ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

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Reply to Attn of: AF

Subject: EPA Policy Statement on Water Reuse

To: All Regional Administrators

The Office of Air and Water Programs and the Office of Research and Monitoring have jointly prepared the attached EPA Policy Statement on Water Reuse and the accompanying Water Reuse Background Statement.

These documents are for your guidance and for distribution as you see fit.

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Attachment

EPA POLICY STATEMENT ON WATER REUSE

The demand for water is increasing both through population growth and changing life styles, while the supply of water from nature remains basically constant from year to year. This is not to imply that we are or will shortly be out of water, although water shortages are of great concern in some regions and indirect reuse has been common for generations. We must recognize the need to use and reuse wastewater. Therefore,

1. EPA supports and encourages the continued development and practice of successive wastewater reclamation, reuse, recycling and recharge as a major element in water resource management, providing the reclamation systems are designed and operated so as to avoid health hazards to the people or damage to the environment.

2. In particular, EPA recognizes and supports the potential for wastewater reuse in agriculture, industrial, municipal, recreational and groundwater recharge applications.

3. EPA does not currently support the direct interconnection of wastewater reclamation plants with municipal water treatment plants. The potable use of renovated wastewaters blended with other acceptable supplies in reservoirs may be employed once research and demonstration has shown that it can be done without hazard to health. EPA believes that other factors must also receive consideration, such as the ecological impact of various alternatives, quality of available sources, and economics.

4. EPA will continue to support reuse research and demonstration projects including procedures for the rapid identification and removal of viruses and organics, epidemiological and toxicological analyses of effects, advanced waste and drinking water treatment process design and operation, development of water quality requirements for various reuse opportunities, and cost-effectiveness studies.

WATER REUSE

Background

While indirect and delayed reuse of water has many accepted applications, the direct application of measures to reuse wastewaters for constructive purposes presents both new opportunities and new problems. Direct reuse is currently being conducted in a number of places for specific purposes; in fact, California reported in 1969 over 200 non-potable reuse situations. Reuse is being applied for a number of purposes, including industrial use for cooling purposes, for groundwater recharge to prevent salt water intrusion in coastal areas; as a source for recreational waters; for irrigation and other agricultural uses, not involving direct contact with food surfaces; and for other uses. An appendix is included for definition of direct and indirect reuse and discussion of the differences related thereto.

The potential for water reuse, as a tool in broad water resources and water quality planning, is many times greater than current practice and should be routine y considered and developed to meet non-potable demands. As could be expected, activity with regard to reuse appears to be much intensified in water-short areas of the country, for instance in the arid West. The Water Resources Council (WRC) report, "The Nation's Water Resources, 1968" cites water shortage problems in 9 basins--Arkansas-White-Red; Texas-Gulf; Rio Grande; Upper Colorado; Souris-Red-Rainy; Missouri; Lower Colorado; Great Basin; and California--and pointedly shows that these problems will worsen by 2020 unless remedial measures are applied.

In addition to reuse of wastewaters, attention is being given to weather modification, desalination, water conservation, interbasin transfer, tapping of the geothermal deep-water reservoirs and other approaches to conserve existing as well as tap new sources. Reuse should be considered in the light of water quality, environmental, ecological and economic aspects as well as the public health aspects; it should provide a vital link in meeting needs in water short areas.

Reuse Application and Public Health Problems

Taking a national view of fresh water demands, it may be seen from the 1968 WRC report that for 2020, electric power (cooling water) will be first in demand (410 BGD); self-supplied industrial, second (210 BGD); irrigation, third (161 BGD); and municipal, fourth (74 BGD); with minor residue demands for livestock and rural domestic. Logically, one would expect that priorities for reuse would pattern after demand with electric power (cooling) first, industrial second, etc. Such a pattern of application would ideally suit health protection-water quality relationships since cooling and most industrial uses would present low health risks; irrigation for some crops would be potentially hazardous, but not for others; and municipal uses would offer the greatest human contact and the largest potential danger.

The problem may not be handled so simply on gross utilization terms since each call for water reuse will be situational, depending on geographic location, climate, public attitudes, the availability of wastewater sources and of potential water users, etc. One community may be non-conservative in utilizing its fresh waters and be willing to treat and recycle wastewaters in order to continue its easy-water practices while another community with a similar policy and an abundant supply of cheap water may be unwilling to treat and recycle wastewater just to conserve water for use by others--for instance for irrigation or municipal purposes elsewhere. In one case, a needy municipality may be in a position to utilize industrial wastewaters and in another case a needy industry may be situated so as to use municipal wastewaters. In any event the technology is available for the treatment and reuse of many wastewaters for many purposes and such reuse should be broadly considered in the management of water resources.

Public health problems do occur and require attention as follows:

1. Industrial: The reuse of water by industry should be encouraged where it is technically and economically feasible. Quality needs for industrial uses vary so widely that it is not possible to generalize on this subject; however, except for food processing industries, they are usually lower than drinking water requirements.

2. Groundwater Recharge: Groundwater recharge can be used to raise or maintain the level of groundwater and/or to prevent the intrusion of salt water. For most recharge applications through spreading and percolation of reuse waters on the surface, quality requirements for health protection would be enhanced by natural filtering processes. However, percolation into a shallow basin used for drinking water supply should receive careful attention and the recharge of reuse water by subsurface injection should not be implemented without strict controls and a clear demonstration that such disposal will not harm present or potential subsurface water supplies or otherwise damage the environment.

3. Recreation: Indirect reuse of water for primary contact recreational purposes is clearly recognized in the section on recreational uses in Water Quality Criteria[1] by way of the recommended limits for fecal coliform organisms and the recommendation that sanitary surveys be conducted to determine the degree of threat of pathogens from specific sources.

   The hazards associated with direct contact recreation in waters receiving inadequately treated waste discharges are chiefly biological and are usually associated with the transmission of infectious diseases that may enter the body through the mouth or nasal passages or other portals such as the eyes, and certain areas of the skin. Numerous examples may be given of both direct and indirect use of treated wastewaters for recreational purposes and this appears to be

a valid practice where health requirements can be met. However, much remains to be known about the health relationships of water quality and recreational use. For example, water high in nutrients may serve as a culture for pathogenic bacteria. Further research and epidemiological investigations into water quality and health relationships are urgently needed.

4. Irrigation: The reuse of waters for irrigation is and should be a satisfactory mode of reuse. Water quality requirements for crop protection relate primarily to salinity and toxic compounds. For irrigation of non-food or shelled-food crops health considerations would be minimal but for irrigation of other food crops or of pasturage for food-animals, the hazards are significant unless the water is adequately treated. Much study and development of safeguards should precede this latter use.

5. Municipal: The concurrent use of the Nation's rivers and lakes for both water supply and waste disposal has been practiced for many years in many areas of the country. It is estimated that 50% of the Nation's population now derives their water supply from surface sources which have also received a variety of industrial wastes, untreated sewage, urban runoff and effluent from a variety of sewage treatment plants. Public health officials have relied upon time of travel or storage and treatment to protect the public against infectious diseases and toxic substances. Water quality standards and treatment requirements applicable to surface sources used for water supply have permitted the discharge of relatively high quantities of wastes. The continuing development of new advanced wastewater treatment technologies and implementation of new standards will necessitate a reappraisal of historical philosophies.

   Indirect reuse for municipal public water supply is a fact of life; however, direct reuse is a new matter requiring careful research and investigation before introduction. Currently, there is insufficient data to support safety of direct interconnection of wastewater reclamation plants into municipal water supplies. However, the direct connection of municipal renovated water to supply industrial water needs is desirable and should be exploited where practical.

Health problems in a direct interconnection or in a recycling situation relate to viruses, bacterial build-up, chemical build-up, the possibility of accidental spills or sabotage and a record of questionable reliability in the operation of wastewater treatment plants. Viruses are difficult to identify and measure and are more resistant to disinfection than bacteria. Carbon columns and other possible advanced waste treatment elements may harbor bacteria or their metabolites and contribute to the development of unhealthful levels of bacteria in a recycling situation.

The direct introduction of chemicals from a waste-stream and their build-up through potable system-waste system recycling can present increased long-term chronic hazards, presently undefined. Accidental spills or sabotage present an acute threat which cannot be disregarded, as anyone can throw anything down the drain. Because of these, even if other objectionable problems were solved, some system of holding and dilution reservoirs may inevitably need to be provided between the reclamation plant and the potable water intake together with biological and chemical monitoring. With regard to the reliability of reclamation plant operation, studies[2] in California have shown that 60% of wastewater treatment plants studied had some breakdown during the year. Observations of engineers and others confirm that reliability is a common problem in wastewater treatment plants; safeguards must be provided to prevent the introduction of non-treated or poorly treated wastes into a potable water system.

Conclusions

1. The purposeful reuse of treated wastewaters has a large potential in helping to meet water supply needs. Expansion of reuse as a tool of water quality and water resources management should be encouraged as long as measures are taken to protect the public health.

2. We do not have the knowledge to support the direct interconnection of wastewater reclamation plants into municipal water supplies at this time. The potable use of renovated wastewaters blended with other acceptable supplies in reservoirs may be employed once research and demonstration has shown that all of the following conditions would be met:

   a) protection from hazards to health

   b) offers higher quality than available conventional sources

   c) results in less adverse ecological impact than conventional alternatives

   d) is tested and supplied using completely dependable chemical and biological control technology

   e) is more economical than conventional sources

   f) is approved by cognizant public health authorities

3. An accelerated research and demonstration program is vitally needed to:

   Develop basic information and remedial measures with respect to viruses, bacteria, chemical build-ups, toxicological aspects and other health problems. Develop criteria and standards to assure health protection in connection with reuse.

   Upgrade the treatment process design and operation so as to assure continuously safe service to the public. Provide economic and other analyses to facilitate the planning and design of effective regional solutions to problems of water-shortage and water quality.

1/ Water Quality Criteria, Report of the National Technical Advisory Committee to the Secretary of the Interior, April 1, 1968.

2/ Ongerth, H.J., Jopling, W.F., and Deaner, D.G. Fitness Needs for Wastewater Reclamation Plants, J. American Water Works Assn., Oct., 1971.

APPENDIX: DEFINITIONS AND DISCUSSION OF DIFFERENCES FOR DIRECT AND INDIRECT REUSE

Definitions are derived from a report of the National Water Commission, "Wastewater Reuse," by Jerome Gavis, July 1971, as follows:

1. Direct Reuse: is the direct routing of treated wastewater effluents to the point of use.

2. Indirect Reuse: is the discharge of treated wastewater where it is subjected to natural purification processes and dilution before being withdrawn for use.

Differences in the two types of reuse that must be considered in any drinking water application are as follows:

1. Direct reuse is more vulnerable to sabotage, operational failure and the accidental spill of toxic or hazardous substances into the water-wastewater system. The provision of fail-safe equipment, processes and holding reservoirs may be necessary to meet this problem.

2. Direct reuse allows no margin for error in the destruction of pathogenic viruses, bacteria and other microorganisms.

3. Direct reuse could result in the buildup of trace substances to many times their usual concentration; depending on the degree of reuse and the efficiency of treatment, the concentration factor could run up to nine times.

Many of the factors influencing direct reuse may come into play for indirect reuse. If the time and dilution factors before indirect reuse are small, the impacts of dilution and natural purification may be minimal. Yet the question of what time and dilution factors are adequate cannot be answered on the basis of today's knowledge. Research to acquire new basic knowledge and common sense in the application of today's limited knowledge is essential. Also, it is essential that each reuse situation be treated on an individual basis, taking into account all factors.