Environmental Remediation
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Water Pollution Controls

Effluent Guidelines, Total Maximum Daily Loads (TMDLs) and Stormwater Permits

Julia Crawford
Editor

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ENVIRONMENTAL REMEDIATION TECHNOLOGIES, REGULATIONS AND SAFETY

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EFFLUENT GUIDELINES, TOTAL MAXIMUM DAILY LOADS (TMDLS) AND STORMWATER PERMITS

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nova publishers
New York

Library of Congress Cataloging-in-Publication Data

ISBN: 978-1-62417-441-4

Published by Nova Science Publishers, Inc. † New York

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PREFACE

Forty years after the Clean Water Act set a national goal of eliminating the discharge of pollutants into navigable U.S. waters, the Environmental Protection Agency (EPA) has made significant progress in reducing pollution from industrial facilities; nevertheless, pollution from these facilities continues to cause concern. EPA's actions to reduce this pollution have included establishing national technology-based regulations, or effluent guidelines, for separate industrial categories, such as petroleum refining, fertilizer manufacturing, coal mining, and metal finishing. Relatively few effluent guidelines have been revised or created in recent years and environmental advocacy groups continue to raise concerns because industrial facilities annually discharge hundreds of billions, and perhaps trillions of pounds of pollutants to U.S. waters. This book examines water pollution controls with a focus on effluent guidelines, total maximum daily loads and stormwater permits.

Chapter 1 – Under the Clean Water Act, EPA has made significant progress in reducing wastewater pollution from industrial facilities. EPA currently regulates 58 industrial categories, such as petroleum refining, fertilizer manufacturing, and coal mining, with technology-based regulations called effluent guidelines. Such guidelines are applied in permits to limit the pollutants that facilities may discharge. The Clean Water Act also calls for EPA to revise the guidelines when appropriate. EPA has done so, for example, to reflect advances in treatment technology or changes in industries.

Chapter 2 – Section 303(d) of the Clean Water Act (CWA) requires states to identify waters that are impaired by pollution, even after application of pollution controls. For those waters, states must establish a total maximum daily load (TMDL) of pollutants to ensure that water quality standards can be

attained. A TMDL is both a quantitative assessment of pollution sources and pollutant reductions needed to restore and protect U.S. waters and a planning process for attaining water quality standards. Implementation of section 303(d) was dormant until states and the Environmental Protection Agency (EPA) were prodded by lawsuits. The program has been controversial, in part because of requirements and costs faced by states to implement this 40-year-old provision of the law, as well as industries, cities, farmers, and others who may be required to use new pollution controls to meet TMDL requirements.

Chapter 3 – The Environmental Protection Agency (EPA) and states are implementing a federally mandated program for controlling stormwater discharges from industrial facilities and municipalities. Large cities and most industry sources are subject to rules issued in 1990, and EPA issued permit rules to cover smaller cities and other industrial sources and construction sites in 1999. Because of the large number of affected sources and deadline changes that led to confusion, numerous questions have arisen about this program. Impacts and costs of the program's requirements, especially on cities, are a continuing concern.

CONTENTS

In: Water Pollution Controls
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Chapter 1

WATER POLLUTION: EPA HAS IMPROVED ITS REVIEW OF EFFLUENT GUIDELINES BUT COULD BENEFIT FROM MORE INFORMATION ON TREATMENT TECHNOLOGIES*

United States Government Accountability Office

ABBREVIATIONS

EPA	Environmental Protection Agency
NPDES	National Pollutant Discharge Elimination System

WHY GAO DID THIS STUDY

Under the Clean Water Act, EPA has made significant progress in reducing wastewater pollution from industrial facilities. EPA currently regulates 58 industrial categories, such as petroleum refining, fertilizer

* This is an edited, reformatted and augmented version of The United States Government Accountability Office publication, Report to the Ranking Member, Subcommittee on Water Resources and Environment, Committee on Transportation and Infrastructure, House of Representatives, GAO-12-845, dated September 2012.

manufacturing, and coal mining, with technology-based regulations called effluent guidelines. Such guidelines are applied in permits to limit the pollutants that facilities may discharge. The Clean Water Act also calls for EPA to revise the guidelines when appropriate. EPA has done so, for example, to reflect advances in treatment technology or changes in industries.

GAO was asked to examine (1) the process EPA follows to screen and review industrial categories potentially needing new or revised guidelines and the results of that process from 2003 through 2010; (2) limitations to this process, if any, that could hinder EPA's effectiveness in advancing the goals of the Clean Water Act; and (3) EPA's actions to address any such limitations.

GAO analyzed the results of EPA's screening and review process from 2003 through 2010, surveyed state officials, and interviewed EPA officials and experts to obtain their views on EPA's process and its results.

What GAO Recommends

GAO is making recommendations to improve the effectiveness of EPA's effluent guidelines program by expanding its screening phase to better assess hazards and advances in treatment technology. EPA agreed with two recommendations in principle and said it is making progress on them, but said that one is not workable given current agency resources. GAO believes improvements can be made.

What GAO Found

The Environmental Protection Agency (EPA) uses a two-phase process to identify industrial categories potentially needing new or revised effluent guidelines to help reduce their pollutant discharges. EPA's 2002 draft *Strategy for National Clean Water Industrial Regulations* was the foundation for EPA's process. In the first, or "screening," phase, EPA uses data from two EPA databases to rank industrial categories according to the total toxicity of their wastewater. Using this ranking, public comments, and other considerations, EPA has identified relatively few industrial categories posing the highest hazard for the next, or "further review," phase. In this further review phase, EPA evaluates the categories to identify those that are appropriate for new or revised guidelines because treatment technologies are available to reduce

pollutant discharges. Since 2003, EPA has regularly screened the 58 categories for which it has issued effluent guidelines, as well as some potential new industrial categories, and it has identified 12 categories for its further review phase. Of these 12 categories, EPA selected 3 for updated or new effluent guidelines. EPA chose not to set new guidelines for the others.

Limitations in EPA's screening phase may have led it to overlook some industrial categories that warrant further review for new or revised effluent guidelines.

Specifically, EPA has relied on limited hazard data that may have affected its ranking of industrial categories. Further, during its screening phase, EPA has not considered the availability of advanced treatment technologies for most industrial categories. Although its 2002 draft strategy recognized the importance of technology data, EPA has stated that such data were too difficult to obtain during the screening phase and, instead, considers them for the few categories that reach further review. Officials responsible for state water quality programs and experts on industrial discharges, however, identified categories they believe EPA should examine for new or updated guidelines to reflect changes in their industrial processes and treatment technology capabilities. According to some experts, consideration of treatment technologies is especially important for older effluent guidelines because changes are more likely to have occurred in either the industrial categories or the treatment technologies, making it possible that new, more advanced treatment technologies are available.

Recognizing the limitations of its hazard data and overall screening approach, EPA has begun revising its process but has not assessed other possible sources of information it could use to improve the screening phase. In 2012, EPA supplemented the hazard data used in screening with four new data sources.

EPA is also developing a regulation that, through electronic reporting, will increase the completeness and accuracy of its hazard data. In 2011, EPA also began to obtain recent treatment technology literature. According to EPA, the agency will expand on this work in 2013. Nonetheless, EPA has not thoroughly examined other usable sources of information on treatment technology, nor has it reassessed the role such information should take in its screening process. Without a more thorough and integrated screening approach that both uses improved hazard data and considers information on treatment technology, EPA cannot be certain that the effluent guidelines program reflects advances in the treatment technologies used to reduce pollutants in wastewater.

September 10, 2012

The Honorable Timothy H. Bishop
Ranking Member
Subcommittee on Water Resources and Environment
Committee on Transportation and Infrastructure
House of Representatives

Dear Mr. Bishop:

Forty years after the Clean Water Act set a national goal of eliminating the discharge of pollutants into navigable U.S. waters, the Environmental Protection Agency (EPA) has made significant progress in reducing pollution from industrial facilities; nevertheless, pollution from these facilities continues to cause concern.[1] EPA's actions to reduce this pollution have included establishing national technology-based regulations—or effluent guidelines—for separate industrial categories, such as petroleum refining, fertilizer manufacturing, coal mining, and metal finishing. EPA issued the vast majority of these regulations in the 1970s and 1980s and has revised most of them; revisions may range from changes in testing methods to establishment of more stringent standards. Relatively few effluent guidelines have been revised or created in recent years, however, and environmental advocacy groups continue to raise concerns because industrial facilities annually discharge hundreds of billions, and perhaps trillions of pounds of pollutants to U.S. waters. According to EPA, industrial pollutants may contribute, in part, to impaired water quality; harm aquatic life; and limit the ways in which people can safely use the nation's waters.

One of EPA's main responsibilities under the act is to regulate "point source" pollution—that is, pollution such as effluent or wastewater coming from a discrete point, such as a pipe from an industrial facility. The Clean Water Act directed EPA to establish effluent guidelines to achieve pollutant reductions using specific treatment technologies or changes in a facility's production processes. In establishing and revising effluent guidelines, EPA is to assess (1) the performance and availability of the best pollution control technologies or pollution prevention practices for an industrial category; (2) the economic achievability of those technologies; (3) non-water-quality environmental impacts, such as the energy required to reduce pollutants; and (4) other factors that the EPA Administrator deems appropriate, such as the risk posed by discharges. The legislative history of relevant provisions in the

Clean Water Act suggests that effluent guidelines were expected to be revised and made more stringent over time to reflect technological advances.

To carry out its effluent guidelines program, EPA develops regulations setting national effluent guidelines, and states generally implement the program by applying limits in permits that they issue to specific facilities. Under the National Pollutant Discharge Elimination System (NPDES) program, all facilities that discharge pollutants from any point source into U.S. waters are required to obtain a permit, typically from their state or EPA region. Under the Clean Water Act, EPA has authorized 46 states to issue NPDES permits and retains the authority to issue permits for the remaining 4 states: Idaho, Massachusetts, New Hampshire, and New Mexico.[2]

The Clean Water Act requires that after setting effluent guidelines, EPA is to annually review each existing effluent guideline—that is, guidelines for regulated industrial categories—to determine whether revising these guidelines would be appropriate. In addition, at least every 2 years, EPA is to identify industrial categories that do not have effluent guidelines but that discharge nontrivial amounts of toxic or certain other pollutants.[3] At least every 2 years, EPA is required to publish schedules for its annual review and revision of existing effluent guidelines and for promulgating effluent guidelines for any newly identified categories. The agency's intent is to issue a plan every year, with preliminary plans to be issued in odd years and final plans for effluent guidelines in even years. If EPA decides that an industrial category requires new or revised effluent guidelines, it generally establishes them through a regulatory process that involves proposing new effluent guidelines, obtaining public comment, making revisions, and publishing a final regulation.

Throughout much of the effluent guidelines program's history, EPA's schedule for issuing effluent guidelines has been driven by litigation and resulting consent decrees.[4] In 2002, following extensive consultation with an advisory task force formed in response to a 1992 consent decree, EPA issued a draft *Strategy for National Clean Water Industrial Regulations*, outlining a new process by which it planned to meet the requirement to review industries in the future to determine whether new or revised effluent guidelines were appropriate. The draft strategy calls for EPA to conduct an annual screening of industrial categories to consider (1) the risks the industrial categories pose to human health or the environment; (2) the availability of treatment technology or other approaches to reduce the risk; (3) the cost, performance, and affordability of the technology; and (4) implementation and efficiency considerations. EPA derived these screening factors in part from the statutory requirements for developing or revising effluent guidelines. Following

screening with available information, the draft strategy calls for EPA to conduct a further review of selected categories. The further reviews may take 1 or more years to complete. EPA has not finalized or formally updated its draft strategy, although according to EPA officials, the draft has served in part as the basis for the agency's annual reviews of industrial categories after 2002.

As EPA's regulatory efforts have reduced pollutants from industrial point sources over the past several decades, the agency has placed greater emphasis on what is now the primary reason for impairment of the nation's waters, namely diffuse or nonpoint pollution, such as some agricultural runoff. In light of that change in emphasis and soon after issuing the draft strategy, EPA reduced staffing levels for the effluent guidelines program by about 40 percent, according to program officials. EPA issued its most recent effluent guidelines—for airport deicing, a previously unregulated industry—in May 2012. Before that, EPA's most recent revisions of existing effluent guidelines were for concentrated animal feeding operations in 2008 and construction and development in 2009.[5] Most effluent guidelines have not been revised since the 1980s or 1990s.

In this context, you asked us to review EPA's effluent guidelines program. This report examines (1) the process EPA follows to screen and review industrial categories potentially in need of new or revised effluent limitation guidelines and the results of that process from 2003 through 2010; (2) limitations to this screening and review process, if any, that could hinder the effectiveness of the effluent guidelines program in advancing the goals of the Clean Water Act; and (3) what actions EPA has taken or could take to address limitations, if any, that exist.

To address our objectives, we reviewed the Clean Water Act and relevant regulations, EPA's 2002 draft strategy, effluent guidelines program plans, and associated supporting documents. We also reviewed EPA's screening decisions for all industrial categories and its further reviews for the 12 industrial categories selected through screening from 2003 through 2010.[6] Our purpose was to identify those industries that EPA had only initially screened and those that received a further review, including an examination of available treatment technologies. We also documented the status of regulatory actions and other steps that EPA took for industries that it reviewed further. In addition, we interviewed officials in EPA's Engineering and Analysis Division to learn about the process the agency follows to screen and review industries potentially in need of new or revised effluent limitation guidelines. We then compared the steps specified in the draft strategy with the agency's current process for screening and reviewing industries for possible revised guidelines.

To better understand the steps in the current process as they apply to specific industrial categories, we conducted detailed interviews with EPA staff regarding 7 of the 12 industrial categories that EPA selected from 2003 onward for possible new or revised effluent guidelines. We chose 2003 because it was the year when EPA issued its first preliminary effluent guidelines plan after developing its 2002 draft strategy for screening and reviewing industries. We also conducted 17 interviews with 22 experts from academia, industry, nonprofit organizations, and state and local water quality agencies for their perspectives on EPA's effluent guidelines program. We selected these experts from a list of approximately 50 individuals identified from a variety of sources, including referrals from EPA, the Association of Clean Water Agencies, the National Association of Clean Water Agencies, and other experts; relevant academic literature; and litigation documents. Because we used a nonprobability sampling method to select experts, the results of our interviews with them cannot be generalized to all experts on the program, but the information derived from interviewing these experts provided illustrative observations and examples. We also surveyed the directors for water quality permits in the 46 states authorized to issue NPDES permits about the adequacy of current effluent guidelines; the results of our analysis are not generalizable to all industrial categories in all states. Using the results of the survey, we selected an industrial category that state officials said warranted revised effluent guidelines and interviewed state officials to learn more about the reasons for their views. We also interviewed EPA officials about their plans, if any, related to those industries. Appendixes I and II present a more detailed description of our scope and methodology. We conducted this performance audit from September 2011 to September 2012, in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

BACKGROUND

Tens of thousands of industrial facilities directly discharge wastewater into the waters of the United States and are subject to permit limits on their discharges, which for certain industries are determined by effluent guidelines set by EPA under the Clean Water Act. For certain industries, EPA issues a

similar type of regulation—pretreatment standards— applicable to facilities that are indirect dischargers; that is, their effluent goes to wastewater treatment plants, which then discharge the collected and treated wastewater into a water body. To establish pollutant control limits for different pollutants in these guidelines or standards, EPA groups industrial facilities into categories that have similar products or services. To date, EPA has issued effluent guidelines or pretreatment standards for 58 industrial categories. EPA has issued effluent guidelines for 57 of the 58 categories and pretreatment standards for 35 of the 58 categories.[7] Table 1 lists industrial categories that are regulated by effluent guidelines and pretreatment standards. According to EPA, there are approximately 35,000 to 45,000 direct dischargers covered by effluent guidelines and about 10,000 facilities that discharge indirectly to wastewater treatment plants.

Table 1. Industrial Categories with Effluent Guidelines and Pretreatment Standards as of August 2012

Industrial category	Effluent guideline	Pretreatment standard
Airport deicing	X	
Aluminum forming	X	X
Asbestos manufacturing	X	
Battery manufacturing	X	X
Canned and preserved fruits and vegetables processing	X	X
Canned and preserved seafood processing	X	
Carbon black manufacturing	X	X
Cement manufacturing	X	
Centralized waste treatment	X	X
Coal mining	X	
Coil coating	X	X
Concentrated animal feeding operations	X	X
Concentrated aquatic animal production	X	
Construction and development	X	
Copper forming	X	X
Dairy products processing	X	
Electrical and electronic components	X	X
Electroplating	X	X
Explosives manufacturing	X	
Ferroalloy manufacturing	X	
Fertilizer manufacturing	X	X

Industrial category	Effluent guideline	Pretreatment standard
Glass manufacturing	X	X
Grain mills	X	X
Gum and wood chemicals manufacturing	X	
Hospital	X	
Ink formulating	X	X
Inorganic chemicals manufacturing	X	X
Iron and steel manufacturing	X	X
Landfills	X	
Leather tanning and finishing	X	X
Meat and poultry products	X	
Metal finishing	X	X
Metal molding and casting	X	X
Metal products and machinery	X	
Mineral mining and processing	X	
Nonferrous metals forming and metal powders	X	X
Nonferrous metals manufacturing	X	X
Oil and gas extraction	X	X
Ore mining and dressing	X	
Organic chemicals, plastics, and synthetic fibers	X	X
Paint formulating	X	X
Paving and roofing materials (tars and asphalt)	X	X
Pesticide chemicals	X	X
Petroleum refining	X	X
Pharmaceutical manufacturing	X	X
Phosphate manufacturing	X	
Photographic	X	
Plastics molding and forming	X	
Porcelain enameling	X	X
Pulp, paper, and paperboard	X	X
Rubber manufacturing	X	X
Soap and detergent manufacturing	X	X
Steam electric power generating	X	X
Sugar processing	X	
Textile mills	X	
Timber products processing	X	
Transportation equipment cleaning	X	X
Waste combustors	X	X
Total	57	35

Source: GAO analysis of EPA data.