

ILLINOIS POLLUTION CONTROL BOARD  
December 15, 1988

IN THE MATTER OF: )  
 )  
PROPOSED AMENDMENT TO ) R87-6  
PHOSPHORUS EFFLUENT STANDARD, )  
35 ILL. ADM. CODE 304.123 )

PROPOSED RULE. SECOND NOTICE.

PROPOSED OPINION AND ORDER OF THE BOARD (by J. Anderson):

A. Background

This rulemaking was initiated by the Illinois Environmental Protection Agency (Agency) on March 20, 1987. The Agency filed an amended proposal on July 13, 1987. The Agency proposes that the Board make the following changes to the phosphorus effluent standard of 35 Ill. Adm. Code 304.123.

1. Delete existing Paragraph 304.123(b). This would result in discharges to the Fox River Basin being regulated under the generally applicable proposed paragraphs.
2. Delete existing Paragraphs 304.123(c) and d). These would be replaced with a single paragraph which would impose a 1.0 mg/l effluent standard on all dischargers of 2500 population equivalents (P.E.) or more, but only if the discharge is located within 40.25 kilometers (25 miles) of a 20-acre or larger lake. As amended, the Agency proposal would also exempt all dischargers to Lake Decatur and its tributaries; according to the Agency in its "Additional Justification" for the Amendment to Proposal filed July 13, 1987, this further amendment will make the Agency's proposal in this docket consistent with the Agency's reasoning in its proposal in Board proceeding R83-20, In the Matter of: Proposed Water Quality and Effluent Standard Amendments for Water in the Sangamon River Basin. \* The current exemption for third-stage lagoon systems would be retained.
3. Delete the compliance dates in Paragraphs (f) and (g), and replace them with a single paragraph specifying compliance with the new standard as soon as the discharger has the capability, but in no event later than the "federally mandated" (NPDES) deadline of July 1, 1988. The Board was advised by the Agency (a) that the United States Environmental Protection Agency has "adopted" the proposal as part of its approval of the Illinois NPDES program.

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\* R83-20 was dismissed on April 7, 1988, upon Motion by the Agency,

Merit hearings were held in Chicago on May 18, 1987, and in Springfield on July 21, 1987. Participants at the hearings besides the Agency were the Northeastern Illinois Planning Commission (NIPC), the Department of Energy and Natural Resources (DENR), the Urbana and Champaign Sanitary District (U-C Sanitary District) and members of the public.

Following completion of the merit hearings, DENR, with the concurrence of the Economic Technical Advisory Committee (ETAC), determined that an Economic Impact Study (EcIS) was warranted in this proceeding. On March 31, 1988, an EcIS report prepared on behalf of DENR by Blaser, Zeni and Co., a management consulting firm, was filed with the Board (Exh. 40).

Upon receipt of the EcIS report, the Board scheduled and conducted two additional public hearings to consider the EcIS. Present at these hearings were DENR, the Agency and William L. Blaser, President of Blaser, Zeni and Co. and the principal author of the EcIS report. Some other members of the EcIS drafting team were also present. Hearings were held on June 7, 1988 in Springfield, and on June 21, 1988 in Chicago.

#### B. Eutrophication of Lakes and Reservoirs

The Participants introduced some 48 exhibits (one, Exh. 36, was withdrawn). Chief among these were the Agency's 1986 report, "Phosphorus: A summary of Information Regarding Lake Water Quality" IEPA/WPC/86-010 (introduced and admitted as Exhibit 1), and the EcIS Report, "A Economic Analysis of Proposed Amendments To Water Pollution Regulations Phosphorus Discharges - R87-6", Department of Energy and Natural Resources, 1988 (introduced and admitted as Exhibit 40). These two reports tend to rely upon and summarize data contained in many of the other exhibits; for instance, pages 8-13 of the Agency's report (Exh. 1) cites Exhibits 8-12 in support of its discussion of phosphorus transport in streams (see also R.21-22 [5/18/87]). Exhibits 8-12 are reports by various authors of results of studies of phosphorus in a number of settings including the Lake Erie watershed (Exh. 8), the Lake Champlain Basin (Exh. 10) and a portion of the Sangamon River in Illinois (Exh. 12).

Both principal studies and several commenters viewed phosphorus loading as, generally, the key determinant of "eutrophication". The term "eutrophication" was generally used to describe the accelerated decline in water quality of lakes attributable to human activities which introduce excessive nutrient (e.g., phosphorus) loadings; this is also referred to as "cultural eutrophication" (Exh. 40, pgs. 10-12; Exh. 32, Att. 1, pgs. 10-11). The commenters and reports noted, however, that lake eutrophication is a very complicated process, involving significant other factors, such as retention time, turbidity, lake depth, other nutrient loadings, temperature, algal species and abundance, internal regeneration, seasonal timing and numerous other factors. (Exh. 1, pgs. 8, 30-34; Exh. 40, pgs. 12-16, Exh. 32 and attachments). All commenters agreed that control and moderation of eutrophication require knowledge of lake-specific conditions; control of point sources of phosphorus may be of little use in one area, but may be valuable in others. All agreed that in-lake phosphorus management strategies could be highly beneficial. Changes in other factors (e.g., turbidity) may increase or

decrease the relative importance of phosphorus loading (Exh. 1, pg. 57; Exh. 40, pgs. 128-131, Exh. 32).

One commenter in particular, Dr. Paul F. Derr, an environmental consultant to FMC Corporation, characterized phosphorus, per se, as "not the cause of eutrophication" (Exh. 32, pg. 2; emphasis in original). Rather, he asserted, phosphorus is but one of "15 to 20 essential nutrient elements", high inputs of which lead to cultural eutrophication, "particularly when they enter streams and lakes as organic wastes" (id). Such organic forms, according to Dr. Derr, "place a large oxygen demand on these waters, which leads to rapid recycling of all the nutrient elements from the sediments into the surface waters to support algal growth" (id; R.81-82 [7/21/87]; emphasis in original). The value of phosphorus measurements and standards, concludes Dr. Derr, is as "nothing more than a tracer of organic pollution which contains all of the fifteen to twenty nutrient elements" (Exh. 32, pg. 3, and Att. III, pg. 11; R.84-85 [7/21/87]). In turn, he notes, phosphorus removal and control is only valuable as a "surrogate" for BOD and COD control, that is, for removal and control of the 15 to 20 nutrients (R.95-96, 101-103 and 109-110 [7/21/87]), since control of phosphorus tends to control the other nutrients as well. Neither the Agency nor DENR took issue with Dr. Derr's statements; as Dr. Derr noted, the essential difference between his views and those expressed by the Agency in Exhibit 1 is the Agency's occasional reference to "phosphorus removal" rather than "nutrient removal" (R.110 [7/21/87]).

#### C. Trophic Status of Lakes and Reservoirs

Notwithstanding the uncertain correlation between phosphorus and lake eutrophication, both the Agency and DENR focused their attention upon phosphorus in gauging the trophic status of lakes and reservoirs. Although the Agency's phosphorus study (Exh. 1) and the EcIS report (Exh. 40) differed as to the use of the so-called "Vollenweider model", they have both used the model (see, e.g., Exh. 1, pgs. 32-33, and Exh. 40, pgs. 17-19). The model, as modified by Rast and Lee and others provides a means of determining "critical" phosphorus loading rates of lakes and for classifying lakes' "trophic states" based on their phosphorus loading, morphometric characteristics and algal biomass. (see Exh. 1, pg. 33) Under this model, lakes and reservoirs are generally classed as being oligotrophic (total phosphorus concentration of less than 10 ug/l), mesotrophic (total phosphorus concentrations of 30-80 ug/l), or eutrophic (total phosphorus concentrations of more than 80 ug/l). Lakes or reservoirs having total phosphorus concentrations of at least 100 ug/l are sometimes described as "hypertrophic". Although 86 percent of all Illinois lakes surveyed exhibit eutrophic conditions (Exh. 1, pg. 14), two of the six lakes potentially impacted by this rulemaking may not be classified as eutrophic; a third has not had its trophic state redetermined since its division into two separate impoundments in 1981 (see following). In any event, due to seasonal variations and other factors, the range of phosphorus values from individual samples can overlap; that is a single sample from a eutrophic lake may exhibit a total phosphorus concentration which is also consistent with another trophic status (see Exh. 40, Table III-2, pg. 18).

D. The Nature and Behavior of Phosphorus

Although the hearings in this proceeding were sometimes contentious, there was little disagreement over the Agency's characterization of the behavior of phosphorus in streams and lakes. It was not disputed that "for a typical wastewater discharge to a stream there is a significant increase in instream phosphorus concentration, depending on dilution, followed by a rapid decline in water column concentrations to the point where ambient levels approach the background levels found upstream. This typically occurs within approximately 10 miles under low flow conditions" (Exh. 27, pg. 4; R.39 [7/21/87]).

There was also agreement that the rapid decline in water column concentration of phosphorus was due primarily to dilution. Another factor may be the conversion of phosphorus from one of its dissolved forms into one of the particulate forms. Although the phosphorus standard is (and under the Agency's proposal would continue to be) expressed in terms of total phosphorus (the sum of particulate phosphorus and dissolved phosphorus), measurement is taken of only the water column. The Agency did not suggest that the decline in total phosphorus measurements indicated destruction or conversion of this element. Rather, its Final Comments (PC #10, p.1) suggest that this and other basic EcIS conclusions on phosphorus transport and loading (e.g., that substantially all phosphorus released to a tributary stream eventually reaches the receiving lake or reservoir) are "self-evident".

No commenters disagreed with the Agency characterization of its experiences with small dischargers (or defining small dischargers as all those with flows of less than 2500 population equivalents, or "P.E."). According to the Agency, such facilities find it very difficult and disproportionately expensive to achieve and maintain compliance with the standard using small mechanical facilities (R.20-21 [5/18/87]). Similarly, there was no disagreement with the Agency's assertion that a phosphorus effluent standard less than 1.0 mg/l is technically infeasible (R.13,17-18 [5/18/87]). Finally, there was no opposition to the Agency's exemption of Lake Decatur tributaries, which was based essentially on its short hydraulic retention time: the two other factors cited by the Agency, namely, high turbidity and extensive non-point contributions (R.42 [7/21/87]), are shared to some degree by most of the other five lakes identified in the EcIS as affected under the Agency's proposal (see below).

E. The Impact of the Agency's Proposal

The EcIS determined that there are six lakes which have tributary treatment plants potentially impacted by the Agency's proposal (EcIS report, pg. 2). These are:

1. Crab Orchard Lake
2. Lake Decatur
3. Pistakee Lake
4. Lake Charleston
5. Lake Shelbyville
6. Lake Carlyle

The authors of the EcIS report identified and listed some 38 point sources which are tributary to these six lakes and which are subject to the current standard (Exh. 40, Table II-1, pg. 3). Of these point sources, some 21 are listed as being exempted from the 1.0 mg/l phosphorus standard under the Agency's proposal. These 21 point sources, and the reason(s) for their exemption under the Agency's proposal, are summarized in Table II-2 of Exhibit 40, which table is reproduced below:

TABLE II-2  
Illinois Wastewater Treatment Plants  
Exempted by  
Adoption of Proposed Regulation R87-6  
As of 2/15/88

Lake/WWTP	Reason For Exemption			Phosphorus- Removal Capability
	25 mile Exemption	Increase in P.E. Exemption	Lake Decatur Exemption	
<b>CARLYLE</b>				
CF Industries	x			No
Pana	x			Yes
Shelbyville	x			Yes
<b>CHARLESTON</b>				
Arcola	x			Yes
Tolono	x			No
Tuscola*	x			No
Villa Grove	x			Yes
<b>CRAB ORCHARD</b>				
Crab Orchard NWR		x		No
<b>DECATUR</b>				
Cerro Gordo		x	x	No
Fisher	x	x	x	No
Gibson City	x		x	Yes
Mahomet	x		x	No
Monticello			x	No
Viobin Cirp			x	No
<b>PISTAKEE</b>				
Hebron	x			Yes
<b>SHELBYVILLE</b>				
Arthur	x			No
Bement	x	x		No
Bethany		x		No
Kraft, Inc.	x			No
Urbana-Champr.	x			Yes
US Ind. Chem.	x			No

\* City will combine two existing plants into one new facility.

The gross "benefit" of adopting the Agency's proposal for these 21 sources, in terms of cost savings only, is estimated by the EcIS to amount to \$567,566 per year (Exh. 40, Table XI-2, pg. 102). Actually, since two of these 21 point sources, Kraft, Inc. and Viobin Corp., are shown as having no measurable phosphorus in their effluent, (Exh. 40, Tables VIII-4, pg. 67, and XI-1, pg. 101), the annual benefits are actually spread among the remaining 19 point sources (Exh. 40, Table XI-2, pg. 102). These benefits range from \$9,779 for Bethany to \$136,726 for U.S. Industrial Chemical Company (USICC). No "non-dollar" benefits were identified by the EcIS (Exh. 40, pg. 103).

As Table II-2 of the EcIS report shows, 16 of the 21 sites which would be exempt from the operation of the current standard by adoption of the Agency's proposal would qualify for that exemption by virtue of the 25 miles exemption; four of these 16 sites would also qualify for exemption under one or more of the other criteria changed under the proposal (i.e., the increase in the population equivalents criteria and/or the blanket exclusion for Lake Decatur tributaries). Hence, 12 of these sites (including Kraft, Inc.) would be exempt solely by virtue of the 25 mile exemption.

#### F. Costs vs. Benefits

The authors of the EcIS attempted to assess the costs of adopting the Agency's proposal (Exh. 40, Chapter XII, pgs. 104-116). They considered as "primary costs" the reduction in the quantity and quality of recreational activities associated with each of the affected lakes (Exh. 40, pg. 105); the implicit assumption is that increases in phosphorus loading causes or triggers such reduction in recreational activities. "Secondary costs" were also identified. These include losses of expenditures for sport fishing and other forms of aquatic recreation as well as costs to farmers for obtaining alternatives to those phosphorus-rich wastewater treatment plant sludges used as fertilizer. The report also suggested that other consequences, including impossible-to-quantify costs, may occur (Exh. 40, pg. 105). The report identified no non-monetary costs (Exh. 40, pg. 115).

The EcIS acknowledged that no study had been found which correlates changes in phosphorus concentrations with changes in aquatic recreation under circumstances applicable to Illinois (Exh. 40, pg. 117). It concluded that such scarcity of data precluded any reasonably defensible dollar estimates of cost consequences of adoption of the proposal (Exh. 40, pg. vii and 117). It proposed, in place of such a study, use of a form of break-even analysis, under which the known benefits were correlated with the corresponding reduction in aquatic-related recreation, expressed as "consumer surplus", adopted from Ciecka, James E., et al., An Economic Analysis of Phosphorus Control and Other Aspects of R76-1, Illinois Institute for Environmental Quality, Chicago, 1978 (Exh. 40, pgs. 118-122 and Appendix 13-2, pgs. A13-1 to A13-3). According to this methodology, the reduction required in aquatic-related recreation to exceed anticipated benefits, if one assumes benefits and costs both commence in 1989, is approximately 2.8% for all six lakes, with a range of 0.3% for Lake Pistakee to 15.8% for Lake Charleston (Exh. 40, Table XIII-1, pg. 119). However, the authors argue that costs associated with increased phosphorus loading may not be fully realized for some time, as it can take months and perhaps years for the phosphorus (especially in its

particulate form) to be transported to the receiving lakes or reservoirs and fully assimilated. For the sake of comparison, the EcIS authors calculated and displayed the results of assuming that costs would not begin (manifest themselves) until five years after benefits had begun. Under this set of assumptions, the reduction in aquatic-related recreation necessary to exceed anticipated benefits was calculated to be approximately 3.9% for all six lakes, with a range of from 0.4% for Lake Pistakee to 22.2% for Lake Charleston (Exh. 40, Table XIII-2, pg. 120). Finally, the authors of the EcIS argue that "to determine whether the benefits of adoption exceed the costs, it is not necessary to accurately estimate the resulting decrease in usage". Rather, they suggest, it is necessary only "to determine whether the estimated decrease in usage is less than the break-even percentage" (Exh. 40, pg. 121). The EcIS report does not explain how one can determine whether the "decrease in usage" is less than some value ("break-even percentage") without some estimation of what that "decrease in usage" is.

G. EcIS Conclusions

The EcIS concludes that no significant change in aquatic-related recreation will occur with respect to any of the potentially impacted lakes, except for Lake Shelbyville, where the resulting decrease in recreational usage is described as "un-quantified". Also, "un-quantified" is the change in aquatic-related recreation for all six lakes taken as a whole (Exh. 40, pgs. 121-122). Using the Vollenweider model, the EcIS predicted an average percentage increase in total phosphorus loadings to the receiving lakes resulting from the approval of the Agency's proposal as follows:

<u>Lake</u>	<u>Status</u>	<u>% Increase in P</u>
Crab Orchard	Eutrophic	0.4
Pistakee	Eutrophic	0.5
Decatur	Eutrophic	6.7
Charleston	Eutrophic (?) <sup>1*</sup>	10.5

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\*  
 1 Trophic status of this lake has not been determined since its division into two separate impoundments in 1981.

Shelbyville	Mesotrophic	19.4 (26.9) <sup>2</sup>
Carlyle	Mesotrophic(?) <sup>3</sup>	5.4

(Date for the above graphic was extracted from Exh. 40, pgs. 24,28-29,34,38-39,44,48-49,57,61,66-67,71-73,77,81 and 85-86).

The EcIS conclusions for the lakes which are described as "Eutrophic" are based generally upon the assumption that additions of phosphorus to eutrophic lakes should not cause a biologically significant increase in algal productivity. The EcIS uses virtually identical language with respect to each of the first three lakes, suggesting that the non-effect of additional phosphorus is due to the "already high levels of primary production" (see pgs. 29,38 and 48). It appears to hold that Lake Charleston also falls within this principle, but also characterizes Lake Charleston as more "riverine" than lake-like due to its very short hydrological retention time (Exh. 40, pg. 61) and thus less likely to support high production of algal biomass despite its eutrophic classification. It also appears to suggest that Lakes Decatur and Charleston are more similar to each other than to the other potentially affected lakes, due mainly to their common very low retention times.<sup>4</sup>

The EcIS conclusion for Lake Shelbyville is that the fairly substantial increase in phosphorus loading and chlorophyll a concentration which would be attributable to adoption of the proposal "may be considered a biologically significant increase". (Exh. 40, pg. 72); this conclusion is tempered by the possible effect of unidentified other factors which may be limiting algal productivity. In any event, the lake is described as possibly being in a "transitional stage of eutrophication" (Id). Further complicating the issue is the existence of somewhat contradictory data regarding the phosphorus loading attributable to USICC. Two possible assumptions were identified. "Assumption I" is that the USICC effluent phosphorus concentration is 1.64 mg/l as suggested by USICC's 1981 permit application data. "Assumption II" is that USICC's effluent phosphorus concentration is 5.8 mg/l as suggested by a

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2 Second figure (in parenthesis) is based on more recent but less reliable (single sample) data regarding effluent from USICC. (see page 10).

3 EcIS (pg. 85) states that this lake "can be considered an eutrophic lake, but may also be borderline mesotrophic". This is due to conflicting chlorophyll a and N:P data. Tributaries to Lake Shelbyville are also tributary to this lake, which is downstream from the Shelbyville dam.

4 See Exh. 40, pg. 61. Lake Charleston's mean hydraulic retention time is a fraction of one day; both Exhibit 1 and Exhibit 40 place Lake Decatur's mean hydraulic retention time at 11 days although the Agency's statement (Exh. 27, pg. 6; R.42 [7/21/87] suggests its retention time is 7 days. The Board was unable to locate, in the record of this proceeding or in R83-20 (to which the Agency referred), support for the 7-day assertion.

single-sample value obtained by the Agency in 1987. This difference is described by the EcIS as "significant" (Exh. 40, pgs. 72-73). Simply stated, if Assumption I is utilized, the percent increase in phosphorus loadings to the lake from all sources is 19.4%, while the figure jumps to 28.9% under Assumption II (Exh. 40, pg. 73). Put another way, the Board has calculated that under Assumption I, USICC will contribute a 1.45% increase in phosphorus loadings to Lake Shelbyville if the Agency's proposal is adopted (2063 kg/year divided by 142,131 kg/year); under Assumption II, USICC will contribute a 10.88% increase in phosphorus loading under identical conditions (15,470 kg/year divided by 142,131 kg/year).

As for Lake Carlyle, the EcIS is ambiguous. While suggesting the lake can be considered eutrophic, it notes that a relatively low chlorophyll a level exists, suggesting that phosphorus may not be the limiting factor in algal productivity. Lake Carlyle, it asserts, "may be a lake that is in a delicate balance between mesotrophy and eutrophy" (Exh. 40, pg. 85). The effect of other factors influencing the lake's trophic state is suggested but not quantified by the EcIS. Based on the assumption that one or more such other unidentified factors may be at work in Lake Carlyle, the EcIS concludes that the 5.4% increase in phosphorus loading would have no effect on primary (algal) productivity "unless a change in these limiting factors would occur" (Exh. 40, pg. 86).

It must be remembered that the EcIS' descriptions of trophic states are primarily reflective of the biological production levels of each lake; other phenomena affecting the trophic state of a lake are not equally taken into account. Hence, as the EcIS report acknowledges (pg. 12), "a lake may be defined as eutrophic because of its nutrient status, but in terms of productivity — it may be something less than eutrophic".

Unfortunately, the EcIS provides little in the way of guidance as to either the economic impact of these proposed rules or the appropriate measure of when a particulate point source contributes a significant phosphorus load to a receiving lake or reservoir. It provides no economic impact figures, and its "break-even" analysis formula lacked meaningful numbers to plug into the equation. The Board cannot comprehend how one can, as the EcIS suggests (pg. 121) "determine whether the resulting decrease in usage is more or less than the break-even percentage" if one does not or cannot estimate that resulting decrease in usage. Neither the EcIS nor any other exhibit or testimony attempted to substantiate its conclusions regarding loss of aquatic-related recreation except to the extent that all eutrophic lakes were essentially lumped together as experiencing "no significant change". All other conclusions regarding loss of such use were "un-quantified".

### Board Conclusions

The Board notes that the Record of this proceeding does not provide the Board with unambiguous data on the role of phosphorus, (particularly measured as total phosphorus in the water column) in the eutrophication of lakes generally. Neither for that matter, does it provide solid data needed to assess the impact and contribution of phosphorus to the trophic status of any of the six lakes discussed at length in the EcIS. Absent such data, it is

very difficult to project the consequences of increasing phosphorus loadings as suggested by the Agency's proposal. However, there is little to suggest that phosphorus is not at least useful in broad general terms in gauging the nutrient load tributary to a lake. Since there is ample support on the record for the notion that control of phosphorus is effective to control such nutrient loading, the Board will (as have most of the commenters) presume that, all other factors being equal, phosphorus is the limiting factor in eutrophication. This presumption, of course, can be overcome by other factors. As more information become known about the eutrophication dynamics of specific lakes and reservoirs in Illinois, it may be necessary to reconsider this position.

Within these limitations, the Board finds that the Agency has amply demonstrated the wisdom of applying a 1.0 mg/l effluent phosphorus as P standard upon all point sources of 2500 P.E. or more located within 25 miles of a 20-acre or larger lake or reservoir. The testimony demonstrates that the 1.0 mg/l standard is attainable using conventional treatment, and that phosphorus control for point sources of less than 2500 P.E. is uncertain, expensive and difficult. The Board also believes that the treatment requirement for all dischargers within 25 miles is warranted based on the Agency's data showing that phosphorus from nearby point sources is more likely to reach the lake in the more readily available dissolved phosphorus form for immediate algae uptake than is the phosphorus from more distant dischargers. Exemption of tributaries to Lake Decatur appears warranted, due primarily to its short hydraulic retention time, although the record is not absolutely clear on that point.

The Board is not, however, satisfied that the Agency has demonstrated that significant point sources of phosphorus which happen to be located more than 25 miles from a lake can be generally ignored by these phosphorus rules. First, what little is known of the six impacted lakes from the record of the proceeding suggests that, at least in some cases, particulate phosphorus could have a significant impact on trophic status. At least two of the lakes are classified as mesotrophic. One of these is described in the EcIS as "transitional", the other as possibly being in a "delicate balance between mesotrophy and eutrophy". This suggests to the Board that even small changes in phosphorus loading could be critical. When other factors are considered, one or more of the other four lakes potentially impacted by this rulemaking may prove either not to be eutrophic or to be similarly "transitional" or "balanced" (e.g., Lake Charleston, for which no current data exists, and Lake Decatur, which was described by the EcIS report in docket R83-20 [Exh. 4(a), pg. 99] as being non-eutrophic). Second, no exhibit or testimony was offered to challenge the EcIS assumption that substantially all phosphorus released in an effluent eventually reaches the downstream lake or reservoir. Third, no exhibit or testimony was offered to challenge the concept that particulate phosphorus may, through the processes of internal regeneration, be converted back into the dissolved form through anoxic, aerobic and other processes. Indeed, the Agency stated that such internal regeneration can be a "significant factor" in lake eutrophication (Exh. 1, pgs. 6-8, 34-38 and 54). This is a view evidently shared by Dr. Derr (Exh. 32, pg. 2) and DENR (Exh. 40, pg.15).

The foregoing suggests to the Board that distance alone is not dispositive as to the need for phosphorus controls on a point source. The record contains numerous unchallenged assertions that additional study is needed in order to understand the specific dynamics of eutrophication on a lake-by-lake basis (R.16 [5/18/87]; Exh. 1, pg. 57; exh. 7; Exh. 40, pgs. 128-131). Absent such understanding, the record suggests that the role and relative impact of particulate phosphorus (from any significant source, including sources more than 25 miles distant) on the water quality of a given lake cannot be readily determined. The record affirms (e.g., Exh. 29, R.61-64 [7/21/87]) that internal regeneration of phosphorus can be critical.

There remains the thorny issue of what constitutes a significant individual point source contribution to a lake's overall phosphorus loading. The EcIS reveals that at least one measure, the potential untreated phosphorus loading from a given point source relative to the overall potential phosphorus loading of the receiving lake, is supported by the record. The EcIS indicates that only a handful of point sources (7) more than 25 miles upstream of the receiving lakes potentially contribute more than 3% of the total phosphorus loading to such lakes. Two of these (Urbana-Champaign and USICC) are tributary to Lake Shelbyville and, by extension, to Lake Carlyle, the lakes of obvious greatest concern to the authors of the EcIS. Since the EcIS suggests, and the Agency does not deny, that relatively small contributions to a mesotrophic lake might result in eutrophic conditions, it would seem prudent and fully supported by the record to at least include within the standard those point sources which have been identified as sizeable or significant. In this case, the EcIS has noted the importance of USICC's daily flow of 2.336 million gallons per day as the third-largest point source potentially affected by these rules; it further describes the range of variables in that discharge as "significant". The Board notes that under either "Assumption I" or "Assumption II" (see above), the relative contribution of USICC is at least 3% (actually, under Assumption I, 3.1%). The Board finds that 3% is therefore a reasonable measure of "significance".

It is also apparent to the Board that, insofar as is known, Lake Charleston has characteristics similar to those of Lake Decatur. Their common distinguishing feature is their relatively low hydraulic retention times. If, as the Agency suggests, sources tributary to Lake Decatur should be exempted, there appears to be no reason to not exempt sources tributary to Lake Charleston or any other lake exhibiting such "riverine" traits. The Board will, therefore, so frame this proposal as to exclude sources tributary to lakes having short retention times. The Board finds that a retention time of 18 days (0.05 years) or less is a reasonable standard, consistent with the Agency's pronouncements and its exhibits in this proceeding, particularly Exhibit 7.

Finally, the Board declines to adopt the July 1, 1988 deadline as proposed by the Agency in its subsection (d)(2) of Section 304.123, and which the Agency states is federally mandated. The Board does so for three reasons. First, the date is manifestly impossible to attain; because of procedural requirements the proceedings in this docket were not capable of being completed until after July 1, 1988. Second, this date may be subject to unilateral modification and can cause confusion. The Board notes that the

regulatory compliance dates for combined sewer overflows (35 Ill. Adm. Code 306.306) were also derived from such administrative deadlines, which deadlines have long since been superseded. Third, any enforceability of the date derives from the Act, so the Board's language is unnecessary. Therefore, as a matter of practice, the Board is reluctant to embed such requirements in its regulations. The Board considered removing this subsection, now subsection (e)(2), in its entirety, consistent with its view that whatever authority the Agency may have to condition its permits in this regard is derived from the Act, rather than from Board rules. It should thus be understood that the reference in (e)(2) to compliance dates "as required by NPDES permit" is intended by the Board as purely informational rather than as a purported delegation of authority to the Agency by Board rule. The Board requests comment as to whether the inclusion of (e)(2), in whole or in part is appropriate (see below for provision of comment period).

The proposed rules which the Board today proposes for second notice should be understood as interim measures, representing an accommodation of the needs expressed by the Agency, but limited to the relief actually justified by the record of this proceeding. It is the Board's wish that the requisite studies of individual lake eutrophication dynamics be undertaken by the Agency and/or DENR promptly. The results of such studies should pave the way for further refinements in the phosphorus standards or, indeed, for framing a regulation that addresses limiting factors other than phosphorus, if appropriate to the dynamics of individual lakes.

Because these proposed rules are interim measures, the Board cautions that those dischargers which under this proposal would be relieved from the necessity of installing or maintaining phosphorus control facilities should not rush to dismantle any such facilities now in place or in progress; it is clear to the Board that one possible outcome of future lake studies is that phosphorus/nutrient control requirements may be reinstated on a lake-by-lake basis.

Due to the differences between the amendments as proposed by the Board and as proposed by the Agency, the Board will defer "Second Notice" filing of this proposal with the Joint Committee On Administrative Rules to allow interested participants opportunity to comment. Such comments should be in writing and must be received by the Board by Monday, January 23, 1989. Such comments should be limited to the differences between the respective versions of the amendments and should be limited to matters of record in this proceeding.

#### ORDER

The Board hereby proposes the following proposed amendments for Second Notice, which is to be filed with the Joint Committee on Administrative Rules.

TITLE 35: ENVIRONMENTAL PROTECTION  
SUBTITLE C: WATER POLLUTION  
CHAPTER I: POLLUTION CONTROL BOARD

PART 304  
EFFLUENT STANDARDS  
SUBPART A: GENERAL EFFLUENT STANDARDS

Section	
304.101	Preamble
304.102	Dilution
304.103	Background Concentrations
304.104	Averaging
304.105	Violation of Water Quality Standards
304.106	Offensive Discharges
304.120	Deoxygenating Wastes
304.121	Bacteria
304.122	Nitrogen (STORET number 00610)
304.123	Phosphorus (STORET number 00665)
304.124	Additional Contaminants
304.125	pH
304.126	Mercury
304.140	Delays in Upgrading
304.141	NPDES Effluent Standards
304.142	New Source Performance Standards (repealed)

SUBPART B: SITE SPECIFIC RULES AND EXCEPTIONS  
NOT OF GENERAL APPLICABILITY

Section	
304.201	Calumet Treatment Plant Cyanide Discharges
304.202	Chlor-alkali Mercury Discharges in St. Clair County
304.203	Copper Discharges by Olin Corporation
304.204	Schoenberger Creek: Groundwater Discharges
304.205	John Deere Foundry Discharges
304.206	Alton Water Company Treatment Plant Discharges
304.207	Galesburg Sanitary District Deoxygenating Wastes Discharges
304.208	City of Lockport Treatment Plant Discharges
304.209	Wood River Station Total Suspended Solids Discharges
304.212	Sanitary District of Decatur Discharges
304.213	Union Oil Refinery Ammonia Discharge
304.214	Mobil Oil Refinery Ammonia Discharge

SUBPART C: TEMPORARY EFFLUENT STANDARDS

Section	
304.301	Exception for Ammonia Nitrogen Water Quality Violations

Appendix A	References to Previous Rules
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AUTHORITY: Implementing Section 13 and authorized by Section 27 of the Environmental Protection Act (Ill. Rev. Stat. 1981, ch. 111-1/2, pars 1013 and 1027)

SOURCE: Filed with the Secretary of State January 1, 1978; amended at 2 Ill. Reg. 30, p. 343, effective July 27, 1978; amended at 2 Ill. Reg. 44, p. 151, effective November 2, 1978; amended at 3 Ill. Reg. 20 p. 95, effective May 17, 1979; amended at 3 Ill. Reg. 25 p. 190, effective June 21, 1979; amended at 4 Ill. Reg. 20, p. 53, effective May 7, 1980; amended at 6 Ill. Reg. 563, effective December 24, 1981; codified at 6 Ill. Reg. 7818, amended at 6 Ill. Reg. 11161, effective September 7, 1982; amended at 6 Ill. Reg. 13750 effective October 26, 1982; amended at 7 Ill. Reg. 3020, effective March 4, 1983; amended at 7 Ill. Reg. 8111, effective June 23, 1983; amended at 7 Ill. Reg. 14515, effective October 14, 1983; amended at 7 Ill. Reg. 14910, effective November 14, 1983; amended at 8 Ill. Reg. 1600, effective January 18, 1984; amended at 8 Ill. Reg. 3687, effective March 14, 1984; amended at 8 Ill. Reg. 8237, effective June 8, 1984; amended at 9 Ill. Reg. 1379, effective January 21, 1985; amended at 9 Ill. Reg. 4510, effective March 22, 1985; peremptory amendment at 10 Ill. Reg. 456, effective December 23, 1985; amended at 11 Ill. Reg. 3117, effective January 28, 1987; amended in R84-13 at 11 Ill. Reg. 7291, effective April 3, 1987; amended in R86-17(A) at 11 Ill. Reg. 14748, effective August 24, 1987; amended in R84-16 at 12 Ill. Reg. 2445, effective January 15, 1988; amended in R87-6 at \_\_\_\_\_ Ill. Reg. \_\_\_\_\_, effective \_\_\_\_\_.

Section 304.123 Phosphorus (STORET number 00665)

- a) No effluent discharge within the Lake Michigan Basin shall contain more than 1.0 mg/l of phosphorus as P.
- b) No effluent from any source which discharges within the Fox River Basin above and including Pistakee Lake and whose untreated waste load is 1500 or more population equivalents shall contain more than 1.0 mg/l of phosphorus as P.
- c) No effluent from any source which discharges to a lake or reservoir with a surface area of 8.1 hectares (20 acres) or more or to any tributary to such a lake or reservoir and whose untreated waste load is 5000 or more population equivalents shall contain more than 1.0 mg/l of phosphorus as P.
- d) No effluent from any source which discharge to a lake or reservoir with a surface area of 8.1 hectares (20 acres) or more which does not comply with Section 302.205 or to any tributary to such a lake or reservoir and whose untreated waste load is 1500 or more population equivalents and which is not governed by Sections 304.120(a) or 304.120(c) shall contain more than 1.0 mg/l of phosphorus as P.
- b) No effluent from any source which discharges to a lake or reservoir with a surface area of 8.1 hectares (20 acres) or more, or to any tributary of such a lake or reservoir within 10.25 kilometers (25 miles) of the point where the tributary enters the lake or reservoir, whose untreated waste load is 2500 or more population equivalents, and which does not utilize a third-stage lagoon treatment system as specified in Sections 304.120(a) and (c), shall exceed 1.0 mg/l of phosphorus as P.

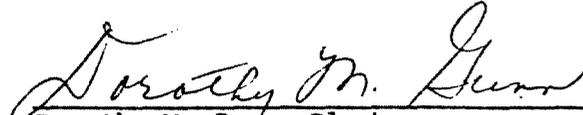
- c) No effluent from any source which discharges to a lake or reservoir with a surface area of 8.1 hectares (20 acres) or more, or to any tributary of such a lake or reservoir beyond 10.25 kilometers (25 miles) of the point where the tributary enters the lake or reservoir, whose untreated waste load is 2500 or more population equivalents, and which does not utilize a third-stage lagoon treatment system as specified in Sections 304.120(a) and (c), shall exceed 1.0 mg/l of phosphorus as P.; however, this subsection (c) shall not apply:
- 1) Where the lake or reservoir on an annual basis exhibits a mean hydraulic retention time of 0.05 years (18 days) or less; or
  - 2) Where effluent, if untreated for removal of phosphorus, would contribute less than 3% of the phosphorus loading of all tributaries to such lake or reservoir, including non-point sources.
- e)d) For the purpose of this Section the term "lake or reservoir" shall not include low level pools constructed in free flowing streams or any body of water which is an integral part of an operation which includes the application of sludge on land.
- f) Compliance with the limitations of paragraph (c) shall be achieved by the following dates:
- 1) New sources shall comply on the effective date of this regulation; and
  - 2) Existing sources shall comply by December 31, 1980, or such other date as required by NPDES permit, or as ordered by the Board under Title VIII or Title IX of the Act.
- g) Compliance with the limitations of paragraph (d) shall be achieved by December 31, 1985, or such other date as required by NPDES permit, or as ordered by the Board under Title VIII or Title IX of the Act.
- de) Compliance with the limitations of paragraph (b) shall be achieved by the following dates:
- 1) Sources with the present capability to comply shall do so on the effective date of this regulation;
  - 2) All other sources shall comply as required by NPDES permit.

(SOURCE: Amended at \_\_\_\_\_ Ill. Reg. \_\_\_\_\_,  
effective \_\_\_\_\_)

IT IS SO ORDERED.

B. Forcade and J. T. Meyer dissented.

I, Dorothy M. Gunn, Clerk of the Illinois Pollution Control Board, hereby certify that the above Proposed Opinion and Order was adopted on the 15<sup>th</sup> day of December, 1988, by a vote of 5-2.

  
Dorothy M. Gunn, Clerk  
Illinois Pollution Control Board