

FACT SHEET

For 401 Certification of U.S. EPA's Vessel General NPDES Permit

Background – All federal actions that could affect water quality in a state must obtain a certification from the state that the action meets state water quality standards (WQS). This is a requirement of Section 401 of the federal Clean Water Act. In the case of a federally-issued National Pollutant Discharge Elimination System (NPDES) discharge permit, the state must certify the permit before it can become effective in that state.

U.S.EPA has issued a draft general NPDES permit for discharges from the operation of vessels. This permit would cover vessels nationwide, and covers and regulates a wide variety of discharges from vessels, including ballast water, bilge water and gray water discharged from vessels. Sanitary wastewater discharges are exempt from the Clean Water Act, but are covered by U. S. Coast Guard regulations.

Federal NPDES Permit Conditions – As part of this permit, U.S. EPA has proposed to regulate several types of discharges by Best Management Practices (BMPs), discharge location restrictions, discharge prohibitions, and, in a few cases, water quality criteria. The U.S. EPA permit fact sheet has details on BMPs, discharge limits, and which wastewaters can not be discharged.

The main issue affecting Ohio waters is the ballast water discharge BMPs. Ballast water is water and associated suspended sediments taken into or discharged from ballast tanks to maintain the stability of the vessel. Under this permit, all vessels with ballast water tanks must have a ballast water management plan. Mandatory ballast water management practices that guide these plans include:

- Avoiding discharges of ballast water in certain identified waters including national parks, national monuments and national wildlife refuges;
- Avoiding or minimizing uptake of ballast water in:
 - Areas known to infestations or populations of harmful organisms and pathogens;
 - Areas near sewage outfalls;
 - Areas near dredging operations;
 - In darkness when bottom dwelling organisms may rise up in the water column;
 - In shallow waters where propellers may stir up the sediment;
- Cleaning ballast tanks regularly to remove sediments in mid-ocean or under controlled arrangements in port, or at dry dock. No discharge of sediments from cleaning of ballast tanks is authorized in waters subject to this permit;

- Discharge only the minimum amount of ballast water essential for vessel operations while in waters subject to this permit.

The federal permit provisions require ocean-going vessels to conduct a salt-water ballast exchange before entering the Great Lakes System; if ships can not do a salt-water exchange, they are not allowed to discharge ballast in the Great Lakes, except if:

- Ballast exchange is unsafe, in accordance with Coast Guard regulations; or,
- Ballast water is treated by a method approved by the Coast Guard; or,
- Ballast water is retained on board for the duration of voyage in waters covered by the permit.

Freshwater ballast discharges are covered by the permit, but have no specific permit requirements beyond those of the ballast management plan.

The federal NPDES permit also acknowledges that those ships using experimental ballast water treatment systems will be discharging chlorine and other biocides. The federal permit contains a discharge limitation for chlorine of 100 ug/l. Other biocides would be limited to U.S. EPA “Gold Book” acute water quality criteria, if included in the “Gold Book”.

Antidegradation Requirements – All Ohio 401 Certifications are subject to the state’s Antidegradation Rule provisions. This review requires a review of alternatives to the discharges and may include mitigation conditions. [OAC 3745-1-05(b)(1)(c)]. Ohio EPA expects no lowering of water quality as a result of this federal permit, as modified by Ohio’s certification conditions.

U.S. EPA has not submitted antidegradation application information specific to this rule. U.S. EPA has argued that the draft permit does not need to go through state antidegradation procedures because the discharges covered by the permit are existing, and not new or increased. While the discharges from some vessels will be the same or decrease (e.g. lake freighters, which have been in service for many years), there will be discharges authorized from vessels that may never have visited Ohio waters before. Ohio believes that these latter vessels may be considered new discharges under the state Antidegradation Rules.

Even though U.S. EPA has not made a formal antidegradation submittal, the background documents that they used to draft the general permit contain much of the information needed for this review. For example, the significant number of zero discharge conditions in the permit indicates that U.S. EPA considered these non-degradation alternatives; the Best Management Practices (BMP) requirements and discharge location restrictions indicate consideration of minimal degradation or mitigation alternatives.

Ohio EPA is not questioning any of U.S. EPA's zero discharge limitations (non-degradation alternatives). For the most part, Ohio EPA accepts U.S. EPA's consideration of minimal degradation alternatives and mitigation, based on our review of the federal permit fact sheet and background reports prepared by the U.S. Navy that support the federal fact sheet. There are some specifics related to ballast water that will be noted here.

First, the obvious non-degradation alternative for ballast water is simply to prohibit discharges of it. The Uniform Naval Discharge Standards document, which U.S. EPA used in developing this permit describes the uses of ballast water, and why discharges are necessary to maintain the stability of the ships in transit. Cargoes are picked up and unloaded at various ports, meaning that ballast water needs to be taken on when cargoes are unloaded, and discharged when cargoes are taken on. Ballast can also be taken on or discharged when moving to deeper or shallower waters. Prohibiting discharges is not a feasible option given the wide variety of circumstances faced by ship masters.

The U.S. EPA BMP options (minimize discharge volumes, restrictions on where ballast can be taken on and discharged) represent minimal degradation options that U.S. EPA has included in the draft permit.

Lastly, ballast water and treatment standards are mitigation for the minimized discharges. The salt water exchange required by the permit is intended to kill residual freshwater organisms in the ballast tanks. The experimental ballast treatments are intended to kill and/or filter out invasive species.

As previously stated, this 401 Certification is being reviewed as a degradation because of the requirement that all 401 Certifications go through the antidegradation process, and because the federal NPDES permit allows for increased discharges should shipping volumes increase. Ohio EPA feels that this federal NPDES permit can be certified as meeting WQS primarily because:

- Ohio EPA expects reductions in invasive species introductions due to: (1) the BMPs and ballast water exchange requirements of the federal permit; (2) the tightening of the No Ballast on Board (NOBOB) exclusion under this permit; and (3) the gradual introduction of ship-board treatment of ballast water between the issuance of the permit and 2016;
- Ohio EPA expects lower loadings of bacterial pathogens as a result of meeting treatment standards;
- Ohio EPA expects to maintain the economic value of state waters for both recreation and shipping as a result of these controls.

Ohio 401 Certification Conditions – There are a few provisions in the federal draft permit that do not meet Ohio Water Quality Standards – the ballast water control provisions, the provisions for discharges of salt water ballast, and the limits for discharges from experimental ballast water treatment systems.

Ballast Water Discharge Controls

Various organizations have documented the nuisance posed by invasive non-native organisms. A recent Great Lakes Commission report had the following summary:

“Throughout history, human settlement and trade have caused the introduction of non-native aquatic invasive species (AIS), often to the detriment of native ecosystems. As of 2006, at least 200 non-native aquatic species have become established in the Great Lakes.* This number continues to grow through vectors (mechanisms of AIS introduction and spread) such as maritime commerce, canals and waterways, organisms in trade, recreational activities, and public and private aquaculture. In one study, the economic and environmental losses caused by AIS in the Great Lakes have been estimated to be as much as \$5.7 billion annually. There is an urgent need to take action in halting the devastating and often permanent damage caused by Great Lakes aquatic invasions. AIS prevention and control is fundamental in sustaining the ecological and economic health as well as recreational benefits of the Great Lakes, protecting a precious legacy for future generations. Impacts caused by AIS are far reaching and extensive. Of special concern in the Great Lakes region are recreational impacts caused by AIS, such as degradation to beaches and swimming areas due to weed infestations and deposits of zebra mussel shells that litter beaches and shorelines. AIS threaten Great Lakes fisheries in a variety of ways including changing water quality and clarity, competing with native species for food and habitat and altering complex foodwebs that support the aquatic ecosystem. AIS impacts can also add significant costs to industry by clogging water intake/discharge pipes and damaging other submerged structures and equipment. In the Great Lakes region and around the globe, AIS are introduced and spread through multiple pathways and, once present, are extremely difficult to eradicate or control. Life history characteristics of aquatic invaders provide an opportunity for these species to dominate native populations, leading to permanent displacement of native species and, ultimately, threatening biodiversity of native ecosystems.” (Great Lakes Aquatic Invasions report).

Other organisms that threaten to enter the Great Lakes would likely do additional damage are the asian carp and Hydrilla. Asian carp individuals have been found in Lake Erie (cited by the Great Lakes Commission). If they became established, these fast-growing, aggressive fish could out-compete Great Lakes species, as they have other species in the Illinois River, where asian carp have thrived. Hydrilla are fast-growing plants that have formed large nuisance mats in the southern states, shading other plants and aquatic life.

The following information from Ohio's 2004 LAMP report supports this conclusion:

"The increase in NIS during the 20th century is attributed to the shift from solid to water ballast in cargo ships and to the opening of the St. Lawrence Seaway in 1959 (Mills et al. 1993). Ballast water discharge from ships has been the primary vector for NIS entering the Great Lakes (Mills et al. 1993). Despite the voluntary (1989-1992) or mandatory (1993 onward, United States Coast Guard, 1993) compliance with the ballast water exchange program, the rate of NIS during 1989-1999 has tripled compared to the previous three decades (Grigorovich et al. 2003a).

There have been reports of new invaders in Lake Erie. Protozoans (Rhizopoda), *Psammobiotus communis* (2 sites east of Wheatley to Rondeau on the north shore of Lake Erie) and *P. dziwnowii* (eastern Lake Erie), were reported in a 2002 survey of Lake Erie (Nicholls and MacIsaac, 2004). It is likely that these euryhaline species entered the Great Lakes through ballast water. *Psammobiotus communis* is pandemic, whereas *P. dziwnowii* was found only on the Polish coast of the Baltic Sea before it was reported in Great Lakes waters. A new species, *Corythionella golemanskyi*, also has been described. These three species have been described from several Great Lake locations where they occur in beach sand. It is likely that these species became established long ago, but investigators simply had not looked for them (Nicholls and MacIsaac 2004)."

As stated in the 401 Certification, Ohio Water Quality Standards (WQS) contain narrative conditions to prohibit nuisance conditions in waters of the state. The specific standard states that "To every extent practical and possible as determined by the director, these waters shall be Free from materials entering the waters as a result of human activity producing color, odor or other conditions in such a degree as to create a nuisance;" [Ohio Administrative Code 3745-1-04(C)].

In this rule, the term materials is not defined or limited; Ohio considers that this condition applies to non-indigenous nuisance species.

The most protective standard for control of invasive species under this narrative standard is zero discharge of viable organisms. The ballast water exchange and Best Management Practices in the federal permit will not eliminate viable organism in ballast water discharges. Treatment is needed for further reduce the potential for viable organisms to be discharged.

In addition, the permit conditions do little to prevent the spread of ANS between the Great Lakes. A large percentage of the ballast water discharged in the Great Lakes is from vessels that exclusively travel the Lakes.

In response to the need for treatment for both ocean-going vessels and lake freighters, the Ohio certification includes a compliance schedule for installing ballast water treatment systems meeting the performance standards contained in Section D-2 of the IMO Convention, with the exception of the standard for vibrio cholerae. Ohio EPA

solicits comments on the achievability of treatment standards more stringent than the IMO standards.

The treatment requirements and schedule are the same as the schedule proposed by the Minnesota Pollution Control Agency. Treatment of ballast water will reduce the risk of new organisms entering Ohio waters from ocean-going ships, and is needed to prevent the spread of organisms from lake to lake. *Vibrio cholerae* were not included because analytical techniques to enumerate the organism have not been validated.

Ohio will also require that treatment systems installed should be operated to reduce the viable organisms to the maximum extent practicable. The goal of this requirement is to achieve zero discharge of viable organisms.

Ohio will also require that if the federal government adopts treatment standards more stringent than IMO, then those standards shall supersede and be required for new treatment systems installed after the date those federal standards go into effect.

The treatment standard was chosen for many of the same reasons Minnesota noted in their state permit documents:

1. The IMO standards are generally accepted throughout the shipping community;
2. Treatment technologies are currently being developed to meet the IMO standards;
3. The technologies to meet the IMO standards are expected to be commercially available and can be installed during the schedule in the certification;
4. Installation costs are not expected to significantly increase operational costs and shipping rates. This is based on the analyses used to support the Minnesota permit as well as other documents (principally "Assessment of the Efficacy, Availability and Environmental Impacts of Ballast Water Treatment Systems for Use in California Waters", California State Lands Commission, December 2007).
5. The schedule to 2016 allows for installation of treatment systems during normal dry dock of lake freighters and ocean-going vessels and enough time to budget the costs into operation budgets.

Treatment system costs were taken from data collected by California and Minnesota authorities. The 2007 California State Lands Commission report cited above lists installed costs between \$165,000 - \$1,175,000 per ship (Lloyds Register data). These costs were based on ballast water volumes from ocean-going ships. Data from the Minnesota Pollution Control Agency on larger volume discharges indicates that costs could be four times these figures for lake freighters.

Salt Water Ballast Discharges

Ballast water exchanges at sea will produce ballast waters high in total dissolved solids (TDS). These waters, which may have TDS concentrations in the range of 30 parts per thousand, will be rapidly lethal if discharged where fresh water organisms will be exposed to the full concentrations.

Ohio WQS contain narrative standards to address toxicity: “To every extent practical and possible as defined by the director, these waters shall be....Free from substances entering the waters as a result of human activity in concentrations that are toxic or harmful to human, animal or aquatic life and/or are rapidly lethal in the mixing zone;” [Ohio Administrative Code 3745-1-04(D)].

If discharged in the shallow waters of Ohio’s harbors, there is a greater possibility that organisms will be exposed to salty water; also, because ships move more slowly in these areas, mixing of ballast discharges will occur slowly, increasing the possibility of toxic zones.

To prevent rapidly lethal conditions, we have included a provision in the certification that prohibits discharge of salt water ballast water within Ohio’s harbors. In open waters of Lake Erie, these discharges will be diluted; also fewer organisms live in the open lake. Both of these considerations make it likely that ballast discharges will meet narrative toxicity water quality standards

Chlorine Discharges from Ballast Water Treatment

The chlorine discharge limits for experimental ballast water treatment systems do not meet WQS. Ohio Water Quality Standards for residual chlorine are 11 ug/l as a chronic aquatic life standard, and 19 ug/l as an acute aquatic life standard. While there is no promulgated Inside-mixing-zone maximum (IMZM or Final Acute Value) water quality standard, Ohio applies an IMZM standard of 38 ug/l using the narrative WQS for toxicity [No rapid lethality in mixing zones – OAC 3745-1-04(D)] and the aquatic life criteria calculation rule [OAC 3745-1-36]. IMZM standards are used as limits in cases where downstream instream waste concentrations (IWC) are 2:1 or greater [OAC 3745-2-05]. Given the standard mixing assumptions for lake discharges from the Great Lakes Initiative Rule, IMZM limits would be the limiting standard for all direct Lake Erie discharges.

The 38 ug/l WQS assumes a fairly continuous exposure to chlorine. Ohio may establish site-specific WQS under OAC 3745-1-35 and -36. Based on discussions between Ohio EPA and Region V, higher chlorine limits can be used if the discharge duration is limited. Specifically, effluent concentrations of 200 ug/l are considered safe if the discharge duration of chlorine is limited to 2 hours per day. Ohio has been using this criterion for cooling waters where the discharge of chlorine can be limited in duration. Other Region V states have similar provisions for short-term discharges of chlorine.

As a result, Ohio has included limits of 38 ug/l for residual chlorine continuously discharged (more than 2 hours per day) from experimental ballast water treatment systems. The residual chlorine limit could be 200 ug/l for discharges lasting less than 2 hours per day.

Other Biocides from Ballast Water Treatment Systems

The same water quality standards used to derive chlorine criteria can be used to derive aquatic life criteria for any material that exhibits toxicity. As part of this certification, Ohio EPA would certify discharges of any biocide that meets the toxicity narrative WQS. The methods used to develop the chlorine standard of 38 ug/l can be used to derive any inside-mixing-zone maximum standard. The Ohio Certification would allow U.S. EPA to approve any biocides to be used in ballast water that can be used routinely in non-contact cooling water. This includes all commercial biocides except for organic quaternary ammonium compounds (quaternary amines).

The prohibition on discharges of quaternary amines is based on the relatively slow breakdown of these compounds to innocuous chemicals. Research from manufacturers show that these chemicals have half-lives measured in weeks, and that some of the breakdown products, which may include aniline and other organic amines, are likely to have similar toxicities as the parent compounds. Ohio EPA has been approving use of these chemicals only for occasional uses, such as seasonal control of zebra and quagga mussels in cooling water systems. Because it is possible that these chemicals could be discharged frequently in a given port over the shipping season, Ohio EPA has proposed to prohibit the discharge of these chemicals.