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HARNESSING THE ATOMIC JUGGERNAUT: THE NEED FOR MULTI-LATERAL INPUT IN NUCLEAR ENERGY DECISION-MAKING

Technology which formerly existed only in the realm of science fiction has been assimilated into the contemporary way of life. Human beings walk upon the moon's surface; a space shuttle orbits the earth; laser beams are being used to cure disease; and energy from atomic fission is being used to create electricity. While technology becomes more specialized, complex and inscrutable to the layperson, society's dependence upon technology inexorably increases. The trend towards technocracy must be met with active and intelligent public participation in this atomic age, when one poorly rendered decision can result in catastrophe.

The use of nuclear energy has been and continues to be promoted as a solution to a bifurcated energy dilemma, whereby the supply of economically extractable fossil fuels is plummeting while energy demands rapidly multiply.¹ It has been predicted that nuclear reactors, now supplying slightly over 5% of the nation's energy, will provide over 50% by the year A.D. 2000.² The national response to the approximately 15% cutback in oil from Arabian nations illustrates what could result if nuclear energy was cut off in the year 2000.³ Before time and resources become irrevocably committed to nuclear power, several critical issues should be scrupulously examined by a diverse and disinterested audience. Should the Atomic Industrial Establishment⁴ alone decide 1) what emission control standards should be; 2) where and how atomic waste material should be contained; and 3) to which forms of atomic energy producers (light-water reactors, fast-breeder reactors, fusion reactors) priority should be given? These problems, along with many others related to nuclear energy, have grave implications for future generations whose

1. See, Hubbert, *The Energy Resources of the Earth*, 224 *Scientific American* 61, 64, 69 (1971).

2. Lewis, *The Nuclear-Power Rebellion*, at 20 (1972); see also, Swan, *Management of High-Level Radioactive Wastes: The AEC and the Legal Process*, 1973 *Law and the Social Order* 263; *Newsweek*, Dec. 10, 1973 at 137.

3. Interview with Charles Hyder, Ph.D., Environmental advisor to NASA and Professor of astronomy at the University of New Mexico.

4. Atomic Industrial Establishment has been variously defined, but generally refers to the coalition of the AEC, Joint Committee on Atomic Energy, the AEC's predominant contractors, General Electric and Westinghouse, as well as certain utility companies furnishing atomic energy.

interests are vitally affected by decisions which are made now. Traditionally, these decisions have been the almost exclusive domain of the Atomic Energy Commission. Advice is proffered by organizations such as the Federal Radiation Council, the National Academy of Science and the National Council on Radiation Protection, but the Atomic Energy Commission ultimately decides.⁵ The Joint Committee on Atomic Energy, formed in 1946 (the only committee with legislative powers), provides the sole supervision of the AEC. Unhappily, this "supervision" has been less than adequate:

With sole authority in its area of activity, extremely broad powers, and with much of its activity cloaked by security regulations on information, the AEC is a singularly difficult body to influence. It is subject only to the restraints of the Joint Committee, designated by law its "watchdog." Yet over the years, the two bodies have drawn together until they are almost indistinguishable.⁶

Criticism and comments from adverse camps have been ill-received by the AEC. A former commissioner of the AEC has referred to the "hogwash syndrome" . . . they talk and write about hazard and accident possibilities but ignore the care that goes . . . into hazard and accident prevention," and "stirrer uppers' who do much to fan unfounded fears by distorting or ignoring the facts."⁷ In litigation, discovery has been difficult. Industry and governmental employees have proved hostile witnesses when called upon to testify regarding technical aspects of their work.⁸ Employees are discouraged from endorsing attitudes not in line with AEC policy. The experience of Arthur Tamplin, a highly regarded AEC researcher, and John Gofman who was an associate director at the AEC's Livermore laboratory illustrate the commission's response to valid differences of opinion. The scientists, hired expressly to study the effects of radiation on man, challenged the AEC emission standard and called for better radiation containment and a tenfold reduction of the annual permissible dose.⁹ The AEC attacked their findings as "without scientific validity" and censored papers which were to be presented to professional associations. Tamplin's staff was transferred to other projects. Ralph Nader was alerted to the Gofman-Tamplin plight and responded in a letter to Senator Edmund Muskie:

5. Moore, *The Environmentalist and Radioactive Wastes*, 49 Chi.-Kent L. Rev. 55, at 63 (1972).

6. S. Novick, *The Careless Atom*, 194 (1968).

7. Ramey, *Radiation Protection—Past, Present, and Future*, 11 Atomic Energy L.J. 1, at 2.

8. Moore, *supra* note 5, at 66.

9. See, Lewis, *supra* note 2, 81-108.

As far as can be determined, the two scientists . . . have been accused of no wrongdoing, no violation of the AEC regulations and no scientific dishonesty. Actually, the available indications are that Gofman and Tamplin have been accused of heresy by an agency so committed to the promotion of atomic energy that it has insisted that radiation risks be treated more as articles of faith . . . than as propositions to be examined continually.¹⁰

The practicality and the wisdom of the AEC's dual responsibility as promoter and as regulator of the atomic energy industry has often been questioned. Compounded by the agency's closed-door attitude, the present arrangement seems counter-productive at best. Commentators have suggested bringing major issues out into public scrutiny:

The attempts of the laboratory to disclaim such presentations by Tamplin, or by Gofman and Tamplin jointly, have raised a number of questions about the public responsibilities of a government laboratory. Was it being operated in the public interest or in the interest of a self-contained Establishment? How can the public interest be advanced by censoring dissent?¹¹

Dissent and citizen organization have advanced the public interest in spite of AEC admonitions to the contrary. Examples of public intervention and its healthy influence upon the final resolution in each instance stress the importance of encouraging and expanding public intervention in proposed and pending atomic energy projects.

Emission standards have been one of the most bitterly contested issues surrounding the operation of nuclear power plants. A growing body of scientists, including Linus Pauling and Ernest Stienglass along with the previously mentioned Gofman and Tamplin, claim that radiation emission standards as presently established (170 millirads¹² annual dose per person) are at least ten times too high. Evidence has been found which has led these scientists to believe that such a high level of radiation exposure has been the cause of increased incidence of birth defects, cancer and leukemia.¹³ Gofman and Tamplin have stated that the 170 millirad dose is responsible for approximately 32,000 deaths a year from cancer and leukemia.¹⁴ Most authorities now agree, as the Federal Radiation Council

10. Lewis, *supra* note 2, at 101.

11. Lewis, *supra* note 2, at 100.

12. Millirad is 1/1000 of a rad: Radiation Absorbed Dose, amount of radiated energy absorbed by animal tissue. The maximum permissible dose of radiation per year is determined by dividing 5 rads by 30 years—170 millirads a year.

13. See, Lewis, *supra* note 2, 48-80; see also, N. Fabricant and R. M. Hallman, *Toward a Rational Power Policy: Energy, Politics, and Pollution* 112 (1971).

14. Green, *Radioactive Waste & the Environment*, 11 *Natural Resources J.* 280 (1971).

admitted, that “. . . every use of radiation involves the possibility of some biological risk either to the individual or his descendants.”¹⁵ A 1960 Federal Radiation Council Report, regarded as the fundamental document establishing national policy with respect to radiation protection standards, presents certain basic biological assumptions:

There are insufficient data to provide a firm basis for evaluating radiation effects for all types and levels of irradiation. There is particular uncertainty with respect to the biological effects at very low dose rates. It is not prudent therefore to assume that there is a level of radiation exposure below which there is absolute certainty that no effect may occur. This consideration in addition to the adoption of the conservative hypothesis of a linear relationship between biological effect and the amount of dose, determining our basic approach to the formulation of radiation protection guides.¹⁶

Yet the federal government, comfortably believing that the benefits justify the risks, still permits emissions of 170 millirads per person per year, although present technology is capable of producing atomic energy with dramatically less emission of radioactive matter. Fortunately, public intervention has contributed to the implementation of more realistic emission standards. Courageous scientists challenging the sanctity of the atomic industrial establishment provided the catalyst, while active, knowledgeable citizens and an independent, concerned judiciary brought these ideas of life.

The battle between the State of Minnesota and Northern States Power exemplifies what can be achieved in the face of a monolithic entity such as the atomic industrial establishment and stresses what results must still be sought.¹⁷ Minnesota's standards for radioactive emissions and wastes were 100 times more restrictive than the AEC limits. Minnesota moved to enforce its standards, when the Northern States Power Company received an AEC permit to build a light/water reactor at Monticello, Minnesota, 40 miles upstream from St. Paul and Minneapolis. The power companies resisted, claiming that even where technically feasible, enforcing Minnesota standards would force increased costs. This was simply a value judgment made by the atomic industrial establishment, not the consumers and the Minnesota citizens, whereby economy of operations was given a higher priority than environmental health and safety. The company defended its stance on the ground that AEC standards were national and thus pre-empted imposition of state standards, even in the state's

15. Fabricant and Hallman, *supra* note 13, at 32; *see also*, J. Gofman and A. Tamplin, *Nuclear Power, Technology and Environmental Law*, 2 Environmental Law 57, at 61.

16. 1 CCH Atomic Energy Rep. ¶ 4046.

17. Lewis, *supra* note 2, 122-135. *See also* Moore, *supra* note 5, 71-74.

exercise of its police power to protect life and property. In *Northern States Power Co. v. State of Minnesota*¹⁸ the Supreme Court of Minnesota held that the State of Minnesota was without authority to regulate the release of radioactive discharges, because Congress had pre-empted the field of regulation.

Fortunately, this was not the end. Public attention was aroused. Once a small band of scientists, the AEC's adversary was now the government of a state, which, in the words of consultant Professor Ernest C. Tsvoglou, questions industry's right to "contaminate the environment beyond the limits of necessity," when it had been established that in most cases emissions could be kept under 1% of the standards set by the federal government.¹⁹ Groups such as the Minnesota Environmental Control Citizen's Association (MECCA) intervened at the operating-license stage of the federally recommended licensing procedure and demanded a public hearing. During the course of this public hearing, the validity of certain inspection reports (generally of public record) was impeached by evidence of censorship, deletions and indications of technical violations. It was found that most monitoring of plant sites and testing of components was done, not by government inspectors, but by the companies themselves. "At many points . . . it was clear that the Regulatory Staff [of the AEC] does no independent testing, but rather dedicates itself to searching through stacks of paper and taking the word of the applicant."²⁰ Obviously the evils which governmental regulation was instituted to avoid are not in the least thwarted by this sort of "regulation."

Although a limited license was granted, the next day Northern States Power Company announced that the Monticello plant would be modified to reduce radioactive discharges in effective compliance with the standards adopted by Minnesota. While citizen intervenors achieved a de facto victory, it was not the result of the exercise of a legally established right; nor was Minnesota's legal right to establish its own emission standards recognized. Thus, the need to establish legal avenues for citizen and state participation and control in the setting of emission standards is obvious.

The transfer of full regulatory authority in standard setting, matters of safety, public health and environmental impact and re-

18. 320 F. Supp. 172 (D. Minn. 1970), *aff'd mem.*, 405 U.S. 1035 (1972).

19. Statement of Ernest C. Tsvoglou to the Minnesota Pollution Control Agency, quoted in Lewis, *supra* note 2, at 127.

20. Statement of intervenors Kenneth Dzugan, George Burnett II, and Theodore Pepin in the Monticello Nuclear Power Station Operating License Hearing, August 24, 1970, quoted in Lewis, *supra* note 2, at 131.

licensing procedures for nuclear facilities from the AEC to the EPA (Environmental Protection Agency) has been recommended enthusiastically by several commentators including the Environmental Protection Administration of the City of New York.²¹ (Approximately 40% of New York City's energy comes from nuclear reactors.) This transfer would encourage a more impartial balancing between energy demands and the need for a viable environment. The public too, through citizen groups and the political process itself, should not be excluded from the complex, yet terribly important, process of establishing emission standards and other environmental parameters necessary in controlling the production of nuclear energy. Lauriston Taylor, Chairman of the National Council for Radiation Protection, has stated that "the setting of radiation standards is not basically a scientific standard. . . . It is more a matter of philosophy, of morality, and of sheer wisdom."²² The atomic industrial establishment alone cannot determine for the public which priorities it will choose. It is a matter of public policy, whereby the people select their priorities and accept the costs of that choice.

The landmark opinion in *Calvert Cliffs Coordinating Committee, Inc. v. AEC*,²³ has been one of the most encouraging results of citizen intervention.²⁴ The construction of a 1600 megawatt nuclear powerplant on the western shore of Chesapeake Bay precipitated a raging controversy over pollution of the bay by atomic wastes (principally tritium) and thermal wastes which endangered much of the bay's flora and fauna.²⁵ The Chesapeake Environmental Protection Association (CEPA) was formed and intervened at the licensing hearings. The AEC, however, disregarded CEPA's fundamental contentions, while alleging that 1) the tritium discharge was acceptable, because it came within federally prescribed standards,²⁶ and 2) thermal pollution was beyond the AEC's purview.

The AEC had placed itself beyond the reach of the National Environmental Policy Act (NEPA) until it could complete a study establishing special regulations pursuant to NEPA. While the AEC asserted jurisdictional and standing deficiencies on the part of the

21. Fabricant and Hallman, *supra* note 13, at 291.

22. Green, *supra* note 14, at 293.

23. 449 F.2d 1109 (D.C. Cir. 1971).

24. Lewis, *supra* note 2, 257-297.

25. Federal Power Commission study found that aquatic species are delicately attuned to their environment and slight changes in temperature can decrease their viability considerably; "All aquatic species have an optimal temperature range. . . . If the temperature varies above or below this range, the chances of survival for that species incrementally decreases." Lewis, *supra* note 2, at 274.

26. 449 F.2d 1109, 1112 (D.C. Cir. 1971).

intervenors, citizens formed a new organization, Calvert Cliffs Coordinating Committee, and solicited help from the Sierra Club, the National Wildlife Federation and certain Washington, D.C., attorneys. They demanded that the AEC issue environmental impact statements pursuant to the requirements of NEPA before continuing construction of the plant. The AEC continued construction promising to comply with NEPA when the special AEC rules under it had been developed. A petition to the Maryland Court of Appeals requested the AEC to show cause why plant construction should not be suspended pending complete review of environmental consequences as required by NEPA. At this point, the AEC issued its regulations pursuant to NEPA. They stipulated among other things that: 1) environmental matters must be affirmatively raised at hearings or they would not be considered; 2) non-radiological environmental issues could not be raised at hearings where notice was published before March 4, 1971 (this would exclude the thermal pollution issue in the Calvert Cliffs hearings); and 3) certificates of compliance with other state and federal environmental standards shall preclude further investigation by the AEC. These regulations seemed to treat NEPA as a statement of policy rather than law. The Calvert Cliffs Coordinating Committee was not placated, and the matter was finally resolved by the United States Court of Appeals.

The coordinating committee ultimately prevailed. The AEC was required under NEPA to substantially broaden its rules in respect to environmental consequences of the construction and operation of nuclear power plants. Judge J. Skelly Wright further illuminated the purpose of the NEPA and the responsibilities of federal agencies pursuant to that act:

NEPA, first of all, makes environmental protection a part of the mandate of every federal agency and department. The Atomic Energy Commission, for example, had continually asserted, prior to NEPA, that it had no statutory authority to concern itself with the adverse environmental effects of its actions. Now, however, its hands are no longer tied. It is not only permitted, but compelled, to take environmental issues into account.

We believe that the Commission's crabbed interpretation of NEPA makes a mockery of the Act.²⁷ NEPA requires that an agency must—to the *fullest* extent possible under its other statutory obligations—consider alternatives to its actions which would reduce environmental damage. That principle establishes that considerations of environmental matters must be more than a *pro forma* ritual. Clearly

27. *Id.* at 1117.

it is pointless to "consider" costs without also seriously considering action to avoid them.²⁸

This landmark decision has erased all speculation as to the role NEPA was to play in protecting those environmental parameters defined by Congress. Had citizens assumed a passive role and allowed the AEC to regulate itself, the vitality of the NEPA might have been destroyed quietly and insiduously by agency interpretation of it as a mere policy statement.

Currently, citizen groups are actively participating in the problem of disposal of atomic wastes. This is an environmental concern which is greatly in need of multilateral input and which should be given increased national exposure. The AEC predicts that boiling-water reactors and liquid-metal reactors will produce an annual combined spent-fuel discharge of over 15,000 tons by the year 2000.²⁹ While most of the atomic wastes created today result from energy generation, wastes do remain from 25 years of weapons production as well. These wastes are classified as low-level and high-level. High level wastes, cesium 137, strontium 90 and transuranic isotopes such as plutonium 239, present the greatest health hazard and the most complex problems of disposal.

Plutonium 239, one of the most explosive and toxic substances known to man, should be isolated from the biosphere for hundreds of thousands of years. Cesium 137 and strontium 90 are also extremely poisonous and require containment for hundreds of years. Because larger quantities of these elements are generated and because they migrate through the soil toward groundwater at a significantly greater rate than does plutonium 239, cesium 137 and strontium 90 could present a greater immediate hazard.³⁰ High level wastes generate a considerable amount of heat through radioactive decay, thus the stainless steel, concrete-sheathed underground tanks in which these wastes are presently being stored must be periodically cooled. There is a danger that plutonium 239 will reach a critical mass resulting in an explosion, which would release the highly toxic and radioactive substance into the atmosphere. High level radioactive wastes have a tendency to concentrate along the food chain, greatly enhancing the danger to human beings and other forms of life. Hazards are amplified by the possibility of military attack at a storage site, as well as by natural calamities such as earthquakes. Extreme care must

28. *Id.* at 1128.

29. Swan, *supra* note 2, 263-64.

30. C. Fox, *Radioactive Wastes*, USAEC Division of Technical Information, 12, 13 (1969).

be taken to insure that wastes are not disposed of near a water table in order to prevent the contamination of human water supplies.

High level wastes are currently being stored in underground tanks cooled by immersion coils. 75% of these wastes, amounting to more than 75 million gallons, are being kept in Hanford, Washington. Other storage sites are located at the National Reactor Testing Station in Idaho and the Savannah River Plant in South Carolina.

These various locations are intended merely as temporary disposal sites, until the AEC decides where and how these highly toxic wastes shall be permanently disposed of. None of the presently employed locations is suitable for permanent storage and the near perpetual guardianship which that entails. A government report stated

that none of the major sites (including the Hanford Reservation) at which radioactive wastes are being stored or disposed of is geologically suited for safe disposal of any manner of radioactive wastes other than very dilute, very low-level liquids. . . .³¹

Indeed, high level wastes have leaked out of underground tanks on 16 occasions releasing radioactive matter into the ground and possibly the water supply.³² Proposals for future disposal include burial in bedded salt deposits, storage in engineered surface facilities above ground and even rocketing the wastes into outer space.³³

The development of a pilot salt bed deposit in Lyons County, Kansas, was arrested, when it was found that water could reach the salt mines and cause the wastes (which were to have been stored in unrecoverable vessels disintegrating within a few years) to be leached into the soil. Citizen intervention helped to expose this hazard and bring it to the attention of the decision-makers.³⁴

In *Natural Resources Defense Council, Inc. v. Dixie Lee Ray*³⁵ an environmental impact statement was required of the AEC in regard

31. Committee on Geologic Aspects of Radioactive Waste Disposal, Division of Earth Sciences, National Academy of Sciences—National Research Council, Report to the Division of Reactor Development and Technology, U.S. Atomic Energy Commission, at 11 (May 1966).

32. Several leaks have been detected near the Hanford site. By the end of 1972, 190,000 curies of cesium 137 had leaked into the soil. Two recent leaks, including the largest ever of 115,000 gallons, have added approximately another 40,000 curies of cesium-137 and 15,000 curies of strontium-90. See AEC Richland Operations Office Press Release dated July 10, 1973; San Francisco Chronicle, June 13, 1973; Oregon Times, 20 (July 1973). Additionally about 100,000 gallons of high-level wastes have leaked from waste transfer pipelines. Seattle Times, July 15, 1973.

33. See, Swan, *supra* note 2, and Fox, *supra* note 30, 24-27.

34. See, Lewis, *supra* note 2, 148-171.

35. Complaint and Memorandum in Support of Plaintiff's Application for Preliminary Injunction, *Natural Resources Defense Council, Inc. v. Dixie Lee Ray*, Civil Action #3924 (E.D. Wash. 1973).

to waste disposal in the Hanford, Washington facility. The AEC agreed to prepare an impact statement, if possible, before generating any further radioactive wastes at the spent-fuel processing plant. According to John Bryson, an attorney for the Natural Resources Defense Council, "We think that this lawsuit and today's agreement and order will make a small contribution to the very substantial problems posed by the necessity to keep radioactive wastes isolated from the environment for centuries to come."³⁶

The disposal of atomic wastes is a crucial problem of immediate importance. New problems are being perceived, new issues are appearing and new policies are developing. Concern is mounting, but unfortunately, not everyone appears sufficiently worried.

Neither the President, the Congress, the scientists or the people appear to be sufficiently worried about the atomic graveyards. An explosion in any one of them could easily result in the nuclear contamination of a large part of the United States. Built over aquifers, near major rivers, in the desert, or even in salt mines, they are potentially the most dangerous regions on earth. Are they as safe as the AEC contends? They can't be! If they were, no one would have suggested the futuristic concept of moving them to the sun.³⁷

In New Mexico, hearings are scheduled within the year concerning the construction of a bedded salt pilot plant near Carlsbad. Stringent site selection factors have been designed to enable the plant to be expanded to a full-scale repository, if all health and safety requirements and other environmental considerations are satisfactorily met.³⁸ Citizen groups, such as the Southwest Research and Information Center and New Mexico Citizens for Clean Air and Water, are currently studying aspects of this proposal and plan to contribute their findings to the public hearings.³⁹ This intervention will bring more aspects of the proposal under public scrutiny and will inject policy considerations which might otherwise have been left unevaluated. With such multilateral input the final resolution of the proposed bedded salt pilot plant near Carlsbad can not help but be better reasoned than it would have been if made solely by the atomic industrial establishment.

Emission standards, thermal pollution and containment of atomic wastes are but a few of the complex problems of tremendous import

36. Agreement and Order in Radioactive Wastes Lawsuit, Natural Resources Defense Council memorandum, August 17, 1973.

37. Moore, *supra* note 5, at 80.

38. Letter from Elliot Winnock, attorney, Office of the General Counsel, Atomic Energy Commission, January 8, 1974.

39. Hyder, *supra* note 3.

associated with the use of nuclear energy. The hazards are numerous: the failure of a cooling apparatus which could cause a nuclear explosion; an accident in transit; the threat to national security; leaks undetected; leaks unreported; and these are but a few of the dangers. Plutonium's deadliness, coupled with its 24,000 year half life, bring the very use of the fast breeder reactor, the primary producer of plutonium, into question. Alternative sources of energy should be considered, as they should have been years ago before the nation became so singularly committed to fossil fuels. Even the fusion reactor is a viable alternative. Being developed at this time, the fusion reactor is fueled by deuterium (heavy hydrogen) which is abundant. It is almost twice as efficient as the fission reactors and appears to be far safer. It is claimed that research priorities have been given to the fission reactors, and there is little incentive to abandon that campaign in favor of a fusion campaign.⁴⁰ Public pressure could provide the incentive.

Perhaps fission energy is inevitable. If so, the inherent risks are inevitable also, and they will multiply as light-water and fast-breeder reactors become far larger and far more numerous. While the atomic industrial establishment has done a very good job in averting catastrophic accidents, the time has come for citizens to participate in the process by which these risks are allocated.

It is not suggested that the AEC program is going forward in callous disregard of the risks attributable to radioactive wastes. Rather those government officials responsible for the licensing and regulation of AEC activities as well as those scientists who develop the radiation protection standards, sincerely believe that the risks are trivial and far out-balanced by the benefits.⁴¹

In short, decision making in atomic energy programs has largely been removed from the normal process of open debate. There is no question but that the Joint Committee and the AEC are conscientious and acutely aware of the need for safety. Yet it is too much to ask them to make decisions unassisted which have such sweeping importance for society. It is too much to ask them to judge the safety and advisability of programs in the development of which they have themselves invested many years and great efforts.⁴²

Before technological mystique and bureaucratic detachment cause public participation to be virtually impossible, political energies should be invested in developing means of achieving avenues of public involvement in the decision making process. Intervention by citi-

40. Lewis, *supra* note 2, 233-235.

41. Green, *supra* note 14, at 294.

42. Novick, *supra* note 6, at 195.

zen groups at administrative hearings has often proved successful as in the *Northern Power* and *Calvert Cliffs* cases. These groups should be encouraged and supported as should the institution of public hearings. Also, the recording of administrative review proceedings, such as license hearings, should be a regular practice. Information must be disseminated and care must be taken to assure its objectivity and accuracy. The Committee for Nuclear Information (now called the Committee for Environmental Information) has published a monthly bulletin for ten years, *Nuclear Information*. Now a monthly magazine is being published entitled *Scientist and Citizen*.⁴³ Organizations and publications such as these help bring crucial issues before the public. Only with exposure to facts, issues and various opinions can the public intelligently exercise its right to participate in the development of the nuclear industrial establishment. Public awareness will bring these issues into the political arena where politicians will be compelled to respond to the sentiments of their constituents. Such multilateral input will result in more responsive and better considered legislation which is essential to intelligent regulation of atomic energy. Existing legislation, such as the National Environmental Policy Act, the Administrative Procedure Act and the Freedom of Information Act, must be broadly and wisely interpreted by the courts which help bring Congressional action to life. Citizen groups should be given liberal standing to insure the necessary checks and balances provided by judicial review.

The time has come. Before we have become abjectly dependent on nuclear energy (specifically fission) and have become resigned to pay its rather drastic costs, we must openly and actively participate in the creation of a new form of decision-making policy and procedure. Fission reactors must not be allowed to spawn on an ad hoc, laissez faire or leave-it-to-Big Brother basis. The result of even a small miscalculation can be disastrous. Clearly, we must take the responsibility to contribute to the sensitive decisions and evaluations which must be made and to establish a precedent, whereby the atomic industrial establishment must cooperate with and work with a constantly vigilant public.

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43. *Id.* 198-201.