UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

MAY 2 1977

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MEMORANDUM

TO: General Counsel (A-130)

FROM: Deputy Assistant Administrator for Water Enforcement (EN-335)

SUBJECT: Use of In-Stream Mechanical Aerators to Meet Water Quality Standards

The Office of Water Enforcement has reviewed your memorandum regarding the use of in-stream aerators to meet water quality standards. You suggested two alternatives that may be considered. They were 1) categorically forbid the use of such devices; or 2) view aerators as analogous to low flow augmentation for maintaining water quality.

By addressing the low flow analogy, it may be shown that the alternative of forbidding the use of in-stream aerators is the proper action. Technically low flow augmentation is not analogous to in-stream aeration. Although, the end result (i.e., maintenance of the minimum dissolved oxygen level specified in the water quality standards) may be the same, the physical conditions of the stream are different. Low flow augmentation creates a constant regulated flow, and the point within the stream where minimum water quality will occur remains static. In-stream aeration, to be efficient, must be applied at a point where the difference between the saturation concentration for dissolved oxygen and the actual concentration in the stream approaches a maximum. Unregulated flows in the stream will cause this point to move upstream or downstream, since the biochemical oxygen demand is time-dependent and the location of the demand will vary according to the velocity of the stream. In a given stream the natural reaeration also varies with flow, as the turbulence is an important factor. Therefore, the point of greatest difference in dissolved oxygen concentration as described above, may not only be remote from the point of discharge but also vary in distance from the point of discharge relative to the actual flow and velocity conditions in the stream. It is conceivable that an aerator would have to be operated and maintained in another state or jurisdiction to be cost-effective.

A combination of flow regulation and in-stream aeration may result in a fixed point for control, but this point could also be outside the control of the discharger or local government. One situation where in-stream aeration could be effective and possibly regulated through the permit mechanism would occur when the discharge was to a reservoir or an extremely sluggish stream. This would create a condition analogous to an aeration basin in a waste treatment facility where the BOD is stabilized under controlled conditions prior to being discharged. The problem with this approach is that there is no enforcement mechanism to protect the water quality. The other alternative would be to issue a permit, to the owner/operator of the aerator, containing in-stream limitations (i.e., that the water quality downstream of the aerator may not exceed a maximum BOD and a minimum dissolved oxygen).

The use of in-stream aerators, to maintain water quality standards, following the application of BAT is not recommended for the following reasons:

1) The BOD-dissolved oxygen relationship in the receiving waters is a dynamic process that is difficult to predict because of the many variables that must be considered. This is not the case when low-flow augmentation is used to reduce the concentration of a non-degradable substance (e.g. a metal) in the stream since the resultant concentration after discharge is inversely proportional to the stream flow.

2) Monitoring of the effluent following BAT would not assure that water quality standards were being maintained.

3) The in-stream aerators may be located where the discharger would not have control over them or operation and maintenance could suffer because of remoteness.

4) It is highly speculative whether the permit could be conditioned to make enforcement a clear-cut action.

In-stream aerators should not be recognized as being analogous to low-flow augmentation. Therefore, the Office of Enforcement recommends that the use of these aerators as a means of achieving water quality standards following BAT be denied.

Jeffrey G. Miller

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Revised:JAGrafton:blh 4/7/77

CONCURRENCES

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