MORE HEAT THAN LIGHT: THERMAL POLLUTION VERSUS HEAT ENERGY UTILIZATION

by Frank E. Maloney

UNIVERSITY OF FLORIDA
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Electric generating plants, both fossil-fueled and nuclear, use enormous amounts of water to cool their turbines, producing both electric and heat energy in the process. Heat energy, absorbed by the cooling water, and usually discharged back into the source waters unused, has been traditionally viewed as waste. These waste heat discharges, because of their tendency to adversely affect aquatic ecology, have become known as "thermal pollution." To grasp the existing and potential magnitude of the waste heat problem, consider that:

1) the electric utility industry now accounts for seventy per cent of the waste heat discharged into the country's waters;
2) the demand for electricity has doubled every ten years since 1945, and is expected to continue doing so every ten years through 1990;
3) the use of nuclear power plants, which produce about fifty per cent more waste heat than fossil-fueled plants, is increasing;
and (4) by 1990 almost 850 billion gallons of water will be required daily for cooling purposes.

This article will examine the legal framework within which the problem of balancing the benefits of power output against the damage from the resultant heat discharges must be worked out. An examination of the legal ability to combat thermal pollution will be followed by a discussion of the legal tools available for encouraging the beneficial use of thermal discharges.

LEGAL TOOLS TO CONTROL THERMAL POLLUTION

Under the English common law “natural flow doctrine,” which originally governed most fresh water discharges interfering with the use of water courses and lakes in the Eastern United States, lakes and streams were to be left substantially unchanged except for the minor effects of domestic uses. Since the doctrine developed when water was used primarily for domestic purposes, there was scant litigation over water usage. Each proprietor had the privilege of uses on or in connection with his land that did not materially affect the natural use of the water by other riparians along the length of the stream. The gradual switch from the natural flow to the reasonable use doctrine thus provided for consumptive use, but weakened the legal basis for pollution control. Courts facing pollution suits began to determine the reasonableness of the discharges by balancing the relative interests of the plaintiff and defendant using the same factors considered in determining the existence of a nuisance. Indeed, the considerations became so similar that the American Law Institute, in rewriting the Restatement of Torts, has relegated interference with water quality to the field of nuisance, no longer considering it a problem of riparian rights.

Applying these common law doctrines, courts have shown a growing awareness that waste heat discharges may be harmful. Initially some jurisdictions reasoned that thermal discharges did not pollute water because there was no change in chemical content. However, today such discharges are universally deemed pollution. As such, they may be subject to abatement as a private nuisance if they interfere unreasonably with the actual or proposed use of the water by other riparians, or as a public nuisance if the interference is with the rights of the public. Injunction is the preferred relief against pollution, since relief is provided before a threatened violation occurs. Additionally, against continuing violations, the injunction may be the only equitable relief if the traditional prerequisites to equitable relief are met. Thus, the plaintiff must show not only that the defendant’s use is unreasonable, but also that injunctive relief is necessary.

15. Id., Scope Note §850A, Topic 3.
17. See note 2 supra.
20. See, e.g., BUNten v. Chicago, R.I. & Pac. Ry., 50 Mo. App. 414 (1912). Although no prescriptive right to maintain a public nuisance can be acquired, CORBY v. RAMSDELL, 48 P.2d 701 (Cal. 1935), an upper riparian owner may acquire a prescriptive easement to pump refuse in a stream even though the dumping amounts to a private nuisance. ANNEberg v. KURTE, 197 Ga. 188, 20 S.E.2d 769 (1944).
because the threatened injury is irreparable,22 cannot be adequately compensated by damages at law,23 or that a multiplicity of suits would result from a failure to grant the injunction.24

Even assuming these requisites are shown, a court may deny the injunction if the public interest in permitting the activity outweighs the harm suffered by the plaintiff.25 This weighing of conflicting interests is sometimes referred to as the “balance of equities” or “balance of convenience” doctrine.26 A combination of laissez-faire propensities to overprotect property rights and an inability to foresee the ecological consequences of pollution usually led earlier courts to balance the equities in favor of the accused polluter. This result was justified either by denying the existence of the nuisance27 or weighing heavily the economic importance of the polluter’s operation.28

Not all of the early courts treated the environment harshly. Indeed, in 1913 the New York court of appeals in Whalen v. Union Bag & Paper Co.29 ordered the closing of a multi-million dollar pulp mill to prevent the destruction of a small waterway. Although Whalen is cited as an early attempt to protect the environment, the primary motivation may well have been the protection of the agricultural industry using the waterways.30 In any event, Whalen represented a minority position, even in New York, for many years.31

Recently, courts have begun to reexamine the weight given to factors used in the balance of convenience doctrine. In Renken v. Harvey Aluminum,32 for example, a federal court in Oregon ordered the abatement of fluorine gas emissions from a $40 million aluminum plant. The plant had a gross annual payroll of $3.5 million and was causing less than $10,000 dollars worth of damage to fruit trees. The court ordered expensive precipitators installed to combat pollution.

Growing concern for preservation of the environment has also prompted state constitutional and legislative action. New constitutional provisions have been adopted to echo environmental concern, sometimes allowing private actions to halt violations of environmental policy provisions.33 Some states have passed laws requiring environmental impact statements as a prerequisite to authorizing regulated projects.34 Others have legislated to strengthen the citizen’s right to challenge public or private activities that degrade or threaten the environment.35 Some states, including Florida,36 provide citizens direct

27. See, e.g., Richard’s Appeal, 57 Pa. 105 (1868), which legalized the status of Pittsburgh as the “Smokey City,” Id. at 111-12.
access to the courts, bypassing the regulatory agencies, while others take the preferable route of providing an administrative agency with the initial opportunity to rectify the citizen's complaint, thereafter guaranteeing him his day in court.

All state regulatory statutes do not specifically include heat in the definition of pollution. However, heat is included in a substantial number of statutes, since many have adopted the definition of pollution of the Suggested State Water Pollution Control Act, which includes:

[C]hange in temperature . . . as will or is likely to create a nuisance or render such waters harmful, detrimental or injurious to public health, safety or welfare, or to domestic, commercial, industrial, agricultural, recreational, or other legitimate beneficial uses, or to livestock, wild animals, birds, fish, or other aquatic life.

State regulations promulgated on the basis of such definitions may be quite restrictive. For example, Pennsylvania's Sanitary Water Board thermal discharge regulations limit heat content of discharges to an amount that would not raise the temperature of the stream at the point of discharge 5°F above ambient temperatures, or to a maximum of 87°F, whichever is less. For a stream capable of supporting a cold water fishery the maximum allowable temperature is 58°F.

The Federal Water Pollution Control Act (FWPCA) amendments of 1972 will force the remaining states to establish thermal pollution standards. The FWPCA expressly incorporates thermal standards within the term "water quality standards," and requires the states to establish such standards for intrastate waters in addition to the thermal standards already required for interstate waters. Moreover, each state must identify waters within its boundaries for which federal effluent limitations are not stringent enough to implement state water quality standards, or will not sufficiently assure protection and propagation of a balanced fish and wildlife population due to inadequate federal control over the thermal discharge component. The state must then estimate the total maximum daily thermal load required to assure the required protection, submitting the estimate to the Administrator of the Environmental Protection Agency (EPA).

Although the Administrator of the EPA is given primary responsibility for establishing effluent limitations, the states are to be consulted prior to their adoption or revision and are not precluded from instituting more stringent limitations. In either event the limitations must identify the degree of effluent reduction attainable through the application of the best practicable control technology available, taking into account the costs, processes, and non-water quality environmental impact (including energy requirements).

To underscore the FWPCA's intent to place responsibility for water pollution control on the states, any applicant for a federal license or permit to conduct an activity that may result in a discharge into navigable waters is required to provide a certificate from the state that the discharge will not violate applicable water quality or effluent standards. No license or permit will be granted if the certification is denied by the state. Moreover, prior to the initial operation of any federally licensed facility or activity which has received the needed state certification, if the facility or activity is not subject to a federal operating license or permit, the certifying state is to be provided

43. The Tennessee Water Quality Act for example, authorizes any person to file a complaint with the Commissioner of the Department of Public Health alleging a violation of the Act's provisions. Appeals to the Tennessee Water Quality Board are guaranteed to either the complainant or the violator if the Commissioner takes action that is considered inappropriate by them. Tenn. Code Ann. §70-341 (Supp. 1971). See Maloney, The Tennessee Water Quality Control Act of 1971, 25 VAND. L. REV. 551 (1972).
45. Suggested State Water Pollution Control Act, §2(a) (rev. 1965) as published in May 1965 by the Division of Water Supply and Pollution Control, Public Health Service, U.S. Dept of Health, Education and Welfare, and reprinted in 1966 by the Federal Water Pollution Control Administration, U.S. Dept of the Interior. The original version of the suggested act was developed in 1950 and the laws of approximately three-fourths of the states include all or part of its provisions. See 5 B. GINSEL, WATER AND WATER RIGHTS 2253.1 (1967).
46. R. BOARDMAN, ELECTRIC POWER AND THERMAL DISCHARGES: THERMAL CONSIDERATIONS IN THE PRODUCTION OF ELECTRIC POWER 215-27 (1917). However, a recent survey indicates that as of 1970 approximately half of the states had not set temperature standards for their streams, even though required to do so by the Water Quality Act of 1965. Comment, supra note 5, at 85 n.59.
an opportunity to review the manner in which the facility or activity will be conducted. This state review assures that applicable water quality, effluent, or other limitations will be taken into account. If the state determines that limitations or standards will be violated, the original license or permit may be suspended.

Federal Legislation

The oldest federal prohibitions against water pollution are contained in the Refuse Act of 1899, an early amendment of the Rivers and Harbors Act. The Refuse Act prohibits the discharge or deposit of "refuse matter . . . other than that flowing from streets and sewers . . . in a liquid state" into, or on the bank of, any navigable waters of the United States. Until recently, however, the term "refuse" was construed so restrictively by the courts that the Act was rarely used in pollution litigation. Not until 1966 in United States v. Standard Oil Co., involving a spill of aviation gasoline into the St. Johns River near Jacksonville, Florida, were teeth supplied for the Act. The Supreme Court in Standard Oil redefined "refuse" to include "anything which has become waste, however useful it may have earlier been." Although aviation gasoline and heated water are quite dissimilar, at least one federal court has interpreted the Refuse Act to encompass thermal discharges as well. In United States v. Florida Power & Light Co., the district court applied the Act to the plant's hot water outflow into Biscayne Bay. Further discharges were not enjoined, however, because the Government had not established that the plant's operation was causing irreparable harm to the Bay's ecology. The opinion weighed heavily the defendant's plan to reduce what the court found to be minimal thermal pollution to a benign level by 1971. Thus, although Florida Power & Light escaped injunction, the precedent of classifying thermal discharges as "refuse" under the Act was established. The Corps of Engineers subsequently adopted this interpretation by regulation.


Id. at 329.

Id. at 1939 (S.D. Fla. 1979).

Id. at 1392. The author understands that following the decision a consent decree was entered into under which the Florida Power & Light Company agreed to greatly extend its cooling canal system, and no further appeal was taken.

53 C.F.R. §209.131(d)(1) (1972) (discharges or deposits of water at a temperature different from that of the navigable waterway or tributary into which the same will flow are considered to be discharges or deposits to which the Refuse Act is applicable).
Federal effluent limitations are to be established, and reviewed every five years to require the application of the best practicable control technology.80 Once established, these limitations will be applied to all "point sources" of pollutant discharges.81 Water quality standards must also be established.82 The Administrator of the EPA will promulgate heat standards to be applied to the states unless the states establish acceptable standards.83 

The Administrator of the EPA is also required to establish "standards of performance" for categories of buildings, structures, facilities, or installations from which there are or may be pollutant discharges.84 Although the Administrator may include any category he deems necessary, Congress has mandated that steam electric power plants be included.85 No later than one year after a category is listed the Administrator must publish regulations establishing standards of performance for new sources within the category.86 After this promulgation it will be unlawful for any owner or operator of any new source to operate in violation of the standards of performance.87 

The Act offers a degree of security to power plant owners and operators subject to these standards of performance. Although the standards can be made more stringent as technology and alternatives change,88 if construction of the facility was designed to meet all applicable standards, it will not be subject to a more stringent standard for ten years after completion.89 

Thermal dischargers are also afforded a degree of security by a special "thermal discharges" section of the FWPCA.90 Although that section requires effluent standards and standards of performance to reflect the best extant technology for the location, design, construction, and capacity of cooling water intake structures to minimize adverse environmental impact,91 the owner or operator may be permitted to discharge additional heat under some circum-

80. Id. §301. 
81. Id. §301(c). "[T]he term, point source, means any discernible, confined and discrete discharge, including, but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, or vessel or other floating craft, from which pollutants are or may be discharged." Id. §502(14). 
82. Id. §303. 
83. Id. See also §302(b), (b). 
84. "[T]he term, standard of performance, means a standard for the control of the discharge of pollutants which reflects the greatest degree of effluent reduction which the administrator determines to be achievable through application of the best available demonstrated control technology, processes, operating methods, or other alternatives, including, where practicable, a standard permitting no discharge of pollutants." Id. §306(c). 
85. Id. §306(b)(1)(A). 
86. Id. §306(c)(1)(B). 
87. Id. §306(c). If the procedure and the law of any state require the application and enforcement of standards of performance to at least the extent required by the FWPCA, such state will be authorized to apply and enforce such standards upon submission of plans to, and approval of, the Administrator of the EPA. Id. §306(c). 
88. Id. §306(b)(1)(B). 
89. Id. §306(d). 
90. Id. §316. 
91. Id. §316(b).
If the Administrator finds a person in violation of any condition or limitation that implements the Act's standards, limitations, or requirements in a permit issued by a state under an approved permit program, he can proceed by compliance order or civil action, or he can notify the violator and the state of his finding. If the state does not commence appropriate enforcement action within thirty days after such notification, the Administrator must issue a compliance order to the violator or commence a civil action.

Stern penalties are provided for violators. Violation of the Act's standards, limitations, or permit conditions can bring a civil penalty of up to $10,000 per day of violation. If the violation is willful or negligent, a criminal fine of $2,500 dollars to $10,000 dollars per day of violation is imposed. A second conviction for a willful or negligent violation brings up to $50,000 dollars per day and up to two years in prison.

The FWPCA now emerges as a far-reaching legislative scheme to cope with the problem of thermal pollution. The Act significantly streamlines enforcement procedures, consolidates certification requirements, and attempts to be determined, and notifies the Congress, that the exemption is "in the paramount interest of the United States." Id. §506(d).

The FWPCA also provides for citizen suits. Any person having an interest that is or may be adversely affected may bring suit in a United States district court against any person or governmental agency that allegedly is in violation of any standard or limitation of the Act or any order issued by the Administrator of the EPA or a state. Id. §505(a), (f), (g). Suit may also be brought against the Administrator for failure to perform any non-discretionary act required by the Act. Id. §505(a)(2). The district courts have jurisdiction, without regard to the amount in controversy or the citizenship of the parties, to enforce the standards, limitations and orders, and to apply appropriate civil penalties. Id. If the citizen alleges violation of a standard of performance, suit may be brought immediately after notifying the Administrator, the appropriate state, and the violator. In all other cases the citizen must wait sixty days after notification to bring suit. Id. §505(b). The court is authorized to award costs of litigation, including attorney and expert witness fees, to any party. Id. §505(d). This section does not, however, restrict any statutory or common law right the citizen has to seek enforcement. Id. §505(e).

Id. §509(c)(1).

Id. §509(d).

104. Id. §509(c)(1).

105. Id. To augment the deterrent effect of these penalty provisions the FWPCA prohibits any federal agency from entering into any contract for goods, materials, and services with anyone convicted of an offense under §506 if the contractor is to be performed at a facility at which the violation that gave rise to the conviction occurred (if such facility is owned, leased, or supervised by the person convicted). Id. §508(a). The President, however, may exempt any contract, loan, or grant from all or part of this "withholding" provision if
to forestall pollution problems through a requirement of pre-construction certification.\textsuperscript{108} The Act is not, however, without weaknesses. Not only does it fail to provide for mandatory pre-certification hearings, but also if the state should choose not to examine the permit applicant properly by pre-operational review, the federal agency has no further duty to withhold a license. State regulatory programs are presently ill-equipped to shoulder the large initiative given them under the Act.\textsuperscript{109} In addition, the funding authorized seems insufficient to guarantee the intended efficiency, and serious doubt remains as to how much of the authorized funds will eventually be appropriated or released by the Office of Management and Budget if provided by Congress.\textsuperscript{110} If the states, which may also lack enforcement money, fail to comply with the Act's directives, lack of money for federal enforcement could result in little or no real enforcement effort at any level.

**Powerplant Certification**

**Licensing Problems in General**

Where does all this leave a power company desiring to construct an electric generating plant? To begin with, it will be required to secure certification from the appropriate state agency assuring that plant construction will comply with existing applicable effluent limitations, water quality standards, and standards of performance.\textsuperscript{111} Public notice will be given announcing the application for certification and, if deemed appropriate, a hearing will be held.\textsuperscript{112} If the state refuses to act on the request for certification within a reasonable time, not to exceed one year, the certification requirements will be waived.\textsuperscript{113} Absent such waiver, the State certification must accompany an application for any federal permit.\textsuperscript{114} A discharge permit will be required from the EPA unless the discharge-permit program has been delegated to the state.\textsuperscript{115} In the latter case the prior state certification\textsuperscript{116} would appear unnecessary. Any construction or dredging and filling affecting navigable waters will necessitate a permit from the Corps of Engineers.\textsuperscript{117}

In addition, nuclear plants will require a license from the Atomic Energy Commission (AEC).\textsuperscript{118} Although the AEC is charged with the duty of licensing nuclear power plants and, in connection therewith, of ascertaining that the public health and safety are adequately protected,\textsuperscript{119} the scope of AEC power to review a state certified application may be somewhat limited. In the past the AEC interpreted its duty as limited to radiological health and safety, not including non-radiological pollution. This interpretation was upheld in New Hampshire v. AEC.\textsuperscript{120} Subsequently, Congress passed the National Environmental Policy Act (NEPA)\textsuperscript{121} and the Water Quality Improvement Act (WQIA).\textsuperscript{122} In Calvert Cliffs Coordinating Committee, Inc. v. AEC the Circuit Court of Appeals for the District of Columbia held that the NEPA established environmental protection as part of the AEC's basic mandate and that the WQIA, although making AEC license approval contingent upon a water quality certification, did not preclude the AEC from demanding stricter controls than those required by the certifying agency.\textsuperscript{123} The new FWPCA,


\textsuperscript{112} Id. §401(a)(1).

\textsuperscript{113} Id. §402.

\textsuperscript{114} Id. See text accompanying note 111 supra.

\textsuperscript{115} 115. 53 U.S.C. §403 (1970). Since the Corps has been charged with the responsibility of evaluating the environmental impact of a proposed dredge and fill project, in addition to its evaluation of the effect on navigation, Zabel v. Tabb, 430 F.2d 199 (5th Cir. 1970), cert. denied, 401 U.S. 910 (1971), applicants for a Corps' permit presumably will undergo another environmental evaluation.


\textsuperscript{117} Id.


\textsuperscript{120} 120. 53 U.S.C. §1171 (1970).

however, expressly states that nothing in the NEPA shall allow any federal agency authorized to license an activity that may result in a discharge of a pollutant to review any effluent limitation or other requirements established pursuant to the FWPCA, or to review the adequacy of any certification, or to impose as a condition precedent to the issuance of a license any different effluent limitation. The FWPCA amendments thus appear to sap much of the vitality of the Calvert Cliffs independent review mandate. The EPA and the AEC have, however, entered into a joint agreement that attempts to preserve the AEC's broad environmental review powers under Calvert Cliffs except where there is a conflict with implementing actions taken under the FWPCA. The AEC Interim Policy Statement on Implementation of the 1972 FWPCA, which both parties adopt in the joint agreement referred to above, states that limitations set forth in state certifications shall be regarded as only minimum limitations or requirements and the Commission shall retain any authority under NEPA to impose more stringent limitations or requirements. Whether the federal agencies can thus shore up section 511(c) of the FWPCA and reinstate the Calvert Cliffs mandate remains to be seen, but it is to their credit that they are trying to avoid what appears to have been a step backward by the Congress in this area of environmental protection.

The same proscription against tampering with state certified standards would of course apply to any federal agency charged with regulatory power over water-related activities. The Federal Power Commission, which licenses hydroelectric plants, would therefore also seem to be subject to the regression implicit in the FWPCA amendments.

Separate state certifications are not needed for each federal license or permit. Generally the certification obtained with respect to the construction of the facility fulfills the certification requirement for any other federal license or permit required for the operation of the plant. However, if the state or the Administrator of the EPA notifies the agency considering the application for an operating license that reasonable assurance of compliance with applicable standards or limitations no longer exists due to changed conditions, further certification will be required.

Powerplant Siting

Much litigation and frustration could be eliminated by changing the traditional practice of allowing a utility to select a site for its plant, undertake extensive planning, and sometimes actually start construction before certification is required. Comprehensive power plant siting legislation can force pre-selection planning to avert or minimize harm from waste heat discharges.


125. Memorandum of Understanding Between the Environmental Protection Agency and the Atomic Energy Commission on Carrying Out Responsibilities Under the Federal Water Pollution Control Act, 38 Fed. Reg. 2713 (1973). The AEC has agreed that it will accept decisions under specified sections of the FWPCA with respect to compliance with limitations or other requirements promulgated or imposed pursuant to the FWPCA. But until decisions under those sections have been made, the AEC will continue to base its permitting action with respect to such factors as thermal pollution on the environmental considerations called for by the NEPA as construed in Calvert Cliffs. In so doing, the agreement calls for the AEC to give due regard to EPA's views as expressed in comments on AEC draft environmental statements. This part of the agreement will be found in Atomic Energy Commission Interim Policy Statement on Implementation of the 1972 Federal Water Pollution Control Act, 38 Fed. Reg. 2679 (1973). This Interim Policy Statement, promulgated simultaneously with the Memorandum of Understanding referred to above, is specifically adopted by both the EPA and the AEC in the latter document as the modus operandi for the AEC action in the environmental area. Memorandum of Understanding, supra. The EPA has expressed its intent to go along with the decisions made by the AEC, thus surfacing and apparently settling environmental questions at the pre-construction licensing stage rather than at the operating license stage years later. Address by Honorable John Quarles, Acting Administrator, EPA, before the Section of Public Utility Law, American Bar Association 96th Annual Meeting, Aug. 6, 1973.

An additional aim of such legislation should be to create "one-stop" licensing to eliminate the costs and delays necessitated by requiring multiple agency permits for a single plant.\(^{131}\)

Proposals are presently before Congress to enact federal siting legislation.\(^{132}\) One proposal, the Macdonald Bill,\(^{133}\) would settle disputes about plant siting by permitting a three-man federal panel to override provisions of both state and federal laws whenever a "demonstrable emergency" exists. The Macdonald Bill has been reported to the House Committee on Interstate and Foreign Commerce and may be superseded by, or fused with, more comprehensive proposals. A bill prepared by the Administration,\(^{134}\) for example, would encourage all states to create one-stop agencies. Under the administration bill the federal government would assume control of site certification in states that fail to adopt one-stop licensing procedures within two years of the bill's passage.\(^{135}\) However, once the state adopts acceptable procedures, state decisions on siting would be considered conclusive on all matters of state and local law.\(^{136}\) To be acceptable the state procedures must be based on Presidential guidelines covering selection criteria, citizen participation rights, and staff adequacy of the one-stop agency.\(^{137}\) A federal certifying agency to be designated

\(^{131}\) The one-stop agency's administrative structure and orientation are obviously important. If the one-stop agency supersedes or preempts the statutory powers of specialized agencies, the possibility exists that the utility may be shielded from more stringent and probing regulation, thus weakening the intent to balance environmental considerations effectively. Tarlock, Tippy & Francis, supra note 109, at 556.

\(^{132}\) On the other hand, it cannot be doubted that the state agency would be less prone to pressure from a proposed power plant than small communities eager to increase their tax base. New England River Basins Comm'n, Environmental Evaluation of Seabrook, New Hampshire Nuclear Power Plant, Power and the Environment, Report No. 2, at IV-A-1-3 (Jan. 1971).


\(^{134}\) The Electric Power Supply & Environmental Protection Act, H.R. 11,066, 92d Cong., 1st Sess. (1971).

\(^{135}\) H.R. 5277, 92d Cong., 1st Sess. §5(d) (1971).


\(^{137}\) H.R. 5277, 92d Cong., 1st Sess. §§5(b) (1971). If the federal agency approves the state's structure, the federal agency issues a "certificate of qualification of procedure." This certificate is then conclusive evidence of the state agency's authority over the construction of the power plant facilities. Id.

\(^{138}\) H.R. 5277, 92d Cong., 1st Sess. §9 (1971). Under the Macdonald Bill, H.R. 11,066, 92d Cong., 1st Sess. (1971), there is no federal authority to issue guidelines. The state is considered to have a siting agency if the Governor certifies to the Secretary of the Interior that the agency is constituted, staffed, and financed to perform functions in a balanced, expedient, and competent manner. Id. §405(b).

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and the public service commission that both conduct investigations and prepare recommendations on the proposed site, submitting their findings to the DPC within three months. The DPC in the meantime conducts its own study and presides over public hearings. At least two hearings must be held. At the initial hearing, held in the county of the proposed site, the DPC must determine whether the proposed location is in compliance with existing land use plans and zoning ordinances. If it is not, the DPC cannot take further action until the site is made to conform. If the site is in compliance, the land planning and zoning authorities are stopped from thereafter changing their requirements so as to affect the proposed location.

Based on the evidence adduced at the hearings and gathered from the studies, the DPC then makes its recommendation to the Florida Pollution Control Board, which must ultimately approve, in whole or with modifications, or deny the issuance of the requisite certificate.

Notwithstanding the benefits to the environment and the siting applicant received from such a streamlined but comprehensive review, the real strength of Florida's Act may lie in its provision for ten-year site planning. Beginning January 1, 1974, each electric utility must submit a ten-year site plan to the division of state planning, estimating its power needs and revealing the general location of proposed plant sites. The division then makes a preliminary study within twelve months, finally classifying each proposal as suitable or unsuitable, and suggesting possible alternatives. The ten-year plan must be reviewed and submitted by the utility at least every two years. The regulatory scheme of the Florida siting act also recognizes a new concept of utility plant location, which may lessen site problems: floating power plants to be operated at sea. Such plants can effectively mitigate environmental harm by providing an unlimited supply of cooling water that can quickly dissipate unwanted heat far from onshore and estuarial breeding grounds. A facility to build such plants is being constructed by Westinghouse-Tennessee on Blount Island in Jacksonville, Florida. The floating nuclear plants it proposes to build are to be moored inside stone or floating breakwaters located some three miles at sea, with underwater cables carrying the power to land. Although the AEC has yet to approve such plans, orders have been received and the company is optimistic about future prospects.

ENCOURAGING BENEFICIAL USES OF THERMAL DISCHARGES

Modern Developments

As previously noted, power plants produce both electric and thermal energy. Traditionally thermal energy has been absorbed by cooling water, which in turn is discharged. Obviously, there is nothing inherently bad about hot water; it has been, and can be, put to beneficial uses. For example, thermal discharges have been used to provide extraction steam for refinery processes; to grow crops, provide moisture, and control temperature in greenhouses; for defray the cost of the study the division may levy a $1,000 fee.

147. Id. §403.507(1). The public service commission must prepare a report and recommendation concerning foreseeable needs for electric power in the area of the projected plant. The division of state planning must review and update its studies made in investigating ten-year site plans submitted by the utilities. See text accompanying notes 156-159 infra.

148. The department of pollution control must evaluate the proposed facility, considering the following non-inclusive criteria: (1) cooling system requirements; (2) proximity to load centers, navigable waters, and transportation systems; (3) soil and foundation conditions; (4) water availability; (5) land use; and (6) accessibility. Fla. Stats. 1973, ch. 35, §1, to be codified as Fla. Stat. §403.507(2).

149. Id. §403.508.

150. Id. The parties to a certification hearing must include the applicant, the public service commission, division of state planning, any interested state or local agency that has filed a notice of intent with the DPC, and any relevant citizens' group that has filed the notice of intent.

151. Id. §403.508(2). The initial hearing must be held within sixty days from receiving the application for certification. Id. §403.508(1).

152. Id. §403.508(2).

153. Id. Any other appropriate matter may, of course, be heard at the initial hearing. No particular requirements are mandated for the second hearing.

154. Id. §403.509(1). This report must be made within twelve months after receiving the application. This deadline may be extended with the mutual consent of the DPC and the applicant.

155. Id. §403.509(2). The action shall be by written order. If the certificate is denied, or approved with modifications, the board must inform the applicant of the action necessary to secure approval.

156. Id. §403.505.

157. In its study the division must solicit the views of federal, state, and local agencies and determine the need for the power, the possible environmental impact, conformance with the state's comprehensive plan, and possible alternatives. Id. §403.505(1). To help
open field irrigation and frost protection by sprinklers;\textsuperscript{165} and to warm agricultural soils.\textsuperscript{166} The potential beneficial use of thermal discharges is limited only by technological imagination.\textsuperscript{167}

But as long as thermal discharges are cast back into the source waters, legal and ecological problems will continue to be raised. If dischargers are to avoid being enjoined as nuisances and as violative of environmental laws and regulations, ways must be devised not only to reduce the effect of the discharges to technologically feasible minimums, but also to provide ecological benefits to offset the allegedly adverse results.

One such benefit can come from the development and encouragement of aquaculture—the growing and harvesting of the products of the sea—in the outflow area of the power plant. Such use has been found not only possible, but also productive and beneficial. In Britain, for example, the hot water outflow of power stations has been used successfully to raise flatfish (sole) to marketable size in half the normal time.\textsuperscript{168} The power plant discharge waters of the Long Island Lighting Company have been used to cultivating oysters year-round at greatly increased growth and survival rates.\textsuperscript{169} Various species of fish are also adaptable to aquaculture techniques, many showing tremendous growth with the higher temperatures.\textsuperscript{170}

\textbf{Florida's Aquaculture Law}

Florida's 1971 Aquaculture Law\textsuperscript{171} establishes a valuable policy statement and legal framework for the improvement of aquaculture. The law authorizes the Trustees of the Internal Improvement Trust Fund to lease submerged lands and the water column above for aquaculture to the extent consistent with the public interest.\textsuperscript{172} The leases,\textsuperscript{173} which may be granted for either commercial or experimental purposes\textsuperscript{174} can run for a maximum of ten years, renewable by agreement.

However, there appear to be a number of areas of potential conflict between the interests created by Florida's Aquaculture Law and other federal and state interests. Successful aquaculture necessitates the erection of stakes, markers, and structures which could impede navigation\textsuperscript{175} and, therefore, may require exclusive or nearly exclusive use of an area.\textsuperscript{176} Assuming the area were navigable, a permit probably would be required from the Corps of Engineers for erection of such structures\textsuperscript{177} and, absent such permit, the structures would be subject to removal notwithstanding state approval.

Even assuming a federal permit were obtained, use of the waters and submerged land may conflict with public and private rights.\textsuperscript{178} If the waters are navigable they are held in trust for the people of the state for purposes of navigation\textsuperscript{179} and exclusive right to their use cannot be claimed.\textsuperscript{180} The public, in addition, has a common right to fish in public navigable waters\textsuperscript{181} and to use such waters for recreational purposes.\textsuperscript{182} However, the public right of navigation is subject to lawful state regulation in the public interest.\textsuperscript{183} The state can also interfere with other public rights by transferring interests in property to promote "the interests of the public therein."\textsuperscript{184} Indeed, since all such public rights are subject to state restrictions in the interests of the public welfare,\textsuperscript{185} the operator of an aquaculture area, leased in the public interest,\textsuperscript{186}
may be able to claim the benefits of such restrictions if a conflict with public rights occurs.187

Situations in which an aquaculture area interferes with private riparian rights may pose an additional conflict.188 Although the riparian owner has no title to the bordering water, he has the right of access.189 Moreover, he is entitled to access from his property to the navigable part of the water190 or to the main body of water.191 Riparian rights, however, are not absolute; the impairment of the right must be substantial to warrant relief.192 Thus, no legal conflict would occur where the aquaculture area is easily circumvented. A substantial interference, however, may give rise to legal sanctions against the lease on grounds that the state action amounts to an unconstitutional "taking" of a protected property right193 or a violation of the public trust.194

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187. See State v. T.O.L., Inc., 206 So. 2d 69 (4th D.C.A. Fla. 1968). "When public rights or public needs come in conflict, it is for the . . . agency cloaked with discretionary authority to exercise that authority by adopting a position of public policy seeking as its end the greatest and highest public good." Id. at 72.

188. All rights listed in Florida Statutes §271.09 plus others "defined by law" are "legal rights" and are afforded appropriate protection. City of Eustis v. First, 113 So. 2d 290 (2d D.C.A. Fla. 1959).


191. Webb v. Giddens, 82 So. 2d 743 (Fla. 1955). But see Central & So. Fla. Flood Control Dist. v. Griffith, 119 So. 2d 423 (3d D.C.A. Fla. 1960). Complementing the right to access, the riparian also has a right to dredge a channel to the navigable part of the water unless it interferes with a paramount public right. City of Philadelphia v. Standard Oil Co., 12 F. Supp. 647 (E.D. Pa. 1934), aff'd, 79 F.2d 764 (3d Cir. 1935), cert. denied, 297 U.S. 705 (1936). In Florida the Randall Act, Fla. STAT. §§253.01 et seq. (1975), requires a dredging permit to be obtained from the Trustees of the Internal Improvement Fund after a biological and ecological study has been made to insure no interference with the natural resources of the area. Arguably, such riparian dredging right could be denied by withholding the permit to further the public's interest in developing such resources. Fla. STAT. §253.08 (1975).

192. Duval Eng'g & Contracting Co. v. Sales, 77 So. 2d 431 (Fla. 1955). However, there is some authority for the proposition that relief will be denied against even a substantial interference. See, e.g., Colberg, Inc. v. State ex rel. Dep't of Pub. Works, 67 Cal. 2d 408, 432 P.2d 3, 62 Cal. Rptr. 401 (1967), cert. denied, 390 U.S. 949 (1968) (the right of access to navigable waters is burdened with a servitude in favor of the state when the state properly exercises its power to utilize such waters); Carmazi v. Board of County Comm'rs, 108 So. 2d 318 (3d D.C.A. Fla. 1959) (upholding the construction of a dam cutting off access by every-one upstream of the dam to Biscayne Bay to control a "menace to the national welfare"—salt water intrusion).


remedy for nuisance lies only when the questioned activity is unreasonable. "Coming to the nuisance," although not usually a complete defense,202 is often considered a factor supporting reasonableness.203 Moreover, the Aquaculture Law does allow the trustees to lease the area with any reasonable conditions they wish to attach.204 Presumably, a condition encompassing waste heat usage could be included. Finally, nothing in the statute seems to preclude the power company from leasing the discharge area itself for "experimental" aquaculture.205 The company might then reap additional benefits in goodwill and possible tax deductions by conducting experiments or by assigning the lease206 to a research or commercial enterprise. Thus, the two-edged sword would become, instead, a doubly sharp one for the company.

By enacting its Aquaculture Law the Florida Legislature has adopted a new concept presaging fuller use of excess heat for the public good. Used constructively to stimulate the growth and harvesting of commercially important marine plants and animals, waste heat may become thermal "enrichment" instead of "pollution." The ecological benefits from such enrichment may become a plus factor that can be balanced against enjoining thermal discharges as a nuisance or statutory violation. With the rapidly increasing demands for power, and the proportional growth in cooling water use, any such plus factor deserves further study and encouragement.207


204. FLA. STAT. § 253.71 (1971).

205. Id. § 253.71(6).

206. Id. § 253.71(6).

207. For a concise summary of present and potential uses of thermal discharges for agriculture and aquaculture see M. YAROSH, B. NICHOLS, E. HIRST, J. MICHEL & W. YEE, AGRICULTURAL AND AQUACULTURAL USES OF WASTE HEAT (1972). See also G. TRUMBLE, LEGAL AND ADMINISTRATIVE ASPECTS OF AN AQUACULTURE POLICY FOR HAWAII (1972). The federal government has shown interest in beneficial utilization of thermal outflow areas. The Federal Water Pollution Control Act Amendments of 1972, Act of Oct. 18, 1972, Pub. L. No. 92-500, 70 Stat. 498, 84 Stat. 91, amending 33 U.S.C. §§ 1151-75 (1970), has authorized funding to conduct studies on maximizing the beneficial effects of thermal discharges. Id. § 104(i). To implement this federal interest, the Act empowers the Administrator of the EPA to permit the discharge of pollutants under controlled conditions for an approved aquaculture project under either state or federal supervision. Id. § 318(a). The Administrator must promulgate regulations, not later than Jan. 1, 1974, establishing procedures and guidelines necessary to carry on an approved project. Id. § 318(b).