

UNITED STATES COURT OF APPEALS
FOR THE SECOND CIRCUIT

August Term 2014

(Argued: January 30, 2015 Decided: October 5, 2015
Amended: December 18, 2015)

Docket Nos. 13-1745(L), 13-2393(CON), 13-2757(CON)

NATURAL RESOURCES DEFENSE COUNCIL, NORTHWEST ENVIRONMENTAL
ADVOCATES, CENTER FOR BIOLOGICAL DIVERSITY, and
NATIONAL WILDLIFE FEDERATION,

Petitioners,

v.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY,

Respondent,

LAKE CARRIERS' ASSOCIATION and CANADIAN SHIPOWNERS ASSOCIATION,

Intervenors.

ON PETITION FOR REVIEW FROM THE
ENVIRONMENTAL PROTECTION AGENCY

Before:

SACK, CHIN, and CARNEY, *Circuit Judges*.

Four environmental organizations petition for review of a Vessel General Permit issued by the Environmental Protection Agency in 2013 under Section 509(b)(1) of the Clean Water Act, 33 U.S.C. § 1369(b)(1). The permit regulates the discharge of ballast water from ships, a primary cause of the spread of invasive species from one body of water to another. Petitioners contend that the Environmental Protection Agency acted arbitrarily and capriciously in issuing the permit, and request that it be set aside. We agree, in part. Accordingly, we grant the petition for review in part and deny it in part, and remand to the Environmental Protection Agency for further proceedings consistent with this opinion. We do not vacate the Vessel General Permit, but allow it to remain in effect until the issuance of a new Vessel General Permit.

PETITION GRANTED IN PART AND DENIED IN PART AND REMANDED.

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MARTIN FRANCIS MCDERMOTT (Sam Hirsch, Acting Assistant Attorney General, *on the brief*), Environmental Defense Section, Environmental & Natural Resources Division, United States Department of Justice, Washington, D.C., *and* Dawn M. Messier, Office of General Counsel, United States Environmental Protection Agency, Washington, D.C., *for Respondent United States Environmental Protection Agency.*

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CHIN, *Circuit Judge*:

This case arises from the efforts of the Environmental Protection Agency ("EPA") pursuant to section 402(a) of the Clean Water Act (the "CWA"), 33 U.S.C. § 1342(a), to regulate the discharge of ballast water from ships.¹ A ship takes on and discharges ballast water to compensate for changes in its weight caused by activities such as loading and unloading cargo or consuming fuel or supplies. The amount of water can range from hundreds of gallons to as much as 25 million gallons -- enough to fill thirty-eight Olympic-sized swimming pools. More than 21 billion gallons of ballast water are released in the United States annually. *See Nw. Env'tl. Advocates v. EPA*, 537 F.3d 1006, 1013 (9th Cir. 2008).

When a ship takes on ballast water, it can inadvertently pick up organisms and their eggs and larvae, as well as sediment and pollutants. When the ship discharges ballast water, often in a new place, these organisms and pollutants are ejected into the surrounding waterbody, enabling these organisms to establish new, non-native populations. As a result, ships have become one of

¹ **Glossary of Acronyms:** As this opinion discusses the CWA and its intricacies, it contains a large number of acronyms. In addition to their definitions in the text, a separate glossary of acronyms is therefore set forth in the Appendix to this opinion.

the primary ways that invasive species are spread from one waterbody to another. *Id.* at 1012-13 ("All told, more than 10,000 marine species each day hitch rides around the globe in the ballast water of cargo ships." (quoting *Nw. Env'tl. Advocates v. EPA*, No. C 03-05760 SI, 2006 WL 2669042, at *3 (N.D. Cal. Sept. 18, 2006)).

Invasive species cause severe economic and ecological harm, including by destroying native fish species and shellfish industries, creating algae blooms, and devastating tourism. Zebra mussels are a particularly destructive example. They were first introduced to Lake Erie in the 1980s by a freighter from Europe that discharged ballast water containing mussels.² These mussels have wreaked havoc in the Midwest and Northeast by blocking water intake and outtake at power plants and other industrial facilities, causing nearly \$70 million in damage between 1989 and 1995. *Nw. Env'tl. Advocates*, 537 F.3d at 1013. One study estimates the damage caused by invasive species collectively at "about \$137 billion a year -- more than double the annual economic damage

² "From that humble start, the invaders colonized the Great Lakes and spread across the country on towed boats." Jim Robbins, *A Western Showdown*, N.Y. TIMES, Sept. 8, 2015, at D6.

caused by all natural disasters in the United States." *Id.* (quoting *Nw. Env'tl. Advocates*, 2006 WL 2669042, at *4).³

Ballast water discharge is particularly problematic in the Great Lakes. Vessels that sail exclusively in the Great Lakes, known as "Lakers," account for over ninety-five percent of ballast water volumes transferred in the Great Lakes. Unfortunately, Lakers are more likely than oceangoing vessels to spread invasive species because the short duration of their voyages allows organisms to survive in their ballast.

In April 2013, EPA issued a Vessel General Permit (the "2013 VGP"), pursuant to section 402 of the CWA, 33 U.S.C. § 1342, to regulate the discharge of ballast water from ships. In response, four environmental groups filed three Petitions for Review ("PFRs") alleging that EPA acted arbitrarily and capriciously in issuing the 2013 VGP: petitioner Natural Resources Defense Council ("NRDC") filed a PFR on May 3, 2013 in this Court; petitioners Northwest Environmental Advocates ("NWEA") and the Center for Biological Diversity jointly filed a PFR on May 3, 2013 in the United States Court of Appeals for the Ninth Circuit; and petitioner National Wildlife Federation ("NWF") filed a PFR on July 3, 2013 in the

³ See also Robbins, *A Western Showdown*, at D6 (discussing damage caused by zebra and quagga mussels).

United States Court of Appeals for the D.C. Circuit.⁴ In an order dated May 24, 2013, the Judicial Panel on Multidistrict Litigation issued a Consolidation Order and assigned final venue for the first two petitions, and any subsequently filed petition, to this Court.

On May 31, 2013, the Lake Carriers' Association and the Canadian Shipowners Association (the "CSA") filed a motion to intervene, which was granted on October 7, 2013. On January 1, 2014, the CSA filed a PFR in this case. EPA and the CSA jointly moved to sever the CSA PFR from this case and hold it in abeyance; the motion was granted on May 23, 2014.

We find that EPA acted arbitrarily and capriciously in issuing parts of the 2013 VGP, and therefore remand this matter to the EPA for further proceedings.

BACKGROUND

A. *The CWA*

Congress created the CWA to limit pollution in the waters of the United States. *See* 33 U.S.C. § 1251(a) (objective of CWA is to "restore and

⁴ All three petitions were timely filed within 120 days of the issuance of the VGP, as required under 33 U.S.C. § 1369(b)(1). Accordingly, this Court has jurisdiction over the petitions pursuant to section 509(b)(1)(F) of the CWA, 33 U.S.C. § 1369(b)(1)(F).

maintain the chemical, physical, and biological integrity of the Nation's waters");

S. Fla. Water Mgmt. Dist. v. Miccosukee Tribe of Indians, 541 U.S. 95, 102 (2004)

(same); *Waterkeeper All., Inc. v. EPA*, 399 F.3d 486, 490-91 (2d Cir. 2005) (same).

The CWA thus prohibits the "discharge of *any* pollutant" from a "point source" to the "navigable waters" of the United States, except as permitted by the CWA. 33 U.S.C. §§ 1311(a), 1362 (emphasis added). The "discharge of a pollutant" includes "any addition of any pollutant to navigable waters from any point source." *Id.*

§ 1362(12)(A). A "pollutant" includes solid, industrial, agricultural, and

biological waste. *Id.* § 1362(6). A "point source" is "any discernible, confined and discrete conveyance, including but not limited to any . . . vessel or other floating craft, from which pollutants are or may be discharged." *Id.* § 1362(14).

"Navigable waters" is defined as "the waters of the United States, including the territorial seas." *Id.* § 1362(7). The discharge of polluted water from a vessel

ballast tank is a point source discharge covered by the CWA. *See Nw. Env'tl.*

Advocates, 537 F.3d at 1021.

A key component of the statute is the establishment of water quality standards. Water quality standards are set by states for waters within their boundaries and are then reviewed for approval by EPA. *See* 33 U.S.C. § 1313; 40

C.F.R. §§ 131.4, 131.10-.11; *see also* *NRDC v. EPA*, 279 F.3d 1180, 1183 (9th Cir. 2002) ("Under the CWA, each state sets its own water quality standards, subject to review and approval by the EPA."). EPA must ensure that the standard proposed by the state will comply with the requirements of the CWA before approving it. *See* 33 U.S.C. §§ 1311(b)(1)(C), 1313(a) 1342(a)(1); 40 C.F.R. § 122.4(d).

1. *National Pollutant Discharge Elimination System Permits*

An entity seeking to discharge a pollutant is required to obtain and comply with a permit that limits the amounts and kinds of pollutants being discharged. *See* *NRDC v. EPA*, 822 F.2d 104, 108 (D.C. Cir. 1987); *see also* *Waterkeeper All.*, 399 F.3d at 498 (discharge allowed "where . . . permits *ensure* that every discharge of pollutants will comply with all applicable effluent limitations and standards"). This permit, known as a National Pollutant Discharge Elimination System ("NPDES") permit, establishes enforceable effluent limitations, as well as monitoring and reporting requirements.

NPDES permits, which are issued either by EPA or a state in a federally approved permitting system, *see* 33 U.S.C. § 1342, may be individual (issued to a specific entity to discharge pollutants at a specific place) or general

(issued to an entire class of dischargers in a geographic location), *see* 40 C.F.R. §§ 122.21, 122.28(a)(2), 124.1-.21, 124.51-.66. The permit here is a general permit.

Permits can impose two different types of standards on discharges: (1) technology-based standards and (2) water quality-based standards. *See* 33 U.S.C. §§ 1311(b)(1)(c) and (b)(2)(a), 1313, 1342(a). The 2013 VGP imposes both.

a. *Technology-Based Effluent Limits*

Technology-based effluent limits ("TBELs") set effluent limitations on a point source based on how effectively technology can reduce the pollutant being discharged. *See* 33 U.S.C. §§ 1311(b), (e), 1314(b); *see also* *PUD No. 1 of Jefferson Cty. v. Wash. Dep't of Ecology*, 511 U.S. 700, 704 (1994) (holding that, to achieve goals of CWA, EPA is required to "establish and enforce technology-based limitations on individual discharges into the country's navigable waters from point sources"). Congress designed this standard to be technology-forcing, meaning it should force agencies and permit applicants to adopt technologies that achieve the greatest reductions in pollution. *See* *NRDC*, 822 F.2d at 124 (holding that CWA seeks "not only to stimulate but to press development of new,

more efficient and effective technologies," which is "essential purpose of this series of progressively more demanding technology-based standards").⁵

In determining the standard for TBELs, EPA considers the source of the pollution (existing or new) and the type of pollutant. For nonconventional pollutants from existing sources, EPA is required to set effluent limits based on the "best available technology economically achievable" or "BAT." 33 U.S.C. § 1311(b)(2)(A).⁶ BAT requires the "application of the best available technology economically achievable for such category or class, which will result in reasonable further progress toward the national goal of eliminating the discharge of all pollutants." *Id.*; *see NRDC*, 822 F.2d at 123 (CWA designed to progress "toward implementation of pollution controls to the full extent of the best technology which would become available"). Because invasive species are a

⁵ EPA issues national effluent limitation guidelines ("ELGs"), which establish limitations for all types of dischargers within a particular industry and for certain types of discharges. *See* 40 C.F.R. § 125.3(c)(1). ELGs are enforceable through their incorporation into a NPDES permit. In this case, no states have established numeric water quality criteria for living organisms or aquatic nuisance species.

⁶ For conventional pollutants from existing sources, the level of pollution control is based on best conventional pollutant control technology. *Id.* § 1311(b)(2)(E). New sources of pollution must meet new source performance standards, which are based on best available demonstrated control technology. *Id.* § 1316(a)(1). Neither standard is implicated here.

nonconventional pollutant from an existing source, ballast water discharges are subject to BAT.

EPA considers a number of factors in assessing whether a technology is BAT, including:

- the cost of achieving the effluent reductions,
- the age of equipment and facilities involved,
- the process employed,
- the engineering aspects of various control techniques,
- potential process changes,
- non-water-quality environmental impacts including energy requirements, and
- other factors as EPA "deems appropriate."

See 33 U.S.C. § 1314(b)(2)(B).

EPA can mandate that BAT requires the use of a technology that is not currently available within a particular industry when (1) the technology is available in another industry, (2) EPA finds that the technology is transferrable from that other industry, and (3) EPA can reasonably predict that such technology will adequately treat the effluent. *See Kennecott v. EPA*, 780 F.2d 445, 453 (4th Cir. 1986) (citing *Tanners' Council of Am., Inc. v. Train*, 540 F.2d 1188, 1192 (4th Cir. 1976)).

b. *Water Quality-Based Effluent Limits*

If the TBELs are insufficient to attain or maintain water quality standards, the CWA requires NPDES permits to include additional water quality-based effluent limits ("WQBELs"). *See* 33 U.S.C. §§ 1311(b)(1)(C), 1312(a); *NRDC*, 822 F.2d at 110 ("Whenever a technology-based effluent limitation is insufficient to make a particular body of water fit for the uses for which it is needed, the EPA is to devise a water-quality based limitation that will be sufficient to the task."). WQBELs are designed to ensure that the discharges authorized by the permit do not violate water quality standards. *See* 33 U.S.C. §§ 1313, 1342(a)(2).

The WQBELs, which supplement the TBELs, are based on the amount and kind of pollutants in the water. *See id.* § 1312(a). WQBELs are set without regard to cost or technology availability. *See NRDC v. EPA*, 859 F.2d 156, 208 (D.C. Cir. 1988) ("A technology-based standard discards its fundamental premise when it ignores the limits inherent in the technology. By contrast, a water quality-based permit limit begins with the premise that a certain level of water quality will be maintained, come what may, and places upon the permittee the responsibility for realizing that goal." (footnote omitted)). WQBELs may be

narrative where the calculation of numeric limits is "infeasible." *See* 40 C.F.R. § 122.44(k)(3).

No permit may be issued when "the imposition of conditions cannot ensure compliance with the applicable water quality requirements of all affected States." *Id.* § 122.4(d). Thus, permits must establish limits on discharges that will lead to compliance with water quality standards. *See Trs. for Alaska v. EPA*, 749 F.2d 549, 556-57 (9th Cir. 1984) (holding that permit must translate state water quality standards into end-of-pipe effluent limitations necessary to achieve those standards).

Because no states have established numeric water quality criteria for invasive species, EPA is required to establish WQBELs that ensure compliance with narrative criteria, designated uses, and antidegradation policies that comprise state water quality standards. The permit may then mandate "best management practices" ("BMPs") to control pollution. *See* 40 C.F.R. § 122.44(k)(3).

c. *Monitoring and Reporting Requirements*

NPDES permits also require both monitoring and reporting of monitoring results of TBELs and WQBELs to assure compliance with permit

limitations and facilitate enforcement. *See* 33 U.S.C. §§ 1314, 1318, 1342(a)(2); 40 C.F.R. § 122.44(i)(1)-(2).

B. *Regulatory History*

When the CWA was first being implemented in the 1970s, EPA regulations exempted discharges that were "incidental" to the "normal operation" of vessels from NPDES permitting requirements. *See National Pollutant Discharge Elimination System*, 38 Fed. Reg. 13,528, 13,530 (May 22, 1973) (codified at 40 C.F.R. § 125.4); *see also National Pollutant Discharge Elimination System; Revision of Regulations*, 44 Fed. Reg. 32,854, 32,902 (June 7, 1979) (codified at 40 C.F.R. § 122.3(a)). This exemption included ballast water discharges.

In 1999, the NWEA and other environmental organizations submitted a rulemaking petition to EPA seeking to repeal this exemption, then codified at 40 C.F.R. § 122.3(a). *See Final National Pollutant Discharge Elimination System (NPDES) General Permit for Discharges Incidental to the Normal Operation of a Vessel*, 73 Fed. Reg. 79,473, 79,475 (Dec. 29, 2008). EPA denied the petition. *See Nw. Env'tl. Advocates*, 537 F.3d at 1013. The environmental groups challenged the denial in the United States District Court for the Northern District of California, while simultaneously filing a PFR in the United States Court of Appeals for the

Ninth Circuit, in case the district court lacked jurisdiction. The district court issued an order vacating the exemption, *see Nw. Env'tl. Advocates*, 2006 WL 2669042, at *15, and the Ninth Circuit upheld the decision. *See Nw. Env'tl. Advocates*, 537 F.3d at 1027. EPA finally repealed the exemption and issued a Vessel General Permit in 2008 (the "2008 VGP"). *Draft National Pollutant Discharge Elimination System (NPDES) General Permits for Discharges Incidental to the Normal Operation of a Vessel*, 73 Fed. Reg. 34,296 (June 17, 2008).

1. **The 2008 VGP**

Environmental groups, industry groups, and the State of Michigan challenged the 2008 VGP in a PFR filed in the United States Court of Appeals for the D.C. Circuit, arguing primarily that the 2008 VGP was inadequate because it contained only narrative provisions, not specific numeric limitations on discharges. In March 2011, EPA settled this matter, agreeing to: (1) set "numeric concentration-based effluent limits for discharges of ballast water expressed as organisms per unit of ballast water volume"; (2) set numeric effluent limits that "represent the applicable levels of technology-based control"; and (3) "include more stringent water quality-based effluent limitations" if needed to satisfy

applicable water quality standards. Settlement Agreement ¶¶ 9-13, *NRDC v. EPA*, No. 09-1089 (D.C. Cir. Mar. 8, 2011), ECF No. 1296922.

2. *The Creation of New Standards*

To create these new, more specific standards, EPA enlisted the help of its own Science Advisory Board (the "SAB") and the National Research Council/National Academy of Sciences Committee on Assessing Numeric Limits for Living Organisms in Ballast Water (the "NAS Committee"). EPA posed a different question to each scientific body.

a. *The SAB*

In 2010, EPA asked the SAB to "provide advice on technologies and systems to minimize the impacts of invasive species in vessel ballast water discharge." App. at 599. Specifically, the SAB looked at four issues: (1) the performance of shipboard systems with available effluent testing data; (2) the potential performance of shipboard systems without reliable testing data; (3) system development for the shipboard systems identified in issues 1 and 2; and (4) the development of reliable information about the status of ballast water treatment technologies and system performance. In considering these questions, the SAB was to take into account *The International Convention for the Control and*

Management of Ships' Ballast Water and Sediments (the "IMO Standard"), adopted by the International Maritime Organization in 2004, which set certain concentration-based ballast water effluent limits. *Id.* at 610.⁷

In July 2011, the SAB issued its report *Efficacy of Ballast Water Treatment Systems: A Report by the EPA Science Advisory Board* (the "SAB Report"). The SAB identified fifty-one ballast-water treatment systems, with five categories of shipboard systems that could reliably achieve the IMO Standard. *Id.* at 601.⁸ The SAB found that none of the systems could meet standards 100 or 1,000 times greater than the IMO Standard. *Id.* at 602. The SAB also found that none of the fifty-one shipboard treatments identified could reliably achieve a "no living organism" standard. *Id.*

⁷ The Coast Guard proposed the same standard in a rulemaking in 2011 pursuant to its authority under the National Invasive Species Act. *See Standards for Living Organisms in Ships' Ballast Water Discharged in U.S. Waters*, 74 Fed. Reg. 44,632 (Aug. 28, 2009). In 2012, the Coast Guard finalized the rule, entitled *Standards for Living Organisms in Ships' Ballast Water Discharged in U.S. Waters*. 77 Fed. Reg. 17,254 (Mar. 23, 2012).

⁸ The five categories were: (1) deoxygenation + cavitation; (2) filtration + chlorine dioxide; (3) filtration + UV; (4) filtration + UV + TiO₂; and (5) filtration + electro-chlorination.

b. *The NAS Committee*

EPA created the NAS Committee to examine "the relationship between the concentration of living organisms in ballast water discharges and the probability of nonindigenous organisms successfully establishing populations in U.S. waters." *Id.* at 235.

In its June 2011 report, *Assessing the Relationship Between Propagule Pressure and Invasion Risk in Ballast Water* (the "NAS Report"), the NAS Committee concluded (1) there was "no significant relationship between ballast volume and invasions," and (2) "[t]he current state of science does not allow a quantitative evaluation of the relative merits of various discharge standards in terms of invasion probability." *Id.* at 363. Essentially, the Committee said that it was unable to establish a reliable numeric limit on discharges that would guarantee protection against invasive species, other than zero.

3. **The 2013 VGP**

On March 28, 2013, EPA issued the 2013 VGP, the permit now before us, allowing vessels to discharge ballast water subject to certain limitations on the living organisms in the discharge. *Final National Pollutant Discharge Elimination System (NPDES) General Permit for Discharges Incidental to the Normal*

Operation of a Vessel, 78 Fed. Reg. 21,938 (Apr. 12, 2013).⁹ This constituted final action on the permit pursuant to section 402(a) of the CWA, 33 U.S.C. § 1342(a). The 2013 VGP included TBELs, WQBELs, and monitoring and reporting requirements.

a. *TBELs*

As discussed above, TBELs impose effluent limitations on a point source based on how much technology is able to reduce the amount of a pollutant at issue. *See* 33 U.S.C. §§ 1311(b), (e), 1314(b). In this instance, EPA chose to set the TBELs at the IMO Standard, which requires:

- (1) Limiting discharges of organisms 50 micrometers or larger to a concentration of fewer than 10 living organisms per cubic meter of ballast water;
- (2) Limiting discharges of organisms less than 50 micrometers and greater than or equal to 10 micrometers to concentrations of fewer than 10 living organisms per milliliter ("mL") of ballast water; and
- (3) Limiting discharges of three types of pathogen and pathogen indicators: (1) *Vibrio cholerae*: fewer than 1 colony forming unit ("cfu") per 100 mL; (2) *Escherichia coli* ("E. coli"): fewer than 250 cfu per 100 mL; and (3) intestinal enterococci: fewer than 100 cfu per 100 mL.

⁹ EPA issued the draft NPDES VGP on November 30, 2011 with a 75-day notice-and-comment period. The public comment period ended on February 21, 2012. The 2013 VGP replaced the 2008 VGP, which expired on December 19, 2013.

Vessel General Permit for Discharges Incidental to the Normal Operation of Vessels (VGP): Authorization to Discharge Under the National Pollutant Discharge Elimination System § 2.2.3.5, at 29 (Mar. 28, 2013), available at http://water.epa.gov/polwaste/npdes/vessels/upload/vgp_permit2013.pdf. The VGP did not set standards for other "small" organisms, such as bacteria or viruses.

b. *WQBELs*

The WQBELs in the 2013 VGP require: (1) oceangoing vessels entering the Great Lakes to continue to perform ballast water exchanges, and (2) all vessels to control discharges "as necessary to meet applicable water quality standards in the receiving water body or another water body impacted by [the] discharges." VGP § 2.2.3.7, at 43, § 2.3.1, at 59.

c. *Monitoring and Reporting Requirements for TBELs and WQBELs*

As noted above, NPDES permits must contain conditions that require both monitoring and reporting of monitoring results of TBELs and WQBELs to ensure compliance with water quality standards. See 33 U.S.C. § 1342(a)(2); 40 C.F.R. § 122.44(i)(1)-(2).

i) Monitoring and Reporting Requirements for TBELs

In the 2013 VGP, EPA established the following monitoring requirements for TBELs:

- (1) that vessels monitor the functionality of their ballast water treatment systems, if installed; and
- (2) that vessels monitor the concentrations of the two "indicator" bacteria, *E. coli* and enterococci.¹⁰

VGP § 2.2.3.5.1.1.2, at 30, § 2.2.3.5.1.1.4, at 31-32.

The first requirement is known as functionality monitoring. Under this requirement, a ballast water treatment program is considered to be in compliance if it is "operating according to the manufacturers' requirements."

App. at 96.

The second requirement is known as effluent biological organism monitoring. Under this requirement, vessels must collect small-volume samples and analyze them for concentrations of two indicator pathogens. This is required between one and four times a year depending on the treatment system.

ii) Monitoring and Reporting Requirements for WOBELs

The only monitoring required for WOBELs is that ships report the "expected date, location, volume, and salinity of any ballast water to be

¹⁰ EPA established effluent limits for *Vibrio cholerae*, but did not require monitoring in this respect because the "monitoring of this parameter would generally not result in the detection of the presence of this pathogen." App. at 99. The 2013 VGP also contains a third requirement that vessels with treatment systems that add or generate biocides, such as chlorine or ozone, to kill organisms must monitor ballast water discharges for residual biocides. *Id.* at 103. This requirement does not implicate TBELs.

discharged." VGP § 4.3, at 72 (emphasis added). Permittees are not required to report actual locations, volumes, or composition of ballast water to be discharged.

d. *Lakers*

The 2013 VGP requires all Lakers to comply with non-numeric technology-based control measures, like ballast water exchange and other BMPs found in VGP § 2.2.3.3. App. at 85; *see* VGP § 2.2.3.3, at 27-28. Lakers are also subject to three ballast water management measures found in VGP § 2.2.3.4: (1) conducting an annual assessment of sediment accumulations; (2) minimizing the amount of water taken in nearshore environments; and (3) adequately maintaining sea chest screens, which keep larger organisms like fish out of ballast tanks. VGP § 2.2.3.4, at 28-29. In addition, all Lakers built on or after January 1, 2009, must comply with VGP § 2.2.3.5, which sets numeric ballast water discharge limits. VGP § 2.2.3.5.3.3, at 39.

DISCUSSION

A. *Standard of Review*

We review a NPDES permit under the Administrative Procedure Act to determine whether EPA's actions were "arbitrary, capricious, an abuse of

discretion, or otherwise not in accordance with law." 5 U.S.C. § 706(2)(A). To determine whether the agency's actions were "arbitrary and capricious," we consider whether the agency

'relied on factors which Congress has not intended it to consider, entirely failed to consider an important aspect of the problem, offered an explanation for its decision that runs counter to the evidence before the agency, or is so implausible that it could not be ascribed to a difference in view or the product of agency expertise.'

Islander E. Pipeline Co. v. McCarthy, 525 F.3d 141, 150-51 (2d Cir. 2008) (quoting *Motor Vehicle Mfrs. Ass'n. v. State Farm Mut. Ins. Co.*, 463 U.S. 29, 43 (1983)). We must be "satisfied from the record that 'the agency . . . examine[d] the relevant data and articulate[d] a satisfactory explanation for its action.'" *Id.* at 151 (quoting *State Farm*, 463 U.S. at 43). An agency's action is lawful "only if it rests 'on a consideration of the relevant factors.'" *Michigan v. EPA*, 135 S. Ct. 2699, 2706 (2015) (quoting *State Farm*, 463 U.S. at 43). We afford the agency's decision greater deference regarding factual questions involving scientific matters in its area of technical expertise. *See Balt. Gas & Elec. Co. v. NRDC*, 462 U.S. 87, 103 (1983); *Envtl. Def. v. EPA*, 369 F.3d 193, 204 (2d Cir. 2004).

In addition, judicial review of statutory interpretation by an agency is governed by *Chevron U.S.A. Inc. v. NRDC*, 467 U.S. 837, 842-45 (1984). Under

Chevron, we must first determine "whether Congress has directly spoken to the precise question at issue" in the CWA. *Id.* at 842. If so, we must give effect to the unambiguously expressed intent of Congress. *Id.* at 842-43. "[I]f the statute is silent or ambiguous with respect to the specific issue, the question for the court is whether the agency's answer is based on a permissible construction of the statute." *Id.* at 843. As the Supreme Court held in *Michigan v. EPA*, "[e]ven under this deferential standard, however, 'agencies must operate within the bounds of reasonable interpretation.'" 135 S. Ct. at 2707 (quoting *Util. Air Regulatory Grp. v. EPA*, 134 S. Ct. 2427, 2442 (2014)). We also grant deference to EPA's interpretation of its own regulations "unless that interpretation is 'plainly erroneous or inconsistent with the regulation.'" *Chase Bank USA, N.A. v. McCoy*, 131 S. Ct. 871, 880 (2011) (quoting *Auer v. Robbins*, 519 U.S. 452, 461 (1997)).

B. *Petitioners' Challenge*

Here, petitioners challenge EPA's issuance of the 2013 VGP as arbitrary and capricious, and not in accordance with law, on a number of grounds.

First, petitioners argue that the TBELs are arbitrary and capricious. Specifically, petitioners assert that EPA acted arbitrarily and capriciously and not

in accordance with the law when it: (1) selected the IMO standard as the standard for the TBELs; (2) failed to consider onshore treatment, limiting consideration to shipboard treatment; (3) failed to include numeric TBELs for viruses and protists; and (4) exempted Lakers built before 2009 ("pre-2009 Lakers") from the numeric TBELs of the 2013 VGP.

Second, petitioners argue that EPA acted arbitrarily and capriciously and not in accordance with the law in choosing narrative WQBELs, rather than numeric WQBELs, because, among other things, the narrative standard is too imprecise to guarantee compliance with water quality standards.

Finally, petitioners argue that EPA's monitoring and reporting requirements for TBELs and WQBELs are not in accordance with the law because they were inadequate to guarantee compliance.

1. TBELs

Under the CWA, EPA must apply BAT in establishing pollution controls for ballast water discharge. BAT requires the "application of the *best available technology economically achievable* for such category or class, which will result in reasonable further progress toward the national goal of eliminating the discharge of all pollutants." 33 U.S.C. § 1311(b)(2)(A)(emphasis added). BAT also requires "a commitment of the maximum resources economically possible to

the ultimate goal of eliminating all polluting discharges." *EPA v. Nat'l Crushed Stone Ass'n*, 449 U.S. 64, 74 (1980).

We hold that in failing to set TBELs that reflected BAT in the 2013 VGP, EPA acted arbitrarily and capriciously in a number of respects.

a. *The IMO Standard*

Petitioners argue that EPA failed to apply BAT when it chose the IMO Standard for TBELs in the 2013 VGP. They allege that EPA chose the IMO Standard first, and then worked "backwards" to determine which systems could achieve that standard. NWEA Br. at 36. In doing so, they contend, EPA improperly restricted the SAB's inquiry to whether certain technologies would meet what petitioners describe as "existing international consensus standards." *Id.* According to petitioners, EPA should have first considered what "available" technology was capable of achieving, and then created standards based on that capability. As a result, petitioners contend, EPA's standard did not achieve greater reductions in pollution discharges that were achievable with current technology.

We agree. EPA acted arbitrarily and capriciously when it chose the IMO Standard without adequately explaining why standards higher than the IMO Standard should not be used given available technology.

In choosing the IMO Standard, EPA overlooked crucial portions of the SAB Report. The SAB identified a number of technologies that can achieve standards higher than IMO for one or more organism sizes, including all five of the technologies identified as also meeting the IMO Standard.¹¹ The SAB acknowledged that "these same five systems have the potential to meet a 10x IMO D-2/ Phase 1 standard [*i.e.*, the IMO Standard] in the near future." App. at 636. In describing the performance of those systems, the SAB concluded that each would require only "reasonable/feasible modifications." *Id.* at 629-30,632. Indeed, according to the SAB Report, the Ecochlor, BalPure, and PeraClean systems can meet 100 times IMO for medium organisms, and Ecochlor can meet 10 times IMO for large organisms.

EPA should not have adhered to the IMO Standard without explanation when technologies could have exceeded IMO. Indeed, seeking to find systems that are capable of doing better than the current standard is in keeping with the technology-forcing aspect of the CWA. *See NRDC*, 822 F.2d at

¹¹ The record further demonstrates that existing shipboard technology can meet a standard between IMO and 10 times IMO. For instance, Hyde Marine Guardian has tested at 1.4 times IMO for large organisms; Optimarin has tested at 7.7 times IMO for large organisms; and Alfa Laval/AlfaWall PureBallast has tested at 4.5 times IMO for large organisms, and at 3.7 times IMO for medium organisms.

124. EPA should have first looked at the available ballast water technologies as identified by the SAB Report. Then, finding that those technologies could exceed the IMO Standard, EPA should have adjusted its standard accordingly, or explained why it would not. *See Islander E. Pipeline*, 525 F.3d at 151 (holding that agency must "examine[] the relevant data and articulate[] a satisfactory explanation for its action" (quoting *State Farm*, 463 U.S. at 43)(alterations omitted)).

EPA's counterargument that no more was necessary because it did not limit the SAB to considering the IMO Standard is unavailing. EPA insists that it gave the SAB a list of potential regulatory limits, and then asked the SAB to identify the systems that could reliably meet those limits. In support, EPA points to its Charge Question 1 to the SAB, which asked the SAB to identify "discharge standards that the available data [about existing systems] credibly demonstrate can be reliably achieved." App. at 607. EPA argues that in response to this charge, the SAB Report supports the conclusion that, "[b]ased upon the data available, no current ballast water treatment technologies were considered likely to meet standards more stringent than the IMO D-2/Phase I" standards. *Id.* at 91.

While it is true that EPA did not strictly limit the SAB's consideration to the IMO Standard, EPA is incorrect in suggesting that the SAB Report supports the conclusion that no system could meet standards stricter than the IMO Standard. *Id.*¹² To the contrary, the record contradicts EPA's assertion that treatment systems that exceed the IMO Standard are not "available." In fact, as noted above, systems that exceed the IMO Standard are available

Accordingly, by failing to consider adequately a standard more stringent than IMO, EPA failed to set permit limits that reflect BAT. *See* 33 U.S.C. § 1314(b)(2); *Nat'l Crushed Stone*, 449 U.S. at 74 (BAT requires "a commitment of the maximum resources economically possible to the ultimate goal of eliminating all pollution discharges"); *FMC Corp. v. Train*, 539 F.2d 973, 983-84 (4th Cir. 1976)

¹² The SAB actually stated that it could not *reliably test* for standards 100 or 1000 times more stringent than the IMO Standard:

The Panel also concludes that the [IMO Standard] . . . [is] currently measurable, based on data from land-based and shipboard testing. However, current methods (and associated detection limits) prevent testing of BWMS to any standard more stringent than [the IMO Standard] and make it impracticable for verifying a standard 100 or 1000 times more stringent.

Id. at 601. While we agree that we must defer to EPA's conclusions regarding the technical feasibility of testing for standards 100 or 1000 times more stringent than the IMO Standard, there is nothing in the record to suggest that it would not be possible to test for twice or even ten times the IMO Standard.

(upholding EPA's decision to set BAT based on data from a single pilot plant). In doing so, EPA acted arbitrarily and capriciously and not in accordance with law in choosing the IMO standard for the TBELs in the 2013 VGP.

b. *Onshore Ballast Water Treatment*

Petitioners also argue that EPA arbitrarily and capriciously limited its consideration to shipboard treatments, failing to consider onshore treatment. Petitioners argue that onshore facilities used in other industries, such as sewage treatment plants and drinking water treatment plants, were reasonable alternatives to shipboard treatment that should have been considered. EPA concedes it directed the Board to "focus its limited time and resources on the status of shipboard treatment systems because such systems were either 'in existence or in the development process.'" EPA Br. at 56-57 (quoting SAB Report). It argues that onshore treatment was not "available," primarily because no onshore system was yet in existence.

While it is true that no onshore systems existed then -- unsurprising considering ballast water treatment was not required at all until the effective date of the 2008 VGP -- the record suggests that such onshore systems were technologically possible at that time. Yet, EPA chose to curtail discussion about onshore systems and failed to develop information necessary to evaluate their

availability. We conclude that by failing to consider onshore ballast water systems, EPA acted arbitrarily and capriciously.

What does "available" mean? As courts have interpreted the term in the CWA context, technologies that *could* be used for a particular discharge, even if they are not currently being used by that industry, are "available." As the Fourth Circuit noted,

The model technology [under consideration] may exist at a plant not within the . . . industry [at issue]. Congress contemplated that EPA might use technology *from other industries* to establish the Best Available Technology. Progress would be slowed if EPA were invariably limited to treatment schemes already in force at the plants which are the subject of the rulemaking. Congress envisioned the scanning of broader horizons and asked EPA to survey related industries and current research to find technologies which might be used to decrease the discharge of pollutants.

Kennecott, 780 F.2d at 453 (emphasis added) (citation omitted). This Court held similarly in *Hooker Chemicals & Plastics Corp. v. Train*,

That no plant in a given industry has adopted a pollution control device which could be installed does not mean that that device is not "available." Congress did not intend to permit continuance of pollution by industries which have failed to cope with and attempt to solve the problem of polluted water.

537 F.2d 620, 636 (2d Cir. 1976); see also *Cal. & Hawaiian Sugar Co. v. EPA*, 553 F.2d 280, 286 (2d Cir. 1977) (technology used "in other industries with similar raw waste characteristics" was "available" (quoting *Liquid and Crystalline Cane Sugar Refining Subcategory*, 39 Fed. Reg. 10,522, 10,522 (1974))); *Am. Petrol. Inst. v. EPA*, 858 F.2d 261, 264-65 (5th Cir. 1988) (holding that a process can be "deemed 'available' even if it is not in use at all" because "[s]uch an outcome is consistent with Congress' intent to 'push pollution control technology'" (quoting *Ass'n of Pac. Fisheries v. EPA*, 615 F.2d 794, 816 (9th Cir. 1980); *Weyerhaeuser Co. v. Costle*, 590 F.2d 1011, 1061 (D.C. Cir. 1978))).

For a technology in one industry to be "available" in a second industry: (1) the transfer technology must be available within the first industry; (2) the transfer technology must be transferable to the second industry; and (3) it must be reasonably predictable that the technology, if used in the second industry, will be capable of removing the increment required by the effluent standards. See *Kennecott*, 780 F.2d at 453 (citing *Tanners' Council*, 540 F.2d at 1192); *CPC Int'l Inc. v. Train*, 515 F.2d 1032, 1048 (8th Cir. 1975); *Hooker Chems.*, 537 F.2d at 636 ("But even if technology which is not presently in use can be treated as available and achievable, there must be some indication in the

administrative record of the reasons for concluding that such technology is feasible and may reasonably be expected to yield the effluent reduction mandated when applied to the particular industry."). For example, in *Kennecott*, the Fourth Circuit upheld EPA's use of manufacturing technology from one industry as part of a BAT determination for treating wastewater in a different industry. 780 F.2d at 453-54.

Here, we cannot evaluate whether onshore technology should be considered "available" because the record does not contain a full discussion of onshore treatment. This lack of information about onshore facilities, however, is a problem of EPA's own making because EPA went to great lengths to *foreclose* discussion of onshore treatment both by expressly limiting the SAB's mandate to studying shipboard treatment technology and consistently opposing any attempt by the SAB to consider onshore treatment.

EPA's effort to curtail discussion of onshore treatment is well documented in the record. In a letter dated February 10, 2012, thirteen scientists, eight of whom were members of the SAB and six of whom were members of the NAS Committee,¹³ including the Chair of the NAS Committee, stated that the

¹³ One person was a member of both the SAB and the NAS Committee.

SAB "never actually addressed the question of what is the best treatment that available technology can achieve" because EPA limited them to the narrower question of "whether *shipboard* treatment systems could meet *certain specific sets of standards*." App. at 740. Furthermore, the scientists assert that their attempts to consider onshore treatments were actively thwarted by EPA:

During the SAB Panel meetings and discussions, some members of the Panel attempted to develop and include in the Panel report a more detailed assessment of onshore treatment, including its cost impacts, and an assessment of the full capability of shipboard treatment [T]hese assessments would have further demonstrated that available technology can achieve levels of treatment beyond what the EPA has proposed as controls. The EPA Office of Water, however, *consistently opposed including such information in the report*. As a result, some relevant information and analysis that could have been developed by the Panel was not, and some of what was developed by Panel members was *excluded or deleted* from the final report. *If there was less information developed on these issues and less provided in the report than the EPA considers sufficient, it is in large part because the EPA Office of Water opposed the development and inclusion of such information.*

Id. at 744 (emphases added).

In light of these facts, we cannot well credit EPA's assertion that it lacked information to support a finding that onshore facilities were "available."

While EPA states that it was "unaware of any onshore treatment facility currently

available in the U.S. that is capable of meeting the VGP's § 2.2.3.5 ballast water discharge standards," and that it did not "receive information indicating they are or would become available over the term of the VGP," *id.* at 544, in fact EPA turned a blind eye to significant information about onshore treatment.

Indeed, the lack of information about the "availability" of onshore treatment is due in large part to EPA's arbitrary and capricious decision to oppose developing such information. As a result, the TBELs were based on an incomplete record -- one lacking meaningful discussion of an "available" treatment, namely onshore treatment. *See Humana of Aurora, Inc. v. Heckler*, 753 F.2d 1579, 1583 (10th Cir. 1985) (agency action is arbitrary and capricious when based on a flawed study); *Tex. Oil & Gas Ass'n v. EPA*, 161 F.3d 923, 935 (5th Cir. 1998) ("A regulation cannot stand if it is based on a flawed, inaccurate, or misapplied study."); *Almay, Inc. v. Califano*, 569 F.2d 674, 682 (D.C. Cir. 1977) (rejecting regulation produced "on the basis of the flawed survey"). Put another way, EPA's refusal to consider onshore treatment "entirely fail[s] to consider an important aspect of the problem" and "offer[s] an explanation for its decision that runs counter to the evidence before the agency." *Islander E. Pipeline*, 525 F.3d at 150-51; *see Tanners' Council*, 540 F.2d at 1191 ("[T]he agency must fully explicate

its course of inquiry, its analysis, and its reasoning."); *see also State Farm*, 463 U.S. at 43; *Hooker Chems.*, 537 F.2d at 636. Hence, it is arbitrary and capricious.

In fact, the SAB Report points out a number of reasonably predictable advantages to onshore treatment. The SAB Report states:

Use of reception facilities for the treatment of ballast water appears to be technically feasible (given generations of successful water treatment and sewage treatment technologies), and is likely to be more reliable and more readily adaptable than shipboard treatment.

App. at 605; *see also id.* at 694. The SAB Report also notes that onshore treatment has a number of advantages over shipboard treatment because onshore facilities are not subject to problems such as limited space, small and overburdened crews, vibrations, weight allowances, limited power, ship instability, and greater corrosion rates. *Id.* at 678-80. Regarding ship crews in particular, studies have shown that "many of these crews are already overburdened," "[o]peration by trained, dedicated personnel in reception facilities would likely result in more reliable performance," and "[m]aintenance and repair work are more likely to be done reliably" as well. *Id.* at 681. Onshore treatment can also be more effective by using superior technologies that are not available for shipboard treatment, such as settling tanks, granular filtration, and membrane filtration. *Id.* at 680-81. Indeed, EPA cites a number of studies that conclude that onshore treatment

facilities are a technically feasible option. *Id.* at 107. These studies date back to 1992, and proceed with some regularity thereafter-- 1996, 1999, 2000, 2002, 2007, 2008.

Moreover, onshore treatment would not necessarily be slower than shipboard treatment to implement. The SAB estimated that onshore implementation would take up to thirty months, while EPA allowed eight years to phase-in shipboard implementation. *See id.* at 684. Nor would onshore treatment necessarily be more expensive than shipboard treatment. Regional economic studies suggest that "treating ballast water in reception facilities would be at least as economically feasible as shipboard treatment." *Id.* at 694. In addition, the cost of monitoring and enforcement is likely to be lower with a smaller number of reception facilities compared with a larger number of shipboard systems. *Id.* at 605, 694. The Coast Guard also found that onshore treatment was generally less expensive per metric ton of ballast water than shipboard treatment. *Id.* at 679.

Of course, onshore treatment has many costs, including the cost of retrofitting vessels for onshore facilities, particularly ships from outside the United States, and the cost of shipping delays created by the time it takes to

discharge ballast onshore (though presumably shipboard treatment is not instantaneous). Costs alone, however, cannot determine BAT. *See* 33 U.S.C. § 1314(b)(2)(B). Furthermore, EPA failed to perform the economic analysis required to determine relative costs of the differing technologies in reaching its conclusion that onshore treatment was not economically achievable. *See Waterkeeper All.*, 399 F.3d at 516 ("[T]he Administrator is obligated to 'inquire into the initial and annual costs of applying the technology and make an affirmative determination that those costs can be reasonably borne by the industry.'" (quoting *Riverkeeper, Inc. v. EPA*, 358 F.3d 174, 195 (2d Cir. 2004))); *Nat'l Wildlife Fed'n v. EPA*, 286 F.3d 554, 563 (D.C. Cir. 2002) ("Although its analysis may be general, EPA 'has the heaviest of obligations to explain and expose every step of its [cost-benefit] reasoning.' . . . This duty to explain arises out of the need for reviewing courts to be able to discern the basis for EPA's decision." (internal citations omitted) (quoting *Am. Lung Ass'n v. EPA*, 134 F.3d 388, 392 (D.C. Cir. 1998))).

In light of these observations, the SAB and NAS Committee scientists concluded that "EPA should conduct a comprehensive analysis comparing biological effectiveness, cost, logistics, operations, and safety

associated with both shipboard [treatment] and reception facilities." App. at 606. If that analysis "indicate[d] that treatment at reception facilities is both economically and logistically feasible and is more effective than shipboard treatment systems, it should be used as the basis for assessing the ability of available technologies to . . . meet a given discharge standard." *Id.* EPA chose not to do so because the SAB "did not specify a timetable for that complex endeavor or suggest that it was possible to complete such an analysis in time to inform the impending VGP." EPA Br. at 58-59. We do not find that answer compelling. There is no impediment to engaging in further study, and further study may advance the goals of the CWA.

Thus, EPA could have well found that onshore treatment was "available." Indeed, EPA's failure to consider onshore treatment is inconsistent with the CWA's mandate that TBELs be technology-forcing. Congress designed the CWA to force agencies and permittees to adopt technologies that achieve the greatest reductions in pollutants. *See NRDC*, 822 F.2d at 124 (holding that CWA seeks "not only to stimulate but to press development of new, more efficient and effective technologies," which is the "essential purpose of this series of progressively more demanding technology-based standards"). As Judge Starr

noted in *NRDC*, "the most salient characteristic of this statutory scheme, articulated time and again by its architects and embedded in the statutory language, is that it is technology-forcing." *Id.* at 123.

EPA's decision on this issue matters. As the SAB scientists pointed out, EPA's choice of system in this permit will have a long-term impact:

[S]hipboard treatment and onshore treatment represent distinct approaches to ballast water management that would each require different large investments in infrastructure. . . . Thus *we are almost certain to be stuck for a very long time with whichever approach is used as the BAT* in setting discharge standards in 2013. It is thus of the utmost urgency that a fair and thorough comparison of the two approaches be made at this time.

App. at 744-45 (emphasis added). We conclude that EPA failed to give fair and thorough consideration to both onshore and shipboard treatment systems in setting the standard in the 2013 VGP, and we remand to EPA to give full consideration to the issue now.

c. *Viruses and Protists*

Petitioners also complain about the lack of numeric TBELs for viruses and protists (primarily single-celled organisms). EPA argues, however, that it could not set TBELs for viruses and protists in the 2013 VGP because EPA could not yet identify "suitable standardized test organisms and/or surrogate

parameters to determine treatment system performance at removing or eliminating viruses and protists and which also can be used in establishing technology-based discharge limitations." App. at 486; *see also* App. at 495 ("EPA does not believe that there are sufficient data available to establish numeric limits for protists or other bacteria.").

We agree that it was not arbitrary and capricious for EPA to decline to set TBELs for organisms for which it is unable to test and for which it has insufficient data to set numeric limits. *See Balt. Gas & Elec. Co. v. NRDC, Inc.*, 462 U.S. 87, 103 (1983) ("[A] reviewing court must remember that [where the agency] is making predictions, within its area of special expertise, at the frontiers of science . . . as opposed to simple findings of fact, a reviewing court must generally be at its most deferential."). Petitioners have not demonstrated that sufficient data are available. EPA has represented that it will consider including numeric TBELs for viruses and protists in the next version of the VGP. App. at 486. This is sufficient.

d. *Pre-2009 Lakers*

Petitioners allege that EPA's decision to exempt Lakers built before January 1, 2009 from numeric effluent limits of VGP § 2.2.3.5 was arbitrary and capricious. EPA based this decision on its finding that there was no treatment

technology "available" for these vessels either onboard or onshore. App. at 115-16. EPA expressed concern about the difficulty of finding effective onboard systems for pre-2009 Lakers due to their "unique operational and design constraints," such as the large volumes of fresh cold water they require, the short duration of their trips, their high pumping rates, and their uncoated ballast tanks. *Id.* at 116.¹⁴ In reaching that conclusion, EPA relied on the SAB Report, which advised that "specific constraints can greatly limit treatment options" for Lakers. *Id.* at 638. EPA also cited the costs of implementing these systems. *Id.* at 116.

We agree with petitioners that exempting the pre-2009 Lakers was arbitrary and capricious. First, the lack of supply of updated shipboard systems is not a legitimate reason to exempt pre-2009 Lakers from the 2013 VGP, as, again, the purpose of BAT is to force technology to keep pace with need. *See NRDC*, 822 F.2d at 124.

Second, EPA's decision was based on a flawed record that failed to consider an important aspect of the problem, namely the possibility of onshore

¹⁴ For example, certain treatment methods, such as electro-chlorination and ozonation, may only be effective in salt water, and others that use oxidizing chemicals may increase corrosion rates in uncoated tanks. *Id.* at 638.

treatment. *See Islander E. Pipeline*, 525 F.3d at 150-51. EPA should have considered the comparable 'cost of achieving such effluent reductions' through onshore treatment versus shipboard treatment, rather than merely dismissing onshore treatment. EPA disregarded the SAB's recommendation that onshore treatment would benefit pre-2009 Lakers that are "engaged solely in regional trade." *Id.* at 684. The SAB points out that the space and power constraints posed by pre-2009 Lakers are "largely absent in reception facilities." *Id.* at 680. EPA's foreclosure of considering onshore treatments for pre-2009 Lakers -- and indeed, all Lakers -- seems shortsighted. *See supra* at 31-42.

Third, EPA imposed the 2013 VGP on Lakers built after 2009, even though post-2009 Lakers face many of the same challenges and constraints as pre-2009 Lakers, such as their short voyages, high pumping rates, and freshwater environment.¹⁵ While it is true that shipbuilders were on notice that post-2009

¹⁵ Intervenors argue that due to these constraints, ballast water treatment is infeasible for *all* Lakers, regardless of when they were built. EPA has concluded, however, that anyone building a ship designed to enter the market after 2009 was well aware of the impending VGP requirements, and could anticipate its impact on shipbuilding. App. at 117. Intervenors also contend that ships exclusively plying the Great Lakes do not pose a threat to water quality because they do not introduce any invasive species from outside the Great Lakes. EPA has properly rejected this argument, noting that Lakers can spread or more rapidly distribute invasive species already present in the Great Lakes. *Id.* at 501.

Lakers would be subject to the 2013 VGP, in reality post-2009 boats appear to be similarly situated to pre-2009 Lakers. *See Islander E. Pipeline*, 525 F.3d at 150-51 (agency decision is arbitrary and capricious when agency offers explanation for decision that runs counter to evidence before agency). Thus, distinguishing pre-2009 and post-2009 Lakers was arbitrary and capricious.

The SAB Report supports our conclusion. Although the SAB Report acknowledged the limitations in treating ballast water from Lakers, it did not declare such treatment impossible. Instead, the SAB concluded that in light of these limitations, "[a] variety of environmental (e.g., temperature and salinity), operational (e.g., ballasting flow rates and holding times), and vessel design (e.g., ballast volume and unmanned barges) parameters" should be considered in determining the treatment standards. App. at 639.

EPA's exemption of the pre-2009 Lakers from the 2013 VGP was also arbitrary and capricious due to EPA's failure to conduct an appropriate and factually-supported cost analysis. Such an analysis might have shown that the cost of subjecting pre-2009 Lakers to the 2013 VGP was not unreasonably high, or, alternatively, that onshore treatment was economically feasible. For all these

reasons, EPA's decision to exempt pre-2009 Lakers from the 2013 VGP was arbitrary and capricious.

2. WQBELs

Under the CWA, NPDES permits must include WQBELs where the TBELs are insufficient to maintain water quality standards. 33 U.S.C. § 1311(b)(1)(C); 40 C.F.R. § 122.44(d)(1)(vii)(A). Here, EPA concluded that "even at the IMO level of discharge, reasonable potential exists for such discharges to cause or contribute to violations of applicable water quality standards pursuant to 40 C.F.R. § 122.44(d)(1)(ii)." App. at 129. To address this concern, EPA established WQBELs to ensure compliance with water quality standards. EPA, however, chose to create narrative WQBELs because it believed numeric WQBELs were "infeasible" to calculate.¹⁶

¹⁶ Federal regulation permits such limits to be expressed narratively if the calculation of numeric limits is "infeasible." 40 C.F.R. § 122.44(k)(3).

The WQBEL in the 2013 VGP states:

Your discharge must be controlled as necessary to meet applicable water quality standards in the receiving water body or another water body impacted by your discharges.

VGP § 2.3.1, at 59. In defending this standard, EPA relied in part on the NAS Report, which stated that "[t]he current state of science does not allow a quantitative evaluation of the relative merits of various discharge standards in terms of invasion probability." App. at 363.

Petitioners argue that this narrative WQBEL does not ensure compliance with water quality standards. We agree. This narrative standard is insufficient to give a shipowner guidance as to what is expected or to allow any permitting authority to determine whether a shipowner is violating water quality standards. By requiring shipowners to control discharges "as necessary to meet applicable water quality standards" without giving specific guidance on the discharge limits, EPA fails to fulfill its duty to "regulat[e] in fact, not only in principle." *Waterkeeper All.*, 399 F.3d at 498. As this Circuit held in *Waterkeeper Alliance*, NPDES permits "may issue only where such permits *ensure* that every discharge of pollutants will comply with all applicable effluent limitations and standards." *Id.* That is hardly the case here. EPA itself notes that it only

"generally expects that compliance with the [TBELs] . . . will control discharges as necessary to meet applicable water quality standards." VGP § 2.3.1, at 59. The WQBELs, although found by EPA to be required to *supplement* the TBELs, in fact add nothing. The WQBELs do not state how they will ensure compliance.

Even if determining the proper standard is difficult, EPA cannot simply give up and refuse to issue more specific guidelines. *See Am. Paper Inst., Inc. v. EPA*, 996 F.2d 346, 350 (D.C. Cir. 1993) (articulating that, even if creating permit limits is difficult, permit writers cannot just "thr[o]w up their hands and, contrary to the Act, simply ignore[] water quality standards including narrative criteria altogether when deciding upon permit limitations"). Scientific uncertainty does not allow EPA to avoid responsibility for regulating discharges. *See Massachusetts v. EPA*, 549 U.S. 497, 534 (2007) ("EPA [cannot] avoid its statutory obligation by noting the uncertainty surrounding various features of climate change and concluding that it would therefore be better not to regulate at this time.").

Moreover, EPA's reliance on the NAS Report is misplaced. EPA concedes that the NAS Committee "did not conclude that it is infeasible to calculate water quality-based effluent limits for ballast water discharges." App.

at 563. Rather, the NAS Committee found that it could not formulate a precise standard. In light of this uncertainty, it recommended further study of the issue. But EPA declined to engage in further study. *See App.* at 363-67. For all these reasons, EPA's WQBELs were arbitrary and capricious.

EPA's remaining counterarguments are unavailing. First, EPA asserts that petitioners fail to offer examples of "meaningful permit limits" for WQBELs. EPA Br. at 74. EPA, however, could articulate specific actions that vessels would be required to take to protect against site-specific threats. For example, if EPA or the shipowner became aware of an unusual risk posed by a specific port, EPA could require vessels to take action to avoid such risk at that port, including not uptaking ballast water or not discharging into other ports the contaminated ballast water that was taken up. Toward that end, EPA has included a set of specific best management practices in the 2013 VGP § 2.2.3.3, further demonstrating the viability of this approach.

Second, EPA argues that under 40 C.F.R. § 122.44(k)(3) it may employ BMPs instead of "[n]umeric effluent limitations" for WQBELs when deriving numeric limitations is "infeasible." 40 C.F.R. §§ 122.44(k)(3). BMPs include "schedules of activities, prohibitions of practices, maintenance

procedures, and other management practices to prevent or reduce . . . pollution."

Id. § 122.2. EPA argues that the narrative WQBEL is a BMP, and therefore it has discharged its duty under 40 C.F.R. § 122.2.¹⁷

But EPA's narrative WQBEL does not qualify as a BMP, as it is neither a practice nor a procedure. BMPs typically involve requirements like operating procedures, treatment requirements, practices to control runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage; they can also be structural requirements including tarpaulins, retention ponds, or devices such as berms to channel water away from pollutant sources, and treatment facilities. *See NRDC v. Sw. Marine, Inc.*, 236 F.3d 985, 991 n.1 (9th Cir. 2000). Examples of BMPs that have been accepted as substitutes for effluent limits include: nutrient management plans for concentrated animal feeding operations, *see Waterkeeper All.*, 399 F.3d at 497, 502, filtration of stormwater runoff from ditches before it enters rivers and streams (by timber companies), and constructing roads with surfacing that minimizes sediment in runoff (by

¹⁷ EPA also claims general prohibitions can be BMPs, citing 40 C.F.R. § 122.2, but does not offer an example of something as general as the WQBEL standard being found to be a BMP. As discussed herein, the EPA's characterization is inconsistent with regulations that require WQBELs to "ensure compliance." 40 C.F.R. § 122.4(d); *see Auer*, 519 U.S. at 461 (holding interpretation may not be inconsistent with regulation).

timber companies), *see Decker v. Nw. Envtl. Def. Ctr.*, 133 S. Ct. 1326, 1338 (2013).

The narrative standard here is nowhere as specific as any of these examples.

Indeed, it requires nothing more of a shipowner than to meet the TBELs. This interpretation is hardly consistent with the regulations that require WQBELS to ensure compliance. *See Auer*, 519 U.S. at 461 (holding that courts should defer to agency's interpretation of its own regulations if not plainly erroneous or inconsistent with the regulation).

Third, EPA claims that WQBEL standards will be sufficiently maintained because EPA can take "corrective actions" *after* the permittee becomes aware of a violation. App. at 160. This is not reassuring. The point of a permit is to prevent discharges that violate water quality standards *before* they happen. *See* 33 U.S.C. §§ 1311(b)(1)(C), 1342(a)(2); 40 C.F.R. §§ 122.4(d), 122.44(d)(1).

"Corrective action" is not an effective remedy in an invasive species context -- it is difficult to eradicate a colony of zebra mussels after they are established. *See, e.g.,* Great Lakes Sci. Ctr., U.S. Geological Survey, *Zebra Mussels Cause Economic and Ecological Problems in the Great Lakes 2* (rev. 2011) ("Once zebra mussels become established in a water body, they are impossible to eradicate with the technology available today. Many chemicals kill zebra mussels, but these exotics

are so tolerant and tough that everything in the water would have to be poisoned to destroy the mussel."); Robbins, *A Western Showdown*, at D6 (noting that officials in Western states have instituted elaborate and expensive inspection systems for boats because they "want desperately to keep the mussels out of blue-ribbon trout streams and pristine mountain lakes" as "once established [the mussels] are impossible to permanently eradicate"). This is all the more problematic because a vessel operator is not likely to know it has a discharge violation if, as discussed below, there are no monitoring requirements.¹⁸

Accordingly, EPA acted arbitrarily and capriciously in issuing the WQBELs because they violate section 1342's requirement that NPDES permits ensure compliance with the CWA. *Cf. Waterkeeper All.*, 399 F.3d at 498.

Intervenors raise one additional argument. Under section 401 of the CWA, before EPA issues a permit, the state in which the discharge is to occur

¹⁸ EPA's response is that petitioners' arguments regarding corrective action and BMPs are waived because they were not raised by petitioners in the comments to the permit. *See, e.g., NRDC v. EPA*, 25 F.3d 1063, 1073-74 (D.C. Cir. 1994). Arguments can be considered, however, even if not raised during the notice and comment period. *See NRDC v. EPA*, 755 F.3d 1010, 1023 (D.C. Cir. 2014) ("EPA retains a duty to examine key assumptions as part of its affirmative burden of promulgating and explaining a nonarbitrary, non-capricious rule and therefore EPA must justify that assumption even if no one objects to it during the comment period." (internal quotation marks and alteration omitted) (quoting *Appalachian Power Co. v. EPA*, 135 F.3d 791, 818 (D.C. Cir. 1998))).

must either certify, or waive its right to certify, that the discharge will comply with the state's water quality standards -- commonly known as a "401 Certification." *NRDC*, 279 F.3d at 1183; *see also* 33 U.S.C. § 1341(a); 40 C.F.R. § 122.4(b). The intervenors argue that because "the 401 Certifications have been upheld, the matter is settled: the VGP will ensure compliance with the state water quality standards." Intervenors' Br. at 46. We disagree. EPA has an independent duty under the CWA to ensure compliance with state and federal water quality standards and may impose "additional permit conditions necessary to meet that end." *NRDC*, 279 F.3d at 1188. Such additional permit conditions may be necessary if state water quality standards are potentially less stringent than the CWA's," because "the CWA provides a federal floor, not a ceiling, on environmental protection." *Dubois v. U.S. Dep't of Agriculture*, 102 F.3d 1273, 1300 (1st Cir. 1996) (citations omitted).

3. Monitoring and Reporting Requirements for TBELs and WQBELs

Under the CWA, NPDES permits must contain conditions that require both *monitoring* and *reporting of monitoring results* of TBELs and WQBELs to ensure compliance. *See* 33 U.S.C. § 1342(a)(2); 40 C.F.R. § 122.44(i)(1)-(2). The regulations provide, in pertinent part:

In addition to the conditions established under § 122.43(a), each NPDES permit shall include conditions meeting the following requirements when applicable.

...

- (i) *Monitoring requirements.* In addition to § 122.48, the following monitoring requirements:
 - (1) To assure compliance with permit limitations, requirements to monitor:
 - (i) The mass (or other measurement specified in the permit) for each pollutant limited in the permit;
 - (ii) The volume of effluent discharged from each outfall;
 - (iii) Other measurements as appropriate including pollutants in internal waste streams under § 122.45(i); pollutants in intake water for net limitations under § 122.45(f); frequency, rate of discharge, etc., for noncontinuous discharges under § 122.45(e); pollutants subject to notification requirements under § 122.42(a); and pollutants in sewage sludge or other monitoring as specified in 40 CFR part 503; or as determined to be necessary on a case-by-case basis pursuant to section 405(d)(4) of the CWA.
 - (iv) According to sufficiently sensitive test procedures (i.e., methods) approved under 40 CFR part 136 for

the analysis of pollutants or pollutant parameters or required under 40 CFR chapter 1, subchapter N or O.

...

- (2) Except as provided in paragraphs (i)(4) and (i)(5) of this section, requirements to report monitoring results shall be established on a case-by-case basis with a frequency dependent on the nature and effect of the discharge, but in no case less than once a year. . . .

40 C.F.R. § 122.44(i)(1)-(2).

Enforcing compliance with a permit is the key to an effective NPDES program. *See NRDC v. Cty of L.A.*, 725 F.3d 1194, 1208 (9th Cir. 2013) ("[T]he NPDES program fundamentally relies on self-monitoring," and "Congress' purpose in adopting this self-monitoring mechanism was to promote straightforward enforcement of the Act." (internal quotations omitted)). We now turn to the monitoring and reporting requirements in the 2013 VGP.

a. *Monitoring Requirements for TBELs*

As previously discussed, the 2013 VGP requires vessels to monitor (1) the functionality of their ballast water treatment systems, if installed, and (2) the concentrations of the two "indicator" bacteria (*E. coli* and enterococci). VGP § 2.2.3.5.1.1.2, at 30, § 2.2.3.5.1.1.4, at 31-32.

The first requirement, known as "functionality monitoring," determines whether a ballast water treatment program is "operating according to the manufacturers' requirements." App. at 96. A shipowner is required to check a measurement that would "verify system functionality," such as how much chlorine the system is using each month. *Id.* at 1168. If the measurement is correct, it is assumed that the program is in compliance. If the equipment is not operating properly, the ship is not permitted to discharge ballast. The vessel owner is not required to take any measurement of pollutants or significant categories of living organisms in ballast water being discharged. Instead, the shipowner relies solely on the functioning of the treatment system to determine if the ship is complying with the permit. Treatment systems are inspected monthly. *See* VGP § 2.2.3.5.1.1.2, at 30 ("To assess the [system's] functionality, monitoring indicators of the [system's] functionality is required at least once per month for specific parameters that are applicable to your system.").

The second provision, effluent biological organism monitoring, requires vessels to collect small-volume samples from ballast discharge and analyze them for concentrations of two indicator pathogens, *E. coli* and enterococci. VGP § 2.2.3.5.1.1.4, at 31-32. The idea is that if there are significant

levels of these two pathogens in the sample, then treatment has not been effective. Vessels are not required to monitor *Vibrio cholera* or medium or large organisms regulated in the 2013 VGP. Sampling is required between one and four times a year, depending on the type of system.

Petitioners present two arguments about why these requirements do not accord with the law. First, petitioners argue that the 2013 VGP violates CWA regulations by not requiring vessels to monitor the *concentration* of living organisms. The regulations require monitoring of mass, volume, or "other measurement specified in the permit." 40 C.F.R. § 122.44(i)(1)(i)-(ii). Petitioners contend the unit of measurement for living organisms in the 2013 VGP should be concentration. Neither functionality monitoring nor testing for two indicator microorganisms measures concentration. Thus, according to petitioners, the monitoring and reporting requirements for TBELs violate 40 C.F.R. § 122.44(i)(1).

Second, petitioners argue that these monitoring requirements violate the requirement in 40 C.F.R. § 122.44(i)(1) that monitoring "assure[s] compliance with permit limitations." Relying on functionality monitoring instead of requiring an actual measurement of concentrations of organisms means that neither EPA nor the public knows if the permittees are complying with the

TBELs. Similarly, petitioners argue that monitoring for the presence of the two "indicator bacteria," *E. coli* and enterococci, is not sufficient to monitor compliance with TBELs because it indicates only their presence in the water, not their quantity.

We disagree with petitioners and conclude that EPA's monitoring requirements were not arbitrary and capricious. The CWA regulations expressly allow for monitoring quantities other than mass or volume, namely some "other measurement specified in the permit[] for each pollutant limited in the permit." 40 C.F.R. § 122.44(i)(1). Functionality monitoring and monitoring for the presence of indicator organisms qualify as such "other measurement."

And while there are potential alternatives, petitioners' urged alternative of direct monitoring is not required because "more sophisticated methods for enumerating living organisms in the larger size classes are not currently available for use by permittees." App. at 524. Current technology is not capable of adequately monitoring ballast water as it is being discharged because, EPA notes, such monitoring requires analyzing large volumes of water and is prohibitively expensive and impractical. According to EPA, testing medium and large organisms with shipboard systems can cost between \$75,000

and \$125,000 per vessel per sampling event. Moreover, the process would be impractical, involving sampling and analyzing large volumes of water in labs and requiring "dozens of hours to collect and analyze those samples." EPA Br. at 89.

Given the difficult circumstances, EPA's monitoring requirements for TBELs were not arbitrary and capricious. *Cf. NRDC v. Costle*, 568 F.2d 1369, 1380 (D.C. Cir. 1977) ("[W]hen numerical effluent limitations are infeasible, EPA may issue permits with conditions designed to reduce the level of effluent discharges to acceptable levels."). In the face of the severe technological limitations on monitoring, it was reasonable for EPA to decline to require monitoring for parameters for which it is currently impractical to collect and analyze samples. Functionality monitoring and biological indirect monitoring are the only feasible options at present to assure compliance with the permit. We defer to EPA's decision that functionality monitoring and biological indicator monitoring, when used in combination, offer an acceptable "other measurement." *See Auer*, 519 U.S. at 461 (holding that courts should defer to agency's interpretation of its own regulations if not plainly erroneous or inconsistent with the regulation).

b. *Monitoring Requirements for WQBELs*

Petitioners also argue that EPA acted arbitrarily and capriciously in failing to require that permittees monitor ballast water discharges to ensure compliance with WQBELs. The only monitoring requirement for WQBELs is that ships report the "*expected* date, location, volume, and salinity of any ballast water to be discharged" into U.S. waters or at a reception facility. VGP § 4.3, at 72 (emphasis added). There is no requirement to report actual volumes, locations, or composition of ballast water discharges.

We agree that failure to include monitoring requirements for WQBELs was arbitrary and capricious. The regulations require monitoring to "assure compliance with permit limitations." 40 C.F.R. § 122.44. Generally, "an NPDES permit is unlawful if a permittee is not required to effectively monitor its permit compliance." *NRDC*, 725 F.3d at 1207. Here, the reporting requirement provided little information on the quality of the ballast water, requiring only information on *expected* date, location, volume, and salinity. There is no way to derive from that information whether a vessel is actually in compliance with the WQBELs. Thus, because the 2013 VGP does not contain a mechanism to evaluate compliance with the WQBELs, the monitoring requirements are arbitrary and

capricious and not in accordance with the law. *See Waterkeeper All.*, 399 F.3d at 499 (failure of permit to include any mechanism for evaluating compliance with required technical standards rendered agency unable to ensure compliance with water quality standards).

Our conclusion is further supported by the simple, but overlooked, options that EPA has in structuring WQBEL monitoring requirements. One possible condition EPA could consider including in the WQBELs would be to require shipowners to monitor the *actual* time, place, and volume of ballast water discharge, rather than the *expected* time, place, and volume. Another possible condition would be to require shipowners to monitor for a particular pathogen or pollutant if it became known that such a pathogen or pollutant is a problem in a particular port. Each of these options would provide more significant monitoring.

EPA's contentions on this point are unpersuasive. EPA argues that if a vessel is in compliance with the TBELs, it should be "generally expected to already be controlling [its] vessel discharges to a degree that is protective of water quality," rendering additional monitoring to demonstrate compliance with narrative WQBELs unnecessary. App. at 530. In defense of this position, EPA

also argues that 40 C.F.R. § 122.44(i) does not apply because of "practical constraints on the ability to collect and analyze the volumes of ballast water necessary to 'directly' detect and quantify such organisms at the levels of concern." EPA Br. at 98. According to EPA, it is simply "unrealistic" to have stricter monitoring.

This, however, is not a valid excuse in the WQBEL context. *See NRDC*, 859 F.2d at 208 (stating legislative history of CWA "strongly supports [the] position that Congress did not intend to tie compliance with water quality-based limitations to the capabilities of any given level of technology," and "a water quality-based permit limit begins with the premise that a certain level of water quality will be maintained, come what may, and places upon the permittee the responsibility for realizing that goal"). It is inconsistent to say that WQBELs are necessary to ensure that water quality standards are met, while specific enforcement of such WQBELs is unnecessary. More importantly, this lack of enforcement violates the CWA regulations, which mandate that no permit may be issued "[w]hen the imposition of conditions cannot ensure compliance with the applicable water quality requirements of all affected States." 40 C.F.R. § 122.4(d).

Accordingly, EPA's failure to include monitoring for compliance with WQBELs was inconsistent with regulations and thus arbitrary and capricious.

C. Remand

Accordingly, we remand this matter to EPA for proceedings consistent with this opinion. The 2013 VGP is to remain in place until EPA issues a new VGP. *See Idaho Farm Bureau Fed'n v. Babbitt*, 58 F.3d 1392, 1405 (9th Cir. 1995) (holding that "[o]rdinarily when a regulation is not promulgated in compliance with the APA, the regulation is invalid. However, when equity demands, the regulation can be left in place while the agency follows the necessary procedures." (citation omitted)); *see also Allied-Signal, Inc. v. U.S. Nuclear Regulatory Comm.*, 988 F.2d 146, 150 (D.C. Cir. 1993) ("An inadequately supported rule, however, need not necessarily be vacated."); *Fertilizer Inst. v. EPA*, 935 F.2d 1303, 1312 (D.C. Cir. 1991) ("[W]hen equity demands, an unlawfully promulgated regulation can be left in place while the agency provides the proper procedural remedy."); *W. Oil & Gas Ass'n v. EPA*, 633 F.2d 803, 813 (9th Cir. 1980) ("[A] reviewing court has discretion to shape an equitable remedy, [and so] we leave the challenged designations in effect.").

CONCLUSION

For the reasons set forth above, we **GRANT** the petition for review with respect to

- (1) EPA's decision to set the TBELs at the IMO Standard,
- (2) EPA's failure to consider onshore treatment for ballast water discharge,
- (3) EPA's decision to exempt pre-2009 Lakers from the TBELs in the 2013 VGP permit,
- (4) EPA's narrative standard for WQBELs, and
- (5) the monitoring and reporting requirements established by EPA for WQBELs,

and **REMAND** for further proceedings in these respects.

We **DENY** the petition for review with respect to TBELs for viruses and protists and the monitoring and reporting requirements established by EPA for TBELs.

The 2013 VGP shall remain in place until EPA issues a new VGP.

APPENDIX
Glossary of Acronyms

BACT	Best available demonstrated control technology
BAT	Best available technology economically achievable
BCT	Best conventional pollutant control technology
BMP	Best management practice
BWTS	Ballast water treatment systems
CSA	Canadian Shipowners Association
CWA	Clean Water Act
ELG	Effluent limitation guidelines
EPA	Environmental Protection Agency
IMO	International Maritime Organization
NAS	National Research Council/National Academy of Sciences
NPDES	National Pollutant Discharge Elimination System
NRDC	Natural Resources Defense Council
NWEA	Northwest Environmental Advocates
NWF	National Wildlife Federation
PFR	Petition for Review
SAB	Science Advisory Board
TBEL	Technology-based effluent limitation
VGP	Vessel General Permit
WQBEL	Water quality-based effluent limitation