U.S. Environmental Protection Agency
2008 Final Issuance of

National Pollutant Discharge Elimination System (NPDES) Vessel General Permit (VGP) for Discharges Incidental to the Normal Operation of Vessels

Fact Sheet

Agency: Environmental Protection Agency (EPA)
Action: Notice of NPDES General Permit

4. EFFLUENT LIMITATIONS

4.1 BACKGROUND

The Clean Water Act (CWA) requires that all point source discharges must meet technology-based effluent limitations representing the applicable levels of technology-based control. Water quality-based effluent limitations (WQBELs) are required as necessary where the technology-based limitations are not sufficient to meet applicable water quality standards (WQS). See *P.U.D. No. 1 of Jefferson County et al. v. Washington Dept. of Ecology*, 511 U.S. 700, 704 (1994). Water quality-based requirements will be discussed in greater depth in Section 4.3. Both technology-based and water quality-based effluent limitations are implemented through NPDES permits containing such limitations issued to point sources. CWA sections 301(a) and (b).

4.1.1 The Clean Water Act Requires EPA to Develop Effluent Limitations that Represent the Following:

4.1.1.1 Best Practicable Control Technology Currently Available (BPT)

The CWA requires BPT effluent limitations for conventional, toxic, and non-conventional pollutants. Section 304(a)(4) designates the following as conventional pollutants: biochemical oxygen demand (BOD5), total suspended solids, fecal coliform, pH, and any additional pollutants defined by the Administrator as conventional. The Administrator designated oil and grease as an additional conventional pollutant on July 30, 1979. 40 CFR 401.16. EPA has identified 65 pollutants and classes of pollutants as toxic pollutants, of which 126 specific substances have been designated priority toxic pollutants. 40 CFR 401.15 and 40 CFR Part 423 Appendix A. All other pollutants are considered to be non-conventional.

In specifying BPT, under CWA section 301(b)(1)(A); 304(b)(1)(B); 40 CFR 125.3(d)(1), EPA looks at a number of factors. EPA first considers the total cost of applying the control technology in relation to the effluent reduction benefits. The Agency also considers the age of the equipment and facilities, the processes employed, and any required process changes, engineering aspects of the control technologies, non-water quality environmental impacts (including energy requirements), and such other factors as the EPA Administrator deems appropriate. Traditionally, EPA establishes BPT effluent limitations based on the average of the best performance of facilities within the industry of various ages, sizes, processes, or other common characteristics. Where existing performance is uniformly inadequate, BPT may reflect higher levels of control than currently in place in an industrial category if the Agency determines that the technology can be practically applied.

4.1.1.2 Best Conventional Pollutant Control Technology (BCT)

The 1977 amendments to the CWA required EPA to identify effluent reduction levels for conventional pollutants associated with BCT for discharges from existing industrial point sources. CWA section 301(b)(2)(E); 304(b)(4)(B); 40 CFR 125.3(d)(2). In addition to considering the other factors specified in section 304(b)(4)(B) to establish BCT limitations, EPA

also considers a two part "cost-reasonableness" test. EPA explained its methodology for the development of BCT limitations in 1986. 51 FR 24974 (July 9, 1986).

4.1.1.3 Best Available Technology Economically Achievable (BAT)

For toxic pollutants and non-conventional pollutants, EPA promulgates effluent limitations based on BAT. CWA section 301(b)(2)(A); 304(b)(2)(B); 40 CFR 125.3(d)(3). In establishing BAT, the technology must be technologically "available" and "economically achievable." The factors considered in assessing BAT include the cost of achieving BAT effluent reductions, the age of equipment and facilities involved, the process employed, potential process changes, non-water quality environmental impacts, including energy requirements, and other such factors as the EPA Administrator deems appropriate. The Agency retains considerable discretion in assigning the weight accorded to these factors. BAT limitations may be based on effluent reductions attainable through changes in a facility's processes and operations. Where existing performance is uniformly inadequate, BAT may reflect a higher level of performance than is currently being achieved within a particular subcategory based on technology transferred from a different subcategory or category. BAT may be based upon process changes or internal controls, even when these technologies are not common industry practice.

This permit contains effluent limits that correspond to required levels of technology-based control (BPT, BCT, BAT) for various discharges under the CWA. Some effluent limits have been established by examining other existing laws and requirements. Where these laws already exist, it was deemed feasible for the operators to implement these practices as effluent limits in this permit. Because these are demonstrated practices, EPA has found that they are technologically available and economically practicable (BPT) or achievable (BAT). In some cases, such as with discharges of oils, including oily mixtures and graywater discharges from cruise ships (under certain circumstances), numeric effluent limits have been established.

4.1.2 Numeric Limitations Are Infeasible

Because of the nature of vessel discharges, it is not practicable to rely on numeric effluent limits to achieve these levels of control for the large majority discharge types until greater information is available. Constituents in properly controlled discharges may vary widely based upon vessel type, size, and activities occurring on board the vessel. In such situations, the CWA authorizes EPA to include non-numeric effluent limits in NPDES permits.[5] 40 CFR 122.44(k)(3). The VGP includes such non-numeric effluent limits developed for discharges for which developing numeric effluent limits are infeasible to calculate at this time. Many of these non-numeric effluent limits require permittees to engage in specific behaviors or best management practices (BMPs).

For example, some permittees must conduct saltwater flushing to minimize the discharge of living organisms. Several other BMPs require vessels to "minimize" pollutant discharges. For purposes of this permit and consistent with the technology-based requirements of the CWA,

[5] Refer to more detailed discussion below under "EPA's Authority To Include Non-Numeric Technology-Based Effluent Limits In NPDES Permits," "EPA's Decision To Include Non-Numeric Technology-Based Effluent Limits In This Permit" and 40 CFR 122.44(k)(3).

EPA is clarifying that the term "minimize" means to reduce and/or eliminate to the extent achievable using control measures (including best management practices) that are technologically available and economically practicable and achievable in light of best marine practice.

This permit defines the term "minimize" in order to provide a reasonable approach by which EPA, permittees, and the public can determine/evaluate appropriate control measures for vessels to control specific discharges. EPA believes that for some vessel discharges, minimization of pollutants in those discharges can be achieved without using highly engineered, complex treatment systems. For other vessel discharges, highly engineered, complex, treatments systems that are reliable and approved for use on vessels are not currently available. The specific limits included in Part 2 of the permit emphasize effective pollution prevention controls, such as requiring phosphorus free soap, storing chemicals in protected areas of the vessel, and minimizing production of graywater in port. In other cases, they require more complex behavioral practices such as saltwater flushing or ballast water exchange. In yet other cases, more advanced treatment may be necessary, such as that needed to meet water quality-based effluent limits.

4.2 TECHNOLOGY-BASED EFFLUENT LIMITS

EPA has determined that the technology-based numeric and non-numeric effluent limits in this permit, taken as a whole, constitute the first level of control (BPT for all pollutants) and the second level of control (BAT for toxic and non-conventional pollutants and/or BCT for conventional pollutants) for discharges from vessels. For all of the discharges in this permit, the technology-based limits are based on best professional judgment, as authorized under CWA section 402(a)(1) and 40 CFR 125.3.

4.2.1 Types of Technology-Based Effluent Limits

As stated above, the CWA establishes two levels of technology-based controls. The first level of control, "best practicable control technology currently available," or "BPT" applies to all pollutants. CWA section 304(b)(1)(B); 33 U.S.C. 1314(b)(1)(B). BPT represents the initial stage of pollutant discharge reduction, designed to bring all sources in an industrial category up to the level of the average of the best source in that category. See *EPA v. National Crushed Stone Association*, 449 U.S. 64, 75-76 (1980). In the second level of control, all point sources are required to meet effluent limitations based on "best conventional pollutant control technology," or "BCT" CWA section 304(b)(4)(B); 33 U.S.C. 1314(b)(4)(B) or "best available technology economically achievable," or "BAT" CWA section 301(b)(2)(A); 33 U.S.C. 1311(b)(2)(A), depending on the types of pollutants discharged. BCT applies to conventional pollutants, listed at 40 CFR 401.16 (biological oxygen demand (BOD), pH, fecal coliform, TSS, and oil and grease). BAT applies to toxic and non-conventional pollutants. Technology-based limits are to be applied throughout industry without regard to receiving water quality. *Appalachian Power Co. v. EPA*, 671 F.2d 801 (4th Cir. 1982).

4.2.2 Inclusion of Non-Numeric Technology-Based Limits in NPDES Permits

NPDES permits are required to contain technology-based limitations. CWA sections 301(b)(1)(A)(BPT); 301(b)(2)(A)(BAT), 301(b)(2)(E) (BCT); 40 CFR 122.44(a)(1). Technology-based limits in the permit represent the BPT (for conventional, toxic, and non-conventional pollutants), BCT (for conventional pollutants), and BAT (for toxic and non-conventional pollutants) level of control for the applicable pollutants. Where EPA has not promulgated ELGs for an industry, or if an operator is discharging a pollutant not covered by the effluent guideline, permit limitations may be based on the best professional judgment (BPJ, sometimes also referred to as best engineering judgment) of the permit writer. 33 U.S.C. 1342(a)(1); 40 CFR 125.3. See *Student Public Interest Group v. Fritzsche, Dodge & Olcott*, 759 F.2d 1131, 1134 (3d Cir. 1985); *American Petroleum Inst. v. EPA*, 787 F.2d 965, 971 (5th Cir. 1986). For this general permit, all of the technology-based limits are based on BPJ decision-making because no ELGs apply.

Most of the BPJ limits in the permit are in the form of non-numeric control measures, commonly referred to as best management practices (BMPs). Non-numeric limits are employed under limited circumstances, as described in 40 CFR 122.44(k). As far back as 1977, courts have recognized that there are circumstances when numerical effluent limitations are infeasible and have held that EPA may issue permits with conditions (e.g., BMPs) designed to reduce the level of effluent discharges to acceptable levels. *Natural Res. Def. Council, Inc. v. Costle*, 568 F.2d 1369 (D.C. Cir.1977).

Through the Agency's NPDES permit regulations, EPA interpreted the CWA to allow BMPs to take the place of numeric effluent limitations under certain circumstances. 40 CFR §122.44(k), entitled "Establishing limitations, standards, and other permit conditions (applicable to State NPDES programs ...)," provides that permits may include BMPs to control or abate the discharge of pollutants when: (1) "[a]uthorized under section 304(e) of the CWA for the control of toxic pollutants and hazardous substances from ancillary industrial activities"; (2) "[a]uthorized under section 402(p) of the CWA for the control of stormwater discharges"; (3) "[n]umeric effluent limitations are infeasible"; or (4) "[t]he practices are reasonably necessary to achieve effluent limitations and standards or to carry out the purposes and intent of the CWA." 40 CFR 122.44(k).

And, as recently as 2006, courts have held that the CWA does not require the EPA to set numeric limits where such limits are infeasible. *Citizens Coal Council v. EPA*, 447 F.3d 879, 895-96 (6th Cir. 2006). The Sixth Circuit cited to *Waterkeeper Alliance, Inc. v. EPA*, 399 F.3d 486, 502 (2d Cir. 2005), stating "site-specific BMPs are effluent limitations under the CWA."

Additionally, the Sixth Circuit cited to *Natural Res. Def. Council, Inc. v. EPA*, 673 F.2d 400, 403 (D.C. Cir.1982), noting that "section 502(11) defines 'effluent limitation' as '*any* restriction' on the amounts of pollutants discharged, not just a numerical restriction."

4.2.3 EPA's Decision to Include Non-Numeric Technology-Based Effluent Limits in This Permit and Rationale for Why the Limits Represent the Appropriate (BPT, BCT or BAT) Level of Control

Non-numeric limits

With the exception of graywater and pool and spa discharges from cruise ships, oily discharges, including oily mixtures, and residual biocide limits from vessels utilizing experimental ballast water treatment systems, numeric effluent limitations are not feasible to calculate for vessel discharges in this permit iteration. EPA may develop numeric effluent limits for certain discharge types for the next permit iteration, if applicable. Vessels vary widely by type and/or class, size, and activity. Furthermore, most vessel designs are unique, onboard space is highly limited, and information on the characteristics of all discharges from these vessels is limited. Hence, vessels can discharge a wide variety of waste streams, whose volume will vary dependent upon seas, cargo carried, and age of the vessel. Additionally, vessel operators cannot install equipment onboard their vessels until that equipment has been approved by the Coast Guard and, in some cases, their class societies. Hence, EPA could not require experimental equipment or technologies in development that would conflict with the requirements of these organizations without fully understanding the implications of these requirements.

These factors create a situation where, at this time, it is generally not feasible for EPA to calculate numeric effluent limitations to effectively regulate vessel discharges, with the limited exceptions noted above (graywater and pool and spa water discharges from cruise ships, some oil discharges, including oily mixtures for vessels, and residual biocide limits). EPA is able to calculate numeric effluent limits for these groups because extensive research has been conducted and effective pollution control technologies are widely commercially available. For other non-numeric effluent limits, such as standards for ballast water exchange, the variability of the effectiveness of the exchange, combined with the impossibility of being able to successfully predict invasions, have prevented EPA from establishing numeric limits expressed as the number of living organisms in the discharge. Instead, vessel owner/operators must exchange a specified volume of water which should increase the effectiveness of the exchange. In other cases, such as establishing ballast water living organism discharge limits where standards have been proposed by other entities, EPA could not identify technologies that are available as of December 19, 2008, using a BAT approach to meet those limits (see section 4.4.3.5 for more detailed discussion). Therefore, in light of these considerations, EPA has determined that it is not feasible for the Agency to calculate numeric, technology-based limits for most of the discharges covered under this permit, and, based on the authority of 40 CFR 122.44(k)(3), has chosen to adopt non-numeric effluent limits.

Rationale for finding that the limits in this permit represent the BPT, BCT or BAT level of control

The BAT/BCT/BPT non-numeric effluent limits in this permit are expressed as:

- Specific pollution prevention practices for minimizing or eliminating the pollutants or constituent of concern in the discharge.

- Specific behavioral practices for minimizing or eliminating the pollutants or constituent of concern in the discharge.
- Narrative requirements to minimize pollutants or constituents of concern in discharges or the discharges themselves[6]
- Limiting or eliminating discharges at certain times for discharge types that can be limited or eliminated for short periods due to technology available on board the vessel and the vessel design (i.e. if the vessel can hold the discharge type for limited periods or reduce production of the effluent).

In the context of this general permit, EPA has determined these non-numeric effluent limits represent the best practicable technology (BPT) for all pollutants, the best conventional pollutant control technology for conventional pollutants (BCT) and the best available technology economically achievable (BAT) for toxic and non-conventional pollutants. EPA has determined that the combination of pollution prevention approaches and structural management practices described above are the most environmentally sound way to control the discharge of pollutants from vessels.

Requirements are technologically available

EPA has found that the requirements of this permit represent the appropriate level of control representing BPT, BCT, and BAT. For example, many class societies require that vessels have coamings or drip pans underneath machinery as a way to keep oil from entering the bilge, being discharged to surrounding waters, or creating hazardous conditions on the vessel deck. The majority of vessels already have these available measures in place to eliminate the discharge of oil from their vessels and many frequently clean oil from the drip pans if present. Hence, EPA believes this requirement represents BPT and this permit requires that all vessels follow this common sense approach if feasible. As an example of an effluent limit that meets BPT and BAT standards, EPA is requiring vessel operators to comply with additional ballast water management requirements such as mandatory saltwater flushing for vessels with empty ballast water tanks (see section 4.4.3.2 of this fact sheet for additional discussion). These requirements are available because of the U.S. Coast Guard's voluntary policy for such vessels and the Saint Lawrence Seaway Corporation's mandatory requirements for vessels entering through the Seaway (33 CFR Part 401.30), and many U.S.-bound vessels with empty ballast tanks already perform saltwater flushing. Furthermore, because reliable treatment technology is not yet currently available for removing residual living organisms in empty ballast water tanks under the BAT standard, saltwater flushing represents BAT since it is the best approach currently available for these vessels under this standard.

EPA has found that it is technologically possible to prohibit discharges in certain waters, and therefore such a limit is technologically available. However, it is not possible to prohibit these discharge categories under all circumstances. EPA decided which discharge types to prohibit in certain waters based on the environmental impacts of discharges and technical information as to whether vessels had the capacity to hold certain discharge types. These sources of information included technical experts and publications cited in this fact sheet including US

[6] These types of effluent limits allow owner/operators to use control measures appropriate for their vessels to meet those limits.

EPA 1999, Alaska Department of Environmental Conservation (ADEC) and Science Advisory Panel 2002, Lamb 2004, and US EPA 2007.

As an example, some vessels such as cruise ships have the ability to hold graywater for a time from hours to days. Likewise, large vessels can retain treated Bilgewater on board in the bilge for prolonged periods; however, it must periodically be discharged or emptied. Yet another example is the discharge of AFFF for maintenance purposes. Vessel owner/operators may elect where they conduct the maintenance, thereby limiting where they will discharge. Since vessels are mobile and can move from water to water, EPA has determined that vessels have the technology to limit their discharges in select waters. Therefore, under the authority to consider "other factors the Administrator deems appropriate," EPA has determined that the requirement to limit discharges to specific waters is technologically available. However, as mentioned, EPA finds that it is not technologically available to limit all discharge types in certain waters. For instance, in the case of deck runoff, vessel operators have little control as to when water may runoff from the deck into surrounding waters without potentially creating major safety concerns. Hence, EPA is not prohibiting the discharge of certain discharge types into waters of greater concern where methods to do so are not technologically available.

Requirements meet the BPT and BAT economic tests set forth in the CWA

There are different economic considerations under BPT, BCT and BAT. EPA finds that the limits in this permit meet the BPT and BAT economic tests. Because the types of controls under consideration minimize toxic, nonconventional, and conventional pollutants, conventional pollutants are controlled by the same practices that control toxic and nonconventional pollutants. Hence, EPA is evaluating effluent limits using a BPT and a BAT standard, but since conventional pollutants will also be adequately controlled by these same effluent limits for which EPA applied the BPT and BAT tests, EPA has determined that it is not necessary to conduct BCT economic tests.

Under BPT, EPA has determined that the requirements of this permit are economically practicable. To make this determination, EPA has considered the reasonableness of the relationship between the costs of application of technology in relation to the effluent reduction benefit derived. CWA section 301(b)(1)(B); 40 CFR 125.3(d)(1). EPA has examined the cost of these requirements and found that the average annual cost per domestic vessel ranged from an average of approximately $125 using low end assumptions to $359 using high end assumptions. At the same time, EPA expects the permit requirements to reduce the risk of invasive species spread, to minimize production of effluent in high quality waters, to reduce nutrient loading, and to minimize the risk of other constituents entering vessel waste streams.

EPA has determined that the requirements of this permit are economically achievable. In determining "economic achievability" under BAT, EPA has considered whether the costs of the controls can reasonably be borne by the industry. EPA typically evaluates "closures," whereby the costs of requirements are evaluated to see whether they would cause a facility to go out of business. EPA has assessed the costs of the requirements in this permit and finds that this permit will result in no "closures" in that the costs of the rule are small compared to all operating costs. EPA has assessed the costs of the requirements and finds that except in rare cases, the cost of implementing this permit is estimated to be below 1% of the total operating costs of almost all

entities for any given year. The total domestic flagged vessel universe that would be affected by this permit includes approximately 61,000 vessels. Including the ballast water and other discharge requirements, the economic impact analysis indicates that the best management practices in this permit would cost between $ 6.7 million and $16.7 million annually. Including paperwork requirements, the permit is estimated to cost between $7.7 and $21.9 million dollars annually for domestic vessels. Including estimates of ballast water costs for foreign vessels, the permit is expected to cost between $8.9 and $23.0 million dollars annually. Depending upon sector (vessel type), median costs per firm range from $1 to $795 in the low end assumptions and from $5 to $1,967 in the high end assumptions (excluding median values from commercial fishing vessels which are expected to be $0). Costs for the 95th percentile range from $7 for the Deep Sea Coastal and Great Lakes Passenger Vessels to $20,355 for marine cargo handling under low end cost estimates and from $88 to $35,190 for the same vessel classes for high end cost estimates (see table 7.1 of the economic assessment cost estimates across vessel classes). EPA applied a cost-to-revenue test which calculates annualized pre-tax compliance cost as a percentage of total revenues and used a threshold of 1 and 3 % to identify entities that would be significantly impacted as a result of this Permit. The total number of entities expected to exceed a 1% cost ratio ranges from 213 under low cost assumptions to 308 under high cost assumptions. Of this universe, the total number of entities expected to exceed a 3 % cost ratio ranges from 55 under low cost assumptions to 73 under high cost assumptions. Based on this analysis, EPA concludes that the BAT limits in this permit are unlikely to result in a substantial economic impact on all businesses, and, in particular, small businesses. Hence, EPA interprets this analysis to indicate that the BAT limits are economically achievable. The economic analysis is available on EPA's webpage at www.epa.gov/npdes/vessels and in the docket for this permit.

Additionally, the discharge location limitation is economically practical and achievable, since discharging in one location versus another will add no or little additional cost. The only potential costs are an increase in fuel consumption from carrying additional volumes of effluent rather than discharging the effluent immediately when generated. EPA expects these incremental costs associated with this permit to be negligible. EPA's information in the record does indicate, however, that it is possible and economically practicable and achievable to minimize graywater and some additional discharges in waters federally protected wholly or in part for conservation purposes. Therefore, under EPA's authority to consider "other factors the Administrator deems appropriate," it is reasonable to focus the limitations on certain discharge types that would have the most environmental significance. In addition, this restriction is alternatively and independently based on EPA's authority under CWA section 403(c).

Requirements have acceptable non-water quality environmental impacts

In addition, EPA has considered the non-water quality environmental impacts, including energy impacts, of the controls required under this permit and finds that they are acceptable. EPA anticipates that the requirements of this permit may result in marginal increase in fuel usage for vessels that must conduct ballast water exchange or saltwater flushing, must treat graywater to standards in Part 5 of the permit, or must limit the discharge location of certain waste streams and transport them into a different receiving water or hold them for discharge onshore. Additionally, owner/operators of vessels may generate more sludge or other waste that may need to be disposed of properly onshore. EPA expects that most permit requirements will result in few

non-water quality impacts because, in many cases, the permit is reflective of practices currently being implemented by owner/operators.

Data sources and request for comment

EPA finds that establishing technology-based controls that can be required of all commercial vessels over a certain size, in many different waters, under many different weather and operational situations, to be a very challenging task. EPA expressly solicited comment on whether the controls in this permit represent the BPT, BCT and BAT levels of control. Following EPA's consideration of comments received and information used in formulation of the proposed permit, EPA finds that today's final permit contains technology-based controls that represent the BPT, BCT or BAT levels of control.

In developing these non-numeric effluent limits, EPA considered data from numerous peer reviewed publications, literature produced by the federal government, other technical reports and publications, public comments, and comments from experts working in the field (Dobroski et al., 2007; Endresen et al., 2004; Environmental Law Institute, 2004; Gracki et al., 2002; Gray et al., 2007; Gregg & Hallegraeff, 2007; Lamb, 2004; Lloyds Register, 2007; Locke et al., 1993; McCollin et al., 2007; Orange County Coastkeeper, 2007; Quilez-Badia et al., 2008; Raikow et al., 2007; Schiff et al., 2004; Tamburri et al., 2002; US EPA, 1999, 2001a, b, 2007). The data sources from which EPA derived information for decision-making purposes are included in the docket for the final permit. These data sources discuss vessel discharge types, BMPs available for these discharge types, and the effectiveness of given BMPs or behavioral practices.

EPA considered these data and how to design a permit that was environmentally protective and included the best practicable technology and best available technology economically achievable in formulating the permit.

4.3 TECHNOLOGY-BASED EFFLUENT LIMITS AND RELATED REQUIREMENTS IN THE PERMIT

4.3.1 General Effluent Limits (Part 2.1)

The general effluent limits are designed to apply to all covered vessels for all covered discharge types present on a particular vessel. These effluent limits are generally preventative in nature, and are designed to minimize the discharge of pollutants from a vessel. Owner/operators are ultimately responsible for ensuring that all required effluent limits are implemented.

As discussed above, these technology-based effluent limits apply to all covered vessels and were developed using BPJ. These general technology-based effluent limits were established based on available and relevant information, including available technical data, existing statutes and regulations, statistical industry information, and research studies cited in the references section of this permit.

4.3.1.1 Material Storage (Part 2.1.1)

Any materials, whether cargo or for use onboard the vessel, that may be exposed to precipitation, surface water spray, or wind can potentially be discharged on their own or become part of other waste streams. Materials that may not be considered toxic in small concentrations