

The Sustainable Development Principle in United States Environmental Law

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I. Introduction

The American public perceives the principle of sustainable development and sustainability, the shorthand nomenclature, through green-tinted lenses. Whether the user of the term is academic,¹ corporate,² or governmental,³ the advocate of sustainability is understood as an advocate of protecting the environment. The international legal understanding of the principle of sustainable development, however, is more ambiguous than this popular American understanding.

Part II of this Article describes the important principle of sustainable development in modern international environmental law.⁴ It discusses how the sustainable development principle has evolved from its initial appearance in the 1987

Brundtland Commission Report⁵ through its central position at the Rio Earth Summit of 1992.⁶ These formulations of the principle accepted that two contrasting goals—environmental protection and economic development—combined to define sustainable development. The Johannesburg Summit of 2002 returned to the question of the meaning of sustainable development and accepted a definition that enriches the principle's paradoxical nature.⁷ This international understanding of sustainable development minimizes its value as a principle of international law because so much government policy may be defended by reference to it.

The principle may, however, provide a framework for assessing a particular nation's environmental law. Part III addresses the extent to which U.S. environmental law adheres to the principle of sustainable development.⁸ The Article evaluates three broad approaches taken by the principal federal environmental statutes. The first approach, the “thumb on the scale” approach, includes the Clean Air Act (“CAA”) and the Clean Water Act (“CWA”). The second approach is the balancing approach, which includes the National Environmental Policy Act (“NEPA”), the Federal Insecticide, Fungicide, and Rodenticide Act (“FIFRA”), and the Endangered Species Act of 1973 (“ESA”). The third approach, which is to shift the regulatory regime along the sustainable development spectrum, features the Toxic Substances Control Act (“TSCA”), the CAA regulation of hazardous air pollutants mandated by the 1990 amendments, the Resource Conservation and Recovery Act (“RCRA”), the Comprehensive Environmental Response, Compensation and Liability Act (“CERCLA” or “Superfund”), and the Safe Drinking Water Act (“SDWA”). An analysis of these statutes reveals a wide range of approaches to balancing environmental protection with economic growth. Although the wide variety of U.S. environmental protection statutes makes them difficult to evaluate with regard to sustainable development, Part IV presents several conclusions. When deciding whether U.S. environmental law conforms to the principle, one important conclusion is that the CWA fails to offer sufficient protection

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1. See, e.g., *Green and Growing Sustainability Showcase*, UNIV. OF KENTUCKY NEWS (Sept. 15, 2009), <http://uknow.uky.edu/category/tags/student-sustainability-council>; Planet Blue—The Sustainable Difference, <http://sustainability.umich.edu/education> (“Beyond the classroom, [Michigan] offers myriad co-curricular sustainability opportunities in the areas of campus life, career development, and community service. As student interest in sustainability continues to grow, we are working diligently to expand and enhance these every day learning opportunities for our students. [Michigan] students don't just *study* sustainability; they *live* it.” (emphasis in original) (last visited Feb. 12, 2011)).
2. See, e.g., *Environmental Policy*, JP MORGAN CHASE, <http://www.jpmorgan-chase.com/corporate/Corporate-Responsibility/environmental-policy.htm> (last visited Feb. 12, 2011) (describing the company's “opportunity to make a positive contribution to environmental and social concerns by enacting policies designed so that our business operations do not degrade the environment or cause social harm. Such policies not only indicate positive environmental stewardship, but also present business opportunities such as innovative financial products and investments in sustainable forestry and renewable energy.”); Press Release, IBM, IBM Global Survey Shows Information Gap in ‘Green,’ Sustainability Strategies (June 1, 2009) (on file with author), available at <http://www-03.ibm.com/press/us/en/presskit/27512.wss>.
3. See, e.g., Exec. Order No. 13,514, 74 Fed. Reg. 52,117 (Oct. 9, 2009) in which “President Obama challenges all federal agencies to lead by example in energy and environmental performance. The Order gives the agencies 90 days to set a 2020 greenhouse reduction goal and also sets targets for efficient and sustainable buildings, reduced petroleum use in vehicles, water efficiency, waste reduction, purchasing green technologies and products, and supporting sustainable communities.” *Government Ordered to Lead the Way on Sustainability*, U.S. ENVTL. PROT. AGENCY, <http://www.epa.gov/Sustainability/index01272010.htm> (last visited Jan. 11, 2011).
4. See *infra* Part II.

5. See *infra* note 12.
6. See *infra* note 16 and accompanying text.
7. See *infra* Part II.
8. See *infra* Part III.

of the environment. This summary also shows how sustainable development values may be accounted for in the type of regulatory response that is employed. Favoring environmental protection is more likely to be politically acceptable if the resulting regulatory requirements are less expensive. The sustainable development principle also assists in understanding when less protection of the environment is more defensible.⁹

II. The Sustainable Development Principle in International Environmental Law

Professor Philippe Sands has written that the principle of sustainable development in “[s]tate practice” has been “a feature in international legal relations since at least 1893, when the United States asserted a right to ensure the legitimate and proper use of seals and to protect them, for the benefit of mankind, from wanton destruction.”¹⁰ More recently, three of the most prominent international discussions of sustainable development are the 1987 Brundtland Report, the Rio Earth Summit in 1992, and the 2002 World Summit on Sustainable Development.

The source of the term “sustainable development” itself is in the 1987 Brundtland Report.¹¹ By the time the United Nation’s Brundtland Commission issued its report, *Our Common Future: Report of the World Commission on Environment and Development*, the rationale for international concern regarding sustainable development had become grounded in ecological interdependence:

[R]elated changes have locked the global economy and global ecology together in new ways. We have in the past been concerned about the impacts of economic growth upon the environment. We are now forced to concern ourselves with the impacts of ecological stress—degradation of soils, water regimes, atmosphere, and forests upon our economic prospects. We have in the more recent past been forced to face up to a sharp increase in economic interdependence among nations. We are now forced to accustom ourselves to an accelerating ecological interdependence among nations. Ecology and economy are becoming ever more interwoven

locally, regionally, nationally, and globally into a seamless net of causes and effects.¹²

The Commission’s Report identified the two key components of sustainable development: economic development and environmental protection. The Report stated that, “[e]nvironment and development are not separate challenges; they are inexorably linked. Development cannot subsist upon a deteriorating environmental resource base; the environment cannot be protected when growth leaves out the costs of environmental destruction.”¹³ When specifically enumerating these concepts, however, the Report appeared to favor development over protection by claiming “overriding priority” to “the essential needs of the world’s poor” and by framing the protection of the environment in purely instrumental terms, such as ensuring “the environment’s ability to meet present and future needs.”¹⁴ The Report accordingly states that a necessary component of sustainable development is the eradication of human poverty.¹⁵

The sustainable development principle became even more prominent with the Rio Earth Summit in 1992. Principle 1 of the 1992 Rio Declaration presents the paradoxical values that animate sustainable development, stating that “[h]uman

9. See *infra* Part IV.

10. PHILIPPE SANDS, *PRINCIPLES OF INTERNATIONAL ENVIRONMENTAL LAW I: FRAMEWORKS, STANDARDS AND IMPLEMENTATION* 199 (1995). United States statutory law has incorporated the principle of sustainable development since at least 1916, when the National Park Service was established in the Department of the Interior. That Service was established “to promote and regulate the use of the Federal areas known as national parks, monuments, and reservations.” Act to Establish a National Park Service, Pub. L. No. 64-235, ch. 408, 39 Stat. 535 (1916) (codified as amended at 16 U.S.C. § 1 (2006)). That statute provided that “the fundamental purpose of the said parks, monuments, and reservations . . . is to conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations.” *Id.*

11. SANDS, *supra* note 10, at 198. *But cf.* EDITH BROWN WEISS ET AL., *INTERNATIONAL ENVIRONMENTAL LAW AND POLICY* 44 (2d ed. 2007) (“The first publicly visible use of the term ‘sustainable development’ was most probably in 1980 when it appeared in the World Conservation Strategy (WCS), a document prepared by the International Union for Conservation of Nature and Natural Resources (IUCN).”).

12. Rep. of the World Comm’n on Env’t and Dev., *Our Common Future*, U.N. Doc. A/42/427; GAOR, 42d Sess., at 21 (Aug. 4, 1987), available at <http://www.un-documents.net/wced-ocf.htm> [hereinafter *Brundtland Report*].

13. *Id.* at 27 (“economics and ecology must be completely integrated in decision making and lawmaking processes not just to protect the environment, but also to protect and promote development. Economy is not just about the production of wealth, and ecology is not just about the protection of nature; they are both equally relevant for improving the lot of humankind.”); *id.* at 28 (“policy makers guided by the concept of sustainable development will necessarily work to assure that growing economies remain firmly attached to their ecological roots and that these roots are protected and nurtured so that they may support growth over the long term. Environmental protection is thus inherent in the concept of sustainable development . . .”).

14. *Id.* at 54. The Brundtland Report stated that:

Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs. It contains within it two key concepts:

- the concept of ‘needs’, in particular the essential needs of the world’s poor, to which overriding priority should be given; and
- the idea of limitations imposed by the state of technology and social organization on the environment’s ability to meet present and future needs.

Id. Other language in the Report is arguably less instrumental in describing the rationale for protection of environmental amenities. See *id.* at 66–67 (“the case for the conservation of nature should not rest only with development goals. It is part of our moral obligation to other living beings and future generations.”).

15. See *id.* at 24–25 (“Poverty is not only an evil in itself, but sustainable development requires meeting the basic needs of all and extending to all the opportunity to fulfil [sic] their aspirations for a better life. A world in which poverty is endemic will always be prone to ecological and other catastrophes.”); *id.* ch. 2, ¶ 29 (“development that is sustainable has to address the problem of the large number of people who live in absolute poverty—that is, who are unable to satisfy even the most basic of their needs.”).

The Report’s claims regarding sustainable development also include a far more controversial view that there is a need for horizontal economic equity among all nations. See *id.* at 55 (“Perceived needs are socially and culturally determined, and sustainable development requires the promotion of values that encourage consumption standards that are within the bounds of the ecological possible and to which all can reasonably aspire.”); *id.* at 62 (“[Sustainable development] requires a change in the content of growth, to make it less material—and energy-intensive and more equitable in its impact. These changes are required in all countries as part of a package of measures to maintain the stock of ecological capital, to improve the distribution of income, and to reduce the degree of vulnerability to economic crises.”).

beings are at the center of concerns for sustainable development. They are entitled to a healthy and productive life in harmony with nature.”¹⁶

Although much discussion of sustainable development highlights how the principle forms the basis for a new environmentalist era,¹⁷ greater caution needs to be exercised with respect to this principle. Indeed, one need look no further than Principle 2 of the Rio Declaration to recognize that the principle of sustainable development may take on various meanings. Principle 2 states that:

States have, in accordance with the Charter of the United Nations and the principles of international law, the sovereign right to exploit their own resources pursuant to their own environmental and developmental policies, and the responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other States or of areas beyond the limits of national jurisdiction.¹⁸

Principle 2 thus insists upon a nation’s sovereign right to exploit its resources, with the “no significant harm principle” placing the only limitation on state autonomy regarding environmental protection and the use of national resources.¹⁹ That limitation imposes far fewer constraints on the use and development of resources than would a requirement that resource development ensure the continued availability of those resources for the nation’s future use.

If Principle 2 stresses the development side of the sustainable development continuum, Principles 3 and 4 highlight the importance of sustainability itself. Principle 3 identifies the importance of intergenerational equity: “The right to development must be fulfilled so as to equitably meet environmental and developmental needs of present and future generations.”²⁰ Principle 4 then defines the means for reaching the end of intergenerational equity recognized by Principle 3: “In order to achieve sustainable development, environmental protection shall constitute an integral part of the development process and cannot be considered in isolation from it.”²¹

The Rio Summit principles, in short, reflect the inherent tension in the principle of sustainable development: economic impact must be balanced against environmental degradation when a nation utilizes its natural resources. The Rio Declaration also identified other principles, one of which has come to exacerbate the tensions between environmental deg-

radation and economic development. Principle 7 of the Rio Declaration states that:

States shall cooperate in a spirit of global partnership to conserve, protect and restore the health and integrity of the Earth’s ecosystem. In view of the different contributions to global environmental degradation, States have common but differentiated responsibilities. The developed countries acknowledge the responsibility that they bear in the international pursuit of sustainable development in view of the pressures their societies place on the global environment and of the technologies and financial resources they command.²²

Professor Sands views Principle 7 as an initial articulation of the principle of common but differentiated responsibility.²³ Common but differentiated responsibility bears significantly on the sustainable development principle because it provides that sustainable development will impose different obligations on different nation states with regard to their use of environmental amenities.

Principle 7 articulates the two important bases for differentiating the environmental protection obligations of nations in their use of resources. Most prominently, Principle 7 states that developed nations are obligated to work harder to protect the environment because their economies have contributed the most to its degradation.²⁴ Principle 7 also states that developed nations have a greater responsibility to protect the environment because they have the technical and financial ability to work against environmental degradation.²⁵ In sum, Principle 7 expressly recognizes the contextual nature of the sustainable development principle: sustainable development does not impose an absolute limit on permissible environmental degradation for economic development.²⁶ Rather, less developed nations may, consistent with the principle, degrade the environment more severely as they seek to improve their economic conditions.²⁷ Indeed, the Rio principles appear to recognize only one fundamental limit on the environmental degradation that may accompany economic development: the “no significant harm” requirement of Principle 2.²⁸

The 2002 World Summit on Sustainable Development, held in Johannesburg, South Africa, highlighted these tensions within the principle of sustainable development.²⁹ The Declaration and the Plan of Implementation, both adopted at the Johannesburg Summit, highlighted the conflicting goals that lie at the heart of sustainable development by focusing

16. United Nations Conference on Environment and Development, Rio de Janeiro, Braz., June 3–14, 1992, *Rio Declaration on Environment and Development*, U.N. Doc. A/CONF.151/26/Rev.1 (vol. 1), princ. 1 (Aug. 12, 1992) [hereinafter *Rio Declaration*].

17. See *supra* notes 1–3 and accompanying text. It is understandable that the United States, as a wealthy industrialized nation, would be more focused on the environmental protection component of sustainable development, because poverty eradication is not nearly as pressing a problem as it is for developing countries.

18. *Rio Declaration*, *supra* note 16, princ. 2.

19. The “no significant harm principle” is most famously articulated in Principle 21 of the Stockholm Declaration. See United Nations Conference on the Human Environment, Stockholm, Swed., June 5–16, 1972, *Stockholm Declaration on the Human Environment*, U.N. Doc. A/CONF.48/41/Rev.1, princ. 21, reprinted in 11 I.L.M. 1416, 1420 (1972) [hereinafter *Stockholm Declaration*].

20. *Rio Declaration*, *supra* note 16, princ. 3.

21. *Id.* princ. 4.

22. *Id.* princ. 7.

23. SANDS, *supra* note 10, at 217.

24. *Rio Declaration*, *supra* note 16, princ. 7. This basis for greater responsibility relates to the polluter pays principle of international environmental law. See generally SANDS, *supra* note 10, at 213–17.

25. *Rio Declaration*, *supra* note 16, princ. 7.

26. *Id.*

27. *Id.*

28. See *supra* note 18 and accompanying text.

29. See generally World Summit on Sustainable Development, Johannesburg, S. Afr., Aug. 26–Sept. 4, 2002, *The Johannesburg Declaration on Sustainable Development*, U.N. Doc. A/CONF.199/20, Annex I (Sept. 23, 2002) [hereinafter *The Johannesburg Declaration*]; World Summit on Sustainable Development, Johannesburg, S. Afr., Aug. 26–Sept. 4, 2002, *Plan of Implementation of the World Summit on Sustainable Development*, U.N. Doc. A/CONF.199/20, Annex II (Sept. 23, 2002) [hereinafter *Johannesburg Plan of Implementation*].

greater attention on the concerns of less-developed nations and by re-establishing the eradication of poverty as one of sustainable development's core components.³⁰ Although the Johannesburg Summit participants restated their commitment to the principles of the Rio Declaration,³¹ the Johannesburg Plan of Implementation explicitly recognized the significance of Rio Declaration Principle 7 to the concept of sustainable development and thereby compounded the paradoxical and contextual nature of the sustainable development principle:

[W]e commit ourselves to undertaking concrete actions and measures at all levels and to enhancing international cooperation, taking into account the Rio principles, including, inter alia, the principle of common but differentiated responsibilities as set out in principle 7 of the Rio Declaration on Environment and Development. These efforts will also promote the three components of sustainable development—economic development, social development and environmental protection—as interdependent and mutually reinforcing pillars. Poverty eradication, changing unsustainable patterns of production and consumption and protecting and managing the natural resource base of economic and social development are overarching objectives of, and essential requirements for, sustainable development.³²

The effect of the Johannesburg Summit deliberations on the principle of sustainable development thus appears to be two-fold. First, the participants enriched the contextual nature of sustainability by adding “social development” to what had previously been the bipolar components of economic development and environmental protection.³³ Though more contextual in this respect, sustainable development was also made more determinative in one respect: development can only be defined as sustainable if it has the effect of eradicating poverty. The Johannesburg Summit accordingly imposed a limit on sustainability that mirrors the absolute limit identified in the Rio Declaration principles: development is sustainable except in cases where poverty has not been eradicated or where the development of resources violates the no significant harm principle.³⁴

In sum, the contemporary international understanding of sustainable development accepts as permissible an exceptionally wide range of development along with its adverse impacts on the environment. Following the Johannesburg Summit, the acceptable range across all nations has been broadened by the new willingness to account for each nation's stage of development.

This broad range of permissible development across many nations should not, however, obscure how the principle of sustainable development, allied with the principle of common but differentiated responsibility, ought to apply to a rich, industrialized nation like the United States. To be sure, such a nation would not violate international law unless its failure to protect the environment caused significant harm beyond its own borders.

The principle of sustainable development for a rich nation, though, should provide that, if the environment can be protected sufficiently at a reasonable cost, the environment must be protected sufficiently. This understanding emerges because the United States is wealthy enough that neither poverty eradication nor the state of development is an acceptable rationale for a failure to provide sufficient protection for the environment. This understanding is also in accord with the popular understanding of sustainability in the United States, which emphasizes protection of the environment.

With this general background in the international principle of sustainable development, we turn to an assessment of environmental protection law in the United States to gauge the extent to which it incorporates the principle.

III. The Sustainable Development Principle in United States Environmental Law

One might expect that an assessment of the extent to which U.S. environmental law reflects the sustainable development principle would begin by describing how that law expressly relies upon the principle. The words “sustainable development” are, however, missing entirely from federal environmental statutes.³⁵ The assessment of the compatibility of federal environmental protection law with sustainable development will therefore depend on an understanding of the architecture of the statutes intended to protect the environment. A review of federal environmental law leads to a conclusion that these laws reflect widely varied approaches to sustainability.

The approaches fall into several categories described in detail below: the thumb on the scale approach, the balancing approach, and the shifting approach. This basic approach to organizing an understanding of U.S. environmental law focuses on the degree to which statutes reference environmental protection alone (often determined by adverse public health impacts), economic impact alone, or a balance of environmental protection and economic impact. This is an important, but not a sufficient ground for understanding

30. The seventh paragraph of the Johannesburg Plan of Implementation states that “Eradicating poverty is the greatest global challenge facing the world today and an indispensable requirement for sustainable development, particularly for developing countries.” *The Johannesburg Declaration*, *supra* note 29, ¶ 7 (emphasis added).

31. *Id.* ¶ 8.

32. *Johannesburg Plan of Implementation*, *supra* note 29, ¶ 2 (footnote omitted).

33. *The Johannesburg Declaration*, *supra* note 29, ¶ 5; *Johannesburg Plan of Implementation*, *supra* note 29, ¶ 2.

34. *The Johannesburg Declaration*, *supra* note 29, ¶ 11; *Johannesburg Plan of Implementation*, *supra* note 29, ¶ 7.

35. A Westlaw search yielded 35 instances where the words appear in the Annotated United States Code. More than two-thirds of these occur in the context of foreign relations and foreign trade, including agricultural trade and technology transfers in the energy sector. Four of the remaining eight occurrences involve domestic commerce, including military purchasing policy. Three of the remaining occurrences relate to international conservation measures included in Title 16. The last of the occurrences is in a note to, but not in the text of, the purpose provision of the National Environmental Policy Act, 42 U.S.C.A. § 4321 (West 2010). That note includes a reference to the President's Council on Sustainable Development, established by Exec. Order No. 12,852, 58 Fed. Reg. 35,841 (June 29, 1993).

how environmental law reflects the principle of sustainable development.

It will also be important to understand the nature of the regulatory regime that is triggered by the consideration of adverse environmental impacts, economic impacts, or a balancing of the two. The best known regulatory approach is command and control regulation, which involves the imposition of controls on activities, usually polluting activities, that either degrade or increase the risk of degrading the environment.³⁶ Another regulatory approach, information-based regulation, relies on the development and consideration of information related to the adverse environmental effect that is of concern.³⁷ This second approach is the approach that imposes the fewest costs on the regulated party.³⁸ A third regulatory approach is the imposition of liability for causing environmental degradation.³⁹ Because these regulatory approaches impose different costs, the impact of regulation on sustainability may depend on the type of regulation as well as on the circumstances under which regulatory action is permitted or required.

A. *The Thumb on the Scale Approach: Favoring Environmental Protection or Economic Development in Regulating Impacts on the Environment*

The first approach to sustainable development is one in which the legal structure establishes a preference either for environmental protection or economic development. The two principal federal environmental statutes, the CAA and the CWA, lie at either end of this spectrum.

36. See CRAIG N. JOHNSTON ET AL., *LEGAL PROTECTION OF THE ENVIRONMENT* 6 (3d ed. 2010) (“Command-and-Control regulations are regulations that direct people to do certain specific things or prohibit them from doing certain specific things.”). The authors describe how these regulatory requirements may be determined by impacts on health or the environment, by available technology or by a comparison of the costs and benefits of regulation. See *id.* at 6–7.

37. Information-based regulation may take one of two forms. One form is environmental planning, which requires government actors to consider and share information about environmental impacts before taking action. See CELIA CAMPBELL-MOHN ET AL., *ENVIRONMENTAL LAW: FROM RESOURCES TO RECOVERY* 138–39 (1993). The second form involves the dissemination of information to the public or to consumers regarding environmental impacts and risks. See *id.* at 142–43.

38. The costs are low because this approach does not impose any direct controls on activities that harm or pollute the environment. The approach requires only that the impacts be understood or communicated to the public. Notwithstanding the low cost, the approach “is a subtle but powerful tool to achieve environmental objectives.” *Id.* at 142. See generally Bradley C. Karkainen, *Information as Environmental Regulation: TRI and Performance Benchmarking, Precursor to a New Paradigm?*, 89 *Geo. L.J.* 257 (2001).

39. See WILLIAM H. RODGERS, JR., *ENVIRONMENTAL LAW* 58–59 (2d ed. 1994). The use of market-based mechanisms to protect the environment is addressed *infra* notes 48 & 80.

I. Environmental Protection as the Organizing Regulatory Principle: The Clean Air Act’s Attainment Principle

The core of the CAA⁴⁰ is the requirement, often breached to be sure,⁴¹ that all geographic areas comply with the National Ambient Air Quality Standards (“NAAQS”).⁴² The NAAQS are defined based only upon a consideration of scientific studies of the adverse effects that the criteria pollutants⁴³ have on public health (for the primary NAAQS)⁴⁴ and public welfare (for the secondary NAAQS).⁴⁵ The Supreme Court recently reached the conclusion, long ago reached by the Court of Appeals for the District of Columbia Circuit,⁴⁶ that Congress permitted the U.S. Environmental Protection Agency (“EPA”) to consider only the human health or environmental effects of criteria pollutants, and not the economic feasibility of those standards, when it establishes or revises the NAAQS.⁴⁷

The CAA initially provided states with substantial discretion to define the limitations on emissions of criteria pollutants in order to comply with the NAAQS.⁴⁸ The 1977 CAA

40. 42 U.S.C. §§ 7401–7671q (2006).

41. The areas of the country that have not attained one or more of EPA’s standards for air quality are available online. *Currently Designated Nonattainment Areas for All Criteria Pollutants*, ENVTL. PROT. AGENCY, <http://www.epa.gov/oar/oaqps/greenbk/anc13.html> (last updated Dec. 17, 2010). Data from an EPA study covering the years 1983–2002 indicates that as of September 2002, more than 125 million people were living in areas where the ambient concentration of at least one criteria pollutant exceeded the acceptable level defined by EPA. ENVTL. PROT. AGENCY, *NATIONAL AIR QUALITY AND EMISSIONS TRENDS REPORT* app. at 169 (2003), available at http://www.epa.gov/airtrends/non_table.pdf. A recent EPA study sets that figure at 127 million as of 2008. ENVTL. PROT. AGENCY, *OUR NATION’S AIR: STATUS AND TRENDS THROUGH 2008* (2010), available at <http://www.epa.gov/airtrends/2010/report/fullreport.pdf>.

42. Section 109(a) of the CAA requires EPA to promulgate NAAQS for criteria pollutants listed by EPA. 42 U.S.C. § 7409(a) (2006). Section 110(a)(1) requires states to adopt State Implementation Plans (“SIP”) to “provide[] for implementation, maintenance and enforcement of” the NAAQS. 42 U.S.C. § 7410(a)(1). The Act then provides for the imposition of sanctions on a state that fails to submit a SIP ensuring attainment of the NAAQS by the attainment date or that fails to implement a SIP approved by EPA. 42 U.S.C. §§ 7410(m), 7509(a)–(b).

43. A criteria pollutant is an “air pollutant [] emissions of which, in [the EPA Administrator’s] judgment, cause or contribute to air pollution which may reasonably be anticipated to endanger public health or welfare [and] the presence of which in the ambient air results from numerous or diverse mobile or stationary sources” 42 U.S.C. § 7408(a)(1)(A)–(B). That provision also provides that the air pollutant be one “for which air quality criteria had not been issued before December 31, 1970, but for which [the Administrator] plans to issue air quality criteria under this section.” 42 U.S.C. § 7408(a)(1)(C). As construed in *NRDC v. Train*, 545 F.2d 320 (2d Cir. 1976), the third requirement does not accord discretion to EPA to defer designation of a pollutant meeting the first two requirements.

44. 42 U.S.C. § 7409(b)(1).

45. *Id.* § 7409(b)(2).

46. *Lead Indus. Ass’n v. EPA*, 647 F.2d 1130, 1148–50 (D.C. Cir. 1980).

47. See *Whitman v. American Trucking Ass’n*, 531 U.S. 457, 471 (2001). Whether the ambient standards defined by EPA are stringent enough to protect human health and the environment is an issue that is beyond the scope of this article.

48. See 42 U.S.C. § 7410(a)(2)(A) (providing that each SIP is to “include enforceable emission limitations and other control measures, means, or techniques . . . as may be necessary or appropriate to meet the applicable requirements of this chapter”). One of the “other control measures, means, or techniques” that states may employ is the use of tradable emissions credits. See 40 C.F.R. §§ 51.490–51.494 (defining rules for voluntary trading programs). Such credits may be traded or sold among controlled sources. The trading systems are designed to yield the same aggregate emissions affecting air quality at a lower total cost of control because sources with lower costs of control will generally reduce

Amendments, however, limited state discretion by imposing minimum requirements for emissions.⁴⁹ As amended, the CAA imposes the most stringent federally mandated emissions limitation for major new sources of criteria pollutants located in areas that have not attained the NAAQS for those pollutants.⁵⁰ The 1977 Amendments also mandated minimum limits on emissions of criteria pollutants from existing stationary sources in areas that have not attained the NAAQS for those pollutants.⁵¹ In short, the CAA mandates minimum limits on emissions of pollutants in nonattainment areas from new and existing sources in order to ensure the attainment of the health-based or environmental-quality-based NAAQS.⁵²

To be sure, the CAA imposes mandatory limits on emissions from air pollution sources, even when the affected air quality complies with the NAAQS. These limitations are intended, however, to ensure adequate protection of human health and the environment. Thus, section 111 mandates emissions limits for stationary sources of air pollution, categorically and without regard to ambient air quality, based on the administrative determination that the “category of sources . . . causes, or contributes significantly to, air pollution which may reasonably be anticipated to endanger public health or welfare.”⁵³ Similarly, EPA must define emissions limitations for new mobile sources when “the emission of any air pollutant from any class or classes of new motor vehicles or new motor vehicle engines, which in [the Administrator’s] judgment cause, or contribute to, air pollution which may reasonably be anticipated to endanger public health or welfare.”⁵⁴ Finally, the amended Act also established minimum emissions limitations for major emitting facilities to ensure that air quality in areas that meet the NAAQS will not be significantly degraded.⁵⁵ This anti-degradation program was intended, in part, to provide an added margin of safety for human health because of the non-threshold impacts of the criteria pollutants.⁵⁶

In broad terms, therefore, Congress established a requirement in the structure of the CAA that minimum standards of environmental quality had to be met, regardless of the

economic consequences and costs of the pollution controls.⁵⁷ The CAA, in short, adopts a model of environmental protection that seeks to ensure a defined level of environmental quality without regard to the economic impacts that result from requiring compliance with that standard. This model plainly favors the environmental quality side of sustainable development.⁵⁸

2. Defining the Extent of Environmental Protection Based on Economic Concerns: The CWA’s Pollution Control Regime

Congress established the structure of the modern CWA in 1972.⁵⁹ Although enacted only two years after the CAA and before the time that NAAQS compliance was first mandated by the CAA, the CWA reflects greater ambivalence toward the protection of human health and environmental quality.⁶⁰ The CWA does not define the required degree of environmental protection by reference to an adequately healthy environment,⁶¹ but rather based on the control of point-source emissions of pollutants as determined by available pollution control technologies.⁶²

The CWA protects the nation’s surface waters by prohibiting the discharge of any pollutant from a point source except in compliance with a permit.⁶³ The most important such permit, the National Pollutant Discharge Elimination System (“NPDES”) permit,⁶⁴ applies to discharges from point sources, including industrial point sources.⁶⁵ Available technology is the basis for the limits on the pollutant discharges allowed by the permit.⁶⁶ The two most important technology-based standards, best practicable technology (“BPT”),⁶⁷

emissions (to generate credits), rather than sources with higher control costs, which will purchase credits. *See generally* Economic Incentive Program Rules, 59 Fed. Reg. 16,690, 16,690 (Apr. 17, 1994) (emissions trading programs are intended to “assist States in meeting air quality management goals through flexible approaches which benefit both the environment and the regulated entities, allow for less costly control strategies, and provide stronger incentives for the development and implementation of pollution prevention measures and innovative emissions reductions technology.”).

49. Pub. L. No. 95-95, 91 Stat. 685, 746–751 (1977) (codified as amended at 42 U.S.C. §§ 7501–7508 (2006)).

50. *See* 42 U.S.C. § 7503.

51. *See id.* § 7502(c).

52. *See id.* § 7502 (State Implementation “Plan Requirements” for areas that are nonattainment). The 1990 Amendments imposed even more stringent minimum requirements. *See* RODGERS, *supra* note 39, at 223–27 (describing minimum requirements for nonattainment areas prescribed by the 1990 Amendments).

53. *Id.* § 7411(b)(1)(A).

54. *Id.* § 7521(a)(1).

55. *See id.* §§ 7470–7492.

56. *See* H.R. REP. NO. 95-294, at 107 (1977). The anti-degradation provisions also were motivated by economic development concerns, because this program would even the playing field for sources of air pollution. *See id.* at 137.

57. *See generally* Union Elec. Co. v. EPA, 427 U.S. 426 (1976).

58. The CAA’s regulatory approach to hazardous air pollutants differs from its regulation of criteria pollutants. CAA regulation of hazardous air pollutants is discussed *infra* Part C.2.

59. Pub. L. No. 92-500, 86 Stat. 816 (1972) (codified as amended at 33 U.S.C. §§ 1251–1387 (2006)).

60. The CWA’s regulatory approach is described in greater detail in Michael P. Healy, *Still Dirty After Twenty-five Years: Water Quality Standard Enforcement and the Availability of Citizen Suits*, 24 *ECOLOGICAL L.Q.* 393, 396–414 (1996).

61. *See supra* notes 45–46 and accompanying text (describing the CAA NAAQS and the attainment principle).

62. A page of history may explain the decision not to employ a regulatory approach focused on protection of water quality. Such an approach, dependent on state adopted and enforced water quality standards had been the regulatory approach of the quite unsuccessful Water Quality Act of 1967, Pub. L. No. 89-234, 79 Stat. 903. *See* EPA v. California *ex rel.* State Water Res. Control Bd., 426 U.S. 200, 202–03 (1976).

63. *See* 33 U.S.C. § 1311(a) (2006).

64. *Id.* § 1342. The other permit system governs the “discharge of dredged or fill material into the navigable waters” *Id.* § 1344(a). The relationship between these two permit systems is the subject of the Supreme Court decision in *Coeur Alaska, Inc. v. Southeast Alaska Conservation Council*, 129 S. Ct. 2458 (2009).

65. *See id.* § 1362(14) (broadly defining “point source”).

66. *See id.* § 1311(b); ENVTL. PROT. AGENCY, NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT WRITERS’ MANUAL (2010) 5-1, available at http://cfpub.epa.gov/npdes/writermanual.cfm?program_id=45. (“Technology-based effluent limitations (TBELs) aim to prevent pollution by requiring a minimum level of effluent quality that is attainable using demonstrated technologies for reducing discharges of pollutants or pollution into the waters of the United States . . .”).

67. *See* 33 U.S.C. § 1311(b)(1)(A). EPA’s approach to defining BPT limits is the following:

and best available technology (“BAT”),⁶⁸ define effluent limitations based either on the technologies that are already in use within a particular industrial category, or on the availability of a technology that may be transferred to that category of point sources.⁶⁹ These standards for existing sources differ in their level of stringency. The more stringent standard, BAT, applies to toxic and nonconventional pollutants, which are more injurious to health and the environment,⁷⁰ while BPT is less stringent and applies to conventional pollutants.⁷¹ Both limits are, however, defined by reference to available technologies.⁷² Standards for new sources also look to available technologies.⁷³ As pollution control technologies improve over time, EPA must establish more stringent standards for each category of sources.⁷⁴

Whether a technology is available and therefore may provide the basis for effluent limitations for a category of sources

depends on the particular effluent limit of concern.⁷⁵ In general, a technology’s availability depends on the costs and benefits of pollution control.⁷⁶ Thus, a control standard may be rejected as a proper basis for identifying effluent limits if the costs of control are found to outweigh the benefits of control sufficiently. This may occur even though the standard is technically available to an industrial category.⁷⁷ Because the consideration of the availability of a technology is pursued by reference to a category of sources,⁷⁸ the economic impact of mandating compliance with an effluent limitation for a particular source is not a consideration.⁷⁹ The impact on a particular source of utilizing the control technology needed to gain compliance with the applicable effluent limitation may cause a source to go out of business.⁸⁰ Indeed, Congress had anticipated this adverse economic impact when it enacted the statute.⁸¹

Notwithstanding this consideration of various factors, including the costs and benefits of control, EPA’s general

Traditionally, the EPA establishes BPT effluent limitations based on the average of the best performances of facilities within the industry, grouped to reflect various ages, sizes, processes or other common characteristics If, however, existing performance is uniformly inadequate, the EPA may establish BPT limitations based on higher levels of control than currently in place in an industrial category when based on an Agency determination that the technology is available in another category or subcategory, and can be practically applied.

Effluent Limitation Guidelines and New Source Performance Standards for the Airport Deicing Category, 74 Fed. Reg. 44,676, 44,678–79 (Aug. 28, 2009) (to be codified at 40 C.F.R. pt. 449).

68. See 33 U.S.C. § 1311(b)(2)(A) (2006). EPA’s approach to defining BAT limits is the following:

In general, BAT effluent limitation guidelines represent the best economically achievable performance of facilities in the industrial subcategory or category As with BPT, where existing performance is uniformly inadequate, BAT may reflect a higher level of performance than is currently being achieved based on technology transferred from a different subcategory or category. BAT also may be based upon process changes or internal controls, even when these technologies are not common industry practice.

Effluent Limitation Guidelines and New Source Performance Standards for the Airport Deicing Category, 74 Fed. Reg. at 44679.

69. See *supra* notes 66–68.

70. See 33 U.S.C. § 1311(b)(2)(A) (2006).

71. See *id.* § 1311(b)(1)(A). The CWA also includes a more stringent level of control for conventional pollutants called the “best conventional pollutant control technology [BCT].” *Id.* § 1311(b)(2)(E). BCT is a control requirement that is more stringent than the baseline BPT standard. EPA’s web site states that “BCT is established in light of a two-part ‘cost reasonableness’ test which compares the cost for an industry to reduce its pollutant discharge with the cost to a POTW [publicly owned treatment works] for similar levels of reduction of a pollutant loading. The second test examines the cost-effectiveness of additional industrial treatment beyond BPT. EPA must find limits which are reasonable under both tests before establishing them as BCT.” ENVTL. PROT. AGENCY, *NPDES Glossary*, http://cfpub.epa.gov/npdes/glossary.cfm?program_id=0#B (last updated Mar. 23, 2004).

72. See 33 U.S.C. § 1311(b); *supra* notes 66–68 and accompanying text.

73. EPA’s approach to standards for new sources is the following:

NSPS [New Source Performance Standards] reflect effluent reductions that are achievable based on the best available demonstrated control technology. New facilities have the opportunity to install the best and most efficient production processes and wastewater treatment technologies. As a result, NSPS should represent the greatest degree of effluent reduction attainable through the application of the best available demonstrated control technology for all pollutants (i.e., conventional, nonconventional, and priority pollutants).

ENVTL. PROT. AGENCY, EPA-821-B-01-007, DEVELOPMENT DOCUMENT FOR THE PROPOSED EFFLUENT LIMITATIONS GUIDELINES AND STANDARDS FOR THE MEAT AND POULTRY PRODUCTS INDUSTRY POINT SOURCE CATEGORY (40 CFR 432), at 2-3 to -4 (2002).

74. See 33 U.S.C. § 1314(m) (2006) (requiring a “schedule for the annual review and revision of promulgated effluent guidelines”).

75. The Supreme Court in *Entergy Corp. v. Riverkeeper, Inc.* provided an Appendix that identifies five standards for control of point source emissions under the CWA. 129 S. Ct. 1498, 1511 (2009). The Court’s chart provides the statutory text that defines the basis for establishing each such standard.

76. See *id.* at 1506–10.

77. The degree to which costs are compared to benefits depends on the applicable standard of control. See *generally id.* In *Chemical Manufacturers Ass’n v. EPA*, the court held that, in defining the baseline BPT limitations, the “relevant inquiry . . . is whether the costs are ‘wholly disproportionate’ to the benefits.” 870 F.2d 177, 205 (5th Cir. 1989). The court upheld the limitations defined by EPA which had been based on EPA estimating that:

[T]he BPT limitations would result annually in the removal of 108 million pounds of conventional pollutants from [] discharges and consequently from our nation’s waters at an annualized compliance cost of 76.6 million dollars after a capital investment of 215.8 million dollars. Thus, the EPA concluded that the total cost of BPT is warranted by the total pounds of pollutant removed.

Id. at 204 (footnotes omitted). Even less consideration to the costs and benefits of regulation is given when EPA defines BAT standards. See *Rybachek v. EPA*, 904 F.2d 1276, 1290–91 (9th Cir. 1990).

78. See *generally* E.I. DuPont de Nemours & Co. v. Train, 430 U.S. 112 (1977).

79. For this reason, a source is not permitted to obtain a variance from a categorical standard, based on the inability of the particular source to afford the costs of the pollution controls needed to comply with the applicable effluent limitations. The Supreme Court in *EPA v. National Crushed Stone Ass’n* concluded that:

[I]f pollution is to be diminished, limitations based on [the best practicable technology, the baseline level of control] must forbid the level of effluent produced by the most pollution-prone segment of the industry, that segment not measuring up to “the average of the best existing performance.” So understood, the statute contemplated regulations that would require a substantial number of point sources with the poorest performances either to conform to BPT standards or to cease production. To allow a variance based on economic capability and not to require adherence to the prescribed minimum technology would permit the employment of the very practices that the Administrator had rejected in establishing the best practicable technology currently in use in the industry.

449 U.S. at 64, 76 (1980).

80. See *id.* at 74–77. Moreover, costs of control may vary greatly among different industries. The fact that control technologies are available to different industries (and thereby influence their effluent limitations) does not mean that the different industries will have the same costs of control. When costs of control differ, the total costs of controlling the same aggregate amount of pollution may be reduced by the use of a credit trading regime. See *supra* note 48 (describing the trading of pollution credits under the CAA). The CWA may also authorize trading credits in certain circumstances. See OFFICE OF WATER, ENVTL. PROT. AGENCY, WATER QUALITY TRADING POLICY 2 (2003), available at <http://www.epa.gov/owow/watershed/trading/finalpolicy2003.pdf>.

81. See *EPA v. Nat’l Crushed Stone Ass’n*, 449 U.S. at 80–82 (discussing legislative history).

approach to effluent limitations is to look toward the emissions controls achieved by sources in the particular industrial category.⁸² For BPT standards, limits are generally based on the average of the best results achieved by sources in the category.⁸³ For BAT standards, EPA defines limits based on the best results for each pollutant achieved by sources in the category.⁸⁴ This practical approach to defining effluent limitations reinforces the extent to which CWA regulation is determined by available technologies.

Imposing these pollution controls on point sources should, of course, improve the environmental quality of protected waters, as compared with the quality that would result from unregulated emissions of pollutants by point sources. Any *federally mandated*⁸⁵ improvement in the environmental quality of the nation's surface waters is driven, however, by the imposition of the available technology-based limits, rather than by mandating the minimum acceptable quality of the waters receiving the discharges.⁸⁶ Indeed, the CWA does not impose enforceable limits on pollution contributed by nonpoint sources.⁸⁷ These sources are subject only to planning requirements and may be subject to management practice requirements.⁸⁸

To be sure, the CWA does not ignore the condition of the receiving waters. Federal regulation of water pollution prior to 1972 had unsuccessfully sought to control pollution by ensuring adequate water quality.⁸⁹ The current Act partly retains this regulatory approach by requiring states to establish water quality standards and to review and revise the water quality standards every three years,⁹⁰ and then by relating discharge permit requirements to those water quality standards.⁹¹ Indeed, a core requirement of the current CWA, unfortunately honored often in the breach,⁹² is that the effluent limits on discharges of pollutants included in point source NPDES permits must be stringent enough to attain the state's water quality standards.⁹³

Given this regulatory structure, one might claim that the CWA pollution control requirements are analogous to CAA requirements⁹⁴ because the stringency of the CWA's required pollution controls is determined by whether the permitted discharge will cause a violation of permissible ambient pollut-

ant levels in the waters receiving the discharged pollutants.⁹⁵ The statutes, however, differ greatly in how the relevant ambient standards, NAAQS for the CAA and water quality standards for the CWA, are determined. EPA only considers the human health impacts of exposure to the criteria pollutant when it establishes the national primary NAAQS for criteria pollutants.⁹⁶ The CAA then requires that all areas of the country attain those standards or be subject to more rigorous regulatory requirements⁹⁷ and sanctions for the failure to attain the NAAQS by the attainment date.⁹⁸

The CWA does not require that all of the nation's surface waters have quality sufficient to permit healthful fishing and swimming.⁹⁹ Water quality standards are defined by each state, which then submits its standards to EPA for review and approval.¹⁰⁰ Although states have some discretion in establishing water quality standards, the CWA does impose some important requirements. Except for the absolute minimum requirement that "[i]n no case shall a State adopt waste transport or waste assimilation as a designated use for any waters of the United States,"¹⁰¹ the limitations on state discretion relate back to the impact of the federal categorical technology-based effluent limitations on ambient water quality.¹⁰²

EPA regulations require states to define water quality standards that are stringent enough to protect existing in-stream uses of the waterway.¹⁰³ Absent a state's decision to impose permit requirements more stringent than the federal standards for categories of industrial point sources, the current existing use would reflect the water quality that the technology-based effluent limitations mandated by the CWA would achieve.¹⁰⁴ Despite the permissibility of the uses of surface waters that are far less protective than fishable and swimmable waters, the nation's waters commonly fail to comply with the less protective water quality standards defined by the states.¹⁰⁵

An exception to the acceptance of water quality that results from implementation of technology-based limits involves "high quality waters."¹⁰⁶ EPA regulations accord more specific protection to waters that "constitute an outstanding National resource, such as waters of National and State parks

82. See *supra* notes 70–71 and accompanying text.

83. See *supra* note 67.

84. See *supra* note 68.

85. The CWA permits states to impose more stringent permit requirements than those mandated by the federal technology-based approach. See 33 U.S.C. § 1370 (2006).

86. See *supra* note 66 and accompanying text.

87. "Nonpoint source pollution is caused by rainfall or snowmelt moving over and through the ground and carrying natural and human-made pollutants into lakes, rivers, streams, wetlands, estuaries, other coastal waters, and ground water. Atmospheric deposition and hydrologic modification are also sources of nonpoint pollution." Nonpoint Source Program and Grants Guidelines for States and Territories, 68 Fed. Reg. 60,653, 60,655 (Oct. 23, 2003).

88. See 33 U.S.C. § 1329 (2006).

89. See Healy, *supra* note 60, at 397–98.

90. See 40 C.F.R. § 131.20.

91. 33 U.S.C. § 1341 (2006)

92. See Healy, *supra* note 60, at 414–415 (discussing studies describing violations of state water quality standards).

93. See 33 U.S.C. § 1311(b)(1)(C).

94. See 42 U.S.C. §§ 7410(a)(1)–(a)(2)(A) (2006) (requiring state implementation plans for national primary and secondary ambient air quality standards).

95. See 33 U.S.C. § 1316(a)–(e).

96. See *supra* notes 43–45 and accompanying text.

97. See *supra* notes 49–52 and accompanying text.

98. See *supra* note 42.

99. See *infra* notes 105, 114 and accompanying text.

100. See 33 U.S.C. § 1313(a)(1)–(2) (2006).

101. EPA Water Quality Standards, 40 C.F.R. § 131.10(a) (2009).

102. 33 U.S.C. § 1314(b) (2006).

103. See 40 C.F.R. § 131.12(a)(1) (2009); see also *id.* § 131.10(h)(2)(i) ("Where existing water quality standards specify designated uses less than those which are presently being attained, the State shall revise its standards to reflect the uses actually being attained.")

104. See 33 U.S.C. § 1370 (2006) (permitting states to impose effluent limitations that are more stringent than the federal limits).

105. EPA's 2004 Report on the quality of the nation's surface waters stated that "[o]f these assessed [rivers and streams], 44% were reported as impaired, or not clean enough to support at least one of their designated uses" and that 64% of the assessed "lakes, ponds, and reservoirs" were impaired with regard to the designated uses. ENVTL. PROT. AGENCY, NATIONAL WATER QUALITY INVENTORY: REPORT TO CONGRESS (2004 Reporting Cycle), at ES-2 (2009), available at http://water.epa.gov/lawsregs/guidance/cwa/305b/upload/2009_05_20_305b_2004report_report2004pt1.pdf.

106. See 40 C.F.R. § 131.12(a)(3) (2009).

and wildlife refuges and waters of exceptional recreational or ecological significance.”¹⁰⁷ For these high quality waters, the regulations require that “water quality shall be maintained and protected.”¹⁰⁸ This mandate, however, amounts to nothing more than a specific direction to maintain the existing water quality for waters whose quality has managed to be outstanding under the CWA’s regulatory regime.

Redesignation of waterway use also reflects the fact that water quality standards are not designed to compel independently an improvement in water quality throughout the country. A state has the discretion to raise a waterway’s water quality standards above the standards needed to protect the existing in-stream uses.¹⁰⁹ In this way, a state may attempt to cause an improvement in a waterway’s quality and facilitate new, more protective uses for the waterway. A state that takes this approach may later redesignate the waterway’s uses to ones that are less protective, provided that the redesignated use is no less protective than the current use;¹¹⁰ that the more protective designated use cannot be achieved as a consequence of the required federal pollutant limitations;¹¹¹ and that the imposition of effluent limits more stringent than the federal limits “would result in substantial and widespread economic and social impact.”¹¹² This redesignation process demonstrates that the water quality that results from the implementation of the national technology-based effluent limitations is really the fundamental determinant of required water quality. Except for high quality waters,¹¹³ the CWA does not require the achievement of any more protective use.

The fact that optimal water quality is merely aspirational under the CWA, as opposed to the mandatory nature of the CAA’s NAAQS, also demonstrates how improved water quality fundamentally relies upon technology-based limitations:

[W]ater quality standards *should, wherever attainable*, provide water quality for the protection and propagation of fish, shellfish and wildlife and for recreation in and on the water and take into consideration their use and value of public water supplies, propagation of fish, shellfish, and wildlife, recreation in and on the water, and agricultural, industrial, and other purposes including navigation.¹¹⁴

In sum, the CWA employs a regulatory approach that is expected to yield incremental improvements in environmental quality. In the absence of a state’s decision to pursue environmental protection at any cost—that is, promoting environmental protection without regard to cost—the environmental improvements won by the CWA result from the application of pollution controls that are generally affordable.¹¹⁵

Thus, the two most important federal statutes protecting the environment, the CAA and the CWA, approach sustainability from very different places. The CAA’s regulation of criteria pollutants strongly values the attainment of healthful environmental quality. The CWA, on the other hand, mandates protection of the environment only to the extent that the protection is affordable.

B. The Balancing Approach: Addressing Sustainable Development Concerns on a Case-by-Case Basis

Other U.S. environmental protection statutes diverge from the contrasting approaches of the CAA and CWA to sustainable development. This second group of environmental statutes appears to more closely reflect the competing objectives of economic development and environmental sustainability that underlie the principle of sustainable development. Each of these three regulatory regimes requires a balancing of the benefits and costs of taking action to protect the environment. The regimes differ, however, in defining the regulatory impact of that balancing. One approach gives the governmental actor the authority to decide which actions, if any, it wishes to take in order to protect the environment, presumably based on a weighing of costs and benefits of regulation. Another approach forecloses protective regulatory action when the environment and health benefits do not exceed the costs that regulation imposes on the economy. Finally, the third regulatory regime forecloses regulatory action when there is a firm conclusion that regulation would harm economic development more than the environmental degradation that is expected to occur without regulation.

I. A Mandate that the Agency Consider Expected Adverse Environmental Impacts Before Pursuing Development Activities

The Brundtland Commission Report’s strong advocacy of the sustainable development principle highlighted the importance of governmental consideration of environmental impacts prior to taking governmental action.¹¹⁶ This suggested process of governmental decisionmaking is the process required by NEPA.¹¹⁷ Enacted at the outset of the environmental decade of the 1970s, NEPA takes an information-based regulatory approach. NEPA does not expressly require an agency to balance the benefits of a proposed action against the environmental harms that will result but rather requires

107. *Id.*

108. *Id.*

109. *See id.* § 131.4(a).

110. *Id.* § 131.10(h)(1).

111. *See id.* § 131.10(h)(2).

112. *Id.* § 131.10(g)(6).

113. *See supra* notes 106–108 and accompanying text.

114. 40 C.F.R. § 131.2 (emphasis added).

115. These federally mandated controls, despite being established by reference to available technologies, were expected to cause significant economic hardship for particular sources. *See supra* notes 77–81 and accompanying text. More-

over, pollution controls determined by reference to available technologies may impose very high costs for the health and environmental benefits that are gained. *See infra* note 210.

116. *See Brundtland Report, supra* note 12, at 71 (“The common theme throughout this strategy for sustainable development is the need to integrate economic and ecological considerations in decision making. They are, after all, integrated in the workings of the real world. This will require a change in attitudes and objectives and in institutional arrangements at every level.”).

117. National Environmental Policy Act of 1969 (NEPA), 42 U.S.C. §§ 4321–4370f (2006).

an agency to consider the anticipated adverse environmental impacts of a proposal before taking the action.¹¹⁸

When an agency action may “significantly affect [] the quality of the human environment,”¹¹⁹ NEPA requires the agency to prepare an Environmental Impact Statement (“EIS”)¹²⁰ that considers alternatives to the proposed action,¹²¹ assesses the environmental impacts of the proposed actions and the alternatives,¹²² and allows for public involvement in the preparation of the EIS.¹²³

The Supreme Court has held that an agency has no obligation to modify its proposal in order to reduce or eliminate the adverse environmental impact once it has adequately considered the environmental impacts of its proposed action.¹²⁴ The Court’s resolution rejects the view that NEPA imposes substantive requirements and establishes that NEPA imposes only procedural requirements.¹²⁵ Viewed through the lens of sustainable development, the issue presented to the Court was whether NEPA mandates protection of the environment despite that environmental protection’s impact on the agency’s interest in development. The Court decided that, after NEPA, the agency retains the authority to pursue development interests notwithstanding the adverse environmental impacts of the agency action, provided those impacts are considered.

To be sure, the Supreme Court has opined that the NEPA procedures “are almost certain to affect the agency’s substantive decision.”¹²⁶ Presumably this effect is greater protection of the environment, as a consequence of NEPA’s legal mandate that agencies must consider the environmental consequences of their actions.¹²⁷ Any such protection is only achieved, however, because of agency deliberation about the extent to which the agency’s programmatic (development) goals may be pursued if the project is modified or even abandoned to reduce adverse environmental impacts.¹²⁸ This is very much an ad hoc approach, with agencies retaining the power to sacrifice development for environmental protection or vice versa.¹²⁹

The Supreme Court’s view of NEPA’s impact on protecting the environment may reflect the fact that an agency may be able to accomplish its development goals in a way that does not degrade the environment to as great an extent (or not at all), once the impacts on the environment are considered. NEPA’s impact is not, however, a consequence of substantive legal protection of the environment. Indeed, NEPA permits the environment to be degraded significantly when the agency understands the nature of that degradation and decides to pursue the action that causes the environmental degradation based on the agency’s view that the benefits of the action outweigh the harm caused to the environment.¹³⁰

2. A Mandate for Regulatory Action When Threatened Environmental Harm Outweighs Societal Benefit

FIFRA¹³¹ regulates pesticides and related products by allowing their sale only when EPA has registered the products and defined guidelines for their use.¹³² Pesticide registration is required when EPA determines that “when used in accordance with widespread and commonly recognized practice [the pesticide] will not generally cause unreasonable adverse effects on the environment.”¹³³ The statute defines “unreasonable adverse effects on the environment” as the “economic, social, and environmental costs and benefits of the use of any pesticide.”¹³⁴

FIFRA accordingly requires EPA to take regulatory action needed to permit the sale of pesticides based on a “cost-benefit analysis” that balances the two principal components of sustainable development.¹³⁵ This regulatory approach contrasts with NEPA, which permits an agency to act in a way

In this case, it would not violate NEPA if the EIS noted that granting the permits would result in the permanent, irreversible destruction of the entire Florida Everglades, but the Corps decided that economic benefits outweighed that negative environmental impact. That capricious decision might run afoul of a duty imposed by a different statute, but it would not violate any duty imposed by NEPA.

Id.

130. In this respect, NEPA may be analogized to a mechanism that promotes protection of the environment without mandating it. Such mechanisms are discussed *infra* in Part C.

131. 7 U.S.C. §§ 136–136y (2006).

132. See JOHN S. APPLIGATE ET AL., *THE REGULATION OF TOXIC SUBSTANCES AND HAZARDOUS WASTES* 551–52 (2000) (“FIFRA . . . requires that all pesticides be registered and have their labeling approved. In addition, regulatory restrictions are most often imposed through the cancellation or suspension (or modification) of existing registrations.”).

133. 7 U.S.C. § 136a(c)(5). The statute provides:

The Administrator shall register a pesticide if the Administrator determines that, when considered with any restrictions imposed under subsection (d) of this section— (A) its composition is such as to warrant the proposed claims for it; (B) its labeling and other material required to be submitted comply with the requirements of this subchapter; (C) it will perform its intended function without unreasonable adverse effects on the environment; and (D) when used in accordance with widespread and commonly recognized practice it will not generally cause unreasonable adverse effects on the environment.

Id.

134. § 136(bb) (“The term ‘unreasonable adverse effects on the environment’ means (1) any unreasonable risk to man or the environment, taking into account the economic, social, and environmental costs and benefits of the use of any pesticide . . .”).

135. See *Envl. Def. Fund, Inc. v. EPA*, 548 F.2d 998, 1005 (D.C. Cir. 1976).

118. See *infra* note 127 and accompanying text.

119. 42 U.S.C. § 4332(C) (2006).

120. 40 C.F.R. § 1508.11.

121. *Id.* § 1502.14.

122. *Id.* § 1502.16.

123. *Id.* § 1503.1(a)(4).

124. See *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 350–51 (1989); *Strykers Bay Neighborhood Council v. Karlen*, 444 U.S. 223, 227 (1980).

125. See, e.g., *RODGERS, supra* note 39, at 862–63.

126. *Methow Valley*, 490 U.S. at 350.

127. See *Natural Res. Def. Council, Inc. v. SEC*, 606 F.2d 1031, 1045, 1049 (D.C. Cir. 1979). The court recognized both that “Congress, in NEPA, made environmental considerations part of the SEC’s substantive mission,” and that “environmental concerns to some extent run counter to the SEC’s primary mandate of financial protection of investors, and that there is here a substantial role for the court to play in ensuring that NEPA’s procedural commands are carried out in full measure by the SEC.” *Id.* at 1045, 1049; ROBERT V. PERCIVAL ET AL., *ENVIRONMENTAL REGULATION: LAW, SCIENCE, AND POLICY* 90 (5th ed. 2006) (NEPA “served as a catalyst for forcing federal agencies that previously had been unresponsive to environmental concerns to incorporate them in their decisionmaking processes.”).

128. See *Methow Valley*, 490 U.S. at 350.

129. See *Sierra Club v. Van Antwerp*, 526 F.3d 1353, 1361–62 (11th Cir. 2008). The court stated:

that harms the environment despite the lack of an offsetting developmental benefit, as long as the adverse impacts were considered.¹³⁶ FIFRA rather reflects Congress's judgment that pesticides should be available for sale whenever the benefits of use are expected to outweigh the costs.

FIFRA also requires that EPA engage in a periodic review of pesticide registration.¹³⁷ Indeed, EPA may cancel the pesticide's registration¹³⁸ if, based on this review or for some other reason,¹³⁹ it "appears to the Administrator that a pesticide . . . when used in accordance with widespread and commonly recognized practice, generally causes unreasonable adverse effects on the environment."¹⁴⁰

In short, FIFRA's regulatory regime is dependent on the cost-benefit analysis dictated by the statute's definition of the "unreasonable adverse effects on the environment" that trigger regulatory action. Judicial interpretation of that standard has accorded substantial deference to EPA's judgment regarding risks to public health and the environment.¹⁴¹

3. A Mandate to Permit Development When its Benefits Clearly Outweigh Important Harms to the Environment

One might expect that the ESA¹⁴² would be easy to locate along the sustainable development continuum. Its purposes are "to provide a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved, [and] to provide a program for the conservation of such endangered species and threatened species."¹⁴³ Given these purposes and the precariousness of the environmental amenities that the statute is intended to protect, one would expect that the statute would be firmly located on the environmental protection side of the protection-development spectrum.

This is indeed how the Supreme Court understood the statute in *Tennessee Valley Authority (TVA) v. Hill*.¹⁴⁴ In that famous case, the Court had to decide whether the TVA's decision to complete work on the Tellico Dam violated the ESA, because that government action would have caused the

extirpation of the snail darter, an endangered species.¹⁴⁵ In this conflict between the development that would have been promoted by construction of the dam¹⁴⁶ and the preservation of the snail darter,¹⁴⁷ the Court concluded that:

One would be hard pressed to find a statutory provision whose terms were any plainer than those in § 7 of the Endangered Species Act. Its very words affirmatively command all federal agencies "to insure that actions authorized, funded, or carried out by them do not jeopardize the continued existence" of an endangered species or "result in the destruction or modification of habitat of such species . . ." 16 U.S.C. § 1536 (1976 ed.). (Emphasis added.) This language admits of no exception.¹⁴⁸

The Court relied as well on the statute's legislative history in concluding that Congress had placed a thumb firmly on the side of environmental protection when enacting the ESA. In particular, the Court emphasized the final 1973 statute's difference from earlier legislation and draft legislation, all of which "qualified the obligation of federal agencies by stating that they should seek to preserve endangered species only insofar as is practicable and consistent with their primary purposes."¹⁴⁹ The Court found it "very significant" that the 1973 ESA contained no such qualifications.¹⁵⁰ The Court's conclusion, in short, was that:

The plain intent of Congress in enacting this statute was to halt and reverse the trend toward species extinction, whatever the cost. This is reflected not only in the stated policies of the Act, but in literally every section of the statute The pointed omission of the type of qualifying language previously included in endangered species legislation reveals a conscious decision by Congress to give endangered species priority over the "primary missions" of federal agencies.¹⁵¹

The Court accordingly rejected the claim "that in this case the burden on the public through the loss of millions of unrecoverable dollars would greatly outweigh the loss of the snail darter,"¹⁵² concluding instead that Congress had mandated that the species be preserved.¹⁵³

136. See *supra* note 127 and accompanying text.

137. See 7 U.S.C. § 136a(g)(1)(A) (2006) (generally requiring registration review every fifteen years).

138. *Id.* § 136d(b). This authority to cancel pesticide registration is supplemented by EPA's authority to suspend registration during the time when the procedure for cancellation is pursued, i.e., when an "imminent hazard" is present. See *id.* § 136d(c)(1) ("If the Administrator determines that action is necessary to prevent an imminent hazard during the time required for cancellation or change in classification proceedings, the Administrator may, by order, suspend the registration of the pesticide immediately.").

139. See *id.* § 136d(g)(1).

140. *Id.* § 136d(b).

141. See, e.g., *Env'tl. Defense Fund v. EPA*, 548 F.2d 998, 1012 (D.C. Cir. 1976) (affirming EPA Administrator's decision to suspend the registration of pesticides heptachlor and chlordane under the FIFRA for certain uses because Administrator properly found pesticides posed carcinogenic risks to humans).

142. 16 U.S.C. §§ 1531–1544 (2006).

143. *Id.* § 1531(b). The Supreme Court has described the ESA as the "most comprehensive legislation for the preservation of endangered species ever enacted by any nation." *Babbitt v. Sweet Home Chapter of Cmities for a Great Oregon*, 515 U.S. 687, 698 (1995) (quoting *Tennessee Valley Auth. v. Hill*, 437 U.S. 153, 180 (1978)) (internal quotation marks omitted).

144. *Tennessee Valley Auth. v. Hill*, 437 U.S. 153, 174 (1978).

145. *Id.* at 172–73.

146. See *id.* at 157 ("Tellico [Dam] is a multipurpose regional development project designed principally to stimulate shoreline development, generate sufficient electric current to heat 20,000 homes, and provide flatwater recreation and flood control, as well as improve economic conditions in an area characterized by underutilization of human resources and outmigration of young people.") (footnote, internal quotations, and citation omitted).

147. See *id.* at 158–59. The court characterized the situation as follows:

Exploring the area around Coytee Springs, which is about seven miles from the mouth of the [Little Tennessee] river [where the Tellico Dam was being constructed], a University of Tennessee ichthyologist, Dr. David A. Etnier, found a previously unknown species of perch, the snail darter, or *Percina (Imostoma) tanasi*. This [was a] three-inch, tannish-colored fish, whose numbers are estimated to be in the range of 10,000 to 15,000.

Id. (footnote omitted).

148. *Id.* at 173.

149. *Id.* at 181 (emphasis, internal quotation marks, and brackets omitted).

150. *Id.* at 182.

151. *Id.* at 184–85.

152. *Id.* at 187.

153. See *id.* at 188 ("[T]he plain language of the Act, buttressed by its legislative history, shows clearly that Congress viewed the value of endangered species as

Following the Court's pro-environmental protection decision in *Hill*, Congress revisited the issue of the degree to which the ESA should provide unconditional protection for endangered species against governmental action. In November 1978, less than six months after the *Hill* decision, Congress enacted the Endangered Species Act Amendments of 1978.¹⁵⁴ This statute modified the substantive requirements of section 7, the key provision in *Hill*. Congress also established the Endangered Species Committee to adjudicate requests for exemptions from the Secretary of the Interior's determination that an agency action would likely "jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of habitat of such species which is determined by the Secretary, after consultation as appropriate with affected States, to be critical."¹⁵⁵

The seven-person Committee *must* grant an exemption if at least five members vote for an exemption, based primarily on two critical determinations: first, that "there are no reasonable and prudent alternatives to the agency action" and second, that "the benefits of such action clearly outweigh the benefits of alternative courses of action consistent with conserving the species or its critical habitat, and such action is in the public interest."¹⁵⁶ Congress thereby added conditions to the protection of endangered species that the Court had not found in *Hill* and relocated the statute along the sustainable development spectrum so that it now provides for a balancing of environmental protection against development interests in deciding whether to permit particular government actions, notwithstanding their catastrophically adverse

impact on endangered species.¹⁵⁷ In sum, the ESA mandates that the Committee provide relief in favor of development, but only when developmental benefits "clearly outweigh" the harm to the environment and when a supermajority (five of the seven Committee members) reaches that conclusion.¹⁵⁸

C. *Shifting the Applicable Regulatory Regime Along the Sustainable Development Spectrum*

The preceding sections demonstrate that U.S. environmental law takes very different approaches to sustainable development when a variety of environmental statutes is considered. This wide variety of approaches is arguably even more striking when one considers that there are particular federal statutes or regulatory contexts in which more than one approach may be applicable in addressing the environmental issue. This Section examines the statutes that employ the shifting approach. The nature of the shift, however, varies greatly: one statute modifies its approach to sustainable development based on the regulatory response that the statute authorizes;¹⁵⁹ one statute shifts its regulatory approach in different statutorily mandated phases of regulation;¹⁶⁰ one statute supplements an environmentally protective regime with technology-based requirements;¹⁶¹ one statute changes its regulatory approach when an environmental problem is addressed at the state or at the federal level;¹⁶² and one statute supplements legally mandated standards with a requirement that information about residual risks be reported to the affected public.¹⁶³ These shifts in sustainable development approaches will be considered in turn.

I. *Varying the Regulatory Approach Based on the Degree of Concern About Harm to Health and the Environment and the Costs of Regulation*

Congress enacted TSCA¹⁶⁴ in 1976 to protect the public from the unreasonable risks posed by hazardous chemicals.¹⁶⁵ The statute pursues two complementary regulatory approaches: developing information about the risks posed by certain substances¹⁶⁶ and imposing regulatory controls to protect the

"incalculable.""). The Court here was quoting from the House Report which the Court had quoted more extensively earlier in the opinion:

As we homogenize the habitats in which these plants and animals evolved, and as we increase the pressure for products that they are in a position to supply (usually unwillingly) we threaten their—and our own—genetic heritage.

....

The value of this genetic heritage is, quite literally, incalculable.

....

From the most narrow possible point of view, it is in the best interests of mankind to minimize the losses of genetic variations. The reason is simple: they are potential resources. They are keys to puzzles which we cannot solve, and may provide answers to questions which we have not yet learned to ask.

....

Who knows, or can say, what potential cures for cancer or other scourges, present or future, may lie locked up in the structures of plants which may yet be undiscovered, much less analyzed? . . . Sheer self-interest impels us to be cautious.

....

The institutionalization of that caution lies at the heart of H.R. 37

....

Id. at 178 (first, third, and fourth omission in original) (emphasis omitted) (quoting H.R. Rep. No. 93-412, at 4-5 (1973)).

154. Endangered Species Amendment Act of 1978, Pub. L. No. 95-632, 92 Stat. 3751 (1978) (codified as amended at 16 U.S.C. §§ 1531-1536, 1538-1540, 1542).

155. 16 U.S.C. § 1536(a)(2)(2006).

156. *Id.* § 1536(h)(1)(A). The exemption is also dependent on two other subsidiary findings.

157. Even when first enacted in 1973, the ESA had one part that reflected the sort of balancing that Congress required for the determination of exemptions from the section 7 prohibition. The statute defines an "endangered species" as:

[A]ny species which is in danger of extinction throughout all or a significant portion of its range other than a species of the Class Insecta determined by the Secretary to constitute a pest whose protection under the provisions of this chapter would present an over-whelming and overriding risk to man.

16 U.S.C. § 1532(6)(2006). Thus, in defining the species that it is intended to protect, the statute omits certain species that are determined overwhelmingly to be harmful to humans.

158. 16 U.S.C. § 1536(h)(1)(A)(2006).

159. *See infra* Part C.1.

160. *See infra* Part C.2.

161. *See infra* Part C.3.

162. *See infra* Part C.4.

163. *See infra* Part C.5.

164. Toxic Substances Control Act, 15 U.S.C. §§ 2601-2692 (2006).

165. *See id.* § 2601(a)-(b).

166. *See id.* § 2601(b)(1) ("[A]dequate data should be developed with respect to the effect of chemical substances and mixtures on health and the environment

public from unreasonably risky products.¹⁶⁷ The statute also establishes an overarching goal of accomplishing these objectives without unreasonably hindering economic development.¹⁶⁸ TSCA employs four different regulatory approaches to the substances it regulates: (1) mandatory pre-manufacture notification for new chemicals (and for some new uses of existing chemicals);¹⁶⁹ (2) reporting and recordkeeping requirements for chemicals subject to regulation that are not new;¹⁷⁰ (3) EPA rulemaking seeking additional information about the risks posed by a chemical;¹⁷¹ and (4) regulatory controls on the production or use of a chemical.¹⁷²

The first approach applies when a chemical is not included on the TSCA chemical substance inventory,¹⁷³ maintained by EPA in accordance with TSCA's requirements.¹⁷⁴ A person may only produce such a new chemical after notifying EPA ninety days before beginning manufacturing.¹⁷⁵ When the person provides this notice, the person must also submit to EPA "data which the person submitting the data believes show that . . . the manufacture, processing, distribution in commerce, use, and disposal of the chemical substance or any combination of such activities will not present an unreasonable risk of injury to health or the environment"¹⁷⁶

In order to locate this requirement along the sustainable development spectrum, one must identify the implicit judgment being made by the producer of a new substance when providing the required notice. That producer has made the judgment that the new substance "will not present an unreasonable risk of injury to health or the environment."¹⁷⁷ To be sure, the statutory standard refers to an "unreasonable risk," which necessitates a balancing of adverse environmental (including health) impacts against productive benefits, and thus appears to be the balancing approach.¹⁷⁸ In this context, however, the producer of the substance, rather than the regulatory agency, is doing the balancing.¹⁷⁹ Moreover, the producer is not required to undertake new studies of adverse

effects when weighing the costs and benefits of production.¹⁸⁰ The balancing, accordingly, is likely to include a thumb on the side of production, especially given the company's commercial interest in selling the new product on the market.

The second approach applies after a substance has been made available on the market and involves mandatory reporting and recordkeeping requirements.¹⁸¹ These requirements arguably reflect a preference for the environmental protection side of the spectrum. Chemicals subject to these requirements are presumptively chemicals that do not "present an unreasonable risk of injury to health or the environment,"¹⁸² because they have been allowed to enter the stream of commerce. These statutory requirements applicable to products on the market are more protective of health and the environment because they require the maintenance and reporting of information relevant to the existence of such risks, without any prior showing of risk.¹⁸³ If the statute had continued to place a thumb on the side of development, as with the pre-manufacture notice requirement, the statute could have included only the independent statutory requirement that a producer inform EPA immediately when that person has "information which reasonably supports the conclusion that [a] substance or mixture presents a substantial risk of injury to health or the environment."¹⁸⁴ Instead, TSCA supplements this specific "substantial risk" reporting requirement with the other reporting and recordkeeping requirements that apply regardless of information that the product has caused such a risk.¹⁸⁵

The third regulatory approach is a more targeted information-based reporting requirement for companies placing on the market chemicals that pose potentially significant risks to the environment or health. This requirement applies when EPA concludes that, "the manufacture, distribution in commerce, processing, use, or disposal of a chemical substance . . . may present an unreasonable risk of injury to health or the environment."¹⁸⁶ If, in such a situation, "there are insufficient data and experience upon which the effects of such . . . substance . . . on health or the environment can reasonably be determined or predicted"¹⁸⁷ and "testing . . . is necessary to develop such data,"¹⁸⁸ EPA must promulgate a regulation ordering the needed testing.¹⁸⁹ Unlike the second approach, which requires only the reporting of some market information, this regulatory approach requires the development of new information about the environment and health impacts of a chemical available on the market.

The trigger for this requirement accounts only for the environmental (and health) harm components of sustainable development. Indeed, the testing requirement is triggered by

and . . . the development of such data should be the responsibility of those who manufacture and those who process such chemical substances and mixtures.").

167. *See id.* § 2601(b)(2) ("[A]dequate authority should exist to regulate chemical substances and mixtures which present an unreasonable risk of injury to health or the environment . . .").

168. *See id.* § 2601(a)(3) ("[A]uthority over chemical substances and mixtures should be exercised in such a manner as not to impede unduly or create unnecessary economic barriers to technological innovation . . ."); *id.* § 2601(c) ("It is the intent of Congress that the Administrator shall carry out this chapter in a reasonable and prudent manner, and that the Administrator shall consider the environmental, economic, and social impact of any action the Administrator takes or proposes to take under this chapter.").

169. *See id.* § 2604.

170. *See id.* § 2607.

171. *See id.* § 2603.

172. *See id.* § 2605.

173. *See id.* § 2604(a).

174. *See id.* § 2607 (b)(1) ("The Administrator shall compile, keep current, and publish a list of each chemical substance which is manufactured or processed in the United States."). EPA reports that this list currently includes more than 84,000 chemicals. *New Chemicals Program*, ENVTL. PROT. AGENCY, <http://www.epa.gov/oppt/newchemicals/pubs/invntory.htm> (last updated Feb. 11, 2011).

175. 15 U.S.C. § 2604(a)(1).

176. *Id.* § 2604(b)(2)(B).

177. *Id.* § 2604(b)(2)(B)(i).

178. *See supra* Part III.B.

179. 15 U.S.C. § 2604(b)(2)(B).

180. *Id.*

181. *Id.* § 2607.

182. *Id.* § 2604(a)(1).

183. *See id.* § 2607(a).

184. *Id.* § 2607(e). Reporting is not required if the producer "has actual knowledge" that EPA has already been informed of the information.

185. *Id.* § 2607(a)-(d).

186. *Id.* § 2603(a)(1)(A)(i).

187. *Id.* § 2603(a)(1)(A)(ii).

188. *Id.* § 2603(a)(1)(A)(iii).

189. *Id.* § 2603(a).

the potential for harm to health or the environment rather than a showing of actual harm being caused.¹⁹⁰ Moreover, the decision to promulgate a testing rule does not account for the consequential developmental benefits of producing the chemical. In short, when determining whether to impose the information-based requirement of testing, the statute directs EPA to account only for adverse environmental and health impacts.

The fourth and last of the regulatory approaches adopted by TSCA is command and control regulation of the chemical in the marketplace.¹⁹¹ EPA is required to impose regulatory controls for a chemical upon finding “that there is a reasonable basis to conclude that the manufacture . . . of a chemical substance . . . presents or will present an unreasonable risk of injury to health or the environment.”¹⁹² Although the obligation to impose regulatory requirements is triggered by a focus on the environmental impacts of the sustainable development,¹⁹³ EPA may impose regulations only “to the extent necessary to protect adequately against such risk using the least burdensome requirements.”¹⁹⁴ The statute clarifies that, when determining the “least burdensome requirements,” EPA must balance the two fundamental components of sustainable development against each other: protection of the environment and promotion of economic development.¹⁹⁵ Thus, along with consideration of how the substance affects health¹⁹⁶ and the environment,¹⁹⁷ the statute dictates that EPA consider “the benefits of such substance . . . and the availability of substitutes”¹⁹⁸ and “the reasonably ascertainable economic consequences of the rule, after consideration of the effect on the national economy, small business, technological innovation, the environment, and public health.”¹⁹⁹

In sum, TSCA’s provisions reflect a range of regulatory approaches, the applicability of which reflects different aspects of sustainable development. One notable feature of the statute’s regulatory structure is that the less intrusive information-based regulatory requirements apply in contexts where the statute is more protective of the environment. When TSCA imposes environmentally protective regulatory requirements without a prior showing that they are warranted based on a weighing of costs and benefits, TSCA employs a less intrusive and less costly regulatory approach. The statute’s more costly command and control requirements, on the other hand, are applicable only after a rigid weighing of the value of environmental protection against the economic impact of the regulations. The appeal of this type of approach is that requirements with significant economic costs are only imposed when the effects of the regulations are not unduly onerous when weighed against the expected benefits of protecting the environment.²⁰⁰

2. Regulatory Requirements that Begin with Available Controls and Later Require Consideration of the Need for Enhanced Controls

After the 1990 Amendments, the CAA’s regulatory approach toward the control of hazardous air pollutant emissions reflects an ambivalent regulatory approach toward sustainable development.²⁰¹ Section 112 establishes baseline regulatory requirements that are presumptively defined by available technologies. Although the Act generally provides that the categorical standards defined by EPA must reflect consideration of “the cost of achieving such emission reduction, and any non-air quality health and environmental impacts and energy requirements,”²⁰² the Act prescribes the minimum stringency for the standard by reference to the degree of emissions control being achieved by sources within the category of sources. Thus, the Act provides that “[t]he maximum degree of reduction in emissions that is deemed achievable for new sources in a category or subcategory shall not be

190. See *Chem. Mfrs. Ass’n v. EPA*, 859 F.2d 977, 985 (D.C. Cir. 1988) (“To issue a test rule, EPA need not find that a substance actually does cause or present an ‘unreasonable risk.’”).

191. See *id.* § 2605.

192. *Id.* § 2605(a).

193. This command and control regulatory trigger does, however, dictate an EPA finding that “there is a reasonable basis to conclude” that the substance “presents or will present an unreasonable risk of injury to health or the environment.” *Id.* This standard requires clearer evidence of the dangers resulting from exposure to a chemical than the standard for product testing, which requires only a finding that the chemical at issue “may present an unreasonable risk of injury to health or the environment.” *Id.* § 2603(a)(1)(A)(i) (emphasis added).

194. *Id.* § 2605(a). The statute itself identifies seven regulatory requirements from which EPA is required to choose the “least burdensome requirements.” The listed requirements range from a prohibition of the manufacturing of the substance to public notice of the risk presented by the substance.

195. See *id.* § 2605(c)(1).

196. *Id.* § 2605(c)(1)(A).

197. *Id.* § 2605(c)(1)(B).

198. *Id.* § 2605(c)(1)(C).

199. *Id.* § 2605(c)(1)(D). In *Corrosion Proof Fittings v. EPA*, the court considered whether EPA complied with § 2605(c) in promulgating a regulatory ban on “the future manufacture, importation, processing, and distribution of asbestos in almost all products.” The court concluded that EPA had failed to engage in the required balancing of the costs and benefits of regulation:

The EPA would have this court believe that Congress, when it enacted its requirement that the EPA consider the economic impacts of its regulations, thought that spending \$200-300 million to save approximately seven lives (approximately \$30-40 million per life) over thirteen years is reasonable.

••••

The EPA’s willingness to argue that spending \$23.7 million to save less than one-third of a life reveals that its economic review of its regula-

tions, as required by TSCA, was meaningless. As the petitioners’ brief and our review of EPA caselaw reveals, such high costs are rarely, if ever, used to support a safety regulation. If we were to allow such cavalier treatment of the EPA’s duty to consider the economic effects of its decisions, we would have to excise entire sections and phrases from the language of TSCA. Because we are judges, not surgeons, we decline to do so.

947 F.2d at 1201, 1207, 1223 (5th Cir. 1991) (footnote omitted).

200. This regulatory approach may paradoxically permit greater concern with economic development than the CWA’s thumb-on-the-scale approach, which looks toward available technologies to define pollution control requirements. See *supra* Part III.A.2. The fact that a technology is available does not mean it is reasonable to pay the costs of pollution control that result from its use. Compare *infra* note 210 (discussing the court’s estimate that the technology-based limit for air emissions of benzene would be more than \$160 million for each life saved), with *supra* note 199 (discussing court’s judgment that it is irrational in balancing the costs and benefits of control to require expenditures of just more than \$23 million to save each life).

201. The CAA defines a regime of regulations of hazardous air pollutants that is independent of the regulations of criteria pollutants, which is described in Part I.

202. 42 U.S.C. § 7412(d)(2)(2006).

less stringent than the emission control that is achieved in practice by the best controlled similar source.²⁰³ Emissions standards for existing sources may be less stringent than the new source standards, but must be at least as stringent as “the average emission limitation achieved by the best performing twelve percent of the existing sources (for which the Administrator has emissions information)” in the category.²⁰⁴ In short, the CAA mandates that the initial standards for hazardous air pollutants be defined solely by reference to the technologies available for pollution controls to the sources being regulated.²⁰⁵

Because the availability of technological controls determines the baseline level of controls for hazardous air pollutants, except in special circumstances,²⁰⁶ the CAA’s approach to the regulation of hazardous air pollutants is very similar to the CWA approach to defining effluent limits for industrial dischargers.²⁰⁷ That regime is unconcerned with whether the controls are affordable for individual sources²⁰⁸ or with the marginal benefit of incremental improvements in pollution controls.²⁰⁹ The standards imposed pursuant to the statute may therefore result in control costs that are quite high in relation to the benefits they achieve, despite the reliance on available technology.²¹⁰

These technology-based standards are not, however, the statute’s final word regarding required limits on emissions of hazardous air pollutants. Section 112 provides for a conditional, more stringent stage of emission controls. Whether more stringent emissions limitations are necessary depends on the nature of the residual risk that remains after the application of the first, technology-based phase of controls. With respect to residual risks to human health, the statute provides that EPA must within eight years after the initial standards “promulgate standards for such category or subcategory if promulgation of such standards is required in order to provide an ample margin of safety to protect public health.”²¹¹ With specific regard to residual risks of cancer, the statute requires EPA to promulgate more stringent standards “[i]f [the technology-based] standards . . . do not reduce life-

time excess cancer risks to the individual most exposed to emissions from a source in the category or subcategory to less than one in one million.”²¹² Regarding risks to human health, therefore, the statute moves firmly in the direction of the protection side of the sustainable development spectrum and decisively away from the development side.

More stringent, second-phase standards may also be necessary when the residual risk is posed to the environment.²¹³ The Act requires more stringent standards when necessary “to prevent, taking into consideration costs, energy, safety, and other relevant factors, an adverse environmental effect.”²¹⁴ Although this enhanced standard to protect against environmental effects moves away from the development side of the sustainable development spectrum, the second-phase standard does not move as far toward environmental protection as the health-based standard. Rather, the environmental-impact-based standard is determined through a case by case balancing of adverse environmental impacts against the costs associated with imposing a more stringent emissions control requirement. The environmental-impact-based standard is thus more consistent with the balancing principle of sustainable development.

In sum, the regulation of toxic air pollutants in the CAA reflects each of the three important points along the spectrum of sustainable development. It establishes baseline controls with a focus on development and then mandates enhanced control that is dependent on the nature of the risk posed by the pollution. The statute addresses residual risks to health with a strong preference for protection, while balancing the costs of reducing residual risks to the environment with development impacts.

3. Supplementing a Health-Based Regime with Available Technology Standards

RCRA²¹⁵ regulates the handling, treatment, and disposal of hazardous wastes.²¹⁶ Unlike the regulatory regimes of FIFRA and TSCA, both of which regulate the sale and use of *products*, RCRA applies only to substances meeting the statute’s definition of “solid waste.”²¹⁷ RCRA’s approach to sustainable development can be understood from two important perspectives. First, the manner in which the statute defines the scope of “hazardous waste” subject to regulation demonstrates the statute’s elevation of protecting health and the environment over the costs of control. RCRA’s stringent

203. *Id.* § 7412(d)(3).

204. *Id.* § 7412(d)(3)(A). The statute provides that when a category or subcategory has fewer than 30 sources, the standard must not be less than “the average emission limitation achieved by the best performing 5 sources (for which the Administrator has or could reasonably obtain emissions information) in the category or subcategory.” *Id.* § 7412(d)(3)(B).

205. Section 112 does provide that the degree of control determined by the methods defined above may be replaced by a more stringent standard of control. Under § 7412(d)(2), EPA must establish standards more stringent than these floor standards when more stringent standards are determined to be achievable accounting for factors including costs and non-air quality impacts.

206. *See supra* note 201.

207. *See supra* notes 67–70 and accompanying text.

208. *See supra* note 81 and accompanying text.

209. The CWA provides for broad consideration of the total, not the marginal, costs of pollution control. *See supra* note 79 and accompanying text.

210. *See Monsanto Co. v. EPA*, 19 F.3d 1201, 1210 (7th Cir. 1994) (Easterbrook, J., dissenting) (“[T]he several benzene NESHAPs create costs as high as \$168.2 million per premature death averted.”). This cost per life saved is significantly higher than the cost-per-life saved that the *Corrosion Proof Fittings* court viewed as unreasonably high. *See Corrosion Proof Fittings v. EPA*, 947 F.2d 1201, 1223 (5th Cir. 1991) (“The EPA’s willingness to argue that spending \$23.7 million to save less than one-third of a life reveals that its economic review of its regulations, as required by TSCA, was meaningless.”).

211. 42 U.S.C. § 7412(f)(2)(A) (2006).

212. *Id.*

213. *See id.*

214. *Id.*

215. 42 U.S.C. §§ 6901–6992k (2006).

216. *Id.* The statute also regulates disposal of nonhazardous wastes in Subchapter IV (42 U.S.C. §§ 6941–6949). The discussion in the text addresses the more stringent requirements applicable to hazardous wastes.

217. *See id.* § 6903(27) (“The term ‘solid waste’ means any garbage, refuse, sludge from a waste treatment plant, water supply treatment plant, or air pollution control facility and other discarded material, including solid, liquid, semisolid, or contained gaseous material resulting from industrial, commercial, mining, and agricultural operations, and from community activities . . .”). Because this term identifies one limit on the scope of RCRA’s applicability, its meaning has been quite controversial. *See, e.g., Am. Petroleum Inst. v. EPA*, 216 F.3d 50 (D.C. Cir. 2000).

regulatory requirements for the handling, storage, treatment, and disposal of hazardous wastes are applicable only when the statutorily defined solid waste is also hazardous waste.²¹⁸ The statute provides that solid waste is hazardous waste when it “may . . . pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, or disposed of, or otherwise managed.”²¹⁹ The statute accordingly imposes regulatory controls based on up to three degrees of uncertain risk: waste is hazardous when it “may” give rise to “potential hazard” as a consequence of being “improperly treated, stored, transported, or disposed of, or otherwise managed.”²²⁰

EPA has promulgated regulations that establish two ways to identify waste as hazardous: such wastes may be listed as hazardous by EPA²²¹ or they may exhibit characteristics of toxicity, reactivity, corrosivity, or ignitability when tested in accordance with standards defined by EPA regulations.²²² EPA has also promulgated regulations that define a substance that is mixed with or derived from a listed hazardous waste as hazardous waste.²²³ In *American Chemistry Council v. EPA*, industry challenged this regulation, contending that EPA did not have statutory authority to regulate substances that did not meet the requirements for a characteristic waste.²²⁴ The court held that RCRA was sufficiently ambiguous to have delegated to EPA the authority to regulate substances mixed with listed hazardous waste as hazardous waste itself: “The element of judgment imported into the definition of hazardous waste by the use of ‘may’ and the inclusion of waste that may be hazardous only if mismanaged necessarily makes the statute ambiguous on this score.”²²⁵ The court also concluded that EPA’s regulatory definition was reasonable, because “[t]he Final Rule fulfills the purpose for which the Congress passed the RCRA, namely to subject hazardous waste to ‘cradle-to-grave’ regulation in order to protect public health and the environment.”²²⁶

When a regulated party has generated hazardous waste, that person must comply with RCRA’s regime for tracking the waste and ensuring that the disposal is proper. With

regard to disposal, a core requirement of RCRA is the ban on land disposal imposed by the 1984 Amendments.²²⁷ The amended statute bars land disposal unless the hazardous waste has been treated in accordance with regulations defining “levels or methods of treatment, if any, which substantially diminish the toxicity of the waste or substantially reduce the likelihood of migration of hazardous constituents from the waste so that short-term and long-term threats to human health and the environment are minimized.”²²⁸ This requirement is defined by reference only to the human health and environmental impact side of the sustainable development spectrum and is analogous to the CAA’s treatment of the attainment principle for criteria pollutants.

EPA promulgated regulations defining treatment requirements in accordance with an implementation schedule defined by Congress.²²⁹ Litigation that grew out of industry challenges to EPA regulations implementing the RCRA treatment standards reinforces the understanding that RCRA’s statutory standard focuses on protection of human health and the environment rather than on economic development. In challenging an early regulation establishing treatment standards, the Chemical Manufacturers Association (“CMA”) contended that the standard established by EPA was an unreasonable interpretation of the statute because it required the application of treatment technology despite the fact that, in some circumstances, treatment was not required to minimize risk to human health; the standard necessitated treatment for treatment’s sake.²³⁰ The D.C. Circuit rejected this challenge, holding that the statute permitted EPA to prescribe treatment methods for hazardous waste in order to minimize risks to human health.²³¹ The court held that EPA’s interpretation of the statute was reasonable because RCRA provides for “regulations specifying [] methods or levels of treatment,” and the uncertainty in assessing risk supported the reasonableness of relying on technology requirements instead.²³² The court noted that none of the levels that CMA argued as appropriate under RCRA met the requisite level of safety.²³³ In short, because RCRA was intended to minimize risks to human health and the environment, the statute delegated substantial discretion to EPA in defining adequately safe treatment standards.²³⁴

218. See 42 U.S.C. §§ 6921–25 (2006).

219. *Id.* The full definition is as follows:

The term “hazardous waste” means a solid waste, or combination of solid wastes, which because of its quantity, concentration, or physical, chemical, or infectious characteristics may—

- (A) cause, or significantly contribute to an increase in mortality or an increase in serious irreversible, or incapacitating reversible, illness; or
- (B) pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, or disposed of, or otherwise managed.

Id.

220. *Id.*

221. See 40 C.F.R. §§ 261.31–33 (2010). These wastes are described as listed wastes.

222. See 40 C.F.R. §§ 261.21–24 (2010). These wastes are described as characteristic wastes. EPA may list a waste even though the waste does not have the characteristics that would make the waste a characteristic waste. See *Dithiocarbamate Task Force v. EPA*, 98 F.3d 1394, 1402 (D.C. Cir. 1996) (discussing wastes listed by EPA that would not have met testing threshold for characteristic wastes).

223. See 40 C.F.R. § 261.3 (2010).

224. See *Am. Chemistry Council v. EPA*, 337 F.3d 1060, 1063 (D.C. Cir. 2003).

225. *Id.* at 1064.

226. *Id.* at 1065 (citation omitted).

227. See 42 U.S.C. § 6924(d)(1) (2006).

228. See *id.* § 6924(m)(1).

229. See *Chem. Waste Mgmt., Inc. v. EPA*, 976 F.2d 2, 8–9 (D.C. Cir. 1992) (describing phased implementation of treatment requirements).

230. *Hazardous Waste Treatment Council v. EPA*, 886 F.2d 355, 361–63 (D.C. Cir. 1989).

231. *Id.* at 361–62 (concluding that “the statute does not unambiguously and in all circumstances foreclose EPA from adopting treatment levels based upon the levels achievable by BADT [Best Available Demonstrated Technology]”).

232. *Id.* at 361, 363.

233. *Id.* at 362–63 (“The screening levels that EPA initially proposed were not those at which the wastes were thought to be entirely safe. Rather, EPA set the levels to reduce risks from the solvents to an ‘acceptable’ level, and it explored, at great length, the manifest (and manifold) uncertainties inherent in any attempt to specify ‘safe’ concentration levels. . . . [N]one of the levels to which CMA compares the BADT [sic] standards purports to establish a level at which safety is assured or ‘threats to human health and the environment are minimized.’”).

234. See *id.* at 361. The court found that EPA provided inadequate justification for setting standards based solely on BADT, however, and remanded for a fuller explanation. *Id.* at 364–66.

A related issue arose in CMA's challenge to the final group of treatment standards promulgated by EPA.²³⁵ CMA claimed that the EPA regulatory standard was unlawful because EPA lacked authority to mandate treatment of characteristic wastes to levels of risk below the level that established the waste as having enough hazardous constituents to trigger the applicability of the statute.²³⁶ CMA contended, in other words, that once treatment of characteristic hazardous waste had resulted in characteristics that would not have met EPA's tests for hazardous characteristics,²³⁷ EPA no longer had authority to impose regulatory requirements for hazardous wastes with respect to those wastes, because they were not hazardous. The court rejected this argument, concluding that the statute "provide[s] the EPA with authority to bar land disposal of certain wastes unless they have been treated to reduce risks beyond those presented by the characteristics themselves."²³⁸

In sum, these cases addressing the implementation of the land ban demonstrate that RCRA reflects a strong rule of risk minimization for the sake of protecting human health and the environment. This mandated protection does not seek to account for the impact of the costs of control on economic development and is applicable to the broadly defined category of "hazardous waste."

RCRA's regulatory requirements regarding land disposal do not end, however, with the application of the thumb-on-the-environmental-protection-side treatment standards.²³⁹ Disposing of "treated" hazardous waste on land is lawful only if it occurs at a permitted disposal facility.²⁴⁰ In order to receive a permit, a disposal facility must comply with command-and-control requirements intended to ensure that the wastes do not escape the site.²⁴¹ These controls include double liners, a system for collecting leachate, and a system for monitoring groundwater.²⁴² These technology-based requirements supplement the health-based treatment standards mandated by the land ban. They are also intended to prevent groundwater contamination by waste that has already been treated in compliance with standards that minimize the short and long term risk to health or the environment. Requiring this available technology thus places additional weight on the side of protection of health and environment on the sustainable development spectrum.²⁴³

The distinguishing characteristic of RCRA regulation is its double layer of protection from the risks posed by hazardous wastes. The regulatory regime seeks to prevent risks arising from land disposal of wastes by first treating the wastes to conform to a health-based safety standard and then imposing technological controls that ensure protection against any residual risks of disposal. This approach contrasts with the other multiple layer of protection regime—the CAA's treatment of hazardous air pollutants.²⁴⁴ In that regime, the statute first mandates technology-based standards, then requires the application of health-based standards when those standards are necessary to minimize the level of residual risk remaining from the technology-based standards control over air emissions.²⁴⁵

4. Applying Alternate Standards for the Cleanup of Hazardous Substance Releases

Congress enacted CERCLA in 1980 to provide for the cleanup of releases of hazardous substances into the environment.²⁴⁶ The law was prompted by widespread public concern that had grown out of several harrowing environmental emergencies, the most prominent of which occurred in New York as a consequence of the wholly inadequate disposal of dangerous chemicals at the Love Canal site.²⁴⁷ CERCLA granted the federal government and other parties the authority to conduct response actions when there has been a release of hazardous substances into the environment or there is a significant threat that hazardous substances will be released into the environment.²⁴⁸

In considering how this statute reflects sustainable development principles, two aspects of the statute are particularly significant. First, the statute aggressively protects human health and the environment. For example, the statute's trigger for authority to pursue a response action is easily met. A response action may be pursued when there has been "a release or significant threat of a release of hazardous substances into the environment."²⁴⁹ The release or threatened release need not meet or exceed any defined amount or risk threshold.²⁵⁰ Indeed, the statute provides *enhanced* enforcement authorities in circumstances where the release or threatened release "may" cause "an imminent and substantial endangerment to the public health or welfare or the environment."²⁵¹ More-

235. See *Chem. Waste Mgmt., Inc.*, 976 F.2d at 2.

236. See *id.* at 12.

237. See *supra* note 222 for a description of characteristic hazardous waste.

238. See *Chem. Waste Mgmt., Inc.*, 976 F.2d at 14.

239. If hazardous waste is treated in accordance with the applicable treatment standards, the treated waste may be disposed of at a permitted hazardous waste disposal facility. See 42 U.S.C. § 6924(m)(2)(2006).

240. See 42 U.S.C. § 6922(a)(5) (requiring that generators of hazardous waste use permitted facilities for disposal); *id.* § 6923(a)(4) (requiring that transporters of hazardous waste transport waste for disposal to permitted facilities).

241. See *id.* § 6924(o).

242. See *id.* § 6924(o)(1)(A). Some of these design requirements may be waived if the facility demonstrates that alternative controls are at least as protective as the required design technology. See *id.* § 6924(o)(2).

243. RCRA permits land disposal of hazardous wastes that have *not* been treated prior to disposal only when disposal is in a deep injection well that will not permit the migration of hazardous constituents out of the contained well. See 42 U.S.C. §§ 6924(d)-(g); *Natural Res. Def. Council, Inc. v. EPA*, 907 F.2d

1146, 1151-52 (D.C. Cir. 1990) (reviewing regulations implementing deep injection well provision).

244. See 42 U.S.C. § 7411(b)(1)(A)(2006).

245. See *supra* Part I.

246. 42 U.S.C. §§ 9601-9675 (2006).

247. See Michael P. Healy, *Direct Liability for Hazardous Substance Cleanups Under CERCLA: A Comprehensive Approach*, 42 CASE W. RES. L. REV. 65, 68-69 (1992).

248. See 42 U.S.C. 9604(a)(1)(A),(B); see also Healy, *supra* note 247, at 69-71.

249. 42 U.S.C. § 9604(a).

250. See *id.* CERCLA also includes a broad definition of hazardous substances, which includes substances identified as hazardous under other federal statutes, see *id.* § 9601(14), or identified as hazardous by EPA under CERCLA itself. See *id.* § 9602(a).

251. *Id.* § 9606(a). In such circumstances, EPA may issue an administrative order requiring a response action or may seek relief in federal district court. See *id.* § 9606(c).

over, CERCLA provides that a variety of parties, including EPA, the state, or a private party, may perform the cleanup,²⁵² which means that protective action does not have to wait for government action. Finally, the Act mandates cleanup standards sufficient to protect human health²⁵³ and establishes a preference for permanent remedies, regardless of the higher costs with which they are associated.²⁵⁴

In addition to being aggressively protective of the environment, CERCLA imposes strict liability²⁵⁵ on parties with prescribed relationships to the location of the hazardous substance release.²⁵⁶ The very protective cleanup standards mandated by the statute have yielded permanent cleanups whose average costs are very high and whose time periods for implementation are quite lengthy.²⁵⁷

One consequence of the minimal trigger for the CERCLA response actions is that many sites across the country may be subject to the costly CERCLA response action and the related strict liability regime.²⁵⁸ This threat of liability, with its potentially expansive scope, has made it difficult to redevelop former industrial sites, typically located in urban areas, for productive use.²⁵⁹ These areas are known as brownfields.²⁶⁰ As a result, development is instead pursued at other,

often agricultural sites that have no history of industrial activity or its legacy of contamination.²⁶¹

Many states decided to try to address this problem in the 1990s because developers' reluctance to redevelop brownfields was harming economic development in urban areas and limiting state and local tax revenues.²⁶² The state response, a "Brownfields Bargain" in the terminology of Professor Applegate, was to moderate cleanup requirements in order to encourage redevelopment of property.²⁶³ The relaxed cleanup requirements were included in state voluntary cleanup programs.²⁶⁴ Pennsylvania, for example, provides in its cleanup standards for voluntary cleanups that "[f]inal remedial responses under this act . . . shall be cost effective."²⁶⁵ The state cleanup programs also differed from the CERCLA-mandated cleanup requirements in another important respect. Permanent remedies could be defined under CERCLA only after a substantial opportunity for public review and comment.²⁶⁶ State voluntary cleanup programs, on the other hand, do not require much input from the local communities that would be affected by the cleanup and redevelopment of the property.²⁶⁷ One scholar has written that, "[i]n comparison to that provided under CERCLA, the extent of liability and degree of cleanup required under state voluntary cleanup laws [are] minimal."²⁶⁸

Given the minimal trigger for the authorization of a response action under CERCLA and the modest cleanup requirements established by state voluntary cleanup programs, the effectiveness of the state programs were undercut by concerns that potential CERCLA liability remained even

252. See 40 C.F.R. § 300.700(a) (2009) ("any person may undertake a response action to reduce or eliminate a release of a hazardous substance, pollutant, or contaminant.").

253. See 42 U.S.C. § 9621(d)(1) ("Remedial actions . . . shall attain a degree of cleanup of hazardous substances . . . released into the environment and of control of further release at a minimum which assures protection of human health and the environment."). This health-based standard for cleanups provides context for the Act's further requirement that the protection of health standard be met in a cost-effective way. *Id.* § 9621(b)(1) ("The President shall select a remedial action that is protective of human health and the environment, that is cost effective"); see also 40 C.F.R. § 300.430(f)(1)(i)(A).

254. See 42 U.S.C. § 9621(b)(1) ("Remedial actions in which treatment which permanently and significantly reduces the volume, toxicity or mobility of the hazardous substances, pollutants, and contaminants is a principal element, are to be preferred over remedial actions not involving such treatment.").

255. See Healy, *supra* note 247, at 86–87.

256. See *id.* at 87–96. The statute established only limited defenses for the categories of parties that the statute identified as liable. See *id.* at 96–99.

257. See RICHARD L. REVESZ, ENVIRONMENTAL LAW AND POLICY 734–35 (2008) (summarizing studies finding that the average cost of a remedial action is between \$20 and \$30 million, and last for an average period of twelve years).

258. EPA reported recently that more than 12,000 sites are included in the agency's list of active sites. ENVTL. PROT. AGENCY, FY 2007 SUPERFUND ANNUAL REPORT 2 (2008), available at http://www.epa.gov/superfund/accomp/pdfs/sf_annual_report_2007.pdf. More than 1,500 of those sites are included on the National Priorities List ("NPL"), the listing of the sites posing the greatest hazard to public health and the environment. See *id.* Federal Superfund money is available to perform permanent remedial actions only at sites listed on the NPL. See 40 C.F.R. § 300.425(b)(1).

259. John S. Applegate, *Risk Assessment, Redevelopment, and Environmental Justice: Evaluating the Brownfields Bargain*, 13 J. NAT. RESOURCES & ENVTL. L. 243, 243–44 (1997-98) (CERCLA's "broad liability and [] stringent clean-up requirements . . . make reuse of such [former industrial] property a risky venture because it is usually contaminated to a greater or lesser degree with hazardous substances.") (footnote omitted); see also *25 Years of Superfund Liability: Progress Made, Progress Needed*, 37 Env't Rep. (BNA) No. 2, at 104 (Jan. 13, 2006) [hereinafter *25 Years of Superfund Liability*] (describing how state voluntary cleanup programs developed "in response to pressure from various groups seeking the cleanup and revitalization of contaminated urban sites to enhance economic opportunities, to expand the job and tax base, and to reduce development sprawl."). See generally Wendy Wagner, *Learning from Brownfields*, 13 J. NAT. RESOURCES & ENVTL. L. 217, 220–27 (1997-98).

260. See 42 U.S.C. § 9601(39)(A)(2006) (defining "brownfield site" as "real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant.").

261. See Statement by President George W. Bush Upon Signing H.R. 2869, 38 WEEKLY COMP. PRES. DOC. 52, 54–55 (Jan. 11, 2002) ("Further benefit will come [from the statute's encouragement of brownfield redevelopment] as businesses recycle older properties and spare surrounding lands from development As a consequence [of brownfields], small businesses and other employers have located elsewhere, pushing development farther and farther outward, taking jobs with them and leaving cities empty."); Applegate, *supra* note 259, at 248 ("the environmental clean-up requirements of CERCLA and RCRA encourage prospective developers to eschew existing industrial land in city centers in favor of non-industrial (typically agricultural land) at the periphery.");

262. See GEN. ACCOUNTING OFFICE, GAO/RCED-97-66, SUPERFUND: STATE VOLUNTARY PROGRAMS PROVIDE INCENTIVES TO ENCOURAGE CLEANUPS 22 (1997) [hereinafter GAO REPORT] ("By redeveloping brownfields, cities and states hope to boost employment and tax revenue in central urban districts and reduce suburban sprawl.").

263. Applegate, *supra* note 259, at 244.

264. See, e.g., GAO REPORT, *supra* note 262, at 18.

Voluntary cleanups can be completed more quickly than cleanups under state enforcement programs, according to state officials, because the voluntary approach eliminates some of the cleanup and enforcement steps. For the same reasons, voluntary cleanups are also less costly for both the states and volunteers. As a result, voluntary cleanups are encouraging economic redevelopment, including that of former industrial sites known as brownfields, by expediting the sites' return to productive use.

Id.; see also *25 Years of Superfund Liability*, *supra* note 259, at 104 ("[T]he states generally have become innovative laboratories creating and testing new approaches to timely and cost-effective, yet protective, cleanups that better account for the realities of real estate development.").

265. 35 PA. STAT. ANN. § 6020.504(a) (West 2003).

266. See 42 U.S.C. § 9617 (2006).

267. See GAO REPORT, *supra* note 262, at 43–44 (reporting that half of programs surveyed in the report did not include opportunities for public participation).

268. Kristen H. Engel, *Brownfield Initiatives and Environmental Justice: Second-Class Cleanups or Market-Based Equity?*, 13 J. NAT. RESOURCES & ENVTL. L. 317, 324 (1997-98).

after a complete state voluntary cleanup.²⁶⁹ Congress resolved this incompatibility between CERCLA and the state voluntary cleanup programs by enacting the Small Business Liability Relief and Brownfields Revitalization Act in January 2002.²⁷⁰ This statute amended CERCLA so that sites cleaned up pursuant to state voluntary cleanup programs would not give rise to additional liability under the federal statute.²⁷¹

This amendment has had the effect of establishing a two-tier program for the cleanup of hazardous substances. One tier is comprised of contaminated sites that are subject only to CERCLA's stringent standards, defined in 1980.²⁷² The amended statute defines this tier in the negative, by providing that only certain sites are "eligible response site[s]" for a cleanup under state cleanup programs.²⁷³ The statute defines an "eligible response site" as a "brownfield site."²⁷⁴ The statutory definition of a "brownfield site" identifies a number of exclusions,²⁷⁵ three of which are most important. A site is eligible for cleanup under only the CERCLA regime, (1) if a CERCLA response action is occurring at or planned for the site,²⁷⁶ (2) the site is listed or is eligible for listing on the National Priorities List ("NPL"),²⁷⁷ or (3) the site is the subject of a CERCLA administrative or court order.²⁷⁸ The statutory definition of an "eligible response site" reinforces the second of these exclusions by excluding from eligibility for cleanup under a state program a site that qualifies for NPL listing based on a preliminary risk evaluation or otherwise qualifies for listing on the NPL.²⁷⁹

The second tier of sites is comprised of brownfield sites meeting two requirements. First, the sites must have been cleaned up pursuant to an acceptable state voluntary cleanup program.²⁸⁰ A state cleanup program is acceptable only if the state

maintain[s], update[s] not less than annually, and make[s] available to the public a record of sites, by name and location, at which response actions have been completed in the previous year and are planned to be addressed under the

269. See GAO REPORT, *supra* note 262, at 46–47 ("Because EPA retains this responsibility, purchasers and real estate developers are sometimes reluctant to voluntarily clean up and redevelop sites because they fear EPA may require them to perform additional cleanup work in the future.").

270. Small Business Liability Relief and Brownfields Revitalization Act, Pub. L. No. 107-118, 115 Stat. 2356 (2002).

271. See *id.* § 231(b), 115 Stat. 2375–2381 (codified as amended at 42 U.S.C. § 9628 (2006)).

272. See *supra* notes 245–254 and accompanying text.

273. See 42 U.S.C. § 9628(b)(1) (2006) (providing generally that CERCLA enforcement is not permitted with respect to an "eligible response site" at which a "response action that is in compliance with" a state cleanup program has been completed).

274. See *id.* § 9601(41).

275. See *id.* § 9601(39)(B).

276. See *id.* § 9601(39)(B)(i).

277. See *id.* § 9601(39)(B)(ii). The NPL identifies the sites posing the greatest risk to public health and the environment based on an evaluation of the "relative risk or danger to public health or welfare or the environment." *Id.* § 9605(a)(8)(A). This evaluation is performed by the use of the Hazard Ranking System. See generally *B & B Tritech, Inc. v. United States*, 957 F.2d 882 (D.C. Cir. 1992) (a site must be listed on the NPL in order to have a remedial action financed by the Superfund); 40 C.F.R. § 300.425(b)(1) (2009).

278. See 42 U.S.C. § 9601(39)(B)(iii).

279. See *id.* § 9601(41)(C)(i). The reason for and legal significance of listing on the NPL is described at *supra* note 277.

280. See *id.* § 9628(a)(1)(A)(ii).

State program that specifically governs response actions for the protection of public health and the environment in the upcoming year. The public record shall identify whether or not the site, on completion of the response action, will be suitable for unrestricted use and, if not, shall identify the institutional controls relied on in the remedy²⁸¹

To be sure, this provision imposes a modest public disclosure requirement regarding the fact that a state voluntary cleanup has been pursued at a site. The provision also accepts, however, that the state program may employ cleanup standards, determined by reasonableness concerns, that will leave sites not "suitable for unrestricted use," rather than the stricter health protective standards mandated by the federal program.²⁸²

The amended statute also includes a second limitation on the protection from CERCLA liability for sites cleaned up under a state voluntary cleanup program.²⁸³ The statute identifies four exceptional circumstances under which EPA, notwithstanding the general prohibition on imposing CERCLA liability at state voluntary cleanup sites, may pursue a judicial or administrative enforcement action under CERCLA.²⁸⁴ The most important of these exceptions is when EPA determines that an imminent and substantial endangerment is present at the site, despite the pursuit of a cleanup under the state program.²⁸⁵

In sum, the two-tier program established by the amended CERCLA permits cleanup of less risky sites in accordance with reasonable standards for safety that will promote economic redevelopment and growth. These sites may effectively opt out of the enhanced protection mandated by CERCLA, by pursuing the less protective and less expensive state cleanup programs. Sites where releases of hazardous substances have been found to pose significant risks to public health and the environment do not have this opt out option and will continue to be subject to the federal statute's very stringent health-based cleanup standards. The two-tier program was very much a result of pressure to reshape a statute so that it is more responsive to promoting economic growth at the price of allowing greater residual risks to the affected public following cleanup.

281. *Id.* The modesty of the public disclosure requirements that are sufficient to qualify the state program for the benefits of protection from CERCLA liability following cleanup under the state program may be seen by contrasting those requirements with the public participation requirements that a state "includes . . . or is taking reasonable steps to include" in its cleanup program in order to qualify for a federal grant to support the development of a voluntary cleanup program. *Id.* § 9628(a)(1)(A)(i). Such federal support is provided in 42 U.S.C. § 9628(a). Section 9628(a)(2) identifies the characteristics of eligible response programs. One such characteristic is "[m]echanisms and resources to provide meaningful opportunities for public participation," that include "prior notice and opportunity for comment on proposed cleanup plans and site activities." *Id.* § 9628(a)(2)(C)(ii).

282. *Id.* § 9628(a)(2)(C).

283. *Id.* § 9628(a)(2)(C).

284. See *id.* § 9628(b)(1)(B).

285. See *id.* § 9628(b)(1)(B)(iii).

5. The Use of a Reasonably Safe Standard Enforced by the Government and Supplemented by an Individual Opportunity to Obtain Enhanced Protection

If the regime for the cleanup of contaminated sites provides a way to opt out of enhanced protection, the SDWA²⁸⁶ can be understood as providing an opportunity to opt in to enhanced protection. This statute is intended to regulate the quality of public drinking water. The current statute is a result of an initial enactment in 1974,²⁸⁷ with significant amendments in 1986²⁸⁸ and 1996.²⁸⁹ The statute requires EPA to define two standards for each water contaminant.²⁹⁰

One standard, defined as the maximum contaminant level goal (“MCLG”), is “the level at which no known or anticipated adverse effects on the health of persons occur and which allows an adequate margin of safety.”²⁹¹ The MCLG is accordingly determined in the same manner as the NAAQS are determined under the CAA—by a substance’s impact on human health. As discussed above, this health-based standard reflects a strong preference for the health and environment protection side of the sustainable development balance.²⁹²

The maximum contaminant level goal does not, however, prescribe a legally binding limit on the amount of a contaminant permitted in drinking water. Instead, the statute imposes a different enforceable standard: the maximum contaminant level (“MCL”).²⁹³ The statute provides generally that the MCL must be set at a level “which is as close to the maximum contaminant level goal as is feasible.”²⁹⁴ The statute defines feasible in a somewhat circular manner, providing that “the term ‘feasible’ means feasible with the use of the best technology, treatment techniques and other means which the Administrator finds, after examination for efficacy under field conditions and not solely under laboratory conditions, are available (or more simply, taking cost into consideration).”²⁹⁵ Thus, when the SDWA imposes enforce-

able standards on sources of public drinking water, it moves away from a sole concern with health protection and requires EPA to weigh both health effects and the costs of limiting the amount of the pollutants contained in drinking water. This feasibility requirement for the enforceable MCL standard was further contextualized by the 1996 amendments, which defined circumstances under which an otherwise feasible standard would be unduly stringent.²⁹⁶ In short, the MCL standards imposed by the statute, the violation of which gives rise to the imposition of sanctions, reflect a balance of the two critical sustainable development variables: protection of health and the environment against the impact on development, here focused on the costs of controls.

If the SDWA only required EPA to define MCLGs and MCLs, the latter of which is enforceable, the statute would appear to have the same basic structure as the CWA, which, as we have seen, leans toward the protection of economic growth in defining the extent to which health and the environment are protected.²⁹⁷ The SDWA, however, following the 1996 amendments, includes additional reporting requirements for companies providing public water supplies. The Act now requires “each community water system to mail to each customer of the system at least once annually a report on the level of contaminants in the drinking water purveyed by that system”²⁹⁸ Among the required contents for these “consumer confidence reports” is the following information:

If any regulated contaminant is detected in the water purveyed by the public water system, a statement setting forth (I) the maximum contaminant level goal, (II) the maximum contaminant level, (III) the level of such contaminant in such water system, and (IV) for any regulated contaminant for which there has been a violation of the maximum contaminant level during the year concerned, the brief statement in plain language regarding the health concerns that resulted in regulation of such contaminant²⁹⁹

The required annual reports accordingly must provide consumers with information about both the levels of con-

286. 42 U.S.C. §§ 300f–300j–26 (2006).

287. Safe Drinking Water Act, Pub. L. No. 93-523, 88 Stat. 1660 (1974). A central objective of the 1974 statute was to expand EPA’s authority to regulate the full range of pollutants that affect the quality of drinking water. Prior to the statute’s enactment, EPA had authority to regulate only “contaminants which may cause or carry a communicable disease.” H. REP. NO. 93-1185, at 1 (1974), *reprinted in* 1974 U.S.C.C.A.N. 6456, 6456.

288. Safe Drinking Water Act Amendments of 1986, Pub. L. No. 99-339, 100 Stat. 642 (1986).

289. Safe Drinking Water Act Amendments of 1996, Pub. L. No. 104-182, 110 Stat. 1613 (1996).

290. 42 U.S.C. § 300g-1(b)(4). The statute defines a “contaminant” as “any physical, chemical, biological, or radiological substance or matter in water.” 42 U.S.C. § 300f(6).

291. 42 U.S.C. § 300g-1(b)(4)(A). The requirement that EPA define the MCLG for a water contaminant was included in the 1986 amendments. *See* S. REP. NO. 99-56, at 3-4, *as reprinted in* 1986 U.S.C.C.A.N. 1568-69.

292. *See supra* notes 57-58 and accompanying text.

293. Both the MCLG and the MCL are required to be defined “simultaneously.” 42 U.S.C. § 300g-1(a)(3). This requirement does not apply if a recommended maximum contaminant level was published prior to June 19, 1986. *Id.* § 300g-1(a)(4).

294. *Id.* § 300g-1(b)(4)(B).

295. *Id.* § 300g-1(4)(D). This section also provides a specific finding about the feasibility of granulated activated carbon:

For the purpose of this paragraph, granular activated carbon is feasible for the control of synthetic organic chemicals, and any technology, treatment technique, or other means found to be the best available for the control of synthetic organic chemicals must be at least as effective in controlling synthetic organic chemicals as granular activated carbon.

Id.

296. *See id.* § 300g-1(b)(6). The House Report explained that the amendment enacting this provision was intended to

authorize[] EPA to promulgate a [MCL] that is less stringent than the level that would be established under paragraph 1412(b)(4), if the Administrator determines that the benefits of a standard would not justify its compliance costs. If the Administrator uses this authority, he or she must set the standard at the level that maximizes health risk reduction benefits at a cost that is justified by the benefits.

H.R. REP. NO. 104-632, at 28 (1996), *reprinted in* 1996 U.S.C.C.A.N. 1366, 1391. The 1996 amendments also permitted EPA to set the MCL at a level different than the feasible level based on increases in risks to health that would result from unintended effects of treatment techniques on other contaminants. *See* 42 U.S.C. § 300g-1(b)(6). The intent of this provision is discussed in House Report 104-632.

297. *See supra* Part III.A.2.

298. 42 U.S.C. § 300g-3(c)(4)(A).

299. 42 U.S.C. § 300g-3(c)(4)(B)(iii).

taminants in drinking water even when those levels are permitted by the enforceable federal standards and EPA's MCLGs.³⁰⁰ Moreover, the consumer confidence report is required to contain

a brief and plainly worded definition of the terms "maximum contaminant level goal", "maximum contaminant level", "variances", and "exemptions" and brief statements in plain language regarding the health concerns that resulted in regulation of each regulated contaminant. The regulations shall also include a brief and plainly worded explanation regarding contaminants that may reasonably be expected to be present in drinking water, including bottled water. The regulations shall also provide for an Environmental Protection Agency toll-free hotline that consumers can call for more information and explanation.³⁰¹

Based on their review of these annual reports, consumers may decide that they do not wish to subject themselves to the residual risks that result from the application of the enforceable, feasible limits on levels of contaminants in drinking water. Such consumers may decide to purchase water from other sources that meet the MCLGs defined by EPA, which are based only on the consideration of what is needed to protect human health. Moreover, the requirements to provide these reports to consumers may prompt companies to reduce levels of contaminants, regardless of the fact that contaminant levels may comply with the feasible MCLs defined by EPA.³⁰²

In sum, the SDWA supplements feasibility-based enforceable standards with information disclosure requirements that permit consumers to avoid the reasonable residual risks that result from an enforceable regulatory regime that is not solely focused on protecting human health.

IV. The Lessons that Sustainable Development Teaches About U.S. Environmental Law

What lessons, then, does this review of the sustainable development characteristics of the environmental law of the United States present? Taken as a whole, U.S. environmental law appears to be quite inconsistent in its approach to sustainable development. There is no single approach, even within several individual statutes, much less across all statutes. Indeed, the broad and inconsistent set of approaches may cause great uncertainty regarding whether there are circumstances under which the regulatory regime ought to favor protection of health and the environment over economic development, or provide for a balancing of the two.

Although the wide range of regulatory responses in U.S. environmental law makes broad conclusions difficult, an overall assessment of whether U.S. environmental law conforms to the international principle of sustainable development must begin with how that principle applies to a rich,

industrialized nation. In this setting, sustainable development requires that the environment be protected sufficiently, if such protection is available at a reasonable cost.³⁰³

The summary of U.S. environmental law demonstrates that one statute, the CWA, fails to meet this standard. The environmental protection provided by this statute is sufficient only if we accept that, aside from the nation's highest quality waters,³⁰⁴ waters will have only a quality that (1) is better than waste transport and assimilation³⁰⁵ and (2) allows only the uses that emerge from the statute's significant limits on discharges of pollutants from industrial point sources and no enforceable limits on nonpoint source discharges.³⁰⁶ Although this degree of control is affordable in the aggregate and therefore consistent with promoting economic development, the statute's regulatory regime is certainly not sufficient to meet the CWA's goals of fishable and swimmable waters.³⁰⁷

The insufficiency of the CWA's requirements may be contrasted with the CAA regulation of emissions of hazardous air pollutants. The CAA, like the CWA, imposes controls on the basis of available technology.³⁰⁸ The CAA, however, provides for a second phase of regulation, which is intended to ensure that the residual risks that are present after the imposition of available technology do not impose more than a minimal risk to human health.³⁰⁹

The SDWA also presents important contrasts with the CWA. The SDWA defines its initial level of control by balancing the costs and benefits of control,³¹⁰ rather than focusing solely on available technology, as the CWA does. The SDWA also includes requirements that may result in greater protection of health and the environment.³¹¹ The CWA's regime of enhanced control through the enforcement of water quality standards offers little added protection because those standards are determined by current uses of the waters, which are dependent on the protection provided by available technology.³¹²

This critique of the CWA is not the only understanding that is gained from the consideration of the sustainable development principle in U.S. environmental law. In presenting the federal statutes' wide range of regulatory responses, the overview provides insights into how different regulatory methods may be employed to promote sustainable development. One way in which the type of response may differ is in the regulatory approach that is pursued after accounting for the impact on the environment, the impact on development, or a balancing of the two. For example, the CAA's second phase health-based limits on hazardous air pollutant emissions requires that any residual risk to human health, following the application of available control technology, is

300. *Id.*

301. *Id.* § 300g-3(c)(4)(A).

302. See CELIA CAMPBELL-MOHN, *supra* note 37, at 138–139.

303. See *supra* Part II.

304. See *supra* notes 106–08 and accompanying text.

305. See *supra* note 101 and accompanying text.

306. See *supra* notes 103–05 and accompanying text.

307. See *id.*

308. See *supra* notes 201–04 and accompanying text.

309. See *supra* notes 211–12 and accompanying text.

310. See *supra* notes 293–96 and accompanying text.

311. See *supra* notes 298–302 and accompanying text.

312. See *supra* notes 103–05 and accompanying text.

minimized.³¹³ The SDWA, on the other hand, relies on the health-based MCLGs as the basis for a reporting requirement about the risks that remain following the application of command-and-control treatment standards that are determined by a balancing of the costs and benefits of regulation.³¹⁴ In short, the law may provide protection beyond a baseline of control in different ways that have widely different costs.

In its layering of regulatory requirements, TSCA's structure ties the regulatory requirements to the type of risk to health or the environment that is posed. This regime modifies the stringency of regulatory controls with the level of identified risk. When a thumb is placed on the environmental protection side of the balance, the regulatory approach is least intrusive and least expensive.³¹⁵ When costly regulatory controls are at issue through the imposition of command-and-control requirements, a balancing of costs and benefits is required.³¹⁶ In short, sustainable development values may be accounted for in the type of regulatory response that is employed, in addition to the location along the sustainable development spectrum that determines whether a regulatory response may or must be taken. Favoring environmental protection is more likely to be politically acceptable if the resulting regulatory requirements are less expensive.³¹⁷

One factor that appears to be of great significance in affecting judgments of sustainable-development characteristics in the regulatory approach is the voluntariness of exposure to the risks resulting from environmental degradation. The existence of voluntariness relates to whether there are alternatives to risk exposure. Whether there are alternatives to risk exposure will often depend on whether different uses are available for the environmental amenity and the public's view of the relative importance of those uses (for example, critical habitat for an endangered species).

Where only a single, unavoidable, involuntary use is available, it is most defensible to impose health or environmental quality based standards that will allow the use to be pursued without resultant harm (or unreasonable risk) to the user. This is the CAA's approach to the regulation of criteria pollutants given the broad, uniform, and involuntary exposure of all when breathing the ambient air.³¹⁸

Reduced environmental protection is more understandable when multiple uses are acceptable, such as for surface waters and land for development. Where multiple uses are possible and allow the avoidance of risks by limiting exposure, permitting local government to identify applicable uses

in compliance with federally mandated minimum requirements may be a sensible approach. This provides a partial explanation for the limited protection of the environment in the CWA.³¹⁹ This approach is effective, however, only if the affected public is actually aware of the opportunity to avoid risks. Such awareness will depend on the provision of understandable information to those who may be exposed to residual risks. The SDWA seeks to communicate this information about risks by informing users of public water sources about all water contamination, even when the level is below the level permitted by federal law.³²⁰ The amended CERCLA, which permits cleanups pursuant to the reasonable standards defined by state cleanup programs rather than the fully health-protective federal standards, takes an analogous approach, but it does not provide sufficient information to the affected public about residual risks.³²¹

Another factor that plays a critical role in determining a federal law's approach toward sustainable development is the extent of the risk present before regulation.³²² The result is that federal law provides varying degrees of protection that sanction a spectrum of residual risks based on the extent of risk posed prior to regulation.³²³ This can be seen within and across various regulatory regimes.³²⁴ For example, the CWA imposes more stringent controls on discharges of toxic pollutants than on discharges of conventional pollutants.³²⁵ Another example is the very stringent regulatory requirements mandated by RCRA,³²⁶ which are triggered only when solid waste is hazardous.³²⁷

This approach may have some intuitive appeal. It is understandable that Congress would want to impose the most stringent requirements on pollutants or activities that pose the greatest risk to the environment and health. The approach is ultimately not convincing, however, because the risk following regulation remains and there is no reason to accept greater post-regulation risks to health and the environment simply because there was a reduced starting risk. The focus should instead be either on whether the final risk is acceptable, or on the balance of the costs and benefits of regulation.³²⁸

313. See *supra* Part III.C.2.

314. See *supra* Part III.C.5.

315. See *supra* notes 181–90 and accompanying text.

316. See *supra* notes 191–99 and accompanying text.

317. Another way in which the response often differs is in the legal effect that the relevant considerations have on the regulator. For example, different statutes require that the agency balance the costs and benefits of regulation before making any regulatory response. These statutes often differ, however, in how they define the legal effect of that balancing. Some statutes permit regulatory action; other statutes require regulatory actions; and others preclude action based on the agency's balancing of costs and benefits. Given the difficulty and uncertainty of any of the three determinations, however, the implementing agency is likely to have substantial discretion about a regulatory response, even when a response is required, rather than permitted.

318. See *supra* notes 40–47 and accompanying text.

319. See *supra* notes 99–105 and accompanying text.

320. See *supra* notes 298–301 and accompanying text.

321. See *supra* notes 280–82 and accompanying text.

322. See, e.g., *supra* notes 272–82 and accompanying text (describing more stringent federal, as contrasted with state, cleanup standards, with eligibility for latter available for less hazardous sites).

323. See, e.g., *supra* notes 67–71 and accompanying text (discussing varying stringencies of controls placed on discharges of pollutants under the Clean Water Act, based on the extent of risk posed prior to regulation).

324. See, e.g., *infra* notes 325–26 and accompanying text.

325. See *supra* notes 67–71 and accompanying text.

326. See *supra* notes 228–43 and accompanying text.

327. See *supra* note 218 and accompanying text.

328. Notwithstanding this understanding of the significance of final risks, there is reason to support greater regulation of more serious risks in other respects. When initial risks are greatest, fail-safe measures, such as RCRA's technology-based standards supplementing a health-based regime of protection, are more likely to be accepted as appropriate. This approach is analogous to the ESA process for exemptions added by the 1976 amendments: The statute's bar on activities with catastrophically adverse impacts on endangered species may be avoided only when a committee supermajority permits the exemption based on a showing that the benefits of the proposed action "clearly outweigh" the expected harm to the environment. See *supra* note 156 and accompanying text.

A final, and counter-intuitive insight, applies to the regulatory regimes that reflect development concerns by providing environmental protection only to the degree provided by available technologies.³²⁹ These regimes place a thumb on the scale to protect development only in the aggregate and thereby do not consider the impact of control costs on individual polluters.³³⁰ The cost of pollution controls available to a category of polluters may cause individual sources of pollution to go out of business. One way to moderate this effect is to supplement technology-based requirements with a properly structured system for trading the right to pollute.³³¹ Moreover, the available technology approach to regulation does not closely consider the cost of the protection accomplished by the available technologies.³³² The result is that the available technologies approach may yield pollution control that is very costly for the health or environmental benefit that is gained.³³³ Thus, by looking only at the overall impact of the regulation on development, this regulatory regime may ironically protect the environment too much, if the ideal is to protect the environment only to the degree justified by the nature and extent of adverse impacts.

V. Conclusion

Sustainable development is a principle of international environmental law that seeks a proper balance between protection of the environment and economic development. This article has evaluated the principal federal environmental statutes by reference to sustainable development. That evaluation provides an important critique of the CWA. The evaluation also provides a framework for considering how greater protection of the environment may be achieved through methods that are less likely to impede economic development.

329. Examples of this approach are CWA regulation, *see supra* notes 66–84 and accompanying text, and the first phase of regulation of hazardous air pollutants under the CAA, *see supra* notes 202–05.

330. *See supra* notes 78–81 and accompanying text.

331. *See supra* note 80.

332. *See supra* notes 77–79 & 205–09 and accompanying text.

333. *See supra* note 210 and accompanying text.