

ILLINOIS POLLUTION CONTROL BOARD
May 26, 1971

In the matter of)
OHIO RIVER TREATMENT DATES) #R71-3
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Opinion of the Board (by Mr. Dumelle)

This rule making was proposed by Mr. Currie on February 3, 1971 and sought to do for the Ohio River what was previously accomplished on the Mississippi River. The proposed amendment sought to change the existing regulation (SWB-10) to accelerate the target dates by which secondary treatment of sewage would be required and it sought to more precisely delineate and define those factors which constitute secondary treatment. The new regulation after amendment requires any municipality or industry which discharges its wastes into the Ohio River to provide a minimum of secondary treatment for that effluent by December 31, 1973. Before amendment the dates were stretched out to December 1977. The 1977 date is a more distant deadline for secondary treatment than any others elsewhere in the State.

The existing regulation is contained in the comprehensive SWB-10 entitled Water Quality Standards, Interstate Waters, Ohio River and Saline River, which was approved by the Sanitary Water Board (SWB) one of this Board's predecessors, in December 1968. The regulation includes an implementation plan which details how wastes discharged into the Ohio River interstate waters are to be treated. However, before amendment the specifications regarding secondary treatment were less specific than they are now.

A public hearing was held on April 22, 1971 at the Dixon Springs Experimental Station at which it was hoped that the dischargers affected by the regulation would appear and discuss possible anticipated difficulties and would testify as to the status of their treatment facilities. As none of the affected municipalities appeared, we are relying on the submission of the Environmental Protection Agency (Agency) as to possible difficulties of plants on the river in meeting the new deadlines. It appears that no municipality should have unusual difficulty in complying with the new deadline date although the Agency indicated that the Cities of Cairo and Metropolis would be burdened.

The question of the necessity for requiring secondary treatment by an accelerated date was dealt with at length at both this Board's hearing on a similar proposal for the Mississippi River (R.70-3, Exhibit 1) and by the Ohio River Valley Sanitation Commission (Exhibit 2). Many of the considerations which were applicable to the Mississippi River are also cogent for the Ohio River. What was said regarding the

efficacy of secondary treatment on the Mississippi River is germane to the present consideration. Conventional secondary treatment of municipal wastes accomplishes one or more of the following purposes:

- Reduces disease-producing and other enteric bacteria and viruses;
- (2) Reduces depletion of oxygen in the receiving water by oxidizing and removing many of the substances that consume oxygen;
- (3) Reduces visible and otherwise aesthetically disagreeable sewage materials;
- (4) Reduces specific substances in municipal wastes, by physical and chemical change, that otherwise will be dangerous to humans, animals, or fish exposed to the contaminated water (Ex.1, p.91-92).

The Ohio River Valley Water Sanitation Commission (ORSANCO) is an interstate agency established with the approval of Congress and by legislative action of the eight states in the Ohio Valley. The states are Illinois, Indiana, Kentucky, New York, Ohio, Pennsylvania, West Virginia, and Virginia. ORSANCO held a hearing on September 16, 1970 whose purpose was as was the Board's in this case, to obtain information and other evidence for use in determining the degree of treatment which should be required for sewage and industrial wastes discharged into the Ohio River. The State of Illinois endorsed the proposed standards at that public hearing. With the enactment of water quality standards in November, 1970 following the hearing, ORSANCO has effected a policy decision of requiring secondary treatment for all discharges (Exhibit 2, p. 20-22).

The BOD standard adopted by ORSANCO is not phrased in the form of effluent standard criteria but is stated in terms of percentage removal and basically requires 92% removal of 5-day BOD. Apparently the ORSANCO standard and that now adopted by this Board are none too tough. In testimony submitted at the ORSANCO hearing, the United States Atomic Energy Commission commented that the recommended BOD standard might not be sufficiently restrictive. The Agency stated that it employed the following criteria to determine the acceptability of water quality from waste treatment plants: Biochemical oxygen demand - 10 ppm maximum; Suspended solids - 15 ppm maximum; Residual chlorine - detectable (Ex.2, doc. 8).

In other testimony at the Ohio hearing the FWQA (now the Water Quality Office of the Federal Environmental Protection Agency) endorsed a standard of a minimum of 90% reduction of BOD for the summer months and stated that the agency could not endorse the 75% removal requirement for the winter months. The FWQA proposed that the 75% figure be changed to 85% (Ex.2, doc.7). The Steel Industry Action Committee endorsed a BOD effluent standard of 20 mg/l and a suspended solids effluent standard of 25 mg/l (Ex.2, doc.10). There was no significant testimony which rebutted the implication in the last statement, that the technical feasibility of achieving the standard was beyond question.

At this point in our history it seems almost as anachronistic to speak about the technical feasibility of secondary treatment as it does the desirability or necessity of secondary treatment of wastes. Nonetheless the Act which created the Board directed it to consider the economic reasonableness and technical feasibility of rules which it sought to enact. The dilution concept for the treatment of wastes was the principal thinking in our society for a very long time. Until the end of the 19th century, raw sewage was discharged directly into water bodies and purified through natural processes by the flowing stream. This worked satisfactorily only where the receiving waters had a large dilution capacity and the effluents were relatively small. It is virtually impossible to find such a situation anywhere in our country today and waste treatment is consequently required. Today, treatment of municipal wastes by what is called primary and secondary treatment is the most common form of pollution control in the U.S.

Primary treatment has been a reality along the length of the Ohio River for some decades now. The compulsion for secondary treatment is a relatively recent development. In primary treatment solids are allowed to settle and are then removed from the plant influent. Secondary treatment is basically a biological operation in which bacteria react with the putrescible organic colloidal or dissolved material by absorption, digestion, oxidation, assimilation, and decomposition. Results of the operation are settleable organic particles or inert mineral substances. Trickling filters and activated sludge plants are the two most common types of secondary treatment and both of these processes take place in the presence of oxygen (aerobic).

The trickling filter uses a bed of crushed stone or other coarse material over which the effluent from the primary treatment is distributed. The stones become covered by slime (biological growths) which represent the active agent in the absorption or reduction of the pollutant. Oxygen is supplied by the circulating air. The results of the biochemical action are washed out and carried by the liquid to the settling basin.

In the activated sludge process, the primary effluent enters a tank and is mixed with a quantity of returned sludge from the final settling basin. This returned sludge is rich with biological growth since it has gone through the process previously. Air is bubbled into the tank with various devices. After the biological action has taken place the particles are simply settled. Either the activated sludge or trickling filter process can have any number of modifications and refinements which can improve the efficiency and degree of treatment but the basic operations are essentially as described.

Historically, secondary treatment has often been spoken about as complete treatment. This is obviously not accurate as none of the methods of secondary treatment accomplishes total removal. The increasing necessity and demand for clean water is increasing the demand for what is variously called advanced waste treatment, tertiary, or third-stage treatment. Briefly, the aim of tertiary treatment is to

achieve purity levels of 98 and 99% of BOD and suspended solids removal. Some of the methods employed are nothing more than refined and improved secondary processes. Additional treatment methods such as chemical treatment and electro-chemical methods could also be used. The Hanover experimental tertiary plant of the Metropolitan Sanitary District uses coagulation, rapid sand filters, or micro-straining. In our decision and adoption of the amended regulation today we are not requiring any of the tertiary treatment processes; we are simply requiring acceleration of the achievement of secondary treatment.

The economic reasonability in requiring secondary treatment is basically the cost of treatment balanced against the public benefit to be derived from such treatment. In this case, as in the Mississippi River case, in determining "economic reasonableness" we need not balance the total cost of secondary treatment against the benefits to be derived but rather whether the additional cost, if any, which would be incurred as a result of the accelerated date by which the treatment is required is reasonable as compared against the benefits to be accrued in having the wastes treated by the earlier date.

The Regulation which was proposed on February 3, 1971 and adopted by the Board simultaneously with this opinion provides essentially as follows:

- (1) all oxygen-demanding wastes and wastes containing suspended solids shall receive secondary treatment, at a minimum, by December 31, 1973;
- (2) for sewage works with a Population Equivalent (P.E.) of 10,000 or more, secondary treatment shall mean 90% removal of BOD₅ and suspended solids, and no more than 20 mg/l of BOD₅ and 25 mg/l of suspended solids;
- (3) for sewage works with a P.E. of less than 10,000 secondary treatment shall mean 85% removal of BOD₅ and suspended solids and no more than 30 mg/l of BOD₅ and 37 mg/l of suspended solids; and
- (4) disinfection shall be provided for effluents to reduce fecal coliforms as follows:
 - (a) 400 per 100 ml in primary contact waters, and
 - (b) 2000 per 100 ml in all other waters.

The principal difference in the amendment as compared to the former directive in SWB-10 is, of course, the advancement of the date by which secondary treatment facilities are required. The regulation makes uniform throughout the Ohio River Basin the date by which such treatment is required. All users of the River as the outlet for their discharges shall be bound by the same requirement. We hope that the other states will adopt consistent standards so that discrimination does not exist between those on one side of the River and those on the other.

The new regulation refers to all waste discharges, thereby not giving specific reference to municipal discharges as did paragraph 7 of Rule 1.08 of SWB-10. Paragraph 8 of SWB-10 directed that industry furnish that degree of treatment "equivalent" to that furnished by the municipalities. The Agency has informed us that the intent of the proposed regulation was that it apply to industry and municipality alike. To avoid any ambiguity in this regard we have therefore phrased the new regulation in terms of "all waste discharges." We have included under the term "discharges," both oxygen-demanding discharges and those containing suspended solids. The regulation therefore also covers those industries which may discharge wastes which are of a non-organic nature.

We have also incorporated a minimum-size exclusion into the new regulation. Those sewage works receiving a waste discharge equal to or greater than 10,000 population equivalents (P.E.) must attain a 90% reduction in BOD₅; those less than 10,000 P.E. need only reach an 85% reduction. The basis for such a differentiation lies in the type of secondary treatment facilities employed. With the activated sludge process, a 90% reduction rate is attainable; with the trickling filter method, however, only 85% is generally possible. The trickling filter, though, is a more suitable method of treatment for smaller plants since it does not demand the extensive testing, the constant overseeing, or the highly-trained personnel that an activated sludge plant would require. In addition, the activated sludge process is more expensive to install. ORSANCO has suggested a 92% reduction rate all along the River.

We have also repealed paragraphs 11(a) and (b) of Rule 1.08. The effluent standard for fecal coliform reduction to 400 per 100 ml or less before discharge to any waters designated for primary contact and the requirement for bypass flows in excess of sewage works capacity have been retained in the amended regulation. We have added the requirement that disinfection reduce fecal coliforms to 2000 per 100 ml before discharge to any waters other than those designated for primary contact. Further, the wording in the new regulation removes any doubt as to whether the bacteria standard is in fact an effluent standard. In all other aspects, the numbers have been transposed to the new regulation and a constant proportion has been maintained in the numerical value of the reduction demanded.

It should be noted that both the effluent standard and the reduction percentage must be met by all waste dischargers. This is especially applicable to industrial wastes. Thus, an industry with greater than 10,000 P.E. must attain a 90% reduction in suspended solids and BOD and an effluent which contains no more than 25 mg/l of suspended solids and no more than 20 mg/l of BOD.

There is ample basis within the criteria established by the Environmental Protection Act for the promulgation of the amended regulation. The necessity of a closer deadline was shown. Today's regulation forms a vital portion of the Board's dedication to the principle of non-degradation of the waters of Illinois. The State legislature has directed the Board to act as expeditiously as possible to abate water

pollution and this regulation as was the change of dates on the Mississippi River imposing a December 31, 1973 deadline is drawn in that spirit.

I concur:

David P. Cooney
Samuel K. Allrich
James D. Dannel
James H. ...
...

I dissent:

I, Regina E. Ryan, Clerk of the Illinois Pollution Control Board, certify that the Board approved this Opinion on 26 day, May, 1971.

Regina E. Ryan
Regina E. Ryan, Clerk
Illinois Pollution Control Board