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TAMING THE TECHNOLOGICAL TYGER THE REGULATION OF THE ENVIRONMENTAL EFFECTS OF NUCLEAR POWER PLANTS -A SURVEY OF SOME CONTROVERSIAL ISSUES--PART TWO

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TAMING THE TECHNOLOGICAL TYGER
THE REGULATION
OF THE ENVIRONMENTAL EFFECTS OF NUCLEAR POWER
PLANTS -A SURVEY OF SOME CONTROVERSIAL ISSUES--PART
TWO

Cover Page Footnote

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THE REGULATION OF THE ENVIRONMENTAL
EFFECTS OF NUCLEAR POWER PLANTS
—A SURVEY OF SOME CONTROVERSIAL
ISSUES—*PART TWO*†

Joyce P. Davis*

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III. Environmental Effects—Cases and Controversies

A. Radiological Effects and their Regulation

1. Radiological Effects

a. Direct Radiation

During normal operation of nuclear power plants, all potential sources of external radiation are shielded to protect plant workers from exposure to radiation in excess of occupational dose limits; such limits, however, are generally less severe¹ than those applicable to the general public outside of the "exclusion area."² This environmental hazard of direct radiation is controlled³ because of the intervening distances and the possibility of adding shielding material if general population dose criteria⁴ would otherwise be exceeded. Once such direct radiation has been reduced to negligible levels, the major source of radiation of environmental interest is radioactive material that in some manner is released or escapes from the containment building or other plant areas. Regulation of such radioactive "effluents" is briefly discussed below.

b. Radioactive Effluents⁵

i. *Gaseous*⁶

The commercial nuclear plants currently in use in the majority of nuclear installations in America utilize a boiling water reactor (BWR)

1. Occupational dose limits are found in 10 C.F.R. § 20 (1972); see particularly §§ 20.101, 20.104 and 20.105.

2. Defined in 10 C.F.R. § 100.3(a) (1972).

3. To meet the applicable safety criteria of the AEC, the plants are designed to ensure that even under the conditions of the most serious "credible accident" possible, the effect on the environs of direct radiation from materials within the high integrity containment building is minimal. See 10 C.F.R. § 100 (1972).

4. See generally 10 C.F.R. § 20 (1972) and the proposed Appendix I to 10 C.F.R. § 50 (1972) in 36 Fed. Reg. 11113 (1971).

5. This discussion is limited to effluents produced during normal operation of the reactor plant or expected abnormal occurrences. Considerations of the effects of the "maximum credible accident," the occurrence of which is considered extremely unlikely, are outside the scope of this article. For discussion of accident safety, see, e.g., Environmental Effects of Producing Electric Power (Summary AEC Report) in Joint Comm. on Atomic Energy, Selected Materials on Environmental Effects of Producing Electric Power, 91st Cong., 1st Sess. 65, 74 (1969) [hereinafter cited as Effects]; Murphy, Atomic Safety and Licensing Boards: an Experiment in Administrative Decision Making on Safety Questions, 33 Law & Contemp. Prob. 566 (1968). See generally Kent, Levy & Smith, Effluent Control for Boiling Water Reactors, a paper presented to the Int'l Atomic

or a pressurized water reactor (PWR) as a heat source for producing steam. Radioactive gases are produced in both types of reactor by activation of certain materials,⁷ and by the release of some of the gaseous products of the fission process from the fuel element into the primary reactor coolant stream.⁸ The amount of the latter materials present in the coolant water depends on the integrity of the fuel elements.⁹

The plants are designed to operate with a certain number of leaking fuel elements.¹⁰ This, in turn, sets the criteria for the design of systems to handle the radioactive gaseous effluents which will maintain releases to the environment within prescribed limits.

In the BWR, the gases released in the primary coolant are carried over, with the steam produced by boiling, to the turbine and the condenser. Steam is condensed back to water in the condenser, but the non-condensable gases,¹¹ including the very small volume of radioactive gases, are vented to a clean-up system, which provides some holdup time for radioactive decay. In currently operating units the gases are then filtered and released through a stack to the environment. In order to reduce the activity level of such releases, longer holdup times and more extensive systems for gas treatment are being incorporated into the design of many future units.¹²

Energy Agency Symposium on Environmental Aspects of Nuclear Power Stations, New York (Aug. 11, 1970).

6. It is interesting to note that fossil-fueled power plants release radioactivity in their effluent gases from naturally-occurring radium in coal and other fuels. See Bedrosian, Easterly & Cummings, *Radiological Survey Around Power Plants Using Fossil Fuel*, EPA, Eastern Environmental Radiation Laboratory, 1970 (EERL 71-3).

7. E.g., nitrogen, oxygen and argon.

8. E.g., xenon, krypton and iodine.

9. If the metal cladding which covers the uranium oxide fuel material is intact, little of the fission product gas will escape; however, as time goes by, the clad elements may develop pin-hole leaks.

10. Design criteria accept leakage in up to (approximately) one per cent of the fuel elements.

11. These include air which may have leaked into the system, hydrogen and oxygen produced by the radiolysis of water in the reactor, as well as fission product gases.

12. In a memo submitted to the Joint Comm. on Atomic Energy the General Electric Company outlined how radioactive wastes from future BWR plants could be further reduced, and indicated the added costs involved. Systems now under development include: (1) extending the gas holdup time and storing the gases in tanks, (2) first utilizing a hydrogen-oxygen recombiner to reduce the volume of

In the PWR, most of the gases remain in the reactor coolant water in a system that is sealed during normal operation. The water in this system is not permitted to boil. When the temperature and pressure are lowered and the system is opened during reactor shutdown for maintenance or refueling, the gases are vented to a cleanup system, from which they may be released to the atmosphere.¹³ A small amount of gaseous activity may also be released continuously during operation.¹⁴

In currently operating reactors, the activity released by a BWR is greater, on an instantaneous basis, than that released by a PWR of comparable size. However, in the BWR most of the activity is short-lived and decays within a short time to non-radioactive matter. The long-term hazard from both types of plants is of similar magnitude and is caused by an isotope of krypton which has a half-life of eleven years.¹⁵ Given the present design of gaseous waste systems, essentially all of the krypton that escapes from the fuel will eventually be released to the atmosphere. Because it is a non-reacting noble gas, krypton does not present a biological hazard at today's concentrations.¹⁶

radioactive gases and then storing the gases in tanks, and (3) using a cryogenic system to remove xenon and krypton from liquified air. Hearings on Environmental Effects of Producing Electric Power Before the Joint Comm. on Atomic Energy, 91st Cong., 2d Sess., vol. 1, at 1695 (1970) [hereinafter cited as Effects Hearings II]. See also the proposed Appendix I to 10 C.F.R. § 50, supra note 4.

13. Westinghouse Electric Corporation announced in 1970 that it was offering a PWR plant, which has "essentially . . . zero release [of radioactive effluents] under normal operating conditions Radioactive gases would be contained within the system and either be stored on-site or shipped off the site periodically." 16 AECH, No. 20, at 1 (May 18, 1970). AEC Commissioner Thompson questioned industry's capability of building plants with "zero release" and the advisability of building them for near zero releases. Nuclear Industry, Vol. 17, No. 6, June, 1970, at 19.

14. One source might be leakage from the condenser in the secondary steam cycle, which is normally isolated from the primary reactor coolant, should there be leakage between the primary water and the secondary steam through defects in the tubes of the steam generator.

15. Krypton-85.

16. Since the half-life of Krypton-85 is so long, however, with continued release its concentration in the atmosphere will steadily increase to an equilibrium level. To minimize the possible future hazards, research is being carried out on methods of removing krypton from effluent gases and converting it into some form amenable to safe long-term storage. See Hendrickson, The Dose from Kr-85 Released to the Earth's Atmosphere, Battelle Memorial Institute, Int'l Atomic Energy Agency Report No. SM-146/12 (July, 1970).

ii. *Liquid*¹⁷

During reactor operation, radioactive materials are present in the reactor cooling water. Some of these come from activation of elements in the water itself—the naturally occurring trace elements. Others include soluble and insoluble products of the corrosion of metals in the system, which are activated by neutrons in their passage through the reactor, and a variety of fission products which may leak from defective fuel elements. In addition, tritium, an isotope of hydrogen, is produced.¹⁸ Tritium, with a 12-year half-life, is a unique radiological contaminant, because in the form of tritiated water,¹⁹ it is not separable from ordinary water by any practical chemical or physical processes.

Liquids leaking into and recovered from various plant systems are collected and sent through a special liquid waste system.²⁰ The processes used in liquid waste treatment are designed to concentrate on the radioactive material and to put it into a form which will permit it to be safely shipped to AEC-licensed radioactive waste storage areas. Reductions in radioactivity levels are also achieved by storing material for a period of time to permit decay of short-lived activity, and by the dilution of effluents containing low levels of radioactivity to reduce the concentration of radioactive matter below the designated limits for release into the environment.²¹

After processing, the effluent liquids, from which most of the radio-

17. See, e.g., Testimony of Dr. T.J. Thompson in Hearings on the Environmental Effects of Producing Electric Power Before the Joint Comm. on Atomic Energy, 91st Cong., 1st Sess. 153-94 (1969) [hereinafter cited as *Effects Hearings I*]. The problems of releases to the environment of wastes from fuel reprocessing plants are outside the scope of this paper, as are the regulation of shipping radioactive materials by the AEC, Dep't of Transportation, etc., and the regulation of long-term radioactive waste storage facilities.

18. Cited as H-3 or T, tritium is produced in a PWR that uses boric acid in the primary coolant for reactor control, by neutron reaction with boron. Other sources of tritium in both types of reactors include solid boron control elements, the fission process, activation of lithium if used for control of water chemistry, and activation of naturally-occurring deuterium, another hydrogen isotope in primary coolant water.

19. HTO, analogous to H₂O with one hydrogen atom replaced by tritium. There are also minute amounts of T₂O.

20. The purification system provided within the reactor coolant system itself is the first stage of liquid waste treatment. Much of the radioactive material in the reactor coolant water is removed and concentrated by the filters and demineralizers of this system.

21. See notes 47-55 *infra*.

active matter has been removed, are collected in monitoring tanks. After being checked for radioactivity, these liquids may be released at a controlled rate to the plant's condenser cooling water discharge, or recycled for use in the plant.²² The concentrated radioactive matter which has been removed in the liquid waste system is treated as solid waste.

iii. *Solid*

Solid radioactive wastes consist mainly of concentrated wastes from the radioactive waste system, contaminated tools and equipment and filters and demineralizers which have concentrated in the radioactive matter removed from air and water. Such solids are generally stored for a time to allow for decay of all but the longest-lived isotopes.²³

They are then shipped off-site in shielded casks to licensed waste storage areas. Also removed from the plant periodically are the spent fuel elements that have been in the reactor for three to five years. After a few months on-site storage to allow decay of short-lived activities, these elements are shipped in heavily shielded casks to a fuel reprocessing plant, where unused fuel material is recovered for recycling to the reactor, and fission products and other wastes are converted to forms amenable to long-term storage and stored indefinitely.²⁴

2. Regulation of Radioactive Effluents

a. Radiological Health Standards

i. *Setting Standards*²⁵

Under the 1970 reorganization,²⁶ the Environmental Protection Agency (EPA) has the responsibility to set standards which govern pub-

22. Further provisions can be made, such as retention of low-level waste effluents for reuse in the plant. An example of a design for maximum reuse is the Rancho Seco unit of the Sacramento Municipal Utility District which is planned routinely to discharge no radioactive liquid wastes to the environment.

23. E.g., corrosion product cobalt-60 and fission product strontium-90.

24. Discussion of challenges to the AEC long-term waste storage policies are outside the scope of this article. See *Nucleonics Week*, Vol. 12, No. 44 Nov. 4, 1971, reporting that NRDC, an intervenor in the Vermont Yankee Operating License Proceeding, plans an appeal to the commission for a ruling on the issue of whether an ASLB can consider radioactive waste transportation and storage at the power plant licensing stage.

25. See generally *Hearings on Radiation Standards, Including Fallout*, before the Subcomm. on Research, Development and Radiation of the Joint Comm. on Atomic Energy, 87th Cong., 2d Sess., pts. 1 and 2 (1962); M. Eisenbud, *Standards of Radiation Protection and their Implications to the Public Health*, a paper pre-

lic exposure to radiation and radioactive materials in the environment from nuclear power plants and from those artificial radioactive materials within the scope of the Atomic Energy Act of 1954.²⁷ The EPA has also been given the advisory functions of the Federal Radiation Council (FRC), which was formed in 1959 to provide "guidance for all Federal agencies in the formulation of radiation standards."²⁸ No federal agency, however, has the authority to enforce standards for *exposure* to radiation from sources not under Atomic Energy Commission (AEC) control, such as that from X-ray and similar electronic machines, from radium and other naturally-occurring radioactive materials and from materials made radioactive in accelerators.

Direct knowledge of the effects of radiation on human beings is based on studies of Japanese survivors of bombings, Marshall Islanders exposed during weapons tests, radiologists, children X-rayed *in utero*, patients treated by radiation, radium watch dial painters, uranium miners and victims of radiation accidents. The value of such studies depends on the size of the population studied, the ability to estimate dose and the availability of control groups.²⁹

The recorded human exposure data are not directly applicable to the effects of long-term exposure to the much lower levels of radiation or concentrations of radioactive materials permitted by AEC regulations. The effects of these low levels of exposure must be inferred by various

sented at the Symposium on Nuclear Power and the Public, Minneapolis, Oct. 10, 1969 in *Nuclear Power and the Public* (H. Forman ed. 1970); National Committee for Radiological Protection [NCRP], *Basic Radiation Protection Criteria*, Report No. 39 (Jan. 15, 1971); Oates, *Radiation Exposure Overview-Nuclear Power Reactors and the Population*, HEW, Bureau of Radiological Health (1970) (BRH/OCS 70-1); Boffey, *Radiation Standards: Are the Right People Making Decisions?*, 171 *Science* 780 (1971); Holcomb, *Radiation Risk: A Scientific Problem?* 167 *Science* 853 (1970) [hereinafter cited as *Radiation Risk*]; S.L. Snow, *Standards Needs in Controlling Radiation Exposure of the Public*, *Am. J. Pub. Health*, Vol. 60, No. 2, Feb., 1970 at 243.

26. Reorganization Plan No. 3 of 1970, 35 *Fed. Reg.* 15623 (1970), as detailed in 42 U.S.C. §§ 4321-47 (1970).

27. 42 U.S.C. §§ 2011-296 (1970).

28. The FRC was established in 1959 by Exec. Order No. 10831, 3 C.F.R. § 365 (1959) and by amendment to the Atomic Energy Act of 1954, 42 U.S.C. § 2021(h) (1970).

29. Since most mass exposures occurred years ago, the main results of such studies are readily available; it is not likely that major new findings will be produced in the foreseeable future. See *Radiation Risk*, *supra* note 25, at 855.

methods of estimation that are frequently little more than scientific conjecture.³⁰

The standards-setting agencies have issued numerous reports containing a variety of numerical standards and guidelines.³¹ One standard which has stirred major controversy sets the limit of 0.17 rem³² per year for the general population.³³

A recent review³⁴ of the history of these standards states:

In the mid-1950's, both the I.C.R.P. [International Committee for Radiological Protection] and the N.C.R.P. [National Committee for Radiological Protection] concluded that 5 Rem per year should be the maximum permissible dose for occupational exposure, and that the general population should receive no more than one-tenth this amount. The F.R.C. divided this latter value by 3 in order to allow for variations of exposure to individuals within the population. In 1956, geneticists on the N.A.S. [National Academy of Sciences] Committee recommended that the contribution of man-made radiation to the human body not exceed 10 Rem per generation (30 years). They estimated that exposure from medical uses of radiation accounted for about one-half this value. The remaining 5 Rem, when divided by 30 years, again gave a figure of 0.17 Rem/year.³⁵

The article comments that, in theory, the setting of standards requires a careful balancing of the benefits to be derived from radiation-producing processes against the expected risks. Determination of benefits—such as military preparedness or abundant electric power—is entirely a social problem; but even the determination³⁶ of risk can, at best, be only partially scientific.³⁷

30. *Id.*

31. See, e.g., NCRP No. 39, *supra* note 25; ICRP Recommendations 1959 (adopted Sept. 9, 1958); ICRP Publication 8, *Evaluation of Risks from Radiation* (1966); ICRP Publication 9, *Recommendations of the ICRP* (1966); ICRP Publication 10A, *Assessment of Internal Contamination Resulting from Recurrent or Prolonged Uptakes* (1971).

32. A "rem," or roentgen equivalent man, is a unit of radiation dosage related to biological effects. The average chest X-ray delivers a dose of 0.2 rem while the average gastro-intestinal tract X-ray series is about 22 rem. For additional explanatory material, see *Testimony of Dr. T.J. Thompson, Effects Hearings I*, *supra* note 17, at 164.

33. See, e.g., ICRP Publication 9, *supra* note 31.

34. *Radiation Risk*, *supra* note 25, at 853.

35. *Id.*

36. The guidelines used by standard setters to estimate the probable risks include: "(i) The lowest absorbed dosage at which medically significant damage to humans has been observed. This is somewhere between 50 and 100 rad, depending on how rigorous a statistical correlation between radiation intensity and effect one demands. (ii) The natural background radiation. This is produced by cosmic

ii. *Reactor Licensing*³⁸

(a) *Application of General Standards*

Within the framework of FRC, NCRP and ICRP recommendations, the AEC has developed regulatory standards and set criteria to control release of radioactivity at the source, prior to its reaching the environment, by placing limits on concentrations and quantities of radioactivity that may be released into the air and water by AEC licensees.³⁹ These limits, set forth in Part 20 of the regulations, are designed to ensure that public exposure to environmental contamination is well within FRC radiation protection guides.⁴⁰ Apparently, AEC emission standards must be compatible with environmental standards promulgated by EPA.⁴¹

Until recently, in applying these Part 20 standards to reactor water effluents, the AEC generally limited concentrations of radioactivity in undiluted effluents leaving a plant site so that a person using the water effluent as his sole source of drinking water throughout his lifetime would not exceed FRC guidelines for individual exposure.⁴²

In addition to Part 20 concentration limits,⁴³ the AEC regulatory program now includes other regulations as well.⁴⁴ In controlling effluents

rays and radioactive materials in the earth and human body. It varies from location to location, with most of the world's population living in a background of from 0.05 to 0.20 rem per year. In some areas relatively large populations live in a background of about 1.5 rem per year. (iii) An attempt to estimate an upper limit of risk. The assumption is made that deleterious effects observed at high doses can be linearly extrapolated to predict the effects at low doses." Id.

37. An indication of the lack of an adequate scientific development of risk standards is noted in *Radiation Risk*, supra note 25, at 853 where it is observed that the very "inability to readily disprove [a popular criticism of current standards] their work on scientific grounds dramatizes the tenuous role that science plays in the determination of radiation risk."

38. See generally testimony of Dr. T.J. Thompson, *Effects Hearings I*, supra note 17, at 153-94.

39. 10 C.F.R. § 20 (1972), *Standards for Protection Against Radiation*.

40. FRC Radiation Protection Guidance for Federal Agencies, Memorandum for the President, May 13, 1960, 25 Fed. Reg. 4402 (1960).

41. 10 C.F.R. § 50, App. I, 36 Fed. Reg. 11113 (1971).

42. See AEC General Design Criteria for Nuclear Power Plant Construction Permits, 10 C.F.R. § 50, App. A at 247, 36 Fed. Reg. 3256, as amended 36 Fed. Reg. 12733 (1971) (*Criterion 60-Control of Release of Radioactivity to the Environment*).

43. 10 C.F.R. § 20, App. B, Table II (1972).

44. For example, various restrictions on plant design and on operation are included in individual operating licenses. 10 C.F.R. §§ 20.1, 50.34, 50.36a (1972); 35 Fed. Reg. 5414 (1970).

from nuclear reactors, one provision in the AEC regulations⁴⁵ considers both the possible effect of multiple units in one geographic area and adverse reconcentration effects of radioactive materials in fish, wildlife or man's food chain. This provision states that *quantity* as well as *concentration* limits may be imposed to ensure that the total radioactivity released to the environment from all sources does not result in radiation doses to humans in excess of FRC guides.⁴⁶

During the AEC staff review phase of licensing, both the site and the plant design are studied thoroughly to ensure that exposure standards can be met. Environmental monitoring is also required, both before the plant starts operation (to form a baseline), and after operations have started (to detect any effects on the environment). In addition to the licensee and the AEC, other agencies are active in performing environmental surveys. These may include the state health or conservation department or similar state agencies, and the EPA (formerly the United States Public Health Service).⁴⁷

(b) *Light-water Reactors*

During recent years, the adequacy of AEC standards has been challenged. Due in part to the pressure resulting from public concern with these matters, the AEC has taken steps to clarify its regulations on radioactive effluents from light-water-cooled nuclear power reactors.⁴⁸

On March 28, 1970 the AEC announced its intention of adding to the statement of purpose of Part 20 a statement of the licensee's obligation to "make every reasonable effort to maintain radiation exposures and releases of radioactive materials in effluents to unrestricted areas as far below the limits specified in this part as practicable."⁴⁹ This is a reflec-

45. 10 C.F.R. § 20.106(e) (1972). "In addition to limiting concentrations in effluent streams, the Commission may limit quantities of radioactive materials released in air or water during a specified period of time if it appears that the daily intake of radioactive material from air, water, or food by a suitable sample of an exposed population group, averaged over a period not exceeding one year, would otherwise exceed the daily intake resulting from continuous exposure to air or water containing one-third the concentration of radioactive materials. . . ."

46. See FRC Radiation Protection Guidance, *supra* note 40.

47. The Public Health Service, Bureau of Radiological Health, Environmental Control Administration made a radiological survey of the area around Commonwealth Edison's Dresden Nuclear Power Station, a boiling water reactor (BWR). Its findings are presented in Effects Hearings I, *supra* note 17, App. 16, at 824.

48. AEC Press Release No. N-48 (1970). See also 35 Fed. Reg. 5414 (1970); 36 Fed. Reg. 12247 (1971).

49. Proposed amendment (c) to 10 C.F.R. § 20.1, 35 Fed. Reg. 5415 (1970).

tion of a similar statement in the FRC guides.⁵⁰ In addition, a Part 50 amendment proposed adding section 50.34a,⁵¹ designed to "give appropriate regulatory effect, with respect to radioactivity in effluents . . . to the guidance of the FRC that radiation doses should be kept as far below the radiation protection guides as practicable."⁵²

These amendments became effective on December 3, 1970. They did not modify the Part 20 limits on radiation exposure,⁵³ which "will continue to be based on the recommendations of the FRC. . ."⁵⁴ Subsequently, the AEC proposed adding a new Appendix I to Part 50, to "provide numerical guides for design objectives and technical specification requirements for limiting"⁵⁵ operating conditions of light-water reactors to keep levels of "radioactivity in effluents as low as practicable."⁵⁶ These proposed regulations are the subject of one of the AEC's first rulemaking hearings,⁵⁷ convened in January, 1972.

(c) *Challenges to Radiation Standards in Licensing Proceedings*

An intervenor at a hearing concerning the Calvert Cliffs Nuclear Power Plant⁵⁸ (construction proposed in Calvert County, Maryland)

50. "[E]very effort should be made to encourage the maintenance of radiation doses as far below this guide as practicable." Federal Radiation Council, Background Material for the Development of Radiation Protection Standards, Report No. 1 (May 13, 1960) § 7.9, at 37.

51. 35 Fed. Reg. 5415 (1970). The section is titled "Design objectives for equipment to control releases of radioactive material in effluents—light-water-cooled power reactors."

52. *Id.* at 5414.

53. In its announcement, the AEC noted: "Experience has shown that AEC licensees have generally kept exposures to radiation and releases of radioactivity in effluents to levels well below AEC limits. In particular, the nuclear power industry has generally held the discharge of radioactivity in effluents from reactor sites down to a small fraction (less than a few per cent) of the maximum limits specified by the AEC. Thus, resultant exposures to the public living in the immediate vicinity of operating power reactors have generally been small fractions of the upper limits designated in the FRC guides." AEC Press Release No. N-48, *supra* note 48, at 2.

54. *Id.*

55. 36 Fed. Reg. 11113 (1971).

56. *Id.*

57. Notice of the hearing was given at 36 Fed. Reg. 22774 (1971).

58. In re Baltimore Gas and Electric Co., Nos. 50-317, 50-318 (AEC, June 30, 1969) (Initial decision). AEC docket numbers can be found, e.g., in Tables 1 and 2, 13 Nuclear Safety 246 (1972). The Board's decision to permit a challenge of the regulations has since been termed the "Calvert Cliff's doctrine." 36 Fed.

challenged the adequacy of AEC Part 20 standards. As the Atomic Safety Licensing Board noted in its initial decision⁵⁹ authorizing the issuance of a construction permit,⁶⁰ “[t]he intervenor does not question that the proposed reactor will comply satisfactorily with the limits of Part 20. The focus of its attack seems to be on the validity of Part 20 itself.”⁶¹ The Board concluded that:

Both the Applicant and the staff argue that it is beyond the Board’s function to inquire into the validity of the standards established by Part 20. . . . [I]t seems to the Board that there may be cases in which the evidence introduced is such as to draw into question the validity of those regulations themselves. In such a case, the Board might not be able to rely upon Part 20 as establishing the outer limits of acceptable risk. In this case however, although questions are raised as to the underlying assumptions of Part 20, there is no evidence upon which the Board could base a refusal to accept Part 20.⁶²

In a memorandum that supported the issuance of the permit, the AEC Commissioners took issue with that statement of the Licensing Board.⁶³ They said:

[T]he Commission’s licensing regulations established the standards for reactor construction permit determinations; and . . . the findings in proceedings such as the instant one must be made in accordance with those regulations. . . . [O]ur licensing regulations . . . are not subject to amendment by boards in individual adjudicatory proceedings.⁶⁴

It should be noted that this decision was made in the context of the AEC’s health and safety review.⁶⁵ Under the later *Calvert Cliffs’* court of appeals decision⁶⁶ and the new AEC regulations⁶⁷ implementing the Na-

Reg. 23008 (1971). For additional information, see also Nuclear Power Plants in Maryland, a report by the Governor’s Task Force on Nuclear Power Plants (Dec., 1969).

59. In re Baltimore Gas and Electric Co., supra note 58.

60. Construction Permit No. CPPR-63 and CPPR-64, issued July 7, 1969.

61. In re Baltimore Gas and Electric Co., supra note 58, at 11.

62. Id. at 12 (emphasis added).

63. In re Baltimore Gas and Electric Co., Nos. 50-317, 50-318 (AEC, Aug. 8, 1969 (memorandum)).

64. Id. at 3 (emphasis added).

65. In a 1970 proceeding, the Atomic Safety and Licensing Board refused to admit a report by two Lawrence Radiation Laboratory scientists who recommended a substantial reduction in permissible discharge. The board held that the hearing was unrelated to establishing radiation standards. Diablo Canyon Unit No. 2, No. 50-323 (AEC June, 1968), *Electrical World*, Vol. 173, No. 4, January 26, 1970, at 57.

66. *Calvert Cliffs’ Coord. Comm. v. AEC*, 449 F.2d 1109 (D.C. Cir. 1971).

67. 36 Fed. Reg. 18071 (1971).

tional Environmental Policy Act (NEPA),⁶⁸ the Board, in its "risk-benefit" evaluation of environmental factors, may have the power to consider challenges to AEC standards.

(d) *Project Rulison Case*⁶⁹

An interesting case decided in early 1970⁷⁰ considered the problem of radiation standards in detail. Although the challenged AEC action (Project Rulison, an experiment in the application of nuclear explosives to the exploitation of natural gas resources) did not involve a nuclear reactor, the AEC (FRC) standards in question were basically the same as those applicable to reactor effluents.⁷¹

The court asked whether the "FRC and AEC radiation protection standards [are] reasonably adequate to protect life, health and property,"⁷² and answered in the affirmative.

Radiation protection standards are established . . . through a complex process. . . . The setting of exposure standards at a given level requires the weighing of . . . risks and benefits to be derived therefrom. The weighing requires a value judgement as well as a measuring, and thus the standards are not scientific numbers below which no danger exists. The value judgement embodies complex social and political considerations, for atomic energy has a potential that suggests unlimited benefits to entire nations and presents a risk to entire populations of people, and perhaps their progeny.⁷³

The court found that the standards, as presently established, "do embody this risk-benefit evaluation,"⁷⁴ and concluded that the court need not determine the risk-benefit question for this project:

[T]he decision of the extent and nature of government participation in development of energy sources is a political question *It is for Congress, in making these decisions, to weigh the risks presented by the use of atomic energy in such projects. Our task here is to ensure that the AEC has not exceeded Congressional standards established to protect the public in utilization of atomic energy which Congress has authorized, presumably after having evaluated the risk-benefit equation presented by the Rulison project.*⁷⁵

68. National Environmental Policy Act of 1969, 42 U.S.C. §§ 4321-47 (1970) [hereinafter cited as NEPA].

69. See generally Plaintiff's Brief in the Project Rulison Case, 55 Cornell L. Rev. 761 (1970).

70. *Crowther v. Seaborg*, 312 F. Supp. 1205 (D. Colo. 1970).

71. *Id.* at 1231.

72. *Id.* at 1230.

73. *Id.* at 1231.

74. *Id.* (emphasis added).

75. *Id.* (emphasis added).

The court determined that although the plaintiffs introduced "impressive evidence of new developments in the field of radiation biology,"⁷⁶ there was no evidence which justified an alteration of standards:⁷⁷

[T]hey did not establish an adequate correlation between this information and radiation exposure at low dose levels [and] they did not refute equally new and impressive evidence of repair of the biological damage from radiation at low dose rates and levels.⁷⁸

The court recognized that the field of radiation protection is constantly changing with the continuing development of new scientific information on the biological effects of ionizing radiation:

Careful decisions must be made in the context of contemporaneous knowledge. Such decisions cannot be indefinitely postponed if the potentials of atomic energy are to be fully realized. *All that is required to establish reasonableness of the decision setting a standard under the statutory directive to protect the public health and safety is that it be made carefully in light of the best of available scientific knowledge.*⁷⁹

The court recognized that in standards-setting "[a]bsolute certainty is neither required nor possible."⁸⁰

b. State Jurisdiction over Environmental Radioactivity⁸¹

i. *The Federal Pre-emption Question*⁸²

Between the passage of the Atomic Energy Act of 1954⁸³ and the 1959 state "turnover" amendment,⁸⁴ and for a time thereafter, several legal

76. *Id.* at 1233.

77. *Id.*

78. *Id.*

79. *Id.* at 1234 (emphasis added).

80. *Id.* (emphasis added).

81. See generally State Regulation of Atomic Energy, in Stason, Estep & Pierce, *Atoms and the Law* (1959).

82. See generally Attorney General of Oregon, Statement of Position No. 6697, Feb. 3, 1970, 1970 CCH Atom. En. L. Rep. ¶ 16,602. 16 AECH, No. 10, (Mar. 9, 1970), at 11; Op. Att'y Gen. South Dakota, July 23, 1964, 1967 CCH Atom. En. L. Rep. ¶ 16,561; Op. Att'y Gen. North Carolina, Oct. 17, 1961, 1967 CCH Atom. En. L. Rep. ¶ 16,545; Interpretation by the General Counsel: AEC Jurisdiction over Nuclear Facilities and Material under the Atomic Energy Act, 10 C.F.R. § 8.4 (1969); Rep. Hosmer, A Legal History and Rationale for the Federal Preemption, 15 AECH, No. 41 (Oct. 13, 1969), at 12; [1961-1962] Mich. Att'y Gen. Biennial Rep. 565; and the following law review articles: Cavers, State Responsibility in the Regulation of Atomic Reactors, 50 Ky. L.J. 29 (1961); Cavers, Legislative Readjustments in Federal and State Regulatory Powers over Atomic Energy, 46 Cal. L. Rev. 22 (1958); Dietz & Harris, How Shall California Govern-

studies were made of the problem of state-federal relationships in the regulation of nuclear materials and the question of federal pre-emption of regulation of materials covered in the Atomic Energy Act.⁸⁵ Recently, the question has been raised again⁸⁶ and considered in *Northern States Power Company v. Minnesota*.⁸⁷

The AEC contends that Congress has pre-empted the entire field of regulation of radioactive effluents from licensed nuclear power plants to the exclusion of the states. In its opinion, the only way that the states can exercise any power over materials subject to the Atomic Energy Act is to enter into a "turnover agreement" with the AEC. Since the section of the Act which authorizes such agreements specifically excludes delegation to the states of any regulatory power over reactors, the states are effec-

ment Meet the Challenge of Atomic Energy?, 8 *Hastings L.J.* 119 (1957); Esgain, *State Authority and Responsibility in the Atomic Energy Field*, 1962 *Duke L.J.* 163; Estep & Adelman, *State Control of Radiation Hazards: An Intergovernmental Relations Problem*, 60 *Mich. L. Rev.* 41 (1961); Helman, *Preemption: Approaching Federal-State Conflict Over Licensing Nuclear Power Plants*, 51 *Marq. L. Rev.* 43 (1967); Krebs & Hamilton, *The Role of the States in Atomic Development*, 21 *Law & Contemp. Probs.* 182 (1956); Lemov, *State and Local Control over the Location of Nuclear Reactors under the Atomic Energy Act of 1954*, 39 *N.Y.U.L. Rev.* 1008 (1964); Parker, *The Need for State Atomic Energy Programs in the West*, 29 *Rocky Mt. L. Rev.* 296 (1957); Shafer, *Federalism and Atomic Energy—The Recent Kentucky Proposal*, 3 *Atom. En. L.J.* 337 (1961). For a later review and a comprehensive bibliography see M. Nathanson, *Federal-State Relationships in the Regulation of Atomic Energy Activities*, Oct. 1965 (unpublished at HEW, Region II, New York, N.Y.).

83. Atomic Energy Act of 1954, 42 U.S.C. §§ 2011-281 (1970).

84. In a 1959 amendment (Pub. L. No. 86-373, § 1, 73 Stat. 688) to the Atomic Energy Act, § 274 was added (42 U.S.C. § 2021). This authorizes the Commission to enter into an agreement with the governor of any state providing for the discontinuance of regulatory authority of the Commission with respect to by-product materials, source materials, and special nuclear materials in quantities not sufficient to form a "critical mass." However, § 274(c)(1) provides that the Commission "shall retain authority and responsibility with respect to regulation of the construction and operation of any production or utilization facility. . . ." In its comments on the bill that was enacted as § 274, the Joint Comm. on Atomic Energy commented that: "It is not intended to leave any room for the exercise of dual or concurrent jurisdiction by States to control radiation hazards by regulating byproduct, source or special nuclear materials." (Quoted from 10 C.F.R. § 8.4, see supra note 82); see 1970 CCH *Atom. En. L. Rep.* ¶ 16,508.

85. See note 82 supra.

86. See remarks by Harold P. Green in 16 *AECH*, No. 47 (Nov. 23, 1970), at 33.

87. 447 F.2d 1143 (8th Cir. 1971); see text accompanying notes 124-34, *infra*.

tively barred from regulating radioactive effluents from reactors to protect radiological health and safety.⁸⁸

Most legal analyses⁸⁹ have concluded that Congress did intend, and had the power, to give the AEC some jurisdiction over the new aspects of nuclear energy, a technology that was "born" as a government monopoly. Although the Act uses the term "health and safety"⁹⁰ without qualification, the AEC has interpreted this, with judicial concurrence, to mean only *radiological* health and safety.⁹¹

It is also apparent that not *all* radiological health and safety is under AEC jurisdiction. As previously mentioned, regulation of X-ray equipment and of such naturally occurring sources as radium was not covered by the Atomic Energy Act. Before the passage of this federal legislation, some states had exercised jurisdiction over such sources, and they continue to do so.⁹² Thus it appears that, absent a federal statute, the states have the right to act in the field of radiological health and safety as part of their inherent police powers.⁹³

It can be contended that some of this power was taken from the states, assuming it was constitutional to do so, and given to the AEC in the 1954 Act⁹⁴ or the predecessor 1946 statute.⁹⁵ The question is whether Congress intended the AEC to take over the field of radiological health and safety completely with respect to sources covered in its Act, or whether states were to be allowed concurrent power. Most authorities who have considered this question have concluded that the federal regulations pre-empt the field.⁹⁶

88. Atomic Energy Act of 1954, § 274, 42 U.S.C. § 2021 (1970).

89. See note 82 *supra*.

90. The phrase, or variations thereof, is found in the following sections: 42 U.S.C. §§ 2073(b), 2093(b), 2099, 2111, 2133(d), 2134(d), 2201(b), 2201(i). See *New Hampshire v. AEC*, 406 F.2d 170, 173 n.3 (1st Cir.), cert. denied, 395 U.S. 962 (1969).

91. *New Hampshire v. AEC*, 406 F.2d 170 (1st Cir. 1969).

92. See, e.g., Dillard, *State Radiation Control Legislation* (1969).

93. Recommendations of the NCRP on a suggested State Radiation Protection Act were presented in 1955. Dep't of Commerce, Nat'l Bureau of Standards, *Regulation of Radiation Exposure by Legislative Means* (Handbook 61, 1955). The introduction to the report states that "[n]o attempt is made in this report to resolve the jurisdictional problems that will almost surely develop between Federal, State and municipal authorities in their efforts to control or regulate the use of ionizing radiations." *Id.* at iv.

94. Atomic Energy Act of 1954, codified in 42 U.S.C. §§ 2011-281 (1970).

95. Atomic Energy Act of 1946, ch. 724, § 60 Stat. 755.

96. See note 85 *supra*.

Even conceding AEC pre-emption, it remains necessary to define the field pre-empted. In a legislative report, the Joint Committee on Atomic Energy has stated that the "AEC's regulatory control was limited to considerations involving the common defense and security and the protection of the health and safety of the public with respect to the special hazards associated with the operation of nuclear facilities."⁹⁷ It could be argued that the term "special hazards"⁹⁸ covers only such aspects as criticality and catastrophic accidents, and not the release of low-level effluents which are similar to the naturally-occurring radioactive materials left to the states to control. Under this theory, the AEC would be responsible only for radiological safety aspects related to the prevention of accidents at reactor plants and the regulation of releases of substantial quantities of radioactive material, whereas the states would be responsible for regulation of normal, low-level effluents.

Several objections can be made to this view, among them: (1) the "operation" of the plant, which is part of AEC regulatory responsibility,⁹⁹ may be affected by state regulation of effluents,¹⁰⁰ (2) not all states have the technical competence to carry out their responsibility; and (3) the interpretation by an administrative agency of its own scope of responsibility and the continued concurrence of Congress carry great weight and the AEC has interpreted its statute as giving it jurisdiction over these low-level effluents to the exclusion of the states.¹⁰¹

However, in response to these objections it may be said that such state jurisdiction over effluents could be considered valid as long as it regulates the operation of the radioactive waste (radwaste) system only, and does not affect the operation of the reactor itself.¹⁰² Furthermore, the increasing number of persons with technical training and experience in the nuclear field will probably solve the competency problems.¹⁰³ Finally,

97. S. Rep. No. 390, 89th Cong., 1st Sess. 4 (1965), as quoted in *New Hampshire v. AEC*, 406 F.2d 170, 175 (1st Cir. 1969).

98. *Id.*

99. 42 U.S.C. § 2021(c)(1); see 10 C.F.R. § 50 (1972).

100. For a discussion of state versus federal regulation, see Chief Judge Devitt's decision in *Northern States Power Co. v. Minnesota*, 320 F. Supp. 172 (D. Minn. 1970).

101. 10 C.F.R. § 8.4 (1969).

102. The district court reaches an opposite conclusion in *Northern States Power Co. v. Minnesota*, 320 F. Supp. 172, 176 (D. Minn. 1970).

103. See generally S. Harris, *Federal-State Relations in Radiological Health—The "Competency Issue"*—Preliminary Observations (Feb. 9, 1966) (unpublished paper at Radiological Health Program, FDA, Brooklyn, N.Y.).

the AEC's deeds, in not vigorously contesting state action in this area, might speak louder than its words.

Assuming that the federal government has indeed pre-empted the field of public radiological health and safety with respect to reactor effluents, there may still be room for state regulation of these effluents *if such regulation is done for purposes other than public health and safety*. It is arguable that the states' police power is broader than the "health and safety" category, encompassing such aspects as general welfare, aesthetics and ecology.¹⁰⁴ On this basis, a state might regulate radioactive effluents for such purposes, setting more stringent standards than those of the AEC, which are based on public health and safety alone.¹⁰⁵

Maintenance of pristine water quality is one possible justification for state regulation.¹⁰⁶ Maine, for example, has established a classification system for the waters of the state.¹⁰⁷ The standards for radioactive material discharge into *Class B* and lower category waters, are based on Public Health Service drinking water criteria.¹⁰⁸ However, for the highest classification, *Class A*, the standards state: "No radioactive matter or substance shall be permitted in these waters other than that occurring from natural phenomena."¹⁰⁹ This regulation to perpetuate water quality is apparently based on aesthetic, ecological or other grounds, since the

104. E.g., *Stone v. City of Maitland*, 446 F.2d 83, 89 (5th Cir. 1971), (the enhancement of aesthetic appeal is a proper exercise of police power), citing *E.B. Elliot Advertising Co. v. Metropolitan Dade County*, 425 F.2d 1141 (5th Cir. 1970); *Sunad, Inc. v. City of Sarasota*, 122 So. 2d 611 (Fla. Sup. Ct. 1960); *Merritt v. Peters*, 65 So. 2d 861 (Fla. Sup. Ct. 1953); *City of Miami Beach v. Ocean & Island Co.*, 147 Fla. 480, 3 So. 2d 364 (1941). See *Central Maine Power Co. v. Waterville Urban Renewal Authority*, 281 A.2d 233 (Sup. Jud. Ct. 1971); *Wes Outdoor Advertising Co. v. Goldberg*, 55 N.J. 347, 262 A.2d 199 (1970) ("scenic beauty" not unconstitutionally vague); *Nattin Realty Inc. v. Ludewig*, 67 Misc. 2d 828, 324 N.Y.S. 2d 668 (Sup. Ct. 1971) ("[t]he definition of 'public health, safety and welfare' surely must now be broadened to include and provide for those belatedly recognized threats and hazards to the public weal [ecological considerations].")

105. See text accompanying notes 219 and 220 *infra*.

106. A similar provision sets aside forest and preserve land as "forever . . . wild." N.Y. Const. art. 14, § 1.

107. Me. Rev. Stat. tit. 38, § 363 (Supp. 1972).

108. *Id.* The definition of Class D waters, however, states that, "No radioactive matter or substance shall be permitted in these waters which would be harmful to humans, animal or aquatic life and there shall be no disposal of any matter or substance which would result in radio-nuclide concentrations in edible fish or other aquatic life thereby rendering them dangerous for human consumption."

109. *Id.*

standard of "no release" is more severe than that of *Class B*, which is based on public health.¹¹⁰ Using this rationale, it would seem that in certain circumstances a state could, reasonably and legally, set standards for radioactive release more stringent than those of the AEC, notwithstanding the AEC's pre-emption of health and safety regulation.¹¹¹

ii. *The Current Situation: Northern States Power Company*¹¹²

In early 1966, Northern States Power Company announced plans for the 550 megawatt Monticello Nuclear Generating Plant to be built in Minnesota, and submitted an application to the AEC for a construction permit and an operating license.¹¹³ The AEC hearing on the application for a construction permit, held in May, 1967, was an uncontested proceeding. After receiving the construction permit, the utility filed an application with the state's Water Pollution Control Commission (WPCC) for a permit to discharge plant effluent, excluding radioactive wastes which would be covered by AEC license. In an unrelated action the state abolished the WPCC and set up a new agency, the Minnesota Pollution Control Agency (MPCA) which took over the permit application.¹¹⁴

In early 1968, the MPCA raised the question of radioactive effluents and retained a nuclear consultant to develop the radiological standards to be applied in the permit.¹¹⁵ The consultant drafted a permit and the MPCA submitted a copy to the AEC for information and review.¹¹⁶ The

110. Because film is highly sensitive to radiation, the photographic film industry requires water of low radioactivity content for its processing work. Here again, such potential use may empower a state to regulate radioactive effluents and set standards totally unrelated to AEC standards. Of course, if such state standards were less stringent, AEC health and safety standards would govern.

111. The attitude of several states is discussed in the Appendix.

112. *Northern States Power Co. v. Minnesota*, 320 F. Supp. 172 (D. Minn. 1970), *aff'd*, 447 F.2d 1143 (8th Cir. 1971), *aff'd mem.*, 405 U.S. 1035 (1972). See generally McElroy, *The Minnesota Environmental Dilemma*, presented at the Topical Meeting on Nuclear Public Information, Atomic Industrial Forum, in Los Angeles, California (Feb. 9, 1970) [hereinafter cited as McElroy]; *Power Engineering*, Vol. 73, No. 10, Oct. 1969, at 20; *Testimony of Dean E. Abrahamson*, 16 AECH, No. 5 (Feb. 2, 1970), at 21; for a copy of the MPCA waste disposal permit see 15 AECH, No. 17 (Apr. 28, 1969), at 53-59.

113. AEC Docket No. 50-263. Construction Permit CPPR-31, authorized June 19, 1967.

114. McElroy, *supra* note 112, at 14.

115. *Id.* at 16.

116. 15 AECH, No. 17 (Apr. 28, 1969), at 50.

permit set effluent standards for the Monticello plant, and required certain other steps to be taken to minimize these effluents. The standards set were, for the most part, considerably more stringent than those set by the AEC.

In a letter to Governor LeVander, the AEC stated its objections,¹¹⁷ asserting, for example, that standards "more restrictive" than AEC standards did not necessarily indicate a corresponding increase in public health and safety; furthermore

[T]he permit reflects an "ad hoc" approach to the regulation of nuclear power plants which, in our view, cannot and should not be made the basis for a fair and effective regulatory program. The approach taken by MPCA is that each nuclear plant should be regarded as an individual case . . . but the MPCA has no definitive criteria or standards for determining on a case-by-case basis what concentrations should be permitted.¹¹⁸

In August, 1969, the utility filed a complaint in the Federal District Court of Minnesota,¹¹⁹ "initiating an action . . . to determine whether the State of Minnesota, acting through the Pollution Control Agency, has jurisdiction over nuclear power plants or the discharge of radioactive effluents therefrom or whether the Federal Government, acting through the Atomic Energy Commission, has sole and exclusive jurisdiction over these matters."¹²⁰ A companion suit was brought in a Minnesota state court, challenging specific provisions of the permit as unreasonable.¹²¹ This action was held in abeyance, awaiting the ruling of the federal court.

On December 22, 1970, the United States district court, per Devitt, Chief Judge, stated:

The question here is whether Congress has preempted the field of regulation of radioactive releases by nuclear power plants. In my view it has, and Minnesota is without authority to enforce its regulations in this field.¹²²

117. Letter from Chairman Seaborg to Governor Le Vander, June 2, 1969, in 10 Nuclear Safety 548 (Nov.-Dec., 1969).

118. *Id.*

119. 11 Nuclear Safety 99 (Jan.-Feb., 1970); Northern States Power Co. v. Minnesota, Civil No. 3-69-185 (D. Minn., filed Aug. 26, 1969); Answer Filed Oct. 15, 1969. See statement by Earl Ewald, Board Chairman, Northern States Power Co., Aug. 26, 1969 (reprinted by Atomic Industrial Forum) [hereinafter cited as Ewald].

120. See Ewald, *supra* note 119, at 1.

121. McElroy, *supra* note 112, at 17.

122. 320 F. Supp. 172, 174 (D. Minn. 1970). Since the parties stipulated many of the facts, certain questions discussed in the preceding section of this report were not before the court. For example, the adequacy of the state and federal regulations to protect the public was not at issue. *Id.* The parties also stipu-

The court was

[S]atisfied from an examination of the statutes and of the congressional reports which accompanied their enactment that the Congress has expressly and effectively manifested its intent to preempt the disputed field of regulation; and in light of practical construction afforded the administration of the law, the interpretation it has received from official legal authorities, the evaluation of the issue by legal scholars, and the inference to be drawn from previous decisions of the Supreme Court in those cases where it established standards for determining the implied intent of the Congress to preempt a field of regulation that, if called upon to do so, the Supreme Court of the United States would hold that the Atomic Energy Commission's authority to regulate radioactive releases by nuclear power plants is exclusive.¹²³

On appeal, the United States Court of Appeals for the Eighth Circuit, in a 2-1 decision, affirmed the district court's decision.¹²⁴ The court declared that Congress had the *power* to pre-empt the field,¹²⁵ but since in framing the statute it did not *expressly state* such an intent,¹²⁶ the court must "determine whether Congress has nevertheless manifested an intent to displace concurrent state regulations in this field."¹²⁷ Considering the legislative history of the Atomic Energy Acts and amendments,¹²⁸ the AEC's construction of its statute¹²⁹ and the pervasiveness of the licensing scheme set up by Congress,¹³⁰ the court of appeals reached the same conclusion as the district court.¹³¹ The Eighth Circuit, however, emphasized that:

Congress vested the AEC with the authority to resolve the proper balance between desired industrial progress and adequate health and safety standards. Only through the application and enforcement of uniform standards promulgated by a national agency will these dual objectives be assured. Were the states allowed to impose stricter standards on the level of radioactive waste releases discharged from nuclear power plants, they might conceivably be so overprotective in the area of health and safety as to unnecessarily stultify the industrial development and use of atomic energy for the production of electric power.¹³²

lated that "[W]aste disposal requirements affect the design, manufacture, cost and sale of nuclear reactor plants and associated equipment." 447 F.2d 1143, 1149 n.6 (8th Cir. 1971).

123. 320 F. Supp. 172, 179 (D. Minn. 1970).

124. 447 F.2d 1143 (8th Cir. 1971).

125. *Id.* at 1145.

126. *Id.* at 1147.

127. *Id.*

128. *Id.* at 1147-52.

129. *Id.* at 1152-53.

130. *Id.* at 1153.

131. *Id.* at 1154.

132. *Id.* at 1153-54.

Thus the court seems to have held that Congress has delegated the risk-benefit analysis of nuclear power to the AEC alone.¹³³ Therefore, as the district court had stated, “[i]f the exercise of federal authority in this field is inadequate or unwise, recourse lies with the AEC to raise its standards or with the Congress to relinquish its authority to the states.”¹³⁴

It should be noted that although the utility challenged the state agency in court, it did eventually agree to comply with many aspects of the contested state permit requirements. Before the trial began in October, 1970, the Northern States Power Company had agreed to install four forty-eight hour off-gas hold-up tanks to reduce emissions,¹³⁵ and its Chairman of the Board had stated:

*We will conform to any regulations imposed by the State of Minnesota whether or not they are more restrictive than AEC [sic], provided: 1) That the regulations are compatible with the Atomic Energy Commission's regulations with which we are legally obligated to comply, 2) That the regulations are based on a comprehensive program supported by adequate, competent, technical staff.*¹³⁶

On April 3, 1972 in a memorandum decision, the Supreme Court, with two justices dissenting, affirmed the court of appeals.¹³⁷

B. Non-Radiological Effects¹³⁸

1. Non-Radiological Effluents

a. Effluents and their Effects

i. Heated Effluents¹³⁹

The problem of heat disposal is not unique to nuclear plants. It has a thermodynamic effect which is common to all steam-electric power plants.

133. *Id.* The dissent noted, however, that “[t]he issue of the reasonableness of the state regulations and of whether they were so burdensome as to frustrate the development of atomic energy is not properly before us.” *Id.* at 1158.

134. 320 F. Supp. at 179.

135. *Electrical World*, Vol. 178, No. 23, June 8, 1970, at 25.

136. Testimony of Earl Ewald, 16 AECH, No. 9 (Mar. 2, 1970), at 24.

137. *Minnesota v. Northern States Power Co.*, 405 U.S. 1035 (1972) (memorandum) aff'g 447, F.2d 1143 (8th Cir. 1971). The federal government, which had not previously taken a position in the case, submitted a memorandum in response to the Supreme Court's invitation for an expression of the government's view. The Justice Department memorandum supported federal pre-emption. *Nucleonics Week*, Vol. 13, No. 6, Mar. 23, 1972, at 6.

138. A major work in this area is *Electricity and the Environment: The Reform of Legal Institutions*, Association of the Bar of the City of New York, Special Comm. on Electric Power and the Environment (1972).

139. See generally Hearings on the Extent to which Environmental Factors are Considered in Selecting Powerplant Sites with Particular Emphasis on the

In the United States today the majority of electric generating plants use fresh water as a coolant and discharge it into nearby surface waters. In 1970, less than eight per cent of installed electric capacity used cooling ponds and about thirteen per cent used cooling towers.¹⁴⁰

The temperature and quantity of the heated effluent varies from plant to plant. Current light-water-cooled nuclear power plants in operation or under construction, however, will discharge up to fifty per cent more heat in cooling water, per electrical unit generated, than new plants using fossil fuels, due mainly to the generally higher thermal efficiency of the large modern fossil-fueled units.¹⁴¹

The excess heat generated in steam-electric power plant operation must be removed from the facility in some manner. Typically, a system is employed in which flowing water takes the heat produced in steam condensation and transfers it to air or water¹⁴² in the external environment. Three major types of cooling systems exist:

(1) once through, where the cooling water is taken from a suitable source, passed through the condenser, and returned to the source body of water; (2) open-cycle, where water is recirculated through the condenser after it has been cooled in an evaporative cooling tower or other cooling system where the heated water is exposed to circulating air; and (3) closed-cycle, where the cooling water is contained in a closed system and its heat dissipated to the air through heat exchangers.¹⁴³

Ecological Effects of the Discharge of Waste Heat into Rivers, Lakes, Estuaries, and Coastal Waters Before the Subcomm. on Air and Water Pollution of the Senate Comm. on Public Works, 90th Cong., 2d Sess. (1968): P. Cootner & G. Lof, *Water Demand for Steam Electric Generation: An Economic Projection Model* (1966); *Thermal Effects: A Report on Utility Action*, *Power Engineering*, Vol. 74, No. 4, April, 1970, at 26; Eisenbud & Gleason (ed.), *Electric Power and Thermal Discharges* (1969); Bloom, *Heat—A Growing Water Pollution Problem*, 1 BNA Environ. Rptr., Mono. No. 4, Vol. 1, No. 1 (May 1, 1970).

140. Nearly half of cooling towers use is found in the more arid south-central and western regions. The southeast, west-central and west regions dominate the use of cooling ponds. Data from FRC study, reported in *Nuclear Industry*, Vol. 17, No. 7, July, 1970, at 8.

141. Fossil-fueled units also release some of their heat directly to the air in their hot effluent combustion gases. It is anticipated that the liquid-metal cooled fast breeder reactor plants, expected to be the principal type of nuclear unit built in the late 1980's, will achieve overall efficiencies roughly comparable to those of today's fossil-fuel plants. See AEC to Build a Reactor Creating Power and Fuel, *N.Y. Times*, Jan. 15, 1972, at 1, col. 6.

142. Working Committee on Utilities, Report to the Vice President and to the President's Council on Recreation and Natural Beauty at 123 (December, 1968) [hereinafter cited as Report to the Vice President].

143. *Id.* at 124. See also Frohwerk, *Spray Modules Cool Plant Discharge-Water, Power*, Vol. 115, No. 9, Sept., 1971, at 52.

The effects of increased water temperatures may be beneficial or detrimental.¹⁴⁴ At the present time, research is being carried on to understand these effects in various ecosystems and bodies of water, and to develop constructive uses for the waste heat.¹⁴⁵

It is possible to utilize an air-cooled condenser, and thereby completely by-pass the water cooling problem. Now, however, these units are available only for relatively small-sized plants.¹⁴⁶

ii. *Gaseous Effluents*

Nuclear plants do not produce heated combustion gases, such as are released from the stacks of fossil-fueled power plants. If cooling towers or other evaporative cooling methods are used for the rejection of waste heat, however, the introduction of warm water vapor and droplets into the atmosphere may itself create environmental problems.¹⁴⁷

A major concern in connection with the possible use of salt-water cooling towers at a seaside site is the small amount of water carried off of the wet towers into the air as a fine spray or mist. This "drift" or "carry-

144. See, e.g., J. Clark, *Thermal Pollution and Aquatic Life*, *Scientific American*, Vol. 220, No. 3, March, 1969, at 18-27.

145. Such as "extending the growing season by warming irrigation water, heating of buildings, and increasing production of certain fish and shellfish." Report to the Vice President, *supra* note 142, at 125. The use of waste heat in industrial and chemical processes, such as salt-water desalinization is also being studied. For example, Westinghouse Electric Corp. and Consolidated Edison Co. of New York formed a joint task force to "pioneer in waste heat utilization in urban systems and identify a project for possible early demonstration." 16 *AECH*, No. 5 (Feb. 2, 1970), at 14.

146. *Air Cooled Condenser Fits Steam Plant to Arid Site*, *Electrical World*, Vol. 173, No. 23, June 8, 1970, at 30. The "first air-cooled condenser on a utility turbine in the western hemisphere" has operated successfully at a fossil fueled plant in South Dakota, which serves an area with sufficient coal but insufficient water. Similar units, up to 160 MW in size, are in use in Europe. *Id.* at 32; See also T. Elliott, *Air-Cooled Heat Exchangers—New Growth?*, *Power*, Vol. 115, No. 8, Aug., 1971, at 88.

147. Such problems include: decreases in visibility (important where there is a highway or airport nearby), and changes in precipitation, humidity, wetting and icing, temperature, concentration of pollutants and wind. E. W. Hewson, *Moisture Pollution of the Atmosphere by Cooling Towers and Cooling Ponds*, *Bull. Am. Meteorological Soc.* Vol. 51, No. 1, Jan., 1970, at 21, reprint of his testimony presented on *Environmental Effects of Nuclear Power Installations in the Willamette Valley* before the Oregon Legislative Task Force on Pollution, at Eugene, Oregon (Nov. 7, 1969); W. Hall, *Cooling Tower Plume Abatement*, *Chemical Engineering Progress*, Vol. 67, No. 7, July, 1971, at 52-54.

over" will contain salt which could cause damage to plant components and neighboring property due to salt deposits.¹⁴⁸

The use of large air-cooled condensers or dry cooling towers, with the resultant production of hot air, may affect the local meteorology.

iii. *Chemical Effluents*

The chemical effluents that may be expected to create environmental problems are generally released with plant liquid wastes. Chemicals that might be released from nuclear plants include boric acid or other boron compounds utilized for reactivity control in the reactor coolant, and detergents, chelating agents, acids, and other substances used in decontamination operations. Chemicals used for plant cleanup, pH control, and regeneration of ion-exchange demineralizer resins may be expected from all types of power plants. In addition, in the open circuit or wet cooling systems, one or more chemicals is generally used to inhibit biological growth, corrosion, and deposit of salts in the water, on the condenser tubes, or in the cooling towers.¹⁴⁹ Other potentially toxic chemicals may be used along rights-of-way or for treating power poles.¹⁵⁰

b. Regulation of Non-Radiological Effluents

During the 1960's, intervenors in several AEC licensing proceedings tried to require licensing boards to take thermal effects into consideration.¹⁵¹ The AEC contended that Congress had not given it jurisdiction over any but radiological effects on environmental health and safety. In

148. Salt Water Cooling Towers Questioned, *Electrical World*, Vol. 173, No. 22, June 1, 1970, at 46. There are no salt water towers of the large hyperbolic type operating in the United States today. Several such units operating in England, however, have reported no significant carryover effects. *Id.* See D. Nester, Salt Water Cooling Tower, *Chemical Engineering Progress*, Vol. 67, No. 7, July, 1971, at 49-51. "Prior to startup, some concern existed with respect to salt water drift and windage. The operating experience of the tower has shown that this concern was not justified." *Id.* at 51.

149. "The most common chemicals used are chlorine, sulfuric acid, polyphosphates, and chromates." Office of Science and Technology, *Considerations Affecting Steam Power Plant Site Selection* (U.S. Govt Print. Office No. 0-336-312, Dec., 1968), reprinted in *Effects*, supra note 5, at 145 [hereafter cited as *Plant Site Selection*]; see, e.g., Hamilton, et al. *Power Plants: Effects of Chlorination on Estuarine Primary Production*, 169 *Science* 197 (July, 1970).

150. Puget Sound Power and Light Company was fined by the Washington State Pollution Control Comm'n for a fish kill caused by the draining into the

a 1969 judicial decision, discussed below, the AEC's view was upheld. Events since then, however, have changed this situation dramatically.

In 1969, construction of the Vermont Yankee plant on the Connecticut River was proposed.¹⁵² In its initial decision favorable to the construction of the plant,¹⁵³ the Licensing Board noted that the Board had refused to consider the proffered evidence on thermal effects.¹⁵⁴ Of the three intervening states, Massachusetts, Vermont and New Hampshire, only the last excepted to the initial decision.¹⁵⁵ The AEC's subsequent memorandum and order¹⁵⁶ stated the questions raised by New Hampshire as follows:

(a) Whether the Atomic Energy Act of 1954, as amended, vests in the Commission jurisdiction to consider, in the licensing and regulation of nuclear facilities, health and safety matters other than those relating to radiological health and safety, and (b) Whether the provisions of the Federal Water Pollution Control Act, as amended by the Water Quality Act of 1965, and Executive Order 11288, enlarge the Commission's regulatory jurisdiction.¹⁵⁷

The Commission resolved both of these issues against the position taken by New Hampshire.¹⁵⁸

New Hampshire appealed the AEC's decision to the United States Court of Appeals for the First Circuit. The court concluded that "in enacting the Atomic Energy Acts of 1946 and 1954, in overseeing its administration, and in considering amendments, the Congress has viewed

Puyallup River of pentachlorophenol, a chemical used for treating power poles. *Electrical World*, Vol. 173, No. 11, March 16, 1970, at 51.

151. Several other recent noteworthy controversies involving thermal effects regulation are the Vermont Yankee Plant, discussed in notes 155-66 *infra*, and the Turkey Point Plant discussed in 406 F.2d 170, 173 n.2 (1st Cir. 1969). Controversies not discussed in this article include the Quad Cities Plants, Nos. 50-254, 50-265 (AEC, May, Sept., 1966), Zion, and Palisades. See generally M. Edwards, *Legal Control and Thermal Pollution*, 1 *Natural Resources Lawyer* 1 (1969).

152. *New Hampshire v. AEC*, 406 F.2d 170 (1st Cir. 1969).

153. *In re Vermont Yankee Nuclear Power Corp.*, No. 50-271 (AEC, Dec., 1966), Initial Decision of Atomic Safety Licensing Board (Dec. 1967).

154. *Id.*

155. The utility's decision to install cooling towers, announced during the hearings, apparently satisfied Massachusetts and Vermont.

156. AEC Memorandum and Order, *In re Vermont Yankee Nuclear Power Corp.* (Apr. 8, 1968).

157. *Id.*

158. *Id.*

the responsibility of the Commission as being confined to scrutiny of and protection against *hazards from radiation*.¹⁵⁹ The court also found that the 1965 amendments to the Federal Water Pollution Control Act¹⁶⁰ were intended to encompass only installations owned by, and operated for the government, rather than those subject to the government's regulatory powers and thus did not expand the AEC's jurisdiction.¹⁶¹ In conclusion, the court found that the Licensing Board and the Commission had properly refused to consider the evidence on thermal effects,¹⁶² saying:

We do so with regret that the Congress has not yet established procedures requiring timely and comprehensive consideration of non-radiological 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.¹⁶³

Within a year Congress did act. The enactment of the National Environmental Protection Act (NEPA)¹⁶⁴ and the Water Quality Improvement Act (WQIA)¹⁶⁵ have rendered this decision moot. In future licensing actions, thermal effects, as well as other areas of environmental impact, must be considered by AEC licensing boards.

A current example of the complexities of the thermal effects regulation picture is the Turkey Point Power Plants controversy. Florida Power and Light Company (FP&L) has, since 1967, operated two fossil-fueled power plants at its Turkey Point site on Biscayne Bay in Dade County, Florida. Two nuclear plants, under construction at the same site in an area of ecological interest, are scheduled to start full power operation in 1973.¹⁶⁶

On October 18, 1968, Congress enacted a law which authorized the Secretary of the Interior to establish the Biscayne National Monument,

159. 406 F.2d at 175 (emphasis added). See also *id.* at 174 n.4.

160. 33 U.S.C. § 466h, transferred to 33 U.S.C. § 1171(6) (1970).

161. 406 F.2d at 176.

162. *Id.*

163. *Id.*

164. In December, 1969, Congress passed NEPA, 42 U.S.C. §§ 4321-47 (1970).

165. 33 U.S.C. §§ 1151-75 (1970).

166. Turkey Point, numbers 3 and 4, Nos. 50-250 and 50-251 (AEC, Mar., 1966). Construction Permits No. CPPR-27 and CPPR-28 were issued for the two nuclear plants in April, 1967.

"[i]n order to preserve and protect for the education, inspiration, recreation, and enjoyment of present and future generations, a rare combination of terrestrial, marine, and amphibious life in a tropical setting of great natural beauty"¹⁶⁷

The two oil-fueled generating plants of FP&L discharge approximately 10,000 gallons of condenser cooling water per second, at 10 to 15 degrees above the ambient temperature, into the waters of Biscayne Bay.¹⁶⁸ The natural temperature of water in Biscayne Bay averages about 85 degrees for much of the year; however, temperatures in excess of 100 degrees have been observed. In June, 1969, water temperature rose to 103 degrees and caused a substantial fish kill.¹⁶⁹

The pollution control office of Dade County had set a 95 degree limit for effluents discharged into the waters of the bay. Existing plants have been operating under a series of variances granted by local pollution control authorities.¹⁷⁰ Under these variances, the utility had been given until July, 1971, to complete a cooling canal to Card Sound,¹⁷¹ a contiguous waterway outside the Monument, at which point the 95 degree limit could be met.¹⁷²

Acting under the Federal Water Pollution Control Act,¹⁷³ the Governor of Florida, which state had not yet developed numerical standards,

167. 16 U.S.C. § 450qq (1970).

168. N.Y. Times, Feb. 22, 1970, at 10, col. 6; see also *id.* at 1, col. 7.

169. *Id.*, at 62, col. 2. In 1971 the operating plants went through another hot summer. The Florida Dep't of Air and Water Pollution Control ordered FP&L to pay approximately \$2,350 for killing more than 400 fish on June 22, 1971. The department cited FP&L for discharging water at 105 degrees Fahrenheit after a condenser at the Turkey Point site malfunctioned. 2 BNA Environ. Rptr.—Curr. Dev. 615 (Sept. 24, 1971).

170. Air and Water News, Vol. 3, No. 50, Dec. 15, 1969, at 6. The Dade County Pollution Control Board set the 1971 deadline on the conditions that (1) the company submit a detailed engineering plan to the county pollution control officer for approval by February 1, 1970, (2) there be a construction contract awarded by April 1, 1970 and (3) the contract bind completion by July 1, 1971.

171. "Before the fossil plants went on stream, the US [sic] Corps of Engineers denied FPL a dredging permit for a canal largely on the recommendation of the Federal Water Pollution Control Administration. The company then decided to shift the canal to another part of the bay. The Corps of Engineers, worried about what FPL was doing, wrote a reminder to FPL on the permit, and the company answered by stating it intends to meet all state and federal requirements." *Electrical World*, Vol. 173, No. 12, March 23, 1970, at 19.

172. See note 170 *supra*.

173. 33 U.S.C. § 1160(d) (1970).

requested a state-federal conference,¹⁷⁴ subsequently held on February 24 and 25, 1970. The resulting standards determined that the effluents could raise the maximum monthly mean of bay water temperatures no more than 1.5 degrees in summer or 4 degrees in winter, and limited the discharge temperature to less than 90 degrees.¹⁷⁵ The conference also ruled that the canal to Card Sound was not acceptable as a solution because the discharged water would not be sufficiently cooled.¹⁷⁶ FP&L was given 60 days to propose an alternate system that would meet the standards.¹⁷⁷ The conference considered a letter from Interior Secretary Hickel, in which the department insisted that the utility promise to stop building the Card Sound Canal or face suit.¹⁷⁸ FP&L declined to make such a promise.¹⁷⁹

On March 16, 1970, a complaint was filed by the Justice Department in the District Court for the Southern District of Florida.¹⁸⁰ The suit alleged violation of the act which established the Biscayne National Monument,¹⁸¹ nuisances against property owned by the United States, and violation of the Rivers and Harbors Act of 1899.¹⁸² The relief sought included a preliminary injunction ordering FP&L:

1. Immediately to cease all activities in the operation of its existing fossil-fuel plants which result in the discharge into Biscayne Bay of waters of such temperature or quality as to adversely affect the marine life . . . to the extent such can be done consistently with the public interest in the continued operation of such plants.
2. To submit to [the] court, within 45 days . . . a plan for the operation of its existing . . . plants . . . to eliminate the destruction of the plankton and other marine life in the waters of Biscayne Bay . . .
3. Immediately to cease construction of any canal . . . designed to be operated

174. "The Miami hearing will mark the first time in 13 years of federal water pollution abatement actions that a move has been based entirely on thermal pollution." *N.Y. Times*, Feb. 22, 1970, at 1, col. 7.

175. *Nuclear Industry*, Vol. 17, No. 3, March, 1970, at 26. These conference standards were proposed by the Florida Department of Air and Water Pollution Control as statewide standards for electric generating plants on Nov. 22, 1971. 2 *BNA Environ. Rep.-Curr. Dev.* 937 (Dec. 3, 1971).

176. *Nuclear Industry*, supra note 175.

177. *Id.*

178. *Id.*

179. *Id.*

180. *United States v. Florida Power & Light Co.*, reported in 16 *AECH*, No. 11 (Mar. 16, 1970) at 1.

181. 16 U.S.C. §§ 450qq (1970).

182. Act of March 3, 1899, ch. 425, § 13, 30 Stat. 4152 as amended 33 U.S.C. § 407 (1970).

or used for the discharge into Biscayne Bay or Card Sound of water of temperature higher than . . . natural conditions. . .¹⁸³

At a hearing in March, 1970, Judge Atkins refused to issue the preliminary injunction requested, calling any damage caused by the Turkey Point Plants "minimal and retrievable."¹⁸⁴

In December, 1970, in further action on the Justice Department's suit, Judge Atkins ruled that the company's two existing fossil plants were a common law nuisance to federal property now owned or to be acquired for the National Monument.¹⁸⁵ The court also ruled that discharge of heated water "saturated with dead organisms" into the bay was a violation of the Refuse Act.¹⁸⁶ The question of whether *heated water* is "refuse" under the Act was certified to the United States Court of Appeals for the Fifth Circuit¹⁸⁷ which remanded the question to the district court without ruling on it.¹⁸⁸

In July, 1971, before the Justice Department's suit for a permanent injunction against operation of the plants had been set for trial, Florida Power & Light filed suit in United States district court in Miami against the federal government, seeking an injunction against having to obtain a permit for discharging heated water into Biscayne Bay under the Refuse Act permit program. The utility contended that heated water is not "refuse" under the 1899 Act.¹⁸⁹ The complaint also attacked the permit program on the grounds that the statute was applicable only to discharges that obstructed navigation,¹⁹⁰ and that the Executive Order creating the permit program in December, 1970 exceeded the scope of authority of the statutes it purported to implement.¹⁹¹

In a compromise settlement approved by Judge Atkins in September, 1971, it was agreed that "[i]n return for a loosening of the discharge stan-

183. Complaint issued by the United States, reported in 16 AECH, No. 9 (Mar. 2, 1970).

184. *United States v. Florida Power & Light Co.*, 311 F. Supp. 1391, 1392 & n.2 (S.D. Fla. 1970).

185. *Air and Water News*, Vol. 4, No. 51, Dec. 21, 1970, at 2.

186. *Id.*

187. *Id.*

188. *Id.*, Vol. 5, No. 7, July 12, 1971, at 2.

189. *Id.* at 1.

190. *Id.* But see *United States v. Standard Oil Co.*, 384 U.S. 224, 230 (1966); *United States v. Republic Steel Corp.*, 362 U.S. 482 (1960); *United States v. United States Steel Corp.*, 3 ERC 1057 (N.D. Ill. 1971).

191. *Air and Water News*, Vol. 5, No. 27, July 12, 1971, at 2. But see *Businessmen for the Public Interest v. Resor*, 3 ERC 1216 (N.D. Ill. 1971).

dards for the next four years, Florida Power [shall] drop its suit questioning the applicability of the 1899 Refuse Act to heated water discharge."¹⁹²

Under the agreement, "the company will spend \$30 million on a 5,000-acre system of cooling canals and lakes."¹⁹³ The government will "permit the company to discharge water at temperatures up to 95° into the bay for five years."¹⁹⁴ In the interim period, Florida Power & Light will be allowed to discharge heated water through an existing canal and a second canal to be completed in the near future. To keep discharge temperatures at 95 degrees, the company's power plants on the site will be operated below capacity. After the new cooling facilities are ready in 1976, the discharge limit would be cut to 90 degrees.¹⁹⁵ Apparently the company agreed not to challenge the government's use of the 1899 Act in a suit brought after this five year period.¹⁹⁶

All discharges require Corps of Engineers and state approval,¹⁹⁷ but such approval has been obtained.¹⁹⁸ The Atomic Energy Commission must also evaluate the plants' environmental impact (including thermal effects) in carrying out the NEPA review as part of its licensing process.¹⁹⁹ On October 30, 1971 the AEC published notice that it was considering issuance of operating licenses for the two nuclear units.²⁰⁰ An operating license for the first nuclear unit has been issued.²⁰¹

192. Air and Water News, Vol. 5, No. 37, Sept. 20, 1971, at 5. A similar challenge to the Refuse Act's applicability to heated water discharge has since been made by Houston Light & Power Co. The utility is suing EPA and asks that the Refuse Act permit program "be declared invalid as an unconstitutional delegation of authority." 2 BNA Environ. Rep.-Curr. Dev. 914 (Dec. 3, 1971).

193. Air and Water News, Vol. 5, No. 35, Sept. 6, 1971, at 3. See also Testimony of G. Kinsman of FP&L at JCAE Hearings on HR 13731 and 13732, reported in 18 AECH, No. 12 (Mar. 20, 1972), at 24, 25.

194. Air and Water News, supra note 193, at 4.

195. AEC Division of Radiological and Environmental Protection, Draft Detailed Statement on the Environmental Considerations Related to the Proposed Issuance of Operating Licenses to Florida Power & Light Company for Turkey Point Plant Units 3 and 4, Nos. 50-250 and 50-251 (AEC, Feb., 1972) at 63. For a description of the cooling system, see id. at 30-35.

196. Air and Water News, supra note 193, at 4.

197. Id.

198. 18 AECH, No. 12 (Mar. 20, 1972), at 24. Testimony of George Kinsman, Sr. Vice President, before the Joint Comm. on Atomic Energy. Id. at 24, 25.

199. Air and Water News, supra note 193, at 4.

200. AEC Press Release No. 0-194, Oct. 30, 1971, at 1.

201. Operating license issued July 20, 1972. Nuclear Industry, Vol. 19, No. 9, Sept., 1972, at 20.

2. Effects of Plant Presence

a. Mechanical Effects

A power plant is a collection of mechanical equipment and structures which may have an effect on animals or fish that come into contact with it. Structures that may extend many hundreds of feet into the air include stacks and cooling towers as well as the plant buildings and electrical transmission towers. These might be considered a potential hazard to birds and, if there is an airport in the vicinity, to planes. Outside plant equipment, if not adequately protected, may be dangerous to small animals. While it can also be an attractive nuisance to children, access to a nuclear plant's "exclusion area" is generally well controlled. However, the hazard to fish and other aquatic life posed by the plant's water intake facilities can be substantial, and fish kills due to such mechanical effects have been reported.²⁰² Smaller aquatic organisms may be affected by mechanical as well as thermal phenomena. Noise may also be a problem where such equipment as mechanical draft cooling towers is used.

202. For example, at the Consolidated Edison Indian Point Nuclear Plant (Unit 1), a fishkill occurred in 1963. "[I]t was caused by a combination of the trapping effect of a partially enclosed dock . . . and revolving mechanical equipment associated with the cooling-water inlet to the reactor facility." 115 Cong. Rec. 5353 (1969) (remarks of Rep. Chet Holifield) (reprinted in *Effects*, supra note 6, at 428). Other causes of fishkills at this plant have been alleged. In a petition to intervene in AEC proceedings for a full-term operating license for Unit 1, Rep. Richard Ottinger of New York "charged Con Edison with killing more than eight million fish at Indian Point 1." The basis of his claim was a report from the U.S. Fish and Wildlife Service's Eastern Fish Disease Laboratory which he said "indicated that thermal pollution and illegal chemical discharges [believed to be alkaline chemical used to clean the steam lines of Unit 1 and the recently installed piping of Unit 2] were the probable causes of the fishkill." *Nuclear Industry* Vol. 17, No. 4, April 1970, at 11. See also 16 *AECH*, No. 27 (July 6, 1970), at 43. New York Attorney General Louis Lefkowitz has also filed a complaint in state supreme court, charging Con Ed with serious violation of state conservation laws and seeking \$5 million in damages for fishkills resulting from the plant's operation. (*EEI Comm. on the Environment Newsletter*, May 25, 1970, Item 34). The Attorney General also intervened in the AEC proceedings opposing a "50 per cent capacity reactor test" of Indian Point Unit 2. 2 *BNA Environ. Rptr.-Curr. Dev.* 1402 (Mar. 17, 1972). An AEC inquiry into the effects of Unit 1 on the Hudson River marine life found that "there is insufficient evidence to substantiate the allegation that there have been significant, irreparable and adverse effects upon the river ecology and marine life." Reported in 17 *AECH*, No. 5 (Dec. 13, 1971), at 3.

The hazards of traffic in the vicinity of the plant, the use of heavy construction and materials-handling equipment, and similar problems are analogous to the safety problems of any large industrial facility.

b. Electrical Effects²⁰³

A central station generates large amounts of electricity,²⁰⁴ which is usually transmitted at high voltage over uninsulated wires carried on tall transmission towers, although the use of underground transmission by insulated cable is possible in certain cases.²⁰⁵ The care taken in the design and operation of these facilities minimizes the electrical hazards. However, safety can never be taken for granted.²⁰⁶

c. Other Ecological Effects

In addition to the specific thermal and radiological effects discussed above, power plants have direct and indirect effects on the natural environment:

Direct effects include actual displacement by inundation or other habitat changes, and mortality from generating facilities or intake structures. Other direct effects are the effluent discharged into streams, the clearing of rights-of-way for transmission lines, and the formation of reservoirs of cooling water. Indirect effects can include change in habitat (physically and chemically), blockage of migration routes, interruption of necessary life cycles of organisms or food supply, physiological changes affecting an organism's resistance to disease and predators, etc.²⁰⁷

Such effects are usually quite specific to a particular site, and a thorough study of the ecology of the area may often be necessary to identify them.

203. Note that our society accepts a death rate of about a thousand persons a year accidentally electrocuted as an acceptable risk when balanced against the benefit of electrified homes, farms and industries. *New York Times Encyclopedia Almanac*, 1971 ed., at 497.

204. The larger nuclear units are rated at over 1000 megawatts (MW) (one megawatt equals 1000 kilowatts, or 1 million watts).

205. In the Bodega Bay case, evidence was presented that conduits containing underground transmission lines "would contain large quantities of inflammable [sic] insulating oil, which could create a fire hazard to the public in the event of a severe earthquake. . . ." *Northern Calif. Ass'n v. Public Util. Comm'n*, 61 Cal. 2d 126, 136 n.6, 390 P.2d 200, 206 n.6, 37 Cal. Rptr. 432, 438 n.6 (1964).

206. For example, "Sailboats [are] no longer permitted on Commonwealth Edison Cos [sic] 2,300-acre Lake Kincaid. . . . clearance between power lines over lake and water presents a hazard (practically all sailboats have some type of metal riggings). . . ." *Electrical World*, Vol. 173, No. 11, March 16, 1970, at 51.

207. *Plant Site Selection*, supra note 149, at 50.

d. Aesthetic Effects²⁰⁸

In the past, aesthetics have not been an important factor in power plant design. However, in the future, the presence of such plant features as high stacks, mammoth cooling towers, power plant structure, switch yards, and transmission lines may well preclude the use of certain sites. At other sites, careful consideration of landscaping and architectural treatment of buildings and facilities will be necessary.²⁰⁹ The problem is compounded when the site is in an area of particular scenic or historic interest:

Power plants and transmission facilities are not welcomed, to say the least, in a natural or historic setting. While proper design and architectural treatment can make a difference there is nothing, short perhaps of undergrounding the facilities, which could eliminate the adverse encroachment of a generating station upon an important historic setting.²¹⁰

As a positive step toward improving the human environment, a number of utilities are associating recreational facilities and real estate development with their nuclear power plants.²¹¹ For example, the Trojan Nuclear Power Plant will have an extensive public recreational area. A strip of land along the Columbia River will be preserved, as will a large marsh area used as a wintering ground by whistling swans. Another marsh area will be redefined for recreational swimming and boating. Areas for picnicking, fishing, nature trails, and playgrounds will be provided. Fish-rearing ponds for chinook salmon and steelhead will be heated by warm water effluent from the plant.

The use of transmission rights-of-way for wildlife purposes has been considered extensively, particularly for game management through habitat improvement. Recently, however, similar consideration has been given to use for outdoor recreation, including hiking, bicycling, horse-

208. See note 104 *supra*.

209. Report to the Vice President, *supra* note 142, at 115. Aesthetic considerations are being recognized in some of the plants now being built. For example, noted architect Pietro Belluschi has designed the Trojan Nuclear Power Plant being built on the Columbia River by the Portland General Electric Company. EEI Comm. on the Environment Newsletter, May 25, 1970, Item No. 24.

210. Plant Site Selection, *supra* note 149, at 50.

211. Environmental Effects of Producing Electrical Power (Summary AEC Report) reprinted in *Effects*, *supra* note 5, at 65-77. "For example, the Virginia Electric Power Company (VEPCO) at their North Anna Power Station is planning to construct an 11,000 acre lake with attractive recreational facilities." *Id.* at 75. See Bureau of Power, FPC Recreational Facility Costs and Design Use (Dec. 1970).

back riding, and motorcycling. In an urban setting, power line rights-of-way may serve a beneficial use for parking purposes.²¹² Such use may thereby free additional land for recreational use.²¹³

3. Regulation of Non-Radiological Effects

a. Health and Safety Regulation

As the court in the *Vermont Yankee*²¹⁴ case stated: "The Atomic Energy Act itself is replete with many references to the 'health and safety of the public.' But in its section on definitions . . . any attempt to delimit 'health' and 'safety' of the public is singularly in absentia."²¹⁵ The AEC has interpreted its statute to give it jurisdiction only over the *radiological* aspects of public health and safety.

In 1961, the Pacific Gas and Electric Company proposed to build a nuclear plant at Bodega Bay, California.²¹⁶ Pursuant to California law, the utility filed an application for a Certificate of Public Convenience and Necessity with the State Public Utilities Commission. After several years of proceedings and a decision favorable to the utility, the Northern California Association to Preserve Bodega Head and Harbor, Inc. petitioned the Supreme Court of California to review the decision denying a rehearing.²¹⁷

One of the questions presented to the court was: "Has the federal government pre-empted the question of safety of the location of atomic re-

212. See, e.g., N.J. Bd. of Pub. Util. Comm'rs; In re Petition of Pub. Serv. Elec. and Gas Co. for Approval of the Lease of Certain Property, Docket Nos. 697-531 and 698-550 (Sept. 1969). At present there is increasing interest in the multiple use of utility rights-of-way. A recent ruling by the N.J. Bd. of Public Utility Comm'rs in approving a lease which permitted parking on the right-of-way stated: "Where an additional use is compatible with the utility's . . . use and where such additional use will provide income to the operating utility, not only does the utility benefit, but so do its ratepayers. The use of the land under power transmission lines for parking facilities in a commercial zone appears to be ideally suited to compatible multiple use of the highest order." In re Public Service Electric & Gas Co., 1969 CCH Utilities L. Rep.-State-New Decisions, ¶ 21,134.04.

213. Effects at 55-56.

214. *New Hampshire v. AEC*, 406 F.2d 170 (1st Cir. 1969).

215. *Id.* at 173 (footnote omitted).

216. AEC Docket No. 50-205. Application submitted Dec., 1962 and withdrawn Nov., 1964. The Bodega Bay case is *Northern Calif. Ass'n v. Public Util. Comm'n*, 61 Cal. 2d 126, 390 P.2d 200, 37 Cal. Rptr. 432 (1964).

217. 61 Cal. 2d 126, 390 P.2d 200, 37 Cal. Rptr. 432 (1964).

actors?"²¹⁸ The court cited Section 274 of the Atomic Energy Act,²¹⁹ and found that the California Commission

unquestionably has authority to inquire into safety questions apart from radiation hazards. Accordingly, since the location of an atomic reactor at or near an active earthquake fault zone involves safety considerations in addition to radiation hazards, it is clear that the federal government has not preempted the field, at least with respect to the phase of protecting the public from hazards . . . other than radiation hazards. . . .²²⁰

The court concluded that "the *states'* powers in determining the locations of atomic reactors are *not limited to matters of zoning or similar local interests* other than safety."²²¹

b. Land Use Regulation²²²

Land use policy has not been considered a federal responsibility in the United States;²²³ in fact, even the states have exercised very little control over land use, having delegated zoning and planning to municipalities, counties and other local governments.²²⁴ Recently, however, the need for a national land use policy and regional or national planning has been acknowledged.²²⁵ Proposed legislation on land use is under consideration by Congress.²²⁶

218. *Id.* at 133, 390 P.2d at 204, 37 Cal. Rptr. at 436 (emphasis deleted).

219. 42 U.S.C. § 2021(k) (1970). The section states: "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."

220. 61 Cal. 2d at 133, 390 P.2d at 204, 37 Cal. Rptr. at 436.

221. *Id.* (emphasis added).

222. At the present time, land use regulation is a state function, subject primarily to local planning and zoning agencies. However, there is increasing interest in national land use planning or at least federal support for the states to develop comprehensive planning. See, e.g., Hearings on National Land Use Planning Before the Subcomm. on the Environment of the House Comm. on Interior and Insular Affairs, 92d Cong., 1st Sess. (1971) [hereinafter Land Use Hearings] which considered H.R. 4332 and related bills (H.R. 4337, 4569, 4703, 5504, 6579, 8119, 10940) and H.R. 2173 and related bills (H.R. 7804 and 8503).

223. Testimony of Russell Train, Council on Environmental Quality, Land Use Hearings, *supra* note 222, at 99-100.

224. *Id.* at 101. But see Me. Rev. Stat. tit. 38, § 481 (Supp. 1972).

225. "There is a national interest in effective land use planning all across the nation." Richard M. Nixon, quoted in Land Use Hearings, *supra* note 222, at 100.

226. See generally Land Use Hearings, *supra* note 222; Bosselman & Callies, The Quiet Revolution in Land Use Control, a report prepared for the Council on Environmental Quality (U.S. Gov't Print. Office No. 0-452-833, 1971). A bill in-

c. Zoning

To some extent, the problems of zoning for nuclear power plants are aspects of the pre-emption question. However, the AEC Regulatory Staff, emphasizing that the responsibility of the AEC "to assure protection of the public health and safety . . . is limited to radiation hazards," has stated that it considers other zoning problems to be "outside the Commission's jurisdiction."²²⁷

If *radiation safety* cannot be considered by local regulatory authorities because of federal pre-emption, other aspects of zoning authority may be applied to nuclear power facilities. These include "provision of adequate light and air, control of traffic, avoidance of undue population concentration, conservation and improvement of property values and promotion of desirable land uses" and aesthetics.²²⁸

Three approaches are offered to the problems of zoning for nuclear energy uses.²²⁹ The first is to ban these facilities outright. Such a ban was proposed in Huntington, New York²³⁰ in 1963, but was never adopted. "At the opposite extreme from total prohibition, a community can permit 'atomic' uses wherever it permits their 'nonatomic' counterparts. . . . Perhaps unintentionally, many cities are apparently taking this permissive approach—by listing . . . power plants as a permitted use and failing

troduced by Rep. Wayne Aspinall, H.R. 4332, 92d Cong., 1st Sess. (1971), called for a national land use policy to protect areas of "critical environmental concern."

227. S. Harris, Progress Report on Proposed American Standard Guide for Planning and Zoning Officials in Considering Atomic Energy Zoning Action, American Standards Ass'n (May 1966) at 5 (unpublished report, available at Radiation Health Program, FDA, Brooklyn, N.Y.).

228. S. Harris, Zoning and Nuclear Facility Siting, Nat'l Center for Radiological Health, at 6 (available at Radiation Health Program).

229. Zimmerman, Zoning for Atomic Energy Uses, 16 Zoning Digest 161 (1964) [hereinafter cited as Zimmerman].

230. *Id.* at 166. New York, N.Y., Law 310 (1963). This bill was a result of public concern about a proposed nuclear power plant to be built by Consolidated Edison in Ravenswood, Queens within New York City. "Before the bill was voted upon, the matter was resolved by withdrawal of the application by Consolidated Edison, ostensibly as a result of the purchase of low cost Canadian hydroelectric power." H. Helman, *supra* note 82, at 44. It is unlikely, however, that the plant, as designed, would have gotten an AEC Construction Permit: no plant has yet been licensed for an urban site. See Letter from Glenn T. Seaborg, Chairman AEC to Paul Screvane, N.Y.C. Council, June 11, 1963, 1967 CCH Atom. En. L. Rep. ¶ 16, 578.

to mention the nuclear aspect."²³¹ However, as Professor Joseph F. Zimmerman noted in his 1964 article, the question of federal pre-emption was as yet undecided, and there existed the "possibility that local governments have no legal *power* to prohibit an 'atomic' use at a location where they permit comparable nonatomic uses."²³²

Another solution is to require special permits for reactor facilities. In Pittsburgh, for example, the zoning ordinance requires that "atomic reactors" comply with the following standards:

(a) It shall be demonstrated by qualified experts that such use may be safely located on the concerned site and will not adversely affect existing or potential adjacent uses.

(b) Suitable measures are to be taken for the disposal of waste without adversely affecting adjacent areas.²³³

Such a permit scheme was proposed for New York City as an alternative to an outright ban.²³⁴ However, it should be noted that the AEC termed this proposal "unnecessary" and emphasized its detailed procedure for evaluating a license application.²³⁵

d. Condemnation

Another place where local interests may challenge the environmental impact of a power plant is in judicial review of the utility's exercise of the power of eminent domain. The utility may be required to show that it has complied or will be able to comply with local, state and federal environmental protection requirements, before it can condemn property for use as a generating or transmission facility site.²³⁶

231. Zimmerman, *supra* note 229, at 166-67.

232. *Id.* at 167 n.7 (emphasis in original).

233. *Id.* at 167.

234. *Nucleonics Week*, Supplement to Vol. 11, No. 10, Mar. 12, 1970, at A-1.

235. Letter from Glenn T. Seaborg, Chairman AEC to the Vice Chairman, N.Y.C. Council, February 27, 1970; Testimony of Joseph J. DiNunno, AEC Special Assistant to the General Manager for Environmental Affairs, before the N.Y.C. Council Comm. on Environmental Protection and General Welfare, Mar. 4, 1970.

236. For example, a suit has been filed against Commonwealth Edison and the AEC by local property owners near the site for the La Salle Station. The suit asks that condemnation proceedings of land for cooling ponds be stopped until environmental reviews are complete. *Gage v. Commonwealth Edison Co.* (N.D. Ill. Civil No. 71c-2691, filed Nov. 9, 1971) (*Nuclear Industry*, Vol. 18, No. 12, Dec., 1971, at 21). See *United States v. 247.37 Acres*, 3 ERC 1098 (S.D. Ohio 1971). But see *Sedade Industries, Inc. v. Florida Power & Light*, 245 So. 2d 209 (Fla. Sup. Ct. 1971).

e. Regulation of Aesthetic Effects

In 1967, the Niagara-Mohawk Power Corporation applied to the AEC for a permit to construct a nuclear power plant at Easton, New York on the upper Hudson River.²³⁷ However, following a year of delays because of objections to aesthetic effects on historic landmarks, as well as ecological effects on the Hudson River,²³⁸ the corporation withdrew its application.²³⁹ The project had been reviewed by the Hudson River Valley Commission²⁴⁰ which mentioned a number of problem areas in its findings of March, 1968, including visual relation of the plant to the Saratoga National Historical Park.²⁴¹ Because of the Commission's objections, the utility had previously rejected the use of giant cooling towers; prompted by the Commission findings, Niagara-Mohawk began a "re-evaluation" of its plant design.²⁴²

Another agency which opposed the plant was the President's Advisory Council on Historic Preservation.²⁴³ Responding to a request from the AEC for comments, a part of the licensing review,²⁴⁴ the Council emphasized the significance of the Saratoga National Historical Park and stressed that, as designed, construction of the facility on a site across the river "would materially detract from interpretation, understanding, and appreciation of the events and locale of a significant battle of the American Revolution. . . ."²⁴⁵ It recommended that:

[T]he Atomic Energy Commission should not issue a construction permit which requires the use of the proposed Niagara-Mohawk Power Corporation site on the Hudson River and opposite the Saratoga National Historical Park unless:

1. there is no feasible and prudent alternative to the use of the proposed site; and

237. No. 50-300 (AEC).

238. 10 Nuclear Safety 108 (Jan.-Feb. 1969).

239. *Id.*

240. The Hudson River Valley Comm. is authorized by the New York State Legislature to review all projects proposed within one mile from the banks of the river within New York state, or within two miles from the banks, if visible from the river. The statutory authority is N.Y. Exec. Law § 721 (McKinney Supp. 1972).

241. Hudson River Valley Comm. Newsletter, Vol. 2, No. 6, Aug.-Sept. 1968, at 1.

242. *Id.*

243. The Council, created under 16 U.S.C. § 470i (1970), is charged with advising "the President and the Congress on matters relating to historic preservation" 16 U.S.C. § 470j(a)(1) (1970).

244. 16 U.S.C. §§ 470a(a) and 470f (1970).

245. Advisory Council on Historic Preservation [ACHP], Comments upon the

2. such use includes all possible planning to minimize the adverse effect to the Saratoga National Historical Park resulting from the use.²⁴⁶

In this case as in several others²⁴⁷ where, after the application was filed, it became evident that there would be sizeable opposition to the plant, the utility chose to withdraw or suspend the application rather than face the possibility of further delay and controversy. Because of the need for advanced planning for required system additions, utilities are particularly sensitive to delays and threats of delays in their construction schedules. Given their ability to arouse public interest and prolong the review schedule, the power of advisory bodies without direct licensing jurisdiction may be far greater than might otherwise be thought.

In 1969, Public Service Electric and Gas Company of New Jersey (PSE&G) proposed to build a two-unit nuclear power plant²⁴⁸ on an island in the Delaware River.²⁴⁹ To meet thermal release guidelines of the Delaware River Basin Commission, cooling towers were required.²⁵⁰ Several agencies, including the Delaware Regional Commission and the Pennsylvania Historical and Museum Commission expressed concern that the plant, particularly the tall hyperbolic cooling towers proposed, would adversely affect Pennsbury Manor, a landmark in the area. In its required review, the Advisory Council on Historic Preservation also criticized the proposed plans.²⁵¹

Pennsbury Manor is owned by the state of Pennsylvania, and while not a national park like the Saratoga battlefield, it is listed in the Na-

Proposed Nuclear Power Plant on the Hudson River Opposite the Saratoga National Historical Park (May 2, 1968) at 1. See also Letter from Advisory Council to Glenn T. Seaborg, Chairman AEC, May 9, 1968 and the Proposed Niagara Mohawk Corp. Easton Nuclear Generating Power Station, a report prepared by the Office of Archaeology and Historic Preservation of the National Park Service for the ACHP.

246. ACHP Comments, *supra* note 245, at 2.

247. Opposition to the Bell Station (No. 50-319, (AEC Mar., 1968)) has been documented in D. Nelkin, *Nuclear Power and its Critics* (1970). See 10 *Nuclear Safety* 551 (Nov.-Dec. 1969); similar opposition greeted Consolidated Edison's proposed Ravenswood Plant in 1962. 5 *Nuclear Safety* 129 (1962).

248. AEC Press Release No. 0-256 (Dec. 6, 1971).

249. Nos. 50-354, 50-355 (AEC Feb., 1970). (Newbold Island 1 and 2). Prior to filing a construction permit application, PSE&G requested site approval; the site received favorable ACRS review. 11 *Nuclear Safety* 100 (Jan.-Feb. 1970); 13 *Nuclear Safety* 249 (May-June, 1972).

250. *Nucleonics Week*, Vol. 11, No. 2, Jan. 15, 1970, at 2-3.

251. Letter from ACHP to Glenn T. Seaborg, Feb. 13, 1970, and attached materials [hereinafter referred to as ACHP Letter].

tional Register,²⁵² and thus comes under the review jurisdiction of the Council.²⁵³ It is the recreated country estate of William Penn, and is operated as a state historical park. As the Council described it:

The Manor, its outbuildings, gardens, and grounds present an appearance that today would be familiar to Penn himself. . . . The area is largely pastoral in nature, and it is in a region which is generally industrial in character.²⁵⁴

Considering the proposed plant in that setting, the report stated:

The . . . facility . . . as proposed, will rise to a height of 400 feet, approximately 1,000 feet from Pennsbury Manor, thereby altering the historical and natural character of the area and creating an unacceptable adverse visual intrusion.²⁵⁵

The Council, however, recognized that failure to build the power plant on the island would create the possibility of construction of a "smelter, refinery or some other less desirable industrial neighbor not subject to Federal licensing. . . ."²⁵⁶ Since the size, design, and location of the cooling towers was the major cause for concern, the Council recommended their relocation and redesign, and the utility complied with the recommendations.²⁵⁷

f. Regulation of Transmission Lines

The consideration of aesthetic factors in transmission line location has been receiving greater attention in recent years.²⁵⁸ Potential aesthetic problems exist:

[Transmission lines] require clearing of the natural vegetation on the right-of-way, construction of large steel towers and access and maintenance roads which so change the natural character of the landscape that scenic and other resources can be virtually destroyed. And even undergrounding is not a complete solution, aside

252. 16 U.S.C. § 470a(a) (1970) states: "The Secretary of the Interior is authorized—(1) to expand and maintain a national register of districts, sites, buildings, structures, and other objects significant in American history, architecture, archaeology, and culture, hereinafter referred to as the National Register, and to grant funds to States for the purpose of preparing comprehensive statewide historic surveys and plans, in accordance with criteria established by the Secretary, for the preservation, acquisition, and development of such properties."

253. 16 U.S.C. § 470f (1970).

254. ACHP Letter, *supra* note 251, at 1.

255. *Id.* at 2.

256. Nuclear Industry, Vol. 17, No. 2, Feb., 1970, at 17.

257. Nuclear Industry, Vol. 17, No. 3, March, 1970, at 21; PSE&G Newbold 1 Hearing Notice published in 36 Fed. Reg. 234 (1971).

258. See *Kamo Elec. Coop., Inc. v. Cushard*, 455 S.W.2d 513 (Sup. Ct. Mo. 1970) ("unsightliness" of transmission lines); *Boston Edison Co. v. Board of Selectmen*, 355 Mass. 79, 242 N.E.2d 868 (1968).

from the cost, because clearing of the vegetation and access roads would still be required.²⁵⁹

In a recent case in Massachusetts²⁶⁰ the court considered a statute that allowed electric companies to cross streets with their lines provided that such lines "shall not incommode the public use of public ways."²⁶¹ The court held that there was nothing wrong in the town's Board of Selectmen determining "that such annoyances [the court's interpretation of 'incommode'] may involve aesthetics. The presence of power lines across a public way can, in our view, disturb natural beauty sufficiently to create real annoyance to the public users of the way, particularly in a day when such beauty seems to be a rapidly diminishing public asset."²⁶²

To minimize the impact of transmission facilities on the environment, guidelines have been prepared for the protection of natural, historic, scenic and recreational values in the design and location of rights-of-way and transmission facilities.²⁶³ The Federal Power Commission,²⁶⁴ the Department of the Interior²⁶⁵ and state commissions²⁶⁶ with jurisdiction

259. Plant Site Selection, *supra* note 149, at 50.

260. *Boston Edison Co. v. Board of Selectmen*, 355 Mass. 79, 242 N.E.2d 868 (1968).

261. *Id.* at 82, 242 N.E.2d at 871.

262. *Id.* at 91, 242 N.E.2d at 876. The court cited the leading case of *Scenic Hudson Preservation Conf. v. FPC*, 354 F.2d 608, 614-17 (2d Cir. 1965), cert. denied, 384 U.S. 941 (1966). 355 Mass. at 93, 242 N.E.2d at 877.

263. Dep't of Interior and Dep't of Agriculture, *Environmental Criteria for Electric Transmission Systems* (U.S. Gov't Print. Office No. 0-404-932, 1970). Maryland was the first state to require utility companies to follow the guidelines. Based on these guidelines, the Maryland Public Service Comm'n approved construction of overhead transmission lines to be built in connection with the Calvert Cliffs' Nuclear Power Plant. These guidelines have been adopted by FPC (18 C.F.R. §§ 2.13, 4.41, 4.50, 4.70 (1972)). See Order No. 414, Amending Part 4, §§ 4.41, 4.50 and 4.71 of Regulations under Federal Power Act, and adding § 2.13 to Part 2, No. R-365 (FPC Nov. 27, 1970), "Protection and Enhancement of National, Historic and Scenic Values in the Design, Location, Construction, and Operation of Project Works."

264. See FPC Order No. 414, Docket R. 365 (Nov. 27, 1970), and Appendix, adopting environmental guidelines for transmission facilities. See also 42 U.S.C. § 2201(r)(9) (1970).

265. 43 C.F.R. § 2851.2-1(6)(i) (1972).

266. "The Maryland Commission ruled on a proposal by Baltimore Gas and Electric Company to construct a transmission line . . . which would extend about 47 miles from the Calvert Cliffs generating plant. . . . The Commission considered the impact of the line on aesthetics and concluded that modern design, aesthetic-

over transmission facilities have begun to consider environmental factors in their reviews.²⁶⁷

IV. Proposals for Improvement

A. Proposed Changes in AEC Procedures

In the past several years, many parties, both governmental and non-governmental, have proposed changes in the AEC's regulatory procedures for the licensing of nuclear plants.²⁶⁸ Legislation to effect certain changes was considered in the first session of the ninety-second Congress (1971) and hearings were held on the proposals.²⁶⁹ The Joint Committee on Atomic Energy (JCAE) decided not to submit any bill to the Congress in that session.²⁷⁰ However, it was suggested that the commis-

type poles should be installed along the 25 per cent of the line which would be readily exposed to general public view. The additional cost to achieve this result—from 20 to 35 per cent—was found to be fully justified. The effect of the proposed line on historic sites received consideration by the commission. Some sites near which the transmission line would run were screened from the line by trees. The impact of the line on other sites was found to require a modification of the proposed route. . . . With the required route and pole changes, and a prohibition against the use of any chemical biocides or herbicides along the transmission route, together with certain specifications and conditions, the Commission approved the construction of the transmission line. . . . [T]he company was directed to follow the guidelines for transmission facilities as recommended by the working committee on utilities in its 1968 report to the Vice President and to the President's Council on Recreation and National Beauty (84 PUR 3d 82).” *Public Utilities Fortnightly*, Apr. 29, 1971, at 63-64.

267. “Upon petition by several municipalities, the New Jersey board ordered changes in the route of a proposed 500-kilovolt transmission line to be constructed by Public Service Electric and Gas Company. . . . Considerable testimony related to parks and recreational lands and natural settings. While the route ordered by the board will be more expensive than that proposed by the company . . . the board considered the additional cost justified. . . . [T]he board declared that it has the statutory power to require the company to route a transmission line so as to minimize the environmental impact (87 PUR 3d 321).” *Id.* at 64. On AEC regulation, see 10 C.F.R. § 50 App. D(A)(1) (1972). One point in controversy is the AEC's interpretation of “utilization facility” to include transmission lines.

268. See recommendations made to the Administrative Conference of the U.S. on the hearing requirement, 17 AECH, No. 29 (July 19, 1971), at 10. Remarks delivered by Harold P. Green, Professor of Law, George Washington University, at a symposium on nuclear power and the public sponsored by the University of Minnesota, reported in 15 AECH, No. 41 (Oct. 13, 1969), at 3.

269. Hearings on AEC Licensing Procedure and Related Legislation Before the Subcomm. on Legislation of the Joint Comm. on Atomic Energy, 92d Cong., 1st Sess., pts. 1-4 (1971) [hereinafter cited as *Licensing Hearings*].

270. 17 AECH, No. 43 (Oct. 25, 1971), at 54.

sion could make appropriate changes through its rulemaking powers.²⁷¹

In late November, 1971, the new AEC Chairman, Dr. James R. Schlesinger, announced that the AEC was considering changes in its licensing rules "to achieve more effective public participation in the licensing process, and to increase efficiency in the conduct of public hearings."²⁷² Such hearings include the "legislative-type" rulemaking hearings, the first two of which were convened in January, 1972.²⁷³

Because of court decisions interpreting NEPA and the Refuse Act Permit Program, the AEC and other agencies proposed early in 1972 that NEPA and the Atomic Energy Act be amended to facilitate licensing of power plants during the "energy crisis" of the next year or two.²⁷⁴

B. Proposed Federal Legislation²⁷⁵

1. Transfer of Authority

Legislation has been proposed which would transfer the regulation of commercial uses of nuclear power to, for example, the Secretary of HEW,

271. *Id.* at 55.

272. 17 AECH, No. 47 (Nov. 22, 1971), at 1. Changes actually made include: withholding AEC's review of a facility license application until an "acceptable" application (one without any deficiencies) has been received; issuing notices of hearing promptly after the facility's license application has been accepted for review; permitting formal discovery only after the matters in controversy have been delineated by the presiding ASLB; placing new responsibilities on intervenors for matters they wish to raise; creating a category of "limited intervenor"; defining matters at issue more precisely, with greater use of prehearing conferences; consolidating the parties, where more than one party raises the same basic questions; limiting the issues at the operating license stage to those raised by the parties to the proceedings; barring late intervention where it cannot be justified; and requiring the submission of written testimony in advance of the hearing. 17 Fed. Reg. 15,127 (1972) with corrections noted in 17 Fed. Reg. 17,381 (1972) and 17 Fed. Reg. 17,704 (1972).

273. In 36 Fed. Reg. 22774-75 (1971), the AEC announced its intention to hold "rulemaking hearings" on Acceptance Criteria for Emergency Core Coding Systems for Light-Water-Cooled Nuclear Power Reactors, Docket RM-50-1 on Jan. 27, 1972, and Effluents from Light-Water-Cooled Nuclear Power Reactors, Docket RM-50-2, on Jan. 20, 1972. Further details on the procedures for the rulemaking hearings were issued in 37 Fed. Reg. 287-89 (1972).

274. See statement by Schlesinger, AEC, before the Joint Hearing by Senate Comm. on Public Works and Interior & Insular Affairs on Administration of NEPA (March 1, 1972). See also BNA Environ. Rep.-Curr. Dev. 1396 (March 17, 1972) and 1427 (March 24, 1972). On June 2, 1972 the Atomic Energy Act was amended to permit temporary operating licenses to be issued. Pub. L. 92-307 adding § 192 to the Atomic Energy Act. The amendment to NEPA was not acted upon.

275. Other bills in the current session include Water Quality, Pub. L. 92-500

subject in certain cases to disapproval by the FPC or the Secretary of the Interior.²⁷⁶ The Administration has opposed these bills. Edward E. David, Jr., the President's Science Advisor, stated:

We recognize the criticisms which are made from time to time regarding the location of nuclear development and nuclear regulatory functions in the same agency. However, the recent transfer to the Environmental Protection Agency of the responsibility to fix the basic standards for radiation protection of the general environment tends to overcome some of this problem. There is now an independent agency which fixes the basic standards and AEC's task is implementing and enforcing those standards through its licensing authority.

In the longer term we would not rule out the possibility of separating AEC's regulatory functions from the other functions of that agency. Developments may make such a move desirable at some appropriate time in the future.²⁷⁷

Dr. David noted that in view of pending reorganization plans,²⁷⁸

enacted Oct. 18, 1972, Dep't of Nat'l Resources (S. 1434). A discussion of currently proposed legislation in various state legislatures is beyond the scope of this article. Attention is drawn, however, to the Model State Utility Environmental Protection Act, which states as its purpose "to provide for the regulation of the location, operation and maintenance of major utility generation and transmission facilities to promote the provision of reliable, abundant and economical energy supply with due regard for the preservation and enhancement of the environment and conservation of scenic, historic, recreational and other natural resources. . . ." Quoted in Hearings before the Subcomm. on Communications and Power of the House Comm. on Interstate and Foreign Commerce on Bills Relating to Powerplant Siting and Environmental Protection, 92d Cong., 1st Sess., pt. 3, at 896 (1971).

276. H.R. 1197, reported in Licensing Hearings, pt. 2, *supra* note 269, Appendix 22, at 985.

277. Letter from Edward E. David, Jr., Director, Office of Science and Technology, to Edward Bauser, Executive Director, Joint Comm. on Atomic Energy, Aug. 9, 1971, *id.* at 1004 [hereinafter cited as David Letter].

278. In one suggestion for reorganization, H.R. 6959, the Administration has proposed creation of a Department of Natural Resources which would take over AEC functions relating to: "(1) the civilian power program (retaining AEC control of research and development); (2) the raw materials program; (3) the uranium enrichment program and related distribution activities constituting part of the AEC production program, and (4) the Plowshare program (retaining AEC control of specified research and development and other functions)." Letter from H.R. Morton, Secretary of the Interior, to Hon. John Pastore, Chairman, Joint Comm. on Atomic Energy, July 6, 1971, Licensing Hearings, pt. 2, *supra* note 269, at 998. The Dep't of Interior, in commenting on this legislation to the JCAE, stated: "The Department of Natural Resources would bring together the many natural resource responsibilities now scattered through the Federal government, including those relating to the energy resources of the Nation. It is appropriate that governmental functions relating to commercial uses of nuclear power be included with the energy

consideration of the possible transfer of AEC's regulatory functions were best left to some later date.²⁷⁹

2. Legislation on State Jurisdiction

During recent hearings by the Joint Committee on Atomic Energy,²⁸⁰ several bills were discussed which would permit individual states to set standards more restrictive than those of the AEC for discharge of effluents for nuclear power plants.²⁸¹ These bills would amend Section 274(d) of the Atomic Energy Act to prohibit the AEC from refusing to enter into an agreement with a state under that section because the state's program for controlling the discharge or disposal of radioactive materials into navigable waters is more restrictive than the commission's standards.²⁸²

The Justice Department, in its review of this legislation for JCAE, noted:

We would like to call attention to two technical matters: (1) Section 274b limits the scope of agreements with the States to certain materials which apparently do not include effluents, a subject of prime interest to States, and (2) we have reservations as to whether it is technically possible to establish standards for the discharge of effluents from nuclear utilization facilities which do not affect construction and operation of such facilities, matters not subject to agreements under § 274(c)(1) (42 U.S.C. 2021(c)(1)). It is not entirely clear that the bills obviate the later difficulty by their amendment of Section 274d.²⁸³

The AEC has opposed the establishment of such a scheme of "dual regulation."²⁸⁴ The Department of Justice refused to recommend that the legislation be adopted because it involves "policy considerations."²⁸⁵

responsibilities of the new Department. H.R. 6959 is part of a comprehensive program of Executive Reorganization proposed by the President in his message to the Congress of March 25, 1971. . . . For the reasons stated therein we recommend the enactment of H.R. 6959." *Id.*

279. David Letter, *supra* note 277.

280. Licensing Hearings, *supra* note 269.

281. Bills include H.R. 997, H.R. 1743, H.R. 3683, H.R. 6933, H.R. 7539, S. 2050. *Id.*, pt. 2 at 962-74.

282. *Id.*

283. Letter from Richard Kleindienst, Deputy Attorney General, to Rep. Chet Holifield, Chairman, Joint Comm. on Atomic Energy, July 8, 1971, *id.* at 984 [hereinafter cited as Kleindienst Letter].

284. Letter from Glenn T. Seaborg, Chairman, Atomic Energy Comm., to Edward Bauser, Executive Director, Joint Comm. on Atomic Energy, June 22, 1971, *id.* at 981.

285. Kleindienst Letter, *supra* note 283.

3. Power Plant Siting²⁸⁶

In October, 1970, a task force²⁸⁷ which had studied the problem of power plant siting issued a report on "Electric Power and the Environment."²⁸⁸ Based on the recommendations of this group, the Office of Science and Technology developed a proposal for implementing legislation.²⁸⁹ The bill which was introduced in the Congress would:

(1) require this Nation's electric utilities to engage in long-range planning and to publish general plans for their system expansions at least ten years in advance of construction; (2) provide that each State or region may establish a decision-making body that will review alternatives in order to assure that optimum sites for power plants and large transmission lines are selected, and that adequate environmental protection features will be employed; (3) provide for Federal Government review and approval responsibility until such time as a decision-making body is established on a State or regional level . . . (4) require proposed power plant sites and general locations or transmission line routes to be disclosed and that public hearings on the plant sites be held at least five years prior to construction; (5) require that detailed applications be filed and another public hearing held at least two years in advance of construction; and (6) provide that the decision of the State or regional power plant siting body shall be conclusive on all matters of State or local law, thus consolidating the various approvals now required at the State and local level.²⁹⁰

Among the other bills introduced in the first session of the ninety-second Congress are at least seven others dealing with power plant siting and environmental protection.²⁹¹ The main features of these bills, as well

286. For a seven state analysis of siting regulations see Stone, *Power Siting: A Challenge to the Legal Process*, 36 Albany L. Rev. 1 (1971); see also Trends in Federal and State Legislation in the United States for the Protection of the Environment and the Regulation of Nuclear Power Plants, paper delivered by Howard K. Shapar, Ass't Gen. Counsel, Licensing and Regulation, AEC, at Int'l Conference on Peaceful Uses of Atomic Energy, Geneva, (1971) [A/Conf. 49/P-089], at 3.4-20, 21 (footnotes omitted) [Hereinafter cited as Shapar].

287. Representatives of AEC, FPC, Interior, HEW, Rural Electrification Administration, and the TVA worked in conjunction with the Energy Policy Staff of the OST.

288. Office of Science and Technology, *Electric Power and the Environment*, (U.S. Gov't Print. Office No. 0-409-381, Aug. 1970) [hereinafter cited as OST Study].

289. See Shapar, *supra* note 286.

290. *Id.*

291. Two bills, H.R. 6971 and 6972 were introduced at the request of two commissioners of the FPC. See *Hearings on Powerplant Siting and Environmental Protection before the Subcomm. on Communications and Power of the House Comm. on Interstate and Foreign Commerce, 92d Cong., 1st Sess., pt. 1, at 1, 54,*

as the administration's proposal, were discussed in the Subcommittee Hearings held in May, 1971.²⁹²

Other proposed legislation would develop and declare a national energy policy or take other steps to meet the "energy crisis."²⁹³

V. Conclusion

This article has not addressed itself to the question of whether nuclear power plants *should* be built; rather it has assumed that, as in the past, they *will* be built, and they will be regulated. The threshold question is where should major regulatory responsibility be placed. Despite continuing pressure to give a concurrent responsibility to the states notwithstanding the decision in *Northern States Power Co. v. Minnesota*, it appears likely that such regulation will remain a federal function; in fact, in the foreseeable future fossil-fueled plants will probably also be subject to federal, or at least, regional regulation.

The first questions facing regulators in the environmental field involve the relative weight to be given to ecological, economic and other considerations in balancing the benefits and costs of electricity in general, and each proposed new plant in particular. An additional set of questions concerns who is to speak for each of these interests. Those who call themselves environmentalists may claim to represent an interest as broad as saving the earth's ecosystem, or as narrow as insuring the continuing productivity of a localized, one-species sport fishery. They may demand the preservation of a pristine wilderness or its opening up to public recreational uses. On the other side, consumers of electricity include such diverse groups as large industrial users trying to remain competitive in world markets, small storekeepers whose refrigerated inventory, and consequently their businesses, may be wiped out by extended interruptions in power supply, and the urban poor who aspire to share in the air-conditioned comfort of their countrymen during long, hot summers.

86 (1971) [hereinafter cited as Siting Hearings]. A third bill was introduced at the request of the Nat'l Ass'n of Regulatory Utility Comm'rs, which proposed federal legislation which would give state regulations a somewhat greater role than that envisioned in the administration supported bill, H.R. 7045. See Siting Hearings, pt. 1, at 1, 172. Additional bills were sponsored by Rep. MacDonald, Chairman of the House Subcomm. on Communications and Power, Comm. on Interstate and Foreign Commerce (H.R. 6970, Siting Hearings, pt. 1, at 1, 35); Rep. Moss of California (H.R. 3838, Siting Hearings, pt. 1, at 1, 133); Rep. Reid of New York (H.R. 1079, Siting Hearings, pt. 1, at 1, 199); Rep. Patten of New Jersey (H.R. 1486, Siting Hearings, pt. 1, at 1, 205).

292. Siting Hearings, pts. 1-3, supra note 291.

293. See, e.g., 2 BNA Environ. Rep.-Curr. Dev., 1334-35 (Mar. 3, 1972).

Other questions include how best to design procedures to insure that each of the many interests can make itself felt in the regulatory process without that process becoming so unwieldy that nothing can be done. In this field, as in others, *inaction* is an action with direct consequences. The respective roles of administrative agencies, the legislatures, the courts, private "attorneys-general" and private interests must be spelled out. Perhaps procedural innovation will provide part of the answer. Such things as "counsel for the environment," consumer ombudsmen, standing for natural objects such as mountains to be represented in proceedings,²⁹⁴ an energy commission, and a technology-assessment arm of Congress are among recently suggested additions to our store of regulatory tools.

In the past, the small number of nuclear power plants proposed for licensing allowed the process of determining their suitability to proceed with some success despite inefficient procedures and insufficient opportunity for the plethora of interests potentially involved to be heard. Even though not specifically considered by the AEC before NEPA, major environmental factors were generally taken into account, if not at the federal level, then in one of the many local agency reviews. But such a sporadic system is ill-adapted to an era of practical nuclear plants, a near-crisis in energy availability, and a raised consciousness of environmental values.

Although the National Environmental Policy Act may not have solved any problems, it has certainly forced us to face many important questions. It is likely that the future will see the application of many "high technology" devices like nuclear reactors. The development of the regulation of nuclear power plants is a pioneering effort in evolving procedures for allowing a democratic society to utilize the benefits of advanced technology while insuring that the concomitant environmental risks are minimized and the public interest is served. Today's procedures for nuclear power plant regulation are hardly optimum. The foregoing description of current problems and proposals for future improvements should, however, prove useful in indicating the path this evolution may be taking, and in helping us direct it, by means of legislation, rulemaking, and other legal action, so that the descendants of today's "Technological Tygers" will be neither monstrous nor extinct, but thoroughly domesticated creatures.

294. See dissent by Douglas, J. in *Sierra Club v. Morton*, 405 U.S. 727, 741 (1972).

Appendix: The States' View²⁹⁵

Several states have refused to acknowledge that the entire field of radiological safety covered by the 1954 Act has been pre-empted by the federal government. The stated and implicit opinions of some states are discussed below.

Massachusetts

In 1954, Massachusetts established the Special Commission on Regulatory and Protective Measures Pertaining to Ionizing Radiation in the Commonwealth of Massachusetts.²⁹⁶ After public hearings and consultation with various state and federal organizations, the Commission issued a report which concluded that an "Agreement" with the AEC under Section 274 of the Atomic Energy Act was neither necessary nor advisable, citing four "marked disadvantages":²⁹⁷

[G]iving the impression that the State needed some mandate from the AEC to protect its people from radiation; that any agreement can apparently be cancelled unilaterally by the AEC, that the expenditure of the required State funds would not yield any significant benefits; and, that any such agreement would not appreciably increase the level of protection provided for the residents of Massachusetts.²⁹⁸

Amplifying its first objection, the Commission further stated:

The special commission is firmly convinced that if any dangerous situation is found within the boundaries of this state, its Department of Public Health, with

295. In concluding that Michigan should enter into a turnover agreement with the AEC, the State Attorney General summarized a typical state view of the problem, as follows: "There is no blanket basis for Federal Government's exercise of police power, as such, in connection with atomic energy; and its authority in this field over a specific operation must find as its basis the Federal Government's power over its property, commerce, national security or other granted power. As atomic energy is more widely used by industry, instances will arise challenging the Federal Government's power in connection with some particular safety regulation. Should it be found that the Federal Government is powerless in a specific operation, the public might be left unprotected in the absence of operative State regulations. The limits of the field covered by the Federal Atomic Energy Act are not static but subject to change by the Commission through its definition of 'special nuclear material.' There is an area of radiation not covered by the Act over which the inherent power of the State to protect the health and safety of the public is operative. It will require the constant vigilance of qualified scientists to determine the areas included and excluded from Federal power to regulate under the Act irrespective of the Commission's exercise thereof." *Op. Att'y Gen. Mich.* 565, 572-73 (No. 4073, Oct. 31, 1962).

296. In 11 AECH, No. 13 (Mar. 29, 1965), at 2-10.

297. *Id.* at 2.

298. *Id.*

or without the approval of the A.E.C., will take such measures as may be necessary to eliminate the danger. Any agreement which would interfere with this position would be harmful to the general welfare of the citizens of Massachusetts. Nor can we find any provision of constitutional law which deprives our commonwealth of the right to exercise its police power in an area where the activity of the federal government is only something of recent vintage and uncertain quality and quantity.²⁹⁹

Among other recommendations, the Commission suggested that a permanent Official Advisory Council on Radiation Protection be established, with specific emphasis on protecting the people of Massachusetts from "ill-considered promotions" of atomic energy.³⁰⁰

New Jersey³⁰¹

In a memorandum of law,³⁰² the state of New Jersey examined the state's jurisdiction over environmental and safety aspects of the Oyster Creek Nuclear Plant.³⁰³ The memorandum cited several New Jersey³⁰⁴ and United States Supreme Court cases which defined the state's police power. The memorandum concluded:

[I]t is clear that the legislature of the State of New Jersey has the authority under the police power to exercise jurisdiction as to the environmental and safety aspects of the proposed Oyster Creek Nuclear Power Plant which affect the health, safety, and welfare of the citizens of New Jersey.³⁰⁵

Examining the delegation of this power to the various state agencies, the memorandum stated:

The Board of Public Utility Commissioners has clear statutory authority, which has been strongly upheld by the courts, to regulate and supervise those environ-

299. *Id.* at 3.

300. *Id.*

301. Although agreements with the AEC are not in effect in New Jersey, Pennsylvania and Michigan, these states have radiation control programs in various stages of development with enabling legislation enacted (or determined not to be required) as preparation for entry into an agreement with the commission.

302. *In re Jersey Central Power & Light Co.*, No. 652-60 (N. J. Bd. of Pub. Util. Comm'rs, July, 1965), Memorandum of Law by N. Weisburd, Deputy Attorney General for Dep't of Health, New Jersey Radiation Protection Comm.

303. No. 50-219 (AEC), Construction Permit CPPR-15, issued Dec., 1964. 1964.

304. "Police power itself is an attribute of sovereignty. It exists without any reservation in the Constitution. It is founded on the right of the state to protect its citizens, provide for their welfare and progress, and to insure the good of society. It corresponds to the right of self-preservation in the individual." *In re Jersey Central Power & Light Co.*, Weisburd memorandum, *supra* note 302, at 2, quoting *Stephens v. Bongart*, 15 N.J. Misc. 80, 82, 189 Atl. 131, 132 (Essex Cty. Juv. Ct. 1937).

305. *Id.* at 3.

mental aspects of a public utility's [sic] operation that may affect the public safety.³⁰⁶

[T]he Department of Health and the Radiation Protection Commission . . . have a clear area of jurisdiction and control over the safety factors of the proposed nuclear plant, specifically on the effect the plant will have on water pollution and atmospheric radiation release and water contamination.³⁰⁷

[T]he Department of Conservation . . . through the [Water policy and Supply, Fish and Game, Shell Fisheries, Resource Development] divisions has a vital interest and duty concerning many of the environmental aspects of the proposed Oyster Creek Plant.³⁰⁸

In its response, the utility (Jersey Central Power and Light Company) pointed out that the state's memorandum had not considered the effect of the Atomic Energy Act of 1954, as amended, and presented the federal pre-emption argument.³⁰⁹

The New Jersey Board of Public Utility Commissioners discussed the the problem of possible pre-emption in its Interim Order of November, 1965.³¹⁰ "It is recognized that the board's role in inquiring into these potential radiation hazards is limited,"³¹¹ and that "it was the intent of the Congress in enacting the Atomic Energy Act of 1954 to pre-empt certain areas of nuclear reactor regulation."³¹² But, in this case, "the board is not presented with the necessity of passing on the possibility of pre-emption *vel non* as to the waste discharge and monitoring thereof,"³¹³ since "there is little conflict between the parties as to the necessity and means of controlling this waste material."³¹⁴

The Board then went on to examine the position it should take with respect to its own powers in an undefined area:

[The state statutes] require us to work for the public interest without regard to a distinction between radiation and nonradiation hazard in regulating the safety of the operations of a utility. This latter classification is imposed on us by federal

306. *Id.* at 4.

307. *Id.* at 6.

308. *Id.* at 7.

309. Memorandum by Jersey Central Power & Light Co. (July 29, 1965), at xxxii.

310. 61 PUR 3d 395-406 (N. J. Bd. of Pub. Util. Comm'rs, Nov. 15, 1965). Further board proceedings and requests for radiation effluent monitoring and reporting are found in *In re Jersey Central Power & Light Co.*, 64 PUR 3d 152 (N. J. Bd. of Pub. Util. Comm'rs, Apr. 2, 1966).

311. 61 PUR3d at 399.

312. *Id.*

313. *Id.* at 400.

314. *Id.*

legislation, purportedly via the federal Supremacy Clause of the United States Constitution.³¹⁵

The Board declared that the rationale underlying the prohibition on inquiry by an administrative body into the constitutionality of its statute precluded, in this instance, an inquiry into the limitations on the literal scope of its mandate to act in the public welfare.³¹⁶ "Inasmuch as the scope of the constitutional implication of the Atomic Energy Act of our general statutory powers is by no means clear, the board deems a resolution of these limitations beyond its function."³¹⁷ The Board decided to follow its clear and statutory duty "until the area of doubt has been resolved by a competent tribunal."³¹⁸

Pennsylvania³¹⁹

Pennsylvania regulates the effluents from nuclear reactors,³²⁰ although it "does not regulate reactors."³²¹ Pennsylvania requires a liquid waste generating facility to secure a Waste Permit from the Sanitary Water Board.³²² The application for a permit is reviewed and commented upon by the Division of Industrial Wastes and, in the case of radio-contaminated wastes, by the Office of Radiological Health. The Sanitary Engineering Department regulates and reviews the non-radioactive aspects, including thermal pollution and liquid effluents from power reactors.³²³

315. *Id.*, referring to N.J. Rev. Stat. 48:2-23 (1969), as amended (Supp. 1972).

316. *Id.*

317. *Id.*

318. *Id.* In a similar situation, the Colo. Pub. Util. Comm. granted a certificate for a nuclear plant, finding that the design provided for "all reasonably foreseeable risks to health and safety." *United Mine Workers v. Public Util. Comm'n*, 1 ERC 1115 (Jan. 12, 1970).

319. See note 301 *supra*.

320. Letter from Margaret A. Reilly, Chief, Environmental Surveillance Section, Office of Radiological Health, Penn. Dep't of Health, to Joyce P. Davis, Apr. 8, 1970 (available from the author) [hereinafter cited as Reilly Letter].

321. See *Stone v. Public Util. Comm'n*, 192 Pa. Super. 573, 162 A.2d 18 (1960). The court stated that the design of the plant was not in issue before the state commission and that, with respect to safety factors, the responsibility was that of the federal government. 162 A.2d at 21.

322. Pennsylvania Clean Streams Law, Pa. Stat. tit. 35 § 691.1 et seq. (1964), as amended (Supp. 1972). The new Dep't of Environmental Resources exercises the powers of this Board as well as those of the Dep't of Health. Pa. Stat. Ann. tit. 71 § 510-11. et seq. (Supp. 1972).

323. Those subdivisions of the Dep't of Health are now part of the new Dep't

The first commercially operated power reactor in the United States, the Shippingport Station, operates under such a Liquid Waste Permit.³²⁴

Radioactive emissions from nuclear reactors have been regulated by the Bureau of Air Pollution Control since January 28, 1969.³²⁵ Prior to operation of a reactor, a permit must be secured from the Air Pollution Control Commission. The application for a permit is reviewed by the Bureau of Air Pollution Control and the Office of Radiological Health.³²⁶ Pennsylvania's Air Pollution Control Engineering Guides for Nuclear Reactors³²⁷ parallel the AEC's requirements. They allow release of concentrations not in excess of state Department of Health standards³²⁸ (similar to 10 C.F.R. § 20), or higher concentrations when it is shown that resulting radiation doses will not exceed state standards.³²⁹

Michigan³³⁰

Apparently, the situation in Michigan is similar to that in Pennsylvania. It was defined in 1970 in an exchange of letters between the AEC and the Michigan Attorney General's Office.³³¹ The Michigan State Water Resources Commission had issued an Order of Determination covering effluents discharged from the planned Donald C. Cook Nuclear Plant³³² into Lake Michigan, and invited AEC comments.³³³

of Environmental Resources, Pa. Stat. Ann. tit. 71 § 510-11. et seq. (Supp. 1972).

324. "In accordance with the Pennsylvania State Industrial Waste Permit . . . [a]fter dilution with condenser water, the activity must be less than 10^{-8} microcuries per cc in excess of the level in the intake water of the plant. This is ten times less than currently applicable and recently proposed Federal MPC's for unidentified mixtures containing no alpha radiation." (Radioactive Waste Handling in the Nuclear Power Industry, March 1960, Edison Electric Institute, EEI Publication No. 60-46 at 42).

325. Reilly Letter, *supra* note 320. Note the statutory reorganization of the department, *supra* note 322.

326. Reilly Letter, *supra* note 320.

327. Pennsylvania Dep't of Health, Air Pollution Comm'n, Regulation III Engineering Guides, Nuclear Reactors § 3.7.1., adopted Jan. 28, 1969.

328. *Id.*

329. *Id.*

330. See note 301 *supra*.

331. Michigan has issued non-pollution orders. 15 AECH, No. 27 (July 7, 1969), at 2-8.

332. Nos. 50-315, 50-316 (AEC, Dec. 1967) (Cook No. 1 and 2, Benton Harbor, Mich.).

333. *Id.*

In response, H.L. Price, AEC Director of Regulation, pointed out that the AEC had responsibility for regulation of radioactive effluents from nuclear plants.³³⁴ He stated that the congressional intent for AEC regulation of radiation hazards was to avoid the evils of "dual regulation."³³⁵

Replying to that letter, Assistant Attorney General Jerome Maslowski wrote:

[T]he Water Resources Commission [W.R.C.] has entered . . . an Order of Determination in the instance of each nuclear plant. These orders have generally been compatible with any federal restrictions. It is the position of the Water Resources Commission, supported by the office of the Attorney General, that they have a basic responsibility to guard the waters of the state against pollution, irrespective of the source. They are not satisfied that the entire responsibility should be left to Atomic Energy Commission. It is their belief . . . that the Atomic Energy Commission is not presently in a position to adequately monitor and safeguard the waters in the State of Michigan. Neither are we satisfied that the Atomic Energy Act reflects a Congressional intent to place waters of state under AEC regulations insofar as pollution from reactors is concerned.³³⁶

The letter went on to state Michigan's intent: "The Water Resources Commission expects to participate in the Atomic Energy Commission licensing procedures in every instance; however, it also purports to issue an Order of Determination before a hearing in every instance. They expect that the orders issued will usually be compatible with the standards set by the Commission."³³⁷ It assured the AEC, however, that the state would cooperate with the federal agency in its licensing proceedings.³³⁸

New York³³⁹

New York is an "agreement state" under Section 274 of the Atomic Energy Act. On October 15, 1962 the AEC and the state entered into

334. 15 AECH, No. 27 (July 7, 1969), at 2.

335. *Id.*

336. *Id.* Letter from Jerome Maslowski to H.L. Price, June 20, 1969.

337. "Such orders are further beneficial in that they justify expenditures . . . by the state for monitoring and checking of such facilities insofar as pollution control is concerned." *Id.*

338. "It is not the purpose of the Commission to allow its procedures to interfere with any of the Atomic Energy Commission licensing procedures. The Water Resources Commission feels that the Atomic Energy Commission and its personnel have been most cooperative in every instance, matters have been solved to our satisfaction and we hope that this shall continue." *Id.*

339. See generally Atomic Energy Coordinating Council, Radiation Control in the State of New York (1963). On federal regulation of safety regulation, see *Lewis v. Alexander*, N.Y. Sup. Ct., Spec. Term Pt. I, New York County, May 11,

the agreement, under which the Commission released certain regulatory authority to the state.³⁴⁰ New York was the fourth state to enter into such an agreement. The New York agreement followed the pattern of prior AEC-state agreements with certain substantial exceptions, the more important of which states that both the Commission and the state "recognize that the limits on their respective rights, powers, and responsibilities under the Constitution, with respect to protection against radiation hazards arising out of the activities licensed by the Commission within the State, are not precisely clear."³⁴¹ It then goes on to provide that both parties will "work together to define, within a reasonable time, the limits of, and to provide methods for accommodating, such responsibilities of both parties."³⁴²

This provision "resulted from a difference of opinion between certain New York State officials and the AEC regarding the extent to which the Atomic Energy Act has pre-empted the regulation of atomic materials and related activities for radiation protection purposes."³⁴³ It is interesting to note in the present context that "[a]n example that has been used in discussing possible principles involved is the release into the environment of radioactive materials from Commission-licensed reactors."³⁴⁴

The New York State Bar Association's Committee on Atomic Energy undertook an independent study of the problem at the same time that the state-federal study authorized by the agreement was underway. The report supported federal pre-emption, and recommended that as soon as a consensus was reached by the state and federal authorities, it be published in the Federal Register.³⁴⁵

In May, 1965, a Memorandum of Understanding was published.³⁴⁶ This document spelled out certain areas for state-federal cooperation. However, it left the larger jurisdictional questions unanswered:

Nothing in this Memorandum of Understanding shall be construed as defining or

1967, 1967 CCH Atom. En. L. Rep., ¶ 16,579 (shareholders' derivative suit seeking to enjoin construction of a nuclear plant on safety grounds).

340. 27 Fed. Reg. 10419 (1962).

341. *Id.* Art. VII.

342. *Id.*

343. N.Y. State Bar Ass'n, Comm. on Atomic Energy, State Jurisdiction to Regulate Atomic Activities: Some Key Questions, at 2 (1963).

344. Letter from Glenn T. Seaborg to Nelson A. Rockefeller, October 15, 1962. *Id.* at n.13.

345. N.Y. State Bar Ass'n Study, *supra* note 343, at 39.

346. Memorandum of Understanding, May 13, 1965 in 1967 CCH Atom. En. L. Rep., ¶ 16,563.

affecting the respective rights and powers of the Commission or the State under the United States Constitution, nor as affecting in any way the rights and privileges of any third party. In view of the mechanisms provided in this Memorandum of Understanding for accommodating the interests of the parties, the Commission and the State consider any attempt to define the limits of the rights and powers of the parties to be unnecessary.³⁴⁷

At the present time, regulations, on "Ionizing Radiation" are included in Part 16 of the New York State Sanitary Code, the statutory authority for which is the Public Health Law.³⁴⁸

Since the AEC recognized the right of the state to monitor for levels of radiation in the environment, the state has developed regulations for participation in environmental surveillance around AEC-licensed nuclear facilities.³⁴⁹ If sufficient increases in radiation levels around such a facility were found, the state would have to ask the AEC to take corrective action.³⁵⁰

Other States

Several other states have regulated the effluents from operating nuclear plants, setting radioactive release standards generally compatible with, but not necessarily identical to, AEC standards. The Illinois Department of Public Health, for example, issued a permit for the Dresden 1 Reactor Plant to discharge a certain amount of radioactivity in its effluent.³⁵¹ It has also stirred recent controversy by setting radiological release limits for the Dresden 2 and 3 units³⁵² and the Quad Cities Plants.³⁵³

California's Northern Coastal Regional Water Quality Control Board has regulated the effluent from the Humboldt Bay Nuclear Reactor

347. *Id.* at 5.

348. N.Y. Pub. Health Law § 225 (McKinney, 1954); see also New York City Health Code, Art. 175 (1966) which specifies New York City's regulations pertaining to radiation control.

349. New York City Sanitary Code § 16.111 (1956).

350. In 1971 the AEC signed contracts for co-operative programs of environmental monitoring around nuclear power plants with Maryland (AEC Press Release 0-141, Aug. 24, 1971), Michigan (0-135, Aug. 9, 1971), New York (0-138, Aug. 20, 1971), and South Carolina (0-106, June 29, 1971). 13 Nuclear Safety 74-75 (Jan.-Feb. 1972).

351. J. Blomeke & F. Harrington, *Management of Radioactive Wastes at Nuclear Power Stations*, Oak Ridge National Laboratory—4070.

352. *In re Dresden Nuclear Power Station*, 2 ERC 1302 (March 3, 1971).

353. *Issac Walton League v. Schlesinger*, 337 F. Supp. 287 (D.D.C. 1971).

Plant.³⁵⁴ These effluents standards are more restrictive than those of the AEC's Part 20 regulations.³⁵⁵

In Maryland, which became an "agreement state"³⁵⁶ effective January 1, 1971, the Department of Water Resources issued a Water Use Permit in 1970 for the Calvert Cliffs Nuclear Plant now under construction.³⁵⁷ Under the terms of the permit, the plant is held to one per cent of 10 C.F.R. Section 20 discharge limits.³⁵⁸

354. Blomeke & Harrington, *supra* note 351.

355. Maryland Dep't of Water Resources, Surface Water Appropriation Permit No. C-70-SAP-1, July 10, 1970. See note 62 *supra*.

356. The agreement is similar to those with other states (see 1971 CCH Atom. En. L. Rep. ¶ 16,606), but is accompanied by a memorandum of understanding on the jurisdictional issue raised by the Water Resources Department permit for Calvert Cliffs.

357. Nucleonics Week, Vol. 11, No. 26, July 2, 1970, at 1.

358. *Id.*