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ENVIRONMENTAL ACTIVISM: THERMAL POLLUTION—AEC AND STATE JURISDICTIONAL CONSIDERATIONS

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The past half-decade has brought about dramatic changes in the relationship of legal institutions to problems of environmental quality and the recognition of environmental values.¹ The myth of limitless

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¹ Increased environmental concern is evidenced in a proliferation of news media attention and legislation, the formation of conservation and environmental groups, and a plethora of legal and scholarly writing. This is not to imply that groups such as the Sierra Club and National Audubon Society, or writers such as Rachel Carson, author of *Silent Spring*, or isolated cases on specific environmental issues, such as *Scenic Hudson Preservation Conf., Inc. v. FPC*, 354 F.2d 608 (2d Cir. 1965), cert. denied, 384 U.S. 941 (1966), did not exist or exert pressures prior to the past five years, but simply that there is a difference in kind, as well as in degree, of environmental concern. See generally, Jackson, Foreword: Environmental Quality, the Courts, and the Congress, 68 Mich. L. Rev. 1073 (1970); Mayda, Conservation, "New Conservation" and Ecomanagement, 1969 Wis. L. Rev. 788 (1969); Roberts, The Right to a Decent Environment; E = MC²: Environment Equals Man Times Courts Redoubling Their Efforts, 55 Cornell L. Rev. 674 (1970); Krier, The Pollution Problem and Legal Institutions: A Conceptual Overview, 18 U.C.L.A. L. Rev. 429 (1971). See also Kenworthy, Who Should Police the Polluters?, N.Y. Times, Feb. 1, 1970, § E, at 2, col. 4.

environmental resources has been replaced by the realization of environmental scarcity as interrelationships within the ecosystem have become more apparent.² Until recently, regulatory agencies and regulated industries were the dominant participants in creating and resolving environmental conflicts. This relationship, however, appears to be on the verge of change³ due to an onslaught of litigation either precipitated or participated in by environmental groups seeking the recognition and protection⁴ of environmental factors before administrative agencies. As a result of greater public awareness of environmental deterioration,⁵ environmental citizen groups have increasingly been accorded a more significant role in environmental decision-making.

² See generally *Resources and Man*, Committee on Resources and Man, National Academy of Sciences, National Research Council (1969); *Readings from Scientific American*, Science, Conflict and Society (Hardin ed. 1969); *The Environmental Handbook* (De Bell ed. 1970); P. Ehrlich & A. Ehrlich, *Population, Resources, Environment* (1970). Some official documents worth noting include *Environmental Quality: The First Annual Report of the Council on Environmental Quality* (1970); *Hearings on S. Res. 78 Before the Subcomm. on Intergovernmental Relations of the Senate Comm. on Gov't Operations*, 91st Cong., 1st Sess. (1969).

A relatively complete bibliography on general environmental materials is contained in *Environmental Policy: An Annotated Bibliography* (State Univ. of New York, Washington Office, April, 1971).

Judicial notice of the ecological matrix and food chain may be gleaned from such cases as *Zabel v. Tabb*, 430 F.2d 199 (5th Cir. 1970), cert. denied, 401 U.S. 910 (1971).

³ See, e.g., the reference to conservation groups as "private attorney generals," *Citizens Comm. for the Hudson Valley v. Volpe*, 425 F.2d 97, 102 (2d Cir. 1970). Many recent legislative enactments grant citizen groups the right to intervene, as in the court's interpretation of the Federal Power Act in *Scenic Hudson Preservation Conf. v. FPC*, 354 F.2d 608 (2d Cir. 1965), cert. denied, 384 U.S. 941 (1966), or in the Connecticut wetlands legislation, Conn. Gen. Stat. Ann. § 22-7n (Supp. 1971). See also *Official Compilation Codes, Rules and Regulations of the State of New York*, tit. 16, § 85.11 [hereinafter cited as *NYCRR*], wherein conservation groups are accorded standing in selected public utility proceedings.

⁴ Recognition and protection must be distinguished. Judicial recognition has generally been limited in the past to quantifiable claims, that is, to claims economically capable of identification and measurement. Claims of ecological devastation and aesthetic desecration have had very limited recognition. Recognition involves the articulation of these values as proper objects of legislative or judicial sanction. Protection, on the other hand, requires a) the recognition of the value and b) a willingness to use the machinery of society to ensure that the harms do not occur. Thus one could interpret *Boomer v. Atlantic Cement Co.*, 26 N.Y.2d 219, 257 N.E.2d 870 (1969), as recognizing harm to property, but not to health or environment. The case further stands as an example of an award of money damages failing to protect either of the latter interests. See also, *Exton Quarries, Inc. v. Zoning Bd. of Adjustment*, 425 Pa. 43, 228 A.2d 169 (1967).

The AEC's refusal to hear nonradiological issues is a classic example of nonrecognition. See, e.g., *Thermal Ecology Must be Preserved v. AEC*, 433 F.2d 524, 525-26 (D.C. Cir. 1970); *Thermal Ecology Must be Preserved v. AEC*, — F.2d —, 2 E.R.C. 1405 (7th Cir. 1970); *Lloyd Harbor Study Group, Inc. v. Seaborg*, — F. Supp. —, 2 E.R.C. 1380 (E.D.N.Y. 1971).

⁵ Securing public awareness of environmental issues constitutes a battleground in and of itself. Thus, in a recent controversy over radiation and thermal problems attendant to nuclear power siting in Michigan, the FCC ordered station WNEM-TV, Bay City, Michigan, to allow opponents equal air time based upon the "fairness doctrine." *Sinclair*, 2 E.R.C. 1833 (FCC Nos. 8330-K, C9-453, C10 578) (Dec. 1, 1970).

ing. This awareness, as reflected by new legislation and changes in judicial considerations of social and environmental values,⁶ has produced shifts in the processes, goals and participants⁷ in environmental decision-making.

Increased public sensitivity to the interrelationships between technology and the environment has made environmental issues of great concern to society. The location of nuclear power generating facilities along inland bodies of water—lakes, bays, and estuaries—with at-

⁶ The environmental problem appears to have captured the literary instincts of the bench and bar. See, e.g., *Izaak Walton League v. Macchia*, 329 F. Supp. 504, at 515, 517 (D.N.J. 1970):

Turning to defendants' contention that plaintiff's action improperly invades or interferes with State riparian rights, this is a premature consideration and ignores the fundamental compatibility of interests of both the State and Federal Governments which, by definition, is designed to promote and protect the general as well as the individual welfare of all men. It is "survival" about which we speak when we discuss the ecological impact of man's activities in this supersonic age and not technical, hair-line, provincial differences between State and Federal interests.

...
In closing, a final observation seems appropriate. At one end of the spectrum of human values lies the resurgence of ecological demands; at the other, the understandable reluctance to retard technological progress. The one case nostalgically prompts a return to the pristine beauty of Thoreau's "Walden's Pond" [sic]—the other encourages a continuation of Einstein's Atomic expansion with unbridled ecological impact. In one instance, the idyllic existence of a "Robinson Crusoe"—in the other, the horror evoked by a "Frankenstein." Our survival lies somewhere in between these extremes without doing violence to the causes and champions of either. Surely, there is an equipoise which does not unduly impede our scientific advancement nor accelerate the destruction of our environment. There is a necessary balance, dependent upon the circumstances of a particular case, which lies between reasonable use and destructive abuse.

⁷ For an example of one interesting intervention, see *Dresden Nuclear Power Station*, 2 E.R.C. 1302 (March 3, 1971), modified, 2 E.R.C. 1580 (Ill. Pollution Control Bd. No. 70-21) (April 28, 1971). The Board stated:

On the first day of the hearing, the Environmental Law Society of the University of Chicago Law School presented its motion to intervene in the Application hearing. After a brisk argument, the hearing officer granted the Environmental Law Society the right to intervene so long as its intervention would not delay the case. We find that the granting of that motion was entirely proper. The Environmental Law Society certainly fit within the requirements of Rule 310 of the Board that it may have been adversely affected by an order of the Board in this Application proceeding. Without a doubt, the members of the Environmental Law Society would be affected if the emissions from the Dresden plant were excessive, and as intervenors they had the right to protect their interests. The argument that they should have been represented by a person or persons charged with defending the public interest, such as the Attorney General, or the State Environmental Protection Agency has absolutely no merit, since neither of the aforementioned made a formal appearance in the Application hearing. The Board would like to officially thank the Intervenor for their participation in this case. Their participation provided the Board with evidence which might not otherwise have come before us.

2 E.R.C. at 1304.

tendant hazards of thermal pollution, has given rise to a series of controversies which reflect this heightened concern for environmental integrity.⁸ The threat of thermal pollution of such fragile water based ecosystems⁹ poses serious technological-environmental problems. There

⁸ See, e.g., Cornell Scientists See Thermal Pollution of Cayuga Lake by Planned Nuclear Power Plant, State Conservation Dep't. Information Leaflet L-171, map at 1 (Aug.-Sept. 1968). See also, Larson, Present State and Future Outlook of Nuclear Power Generation in the United States, 12 Atomic Energy L.J. 274, 292-93 (1970).

⁹ Justification for concern with the problem of fresh water lake impairments and the extent of research in the area can be gleaned from the extract, Comm. on Government Operations, Views of the Governors on Saving America's Small Lakes (Water Pollution Control and Abatement), H.R. Rep. No. 1571, 90th Cong., 2d Sess. 4-5 (1968) [hereinafter cited as *Saving America's Small Lakes*]:

The accelerated eutrophication which threatens America's 100,000 lakes is, primarily, the result of man's activities which are responsible for increasing discharges into lake waters of untreated or inadequately treated municipal and industrial wastes, septic tanks, siltation, agricultural and urban runoff, and wastes from boats. All bodies of water undergo a process of natural eutrophication which can cover a span of thousands of years before the waters affected are degraded. But man's ever-increasing abuse of lake waters has accelerated the eutrophication process to an alarming degree, thus threatening to shorten the lifespan of these waters significantly.

America's insatiable drive for economic progress, combined with its carelessness, and lack of foresight and planning, has raised to a critical level the problem of eutrophic, or dying, lakes. The consequences of accelerated eutrophication are described in the committee's report, "To Save America's Small Lakes," as follows: "The destruction of water quality in our Nation's small lakes cuts deeply into their recreational uses; swimming beaches and picnic areas close; fishing and boating activities decline sharply; shoreline property values fall off. The deteriorating water quality also adversely affects the water supplies of nearby communities and industries, and can result in financial disaster to the town and cities whose economic well-being is dependent upon good quality water (H. Rept. 594, 90th Cong., Aug. 23, 1967, p. 2)."

Until quite recently, the plight of America's deteriorating small lakes caused only a ripple of concern at the Federal level of Government. In fact, the committee's report was the first congressional study of this specific subject.

The report on S. 2760 by the Senate Committee on Public Works emphasized the serious and unique nature of the pollution problem threatening our lakes, as follows: "Lake pollution is a critical national problem. Little has been done to develop meaningful methods for solving this problem while lakes continue to deteriorate and a vital public resource is wasting away. . . . Considerable attention has been paid to water quality in our rivers, and construction programs for waste treatment facilities which improve the quality of all our waters have been increasingly successful. The particular problem of lake pollution has not had equivalent attention. As Senator Walter Mondale, of Minnesota, a sponsor of the legislation, pointed out during hearings on this bill, "There is no program of Federal assistance to the States for the full-scale cleaning of polluted lakes, and without assistance the States cannot handle this problem" (S. Rept. 197, 90th Cong. Dec. 11, 1967, p. 6)."

The Senate report pointed out—as did this committee's prior report, "To Save America's Small Lakes"—that the peril of eutrophication also threatened the usefulness of manmade impoundments as sources of water supply and public recreational sites. The Senate report said (p. 6): "Manmade reservoirs add to the natural lake resource and experience the same problem of accelerated eutrophication. Manmade impoundments of 5,000 acre-feet or greater capacity in

is a great difference in the magnitude of harms arising from the location and operation of nuclear power generating facilities along inland, rather than free running, bodies of water. Problems of inland lake, bay and estuary preservation, and the licensing practices of the Atomic Energy Commission (AEC) and the states provide a context for the analysis of recent controversies surrounding the harms of thermal pollution.

The purpose of this article is to present the conflicts concerning the location and operation of nuclear power facilities as a series of points along a unified continuum, in the perspective of the physical problems caused by thermal pollution and the responses of the courts and administrative agencies. The starting point of this continuum lies in the initial abdication of responsibility for general environmental protection by the AEC in *New Hampshire v. Atomic Energy Commission*,¹⁰ where it was held that the AEC need consider only radiological data. After this decision, a semblance of balance was reached, as problems of thermal pollution were accorded recognition in state administrative decisions and in private negotiations between conservation groups and nuclear power generating utilities.¹¹ Selected state agencies, such as the public utility commissions in both Michigan¹² and Illinois,¹³ have been able to resolve, thus far without judicial review, the extraordinarily complex issues raised by both conservationists and the proponents of electric power generation.

Once again, however, the process of environmental decision-making concerning nuclear power facilities has been placed in question by the latest point along the continuum—the decision of the District of Columbia Court of Appeals in *Calvert Cliffs' Coordinating Committee, Inc. v. Atomic Energy Commission*.¹⁴ In July, 1971, this court held that the AEC has a duty to consider thermal pollution and general environmental data in its licensing processes. The failure of the AEC to consider other than radiological data was denounced by the court as contrary to both the express and implied policies of the Na-

this country number more than 1,600 with over 15 million acres of surface area. Generally, the comments of the States on the committee's report indicate that the states, as well as the Federal Government, are becoming more concerned about the need for immediate and forceful action to clean up America's lakes and impoundments, and to keep them clean."

¹⁰ 406 F.2d 170 (1st Cir.) cert. denied, 395 U.S. 962 (1969); noted in 47 J. Urban L. 895 (1970).

¹¹ One such negotiated agreement was the subject of the dispute in *Consumers Power Co.*, 3 E.R.C. 1001 (Mich. Pub. Service Comm. No. U-3884) (June 16, 1971).

¹² Id.

¹³ Dresden Nuclear Power Station, 2 E.R.C. 1302 (Mar. 3, 1971), modified, 2 E.R.C. 1580 (Ill. Pollution Control Bd. No. 70-21) (Apr. 28, 1971).

¹⁴ 449 F.2d 1109, 2 E.R.C. 1779 (D.C. Cir. 1971). See Casenote discussing *Calvert Cliffs'* at p. 802 infra.

tional Environmental Policy Act (NEPA) of 1969;¹⁵ the court construed NEPA as requiring that all federal agencies take into account, in all decision-making processes, the environmental effects of any contemplated action.¹⁶ The court therefore ordered the AEC to revise its rules, regulations and procedures to (a) admit and consider, (b) conduct independent investigations on, and (c) properly apply the environmental criteria required by NEPA to all nuclear power generating facilities before granting final operating permits.

A detailed contextual analysis of the cases, agency hearings and legislation which preceded *Calvert Cliffs'* is necessary in order to place into a properly framed reference the significant factors affecting future thermal pollution problems, AEC procedures, and state actions. Since the AEC has now been ordered to assume general environmental jurisdiction over thermal pollution, the role of the states and their agencies in future decision-making must be discussed.¹⁷ Earlier federal court decisions such as *Northern States Power Co. v. Minnesota*,¹⁸ in which the AEC was held to have preempted the field on radiological environmental matters, and the *New Hampshire* case are of primary importance in determining this relationship. The juxtaposition of *Calvert Cliffs'* with both these decisions raises serious questions of preemption and standing to raise thermal pollution questions before state agencies. A quagmire of unresolved problems for the future has been left by the entire line of judicial decisions in this area; these decisions may be more significant in terms of obfuscating environmental protection than the abstention of the AEC itself from the general environmental (non-radiological) area.

This article is divided into three main sections. The first will briefly review the technological and ecological problems surrounding thermal pollution, with emphasis on the unexplored dichotomy between immediate and long-range harms to fragile water based ecosystems. In the second, the federal court decisions in *New Hampshire* and *Northern States*, and the state agency hearings in *Dresden Nuclear*

¹⁵ 42 U.S.C. §§ 4321 et seq. (1970).

¹⁶ 449 F.2d at 1113, 2 E.R.C. at 1781.

¹⁷ See Note, Federal Pre-Emption and State Regulation of Radioactive Air Pollution: Who Is the Master of the Atomic Genie, 68 Mich. L. Rev. 1294, 1308-09 (1970). Based upon statements made by persons attached to the AEC, the question arises as to whether the message is not also being raised from within the agency itself. See, e.g., Larson, *supra* note 8; Ramey, Planning for Environmental Protection In The Siting of Nuclear and Fossil Powered Plants, 12 Atomic Energy L.J. 59 (1970). See also Note, The Regulation of Nuclear Power After the National Environmental Policy Act of 1969, 24 Rutgers L. Rev. 753 (1970).

¹⁸ 320 F. Supp. 172 (D. Minn. 1970), *aff'd*, 447 F.2d 1143 (8th Cir. 1971), noted in 55 Minn. L. Rev. 1223 (1971). (district court opinion). The opinion of the appellate court is noted at p. 813 *infra*.

*Power Station*¹⁹ and *Consumers Power Company*²⁰ will be considered from the vantage of attempts to secure recognition and protection from thermal pollution within the vacuum created by the AEC's abdication of general environmental jurisdiction during its construction and operating licensing proceedings. Finally, the implications of *Calvert Cliffs*²¹ on the relationship of federal and state practices in the licensing and operation of nuclear power generation facilities and the attendant problems of thermal pollution will be analyzed. Throughout each of these sections, an attempt is made to consider the interrelationship of the forces and pressures of state, federal and environmental interests as they affect the nuclear thermal pollution decision-making process.

I. THERMAL POLLUTION IN GENERAL²¹

A. Sources of Thermal Pollution: The Nuclear SES

Almost all industries which use water for cooling purposes contribute to the thermal pollution problem. Electric power generating facilities, however, are the primary sources of heated effluent discharges.²² These steam-electric-stations (SES) require huge amounts

¹⁹ 2 E.R.C. 1302 (March 3, 1971), modified, 2 E.R.C. 1580 (Ill. Pollution Control Bd. No. 70-21) (Apr. 28, 1971).

²⁰ 3 E.R.C. 1001 (June 16, 1971) (Mich. Pub. Service Comm. No. U-3884) (June 16, 1971).

²¹ A number of other articles dealing with the general area of thermal pollution have recently appeared. The best discussion of the technical aspects appears in Comment, Thermal Electric Power and Water Pollution: A Siting Approach, 46 Ind. L.J. 61 (1970) [hereinafter cited as Thermal Electric Power]. A worthwhile discussion of the National Environmental Policy Act is contained in Note, The Regulation of Nuclear Power after the National Environmental Policy Act of 1969, 24 Rutgers L. Rev. 753 (1970); for discussion of the Federal Water Pollution Control Act see Note, Thermal Pollution: The Electrical Utility Industry and Section 21(b) of the Federal Water Pollution Control Act, 22 Hastings L.J. 685 (1971). In addition, see generally Comment, Cold Facts on Hot Water: Legal Aspects of Thermal Pollution, 1969 Wis. L. Rev. 253 (1969); Comment, Thermal Discharges: A Legal Problem, 38 Tenn. L. Rev. 369 (1971); Comment, Thermal Pollution: The "Dishonorable Discharge"—New York's Criteria Governing Heated Liquids, 34 Albany L. Rev. 539 (1970); Edwards, Legal Control of Thermal Pollution, 2 Natural Resources Lawyer 1 (1969); Holifield, Federal-State Responsibilities in Nuclear Development, 12 Atomic Energy L.J. 165 (1970) (address by the Chairman, Joint Comm. on Atomic Energy); Note, Federal Pre-emption and State Regulation of Radioactive Air Pollution: Who Is the Master of the Atomic Genie?, 68 Mich. L. Rev. 1294 (1970); Note, Environmental Control: Higher State Standards and the Question of Preemption, 55 Cornell L. Rev. 846 (1970); Ramey, Planning for Environmental Protection in the Siting of Nuclear and Fossil Powered Plants, 12 Atomic Energy L.J. 59 (1970); Smith, Electricity and the Environment—The Generating Plant Siting Problem, 26 Bus. Law. 169 (1970); Trowbridge, Environmental Issues in Reactor Licensing, 12 Atomic Energy L.J. 251 (1970).

²² U.S. Dep't of the Interior, Physical and Ecological Effects of Waste Heat on Lake Michigan 34-35 (1970) [hereinafter cited as Effects of Waste Heat].

It is projected that by 1980, one-sixth to one-fifth of the total freshwater runoff in the United States will be needed for cooling and condensing purposes (Mihursky & Kennedy, Water Temperature Criteria to Protect Aquatic Life [hereinafter cited as Mihursky and Kennedy] in Hearings on Thermal Pollution Before the Subcomm. on Air and

of water to turn and cool the turbines used to generate electricity. This water is generally run, after use, directly into the original water source, slightly downstream from the intake pump.²³ The environmental significance of electric generators has been increased by the advent of the nuclear SES, as each nuclear plant requires at least forty percent more cooling water than its equivalent conventional SES.²⁴ These nuclear reactors discharge forty to sixty percent more waste heat than do fossil-fueled stations.²⁵ The Atomic Energy Commission has projected that over the next thirty years the number of operational nuclear plants will increase from fourteen to seven hundred, and that each unit will have a capacity of one thousand megawatts.²⁶ Continuing controversy surrounds nuclear SES projects at places such as Biscayne Bay, Florida,²⁷ Chesapeake Bay, Maryland,²⁸ and Cayuga Lake, New York.²⁹

Thermal pollution problems are neither unavoidable nor insoluble. Sufficient technology now exists to decrease substantially the amount of thermal discharge and virtually eliminate waste heat as a water pollution factor.³⁰ Long-range solutions may potentially alter the

Water Pollution of the Senate Comm. on Public Works, 90th Cong., 2d Sess., pt. 1, at 117 (1968) [hereinafter cited as *Hearings on Thermal Pollution*]. By the year 2000, this need is expected to increase to two-thirds. N.Y. Times, Feb. 22, 1970, at 62, col. 2.

²³ Discharges may reach 115° F. and increase a stream's temperature to "95° F. as far as five miles downstream. . . ." *Hearings on Thermal Pollution*, supra note 22, at 6.

²⁴ *Id.* at 312.

²⁵ Thermal Electric Power, supra note 21, at 64 n.8.

²⁶ *Hearings on Thermal Pollution*, supra note 22, at 312.

²⁷ See *United States v. Florida Power & Light Co.*, 311 F. Supp. 1391 (S.D. Fla. 1970).

²⁸ See *Calvert Cliffs' Coordinating Comm., Inc. v. AEC*, 449 F.2d 1109, 2 E.R.C. 1779, (D.C. Cir. 1971).

²⁹ New York State is illustrative of the nuclear SES situation. There existed but one operational nuclear SES there in 1968 but *thirteen* were either under construction or planned. N.Y. State Conservation Dep't, Cornell Scientists See Thermal Pollution of Cayuga Lake by Planned Nuclear Power Plant, Information Leaflet L-171, map at 1 (Aug.-Sept. 1968). See also *Hearings on S. 2472 Before the Subcomm. on Executive Reorganization and Gov't Research of the Senate Comm. on Gov't Operations*, 91st Cong., 2d Sess. pt. 1, at 32-42 (1970). [hereinafter cited as *Hearings on S. 2472*].

Nor is the thermal pollution problem restricted to the United States:

Brazil's first nuclear power plant, due for operation in 1976, already is generating controversy.

... Critics claim the hot water released from the plant would kill marine life in the bay, and otherwise disturb the ecology.

Government experts respond [that] the mixing of the plant's hot water—41 degrees centigrade [105.8° F.]—with the sea's cold water—as low as 16 [degrees] centigrade [61° F.]—could foster a greater development of marine life in the region.

Buffalo Evening News, Nov. 10, 1971, at 5, col. 7.

³⁰ With present technology there are only two basic methods of cooling heated waste water from an SES. Cooling towers, which would expose the heated water to the supposedly cooler outside air before returning it to its source, are now in service

negative aspects of thermal pollution and convert them into positive social and economic advantages. Thus, it may be possible to use the

at a number of SES's. Indeed, cooling towers are required at all stations in Great Britain. Cairnes, *We're in Hot Water*, 10 Scientist and Citizen 187, 193 (1968). There are several drawbacks to their use, however. First and foremost is that the additional heat is not eliminated from the water before the latter is returned to the ecosystem; rather, its temperature is only lowered somewhat and even that temperature drop must necessarily depend upon the length of exposure to the air and, of course, upon the ambient air temperature itself. Seemingly, this last consideration makes cooling towers impracticable in very hot locales, particularly during summer months, when electricity demands are usually highest. In addition, cooling towers do not appear to be appropriate in northern climes. Although cooling towers are capable of reducing the temperature of the heated water by 10-15° F., they lose 20% of the water being cooled by evaporation. Strand and Douglas, *Thermal Pollution of Water*, in *Hearings on Thermal Pollution*, supra note 22, at 720. The authors do not discuss the consequences of a 20% loss but common sense dictates that such waste cannot continue without drastic effects on both the body of water from which it is taken and the general ecosystem. Furthermore, extensive utilization of such a procedure may conceivably change local weather patterns, causing additional unforeseen effects. As the superheated water is exposed to the air, huge amounts of humidity are discharged. This in turn has caused fogging and icing of roads for several miles around the towers, and the towers themselves may freeze. *Id.* See generally U.S. Dep't of the Interior, *Feasibility of Alternative Means of Cooling for Thermal Power Plants Near Lake Michigan*, chap. VI (1970).

The second major method in combatting thermal discharges is much more effective in that it releases virtually no thermal effluents to watercourses or to the air. These so-called closed-circuit-cooling systems (CCC) operate in their first stage much the same as do the cooling towers. They expose the heated water not to the open air but within a completely enclosed tank or huge trough. In addition, large electric fans blow directly on the water, speeding the cooling process. Once the water has been cooled sufficiently (or as much as desired) it is recirculated to be used again in the cooling cycle. Strand and Douglas, supra, at 720-22. Small amounts would occasionally have to be replenished but these supplies can be taken from the usual sources without great harm. The advantage of a CCC is obvious: the elimination of all adverse environmental effects from thermal effluents. Perhaps not as obvious is the inherent disadvantage of this system. The electric fans, a necessary step in the quick cooling process in order to get the water recirculating without substantial delay, need considerable amounts of electric power—up to 3% of the SES' total kilowatt output. *Id.* at 722.

Like the cooling towers, construction costs of the CCC would require a substantial financial outlay. Estimates of cost for cooling towers range from \$5-10 per kilowatt of power generation (Comment, *Cold Facts on Hotwater*, 1969 Wis. L. Rev. 253, 255) to Federal Power Commission (FPC) estimates of \$5-13 per kilowatt for wet towers, and as much as \$30 per kilowatt for dry (closed circuit) towers. House Comm. on Gov't Operations, *Protecting America's Estuaries: The Potomac*, H.R. Rep. No. 1761, 91st Cong., 2d Sess. at 31 (1970) [hereinafter cited as H.R. Rep. No. 1761]. The FPC figures cost of cooling ponds to be considerably less, at \$4-9 per kilowatt. *Id.*

An additional method of abatement was advanced by one power company. Working from the old idea of cooling ponds (which pose the same problems, over a greater area, as towers) the company proposed to build a canal several miles long designed to cool the water on its way to a sound. The ponds would perhaps be a greater problem than the cooling towers, owing to the vast surface area of water exposed. It has been estimated that cooling the water expended from the SES around Miami, Florida, would require 4000 acres (6- $\frac{1}{4}$ sq. miles) of ponds. N.Y. Times, Feb. 22, 1970 at 62, col. 7. Rather than being a solution, this method would spread the harmful effects of the waste along a greater area. Federal officials have said that this method would "cause extensive biological damage." *Id.* This warning was disregarded and construction continued on the canal. An unsuccessful attempt was made to stop the construction by enjoining the power company

heated effluent discharges of nuclear stations³¹ to heat buildings, for cold weather agricultural irrigation,³² or to increase the growth rate of certain fish species.³³

B. *Identifying and Distinguishing Thermal Pollution Harms—
The Dichotomy Between Short and Long-Range Implications*

Perceptions of thermal pollution, as with other aspects of environmental degradation, have moved from the obvious and observable to the more abstract characteristics of future harms. The major difficulty encountered in dealing with the harms of thermal pollution lies in the lack of clear conceptual differentiation between the magnitudes of harm accompanying the direct and the long term implications of thermal pollution. A fish kill caused by super-heated water and thermal shock is a direct and immediately observable consequence of heated effluent discharge. In sufficient scale, the death of many fish, particularly of spawning age, presents questions of longer term implications. Both of these consequences are conceptually distinguishable, however, from the implications of increased algae growth and the preservation of inland waters, the destruction of a valuable coral reef, or the disruption of a fragile coastal ecological matrix. Despite protestations to the contrary, if the discharge is abated, the fish will eventually return; however, a lake, constantly subjected to increased algae growth because of a longer growing season and thermal cultivation, may be "lost" forever.³⁴ National attention has focused on the preservation of inland fresh water lakes.³⁵ While the effect of phosphates and nitrates has been studied and isolated as the most important single factor in the aging process of lakes, it is eminently clear that temperature differences among various water bodies play a major role in the rate and extent of algae growth, nutrient absorption, bio-oxygen demand levels and general eutrophic processes.³⁶ One of the major causes of eutrophication is the growth of algae.³⁷

from condemning the land it needed for the canal. The appellate court specifically refused to consider prospectively the possible environmental harms from the thermal discharges and stated that it would consider such factors only after the discharges could be shown to be harmful, or that an actual regulatory violation had occurred. *Seadade Indus., Inc. v. Florida Power & Light Co.*, 232 So. 2d 46; (Dist. Ct. App. 1970), *aff'd*, 245 So. 2d 209 (Fla. 1971).

³¹ Hearings on S. 2472, *supra* note 29, pt. 1, at 33 (1970); but see Clark, *Thermal Pollution and Aquatic Life*, *Scientific American*, March 1969 at 23.

³² Bloom, *Heat—A Growing Water Pollution Problem*, BNA Env. Rep., Monograph No. 4 at 5 (1970).

³³ Clark, *supra* note 31, at 21.

³⁴ See generally Reitze, *Wastes, Water, and Wishful Thinking: The Battle of Lake Erie*, 20 Case W. Res. L. Rev. 5 (1968).

³⁵ See *Saving America's Small Lakes*, note 9 *supra*.

³⁶ See generally Reitze, note 34 *supra*.

³⁷ Algae are plants which "breathe" carbon dioxide rather than oxygen. As the tem-

In addition to the nuisance problem of localized algae blooms, there is the general eutrophic effect of increased algae growth.³⁸ As algae die off from seasonal changes in the ambient temperature, they decay, use up needed oxygen, and fall to the bottom. There they accumulate and gradually fill in that body of water.³⁹ The result is the "death" of the lake and the emergence of a swamp, with an attendant loss of fish, wildlife, fresh water sources for domestic purposes and, perhaps most ironically, loss of water for cooling purposes by the industries which assisted in the creation of the thermal pollution problem. Because eutrophication advances by such subtle degrees, more pronounced indicators may be helpful to gauge the part played in its progress by thermal alteration. Fish kills caused by thermal discharges represent not only an immediate ecological threat but also a ready index of long term eutrophic damage. Increasing numbers of fish kills are caused primarily by the direct discharge of heated waters.⁴⁰ One study recently found that over a four-year period fish were entirely absent from artificially heated areas of the Delaware River.⁴¹ In addition to this evidence of fish kills immediately caused by heated effluents, a British researcher found that

the [general] increase in temperature of the water used by electricity generating stations for cooling purposes during

perature of water increases, its ability to hold oxygen decreases. Statement of R. Martin, Hearings on Thermal Pollution, *supra* note 22, at 4. The Lake Michigan study found that

An extensive zone of thermal influence would affect the species composition of algae and bacteria, in favor of species preferring higher temperatures; for example, green and blue-green algae would be favored over diatoms. Such a localized eutrophication effect is particularly important in lake zones where nutrient concentrations are high.

Effects of Waste Heat, *supra* note 22, at 85. The result of a lowered dissolved oxygen level is an increased algae growth rate where the necessary nutrients are present.

Not all algae forms respond equally to temperature, nor are they equally undesirable. Of the three main types, diatoms generally prefer water less than 86°F., green algae prefer waters up to 95°F., and blue-greens prefer waters above 95°F. *Id.* at 77. However, in Lake Erie, an example of an extremely nutrient-rich area, the blue-greens thrive at temperatures above 75°F. *Id.* at 78. Blue-green algae forms are primarily responsible for the stench and poor taste of water associated with periods of algae blooms. Odors from algae may make waters unsuitable for swimming as well. Report of the National Technical Advisory Comm. to the Secretary of the Interior on Water Quality Criteria 52 (1968) [hereinafter cited as Water Quality Criteria].

In addition, some species of blue-green algae are toxic to fish and birds. *Id.* at 52, 97-98.

³⁸ See Effects of Waste Heat, *supra* note 22, at 87; H.R. Rep. No. 1761, *supra* note 30, at 38.

³⁹ See generally, Saving America's Lakes, note 9 *supra*.

⁴⁰ Bloom, *supra* note 32, at 4. At least 19 such instances ranging in size from about 150 fish deaths to "millions" have been reported. *Id.*

⁴¹ Cited by W. Glooschenko in Hearings on Thermal Pollution, *supra* note 22, at 755. Apparently, no conclusion was reached as to whether this was a result of fish avoiding the heated areas or from large-scale kills.

the summer was often potentially lethal to trout and to the more sensitive species of coarse fish ⁴²

It is, however, important to understand that the major threat to fish life is not direct killing caused by over-heating; rather, it is asphyxiation resulting from the reduced ability of water at higher temperatures to retain dissolved oxygen.⁴³ Even a slight temperature increase will cause a substantial reduction in oxygen. While the rate at which oxygen is replaced in the water is directly proportional to the depletion rate,⁴⁴ this replacement rate is not as significant as it may at first appear because hotter water, being less dense than cooler water, rises to the surface. The oxygen-rich hot water, because of its contact with air, cannot reach the oxygen-deficient cooler waters below.⁴⁵

Increased water temperatures also have a synergetic effect which alters the impact of other substances on fish. In warmer waters parasites and chemicals, which in given concentrations may not be harmful to fish life, may suddenly become lethal as the rise in temperature lowers the resistance of the fish.⁴⁶ Further, it has been shown that certain types of fish particularly sensitive to water temperatures can have their entire reproductive processes altered.⁴⁷ Other fish are affected by the existence of heated effluent plumes, which may cause thermal barriers that fish either cannot or will not cross.⁴⁸ This problem is particularly serious when fish are seeking to migrate to spawning grounds.⁴⁹ Even a slight decrease in the reproduction rate could precipitate a decrease in future fish population levels.⁵⁰

Of special concern, however, is the effect of heated discharges on estuarine ecosystems:

⁴² J. Alabaster, *The Effect of Heated Effluents on Fish*, in *Hearings on Thermal Pollution*, supra note 22, at 844-45.

⁴³ Glooschenko, supra note 41, at 752-53.

⁴⁴ Hoak, *The Thermal Pollution Problem*, *Hearings on Thermal Pollution*, supra note 22, at 73.

⁴⁵ See *Thermal Electric Power*, supra note 21, at 68-69 n.22.

⁴⁶ "Extensive areas of waste heat influence would also favor species of bacteria tolerant of relatively high temperatures. Under certain conditions, the warming influence would assist in proliferating both the abundance and toxin production of *Clostridium botulinum* type E [botulism] during summer and fall, and increase the probability and magnitude of mass dieoffs of shore and water birds." *Effects of Waste Heat*, supra note 22, at 87. See also statement of F. Trembley, *Hearings on Thermal Pollution*, supra note 22, at 96; Glooschenko, supra note 41, at 753.

⁴⁷ Trout and salmon, for example, will neither spawn nor reproduce in water only a few degrees warmer than their normal habitat. Martin, supra note 37; Hoak, supra note 44, at 72; Mihursky & Kennedy, supra note 22, at 121.

⁴⁸ H.R. Rep. No. 1761, supra note 30, at 36-37.

⁴⁹ *Effects of Waste Heat*, supra note 22, at 59-63.

⁵⁰ "It is . . . evident that continuously high water temperatures [such as produced by SES] would prevent production of desirable game fishes and other species and result in their eventual elimination." Strand & Douglas, supra note 30, at 718.

It is in these areas that the maximum conversion of solar energy into aquatic plant life takes place and they are justly identified as "nurseries" since so many animals utilize them for feeding their early life stages. . . . [M]ore than half of the 4.5 billion pounds of fishery products harvested by U.S. fishermen annually is derived from animals dependent for their existence on clean estuarine waters during some part or all of their life cycle.⁵¹

These areas constitute major spawning grounds for both recreationally and commercially important fish species.⁵² However, it is projected that "by 1980 . . . approximately a third of all powerplants will be adjacent to estuaries."⁵³ This fact, combined with the more thermally sensitive nature of estuarine organisms,⁵⁴ makes it readily apparent that continued electric power development in such areas as Chesapeake Bay⁵⁵ invites environmental catastrophe.

The industry most directly threatened is, of course, the commercial fishing industry. In such areas as Chesapeake Bay, where new nuclear generating stations are planned, large fishing operations support entire communities.⁵⁶ Ironically, the long range implications have not generally been perceived and only overt and direct threats to marine life, such as factories with highly visible pollution rates, have prompted action by commercial fishermen.⁵⁷ There are, however, increasing exceptions to this generalization, and commercial fisheries are becoming allied with environmental groups both in and out of court.⁵⁸ The fact that private legal actions have not provided a com-

⁵¹ Water Quality Criteria, *supra* note 37, at 67.

⁵² H.R. Rep. No. 1761, *supra* note 30, at 35.

⁵³ *Id.* at 32.

⁵⁴ Water Quality Criteria, *supra* note 37, at 69-70. The National Technical Advisory Comm. has recommended that heated additions to estuaries be limited so that water temperatures would be raised by only 4° during most of the year and 1.5° during the summer. *Id.* at 70. These temperatures are to be compared with a recommended allowance of 5° increase in streams. *Id.* at 42-43.

⁵⁵ In Chesapeake Bay there are presently two SES's operating within spawning areas of the striped bass. Hearings on Thermal Pollution, *supra* note 22, at 105, 106 (maps). Significantly, there are also three proposed and two operational SES's whose thermal discharges could form a thermal barrier, thereby blocking passage of the bass to their upstream spawning grounds. *Id.*

⁵⁶ H.R. Rep. No. 1761, *supra* note 30, at 33 (referring to the Potomac River portion of the Chesapeake fishing industry).

⁵⁷ "In February [1970], three commercial fishing companies filed suit in Federal court seeking an injunction against the [dyestuff] plant's construction on the grounds that it would 'kill or render unfit for human consumption the shrimp, crabs and oysters in the fishing waters.'" Newsweek, April 13, 1970, at 72. Within days after this article appeared the company announced that it had suspended construction pending further studies.

⁵⁸ See, for example, the parties to Consumers Power Co., 3 E.R.C. 1001 (Mich. Pub. Service Comm'n. No. U-3884) (June 16, 1971).

plete solution is evident in the recent oil spill cases, where the parties sought money damages only after the harm had been done.⁵⁹ In another case, an Ohio sugar processor paid \$3,241 to the Ohio Department of Natural Resources as indemnification for the loss of over a half-million fish in 1967 and 1968, caused by the thermal discharges of a plant.⁶⁰ When a value of approximately only one-half cent per fish is assigned, it does not seem surprising that money damages are rarely sought and do not operate as an effective sanction against future harms.⁶¹

The tally sheet on thermal pollution, from an ecological perspective, is bleak. Our ever dwindling fresh water resources are threatened with extinction.⁶² Although thermal pollution has been an isolated occurrence, neither ubiquitous nor pervasive in location or effect, with most nuclear SES facilities to be located along the shores of inland waters, or in areas where the ecological matrix is extremely delicate, the full significance of thermal pollution is yet to be felt. Unlike other environmental assaults, however, this forewarning of an impending problem comes at a time when society has become increasingly receptive to the idea that environmental values must be balanced with material progress. The recent decision in *Calvert Cliffs*,⁶³ considered in the context of a half-decade of environmental confrontation, action and education, gives rise to the belief that it is possible to act preventively and intelligently to preserve lakes, bays, and estuaries threatened with extinction by thermal pollution.

II. ENVIRONMENTAL AND LEGAL ISSUES ARISING FROM THERMAL AWARENESS

A. General Principles of Conflict

Until recently, environmental issues have arisen in the context of a conflict between the regulatory agencies and the regulated industries.⁶³ Now, however, increased citizen frustration with administra-

⁵⁹ See note 57 supra; see also discussion of *Boomer v. Atlantic Cement Co.*, note 4 supra.

⁶⁰ This is possibly the only such reported instance of payment for damages from a heat-related fish kill. Bloom, supra note 32, at 12.

⁶¹ See note 202 infra.

⁶² See generally Comm. on Government Operations, *Views of the Governors on Saving America's Small Lakes* (Water Pollution Control and Abatement), H.R. Rep. No. 1571, 90th Cong., 2d Sess. 4-5 (1968) [hereinafter cited as *Saving America's Small Lakes*].

⁶³ It is interesting to note that the literature presents the conflict as between the AEC and the states. See generally Note, *Federal Pre-emption and State Regulation of Radioactive Air Pollution: Who is Master of the Atomic Genie?*, 68 Mich. L. Rev. 1294 (1970); Note, *Thermal Pollution from a Nuclear Power Plant*, 47 Journal Urban L. 895 (1970); Note, *Environmental Control: Higher State Standards and the Question of Pre-emption*, 55 Cornell L. Rev. 846 (1970). See *New Hampshire v. AEC*, 406 F.2d 170 (1st Cir.), cert. denied, 395 U.S. 962 (1969) and *Northern States Power Co. v. Minnesota*, 320 F. Supp. 172 (D. Minn. 1970), aff'd 447 F.2d 1143 (8th Cir. 1971).

tive processes has shifted the focus of conflict to the securement of independent environmental rights.⁶⁴ Although impeded by a labyrinth of red tape and governmental procrastination,⁶⁵ environmental groups and other concerned citizenry have made significant inroads into the traditional regulatory processes and have wrested the initiative for environmental protection from the federal and state regulatory agencies. Faced with the fact that the regulatory agencies and regulated industries have reached an accord on environmental issues, the citizen intervenors have been forced to challenge the very structure of decision-making. Spurred on by changing societal values and the spotlighting of specific agencies and issues, this new force has acquired the cohesion and tenacity which is necessary to prevail on issues fundamental to the structure of society and to the redistribution of power in the decision-making process.⁶⁶ That they are called the watchdogs of environmental property⁶⁷ is a tribute to their efforts.

⁶⁴ See generally, Hanks and Hanks, An Environmental Bill of Rights: The Citizen Suit and the National Environmental Policy Act of 1969, 24 Rutgers L. Rev. 230 (1970).

⁶⁵ The reactions both of the court in *Calvert Cliffs* and of the Michigan PSC, in *Consumers Power Co.* evidence the process of "procrastination."

For excellent analysis of the "initiative power" in administrative decision-making, see generally Comment, Judicial Control of Administrative Inaction: Environmental Defense Fund, Inc. v. Ruckelshaus, 57 Va. L. Rev. 676 (1971); Note, 13 B.C. Ind. & Com. L. Rev. 408 (1971).

⁶⁶ The classic example of long term battling is *Scenic Hudson Preservation Conf., Inc. v. FPC*, 354 F.2d 608 (2d Cir. 1965). It was estimated, in 1966, that the case had already cost \$250,000 with an added indebtedness at that time of \$100,000. Note, *Of Birds, Bees and the FPC*, 77 Yale L.J. 117, 120-21 (1967). As of the date of this article, the controversy still continues. 2 BNA Env. Rep., Current Devs. 752 (1971).

The problem of legal costs does not appear to "bother" the courts. Thus the 7th Circuit in *Thermal Ecology Must Be Preserved v. AEC* — F.2d —, 2 E.R.C. 1405, 1406 (7th Cir. 1970) noted:

Plaintiffs also complain that all legal services for the plaintiffs have thus far been donated on a *pro bona publica* basis and that the extended duration of the hearings will be detrimental to them. The plaintiffs and their counsel are to be commended for their public interest in pursuing the ecological aspects of this matter. Nevertheless, the cost or expense of litigation is ordinarily not deemed irreparable damage. As Mr. Justice Brandeis in *Myers v. Bethlehem Corp.*, 303 U.S. 41, 51 (1939) stated: "Lawsuits also often prove to have been groundless; but no way has been discovered of relieving a defendant from the necessity of a trial to establish the fact."

Id.

The District Court in *Lloyd Harbor Study Group, Inc. v. Seaborg*, — F. Supp. —, 2 E.R.C. 1380, 1381 (E.D.N.Y. 1971) was able to provide greater comfort to conservationists:

Litigation expenses and the possibility that plaintiff will not have the financial resources to litigate fully are factors to be considered in balancing equities in a case such as this. . . . But, as already noted, it is not clear that expenses will be reduced by permitting this preliminary attack in the District Court with appeals when there is almost certain to be an additional series of administrative appeals followed by review in the Federal Court of Appeals of the final administrative order. In any event, the fact that the State of New York has added its

This shift in power to independent interests has not gone unnoticed. Its implications, however, have not been sufficiently identified, perhaps because they are too remote to permit identification, or because those favoring the status quo would either ignore or demean the role of the environmental movement.⁶⁸ It is possible, on the other hand, that those favoring such a shift in power remain silent out of fear to generalize lest the full confrontation be joined before the time is ripe. Another chapter in the constant redefinition of role and distribution of power has been closed, however, by the recent decision in *Calvert Cliffs*.⁶⁹ As a consequence of this decision, the one federal agency which had not yet accepted full environmental responsibility, the AEC, was brought into the fold.⁶⁹

The answer to why the AEC was the last to succumb probably lies in the mystique which surrounded the utilization and development of atomic energy from its inception,⁷⁰ either because of the AEC's self-acknowledged monopoly on expertise,⁷¹ or because, as the AEC so describes it, energy resources and power generation are pivotal forces

resources to that of plaintiff has minimized chances that justice will be frustrated by a lack of financial capacity to litigate.

Id.

⁶⁷ See generally, Hanks and Hanks, note 64 supra. See also the lengthy list of cases cited in *Thermal Electric Power*, supra note 21, at 78 n.32.

The AEC participated in four actions directly involving thermal pollution: *New Hampshire v. AEC*, 406 F.2d 170 (1st Cir. 1969); *Thermal Ecology Must Be Preserved v. AEC*, 433 F.2d 524 (D.C. Cir. 1970); *Thermal Ecology Must Be Preserved v. AEC*, — F.2d —, 2 E.R.C. 1405 (7th Cir. 1970); and *Lloyd Harbor Study Group, Inc. v. Seaborg*, — F. Supp. —, 2 E.R.C. 1380 (E.D.N.Y. 1971). The states appeared in *New Hampshire* and *Lloyd Harbor*, supra; and in *Northern States Power Co. v. Minnesota*, 320 F. Supp. 172 (D. Minn. 1970), aff'd, 447 F.2d 1143 (8th Cir. 1971). Michigan, Wisconsin, Maryland, Missouri, Vermont and Virginia filed briefs at the trial in *Northern States* and Michigan, Wisconsin, Illinois, Maryland, and Vermont filed amici curiae briefs in the appeal to the Eighth Circuit.

⁶⁸ It would be impossible to document the number of times conservationists have been labeled "obstructionists" by administrative agencies.

⁶⁹ Prior judicial decisions and statutory enactments have converted the Federal Power Commission (see, e.g., *Scenic Hudson Preservation Conf., Inc. v. FPC*, 354 F.2d 608 (2d Cir. 1965)), the Army Corps of Engineers (see, e.g., *Zabel v. Tabb*, 430 F.2d 199 (5th Cir. 1970)), the Department of Interior (see, e.g., *Wilderness Soc'y v. Hickel*, 325 F. Supp. 422 (D.D.C. 1970)), and the Department of Transportation (see, e.g., *San Antonio Conservation Soc'y v. Texas*, — F.2d —, 2 E.R.C. 1872 (5th Cir. 1971) and *D.C. Fed'n of Civic Ass'ns v. Volpe*, 308 F. Supp. 423 (D.D.C. 1970)). The Federal Aviation Admin. (see, e.g., *Kirk v. United States*, 326 F. Supp. 843 (W.D. Okl. 1970)), the Dep't of Health, Educ. and Welfare (see, e.g., *Environmental Defense Fund, Inc. v. HEW*, 428 F.2d 1083 (D.C. Cir. 1970)) and the Federal Communications Comm'n (see, e.g., *Friends of the Earth v. FCC*, 449 F.2d 1164, 2 E.R.C. 1901 (D.C. Cir. 1971)) are less certain additions to the list of environmental converts.

⁷⁰ See generally Holifield, *Federal-State Responsibilities in Nuclear Development*, 12 *Atomic Energy L.J.* 165 (1970); see also, Green, *Safety Determinations in Nuclear Power Licensing: A Critical View*, 43 *Notre Dame Lawyer* 633 (1968).

⁷¹ See Holifield, supra note 70, at 178, where the author notes that the AEC "has individual consultants in every -ology in Webster's Third Unabridged Dictionary."

in our society.⁷² The realities of electrical power generation, the crisis response to fossil fuel emissions and air quality, and the inability, until recently, to marshal factors detailing implications of thermal discharges on the ecological matrix, had postponed recourse to the procedures of the AEC for the protection of inland and coastal waters. The AEC had tenaciously defined its own jurisdiction to the most limited environmental area—radiological impacts; its goals were self-defined as the promotion and development of nuclear resources as a primary source of electric power for a country suffering from obvious problems of over-consumption and threatened scarcity of electrical power.⁷³ The goal of energy production, having achieved supremacy as a social objective at an earlier date, was accepted by the legislature and the courts as an operating premise in balancing the costs and benefits of power production and “remote” environmental harms. Furthermore, the courts, lacking what they perceived to be the requisite nuclear expertise, deferred to the AEC’s delineations of conflict and jurisdiction.⁷⁴

B. *The Federal-State Conflict*

Private nuclear power generating facilities initially engendered fears closely associated with nuclear matters—that is, radiation. The legislative history accompanying the decision to license private nuclear power production facilities and to promote their development as major sources of electrical power generation evidences considerable concern for the effects of radiation and general population safety in terms of site location and radiation emission standards.⁷⁵ By the mid-1960’s several states, but not the Atomic Energy Commission, had become convinced that environmental threats posed by nuclear-powered generating plants were not limited to radiological hazards. Subsequent attempts by these states to secure recognition of nonradiological dangers are an interesting illustration of how diverse interests—environmental, industrial, technological and governmental—are harmonized in a federal system. *New Hampshire v. Atomic Energy Commission* and *Northern States Power Co. v. Minnesota* are especially illustrative of this process.

⁷² See generally Larson, Present State and Future Outlook of Nuclear Power Generation in the United States, 12 Atomic Energy L.J. 274, 292-93 (1970).

⁷³ Id. See also Statement of H. Woodbury, Hearings on S. 3354 Before the Senate Comm. on Interior and Insular Affairs, 91st Cong., 2d Sess., pt. 2, at 416-41 (1970); The Impact of the Energy and Fuel Crisis on Small Business, Hearings Before the House Subcomm. on Special Small Business Problems, Select Comm. on Small Business, 91st Cong., 2d Sess. (1970).

⁷⁴ While the deference remained, it is interesting to note the detailed involvement and debate of the court in *Crowther v. Seaborg*, 312 F. Supp. 1205 (D. Colo. 1970).

⁷⁵ See *New Hampshire v. AEC*, 406 F.2d 170, 174-76 (1st Cir. 1969).

1. *New Hampshire v. Atomic Energy Commission*⁷⁶

This case arose in 1966, when the Vermont Yankee Nuclear Power Corporation applied to the AEC for a provisional construction permit pursuant to the Atomic Energy Act of 1954.⁷⁷ By this time, there had been sufficient experience with actual operations of nuclear power generating facilities to warrant the states of Vermont, New Hampshire and Massachusetts to exhibit substantial concern with the environmental effects of thermal pollution discharges into the Connecticut River at Vernon, Vermont, along the Vermont-New Hampshire border.⁷⁸ As intervenors in the AEC licensing process, these three states sought to introduce evidence showing that the proposed operation of the Vermont Yankee Facility, without the use of cooling

⁷⁶ 406 F.2d 170 (1st Cir.), cert. denied, 395 U.S. 962 (1969).

⁷⁷ 42 U.S.C. § 2131 (1970).

⁷⁸ The First Circuit stated in *New Hampshire*:

Without purporting to make a definitive summary of the extensive testimony and offers of proof as to such alleged harm, we note the following general thrust of the rejected evidence.

The states of Vermont, New Hampshire, Massachusetts and Connecticut have agreed to a new, upgraded future use classification for the Connecticut River which would make it more suitable for bathing and recreation, provide an excellent fish and wildlife habitat, and a source of public water supply, assuming appropriate treatment. A program for encouraging Atlantic salmon and other anadromous fish is actively being considered.

The estimated temperature increases in the river, if applicant's facility were constructed without cooling towers, would have a variety of deleterious effects. The major effects were alleged to be a substantial reduction in dissolved oxygen and consequent capacity to assimilate municipally treated waste; a change in the nature of aquatic plants and bottom fauna resulting, for example, in an increase of odiferous algae; and destruction of opportunity to develop the river as a cold water fishery.

The latter conclusion was supported by proffered testimony that the presence of a zone of water of substantially higher than natural temperature would (1) serve as a thermal barrier preventing fish from reaching their spawning grounds at the river's headwaters, (2) prematurely trigger spawning, with resultant loss of fish population from inadequate terrain for depositing roe, and (3) cause, through the abrupt change in temperature, thermal shock to migrating fish, especially young smolt and fish weakened from the reproductive process. Among the kinds of fish threatened are walleye pike, small mouth bass, perch, brown and rainbow trout, shad, and Atlantic salmon.

In addition to these possible thermal effects, the discharge of algacides used in cleaning the facility's cooling system was alleged to be potentially toxic to fish, as was the transmission of increasing concentrations of radioactive matter from aquatic invertebrates through radionuclides passed on to fish through the food chain. While the latter claim would not seem to us to be necessarily irrelevant to "public health and safety," we find no suggestion in the offers of proof that human consumers of fish would be harmed.

406 F.2d at 172 n.1. The problems of Turkey Point, Florida, were also brought to the court's attention. *Id.* at 173 n.2.

It should be noted that prior to the decision of the court in *New Hampshire*, the Dep't of Interior had conducted studies and released reports designed to ensure the very interest raised by the states. The position of Interior was expressed in New England Heritage: The Connecticut River National Recreation Area Study (July, 1968).

towers, threatened the ecological balance of the Connecticut River with thermal pollution. The AEC's preemptory refusal to consider the consequences of pollution on the grounds that such a consideration was beyond its jurisdiction precipitated the first major challenge to the role of the AEC on environmental issues broader than radiological harms.

The general issue in the case involved New Hampshire's petition for the review of the AEC order granting a provisional construction permit to Vermont Yankee Nuclear Power Corporation. Judge Coffin's opinion for the First Circuit Court of Appeals characterized the central issue as the propriety of the AEC's refusal "to consider, as outside its regulatory jurisdiction, evidence of possible thermal pollution of the Connecticut River as a result of the discharge of cooling water by applicant's facility."⁷⁹ In arriving at his conclusion that the AEC had not erred in its refusal to consider these issues, Judge Coffin considered the following major factors: (a) the legislative history; (b) the AEC's prior practices; (c) the absence, at the date of the hearing application and judicial determination, of an express national environmental policy; (d) the failure of modestly pursued legislative attempts to include thermal pollution within the purview of AEC licensing practices; and (e) judicial deference to sensitive legislative, political and administrative policy decisions.

At the time of the passage of the Atomic Energy Act of 1946, the AEC was given a monopoly over the use and production of fissionable materials.⁸⁰ This monopoly ended with passage of the Atomic Energy Act of 1954, which not only sanctioned, but encouraged private nuclear power production.⁸¹ The legislative history of this major shift in policy reflects a continued concern with questions of radiation hazards.⁸² The limited jurisdictional role assumed by the Commission has sustained this narrow mandate. At the time of the suit, the AEC Rules of Practice appear specifically to have precluded the raising of thermal effects as an issue during construction or operating license hearings.⁸³ Attempts to amend the Atomic Energy Act to ensure consideration and application of thermal pollution standards were never acted upon.⁸⁴

⁷⁹ 406 F.2d at 171.

⁸⁰ *Id.* at 174 n.4.

⁸¹ *Id.*

⁸² *Id.* at 174-76.

⁸³ *Id.* at 175; citing the old AEC regulations, 10 C.F.R., pt. 2, app. A, III(c)(7) (1971). This version has been modified by 35 Fed. Reg. 19659 (1970).

⁸⁴ See generally *Dresden Nuclear Power Co.*, 2 E.R.C. 1302 (March 3, 1971), modified, 2 E.R.C. 1580 (Ill. Pollution Control Bd. No. 70-21) (Apr. 28, 1971); Note, *The Regulation of Nuclear Power After the National Environmental Policy Act of 1969*, 24 Rutgers L. Rev. 753 (1970).

Prior practices of the AEC and unsuccessful attempts to require the Commission to consider thermal pollution would not ordinarily have been considered conclusive of the jurisdictional bounds of the AEC. Changes based upon evolutionary processes in the recognition and realization of harms could have been used by the court to require the AEC to take general jurisdiction over environmental matters; as noted by the court in the *New Hampshire* case, "[t]he Atomic Energy Act itself [was] replete with many references to the 'health and safety of the public.'"⁸⁵ The court, in addition to being concerned with the internal operating balance achieved by the AEC,⁸⁶ appears to have been uneasy about two questions it subsequently declined to consider fully: (a) the unresolved question of whether jurisdiction over water quality standards ought to reside with the Department of the Interior;⁸⁷ and (b) the fact that no licensing activities of the AEC relieved any licensee from complying with state standards or those of the Department of the Interior's Federal Water Pollution Control Administration⁸⁸ (now the Environmental Protection Agency).

The court also perceived the need to exercise judicial restraint in approaching this technologically and politically unsettled area. Judge Coffin characterized this attitude succinctly:

We conclude that the licensing board and the Commission properly refused to consider the proffered evidence of thermal effects. We do so with regret that the Congress has not yet established procedures requiring timely and comprehensive consideration of nonradiological pollution effects in the planning of installations to be privately owned and operated. But the very fact that complex questions of jurisdiction among federal agencies, of federal-state relations, of procedure, and even of specialized staff and appropriations must be resolved indicates the inappropriateness of any judicial fiat—particularly when the legislative branch is actively seized of the problem.⁸⁹

⁸⁵ 406 F.2d at 173.

⁸⁶ Id. at 174.

⁸⁷ Id. at 175.

⁸⁸ Id. at 173.

⁸⁹ Id. at 176. This statement ought to be read in the context of the apology offered by the court as follows:

We confront a serious gap between the dangers of modern technology and the protections afforded by law as the Commission interprets it. We have the utmost sympathy with the appellant and with the sister states of Massachusetts and Vermont, which took the same position before the Commission. That position was simply that adequate planning be required of the applicant *before* a construction permit is issued in order to assure all feasible protection against thermal pollution instead of waiting until heavy investment has been made, and damage has occurred or is imminent. To delay the day of reckoning is to invite the un-

The significance of Judge Coffin's decision lies not in the specific holding, nor in the "rationalizations" proffered, but in the issues avoided and left unresolved.

First, the decision produced no clear delineation of the proper relationship between the states and the AEC. Apparently, Vermont, Massachusetts and New Hampshire believed that the AEC possessed primary and perhaps sole jurisdiction over the construction, design, location, operation, maintenance and safeguards related to nuclear power generation facilities. The states pursued the matter before the AEC because they believed that the latter alone had a competence sufficiently broad to account for all the interests involved.⁹⁰ The AEC's contention that the states have jurisdiction over water quality standards represents an attempt to fractionize this competence; despite possible appearances to the contrary, the attempt was not accepted by the court. The issue left open was one of preemption and, specifically, the extent to which states may set water quality standards which would have the effect of limiting the discretion of the AEC; if the states enacted water quality standards relative to thermal discharges, they would clearly be limiting the design and operating options available to the AEC. By limiting thermal discharges, the size, output, design, capital cost, operating efficiency and site location of generating facilities and numerous other issues would have been determined before the matters ever arose before the AEC.⁹¹

Second, Federal Water Pollution Control Administration (FWPCA)⁹² procedures for violation of water quality were, at the time, cumbersome⁹³ and inoperative until *after* actual harm had occurred. At this later point, the fact that substantial capital had already been invested in the projects no doubt had an inhibiting effect on both the AEC and the court. The harm as perceived by the states was in allowing the construction of the facility without the necessary safeguards in the first place. Thus, at the state and federal levels, questions remained as to whether the state could impede or foreclose

necessary dilemma of choosing between harming natural environment, with harmful effects on even the health and well being of humans, and frustrating the needed production of power.

Id. at 173.

⁹⁰ These issues were later raised generally and acted upon favorably by the D.C. Circuit in *Calvert Cliffs*. See textual discussion and accompanying notes at p. 669 *infra*.

⁹¹ See, e.g., textual discussion of Dresden Nuclear Power Station and Consumers Power Co. and accompanying notes at pp. 661 and 666 *infra*.

⁹² Later changed to the Federal Water Quality Admin. 33 U.S.C. § 1152 *et seq.* (1970). Its functions are now under the jurisdiction of the Environmental Protection Agency. Reorganization Plan No. 3 of 1970, 35 Fed. Reg. 15623 (1970).

⁹³ See, e.g., Note, Thermal Pollution: The Electric Utility Industry and Section 21(b) of the Federal Water Pollution Control Act, 22 Hastings L.J. 685 (1971) [hereinafter cited as Thermal Pollution].

operation of a nuclear power facility approved by the AEC by (a) securing relief through the continuing jurisdiction of the AEC, (b) securing relief under FWPCA conference, hearing and legal procedures, (c) securing an injunction in a federal or state court for actual harms, or (d) condoning private, *inter partes* relief under the riparian rights doctrine or general nuisance theories.⁹⁴

2. *Northern States Power Co. v. Minnesota*⁹⁵

Northern States constructed a nuclear power facility at Monticello, Minnesota, along the Mississippi River, pursuant to a permit granted by the AEC. Before the start of operations, but apparently after construction of the facility had been completed, Northern States applied to the Minnesota Pollution Control Agency (PCA) for a permit to discharge heated cooling waters and liquid radioactive wastes into the Mississippi River. Northern States objected to the conditions attached to the permit granted by the PCA as

practically impossible of fulfillment, at least in the foreseeable future, and at a prohibitive and unnecessary expense, and all to the detriment of [Northern States] and the consuming public.⁹⁶

Both the District Court of Minnesota⁹⁷ and the Eighth Circuit Court of Appeals⁹⁸ struck down the PCA's conditions, holding that the federal government has exclusive authority to regulate nuclear power plants. Whether the protest was directed to the conditions attached to thermal discharges, as well as to those attached to radioactive waste disposal, is not clear. The sole issue considered by both courts was that of federal preemption as applied to the control of radioactive wastes.

As in the *New Hampshire* case, the prior practices of the AEC, the legislative history and notions of judicial restraint fully occupied the court's considerations. Unlike the *New Hampshire* court, the court of appeals in *Northern States* placed the question of judicial restraint at the threshold of its decision.⁹⁹ According to Chief Judge

⁹⁴ For an interesting discussion of "private rights" see Coleman, Possible Repercussions of the National Environmental Policy Act of 1969 on the Private Law Governing Pollution Abatement Suits, 3 Natural Resources Lawyer 647 (1970).

⁹⁵ 320 F. Supp. 172 (D. Minn. 1970), aff'd, 447 F.2d 1143 (8th Cir. 1971).

⁹⁶ 320 F. Supp. at 173.

⁹⁷ 320 F. Supp. at 179.

⁹⁸ 447 F.2d at 1154.

⁹⁹ The court noted that

it is appropriate to observe that the question of federal pre-emption of the subject matter involved is one of first impression in the federal appellate courts. We realize too that our decision may affect future relationships between other states and other public utility companies who enter the still evolutionary field of nuclear reactor energy production. The many amici briefs filed in this appeal have

Matthes, the first inquiry was whether congressional action in a particular field "had been undertaken pursuant to one of the powers delegated to the United States by the Constitution."¹⁰⁰ If the answer to this question is in the affirmative, it must then be determined whether Congress "has exercised its power of legislation in such a manner as to exclude the states from asserting concurrent jurisdiction over the same subject matter."¹⁰¹ A finding of federal preemption necessarily results if "compliance with both federal and state regulators is a physical impossibility"¹⁰² or if Congress has "unequivocally and expressly declared that the authority conferred by it shall be exclusive. . . ."¹⁰³ In the absence of these two situations, the court must look to an implied congressional intent. Judge Matthes indicated that the following factors were indicative of such an intent:

- a. The aim and intent of Congress as revealed by the statute itself and its legislative history.¹⁰⁴
- b. The pervasiveness of the federal regulatory scheme as authorized and directed by the legislation and as carried into effect by the federal administrative agency.¹⁰⁵
- c. The nature of the subject matter regulated and whether it is one which demands "exclusive federal regulation in order to achieve uniformity vital to national interests."¹⁰⁶
- d. Whether, under the circumstances of a particular case state law stands as an obstacle to the accomplishment and execution of the full purposes and objectives of Congress.¹⁰⁷

Judge Matthes appears also to have found that there existed an express congressional intent that the AEC preempt the field.¹⁰⁸ The factors which led him to this conclusion were: (1) Section 2021(c)

not only been helpful in our consideration of this case, but have served as an indicator of the widespread interest generated by this litigation. Finally, we are cognizant that apart from the significant and controlling legal issue, the subject of this appeal is collaterally pervaded by currently compelling controversies concerning the need to supply power to an ever burgeoning population coupled with the newly recognized importance of maintaining an ecological balance and also with the whole Pandora's box of problems in the area of federal-state relationships and responsibilities.

447 F.2d at 1145.

¹⁰⁰ *Id.* at 1146.

¹⁰¹ *Id.*

¹⁰² *Id.*

¹⁰³ *Id.*

¹⁰⁴ *Id.*

¹⁰⁵ *Id.*

¹⁰⁶ *Id.*

¹⁰⁷ *Id.* at 1147.

¹⁰⁸ *Id.* at 1150.

of the Atomic Energy Act of 1954, under which the AEC is prohibited from abdicating any of its responsibilities for "the construction and operation of any production or utilization facility";¹⁰⁹ (2) the legislative history leading to the amendment of the Atomic Energy Act in 1959, and the unanimous Joint Committee report in support of the exclusive responsibility of the AEC with regard to radiation matters;¹¹⁰ and (3) the AEC's construction of its mandate under the statute, as represented by Commission regulations to the effect "that the states lack authority to regulate nuclear power plants and the discharge of effluents from these facilities from the standpoint of radiological safety and health."¹¹¹

Judge Matthes concluded his opinion on the question of preemption by noting that, in addition to the unequivocal direct intent to preempt the field, there existed

further evidence of an *implied Congressional intention* to pre-empt this area by the pervasiveness of the federal regulatory scheme which Congress directed and which the AEC has carried into effect through the promulgation and enforcement of detailed regulations governing the licensing of atomic power plants.¹¹²

He further noted that:

The nature of the subject matter regulated and the need for *uniform* controls in order to effectuate the objectives of Congress are additionally supportive of a finding of preemption.¹¹³

While these latter observations may be construed as dicta, the opinion is carefully couched so as to find both express and implied congressional intent to preempt the field, leaving little room to distinguish future cases on the basis of legislative history.

Judge Van Oosterhout's dissenting opinion¹¹⁴ illuminated some subtle issues of federal preemption and some general questions of environmental concern.¹¹⁵ First, Judge Van Oosterhout pointed to the

¹⁰⁹ 447 F.2d at 1149 n.6.

¹¹⁰ The legislative history and the joint report are discussed by the court. *Id.* at 1150-51.

¹¹¹ *Id.* at 1152.

¹¹² *Id.* at 1152-53 (emphasis added).

¹¹³ *Id.* at 1153 (emphasis added).

¹¹⁴ *Id.* at 1154-58.

¹¹⁵ It is noteworthy that the dissent considered NEPA as relevant to the issues of the case, *id.* at 1157, but the majority opinion never acknowledged the existence of either NEPA or the WQIA of 1970, both of which had been in existence for some time before the decision.

ubiquitous and complex interrelationship of all forms of environmental degradation:

Pollution of land, water and air by nuclear power plants may be brought about by other means than radiation. Close factual issues may arise whether pollution is caused by radiation or by other pollutants. Control of pollution not caused by radiation is expressly reserved to the states. Thus the control of various sources of pollution is divided and hence complete unification of pollution caused by nuclear plants is not possible.¹¹⁶

He also challenged the majority's position that because overly zealous state regulations would stultify nuclear power development, it was important that there be uniform regulation.¹¹⁷

Both of the foregoing issues are double-edged swords. While there was evidence offered at the Joint Committee Hearing in 1959 to the effect that the AEC preferred to avoid the premature setting of definitive lines of preemption,¹¹⁸ it was clear that the AEC's attempt to relinquish its role as decision-maker on federal legislative policy to the courts was not likely to be favorably received by the judiciary.¹¹⁹ The line of federal decisions prior to *Northern States* indicates a further problem in that the AEC had not been a party to any action, nor had the issue been directly raised in any proceeding as regards the extent of AEC preemption beyond issues of radiation.¹²⁰ The issues of unification of pollution control and uniformity of policies concerning the construction and control of nuclear facilities thus noted by both the majority and minority opinions raise serious questions. Application of the majority's preemption criteria to the reasoning of the dissent would actually lead to AEC preemption of *any* environmental issue affecting the AEC's basic jurisdictional legislative charges—that is, the responsibility for the promotion and private development of nuclear power generating facilities.¹²¹

¹¹⁶ Id. at 1157.

¹¹⁷ Id. at 1157-58.

¹¹⁸ Id. at 1156.

¹¹⁹ See generally *Calvert Cliffs' Coordinating Comm., Inc. v. AEC*, 449 F.2d 1109, 2 E.R.C. 1779 (D.C. Cir. 1971).

¹²⁰ It should be noted that the AEC was not at any time a party in the *Northern States* case.

¹²¹ The question which must be faced is whether the AEC will attempt to preempt the field of thermal regulation as it has done regarding radiation control. The clues lead to conflicting conclusions.

As stated by the Atomic Energy Act, 42 U.S.C. § 2011 et seq. (1970), and as recognized by the courts, *Northern States Power Co. v. Minnesota*, 320 F. Supp. 172 (D. Minn. 1970), aff'd, 447 F.2d 1143 (8th Cir. 1971), the AEC has exclusive jurisdiction over the licensing and use of nuclear materials and facilities. See generally, 10 C.F.R. §§ 30-55

C. *Recognition and Protection of Environmental Interests in State Agencies—Environmental Sensitivity and Forecasts of Future Federal-State Conflicts*

Proceedings before the Illinois Pollution Control Board in *Dresden Nuclear Power Station*¹²² and before the Michigan Public Service Commission in *Consumers Power Company*¹²³ during the first half of 1971 demonstrate the extent to which a state's exercise of jurisdiction to protect generalized environmental interests can affect specialized decisions concerning the licensing and operation of private nuclear power generation facilities. Recently decided and still largely unexplicated, the decisions have unmistakably opened the path for future state confrontations with the AEC.¹²⁴ The path is being widened by

(1971). Further, even under so-called "turn-over" agreements with the states, the Commission nevertheless retains "authority and responsibility with respect to regulation of . . . the construction and operation of any production or utilization facility. . . ." 42 U.S.C. § 2021(c) (1970). Since the amount of thermal effluent discharge is a function of two factors—the size and number of the turbines to be cooled and the type of abatement process used (if any)—the matter becomes intimately involved in the planning and production stages of the generating plant in question.

Thus far the AEC has not seen fit to include this type of environmental regulation within its general regulation of nuclear power plants. In fact, the latest revision of the AEC's implementation of NEPA, 10 C.F.R. § 50, App. D., revised in 36 Fed. Reg. 18071, 18072 (1971), specifically mentions that consideration will be given to:

applicable environmental quality standards and requirements (including, but not limited to, thermal and other water quality standards promulgated under the Federal Water Pollution Control Act) which have been imposed by Federal, State, and regional agencies having responsibility for environmental protection.

It should be noted in passing that this consideration of environmental effects is prospective in a way that the enforcement procedures of § 10 of FWPCA cannot be. In addition, the Atomic Energy Act itself appears to provide for continued state regulation of environmental effects: "Nothing in this section shall be construed to affect the authority of any State or local agency to regulate activities for purposes other than protection against radiation hazards." 42 U.S.C. § 2021(k) (1970). However, "this section" probably refers only to § 2021's turn-over agreements. The question remains an open one.

Also an open question but one engendering more active conflict is the selection and regulation of site locations for new nuclear SES's. See generally note 126 *infra*. Pursuant to provisions of its enabling act, 42 U.S.C. §§ 2133, 2232 (1970), the AEC has developed limited "Reactor Site Criteria." 10 C.F.R. §§ 100.1 et seq. (1971). Although these are termed an "interim guide" and the Commission allows applicants to demonstrate that other factors are worthy of consideration, (10 C.F.R. § 100.1 (1971)), it is not surprising (in light of the Commission's position prior to *Calvert Cliffs*) that no mention at all is made of ecological factors which may have some bearing on the choice of sites for nuclear facilities.

¹²² 2 E.R.C. 1302 (March 3, 1971) modified, 2 E.R.C. 1580 (Ill. Pollution Control Bd. No. 70-21) (Apr. 28, 1971).

¹²³ 3 E.R.C. 1001 (Mich. Public Service Comm'n No. U-3884) (June 16, 1971).

¹²⁴ Several factors are significant here, in addition to time. (1) Several utilities joined in the *Calvert Cliffs* case; (2) the economics of any lengthy appeal are clearly illustrated by Scenic Hudson Preservation Conf. v. FPC, 354 F.2d 608 (2d Cir. 1965), and the plight of Consolidated Edison; (3) the capital costs involved in both *Dresden* and *Consumers Power* were enormous; see generally, both agency discussions of the rate and capital structure of the respective utilities.

the development, in increasing numbers of states, of thermal pollution and discharge criteria,¹²⁵ nuclear power site location statutes and gen-

¹²⁵ Although not recognized as such until rather recently (see, e.g., *Hearings on Thermal Pollution Before the Subcomm. on Air and Water Pollution of the Senate Comm. on Public Works*, 90th Cong., 2d Sess. pt. 1 (1968)) [hereinafter cited as *Hearings on Thermal Pollution*], thermal pollution has been a problem at least since the beginning of this century. See *Walker Ice Co. v. American Steel & Wire Co.*, 185 Mass. 463, 70 N.E. 937 (1904); *Sandusky Portland Cement Co. v. Dixon Pure Ice Co.*, 221 F. 200 (7th Cir. 1915)—both cases dealing with the rights of a lower riparian owner to harvest ice from a stream and his right to enjoin the discharge of heated water by an upper riparian. See also, the Rivers and Harbors Act of 1899, 33 U.S.C. § 407 (1970), with its broad prohibition of pollution of navigable waters, which has been used in an attempt to enjoin thermal pollution. *United States v. Florida Power & Light Co.*, 311 F. Supp. 1391 (S.D. Fla. 1970) (dismissed for lack of ripeness). Heat was recognized as a threat to aquatic life as early as 1932. *People v. Glenn-Colusa Irrigation Dist.*, 127 Cal. App. 30, 35, 15 P.2d 549, 552 (1932). Since those early days, increasing environmental awareness has caused thermal pollution to take its place among other sources of ecological degradation. The federal government, aware of the void regarding protection of the nation's waterways, enacted the Water Quality Act of 1965, 33 U.S.C. §§ 1151 et seq. (1970).

Among the Federal Water Quality Act provisions was a requirement that all states adopt water quality standards by June 30, 1967. 33 U.S.C. § 1160(c)(1) (1970). The states had the option of not adopting them and having standards imposed by the federal government. All states have adopted their own standards. See 18 C.F.R. § 620.10 (1971). The states are mandated by the Act to enact criteria applicable to "interstate waters." 33 U.S.C. § 1160(c)(1) (1970). The Environmental Protection Agency (EPA) will then pass upon these criteria and determine whether they are sufficient in light of the "use and value [of said waters] for public water supplies, propagation of fish and wildlife, recreational purposes, and agricultural, industrial, and other legitimate uses . . . [including] navigation." 33 U.S.C. § 1160(c)(3) (1970). This broad scope necessarily includes thermal criteria. However, there appears to be a question regarding the extent of the Act's applicability. See *Thermal Pollution*, *supra* note 93, at 691. The general prohibition of pollution applies to both interstate and navigable waters. 33 U.S.C. § 1160(a) (1970). The prohibition against violation of the water quality standards concerns only interstate waters. 33 U.S.C. § 1160(c)(5) (1970). However, where intrastate waters are involved, the governor of the state must authorize any abatement action by the United States Attorney General. 33 U.S.C. § 1160(g)(2) (1970). In addition, though the latter application is more limited, its procedure is somewhat quicker—six months' notice to a violator that a violation of the criteria exists, 33 U.S.C. § 1160(c)(5) (1970), after which the EPA may request the Attorney General to bring an abatement action, 33 U.S.C. § 1160(c)(5) & (g)(1) (1970), compared with more than a year in proceedings prior to such request under the general prohibition, 33 U.S.C. § 1160(d), (e), (f)(1) & (g)(1) (1970).

Perhaps even more significant is that the provisions of § 10 are operative only after harm has been done:

One of the greatest problems is that while we have water pollution requirements, they cannot be enforced until a violation in the form of pollution takes place. There is no mechanism for preventing the construction of a plant, for example, which is clearly going to pollute a river or other body of water. And once a multi-million dollar facility is standing, it is impractical to say that it simply cannot be operated. The result usually is an abatement to the company. Harm to the environment and inefficient use of resources [sic].

Statement by Senator Edward M. Kennedy to Chairman Senator Edmund S. Muskie, *Hearings on S. 7 and S. 544 Before the Subcomm. on Air and Water Pollution of the Senate Comm. on Public Works*, 91st Cong., 1st Sess. ser. 2, pt. 4, at 1039-40 (1969). Particularly in light of the lengthy enforcement procedures involved, this total lack of prospective enforcement becomes potentially disastrous.

eral environmental policy statements regarding the use of nuclear power generating facilities.¹²⁸

Considering the vast amount of research conducted on the effects of heat on aquatic life forms (see Kennedy & Mihursky, *Bibliography on the Effects of Temperature in the Aquatic Environment*, in *Hearings on Thermal Pollution*, supra at 471-568), it is surprising that various recommended and adopted criteria vary so widely. In 1968 the Federal Water Pollution Control Administration published its recommended water quality criteria. Report of the National Technical Advisory Comm. to the Secretary of the Interior on Water Quality Criteria (1968). The study recommended that maximum temperature limits be set. *Id.* at 43. These range from 48°F. for spawning and egg stages of lake trout, et al. to 93°F. for catfish, some bass, and shad. *Id.* Thus the decision was made that either (1) some level of heated discharge is not biologically harmful, or (2) the harms that are (or may be) caused by thermal discharges within these limits are outweighed by the economic benefits. The study also recommended that ambient water temperatures not be raised more than 5°F. in streams (*id.* at 42-3), 3°F. in the epilimnion of lakes (*id.*), 1.5-4°F. in coastal or estuarine waters (depending on season) (*id.* at 69-70), and that mixing zones be carefully regulated (*id.* at 31). The report recommends generally that 75% of the width of any body of water remain free from the discharge to prevent the formation of thermal barriers.

These criteria were intended to "be used as a basic reference by groups and agencies engaged in water quality studies and standards-setting activities. *Id.* at i. And yet, the actual criteria adopted by the states (see Bloom, *Heat—A Growing Water Pollution Problem*, BNA Env. Rep., Monograph No. 4 at 9-11 (1970)), and approved by the EPA (18 C.F.R. § 620.10 (1971)), almost seemed to ignore this study. The maximum temperature limits vary but some states do allow temperatures over 90°F (Indiana, Mississippi, New Mexico and West Virginia, Bloom supra at 9-11), and one, Louisiana, permits temperatures to reach 97°F. *Id.* at 9. The temperature increases permitted by the states go as high as the 20° raise allowed in Maryland. *Id.* Significantly, almost uniformly absent from the state criteria is any regulation of mixing zones. See generally, Edwards, *Legal Control of Thermal Pollution*, 2 *Natural Resources Lawyer* 1, 2 (1969). An exception to this general rule is New York (6 NYCRR § 704.1 (1969)), which limits mixing zones in lakes and coastal waters to an area 300 feet from the point of discharge and in estuaries to an area one-third of the surface width of such waters.

It is questionable how effective these regulations will be in preventing harms to aquatic species from thermal discharges. Several studies have found that within the present limits a significant threat to aquatic life would occur. With reference to the more sensitive salmonoid species, Maryland researchers concluded that:

[C]ommercial species and key foodchain species cannot tolerate temperatures greater than about 90°F For some species, in fact, temperatures of 86°-88°F during the summer may cause serious stress.

Hearings on Thermal Pollution, supra at 165. In addition, Mihursky and Kennedy found that 6 of 7 estuarine organisms studies showed at least a 50% mortality rate at temperatures below 90°F. (All seven organisms had been acclimated to approximately 60°F.) *Id.* at 119. Thus, even if enforced strictly, many of the regulations fall short of protecting aquatic organisms. Also, the salmonoid limits come dangerously close to the 56°F. found to be lethal to the hatching eggs of the Pacific salmon. *Id.* at 122.

In sum, an example of the overall situation is helpful:

Lake Michigan temperature regimes may now be at borderline limits for optimum growth, reproduction, and/or survival of yellow perch, whitefish, lake trout, lake herring, alewives, and coho salmon. Thus, it appears that artificial heating would aggravate and intensify existing critical adverse effects and perhaps create new ones. Particularly in warmer years, temperature increases induced by waste heat would detrimentally affect these species or reduce their habitat in the area influenced by the plume.

U.S. Dep't of the Interior, *Physical and Ecological Effects of Waste Heat on Lake Michigan* 85 (1970).

1. *Dresden Nuclear Power Station*

a. *Jurisdiction and General Background.*—The Commonwealth Edison Company (CEC) applied to the Pollution Control Board

It should also be noted that three states, Massachusetts, Minnesota and Rhode Island, permit no temperature increases whatsoever in certain of their waters. Bloom, *supra* at 9-10. Also, there are as yet some states which have not had criteria approved, either totally or in part. 18 C.F.R. § 620.10 (1971).

¹²⁰ See, e.g., Conn. Gen. Stat. Ann. §§ 25-54b (Supp. 1971); Ill. Ann. Stat. ch. 111 ½, § 1003(n) (Supp. 1971); Pa. Stat. Ann. tit. 35, § 691.1 (Supp. 1971).

It should also be noted that several states have not been in the least recalcitrant in the consideration of nonradioactive effects resulting from site selection. California has recently declared that

the location and operation of thermal electric power plants shall enhance public benefits and protect against or minimize adverse effects on the public, the ecology of the land and its wildlife, and the ecology of state waters and their aquatic life, and that the public opportunity to enjoy the material, physical and aesthetic benefits of its resources shall be preserved to the greatest extent feasible.

Cal. Pub. Res. Code § 800 (West Supp. 1971). The statute also charges the state's utilities with considering these objectives in the selection of new sites. New Jersey has taken a different approach. It has given its Public Utility Board a general mandate to

furnish . . . proper service, including furnishing and performance of service in a manner that tends to conserve and preserve the quality of the environment and prevent the pollution of the waters, land and air of this state. . . .

N.J. Stat. Ann. § 48:2-23 (Supp. 1971).

New York State, where the numerical growth of electric generating facilities is extremely rapid (see note 29 *supra*), has gone halfway toward regulation of utilities' location based on their environmental effects. The state legislature found that

there is a need for the state to control the siting of thermal electric generating plants and other major electric, gas, water and steam facilities within the state in order to minimize any adverse effect on the environment which these facilities may occasion but that the formulation of such legislation requires consultation with, and the active solicitation of the views of, interested persons and public and private bodies concerned with the various aspects of the problem.

N.Y. Unconsol. Laws ch. 272, § 1 (McKinney 1970). However, New York merely established a "temporary state commission on the environmental impact of major public utility facilities." *Id.* at § 1. See Interim Report of the Temp. State Comm'n on the Environmental Impact of Major Public Utility Facilities (1970). In furtherance of correlative goals New York now regulates "major utility transmission facilities" by requiring the issuance of a "certificate of environmental compatibility and public need." N.Y. Pub. Serv. Law §§ 120-130 (McKinney Supp. 1971). The issuance of such certificate is to depend upon, *inter alia*,

the nature of the probable environmental impact . . . [and a finding] that the facility represents the minimum adverse environmental impact, considering the state of available technology and the nature and economics of the various alternatives

Id. at § 126(1)(b), (c). In addition, given the right to participate and/or formally intervene in the certification proceedings are residents of the municipality where the facility is to be located, as well as

any domestic nonprofit corporation or association, formed in whole or in part (i) to promote conservation or natural beauty, (ii) to protect the environment, personal health or other biological values, (iii) to preserve historical sites, (iv) to promote consumer interest, (v) to represent the interests of commercial and industrial groups or (vi) to promote the orderly development of the areas which [sic] the facility is to be located.

¹⁶ NYCRR § 85.11 (1969).

The most specific of the state attempts to regulate nuclear site locations is that of

(PCB), established under the Illinois Environmental Protection Act of 1970 (IEPA),¹²⁷ for a permit to operate a nuclear power generating facility known as Dresden Unit 3.¹²⁸ Two distinct environmental issues were raised by the application: (1) whether the CEC met radiation emission standards set by the states for the discharge of radioactive wastes, and (2) whether the thermal discharges would create thermal pollution problems if the facility were to be used before the completion of a cooling lake, designed to minimize thermal dangers to the Illinois River.

IEPA structures for the governance of nuclear generating facilities appear to have been created prior to the district court decision in the *Northern States* case, rendered on December 27, 1970. While federal preemption was not, by *Northern States*, extended to thermal water pollution standards, clearly, the question of IEPA's radiation standards and their applicability to CEC were placed in issue by CEC's application.¹²⁹ The timing of CEC's application was fortuitous and the result ironic. To the date of the enactment of IEPA and the application of CEC on October 5, 1970, the states had been operating under the jurisdictional vacuum created by the *New Hampshire* case. If CEC had not applied for a permit before the district court decision in *Northern States*, the jurisdiction of the PCB might have been foreclosed through judicial, rather than administrative action. Having assumed jurisdiction, however, the PCB expressed its belief that CEC had submitted to PCB jurisdiction and that the Board had a "duty" to deal with the application in toto.¹³⁰ The PCB's analysis of *Northern*

Washington. Not only does the Washington statute specifically include nuclear power facilities within its purview, Wash. Rev. Code Ann. § 80.50.020(4) (Supp. 1971) but moreover, "[t]he state hereby preempts the regulation and certification of thermal power plant sites and thermal power plants." Id. at § 80.50.110(2). Procedurally, the statute established a "thermal power plant site evaluation council." Id. at § 80.50.030. It is the council's responsibility to review all applications for the certification necessary prior to the construction or operation of thermal power plants. Id. at § 80.50.120(2). The council must submit within one year its recommendations to the governor who must then approve or reject the application within sixty days. Id. at § 80.50.100(2). The significance of the Washington statute lies in its one-step unification in the administrative end of the site location process (§ 80.50.120(3)), coupled with mandatory consideration of environmental factors (§ 80.50.080). This section provides that a special state assistant attorney general shall act as an adversary in all such cases on behalf of environmental protection.

¹²⁷ Ill. Ann. Stat. ch. 111½, §§ 1001 et seq. (Supp. 1971).

¹²⁸ Dresden Nuclear Power Station, 2 E.R.C. 1302, 1303 (Ill. Pollution Control Bd. No. 70-21) (March 3, 1971).

¹²⁹ "Before the merits of the Application can be reached, the Board must face the challenges raised by Edison to the jurisdiction of the Board in this matter. Although there is some question of the right of Edison to raise the issues in the manner in which it did, after proceeding with the hearing, the Board feels that it is unnecessary to deal with the issue of whether Edison indeed has waived its right to raise the jurisdictional issues." Id. at 1304.

¹³⁰ Id.

States is an interesting exercise in unilateral state retention of jurisdiction against the clear mandate of a federal court decision.¹³¹ Obvious significance can be attached to the fact that the environmental interest was clearly voiced in the proceedings.¹³²

The rationale of the PCB's decision for nonpreemption is framed in sufficiently general terms to apply to both radiation and thermal pollution criteria. On both of these issues, the PCB's findings of fact and law run counter to *Northern States*. In essence, the PCB reasoned that (1) there was no express statement of intent to preempt the field;¹³³ (2) there exists no relevant conflict between the AEC and state regulation, nor with any national policy;¹³⁴ and (3) the states have the authority to protect their citizenry.¹³⁵

¹³¹ The enormous capital investment already committed to the facility, the need for power to satisfy consumer demands, and the general quagmire created by uncertainty as to AEC or judicial action probably would foreclose a direct challenge to the Illinois PCB decision. The fact that the CEC invested substantial efforts in securing a second hearing on the matter, with an "amicable" result, buttresses the fact that once the State has jurisdiction in cases of this nature, the matter can be "terminal."

¹³² If the three members of the Environmental Law Society of the University of Chicago Law School had not been admitted as intervenors, the full impact of the PCB's retention of jurisdiction, and analysis of the preemption question, might not have been as clear. See generally the statements of the PCB regarding these intervenors. 2 E.R.C. at 1304.

¹³³ Thus the scales are heavily balanced at the outset against any finding of pre-emption in this area. And there is certainly no "unambiguous congressional mandate" for pre-emption in the present case. The section of the federal statute relied on to establish pre-emption in the *Northern States* opinion, 42 U.S.C. section 2021(c), provides as follows: "No agreement entered into pursuant to subsection (b) of this section [which authorizes agreements under which the states assume regulatory responsibility over certain minor sources of radiation] shall provide for discontinuance of any authority and responsibility . . . [with respect to] . . . construction and operation of any production or utilization facility."

There is not the slightest hint in this language that the authority of the AEC was to be exclusive, the quoted section [42 U.S.C. § 2021(c)] seems designed not to pre-empt state regulation but to assure that the states would not pre-empt federal regulation—that is, that the AEC not surrender its own regulatory authority but retain jurisdiction concurrent with that of the states.

Id. at 1305.

¹³⁴ The issue therefore becomes whether or not the limitations we impose today in any way conflict with the purposes of the federal statute. We find they do not. The *Northern States* opinion suggests that state regulation might "frustrate the congressional purpose to achieve uniformity" in nuclear regulation. We find this contention wholly unpersuasive. There is no particular reason why the emissions from nuclear plants in Vermont should be the same as those in New Mexico. The case is worlds apart from that in which uniformity is usually invoked, namely, when the subject of regulation is a vehicle that must travel freely from state to state. Even in the transportation field, moreover, where the interest in uniformity is at its peak, Congress has not invariably forbidden state regulation. In *Huron Portland Cement Co. v. City of Detroit* . . . the Supreme Court allowed application of a local smoke regulation to a vessel that was engaged in interstate commerce, relying on the state's strong interest in regulating pollution. The case for depriving states of authority in the interest of uniform regulation has no place in the case of stationary nuclear reactors.

b. *Findings of the PCB on Thermal Discharges, Plant Construction and Operation.*—CEC's Dresden Unit 3 was designed to use a cooling lake of approximately 1275 acres in surface area.¹³⁶ With the cooling lake in operation, the thermal discharges from Unit 3 apparently would fall within the allowable limits of the thermal criteria set by the Sanitary Water Board.¹³⁷ Without the cooling lake, the operation of the facility would clearly violate those criteria.¹³⁸ Based upon an extensive analysis of the thermal discharge problem balanced against a perceived "eight percent plus reserve of power," the PCB apparently denied CEC permission to operate Unit 3 without a cooling lake.¹³⁹ The effective date of the order was postponed and CEC was given thirty days to file further information on the time, costs and engineering factors involved in meeting the thermal criteria of the State Sanitary Water Board.¹⁴⁰

The subsequent hearing¹⁴¹ before the PCB demonstrates the de-

The contention has also been made that state regulation might in some way interfere with the congressional policy favoring the promotion of nuclear power. And so it could, if a state were to attempt to outlaw the production of nuclear power altogether, or to impose conditions that unreasonably burdened the production of nuclear power. But the limitations we impose today have no such effect. All we require is what the AEC has declared is its own policy, namely, that radioactive releases be kept as low as practicable. The restrictions we impose are based entirely upon the applicant's own testimony as to what is technically and economically feasible, and we have allowed ample time, again in accordance with Edison's own testimony, in which to construct the necessary additional facilities in order to achieve compliance. There is no reason why Edison cannot comply with our limitations and produce all the power the federal statute and the AEC desire, at a cost that is entirely nominal in light of the cost of the facility as a whole.

Id. at 1306.

¹³⁶ The Court further indicated that:

[W]e believe that Congress has not pre-empted our authority to take the action we take today. We cannot afford, when the health and safety of Illinois citizens are at stake, to take the easy road and pass the task of adequate regulation on to Big Brother. The federal statute does not require that we do so.

Id. at 1306.

¹³⁷ Id. at 1314. Note that Unit No. 1 utilized a once-through cooling system.

¹³⁸ Id. at 1315-16. It should be noted that the PCB was concerned with newly issued criteria on thermal discharges.

¹³⁹ As to the discharge temperatures of water, assuming no cooling lake, the testimony of Mr. Ellis was that assuming that Units 1, 2 and 3 were operating a full capacity [sic] at a time of low flow and high ambient temperature the temperature of the outfall would be 113° and that 2800 feet down river at the Dresden dam the temperature would be 101°. Although the likelihood of all the conditions of that assumption being met at one time is low, the testimony does give the Board some idea of the gross thermal pollution involved if the cooling lake is not operated.

Id. at 1315.

¹⁴⁰ Id.

¹⁴¹ Id. at 1316.

¹⁴¹ Dresden Nuclear Power Station, 2 E.R.C. 1580 (Ill. Pollution Control Bd. No. 70-21) (Apr. 28, 1971).

gree of responsiveness needed for proper administrative balancing of the conflicting interests of power operation and ecology. The scope of this second hearing was broadened significantly by an interim hearing in which CEC clarified several crucial points in the balancing process. First, CEC demonstrated that because of equipment malfunction shutdowns, low sulfur coal limitations and other problems plaguing its entire power production capacity, it would not be able to meet the summer peak power needs of its customers.¹⁴² Second, as an interim measure until the completion of the cooling lake, CEC agreed to install spray modules along the three-mile canal between the cooling lake and the Dresden units.¹⁴³ These spray modules were to be installed before operations commenced and were to have sufficient capacity to render the thermal effect on the Illinois River "minimal."¹⁴⁴ With the

¹⁴² Id. at 1580-84.

¹⁴³ Edison, through Mr. Ellis, recognized that the means for auxiliary cooling of the heated water would be necessary during this interim period. The only feasible method, according to Edison, for such cooling is the use of sprays in the lake canals. Since the lake canals between the plant and Dresden Road (about 3 miles of canals—1½ miles each way) will be completed May 1, Edison has decided to install spray modules in those canals. 98 floating spray modules with 392 sprays will be used. Each spray module is 120 feet long and weighs about 25,000 pounds. The spray nozzles are spaced at 40-foot intervals since the spray pattern from the modules has a diameter of 40 feet. The sprayed water, after going through the sprays, is returned to the flow stream in the area immediately adjacent to the sprays. Cooling is accomplished primarily by evaporation from the water droplets. Modules are scheduled for delivery on the 1st of May, and all should be installed by June 13, 1971. Installation is not a difficult problem since each module assembly floats and all that is needed is to place it in position and to moor it. The effect of the spray modules were described by Mr. Willis:

Assuming maximum river temperature conditions, 88°F., a temperature increase of 23°F. across the condensers, and a flow of 2230 cfs [the actual flow of units 2 and 3] the sprays will reduce the temperature of the cooling water from units 2 and 3 by about 13° before release to the River. The efficiency of the spray modules is reduced as the water temperature of the incoming water is reduced. Thus, if the ambient river temperature were 78° the sprays would reduce the 23° temperature down by 8°. The spray modules and their installation represent an investment of \$3,000,000.

Id. at 1586.

¹⁴⁴ The thermal effect, of which we are primarily concerned in this opinion, would be minimal on the Illinois River. It must be remembered that in the original opinion of this Board we did not in any way restrict the operation of Dresden Unit 2. Had the spray ponds not been installed and had the cooling lake not been in operation (as is contemplated now) Dresden Unit 2 could be operated full power, 800 megawatts, without any cooling devices. This would have meant 1115 cubic feet per second cooling water raised to a delta of 23° and discharged directly into the Illinois River, or put another way, if Dresden Units 2 and 3 are operated at a total of 1000 megawatts with the spray ponds in operation this will amount to less of a thermal load on the Illinois River than would the operation of Dresden Unit 2 alone without the spray ponds. Certainly, at peak times there will be an increase in thermal load on the Illinois River when both units, or either of them is brought to 800 megawatts. But it is at this time when the electrical consuming public is in most need of the power—the time of the peak summer demand. At those times, and only those times, is the balance

environmental and consumer power needs thus balanced, the PCB agreed to allow CEC to operate Dresden Unit 3 during the summer of 1971, subject to numerous conditions, restrictions and limitations.¹⁴⁵

2. Consumers Power Company¹⁴⁶—*The Process of Environmental Compromise*

The setting of *Consumers Power*, unlike that for the *Dresden* hearings, was nonadversarial. Consumer Power Company (CPC) appeared before the Michigan Public Service Commission (MPSC) to secure the approval of a settlement agreement and the necessary changes in rate structure required by the agreement. The company had the support of a number of conservation interest groups which had been parties to the negotiated settlement.¹⁴⁷ What ensued was an interesting example of the role private initiative can fulfill in securing resolution of highly complex issues, and the use of nonadversary processes to achieve mutually satisfactory ends in balancing objectives which, on the surface, appear to be mutually exclusive.¹⁴⁸

a. *The Background Pressures for CPC/Environmental Compromise*.—CPC applied to the AEC for a permit to construct its Palisades Power Plant along the shore of Lake Michigan in June of 1966. The permit was granted on March 14, 1967, after an uncontested public hearing. After further hearings and facility testing, the AEC, on March 10, 1970, gave public notice of its proposed issuance to CPC of a provisional operating license. At this juncture, six environmental and citizen groups¹⁴⁹ intervened in the AEC proceeding and requested a public hearing on the issues of thermal discharge and radioactive wastes. The hearings began on June 23, 1970, occupied thirty-seven days, and produced over 6,000 pages of transcript.¹⁵⁰

The protracted hearing led CPC and the intervenors to begin the negotiations, early in 1971, which culminated in an agreement, on March 12, 1971, under which CPC agreed to (1) modify its once-

between hardship to the public for the harm caused the Illinois River significantly less than the benefit to the public to have electric power on those hot humid summer days.

Id. at 1586-87.

¹⁴⁵ Id. at 1588.

¹⁴⁶ 3 E.R.C. 1001 (Mich. Pub. Service Comm'n No. U-3884) (June 16, 1971).

¹⁴⁷ The parties included Consumers Power Company, Michigan Steelhead and Salmon Fishermen's Assoc., Thermal Ecology Must be Preserved (T.E.M.P.), Concerned Petitioning Citizens, Michigan Lake and Stream Associations, Inc., and Sierra Club.

¹⁴⁸ The role of private initiative in securing state agency, legislative and judicial approval where the factual circumstances of water shortage exhibited "apparent" mutual exclusiveness was discussed in Reis, *A Review and Revitalization: Concepts of Ground Water Production and Management—The California Experience*, 7 *Natural Resources J.* 53 (1967).

¹⁴⁹ See note 147 *supra*.

¹⁵⁰ 3 E.R.C. at 1002.

through cooling system with cooling towers to a closed cycle system, and (2) modify its radioactivity waste system "so that under normal operating conditions radioactive materials in liquid discharges . . . are reduced to essentially zero." The estimated modification cost of the cooling system was between ten and fifteen million dollars, with additional operating costs expected to be in excess of two million dollars per year. The radioactive waste system would cost an estimated three million dollars initially and approximately five hundred thousand dollars per year in operating costs.¹⁵¹

The agreement drafted by CPC and the environmental intervenors significantly provided for official sanction of the agreement by the state and included a number of interesting conditions, as follows:

The Agreement provides for the filing by Applicant of the application herein being considered and further provides in Section 6.3 that: ". . . this Agreement (and all the rights and obligations of the parties hereunder) shall terminate and the Stipulation supporting the issuance to Consumers Power of the full-power license containing the special technical specifications shall be of no further force or effect (i) if the MPSC order is denied; or (ii) if the proceeding is reconvened to consider the issuance of the full-power license or any operating license other than the testing license prior to the granting or denial of the MPSC order; or (iii) if, after the MPSC order has been granted, the proceeding is reconvened to consider the issuance of the full-power license or any operating license other than the testing license prior to the expiration of all time permitted by law for rehearing, appeal or review of the MPSC order, or prior to the completion of any and all rehearing, appeal or review of the MPSC order if rehearing, appeal or review thereof is sought by any person."

The Agreement subsequently provides that if Applicant ". . . is granted the MPSC order . . ." Intervenor then are to join in a stipulation before the Board supporting the issuance of a full-power license containing provisions which, in effect, would require the AEC to enforce the provisions of the Agreement. Once such a license has been issued, pursuant to an order of the AEC which has become the final action

¹⁵¹ At this point, the AEC had not modified its jurisdictional scope to include the full range of environmental harms (see textual discussion and notes, *infra*, Sections III and IV)—particularly thermal pollution. Any effort at compromise would thus be outside the range of normal AEC involvement. The fact, however, that the AEC was kept apprised of the settlement and even appeared to have had some unofficial input into the final agreement was noted by the MPSC. *Id.* at 1006.

of that agency, Intervenor finally are deemed to have withdrawn from the AEC proceedings.¹⁵²

In essence, the Consumers Power Company and the environmental groups placed the onus of action squarely on the MPSC.

b. *The MPSC Response to the Negotiated Settlement Agreement.*—The MPSC's ratification of the compromise has earmarks more of moral support than decisive and independent administrative action. In essence, the MPSC believed that it did not have jurisdiction to make a final finding on

the possible environmental impact of once-through cooling or the existing liquid radioactive waste system, or any potential environmental impact of cooling towers. . . .¹⁵³

The MPSC reviewed both the power production problems of CPC and CPC's management decision to enter into the settlement with the environmental groups. The most that MPSC indicated it could do under its jurisdictional practices would be to agree in principle but nevertheless postpone ratification of either the settlement agreement or projected alteration of rate structure.¹⁵⁴ The clear purpose of the MPSC's analysis, however, was to assure CPC and the environmental groups a favorable attitude at future hearings, and to support substantially the content of their settlement agreement.¹⁵⁵

Both the Illinois decision in *Dresden* and the Michigan decision in *Consumers Power Company* illustrates what can be accomplished on environmental issues if an agency accepts jurisdiction over both environmental and economic issues. Both agencies balanced the need for additional electrical power, the costs of producing the power in traditional economic terms, and the less quantifiable values of environmental protection. Both agencies clearly identified each of these several issues and interests and evidenced the type of acute decision-making which properly reflects the public interest in including all costs—economic and environmental—in the balancing process which must accompany the recognition of environmental values.

The decision in *Dresden* protected the power utility, environmental interests and the consuming public by providing for alternative protective devices during interim operations. Similarly, while no final resolution was forthcoming in *Consumers Power Company*, the MPSC

¹⁵² Id. at 1002-03.

¹⁵³ Id. at 1004.

¹⁵⁴ The MPSC's conditional approval was expressly stated to be on the basis that there was no abuse of management discretion detrimental to the public interest. Id. at 1005. The approval was further subject to accounting at future rate proceedings. Id. at 1007.

¹⁵⁵ Id. at 1004.

indicated that protection of the environment and the additional costs thus created were well within the policies of the state and proper utility management discretion. By so finding, the MPSC encouraged state public utilities to compute the true costs of nuclear electric power generation in a manner which clearly accords due respect for environmental, ecological and economic values. Despite these two significant indices of the potential of administrative action, the basic consideration of general environmental issues in AEC licensing practices presented a troublesome question. Decisions before the AEC were still semifinal in most instances, and the Michigan and Illinois actions could be easily construed as atypical of state activity in the area.

III. THE ERA OF CONTENT AND CONFUSION—THE *Calvert Cliffs'* DECISION¹⁵⁶

A. *The Background*

For two years after the decision in *New Hampshire v. Atomic Energy Commission*,¹⁵⁷ the AEC persisted in its refusal to consider questions of nonradiological environmental harm and thermal pollution. Between July of 1970 and April of 1971, parties in at least three cases¹⁵⁸ challenged the validity of AEC procedures pursuant to which the Atomic Safety and Licensing Board had refused to consider the cumulative effects on the environment of thermal pollution or radiation. In each case the court noted that it would not interfere with nonfinal orders of the Commission.¹⁵⁹

¹⁵⁶ 449 F.2d 1109, 2 E.R.C. 1779 (D.C. Cir. 1971).

¹⁵⁷ 406 F.2d 170 (1st Cir.), cert. denied, 395 U.S. 962 (1969).

¹⁵⁸ *Thermal Ecology Must Be Preserved v. AEC*, 433 F.2d 524 (D.C. Cir. 1970); *Thermal Ecology Must Be Preserved v. AEC*, — F.2d —, 2 E.R.C. 1405 (7th Cir. 1970); *Lloyd Harbor Study Group, Inc. v. Seaborg*, — F. Supp. —, 2 E.R.C. 1380 (E.D.N.Y. 1971).

¹⁵⁹ In *Thermal Ecology Must Be Preserved v. AEC*, 433 F.2d 524, 526 (D.C. Cir. 1970), the Court stated that:

An agency's procedural or evidentiary rulings in the course of a proceeding do not constitute a final order justifying judicial review except in extreme instances where the action is held to constitute an effective deprivation of appellant's rights An order denying intervention would be reviewable In the present case petitioners have been granted the status of intervenors, and their complaint is from the announced refusal to accept evidence along the line proffered. If the Commission persists in excluding such evidence, it is courting the possibility that if error is found a court will reverse its final order, condemn its proceedings as so much waste motion, and order that the proceeding be conducted over again in a way that realistically permits de novo consideration of the tendered evidence. But the availability of relief from the final order granting a certificate is sufficient to preclude the ruling denying admission of evidence from being considered a final order. The possibility that an agency may make an error that is beyond the effective reach of a court is part of the price we pay for the advantages of an administrative process. That process would, in the judgment of Congress, be clogged if there were interlocutory appeals to the courts.

The denial of interlocutory appeals goes on the assumption that appeals from

The consistent refusals of the AEC to admit thermal pollution evidence, and of the court to modify the nature of evidence admissible at AEC hearings, were responsible for environmentalist intervention in state-public service or utility proceedings and for "out of agency" settlements with utilities. In the absence of a single forum for the consideration and resolution of all relevant environmental issues, the goals and objectives of environmental and power production interest groups went uncoordinated. The problem became particularly evident when states, after AEC approval, began to require extensive modifications of facilities vis-à-vis thermal pollution and general environmental effects. Under this approach, full consideration of environmental issues concerning the states came *after* the actual construction of the facilities. By the time this point was reached the capital solvency of affected utilities was jeopardized and the abiding certainty of AEC licenses called into question.

B. *The Decision*

Calvert Cliffs' was actually a joinder of two separate actions challenging the AEC's refusal to admit and consider other than radiological evidence in the licensing of nuclear power facilities. The joined cases were distinguishable. The first set of challenges was directed at AEC rules and regulations affecting general environmental review practices unrelated to the granting of any specific application—practices with which this same court had previously refused to interfere.¹⁰⁰ The second set of challenges, however, was directed at specific construction permits which had been granted by the AEC for several nuclear facilities, including that at Calvert Cliffs. The basis for this challenge was that the AEC had not adequately considered thermal pollution and general environmental data and thus had frustrated both the express and implied policies of the National Environmental Policy Act of 1969. The court did not distinguish, for purposes of its holding or the retaining of jurisdiction, between the substantive questions raised by these two different challenges to AEC practices. It proceeded to decide that the rules and regulations of the AEC, by specifically excluding general environmental data from consideration in the construction and licensing review stages of AEC proceedings, were in contravention of the requirements of NEPA.

The juxtaposition of the National Environmental Policy Act of

final orders are realistic and effective. Courts can take steps to insure that in the event of a court order reversing and remanding a final order for de novo consideration of rejected evidence and issues, the agency will make a bona fide attempt to provide the de novo consideration contemplated by the court, rather than merely rubber stamping and perpetuating its first order.

¹⁰⁰ See *Thermal Ecology Must Be Preserved v. AEC*, 433 F.2d 524 (D.C. Cir. 1970).

1969 and the Water Quality Improvement Act of 1970,¹⁶¹ together with the jurisdictional confusion and infighting already recounted, contributed to the enormous complexities of the question before the court in *Calvert Cliffs*'. The court's task was to reconcile these diverse interests and the obvious changes in national environmental values:

These cases are only the beginning of what promises to become a flood of new litigation—litigation seeking judicial assistance in protecting our natural environment. Several recently enacted statutes attest to the commitment of the Government to control, at long last, the destructive engine of material "progress." But it remains to be seen whether the promise of this legislation will become a reality. Therein lies the judicial role. In these cases, we must for the first time interpret the broadest and perhaps most important of the recent statutes: the National Environmental Policy Act of 1969 (NEPA). We must assess claims that one of the agencies charged with its administration has failed to live up to the congressional mandate. Our duty, in short, is to see that important legislative purposes, heralded in the halls of Congress, are not lost or misdirected in the vast hallways of the federal bureaucracy.

NEPA, like so much other reform legislation of the last 40 years, is cast in terms of a general mandate and broad delegation of authority to new and old administrative agencies. It takes the major step of requiring all federal agencies to consider values of environmental preservation in their spheres of activity, and it prescribes certain procedural measures to ensure that those values are in fact fully respected.¹⁶²

The court's analysis focused on three major points: 1) the national environmental policy reflected by NEPA and its implications for the AEC; 2) the prior approach of the AEC and its failure to fulfill its procedural and substantive mandates; and 3) the cumulative effect of AEC practices, NEPA, and the Water Quality Improvement Act of 1970 (WQIA).

1. *AEC Procedures, NEPA and WQIA*

The National Environmental Policy Act's policy and impact statement procedure provisions¹⁶³ were construed by the court to mandate an unequivocal reordering of national priorities and to require that all

¹⁶¹ 33 U.S.C. § 1151 (1970).

¹⁶² 449 F.2d at 1111, 2 E.R.C. at 1780.

¹⁶³ See id. at 1112, 1129-31, 2 E.R.C. at 1780, 1993-95.

federal agencies, including the AEC, consider to the fullest extent possible the environmental impact of any proposed or current activity over which the agency had jurisdiction.¹⁶⁴ Under the Act, the agency was to consider all relevant factors and to cast them in some final balance at the earliest possible point in the review process.¹⁶⁵ The court carefully phrased its holding to indicate that it was reversing the AEC on *procedural* rather than *substantive* grounds in order to avoid disrupting the delicate balance involved in judicial review of administrative proceedings.¹⁶⁶

The specific procedures deemed to violate the full environmental mandate of section 102 of NEPA were set forth by the court as follows:

Each of these parts in some way limits full consideration and individualized balancing of environmental values in the Commission's decision making process. (1) Although environmental factors must be considered by the agency's regulatory staff under the rules, such factors need not be considered by the hearing board conducting an independent review of staff recommendations, unless affirmatively raised by outside parties or staff members. (2) Another part of the procedural rules prohibits any such party from raising nonradiological environmental issues at any hearing if the notice for that hearing appeared in the Federal Register before March 4, 1971. (3) Moreover, the hearing board is prohibited from conducting an independent evaluation and balancing of certain environmental factors if other responsible agencies have already certified that their own environmental standards are satisfied by the proposed federal action. (4) Finally, the Commission's rules provide that when a construction permit

¹⁶⁴ Id. at 112-13, 2 E.R.C. at 1780-82.

¹⁶⁵ The sort of consideration of environmental values which NEPA compels is clarified in Section 102(2)(A) and (B). In general, all agencies must use a "systematic, interdisciplinary approach" to environmental planning and evaluation "in decisionmaking [sic] which may have an impact on man's environment." In order to include all possible environmental factors in the decisional equation, agencies must "identify and develop methods and procedures . . . which will insure that presently unquantified environmental amenities and values may be given appropriate consideration in decisionmaking along with economic and technical considerations." "Environmental amenities" will often be in conflict with "economic and technical considerations." To "consider" the former "along with" the latter must involve a balancing process. In some instances environmental costs may outweigh economic and technical benefits and in other instances they may not. But NEPA mandates a rather finely tuned and "systematic" balancing analysis in each instance.

Id. at 1113, 2 E.R.C. at 1781.

¹⁶⁶ Id. at 1115, 2 E.R.C. at 1783.

for a facility has been issued before NEPA compliance was required and when an operating license has yet to be issued, the agency will not formally consider environmental factors or require modifications in the proposed facility until the time of the issuance of the operating license.¹⁶⁷

These procedural restrictions imposed by the AEC led the court to conclude that the AEC would give full environmental consideration to the impact of nuclear power facilities only when the matter was "contested."¹⁶⁸ If the matter were not contested, however, the AEC would not make an independent evaluation of all essential factors.¹⁶⁹ The court noted that this purely "technical compliance" with NEPA was a "crabbed . . . mockery of the Act" and constituted nothing more than "regulat[ing] the flow of papers in the federal bureaucracy."¹⁷⁰

The court further observed that the AEC, by its procrastination in developing procedures for full environmental hearings, and its attempted reliance on other agency environmental reviews, had abdicated its environmental role in favor of its perceived role—to "encourage" nuclear power production, whatever the nonradiological environmental consequences.¹⁷¹ The court also noted that the AEC's perception of its role was one of subservience to the state and to the certification requirements under the Water Quality Improvement Act of 1970. This perception, the court noted, was an intolerable interpretation of the relationship between section 104 of NEPA and the WQIA.¹⁷² Under the AEC's interpretation, AEC rules foreclosed consideration of many significant environmental issues, as the following example illustrates:

[N]o party may raise and the Commission may not independently examine any problem of water quality—perhaps

¹⁶⁷ Id. at 1116-17, 2 E.R.C. at 1784.

¹⁶⁸ Id., 2 E.R.C. at 1784.

¹⁶⁹ Id. at 1118, 2 E.R.C. at 1785.

¹⁷⁰ Id. at 1117, 2 E.R.C. at 1784.

¹⁷¹ In the end, the Commission's long delay seems based upon what it believes to be a pressing national power crisis. Inclusion of environmental issues in pre-March 4, 1971 hearings might have held up the licensing of some power plants for a time. But the very purpose of NEPA was to tell federal agencies that environmental protection is as much a part of their responsibility as is protection and promotion of the industries they regulate. Whether or not the spectre of a national power crisis is as real as the Commission apparently believes, it must not be used to create a blackout of environmental consideration in the agency review process. NEPA compels a case-by-case examination and balancing of discrete factors. Perhaps there may be cases in which the need for rapid licensing of a particular facility would justify a strict time limit on a hearing board's review of environmental issues; but a blanket banning of such issues until March 4, 1971 is impermissible under NEPA.

Id. at 1122, 2 E.R.C. at 1788.

¹⁷² 449 F.2d at 1124, 2 E.R.C. at 1789.

the most significant impact of nuclear power plants. Rather, the Commission indicates that it will defer totally to water quality standards devised and administered by state agencies and approved by the federal government under the Federal Water Pollution Control Act.¹⁷³

The entire process of intelligent and complete decision-making was clearly altered by the AEC's interpretation. The effect of the AEC's position was summarized by the court as follows:

As to water quality, Section 104 and WQIA clearly require obedience to standards set by other agencies. But obedience does not imply total abdication. Certainly, the language of Section 104 does not authorize an abdication. It does not suggest that other "specific statutory obligations" will entirely replace NEPA. Rather, it ensures that three sorts of "obligations" will not be undermined by NEPA: (1) the obligation to "comply" with certain standards, (2) the obligation to "coordinate" or "consult" with certain agencies, and (3) the obligation to "act, or refrain from acting contingent upon" a certification from certain agencies. WQIA imposes the third sort of obligation. It makes the granting of a license by the Commission "contingent upon" a water quality certification. But it does not *require* the Commission to grant a license once a certification has been issued. It does not preclude the Commission from demanding water pollution controls from its licensees which are *more strict* than those demanded by the applicable water quality standards of the certifying agency. It is very important to understand these facts about WQIA. For all that Section 104 of NEPA does is to reaffirm other "specific statutory obligations." Unless those obligations are plainly mutually exclusive with the requirements of NEPA, the specific mandate of NEPA must remain in force. In other words, Section 104 can operate to relieve an agency of its NEPA duties only if other "specific statutory obligations" clearly preclude performance of those duties.

Obedience to water quality certifications under WQIA is not mutually exclusive with the NEPA procedures. It does not preclude performance of the NEPA duties. Water quality certifications essentially establish a *minimum condition* for the granting of a license. But they need not end the matter. The Commission can then go on to perform the very different

¹⁷³ Id. at 1122, 2 E.R.C. at 1788.

operation of balancing the overall benefits and costs of a particular proposed project, and consider alterations (above and beyond the applicable water quality standards) which would further reduce environmental damage. Because the Commission *can* still conduct the NEPA balancing analysis, consistent with WQIA, Section 104 does not exempt it from doing so. And it, therefore, *must* conduct the obligatory analysis under the prescribed procedures.¹⁷⁴

Finally, the court held, in substance, that NEPA had a clear retroactive effect on AEC decisions and procedures. The court indicated that the AEC should consider the consequences of waiting until the preoperating license stage to consider environmental problems. The fact that environmental harms might have occurred by this time, and the fact that the expense of major backfitting might involve the "irreversible and irretrievable commitment of resources,"¹⁷⁵ should lead the AEC to conclude that a temporary halt in construction of approved facilities might be appropriate. While full operational status would be postponed, it would be better to consider environmental consequences at a stage of the hearing process where "backfitting" and "corrective action" would not involve enormous costs.¹⁷⁶ The seeming harshness of this "mandate" is ameliorated by the fact that far greater delays in nuclear plant and conventional power facility operations have already been occasioned by the failure of the AEC to merge conflicting environmental, state and federal interests in one comprehensive proceeding.

C. *The Revision of AEC Rules and Regulations— An Uncertain Future*

The AEC issued its revised rules and regulations on September 9, 1971. Although providing for full environmental review, including review of "the thermal effects and the other environmental effects, of the facility" at all stages of the hearing process, and review of existing permits in the construction, preoperation, and operating stages,¹⁷⁷ these rules left the AEC with ample discretion to determine whether construction or operation of the facility would "have a significant impact on the environment."¹⁷⁸ The troubled history of the AEC's actions in the area,¹⁷⁹ however, raises the question of whether the

¹⁷⁴ Id. at 1124-25, 2 E.R.C. at 1789-90 (emphasis in original).

¹⁷⁵ Id. at 1128, 2 E.R.C. at 1792.

¹⁷⁶ Id., 2 E.R.C. at 1792.

¹⁷⁷ 36 Fed. Reg. 18071, 18072-73 (1971).

¹⁷⁸ Id. at 18072.

¹⁷⁹ See, e.g., the attitude expressed in Larson, Present State and Future Outlook of Nuclear Power Generation in the United States, 12 Atomic Energy L.J. 274 (1970), and

Commission can adequately perform the substantive balancing process over which it appears to have "final" jurisdiction. Both this speculation and criticism of the AEC's docility on environmental issues in general are reinforced by the AEC's preamble to its revised rules and regulations.¹⁸⁰

The AEC, in exercising its responsibility for consideration of environmental factors, now requires from applicants for construction permits an environmental report which discusses, among other things, the following:

- (a) The environmental impact of the proposed action. . . .
- (c) Alternatives to the proposed action, . . . [and] (e) Any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented.¹⁸¹

In the actual decision-making process, the Director of Regulation is to give environmental considerations, including state and federal water quality standards, "due consideration."¹⁸² The adequacy of consideration, however, that environmental factors will receive from the Atomic Energy Commission is yet to be determined.

Neither the AEC nor the utility company has a reputation for sensitive regard for environmental protection. Although the AEC's

Holifield, *Federal-State Responsibilities in Nuclear Development*, 12 *Atomic Energy L.J.* 165 (1970).

¹⁸⁰ On July 23, 1971 the U.S. Court of Appeals for the District of Columbia Circuit rendered its decision in *Calvert Cliffs' Coordinating Committee, Inc., et al. v. United States Atomic Energy Commission, et al.* . . . holding that Atomic Energy Commission regulations for the implementation of the National Environmental Policy Act of 1969 (NEPA) in AEC licensing proceedings did not comply in several specified respects with the dictates of that Act, and remanding the proceedings to the Commission for rule making consistent with the Court's opinion.

. . . .
The effect of the revised regulations will be to make the Atomic Energy Commission directly responsible for evaluating the total environmental impact, including thermal effects, of nuclear power plants, and for assessing this impact in terms of the available alternatives and the need for electric power.

The Commission intends to be responsive to the conservation and environmental concerns of the public. At the same time the Commission is also examining steps that can be taken to reconcile a proper regard for the environment with the necessity for meeting the Nation's growing requirements for electric power on a timely basis.

36 *Fed. Reg.* 18071 (1971).

¹⁸¹ 10 C.F.R. § 50, App. D., as revised, 36 *Fed. Reg.* 18072 (1971).

¹⁸² *Id.* at 18073. The inherent discretionary nature of the extent of this consideration is disturbing in view of the Commission's former reluctance to consider environmental matters of a nonradiological nature.

Equally disturbing is the fact that AEC regulations provide that the Commission need not require any environmental statement if it determines that the facility in question will not "have a significant impact on the environment." *Id.* How this is to be determined absent an environmental hearing remains an open question.

regulations provide for intervenors¹⁸³ and participation by other persons,¹⁸⁴ admission of these third parties is discretionary with the hearing's presiding officer. Provision is made for comments by interested persons on an applicant's environmental statement;¹⁸⁵ however, there is no guarantee as to the nature of the consideration these comments will be given. One final process by which environmental interests may be afforded a hearing is as follows:

In any proceeding under this chapter, for the granting, suspending, revoking, or amending of any license or construction permit, . . . the Commission shall grant a hearing upon the request of any person whose interest may be affected by the proceeding, and shall admit any such person as a party to such proceeding.¹⁸⁶

The determination of sufficient "interest" is therefore critical. It is to be hoped that economic interest will not be used as the sole criterion¹⁸⁷ for the determination of this interest.

One final problem should be noted. When a nuclear power facility already in operation violates one of the environmental standards—e.g., those affecting thermal discharge—the Atomic Energy Act provides for revocation of its license. Reasons for such revocation include, *inter alia*,

failure to construct or operate a facility in accordance with the terms of the construction permit or license or the technical specifications in the application, or for violation of, or failure to observe any of the terms and provisions of this chapter or of any regulation of the Commission.¹⁸⁸

In light of the AEC's most recent attempt at implementation of the National Environmental Policy Act¹⁸⁹ it may well be that one of the terms of the license and/or technical specifications is that the facility comply with previously established state thermal effluent criteria. In the alternative, the Commission's implementation procedure¹⁹⁰ may be viewed as part of the Commission's regulations, and failure to observe any of the provisions of these regulations relating to safe-

¹⁸³ 10 C.F.R. § 2.714 (1971).

¹⁸⁴ 10 C.F.R. § 2.715 (1971).

¹⁸⁵ 10 C.F.R. 50, App. D., as revised, 36 Fed. Reg. 18072 (1971).

¹⁸⁶ 42 U.S.C. § 2239 (1970).

¹⁸⁷ At least in regard to the turn-over agreements (42 U.S.C. § 2021) between the states and the AEC, there is some safeguard that other than economic interests will be present. Section 2021(1) provides that the state(s) involved will be given notice and an opportunity to be heard regarding license applications within such state(s).

¹⁸⁸ 42 U.S.C. § 2236(a) (1970). See also 10 C.F.R. § 50.100 (1971).

¹⁸⁹ 10 C.F.R. 50, App. D., as revised, 36 Fed. Reg. 18072 (1971).

¹⁹⁰ *Id.*

guarding the environment may be grounds for revocation of the operating permit.

License revocation is, of course, a severe penalty—not only for the power company but, potentially, for the consumer of electric power as well.¹⁹¹ Therefore, the Atomic Energy Act provides for modification of licenses.¹⁹² Such modification may be based on the same grounds as a revocation.¹⁹³ Moreover, the Commission regulations now provide for the backfitting¹⁹⁴ of facilities, where necessary, to "provide substantial, additional protection which is required for the public health and safety. . . ."¹⁹⁵ Thus the Commission may require an operational nuclear power facility to add thermal pollution abatement facilities to its existing structure. By these provisions the Atomic Energy Commission maintains continuing jurisdiction over the operation of all nuclear generating stations.

IV. REFLECTIONS

Although *Calvert Cliffs*⁹ appears to resolve a number of critical questions respecting the role to be played by the AEC in environmental decision-making, many important questions remain unanswered. The dangers of short-sighted site location and operational practices, and the concentration of nuclear power generating facilities in environmentally sensitive areas such as bays, estuaries and the shores of highly fragile lakes, are still before us. Little, if any, attention has been focused on thermal operating practices as they affect fragile ecosystems.¹⁰⁰ Few crucial questions have been answered with any substantial degree of finality by *Calvert Cliffs*⁹ or the earlier cases.

At best, the current situation regarding environmental issues would have to be described as follows: (1) the AEC is the unwilling recipient of jurisdiction over the general environmental aspects of nuclear power generation facilities; (2) there is no clear indication what the role of environmental, state or utility groups will be in hearings before the AEC, or how these groups will be received by the AEC; (3) the AEC's narrow environmental perspective raises questions regarding the validity of the balancing process of environmental and power generating values; and (4) in light of the potential for aggres-

¹⁹¹ There is provision for the AEC to take over a facility and continue its operation. 42 U.S.C. § 2238 (1970); 10 C.F.R. § 50.102 (1971). However, this procedure would continue the environmental injury complained of.

¹⁹² 42 U.S.C. § 2237 (1970).

¹⁹³ 10 C.F.R. § 50.100 (1971).

¹⁹⁴ "[B]ackfitting" . . . means the addition, elimination or modification of structures, systems or components of the facility. . . ." 10 C.F.R. § 50.109(a) (1971).

¹⁹⁵ *Id.*

¹⁹⁶ See, e.g., *Seadade Indus., Inc. v. Florida Power & Light Co.*, 232 So. 2d 46 (Dist. Ct. App. 1970), *aff'd* 245 So. 2d 209 (Fla. 1971).

sive state involvement in environmental matters in (a) legislation, (b) public utility proceedings, (c) recognition and enforcement of private rights, and (d) the quest for judicial remedies on grounds of public nuisance or general state police power, it is not at all clear whether the AEC will attempt to preempt the field on the basis of the Atomic Energy Act of 1954 and the rationale of *Northern States*.

Several other extended policy issues remain unresolved. Prospective regulation of both environmental and economic interests is essential for credible decision-making in the area of nuclear power production. Time and money are of the essence for both utility companies and consumers.¹⁹⁷ An undeveloped parcel of property produces no income; thus it is to the economic interest of the power company to put its plant in operation as quickly as possible¹⁹⁸ and to avoid regulatory delays. Environmental protection requires regulation *prior* to construction or operation since this is the best time to assess ecological harms and to prevent their occurrence.¹⁹⁹

The availability of judicial remedies does not appear to offer the requisite environmental protection necessary to fill the vacuum created by AEC abstention from complete environmental jurisdiction. For example, when the federal government attempted to enjoin the construction of a power station because of potential thermal pollution,²⁰⁰ the case was dismissed because of the absence of any showing of irreparable harm.²⁰¹ If courts are to be stymied by traditional notions of standing, ripeness and "irreparable harm," then prophylactic environmental protection cannot be achieved through the judicial process. The usual alternative to injunctive relief is money damages.²⁰² Such a sanction, however, does not undo the harm, and given the economic resources of many offending corporations, it provides little incentive to polluters to prevent harmful discharges. Furthermore, the entire com-

¹⁹⁷ Time may be just as important for the consumers of electric power, particularly in view of recent power shortages and brown-outs. See generally, Inter-Governmental Coordination of Power Development and Environmental Protection Act, Hearings on S. 2752 Before the Subcomm. on Inter-governmental Relations of the Senate Comm. on Gov't Operations, 91st Cong., 2d Sess. pt. 1, at 36 (1970).

¹⁹⁸ However, the construction of facilities without proper abatement techniques which may require later backfitting (see note 194 *supra* and accompanying text) may be even more costly.

¹⁹⁹ At least one reported fish kill occurred while a new power plant was being tested. Clark, *Thermal Pollution and Aquatic Life*, Scientific American, March 1969, at 23.

²⁰⁰ *United States v. Florida Power & Light Co.*, 311 F. Supp. 1391 (S.D. Fla. 1970).

²⁰¹ *Id.* at 1392. It should be noted that the action was brought under the Rivers and Harbors Act of 1899, 33 U.S.C. § 407 (1970), and not the applicable water quality standards.

²⁰² See, e.g., *Boomer v. Atlantic Cement Co.*, 26 N.Y.2d 219, 257 N.E.2d 870 (1970), where plaintiffs complained of air pollution from defendant's factory and asked injunctive relief. The court denied the injunction, awarded the defendants "permanent damages" and permitted the pollution to continue unabated. See note 4 *supra*.

mon law rationale of making the victim "whole" is inapposite in this area. Unlike the private law perspective, where cash is awarded on the theory that the injured party can a) use it to move to another location, b) pay for any actual physical injury incurred to his property, or c) achieve some alternative satisfaction, the effects of pollution are today so widespread that there is no geographic escape. Thermal pollution, for example, may cause the loss of certain fish species and the disruption of ecosystems. It is unlikely that an area's commercial fishing industry, with all of its interdependent parts, could relocate. Second, it seems naive to consider seriously the idea of compensating fishermen for the loss of a species that may never return, or the idea of restocking fish, absent the abatement of the thermal discharges. Finally, in a survival-oriented society where the current crisis in the environment should rise to social consciousness, all life forms should be recognized as necessary for a balanced ecosystem. No amount of compensation can replace a life form or postpone the havoc of technological and ecological imbalance which is created by concepts of redress that ignore the realities of the environment.

In this context, it might be beneficial to subject the AEC to other than judicial review of its procedures and decisions. The Council on Environmental Quality, for example, could be given general review powers over decisions of the AEC. The states, in public utility hearings such as those in *Dresden* and *Consumers Power Company*, have attempted to perform such a review and coordinating function. Unfortunately, however, little general environmental policy can be formulated at the state level.

The last, and perhaps most significant, question is that of the role to be played in the future by environmental citizen groups. The decision in *Calvert Cliffs*,²⁰³ by its focus on violations of both the express and implied policies of NEPA, appears to have rendered attacks solely on procedures, as distinguished from substantive issues and decision-making, an issue of the past. In today's society, the control of environmental decision-making processes ultimately becomes a question of capturing the support of environmental interest groups. Without the support of those groups which profess the establishment of environmental values as an inalienable social right,²⁰³ few "official" programs and policies of the AEC will have the necessary legitimization to be insulated from repeated conflicts. This support is unlikely to be forth-

²⁰³ See Hanks and Hanks, *An Environmental Bill of Rights: The Citizen Suit and the National Environmental Policy Act of 1969*, 24 Rutgers L. Rev. 230 (1970); see also Comment, *The Clean Air Amendments of 1970: Better Automotive Ideas from Congress*, 12 B.C. Ind. & Comm. L. Rev. 571, 612-16 (1971).

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coming unless the revised procedures of the AEC reflect substantive as well as procedural commitments to environmental integrity.²⁰⁴

APPENDIX

CONSTRUCTION PERMIT AND OPERATING LICENSE APPLICATIONS FOR CENTRAL STATION NUCLEAR POWER PLANTS*

A. <i>Construction Permit Applications Under Review</i>	<i>Date of Application</i>
1. Consolidated Edison Co. Verplanck 1 and 2	6/3/69
2. Alabama Power Company Unit 1 Farley 1 and 2 Unit 2	10/15/69 6/30/70
3. Philadelphia Electric Co. Limerick 1 and 2	2/27/70
4. Public Service Electric & Gas Co., Newbold 1 and 2	2/27/70
5. Cincinnati Gas & Electric Co. Zimmer 1	4/6/70
6. Southern California Edison Co. San Onofre 2 and 3	6/1/70
7. Jersey Central Power & Light Co. Forked River 1	6/1/70
8. Georgia Power Company Formal Edwin I. Hatch 2 PSAR	7/27/70 9/11/70
9. Northern Indiana Public Service Co., Bailly Station 1	8/28/70
10. Arkansas Power & Light Co. Arkansas 2	9/17/70
11. Duke Power Co. McGuire 1 and 2	9/18/70
12. Commonwealth Edison Co. LaSalle 1 and 2	11/3/70
13. Puerto Rico Water Resources Authority (Aguirre)	11/30/70
14. Louisiana Power & Light Co. Waterford 3 and 4	12/31/70
15. Pennsylvania Power & Light Co. Susquehanna 1 & 2	4/1/71

²⁰⁴ See generally Sax, *The Public Trust Doctrine in Natural Resource Law: Effective Judicial Intervention*, 68 Mich. L. Rev. 471 (1970). By reference to the public trust doctrine, Professor Sax illustrates a mechanism for the legitimization of environmental decision-making.

* Currently pending before the Atomic Energy Commission.

16. Florida Power & Light Co. Hutchinson 2	5/1/71
17. Tennessee Valley Authority Watts Bar 1 and 2	5/18/71
18. South Carolina Electric & Gas Co. Summer 1	6/30/71
19. Washington Public Power Supply System, Hanford 2	8/19/71
20. Pacific Gas & Electric Co. Mendocino 1 and 2	8/20/71
21. Carolina Power & Light Co. Harris 1, 2, 3 and 4	9/7/71
22. Virginia Electric & Power Co. North Anna 3 and 4	9/15/71
<i>In Public Hearing Stage</i>	
23. Long Island Lighting Co. Shoreham	5/15/68
24. Consumers Power Co. Midland 1 and 2	1/15/69
25. Detroit Edison Co. Fermi 2	4/29/69

B. <i>Operating License Applications Under Review</i>	<i>Date Appl. Received</i>	<i>Est. Date of Issuance</i>
1. Florida Power & Light Co. Turkey Point 3 and 4	5/12/69 #1	12/71
	#2	4/72
2. Duke Power Company Oconee 2 and 3	6/2/69 #2	9/72
	#3	3/73
3. Public Service Co. of Colorado Ft. St. Vrain	11/7/69	1/72
4. Omaha Public Power District Ft. Calhoun	11/28/69	9/72
5. Boston Edison Company Pilgrim Station	1/5/70	12/71
6. Virginia Electric & Power Co. Surry Station 1 and 2	1/21/70 #1	2/72
	#2	4/72
7. Metropolitan Edison Company Three Mile Island 1	3/2/70	9/72
8. Philadelphia Electric Co. Peach Bottom 2 and 3	8/31/70 #2	10/72
	#3	11/73
9. Maine Yankee Atomic Power Co., Maine Yankee	8/31/70	4/72
10. Tennessee Valley Authority Browns Ferry, 1, 2 and 3	9/25/70 #1	5/72
	#2	2/73
	#3	11/73

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11.	Commonwealth Edison Co. Zion 1 and 2	11/25/70 #1 #2	4/72 1/73
12.	Consolidated Edison Co. Indian Point 3	12/4/70	5/73
13.	Baltimore Gas & Electric Co. Calvert Cliffs 1 and 2	1/4/71 #1 #2	6/72 7/73
14.	Wisconsin Public Service Corp., Kewaunee	1/30/71	5/72
15.	Northern States Power Co. Prairie Island 1 and 2	2/1/71 #1 #2	5/72 2/74
16.	Indiana & Michigan Electric Co., Cook 1 and 2	2/2/71 #1 #2	9/72 9/73
17.	Florida Power Corp. Crystal River 3	2/8/71	8/72
18.	Nebraska Public Power District, Cooper Station	3/1/71	11/72
19.	Georgia Power Company Hatch 1	3/22/71	10/72
20.	Arkansas Power & Light Co. Arkansas 1	4/26/71	4/73
21.	Sacramento Municipal Utility District, Rancho Seco	4/29/71	12/72
22.	Power Authority of the State of New York (Fitzpatrick)	6/4/71	1/73
23.	Public Service Electric & Gas Co., Salem 1 and 2	8/27/71 #1 #2	7/73 7/74

Technical Review Completed

24.	Consolidated Edison Co. Indian Point 2	10/15/68	(Hearing being held)
25.	Wisconsin Michigan Power Co., Point Beach 2	3/18/69	(Hearing being held)
26.	Vermont Yankee Nuclear Yankee Power Corp., Vermont	1/5/70	(Hearing being held)
27.	Duke Power Co. Oconee 1	6/2/69	
28.	Commonwealth Edison Co. Quad-Cities 1 and 2	9/3/68	

C.	Plants Under Construction but not in for Operating Licenses (OL)	CP Issuance	Est. Month of OL Appl.
1.	Pacific Gas & Electric Company Diablo Canyon 1	4/23/68	March 1972

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2. Metropolitan Edison Company Three Mile Island 2	11/4/69	August 1972
3. Carolina Power & Light Co. Brunswick 1 and 2	2/7/70	December 1971
4. Tennessee Valley Authority Sequoyah 1 and 2	5/27/70	April 1972
5. Iowa Electric Light & Power Co., Arnold	6/22/70	February 1972
6. Duquesne Light Co. Beaver Valley	6/26/70	October 1971
7. Florida Power & Light Co. Hutchinson Island	7/1/70	May 1972
8. Pacific Gas & Electric Co. Diablo Canyon 2	12/9/70	March 1972
9. Millstone Point Co. Millstone Point 2	12/11/70	July 1972
10. Portland General Electric Co. Trojan	2/8/71	October 1972
11. Virginia Electric & Power Co. North Anna 1 and 2	2/19/71	March 1972
12. Toledo Edison Company Davis-Besse	3/24/71	February 1973