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Dear Editor

**IMPLICATIONS OF DRAFT EC DIRECTIVE CONCERNING MUNICIPAL  
WASTE WATER TREATMENT - MEMORANDUM SUBMITTED BY THE NRA**

The National Rivers Authority today gave oral evidence relating to the Municipal Waste Water Treatment Directive to the House of Lords Select Committee on the European Communities.

Please find attached the full text of the memorandum submitted to the Committee.

Please ring me if you need any further information.

Yours sincerely

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DRAFT EC DIRECTIVECONCERNING MUNICIPAL WASTE WATER TREATMENT:MEMORANDUM SUBMITTED BY THE NATIONAL RIVERS AUTHORITYINTRODUCTION

1. This Directive has a number of primary objectives : to increase the collection of municipal waste water through sewers; to increase the fraction of such waters which receive treatment; to raise the level of treatment for wastes entering waters which require higher levels of protection; to phase out the disposal of sewage sludge to sea; to make the information relating to all such discharges available to the public; and to encourage Member States to assist each other in meeting such objectives. A central part of the Directive would be the imposition of fixed effluent quality standards.
  
2. Municipal waste water contains water from industry and urban run-off, in addition to waste of domestic origin. Its principal constituents are therefore organic material, ammoniacal nitrogen, other forms of nitrogen, phosphorus, fats, various metals, trace quantities of many other chemicals, plus bacteria and viruses. The principal reason for 'treating' such water is to remove those materials which, upon entering the receiving water, would use up the oxygen such that aquatic life would be 'suffocated'. Many other constituents of the waste water are also removed co-incidentally in the treatment process and, if necessary, specific chemical removal - or other forms of water treatment processes - can be incorporated into the overall procedures.

3. The draft Directive calls for all municipalities to be provided with collecting systems for their waste water; the NRA welcomes and supports this initiative. Approximately 96% of waste water in England and Wales is collected and disposed of, either through sewage treatment works which discharge to inland waters (83%), or directly into the sea (13%), by the ten Water Service Companies. The NRA would wish to see that all municipalities are connected to waste water services. Where discharges are made to inland waters, the waste water is first screened to remove grit and other materials; it then receives primary treatment, in which settlement of suspended solids occurs, and the supernatant liquid passes on to secondary, or even tertiary stages of treatment. Secondary treatment usually involves passage either through a 'biological filter bed' or an 'activated sludge process'. The purpose of both the primary and secondary treatment processes is to reduce the quantity of suspended solids and the level of biochemical oxygen demand (BOD) of the waste waters. Without such treatment processes, many of the rivers in England and Wales would be virtually devoid of fish life. Such treatment has not, in the past, been considered necessary for direct discharges to sea - except for some degree of screening - because the quantities discharged are not sufficient to reduce the oxygen content of the receiving sea water to an unacceptable level. Sewage treatment works currently produce almost a million tonnes of dry solids - in the form of sludge - per year, of which some 25% has also been disposed of to sea for the same reason.

4. It is important to appreciate that sewage treatment works are not designed to 'sterilise' the waste water. Municipal waste waters may contain several thousand million bacteria per litre and a substantial fraction of these, and of viruses, may be physically removed in the treatment processes. The majority of bacteria are harmless, but a few may be pathogenic - depending on the local human

population. Long sea outfalls were designed to remove aesthetically unpleasant materials - by the use of fine mesh screening - and to discharge the waste water sufficiently far from the coast that the organic material would be dispersed and most of the bacterial and viral contents would both die-off, and be diluted, such that the inshore waters would meet the requirements of the EC Bathing Waters Directive. As is well known, compliance with this Directive for marine beaches in the UK has been steadily improving as capital investment has been increased although, as the NRA stated in its evidence to the House of Commons Environment Committee Enquiry into the Pollution of Beaches, there are many other causes of bacterial and viral failure of the water at such beaches. These include storm discharges through short outfalls - which can to some extent be remedied - but also include less readily controlled sources, including those of natural origin.

5. The draft Municipal Waste Water Treatment Directive would certainly improve the quality of waste waters discharged into coastal and marine environments in some areas, although of itself it would not guarantee compliance with the EC Bathing Water Directive, for the reasons stated above. It should also be noted that the NRA has previously stated that it considers the bacterial and viral standards in the EC Bathing Water Directive have little epidemiological or scientific basis, although it believes that properly-derived standards should be developed and used.
6. To some extent a number of the proposals in the draft Directive have already been addressed as a result of a statement made prior to the third interministerial North Sea Conference; thus the NRA received a letter in June 1990 from the Department of the Environment which stated that it should adopt the following policy in relation to applications for discharge consents made under Chapter 1 of

part III of the Water Act 1989.

"a) for discharges of sewage effluent into relevant territorial waters (as defined in the Water Act 1989) with a proposed discharge flow in dry weather conditions of 1500 or more cubic metres in any period of 24 hours, a condition should be imposed which requires the effluent to receive before discharge at least treatment by a physical process involving settlement of suspended organic solids or equivalent process to reduce its solids content ("primary treatment");

b) for discharges of sewage effluent into coastal waters (as defined in the Water Act 1989) with a proposed discharge flow in dry weather conditions of 1500 or more cubic metres in any period of 24 hours, a condition should be imposed which requires the effluent to receive before discharge, at least both primary treatment and treatment by a process involving biological treatment with a secondary settlement (or equivalent process) to reduce its biochemical oxygen demand ("secondary treatment").

Where the NRA are minded to grant consent for such discharges of sewage effluent without imposing such conditions the NRA should inform the Secretary of State to give him the opportunity of deciding whether to direct the NRA to transmit the application to him for determination in exercise of his powers in paragraph 4 of Schedule 12 of the Water Act 1989.

The policy does not apply in relation to applications for consents to discharge sewage from any storm overflow. It also does not apply to reviews initiated by NRA of existing discharge consents, including deemed consents. The timetable for introducing

treatment of such discharges will be determined on the basis of investment programmes to be drawn up by the sewerage undertakers (paragraph 3 above refers). It is, of course, open to the NRA to apply stricter standards in individual cases where circumstances so warrant."

Suitable standards, and criteria relating to derogations upon which the NRA would wish to inform the Secretary of State, are currently being drawn up.

7. Finally, it should be noted that information relating to discharge consent and compliance in the UK is already available to the general public on the Water Act 1989 register - previously the Control of Pollution Act register - the appropriate sections of which are held at the appropriate Regional NRA Offices for England and Wales. The subject of consent and compliance for all discharges under NRA control has recently been thoroughly reviewed and a document - Discharge consent and compliance policy : a blueprint for the future, Water Quality Series No. 1 - is currently out for public consultation. (A copy is enclosed.) The following comments relate to specific objectives in the draft Municipal Waste Water Treatment Directive.

#### DISCHARGES OF MUNICIPAL WASTE WATER TO FRESH WATERS AND ESTUARIES

8. The draft Directive proposes mandatory secondary treatment for discharges from "population equivalents" of more than 2,000 to fresh waters and estuaries (note that, in the Water Act 1989, estuaries are included within the definition of 'coastal waters'). Almost all such discharges to rivers in England and Wales are already subject to secondary treatment, irrespective of their size. The principal benefit of the Directive is that it would ensure that minimum aesthetic standards obtain for all such

discharges; the use of such treatment would remove gross solids and non-biodegradable plastic and other debris. The draft Directive would also apply mandatory quality standards to these discharges. It is difficult to assess the implications of these standards, because the statistical interpretation as given in Table 1 of the Directive is ambiguous at present and requires clarification. The most likely interpretation of the concept of 'Maximum Daily Average Concentration' suggests that many sewage works in England and Wales would fail such maximum standards using present sampling regimes, including those works where remedial measures have been completed under existing investment programmes; demonstration of compliance would in any case be crucially dependent upon the numbers of samples collected. The frequency of sampling would also be important, because this will influence the basis of compliance; daily sampling is both impractical and unnecessary, and the scale of the monitoring operation should be in proportion to the size of the works, its expected performance, and the standards required to be met in the receiving water. (The application of on-line automated sampling practices is encouraged by the NRA, but could only be applied initially to large and significant discharges.) In some situations, however, a rigid application of these standards would be insufficiently stringent to afford the present level of protection to the rivers and associated fisheries. Thus it is essential that the Directive contains sufficient flexibility to introduce more stringent standards at a national level; these should reflect requirements of individual works as dictated by the desired quality of the receiving waters, in line with the Water Quality Objective approach of the 1989 Water Act.

9. The Directive does provide for an alternative to the Maximum Daily Average Concentration, via a concept of 'Minimum Percentage Reduction', for the control of effluent



quality from waste water treatment plants. Whilst superficially more attractive, the NRA believes that this is technically difficult to monitor, because of the problems involved with measuring the "strength" of raw sewage, and is thus unlikely to afford the level of confidence necessary for statutory regulation on its own. Furthermore, the NRA only monitors the effluent from a sewage treatment plant, not the influent; if the latter was to be monitored by the plcs, then this would result in two sets of data of different origin.

10. The NRA welcomes the opportunity to offer an alternative to the parameter of biochemical oxygen demand (BOD at 20°C), without nitrification, by using one for Total Organic Carbon (TOC) or one for Total Oxygen Demand (TOD). This is in line with the NRA's own views. The NRA would also urge the Commission to consider offering an alternative to the parameter of total suspended solids by one for turbidity.
11. Clarification is required as to whether the Directive will apply to storm sewage discharges. It is known that problems of pollution from these sources occur widely, and efforts are currently being made by the NRA to control such discharges by the consenting procedure, together with research into improved methods for reduction of their impact. Under present design criteria for sewerage networks, such discharge points are essential to prevent hydraulic overloading of the networks.
12. The Draft Directive proposes identical requirements for discharges into estuaries to those applying to rivers; these two environments should be treated separately. Some estuaries - particularly larger and more dynamic ones - can absorb sewage effluents, which are not subject to biological treatment, without adversely affecting water quality or indigenous or migratory fisheries. The principal exceptions are those estuaries which support

significant shell fisheries. Secondary treatment would certainly reduce the bacterial load entering the estuary and thus may improve the sanitary quality of shellfish; but it has again to be recognised that secondary treatment measures are not designed specifically to reduce bacterial and viral discharges. Thus it is necessary to consider the totality of treatment required for individual discharges in each location.

#### DISCHARGES INTO COASTAL WATERS

13. The Draft Directive proposes secondary treatment for discharges into coastal waters (defined in the Water Act 1989 as 'relevant territorial waters') from population equivalents greater than 10,000, except for those to "less sensitive" waters where primary treatment is acceptable as a minimum. The NRA believes that many UK open coastal waters can be categorised as "less sensitive" waters under the terms of the draft Directive, and that there will be no pressing requirement for mandatory secondary treatment, but this needs to be assessed on a case-by-case basis.
14. In its evidence to the House of Commons Environment Committee's Enquiry into Beach Pollution, the NRA did state that it would be prudent for all dischargers to reserve additional land at the headworks of new outfalls to allow for the installation of additional treatment, should this prove necessary if minimum levels of treatment were to be imposed by forthcoming EC directives.

#### DISPOSAL OF SEWAGE SLUDGE

15. The Directive will inevitably lead to an increased production of sewage sludge; the UK Government has already announced its intention of phasing out the sea route for disposal of such material. It is currently estimated that almost a quarter of a million dry tonnes of sludge are

disposed of to sea from England and Wales; further sludge will be created not only from the primary and secondary treatment of discharges to estuaries and coastal waters but from the upgrading of existing sewage treatment works. There will be an increased pressure for suitable alternative disposal routes, which will fall into three principal categories: incineration, land disposal, and agricultural spreading and re-use. Each of these options will involve a risk of some form of environmental damage or impact. Of particular concern to the NRA would be the possibility of leaching from land-fill sites into the surface or groundwaters. There will also be the need to take precautions to prevent the spread of pathogenic organisms, and the leaching of materials into surface or groundwaters if agricultural spreading is used. Inland waters are already under severe pressure in the UK from agricultural waste from livestock which is applied to the land, and from the storage of such wastes on farms. In each case other EC Directives apply, leading to a number of constraints which must be observed. A large increase in the construction of treatment facilities for dealing with sludge must also be anticipated. The NRA will be concerned to ensure that these treatment facilities are constructed and managed in such a way as to minimise their effect on the aquatic environment.

#### OTHER INDUSTRIAL DISCHARGES

16. The Directive seeks to apply the same constraints to certain direct industrial waste water discharges which are of a similar composition to municipal waste water discharges. The Directive is not specific as to the type of industries envisaged, which makes it impossible to comment in detail.

## DISCHARGES TO SENSITIVE WATERS

7. The Directive seeks to apply more stringent effluent standards to those discharges entering "sensitive" waters. In general terms, this would be consistent with current NRA policy of consenting discharges to safeguard the specific requirements of individual receiving waters; however, the requirement that these effluent standards must be more stringent than those identified for general application could be wasteful of resources and result in little environmental benefit.
18. The draft Directive identifies more stringent effluent standards, representing tertiary treatment to remove nutrients, for those discharges entering waters considered to be eutrophic. This is a blanket requirement irrespective of whether or not the effluents contribute significant quantities of nutrients compared with other inputs, such as diffuse run-off from agricultural land. The provision of nutrient removal in such circumstances would be very expensive and may have little effect on the level of eutrophication, particularly in areas subject to intensive use of fertilisers.

## OVERALL RESOURCE IMPLICATIONS

19. The draft Directive contains a requirement for monitoring and reporting which will fall to the NRA to administer in England and Wales. It is difficult at this stage to quantify the increases above what is currently being done or planned. In order to enable suitable reports for the Commission, it will be essential to ensure that this increased workload is properly resourced.

## DISCUSSION AND CONCLUSIONS

20. The NRA welcomes the initiative to bring European municipal

waste water discharges up to a common minimal standard, although it considers that the use of Water Quality Objectives is a more useful approach than that of 'emission standards' - unless the latter are a minimum requirement. As drafted, however, there are difficulties in understanding how the requirements of the Annexes could be applied at a technical level.

21. The NRA welcomes the opportunity to offer an alternative to the biochemical oxygen demand parameter by using one for either total oxygen demand (TOD) or total organic carbon (TOC), and regrets that the opportunity was not taken to have a turbidity value as an alternative to that for suspended solids.
  
22. The NRA believes that protection of the aquatic environment must take into account the full range of techniques which could be applied in relation to specific discharges into particular areas; this would include consideration of the use of disinfection or microfiltration techniques. In a large number of cases, the application of such techniques may be advantageous in order to improve the quality of discharges for certain uses of the receiving water. It would be a mistake to infer that primary and secondary treatment would axiomatically achieve such improvements. There is insufficient information on the relative reduction of viruses, in particular, at each stage of treatment. More research is necessary to determine the fractions of bacteria and viruses removed by different treatment processes, on different scales, and to assess the best means of applying disinfectant techniques at the appropriate stages of treatment without incurring environmental damage. The NRA is actively engaged in studies on the latter.
  
23. If the draft Directive is also to be considered as a possible means of protecting inland and coastal waters from

eutrophication, it is necessary to point out that the effect of such waste water treatment has to be considered alongside the impact of other sources of nutrients, and the capacity of the water to receive and recycle them. The application of tertiary treatment specifically to remove either phosphorus or nitrogen should be considered carefully; such processes also create waste. The NRA's approach is to make such evaluations on a catchment-by-catchment basis, or at specific sites, to achieve the optimum effect; nevertheless, there would be no hesitation on the part of the NRA in imposing such nutrient removal process as part of the discharge consents, should it prove advisable to do so.

24. It is not for the NRA to assess those costs which would fall on the dischargers in implementing the Directive. That is not to say that the NRA lacks an interest in such matters, because resources are always limited and the NRA is concerned to ensure that such resources are deployed in the most effective manner in order to obtain improvements overall throughout the aquatic environment. Demonstrating compliance with the Directive - in England and Wales - would, however, be an additional burden upon the NRA. The current NRA programme of monitoring discharges, for the purposes of the Water Act, already covers much of what may be required; additional costs are, in any case, difficult to assess because of the lack of detail provided, and the uncertainty of the parameters to be applied.
25. Finally, the need for a Regulatory Committee is welcomed, providing that it is adequately serviced with appropriate scientific and technical advice, and that it is prepared to act upon such advice. This has not previously been the case; it would be interesting to learn from the Commission of the extent to which previous Directives, which contain mechanisms for revision, have subsequently been changed.