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Michael P. Healy*

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, corporate, or governmental, 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. It discusses how the sustainable development principle has evolved from its initial appearance in the 1987

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1. Wilbur D. Ham Professor of Law, University of Kentucky College of Law, J.D. 1984, University of Pennsylvania; B.A. 1978, Williams College. The author thanks Jennifer Wills for reviewing an earlier draft of this article. The author is responsible for any errors.

2. 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)).

3. See, e.g., Environmental Policy, JP MORGAN CHASE, http://www.jpmorgan chase.com/corp/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/pwar/us/en/prnews/27512.wss.


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 Phillipe 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 seas and to protect them, for the benefit of mankind, from wanton destruction."

More recently, three of the most prominent international discussions of sustainable development are the 1987 Brundland 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 Brundland Report.11 By the time the United Nation’s Brundland 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:

"Related 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."

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 inextricably linked. Development cannot subsist upon a deteriorating environmental resource base; the environment cannot be protected when growth leaves out the costs of environmental destruction." 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." The Report accordingly states that a necessary component of sustainable development is the eradication of human poverty.

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. PHILLIPPE 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 WRISS 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)").
beings are at the center of concerns for sustainable development. They are entitled to a healthy and productive life in harmony with nature.\textsuperscript{16}

Although much discussion of sustainable development highlights how the principle forms the basis for a new environmentalist era,\textsuperscript{18} 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.\textsuperscript{19}

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.\textsuperscript{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 the needs of those who are to come after us.”\textsuperscript{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.”\textsuperscript{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 degradation 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.\textsuperscript{22}

Professor Sands views Principle 7 as an initial articulation of the principle of common but differentiated responsibility.\textsuperscript{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.\textsuperscript{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.\textsuperscript{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.\textsuperscript{26} Rather, less developed nations may, consistent with the principle, degrade the environment more severely as they seek to improve their economic conditions.\textsuperscript{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.\textsuperscript{28}

The 2002 World Summit on Sustainable Development, held in Johannesburg, South Africa, highlighted these tensions within the principle of sustainable development.\textsuperscript{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...
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. Although the Johannesburg Summit participants restated their commitment to the principles of the Rio Declaration, 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.

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. 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.

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. 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...
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. Another regulatory approach, information-based regulation, relies on the development and consideration of information related to the adverse environmental effect that is of concern. This second approach is the approach that imposes the fewest costs on the regulated party. A third regulatory approach is the imposition of liability for causing environmental degradation. 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.

1. Environmental Protection as the Organizing Regulatory Principle: The Clean Air Act's Attainment Principle

The core of the CAA is the requirement, often breached to be sure, that all geographic areas comply with the National Ambient Air Quality Standards ("NAAQS"). The NAAQS are defined based on a consideration of scientific studies of the adverse effects that the criteria pollutants have on public health (for the primary NAAQS) and public welfare (for the secondary NAAQS). The Supreme Court recently reached the conclusion, long ago reached by the Court of Appeals for the District of Columbia Circuit, 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.

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

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 Celina Campbell-Moeln 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).

Amendments, however, limited state discretion by imposing minimum requirements for emissions. 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. 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. 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.

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." 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." 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. 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.

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. 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.

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. 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. The CWA does not define the required degree of environmental protection by reference to an adequately healthy environment, but rather based on the control of point-source emissions of pollutants as determined by available pollution control technologies.

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. The most important such permit, the National Pollutant Discharge Elimination System ("NPDES") permit, applies to discharges from point sources, including industrial point sources. Available technology is the basis for the limits on the pollutant discharges allowed by the permit. The two most important technology-based standards, best practicable technology ("BPT"),

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.
60. The CWA's regulatory program 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 ECOLOGY L.Q. 393, 396–414 (1996).
61. See supra notes 45–46 and accompanying text (describing the CAA NAAQS and the attainment principle).
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 Conner Alaska, Inc. v. Southeast Alaska Conservation Council, 129 S. Ct. 2458 (2009).
65. See id. § 1362(1) (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:

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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

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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 that 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.


See 33 U.S.C. § 1311(b)(2)(A) (2006). EPAs 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 those technologies are not common industry practice.


See supra notes 66-68.


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.” Env't Prot. Agency, NPDES Glossary, http://cfpub.epa.gov/npdes/glossary.cfm?program_id=0#B (last updated Mar. 25, 2004).

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

EPAs approach to standards for new sources is the following: NSPS should represent the greatest degree of effluent reduction attainable through the application of the best available control technology for all pollutants (i.e., conventional, nonconventional, and priority pollutants).


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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. See id. at 1506–10.

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: [The] 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).


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 Entergy Corp. 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 industry of the particular source to afford the costs of the pollution controls needed to comply with the applicable effluent limitations. The Supreme Court in Entergy Corp. v. National Crushed Stone Ass’n concluded that:

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, Env't Prot. Agency, Water Quality Trading Policy 2 (2003), available at http://www.epa.gov/owow/watershed/trading/finalpolicy2003.pdf.

approach to effluent limitations is to look toward the emis-
sions controls achieved by sources in the particular indus-
trial category. For BPT standards, limits are generally based
on the average of the best results achieved by sources in the
category. For BAT standards, EPA defines limits based on
the best results for each pollutant achieved by sources in the
category. 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 pro-
tected waters, as compared with the quality that would result
from unregulated emissions of pollutants by point sources.
Any federally mandated 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. Indeed, the CWA
does not impose enforceable limits on pollution contributed
by nonpoint sources. These sources are subject only to plan-
ing requirements and may be subject to management prac-
tice requirements.

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 pollu-
tion by ensuring adequate water quality. 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, and then by
relating discharge permit requirements to those water quality
standards. Indeed, a core requirement of the current CWA,
unfortunately honored often in the breach, is that the
efficient limits on discharges of pollutants included in point
source NPDES permits must be stringent enough to attain
the state’s water quality standards.

Given this regulatory structure, one might claim that the
CWA pollution control requirements are analogous to CAA
requirements 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-

94. See supra notes 70–71 and accompanying text.
95. See supra note 67.
96. See supra note 68.
97. The CWA permits states to impose more stringent permit requirements than
those mandated by the federal technology-based approach. See 33 U.S.C. §
98. See supra notes 66 and accompanying text.
99. “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
100. See supra note 60, at 397–98.
102. See Healy, supra note 60, at 397–98 (discussing studies describing violations
of state water quality standards).
tion plans for national primary and secondary ambient air quality standards).
105. See 33 U.S.C. § 1316(a)–(e).
106. See supra notes 43–45 and accompanying text.
107. See supra notes 49–52 and accompanying text.
108. See supra note 42.
109. See infra notes 105, 114 and accompanying text.
111. EPA Water Quality Standards, 40 C.F.R. § 131.10(a) (2009).
113. See 40 C.F.R. § 131.12(a)(1) (2009); see also id. § 131.10(h)(2) (“Where
existing water quality standards specify designated uses less than those which
are presently being attained, the State shall review its standards to reflect the
uses actually being attained.”).
that are more stringent than the federal limits).
115. EPA’s 2004 Report to Congress on the quality of the nation’s surface waters
stated that “[o]f the 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/lawregs/guidance/cwa/305b/upload/
and wildlife refuges and waters of exceptional recreational or ecological significance.\textsuperscript{107} For these high quality waters, the regulations require that “water quality shall be maintained and protected.”\textsuperscript{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.\textsuperscript{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;\textsuperscript{110} that the more protective designated use cannot be achieved as a consequence of the required federal pollutant limitations;\textsuperscript{111} and that the imposition of effluent limits more stringent than the federal limits “would result in substantial and widespread economic and social impact.”\textsuperscript{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,\textsuperscript{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.\textsuperscript{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.\textsuperscript{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.

1. 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.\textsuperscript{116} This suggested process of governmental decisionmaking is the process required by NEPA.\textsuperscript{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

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.

\textsuperscript{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.”).

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

When an agency action may "significantly affect [] the quality of the human environment,"\textsuperscript{119} NEPA requires the agency to prepare an Environmental Impact Statement ("EIS")\textsuperscript{120} that considers alternatives to the proposed action,\textsuperscript{121} assesses the environmental impacts of the proposed actions and the alternatives,\textsuperscript{122} and allows for public involvement in the preparation of the EIS.\textsuperscript{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.\textsuperscript{124} The Court's resolution rejects the view that NEPA imposes substantive requirements and establishes that NEPA imposes only procedural requirements.\textsuperscript{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."\textsuperscript{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.\textsuperscript{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.\textsuperscript{128} This is very much an ad hoc approach, with agencies retaining the power to sacrifice development for environmental protection or vice versa.\textsuperscript{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.\textsuperscript{130}

\section{2. A Mandate for Regulatory Action When Threatened Environmental Harm Outweighs Societal Benefit}

FIFRA\textsuperscript{131} regulates pesticides and related products by allowing their sale only when EPA has registered the products and defined guidelines for their use.\textsuperscript{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."\textsuperscript{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."\textsuperscript{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.\textsuperscript{135} This regulatory approach contrasts with NEPA, which permits an agency to act in a way

\begin{itemize}
  \item \textsuperscript{118} See infra note 127 and accompanying text.
  \item \textsuperscript{119} 42 U.S.C. § 4332(C) (2006).
  \item \textsuperscript{120} 40 C.F.R. § 1508.11.
  \item \textsuperscript{121} Id. § 1502.14.
  \item \textsuperscript{122} Id. § 1502.16.
  \item \textsuperscript{123} Id. § 1503.1(a)(4).
  \item \textsuperscript{125} See e.g., RODGERS, supra note 39, at 862–63.
  \item \textsuperscript{126} Methow Valley, 490 U.S. at 350.
  \item \textsuperscript{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 substantive 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 (3rd 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.")
  \item \textsuperscript{128} See Methow Valley, 490 U.S. at 350.
  \item \textsuperscript{129} See Sierra Club v. Van Antwerp, 526 F.3d 1353, 1361–62 (11th Cir. 2008).
  \item The court stated:
  \begin{quote}
    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.
  \end{quote}
  \item \textsuperscript{130} Id.
  \item \textsuperscript{131} 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.
  \item \textsuperscript{132} 7 U.S.C. §§ 136c-136y (2006).
  \item \textsuperscript{133} See John S. Applegate 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.").
  \item \textsuperscript{134} 7 U.S.C. § 136a(c)(5). The statute provides:
    \begin{quote}
      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.
    \end{quote}
  \item \textsuperscript{135} Id. § 136(bb) ("The term 'unreasonable adverse effects on the environment' means (I) 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 . . . .")
  \item \textsuperscript{136} See Envil. Def. Fund, Inc. v. EPA, 548 F.2d 998, 1005 (D.C. Cir. 1976).
\end{itemize}
that harms the environment despite the lack of an offsetting developmental benefit, as long as the adverse impacts were considered.\textsuperscript{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.\textsuperscript{137} Indeed, EPA may cancel the pesticide’s registration\textsuperscript{138} if, based on this review or for some other reason,\textsuperscript{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.”\textsuperscript{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.\textsuperscript{141}

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

One might expect that the ESA\textsuperscript{142} 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.”\textsuperscript{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\textit{Tennessee Valley Authority (TVA) v. Hill}.\textsuperscript{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.\textsuperscript{145} In this context between the development that would have been promoted by construction of the dam\textsuperscript{146} and the preservation of the snail darter,\textsuperscript{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 ensure 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.\textsuperscript{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.”\textsuperscript{149} The Court found it “very significant” that the 1973 ESA contained no such qualifications.\textsuperscript{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.\textsuperscript{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,”\textsuperscript{152} concluding instead that Congress had mandated that the species be preserved.\textsuperscript{153}

\textsuperscript{136} See supra note 127 and accompanying text.
\textsuperscript{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.").
\textsuperscript{139} See id. § 136d(g)(1).
\textsuperscript{140} Id. § 136d(b).
\textsuperscript{141} See, e.g., Envtl. 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 pesticides heptachlor and chlordane under the FIFRA for certain uses because Administrator properly found pesticides posed carcinogenic risks to humans).
\textsuperscript{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 Citizens 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).
\textsuperscript{145} Id. at 172–73.
\textsuperscript{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 outmigrating of young people.”) (footnote, internal quotations, and citation omitted).
\textsuperscript{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. Emier, found a previously unknown species of perch, the snail darter, or \textit{Percina (Imostoma) tanasi}. This [was a] three-inch, tanish-colored fish, whose numbers are estimated to be in the range of 10,000 to 15,000.
\textsuperscript{148} Id. (footnote omitted).
\textsuperscript{149} Id. at 173.
\textsuperscript{150} Id. at 181 (emphasis, internal quotation marks, and brackets omitted).
\textsuperscript{151} Id. at 182.
\textsuperscript{152} Id. at 184–85.
\textsuperscript{153} Id. at 187.
\textsuperscript{154} 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. 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.”

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.” 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. 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.

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; one statute shifts its regulatory approach in different statutorily mandated phases of regulation; one statute supplements an environmentally protective regime with technology-based requirements; one statute changes its regulatory approach when an environmental problem is addressed at the state or at the federal level; and one statute supplements legally mandated standards with a requirement that information about residual risks be reported to the affected public. 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 TSCA in 1976 to protect the public from the unreasonable risks posed by hazardous chemicals. The statute pursues two complementary regulatory approaches: developing information about the risks posed by certain substances and imposing regulatory controls to protect the public.

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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: *Any 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 overwhelming 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.


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.*


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.\textsuperscript{167} The statute also establishes an overarching goal of accomplishing these objectives without unreasonably hindering economic development.\textsuperscript{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);\textsuperscript{169} (2) reporting and recordkeeping requirements for chemicals subject to regulation that are not new;\textsuperscript{170} (3) EPA rulemaking seeking additional information about the risks posed by a chemical;\textsuperscript{171} and (4) regulatory controls on the production or use of a chemical.\textsuperscript{172}

The first approach applies when a chemical is not included on the TSCA chemical substance inventory,\textsuperscript{173} maintained by EPA in accordance with TSCA’s requirements.\textsuperscript{174} A person may only produce such a new chemical after notifying EPA ninety days before beginning manufacturing.\textsuperscript{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 . . . .”\textsuperscript{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.”\textsuperscript{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.\textsuperscript{178} In this context, however, the producer of the substance, rather than the regulatory agency, is doing the balancing.\textsuperscript{179} Moreover, the producer is not required to undertake new studies of adverse effects when weighing the costs and benefits of production.\textsuperscript{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.\textsuperscript{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,”\textsuperscript{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.\textsuperscript{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.”\textsuperscript{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.\textsuperscript{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.”\textsuperscript{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”\textsuperscript{187} and “testing . . . is necessary to develop such data,”\textsuperscript{188} EPA must promulgate a regulation ordering the needed testing.\textsuperscript{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

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\textsuperscript{167} See id. § 2601(b)(2). ([A]dequate authority should exist to regulate chemical substances and mixtures.").

\textsuperscript{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 . . . .)

\textsuperscript{169} See id. § 2604(a). ([A]dequate authority should exist to regulate chemical substances and mixtures.").

\textsuperscript{170} See id. § 2607(e). Reporting is not required if the producer “has actual knowledge” that EPA has already been informed of the information.

\textsuperscript{171} See id. § 2607(a).

\textsuperscript{172} See supra Part III.B.


\textsuperscript{174} Id. § 2604(b)(2).\textsuperscript{175} Id. § 2605.

\textsuperscript{176} Id. § 2604(b)(2)(B).

\textsuperscript{177} Id. § 2604(b)(2)(B).

\textsuperscript{178} See supra Part III.B.


\textsuperscript{180} Id.


\textsuperscript{182} Id. § 2604(a)(1).

\textsuperscript{183} See id. § 2607(a).

\textsuperscript{184} Id. § 2607(c).

\textsuperscript{185} Id. § 2607(a)–(d).

\textsuperscript{186} Id. § 2603(a)(1)A(i).

\textsuperscript{187} Id. § 2603(b)(1)A(iii).

\textsuperscript{188} Id. § 2603(a)(1)A(iii).

\textsuperscript{189} Id. § 2603(a).
the potential for harm to health or the environment rather than a showing of actual harm being caused. 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. 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." Although the obligation to impose regulatory requirements is triggered by a focus on the environmental impacts of the sustainable development, EPA may impose regulations only "to the extent necessary to protect adequately against such risk using the least burdensome requirements." 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. Thus, with consideration of how the substance affects health and the environment, the statute dictates that EPA consider "the benefits of such substance . . . and the availability of substitutes" 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."

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.

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. 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," 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
less stringent than the emission control that is achieved in practice by the best controlled similar source.\textsuperscript{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.\textsuperscript{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.\textsuperscript{205}

Because the availability of technological controls determines the baseline level of controls for hazardous air pollutants, except in special circumstances,\textsuperscript{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.\textsuperscript{207} That regime is unconcerned with whether the controls are affordable for individual sources\textsuperscript{208} or with the marginal benefit of incremental improvements in pollution controls.\textsuperscript{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.\textsuperscript{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."\textsuperscript{211} With specific regard to residual risks of cancer, the statute requires EPA to promulgate more stringent standards "[t]he 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."\textsuperscript{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.\textsuperscript{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."\textsuperscript{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**

RCRA\textsuperscript{215} regulates the handling, treatment, and disposal of hazardous wastes.\textsuperscript{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."\textsuperscript{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
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.\textsuperscript{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."\textsuperscript{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."\textsuperscript{220}

EPA has promulgated regulations that establish two ways to identify waste as hazardous: such wastes may be listed as hazardous by EPA\textsuperscript{221} or they may exhibit characteristics of toxicity, reactivity, corrosivity, or ignitability when tested in accordance with standards defined by EPA regulations.\textsuperscript{222} EPA has also promulgated regulations that define a substance that is mixed with or derived from a listed hazardous waste as hazardous waste.\textsuperscript{223} In American Chemistry Council v. EPA,\textsuperscript{224} 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.\textsuperscript{225} 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."\textsuperscript{226} 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."\textsuperscript{227}

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.\textsuperscript{228} 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."\textsuperscript{229} 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.\textsuperscript{230} Legislation 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.\textsuperscript{231} 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.\textsuperscript{232} 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.\textsuperscript{233} The court noted that none of the levels that CMA argued as appropriate under RCRA met the requisite level of safety.\textsuperscript{234} 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.\textsuperscript{235}

\textsuperscript{228} See id. § 6924(m)(1).
\textsuperscript{229} See Chem. Waste Mgmt., Inc. v. EPA, 976 F.2d 2, 8–9 (D.C. Cir. 1992) (describing phased implementation of treatment requirements).
\textsuperscript{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]").
\textsuperscript{232} Id. at 361, 363.
\textsuperscript{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. . . . [None of the levels to which CMA compares the BADT] standards purports to establish a level at which safety is assured or 'threats to human health and the environment are minimized'.")
\textsuperscript{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

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236. See id. at 12.
237. See supra note 222 for a description of characteristic hazardous waste.
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)(9) (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).
245. See supra Part I.
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. § 9603(c).
251. 12. § 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, which means that protective action does not have to wait for government action. Finally, the Act mandates cleanup standards sufficient to protect human health and establishes a preference for permanent remedies, regardless of the higher costs with which they are associated.

In addition to being aggressively protective of the environment, CERCLA imposes strict liability on parties with prescribed relationships to the location of the hazardous substance release. 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.

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. 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. These areas are known as brownfields. As a result, development is instead pursued at other, often agricultural sites that have no history of industrial activity or its legacy of contamination.

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. The state response, a “Brownfields Bargain” in the terminology of Professor Applegate, was to moderate cleanup requirements in order to encourage redevelopment of property. The relaxed cleanup requirements were included in state voluntary cleanup programs. Pennsylvania, for example, provides in its cleanup standards for voluntary cleanups that “[f]inal remedial responses under this act . . . shall be cost effective.” 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. 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. 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.”

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

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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.

257. See Richard L. Friesz, 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/apa/ sfannual_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).


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, 28 Wklys. 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 space 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 ("[T]he 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 been 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. § 6020.509(a) (West 2003).


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).

after a complete state voluntary cleanup.\textsuperscript{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.\textsuperscript{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.\textsuperscript{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.\textsuperscript{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.\textsuperscript{273} The statute defines an "eligible response site" as a "brownfield site."\textsuperscript{274} The statutory definition of a "brownfield site" identifies a number of exclusions,\textsuperscript{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 or planned for the site,\textsuperscript{276} (2) the site is listed or is eligible for listing on the National Priorities List ("NPL"),\textsuperscript{277} or (3) the site is the subject of a CERCLA administrative or court order.\textsuperscript{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.\textsuperscript{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.\textsuperscript{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 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 remedy . . . .\textsuperscript{281}

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.\textsuperscript{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.\textsuperscript{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.\textsuperscript{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.\textsuperscript{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.

\textsuperscript{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.").


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

\textsuperscript{272} See supra notes 245–254 and accompanying text.

\textsuperscript{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).

\textsuperscript{274} See id. § 9601(41).

\textsuperscript{275} See id. § 9601(39)(B).

\textsuperscript{276} See id. § 9601(39)(B)(i).

\textsuperscript{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)(i) (2009).


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

\textsuperscript{280} See id. § 9628(a)(1)(A)(ii).

\textsuperscript{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 programs. Id. § 9628(a)(1)(A)(ii). 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)(i).

\textsuperscript{282} See id. § 9628(a)(2)(C).

\textsuperscript{283} Id. § 9628(a)(2)(C).

\textsuperscript{284} See id. § 9628(a)(2)(C).

\textsuperscript{285} See id. § 9628(b)(1)(B).

\textsuperscript{286} 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 SDWA 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, with significant amendments in 1986 and 1996. The statute requires EPA to define two standards for each water contaminant.

One standard, defined as the maximum contaminant level goal (“MCLG”), is “the level at which which no known or anticipated adverse effects on the health of persons occur and which allows an adequate margin of safety.” 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 environmental protection side of the sustainable development balance.

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”). 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.” 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).” Thus, when the SDWA imposes enforceable 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. 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. 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 . . .” 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 contaminant . . .

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

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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.

297. See supra Part IIIA.2.

298. 42 U.S.C. § 300g-3(c)(4)(A).

taminants in drinking water even when those levels are permitted by the enforceable federal standards and EPA's MCLGs. 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.

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 MCLs 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.

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.

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, waters will have only a quality that (1) is better than waste transport and assimilation 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. 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.

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. 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.

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 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. 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.

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 296–302 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. 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

319. See supra notes 93–105 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 the significance of the 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 202–95.
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.