

THE FAILURE OF AGENCY-FORCING: THE REGULATION OF AIRBORNE CARCINOGENS UNDER SECTION 112 OF THE CLEAN AIR ACT

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Professor Graham analyzes section 112 of the Clean Air Act, a provision intended by Congress to achieve ambitious regulatory ends by constraining agency discretion. The performance of the Environmental Protection Agency in implementing section 112 reveals flaws inherent in this "agency-forcing" approach to statutory design. In particular, section 112 directs the Agency to list formally those pollutants that it determines—without statutory guidance—to be "hazardous." This directive, added to the requirement that the Agency promulgate within short deadlines very stringent rules regulating listed pollutants, has led to a lack of result that is perceived as bureaucratic footdragging. This lack of result is, however, due to the statutory design itself, and especially to its denial to the Agency of authority to consider costs and benefits in writing regulations governing sources of listed pollutants. A package of reforms is proposed to bring needed flexibility to section 112.

I. INTRODUCTION

The mandate to the United States Environmental Protection Agency (EPA) expressed in the Clean Air Act Amendments of 1970¹ reflects a radical departure from what has been called the "New Deal model" of administrative policymaking.² Under the traditional regulatory approach, Congress entrusted expert agencies with broad authority to advance the public interest by devising informed solutions to complex economic and social problems. Expertise was housed in the so-called "independent" agencies or commissions, which were to be insulated from

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1. Act of Dec. 31, 1970, Pub. L. No. 91-604, 84 Stat. 1685 (codified as later amended in scattered sections of 42 U.S.C.). The Clean Air Act is codified, as amended, at 42 U.S.C. §§ 7401-7642 (1982).

2. On the New Deal ideal, see B. ACKERMAN & W. HASSLER, CLEAN COAL/DIRTY AIR 4-7 (1981) and references therein.

political influence and judicial intervention. Yet decades of experience with the New Deal model have generated disappointment, criticism, and mistrust.³ Much of the new social regulatory legislation passed in the 1960's and 1970's was designed to rectify the perceived shortcomings of the traditional approach to regulation.⁴

The "agency-forcing" nature of the Clean Air Act Amendments of 1970 reflects this repudiation of the New Deal model.⁵ Under the agency-forcing approach, blind faith in administrative discretion was replaced by strict procedural and substantive demands on bureaucratic policymaking. Activists in Congress, spurred by their allies in consumer and environmental groups, used statutory language and legislative history to specify the ends/means relationships that would be expected to govern administrative decisions.⁶ The federal judiciary was recruited as an institutional ally in this aggressive bid to force implementation of health, safety, and environmental programs.

It has been fifteen years since passage of the 1970 Amendments, and scholars are beginning to assess and evaluate the consequences of the new approach to regulation. At the risk of oversimplifying the lessons of a growing and complex literature, suffice it to say that the agency-forcing model has not proven to be the panacea that its creators might have hoped it would be.⁷ This article extends the academic critique of the agency-forcing model by examining a somewhat less publicized provision of the Clean Air Act dealing with hazardous air pollutants.

The narrow purpose of the article is to build a case for reform of section 112 of the Clean Air Act. The larger purpose of the article is to criticize the basic model of administrative policymaking embodied in the Clean Air Act. The argument will emphasize the degree to which administrative behavior can be perverted by the nature of statutory de-

3. See *id.* at 7-8 and references therein.

4. On this new social regulation, see National Research Council, *Risk and Decision Making: Perspectives and Research* 2-4, 28-32 (Jan. 1982) (unpublished manuscript) (describing the growth of regulatory legislation passed to protect the health of consumers, workers, and ordinary citizens).

5. On the characteristics of the agency-forcing approach, see B. ACKERMAN & W. HASSLER, *supra* note 2, at 104-15.

6. For a defense of the agency-forcing approach in the case of the Clean Air Act, see Ingram, *The Political Rationality of Innovation: The Clean Air Act Amendments of 1970*, in *APPROACHES TO CONTROLLING AIR POLLUTION* 12-50 (A. Friedlander ed. 1978).

7. See generally R. CRANDALL, *CONTROLLING INDUSTRIAL POLLUTION* (1983) (an economist's critique of EPA's stationary source programs); L. LAVE & G. OMENN, *CLEARING THE AIR: REFORMING THE CLEAN AIR ACT* 2-5, 13-18 (1981) (problems in setting ambient air quality standards); R. MELNICK, *REGULATION AND THE COURTS: THE CASE OF THE CLEAN AIR ACT* (1983) (difficulties with the EPA/judiciary relationship); L. WHITE, *THE REGULATION OF AIR POLLUTANT EMISSIONS FROM MOTOR VEHICLES* (1982) (an economist's critique of EPA's mobile source programs); Ackerman & Hassler, *Beyond the New Deal: Coal and the Clean Air Act*, 89 *YALE L.J.* 1466 (1980) (perversities arising from implementation of section 111 of the Clean Air Act).

mands and judicial review. The article is not so much a challenge to the worthiness of environmental goals as it is a critique of the efficacy of agency-forcing mandates as tools for accomplishing those goals. The recommendations for reform do not call for a complete return to the New Deal approach. Instead, they suggest that section 112 should reflect a calculated mixture of confidence in agency expertise and skepticism about loosely constrained agency discretion.

II. REGULATING AIRBORNE CARCINOGENS

The role of air pollution in the development of human cancers is not well understood. While it is known that man-made sources emit substantial quantities of carcinogenic substances into the atmosphere,⁸ it is not clear whether human exposure to these substances is a major cause of specific cancers. For example, estimates of the proportion of lung cancer in the United States attributable to air pollution range from virtually zero to as much as twenty percent.⁹ Smoking is known to be the dominant cause of lung cancer,¹⁰ but exposure to air pollution may be an additive or synergistic causal factor.¹¹

The Clean Air Act Amendments of 1970 do not provide a general framework for regulation of airborne carcinogens. In the absence of special legislative directions, environmental groups have urged the EPA to regulate carcinogenic air pollutants under section 112 of the Act.¹² Pressure from environmentalists has, for example, caused the EPA to issue emission standards under section 112 for asbestos and vinyl chloride, two

8. B. FULLER, J. HUSHON, M. KORNREICH, R. QUELLITTE, L. THOMAS & P. WALKER, PRELIMINARY SCORING OF SELECTED ORGANIC AIR POLLUTANTS (1976) (report prepared for Office of Air and Waste Management, EPA) (survey of industrial sources reveals that over 50 known or suspected chemical carcinogens are emitted into the air).

9. For evidence that air pollution plays no significant role in causation of lung cancer, see Doll & Peto, *The Causes of Cancer: Quantitative Estimates of Avoidable Risks of Cancer in the United States Today*, 66 J. NAT'L CANCER INST. 1191, 1247 (1981), and Higginson, *Multiplicity of Factors Involved in Cancer Patterns and Trends*, J. ENVTL. PATHOLOGY & TOXICOLOGY, Feb.-Mar. 1980, at 113, 123 (1980). For evidence supporting the contrary thesis, see R. WILSON, S. COLOME, J. SPENGLER & D. WILSON, HEALTH EFFECTS OF FOSSIL FUEL BURNING: ASSESSMENT AND MITIGATION 174 (1980); N. Karch & M. Schneiderman, *Explaining the Urban Factor in Lung Cancer Mortality: Report to the Natural Resources Defense Council 2-6* (Dec. 15, 1981), printed in *Clean Air Act—Part 2: Hearings on New Technology, New Source Performance Standards, Nonferrous Smelters, and Toxic Air Pollutants, Before the Subcomm. on Health and the Environment of the House Comm. on Energy and Commerce, 97th Cong., 1st Sess.* 491 (1981) [hereinafter cited as *1981 Hearings*].

10. See generally J. CAIRNS, *CANCER: SCIENCE AND SOCIETY* 43-45 (1978).

11. See, e.g., Cohen, Arai & Brain, *Smoking Impairs Long-Term Dust Clearance from the Lungs*, 204 SCIENCE 514, 514 (1979).

12. 42 U.S.C. § 7412 (1982).

chemicals known to cause cancer in humans.¹³

Despite scientific uncertainty about the carcinogenic effects of air pollution, the EPA is considering additional regulatory steps to reduce public exposure to suspected airborne carcinogens. The Agency has been studying thirty-seven "priority" air pollutants, many of which are known, based on animal experiments or occupational studies, to cause cancer.¹⁴ Estimates of the number of cases of cancer associated with these thirty-seven pollutants range from several hundred to several thousand per year.¹⁵ The EPA is adopting emission limits for benzene,¹⁶ one of these pollutants, because high occupational exposures to the chemical have been associated with an incidence of leukemia in excess of what would be expected if benzene were harmless.¹⁷ Although environmental exposures to benzene are typically very much lower than occupational exposures,¹⁸ the EPA has taken the position that any exposure to a carcinogen, however small, poses some incremental risk of cancer to exposed individuals.¹⁹

13. Initial Proposed Rule, 36 Fed. Reg. 23,239 (1971) (emission standards for asbestos; proposed Dec. 7, 1971); Final Emission Standards, 38 Fed. Reg. 8819 (1973) (codified at 40 C.F.R. §§ 61.140-.156 (1984)) (asbestos); Initial Proposed Rule, 40 Fed. Reg. 59,531 (1975) (emission standards for vinyl chloride; proposed Dec. 24, 1975); Final Emission Standards, 41 Fed. Reg. 46,559 (1976) (codified at 40 C.F.R. §§ 61.60-.71 (1984)) (vinyl chloride).

14. COMPTROLLER GEN. OF THE U.S., DELAYS IN EPA'S REGULATION OF HAZARDOUS AIR POLLUTANTS 8-11 (1983) [hereinafter cited as GAO REPORT ON SECTION 112] (discussion of how list was developed, including table of 37 pollutants).

15. *Compare Clean Air Act Amendments of 1983—Part 2: Hearings on S. 768 Before the Senate Comm. on Environment and Public Works*, 98th Cong., 2d Sess. 50, 51 (1984) [hereinafter cited as *1983 Hearings*] (statement of William D. Ruckelshaus, Administrator, EPA) (preliminary EPA study estimates excess cancers from industrial point sources in neighborhood of "a few hundred") *with Toxics Problem Said Larger Than Expected; Up to 2,010 Annual Cancers Seen Possible*, CHEMICAL REG. REP. (BNA) No. 8, at 430 (July 20, 1984) (estimate based on draft EPA study) *and with Summary of Data on Specific Pollutants and Cancer Risk Estimates Excerpted from EPA Draft Study on Air Toxics Problem in United States*, 15 ENV'T REP. (BNA) 616, 616-18 (Aug. 10, 1984) (summary table from draft EPA study).

16. *See generally EPA Board to Review Health Data on Emissions from Gasoline Chain*, 8 CHEMICAL REG. REP. (BNA) No. 3, at 82 (Apr. 20, 1984); *Drops in Air Emissions from Sources Prompt EPA to Reconsider Proposed Standards*, 7 CHEMICAL REG. REP. (BNA) No. 51, at 1749 (Mar. 23, 1984); *Plan to Control Benzene Under Section 112 Set by EPA, Includes Final, Proposed Rules*, 14 ENV'T REP. (BNA) No. 33, at 1435 (Dec. 16, 1983).

17. *See, e.g., Infante & White, Benzene: Epidemiologic Observations of Leukemia by Cell Type and Adverse Health Effects Associated with Low-level Exposures*, 52 ENVTL. HEALTH PERSPS. 75 (1983).

18. *See Notice of Addition to List of Hazardous Air Pollutants*, 42 Fed. Reg. 29,332, 29,332 (1977); INTERNATIONAL AGENCY FOR RESEARCH ON CANCER, No. 29, EVALUATION OF THE CARCINOGENIC RISK OF CHEMICALS TO HUMANS 99-103 (1982).

19. *Interim Procedures and Guidelines*, 41 Fed. Reg. 21,402 (1976) (interim EPA procedures and guidelines for health risk and economic impact assessments of suspected carcinogens based on the premise that "there is no such thing as a completely safe dose"). A recent EPA estimate is that up to 246 cancers per year may be attributable to environmental benzene exposure. *See Products of*

Both environmentalists and industrialists object to current EPA policy toward airborne carcinogens. Environmentalists point to the dozens of unregulated pollutants and the long delays in standard-setting that have occurred in connection with the few pollutants already listed under section 112.²⁰ Industrialists object that the EPA might be compelled to consider regulation—without regard to technological or economic considerations—of pollutants and source categories that do not pose a significant risk of cancer.²¹ Both criticisms derive from a more fundamental and subtle indictment of the current process. The design of section 112 has produced an array of perverse responses by reasonably well-intentioned public servants. These responses include: excessive concern about the scientific basis of listing decisions; indefinite delays of decisions to list clearly carcinogenic pollutants; partial loss of agency control over the priority-setting process; unnecessary delays in adoption of final emission standards; reliance on legally questionable uses of risk assessment and cost information; adoption of technology-based standards that are economically inefficient; and failure to consider potentially effective and economical emission-control strategies.

A package of administrative and legislative reforms could minimize, if not eliminate, many of the deficiencies in the current process. These changes in section 112 could, in the long run, enable more expeditious and cost-effective regulation of airborne carcinogens. In particular, the reforms advocated in this article are designed to clarify and accelerate the listing of carcinogenic air pollutants, to relax unreasonable rulemaking deadlines, to focus administrative resources on pollutants and source categories that pose a significant risk of cancer, and to provide the EPA with explicit authorization to weigh costs and benefits and to implement alternative pollution control strategies. At a minimum, the reform package would assure that implementation of section 112 involves public discussion of the real scientific, technological, economic, and ethical issues. The normative analysis is developed in several stages. Part III²² is a descriptive account of the legislative and regulatory history of section 112. Part IV²³ is a critical analysis, from the perspectives of public health, equity, administrative process, and economic efficiency, of current statu-

Incomplete Combustion Said Responsible for Up to 820 Cancers Annually, 15 ENV'T REP. (BNA) 569 (Aug. 10, 1984).

20. See, e.g., *1981 Hearings*, *supra* note 9, at 694-97 (statement of David D. Doniger, National Clean Air Coalition); *id.* at 709-10 (statement of Khristine Hall, Environmental Defense Fund).

21. See, e.g., *id.* at 722-24 (statement of Michael A. James, Chemical Manufacturers Association); *id.* at 573-75 (statement of William J. McCarville, Chairman, Health Assessment Task Group, Chemical Manufacturers Association).

22. See *infra* text accompanying notes 26-104.

23. See *infra* text accompanying notes 105-279.

tory and administrative approaches. The reform package is then advanced in part V.²⁴ The concluding remarks in part VI²⁵ place the recommendations in a broader philosophical and political context.

III. HISTORY OF SECTION 112

It will be useful to survey the legislative, judicial, and administrative history of this provision of the Clean Air Act. An outline of the legislative history will be followed by a review of the administrative design of section 112, early EPA rulemakings, the 1977 congressional amendments, subsequent EPA rulemakings, and recent congressional deliberations.

A. *Legislative Compromise in 1970.*

The Clean Air Act Amendments of 1970 were debated and passed at a time when the political momentum behind environmental protection was powerful.²⁶ The Senate passed a massive clean air bill authored primarily by a subcommittee chaired by Senator Edmund Muskie.²⁷ The House passed a more limited bill that was similar to the Nixon Administration's proposal.²⁸ The most prominent issues at the time were emission-control deadlines for the automobile industry and, to a lesser extent, new source performance standards for stationary sources of air pollution.²⁹ A major yet unpublicized discrepancy between the House and Senate bills was the treatment of hazardous air pollutants.

While the House bill had no section devoted exclusively to hazard-

24. See *infra* text accompanying notes 280-94.

25. See *infra* text accompanying notes 295-308.

26. The Earth Day activities had dramatized the nation's environmental problems, and politicians were maneuvering to position themselves favorably on the issue. President Nixon introduced national clean air legislation and later issued a reorganization plan creating the Environmental Protection Agency. See Message of the President, 35 Fed. Reg. 15,623 (1970), reprinted in ENVIRONMENTAL QUALITY: THE FIRST ANNUAL REPORT OF THE COUNCIL OF ENVIRONMENTAL QUALITY 294-300 (1970). Senator Edmund Muskie, D-Me., was eager to preempt Nixon's initiatives and to overcome adverse media publicity caused by Ralph Nader's 1970 report, *Vanishing Air*. See J. ESPOSITO, VANISHING AIR (1970). Muskie was chairman of the key Senate Subcommittee on Environmental Pollution and a major force behind federal environmental legislation in the 1960's. See R. MELNICK, *supra* note 7, at 28. As a probable Democratic candidate for President in 1972, Muskie wanted to refute Nader's charge that Muskie was unwilling to be "tough" on industrial polluters. See *id.* On the legislative history of the Clean Air Act of 1970, see generally Marcus, *Environmental Protection Agency*, in THE POLITICS OF REGULATION 267-303 (J. Wilson ed. 1980).

27. The Senate bill received unanimous support. See generally J. DAVIES & B. DAVIES, THE POLITICS OF POLLUTION 55 (1975).

28. The House bill passed by a vote of 374 to 1. *Id.* at 54.

29. See R. MELNICK, *supra* note 7, at 28-30.

ous air pollutants,³⁰ the Senate bill contained a section entitled "National Emission Standards—Hazardous Air Pollution Agents," which specified procedures for listing hazardous air pollutants³¹ and created a "nondiscretionary" duty to regulate listed pollutants within strict timetables.³² Emissions of hazardous air pollutants from both new and existing stationary sources would be prohibited unless the EPA could show "that a departure from such a prohibition for [a] stationary source will not be hazardous to the health of persons."³³ The Senate committee report reveals that the section was originally intended to "encompass a limited number of pollutants."³⁴ Asbestos, cadmium, mercury, and beryllium are mentioned as possible candidates.³⁵ The report describes the definition of "hazardous" as "relatively restrictive,"³⁶ apparently because of the severe nature of the health effects encompassed by the definition. A restrictive definition was perceived as appropriate because "a total prohibition on emissions is a step to be taken only where a danger to health, as defined, exists."³⁷ If a pollutant is not deemed "hazardous," yet poses a "significant danger to public health or welfare," the Senate report describes another section of the bill as the appropriate statutory basis for regulation.³⁸

During negotiations between House and Senate conferees, the Nixon Administration recommended that the provision on hazardous air pollutants be deleted.³⁹ The conferees rejected the Administration's recom-

30. The House bill treated hazardous pollutants as an extreme case of emissions that "may contribute substantially to endangerment of public health." While the House bill authorized the EPA to prohibit construction and operation of new stationary sources of extremely hazardous emissions, it also provided for a variety of exemptions and generally called for emission standards based on economic and technological feasibility. 1 CONGRESSIONAL RESEARCH SERVICE, FOR THE SENATE COMM. ON PUBLIC WORKS, 93D CONG., 2D SESS., A LEGISLATIVE HISTORY OF THE CLEAN AIR ACT AMENDMENTS OF 1970 195-96 (Comm. Print 1974) [hereinafter cited as LEGIS. HIST. OF 1970 AMENDMENTS] (summary of House bill contained in conference report).

31. A "hazardous air pollutant" was defined in the Senate bill as "one whose presence, chronically or intermittently, in trace concentrations in the ambient air, either alone or in combination with other agents, causes or will cause, or contribute to, an increase in mortality or an increase in serious irreversible or incapacitating reversible damage to health." *Id.* at 496.

32. *Id.* at 495-98 (report on section 115 of the Senate bill). "Nondiscretionary" duties are typical of the agency-forcing model. An agency's failure to discharge such a duty will expose the agency to citizen suits and judicial supervision. *See infra* note 112.

33. *Id.* at 496.

34. *Id.* at 420-21 (Senate committee report on section 115).

35. *Id.* at 420.

36. *Id.*

37. *Id.*

38. Section 114 of the Senate bill was intended to cover other pollutants that might pose a significant danger to public health. *Id.*

39. In a letter to House and Senate conferees, Secretary of the Department of Health, Education, and Welfare Elliot Richardson argued, for the Administration, that a separate section for hazardous air pollutants was unnecessary. Sections 114 and 116 of the Senate bill, argued Richardson,

mendation, preferring a distinctive regulatory approach for hazardous air pollutants. The Senate approach was adopted as section 112, albeit with notable revisions. A "hazardous" air pollutant was defined as "an air pollutant to which no ambient air quality standard is applicable and which in the judgment of the Administrator causes, or contributes to, . . . an increase in mortality, or an increase in serious irreversible, or incapacitating reversible, illness."⁴⁰ The most important change was substitution of the precautionary language—"inay cause"—for the more exacting language in the Senate bill—"causes or will cause". The conferees also appear to have changed the basis for setting national emission standards. The conference substitute called for the Administrator to set emission standards "at the level which in his judgment provides an ample margin of safety to protect the public health from such hazardous air pollutants."⁴¹ The explicit prohibition on emissions was removed, but consideration of economic and technological factors was not explicitly authorized.

B. *The Design of Section 112.*

The approach chosen by Congress for control of hazardous air pollutants, while based on the same theory of environmental rights that characterizes the entire Act,⁴² differs somewhat from the approach chosen for other types of air pollutants. The cornerstone of the Clean Air Act Amendments of 1970 was the complex federal/state relationship established for control of the so-called "criteria" pollutants under sections 108 through 110.⁴³ Section 112 is one of the major exceptions to this federalist approach to pollution control.⁴⁴ The point of section 112 is to

provided sufficient authority to regulate hazardous air pollutants, including the possibility of zero-emission limits for all facilities in some cases. Administration's Letter to Conference Recommending Certain Provisions, by HEW Secretary Elliot Richardson (Nov. 17, 1970), reprinted in LEGIS. HIST. OF 1970 AMENDMENTS, *supra* note 30, at 211-17.

40. 42 U.S.C. § 7412(a)(1) (1982).

41. 42 U.S.C. § 7412(b)(1)(A)-(B) (1982).

42. See Schroeder, *Foreword: A Decade of Change in Regulating the Chemical Industry*, LAW & CONTEMP. PROBS., Summer 1983, 1, 21; see also *infra* notes 295-99.

43. Section 108 requires the EPA to issue "criteria documents" describing the adverse health and welfare effects of all widespread air pollutants. 42 U.S.C. § 7408 (1982). Under section 109, the EPA is directed to establish, for each "criteria pollutant," both primary and secondary ambient air quality standards. The primary standards would "protect the public health" with "an adequate margin of safety;" secondary standards would protect against "welfare" effects of pollution, such as impaired visibility and property damage. 42 U.S.C. § 7409 (1982). While the EPA was to set the ambient standards, the states were directed by section 110 to implement emission controls that were necessary and sufficient to achieve the federal ambient standards. 42 U.S.C. § 7410 (1982).

44. Section 111 empowers the EPA to establish emission standards for categories of new stationary sources that "[contribute] significantly to . . . air pollution which may reasonably be anticipated to endanger public health or welfare." 42 U.S.C. § 7411(b)(1)(A) (1982). In addition,

allow the EPA to bypass the unwieldy processes of establishing ambient standards and reviewing state implementation plans. The toxic air pollutants to be regulated under section 112 were supposed to be more dangerous—that is, more severe in their health effects—than the criteria pollutants, thus justifying direct EPA control of emission sources. In light of the dangers involved, Congress created a simple two-step rulemaking process: A specific pollutant is first listed as hazardous, based on a consideration of relevant scientific data; then, uniform national emission standards are established for each source category.⁴⁵

Once a pollutant is listed, the EPA must propose emission standards within 180 days, hold a public hearing within thirty more days, and publish final emission rules within 180 days of the proposal.⁴⁶ These deadlines are applicable “unless [the EPA] finds, on the basis of information presented at such hearings, that such pollutant clearly is not a hazardous air pollutant.”⁴⁷ The initial listing decision imposes a nondiscretionary duty upon the EPA within the specified deadlines to propose and to promulgate national emission limits. Citizens have the right under the Clean Air Act to sue in federal courts to compel EPA compliance with such nondiscretionary duties.⁴⁸

Emission standards adopted under section 112 are to take effect immediately for new sources and within ninety days for existing sources.⁴⁹ Waivers for existing sources may be granted by the EPA for up to two years if such delay is necessary to install abatement equipment and if interim steps are taken to assure that public health is protected from “imminent endangerment.”⁵⁰ Extended exemptions can be granted by the President only for national security purposes.⁵¹ Section 112 permits states to adopt their own emission standards as long as they are at least as stringent as those required by the EPA. If states submit adequate control programs to the EPA, the Administrator is authorized to delegate his implementation and enforcement authority to the states.⁵² As of November, 1983, about nineteen states and twenty-one local air pollution

section 202 provides the EPA with power to set emission limits for new motor vehicles. 42 U.S.C. § 7502 (1982). Finally, section 112 provides the EPA with direct authority over new and existing stationary sources of hazardous air pollutants. 42 U.S.C. § 7412 (1982).

45. The EPA is expected to publish and periodically revise “a list which includes each hazardous air pollutant for which [it] intends to establish an emission standard.” 42 U.S.C. § 7412(b)(1)(A) (1982).

46. 42 U.S.C. § 7412(b)(1)(B) (1982).

47. *Id.*

48. 42 U.S.C. § 7604(a)(2) (1982).

49. 42 U.S.C. § 7412(c)(1)(A), (B)(i) (1982).

50. 42 U.S.C. § 7412(c)(1)(B)(ii) (1982).

51. 42 U.S.C. § 7412(e)(2) (1982).

52. 42 U.S.C. § 7412(d)(1) (1982).

control agencies had developed such programs.⁵³

C. *Implementation by the EPA: 1970 to 1976.*

During the Nixon and Ford Administrations, four pollutants were listed and regulated under section 112: asbestos, beryllium, mercury, and vinyl chloride. These regulations can be attributed in large measure to tenacious legal tactics by environmental groups. Although the EPA promptly listed and proposed standards for asbestos, beryllium, and mercury, the final standards were promulgated only after the Environmental Defense Fund (EDF) obtained a court order compelling the EPA to do so.⁵⁴ The EPA adopted final standards for vinyl chloride while under constant legal pressure from both the EDF and the Natural Resources Defense Council (NRDC).⁵⁵

Asbestos and vinyl chloride are of special interest because they were the first carcinogens regulated under section 112. The EPA considered prohibiting emissions of asbestos into the atmosphere or banning the production, processing, and use of asbestos.⁵⁶ These drastic options were rejected, even though the EPA could not identify a positive amount of asbestos emission that would not be hazardous.⁵⁷ Although the Agency speculated that "there are levels of asbestos exposure that will not be associated with any *detectable* risk," it concluded that "these levels are not known."⁵⁸ The Agency rejected the drastic alternatives on the grounds of enforcement difficulties and adverse economic consequences.⁵⁹ Instead of prohibition, the EPA opted for limitations on visible emissions and for requirements for certain production procedures and operations.⁶⁰ Environmentalists chose not to litigate the EPA's failure to ban asbestos emissions.⁶¹ Quantitative emission standards were not established because it was not practicable at that time to measure asbestos emissions, especially from operations such as building demolition.⁶²

53. *States Moving Ahead with Toxics Programs in Absence of Federal Action, Official Says*, 14 ENV'T REP. (BNA) No. 30, 1371-72 (Nov. 25, 1983).

54. *Environmental Defense Fund v. Ruckelshaus*, 3 ENVTL. L. REP. (ENVTL. L. INST.) 20,173, 20,173 (D.D.C. 1973).

55. Doniger, *Federal Regulation of Vinyl Chloride: A Short Course in the Law and Policy of Toxic Substances Control*, 7 ECOLOGY L. Q. 497, 565-88 (1978).

56. 38 Fed. Reg. 8820, 8820-22 (1973) (codified at 40 C.F.R. §§ 61.140-156 (1984)).

57. *See id.*

58. National Emission Standards for Hazardous Air Pollutants, *supra* note 56, at 8820.

59. *Id.*

60. *Id.*

61. *See Doniger, supra* note 55, at 572-73 (explaining reaction of environmental groups to asbestos standard).

62. The Supreme Court ultimately struck down parts of the asbestos standard because the Act was read to require quantitative emission limits only. *Adamo Wrecking Co. v. United States*, 434

During the vinyl chloride rulemaking, the EPA took the position that "for carcinogens there may be no atmospheric concentration which poses absolutely no public health risk."⁶³ In light of that position, the EPA considered the possibility that only zero-emission standards for carcinogenic pollutants could protect the public health. Indeed, environmentalists urged the EPA to ban vinyl chloride products for which substitutes were currently available and gradually to phase out other vinyl products as substitutes were developed.⁶⁴ In contrast, industrial commentators argued that emission standards for vinyl chloride should be set at each plant based on a comparison of costs and benefits.⁶⁵

The EPA rejected both of these suggestions, deciding instead on vinyl chloride standards that require emission reduction by means of the best available technology. A zero-emission rule was rejected because available substitutes for vinyl chloride lacked certain desirable features, such as nonflammability, and because substitute chemicals might introduce new adverse health or environmental effects.⁶⁶ The cost-benefit approach was also rejected; the EPA argued that section 112 permitted consideration of costs "only to a very limited extent."⁶⁷ The EDF sued the EPA on the grounds that the vinyl chloride standards were impermissibly lenient, but the case was dismissed when the parties reached a settlement.⁶⁸ The EPA apparently agreed to tighten the standard and to accept zero vinyl chloride emissions as a goal,⁶⁹ but the standard has never been strengthened.⁷⁰

U.S. 275, 286-89 (1978). The Court did not, however, address the issue of whether zero-emission standards are required by the Act for a "nonthreshold" pollutant, *see infra* note 111, such as asbestos. *See Doniger, supra* note 55, at 573 n.386 (agreeing that the Court did not address zero-emissions issue). Congress eventually amended section 112 to permit design, equipment, work practice, or operational standards where numerical emission standards are not feasible. 42 U.S.C. § 7412(e)(1),(5) (1982). Under this authority, the asbestos rules have been reinstated. *See Amendments to Asbestos Standard*, 49 Fed. Reg. 13,658 (codified at 40 C.F.R. §§ 61.140-156 (1984)).

63. Initial Proposed Rule, 40 Fed. Reg. 59,532, 59,533 (1975) (national emission standard for vinyl chloride, proposed Dec. 24, 1975).

64. Adoption of Regulation, 41 Fed. Reg. 46,560, 46,561-62 (1976) (discussing significant comments to proposed regulation).

65. *Id.* at 46,562.

66. *Id.* at 46,561.

67. *Id.* at 46,562.

68. *Environmental Defense Fund v. Train*, No. 76-2405 (D.C. Cir., settled and dismissed, June 24, 1977).

69. This characterization of the settlement is based on D. Doniger & A. Ahmed, National Resources Defense Council, Inc., Comments on the Proposed National Hazardous Air Pollutant Emission Standards for Inorganic Arsenic 15 (submitted to the EPA, Jan. 31, 1984).

70. The EPA proposed amendments to the vinyl chloride standard that embraced a goal of zero emissions, Initial Proposed Amendments to Rule, 42 Fed. Reg. 28,154 (1977) (proposed June 2, 1977), but these amendments were never adopted. Some clarifications of the existing standard were published. 42 Fed. Reg. 29,005 (1977) (codified at 40 C.F.R. §§ 61.60-.70 (1984)).

D. *The 1977 Clean Air Act Amendments.*

The pace of rulemaking pursuant to section 112 was not a major point of controversy during congressional deliberations on reauthorization of the Clean Air Act in 1976 and 1977. Environmentalists in the House of Representatives were, however, disappointed that a greater number of hazardous air pollutants had not been listed by the EPA. The House report on the 1977 Amendments criticized the EPA for its preoccupation with criteria pollutants:

[T]here are numerous other air pollutants which to date have not been subject to regulation under the Clean Air Act. Despite mounting evidence that these pollutants are associated with serious health hazards and despite recommendations from prestigious medical and scientific bodies, the Agency has failed to promulgate regulations to institute adequate control measures for these unregulated pollutants.⁷¹

As a result, the 1977 Amendments added another "agency-forcing" provision, section 122, which was designed to spur rulemaking activity with respect to radioactive pollutants, arsenic, cadmium, and polycyclic organic matter.⁷²

The 1977 Amendments also added a more inclusive definition of a hazardous air pollutant. A hazardous air pollutant, according to the revised definition, is "an air pollutant to which no ambient air quality standard is applicable and which in the judgment of the Administrator causes, or contributes to, air pollution which *may reasonably be anticipated* to result in an increase in mortality or an increase in serious irreversible, or incapacitating reversible, illness."⁷³ The word "may" was relocated to appear before the new phrase "reasonably be anticipated to"—a revision intended "to emphasize the precautionary or preventative purpose of the Act."⁷⁴ In view of litigation over the EPA's stan-

71. H.R. REP. NO. 294, 95th Cong., 1st Sess. 36 (1977).

72. Section 122 requires the EPA Administrator to decide within one year (or two years for radioactive emissions) whether or not these four categories of pollutant are hazardous within the meaning of section 112. 42 U.S.C. § 7422(a) (1982). According to the House report, each of the four pollutants specified in section 122 "has been found to be cancer causing or cancer promoting in laboratory animal experiments and in human beings in occupational settings." H.R. REP. NO. 294, *supra* note 71, at 36. Indeed, the House report contains a detailed discussion of the scientific evidence linking the four pollutants to various adverse health effects. *Id.* at 36-40. It is apparent, therefore, that Congress intended that the EPA devote significant agency resources to developing emission standards for these pollutants.

73. 42 U.S.C. § 7412(a)(1) (1982).

74. H.R. REP. NO. 294, *supra* note 71, at 51. The same protective language was added to sections 108 (criteria for national ambient air quality standards), 111 (new source performance standards), 112 (hazardous air pollutants), 202 (new motor vehicle emission standards), 211 (regulation of fuels and fuel additives), and 231 (aircraft emission standards). The new language in these sections was described by the House committee report as "a standardized basis for future rulemaking to protect the public health." *Id.* at 50.

dard for lead emissions,⁷⁵ Congress wanted to clarify that the EPA was not required to wait for proof of adverse human health effects before taking protective action under the Act.

E. *Subsequent EPA Rulemaking: 1977 to 1984.*

During the Carter Administration, the EPA did not accomplish much in the way of setting emission standards for hazardous air pollutants. Despite a one-year deadline in the 1977 Amendments, the EPA never made formal listing decisions on cadmium or polycyclic organic matter. Affirmative listing decisions were made for radionuclides⁷⁶ and arsenic,⁷⁷ but emission standards were not even proposed before President Carter left office. In response to an EDF petition, benzene was listed as a hazardous air pollutant in June, 1977.⁷⁸ Yet the EPA did not even *propose* emission standards for categories of benzene sources until the period from April, 1980, to January, 1981,⁷⁹ thus leaving the issue of final standards to the Reagan Administration.

In total, the Carter EPA listed three pollutants as hazardous, proposed emission standards for one pollutant, and promulgated no final standards. As Khristine Hall of the EDF testified before a House Subcommittee in 1981: "I can only say it is one of the environmental groups' grave disappointments that the Carter Administration didn't do something on hazardous air pollutants. In fact, they were urged repeatedly by both EDF and [the National Clean Air Coalition] to do something and didn't."⁸⁰ In fairness to the EPA, it should be noted that the agency responded to an EDF petition and proposed an ambitious "generic" policy for listing and regulating airborne carcinogens under section 112.⁸¹

75. In a pathbreaking decision on environmental health regulation, the Court of Appeals for the District of Columbia Circuit held, in an en banc decision, that the EPA's lead rules were a lawful exercise of discretion under the Clean Air Act, even though adverse health effects from lead exposure were not conclusively proven at the time of the Administrator's decision. See *Ethyl Corp. v. EPA*, 541 F.2d 1, 17 (D.C. Cir. 1976) (en banc), cert. denied, 426 U.S. 941 (1977).

76. See 44 Fed. Reg. 76,738 (1979) (notice, Dec. 27, 1979).

77. See 45 Fed. Reg. 37,886 (1980) (notice, June 5, 1980).

78. See Addition to List of Hazardous Air Pollutants, 42 Fed. Reg. 29,332 (notice, June 8, 1977).

79. See Proposed Emission Standards, 45 Fed. Reg. 26,660 (1980) (proposed Apr. 18, 1980) (benzene emissions from maleic anhydride plants); Proposed Emission Standards, 45 Fed. Reg. 83,448 (1980) (proposed Dec. 18, 1980) (benzene emissions from ethylbenzene/styrene plants); Proposed Emission Standards, 45 Fed. Reg. 83,952 (1980) (proposed Dec. 19, 1980) (benzene storage vessels); 46 Fed. Reg. 1165 (1981) (codified at 40 C.F.R. §§ 61.110-117 (1984)) (proposed Jan. 1, 1981) (standards for fugitive benzene emissions).

80. 1981 Hearings, *supra* note 20, at 729 (statement of Khristine Hall, Environmental Defense Fund).

81. National Emission Standards for Hazardous Pollutants: Policy and Procedures for Identifying, Assessing, and Regulating Airborne Substances Posing a Risk of Cancer, 44 Fed. Reg. 58,642

The effort was not completed before Carter left office and a final, general policy for airborne carcinogens has never been issued by the EPA. The fact that the EPA was inclined to propose an entire policy framework for airborne carcinogens—as opposed to other hazardous air pollutants—is an indication that the policy underlying the statute was perceived by the agency to be ambiguous or unacceptable.

If Carter's record on hazardous air pollutants is characterized as disappointing, the record of EPA Administrator Gorsuch in the Reagan Administration was abysmal. From March, 1981, when Gorsuch took office, until her resignation in the spring of 1983, the EPA issued no listings, no proposed emission standards, and no final rules under section 112. Meanwhile, the Agency was ordered by federal courts to propose emission standards for radionuclides⁸² and arsenic.⁸³ The EDF and the NRDC also informed Gorsuch before her resignation of their intent to sue the Agency for failure to issue final emission standards for benzene.⁸⁴ Gorsuch's intransigence had the unfortunate effect of diverting the attention of members of Congress from fundamental problems with the design and implementation of the statute. Members of the key environmental committees in Congress began to consider crude statutory schemes that would automatically list various substances within strict deadlines,⁸⁵ regardless of the status of the EPA's scientific and regulatory analyses. Under intense pressure from Congress and environmentalists, the EPA under Administrator Ruckelshaus made public commitments in November, 1983, to announce regulatory decisions on twenty-three priority pollutants by January, 1986, and an additional eight to ten priority pollutants sometime in fiscal year 1986.⁸⁶

Despite these commitments, there were indications that the Ruckelshaus EPA was trying to avoid extensive use of section 112. While emission standards for radionuclides were proposed under court order,⁸⁷ they were later withdrawn because of inadequate scientific justification.⁸⁸ In

(1979) (proposed Oct. 10, 1979). The "generic" policy was the subject of public hearings, and became the target of a large volume of critical written comments by both industrial and environmental organizations.

82. *Sierra Club v. Gorsuch*, 551 F. Supp. 785, 789 (N.D. Cal. 1982).

83. *New York v. Gorsuch*, 554 F. Supp. 1061, 1066 (S.D.N.Y. 1983).

84. *See NRDC v. EPA*, 14 ENVTL. L. REP. (ENVTL. L. INST.) 10,026 (D.D.C. 1984).

85. *Congress Fails to Act on Clean Air Rewrite*, 1982 CONG. Q. ALMANAC 425, 432-33.

86. 1983 Hearings, *supra* note 15, at 54-55 (statement of William D. Ruckelshaus, Administrator, EPA).

87. *See Sierra Club v. Gorsuch*, 551 F. Supp. 785, 786-89 (N.D. Cal. 1982); *see also* Proposed Rule, 48 Fed. Reg. 15,076 (1983) (proposed Apr. 6, 1983).

88. *See EPA Withdraws Radionuclide Standards: Environmental Group Responds with Suit*, [Current Developments] ENV'T REP. (BNA) 1051, 1051 (Oct. 26, 1984) (EPA official quoted as saying that the risk involved was "rather trivial").

addition, the EPA published reasons for not listing toluene⁸⁹ and not regulating polycyclic organic matter as a per se hazardous air pollutant.⁹⁰ Controversial emission standards to curtail arsenic emissions were proposed,⁹¹ but the shutdown of a major copper smelter in Tacoma, Washington, rendered the fate of the proposal uncertain.⁹² While some sources of benzene emissions have been regulated,⁹³ others have been ignored or left unregulated due to "insignificant risk."⁹⁴ Instead of listing acrylonitrile under section 112, the EPA apparently plans to seek control of this known human carcinogen through agreements with state agencies.⁹⁵ Coke oven emissions were recently listed under section 112,⁹⁶ but it is not clear that further control is technologically feasible in many plants.⁹⁷

As Congress considered reauthorization of the Clean Air Act in the early 1980's, the record of the EPA under section 112 surfaced as a focal point of debate. Environmentalists and industrialists recommended that Congress amend section 112 rather than reauthorize it in its then-current form. Environmentalists wanted new statutory language that would automatically list specified pollutants within fixed deadlines.⁹⁸ Industrialists recommended that the EPA Administrator be permitted to consider economic and technological data as well as health data when setting emission standards.⁹⁹ In 1982, political infighting over section 112 was particularly intense in the House Committee on Energy and Commerce, where the badly split Committee voted out a bill calling for automatic listing of thirty-seven priority pollutants within four years.¹⁰⁰ A consen-

89. Decision Not to Regulate, 49 Fed. Reg. 22,195 (1984).

90. Proposed Decision Not to Regulate, 49 Fed. Reg. 5580 (1984).

91. Proposed Standards for Inorganic Arsenic, 48 Fed. Reg. 33,112 (1983) (proposed July 20, 1983).

92. See *Tacoma ASARCO Copper Smelter to Close in June 1985, Company Board Announces*, [Current Developments] ENV'T REP. (BNA) 388, 388-89 (July 6, 1984).

93. See Proposed Emission Standards, 49 Fed. Reg. 23,522 (1984) (proposed June 6, 1984) (coke by-product recovery plants); 49 Fed. Reg. 23,498 (1984) (codified at 40 C.F.R. §§ 61.110-.112, 61.240-.247 (1984)) (final emission standards for fugitive emission sources).

94. Proposed Withdrawal of Proposed Standards, 49 Fed. Reg. 8386 (1984).

95. See *Alm Said to Approve Plan to Regulate Acrylonitrile Through State Programs*, 15 ENV'T REP. (BNA) 167, 167-68 (1984); *State Control of Acrylonitrile Regulation Nears Release in Policy Statement, Alm Says*, 15 ENV'T REP. (BNA) 1008, 1008 (1984).

96. Addition to List of Hazardous Air Pollutants, 49 Fed. Reg. 36,560 (1984).

97. See *Control of Coke Ovens at High-Risk Plants Poses Problems for EPA, Agency Official Says*, 15 ENV'T REP. (BNA) 793, 793-94 (1984).

98. E.g., 1981 Hearings, *supra* note 9, at 709-10 (statement of Kristine Hall, Environmental Defense Fund).

99. *Id.* at 722-23 (statement of Michael A. James, Chemical Manufacturers Association).

100. A showdown occurred between Rep. John Dingell, D-Mich., chairman of the Committee, and Rep. Henry Waxman, D-Cal., chairman of the Subcommittee on Health and the Environment. A bill supported by Dingell would have deleted the "ample margin of safety" language in section 112

sus favoring a similar bill emerged in the Senate Committee on Environment and Public Works.¹⁰¹ Although the clean air bills approved by the House and Senate committees in 1982 were a victory for environmentalists, the efforts were ultimately inconsequential because the Ninety-Seventh Congress failed to pass a reauthorization of the Clean Air Act. The Clean Air Act was considered again by the Ninety-Eighth Congress,¹⁰² but election-year politics caused the issue to be delayed until the Ninety-Ninth Congress.¹⁰³ In the meantime, the Ruckelshaus EPA entered into negotiations with key congressional staff members in order to find a mutually-acceptable reform package.¹⁰⁴

IV. ANALYSIS OF SECTION 112

As originally conceived, section 112 called for the EPA to adopt stringent quantitative emission standards for a limited number of especially dangerous air pollutants. While EPA performance to date is consistent with that conception, there nonetheless exists a widespread belief that the EPA's implementation of the section has been disappointing.¹⁰⁵

and replaced it with authorization for the EPA to set emission standards based on technological and economic feasibility. Although the bill also required the EPA to evaluate the list of 37 priority pollutants within a four-year deadline, it would have allowed the EPA to delay a listing decision beyond four years if insufficient information were available to decide whether or not to list a pollutant. The Dingell-backed bill was defeated by a vote of 20-21. The Committee adopted, by a vote of 22-20, a watered-down version of a Waxman-backed bill that deleted the ample-margin-of-safety language yet retained the health orientation of emission standards. In addition, the bill required automatic listing of the 37 pollutants if the EPA did not make an explicit listing decision within four years. 1982 CONG. Q. ALMANAC 432-33.

101. In the Senate Committee on Environment and Public Works, Chairman Robert Stafford, R-Vt., also cleared a bill with major revisions to section 112. See S. 3041, 97th Cong., 2d Sess. (1982). Listing decisions on 20 pollutants would be required within two years and 20 more would confront a five-year deadline. Failure to make a decision on a pollutant within the allotted time would cause automatic listing of the pollutant under section 112. Proposed emission standards would then be required within one year. All emission standards under the bill would be "established at the level that requires the greatest degree of emission reduction achievable through . . . application of the best system of continuous emission reduction available." *Id.* at 14. If the Administrator cannot determine that the best available technology will protect the public health with an adequate margin of safety, then more stringent levels of emission control would be required. A report accompanying the Stafford bill states that the committee envisions that the number of pollutants to be regulated under section 112 "may well be at least an order of magnitude larger than the number regulated to date." *Id.* at 15.

102. See *Dingell Air Toxics Amendment Giving EPA More Assessment Time is Supported by Cannon*, 15 ENV'T REP. (BNA) 36 (May 11, 1984).

103. See *Clean Air Markup Session Snags on Acid Rain Provisions*, 42 CONG. Q. WEEKLY REP. 987 (Apr. 28, 1984); *Acid Rain Provisions Cut from Clean Air Bill*, 42 CONG. Q. WEEKLY REP. 1009 (May 5, 1984).

104. 1983 *Hearings*, *supra* note 15, at 3, 19 (statement of Joseph A. Cannon, Assistant Administrator for Air and Radiation, EPA).

105. See 1981 *Hearings*, *supra* note 9, at 487 (statement of Rep. Henry A. Waxman, D-Cal., Chairman, Subcomm. on Health and the Environment, House Comm. on Energy and Commerce)

Growing public and scientific attention to the cancer problem has caused the EPA to identify dozens of potentially carcinogenic air pollutants.¹⁰⁶ Because cancer is clearly "hazardous" within the meaning of section 112, the number of pollutants that might be regulated under section 112 has grown enormously since the provision was written in 1970.

Despite the perceived need for regulation of dozens of airborne carcinogens, the EPA has listed only eight pollutants as hazardous and has issued final emission standards for only five.¹⁰⁷ Most of this rulemaking activity occurred before 1977, the year the EPA identified the thirty-seven priority candidates for listing and regulatory decision.¹⁰⁸ The EPA's failure to implement section 112 is attributable to a combination of unworkable statutory provisions and inappropriate administrative choices—the slow pace of rulemaking is not simply a reflection of sinister political forces. Section 112 has been administered ineffectively by all EPA administrators—five individuals who have had different partisan affiliations and varying degrees of commitment to environmental protection.¹⁰⁹ The persistence of implementation problems throughout the section's history suggests that there may be fundamental statutory and administrative obstacles—in addition to technological and economic barriers—to expeditious control of airborne carcinogens.

A. *The Cumbersome Listing Process.*

Section 112 is designed so that profound regulatory implications flow from the initial decision to list a pollutant as hazardous. Once a pollutant is listed, the EPA has a nondiscretionary duty to promulgate

(describing EPA "tardiness" in implementation of section 112 as "disturbing"); *id.* at 699 (statement of David Doniger, National Clean Air Coalition) (EPA "has done very little to control the dozens—perhaps more than 100—unregulated substances" since 1970); 1983 *Hearings*, *supra* note 15, at 60 (statement of William D. Ruckelshaus, Administrator, EPA) (acknowledging criticisms that implementation of section 112 has been "plagued" by "avoidable" delays); Dowd, *Debate on Hazardous Air Pollutants Continues*, 18 ENVTL. SCI. & TECH. 153A (1984) (Congress unhappy with lack of decisionmaking on section 112).

106. 1983 *Hearings*, *supra* note 15, at 51 (statement of William D. Ruckelshaus, Administrator, EPA) (acknowledging that cancer is "the most important reason" for concern about implementation of section 112, and that "a firm base of public support" exists for control of airborne carcinogens); *see also supra* note 8.

107. Listed pollutants, in chronological order, are asbestos, mercury, beryllium, vinyl chloride, benzene, radionuclides, arsenic, and coke-oven emissions. *See infra* note 152.

108. GAO REPORT ON SECTION 112, *supra* note 14, at ii (EPA developed list of 37 pollutants in 1977 based on 1976 contractor report).

109. The five administrators of the EPA have been William Ruckelshaus (1971-1973 and 1983-1985); Russell Train (1974-1977); Douglas Costle (1977-1981); Ann Gorsuch Burford (1981-1983); and Lee Thomas (1985-present). On the backgrounds of the first four administrators, *see* R. MELNICK, *supra* note 7, at 39.

national emission standards within a period of one year.¹¹⁰ That duty may require, as we shall see, that zero-emission standards be set for all sources of a nonthreshold pollutant,¹¹¹ regardless of technological feasibility and the size or affordability of compliance costs. The nondiscretionary duty is enforceable in the courts by citizen suits,¹¹² which provide environmental organizations a powerful enforcement tool. The regulatory significance of the initial listing decision is enhanced by the difficulty of delisting a pollutant—for delisting requires a showing that a pollutant is “clearly” not hazardous.¹¹³ Indeed, because it is practically impossible to prove the negative—to show that a pollutant is “clearly” not hazardous—it is doubtful that the EPA could ever delist a pollutant.

In light of the regulatory implications of the listing decision, the EPA has been extremely careful to study a pollutant extensively before listing it. Unfortunately, the statute and its legislative history provide no guidance concerning what types of scientific data are required to support a decision to list. While the listing action is a discretionary matter,¹¹⁴ the EPA has nonetheless created a time-consuming and cumbersome process for making the initial decision. A pollutant can become a candidate for listing either by citizen petition or by internal agency initiative, but it is not listed until a comprehensive health assessment document is prepared by the EPA staff, written approval is obtained from the agency’s Scientific Advisory Board (SAB),¹¹⁵ and final approval is granted by the EPA

110. 42 U.S.C. § 7412(b)(1)(B) (1982).

111. If a pollutant has no exposure threshold any nonzero dose of the pollutant is associated with some incremental risk of health damage. See *infra* note 128 and accompanying text.

112. Section 304(a) of the Clean Air Act Amendments of 1970 authorizes “citizen suits” against the EPA Administrator for failure to perform “any act or duty under this Act which is not discretionary with the Administrator.” 42 U.S.C. § 7604(a)(2) (1982). For a general discussion of the merits of this provision, see text and references in R. STEWART & J. KRIER, ENVIRONMENTAL LAW AND POLICY 547-48, 642-43 (2d ed. 1978).

113. Environmentalists have contended that the delisting action should impose on industry “a heavy burden of proof,” especially in the case of carcinogenic pollutants that may cause disease in some people at all ambient exposure levels. See, e.g., D. Doniger & A. Ahmed, *supra* note 69, at 21.

114. One commentator has suggested that section 112 be amended to authorize citizen suits for discretionary duties, such as the listing decision. Ferguson, *Direct Federal Controls: New Source Performance Standards and Hazardous Emissions*, 4 ECOLOGY L.Q. 645, 658-59 (1975). This proposal is problematic because a court may have little or no evidentiary record to review in cases in which citizens sue to compel a listing. See generally *Natural Resources Defense Council v. SEC*, 606 F.2d 1031, 1045-47 (D.C. Cir. 1979) (court review less appropriate where record is nonexistent or incomplete). The proposal would also be an intrusion on the priority-setting freedom of the EPA. Courts are generally reluctant to intrude on internal agency management decisions such as whether and when to list a particular pollutant. Cf. *Industrial Union Dep’t v. American Petroleum Inst.*, 448 U.S. 607, 644 n.49 (1980) (OSHA’s priority-setting decisions may be immune from judicial review).

115. On the SAB’s role in reviewing health assessment documents, see GAO REPORT ON SECTION 112, *supra* note 14, at 28; see also *infra* note 137.

Administrator.¹¹⁶

The EPA estimates that it takes from one to two years to draft a health assessment document and another three to six months to obtain SAB review.¹¹⁷ As of June, 1983, the EPA had initiated health assessment documents for nineteen of the thirty-seven "priority" pollutants.¹¹⁸ Written approval from the SAB had been obtained for only two of these documents,¹¹⁹ although the review process was accelerated somewhat during the tenure of Administrator Ruckelshaus.¹²⁰

Unlike the early listing decisions made regarding asbestos, beryllium, and mercury, current EPA practice requires more than a qualitative determination that a pollutant meets the statutory definition of hazardousness.¹²¹ In light of the important consequences of the listing decision, the lack of direction from Congress, and the likely opposition from affected industries, the EPA has attempted to protect itself from judicial reversal by including progressively more sophisticated and comprehensive analyses in its health assessment documentation.¹²² Documents are now expected to contain an assessment of the degree of health risk posed by the pollutant at various exposure levels.¹²³ Methods of quantitative risk assessment for cancer are extremely controversial,¹²⁴ so

116. A five-step process is used for listings: (1) the EPA's Office of Air Quality Planning and Standards (OAQPS) identifies a pollutant; (2) the EPA's Office of Health and Environmental Assessment (OHEA) prepares a health assessment document; (3) the OAQPS initiates an exposure assessment for the pollutant; (4) the SAB reviews the health assessment document; and (5) the OAQPS makes listing recommendation to the EPA Administrator. GAO REPORT ON SECTION 112, *supra* note 14, at 3-4.

117. EPA estimates reported in *id.* at iii, 14.

118. *Id.* at 15.

119. *Id.*

120. During 1983, seven health assessment documents were cleared by the SAB. 1983 Hearings, *supra* note 15, at 63 (statement of William D. Ruckelshaus, Administrator, EPA). On specific pollutants, see *Advisory Group Says Carbon Tetrachloride Builds Up in Air, Probably Causes Cancer*, 14 ENV'T REP. (BNA) 102 (Apr. 20, 1984) (written SAB approval of document on carbon tetrachloride); *Advisory Board Accepts Health Report Saying Manganese Causes Chronic Poisoning*, 14 ENV'T REP. (BNA) 1394 (Dec. 2, 1983) (SAB approval of manganese report); *Toluene, Coke Emissions Listing Decisions Near Final EPA Scrutiny; Groups Hit Inaction*, 14 ENV'T REP. (BNA) 1390-91 (Dec. 2, 1983) (SAB approval of documents for coke oven emissions and toluene).

121. The listings of asbestos, beryllium, and mercury were based on four factors: the severity of the health effects, the length of time between exposure and disease, the fraction of total human exposure attributable to air pollution, and reported cases of disease linked to the pollutants. Quantitative risk assessment did not play an important role. See Tabler, *EPA's Program for Establishing National Emission Standards for Hazardous Air Pollutants*, 34 J. AIR POLLUTION CONTROL A. 532, 533-34 (1984).

122. GAO REPORT ON SECTION 112, *supra* note 14, at 17. The cost of producing each of these documents is estimated to range from \$68,000 to \$320,000. *Id.* at 23-24.

123. *Id.* at 19-20.

124. See, e.g., OFFICE OF TECHNOLOGY ASSESSMENT, TECHNOLOGIES FOR DETERMINING CANCER RISKS FROM THE ENVIRONMENT, 157-74 (1981) [hereinafter cited as OTA CANCER REPORT]; Leape, *Quantitative Risk Assessment in Regulation of Environmental Carcinogens*, 4 HARV.

one can see why the health assessment documents often generate lengthy debates. The issues that regularly stimulate debate include the extent to which human cancer risk may be inferred from and quantified according to analyses of animal data, and how health effects observed at high doses—possibly from animal tests or occupational exposures—should be extrapolated to ambient concentrations.

The amount of scientific detail contained in the documents has been enlarged further by the Agency's policy of evaluating all health effects of a pollutant, not just cancers, before making a listing decision. Beginning in 1977, EPA health assessment documents evaluated all health effects of the pollutant in question.¹²⁵ In 1979, however, the EPA's proposed "generic" cancer policy called for the documents to emphasize carcinogenic effects.¹²⁶ That policy was reversed early in 1981, when the EPA returned to full-scale health assessments.¹²⁷ One problem with the full-scale approach is that it consumes limited agency resources and delays listing of a pollutant, even though the carcinogenic effects may have been established. Since carcinogenic pollutants are generally assumed by the EPA to have no exposure thresholds,¹²⁸ the justification for stringent regulation of toxic air pollutants can often be based on carcinogenic effects alone. In these cases, an analysis of noncarcinogenic effects is arguably a waste of the Agency's limited scientific resources. Only if evidence of carcinogenicity is weak do other potential health effects require evaluation.

Qualitative evaluation of carcinogenicity data also raises complex and controversial issues. For example, what relative weights should be given to positive and negative findings from epidemiological, animal, and mutagenicity studies? The Agency attempted, in its proposed generic cancer policy, to standardize the treatment of different types of scientific data.¹²⁹ Although the proposed cancer policy was never finalized, the Agency did endorse the carcinogenicity guidelines contained in a draft

ENVTL. L. REV. 86, 86-89 (1980); Whittemore, *Mathematical Models of Cancer and Their Use in Risk Assessment*, J. ENVTL. PATHOLOGY & TOXICOLOGY, Dec. 1979, at 353, 360-61; Whittemore, *Facts and Values in Risk Analysis for Environmental Toxicants*, 3 RISK ANALYSIS 25, 31-32 (1983).

125. GAO REPORT ON SECTION 112, *supra* note 14, at 19-20.

126. See Proposed Cancer Policy, 44 Fed. Reg. 58,642 (1979) (proposed Oct. 10, 1979).

127. GAO REPORT ON SECTION 112, *supra* note 14, at 19-20.

128. See Interim Procedures and Guidelines, 41 Fed. Reg. 21,402-03 (1976) (summary of interim procedures and guidelines for cancer risk assessment, where EPA endorses nonthreshold view).

129. Proposed Rulemaking, 44 Fed. Reg. 58,642, 58,646-47 (1979) (evaluation of the probability of human carcinogenicity based on quality and weight of evidence; "best evidence" is positive epidemiological data with confirmatory animal tests; "substantial evidence" is provided by positive animal tests in one or more species; "suggestive evidence" includes positive mutagenicity and other factors) (proposed Oct. 10, 1979).

report by the Interagency Regulatory Liaison Group (IRLG).¹³⁰ Unfortunately, the Group's report¹³¹ is controversial because it never incorporated comments from the public.¹³² In any event, the Agency's endorsement of the document probably carries no legal significance.¹³³ The Office of Science and Technology Policy is currently completing another generic cancer policy document that may influence the carcinogenicity determinations made by the EPA.¹³⁴ For the most part, the EPA and the SAB are compelled to assess carcinogenicity data on a pollutant-by-pollutant basis, without the guidance of statutory or agency policy.

As the analytical sophistication of the health assessment document has grown, so has the amount and intensity of peer review. Authors of the documents—EPA staff or contractors—are expected to present drafts to open peer review workshops attended by scientists inside and outside

130. The IRLG was formed in the Carter Administration by the heads of the EPA, the FDA, the OSHA, and the Consumer Product Safety Commission. See generally M. Gerteis & S. Thomas, *The Interagency Regulatory Liaison Group* (Dec. 10, 1983) (unpublished draft, copy on file with author); *Interagency Agreement*, 42 Fed. Reg. 54,856 (1977) (IRLG agreement to cooperate on regulation of toxic substances); *Interagency Work Plan*, 43 Fed. Reg. 7174-78 (1978) (IRLG work plan on risk assessment).

131. Interagency Regulatory Liaison Group, *Work Group on Risk Assessment, Scientific Bases for Identification of Potential Carcinogens and Estimation of Risks*, 63 J. NAT'L CANCER INST. 241 (1979) [hereinafter cited as *Draft IRLG Report*].

132. The *Federal Register* notice states that the authors "anticipate publishing a statement giving notice of whatever revisions to the document are appropriate, if any." Request for Public Comment, 44 Fed. Reg. 39,858 (1979). Despite receipt of extensive comments, no revisions were published. The lack of adequate peer review of the IRLG document has been a source of controversy in congressional hearings. See, e.g., *Control of Carcinogens in the Environment: Hearings Before the Subcomm. on Commerce, Transportation, and Tourism of the House Comm. on Energy and Commerce*, 98th Cong., 1st Sess. 69-79 (1983) (statement of Dr. Norton Nelson, New York University Medical Center) (under questioning from Rep. Don Ritter, R-Pa., Dr. Nelson admitted that the IRLG report should have been subjected to extensive, formal external review).

133. In contrast to OSHA's generic cancer policy, 45 Fed. Reg. 5002 (codified at 29 C.F.R. §§ 1990.101-152 (1984)) (proposed Jan. 22, 1980), the IRLG guidelines were never officially promulgated as regulations by the participating agencies. Nor has the EPA officially adopted the IRLG guidelines as agency policy. The *Federal Register* notice accompanying the draft IRLG report states that "the report does not have any regulatory status at this time other than as a valuable scientific appraisal of scientific principles applicable to identifying and evaluating potential human carcinogens." Request for Public Comment, 44 Fed. Reg. 39,858 (1979). Instead, the EPA continues to abide by the "interim" cancer policy principles adopted by Administrator Train in 1976. See *Interim Procedures and Guidelines*, 41 Fed. Reg. 21,402 (1976). A contrary view is that agencies participating in the IRLG are required to acknowledge and justify any departures from the guidelines contained in the draft IRLG report. See Ashford, Ryan & Caldert, *A Hard Look at Federal Regulation of Formaldehyde: A Departure from Reasoned Decisionmaking*, 7 HARV. ENVTL. L. REV. 297, 300-03, 316 (1983) (arguing that the "reasoned decisionmaking" doctrine created by federal courts pursuant to the Administrative Procedure Act compels agencies to explain departures from IRLG document). But see J. Graham, *Reasoned Decisionmaking, Formaldehyde, and Federal Cancer Policy: A Different View* (Oct. 1984) (unpublished draft, available from author) (disputing the Ashford, Ryan, and Caldert interpretation of "reasoned decisionmaking" doctrine).

134. Notice of Guidelines, 49 Fed. Reg. 21,594 (1984) (proposed Office of Science and Technology Policy cancer guidelines).

of the EPA.¹³⁵ The results of these reviews are supposed to be incorporated into the documents before subsequent reviews by high-level agency staff and the SAB.¹³⁶ Review of the documents by the SAB has been an integral part of the listing process since 1978.¹³⁷ Although section 117(c) of the Act directs the EPA Administrator to *consult* with appropriate advisory committees,¹³⁸ it is the EPA's policy to delay listing and regulatory decisions until SAB *approval* of the health assessment document has been obtained.¹³⁹ Aside from the administrative costs and delay associated with such intensive scientific review, there is a danger that the precautionary intent of the listing process will be sacrificed in the pursuit of scientific respectability. The elaborate review process conveys the impression that a listing decision must be based on scientific consensus or conclusive scientific evidence. Such strict scientific review may conflict with the precautionary intent of the Act.

Two types of errors can be made in the listing decision. A "false-negative" error means that a truly carcinogenic pollutant is *not* listed due to inconclusive scientific data. A "false-positive" error means that a truly noncarcinogenic pollutant *is* listed due to misinterpretation of available scientific data. Both types of error are costly to society. False-positive listings cause unwarranted regulatory costs to be imposed on the private sector and limited agency resources to be diverted from the regulation of truly carcinogenic pollutants. False-negative listing decisions result in uncontrolled emissions of a carcinogenic substance and the creation of a false sense of safety about the pollutant in question. In light of the different consequences associated with the two types of error, the listing action should be viewed as a policy decision to be informed by scientific data, but not controlled by concepts of scientific consensus or proof.

The plain language and legislative history of section 112 indicate that Congress was particularly concerned about the failure to list a truly hazardous pollutant. The definition of hazardousness—applying to what "may reasonably be anticipated to result" in increased illness or mortality¹⁴⁰—is highly precautionary and the 1977 Clean Air Act Amendments emphasize the precautionary and preventive purposes of section 112 and

135. GAO REPORT ON SECTION 112, *supra* note 14, at 15.

136. *Id.*

137. The Scientific Advisory Board (SAB) is a group of independent scientists appointed and paid by the EPA who review the quality and sufficiency of the scientific data underlying some EPA decisions, such as section 112 listings. The SAB has standing committees, special committees, and ad hoc consultants for specific issues. Meetings of the SAB are announced in the *Federal Register* and are open to the public. *See id.* at 3-4, 28-35.

138. 42 U.S.C. § 7417(c) (1982).

139. GAO REPORT ON SECTION 112, *supra* note 14, at iv.

140. 42 U.S.C. § 7412(a)(1) (1982).

of the Act as a whole.¹⁴¹ While Congress did not intend to transfer the burden of proof from the EPA to industrial polluters,¹⁴² the legislative history of the 1977 Amendments reveals a conviction that standards of health protection should not be delayed due to the absence of conclusive scientific indications of adverse health effects from pollution.¹⁴³ A special concern with false-negative errors is particularly justified in the context of section 112, where the pollutants addressed may cause severe health damage, including various forms of cancer.¹⁴⁴

Although the listing process should be highly precautionary, there are good reasons to subject EPA listing decisions to some form of independent scientific review.¹⁴⁵ Such review can weed out arbitrary listings, stimulate higher quality work by EPA staff, redirect the Agency toward pollutants with genuine risks of severe health damage, promote public confidence in the agency's decisionmaking, insulate the Administrator from political attacks, and possibly reduce the incentive for and ultimate success of legal challenges both by industry and by environmental groups. A study by the General Accounting Office found that SAB review results in substantial improvement in the scientific accuracy of health assessment documents.¹⁴⁶ It should be recognized, however, that scientific review is not a neutral device in the adversarial process of environmental regulation. Layers of scientific review can be exploited by opponents of regulation to delay the listing process while maintaining that an ideal of "good science" is being advanced.¹⁴⁷

From this perspective, it is not surprising that industrial groups affected by section 112 propose even more elaborate forms of scientific review of EPA listing decisions. Industrialists have proposed that carcinogenicity determinations by the federal government—and particularly those made under section 112—be subjected to advisory opinions of independent scientific panels.¹⁴⁸ Proposals ranging from formal science

141. H.R. REP. NO. 294, *supra* note 71, at 51.

142. *Id.* at 49 (citing *Ethyl Corp. v. EPA*, 541 F.2d 1 (D.C. Cir.), *cert. denied*, 426 U.S. 941 (1976)).

143. *Id.* at 46-51.

144. H.R. REP. NO. 294, *supra* note 71, at 50 (emphasizing the more "serious" nature of hazardous air pollutants).

145. See, e.g., NATIONAL RESEARCH COUNCIL, *supra* note 4, at 55-56.

146. GAO REPORT ON SECTION 112, *supra* note 14, at 28.

147. For example, intensive scientific debate about the health effects of radionuclides has delayed adoption of the EPA's regulatory proposals for radionuclides. See *EPA Science Board Says Scientific Basis for Radionuclides Decision was Inadequate*, 15 ENV'T REP. (BNA) at 465-66 (July 27, 1984).

148. See, e.g., *Health Standards for Air Pollutants: Hearings Before the Subcomm. on Health and the Environment of the House Comm. on Energy and Commerce*, 97th Cong., 1st Sess. 420-23 (1981) (statement of Dr. Fred Hoerger, American Industrial Health Council); see also American Indus. Health Council, *Risk Assessment: Past and Future Proposals to Improve the Science Base for Regulatory Decisions 25-27* (May 1984) (draft manuscript, copy on file with author).

courts to ad hoc agency science panels have received extensive discussion in the scholarly literature.¹⁴⁹ But the case for further scientific review of the EPA's listing decisions is not a strong one. The current listing process appears to be excessively oriented to scientific validity, a problem that is exacerbated by the requirement that the SAB provide written approval to all documents before listing decisions are made.¹⁵⁰ A recent evaluation of the EPA's rulemakings under section 112 found that there was "a myth of scientific incompetence" about the EPA that leads to excessive scientific scrutiny of its decisions.¹⁵¹

B. *Unrealistic Rulemaking Deadlines.*

Once a pollutant is listed, the EPA must propose emission standards within six months and final standards within a year. The EPA has consistently failed to meet the timetable for final standards.¹⁵² While it is always fashionable to criticize bureaucratic delay, it must also be noted that the legislated deadlines in section 112 are ludicrous. Within the con-

149. See, e.g., NATIONAL RESEARCH COUNCIL, RISK ASSESSMENT IN THE FEDERAL GOVERNMENT: MANAGING THE PROCESS 5-8 (1983); Martin, *The Proposed Science Court*, 75 MICH. L. REV. 1058 (1977); Ramo, *Regulation of Technological Activities: A New Approach*, 213 SCIENCE 837, 841-42 (1981); Task Force of the Presidential Advisory Group on Anticipated Advances in Science and Technology, *The Science Court Experiment: An Interim Report*, 193 SCIENCE 653 (1976); Whitney, *The Case for Creating a Special Environmental Court System—A Further Comment*, 15 WM. & MARY L. REV. 33 (1973); Yellin, *Science, Technology, and Administrative Government: Institutional Designs for Environmental Decisionmaking*, 92 YALE L.J. 1300 (1983); Yellin, *High Technology and the Courts: Nuclear Power and the Need for Institutional Reform*, 94 HARV. L. REV. 489 (1981).

150. For example, SAB written approval for several pollutants has been delayed because of a technical disagreement with EPA staff about the proper method for assessing human cancer risk from animal data. See GAO REPORT ON SECTION 112, *supra* note 14, at 18.

151. Greenwood, *The Myth of Scientific Incompetence of Regulatory Agencies*, SCI., TECH. & HUM. VALUES, Winter 1984, at 83-96.

152. Asbestos, beryllium, and mercury were listed under section 112 on March 31, 1971. Addition to List of Hazardous Air Pollutants, 36 Fed. Reg. 5931 (1971). Final emission standards for these pollutants were not promulgated until April 6, 1973. 38 Fed. Reg. 8820 (1973) (codified at 40 C.F.R. §§ 61.32, .52, .147 (1984)). On December 24, 1975, EPA listed vinyl chloride as a hazardous air pollutant, Addition to List of Hazardous Air Pollutants, 40 Fed. Reg. 59,477 (1975), and proposed emission standards, Initial Proposed Rule, 40 Fed. Reg. 59,532 (1975). Final standards were issued on October 21, 1976. 41 Fed. Reg. 46,560 (1976) (codified at 40 C.F.R. § 61.60-.65 (1984)). The EPA listed benzene as a hazardous air pollutant on June 8, 1977. Addition to List of Hazardous Air Pollutants, 42 Fed. Reg. 29,332 (1977). Final emission standards for one of the categories of benzene emission were issued on June 6, 1984. 49 Fed. Reg. 23,498 (1984) (codified at 40 C.F.R. § 61.112 (1984)). Arsenic was listed on October 18, 1979, Addition to List of Hazardous Air Pollutants, 44 Fed. Reg. 60,155 (1979), and radionuclides on December 27, 1979, Addition to List of Hazardous Air Pollutants, 44 Fed. Reg. 76,738 (1979). As of this writing, final standards for radionuclides and arsenic have not been promulgated. *But see Court Finds Ruckelshaus in Contempt, Orders EPA to Decide on Radionuclides*, [Current Developments] ENV'T REP. (BNA) 1371, 1371 (Dec. 14, 1984) (noting *Sierra Club v. Ruckelshaus*, No. C84-0656 (N.D. Cal. Dec. 11, 1985) (contempt order)).

straints of the resources provided by Congress, it generally takes the EPA at least two years to propose standards because of the time required to identify the full range of emission sources, to obtain requisite information on compliance technologies and costs, and to generate EPA consensus on a proposed regulatory package.¹⁵³ It then takes at least one year to promulgate final regulations after the proposal because of the time necessary to obtain, analyze, and respond to public comments, to revise the proposals accordingly, and to obtain final EPA approval.¹⁵⁴ Sometime during this process the EPA must also subject the package to review by the Office of Management and Budget.¹⁵⁵ The timetable described above is achievable only if the EPA continues the often-criticized practices of making extensive use of outside consultants and external contracts.¹⁵⁶

When Congress establishes unrealistic deadlines for the discharge of nondiscretionary duties, it invites disruptive litigation. The recent court orders regarding benzene,¹⁵⁷ radionuclides,¹⁵⁸ and arsenic¹⁵⁹ have accelerated regulatory analysis of these pollutants by indirectly bringing about a shift of EPA resources from other projects. The recent General Accounting Office study of the EPA's air toxics program describes the following consequences of the court orders: additional delays in the development of health assessment documents for unlisted pollutants, new delays in the Agency's review of emission standards now in effect for listed pollutants, and substantial setbacks in the development of several new source performance standards for pollutants under section 111 of the Clean Air Act.¹⁶⁰

The disruptions caused by recent lawsuits could also have a perverse effect on EPA behavior—the Agency may delay listing pollutants in the future until proposed emission standards are ready for publication. In fact, delay in the listing of vinyl chloride from May, 1974, until December, 1975, has been attributed to the EPA's desire to avoid the statutory rulemaking deadlines in section 112.¹⁶¹ Recent lawsuits have encouraged

153. GAO REPORT ON SECTION 112, *supra* note 14, at 39; *see also* Tabler, *supra* note 121, at 535-36.

154. GAO REPORT ON SECTION 112, *supra* note 14, at 39.

155. Exec. Order No. 12,291, 3 C.F.R. 127, 128 (1982) (requiring that all major rules be subjected to cost-benefit analysis).

156. GAO REPORT ON SECTION 112, *supra* note 14, at 24.

157. *Natural Resources Defense Council v. EPA*, No. 83-2011 (D.D.C. filed Jan. 27, 1984).

158. *Sierra Club v. Gorsuch*, 551 F. Supp. 785, 786 (N.D. Cal. 1982).

159. *New York v. Gorsuch*, 554 F. Supp. 1060, 1063 (S.D.N.Y. 1983).

160. GAO REPORT SECTION 112, *supra* note 14, at 42-43.

161. Doniger, *supra* note 55, at 587.

such behavior.¹⁶² It appears that the EPA is currently delaying the listing of known carcinogenic pollutants until emission standards are ready for formal proposal in the *Federal Register*.¹⁶³ Such delay is legally defensible because there is no time limit governing when a pollutant must be listed under section 112. If the EPA continues to respond in this fashion, then the benefits of a prompt listing decision will be foregone.

Prompt listings are beneficial because they may cause industrial sources to take some steps to curtail emissions, even in the absence of emission regulations. For example, benzene emissions from some plants were lessened substantially from the time of the listing—1977—until the promulgation of final standards—1984.¹⁶⁴ Economic factors were primarily responsible for this decline, but some additional emission control may be attributable to the prompt listing. In addition, prompt listings are useful in providing continuity in EPA policy as agency administrators and presidential administrations come and go. Without a prompt listing, there is no expectation that the Agency's partial work on emission standards will be proposed or promulgated in a timely fashion. If arsenic and benzene had not been listed during the Carter Administration, it is unlikely that the Reagan Administration would have made regulatory decisions about these known human carcinogens. Effective implementation of the congressional purpose of section 112 is facilitated by prompt listing decisions.

One way to accelerate the listing of pollutants under section 112, sometimes called the "list and hammer" method,¹⁶⁵ is for Congress to incorporate a list of pollutants into its legislative mandate to the EPA. A variant of this approach was used in the 1977 Amendments¹⁶⁶ and a more radical version is endorsed by environmentalists in the House and Senate.¹⁶⁷ This approach to listing pollutants is a legislative practice of questionable effectiveness and desirability. Grafting a priority list of

162. See, e.g., *Natural Resources Defense Council v. EPA*, No. 83-2011 (D.D.C. filed Jan. 27, 1984) (action against EPA for failing to propose control standards after listing benzene as hazardous). Some EPA staff members believe the agency "got burned on benzene;" as a result, formal listings are being replaced by notices of "intent to regulate." *EPA's New Approach to Regulating Toxics May Delay Decision Process, Dingell Says*, [Current Developments] ENV'T REP. (BNA) 2185-86 (Mar. 30, 1984).

163. GAO REPORT ON SECTION 112, *supra* note 14, at 42-43.

164. Proposed Withdrawal of Proposed Standards, 49 Fed. Reg. 8386 (1984) (proposed Mar. 6, 1984).

165. American Indus. Health Council, *Risk Assessment: Past and Future Proposals to Improve the Scientific Base for Regulatory Decisions*, 38 (May 1984) (unpublished draft; copy on file with author).

166. 42 U.S.C. § 7422(a) (1982).

167. See 1982 CONG. Q. ALMANAC, 432-33; *Plan to Provide for Automatic Listing of Hazardous Pollutants Introduced in House*, 7 CHEMICAL REG. REP. (BNA) No. 51, at 1744 (Mar. 23, 1984).

thirty-seven pollutants onto section 112 is inadvisable because the priorities should change as new scientific data are gathered. As an expert administrative agency with scientific staff, the EPA should be in a better position than Congress to evaluate the carcinogenic risks of various pollutants and to establish sensible priorities for rulemaking action. Members of Congress lack the time, the attention span, and the expertise to modify priorities in the face of evolving patterns of scientific data. The EPA recently found that many substances on the original list of thirty-seven priority pollutants no longer deserve priority assessment.¹⁶⁸ There is a real danger that forced listings could cause the EPA to lose control of the priority-setting process, thereby diverting the Agency from a more productive use of its health-protecting resources.¹⁶⁹ As we shall see, the EPA's footdragging does not reflect bad motives on the part of agency personnel; rather, it is caused by the statute itself.

A close look at events subsequent to the 1977 Amendments reveals that the strategy of forced listings was ineffective and disruptive. Of the four pollutants specified in the 1977 Amendments, none were listed and regulated within the legislated time limits. The EPA continues to believe that cadmium is not hazardous at ambient exposures¹⁷⁰ and that polycyclic organic matter per se is not usefully listed and regulated as a hazardous air pollutant.¹⁷¹ The staff time expended by the EPA on these two pollutants pursuant to congressional mandate has achieved no discernible health benefit. Additional agency resources will be expended in the litigation that is certain to ensue.¹⁷² In the case of radionuclides, the Agency was forced by court order to propose complicated emission standards before the magnitude of the cancer risks was estimated. Now, after completing the appropriate analyses, the EPA is withdrawing the proposed standards on grounds of insignificant risk—a decision that presumably will be litigated.¹⁷³ The listing of arsenic as a hazardous air

168. GAO REPORT ON SECTION 112, *supra* note 14, at 11-13.

169. See 1983 Hearings, *supra* note 15, at 9, 11 (statement of Joseph A. Cannon, Assistant Administrator for Air and Radiation, EPA) ("The simple fact is, an automatic listing requirement might make [the EPA] make decisions . . . that are not always in the best interest of the country.").

170. 1981 Hearings, *supra* note 9, at 743 (statement of Walter Barber, Director, Office of Air Quality Planning and Standards, EPA) (stating EPA position on cadmium exposure).

171. The state of New York has appealed the EPA's decision not to list polycyclic organic matter. *New York v. Ruckelshaus*, No. 84-1472 (D.C. Cir. filed Sept. 18, 1984). The EPA believes that a more practical means of regulating polycyclic organic matter is to list particular source categories, such as coke-oven emissions. See Proposed Decision Not to Regulate, 49 Fed. Reg. 5580, 5582 (1984).

172. See *New York, Colorado, NRDC Sue to Force EPA to Regulate Polycyclic Organic Matter*, 15 ENV'T REP. (BNA) 801, 801-02 (1984).

173. T. Gorman, Risk Management: EPA Experiments With a New Policy 14 (unpublished manuscript; presented at the Sixth Annual Research Conference of the Association for Public Policy

pollutant appears to be supportable on scientific grounds, but it is not clear in some cases what can be done further to reduce emissions, short of shutting down large industrial facilities. On the whole, the legislative attempt to force EPA decisionmaking on these four pollutants has had little beneficial result while it has diverted the EPA's attention and resources from other priority air pollutants and other environmental projects.¹⁷⁴

C. *Contentious Assertions of Insignificant Risk.*

Once a pollutant is listed as hazardous, the EPA must determine which industries, source categories, and plants emit the pollutant in sufficient quantities to justify imposition of emission standards. The language of section 112 contains no explicit guidance to inform this process. Environmentalists have urged the EPA to establish stringent emission limitations for virtually all sources of the pollutant.¹⁷⁵ Industrialists urge that exemptions be provided for categories of emission sources that do not pose a "significant" risk.¹⁷⁶

The EPA has sided with industry, preferring the view that some categories of hazardous emissions need not be regulated under section 112. The nature of the EPA's process for determining significant emission sources was revealed in the recent benzene rulemaking.¹⁷⁷ Proposed emission standards for three source categories were withdrawn by the EPA in June, 1984, on grounds of insignificant risk.¹⁷⁸ The EPA argues that a margin of safety does not require zero risk and, therefore, source categories causing sufficiently small risks can be ignored in the standard-setting process.¹⁷⁹ The EPA estimates, based on quantitative risk assessment, that citizens suffering the highest exposures to benzene from the three unregulated source categories would incur "excess lifetime risks"¹⁸⁰ of leukemia in the 10^{-4} to 10^{-5} range.¹⁸¹ While individual risks of this

Analysis and Management, New Orleans, La., Oct. 18-20, 1984) (EPA "very likely" to be sued on radionuclides).

174. *Id.* at 14-15, 17 (discussing the resource tradeoffs that occur when a pollutant is selected for rulemaking).

175. *See, e.g.*, D. Doniger & A. Ahmed, *supra* note 69, at 8-9.

176. *See, e.g.*, 1981 Hearings, *supra* note 20 at 722-23 (statement of Michael A. James on behalf of the Chemical Manufacturers Association).

177. Proposed Withdrawal of Proposed Standards, 49 Fed. Reg. 8386 (1984).

178. Withdrawal of Proposed Standards, 49 Fed. Reg. 23,558 (1984).

179. Proposed Withdrawal of Proposed Standards, 49 Fed. Reg. 8386 (1984).

180. An "excess lifetime risk" is the increased chance—owing to exposure to a given substance—that one will contract a given disease during one's expected lifetime.

181. Proposed Withdrawal of Proposed Standards, *supra* note 179, at 8389-91; *see also* E. Salo, Decision Memorandum for the Administrator on Benzene 4 (Sept. 7, 1983) (unpublished memorandum by EPA attorney; copy on file with author).

magnitude are sometimes regulated by the states, the EPA, and other agencies,¹⁸² the withdrawal notice emphasizes that, on a national basis, the expected number of leukemia cases attributable to emissions from the three sources combined is estimated to be considerably less than one per year.¹⁸³ The EPA asserts that the decision is consistent with the Supreme Court's opinion in *Industrial Union Department v. American Petroleum Institute*,¹⁸⁴ in which a plurality of the Court argued that the Occupational Safety and Health Administration (OSHA) must show that benzene creates a "significant" leukemia risk before OSHA attempts to reduce the ten-parts-per-million workplace exposure limit.¹⁸⁵ Justice Stevens described an excess lifetime risk of death of 10^{-3} as one that "a reasonable person might well consider significant and take appropriate steps to decrease or eliminate."¹⁸⁶ The OSHA is now using the 10^{-3} cut-off in its determination of what constitutes a significant risk in terms of its enabling legislation.¹⁸⁷

Environmentalists have recently challenged the EPA's withdrawal decision in federal court.¹⁸⁸ The NRDC contends that no person should lose his or her life from air pollution and that the Clean Air Act embraces this goal.¹⁸⁹ The nature and severity of the health effects caused by hazardous air pollution are so serious that the NRDC believes that judgments of insignificant risk are ethically and legally impermissible. The definition of a hazardous air pollutant refers to "an increase in mortality," not a "significant" increase in mortality.¹⁹⁰

As a practical matter, the NRDC concedes that the EPA "may have limited authority to define de minimis rates of *emissions* and to conclude

182. Some states use an excess lifetime risk of 10^{-6} as a guideline for acceptable cancer risk. *See States Moving Ahead with Toxics Programs in Absence of Federal Action, Official Says*, [Current Developments] ENV'T REP. (BNA) 1371 (Nov. 25, 1983) (states include Illinois, Michigan, New Jersey, and New York). The EPA, at least under Administrator Gorsuch, tended to take an ambivalent attitude toward lifetime cancer risks of 10^{-4} to 10^{-5} . *See* J. Todhunter, Review of Data Available to the Administrator Concerning Formaldehyde 5 (Feb. 10, 1982) (unpublished memorandum by Assistant Administrator, EPA; copy on file with author). Richard Wilson has urged agencies to employ such quantitative criteria more extensively as a method for determining what risks are acceptable. *See* Wilson, *Risks and Their Acceptability*, SCI., TECH. & HUM. VALUES, Spring 1984, at 11, 14-22 (1984).

183. Proposed Withdrawal of Proposed Standards, 49 Fed. Reg. 8386, 8389-91 (1984).

184. 448 U.S. 607 (1980).

185. *Id.* at 641.

186. *Id.* at 655.

187. *See* the discussion of the significant-risk doctrine in OSHA's rulemakings on arsenic, Supplemental Statement of Reasons for Final Rule, 48 Fed. Reg. 1864, 1866-67 (1983) (proposed Jan. 14, 1983), and asbestos, Emergency Temporary Standard, 48 Fed. Reg. 51,086, 51,088-91 (1983).

188. *See* Natural Resources Defense Council v. Thomas, No. 84-1387 (D.C. Cir. filed Aug. 3, 1984); American Petroleum Inst. v. EPA, No. 84-1391 (D.C. Cir. filed Aug. 3, 1984).

189. D. Doniger & A. Ahmed, *supra* note 69, at 2, 9.

190. *Id.* at 9.

that sources emitting at lower rates need not be subject to standards.”¹⁹¹ The determination of de minimis emission rates would, according to the NRDC, be based not on quantitative risk assessment, but rather on considerations discussed in *Alabama Power Co. v. Costle*.¹⁹² There, the Court of Appeals for the District of Columbia Circuit found that most regulatory statutes, including the Clean Air Act, provide agencies with inherent authority to ignore “trifling matters.”¹⁹³ *Alabama Power* is unfortunately of little value in the context of section 112 because it does not indicate the limits of the EPA’s authority to define what is “trifling.”

Underlying the conflict between the EPA and the NRDC is a normative dispute about the relative importance of individual rights and the social value of minimizing risks. The EPA gives weight to the argument that the total number of persons adversely affected by the three unregulated sources of benzene emissions is small.¹⁹⁴ In contrast, the NRDC approaches environmental protection from a rights-based perspective, asserting that each citizen has a right not to be victimized by hazardous air pollution.¹⁹⁵ Both positions have a certain plausibility, and thus a procedure for making significant-risk judgments incorporating both is recommended below.¹⁹⁶

The NRDC and the EPA have also taken conflicting positions on the reliability and appropriate use of quantitative risk assessment under section 112. The EPA believes that the assumptions used by the agency’s Carcinogen Assessment Group are “conservative” in the sense that the predictions of the linear, no-threshold model the Group employs are unlikely to underestimate the actual cancer incidence attributable to specific air pollutants.¹⁹⁷ The EPA therefore argues that risk assessment can be used to distinguish “significant” from “insignificant” source categories, although the Agency has yet to adopt publicly a numerical cutoff for this determination.¹⁹⁸

191. *Id.* at 10 n.3 (emphasis in original). However, Doniger and Ahmed also stated that such levels “would have to be consistent with the de minimis [sic] emissions levels already established for the existing hazardous air pollutants.” *Id.*

192. 636 F.2d 323 (D.C. Cir. 1979).

193. *Id.* at 360-61.

194. Proposed Withdrawal of Proposed Standards, 49 Fed. Reg. 8386, 8389-91 (1984); E. Salo, *supra* note 181, at 7.

195. D. Doniger, Remarks on Toxics in the Environment, sponsored by *Inside EPA Weekly Report* and The Center for Energy and Env’tl. Mgmt. 2 (Nov. 17-18, 1983) (copy on file with author).

196. See *infra* text accompanying notes 295-308.

197. See, e.g., Ruckelshaus, *Risk in a Free Society*, 14 ENVTL. L. REP. (ENVTL. L. INST.) 10,190-91 (1984) (describing conservatism in EPA risk assessments); see also Proposed Withdrawal of Proposed Standards, Fed. Reg. 8386, 8388 (1984) (EPA describes its Carcinogen Assessment Group’s estimates of benzene-induced leukemia as “reasonable”).

198. The Office of Management and Budget has criticized the EPA for not adopting a common de minimis cutoff risk level for source categories. See *OMB Position on Use of Risk Assessment, Cost-*

In contrast, the NRDC believes that the techniques of cancer-risk assessment are "too uncertain and fragile to be a rational basis" for regulatory decisions under section 112.¹⁹⁹ The NRDC challenges the Agency's assumption of "conservatism" by pointing to possibilities of interaction between chemicals or between pollutants and other risk factors.²⁰⁰ However, the NRDC offers no alternative analytical foundation for significant-risk decisions. Although the NRDC has suggested that exemptions of source categories be based on previous agency decisions on hazardous pollutants,²⁰¹ it is not clear that the exemption decisions for these pollutants have a rational basis.²⁰² The use of quantitative risk assessment is necessary not because it is highly reliable but because there are no available alternative modes of analysis.²⁰³

D. *Fear of Zero-Emission Standards.*

A basic problem with section 112 is the unworkable statutory test for setting emission standards for nonthreshold pollutants, such as airborne carcinogens. The EPA is supposed to set emission standards at the level that "protects the public health with an ample margin of safety." However, the scientific community has not established a safe or "no-effect" level of exposure for any known carcinogen.²⁰⁴ A significant segment of the scientific community believes, on the basis of certain theories of carcinogenesis, that any human exposure to a carcinogen, however small, poses some incremental risk of cancer.²⁰⁵ Under these conditions it is impossible for the EPA to establish nonzero emission limits for carcinogens that protect the public health, let alone provide an ample margin of safety. The EPA has acknowledged that a literal interpretation of the Act might require that zero emission limits be established for all non-

Effectiveness Analysis, Benefit-Cost Review in Setting Standards for Toxic Air Pollutants, 14 ENV'T REP. (BNA) 1593 (Dec. 8, 1983) [hereinafter cited as *OMB Report*].

199. D. Doniger & A. Ahmed, *supra* note 69, at 5.

200. D. Doniger, *supra* note 195, at 8.

201. D. Doniger & A. Ahmed, *supra* note 69, at 10 n.3.

202. Indeed, the EPA's exemption of some sources from vinyl chloride regulation was criticized as inconsistent by the same author who is now proposing that past EPA exemption decisions serve as the basis for future exemption decisions. *Compare id. with Doniger, supra* note 55, at 586 n.468.

203. For an extensive analysis supporting this statement, see QUANTITATIVE RISK ASSESSMENT 1-54 (L. Lave ed. 1982).

204. See, e.g., EPA National Emission Standards for Hazardous Air Pollutants; Policy and Procedure for Identifying, Assessing and Regulating Airborne Substances Posing a Risk of Cancer, 44 Fed. Reg. 58,642, 58,642 (1979) (EPA position that carcinogenic thresholds cannot be shown); *Draft IRLG Report, supra* note 131, at 264-65.

205. See discussion of dose-response functions in OTA CANCER REPORT, *supra* note 124, at 157-65. See also Tabler, *supra* note 121, at 532.

threshold pollutants.²⁰⁶ That conclusion is not far-fetched because the original Senate bill in 1970 called for a prohibition of emissions of hazardous air pollutants.²⁰⁷ In practice, the EPA has not issued zero-emission standards. In the two instances in which the EPA has regulated nonthreshold pollutants—*asbestos* and *vinyl chloride*—the Agency has rejected zero-emission standards in favor of rules based on available technology.²⁰⁸ The EPA's legal reasoning in these rulemakings has never been judicially reviewed. As argued below,²⁰⁹ there are good reasons to doubt the soundness of the EPA's legal position.

In any case, the perception that section 112 might require extremely strict emission limits appears to have had a counterproductive effect—the EPA has been reluctant to list pollutants and to promulgate emission standards. The recent General Accounting Office report on the implementation of section 112, citing interviews with EPA officials, states that the EPA “has been reluctant to list pollutants as hazardous under section 112 without a reasonable assurance that subsequent regulations would result in health benefits that are not grossly disproportionate to the costs of control.”²¹⁰ In testimony before Congress, a veteran employee of the EPA's air quality office pleaded for legislative correction:

While low-cost controls with the potential to reduce emissions and exposure by fifty to ninety percent may be available, it is not clear that they would meet the statutory test of “ample margin of safety” under section 112. On the other hand, uncertainty in the health and exposure data make [sic] more stringent and more costly controls less justifiable. The ability to balance the magnitude and uncertainty of health risk with the cost and impact of control techniques is a prerequisite to any accelerated decisionmaking under the statute.²¹¹

Even if the EPA lists a pollutant, the fear of excessively stringent emission requirements may paralyze or delay the process of setting standards. For example, the delay between the proposed and final vinyl chloride standards has been attributed in part to legal uncertainty about the de-

206. See Initial Proposed Rule, 44 Fed. Reg. 58,642, 58,645 (1979); see also *Air Act Interpretation Could Bar Chemicals, Cannon Warns, Urging Changes in Section 112*, 14 ENV'T REP. (BNA) 1901-02 (Mar. 2, 1984); *Ruckelshaus Defends Reagan on Acid Rain, Says House-Senate Measures Would Not Work*, 14 ENV'T REP. (BNA) 2205 (Apr. 6, 1984) (reading section 112 to require a zero-emission level).

207. See S. REP. NO. 4358, 91st Cong., 2d Sess. 495-97 (1970).

208. See Final Vinyl Chloride Emission Standards, 41 Fed. Reg. 46,560, 46,562 (codified at 40 C.F.R. §§ 61.60-71 (1984)) (proposed Oct. 21, 1976); Final Emission Standards for Asbestos, Beryllium, and Mercury, 38 Fed. Reg. 8820, 8820-22 (codified at 40 C.F.R. §§ 61.01-.53 (1984)) (proposed Apr. 6, 1973).

209. See *infra* notes 225-36 and accompanying text.

210. GAO REPORT ON SECTION 112, *supra* note 14, at 43.

211. 1981 Hearings, *supra* note 9, at 740-41 (statement of Walter Barber, Director, Office of Air Quality Planning and Standards, EPA).

gree of reduction of emissions that was intended by Congress.²¹² Difficulty in interpreting the "ample margin of safety" language was apparently a major impediment to implementation of section 112 during the Carter Administration.²¹³

Officials of the EPA have been so dismayed by the stringent standards called for in section 112 that alternative statutory bases for regulation of airborne carcinogens have been actively investigated.²¹⁴ A recent EPA strategy paper proposes that the agency consider regulating airborne carcinogens under other sections of the Clean Air Act or under section 6 of the Toxic Substances Control Act.²¹⁵ It has also been reported that the EPA is considering the possibility of negotiating state-by-state regulation of localized airborne carcinogens, instead of making formal listing decisions under section 112.²¹⁶ The Agency's exploration of these alternatives is a response to a blunt and inflexible statute.

E. *Unauthorized Consideration of Technology and Cost.*

The EPA's legal defense of the technology-based approach²¹⁷ to standard setting is a remarkable exercise in statutory (re)interpretation.²¹⁸ The Agency begins with the premise that members of Congress did not have nonthreshold pollutants in mind when section 112 was written.²¹⁹ The ample-margin-of-safety formula assumes that some "safe" level of exposure can be demonstrated and that a safety factor can be applied to the threshold to assure that the public health is

212. See Doniger, *supra* note 55, at 566 (delay attributed to EPA's reluctance to "flout the literal meaning of section 112").

213. 1981 Hearings, *supra* note 9, at 729 (statement of Khristine Hall, Environmental Defense Fund).

214. Before vinyl chloride was regulated under section 112, other options were actively considered. The EPA considered using section 115 (abatement conferences, codified at 42 U.S.C. § 7415(d) (1982)), section 303 (imminent hazard emergency powers, codified at 42 U.S.C. § 7603(a) (1982)), and section 109 (a primary ambient air quality standard, codified at 42 U.S.C. § 7409(a) (1982)). These options were ultimately rejected, for a variety of reasons, in favor of a listing under section 112. See Doniger, *supra* note 55, at 573-75.

215. EPA Staff Draft, Proposed Process for Evaluation and Control of Toxic Air Pollutants 25-27 (Mar. 23, 1983) (unpublished draft; copy on file with author).

216. See, e.g., *Alm Said to Approve Plan for Regulation of Acrylonitrile Emissions by State Programs*, 8 CHEMICAL REG. REP. (BNA) No. 10, at 301-02 (June 8, 1984).

217. Under this approach, the stringency of emissions standards is determined by engineering, rather than health or economic, considerations. See McGarity, *Media-Quality, Technology, and Cost-Benefit Balancing Strategies for Health and Environmental Regulation*, LAW & CONTEMP. PROBS., Summer 1983, at 159, 160.

218. The EPA's legal defense was advanced for comment in the proposed generic cancer policy. See Initial Proposed Rule, 44 Fed. Reg. 58,642, 58,659-61 (1979).

219. *Id.* at 58,659-60. But see Schroeder, *supra* note 42, at 35 n.118 (arguing that Muskie knew about nonthreshold pollutants).

protected.²²⁰ If, however, zero exposure is the only safe level, then the ample-margin-of-safety formula cannot be applied. Because Congress did not explicitly indicate its intent to create the economic disaster that zero-emission standard would bring about,²²¹ and because a zero-emission standard renders the margin-of-safety concept meaningless, the EPA infers that zero-emission standards for nonthreshold pollutants were not intended by Congress.²²² From this point, the EPA proceeds to advocate a technology-based approach to setting emission standards, which calls for zero emissions only where an unreasonable risk persists after the best control technologies have been installed by polluters. Residual cancer risks are “unreasonable” if the EPA determines that the costs of further emission control are not grossly disproportionate to the marginal health benefits.²²³

One can sympathize with the EPA in this predicament, but that does not mean that its statutory interpretation is sound. No judicial rulings have been issued on the matter, so it is conceivable that the EPA’s legal strategy will survive.²²⁴ Several legal commentators, however, have

220. 44 Fed. Reg. 58,660 (1979).

221. *Id.* (predicting “massive social dislocations” from zero-emission standards).

222. *Id.* (Congress “would have spoken with much greater clarity”).

223. *See, e.g., id.* at 58,650.

224. The survival of the EPA’s reading of section 112 may seem somewhat more likely in light of two recent rulings of the Supreme Court. In *Chevron, U.S.A., Inc. v. Natural Resources Defense Council*, 104 S. Ct. 2778 (1984), the Court reversed the D.C. Circuit and upheld the EPA’s interpretation of the term “stationary source,” 40 C.F.R. § 51.18(j)(1)(i),(ii) (1984), as “a permissible construction of the statute [i.e. section 172(b)(6) of the Clean Air Act Amendments of 1977, codified at 42 U.S.C. § 7502(b)(6) (1982)] which seeks to accommodate progress in reducing air pollution with economic growth.” *Chevron*, 104 S. Ct. at 2793-94. The Court noted, however, that despite the opacity of the statute its legislative history—although otherwise “unilluminating,” *id.* at 2791—“plainly disclose[d] that . . . Congress sought to accommodate the conflict between the economic interest in . . . capital improvements . . . and the environmental interest in improving air quality.” *Id.* at 2786. The language of section 112 is therefore distinguishable from that at issue in *Chevron*, for the legislative history of section 112 is both illuminating and clearly hostile to agency balancing of economic interests. *See supra* notes 198-208 and accompanying text.

In *Chemical Mfrs. Ass’n v. Natural Resources Defense Council*, 53 U.S.L.W. 4193 (U.S. Feb. 27, 1985) (5-4 decision), the Court upheld the EPA’s reading of the term “may not modify” as it occurs in section 301(l) of the Clean Water Act Amendments of 1977, codified at 33 U.S.C. 1311(l) (1982). The EPA reading left the Agency free to issue “fundamentally different factor” (FDF) variances—*see* 40 C.F.R. §405.13 (1984)—for specific sources of pollutants listed as toxic by the Agency. A divided Court held that such variances were not contrary to Congress’ directive to the agency not to “modify” standards for toxic pollutants listed by the Agency. *Chemical Mfrs.* at 4198. The structure of the Clean Air Act fundamentally differs from that of the Clean Water Act, however. In drafting the Clean Water Act, Congress considered the economic impact on industry of regulating toxic effluents. *See* 33 U.S.C. § 1317(a)(2) (1982) (effluent limitation of toxics to be based on best available technology economically achievable). The EPA, relying on this statutory basis, promulgated the FDF variance mechanism, which allowed for consideration of economic factors as they apply to a specific polluter. 40 C.F.R. § 403.13(c)(2)(C) (1984). In drafting section 112 of the Clean Air Act, however, Congress was not concerned with any type of cost/benefit analysis. *See*

denounced and ridiculed the EPA's reading of the statute.²²⁵ In short, the EPA has attempted to convert section 112 from a health-based statute to a technology-based statute. Some observers believe that the Ruckelshaus EPA moved toward some form of cost-benefit analysis.²²⁶

The Agency's departure from health-based emission standards is highly questionable in light of the plain language of the section, the legislative history, other sections of the Clean Air Act, and parallel case law. The plain language of section 112 does not qualify the EPA's duty to provide an ample margin of safety to protect the public health. There is no explicit authorization for the EPA to incorporate economic and technological data into the process of setting emission standards.

The Clean Air Act as a whole carefully distinguishes between health standards and technology standards. Section 109, which also uses the language "adequate margin of safety," calls for primary ambient air quality standards based solely on health considerations.²²⁷ Section 111, in contrast, explicitly authorizes the EPA to consider economic and technological feasibility when setting emission performance standards for new stationary sources.²²⁸ If Congress had intended the EPA to consider technology and costs under section 112, it is hard to imagine why that intention was not made clear, as it was in section 111. The District of Columbia Circuit has, in fact, noted this distinction:

The Clean Air Act Amendments of 1970 . . . distinguish between pollutants subject to technology-based regulation under section 111, and hazardous substances subject to health-based regulation under section 112. Recognizing that "certain pollutants" required special treatment because of risk to health, Congress enacted section 112 dealing with hazardous pollutants, without provision for considerations of

infra notes 225-36 and accompanying text. Therefore, there appears to be no statutory basis on which the EPA could rely in promulgating an analogue to the FDF variance mechanism to allow cost/benefit analysis.

225. See 1983 Hearings, *supra* note 15 at 10 (statement of Joseph A. Cannon, Assistant Administrator for Air and Radiation, EPA) ("candid" statement concedes that some would argue that EPA has made a "pretzel" out of section 112); see also GAO REPORT ON SECTION 112, *supra* note 14, at 44, 51 (finds "little support for EPA's [legal] position;" agency's interpretation "appears at odds with section 112"); Currie, *Direct Federal Regulation of Stationary Sources Under the Clean Air Act*, 128 U. PA. L. REV. 1389, 1460-63 (1980) (generally disputing EPA's interpretation of the standard-setting criteria in section 112); Doniger, *supra* note 55, at 566-88; Schroeder, *supra* note 42, at 1, 30-36 ("EPA rewrote the statute;" statutory interpretation is "totally unjustified;" "flatly contradicts" the rights-based intent of the statute; an "unusually untenable set of positions;" "textually implausible;" "EPA's idea gives the agency a roving commission to be 'reasonable'").

226. T. Gorman, *supra* note 173, at 1, 4-5, 9, 18 (describing the Ruckelshaus EPA's tentative transition to cost-benefit balancing under section 112).

227. 42 U.S.C. § 7409(b)(1) (1982).

228. 42 U.S.C. § 7411(a)(1) (1982).

feasibility.²²⁹

A good case can be made that emission standards under section 112 are intended to be even more stringently protective of public health than the primary ambient standards for criteria pollutants in section 109. The phrase "margin of safety" contained in both sections "was intended to provide protection against hazards which research has not yet identified."²³⁰ While section 109 calls for an "adequate" margin of safety, section 112 calls for an "ample" margin of safety.²³¹ One judicial opinion suggests that an "ample" margin of safety is greater than an "adequate" margin of safety.²³² This conclusion is sensible because hazardous pollutants are expected to cause severer health effects than those caused by criteria pollutants.

One might read some flexibility into the phrases "in the judgment of the Administrator" and "to protect the public health," as they occur in the Act,²³³ but it is hard to see how an authorization to rely on economic or technological factors could reasonably be derived from this language. In a variety of contexts, courts have found that when Congress wants an agency to consider economic and technological data, it does so expressly in the language of the Act.²³⁴ Moreover, the District of Columbia Circuit has expressly rejected suggestions that nonhealth factors should be permitted to influence the EPA's setting of primary ambient standards under section 109²³⁵ or the setting of discharge limits of toxic water pollutants under the Federal Water Pollution Control Amendments of 1972.²³⁶

The EPA's rejection of zero-emission standards is based on a defensible view of what is good social policy. While zero-emission standards

229. *Hercules, Inc. v. EPA*, 598 F.2d 91, 112 (D.C. Cir. 1978). *But see* Initial Proposed Rule, 44 Fed. Reg. 58,642, 58,661 n.32 (1979) (EPA arguing that this case is not "controlling precedent" for section 112).

230. *Environmental Defense Fund v. EPA*, 598 F.2d 62, 81 (D.C. Cir. 1978) (quoting S. REP. No. 1496, 93d Cong., 2d Sess. 10 (1970)).

231. Compare 42 U.S.C. § 7409(b)(1)(1982) with 42 U.S.C. § 7412(b)(1)(B) (1982).

232. *Environmental Defense Fund v. EPA*, 598 F.2d 62, 81 (D.C. Cir. 1978). *But see* Initial Proposed Rule, 44 Fed. Reg. 58,642, 58,661 (1979) (Congress did not intend "to make air pollution practically the sole facet of American life from which the government would attempt to eliminate risk entirely.").

233. 42 U.S.C. § 7412(a)(1) (1982).

234. See, e.g., *American Textile Mfrs. Inst. v. Donovan*, 452 U.S. 490, 510-11 (1981); *Union Elec. Co. v. EPA*, 427 U.S. 246, 256-57 (1976); *American Petroleum Inst. v. Costle*, 665 F.2d 1176, 1185 (D.C. Cir. 1981); *Lead Indus. Ass'n v. EPA*, 647 F.2d 1130, 1148 (D.C. Cir. 1980).

235. *Lead Indus. Ass'n v. EPA*, 647 F.2d 1130, 1150 (D.C. Cir. 1980).

236. *Environmental Defense Fund v. EPA*, 598 F.2d 62, 71 (D.C. Cir. 1978) (section 112 of the Clean Air Amendments of 1970 "bears a marked resemblance" to the toxics provision—section 307(a)—of the Federal Water Pollution Control Act Amendments of 1972, codified as amended at 33 U.S.C. § 1317(a) (1982)).

assure fewer emissions than technology-oriented standards, the EPA is concerned that the drastic economic consequences of zero-emission rules will not generally justify standards stricter than the best available technology.²³⁷ The EPA, however, is not Congress, and Congress appears to have embraced a different view of what is good social policy. Senator Muskie characterized the mandate of section 112 as follows: "The standards must be set to provide an ample margin of safety to protect the public health. This could mean effectively, that a plant would be required to close because of the absence of control techniques. It could include emission standards which allowed for no measurable emissions."²³⁸

While Congress did not explicitly consider the regulation of carcinogens,²³⁹ it did consider the possible necessity of standards so stringent that polluters would have to shut down. As David Doniger has explained, "in 1970, at least, Congress apparently found this an acceptable price to pay for safety."²⁴⁰ In light of the rather clear legislative intent of section 112, it would seem that the EPA has indeed "taken excessive liberties; the difference between health standards and technology standards is too obvious to be explained away as accidental."²⁴¹

If the EPA is correct in saying that Congress did not contemplate regulation of nonthreshold pollutants under section 112, then the proper conclusion is that the EPA lacks the authority to regulate carcinogens under section 112.²⁴² If that is the case, Congress should either draft a new provision for carcinogens or amend section 112 to add such power, including explicit statutory criteria concerning how stringently non-threshold pollutants are to be regulated. Instead of drawing this inference, the EPA has manufactured a technology-based criterion for carcinogens that has "no textual warrant."²⁴³

Both Congress and the environmentalists appear to have acquiesced

237. Initial Proposed Rule, 44 Fed. Reg. 58,642, 58,660-61 (1979).

238. 116 CONG. REC. 42,385 (1970) (from summary of Conference Report prepared by Sen. Muskie). *But see* Initial Proposed Rule, 44 Fed. Reg. 58,642, 58,660 (1979) (EPA discounts Muskie statement as part of only a "brief consideration" given by Congress to the subject of plant closings).

239. *See* Initial Proposed Rule, 44 Fed. Reg. 58,642, 58,660 (1979) (this point emphasized by EPA).

240. Doniger, *supra* note 55, at 585.

241. Currie, *supra* note 225, at 1389, 1461 (1980).

242. This line of argument originates with Schroeder, *supra* note 42, at 33-34 n.117. The conclusion is strengthened by the fact that Congress envisioned only "a limited number" of pollutants regulated under section 112. *See* S. REP. NO. 1196, 91st Cong., 2d Sess. 20-21 (1970). To adopt the EPA's line of reasoning, if Congress had intended section 112 to cover dozens of airborne carcinogens, it could have spoken with "more clarity."

243. Schroeder, *supra* note 42, at 34.

in the EPA's rewriting of section 112.²⁴⁴ Congress could easily have amended the criteria for emission standards when drafting the 1977 Amendments, but did not do so.²⁴⁵ While some environmentalists have expressed the view that section 112 requires zero emissions for carcinogens,²⁴⁶ environmental groups have not yet pressed this view in litigation against the EPA.²⁴⁷ The brittle alliance between the EPA and environmental groups may be broken by the benzene rulemaking.²⁴⁸ Officials of the EPA are openly predicting a lawsuit challenging the Agency's reading of section 112²⁴⁹ and they are clearly not confident about the prospects for victory.²⁵⁰ If the federal courts, Congress, and environmentalists were quietly to ignore the EPA's indiscretion, it would be a frightening example of administrative government. It is Congress, not these other parties, that should be responsible and accountable for deciding how the EPA weighs costs and health benefits when writing standards for hazardous air pollutants.²⁵¹

244. One commentator predicts that the courts will join Congress and the environmentalists in accepting the EPA's role as rewriter of section 112. He believes that the rights theory underlying the Clean Air Act has already been "dismissed." *Id.* at 30.

245. Although Congress did amend section 112 in the 1977 Amendments, *see* Clean Air Act Amendments of 1977, Pub. L. No. 95-95, § 110, 91 Stat. 685, 703 (codified at 42 U.S.C. § 7412(e)(1982)), it did not revise the health orientation of emission standards. *See generally* Doniger, *supra* note 55, at 567 n.360, 569 n.362.

246. *See, e.g.*, Doniger, *supra* note 55, at 571; *see also* 1981 Hearings, *supra* note 20, at 710 (statement of Kristine Hall, Environmental Defense Fund).

247. Consider the following excerpt from congressional testimony:

Mr. Waxman: Do you think that the present language of the Clean Air Act requiring emission standards with an ample margin of safety requires zero emission standards?

Mr. Doniger: No, not always. It has never been interpreted in that way and none of the public health or environmental organizations has sought to press it that far.

1981 Hearings, *supra* note 9, at 725.

248. Litigation of the benzene standard might force the judiciary to address what section 112 means in the context of nonthreshold carcinogens.

249. 1983 Hearings, *supra* note 15, at 10 (statement of Joseph A. Cannon, Assistant Administrator for Air and Radiation, EPA) (commenting that the agency has not yet had a judicial ruling on its legal interpretation of section 112 but "we expect one relatively soon").

250. Statement of William Ruckelshaus, EPA Administrator, at Executive Session on Risk Management, John F. Kennedy School of Government, Harvard University, Cambridge, Mass. (Mar. 21, 1984) (author in attendance) (Ruckelshaus expressed fear that a federal judge could easily interpret section 112 as requiring zero emissions in the case of carcinogens).

251. For concurring views, *see* GAO REPORT ON SECTION 112, *supra* note 14, at 53; Doniger, *supra* note 55, at 585, 588 n.465 (noting that environmental groups have few incentives to use limited resources to uphold such "governmental process" values); *cf.* Schroeder, *supra* note 42, at 36 (noting conflict between environmentalists and EPA over EPA's construction of section 112). One can also find support for this view of the American constitutional system in the Supreme Court's decision on the snail darter, *Tennessee Valley Auth. v. Hill*, 437 U.S. 153, 194-95 (1978), in which the Court noted that:

Our individual appraisal of the wisdom or unwisdom of a particular course consciously selected by the Congress is to be put aside in the process of interpreting a statute In our constitutional system the commitment to the separation of powers is too fundamental for us to pre-empt congressional action by judicially decreeing what accords with "com-

F. *The Inefficiency of BAT.*

The EPA has embraced the concept of the "best available technology" (BAT) as an approach to setting emission standards for airborne carcinogens under section 112. Once a pollutant is listed as hazardous, the EPA plans to require BAT for all categories of stationary sources that emit "significant" quantities of the pollutant in question.²⁵² Setting aside the fact that BAT may be a legally impermissible basis for standard setting, it is useful to evaluate the economic effects of the BAT approach to emission control. Two recent studies have assessed the economic efficiency of the BAT approach in the context of section 112. An Office of Management and Budget (OMB) analysis investigated the EPA's proposed emission standards for radionuclides and inorganic arsenic.²⁵³ An independent analysis by economists at Harvard's Keunedy School of Government assessed BAT as an approach to regulation of benzene, acrylonitrile, and coke-oven emissions.²⁵⁴

The OMB analysis found that the uniform BAT approach to standard setting could reduce the expected incidence of cancer for the two pollutants by an estimated 4.06 cases per year at an annual total cost of \$27.1 million, or an average cost of \$6.7 million per case of cancer avoided.²⁵⁵ An alternative strategy that concentrates on reducing emissions where population density is high and compliance costs are modest could lessen cancer incidence by 3.92 cases annually at an annual total cost of \$7.4 million, or \$2.1 million per case of cancer avoided.²⁵⁶ When the BAT approach is added to the alternative strategy, only 0.13 expected cases of cancer are averted at a cost of \$19.7 million, or the equivalent of about \$150 million per case of cancer avoided.²⁵⁷ Under the BAT approach, the public health gains per dollar of expenditure vary across sources by a factor of two thousand.²⁵⁸ A similar demonstration of economic inefficiency is contained in the Harvard study; the investigators conclude that "uniform technology-based controls will have vastly different net benefits depending upon the pollutant and the source category; the implicit cost per life saved of BAT standards varies by more

mon sense and the public weal." Our Constitution vests such responsibilities in the political branches.

252. EPA Staff Draft, *supra* note 215, at 23-24.

253. OMB Report, *supra* note 198, at 1593-603.

254. Haigh, Harrison & Nichols, *Benefits Assessment and Environmental Regulation: Case Studies of Hazardous Air Pollutants*, 8 HARV. ENVTL. L. REV. 395 (1983).

255. OMB Report, *supra* note 198, at 1593.

256. *Id.*

257. *Id.*

258. *Id.*

than a factor of one hundred for the three pollutants."²⁵⁹ Alternative standards with greater sensitivity to population density and compliance costs can be more cost-effective than the uniform BAT approach.

The results of the two studies must be qualified in several important respects. The quantitative results are not as precise as they may appear because they are based on highly uncertain models of quantitative risk assessment. The estimates are based on crude emissions data, simplistic dispersion and exposure models, linear dose-response curves, and cost data from secondary sources.²⁶⁰ It is possible that the cost-effectiveness estimates are too high or too low by at least a factor of ten. These estimates are likely to misestimate actual health benefits,²⁶¹ but the degree to which they do so is not certain. The studies do not estimate, for example, the extent of non-cancer-related health benefits—if any—or the extent of carcinogenic synergism with other pollutants, diet, or lifestyle factors. Moreover, the costs of environmental rules are often overestimated,²⁶² though that may not be an inherent problem.²⁶³

Even if none of these uncertainties existed, the policy implications of the cost-effectiveness estimates would still be unclear because economists have not produced reliable estimates of the public's willingness to pay for reductions in the cancer rate.²⁶⁴ Some studies suggest that society as a whole is willing to pay \$300,000 to \$3 million to avert an accident fatality,²⁶⁵ but it is not clear whether this range is applicable to prevention of a cancer fatality.²⁶⁶ Moreover, some people do not accept the ethical

259. D. Harrison, *Case Studies of Hazardous Air Pollutants 11* (1984) (unpublished paper prepared for Executive Session on Risk Management, John F. Kennedy School of Government, Harvard University; copy on file with author); see also Haigh, Harrison & Nichols, *supra* note 254, at 411-13.

260. See Haigh, Harrison & Nichols *supra* note 254, at 418-30 (useful discussion of the uncertainties associated with each of these factors).

261. *Id.* at 23, 54-55.

262. See Ashford, *Alternatives to Cost-Benefit Analysis in Regulatory Decisions*, in *MANAGEMENT OF ASSESSED RISK FOR CARCINOGENS* 129, 130-31 (Annals of the N.Y. Academy of Sciences Vol. 363, 1981).

263. See Crandall, *The Use of Cost-Benefit Analysis in Regulatory Decisionmaking*, in *MANAGEMENT OF ASSESSED RISK FOR CARCINOGENS* 99, 102 (Annals of the N.Y. Academy of Sciences Vol. 363, 1981) (analysis of data gathered from regulated firms can guard against overestimates of costs).

264. In cost-benefit analysis, the appropriate monetary value of a lifesaving program is the total amount of money society is willing to pay for the lifesaving effects of the program. See generally M. BAILEY, *REDUCING RISKS TO LIFE* 30-35 (1980).

265. See *id.* at 35-45; Blomquist, *The Value of Human Life: An Empirical Perspective*, 19 *ECON. INQUIRY* 157, 158-60 (1981); Smith, *Compensating Wage Differentials and Public Policy: A Review*, 32 *INDUS. & LAB. REL. REV.* 339-50 (1979).

266. The public may be willing to pay more to prevent accidents than cancers because accident victims are, on the average, younger, more productive citizens with more dependents. On the other hand, cancer is an especially painful and demoralizing way to die. On these difficult comparisons see Vaupel, *Early Death: An American Tragedy*, *LAW & CONTEMP. PROBS.*, Autumn 1976, at 73, 90-

foundations of cost-benefit comparisons. They argue that each citizen has an unqualified right not to be victimized by hazardous air pollution, regardless of the degree of health risk or the amount of compliance costs.²⁶⁷ I do not share that view, but it seems that some protection should be provided for residents living close to a plant who incur large individual cancer risks, even if such protection cannot be justified on cost-benefit grounds. A dual cost-benefit and individual-equity approach is advocated below²⁶⁸ as a modification of the uniform BAT approach.

It turns out that BAT is a highly subjective concept. In theory, the "marginal balancing analysis" that takes place with cost-benefit comparisons is "foreign" to the technology-based approach.²⁶⁹ But, as it is actually applied, BAT is inevitably chosen with implicit cost-benefit considerations. There is never really a "best" available technology; there are only progressively more stringent and expensive abatement methods.²⁷⁰ In the vinyl chloride rulemaking under section 112, the EPA determined that a technology was not "best" if the marginal costs of the technology were "grossly disproportionate" to the marginal gains in emission control.²⁷¹ This formulation does not entail a strict cost-benefit analysis, but it clearly is different from the exclusively health-based approach to emission control contemplated in the plain language of section 112. Under Administrator Ruckelshaus, there were signs of increased use of cost-effectiveness analysis instead of the BAT approach.²⁷²

G. *The Narrow Statutory Approach to Emission Control.*

In principle, a variety of approaches can be used by government to accomplish any given degree of air pollution control. These approaches include ambient air quality standards, quantitative emission standards, technology requirements, controls of work practices, emission fees or taxes, and alienable rights to pollute. A growing technical literature in environmental policy suggests that the proper choice of control strategy

116; see also Mendeloff, *Measuring Elusive Benefits: On the Value of Health*, 8 J. HEALTH POL., POL'Y & L. 554 (1983).

267. See, e.g., Ashford, *Alternatives to Cost-Benefit Analysis in Regulatory Decisions*, 14 ENVTL. L. REP. (ENVTL. L. INST.) 132-35 (1984); Doniger, *The Gospel of Risk Management: Should We Be Converted?*, 14 ENVTL. L. REP. (ENVTL. L. INST.) 10,222-23 (1984).

268. See *infra* text accompanying notes 286-92.

269. McGarity, *supra* note 217, at 205 (distinguishing the technology approach from cost-benefit analysis).

270. See L. LAVE, *THE STRATEGY OF SOCIAL REGULATION* 14 (1981); see also Crandall, *supra* note 263, at 104-05 (criticizing BAT approach).

271. 41 Fed. Reg. 46,562 (1976) (codified at 40 C.F.R. §§ 61.60-71 (1984)); see also Doniger, *supra* note 55, at 576, 583, 585-86.

272. T. Gorman, *supra* note 173, at 13 (reporting that cost-effectiveness analyses now appear regularly in analyses of draft emission regulations under section 112).

should depend on the nature of the specific pollution problem.²⁷³ A major defect of section 112 is that it does not provide the EPA Administrator with flexibility in the choice of emission control strategies. The section contains no authorization for ambient standards,²⁷⁴ pollution fees,²⁷⁵ or alienable permits.²⁷⁶ Design, equipment, work practice, and operational standards are permissible only if the Administrator determines that quantitative emission standards are infeasible.²⁷⁷ This presumptive preference for quantitative emission limits, as opposed to other strategies, is not justified either by the legislative history of section 112 or by the technical literature on pollution control.

If section 112 were intended to require that all emissions of hazardous air pollutants be prohibited, then one can understand why the provision contains little flexibility for the EPA to choose control strategies. Congress may have envisioned that section 112 would apply only to pollutants that are so hazardous that a flat prohibition of emissions would be justified. If nonzero amounts of airborne carcinogens are to be permitted, however, then it would seem appropriate to provide the EPA with flexibility in choosing control strategies. Lacking explicit guidance from Congress, the EPA has embraced the BAT approach to devising emission regulations. However, BAT is, in some respects, inferior to emission fees.²⁷⁸ For example, a firm that installs BAT to control a hazardous air pollutant may have little incentive to invest research dollars in developing better control techniques, especially in light of the bureaucratic barriers to the constant updating of BAT standards that would be necessary. In contrast, an emission fee applied to each unit of a hazardous air pollutant would provide the firm with a constant economic incentive to search for effective abatement methods. A fee may also result in less costly control than that required under BAT standards, because firms are generally in a better position than the EPA to identify efficient control technologies for a particular source or category of sources. In other situations, the

273. See generally Schelling, *Prices as Regulatory Instruments*, in *INCENTIVES FOR ENVIRONMENTAL PROTECTION* 1, 14-40 (T. Schelling ed. 1983).

274. The original beryllium standards contain a partial ambient approach. See 38 Fed. Reg. 8823, 8830-31 (1973) (codified at 40 C.F.R. §§ 61.30-34 (1984)). However, the legality of this approach has not been tested. See W. ROGERS, *ENVIRONMENTAL LAW* 278-79 (1977); Currie, *supra* note 225, at 1462 (arguing that ambient standards will not survive judicial scrutiny under section 112).

275. See generally A. KNEESE & C. SCHULTZE, *POLLUTION, PRICES, AND PUBLIC POLICY* 51-53 (1975).

276. See generally Hahn & Noll, *Designing a Market for Tradable Emissions Permits*, in *REFORM OF ENVIRONMENTAL REGULATIONS* 119-46 (W. Magat ed. 1982).

277. 42 U.S.C. § 7412(e)(1) (1982).

278. The ensuing discussion of BAT as opposed to fees is based on R. CRANDALL, *supra* note 7, at 58-80.

EPA may rationally prefer BAT to fees if it wants immediate assurances that firms will accomplish substantial emission reductions. One can also imagine an approach that combines BAT standards with emission fees, thereby reaping some of the benefits of each. The point is that Congress should allow the EPA to use its considerable expertise in the choice of control techniques.²⁷⁹

V. REFORM OF SECTION 112

If section 112 is to be used as the primary statutory basis for regulating airborne carcinogens, it should be amended to reflect scientific, administrative, and economic realities. The current statutory framework has inadvertently discouraged the EPA from listing and regulating carcinogenic pollutants.²⁸⁰ More realistic procedural and substantive demands on the EPA might reduce the paralysis of decisionmaking that seems to have afflicted the implementation of the section since its inception in 1970.²⁸¹ Some specific reform suggestions follow.

A. Clarify and Simplify the Listing Process.

An affirmative listing decision is the crucial first step toward regulation of a carcinogenic air pollutant. One of the major sources of delay in implementing the section has been the EPA's uncertainty about the types of scientific finding necessary or appropriate to justify listing a pollutant.²⁸² Current agency policy requires that a comprehensive health assessment document containing quantitative analysis of multiple health effects be prepared and approved in writing by the SAB *before* a pollutant is listed. This process takes anywhere from two to seven years and delays are often so long that a document requires updating before a first,

279. For an extensive analysis of how fees on emissions or exposure could be employed for airborne carcinogens, see Nichols, *The Regulation of Airborne Benzene*, in *INCENTIVES FOR ENVIRONMENTAL PROTECTION* 145, 194-98, 213-19 (T. Schelling ed. 1983); see also A. NICHOLS, *TARGETING INCENTIVES FOR ENVIRONMENTAL PROTECTION* 159-65 (1983).

280. Robert Hahn has suggested, only partly in jest, that Congress *intentionally* designed section 112 so that it would be impossible to administer effectively. Congress could then reap the symbolic benefits of passing clean air legislation without imposing any real costs on the economy. The failure to achieve tangible environmental improvement could be rationalized to voters as the result of bureaucratic incompetence. Personal communication from Robert Hahn (Aug. 9, 1984).

281. This prediction about bureaucratic behavior, which is central to the argument of this article, is consistent with a recent theory developed by John Mendeloff. He postulates a trade-off between stringency of regulation and what he calls the "extensiveness" of regulation (i.e., the number of chemicals subject to regulation). The more stringently an agency attempts to regulate toxic chemicals, the fewer chemicals it will be able to regulate. Section 112, by mandating extremely strict emission controls, may be deterring the regulation of carcinogens. Mendeloff, *Does Underregulation Cause Overregulation?*, *REGULATION*, Sept.-Oct. 1981, at 47-52.

282. GAO REPORT ON SECTION 112, *supra* note 14, at 17.

unapproved draft has been completed.²⁸³

Congress should amend section 112 to direct the EPA to adopt a "low-hurdle" approach to listing decisions. A pollutant should be listed under section 112 as soon as the EPA determines that there is a high probability of human carcinogenicity. An inference of high probability could be based either on positive epidemiological data or on positive animal data. A workable "low-hurdle" process for making carcinogenicity judgments is contained in the EPA's proposed generic policy for airborne carcinogens.²⁸⁴ Alternatively, the EPA could use the carcinogenicity classifications published by the International Agency for Research on Cancer.²⁸⁵ Although Congress should allow the EPA some flexibility to decide what patterns of scientific data satisfy the "high-probability" test, the statute should make clear that animal data alone are sufficient to make an affirmative listing decision. The EPA has yet to list a pollutant primarily or solely on the basis of animal experiments, even though a policy of waiting for positive human data is inconsistent with the precautionary purposes of section 112. The listing would not necessarily mean that regulation is appropriate; it would simply engage the process of risk-assessment and cost-effectiveness analysis. Although more elaborate analyses are appropriate at the regulatory stage, listing decisions should be made as soon as substantial evidence of carcinogenicity is available to the EPA.

A delay of elaborate analyses until emission controls are proposed is advisable as a mechanism to conserve limited agency resources. In some situations, emission controls will be primarily or exclusively a function of technological and economic feasibility, not of the degree of health risk. Detailed analyses of carcinogenic potency, noncarcinogenic health effects, human exposures, population risk, and individual risk should be conducted only when such analyses would provide useful information in the selection of source categories for regulation or in the formulation of emission-control policies. Review by the SAB prior to listing is appropriate to avoid arbitrary or unsubstantiated listings. However, the current review process is excessively geared to producing scientifically and legally defensible documents. Congress should clarify that SAB review is intended to be advisory and that it is expected that some pollutants will be listed as hazardous before a comprehensive health assessment is completed. In fact, the precautionary purposes of section 112 should cause some pollutants to be listed, even though certain members of the SAB are

283. *Id.* at 15-16.

284. Initial Proposed Rule, 44 Fed. Reg. 58,642, 58,647-49 (1979).

285. *See, e.g.*, INTERNATIONAL AGENCY FOR RESEARCH ON CANCER, *supra* note 18, at 20 (on what constitutes "sufficient" evidence of carcinogenicity).

not convinced that the pollutants have been shown to be carcinogenic by scientific studies.

The listing stage should attempt to keep the rate of false negatives extremely low, even at a cost of a substantial rate of false positives. An appropriate listing process will inevitably produce a substantial number of scientifically questionable listings because of the protective nature of the legislative mandate. The current administrative process is backwards—paranoia at the EPA and stringent SAB review have deterred or delayed all listings except for a few pollutants that have produced dramatic evidence of carcinogenic hazard to humans.

B. *A Significant-Risk Test.*

The existing statutory framework does not explicitly authorize the EPA to ignore sources of a carcinogenic pollutant that do not pose a significant risk. In the absence of congressional direction, the EPA is attempting to devise a significant-risk test on an ad hoc basis, a process begun in the recent benzene rulemaking. The ethical judgments underlying any significant-risk doctrine are so sensitive that Congress, not the EPA or the courts, should delineate the nature and limits of the doctrine. The formulation proposed here is intended to preserve the protective emphasis of section 112 while avoiding expenditure of limited agency resources on rulemakings for sources that do not pose a significant risk.

Congress should demand that, once a pollutant is listed, control strategies be proposed for all source categories that the EPA shows—subject to substantial-evidence judicial review—pose a significant risk. The statute should make clear that both population and individual risks should be estimated for purposes of informing the policy judgment that a significant risk exists.²⁸⁶ Quantitative risk assessments should use conservative, though scientifically plausible, assumptions so that it is unlikely that actual cancer risks are greater than those estimated by the EPA.²⁸⁷ Such assessments would incorporate relevant data and expert judgment about carcinogenic potency, dose-response functions, and exposure patterns.

In order to justify regulating a source category, the EPA should have to show that either maximum individual lifetime risk or annual population risk are greater than certain quantitative thresholds—for example, 10^{-3} for individuals or one excess case of cancer per year for a

286. On the issue of individual versus population risk, see generally Brooks, *The Resolution of Technically Intensive Public Policy Disputes*, SCI. TECH. & HUM. VALUES 45, Winter 1984, at 39.

287. As a matter of administrative practice and public reporting, the EPA should produce both best estimates and conservative (plausible upper bound) estimates of carcinogenic risk. See Ruckelshaus, *supra* note 197, at 10,191, 10,193.

source category. Although it is difficult to defend any specific numerical cutoff, the important point is that the EPA should apply some specific cutoff on a consistent basis with respect to all pollutants. This doctrine would assure some consideration of the health of residents living close to an emission source, even if the total number of persons exposed is small. It would also assure that widespread population exposure will be considered, even if the risk to any particular person is slight. Congress should determine the threshold levels of significant risk, giving due consideration to the health goals of the Clean Air Act and the significant-risk doctrine enunciated by Justice Stevens in *Industrial Union Department v. American Petroleum Institute*.²⁸⁸ All significance and insignificance determinations should be subject to SAB review and defended with published rationales in the *Federal Register* after ample opportunity for public comment.

Congress should also delete the impossible standard for delisting a pollutant. In light of the low-hurdle listing process and the less demanding analyses conducted prior to listing, the EPA should be free to delist a pollutant if, in a published opinion, the Agency produces assessments that do not suggest significant risk. The criteria for delisting a pollutant should be the same as the criteria used in assessing whether an unlisted pollutant should be listed.

C. *The Stringency of Emission Control: Unreasonable Risk.*

If a source category is to be regulated, the EPA must decide how much emission control is appropriate. The current statutory formula calls for emission standards with an ample margin of safety to protect the public health. That test is scientifically misleading, if not dishonest, when applied to nonthreshold pollutants such as carcinogens. Congress should rewrite the standard-setting test to call for the elimination of "unreasonable risks,"²⁸⁹ where reasonability is primarily a function of best available technology and, secondarily, a balancing of the marginal costs of emission control against the marginal benefits of control. Emission

288. 448 U.S. 607 (1980) (5-4 decision). The judiciary may apply the significant-risk doctrine, see *supra* notes 186-87 and accompanying text, to the Clean Air Act, even though *Industrial Union Dep't* was a case dealing with the Occupational Safety and Health Act, 29 U.S.C. §§ 651-678 (1982). See Latin, *The "Significance" of Toxic Health Risks: An Essay on Legal Decisionmaking Under Uncertainty*, 10 *ECOLOGICAL Q.* 339, 341 (1982) (arguing that nothing in the mode of analysis used by Justice Stevens would restrict application of significant-risk doctrine to OSHA regulation). But see Doniger, *Defeat in Benzene Exposure Case No Death Knell for OSHA Standards*, Nat'l L. J., Sept. 15, 1980, at 26-27, col. 1 (arguing that, due to fragmentation of the Court, no law emerged from *Industrial Union Dep't*).

289. The criterion of unreasonable risk, which generally calls for discretionary balancing of health benefits and costs, was used by Congress in the Consumer Product Safety Act of 1972, 15 U.S.C. § 2051(b)(1) (1982).

control requirements more stringent than BAT should be permitted where the EPA finds that the economic costs of further control would not be grossly disproportionate to expected benefits. For example, prohibiting emissions might be appropriate where cancer risks after BAT remain high and where apparently risk-free, economical substitutes exist for the chemical or production process in question. Emission control policies less stringent than BAT should be permitted where the EPA finds that the marginal costs of BAT are greater than, say, \$5 million per case of cancer averted and individual lifetime risks permitted by a less stringent policy do not exceed the significance threshold for individuals—for example, 10^{-3} for the most-exposed resident.²⁹⁰ Where high individual cancer risks persist, yet population risks are insignificant, the EPA should be willing to impose a larger expenditure of resources per case of cancer avoided—say, ten or twenty million dollars per case. This value judgment reflects considerations of equity for those individuals at high risk.²⁹¹

Under the formulation advocated here, BAT would be the presumptive remedy subject to modification by the results of cost-benefit analysis.²⁹² If a policy other than BAT is to be adopted, the EPA must consider any noncarcinogenic health effects associated with low-level exposures to the pollutant. In some cases, it might be necessary to incorporate different types of health effects into a single benefit measure, which would then be compared to the cost of the proposed control. Thus, the statutory framework advocated here would permit, but not require, that emission-control strategies under section 112 be based on cost-benefit analysis. As mentioned earlier, the EPA should also be authorized to consider a broad range of emission-control strategies. In particular, Congress should permit the EPA to make use of ambient standards, design standards, and economic-incentive approaches as well as quantitative emission standards.

290. In some cases, it may be more cost-effective to pay residents to move away from plants than to control emissions at plants. The EPA was considering this approach for some sources of radionuclides. See Proposed Rule, 48 Fed. Reg. 15,076, 15,079 (1983) (proposed Apr. 6, 1983); see also *supra* note 88.

291. This position can be defended on both efficiency and equity grounds. Some economists believe that citizens facing high fatality risks are willing to pay more for a specified reduction in risk than are other citizens who face a lower baseline risk but are offered the same specified reduction in risk. See, e.g., Rosen, *Valuing Health Risk*, AM. ECON. REV., May 1981, at 241, 242 ("those at greater risk have larger demand prices for safety"); see generally Weinstein, Shepard & Pliskin, *The Economic Value of Changing Mortality Probabilities*, 94 Q.J. ECON. 373-95 (1980).

292. On the utility of cost-benefit analysis to environmental decisionmakers, see generally GENERAL ACCOUNTING OFFICE, *COST-BENEFIT ANALYSIS CAN BE USEFUL IN ASSESSING ENVIRONMENTAL REGULATIONS, DESPITE LIMITATIONS*, RCED-84-62 (1984).

D. *Sensible Deadlines for Nondiscretionary Duties.*

Section 112 creates nondiscretionary duties to propose and promulgate emission standards within strict deadlines. The duties should be retained because the citizen suits they trigger are an essential safeguard against bureaucratic inertia and footdragging at the EPA. Much of the regulatory progress under section 112 to date is attributable to citizen suits by environmental organizations. But in order to minimize the disruptive effects of court orders, the EPA should be allowed a reasonable amount of time to discharge these nondiscretionary duties. Congress should amend the section to allow the EPA two years to propose emission policies and an additional year for promulgation of final standards. According to the EPA, these deadlines would allow it sufficient time to identify the full range of emission sources, perform necessary quantitative risk assessments, obtain SAB review of risk assessments, elicit economic and technological data from industrial sources, study emission-control options, and perform cost-benefit analyses.²⁹³ More realistic deadlines are necessary to protect the viability of the citizen-suit provision. If deadlines are not lengthened, the EPA may simply circumvent the listing process by delaying a public listing until emission regulations are ready to be proposed.²⁹⁴

VI. CONCLUSION

The Clean Air Act Amendments of 1970 were passed during a period of lofty political symbolism about environmental values. Books such as Rachel Carson's *Silent Spring*,²⁹⁵ Paul Ehrlich's *The Population Bomb*,²⁹⁶ John Esposito's *Vanishing Air*,²⁹⁷ and Barry Commoner's *The Closing Circle*²⁹⁸ aroused national concern about environmental degradation. Activists argued that there was an urgent need to reassert environmental rights, such as the citizen's right to breathe clean and healthy air.²⁹⁹ Politicians were engaged in fierce competition to take credit for passage of health-based environmental legislation and were attracted to the notion of national approaches to pollution control that were accom-

293. See GAO REPORT ON SECTION 112, *supra* note 14, at 39; Tabler, *supra* note 121, at 535.

294. Even Ruckelshaus has publicly hinted that the current statutory deadlines discourage prompt listings. He has urged Congress to adopt sensible rulemaking deadlines. See 1983 Hearings, *supra* note 15, at 61 (statement of William D. Ruckelshaus, Administrator, EPA).

295. R. CARSON, *SILENT SPRING* (1962).

296. P. EHRLICH, *THE POPULATION BOMB* (1968).

297. J. ESPOSITO, *VANISHING AIR* (1970).

298. B. COMMONER, *THE CLOSING CIRCLE: NATURE, MAN AND TECHNOLOGY* (1971).

299. On the notion of a constitutional right to environmental quality, see Schroeder, *supra* note 42, at 17 & nn.62-63.

panied by ambitious rulemaking and compliance deadlines.³⁰⁰

Section 112 reflects the symbolism of 1970 in its call for the EPA to set national emission standards for hazardous air pollutants at a level that protects the public health with an ample margin of safety. No distinction is made between threshold and nonthreshold pollutants and no administrative consideration of economics and technology is authorized. Section 112 is a more dramatic assertion of federal power than the provisions dealing with criteria pollutants because section 112 does not "fiddle with the niceties of cooperative federalism."³⁰¹ After fifteen years of experience with section 112, it is time to reassess the effectiveness and desirability of the prevailing approach to control of hazardous air pollutants. This article addresses regulation of airborne carcinogens because they are the type of pollutant most commonly considered for control under section 112 and are of considerable public concern.³⁰²

An examination of the EPA's experience with section 112 during the last fifteen years forces one to conclude that the current regulatory strategy is unacceptable. Only eight air pollutants have been listed, and of these, only five have been regulated. Although the EPA identified a list of thirty-seven "priority" pollutants for consideration in 1977, the Agency has yet to make significant rulemaking progress with respect to them. The few pollutants that have been regulated were the subjects of lengthy delays, procedural litigation, and economically wasteful standards.

It is Congress, not the EPA, that is primarily responsible for the failure of section 112. In short, Congress has put the EPA in a virtually impossible administrative position. In the presence of scientific dispute about cancer risk assessment, and in the absence of legislative guidance, how is the EPA supposed to decide which airborne pollutants are "hazardous" within the meaning of section 112? How can the EPA set national emission standards for nonthreshold pollutants at a level that protects the public health with an ample margin of safety? If the EPA is brave and lists a pollutant under section 112, how is it supposed to fulfill its nondiscretionary duty to propose emission controls for all stationary sources within six months and promulgate final standards within one year? Faced with these demands, it is hardly surprising that the EPA has behaved in a manner that can be criticized.

300. The political struggles between Senators Muskie and Jackson and President Nixon are discussed in C. JONES, *CLEAN AIR: THE POLITICS OF POLLUTION CONTROL* (1975), and J. DAVIES & B. DAVIES, *supra* note 27, at 63.

301. Schroeder, *supra* note 42, at 30.

302. See 1983 *Hearings*, *supra* note 15, at 50-51 (statement of William D. Ruckelshaus, Administrator, EPA).

The EPA's traditional response has been to ignore section 112 as much as possible and to devote its resources to other provisions of the Clean Air Act.³⁰³ In an effort to protect itself from scientific, judicial, and industrial criticism, the EPA has erected a formidable process of scientific review that allows only the most blatantly carcinogenic air pollutants to be listed under section 112. For the few pollutants that have been listed, the EPA has openly violated the legislated timetables for rulemaking and has promulgated emission standards that do not satisfy the plain language and intent of section 112. Instead of adopting the zero-emission standards called for by the Act, the EPA has embraced the concept of best available technology—itsself an ill-defined and economically inefficient approach to pollution abatement.

Despite the fact that it had observed this charade in the EPA's rulemakings on asbestos and vinyl chloride, Congress decided to ignore the issue in the 1977 Amendments to the Clean Air Act.³⁰⁴ It chose instead to proceed further with the symbolic approach to pollution control, chastising the EPA for inaction and compelling the agency to make decisions on four specific pollutants within short deadlines. Under Administrators Costle and Gorsuch, the EPA openly violated the 1977 Amendments by failing promptly to list these pollutants and by failing to propose timely emission standards. The EPA is now under federal court order to make rulemaking decisions. The conduct of such litigation has diverted the EPA from attending to what the Agency regards as more serious air pollutants.

Key members of Congress are frustrated with the EPA's failure to list and regulate pollutants under section 112.³⁰⁵ They have diagnosed the problem as one of bureaucratic footdragging by an agency with pro-industrial motives—a perception that was enhanced by the Gorsuch approach to management of the EPA. In response to these perceptions, environmentalists and their allies in Congress are advocating passage of amendments to section 112 that would force the EPA to list and regulate

303. See Doniger, *supra* note 55, at 571 (since 1970, EPA has been reluctant to act under section 112 because officials have been uncomfortable with the statute); see also 1983 Hearings, *supra* note 15, at 15 (testimony of Joseph A. Cannon, Assistant Administrator for Air and Radiation, EPA (EPA historically has had difficulty implementing this section of Clean Air Act)).

304. On one interpretation, Congress was unwilling to infuse reality into section 112 because so many other compromises of the "media-quality-based" approach, see McGarity, *supra* note 217, at 160 ("the 'media-quality-based' approach focuses on the quality of the receiving media . . . and requires the agency to promulgate . . . regulations capable of rendering the media acceptably 'safe' or 'clean' without regard to . . . costs or . . . feasibility"), were being authorized under other provisions of the Clean Air Act. Personal communication from Joe Adamchic, University of Pittsburgh (Aug. 1984).

305. See generally Dowd, *Debate on Hazardous Air Pollutants Continues*, 18 ENVTL. SCI. & TECH. 153A (1984).

the thirty-seven priority pollutants within fixed deadlines. The most prominent legislative proposal in the House would retain the health-based approach as a goal, but permit "interim" standards based on best available technology in limited circumstances.³⁰⁶ Unfortunately, this approach contains more political symbolism than pragmatic reform. Congress lacks the expertise and attention span to modify the EPA's rulemaking priorities in response to evolving data on health effects and human exposure. The technology approach is a step in the right direction, but it does not authorize the balancing of marginal costs and health benefits that the EPA should and inevitably will engage in.

If Congress is serious about control of airborne carcinogens, it will address itself to the fundamental defects of section 112. By stating clearly that positive animal data on carcinogenicity are sufficient to justify listings, Congress would accelerate the listing process. By authorizing the EPA to exempt source categories that do not pose a significant risk, Congress would allow the EPA to focus limited rulemaking resources on the most important sources of pollution. By replacing the approach to emission control that is focused on health alone with one that permits technological and cost-benefit comparisons, Congress would tell the truth about how emission standards must inevitably be made; and by relaxing the rulemaking deadlines to accommodate regulatory analysis, Congress could reduce unnecessary and disruptive litigation.

It is essential that these reforms be adopted as a package. Revision of the statutory criteria for emission standards, without a simplified listing process, affords no legal leverage for environmentalists when the EPA does engage in political footdragging. Alternatively, an accelerated listing without realistic rulemaking deadlines and administrative discretion to balance risks and costs would only lead to economic inefficiency and industrial backlash in Congress and the judiciary. The early 1970's were properly a time for Congress to express the public's commitment to health and environmental goals.³⁰⁷ It is now time for members of Congress to address themselves to the complex issues of implementation.³⁰⁸ The agency-forcing model has simply failed to accomplish the goal of health protection that section 112 was supposed to advance.

306. See *id.*; see also H.R. 5084, 98th Cong., 2d Sess., reprinted in *Clean Air Act Reauthorization—Part I: Hearings on H.R. 3400 and H.R. 5084 Before the Subcomm. on Health and the Environment, House Comm. on Energy and Commerce, 98th Cong., 2d Sess. 33 (1984).*

307. On the social utility of symbolic commitments to health and environmental goals, see McGarity, *supra* note 217, at 193-99.

308. See 1983 Hearings, *supra* note 15, at 2-3 (statement of Joseph A. Cannon, Assistant Administrator for Air and Radiation, EPA) (Ruckelshaus EPA takes position that section 112 should be modified to reflect experience of the 1970's and realities of 1980's).