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What Comes After Technology: Using an "Exceptions Process" to Improve Residual Risk Regulation of Hazardous Air Pollutants

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HeinOnline -- 13 Stan. Envtl. L. J. 263 1994

I. INTRODUCTION

Section 112 of the Clean Air Act (the Act) governs the regulation of hazardous air pollutants.[1] From 1970 to 1990, the statute required the United States Environmental Protection Agency (EPA) to regulate hazardous air pollutants on a pollutant-by-pollutant basis.[2] Environmental policy analysts generally acknowledge that this approach failed due to scientific uncertainties and unclear direction from Congress on how the EPA should balance the competing concerns of cost and safety. In an effort to improve the Act's effectiveness, Congress passed the 1990 Amendments (the Amendments) to the Act,[3] which established a two-phased approach to regulation. First, subsection 112(d) requires the EPA to promulgate technology-based emission standards for categories and subcategories of industries that are major or area sources of 189 specified hazardous air pollutants.[4] Because Congress was concerned that these controls would not eliminate all emissions posing unacceptable health risks to exposed populations, subsection 112(f) then requires the EPA to determine for each category or subcategory of industries whether more stringent emission standards should be promulgated to control residual risks.[5]

Given the previously slow pace of regulation, Congress was probably right to emphasize speed and scope, rather than stringency and health, in requiring the EPA to promulgate national,

1. 42 U.S.C. § 7412 (1988 & Supp. III 1991).
2. 42 U.S.C. §§ 7412(b)(1)(A)-(B) (1988).
3. Clean Air Act Amendments of 1990, Pub. L. No. 101-549, 104 Stat. 2399.
4. 42 U.S.C. §§ 7412(d)(1)-(2). The Amendments require that EPA set emissions standards based on "measures, processes, methods, systems, or techniques" then available for pollution reduction. *Id.* § 7412(d)(2).
5. *Id.* § 7412(f).

HeinOnline -- 13 Stan. Envtl. L. J. 264 1994

uniform technology-based regulations for categories and subcategories of industries. The residual risk provisions in subsection 112(f), however, provide only vague guidelines for the EPA to follow in establishing health-based standards after the technology-based approach is in place. In fact, the residual risk provisions adopt essentially the same approach to health-based regulation that failed in the pre-1990 version of the statute. Subsection 112(f) requires the EPA to examine the cancer risk of *individual* facilities in determining whether the agency must promulgate residual risk standards, but then requires the agency to issue such standards for a category or subcategory of industry rather than for the individual facilities.[6]

This Article proposes establishing an "exceptions process" to exempt individual facilities from both the categorical technology-based standards in subsection 112(d) and the residual risk standards in subsection 112(f). Under this approach, a firm could apply for a variance from either type of standard following a site-specific risk assessment that demonstrates that (a) the costs of the standard are disproportionate to the benefits, and that (b) there is not an unacceptable risk to surrounding residents. At the same time, this approach would enable citizens to request a more stringent standard for an individual facility upon proof that the existing standards inadequately control the health risks presented by the facility.

On the one hand, an individualized approach would more effectively regulate hazardous air pollutants. The current residual risk regulations provide insufficient protection in several important areas. Subsection 112(f) fails to address the risks of excessive concentrations of certain pollutants (hot-spots), our inability to compare carcinogens and non-carcinogens, indirect and multimedia impacts, and potentially disparate impacts on diverse exposed subpopulations.[7] While more stringent national standards might be

6. *See id.* § 7412(f)(2).

7. Scientists are beginning to chart genetic differences in human cancer susceptibility. *See* Alon Rosenthal et al., *Legislating Acceptable Cancer Risk from Exposure to Toxic Chemicals*, 19 ECOLOGY L.Q. 269, 289 n.104 (1992). However, even without scientific evidence of genetic cancer-risk differences, occupational exposure to airborne carcinogens increases cancer risks for groups such as farmworkers and pesticide applicators.

In addition, the EPA has recently targeted the issue of environmental justice in light of evidence that facilities emitting airborne toxics are more likely to be found in minority, than in white neighborhoods even when income differences are taken into account. *See* Stephen C. Jones, *EPA Targets 'Environmental Racism'*, NAT'L L.J., Aug. 9, 1993, at 28, 34, 36.

HeinOnline -- 13 Stan. Envtl. L. J. 265 1994

helpful in addressing some of these issues, many of these problems are essentially local in nature and require site-specific solutions.

On the other hand, industry often argues that technology-based regulation frequently imposes requirements that are unnecessary and inefficient at specific facilities.[8] Other pollution control statutes contain some limited exceptions for certain categories of polluters.[9] In contrast, the Clean Air Act provides no variance procedure from subsection 112(d)'s technology-based emission standards for sources of hazardous air pollutants. Moreover, the residual risk provisions in subsection 112(f) do not provide any exemptions for industry, even where the technology-based emission standards for a category of sources exceeds the level necessary to achieve subsection 112(f)'s health-based standards at a particular source.

Even if the reader agrees that subsection 112(f) suffers from both over- and under-regulation, the difficult question of how to implement a better approach remains. Commentators disagree about whether exceptions from national, uniform environmental standards promote efficiency or simply encourage political manipulation.[10] The use of an exceptions process for sources of toxic pollutants is likely to be especially controversial, but both fairness and efficiency arguments support establishing a variance process for sources of air toxics. Because any exceptions process includes a risk of abuse,[11] policymakers should encourage public participation to protect against biased decisionmaking.

While Congress could simply allow the EPA to grant exceptions on an ad hoc basis, congressional standards regarding appropriate exceptions would more readily achieve public approval. Two contradictory yet related issues must be addressed. On the one hand, a statute must provide sufficient guidance to the EPA regarding the appropriate level of stringency for regulating specific hazardous air pollutants. On the other hand, there is insufficient information

8. *See generally* AMOCO/U.S. E.P.A., YORKTOWN POLLUTION PREVENTION PROJECT, PROJECT SUMMARY (1992) [hereinafter AMOCO]. Industry has suggested site-specific controls as a way to reduce uniform national requirements. *Industry Convinces EPA to Seek Comment on Plan for Site-Specific Benzene Controls,* 23 Env't Rep. (BNA) 1911 (Nov. 27, 1992).

9. *See, e.g.,* 33 U.S.C. § 1311(k) (1988) (innovative technology variance for two years); *Id.* § 1311(n) (fundamentally different factors variance).

10. *See infra* notes 236-50 and accompanying text.

11. *See, e.g.,* EPA v. National Crushed Stone Ass'n, 449 U.S. 64, 75-81 (1980) (criticizing variances as potential tool of political influence); Howard Latin, *Ideal Versus Real Regulatory Efficiency: Implementation of Uniform Standards and "Fine-Tuning" Regulatory Reforms,* 37 STAN. L. REV. 1267, 1316 (1985) [hereinafter Latin, *"Fine-Tuning"*].

HeinOnline -- 13 Stan. Envtl. L. J. 266 1994

about many risks, and pollutant risks are often difficult, if not impossible, to compare.

The EPA needs significant discretion in order to exercise its technical expertise to address complicated risks. The EPA, however, also needs clearer congressional guidance to provide the agency with greater legitimacy and a better understanding of public priorities. This Article therefore proposes a "fuzzy bright line" statute that combines significant delegation to the EPA with flexible, but clear, standards. This proposal represents a compromise between those favoring congressional micromanagement of the EPA, and those wishing to delegate most decisions to the agency's expertise. In particular, this Article disagrees with the argument that the priority-setting and screening approach in section 112(f) will lead to more effective pollution control than legislating residual risk standards.[12]

The "fuzzy bright line" approach proposed in this Article may be the best legislative approach. Given the serious criticisms this Article raises concerning the inaccuracies of risk assessment, however, the "fuzzy bright line" approach may appear irresponsible. One possible solution to this problem is to promote increased public participation in policy-making at the local level.

II. RESIDUAL RISK AND THE 1990 AMENDMENTS

Subsection A will discuss the original version of section 112, which regulated hazardous air pollutants on a pollutant-by-pollutant basis, and will describe how the 1990 Amendments shifted the regulatory focus from individual pollutants to sources of hazardous air pollutants. This subsection closely examines the limitations of the residual risk provisions in subsection 112(f)(2)(A) of the amended Act.

A. *The Original Clean Air Act and the 1990 Amendments*

1. *Pre-1990 Regulation of Air Toxics.*

Section 112 of the 1970 Clean Air Act required the EPA to set health-based emission standards, rather than technology-based standards, for hazardous air pollutants. Congress intended these standards to provide "an ample margin of safety to protect the pub-

12. *See, e.g.*, Rosenthal et al., *supra* note 7, at 275-76 (bright lines may undermine scientific progress), 323-27 (discussing bright lines for "screening" and "priority setting"), 344, 360-61 (bright lines create inefficiency).

HeinOnline -- 13 Stan. Envtl. L. J. 267 1994

lic health" from that air pollutant.[13] Because "most hazardous air pollutants . . . are nonthreshold pollutants, for which scientists cannot determine a no-observed-effect level of exposure,"[14] the only absolutely safe level of emissions is zero. Yet the ambiguous "ample margin of safety" language does not guide the agency to standards that are absolutely safe.[15] Nor does it clarify whether EPA may consider technological constraints or economic considerations in crafting an emissions standard.[16] The "ample margin of safety" language proved counterproductive because the EPA was reluctant to effectively shut down entire industries by listing pollutants, where such listing would require zero emission standards.[17] This proved especially true when the costs of industry shutdowns were far greater than the benefits from pollutant regulation.[18] As a result, between 1970 and 1988 the agency listed only eight hazardous air pollutants and promulgated standards for only some sources of seven types of hazardous air pollutants.[19]

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13. 42 U.S.C. § 7412(b)(1)(B).

14. Janet L. McQuaid, Note, *Risk Assessment of Hazardous Air Pollutants Under the EPA's Final Benzene Rules and the Clean Air Act Amendments of 1990,* 70 TEX. L. REV. 427, 430 (1991); *see* NRDC v. EPA, 824 F.2d 1146, 1153 n.1 (D.C. Cir. 1987) (en banc) ("With the exception of mercury, every pollutant the Administrator has listed or intends to list under § 112 is a non-threshold carcinogen."); William A. Wichers et al., *Regulation of Hazardous Air Pollutants Under the New Clean Air Act: Technology-Based Standards at Last,* 22 Envtl. L. Rep. (Envtl. L. Inst.) 10,717, 10,718 (1992).

15. *See* Wichers et al., *supra* note 14, at 10,718; McQuaid, *supra* note 14, at 430-31. The statutory phrase "ample margin of safety" suggested that an emission standard be set at a very protective level because of the difference between this standard and the standard in § 109(b)(1) setting primary ambient air quality standards based "on an *adequate* margin of safety." *Compare* 42 U.S.C. § 7412(b)(1)(B) (1970) ("ample margin of safety") *with* 42 U.S.C. § 7409(b)(1) (1988) (emphasis supplied). *See* Khristine L. Hall, *The Control of Toxic Pollutants Under the Federal Water Pollution Control Act Amendments of 1972,* 63 IOWA L. REV. 609, 629-30 (1978) (referencing CAA § 112, and comparing the meaning of an "ample" versus an "adequate" margin of safety); Wichers et. al., *supra* note 14, at 10,718 n.12.

16. The most likely explanation for § 112's ambiguity is that, to the extent Congress actually considered the implications of its "ample margin of safety" language, it deliberately excluded cost and feasibility as factors for EPA to consider in setting emissions standards. *See* John P. Dwyer, *The Pathology of Symbolic Legislation,* 17 ECOLOGY L.Q. 233, 237-41 (1990); *see also* Wichers et al., *supra* note 14, at 10,718.

17. *See* Dwyer, *supra* note 16, at 255; McQuaid, *supra* note 14, at 431.

18. *See Clean Air Act (Part 2): Hearings before the Subcomm. on Health and Environment of the House Comm. on Energy and Commerce,* 97th Cong., 1st Sess. 737 (1981) (statement of Walter C. Barber, Jr., Director, Office of Quality Planning and Standards, EPA, "[T]he Agency has been reluctant to list chemicals without some assurance that adverse effects could actually occur and can be prevented by control strategies."); Dwyer, *supra* note 16, at 260; Wichers et al., *supra* note 14, at 10,718.

19. *See* Dwyer, *supra* note 16, at 252, 261-62, 267-69; Wichers et al., *supra* note 14, at 10,718-19; Gary E. Marchant & Dawn P. Danzeisen, Comment, *"Acceptable" Risk for Hazardous Air Pollutants,* 13 HARV. ENVTL. L. REV. 535, 536-37 (1989); McQuaid, *supra* note 14, at

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Some commentators argue that the old section 112 was bound to fail because Congress intentionally created a program that was "more symbolic than functional."[20] The Act failed to address the administrative and political constraints that would prevent the EPA from implementing the statutory provisions.[21] Thus, the combination of insufficient information and overly strict regulation doomed the original emissions reduction program.[22]

Following the Clean Air Act's enactment in 1970, the EPA gradually developed a two-fold strategy to address the problems created by the "ample margin of safety" criterion. First, the EPA delayed listing pollutants. Second, the EPA construed the language of section 112 to permit consideration of economic and technological factors when developing emission standards.[23] Environmentalists strongly opposed the EPA's interpretation, claiming that the origi-

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431. In part, the EPA did not wish to list a substance and to promulgate emission standards until the agency had compiled sophisticated studies that could withstand litigation from regulated industries. However, this quest for greater certainty made it difficult, if not impossible for the EPA to meet the six-month deadlines for proposing and promulgating emission standards following listing. *See* Dwyer, *supra* note 16, at 237-39; Wichers et al., *supra* note 14, at 10,718-19.

20. Dwyer, *supra* note 16, at 233.

21. *See id.* & *passim.* Professor Dwyer has argued that the legislators who enacted the old § 112 reaped political benefits from voting for "an ample margin of safety" and left the EPA and the courts with the unpalatable task of balancing health against jobs. *Id.* at 246-49; Kevin J. Worthen, *The Last Shall Be First, and the First Last: Ruminations on the Past, Present and Future Course of Government Regulation of Hazardous Pollutants*, 1989 B.Y.U. L. REV. 1113, 1142 (discussing symbolic nature of statutes that do not consider cost of regulation); *see also* McQuaid, *supra* note 14, at 432-33.

22. Some commentators target the lack of sufficient information as explaining the failure of health-based regulation. *See generally* Latin, *"Fine-Tuning," supra* note 11, at 1328-31; *see also* John S. Applegate, *Worst Things First: Risk, Information, and Regulatory Structure in Toxic Substances Control*, 9 YALE J. ON REG. 277, 282 n.15 (1992) [hereinafter Applegate, *Worst Things*] ("[T]he precise effects of toxic substances on human health and the environment cannot be stated with any certainty."). Others explain the under-regulation of hazardous air pollutants and other toxics by the EPA as the paradox of over-regulation–that excessive stringency results in under-regulation because regulators are unwilling to impose irrationally tight controls. *See* CASS R. SUNSTEIN, AFTER THE RIGHTS REVOLUTION: RECONCEIVING THE REGULATORY STATE 91-92, 106-07 (1990); JOHN MENDELOFF, REGULATING SAFETY: AN ECONOMIC AND POLITICAL ANALYSIS OF OCCUPATIONAL SAFETY AND HEALTH POLICY (1979).

23. Dwyer, *supra* note 16, at 235, 251-52. While the EPA was initially hesitant to admit that it was relying on economic and technological factors in issuing standards, the agency was more forthright about its use of economic factors in the proposed and final emission standards for vinyl chloride. *Id.* at 252-53; National Emission Standards for Hazardous Air Pollutants; Standard for Vinyl Chloride, 41 Fed. Reg. 46,560 (1976) [hereinafter Standard for Vinyl Chloride]; National Emission Standards for Hazardous Air Pollutants; Proposed Standard for Vinyl Chloride, 40 Fed. Reg. 59,532 (1975) [hereinafter Proposed Standard for Vinyl Chloride].

HeinOnline -- 13 Stan. Envtl. L. J. 269 1994

nal section 112 required a zero-risk approach.[24] Nevertheless, the EPA's apparently less stringent technology-based approach may have been more effective than the symbolic (but unworkable) "ample margin of safety" standard.[25]

In a unanimous en banc decision, the D.C. Circuit in *Vinyl Chloride*,[26] struck down the EPA's attempt to apply a technology-based policy to section 112. That court also rejected, however, the Natural Resources Defense Council's argument that the agency should focus only on health considerations when setting emission standards for air toxics.[27] The *Vinyl Chloride* court required the EPA to undertake a two-step procedure for setting emissions standards for hazardous air pollutants. First, the agency must determine what constitutes an "acceptable risk to health" based exclusively on health considerations. The court emphasized that while it did not equate "safe" with "risk-free" or even free from uncertainty, "the Administrator cannot under any circumstances consider cost and technological feasibility at this stage of the analysis."[28] Second, the EPA has the discretion to set a stricter emission standard to provide an ample margin of safety. In taking such action the agency may consider the limitations of scientific knowledge, as well as costs and technological feasibility.[29] In the wake of *Vinyl Chloride*, the EPA promulgated final emissions standards for several benzene and ra-

24. *See* John D. Graham, *The Failure of Agency-Forcing: The Regulation of Airborne Carcinogens Under Section 112 of the Clean Air Act*, 35 DUKE L.J. 100, 131 (1985); Wichers et al., *supra* note 14, at 10,719.

25. *See* Latin, *"Fine-Tuning," supra* note 11, at 1309 ("In sum, the original harm-based approach for regulation of toxic water pollutants proved ineffective and has largely been replaced by technology-based standards that are more easily implemented. Experience with regulation of hazardous air pollutants has been quite similar."); *see also* Sanford E. Gaines, *Science, Politics, and the Management of Toxic Risks Through Law*, 30 JURIMETRICS J. 271, 300 (1990) ("Technology-based standards have many theoretical advantages over the nominally pure health-based approach now embodied in section 112.").

26. NRDC v. EPA, 824 F.2d 1146 (D.C. Cir. 1987) (en banc).

27. The court acknowledged its obligation to defer to the EPA's reasonable interpretation of a statute. The court concluded, however, that in applying the technology-based formulation set out in the vinyl chloride emission standards, the EPA administrator had not "exercised his expertise to determine an acceptable risk to health" but had "substituted technological feasibility for health as the primary consideration under Section 112." *Id.* at 1163; *see also* Chevron, U.S.A. v. NRDC, 467 U.S. 837, 842-43 (1984) (courts must defer to agency's construction of statute if statute is ambiguous and agency's construction is reasonable).

28. NRDC v. EPA, 824 F.2d at 1165.

29. *Id.* at 1164-66. The court's analysis is confusing because the decision excludes nonhealth factors from the determination of what constitutes acceptable risk, but includes them for judging whether a standard provides the requisite "ample margin of safety." *See* Gaines, *supra* note 25, at 293-94.

HeinOnline -- 13 Stan. Envtl. L. J. 270 1994

dionuclide categories. Notably, the agency employed an historical risk survey to set a "presumptive level" of acceptability for the maximum individual cancer risk at one-in-10,000.[30]

2. *1990 Amendments.*

The controversy over the Act's health-based "ample margin of safety" language and the agency's delay in issuing emission standards for individual pollutants based on that language led Congress to overhaul section 112 of the Act in the 1990 Amendments. Under the current version of the statute, regulation of hazardous air pollutants will take place in two stages.

First, the EPA must promulgate uniform, national technology-based[31] emission standards for categories or subcategories of major sources[32] and area sources[33] of hazardous air pollutants.[34] Congress specified 189 substances that are to be considered "hazardous air pollutants" for purposes of the Act.[35] In the second phase of regulation, the EPA is required to promulgate more stringent emissions standards for those categories of sources for which the technology-based standards have proven to be insufficiently protective of human health or the environment.[36] An important question is what type of criteria should the EPA employ to determine whether technology-based emission standards are sufficiently protective.

3. *Residual Risk Provisions.*

One possible objection to this Article's proposal is that it is premature to discuss how to improve the residual risk provisions until the National Academy of Sciences, the Risk Assessment and Management Commission, and the EPA have had an opportunity to prepare reports on the agency's risk assessment methods relating

30. NRDC v. EPA, 824 F.2d at 1164-66. *But see* McQuaid, *supra* note 14, at 437 (criticizing use of historical survey data as inappropriate guide for setting current standards).

31. In a technology-based system of regulation, an agency sets standards based not on the health effects of pollutants, but on the pollution-control capabilities of technology. John S. Applegate, *The Perils of Unreasonable Risk: Information, Regulatory Policy, and Toxic Substances Control*, 91 COLUM. L. REV. 261, 268 n.28 (1991) [hereinafter Applegate, *Perils*].

32. A major source is one that emits either ten tons per year of any single air toxic or twenty-five tons per year of any combination of air toxics. 42 U.S.C. § 7412(a)(1).

33. An area source is defined as "any stationary source . . . that is not a major source." *Id.* § 7412(a)(2). Dry cleaners fall into this category.

34. *Id.* § 7412(d).

35. *Id.* § 7412(b). Congress' list includes the eight hazardous air pollutants identified by the EPA prior to 1989. *Id.*

36. *Id.* § 7412(f).

to hazardous air pollutants. The very questions that section 112 requires that these reports address, however, suggest that an exceptions process is necessary to address a number of complex risk issues at individual sites, although these reports will undoubtedly raise technical issues beyond the scope of those discussed in this Article. This Article's prediction that the residual risk regulations will inadequately address noncancer effects is already being borne out by the Academy's draft report, issued on January 19, 1994, which was unable to provide a full evaluation of such impacts because of time constraints. It is important to understand what issues Congress wanted these reports to address and why any nationally uniform residual risk regulations are unlikely to address the concerns raised by this Article.

a. EPA's Report.

By November 15, 1996, after consulting with the Surgeon General and providing opportunity for public comment, the EPA must report to Congress on: (1) methods for measuring the residual risks remaining after application of the technology-based emission standards; (2) the public health impact of such remaining risks and the costs associated with any "technologically and commercially available" methods of reducing such risks; (3) the actual health effects caused by these residual emissions with respect to persons living in the vicinity of such emissions, in light of any uncertainties in risk assessment methodology; and (4) the agency's recommendations for addressing the remaining risks.[37]

b. National Academy of Sciences' Report.

To address the policy questions surrounding the issues of residual risk, Congress ordered the National Academy of Sciences to conduct an independent study of the EPA's risk assessment methods relating to hazardous air pollutants. Subsection 112(o)(1) requires the EPA and the Academy to enter into an agreement to conduct a review of the agency's present risk assessment methodology for carcinogens and to recommend improvements.[38] Specifically, Congress requested that the Academy consider the techniques used for "estimating and describing the carcinogenic potency to humans of hazardous air pollutants" and for estimating the exposure of various individuals, including "hypo-

37. *Id.* § 7412(f)(1).
38. *Id.* § 7412(o)(1).

HeinOnline -- 13 Stan. Envtl. L. J. 272 1994

thetical and actual maximally exposed individuals," to hazardous air pollutants.[39] In addition, Congress mandated that the Academy evaluate "[t]o the extent practicable" the methodology for assessing the risk of "adverse human health effects other than cancer for which safe thresholds of exposure may not exist, including, but not limited to, inheritable genetic mutations, birth defects, and reproductive dysfunctions."[40] The Academy is to submit its report to the relevant Senate and House committees, the EPA, and the Risk Assessment and Management Commission (the Commission) established by section 303 of the Amendments.[41]

On January 19, 1994, the Academy's Committee on Risk Assessment of Hazardous Air Pollutants issued a draft report pursuant to subsection 112(o), entitled *Science and Judgment in Risk Assessment.*[42] The report calls on the EPA to express more emphasis on uncertainties in the agency's risk assessments, and to devote more attention to chemical risks when there are multiple routes of exposure, multiple chemicals, and multiple possible adverse health effects.[43] Members of the Executive Committee of the agency's Science Advisory Board have criticized the Academy report for failing to evaluate noncancer effects because of time limitations.[44] These members argued that the Academy or EPA should examine immunological, respiratory, reproductive, and neurological problems.[45] Richard Thomas, director of toxicology and risk assessment at the Academy, will soon begin a project to look at reproductive and developmental risk assessment.[46]

The limited scope of the Academy's report suggests the difficulties that the EPA will have in developing national uniform residual risk emission standards for risks other than cancer. An exceptions process would provide the agency with the flexibility to impose ad-

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39. *Id.* § 7412(o)(2).

40. *Id.* § 7412(o)(3). This last provision regarding noncancer health effects is notable because, as will be discussed below, § 112(f)(2)(A)'s residual risk provisions are mandatory only with respect to cancer risks.

41. *Id.* § 7412(o)(4).

42. NATIONAL ACADEMY OF SCIENCES, SCIENCE AND JUDGMENT IN RISK ASSESSMENT (Draft 1994); *Toxic Substances: Report Backs EPA Risk Assessment Methods, Offers 70 Suggestions for Improvements*, 24 Env't Rep. (BNA) 1699 (Jan. 28, 1994) [hereinafter *Report Backs EPA*].

43. *Report Backs EPA*, *supra* note 42, at 1699.

44. *Air Pollution: Report on the Health Effects of Toxic Pollutants Should Address Non-cancer Problems, SAB Says*, 24 Env't Rep. (BNA) 1720 (Feb. 4, 1994) [hereinafter *Non-cancer Problems*].

45. *Id.*

46. *Id.*

HeinOnline -- 13 Stan. Envtl. L. J. 273 1994

ditional requirements at individual sites where noncancer effects are especially worrisome.

Prior to the promulgation of any residual risk standard under subsection 112(f), the EPA must consider, but need not adopt, the Academy's recommendations. In addition, the Administrator must publish revised Guidelines for Carcinogenic Risk Assessment or a detailed explanation of the reasons why any recommendation in the Academy's report will not be implemented.[47]

c. Risk Assessment and Management Commission Report.

Subsection 303(a) of the Amendments established the Commission and assigned it the task of making a "full investigation of the policy implications and appropriate uses of risk assessment and risk management in regulatory programs under various federal laws to prevent cancer and other chronic human health effects which may result from exposure to hazardous substances."[48] Many of the factors that Congress required the Commission to consider, such as noncancer chronic health effects, the "existence of synergistic or antagonistic effects among hazardous substances," the "existence of unquantified direct or indirect effects on human health in risk assessment studies," and the "use of site-specific actual exposure information in setting emission standards," were ignored in the agency's pre-1990 regulation of hazardous air pollutants.[49]

d. Residual Risk Standards.

If Congress does not enact new legislation based on scientific reports of the adequacy of risk assessment, then the Administrator must determine for *each* category or subcategory whether addi-

47. 42 U.S.C. § 7412(o)(7). The publication of such revised Guidelines shall be considered a final agency action for purposes of judicial review pursuant to § 307 of the Act. *Id.*

48. *Id.* § 7412. Section 303 of the Amendments, which is referred to in § 112(o)(4) of the Act, is set out as a note to § 112. *Id.* § 7412 (Historical and Statutory Notes).

49. Clean Air Act Amendments of 1990, Pub. L. No. 101-549, § 303, 104 Stat. 2399, 2575. Subsection 303(b)(1) mandates that the Commission consider the Academy report in evaluating the use and limitations of risk assessment in establishing emission or effluent standards for hazardous substances that present a risk of carcinogenic effects or other chronic health effects. Subsection 303(b)(2) requires the Commission to consider the most appropriate methods for measuring and describing cancer risks or risks of other chronic health effects from hazardous substances considering various factors including "such alternative approaches as the lifetime risk of cancer or other effects to the individual or individuals most exposed to emissions from a source or sources on both an actual and worst case basis."

HeinOnline -- 13 Stan. Envtl. L. J. 274 1994

tional, more stringent residual risk requirements are needed to provide "an ample margin of safety to protect public health" or to protect against "an adverse environmental effect."[50] Senate bills 816 and 1630 each would have required the EPA to promulgate emission standards eliminating lifetime cancer risks to the most exposed individual greater than one-in-a-million.[51] In addition, both bills would have required the agency to close facilities that could not meet an interim one-in-10,000 standard for reducing all lifetime cancer risk. This one-in-10,000 standard allowed for limited extensions but no exceptions.[52] The final version of the Amendments incorporated a one-in-one-million standard as the threshold for triggering further regulatory consideration and eliminated the mandatory one-in-10,000 standard.[53]

With regard to carcinogens, Section 112(f)(2)(A) specifically defines the crucial phrase, "an ample margin of safety to protect the public health," to require the Administrator to promulgate a second phase of emission standards if technology-based controls do not reduce lifetime excess cancer risks to the most exposed individual to less than one-in-one-million.[54] The technology-based emission standards for each source category or subcategory are simple, uniform, national regulation. However, the residual risk provisions require the EPA to consider each category or subcategory in light of a site-specific exposure assessment of the cancer risk at each individual major source. The EPA must then promulgate residual risk standards for categories and subcategories of

50. 42 U.S.C. § 7412(f)(2)(A). The residual risk standard apparently must be at least as protective of the most exposed individual as the EPA's post-*Vinyl Chloride* policy, since the statute references the pre-1990 "ample margin of safety" definition. *Id.*

51. Senate Bill 816 stated this standard as "a standard which eliminates all lifetime risks of carcinogenic effects greater than one in one million to the individual in the population who is most exposed to emissions of a pollutant (or stream of pollutants) from a source in the category or subcategory." S. 816, 101st Cong., 1st Sess. § 2 (1989) (proposed amendment to CAA § 112(f)(1)); Rosenthal et al., *supra* note 7, at 323-24. Senate Bill 1630 adopted essentially the same test. *See* S. REP. No. 228, 101st Cong., 2d Sess. 148 (1990), *reprinted in* 1990 U.S.C.C.A.N. 3385, 3533 (discussing Section 301 of S. 1630, which retained the two-tiered one-in-a-million and one-in-10,000 approaches).

52. *See* S. 816, 101st Cong., 1st Sess. § 2 (1989) (proposed Amendment to CAA §§ 112(f)(1)(A)(i)(1)-(2); S. REP. No. 228, 101st Cong., 2d Sess. 148 (1989), *reprinted in* 1990 U.S.C.C.A.N. 3385, 3533 (discussing interim one-in-10,000 standard).

53. *See* 42 U.S.C. § 7412(f)(2)(A); Rosenthal et al., *supra* note 7, at 326.

54. *See* 42 U.S.C. § 7412(f)(2)(A); *see also* 136 CONG. REC. S16,928 (daily ed. Oct. 27, 1990) (statement of Sen. Durenberger) (combined hazardous emissions of an entire major source are used in determining ample margin of safety); *id.* at E3711 (daily ed. Nov. 2, 1990) (extension of remarks by Sen. Rowland) (ample margin of safety at least as protective as benzene regulations).

HeinOnline -- 13 Stan. Envtl. L. J. 275 1994

sources, however, rather than individual facilities.[55] The text of the statute does not require that the residual risk standard for a category be set at a level that would force the highest risk source in that category to achieve the one-in-one-million benchmark, but merely mandates an additional round of regulation.[56] The statute, however, does not specify what risk requirements the agency must use in the second phase of standards, nor do the provisions provide any guidance on how to address risks from noncarcinogenic substances.

Subsection 112(f)(2)(b) states that the amended section 112 does not repudiate the EPA's pre-1990 interpretation of "an ample margin of safety" contained in the benzene rulemaking.[57] In the benzene rulemaking, the EPA did not apply a one-in-one-million standard to the maximally exposed individual, but instead determined that a one-in-ten-thousand risk to the maximally exposed individual from a particular chemical was presumptively acceptable.[58] The agency also stated that as many people as possible should be protected from a one-in-one-million risk.[59] In addition, the agency would look at other health and risk factors.[60]

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55. *See* 42 U.S.C. § 7412(f)(2).

56. *See id* § 7412(f)(2)(A); Wichers et al., *supra* note 14, at 10,729.

57. *See* 42 U.S.C. § 7412(f)(2)(B). In the wake of *Vinyl Chloride*, the EPA issued final emission standards for several benzene and radionuclide categories, and, most notably, used a historical risk survey to set the "presumptive level" of maximum acceptable individual risk at one-in-10,000. *See* National Emission Standards for Hazardous Air Pollutants (NESHAP); Benzene Emissions from Maleic Anhydride Plants, Ethyl Benzene Styrene Plants, Benzene Storage Vessels, Benzene Equipment Leaks, and Coke By-Product Recovery Plants, 54 Fed. Reg. 38,044, 38,045-46 (1989) [hereinafter 1989 Benzene Standards] (describing how EPA selected its method for setting emission standards for benzene and radionuclide categories) (codified at 40 C.F.R. §§ 61.270-.277, .110-.112, .130-.139 (1991).

58. *See* 1989 Benzene Standards, *supra* note 57, at 38,044-46 (establishing one in ten thousand presumptive risk level); NESHAP; Benzene Emissions From Chemical Manufacturing Process Vents, Industrial Solvent Use, Benzene Waste Operations, Benzene Transfer Operations, and Gasoline Marketing System, 54 Fed. Reg. 38,083, 38,089, 38,091 (1989) [hereinafter Proposed Benzene Emissions Rule] (applying one-in-10,000 presumptive standard to certain sources of benzene emissions and benzene transfer operations); Rosenthal et al., *supra* note 7, at 304.

59. *See* Proposed Benzene Emissions Rule, *supra* note 58, at 38,091 ("The majority of the people (greater than 99.9 percent) exposed to benzene emissions from this category would be exposed to risk levels lower than [one-in-one-million]."); Rosenthal et al., *supra* note 7, at 304.

60. These factors include: (1) the overall incidence of cancer or other serious health effects within the exposed population, (2) the number of persons exposed within each individual lifetime range (such as a 50-kilometer exposure radius around the emitting facilities), (3) the science and policy assumptions and estimation uncertainties associated with the risk measures, (4) the weight of the scientific evidence for human health effects, (5) other quantified or unquantified health effects, and (6) the effects resulting from co-loca-

HeinOnline -- 13 Stan. Envtl. L. J. 276 1994

Critics of the benzene rulemaking have argued that it allows the EPA to retain consideration of economic and technological factors while nominally complying with *Vinyl Chloride's* two-pronged test.[61] In setting a particular "ample margin of safety," the EPA stated that it would seek to set a lifetime cancer risk level for hazardous air emissions at no greater than one-in-one-million, but noted that additional factors such as technological feasibility and the economic costs of control would be considered.[62]

By not requiring a one-in-a-million or any other residual risk standard in section 112(f), Congress essentially left the difficult task of defining an "ample margin of safety" to the EPA's discretion.[63] Furthermore, the Senate Bill does not provide any direction on how the agency should address harmful noncarcinogens.[64] This Article's proposal would require Congress to provide more specific guidance to the EPA on residual risk standards.

B. *Risk, Hot Spots, Environmental Justice, and Multimedia Pollution*

1. *Factual Backdrop.*

There are significant problems with the residual risk provisions for hazardous air pollutants. There is considerable scientific uncertainty about the actual risks of most hazardous air pollutants, and great disagreements ensue about how to assess what little we know about risk. Thus, a single risk standard on a single scale poses problems. For example, the one-in-one-million standard in subsection 112(f) is misleading; a risk *range* more accurately reflects our uncertainties about risk. In addition, it is important to consider noncancer risks and to recognize the absence of good measures for comparing chemicals that cause fundamentally different diseases. Society's uncertainty about the risks that many chemicals pose exacerbates the difficult problems of preventing "hot-spots" and multimedia pollution.

Even setting aside the pervasive uncertainties about the risks of many hazardous chemicals, industry arguments that national, uni-

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tion of facilities and co-emission of pollutants. 1989 Benzene Standards, *supra* note 57, at 38,045-46.

61. *See* Dwyer, supra note 16, at 276; McQuaid, *supra* note 14, at 439, 446. *But cf.* Gaines, *supra* note 25, at 295 ("The proposals and final rules that EPA has published since the *Vinyl Chloride* decision show no signs of procedural subversion, but they do reveal the tortured nature of a health-factors-only analysis.").

62. *See* 1989 Benzene Standards, *supra* note 57, at 38,046.

63. *See* Wichers et al., *supra* note 14, at 10,729.

64. *See supra* notes 51-53 and accompanying text.

HeinOnline -- 13 Stan. Envtl. L. J. 277 1994

form regulation is inefficient because it results in over-regulation at some sites have merit. The difficulty lies in allowing some flexibility for individual sites without undermining national standards and pollution-reduction goals. Public participation can reduce the potential dangers of allowing exceptions to technology-based or residual risk standards for air toxics.

a. Scientific Uncertainty

There are two major questions that need to be addressed in assessing the residual risk provisions and the proposal in this Article. First, can we properly assess the risk of cancer and other diseases caused by toxic chemicals?[65] Second, is our inability to assess the risk of cancer and other diseases fatal to the proposal or the residual risk provisions, or is the uncertainty of this risk assessment of the same magnitude as for all toxic pollution?[66]

There is considerable scientific uncertainty about most toxic chemicals.[67] Unfortunately, for non-threshold chemicals at the lowest levels of risk,[68] there is *no* accurate method of risk quantification.[69] Former EPA Administrator William Ruckelshaus popular-

65. *See generally* Gaines, *supra* note 25, at 272-90 (discussing scientific, political and legal uncertainties of risk assessment).

66. Because risk assessment involves predicting future events, there will always be an element of uncertainty. *See* Alyson C. Flournoy, *Legislating Inaction: Asking The Wrong Questions in Protective Environmental Decisionmaking*, 15 HARV. ENVTL. L. REV. 328 (1991) (suggesting a sliding-scale standard of proof that would base the stringency of regulatory restrictions on the amount of evidence that a substance "causes" a risk of harm). Because of our relative uncertainty about the risk of most toxic chemicals, this Article suggests that the extent of public participation in permit decisions should depend on the riskiness of the trade-off.

67. There is scientific uncertainty in part because scientific information about the toxic effects of many toxic substances is relatively scarce.

68. The distinction between regulation of risk and regulation of harm, and therefore the unreasonable risk standard, exists because of the difficulties in proving actual harm in toxic torts cases. *See* Applegate, *Perils*, *supra* note 31, at 267-73. "Risk is an expression of uncertainty; it is easier to prove than actual harm. Regulation based on risk permits regulatory action based on *ex ante* collective danger rather than *ex post* individual injury, and also operates preventively to avert injury to the public as a whole." *Id.* at 273. Congress has used the term "unreasonable risk" in slightly different ways in several different environmental statutes, each with its own regulatory structure, but all basically adopt "an undefined, nonzero level of risk determined on an ad hoc basis by balancing both health considerations and nonhealth concerns such as technology, feasibility, and cost." *Id.* at 268, 267-77; *see* Applegate, *Worst Things*, *supra* note 22, at 284-85; Rosenthal et al., *supra* note 7, at 305 (the TSCA and FIFRA statutes both use unreasonable risk standards, but their risk assessment practices are considerably different). Risk-based standards generally either openly or secretly look at technological and economic feasibility as well. *See* Applegate, *Perils*, *supra* note 31, at 268.

69. *See generally* Gary P. Rosenblum & Steven Lapp, *The Use of Risk Index Systems to*

HeinOnline -- 13 Stan. Envtl. L. J. 278 1994

ized the distinction between "risk assessment"—the use of scientific research to define the likelihood of harm as a result of exposure to a substance or situation, and "risk management"—the process of deciding a course of action upon determination of risk.[70] Following the recommendations of a 1983 report of the National Research Council,[71] the EPA divides risk assessment into four stages: (1) hazard identification;[72] (2) dose-response assessment;[73] (3) exposure assessment;[74] and (4) risk characterization.[75] Despite the

Evaluate Risk, in RISK ASSESSMENT IN NATIONAL PRIORITY SETTING 190, 190-93 (James J. Bonin & Donald E. Stevensen, eds., 1989); Applegate, *Worst Things*, *supra* note 22, at 325 n.252. Some have suggested that society may never have precise knowledge that below a particular threshold of exposure a carcinogen may be safe, although it is obviously difficult to predict the limits of future scientific advances. In NRDC v. EPA, 824 F.2d 1146, 1165 (D.C. Cir. 1987) (en banc) (*Vinyl Chloride*), Judge Bork stated that Congress in § 112 of the Clean Air Act had recognized that the "determination of what is 'safe' will *always* be marked by scientific uncertainty and thus exhorted the Administrator to set emission standards that will provide an 'ample margin' of safety." *Id.*

70. William Ruckelshaus, *Risk in a Free Society*, 14 Envtl. L. Rep. (Envtl. L. Inst.) 10,190 (1984); *see* Rosenthal et al., *supra* note 7, at 270-71.

71. *See generally* NATIONAL RESEARCH COUNCIL, RISK ASSESSMENT IN THE FEDERAL GOVERNMENT: MANAGING THE PROCESS (1983); Rosenthal et al., *supra* note 7, at 279-95; Mary Jean Sawey et al., *Notes from the Field: The Potential Health Benefits of Controlling Hazardous Air Pollutants*, 1 VILL. ENVTL. L.J. 473, 479 (1990).

72. Hazard identification involves a study of the weight of scientific evidence to determine whether or not a chemical or mixture poses a risk of adverse health effects to human beings. *See* Guidelines for Carcinogenic Risk Assessments, 51 Fed. Reg. 33,992, 33,994-34,000 [hereinafter EPA Guidelines]; Rosenthal et al., *supra* note 7, at 279-85.

73. Dose-response assessment involves a study of the quantitative relationship between the amount of exposure to a chemical and the incidence or severity of resulting illness. It often involves extrapolating from evidence of cancer in animals from high exposures in the laboratory to lower doses to which humans are exposed in the environment. *See* Rosenthal et al., *supra* note 7, at 285-90.

74. Exposure assessment involves a study of the number of people exposed to the chemical and their exposure profiles in terms of concentration, frequency, and duration. *See* EPA Guidelines, *supra* note 72, at 33,998; Guidelines for Exposure Assessment, 57 Fed. Reg. 22888 (1992) [hereinafter Exposure Assessment]; Rosenthal et al., *supra* note 7, at 290-93. A distinction needs to be made between risk assessments that examine the general health impacts of a chemical and site-specific exposure assessments that examine the hypothetical or actual impacts of a particular source's emissions on the surrounding population. Even if our generalized knowledge concerning a chemical is limited, it is still possible to acquire additional information about the impact from that chemical at a specific source. The use of site-specific exposure assessments is not intended to replace the need for additional testing of chemicals, however. *See generally* Applegate, *Perils*, *supra* note 31, at 261 (calling for additional testing of toxic chemicals pursuant to Toxic Substances Control Act); Mary L. Lyndon, *Information Economics and Chemical Toxicity: Designing Laws to Produce and Use Data*, 87 MICH. L. REV. 1795 (1989).

75. Risk characterization involves calculating a summary of the overall magnitude of health risk attributable to exposure to the chemical, including some discussion of the degree of scientific uncertainty about the risk. *See* Rosenthal et al., *supra* note 7, at 293-95. Generally, the assessor will multiply the cancer potency factor, which is usually expressed in

HeinOnline -- 13 Stan. Envtl. L. J. 279 1994

limitations of risk assessment, an entire consulting industry has developed to produce such studies.[76]

To scientifically determine the health benefits of the Amendments, society needs good risk assessments for each of the 189 listed pollutants and a solid understanding of the synergistic effects of various combinations of these pollutants.[77] Unfortunately, this ideal analytical strategy cannot be implemented with available exposure and toxicity data. Therefore, it is not possible to produce a scientifically reliable estimate of section 112's potential health benefits.[78]

Science can provide useful information, but ultimately society must decide how to assess that information and to what extent it is worth acquiring information in light of relevant costs.

b. Expert and Public Approaches to Risk Management.

There are two common but opposing approaches to discussing risk management issues: the "expert" approach,[79] which tends to emphasize formal benefit-cost analysis,[80] and the "public" ap-

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units of increased lifetime probability of cancer per kilogram of body weight per day of exposure, times estimated exposure, which is expressed in units of milligrams of carcinogen per kilogram of body weight per day. *Id.* at 293. The calculation leads to an estimate of the increase in the lifetime probability of cancer from the particular level of exposure. *Id.*

76. *See* Sawey et al., *supra* note 71, at 479; *see generally* JOHN D. GRAHAM ET AL., IN SEARCH OF SAFETY: CHEMICALS AND CANCER RISK (1988).

77. *See* Sawey et al., *supra* note 71, at 482.

78. *Id.*

79. Some commentators have argued that "experts" tend to focus simply on the expected annual fatalities, or "body count," caused by a chemical, whereas the lay person is often also concerned with additional factors. *See generally* Clayton P. Gillette & James E. Krier, *Risk, Courts, and Agencies*, 138 U. PA. L. REV. 1027, 1071-85 (1990) (contrasting expert and public perceptions of risk); *see also* W. KIP VISCUSI, FATAL TRADEOFFS 44 (1992) (discussing difference between individuals incurring risk of nuclear power involuntarily versus coal miners cognizant of risks and who receive wage premiums for those risks); Donald T. Hornstein, *Lessons from Federal Pesticide Regulation on the Paradigms and Politics of Environmental Law Reform*, 10 YALE J. ON REG. 369, 418-19 (1993) [hereinafter Hornstein, *Politics of Environmental Law Reform*] (risk-based conceptualizations tend to undervalue subjective attributes of risk that concern public); Donald T. Hornstein, *Reclaiming Environmental Law: A Normative Critique of Comparative Risk Analysis*, 92 COLUM. L. REV. 562, 564, 584-615 (1992) [hereinafter Hornstein, *A Normative Critique*] (contrasting expert and public perceptions of risk).

80. *See generally* Dwyer, *supra* note 16, at 248 (arguing explicit cost consideration overemphasizes the costs, which are more easily quantifiable, and underemphasizes health concerns, which are difficult to quantify); Sidney A. Shapiro & Thomas O. McGarity, *Not So Paradoxical: The Rationale for Technology-Based Regulation*, 41 DUKE L. J. 729, 731-36, 741 (arguing benefit-cost analysis is often based upon questionable assumptions and highly uncertain information, fails to consider many benefits of health and safety regulation, masks distributional issues, underestimates the value of lives, and undercompensates workers).

HeinOnline -- 13 Stan. Envtl. L. J. 280 1994

proach,[81] which advocates a nontechnocratic and more diverse definition of relevant issues.

The extent to which section 112 of the Act favors either the public or expert definition of risk will play an important role in the character of EPA regulation. The one-in-one-million residual risk standard in subsection 112(f)(2)(A) is a classic "body count" measure of environmental progress.[82] The technology-based emissions standards in subsection 112(d) are not directly based on the number of expected fatalities, but reflect a narrow, technocratic approach to standard setting that is more reflective of the expert approach.[83] On the other hand, subsection 112(d)(2) allows the EPA to consider "any non-air quality health and environmental impacts and energy requirements,"[84] and subsection 112(f)(2)(A) allows the agency to set more stringent standards than the "ample margin of safety" test used before 1990, based upon "energy, safety, and other relevant factors . . . ."[85] These two provisions, especially the phrase "other relevant factors," would appear to allow the EPA to adopt a more "public" definition of risk if the agency were so inclined. Because section 112 does not exclusively rely upon either the expert or public definitions of risk, the EPA has at least some discretion in which approach or combination of approaches to take. Subsection II.C and Sections III and IV of this Article will address whether the EPA ought to have such discretion or whether Congress should provide more guidance on how the agency should manage risk.

c. Carcinogens and Noncarcinogens.

Carcinogenicity as a Flawed Metric. The one-in-one-million standard in subsection 112(f) is misleading because society cannot precisely assess cancer risks and therefore a risk range is more appropriate. The cancer risk assessments used by EPA have impor-

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The bias toward overemphasizing costs may be exacerbated by informational biases because industry generally has the best information about the costs and feasibility of pollution controls. *See* Dwyer, *supra* note 16, at 248. Critics of the expert approach and of formal cost-benefit analysis suggest that the analytical methods of the technical approach may make it risk-preferring, in contrast to the public's risk aversion. *See* Gillette & Krier, *supra* note 79, at 1060-61.

81. *See generally* Gillette & Krier, *supra* note 79, at 1071-85; Hornstein, *A Normative Critique*, *supra* note 79, at 584-615.

82. 42 U.S.C. § 7412(f)(2)(A).

83. *See generally id.* § 7412(d).

84. *Id.* § 7412(d)(2).

85. *Id.* § 7412(f)(2)(A).

HeinOnline -- 13 Stan. Envtl. L. J. 281 1994

tant shortcomings. Some of the weaknesses are inherent in the inadequate state of environmental science while others are correctable with available data or alternative modeling procedures.[86] When hard data are lacking, the EPA may create a grossly inflated upper bound for actual cancer risk from specific pollutants. Alternatively, EPA may create too low a bound despite conservative assumptions.[87] In addition, the EPA's methods inadequately account for the possibility of synergistic and antagonistic effects of various pollutants,[88] and the possibility of extrasensitive subpopulations for carcinogenic exposures.[89] The EPA has used carcinogenicity as a common metric, but that single measurement cannot provide scientific answers on what is an acceptable cancer risk to diverse exposed subpopulations (such as children) or how to make tradeoffs between a pesticide that may present comparatively greater risks to consumers as opposed to lesser risks to farmworkers and applicators than would the most likely chemical replacement.[90] Even if two different chemicals cause the same disease, they may produce effects that are more concentrated in time or space. Proponents of a "public" definition of risk would argue that even chemicals that cause the same disease cannot always be compared on a single scale based upon expected fatalities.[91] In addition, there are often substantial differences in the weight of scientific evidence supporting whether a particular

86. *See* GRAHAM ET AL., *supra* note 76, at 160.

87. *Id.* at 149, 161. For example, an implicit assumption in the EPA method is that the amount of toxic pollutant or its toxic metabolites that reaches a target cell is proportional to the amount of the pollutant inhaled, the so-called "administered dose." *Id.* at 161. For some chemicals, pharmacokinetic data are now available that contradict this assumption. *Id.* The EPA is beginning to use such data. *Id.* "Incorporation of new pharmacokinetic data could lead to either higher or lower risk estimates than EPA would normally report depending upon the specific chemical." *Id.* at 162. New mechanistic data about the biological mechanisms of tumor formation in animals may lead to higher or lower estimates of cancer risk in human beings than does the EPA's traditional practice of simply extrapolating responses from rodents to human beings. *Id.*

88. *See id.* at 163; *Report Backs EPA*, *supra* note 42, at 1699.

89. *See Report Backs EPA*, *supra* note 42, at 1699.

90. *See* Hornstein, *Politics of Environmental Law Reform*, *supra* note 79, at 441.

91. For example, pesticide A may cause about 10 extra cancers a year while B has a 5 percent chance of causing 100 extra cancers annually and a 95 percent chance of causing none. The "expert" approach would rate B to be half as harmful as A based upon the expected number of cancers, but the lay person might argue it is more important to avoid the worst case result and therefore might prefer A despite the likelihood that A will cause more deaths. *See* Gillette & Krier, *supra* note 79, at 1083-84; Albert J. Nicholas & Richard J. Zeckhauser, *The Perils of Prudence: How Conservative Risk Assessments Distort Regulation*, REGULATION, Nov.-Dec. 1986, at 13, 22-24; *see also* Hornstein, *A Normative Critique*, *supra* note 79, at 595-96 (providing similar example). Thus, whether it is acceptable to trade two units of

HeinOnline -- 13 Stan. Envtl. L. J. 282 1994

substance is carcinogenic.[92] Thus, Congress needs to direct the EPA to adopt a more complex approach to assessing residual cancer risks.

Noncarcinogens and the Lack of Adequate Data. The residual risk provisions are seriously flawed because they do not consider noncancer risks. Congress' reluctance to address noncancer issues is understandable in light of the complexities associated with assessing such risks and comparing them with cancer risks, but noncancer risks are too important to ignore.

There are substantial uncertainties about the comparability of chemicals that cause different diseases, especially carcinogens and noncarcinogens.[93] Noncancer effects range from subtle to

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B for one unit of A depends upon whether one accepts the expert model of risk or believes that the lay person correctly senses that risk depends upon a number of complex factors.

92. When assessing whether a chemical is a carcinogen, EPA scientists place each compound into one of the following five categories based on the weight of the evidence: (A) carcinogenic to humans; (B) probably carcinogenic to humans; (C) possibly carcinogenic to humans; (D) not classifiable as to human carcinogenicity; (E) evidence of noncarcinogenicity for humans. EPA Guidelines, *supra* note 72, at 33,994-34,000; Rosenthal et al., *supra* note 7, at 282-83. In the early reductions rule, the EPA classified all Group A carcinogens as high-risk, and also placed some Group B and C chemicals on that list based upon a two-tiered analysis that examined both carcinogenic and noncarcinogenic health effects as well as exposure modeling. Compliance Extensions for Early Reductions, 57 Fed. Reg. 61,983 (1992) (to be codified at 40 C.F.R. pt. 63) [hereinafter Early Reductions Rule]. A number of commentators argued that the EPA should adjust the weighting factor system used in the agency's risk index for averaging to reflect the weight of scientific evidence. *Id.* at 61,983. In the final rule, the EPA assigned a lower weight to Group C carcinogens, but rejected weighing Group B chemicals lower than Group A ones because there is solid evidence of animal carcinogenicity for Group B chemicals, and the absence of conclusive human data "most likely" reflects the difficulty of obtaining quality epidemiologic data. *Id.* There are good reasons to argue, however, that at least some Group B chemicals that cause cancer in animals may not cause cancer in human beings and therefore should be weighted lower than Group A chemicals. Some critics of the EPA argue that agency scientists give undue emphasis to positive evidence of carcinogenicity from long-term animal bioassays and do not include other types of scientific evidence that could change the weight of evidence classification. *See* Rosenthal et al., *supra* note 7, at 284. Because the EPA guidelines on hazard identification require that a finding of animal carcinogenicity be taken as possible or probable evidence of human carcinogenic potential, the EPA has difficulty responding to new scientific data which suggest that some animal carcinogens do not pose risks to human beings. *Id.* For example, a number of hydrocarbon compounds, including unleaded gasoline, have been found to cause tumors in the kidneys of male rats, but recent scientific research suggests that the biological mechanism responsible may be unique to male rats and have no relevance to human beings. *Id.* at 284-85. The use of these tumors as a basis for human risk assessment is a source of ongoing controversy in the risk assessment community. *Id.* at 285.

93. As a general matter, scientists simply do not have good measures for comparing carcinogens with noncarcinogens. *See Witnesses Oppose Averaging, Trading Provisions in HON Proposal at Public Hearing in Louisiana*, 23 Env't Rep. (BNA) 3045 (Mar. 26, 1993) [hereinaf-

deadly.[94] How can society compare the risks from chemicals that present risks of such noncancer "endpoints" as birth defects, reproductive failure, acute poisonings, and neurological defects?[95] Although cancer risks currently dominate risk assessment and management agendas, concern for other health risks probably will increase in the decades ahead.[96] The EPA is beginning to study noncancer impacts, but this effort has been hampered by a lack of available data.[97]

Emissions Averaging of Carcinogens and Noncarcinogens: Comparing the Incomparable. Unfortunately, at the end of the Bush administration, as part of its emissions averaging regulations for the early reductions program, the EPA developed a risk index based upon arbitrary assumptions about the comparability of harm from carcinogens and noncarcinogens, in effect allowing increased emissions of carcinogens to be offset by noncarcinogens.[98] Two days

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ter *Witnesses*]. In the rule for the early reductions program, the EPA admitted: "For the carcinogens, the cancer potency factor is a straightforward measure of relative toxicity and was used in conjunction with the weight of evidence classification to develop the weighting factors. For the noncarcinogens, however, there is not a comparable measure of toxicity that can be used consistently for pollutants with different health effects." Early Reductions Rule, *supra* note 92, at 61,984. In the proposed rule for the synthetic organic chemical manufacturing industry, the agency conceded: "The EPA is not able at this time to quantify the noncancer effects so that they can be combined with the cancer health effects for the HON." Organic Hazardous Air Pollutants from the Synthetic Organic Chemical Manufacturing Industry and Seven Other Processes, 57 Fed. Reg. 62,608 (1992) (to be codified at 40 C.F.R. pt. 63) (proposed Dec. 31, 1992) [hereinafter Proposed HON].

94. U.S. ENVTL. PROTECTION AGENCY, A STRATEGY TO REDUCE RISKS TO PUBLIC HEALTH FROM AIR TOXICS 1-9 (June 1985).

95. Hornstein, *Politics of Environmental Law Reform*, *supra* note 79, at 441.

96. While federal agencies are beginning to use quantitative risk assessment to assess such noncancer health effects as kidney damage, neurobehavioral deficits, and developmental and reproductive effects, risk assessors still calculate and report cancer risks more frequently than noncancer risks. Rosenthal, *supra* note 7, at 271. In its major 1990 study, CANCER RISK FROM OUTDOOR EXPOSURE TO AIR TOXICS, the EPA included the Executive Summary from a separate noncancer study as appendix C of the report.

97. *See* II AIR TOXICS, *supra* note 94, at C-74 to C-75. The agency has stated, however, that, even though it cannot quantify the magnitude of noncancer risks, "ambient air concentrations of many pollutants may significantly contribute to potential noncancer health risks associated with environmental exposure." I AIR TOXICS, *supra* note 94, at C-72. The National Academy of Sciences' most recent report on risk assessment of hazardous air pollutants was unable to review noncancer effects.

98. *See* Early Reductions Rule, *supra* note 92, at 61,980-83; *see also* NESHAP for Source Categories: Proposed Regulations Governing Compliance Extensions for Early Reductions of Hazardous Air Pollutants, 56 Fed. Reg. 27,338 (1991) [hereafter Proposed Early Reductions]. The early reduction program allows an emission source a six-year waiver of requirements to meet the maximum achievable technology standards required by 42 U.S.C. § 7412(d) if the source voluntarily reduces its hazardous air emissions by 90 percent or its

HeinOnline -- 13 Stan. Envtl. L. J. 284 1994

later, the agency also put forward a similar emissions averaging approach in the proposed national emission standard for hazardous air pollutants emitted by the synthetic organic chemical manufacturing industry.[99]

The final rule published on April 22, 1994 for the synthetic organic manufacturing industry, however, significantly changed the emissions averaging proposal.[100] It will be useful to examine both

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hazardous particulate emissions by 95 percent on or before January 1, 1994. *See id.* § 7412(i)(5); David P. Novello & Robert J. Martineau Jr., *Better Earlier Than Later: EPA's Air Toxics 'Early Reductions' Program*, 24 Env't Rep. (BNA) 401 (July 2, 1993); *Air Pollution: Proposal on Hazardous Organic Emissions, Final Early Reduction Rules Issued by EPA*, 23 Env't Rep. (BNA) 1707 (Nov. 6, 1992) [hereinafter *Proposal*]. As part of its regulations concerning the early reductions program, the EPA adopted a weighted emissions trading scheme in which a source can offset increases in high-risk hazardous air pollutants by larger volume decreases in low-risk hazardous air pollutants based upon a risk index that assigns weighting factors to each of 47 different pollutants. *See generally* Early Reductions Rule, *supra* note 92, at 61,980-85. Environmentalists have attacked the EPA's risk index because they contend it is impossible to compare on a single risk index different hazardous air pollutants, especially noncarcinogens that cause different diseases. *See*, e.g., *Witnesses*, *supra* note 93, at 3045 (statements by Natural Resources Defense Council attorney David Driesen and other environmentalists). In the early reductions regulations, the EPA made a number of questionable simplifying assumptions including assuming that most so-called "high-risk" noncarcinogens have the same weighting factor of 10 assigned to 19 high-risk carcinogens and that other noncarcinogens and carcinogens not on the agency's high-risk list have a weight of one for trading purposes. *See* Early Reductions Rule, *supra* note 92, at 61,970, 61,983-84; Proposed Early Reductions, *supra*, at 27,354-55. In the final rule, after considerable criticism of the agency's approach to assigning weighting factors to both carcinogens and noncarcinogens, the EPA increased the weighting factor from 10 to 100 for three noncarcinogens: for mercury because of its persistence in the environment and potential for bioaccumulation, and acrolein and 2-chloroacetophenone to provide an adequate margin of safety from adverse health impacts. Early Reductions Rule, *supra* note 92, at 61,970, 61,983. The EPA failed to address adequately even the body count comparisons between carcinogens and noncarcinogens, let alone more difficult questions such as whether it is appropriate to equate deaths from carcinogens with deaths from other diseases or how to compare chemicals causing long-term chronic illnesses with those causing deaths in the short-term.

The Clinton Administration's EPA has clearly taken a different approach to emissions averaging of hazardous air pollutants and comparing carcinogens and noncarcinogens than the Bush Administration. In the proposed rule governing plant modifications, the EPA now implicitly criticizes the weighting approach adopted in the early reductions rule arguing that this approach "was not intended to serve as a precedent for other programs" and specifically states that "the weighting factors of one and 10 for non-carcinogens, which were based upon a broad policy decision for the early reductions program, are inadequate for describing the differences in potency or severity between pollutants for purposes of offset comparisons under § 112(g). The actual difference in potency between the noncarcinogens could span many orders of magnitude." Hazardous Air Pollutants: Proposed Regulations Governing Constructed, Reconstructed or Modified Major Sources, 59 Fed. Reg. 15,504, 15,563 (Apr. 1, 1994).

99. *See* Proposed HON, *supra* note 93, at 62,631.

100. *Final HON Rule Could Cut Toxic Emissions From Chemical Manufacturing By 90%*, 24

the proposals considered by the EPA as well as the final rule.

The Clinton Administration's EPA reopened public comment on the standard for the synthetic organic chemical manufacturing industry, and requested comment on five possible changes in the emissions averaging policy.[101] One possible change would have required facilities considering averaging to demonstrate that it would not result in increased risk; such an individualized risk assessment would be similar to this Article's proposal for sources seeking a variance from technology-based standards.[102] The risk assessment policies developed for approving emissions averaging would likely prove helpful in developing regulations based on this Article's proposal. Because "many states have and use their own risk assessment policies and tools, these states and local agencies would be authorized under this possible change to utilize not only the EPA guidance, but also any procedures approved by their own agencies, for analyzing the risk equivalence of the compliance scenarios with and without averaging."[103] The EPA requested comment on whether identifying all the hazardous air pollutants in the emis-

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Env't Rep. (BNA) 1883, 1883 (Mar. 4, 1994) [hereinafter *Final HON Rule*]. The final rule was published just as this Article was sent to the printer. National Emission Standards for Hazardous Air Pollutants for Source Categories; Organic Hazardous Air Pollutants from the Synthetic Organic Chemical Manufacturing Industry and Other Processes Subject to the Negotiated Regulation for Equipment Leaks, 59 Fed. Reg. 19,402 (April 22, 1994) [hereinafter Organic Hazardous Air Pollutants Rule]. The final rule will be addressed in an abbreviated discussion.

101. The first possible change would have given states the authority to omit the emissions averaging provisions without having to go through the § 112(*l*) rule delegation process, even if the state's statutory provisions do not grant the state authority to elect requirements that are more stringent than the federal standards. *See* NESHAP: Organic Hazardous Air Pollutants From the Synthetic Organic Chemical Manufacturing Industry and Seven Other Processes, 58 Fed. Reg. 53,478 (1993) [hereinafter Reopening Public Comment]; *Comment Sought on Five Possible Changes To Emissions Averaging Policy in HON Proposal*, 24 Env't Rep. (BNA) 1172 (Oct. 22, 1993) [hereinafter *Five Possible Changes*]. The second possible change would have required those facilities considering an averaging plan to demonstrate it would not result in a greater risk than trying to comply without averaging. The third possible change involved the compliance period for emissions averaging; the fourth would have limited the number of emission points allowed in an average, and the fifth would have addressed the effect of missing monitoring data or parameter exceedances on averaging. Reopening Public Comment, *supra*, at 53,479.

102. Reopening Public Comment, *supra* note 101, at 53,479. To aid in the implementation of this requirement, the EPA considered publishing guidance setting forth examples of what would constitute an adequate risk equivalency demonstration and requested public comment on whether such guidance would be useful or necessary to implement the risk demonstration requirement. *Id.* The decision to approve or disapprove any particular averaging plan would rest with the agency implementing the emission standard, in most cases a state or local air pollution control agency. *Id.* at 53,480.

103. *Id.*

HeinOnline -- 13 Stan. Envtl. L. J. 286 1994

sions streams would pose difficulties for sources. Predictably, industry opposed giving states more discretion in determining the conditions for emissions averaging, arguing that the EPA should use uniform federal standards to facilitate emissions averaging.[104]

On November 29, 1993, Mary Nichols, EPA assistant administrator for air and radiation, stated that a majority of states are expected to prohibit emissions averaging of air toxics and that the Clinton Administration would not force such averaging.[105] In states allowing emissions averaging, Nichols indicated that the the procedures would be carefully controlled, especially because synthetic organic chemical manufacturing facilities tend to be concentrated near low-income communities.[106] She acknowledged that industry has legitimate concerns about uniformity, but argued that "a chemical facility situated in a large field in a rural area has a 'quite different impact from one sitting in a complex in the middle of a large urban area' and should be treated differently."[107]

On March 1, 1994, EPA Administrator Carol M. Browner announced that the EPA would soon issue a final rule on hazardous air emissions from chemical manufacturing plants, and on April 22, 1994, the agency published the rule in the Federal Register.[108] The final rule limits averaging to emission points within the synthetic chemical manufacturing source category and also restricts the number of points to twenty or twenty-five among which averaging may be conducted.[109] Most importantly, facilities choosing to average their emissions would have to perform a risk assessment to ensure that a net overall reduction in hazardous air emissions is achieved and that public health and the environment are protected.[110] The risk assessment required to justify emission averag-

104. *Plan to Give States Discretion on Averaging of Toxic Emissions Meets Industry Opposition*, 24 Env't Rep. (BNA) 1464, 1464-65 (Dec. 3, 1993).

105. *States Expected to Avoid Averaging on Air Toxics, Agency's Air Chief Says*, 24 Env't Rep. (BNA) 1474, 1474 (Dec. 3, 1993).

106. *Id.* The EPA has recently become concerned about the potentially disparate impacts of toxic pollution on low-income and especially minority neighborhoods.

107. *Id.* at 1475.

108. *Final HON Rule*, *supra* note 100, at 1883; Organic Hazardous Air Pollutants Rule, *supra* note 100. A discount factor of 10% is required in calculating credits for emissions averages in the final rule. An exception is provided for reductions accomplished by the use of pollution prevention measures. For pollution prevention measures full credit with no discounting is allowed.

109. *Final HON Rule*, *supra* note 100, at 1883; Organic Hazardous Air Pollutants Rule, *supra* note 100, at 19,408.

110. *Final HON Rule*, *supra* note 100, at 1883; Organic Hazardous Air Pollutants Rule, *supra* note 100, at 19,408.

HeinOnline -- 13 Stan. Envtl. L. J. 287 1994

ing would be similar in many respects to the risk assessment proposed in this article to obtain an exception and therefore the adoption of a risk assessment requirement for emission averaging in one major industry suggests that this Article's proposal would be feasible for at least some industries. Some environmentalists, however, continue to criticize emission averaging. Although states are not required to adopt averaging, environmentalists fear that the chemical industry will pressure states to adopt averaging.[111]

Noncarcinogens and the Legislative History of the 1990 Amendments. There is some evidence in the legislative history of the Amendments and in the statute itself that Congress intended to treat carcinogens and noncarcinogens differently. Section 301 of Senate Bill 1630, in addition to requiring EPA to promulgate residual risk standards for carcinogens, would have amended section 112 of the Act "to promulgate a second round of standards for hazardous pollutants *other than carcinogens* where [technology-based] standards do not reduce emissions to a level below the 'safe' threshold (the 'no observable effects level' with an ample margin of safety), if a threshold can be identified . . . ."[112]

The Amendments created a new subsection 112(g), which allows a source to avoid classification as a modified source if increases in one hazardous air pollutant are offset "by an equal or greater decrease in the quantity of emissions of another hazardous air pollutant (or pollutants) from such source which is deemed more hazardous, pursuant to guidance issued by the Administrator under subparagraph (B)."[113] Notably, the statute requires that

111. *Final HON Rule, supra* note 100, at 1883-84.

112. S. REP. No. 228, 101st Cong., 2d Sess. 149 (1989), *reprinted in* 1990 U.S.C.C.A.N. 3385, 3534 (emphasis supplied).

113. 42 U.S.C. § 7412(g)(1)(A). "The offset program applies only to modifications, and not to the construction or reconstruction of new sources." Henry A. Waxman, *An Overview of the Clean Air Amendments of 1990,* 21 ENVTL. L. 1721, 1780-81 n.269 (1991). In this article, Representative Waxman argues, "When EPA promulgates its regulations, it should require that the offsetting reductions occur within that same unit as the emission increase. For purposes of § 112(g)(1), 'source' should be interpreted to refer to the 'unit,' not the entire facility." *Id.* One must ask to what extent Representative Waxman's views are authoritative; presumably a law review article counts less than actual remarks before Congress.

Subsection 112(g)(1)(B) requires the EPA to publish guidance within 18 months after November 15, 1990, the enactment date of the Amendments, which deadline the agency failed to meet, regarding the implementation of this subsection. 42 U.S.C. § 7412(g)(1)(B).

The EPA has issued a proposed rule on plant modifications that would impose stringent controls if a plant exceeded *de minimis* levels set forth in the rule. *See generally* Hazard-

HeinOnline -- 13 Stan. Envtl. L. J. 288 1994

such EPA guidance consider the relative hazard to human health resulting from the emissions of "*each*" of the 189 hazardous air pollutants listed in subsection 112(b).[114] Further, subsection 112(g)(1)(B) states that the guidance shall not authorize offsets between pollutants where the increased pollutant "causes adverse effects to human health for which no safety threshold for exposure can be determined unless there are corresponding decreases in such *types* of pollutant(s)."[115] This provision's reference to types of pollutants might be read to preclude offsetting increases in emissions of a carcinogen with decreases in non-carcinogens.[116]

The residual risk provisions in subsection 112(f)(2)(A) require the EPA to promulgate a second round of standards if the technology-based standards in subsection 112(d) "do not reduce lifetime excess *cancer* risks to the individual most exposed to emissions from a source in the category or subcategory to less than one in one million,"[117] but do not specifically address noncancer risks.[118] Sec-

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ous Air Pollutants: Proposed Regulations Governing Constructed, Reconstructed, or Modified Major Sources, 59 Fed. Reg. 15,504 (Apr. 1, 1994) [hereinafter Proposed Regulations]; *Proposed Rule on Plant Modifications Sets De Minimis Levels that Trigger MACT*, 24 Env't Rep. (BNA) 1915 (Mar. 11, 1994) [hereinafter *Proposed Rule on Plant Modifications*]. In addition, the proposed rule would allow increases in one pollutant to be offset by a decrease in another "more hazardous" substance, a form of interpollutant trading that may prove to be very contentious. *Proposed Rule on Plant Modifications*, *supra*, at 1916. The proposed rule discusses a number of different approaches to weighting different types of chemicals for offsetting purposes, and taking into account noncancer effects. Proposed Regulations, *supra*, at 15,548-63. The proposed rule implicitly criticizes the weighting approach adopted in the early reductions rule and strongly suggests that the Clinton Administration's EPA has taken a different approach to emissions averaging of hazardous air pollutants and comparing carcinogens and noncarcinogens than the Bush Administration. *See id.* at 15,563.

114. 42 U.S.C. § 7412(g)(1)(B) (emphasis supplied).

115. *Id.* (emphasis supplied).

116. One commentator has suggested that, because of the provision's reference to types of pollutants, it may preclude offsetting increases in emissions of a carcinogen with decreases in non-carcinogens. Russell S. Frye, *Corporate Cautions in the Implementation of Air Toxics Provisions*, *in* IMPLEMENTING THE 1990 CLEAN AIR ACT: THE RACE FOR REGULATIONS 295, 301 (1991) (ALI-ABA Course No. 661, 1991). The EPA recently published a proposed rule discussing a number of approaches to comparing different chemicals for offsetting purposes. Proposed Regulations, *supra* note 113, at 15,548-63.

117. 42 U.S.C. § 7412(f)(2)(A).

118. Subsections 112(f)(2)(B) and 112(d)(4) authorize the EPA to apply a different approach than the two phases of technology-based and then residual risk regulation for the small number of chemicals for which the EPA had already promulgated health standards based on the ample margin of safety language in effect prior to 1990. *See id.* §§ 7412(d)(4), 7412(f)(2)(B). Mercury is one noncarcinogen affected by these provisions, but most noncarcinogens or carcinogens are unaffected. *See* 40 C.F.R. § 61.52 (1993) (mercury emission standard).

HeinOnline -- 13 Stan. Envtl. L. J. 289 1994

tion IV of this Article will discuss how Congress might provide guidance to the EPA on how to regulate noncarcinogens.

d. "Hot-Spots."

Both marketable permit systems and technology-based forms of regulation are usually designed to reduce aggregate pollution or risk without forcing a particular level of control at any given facility or location.[119] Consequently, "hot-spots," relatively high concentrations of particular pollutants, may accumulate in small areas within the larger pollution control region.[120] Some pollutants do not have significant site-specific impacts, but others create localized pollution problems around the emitting source.[121]

The Amendments do not adequately address this problem. The EPA will promulgate subsection 112(f) residual risk standards for categories or subcategories of industries rather than individual sources.[122] The one-in-one-million screening standard in subsection 112(f)(2) places some limits on "hot-spots," but residual risk requirements only address the overall cancer risks of a source's combined emissions of hazardous air pollutants, and do not measure the impact of specific pollutants on particular population groups living around an individual source, including noncarcinogenic chemicals.

A more specific program is needed to address "hot-spots." Site-specific exposure assessments are one way to identify "hot-spot" problems at a particular facility. Of course, such assessments will require standards for deciding when a particular pollutant poses

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119. *See* Bruce A. Ackerman & Richard B. Stewart, *Reforming Environmental Law*, 37 STAN. L. REV. 1333, 1350 (1985).

120. *See generally* California Air Toxics "Hot Spots" Information and Assessment Act of 1987, CAL. HEALTH & SAFETY CODE §§ 44300-44384 (West Supp. 1994).

121. Some air pollutants do not have significant site-specific impacts; for example, volatile organic compounds that can contribute to the formation of ozone. *See* RICHARD A. LIROFF, REFORMING AIR POLLUTION REGULATION: THE TOIL AND TROUBLE OF EPA'S BUBBLE 590 n.* (1986). Nonindustrial sources play a major role. *See* Ackerman & Stewart, *supra* note 119, at 1356 n.53 (citing E. HAEMISEGGER, THE AIR TOXIC PROBLEM IN THE UNITED STATES: AN ANALYSIS OF CANCER RISKS FOR SELECTED POLLUTANTS (EPA-450/1-85-001 (1985)); AIR TOXICS, *supra* note 94. In addition, carbon monoxide can create "hot-spots" in or near tunnels and also around major intersections where motor vehicle traffic is heaviest. Henry A. Waxman et al., *Roadmap to Title I of the Clean Air Act Amendments of 1990: Bringing Blue Skies Back to America's Cities*, 21 ENVTL. L. 1843, 1902 (1991).

122. 42 U.S.C. § 7412(f)(2). Residual risk emission standards are issued for categories and subcategories of industries even though the one-in-one-million screening criterion for triggering the issuance of such standards is based upon individual plants within the category or subcategory. *Id.*

HeinOnline -- 13 Stan. Envtl. L. J. 290 1994

excessive risk. In addition, public participation may be especially important when a "hot-spot" problem threatens people living in the vicinity of a plant.

e. Environmental Justice Concerns.

In recent years, there has been enormous controversy about whether "locally undesirable land uses" such as toxic waste landfills or sources of air toxics are disproportionately located in poor and minority neighborhoods.[123] For example, there is evidence that synthetic organic chemical manufacturing plants tend to be concentrated in poor neighborhoods.[124] While there is significant evidence of disproportionate siting, the evidence does not establish whether the siting process itself, rather than market forces such as residential mobility, cause the disparity.[125] Furthermore, methodological problems with existing studies call into question their va-

123. *See generally* Vicki Been, *What's Fairness Got To Do With It? Environmental Justice and the siting of Locally Undesirable Land Uses*, 78 CORNELL L. REV. 1001, 1002-03 (1993). There is also evidence that cleanups occur more quickly and fines against polluters are higher in predominantly white areas. *Poor Blacks Hope to Halt Plants: EPA to Investigate Allegations that Rights were Violated*, CINCINNATI ENQUIRER, Dec. 20, 1993, at A8 [hereinafter *Poor Blacks*]. On February 11, 1994, President Clinton signed Executive Order 12898, which requires government agencies to develop policies to ensure that: (1) minorities and low-income populations have access to public information related to the human health and environment; (2) agencies conduct activities related to the health and environment in a manner that does not discriminate against low-income and minority populations; and (3) agencies consider disproportionate health effects in conducting research and collecting data. *See generally* Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, Exec. Order No. 12,898, 59 Fed. Reg. 7629 (1994). This Article's proposal would require firms seeking exceptions from national standards to address environmental justice issues and would also allow citizens to raise these issues when a firm applies for a permit to emit hazardous air pollutants.

A full discussion of whether environmental racism exists, and of possible legal remedies, is beyond the scope of this Article.

124. *States Expected to Avoid Averaging on Air Toxics, Agency's Air Chief Says*, *supra* note 105, at 1474.

125. Been, *supra* note 123, at 1014. Professor Been recently published an article examining empirical evidence for the market dynamics hypothesis. Vicki Been, *Locally Undesirable Land Uses in Minority Neighborhoods: Disproportionate Siting or Market Dynamics?*, 103 YALE L.J. 1383 (1994). While her evidence is inconclusive, two reports funded by business interests have challenged claims that plants specializing in the treatment, storage, and disposal of hazardous waste are more apt to be found in minority neighborhoods; a study by University of Massachusetts researchers using Census tracts concluded that such facilities are more likely to be found in working-class, white neighborhoods than in minority communities. *Two Reports Dispute Claims that Siting of Commercial Facilities Discriminatory*, 24 Env't Rep. (BNA) 2100, 2100-01 (Apr. 15, 1994). This Article's proposal for an "exceptions process" is designed to reduce the risk to exposed populations regardless of whether the initial siting process was discriminatory.

HeinOnline -- 13 Stan. Envtl. L. J. 291 1994

lidity.[126] In any case, the justice concerns need to be considered in any proposal for amending the Clean Air Act's section 112, since such amendments will have a greater impact on low-income communities.

Residual risk standards under subsection 112(f) do not specifically address siting issues.[127] An important question is to what extent residual risk standards should take into account issues such as potentially disparate impacts on poor people and minorities. At least in theory, particular subpopulations may be disparately affected by certain toxic substances.[128] The more difficult question is whether the air toxics program should seek to reduce the tendency of plants to locate in poor and minority neighborhoods. This Article proposes an increase in the level of agency scrutiny. An increased burden should be applied to an applicant when a variance is sought for a facility located in a "poor" or "minority" neighborhood.[129] This Article will not, however, directly attempt the far more socially complex task of forcing new sources to locate, or existing sources to relocate, in non-minority or relatively wealthy neighborhoods.[130] Site-specific exposure assessments could determine who is being affected by a facility's emissions of air toxics and would be more precise than current research defining minority neighborhoods in terms of census tracts or zip codes. This Article's proposal would indirectly address distributional inequities by

126. Been, *supra* note 123, at 1014-15 ("some studies define neighborhood as broadly as a municipality, while others use census tracts or zip code areas, and some draw concentric circles around LULUs [Locally Undesirable Land Uses].") (citations omitted).

127. *See* 42 U.S.C. § 7412(f).

128. Taking into account the fact that African-Americans have statistically poorer health than whites raises difficult questions about whether equality of treatment or equality of results is required. *See* Been, *supra* note 123, at 1035. This Article's proposal would emphasize examples where there is scientific evidence, for example, that African-Americans are disproportionately affected by a specific chemical or disease rather than simple statistical differences among groups in their overall health.

129. For example, the EPA is currently investigating plans to build a hazardous waste incinerator in Carville, Louisiana because there are already ten hazardous facilities in a six-mile area, the population is predominantly minority, and toxic emissions around Carville are more than three times the state average. *Poor Blacks*, *supra* note 123, at A8. Dan Borne, president of the Louisiana Chemical Association, argues that there was no intent on the part of industry to discriminate against minorities, but that industry had located in this area because of the availability of natural gas, the Mississippi River for transportation, and large acreage at a reasonable price. *Id.*

130. Such a relocation program raises complex issues about defining a "fair" siting process and perhaps even more complex questions about how to achieve such fairness when fair siting proposals run counter to the free-market ideology of the United States. *See generally* Been, *supra* note 123, at 1008-09, 1015-85.

HeinOnline -- 13 Stan. Envtl. L. J. 292 1994

providing technical assistance grants to citizen groups to enable them to challenge agency standards or industry variance applications.

f. Multimedia and Indirect Effects.

The residual risk provisions in subsection 112(f)(2) do not address potential multimedia and indirect impacts. These omissions are not surprising because both problems have virtually been ignored until recently. In the past the EPA has largely approached each medium problem separately: air, water, pesticides and land disposal.[131] For example, rulemaking normally originates in the four media program offices, which are sometimes referred to as the "lead offices," under the four assistant administrators with rulemaking responsibility. Until recently single-medium program offices did not spend much time thinking about the effects of their regulations on media that are regulated by other program offices.[132] In large part, Congress in the past enacted statutes requiring the agency to focus on each medium separately.[133] The National Environmental Policy Act and Toxic Substances Control Act in theory are supposed to bring an integrated approach to environmental management, but they have had little real impact on the EPA's media policies.[134]

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131. *See generally* Laxshman Guruswamy, *Integrating Thoughtways: Re-opening of the Environmental Mind*, 1989 WIS. L. REV. 463, 467-69, 476-79, 488-92, 516; *Integrated Pollution Control: A Symposium*, 22 ENVTL. L. 1 (1992).

132. *See* Thomas O. McGarity, *The Internal Structure of EPA Rulemaking*, 54 LAW & CONTEMP. PROBS. 57, 70, 85-86 (1991).

133. *See generally* Guruswamy, *supra* note 131, at 467, 471, 476-79, 490-92 (media statutes generally do not consider multimedia impacts).

134. Read literally, the National Environmental Protection Act would appear to require the EPA to consider multimedia impacts when the agency issues rules having a significant impact on the environment *See* Guruswamy, *supra* note 131, at 477-78, 490-92. But Congress has provided major exceptions and courts have largely accepted the argument that certain provisions in the media statutes are the "functional equivalent" of an assessment. 33 U.S.C. § 1371(c)(1) (Clean Water Act exempts EPA from impact assessments except for municipal waste water treatment grants and permits for discharges by new sources); 15 U.S.C. § 793(c)(1) (Clean Air Act generally exempts EPA from environmental impact requirements). Portland Cement Ass'n v. Ruckelshaus, 486 F.2d 375, 381, 384-85 (D.C. Cir. 1973), *cert. denied*, 417 U.S. 921 (1974) (holding § 111 of Clean Air Act constituted a functional equivalent of impact statement and therefore exempted EPA from NEPA; strict Act timetables another consideration); Guruswamy, *supra* note 131, at 477-79, 484-87, 491-92.

Professor Guruswamy argues that the Toxic Substances Control Act could be used to move towards the administrative implementation of an integrated approach. *See generally* Guruswamy, *supra* note 131, at 522-30.

HeinOnline -- 13 Stan. Envtl. L. J. 293 1994

A number of commentators have argued in general for an integrated approach to pollution control that would tackle problems on a multimedia basis because controls on air pollutants often simply result in the discharge of these chemicals into sewers or landfills without reducing the overall number of harmful substances released into the environment.[135] Little research has been done regarding the potential multimedia impacts of air toxics, but the Amoco-EPA study discussed below in Subsection III.B.2.e suggests that regulatory policies should take a more multimedia approach in addressing the risks from hazardous air pollutants. For instance, let us suppose that production changes necessary to reduce emissions of hazardous air pollutants below the one-in-one-million threshold result in more sludge for landfills or the discharge of more water effluent. There is nothing in the residual risk provisions to address these types of issues. Nor is it clear that the one-in-one-million standard adequately considers the impact of hazardous air pollutants on other media. For example, there is no requirement for a risk assessment to determine the indirect impacts of emissions that enter the food chain and are eventually ingested by humans.

Partly in response to controversy over an incinerator in East Liverpool, Ohio, the Clinton administration imposed new restrictions on hazardous waste incinerators, including requiring a site-specific risk assessment prior to issuing combustion permits.[136] EPA head Carol Browner has promised to increase "public participation" in the approval process, a policy this Article believes should be applied in general to sources of hazardous air pollutants.[137] The EPA will require full risk assessments, including assessment of the risk of indirect exposure to emissions through the ingestion of chemicals that reach the food chain, as part of all new hazardous waste incinerator permits and also includes industrial furnaces and boilers that burn the waste as a fuel.[138] Some EPA regional offices are

135. *See generally* Guruswamy, *supra* note 131.

136. *See* EPA Draft Strategy for Combustion of Hazardous Waste in Incinerator and Boilers; Interim Final Guidance on Waste Minimization for Hazardous Waste Generators (May 18, 1993), *reprinted in* 24 Env't Rep. (BNA) 157, 160 (May 21, 1993) [hereinafter EPA Draft Strategy] (site-specific risk assessments); Timothy Noah, *EPA Unveils Plans to Curb Incinerators of Hazardous Waste by Blocking Growth*, WALL ST. J., May 19, 1993, at B6; *'Temporary Capacity Freeze' Announced By EPA On New Hazardous Waste Incinerators*, 24 Env't Rep. (BNA) 131 (May 21, 1993) [hereinafter *'Temporary Capacity Freeze'*].

137. Noah, *supra* note 136, at B6.

138. *See* EPA Draft Strategy, *supra* note 136; *Permit for $120 Million Incinerator Requires Risk Assessment, Tight Controls*, 24 Env't Rep. (BNA) 243 (June 4, 1993) (In response to new

HeinOnline -- 13 Stan. Envtl. L. J. 294 1994

currently conducting indirect risk assessment.[139] The EPA has released a draft addendum updating its approach to indirect risk assessment.[140] Don R. Clay, who served as EPA assistant administrator for solid waste and emergency response during the Bush administration, has predicted that the Clinton administration will expand the use of indirect risk assessment in future rulemaking and has observed that such a policy would "add another two to three orders of magnitude of increased risk."[141]

The EPA has recently proposed strict paper-industry regulations that combine air and water requirements for the first time rather than addressing them separately.[142] The so-called cluster rule takes what the EPA terms an "ecosystem-wide" approach to reduce and prevent discharges of dioxin and other toxic pollutants.[143] According to the EPA, the rule will "virtually eliminate" all dioxin discharges into rivers and other surface waters, and will cut toxic air emissions by roughly 70%.[144] Industry has argued that the proposed rule is too costly and will force some older plants to

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EPA guidelines, Texas Water Commission ordered firm to carry out comprehensive assessment of risk posed by the facility as well as risk from potential indirect routes of exposure); *'Temporary Capacity Freeze'*, *supra* note 136, at 131; *Use of Indirect Risk Assessment Likely in Future Rule-Making, Former Official Says*, 24 Env't Rep. (BNA) 262 (June 11, 1993) [hereinafter *Former Official Says*].

139. Officials from Regions I, IV, and V are conducting indirect risk assessments on selected hazardous waste combustion facilities seeking final permits or permit modifications. *Hazardous Waste: Indirect Risk Assessments Get Cooperation From Facilities Despite Concerns Over Timing*, 24 Env't Rep. (BNA) 1724, 1724 (Feb. 4, 1994). It is not clear whether the other seven EPA regions also are collecting data for the indirect risk assessments. *Id.*

140. In November, 1993, the EPA released a draft addendum to the 1990 Methodology for Assessing Health Risks Associated with Indirect Exposure to Combustor Emissions. *Id.* The Science Advisory Board's Human Exposure Committee is reviewing the draft addendum and has drafted a letter to EPA Administrator Browner expressing serious concerns. *Id.*; *Hazardous Waste: Indirect Risk Assessment Draft Addendum Called Deficient in SAB Letter to Browner*, 24 Env't Rep. (BNA) 1723 (Feb. 4, 1994) (Human Exposure Committee stated draft addendum relies too much on default data, with little validation, lacks information on the occurrences and effects of upset events such as natural disasters or accidents, does not consider cumulative impacts from existing facilities in addition to the impacts from a single plant, and should look at regional impacts beyond 50 kilometers from the facility boundary). Industry and state officials have argued that the EPA should significantly modify its draft guidance before the agency makes indirect risk assessments a permit requirement. *Hazardous Waste: Draft Guidance on Indirect Risk Assessments Needs Changes, Industry, State Officials Say*, 24 Env't Rep. (BNA) 1892 (Mar. 4, 1994).

141. *Use of Indirect Risk Assessment Likely in Future Rule-Making, Former Official Says*, 24 Env't Rep. (BNA) 262 (June 11, 1993).

142. Timothy Noah, *EPA Seeks Strict Paper-Industry Rules Aimed at Cutting Dioxin, Air Pollution*, WALL ST. J., Nov. 2, 1993, at A24.

143. *Id.*

144. *Id.*

HeinOnline -- 13 Stan. Envtl. L. J. 295 1994

close.[145] On the other hand, environmental groups have criticized the proposal because it does not totally eliminate use of chlorine from the papermaking process.[146] The use of a combined rule is intended to make regulatory actions less burdensome to industry.[147]

Section 112 does not provide any answers on how the EPA should take into account multimedia and indirect risk factors in regulating hazardous air pollutants, although subsection 112(d)(2) allows the EPA to consider "any non-air quality health and environmental impacts and energy requirements . . . ."[148] The residual risk provisions in subsection 112(f)(2)(A) will eventually require the EPA to examine the excess cancer impacts of air emissions from each major source after technology-based controls are in place, but the statute does not explain whether the EPA may consider only direct impacts of air emissions in calculating excess cancer risks or must consider multimedia or indirect impacts beyond generally authorizing the administrator to consider "safety" and "other relevant factors."[149] Under *Chevron's* deference principle, the EPA probably could simply ignore the multimedia and indirect impacts of sources of air toxics if it chooses to do so, but such an approach is at odds with its stated goal of placing increasing emphasis on multimedia impacts.[150] This Article's proposal would require firms seeking a variance to address multimedia and indirect impacts, and allow interested citizens to request more stringent regulation of a source or a source category if there is evidence of significant multimedia or indirect impacts. Eventually, the EPA should consider developing "cluster" or combined rules for as many industries as possible.

145. *Id.*

146. *Id.* When used as a bleaching agent, chlorine is converted into dioxin and other potentially toxic chemicals. *Id.*

147. *Id.*

148. 42 U.S.C. § 7412(d)(2).

149. *Id.* § 7412(f)(2)(A).

150. The EPA is currently making some efforts to use existing legislation to address integrated, multimedia concerns. *See* Thomas L. Adams Jr. & M. Elizabeth Cox, *The Environmental Shell Game and the Need for Codification*, 20 Envtl. L. Rep. (Envtl. L. Inst.) 10,367, 10,368-69 (1990); Applegate, *Perils*, *supra* note 31, at 330-32 (advocating a wider role for the Toxic Substances Control Act in information development).

HeinOnline -- 13 Stan. Envtl. L. J. 296 1994

2. *Technology-Based Pollution Control Standards*

a. Economic Criticisms of Technology-Based Standards.

In a technology-based system of regulation, an agency sets standards based not on health effects, but on the control capacity of current or expected technology, or by mandating the use of a particular technology or process.[151] A number of economists and legal scholars have argued that technology-based pollution control standards are inefficient because they are typically uniform across an entire industry. This approach does not take into account the actual impacts of specific sources on ambient air or water quality, impacts which vary widely depending upon the source's location.[152] There is good reason to believe that the technology-based standards in subsection 112 will be inefficient among different industries because the top 12% of plants in pollution control effectiveness in one industry may be vastly different from the top 12% in another industry. Some industries, therefore, are likely to bear higher compliance costs without regard to their ability to reduce pollution or the actual impact of their pollution upon surrounding populations.[153]

Moreover, technology-based statutes and regulations usually fail to promote technological improvements because industry often lacks any incentive to go beyond the technology specified in the EPA's regulations.[154] The one-in-one-million residual risk standard

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151. *See* Applegate, *Perils, supra* note 31, at 268 n.28. If an industrial process or product generates some nontrivial risk, technology-based regulations generally require the responsible plant or industry to install whatever technology is available to reduce or eliminate this risk, as long as the costs of doing so will not cause a shutdown of the plant or industry. Ackerman & Stewart, *supra* note 119, at 1335.

152. Ackerman & Stewart, *supra* note 119, at 1334-40 (arguing technology-based regulation is inefficient compared to market-based); Note, *Technology-Based Emission and Effluent Standards and the Achievement of Ambient Environmental Objectives*, 91 YALE L.J. 792, 794-98 (1982) (arguing technology-based standards are inefficient in achieving ambient standards because they fail to take into account geographical differences in air or water quality or cost differences among individual firms and fail to promote any important non-economic goals).

153. *See* 42 U.S.C. § 7412(d)(3)(A). The Administrator has the authority to set a standard higher than that achieved by the best performing 12% of the existing sources and theoretically could address interindustry disparities. *Id.* § 7412(d)(3). Based upon the experience of the Clean Water Act, however, the Administrator is unlikely to force technology in industries that have lagged behind others in pollution control efforts. One solution would be to allow trading between firms in different industries, but this Article rejects that solution because of difficulties in comparing risks in a trading scheme and instead proposes individual variances to achieve greater efficiency while protecting the public health.

154. Richard B. Stewart, *Regulation, Innovation, and Administrative Law: A Conceptual*

HeinOnline -- 13 Stan. Envtl. L. J. 297 1994

does, in theory, require the EPA to issue standards that may promote technological improvements needed to achieve "an ample margin of safety." The dismal failure of the pre-1990 health-based regulations, however, raises serious questions about whether the EPA will actually issue residual risk standards that are so stringent they force firms to shut down unless the firms adopt cutting-edge technology.[155]

Many critics of technology-based regulation advocate market-based solutions,[156] and some have suggested the use of trading schemes similar to the EPA's risk index for emissions averaging of air toxics.[157]

b. Defenders of Technology-Based Standards.

Skeptics have argued that proponents of market-based systems are overly optimistic about the ease with which government can set accurate charges, define property rights, or establish market mechanisms.[158] A number of academics contend that technology-based emission or effluent standards are the most practical solution to pollution control in light of pervasive uncertainties about the impact of chemicals on human health and the environment.[159] Some advocate technology-based systems because they may be less information-intensive.[160] Others argue that EPA officials have some-

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Framework, 69 CAL. L. REV. 1256, 1284 (1981) [hereinafter Stewart, *Innovation*]; Note, *supra* note 152, at 799.

155. *See generally* 42 U.S.C. § 7412(f); McQuaid, *supra* note 14, at 459 (predicting that Congress will rescind the residual risk program because of its potential expense and limited benefits).

156. Ackerman & Stewart, *supra* note 119, at 1341-51 (advocating transferable marketable permits); William F. Pedersen, Jr., *Turning the Tide on Water Quality*, 15 ECOLOGY L.Q. 69, 82-84 (1988); Note, *supra* note 152, at 811-12 (advocating zoned marketable permit scheme).

157. *See* Ackerman & Stewart, *supra* note 119, at 1360-61 n.62 (suggesting "mutual fund" approach to control related pollutants through permits based upon weighted average of volume and risk "where appropriate"); Richard B. Stewart, *Controlling Environmental Risks Through Economic Incentives*, 13 COLUM. J. ENVTL. L. 153, 161-62 (1988) (arguing in favor of trading schemes for toxics, although conceding it may not yet be feasible to do so for pesticides and other chemicals that presently elude workable quantification).

158. *See* Applegate, *Worst Things*, *supra* note 22, at 288 n.45; Guruswamy, *supra* note 131, at 501-07; Joel A. Mintz, *Economic Reform of Environmental Protection: A Brief Comment on a Recent Debate*, 15 HARV. ENVTL. L. REV. 149, 158, 161 (1991).

159. *See generally* Latin, *"Fine-Tuning"*, *supra* note 11, at 1267-75, 1331-32 & *passim* (arguing uniform, technology-based standards work better than market-based or other "fine-tuning" schemes because of limited information about the risks of chemicals and ecological systems); *see also* Mintz, *supra* note 158, at 149-64 (discussing debate between advocates of market-based regulation and technology-based regulation).

160. Thomas O. McGarity, *Media-Quality, Technology, and Cost-Benefit Balancing Strate-*

HeinOnline -- 13 Stan. Envtl. L. J. 298 1994

times advocated market-based measures to weaken environmental regulations, especially during the Reagan administration.[161]

c. Technology-Based Standards Are Inefficient.

There is considerable evidence that technology-based pollution control standards are inefficient. A recent EPA/Amoco joint study of an Amoco refinery in Yorktown, Virginia suggests that uniform pollution control standards, including technology-based approaches, are inefficient because the EPA's standards are often based on obsolete information, ignore multimedia pollution problems and do not provide industry with incentives to reduce pollution at lower cost.[162] In addition, the EPA's experience with Section 307 of the Clean Water Act addressing water toxics suggests that technology-based controls can achieve a certain degree of pollution reduction, but must be supplemented with individual control strategy techniques that address individual "hot-spots" and examine a source's impact on water quality.[163]

Professor Gaines has suggested that it will be much more difficult to determine technology-based approaches for air toxics than for the treatment of water toxics.[164] The EPA is already behind schedule in issuing subsection 112(d) technology-based standards for various categories and classes of industry.[165] Professor Gaines observes that the complexities of regulating air toxics will increase when the second phase of residual risk controls goes into effect.[166] Ultimately, he concludes that there are no easy answers to regulating air toxics. This Article generally concurs with that conclusion, but proposes some possible solutions to the problem.

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gies for Health and Environmental Regulation, LAW & CONTEMP. PROBS. 159, 206-08 (1983); *see also* Applegate, *Perils*, supra note 31, at 268.

161. *See* Latin, *"Fine-Tuning"*, *supra* note 11, at 1271-72; *cf.* Guruswamy, *supra* note 131, at 503.

162. *See infra* notes 299-307 and accompanying text.

163. 33 U.S.C. § 1314(*l*) (1988); Oliver Houck, *The Regulation of Toxic Pollutants Under the Clean Water Act*, 21 Env't L. Rep. (Envtl. L. Inst.) 10,528, 10,536-42, 10,547-49 (1991); Pedersen, *supra* note 156, at 70-73 & *passim*.

164. Gaines, *supra* note 25, at 302-03.

165. As of the fall of 1993, the EPA had issued only two final rules for technology-based emission standards for categories or subcategories of major sources of air toxics: one for dry cleaners, and the other for steel mills' coke ovens. John H. Cushman, Jr., *States and Government Lag in Meeting Clean Air Law*, N.Y. TIMES, Nov. 16, 1993, at A18. In the spring of 1994, the agency issued a final rule governing the toxic emissions of the chemical industry, a rule that is expected to eliminate one billion tons of toxic emissions a year. *See supra* notes 100, 108-11 and accompanying text.

166. *See* Gaines, *supra* note 25, at 303.

HeinOnline -- 13 Stan. Envtl. L. J. 299 1994

C. *Enactment of the Proposal*

1. *Degree of Statutory Specificity.*

This Article's proposed statute must be understood in light of the debate about congressional specificity in regulatory statutes. Commentators have made an important, if imperfect, distinction between "goals statutes," which announce goals and authorize delegates to promulgate controls on conduct in furtherance of those goals, and "rules statutes," which demarcate permissible and impermissible conduct.[167] Commentator advocacy between these two types of statutes corresponds to preferences for agency decisionmaking versus congressional policy making.[168] An advocate of technocratic regulation tends to favor goal-oriented statutes that grant discretion to the agency and would probably approve of the residual risk provisions in subsection 112(f) because of the discretion it provides the EPA. Those who favor strong congressional control and are skeptical of agency expertise would likely favor strict rules-oriented statutes. There is a middle ground as well.[169]

Commentators have disagreed about whether the Clean Air Act is a "rules" or "goals" statute.[170] In the 1990 Amendments, Congress moved away from the goals-oriented "ample margin of safety" language in section 112 of the Act and adopted detailed rules on the number of hazardous air pollutants and the stringency of technology. The second phase of residual risk standards may return to the failed policies of the pre-1990 version of the statute.[171]

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167. *See* Applegate, *Worst Things, supra* note 22, at 302 n.128 ("A rules statute sets out relatively specific standards of conduct for the regulated industry; a goals statute gives a general mandate to an agency, which the agency must translate into rules of conduct."); David Schoenbrod, *Goals Statutes or Rules Statutes: The Case of the Clean Air Act*, 30 UCLA L. REV. 740 (1983). "Whether a statute works to define permissible conduct depends on the context." *Id.* at 784. A plausible argument can be made that there is no real distinction between goals and rules because all rules need interpretation and all goals reflect some choices. *Id.* at 787. Schoenbrod, however, argues that there is a genuine distinction between a rules statute in which the legislature states what is permissible and impermissible in a range of situations and a goals statute in which the legislature deals solely with objectives. *Id.* He concedes that the distinction is not a bright line and may change as society's customs evolve. *Id.* at 788.

168. *See generally* Applegate, *Worst Things, supra* note 22, at 289-304 (discussing technocratic regulatory tradition and its skeptics, including proponents of rules statutes).

169. *See id.* at 328-331.

170. *Compare* BRUCE A. ACKERMAN & WILLIAM T. HASSLER, CLEAN COAL/DIRTY AIR 10-12 (1981) (criticizing the Clean Air Act as an example of overly specific post-New Deal legislation) *with* Schoenbrod, *supra* note 167, at 753, 766-67 (criticizing Clean Air Act legislation as a goals statute).

171. *See supra* notes 13-30 and accompanying text.

HeinOnline -- 13 Stan. Envtl. L. J. 300 1994

Neither goals nor rules statutes are a panacea for solving environmental problems.[172] Congress, however, could and should enact a statute that provides more guidance to the EPA on adopting residual risk standards.

Another distinction used in discussing the degree of statutory specificity is the distinction between narrative and numerical tests. Existing environmental statutes regulating carcinogens contain primarily narrative tests for priority-setting and standard setting.[173] There are three major types of environmental narrative statutes:[174] (1) technology-based statutes that require the EPA to clean up the environment to the degree that is technologically achievable;[175] (2) balancing statutes that require the EPA to balance the costs of control and health benefits; and (3) health or risk-based statutes that require the EPA to clean up the environment to a degree that assures the protection of public health.[176] Hybrid narrative statutes are either difficult to categorize or combine elements of each type

172. Rules statutes may be counterproductive if they subject the details of administration to the constant supervision and second-guessing of congressional committees. *See generally* Michael Herz, *Judicial Textualism Meets Congressional Micromanagement: A Potential Collision in Clean Air Act Interpretation*, 16 HARV. ENVTL. L. REV. 175 (1992) (arguing congressional micromanagement and judicial textualism combine to produce deleterious results); Richard J. Lazarus, *The Neglected Question of Congressional Oversight of EPA: Quis Custodiet Ipsos Custodes (Who Shall Watch the Watchers Themselves)?*, 54 LAW & CONTEMP. PROBLEMS 205 (1991) (arguing congressional oversight committees interfere too much in EPA's work); David S. Broder & Stephen Barr, *Hill's Micromanagement of Cabinet Blurs Separation of Powers*, WASH. POST, July 25, 1993, at A1, A16 (discussing recent trend toward congressional involvement in departments' management functions). While this Article advocates greater congressional scrutiny of the EPA's emissions averaging program for air toxics, it is also sensitive to preserving discretion on the part of the agency. In addition, rules statutes could stifle technological innovation if a statute mandates a particular technology. Matt Ridley, *How to Smother Innovation*, WALL ST. J., June 9, 1993, at A12 (arguing EPA regulations on technology used to limit nitrogen oxide emissions delayed introduction of promising new technology). Furthermore, rules statutes may lead to other distortions. On the other hand, goals statutes may allow the EPA or the Office of Management and Budget to ignore congressional intent.

173. Rosenthal et al., *supra* note 7, at 273.

174. *Id.* at 296.

175. *Id.* There is a distinction between statutes that require the EPA to base standards on what is currently achievable as opposed to technology-forcing statutes. SUNSTEIN, *supra* note 22, at 627-28 n.85. Some commentators have argued that technology-forcing statutes have not worked well because industry generally has more information than the EPA about what technologies are likely to be technologically feasible in the next five or ten years, but that industry has little incentive to share such information with the agency if the result will be higher compliance costs. *See e.g.*, Stewart, *Innovation*, *supra* note 154, at 1282-83, 1296-97, 1300-01.

176. *See supra* notes 50-85 and accompanying text (discussing distinction between health and risk).

HeinOnline -- 13 Stan. Envtl. L. J. 301 1994

of narrative statute.[177] For example, the pre-1990 version of section 112 was a classic health-based statute requiring the EPA to set emissions standards for air toxics that would protect the public with an "ample margin of safety."[178] The first phase of the Amendments is clearly technology-based in nature. The second phase of residual risk standards requires a health-based approach in part, but also provides the EPA with enough discretion to allow implicit and perhaps even explicit balancing. In addition, the statute includes a numerical one-in-one-million screening standard, but provides no guidance on what the second round of emission standards might encompass. One might classify these residual risk provisions as a hybrid narrative statute.

2. *Agency Capture, Public Choice Theory, the Race-to-the-Bottom Rationale and an Exception Process.*

a. Agency Capture.

An exception process may allow a regulated entity to "capture" an agency's decisionmaking process.[179] Capture is less likely to occur when an agency is regulating several industries with competing or conflicting interests.[180] Some commentators have argued that the EPA as a whole is not captured.[181] In another article, this au-

177. Rosenthal et al., *supra* note 7, at 313-14.

178. Despite the statute's health-based nature, critics have charged that the agency implicitly considered cost and technology before and perhaps even after the *Vinyl Chloride* decision.

179. A leading administrative law treatise defines agency capture as follows: "An agency is captured when it favors the concerns of the industry it regulates, which is well-represented by its trade groups and lawyers, over the interests of the general public, which is often unrepresented. RICHARD J. PIERCE, JR., ET AL., ADMINISTRATIVE LAW AND PROCESS § 1.7.2 (2d ed. 1992). There is an enormous literature on the phenomenon of "agency capture" of regulators by regulated industry and commentators have sharply disagreed over to what extent such capture takes place among major federal agencies. *See, e.g.*, MARVER BERNSTEIN, REGULATING BUSINESS BY INDEPENDENT COMMISSION 74-95, 169-71 (1955) (regulated industry tends to capture its regulators); Alfred C. Aman, Jr., *Administrative Equity: An Analysis of Exceptions Rules*, 1982 DUKE L.J. 277, 326-28 ("The capture doctrine is inapposite, however, when the regulations involved cut across several industries."); Bradford C. Mank, *Superfund Contractors and Agency Capture*, 2 N.Y.U. ENVTL. L.J. 34, 34-35, 49-54 (1993) [hereinafter *Superfund Contractors*] (capture more likely to occur in a single program even if agency as a whole remains uncaptured). *But see* Richard A. Posner, *Theories of Economic Regulation*, 5 BELL J. OF ECON. & MGMT. SCI. 335, 342 (1974) (capture theory unsatisfactory because it lacks any theoretical foundation as to why the regulated industry should be the only interest group able to influence an agency).

180. *See generally* Aman, *supra* note 179, at 327-28; Mank, *Superfund Contractors*, *supra* note 179, at 50-51.

181. *See* Dwyer, *supra* note 16, at 309-10; Richard J. Lazarus, *The Tragedy of Distrust in*

thor suggested that it may be easier for special interests to capture an agency's decision on a particular plant or program even if the agency as a whole remains uncaptured, and an individualized exceptions process might enhance the possibility of capture.[182]

Whether an agency can be captured by a regulated firm depends to a considerable extent upon whether countervailing interest groups actively participate in the regulatory process. Proponents of agency capture theories generally assume that regulatory agencies begin serving particular private interests once the public interest that led to the formation of the agency dissipates.[183] Richard Posner has criticized the theoretical foundation of agency capture theories on the ground that they do not explain "why the regulated industry should be the only interest group able to influence the agency."[184] Others have argued that there is strong evidence that so-called "public interest groups" or countervailing interest groups in fact influence agency policies, especially where agencies regulate multiple industries.[185] There is considerable evidence that the public has retained interest in environmental issues

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the Implementation of Federal Environmental Law, 54 LAW & CONTEMP. PROBS. 311, 315-17 (1991); *see generally* Mank, *Superfund Contractors*, *supra* note 179, at 34-35, 49-54.

182. *See generally* Mank, *Superfund Contractors*, *supra* note 179, at 34-35, 49-54 For example, there is some evidence that "Superfund contractors" make too many policy decisions because the EPA lacks sufficient experienced staff; however, the evidence of actual capture is tenuous. *Id.* at 80. In a case study of how local air quality management districts in California grant variances, the authors suggested that the large Bay Area [which includes San Francisco, Oakland and San Jose] and South Coast [Los Angeles and Orange County] Air Quality Management Districts were relatively immune to capture, but that the smaller Kern County Air Quality Management District "is viewed as being more susceptible to the economic interests of industry and the community." Marc Melnick & Elizabeth Willes, Comment, *Watching the Candy Store: EPA Overfiling of Local Air Pollution Variances*, 20 ECOLOGY L.Q. 207, 224 (1993). The Kern County District has recently joined a new unified district, the San Joaquin Valley Unified Air Quality Management District, and the authors of the case study suggest that "[t]his change has probably changed the regulatory climate in Kern County by bringing in a wider range of perspectives toward air pollution. The hearing board will be drawn from a more diverse area and will be less susceptible to local pressure." *Id.* at 241 n.241. On the other hand, Professor Aman has argued that an exceptions process will not facilitate agency capture.

183. *See generally* BERNSTEIN, *supra* note 179, at 87-90; EMMETTE REDFORD, ADMINISTRATION OF NATIONAL ECONOMIC CONTROL 386 (1952); Aman, *supra* note 179, at 326-27 n.209; Mank, *Superfund Contractors*, *supra* note 179, at 34 n.1, 50-52.

184. Posner, *supra* note 179, at 342. Professors Gillette and Krier, however, suggest that some groups may have asymmetric access to the administrative process. *See generally* Gillette & Krier, *supra* note 79, at 1064-70.

185. JAMES Q. WILSON, BUREAUCRACY: WHAT GOVERNMENT AGENCIES DO AND WHY THEY DO IT 83-85 (1990) (arguing that since 1970s it has become rare to find an agency serving only a regulated industry's interests); Mank, *Superfund Contractors*, *supra* note 179, at 50-51.

HeinOnline -- 13 Stan. Envtl. L. J. 303 1994

and that the EPA on the whole has not been captured.[186] Thus, even if an exceptions process could be abused by regulated firms bent upon capturing the air toxics program, effective measures to encourage public participation could defeat any such efforts.[187]

3. *Public Choice Theory.*

Public choice theory assumes that each person is an egoistic, rational utility maximizer and that behavior based upon these assumptions applies not just to market transactions, but also to non-market political decisionmaking.[188] Public choice models often treat the legislative process as a microeconomic system in which interest groups manipulate the political process to obtain "rents" in the form of tax relief, subsidies or favorable regulation in order to increase their wealth in excess of what the group could achieve in the marketplace without legislation.[189] On the other hand, proponents of "civic republicanism" argue that politics can and ought to consist of deliberation reflecting the values of all citizens. They reject the central economic assumptions about human behavior in public choice theory, contending that individuals in many cases are willing to sacrifice private interests to the common good.[190]

Public choice theory would suggest that legislation affecting particular geographic areas would be dominated by legislators from that area and that local interests would tend to triumph over more diffuse national public interests.[191] Thus, it is important to

186. *See* Mank, *Superfund Contractors*, *supra* note 179, at 50-51; *see generally* Dwyer, *supra* note 16, at 278, 309-10; Lazarus, *supra* note 181, at 364-65; WILSON, *supra* note 185, at 83-85; *see also* Hornstein, *A Normative Critique*, *supra* note 79; Irma S. Russell, *The Role of Public Opinion, Public Interest Groups, and Political Parties in Creating and Implementing Environmental Policy*, 23 Envtl. L. Rep. (Envtl. L. Inst.) 10,665 (1993).

187. The presence of public interest groups can substantially increase the cost of lobbying expenditures by a firm that is trying to influence an agency and defeat attempts by a regulated firm to "capture" an agency. *See generally* IAN AYRES & JOHN BRAITHWAITE, RESPONSIVE REGULATION: TRANSCENDING THE DEREGULATION DEBATE 71-86 (1992).

188. *See* Daniel A. Farber & Philip P. Frickey, *The Jurisprudence of Public Choice*, 65 TEX. L. REV. 873, 878 (1987).

189. *See id.*; Gary S. Becker, *A Theory of Competition Among Pressure Groups for Political Influence*, 98 Q.J. ECON. 371, 371-74 (1983); Jonathan Macey, *Promoting Public-Regarding Legislation Through Statutory Interpretation: An Interest Group Model*, 86 COLUM. L. REV. 223, 223-24 (1986).

190. *See generally* Hornstein, *Politics*, *supra* note 79, at 413; Frank Michelman, *Law's Republic*, 97 YALE L.J. 1493, 1513 (1988); Mark Seidenfeld, *A Civic Republican Justification for the Bureaucratic State*, 105 HARV. L. REV. 1511, 1512 (1992); Cass R. Sunstein, *Beyond the Republican Revival*, 97 YALE L.J. 1539, 1548-49 (1988).

191. *See generally* Alyson C. Flournoy, *Beyond the "Spotted Owl Problem": Learning From the Old-Growth Controversy*, 17 HARV. ENVTL. L. REV. 261, 305-06 (1993).

HeinOnline -- 13 Stan. Envtl. L. J. 304 1994

consider whether the capture of influential legislators by important industrial actors could result in congressional pressuring of the EPA to modify residual risk standards or to grant exceptions to the advantage of favored industries. Public participation, however, can overcome this tendency. For example, when environmental groups were able to capture national public attention about the spotted owl through the news media, lobbying pressure created by local interests seeking to cut old-growth forests was neutralized.[192] Accordingly, an exceptions process may be more vulnerable to special interest lobbying of Congress than nationally uniform legislation.

The public participation portion of this Article's proposal is designed to enhance the possibility of "republican civicism" in the exceptions' decisionmaking process and to lessen the tendencies of an exceptions process to allow regulated firms to obtain special favors from legislators or bureaucrats as the public choice model predicts. Furthermore, this Article's proposal would give Congress a greater role in establishing residual risk standards despite the possible criticism that Congress is really not representative of the public interest.

a. States and the "Race-to-the-Bottom."

In the context of a federalist scheme for air and water pollution control in which states play the primary role of regulating firms and in which the EPA plays a supervisory role, an expanded exceptions process would give states more discretion in making regulatory decisions. So long as a state's program meets certain minimum requirements, the Title V air permit statutory scheme assumes that states will make the initial decision about granting or revising a permit.[193] The EPA has issued a final rule pursuant to subsection 112(*l*) establishing procedures for the agency's approval of state air toxics rules or programs that are at least as stringent as applicable section 112 rules and even to allow states to enforce state rules in place of certain federal rules promulgated under section 112 despite industry's call for uniform federal rules.[194]

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192. *Id.* at 305.

193. *See generally* 42 U.S.C. §§ 7661-7661d. The EPA may object to any permit and citizens may petition the EPA to challenge any permit approval by the agency. *Id.* § 7661d(b).

194. *See generally id.* § 7412(*l*) (state can develop and submit to Administrator a § 112 program that is at least as stringent as federal standards); Approval of State Programs and Delegation of Federal Authorities, 58 Fed. Reg. 62,262 (1993) (final rule to be promul-

HeinOnline -- 13 Stan. Envtl. L. J. 305 1994

A number of commentators have argued that uniform, federal legislation is necessary to prevent states from engaging in a socially undesirable "race-to-the-bottom," relaxing their environmental standards to attract and retain industry.[195] Professor Stewart has argued that public interest groups are more effective at the national level than the local level because there are higher transaction costs for local groups to organize. There are economies of scale for national groups and donors to groups may be more willing to give to national environmental causes.[196] The problems arising from the relative ineffectiveness of local public interest groups could be ameliorated by having the federal government or industry provide financial assistance to such groups. Active local environmental groups could alert the EPA to exercise its objection power over state-issued permits if state officials neglect environmental concerns to attract industry.[197] Section IV of this Article proposes that the EPA or industry applicants for exceptions provide grants to groups raising *bona fide* challenges that need money to research critical issues related to an exception.

b. Public Concerns and the Democratic Critique.

Advocates of a "public" definition of risk belong to a larger school of thought that questions the very legitimacy of agencies making tradeoffs between health and cost. They contend that Congress should make these fundamental policy decisions rather than agencies.[198] For these commentators, quantification is undesirable

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gated in 40 C.F.R. Parts 9 and 63); *Plan to Give States Discretion on Averaging of Toxic Emissions Meets Industry Opposition*, *supra* note 104, at 1465 (industry opposes allowing states too much flexibility in administering air toxics programs because of resulting inconsistencies and uncertainties).

195. Richard L. Revesz, *Rehabilitating Interstate Competition: Rethinking the "Race-to-the-Bottom" Rationale for Federal Environmental Regulation*, 67 N.Y.U. L. REV. 1210, 1210-11 n.1 (1992) (citing sources); Richard B. Stewart, *Pyramids of Sacrifice? Problems of Federalism in Mandating State Implementation of National Environmental Policy*, 86 YALE L.J. 1196, 1212 (1977). Recently, the "race-to-the-bottom" rationale has been questioned. *See generally* Revesz, *supra*.

196. Stewart, *Pyramids of Sacrifice*, *supra* note 195, at 1213-15.

197. *See* 42 U.S.C. § 7661d(b)(2) (citizen can petition Administrator to object to state-issued permit).

198. *See generally* Applegate, *Worst Things*, *supra* note 22, at 289, 298-302 (discussing four critiques of technocratic agency decisionmaking: (1) the informational critique argues agencies lack sufficient good information to make "expert" decisions; (2) the legitimacy critique contends public participation values should trump technocratic decisionmaking; (3) the rationalist critique argues in favor of clear statutes to guide agency discretion; and (4) the historical critique argues agencies tend to underregulate if given too much flexibility because it is easier not to make a decision).

HeinOnline -- 13 Stan. Envtl. L. J. 306 1994

because the determination of whether a particular risk is "reasonable" or "unreasonable" is a fundamentally political decision resting on a broader set of values, many of which are not quantifiable.[199] They believe that quantification is meaningful only to a limited extent where lives and deaths are involved.[200] Democratic critics of quantification usually want choices about who bears the risk of toxic substances to be made by Congress rather than an expert agency.[201] Critics of technocratic decisionmaking often use legal techniques such as broadened standing, expanded participation in the decisional process, as well as citizen suits and petitions to guarantee broad citizen access to the regulatory process.[202]

Some commentators however, argue that broad discretion to apply knowledge and technocratic expertise is better. They therefore want Congress to set only broad goals.[203] Judge Stephen Breyer, among others, has argued that the public often overreacts to risks and that thus Congress is incapable of addressing risk comprehensively.[204] In his view, greater knowledge and public awareness do not necessarily lead to better regulation.[205] Judge Breyer's solution is to create an elite reviewing body of civil servants within the executive branch to coordinate risk regulation.[206] While Judge Breyer's assessment of how well the public and Congress have handled risk assessment issues in the past has considerable merit, his

199. *See id.* at 300 (discussing political critique of quantitative decisionmaking).

200. *See id.* at 300-301; *see generally* Gillette & Krier, *supra* note 79, at 1070-85; Guruswamy, *supra* note 131, at 504-09.

201. *See* Applegate, *Worst Things*, *supra* note 22, at 301-02 (discussing democratic critics of expert agencies and quantitative decisionmaking).

202. *See id.* at 301-02; Gillette & Krier, *supra* note 79, at 1104-05; Richard B. Stewart, *The Reformation of American Administrative Law*, 88 HARV. L. REV. 1667, 1676-81 (1975).

203. *See generally* ACKERMAN & HASSLER, *supra* note 170, at 5-6 (Congress should provide only the "most general kinds of policy guidance" to free the agency to engage in rationalist decisionmaking processes); Dwyer, *supra* note 16, at 283 (arguing "that literal interpretation of symbolic legislation would be a mistake and that the Agency should be allowed to reformulate symbolic legislation because rational policymaking involving volatile social issues is more likely to be done by an agency than by the legislature, particularly where statutes are difficult to amend and enacting symbolic legislation is an accepted means of doing business.") & *passim*; Lazarus, *supra* note 181, at 355 (finding that "wasted resources and misdirected priorities" are the result of the "combination of impossible statutory mandates and increased judicial access"); *see also* Applegate, *Worst Things*, *supra* note 22, at 296-98 (discussing rationalist models of regulation that emphasize agency discretion and congressional role limited to broad goal setting).

204. *See generally* STEPHEN BREYER, BREAKING THE VICIOUS CIRCLE 33-42 (1993); Sam Kazman, *Risk Regulation Run Amok*, WALL ST. J., Nov. 5, 1993, at A7 (book review of Judge Breyer's Breaking the Vicious Circle).

205. *See generally* BREYER, *supra* note 204, at 42-51; Kazman, *supra* note 204, at A7.

206. *See generally* BREYER, *supra* note 204, at 59-80; Kazman, *supra* note 204, at A7.

HeinOnline -- 13 Stan. Envtl. L. J. 307 1994

solution, as well as those of many other technocrats, underplays the need for public participation and legitimacy.

Advocates of a technocratic solution to risk regulation contend that bureaucratic agencies possess sufficient public legitimacy. Some commentators argue that agencies can allow broader participation by interested parties than Congress[207] and that the Administrator of the EPA is more accountable than most members of Congress.[208] The legitimacy arguments of technocrats are less convincing than their criticisms of the inability of the public and Congress to assess complex risk issues.

Society is better off when Congress and the President enact legislation that makes the hard political choices about how much risk is acceptable in light of relevant costs. Ultimately, how to regulate and to assess the comparative risk of chemicals causing different diseases is a political question that must be addressed through collective risk preferences as expressed in the democratic process.[209] Critics of technocratic decisionmaking correctly observe that such an approach is information-intensive, leaves fundamental decisions to unelected officials, and does not always produce effective and efficient regulation.[210] Because of the disagreements in the scholarly community between the expert and public definitions of risk, Congress should make the basic policy choices about which factors should be included in risk assessment and management of hazardous air pollutants. Even though individual members of Congress in some ways are less accountable than the administrator of the EPA or the agency itself, Congress as a whole and the President are

207. *See* Latin, *"Fine-Tuning"*, *supra* note 11, at 1300 ("Agencies can develop better technical expertise, address a wider range of issues concurrently, allow broader participation by interested parties, and respond more rapidly to new information than Congress ordinarily could.").

208. *See id.* at 1300 n.165 (arguing supposed greater public accountability of Congress than agencies is largely a myth because few members of Congress know enough about air pollution issues to make informed decisions and therefore the real issue is whether Congress should delegate its authority to a few peers together with committee staff or administrative agencies subject to congressional oversight); Gaines, *supra* note 25, at 307-08 (arguing that congressional committees or federal judges regularly scrutinize the actions of the EPA, and that "the administrator of the EPA is arguably more readily held to account, through the media and through public pressure on the president, than most legislators, whose individual actions are often obscured in secrecy and the relative anonymity of membership in a group of 535 people subject to inquisition only every two or six years.").

209. *See* Hornstein, *Politics of Environmental Law Reform*, *supra* note 79, at 442; *see generally* Applegate, *Worst Things*, *supra* note 22 (Congress should give EPA specific directions for setting priorities and goals).

210. *See* Applegate, *Worst Things*, *supra* note 22, at 281, 289-304.

HeinOnline -- 13 Stan. Envtl. L. J. 308 1994

more accountable when they enact legislation that provides clear direction for an agency's exercise of discretion.

As a matter of general policy, Congress should encourage public participation in significant environmental decisions because such involvement lessens the risk that the agency will be "captured" by special interest groups.[211] Furthermore, Congress should provide opportunities for public participation in risk assessment decisions at individual sites because chemicals may have different impacts on diverse exposed subpopulation groups such as children, minorities, consumers or workers. Because there are often disagreements about the impacts of toxic pollutants on a particular community, Congress should provide for significant public opportunities for comment on permit applications and trading approvals despite the potential for Not-In-My-Back-Yard opposition.[212] Section IV will show how this Article's proposal would allow potentially affected citizens more meaningful participation and opportunities to challenge proposed permits than the current system.

III. "BRIGHT LINES" AND EXCEPTIONS

A. *Bright Line Rules*

1. *"Bright Lines" and Standard-Setting*

Legislators have increasingly considered using numerical risk levels, or "bright lines," as a means to reduce executive branch discretion and to gain greater congressional control over risk management.[213] In 1989, Congress considered mandating an interim residual risk standard of one-in-ten-thousand and a final standard of one-in-a-million, but the enacted Amendments incorporated a "bright line" only as a screening and priority-setting device.[214] Congress has also considered enacting "bright lines" in legislation governing food safety and water quality standards.[215] For example,

211. *See generally* Mank, *Superfund Contractors*, *supra* note 179, at 50-51 (strong public interest in environmental issues helps prevent capture of EPA); *see also* Hornstein, *Politics of Environmental Law Reform*, *supra* note 79, at 417-19, 440-46 (discussing theory that environmental law reform results from "republican moments" of significant public involvement).

212. *See generally* Been, *supra* note 123, at 1001-09 & *passim* (discussing distributional consequences of siting locally undesirable land uses); Bradford C. Mank, *The Two Headed Dragon of Siting and Cleaning Up Hazardous Waste Dumps: Can Economic Incentives or Mediation Slay the Monster?*, 19 B.C. ENVTL. AFF. L. REV. 239, 239, 272-85 (discussing "Not-In-My-Back-Yard" problem and possible solutions).

213. Rosenthal et al., *supra* note 7, at 275.

214. *Id.*

215. *Id.* at 327-329.

a 1991 proposal in Congress sought to amend the Clean Water Act by limiting "the probability to not more than 1 in 1,000,000 that an individual with high exposure to dioxins in [state] waters will be diagnosed with cancer as a result of such exposure over a lifetime."[216] New Jersey's 1984 Amendments[217] to its Safe Drinking Water Act[218] establish a one-in-one-million standard for persons ingesting dioxins for a lifetime.[219] After the enactment through the voter initiative process of California's Proposition 65, the Safe Drinking Water and Toxic Enforcement Act of 1986[220] adopted regulations setting the level of significant risk for discharges into drinking water and other media at one-in-100,000 on a lifetime basis.[221] Wisconsin's surface water quality standards also employ a bright line, stating that "the incremental cancer risk from exposure to surface waters may not exceed 1 in 100,000."[222]

The use of mandated numerical risk levels in prescribing the desired stringency of residual risk controls may create a misleading sense of legislative control and mask possible agency manipulation. Regulators can often plausibly manipulate modeling assumptions and interpret data to change risk estimates by factors of a thousand or more.[223] The dangers of manipulation are especially great when considerable scientific uncertainty surrounds an issue. Subsection 112(f)'s one-in-one-million standard is misleading because it suggests that the EPA can apply a clear metric to carcinogenicity when that is not the case. It is even more misleading to apply a numerical "bright line" approach to noncarcinogens causing different types of diseases or multimedia impacts when there is no scientific consensus. Whether *any* legislative metric is appropriate will be discussed below.

2. *"Bright Lines" and Priority Setting.*

Some commentators have argued that legislative "bright lines"

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216. H.R. 2084, 102 Cong., 1st Sess. § 1(a) (1991) (proposed April 24, 1991); *see* Rosenthal et al., *supra* note 7, at 328.

217. Act of Jan. 9, 984, ch. 443, 1983 N.J. Laws 1801.

218. N.J. Stat. Ann. §§ 58.12A-1 to -25 (1992).

219. N.J. Stat. Ann. § 58.12A-13(b)(1992); Rosenthal et al., *supra* note 7, at 331.

220. Cal. Health & Safety Code §§ 25249.5-.13 (1992); Kristen R. Stevens, *Regulating Toxics at the State Level, Proposition 65's Warning Requirement*, 9 STAN. ENVTL. L.J. 84 (1990).

221. Cal. Code Regs. tit. 26, § 22-12703(b) (1992); Rosenthal et al., *supra* note 7, at 331.

222. Wis. Admin. Code § NR 105.09-.10 (1989); Rosenthal et al., *supra* note 7, at 332.

223. *See* Rosenthal et al., *supra* note 7, at 360; *see also* Dwyer, *supra* note 16, at 276 (discussing post-*Vinyl Chloride* benzene standards).

HeinOnline -- 13 Stan. Envtl. L. J. 310 1994

can also be used as a priority-setting device to direct an agency to target for regulatory consideration those chemical exposures which exceed a bright line.[224] In addition, Congress might require the EPA to initiate rulemaking, which is currently often a matter of agency discretion, if risk assessments suggest that the magnitude of a problem exceeds some specified numerical standard, or to refrain from rulemaking if the magnitude of the health problem is less than some specified bright line.[225] According to Alon Rosenthal, George M. Gray and John D. Graham, "From a scientific perspective, the use of cancer risk estimates in priority-setting is less problematic than it is in standard setting. Risk assessment techniques may establish relative risk with more certainty than they establish an absolute level of risk protection."[226]

Professor Applegate has argued that the Amendments to section 112 essentially represent a form of priority-setting in which the agency must establish a schedule for action regarding listed chemicals based upon stated criteria such as: known or anticipated effects, quantity and location of emissions, and efficiency of grouping categories by pollutants or technologies.[227] While observing that the technology-based phase of regulation does not grant flexibility in standard setting in the way his priority-setting model of legislative control advocates, he maintains that Congress clearly recognized the value of trading stringency for speed and scope by enacting Amendments that defer regulation of the health-based level of "residual risk" in favor of quick risk reduction based upon the more easily determinable best available technology standard.[228]

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224. *See* Rosenthal et al., *supra* note 7, at 329-30; *see generally* Applegate, *Worst Things*, *supra* note 22, at 282 & *passim* (arguing that locus of legislative control should be moved from standard setting stage of regulatory process to earlier priority-setting phase).

225. Rosenthal et al., *supra* note 7, at 330.

226. *Id.*

227. *See* Applegate, *Worst Things*, *supra* note 22, at 327. Professor Applegate has proposed that Congress should provide broad parameters for agency action in particular cases, but should give specific directions to the agency for setting priorities and goals. *See generally id.*, at 281-82. His plan would move the locus of legislative control from the standard setting state of the regulatory process to the earlier priority-setting phase. *Id.* at 282. "Specifically, EPA would have considerable discretion to target risks and to select levels of regulatory stringency, but its discretion would be constrained by a comprehensive plan for toxic risk reduction which the agency would adopt in accordance with congressional guidelines." *Id.*

228. *Id.* at 327. He criticizes Congress, however, for exempting the section 112 priority-setting process from judicial review except for failure to set a schedule at all. *Id.*; *see* 42 U.S.C. § 7412(e)(4) ("no action . . . shall be final agency action subject to judicial review." Congress has however carved out a § 7607 exception).

HeinOnline -- 13 Stan. Envtl. L. J. 311 1994

Applegate contends that the Amendments to section 112 demonstrate that it is feasible to use priority-setting to direct agency action. He recognizes, however, that there are several practical difficulties in implementing the scheme—"not the least of which is commensurability of toxic risks . . . ."[229]

The use of priority-setting in the first phase of the statute, along with more specific rules on the number of air toxics and the stringency of technology-based standards, may have been a wise move in light of the slow pace at which the EPA regulated hazardous air pollutants before 1990. The use of priority-setting and screening techniques in lieu of standard setting, however, went too far in the residual risk provisions of the statute. Congress should have given the EPA more guidance on the definition of what is an "ample margin of safety" in light of the controversies surrounding the use of that term prior to the enactment of the Amendments.

Rosenthal, Gray, and Graham have argued that Congress wisely abandoned its attempt to establish bright line standards of one-in-ten-thousand and one-in-a-million in the residual risk provisions of the statute and correctly adopted the one-in-a-million standard as merely a priority-setting and screening standard for initiating further regulation.[230] They contend that advocates of bright lines who see them as a way to guarantee particular policy outcomes should be wary because congressional participation in risk assessment procedures can have unpredictable outcomes.[231] For example, they point out that one version of the Senate's Amendments would have required the EPA to protect the maximally exposed individual near a factory rather than a hypothetical maximally exposed individual—a change that could have reduced estimated exposures by a factor of 100 at some sources.[232] They argue that "bright lines" do not guarantee outcomes and that risk assessment techniques can be manipulated by agencies to change policy results.[233]

While "bright line" standards can be arbitrary and are subject to manipulation, the residual risk provisions currently leave too much discretion in the hands of the EPA. The only guidance the statute provides as far as how the EPA must set a second round of emis-

229. *See* Applegate, *Worst Things*, *supra* note 22, at 327-28.

230. *See* Rosenthal et al., *supra* note 7, at 275, 323-27, 330, 360-61.

231. *Id.* at 344.

232. *Id.*

233. *Id.* at 344, 360-61.

HeinOnline -- 13 Stan. Envtl. L. J. 312 1994

sions standards, is that the agency has the authority to adopt the approach in its 1989 Benzene standards. Commentators have criticized these standards for giving the agency too much discretion to consider cost and technological factors. In addition, the statute fails to address adequately the risks of noncarcinogens, multimedia and indirect impacts, and disparate impacts on diverse exposed subpopulations. Thus, this Article disagrees with the argument that the priority-setting and screening nature of the residual risk provisions are adequate.

Even if Congress chooses to retain a priority-setting approach that allows the EPA to determine the appropriate emission standard and ample margin of safety for a particular chemical or category or subcategory of industry if the excess cancer risk exceeds one-in-one-million, Congress should at the very least identify the reduction of noncarcinogenic risks as a priority for the EPA to consider when it issues emission standards under subsection 112(f)'s residual risk program.

B. *Exceptions and Flexible Regulation*

1. *Exceptions and Technology-Based Regulation.*

This Article argues that the technology-based controls for air toxics in subsection 112(d) are a good place to start, but that the residual risk provisions in subsection 112(f) should be used to provide exceptions[234] from the technology-based standards, both to provide additional protection and to lower standards where they are too costly and their relaxation will not endanger the public health. Market-based solutions are inappropriate because we lack sufficient information to compare chemicals that cause different diseases.

Subsection III.B will examine whether an "exception process" should be created to allow variances for individual firms from the technology-based and residual risk variances in section 112.[235]

234. Commentators often cite the implementation problems, expenses, and inconsistencies associated with an "exceptions" or "waiver" policy. *See generally* Colin Diver, *The Optimal Precision of Administrative Rules*, 93 YALE L.J. 65, 70-71 n. 31 (1983); Latin, *"Fine-Tuning", supra* note 11, at 1324 n. 286; Stewart, *Innovation, supra* note 154, at 1319 n.195. This Article acknowledges the dangers of trying to attempt regulatory solutions that are too complicated, costly and potentially counter-productive. The Amoco-EPA study and the experience with using technology-based controls to reduce water toxics suggests, however, that society must experiment with bold, new regulatory initiatives to tackle such issues as multimedia pollution, "hot-spots," and environmental racism.

235. Another approach would be to set standards entirely through individual adjudi-

HeinOnline -- 13 Stan. Envtl. L. J. 313 1994

While strong arguments can be made against allowing an exceptions process for toxic chemicals, this Article's proposal for an exceptions process for sources of air toxics seeks to benefit both industry and public safety.

a. The Case for Exceptions.

Some scholars have argued that even detailed rules fail to account for the full variety of situations to which they arguably apply.[236] In particular, regulatory rules often leave too little room for individualized justice.[237] Such rigid and highly specific provisions often characterize statutory rules as well as administrative ones.[238]

Administrative agencies can tailor the application of statutory or administrative rules to special cases either through ad hoc, "dispensatory" discretion, or through an "exceptions process" in which the agency considers applications for waivers, exemptions, or variances from a rule in a procedure that incorporates limited protections for applicants and other affected parties.[239]

Without a variance option, many sources "would have a greater incentive to hide violations from inspection and regulation."[240] It is important to encourage regulated firms to practice voluntary self-disclosure because regulatory agencies usually lack the resources to detect all violations. Further, it is economically rational for regulated firms to commit violations even where there is a significant risk of agency detection because these agencies rarely bring en-

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cations when a source of air toxics seeks a permit, but a totally individualized process would create enormous administrative burdens. *See* E.I. du Pont Nemours & Co. v. Train, 430 U.S. 112, 123-27, 132-35, 138 (1977); Stewart, *Innovation, supra* note 154, at 1265-66 (distinguishing between standards that are applied uniformly to an entire category of industry or processes and screening techniques applied through "hand-tailored" individual determinations); *see generally* Latin, *"Fine-Tuning", supra* note 11 (arguing in favor of uniform standards and criticizing attempts to "fine-tune" statutes). The residual risk provisions in subsection 112(f) require screening assessments regarding excess cancer risk after technology-based are installed for individual sources. 42 U.S.C. § 7412(f).

236. *See* ROSCOE POUND, AN INTRODUCTION TO THE PHILOSOPHY OF LAW 48-63 (1954); H.L.A. Hart, *Positivism and the Separation of Law and Morals*, 71 HARV. L. REV. 593, 627-29 (1958); Jeffrey M. Sellers, *Regulatory Values and the Exceptions Process*, 93 YALE L. J. 938 (1983).

237. *See* EUGENE BARDACH & ROBERT A. KAGAN, GOING BY THE BOOK: THE PROBLEM OF REGULATORY UNREASONABLENESS 25 (1982); Aman, *supra* note 179, at 288-92; Sellers, *supra* note 236, at 938.

238. *See* Sellers, *supra* note 236, at 938 n.3, 941-42).

239. *Id.* at 938 (advocating exceptions process).

240. *See* Melnick & Willes, *supra* note 182, at 247; John T. Scholz, *Cooperation, Deterrence, and Ecology of Regulatory Enforcement*, 18 LAW & SOC. REV. 179, 179-80 (1984) (contrasting deterrence-oriented enforcement strategy with "cooperative" enforcement strategy).

HeinOnline -- 13 Stan. Envtl. L. J. 314 1994

forcement actions against all violators. Even when they do, agencies and courts are often unwilling to impose drastic sanctions that would force a firm to shut down.[241] An exceptions process may convince some firms that the regulatory process is "fair" and that they should comply as a matter of civic responsibility.[242] Thus, some commentators suggest that an exceptions process would promote a more cooperative regulatory environment that leads to more effective enforcement than an inflexible, deterrence-oriented model of enforcement.[243] Exceptions might, therefore, foster a cooperative atmosphere where regulators work with a source to find solutions to reduce emissions.[244]

This Article proposes an exceptions process for sources of air toxics regulated under subsection 112 of the Act. Commentators have distinguished between "hardship" exceptions, which in the regulatory context are usually based upon financial distress or technological infeasibility, and "fairness" exceptions, which may be based upon such grounds as equal protection, comparative fairness, estoppel, or reasonableness as measured by a cost-benefit analysis.[245] This Article will discuss both types of exceptions, using examples from the Clean Water Act. and will propose that sources of air toxics be allowed "fairness" exceptions where the cost of regulation is disproportionate to the ambient air quality benefits and the exception will not pose an unacceptable health risk, but will advise against "hardship" exceptions because of the health dangers of air toxics.

b. The Case Against Exceptions.

Numerous commentators have argued that allowing variances or exceptions to national, uniform standards can create implemen-

241. *See generally* Melnick & Willes, *supra* note 182, at 247-348.

242. *See generally id.* at 248-49; BARDACH & KAGAN, *supra* note 237, at 7; Sellers, *supra* note 236, at 944-46.

243. *See id.* at 248-49; *see generally* BARDACH & KAGAN, *supra* note 237, at 123-62; KEITH HAWKINS, ENVIRONMENT AND ENFORCEMENT: REGULATION AND THE SOCIAL DEFINITION OF POLLUTION 105-55 (1984); Scholz, *supra* note 240, at 179-80.

244. *See generally* BARDACH & KAGAN, *supra* note 237, at 144-49; Melnick & Willes, *supra* note 182, at 249.

245. *See* Chemical Mfrs. Ass'n v. Natural Resources Defense Council, 470 U.S. 116, 162 n.21 (1985) (Marshall, J., dissenting); Aman, *supra* note 179, at 293-94; Martin Shapiro, *Administrative Discretion: The Next Stage*, 92 YALE L.J. 1487, 1504 (1983); Peter Schuck, *When the Exception Becomes the Rule: Regulatory Equity and the Formulation of an Energy Policy Through an Exceptions Process*, 1984 DUKE L.J. 163, 283-89. There are also policy exceptions that focus less on the individual characteristics of the petitioner and more on overall policy goals. *See* Aman, *supra* note 179, at 293-94.

HeinOnline -- 13 Stan. Envtl. L. J. 315 1994

tation problems, increase the expense of administration and result in inconsistencies among similarly situated regulated firms.[246] Administrators generally prefer uniform standards to more individualized approaches because ignoring differences among firms reduces decisionmaking costs and may reduce strategic behavior by firms seeking special treatment from regional federal administrators, state or local officials, or pursuing costly litigation in order to obtain a variance from uniform standards.[247] Professor Howard Latin has argued, "the implementation of variances based on individualized circumstances raises numerous problems: high decisionmaking costs, frequent litigation, inconsistent results, persistent delays, increased opportunities for manipulative behavior by applicants or administrators, and inadequate participation."[248] Perhaps for these reasons, courts now rarely require that "legislative" rules include waiver provisions.[249] The case against exceptions and for uniform application may be especially strong where regulatory schemes further important national objectives such as health or safety or civil rights.[250]

2. *Air and Water Pollution Control Variances.*

a. Air Pollution Variances, Revisions and Extensions.

It is useful to examine how Congress and the EPA have provided for exceptions as part of the current regime for air and water pollution control. For criteria air pollutants, variance applications from requirements in a state implementation plan[251] are typically reviewed and initially determined at the state level,[252] require rea-

246. Colin S. Diver, *The Optimal Precision of Administrative Rules*, 93 YALE L. J. 65, 70-71 n.31 (1983); Latin, *"Fine-Tuning"*, *supra* note 11, at 1324 n.286; Stewart, *Innovation*, *supra* note 154, at 1319 n.195 (arguing that waiver process involves high costs and is unlikely to promote innovative technology).

247. *See* Stewart, *Innovation*, *supra* note 154, at 1266; *see generally* Latin, *"Fine-Tuning,"* *supra* note 11.

248. Latin, *"Fine-tuning"*, *supra* note 11, at 1323.

249. *See* Colin S. Diver, *Policymaking Paradigms in Administrative Law*, 95 HARV. L. REV. 393, 419 (1981).

250. *Id.* at 431-32; Sellers, *supra* note 236, at 955.

251. To achieve the National Ambient Air Quality Standards for each criteria pollutant within the statutory time limits, the Act requires each state to adopt and submit for EPA approval a State Implementation Plan specifying how state and local procedures and regulations will enable all areas in a state to achieve those standards. 42 U.S.C. § 7410(a). For critical evaluation of this process, see William F. Pedersen, Jr., *Why the Clean Air Act Works Badly*, 129 U. PA. L. REV. 1059, 1078-88 (1981); Howard Latin, *Regulatory Failure, Administrative Incentives, and the New Clean Air Act*, 21 ENVTL. L. 1647, 1688-1715 (1991).

252. States seeking to revise a plan must follow strict procedures similar to those nec-

sonable notice and a public hearing,[253] and then must be approved by the Administrator of the EPA as a revision to the plan.[254] Subsection 112(i) provides several different types of extensions for sources of air toxics, but these exemptions merely postpone the inevitable and do not provide a permanent exception from applicable technology-based emissions standards provided in subsection 112(d).[255]

b. Clean Water Act Variances.

Effluent limitations for point sources under the Clean Water Act are primarily based upon industry-wide technology-based standards.[256] Similarly, subsection 112(d)'s technology-based emission limitations are promulgated for categories and subcategories of industry.[257] Thus, the Clean Water Act may serve as a potential model for developing an exceptions process for sources of air toxics.

c. Fundamentally Different Factors Variance.

The Clean Water Act provides a far more complex series of variances and modifications than the Clean Air Act.[258] Subsection

essary for approval of the original plan. 42 U.S.C. § 7410(k), (*l*); 40 C.F.R. § 51.104 (1993); Melnick & Willes, *supra* note 182, at 213-14.

253. 42 U.S.C. § 7410(*l*); 40 C.F.R. § 51.104.

254. *See* 42 U.S.C. § 7410(*l*); 40 C.F.R. §§ 51.104, 51.105, 51.112 (1993). *See generally* Train v. Natural Resources Defense Council, 421 U.S. 60 (1975) (holding in dicta that proposed revisions cannot be approved by EPA if it would cause the plan to fail to ensure maintenance of the national standards). The 1990 Amendments repealed the revision provisions discussed in *Train*, 42 U.S.C. § 7410(a)(3), and added the somewhat more stringent provisions in § 110(*l*), which state that "[t]he Administrator shall not approve a revision of a plan if the revision would interfere with any applicable requirement concerning attainment and reasonable further progress (as defined in section 7501 of this title), or any other applicable requirement of this chapter." 42 U.S.C. § 7410(*l*). Until the EPA approves a plan revision, the federal government may still enforce the original plan even though the variance may bar state or local enforcement. 40 C.F.R. § 51.105. General Motors Corp. v. United States, 496 U.S. 530, 540-41 (1990).

255. *See* 42 U.S.C. §§ 7412(i)(3) (compliance schedule for existing sources), (4) (Presidential exemption), (5) (early reductions), (6) (other reductions), (7) (extension for new sources), (8) (coke ovens).

256. *See generally* 33 U.S.C. §§ 1311(b), 1314(b) (1988); E.I. du Pont de Nemours & Co. v. Train, 430 U.S. 112 (1977) (holding EPA may by rule set industrywide effluent standards under Clean Water Act rather than set standards as part of the permit-issuance process for individual plants). Under § 302 of the Clean Water Act, the Administrator of the EPA may impose more stringent water quality-based limitations on discharges if technology-based standards are inadequate. 33 U.S.C. § 1312.

257. *See supra* section II.A.

258. *See* William F. Ford, Jr., *Third Circuit Review, Fundamentally Different Factor Vari-*

HeinOnline -- 13 Stan. Envtl. L. J. 317 1994

301(*l*) of the Clean Water Act, however, limits exceptions for point sources discharging toxic pollutants to fundamentally different factors variances under subsection 301(n).[259] Adopted in 1987, subsection 301(n) allows the Administrator, with the concurrence of the relevant state, to modify national effluent guidelines or categorical pretreatment standards, which govern sources that discharge toxic pollutants into publicly-owned treatment works rather than directly into navigable waters. Congress or the EPA should consider establishing a fundamentally different factors variance for sources of air toxics. A broader exception process, however, is needed that takes into account a source's actual impact on ambient air quality.

The Supreme Court in *EPA v. National Crushed Stone*, held that an individual firm's inability to comply with national effluent standards because of economic hardship, could not exempt that firm from meeting *minimum* industry-wide standards.[260] From the standpoint of economic theory, "hardship" exceptions are inadvisable because they reward a firm for being less efficient than other firms in an industry.[261] Because of the health hazards of air toxics, simple financial distress should not relieve sources of air toxics from subsection 112(d)'s technology-based requirements or even the more stringent residual risk requirements. There should, therefore, be no "hardship" exceptions for producers of air toxics.

Subsequent court decisions have established that fundamentally different factors variances may not be issued based upon the source's impact on water quality.[262] Thus, a firm must demonstrate engineering and technical constraints or compliance costs from

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ances Under the Clean Water Act: Should They be Applicable to Toxic Pollutants, 29 VILL. L REV. 771, 784-88 (1984) (discussing several variance and modification provisions under Clean Water Act).

259. 33 U.S.C. §§ 1311(*l*), (n).

260. 449 U.S. 66, 72-85 (1980). In § 301(c) of the Clean Water Act, Congress had established a procedure for granting individual sources a modification from the timetables for complying with more stringent "best available technology" effluent standards, 33 U.S.C. § 1311(c), but there was evidence that Congress did not intend to allow similar modifications based upon an individual source's financial distress as a grounds for an exception from complying with the "best practicable technology currently available" standards that every firm had to meet or shut down. *See National Crushed Stone*, 449 U.S. at 73-84.

261. From an economist's perspective, a variance for economic hardship (as opposed to a cost-benefit analysis) makes no sense.

262. *See* Chemical Mfrs. Ass'n v. Natural Resources Defense Council 470 U.S. 116, 132 (1985); Appalachian Power Co. v. EPA, 671 F.2d 801 (4th Cir. 1982) (*Appalachian III*); Crown Simpson Pulp Co. v. Costle, 642 F.2d 323, 326 (9th Cir.), *cert. denied*, 454 U.S. 1053 (1981); Ford, *supra* note 258, at 791 n.89.

HeinOnline -- 13 Stan. Envtl. L. J. 318 1994

engineering, technical or raw material requirements that are fundamentally different from other firms.[263]

There is an internal logic to excluding water quality factors from consideration in granting fundamentally different factors variances.[264] A source's actual impact on air quality, however, ought to be grounds for granting a "fairness" variance from subsection 112(d)'s technology-based standards or subsection 112(f)'s residual risk requirements.[265] A fairness exception is appropriate where an individual firm's compliance with categorical standards would result in no significant environmental benefit.[266] A more difficult question arises where compliance results in some reduction in risk, but there are disproportionately high costs in relationship to the benefits achieved. The issues surrounding a "fairness" exception for sources of air toxics will be discussed below.

In *Chemical Mfrs. Ass'n v. Natural Resources Defense Council*,[267] the Supreme Court explained that a source of water toxics seeking a fundamentally different factors variance must prove that the EPA should have placed the firm in a separate subcategory during the rulemaking process.[268] When this case was decided in 1985, subsection 301(*l*) prohibited the Administrator from modifying any requirement applicable to toxic pollutants and did not yet contain the exception for fundamentally different factors variances added in 1987.[269] In a five to four decision, the Supreme Court held that there was no clear congressional intent indicating whether fundamentally different factors variances were precluded under subsection 301(*l*) and that the EPA's interpretation that fundamentally

263. *See Chemical Mfrs. Ass'n* 470 U.S., at 156 (Marshall, J., dissenting); 40 C.F.R. § 403.13(d)(5); Latin, *"Fine-Tuning"*, *supra* note 11, at 1315-16.

264. *Appalachian Power Co.*, 671 F.2d at 809 ("Because receiving water quality is clearly excluded in the setting of generic BPT [best practicable technology] limitations, it must also be excluded in determining whether to grant a variance from those general limitations.").

265. *See* text accompanying notes 293-95.

266. *See Chemical Mfrs. Ass'n* 470 U.S., at 162 n. 21 (Marshall, J., dissenting); Aman, *supra* note 179, at 311-12.

267. 470 U.S. 116 (1985); *Compare* William Funk, *The Exception That Approves the Rule: FDF Variances Under the Clean Water Act*, 13 B.C. ENVTL. AFF. L. REV. 1 (1985) (criticizing *Chemical Mfrs.* allowance of variances from toxic effluent limitations, but arguing that case will have little significance) *with* Elaine Eichlin Henninger, Note, *Chemical Manufacturers Association v. Natural Resources Defense Council, Inc.: Congressional Ambiguity Allows EPA's Safety Valve to Remain Open*, 35 CATH. U. L. REV. 595 (1986) (arguing Supreme Court correctly deferred to EPA's statutory interpretation allowing variances).

268. *Chemical Mfrs. Ass'n.*, 470 U.S. at 120-21.

269. *Compare* 33 U.S.C. § 1311(l) (1988) *with* 33 U.S.C. § 1311(l) (1984).

HeinOnline -- 13 Stan. Envtl. L. J. 319 1994

different factors variances are not modifications as the term is used in subsection 301(*l*) was permissible. The court also found that in the absence of clear congressional intent courts should defer to the agency's interpretation of the statute and held that such variances are therefore available to sources of toxic pollutants.[270]

In his dissenting opinion, Justice Marshall argued that the EPA's interpretation of subsection 301(*l*) was inconsistent with the clear intent of Congress.[271] He acknowledged that the EPA has the authority to establish a separate subcategory and effluent standards for a single source discharging water toxics that is fundamentally different from other sources in the original category or subcategory, but disagreed with the EPA's position that revision of the standards through notice-and-comment rulemaking is substantially equivalent to granting an fundamentally different factors variance even if the procedure is somewhat different.[272] Justice Marshall argued that "Congress attached great *substantive* significance to the method used for establishing pollution control requirements."[273] He contended that having individual states or the EPA evaluate a variance application for a single source was no substitute for evaluating whether there are similarly situated dischargers that deserve their own subcategory.[274] For example, the effluent standards for a group of similarly situated dischargers in a new subcategory might be significantly more stringent or more likely to spur technological innovation than those set for a single source granted a fundamentally different factors variance.[275] Even if the statutory revision procedure resulted in the creation of a subcategory with only one discharger, that procedure would at least establish that this discharger is uniquely situated whereas a variance procedure sets individual requirements even where there may be similarly situated dischargers.[276]

In the concluding section of his dissent, Justice Marshall argued that Congress intended to prohibit any exceptions to the general rules for water toxics.[277] He acknowledged that exceptions may

270. *Chemical Mfrs. Ass'n*, 470 U.S. at 125-34.

271. *Id.* at 135-65.

272. *See id.* at 153-54 (Marshall, J., dissenting).

273. *Id.* at 154 (Marshal, J., dissenting) (emphasis in original).

274. *Id* at 156.

275. *Id.* at 157.

276. *Id.* at 158.

277. *Id.* at 159-65. Justices Blackmun and Stevens joined his dissent, but Justice O'Connor "express[ed] no view as to Part IV of the dissent because I think it is not necessary to the disposition of these cases." *Id.* at 165 (O'Connor, J., dissenting).

HeinOnline -- 13 Stan. Envtl. L. J. 320 1994

"mediate between demands for comprehensive solutions on the one hand, and individualized application of law on the other."[278] He contended, however, that exceptions "are inappropriate where small errors could lead to irreversible or catastrophic results" and that Congress had clearly indicated that an exceptions process would interfere with controlling toxic pollution.[279] Thus, fundamentally different factors variances are prohibited as any other type of "fairness" or "hardship" exception would be.[280] On the other hand, revision of existing categories and creation of new subcategories are appropriate "because they are rules of general applicability."[281]

"Fairness" exceptions are preferable on both on equity and efficiency grounds. Prohibiting any exceptions and requiring revision of categories through the rulemaking process would provide more procedural and thus more substantive protections to the public, but the EPA's delays in promulgating technology-based rules pursuant to subsection 112(d) despite firm congressional deadlines suggests that rulemaking is too cumbersome. The majority in *Chemical Mfrs. Ass'n* agreed with the agency that the availability of "variances makes bearable the enormous burden faced by EPA in promulgating categories of sources and setting effluent limitations."[282] The administrative convenience of an exception process outweighs the potential disadvantages suggested in Justice Marshall's dissent as long as appropriate safeguards are in place: allowing individual exceptions, but requiring a source in its variance application to discuss whether there are similarly situated sources and mandating that the EPA consider such information in determining whether to grant an individual exception and in setting the appropriate standard for that source. Furthermore, citizens would have the opportunity to challenge a source's assertion that it is uniquely situated and would have the opportunity to obtain government grants to investigate whether other sources are similarly situated. Nevertheless, Justice Marshall's dissent demonstrates that procedural differences can have substantive consequences.

Despite the enormous litigation surrounding fundamentally dif-

278. *Id.* at 159 (citing Diver, *Policy Making Paradigms*, *supra* note 249).

279. *Id.* at 159-61.

280. *See id.* at 161-65.

281. *Id.* at 165.

282. *Id.* at 132.

HeinOnline -- 13 Stan. Envtl. L. J. 321 1994

ferent factors variances, the EPA has granted relatively few.[283] The EPA should be able to grant exceptions not only for sources meeting the criteria for such variances, but also where the cost of regulation is clearly disproportionate to a source's actual impact on the environment and the exception will not pose an unacceptable health risk.

d. Ambient Quality "Fairness" Exceptions.

The Clean Water Act contains a water quality-related variance in subsection 316(a) for sources demonstrating that thermal effluent limitations are "more stringent than necessary to assure the pro[t]ection and propagation of a balanced, indigenous population of shellfish, fish, and wildlife . . . ."[284] Subsection 301(h) authorizes a water quality-related exception for publicly owned treatment works whose discharges do not interfere with attainment of the national water quality goal in marine waters in recognition of the ocean's natural assimilative capacity.[285] Professor Latin contends that the EPA has granted too many exemptions under both provisions and that such exceptions produce negative overall policy results even if some sources genuinely deserve a variance.[286]

The most interesting example of a water quality-related variance is contained in subsection 301(g), which allows modifications for certain nonconventional pollutants.[287] Nonconventional pollutants are all pollutants that are not classified either as conventional or toxic pollutants.[288] Nonconventional pollutants are sometimes referred to as "gray area" pollutants because some may be reclassi-

283. By 1984, the EPA had been granted a total of four fundamentally different factors variances to direct dischargers, and none to indirect dischargers. *Id.* at 124 n.12.

284. 33 U.S.C. § 1326; Latin, *"Fine-Tuning", supra* note 11, at 1320-21 (criticizing wholesale exemptions EPA granted to thermal polluters).

285. 33 U.S.C. § 1311(h); Latin, *"Fine-Tuning", supra* note 11, at 1321-22 (criticizing excessive number of marine water exceptions).

286. *See generally* Latin, *"Fine-Tuning", supra* note 11, at 1320-23. Sometimes courts required the agency to read an exception in an expansive manner. *See, e.g.* Natural Resources Defense Council, Inc. v. EPA, 656 F.2d 768 (D.C. Cir. 1981) (rejecting EPA's narrow interpretation of Clean Water Act § 301(h)).

287. 33 U.S.C. § 1311(g).

288. *Id.* § 1311(b)(2)(F). Conventional pollutants are those which were traditionally regulated in discharges from publicly owned treatment works and include biochemical oxygen demand, suspended solids, fecal coliform, pH, oil, and grease. WILLIAM MURRAY TABB & LINDA A. MALONE, ENVIRONMENTAL LAW 454 (1992). *See generally* 33 U.S.C. §§ 1311(b)(2)(E); 1314(b)(4)(A)-(B). Toxic pollutants are listed pursuant to requirements set forth in section 307 of the Clean Water Act. 33 U.S.C. § 1317.

HeinOnline -- 13 Stan. Envtl. L. J. 322 1994

fied in the future as toxic pollutants.[289] In 1987, Congress defined "nonconventional" to include ammonia, chlorine, color, iron, and total phenols, and also granted the EPA authority to list additional pollutants.[290]

Subsection 301(g) authorizes the EPA to grant a modification of "best available technology" requirements for direct dischargers of nonconventional pollutants that can demonstrate compliance with minimal technology- or water quality-based standards in subsections 301(b)(1)(A) or (C), that the modification will not result in any additional requirements on any other point or nonpoint source, and that the modification will not interfere with water quality-related standards.[291] The petitioner must show that the modification will not interfere with public drinking water supplies, recreational activities, or the protection and propagation of shellfish, fish, and wildlife.[292] Furthermore, the owner or operator of the point source must demonstrate that the modification will not "pose an unacceptable risk to human health or the environment because of bioaccumulation, persistency in the environment, acute toxicity, chronic toxicity (including carcinogenicity, mutagenicity or teratogenicity), or synergistic propensities."[293]

Congress should amend the Clean Air Act by establishing a fairness exception system for sources of air toxics where a source can demonstrate that the cost of regulation disproportionately exceeds the public health benefits provided the source can satisfy air quality-related criteria similar to those for water quality in subsection 301(g) of the Clean Water Act.[294] A major question is whether fairness exceptions to the Clean Air Act should be applied to toxic chemicals where great uncertainty exists of their health effects.[295] Congress clearly excluded water toxics from the subsection 301(g)

289. *See generally* JOHN E. BONINE & THOMAS O. MCGARITY, THE LAW OF ENVIRONMENTAL PROTECTION 269, 293, 322 (2d ed. 1992).

290. 33 U.S.C. §§ 1311(g)(1), (4). The version of § 301(g) adopted in 1977 had not listed any particular chemicals as nonconventionals. 33 U.S.C. § 1311(g) (1978).

291. 33 U.S.C. § 1311(g)(2). Indirect dischargers into publicly owned treatment works are ineligible for a § 301(g) modification. Koppers Co., Inc. v. EPA, 767 F.2d 57 (3rd Cir. 1985) (per curiam).

292. 33 U.S.C. § 1311(g)(2)(C).

293. *Id.*

294. This author would probably favor expanding subsection 301(g) to include water toxics, but will not directly address whether the same arguments for fairness exceptions apply to water toxics.

295. *See supra* notes 65-78 and accompanying text.

HeinOnline -- 13 Stan. Envtl. L. J. 323 1994

water quality-related variance program.[296] Similarly, because subsection 112(d)'s technology-based emission standards "shall require the maximum degree of reduction in emissions of hazardous air pollutants subject to this section (including a prohibition on such emissions, when achievable) that the Administrator, taking into consideration the cost [and other factors], determines is achievable . . .", a strong argument can be made that sources of air toxics are not entitled to a variance even if their residual risk is far below one-in-one-million.[297]

While fairness exceptions would pose some risk to the public health, applicants for exceptions would have to demonstrate on a site-specific basis that their pollution does not pose an unacceptable risk. Thus, this Article's proposed variance process would contain far more safeguards than the Bush administration's trading scheme for sources in the early reductions program.[298] The following study demonstrates some powerful reasons for allowing more regulatory flexibility despite the risks of toxic chemicals.

e. The Amoco-EPA Study: The Case for Flexible Regulation.

A recent joint Amoco-EPA study of Amoco's Yorktown, Virginia refinery sought to assess how well current environmental regulations and pollution control requirements work at an individual source through extensive monitoring of actual emissions. The study's findings demonstrated ways to reduce pollution at less cost than is possible following current regulatory techniques.[299] The re-

296. *See* 33 U.S.C. § 1311(g)(4).

297. *See* 42 U.S.C. § 7412(d)(2). There is no variance procedure from § 112's technology-based emission standards for *individual* sources of hazardous air pollutants. Under § 112(c)(9), however, a source category would not be subject to technology-based standards if no source in the category emits such hazardous pollutants in quantities that result in a lifetime cancer risk of one-in-one-million to the most exposed individual and emissions from non-carcinogenic pollutants do not exceed air quality levels beyond those necessary to protect the public health with an ample margin of safety. This deletion provision applies only to whole source categories and not to individual sources.

298. Possible changes to emission averaging policies may require sources engaged in "trading" of hazardous air pollutants to conduct risk assessments that would be similar in nature, although potentially more limited in scope, to the site-specific exposure assessments proposed in this Article. *See supra* note 110 and accompanying text.

299. *See generally* AMOCO, *supra* note 8; *see also* Keith Schneider, *Unbending Regulations Incite Move to Alter Pollution Laws*, N.Y. TIMES, Nov. 29, 1993, at A1, A11 (discussing Amoco/EPA study); Caleb Solomon, *Clearing the Air: What Really Pollutes*, WALL ST. J., March 29, 1993, at A1, A6 (same). The project took two years, cost $ 2.3 million, and produced volumes of information on air, water and solid waste releases. AMOCO *supra* note 8, at vi. The study faced difficult problems in identifying, sampling and monitoring emissions from thousands of valves, flanges, pump seals and tank vents. *Id.* at 1-4, 1-5, 1-16, 1-17, B-1, B-2.

HeinOnline -- 13 Stan. Envtl. L. J. 324 1994

finery was spending $31 million to rebuild the refinery's waste-water system to prevent benzene, an air toxic, from evaporating into the air, but no controls were required at marine loading docks that emitted far more pollution and could be controlled at far less cost—just $6 million.[300] The regulation requiring the cleanup of benzene at refinery's waste-water treatment plants was based upon 1959 benzene emissions estimates from pools of dirty water known as "separators" that the Yorktown study showed to be twenty times less than the 1959 study predicted.[301] Under current law, however, there are no provisions that allow the EPA to exempt sources of hazardous air pollutants from nationwide, uniform technology-based requirements even if alternative approaches to regulation might be more efficient or result in less pollution.[302] In particular, the study pointed out that current administrative procedures discourage a coordinated approach to multimedia releases, including the analysis of risks, benefits, and costs of managing residual pollutants in different media.[303] The study recommends that incentives be provided for conducting facility-wide assessments and developing multi-media release reduction strategies.[304] The Amoco-EPA study raises important questions concerning the EPA's authority to exempt a particular facility from national pollution control standards if site-specific exposure modeling indicates there are alternative methods to reduce pollution at less cost or the expense of regulation is disproportionate to the risk posed by a pollutant or combination of pollutants.

There are good policy reasons to favor variances from technology-based standards despite Professor Latin's arguments and congressional intent to establish subsection 112(d) standards as a minimum. Noncancer, multimedia and other potential impacts may not be addressed until industry has an incentive to conduct

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The EPA pointed out that samples were collected over a short period of time and therefore represent a "snapshot" of releases to the environment at that time. Because of both practical and perhaps inherent uncertainties in risk assessments, the study could not establish absolute risk levels or measure the ecological impact from airborne emissions, but focused on the more narrow issue of measuring relative changes in risk from current levels on human health effects indicated by changes in exposure to benzene. *Id.* at 1-1, 1-2, B-4.

300. *See* AMOCO *supra* note 8, at viii, 1-7, 1-11, 1-12; Solomon, *supra* note 299, at A1, A6. There was some disagreement between EPA and Amoco about some specific measurements and results, but both agreed wastewater is a small contributor to total benzene releases. AMOCO, *supra* note 8, at 1-12.

301. *See* Schneider, *supra* note 299, at A11; Solomon, *supra* note 299, at A6.

302. *See* AMOCO *supra*, note 8, at ix, 1-12, 1-15, 1-16.

303. *Id.* at ix, 1-18.

304. *Id.* at 1-17, 1-18.

HeinOnline -- 13 Stan. Envtl. L. J. 325 1994

site-specific facility-wide assessments and develop multi-media release reduction strategies. The EPA simply did not know about the importance of benzene emissions from loading docks at Amoco's Yorktown refinery until a joint study was done.[305] After this study, the EPA is considering new regulations to control benzene emissions at loading docks, but those regulations will not take effect for a few years.[306] Meanwhile, Amoco continues to spend huge amounts on controlling relatively small amounts of benzene emissions from wastewater, but allows benzene emissions from its loading docks to continue because there are no regulations.[307] The Amoco-EPA study suggests that the whole approach to regulation needs to be framed in terms of tailoring regulations to individual plants.

IV. LEGISLATING RESIDUAL RISK AND PUBLIC PARTICIPATION STANDARDS

A. *When EPA Should Impose More Restrictive Regulations on a Facility*

This Article proposes that Congress enact a "fuzzy bright line" statute for regulating residual risk that would: (1) require the elimination of cancer risks greater than one-in-ten-thousand from any pollutant or combination of pollutants; (2) would presumptively allow industry variances from technology-based standards if cancer risks are less than one-in-one-million and there are no other significant dangers from noncancer or multimedia risks, and (3) would allow the agency limited discretion in regulating risks between those figures in light of economic costs and technological feasibility. The proposed statute would require that the EPA or states hold formal public hearings and prepare more detailed administrative records than normally required for the Title V operating permit program if a source applies for a variance from technology-based standards. It would also allow the public to compel hearings on a source's permit application or reapplication if they present evidence of significant risks from carcinogens, noncarcinogens, "hotspots," multimedia pollution, indirect effects, or potentially disparate impacts on diverse, exposed subpopulations.

The proposal raises important questions such as about the ex-

305. *See* Solomon, *supra* note 299, at A6.
306. *Id.*
307. *Id.*

HeinOnline -- 13 Stan. Envtl. L. J. 326 1994

tent to which Congress should allow the EPA flexibility in exempting a source from technology-based standards if the source argues it can achieve other reductions. The incommensurability of many different types of risks suggests that Congress must define priorities and constrain the agency's discretion by establishing ranges in which the agency may operate. The difficult problems of assessing risk raises questions about what types of exposure assessments are appropriate to gather information. Must a source engage in actual monitoring or simply rely on models? Congress could establish a preference for actual monitoring, but give the agency some discretion in allowing modeling.

In addition to showing the shortcomings of the residual risk provisions of subsection 112(f), this Article has argued that public participation in environmental decisionmaking is an important policy consideration. In this section, this Article will discuss *how* the proposal would allow greater meaningful participation than the current system. This section will briefly discuss under what circumstances the EPA should impose additional procedures, including public hearings or site-specific exposure assessments, and especially more restrictive regulations on an individual facility when a citizen alleges that national standards do not adequately protect the public safety. It will also suggest how the EPA might implement an exceptions process that can impose more restrictive regulations on some firms while also allowing more lenient variances from national standards in favor of other sources.

In determining whether to impose additional procedural requirements on a source when a citizen requests a public hearing or a site-specific risk assessment, the EPA should consider the cost of such procedures, but should err on the side of enhancing public participation. In determining whether to impose more stringent regulations on an individual source, the EPA should attempt to compare the costs and benefits of regulation but err on the side of public safety. The proposal would require the EPA or industry to fund technical assistance grants to allow citizens to substantiate serious concerns about a facility's risk.

This Article would allow the agency to consider rapidly escalating costs that fail the "knee-of-the-curve"[308] benefit-cost test in determining whether to grant a citizen's request for more restrictive regulation of a particular facility than required by national stan-

308. *See infra* note 320 (discussing "knee-of-the-curve" test).

HeinOnline -- 13 Stan. Envtl. L. J. 327 1994

dards.[309] There are, however, important normative reasons to prevent potential environmental and health-related harm even if such safeguards fail cost-benefit analysis[310] There are also reasons to believe that the tort system may be inadequate to compensate all potential victims.[311]

The ultimate goal of Congress was to achieve maximum reductions for each hazardous air pollutant. Even the residual risk standards do not require the EPA or a major source to consider the impact of individual pollutants. That omission would be fine if each chemical caused the same disease and affected each exposed subpopulation in the same way, but in fact different types of hazardous air pollutants can cause different diseases and can have a greater or lesser impact on different subpopulations. Furthermore, there may be potential multiplicative or synergistic impacts from different chemicals which increase the risk of cancer or other diseases.[312] Site-specific exposure assessments of individual pollutants may produce benefits by producing information useful for other regulatory programs or helping to develop more flexible regulatory approaches better suited to addressing multimedia problems.[313] This Article proposes to establish a presumption in

309. *See generally* Chemical Mfrs. Ass'n v. EPA, 870 F.2d 177, 204-06 (5th Cir. 1989) (rejecting industry challenge that EPA regulations failed "knee of curve" test).

310. Professors Shapiro and McGarity have argued that tough technology-based controls should be used even if those controls may fail a cost-benefit test because, for normative reasons, they would prefer to prevent injuries to the extent feasible, rather than compensate for injuries after they occur. Shapiro & McGarity, *supra* note 80, at 751. They also maintain, however, that cost-benefit analysts underestimate the value of a life and that worker compensation systems pay workers less than the full economic value of their lives, as defined by economists. *Id.*; *see also* VISCUSI, *supra* note 79, at 17-18 (loss of earnings does not reflect full value of worker's life). Their arguments would apply even more powerfully to neighbors of plants using such substances because their exposure is involuntary and because workers in at least some sense "volunteer" to work for a firm using high-risk chemicals and generally receive wage premium for such work. *See* VISCUSI, *supra* note 79, at 44; Gillette & Krier, *supra* note 79, at 1071-86 (arguing that ordinary persons correctly consider voluntary versus involuntary distinction in assessing acceptability of risk).

311. In another article, this author argued that firms using extremely hazardous materials may not fully internalize those costs because of the possibility of filing for bankruptcy and that insurance requirements may not be adequate to force firms to internalize fully such costs. *See* Bradford C. Mank, *Preventing Bhopal: "Dead Zones" and Toxic Death Risk Index Taxes*, 53 OHIO STATE L.J. 761, 791-97 (1992). An even larger problem is the difficulty of proving causation in toxic tort suits. *See, e.g.*, Applegate, *Perils*, *supra* note 22 , at 272 n.59; Daniel A. Farber, *Toxic Causation*, 71 MINN. L. REV. 1219 (1987).

312. In general, the EPA's risk assessment methods for hazardous air pollutants do not take into account the possibility of synergistic and antagonistic effects of various pollutants. *See* Sawey et al., *supra* note 71, at 482.

313. The recent Amoco-EPA study indicates that individualized risk assessments can yield benefits in identifying less expensive ways to achieve the same pollution reductions.

HeinOnline -- 13 Stan. Envtl. L. J. 328 1994

favor of more restrictive regulation of individual plants if a citizen can produce substantial evidence demonstrating that significant risks from individual pollutants exist at a facility that are not addressed by existing national regulation and that the costs of additional regulation are not disproportionate to the expected benefits.

There are a variety of ways that Congress might develop a "fuzzy bright line" or risk range approach to regulation. This Article will distinguish between the use of noncarcinogenic risk and other factors as either comparison factors or consideration factors. The technology-based standards in the Clean Water Act distinguish between *comparison factors* that require the EPA to undertake a limited balancing test in which the cost of technology-based controls are compared against effluent reduction benefits, and *consideration factors* that the agency must simply "take into account."[314] In determining "best practicable technology currently available" under the Clean Water Act, the limited comparison factors balancing test requires the EPA "to limit the application of technology only where the additional degree of effluent reduction is *wholly out of proportion* to the costs of achieving such marginal level of reduction for any class or category of sources."[315] By contrast, "Congress did not mandate any particular structure's or weight for the many consideration factors," but merely "left EPA with discretion to decide how to account for the consideration factors, and how much weight to give each factor."[316]

This Article's proposal would require the EPA to undertake a comprehensive cost-benefit comparison test whenever possible to estimate the risk of granting an exception from national standards where a firm contends that the costs of regulation at one of its

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While the study was costly and difficult to perform, the EPA and Amoco identified ways to achieve greater pollution reductions for about $11 million than are being achieved at a cost of $41 million under current agency regulations. *See* AMOCO *supra*, note 8, at viii-ix, 1-11, 1-23 (Table 1.3).

314. For example, pursuant to § 304(b)(1)(B) of the Clean Water Act, the EPA must take into account both consideration and comparison factors in determining the best practicable technology currently available. 33 U.S.C. § 1314(b)(1)(B); *see generally* Weyerhaeuser Co. v. Costle, 590 F.2d 1011, 1045-47 (D.C. Cir. 1978). By contrast, in § 304(b)(2)(B) of the Clean Water Act all factors, including costs and benefits, are consideration factors, and no factors are separated out for comparison in determining the best available technology economically achievable. 33 U.S.C. § 1314(b)(2)(B); *Weyerhaeuser*, 590 F.2d at 1045.

315. *Weyerhaeuser*, 590 F.2d at 1045 n.52 (quoting SENATOR MUSKIE, A LEGISLATIVE HISTORY OF THE WATER POLLUTION CONTROL ACT AMENDMENTS OF 1972 170 (1973)) (emphasis added by *Weyerhaeuser* court).

316. *Id.* at 1045.

HeinOnline -- 13 Stan. Envtl. L. J. 329 1994

facilities are wholly disproportionate to health benefits achieved. On the other hand, the EPA would have to assess whether additional regulations proposed by a citizen for a plant are reasonably cost effective for the health benefits that would be gained. In some cases, the EPA may have to apply a "consideration approach" in which the agency simply takes into account health and cost factors where there is insufficient information with which to assess the risks of a chemical or the potential cost of reducing its emissions. Because of the great uncertainties about the risks posed by many hazardous air pollutants, this Article's proposal would allow the EPA to err on the side of conservative health assumptions in determining whether the costs of technology-based or residual risk standards are wholly disproportionate to the costs of regulation at a particular facility.

Congress might set some limits on the agency's balancing of health and cost factors by specifying a list of factors that may or may not be considered. For example, a statute could simply require the EPA to consider noncarcinogens, indirect and multimedia impacts, impacts on diverse exposed subpopulations and other "public" risk considerations. The advantage of such an approach is that no attempt would be made to assign arbitrary weights to factors that are incommensurable. A simple "consideration" factor approach, however, may not give the EPA enough congressional guidance on how to weigh such factors.

On the other hand, Congress could require the EPA to balance the cost and benefits of regulation within certain constraints. A statute might mandate that the marginal cost of a decision to protect public health fall within a range, for instance, of five to fifty million dollars per life saved, and establish criteria directing how agencies should set the level of expenditure in specific rulemaking contexts.[317] For example, Congress might compel expenditures at the high end of the range if the maximum individual risk exceeded a specific value, such as one-in-ten-thousand.[318] In the Superfund program, the EPA uses a "point of departure" approach in which risk managers seek to attain the smallest risk within the range, which places a burden of proof on those advocating a more permissive risk within the risk range.[319] Congress could place a higher

317. Rosenthal et al., *supra* note 7, at 336-38.

318. *Id.*

319. *Id.* at 319-20, 336-38; National Oil and Hazardous Substances Contingency Plan, 55 Fed. Reg 8,666, 8,715-18 (1990) [hereinafter Contingency Plan]. In an April 22, 1991

HeinOnline -- 13 Stan. Envtl. L. J. 330 1994

burden of proof on applicants to the extent their variance proposals may create risks in the upper portion of the risk range. Applicants for variance proposals that have a greater overall excess cancer risk would face a proportionately higher requirement to prove that the variance would not disparately affect diverse subpopulations, create "hot spots," cause non-carcinogenic diseases, or produce multi-media or indirect impacts.

Furthermore, Congress might enact a statute that requires each source to reduce the risk of each noncarcinogen until "the ratio of incremental cost to incremental risk reduction exceeds a specified value."[320] The EPA would clearly have to exercise considerable technocratic discretion in assessing the costs and benefits, for example, of regulating noncarcinogens or multimedia pollution. Nevertheless, the value specified in the statute would provide some congressional guidance to the agency. That value might be fairly arbitrary, but it would bear the imprimatur of legislative legitimacy. That ratio might also constrain the EPA's consideration of costs within the "fuzzy bright line" risk levels for carcinogens. Public participation and judicial review could serve as limited checks in determining whether the EPA's choices in a given variance proceeding are arbitrary or capricious.

A "fuzzy bright line" or risk range approach may encourage regulators to be more forthcoming about uncertainties in the risk assessment approach than they would under a single number standard.[321] In addition, the use of a range that allows consideration of competing interests within the discretionary range might encourage democratic dialogue about the realities of environmental decisionmaking.[322] On the other hand, the EPA may hesitate to assign costs and benefits to risks such as birth defects or neurologi-

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Memorandum from Don R. Clay, Assistant Administrator Office of Solid Waste and Emergency Response, to Directors of Regional Divisions, the EPA indicated a somewhat more lenient approach by allowing a "no action" record of decision where a baseline risk assessment shows a risk less than one-in-10,000, but in some cases in which such an assessment has indicated risks in the higher part of the risk range the EPA has initiated remedial action to achieve a one-in-a-million remediation. Rosenthal et al., *supra* note 7, at 319-20. The EPA is most likely to adopt a one-in-a-million approach when cleanup costs are low or when population density suggests potentially high incidence of disease. *Id.* at 320.

320. *See* Rosenthal et al., *supra* note 7, at 347. The familiar notion of the knee-of-the-curve, the point on the cost curve where costs begin to escalate dramatically, may provide an attractive starting point for answering the difficult question of how much expense on risk reduction is "too much." *See* Shapiro & McGarity, *supra* note 80, at 743.

321. Rosenthal et al., *supra* note 7, at 338.

322. *Id.* at 356.

HeinOnline -- 13 Stan. Envtl. L. J. 331 1994

cal damage. Imperfect regulation of such risks, however, is better than none.

B. *"Fuzzy Bright Lines"*

1. *Current Use of "Fuzzy Bright Lines."*

Legislators could mandate minimal standards but specify a range of numeric values within which regulators could exercise discretion, so called "fuzzy bright lines."[323] For example, a statute might permit an agency to set standards from lifetime cancer risk from carcinogens between one-in-ten-thousand and one-in-a-million.[324] During congressional discussions on the Amendments, a group of moderate Democrats, led by Representative Tauzi, advocated such a risk range and referred to this approach informally as a "fuzzy bright line."[325] Risk managers in several EPA program offices already use such ranges to guide their decisions, without statutory directives.[326] In addition, the New Jersey Department of Environmental Protection's Division of Environmental Quality considers risks less than one-in-a-million to be negligible, risks greater than one-in-ten-thousand to be unacceptable, and judges risks between these limits on a case-by-case basis.[327]

A risk range allows government agencies to balance a number of factors when setting standards within the permissible range of risk.[328] The disadvantage of the "fuzzy bright line" approach compared to a "bright line" or "rules" requirement is that a risk range may give the agency as much discretion as a narrative standard such as an "ample margin of safety" and therefore allow residual risk to cluster at the high end of the risk range.[329] Every type of statute can potentially be manipulated or ignored by an agency. The more discretionary a statute, however, the easier it is for a con-

323. *Id.* at 336-38, 361.

324. *Id.* at 336.

325. *Id.* at 336-37.

326. *Id.* at 337. For example, EPA's Office of Solid Waste in selecting among cleanup alternatives for corrective actions at active waste sites seeks to reduce risks into the one-in-10,000 to one-in-a-million range. *Id.* at 315-16; Corrective Action for Solid Waste Management Units (SWMU's) at Hazardous Waste Facilities, 55 Fed. Reg. 30,798, 30,825-27 (1990). The National Contingency Plan for the Superfund program states that remedies must generally reduce the threat from lifetime cancer risk to a highly exposed individual, a reasonable worst case, to within or below the range of one-in-10,000 to one-in-a-million. Contingency Plan, *supra* note 319, at 8,718-23, 8,768.

327. Rosenthal et al., *supra* note 7, at 337.

328. *Id.* at 337.

329. *See id.*

HeinOnline -- 13 Stan. Envtl. L. J. 332 1994

gressional oversight committee or court to point out flagrant abuses by an agency. To a certain extent, one must rely upon the good faith of an agency in carrying out the statute. If Congress desires to achieve a particular goal and wants the agency to carry out congressional wishes, it is wise for Congress to explicitly require that the agency make efforts to achieve that goal.

2. *Incommensurability and "Fuzzy Bright Lines."*

a. Scientific Uncertainty.

Cancer research cannot always specify the risk of a chemical even within a range of two orders of magnitude, a factor of 100.[330] The difficulties in assessing the true range of risk may be even greater under this Article's proposal to include a broader range of factors than carcinogenicity, such as noncarcinogens, indirect and multimedia effects, and impacts on diverse exposed subpopulations. It is more difficult to establish even "fuzzy bright line" values for noncarcinogens that cause birth defects, reproductive failure, acute poisonings, neurological defects and other diseases. In fact, many argue that it is impossible to compare such chemicals with each other or with carcinogens. These scientific ambiguities raise profound questions as to whether there is any legislative metric that can address such problems.

One simplistic solution to the problem of incommensurability would be to require that the EPA simply rank the relative risk of both carcinogens and noncarcinogens on a single risk index. The EPA has already done this for its emissions averaging scheme for the early reductions program. That risk index, however, is based on a series of arbitrary assumptions. There needs to be better scientific evidence about both carcinogens and noncarcinogens before an adequate risk index could be constructed, and even then there would be profound questions about commensurability.[331]

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330. *Id.* at 338.

331. In another article, however, this author advocated a "toxic death risk index tax" designed to force firms to internalize fully the costs of an accidental release despite the possibility of using the federal bankruptcy laws to avoid paying full costs. *See generally,* Mank, *Preventing Bhopal, supra* note 311, at 762, 791-804. That article recognized that some risks, especially long-term ones, are too uncertain to quantify, but maintained that it might be possible to base a tax and risk index upon established risks, especially short-term ones. *Id.* The lack of adequate scientific evidence that plagued the EPA in constructing its risk index for the emissions averaging component of the early reductions program suggests that constructing a risk index that considers the risks of a wide variety of carcinogens and noncarcinogens is beyond present scientific knowledge. Risk indexes may be useful in prioritizing which risks the EPA or other agencies should study given limited resources, but

HeinOnline -- 13 Stan. Envtl. L. J. 333 1994

Some environmentalists would undoubtedly favor legislation mandating rigorous emission standards for both carcinogens and noncarcinogens without any possibility of variances or tradeoffs between regulation of different types of chemicals. There are many reasons to support the "public" approach to risk assessment, especially its proponents' argument that chemicals causing different diseases are incommensurable. Nevertheless, the Amoco-EPA study suggests that agency expertise is limited, and that the public safety can be enhanced where industry has an incentive to increase regulation of certain chemicals or types of operations in exchange for more lenient regulation in other respects. In the absence of industry incentives and variances, Congress or the EPA may simply not regulate certain types of risk, such as those posed by noncarcinogens, and therefore the public safety may benefit from this Article's proposal.

At some point, tradeoffs must be made between acknowledging scientific uncertainty and providing legislative direction through a common metric. Public participation both through the legislative process and public hearings are means to legitimate those tradeoffs in a way that the exercise of agency discretion and expertise cannot.

Another approach would give the EPA discretion to regulate noncarcinogens as the agency sees fit. Arguably, subsection 112(f) currently gives the EPA such discretion in determining what is an "ample margin of safety." The failure of that approach before 1990, however, raises serious concerns about how effectively the agency will address residual risk issues once technology-based controls are in place.

This Article proposes an approach that would acknowledge the considerable uncertainty about the risks of many chemicals, and suggests that the EPA must exercise at least some discretion in evaluating risks at individual sites. On the other hand, Congress would establish a clear priority that the risks of noncarcinogens and other risk factors must be addressed in the EPA's residual risk program.

b. Site-Specific Exposure Assessments.

Site-specific exposure assessments are potentially explosive. The Amoco-EPA project took two years, and cost $ 2.3 million.

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risk indexes seem ill-suited at present to serve as the primary basis for regulating residual risk. *See generally* Applegate, *Worst Things*, *supra* note 22, at 325-27 & *passim* (discussing use of risk indexes to set priorities).

HeinOnline -- 13 Stan. Envtl. L. J. 334 1994

However, it produced volumes of information on air, water, and solid waste releases.[332] In some cases, where a major source requests significant regulatory variances or where a citizen group demonstrates substantial pollution problems, a detailed and site-specific, facility-wide study similar to the Amoco-EPA study may be justified. In many cases, however, the potential risk will not justify such assessment.

This Article suggests ways to reduce costs. First, the proposed statute could provide a formula or guidelines for determining if individualized risk-based assessments are too costly in a particular case. Congress through the statute or the EPA through the rulemaking process could set *de minimis* levels for triggering individualized testing that would reduce the number of sources affected by this Article's proposal.[333] Second, the EPA might allow a variance even without a risk assessment if a source makes other substantial reductions not otherwise required by law that are clearly of more value with regards to public safety.

An important issue is whether the Article's proposal should require actual monitoring of data from a source's emissions or simply rely on less expensive predictive models.[334] In practice, risk assessors usually use a combination of monitoring and models.[335] Even when an agency knows a source's emissions, it is still necessary to make assumptions about how many people are actually exposed and at what concentrations.[336] While monitoring is generally pref-

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332. AMOCO *supra* note 8, at vi.

333. Subsection 112(a)(5) defines "modification" to exclude *de minimis* changes. 42 U.S.C. § 7412(a)(5). Congress, under this proposal, or the EPA through regulations could use the definition of *de minimis* found in that subsection or similar such measures to establish *de minimis* levels for determining when a source must conduct an individualized risk assessment in order to justify a trade.

334. The EPA generally uses predictive models, such as the Human Exposure Model, rather than direct measurements to calculate the exposure of the maximally exposed individual. Rosenthal et al., *supra* note 7, at 291. The agency normally assumes that exposure to a pollutant occurs over 70 years. Some commentators have criticized that assumption as overly conservative because no one spends her entire life outdoors at the fenceline of a factory, and because few factories produce the same products or even exist for seventy years. *See* Bernard Goldstein, *The Maximally Exposed Individual: An Inappropriate Basis for Public Health Decisionmaking*, ENVTL. FORUM, Nov.-Dec. 1989, at 13. *But see* Katherine Kaufman, *In Defense of the Maximally Exposed Individual*, ENVTL. FORUM, Mar.-Apr. 1990, at 50.

335. Assessors usually use a combination of direct ambient level measurements of a compound and, for known sources and emission rates, ambient level modeling. Rosenthal et al., *supra* note 7, at 292.

336. The population risk estimate is more difficult to quantify than the maximum individual risk because the assessor needs to know how many people are exposed to the contaminant, at what levels of concentration, and for what periods of time. Rosenthal et

HeinOnline -- 13 Stan. Envtl. L. J. 335 1994

erable,[337] models have been extensively used to predict site-specific concentrations for both criteria and hazardous air pollutants.[338] Some researchers have questioned the reliability of exposure assessments based upon models. They argue that such models need to be validated by measurements of internal doses in persons or animals actually exposed.[339]

Absent hard data, exposure assessments make assumptions about the amount of water the average person drinks, the amount of air that everyone in the population breathes, and about the population's food intake based upon market basket or national consumption surveys.[340] These assumptions usually do not account for the heterogeneity of the population, including gender differences, age differences, socioeconomic differences, and lifestyle differences.[341] These shortcomings create uncertainties that sometimes produce large overestimates of exposure, especially for estimates of

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al., *supra* note 7, at 291. While consumers and farm workers receive differing exposures and while toxic substances are more likely to situate in minority communities, risk assessors usually assume that a certain quantity of a carcinogen will produce the same incremental increase in cancer risk for any person. *See id.*

337. Researchers prefer detailed monitoring of a pollutant to modeling. Monitoring, however, is expensive, cumbersome, requires actual releases of toxic compounds into the environment and does not prove that a compound will behave similarly in other environments. *See* Rosenthal et al., *supra* note 7, at 292; *see generally* NATIONAL RESEARCH COUNCIL, NATIONAL ACADEMY OF SCIENCES, HUMAN EXPOSURE ASSESSMENT FOR AIRBORNE POLLUTANTS: ADVANCES AND OPPORTUNITIES (1991). Still, monitoring may produce information otherwise impossible to attain and monitoring also helps prevent cheating by sources. *See generally* Clifford S. Russell, *Monitoring and Enforcement, in* PUBLIC POLICIES FOR ENVIRONMENTAL PROTECTION 245-72 (Paul R. Portney ed. 1990). There is general agreement that the EPA in the past has done a relatively poor job of monitoring air emissions. *See generally* Russell, *supra* (arguing that the EPA should conduct more and better ambient air quality monitoring to allow society to assess whether federal pollution control laws are effective).

338. The EPA has stated that the technical basis for determining the impacts on human health and the environment from various sources of air pollution will be improved under a final rule issued by the agency on July 23, 1993 which will add new models and upgrade existing models. *New, Upgraded Models Will Improve Basis for Determining Health Effects, EPA Says*, 24 Env't Rep. (BNA) 515, 515-16 (July 23, 1993) [hereinafter *New, Upgraded Models*].

339. *Exposure Assessments Based on Models Not Always Sound Predictors, Scientist Warns*, 22 Env't Rep. (BNA) 1949, 1949 (Dec. 6, 1991) (reporting speech by Larry Needham, chief of the Centers for Disease Control's Toxicology's Branch).

340. *See* Rosenthal et al., *supra* note 7, at 292-93.

341. *See id.* at 293. The EPA is aware of, and attempts to account for, some variations in individual consumption. In light of Executive Order 12898, which requires federal agencies to consider environmental justice issues, EPA Administrator Browner has stated that the agency would evaluate fish consumption on Indian reservations, where fish may represent a larger portion of the daily diet than is reflected in federal standards. *Pollution Exposure Targeted: Protection of Poor, Minorities Ordered*, CINCINNATI ENQUIRER, Feb. 12, 1993, at A3.

HeinOnline -- 13 Stan. Envtl. L. J. 336 1994

the most exposed individuals.[342] In other cases, serious underestimates may result.[343]

This Article's proposal would expand on the existing residual risk provisions in subsection 112(f)(2)(A), which already requires exposure assessments.[344] The statute requires that the EPA determine whether excess cancer risks at individual major sources of air toxics exceed one-in-one-million for the most exposed individual after technology-based controls are installed.[345] The statute, however, does not specify what method the agency may use to make that assessment.[346] In addition, subsection 112(r)(7)(B) requires the EPA to issue regulations mandating that users of threshold amounts of certain listed hazardous substances prepare and implement a risk management plan that includes a hazard assessment to determine the potential impact of an accidental release of any listed substance.[347] Neither statute, however, provides sufficient Congressional guidance to the EPA regarding what types of information an exposure assessment should collect and how the agency should evaluate that information.

Both monitoring actual emissions and modeling ambient levels can provide useful information. Because there are often complex technical considerations in determining the best approach for a certain situation, Congress should allow discretion.[348] Nevertheless, Congress might establish a goal of monitoring actual emissions whenever it is cost-effective.[349] Variations in human exposure pose even greater problems for both congressional control and risk managers in the EPA. A fuzzy bright line statute could require

342. Neil C. Hawkins, *Conservatism in Maximally Exposed Individual (MEI) Predictive Exposure Assessments: A First-Cut Analysis*, 14 REG. TOXICOLOGY & PHARMACOLOGY 107, 116 (1991) (exposure estimates often overestimate risk, especially for most exposed individual).

343. *See* Rosenthal et al., *supra* note 7, at 293 (discussing impact of heterogeneity on exposure estimates).

344. 42 U.S.C. § 7412(f)(2)(A).

345. *Id.*

346. *See id.*

347. 42 U.S.C. § 7412(r)(7)(B)(ii); Risk Management Programs for Chemical Accident Release Prevention, 58 Fed. Reg. 54,190 (Oct. 20, 1993).

348. *See generally* Rosenthal et al., *supra* note 7, at 348-53 (arguing Congress lacks technical expertise to prescribe risk assessment techniques and that bright line rules might freeze scientific progress in risk assessment).

349. A number of environmental statutes require monitoring, but they rarely require continuous monitoring. *See, e.g.* 42 U.S.C. § 7661c(b) ("continuous emissions monitoring need not be required if alternative methods are available that provide sufficiently reliable and timely information for determining compliance.").

HeinOnline -- 13 Stan. Envtl. L. J. 337 1994

heightened attention to the problems of heterogeneity in proportion to the overall risk from a pollutant or a source's overall emissions.

3. *Public Participation.*

In a major study sponsored by the Conservation Foundation, Richard Liroff has argued that public participation, especially by the Natural Resources Defense Council,[350] has been vitally important in alerting regulators to questionable calculations by industries proposing bubbles for criteria pollutants.[351] Professor Latin has argued that lack of public participation is a major failing of most variance procedures for polluters as well as ordinary zoning variance matters.[352] This Article contends that special measures are necessary to insure adequate public participation in the proposed variance procedures for sources that contend that technology-based regulation of hazardous air pollutants is unnecessarily strict.

This Article proposes following the special measures enumerated below to insure the adequate public participation needed to better regulate hazardous air pollutants.

a. Right to a Public Hearing Established.

EPA or a designated state agency should be mandated to grant and hold a public hearing upon request in the following instances: 1) when a major source requests a variance from technology-based standards in subsection 112; 2) when a major source of hazardous air pollutants files a permit application; 3) a citizen group raises a substantial issue as to whether a major source's operations would pose substantial, carcinogenic, toxic (noncarcinogenic), multi-me-

350. Mary Nichols, formerly an attorney at the Natural Resources Defense Council, is currently the Assistant Administrator for Air and Radiation, the crucial position for establishing policies on air emissions. She may have a major impact in reevaluating the agency's emission averaging policies for air toxics.

351. LIROFF, *supra* note 121, at xvii, 101. The amount of public participation involved in bubble applications for criteria pollutants depends in part on the types of procedures used. The state implementation plan revision process generally provides greater opportunities for public participation than state generic regulations, although the EPA has taken steps to narrow the gap. *See* Emissions Trading Policy Statement; General Principles for Creation, Banking and Use of Emission Reduction Credits, 51 Fed. Reg. 43,814, 43,816, 43,824, 43,835 (1986) [hereinafter Emissions Trading Policy Statement] (EPA promises more oversight in state's public notice and comment process for generic bubble applications).

352. *See* Latin, *"Fine-tuning", supra* note 11, at 1323.

HeinOnline -- 13 Stan. Envtl. L. J. 338 1994

dia, or disparate "hot-spot" type impacts. A citizen group would not be able to challenge an agency's failure to grant or hold a public hearing absent a showing that a source poses a substantial risk. In line with the Supreme Court's holding in *Vermont Yankee Nuclear Power Corp. v. Natural Resources Defense Council*,[353] a citizen has some burden to articulate issues when demanding costly allocation of agency resources. A citizen may not simply raise a list of objections and demand action.

b. Type of Hearing Required.

EPA and state agencies may have legitimate reasons for encouraging more informal hearings[354] even if the applicable statute entitles citizens to the right to a formal process; they may recognize that formal adjudicatory hearings can be costly and time consuming. This article proposes a requirement for formal hearings where 1) a source requests a variance from technology-based standards, 2) the source's excess cancer risk exceeds one-in-one-million, or 3) there are other significant risk factors.

The policy of encouraging citizens to elect informal hearings, can be achieved through creating a lower burden on citizens requesting such informal hearings. This lower burden would apply to the requirement of showing that a source poses a substantial risk even after technology-based standards were in place.

This Article's proposal for formal public hearings where a source seeks a variance or a citizen raises substantial issues about the risks at an individual source would simply give citizens the same

353. 435 U.S. 519 (1978).

354. This Article's proposal must be understood in light of the operating permit rules that apply to public participation. The rules provide for a thirty-day public comment period, and an opportunity for an informal public hearing, with the state providing notice of the hearing at least thirty days in advance. Operating Permit Program, 57 Fed. Reg. 32250, 32309 (1992) (to be codified at 40 C.F.R. Part 70.7(h). In contrast to the National Pollution Discharge Elimination System permit program, which requires formal adjudicatory hearings, *See* Marathon Oil Co. v. EPA, 564 F.2d 1253 (9th Cir. 1977) (formal adjudicatory hearing under Administrative Procedure Act required for issuance of NPDES permit); Seacoast Anti-Pollution League v. Costle, 572 F.2d 872 (1st Cir. 1978) (same); 1 FRANK GRAD, TREATISE ON ENVIRONMENTAL LAW 3-234.6 to 3-237, an air permit hearing need not include trial-type procedures such as cross-examination of witnesses. *See* Operating Permit Program, 56 Fed. Reg.21712, 21742-43 (1991); David P. Novello, *The New Clean Air Act Operating Permit Program: EPA's Final Rules*, Envtl. L. Rep (Envtl L. Inst.) 10,080, 10,089 (1993). Likewise, section 3008(h) of the Resource Conservation and Recovery Act does not require formal "on the record" hearings. *See* Chemical Waste Management, Inc. v. EPA, 873 F.d 1477 (D.C. Cir. 1989). Because formal adjudicatory hearings can be very expensive, most states will probably elect to hold informal hearings instead. *See* Novello, *supra*, at 10089.

HeinOnline -- 13 Stan. Envtl. L. J. 339 1994

rights as they have under the Clean Water Act's permit application process; however, these rights would be greater than those provided under the EPA's new rules for Clean Air Act permits. Clearly, the Bush administration sought less formal procedures for permit hearings under the Amendments as a way to reduce costs and to shorten hearings. While faster and cheaper hearings are appropriate when risks are relatively low, high risks demand formal hearings to allow for more careful consideration of scientific models and risk assessment assumptions.

c. Regulations requiring states to prepare detailed fact sheets; grants for technical assistance.

This Article argues that citizens who lack resources to research well grounded concerns about a sources hazardous air emissions, should not bear the full burden of developing issues without government assistance. This article proposes the following: (1) EPA must issue regulations requiring states to prepare a detailed fact sheet when a source seeks a variance, or when an interested citizen raises substantial risk issues and (2) EPA must provide grants for technical assistance to any group of individuals deemed threatened by significant exposure from a facility's toxic air emissions.[355] Such grants would encourage citizen access in the early stages of decision making. They would allow greater opportunities for citizens to challenge the substantive assumptions in an application, and not rely solely on the more common procedural challenges which seek to kill projects using delay tactics.[356] Congress adopted a similar policy to encourage public participation by citizens who may be affected by toxic releases from Superfund sites.[357] Congress might

355. There are several alternative models of citizen involvement including: a state-funded public interest law firm; the Interstate Commerce Commission Office of Public Counsel; the California private attorney general program; the EPA's Ombudsman concept; institutionalized alternative dispute resolution; negotiated rule-making; citizens boards as regulatory agencies; and a local citizens advisory committee. *See generally* Bruce Comly French, *More Effective Citizen Participation in Environmental Decisionmaking*, 24 U. TOL. L. REV. 389, 391-415 (1993). Providing funds to citizen groups so they can challenge applicant assumptions during permit hearings appears to be the most direct approach to correct informational biases that favor applicants.

356. *Id.* at 390, 420 (arguing applicant should fund expense of information collection).

357. *See* 42 U.S.C. § 9617(e); Ellison Folk, *Public Participation in the Superfund Cleanup Process*, 18 ECOLOGY L.Q. 173, 194-95 (1991). Both the General Accounting Office and the private National Commission on Superfund have recently issued reports suggesting how to improve community involvement in the superfund process that might prove helpful in designing a public participation for hazardous air pollutants. *See generally* NATIONAL COM-

HeinOnline -- 13 Stan. Envtl. L. J. 340 1994

even require industry applicants to fund technical grants to citizen groups.[358]

This Article's proposals for more public participation would reverse certain policies on operational flexibility[359] and minor permit

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MISSION ON SUPERFUND, FINAL CONSENSUS REPORT OF THE NATIONAL COMMISSION ON SUPERFUND 43-46 (Pre-publication draft Dec. 21, 1993) (arguing inflexible limits on technical assistance grants are inappropriate and grants should reflect site's complexity); *Agency Should Solicit Public Input Earlier, Make Information More Accessible, GAO Says*, 24 Env't Rep. (BNA) 2096, 2096-97 (Apr. 15, 1994) (discussing GAO, EPA's COMMUNITY RELATIONS COULD BE MORE EFFECTIVE (Apr. 12, 1994) (arguing EPA's superfund community relations program is generally effective, but that agency should do more to increase public involvement)).

In the early reductions rule, the EPA adopted the one-in-ten-thousand presumptive risk benchmark used in the 1989 Benzene Standard, *supra* note 57, at 38,045-46, and argued that the agency does not have to implement the one-in-million standard until residual risk provisions take effect. *See* Early Reductions Rule, *supra* note 92, at 61,981-82. The EPA could use this one-in-one-million standard to determine eligibility for grants. The Act does provide grants to air pollution control agencies, but providing assistance to citizen groups is a different issue. *See* 42 U.S.C. § 7405 (grants to air pollution control agencies). The Amendments established reward provisions up to $10,000 for citizens who report violations of the Act that lead to a criminal conviction or civil penalty and this system may provide some incentives for citizens to report violations of permit limits, but would not address the larger issue of encouraging public participation in permit hearings. *See* 42 U.S.C. § 7413(f); *Public Participation Provision Could Turn Permitting Process Into 'Nightmare,' Lawyer Says*, 23 Env't Rep. (BNA) 1283 (Aug. 28, 1992) (industry attorney complains that rewards could result in overly zealous enforcement).

358. See French, supra note 355, at 390, 420 (arguing applicant should fund expense of information collection).

359. Section 502(b)(10) of the Act allows certain facility changes without a permit revision if the changes "do not exceed the emissions allowable under the permit." 42 U.S.C. § 7661a(b)(10). The congressional compromises used to reach agreement on this provision make its meaning "difficult, if not impossible to decipher." Novello, *supra* note 354, at 10090. The EPA has taken a complex and somewhat confusing middle position between environmentalists and states on the one hand and industry on the other in interpreting the operational flexibility statute. The EPA rejected the view that § 502(b)(10) is a mandate only to include alternate permitted scenarios in the permit because the agency contended that such a narrow interpretation would render the section "mere surplusage or an unnecessary gloss on a source's obligation under section 502(a) to comply with its permit." Operating Permit Program, *supra* note 254, at 32,267. On the other hand, the agency disagreed with some industry commentators who contended that they could average "all emissions across the 'permitted facility' regardless of whether such averaging would be consistent with the underlying requirements of the Act." *Id.* For example, a facility could not average emissions if a state implementation plan set an emissions limit at each emissions unit at a facility, and averaging would result in a violation of any such emission limit. *Id.* The EPA stated that emissions averaging provisions often required careful review to determine whether the trading plan meets all applicable requirements, and that the seven-day notice provision in § 502(b)(10) "is not a reasonable amount of time to conduct such a review." *Id.* On the other hand, the agency stated that "one policy goal of the Act is to encourage responsible emissions trading plans and to reduce the costs of meeting the Act's requirements." *Id.* Accordingly, the EPA promulgated implementing regulations for § 502(b)(10) "designed to encourage emissions trading as extensively as possible consis-

HeinOnline -- 13 Stan. Envtl. L. J. 341 1994

modifications[360] adopted by the EPA during the Bush Administration.[361] This Article's proposed technical assistance grants are espe-

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tent with the requirement that title V permits comply with the applicable requirements of the Act and the need to ensure a reasonable review of the emissions trading provisions established in a permitting process." *Id.* The regulations allow a source to trade emissions within the permitted facility to meet its state implementation plan limits, where the permit does not already provide for such emissions trading but the plan does. *Id.* (to be codified at 40 C.F.R. § 70.4(b)(12)(ii)). The regulations also require states to allow emissions trading where a source is under a federal emissions cap that is lower than any required under the state implementation plan or other requirements, but such a source would still have to comply with the plan. *Id.* at 32,268-69 (discussing 40 C.F.R. § 7.4(b)(12(iii)). The EPA observed, however, that no plan currently allows sources to opt into an emissions trade based upon a seven-day notice. *Id.* at 32268. The agency stated that it would encourage states to develop such provisions "as part of its efforts to promote market-based regulation under the Act," and would issue final guidance by 1994. *Id.* at 32,268.

360. One of the most controversial parts of the permit regulations are the provisions for minor permit modifications, which do not require public participation nor preclude a source from acting on its application for a modification. *See* Operating Permit Program, *supra* note 354, at 32,281-88. These two aspects of the proposed rule provoked a major battle between the EPA, led by then Administrator William K. Reilly, who believed that they were illegal, and the Council on Competitiveness, chaired by then Vice President Dan Quayle, which argued that the provisions were legal and would provide substantial savings to industry. *White House, EPA Officials to Meet Soon to Rewrite Permit Rule According to Bush Order*, 23 Env't Rep. (BNA) 428, 428-29 (May 29, 1992) [hereinafter *White House*]. The EPA's then General Counsel, Professor Donald Elliott, argued in an internal opinion, which was later leaked and inserted into the rulemaking docket as attachments to comments by David Hawkins of the Natural Resources Defense Council, that the EPA's May 1991 proposal was illegal, but the Department of Justice sharply disagreed with Elliott's reasoning and defended the legality of the minor permit modifications. *See* Novello, *supra* note 354, at 10090-91; Justice Department Opinion on Legality of Comment Provisions of Proposed Clean Air Act Regulations Related to Air Permitting Revisions Comment Period With Accompanying Memorandum, Memorandum for William K. Reilly, Administrator of EPA, from Barry M. Hartman, Acting Assistant General, Department of Justice, May 27, 1992, *reprinted in* 23 Env't Rep. (BNA) 624, 624-640 (June 5, 1992). In the end, President Bush had to personally resolve this dispute and decided in favor of their legality despite the EPA's objections. Novello, *supra* note 354, at 10,091; *White House, supra*, at 428-29.

Under the regulations, states may adopt minor modification provisions, under which a source need not obtain a permit revision if a change does not rise to the level of a modification under any provision of Title I of the Act or involve significant changes to applicable requirements. *See* Operating Permit Program, *supra* note 354, at 32,280, 32,287-89 (to be codified at 40 C.F.R. § 70.7(e)(1), (e)(2)(i), (e)(4)). A source may make its changes as soon as it files an application, and need not notify the public. *See id.* The EPA has 45 days to veto an application. *Id.* A state should issue or deny the revision within 90 days after receiving the application and need not request public comment or hold a public hearing. *Id.*

361. A fundamental problem with the operational flexibility regulations is that they do not even discuss emissions averaging of air toxics, which are independent of any state implementation plan. Because of their hazardous nature, the EPA should exclude air toxics from the seven-day notice requirements of § 502(b)(10)'s operational flexibility requirements. Furthermore, the EPA should adopt regulations prohibiting the use of the operational flexibility provisions for sources seeking to average emissions of air toxics.

This Article contends that the minor modification provisions are especially inappro-

cially intended to assist citizens from poor or minority neighborhoods, who are disproportionately likely to live near undesirable land uses. The danger arises, however, that wealthier and better educated citizens will disproportionately take advantage of such grants to block the siting of facilities emitting air toxics and that such grants could exacerbate the tendency of such sources to locate in poor and minority neighborhoods.[362] The most practical solution would require that the EPA monitor this issue and encourage applications from poor or minority groups.

While this Article proposes that Congress or the EPA adopt the proposals for site-specific exposure assessments and expanded public participation, states could choose to adopt such requirements if there is a lack of federal leadership.[363]

V. CONCLUSION

The residual risk provisions in subsection 112(f) of the Clean Air Act fail to: safeguard against "hot-spots," adequately compare carcinogens and noncarcinogens, consider indirect or multimedia impacts, or protect all the different discrete population groups surrounding a facility. At its core, subsection 112(f)'s residual risk provisions do not provide the agency with adequate guidance on

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priate for sources of air toxics because the definition of modification is more liberal under § 112. Section 112(a)(4)'s definition of modification for sources of air toxics excludes de minimis changes whereas § 111(a)(4)'s definition for sources of criteria pollutants applies to any physical change. *Compare* 42 U.S.C. § 7412(a)(4) (more than de minimis amount required) *with* 42 U.S.C. § 7411(a)(4). More importantly, § 112(g) allows a source to use offsetting of different air toxics to avoid being classified as a modified source, although one might read the provision to exclude trading among pollutants that cause different diseases. *See* 42 U.S.C. § 7412(g). Thus, it may be easier for sources of hazardous pollutants to qualify for a minor permit modification than sources of criteria pollutants, an outcome that makes no sense given the greater toxicity of such chemicals.

This Article argues that the EPA should exclude air toxics from the minor modification provisions because there is a greater need for public comment on these more dangerous pollutants. If the EPA fails to make this change, states should exercise their discretion to impose such restrictions. *See* Novello, *supra* note 354, at 10,092 (states may adopt additional requirements).

362. Commentators argue that "fairness" attains through "progressive siting" i.e. advantaged neighborhoods to bear more of the burden of undesirable local land uses. *See* Been, *supra* note 123, at 1047-52. It is difficult in a free-market society (or, indeed, any society) to force such equal allocation of society's burdens. A progressive siting scheme might hurt everyone by making it difficult to site necessary but unpleasant facilities. *Id.* at 1050-52.

363. Under § 116 of the Act, states generally retain the authority to adopt more stringent standards and § 112(*l*) implicitly recognizes provisions for adopting state programs to implement and enforce emissions standards for hazardous air pollutants. *See generally* 42 U.S.C. §§ 7412(*l*), 7416.

HeinOnline -- 13 Stan. Envtl. L. J. 343 1994

how to adopt a second round of emissions standards if a source in a category poses an excess cancer risk greater than one-in-one-million after technology-based controls are in place. For these reasons, Congress needs to amend subsection 112(f) to rectify these deficiencies and to enact more comprehensive amendments to the residual risk statute.

Congress should enact a statute allowing a source to obtain a variance from technology-based requirements where the risk is clearly low relative to the costs of compliance or where there are alternative methods to significantly reduce pollution in a cost effective manner. In turn, a source applying for a variance would be required to conduct a site-specific exposure assessment of each significant pollutant emitted, with possible *de minimis* provisions or allowance for alternative risk assessment methods if the marginal cost exceeds a certain limit or the "knee-of-the-curve" test.

In addition, private citizens would have the right to demand a public hearing on a source's permit application, as well as a site-specific exposure assessment upon introduction of substantial evidence of risk left unaddressed by the technology-based emission standards and existing residual risk emission standards. The EPA could provide technical assistance grants to help citizens develop the requisite substantial evidence of such risks. The EPA could impose more stringent emission standards in response.

This Article's proposal for more and less stringent individualized emission standards for sources raises questions about nondelegation and due process issues. The proposed statute would use a "fuzzy bright line" or risk range approach to give clearer congressional guidance to the EPA while at the same time preserving a considerable amount of the agency's technocratic discretion. The statute would provide a risk range of one-in-ten-thousand to one-in-a-million. Risks greater than one-in-ten-thousand would be presumptively unacceptable. There would be a presumption in favor of a variance if a risk were clearly less than one-in-one-million and there are no other significant risk factors. There would be a greater burden on applicants to justify variances the higher a source fell in the range of risk. The higher the risk, the higher the burden on the applicant to address issues such as multimedia and indirect impacts, "hot-spots," noncarcinogens, and disparate impacts on diverse exposed subpopulations. The EPA would have limited authority to consider cost in determining whether to ap-

HeinOnline -- 13 Stan. Envtl. L. J. 344 1994

prove an application, but the statute would provide a range of permissible benefit-cost comparisons.

Realistically, this Article's proposal has a better chance of being adopted if both environmentalists and industry recognize potential benefits from the plan and the need for compromise. It is time to adopt a statute that will address a broader range of risk issues than simply carcinogenicity. Furthermore, the Amoco-EPA study demonstrates that it is time to take a more individualized and multimedia oriented approach to pollution control despite the legitimate concerns Professor Latin and others have raised about variances and individualized pollution control.

HeinOnline -- 13 Stan. Envtl. L. J. 345 1994

HeinOnline -- 13 Stan. Envtl. L. J. 346 1994

Notes

HeinOnline -- 13 Stan. Envtl. L. J. 347 1994

HeinOnline -- 13 Stan. Envtl. L. J. 348 1994