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Industrial pollution control in the UK

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ABSTRACT

Industrial emissions in the UK are currently being reduced by a combination of the toughening of the existing regulatory regime, and a heightened sense of environmental and corporate responsibility by industry itself. But the overall record of British industry, while improving, is still unsatisfactory compared both with public expectation and regulatory standard setting.

Key words: pollution; regulations; industry; environmental protection

INTRODUCTION

The regulation of environmental protection is undergoing a transformation in the United Kingdom. This is spurred by the demands of European Community environmental directives, and by changes in the policy within the British government. But much more still needs to be done by almost all industry for performance to meet public expectations

THE UK ENVIRONMENTAL REGULATION REGIME

Pollution control in the UK goes back over 150 years under various public health acts. The first industrial pollution inspectorate was created in 1863 to cope with the toxic hydrochloric emissions from the alkali works that produced caustic soda for the chemical industry. This special band of chemical inspectors was known for over a hundred years as the Alkali Inspectorate [2].

That decision to establish a specialist body of professionals set three important principles in British pollution control, principles which have remained to this day.

(1) Works that are specially complicated or specialised in manufacturing processes are singled out for particular attention by a national agency controlled by a national government department. Over the years these have

become known as 'scheduled works'. They are statutorily separate in pollution control terms, and they set the parameters for imaginative and challenging pollution control in industry.

(2) The officials responsible for industrial pollution control are drawn from industry itself. Usually they are engineers or process operators with considerable first hand knowledge of the industry concerned and of the particular processes being regulated. They generally command the respect of industry, because they are regarded as part of a fraternity. But they undoubtedly regard themselves as independent and critical, acting in the public interest. Thus there is a professional ethos amongst regulators that commands respect [3].

(3) Localised pollution from small firms, or from industry whose emissions and processes are well understood and relatively uncomplicated is handled by officials operating under the control of local authority public health departments via public health legislation. Since 1972 these officials have been known as environmental health officers. They work at the level of the district council (the lowest tier of government in Britain), with an arms length relationship to the national regulatory authorities. There are enormous variations of geography and economy amongst the district councils, so the knowledge and experience of the environmental health officers differ greatly.

Since the last war, British pollution control policy has evolved piecemeal with a number of national and regional agencies involved, and a variety of government departments in a policy supervisory role. Table 1 outlines the present state of regulatory responsibility. Two points stand out.

(1) The basis for regulation is usually a discretionary judgment between the regulatory official and the regulated client according to the principle of best practicable means (BPM). BPM has never been precisely defined in the courts, hence its disfavour with the European Community. In general it means the application of the best technology and practices of abatement, taking into account the state of technology and its likely developments, the scope for improving the operational efficiency and the maintenance of the equipment used, the condition of environmental quality in the area immediately adjacent to the plant, and the economic circumstances of the firm concerned. Note that BPM differs from the West German concept of 'State of Technology' (Stand der Technik) in that it does not presuppose the very best technology, nor is it technology-forcing in its application. Note too, that the application of BPM does not involve any economic calculus: it is simply a matter of negotiation subject to broad rules about best practice, presumed standards of industrial and technical performance, and some indication of the state of environmental well-being in the surrounding area.

(2) While in the case of scheduled works for air pollution control, there was some separation of functions between the regulatory agency and the

client, this was not so in water and waste management before 1989. In the case of water pollution control, the agency responsible for regulation was the same as the agency responsible for building and managing sewage treatment works, namely the regional water authority in England and Wales. Only where industry discharged directly into a watercourse (but not an estuary until 1987) was there any separation of powers in water pollution control. Since the majority of industry emitted wastes into the public sewer, the issue of overlapping jurisdiction remained [4]. In the case of waste management the regulatory agency was the county waste authority, while the county was also responsible for collecting and disposing the waste in controlled tips. Broad application of variants of BPM within this somewhat incestuous regulatory regime did not encourage strong independent enforcement [5].

These two themes are not unusual in regulatory experience. In general regulators have to negotiate rather than to enforce. They use a variety of measures to achieve results, but the interconnections between action and agency client relationships are fairly similar in industrialised countries [3,6].

THE IMPACT OF EUROPEAN COMMUNITY POLICY AND DIRECTION ON UK PRACTICE

The emergence of ever stronger and more specific environmental policy in the European Community since 1973 has steadily transformed British regulatory attitudes and practices [1]. This has been due to the requirement to conform to directives that set targets and procedural styles that the British would not otherwise have adopted. In particular, the principle of establishing ambient environmental quality standards for certain categories of pollutant (e.g., the various black, grey and red lists of chemicals, SO_2, NO_x, particulates) and for water quality (e.g., drinking water, bathing beaches and shellfish) has forced British regulators to set emission limits in relation to the receiving source quality, not just to the environmental conditions at the end of the pipe [7].

The second major role of Community policy is to promote the cause of the precautionary principle. British air pollution control has always contained an element of precaution, urging the control of substances so that they become 'harmless and inoffensive' even when not all is known about their possible environmental consequences. But the application of BPM has always allowed a certain weakening of this principle in practice. The strengthening of the precautionary principle in Community directives, and the growing interest in protection to safeguard the intrinsic rights of the natural world [8], have become an element in British industrial pollution control that would not have taken place so quickly, had Britain not joined the Community. Indeed in the Environmental Protection Act of 1990 the

TABLE 1

UK pollution control arrangements

Type of pollution and mode of regulation	Legislation	Level of primary responsibility for pollution control	Enforcement agency
Integrated pollution control (scheduled works) must carry out Best Practicable Environmental Option (BPEO) via BATNEEC	Alkali Act, Health and Safety at Work., etc. Act, Environmental Protection Act	Central Government (Department of the Environment)	Her Majesty's Inspectorate of Pollution. Department of Environment
Air and noise pollution (unscheduled works) discretionary judgment backed by BATNEEC guidelines plus response to specific EC directives	Control of Pollution Act Part III. Clean Air Acts, Nuisance Provisions of Public Health Acts	District Authorities (Department of the Environment)	Environmental Health Department of the district council
Water pollution: some use of BATNEEC, but much discretion	Control of Pollution Act Part II, Water Act	Regional National River Authorities (Department of the Environment)	Regional National River Authorities

Marine pollution: informal arrangements plus response to specific EC directives	Food and Environment Protection Act	Central Government (Ministry of Agriculture, Fisheries and Food)	Ministry of Agriculture Fisheries and Food
Waste disposal to land: informal arrangements subject to general guidelines	Control of Pollution Act Part I	County Authorities (Department of the Environment)	Waste Disposal Executive
Land-use Planning: DoE circulars, codes of practice, court rulings	Town and Country Planning Acts 1971, etc.	District Authorities but County for waste and minerals (Department of the Environment)	Local authority planning departments
Radiation-related wastes authorized by licence using the principal of discharges as low as reasonably practicable	Radioactive Substances Act	Central Government and Health and Safety Executive (Department of Employment)	Radiochemicals Inspectorate controlled by Department of the Environment and Nuclear Installations Inspectorate within the Health and Safety Executive

concept of environmental health now legally embraces the well-being of ecosystems and non-human species. This was forced on the government by environmental groups, but the government was also mindful of the need to fall in with community principles in this regard.

The third aspect of Community regulatory philosophy which may well revolutionise British practice in years to come is the endorsement of the principle of best available technology not entailing excessive costs [9]. In the UK this acronym stands for best available *techniques* not entailing excessive cost (BATNEEC). The distinction is important. In the UK focus is on ways of achieving minimum discharges that include management, process control, quality control of equipment manufacture, maintenance standards and surveillance, and operator training, together with health and safety standards in the workplace. This wider definition allows British regulatory authorities more latitude to negotiate with companies, and for companies to construct more comprehensive environmental audits.

Nobody is really sure just how much BATNEEC will differ from BPM [10]. Legally speaking the two are quite different. In the UK courts BPM has never received a formal definition, being dependent on the balance of advantage, as perceived by specialists, on the relative costs of additional controls and the adjudged advantages to society, mostly to those living in the vicinity of the plant concerned, or reduced emissions [11]. BATNEEC will be defined by the regulatory agencies themselves arising out of a series of technical notes that will set the parameters for particular classes of emission. Already some ten BATNEEC notes have been drafted for discussion by the industry concerned. The final text does not have statutory force, but will nevertheless provide a clear guideline for subsequent regulatory policy. Experience and enforcement performance will cause these notes to be revised, probably on the basis of a 5-yearly review.

All this will mean a clearer statement of what is regarded as the state of the art, not just in technology, but also in the standards of operation and maintenance. It will also require industrialists to have regard to the very choice of processes and of by-product recovery in selecting emission control strategies. This shift of emphasis for the 'end of the pipe' to the process management practice means that pollution control responsibility will move from the engineer to the works manager, the designer and, in some cases, to the board of directors. So far that has not happened very much in UK industry [12] with less than one third of chief executive officers admitting that their company has produced any kind of code of practice for good environmental management [13].

Waiting in the wings is a draft community directive on environmental auditing in industry. So far this is very much in its early stages, but the idea is to establish a self-appraisal process of comprehensive accounting of in-

dustrial environmental demands from extraction through fabrication or operation to waste disposal. This will apply equally to service industries as to the manufacturing sector.

At the outset some 58 classes of activity are to be included. The trial audits will include an assessment of the entire operations of the company, the use and maintenance of environmental protection equipment, management procedures to reduce energy and cut waste, training schemes for managers and employees. All of this is to be summarised in a public report to top management. This report will also indicate publicly what measures will be put in train to rectify any shortcomings. A cross section of these appraisals may be subject to independent audit by qualified inspectors, though, as yet, such people do not exist, and member states may well balk at the excessive degree of bureaucracy implicit in these proposals.

Nevertheless the trend towards comprehensive environmental accounting and management response statements is inevitable. Clearly there will be important implications for pollution control, which will be at the forefront of corporate attention.

The introduction of a Community directive on environmental impact assessment for certain classes of development, has steadily been widened to include almost any large new industrial process, irrespective of compulsion under the directive. This has also increased managerial responsibility at higher levels in British industry for environmental matters. At present, however, the relationship between EIA and industrial pollution control is still tenuous. This is because EIA is new and only applies to the construction of new plants for which planning control is being sought.

Over time, however, the combination of EIA and specialised industrial audits will encourage greater emphasis to be made on the 'whole management' approach to environmental protection. This will begin at first within the more responsible elements of British industry. These industrial audits are not yet statutory and few industries have carried out any internal environmental accounts that have been made public. To date about six major companies have been prepared to submit themselves to independent audits by competent analysts [14].

RECENT CHANGES IN UK REGULATORY LEGISLATION

Since 1989 a number of important developments have taken place to alter both the style and the responsibility of regulatory agencies in the UK. This will have a bearing on industrial pollution control in the years to come.

The 1989 Water Act which created commercial private companies for water supply and sewage services, also established an independent, publicly financed, National Rivers Authority (NRA). This has split the responsibility

for sewage treatment, the regulation of groundwater and surface water flows, quality, and fisheries, nature conservation and amenity into two clearly definable agencies, namely the private water service and the public regulatory agency, the NRA. The water companies will now be statutorily controlled over the abstraction and disposal of the water they licence according to legislatively enshrined minimum acceptable flows and water quality standards. These two critical variables will set the conditions for water abstraction and disposal for each industrial user. These two criteria will be set by the NRA in the light of the needs of other users and interests, taking into account environment considerations. For the first time, a statutory duty to 'further' the interests of amenity and nature conservation will be built into standard setting and enforcement. This means that environmental quality standards, and emission controls, will have to reflect the natural capacities of rivers and water courses for maintaining a productive and ecologically healthy wildlife.

It is too early to tell how effective this new arrangement will prove to be, since the consultative process has barely begun, and the final determination will be made by the Environment Secretary in 1992 and beyond. Points to watch out for will be how far industry will be able to argue that the cost of meeting BATNEEC coupled to the 'furthering' clause could be prohibitive and possibly commercially disastrous. That will be the time to consider the outcome between economy and ecology on a narrow front. Certainly this is the first time that an independent regulatory agency (the NRA) has been required to take into account the views of legitimate environmental protection interests in the critical areas of standard setting and licensing of individual discharges.

Both the 1989 Water Act and the 1990 Environmental Protection Act will also establish new arrangements for publicising air, water and waste discharge licence conditions and actual emissions to the full glare of scrutiny by outside parties. Up till now industrial waste discharges have been secret, even to the point where the fine for disclosing unauthorised information has been greater than the penalty for violating an effluent licence [3]. However, these secrecy days are on the wane, though they are not eliminated. It will still be awkward for third parties to gain access to all relevant information on particular discharges, and it will still be very difficult for interested parties to be knowledgeable about the degree of compliance, since this will be based on a complicated sampling regime that will require specialised knowledge to unravel.

In the area of waste management, the 1990 Environmental Protection Act has split the regulatory responsibility for waste treatment, from the actual collection and disposal of waste material. Furthermore, it has placed a 'duty of care' on all industry to ensure that when they are disposing of waste, or

passing their waste to a specialised agency for disposal, that they can prove that the material will be disposed of in a manner that shows that they have taken all reasonable steps to prevent illegal treatment of waste. How far this onus of reasonableness can be carried by individual industry requires clarification. Industry awaits a much more simplified code that can be operated via the BATNEEC provision. So for what constitutes 'best practice', we shall have to wait and see [15].

At present the Department of Environment is running into much difficulty over its proposals for what constitutes a duty of care because the concept is still too untested. It maybe necessary to run a few pilot schemes to try out the operationality of the idea. To begin with the duty will probably lie more with waste handler than with the waste originator. Over time, especially as the environmental auditing process begins to bite, the waste originator will be forced to accept a greater share of liability.

In short, industry now has a statutory responsibility to care for waste from the point of creation (the cradle) to the point of disposal (the grave) and to show that it has exercised this responsibility when conducting its business. This is an important step forward as it places the onus of proof in industry to show it has followed best practice, not on the regulatory agency, or the intervener pressure group to show that it has not. The new county waste regulatory agencies are to be strengthened and made more independent so that they can oversee the management of waste in a more detailed manner. Again it is far too early to tell just how effective all these new arrangements will prove to be, because they came into force in April 1991, but at least an important new principle has been established.

The 1990 Environmental Protection Act also gave statutory force to the amalgamated regulatory agency established in the Department of the Environment in 1987. This is Her Majesty's Inspectorate of Pollution (HMIP) an amalgam of the 'scheduled works' inspectorates in air, water, waste and radioactive emissions within the Department of the Environment. The Act creates a new class of scheduled works for integrated pollution control (IPC) of which there will be some 500. IPC involves the application of a new approach to 'all round' regulation, known as best practicable environmental option (BPEO) [10]. Unlike BATNEEC, BPEO has no statutory force. It is an idea created by the independent Royal Commission on Environmental Pollution designed to coordinate emission limitation across air, water and land into one unified, and least environmentally damaging strategy (Table 2).

This, at least, is the principle and the objective. In practice BPEO is all but impossible to achieve. It involves computations of emission comparability that cannot be identified either in technical nor in economic terms. A pilot study carried out by HMIP took 200 person hours and was still only partially successful.The IPC firms all involved specialised processes that result in

TABLE 2

Summary of steps in selecting a BPEO

Step 1: Define the objective
State the objective of the project or proposal at the outset, in terms which do not prejudge the means by which that objective is to be achieved.

Step 2: Generate options
Identify all feasible options for achieving the objective: the aim is to find those which are both practicable and environmentally acceptable.

Step 3: Evaluate the options
Analyse these options, particularly to expose advantages and disadvantages for the environment. Use quantitative methods when these are appropriate. Qualitative evaluation will also be needed.

Step 4: Summarise and present the evaluation
Present the results of the evaluation concisely and objectively, and in a format which can highlight the advantages and disadvantages of each opinion. Do not combine the results of different measurements and forecasts if this would obscure information which is important to the decision.

Step 5: Select the preferred option
Select the BPEO from the feasible options. The choice will depend on the weight given to the environmental impacts and associated risks, and to the costs involved. Decision-makers should be able to demonstrate that the preferred option does not involve unacceptable consequences for the environment.

Step 6: Review the preferred option
Scrutinise closely the proposed detailed design and the operating procedures to ensure that no pollution risks or hazards have been overlooked. It is good practice to have the scrutiny done by individuals who are independent of the original team.

Step 7: Implement and monitor
Monitor the achieved performance against the desired targets especially those for environmental quality. Do this to establish whether the assumptions in the design are correct and to provide feed-back for future development of proposals and designs.

Throughout Steps 1–7: Maintain an audit trail
Record the basis for any choices or decisions through all of these stages; i.e. the assumptions used, details of evaluation procedures, the reliability and origins of the data, the affiliations of those involved in the analytical work and a record of those taking the decisions.

Note: The boundaries between each of the steps will not always be clear-cut: some may proceed in parallel or may need to be repeated.

awkward pollutants where particular care should be given to precaution, waste minimisation and best management practice. HMIP are issuing a series of IPC notes which will become the guide-lines for best industrial practice in all key areas of materials management and abatement processes. It will be 2 years before the notes are fully in force.

THE IMPACT ON INDUSTRY

The combination of powerful European Community water and air directives, with even more ambitious directives on waste transfer and wastewater to come [17], together with recent legislative changes strengthening the independence of the regulatory agencies, has altered industrial pollution practice in the UK. How far this is the case is difficult to determine as official figures of industrial discharges are not available. The industrial trade associations claim that general industrial practice has improved considerably since the onset of 'green capitalism' [18] over the past 3 years. This is true for the major companies and the trade associations. Recent conferences have shown a strong degree of responsiveness amongst industrialists to take environmental matters formally into management [19].

Despite clear evidence of self regulation and responsiveness to a new regulatory regime, British industry still has some way to go. A recent survey by an independent analyst [20] found that fewer than a quarter of UK firms have any specific policy towards improving the quality of their environments other than meeting regulatory requirements. Less than a fifth have developed a comprehensive code of ethics towards the environment, or a duty of care towards the consumer. The vast majority still do not put environmental protection matters in the hands of senior management, or a practical and experienced official with direct access to corporate level decision making. This evidence suggests that few British firms are yet taking their environmental responsibilities as seriously as the new political climate is demanding, and that only a very small number have begun to incorporate best practice into the total application of management.

Another survey (also in Ref. 20) found that only 46% of UK firms had a board member responsible for environmental management compared with 80% in Denmark and 66% in West Germany. The same survey found that no UK firms specify, or even ask about the environmental performance of their suppliers. Yet 38% in West Germany and Luxembourg, 60% in Belgium and 80% in Denmark do so. These results suggest that the onset of the Single European Market will exert a stronger environmental pressure, notably on performance standards and labelling, than presently envisaged by the majority of managers.

WHAT NEEDS TO BE DONE

What will change this will be the tough application of the precaution principle, better financed and resourced regulatory agencies, and a degree of policy independence between regulation and government itself? These are all highly contentious areas. The opening up of a schism between the client and the regulator has begun to reveal a genuine capacity in British pollution regulation of competence and independence combining effectively to force improvements in industrial practice. This separation of powers needs to be placed on a proper statutory footing so that all regulators have the necessary powers to set standards, issue discharge licences and enforce regulations, free of political pressure, in the full view of public scrutiny.

These are long-term objectives. What needs to be done to encourage industry further in the foreseeable future? Three developments are significant here. One is the pace set by the major oil, chemical and engineering consortia to establish codes of good practice which they will publish and make available to member organisations. The second is the growth of environmental accountability in the newly privatised industries — notably gas, oil, electricity, water and telecommunications. The third is the steady increase in employment of scientifically trained young managers who will have an important responsibility for educating the workforce and creating a positive corporate environmental image. Forthcoming Euro directives on labelling, auditing, rights of access to information and cross-border waste disposal will also help.

Ultimately the requirement in the UK is to establish all regulatory agencies on a quasi independent basis, separate from the financial controls of Treasury. This would make them free to recruit and promote according to requirements and their own codes of practice. At present the agencies are largely the creatures of civil service policies in financing, salary scales and career pathways. At a time when the private sector is eager to poach an experienced inspector by offering up to twice the salary, the very best and most experienced are tempted to leave. Already four senior officials have departed from the HMIP and more are on their way. Morale is low, particularly in HMIP. Staff morale could also fall in the NRA and the new county waste executives if the very contentious issues of salary scale and career prospects are not rapidly resolved.

The government is clearly mindful of this dilemma. Despite the general restrictions on public sector spending reflecting the political imperative to control inflation, the staff complement of HMIP has been increased from 223 to 305, with the starting salary of a junior inspector raised by 18%. The budget for the NRA has also been increased by a percentage greater than the retail price index increase, though the new total is still below the minimum figure requested by the NRA to meet is new responsibilities.

These are hopeful signs, though they do not solve the government's dilemma. Waiting in the wings is a proposal to separate HMIP into an independent agency with the freedom to run its own financial and management affairs [21]. This is an important first step towards an inevitable establishment of a comprehensive environmental protection executive in the UK [22].

At the local authority level, environmental health departments are much more understaffed and under-resourced. This means that monitoring of environmental conditions is patchy and discontinuous. For the most part, monitoring only takes place following complaints by the local public of nuisance in the form of smell or dust or fumes. This is hardly proactive, and not conducive to good working relations with industry. There are simply too few officers on the ground to fulfil the necessary surveillance requirements expected of them by the new rules and regulations. Dependence on industrial self policing is an unstable basis on which to develop adequate regulatory enforcement.

The government is contemplating a system of charging for the authorisation of a licence based on the principle of cost recovery. This will apply to the NRA and HMIP, it will also be levied by the private water companies, and it may also be introduced at the local government level. The principle of cost recovery is designed to offset the public sector cost of running the agency. It is not a pollution charge as such. There is much debate in Britain about the introduction of incentive charging into regulatory practice [23]. This would be used both to improve the effectiveness of compliance and the efficiency of the control process itself. Meeting inflexible targets, firm by firm, is not the most cost effective way of limiting pollution.

Incentive charging tied to the quality of the environment and the scope for firms to clean up through tradeable permits is still some way off in Britain. At present there is no enthusiasm for it in Treasury nor in Cabinet. The Government policy paper on this topic [22] failed to endorse even an experimental scheme in explicit environmental charging. Instead it published various options in the form of an appendix without comment as to their practicability. It will require another election and some confidence over the handling of the economy before incentive charging takes hold in the UK. When it does the accountability of the regulatory agencies both to industry and to the public will be all the greater.

Therefore it looks as if the 'polluter pays' principle will be delayed for some time to come, and so far as specific pricing measures are concerned. Of course, effort to meet the conditions of a licence require costs, and for the time being, this will be the polluter paying. But this is rarely an efficient, nor a cost effective approach.

CONCLUSIONS

The regulation of environmental protection is undergoing a transforma-

tion in the United Kingdom. This is spurred by the demands of European Community environmental directives, and by changes in policy within the British government. This policy shift has led to a more technology forcing approach to regulation, greater emphasis on charging for environmental protection, more access to information, and a more independent regulatory regime. In addition, industry in general is undertaking a more positive attitude to environmental protection and, in some cases, has adopted a tough self regulatory role.

The United Kingdom provides a good example of how Community wide environmental policy dominates national effort. Certainly in the case of air and water pollution control, so far less so in the area of waste management, directives emanating from Brussels, and agreed to by UK environment ministers, control subsequent UK policy [1].

Industrial emissions in the UK are currently being reduced by a combination of the toughening of the existing regulatory regime, and a heightened sense of environmental and corporate responsibility by industry itself. This self-regulation is to some extent policed by the major trade federations, who realise that they should get their members in order, or even more stringent and less acceptable regulations might follow. But the overall record of British industry, while improving, is still unsatisfactory compared both with public expectation and regulatory standard setting. This is because the style of regulation has been too conciliatory to industry in the past, especially at local government level. It is also an outcome of the under-financing of the regulatory agencies, both in terms of manpower and monitoring equipment. This financial restriction of the regulatory agencies has not been reversed, yet new legislation expects of them a far more aggressive policing regime. Much emphasis is being placed upon the 'good neighbour' attitudes of industry, most of which are now well aware that good environmental practice is good for image, investment and commercial profitability. Future years should see a general improvement of industrial performances, most especially in the waste disposal sector, but much more still needs to be done by almost all industry for performance to meet public expectations.

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