

ILLINOIS POLLUTION CONTROL BOARD
February 21, 1980

IN THE MATTER OF:)
AMENDMENTS TO THE WATER POLLUTION) R77-12,
CONTROL REGULATIONS) Docket C

PROPOSED OPINION OF THE BOARD (by Mr. Dumelle):

This proceeding was initiated by a proposal from the Agency filed with the Board on May 10, 1977. The Agency's proposal was published in Environmental Register #124 dated June 9, 1977. On July 5, 1977 the proposal was divided into four dockets. Docket C concerns the deletion of Rule 404(f) of Chapter 3: Water Pollution. Hearings were held on September 19 and 20, 1977 in Springfield and on September 21, 1977 in Chicago. On September 28, 1979 the Institute of Natural Resources presented a study entitled Economic Impact of Proposed Change in Illinois Deoxygenating Regulations R77-12, Docket C (Doc. No. 79/26) (Ex.C-8). Hearings on the study were held in Chicago on December 3, 1979 and in Springfield on December 18, 1979. On January 10, 1980 the Board adopted a Proposed Order which called for the deletion of Rule 404(f). This Proposed Opinion supports the Board's Proposed Order.

RULE 404

The Board adopted the effluent standards for deoxygenating wastes in In the Matter of: Effluent Criteria, R70-8, March 7, 1972, 3 PCB 755. At 3 PCB 766, the Board stated that it was retaining the effluent standard of 4 mg/l BOD₅ and 5 mg/l suspended solids (4/5) for discharges to streams with dilution ratios of less than 1 to 1. This standard was originally adopted by the Sanitary Water Board and was preserved by Section 49(c) of the Act. The Board recognized the fact that treatment more stringent than ordinary good practices may be necessary to assure that streams comply with water quality standards. The Board relied heavily on the testimony of Dr. John Pfeffer who suggested that the considerable costs to meet the 4/5 standard need not be incurred in all cases to meet water quality standards. Dr. Pfeffer suggested and the Board provided for a demonstration by affected dischargers that a 10/12 standard would be adequate. In commenting on the significant expense associated with meeting the 4/5 standard, the Board noted:

"There is always the contention that all of the suggested things should be done, that money is no object. But in light of the notorious difficulties of municipalities in raising enough money to finance the most necessary treatment projects, as well as the general undesirability of wasting money, we think it appropriate to reorder our priorities somewhat along the lines suggested by Mr. Matchke in order that limited funds will provide the maximum benefit in terms of actual stream improvement." (3 PCB 770).

In establishing the ground rules for a 10/12 exemption the Board stated as follows:

"Accordingly, we have provided an exception from the effluent standard of 4 mg/l BOD and 5 solids upon proof that an effluent of 10 and 12 will suffice to achieve compliance with all applicable water quality standards. The burden is on the discharger to make that proof or to meet the stricter standard. Other sources discharging to the same stream must be taken into account, although the applicant is entitled to assume that others will bring themselves into compliance with their own effluent standards. We require proof that undesirable bottom deposits will not be caused, to satisfy the most serious question raised by Dr. Pipes; and that a program of ammonia control and of combined-sewer overflow control, where necessary, be provided at the time of applying for an exemption. What the new rule says is that it is the discharger's obligation to achieve satisfactory stream quality; he should demonstrate to the Agency how that is to be done." (3 PCB 770).

NEED FOR THIS RULEMAKING

In its Justifications for deleting Rule 404(f), the Agency pointed to three problems it has had in administering this rule. The Agency felt that carbon adsorption was the only known technique which could achieve a 4/5 effluent. The prohibitive costs associated with this technology make it difficult, if not impossible, to put in place. The Agency pointed to the analytical procedures used to measure compliance with 4/5 and claimed that the margin of error in

tests at this level approached 100%. In the Agency's attempts to administer the "lagoon and Pfeffer exemptions" in Rule 404(f)(i) and (ii), it found that standard stream modelling techniques were inappropriate in projecting the impact on certain categories of receiving waters. As a result, extraordinary and perhaps impossible modelling was necessary in order to avoid the application of the 4/5 standard.

The Agency stated that carbon adsorption has never been installed in Illinois for the treatment of municipal sewage (R.11). Carbon adsorption is not reliable when upsets occur in activated sludge or tertiary filtration (R.26). Projected costs for the installation of carbon adsorption were drawn from the USEPA Process Design Manual (Ex.C-2). In general, costs for carbon adsorption double the capital and operating costs associated with secondary treatment (R.71). For a sewage treatment plant with a design capacity of 20 million gallons per day (MGD), capital costs were estimated at \$4 million and \$190,000/year additional operating costs (R.73).

In Exhibit C-3, the Agency surveyed the performance of 125 tertiary treatment plants in Illinois. Only two could meet 4/5 (R.320). At page 68 of Exhibit C-3, it was concluded that activated sludge plants followed by high rate tertiary filtration could meet 10/12, but not 4/5. Extended aeration plants followed by tertiary filtration probably cannot meet 10/12, according to Exhibit C-3. Exhibit C-12 provided a summary of the performance of the John Egan Plant, which is operated by the Metropolitan Sanitary District of Greater Chicago. This plant is presently required to meet 4/5 under its NPDES permit and uses multimedia (sand and anthracite) tertiary filtration (December 18, 1979, p.18). From October, 1978 until October, 1979, the plant complied in all but four months with 4/5 with a high monthly average for BOD₅ of 12 mg/l. While this performance approaches 4/5, the Agency pointed out that the plant is operating at 80% of its design flow, and it is not subject to unexpected high flows (December 18, 1979, p.12). Exhibit C-13 provided a similar analysis of the performance of the Downers Grove Sanitary District Plant. This plant is required to meet 10/12, employs microstrainer filtration and met 4/5 in seven months with high monthly averages of 6.8 mg/l BOD₅ and 8.7 mg/l suspended solids. Exhibit C-7 analyzed the performance of various methods of wastewater filtration employed in the United States and Great Britain. In Appendix A, only two plants in the United States (Cleveland, Ohio and Philowith, Oregon) showed performance at or near 4/5. Neither of these plants uses carbon adsorption.

Based on this evidence, the Board concludes that while

compliance with the 4/5 standard may not require carbon adsorption, most of the sewage plants approaching 4/5 are large and employ highly qualified operators. Many of the Illinois dischargers who would be required to meet 4/5 if Rule 404(f) were retained cannot be expected to achieve the same efficiencies without carbon adsorption.

The Agency felt that the BOD₅ test was not a reliable analytical technique (R.48). While USEPA has stated that a COD (chemical oxygen demand) test can be used, it cannot be substituted for the BOD₅ test (R.67). The Agency feels that there is little correlation between the BOD₅ test and dissolved oxygen (R.66). When these shortcomings are viewed together with the 4/5 standard, other problems emerge. The testing errors at 4 mg/l for BOD₅ reach 100% and can be affected by low (1 mg/l) nitrogen concentrations. Some of these problems may be resolved through a recently published proposal by USEPA to approve a new testing procedure for carbonaceous BOD₅ (44 Federal Register 69464, December 3, 1979). The proposed procedure involves the addition of a reagent to act as a nitrogen oxygen demand suppressant. USEPA reviewed data from 86 analysts in 58 laboratories which analyzed natural water samples plus an exact increment of biodegradable organic compounds. USEPA estimated a standard deviation of + 0.7 mg/l at 2.1 mg/l. Since compliance with the 4/5 standard is based on averaging, the Agency feels that some highly suspect low measurements will have to be used to determine compliance (R.86). This leaves no room for the upsets which will inevitably occur (R.11). The Agency is not in a position to verify the accuracy of all of the tests results it receives. The accuracy of the suspended solids test at 5 mg/l is affected by the fact that there may not be enough solids present to obtain a uniform mix when a sample bottle is shaken (December 18, 1979 p.20).

The Board concludes that many of the weaknesses in BOD₅ and suspended solids testing can be overcome in a properly run laboratory which analyzes a large number of samples of a given effluent stream. Once again, many of the plants that would be required to meet 4/5 if Rule 404(f) were retained are not subject to sufficiently frequent sampling requirements to obtain a reliable data base to show compliance with these stringent standards.

On March 1, 1976 the Agency adopted guidelines for the dischargers seeking exemptions under Rules 404(c) and (f), (Technical Policy WPC-1, Exhibit C-5). WPC-1 uses the Modified Streeter-Phelps Equation to predict the influence of typical domestic sewage effluent on the dissolved oxygen profile of a stream. While the equation is generally useful, it has some shortcomings. The equation assumes constant stream velocity, and consequently it is not useful when a discharge enters still waters (lakes and pools)

(R.15). The dischargers who are faced with downstream still waters would have to go through extensive additional modelling to make the necessary demonstration for an exemption. The Agency feels that neither it nor the affected dischargers have the resources to make valid projections in these cases (R.16). Over 200 exemptions have been granted under WPC-1 (R.14) but at least 15 applications have been denied because of the proximity of a downstream lake (December 3, 1979 p.20). These discharges are generally small involving communities under 10,000 population (December 3, 1979 p.19).

The Board has been advised of this problem in a series of variances and concludes that the Agency's alternative approach described below will provide a more realistic solution for the affected dischargers.

EFFECT OF THIS RULEMAKING

Deletion of Rule 404(f) will not change the fact that all dischargers must comply with the Board's dissolved oxygen water quality standards. The Agency has proposed a combination of stream sampling and an assessment of alternatives for those dischargers who cannot avail themselves of the procedures outlined in WPC-1. These dischargers will be issued two year NPDES permits with 10/12 limitations (R.18). During this period, the Agency will engage in a joint monitoring program with each discharger to measure downstream impacts (R.19). The Agency will be looking primarily at dissolved oxygen levels under worst case conditions (R.330). Additional sampling of downstream lakes will also be performed, (December 3, 1979 p.17). If discharging at the 10/12 level does not prove to be sufficient to protect dissolved oxygen levels, the affected dischargers would be required to assess alternative techniques. These would include additional treatment, instream aeration, diversion, or elimination of the discharge (R.19). Construction and operation of any additional treatment facilities will require the necessary permits with the possibility of review by the Board in permit appeal proceedings.

The Board concludes that the Agency's approach should provide a realistic solution to the problems faced by those dischargers unable to obtain exemptions under present circumstances. The Agency's present permitting authority coupled with the Board's review powers should provide the necessary flexibility to address any unique problems which may arise.

ECONOMIC IMPACT

Exhibit C-8 (the Study) identified 19 dischargers affected by this rulemaking (Table 1). The study author included five additional dischargers in later testimony (December 3, 1979 p.36). These dischargers were categorized as those which had been denied "Pfeffer exemptions" due to the nature of their receiving streams (Ex.C-8, p.viii). These denials were generally due to the shortcomings in WPC-1 described above (December 3, 1979 p.21).

These 24 dischargers are not necessarily the only ones that will be affected by this rulemaking, but they are representative. While some of these dischargers will not be required to treat beyond 10/12, some will have to and the costs to do so are not reflected in the study.

Exhibit C-8 designates the foregone costs of additional treatment as benefits of this rulemaking. Carbon adsorption, land application, and rerouting of discharges were the methods of treatment analyzed. Annual costs for the least expensive alternative for all 24 dischargers totaled \$1,507,000 (Ex.C-11; December 3, 1979 p.45)

Costs of this rulemaking were divided into monitoring costs and environmental costs (Ex. C-8,p.31). Monitoring costs cover the two year program discussed above, and environmental costs are those attributable to degradation of water quality from higher permitted effluent levels.

Monitoring costs were estimated at \$37,500 per year for 2 years (Ex. C-9, p.8).

Environmental costs were discussed from two views. The first was that water quality standards will be maintained through monitoring and additional sewage treatment if necessary. Under this view, there is no environmental cost (Ex. C-9, p.6). This approach effectively assumes that the water quality standards are a threshold below which no damage occurs.

The second view was that permitted effluent levels above 4/5 have an incremental effect on receiving bodies of water. This effect was analyzed by examining incremental BOD₅ loading to affected lakes. Individual lake characteristics were used to calculate the area of each lake which would experience a 1 mg/l net increase in ultimate BOD. A previous estimate of the public willingness to pay for recreation at Lake Carlyle and Lake Shelbyville provided an estimate of the value of recreation per acre of lake

surface. Combining the recreation value with the estimate of the area affected produced an estimate of \$4500/year for reduced recreational benefits (December 18, 1979, p.7). This was described as an underestimate due to theoretical limitations inherent in the travel cost method used to estimate willingness to pay. The cost estimate of \$4500/year reflects the small changes anticipated in ultimate BOD.

Adoption of this rulemaking was described as having no direct impacts on the agricultural, commercial, or manufacturing sectors of the Illinois economy (Ex.C-9, p.8). Ten municipalities were identified which would experience increased operating costs to cover temporary monitoring expenses. These increases ranged from \$0.04 to \$2.07 per capita.

Based on this evidence, the Board concludes that this rulemaking will have no significant adverse economic impact on the people of the State of Illinois.

IT IS SO ORDERED.

I, Christan L. Moffett, Clerk of the Illinois Pollution Control Board, hereby certify the above Proposed Opinion was adopted on the 21st day of February, 1980 by a vote of 4-0.



Christan L. Moffett, Clerk
Illinois Pollution Control Board