

Commission (ORSANCO), to which Illinois is a party, to govern the entire river. They appear to be related both to actual temperature records (R. 9) and to maximum permissible temperatures consistent with the successful maintenance of the natural biota, as determined by federal biologists (R. 51-55). The necessity for monthly maximum temperatures in addition to the general 5°-rise limitation was well explained by the statement of Dr. Donald Mount, Director of the National Water Quality Laboratory:

Experimental evidence is convincing that the temperature providing best growth of fishes is but a few degrees cooler than a lethal temperature. For this reason, specified permissible maximum temperatures must be adhered to. . . . Even though channel catfish are a bottom dwelling animal, the newly hatched fry stay at the surface for several days before moving to the bottom. Water that is too warm at the surface during that period will completely destroy the year class. This provides ample reason to adhere to the temperature limits prescribed and explains why operation of cooling devices for even a few days warrants their cost of construction. (R. 49-50, 54).

In short, the principle of maximum temperatures, already recognized in the Illinois regulations, is essentially an analog to the familiar regulations prescribing special emission reductions during air pollution emergencies. It does no good to preserve a fish population for the bulk of the year and then to snuff them out or to destroy a year's crop of young. We agree that maxima must be provided.

There was objection to the suggested monthly maxima on the ground they might, as Dr. Mount implied, require expensive construction of standby facilities or result in plant shutdowns during emergencies (R. 96). And so they might, but so might the existing standards. A comparison between the existing and the proposed maxima demonstrates the likelihood that anyone with such a problem under the federal proposal would have a similar problem under the present law:

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Proposed Ohio (°F.)	50	50	60	70	80	87	89	90	87	79	70	57
Proposed Wabash (°F.)	50	50	60	70	80	90	90	90	90	70	70	57
Present (°F.)	60	60	60	90	90	90	90	90	90	90	90	60

Given the fact that summer temperatures in these rivers naturally have reached 93° on occasion (R. 39), it seems clear that the present regulations already impose on dischargers the duty to provide assurance that temperatures at times will not be raised above the natural. Whether this must be achieved

once in three years or twice in one, if such a comparison could here be made, seems not very material, since the crux of the objection is that it is unreasonable to require such assurance at all. In short we find that the changes suggested by USEPA, while affording more precise protection to the environment, do not have a significantly different effect upon those discharging heated effluent than have the existing regulations. Much is made of the fact that the maxima change abruptly at the end of each month (R. 15, 88), but the present standard is more abrupt yet, since it changes by thirty degrees in a single day. Short of an unwieldy table with 365 different maxima, we think it would be difficult to improve on the proposed table in this regard.

Also the subject of contention at the hearing was the provision specifying that the 5°-rise limit and monthly maxima be met within no more than 600' from the point of discharge (R. 106, 108, 116-17). One witness argued that 1000' would be required to avoid expensive cooling devices in generating stations of over 600 mw and that the larger zone would not be harmful to the water as a whole. Another urged that no mixing zone at all be provided, apparently intending either, as in the Indiana regulation, that opportunity be given for "reasonable admixture," or that stream temperature be computed on the assumption of complete mixing. Neither of these modifications would be acceptable. Complete mixing would allow virtually all the river to be raised above the standard, so long as at some point distant in time and space it could theoretically be expected to return to normal. And "reasonable admixture" would be too imprecise a standard either for enforcement purposes or for the guidance of those who must design and operate facilities for the control of heated discharges. It is our obligation to specify clearly what area, if any, is exempt from the standards.

It would of course be possible to do without mixing zones and to require that water quality standards be met at every point in the stream. This is obviously a desirable goal. It would require, as we have proposed (#R 70-8) for a number of toxic contaminants, that effluents discharged themselves meet the standards for the receiving stream. But such a requirement would have its costs, for it would sharply restrict the use of the streams for purposes of cooling and of waste assimilation. The concept of the mixing zone is a compromise designed to allow relatively small portions of a stream to be degraded below desirable conditions in order to reduce the cost of pollution control.

This compromise is built into the existing regulations SWB-9 and SWB-10, which provide that water quality standards must be met everywhere except "immediately adjacent to outfalls" and after opportunity for "admixture" of stream and effluent. No figures specifying the size of the exempted area appear in the regulations themselves, but in order to provide guidelines for design and enforcement the Technical Secretary of the Sanitary Water Board, which adopted the regulations, issued an interpretation of

the rules in Technical Release 20-22, which provides that reasonable admixture is deemed to occur within 600' from the outfall. In re Commonwealth Edison Co. (Dresden), # 70-21 (March 3, 1971), this Board held that it would adhere to the Technical Secretary's interpretation of the size of the mixing zone in the comparable regulations SWB-8, governing the Illinois River. Thus the present proposal to specify a 600' zone is nothing more than a restatement of the present law as it has been construed by this Board.

We are aware that the 600' zone may or may not be the ultimate best provision on this subject. For one thing, it was apparently based upon a misconception as to the distance within which heat from a rather large electric plant could be dissipated without special cooling devices (R. 27). Whether that criterion, with or without the misconception, is appropriate is another question, depending on the cost of cooling methods and the effect of zones of that size upon the particular stream. Moreover, a complete program of protection against thermal pollution must consider not only the area of an individual mixing zone but the number of zones:

The observations emphasize the need for better conditions in the bulk of the receiving water than exist in the plume. The fish are found to leave the plume because it is unsuitable, and obviously it follows that they must find a cooler place to go. (R. 51).

Further, consideration must be given to forbidding zones that block passage up or down a stream, and to special provisions for avoiding interference with spawning grounds, the shore, or the bottom (R. 6-7, 56-57). Some of these considerations have been incorporated into our new Lake Michigan thermal standards, #R 70-2; and some have been made part of the regulation adopted today.

We recognize therefore the desirability of further reexamination of the standards today adopted. Indeed we have already begun hearings on a comprehensive proposal (#R71-14) to overhaul and restate the entire package of water pollution regulations, and additional provisions regarding thermal pollution are included. These hearings will afford an ample opportunity to revisit the troublesome question of the mixing zone as well as the monthly maximum figures. In the meantime we have insufficient basis for altering the present law as to the 600' mixing zone, and we therefore continue it in effect by adopting the proposed Ohio and Wabash standard.

We are asked to provide that the standard apply to a 24-hour average temperature, rather than to a single sample (R. 91-92). Once again we are unwilling at this point to change the present law without more proof, especially since to require evidence of such an average temperature might impose quite an impracticable burden on the enforcement process.

On the other hand we think it wise to permit monthly maximum temperatures to be exceeded by not more than 3°, so long as the 5°-rise limit is adhered to, for time periods too brief to have biological significance, and we have added a provision to that effect. We have also, for reasons given in the Mississippi case, added a provision specifying that the monthly maxima are to be met in the main part of the river, believing this will afford adequate protection against excessive temperatures in the naturally warmer shallow backwaters.

The Illinois Environmental Protection Agency, while generally acceding to the proposed standard, asks that we make it applicable to new sources only (R. 11) and that we couple it with an ORSANCO formula for determining permissible discharges (R. 6, 21-22). We decline to do so. The present standard applies to existing sources; we see no reason why the new one, which as we have said is not substantially different, should not do so too. And the ORSANCO formula has not been shown to assure that the water quality standards will be met at the edge of the mixing zone. The formula may be an acceptable means of defining a mixing zone otherwise unspecified, but it has not been shown to fit with our standard, and whether it adequately provides for emergency situations is unclear. This question too can be further explored in future.

One final point must be considered. One witness questioned our authority to regulate the Ohio River on the ground that it lies entirely in Kentucky, the state line falling at the low-water mark on the Illinois side (R. 116-17). We disagree. Illinois has long had water quality standards for the Ohio, and federal law requires that we have if we are to receive full federal funding for sewage treatment plants, concededly our responsibility, that discharge into that river. We have a duty to Kentucky and other river states to limit pollution of the Ohio from Illinois sources, and the statute expresses the state's strong policy of protecting the quality of border waters for the benefit of Illinois citizens who use them and for the protection of riparian interests of Illinois landowners. Section 13 of the Act authorizes the adoption of water quality standards for all "waters," and "waters" are specifically defined to include not only those which "are wholly or partially within" or "flow through" Illinois, but also those which "border upon this State" (section 3(o)). Our statutory power is clear, and the strong and obvious interests of Illinois in the condition of this bordering stream are ample to sustain the constitutionality of our jurisdiction.

In sum we think it appropriate, pending further review of the entire thermal pollution issue in pending hearings, to assure the provision of federal funds for sewage treatment plant construction by adopting the monthly maximum temperatures proposed by USEPA for the Ohio and Wabash Rivers, and in other respects to preserve

existing law. The amendment, as we have said, should afford more precise protection to the biota without imposing any significant new burden on those utilizing the streams for cooling purposes.

As in other cases, we also require that the effects of new large sources be studied and that correction be made if significant harm is shown. The present standards are based on current knowledge, which is incomplete; we must review them in the light of future learning.

ORDER

- I. Rule 1.05c of Rules and Regulations SWB-9 and SWB-10 are hereby amended to read as follows:

All sources of heated effluents shall meet the following restrictions outside of a mixing zone which shall extend no farther in any direction from an effluent discharge than 600 feet. The mixing zone shall include no more than one-fourth of the cross sectional area of the river nor shall it, at any time, extend to more than one-half of the surface of any river sector.

A. There shall be no abnormal temperature changes that may affect aquatic life unless caused by natural conditions.

B. The normal daily and seasonal temperature fluctuations that existed before the addition of heat due to other than natural causes shall be maintained.

C. The maximum temperature rise at any time or place above natural temperatures shall not exceed 5°F.

D. In addition, the water temperature at representative locations in the main river shall not exceed the maximum limits in the following table during more than one percent of the hours in the 12-month period ending with any month. Moreover, at no time shall the water temperature at such locations exceed the maximum limits in the following table by more than 3°F.

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.
Ohio River(°F)	50°	50°	60°	70°	80°	87°	89°	89°	87°	78°	70°	57°
Wabash River & Other Interstate Tributaries (°F)	50°	50°	60°	70°	80°	90°	90°	90°	90°	78°	70°	57°

Main river temperatures are temperatures of those portions of the river essentially similar to and following the same thermal regime as the temperatures of the main flow of the river.

- II. A. The owner or operator of a source of heated effluent which discharges 0.5 billion British thermal units per hour or more shall demonstrate in a hearing before this Board not less than 5 nor more than 6 years after the effective date of these regulations or, in the case of new sources, after the commencement of operation, that discharges from that source have not caused and cannot be reasonably expected to cause significant ecological damage to the River. If such proof is not made to the satisfaction of the Board appropriate corrective measures shall be ordered to be taken within a reasonable time as determined by the Board.
- B. Permits for heated effluent discharges, whether issued by the Board or the Environmental Protection Agency shall be subject to revision in the event that reasonable future development creates a need for reallocation of the assimilative capacity of the river as defined in the regulation above.
- C. The owner or operator of a source of heated effluent shall maintain such records and conduct such studies of the effluents from such source and of their effects as may be required by the Environmental Protection Agency or in any permit granted under the Environmental Protection Act.
- D. Appropriate corrective measures will be required if, upon complaint filed in accordance with Board rules, it is found at any time that any heated effluent causes significant ecological damage to the River.
- III. Paragraph 4 of Rule 1.08 of SWB-9 and SWB-10 is hereby repealed.