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 1970 reflects a radical departure from what has been called the “New Deal model” of administrative policymaking. 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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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.
⁵. On the characteristics of the agency-forcing approach, see B. ACKERMAN & W. HASSLER, supra note 2, at 104-15.
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

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

chemicals known to cause cancer in humans.\textsuperscript{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.\textsuperscript{14} Estimates of the number of cases of cancer associated with these thirty-seven pollutants range from several hundred to several thousand per year.\textsuperscript{15} The EPA is adopting emission limits for benzene,\textsuperscript{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.\textsuperscript{17} Although environmental exposures to benzene are typically very much lower than occupational exposures,\textsuperscript{18} the EPA has taken the position that any exposure to a carcinogen, however small, poses some incremental risk of cancer to exposed individuals.\textsuperscript{19}


\textsuperscript{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).


\textsuperscript{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 PERPS. 75 (1983).


\textsuperscript{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. 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. 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 III is a descriptive account of the legislative and regulatory history of section 112. Part IV is a critical analysis, from the perspectives of public health, equity, administrative process, and economic efficiency, of current statu-


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. Espy, 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).
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,\textsuperscript{30} the Senate bill contained a section entitled \textquote{National Emission Standards—Hazardous Air Pollution Agents,\textquote} which specified procedures for listing hazardous air pollutants\textsuperscript{31} and created a \textquote{nondiscretionary\textquot; duty to regulate listed pollutants within strict timetables.\textsuperscript{32} Emissions of hazardous air pollutants from both new and existing stationary sources would be prohibited unless the EPA could show \textquote{that a departure from such a prohibition for [a] stationary source will not be hazardous to the health of persons.}\textsuperscript{33} The Senate committee report reveals that the section was originally intended to \textquote{encompass a limited number of pollutants.}\textsuperscript{34} Asbestos, cadmium, mercury, and beryllium are mentioned as possible candidates.\textsuperscript{35} The report describes the definition of \textquote{hazardous\textquot; as \textquote{relatively restrictive,\textquot; apparently because of the severe nature of the health effects encompassed by the definition. A restrictive definition was perceived as appropriate because \textquote{a total prohibition on emissions is a step to be taken only where a danger to health, as defined, exists.}\textsuperscript{37} If a pollutant is not deemed \textquote{hazardous\textquot; yet poses a \textquote{significant danger to public health or welfare\textquot; the Senate report describes another section of the bill as the appropriate statutory basis for regulation.\textsuperscript{38}

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

\textsuperscript{30} The House bill treated hazardous pollutants as an extreme case of emissions that \textquote{may contribute substantially to endangerment of public health.\textquot; 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).

\textsuperscript{31} A \textquote{hazardous air pollutant\textquot; was defined in the Senate bill as \textquote{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.\textquot; Id. at 496.

\textsuperscript{32} Id. at 495-98 (report on section 115 of the Senate bill). \textquote{Nondiscretionary\textquot; 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.

\textsuperscript{33} Id. at 496.

\textsuperscript{34} Id. at 420-21 (Senate committee report on section 115).

\textsuperscript{35} Id. at 420.

\textsuperscript{36} Id.

\textsuperscript{37} Id.

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

\textsuperscript{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." The most important change was substitution of the precautionary language—"may 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." 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, 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. Section 112 is one of the major exceptions to this federalist approach to pollution control. 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.

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


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).
47. Id.
control agencies had developed such programs.\textsuperscript{53}


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.\textsuperscript{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).\textsuperscript{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.\textsuperscript{56} These drastic options were rejected, even though the EPA could not identify a positive amount of asbestos emission that would not be hazardous.\textsuperscript{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."\textsuperscript{58} The Agency rejected the drastic alternatives on the grounds of enforcement difficulties and adverse economic consequences.\textsuperscript{59} Instead of prohibition, the EPA opted for limitations on visible emissions and for requirements for certain production procedures and operations.\textsuperscript{60} Environmentalists chose not to litigate the EPA's failure to ban asbestos emissions.\textsuperscript{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.\textsuperscript{62}

\textsuperscript{56} 38 Fed. Reg. 8820, 8820-22 (1973) (codified at 40 C.F.R. §§ 61.140-.156 (1984)).
\textsuperscript{57} See id.
\textsuperscript{58} National Emission Standards for Hazardous Air Pollutants, supra note 56, at 8820.
\textsuperscript{59} Id.
\textsuperscript{60} Id.
\textsuperscript{61} See Doniger, supra note 55, at 572-73 (explaining reaction of environmental groups to asbestos standard).
\textsuperscript{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." 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. 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.

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. The cost-benefit approach was also rejected; the EPA argued that section 112 permitted consideration of costs "only to a very limited extent." 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. The EPA apparently agreed to tighten the standard and to accept zero vinyl chloride emissions as a goal, but the standard has never been strengthened.

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(o)(1)(A) (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)).

65. Id. at 46,562.
66. Id. at 46,561.
67. Id. at 46,562.
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-

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


During the Carter Administration, the FDA 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 FDA never made formal listing decisions on cadmium or polycyclic organic matter. Affirmative listing decisions were made for radionuclides and arsenic, 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. Yet the FDA did not even propose emission standards for categories of benzene sources until the period from April, 1980, to January, 1981, thus leaving the issue of final standards to the Reagan Administration.

In total, the Carter FDA 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." In fairness to the FDA, 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.

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 FDA’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. FDA, 541 F.2d 1, 17 (D.C. Cir. 1976) (en banc), cert. denied, 426 U.S. 941 (1977).
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 radionuclides and arsenic. 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. 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, 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.

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, they were later withdrawn because of inadequate scientific justification. 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.

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 toluene\textsuperscript{89} and not regulating polycyclic organic matter as a per se hazardous air pollutant.\textsuperscript{90} Controversial emission standards to curtail arsenic emissions were proposed,\textsuperscript{91} but the shutdown of a major copper smelter in Tacoma, Washington, rendered the fate of the proposal uncertain.\textsuperscript{92} While some sources of benzene emissions have been regulated,\textsuperscript{93} others have been ignored or left unregulated due to "insignificant risk."\textsuperscript{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.\textsuperscript{95} Coke oven emissions were recently listed under section 112,\textsuperscript{96} but it is not clear that further control is technologically feasible in many plants.\textsuperscript{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.\textsuperscript{98} Industrialists recommended that the EPA Administrator be permitted to consider economic and technological data as well as health data when setting emission standards.\textsuperscript{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.\textsuperscript{100} A consen-
sus favoring a similar bill emerged in the Senate Committee on Environment and Public Works.\textsuperscript{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,\textsuperscript{102} but election-year politics caused the issue to be delayed until the Ninety-Ninth Congress.\textsuperscript{103} In the meantime, the Ruckelshaus EPA entered into negotiations with key congressional staff members in order to find a mutually-acceptable reform package.\textsuperscript{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.\textsuperscript{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).


Growing public and scientific attention to the cancer problem has caused the EPA to identify dozens of potentially carcinogenic air pollutants. 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. Most of this rulemaking activity occurred before 1977, the year the EPA identified the thirty-seven priority candidates for listing and regulatory decision. 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. 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 ENVT. 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.


national emission standards within a period of one year. That duty may require, as we shall see, that zero-emission standards be set for all sources of a nonthreshold pollutant, regardless of technological feasibility and the size or affordability of compliance costs. The nondiscretionary duty is enforceable in the courts by citizen suits, 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. 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, 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), and final approval is granted by the EPA.

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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.\textsuperscript{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.\textsuperscript{117} As of June, 1983, the EPA had initiated health assessment documents for nineteen of the thirty-seven “priority” pollutants.\textsuperscript{118} Written approval from the SAB had been obtained for only two of these documents,\textsuperscript{119} although the review process was accelerated somewhat during the tenure of Administrator Ruckelshaus.\textsuperscript{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.\textsuperscript{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.\textsuperscript{122} Documents are now expected to contain an assessment of the degree of health risk posed by the pollutant at various exposure levels.\textsuperscript{123} Methods of quantitative risk assessment for cancer are extremely controversial,\textsuperscript{124} so

\begin{itemize}
\item \textsuperscript{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.
\item \textsuperscript{117} EPA estimates reported in id. at iii, 14.
\item \textsuperscript{118} Id. at 15.
\item \textsuperscript{119} Id.
\item \textsuperscript{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).
\item \textsuperscript{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.
\item \textsuperscript{123} Id. at 19-20.
\item \textsuperscript{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. In 1979, however, the EPA's proposed "generic" cancer policy called for the documents to emphasize carcinogenic effects. That policy was reversed early in 1981, when the EPA returned to full-scale health assessments. 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, 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. Although the proposed cancer policy was never finalized, the Agency did endorse the carcinogenicity guidelines contained in a draft

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125. GAO REPORT ON SECTION 112, supra note 14, at 19-20.
127. GAO REPORT ON SECTION 112, supra note 14, at 19-20.
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). Unfortunately, the Group's report is controversial because it never incorporated comments from the public. In any event, the Agency's endorsement of the document probably carries no legal significance. 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. 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


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).


The results of these reviews are supposed to be incorporated into the documents before subsequent reviews by high-level agency staff and the SAB. Review of the documents by the SAB has been an integral part of the listing process since 1978. Although section 117(c) of the Act directs the EPA Administrator to consult with appropriate advisory committees, it is the EPA’s policy to delay listing and regulatory decisions until SAB approval of the health assessment document has been obtained. 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 mortality—is highly precautionary and the 1977 Clean Air Act Amendments emphasize the precautionary and preventive purposes of section 112 and

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.
139. GAO Report on Section 112, supra note 14, at iv.
of the Act as a whole. While Congress did not intend to transfer the burden of proof from the EPA to industrial polluters, 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. 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.

Although the listing process should be highly precautionary, there are good reasons to subject EPA listing decisions to some form of independent scientific review. 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. 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.

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. 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.
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courts to ad hoc agency science panels have received extensive discussion in the scholarly literature. 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. 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.

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. 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-


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.


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. 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. Sometime during this process the EPA must also subject the package to review by the Office of Management and Budget. 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.

When Congress establishes unrealistic deadlines for the discharge of nondiscretionary duties, it invites disruptive litigation. The recent court orders regarding benzene, radionuclides, and arsenic 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.

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. 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.
156. GAO REPORT ON SECTION 112, supra note 14, at 24.
160. GAO REPORT ON SECTION 112, supra note 14, at 42-43.
161. Doniger, supra note 55, at 587.
such behavior.\textsuperscript{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 \textit{Federal Register}.\textsuperscript{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.\textsuperscript{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,\textsuperscript{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 Amendments\textsuperscript{166} and a more radical version is endorsed by environmentalists in the House and Senate.\textsuperscript{167} This approach to listing pollutants is a legislative practice of questionable effectiveness and desirability. Grafting a priority list of


\textsuperscript{163} \textit{GAO Report on Section 112, supra note 14, at 42-43.}


\textsuperscript{166} 42 U.S.C. § 7422(a) (1982).

\textsuperscript{167} \textit{See} 1982 \textit{Cong. Q. Almanac}, 432-33; \textit{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. 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. 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 exposures and that polycyclic organic matter per se is not usefully listed and regulated as a hazardous air pollutant. 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. 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. The listing of arsenic as a hazardous air

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. See 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).
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

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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).


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.\textsuperscript{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.\textsuperscript{183} The EPA asserts that the decision is consistent with the Supreme Court's opinion in \textit{Industrial Union Department v. American Petroleum Institute},\textsuperscript{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.\textsuperscript{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."\textsuperscript{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.\textsuperscript{187}

Environmentalists have recently challenged the EPA's withdrawal decision in federal court.\textsuperscript{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.\textsuperscript{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.\textsuperscript{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

\begin{footnotes}
\item[184] 448 U.S. 607 (1980).
\item[185] \textit{Id.} at 641.
\item[186] \textit{Id.} at 655.
\item[189] D. Doniger & A. Ahmed, \textit{supra} note 69, at 2, 9.
\item[190] \textit{Id.} at 9.
\end{footnotes}
that sources emitting at lower rates need not be subject to standards."

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. 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." 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. 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. Both positions have a certain plausibility, and thus a procedure for making significant-risk judgments incorporating both is recommended below.

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. 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.

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 minimus [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.


196. See infra text accompanying notes 295-308.


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-

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199. D. Doniger & A. Ahmed, supra note 69, at 5.
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).
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. That conclusion is not far-fetched because the original Senate bill in 1970 called for a prohibition of emissions of hazardous air pollutants. In practice, the EPA has not issued zero-emission standards. In the two instances in which the EPA has regulated nontreshold pollutants—asbestos and vinyl chloride—the Agency has rejected zero-emission standards in favor of rules based on available technology. The EPA’s legal reasoning in these rulemakings has never been judicially reviewed. As argued below, 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.” 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.

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-


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.\textsuperscript{212} Difficulty in interpreting the “ample margin of safety” language was apparently a major impediment to implementation of section 112 during the Carter Administration.\textsuperscript{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.\textsuperscript{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.\textsuperscript{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.\textsuperscript{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 approach\textsuperscript{217} to standard setting is a remarkable exercise in statutory (re)interpretation.\textsuperscript{218} The Agency begins with the premise that members of Congress did not have nonthreshold pollutants in mind when section 112 was written.\textsuperscript{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

\begin{itemize}
\item \textsuperscript{212} See Doniger, supra note 55, at 566 (delay attributed to EPA’s reluctance to “flout the literal meaning of section 112”).
\item \textsuperscript{213} 1981 Hearings, supra note 9, at 729 (statement of Khristine Hall, Environmental Defense Fund).
\item \textsuperscript{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.
\item \textsuperscript{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).
\item \textsuperscript{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.
\item \textsuperscript{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).
\item \textsuperscript{219} Id. at 58,659-60. But see Schroeder, supra note 42, at 35 n.118 (arguing that Muskie knew about nonthreshold pollutants).
\end{itemize}
protected.\textsuperscript{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,\textsuperscript{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.\textsuperscript{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.\textsuperscript{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.\textsuperscript{224} Several legal commentators, however, have

\begin{itemize}
\item \textsuperscript{220} 44 Fed. Reg. 58,660 (1979).
\item \textsuperscript{221} \textit{Id.} (predicting "massive social dislocations" from zero-emission standards).
\item \textsuperscript{222} \textit{Id.} (Congress "would have spoken with much greater clarity").
\item \textsuperscript{223} See, e.g., \textit{id.} at 58,650.
\item \textsuperscript{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 \textit{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)(0)(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." \textit{Chevron}, 104 S. Ct. at 2793-94. The Court noted, however, that despite the opacity of the statute its legislative history—although otherwise "unilluminating," \textit{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." \textit{Id.} at 2786. The language of section 112 is therefore distinguishable from that at issue in \textit{Chevron}, for the legislative history of section 112 is both illuminating and clearly hostile to agency balancing of economic interests. \textit{See supra} notes 198-208 and accompanying text.
\item In \textit{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(f) of the Clean Water Act Amendments of 1977, codified at 33 U.S.C. 1311(f) (1982). The EPA reading left the Agency free to issue "fundamentally different factor" (FDF) variances—\textit{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. \textit{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. \textit{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. \textit{See}
denounced and ridiculed the EPA's reading of the statute.\textsuperscript{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.\textsuperscript{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.\textsuperscript{227} Section 111, in contrast, explicitly authorizes the EPA to consider economic and technological feasibility when setting emission performance standards for new stationary sources.\textsuperscript{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

\textit{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.

\textsuperscript{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, \textit{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, \textit{supra} note 55, at 566-88; Schroeder, \textit{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' ").

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


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 109 235 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


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

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.\textsuperscript{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."\textsuperscript{238}

While Congress did not explicitly consider the regulation of carcinogens,\textsuperscript{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."\textsuperscript{238} 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."\textsuperscript{240}

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.\textsuperscript{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."\textsuperscript{243}

Both Congress and the environmentalists appear to have acquiesced

\textsuperscript{240} Doniger, \textit{supra} note 55, at 585.
\textsuperscript{241} Currie, \textit{supra} note 225, at 1389, 1461 (1980).
\textsuperscript{242} This line of argument originates with Schroeder, \textit{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. \textit{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."
\textsuperscript{243} Schroeder, \textit{supra} note 42, at 34.
in the EPA's rewriting of section 112. Congress could easily have amended the criteria for emission standards when drafting the 1977 Amendments, but did not do so. While some environmentalists have expressed the view that section 112 requires zero emissions for carcinogens, environmental groups have not yet pressed this view in litigation against the EPA. The brittle alliance between the EPA and environmental groups may be broken by the benzene rulemaking. Officials of the EPA are openly predicting a lawsuit challenging the Agency's reading of section 112 and they are clearly not confident about the prospects for victory. 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.

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


246. See, e.g., Doniger, supra note 55, at 571; see also 1981 Hearings, supra note 20, at 710 (statement of Khristine 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").


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. 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. An independent analysis by economists at Harvard’s Kennedy School of Government assessed BAT as an approach to regulation of benzene, acrylonitrile, and coke-oven emissions.

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. 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. 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. Under the BAT approach, the public health gains per dollar of expenditure vary across sources by a factor of two thousand. 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

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253. OMB Report, supra note 198, at 1593-603.
255. OMB Report, supra note 198, at 1593.
256. Id.
257. Id.
258. Id.
than a factor of one hundred for the three pollutants.” 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. 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, 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, though that may not be an inherent problem.

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. Some studies suggest that society as a whole is willing to pay $300,000 to $3 million to avert an accident fatality, but it is not clear whether this range is applicable to prevention of a cancer fatality. Moreover, some people do not accept the ethical


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.


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).


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. 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 below 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. 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. 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. 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.

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


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).


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. 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, pollution fees, or alienable permits. Design, equipment, work practice, and operational standards are permissible only if the Administrator determines that quantitative emission standards are infeasible. 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. 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


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).


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,
unapproved draft has been completed.\footnote{Id. at 15-16.}

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.\footnote{Initial Proposed Rule, 44 Fed. Reg. 58,642, 58,647-49 (1979).} Alternatively, the EPA could use the carcinogenicity classifications published by the International Agency for Research on Cancer.\footnote{See, e.g., INTERNATIONAL AGENCY FOR RESEARCH ON CANCER, supra note 18, at 20 (on what constitutes "sufficient" evidence of carcinogenicity).} 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
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. 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. 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

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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*. 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," 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

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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 ECOLOGY L. 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*).

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. 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.

Under the formulation advocated here, BAT would be the presumptive remedy subject to modification by the results of cost-benefit analysis. 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).

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. 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.

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*, Paul Ehrlich's *The Population Bomb*, John Esposito's *Vanishing Air*, and Barry Commoner's *The Closing Circle* 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. 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-

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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).
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.  

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.” 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.

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.
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. 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—itself 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. 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. 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

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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).

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. 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. It is now time for members of Congress to address themselves to the complex issues of implementation. The agency-forcing model has simply failed to accomplish the goal of health protection that section 112 was supposed to advance.


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