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A Primer: Air and Water Environmental Quality Standards in the United States

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A PRIMER: AIR AND WATER ENVIRONMENTAL QUALITY STANDARDS IN THE UNITED STATES

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INTRODUCTION

How are environmental quality standards created, implemented, and enforced in the United States? The Clean Air Act calls on the Environmental Protection Agency ("EPA") to set the acceptable ambient levels of pollution through the national ambient air quality standards, while leaving it to the states to decide how to obtain those pollution levels.[1] In contrast, under the Clean Water Act, EPA promulgates national industry-wide standards with which polluters must comply, whereas the states are empowered to define acceptable ambient pollution levels in water bodies within their borders.[2] What are the details, successes, and challenges to this approach?

This Article, designed as a resource for environmental law professors both domestically and abroad, addresses how environmental quality standards are created, implemented, and enforced in the United States. The answers to these questions are useful to those teaching U.S. environmental law and international scholars, especially in the European Union, who are faced with the challenge of creating new environmental quality standards under both national and EU directives. It must be noted that this project is complicated by the federal system within the country, and, thus,

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[1] JONATHAN R. NASH, ENVIRONMENTAL LAW AND POLICY: THE ESSENTIALS 87 (2010).

[2] *Id.*

attention must be devoted to the federal-state relationship. In fact, the major relevant statutes, the Clean Air and Clean Water Acts, were designed to use the federal system in order to implement their statutory objectives, and this Article is divided into two sections focusing on these two natural resources, air and water.

Part I entitled "Water" considers the components of water quality standards, determination of maximum pollutant load to waterways to maintain water quality standards (known as total maximum daily loads), and the state planning and federal oversight process. It continues to discuss the components of the National Pollutant Discharge Elimination System ("NPDES")—technology-based and water quality–based effluent limitations, permitting, and the federal/state relationship—and enforcement of the Clean Water Act.

Part II entitled "Air" provides an overview of the Clean Air Act, summarizing legislative and statutory provisions, offering insight into the design and creation of National Ambient Air Quality Standards ("NAAQS"), and discussing the federal/state relationship as it relates to implementation. This Article strives to provide a snapshot of environmental quality standards and their legal constructions in the United States in a manner that might be useful in providing insight to policymakers in other systems seeking to make their environmental quality regulatory regimes more effective.

I. WATER

Protection of water quality in the United States is governed by the federal Clean Water Act and state water quality protection legislation.[3] The first federal water pollution control legislation was the Water Pollution Control Act of 1948, which gave the federal government a limited role in water pollution control.[4] It, along with subsequent amendments, provided funds to state and local governments to assist them in water pollution control.[5] In 1965, Congress passed the Water Quality Act, which provided the federal government with a stronger oversight role.[6]

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[3] *See* EPA, *Water Permitting 101*, http://www.epa.gov/npdes/pubs/101pape.pdf [http://perma.cc/6NCF-AE5M] (last visited Oct 26, 2015); EPA, *Water Quality Standards History*, http://water.epa.gov/scitech/swguidance/standards/history.cfm [http://perma.cc/PFW3-MC7A] (last visited Oct 26, 2015).

[4] *Water Permitting 101*, *supra* note 3.

[5] *Id.*

[6] *Id.*

It required states to establish water quality standards for navigable interstate waters and to develop waste load allocations to determine the amount of pollutants that could be discharged without exceeding the standards.[7] The law prohibited pollutant discharges that harmed human health or violated the water quality standards.[8]

While the Water Pollution Control Act of 1948 and Water Quality Act of 1965 ("WQA") were intended to promote and protect state water quality standards, during the period between 1948 and congressional consideration of the Clean Water Act, their harm-based enforcement scheme resulted in only one prosecution, and, by the early 1970s, it was clear that the WQA was a failure and inadequate.[9] Thus, in 1972 when Congress passed the Federal Water Pollution Control Act, now known as the Clean Water Act ("CWA"), "it changed the primary focus of federal law from the harm visited on the receiving water stream segments to end-of-pipe, technology-based permit limits."[10] Congress created the National Pollutant Discharge Elimination System ("NPDES") permit program and made it unlawful to discharge any pollutant into navigable waters of the United States unless a NPDES permit is obtained.[11] The Environmental Protection Agency ("EPA") was granted authority to establish technology-based limitations to control the discharge of pollutants from a point source and to implement pollution control programs.[12] With the focus on the control of pollutant discharges, the CWA created grant programs to assist states to fund the construction of sewage treatment plants to help control point source discharges.[13]

However, the CWA did not altogether abandon the water quality–based approach of the WQA to control water pollution.[14] It maintained the existing requirements for states to set water quality standards for surface waters within their borders based on a list of toxic pollutants and a separate list of priority pollutants.[15] The water quality standards provide

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[7] *Id.*
[8] *Id.*
[9] David Drelich, *Restoring the Cornerstone of the Clean Water Act*, 34 COLUM. J. ENVTL. L. 267, 304 (2009).
[10] *Id.*
[11] *Id.* at 304–05.
[12] *Id.* at 305.
[13] EPA, *History of the Clean Water Act*, http://www2.epa.gov/laws-regulations/history-clean-water-act [http:perma.cc/49EE-PPDM] (last visited Oct 26, 2015).
[14] *Water Permitting 101*, *supra* note 3.
[15] *Id.*; *see* EPA, *Toxic and Priority Pollutants*, http://water.epa.gov/scitech/methods/cwa/pollutants-background.cfm [http://perma.cc/W2MG-JKTF] (last visited Oct 26, 2015).

the foundation for state water quality management programs and strategies and serve the purpose of the CWA by establishing water quality goals "to restore and maintain the chemical, physical, and biological integrity of the Nation's waters."[16] Moreover, NPDES permits are required to be consistent with applicable state water quality standards, thus, creating complementary technology-based and water quality–based approaches to water pollution control.[17]

A. Water Quality Standards

The CWA requires states to adopt water quality standards (1) to "provide, wherever attainable, water quality for the protection and propagation of fish, shellfish, and wildlife and recreation in and on the water ("fishable/swimmable")"; and (2) to "consider the use and value of State waters for public water supplies, propagation of fish and wildlife, recreation, agricultural and industrial purposes, and navigation."[18] States may develop water quality standards more stringent than required by federal regulation.[19]

1. Components of Water Quality Standards

To establish water quality standards, states are required to classify the water bodies within their borders based on the expected use of those waters (designated uses), develop water quality criteria sufficient to support the designated uses, and adopt an antidegradation policy specifying the framework to be used in making decisions about proposed activities that will result in changes in water quality.[20]

The designated uses are an expression of the goals for a water body or segment.[21] EPA regulations describe various uses of waters that are desirable and must be considered when classifying a water body.[22]

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[16] 33 U.S.C. § 1251(a) (2012).
[17] *Water Permitting 101*, *supra* note 3; *see* 33 U.S.C. § 1251(g) (2012).
[18] *Water Quality Standards History*, *supra* note 3 (citing 40 C.F.R. § 131.2); NASH, *supra* note 1, at 85 (noting that water quality standards consist of (1) the designated use and (2) water quality criteria and stating that designated uses are public water supply, fish and wildlife habitat, agriculture and industrial purposes, swimming, recreation, etc.).
[19] *See* 33 U.S.C. § 1370 (2012).
[20] 40 C.F.R. § 131.6 (2013).
[21] *See* EPA, *NPDES Permit Writers' Manual*, at 6-3 (Sept. 2010), http://www.epa.gov/npdes/pubs/pwm_chapt_06.pdf [http://perma.cc/X45Q-G8RZ].
[22] 40 C.F.R. § 131.10 (2013).

The uses include "public water supplies, protection and propagation of fish, shellfish and wildlife, recreation in and on the water, agricultural, industrial, and other purposes including navigation."[23] In classifying its waters, a state should designate uses that include fishable/swimmable uses, which is the national goal established in the CWA.[24] If it does not designate a water body for fishable/swimmable uses, it must conduct a use attainability analysis for that water body, which is "a structured scientific assessment of the factors affecting the attainment of the use, including physical, chemical, biological, and economic factors."[25] A state must designate uses that it believes are attainable in the future, whether or not they are being attained.[26] They are deemed attainable "if they can be achieved by the imposition of effluent limits required under the NPDES program and cost-effective and reasonable best management practices for nonpoint source control."[27] States must consider and ensure the attainment and maintenance of water quality standards of downstream waters.[28]

"A water quality criterion establishes a threshold for a pollutant or condition, above or below which the designated uses for a water body may be threatened."[29] In setting water quality criteria to achieve, maintain, and protect the designated uses, states must base them on data and scientific judgments about pollutant concentrations and their effects on a water body.[30] If the water body supports multiple designated uses, the criteria must support the most sensitive uses.[31] EPA regulations permit the states to adopt both numeric and narrative water quality criteria.[32] Numeric criteria are developed for specific pollutants or parameters.[33] States adopt narrative criteria where numeric criteria cannot be established or to supplement numeric criteria.[34] EPA has developed recommended criteria to

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[23] *Id.* § 131.10(a) (2013).
[24] 33 U.S.C. § 1251(a)(2) (2012).
[25] 40 C.F.R. §§ 131.10(g), (j) (2013). Factors considered for the assessment include those at 40 C.F.R. § 131.10(g) (2014).
[26] *See* 40 C.F.R. §§ 131.10, 131.3(g) (2013).
[27] 40 C.F.R. § 131.10(d) (2013).
[28] 40 C.F.R. § 131.10(b) (2013).
[29] EPA, *Criteria Purpose: Establish a Risk Threshold for the Water Body*, http://water.epa.gov/learn/training/standardsacademy/mod3/page4.cfm [http://perma.cc/FXR6-7Y5P] (last visited Oct 26, 2015).
[30] 40 C.F.R. § 131.11(a) (2013).
[31] *Id.*
[32] 40 C.F.R. § 131.11(b) (2013).
[33] 33 U.S.C. § 1313(c)(2)(B) (2012).
[34] *Id.*; 40 C.F.R. § 131.11 (2013).

assist states in establishing their water quality standards.[35] Examples of numeric and narrative water quality criteria are described in Table 1 below.

TABLE 1: EXAMPLES OF NUMERIC AND NARRATIVE WATER QUALITY CRITERIA[36]

Type	Definition	Example
Numeric criteria	The maximum pollutant concentration levels in water that would still allow the water to maintain its designated use	The maximum concentration of lead that aquatic life can tolerate in a water body on a short-term (acute) basis is 65 micrograms of lead per liter of freshwater
Narrative criteria	Describe the desired conditions for a water body as being "free from" certain negative conditions	Free from excessive algae bloom
Narrative biological criteria	Describe the kind of organisms expected in a healthy water body	Capable of supporting and maintaining a balanced, integrated, adaptive community of diverse warm water aquatic organisms

The third component of a water quality standard is the antidegradation policy. States are required to adopt a policy consistent with EPA's antidegradation regulations, which provide three levels of protection[37]:

> Tier 1—Existing uses and level of water quality necessary to protect the existing uses must be maintained and protected. This level of protection applies to all surface waters.
>
> Tier 2—Where the quality of the waters (high quality) exceeds levels necessary to support propagation of fish, shellfish, and wildlife and recreation, that quality must be

[35] *See* EPA, *National Recommended Water Quality Criteria*, http://water.epa.gov/scitech/swguidance/standards/criteria/current/index.cfm [http:/perma.cc/SD7E-GTS3] (last visited Oct 26, 2015).

[36] EPA, *Water Quality Standards: Protecting Human Health and Aquatic Life* (Feb. 2011), http://water.epa.gov/scitech/swguidance/standards/upload/WQS_basic_factsheet.pdf [http://perma.cc/H9BH-XXVE].

[37] 40 C.F.R. § 131.12 (2013).

> maintained and protected unless the state finds that allowing lower water quality is necessary to accommodate important economic or social development in the area in which the waters are located. The state must adopt procedures that include intergovernmental coordination and public participation when making such findings, in accordance with the all the intergovernmental coordination and public participation provisions required in the state's continuing planning process under Section 303(e) of the CWA. If the state allows the degradation of the water quality, it must assure that the quality is adequate to protect existing uses fully and that all new and existing point sources and all cost-effective and reasonable best management practices for nonpoint source control must comply with the highest statutory and regulatory requirements.
>
> Tier 3—Water quality of outstanding national resource waters ("ONRW"), such as waters in national and state parks and wildlife refuges and waters of exceptional recreational or ecological significance, must be maintained and protected.[38]

EPA allows states flexibility in developing their antidegradation policies. Some states designate their waters under this tier system in implementing their policies while others designate a water body as Tier 2 or higher at the time when activities that would degrade the water are proposed.[39] Some states designate a water body as receiving a certain level of protection for all pollutant-related parameters; others determine the level of protection on a parameter-by-parameter basis.[40] Violating the antidegradation policy has the same consequences as violating any other aspects of the CWA's requirements for state establishment and implementation of water quality standards ("WQS").[41] EPA regulations do not define "high quality" waters or provide guidance on when waters are of exceptional recreational or ecological significance.[42] As a result, the states

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[38] *Id.*

[39] *NPDES Permit Writers' Manual*, *supra* note 21, at 6-8 to 6-9.

[40] *Id.*

[41] GEORGE CAMERON COGGINS & ROBERT L. GLICKSMAN, PUBLIC NATURAL RESOURCES LAW § 19:13 (2d ed. 2015).

[42] *See* Christie C. Morgan, *Challenges and Opportunities in Protecting Outstanding National Resource Waters*, 5 NAT. RESOURCES & ENV'T 30, 30–32; *see also* Judith M. Brawer,

adopted three approaches to addressing the antidegradation policy.[43] Some copied the EPA's terminology without further elaboration.[44] Other states developed their own criteria for determining which waters qualify as exceptional, motivated by a desire to avoid EPA interference with the state's program or by a desire to provide a degree of protection for its waters beyond what is required by the federal policy.[45] A third group attached the term "high quality" or "exceptional" to water bodies designated as federal or state wild and scenic rivers or that have an endangered species.[46]

The antidegradation policy is not a "no growth" policy. It is designed to ensure that the states engage in a process with public participation and intergovernmental coordination to make decisions on important environmental actions and that if a state decides to permit degradation of high quality waters, it does so only "to accommodate important economic or social development."[47] It also requires states to assure that any such degradation would protect existing uses and that all sources of discharge (both point sources and nonpoint sources) are adequately controlled—existing and new point sources subject to maximum controls under the regulations and nonpoint sources subject to all cost-effective and reasonable best management practices.[48]

As an example, Massachusetts has divided its surface waters into segments and classified each segment into six classes: Class A through C for inland waters and Class SA through SC for coastal and marine waters.[49] Massachusetts has established water quality criteria for chemical and biological parameters (dissolved oxygen, temperature, pH, bacteria, solids, color and turbidity, oil and grease, taste and odor) that waters in each class must meet.[50] The state has also established minimum criteria for five other parameters (aesthetics, bottom pollutants or alterations, nutrients,

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Antidegradation Policy and Outstanding National Resource Waters in the Northern Rocky Mountain States, 20 PUB. LAND & RESOURCES L. REV. 13, 20 (1999) (discussing designation of ONRWs in Montana, Idaho, and Wyoming); C. Mark Hersh, *The Clean Water Act's Antidegradation Policy and Its Role in Watershed Protection in Washington State*, 15 HASTINGS W.-NW. J. ENVTL. L. & POL'Y 217 (2009).

[43] Morgan, *supra* note 42, at 32.

[44] *Id.*

[45] *Id.*

[46] *Id.*

[47] EPA, *Water Quality Standards Handbook*, ch. 4 (1994), *available at* http://water.epa.gov/scitech/swguidance/standards/handbook/chapter04.cfm [http://perma.cc/3NBJ-XPQ2].

[48] *Id.*

[49] 314 MASS. CODE REGS. 4.05(3)–(4) (2015).

[50] *Id.* at 4.05(3).

radioactivity, and toxic pollutants) that are applicable to all waters.[51] Its antidegradation provisions establish four levels of protection against degradation of water quality.[52] In addition to the three levels prescribed in the federal regulations, Massachusetts also provides a level of protection higher than Tier 2 for Class A waters, which are "designated as a source of public water supply and their tributaries."[53] "They are designated as excellent habitat for fish, other aquatic life and wildlife . . . and for primary and secondary contact recreation."[54] They are considered outstanding resources to the state and receive a higher level of protection than Tier 2.[55] Thus, in addition to obtaining authorization under procedures that include intergovernmental coordination and public participation under the general antidegradation provisions, among other things, any new or increased discharge must be proposed for the express intent of maintaining or enhancing the resources for its designated use.[56] While Massachusetts has adopted a provision to protect special resource waters, "such as waters in national or state parks or wildlife refuges," under Tier 3 protection, it has not classified any specific water body as special resource waters.[57]

Similar to Massachusetts, Wisconsin has developed water quality standards by "determining the types of activities the water should support, developing water quality criteria to protect these uses from excess pollution, [and] establishing an antidegradation policy to maintain and protect existing uses and high quality waters."[58] Like many states, Vermont has applicable state law that interacts with federal water legislation.[59] For example, Vermont requires a basin planning process under state law.[60] At the same time, the state has experienced considerable challenges in created substantive non-narrative water quality standards (of the type discussed above) that go beyond the state's water quality policy.[61]

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[51] *Id.* at 4.05(5).
[52] *Id.* at 4.04.
[53] *Id.* at 4.05(3).
[54] *Id.*
[55] 314 MASS. CODE REGS. 4.05(3).
[56] *Id.* at 4.04(3).
[57] *Id.* at 4.04(4).
[58] Wis. Dep't of Natural Res., *Water Quality Standards*, http://dnr.wi.gov/topic/SurfaceWater/standards.html [http://perma.cc/R6SH-4VW9] (last revised Jan. 9, 2013).
[59] VT. STAT. ANN. tit. 10, § 1253 (2015).
[60] *Id.*; 40 C.F.R. § 130.6 (2013); Vt. Dep't of Envtl. Conservation, *Water Quality Standards* § 1-02 (effective Oct. 30, 2014), http://www.watershedmanagement.vt.gov/rulemaking/docs/wrprules/wsmd_wqs2014.pdf#zoom=100 [http://perma.cc/A6EP-A76X].
[61] VT. STAT. ANN. tit. 10, § 1250 (2015); *see also* Vt. Dep't of Envtl. Conservation, *Vermont*

By adopting water quality standards, states are able to determine which healthy waters need protection and which waters must be restored.

2. Total Maximum Daily Load

An important part of the water quality–based approach to protecting and cleaning up the nation's waters under the CWA is the identification of impaired water body segments and development of a mechanism to control the amount of pollutants to those segments based on the segments' conditions and the standards set to protect it. Thus, states are required to conduct monitoring of the water qualities of their own waters.[62] The monitoring provides the data to characterize waters and identify changes or trends in water quality over time. The collection of monitoring data enables states to identify existing or emerging water quality problems and determine whether current pollution control mechanisms are effective to assure compliance with water quality regulations. The Federal Water Pollution Control Act allows the EPA to set minimum criteria for state water quality standards, review state water quality standards and corresponding revisions, and apply those standards for permits under NPDES.[63] The state regulatory bodies actually set the standards themselves and apply those standards to navigable waters within the states.[64] Section 303(d) of the CWA requires the states to use the monitoring data to identify and list "'water-quality limited segments,' i.e., waters that do not meet water quality standards for a particular pollutant even after a technology-based permit is in place."[65] States must then establish a priority ranking for these impaired waters based on the severity of the

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Regulations Pertaining to Surface Water Management (2013), http://www.vtwaterquality.org/wqd_mgtplan/swms_appA.htm [http://perma.cc/KEC9-UDQ5].

[62] 33 U.S.C. § 1313 (2012); *see* Symposium, *Treating Tribes as States Under the Clean Water Act: The Good and the Bad*, 71 N.D. L. REV. 497 (1995); John S. Harbison, *The Downstream People: Treating Indian Tribes as States Under the Clean Water Act*, 71 N.D. L. REV. 473 (1995), for discussion on whether these standards should also be applied to Indian Tribes. At least one circuit has held that tribes should be required to set water quality standards for waters in their jurisdiction. *See* Montana v. EPA, 137 F.3d 1335 (9th Cir. 1998), *cert. denied*, 119 S. Ct. 275 (1998) (holding that although tribes may not normally exercise jurisdiction over nonmembers, water quality standards fall under a recognized exception for nonmember conduct that threatens or has some direct effect on the political integrity, economic security, or the health or welfare of the tribe).

[63] LINDA MALONE, ENVIRONMENTAL REGULATION OF LAND USE § 8:4 (2013).

[64] *Id.*

[65] EPA, *Overview of Impaired Waters and Total Maximum Daily Loads Program*, http://water.epa.gov/lawsregs/lawsguidance/cwa/tmdl/intro.cfm [http://perma.cc/SA2Z-7LBN] (last updated Mar. 6, 2012).

pollution and the designated uses of the waters.[66] To bring the waters into attainment of the water quality standards, states must implement an overall plan to manage the excess pollutants entering the waters through the development of total maximum daily loads ("TMDLs") for every water body/pollutant combination on the 303(d) list.[67]

A TMDL is a calculation of the maximum amount of a pollutant that a water body can receive and still safely meet water quality standards and an allocation of that amount to a pollutant's sources.[68] The TMDL is essentially a "pollution budget."[69] This budget is then allocated to the pollutant sources. It is a tool for implementing state water quality standards and is based on the relationship between pollution sources and in-stream water quality conditions. By quantifying the assimilative capacity of a water body and determining the pollutants' sources and how much each source can contribute to the water body without exceeding and degrading its water quality, the TMDL contributes to the establishment of water quality–based controls to reduce pollution sufficient for the water body to meet water quality standards.[70]

When identifying the 303(d) waters, states are required to identify the causes of the impairment for specific parameters or categories (e.g., nutrient overloading, metals, pathogens, etc.) for each water body segment listed and the sources of the impairment (e.g., industrial point sources, municipal point sources, combined sewer overflow, agriculture, etc.). A state must also provide adequate documentation to support the listing of waters. Documentation for listing should provide a description of the methodologies used to develop the list and a description of the data and information used to identify water quality–limited waters.

States are required to target the high priority waters for TMDL development within two years after they are listed.[71] In order to effectively develop and implement TMDLs for all waters identified, states may establish multi-year schedules that take into consideration the immediate TMDL development for targeted water bodies and the long-range planning for addressing all water quality–limited waters still requiring TMDLs.[72]

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[66] 33 U.S.C. § 1313 (2012).

[67] *Id.*; *see also* Friends of Pinto Creek v. EPA, 504 F.3d 1007, 1011 (9th Cir. 2007).

[68] *See* 40 C.F.R. § 130.2(i) (2003).

[69] Conservation Law Found., Inc. v. EPA, 964 F. Supp. 2d 175, 179–89 (D. Mass. 2013).

[70] *Id.* at 179–80.

[71] 40 C.F.R. § 130.7(d) (2012).

[72] Sierra Club v. EPA, 162 F. Supp. 2d 406, 418 (D. Md. 2011); Natural Res. Def. Council v. Fox, 93 F. Supp. 2d 531, 539 (S.D.N.Y. 2000); Sierra Club v. Browner, 843 F. Supp. 1304, 1313–14 (D. Minn. 1993); *cf.* Scott v. City Hammond, 741 F.2d 992, 996 (1984)

A state determines the TMDL for an impaired water body by conducting the following activities:

- Selection of the pollutant of concern.
- Estimation of the waterbody assimilative capacity.
- Estimation of the pollution from all sources to the waterbody.
- Predictive analysis of pollution in the waterbody and determination of total allowable pollution load.
- Allocation (with a margin of safety) of the allowable pollution among the different pollution sources in a manner that water quality standards are achieved.[73]

This is an involved process that is technically complex. EPA has estimated that typically, it takes approximately three to five years to develop a TMDL from the point when data gathering begins.[74] A state agency may need to hire consultants to study the characteristics of the water body and collect monitoring data on water quality to study the health of the water body and to determine its assimilative capacity for the pollutant or groups of pollutants of concern.[75] The state will need to collect information about the various sources of pollution (both point source and nonpoint source), including background sources, and the extent of their contribution. In addition, the state employs various models to analyze the assimilative capacity of the water body and determine the maximum allowable loading capacity or the TMDL of the water body.[76]

Once a state determines the TMDL, it then allocates the TMDL to point sources, nonpoint sources, and natural background sources. The portion of the water body's allowable loading capacity allocated to activities or sources that lead to end-of-pipe discharges (point sources) is called the wasteload allocations or WLAs; and the portion allocated to activities or sources that result in land runoff, drainage or seepage to a water body,

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(finding state's failure to submit a TMDL for a long period of time could constitute a "constructive submission of no TMDL" triggering EPA's action to approve or disapprove the no TMDL submission).

[73] EPA, *Guidance for Water Quality–Based Decisions: The TMDL Process* ch. 3, http://water.epa.gov/lawsregs/lawsguidance/cwa/tmdl/dec3.cfm [http://perma.cc/3VCM-FYHV] (last updated Mar. 6, 2012).

[74] Anacostia Riverkeeper, Inc. v. Jackson, 713 F. Supp. 2d 50, 53 (D.D.C. 2010).

[75] *Third-Party TMDL Development*, WATER ENV'T FED'N 7 (2007), http://water.epa.gov/lawsregs/lawsguidance/cwa/tmdl/upload/ToolKitWebVersion.pdf [http://perma.cc/PUK7-DXZN].

[76] *See* EPA, *TMDL Modeling Toolbox*, http://www.epa.gov/athens/wwqtsc/Toolbox-overview.pdf [http://perma.cc/6TL3-JZTU].

such as logging or land drainage (nonpoint sources), and natural background is called the load allocations or LAs.[77] The TMDLs must be set at a level to meet water quality standards "with seasonal variations and a margin of safety which takes into account any lack of knowledge concerning the relationship between effluent limitations and water quality."[78] Thus, the TMDL is the sum of WLAs, LAs, and margin of safety. The state then is required to submit the TMDL to EPA for approval.[79]

WLAs and LAs are not mandated in the CWA. They are created by EPA regulations.[80] EPA's regulations instruct that a WLA should be assigned to "one of [the water body's] existing or future point sources of pollution. WLAs constitute a type of water quality–based effluent limitation."[81] LAs should be assigned to "one of its existing or future nonpoint sources of pollution or to natural background sources. [LAs] are best estimates of loading, which may range from reasonable accurate estimates to gross allotments, depending on availability of data and appropriate techniques for predicting the loading."[82] Interpreting the WLAs and LAs regulations, courts have given great deference to EPA in approving TMDLs and their associated WLAs and LAs. In one case, the U.S. District Court for the District of Columbia found that EPA had acted reasonably in approving the pollutant load allocation scheme for a TMDL for sediment and total suspended solids for the Anacostia River.[83] A portion of the WLAs was assigned to individual point sources, such as industrial sources and water treatment facilities, and the remainder portion was assigned to three separate municipal sewer and storm drainage systems ("MS4s"); the LAs were assigned to forest and other underdeveloped lands.[84] The plaintiff in that case challenged the portion of the WLAs assigned to an entire system of MS4, rather than each individual discharge point within the system.[85] In affirming EPA's decision on this issue, the court reasoned that since each MS4 (even though it had many individual outflow points) was regulated by one single entity, which received a single NPDES permit, EPA could impose on each MS4 permit recipient through the permitting process the responsibility of suballocating the WLA throughout the MS4

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[77] *See* 40 C.F.R. § 130.2 (2012).
[78] 33 U.S.C. § 1313 (2012).
[79] 40 C.F.R. § 130.7.
[80] *Id.*
[81] 40 C.F.R. § 130.2(g).
[82] 40 C.F.R. §130.2(h).
[83] *Anacostia Riverkeeper*, 798 F. Supp. 2d at 213.
[84] *Id.* at 219 n.4, 248.
[85] *Id.* at 221.

to individual point sources.[86] Thus, the WLAs for MS4 need not be further assigned to individual discharge points within the system.[87]

In another case, a U.S. District Court in Pennsylvania affirmed a TMDL that EPA established for Chesapeake Bay where a portion of the WLAs were assigned to categories of discharge, i.e., regulated agriculture discharges and stormwater discharges, while the other portions of the WLAs were assigned to individual permitted sources. The LAs were broken down into agriculture, forest, nontidal atmospheric deposition, onsite septic, and urban.[88]

Depending on the sources of pollutant discharges to a water body, WLAs may be distributed to categories of sources or individual facilities. For example, in determining the TMDL of phosphorus for a pond, the Massachusetts Department of Environmental Protection ("MassDEP") distributed the WLAs to general storm flow and to two industrial facilities that discharged stormwater to the water body pursuant to two NPDES permits.[89] To control phosphorus discharges to another water body, MassDEP allocated WLAs to categories of discharges, e.g., residential (high density) sources and commercial/industrial sources.[90]

Although the CWA refers to "daily" load, EPA regulations provide that TMDLs "can be expressed in terms of either mass per time, toxicity, or other appropriate measure."[91] The Second Circuit of the U.S. Court of Appeals affirmed EPA's interpretation that TMDL need not be expressed in "daily" load where "an alternative measure best serves the purpose of effective regulation of pollutant levels in waterbodies."[92] However, the D.C. Circuit Court of Appeals later disagreed and held that the "daily" language in the CWA was unambiguous and requires that the TMDL be measured on a daily basis.[93] In response to this opinion, EPA issued guidance on

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[86] *Id.* at 250.

[87] *Id.*

[88] Am. Farm Bureau Fed'n v. EPA, 984 F. Supp. 2d. 289, 316 (M.D. Pa. 2013); *see also* EPA, *Chesapeake Bay Total Maximum Daily Load for Nitrogen, Phosphorus and Sediment* (2010), http://www.epa.gov/reg3wapd/pdf/pdf_chesbay/FinalBayTMDL/CbayFinalTMDLExecSumSection1through3_final.pdf [http://perma.cc/NMH2-C8PJ].

[89] Mass. Dep't Envtl. Prot., *Total Maximum Daily Load of Phosphorus for Lake Quinsigamond and Flint Pond*, at 15 (May 14, 2002), http://www.mass.gov/eea/docs/dep/water/resources/n-thru-y/quinsig.pdf [http://perma.cc/3JMB-Y5AR].

[90] Mass. Dep't Envtl. Prot., *Total Maximum Daily Load of Phosphorus for Leesville Pond*, at 8 (May 14, 2002), http://www.mass.gov/eea/docs/dep/water/resources/a-thru-m/leesvill.pdf [http://perma.cc/PF53-32NQ].

[91] 40 C.F.R. § 130.2(i) (2012).

[92] Natural Res. Def. Council v. Muszynski, 268 F.3d 91, 99 (2d Cir. 2001).

[93] Friends of the Earth, Inc. v. EPA, 446 F.3d 140, 145–46 (D.C. Cir. 2006).

the development of TMDLs. In that guidance, EPA explains that it does not believe that the D.C. Circuit opinion "requires any changes to EPA's existing policy and guidance describing how a TMDL's wasteload allocations are implemented in the NPDES permits."[94] However, it recommends that "all TMDLs and associated load allocations and wasteload allocations be expressed in terms of daily time increments."[95]

The TMDL applies to all impaired water bodies whether the impairment is caused by point sources, nonpoint sources, or both. The Ninth Circuit Court of Appeals affirmed EPA's interpretation that TMDL requirements applied to a water body that was polluted solely by nonpoint sources.[96]

For instances of limited existing data, EPA has developed guidance on phased TMDLs to enable states to gather "additional data or data based on better analytical techniques [that] would likely increase the accuracy of the TMDL load calculation."[97] Like regular TMDLs, all phased TMDLs must include load allocations, wasteload allocations and a margin of safety, and must be established to attain and maintain the applicable water quality standard.[98] In addition, submissions to EPA for review and approval of a phased TMDL should include a monitoring plan and a timeframe for revision of the TMDL.[99] The TMDL is not self-implementing.[100] It provides information to EPA and states to coordinate necessary responses to pollution in order to bring the water body back into compliance with the applicable water quality standards.[101] The TMDLs—and the WLAs in

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[94] Memorandum from Benjamin H. Grumbles, Assistant Administrator to Regional Directors, Establishing TMDL "Daily" Loads in Light of the Decision by the U.S. Court of Appeals for the D.C. Circuit in *Friends of the Earth, Inc. v. EPA*, No. 05-5015 (Apr. 25, 2006), and Implications, for NPDES Permits, EPA (Nov. 15, 2006), http://water.epa.gov/lawsregs/lawsguidance/cwa/tmdl/dailyloadsguidance.cfm [http://perma.cc/Y458-8776].

[95] *Id.*

[96] Pronsolino v. Nastri, 291 F.3d 1123, 1135–39 (9th Cir. 2002), *cert. denied*, 123 S. Ct. 2573 (2003). In this case, California listed a river as impaired and established a TMDL for sediments in that river, which included LAs for, among other things, timber-harvesting and erosion from roads. *Id.* Owners of land within the river's watershed who received logging permits imposing logging restrictions to control sediment runoff, challenged TMDL on the grounds that EPA lacked authority to impose TMDLs on rivers polluted solely by nonpoint sources. *Id.*

[97] Memorandum from Benita Best-Wong, Director of Assessment and Watershed Protection Division to Regional Water Division Directors (Aug. 2, 2006), http://water.epa.gov/lawsregs/lawsguidance/cwa/tmdl/tmdl_clarification_letter.cfm [http://perma.cc/52NW-H2X5].

[98] *Id.*

[99] *Id.*

[100] *Anacostia Riverkeeper*, 798 F. Supp. at 216.

[101] *Pronsolino*, 291 F.3d at 1129.

particular—inform the establishment of effluent limitations in permits for point sources under the NPDES program.[102] WLAs provide a "supplementary basis [for permit limits] so that numerous point sources, despite individual compliance with effluent limitations, may be further regulated to prevent water quality from falling below acceptable levels."[103]

The CWA does not regulate nonpoint sources, but requires the states to develop a water quality management plan to control nonpoint sources. The plan must "describe the regulatory and non-regulatory programs, activities and Best Management Practices (BMPs) which the agency has selected as the means to control nonpoint source pollution where necessary to protect or achieve approved water uses."[104] The TMDLs, and the LAs in particular, inform the process of developing this plan.[105] It is up the states to determine how to implement the plan to control nonpoint sources.[106] The CWA provides financial incentives to encourage the states in this effort.[107]

States' nonpoint source management plans are many and diverse. They may include regulatory or nonregulatory programs for enforcement, technical assistance, financial assistance, education, training, technology transfer, and demonstration projects.[108] For example, Massachusetts developed a nonpoint source management plan in 2000 that includes the following components:

> 1. Provide regional guidance and assistance to the watershed teams and public to:
>
> a. identify and prioritize NPS [nonpoint source] problems in each watershed,
>
> b. develop specific grant proposals for implementation projects, and
>
> c. target funding to these priorities to address and remediate NPS impacts to water quality.

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[102] *See infra* Part II.B.2; *see also Am. Farm Bureau Fed'n*, 984 F. Supp. 2d at 328 ("WLAs are not permit limits per se; rather they still require translation into permit limits") (quoting In re City of Moscow, Idaho, 10 E.A.D. 135, 146–47 (July 27, 2001)).

[103] *Anacostia Riverkeeper*, 798 F. Supp. at 216 (quoting Raymond Proffitt Found. v. EPA, 930 F. Supp. 1088, 1090 (E.D. Pa. 1996)) (changes in original).

[104] 40 C.F.R. § 130.6(b)(4) (2003).

[105] *Id.*

[106] *Pronsolino*, 291 F.3d at 1128–29.

[107] *Id.*; 33 U.S.C. § 1329(h)(1) (2015).

[108] *See* EPA, *Development and Implementation of the TMDL* (2014), http://water.epa.gov/lawsregs/lawsguidance/cwa/tmdl/dec3.cfm [http://perma.cc/2X7A-Y4VF].

2. Integrate NPS strategic actions into the Massachusetts Watershed Initiative ("MWI") to achieve more targeted implementation.
3. Integrate Total Maximum Daily Load (TMDL) recommendations (which are mostly NPS BMPs) into the MWI to achieve effective implementation by the watershed teams and municipalities and thus attain water quality standards in the state's impaired water bodies.
4. Identify short and long-term strategies for both the NPS [CWA] Section 319 Program and the Coastal Section 6217 NPS Program and effectuate their implementation through specific segment-by-segment analysis and subsequent remediation by the watershed teams and [MassDEP].[109]

The plan encompasses collaborative efforts with municipalities and local communities to implement program plans to control nonpoint sources.[110] In addition, Massachusetts's stormwater and onsite wastewater (septic systems) permitting programs, which are part of this plan, provide the regulatory enforcement mechanisms for the control of nonpoint source pollution. In Massachusetts, stormwater runoff from all industrial, commercial, institutional, office, residential, and transportation projects that discharges to wetlands are subject to regulation under the Wetlands Protection Act.[111] Massachusetts has developed a set of stormwater management standards that require the use of BMPs.[112] In cases where the

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[109] *Massachusetts Nonpoint Source Management Program Plan, 2014–2019*, at vii–2 (Aug. 29, 2014), http://www.mass.gov/eea/docs/dep/water/resources/n-thru-y/npsmp.pdf [http://perma.cc/7T6M-6UCC].

[110] *Id.*

[111] MASS. GEN. LAWS. ch. 131, § 40; 310 MASS. CODE REGS. 10.05(k) (2014). Until 1987, when Congress added section 402(p) to the CWA, 33 U.S.C. § 1342(p), stormwater runoff was not regulated as point source discharges and did not require a NPDES permit. Pursuant to that section, EPA promulgated regulations at 40 C.F.R. §§ 122.26, 122.32–122.37 to regulate as point sources, and therefore require a NPDES permit for certain stormwater discharges—discharges associated with industrial activity, from a municipal separate storm sewer system ("MS4"), and from small construction activities that disturbs greater than one acre of land. All other stormwater runoff not regulated under the NPDES program is regulated as nonpoint sources by the states. In Massachusetts, for stormwater runoff that is regulated as point sources under the federal CWA, the NPDES permit conditions for such discharges are presumed to comply with the Massachusetts Wetlands Protection Act and are incorporated into a wetlands order of conditions. 310 MASS. CODE REGS. 10.03(4) (2014).

[112] 310 MASS. CODE REGS. 10.05(k) (2014).

discharge goes to a water body with an approved TMDL, the standards require that BMPs selected must be consistent with the TMDL.[113] Once BMPs are incorporated into a wetlands order of conditions, they are enforceable under the Wetlands Protection Act, which provides for civil and criminal enforcement of a wetlands order of conditions.[114] Septic systems are subject to construction permit requirements, which are enforceable under the Massachusetts Clean Waters Act, providing also for civil and criminal enforcement.[115]

The TMDL is a mechanism for integrating the management of both the point and nonpoint pollution sources. States must ensure public participation in the development and implementation of TMDLs. However, the biggest challenge facing the establishment of the TMDL is that it is data intensive.[116] Compliance with the 303(d) requirements after 1972 amendment was very slow, leading to citizen suits forcing EPA to require states to list 303(d) waters and set a schedule to establish TMDLs.[117] Despite the delay in implementing Section 303(d), more than 47,000 TMDLs have been completed throughout the United States.[118]

3. State Continuing Planning Process and Federal Approval Process

In addition to requiring states to adopt standards for water quality, the CWA also requires states to review such standards at least every three years (triennial review).[119] Whenever a state revises a water quality standard, or adopts a new standard, such revised or new standard must be submitted to the EPA.[120] EPA will review and approve or disapprove

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[113] Massachusetts Stormwater Handbook, *Stormwater Management Standards*, http://www.mass.gov/eea/docs/dep/water/laws/i-thru-z/v1c1.doc [http://perma.cc/32Z5-C8VB].

[114] MASS. GEN. LAWS. ch. 131, § 40 (2015).

[115] *Id.* at ch. 21, §§ 42–43 (2015); 310 MASS. CODE REGS. 15.025 (2014).

[116] *Am. Farm Bureau Fed'n*, 984 F. Supp. 2d at 305.

[117] *Id.* (EPA ignored the § 303(d) requirement until environmental groups began bringing citizens suits against EPA for inadequately implementing § 303(d) and TMDL requirements) (citing Scott v. City of Hammond, 741 F.2d 992, 996 (7th Cir. 1984) (finding a state's prolonged failure to submit TMDL to EPA for review and approval was constructive submission of no TMDL requiring EPA to issue a TMDL); Alaska Ctr. for the Env't v. Browner, 20 F.2d 981 (9th Cir. 1994); Idaho Sportsmen's Coal. v. Browner, 951 F. Supp. 962 (W.D. Wash. 1996)).

[118] *Am. Farm Bureau Fed'n*, 984 F. Supp. 2d at 303.

[119] 33 U.S.C. § 1313(c)(1) (2000); *see also* John A. Chilson, *Keeping Clean Waters Clean: Making the Clean Water Act's Antidegradation Policy Work*, 32 U. MICH. J.L. REFORM 545, 552 (1999).

[120] The EPA has 60 days from the date of submission to review the revised or new water quality standard, and if approved, it becomes the water quality standard for the applicable

state-adopted water quality standards.[121] EPA may also promulgate a new or revised standard when necessary to meet the requirements of the CWA.[122] If the standards are disapproved, the state's existing water quality standards that were approved by EPA in the previous round of review remain in effect until the state revises them or until EPA promulgates standards to supersede the state standards.[123] States are also required to submit the 303(d) list of impaired waters and their TMDL to EPA for approval.[124] If EPA disapproves the list or the TMDL, it will identify the impaired waters and establish the TMDL.[125] Once the TMDL is approved or set by EPA, it is incorporated into the state's water quality management plan.[126]

EPA's responsibility to review state water quality standards includes the obligation to review the scientific validity of specific criteria values.[127]

> In theory, this assessment of scientific validity should be simple; EPA must determine whether the criteria will support the designated use. While the establishment of designated uses is a social and political question, the determination of appropriate criteria values is, at least conceptually, a purely scientific one. The only issue relevant in determining a criteria value is whether a water body with a given ambient concentration of a pollutant or pollutants can still support the designated use. Economic attainability of the limitations that the value requires is irrelevant.[128]

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waters of that state. If the EPA determines, however, that the revised or new standard is not consistent with the applicable requirements of the CWA, the EPA has 90 days from the date of submission of such standard to notify the state and specify the changes to meet such requirements. Any new or revised state standard must be accompanied by some type of supporting analysis. If such changes are not adopted by the state within 90 days after the date of notification, the EPA must promulgate the standard. 33 U.S.C. § 1313(c)(2)–(4) (2012).

[121] 33 U.S.C. § 1313(c)(4) (2012).

[122] 40 C.F.R. § 131.5(a) (2013).

[123] This applies to state water quality standards submitted to EPA for approval on or after May 30, 2000. State water quality standards submitted to EPA for approval prior to May 30, 2000, became effective until replaced by federal water quality standards or approved state standards. *See* 40 C.F.R. § 131.21(a)–(c) (2013).

[124] *Am. Farm Bureau Fed'n*, 984 F. Supp. 2d at 297.

[125] *Id.* at 298; 33 U.S.C. § 1313(d)(2) (2012).

[126] 33 U.S.C. § 1313(d)(2) (2012).

[127] Jeffrey M. Gaba, *Federal Supervision of State Water Quality Standards Under the Clean Water Act*, 36 VAND. L. REV. 1167, 1209–10 (1983).

[128] *Id.*

The CWA also requires that each state monitor and assess the health of all their waters and report their findings every two years to EPA. This list of data and findings is called the 305(b) Report or Biennial Water Quality Report.[129]

In addition, the CWA requires the states to engage in a continuing planning process ("CPP") reviewable by EPA for consistency with the CWA.[130] While states are responsible for managing their water quality programs, they are required to submit the programs' planning process to EPA for approval. At a minimum, the CPP must include, among other things, a description of the process for developing effluent limitations and schedules of compliance, the process of incorporating elements of areawide waste treatment plans, process for developing the TMDL, process for updating the water quality management plans, process for assuring adequate intergovernmental cooperation in the implementation of the water quality management plan, and process for establishing and implementing new or revised water quality standards.[131] The CPP should result in state plans to develop procedures and schedules to review and revise, if necessary, the water quality standards and the TMDL periodically and to develop control measures to implement the standards, such as the water quality management plan.[132] The primary purpose of these plans—and the water quality management plans in particular—is "to combat nonpoint sources of pollution."[133] The elements of the water quality management plans include the TMDLs established for impaired waters, effluent limitations and schedules for compliance, identification for construction of municipal and industrial waste treatment works and programs to provide necessary financial arrangements for these treatment works, regulatory and nonregulatory programs to control and manage nonpoint sources, identification of agencies to carry out the plan elements, and identification of implementation measures including financing.[134] The CPP ensures that states are engaged in a dynamic process of identifying critical water bodies, developing plans to abate water quality problems, and identifying control measures to achieve water quality goals.[135]

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[129] 33 U.S.C. § 1315.305(b) (2012).
[130] 33 U.S.C. § 1313(e) (2012); *see also* Environmental Defense Fund, Inc. v. Costle, 657 F.2d 275, 296 (D.C. Cir. 1981).
[131] *Costle*, 657 F.2d at 296.
[132] 40 C.F.R. § 130.5(b) (2011).
[133] *Costle*, 657 F.2d at 296.
[134] *Id.*
[135] 40 C.F.R. § 130.6(c).

Figure 1: Water Quality–Based Approach to Pollution Control[136]

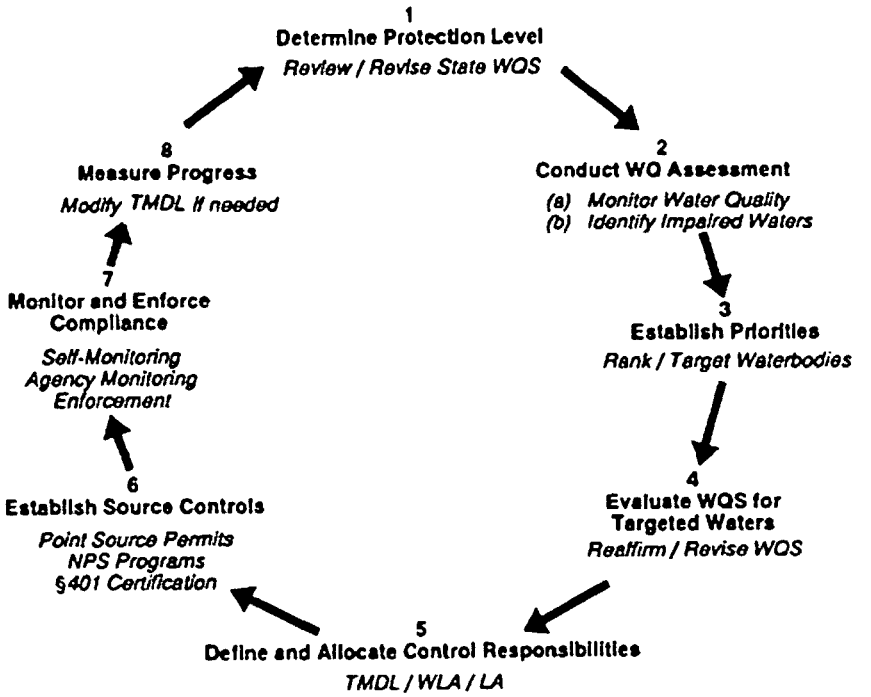

Figure 1 describes the overall water quality–based approach and how the different CWA programs fit into the overall water quality–based approach:

1) "Determining Protection Level": involves State development of water quality standards.
2) "Monitoring and Assessing Water Quality": States identify impaired waters, determine if water quality standards are being met, and detect pollution trends. Sections of the Clean Water Act require States to compile data, assess, and report on the status of their water bodies. States generally use existing information and new data collected from ongoing monitoring programs to assess their waters.
3) "Establishing Priorities": States rank water bodies according to the severity of the pollution, the uses

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[136] *Id.*

to be made of the waters, and other social-economic considerations, and determine how best to utilize available resources to solve problems.

4) "Evaluating WQS for Targeted Waters": the appropriateness of the water quality standards for specific waters is evaluated. States may revise or reaffirm their water quality standards. A State may choose, for example, to develop site-specific criteria for a particular stream because a particular species needs to be protected.

5) "Defining and Allocating Control Responsibilities": the level of control needed to meet water quality standards is established, and control responsibilities are defined and allocated. States use mathematical models and/or monitoring to determine TMDLs for impaired water bodies; the TMDLs include waste load allocations ("WLAs") for point sources, load allocations ("LA[s]") for nonpoint sources, and a margin of safety. The TMDL is the amount of a pollutant of concern that may be discharged into a water body and still maintain water quality standards. Pollutant loadings above this amount generally will result in waters exceeding the standards. Allocations for pollution limits for point and nonpoint sources are calculated to ensure that water quality standards are not exceeded.

6) "Establishing Source Control": States and EPA implement point source controls through NPDES permits, State and local governments implement nonpoint source management programs through State laws and local ordinances, and States assure attainment of water quality standards through the CWA section 401 certification process [which requires that an applicant for a federal license or permit provide a certification that any discharges from the facility will comply with the CWA, including water quality standard requirements, empowering states to impose conditions upon federal permits through the certification, or deny federal permits or licenses by withholding certification].

7) "Monitoring and Enforcing Compliance": States (or EPA) evaluate self-monitoring data reported by dischargers to see that the conditions of the NPDES permit ar[e] being met and take actions against any violators. Dischargers are monitored to determine whether or not they meet permit conditions and to ensure that expected water quality improvements are achieved. State to Pollution Control nonpoint source programs are monitored and enforced under State law and to the extent provided by State law.

8) "Measuring Progress": the States (and EPA) assess the effectiveness of the controls and determine whether water quality standards have been attained, water quality standards need to be revised, or more stringent controls should be applied.[137]

B. National Pollutant Discharge Elimination System ("NPDES")

The NPDES program applies to discharges from point sources only.[138] It requires all facilities to obtain a permit before discharging a pollutant from a point source into the waters of the United States.[139] EPA defines the waters of the United States to include "[a]ll navigable waters of the United States; tributaries of navigable waters of the United States; interstate waters; intrastate lakes, rivers, and streams . . . ."[140]

A pollutant is defined as "dredged spoil, solid waste, incinerator residue, sewage, garbage, sewage sludge, munitions, chemical waters, biological materials, radioactive material, heat, wrecked or discarded equipment, rock, sand, cellar dirt and industrial, municipal, and agricultural waste discharged into water."[141] EPA has grouped pollutants into three general categories—conventional, toxic, and nonconventional.[142] Conventional pollutants are five day biochemical oxygen demand ("BOD_5"), total suspended solids ("TSS"), fecal coliform, pH, and oil and grease.[143] EPA has designated sixty-five pollutants and classes of pollutants as toxic pollutants, of which 129 specific substances containing those pollutants have

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[137] EPA, *Water Quality Handbook*, ch. 7, http://water.epa.gov/scitech/swguidance/standards/handbook/chapter07.cfm [http://perma.cc/ZD6G-WEA9].
[138] *See* 33 U.S.C. § 1311(e).
[139] *See* 33 U.S.C. § 1342.
[140] 40 C.F.R. § 401.11(l) (2014).
[141] 33 U.S.C. § 1362(6); 40 C.F.R. § 401.11(f) (2014).
[142] *See* 33 U.S.C. §§ 1314(b)(4) (conventional), 1317(a)(1) (toxic), 1311(g) (nonconventional).
[143] 33 U.S.C. § 1314(a)(4); 40 C.F.R. § 401.16 (2014).

been designated priority toxic pollutants.[144] Nonconventional pollutants are those which do not fall within either of these categories, and include chlorine, ammonia, nitrogen, phosphorus, chemical oxygen demand ("COD"), and whole effluent toxicity ("WET").[145]

A discharge may come from direct or indirect sources. Direct sources discharge wastewater directly to the receiving water body while indirect sources are those that discharge wastewater to a publicly owned treatment works ("POTW"), which treats and then discharges the wastewater to the receiving water body. Only direct point source discharges are required to obtain a NPDES permit.[146] POTWs are the largest category of direct point source dischargers. Other typical point sources subject to the NPDES requirements include industrial facilities and certain collected and/or channeled stormwater discharges.[147] Indirect industrial and commercial dischargers to a POTW are subject to the National Pretreatment Program,[148] which requires POTWs to develop and implement pretreatment programs as part of the NPDES permitting process to control pollutants from industrial and commercial users that may pass through or interfere with the POTW treatment processes.[149]

The NPDES permit requires two levels of pollution control: technology-based limits and water quality–based limits, if technology-based limits are not sufficient to avoid violations of water quality standards in the receiving water body.[150]

1. Technology-Based Effluent Limitations

Technology-based limits for point sources are not environmental quality standards, but are based on the capabilities of the technologies available to treat the discharges:

> Although Congress has varied the stringency of the applicable effluent limitations over time, they have always been technology-based standards .... [T]echnology-based standards are not necessarily standards that require the

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[144] *See* 40 C.F.R. § 401.15 (2014); 40 C.F.R. pt. 423, Appendix A (2014).
[145] *Water Permitting 101*, *supra* note 3, at 5.
[146] *Id.*
[147] *Id.* at 4.
[148] 40 C.F.R. § 403 (2014) (General Pretreatment Regulations for Existing and New Sources).
[149] EPA, *Introduction to the National Pretreatment Program*, at 2-2, http://www.epa.gov/npdes/pubs/pretreatment_program_intro_2011.pdf [http://perma.cc/PFP7-9SSD].
[150] *Water Permitting 101*, *supra* note 3, at 2.

> installation of particular technology. The Clean Water Act effluent limitations fall into this category. Instead, the laws (and regulations thereunder) identify standards based in a particular part of technology (for example, the "best available technology economically feasible") for each class of polluter. They then determine a standard of pollution reduction that that technology can achieve and require all polluters in that class to attain that standard, whether by installing that technology or otherwise.[151]

The CWA required that POTWs, the largest category of dischargers, meet effluent limitations based on secondary treatment by July 1, 1977.[152] EPA established the secondary treatment standards based on "an evaluation of performance data for POTWs practicing a combination of physical and biological treatment to remove biodegradable organics and suspended solids."[153] The secondary treatment standards are listed in Table 2 below.

TABLE 2: SECONDARY TREATMENT STANDARDS[154]

Parameter	30-Day Average	7-Day Average
BOD_5	30 mg/L (or 25 mg/L 5 day carbonaceous biochemical oxygen demand [$CBOD_5$])	45 mg/L (or 40 mg/L $CBOD_5$)
TSS	30 mg/L	45 mg/L
BOD_5 and TSS removal (concentration)	not less than 85%	—
pH	within the limits of 6.0–9.0*	

** unless the POTW demonstrates that: (1) inorganic chemicals are not added to the waste stream as part of the treatment process; and (2) contributions*

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[151] NASH, *supra* note 1, at 81.
[152] 33 U.S.C. § 1311(b)(1)(B).
[153] *NPDES Permit Writers' Manual*, *supra* note 21, at 5-2.
[154] *Id.*; *see also* 40 C.F.R. § 133.102 (2014). EPA has also established standards for treatment equivalent to secondary treatment at 40 C.F.R. § 133.105 (2014) for facilities using certain treatment processes that it deems to be equivalent. The secondary treatment standards can be adjusted based on special considerations. *See* 40 C.F.R. § 133.103 (2014).

from industrial sources do not cause the pH of the effluent to be less than 6.0 or greater than 9.0 mg/L = milligrams per liter.

The CWA of 1972 and its subsequent amendments required that all existing direct industrial (non-POTW) dischargers comply with increasingly stringent effluent limitations in two steps. The first step required that all such dischargers meet standards based on "the application of the best practicable control technology currently available" ("BPT") for all pollutants by July 1, 1977.[155] The second step required that they meet standards based on the "application of best available technology economically achievable" ("BAT") for toxic and nonconventional pollutants and "best conventional pollutant control technology" ("BCT") for conventional pollutants by March 31, 1989.[156]

The CWA imposes more stringent standards for sources that begin construction following the promulgation of the proposed standards for new sources.[157] They are required to attain a certain level of control, "which reflects the greatest degree of effluent reduction which [EPA] determines to be achievable through application of the best available demonstrated control technology, processes, operating methods, or other alternatives."[158] These new source performance standards ("NSPS") represent the most stringent controls attainable as new sources have the opportunity to install the best and most efficient production processes and wastewater treatment technologies at the time of construction. EPA has developed NSPS for the existing point source categories.[159]

Thus, the industrial wastewater dischargers are subject to the following levels of control:

Type of Sites Regulated	BPT	BCT	BAT	NSPS
Existing Direct Dischargers	X	X	X	
New Direct Dischargers				X
Existing Indirect Dischargers				
New Indirect Dischargers				

[155] 33 U.S.C. § 1311(b)(1)(A).
[156] 33. U.S.C. §§ 1311(b)(2)(C), (D), (F) (toxic and nonconventional pollutants), (E) (conventional pollutants).
[157] *See* 33 U.S.C. § 1316.
[158] *Id.* § 1316(a).
[159] *See, e.g.*, 40 C.F.R. § 407.15 (2014) (apple juice subcategory).

Pollutants Regulated	BPT	BCT	BAT	NSPS
Toxic Pollutants	X		X	X
Nonconventional Pollutants	X		X	X
Conventional Pollutants	X	X		X

BPT is the baseline of controls applicable in all circumstances for existing sources and is not replaced by BCT or BAT.[160] EPA defined BPT as "the average of the best performance by well operating plants within each industry category or subcategory."[161] In determining the control measures and practices to be applicable to a facility within a category or subcategory, EPA considers "the total cost of application of technology in relation to the effluent reduction benefits to be achieved from such application."[162] In conducting this cost-benefit analysis, EPA may determine that a technology is not BPT "only when the costs are 'wholly disproportionate' to the potential effluent-reduction benefits."[163]

BAT applies to toxic and nonconventional pollutants.[164] "BAT represents, at a minimum, the best economically achievable performance in the industrial category or subcategory."[165] It requires use of more stringent technology that is "both technically available and economically achievable."[166] EPA defined BAT as "the performance associated with the best control measures and practices that have been, or are capable of being, achieved."[167] While EPA is also required to consider the cost of achieving the required effluent reductions in determining the BAT standards for an industrial category or subcategories, it is not required to balance the cost against the reduction benefits of using BAT.[168]

"The BCT provisions were intended to establish an intermediate level between BPT and the stricter BAT limitations for conventional pollutants."[169] Like for BPT, EPA also considers:

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[160] Chemical Mfrs. Ass'n v. EPA, 870 F.2d 177, 207 (5th Cir. 1989).
[161] *Water Permitting 101, supra* note 3, at 3.
[162] 33 U.S.C. § 1314(b)(1)(B).
[163] Rybachek v. EPA, 904 F.2d 1276, 1289 (9th Cir. 1990) (quoting *Chemical Mfrs. Ass'n*, 870 F.2d at 205).
[164] *See* 33 U.S.C. § 1311.
[165] BP Exploration & Oil, Inc. v. EPA, 66 F.3d 784, 790 (6th Cir. 1995).
[166] *Id.*
[167] *Water Permitting 101, supra* note 3, at 3.
[168] *See* 33 U.S.C. § 1314(b)(2)(B); *see also* EPA v. Nat'l Crushed Stone Ass'n, 449 U.S. 64, 69 (1980); *Rybachek*, 904 F.2d at 1290–91; *Water Permitting 101, supra* note 3, at 3.
[169] *Chemical Mfrs. Ass'n*, 870 F.2d at 205.

> [T]he reasonableness of the relationship between the cost of attaining a reduction in effluents and the effluent reduction benefits derived, and the comparison of the cost and level of reduction of such pollutants from the discharge from publicly owned treatment works to the cost and level of reduction of such pollutants from a class or category of industrial sources.[170]

Under the first part of the "industry cost-effectiveness test," "additional limitations on conventional pollutants [which are also subject to BPT] that are more stringent than BPT can be imposed only 'to the extent that the increased cost of treatment [would] be reasonable in terms of the degree of environmental benefits."[171] Thus, if cost of treatment is not reasonable compared to the reduction benefits under both the industry cost-effectiveness test and the second part of the POTW test, then BPT standards would apply.

The CWA directed EPA to develop effluent limitation guidelines "to identify, in terms of amounts of constituents and chemical, physical, and biological characteristics of pollutants, the degree of effluent reduction attainable through the application" of each of these technologies for classes and categories of existing direct industrial (non-POTW) dischargers.[172] The guidelines are effluent standards promulgated as regulations.

The effluent guidelines development is an involved process in which EPA conducts in-depth engineering and economic analysis of each industrial sector. EPA describes this process as follows:

> For each industrial sector, EPA assesses the performance and availability of the best pollution control technologies and pollution prevention practices that are available for an industrial category or subcategory .... EPA may divide an industrial point source category into groupings of subcategories to provide a method for addressing

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[170] 33 U.S.C. § 1314(b)(4)(B).
[171] *Chemical Mfrs. Ass'n*, 870 F.2d at 205 (quoting American Paper Inst. v. Train, 660 F.2d 954, 957–58 (4th Cir. 1981) (second change in original)).
[172] 33 U.S.C. § 1314(b)(1)(A).

> variations between products, raw materials, processes, and other factors that result in distinctly different characteristics .... For each possible treatment technology option for an industry, EPA conducts an analysis of industry-wide incremental compliance costs, pollutant loadings and removals, and related non-water quality effects. The Agency also performs an economic analysis to assess the financial impact on the industry of implementing each option. That entire process involves data collection, rigorous data review, engineering analysis, and public comment. EPA selects a technology to serve as the model technology for pollutant removal for each required level of control (i.e., BPT, BCT, BAT, NSPS, PSES [pretreatment standards for existing sources], and PSNS [pretreatment standards for new sources]). Limitations and other requirements in the effluent guidelines for each level of control are based on application of the model technology to the category or subcategory of facilities.[173]

EPA has developed guidelines for approximately fifty-eight existing point source categories.[174] EPA is required to review annually and revise, if appropriate, the effluent guidelines.[175] In addition, EPA is required to publish a plan biennially, for public comment, establishing a schedule for this annual review and revision of the guidelines, identifying the categories of sources discharging toxic or nonconventional pollutants for which it has not established effluent guidelines, and establishing a schedule to promulgate these guidelines.[176]

The following is an example of the effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the BPT for a particular category of point source.

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[173] *NPDES Permit Writers' Manual*, *supra* note 21, at 5-17 to 5-18, *available at* http://www.epa.gov/npdes/pubs/pwm_chapt_05.pdf [http://perma.cc/3A9W-Q2VJ].

[174] 40 C.F.R. § 400 (2015). See a list of the Effluent Guidelines by industry category attached at end of the paper and can be found at http://water.epa.gov/scitech/wastetech/guide/industry.cfm#exist [http://perma.cc/SHD8-JW92].

[175] 33 U.S.C. § 1314(b) (2015).

[176] 33 U.S.C. § 1314(m); *see, e.g.*, Preliminary 2012 Effluent Guidelines Program Plan and accompanying factsheet, at http://water.epa.gov/scitech/wastetech/guide/304m/ [http://perma.cc/SXS7-PDMF].

TABLE 3: EFFLUENT LIMITATIONS FOR CANNED AND PRESERVED FRUITS AND VEGETABLE PROCESSING POINT SOURCE, APPLE JUICE SUBCATEGORY[177]:

Effluent characteristic	Maximum for any 1 day	Average of daily values for 30 consecutive days shall not exceed—
	Metric units (kilograms per 1,000 kg of raw material)	
BOD_5	0.60	0.30
TSS	0.80	0.40
pH	[1]	[1]
	English units (pounds per 1,000 lb of raw material)	
BOD_5	0.60	0.30
TSS	0.80	0.40
pH	[1]	[1]

[1] *Within the range 6.0 to 9.0.*

From the standards established in these effluent guidelines, a NPDES permit writer must determine the appropriate limitations for a NPDES permit. The permit writer usually takes the following steps in determining the NPDES permit limitations:

> Step 1. Learn about the industrial discharger
> Step 2. Identify the applicable effluent guidelines category(ies)
> Step 3. Identify the applicable effluent guidelines subcategory(ies)
> Step 4. Determine whether existing or new source standards apply
> Step 5. Calculate TBELs [technology-based effluent limitations] from the effluent guidelines

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[177] 40 C.F.R. § 407.12 (2015).

> Step 6. Account for overlapping or multiple effluent guidelines requirements
> Step 7. Apply additional regulatory considerations in calculating TBELs
> Step 8. Apply additional effluent guidelines requirements
> Step 9. Document the application of effluent guidelines in the fact sheet[178]

2. Water Quality–Based Effluent Limitations

In setting the effluent limitations in an NPDES permit, a permit writer must also consider whether they are sufficient to avoid causing or contributing to violations of the approved state water quality standards. Thus, a point source may also be subject to more stringent effluent limitations, known as "water quality based effluent limitations" ("WQBELs"), necessary to assure attainment of state water quality standards:

> [The CWA] requires that NPDES permits include limitations that will ensure that water quality standards are not violated. This includes water quality standards of the state in which the discharge occurs, as well as the standards of neighboring states affected by the discharge. Permit writers must determine whether the amount of a pollutant discharged by a source will cause the level of a pollutant in a stream to exceed criteria values, and specific end-of-pipe numerical limitations can be placed in a permit to assure that this does not occur. Assessment of water quality is complex. Because most monitoring data provides no more than an instantaneous snapshot of stream quality, a comprehensive assessment is preferable based on frequent sampling and computer analyses beyond the resource capabilities of most states. All point sources must meet applicable technology-based limitations; water quality standards based restrictions are imposed as an additional and a more stringent limitation only where the discharge will cause violation of water quality standards.[179]

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[178] *NPDES Permit Writers' Manual*, *supra* note 21, at 5-23, *available at* http://www.epa.gov/npdes/pubs/pwm_chapt_05.pdf [http://perma.cc/3A9W-Q2VJ].

[179] Stanley Abramson, *Effluent Standards and Limitations—Water Quality Based Limitations—Water Quality Standards*, 2 L. OF ENVTL. PROT. § 13:71 (2015).

To determine whether WQBELs are necessary, a permit writer must determine whether the levels of pollutants in the discharge "will cause, have the reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality."[180] If they, by themselves or in combination with other pollutants in the water, will cause or have potential to cause a violation of the water quality standards, the permit writer must take the TMDL, if one is established, and translate the waste load allocations for the particular point source seeking a permit into effluent limitations.[181] If no TMDLs have been established for the point source, the permit writer must determine the WLAs and use that to determine the WQBELs.[182]

Effluent limitations, whether based on technology or water quality standards, are typically expressed as a numerical limit in the quantity or concentration in the discharge of specific pollutants, and effluent limitations in NPDES permits are generally achieved through the use of waste water treatment systems that remove pollutants from the industrial effluent.[183]

While the NPDES program strives to address water quality problems through setting the WQBELs, it does not control nonpoint pollution, which is the leading remaining cause of water quality problems in the states.[184] It is addressed through state and local regulation and management policies.[185]

3. Permitting & Federal and State Responsibilities

"A permit is typically a license for a facility to discharge a specified amount of a pollutant into a receiving water under certain conditions."[186] The NPDES program provides for both individual and general permits. An individual permit is tailored to a specific individual facility. A general permit covers "multiple facilities in a specific category of discharges."[187] EPA allows authorized agencies to issue general permits as "a cost-effective

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[180] 40 C.F.R. § 122.44(d)(1)(i) (2015).

[181] *State Standards for Water Quality*, 1 ENVTL. REG. OF LAND USE § 8:4 (2014).

[182] The determination of WQBELs is very technical. Please *see generally* EPA, *NPDES Permit Writers' Manual*, *supra* note 21, at ch. 6.

[183] Gaba, *supra* note 127, at 417.

[184] EPA, *What is Nonpoint Source Pollution*, http://water.epa.gov/polwaste/nps/whatis.cfm [http://perma.cc/67QD-AC6Z] (last visited Oct 26, 2015).

[185] The CWA provides support to states to help with nonpoint source control efforts, including technical assistance, financial assistance, training, technology transfer, and demonstration projects. *See* 33 U.S.C. § 1329 (2015).

[186] *Water Permitting 101*, *supra* note 3, at 6–7.

[187] *NPDES Permit Writers' Manual*, *supra* note 21, at 3-1, *available at* http://water.epa.gov/polwaste/npdes/basics/upload/pwm_2010.pdf [http://perma.cc/4R3X-KB2D].

option for agencies because of the large number of facilities that can be covered under a single permit."[188] A general permit covers dischargers within an area corresponding to specific geographic or political boundaries such as a designated planning area, sewer district, or city or county boundary.[189] All NPDES permits contain at minimum the following components:

- Cover Page: Contains the name and location of the permittee, a statement authorizing the discharge, and a listing of the specific locations for which a discharge is authorized.
- Effluent Limitations: The primary mechanism for controlling discharges of pollutants to receiving waters. A permit writer spends the majority of his or her time, when drafting a permit, deriving appropriate effluent limitations on the basis of applicable technology and water quality standards.
- Monitoring and Reporting Requirements: Used to characterize wastestreams and receiving waters, evaluate wastewater treatment efficiency, and determine compliance with permit conditions.
- Special Conditions: Conditions developed to supplement numeric effluent limitations. Examples include additional monitoring activities, special studies, best management practices (BMPs), and compliance schedules.
- Standard Conditions: Pre-established conditions that apply to all NPDES permits and delineate the legal, administrative, and procedural requirements of the NPDES permit.[190]

While the limits and conditions in an individual NPDES permit are unique to the permittee, the process used to develop the limits and conditions and issue the permit generally follows a common set of steps, their order varying depending on whether the permit is an individual or general permit.[191] Once a general permit is issued, a facility wishing to be covered by the general permit would typically be required to submit a notice of intent to the permitting authority, which then determines whether the facility

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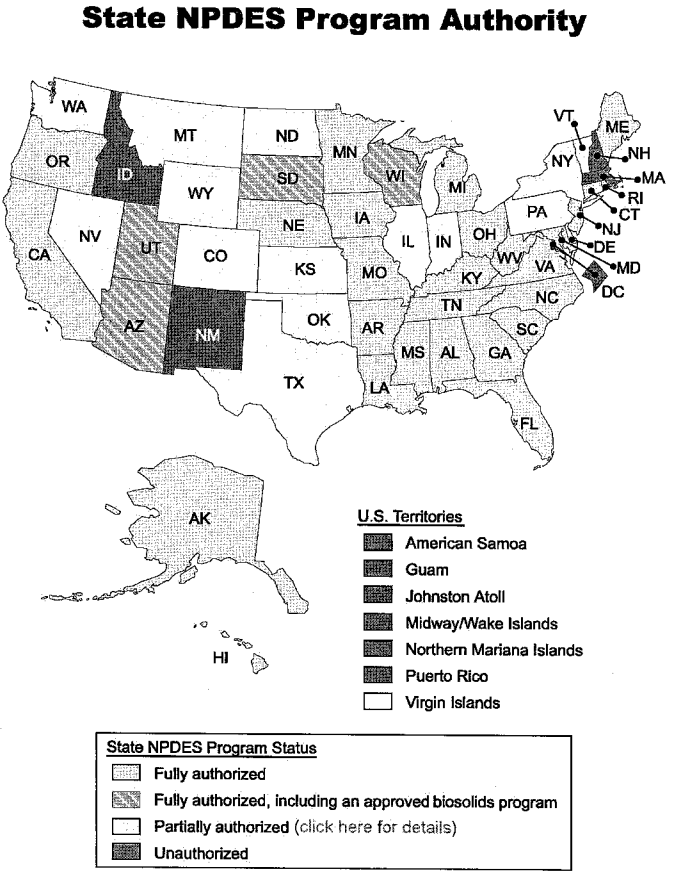
[188] *Id.*
[189] 40 C.F.R. § 122.28(a)(1) (2015).
[190] *NPDES Permit Writers' Manual*, *supra* note 21, at 3-2.
[191] *Water Permitting 101*, *supra* note 3, at 8.

would be covered under the general permit or required to apply for an individual permit.[192] EPA is authorized under the CWA to directly implement the NPDES program. EPA, however, may authorize States to implement all or parts of the national program as seen in Figure 2 below.[193]

Figure 2[194]



[192] *NPDES Permit Writers' Manual*, *supra* note 21, at 3-6.
[193] *Water Permitting 101*, *supra* note 3, at 10.
[194] EPA, *State NPDES Program Authority*, *available at* http://www.epa.gov/npdes/images/State_NPDES_Prog_Auth.pdf [http://perma.cc/2BPX-ZLNQ].

C. *Enforcement*

The Clean Water Act, like most federal environmental statutes, authorizes administrative, civil judicial, and criminal enforcement actions for violations of statutory provisions. Section 309 of the CWA contains the Act's governmental permit enforcement provisions. State authorities report on nonpoint discharges. EPA has brought at least 142 civil judicial enforcement cases since 1999.[195]

To aid in enforcement of the CWA, § 505(a)(2) of the CWA[196] authorizes a citizen suit in federal court against the EPA where the EPA has allegedly failed to perform "any nondiscretionary act or duty" set forth in the CWA. The availability of a citizen suit thus depends on whether a nondiscretionary duty of the EPA has been triggered. Even though the CWA recognizes the right of citizen interest groups to petition state environmental agencies to designate water bodies as ONRWs,[197] the CWA does not require these state agencies to respond.[198] It has thus been held that, because the statute requires the EPA to either approve or disapprove a state's submission of TMDLs within 30 days, a citizen suit is proper to challenge the EPA's failure to make a determination either approving or disapproving a TMDL submission.[199] More citizen suits are brought to enforce the CWA directly against permit holders and unpermitted dischargers (as opposed to against EPA) under 505(a)(1) to enforce an effluent standard or limitation (which is defined under 505(f) to include any NPDES permit).

> *When Not Proper*—here a challenge is raised as to the EPA's approval or disapproval of a specific TMDL actually

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[195] EPA, *Civil Cases and Settlements Under the CWA*, http://cfpub.epa.gov/enforcement/cases/index.cfm?templatePage=12&ID=3&sortby=&stat=Clean%20Water%20Act [http://perma.cc/5BJH-BB7N]. The Congressional Research Service document "Federal Pollution Control Laws: How Are They Enforced," *available at* http://www.fas.org/sgp/crs/misc/RL34384.pdf [http://perma.cc/8NG5-RSHF], provides a useful summary of the different layers of environmental enforcement.

[196] 33 U.S.C. § 1365(a)(2) (2015).

[197] 33 U.S.C. §§ 1365(a), (b) (1994).

[198] Chilson, *supra* note 119, at 549. Organized interest groups are more likely to achieve success in impacting administrative outcomes. *See* John Tierney, *Organized Interests and the Nation's Capitol*, in THE POLITICS OF INTERESTS: INTEREST GROUPS TRANSFORMED 216–17 (Mark P. Petracca ed., 1992) (describing the ways that organized interests make a difference in congressional politics and policymaking).

[199] *Construction and Application of Clean Water Act's Total Maximum Daily Loads (TMDLs) Requirement for Waters Failing to Achieve Water Quality Standards Under 33 U.S.C.A. § 1313(d)*, 53 A.L.R. Fed. 2d 1, 1 (2011).

> submitted, which is a discretionary determination, a citizen suit has thus been generally found not proper.[200]
>
> *When Appropriate*—Where it is alleged that the EPA's mandatory duty has been triggered by a state's constructive submission of no TMDLs, however, courts have found a citizen suit to be appropriate in some instances, but not in others.[201]

The EPA does have authority under the CWA's "emergency powers" provision, however, to institute a civil action against any polluter, whether from a point source or nonpoint source, "upon receipt of evidence that a pollution source or combination of sources is presenting an imminent and substantial endangerment" to human health or welfare.[202]

II. AIR

The first comprehensive legislation to address the dangers that air pollution poses to public health was the Clean Air Act ("CAA") of 1970. This legislation authorized the EPA to establish national ambient air quality standards ("NAAQS") that would define the specific levels of air quality to be achieved in order to protect public health and welfare. It set forth a federal/state regulatory framework that required states to develop plans (state implementation plans, or "SIPs") to implement the NAAQS through the establishment of emission limitations for air pollution sources within their borders. In addition, the CAA established the New Source Performance Standards ("NSPS") program to provide for more stringent control for new sources and the National Emission Standards for Hazardous Air Pollutants ("NESHAPs") to regulate air toxics.

Major amendments to the CAA in 1977 extended the dates for the attainment of the NAAQS and provided additional guidance for the development of the SIPs for states that had not met the NAAQS. They also established requirements for the prevention of significant deterioration ("PSD") of air quality in areas attaining the NAAQS and established specific requirements for areas that do not meet one or more of the NAAQS.

The 1990 amendments to the CAA substantially modified and expanded the provisions for attainment and maintenance of the NAAQS,

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[200] *Id.*
[201] *Id.*
[202] 33 U.S.C. § 1364 (2015).

classifying nonattainment areas according to the extent to which they exceed the standard and tailored attainment deadlines, planning, and implementation of controls to the areas' nonattainment status. It also created new regulatory programs for the control of acid rain and for the issuance of stationary source operating permits. It also revised and greatly expanded the air toxics provisions to control more toxic air pollutants.

A. NAAQS

The NAAQS are the centerpiece of the CAA. EPA is required to identify air pollutants that "may reasonably be anticipated to endanger public health or welfare."[203] After it identifies the pollutants, EPA is required to issue air quality criteria for each of the pollutants, reflecting "the latest scientific knowledge useful in indicating the kinds and extent of all identifiable effects on public health or welfare which may be expected from the presence of such pollutant in the ambient air in varying quantities."[204] For each of these "criteria" pollutants, EPA is required to establish a "primary" and a "secondary" NAAQS.[205] The primary NAAQS is a health-based standard and must be set at a level that, in EPA's judgment, is "requisite to protect the public health" with "an adequate margin of safety."[206] EPA has discretion in determining adequate margin of safety, and NAAQS levels must be based solely on health considerations, not cost-benefit analysis, economics, or technical feasibility.[207]

The secondary NAAQS protects public welfare and must be set at a level that is "requisite to protect the public welfare from any known or anticipated adverse effects associated with the presence of such air pollutant in the ambient air."[208] The CAA defines effects on welfare to include "effects on soils, water, crops, vegetation, manmade materials, animals, wildlife, weather, visibility, and climate, damage to and deterioration of property, and hazards to transportation, as well as effects on economic values and on personal comfort and well-being."[209]

EPA has identified sulfur oxides ("SOx"), particulate matter ("PM"), carbon monoxide ("CO"), ozone ("O_3"), nitrogen dioxide ("NOx"), and lead

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[203] 42 U.S.C. § 7408(a)(1)(A) (2015).
[204] 42 U.S.C. § 7408(a)(2).
[205] 42 U.S.C. § 7409(b).
[206] *Id.* § 7409(b)(1).
[207] Lead Industries v. EPA, 647 F.2d 1130, 1130 (D.C. Cir. 1980); *see also* Whitman v. American Trucking Ass'n, Inc., 531 U.S. 457, 457 (2001).
[208] 42 U.S.C. § 7409(b)(2) (2012).
[209] 42 U.S.C. § 7602(h) (2012).

("Pb") as criteria pollutants and established NAAQS for each of these pollutants.[210] Each NAAQS has four components: the indicator, the level, the averaging time, and the form.

> The "indicator" defines the parameters of the substance that the EPA will measure—for example, the size or composition of the particles to which a PM standard will apply. The "level" specifies the acceptable concentration of that indicator in the air. The "averaging time" specifies the span of time across which the amount of a pollutant in the air will be averaged. For example, some NAAQS require a certain average *annual* level, while others require a certain average *daily* level. The "form" of a NAAQS describes how compliance with the level will be determined within this averaging time. A NAAQS with a daily averaging time, for example, might require that the level not be exceeded on more than one day each year.[211]

As seen in Table 4 below, EPA has established the NAAQS for each of the criteria pollutants.[212]

TABLE 4: NATIONAL AMBIENT AIR QUALITY STANDARDS

Pollutant [Final Rule Cite]	Primary/ Secondary	Averaging Time	Level	Form
Carbon Monoxide [76 FR 54294, Aug. 31, 2011]	primary	8-hour	9 ppm	Not to be exceeded more than once per year
		1-hour	35 ppm	
Lead [73 FR 66964, Nov. 12, 2008]	primary and secondary	Rolling 3-month average	0.15 $\mu g/m^3$ [1]	Not to be exceeded

[210] EPA, *National Ambient Air Quality Standards*, http://www.epa.gov/air/criteria.html [http://perma.cc/4RDR-6DGZ] (last updated Oct. 21, 2014).
[211] Am. Farm Bureau Fed'n v. EPA, 559 F.3d 512, 516 (D.C. Cir. 2009).
[212] *National Ambient Air Quality Standards, supra* note 210. Ozone is not emitted directly into the air but is formed from precursor emissions of NOx and volatile organic compounds ("VOCs"), which interact in sunlight to produce ozone. PM2.5 emissions are formed from SOx and NOx.

Pollutant [Final Rule Cite]		Primary/ Secondary	Averaging Time	Level	Form
Nitrogen Dioxide [75 FR 6474, Feb. 9, 2010] [61 FR 52852, Oct. 8, 1996]		primary	1-hour	100 ppb	98th percentile, averaged over 3 years
		primary and secondary	Annual	53 ppb[2]	Annual mean
Ozone [73 FR 16436, Mar. 27, 2008]		primary and secondary	8-hour	0.075 ppm[3]	Annual fourth-highest daily maximum 8-hr concentration, averaged over 3 years
Particle Pollution (fine particles less than 2.5 micrometers in diameter [$PM_{2.5}$]; coarse particles betw 2.5 and 10 micrometers in diameter [PM_{10}]) [Dec. 14, 2012]	$PM_{2.5}$	primary	Annual	12 $\mu g/m^3$	Annual mean, averaged over 3 years
		secondary	Annual	15 $\mu g/m^3$	Annual mean, averaged over 3 years
		primary and secondary	24-hour	35 $\mu g/m^3$	98th percentile, averaged over 3 years
	PM_{10}	primary and secondary	24-hour	150 $\mu g/m^3$	Not to be exceeded more than once per year on average over 3 years
Sulfur Dioxide [75 FR 35520, June 22, 2010] [38 FR 25678, Sept. 14, 1973]		primary	1-hour	75 ppb[4]	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		secondary	3-hour	0.5 ppm	Not to be exceeded more than once per year

As of October 2011.
[1] Final rule signed October 15, 2008. The 1978 lead standard (1.5 $\mu g/m^3$ as a quarterly average) remains in effect until one year after an area is designated for the 2008 standard, except that in areas designated nonattainment for 1978, the 1978 standard remains in effect until implementation plans to attain or maintain the 2008 standard are approved.
[2] The official level of the annual NO_2 standard is 0.053 ppm, equal to 53 ppb, which is shown here for the purpose of clearer comparison to the one-hour standard.
[3] Final rule signed March 12, 2008. The 1997 ozone standard (0.08 ppm, annual fourth-highest daily maximum eight-hour concentration, averaged over three years) and related implementation rules remain in place. In 1997, EPA revoked the one-hour ozone standard (0.12 ppm, not to be exceeded more than once per year) in all areas, although some areas have continued obligations under that standard ("anti-backsliding"). The 1-hour ozone standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 ppm is less than or equal to one.
[4] Final rule signed June 2, 2010. The 1971 annual and twenty-four-hour SO_2 standards were revoked in that same rulemaking. However, these standards remain in effect until one year after an area is designated for the 2010 standard, except in areas designated nonattainment for the 1971 standards, where the 1971 standards remain in effect until implementation plans to attain or maintain the 2010 standard are approved.

Unfortunately, while these NAAQS exist, the regulatory burdens involved in establishing them are so demanding that EPA has strong incentives to avoid making frequent changes in such standards, much less to promulgate new ones. The scientific burdens are equally challenging. For example, what constitutes an adequate margin of safety, and whose health is the public health?[213]

> Note that although the NAAQS identify the acceptable level of pollution in the ambient atmosphere, they do not describe or prescribe the steps that should be taken to make sure that that level is achieved and maintained. Put another way, the NAAQS simply announce acceptable ambient pollutant

[213] JAMES SALZMAN & BARTON H. THOMPSON, JR., ENVIRONMENTAL LAW & POLICY 91 (3d ed. 2010).

> levels; they do not put anyone on the hook for reducing pollution emissions. Still, they are important in that they set regulatory goals with which the states must endeavor to comply.[214]

States are required to submit to EPA within one year after promulgation of a NAAQS for a pollutant a list of all areas in the state, designating them as (1) "nonattainment" if an area "does not meet (or that contributes to ambient air quality in a nearby area that does not meet) the [primary or secondary NAAQS] for the pollutant;" (2) "attainment" if an area meets the primary and secondary NAAQS; or (3) "unclassified" if an area cannot be classified because of lack of available information.[215] EPA must then review the lists and within two years after the NAAQS promulgation, promulgate regulations establishing the designation for all areas within the state.[216] When enacted in 1970, the CAA set tight deadlines for nonattainment areas to achieve attainment.[217] Widespread failure to meet the requirements of the 1977 amendments led Congress to extend the deadlines for attainment.[218] However, numerous states still failed to meet the attainment deadlines for ozone, CO, and PM in particular. The 1990 amendments further extended the deadlines for those areas that have failed to meet the NAAQS for ozone, CO, and PM.[219]

1. Establishment and Review Process for NAAQS

The CAA requires EPA to review the standards and the science upon which the standards are based at least once every five years. In establishing and reviewing the standards, EPA relies on the recommendations of the Clean Air Scientific Advisory Committee ("CASAC"): a seven-member, independent scientific review committee, appointed by the EPA Administrator pursuant to the CAA.[220] The process is lengthy and generally includes the following major phases:

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[214] NASH, *supra* note 1, at 56–57.
[215] 42 U.S.C. § 7407(d)(1)(A) (2012).
[216] 42 U.S.C. § 7407(d)(1)(B) (2012).
[217] Clean Air Act, Pub. L. No. 91-604, § 4(a), 84 Stat. 1678 (1970) (codified as 42 U.S.C. § 7407 prior to 1977, 1990, and 2004 amendments).
[218] Clean Air Act, Pub. L. No. 95-95, § 103, 91 Stat. 685 (1977) (codified as 42 U.S.C. § 7407 prior to 1977, 1990, and 2004 amendments).
[219] Clean Air Act, Pub. L. No. 101-549, § 101, 104 Stat. 2399 (1990) (codified as 42 U.S.C. § 7407 prior to 1977, 1990, and 2004 amendments).
[220] 42 U.S.C. § 7409(d)(2) (2012).

Planning: The planning phase of the NAAQS review process begins with a science policy workshop, which is intended to gather input from the scientific community and the public regarding policy-relevant issues and questions that will frame the review. Drawing from the workshop discussions, EPA prepares an Integrated Review Plan (IRP) that presents the schedule for the entire review, the process for conducting the review, and the key policy-relevant science issues that will guide the review.

Integrated Science Assessment (ISA): This assessment is a comprehensive review, synthesis, and evaluation of the most policy-relevant science, including key science judgments that are important to inform the development of the risk and exposure assessments, as well as other aspects of the NAAQS review.

Risk/Exposure Assessment (REA): This assessment draws upon information and conclusions presented in the ISA to develop quantitative characterizations of exposures and associated risks to human health or the environment associated with recent air quality conditions and with air quality estimated to just meet the current or alternative standard(s) under consideration. This assessment includes a characterization of the uncertainties associated with such estimates.

Policy Assessment (PA): This assessment provides a transparent staff analysis of the scientific basis for alternative policy options for consideration by senior EPA management prior to rulemaking. Such an evaluation of policy implications is intended to help "bridge the gap" between the Agency's scientific assessments, presented in the ISA and REA(s), and the judgments required of the EPA Administrator in determining whether it is appropriate to retain or revise the NAAQS. In so doing, the PA is also intended to facilitate the Clean Air Scientific Advisory Committee's (CASAC's) advice to the Agency and recommendations to the Administrator, as provided for in the CAA, on the adequacy of the existing standards or revisions that may be appropriate to consider. The PA focuses on the information

> that is most pertinent to evaluating the basic elements of the NAAQS: indicator, averaging time, form, and level.[221]

The documents created in this process are reviewed by the CASAC, and the public has an opportunity to comment. EPA then takes into consideration these scientific documents along with CASAC's recommendations and publishes a notice of proposed rulemaking on the NAAQS. EPA may not consider the cost of implementing a NAAQS in setting the standards.[222] After the public has an opportunity to comment and taking those comments into consideration, EPA issues a final rule on the standards or revisions thereof.

2. State Implementation Plans

a. General Requirements

While the CAA requires EPA to establish the NAAQS, states are responsible for developing and implementing plans to attain the primary and secondary NAAQS within their borders. States must submit these SIPs to EPA for approval within three years after a NAAQS has been promulgated.[223] The SIPs must include the following basic requirements:

- "[E]nforceable emission limitations and other control measures, . . . (including economic incentives . . .), as well as schedules and timetables for compliance."
- Ambient air quality monitoring/data system.
- Program for enforcement of control measures and regulation of stationary source construction and modification.
- Program to prohibit emissions within the state from contributing significantly to the nonattainment of the NAAQS by another state and interfering with another state's provisions for the prevention of significant deterioration or visibility protection.
- Adequate authority and resources to implement the SIP.
- Stationary source monitoring system.

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[221] EPA, *Process of Reviewing the National Ambient Air Quality Standards*, http://www.epa.gov/ttn/naaqs/review.html [http://perma.cc/82YE-PCUQ] (last updated July 21, 2015).
[222] Whitman v. American Trucking Ass'n, Inc., 531 U.S. 457, 464–71 (2001).
[223] 42 U.S.C. § 7410(a)(1) (2012).

- Emergency powers and adequate contingency plan.
- Provisions for future SIP revisions.
- Provisions relating to prevention of significant deterioration and visibility protection.
- Air quality modeling/data.
- Permitting fees.
- Consultation and participation by local affected entities.[224]

Each state must have a SIP for each of the criteria pollutants.[225] Typically, a SIP includes a combination of various programs to control emissions from stationary sources, mobile sources, and pollution transport from other areas. For example, a SIP for ozone may include permitting programs for stationary sources and mobile source emission control programs, such as fuel vapor recovery and enhanced motor vehicle inspection and maintenance programs, to limit emissions of ozone's precursor pollutants, volatile organic compounds ("VOCs") and NOx, that interact in sunlight to produce ozone.[226]

b. Requirements for SIPs for Nonattainment Areas

For those areas that are in nonattainment of a NAAQS for any one of the criteria pollutants, the due dates for those SIPs are based on the area designation date and vary by pollutant and area classification.[227] The due dates range between 18 and 36 months after EPA promulgates regulations designating an area for nonattainment of one of the criteria pollutants.[228] In addition to the general requirements above, SIPs for nonattainment areas must also contain the following requirements:

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[224] 42 U.S.C. § 7410(a)(2)(A)–(H), (I)–(M). Section 7410(a)(2)(I) provides for planning requirements in SIPs for areas that are in nonattainment of a NAAQS and is discussed below.
[225] *See* 42 U.S.C. § 7410(a)(1) (stating that the states must submit plans for all national air quality standards); *National Ambient Air Quality Standards*, *supra* note 210 (defining the six "criteria" pollutants that the EPA has set as NAAQS).
[226] *See* 310 MASS. CODE REGS. § 7.00 (2015) (explaining Massachusetts air permitting regulations); 310 MASS. CODE REGS. § 60.02 (2015) (detailing Massachusetts enhanced motor vehicle inspection and maintenance regulations); *see also State Implementation Plans*, MASS. OFFICE OF ENERGY & ENVTL. AFFAIRS, http://www.mass.gov/eea/agencies/massdep/air/reports/state-implementation-plans.html [http://perma.cc/D823-849E] (last updated 2015); EPA, *Region 5 Air and Radiation State Implementation Plans*, http://www.epa.gov/reg5oair/sips/ [http://perma.cc/6BPA-LGU5] (last updated Oct. 26, 2011).
[227] EPA, *SIP Development Process*, http://www.epa.gov/airquality/urbanair/sipstatus/process.html [http://perma.cc/JFV6-33TV].
[228] *Id.*; *see also* 42 U.S.C. § 7502(b) (2012).

- "[I]mplementation of all reasonably available control measures as expeditiously as practicable (including such reductions in emissions from existing sources in the area as may be obtained through the adoption, at a minimum, of reasonable available control technology)."
- Reasonable further progress. The CAA defines this to mean "annual incremental reductions in emissions of the relevant air pollutant."
- "[A] comprehensive, accurate, current inventory of actual emissions from all sources of the relevant pollutant or pollutants."
- Identification and quantification of emissions to be allowed from new or modified major stationary sources and explanation that these emissions would be consistent with the achievement of reasonable further progress toward attainment.
- Permit requirements for new and modified major stationary sources within the nonattainment area.
- Catch-all provision requiring enforceable emission limitations and other control measures, including economic incentives such as fees and marketable permits, as well as a schedule for compliance.
- EPA may allow, upon application, "the use of equivalent modeling, emission inventory, and planning procedures."
- Contingency measures for the failure to make reasonable further progress or attain the NAAQS by the attainment deadlines.[229]

The CAA also imposes additional requirements applicable to the criteria pollutant for which an area is designated as being in nonattainment. For example, SIPs for areas that are in nonattainment for ozone must also, among other things, include a comprehensive, accurate, and current inventory of actual emissions of VOCs and NOx, both precursors of ozone, in all ozone nonattainment areas; demonstrate reasonable further progress by providing for specific annual reductions in VOC emissions; and implement certain programs to control mobile sources, including a motor

[229] 42 U.S.C. §§ 7502(c)(1)–(6), (8), (9) (2012); *see also* 42 U.S.C. § 7501(1) (2012).

vehicle inspection and maintenance program, requiring the sale of low emission vehicles, and clean-fuel vehicle programs.[230]

B. Prevention of Significant Deterioration and New Source Review

In addition to requiring states to develop SIPs to implement NAAQS, the CAA also attempts to reduce the likelihood that areas in attainment of NAAQS will not fall into nonattainment and requires EPA to promulgate permitting regulations to control emissions from stationary sources to assist the attainment and maintenance of the NAAQS.[231] Areas in attainment are subject to the PSD program.[232] The PSD program applies to new major sources or major modifications at existing sources for pollutants where the area in which the source is located is in attainment of NAAQS. It requires that the major sources obtain a PSD permit, which includes the installation of the "Best Available Control Technology," an air quality analysis, an additional impacts analysis, and public involvement.[233]

EPA considers the PSD program to be part of the New Source Review ("NSR") permitting program. NSR is a preconstruction permitting program that seeks to ensure that air quality is not significantly degraded from the addition of new and modified factories, industrial boilers, and power plants and that any large new or modified industrial sources use advanced pollution control technology as industries expand.[234] NSR permits specify what construction is allowed, what emission limits must be met, and often how the emissions source must be operated.[235]

C. Sanctions for Inadequate SIP or Implementation

The CAA requires EPA to promulgate a Federal Implementation Plan ("FIP") at any time within two years after EPA finds that a state has failed to submit the SIP or that the SIP fails to meet the minimum criteria required for EPA to commence review, or after EPA disapproves of

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[230] 42 U.S.C. § 7511(a)–(c) (2012).
[231] 42 U.S.C. § 7502(a) (2012).
[232] 42 U.S.C. § 7470 (2012).
[233] EPA, *Prevention of Significant Deterioration ("PSD") Basic Information*, http://www.epa.gov/nsr/psd.html [http://perma.cc/TK2Q-QK4E] (last updated Oct. 8, 2014).
[234] EPA, *New Source Review (NSR) Permitting*, http://www2.epa.gov/nsr [http://perma.cc/C85K-33QG] (last updated Oct. 14, 2015).
[235] *Id.*

a SIP.[236] EPA is also authorized to impose sanctions on a state at any time it (1) finds that the state has failed to submit a SIP for an area designated nonattainment for the NAAQS for any of the criteria pollutants; (2) disapproves a SIP for an area in nonattainment of the NAAQS; (3)(i) determines that the state has failed to make any submission required as part of the SIP, including an adequate maintenance plan, or failed to make any submission that satisfies the minimum criteria required for EPA to commence review; or (3)(ii) disapproves in whole or in part any such submissions under (3)(i); or (4) finds that any requirement of an approved SIP is not being implemented.[237] The sanctions may include a funding moratorium for all highway construction projects (except for safety and mass transit projects) applicable to a nonattainment area, or imposition of a ratio of at least 2:1 emissions reductions within the nonattainment area for new or modified major facilities to offset increased emissions.[238] EPA's finding, determination, or disapproval described above triggers the clock for imposition of the sanctions.[239] The emissions offset sanction is required to be imposed eighteen months after EPA's finding, determination, or disapproval; and the highway funds sanction is required to be imposed twenty-four months after such finding, determination, or disapproval.[240] If, before the eighteen months, the state submits a revised plan to correct the deficiency and EPA issues an interim final determination that the deficiency is corrected, the sanctions are deferred pending EPA final action on the plan.[241] EPA also has the discretion to impose either one of these sanctions at any time after it makes the findings, determinations, or disapprovals, thus shortening the clock on the imposition of the sanctions.[242]

D. Enforcement

Similar to the CWA, the CAA also provides a citizen suit provision that enables any person to bring a civil action against any person, who has violated any emission standard or limitation under the Act.[243] The provision also permits suit against the EPA for failure to perform a mandatory

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[236] 42 U.S.C. § 7410(c)(1) (2012).
[237] 42 U.S.C. §§ 7410(m), 7509(a) (2012); *see also* 42 U.S.C. §§ 7407, 7410(k) (2012).
[238] 42 U.S.C. §§ 7410(m), 7509(b)(1), (2) (2012).
[239] 42 U.S.C. § 7509(a)(4) (2012); 40 C.F.R. § 52.31(d)(1) (2015).
[240] 42 U.S.C. § 7509(a)(4) (2012); 40 C.F.R. § 52.31(d)(2) (2015).
[241] 40 C.F.R. § 52.31(d)(2)(i), (ii) (2015).
[242] 42 U.S.C. § 7410(m) (2012).
[243] 42 U.S.C. § 7604(a).

act or duty under the CAA.[244] Citizens have used this provision to force EPA to promulgate NAAQS for lead where EPA conceded that lead emissions caused or contributed to air pollution, "which [might] reasonably be anticipated to endanger public health or welfare."[245]

CONCLUSION

In assessing environmental quality standards in the United States, in the context of water and air quality, three key points must be remembered. First, implementation of the Clean Water and Clean Air Acts are a cooperative federal-state enterprise in the American federalism system and this may limit the utility of any comparative approach in the context of implementation and environment. Second, in terms of creating environmental quality standards, policymakers in other countries may wish to look at challenges in creating the National Ambient Air Quality Standards and state-level water quality standards. By looking at these challenges, policymakers will recognize the degree to which environmental laws and regulations are driven by technology-based standards. Finally, it is important to appreciate the different paths through which the Clean Water and Clean Air Acts hope to achieve their goals. The Clean Air Act calls on the EPA to set the acceptable ambient levels of pollution through the national ambient air quality standards, while leaving it to the states to decide how to obtain those pollution levels through state implementation plans.[246] In contrast, under the Clean Water Act, EPA promulgates national industry-wide standards with which polluters must comply, whereas the states are empowered to define acceptable ambient pollution levels in water bodies within their borders.[247]

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[244] *Id.*
[245] 42 U.S.C. § 7408(a)(1)(A) (2012); *see* Train v. Natural Res. Def. Council, Inc., 545 F.2d 320, 324 (2d Cir. 1976).
[246] NASH, *supra* note 1, at 87.
[247] *Id.*