief Scientific Adviser

Cabinet Office
27 November

ANNEX

CURRENT AND PROPOSED EMISSION STANDARDS AND RESULT OF CURRENT PERFORMANCE TESTS FOR LARGE AND SMALL CARS.

Standards	Carbon monoxide	Nitrogen oxides	Hydrocarbons plus nitrogen oxides
Current UK and EC standards	67	8	20.5
Proposed EC Stage I standard (1989/1991)	45	6	15
Proposed EC Stage II standard (1995)	10-35	1.1-4.0	2.6-8.2
German proposal based on USA standard	15	3	5
Current performance tests			
Large (2-litre)car			
(a) with lean-burn engine	65	8	21
(b) with 3-way catalyst	20	3	5.5
Small (1.4 litre)car			
(a) with lean-burn engine	40	5	13.5
(b) with 3-way catalyst	15	2.5	4

All figures are grams per ECE test

10 DOWNING STREET

From the Private Secretary

20 June 1984

cc- H. Gregson
Dr Nicholson

Dear John,

Acid Deposition

The Prime Minister chaired a meeting on 19 June to consider the Government's policy towards acid deposition. In addition to your Secretary of State, those present were the Lord President, the Secretaries of State for Energy, Scotland, Wales, Transport, Mr. Gummer, Mr. Hayhoe, Mrs. Fenner, Mr. Baker, Mr. Rifkind, Mr. Waldegrave and Sir Robert Armstrong, Mr. Gregson and Dr. Nicolson and Mr. Pascall (No.10 Policy Unit). The papers before the meeting were your Secretary of State's minute to the Prime Minister of 15 June, and the Energy Secretary's minute of the same date.

Introducing his paper your Secretary of State said that at an earlier meeting Ministers had agreed on the need for a more positive approach towards acid deposition. This view had been reaffirmed at the London Summit. Following the valuable technical presentation which had taken place at Chequers, he was now putting forward a revised set of proposals which he believed constituted a positive and coherent response to our international critics. It was in his judgment a line that could be held successfully, even though it fell a long way short of the more extreme demands being made. The main features of his proposals were:

i) A continuing commitment to research and to the development of new cost effective technology.

ii) A statement of intent to reduce further emissions of both sulphur dioxide and nitrogen oxide, aiming at a reduction in each of 30 per cent by the year 2000 as compared with 1980 levels.

iii) The introduction of tighter standards for vehicle emissions, provided these were achieved through lean burn technology rather than three-way catalysts.

In discussion it was argued that considerable uncertainty attached to the forecast that 30 per cent reductions in SO2 and NOX emissions could be achieved by the year 2000 without significant additional expenditure. This forecast depended upon assumptions about the commissioning of new nuclear power stations which were, in the view of some Ministers, optimistic. Moreover, the environmental lobby regarded nuclear power with as much antipathy as they regarded acid rain. They would continue to press European Governments for flue gas desulphurisation.

The other area of uncertainty was the future level of emissions from industry other than the CEGB. Arguably the substantial reduction which had occurred in the early 1980s was a fortuitous result of the recession, which would gradually be reversed as economic growth resumed. On the other hand, the reduction also reflected structural changes in British industry which were in effect irreversible (for example, the contraction of the steel industry); and further technological developments which would benefit emissions, such as the use of fluidise bed combustion, were imminent. Concern was however expressed about the possible impact on industrial costs if target reductions did not materialise as expected but had to be achieved by other means.

In further discussion, firm support was expressed for "lean burn" technology as a means of reducing vehicle emissions. The consensus view was that when properly tuned lean burn engines could both reduce emissions and improve fuel economy; and British motor manufacturers favoured its introduction. It was widely agreed that the alternative approach using three-way catalysts on the American model was both less effective in controlling pollution, and vastly more expensive.

In discussion of the question of quantification, support was expressed for the concept of "aims" rather than commitments. Despite international criticism of the UK (much of which was ill informed), it was important not to move any faster than our industrial competitors towards implementation of improved environmental standards.

Summing up the discussion, the Prime Minister said that the meeting supported the main features of your Secretary of State's analysis and proposals. They offered the prospect of a positive and flexible response to international pressure. We should take credit for the benefits which would flow from the adoption of lean burn, and from the inclusion of NOX and hydrocarbons as well as sulphur dioxide in the package. The conclusions set out in paragraph 19 of your Secretary of State's paper were accordingly approved, subject to the following points:-

i) The deletion of the words "at least" from the

i) The deletion of the words "at least" from the last line of sub-paragraph (b).

ii) The deletion of the last three lines of sub-paragraph (d).

iii) The insertion of a specific reference to lean burn in sub-paragraph (e).

I am sending copies of this letter to those who attended the meeting.

Yours ever,

David

John Ballard Esq
Department of the Environment

CONFIDENTIAL

Sir R Armstrong - for

c. Mr Mehta

FOLIO 201

Prime Minister

c. Miss Lambert

ACID DEPOSITION

I was invited at our meeting on 17 May to set out the options for our policy on acid rain.

Background

2. This problem has, of course, both scientific and political components. The scientific issues are complex and long term and although there have been welcome recent developments in our understanding, it is still far from complete. We cannot be certain which causes determine which effects - and therefore what success might follow from the various actions we might take. We are giving a high priority to research designed to reduce these uncertainties. Meanwhile we have to make provisional and prudential judgements, in such a way that we can change direction without too much difficulty or expense.

3. The political problem is, however, a fairly immediate one. A number of other Governments (notably the members of the so called "30% club") have embarked upon programmes of sulphur dioxide emission abatement. A draft Directive now before the EC Environment Council calls for a 60% reduction in sulphur dioxide, 40% in nitrogen oxides and 40% in particulates from power stations and other major installations by 1995 (all percentages below a 1980 baseline). This pressure is attributable to genuine concern about transboundary pollution, especially in Scandinavia and Germany, as well as to a desire for evenness in industrial costs. And in Western Europe generally professional as well as public opinion is widely agreed upon the need for abatment of acidifying emissions. We can expect to be pressed to accept such action at the forthcoming Conference in Munich, mentioned with approval in the Summit declaration.

4. Against this background, I have considered four options:

(a) pursue a vigorous and well published research programme and welcome technological trends which bring emissions down, but take no other special action (our policy so far);

(b) join the "30% Club";

(c) support the Commission's draft Large Plant Directive;

(d) pursue a package of policies which achieves creditable gains in abating the air pollutants involved in acid deposition, but falls into none of the above categories.

5. I advocate option (d), but before outlining it I would like to summarize my objections to the other three.

6. Before starting this analysis, it is worth reminding ourselves of what has been happening. UK total sulphur dioxide emissions rose steadily during this century to peak at 6.2 million tonnes in 1972: they then fell to 4.67 million tonnes in 1980 and, if provisional figures are confirmed to about 3.75 million tonnes in 1983 (thereby giving us a 20% reduction in the past 3 years). Sixty-five per cent of these emissions come from power stations. Nitrogen oxide emissions have remained more or less steady at 1.65-1.75 million tonnes over the past 10 years: 46% of them come from power stations and the rest from a multiplicity of sources (statistical tables are at Annex A). But I must stress that there can be no guarantee that the gain in SO2 abatement will be held. It has come from such changes as the substitution of gas for other fuels, the reduced use of heavy fuel oils, energy conservation, and the depression of industrial activity. Some estimates imply that we could see a rebound as the economy picks up.

7. I turn now to the four options. In the first part of this analysis I concentrate on sulphur dioxide because that is the most difficult problem, but I discuss nitrogen oxides,

hydrocarbons and ozone when I come to option (d).

The research option

8. It is common ground that we must pursue research, and we proposed a collaborative programme at the Economic Summit. We are spending over £5m a year on the themes identified at the Chequers presentation, and in addition the CEGB has a £50m R & D programme on new technology for abating SO2 and NOX emissions from power stations. These costs are modest compared with the potential cost of emission control. We have to present this effort positively and get more credit for it than we have been doing. But research alone will not meet our political need, which is to have a credible response to the various international demands. While the research effort must be part of our package, I therefore reject it as the sole action.

The Large Plant Directive

9. At the other end of the scale, I am sure we are all agreed in rejecting the Large Plant Directive in its present form. Although the provisional figures suggest that we may have achieved a 20% reduction in national sulphur dioxide emissions between 1980 and 1983, and 15% in those from large plants as defined in the directive, to achieve a further reduction of 45% in the latter sector by 1995 could only be achieved by fitting flue gas desulphurisation to virtually all the CEGB's large power stations. This costs about £150m per 2 Gigawatt (2000 MW) installation and even assuming that we can hold the 15% gain since 1980, would incur expenditure of the order of £1.5 billion and very likely more. It is not a practicable proposition.

The 30% Club

10. I said in my earlier paper, I am much more attracted by the proposition that we joint the "30% Club". Unlike the draft Directive, this embraces total national emissions of sulphur dioxide and if we can hold to the 1983 position we are already two-thirds of the way there. Against this, there are however substantial uncertainties. The best estimates suggest that

even without new special measures 1995 national emissions are likely to be less than those in 1980, but we cannot be confident of holding all or most of the recent advance. While reductions in the use of heavy fuel oil, further energy conservation, and a variety of ancillary measures may help there is a real risk that we could find ourselves having to secure at least a 15% reduction in national SO2 emissions by installing abatement equipment which in this time scale could only be FGD. Since each 2GW FGD installation reduces national emissions by 3% of the 1980 total, a 15% reduction would mean 10 GW - at a cost of £0.8bn. Although I have to stress that in my judgement nothing short of the "30% Club" will calm our international critics, the calculation leads me to look at the alternative.

The ingredients of a package

11. I start from a point evident at the Chequers presentation - that sulphur dioxide abatement deals with only one of the components of acid deposition (the generally accepted ratio is 70:30 sulphuric:nitric acids). The Large Plant Directive is in this respect more sensible than the 30% Club in dealing with nitrogen oxides as well as SO2. I believe that there are political advantages in our emphasising our concern to tackle both - and also the hydrocarbons that, with nitrogen oxides in sunlight, generate the ozone that is increasingly emerging as a cause of forest damage.

12. I have asked how far we might get by 1995 and then by 2000 if we do not commit any investment to flue gas desulphurisation (or the equally expensive and less proven Japanese technology for removing nitrogen oxides from flue gases).

13. For the purposes of this calculation I will make the optimistic assumption that we can hold onto the 20% reduction in national SO2 emissions between 1980 and 1983. From then

on, analysis of future trends in emissions and of the most cost-effective options open to us depends crucially upon assumptions about changes in demand for electricity and about the growth of nuclear power. There are considerable uncertainties here. The CEGB's "medium nuclear scenario", prepared for Sizewell, envisaged a 0.75% per annum increase in electricity demand and the construction of a further 10GW (the equivalent of 9 Sizewell Bs) of nuclear capacity by 2000. If this were achieved, CEGB SO2 emissions would fall by 20% by 2000 and 30% by 2002/3 - bringing national totals down by 14% - 20% and giving us a gain of 34% to 40% since 1980. CEGB are uncertain of achieving this and have referred to the possibility of no more than 5 or 6GW being commissioned by 2000, and in this case the improvement on 1980 falls to 27% to 30%. The gap could be narrowed by other technical advances, like the substitution of low sulphur coal - water slurries for heavy fuel oils, coal pre-treatment, the adoption of small scale atmospheric fluidised bed furnaces in industry and even the importation of some low-sulphur coal, but it is hard to estimate the gains from such a package. Taking all the data together, however, I remain optimistic that we could look for a 30% reduction in national SO2 emissions by 2000, and possibly more, without the use of FGD and without major investment above that already planned. I suggest that we make this a stated objective of our policy. It will not get us into the "30% Club" as currently defined, but it will display a positive commitment and make our international and domestic position easier.

14. At present we do not envisage building any new coal-burning power stations until the early years of the next century. When we do, I take it for granted that they will be designed with whatever technology for sulphur and nitrogen oxide control has emerged by then as "best practicable means". We have encouraged research on more cost-effective technology in this area, and much is going on, so that I am confident we shall

end up with something considerably cheaper than the £120m cost of FGD in a new 2GW station. All we need to say now is that we envisage such technology as part of the design of such stations - when we build them.

15. The nitrogen oxide position appears a little more tractable. Our "baseline" however has changed little between 1980 and 1983 (it is to our credit that our emissions have stayed more or less level while the Germans' have increased by some 50% over 15 years). The CEGB, in partnership with private industry, are developing low - NOX burners suited to UK conditions and if even partly successful these might allow a 10-20% reduction in these emissions from CEGB fossil-fuelled plants by 2000. Other equipment might be applicable to the 19% of national emissions from other industry: nuclear substitution at 5 and 10 GW would give the CEGB a 10% and 20% NOX reduction respectively. Given a parallel attack on the 19% of NOX from petrol engined cars (and the measures I advocate below would allow this to be halved by comparison with the current European standard), we might well achieve a 20% - 30% reduction in national emissions by 2000. I suggest we should declare 30% as our goal, and proclaim a positive initiative in that direction. We would then be mounting an attack on total acidity, which the members of the 30% Club are not.

16. Vehicle emissions should be the other component of our package. We are agreed that we must not accept the extremely expensive United States 3-way catalyst system (which could add £2.01bn to annual UK motoring costs) - but a reduction of 85% carbon monoxide, 60% hydrocarbons and 40% NOX emissions by comparison with an uncontrolled vehicle could be gained by a "lean burn" engine tuned for minimum pollution at a benefit in operating costs (from improved fuel economy) of £30 per car per year. The first stage of the Commission's current proposals for new petrol driven vehicle emissions could be met by this technology and I believe we should support them. We shall naturally go on pressing, in this context, for the

earliest possible achievement of unleaded petrol. The Commission's second stage proposals (for 1995) are not due to be confirmed until 1988 but it is most unlikely that further "lean-burn" engine development will suffice to meet them, though some further reduction in hydrocarbon emissions (which scientific studies indicate as the key factor in ozone formation) will probably be feasible at relatively small cost. I suggest that our policy should be to accept tighter standards provided that these can be achieved by engineered solutions that do not require costly, fragile and energy-wasteful systems such as the USA 3-way catalyst.

17. I accept that there is an element of optimism in this package. We shall need to monitor our performance carefully as we go along. Technology should be working for us, especially if we set clear goals for industry (including the CEGB). Should it become apparent that we shall miss the 30% objectives we have two options: to resile from the policy or to commit additional investment - and the case for the latter will be easier to judge as our research programme clarifies the issues. I therefore have no hesitation in embarking upon this course.

Negotiations at forthcoming meetings

18. I have deliberately left until now proposals for our stance at the Munich Conference, and in the Environment Council on 28 June when the Large Plant Directive comes forward for discussion for the first time. I believe that if we can agree the broad lines of policy set out here before the Munich Conference, a credible negotiating position will follow both there and in the Environment Council. Clearly we have to reject the Directive as drafted, but I believe we shall be well placed to explore the prospects of securing changes in the percentages, dates and industrial scope so as to achieve an acceptable final text. That would allow us to be positive (whereas outright opposition to the whole concept could undermine the gains we may hope for from the package of policies I set out above), without binding an economic millstone about our necks.

CONFIDENTIAL

Conclusions

19. On the basis of this analysis I propose that we:

(a) continue to support and publicise a well-balanced programme of research on air pollutants, their effects and the technology for their control, participating in the international exchanges that will make the most of all our national efforts;

(b) announce our intention to achieve further reductions in national sulphur dioxide emissions, consolidating the remarkable gains of recent years and aiming at a reduction of ~~[illegible]~~ 30% by 2000;

(c) announce that we shall pursue available measures to reduce nitrogen oxide emissions, aiming at a 30% abatement by 2000;

(d) make it clear to the public that the development of the nuclear component is an important element in our strategy, but that we also seek gains in a variety of other ways, and will expect any new fossil fuelled power stations to adopt the most cost-effective sulphur and nitrogen oxide abatement then available;

(e) support stricter emission standards for petrol-engined cars - but ensure that the latter do not require 3-way catalysts.

20. I am sending copies of this minute to Willie Whitelaw, Geoffrey Howe, Peter Walker, George Younger, Nick Edwards, Norman Tebbit, Tom King, Michael Jopling, Peter Rees, and Nicholas Ridley, and to Sir Robert Armstrong.

William Waldegrave

(William Waldegrave for Patrick Jenkin)

15 June 1984

2.4 Sulphur dioxide: estimated emissions from fuel combustion: by type of consumer and fuel[1]

(a) By type of consumer

Million tonnes

	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982[P]	*Percentage of total in 1982*
Domestic	0.37	0.36	0.35	0.30	0.28	0.29	0.26	0.26	0.22	0.21	0.20	*5*
Commercial/ public service[2]	0.31	0.29	0.26	0.24	0.24	0.24	0.23	0.24	0.20	0.18	0.17	*4*
Power stations	2.87	3.02	2.78	2.82	2.69	2.74	2.81	3.10	2.87	2.71	2.65	*66*
Refineries	0.26	0.29	0.30	0.26	0.28	0.27	0.29	0.29	0.28	0.22[R]	0.21	*5*
Other industry[3]	1.75[R]	1.77[R]	1.59	1.44[R]	1.42[R]	1.37[R]	1.36[R]	1.38[R]	1.05[R]	0.84[R]	0.76	*19*
Rail transport	0.02	0.02	0.02	0.02	0.02	0.01	0.02	0.01	0.01	0.01	0.01	*< 1*
Road transport	0.06	0.05	0.05	0.05	0.05	0.05	0.05	0.06	0.04	0.05	0.05	*1*
All consumers	5.64[R]	5.80[R]	5.35[R]	5.13[R]	4.98[R]	4.98[R]	5.02[R]	5.34[R]	4.67	4.23[R]	4.04	*100*

2.7 Nitrogen oxides estimated emissions[1] by source

Nitrogen oxides[2]

Thousand tonnes

	1972[R]	1973[R]	1974[R]	1975[R]	1976[R]	1977[R]	1978[R]	1979[R]	1980[R]	1981[R]	1982	*Percentage of total in 1982*
Domestic	51	53	53	51	50	52	52	56	52	52	51	*3*
Commercial and Industrial	470	486	449	408	419	415	405	417	338	318	309	*19*
Power stations	731	808	722	760	770	793	806	876	851	818	769	*46*
Incineration and agricultural burning	8	8	8	10	12	12	12	12	12	12	12	*1*
Road vehicles												
petrol engined	262	279	272	266	279	286	303	308	316	309	318	*19*
diesel engined	158	170	166	162	168	171	176	182	176	167	172	*10*
Railways	48	50	47	44	41	42	42	41	40	39	35	*2*
All emissions	1,728	1,854	1,716	1,700	1,739	1,771	1,796	1,893	1,785	1,714	1,666	*100*

CENO

01 211 6402

Dmb 20/11

Andrew Allberry Esq
Private Secretary to the
Secretary of State for the
Environment
2 Marsham Street
LONDON
SW1P 3EB

19 November 1984

Dear Andrew

with DB?

My Secretary of State has seen a copy of David Barclay's letter of 9 November. He is generally content with the revised text of the response to recommendation 7.95, subject to two small changes.

At the end of line 15 and beginning of line 16, Mr Walker suggests replacing "as high as 34 per cent" with "in excess of 30 per cent". Only one of the eight scenarios in the energy projections (involving amongst other things a tripling of the real oil price by 2010) produced a share as high as 34 per cent, whereas three others had the nuclear and renewable share at over 30 per cent.

Secondly, in the last sentence, the reference to "... requirements and sources ..." should be replaced by "needs". A commitment to publish assessments of future energy sources would conflict with stated policy that the Government does not produce projections for future supplies of the primary fuels.

I am copying this to David Barclay and the recipients of his letter.

Yours
John

J S NEILSON
Private Secretary

Acid Rain: Env. Affairs Pt 3.

The National Archives

DEPARTMENT/SERIES PREM 19 PIECE/ITEM 1477 (one piece/item number)	Date and sign
Extract/Item details: Barclay to Butler/PM dated 16 November 1984	
CLOSED FOR .....YEARS UNDER FOI EXEMPTION	
RETAINED UNDER SECTION 3(4) OF THE PUBLIC RECORDS ACT 1958	
TEMPORARILY RETAINED	J. Gray 5/12/13
MISSING AT TRANSFER	
MISSING	
NUMBER NOT USED	

CC NO

DEPARTMENT OF HEALTH & SOCIAL SECURITY

Alexander Fleming House, Elephant & Castle, London SE1 6BY

Telephone 01-407 5522

From the Secretary of State for Social Services

The Rt Hon Patrick Jenkin MP
Department of the Environment
Room N16/05
2 Marsham Street
LONDON
SW1P 3EB

Dear Patrick

GOVERNMENT RESPONSE TO THE TENTH REPORT OF THE ROYAL COMMISSION ON ENVIRONMENTAL POLLUTION

I am responding to your minute of 2 November 1984 to the Prime Minister.

My officials have been involved in the interdepartmental discussions and some of their suggestions for changes have been accepted. I am content that you publish the response in your Pollution Paper series.

I am copying this letter to the Prime Minister, Cabinet colleagues and Sir Robert Armstrong.

Yours Norman

NORMAN FOWLER

CCAD

NEW ST. ANDREWS HOUSE
EDINBURGH EH1 3SX

The Rt Hon Patrick Jenkin MP
Secretary of State for the Environment
Department of the Environment
2 Marsham Street
LONDON
SW1P 3EB

13 November 1984

Dear Patrick,

GOVERNMENT RESPONSE TO THE TENTH REPORT OF THE ROYAL COMMISSION ON ENVIRONMENTAL POLLUTION

Thank you for the copy of your letter of 12 November to the Prime Minister with a draft response to the Royal Commission's Tenth Report.

My officials have suggested a few changes and if these can be incorporated I am content with the terms of the response and to its publication in the Pollution Paper series.

Copies of this letter go to all members of the Cabinet and to Sir Robert Armstrong.

Yours ever,

George

Env. Affairs A3

Acid Rain

10 DOWNING STREET

From the Private Secretary 13 November 1984

GOVERNMENT RESPONSE TO THE TENTH REPORT OF THE ROYAL COMMISSION ON ENVIRONMENTAL POLLUTION

The Prime Minister was grateful for Lord Gowrie's minute of 8 November and has noted its contents.

I am sending a copy of this letter to Richard Hatfield (Cabinet Office).

(DAVID BARCLAY)

Paul Thomas, Esq.,
Chancellor of the Duchy of Lancaster's Ojfice.

Note: spoke to H Secretariat to convey PM's views on the Broads. They will report.

PRIME MINISTER

SUBJECT: HOME AFFAIRS
Disposal of Nuclear Waste July 79

H COMMITTEE NEXT WEEK

Three issues come before H Committee next week.

Nuclear Waste Disposal

Lack of co-operation from ICI, together with local pressure, effectively rule out Billingham as a possible site for the deep disposal of nuclear waste. As foreshadowed at the meeting which you held earlier this year, Mr. Jenkin is now proposing to invite NIREX

- to investigate a total of six sites (three for a shallow facility and three for deep disposal):

- to authorise exploratory works at all six sites by special development order;

- to hold only two "second stage" public inquiries; one for each type of facility.

Even under this expedited procedure NIREX do not expect a shallow facility to be operational before the early 1990's - and deep disposal not much before 2,000. So speed is essential. But there is bound to be a row, not least in the House, as the special development orders go through.

The Norfolk Broads

The Broads Authority (who seem to twist DOE around their little finger) are demanding more money to do their job of preserving the Broads' landscape. Mr. Jenkin and Mr. Jopling are proposing to give to them, in the form either of 90% grant in aid for expenditure on management agreements, or a three year "grazing grant" for all Broads'

why?

farmers. The Policy Unit oppose this (see attached note). So too does the Chief Secretary, and you may prefer to leave it to him to make the running in H Committee.

Scotch Whisky

The Minister of Agriculture proposes to offer to a Private Member a Bill to prohibit the sale of Scotch Whisky at a strength of less than 40%. This would be designed to protect the integrity of the finished product, against in-roads from lower strength spirits. The Scotch Whisky Distillers need as much help as they can get in retaining their traditional export markets.

Duty Clerk

pp. David Barclay
9 November 1984

E.R.

CONFIDENTIAL

PRIME MINISTER

9 November 1984

CONSERVATION OF THE BROADS' LANDSCAPE

(TO BE DISCUSSED AT H, TUESDAY 13 NOVEMBER 1984)

The Broads Authority has insufficient funds to pay six farmers (and possibly others) not to put some unusually beautiful landscape to the plough. Under the present arrangements, which DoE are still reviewing at your request, the options set out in the H paper are:

1) Offer the Broads Authority a higher rate of grant-aid (90% rather than 75%), at an extra cost of £30,000 in 1985-86, to enable it to negotiate agreements.

2) Introduce a "grazing grant" for 3 years to all farmers grazing on the Broads at a cost of £445,000 in 1985-86.

The DoE and MAFF favour the grazing grant scheme and want a quick decision prior to a meeting on 30 November of the full Broads Authority.

It is essential that we protect the Broads landscape which, as the paper explains in a lyrical passage, is unique, but we are doubtful about the course proposed, for two reasons:

1) Why throw more money at this problem before colleagues have considered the options which DoE are working on to

make the Wildlife and Countryside Act, 1981 more effective, at less cost?

2) If we must spend more, why choose the more expensive option? This gives all farmers £40 an acre per year, irrespective of whether they intend to plough up landscape, plus a £60 an acre per year to the hard cases which threaten to plough.

In view of your request of July for a review of the operation of the W&C Act, 1981, you may wish to minute the Lord President in advance of H to enquire:

1) Whether any of the options which have emerged from the review of the operation of the W&C Act, 1981 offer a cheaper and less contentious alternative, which does not set a precedent for further expenditure?

2) If the options outlined in the H paper are indeed the only alternatives available to us to save the landscape in question, does it make sense to offer automatic grants of £40 an acre to farmers who have no known intention of ploughing, at considerable extra cost?

Agreed NO

Nicholas Owen

NICHOLAS OWEN

OLD

CCNO

2 MARSHAM STREET
LONDON SW1P 3EB

My ref:

Your ref:

Sub
9/11

9 November 1984

Dear David

GOVERNMENT RESPONSE TO SELECT COMMITTEE REPORT ON ACID RAIN

I enclose the text of the Government's response to the House of Commons Environment Select Committee's report on acid rain (which was published on 6 September). My Secretary of State has taken account of the Prime Minister's views on the text and those of his colleagues who have the greatest interest in this issue and now proposes to publish the present text in the form of a Command Paper.

Strong interest in the matter has been expressed in the House and my Secretary of State therefore wishes to publish the response at the earliest possible date. He will assume that unless he hears to the contrary by close on Tuesday 13 November, colleagues are content that he should proceed to publication.

Copies of this letter and the accompanying text go to the private secretaries to members of the Cabinet, the Paymaster General, and Sir Robert Armstrong, and to Mr Bernard Ingham.

Yours ever

Andrew

A C ALLBERRY
Private Secretary

David Barclay Esq

RESTRICTED

DEPARTMENT OF THE

ENVIRONMENT

Acid Rain:

The Government's reply to the Fourth Report from the Environment Committee, Session 1983-84, HC446-1

Presented to Parliament by the Secretary of State

for the Environment

by Command of Her Majesty

November 1984

LONDON

HER MAJESTY'S STATIONERY OFFICE

£ net

Cmnd

I. INTRODUCTION

1.1 The Government welcomes the Environment Committee's timely Report on the important subject of Acid Rain. As the Committee rightly note, a term which had a single meaning when first devised has now been extended to cover a variety of forms of air pollution arising from a number of emissions and from chemical interactions of those emissions in the atmosphere. The Government considers that this process of broadening has also blurred important issues which need to be disentangled if effective solutions are to be found.

1.2 The Government acknowledges that this is an area of wide concern. It recognises in particular that a number of European countries are sustaining damage which they attribute in whole or part to acid deposition. This damage is far more extensive than we appear to be experiencing in the United Kingdom. Some countries can point to evidence that pollutants emitted in neighbouring countries, including our own, are contributing to their damage - and consider that without concerted international action their problems are not soluble. The United Kingdom believes in the principle of good neighbourliness; and the Government - both in the European Community and in the relevant international Convention - has repeatedly expressed its willingness to develop environmentally effective and economically feasible policies. It will continue to play a full and positive part in international discussions and research programmes designed to identify the cause of damage and to provide solutions.

1.3 Building on the nearly 40% reduction in SO_2 emissions achieved since 1970, the Government aims to achieve a further reduction of 30% from 1980 levels of SO_2 emissions by the end of the 1990s and a similar reduction in levels of NO_x emissions. It also intends to support stricter emission standards for petrol engined cars, achievable by development of lean-burn engines. It does not believe that the very substantial expenditure (running into hundreds of millions of pounds) which would be required to install flue-gas desulphurisation plant at existing power stations can be justified while scientific knowledge is developing and the environmental benefit remains uncertain. It will, however, continue to encourage the development of new technologies which can provide more cost-effective solutions.

1.4 Pollution is dealt with by political action, but it is explained by science. Science is dynamic, and the policies of this and other Governments must evolve to meet new evidence about the environmental situation. What is durable within this framework of change is the Government's overall policy: that action against pollution shall rest on the best scientific evidence, the best technical and economic analysis, and the best possible assessment of priorities. The United Kingdom has a proud record of achievement in tackling the massive legacy of pollution inherited from the past and the Government firmly intends to sustain that record.

1.5 This response to the Select Committee is in two main parts. Chapter II comprises a short general essay which sets out, very much in summary terms, the Government's present interpretation of the scientific evidence and the evolution of our response to it. This chapter is intended to set the detailed responses to individual recommendations, which follow in Chapter III, within the broad context of the Government's overall policy on acid rain.

II. ACID DEPOSITION

2.1 The Select Committee discuss many kinds of risk and damage - to human health, crops, forests, freshwater life, stonework and other materials. Although air pollution may contribute to all these kinds of damage, the relative importance of pollutants and of natural factors like climate, and the pollutants likely to be of most significance, vary from one situation to another. There are subtle interactions between pollutants and the natural components of air, soil and water and many of these are still imperfectly understood. Mathematical models of these complex phenomena are still being developed and tested.

2.2 These diverse processes cannot be described comprehensively in a short essay. The simplification required in order to achieve brevity and clarity brings an inevitable risk of distortion. Uncertainities, expressed in alternative hypotheses, tend to be glossed over. Moreover, this is a field in which knowledge and understanding are developing rapidly. The following short explanation of the Government's present interpretation of the scientific evidence is not regarded as in any way a last word on the subject, or a substitute for the increasingly extensive and authoritative scientific literature (much of it international in character).

Atmospheric pollutants and their interactions

2.3 The Select Committee draw attention to three principal problems associated with acid deposition: damage to buildings and materials, damage to freshwater ecology, and damage to forests. They refer in less detail to possible hazards to human health and to crops. The agents and mechanisms of these different kinds of damage differ, and the Select Committee were wise to treat them separately.

2.4 Air pollutants fall into two broad categories: "primary" and "secondary". The first are those directly emitted from factories, domestic chimneys, cars or power stations. The most common are those produced in fuel combustion: smoke, carbon dioxide, sulphur dioxide (SO_2) and oxides of nitrogen (NO_x). Only the last two of these are important in the process of acid deposition. In addition there are many other primary pollutants, from combustion and other sources, a

few of which are important because they are involved in the chemistry of acid deposition. Among them are hydrocarbons, ammonia (or the substances that produce it as a secondary pollutant) and some chlorine-containing compounds. "Secondary" pollutants are produced in the air by the transformation of primary pollutants. Sulphur dioxide and nitrogen oxides are converted in this way to sulphuric and nitric acids, and ozone is generated by chemical reactions involving NO_x and hydrocarbons in the presence of sunlight. Ozone can be directly damaging to plants and materials, and also plays a key role in the oxidation of SO_2 and NO_x to strong acids, and the conversion of other nitrogen oxides to the environmentally active nitrogen dioxide (NO_2). Ammonia, in contrast, has a neutralizing influence, producing the ammonium sulphate haze that is believed to be the main cause of the impaired visibility on which the Select Committee also comment.

2.5 As the Select Committee recognise, environmental damage can occur both through the direct impact of SO_2 and NO_x (sometimes called "dry deposition"), and through the "wet deposition" of the sulphuric and nitric acids derived from them in mist (particularly important at higher altitudes) and in rain. The proportions of the two strong acids varies with situation: it is commonly stated as 70:30 sulphuric: nitric, but some hill mists have proved to contain more or less equal amounts of the two. Rain is naturally acid (because atmospheric carbon dioxide dissolves in it to form dilute carbonic acid, volcanoes puff out SO_2, and NO_x is produced in forest fires and biological decomposition). But there is no reason to doubt that in the industrial regions of the northern hemisphere, where some 90% of the SO_2 originates from human activities, rain has been made much more acid by man.

2.6 The chemical transformations and interactions in the air are complex, involve dozens of identified reactions (and probably many that have not yet been described) and have been the subject of a copious scientific literature (1,2). The implications of variations in concentrations, rates, and meteorological conditions are best explored

---

1) Reference: Cox, R A and S A Penkett (1983)
Formation of atmospheric acidity in acid deposition (ed S Beilke and A J Elshout) Brussels: CEC (pp58-83)

2) Buckley-Golder, D H (1984)
Acidity in the Environment
Department of Energy, Energy Technology Support Unit Report R.23 (HMSO)

using mathematical models. One recent model result in the UK (3), which uses data appropriate to British conditions, indicates that hydrocarbons may be a key factor in ozone formation and require even more stringent control than NO_x if this process is to be minimised.

Damage to Health

2.7 The Select Committee review assertions made in a number of countries that SO_2 emissions may damage human health, both directly via the lungs and indirectly because the acidification of fresh waters can make them more liable to dissolve toxic metals from rocks, sediments or water supply systems. There is no doubt that in the past high urban concentrations of smoke and SO_2 did kill people prematurely: the London smog of 1952/53 was notorious for this and led directly to the Clean Air Acts. Since then maximum urban SO_2 concentrations have been reduced by 90% and such deaths are not now recorded in Britain. There is no clear evidence that the much lower air pollution concentrations today constitute a health hazard. As to water supplies, the role of air pollution in raising toxic metal concentrations in drinking water is still unclear (para 3.26) but the capacity of acid waters to dissolve lead from plumbing has been known for many years and has led to preventive action, especially in Scotland.

Damage to buildings

2.8 Buildings built of, or faced with, limestones are particularly vulnerable to SO_2 attack. The process involves both dry deposition, in which the gas penetrates the porous stone and converts the insoluble calcium carbonate which is the main ingredient into soluble calcium sulphate, and the penetration of moisture (whether acidified or not). Repeated crystallization of calcium sulphate and other salts during cycles of wetting and drying causes slow crumbling of the stone. Such salts can remain inside the stone for long periods so that the damage can continue after exposure to SO_2 is reduced: much of the damage now being observed is believed to be due to past pollution.

---

3) Derwent, R G and O Hov (1980)
Computer modelling studies of the impact of vehicle exhaust emission controls on photochemical air pollution formation in the United Kingdom

Env Sci Tech 14 1360

2.9 This form of damage is governed by SO_2 concentrations in the levels of the atmosphere near the ground. Most of this pollution occurs in urban areas and comes from local domestic, commercial and industrial sources: less originates from power stations, which are now mainly located in rural areas and disperse their emissions through tall stacks. Ground level urban SO_2 concentrations have fallen sharply in the last 20 years, largely because of the substitution of sulphur-free natural gas for high-sulphur coal and fuel oil: concentrations in 1970/71 and 1981/82 were 62% and 32% respectively of the peak concentrations in 1962/63.

2.10 If this analysis is correct, the disturbing accounts of damage to historic monuments described in the Select Committee's report may well be the result of the high pollution episodes of 30 years ago, and the improvements in air quality already secured will have greatly reduced the risk of new damage. But this does not mean that action is not still required. Although the natural acidity of rainfall may cause damage to some permeable limestones any elevation of SO_2 above natural background levels increases the risk of some deterioration. Little is known about the effects of nitrates and wet-deposited nitric acid on building materials, and this needs further research. It is clear that neither SO_2 nor NO_x is involved in concrete deterioration: the problem here is carbon dioxide, causing a change called carbonation, and as this is not one of the phenomena to which the Select Committee draw attention it is not considered further in this response.

Effects on Soils and Freshwaters

2.11 Although it was the report of changes in freshwater systems, and especially in fish populations in Scandinavia, that first drew attention to problems of acid rain, very little of the latter falls directly into river and lake systems. The chemistry of freshwater acidification is largely governed by the interactions between dry and wet deposited acids and the vegetation and soils they encounter as they drain through a catchment.

2.12 Many kinds of vegetation are naturally acid: the mossy *Sphagnum* bogs that cover our wetter northern and western hills are an extreme example. The decay of dead plant material, including leaf litter, releases acid as does the bacterial oxidation of mineral or organic

sulphides in the soil. Forests act as an effective trap for both dry and wet acidic depositions, and the water falling through the leaf canopy or passing down the main stem, especially of old coniferous trees, is often more acid than the incoming precipitation.

2.13 Vegetation can therefore add to the acidity reaching the soil surface. Tree-growth can also acidify some soils directly by withdrawing neutralizing metallic ions such as calcium and magnesium. Once water reaches the ground, subsequent changes depend critically on whether it drains swiftly from an impermeable surface or percolates through the soil layers, undergoing at least some degree of chemical transformation. If the drainage is through mineral-rich layers, calcium and magnesium are dissolved: if the neutralizing capacity of the soil is low, as it is in shallow layers over granite or in many sands, the acidity remains high. Acid drainage through some kinds of soil can bring aluminium into solution, and this is important later because free inorganic aluminium is toxic to fish.

2.14 Both sulphate and nitrate, deposited in rain and mist, are capable of contributing to the acidification of fresh waters, but the nitrate is probably generally absorbed fairly quickly by vegetation since it is an important plant nutrient.

2.15 If fresh waters are made more acid, they progressively lose their capacity to support many kinds of freshwater life, including molluscs, insects, crustaceans and fish. The eggs and young of fish are most sensitive, and the hatching rate and survival of fry are reduced before the adults suffer: it is possible for a population to dwindle because it cannot reproduce. The young stages are also particularly at risk in some species because spawning occurs in small streams and shallows which are especially exposed to "pulses" of acidity when accumulated acidified snow melts or the first autumn rains flush out acidity that has developed in the soil in summer. If the acidity of the water is high enough aluminium may be brought into solution, and waters with a combination of high acidity, high aluminium and low calcium are especially likely to lose their fish.

2.16 The story of freshwater acidification is not a simple one. It has reached different degrees in different areas in a fashion that is probably related particularly to rock and soil types, rainfall, vegetation and industrial history. Data on the progress of the pheno

menon in Britain are, as the Select Committee point out, incomplete. Substantial research is in progress, in the UK and elsewhere, to elucidate the details of the many processes involved.

Effects on Forests

2.17 An increasing amount of forest damage over a wide area of the Federal Republic of Germany and neighbouring countries has been reported in the past three years, and the latest Federal German government statement, indicating a further deterioration in the position, has appeared very recently (4). Similar damage has been recorded in Sweden and North America. It was originally believed that acid deposition was a major factor causing this damage, and in some areas (for example along the frontier between the Federal Republic and its eastern neighbours) where SO_2 concentrations in the air are very high, direct damage from this gas may well be important. In other areas hypotheses linking wet-deposited acid to aluminium release in the soil, with toxic effects on roots, have been put forward. In yet other areas the pattern of pollution and of damage suggests that altitude, climatic stress, and fungal and insect attack, are also involved, very probably in combination with air pollution.

2.18 Concentrations of ozone measured in damaged areas of the Black Forest are often comparable with those observed in parts of the United States where this secondary pollutant is believed to cause forest damage. They also match levels found to damage coniferous trees in laboratory experiments. Ozone concentrations are consistently greater at higher altitudes in both the Federal Republic of Germany and the USA, matching the observed fact that forest damage is greater at altitudes above 600m - 800m. There is therefore an increasing belief that ozone is a major factor.

2.19 Ozone concentrations in southern Britain in summer are similar to those in parts of Europe where tree damage has been reported, but annual mean concentrations in the UK are lower than those in areas of Germany and the USA where forest damage occurs. The situation in the United Kingdom therefore remains uncertain, and is the subject of investigation (see paragraph 3.16). Although a new form of damage to

---

4) Federal Minister of Food, Agriculture and Forestry 1984 Forest Damage Survey - 16 October 1984.

trees has recently been observed in North and West Britain, this bears only a superficial resemblance to that associated with air pollution in Germany.

Reactions and Remedies

2.20 In the United Kingdom it was urban air pollution, and especially the deaths caused by smoky smogs in the 1950s and early 1960s, together with damaging fumes from industry (first recognised in the 1860s), that stimulated control. The Clean Air Acts regulated smoke from low level sources and the Alkali Acts dealt with major polluting industries. The success of the results, alongside changes in fuel (including the replacement of coal by natural gas in domestic heating), is well known. The quality of urban air has been transformed in little more than a generation.

2.21 Total SO_2 emissions in the UK have also declined steadily in recent years. In 1970, total UK SO_2 emissions peaked at 6.09 million tonnes. Since that year they have fallen so that in 1980 the total was 4.67 million tonnes. The latest figure - for 1983 - is 3.72 million tonnes, a reduction of nearly some 40% from the peak year of 1970 and of 20% since 1980. A number of factors have contributed to the decrease, including energy economies which are estimated to account for about 4% of the decline since 1980, reduction in the sulphur content of fuel (4%), changes in fuel use patterns (about 5%) and industrial modernisation (6%). The nature of these reductions is such that resumed industrial growth is unlikely to reverse them.

2.22 This very improvement has led to concentrations in SO_2 in all areas in the country being below, and generally well below, the limit value set for health protection by the European Community (although domestic smoke exceeds these values in a few areas). In contrast, in the urban areas of some other countries, including some EC member states, levels of sulphur remain a problem. As the effects of the acute local pollution of the past have receded the possibility that dispersed emissions may have effects at long range from their sources has taken some time to emerge as a serious issue. Effects of this sort may have been hidden behind the effects of more obvious causes in the past. However, the problem has been studied seriously in the UK since the early 1970s. The Meteorological Office, for example, has played an

active role in the study of acid rain, performing theoretical research and carrying out fundamental measurements from its instrument research aircraft over the North Sea since 1971 (5). Such studies have involved significant cooperation with other countries in exchange of information and study, notably in the forum provided by the United Nations Economic Commission for Europe Convention on Long Range Transboundary Air Pollution (the UNECE Convention).

2.23 Elsewhere in Europe, although urban and industrial pollution has been responsible for severe environmental damage in some areas, public concern over the effects of acid deposition resulting from long-distance dispersion across national frontiers was first aroused in Scandinavia in the late 1960s. A report on the subject was submitted by the Swedish Government to the United Nations Conference on the Human Environment held at Stockholm in 1972. The Organisation for Economic Cooperation and Development (OECD) mounted an international study which showed that long range transport of SO_2 did occur - and that under certain weather conditions up to half that produced in Britain could leave the country. In 1979 the UNECE Convention was signed in Geneva. In 1982 Sweden hosted a conference in Stockholm which heightened awareness of the problem. Since then the seriousness with which these matters are viewed internationally has been stressed in many conferences and at two meetings of the Executive Body of the UNECE Convention.

2.24 Within the past year, a number of Governments have committed themselves to make a 30% reduction in their total annual national emissions of SO_2 by 1993 (using their 1980 emissions as a baseline). The number of countries in this 'club' is now 20 including Canada, the Federal Republic of Germany, France, the Scandinavian countries and some Eastern European countries. In the European Community the Commission has published a draft Directive which would require member states to achieve 60%, 40% and 40% reductions respectively by 1995 in their SO_2, NO_x and particulate emissions from large combustion plants including power stations. The Committee recommend that the Government should accept all these proposals. In parallel, and because of mounting concern over ozone as a possible cause of damage, proposals

---

5) Meteorological Office Annual Report 1983, Directorate of Research, Special Topic - Meteorological Aspects of Acid Rain pp 76-99.

for more stringent controls of motor vehicle emissions (which account for a significant proportion of NO_x and hydrocarbons) have been brought forward.

2.25 The Government welcomes this opportunity to make clear its position on these important issues. It agrees with the Committee on the need to continue to reduce emissions contributing to acid deposition. It shares this objective with those countries that have already joined the "30% club". But in considering that specific objective and the emission control proposals by the Commission, the Government has to take account of the current state of scientific knowledge of the problem, and the need to ensure that the most cost effective remedial measures are applied.

2.26 The scientific evidence reviewed in this chapter has led to a greater understanding of the mechanisms involved in the formation of acid deposition, and in its relationship to environmental damage. It is clear that the problems are much more complex than was earlier envisaged. While air pollutants emitted in the United Kingdom may be involved in the damaging processes described, the precise role of primary and secondary pollutants varies with the circumstances. It seems unlikely for example that transboundary pollution is the dominant element in ozone concentrations identified as a possible contributory factor to forest damage, and certainly UK vehicle emissions are unlikely to form anything more than a very small proportion of transboundary pollution.The contribution to environmental damage of distant and local sources also varies. For instance, damage to stonework seems principally due to very local sources.

2.27 The costs of emission control measures have to be assessed against this scientific evidence. As the Committee point out, they would be substantial; meeting the requirements of the Commission's draft Directive for SO_2 would mean installing flue gas desulphurisation (FGD) plant at power stations, at a cost of some £1.5bn. Control costs for individual and smaller industrial combustion plants are also likely to be unacceptably high. In addition it is possible that several million pounds per power station would be required to install NO_x controls. Expenditure of this order clearly requires reasonable certainty that it will achieve the desired results.

2.28 The Government is however determined to continue the attack on air pollution. The UK has already made a substantial contribution; our emissions of SO_2 have fallen by nearly 40% since 1970. The Government will build on this firm foundation; specifically it intends:

i. to achieve further reductions in national sulphur dioxide emissions aiming at a reduction of 30% from 1980 levels by the end of the 1990s;

ii. to aim for the same reduction in nitrogen oxide emissions;

iii. to support stricter emission standards for petrol engined cars achievable by development of lean-burn engines; and

iv. to continue to support a well balanced programme of research on air pollutants, their effects and the technology for their control, participating fully in international research efforts already deployed in these fields.

In pursuit of these objectives the Government is participating in the work of the UNECE Convention and negotiating with its fellow signatories on policies for further measurement and control of emissions which all can endorse. It is expanding monitoring in the UK on the processes of transport, transformation, deposition and effects arising from emission of air pollutants. It is backing new developments in the technologies of fuel combustion and emission control that offer the prospect of much more economic solutions to the problem than are currently available. It will pursue these objectives with urgency and vigour. The United Kingdom has a proud record of achievement in tackling the massive legacy of pollution inherited from the past and the Government firmly intends to sustain that record.

III. THE COMMITTEE'S RECOMMENDATIONS

3.1 This Chapter deals with the Select Committee's detailed recommendations. For convenience, the responses which follow have been cross-referenced to the relevant paragraphs of volume I of the Committee's report as well as to the conclusions, and follow the same order. The Government considers, however, that the key elements of its response relate to the Committee's recommendations on the reduction of SO_2 and NO_x emissions. These are discussed in paragraphs 3.61-3.68.

Paragraph 18 page xvi (Recommendation 1)

Recommendation

3.2 We recommend that BRE be commissioned to conduct detailed research into the effects of acid rain on different types of stone and concrete in a variety of environments.

Response

3.3 The Building Research Establishment (BRE) has been commissioned to conduct research into the effects of acid rain on materials of economic importance, including stone, concrete, slate, plastics, paint and glass. The programme will comprise both laboratory and atmospheric studies and will cover factors such as temperature, humidity, variations in wetness with time, materials composition and concentrations of particular air pollutants known or suspected to cause deterioration.

3.4 In addition a separate research programme on the micro-climate around buildings is being undertaken in which local meteorological factors affecting the movement of wind and rain close to building surfaces are being studied.

3.5 A precursor to all these investigations is the preparation at BRE of an inventory of the different locations, amounts of materials and types of buildings within the UK which are likely to be at risk. As far as possible, this inventory will include all monuments and buildings of historic importance and will attempt to separate the

deterioration which has arisen from past high levels of pollution and that which is likely to occur from existing or future levels of pollution.

3.6 The Department of the Environment (DOE) is also proposing to fund work at the National Physical Laboratory on the corrosion of metals by air pollutants and is in discussion with the University of Manchester Institute of Science and Technology regarding a programme on the interaction of air pollutants with building materials, with special emphasis on NO_x.

Paragraph 23 page xviii (Recommendation 2)

Recommendation

3.7 We welcome the commitment of PSA's Chief Executive to conduct a short survey of acid rain damage. We recommend that suitable cases should as a matter of course be referred to BRE, and that PSA use a selection of buildings in different materials to monitor any damage additional to natural weathering.

Response

3.8 PSA has now completed its short regional survey of acid rain damage and will refer the cases of damage identified to BRE as subjects for their further research. Cases identified in the future will be treated in the same way. PSA is also making arrangements for a selection of buildings in different materials on its estate to be monitored for damage additional to natural weathering. BRE has agreed to assist in this if required.

Paragraph 36 page xxii (Recommendation 3)

Recommendation

3.9 We recommend that a substantial research programme on the effects on buildings of low-level emissions be initiated.

Response

3.10 Studies of the deterioration in the fabric of buildings of notable historic importance, specifically St Paul's and Wells Cathedrals, have been in progress for several years. The work has been jointly undertaken by staff from BRE and University College London. Future work will include Lincoln Cathedral, and will look particularly at the effects on stained glass windows. BRE has in the past commissioned studies from the British Glass Industries Research Association on methods of reducing environmental attack on mediaeval windows, from Aston University on evaluating the synergistic effects of air pollutants (ozone, NOx, SO_2) on plastic and surface coatings, and from the Paint Research Association on the soiling of and damage to paint surfaces. Existing studies on natural stone are being extended to monitor damage in regions with higher pollution levels than those generally existing in urban areas. Bolsover Abbey has been specifically chosen for this purpose because of its close proximity to an industrial complex. The results will be compared to those from the Wells Cathedral project.

Paragraph 37 page xxii (Recommendation 4)

Recommendation

3.11 We recommend that the Government give urgent and immediate consideration to the cost/benefit of preventing the avoidable erosion of both historic and modern buildings.

Response

3.12 Urgent attention is being given to evaluating the extensive damage to buildings arising from wet and dry deposition and ways of preventing these effects. Methods of preventing acid deterioration of natural stone have been developed by BRE, but they are expensive and can be used economically only on especially vulnerable external surfaces (see para 3.20). Two important factors have to be resolved in evaluating the cost/benefit of preventative action. The first is to quantify the area of materials at risk, and the second is to deduce the dose-response relationship for existing and projected levels of atmospheric pollution. The BRE programme is designed to provide a

basis for assessing both these factors and to establish what can best be done, at least cost to the community, to preserve the heritage and secure the design life of modern buildings and other constructions.

Paragraph 92 page xli (Recommendation 5)

Recommendation

3.13 We recommend that the Forestry Commission using its own and West German experts, conduct a survey on the same lines as that in Sweden forthwith.

Response

3.14 The Forestry Commission is now undertaking a survey of the health of Norway and sitka spruce and Scots pine in Britain. In order to take advantage of the experience gained in such surveys in West Germany, a scientist from the Lower Saxony Forest Research Institute was invited to visit sites in Scotland, England and Wales in September 1984 and his advice on methods and the design of the survey has been accepted. Following the initial survey, a number of the sites will be designated for long-term monitoring.

Paragraph 93 page xli (Recommendation 6)

Recommendation

3.15 We recommend that the Forestry Commission undertake detailed NOx and ozone monitoring and begin research into acid rain and trees.

Response

3.16 The Government considers that detailed NOx and ozone monitoring should remain part of DOE'S responsibility and that the recommendation should be acted upon within the Department's overall air pollution monitoring plan, which is drawn up in consultation with the Forestry Commission and other appropriate Government Departments. The DOE is planning to extend its NOx and ozone monitoring networks substantially, partly in response to recommendations made in the 10th Report of the Royal Commission on Environmental Pollution. A network of about 20

NOx and 10 ozone monitoring sites is currently being considered. The installation costs of such a network would be in the region of £400,000 and the annual running costs approximately £150,000. By the end of 1985, the UK will also have 9 primary sites in remote areas (5 are already operational) capable of measuring a range of air pollutants including SO_2, particulates, anions and cations in precipitation and ultimately, NOx, ozone and hydrocarbons. These sites contribute results to meet UK international obligations arising from our membership of the UNECE cooperative programme for monitoring and evaluation of long range transmission of air pollutants in Europe (EMEP).

3.17 In the same recommendation the Committee say that the Forestry Commission should begin research into acid rain and, by implication, ozone and trees. Extensive research is already being funded in these areas by DOE and NERC at Research Council laboratories such as the Institute of Terrestrial Ecology (acid rain), Universities like Imperial College (ozone) and the Meteorological Office which undertakes both experimental and theoretical research into the dispersion and chemical transformation of pollutants. The Forestry Commission provides assistance to these bodies and has recently put in hand in-house research into the effects of air pollution on the health and growth of trees in forest areas. Specific measurements of pollution will be made for experimental purposes in addition to information acquired from DOE's background monitoring. UK research into the effects of air pollution on terrestrial systems, including forests, has been coordinated through the Committee on Air Pollution Effects Research (CAPER) which is organised by NERC. DOE, MAFF and the Forestry Commission are all members of this committee, and the Government Departments concerned will now review with the other members the need for additional research on the topics the Select Committee identify.

Paragraph 113 page xlvii (Recommendation 7)

Recommendation

3.18 We recommend that the Government commission research on the effects of acid rain on materials, and on means of protecting them, as a matter of urgency.

Response

3.19 For several years the BRE has collaborated with the Central Electricity Generating Board (CEGB) on a programme exposing a range of building and construction materials to ambient levels of air pollution around power stations and at a CEGB site at the Glasshouse Crops Research Institute at Littlehampton, Sussex. Stone samples which have been exposed for a designated period at these sites are currently being examined at BRE to evaluate the extent of deterioration. The present intent is to continue the programme and to take advantage of the special exposure facilities available at the CEGB sites.

3.20 BRE has also been working for many years on protective measures for stonework. The well known Brethane treatment is effective but expensive and has only been used to protect exposed stone surfaces that are particularly vulnerable, such as stone statuary on historic buildings. Other less expensive methods of preservation which restrict the ingress of pollutants and acid waters into stones are also being studied, including the use of silicones, silicates, stearates and acrylic formulations. So far these have not proved as effective as the Brethane treatment. Work is continuing.

3.21 The main agents that damage organic materials such as rubber, plastics and paints are UV radiation, ozone and photochemicals. Most damage to these materials occurs in urban areas, and motor vehicles are the main source of the precursors which give rise to ozone and photo-oxidants. The Government is currently considering research proposals in this area in addition to the programme on building and construction materials already mentioned.

Paragraph 117 para xlviii (Recommendation 8)

Recommendation

3.22 We recommend that research on visibility degradation be commissioned.

Response

3.23 A study of the records of the Meteorological Office shows that since the Clean Air Act, the incidence of fogs in the UK has generally decreased significantly. There is no evidence of any recent reversal of this trend. However in some areas there is evidence of an inverse correlation between visibility and ozone concentration. This is due partly to the generation of some particulate matter being linked with the same air chemistry reactions as are involved in the local generation of ozone. But other factors such as prevailing meteorological conditions and humidity are often the over-riding factors determining visibility. This means that the monitoring of atmospheric visibility is not a good method of detecting atmospheric pollution. Generally it is more satisfactory to measure directly the concentration of individual pollutants. The Government will consider further the need to set up a research programme into the causes and control of reductions in atmospheric visibility, building on early work undertaken by the Meteorological Office, Warren Spring Laboratory (6) and Environmental Sciences Division, Harwell.

Paragraph 124 page xlix (Recommendation 9)

Recommendation

3.24 We recommend that the Government should commission research in this country on all aspects of risk to human health to which US, Swedish and German research has drawn attention, with a view to establishing whether similar risks exist in this country.

Response

3.25 Within the UK it has been demonstrated that the clear-cut acute effects of air pollution on health linked with the former high concentrations of smoke and sulphur dioxide in towns have been eliminated, principally by actions taken under the Clean Air Acts. There are other pollutants in urban atmospheres, derived from both stationary and

---

6) Report LR 348(AP), 1980.

mobile sources, that could adversely affect health, at relatively high concentrations, but present ambient concentrations are not such as to suggest the likelihood of significant effects (7). Thus NO_2 concentrations in the UK do not exceed the World Health Organisation (WHO) guidelines, although there may be isolated exceptions. It is not therefore considered that NO_2 levels in the UK represent a significant environmental health risk (8). The Committee refer to other statements concerning possible health effects arising from air pollution (para 122 p xlix). A preliminary report on a desk study by the WHO European Office on the health effects associated with acid rain was presented at the second meeting of the Executive Body of the UNECE Convention, and further examination of these matters has been remitted to WHO. The Government will consider its own position further in the light of the results.

3.26 Dissolved lead from plumbing systems can be a problem in areas of the country where there are acidic soft waters. The reason for the acidity of these waters is that they originate from naturally acidic peat-covered uplands. Generally treatment of such waters with lime to reduce the acidity reduces the problem, although in particularly difficult cases replacement of lead plumbing may be required. Government action on the wider lead problem is set out in its response to the Ninth Report of the Royal Commission on Environmental Pollution (9). Copper is considered to have relatively little health effect and the EC Directive on drinking water (80/778/EEC) recommends that up to 3000 microgrammes per litre can be tolerated. In contrast, the same Directive recommends a limit of 50 microgrammes per litre for lead.

---

7) S. Chinn, C. du V. Florey, I. G. Baldwin, and M. Gorgol, The relation of mortality in England and Wales 1969-73 to measurements of air pollution. J. Epidem. Community Health, 1981, 35, 174-179; R. E. Waller, Control of air pollution: present success and future prospect. In Recent Advances in Community Medicine, Edit., A. E. Bennett pp 59-72. Churchill Livingstone, Edinburgh, 1978.

8) A memorandum on the effect of NO_2 on human health was presented by the Chief Medical Officer of DHSS to the enquiry of the House of Lords Select Committee on the European Communities on Air Pollution - 22nd Report, pp 190-191 June 1984.

9) Lead in the Environment. Pollution Paper no 19 (1983). HMSO.

3.27 Data reported in the 1973 MAFF Food Survey showed that levels of mercury in freshwater fish (0.09 and 0.03 ppm respectively for brown and rainbow trout) were considerably lower than in marine fish and well within safety levels. Pike were an exception in having rather higher mercury levels (0.52 ppm), but this is considered to be a function primarily of their long life and predatory feeding habits, rather than a consequence of habitat acidification. Although pike is occasionally eaten in this country, it is not a sufficiently important element of diet to be a significant source of mercury to UK consumers. It is recognised that this monitoring was not specifically aimed at fish originating from acidic waters, although doubtless fish from such sources were included in the sample. The Government will initiate a limited programme to determine mercury levels in fish originating from acid waters on catchments naturally rich in heavy metals.

Paragraph 134 page lv (recommendation 10)

Recommendation

3.28 We recommend that a rural network of monitoring stations at different altitudes over the whole country be set up.

Response

3.29 The Government agrees that monitoring of air pollution in rural areas is essential.

3.30 There already exists a network of sites over the whole country to monitor atmospheric levels of sulphur.

3.31 The recently published report of the UK Review Group on Acid Deposition (the Warren Spring Laboratory Report to which the Select Committee refer) recommends that more sites be established to monitor both wet and dry acid deposition in rural areas of the UK to provide proper coverage of the whole country. The report also identifies the need for more monitoring sites at different altitudes. The Government has already accepted the recommendations of the Review Group and is taking steps to implement them.

3.32 As to NOx and O_3 the Royal Commission on Environmental Pollution in its tenth report proposed extension of the monitoring network for these pollutants, and the Government intends to extend the network in accordance with that recommendation by 1986. The need both to cover the whole country and to monitor at different altitudes will be taken into account in designing the new network.

3.33 In addition to these measures (and as stated in paragraph 3.16), the Government intends to have in place by 1985 a primary network of nine well instrumented sites in remote areas providing national background levels for a range of air pollutants and reporting to the EMEP.

3.34 Finally the Meteorological Office and DOE are funding research which will lead to the development of mathematical models capable of predicting variation of precipitation with altitude over mountainous areas.

Paragraph 141, page lvii (recommendation 11)

Recommendation

3.35 We recommend that greater impetus be given to the perfection of PFBC technology for commercial use.

Response

3.36 The Government agrees with the Committee that pressurised fluidised bed combustion (pfbc) technology offers excellent prospects for emission control at relatively low costs. It is for this reason that the Department of Energy is contributing to the joint CEGB/ National Coal Board (NCB) design studies for a full-scale generating plant based on pfbc. Decisions on the expansion of work on this promising process will be a matter for the two industries in the light of these design studies and in the light of the £25m two-year joint development programme at the pfbc experimental facility at Grimethorpe which the two Boards recently announced.

Paragraph 145, page lviii (recommendation 12)

Recommendation

3.37 We recommend that the necessary resources be devoted to fgd by the CEGB, not least in order to reduce its cost.

Response

3.38 This is a matter in the first place for the commercial judgement of the CEGB which, in accordance with the polluter pays principle, would have to meet the costs of any environmental controls with which it was required to comply. The Board's task is to prepare itself to meet any such controls, using means which are economically feasible and technically adaptable. To this end, the Board maintains a substantial programme of evaluation of the various fgd systems which have been developed, especially in Japan and the USA, and which have been in commercial use for some years. These systems are available "off the shelf" and their costs are governed by normal commercial considerations. The Lodge Cottrell process referred to by the Committee is still being evaluated by the Board. The Board has made it clear that, if it becomes necessary to install fgd, the equipment would be manufactured in the UK irrespective of the system chosen.

Paragraph 146, page lviii (recommendation 12A)

Recommendation

3.39 We recommend that further encouragement be given to the development of British technology both through NCB and CEGB research and through grants towards development costs by the Department of Trade and Industry.

Response

3.40 The Government agrees that the development of British technology should be encouraged. Development work by the NCB and CEGB is directed towards the efficiency and competitiveness of their operations and to this end both Boards have in hand work which is relevant to the

control of emissions. The experimental pfbc facilitity at Grimethorpe has already been mentioned. In addition, the CEGB has work in hand on a pilot installation of a chloride prescrubber which is necessary for UK coals if the flue gases are to be cleaned. Jointly with the NCB, it is studying a number of coal cleaning techniques including their optimum use in conjunction with FGD. It is also undertaking work on coal/water mixes as power station fuel (as a substitute for fuel oils).

3.41 The Government itself recognises both new low-pollution combustion techniques and emission control technologies as worthwhile areas for sponsorship. It is important that UK industry should run with the leaders in this field. The Government has provided financial assistance to a number of companies in the past and is willing to consider any new application. DOE is currently considering possible research support in relation to a test fluid combustion bed.

Paragraph 154, page lx (recommendation 13)

Recommendation

3.42 We recommend that any programme to limit NOx and hydrocarbon emissions from motor vehicles should be based on lean-burn technology.

Paragraph 198, (last sentence), page lxxii (recommendation 17A)

Recommendation

3.43 We recommend that new motor vehicles be required to have reduced NOx emission levels by 40% by 1.1.87 and that the Department of Transport should inquire into the best possible means of reducing emissions from existing motor vehicles.

Response

3.44 The Government accept that new standards for emissions controls should be achievable by lean-burn technology. Vehicle emissions in the European Community are governed by a Council directive which was amended in June 1983 so as to reduce HC and NOx emissions by about 30% for all new cars from 1 October 1986. Discussion has already started

in Brussels on a further amendment to this directive, to become operative between 1989 and 1991. The UK is arguing that emission standards for the end of this decade should be set at levels achievable with lean-burn technology. The potential exists for a further reduction of 25% in combined HC + NOx and 40% in NOx alone within this time scale. Subject to Community agreement therefore, a 40% reduction in NOx levels can be achieved. Some models of vehicles with lean-burn engines and lower NOx emissions can be expected to appear on the UK market from next year onwards. But we do not believe that the standards under discussion could be imposed on all new vehicles as early as the beginning of 1987. The process of development and setting up production over the whole model range, and type approval by Department of Transport and other authorities, can be expected to take four to five years from the agreement of the standard in a Council directive.

3.45 It is not clear what the Committee had in mind in recommending that the Department of Transport should enquire into the best possible means of reducing emissions from existing vehicles. The fact is that it is impracticable to use retrospective modification of existing vehicle engines to influence their gaseous emissions. Studies of NOx emissions from existing vehicles in service have shown that they are generally well within the relevant standards to which they were manufactured and approved. Although NOx emissions do not tend to increase with vehicle age, they do increase at high speeds. So possible means of reducing emissions from existing motor vehicles would, therefore, be the better enforcement of the 70 mile per hour speed limit, or some lower limit. Since high-speed motoring is a small proportion of UK total car mileage, however, the potential reduction in total NOx emissions is very small. And, of course, such a proposal would raise much wider issues than the effect on air pollution.

Paragraph 171, page lxvi (recommendation 14)

Recommendation

3.46 We recommend that those industries reliant on high combustion temperatures, for example the cement and glass industries, should not have NOx controls put upon them.

Response

3.47 The Government agrees that in industries where, in the judgement of the Industrial Air Pollution Inspectorate and equivalent Inspectorates in Scotland and Northern Ireland (the Inspectorates) NOx controls would not constitute best practicable means, such controls should not be required.

Paragraph 172, page lxvi (recommendation 15)

Recommendation

3.48 We recommend that the UK should follow what is known as the "bubble approach": it should, in agreement with its EEC partners, agree an overall level of reduction. Each member country should determine how to achieve that. We recommend that existing, small industrial plant should be excluded from emission controls. All new plants should meet SO_2 emission levels contained in the draft Directive, and all those not reliant upon high combustion temperatures should meet the NOx levels.

Paragraph 195, page lxxii (not recorded in the conclusions as a recommendation)

Recommendation

3.49 We recommend that within whatever national levels (of emissions) are agreed each Government should be free to decide how to achieve the necessary reduction.

Paragraph 196, page lxxii (recommendation 17)

Recommendation

3.50 We recommend -

(a) that the United Kingdom join the 30 per cent club immediately, and that this target be achieved by the CEGB being required to reduce its emissions accordingly;

(b) that in the medium term as power stations come to be refitted the CEGB should be required to install equipment to attain the overall national reduction of 60 per cent in accordance with the EEC draft directive, that is, by the end of 1995.

Paragraph 197, page lxxii (recommendation 15)

Recommendation

3.51 Insofar as industry is concerned, we are aware that for some the high costs of meeting control standards may render them uncompetitive, and for others, even if cost is not of major consideration, it would be impractical to install control technology. Accordingly, we recommend that:

(1) EC emission control levels for SO_2 should apply to all new industrial plant over 50 MW from 1.1.89;

(2) For all existing plants the stringent application of "best practicable means" by the Air Pollution Inspectorate should continue;

(3) The Government should give assistancce to industry to convert existing plant to meet SO_2 control standards.

Paragraph 198 (except for last sentence), page lxxii (recommendation 17A)

Recommendation

3.52 We recommend, consistent with best practicable means, that all power stations should have low NOx burners installed during routine shut-downs. With the exception of those industries totally dependent on high combustion temperatures, which we feel should continue to explore other means of reducing their NOx emissions, we recommend that all industrial users be required to fit low NOx burners. We recommend that Government give assistance to industry to install low NOx burners in existing plants.

Response

3.53 The recommendations in these paragraphs are closely interrelated. The question addressed is that of reduction of SO_2 and NOx emissions from industrial combustion plants and the manner in which such a reduction might be achieved.

3.54 The present position in the UK is that industrial operators are controlled by the Inspectorates, which have required the use of the best practicable means to prevent emissions to their satisfaction. Judgement of what is practicable has taken account of the environmental effect of the emission concerned and of technical and economic feasibility of control. If the Inspectorates judge that it is not practicable to abate certain emissions at source, other steps have to be taken to render them harmless. The Inspectorates have accordingly required the abatement of dust emissions from power stations by the best practicable means, but have judged that abatement of SO_2 and NOx emissions is not practicable because of the high costs involved. Operators have therefore been required to construct stacks sufficiently high to ensure that those emissions are dispersed and diluted in the air to reduce ground level concentrations of the gases to the minimum.

3.55 Emissions from other industrial combustion plants are controlled by local authorities under the provisions of Clean Air legislation. The effect of this legislation is much the same as that achieved by the Inspectorates under Health and Safety at Work legislation; grit and dust emissions are abated, and SO_2 and NOx emissions are dispersed from chimneys.

3.56 Dispersal of SO_2 and NOx emissions has been widely practised by Western industrial nations for many years. However, in recent years an increasing number of countries have required the abatement of these emissions at source. For the most part these requirements apply to new plant only but, in the Federal Republic of Germany in particular, there is now legislation requiring SO_2 and NOx abatement technologies to be fitted to existing combustion plants.

3.57 Recognition of the involvement of SO_2 and NO_x in long-range transboundary air pollution, and therefore the interdependence of countries in seeking a reduction in deposited acidity, led directly to the UNECE Convention and to the commitment by a number of countries to reduce their total annual national SO_2 emissions by 30% by 1993 on the basis of total emissions in 1980. This approach - viewing each country's emissions as a whole and setting a reduction target to be achieved in ways of countries' own choosing - is referred to by the Select Committee as "the bubble approach", a term derived from an administative mechanism devised in the USA for reducing emissions within defined areas. As recorded in Chapter II, the "30% club" of countries are pressing others within the UNECE region (Europe, Canada and the USA) to make a similar commitment, and negotiations are under way within the framework of the Convention to prepare a specific agreement on reduction of SO_2 emissions. The UK is participating in these negotiations.

3.58 The European Community draft Directive referred to has been passed by the Commission to the Council. It would require limitation of emissions from large combustion plants above 50 MW rated thermal output. This category of plant includes all power stations together with the largest industrial combustion plants in refineries, chemical factories etc. In the UK these plants give rise to some 80% of total SO_2 and 50% of total NOx emissions. The draft Directive contains two main provisions:

(i) that total annual national emissions of SO_2, NOx and dust from the category of plant in question should be reduced by 60%, 40% and 40% respectively by 1995 using 1980 annual emissions as the base, and

(ii) that all new plants of the category described should be subject to limits on emissions of SO_2, NOx and dust which would, in the UK, require the introduction of abatement equipment for SO_2 and NOx as well as for dust.

This proposal is now under negotiation between member states.

3.59 Against this background, the Select Committee recommends:

(i) that the UK should subscribe to the principle of the bubble approach, that is, to the principle of overall national reductions in emissions in agreement with EEC partners (paragraphs 172 and 195)

(ii) that in respect of SO_2 emissions:

(a) the UK should join the 30% club and should agree to the reduction in SO_2 emissions from large plants as proposed in the EC Directive, both targets being met by the application of controls to existing CEGB power stations alone (paragraph 196)

(b) all new power stations should meet the SO_2 emission limits proposed in the proposed EC Directive (paragraph 172)

(c) the requirement to use best practicable means in relation to SO_2 emissions from existing industrial combustion plants other than CEGB power stations should be stringently applied (paragraph 197(2)) and the Government should assist industry to introduce SO_2 controls in existing plant (paragraph 197(3)). Existing small industrial plants however should be excluded from emission controls (paragraph 172)

(d) emission limits for SO_2 as proposed in the draft EC Directive should be applied to all new industrial plants other than power stations of more than 50 MW thermal output with effect from 1.1.89. (Paragraphs 172 and 197(1))

(iii) that in respect of NOx emissions:

(a) control of NOx emissions should be introduced to all existing power stations consistent with the best practicable means possible (paragraph 198)

(b) all new power stations should meet the NOx emission limits proposed in the draft EC Directive (paragraph 172)

(c) all existing industrial combustion plants other than power stations with the exception of those dependent on high temperatures should be required to introduce NOx controls and the Government should provide assistance to industry to this end (paragraph 198)

(d) emission limits for NOx as proposed in the draft EC Directive should be applied to all new industrial plants other than power stations except for those plants dependent on high temperatures (paragraph 172)

3.60 The comments which follow are without prejudice to the negotiations in which the Government is now engaged both in the European Community and in the UN/ECE.

SO_2 emissions

3.61 Consideration of the case for reduction of SO_2 emissions has to have regard to the scientific, technological and economic position. The Government's view of the scientific position is outlined in Chapter II of this response.

3.62 The arbitrary choice of 1980 as a base year masks the UK's achievements in the previous decade. UK SO_2 emissions declined by 23% from the peak year of 1970 when total emissions amounted to 6.09m tonnes, to 4.7m tonnes in 1980. In 1983 emissions amounted to 3.72m tonnes, representing a cumulative reduction of nearly 40% since 1970. This reduction has been due to a number of factors such as fuel substitution, energy conservation and industrial restructuring, which may continue to influence emission patterns over the next 15-20 years. It is reasonable to assume that much of this reduction will not be reversed as a consequence of continued industrial growth. However, the future pattern of industrial structure and energy use is not easy to predict, making it difficult in turn to estimate what further effort and investment might be required in order to be certain of achieving the targets set by the "30% club".

3.63 The substantial costs of meeting the draft EC Directive have already been mentioned (paragraph 2.27): some £1.5 billion for power stations alone. This represents the costs of installing FGD at some

ten major power stations at a capital cost and an annual operating cost of £150m and £35m respectively for each station. This would add some 5% to electricity bills. Joining the 30% club could require relatively little action to abate emissions if the trends in recent years (paragraph 2.21) continue. But stronger growth in electricity demand could reverse these trends and could entail the installation of FGD at a number of power stations involving expenditure of several hundred million pounds. Control costs for industrial plants would be even higher in relation to the emissions abated.

3.64 The Committee's recommendation that a 60% reduction in emissions from large plants should be accomplished by 1995 by controls on CEGB power stations alone would be particularly onerous. Even on the assumption that power generation remained at the level of the past few years, achievement of the 60% target would require retrofitting of controls to many more than the 10 major stations mentioned above. These would inevitably include a number of older stations with a short remaining life and low load factors, substantially increasing the costs of such a programme and extending it well beyond 1995.

3.65 The Government will continue to keep under review projections of likely future emission levels. It also believes that there are good prospects that new and better combustion technologies which will lead to reductions in SO_2 emissions will be developed as a consequence of research now in hand or foreseen. In these circumstances the Government does not intend to commit the country to expensive emission controls, especially when there is uncertainty about the environmental benefits to be achieved in this country and in continental Europe. The Government intends to achieve further reductions in national SO_2 emissions, aiming at a reduction of 30% from 1980 levels by the end of the 1990s.

3.66 When the time comes to build new fossil-fuelled power station plant, it will be for decision what should be regarded as the best practicable means for preventing or rendering harmless SO_2 emissions in the light of technical developments and other factors at the time but this decision cannot be prejudged.

NOx emissions

3.67 Emissions of NOx are far more difficult to estimate than SO_2 emissions, since combustion temperature as well as quantity of fuel influences the level of emissions. Best estimates are that industrial emissions have declined over the past 15 years although not to the same extent as SO_2 emissions; this decline has been offset by increased vehicle emissions. Low NOx burner technology does appear to have potential for reducing emission levels, but is not yet available in a form suitable for most UK power station boilers. The CEGB research in this field is well advanced and the Board expects to start field trials of a new design soon, possibly in 1986. But despite promising research, in which the CEGB is taking a leading role, the technology has yet to be fully developed for use in UK conditions and with UK fuels; nor are the economics established.

3.68 It is therefore not yet possible to judge whether low NOx burners could become the best practicable means of control, as the Committee recommend. In consequence, it would not be sensible to set a target or timetable for emission reductions from existing plants, or emission limits on new plants, and there could be no question of the Government assisting industry to convert existing plants. That would be contrary to the polluter pays principle, and the Government rejects it here as for other emissions. However, economically feasible technology to reduce NOx emissions from vehicles is further advanced. Against this background, the Government intend to achieve further reductions in national nitrogen oxide emissions from motor vehicles aiming again at a reduction of 30 per cent of the 1980 levels by the end of the 1990s.

Paragraph 185 page lxix (Recommendation 16)

Recommendation

3.69 We recommend that in any review of the desirability of combined heat and power/district heating, full account should also be taken of the pollution aspects highlighted by our report.

Response

3.70 The Government is taking account of the potential for energy efficiency of the use of combined heat and power technology. A report by W S Atkins published in 1984 by the Department of Energy discussed the possible national benefits of large scale combined heat and power technology. As a result of this report the Government has invited proposals from consortia led by the private sector for preparation of a prospectus for up to three UK city schemes. Full consideration will be given in this programme to minimising polluting emissions.

Paragraph 199 page lxxiii (Recommendation 18)

Recommendation

3.71 We recommend that the Government make a long-term commitment to air pollution research.

Response

3.72 The Government accepts that in the area of air pollution research there is need for long-term commitment. Its current and proposed research and monitoring programmes in air pollution (£2.5M for 1984/85 and (projected) £3.5M in 1985/86) provide an indication of the Government's resolve to continue these activities on a long-term basis. This will allow the impacts of variables such as changes in emissions, land management and forestry practice to be adequately measured and evaluated over sufficiently long time scales.

3.73 In making this commitment the Government also recognises the need for a well coordinated approach to air pollution research in the UK with adequate resources. Coordination is achieved through committees such as the NERC Committee on Air Pollution Effects Research, the DOE group on Acid Waters and Soils, the DOE UK Steering Group on Long Range Transport of Air Pollution and the NERC Coordinating Committee on Atmospheric Chemistry Research. Discussions are currently taking place with a view to setting up a similar DOE research coordinating committee on the effects of air pollution on materials, including historic buildings and cultural monuments.

Paragraph 200, page lxxiii (recommendation 19)

Recommendation

3.74 We recommend that the Government require the emitters of SO_2 and NOx from plants over 50 MW to monitor their emissions sources.

Response

3.75 Emissions of SO_2 over extended periods are readily calculated from the sulphur content of the fuel and knowledge of fuel consumption. With any one fuel, a sulphur dioxide monitor would merely reflect the output of the plant.

3.76 If equipment were fitted to remove sulphur during or after combustion then some form of sulphur dioxide monitor would be required to show that the plant is operating effectively.

3.77 The emission of NOx depends on the conditions of combustion of all fuels and also, in the case of coal, on the nitrogen content of the fuel itself. With pre-set combustion conditions such as low NOx burners and with any one particular fuel the concentration of NOx would not fluctuate greatly and would, in any case, be outside the control of the operator. There would therefore be little to be gained from the fitting of continuous NOx monitors which, in themselves, are expensive and require considerable maintenance.

2 APS CCPO

DEPARTMENT OF TRANSPORT
2 MARSHAM STREET LONDON SW1P 3EB

01-212 3434

The Rt Hon Patrick Jenkin MP
Secretary of State for the Environment
Department of the Environment
2 Marsham Street
LONDON SW1P 3EB

9 November 1984

Dear Patrick

GOVERNMENT RESPONSE TO TENTH REPORT OF THE ROYAL COMMISSION ON ENVIRONMENTAL POLLUTION

Thank you for copying to me your minute of 2 November to the Prime Minister about RCEP10.

I am content with the passages in response to recommendations 7.77, 7.78, and 7.79 on diesel engines and smoke and have no objection to their being included in our published response to the Report.

I am copyinf this minute and attachments to all members of the Cabinet and to Sir Robert Armstrong.

Nicholas

NICHOLAS RIDLEY

12 NOV 1991

ENV. Affairs PT3
Acid Rain

017/106

CCNO

Treasury Chambers, Parliament Street, SW1P 3AG

John Ballard Esq
Private Secretary to
Secretary of State for the Environment
Department of the Environment
2 Marsham Street
London SW1P 3EB

9 November 1984

Dear John

wlspm
12/-

GOVERNMENT RESPONSE TO THE TENTH REPORT OF THE ROYAL COMMISSION ON ENVIRONMENTAL POLLUTION

Your Secretary of State copied to the Chief Secretary his minute of 2 November to the Prime Minister.

Our officials have seen earlier drafts of the proposed response and I gather your officials are still considering some of our comments. Provided that our comments are taken into account in the final version, the Chief Secretary is content for the response to be published, on the understanding that any extra monitoring, research or other expenditure will be contained within Department's public expenditure baselines; and subject to any costs to Water Authorities arising from the implementation of Part II of the Control of Pollution Act 1974, in particular the cost of any essential work to improve their own discharge consent compliance, being contained within present provision.

I am copying this letter to the Private Secretaries to the Prime Minister and Cabinet Ministers and to Sir Robert Armstrong.

Yours sincerely

Richard Broadbent

R J BROADBENT
Private Secretary

12 NOV 1984

Env. Affairs Pt 3

Acid Rain

FILE cc HO MAFF CSO
LCO SO WPSO
HMT WO D/N
FCO DTI D/M
DES WPO PGO
NIO DOT CO
MOD DHSS CAL
MWP
bc Dr. Nicholson

da

10 DOWNING STREET

From the Private Secretary

9 November 1984

Dear Andrew,

Government Response to the Tenth Report of The Royal Commission on Environmental Pollution

The Prime Minister has considered your Secretary of State's minute of 2 November to which was attached a draft of the Government's response to the Tenth Report of The Royal Commission on Environmental Pollution.

As I told you on the telephone, the Prime Minister believes that the passage in the draft response which deals with recommendation 7.95, and in particular with the environmental benefits of nuclear energy, could be strengthened. I enclose a revised text which the Prime Minister has approved, subject to your Secretary of State's views and those of the Secretary of State for Energy.

I am sending copies of this letter to the Private Secretaries to members of the Cabinet and to Richard Hatfield (Cabinet Office).

Yours ever,

David

David Barclay

Andrew Allberry, Esq.,
Department of the Environment.

da

"The Government accepts that the UK's energy strategy needs to give full weight to the environmental impact of the use of different fuels. Nuclear energy is already the most highly developed alternative to energy derived from fossil fuels, and its further growth offers one of the most effective ways of reducing air pollution associated with electricity generation. Renewable sources of energy also have a contribution to make, but the immediate task here is to establish the technical and economic feasibility of exploitation of the available technologies on a commercial scale. As part of a continuing programme the Department of Energy spent £11 million on such work in 1983-84.

"Current energy projections, published in 1982, included scenarios which suggest that the share of UK energy demand supplied by nuclear and renewable energies in 2010 might be high as 34 per cent. An important complementary approach is energy conservation; the Government already have a substantial programme to encourage the most efficient use of energy. The Government's assessment of future energy requirements and sources will continue to be available to Parliament and the public."

Chancellor of the Duchy of Lancaster

Prime Minister (2)

Lord Gowrie welcomes the emphasis on openness in the draft response to the Royal Commission on Environmental Pollution.

PRIME MINISTER

GOVERNMENT RESPONSE TO TENTH REPORT OF THE ROYAL COMMISSION ON ENVIRONMENTAL POLLUTION

I am grateful to Patrick Jenkin for sending me a copy of his minute to you of 2 November, with the proposed response to the Royal Commission's report.

I very much welcome the paper generally because of the positive way in which it presents our approach to environmental problems, and particularly because of its emphasis on providing information to the public. The latter seems to me especially important to us for our handling of the Campaign for Freedom of Information, which is likely to become active again during the new session.

The signs are that the Campaign will probably rest their main Freedom of Information bill and instead try to pick off individual targets that seem to them both "softer" and more likely to catch the popular imagination.

Two other Private Members' bills were introduced last session:

> Access to Personal Records, to extend the principles of the Data Protection Act to manual as well as computerised records and give individuals the right to see and check a wide range of information held about them;
>
> Access to Local Authority Information. The bill has already attracted support from a substantial number of our own back benchers.

Two further bills are known to be planned:

> Water Authorities - to open up the authorities' meetings to the public again, as before the 1983 legislation,
>
> Environmental Secrecy - to which of course the present paper is very relevant.

The Campaign's ultimate objective is "a statutory right of access to all information held by government and other public sector bodies, other than that for which specific statutory protection is provided".

It will be surprising if none of the 150 MPs who support legislation of this kind draws a place in the ballot on 15 November. The bills most likely to be taken up are those on personal records and local authorities, but the Campaign's tactics will not be known for certain until the titles of the chosen bills are published on 5 December.

Our best answer to the Campaign is to demonstrate to Parliament and the public that its efforts are unnecessary, and that - as we said in 1979 - our policy is to make as much information available as possible. Although the proposed bills deal with discrete subjects there is obviously a read-across from one area of "open government" to another. Against this background the "presumption of openness" set out at the beginning of Part II of the Government's response to the Royal Commission is particularly useful.

I should be grateful if Patrick's officials would keep in touch with mine as the date of publication approaches, so that we can review the latest position and consider how the message of this paper can be used to best advantage.

I am sending copies of this minute to members of the Cabinet and to Sir Robert Armstrong.

GOWRIE
8 November 1984

Acid Rain

Pt 3

MINISTRY OF AGRICULTURE, FISHERIES AND FOOD
WHITEHALL PLACE, LONDON SW1A 2HH

From the Minister

The Rt Hon Patrick Jenkin MP
Secretary of State for the Environment
Department of the Environment
2 Marsham Street
London
SW1

8 November 1984

Dear Patrick

GOVERNMENT RESPONSE TO TENTH REPORT OF THE ROYAL COMMISSION ON ENVIRONMENTAL POLLUTION

In your minute dated 2 November to the Prime Minister you sought colleagues' agreement to publication of the Government's Response.

My officials have participated fully in the extensive inter-departmental preparation of the response. I have noted that the response involves follow up action in a number of areas and I assume your officials will be in touch with mine as appropriate, in particular I would wish my officials to participate in the proposed Working Party on Confidentiality.

I am content with the text and welcome the tenor of the response. I can agree to publication of the response in the DOE Pollution Paper series.

I am copying this letter to all members of the Cabinet and Sir Robert Armstrong.

Yours Ever
Michael

MICHAEL JOPLING

FCS/84/289

SECRETARY OF STATE FOR THE ENVIRONMENT

Government Response to the House of Commons Environment Select Committee's Report on Acid Rain

1. Thank you for copying to me your minute of 2 November to the Prime Minister enclosing the Government's proposed response to the Select Committee's Report on Acid Rain. I have seen copies of the replies from the Prime Minister, the Chief Secretary, the Secretary of State for Energy and the Secretary of State for Agriculture.

2. I too agree with the line you propose to take. As you say this is an issue on which we will continue to face pressure both at home and abroad. This clear statement of our policy together with the detailed presentation of the thinking which lies behind it should be useful in correcting misunderstandings of our position and intentions; but as I know you agree, we must continue to coordinate very carefully the presentation abroad of our policy on this issue. I attach importance to our officials continuing to work closely together on this.

3. I am copying this minute to the Prime Minister, Peter Walker, Nigel Lawson, George Younger, Nicholas Edwards, Norman Tebbit, Michael Jopling, Norman Fowler, Nicholas Ridley, Sir Robert Armstrong and Robin Nicholson.

GEOFFREY HOWE

Foreign and Commonwealth Office

8 November, 1984

Acid Rain

pt 3

RESTRICTED

DEPARTMENT OF TRANSPORT
2 MARSHAM STREET LONDON SW1P 3EB

01-212 3434

8 November 1984

The Rt Hon Patrick Jenkin MP
Secretary of State for the Environment
Department of the Environment
2 Marsham Street
SW1P 3EB

Dear Secretary of State

ACID RAIN

In your recent minute to the Prime Minister you asked for urgent comments on your draft response to the Environment Committee's report on acid rain.

Although I am content with the general line of the response on the recommendations which concern vehicle emissions (13 and 17A), I hope that the document can bring out more clearly than it does at present that it is wrong to blame UK emissions, and particularly UK vehicle emissions, for forest damage in Germany. That is a fact of which many people in this country seem unaware.

That might best be done by adding at the end of paragraph 26 a passage on these lines:-

> "Certainly, UK vehicle emissions are unlikely to form anything more than a very small proportion of transboundary pollution".

I notice also that the final sentence of paragraph 24 implies that the Committee has recommended acceptance of the whole of the draft directive on vehicle emissions, which would involve the installation of catalysts. That is not so, as their recommendation 13 makes clear. Perhaps the last two sentences of paragraph 24 should be transposed?

I am sending copies of this letter to the Prime Minister, Peter Walker, Nigel Lawson, George Younger, Nicholas Edwards, Norman Tebbit, Geoffrey Howe, Michael Jopling, Norman Fowler, Sir Robert Armstrong and Robin Nicholson.

Yours sincerely

Henry Dimbleby (Private Secretary)

for NICHOLAS RIDLEY

(Approved by the Secretary of State but signed in his absence)

RESTRICTED

ENV. AFFAIRS. Acid Rain

Prime Minister (1)

You agreed that the Government should take a more robust line on nuclear energy in responding to the Royal Commission.

Re-draft below. Content, subject to Mr Walker and Mr Jenkin?

cc NO

W.0809 7 November 1984

MR BARCLAY, NO 10

GOVERNMENT RESPONSE TO THE TENTH REPORT OF THE ROYAL COMMISSION ON ENVIRONMENTAL POLLUTION

DWB 8/11

with DB.

I think your redraft of the paragraph on nuclear energy in the above response is crisper than my original suggestion. I would like to propose some further alterations which I give below. The only one which I should explain is the re-inclusion of conservation. I'm sure that the Department of Energy will want to preserve this and could reasonably claim that it is part of their appraisal of alternative energy scenarios, which is the basis of the Select Committee's recommendations.

"The Government accepts that the UK's energy strategy needs to give full weight to the environmental impact of the use of different fuels. Nuclear energy is already the most highly developed alternative to energy derived from fossil fuels, and its further growth offers one of the most effective ways of reducing air pollution associated with electricity generation. Renewable sources of energy also have a contribution to make, but the immediate task here is to establish the technical and economic feasibility of exploitation of the available technologies on a commercial scale. As part of a continuing programme the Department of Energy spent £11 million on such work in 1983-84.

"Current energy projections, published in 1982, included scenarios which suggest that the share of UK energy demand supplied by nuclear and renewable energies in 2010 might be high as 34 per cent. An important complementary approach is energy conservation; the Government already have a substantial programme to encourage the most efficient use of energy. The Government's assessment of future energy requirements and sources will continue to be available to Parliament and the public."

RBN

ROBIN B NICHOLSON
Chief Scientific Adviser

Excellent

AMU

CNO

SCOTTISH OFFICE
WHITEHALL, LONDON SW1A 2AU

2pp's.

The Rt Hon Patrick Jenkin MP
Secretary of State for the Environment
Department of the Environment
2 Marsham Street
LONDON

7 November 1984

File with DB

Dear Patrick,

GOVERNMENT RESPONSE TO THE HOC ENVIRONMENT SELECT COMMITTEE'S REPORT ON ACID RAIN

Your minute of 2 November enclosing a draft Government response to the Select Committee's Report did not reach my office until late on 5 November so I am afraid that I have been unable to meet the deadline you proposed.

The approach of outlining the Government's interpretation of current scientific knowledge strikes me as a sensible way to counter some of the Committee's misunderstandings of the issues involved. The detailed responses to the individual recommendations are clear as is the statement to present Government policy, and I am content for the response to go forward as drafted.

I am copying this letter to the Prime Minister, Peter Walker, Nigel Lawson, Nicholas Edwards, Norman Tebbit, Geoffrey Howe, Michael Jopling, Norman Fowler, Nicholas Ridley, Sir Robert Armstrong and Robin Nicholson.

Yours ever,

George

Env. Affairs
Dial Rein
PE3.

Treasury Chambers, Parliament Street, SW1P 3AG

J F Ballard Esq
Private Secretary to
Secretary of State for the Environment
Department of the Environment
2 Marsham Street
London
SW1P 3EB

Wpm 6 November 1984
Dwb
7/11

Dear John

GOVERNMENT RESPONSE TO THE ENVIRONMENT SELECT COMMITTEE'S REPORT ON ACID RAIN

The Chief Secretary is content with the thrust of the draft response attached to Mr Jenkin's minute of 2 November. This is on the understanding that where proposals are accepted (e.g. on research programmes), the cost can be contained with agreed programme totals.

2 We have several drafting amendments:

Para v line 13
"hundreds of "would be clearer than "many".

Para 27 line 5
The global figures (in para 91) would be preferable.

Para 91
Add "Control costs for industrial plants would be even higher in relation to the emissions abated."

Para 96
The third sentence might be clearer as " ..polluters pays principle, and the Government rejects it here as for other emissions."

We presume that the same point was not made separately under the sulphur emissions simply because no controls are envisaged, so the question of assistance does not arise.

In the penultimate sentence, "from vehicles" should follow NOx emissions.

Para 98

to match the terms of previous announcements, rephrase penultimate sentence as "invited proposals from consortia led by the private sector for preparation."

3 A copy goes to Andrew Turnbull at No. 10, Mike Reidy (Department of Energy), John Graham (Scottish Office), Colin Jones (Welsh Office), Callum McCarthy (Trade and Industry), Len Appleyard (Foreign Office), Steve Godbar (Health and Social Security),Dinah Nichols (Transport) Ivor Llewelyn (Agriculture) and to Sir Robert Armstrong and Dr Nicholson.

Yours sincerely
Richard Broadbent

R J BROADBENT
Private Secretary

Env. Affairs Pt 3

Acid Rain

CONFIDENTIAL

LPOACB

10 DOWNING STREET

From the Private Secretary

6 November 1984

GOVERNMENT RESPONSE TO THE TENTH REPORT OF THE ROYAL COMMISSION ON ENVIRONMENTAL POLLUTION

Because of her other pre-occupations, the Prime Minister will not be able to consider your minute of 5 November until later in the week.

May I take advantage of the interval to suggest a further re-draft of the paragraph in question:

> "The Government accepts that the UK's energy strategy needs to give full weight to the impact of different fuels on the environment. Nuclear energy is already the most highly developed alternative to energy derived from fossil fuels, and its further growth offers one of the most effective ways of reducing air pollution from electricity generation. Renewable technology also has a contribution to make, although in most forms the immediate task is to establish the technical and economic feasibility of exploitation on a commercial scale. As part of the continuing programme, the Department of Energy spent £11 million on such work in 1983/84.
>
> "Current energy projections, published in 1982, included scenarios which suggest that the share of UK energy demand supplied by nuclear and renewable energies in 2010 might be as high as 34 per cent. The Government's assessment of future energy requirements and sources will continue to be available to Parliament and the public."

Could you please let me know as soon as possible whether you would be content with this?

DAVID BARCLAY

Dr. R.B. Nicholson,
Cabinet Office.

CONFIDENTIAL

File

RESTRICTED

LPo

10 DOWNING STREET

From the Private Secretary

6 November 1984

Dear Andrew,

The Prime Minister has considered your Secretary of State's minute of 2 November about the Government's response to the Environment Select Committee's Report on Acid Rain.

The Prime Minister is content with the terms of the draft response, and with the proposals for publication, subject to any comments from colleagues.

I am copying this letter to John Neilson (Department of Energy), Margaret O'Mara (H.M. Treasury), John Graham (Scottish Office), Colin Jones (Welsh Office), Andrew Lansley (Department of Trade and Industry), Peter Ricketts (Foreign and Commonwealth Office), Ivor Llewelyn (Ministry of Agriculture, Fisheries and Food), Steve Godber (Department of Health and Social Security), Dinah Nichols (Department of Transport), Dr. Nicholson and Richard Hatfield (Cabinet Office).

Yours ever,

David

DAVID BARCLAY

Andrew Allberry, Esq.,
Department of the Environment.

dl

SD

CC NO

MINISTRY OF AGRICULTURE, FISHERIES AND FOOD
WHITEHALL PLACE, LONDON SW1A 2HH

From the Minister

5 November 1984

The Rt Hon Patrick Jenkin MP
Secretary of State for the Environment
Department of the Environment
2 Marsham Street
London SW1P 3EB

Dear Patrick

no pm
DMB
6/11

GOVERNMENT RESPONSE TO THE HOC ENVIRONMENT SELECT COMMITTEE'S REPORT ON ACID RAIN

I am responding to your minute of 2 November to the Prime Minister. – with DB?

My officials have been concerned in the interdepartmental discussions about the response, in which we have a small interest, and have agreed certain minor changes with them. On this basis I can agree to the response as now drafted, and to the arrangements set out in Paragraph 6 of your minute.

I am copying this letter to the Prime Minister, Peter Walker, Nigel Lawson, George Younger, Nicholas Edwards, Norman Tebbit, Geoffrey Howe, Normal Fowler, Nicholas Ridley, Sir Robert Armstrong and Robin Nicholson.

Yours ever

Michael

MICHAEL JOPLING

CC NO

PRIME MINISTER

GOVERNMENT RESPONSE TO THE ENVIRONMENT SELECT COMMITTEE'S REPORT ON ACID RAIN

Patrick Jenkin's minute to you of 2 November invited comments on his draft response to the Report on Acid Rain.

I agree with him on the importance of adhering to the robust stand which we agreed in June. With this in mind, I should like to suggest some changes to the drafting and order of the Introduction. I attach a revised version. As you will see, I am suggesting that this should end on the very positive points about the durability of Government policy and about our record of achievement.

I should also prefer to omit the first sentence of paragraph 94, which would then begin:

> "When the time comes to build new fossil-fuelled power station plant, it will be for decision .... "

There are also a number of important technical points, particularly on control costs, which I am asking my officials to pursue urgently with their Department of Environment counterparts. I should however make it clear that the £150m figure given in paragraph 27 for the costs of installing FGD plant refers to one power station only, and I would prefer that the global cost of meeting the EC directive, ie £1.5 billion, should be quoted instead.

I am copying this to the recipients of Patrick Jenkin's minute.

SECRETARY OF STATE FOR ENERGY

5 November 1984

I. INTRODUCTION

(i) The Government welcomes the Environment Committee's timely Report on the important subject of Acid Rain. As the Committee rightly note, a term which had a single meaning when first devised has now been extended to cover a variety of forms of air pollution arising from a number of emissions and from chemical interactions of those emissions in the atmosphere. The Government considers that this process of broadening has also blurred important issues which need to be disentangled if effective solutions are to be found.

(ii) The Government acknowledges that this is an area of wide concern. It recognises in particular that a number of European countries are sustaining damage which they attribute in whole or part to acid deposition. This damage is far more extensive than we appear to be experiencing in the United Kingdom. Some countries can point to evidence that pollutants emitted in neighbouring countries, including our own, are contributing to their damage - and consider that concerted international action is needed. The Government has on a number of occasions expressed its willingness to develop environmentally effective and economically feasible policies. It will continue to play a full and positive part in international discussions and research programmes designed to identify the cause of damage and to provide solutions.

(iii) Building on the nearly 40% reduction in SO_2 emissions achieved since 1970, the Government aims to achieve a further reduction of 30% from 1980 levels of SO_2 emissions by the end of the 1990s and a similar reduction in levels of NOx emissions. It also intends to support stricter emission standards for petrol engined cars, by development of lean-burn engines. It does not believe that the very substantial expenditure (running into hundreds of millions of pounds) which would be required to install flue-gas desulphurization plant at existing power stations can be justified while scientific knowledge is developing and the environmental benefit remains uncertain. It will, however, continue to encourage the development of new combustion technologies which offer the prospect of emission control at relatively low cost .

(iv) Pollution is dealt with by political action, but it is explained by science. Science is dynamic, and the policies of this and other Governments must evolve to meet new evidence about the environmental situation. What is durable within this framework of change is the Government's overall policy: that action against pollution shall rest on the best scientific evidence, the best technical and economic analysis, and the best possible assessment of priorities. The UK has a proud record of achievement in tackling the massive legacy of pollution inherited from the era of our industrial expansion and the Government firmly intends to sustain that record.

W.0807 5 November 1984

PRIME MINISTER

GOVERNMENT RESPONSE TO THE TENTH REPORT OF THE ROYAL COMMISSION ON ENVIRONMENTAL POLLUTION

You invited me to suggest a new draft response to recommendation 7.95 of the Royal Commission's Report, with particular reference to the environmental benefits of nuclear energy.

2. A response along the following lines would be consistent with the Government's energy and environmental policies, and would show them in a more positive light than does the draft circulated by the Secretary for the Environment:

> "We accept that environmental impact is an important criterion in formulating the UK's energy strategy and that forward planning should take account of the more pessimistic air pollution scenarios. This is already Government policy. Nuclear energy is the most highly developed alternative to energy derived from fossil fuels. It not only makes a large current contribution to the UK's energy supplies but also has the greatest potential for further growth. On the other hand, most forms of renewable energy technology are at the stage where the immediate task is to establish the technical and economic feasibility of exploitation on a commercial scale; as part of a continuing programme, the Department of Energy spent £11m on such work in 1983-84. Current energy projections, published in 1982, include scenarios which suggest that the share of UK energy demand supplied by nuclear and renewable energies in 2010 might reach 21-34 per cent. An important complementary approach is energy conservation; the Government already have a substantial programme to encourage the most efficient use of energy. Our current assessment of future energy requirements and sources will continue to be available to Parliament and the public."

3. The critical passage in the text of the Royal Commission was:

> "We respect the fears that many people continue to express about certain aspects of the nuclear power programme. The safeguards recommended in the Sixth Report have been largely accepted by successive United Kingdom Governments. The United Kingdom nuclear industry has devoted considerable effort and expertise to the reduction of risk and the safety record of British nuclear power stations is good. As the reduction of atmospheric pollution may in the future be seen as imperative we therefore believe that the United Kingdom should retain a wide range of options for achieving that reduction. Until the United Kingdom has a secure and environmentally attractive alternative, it would be wrong to discard the experience and expertise gained from several decades of nuclear power development. We would therefore support a modest increase in nuclear power capacity as part of a strategy for reducing dependence on fossil fuels as a primary energy source and for reducing the polluting effects of their combusion."

And the recommendation is:

> "An appraisal of alternative energy scenarios, in preparation for a possible progressive shift away from fossil fuels, should be given the highest priority, and the Government should regularly inform Parliament and the public of its current assessment of future energy requirements and their sources."

4. I am sending a copy of this minute to Robert Armstrong.

RBN.

ROBIN B NICHOLSON
Chief Scientific Adviser

Cabinet Office
5 November 1984

E.R.

PRIME MINISTER

ROYAL COMMISSION ON ENVIRONMENTAL POLLUTION: GOVERNMENT RESPONSE TO TENTH REPORT

The DOE minute and draft response to the Royal Commission was circulated very late on Friday. I do not think you can possibly be expected to respond in detail in the time available.

But Dr. Nicholson makes an important point about nuclear power in his minute immediately below.

I think you may well want to press for a firmer reference to the environmental benefits of nuclear power, in terms of reduced emissions of sulphur and nitrogen oxides.

Agree I ask Dr. Nicholson to suggest a redraft of the appropriate passage for your approval?

Yes please

DAWB

2 November 1984

010

CENO

Prime Minister

GOVERNMENT RESPONSE TO TENTH REPORT OF THE ROYAL COMMISSION ON ENVIRONMENTAL POLLUTION

One of the key conclusions to emerge from the meeting on environmental policy under your chairmanship on 17 May was that we must adopt a much more positive stance on environmental matters. It was agreed that the Government response to the Royal Commission's Tenth Report would provide an early opportunity of publishing a comprehensive statement of our approach - for consumption both at home and abroad.

Since then, there has been extensive consultation between officials of my Department and other officials concerned, including Dr Robin Nicholson, about the terms of the Government response. The end result is that we now have a document which, I believe, seizes the opportunity offered by the Royal Commission's review to restate our pollution control achievements and philosophy in a much more compelling way than we have sometimes done in the past. A copy of the latest draft is attached.

Copies have already been circulated for final official comment on matters of detail. Subject to the incorporation of minor changes which may result from this, from further polishing within my own Department, and from points raised in Eric Ashby's debate on RCEP10 in the Lords on 29 October (I shall of course consult colleagues with a particular interest if we propose any material changes), I should be grateful for colleagues' agreement by next Friday, November 9, to publish the text in our Pollution Paper series as soon as possible.

I am copying this minute and attachments to all members of the Cabinet and to Sir Robert Armstrong.

PJ

P J

2 November 1984

RESPONSE TO RCEP10: DRAFT FOREWORD BY SECRETARY OF STATE

1984 has been a particularly busy year for all concerned with the protection of the environment. Major international conferences have been held on matters as diverse as transboundary air pollution and the health of the North Sea. We are now looking forward to a meeting of Environment Ministers from the world's leading industrial countries which I have called as part of the follow-up to this year's London Economic Summit. There is increasing awareness of the international dimension of many environmental problems; and the United Kingdom is deeply committed to helping to identify the international solutions they demand.

But we must also make sure that our own house is in order. The Royal Commission on Environmental Pollution's wide-ranging Tenth Report published earlier this year, has been a very effective reminder that despite the substantial improvement in the quality of our environment over the past three or four decades a wide range of issues still require attention. This response sets out how we intend to tackle them - and shows that there has been no weakening in our commitment to environmental protection.

I am very grateful to the Royal Commission for all the work which went into the production of their Tenth Report, and wish them well for their next, equally daunting, study on the question of pollution by wastes, including contaminated land.

INTRODUCTION

(i) Co-ordinated action to deal with environmental pollution in all its forms began in Britain in the early 1970s, although measures to deal with particular forms of pollution have a much longer history. The Government of the day surveyed the scene in 1970 [Ref] , and the Royal Commission itself examined all the main issues in its First Report. Another general statement of philosophy was published as the Government's report to the 1972 United Nations Conference on the Human Environment [Ref]

(ii) It is timely to review, once again, the state of the British environment and the success of our policies. The Government is grateful to the Royal Commission for its assessment in its Tenth Report. This appeared at a time when many of the objectives set down a decade ago - and some not recognised even then - have been achieved. Clean air is now a fact in our city centres. Detergent foam has gone from our rivers. Unleaded petrol is to be introduced. Motor vehicle emissions have been curbed. National emissions of sulphur dioxide have been reduced by 39%.
New measures have grappled with irresponsible tipping of toxic wastes. Controls over marine pollution by dumping and by discharges from land have been extended. These welcome advances have been highlighted in a recent Government booklet [Ref] and, in a more substantial form in the Government's Digest of Environmental Protection and Water Statistics which is, itself, a pioneering document equalled in few other western countries [Ref]

(iii) But these advances have themselves drawn attention to new needs. As we have dealt with acute pollution in "hot spots" such as urban centres, so we have exposed potential problems of long-term exposure to lower concentrations, sometimes far away from the sources of emission. And our concepts have

changed. Our previous pre-occupation with sectors of pollution - air, water or land - has been replaced by a concern to ensure that those substances which must go into the environment do so where they will do least harm: the concept of Best Practicable Environmental Option defined by the Royal Commission in its Fifth Report. Similarly, concern with curing pollution has been replaced by a quest for prevention, by substituting cleaner industrial processes, by screening and controlling new chemicals, and by dealing with more and more wastes within the factory fence.

(iv) The Government accept the broad analysis, and many of the detailed points in the Royal Commission's Tenth Report. The first part of this response discusses the general principles of pollution control in the United Kingdom, using this opportunity to state again the Government's philosophy. The second part deals with the detailed recommendations. The Government welcome the prospect of continuing analysis - and constructive criticism - from the Royal Commission, just as we welcome the growing public debate on environmental issues.

(v) As the Royal Commission recognises, a clear and well-informed public perception of these issues is crucial. Accurate information about the state of our environment, and reliable scientific analysis of the way environmental systems work, is essential for informed judgement. Risks should be measured as objectively as possible - with uncertainties made equally explicit. But the Government also accept that people's feelings do not always fit the neat mathematical order of estimated risk. Environmental policy must take these into account. Where they are the result of misconception, only information - which is accepted as unbiased and derived from open processes - is likely to remove them. Where they are the considered reaction to values that cannot be measured by science, they have to be taken very seriously in the political process. This seems to be at the heart of the present environmental debate. It guides our approach, stated in the following section, to research, policy analysis, confidentiality, and presentation.

PART I

1. The Government are firmly committed to improving the quality of our environment. Although much has already been done, we shall do more. We have announced our aim of reducing national emission of sulphur and nitrogen oxides by 30% by the end of the 1990s. We have launched a major scheme to clean up the Mersey, our largest estuary still suffering from severe pollution. We are at the forefront of the move to take lead out of petrol throughout Europe. But in taking actions such as these we cannot ignore costs, or escape the need to spend money wisely.

2. Six broad principles govern the British approach:

A. the need to base decisions on a sound scientific foundation;

B. the need to set realistic goals for environmental quality, taking account of the uses to which environmental resources are put and the value we place on its preservation;

C. the need to take technical feasibility and cost into account in reaching decisions;

D. the need to recognise interactions between different sectors of the environment, and to dispose of wastes where they will do least harm;

E. the need to recognise the international dimension to many environmental problems, and to take international remedies accordingly;

F. the need to inform the public about the state of the environment and the actions taken to improve it, if confidence in the overall policy is to be established and maintained.

These principles are discussed in more detail below.

The Scientific Foundation

3. Pollution is controlled in order to prevent damage or reduce risk to human health, livestock, crops, ecological systems, historic monuments and the countryside.

Because pollution damage is generally proportional to the amount of pollution to which these 'targets' are exposed, and to the duration of exposure, in theory it should be possible to establish strict scientific criteria on which to base controls. In practice this is more difficult because individual pollutants are not the only factors affecting these targets. They interact with one another and with climate; their effects on health can be affected by the age and robustness of individuals. In setting standards pollution control authorities must take account of the best evidence of the effects of a pollutant, but they must apply their judgement in context (this is the main reason why pollution control is often best delegated to the local level), and they must allow for uncertainty. Continuing scientific research is needed in order to improve understanding of the link between exposure and effect, and so enable us to judge the likely effectiveness of particular controls. Effective monitoring is also needed in order to record the changes in our environment (and hence the success of our policies).

Realistic Environmental Goals

4. However much we might wish to, we cannot turn the clock back and restore the environment to its pre-industrial state. Pollution control means getting rid of unacceptable damage and reducing risk. It does not mean that we never discharge the wastes of our society into the environment. Our aim must be to set goals of environmental quality which take account of the uses we wish to make of particular environmental resources, and of the feasibility and cost of achieving these goals. For example, tighter water quality standards apply to water courses which provide the domestic water supply than to those which are used for industrial purposes. This is simply recognition that it would be both costly and unnecessary to apply uniform standardsregardless of use.

5. This does not of course mean that we cannot move progressively towards higher goals, taking advantage of technical advances. But it does mean that we should give top priority to defending areas which are of outstanding environmental quality, to tackling the worst problems vigorously, and to restoring as much of the environment as possible to acceptable quality on the best achievable timescale. In this context, the Government accepts the appropriateness of the Royal Commission's concept of the Best Environmental Timetable.

Making Use of New Technology

6. Pollution control has an inevitable cost. We must always try to compare this cost with the benefits of control, even though some of the benefits, such as the preservation of natural beauty, are impossible to value in strictly financial terms. Sometimes we cannot achieve the controls we would like because the technology is not available (as is currently the case for disposal of high level radioactive wastes); at other times it is too expensive. For example, flue gas desulphurisation is an efficient way of removing sulphur dioxide from power station plumes, but the Industrial Air Pollution Inspectorate has not required its installation, because at a capital cost of some £150 million for each major power station, they have regarded it as too expensive an imposition to constitute 'best practicable means'. This is an illustration of why the Government cannot necessarily accept international calls for the installation of the 'best available technology' for pollution control, regardless of the balance of costs and benefits. But we stand committed to the use of the best technology that is economically feasible.

7. Moreover, the Government attach great importance to technical developments that lower the cost of pollution control (and may help Britain to win orders in an expanding export market). That is one reason why we particularly welcomed the new Pollution Abatement Technology Award Scheme (PATAS) which is now well into its second year. This is a splendid example of active co-operation between the promoting bodies (the Royal Society of Arts, the Confederation of British Industry and the Department of the Environment) and the sponsors, the ERAS Foundation, in pursuit of a very worthwhile objective.

8. The winners last year included enterprising proposals for the treatment of effluent from pectin manufacture, for using earthworms to turn agricultural and industrial wastes into compost and animal feed, for disposing of sludge from water treatment tanks, and for solidifying and collecting oil spills without damage to aquatic life. But there are many other examples of progress outside the competition, including the recent announcement by the Central Electricity Generating Board to develop and test a low NOx burner at a working power station. A number of other examples are set out in paragraph /_ _/ of Part II below.

Interactions between different sectors of the environment

9. The Royal Commission has rightly pointed out that different sectors of the environment can sometimes exchange pollutants between them. The problems of 'acid rain' are a classical example involving transfers between air, soil and water.

The Government accept the concept of the Best Practicable Environmental Option (BPEO) which the Royal Commission first enunciated in their Fifth Report. It is clearly right that wastes should be disposed of in the way which causes least harm to the environment as a whole, taking account of possible interactions as well as economic, geographic, technical and other relevant factors. Such decisions require very complex analysis but it is important that our waste disposal policies should stand the test of the BPEO principle.

The International Dimension

10. More and more pollution controls are now agreed at the international level. This has happened in part because some problems that now cause concern (such as acid rain, and the health of the marine environment) result from the discharge by many nations of substances that affect the shared resources of air, sea, or international rivers. It has also happened because pollution is often caused by mobile sources such as cars, aircraft and ships, or from chemicals that are traded widely.

11. Our membership of the European Community has led to the adoption of a series of measures which have done much to improve the quality of our environment, but many of the international problems go much wider than this. That is why we participate actively in many international bodies, such as the United Nations Environment Programme and the Commissions of the Paris, Oslo and London Conventions, which are seeking ways and means of controlling pollution on a global or regional basis. Co-operation on research internationally has also broadened, as was shown at the London Economic Summit in June when it was agreed, as a result of an initiative by the United Kingdom, that the Summit Working Group on Technology, Growth and Employment should report by the end of the year on the areas of pollution control where further research is needed.

The Need for Information

13. The Government accept that the public cannot be expected to have confidence in the actions taken by pollution control authorities unless the reasoning behind those actions is explicit. As the Royal Commission recognises, both industry and pollution control authorities have shown welcome readiness to provide more information to the public about their activities in recent years, and we are keen to pursue their recommendation that this should be put on a more systematic basis. These issues are considered at greater length in Part II of this paper.

Presentation of UK Environmental Policies

14. However sound our concepts and our actions, we shall not make the best use of available resources unless we get our organisational structure right; nor shall we convince our audience at home and abroad unless we present our policies and achievements effectively. In Part II of this response, we describe some practical steps to strengthen the Department of the Environment and other Government Departments concerned with pollution control (paras [ ] [ ]).

15. We accept the Royal Commission's criticism that the United Kingdom has not always presented its policies to best effect, particularly in Europe. At home, our achievements have sometimes been underrated and our policies misunderstood; in European discussions, positions have sometimes become polarised, so that it has appeared that we are pulling in a different direction from the rest of Europe when in fact we are trying to achieve broadly the same objectives.

16. We are determined to change this. In Europe we are pressing hard for agreement to achieve the use of [unleaded] petrol [by new cars] by the end of the decade and there is increasing recognition that our approach to some of the difficult water pollution issues which face us is legitimate and effective. Within the UK, the Department of the Environment's recent booklet 'Environmental Protection' [Ref] has helped to put the record straight about the very real environmental achievements of the past two or three decades.

PART II

A. GENERAL ISSUES

CONFIDENTIALITY (to be printed opposite a reprint of RCEP10: 7.8-7.16)

1. One of the 'Principles' outined in Part I was the need to inform the public about the state of the environment. As the Royal Commission recognises, there has been a trend towards greater openness in environmental matters in recent years. Accident reports have been made generally available (the reports on the contamination of beaches at Sellafield in November 1983 are a recent example of prompt publication by the Government on a matter of understandable public concern); Government research reports are generally made available (although cost consideration may preclude formal publication); and pollution control authorities have been disclosing a steadily increasing flow of information, some required by statute but the rest voluntarily, in the interests of keeping the public informed about the state of the environment. Industry has played its part in this by readily agreeing to the publication of much information which, as the legislation stands, could be regarded as confidential.

2. The Government accept that this trend should now be accelerated. The environment is a common resource, and secrecy about the way in which one part of society is using that resource can cause concern amongst others - who may fear that it is being abused. In a debate in the House of Commons on 12 March 1984, Mr William Waldegrave, Parliamentary Under Secretary of State at the Department of the Environment, said that "the presumption must be in favour of openness in environmental matters" (Official Report Vol. 56, No. 117, Col. 128). Action now needs to be taken to convert principle into practice in relation to every sector of the environment in a way which is readily comprehensible to the public at large. Obscure procedures can be as effective as secrecy in 'fuelling fear'.

3. There are, however, cogent arguments against total openness. The Royal Commission itself recognises that there are good reasons for non-disclosure in certain situations - for instance, in cases of national security and genuine commercial confidentiality. Moreover, the Government believe that it would be wrong to introduce a new uniform system which either

i. entailed an unacceptable increase in costs for either industry or pollution control authorities; or

ii. required cumbersome bureaucratic procedures - for example to obtain exemption from disclosure on agreed grounds,

4. Our response to the Royal Commission's recommendations on this important subject therefore divides them into two categories: those that we can accept immediately, and those on which we believe that further work is necessary in order to establish the most workable and cost-effective regime, bearing in mind the considerations mentioned in the previous paragraph.

5. The Government accept:

i. the thrust of the Royal Commission's overriding recommendation that '... there should be a presumption in favour of unrestricted access for the public to information which the pollution control authorities obtain or receive by virtue of their statutory powers.';

ii. the Royal Commission's proposals concerning public registers under Part II of the Control of Pollution Act 1974. Regulations are to be made to allow public access to information on discharges to water and the consent conditions attached to them, and on measures taken by Water Authorities (in Scotland, River Purification Authorities) to monitor and ensure satisfactory compliance with those conditions. The Act provides for free inspection of the registers at all reasonable times and for copies of entries to be obtainable for a reasonable charge;

iii. the recommendation that the law should be changed to facilitate the disclosure of information about emissions to the atmosphere. This conclusion was announced by Mr John Gummer, then Minister of State at the Department of Employment, on 9 July 1984.* He added that the Health and Safety Commission were continuing their examination of the possibilities for more extensive disclosure of information about other aspects of health and safety matters of interest to the public, having due regard to the considerations of commercial confidentiality. They intend to publish a consultative document shortly.

6. The Government recognise the force of the Royal Commission's other recommendations on confidentiality, and particularly the attraction of establishing a uniform regime. But we believe that further work is necessary, in conjunction with the bodies who will be most directly affected by any revised arrangements, on the details of such a regime. We therefore propose to establish forthwith a working party, consisting of representatives of the pollution control authorities and relevant Government Departments. Their remit will be to report to the Government within 12 months on the measures necessary to implement, in the most practcable way, a regime consistent with the Royal Commission's principal recommendation (see 5(i) above). The working party will be asked to pay particular attention to the costs of the scheme, and the need to avoid red tape.

* Official Report: Vol. 63, No. 189. Col. 397

7. Our overall objective in this area is to satisfy as fully as possible the public's legitimate demand for information without imposing a regime which could undermine the proper relationship between the pollution control authorities and industry.

B. WATER QUALITY AROUND THE COAST

As the Royal Commission observes, there has been a substantial reduction in estuarial pollution in the United Kingdom in the last decade and the general quality of waters around the coastline gives ground for encouragement. The river quality surveys for England and Wales, the most recent of which was undertaken in 1980, show a marked reduction in the length of tidal rivers classified as poor or grossly polluted (from 820km in 1970 to 440km in 1980). Much is also being done to promote further improvement. There is continuing attention to industrial estuaries such as the Tyne and Tees and the programme to clean up the Mersey Basin will require a very substantial long-term commitment of public resources. Water authority programmes are also making substantial provision - some £100 million over the next four years in England alone - for capital works to improve sewage discharges to coastal waters, in particular by suitably designed and sited long sea outfalls which, as the Royal Commission indicate, represent a satisfactory means of sewage disposal.

Nevertheless, in the Government's view, the Royal Commission is right to conclude that water quality in some estuaries is not yet satisfactory and that many bathing waters and beaches still suffer from an undesirable degree of sewage contamination. The Government therefore welcome, and for the most part endorse, the Royal Commission's recommendations which will help to ensure that current progress is sustained and where possible extended.

(Opposite 7.39) The Royal Commission expressed concern that the implementation of Part II of the Control of Pollution Act 1974 should not be further delayed and that it should as soon as possible make the real contribution to water quality for which it was enacted.

In line with the Government's earlier commitments, about half of the provisions of Part II have now been brought into force, covering in particular the extension of the control system and the introduction of public involvement. Within the next few months the wider enforcement powers will be made available to Water Authorities and regulations will be laid to provide for the establishment of public registers of discharge consents. Implementation of the few remaining provisions will then be subject to public consultation in the usual way.

The Government share the Royal Commission's wish that the Act should quickly make an effective contribution to the improvement of water quality, in particular by providing a framework for improvement programmes geared to stated water quality objectives. Accordingly the Government are now consulting widely on a timetable for withdrawal of the exemptions granted, as a transitional measure, to existing discharges. This programme will give Water Authorities and industry a planning framework for the regular review and upgrading of existing discharges and a means of ordering priorities and monitoring progress. We intend to bring existing discharges within the scope of the Act in the order of their importance for the environment, starting with discharges to estuarial and coastal waters. We will also use the powers in the Act for the regular and systematic review of those consents granted to Water Authorities under previous legislation for their own discharges to inland waters, to ensure that standards are maintained and, where appropriate, improved.

Improving the quality of estuarial waters and coastal waters (and bathing beaches) is expensive. The treatment system for sewage in Weymouth and Portland, the major part of which was completed this year, included 2.7 kilometres of sea outfall and a sewage screening plant; it will also involve the construction of about 20 kilometres of interceptor sewers to cut off flows of sewage from entering the sea untreated and to convey them to the screening plant. The project has so far cost £25 million. Current major schemes at Shield Hall on the Clyde, Langbaurgh on the North East coast, and at Hastings and Bexhill are expected to cost £59 million, £14 million and £8 million respectively. These formidable costs are largely borne locally. They have to compete in the regional scheme of priorities: and all Water Authorities have other pressing claims on their investment funds - including the maintenance and renewal of sewers and water mains, the improvement of water supplies (eg to reduce plumbosolvency or nitrate content), or the extension of services to cater for new development.

Our principal concern must therefore be to get priorities right in the short term and to ensure that they are consistent with coherent longer-term objectives. We believe that

a continuation of current investment levels over the next 15-20 years should allow improvement of all estuaries (other than the Mersey for which separate plans exist) to fair quality (class B) and most to good quality (class A) and the elimination of those unsatisfactory sewage discharges to coastal waters which affect areas of environmental or amenity significance. If water authorities are able to invest more in these works, the rate of progress will be improved. The Government will also discuss with Water Authorities and other interested bodies the setting and publication of objectives on a wider scale for estuaries and other tidal waters; the methods of measuring and reviewing progress towards these objectives; and the priority to be accorded to them as against other general and regional water authority programmes.

(Opposite 7.45) The Government agrees that the elimination of discharges of crude sewage is an important long-term objective, but is doubtful of the advantages of setting a target date for elimination of all such discharges. The priority must be to establish clear and realistic programmes to deal with those unsatisfactory outlets which affect areas of amenity or environmental significance.

(Opposite 7.47) Council Directive 76/160/EEC requires Member Governments to ensure that waters which are identified as bathing waters should consistently achieve certain prescribed standards of bacteriological quality by 1986 save where derogations have been agreed. The UK Government expects to comply with this Directive in respect of all the 27 bathing waters identified. However, the Government recognise the criticism that many bona fide bathing waters were not identified and accepts that in many cases there is no satisfactory information available on their quality.

It is the Government's view that coastal bathing waters (defined for example by sites at which changing huts, car parks or toilets are provided on a substantial scale for bathers) should be monitored. We will soon open discussions with the authorities concerned on monitoring these waters and publishing the results. This should enable authorities to identify those areas where remedial action is required, although it is expected that, in many cases, water quality will already meet the standards of the Directive.

(Opposite 7.48) We note with interest the Royal Commission's recommendation on coliform bacteria and will be discussing it with the Commission of the European Communities. But the technical difficulties of improving on the sampling and analysis regime for coliform bacteria as it is at present laid down in the Directive should not be underestimated.

(opposite 7.50) The United Kingdom Government ratified the MARPOL Convention and its 1978 Protocol on 22 May 1980; in doing so it was one of the first maritime administrations to become a party. But like many other maritime nations it has not yet ratified the optional Annexes III, IV and V. Inter-departmental discussions are currently taking place on ratification of Annex V (on litter), and the local authority associations and a sample of local authorities have been consulted on the costs of clearing marine litter from beaches.

(opposite 7.51) The Government consider public education on the problem of marine litter to be a matter of importance. Through our annual grant to the Keep Britain Tidy Group, we support the Group's Marine Litter Research Programme. The Group's litter abatement activities are aimed at educating and persuading the public not to create litter, and lay

particular emphasis on education in schools and the involvement of all sectors of the community (local authorities, voluntary groups, industry and commerce) in changing attitudes by raising environmental awareness. The need for proper waste management in all situations is central to their overall message. We have also consistently stressed to the shipping industry the need to avoid the disposal of garbage at sea and have recommended voluntary compliance with the provisions of Annex V of MARPOL, pending its entry into force. Shipowners have responded positively, and passenger ferry operators have standing orders banning the disposal of garbage into the sea. Particular problems exist for cruise liners when large numbers of the minor ports visited around the world have inadequate reception facilities. It is also difficult in existing liners to provide enough space on board for storage and new garbage processing machinery.

(opposite 7.52) We note the Royal Commission's view that tipping of colliery waste off the Durham coastline should be brought to an end. Spoil from collieries along the North East coast has been deposited on a number of beaches and at sea for many years. The Government recognise the strength of local feeling about these practices and the need to bring such tipping to an end as soon as practicable.

As we made clear in our response* to the CENE report on coal last year the costs of doing so in the immediate future are prohibitive. We are nonetheless determined to continue the search for a cost-effective and environmentally acceptable solution within a realistic time period. The experimental pipeline at Horden colliery will help to determine the optimum distance out to sea for disposal and the extent of any adverse effects on the marine environment. This is fully in accord with the spirit of the 'best practicable environmental option' approach endorsed by the Royal Commission. The Commission itself has recommended against the extension of existing off-shore dumping operations as a possible alternative. We accepted this in our response to the CENE report. We have now

---

* Coal and the Environment Cmnd 8877 HMSO May 1983

agreed with the NCB that the amount of spoil reaching the marine environment over the next five years will be progressively reduced. It has also been agreed that remedial measures should be put in hand wherever practicable on the beaches most affected. A number of specific measures designed to contain the area of beach affected by spoil disposal and to ensure that such areas are cleared regularly of any unsightly debris are to be put in hand by the Board as a first step towards full restoration. These include the diversion of spoil to an inland quarry, a study into the feasibility of a containing bund, and a periodic sweep of the beaches.

(opposite 7.53) We accept the Royal Commission's conclusion that there should be a more positive approach to the EC Waters for Shellfish Directive. The progressive implementation of Part II of the Control of Pollution Act 1974 will provide enhanced powers for the Water Authorities in this area, and as part of our continuing discussion with them we shall be seeking an extension of the implementation of the Directive.

(Opposite 7.56) We played a full and constructive part in the preparation of the international conference on the North Sea. As the country with the longest North Sea coastline, the United Kingdom has a strong interest in preserving its health and the Government welcome the Royal Commission's view that there is at present no substantial threat to the North Sea. Because of its assimilative capacities, the North Sea represents the best practicable environmental option for the disposal of certain types of waste under controlled conditions. Nevertheless we recognise the strength of international concern about the possible effects of inputs to the North Sea, and during the preparation for the conference we insisted on a thorough international scientific assessment by experts from all the participating countries of the environmental state of the Sea. to isolate areas of concern.

This "quality status" paper has now been completed. It has confirmed the UK's view that the health of the North Sea is generally good, and that damage is limited to certain coastal and estuarine regions, mainly on the Continental side. The UK will support any action aimed at protecting these endangered areas. The findings of the quality status paper support the results of studies by the International Council for the Exploration of the Sea (ICES), which through co-operative international programmes keeps the effects of man's activities on the North Sea under constant review.

(Opposite 7.57) Monitoring and research studies on the Irish Sea have been carried out by ICES, and more recently by the Joint Monitoring Group of the Oslo and Paris Commissions. Reports on these studies have been published and ICES have announced their intention to carry out a further analysis of the Irish Sea in the near future. In addition the UK environment departments have sponsored or carried out research and monitoring to determine the effects of discharges into the Irish Sea, and the results have been published. Reports on radioactive waste discharges appear annually, and a Government report on the effects of sewage sludge disposal is expected to be available towards the end of the year.

But we recognise that there is public concern about the area and welcome the seminar on the environmental health of the Irish Sea which was recently held by the Royal Society of Arts (RSA), in which Government officials participated. Possible follow-up measures are under consideration.

FOOTNOTE

These paragraphs have been written to reflect UK conditions. While for some matters, such as the essential features of the implementation of the Control of Pollution Act 1974, this is appropriate, there are as regards other matters important differences in respect of Scotland; the most significant of these are summarised here. Prior to the implementation of the Control of Pollution Act Part II, the extent of control by River Purification Boards of estuaries and tidal waters was much more extensive in Scotland than elsewhere. For this reason, much has already been done to deal with some of the more serious unsatisfactory discharges; in the last 10 years some £200 million has been spent by the Sewerage Authorities concerned. Future plans envisage a further £130 million being spent by these authorities and there has been, in addition, significant expenditure by industry. When all these plans are fully implemented only relatively small and local areas of pollution will remain to be dealt with. In line with this investment the most recent survey data disclosed that with the exception of local "black spots" estuarial conditions in Scotland are generally good and that only 25 km of the tidal reaches of rivers are still grossly polluted. While no Bathing Waters were designated in Scotland, the EC Directive's main criteria are applied to beaches in their area by some River Purification Boards and the results published. The application of the EC Shellfish Waters Directive has been assisted by the extensive control available to River Purification Boards; designations represent a fair proportion of current shell fisheries and there has been little pressure for further action.

C. AIR QUALITY

(Opposite 7.6 and 7.7) - Straw burning

We recognise the problems which can arise as a result of careless straw- and stubble-burning and have taken action to strengthen the model on which local authority byelaws in England and Wales are based. The model is broader in scope than its predecessor and reflects the Royal Commission's view that more reliable methods of control over straw- and stubble-burning are required if the practice is not to become a recurring problem.

Experience of the 1984 harvest is that observance of the byelaws and of the code of practice issued by the NFU has markedly reduced problems, but we shall continue to monitor the situation in future and will implement more stringent controls if necessary. Meanwhile, we do not consider that prohibition of straw- and stubble-burning would be a practical means of reducing the risks associated with the practice so long as there remains some 5-6 million tonnes annually of straw for which no alternative outlets are available.

There are major snags which will have to be overcome with all currently known alternatives, and we are not cofident that quick or easy solutions will emerge. We agree with the Royal Commission that priority should be given to research and development of alternative uses of straw and we are currently spending some £2m a year in this area. In this connection we welcome the NFU's proposal to set up a computerised register of techniques for, and problems associated with, ploughing in straw rather than burning it.

In Scotland, a much lower proportion of the crop is burnt since most can be used for livestock purposes. Model byelaws for straw-burning have not been issued in Scotland.

(opposite 7.60) - Long-term monitoring

We accept the importance of long-term air monitoring in providing a basis for the development of air pollution control policies. But as the Royal Commission recognises, there are difficulties in designing networks appropriate to the purpose, because of the costs involved: it is all too easy to spend large sums acquiring data that are of little real value. Monitoring arrangements are reviewed periodically and steps have already been taken to increase (from 6 to 9) the primary sites on which the most important pollutants are measured nationally. These sites provide our input to the international monitoring system (EMEP - Co-operative Programme for Monitoring and Evaluation of the Long Range Transmission of Air Pollutants in Europe) concerned with the acid deposition problem, which now operates under the Long Range Trans-boundary Air Pollution Convention; they will also form the nucleus of the network being established (in response to the report of the Acid Rain Review Group*) to measure acid deposition in the UK.

(opposite 7.61) The rural monitoring network

We accept that insufficient attention has been given to the acquisition of data of SO_2 in rural areas; and we agree that monitoring should be better tailored, subject to the availability of funds to provide general support for research on the effects of air pollutants. Rural monitoring is accordingly under review and the Royal Commission's advice will be taken into account as decisions on it are made.

(opposite 7.63) NO_x and ozone monitoring

We have been conscious that baseline monitoring of NO_x and ozone was at a minimal, and barely acceptable, level. In view of the increasing significance of NO_x and ozone in relation to current environmental concerns, we have plans for extending

---

* "Acid Deposition in the United Kingdom" was written by the United Kingdom Review Group on Acid Rain and published by the Warren Spring Laboratory in December 1983

monitoring of these to the 9 primary national air-monitoring sites referred to above. Determination of the ideal number of sites is always difficult, and the Tenth Report does not make clear the Royal Commission's reasons for proposing 25 sites for NO_x and 10 for ozone. We shall, however, consider the provision further in the light of the Commission's recommendation. It should be noted that monitoring in connection with the proposed EC Directive will call for essentially separate arrangements; monitoring for this purpose would need to be conducted at urban sites.

(opposite 7.62) Measuring methodology

Improvement in measuring methodology is a continuous process, and we fully accept the recommendation that improved techniques for the measurement of sulphur dioxide, smoke and the wet and dry deposition of other substances should be actively pursued at the Warren Spring Laboratory and elsewhere.

(Opposite 7.66 and 7.68) - Indoor air pollution - Radon

We agree that priority should be given to devising remedial measures for existing houses where radon concentrations are relatively high, and the Building Research Establishment and the National Radiological Protection Board (NRPB) are already undertaking research into this. In addition the NRPB are undertaking research to enable areas and houses at risk to be more readily identified. It is, however, clear that only a very small minority of existing houses are affected - depending on the underlying geology. The simplest step which can be taken to reduce radon concentrations is to increase ventilation, and there are other good reasons for doing this (see paragraph [ ] below [ie that opposite para 7.72]), but this may conflict with the aims of energy conservation. Ventilation of buildings is a complex matter and the Government are accordingly undertaking research to determine the degree of ventilation which will provide the best balance between the needs of indoor air quality and those of conservation.

Objectives for radiation exposure in the UK are set by reference to the recommendations of the International Commission on Radiological Protection (ICRP); NRPB advise the Government on the interpretation of ICRP recommendations and on any relevant European Community legislation. The figures recommended by the Royal Commission differ in some respects from the ICRP's recent recommendations on limiting exposures from natural sources of radiation, especially in relation to the circumstances in which particular action is justified. Advice on this has been sought from NRPB. When this advice is received, we shall consider, in the light of the results of the research mentioned above, what remedial measures are available and necessary for new and existing houses.

(opposite 7.70) Publicity on dangers of asbestos

We have published advice on the dangers of asbestos.* This will be updated as necessary. Separate advisory publications cover the building professions and the householder respectively and have generally been well received. A working party has been set up by the Health and Safety Commission jointly with the local authority associations to work on publicity for all sections of the building industry, and the Department of the Environment has also established links with the Institution of Environmental Health Officers on asbestos. This should ensure that up to date advice continues to be available and is widely disseminated. Further action along the lines suggested by the Royal Commission will be considered. As far as possible we propose to work through existing channels, eg Citizens Advice Bureaux, local authorities, and specialist trade and DIY journals.

(opposite 7.72) Publicity on ventilation

In our advice on energy conservation and the avoidance of condensation, we already warn householders not to seal their homes too tightly. Much of this advice stresses the need for additional ventilation when flueless heaters are used. Ventilation requirements are among the matters to be considered in a forthcoming revision of the national model building regulations.

(opposite 7.76) Unleaded petrol and carcinogens

We share the Commission's concern that we should not solve one health problem at the expense of introducing another. Subject to the constraints of the present state of knowledge on the nature of the emissions and their carcinogenic potential,

the Government will try to to bear this important point in mind. Vehicle emissions are a matter for international discussion and agreement, notably within the European Community. In the recently published draft Directive on unleaded petrol, the European Commission has proposed a limit of 5% on the benzene content of fuel.

* [Reference]

(Opposite 7.77, 7.78 and 7.79) Diesel engines and Smoke

We agree that there is considerable scope for improving the construction standard governing smoke emissions from diesel engined vehicles. But in the Government's view the scope for increasing effective enforcement against offending vehicles is much more limited.

The Department of Transport has already commissioned an assessment of possible technical improvements in the design of diesel engines so as to reduce smoke emissions and to maintain low emission levels during service. This assessment will enable the Department to work for more stringent limits in discussions of the expert working group under the UN Economic Commission for Europe. The Department will argue for the lowest limits that can be achieved by modern technology, taking into account the need to conserve fuel and to contain operating costs. Lower limits that may be agreed in Geneva, and incorporated in an ECE regulation, will need to be adopted by the European Community as an amendment to the current directive, before UK regulations can be changed. The Department will undertake further assessment work which, in the light of international discussions, appear desirable to support the UK position.

As regards vehicles in use, the Department of Transport checks heavy goods vehicles at their annual test and mounts such roadside checks as it can with available resources. In the Department's view, visual assessment by an experienced vehicle examiner is both expeditious and reasonably objective, at least as regards identifying the worst offenders. Although smoke meters exist, we doubt if an instrumented procedure would give significantly better results. Relatively few vehicles fail the annual test but, as the Royal Commission observe, this is not surprising given the opportunity to prepare for the test - and a low failure rate could be expected whatever the method of assessment. For these reasons, the Department have not given priority to the development of an objective test method for smoke, though some work is in hand at the Transport and Road Research and Warren Spring Laboratories.

Although smoke from vehicles is an environmental nuisance, and thus may appear a suitable subject for local authority environmental health officers, official examination of heavy goods vehicles is most effectively done by examiners competent to check all aspects of the vehicle - including, where operators' premises are visited, arrangements for vehicle maintenance. The Department of Transport's vehicle examiners, organised on a regional basis, are best placed to do this and, in the Government's view, the involvement of local authority environmental health officers would not be cost-effective.

(opposite 7.81) Secondary pollutants

We welcome the Royal Commission's discussion of this issue and agree that more needs to be known about the extent and effects of secondary pollutants. Within the Government, the Department of the Environment is the coordinating body for research in this field, and the Government's current annual expenditure on relevant research is £600,000. A number of bodies - including the Atomic Energy Research Establishment, Harwell, Imperial College, London; Warren Spring Laboratory, the Institute of Terrestrial Ecology; and the University of Lancaster - are carrying out relevant projects under contract to the Department.

(opposite 7.86) Acid deposition research

We wholly accept the Royal Commission's view that acid deposition is one of the most important pollution issues of the present time and that high priority should be given to research in this field. In the UK and other industrialised countries there is increasing public anxiety about the possible links between emissions from combustion processes, acid deposition and environmental damage. Recognising the urgent need for improved scientific understanding in these areas to provide the basis for policy decision-making, we have already substantially increased our support for research. The Department of the Environment's current expenditure on air pollution research is about £2.5m a year, of which about one half is directly concerned with the acid deposition problem. With the addition of other Government research expenditure - notably by the Scottish Office, the Welsh Office, the Meteorological Office, The Forestry Commission and the NERC - and of other expenditure by public bodies (notably the CEGB), total UK expenditure on relevant research is currently running at some £5m a year.

(opposite 7.87) Pilot schemes for SO^2 abatement

We accept the Commission's view that it is important for the CEGB to gain technical experience of the options available for sulphur dioxide abatement. So far as flue-gas desulphurisation (FGD) is concerned, the Board are confident that a full-scale plant could

if necessary be ordered without the need for a pilot project given the fact that FGD is, as the Royal Commission itself has pointed out, the best developed and most widely used of the existing technologies. They have already carried out detailed engineering assessment on a number of the available processes. As for other emission control technologies, an extensive programme of work is being carried out. The CEGB and the NCB are collaborating on extending the use of existing coal preparation technologies and the development in the longer term of new coal cleaning techniques. The Boards are also embarking on a joint programme at a cost of £25m on pressurised fluid bed (PFB) combustion at the large experimental facility at Grimethorpe. Together with the Department of Energy, they are jointly sponsoring a design study of a generating plant based on a PFB combustor which offers the advantages of reduced SO_2 and NO_x emissions as well as improved efficiency. A similar study, sponsored by the Department of Energy, CEGB and British Gas Council, is examining combined cycle generation based on the slagging gasifier. Other relevant work includes an investigation by the CEGB of special designs for low-NO_x burners and the installation of a pilot plant to study the removal of hydrogen chloride from power station flue gas - the high chlorine content of UK coal could reduce the efficiency of FGD. These programmes, which are costing over £10m, should enable the generating authorities and their suppliers to keep abreast of available abatement options. Since publication of the Royal Commission's report, the House of Commons Select Committee on the Environment has recommended that the United Kingdom should commit itself to meet targets for reduction of emissions which would entail an extensive programme of emission abatement. The response to the Select Committee's report* should be read for a fuller statement of the Government's views.

(opposite 7.89) <u>Encouragement of restriction of use of gases affecting the stratospheric ozone: initiative in OECD to encourage a worldwide policy to restrict the use of such gases</u>

The Royal Commission recognises that over the last few years scientific concern about stratospheric ozone depletion has

* Reference 7

decreased but that uncertainties remain about the effect of chlorofluorocarbons (CFCs) and of other substances and that research must continue. We share their views and in the circumstances do not consider that a basis yet exists for the initiatives recommended by the Commission although we shall continue to study the evidence as it emerges in this and other countries. The UK has already accepted that restrictions in the use of CFCs is a wise precaution, and steps have been taken in the European Community to establish a voluntary agreement with industry that use of CFCs in aerosols be reduced by 30%. In practice a reduction of 35% has been achieved. We regard this as an appropriate response to the problem in the light of current knowledge.

In a wider context, the UK was instrumental in establishing a Coordinating Committee on the Ozone Layer within the United Nations Environment Programme which brings together most of the scientific experience and knowledge of the problem which is available in the world. The UK is also participating fully in negotiations to prepare a Convention on Protection of the Ozone Layer which will provide a framework within which action on ozone depleting substances can be taken rapidly if this is justified by the evidence.

(opposite 7.92) Resolution of the CO_2 problem

We accept that it is essential to continue to investigate the implications of the slow build-up of CO_2 which is occurring in the atmosphere.

Concern over this increased carbon dioxide concentration, arises from the possible consequential effect on climate. There are still major uncertainties about this, and the Meteorological Office, with its acknowledged expertise in modelling, is contributing to their solution with substantial support from the European Commission, and as part of a major international effort coordinated by the World Climate Programme. Work being undertaken within the Natural Environment Research Council is also contributing to development of understanding of the carbon dioxide balance, both historic and prospective. The United Kingdom is also participating in the work of the OECD Environment Committee which includes the development of environmentally favourable energy strategies.

D. GENERAL ISUES

(i) STRUCTURE

The Government have taken a number of steps aimed at improving the existing mechanisms for environmental policy co-ordination and development in the United Kingdom. For example, the resources of the Department of the Environment's Central Directorate of Environmental Protection have been strengthened in key areas, eg to enable important work on the Government review of air pollution legislation to be taken forward; the Radiochemical Inspectorate has been strengthened and a Northern Office established; and the Ministry of Agriculture, Fisheries and Food have recently set up an Environment Co-ordination Unit with the specific objective of providing a strategic framework for co-ordinating that Ministry's work on environmental issues, including pollution, conservation and rural affairs.

These measures supplement the arrangements recently introduced on the research side: the initiative announced at the London Summit (Part I, paragraph 11), and the new arrangement whereby the Royal Commission is invited to offer advice on the Department of the Environment's environmental protection research programmes before they are submitted to Ministers for approval.

We shall continue to keep our organisational arrangements under review. Our specific responses to the Royal Commission's recommendations are set out below:

(Opposite 7.26) The Confederation of British Industry first put forward their proposal for a high-level advisory body on cross-media environmental questions in 1976 following the Royal Commission's Fifth Report. The proposal has been considered again.

We fully accept the CBI's view that BPEO questions can arise at two distinct levels: individual local cases (eg in relation to emissions from a particular works) and strategic national issues (eg whether dumping at sea should be retained as a waste disposal option).

The CBI proposal is intended to address issues in the lar[illegible]r category. Our view is that the BPEO principle is already encompassed in the Government's approach to major environmental considerations, and that where necessary we would continue to seek advice from experts on specific issues rather than consulting an additional standing advisory committee. We propose therefore not to establish the kind of high-level body proposed by the CBI.

(Opposite 7.28) The Department of Transport is consulting the Health and Safety Commission about the desirability of establishing an independent source of advice on the transport of nuclear materials. We are not yet ready to announce conclusions but we accept that a valuable contribution could be made by members of the Radioactive Waste Management Advisory Committee (RWMAC) and members of the Advisory Committee on the Safety of Nuclear Instalations (ACSNI).

(opposite 7.29) We have for some time recognised the need for local government experience on the Radioactive Waste Management Advisory Committee, and on 3 May 1984 Mr Patrick Jenkin, Secretary of State for the Environment, announced the appointment to the Committee of the Scientific Adviser and County Analyst to Somerset County Council.

(opposite 7.30) The Nuclear Industry Radioactive Waste Executive (NIREX) is an executive body set up and financed by the nuclear and electricity generating industries. Although we had not thought that it would be appropriate for independent members to serve on NIREX, in view of the Royal Commission's recommendation we are now giving further consideration to the possibility in consultation with NIREX.

(opposite 7.98) We have considered whether to take out of abeyance the Commission on Energy and the Environment (CENE) in the light of the availability of advice on the environmental implications of energy development from existing bodies. We do not see a sufficient case for doing this. Should the future need for work on energy and the environment justify it, we would envisage enhancing the role of the Royal Commission itself to provide such advice. We have accordingly decided that the Commission on Energy and the Environment should now be abolished.

(ii) OTHER MATTERS

(opposite paragraph 7.17)
We agree that Pollution Paper No 9 ("Pollution Control in Great Britain - How It Works") has proved a valuable reference document, and accept that it must be kept up to date if that value is not to be diminished. A new version will be published shortly after this response, the need for updating will be reviewed annually thereafter, and further editions will be published as necessary.

(printed opposite paragraph 7.25) There can be no doubt that the pooling of manpower and equipment for pollution control will often be a sensible use of resources. The Department of Transport's Marine Pollution Control Unit already operates on this principle, and the Government commend the example set by the Boroughs of Cleveland Pollution Control Group and referred to in the Royal Commission's report. Arrangements of this kind are best determined at the local level, and pollution panels generally could provide a valuable forum for settling them. We shall encourage the pollution control authorities to consider what practical assistance they can offer in this area.

(opposite paragraph 7.95) Many of the technologies which would be required should research establish the need to reduce reliance on fossil fuel are already available. Nuclear power is already well established. The Department of Energy's current Energy Projections, which were published in 1982 as part of the Department's proof of evidence for the Sizewell Inquiry, include scenarios which suggest that the share of UK energy demand supplied by non-fossil fuels in 2010 might rise to a point within the range 21-34%. Most forms of renewable energy are at the stage where the immediate task is to establish the technical and economic feasibility of exploiting them on a commercial scale; as part of a continuing programme, the Department of Energy spent £11m on such work in 1983-84.

On the demand side, the Government already have a substantial programme to encourage the most efficient use of energy.

The Department of Energy will produce new energy projections from time to time as necessary.

(Opposite 7.101)

In co-operation with DHSS, QPCS, IAPI and other appropriate bodies the Department of the Environment will be initiating studies aimed at examining health patterns around sources of substances which are known to have health effects at high concentrations.

In the field of bioengineering the Department will be considering how best to guard against any environmental damage that may arise from the adoption and application of this technology. It is important that the Government take effective action if public confidence in this important new technology is to be preserved.

(opposite 7.102) There is no question of relaxing pollution control requirements in Enterprise Zones. The legislation governing pollution control makes no distinction between Enterprise Zones and other areas.

(opposite 7.105) A study of the availability of subsidies for investment in pollution control equipment in certain member states has been completed for the Department of the Environment by Environmental Resources Limited. This research was carried out in response to the House of Lords Select Committee on the European Communities' Report on the Polluter Pays Principle. Following a review of pollution charging systems in member states which is currently in hand, the Select Committee's report will be fully evaluated to assess whether or

not such instruments should be incorporated into UK pollution control policy. In this context, we welcome the adoption of the Regulation on Action by the Community Relating to the Environment at the European Council of Environment Ministers in June 1984. Amongst other things, this Regulation enables the Community to make grants towards the demonstration of new clean technologies (by pilot projects for example) in certain industries and the development of new techniques for monitoring certain pollutants.

(opposite 7.109) We agree with the Royal Commission that continuity and anticipation are essential components of forward planning. During the last decade environmental protection policy in the United Kingdom has moved significantly away from short-term reaction to obvious and immediate pollution problems towards a greater concentration on more subtle problems whose prevention requires long-term forward planning. This response sets out elsewhere our proposals for increased research and monitoring in specific areas, and for a more strategic approach to research generally. It also describes our longer-term proposals for improving water quality, particularly in areas where the Royal Commission have made criticisms. Our policy on the removal of lead from petrol, on an agreed timetable and in consultation with our European Community colleagues and the motor manufacturers, is an example of our general approach. We recognise the force of the Royal Commission's recommendation and we shall endeavour to extend it throughout all aspects of our environmental policy.

JJ 010

RESTRICTED

Prime Minister (1)

This is a fair attempt to expose some of the Select Committee's naivete. You may like to glance at paras 25-29 (flagged) which summarise the Government's position.

Content, subject to colleagues?

DWB 5/11

The Prime Minister

GOVERNMENT RESPONSE TO THE HOC ENVIRONMENT SELECT COMMITTEE'S REPORT ON ACID RAIN

1. I enclose the text of the Government's proposed response to the HOC Environment Select Committee's report on acid rain, which was published on 6 September. (A copy of the report is also enclosed for reference).

2. The Committee's report is a timely contribution to the debate on an environmental issue which, as you know, is very much to the fore. It is one on which we continue to face considerable pressure both at home and abroad. I have therefore included in our response a clear and positive statement of the Government's policy. This will elaborate on, and reinforce, the message on acid rain on pages 28 and 29 of the draft of our response to the Tenth Report of the Royal Commission on environmental pollution; I have sent that draft response to you under separate cover.

3. The Select Committee dealt principally with three aspects of the problem; damage from acid deposition to buildings, to forests and to fresh water ecosystems. They paid considerable attention in each case to the scientific evidence available, but my scientific advisors felt that their review of this betrayed some inaccuracies. Section 2 of our response therefore includes a counterbalancing passage giving the Government's interpretation of current scientific knowledge, drafted in consultation with Robin Nicholson and other Government scientific advisers working in this field.

4. The key recommendations for us (because they strike at the heart of the Government's policy) are those relating to the reduction in emissions of SO_2 and NO_x (paras 196-198 of the report). The Committee calls for the UK to join the "30% club" and to subscribe to the EC Directive which would require

RESTRICTED

RESTRICTED

60% reduction in SO_2 emissions from power stations and other large plants. They propose that these targets should be achieved by requiring the CEGB to reduce emissions from power stations. It is possible that we will meet the 30% overall reduction of emissions without the introduction of controls but the 60% target would certainly mean retrofitting of flue gas desulphurisation (FGD). We have agreed that expenditure of the magnitude required to do this is unacceptable given the uncertainty of the results for the environment.

5. On 19 June we agreed that our policy on acid rain should be driven by the scientific evidence. I believe that this is right and that we should not be swayed by demands within the Community for harmonisation. The response, therefore, adheres robustly to the stance agreed in June. The Government's position is summarised in the introduction and set out more fully in paragraphs 25-29. You may also wish to refer particularly to paragraphs 79 to the end which deal specifically with the relevant recommendations.

6. I understand that the Select Committee is eager to know the Government's views on the report and John Biffen has been pressed to arrange a debate as soon as possible. Although I know that you will not be able to look at this until after the weekend, I would like, if possible, to make advance copies of our response available to the Committee in time for their next meeting on 7 November. Formal publication would follow as soon as this can be arranged.

7. I am also sending copies of the text to Peter Walker, Nigel Lawson, George Younger, Nicholas Edwards, Norman Tebbit, Geoffrey Howe, Michael Jopling, Norman Fowler, Nicholas Ridley, Sir Robert Armstrong and Robin Nicholson. Since this has already been the subject of detailed interdepartmental consultation, I would be grateful if colleagues could indicate their views by close of play on Monday, 5 November, if at all possible.

Yours ever

for PATRICK JENKIN (agreed by the Secretary of State, and signed in his absence)

2 November 1984

I. INTRODUCTION

i. The Government welcomes the Environment Committee's timely and thorough Report on the important subject of Acid Rain. As the Committee rightly note, a term which had a single meaning when first devised has now been extended to cover a variety of forms of air pollution arising from a number of emissions and from chemical interactions of those emissions in the atmosphere. The Government considers that this process of broadening has also blurred important issues which need to be disentangled if effective solutions are to be found.

ii. The Government recognizes that a number of neighbouring European countries are sustaining damage which they attribute in whole or part to acid deposition. This damage is far more extensive than we appear to be experiencing in the United Kingdom, and is an issue of deep concern. Moreover, some of our neighbours can point to scientific evidence that pollutants emitted in this country are contributing to their damage - and that without concerted international action their problems are not soluble. Britain believes in the principle of good neighbourliness, and this is a reason why we must take these matters seriously. The Government accordingly shares with the Governments of those countries a common will to develop environmentally effective and economically feasible solutions to the problem.

iii. Pollution is dealt with by political action, but it is explained by science. Science is dynamic, and the policies of this and other Governments must evolve to meet new evidence about the environmental situation. What is durable within this framework of change is the Government's overall policy: that action against pollution shall rest on the best scientific evidence, the best technical and economic analysis, and the best assessment of priorities of which we are capable.

iv. This chapter is intended to set the detailed responses to individual recommendations, which follow in Chapter III, within the broad context of the Government's overall policy on acid rain.

v. The Government acknowledges that this is an issue of major international and domestic concern. It will continue to play a full and positive part in international discussions and research programmes designed to provide solutions to the problem. It accepts the urgent need to reduce harmful emissions and is determined to promote further measures to build on the nearly 40% reduction in SO2 emissions achieved since 1970. The Government aims to achieve a reduction of 30% from 1980 levels of SO2 emissions by the end of the 1990's and a similar reduction in levels of NOx emissions. It also intends to support stricter emission standards for petrol engined cars, by development of lean-burn engines. It does not believe that the very substantial expenditure (running to many millions of pounds) which would be required to install flue gas desulphurisation plant at existing power stations would be acceptable while scientific knowledge is developing and the environmental benefit remains uncertain. It will, however, continue to back the development of alternative technologies which can provide a more cost effective solution to the problem.

II. ACID DEPOSITION

1. The Select Committee discuss many kinds of risk and damage - to human health, crops, forests, freshwater life, stonework and other materials. Although air pollution may contribute to all these kinds of damage, the relative importance of pollutants and of natural factors like climate, and the pollutants likely to be of most significance, vary from one situation to another. There are subtle interactions between pollutants and the natural components of air, soil and water and many of these are still imperfectly understood. Mathematical models of these complex phenomena are still being developed and tested.

2. These diverse processes cannot be described comprehensively in a short essay. The simplification required in order to achieve brevity and clarity brings an inevitable risk of distortion. Uncertainities, expressed in alternative hypotheses, tend to be glossed over. Moreover, this is a field in which knowledge and understanding are developing rapidly. The following short explanation of the Government's present interpretation of the scientific evidence is not regarded as in anyway a last word on the subject, or a substitute for the increasingly massive and authoritative scientific literature (much of it international in character).

Atmospheric pollutants and their interactions

3. The Select Committee drew attention to three principal problems associated with acid deposition: damage to buildings and materials, damage to freshwater ecology, and damage to forests. They refer in less detail to possible hazards to human health and to crops. The agents and mechanisms of these different kinds of damage differ, and the Select Committee was wise to treat them separately.

4. Air pollutants fall into 2 broad categories: "primary" and "secondary". The first are those directly emitted from factories, domestic chimneys, cars or power stations. The commonest are those produced in fuel combustion: smoke, carbon dioxide, sulphur dioxide (SO_2) and oxides of nitrogen (NO_x). Only the two last of these are important in the process of acid deposition. In addition there are many other primary pollutants, from combustion and other sources, a few of which are

important because they are involved in the chemistry of acid deposition. Among them are hydrocarbons, ammonia (or the substances that produce it as a secondary pollutant) and some chlorine-containing compounds. Secondary pollutants are produced in the air by the transformation of primary pollutants. Sulphur dioxide and nitrogen oxides are converted in this way to sulphuric and nitric acids, and ozone is generated by chemical reactions involving NO_x and hydrocarbons in the presence of sunlight. Ozone can be directly damaging to plants and materials, and also plays a key role in the oxidation of SO_2 and NO_x to strong acids, and the conversion of other nitrogen oxides to the environmentally active nitrogen dioxide (NO_2). Ammonia, in contrast, has a neutralizing influence, producing the ammonium sulphate haze that is believed to be the main cause of the impaired visibility on which the Select Committee also comment.

5. As the Select Committee recognise, enviornmental damage can occur both through the direct impact of SO_2 and NO_x (sometimes called "dry deposition"), and through the "wet deposition" of the sulphuric and nitric acids derived from them, in mist (particularly important at higher altitudes) and in rain. The proportions of the two strong acids varies with situation: it is commonly stated as 70:30 sulphuric: nitric, but some hill mists have proved to contain more or less equal amounts of the two. Rain is naturally acid (because atmospheric carbon dioxide dissolves in it to form dilute carbonic acid while volcanoes puff out SO_2 and NO_x is produced in forest fires and biological decomposition). But there is no reason to doubt that in the industrial regions of the northern hemisphere, where some 90% of the SO_2 originates from human activities, rain has been made much more acid by man.

6. The chemical transformations and interactions in the air are complex, involve dozens of identified reactions (and probably many that have not yet been described) and have been the subject of a copious scientific literature (a,b). The implications of variations in concentrations, rates, and meteorological conditions are best explored using mathematical models.

One recent model result in the UK (c), which uses data appropriate to British conditions, indicates that hydrocarbons may be a key factor in ozone formation and require even more stringent control than NO_x if this process is to be minimised.

a) b) References to key documents eg. Royal Society discussions
c) Reference: Derwent and HOV

Damage to Health

7. The Select Committee review assertions made in a number of countries that SO_2 emissions may damage human health, both directly via the lungs and indirectly because the acidification of fresh waters can make them more liable to dissolve toxic metals from rocks, sediments or water supply systems. There is no doubt that in the past high urban concentrations of smoke and SO_2 did kill people prematurely: the London smog of 1952/53 was notorious for this and led directly to the Clean Air Acts. Since then maximum urban SO_2 concentrations have been reduced by 90% and such deaths are not now recorded in Britain. There is less certainty over the plausibility of the evidence that much lower air pollution concentrations today constitute health hazards. As to water supplies, The role of air pollution in raising toxic Metal concentrations in drinking water is still unclear (para 54) but the capacity of acid waters to dissolve lead from plumbing has been known for many years and has led to preventative action, especially in Scotland

Damage to buildings

8. Buildings built of, or faced with, limestones are particularly vulnerable to SO_2 attack. The process involves both dry deposition, in which the gas penetrates the porous stone and converts the insoluble calcium carbonate which is the main ingredient into soluble calcium sulphate, and the penetration of moisture (whether acidified or not). Repeated crystallization of calcium sulphate and other salts during cycles of wetting and drying causes slow crumbling of the stone. Such salts can remain inside the stone for long periods so that the damage can continue after exposure to SO_2 is reduced: much of the damage now being observed is believed to be due to past pollution.

9. This form of damage is governed by SO_2 concentrations in the levels of the atmosphere near the ground. Most of this pollution occurs in urban areas and comes from local domestic, commerical and industrial sources: less originates from power stations which are now mainly located in rural areas and disperse their emissions through

tall stacks. Ground level urban SO_2 concentrations have fallen sharply in the last 20 years, largely because of the substitution of sulphur free natural gas for high sulphur coal and fuel oil: concentrations in 1970/71 and 1981/82 were 62% and 32% respectively of the peak concentrations in 1962/63.

10. If this analysis is correct, the disturbing accounts of damage to historic monuments in the Select Committee's report may well result from the high pollution episodes of 30 years ago, and the improvements in air quality already secured will have greatly reduced the risk of new damage. But this does not mean that action is not still required. Although the natural acidity of rainfall may cause damage to some permeable limestones any elevation of SO_2 above natural background levels increases the risk of some deteriorati
Little is known about the effects of nitrates and wet-deposited nitric acid on building materials, and this needs further research. It is clear that neither SO_2 nor NO_x is involved in concrete deterioration: the problem here is carbon dioxide, causing a change called carbonation, and as this is not one of the phenomena to which the Select Committee drew attention it is not considered further in this response.

Effects on Soils and Freshwaters

11. Although it was the report of changes in freshwater systems and especially in fish populations in Scandinavia, that first drew attention to problems of acid rain very little of the latter falls directly into river and lake systems. The chemistry of freshwater acidification is largely governed by the interactions between dry and wet deposited acids and the vegetation and soils they encounter as they drain through a catchment.

12. Many kinds of vegetation are naturally acid: the mossy *Sphagnum* bogs that cover our wetter northern and western hills are an extreme example. The decay of dead plant material, including leaf litter, releases acid as does the bacterial oxidation of mineral or organic sulphides in the soil. Forests act as an effective trap for both dry and wet acidic emissions and the water falling through the leaf canopy or passing down the main stem, especially of old coniferous trees, is often more acid than the incoming precipitation.

13. Vegetation can therefore add to the acidity reaching the soil surface. Tree-growth can also acidify some soils directly by withdrawing neutralizing metalic ions such as calcium and magnesium. Once water reaches the ground, subsequent changes depend critically on whether it drains swiftly from an impermeable surface or percolates through the soil layers, undergoing at last some degree of chemical transformation. If the drainage is through mineral-rich layers, calcium and magnesium are dissolved: if the neutralizing capacity of the soil is low, as it is in shallow layers over granite or in many sands, the acidity remains high. Acid drainage through some kinds of soil can bring aluminium into solution, and this is important later because free inorganic aluminium is toxic to fish.

14. Both sulphate and nitrate, deposited in rain and mist, are capable of contributing to the acidification of fresh waters, but the nitrate is probably generally absorbed fairly quickly by vegetation since it is an important plant nutrient.

15. If fresh waters are made more acid, they progressively lose their capacity to support many kinds of freshwater life, including molluscs, insects, crustaceans and fish. The eggs and young of fish are most sensitive, and the hatching rate and survival of fry are reduced before the adults suffer: it is possible for a population to dwindle because it cannot reproduce. The young stages are also particularly at risk in some species because spawning occurs in small streams and shallows which are especially exposed to "pulses" of acidity when accumulated acidified snow melts or the first autumn rains flush out acidity that has developed in the soil in summer. If the acidity of the water is high enough aluminium may be brought into solution, and waters with a combination of high acidity, high aluminium and low calcium are especially likely to lose their fish.

16. The story of freshwater acidification is not a simple one. It has progressed to different degrees in different areas in a fashion that is probably related particularly to rock and soil types, rainfall, vegetation and industrial history. Data on the progress of the phenomenon in Britain are, as the Select Committee point out, incomplete. Substantial research is in progress, in the UK and elsewhere, to elucidate the details of the many processes involved.

Effects on Forests

17. An increasing amount of forest damage over a wide area of the Federal Republic of Germany and neighbouring countries has been reported in the past three years, and the latest German government statement, indicating a further deterioration in the position, has appeared very recently (d). Similar damage has been recorded in Sweden and North America. It was originally believed that acid deposition was a major factor causing this damage, and in some areas (for example along the frontier between the Federal Republic and its eastern neighbours) where SO_2 concentrations in the air are very high, direct damage from this gas may well be important. In other areas hypotheses linking wet-deposited acid to aluminium release in the soil, with toxic effects on roots, have been put forward. In yet other areas the pattern of pollution and of damage suggests that altitude, climatic stress, and fungal and insect attack, are also involved, very probably in combination with air pollution.

18. Concentrations of ozone measured in damaged areas of the Black Forest are often comparable with those observed in parts of the United States where this secondary pollutant is believed to cause forest damage. They also match levels found to damage coniferous trees in laboratory experiments. Ozone concentrations are consistently greater at higher altitudes in both the Federal Republic of Germany and the USA, matching the observed fact that forest damage is greater at altitudes above 600m - 800m. There is therefore an increasing belief that ozone is a major factor.

19. Although damage to trees has recently been observed in North and West Britain, this bears only a superficial resemblance to that associated with air pollution in Germany. Ozone concentrations in southern Britain in summer are similar to those in parts of Europe where tree damage has been reported, but annual mean concentrations in the UK are lower than those in areas of Germany and the USA where forest damage occurs. The situation in the United Kingdom therefore remains uncertain, and is the subject of investigation (see paragraph 44).

d) Federal Minister of Food, Agriculture and Forestry 1984 Forest Damage Survey - 16 October 1984

Reactions and Remedies

20. In the United Kingdom it was urban air pollution, and especially the deaths caused by smoky smogs in the 1950s and early 1960s, together with damaging fumes from industry (first recognised in the 1860s), that stimulated control. The Clean Air Acts regulated smoke from low level sources and the Alkali Acts dealt with major polluting industries. The success of the results, alongside changes in fuel (including the replacement of coal by natural gas in domestic heating), is well known. The quality of urban air has been transformed in little more than a generation.

21. Total SO_2 emissions in the UK have also declined steadily in recent years. In 1970, total UK SO_2 emissions peaked at 6.09 million tonnes. Since that year they have fallen so that in 1980 the total was 4.67 million tonnes. The latest figure - for 1983 - is 3.72 million tonnes, a reduction of some 40% from the peak year of 1970 and of 20% since 1980. A number of factors have contributed to the decrease, including energy economies which are estimated to account for about 4% of the decline since 1980, reduction in the sulphur content of fuel (4%), changes in fuel use patterns (about 5%) and industrial modernisation (6%). Many of these reductions are likely to be maintained even should there be a strong resumption of industrial growth.

22. This very improvement has led to concentrations of SO_2 of all areas in the country being below, and generally well below, the limit value set for health protection by the European Community (although domestic smoke remains a problem in a few areas). In contrast, in the urban areas of some other countries including some in the Community, levels of sulphur remain a problem. As the effects of the acute local pollution of the past have receded the possibility that dispersed emissions may have effects at long range from sources has taken some time to emerge as a serious issue. Effects of this sort may have been hidden behind the effects of more obvious causes in the past. However the problem has been studied seriously in the UK since the early 1970s. The Meteorological Office, for example, has played an active role in the study of acid rain, performing theoretical research and carrying out fundamental measurements from its instrument research aircraft over the North Sea since 1971 (e). Such studies have involved significant cooperation with other countries in exchange of information and study, notably in the forum provided by the UNECE Convention.

e) Meteorological Office Annual Report · 1983, Directorate of Research, Special Topic - Meteorological Aspects of Acid Rain. pp 76-99.

23. Elsewhere in Europe, although urban and industrial pollution has been responsible for severe environmental damage in some areas, public concern over the effects of acid deposition resulting from long-distance dispersion across national frontiers was first aroused in Scandinavia in the late 1960s. A report on the subject was submitted by the Swedish Government to the United Nations Conference on the Human Environment, held at Stockholm in 1972. The Organisation for Economic Cooperation and Development (OECD) mounted an international study which showed that long range transport of SO_2 did occur - and that under certain conditions up to half that produced in Britain could leave the country. In 1979 a Convention on Long Range Trans-Boundary Air Pollution was signed in Geneva, under the auspices of the UN Economic Commission for Europe. In 1982 Sweden hosted a conference in Stockholm which heightened awareness of the problem. Since then the seriousness with which these matters are viewed internationally has been stressed in many conferences and at two meetings of the Executive Body of the Geneva UNECE Convention.

24. Within the past year, a number of Governments have committed themselves to make a 30% reduction in their total annual national emissions of SO_2 by 1993 (using their 1980 emissions as a baseline). The number of countries in this 'club' is now 20 including Canada, the Federal Republic of Germany, France and the Scandinavian countries and some Eastern countries. In the European Community the Commission has published a draft Directive which would require member states to achieve 60%, 40% and 40% reductions respectively in their SO_2, NO_x and particulate emissions from large combustion plants including power stations. In parallel, and because of mounting concern over ozone as a possible cause of damage, proposals for more stringent controls of motor vehicle emissions (which account for a significant proportion of NO_x and hydrocarbons) have been brought forward. The Committee has recommended that the Government accept all these proposals.

25. The Government welcomes this opportunity to make clear its position on these important issues. We agree with the Committee on the need to continue to reduce emissions contributing to acid deposition. We share this objective with those countries that have already joined the "30% club". But in considering that specific objective and the emission control proposals by the Commission, the Government has to

take account of the current state of scientific knowledge of the problem, and the need to ensure that the most cost effective remedial measures are applied.

26. The scientific evidence reviewed in this chapter has led to a greater understanding of the mechanisms involved in the formation of acid deposition, and in its relationship to environmental damage. It is clear the problems are much more complex than was earlier envisaged. While air pollutants emitted in the UK may be involved in the damaging processes described, the precise role of primary and secondary pollutants varies with the circumstances. The contribution to environmental damage of distant and local sources also varies. For instance damage to stonework seems principally due to very local sources and it seems unlikely that transboundary pollution is the dominant element in ozone concentrations identified as a possible contributory factor to forest damage.

27. The costs of emission control measures has to be assessed against this scientific evidence. As the Committee has pointed out they would be substantial; to meet the requirements of the Commission's draft Directive for SO_2 would mean installing flue gas desulphurisation (FGD) plant at power stations at a capital cost of up to £150m and annual running cost of £35m. Control costs for individual and smaller industrial combustion plants are also likely to be unacceptably high. In addition several million pounds per power station would be required to install NO_x controls. Expenditure of this order clearly requires reasonable certainty that it will achieve the desired results.

28. The Government is however determined to continue the attack on air pollution. The UK has already made a substantial contribution; our emissions of SO_2 have fallen by nearly 40% since 1970. The Government will build on this firm foundation; specifically we intend:

i. to achieve further reductions in national sulphur dioxide emissions aiming at a reduction of 30% from 1980 levels by the end of the 1990s;

ii. to aim for the same reduction in nitrogen oxide emissions;

iii. to support stricter emission standards for petrol engined cars by development of lean-burn engines; and

iv. to continue to support a well balanced programme of research on air pollutants, their effects and the technology for their control, participating fully in international research efforts already deployed in these fields.

In pursuit of these objectives the Government is participating in the work of the ECE Convention on Transboundary Air Pollution and negotiating with its fellow signatories, policies for further measurement and control of emissions which all can endorse. We are expanding monitoring in the UK on the processes of transport, transformation, deposition and effects arising from emission of air pollutants. We are backing new developments in the technologies of fuel combustion and emission control that offer the prospect of much more economic solutions to the problem than are currently available. We shall pursue these objectives with urgency and vigour. The UK has a proud record of achievement in tackling the massive legacy of pollution inherited from the era of our industrial expansion and the Government firmly intends to sustain that record.

III. THE COMMITTEE'S RECOMMENDATIONS

29. We turn now to the Select Committee's detailed recommendations. For convenience, the responses which follow have been cross-referenced to the relevant paragraphs of volume I of the Committee's report as well as to the conclusions, and follow the same order. The Government considers, however, that the key elements of its response relate to the Committee's recommendations on the reduction of SO_2 and NO_x emissions. These are discussed towards the end of this section in Paragraphs 89 – 96.

Paragraph 18 page xvi (Recommendation 1)
Recommendation

30. We recommend that BRE be commissioned to conduct detailed research into the effects of acid rain on different types of stone and concrete in a variety of environments.

Response

31. The Building Research Establishment has been commissioned to conduct research into the effects of acid rain on materials of economic importance, including stone, concrete, slate, plastics, paint and glass. The programme will comprise both laboratory and atmospheric studies and will cover factors such as temperature, humidity, variations in wetness with time, materials composition and concentrations of particular air pollutants known or suspected to cause deterioration.

32. In addition a separate research programme on the micro climate around buildings is being undertaken in which local meteorological factors affecting the movement of wind and rain close to building surfaces are being studied.

33. A precursor to all these investigations is the preparation at BRE of an inventory of the different locations, amounts of materials and types of buildings within the UK which are likely to be at risk. As far as possible, this inventory will include all monuments and buildings of historic importance and will attempt to separate the deterioration which has arisen from past high levels of pollution and those which are likely to occur from existing or future levels of pollution.

34. In addition DOE are proposing to fund work at the National Physical Laboratory on the corrosion of metals by air pollutants and are in discussion with the University of Manchester Institute of Science and Technology regarding a programme on the interaction of air pollutants with building materials, with special emphasis on NOx.

Paragraph 23 page xviii (Recommendation 2)
Recommendation

35. We welcome the commitment of PSAs Chief Executive to conduct a short survey of acid rain damage. We recommend that suitable cases should as a matter of course be referred to BRE, and that PSA use a selection of buildings in different materials to monitor any damage additional to natural weathering.

Response

36. PSA has now completed its short regional survey of acid rain damage and will refer the cases of damage identified to the BRE as subjects for their further research. Cases identified in the future will be treated in the same way. PSA is also making arrangements for a selection of buildings in different materials on its estate to be monitored for damage additional to natural weathering. The BRE has agreed to assist in this if required.

Paragraph 36 page xxii (Recommendation 3)
Recommendation

37. We recommend that a substantial research programme on the effects on buildings of low-level emissions be initiated.

Response

38. Studies of the deterioration in the fabric of buildings of notable historic importance, specifically St Paul's and Wells Cathedrals, have been in progress for several years. The work has been jointly undertaken by staff from the BRE and University College London. Future work will include Lincoln Cathedral, and will look particularly at the effects on stained glass windows. BRE has in the past commissioned studies from the British Glass Industries Research Association on methods of reducing environmental attack on mediaeval windows, from Aston University on evaluating the synergistic effects of air pollutants (ozone, NOx, SO_2) on plastic and surface coatings, and from the Paint Research Association on the soiling of and damage to paint surfaces. Existing studies on natural stone are

being extended to monitor damage in higher pollution regions than those generally existing in urban areas. Bolsover Castle has been specifically chosen for this purpose because of its close proximity to an industrial complex. The results will be compared to those from the Wells Cathedral project.

Paragraph 37 page xxii (Recommendation 4)

Recommendation

39. We recommend that the Government give urgent and immediate consideration to the cost/benefit of preventing the avoidable erosion of both historic and modern buildings.

Response

40. Urgent attention is being given to evaluating the extensive damage to buildings arising from wet and dry deposition and ways of preventing these effects. Methods of preventing acid deterioration of natural stone have been developed by BRE, but they are expensive and can be used economically only on especially vulnerable external surfaces (see para 48). Two important factors have to be resolved in evaluating the cost/benefit of preventative action. The first is to quantify the area of materials at risk, and the second is to deduce the dose-response relationship for existing and projected levels of atmospheric pollution. The BRE programme is designed to provide a basis for assessing both these factors and to establish what best can be done, at least cost to the community, to preserve the heritage and secure the design life on modern buildings and other constructions.

Paragraph 92 page xli (Recommendation 5)

Recommendation

41. We recommend that the Forestry Commission using its own and West German experts, conduct a survey on the same lines as that in Sweden forthwith.

Response

42. The Forestry Commission is now undertaking a survey of the health of Norway and sitka spruce and Scots pine in Britain. In order to take advantage of the experience gained in such surveys in West Germany, a scientist from the Lower Saxony Forest Research Institute was invited to visit sites in Scotland, England and Wales in September 1984 and his advice on methods and the design of the survey has been accepted. Following the initial survey, a number of the sites will be designated for long term monitoring.

Paragraph 93 page xli (Recommendation 6)
Recommendation

43. We recommend that the Forestry Commission undertake detailed NOx and ozone monitoring and begin research into acid rain and trees.

Response

44. The Government considers that detailed NOx and ozone monitoring should remain part of DOE's responsibility and that the recommendation should be acted upon within the Department's overall air pollution monitoring plan, which is designed in consultation with the Forestry Commission and other appropriate Government Departments. The DOE is planning to extend its NOx and ozone monitoring networks substantially, partly in response to recommendations made in the 10th Report of the Royal Commission on Environmental Pollution. A network of about 20 NOx and 10 ozone monitoring sites is currently being considered. The installation costs of such a network would be in the region of £400,000 and the annual running costs approximately £150,000 p.a. By the end of 1985, the UK will also have 9 primary sites in remote areas (5 are already operational) capable of measuring a range of air pollutants including SO_2, particulates, anions and cations in precipitation, NOx, ozone and hydrocarbons. These sites contribute results to meet UK international obligations arising from our membership of the UNECE cooperative programme for monitoring and evaluation of long range transmission of air pollutants in Europe (EMEP).

45. In the same recommendation the Committee said that the Forestry Commission should begin research into acid rain and, by implication ozone and trees. Extensive research is already being funded in these areas by DOE and NERC at Research Council laboratories such as the Institute of Terrestrial Ecology (acid rain) and Universities like Imperial College (ozone) and by the Meteorological Office which undertakes both experimental and theoretical research into the dispersion and chemical transformation of pollutants. The Forestry Commission provide assistance to these bodies and have recently put in hand in-house research into the effects of air pollution on the health and growth in forest areas. Specific measurements of pollution will be made for experimental purposes in addition to information required from DOE's background monitoring. UK research into the effects of air pollution on terrestrial systems, including forests, has been coordinated through the Committee on Air Pollution Effects Research (CAPER) which is organised by NERC. DOE, MAFF and the Forestry Commission are all members of this committee, and the Government Departments concerned will now review with the other members the need for additional research on the topics the Select Committee identify.

Paragraph 113 page xlvii (Recommendation 7)

Recommendation

46. We recommend that the Government commission research on the effects of acid rain on materials, and on means of protecting them, as a matter of urgency.

Response

47. For several years the BRE has collaborated with the CEGB on a programme exposing a range of building and construction materials to ambient levels of air pollution around power stations and at a CEGB site at the Glasshouse Crops Research Institute at Littlehampton, Sussex. Stone samples which have been exposed for a designated period at these sites are currently being examined at BRE to evaluate the extent of deterioration. The present intent is to continue the programme and to take advantage of the special exposure facilities available at the CEGB sites.

48. BRE has also been working for many years on protective measures for stonework. The well known Brethane treatment is effective but expensive and has only been used to protect exposed stone surfaces that are particularly vulnerable - such as stone statuary on historic buildings. Other less expensive methods of preservation which restrict the ingress of pollutants and acid waters into stones are also being studied, including the use of silicones, silicates, stearates and acrylic formulations. So far these have not proved as effective as the Brethane treatment. Work is continuing.

49. The main agents that damage organic materials such as rubber, plastics and paints are UV radiation, ozone and photochemicals. Most damage to these materials occurs in urban areas and the main source of the precursors which give rise to ozone and photo-oxidants are motor vehicles. The Government is currently considering research proposals in this area in addition to the ongoing programme on building and construction materials already mentioned.

Paragraph 117 page xlviii (Recommendation 8)
Recommendation

50. We recommend that research on visibility degradation be commissioned.

Response

51. A study of the records of the Meteorological Office shows that since the Clean Air Act, the incidence of fogs in the UK has generally decreased significantly. There is no evidence of any recent reversal of this trend.

However in some areas there is evidence of a correlation between visibility and ozone concentration. This is due partly to the generation of some particulate matter being linked with the same air chemistry reactions as are involved in the local generation of ozone. But other factors such as prevailing meteorological conditions and humidity often are the over-riding factors determining visibility. This means that the monitoring of atmospheric visibility is not a good method of detecting atmospheric pollution. Generally it is more satisfactory to measure directly the concentration of individual pollutants. The Government will consider further the need to set up a research programme into the causes and control of

atmospheric visibility degradation building on early work undertaken by the Meteorological Office, Warren Spring Laboratory[a] and Environmental Sciences Division, Harwell.

Paragraph 124 page xlix (Recommendation 9)

Recommendation

52. We recommend that the Government should commission research in this country on all aspects of risk to human health to which US, Swedish and German research has drawn attention, with a view to establishing whether similar risks exist in this country.

Response

53. Within the UK it has been demonstrated that the clear-cut acute effects of air pollution on health linked with the former high concentrations of smoke and sulphur dioxide in towns have been eliminated, principally by actions taken under the Clean Air Acts. There are other pollutants in urban atmospheres, derived from both stationary and mobile sources, that could adversely affect health, at relatively high concentrations, but present ambient concentrations are not such as to suggest the likelihood of significant effects[b]. Thus NO_2 concentrations in the UK do not exceed the WHO guidelines, although there may be isolated exceptions. It is not therefore considered that NO_2 levels in the UK represent a significant environmental health risk[c]. Reference was made by the Committee to other statements concerning possible health effects

---

a. Report LR348(AP), 1980.

b. S. Chinn, C. du V. Florey, I. G. Baldwin, and M. Gorgol, The relation of mortality in England and Wales 1969-73 to measurements of air pollution. J. Epidem. Community Health, 1981, 35, 174-179; R.E. Waller, Control of air pollution: present success and future prospect. In Recent Advances in Community Medicine, Edit., A.E. Bennett Pp 59-72. Churchill Livingstone, Edinburgh, 1978.

c. a memorandum on the effect of NO_2 on human health was presented by the Chief Medical Officer of DHSS to the enquiry of the Select Committee on the European Communities on Air Pollution - 22nd Report, pp 190-191.

arising from air pollution (para 122 p xlix). A preliminary report on a desk study by the WHO European Office on the health effects associated with acid rain was presented at the second meeting of the Executive Body of the ECE Long Range Trans-Boundary Air Pollution Convention, and further examination of these matters has been remitted to WHO: the Government will consider its own position further in the light of the results.

54. Dissolved lead from plumbing systems can be a problem in areas of the country where there are acidic soft waters. The reason for the acidity of these waters is that they originate from naturally acidic peat uplands. Generally treatment of such waters with lime to reduce the acidity reduces the problem - although in particularly difficult cases replacement of lead plumbing may be required. Government action on the wider lead problem has been set out in Pollution Paper No 19 issued in 1983. Copper is considered to have relatively little health effect and the EC Directive on drinking water (80/778/EEC) recommends that up to 3000 microgrammes per litre can be tolerated. In contrast, the same Directive recommends a limit of 50 microgrammes per litre for lead.

55. Data reported in the 1973 MAFF Food Survey showed that levels of mercury in freshwater fish (0.09 and 0.03 ppm respectively for brown and rainbow trout) were considerably lower than in marine fish and well within safety levels. Pike were an exception in having rather higher mercury levels (0.52 ppm), but this is considered to be a function primarily of their long life and predatory feeding habits, rather than as a consequence of habitat acidification. Although pike are occasionally eaten in this country, it is not a sufficiently important element of diet to be a significant source of mercury to UK consumers. It is recognised that this monitoring was not specifically aimed at fish originating from acidic waters, although doubtless fish from such sources were included in the sample. The Government will initiate a limited programme to determine mercury levels of fish originating from acid waters on catchments naturally rich in heavy metals.

Paragraph 134 page lv (recommendation 10)

Recommendation

56. We recommend that a rural network of monitoring stations at different altitutes over the whole country be set up.

Response

57. The Government agrees that monitoring of air pollution in rural areas is essential.

58. There already exists a network of sites over the whole country to monitor atmospheric levels of sulphur.

59. The recently published report of the UK Review Group on Acid Deposition (the Warren Spring Laboratory Report to which the Select Committee refers) recommends that more sites be established to monitor both wet and dry acid deposition in rural areas of the UK to provide proper coverage of the whole country. The report also identifies the need for more monitoring sites at different altitudes. The Government has already accepted the recommendations of the Review Group and steps are being taken to implement them.

60. As to NOx and O_3 the Royal Commission on Environmental Pollution in its tenth report proposed extension of the monitoring network for these pollutants and the Government intends to extend the network in accordance with that recommendation by 1986. The need both to cover the whole country and to monitor at different altitudes will be taken into account in designing the new network.

61. In addition to these measures (and as stated in paragraph 44), the Government intends to have in place by 1985 a primary network of nine well instrumented sites in remote areas providing national background levels for a range of air pollutants and reporting to the EMEP.

62. Finally the Meteorological Office and DOE are funding research which will lead to the development of mathematical models capable of predicting variation of precipitation with altitude over mountainous areas.

Paragraph 141, page lvii (recommendation 11)

Recommendation

63. We recommend that greater impetus be given to the perfection of PFBC technology for commercial use.

Response

64. The Government agrees with the Committee that pressurised fluidised bed combustion (pfbc) technology offers excellent prospects for emission control at relatively low costs. It is for this reason that the Department of Energy is contributing to the joint CEGB/NCB design studies for a full-scale generating plant based on pfbc. Decisions on the expansion of work on this promising process will be a matter for the two industries in the light of these design studies and in the light of the £25m two-year joint development programme at the pfbc experimental facility at Grimethorpe which the two Boards recently announced.

Paragraph 145, page lviii (recommendation 12)

Recommendation

65. We recommend that the necessary resources be devoted to fgd by the CEGB, not least in order to reduce its cost.

Response

66. This is a matter in the first place for the commercial judgement of the CEGB which in accordance with the polluter pays principle would have to meet the costs of any environmental controls with which it was required to comply. The Board's task is to prepare itself to meet those controls, using means which are economically feasible and technically adaptable. To this end, it is understood that the Board maintains a substantial programme of evaluation of the various fgd systems which have been developed, especially in Japan and the USA, and which have been in commercial use for some years. These systems are available "off the shelf" and their costs are governed by normal commercial considerations. It is

understood too, that the Lodge Cottrell process referred to by the Committee is still being evaluated by the Board. The Board has made it clear that, if it becomes necessary to install fgd, the equipment could be manufactured in the UK irrespective of the system chosen.

Paragraph 146, page lviii (recommendation 12A)

Recommendation

67. We recommend that further encouragement be given to the development of British technology both through NCB and CEGB research and through grants towards development costs by the Department of Trade and Industry.

Response

68. The Government agrees that the development of British technology should be encouraged. Development work by the NCB and CEGB is directed towards the efficiency and competitiveness of their operations and to this end both Boards have in hand work which is relevant to the control of emissions. The experimental pfbc facilitity at Grimethorpe has already been mentioned. In addition, the CEGB has work in hand on a pilot installation of a chloride prescrubber which is necessary for UK coals if the flue gases are to be cleaned. Jointly with the NCB, it is studying a number of coal cleaning techniques including their optimium use in conjunction with FGD. It is also undertaking work on coal/water mixes as power station fuel (as a substitute for fuel oils).

69. The Government itself recognises both new low-pollution combustion techniques and emission control technologies as worthwhile areas for sponsorship. It is important that UK industry should run with the leaders in this field. It has provided financial assistance to a number of companies in the past and is willing to consider any new application. The Department is currently considering possible research support in relation to a test fluid combustion bed.

Paragraph 154, page lx (recommendation 13)

Recommendation

70. We recommend that any programme to limit NOx and hydrocarbon emissions from motor vehicles should be based on lean-burn technology.

Paragraph 198, (last sentence), page lxxii (recommendation 17A)

Recommendation

71. We recommend that new motor vehicles be required to have reduced NOx emission levels by 40% by 1.1.87 and that the Department of Transport should inquire into the best possible means of reducing emissions from existing motor vehicles.

Response

72. The Government accept that new standards for emissions controls should be achievable by lean-burn technology. Vehicle emissions in the European Community are governed by a council directive which was amended in June 1983 so as to reduce HC and NOx emissions by about 30% for all new cars from 1 October 1986. Discussion has already started in Brussels on a further amendment to this directive - to become operative between 1989 and 1991. The UK is arguing that emission standards for the end of this decade should be set at levels achievable with lean-burn technology. The potential exists for a further reduction of 25% in combined HC + NOx and 40% in NOx alone within this time scale. Subject to Community agreement therefore, a 40% reduction in NOx levels can be achieved. Some models of vehicles with lean-burn engines and lower NOx emissions can be expected to appear on the UK market from next year onwards. But we do not believe that the standards under discussion could be imposed on all new vehicles as early as the beginning of 1987. The process of development and setting up production over the whole model range, and type approval by Department of Transport and other authorities, can be expected to take 4-5 years from the agreement of the standard in a council directive.

73. It is not clear what the Committee had in mind in recommending that the Department of Transport should enquire into the best possible means of reducing emissions from existing vehicles. The fact is that it is impracticable to use retrospective modification of existing vehicle engines to influence their gaseous emissions. Studies of NOx emissions from existing vehicles in service have shown that they are generally well within the relevant standards to which they were manufactured and approved. Although NOx emissions do not tend to increase with vehicle age, they do increase at high speeds. So possible means of reducing emissions from existing motor vehicles would, therefore, be the better enforcement of the 70 mile per hour speed limit, or some lower limit. As high speed motoring is a small proportion of total car mileage, the potential reduction in total NOx emissions is very small. And, of course, such a proposal would raise much wider issues than the effect on air pollution.

Paragraph 171, page lxvi (recommendation 14)

Recommendation

74. We recommend that those industries reliant on high combustion temperatures, for example the cement and glass industries, should not have NOx controls put upon them.

Response

75. The Government agrees that in industries where, in the judgement of the Industrial Air Pollution Inspectorate and equivalent Inspectorates in Scotland and Northern Ireland (the Inspectorates) NOx controls would not constitute best practicable means, such controls should not be required.

Paragraph 172, page lxvi (recommendation 15)

Recommendation

76. We recommend that the UK should follow what is known as the "bubble approach": it should, in agreement with its EEC partners, agree an overall level of reduction. Each member country should determine how to achieve that. We recommend that existing, small

industrial plant should be excluded from emission controls. All new plants should meet SO_2 emission levels contained in the draft Directive, and all those not reliant upon high combustion temperatures should meet the NOx levels.

Paragraph 195, page lxxii (not recorded in the conclusions as a recommendation)

Recommendation

77. We recommend that within whatever national levels (of emissions) are agreed each Government should be free to decide how to achieve the necessary reduction.

Paragraph 196, page lxxii (recommendation 17)

Recommendation

78. We recommend -

(a) that the United Kingdom join the 30 per cent club immediately, and that this target be achieved by the CEGB being required to reduce its emissions accordingly;

(b) that in the medium-term as power stations come to be refitted the CEGB should be required to instal equipment to attain the overall national reduction of 60 per cent in accordance with the EEC draft directive, that is, by the end of 1995.

Paragraph 197, page lxxii (recommendation 15)

Recommendation

79. Insofar as industry is concerned, we are aware that for some the high costs of meeting control standards may render them uncompetitive, and for others, even if cost is not of major consideration, it would be impractical to install control technology. Accordingly, we recommend that:

(1) EC emission control levels for SO_2 should apply to all new industrial plant over 50 MW from 1.1.89;

(2) For all existing plants the stringent application of "best practicable means" by the Air Pollution Inspectorate should continue;

(3) The Government should give assistancce to industry to convert existing plant to meet SO_2 control standards.

Paragraph 198 (except for last sentence), page lxxii (recommendation 17A)

Recommendation

80. We recommend consistent with best practicable means that all power stations should have low NOx burners installed during routine shut-downs. With the exception of those industries totally dependent on high combustion temperatures, which we feel should continue to explore other means of reducing their NOx emissions, we recommend that all industrial users be required to fit low NOx burners. We recommend that Government give assistance to industry to install low NOx burners in existing plants.

Response

81. The recommendations in these paragraphs are closely inter-related. The question addressed is that of reduction of SO_2 and NOx emissions from industrial combustion plants and the manner in which such a reduction might be achieved.

82. The present position in the UK is that industrial operators are controlled by the Inspectorates who have required the use of the best practicable means to prevent emissions to the satisfaction of the Inspectorates. Judgement of what is practicable has taken account of the environmental effect of the emission concerned and of technical and economic feasibility of control. If the Inspectorates judge that it is not practicable to abate certain emissions at source, other steps have to be taken to render them as harmless. The Inspectorates accordingly

have required the abatement of dust emissions from power stations by the best practicable means, but have judged that abatement of SO_2 and NOx emissions is not practicable because of the high costs involved. Operators have therefore been required to construct stacks sufficiently high to ensure that those emissions are dispersed and diluted in the air to reduce ground level concentrations of the gases to the minimum.

83. Emissions from other industrial combustion plants are controlled by local authorities under the provisions of Clean Air legislation. The effect of this legislation is much the same as that achieved by the Inspectorates under Health and Safety at Work legislation; grit and dust emissions are abated whilst SO_2 and NOx emissions are dispersed from chimneys.

84. Dispersal of SO_2 and NOx emissions has been widely practiced by Western industrial nations for many years. However, in recent years an increasing number of countries have required the abatement of these emissions at source. For the most part these requirements apply to new plant only but, in the Federal Republic of Germany in particular, there is now legislation requiring SO_2 and NOx abatement technologies to be fitted to existing combustion plants.

85. Recognition of the involvement of SO_2 and NO_x in long-range transboundary air pollution, and therefore the interdependence of countries in seeking a reduction in deposited acidity, led directly to the ECE Geneva Convention and to the commitment by a number of countries to reduce their total annual national SO_2 emissions by 30% by 1993 on the basis of total emissions in 1980. This approach - viewing each country's emissions as a whole and setting a reduction target to be achieved in ways of countries' own choosing - is referred to by the Select Committee as "the bubble approach", a term derived from an administative mechanism devised in the USA for reducing emissions within defined areas. As recorded in Chapter II, the "30% club" of countries are pressing others within the UN/ECE region (Europe, Canada and the USA) to make a similar commitment and negotiations are under way within the framework of the Convention to prepare a specific agreement on reduction of SO_2 emissions. The UK is participating in these negotiations.

86. The European Community draft Directive referred to has been passed by the Commission to the Council. It would require limitation of emissions from large combustion plants above 50 MW rated thermal output. This category of plant includes all power stations together with the largest industrial combustion plants in refineries, chemical factories etc. In the UK these plants give rise to some 80% of total SO_2 and 50% of total NOx emissions. The draft Directive contains two main provisions:

(i) that total annual national emissions of SO_2, NOx and dust from the category of plant in question should be reduced by 60%, 40% and 40% respectively by 1995 using 1980 annual emissions as the base, and

(ii) that all new plants of the category described should be subject to limits on emissions of SO_2, NOx and dust which would, in the UK, require the introduction of abatement equipment for SO_2 and NOx as well as for dust.

This proposal is now under negotiation between member states.

87. Against this background, the Select Committee recommends:

(i) that the UK should subscribe to the principle of the bubble approach, that is, to the principle of overall national reductions in emissions in agreement with EEC partners (paragraphs 172 and 195)

(ii) that in respect of SO_2 emissions:

(a) the UK should join the 30% club and should agree to the reduction in SO_2 emissions from large plants as proposed in the EC Directive, both targets being met by the application of controls to <u>existing CEGB power stations alone</u> (paragraph 196)

(b) <u>all new power stations</u> should meet the SO_2 emission limits proposed in the proposed EC Directive (paragraph 172)

(c) the requirement to use best practicable means in relation to SO_2 emissions from existing industrial combustion plants other than CEGB power stations should be stringently applied (paragraph 197(2)) and the Government should assist industry to introduce SO_2 controls in existing plant (paragraph 197(3)). Existing small industrial plants however should be excluded from emission controls (paragraph 172)

(d) emission limits for SO_2 as proposed in the draft EC Directive should be applied to all new industrial plants other than power stations of more than 50 MW thermal output with effect from 1.1.89. (Paragraphs 172 and 197(1))

(iii) that in respect of NOx emissions:

(a) control of NOx emissions should be introduced to all existing power stations consistent with the best practicable means possible (paragraph 198)

(b) all new power stations should meet the NOx emission limits proposed in the draft EC Directive (paragraph 172)

(c) all existing industrial combustion plants other than power stations with the exception of those dependent on high temperatures should be required to introduce NOx controls and the Government should provide assistance to industry to this end (paragraph 198)

(d) emission limits for NOx as proposed in the draft EC Directive should be applied to all new industrial plants other than power stations except for those plants dependent on high temperatures (paragraph 172)

88. The comments which follow are without prejudice to the negotiations in which the Government is now engaged both in the European Community and in the UN/ECE.

SO_2 emissions

89. Consideration of the case for reduction of SO_2 emissions has to have regard to the scientific, technological and economic position. The Government's view of the scientific position has been outlined briefly in the introduction to this response.

90. UK SO_2 emissions declined by 17% from the peak year of 1970 when total emissions amounted to 6.09 m tonnes to 1980. In 1980 emissions amounted to 4.67 m tonnes and in 1983 3.72 m tonnes. The reduction on the 1980 base has therefore been of the order of 20% although the arbitrary choice of 1980 as a base year masks the UK's achievements in the previous decade. This has been due to a number of factors such as fuel substitution, energy conservation and industrial restructuring which may continue to influence emission patterns over the next 15-20 years. It is reasonable to assume that much of this reduction will not be reversed as a consequence of continued industrial growth. However, the future pattern of industrial structure and energy use is not easy to predict, making it difficult in turn to estimate what further effort and investment might be required in order to be certain of achieving the targets set by the "30% club".

91. Joining that "club" might require little action to abate emissions if the trends of recent years continued, or it might entail the need for controls on sulphur emissions from up to 10 major power stations with long life expectancy if industrial growth reversed all of these trends. This could cost up to £1.5 bn depending on the control systems used and add some 5% to electricity bills. It would also take at least 10 years to accomplish since only one major station could be retrofitted with controls at a time.

92. The Committee's recommendation that a 60% reduction in emissions from large plants should be accomplished by controls on CEGB power stations alone would certainly be particularly onerous since the reductions since 1980 have come almost entirely from other sources. Again, estimates of future emissions are of key importance but even on the assumption that power generation remained at the level of the past few years, achievement of the 60% target would require retrofitting of controls to more than the 10 major stations mentioned above at an annual cost of £260 ton SO_2 emissions abated.

would inevitably include a number of older stations with a short remaining life and low load factors; substantially increasing the costs of such a programme and extending it well beyond 1995.

93. The Government will continue to keep under revue projections of likely future emission levels. It also believes that there are good prospects that new and better combustion technologies which will lead to reductions in SO_2 emissions will be developed as a consequence of research now in hand or foreseen. In these circumstances the Government does not intend to commit the country to expensive emission controls, especially when there is uncertainty about the environmental benefits to be achieved in this country and in continental Europe. The Government intends to achieve further reductions in national SO_2 emissions, aiming at a reduction of 30% from 1980 levels by the end of the 1990s.

94. No new fossil-fuelled power stations are likely to be built until the end of the century. When the time comes it will be for decision what should be regarded as the best practicable means for preventing or rendering SO_2 emissions harmless in the light of technical developments and other factors at the time but this decision cannot be prejudged.

NOx emissions

95. Industrial emissions of NOx are far more difficult to estimate than SO_2 emissions, since combustion temperature as well as quantity of fuel influences the level of emissions. Best estimates are that industrial emissions have declined over the past 15 years although not to the same extent as SO_2 emissions; this decline has been offset by increased vehicle emissions. Low NOx Burner technology does appear to have potential for reducing emission levels (the Board expects to start field trials of a new design soon, possibly in 1986). But despite promising research, in which CEGB is taking a leading role, the technology has yet to be fully developed for use in UK conditions and with UK fuels; nor are the economics established.

96. It is therefore not yet possible to judge whether low NOx burners could become the best practicable means of control, as the Committee recommends. In consequence, it would not be sensible to set a target or timetable for emission reductions from existing plants, or

emission limits on new plants, and there could be no question of the Government assisting industry to convert existing plants. That would be a serious attack on the polluter pays principle, which the Government rejects. However, economically feasible technology to reduce NO_x emissions is further advanced than industrial controls. Against this background, the Government also intend to achieve further reductions in national nitrogen oxide emissions aiming again at a reduction of 30 per cent of the 1980 levels by the end of the 1990s.

Paragraph 185 page lxix (Recommendation 16)

Recommendation

97. We recommend that in any review of the desirability of combined heat and power/district heating, full account should also be taken of the pollution aspects highlighted by our report.

Response

98. The Government are taking account of the implications for energy efficiency of the use of combined heat and power technology in the development of energy policy. A report by W S Atkins published in 1984 by the Department of Energy discussed the possible national benefits of large scale combined heat and power technology. As a result of this report the Government has invited proposals from led by the private sector for financial assistance towards preparation of a prospectus for up to 3 UK city schemes. Full consideration will be given in this programme to minimising polluting emissions.

Paragraph 199 page lxxiii (Recommendation 18)

Recommendation

99. We recommend that the Government make a long-term commitment to air pollution research.

Response

100. The Government accepts that in the area of air pollution research there is need for long-term commitment. Its current and proposed research and monitoring programmes in air pollution (£2.5M for 1984/85

and (projected) £3.5M in 1985/86) provide an indication of the Government's resolve to continue these activities on a long-term basis. This will allow the impacts of variables such as changes in emissions, land management of fishery practice to be adequately measured and evaluated over sufficiently long time scales.

101. In making this commitment the Government also recognises the need for a well coordinated approach to air pollution research in the UK with adequate resources. Coordination is achieved through committees such as the NERC Committee on Air Pollution Effects Research, the DOE group on Acid Waters and Soils, the DOE UK Steering Group on Long Range Transport of Air Pollution and the NERC Coordinating Committee on Atmospheric Chemistry Research. Discussions are currently taking place to set up a similar DOE research coordinating committee on the effects of air pollution on materials, including historic buildings and cultural monuments.

Paragraph 200, page lxxiii (recommendation 19)

Recommendation

102. We recommend that the Government require the emitters of SO_2 and NOx from plants over 50 MW to monitor their emissions sources.

Response

103. Emissions of sulphur dioxide over extended periods are easily calculated from the sulphur content of the fuel and knowledge of fuel consumption. With any one fuel, a sulphur dioxide monitor would merely reflect the output of the plant.

104. If equipment is fitted to remove sulphur during or after combustion then some form of sulphur dioxide monitor would be required to show that the plant is operating effectively.

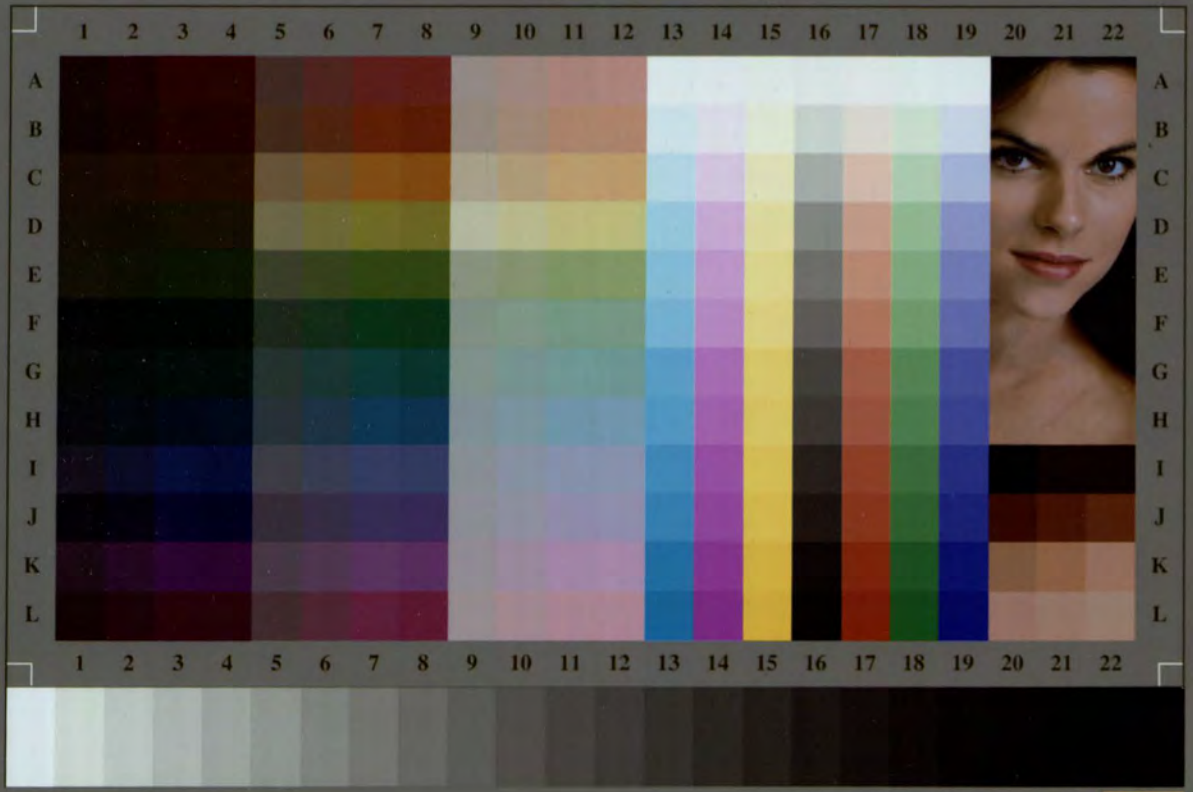
105. The emission of NOx depends on the conditions of combustion all fuels and also, in addition, with coal on the nitrogen content of the fuel itself. With pre-set combustion conditions such as low NOx burners and with any one particular fuel the concentration of NOx would not fluctuate greatly and is, in any case, outside the control of the operator. There would therefore, be little to be gained from the fitting of continuous NOx monitors which, in themselves, are expensive and require considerable maintenance.

PART 2 ends:-

Dr Nicholson to PM W.0786 31.10.84

PART 3 begins:-

S/SDOE to PM 2.11.84


KODAK Q-60 Color Input Target
C M Y
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22
A B C D E F G H I J K L
IT8.7/2-1993
2007:03
FTP://FTP.KODAK.COM/GASTDS/Q60DATA
Q-60R2 Target for
KODAK
Professional Papers
Kodak