RECOMMENDATIONS TO ECE GOVERNMENTS ON WASTE-WATER MANAGEMENT

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While the promotion of low- and non-waste technologies will continue to be the cornerstone of ECE policies and strategies to prevent water pollution and reduce the generation of waste water and sludge, the shortfall between realization of that objective and the current situation must nevertheless be faced. Therefore, add-on measures for waste-water management will have to be developed further and applied together with environmentally sound inTrocess technology.

Growing awareness of deterioration of water quality and aquatic ecosystems has led many ECE countries to develop and implement integrated policies and strategies to resolve the comprehensive and interrelated problems of water management. To this end, waste-water management has an important role to play.

The integration of waste-water management with environmental, socio-economic and sectoral policies would promote the further sustainable use and protection of water resources, including transboundary waters. Efficient legal, planning, economic, financial, managerial, technical and educational measures are required to achieve these objectives.

Already in 1988, the ECE, in its *Recommendations to ECE Governments on Waste-water Treatment,* called upon member countries to apply the highest standards of efficiency, competence and technology in the planning, construction, operation and maintenance of treatment facilities, to achieve optimum abatement of water pollution as well as the most effective use of the considerable investment involved.

In the light of the above considerations and with a view to providing guidance in formulating national policies of sustainable water management as well as strategies for integrated management of domestic sewage, trade and industrial waste water and sewage sludge, and in order to strengthen international cooperation in this field,

it is recommended that:

1. National policy for waste-water management should be coordinated with a coherent waste-management policy based on the concept of low- and non-waste technology. All appropriate steps should be taken and priority given to promoting pollution abatement and waste-water minimization at source by, *inter alia:*

(a) Control of pollutants within industrial processes and agricultural practices;

(b) Application of the best available technology and the precautionary principle for the containment and treatment of hazardous substances which are toxic, persistent and/or bio-accumulative;

(c) Selective collection and treatment of industrial and agricultural waste water allowing the recycling of water, manure and wastes and the recovery of valuable substances, where appropriate; and

(d) Substitution of potentially hazardous chemicals in industry, agriculture, trade and service.

Industry should be encouraged to develop alternative detergents without phosphate, using components which would prove harmless to the environment.

2. Public awareness should be raised to modify lifestyles to conserve resources and produce less waste, and to support and promote policies and strategies to implement this. The public should be educated and reliably informed of potential environmental impacts of industrial processes and commercial products. It should be encouraged to conserve water, energy and other resources and to recycle materials which can safely and usefully be reused.

3. Legislation on waste-water treatment and sludge disposal should stipulate that all parties in the waste management chain should ensure that wastes under their control are handled and disposed of in accordance with appropriate regulations. Codes of practice should be developed and harmonized at an international level providing guidance on how to fulfil these responsibilities.

4. Discharges of industrial waste water into sewage systems as well as direct discharges of effluents into receiving waters should be subject to authorization. Disposal of sewage sludge from treatment plants should be subject to regulation and/or authorization. Permits should be issued on the basis of comprehensive informa-

tion provided by operators on production processes; application of low-waste technology; use and storage of raw materials and chemicals; pollution control measures and emergency plans; evaluation of discharges and their impact on the environment; and waste handling. They should be reviewed regularly in the light of available technologies, up-to-date environmental knowledge and changing environmental exigencies. Compliances of treatment plant performances with operational permits should be verified both by the operator and the competent authority or an independent auditor.

5. Innovative economic instruments should be used to promote and encourage rational use of water and pollution prevention at source, efficient and reliable waste-water treatment and sludge disposal practices.

6. Appropriate legal sanctions should be instituted for non-compliance.

7. Research and development programmes aimed at improving water pollution abatement methods and techniques, including low- and non-waste technologies, should be promoted, as well as an exchange of knowledge and experience on all areas of waste-water management practices such as the separate or combined treatment of specific industrial waste water, managerial aspects of the design and operation of treatment plants, implementation of waste-water and sludge treatment strategies and processes, storm-water management, sewer rehabilitation, waste-water management in areas with low population densities and with high fluctuations in waste-water quality and quantity.

8. Waste-water management planning should be used to upgrade and develop the infrastructure of waste-water treatment and sludge disposal systems. It should also be integrated with other relevant planning sectors of water management and those sectors dealing with land use, waste handling and disposal and environmental protection in general.

9. The forecasting methods used as a basis for planning in waste-water management should be improved for water demand, particularly in industry, waste-water discharge and resulting sludge generation, taking into account policies and technologies favouring the rational use of water, pollution abatement at source, the reuse of waste water, rational energy use and chemical-saving techniques. Forecasts should not only be based on the extrapolation of past trends but should also take into account present and anticipated new technologies, economic incentives, legal and control measures and rational water-use practices. The exchange of experience in developing and utilizing forecasting methods for water demand should be promoted, aiming at harmonizing methodologies, in particular for transboundary river basins.

10. Planning authorities, mainly at the local level, should take into account a staged development of treatment facilities in order to cope with increasing demands on effluent quality to be met at specific sites, as well as with growth in population to be served or changes in industrial waste-water output. At the design stage, provision should be made for the future upgrading of the plant, if required. All appropriate means for the reduction of water demand, wastage and discharge should be applied in the public sector, industry and agriculture.

11. Environmental impact assessments, risk assessments and technology assessments should be an integral part of the planning, design, construction, operation and maintenance of waste-water and sludge facilities with a view to preventing and controlling adverse environmental impacts and transfer of pollution to other environmental media. Analyses of the potential effects of long-term failures or the accidental disruption of collecting systems and treatment plant performances should be part of these assessments. Increased attention should be paid during the environmental impact assessment procedure to the selection of sites of facilities for the collection, storage and treatment of waste water and sludge.

12. Public participation in decision-making processes in waste-water management should be promoted and public access to relevant information facilitated. Competent authorities should provide the public with comprehensible information and arguments, including appraisals of potential risks and trade-offs involved in various management alternatives, such as treatment and disposal options.

13. A periodic updating of waste-water management plans and discharge consents should be undertaken with a view, *inter alia,* to: keeping pace with changes in the sewerage catchment (waste type, concentration and volume) and matching planned improvements in the quality of receiving water bodies; and ensuring the timely replacement of aging or obsolete installations before their condition leads to failure to comply with effluent quality standards. The coordination of national waste-water management plans for respective parts of a transboundary river basin or the preparation of a joint plan for the whole river basin should be promoted.

14. Consideration should be given to setting up, particularly at the local level, consultative committees representing various interests, in particular the public concerned, non-governmental interest groups, water authorities, representatives of health protection agencies and other competent authorities, to formulate a common position for and to participate in decision-making processes in the field of waste-water management.

15. Every measure should be taken to avoid the diversion or discharge of sewage sludge into the aquatic environment. Technologies should be developed or improved that allow the efficient transformation of sludge into usable by-products, the extraction of economically useful substances from sludge or the utilization of its energy content. Their application should be promoted by appropriate instruments.

16. All appropriate measures should be taken to ensure that industries using or producing hazardous substances avoid any discharges of these substances into the public sewer system or receiving waters by using the most reliable means.

17. Appropriate biological treatment, including soft technology, or physical-chemical treatment with similar efficiency, should be regarded as the minimum require-

ment for the treatment of organically polluted waste waters before discharge.

18. The reuse of sewage sludges as fertilizer in agriculture should be the goal for all sewage sludges of appropriate quality. To this effect Codes of Practice should be developed having regard to the requirements of public and veterinary health and the avoidance of dangerous accumulations of toxic, mutagenic and carcinogenic substances in agricultural land and their migration into groundwaters and surface waters.

19. All appropriate measures should be taken to upgrade and improve efficiently the operation and maintenance of waste-water and sludge facilities with a view to optimizing the exploitation of treatment facilities, increasing the efficiency of treatment, and saving energy and chemicals, thus achieving the required effluent and sludge quality standards.

20. In order to achieve the highest level of efficiency to protect the environment, renovation programmes should be initiated for the renewal and upgrading of unsatisfactory, deteriorating sewer systems and treatment plants. Renovation programmes should aim at detecting and reducing the number of inappropriate freshwater connections, faulty connections with storm-water sewers and leakages in collecting networks, and at preventing the intrusion of groundwater into the system and the consequent overloading of treatment plants and reduction of their efficiency. Furthermore, they should aim at upgrading the operation of deteriorating plants by, *inter alia,* replacing installations by more efficient equipment, integrating automation in treatment processes and/or applying additional unit operations.

21. The professional status of treatment plant managers, operators and other relevant staff should be upgraded by training and other suitable means. Exchange of experience and know-how among staff from different facilities should be promoted at a regional level. In this respect, multidisciplinary teams should be used to advantage. Staff recommendations and critical evaluation should be taken into consideration, and used as feedback to the planners and designers of the systems, equipment suppliers and construction firms. The optimization, regulation and standardization of the infrastructure thus designed and built should facilitate operation and maintenance activities, reduce operational risks, improve performance in pollution abatement and help to achieve the project's aims more rapidly.

22. Emergency response systems, including effective contingency planning to cope with failures in waste-

water and sludge facilities, should be established. At appropriate intervals, emergencies should be simulated, and treatment plant operators and all other relevant personnel should establish effective and tested links with fire brigades, emergency civil• defence, environmental protection agencies and water authorities, with a view to familiarizing all concerned with potential problems occurring in emergencies, and rendering them fit to combat health hazards or environmental damage from accidents in sewer systems and treatment plants.

23. Appropriate steps should be taken to establish and improve the reliability of automatic devices for the continuous measurement of main effluent parameters and parameters critical to the smooth operation of the plant. Telemetric systems, in particular in large plants and plants which are not always attended, should be set up in order to supervise plant operation and raise the alarm in case of plant failures.

24. Programmes for the supervision of sewer systems and of treatment-plant operations should be drawn up and control procedures established in order to monitor compliance with permits for discharging industrial waste water into sewer systems and with operation permits; and to assess treatment efficiency and factors affecting this efficiency. Treatment plants should be designed or modified in such a way that representative samples of incoming waste water, of waste water during various stages of treatment processes, including sludge treatment, and of treated effluents before discharge, can be obtained characterizing both flow and concentration.

25. Procedures should be laid down in the operational permit for reporting effluent and sludge characteristics to the competent authority and for informing operators of treatment facilities about the conditions in the receiving water body, both in terms of water quality and quantity, and about their seasonal fluctuations. Methods for achieving comparable monitoring results should be developed and harmonized at an international level.

26. Procedures should be established for the routine scrutiny of analyses carried out by laboratories including inter-calibration and quality assurance of laboratory data. Networks of accredited laboratories should be set up to allow for both routine and special analyses of wastewater and sludge ingredients. A rationale for selecting key parameters aimed at providing relevant information on micropollutants should be agreed upon and appropriate methods developed. Greater emphasis should be placed on the use and improvement of bio-tests for measuring the acute or chronic toxicity of industrial waste water and trade effluents.