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Clean Water, Dirty Dams: Oxygen Depletion and the Clean Water Act*

John Wilson Attey†
Drew Randall Liebert††

INTRODUCTION

As with most environmental regulation, the federal government only recently began exercising control over water pollution problems. Although the Federal Water Pollution Control Act (FWPCA) dates back to 1948,1 Congress did not take forceful action to deal with the public outcry over increasingly polluted waterways until little more than a decade ago.2 In 1972, Congress amended the FWCPA, renamed the statute the Clean Water Act (CWA),3 and, for the first time, preempted the states in regulating water pollution.4

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* An earlier draft of this Comment received Honorable Mention in the 1984 Ellis J. Harmon Environmental Law Writing Competition.
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2. It took several well-publicized ecological disasters before Congress finally agreed to preempt the states’ traditional control over water pollution within their boundaries. In the 1950s and 1960s, for example, steel and chemical factories discharged some 155 tons of wastes a day into Ohio’s Cuyahoga River. Flammable gas from decaying organic matter bubbled to the river’s surface. In 1959, the river actually caught fire and burned for over a week. A decade later, it burst into flames again. Widespread media attention led to massive public pressure on Congress for a federal response to such water pollution tragedies. See Brodie, The Clean Water Act: New Threats From Toxic Wastes Demand A Stronger Law, THE SIERRA CLUB BULLETIN, Sept.-Oct. 1983, at 39-45.
5. Prior to 1972 the FWPCA prescribed a regulatory system consisting of state devel-
The primary goal of the CWA is "to restore and maintain the chemical, physical and biological integrity of the Nation's waterways." One measure of that integrity is the dissolved oxygen content of water, since oxygen is necessary for the survival of aquatic life. This oxygen content can be dangerously altered by the structure of dams and hydroelectric power plants.

However, the Eighth Circuit and the District of Columbia Courts of Appeals, recently held that Congress did not intend to regulate the destructive discharges of dams under the CWA. This Comment suggests that the decisions reached by these courts in *Missouri v. Dept. of the Army* and *National Wildlife Federation v. Gorsuch (Gorsuch II)* are ominous threats to the economic viability and biological integrity of the nation's waterways. Part I of this Comment briefly describes the relationship of dissolved oxygen to water quality and explains how dams and hydroelectric facilities pollute the surrounding waters. Part II examines the holdings of the two circuit court opinions noted above. Part III argues that only one lower court decision, *National Wildlife Federation v. Gorsuch (Gorsuch I)*, later reversed in *Gorsuch II*, followed the correct course of judicial reasoning. The Comment reaches this conclusion by analyzing the provisions of the CWA which define "pollution," "point source," and "addition of a pollutant." Finally, Part IV of this Comment suggests possible solutions to counter the unsatisfactory results reached by the circuit courts. Actions by both Congress and the Environmental Protection Agency (EPA) are proposed in

7. See infra text accompanying note 14.
8. See, e.g., MARYLAND DEPARTMENT OF NATURAL RESOURCES: TIDAL FISHERIES DIVISION, SUSQUEHANA RIVER FISH KILL OF JULY 8, 1980 (1980). In this report, the state's tidewater administration stated that:

A fish mortality involving white perch, striped bass, Atlantic menhaden, and carp, occurred in the Susquehanna River below Conowingo Dam sometime during the period from sunset on July 7, 1980 to sunrise on July 9, 1980. An estimated 16,959 white perch, 1310 striped bass, 1208 menhaden and 162 carp died between 0300 and 1500 hours on July 8, 1980. Low levels of dissolved oxygen is believed to be the cause of the mortality . . . .

*Id.* (emphasis added). See also, R. MITCHELL, INTRODUCTION TO ENVIRONMENTAL MICROBIOLOGY 138 (1974). In 1979, for example, 87 fish kills occurred in Missouri (claiming over 300,000 fish), and as many as 42 of these were due to oxygen depletion.

10. 693 F.2d 156 (D.C. Cir. 1982).
order to ensure that environmental degradation and the tragic fish kills caused by dams and hydroelectric power plants are prevented.

I

DISSOLVED OXYGEN LEVELS AND WATER POLLUTION

Oxygen levels in the nation’s streams, lakes and rivers must remain in a delicate balance to sustain fish and other aquatic life. These organisms need oxygen to survive. When the dissolved oxygen content of the water is reduced, certain types of fish are replaced by pollution-resistant, lower orders of fish, such as carp.\textsuperscript{12} If all the dissolved oxygen is used, anaerobic (without air) decomposition occurs. Rather than releasing carbon dioxide, anaerobic decomposition releases methane or hydrogen sulfide, which turns the water dark and smelly.\textsuperscript{13}

A dam or hydroelectric facility can upset the oxygen balance by impounding a free-flowing stream and creating a lake (the reservoir). Lakes are subject to thermal stratification, which causes oxygen depletion.\textsuperscript{14} The process of oxygen depletion begins as the sun heats the surface of the lake to a higher temperature than the deeper water. Since warmer water is less dense, it tends to stay at the top of the reservoir, separate from the deeper water. In the summer, when the temperature difference is the greatest, the water becomes stratified into two distinct layers. The upper layer is called the epilimnion, the lower layer the hypolimnion.\textsuperscript{15}

Thermal stratification creates a barrier which cuts off the hypolimnion from the epilimnion and the atmosphere. Little or no sunlight penetrates to the hypolimnion, inhibiting photosynthesis, a primary form of reaeration.\textsuperscript{16} The respiration and decomposition of animals, bacteria, and algae continues, resulting in a net consumption and loss of oxygen. Since the hypolimnion cannot mix with the reaerated waters of the epilimnion, the lower level may become anaerobic or, at a minimum, oxygen poor.\textsuperscript{17}

A dam contributes to the problem of oxygen depletion by directing


\textsuperscript{13} Id.

\textsuperscript{14} Smalley & Novak, Natural Thermal Phenomena Associated with Reservoirs, in Environmental Effects of Large Dams 37 (Committee on Environmental Effects of the United States Committee of the International Commission on Large Dams 1978) [hereinafter cited as Large Dams].

\textsuperscript{15} The stratified condition will exist until the surface water cools in the fall and the two layers mix. By the time the mixing occurs, however, the reservoir may have been stratified for up to five months. Id. at 32.

\textsuperscript{16} Reaeration is “the absorption of oxygen into water under conditions of oxygen deficiency.” American Public Health Association, Glossary: Water and Wastewater Control Engineering 299 (3d ed. 1981).

\textsuperscript{17} Large Dams, supra note 14, at 37.
reservoir discharges to certain points in the body of water. A dam’s outlet may be in the hypolimnion layer. Unlike discharges from natural lakes, dam discharges into the deep hypolimnion layer result in the discharge of water low in dissolved oxygen. Low levels often extend for many miles downstream from the reservoir. Thus dam discharges radically increase the process of oxygen depletion and present grave dangers to aquatic life.

Impoundment of water creates additional environmental problems. A reservoir collects oxygen-demanding materials which normally travel downstream in a free-flowing river. These organic materials sink directly to the bottom of the lake and oxygen is consumed when decomposition occurs. In addition, inflowing chemical nutrients increase the growth of aquatic plants, which also sink to deeper levels, decompose, and consume oxygen. Thus, a dam may seriously reduce the amount of dissolved oxygen in the water by impounding a river, collecting oxygen-demanding organic materials, and releasing oxygen depleted water from the bottom of the reservoir. Against this backdrop of environmental problems courts have recently faced the issue of


19. Large Dams, supra note 14, at 43.

20. Id. at 46.

21. As the district court noted in National Wildlife Federation v. Gorsuch, 530 F.Supp. 1291 (D.D.C. 1982), rev’d, 693 F.2d 156 (D.C. Cir. 1982), there are several other “dam-created pollution problems” besides oxygen depletion. Id. at 1297. For example, dams which discharge water low in dissolved oxygen often emit water high in dissolved metals. Normally metal particulates such as iron and manganese—present in most bottom sediments of reservoirs—remain at the bottom of the water body. Low dissolved oxygen levels cause the metals to become more soluble and they leach into the water. When water high in dissolved metals is discharged by dams, aquatic organisms can be harmed. The water may also require special treatment to be usable for domestic, municipal, or industrial purposes. Id. at 1299.

Another significant problem caused by some dams is the discharge of temperature altered water. Dams can cause changes in downstream water temperatures by as much as 20 to 30 degrees. Id. at 1300. Releases from the top layer of the reservoir can result in higher than normal water temperatures. Conversely, releases from the lower levels of the reservoir can result in abnormally cold downstream temperatures. These temperature changes may result in fish migrations or fish kills, as certain species are adapted to either warm or cold water. Releases from the warmer top layer of the reservoir are best for optimal oxygen content; however, cold water releases may be desirable, for example, to create a trout fishery. Id.

Dam reservoirs may either reduce or increase sediment flows in streams. The amount of sediment depends on the flow conditions (hydraulics) of the stream and sediment particle characteristics. An increase in sediments degrades water quality. A reduction in sediments may induce erosion or increase seepage and plant growth downstream. Sediments entering the reservoir settle to the bottom and the reservoir must be periodically dredged or sluiced to prevent it from filling in. Sluicing results in additional sediments being carried downstream.
whether dam discharges of contaminated, oxygen depleted water violate the CWA.

II
THE MISSOURI AND GORSUCH OPINIONS

Under Congressional authorization, the Army Corps of Engineers (the Corps) constructed a dam and generator on the Sac River, near Stockton, Missouri. The Corps' primary purpose for building the Stockton Dam was flood control, and they originally recommended a generator of only 7000 kilowatts. As plans progressed the recommended capacity of the generator was increased several times.

When the dam was completed, the Corps faced new problems. Their plans for construction overestimated the channel capacity of the river below the dam and they feared downstream flooding from discharges. To correct this problem the Corps planned to purchase flowage easements on land downstream, build a channel cut-off and limit discharges from the dam. The State of Missouri and local landowners filed suit in 1978 seeking to enjoin the Corps from following through with its planned channel expansion. Plaintiffs alleged that the operation of the hydroelectric power facility violated the CWA and the Missouri Clean Water Law. Specifically, Missouri argued that oxygen depleted water released from the dam constituted the unlawful "discharge of a pollutant from a point source" under the CWA, an event which requires the polluter to obtain a permit. More importantly, the state alleged that since such a discharge subjects the dam facilities to both state and local laws, the strict Missouri laws were also violated.

The district court in Missouri rejected the state's argument, holding that the Corps' operation at Stockton Dam did not violate the CWA. Although it noted that the Corps installed a skimming weir on

Sediments may be controlled by careful dredging or filtering at the point of release. Id. at 1300-01.

A final known pollution problem caused by dams is supersaturation. The opposite of oxygen-depleted water, supersaturated water contains more than the normal amount of dissolved atmospheric gases. Supersaturation occurs when water released from dam spillways traps an excess amount of air as it plunges into the water below. Water mixed with an abnormal amount of air can be fatal to fish. The trapped atmospheric gas bubbles come out of solution in the fishes' bodies and block the flow of blood. In 1978, 421,000 fish were killed below the Harry S. Truman Dam on the Osage River in Missouri from this "gas bubble disease." Id. at 1302. Supernasaturation can be controlled by deflectors which reduce overflow turbulence or by increasing reservoir capacity, thus reducing the need for spillway releases.

23. Id.
24. Id. at 667.
27. A skimming weir is part of the dam enclosing a reservoir, with an adjustable crest
the dam which had largely corrected the oxygen problem, the court did not consider this vital. Rather, it focused on the CWA definitions of "pollutant" and "point source" and summarily stated that "[d]efendants' operation of the Stockton project clearly does not involve or result in the 'discharge of a pollutant' as the term is defined in the [Act]." The court held that the dam did not violate the CWA and was not, therefore, subject to Missouri water quality laws.

On appeal, the Eighth Circuit affirmed the district court holding with an equally short discussion. The court held that the district court was not in error on the issue because "the reduction of oxygen caused by the dam did not constitute the 'addition of a pollutant from a point source.'"

In a later case, National Wildlife Federation v. Gorsuch (Gorsuch I) the same issue was again presented to a district court. Rather than suing to prevent the operation of a single dam, plaintiffs, consisting of a nonprofit environmental organization and the state of Missouri, filed suit seeking a declaratory judgment that the administrator of EPA had violated her nondiscretionary duty by failing to regulate discharges from dams under the National Pollutant Discharge Elimination System (NPDES) mandated by the CWA. The plaintiffs also sought mandamus or injunctive relief compelling the EPA administrator to promulgate appropriate regulations to ensure that such dam discharges must meet NPDES specifications.

In a well documented opinion, the District Court for the District of Columbia issued the requested declaration and order. It ordered EPA to designate dams as a "point source" category under Section 402 elevation, to afford means of restricting the depth of overflow, so that the water released from the reservoir is of small depth and is from the top of the reservoir. See American Public Health Association, Glossary: Water and Wastewater Control Engineering 342 (3d ed. 1981).

29. Id.
30. Missouri v. Dep't of the Army, 672 F.2d 1297 (8th Cir. 1982).
31. Id. at 1304.
33. Id. at 1295. EPA based its decision not to regulate dam discharges under the NPDES program on the same arguments which the district court and court of appeals in Missouri found persuasive. See infra text accompanying notes 68 and 96 for a discussion of these arguments.
34. 530 F. Supp. at 1295.
35. In its opinion the Gorsuch I court cited a great deal of expert testimony in support of its conclusion that the "discharge of oxygen-depleted water from dams is a widespread and serious problem." 530 F. Supp. at 1299. For example, it noted the testimony of Gerald T. Orlob, an expert in water quality, hydrology, and hydraulics, id. at 1298, n.10, Dr. James R. Whitley, an expert in aquatic pollution and the effects of such pollution on aquatic ecology, id., at nn.15-16, and Dr. Atwell Ray Abernathy, an expert in water pollution and aquatic biology, id. at 1299, n.16.
of the CWA, establish effluent limitation or other performance standards for dams on a categorical basis, and subject dams to NPDES permit requirements. The district court concluded that discharges need not be specifically listed in Section 502(6) of the CWA in order to be regulated as pollutants.

The court in Gorsuch I acknowledged that agency interpretation of statutory language is generally afforded great deference. The court noted, however, that where the agency's interpretation does not coincide with the purpose and intent of the statute, judicial deference is not justified.

EPA and a multitude of electrical companies appealed the district court's order. A three-judge panel of the Circuit Court of the District of Columbia, in Gorsuch II, reversed the district court. In so ruling, the circuit court upheld EPA's interpretation of the term "discharge of a pollutant" under section 502(12) of the CWA. The court found that the definition did not include dam induced changes in water quality. In conclusion, the appeals court stated that the district court should have deferred to EPA's interpretation of CWA statutory requirements. The court noted that the agency's interpretation of the CWA must be accepted unless it is "manifestly unreasonable." Thus, EPA does not have a nondiscretionary duty to require dam operators to apply for pollutant discharge (NPDES) permits under Section 402 of the CWA.

III

DISCUSSION

A. Statutory Considerations

The judicial resolutions of Missouri, Gorsuch I, and Gorsuch II were almost exclusively a matter of statutory interpretation. The CWA states that any activity that discharges a pollutant must receive a permit

37. 530 F. Supp. at 1314.
40. Id. at 1311. See infra text accompanying notes 115-41 for a discussion of the deference issue.
41. In addition to the EPA, Judge Green's order affected 110 electric companies that were defendant-intervenors in the suit. All appealed the district court decision. Gorsuch II, 693 F.2d at 156.
42. Id. at 183.
44. 693 F.2d at 183.
45. Id.
46. Id. at 175.
47. Id. at 166.
under the NPDES program. In order to receive the permit, dam operators must comply with water quality standards, allow for periodic inspections, and file reports with EPA. In addition, any hydroelectric facility or activity which results, or may result, in the discharge of a pollutant must comply with all state and local requirements as well as federal laws.

The CWA defines "discharge of a pollutant" as "any addition of any pollutant to navigable waters from any point source." In order for the provisions of the CWA to apply to facilities like the Stockton Dam, therefore, the dam must be responsible for 1) the addition 2) of a pollutant 3) from a point source. The following discussion examines each of these statutory elements in detail.

1. Definition of a "Pollutant"

CWA section 502(6) defines a "pollutant" as "dredged soil, solid waste, incinerator residue, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, radioactive material, heat, wrecked or discarded equipment, rock, sand, cellad dirt and industrial, municipal, and agricultural waste discharged into water." Two primary arguments exist for finding that oxygen depleted water caused by and released from a hydroelectric facility is a "pollutant."

The first proposition is that CWA section 502(6) is not an exhaustive list, but rather functions as a suggestive list to aid EPA and the courts in determining which specific substances are "pollutants." In cases decided before Missouri and Gorsuch II some courts adopted this view. In South Carolina Wildlife Federation v. Alexander, the District Court for South Carolina held that the definition of pollutant under the CWA does not exclude water deficient in oxygen. The issue presented was whether the Russell Dam discharged a pollutant by reducing oxygen levels. In refusing to grant defendant's motion for summary judgment, the district court held that waters characterized by a low dissolved oxygen content could not be held as a matter of law not to be "chemical wastes," one element of the CWA definition. Thus, at least according to this lower court decision, the CWA's definition of "pollutant" is not an exclusive one, and water low in dissolved oxygen may fall within it.

49. Id. § 1323. For example, if a court determined that the Stockton Dam was discharging a pollutant, the operators would be subject to the strict provisions of Missouri's Clean Water Law. The facility would also be compelled to apply for an NPDES permit and demonstrate that it violated no water quality standards.
50. Id. § 1362(12).
51. Id. § 1362(6).
53. Id. at 125.
Other cases, where the status of oxygen depleted dam water was not directly at issue, also provide support for the argument that the CWA definition is not an exhaustive list. These cases hold that substances, other than dam discharges, do not have to be specifically mentioned in the CWA definition in order to be considered a pollutant. In *United State v. Hamel*\(^54\) the defendant was charged with willfully discharging gasoline into a waterway. The Sixth Circuit Court of Appeals held that gasoline might be considered either “biological material” or “chemical waste,”\(^55\) but that either interpretation was sufficient to find a violation of the Act. The court further noted that Congress’ failure to include “petroleum products” in section 502(6) did not indicate an intent to exclude those materials from the Act’s coverage. Rather, Congress’ use of broad generic terms indicated an intent to encompass many substances under the definition of “pollutant.”\(^56\) Thus significant case law exists for the interpretation that the CWA definition of “pollutant” is not exclusive. The obvious impact of oxygen depleted water on the surrounding ecosystem should allow a court, using a liberal interpretation of section 502(6), to include such discharges as a “pollutant.”

The second argument for establishing oxygen depleted dam discharges as a “pollutant” is based on a statutory analysis of accompanying CWA definitions. According to a companion section of the CWA, “pollution” is “man-induced alteration of the chemical, physical, biological or radiological integrity of the water.”\(^57\) Because the two terms are defined separately, it is theoretically possible that a substance could be considered “pollution” without being a “pollutant.” While oxygen depleted dam water alters the chemical integrity of the surrounding water, it might not be considered a pollutant on the basis of the CWA definition.

In practice courts have not accepted this theoretical distinction. The Tenth Circuit Court of Appeals in *United States v. Earth Sciences*\(^58\) effectively eliminated the distinction between the definitions of pollution and pollutant. The court stated that “it contravenes the intent of the [CWA] and the structure of the statute to exempt from regulation any activity that emits pollution from an identifiable source.”\(^59\) This position is almost identical to dicta by the district court in *Alexander*,\(^60\) decided a year earlier. After noting the dangers of oxygen deficient water, the court in *Alexander* stated that “no reasonable purpose would be served by admitting pollution while denying the existence of a

\(^{54}\) 551 F.2d 107 (6th Cir. 1977).
\(^{55}\) Id. at 110, n.3.
\(^{56}\) Id.
\(^{58}\) 599 F.2d 368 (10th Cir. 1979).
\(^{59}\) Id. at 373 (emphasis added).
\(^{60}\) 457 F. Supp. 118.
The district court in Gorsuch I cited both the Alexander and Earth Sciences cases in its discussion of whether dam discharges should be deemed “pollutants.” The court concluded that “EPA is looking toward the pollution effect on the water, such as the total sediment load or the depletion of dissolved oxygen, rather than at whether the constituents of the discharge strictly conform to the definitional list.”62 These lower court decisions, therefore, demonstrate that the courts tend to interpret the definition of “pollutant” broadly in an effort to attain the ambitious goal of the CWA to completely eliminate the discharge of pollutants into the nation’s navigable waters by 1985.63

Logical support for the argument that oxygen deficient waters are pollutants is found by an examination of the effect of adding substances listed as “pollutants” directly to the water. Chemical wastes such as phosphorous and nitrogen, which qualify as pollutants under the CWA, are powerful nutrients to aquatic plant life. They cause explosive growth in aquatic plants, such as algae, far in excess of normal water levels. When the plants die, oxygen is consumed in their decomposition, and an overabundance of plants depletes the water’s available oxygen.64 The same result occurs when biological materials, also included in the definition of “pollutant,” are added directly to the water. As the Gorsuch I court recognized, the primary reason why pollutants must be controlled is because of the effect they have on the dissolved oxygen content of the water.65

Legislative history also supports this position. When it passed the CWA, Congress directed EPA to classify pollutants on the basis of their biochemical oxygen demand (BOD).66 BOD is a measure of the amount of dissolved oxygen consumed through biological oxidation (decomposition) when a substance is added to a body of water.

Recognizing the connection between pollutants and oxygen-deficient water, the district court in Gorsuch I stated that “it would serve no purpose to use a BOD parameter to regulate all substances causing water to be depleted of oxygen while leaving unregulated the discharge of oxygen deficient water from dams.”67 The court’s analysis is preferable to the position taken by defendants in the Missouri case. Defendants there contended that waters low in dissolved oxygen could not be

61. Id. at 125.
62. 530 F. Supp. at 1310 (emphasis added).
64. R. M itchell, INTRODUCTION TO ENVIRONMENTAL MICROBIOLOGY 189-209 (1974). Oxygen is consumed because microorganisms utilize dissolved oxygen during the biodegradation of algae and other plants.
65. 530 F. Supp. at 1310.
67. 530 F. Supp. at 1310.
pollutants because a pollutant was something added to water, not water itself. This constricted view disregards the harm caused by pollutants and the rationale for controlling them. It violates neither common sense nor intuition to consider water deprived of its oxygen content a pollutant when it is discharged into a river. If the water is used in an industrial plant and then injected into navigable waters, there would be little doubt that the oxygen deficient water would be considered a pollutant. To rule differently because the condition originates in a navigable reservoir ignores prior judicial decisions, logic, and the express goals of the CWA to preserve the integrity of the nation's waters.

The circuit court in Gorsuch II did not criticize the lower court's view that the CWA could reasonably be read to include dam discharges within its regulatory purview. Indeed, the court noted the seriousness of the environmental problem at issue. Rather, Gorsuch II was decided largely on deference grounds. Emphasizing "the narrowness of our decision," the court stated that established standards of deference gave it no choice but to accept the EPA view: "We hold merely that EPA's interpretation is reasonable, not inconsistent with congressional intent, and entitled to great deference . . . ." By ruling on the issue of deference the court did not address this major substantive issue.

2. "Addition"

Even if courts accept that dam discharges are a "pollutant," parties challenging the operation of dams must also show that the facility "adds" pollutants to the water. Proponents of nonregulation argue that dam discharges are not additions because nothing tangible is actually added to the water. This argument, however, is based merely on technical definitions and ignores the actual impact of dams on the surrounding water supply.

There is no doubt that dams significantly contribute to the depletion of oxygen from the water and disrupt aquatic life. The Alexander court explicitly found that dams cause a reduction in the oxygen content of water. While "defendants may not have added the first particle to the water in the reservoir, they would have unquestionably caused the addition of pollutants into a navigable water." Since nothing tangible is actually added to the water, however, the issue re-

68. Brief for Amici Curiae at 15, Missouri ex rel. Ashcroft v. Dept. of the Army, 672 F.2d 1297 (8th Cir. 1982).
69. See, e.g., 693 F.2d at 161-62.
70. Id. at 183.
71. Id.
72. See infra text accompanying notes 115-41.
73. See supra text accompanying notes 12-21.
74. 457 F. Supp. at 126 (emphasis added).
mains whether the process of oxygen depletion is the "addition" of a pollutant.

In many cases, where courts conclude that a pollutant was unlawfully discharged, the "addition" is from an external source, independent of the surrounding water. For example, *Sierra Club v. Abston Construction Co.*\(^7\) involved the erosion of waste piles at a strip mine which introduced pollutants into navigable waters. In *Earth Sciences*,\(^7\) a gold leaching operation discharged a chemical leachate solution into a creek. And in *Barcelo v. Brown*\(^7\) munitions were dropped into water from airplanes during bombing practice. In all three of these cases, courts concluded that the "addition" of a pollutant occurred.

In contrast, the Missouri Court of Appeals, in a decision prior to the Eighth Circuit's opinion in *Missouri*, placed great significance on the need for an external source of pollution. In *State of Missouri ex rel. Ashcroft v. Union Electric Co.*,\(^7\) the court held that low dissolved oxygen levels downstream from a power plant did not involve the "discharge [of] any water contaminant into any waters of the state," under Missouri clean water laws. In *Union Electric* the state sought an injunction preventing the electric company from causing waters downstream from the Bagnell Dam to fall below the minimum acceptable dissolved oxygen levels permitted under Missouri Water Quality Standards.\(^7\) Although the statute did not explicitly require an external source, the Missouri Court of Appeals held that the discharge of water "'biologically' devoid of or deficient in 'dissolved oxygen' by Union Electric" was not pollution because there was no external source or cause to the harmful effects.\(^\)\(^\)\(^8\) Faced with the same issue of whether oxygen reduction caused by a dam was the "addition" of a pollutant, the court in *Gorsuch I* refused to adhere to the literal interpretation of "addition" from an external source. Rather, it held that, absent a dam, pollutants would not have existed and drastic reductions in oxygen levels would not have occurred in the Sac River. According to the court, "the definition says that the point source must add pollutants, not that the pollutants must be 'additions.' The addition of water low in dissolved oxygen . . . could clearly qualify."\(^\)\(^\)\(^9\) This reasoning is preferable in light of the congressional mandate to preserve the integrity of the nation's waters.

Furthermore, the holding in *Gorsuch I* follows the reasoning of

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75. 620 F.2d 41 (5th Cir. 1980).
76. 599 F.2d 368 (10th Cir. 1979).
78. 559 S.W. 2d 216 (Mo. App. 1977).
79. Id. at 217.
80. Id. at 223.
81. 530 F. Supp. at 1291, 1306.
Natural Resources Defense Council, Inc. v. Costle, which held that states are required to implement comprehensive water quality planning in all areas, even those not specifically designated under EPA guidelines. In reaching this conclusion, the court stated that “the [CWA] must be given a reasonable interpretation, not parsed and dissected with the meticulous technicality applied in testing a common law indictment or a deed creating an estate in fee tail.” Thus judicial recognition of the overall purpose of the CWA supports the adoption of the Gorsuch I rationale.

The opinion in Gorsuch II did not consider the validity of the district court’s treatment of the “addition of a pollutant” issue. Once again, the court did not state that the district court’s view lacked statutory support or wisdom. It simply concluded that “the language of the statute” permits either the district court’s or the EPA’s construction. The Gorsuch II court stated that Congress had given EPA broad discretion to define “addition.” The court concluded that EPA’s interpretation “must be accepted unless manifestly unreasonable, and we do not find it so.”

It is important to note that a finding of “addition” of oxygen depleted dam discharges would not lead to unfair economic consequences. Such a holding would not make a dam operator responsible for ensuring that the water passing through the dam was entirely free of pollutants. The quality of water leaving the dam would only have to be as high as the quality of the water entering the reservoir. For example, in Appalachian Power Co. v. Train, an industrial plant diverted water from a river, used it, and then returned the water back to the stream with pollutants added. The Court of Appeals for the Fourth Circuit held that a plant is responsible under the NPDES program for the pollutants it adds to the waters passing through it, but not for pollutants naturally occurring in the waterway or added by other sources.

The holding in Train seems consistent with the Gorsuch I interpre-
tation of "addition," and is more sensible than requiring the existence of an external source. It is not unfair to make dam operators responsible for the pollution their facilities cause, regardless of whether the pollution was caused within the water or added to it. By deciding differently, the courts in Gorsuch II and Missouri have allowed dam operators to leave untreated dam facilities which severely jeopardize the quality of the water they impound.

3. "Point Source"

The last hurdle to recovery under CWA is a showing that pollutants are added by means of a "point source." CWA defines "point source" as "any discernible, confined and discrete conveyance," including but not limited to any pipe, ditch, channel, tunnel or conduit. Every dam must have some structure to release excess water either through, over, or around the dam. This structure is called a spillway. Many large hydroelectric dams have an inlet near the bottom of the reservoir and pipes which allow water to flow through the dam to the turbines. The issue, then, is whether spillways and pipes can be considered point sources. The court in Gorsuch I analyzed the structure of dams and stated that "at least some, if not all, of these discharge outlets from dams, are 'discernible, confined and discrete conveyances' which meet [the CWA's] definition of point source."

The argument for a liberal interpretation of "point source" was also made in Earth Sciences, where the Court of Appeals for the Tenth Circuit held that the concept of a point source was designed to embrace the broadest possible definition of any identifiable conveyance from which pollutants might enter water. It further held that the touchstone for regulation is whether the pollution is emitted from an identifiable source.

The Eighth Circuit in Missouri, however, did not even consider the structure of dams in determining whether they were point sources. Perhaps one reason the Missouri court devoted so little thought to the subject of oxygen reduction is because the plaintiffs themselves did not emphasize its importance. The plaintiffs' main allegation under the CWA was that the dam caused soil erosion by increasing the turbulence of the water. Missouri did not bring suit until after the Corps increased the size of the generator and the state discovered that the river capacity was insufficient to handle the new, increased flow of water. It is reasonable to assume that the state's main concern was not with the effects of the dam on water quality, but with the effects of increased

92. 530 F. Supp. at 1297.
93. 599 F.2d at 373.
94. Id.
95. Perhaps one reason the Missouri court devoted so little thought to the subject of oxygen reduction is because the plaintiffs themselves did not emphasize its importance. The plaintiffs' main allegation under the CWA was that the dam caused soil erosion by increasing the turbulence of the water. Missouri did not bring suit until after the Corps increased the size of the generator and the state discovered that the river capacity was insufficient to handle the new, increased flow of water. It is reasonable to assume that the state's main concern was not with the effects of the dam on water quality, but with the effects of increased
Rather, it held that the Stockton Dam was not a point source because that term did not apply to "the oxygen content of water." This focus on the type of pollutant rather than on the physical structure of dams was probably influenced by arguments made on behalf of the Corps. An amicus brief, filed on behalf of seventy-five electric utility companies, the Edison Electric Institute, and the National Rural Electric Cooperative Association, argued that any reduction of oxygen occurred throughout the entire reservoir, and was not conveyed into the water from a pipe or other conduit; therefore, the Corps asserted, the "source" of the condition did not coincide with the "point" (the dam's outlet). Since the outlets were not the means by which the oxygen-depleted water entered the navigable waters, there was no discharge of pollutants from them. This technical, semantic argument is incorrect in light of the language and rationale of the CWA. Point source is defined by the Act in terms of structure, not pollutants emitted. The definition states that a point source includes any discrete conveyance "from which pollutants are or may be discharged." A structure will be considered a point source, therefore, if it meets CWA physical requirements, regardless of whether it is currently discharging a pollutant.

A review of the pertinent provisions of the CWA explains why Congress defined point source without regard to the type of pollutant. While nonpoint sources are subject to some controls under the Act, all point sources discharging pollutants must receive an NPDES permit. To obtain a permit, operators of the point source must show that it does not exceed any effluent limitations. This requires knowledge of the precise quantity of pollutant added by the structure. If EPA is unable to measure the contributions from each source of pollution, then effluent standards cannot be used, and point source controls will not work. Thus point sources such as pipes are distinguished from nonpoint sources, not because the pipes are the cause of the pollution, but because EPA is capable of measuring pollutants emanating from the structures.

As the district court in Gorsuch I noted, the legislative history of the CWA shows that the NPDES permit program is the preferred
method of pollution control. Commenting on proposed amendments to the CWA in 1977, Senator Baker characterized the emphasis on effluent controls (rather than on ambient quality) as an "essential shift of policy." Senator Muskie described the creation of the NPDES permit program as a major change from the old act and "the best available mechanism to control water pollution." This legislative history indicates that Congress intended the permit program to be used whenever possible, and that point sources were distinguished from nonpoint sources solely on the assumption that point sources are easier to control. The court in *Earth Sciences* recognized this reason for the distinction, stating that it was clear from the legislative history that Congress would have regulated nonpoint sources if a workable method could have been found.

Practically, there is no doubt that the structure of dams facilitates the application of point source controls. While it is true that oxygen reduction occurs throughout the reservoir, the total effect on the downstream water can be measured at the dam spillway. Only two readings—one upstream from the reservoir and one at the outlet of the dam—need to be taken to determine the oxygen depletion caused by the dam. The same is true with any other point source pollutant, such as when a factory discharges chemical wastes into a river.

The district court in *Gorsuch I* stressed that the permit program is a more desirable and effective control mechanism than nonpoint source controls, and should be used whenever possible. The court then added that exemptions could not be based solely upon one possible interpretation of the statutory language "when that interpretation frustrates the known purposes and policies of the Act."

*Gorsuch II* did address the question of whether dams are point sources under the terms of the CWA. The circuit court acknowledged that the CWA did not explicitly state whether dams and hydroelectric power plants are to be considered point or nonpoint sources of pollution. It also noted that "there is indeed some basis in the legislative

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102. 530 F. Supp. at 1304. The district court, after reviewing the legislative history of the 1972 amendments to the FWPCA, concluded that Congress probably "would have put all pollution sources under [the NPDES] program had it been feasible." *Id.*


104. *Id.* at 1254.

105. 599 F.2d at 373.

106. 530 F. Supp. at 1306.

107. 693 F.2d at 175. The court did note that throughout Congress’ consideration of the CWA, its focus was on traditional industrial and municipal wastes. "It never considered how to regulate facilities such as dams which indirectly cause pollutants to enter navigable upstream water and then convey these polluted waters downstream." *Id.* The court also pointed out that "Congress did consider downstream water changes caused by dams such as
history” for the position that Congress viewed the NPDES program as “its most effective weapon against pollution.” The “admittedly important place of the NPDES program” nonetheless did not convince the court that EPA's nonpoint source classification of dams was “unreasonable.”

Thus the Court of Appeals in Gorsuch II did not necessarily disagree with the substantive decision of the lower court. In reversing Gorsuch I the court provided three reasons for supporting the EPA interpretations of “pollutant,” “addition,” and “point source” as “a natural reading, both on its face and in light of the legislative history.” First, Congress specifically delegated to the EPA “reasonable discretion” to define various terms in the CWA. The court suggested that Congress should have expressly indicated its desire that EPA regulate dams. Second, the CWA does explicitly refer to dams in several of its provisions dealing with nonpoint source issues. Finally, Congress explicitly chose not to completely federalize water pollution control. It “might well have decided that dam-caused pollution was a problem best addressed through state programs.”

The foregoing analysis suggests that the depletion of dissolved oxygen caused by dams should be considered the addition of a pollutant from a point source. In reaching the opposite conclusion, the circuit courts in Missouri and Gorsuch II applied a narrow reading of the CWA’s definitions and accepted a semantic argument centering around prepositions such as “to” (additions to navigable waters) and “from” (from a point source). The courts paid insufficient attention to both the legislative history and mandates of the entire Act as well as to the rationales behind certain specific statutory provisions. The Missouri court simply disregarded these Congressional objectives in favor of a technical but superficial reading of the Act. The Gorsuch II court also frustrated the Act’s purposes by broadly deferring to the views of EPA “experts.”

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108. Id. For support of the view that Congress did indeed desire maximum reliance by EPA on the NPDES permitting mechanism, see, e.g., NRDC v. Costle, 568 F. 2d 1369, 1374 (D.C. Cir. 1977) (NPDES program “is central to the enforcement of the [Act]”) and United States v. Earth Sciences, 599 F.2d at 273 (“Congress would have regulated so-called nonpoint sources if a workable method could have been derived.”). See also, Gorsuch I, 530 F. Supp. at 1304, n.56 for further evidence of this view.

109. 693 F.2d at 176-77.

110. Id. at 174.

111. Id. at 176.

112. Id. at 177.

113. Id. at 178.

114. Ironically, the court provides its own best arguments to refute its suggestion that because the CWA explicitly refers to dams in only nonpoint source provisions, Congress meant dams to be considered nonpoint sources generally. For example, the court notes that,
B. Judicial Deference to EPA Interpretations

Given the court's decision in *Gorsuch II*, a brief examination of the law surrounding judicial deference to agency decisions is appropriate.\textsuperscript{115} When Congress assigns an agency the responsibility of enforcing a statute, courts generally accord some measure of deference to the agency's interpretation of the various provisions of the statute.\textsuperscript{116} However, courts still retain the power to substitute their judgment for that of an agency when reviewing an interpretative rule, such as EPA's "nonpoint source" rule regarding dam discharges.\textsuperscript{117} The amount of deference shown will depend on the reasonableness of the agency's interpretation and its consistency with earlier and later agency pronouncements.\textsuperscript{118} In addition, courts are likely to give more weight to an agency's position if the statute requires the agency to employ scientific expertise in interpreting the statute.\textsuperscript{119}

In holding that EPA's decision not to regulate dams as point sources was entitled to great deference, the court in *Gorsuch II* relied primarily on three factors. The court stated that "construction of the Act is likely to require scientific and technical expertise,"\textsuperscript{120} and that a higher degree of deference was therefore required.\textsuperscript{121} EPA's position in this case was not based on actual scientific evidence, however, but rather on an interpretation of ordinary statutory language, such as "to," "from," and "in."\textsuperscript{122} While construing other provisions of the Act may require EPA to rely on scientific expertise,\textsuperscript{123} no particular expertise contrary to EPA's assertion, just because Congress mentioned dam-induced changes in the "movement, flow, or circulation" of waters downstream from dams in § 304 (f)(2)(F) of the Act, this provides "only mild support for EPA's position, since some dam-caused water quality changes will be treated as nonpoint sources pollution in any event." \textsuperscript{693} F.2d at 177. The court added:

Even less relevant are the references to dams in section 404 (dredge and fill permits required for, among other things, construction of new dams) and section 102(b) (use of dams to regulate streamflow). That Congress created a special section to deal with dredge and fill problems caused by dams as well as many other construction activities tells us little about the dam-caused problems at issue here, had it focused on them. Similarly, because it affirmatively recognized one beneficial water quality effect of dams in section 102(b) does not tell us what it would have wanted to do about other, harmful effects of dams.

\textit{Id.}

\textsuperscript{115} For a more thorough inquiry into such administrative law principles, see, \textit{e.g.}, K.C. Davis, \textit{Administrative Law Text}, 508-56 (3d. ed. 1972); B. Schwartz, \textit{Administrative Law}, 579-664 (1976).


\textsuperscript{119} NRDC v. EPA, 656 F.2d 768, 774 (1981).

\textsuperscript{120} 693 F.2d at 167.

\textsuperscript{121} \textit{Id.} at n.32.

\textsuperscript{122} \textit{See supra} text accompanying note 114.

\textsuperscript{123} It is undeniable that significant scientific expertise on the part of EPA is required
was required in this instance.124

The Gorsuch II court also pointed to the consistency of EPA’s position as another reason for deferring to the agency’s interpretation: “EPA has never changed its basic position that dams generally do not require NPDES permits.”125 While it may indeed be true that EPA’s position regarding dam regulation has remained constant, this result does not address the fact that EPA’s rulemaking for dams is inconsistent with agency interpretations of the Act in other contexts. Sierra Club v. Abston Construction126 and Earth Sciences,127 for example, both approved a broad EPA definition of “point source.” In addition, Hamel128 upheld EPA’s position that gasoline was a “pollutant” even though not specifically mentioned in the statutory definition.129 Although EPA has always maintained that dams are not point sources, this position has not been consistent with past agency interpretations. The court’s deference to EPA in Gorsuch II on the ground of agency consistency was thus misplaced.

In deferring to EPA’s “nonpoint source” position on dam pollution, the circuit court placed great emphasis on its assertion that “Congress expressly meant EPA to have not only substantial discretion in administering the Act generally, but also at least some power to define the specific terms “point source” and “pollutant.”130 Yet, the legislative history on which this assertion is based states that “guidance with respect to the identification of ‘point sources’ and ‘nonpoint sources,’ especially as related to agriculture, will be provided in regulations and guidelines of the Administrator.”131 This statement is consistent with the theory, also evident in the legislative history, that the NPDES program should be used by EPA whenever possible.132

for the agency to construe the dictates of § 1311(b)(1)(a) of the CWA. 33 U.S.C. § 1311(b)(1)(a) (1976 & Supp. V 1981). This provision of the federal water law requires EPA to promulgate “effluent limitations for point sources, other than publicly owned treatment works, (i) which shall require the application of the best practicable control technology currently available as defined by the Administrator . . . .” Technical expertise is obviously required by the administrator in determining what currently constitutes the “best practicable control technology.” Such expertise is not necessary, however, in interpreting whether or not the definitional list in the CWA was meant by Congress to be inclusive or exclusive. See supra text accompanying notes 62-67.

124. The district court in Gorsuch I expressly found that “the statutory interpretation involved here does not require scientific expertise, but rather is an interpretation of ordinary language used by Congress to identify the kinds of pollution it intended to control through the NPDES program.” 530 F. Supp at 1311.

125. 693 F.2d at 168.
126. 620 F.2d 41 (5th. Cir. 1980).
129. Id. at 110.
130. 693 F.2d at 167.
131. 117 CONG. REC. 38,816 (1971).
132. This aspect of the legislative history of the CWA, that Congress intended EPA to
As discussed earlier, there are instances where pollutants are carried off by rainwater and joined with pollutants from other sources before reaching a particular waterway.\textsuperscript{133} When this process occurs, there is no reliable method to measure the pollutants from each individual source, making EPA use of the NPDES program impossible. As the legislative history demonstrated, such practical limitations facing the NPDES process was Congress' only reason for making a point source/nonpoint source distinction in the CWA.\textsuperscript{134} A farm field's runoff is one of the more common examples of a practical restraint on NPDES regulation.\textsuperscript{135} Thus, Congress' grant of power to EPA is limited to decisions about whether certain sources were sufficiently susceptible to accurate pollution-contribution measurement under NPDES. Since dams are in fact \textit{particularly} susceptible to such contribution measurement,\textsuperscript{136} EPA's decision was not grounded on a reasonable basis and, therefore, judicial deference was not appropriate.

The district court in \textit{Gorsuch I} noted that agency interpretations of statutes are normally afforded deference, and that a court need not agree with the agency interpretation in order to uphold it.\textsuperscript{137} The court went on to state, however, that a court "cannot simply echo an agency's construction and do no more."\textsuperscript{138} Turning specifically to EPA's decision not to regulate dams as point sources, the court in \textit{Gorsuch I} noted that the interpretation of the statute did not require scientific expertise, and was not entitled to deference on those grounds.\textsuperscript{139} The court went

\textsuperscript{133} See supra text accompanying notes 87-88.
\textsuperscript{134} See supra note 132.
\textsuperscript{135} 530 F. Supp. at 1305. ("When pollutants from, for example, a farm field . . . are carried off by rainwater and joined by pollutants from other sources before they reach a waterbody, there is no way to measure the pollutants contributed by each source to enable enforcement of an effluent limitation . . . .")
\textsuperscript{136} See supra text accompanying notes 105-106. The \textit{Gorsuch I} opinion noted that, "[i]n contrast to [multisource pollutants mixed in agricultural run-off], it is a relatively simple matter to measure pollutants discharged from a pipe or other defined point [i.e. dam turbine]." 530 F. Supp. at 1305.
\textsuperscript{137} Id. at 1311.
\textsuperscript{138} Id.
\textsuperscript{139} Id.
on to hold that EPA's interpretation of the legislative intent regarding dam pollution was contrary to law and, therefore, unreasonable:

As we have seen, EPA's interpretation of the statute runs counter to expressed Congressional intent, and is inconsistent with its own implementation of the Act in other contexts. EPA has given absolutely no reasonable basis, consistent with the purpose and policies of the Act, why dams should not be regulated as point sources. Its entire argument rests upon a dissection of the language of the Act, particularly the definition section, in an overly technical manner which has been rejected in the context of this broadly remedial legislation. Under the circumstances, EPA's interpretation cannot be accepted merely because it is the agency administering the CWA.140

Although it is generally appropriate for courts to accord some measure of deference to an implementing agency's interpretations, review of the circuit court's treatment of EPA's dam pollution policy demonstrates excessive deference to agency rulemaking. Regardless of whether Gorsuch I's refusal to "simply echo [the] agency's construction" was the proper judicial approach, however, the problem of dam pollution persists. The circuit court's deference to EPA in Gorsuch II, therefore, only underscores the need for a Congressional response to this issue.141

IV

LEGISLATIVE AND REGULATORY ALTERNATIVES

EPA's approach to the problem of dam pollution has been a conscious policy of nonregulation.142 Part III of this Comment argued that this administrative policy results from an improper interpretation of the pertinent provisions of the CWA. Yet EPA has not considered the practical issue of whether or not a more aggressive administrative approach is feasible.

A. Suggested Regulatory Response

There are several alternative approaches to dam pollution control. EPA has continued to follow one of these: doing nearly nothing.143

140. Id.
141. See infra text accompanying notes 167-70.
142. As the circuit court noted in Gorsuch II, EPA's interpretation that discharges from dams were not to be regulated under the NPDES permit program "was made contemporaneously with the passage of the Act, and has been consistently adhered to since." 693 F.2d at 167. EPA based its view that dams were excluded from agency regulation, as the Gorsuch I court noted, "upon a dissection of the language of the Act, particularly the definition section, in an overly technical manner which has been rejected in the context of this broadly remedial legislation." 530 F. Supp. at 1312. See also supra text accompanying notes 21-46.
143. EPA has interpreted the CWA as not requiring the agency to regulate dam discharges under NPDES. See supra text accompanying notes 35-39. The agency has thus classified dam induced water pollution problems as nonpoint sources of pollution. As one water
Another possible response is for the agency to amend the present regulations exempting dams from NPDES standards. EPA could require all such dam facilities—over 2,000,000 dams—to apply for NPDES permits.

This approach would not instantly shut down the nation's major dam and hydroelectric facilities. The NPDES program does not automatically close down a facility which discharges a pollutant. Rather, the program requires the facility to comply with EPA effluent limitations, like any other point source of pollution. Thus, if a particular dam threatens water quality, it would not have to cease operations. Instead, EPA would require the dam to restore the oxygen content of the water to acceptable levels before it could receive a NPDES operational permit.

Although this interpretation of the CWA might appear to replace one inflexible policy of nonregulation with another equally inflexible

law expert notes, classification of pollution sources as "nonpoint" basically translates into "nonregulation":

The weakness in the FWPCA's provisions for regulating non-point sources of pollution stems largely from the fact that no one has a good idea of how federal control over non-point sources can be achieved. In the case of industries and sewage treatment plants, it is generally possible to state with reasonable accuracy the levels of pollutant discharge which specific categories of sources can achieve, and to establish a monitoring and reporting system to keep track of actual levels of discharge. On this basis, the FWPCA has established a federal regulatory system for point source discharges that is apparently viable. However, such a system does not seem possible for non-point sources.


145. The wholesale closure of dams and hydroelectric facilities would not be politically feasible even if it were practically possible. The United States depends on hydroelectric power for a significant percentage of its energy requirements. At the beginning of the decade the nation consumed over 3000 trillion BTUs, or about 4% of its total energy use, from hydropower production. U.S. Bureau of the Census, Statistical Abstract of the United States 574 (1982).


147. In addition to prescribing effluent limitations, NPDES permits also contain a number of procedural requirements. Most important of these is the monitoring requirement. Section 308(a) of the Act gives EPA broad discretion to require dischargers to install monitoring equipment, sample effluents, maintain records and make reports. 33 U.S.C. § 1318(a) (1976 & Supp. V 1981). Monitoring reports are public information, subject only to trade secrets protection, and "effluent data" must be available to the public regardless of whether it contains trade secrets. 33 U.S.C. § 1318(b) (1976 & Supp. V 1981). Obviously, adequate monitoring is essential to successful enforcement of the permit system.
policy of regulation, it need not do so. As the court in Gorsuch II repeatedly emphasized, Congress vested the EPA with broad discretionary authority to implement the policies of the CWA. Using this discretion, EPA could require only those types of facilities which cause significant pollution problems to secure NPDES permits. Thus, as one commentator notes, "[w]ith minimal good faith and due diligence, EPA can structure a solution to the [dam pollution] problem quickly, at relatively low cost, and with substantial benefits in overall water quality as well as improvements in our nation's fisheries." 149

1. The Number Of Problem Dams

It is difficult to determine how many dams pollute because few streams are monitored for such pollution and because the problem has received little attention. 150 It may be inferred, however, that the pollution problems described in Part I tend to occur in larger dams and hydroelectric facilities which discharge water obtained from the bottom of the reservoir. 151 There are several ways EPA could reduce the number of dams which would require individual permits. The agency could largely exempt those facilities which, by its determination, do not pose serious water pollution threats. 152 By "cutting the regulatory pie" for dams, one authority estimates that EPA would only have to regulate between 1000 to 1500 facilities to "cover most existing problem dams." 153

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150. Id. at 1212-13.


152. EPA already has significant experience in using its discretion to reduce the "universe" of targeted facilities requiring court-ordered permits:

This is precisely what a more responsive EPA did in 1977 when a similar suit resulted in an order requiring EPA to regulate discharges from feedlots and storm sewers. Rather than ask Congress for an exemption, EPA undertook a targeted program of regulation, hitting the problem discharges while issuing general permits for non-problem areas. When problem discharges are identified in a category covered by a general permit, an individual permit must be obtained. The entire regulatory program was grafted onto the existing point source program with little disruption of overall priorities or increase in staff. With minimal ingenuity, a similar program could be structured for dams.

Burwell Testimony, supra note 149, at 1213 (footnotes omitted).

153. Burwell bases his estimate of "problem" dams on the data base created by the U.S. Army Corps of Engineers in response to the National Dam Safety Act, 43 U.S.C. § 506 (1976 & Supp. V 1981). Id. at 1214. Of particular import to his estimate of dams that would need to be regulated under the NPDES is the fact that "there are only about 1500 hydroelectric facilities in this country . . . ." Id.
2. Available Technology

Congress designed certain provisions of the Clean Water Act Amendments of 1972 to encourage polluters to develop new technologies that mitigate the effects of water pollution.\textsuperscript{154} As EPA has not required dam and hydroelectric plant polluters to receive NPDES permits, the "technology-forcing" incentive for dam operators to develop new pollution control technology is absent. Thus a potential benefit from EPA regulation of dam discharges is the introduction of efficient, inexpensive dam pollution control technology.\textsuperscript{155}

Even absent EPA coercion, the Tennessee Valley Authority (TVA) recently demonstrated that relatively inexpensive technology currently exists to improve the water quality of dam discharges. TVA experienced significant problems with low dissolved oxygen discharges at many of its dams and hydroelectric facilities. While the Tennessee River ranks 10th in overall water quality among the nation's 25 largest rivers, it ranks 23rd in levels of dissolved oxygen.\textsuperscript{156} After experimenting with many strategies to raise oxygen levels in dam discharges, TVA developed a pollution control technology that it considers a breakthrough of major significance.\textsuperscript{157} One can reasonably assume the cost and efficiency of such dam pollution control technologies would be further improved if EPA required all polluting dams to achieve prede-

\textsuperscript{154} For example, section 307 of the Act requires that EPA maintain a list of toxic substances and establish separate limitations for their use. These limitations, like the toxic substance requirements in the Clean Air Act, 42 U.S.C. § 7412 (1976 & Supp. V 1981), are geared toward protecting public health and environmental quality regardless of technological feasibility. This Congressional requirement was designed to have major "technology forcing" incentives, i.e., to provide incentives for polluters to install available technology, or, if such technology is not yet available, to "force" polluters to develop wholly new technologies. R. Stewart, B. Richard & J. Krier, Environmental Law and Policy: Readings, Materials and Notes 371-72 (2d ed. 1978). For a comparison between the CWA's "technology forcing" provisions and those of the Clean Air Act, see id. at 515-16. See also La Pierre, Technology-Forcing and Federal Environmental Statutes, 62 Iowa L. Rev. 771 (1977).

\textsuperscript{155} Although the concept of "technology forcing" makes theoretical sense, practical experience under the CWA and Clean Air Act has demonstrated several difficulties in implementing the concept. For example, economic problems arise in the CWA's stated goal of ultimately requiring all point sources of water pollution to achieve "zero discharge." Although "engineering is presently available to turn all point source discharges of water pollution into distilled drinking water . . . the costs of installing the requisite engineering would be enormous . . . [estimated] at $600 billion, plus substantial additional operating costs." Stewart, Richard, & Krier, supra note 154, at 516.

\textsuperscript{156} Burwell Testimony, supra note 149, at 1215.

\textsuperscript{157} TVA's strategies to raise dissolved oxygen levels in dam discharges have included multilevel intakes that selectively withdraw water from a particular reservoir level, and direct aeration of turbine discharges using oxygen diffusers, tailwater weirs, turbine venting, and operational strategies. The costs, in terms of installation and lost power generating capacity have gradually declined but are still significant. TVA recently experimented with installing hub baffles on the turbines during normal maintenance. Dissolved oxygen levels were significantly improved, with little cost to power generating capacity. Id. at 1216-17.
3. Costs And Benefits Of Dam Pollution Control

Because EPA has chosen not to require dam and hydroelectric plant operators to secure discharge permits, there is little incentive for polluters to use control technology. Therefore, calculating the cost of applying dam pollution control technology, like determining exactly how many dams pollute, is difficult. One problem in attempting to develop accurate cost/benefit models in this area is the difficulty of putting a price tag on the protection of natural resources such as water, air, and fish.159

Available studies indicate that dam pollution control measures are cost effective. A study conducted by the state of Missouri sought to determine the impairment in the value of the trout fishery in Lake Taneycomo below Table Rock Dam due to low dissolved oxygen discharges.160 Lake Taneycomo is the only tailwater trout fishery in Missouri, Illinois, Iowa, or Kansas. Experts estimated the socioeconomic value of the fishery at nearly $10 million annually. The decline in the value of the fishery from Table Rock Dam due to dissolved oxygen depletion was an estimated $300,000-$500,000 per year.161 The study concluded that the economic loss could be eliminated through the construction of weirs or multi-leveled release structures to allow high oxygen surface releases from Table Rock Reservoir.162 Based on Bureau of Reclamation costs in constructing pollution control structures at the Flaming Gorge Dam in Utah, it would require approximately 10 years to recover the entire cost of the controls in the form of a healthier and more economically lucrative fishery.163 Similar studies at the Columbia River Basin164 and the TVA's Norris Dam165 provide further evi-

158. See supra note 154.
159. The total damage to downstream water quality and fisheries from dam discharges is unknown. However, the economic value of our national freshwater sport fishery is well over $11 billion annually. Most streams are now regulated by dams and regulation of dam discharges to improve downstream water quality can produce substantial economic benefits. Burwell Testimony, supra note 149.

160. Burwell Testimony, supra note 149, at 1219.
161. Id.
162. Id.
163. Id.
164. The installation of spillway deflectors on dams in the Columbia River Basin has been estimated to increase the total number of returning adult Chinook salmon from 15,347
dence that currently available control technology can pay for itself over reasonable time periods in improved fishery productivity.

B. Suggested Legislative Response

Part III of this article\textsuperscript{166} argued that EPA already possesses the statutory authority to regulate dam pollution discharges under the NPDES permit program. Yet this Comment also acknowledged that Congress did not make a specific declaration in the national water pollution law regarding proper administrative regulation of such discharges.\textsuperscript{167} An alternative to EPA regulatory reform is a direct congressional response explicitly directing the regulation of dam pollution under the CWA. The opportunity for such a response is especially ripe since the CWA is currently before Congress for reauthorization.\textsuperscript{168}

To ensure that no dams need be taken out of operation due to the new federal regulation of their discharges, Congress should expressly instruct EPA to take economic considerations into account in formulating new dam effluent limitations.\textsuperscript{169} Because it will be more difficult and costly to modify existing structures than to change plans for future ones, the legislature should require EPA to set less restrictive effluent standards for preexisting dams than for dams that are not yet built.\textsuperscript{170}

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\item fish per 4.3 million immature salmon outmigrants to 45,382, an approximate 200 percent increase. The total number of returning adult steelhead trout for the same number of outmigrating young fish was estimated to increase from 41,409 to 60,965, over a 50 percent increase in return. Total costs were estimated at \$9.1 million and total benefits over the 25-year life of the improvement were estimated at \$47-\$126 million. \textit{Id}. at 1217-18.

165. TVA has estimated the cost of turbine venting at Norris Dam at \$150,000, with maintenance cost of about \$5000 annually. Turbine venting alone is estimated to increase the economic value of the downstream coldwater fishery from \$252,000 per year to \$395,000 per year, or an incremental annual benefit of \$143,000 per year. Thus, almost the entire capital cost could be recovered in the first year from the increased value of the fishery. \textit{Id}. at 1218.

166. \textit{See supra} text accompanying notes 48-141.


168. In the Senate, proposed amendments to the CWA are in the hands of the Committee on Environment and Public Works. In the House of Representatives, the Committee on Public Works and Transportation is in charge of the reauthorization measure.


170. To guide EPA as to what these differing standards should be, Congress need look no further than the CWA itself. The statute already requires EPA to set tougher standards for new point sources of water pollution than for existing sources. Section 301(b)(2)(A) requires all existing point source dischargers other than publicly owned treatment works to apply "the best available technology \textit{economically achievable}." 33 U.S.C. § 1311(b)(2)(A) (1976 & Supp. V 1981) (emphasis added). Section 306, on the other hand, requires new sources to meet standards which reflect "the greatest degree of effluent reduction . . . achievable through application of the best available demonstrated control technology, processes, operating methods, or other alternatives, \textit{including, where practicable, a standard permitting no discharge of pollutants}." 33 U.S.C. § 1316(a)(1) (1976 & Supp. V 1981) (emphasis added).
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CONCLUSION

In holding that oxygen depletion caused by dams was not covered under the NPDES program of the Clean Water Act, the courts in Missouri and Gorsuch II opted for a semantic argument that ignores the purpose of the CWA and the realities of water pollution. The inclusion of dam-induced oxygen depletion in EPA enforcement of the CWA is the correct interpretation of the statute and a feasible result which will produce both economic and environmental benefits. In holding otherwise, the courts have seriously threatened the ability of our nation's waterways to sustain aquatic life—a situation that may prove disastrous in years to come if it continues unabated.