CORPORATE RESPONSES TO EUROPEAN ENVIRONMENTAL LAW:

THE CASE OF THE WATER INDUSTRY AND

THE DRINKING WATER DIRECTIVE

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Abstract

The paper considers the response of water supply companies to Council Directive 778/80/EEC on the Quality of Water Intended for Human Consumption, both in terms of corporate compliance and lobbying activity. It outlines the results of a documentary review and interviews with industry representatives, policy makers, water regulators and environmental groups in the UK. It identifies the processes of lobbying and negotiation between firms and policy makers during the formulation, implementation and subsequent review of the Directive and examines the implications of the Directive in terms of corporate strategy and the resultant costs of compliance on the supply of water services.

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1 INTRODUCTION

This paper is the result of research carried out into the ways that companies influence and respond to rule making in the single European market. The research is funded by the Economic and Social Research Council (research grant no. R000233673) as part of a wider project entitled 'The Role of the Firm in the Evolution of Rules for the Single European Market'. The approach adopted is by case study of different types of European regulation and their impact on a variety of industries. It seeks to identify the processes of lobbying and negotiation between firms and policy makers which underpin the formulation, implementation and subsequent review of European law. It is a study of both of corporate compliance and of lobbying activity from a UK perspective.

Previous case studies within this programme of research have dealt with the effects of new technical standards on the machine tool industry (Matthews and Mayes, 1992), taxation and accounting standards on the leasing industry (Matthews and Mayes, 1993), opening hours restrictions and recycling laws on the retail sector (Matthews and Mayes, 1994), and European employment law on the construction industry (Matthews and Pickering, 1995).

The focus of this paper is on environmental management. Clearly a wide range of manufacturing and service industries give rise to environmental impacts (see for example European Environmental Agency/Dobris Report, 1995) and concerns about their effects are expressly articulated through public and political channels (United Nations, 1992). Our focus here is on the question of the quality of water supplies intended for human consumption - ie. drinking water, on which the European Community (EC) introduced Directive 80/778 on Drinking Water Quality - and in 1995 began a process of review and amendment to that Directive with the publication of Commission proposal COM(94) 612 final on 4th January 1995. Within this framework of rule making, our particular concern is with the control of pollution caused by pesticides (although nitrates and lead are also important sources of contamination of drinking water). The main focus of the research reported here is the implementation of Directive 80/778 in the UK and the response of the UK industry through compliance strategies and corporate lobbying activities.

The research has been primarily conducted through a combination of documentary review and an extensive interview programme during 1995 with water regulators, policy makers, the water supply companies, representatives of the pesticide manufacturing industry and environmental groups in the UK. Whereas water and sewerage services in Scotland continue to be provided by local authorities and in

Northern Ireland under the supervision of the Northern Ireland office, the situation in England and Wales since 1989 has been influenced by the privatisation of the water industry. It is the impact on the situation in England and Wales with which this paper is concerned.

The Water Act 1989 (now amended by the Water Act 1991) set up ten privatised regional water companies in England and Wales to provide drinking water and sewerage services, with a further 29 smaller companies (now reduced to 21) providing drinking water, but not sewerage services. The Act set up the Office of Water Services (OFWAT) as economic regulator to protect customers from high prices and poor service and the National Rivers Authority (NRA) as environmental regulator with responsibility for surface and groundwater quality. In 1990, the Drinking Water Inspectorate (DWI) was formed to ensure the quality of drinking water supplies. (From April 1996, the NRA, together with Her Majesty's Inspectorate of Pollution (HMIP) have been incorporated within the new Environment Agency). The regulatory regime in England and Wales thus separates environmental from economic regulation.

2 THE PROBLEM OF DRINKING WATER QUALITY AND PUBLIC PERCEPTIONS OF WATER QUALITY

Under natural conditions, sources of drinking water possess few chemical properties likely to have an adverse effect on human health. Yet, one consequence of modern economic life has been the dramatic increase in residues of chemical substances, particularly nitrates and pesticides, in drinking water supplies. This is attributable to such factors as the use of pesticides in farming as an aid to increasing crop yields; the use of pesticides as weedkillers by leisure organisations and public bodies such as local authorities, Railtrack and the Ministry of Defence (MoD); and incautious procedures for the disposal of unused pesticides which may allow them to leach into aquifers.

The pesticides which are most commonly found in high concentrations in sources of drinking water tend to be the herbicides Atrazine, Simazine, Diuron, Isoproturon (IPU) and Mecoprop. Some of these at least, for example Atrazine, are recognised as having carcinogenic properties. The extent to which pesticides are a problem in a particular geographical area depends on a variety of factors, notably rainfall levels, the geological composition of the main water aquifers and the extent to which cereal farming predominates (as opposed, for example, to dairy or upland livestock farming).

When rainfall is heavy, pesticides are washed into surface water (rivers, streams, lakes and reservoirs) often within a matter of hours after spraying or dumping. In such cases the pesticides will tend to disperse. In contrast, pesticides accumulating in the groundwater system may remain for up to thirty years, though their presence may not be initially identified. With heavy rainfall in a groundwater system containing cracks and fissures the pesticides may enter the system rapidly, though in other cases they may be removed by contact with the soil before they reach the underground source.

In England and Wales 33% of drinking water supplies are extracted from groundwater, with the remaining 67% taken from surface water sources. However, the proportions vary dramatically between the regions. In the Thames region, 75% of drinking water is taken from surface water sources, while in Wessex and Severn Trent some 70-80% is taken from groundwater. Consequently, the problem of pesticide contamination and possible responses to it will vary. More attention is required in areas where surface water supplies predominate due to the potentially greater risk of pesticide contamination. Attention to groundwater sources is only appropriate because of the longer clean-up times for underground supplies, but concentrations of pesticides found there are likely to be lower.

Public awareness of the implications of pesticides residues in drinking water first came to prominence in the UK in the 1960s when the carcinogenic properties of DDT were officially acknowledged. At about the same time Rachel Carson's *Silent Spring* (1962) highlighted the concern that "what we have to face is not an occasional dose of poison which has accidentally got into some article of food, but a persistent and continuous poisoning of the environment". More recently, in 1994, the long-term implications of pollution for drinking water quality in the UK were highlighed by *Cambridge Water Co. v Eastern Counties Leather plc*[1], where a chemical used in tanning (perchloroethene) was found to have percolated down into groundwater after having been spilled over a number of years prior to the implementation of Directive 80/778[2].

Consumer expectations and requirements for high quality drinking water have been strongly emphasised with, in some cases, particular stress on the importance of achieving zero pollution, though as we shall see the interpretation of this criterion has not been consistent. Evidence on recent consumer expectations regarding water quality in England and Wales, contained in a research report of a survey of more than 3600 households conducted by MORI for the water regulator (OFWAT), illustrated the importance attached to water quality by the general public. The report showed that the main priorities amongst water consumers were: safety to drink (98% regarding this as essential or very important), pleasant taste (96%), absence of smell (95%), water that is clear and colourless (91%). However, while 66% reported that they were satisfied with both the safety and quality of their drinking water, 20% were dissatisfied with its safety and 26% were dissatisfied with its quality. Particular criticisms tended to relate to concerns about smell, taste, chemicals and pollution. The proportion of dissatisfied customers tended to be highest in the East, South West, Thames and Wessex regions (MORI, 1992).

Consumers were also asked about their perceptions of priorities for areas of improvement in water quality and the ways in which they would allocate £100 to be spent on alternatives. The top priorities indicated on this basis are set out in Table 1 below.

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[1] [1994] 2 AC 264.

[2] In the *Cambridge Water Co.* case, at first instance Kennedy J would not accept that those responsible for past spillages could be have foreseen the development of higher water quality standards in the future, and their past acts could not be considered wrongful simply because present knowledge and standards show the risks involved.

Table 1 Customer Priorities to Improve Water Quality (England & Wales)

Priority	Proportion Mentioning	Allocation from £100 for this Priority
	%	£
Better sewerage treatment to improve river cleanliness	55	19
Better sewerage treatments to improve cleanliness of sea water bathing areas	52	18
Improving the quality of tap water	50	20
Replacing old mains and sewage pipes	49	18

Source: MORI (1992)

Consumer requirements for high drinking water safety and quality cannot be satisfied without actions to deal with the problems of the pollutants. Although (see next section) there are a variety of means of addressing this problem, it is almost inevitable that higher costs and charges will ensue in one way or another. The MORI survey showed that over 50% of respondents expected water services charges to rise by more than the rate of inflation over a ten year period and very few expected charges to rise by less than the general rate of inflation. However, while many consumers recognised the likely costs increases at a time when the privatised water supply industry in England and Wales was under greater public scrutiny, only 9% expected the increases in prices to be attributable to improvements in tap water quality, while 7% specifically mentioned the cost of meeting EC directives as the reason for their expectation of above average price increases (MORI, 1992). The consumer preference for improved water quality was not, therefore, linked to an expectation that prices would necessarily rise as a result. Nor did consumers anticipate that EC directives designed to improve the quality of water would be main stimulus for new investment and higher water supply costs in England and Wales. However, the reality was that the options chosen for improvements in the management and control of water quality in England and Wales, in compliance with Directive 80/778 on Drinking Water Quality, in fact directly influenced the increases in water prices that were experienced in England and Wales during the first half of the 1990s. The task for water supply companies in England and Wales has, therefore, been to reconcile the need for improvements in water quality with consumers' reluctance to pay for these improvements via higher water charges.

3 OPTIONS FOR THE MANAGEMENT AND CONTROL OF WATER QUALITY

It is widely recognised that one of the key functions of water supply companies is the supply, to the public, of drinking water that is safe, wholesome and aesthetically pleasing, especially in respect of taste and smell (see, for example the report prepared by the European Federation of National Water Suppliers, EUREAU, 1991). However, there are various means by which this may be achieved. In this section we consider three broad categories of policy: controls on the use of pollutants, the use of the price mechanism, and pollutant extraction measures. This illustrates that, while end-of-pipe clean-up solutions have been the primary method of ensuring safe, wholesome and asthetically pleasing drinking water in England and Wales, a number of other options are also available to the regulatory authorities and water supply companies. These options are capable of contributing toward a strategy to comply with Directive 80/778 by means other than the large-scale investment in water filtration plant that has been undertaken in England and Wales.

Controls on Pesticide Usage

The measures available here constitute forms of control on pollution at source, ie. where the pollutants are applied.

(a) Restrictive Licensing

Command and control measures are available to Environment Agency in the form of restrictive licensing of pesticides that give rise to particular exceedence problems. For example, since 3 August 1993, at the instigation of the Ministry of Agriculture, Fisheries and Food (MAFF) the use of Atrazine and Simazine has been banned on non-cropped land (domestic use was not affected by the ban). The force of this measure clearly falls directly on the users of the pesticides primarily farmers and also the pesticide manufacturers.

(b) Controlling Exceedence Levels: Through Catchment Management

Under the Water Act 1989, responsibility for enforcing pollution control measures has lain with the NRA (following the Environment Act 1995, now established under the Environment Agency) and since that time water companies no longer have powers to enter and inspect private property even where they suspect pollution is occurring. Five year catchment management plans have been drawn up for every area by the NRA, following consultations with all those concerned with the water environment - including local water supply companies, the agro-chemical manufacturers, farming and environmental groups. These plans provide an integrated strategy for ensuring that the quality of all water sources within a specified 'catchment' area is protected and, where possible, improved (National Rivers Authority, 1994). Each plan includes measures to monitor water quality and, where necessary, to reduce pollution from agricultural and non-agricultural sources. Where particular concerns over pollution from different sources are identified, the NRA may set up 'buffer zones' to prevent farmers spraying pesticides close to water courses. The NRA may also apply to MAFF to set up protection zones in which the use of certain substances is prohibited, as with the MAFF nitrate sensitive areas programme (MAFF, 1993) which restricts the use of nitrates during autumn and winter months

where there is a serious risk they would leach into water abstracted for drinking. The effects of this approach impact particularly upon the actions of pesticide users.

(c) Voluntary Self-Regulation

Non-statutory measures to deal with pollution problems at source by discouraging over-spraying or otherwise to minimise the use of harmful substances have gone some way towards improving the quality of untreated water. The water supply companies have been recognised as being influential in policy making by the majority of users, particularly through creating awareness of best practice in the use and application of pesticides (WRC, 1995).

Thames Water, with NRA support, has tackled the problem of the non-agricultural use of Atrazine by setting up arrangements with British Rail to advise on the use of less harmful substances. It has also enlisted the co-operation of local authorities in voluntarily restricting the use of Atrazine. Severn Trent has also used persuasion effectively with its 'Spray Safe' campaign, aimed at both agricultural and non-agricultural users of pesticides in order to encourage them to switch to less harmful substances. In liaison with the farming community it has also sought to encourage good farming practice through crop rotation, avoidance of spraying close to water courses or before rain is forecast. The NRA has also contributed to efforts to encourage voluntary adoption of environmentally acceptable policies on the part of pesticide users through the Code of Good Agricultural Practice which was developed jointly with MAFF and the National Farmers Union. This aims to encourage farmers to rotate the substances used and to avoid spraying during the autumn and winter rainy season.

The pesticide manufacturers are also acutely aware of the risks of pesticide overuse. The British Agrochemical Association (BAA), in conjunction with the NRA, has run the 'Think Water, Keep It Clean' campaign to raise awareness and encourage responsible use of pesticides by customers. It has also organised a national retrieval scheme for pesticides no longer authorised for use, such as DDT. There is however a wider question as to who should be responsible for financing collection and disposal of old and unused surplus pesticides. This remains unresolved.

Although the water companies are parties to a number of these voluntary initiatives, with Severn Trent in particular instigating the Chem-E-Safe campaign for good practice in pesticide usage, the onus for pollution prevention in this instance lies with the pesticide users and suppliers.

Market Solutions

(a) "The Polluter Pays"

In economic terms it is an appropriate resource allocation principle that the polluter should pay for the environmental damage that is caused or for the costs of removing that damage - ie. in this case by removing the pollutants in the water source. Indeed, the Single European Act in 1986 introduced this as a principle of policy making in European law (Article 130r (2)) (Weale & Williams, 1992). However such arrangements are not always likely to be practical. The considerable number of users of pesticides (individual farmers etc.) would make a taxation or charging system

difficult to implement and operate at that level. It would also not be possible to identify specifically those individuals or organisations who over-used or dumped pesticides into water sources. To impose a tax or 'shadow price' on the pesticides at source would raise major problems in determining the appropriate levy to impose. Furthermore, if policy-making is driven (as it is in this case) by the need to achieve a specified level of pollution avoidance, a market solution of this nature may yield an outcome which leaves an excess level of pollution even at the expense of higher payments by the polluter.

(b) The Law of Diminishing Returns

As a variant on the "polluter pays" principle, we may note the likely operation of the law of diminishing returns. This suggests that as increasing quantities of pesticides are applied to a given area, so the increment to crop output declines. There may therefore come a point at which the value of extra output is more than offset by the costs of the additional quantities of pesticide applied. While this may discourage farmers from continuing to increase the quantities of pesticide in use, it does not by any means guarantee that consumption will be constrained to the levels consistent with those required to meet the environmental quality constraints on pollution levels.

(c) Product Substitution

It may be possible to persuade farmers and other pesticide users to change their practices in order to use reduced concentrations of pesticides or to adopt less harmful substances with, perhaps, lower solubility. For example, Glyphosate is considered by the water supply companies to be preferable to Atrazine since it is biodegradable and therefore less likely to exceed permitted concentrations in water supplies. While such changes may be achieved voluntarily or encouraged by considerations of relative costs, such solutions may also on occasion prove to be expensive to the pesticide users. This may therefore give rise to pressure for financial compensation.

Pollutant Extraction Measures

If the measures to control the usage of pollutants are not adequate to ensure that they do not exceed permissible levels in drinking water, the remaining set of options relates to steps to remove the pollutants before the drinking water reaches the final consumer. These are known as "end-of-pipe" solutions. It is this type of solution that is the main focus of environmental policy on drinking water quality in the UK in the light of the Directive 80/778.

(a) Direct Controls on Exceedence Levels

Maximum exceedence levels are specified for individual pollutants and for a set of pesticides taken together. The quality of drinking water supplied to consumers is monitored against those standards. Where enforcement action for non-compliance with the specified standards is required, this is brought by the DWI against the water supply companies. As a consequence, the water supply companies have invested heavily in new treatment works and filtration processes, with particular emphasis on granular activated carbon adsorption procedures which remove pesticides during filtration. In addition, some companies have invested in ozone treatment equipment which breaks down pesticides into smaller molecules which are then absorbed during

carbon filtration. This has the effect of improving the taste and odour of the water and reduces the need for chlorine treatment.

This system of pesticide pollution control takes the responsibility well away from the original polluter. It places the solution on a cure for the problem rather than its prevention, though as we have already noted the water supply companies are working with the up-stream producers and users of pesticides to reduce this problem. The consequence of the heavy investment required is to raise the price of drinking water to consumers.

(b) Product Substitution by Consumers

One alternative to supplying drinking water which meets rigorous toxicological standards might be thought to be to leave the consumer to purchase bottled water where the standards of tap water are not to the satisfaction of the consumer. This is not however a realistic option and would have adverse effects on poorer consumers. Furthermore, a recent report (Consumers' Association, 1995) found that bottled mineral water contained high levels of bacteria, tastes no different from filtered tap water, and yet costs up to 4000 times as much.

Comment

Given the potential presence of high levels of pesticides in drinking water, a number of policy instruments seem to be available to address the problem. Controls on the use of pesticides are a form of control of pollution at source which have had an impact in England and Wales through the restrictive licensing of Atrazine and Simazine, now banned on non-cropped land, through catchment management which provides an integrated strategy for ensuring that all water sources within a catchment area are protected and improved, and through voluntary self-regulation, raising awareness of good practice among pesticide users and encouraging responsible storage of surplus pesticides. Water supply companies, the environmental regulator and the agrochemical industry all have a part to play in preventive measures to minimise pesticide pollution. In terms of market solutions, the "polluter pays" principle enshrined in the Treaty on European Union has not been rigorously applied in this instance. The large number of pesticide users would make a charging system difficult to implement at the practical level, while it would also be impossible to identify those who over-used or dumped pesticides into water sources. It may be more realistic to expect the law of diminishing returns to take effect, whereby the cost of using additional quantities of pesticides discourages farmers from continuing to use larger quantities, particularly when the associated increase in crop output becomes negligible. Encouraging farmers to change their practices or use less harmful substances is also an option, but here lower crop yield would present a case for financial compensation to farmers. Such compensation has not been forthcoming in England and Wales in this instance.

Although controls on pesticide usage and market solutions have played some part in addressing the need for pesticide reduction, in England and Wales end-of-pipe pollution extraction measures have predominated. Water companies have invested heavily in new treatment works and filtration processes to meet the parameters for

water quality set out in Directive 80/778. The implications of these compliance costs for consumers' water bills is examined in detail in section 5 below.

In practice, if an environmental quality target is specified in terms of maximum permitted exceedences it seems unlikely that a full market solution will be appropriate. However restrictions on the use of the pesticides in the first instance or steps to remove them from the water before its final delivery to the consumer are available (and may of course be used in conjunction with each other). The latter case does however imply a shift away from the principle that the polluter pays and has a likely effect on water charges, whereas in the former case the impact will be on food prices, but may well be less direct.

A recent study entitled 'A Study of the Economics of Restrictions on the Use of Pesticides' undertaken for the Department of the Environment (WRC, 1995) investigated the likely economic impact of alternative means of ensuring that pesticide concentrations in drinking water comply with the standards laid down in the relevant legislation - the Water Supply (Water Quality) Regulations (SI 1989 No 1147). Two study areas were selected, reflecting a surface water catchment area and a groundwater catchment. The research demonstrated that without restrictions on the future use of pesticides, contamination in the sources of drinking water would continue for both types of catchment area. Having considered alternative control procedures and their impacts at various stages in the supply chain, it was concluded that protection zones were generally to be preferred, with restrictions in usage and product bans also considered useful. Sensitivity analysis showed that these conclusions were robust to variations in the assumptions adopted. This study did not however evaluate market, or end of pipe solutions. A study undertaken by Dr Ingo Heinz of the Institute of Environmental Protection at the University of Dortmund has however compared the cost of pesticide removal through water treatment as compared with the cost of prevention through water protection schemes, on behalf of DGXI of the European Commission (Institut fur Umweltschutz Universität Dortmund, 1995).

4 DIRECTIVE 80/778 ON DRINKING WATER QUALITY

Rule-Making

In the light of the public concerns over the use of pesticides, which translated into political pressures, the European Community member states, including the UK, adopted in July 1980 Council Directive 80/778/EEC relating to the quality of water intended for human consumption (hereafter Directive 80/778 on Drinking Water Quality)[3]. During the process of negotiating the terms of the Directive, the interests of the pre-privatisation water industry in the UK were represented almost entirely by the UK Government which supported the introduction of new rules. The terms of the Directive were unanimously accepted by the member states.

The Directive set minimum standards for the quality of drinking water, including 62 quality and health parameters for microbiological content, nitrates, pesticides and

[3] OJL 229, 30.8.80.

lead in water intended for human consumption or for use in food or drink. It also laid down guidelines for water quality monitoring. One of the most significant provisions in the Directive was the requirement that the maximum permissible concentration for any pesticides found in drinking water was to be 0.1 microgramme per litre and that the maximum concentration for all pesticides taken together was to be 0.5 microgrammes per litre. This was the first time that mandatory standards had been set. The reasoning behind the setting of this very high standard appears to have been that in the late 1970s the effect of persistent organochlorine pesticides (such as DDT) was receiving much adverse publicity. Since public pressure was for drinking water to contain no pesticides at all, the standard was set at the minimum concentration at which organochlorine pesticides could be detected by scientific analysis. At that time no pesticide concentrations in amounts smaller than 0.1 microgramme per litre could be detected in water, so the standard effectively became a surrogate for zero. Scientific uncertainty came to determine the range of policy options considered viable in the drinking water quality debate.

The standards provided a stimulus to improvements in drinking water quality throughout the EC. The Directive was of considerable significance in the UK in two respects. First, it redefined the underlying philosophy governing the importance of drinking water quality. Secondly, it marked a fundamental shift from negotiated to mandatory standards with a requirement for the use of standardised sampling procedures for the first time in the UK (Ward *et al*, 1995). Thus, in formal terms at least, there was a raising of standards and the establishment of formal enforcement provisions.

Implementation

In England and Wales the Directive was originally intended to be implemented by incorporating its requirements within the existing statutory obligation on water authorities and local authorities to provide wholesome water supplies. In September 1982 the UK Government sent formal notification of compliance to the Commission. The Department of the Environment (DoE) subsequently issued, for the industry, Circular 20/82 as guidance on implementation of the Directive, placing responsibility for its administration on the statutory water and local authorities and stating that "the Secretaries of State [for the Environment and for Wales] will regard compliance with the terms of the Directive as a *necessary characteristic but not a complete definition* of any water that is to be consider wholesome" (emphasis added) (quoted in Ward *et al*, 1995). At that stage the UK took the view that it was sufficient to achieve the EC's specified standards through averaging across a series of samples whereas the EC regarded the standards as absolute and not to be exceeded at all. It is now generally agreed that the UK Government initially interpreted the Directive in a way that was intended to minimise compliance costs for the benefit of its domestic water suppliers.

However, in 1986, Friends of the Earth lodged a formal complaint with the EC, claiming that the UK Government had not adequately implemented Directive 80/778 into national law, citing the continued high levels of nitrates in drinking water in England and Wales in support. In 1988, FoE lodged a similar complaint relating to pesticides and in 1989 the European Commission commenced legal proceedings against the UK under Article 169 of the EEC Treaty, for non-implementation of the

Directive, arguing that the Directive should be implemented by legislative means rather than by DoE Circular or similar administrative methods. In November 1992, the European Court of Justice found the UK to be in breach of its obligations to implement Directive 80/778 on Drinking Water Quality[4].

In fact, the ruling of the European Court of Justice referred to the UK's failure to implement fully the Directive prior to the privatisation of the industry in 1989. Formal implementation of the Directive had been achieved in the context of the privatisation of the water supply industry in October 1989 when the Water Act 1989[5] and the Water Supply (Water Quality) Regulations 1989 (SI No 1147)[6] set, for the first time in UK law, clearly defined drinking water quality standards. From 1989 onwards the UK has accepted the Commission's interpretation that the Directive sets absolute standards which all drinking water must reach. Under the Water Industry Act 1991, the obligation to provide water supplies which comply with the standard set out in the Water Supply Regulations 1989 passed to the newly privatised water companies, who produce annual monitoring results. The Drinking Water Inspectorate was established, as a small unit within the DoE, to enforce the provisions.

By 1989 the question of drinking water quality had become a political issue with consequences and cost implications out of all proportion to those originally anticipated when the UK Government voted in favour of the Directive in the Council of Ministers seven years previously. The opportunities to pass on the compliance costs to the new, privatised water companies in England and Wales became both politically and economically expedient. It is difficult however to avoid the view that the UK Government had underestimated the implications of the Directive.

Enforcement and Compliance

Under the Water Supply (Water Quality) Regulations 1989, statutory responsibility for monitoring the quality of drinking water supplies in England and Wales actually lies with the water companies themselves. They are required to monitor the quality of their own supplies by taking samples which are then made available for checking by the Drinking Water Inspectorate (DWI) and local authorities, who have duties under the 1989 Water Act to verify the self-enforcement and monitoring procedures used by the water companies. The water supply companies must also submit information on water quality to the DWI four times a year. The DWI undertakes an annual assessment of the information provided by the companies and cross-checks the validity of data by undertaking its own sampling on an *ad hoc* basis. The DWI then publishes an Annual Report on the quality of drinking water supplies (see for example Drinking Water Inspectorate, 1994). If a water company breaches water quality standards, the DWI may require an "undertaking" from the company that it will take remedial action within an agreed period of time. If water quality does not improve, the DWI may ultimately begin formal enforcement procedures to shut down a water company's treatment works for failure to provide wholesome drinking water

[4] Case C-337/89, *Commission v. UK (1993)* JEL Vol. 5, No. 2, 273.
[5] Consolidated by the Water Industry Act 1991 and the Water Resources Act 1991.
[6] Amended by the Water Supply (Water Quality Amendment) Regulations 1989 (SI 1384) and 1991 (SI 1837).

supplies to its customers, though this has not so far occurred. In most cases, the DWI will seek improvements in treatment. Local authorities play a relatively minor role in ensuring water quality, in most cases relying on the results of water companies and simply notifying the company if the results of those samples are considered "unwholesome".

The legal duties of the NRA (now the Environment Agency) under the Water Resources Act 1991 include an obligation to protect supplies to be used for drinking water. Water supply companies are required to notify the NRA where mandatory standards are breached. The NRA is then required to take "appropriate action" to minimise exceedences by tracing the source of pollution. This can be in one or more of three ways, NRA officers can:

- liaise with the water companies on action to be taken;
- request measures to restrict the issue of licences by the Pesticide Safety Directorate or, in the case of non-agricultural usage, the Health and Safety Directorate;
- co-operate with pesticide users by giving advice on issues such as using non-soluble substances or refillable containers.

The NRA views its role primarily in terms of persuasion and advice and is understood to be more enthusiastic about its advisory role than enforcement per se. In addition it monitors water quality in England and Wales, taking approximately 30,000 samples per annum, mostly from surface water (although this represents a minority source of drinking water supplies as compared with groundwater). The NRA actively looks for evidence of any of the 140 of the 450 pesticides for which authorisations have been given by the Pesticide Safety Directorate. It uses a computer modelling system to seek to identify potential problems and to produce national vulnerability assessments arising from the pesticides it finds. The NRA's ultimate powers under the Water Resources Act 1991 are to recommend to the DoE the establishment of water protection zones where it judges that the use of certain substances should be prevented outright. As a result of these steps, together with the compliance activities by the industry, pesticide levels are reducing and drinking water quality has steadily improved (see table 2).

Table 2 Compliance Levels 1990 and 1993

	% Water Supply zones Not Complying	
Water Treatment	**1990**	**1993**
Aluminium PCV	10.2	5.4
Nitrates PCV	3.1	2.0
Faecal Coliform PCV	12.4	6.4
Total Pesticide Parameter	14.6	11.9
Water Distribution		
Iron PCV	29.6	26.0
Manganese	9.7	6.9

Source: OFWAT (1993-94)

The attainment of the quality standards specified in Directive 80/778 on Drinking Water Quality is, in practical terms, highly dependent not just on the enforcement actions of quality regulators but on the compliance actions taken by the industry itself. In Section 3 of this paper, we gave a flavour of the various ways in which compliance might be achieved and indicated the range of measures which were, to some extent, in use.

However, the main compliance steps in the UK are those being taken by the privatised water supply companies to purify the water they supply before it reaches the final consumer. Under section 19 of the Water Act 1989, the water companies gave undertakings to the DoE setting out a timetable to install the water filtration plant deemed necessary to achieve compliance with the Directive. By giving these undertakings, the water companies were allowed a temporary six year derogation (from 1989) from the standards for drinking water quality set in the Directive. They were thereby effectively given exemption from their duties under the Directive over that period.

In February 1990, FoE formally challenged these undertakings and was granted leave to proceed with judicial review over the timetable for compliance with the Directive[7]. However, in October 1991, before the judicial review had taken place the Secretary of State for the Environment announced revised undertakings which had the effect of shortening the timetables in which pesticide levels in two regions (Anglian and Thames) should comply with the Directive. As a consequence, FoE did not proceed at that time but again challenged the revised undertakings in April 1992. This was decided by the High Court in 1994 which found that the Secretary of State had acted lawfully in accepting undertakings from the water companies to bring drinking water in line with the Directive over the duration of the revised timetable[8]. In complying with Directive 80/778 on Drinking Water Quality, the water supply companies have undertaken large-scale capital expenditure to install new filtration plant capable of removing pesticides from drinking water supplies, particularly using activated carbon filtration processes. In some cases, this is preceded by ozone treatment which separates certain pesticides from water prior to carbon filtration, so making the latter process more effective. Details of expenditures in the early part of the 1990s are set out in table 3.

[7] These proceedings followed a separate complaint to the European Commission by FoE regarding the UK's failure to comply with the Directive's limit values for nitrates in drinking water. This resulted in prosecution of the UK in the European Court of Justice in November 1992.

[8] R v. Secretary of State ex parte Friends of the Earth & another (Court of Appeal, Civil Division, 25 May 1995), reported in ENDS Report No 245 June 1995, 44. High Court proceedings reported at [1995] EnvLR 11 and CA *The Times* 8 June 1995.

Table 3 **Water Company Expenditure on Compliance Programmes 1990/91-1993/4** (at 1993/94 prices)

Water Treatment	**£m**
Water quality (nitrates)	128
Water quality (including pesticides)	1131
New obligations	103
Water Distribution	
Discoloration	492
Bacteriological quality	102
Communications pipes (including lead)	228
Other distributions	229
New obligations	34

Source: OFWAT (1993-94)

While the installation of new plant and equipment may not have been solely to remove pesticides but to improve the taste and odour of drinking water as well, it has been estimated that the total cost of new investment and the associated operating costs between 1989 and 1994 incurred by the water supply companies has been of the order of £1 bn. These costs are likely to flow through in the form of higher water charges to consumers. In addition, there is likely to have been some indirect impact on farmers from changes in the level and nature of pesticides which they have used in crop production. However, it seems this element may be relatively small, at least as compared with the investment expenditure by the water companies (WRC, 1995).

5 IMPACT ANALYSIS

Effect on Water Charges

Not only has the UK water supply industry needed to adjust to the formal requirements of the Directive 80/778 and other quality controls, it has also in recent years been affected by the privatisation of the industry and the consequent imposition of economic regulation in the form of price controls operated by the Director General of OFWAT, the regulatory body.

At an early stage in the development of the price control regime, tensions were identified between the expenditure requirements of water quality improvements and the need to exercise effective control over the prices charged. It was recognised that, in addition to meeting the funding requirements for quality and environmental improvements in water, the Regulator would need to have regard also to the effect on the customer and his willingness to pay for improvements, the effect which price controls would have on the return on investment to the supply company (and hence the shareholder's interest) and to the overall resource utilisation considerations of economy and efficiency. Since much of the improvement required in drinking water quality would involve capital outlays, in an industry where plant life is lengthy, the development of Asset Management Plans was an important element in developing

the necessary information flows on which the pricing consequences of the investment requirements imposed by the legislation could be considered.

In addressing the implications of the legal requirements for quality and environmental standards in setting the price cap, the Director General of OFWAT worked closely with the quality regulators and the water companies to establish mechanisms for identifying and managing legally enforceable environmental obligations[9]. In addition, a quadripartite group was established in which the Director General was able to discuss, with Government and the quality regulators, issues affecting the regulation of the industry.

An early stage in the process was the production of a consultative paper, *The Cost of Quality* (OFWAT,1992). Following responses on this, a report was made to the Secretaries of State [for the Environment and for Wales] entitled *Paying for Quality: The Political Perspective* (OFWAT, July 1993). In this the Director General warned that customers would not tolerate increases in water charges that were well above the general rate of inflation, although he feared that this could be the consequence of the new EC water quality obligations. He advised that the Secretaries of State should take into account the impact on customers' bills in the way in which they interpreted the EC Directive, and that they "should continue going as far as renegotiation of European standards where obligations and particularly the speed of their implementation, place an unmanageable burden on customers". As regards national obligations, he advised that consideration should be given to relaxing some of these and that they should only be imposed if they have been costed and if the Secretaries of State have concluded that they are consistent with consumer willingness to pay. This was criticised by environmental groups who accused the Director General of being concerned only with cost and ignoring customers' health, though this is an inevitable corollary of the separation of environmental from economic regulation.

In their response (*Water Charges: The Quality Framework* (October, 1993)) the Secretaries of State agreed the general principle that improvements in environmental quality should proceed at an affordable rate. The companies should manage their investment programmes at the lowest cost appropriate in the circumstances and the Regulator's concern to constrain the rate of price increases was supported. They agreed that new obligations should be focused on the most urgent matters, ".. we should resist spending billions to guard against insignificant or doubtful risks while neglecting other more important issues".

In his framework document for the 1994 Periodic Review (OFWAT, November 1993) the Director General reiterated the view that new quality and environmental obligations are a major driving force behind increased prices. He pointed out that decisions on those obligations are matters for the standard setters - Government and the EC - not OFWAT. While it is the Director General's job to ensure that when standards are set the Companies are able to finance them, he pointed out that the more expensive are the quality standard obligations, the less scope there is for other

[9] For a helpful review of the actions taken in this respect and other related matters dealt with in this section, the two reports by the Monopolies and Mergers Commission (MMC) on the price determination of the two water companies that appealed against the Director General's determination are particularly helpful (MMC, 1995 a and b).

improvements within an overall price cap that is at a level acceptable to customers. The Director General emphasised that it was his wish to see the water companies as service providers rather than actors seeking high price increases over the rate of inflation.

The price regime in this industry is that the allowable price increase is given by:

$$RPI + K$$
where
$$K=Q-X$$

In this formula:

- Q is a factor which meets the increased cost of mandatory improvements in drinking water standards and environmental quality levels as laid down by the Secretaries of State. In the case of the Director General's price determination for the industry as a whole for the period 1994/95 to 2004/05, the cumulative effect of the determination on this factor was +20%. On this, the Director General emphasised that he would have a marked reluctance to make future provisions for enhanced service standards unless there was clear evidence of customer willingness to pay for these enhancements.

- X is a factor to allow for the cost of maintaining current standards of water supply. On this, the Director General emphasised that it was his view that all water companies should be able to provide existing standards of service at prices below today's levels in real terms. In other words, the Director General was clearly looking for efficiency gains so that the value of X would be negative. In fact, for the water companies as a whole over the period 1994/95 to 2004/05, the weighted value of X was -11%[10].

Thus the overall ten year cumulative effect was, on average to allow price increases of 9% above the general rate of inflation (OFWAT, July 1994). So far as water services are concerned, the Director General commented that "increases in efficiency and a lower rate of return on capital will off-set much of the additional costs of higher drinking water quality, although some water companies will have to spend heavily to meet the stringent EC standards for the removal of pesticides". Certainly it appears that water quality improvements account for less of the increase in the K factor allowed by the determinations than sewerage improvements. Even the implementation of the 1991 Urban Waste Water Treatment Directive 91/271 had been substantially reduced by the Secretaries of State, so helping to minimise the financial impact in the UK of this particular European Directive.

So far as drinking water quality is concerned, the Director General reported that additional expenditure on improvements had been allowed within the approved price limits so that companies could comply with the drinking water quality regulations, or where the Drinking Water Inspectorate had confirmed the need to make further quality improvements. Over the ten years covered by the determination, the costs of

[10] For a more lengthy explanation of the price regime see Rees, R. & Vickers, J. (1995).

the quality enhancements for drinking water and waste water will amount to £3.9 billion at 1993/4 prices, with the greater proportion of this going on capital expenditures rather than operating costs, especially in the early years of the period. For these outlays, by March 2000, the Director General expects that companies will have achieved:

· construction of over 120 pesticide removal plants and 30 nitrate removal plants, in completion of the existing compliance programme;
· modification of over 70 water treatment works to reduce the risk of cryptosporidium entering the distribution system;
· fitting of treatment facilities at nearly 100 water sources to reduce lead take up from lead piping;
· renovation of over 25,000 kilolitres of water distribution mains (8% of the total system) to reduce problems of manganese and iron discoloration, polyaromotic hydrocarbons and turbidity.

In his review of the financial performance of the water companies 1993-94, the Director General commented that overall expenditure on the drinking water (and bathing waters) programmes was lower than originally provided for, due to some work being carried out at lower than planned cost as well as some slippage in the original programmes. At that time, as the Director General pointed out, there were still a further three years to run on the capital expenditure programme to achieve pesticide compliance. There is a risk that the water companies may have taken an unduly pessimistic view of their capital expenditure needs for compliance. Once the K factor is established this remains even if actual costs are lower, thereby allowing additional profits to accrue to the water companies.

Only two of the price determinations by the Director General in 1994 resulted in an appeal for review by the Monopolies and Mergers Commission (MMC). In neither case did the MMC fundamentally vary the determination previously arrived at by the Director General. Of particular interest in this case are the arguments put forward to MMC by South West Water Services Ltd (MMC, 1995 b). In particular, they argued:

· for higher levels of expenditure on the replacement of galvanised iron and lead communication pipes to be allowed in order to assist reduction in the problems of rusting;
· that proposed capital expenditure to improve water taste, odour and colour should not be treated as a discretionary expenditure or as directly dependent upon evidence of customer willingness to pay;
· that customers would be willing to accept, on average, an increase of 10% in their annual water bills in order to allow the achievement of improved standards of water quality and environmental improvement.

Given the criteria clearly laid down in advance by the Director General, it is not surprising that these arguments did not succeed. In the case of the Portsmouth Water Company, the arguments against the Director General's determination were more directly financial. However, it is relevant in our context to note that the MMC disallowed two proposed expenditures as not necessary either as required by law or to meet new legal requirements.

It has been widely held amongst industry observers that the UK water companies have been strong supporters of EC (and any other) water quality improvements since they expected that such improvement would necessarily be funded through price increases. Not only might this give rise to the prospect of some profit enhancement, especially if cost savings or other efficiency gains could be achieved, but the additional capital investment to be funded would strengthen cash flows through higher depreciation provisions and the balance sheet enhancement could well contribute to a stronger share price.

Thus we have here a situation where the domestic supply industry saw a potential financial benefit from EC legislation intended to enhance the consumer's interest. In effect, the compliance costs resulting from Directive 80/778 could be borne not by the pesticide users (predominantly farmers), nor by the water supply companies who have invested in new capital equipment capable of removing pesticides from water intended for human consumption, but by the final consumer. The full costs of compliance with the Directive could be passed onto the consumer in higher water bills through the determination of the K factor in RPI+K, which requires the Director General of OFWAT to take account of the increased cost of mandatory improvements in drinking water standards. However, the Director General of OFWAT, the Drinking Water Inspectorate and relevant Government departments appear to have been alert to this. While recognising the important link between price adjustments above the general rate of inflation and the justification of new capital investment, we find strong evidence of circumspection in relation to price determinations. This is particularly reflected in the reluctance of the Director General to approve expenditure for improvements that were not mandatory, the emphasis on examining evidence of customer willingness to pay for new enhancements and the recognition that EC policy may need to be challenged in order to avoid unnecessary and costly increases. Underlying some of this resolve is undoubtedly the question whether the standards which the EC is seeking to impose in relation to Directive 80/778 on Drinking Water Quality are based on valid scientific criteria or whether they might prove to be too severe, so possibly imposing additional treatment costs for no further consumer gain. Consideration is now being given to possible modifications to Directive 80/778 on Drinking Water Quality and we consider this in the next section.

Effect on the Manufacturers of Pesticides

Although the primary emphasis in UK compliance with Directive 80/778 has been in terms of "end of pipe" solutions, the pesticide manufacturers have contributed to the general effort to reduce pesticide pollution. In particular, as noted in the discussion of options for management and control (see Section 3 above) they have provided users with advice and training on safe usage and optimal quantities and have assisted with the disposal of unused pesticides.

The fear of the UK agro-chemical manufacturers is that the requirements of Directive 80/778 on Drinking Water Quality have given rise to additional costs in producing existing products, have increased difficulties in the development of new products and are tending to squeeze out older products. They also fear the adverse operation of the

free-rider problem in that, if the rules are applied more restrictively in the UK than other EC member states, this could encourage the location of research and development and of pesticide manufacture abroad.

Their greater concern is with the implications of Directive 80/778 for the establishment of a European system of pesticide authorisations. The 1991 Pesticides Authorisation Directive 91/414[11] introduced a two-tier system for the authorisation of products to be made legally available on the European market. The first tier (Annex 1 of the Directive) provides for full authorisation in each EC member state as a result of harmonised testing and certification procedures. The second tier (Annex 2) provides for provisional pesticide authorisations for up to three years as an interim measure. The testing and assessment criteria were set out later in the 1994 Uniform Principles Directive 94/43[12] to the effect that pesticides would only be authorised if they are in accordance with the standards laid down in Directive 80/778 on Drinking Water Quality. This was not welcomed by the pesticide manufacturers who argued that permissible levels of pesticide residues are higher in food than in drinking water. They advocated that the more generous level should be allowed in relation to drinking water also, as an aid to pesticide authorisation and new product development.

6 RENEGOTIATING DIRECTIVE 80/778 ON DRINKING WATER QUALITY: THE 1995 DRAFT AMENDMENTS IN COM(94) 612 FINAL

The Initiative

The initiative to seek comprehensive revision of Directive 80/778 on Drinking Water Quality seems largely to have come from the UK Government, which had consulted extensively with the NRA, DWI and the Water Services Association (representing the privatised water supply companies). In this it was also supported by the pesticide manufacturers and their trade association - the British Agrochemicals Association. The grounds on which the revision was advocated were the following: the maximum admissible concentration of pesticides specified in the Directive 80/778 (0.1 microgramme per litre) are out of line with scientific evidence now available, particularly that produced by the World Health Organisation (WHO) in the 1993 report *Guidelines for Drinking Water Quality*. Scientific standards for individual pesticides should now therefore be adopted; the costs of compliance with the 1980 standards exceed the benefits to health from complying with them. In the case of the UK, with its emphasis on "end of pipe" solutions, the effects of compliance on water charges to consumers were onerous; there is a risk that existing or new products currently under development which may have beneficial effects for agriculture may be lost simply because they breach a standard relating to their concentration in water which has no bearing on questions of health; allowable pesticide residues in foodstuffs exceed those permitted by Directive 80/778, thus suggesting that the Directive is of little relevance to human health.

[11] OJL 230, 19.8.91
[12] OJL 227, 1.9.94.

Support for these arguments came from a number of sources. The views of the Director General of Water Services have already been noted to indicate his concerns at the cost effects of inappropriately high pesticide exceedence level standards (OFWAT, July 1993). The UK water companies advocated revision of the Directive, based on WHO or equivalent guidelines and suggested that the cost burden of measures to prevent pesticide pollution should be placed upon pesticide users and manufacturers rather than the water suppliers (Water Industry Co-ordinator, 1994). In their report to the DoE, the consultancy organisation WRC commented that "the [maximum admissible] concentration is arbitrary: it has no scientific significance in terms of effects on consumers' health". It went on to argue that the economic impact of complying with toxicologically based standards would not be very different. Referring to the individual toxicological limits issued by the Department of the Environment (DoE, 1989) it commented that these follow the WHO recommendations. Generally these limits are above the 0.1 standards set in the 1980 Directive, so compliance with these would remove any economic impact, since the actual pesticide levels found tend to be less than the WHO guidelines. As an alternative approach, WRC argued for the adoption of protection zones and restrictions on the use of pesticides (WRC, 1995).

Negotiation

Procedurally, the first step to revision was taken at the European Council meeting in Edinburgh in December 1992, at which guidelines were agreed for reassessing the scope of some aspects of European law in the light of the application of the subsidiarity principle. In early 1993, the EC announced its intention to include the Directive 80/778 in the review of older EC measures.

In August 1993, the UK's permanent representative to the EC submitted a "non-paper" to the Commission's review procedure (UKREP, 1993). The key features of the argument in this paper were that: a revised Directive should not seek to deal with matters which are not essential to securing good quality drinking water; it should seek to balance the benefits for consumers with the likely costs of achieving prescribed standards - not only for water consumers but for other industries and activities that may be affected; the opportunity costs of heavy expenditures for limited benefit in one area should be assessed against the benefits of using the same resources to secure alternative environmental and health goals; most important, a sound scientific basis should be adopted for determining maximum allowable pesticide exceedence standards.

In pursuit of the argument for a scientific basis for pesticide controls, the non-paper advanced the argument that adoption of the 0.1 microgramme per litre maximum admissible concentration as the absolute maximum value for individual pesticides in drinking water in the 1980 Directive had resulted in unnecessary expenditures by the water supply and agricultural sectors. In its place, the adoption of WHO guidelines was advocated as being more up to date, reflecting current scientific and medical evidence and providing for wide margins of safety. The non-paper also proposed that the broad-brush approach adopted in the 1980 Directive should be dropped in favour of individual guideline values for each of the 34 most commonly found pesticides, for all of which WHO had provided guideline values. Where a particular pesticide is

known to create no risk to human health, it should not be included in the Directive at all. The non-paper proposed that the 0.5 microgramme per litre maximum admissible concentration for total pesticides in drinking water should be abolished since it does not reflect any toxicologically proven admissible limit for total pesticide concentration. The non-paper furthermore argued that, although the 1980 Directive specifies absolute maximum values and therefore requires targeting to achieve an average below the absolute maximum, the more generous WHO guidelines based on average ingestion would more accurately relect actual intake of pesticide residues contained in drinking water. It would be preferable to set the value on the basis of an average to be achieved over a period of time. The non-paper went on to argue that trivial exceedence of the maximum admissible concentration (or larger exceedences of only brief duration - in order to take account of seasonal variations) should not be deemed to have given rise to a breach of the requirements of the Directive, and that intervention by national enforcement agencies could be triggered where a specific number of samples failed to meet the standard, as exists, for example, in the 1979 Shellfish Waters Directive 79/923.

As we have already noted, the UK pesticide manufacturers and their trade association (the British Agrochemicals Association) supported the UK Government line. The manufacturers had a particular concern that, without change to Directive 80/778, they would suffer in the implementation of the 1991 Pesticide Authorisations Directive 91/414 which (through Annex 6, set down in the later Uniform Principles Directive 94/43) limits the approval of new pesticides to the extent to which substances are likely to breach the standards set out in Directive 80/778. The British privatised water companies were more ambivalent. While the paper by the Water Industry Co-ordinator was supportive, in other situations the Water Services Association tended to distance itself from the arguments on pesticide exceedences, seemingly reluctant to be thought to be advocating a relaxation in water quality standards. While the WSA provided toxicological evidence to assist the Government in its advocacy, it placed greater direct emphasis in commenting on proposals for new standards relating to maximum admissible concentrations of lead and boron in drinking water. To the extent that the necessary capital investments had already been made or approved and the cost implications for water consumers recognised, it may be concluded that the UK water companies no longer stood to benefit significantly from an adjustment to the pesticide provisions in the 1980 Directive.

Within the rest of the EC there seems to have been less support for change. The European Parliament opposed attempts to amend the Directive. Under Article 189 EC[13] the legislative procedure for adopting European Community environmental law[14] includes a second 'co-operation' stage whereby the Parliament receives a second reading of proposed legislation. This allows the Parliament considerable scope in formulating environmental directives and makes the Council accountable to the Parliament (Shaw, 1993). It was apparent to member state Governments that any proposed amendment to the 1980 Directive which would revise the 0.1 microgramme per litre standard for pesticide residues could lead to significant opposition from

[13] As amended by the Treaty on European Union.
[14] As defined under Article 130r(1) EC.

within the European Parliament and perhaps even to steps to annul the Directive itself.

Other EC member state Governments argued that, since the precautionary principle is enshrined in Article 130r(1) EC (inserted by the Treaty on European Union) there is no place for pesticides in drinking water at all if there remains any scientific doubt about their safety. Thus the 0.1 limit must be retained as a precursor to their total elimination. The German Government has taken the 1980 pesticide standard as indicating that there should be no pesticides at all in drinking water and sees this as a stepping stone to higher environmental standards generally, in which Germany is driving the "race for the top" - ie. to achieve higher environmental standards.

The German water companies were not in favour of change, taking the view that if they had to comply with strict water quality standards domestically, the rest of Europe should do so too and thereby help to create a "level playing field" for competition between the companies. The European Federation of National Water Suppliers - EUREAU - was encouraged by the British Water Services Association to establish a united front in favour of adoption of the WHO standards. However, WSA was not successful in this and EUREAU's position has been largely neutral, advocating that standards should be based on toxicological data but without a recommendation to vary the absolute maximum admissible concentration values from those specified in the 1980 Directive (EUREAU, 1991).

The European pesticide manufacturers through their trade association, the European Crop Protection Association (ECPA) are also believed to have been less supportive of change than the British companies and their association - BAA. The explanation for this seems to be that the BAA contains 11 companies all of whom are active in large scale research and development and who would expect to benefit from adjustment to the 1980 Directive on pesticide standards. In contrast, the ECPA is dominated by manufacturers of generic products for whom the standards of Directive 80/778 on Drinking Water Quality and, by extension, the implications of the Pesticides Authorisation Directive, are likely to be less pronounced.

On 23 and 24 September 1993 the EC hosted a conference in Brussels where interested parties presented their views on the 1980 Directive and the need for revision. The UK Government position remained in line with that set out in its "non-paper" submitted the previous month. However, this was opposed by Friends of the Earth who claimed that "a relaxation of the pesticide standard would be politically convenient for the UK because it would legalise the current situation whereby supplies to around 14.5 million people in England and Wales had exceeded the standard at times in 1992 [and] a total of 50 different pesticides have been detected in drinking water supplies during the last three years" (FoE, 1993). They argued against reliance on the WHO guidelines on the grounds that a degree of scientific uncertainty existed regarding the way in which degradation may create new compounds whose effects are not known and further that the effects of interactions between different toxic chemicals cannot be predicted. Their position was that no pesticides should be allowed in drinking water at all and advocated that all pesticides which exceeded the 0.1 maximum admissible concentration should be banned outright.

The 1995 Draft Directive

The European Commission published its proposal for a Council Directive to revise Directive 80/778 in January 1995[15]. This draft retains the 0.1 microgramme per litre maximum admissible concentration for each individual pesticide (and the same parameter for nitrates) in spite of the UK's attempts to replace the uniform standard with scientific parameters based on WHO assessments of risk to human health in the case of individual pesticides. A footnote to the Directive does however state that the Commission shall examine whether an individual value can be set for a given substance after an evaluation of available scientific information[16]. It also acknowledges the role of scientific expertise in refining the parameters, undertaking to review standards in the Directive at least every ten years in the light of scientific and technical progress (Article 14). The draft omits reference to the 0.5 microgramme per litre limit for total pesticides, which was generally considered to have little logic in toxicological terms. Furthermore, Article 10 (3) of the proposal specifically addressed the issue of trivial or infrequent exceedences which were raised in the UK's "non-paper". The draft states that if competent authorities consider non-compliance with parameters set down in the Directive to be trivial, or if remedial action is taken within a maximum of ten days, no breach of standards will be deemed to have occurred for the purposes of EC law. This provision will not apply, however, if parameters for any one substance have been breached on a total of 30 days or more during a 12 month period. Greater commitment to improving drinking water quality in other parts of the European Community is likely to be achieved by the provisions of Article 16 which require member states to publish annual reports on the quality of their drinking water and to send those reports to the Commission, which will publish a synthesis of results every three years.

While there appear to be some limited gains for the UK Government position in the 1995 draft, on both a short term and a longer term basis, the overall conclusion has to be that the UK Government has not succeeded in its primary objective of shifting the basis on which Directive 80/778 is specified. This is undoubtedly primarily attributable to opposition from other European countries, a lack of support from European pesticide manufacturers and water companies and to the opposition mounted to the UK proposals by Friends of the Earth. So far as pesticide concentrations in drinking water are concerned, it is apparent that the general position in Europe is not concerned so much with assessing the scientific evidence on the risks to health. Rather, it is clear that the 1980 Directive's 0.1 maximum admissible concentration level is now seen as a talisman indicating a commitment to excluding pesticides from drinking water altogether.

The water supply companies in England and Wales seem now to accept that there will not be change in the individual pesticides provisions in Directive 80/778 on Drinking Water Quality. Their attention now appears to be shifting more to the likely compliance costs resulting from proposals elsewhere in the new draft, with particular reference to the presence of lead in drinking water. Whereas the 1980 Directive allowed a maximum permitted concentration of 50 microgrammes of lead

[15] COM (1994) 612 Final 4.1.95.
[16] Annex I, part B, note 5 (3) of COM (94) 612.

per litre of drinking water, this is now reduced to 10 microgrammes per litre. It is ironic, in the context of the rejection of the WHO recommendations on pesticides, that this new standard reflects the latest WHO recommendations on lead.

Toxicologists consider the need to reduce lead concentrations in drinking water to be a priority area since this is held to constitute a greater risk to human health (particularly in young children and pregnant women) than pesticides. Replacement of lead piping in domestic dwellings (where 75% of all lead pipes are to be found) and mains supplies will be required if the new maximum admissible lead concentration is to be achieved. The Commission estimates that total compliance costs will be in the region of ECU 70,000 million and had proposed a 15-year implementation period in acknowledgement of the magnitude of the investment that would be required of national water suppliers in nearly every EC member state. If this is to be achieved in England and Wales, there will be many issues to be addressed, not least the question of who is to pay for the replacement of the lead piping within the domestic dwelling - ie. beyond the stopcock.

7 CONCLUSIONS

There can be little doubt that the quality of drinking water is a matter which arouses considerable attention and potential concern, especially where it is believed that it may contain undesirably high quantities of toxic substances. The EC's approach to regulating its quality through Directive 80/778 has given rise to a number of issues which are of general interest and relevance to our overall investigation into the effects of EC rule-making. We consider the main implications below.

The question of scientific standards When Directive 80/778 was introduced in 1980, the adoption of a maximum exceedence standard of 0.1 microgramme per litre of any pesticide in drinking water was treated, by some at least, as a surrogate for zero. In other words drinking water should be free of any pesticides. For others, however, it seems to have been accepted as an indication of a level of pesticide that could be allowed to remain without damage to public health and safety, in the absence of more incisive information.

Since that time, the World Health Organisation has published information on the risks attaching to pesticides in drinking water which offer a more incisive and informed scientific and medical assessment. The effects of this would be to allow some relaxation of the maximum acceptable concentration standards and more incisive variations in levels between pesticides. Despite the efforts of the UK Government to encourage the adoption of these informed scientific standards in the 1990 revised draft Directive, this was defeated by those who preferred to base their arguments on what others consider to be the emotional, unscientific, view that drinking water must be free of all pesticides. Thus, in this case, scientific and medical evidence has been discounted. The irony of this position is that pesticide concentration in foodstuffs remains higher than the permissible levels in drinking water and furthermore that within the self-same draft Directive on Drinking Water, WHO's scientific and medically based recommended standards have been adopted in relation to the setting of maximum acceptable levels of lead pollution.

It would appear therefore that the EC is inconsistent in its approach to the use of scientific data and the role of risk assessment in guiding policy making. In addition, its refusal to accept arguments for a standard based on an average exceedence level rather than a maximum for any pesticide and its unwillingness to allow trivial exceedences also suggest a non-scientific approach to questions of sampling and sample distributions.

Issues of environmental and economic regulation Economic analysis suggests that the optimal amount of pollution, as determined by the interaction of considerations of the incremental costs of further pollution reduction and the willingness to pay for such reductions, is not zero. Where health or other considerations lead to the view that "market failure" would give an inappropriate solution there is reason for intervention, through subsidy etc. In the present case, it is clear that Directive 80/778 on Drinking Water Quality is imposing an environmental quality regulation. The ways in which this may be responded to in economic terms would normally be considered to be that "the polluter pays".

However, in the UK this has not been the solution adopted. Rather, it is one that makes some use of voluntary self-regulation with a major response through the regulation of water charges proposed by the privatised water companies and on whom falls the burden of removing pesticide deposits from drinking water. This gives rise to a major responsibility on the regulator to review investment plans in the light of statutory obligations and to consider the price increase requirements in the light of those investment plans and the implications for the overall financial performance of the water companies. In approaching this, and notwithstanding the quality standards that are legally imposed externally to the water supply industry, it is noteworthy that the Director General of Water Services has sought to take into account evidence of consumer willingness to pay for greater water quality.

The very fact that economic regulation is important in this case is a consequence of a preference for "end-of-pipe" soloutions through water purification by the water companies. The alternative would be to encourage control of pollution at source through tighter restrictions on pesticide usage and perhaps the use of a systematic catchment management programme which would seek to ensure that water collected for human consumption was uncontaminated by pesticides.

The response of the UK corporate sector We should recognise here two different industry groups, whose responses, at least in the UK, appear to differ - the pesticide manufacturers and the water companies.

Pesticide manufacturers in the UK have clearly felt threatened by the Directive and also the implications which Directive 80/778 has for product approvals under the Pesticides Authorisations Directive. They fear that existing product lines would be placed in some jeopardy and that high standards of enforcement in the UK may drive their activities abroad. They have therefore strongly supported the changes to Directive 80/778 which the UK Government advocated. That they did not receive tangible support in this from all their European counterparts may be attributed to the greater orientation of those other firms to the production of generic products

(particularly in southern Europe) and to the different forms of pesticide control adopted in some other European countries.

The operation of Directive 80/778 has caused pesticide manufacturers to encourage responsible use of pesticides amongst farmers and other users. It is also likely that the Directive would have some bearing on the search for less toxic, and/or more efficient, pesticides that might substitute for those currently in use.

The UK water supply companies have initially benefited from some derogation as to the point at which the full environmental standards would be imposed. Although the burden of compliance falls particularly upon them, their response has, so far, not suggested undue concerns. It has been suggested that the reason for this is that the form of the price review offers a degree of protection to the water supply companies and that they are likely to feel able to pass on the additional costs to consumers. Further, it has been suggested that the requirements for additional plant investment may, by enhancing balance sheet values, give rise to an increase in market value for successful water companies.

These interpretations may offer a possible explanation as to the reasons why the UK water companies appear to have been lacking in enthusiasm for the UK Government's efforts to obtain significant revisions to the provisions of the Directive. The failure of the European water companies to support the initiative is probably attributable to the different forms of environmental quality control adopted which impinge less directly on the water companies outside the UK.

The role of pressure groups The formal consumer position, as reflected by survey research evidence, is that consumers were generally anxious to have high quality drinking water, that only a minority were particularly dissatisfied and that the willingness to pay more for higher quality was distinctly limited. As already noted, the force of this evidence was deployed by the Director General of Water Services to argue against unnecessary changes in quality standards that would give rise to price increases. As such, we may conclude that in this case consumer opinion was probably a force for change in the Directive along the lines advocated by the UK Government.

However, here we also see evidence of the role played by Friends of the Earth, first in relation to the UK's timetable for implementation of the Directive and then in opposing the UK Government's arguments for a scientific basis to be adopted, in a revised Directive, to the specification of maximum acceptable concentrations of pesticides in drinking water. They appear to have been very successful in this, though whether their actions have been in the best overall interests of consumers is a matter of individual opinion. What is noticeable is the use made by Friends of the Earth of concerns about scientific uncertainty as part of their justification for opposing the UK Government's proposals for revision.

The role of the UK Government The UK Government's involvement with Directive 80/778 does not appear to have been a happy one. It was slow to implement the 1980 Directive and initially appears to have given less than full effect to it. Whether this was by design - seeking to minimise the compliance costs falling

on a newly privatised industry, or whether it reflected a misreading of the real intent and implications of the Directive, is not clear. The industry believes the Government misread the intentions of the Directive and so "got it wrong" in its response. That it was able to pass on the compliance costs to the water supply industry was no doubt politically helpful and expedient.

The attempts in the period 1992-95 to effect significant change in the content of the Directive has been well regarded by the UK industry. However, despite the support of the UK's quality and economic Regulators, of the UK pesticide suppliers and evidence of consumer reluctance to pay higher prices, it is clear it faced considerable forces ranged against it, notably the European Parliament, other member state Governments and water companies. At best, it appeared to have the neutrality of the European associations representing the European water companies and pesticide manufacturers.

To some extent the case against a fundamental revision of the pesticide parameters in Directive 80/778 seems to have been on the emotional argument for "pure" water and hence an apparent unwillingness to take account of new scientific standards no matter how well grounded. The outcome for a revised version of Directive 80/778 is likely to be the retention of outmoded standards based on expertise which may have been state-of-the-art in 1980, but which have since been superseded by significant advancements in the accuracy of toxicological testing. On this evidence, the European Community policy process appears ill-equipped to accommodate subsequent advancements in scientific expertise into EC law.

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