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Gasping for Breath: The Administrative Flaws of Federal Hazardous Air Pollution Regulation and What We Can Learn from the States

Victor B. Flatt[*]

This Article explains the continuing problems with protecting human health under the Clean Air Act's hazardous air pollutant program, in particular, the difficulty of protecting the public from residual health risks when all sources have put maximum technological controls into place. The Article traces the causes of these problems to flaws in the statutory implementation and the enforcement regime concerning residual health risks. In seeking to resolve these lingering flaws in the federal program, this Article surveys twelve states that have stricter protections than the federal government for residual risk from air toxics, and analyzes these states' success in reducing air toxic concentrations. Commonalities between the most successful states programs reveal potential solutions for improving regulation of hazardous air pollutants at the federal level.

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[*] A.L. O'Quinn Chair in Environmental Law and co-director of the University of Houston Law Center's Program in Environment, Energy, and Natural Resources, University of Houston Law Center; member, the Center for Progressive Reform. I would like to thank the Houston Endowment for its financial support of the research that forms part of this Article. I would also like to thank other members of the Houston Endowment research team including Winnie Hamilton, Jim Blackburn, and Matt Fraser, as well as the University of Houston scholarship research program, and the support of the A.L. O'Quinn Chair, funded by John O'Quinn. This work was made clearer by the comments of Bradford Mank, and the prior work and review of Tom McGarity and Wendy Wagner and researchers at the University of Texas Law School and the Center for Progressive Reform. Thanks also to my dedicated research assistants over several years: Charles Irvine, Vanessa Luna, Dustin Rynders, Jere Overdyke, and Emily Buckles. Last, a special thank you to the excellent editors at the Ecology Law Quarterly, especially Lee Awbrey, Casey Roberts, and Keely Rankin, whose efforts beyond the call of duty have helped make this Article a better one.

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> Nowhere were the air pollution levels higher or more widespread, or the industry connection more clear, than in . . . two neighborhoods that are located close together in southeast Houston. . . . For example, . . . concentrations of 1,3-butadiene ranged from 1.11 micrograms per cubic meter to 13.45 micrograms per cubic meter . . . . [E]xposure to 3 micrograms per cubic meter of butadiene over a lifetime would cause [1] extra cancer cases in [10,000] people.[1]

> The data provided [in the Chronicle article] is . . . within permitted emissions levels.[2]

INTRODUCTION

In January 2005, the Houston Chronicle ran the first in a series of articles on the risks of hazardous and toxic air pollutants faced by the citizens of Houston.[3] Completed after months of investigation, this article served as a wake-up call. A flurry of subsequent articles appeared nationwide to call attention to unhealthy air quality in many other regions.[4] What was surprising was the fact that "nothing had been done" about the toxics in the air because the complained-of pollution was legal and permitted. How could that be? Doesn't the Clean Air Act protect all

1. Dina Capiello, *In Harm's Way*, HOUS. CHRON., Jan. 16, 2005, at 10.
2. *Id.* (quoting a written statement from Texas Petrochemicals).
3. *Id.*
4. *See Abramson Asks STAR Advisory Panel to Review Concerns*, BUS. FIRST LOUISVILLE, Apr. 19, 2006; Danielle Braff, *Toxic Air Raises Risk of Cancer in Region*, POST-TRIB., Feb. 23, 2006, at A1; Marla Cone, *State's Air is Among Nation's Most Toxic*, L.A. TIMES, Mar. 22, 2006, at A1; Anthony DePalma, *EPA Lets Plants Keep Emissions*, PITTSBURGH POST-GAZETTE, Apr. 4, 2006, at A5; Anthony DePalma, *EPA Warns of City's Air Quality*, N.Y. TIMES, Mar. 23, 2006, at B4; *Estimated Cancer Risks and Residential Segregation Linked to Ambient Air Toxics*, OBESITY, FITNESS & WELLNESS WEEK, May 9, 2006, at 473; Bruce Henderson, *EPA to Investigate Higher Risk of Cancer Increased Danger in Sherrills Ford Area*, CHARLOTTE OBSERVER, Mar. 9, 2006, at N1; David Pace, *Americans Worry About Effects of Toxic Air on Children*, CHARLESTON GAZETTE, Dec. 16, 2005, at P8A; *Veto Aids DEQ in Rules on Clean Air*, ARIZ. DAILY STAR, May 3, 2006, at D1; Tammy Webber & Mark Nichols, *Higher Cancer Risk: It's in Our Air*, INDIANAPOLIS STAR, Feb. 23, 2006, at A1.

U.S. citizens from harmful air pollution? As the *Houston Chronicle* investigation and many follow-up articles have indicated, the answer is "no."

From the start of the first comprehensive federal program to regulate air pollution, hazardous air pollutants (HAPs)—those pollutants that can cause immediate or chronic harm from localized exposure[5]—have been difficult to manage and control.[6] The 1970 Clean Air Act (the "Act") sought to control the harm to human health caused by these pollutants, but failed.[7] Questions of risk assessment and appropriate control technologies dogged the federal regulatory program from the beginning.[8] In 1990, significant changes to the Act promised to improve results.[9] Now, over fifteen years after the implementation of the changes, the federal HAP program still fails to ensure human safety from hazardous air pollution, particularly in some urbanized areas. The federal response requires technological controls on HAP sources and supposedly controls any remaining or "residual risks," but ultimately it has failed to protect public health.

Why is this the case? Does the Act provide for some mechanism to ensure protection, and the problem is implementation? Or is the Act itself flawed? In this Article, I assert that the answer is both. The legislative mechanisms of the Act are unworkable precisely because of the problems they leave in enforcement and administration.

Part I of this Article provides a review of the past and current federal legal framework for addressing the negative health repercussion of HAPs, particularly that part that deals with residual risk, and then discusses why that framework is flawed. In Part II, I provide an overview of various state strategies for HAP residual risk control and compare their differing enforcement and administration techniques. Finally, in Part III, I use theories of environmental administration and limited data on actual reductions of air toxics in these states to suggest the best ways to create new, more effective, federal protections.[10]

This Article builds on an existing body of commentary critical of HAP regulation. After the passage of the 1990 Clean Air Act Amendments, commentators analyzed challenges and problems with the

5. *See* Clean Air Act § 112, 42 U.S.C. § 7412 (2006).

6. *See* Anne D. Curley, *Requirements for Contracted or Reconstructed Major Sources of Hazardous Air Pollutants*, 4 ENVTL. LAW. 225, 226 (1997).

7. *See* Bradford Mank, *What Comes After Technology: Using an "Exceptions Process" to Improve Residual Risk Regulation of Hazardous Air Pollutants*, 13 STAN. ENVTL. L.J. 263, 264 (1994).

8. *See id.*

9. *See id.*

10. This is not an attempt to argue that the states are inherently better at addressing pollution or that we should not have federal law. I believe all Americans should be protected from hazardous air pollution, and this is best accomplished through federal legislation.

statute and noted ways to improve implementation of the HAP provisions.[11] However, without information about whether there are still health risks present after the application of technological controls (known as residual risks), and before the statutory deadlines for EPA action had passed, it was difficult to assess what problems might exist with our current statutory scheme. But now that we have new information about the harms to human health, a focus on environmental justice, and a track record of the EPA's ability (or inability) to implement the 1990 HAP amendments, we are at the point where environmental academics must come forth with new possibilities for change. I hope this Article can create one of those possibilities.

I. THE FEDERAL PROGRAM FOR CONTROLLING HAZARDOUS AIR POLLUTION AND ITS SHORTCOMINGS

The first federal attempt to control hazardous air pollutants (HAP) came in section 112 of the 1970 amendments to the Clean Air Act.[12] Section 112 required the EPA to list as a HAP any air pollutant that "may cause, or contribute to, an increase in mortality or an increase in serious irreversible, or incapacitating reversible, illness."[13] Once the EPA listed the pollutant, the agency was then required to establish health-based emission standards that provided an ample margin of safety to protect the public health.[14] Substances listed as criteria pollutants and regulated under sections 108 and 109 of the Act were not considered under this category.

The question of how this law would work arose early. In *Natural Resources Defense Council (NRDC) v. EPA* (the "*Vinyl Chloride*" case), the NRDC challenged the EPA's failure to list vinyl chloride as a HAP under the Act, even though the EPA had concluded that it caused harm to human health.[15] NRDC argued that cost of compliance could not be taken into account in making that determination. Rather, once the EPA had concluded that the emission of vinyl chloride created an adverse health effect, section 112 required the EPA to establish an emission level of zero if it was unable to determine a safe threshold. However, the EPA noted that this would effectively shut down the industry.[16] The EPA disagreed with NRDC that the Act compelled an

11. *See, e.g.*, Mank, *What Comes After*, *supra* note 7.

12. *See* CRAIG N. JOHNSTON, WILLIAM F. FUNK & VICTOR B. FLATT, LEGAL PROTECTION OF THE ENVIRONMENT 367–68 (2005).

13. 42 U.S.C. § 7412(a)(1) (1970), *amended by* Clean Air Act Amendments of 1977, Pub. L. No. 95-95, 91 Stat. 685. The current definition of a HAP is a pollutant "known to cause or [that] may reasonably be anticipated to cause adverse effects to human health or adverse environmental effects." *Id.* § 7412(b)(3)(B).

14. *See id.* § 7412(f)(2)(A).

15. Natural Res. Def. Council v. EPA, 824 F.2d 1146 (D.C. Cir. 1987) (en banc).

16. *See id.* at 1148, 1153.

emission level of zero and had instead adopted a standard based solely on the emission level attainable by the best available control technology (BACT).[17]

The D.C. Circuit held that neither the NRDC nor the EPA was correct and remanded the case to the EPA with instructions that the EPA consider the health effect of the chosen emission standard while making the initial determination of what is "safe."[18] The court read section 112 to require the EPA to determine what is "safe" solely on the basis of health risk at a particular emission level.[19] But the court also defined "safe" as not meaning risk-free but, rather, gave the administrator discretion to determine what is an acceptable risk to health.[20] The court held that if the administrator could not find an acceptable risk at any emission level then he was to set the level at zero emissions.[21] Once EPA determined the initial "safe" level, section 112 allowed the administrator to then set a final level that ensures an ample margin of safety to protect the public.[22] Only at this point was the administrator free to take into account other factors, including technology and economics, in lowering the initial standard to the lowest feasible level.[23]

The standard articulated by the D.C. Circuit, which arguably followed Congress' intent, presented unusual problems for the EPA. Unlike the criteria pollutants, HAPs can be harmful in extremely small doses. If the EPA followed the court's prescribed formula, the agency would inevitably ban certain chemicals that play an important part in the economy.[24] This formula left open then question as to what constituted "protecting the public health." If this did not mean "risk-free," what did it mean?[25]

During this controversy over how to set the appropriate emissions level, the EPA was also slow to identify and list new HAPs. Despite

17. *See id.* at 1148–49.
18. *Id.* at 1153, 1164–65.
19. *Id.* at 1164.
20. *Id.*
21. *See id.* at 1165.
22. *See id.*
23. *See id.*
24. *See* 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, 433 (1991).
25. It is unclear whether this question has a definitive answer. The determination of "public health" in air toxics (§ 112) has been distinguished from that for criteria pollutants (§ 109). *See* Natural Res. Def. Council v. Costle, 902 F.2d 962, 973 (D.C. Cir. 1990). Although the measure of "ample margin of safety" is clearly left to administrative discretion, the underlying idea of what qualifies as "protecting public health" has not been clearly defined. Some guidance may be found in the related Occupational Safety and Health Act. *See* Indus. Union Dep't v. Am. Petroleum Inst., 448 U.S. 607, 608 (1980) (holding that a workplace is unsafe if it creates a "significant" risk of harm.)

litigation and pressure from Congress, between 1970 and 1990 the EPA identified only eight of the hundreds of HAPs already listed by state agencies, and many of these were spurred by litigation against the agency.[26] Asbestos was listed first in 1971 with standards established in 1973.[27] Later the EPA listed benzene, beryllium, coke oven emissions, inorganic arsenic, mercury, radio-nucleides, and vinyl chloride.[28]

In 1989, nineteen years after the passage of the Act, and again in response to pressure from lawsuits, the EPA promulgated a new risk-based approach for establishing national emission standards for hazardous air pollutants (NESHAPs). Under this new regulation, the emission standard was to be set at a level that "(1) protect[s] the greatest number of persons possible to an individual lifetime risk level no higher than approximately 1 in 1 million and (2) limiting to no higher than approximately 1 in 10 thousand the estimated risk that a person living near a plant would have if he or she were exposed . . . for 70 years."[29] In undertaking this analysis the EPA stated that it would first consider the estimated risk to an individual who is exposed for a lifetime, the "maximum individual risk" (MIR). If the MIR was less than one in ten thousand, it would be deemed acceptable. In setting the NESHAP to ensure an ample margin of safety for the greatest number of persons, the EPA would allow an individual lifetime risk level no higher than one in one million.[30]

In spite of these regulations defining how the agency would determine the appropriate threshold for a standard, the standard setting still did not occur.[31] As a result of the EPA's failure to act, in 1990 Congress imposed a technology-based regime with strict requirements that limited the agency's discretion and imposed short timelines for compliance.[32] The technology-based regime is still in place today.

The new HAP regulatory plan leaves little discretion to the EPA for implementation. Rather than asking the EPA to develop a list, Congress itself listed 189 substances as HAPs.[33] Congress compiled the list from information furnished by companies in compliance with the Emergency

26. *See Risk Assessment of Hazardous Air Pollutants under the EPA's Final Benzene Rules*, *supra* note 24, at 431.

27. *See* JOHNSTON, FUNK & FLATT, *supra* note 12, at 368.

28. *See id.*

29. National Emission Standards for Hazardous Air Pollutants, 54 Fed. Reg. 38,044 (Sept. 14, 1989) (codified at 40 C.F.R. pt. 61) [hereinafter Benzene NESHAP].

30. *See id.*

31. *See* JOHNSTON, FUNK & FLATT, *supra* note 12, at 369. EPA did successfully implement some standards based on the 1989 regulations before the passage of the 1990 amendments. *See* Benzene NESHAP, 54 Fed. Reg. 38,044.

32. *See* Mank, *What Comes After*, *supra* note 8, at 264.

33. *See* 42 U.S.C. § 7412 (2006).

Planning and Community Right-to-Know Act.[34] The 1990 amendments require the EPA to periodically review the list and add other substances as evidence becomes available.[35] Under the new program, the EPA must add a pollutant to the list if there is or could be a threat of adverse human health or environmental effect.[36] This directive effectively lowers the threshold for inclusion of a pollutant on the HAP list compared to the previous provision that required the agency to find that the pollutant caused a "serious" illness in humans.[37]

The EPA had twelve months after the passage of the 1990 amendments—until November 15, 1991—to publish a list of the industrial source categories that emit HAPs.[38] The sources had to be classified as either "major sources," i.e., a stationary source that emits ten tons per year or more of any hazardous pollutant or twenty-five tons per year of any combination of HAPs, or as "area sources," which includes all other stationary sources that emit HAPs.[39]

Once the sources are listed, the EPA follows a two-phase process. In Phase I, the EPA establishes technology-based standards for each category of major sources and area sources that have been listed[40] in accordance with the established schedules.[41] Phase II mandates a risk-based analysis to determine whether the technology standards adequately protect human health.

A. An Overview of the Federal Program's Two-Phase Strategy: The Control of Emissions through Technology-Based Standards and Risk-Based Analysis

In Phase I, the EPA is to establish Maximum Achievable Control Technology (MACT) for all new and existing[42] major sources, defined as the technology that provides the "maximum degree of reduction in emissions of the hazardous air pollutants."[43] In determining which technology should be required, the administrator is to consider the cost of

34. *See id.* §§ 11001–05, 11021–23, 11041–50 (1986).
35. *See id.* § 7412(b)(2)–(3).
36. *See id.* § 7412(b)(2).
37. *Id.* § 7412(a)(1) (1970), *amended by* Clean Air Act Amendments of 1977, Pub. L. No. 95-95, 91 Stat. 685.
38. *See id.* § 7412(c) (2006).
39. *Id.* § 7412(c), (e).
40. *See id.* § 7412(d)(1); *see also* Nat'l Lime Ass'n v. EPA, 233 F.3d 625, 628 (D.C. Cir. 2000).
41. *See* 42 U.S.C. § 7412(c), (e).
42. Applying the Clean Air Act to existing sources was a new feature of the 1990 amendments.
43. 42 U.S.C. § 7412(d)(2).

the technology as well as any non–air quality health, environmental, or energy impacts or requirements.[44]

Based on the administrator's evaluation of these factors, MACT standards for existing sources and new sources may differ. For new major sources, Congress mandates that MACT standard may not "be less stringent than the emission control that is achieved in practice by the best controlled similar source."[45] In contrast, for existing major sources, MACT standards may be "less stringent than standards for new sources . . . but shall not be less stringent, and may be more stringent than [] the average emission limitation achieved by the best performing 12 percent of the existing sources . . . or [] the average emission limitation achieved for the best 5 sources . . . in a category . . . with fewer than 30 sources."[46] There is still some question as to when modification of an existing source results in transforming that source into a "new" source for the purposes of determining the MACT standard. The EPA has issued rules on the matter,[47] but uncertainty in application remains.[48]

Congress established specific deadlines by which the EPA was to promulgate the MACT standards.[49] By 1992, the EPA was to issue MACT standards for the forty most harmful source categories, an additional 25 percent of the source categories by 1994, an additional 25

44. *See id.*

45. *See id.* § 7412 (d)(3).

46. *Id.*

47. Hazardous Air Pollutants: Regulations Governing Constructed or Reconstructed Major Sources, 61 Fed. Reg. 68,384 (Dec. 27, 2006).

48. *See* EPA, Section 112(g) of the Clean Air Act, http://www.epa.gov/ttn/atw/112g/112gpg.html (last visited Mar. 21, 2007) (explaining technology standards imposed on new or reconstructed facilities).

49. *See* 42 U.S.C. § 7412 (d)(2) (2006):

> Emissions standards promulgated under this subsection and applicable to new or existing sources of hazardous air pollutants shall require the maximum degree of reduction in emissions of the hazardous air pollutants subject to this section (including a prohibition on such emissions, where achievable) that the Administrator, taking into consideration the cost of achieving such emissions reduction, and any non-air quality health and environmental impacts and energy requirements, determines is achievable for new or existing sources in the category or subcategory to which such emission standard applies, through application of measures, processes, methods, systems or techniques including, but not limited to, measures which—
>
> (A) reduce the volume of, or eliminate emissions of, such pollutants through process changes, substitution of materials or other modification,
>
> (B) enclose systems or processes to eliminate emissions,
>
> (C) collect, capture or treat such pollutants when released from a process, stack, storage or fugitive emissions point,
>
> (D) are design, equipment, work practice, or operational standards (including requirements for operator training or certification) as provided in subsection (h) of this section, or are
>
> (E) a combination of the above.

percent by 1997, and the rest by 2000.[50] In reality, the EPA lagged and by 1997 had issued only seventeen MACT standards covering twenty-nine major source categories.[51] In anticipation of this problem, Congress stipulated that if the EPA failed to set a MACT standard for a major source within the specified time, each source in the category would be required to submit a Title V permit application through which a MACT-equivalent technology would be imposed.[52] As of 2006, years behind schedule, the EPA completed issuing MACT standards for the required 158 major sources categories, but was still far behind issuing standards for area sources.[53]

With respect to area sources, i.e., all sources that emit one of the listed HAPs below the major source thresholds, the administrator is permitted to enact standards that provide for the use of generally available control technologies or management practices to reduce emissions.[54] The EPA was supposed to issue the standards for all area sources by November 15, 2000, but did not do so.[55]

The EPA's failure to quickly promulgate MACT standards is only one aspect of its troubled implementation of section 112. By mandating technology-based standards in the first phase, Congress intended that the EPA would be able to quickly enunciate the applicable pollution control mechanisms, thereby effecting a noticeable reduction in emissions of HAPs.[56] However, Congress recognized that technology controls may prove inadequate in certain contexts, and did not eliminate the principle of health-based standards.

Phase II of the 1990 amendments directed the EPA to determine within six years of the promulgation of MACT standards—and before actual implementation of the second phase—whether they had been

50. *Id.* § 7412(e).

51. *See* Alec Zacaroli, *Air 'Milestones' Expected in 1996*, 26 Env't Rep. (BNA) 38 (Feb. 2, 1996).

52. *See* 42 U.S.C. § 7412(j) (2006). Title V of the Clean Air Act is a permit system that gathers all source requirements in one place. The Title V permit is required to contain emission limitations that are determined on a case-by-case basis, to be equivalent to the limitation that would apply to such a source if an emission standard had been promulgated in a timely manner. *See id.* § 7412 (j)(5). Of interest is the fact that Congress felt compelled to state that, although the administrator has discretion in how he or she develops the emission standards, "there shall be no delay in the compliance date for any standard applicable to any source under subsection (i) of this section" as a result of the discretionary authority conveyed. *Id.* § 7412(d)(1).

53. GOV'T ACCOUNTABILITY OFFICE, EPA SHOULD IMPROVE THE MANAGEMENT OF ITS AIR TOXICS PROGRAM 16, tbl.4 (2006), *available at* http://www.gao.gov/new.items/d06669.pdf.

54. *See* 42 U.S.C. § 7412 (d)(5) (2006); *see also* Nat'l Mining Ass'n v. EPA, 59 F.3d 1351 (D.C. Cir. 1995).

55. *See* 42 U.S.C. § 7412 (c)(3). The EPA failed to meet this statutory requirement and was sued by the Sierra Club to compel the issuance. Sierra Club v. Johnson, 444 F. Supp. 2d 46 (2006) (D.D.C. 2006). The EPA was ordered to complete all standards for area sources by June 15, 2009. *See id.* at 59.

56. *See* Mank, *What Comes After*, *supra* note 8, at 264.

effective in protecting human health or whether remaining health risks warranted more stringent controls.[57] The EPA was required to report to Congress regarding any residual risk that remained after the application of MACT standards.[58] This reporting would enable Congress to enact legislation to remedy the residual risk before the Phase II requirements began. [59] If Congress failed to enact legislation, Phase II requirements would begin automatically eight years after implementation of MACT standards.[60] Congress has not enacted legislation to change the HAP program although the EPA and third parties have accumulated evidence that HAPs continue to pose a substantial health risk.[61]

B. Houston, Do We Have a Problem (With Enforcement Strategies)? The Shortcomings of the Federal Program

Phase II of the Act requires the EPA to assess whether the MACT standards for a category of sources emitting a known, probable, or possible carcinogen reduces lifetime excess cancer risks to the most exposed population to less than one in one million (10^{-6}).[62] If MACT does not reduce cancer risks to this level, the EPA is *required* to prepare standards that would address the residual risks to human health created by the continued emission of the particular HAP. This standard should also address environmental issues. According to the Senate report, the 1990 amendments "require [the EPA] to protect against all significant environmental effects when setting residual risk standards in the second phase."[63]

In theory, the safeguards of Phase II seem ideal to address particular concerns of citizens of Houston and other areas with high air toxic concentrations, such as New York City and Los Angeles. According to the Act and the interpretation provided in *Sierra Club v. EPA*,[64] the EPA must establish more stringent standards if necessary to protect the health of the public. However, as we saw at the beginning of this Article,

57. *See* 42 U.S.C. § 7412(f)(1); *see also* Sierra Club v. EPA, 353 F.3d 976, 980 (D.C. Cir. 1990) (citations omitted).

58. *See* 42 U.S.C. § 7412(f) (2006).

59. *See id.* § 7412(f).

60. *See id.* § 7412(f)(2).

61. *See* OFFICE OF AIR QUALITY PLANNING & STANDARDS, RESIDUAL RISK: REPORT TO CONGRESS, EPA-453/R-99-001 (1999), *available at* http://www.epa.gov/ttn/oarpg/t3/reports/risk_rep.pdf; ANDREA L. CLEMENTS ET AL., THE CONTROL OF AIR TOXICS: TOXICOLOGY MOTIVATION AND HOUSTON IMPLICATIONS 8 (2006), *available at* http://hydrology.rice.edu/ceve/fraser/FINAL%20MASTER.pdf.

62. *See* 42 U.S.C. § 7412(f) (2006); *see also* Bradford Mank, *A Scrivener's Error*, 24 VA. ENVTL. L.J. 75, 79 (2005).

63. S. Rep. No. 101-228, at 155 (1989); *accord* Sierra Club v. EPA, 353 F.3d 976, 980 (D.C. Cir. 1990).

64. *Sierra Club*, 353 F.3d at 980.

problems remain. Why? The answer lies in the uncertainty of administration and of administrative follow-ups that are built into the statutory scheme for residual risk. The effectiveness of environmental programs "is more a function of how likely and whether the rules are enforced. . . . [A] government or association will not act if there are incentives not to and no absolute requirement to do so."[65] The federal HAP residual risk scheme is replete with these problems of uncertain standards, deadlines, and penalties for failure to act.

1. Problems of Delay

The first problem involves timelines for setting standards. The EPA is not required to begin Phase II risk analysis until eight years after the establishment of the MACT standards for major sources.[66] Given delays in setting the MACT standards, the first significant eight-year deadline did not fall until 2003 and some will not fall until 2012.[67] Additionally, the Act asks the EPA to first determine whether standards are required to provide an ample margin of safety to protect the public health, and only after that determination to promulgate health-based residual risk standards.[68] This two-stage process further delays promulgation of the health-based standards.

Courts are unlikely to force more timely administrative action. In contrast to the more prescriptive provisions for implementation of Phase I, the Act grants significant administrative discretion to the EPA's implementation of Phase II. Courts are generally deferential to an agency's own timetable in making such determinations and to an agency's interpretation of broad risk-setting terms, such as "adequate margin of safety."[69] Though the *Vinyl Chloride* case indicates that such risk determinations and categorizations can eventually be mandated through court interpretation of statutory terms,[70] the lengthy litigation necessary to bring enforcement in that instance is not very encouraging. For example, the requirement for controlling area sources of HAPs has been delayed by over nine years.[71]

65. Victor B. Flatt, *Spare the Rod and Spoil the Law: Why the Clean Water Act Has Never Grown Up*, 55 ALA. L. REV. 595, 597, 601 (2005).

66. *See* 42 U.S.C. § 7412(f) (2006).

67. *See* GAO, *supra* note 53, at 17.

68. *Id.* 42 U.S.C. § 7412(f).

69. *See, e.g.*, Whitman v. Am. Trucking Ass'ns, 531 U.S. 457, 475 (2001).

70. *See supra* notes 15–23.

71. *See* Steven D. Cook, *U.S. District Court Establishes Deadlines for EPA to Issue 'Area' Source Toxic Limits*, 37 Env't Rep. (BNA) 781 (Apr. 14, 2006) (reporting on Sierra Club v. Johnson, No. 01-1537, 2006 U.S. Dist. LEXIS 14923 (D.D.C. Mar. 31, 2006).

2. Uncertainty of Risk Assessment and Measurement

A further problem lies in the Act's failure to address the uncertainty inherent in the assessment and measurement of residual risk. The Act itself is not clear about the acceptable level of residual risk that can remain. The trigger for an EPA determination of residual risk is whether the lifetime excess cancer risks to the most exposed individual exceed one in one million.[72] So though the trigger for taking action is clear, what action must be taken is not specified. Therefore, knowledgeable interpretations of the Act conclude that the EPA has broader discretion than the one-in-a-million residual risk standard which triggers additional regulation suggests in its choice of a risk threshold when setting health-based residual risk standards.[73] For example, the legislative history of the 1990 amendments cites with approval the *Vinyl Chloride* case's suggestion that a residual risk of one in ten thousand might be sufficient to satisfy the statute's "protect human health" provision.[74] This is different by two orders of magnitude from the official statutory trigger for the EPA's analysis, and also different from other regulatory guidelines. This wide variation suggests that a very important question of what constitutes "elimination" of residual risk has not been addressed statutorily, but instead has been left to administrative discretion.

3. How These Statutory Problems Undercut the Supposed Health Protections in the Act

To see what is actually happening under the current statute, we can look to the Houston area. Refineries in the Houston area (which can be large producers of HAPs) are subject to a number of MACTs that have been developed since the 1990 amendments. These include standards called Refinery MACT1, Refinery MACT2, Organic Liquids Distribution MACT, Boiler and Process Heater MACT, and Turbines and Engine MACT.[75] Of these, the Refinery MACT1 standard was promulgated in August 1995, meaning that the EPA should have set residual risk standards by August 2003.[76]

The EPA did not meet this deadline, but did issue an initial assessment in the fall of 2005. The agency determined that the residual risk from Refinery MACT1 was above the one-in-one-million risk

72. 42 U.S.C. § 7412(f) (2006).

73. *See* Mank, *Scrivener's Error*, *supra* note 62, at 94.

74. *See* Cook, *supra* note 71.

75. *See* Dan Hunter, HSE Regulatory Issues Manager, ConocoPhillips, Address at the 9th Annual AWMA Hot Air Topics Conference: Residual Risk in the Petrochemical & Refining Industries, Update (Oct. 6, 2005) (slides on file with author).

76. *See id.*

threshold and that the "risk driver" was benzene.[77] Under section 112, this determination triggers the requirement that the residual risk be addressed through additional control measures.[78]

However, as anticipated, the statute's structure creates problems because it is insufficiently detailed to avoid serious delay in development and implementation of measures to address residual risk. The first administrative problem relates to the uncertainty of the risk analysis: Is the EPA's determination of existing residual risk correct? The petroleum industry stated that it believes the EPA's risk assessment methodology to be a crude one that overstates the risk.[79] Given scientific uncertainty, the industry's assertion is not immediately rebuttable. In response to the industry's interest, there is currently a workgroup comprising the EPA, the American Petroleum Institute (API), and the National Petroleum Refiners Association (NPRA) that is designed to conduct a more accurate risk analysis going forward.[80] Theoretically, this could produce some kind of binding regulation on residual risk.

In addition, there is no guarantee that the EPA will not revise its initial determination that Refinery MACT1 leaves unacceptable residual risk due to lobbying from the petroleum industry. It should also be noted that the EPA is not bound by statute to utilize one in one million as its threshold for determining when additional controls are necessary,[81] though this seems to be the agency's current regulatory position for assessing risks from air toxics.[82]

Therefore, at this time, some of the sources of the risk in Houston may be examined individually through Title V permits, there may or may not be a residual risk level set for these sources, and the timeline for setting the residual risk level is unknown. Even if residual risk standards were in place, there is no certainty that that the determination of those standards would actually address the possible real risks that exist because uncertainties remain with regard to measuring and monitoring.

Note that the Phase II residual risk standards differ little from the situation that existed before the passage of the 1990 amendments. As noted above, the original health-based HAP control regime was a disastrous failure in terms of protecting health.[83] This situation, noted for its failure to promulgate meaningful health-based standards, led directly to the passage of the 1990 amendments. However, the problems in the

77. *See id.*

78. *See* Sierra Club v. EPA, 353 F.3d 976, 980 (D.C. Cir. 1990).

79. *See* Hunter, *supra* note 75.

80. *See id.*

81. One in one million is the statutory threshold for EPA's obligation to examine residual risks.

82. *See* Hunter, *supra* note 75; *see also* Mank, *Scrivener's Error*, *supra* note 62, at 106.

83. *See* Mank, *What Comes After, supra* note 8, at 264.

old health-based standard scheme remain in the residual risk parts of the Act. Indeed, the conference report for the 1990 amendments referenced the *Vinyl Chloride* case and the EPA's determination of risks under the old statute as models for making residual risk determinations under the new statute.[84] Unfortunately, there is no reason to assume that the EPA will now be able to better determine and implement health-based standards than it was able to from 1970 to 1990.

In regulatory arenas where uncertainty of risk assessment and measurement is the norm, legitimate and meaningful standard setting is very difficult, if it happens at all.[85] The example of residual risk regulation of HAPs from the petroleum industry in Houston does not give great hope that somehow air toxics regulation will be different from this pattern. Though we may have fewer air toxics in certain areas due to more stringent technology controls, residual risks remain. Houston (and Los Angeles, New York, and others), we still have a problem.

II. CAN THE SOLUTION BE FOUND IN OTHER WAYS OF REGULATING HAZARDOUS AIR POLLUTANTS? EXAMPLES FROM THE STATES

If the current system has done little to help regulation of residual risk from HAPs, are there ways that the system could be corrected to address the possible harms to human health that have been imposed on citizens in many parts of the country? In particular, could the problem be addressed by differing strategies for setting and policing residual risk using ambient air quality standards rather than source-specific emissions standards? Various theories of environmental administration, as well as the example of federal HAP regulation itself, suggest that existing regulation can be enhanced.[86] In order to do this, scientific uncertainty of measuring harm must be addressed and there must be some way to require agencies or the regulated community to take action when a risk determination has been made, that is, there must be enforceable triggers. But the problem with such theoretical fixes is that the nature of administrative enforcement depends on the particular program itself. Without seeing how administrative reforms are implemented in a particular area, we cannot be sure if the theories of administration and enforcement would work in that arena.

Fortunately, we have a ready-made way to analyze other approaches to the control of residual risks from air toxics. Many states currently have standards that, according to the statutes, are designed to address health risks from HAPs. Several of these were passed before the 1990 Clean Air

84. *See* Mank, *Scrivener's Error, supra* note 62, at 79.
85. *See* Flatt, *Spare the Rod*, *supra* note 65, at 601.
86. *See id.*

Act Amendments,[87] in response to the shortcomings noted above, and the 1990 amendments did not preempt state efforts to regulate residual risk on their own.[88]

Thus, many states have requirements that go above and beyond federal regulation. By examining several of these, we can begin to see how states administer so-called health-based standards to control residual risk, and which of them, if any, are effective at achieving protection. While we have limited and imperfect data on whether the state statutes have spurred actual health improvements, an analysis of this information coupled with administrative enforcement theory can give us important insights. This information may assist in the formulation of a model for improved federal regulation of HAPs. It may also reinforce certain theories of environmental administration more generally.

This next Part will examine residual risk regulations in twelve states, comparing eight particularly common and dangerous HAPs: benzene, 1,3-butadiene, formaldehyde, toluene, acrolein, hydrogen sulfide (H_2S), styrene, and vinyl chloride.[89] The states examined include: California, Connecticut, Louisiana, Maryland, Massachusetts, Michigan, New Jersey, New York, North Carolina, Oregon, Rhode Island, and Wisconsin.

A. California

1. Overview

California enacted the Toxic Air Contaminant Identification and Control Act (A.B. 1807 or Tanner Act) in 1983 to reduce exposure to air toxics.[90] The Tanner Act set up the Air Resources Board's (ARB) statewide comprehensive air toxics program, now found in California Health and Safety Code, sections 39650 through 39675.[91] Along with the Office of Environmental Health Hazard Assessment (OEHHA), the ARB prioritizes the identification and control of air toxics by considering criteria relating to "the risk of harm to public health, amount or potential

87. States that regulated health risks before 1990 include California, Connecticut, Louisiana, Maryland, Massachusetts, New Jersey, New York, Rhode Island, and Wisconsin.

88. 42 U.S.C. § 7416 (2006).

89. Benzene, 1,3-butadiene, and vinyl chloride are known carcinogens. Toluene, formaldehyde, styrene are reasonably anticipated human carcinogens. Acrolein and H_2S are noncarcinogenic. These chemicals also have either suspected or known toxic effects on human development, reproductive organs, the respiratory system, and other organs. For more information on the negative health effects of these chemicals, see EPA, Hazard Information on Toxic Chemicals Added to EPCRA Section 313 Under Chemical Expansion, http://www.epa.gov/tri/chemical/hazard_cx.htm (last visited Feb. 24, 2007).

90. CAL. HEALTH & SAFETY CODE §§ 39650–39675 (Deering 2006).

91. *See* Cal. Air Res. Bd., California's Air Quality History Key Events, http://www.arb.ca.gov/html/brochure/history.htm (last visited Jan. 4, 2007).

amount of emissions, manner of, and exposure to, usage of the substance in California, persistence in the atmosphere, and ambient concentrations in the community."[92] The California legislature supplemented this framework in 1987 with the Air Toxics "Hot Spots" Information and Assessment Act.[93] That supplemental legislation requires a statewide air toxics inventory, notification of people exposed to a significant health risk, and facility plans to reduce these risks.[94] Emissions information that sources report to ARB is made accessible to the public.[95] In September 1992, the legislature strengthened the Hot Spots program with Senate Bill 1731, which requires facilities that pose a significant health risk to the community to reduce their risk through a risk management plan.[96] California's thirty-five local air districts administer the program.

2. Identification of Pollutants and Sources

California established a two-step process of risk identification and risk management.[97] During the first step (risk identification), the ARB and OEHHA determine if a substance should be formally identified as a toxic air contaminant (TAC),[98] based on a draft report prepared by the ARB and OEHHA staff.[99] The statute allows for "any person" to provide information pertinent to TAC identification, and the ARB allows public input through public hearings and workshops.[100] The staff report is also submitted to an independent Scientific Review Panel (SRP) that reviews the report for scientific accuracy.[101] If the SRP approves the report, they develop specific scientific findings that are officially submitted to the ARB.[102] Based on public input and the report, the ARB will decide whether to identify a substance as a TAC.[103] Any person may petition the ARB to review a previous determination by providing new evidence.[104]

92. CAL. HEALTH & SAFETY CODE § 39660(f).

93. A.B. 2588, 1987 Cal. Stat. 4449 (codified at CAL. HEALTH & SAFETY CODE §§ 44300–44394).

94. *See* CAL. HEALTH & SAFETY CODE §§ 44300–44394.

95. *See id.* § 44345(a); *see also* Masonite Corp. v. County of Mendocino Air Quality Mgmt. Dist., 49 Cal. Rptr. 2d 639, 645 (Ct. App. 1996).

96. S.B. 1731, 1992 Cal. Stat. 5426 § 3 (codified at CAL. HEALTH & SAFETY CODE §§ 44390–44394) ("Facility Toxic Air Contaminant Risk Reduction Audit and Plan").

97. *See* Cal. Air Res. Bd., California Air Toxics Program Background, http://www.arb.ca.gov/toxics/background.htm (last visited Jan. 4, 2007).

98. *See* CAL. HEALTH & SAFETY CODE §§ 39660–39661 (Deering 2006).

99. *See id.* § 39660(d). The ARB assesses the potential for human exposure to a substance, and the OEHHA evaluates the health effects.

100. *Id.* § 39660(c)(3), (e).

101. *See id.* § 39661(b).

102. *See id.*

103. *See id.* § 39662(b).

104. *See id.* § 39662(e).

The California Legislature has amended the A.B. 1807 program twice to expand the list of regulated air toxics. The 1987 Hot Spots program requires facilities to report on a more comprehensive list of toxics than the list under A.B. 1807.[105] In 1993, the legislature required the ARB to identify the 189 federal HAPs as TACs.[106]

3. Settings of Standards and Emissions Levels

If the ARB lists a TAC, it must also attempt to identify a threshold level of exposure below which there are "no significant adverse health effects" with "an ample margin of safety."[107] The acceptable exposure level, expressed as "Reference Exposure Level" (REL), is the "level at or below which no noncancer adverse health effect is anticipated."[108] The ARB also addresses cancer risks in accord with statutory requirements.[109]

Unlike most states, California uses exposure levels not tied to any particular time period.[110] Unlike other states that have essentially two acute exposure periods (e.g., Rhode Island has one-hour and twenty-four hour periods) in addition to an annual level, California does not make this distinction. It simply has an acute level (with different sampling periods for each chemical) and a long-term chronic level.

In the risk management step, the ARB must also produce a report reviewing the emission sources of an identified TAC to determine if any regulatory action is necessary to reduce the risk.[111] The analysis includes a review of controls already in place, the technologically feasible control technologies and associated costs for reducing emissions, and the associated risk.[112] The ARB must hold public hearings before deciding on the control technologies for types or categories of sources.[113]

California's thirty-five local air districts[114] must adopt ARB's control measures to meet the standards for airborne toxics.[115] Local districts also may adopt air toxics standards for pollutants ARB has not yet listed.[116]

105. *See id.* § 44321 (instructing ARB to list TACs); *see also* CAL. CODE REGS. tit. 17, § 93001 (2005) (list of TACs and federally listed HAPs).

106. A.B. 2728, 1992 Cal. Stat. 5415 § 2 (codified at CAL. HEALTH & SAFETY CODE § 39655(a) (Deering 2006).

107. CAL. HEALTH & SAFETY CODE § 39662(c).

108. *See* OEHHA, THE AIR TOXICS HOT SPOTS PROGRAM GUIDANCE MANUAL FOR PREPARATION OF HEALTH RISK ASSESSMENTS, at J-9 (2003), *available at* http://www.oehha.ca.gov/air/hot_spots/pdf/HRAfinalapps.pdf.

109. CAL. HEALTH & SAFETY CODE § 39662(c) (Deering 2006).

110. *See* OEHHA, TECHNICAL SUPPORT DOCUMENT FOR DETERMINATION OF NONCANCER CHRONIC REFERENCE EXPOSURE LEVELS 11 (2000), *available at* http://www.oehha.ca.gov/air/chronic_rels/pdf/relsP32k.pdf.

111. CAL. HEALTH & SAFETY CODE § 39655(a).

112. *See id.* § 39665(b).

113. *See id.* § 39666(a).

114. *See* Cal. Air Res. Bd., California Air District Resource Directory, http://www.arb.ca.gov/capcoa/roster.htm (last visited Jan. 10, 2007).

Based on their emissions, certain "high priority" facilities must ascertain health risks[117] and notify nearby residents of significant risks.[118] The risk assessment is subject to review by the air district and the public[119] under Proposition 65, California's toxic chemical information disclosure statute.[120] Under the 1992 amendments to the Hot Spots program, many facilities must reduce their risk through a risk management plan.[121]

4. Monitoring, Compliance and Enforcement

The ARB has an active enforcement program to make sure that no one illegally emits harmful toxic air pollutants. The ARB also conducts reviews of the individual districts' air toxics control programs.[122] Multi-media enforcement cases address not only TACs, but also toxic pollutants of water and soil, and the disposal of toxic wastes.[123] These cases call upon investigative resources from local air districts, other agencies within the California Environmental Protection Agency, and the U.S. EPA.

To reach the chosen standard, ARB mandates certain requirements of sources that are meant to reduce ambient levels of toxics. The ARB has adopted a large number of Air Toxic Control Measures (ATCMs) which can be found in Titles 13 and 17 of the California Code of Regulations.[124] Many of ARB's adopted control measures use pollution prevention techniques as the foundation of the regulation. ARB controls have concentrated on several particular chemicals due to their proven risk.

California imposes several self-reporting requirements on TAC sources. Health and Safety Code section 42706 strongly encourages sources to self-monitor and requires some of the larger sources in the most polluted air quality districts to do so.[125] It also imposes reporting

115. CAL. HEALTH & SAFETY CODE § 39666(d) (Deering 2006).

116. *See* W. Oil & Gas Ass'n v. Monterey Bay Unified Air Pollution Control Dist., 777 P.2d 157, 162 (Cal. 1989).

117. *See* CAL HEALTH & SAFETY CODE §§ 44360–44362.

118. *See id.* § 44362(b).

119. *See id.* § 44361(a).

120. *See* Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65), CAL. HEALTH & SAFETY CODE §§ 25249.5–25249.13.

121. *Id.* §§ 44390–44394 ("Facility Toxic Air Contaminant Risk Reduction Audit and Plan").

122. *See id.* § 41500; *see, e.g.*, CAL. AIR RES. BD., SAN JOAQUIN VALLEY AIR POLLUTION CONTROL DISTRICT PROGRAM REVIEW (2005), http://www.arb.ca.gov/audits/sjv/sjvaudit05.pdf.

123. *See, e.g.*, CAL. AIR RES. BD., MULTIMEDIA CHROME PLATING PROJECT (2000), http://www.arb.ca.gov/toxics/chrome/chromeplating.pdf.

124. *See* Cal. Air Res. Bd., Airborne Toxic Control Measures, http://www.arb.ca.gov/toxics/atcm/atcm.htm (last visited Jan. 10, 2006).

125. CAL. HEALTH & SAFETY CODE § 42706 (Deering 2006).

requirements on the operator of any stationary source required by a district to install and operate a continuous emissions monitor (CEM).[126] The operator must report to the district within ninety-six hours any violation of any applicable emission standard reflected in the CEM records, including violations recorded by monitors required by local, state, or federal regulations.[127] The air district, in turn, must report the violation to the ARB within five working days after receiving the report of violation from the operator.[128] The ARB is responsible for collecting this data in order to detect chronic problems and to work with the districts and the sources to alleviate the excess emissions.

There are also requirements for mobile sources to reduce overall risk. Heavy-Duty Vehicle Smoke Inspections for diesel trucks and buses ensure that these vehicles are not in violation of California motor vehicle standards that would allow excessive pollution to be emitted.[129]

5. Conclusion

California has taken a multi-pronged, realistic approach to air toxics. Its identification of compounds and risk is one of the most rigorous, and is the only one that uses independent research, generated by the state itself, in addition to reliance on the studies of others. It has tackled mobile as well as both new and existing stationary sources and actively identifies risk, whatever its source. Its enforcement scheme for large stationary sources depends heavily on self-reporting and self-monitoring, and uses the very large regulatory infrastructure of the local control districts that also regulate the criteria air pollutants, which have heretofore commanded much more attention nationwide. Lastly, through the use of Proposition 65 and the Hot Spots program, California puts the onus on sources themselves to ensure that they do not pose a high risk to the public. Without effective monitoring programs or information, these information-disclosure requirements might not be particularly notable, but in California, which has heavily regulated and monitored sources, and also has public and private enforcement resources, these two laws probably also contribute to strong implementation of air toxic policies.

126. *Id.*
127. *See id.*
128. *See id.*
129. CAL. CODE REGS. tit. 13, § 2180–2188 (2005).

Table 1. California Summary of Ambient Health-Based Regulation of Selected Toxics

Compound	Inhalation Reference Exposure Level (REL) ($\mu g/m^3$)		Inhalation Cancer Risk Value[c] ($(\mu g/m^3)^{-1}$)	Primary Evidentiary Support
	Acute[a] [averaging time in hours]	Chronic[b]		
Benzene	1,300 [6]	60	2.9×10^{-5}	OEHHA[d]
1,3-Butadiene	NA	20	1.7×10^{-4}	
Formaldehyde	94 [1]	3	6.0×10^{-6}	
Toluene	37,000 [1]	300		
Acrolein	0.19 [1]	0.06		
H_2S	42 [1]	10		
Styrene	21,000 [1]	900		
Vinyl Chloride	180,000 [1]	NA	7.8×10^{-5}	

[a] Acute Exposure: One or a series of short-term exposures generally lasting less than 24 hours.
[b] Chronic Exposure: Long-term exposure, usually lasting one year to a lifetime.
[c] Inhalation Unit Risk Factor: The theoretical upper-bound probability of extra cancer cases occurring in the exposed population assuming a lifetime exposure to the chemical when the air concentration is expressed in exposure units per microgram/cubic meter $(\mu g/m^3)^{-1}$.
[d] OEHHA: California Office of Environmental Health Hazard Assessment

Source: See OEHHA, Acute Reference Exposure Levels Summary Table and Table of Hazard Index Target Organs, http://www.oehha.ca.gov/air/acute_rels/relnums.html (last visited Feb. 26, 2007), for acute RELs; See OEHHA, All Chronic Reference Exposure Levels Adopted by OEHHA as of February 2005, http://www.oehha.ca.gov/air/chronic_rels/AllChrels.html (last visited Feb. 26, 2007), for Chronic RELs; See OEHHA, AIR TOXICS HOT SPOTS PROGRAM RISK ASSESSMENT GUIDELINES 2–6 (2002), *available at* http://www.oehha.ca.gov/air/hot_spots/pdf/TSDNov2002.pdf, for inhalation cancer risk values.

B. Connecticut

1. Overview

In 1986, Connecticut adopted and began implementing a law controlling toxic air emissions.[130] Following the passage of the 1990 Clean Air Act Amendments, with its MACT requirements, the Connecticut Department of Environmental Protection (CTDEP) decided to retain the existing state regulation for control of air toxics as well as to implement the required federal MACT program.[131] Connecticut viewed its existing

130. *See* Conn. Dep't of Envtl. Prot., Connecticut's Management of Toxic Air Pollutants, http://ct.gov/dep/cwp/view.asp?a=2684&q=322230&depNav_GID=1619 (last visited Jan. 5, 2006).
131. *See id.*

regulation as being more protective because it is health based, covers 850 chemicals is flexible enough to address urban hot spots, and applies to all sources.[132]

Statutory authority for the CTDEP to formulate, adopt, amend and repeal regulations for the abatement of air pollution is found in sections 22a-6 and 22a-174 of the Connecticut General Statutes.[133] Controls of mobile sources are authorized under 22a-174g.

2. Identification of Pollutants and Sources and Setting of Emissions Standards

Connecticut has established both thirty-minute and eight-hour emission limits (Hazard Limiting Values, or HLV) for 850 chemicals.[134] The HLVs are defined as "highest acceptable concentration of a hazardous air pollutant in the ambient air."[135] These emission limits are based on national occupational health standards from the Occupational Safety and Health Administration, American Congress of Government Industrial Hygienists, and the National Institute of Occupational Safety and Health,[136] but the law does not specify how the occupational standards are to be transformed into the HLVs.

3. Monitoring, Compliance, and Enforcement

DEP verifies stationary source compliance with the HLV by comparing emissions at the source unit (or stack) to the Maximum Allowable Stack Concentration, or MASC[137]—an emission limit based on calculations worked back from the ambient standard (the HLV). The MASC is based on a formula incorporating the HLV, discharge flow rate, height, and distance to the closest property line.[138]

These emissions limits are enforced by periodic testing and inspections conducted by the CTDEP's enforcement staff.[139] The CTDEP may require sampling to determine actual concentrations of listed air toxics at discharge points, triggered by an observed exceedance, other air enforcement action, or at the discretion of the CTDEP.[140] If they fail to

132. *See id.*
133. CONN. GEN. STAT. §§ 22a-6, 22a-174 (2006).
134. CONN. AGENCIES REGS. § 22a-174-29 (2006).
135. *Id.* § 22a-174-1(45).
136. *See* Connecticut's Management of Toxic Air Pollutants, *supra* note 130.
137. *See* CONN. AGENCIES REGS. § 22a-174-29(b)–(c) (2006).
138. *See id.* § 22a-174-29(c).
139. *See id.* § 22a-174-29(e).
140. *See id.*

comply with the MASC, the CTDEP may require a stationary source to seek a permit containing self-monitoring and reporting requirements.[141]

Exceedances may be identified as a result of citizen complaints, through the CTDEP air toxic monitoring stations at various locations throughout the state, special monitoring projects (in response to odor complaints), photochemical assessment monitoring (collecting data on seventy air toxics, in addition to ozone precursors), dioxin and mercury monitoring, and monitoring of municipal waste combustion stacks.[142] The CTDEP has operated a Small Business Assistance Program since 1994 to facilitate small business compliance with all air quality regulations, including air toxics.[143]

Mobile sources of air toxics are addressed by a combination of programs that combat both ozone and air toxics. These include the adoption of the National Low Emission Vehicle program, enhanced vehicle inspections, reformulated gasoline, a Vapor Recovery Program, and diesel truck inspections.[144] The CTDEP has passed a regulation adopting the second phase of California's Low Emissions Vehicle Program for motor vehicles from 2008 onwards, with its tighter controls on toxic air pollutant emissions.[145]

4. Conclusion

Connecticut's program on air toxics is definitive and rigorously enforced. The ambient standards that each source must meet are clearly specified based on the HLV and the derivative limits on the specific amount of the toxic that can be emitted from a source stack. All new and existing stationary sources, not just "major" ones, are regulated. In a nod to the realities of regulating so many sources, including smaller ones, the program provides financial assistance to ensure that less sophisticated or smaller stationary sources are able to comply with these limits.

The enforcement system is extensive, responsive to complaints, and relies on actual monitoring at many points to ensure that the standards

141. *See id.* § 22a-174-29(g).

142. *See* Conn. Dep't of Envtl. Prot., Monitoring Initiatives, http://www.dep.state.ct.us/air2/toxics/monitiat.htm (last visited Jan. 6, 2007).

143. *See* Conn. Dep't of Envtl. Prot., Small Business Assistance Program, http://www.dep.state.ct.us/air2/toxics/smllbsns.htm (last visited Jan. 6, 2007).

144. For descriptions of Connecticut's Diesel Reduction Initiatives, see http://ct.gov/dep/cwp/view.asp?a=2684&q=322102&depNav_GID=1619 (last visited Feb. 24, 2007). Regarding the state's vehicle emissions and inspection and maintenance programs, see http://ct.gov/dep/cwp/view.asp?a=2684&q=322144&depNav_GID=1619 (last visited Feb. 24, 2007).

145. *See* CONN. AGENCIES REGS. § 22a-174-36b (2006); *accord* PAUL E. FARRELL, HEARING REPORT: REGULATIONS FOR THE ABATEMENT OF AIR POLLUTION 13–14 (2004), *available at* http://www.dep.state.ct.us/air2/regs/callev.pdf.

are reached. If any violation is found, the source must get a permit and become self-reporting.

Table 2. Connecticut Summary of Ambient Health-Based Regulation of Selected Toxics

Compound	Hazard Limiting Value ($\mu g/m^3$)		Primary Evidentiary Support
	30 min.	8 hr.	
Benzene	750	150	Occupational Exposure Levels (OELs) provided by federal occupational health agencies, with various safety factors applied. *See supra* text accompanying note 136.
1,3-Butadiene	110,000	22,000	
Formaldehyde	60	12	
Toluene	37,500	7,500	
Acrolein	25	5	
H_2S	1,400	280	
Styrene	21,500	4,300	
Vinyl Chloride	250	50	

Source: CONN. AGENCIES REGS. § 22a-174-29, tbls. 29-1 & 29-2 (2006), *available at* http://www.ct.gov/dep/lib/dep/air/regulations/mainregs/sec29.pdf.

C. Louisiana

1. Overview

Louisiana has regulated air toxics for over a decade.[146] According to the Louisiana Department of Environmental Quality (DEQ), the state began to regulate air toxics in response to increasing public concern about air quality.[147]

> Louisiana is one of the most heavily industrialized states in the nation, due largely to the attraction of the major waterway and deep-water port for shipping along the Lower Mississippi River Corridor. In 1987, the publication of the Toxic Release Inventory Report ranked Louisiana among the top five states in totals of toxic air emissions.[148]

In 1989, the legislature enacted a law requiring the state to determine a 1987 baseline for toxic air pollutant (TAP) emissions, and to set a goal to reduce statewide emissions by 50 percent from this baseline by the end of

146. *See* La. Dep't of Envtl. Quality, Toxic Air Pollutants Fact Sheet, http://www.deq.louisiana.gov/portal/tabid/2339/Default.aspx (last visited Apr. 2, 2006) [hereinafter Louisiana Toxic Air Facts].

147. *See id.*

148. *Id.*

1996.[149] As mandated by the law, the DEQ developed and promulgated the *Comprehensive Toxic Air Pollutant Emission Control Program*.[150]

2. Identification of Pollutants and Sources

The statute mandated that the DEQ develop and publish a list of not more than one hundred TAPs.[151] The legislature defined "toxic air pollutant" to mean an air pollutant that "based on scientifically accepted data, is known to cause or can reasonably be anticipated to cause either directly or indirectly through ambient concentrations, exposure levels, bioaccumulation levels, or deposition levels, adverse effects in humans."[152] The statute specified that the negative health effects included, but were not to be limited to cancer; mutagenic, teratogenic, or neurotoxic effects; reproductive dysfunction; acute health effects; and chronic health effects.[153]

In addition to the TAPs identified by the DEQ, the statute required that the list of toxic air pollutants also include substances listed as HAPs in section 112 of the federal Clean Air Act.[154] Criteria pollutants for which National Ambient Air Quality Standards have been established under section 108 of the Clean Air Act are excluded, with the exception of lead compounds.[155] In total, Louisiana currently regulates over 200 pollutants.[156]

3. Setting of Standards and Emissions Levels

DEQ bases the eight-hour ambient standard on one forty-second (1/42) of the selected occupational exposure level, or other data it finds to be superior.[157] The annual eight-hour ambient standard is based on unit risk factors and a residual risk of one in ten thousand. DEQ can deviate from these requirements if it finds other data to be superior.[158]

149. *Id.*
150. LA. ADMIN. CODE tit. 33, §§ 5101–5151 (2005).
151. LA. REV. STAT. ANN. § 30:2060(a) (2000).
152. *Id.* § 30:2053(3)(a).
153. *Id.* § 30:2053(3)(a)(i-v).
154. *Id.* § 30:2053(3)(b).
155. *Id.* Still, the statute specifically excluded "elemental lead [and] those pollutants chosen solely for their contribution to the formation of pollutants regulated under the National Ambient Air Quality Standards."
156. Louisiana Toxic Air Facts, *supra* note 146.
157. *See* LA. ADMIN. CODE tit. 33 § 5112, at tbl. 51.2 (2005).
158. *See id.*

4. Monitoring, Compliance, and Enforcement

In addition to incorporating the federal MACT standards,[159] Louisiana establishes emission reporting requirements for major sources of TAPs, consistent with the federal definition.[160] DEQ's Toxic Emission Data Inventory tracks annual emissions of various toxins from over 250 industrial facilities.[161] However, no actual monitoring of the ambient air is mandated or regularly done. Instead, Louisiana depends on information from major source permit data to estimate that ambient standards are met and are not violated by one or more sources.

5. Conclusion

Louisiana's program lacks the specificity and actual monitoring that is found in other state programs, such as California and Connecticut. Though ambient standards are set, neither legislation nor regulation requires that this ambient standard be turned into a specific emission limitation applicable at a source stack, nor that the source be monitored. Additionally, Louisiana's residual risk standard of one in ten thousand excess cancer deaths is less protective than most other states' residual risk standards.

The Louisiana DEQ claims that the state has already reduced statewide air toxic emissions by 50 percent from 1987 levels.[162] While this may be true, reductions are far less than other states have achieved, and Louisiana has gone from being the fourth largest producer of air toxics in 1988, to the second largest today.[163]

159. *Id.* § 5109.
160. *Id.* § 5107.
161. *See id.*
162. *See id.*
163. *See* EPA's Toxic Release Inventory data for 1988 and 2003, *available at* http://www.epa.gov/tri/ (last visited Mar. 21, 2007).

Table 3. Louisiana Summary of Ambient Health-Based Regulation of Selected Air Toxics

Compound	**Ambient Air Standard** ($\mu g/m^3$)	
	Acute[a] (8 hr.)	**Chronic**[b] (annual)
Benzene	NA	12
1,3-Butadiene	NA	0.92
Formaldehyde	NA	7.69
Toluene	8,900	NA
Acrolein	5.40	NA
H_2S	330	NA
Styrene	5,070	NA
Vinyl Chloride	NA	1.19

[a] Based on one forty-second of the selected occupational exposure level, or other data determined to be superior by the administrative authority.

[b] Based on unit risk factors and a residual risk of one in ten thousand, or other data determined to be superior by the administrative authority.

Source: LA. ADMIN. CODE tit. 33, § 5112, at tbls. 51.1, 51.2, 51.3 (2006) (excerpted); LA. ADMIN. CODE tit. 33, § 501 (2006). Toxins are divided into three classes. *See id.* § 5112 tbl. 51.1. Class I toxins are known or probable carcinogens. Class II includes suspected carcinogen and reproductive toxins. Class III includes acute and chronic toxins.

D. Maryland

1. Overview

The State of Maryland has regulated hazardous pollutants since September 1988,[164] pursuant to authority in the Maryland Environmental Code section 2-302, The Maryland Department of the Environment (MDE) is authorized to establish ambient air standards for harmful substances even if they haven't been addressed by the federal government.[165]

2. Identification of Pollutants and Sources

There are over 750 pollutants or classes of pollutants listed in Maryland's air toxics regulations.[166] Maryland divides its air toxics pollution into categories based on severity. Class I includes known

164. Md. Dep't of the Env't, Fact Sheet: Maryland's Toxic Air Pollutant (TAP) Regulations, http://textonly.mde.state.md.us/assets/document/permit/summary_tap.pdf (last visited Jan. 8, 2007) [hereinafter Maryland Fact Sheet].

165. *See* MD. CODE ANN. ENVIR. § 2-302 (West 2006).

166. *See* MD. CODE REGS. 26.11.16.06–07 (2006).

carcinogens, probable carcinogens, and potential carcinogens,[167] while Class II encompasses noncarcinogenic compounds.

3. Standards and Emissions Levels

Maryland's air toxics regulations have three basic requirements: (1) the owner or operator of an emission source must quantify the emissions of toxic air pollutants (TAPs) from the premises;[168] (2) the owner or operator of all new sources of air pollution (and certain existing sources) must apply the best available control technology for toxics (T-BACT);[169] and (3) each TAP must not adversely affect public health.[170]

In order to not adversely affect public health, a facility's premises-wide emissions must not exceed established benchmarks called screening levels.[171] These screening levels are based on data from the EPA or the California air toxic program. According to the MDE, public health is protected when the emissions of a facility are less than the maximum allowable emissions or when off-site impact of each TAP is less than the screening level for the TAP, as determined by dispersion modeling.[172]

4. Monitoring, Compliance, and Enforcement

Sources constructed or modified after July 1, 1988 that discharge TAPs and are otherwise required to obtain an air quality permit to construct must comply with the air toxics regulations.[173] The TAP limits and T-BACT requirements become fully enforceable provisions in the facility's air permits. Sources constructed before July 1988 that discharge TAPs and are a type of source required to obtain a state permit to operate on or before March 1, 1993 are also required to comply with air toxics regulations.[174]

5. Conclusion

Maryland has a relatively typical air toxics program. It sets standards and then incorporates these standards into major source permitting of both new and existing sources. The standards are generally enforced by modeling, not monitoring of individual sources. Maryland also does not

167. *See id.* 26.11.16.06.
168. *See id.* 26.11.15.04(A)(1).
169. *See id.* 26.11.15.05(A). T-BACT is a control strategy that reduces the most toxic air pollution while still being cost effective.
170. *See id.* 26.11.15.06(B)(1).
171. *Id.* 26.11.15.07.
172. *See id.* 26.11.16.02.
173. *See id.* 26.11.02.11(A); *see also id.* § 26.11.15.01(B)(7).
174. Maryland Fact Sheet, *supra* note 164.

have a general program for ambient monitoring to test whether the modeling data and/or reported data are correct.

Table 4. Maryland Summary of Ambient Health-Based Regulation of Selected Air Toxics

Compound	**Screening Level**[a] ($\mu g/m^3$) (8 hr.)	**Primary Evidentiary Support**
Benzene	82	IRIS (EPA)
1,3-Butadiene	44.25	California 12/02 Hot Spots Program.
Formaldehyde	6.3	IRIS (EPA)
Toluene	1884.05	NA
Acrolein	0.56	NA
H_2S	139.39	NA
Styrene	852.02	NA
Vinyl Chloride	25.56	IRIS (EPA)

[a] Screening level at point of contact with public as determined through dispersion modeling.

Source: Md. Dep't of the Env't, Toxic Air Pollutant Screening Levels March 2006, *available at* http://www.mde.state.md.us/permits/airmanagementpermits/toxic_air/index.asp (follow "Sorted by CAS (Word document)" hyperlink) (last visited Feb. 6, 2007).

E. Massachusetts

1. Overview

In addition to the technological controls required by the federal HAP program,[175] the Massachusetts Department of Environmental Protection (DEP) controls emissions of toxic air pollutants within the Commonwealth by establishing ambient standards, permitting sources, and restricting exceedances of ambient standards.[176] Statutory authority for the control of air toxics comes from Chapter 111 of the Massachusetts General Laws on Public Health.[177]

Additionally, the Massachusetts Toxics Use Reduction Act (TURA) was enacted in 1989 to prevent toxics usage in a manner that would not cause undue harm to the economy.[178] TURA requires that companies which exceed a threshold level of listed pollutants: (1) evaluate pollution prevention opportunities, (2) implement practical pollution prevention strategies, and (3) measure and report their results on an annual basis.[179]

175. *See* 42 U.S.C. § 7412(d)(1) (2006).

176. The Massachusetts Department of Environmental Protection (DEP) has promulgated regulations for both the Toxics Use Reduction Act and the general air toxics permitting program. 310 MASS. CODE REGS. 50.00.

177. MASS. GEN. LAWS ch. 111, § 2B (2006).

178. *Id.* ch. 21I, §§ 1–23.

179. 310 MASS. CODE REGS. 50.31–50.33 (2006).

Companies must update their plans every two years.[180] The state reports that toxic byproducts of manufacturing activity fell 65 percent between 1990 and 2004, in the so-called core industries.[181]

2. Identification of Pollutants and Sources

Under the grant of power to protect the public health, in the late 1980s DEP identified 115 pollutant-specific health-based air toxics guidelines (Allowable Ambient Limits or AALs), which are used in permitting certain stationary sources.[182] TURA covers a broader range of air toxics, including most chemicals that are subject to federal reporting requirements.[183]

3. Setting of Standards and Emissions Levels

The AALs are based on potential known or suspected carcinogenic and toxic health properties of individual compounds, with adjustments to account for noninhalation exposures, and for exposures to children and sensitive individuals.[184] For cancer risk, AALs are based on the EPA's reference concentration (RfC), which is the concentration to which a person can be exposed for a lifetime without any anticipated adverse health effects—defined as a one in one million excess cancer risk.[185] For noncancer benchmarks, the RfC represents the value likely to present no appreciable risk of adverse noncancer effects with long-term continuous inhalation.[186] AALs are reviewed and updated periodically to reflect current toxicity information.[187]

180. *See id.* 50.41.

181. Mass. Dep't of Envtl. Prot., Toxics Use Reduction Act: Measuring Success, http://www.mass.gov/dep/toxics/priorities/succes03.htm (last visited Feb. 20, 2007).

182. *See* Mass. Dep't of Envtl. Prot., Addressing Air Toxics in Massachusetts, http://www.mass.gov/dep/air/community/airtox.htm (last visited Jan. 6, 2007) [hereinafter Mass. Air Toxics].

183. *See* Mass. Dep't of Envtl. Prot., Toxics Use Reduction Act: Regulated Chemicals, http://www.mass.gov/dep/toxics/approvals/regchem.htm (last visited Feb. 14, 2007) (referring to reporting requirements imposed by section 313 of the Emergency Planning and Community Right-to-Know Act (EPCRA), and the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)).

184. MASS. DEP'T OF ENVTL. PROT., MASSACHUSETTS THRESHOLD EFFECTS EXPOSURE LIMITS (TELS) AND ALLOWABLE AMBIENT LIMITS (AALS) FOR AMBIENT AIR (1995), *available at* http://www.mass.gov/dep/air/aallist.pdf.

185. *See id.*

186. *See id.*

187. See *id.* for an example of an updated AAL.

4. Monitoring, Compliance, and Enforcement

DEP enforces the TURA program and the AALs through reporting requirements and permitting.[188] DEP evaluates permitted air toxics sources, which includes all major sources and some smaller sources that are of particular concern, for exceedances of the AALs.[189] DEP also monitors nearly sixty pollutants as part of the Photochemical Assessment Monitoring System (PAMS) programs, many of which are air toxics.

Large quantity toxic users must file annual reports describing their toxic substances management practices, and develop plans for reducing their use of toxics.[190] When more than one threshold applies to a facility's manufacturing, processing, or other use of a toxic substance, the toxics user is a large quantity toxics user if the facility exceeds any applicable threshold.[191] Moreover, toxics in the same category can be cumulated in determining whether the source is a large quantity toxic user.[192]

5. Conclusion

Massachusetts has some of the most protective and complete standards of any of the states. It not only uses a risk standard of one in one million excess cancer deaths, but also conducts sophisticated investigations of how air toxics may cause cumulative harm with each other and with other sources of harm. This approach focuses on the realistic health of the Commonwealth's citizens and does not simply measure levels in a pollutant-by-pollutant manner. Though the primary method of controlling air toxics is developing standards that are then incorporated into permits for a limited category of sources, Massachusetts also requires that air toxics sources undertake pollution reduction programs and file annual reports to demonstrate their compliance. This means that any sources that might be missed in a typical permitting situation would be recognized and addressed through the air toxics self-evaluation process.

188. *See* Mass. Air Toxics, *supra* note 182.

189. *See id.*

190. MASS. DEP'T OF ENVTL. PROT., TOXICS USE REDUCTION PLANNING GUIDANCE: PUBLISHED IN ACCORDANCE WITH MGL 21I AND 310 CMR 50.00, at 1 (2002), *available at* http://www.mass.gov/dep/toxics/laws/planguid.pdf. A large quantity toxic user means any toxics user who manufactures, processes or otherwise uses any toxic or hazardous substance in an amount, determined in accordance with 310 MASS. CODE REGS. 50.20, the same as or greater than the applicable threshold amount in a calendar year at a facility. *See* MASS. GEN. LAWS, ch. 21I, § 2 (2006).

191. *See* 310 MASS. CODE REGS. 50.10 (2006).

192. *See id.* 50.20(2).

Table 5. Massachusetts Summary of Ambient Health-Based Regulation of Selected Toxics

Compound	Threshold Effects Exposure Limit (TEL) ($\mu g/m^3$) (24 hr.)	Allowable Ambient Limit (AAL) ($\mu g/m^3$) (annual)	Primary Evidentiary Support
Benzene	1.74	0.12	MACT and 115 risk-based derivation process for cancer and/or noncancer effects. Carcinogen-based limits at 10^{-6} risk level, noncancer use RfC or OELs with averaging time and other adjustments.
1,3-Butadiene	1.20	0.003	
Formaldehyde	0.33	0.08	
Toluene	80	20	
Acrolein	NA	NA	
H_2S	0.9	0.9	
Styrene	200	2	
Vinyl Chloride	3.47	0.38	

Source: Mass. Dep't of Envtl. Prot., Massachusetts Threshold Effects Exposure Limits and Allowable Ambient Limits for Ambient Air (1995), *available at* http://www.mass.gov/dep/air/aallist.pdf.

F. Michigan

1. Overview

Michigan's Department of Environmental Quality (DEQ) first promulgated air toxic ambient standards on April 17, 1992.[193] Over time, the rules were revised under the authority granted under part 55 of the Natural Resources and Environmental Protection Act of 1994 and became effective November 10, 1998.[194]

2. Identification of Pollutants and Sources

Michigan regulates any noncriteria air contaminants that may become harmful to public health or the environment when present in the outdoor atmosphere in sufficient quantities and duration,[195] except for certain substances that are specifically exempt, such as inert gases or nuisance particulates.[196] Michigan has no comprehensive list of all regulated toxic air contaminants, but this list would include the 189 federally regulated compounds.[197]

193. *See* Mich. Dep't of Envtl. Quality, Overview of Michigan's Air Toxic Rules, http://www.michigan.gov/deq/0,1607,7-135-3310_4105-11749--,00.html (last visited Mar. 21, 2007) [hereinafter Michigan Air Toxic Overview].

194. *See id.* The air toxic rules are found at MICH. ADMIN. CODE r. 336.1224–1232 (2006).

195. *See id.*

196. *See id.*

197. *Id.*

The Michigan air toxic rules apply to any "person who is responsible for any proposed new or modified emission unit or units for which an application for a permit to install is required . . . and which emits a toxic air contaminant."[198] The rule therefore applies to sources subject to MACT regulation under the federal HAP program, including new or modified sources, but not to existing sources.[199]

3. Setting of Standards and Emissions Levels

The rules specify a hierarchy of methods for determining the health-based screening level for noncarcinogenic effects of a toxic air contaminant—the initial threshold screening level (ITSL).[200] The choice of methods depends upon the available toxicological data. There are two health-based screening levels for carcinogenic effects: the Initial Risk Screening Level (IRSL), defined as an increased cancer risk of one in one million (10^{-6}); and the Secondary Risk Screening Level (SRSL), defined as an increased cancer risk of one in one hundred thousand (10^{-5}).[201] Michigan bases screening levels on the U.S. EPA's data on the health risk of that particular compound, contained in the Integrated Risk Information System (IRIS) database.[202]

4. Monitoring, Compliance, and Enforcement

The rules require both technology controls and health-based controls.[203] First, each regulated source must apply the best available control technology for toxics (T-BACT) as also required by federal law.[204] Additionally, the emissions of the toxic air contaminant after the application of T-BACT cannot result in a maximum ambient concentration that exceeds the applicable health-based screening level as determined by the state.[205]

The IRSL applies only to new or modified sources that are subject to a HAP permit application.[206] The applicant must demonstrate that

198. *Id.* at 336.1224(1).
199. Michigan Air Toxic Overview, *supra* note 193.
200. *Id.*
201. *See id.*
202. Michigan's ITSL standards can be found at http://www.deq.state.mi.us/itslirsl/ (last visited Feb. 15, 2007). Screening levels can be looked up based on chemical name or CAS (Chemical Abstracts Service) number. For each chemical, information is provided about the basic methodology for determining the screening level. All standards, however, rely on information available on EPA's Integrated Risk Information System (IRIS) website, *available at* IRIS Database for Risk Assessment, http://www.epa.gov/iris/ (last visited Jan. 10, 2007).
203. *See* Michigan Air Toxic Overview, *supra* note 193.
204. *See id.*
205. *See id.*
206. *See id.*

emissions of any toxic air contaminants meet the IRSL. If the applicant cannot demonstrate IRSL compliance, it may instead "choose to demonstrate compliance with the SRSL," which is based on a risk level of one in one hundred thousand.[207] To do this, a permitted entity must include all sources of that toxic air contaminant emitted from the plant, not just the emission unit being permitted.[208]

If DEQ finds that the existing requirements, as applied to a particular source, may not provide adequate protection of human health or the environment, the air toxic rules allow the DEQ "to require a lower emission rate than that specified by T-BACT or the health-based screening level."[209] DEQ can make such a determination after considering "all relevant scientific information . . . including routes of exposure other than direct inhalation, synergistic or additive effects of toxic air contaminants, and effects on the environment."[210] While DEQ has this authority, it does not appear that it has ever required a lower rate than the "existing requirements" described above.

5. Conclusion

Michigan's program is relatively basic; it only requires already permitted major sources to meet ambient standards. It does not incorporate these into overall reductions, nor does it have an independent program to measure ambient air quality. Moreover, while the program aspires to reduce risks to the one-in-one-million level, it effectively allows a risk level of one in one hundred thousand in certain cases, and the actual risk could be higher considering that all sources may not be identified. Michigan's enforcement program does place the burden on the sources themselves to ensure that they are meeting the required health risk level. However, there is no evidence as to how this self-monitored compliance is ensured beyond general permitting review.

207. *Id.*
208. *See id.*
209. *Id.*
210. *Id.*

Table 6. Michigan Summary of Ambient Health-based Regulation of Selected Toxics

Compound	Screening Levels ($\mu g/m^3$)		Primary Evidentiary Support
	Noncancer ITSL[a] (24 hr.)	Cancer IRSL[b] (annual)	
Benzene	30	0.1	IRIS
1,3-Butadiene	2	0.03	
Formaldehyde	NA	0.08	
Toluene	5,000	NA	
Acrolein	NA	NA	
H_2S	2	NA	
Styrene	1,000	1.7	
Vinyl Chloride	100	0.11	

[a] Initial Threshold Screening Level
[b] Initial Risk Screening Level

Source: Mich. Dep't of Envtl. Quality, Michigan Air Toxics System Initial Threshold Screening Level/Initial Risk Screening Level (ITSL/IRSL), http://www.deq.state.mi.us/itslirsl/results.asp?Chemical_Name=&CASNumber=&cmdShowAll=Show+All+Chemicals (last visited Mar. 21, 2007).

G. New Jersey

1. Overview

The New Jersey Department of Environmental Protection (NJDEP) boasts that it has regulated air toxics since 1979, well before most states. In that year, NJDEP adopted a rule entitled "Control and Prohibition of Air Pollution by Toxic Substances."[211] In fact, its regulatory authority dates to 1954, when the New Jersey Air Pollution Control Act[212] was enacted, authorizing the agency to take actions to protect New Jersey citizens from air pollution.

2. Identification of Pollutants and Sources

The original 1979 rule identified eleven compounds of concern, known as Toxic Volatile Organic Substances (TVOS).[213] The program also regulates the 189 compounds identified in the 1990 amendments to the federal HAP program.[214] The 1979 rule requires that sources emitting

211. N.J. ADMIN. CODE §§ 7:27-17.1 to 7:27-17.9 (1979).
212. N.J. STAT. ANN. § 26:2C-1 to -25.2 (West 2006)
213. *See* N.J. Dep't of Envtl. Prot, NJDEP Air Toxics Program, *available at* http://www.state.nj.us/dep/airmon/airtoxics/njatp.htm (last visited Mar. 21, 2007) [hereinafter N.J. Air Toxics Program].
214. *See id.*

any of these eleven TVOS register with the NJDEP and demonstrate that they are using state-of-the-art (SOTA) controls to limit their emissions.[215]

3. Setting of Standards and Emission Levels

New Jersey does not publish ambient standards for toxic air pollutants, but instead requires technological controls on sources. However, in the early 1980s, the NJDEP "recognized that one shortcoming of the control technology approach was that it does not guarantee that the emissions from a source with state-of-the-art controls are sufficiently low to protect public health."[216] NJDEP began to require most large sources of air toxic emissions to submit a risk assessment along with their permit application.[217] Large sources include municipal waste and hazardous waste incinerators, coal-fired power generation facilities, cogeneration units, and other sources as determined by the NJDEP on a case-by-case basis.[218] The risk standards vary between one in one million and one in ten thousand for carcinogens. Reference concentrations for noncarcinogens are based on a combination of research conducted by the U.S. EPA and California EPA.[219]

4. Monitoring, Compliance, and Enforcement

NJDEP's primary method of enforcement is through a permitting system. The permitting process requires a combination of control technology requirements and risk assessment.[220] When a new or modified source of air emissions applies for an Air Pollution Control Permit, it must show that it uses SOTA control techniques.[221] NJDEP has required SOTA techniques for over thirty years. The SOTA requirements incorporate any MACT standards for federally regulated major air toxics sources.[222] SOTA techniques generally include performance limits that are based on air pollution control technology, pollution prevention methods, and process modifications or substitutions that provide the greatest emission reductions that are technologically and economically

215. *See id.*
216. *Id.*
217. *See id.*
218. *See id.*
219. N.J. Dep't of Envtl. Prot., Air Quality Permitting Program, http://www.nj.gov/dep/aqpp/risk.html (last visited Mar. 21, 2007) [hereinafter N.J. Air Quality Permitting Program].
220. *See* N.J. Air Toxics Program, *supra* note 213.
221. *See id.*
222. *See* N.J., DEP'T OF ENVTL. PROT., STATE OF THE ART (SOTA) MANUAL 1.6 (1997), *available at* http://www.nj.gov/dep/aqpp/downloads/sota/sota0.pdf.

feasible.[223] NJDEP developed a SOTA workgroup to assist in producing technical manuals for applicants.[224]

NJDEP provides all permit applicants with a worksheet that estimates risk by using information about the source's stack height and distance to the property line, in addition to the emission rate and toxicity of each chemical.[225] The worksheet uses a unit risk factor of one in one million for carcinogens. Proposed permit projects that would result in an increased risk of cancer that is less than one in one million are considered safe for that chemical.[226] When a risk assessment shows a cancer risk of greater than one in one million, NJDEP conducts further evaluation to determine whether the permit should be approved. [227] Generally, NJDEP denies permit applications for a specific process if the risk is greater than one in ten thousand.[228] If it is above one in one million but less than one in ten thousand after second-level risk screening, an NJDEP permit evaluator discusses with the applicant ways to decrease the risk.[229] If the risk cannot be decreased to a reasonable level, the permit application is reviewed by NJDEP's air program Risk Management Committee, which usually includes the permit evaluator in addition to a risk assessor, an inspector familiar with the facility, and bureau chiefs.[230]

NJDEP works to determine whether additional pollution prevention and control measures could be implemented to reduce emissions that pose health risks.[231] For example, though New Jersey permits small as well as large facilities, small facilities are not required to conduct a risk assessment and therefore may not have information about possible risks to the air from their operations. To address this concern, NJDEP permit evaluators screen for risk at smaller facilities.[232] NJDEP's plans for smaller facilities include the development of general permits for dry cleaners and halogenated solvent cleaners, and compliance plans for sources designated as area sources under federal law.[233]

223. *See* N.J. Air Toxics Program, *supra* note 213.

224. See N.J. Dep't of Envtl. Prot., http://www.state.nj.us/dep/aqpp/sota.html (last visited Feb. 24, 2007), for New Jersey's State of the Art Manuals.

225. *See* N.J. Dep't of Envtl. Prot., Air Quality Permitting Program: Risk Screening Tools, http://www.state.nj.us/dep/aqpp/risk.html (follow "MS Excel" hyperlink) (last visited Jan. 17, 2007).

226. *See id.*

227. *See* N.J. DEP'T OF ENVTL. PROT., RISK SCREENING POLICY AND SECOND-LEVEL RISK SCREENING 1, *available at* http://www.state.nj.us/dep/aqpp/downloads/risk/2Level.pdf (last visited Mar. 28, 2006) [hereinafter N.J. RISK SCREENING].

228. *See id.* at 2.

229. *See id.*

230. *See id.*

231. *See* N.J. Air Toxics Program, *supra* note 213.

232. *See id.*

233. N.J. Dep't of Envtl. Prot., Air Toxics Reductions in NJ, http://www.state.nj.us/dep/airmon/airtoxics/reduxnj.htm (last visited Mar. 21, 2007).

5. Conclusion

New Jersey's program is unusual in that it does not require sources to reduce pollutants to a particular ambient level. Rather, pollutants must be reduced to a particular risk level. Left to their own devices, the permit applicants are likely to come up with widely varying estimates as to that risk. However, New Jersey requires sources to calculate the risk using a standardized worksheet based on ambient health standards that have been determined by California and the EPA. If the worksheet is set up correctly, the level of pollutants allowed for each source is uniquely tailored to its processes and location. This tailor-made risk assessment technique may allow for more efficient control.

New Jersey agencies are also active in enforcement. The primary method is a typical permitting system to enforce risk reductions. Unfortunately, the enforcement scheme does not have general ambient monitoring or testing, or other methods to ensure that risk reduction targets are in fact met. Moreover, New Jersey allows sources to avoid the most stringent risk regulation by allowing risk to rise to one in ten thousand on a case-by-case basis. If the risk exceeds one in one million, the applicant is to "work with" the state to try and reduce it, at least to one in ten thousand.[234] There is no record of any applicant having to reduce emissions to meet the one in one million standard as long as they meet one in ten thousand.

New Jersey Summary of Ambient Health-based Regulation of Selected Air Toxics

New Jersey does not currently have any ambient air quality standards used in its permitting process.[235] Instead, the state relies on mandatory risk assessments from permit applicants.[236]

H. New York

1. Overview

The New York State Department of Environmental Conservation (NYSDEC) has been responsible for the implementation of the state's comprehensive air toxics control program for over twenty years.[237]

234. *See* N.J. RISK SCREENING, *supra* note 227.
235. *See id.*
236. *See id.*
237. *See* N.Y. Dep't of Envtl. Conservation, Air Toxics Program, http://www.dec.state.ny.us/website/dar/boss/toxics.html (last visited May 15, 2006).

Sources must comply with air pollution permitting and regulation contained in Title 6, Part 212 of the New York administrative code unless specifically exempt.[238]

2. Identification of Pollutants and Sources

The State of New York recognizes 189 different chemicals as HAPs, consistent with the federal list.[239] All sources that must obtain an air permit from the state or federal government are regulated through the program.

3. Setting of Standards and Emissions Levels

The NYSDEC may adopt rules or regulations on ambient standards that are more restrictive than those required by the federal Clean Air Act.[240] However, NYSDEC must prepare a "regulatory impact statement" that includes a detailed justification as to why the state regulation must exceed the federal minimum for a particular air toxic, an evaluation of the cost-effectiveness of the proposed state regulation in comparison with the cost-effectiveness of reasonably available alternatives, a review of reasonably available alternative measures considered, and an explanation of the reasons for rejecting such alternatives.[241]

In determining whether restrictions on sources are required, the state uses ambient air guidelines based on toxicity determinations about the compounds. According to the New York State DAR-1 Guidelines for the Control of Toxic Ambient Air Contaminants report,[242] the state uses "guidelines," not requirements, to ensure flexibility to apply general standards, to allow for the most current toxicological information, and to avoid the inefficient administrative effort necessary to adopt these guidelines as standards.[243] These guidelines are known as "Annual Guideline Concentrations" or AGCs.[244]

New York has an environmental rating system for air toxics that ranges from an *A* to *D* rating.[245] The criteria for the various rating levels range from the most severe and documented impacts, *A*, to air pollutants

238. N.Y.COMP. CODES R. & REGS. tit. 6, § 201-1.1(b) (2006) (exempting sources pursuant to N.Y. COMP. CODES R. & REGS. tit. 6, § 201-3).

239. *See id.* § 200.1(ag).

240. *See* N.Y. ENVTL. CONSERV. LAW § 19-0303(4) (2006).

241. *See id.*

242. N.Y. DEP'T OF ENVTL. CONSERVATION, DAR-1 GUIDELINES FOR THE CONTROL OF TOXIC AMBIENT AIR CONTAMINANTS 13 (1991), *available at* http://www.dec.state.ny.us/website/dar/ood/dar1.pdf [hereinafter DAR-1].

243. *See id.*

244. *See id.* at 7.

245. N.Y. COMP. CODES R. & REGS. tit. 6, § 212.9 (2006).

not expected to cause harm in the released amount, *D*.[246] From these ratings, NYSDEC creates the final ambient guidelines for toxics, which serve as reference points for the state to determine what technological controls are required.

4. Monitoring, Compliance, and Enforcement

New York regulates air toxics through the permitting process specified in Title 6, Part 212 of the New York administrative code. Prior to issuing a permit, sources must comply with applicable federal and state standards including the AGCs.[247]

Sources of emissions that emit *A*-rated (e.g., high toxicity) contaminants must control at least 99 percent of their emissions or apply the best available control technology (BACT).[248] Where a source owner can demonstrate that application of BACT will eliminate health impacts, the NYSDEC may specify a less restrictive permissible emission rate, emission standard, or degree of air cleaning.[249] For emissions sources not equipped with BACT, the annual impact must be less than the AGC specified for a particular air toxic.[250] In other words, though New York examines toxicity and risk through ambient standards, the response is primarily technological in nature. However, this framework still allows New York to regulate all existing sources with BACT, an advantage given the lagging federal response on area sources.[251]

The statute authorizes a compliance monitoring and enforcement program.[252] The goal of the compliance monitoring program is "to

246. These categories are defined as follows:

> *A* = An air contaminant whose discharge results, or may result, in serious adverse effects on receptors or the environment. These effects may be of a health, economic or aesthetic nature or any combination of these.
>
> *B* = An air contaminant whose discharge results, or may result in only moderate and essentially localized effects; or where the multiplicity of sources of the contaminant in any given area require an overall reduction of atmospheric burden of that contaminant.
>
> *C* = An air contaminant whose discharge may result in localized adverse effects of an aesthetic or nuisance nature.
>
> *D* = An air contaminant whose discharge will not result in measurable or observable effects on receptors, nor add to an existing or predictable atmospheric burden of that contaminant which may cause adverse effects, considering properties and concentrations of the emissions, isolated conditions, stack height and other factors.

Id.

247. *See* DAR-1, *supra* note 242, at 5.

248. *See id.* at 14.

249. *See* N.Y. COMP. CODES R. & REGS. tit. 6, § 212.5(d) (2006).

250. *See* DAR-1, *supra* note 242, at A-4.

251. *See supra* text accompanying note 39.

252. *See* N.Y. COMP. CODES R. & REGS. tit. 6, § 212.11(a)–(b) (2006).

achieve compliance with all legal and regulatory requirements."[253] The program consists of on-site inspections, review of periodic monitoring reports and performance tests, compliance evaluations, and tracking of compliance related activities.[254] When violations are detected, an enforcement response may involve the assessment of penalties.[255] However, enforcement seems primarily concerned with the technological standards—the Compliance and Enforcement Summary for fiscal year 2003 showed no enforcement actions based on violations of the AGCs.

5. Conclusion

New York's program recognizes that health risks can be specified through ambient standards. It uses these standards to determine how much permitted sources should control their emissions. The regulatory response is technology specific and goes further than the federal law by regulating all new and existing sources, not just major sources. However, while the enforcement work is rigorous, it centers completely on enforcing permit limitations and does not directly test these sources' impacts on the ambient air, or use ambient monitoring to ensure that the state's health guidelines are being met.

Table 7. New York Summary of Ambient Health-Based Regulation of Selected Air Toxics

Compound	**Annual Guideline Concentration (AGC)** ($\mu g/m^3$)[a]	**Toxicity Level** (NYSDEC Envtl. Rating)	**Primary Evidentiary Support**
Benzene	0.13	High (A)	IRIS (EPA)
1,3-Butadiene	0.028	High (A)	IRIS (EPA)
Formaldehyde	0.06	High (A)	N.Y. State Dep't of Health (more conservative than EPA values)
Toluene	400	Low (C)	IRIS (EPA)
Acrolein	0.02	High (A)	IRIS (EPA)
H_2S	2/hr. [b]	Moderate (B)	IRIS (EPA)
Styrene	1000	Moderate (B)	IRIS (EPA)
Vinyl Chloride	0.11	High (A)	IRIS (EPA)

[a] Annual Average

[b] NY has adopted a one-hour *standard* for hydrogen sulfide, as opposed to a *guideline*.

Source: N.Y. STATE DEP'T OF ENVTL. CONSERVATION, DAR-1 AGC/SGC TABLES (2003), *available at* http://www.dec.state.ny.us/website/dar/boss/ agcsgc03tables.pdf.

253. DIV. OF AIR RES., N.Y. DEP'T OF ENVTL. CONSERVATION, COMPLIANCE AND ENFORCEMENT SUMMARY FEDERAL FISCAL YEAR 2005, at 1 (2006), *available at* http://www.dec.state.ny.us/website/dar/boss/ffy2005report.pdf.

254. *See id.* at 1–2.

255. *See id.*

I. North Carolina

1. Overview

In 1998, the North Carolina Department of Environmental and Natural Resources (DENR) implemented Toxic Air Pollution Procedures.[256] These procedures are used to insure that toxic air pollutants (TAPs) from new or modified facilities do not exacerbate existing TAP levels. North Carolina's risk-based program is designed around a set of Acceptable Ambient Level (AAL) guidelines.[257]

2. Identification of Pollutants and Sources

North Carolina requires any air toxics that harm human health to be regulated.[258] Consequently, North Carolina currently regulates 105 toxic air pollutants in addition to those listed under federal law.[259] Of course, major sources of the federal HAPs must also be regulated pursuant to section 112.

3. Setting of Standards and Emissions Levels

DENC sets AALs "below the concentration that would produce adverse health effects in sensitive subgroups of the general population."[260] AALs for noncancer health effects are based on occupational exposure standards adjusted downward using safety factors of between 10 and 160.[261] North Carolina uses safety factors because it "recognize[s] that chemical compounds differ[] in the nature and severity of the toxic effects and how much [i]s known about the health effects of a chemical."[262] In general, the state uses a larger safety factor when less is known about a chemical.[263]

To address the risk of known human carcinogens, AALs are calculated to represent a residual risk of one in one million.[264] In contrast,

256. *See* 15A N.C. ADMIN. CODE 2Q.0701–2Q.0714 (2006).

257. *See* N.C. DEP'T OF ENVTL. & NATURAL RES., AIR TOXICS PROGRAM: ACCEPTABLE AMBIENT LEVELS (2000), *available at* http://daq.state.nc.us/toxics/aaldisc.pdf [hereinafter N.C. Air Toxics Program].

258. *See* N.C. Dep't of Envtl. & Natural Res., Acceptable Ambient Level (AAL) Concentrations for Toxic Air Pollutants, http://daq.state.nc.us/toxics/haps-taps/ (last visited Mar. 21, 2007).

259. *Id.*

260. N.C. Dep't of Env't & Natural Resources, An Introduction to Risk Assessment, http://daq.state.nc.us/cgi-bin/parsePdf1.cgi?file=/toxics/riskintro.pdf (last visited Mar. 21, 2007).

261. *See* N.C. Air Toxics Program, *supra* note 257, at 1.

262. *Id.*

263. *See id.*

264. *See id.*

AALs for "probable" and "possible" human carcinogens allow the risk levels to rise to one in one hundred thousand and one in ten thousand, respectively. [265] To keep up with current research on health effects of various pollutants, the air toxics program maintains a Scientific Advisory Board (SAB) of toxicology experts that periodically suggest changes to AAL guidelines.[266]

4. Monitoring, Compliance, and Enforcement

Regulated pollution sources must reduce their emissions so that the predicted (modeled) fenceline levels attributable to those emissions do not exceed the AAL.[267] Computer-based dispersion models predict the downwind, fenceline concentrations of a given pollutant from a particular smokestack by accounting for wind, temperature, and terrain.[268] According to DENR, AALs are not, therefore, directly comparable to air concentrations measured during ambient monitoring, because AALs are applicable only to the portion of the air concentration emitted from a specific industrial source.[269] North Carolina has faced questions about the accuracy of using these models to predict fenceline concentrations,[270] particularly when multiple sources contribute to the measured ambient concentration.

Several environmental groups have claimed that the distinctions that DENR attempts to draw between AALs and air concentrations measured during ambient monitoring are improper under North Carolina law.[271] The Blue Ridge Environmental Defense League disputes DENR's claim that the AALs are different from an ambient standard, based on the language of the statute and the legislative intent to protect public health.[272] However, while North Carolina's regulations ignore the combined risk of emissions of the same TAP from different facilities, they do consider the cumulative impacts of multiple TAPs from the same facility if there is "evidence that two or more [TAPs] being emitted from

265. *Id.*

266. *See id.*

267. *See id.* at 2.

268. *See id.* at 3.

269. *See id.* at 3–4; *see also* BLUE RIDGE ENVTL. DEF. LEAGUE, COMMENTS ON CAROLINA SOLITE SAMPLING PLANS AND AIR MODELING (2000), *available at* http://www.bredl.org/solite/comments050800.htm.

270. Fenceline concentrations refer to the actual level of a particular substance when it leaves the source to go into the wider world, at the fenceline. Other sources may also affect the ambient concentration at the fenceline.

271. *See* BLUE RIDGE, *supra* note 269.

272. *Id.* The statute being disputed states: "A facility shall not emit any of the following toxic air pollutants in such quantities that may cause or contribute beyond the premises (adjacent property boundary) to any significant ambient air concentration that may adversely affect human health." 15A N.C. ADMIN CODE 2D.1104 (2006).

a facility or combination of facilities act in the same way to affect human health."[273]

5. Conclusion

North Carolina examines sources with technology controls in place to determine if their controlled emissions would create a level of pollution higher than a "safe" ambient level of an air toxic. However, as seen in the Blue Ridge Environmental Defense League's challenge to the use of the smokestack-specific limits and modeling to predict these exceedances, North Carolina ignores any cumulative effects at the fenceline from more than one source. The control requirements that are generated by models are developed and enforced as part of the permit process, but not all potential sources are permitted or addressed, only new or modified sources otherwise requiring permits.

Table 8. North Carolina Summary of Ambient Health-Based Regulation of Selected Air Toxics

Compound	**Acceptable Ambient Levels**[a] ($\mu g/m^3$)		
	Acute Irritant (1 hr.)	Chronic Toxicant (24 hr.)	Carcinogen (annual)
Benzene	NA	NA	0.12
1,3-Butadiene	NA	NA	0.17
Formaldehyde	150	NA	NA
Toluene	56,000	4.7	NA
Acrolein	80	NA	NA
H_2S	NA	0.12	NA
Styrene	10,600	NA	NA
Vinyl Chloride	NA	NA	0.38

[a] *Level* at fenceline which is expected to yield the one in one million risk, but note that no direct measurement occurs at the fenceline and ambient level is estimated based on modeling.

Source: N.C. ADMIN. CODE tit. 15A, r 2D. 1104 (2005) (listing AALs for all 105 TAPs). *See also* N.C. Dep't of Env't & Natural Resources, Acceptable Ambient Level (AAL) Concentrations for Toxic Air Pollutants, http://daq.state.nc.us/ toxics/haps-taps/ (last visited Feb. 25, 2007).

273. 15A N.C. ADMIN. CODE 2D.1108.

J. Oregon

1. Overview

After five years of extensive collaboration between the Oregon Department of Environmental Quality (DEQ) and the Hazardous Air Pollutant Consensus Group (HCG),[274] the Oregon Environmental Quality Commission (EQC) adopted rules implementing Oregon's air toxics program in October 2003.[275] The program's pertinent elements are the creation of an Air Toxics Science Advisory Committee (ATSAC), the formulation of ambient benchmark values, the implementation of a geographic program, the formulation of a Source Category strategy and rules, and a Safety Net program.[276]

2. Identification of Pollutants and Sources

The Source Category program authorizes DEQ to promulgate statewide categorical rules which "evaluate toxic problems [and] design emission reduction efforts."[277] The geographic program focuses on air toxics concerns in specific geographic areas, such as the Portland metropolitan area,[278] whereas the Safety Net program addresses the rare situation in which a source lying outside of a selected geographic area is the sole cause of ambient air benchmark exceedances of one or more air toxic ambient benchmarks.[279]

The ATSAC provides DEQ with scientifically and technically sound advice on the state air toxics program.[280] Among other responsibilities,

274. The Hazardous Air Pollutant Consensus Group (HCG) was composed of representatives from a broad range of interests including members of the public, local governments, local and state health departments, the environmental justice community, businesses, and industrial groups. *See* News Release, Or. Dep't of Envtl. Quality, Advisory Group Recommends State Air Toxics Program (Sept. 20, 1999), *available at* http://www.deq.state.or.us/news/prDisplay.asp?docID=504.

275. OR. ADMIN. R. 340-246-0010 to -0230 (2006). Oregon's air toxic program is authorized by OR. REV. STAT. §§ 468.035, 468A.010(1), 468A.015 (2005).

276. AIR TOXICS SCIENCE ADVISORY COMMITTEE, PROGRAM ORIENTATION (2004) [hereinafter ATSAC PROGRAM ORIENTATION] (on file with journal).

277. Or. Dep't of Envtl. Quality, Air Quality: Frequently Asked Questions, http://www.deq.state.or.us/aq/toxics/faq.htm (last visited Feb. 20, 2007).

278. *See* J. Mark Morford & Thomas R. Wood, Oregon Air Toxics Rules: Final Proposal Adopted (2003), *available at* http://www.stoel.com/showarticle.aspx?Show=853.

279. *See id.* This program is applied in situations where a pollutant source is located outside of a designated geographic area and is clearly the sole cause of an air toxics concern.

280. The ATSAC must have at least five, but no more than seven, members with relevant air toxics experience in the following six disciplines: (1) Toxicology; (2) Environmental science or engineering; (3) Risk Assessment; (4) Epidemiology & Biostatistics; (5) Public Health Medicine (physician); and (6) Air pollution modeling, monitoring, meteorology or engineering. OR. ADMIN. R. 340-246-0070(2) (2006); *see also* Or. Dep't of Envtl. Quality, Air Toxics Science Advisory Committee, http://www.deq.state.or.us/aq/toxics/atsac.htm (last visited Mar. 21, 2007).

ATSAC selects and categorizes air toxics and recommends ambient benchmarks for the state air toxics program for purposes of deciding how to regulate sources.[281] The ATSAC prioritizes air toxics based on five criteria:[282] toxicity and potency; exposure and number of people at risk; impact on sensitive human populations; number and degree of ambient benchmark exceedances;[283] and potential to cause harm through persistence or bioaccumulation.

3. Setting of Standards and Emissions Levels

The EQC, a commission that oversees the DEQ, is charged with establishing air purity standards, designating areas of the state for different controls, and prescribing the degree of air pollution or air contamination permitted in those areas.[284] The current benchmark concentration for carcinogenic air toxics is based on an excess lifetime cancer risk level of one in one million.[285] When determining air purity standards, the EQC considers the following factors:

> [1] the quality or characteristic of air contaminants or the duration of their presence in the atmosphere which may cause air pollution in the particular area of the state; [2] existing physical conditions and topography; [3] possible chemical reactions between air contaminants; [4] availability of air-cleaning devices; [5] economic feasibility of air cleaning devices; [6] effect on normal human health of particular air contaminants; [7] effect on efficiency of industrial operation resulting from use of air-cleaning devices; [8] extent of danger to property in the area reasonably to be expected from any particular air contaminants; [9] interference with reasonable enjoyment of life by persons in the area which can reasonably be expected to be affected by the air contaminants; [10] the volume of air contaminants emitted from a particular class of air contamination source; [11] the economic and industrial development of the state and continuance of public enjoyment of the state's natural resources; and [11] other factors which the commission may find applicable.[286]

281. OR. ADMIN. R. 340-246-0070(1).

282. *See* ATSAC PROGRAM ORIENTATION, *supra* note 276.

283. National-scale Air Toxics Assessment (NATA) benchmarks were used as a point of reference to determine the number and degree of ambient benchmark exceedances. Or. Dep't of Envtl. Quality, National-Scale Air Toxics Assessment, *available at* http://www.deq.state.or.us/aq/toxics/nata.htm (last visited Jan. 6, 2007).

284. *See* OR. REV. STAT. § 468A.025(1) (2005).

285. *See* OR. ADMIN. R. 340-246-0030(2) (2006); *see also* Memorandum from Bruce Hope, PhD, Environmental Toxicologist, Or. Dep't of Envtl. Quality, on the Proposed Basis for Ambient Benchmarks (Sept. 17, 2004), *available at* http://www.deq.state.or.us/aq/toxics/archive/docs/092304_basis.pdf.

286. OR. REV. STAT. § 468A.025(2)(a)–(0) (listing the factors considered by the Environmental Quality Commission).

The ambient air benchmarks for air toxics serve as goals for the ATSAC's controls in the air toxics program.[287]

4. Monitoring, Compliance, and Enforcement

The DEQ employs a combination of modeling and/or monitoring to measure concentrations of an air toxic.[288] The Oregon air quality statute mandates that the DEQ establish a program to measure and test air toxic sources. DEQ may perform the sampling or testing itself, or may require the source to test its emissions for air toxics.[289] In reality, all testing is done and self-reported by the permitted sources through Title V requirements. Therefore the monitoring requirement extends only to those sources that must obtain Title V permits and does not include measurements of ambient levels of air toxics.

The EQC is empowered to grant specific variances that may be limited in time from the particular requirements of any rule or standard to such specific persons or specific contamination source as it may consider necessary to protect the public health and welfare if it finds that strict compliance with the rule or standard is inappropriate or economically impracticable.[290]

The Oregon legislature anticipated that regional authorities would provide front-line administration of the program. Joining and forming an air pollution authority is voluntary, and cities and counties set the authority's geographic boundaries.[291] EQC approves the formation of the regional authority if it determines that the participating governments have planned adequate financing.[292] Each regional authority exercises the functions relating to air pollution control vested in the EQC and DEQ.[293] Regional authorities may not adopt any rule or standard that is less

287. *See* Or. Dep't of Envtl. Quality, Notice of Proposed Rulemaking, Or. Bull., Mar. 1, 2006, *available at* http://arcweb.sos.state.or.us/rules/0306_Bulletin/0306_rulemaking_bulletin.html (establishing ambient benchmarks for the state's air toxics program).

288. *See* OR. REV. STAT. § 468A.070(1) (2005); *see also* OR. ADMIN. R. 340-250-0030.

289. All sampling and testing of air toxics are conducted in accordance with methods used by the DEQ. *See* OR. REV. STAT. § 468A.070(3). Specifically, the Oregon DEQ implemented its monitoring mandate under OR. ADMIN. R. 340-212-0140 which states: "Any sampling, testing, or measurement performed pursuant to [section 212, Stationary Source Testing and Monitoring] must conform to methods contained in the Department's Source Sampling Manual (January 1992) or to recognized applicable standard methods approved in advance by the Department." OR. ADMIN. R. 340-212-0140(1); *accord* AIR QUALITY DIV., OR. DEP'T OF ENVTL. QUALITY, SOURCE SAMPLING MANUAL, vol.1, chs. 2–4 (Jan. 2002), *available at* http://www.deq.state.or.us/aq/forms/sourcetest/ssmVOL1.pdf; *accord* OR. ADMIN. R. 340-200-0040 (enacting the Oregon Clean Air Act Implementation Plan which contains strategies, rules and standards prepared by the Department of Environmental Quality).

290. *See* OR. REV. STAT. § 468A.075(1)(a)–(c) (2005).

291. *Id.* § 468A.105(2)(a)–(b).

292. *Id.* § 468A.105(2)(c).

293. *See id.* § 468A.135(1).

protective than the rule promulgated by the EQC and must obtain EQC approval for all air quality standards.[294] EQC may disqualify a regional authority that "has failed to establish an adequate air quality control program."[295]

5. Conclusion

Oregon's program establishes ambient standards based on health risk but only regulates them through the Title V permitting process. The program does not measure actual air concentrations, nor does it look at sources not otherwise regulated. Virtually all monitoring is self-reported, though the agency does have authority to conduct its own monitoring.

Table 9. Oregon Summary of Ambient Health-Based Regulation of Selected Air Toxics

Compound[a]	**Ambient Air Standard** ($\mu g/m^3$) (annual)	**Primary Evidentiary Support**[b]
Benzene (1)	0.45	IRIS (EPA) URE; After considering both cancer and noncancer studies, ATSAC based the ambient standard on cancer effects.
1,3-Butadiene (6)	0.033	IRIS (EPA) unit risk estimate (URE) because it was derived from a recent human study.
Formaldehyde (3)	3.0	Cal. OEHHA noncancer RfC.
Toluene (59)	400	IRIS (EPA) value
Acrolein (25)	0.02	IRIS (EPA) value
H_2S (78)	2.0	IRIS (EPA) RfC
Styrene (22)	to be announced	NA
Vinyl Chloride (9)	0.11	IRIS (EPA) URE

[a] The number in parentheses indicates the prioritization rank number as assigned by the ATSAC according to the five-criteria ranking system.

[b] For a detailed explanation of ATSAC's reasoning in selecting the evidentiary support, see Notice of Proposed Rulemaking, *infra*.

Source: All values listed represent the Interim Ambient Benchmark Concentration as determined by the ATSAC. OR. DEP'T OF ENVTL. QUALITY, NOTICE OF PROPOSED RULEMAKING: OREGON AIR TOXICS PROGRAM, BENCHMARKS (Feb. 1, 2006), *available at* http://www.deq.state.or.us/news/publicnotices/uploaded/060207_5621_05-AQ-002_Benchmarks.pdf.

294. *See id.* § 468A.135(2).

295. *See id.* § 468A.165(1)(a).

K. Rhode Island

1. Overview

Rhode Island has regulated air toxics since 1988 through Air Pollution Regulation Number 22.[296] The Rhode Island Department of Environmental Management (R.I. DEM) administers the program described at Rhode Island Code of Regulations 12-031-022, with the purpose of promoting the state's policy "to preserve, protect and improve the air resources of the state to promote the public health, welfare, and safety, to prevent injury or detriment to human, plant, and, animal life, physical property and other resources, and to foster the comfort and convenience of the state's inhabitants."[297]

2. Identification of Pollutants and Sources

In 1988, R.I. DEM listed Ambient Air Levels (AALs) for forty substances.[298] After the federal 1990 Clean Air Act Amendments, and based on the work of the California Air Resources Board and the federal Agency for Toxic Substances and Disease Registry (ATSDR), Rhode Island amended Regulation Number 22 to expand the list of air toxics to include all federally listed HAPs and other air pollutants that have significant health impacts. The final regulation lists all 189 federal HAPs, forty-seven other substances with derived inhalation health benchmarks, and seventeen substances that R.I. DEM had evaluated in past air permit reviews.[299]

3. Setting of Standards and Emissions Levels

Rhode Island's AALs are based on ground-level impacts and only take into account inhalation exposures from single sources, rather than the cumulative inhalation risk. Rhode Island uses the inhalation benchmarks developed by other agencies, including inhalation Reference Concentration (RfC), Reference Dose (RfD) or cancer potency factor from the EPA's IRIS database, Minimal Risk level (MRL) from ATSDR, and Reference Exposure Level (REL) from California.[300] When the levels

296. *See* R.I. CODE R. 12-031-022 (Weil 2006); R.I. DEP'T OF ENVTL. MGMT., AIR POLLUTION CONTROL REGULATION NO. 22, at 1 (2004), *available at* http://www2.sec.state.ri.us/rules/released/pdf/DEM/DEM_2958.pdf [hereinafter REGULATION NO. 22]; R.I. DEP'T OF ENVTL. MGMT., RHODE ISLAND AIR TOXICS GUIDELINE 3 (2004), *available at* http://www.dem.ri.gov/programs/benviron/air/pdf/airtoxgl.pdf [hereinafter R.I. GUIDELINE].

297. R.I. GEN. LAWS § 23-23-2 (2005).

298. *See* R.I. GUIDELINE, *supra* note 296, at 3.

299. *See* REGULATION NO. 22, *supra* note 296.

300. *See* R.I. GUIDELINE, *supra* note 296, at 4.

recommended by these agencies are contradictory, Rhode Island usually adopts the more stringent standard for each available AAL.

Rhode Island develops AALs for three different averaging times: "one-hour for acute effects, [twenty-four]-hours for effects associated with intermediate length exposures, and annual for chronic effects."[301] These AALs are listed for each pollutant and each averaging time in two tables; the first has the simple AALs, and the second has what the AALs must be with application of the federal standard requiring Lowest Achievable Emissions Rate (LAER) from some sources.[302]

4. Monitoring, Compliance, and Enforcement

Regulation Number 22 applies to any stationary source that emits a listed air toxic, except certain specified facilities (e.g., gas stations) or emissions of a particular air toxic from certain facilities (e.g., perchloroethylene from dry cleaners).[303] R.I. DEM will not issue a construction, modification, or installation permit to a source with the potential to emit more than a specified "minimum quantity" unless the source can demonstrate that it is in compliance with AALs or AALs with LAER.[304] Further, all emitting stationary sources must register with R.I. DEM and seek an Air Toxics Operating Permit (ATOP)[305] that imposes reasonable conditions or limitations on operations, monitoring, and testing.[306] ATOPs are only issued if the stationary source is in compliance with Regulation Number 22, that is, if the emissions from that source do not cause ground-level concentrations to exceed the AALs beyond the facility's fenceline.[307]

5. Conclusion

Rhode Island regulates and permits sources beyond the major federal sources. All sources must demonstrate that they do not exceed the ambient standard at their fenceline. Moreover, the AAL standards themselves are purposefully based on the most protective inhalation benchmarks that the agency can find.

301. *Id.* at 5.
302. *See* REGULATION NO. 22, *supra* note 296, at 13–27. AALs equate to a cancer risk of 10^{-6}, or 10^{-5} with LAER.
303. *See* REGULATION NO. 22, *supra* note 296, at 4–5.
304. *See* R.I. CODE R. 12-031-022.3.3 (Weil 2006).
305. *See id.* 12-031-022.4 to -022.5.
306. *See id.* 12-031-022.5.7.
307. *Id.* 12-031-022.5.3.

Table 10. Rhode Island Summary of Ambient Health-Based Regulation of Selected Toxics

Compound	**Minimum Quantities**[a] (lbs./yr.)	**Ambient Air Level** (μg/m^3) [with LAER if different]			**Primary Evidentiary Support**
		1 hr.	24 hr.	Annual	
Benzene	10	200	30	0.1 [1]	ATDSR (1 hr.), IRIS (EPA) RfC (24 hr.), IRIS (ann.)
1,3-Butadiene	3	NA	NA	0.03 [0.3]	IRIS (EPA) (ann.)
Formaldehyde	9	50	40	0.08 [0.8]	ATDSR (1 hr.), ATDSR (24 hr.), IRIS (ann.)
Toluene	1,000	4,000	400	300	ATDSR (1 hr.), IRIS (EPA) RfC (24 hr.), ATSDR and Cal. (ann.)
Acrolein	0.04	0.1	0.02	NA	ATDSR (1 hr.), IRIS (EPA) RfC (24 hr.)
H_2S	10	40	NA	10	Cal. (1 hr.), Cal. (ann.)
Styrene	3,000	20,000	1,000	100	Cal. (1 hr.), IRIS (EPA) RfC (24 hr.), IRIS (EPA) RfC/10 (ann.)
Vinyl Chloride	20	1,000	100	0.2 [2]	ATSDR (1 hr.), IRIS (EPA) RfC (24 hr.), IRIS (EPA) (ann.)

[a] Minimum quantities are the emissions threshold above which a facility is subject to the Air Toxics Operating Program requirement.

Source: For AALs and Evidentiary Basis: R.I. GUIDELINE, *supra* note 296, at tbl.D. For Minimum Quantities see Regulation No. 22, tbl. III.

L. Wisconsin

1. Overview

Since the early 1980s, the state of Wisconsin has been concerned "about the health effects of toxic air releases and . . . the lack of policy

and regulations of hazardous air pollutants at the federal level."[308] In reaction, Wisconsin formed the Hazardous Emissions Task Force (HETF),[309] with the mission of (1) defining toxic and/or hazardous air emissions, (2) formulating a methodology by which to establish emissions limitations, and (3) determining which sources were insignificant contributors and should therefore be exempt from permitting.[310] In July 1985, the HETF reported its findings.[311] After three years of contentious rulemaking, Wisconsin codified its HAP requirements.[312]

The Wisconsin Department of Natural Resources (DNR) has the authority to establish emissions limitations for Wisconsin sources.[313] Among other mandates, the Wisconsin air pollution legislation requires the DNR to "[p]repare and develop one or more comprehensive plans for the prevention, abatement and control of air pollution,"[314] and "specify the best available control technology on an individual case-by-case basis considering energy, economic and environmental impacts and other costs related to the source."[315]

2. Identification of Pollutants and Sources and Setting of Standards

Wisconsin law requires the DNR to promulgate ambient air quality standards that meet, but do not exceed, those promulgated under section 109 of the federal Clean Air Act.[316] If the EPA has not set an air quality standard for an air contaminant under section 109—as it has not for hazardous air pollutants—then the DNR may promulgate one, but only to protect human health and welfare.[317] This determination may only be made if the department can document:

> (1) A public health risk assessment that characterizes the types of stationary sources in [the] state that are known to emit the air contaminant and the population groups that are at risk from the emissions; (2) An analysis showing that members of population groups are subjected to levels of the air contaminant that are above

308. BUREAU OF AIR MGMT., WIS. DEP'T OF NATURAL RES., UNDERSTANDING WISCONSIN'S HAZARDOUS AIR POLLUTANT RULES AND REQUIREMENTS 3 (2000), *available at* http://www.dnr.state.wi.us/org/aw/air/HOT/NR445rev/understandingHAPs.pdf [hereinafter UNDERSTANDING WISCONSIN'S AIR RULES].

309. *See id.*

310. *See id.* HETF was also charged with studying the effects of 1,1,1-Trichloroethane (also known as methyl chloroform) and methylene chloride (also known as dichloromethane). These two chemicals were of paramount concern in 1983 when HETF was formed.

311. *See id.*

312. *See id.*; *see also* WIS. ADMIN. CODE NR §§ 445.01–445.06 (2006).

313. *See* WIS. STAT. ANN. § 285.13(7) (West 2004).

314. *Id.* § 285.11(6).

315. *Id.* § 285.11(10).

316. *See id.* § 285.21(1)(a).

317. *See id.* § 285.21(1)(b).

> recognized environmental health standards . . . ; (3) an evaluation of options for managing the risks caused by the air contaminant considering risks, costs, economic impacts, feasibility, energy, safety, and . . . a finding that the proposed ambient air quality standard reduces risks in the most cost-effective manner.[318]

If the EPA changes the federal standards in section 109, then the DNR must change the state standards as well.[319]

DNR defines HAPs as:

> any air contaminant for which no ambient air quality standard is set in ch. NR 404 [the "criteria pollutants"] and which the department determines may cause or significantly contribute to an increase in mortality or an increase in serious irreversible or incapacitating reversible illness, or may pose any significant threat to human health or the environment.[320]

However, the DNR may not make this finding without specific documented scientific evidence of a significant threat.[321]

Wisconsin hazardous pollutant control regulations apply throughout the state, without exception,[322] to "all stationary air contaminant sources which may emit hazardous contaminants and to their owners and operators," including both new and existing sources.[323] DNR promulgates rules classifying air contaminant sources that may cause or contribute to air pollution.[324]

3. Monitoring, Compliance, and Enforcement

The DNR may require owners or operators of air toxics sources to monitor their emissions and the local ambient air, and to report those results to the department.[325] If the source is classified as a major source under federal law, the DNR requires reports at least every six months.[326]

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318. *Id.* § 285.21(1)(b)(1)–(4).

319. *See id.* § 285.21(4).

320. *Id.* § 445.02(7). "The term hazardous air contaminant includes the substances listed in Tables 1 to 5 in [section] NR 445.04 and Tables A, B and C in [section] NR 445.07." *Id.*

321. *See* WIS. STAT. ANN. § 285.21(1)(b)(1)–(4) (West 2004).

322. WIS. ADMIN. CODE NR § 404.04(1) (2006).

323. *Id.* § 445.01(1).

324. *See* WIS. STAT. ANN. § 285.17(1)(a) (West 2004).

325. *See id.*

326. *See id.* A major source includes

> any stationary source or group of stationary sources located within a contiguous area and under common control that emits or has the potential to emit considering controls, in the aggregate, 10 tons per year or more of any [HAP] or 25 tons per year or more of any combination of [HAPs], unless the administrator establishes a lesser quantity, or in the case of radionuclides, different criteria from those specified in this definition.

WIS. ADMIN. CODE NR § 460.02(24).

To aid in compliance, DNR agents may inspect any permitted facility at any reasonable time, free from interference by the operator.[327]

4. Conclusion

The Wisconsin statute requires DNR to measure the ambient air surrounding sources. However, DNR routinely monitors only those major HAP sources already regulated by the federal HAP program.

Table 11. Wisconsin Summary of Air Quality Standards For Selected Air Toxics

Compound	**Emission Thresholds**[a] (lbs./yr.)	**Ambient Air Standard**[b] ($\mu g/m^3$) [averaging time in hours]	**Primary Evidentiary Support**
Benzene	7854	NA	IRIS (EPA)
1,3-Butadiene	219	NA	
Formaldehyde	4712	NA	
Toluene	306	4522 [24]	
Acrolein	0.281	22.9 [1]	
H_2S	22.6	335 [24]	
Styrene	138	2045 [24]	
Vinyl Chloride	6961	NA	

[a] The Allowable Ambient Standards are ground level-impact limits, taking into account only inhalation exposures from single sources.

[b] Emissions are measured at least seventy-five feet from stacks.

Source: WIS. DEP'T OF NATURAL RES., COMBINED CHEMICAL TABLE FOR THE AIR TOXICS RULE REVISIONS (2004), *available at* http://www.dnr.state.wi.us/org/aw/air/health/airtoxics/documents/webversion9-01-04combinedNR445revtables.xls.

III. ANALYSIS AND IMPLICATIONS FOR CHANGING HAP REGULATION

At first glance, the federal government could presumably adopt any of these states' requirements and ambient standards for listed HAPs because fidelity to these standards and requirements would theoretically protect the public from residual health risk, a stated goal in the federal HAP program. The states examined above all regulate residual risk after application of technology standards, most through permitted levels of toxics in the ambient air. Some had these standards in place before passage of the 1990 federal HAP amendments, others later, but all claim to deal with the residual risk that the EPA has not yet taken action on. Unlike the federal HAP program, most of these states have implemented standards for particular toxics that are designed to protect public health

327. *See* WIS. STAT. ANN. § 285.19 (West 2004).

and eliminate risk. However, a closer look reveals that the state programs, though they appear to go further than the federal government in actually creating requirements that deal with residual risk, may not be any more effective.

The health standards in the state regulations are remarkably dissimilar. To mention only one example of this, the difference in allowable exposure to benzene varies from 60 micrograms per cubic meter in California for noncancer effects from chronic exposure to 0.1 micrograms per cubic meter in Rhode Island for average annual exposure—a six-hundred-fold difference.[328] For cancer effects, the California standard of 2.9 milligrams benzene per cubic meter is twenty-nine times higher than the Rhode Island standard and is based on a different residual risk threshold.[329] Many more examples can be found by looking at each state's regulation chart in the descriptions of state regulatory regimes found in the previous Part of this Article. Such large differences suggest that the ability to measure health-based harms varies greatly, and that either one state is not regulating these emissions enough, or that another state is regulating them too much.

No one answer can explain these differences. One reason may lie in the different cost structures among the states. States with lower ambient levels might regulate to lower levels for insurance reasons because they can afford to do so. For instance, if the toxics in a particular state are unusually inexpensive to control, that state may simply decide to insure against any uncertain risk by lowering the standard to known safe levels. Other states may have a culture or history that is more favorable to industry or business and therefore be reluctant to impose costly health-based standards. Human health needs, however, do not differ from state to state, and where the states have expressed the shared goal of protecting human health from HAP exposure, such large differences are troubling. In asking whether any of these state regulatory systems should be a model for the federal system,[330] one seeks a system that adequately protects public health, as the Clean Air Act requires, and does so in the most economically efficient manner possible.[331]

328. The exposure window is different, but it is not illogical to compare allowable chronic average exposure with allowable annual average exposure since both calculate risk based on cumulative, long-term exposure.

329. *See supra* tbls. 1 & 10.

330. In making this claim that the federal government should effectively deal with residual risk as opposed to letting the states handle it, I take as a given that the policy choice to do this is already imbedded in the federal statutory requirement.

331. There are obviously different kinds of efficiencies, and different regulatory systems may impose costs upon different segments of government or the public, *see* Carol M. Rose, *Rethinking Environmental Controls: Management Strategies for Common Resources*, 1991 DUKE L.J. 1 (1991), but regardless of the mechanism selected, the overall costs should be as low as possible and distributed in the way that is most efficient for the system chosen.

Many of these differences can be traced to two factors that were also problematic in the early federal HAP program: (1) what reference level the states use for health assessment, and (2) who has the burden of monitoring and enforcing the standards.

A. State References for Health Assessment

With respect to health assessment, the states start at a similar point—protection of public health. But the results differ. While the EPA and many states utilize the same residual risk standard of one in one million, others define "safe" as excess lifetime cancer risks of one in ten thousand, or one in one hundred thousand. This can make a large difference in the final accepted ambient level of a toxic compound. Some states look directly at studies that purportedly establish an ambient level of an airborne toxic at which "no risk" occurs, but that "no-risk" level may vary among studies. For instance, California's standard for chronic benzene exposure, which supposedly avoids all ill health effects, would still allow 1.2 additional lifetime cancer deaths per one hundred thousand persons, significantly higher than the EPA's standard of one in one million excess cancer deaths for purposes of determining "residual risk." Some of the California risk levels are even set to only prevent one excess cancer death in ten thousand.[332] The only state that has established a consistent residual risk level for all toxics that is significantly higher than one in one million is Louisiana, which established its standard at one in ten thousand for its annual average.[333]

In order to determine either the safe exposure level or to determine what risk exists at a particular level (later modified to meet a selected risk target), all of the states utilize either the EPA's IRIS data, the Agency for Toxic Substances Registry (ATSDR) data, worker safety data from federal agencies such as OSHA, or the results of the testing done in California for its own air toxics program. The states may then reach the ambient exposure level for their citizens by applying some multiplier to the exposure data they have chosen to use.[334] For example, Louisiana uses one forty-second of the OSHA standards to establish its eight-hour standard.[335] Rhode Island, which has tighter ambient standards, simply applies the most stringent standard between the ATSDR and the California data.[336] A state may adjust final adopted standards if it has

332. *See* California Summary of Ambient Health-Based Regulation of Selected Toxics, *supra* tbl. 1.

333. *See* LA. ADMIN. CODE tit. 33, § 5112 (2006).

334. States make these adjustments based on assumptions about the exposure of their citizens relative to the exposures assumed in developing the data they are using.

335. *See* LA. ADMIN. CODE tit. 33, § 512 at tbl.51.2.

336. *See* R.I. GUIDELINE, *supra* note 296.

chosen a residual risk standard different from the one that was targeted in the original data that the state uses, or based on different assumptions about exposure. These standards may thus differ based on the presumed point of exposure (e.g., fenceline or ambient) and what assumptions and models are then applied to equate the measured average concentration to some target ambient exposure average.

Even though the states all claim to be addressing the same problem—harm to human health from air toxics—the execution of this narrative standard varies wildly because the states have different ways of measurement and different sets of assumptions. This creates uncertainty as to whether the narrative goal of protecting human health is being accomplished at all, or whether it may be accomplished at too high a cost.

While scientific uncertainty can never be completely eliminated, proposals for health-based standards should be clear about the residual risk that is deemed acceptable and the health effect exposure models used. This standard should be a political decision of what is an acceptable health risk for persons and it should be stated up front. If health-based regulation is to continue, the levels must be set somewhere—equivalent to some risk level. To reduce administrative discretion and possibilities for legal challenges this risk level should be clear, and established by statute.[337] Otherwise, legislators can maintain an appearance of addressing real problems while actual harms continue, often to the most vulnerable.[338] The current default is simply to accept what another body, such as an occupational health agency, has determined to be unsafe in what could be a completely different context. For instance, a standard of one in ten thousand excess lifetime cancer deaths might be appropriate for occupational exposures, but this risk factor would not be equally appropriate in areas where exposure is completely involuntary.

The question of which of these levels, if any, represent a level of no externally imposed risk, is a complex one. The EPA has chosen one in one million as its residual risk standard for triggering additional scrutiny of risk and the possible need for additional controls. Many states have also chosen this as their definition of "no risk." It is possible that this could be the chosen future value for all standards of risk from HAP. However, there is no requirement that this value be selected. Given my own belief that environmental statutory laws are designed to replicate common law entitlements, I believe that the lowest measurable risk is the one that is closest to the normative goal of not allowing the imposition of externally imposed risk on others.[339] However, after full and open

337. *See* Victor B. Flatt, *Saving the Lost Sheep: Bringing Environmental Values Back Into the Fold with a New EPA Decisionmaking Paradigm*, 74 WASH. L. REV. 1, 20–21 (1999).

338. *See id.* at 3.

339. *See* Victor B. Flatt, *This Land is Your Land*, 107 W. VA. L. REV. 1 (2004).

debate, it is possible that a different risk level would be selected. The key is that the discusson be had appropriately in an open democratic forum.

B. Who Has the Burden of Monitoring and How It Is Enforced

The states also vary in terms of how the standards are enforced and monitored, and who has the burden of these tasks. The federal government and all of the states have certain technological requirements on major sources (i.e., MACT). While this is successful in cutting overall emissions, it is not necessarily the best way to address localized pollution hot spots. At the same time, establishing standard technology requirements at a level that will address hot spots means that there may be "too much" regulation in many places.[340] Though efficient to administer, command-and-control regimes may be too blunt to address every area's unique problems and pollution sources. This is where administrative discretion is important. But since discretion can also lead to ineffective action or no action at all (as we have seen in the federal HAP program), the discretion must be circumscribed and controlled to ensure that real problems are addressed. A regulatory system should effectively, fairly, and efficiently accomplish the goals expressed—in this case the Clean Air Act's goal of eliminating residual risk where it exists after the application of MACT. How a system is enforced and administered is critically important to this question.

The states examined in this Article vary widely in their methods. For instance, the states of Rhode Island, Connecticut, Massachusetts, and California have clearly defined reporting standards, measurement or modeling standards, and specific requirements, such as ambient standards or risk standards, with which to compare them. They also have effective follow-up procedures to test whether the air quality is actually improving and whether the sources are meeting their goals. In such cases, it seems clear, at least within the range of error inherent in modeling, that the state sources have been effectively required to reduce emissions to meet an ambient health standard.

Other states, such as Maryland, Michigan, New York, New Jersey, North Carolina, and Wisconsin, have either relatively definitive standards or effective follow-up measurements, but not both. These programs may be failing to regulate all sources, may have standards that are too indefinite for the sources to be judged against,[341] may require the source

340. See discussion of economic efficiency *supra* note 331.

341. For instance, North Carolina has reporting requirements and applies modeling techniques to these reported emissions to determine whether fenceline ambient standards have been violated. Citizen groups, however, claim that this is ineffective and does not accurately reflect real exposures. *See supra* Part II.I.

itself to alert them to the need for more stringent regulation,[342] or may fail to adequately test whether the source is meeting its requirements or whether the air itself is actually meeting the ambient standard. For example, New York is aggressive about ensuring compliance with permitted standards, but the permitted standards are not primarily based on ambient standards; instead, they are based on technology standards. Therefore, though the state of New York has been known to be strict in its enforcement, in particular through levying fines, this enforcement extends only to the state's more predictive technology requirements. In contrast, enforcement of the statutory provisions that address residual risk focus is looser and relies primarily on self-reporting. Wisconsin's regulations on health-based risks similarly focus on whether the technology standards are insufficient, but there is no evidence that in enforcing its laws, that Wisconsin has ever found them to be so.

Finally, though Oregon and Louisiana both have HAP programs, neither of them has definitive standards to which source emissions can be compared, other than permit terms in Louisiana, nor do they have independent enforcement schemes. In Louisiana, sources are supposed to be measured against ambient standards but there is no statutory requirement concerning how this measurement will take place. Similarly, in Oregon, it is unclear how measurements and enforcement against potential violators will occur.

In general, academic theories of enforcement suggest that the better enforcement schemes put responsibility for compliance directly on the regulated entities and then ensure that those entities are meeting these requirements.[343] Likewise, agency compliance with the regulatory mandate is best achieved by reducing agency discretion.[344] Of course, this is only optimal if the regulatory mandate is itself *correct* as a policy matter. Because of uncertainty in the environmental arena, it has been suggested that administrative flexibility is critical for effective regulation, but new studies and analysis suggest it could be otherwise.[345] When one recognizes both the consequences of enforcement and regulatory failure and that pollution sources do not have a right to pollute, then even the

342. New Jersey is an example of what happens when a state does not determine whether residual risk exists and fails to tests sources. New Jersey only regulates residual risk levels when a source self-reports that residual risk exists. However, when asked, New Jersey regulators state that *no* sources have ever triggered additional regulation, leading to questions about the practical effectiveness of this self-reporting scheme. Interview by Dustin Rynders, research assistant to author, with N.J. Dep't of Envtl. Prot. in Houston, Tex. (Oct. 2005) (contemporaneous notes on file with the author); *see also supra* Part II.G.

343. *See* Flatt, *Spare the Rod*, *supra* note 65, at 602–03.

344. Note, however, that a reduction in agency discretion also reduces flexibility.

345. *See* Victor B. Flatt, *The Enron Story and Environmental Policy*, 33 Envtl. L. Rep. (Envtl. Law Inst.) 10,485, 10,493–94 (2003).

uncertainty about whether technology controls will completely protect health may be justified.[346]

California manages to have regulatory flexibility, strong requirements on sources, and effective agency action. Some of California's air toxic regulations require the source to self-report risk, and Proposition 65 creates a strong financial incentive for a source to do so. Many of the provisions in California's HAP statute are not directed at the sources themselves but require the state agency to take further action on sources to force reductions. In California, where the state agency is active and funded sufficiently, this increases the likelihood that violations will be discovered. Thus, the high penalty for noncompliance combined with the relatively active state agency may explain the effectiveness of the California program.[347] California is seen as a leader in this field of air toxic regulation and is the only state to conduct its own assessments of human health risks. Whether California has selected the best system or whether it simply happens to work because of factors unique to California is unclear.

With mandatory triggers of enforcement for noncompliance, requirements that sources take steps to ensure that they meet standards through self-monitoring, and with credible follow-up, one can anticipate at least some compliance. This is true even without complete enforcement if exceedances of ambient standards are directly detected and penalized.

C. From Administrative System to Outcome—Which Works?

The true test of the effectiveness of these programs is how much they have improved human health by controlling HAPs. Unfortunately, as in many environmental contexts, there are no uniform reliable data that specifically measure this outcome,[348] and we must use the best data available.

There are data on statewide levels of HAP emissions from annual state emissions inventories. A comparison of this information from the twelve states reviewed in this Article and Texas, the largest producer of HAPs,[349] shows that nearly all states with state-run programs have seen reductions of HAPs:

346. *See id.*

347. *See* CAL. HEALTH & SAFETY CODE §§ 39660, 39674 (Deering 2006).

348. CLIFFORD RECHTSCHAFFEN & DAVID L. MARKELL, REINVENTING ENVIRONMENTAL ENFORCEMENT AND THE STATE/FEDERAL RELATIONSHIP 238–39 (2003).

349. The list also shows the state of Texas, the largest producer of reported air toxics, which reports reductions without a state program. *See* EPA, Toxic Release Inventory, http://www.epa.gov/tri (data analysis by author).

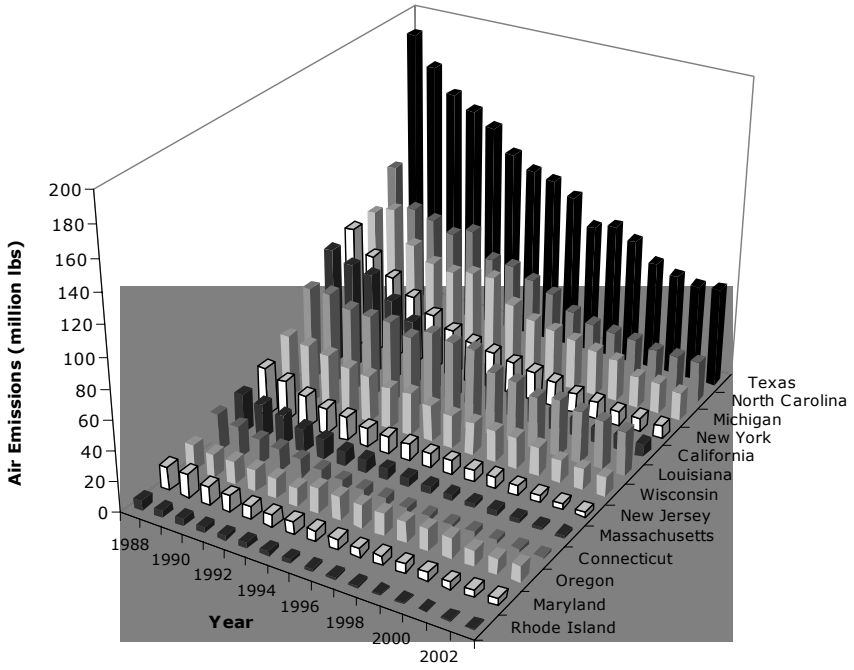

Figure 1. Reductions in Hazardous Air Pollutant Emissions by Thirteen States: 1988–2003.
Source: Toxic Release Inventory, 1988–2003. http://www.epa.gov/tri/.

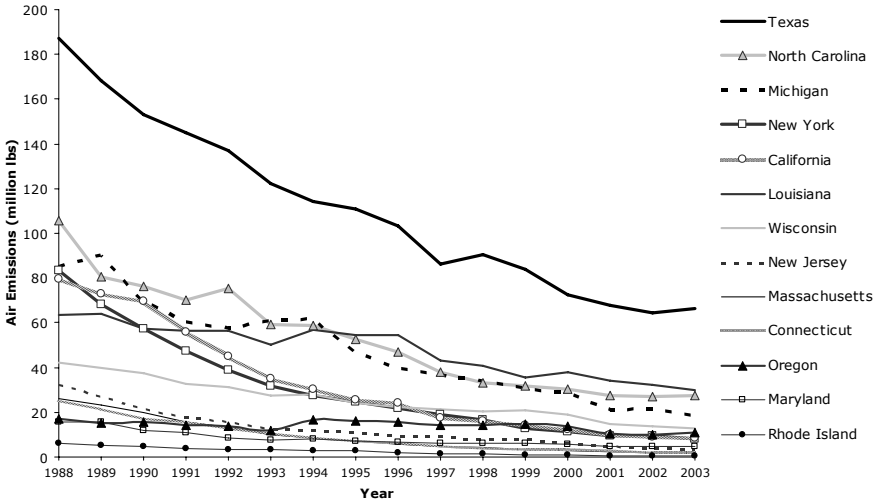

Figure 2. Reductions in Hazardous Air Pollutant Emissions by Thirteen States: 1988–2003.
Source: Toxic Release Inventory, 1988–2003. http://www.epa.gov/tri/.

Because the states originally varied so much in total amount of HAPs produced, and continue to vary in geographic size, population, and industry, percentage reductions are more informative. Although the data are self-reported and do not control for differences unrelated to the effectiveness of the administrative schemes, the data are still helpful in assessing each state's success in reducing emissions. The following graph shows the percentage change in total reported emission from 1988 to 2003, with 1988 as the baseline.

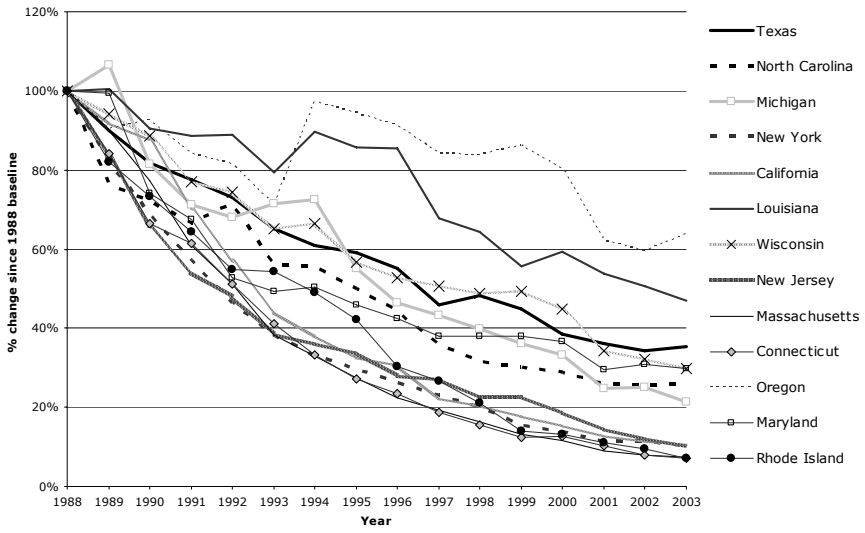

Figure 3. Reductions in Hazardous Air Pollutant Emissions as a Percentage of 1988 Emissions: 1988–2003.
Source: Toxic Release Inventory, 1988–2003. http://www.epa.gov/tri/

The first interesting fact is that all of the states—even Texas, which does not have a mandatory residual health-based standard for HAPs—show reductions in total HAP production. This could indicate that the 1990 Clean Air Act Amendments that rely primarily on technological controls have worked in a broad way to reduce the total amount of air toxics. This theory is supported by the fact that the percentage reductions start to flatten out towards the end of the curve, at about the same time that the federal technological controls would have been fully implemented.

Administrative theory predicts that certainty in regulatory requirements will result in greater compliance—in this case, greater

reductions.[350] But even though technological controls yield high reduction rates, they do not necessarily address highly concentrated sources, nor do they necessarily protect public health. As noted in the Introduction, there are still air toxic hot spots in areas with high concentrations of sources. Fixing these hot spots will require a HAP program with mechanisms, such as effective regulation of residual risks, to provide additional reductions.

So, does the information on total percentage reductions help us determine the effectiveness of state efforts to reduce residual risk? Would different percentage reductions show that some state programs reduce more toxics than would occur from technology alone? Though the data are imperfect, it is reasonable to assume that those states with the largest reductions would be the ones most likely to have reduced some of the harm resulting from the hot spots. How do the states' reductions compare, and how do these reductions correlate with residual risk control commonalities?

The five states with the largest percentage reductions of air toxics are Rhode Island, California, Massachusetts, Connecticut, and New Jersey. These states have reduced their air toxics to only 9 to 14 percent of their 1988 total. On the other hand, Oregon is still at over 60 percent of its 1988 total, and Louisiana is about 50 percent of its 1988 total. The state of Texas, which does not have enforceable health-based standards, has reduced to less than 40 percent of its 1988 total. So we see significant differences in reduction among the states that have residual risk standards; and even that a state making an effort to reduce residual risk may realize fewer reductions than a state relying on technology controls alone.

Of the five states with significantly better reductions, four have clearly defined reporting standards, measurement or modeling standards, and specific requirements—such as ambient standards or risk standards—that allow comparison. They also have effective monitoring to test whether the air quality is actually improving and whether the sources are meeting their goals. New Jersey is also one of the top five reducers, even though its program does not have all of these aspects. However, New Jersey is in the middle category of states that have either some definitive standard or an effective enforcement process. New Jersey has also regulated air toxics for almost thirty years, longer than most states, which may explain some of its success at reducing emissions.

Just out of the top five, Michigan has the next best percentage reduction, at close to 80 percent. Like New Jersey, Michigan is also in the middle category of states in terms of the degree of discretion allowed in

350. Flatt, *Spare the Rod, supra* note 65, at 603.

its administrative strategies. Michigan is specific about the level of health-based standards used and the data used to determine consistency with the standards.

Even more telling is that the two states with the lowest percentage reductions, Oregon and Louisiana, are the two states that have no definitive standards with which a source is to be compared (beyond Title V permit terms), nor any independent enforcement schemes. While sources in Oregon also report air toxic emissions through the air permitting programs required by Title V, Oregon does not require the source to engage in an ambient risk analysis. As a result, any such data must be generated by the state or by a local agency with delegated authority—agencies that are likely too resource-constrained to monitor effectively.[351] Similarly, Louisiana does not require the source to do its own risk analysis. Moreover, Louisiana's reductions may also be limited by its choice of a residual risk level of one in ten thousand, which is one hundred times greater than the more accepted standard of one in one million.

These comparisons suggest that enforcement of mandatory risk standards may be less effective when it depends on the state agency to make the risk determinations and do the monitoring. Instead, if the source is required to self-report and do their own risk analysis, the state would only have to occasionally audit work that had already been done, requiring far fewer resources and probably producing better data.

This limited analysis of various approaches to state residual risk regulation of air toxics teaches us that the devil is in the details: having specific standards and specific methods of testing, placing the onus on the parties to ensure their compliance, and having an effective follow-up program to test compliance seem important in producing the desired results. Additionally, many of the states with the most effective reductions—Connecticut, Massachusetts, California, and Rhode Island—also look at toxic reductions from sources other than just stationary sources with Title V permits, and test the ambient air directly to assess compliance or effectiveness of their residual risk programs.

CONCLUSION: HOW DO WE PROTECT THE PUBLIC FROM AIR TOXICS AT THE FEDERAL LEVEL?

The federal HAP program, now almost fully implemented, has not effectively controlled the risks of HAPs to human health in certain areas. This is true despite the Clean Air Act's focus on residual risk. The problem is the same that bedeviled the HAP program before the 1990 amendments. An open-ended congressional request to control possible

351. *See* discussion *supra* Part II.J.

health hazards may be too uncertain and under too much political pressure to be effective.

A detailed examination of the programs of states that have their own health-based controls on HAP reveals much the same thing. In general, the programs appear to be more effective the more specifically they set and implement ambient standards or risk levels. This is particularly true where states require the source itself to produce and prove its own risk analysis. This is consistent with and supports general theories of enforcement.[352]

An effective response to residual risk from air toxics will require a change in the federal implementing statute. This change should focus on standard setting and enforcement techniques, and should require accurate self-reporting of residual risk analysis accompanied by requisite corrections if the standards are exceeded. To avoid obstructive pressures on administrative agencies, the statute should specify minimum acceptable health risks. Though a different decision could be made in the future, I believe that the Clean Air Act should specify that the current trigger for residual risk analysis—one in one million lifetime excess cancer deaths—should also be the residual risk to be eliminated. Though there may be no absolute "risk-free" level, a level that reduces externally created risk as much as possible is most consistent with the spirit of the Clean Air Act and with our common law heritage.[353] If we as a society wish to alter this basic premise, we should do so after open debate and in the public arena, not as a secondary consideration or deliberately hidden consideration ascribed to another administrative decision.

Additionally, the federal HAP program should require specific means for detecting violations and triggers for subsequent enforcement. The more certain the standards, the clearer the determination that regulated sources are meeting them. Also, violations of standards must be easily detected and corrected. Though most states and the federal government could not themselves monitor all sources to ensure compliance, the sources could be required to self-monitor and report violations. Due to the declining costs of monitoring equipment, it may now be cost effective to require continuous monitoring by all sources of air toxics, making the sources themselves bear the burden of compliance. Self-reporting and monitoring is feasible and is similar to what is required in the Clean Water Act's highly effective and enforceable National Pollutant Discharge Elimination Program (NPDES).[354] This recommendation is grounded in this Article's finding that the states with the largest air toxics percentage reductions were those that required

352. Flatt, *Enron*, *supra* note 345, at 10,494–95.

353. *See* Flatt, *This Land is Your Land*, *supra* note 339.

354. *See* 33 U.S.C. § 1318(a) (2006).

sources to self-monitor and report, and had a credible method to check whether this was being accomplished.

With actual monitoring data and specific criteria for comparison, we would have a better understanding of actual emissions. With these data, the EPA could require specific triggers for violation detection and enforcement. Data from successful state programs suggest that residual risk in particular hot spots could be effectively controlled with such triggers. If Congress reformed the federal administrative system for the regulation of residual risks so that it looks like California's or Connecticut's, no person in this country would be exposed to levels of air toxics higher than considered safe and acceptable. This is a stated goal of the Clean Air Act's HAP program, and should be made a reality as well.