

FROM "NONPOINT" TO "POINT," AND WHAT IS THE POINT?

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Introduction

Rainfall picks up a multitude of pollutants as a result of its falling on and draining off streets and parking lots; construction and industrial sites; and mining, logging, and agricultural areas. The runoff, storm water discharge, with its accumulated pollutants, eventually flows into surface water bodies such as creeks, rivers, estuaries, bays, and oceans.

Many recent studies have shown that runoff from urban and industrial areas typically contains significant quantities of the same general types of pollutants that are found in wastewaters and industrial discharges and often causes similar water quality problems. These pollutants include heavy metals (e.g., chromium, cadmium, copper, lead, mercury, nickel, and zinc), pesticides, herbicides, and synthetic organic compounds such as fuels, waste oils, solvents, lubricants, and grease.¹ These pollutants can cause problems for both human health and the aquatic ecosystems supported by the diverse receiving water bodies.

It is desirable to control, by law, the discharge of storm water to the waters of the United States. Is it practical? Is it possible? Is it reasonable? Is it sensible? Is it economical? Regardless of how one chooses to answer these questions, the fact is that federal law mandates storm water control. Furthermore, storm water discharge is to be regulated as a point source discharge, which makes it subject to stringent regulations.

Is storm water a point-source discharge, or is it a nonpoint-source discharge? Really, storm water is a diffuse, nonpoint source of pollution. It is described as a nonpoint source in scientific literature. Even the U.S. Environmental Protection Agency (EPA) designates storm water runoff as a nonpoint source of pollution in water quality studies authorized by the agency and in its reports of assessments of water quality.²

Legally, however, storm water is a point source, or end-of-pipe discharge because of the statutory definition of point source. A point source is defined as:

"any discernible, confined, and discrete conveyance, including but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, landfill leachate collection system, vessel or other floating craft from which pollutants are or may be discharged. This term does not include return flows from irrigated agriculture or agricultural storm water runoff."³

Thus storm water is, by nature, a nonpoint source discharge, but is, by law, a point source discharge. In fact, over 100,000 of our nation's industries, 173 cities, and 47 counties currently are engaged in the permitting process to allow them, by law, to discharge their storm waters.⁴ What is the point of this?

Development of Federal Control of Water Pollution

Some history of the development of water pollution control efforts in the U.S. may make the current program more understandable.

Before 1948, almost all water pollution control authority was vested in states and local governments. To establish some federal authority in abating interstate water pollution, the Water Pollution Control Act was passed in 1948.⁵

The 1948 act, which was amended four times between 1948 and 1972, was based on receiving-water standards instead of effluent standards. When a stream standard was exceeded, usually it was not possible to determine which discharger was responsible. Thus enforcement was difficult.

By 1970, many legislators believed that an effective nationwide approach required a permit program based on federal minimum "end-of-pipe" effluent criteria enforceable directly against the dischargers.⁶ Legislation to provide this mechanism was proposed in 1969, but was not passed.

Then citizens' groups and courts "discovered" an archaic 1899 statute, the Refuse Act, which was designed to protect navigation. It prohibited almost all discharge into navigable waters or tributaries thereof unless a permit was obtained from the Army Corps of Engineers. The act contained mechanisms for penalties and provided a "bounty" to citizens who provided information to the government to enable it to bring enforcement actions. The Nixon Administration initiated the Refuse Act Program in late 1970. Using the authority of this act to require all industrial dischargers to apply for and obtain permits, the granting or denial of which would be based on environmental factors, the federal government was able to pose such a credible threat of prosecution that hundreds of cases were initiated.⁶ Then in 1971, a court decision invalidated the Refuse Act Program.⁵

In late 1972, after two years of intense debate, negotiation, and compromise, Congress passed the Federal Water Pollution Control Act Amendments, later renamed the Clean Water Act (CWA). The CWA put into place the basic framework upon which our current water-quality program is built. This framework did the following:

- made the Environmental Protection Agency (EPA) responsible for implementing and enforcing the provisions of the act
- required that nationwide minimum effluent standards be set for each industry
- contained requirements for water quality standards so that more stringent discharge standards could be imposed where effluent standards were insufficient
- established a permit program, the National Pollutant Discharge Elimination System (NPDES), which prohibits the discharge of any pollutant to waters of the United States from a point source unless the discharge is authorized by a NPDES permit
- provided means for public participation in executing the act⁶

The 1972 CWA was amended extensively in 1977 and again in 1987.

The 1977 amendments followed litigation in which the Natural Resources Defense Council (NRDC) sued EPA for its failure to develop a toxics-control strategy under the CWA.⁶ The NRDC consent decree which resulted from negotiations between the agencies, provided a

judicial mandate for full use of the CWA's enforcement mechanisms in an effort to reduce discharges of toxic pollutants. The 1977 amendments largely adopted this mandate.

The consent decree also largely influenced the 1987 amendments. Known as the Water Quality Act (WQA), these amendments dictate the imposition of discharge limitations based on water-quality standards, which increases the stringency of treatment requirements imposed on many dischargers.⁶ Also, the WQA specifically addresses storm water discharges.²

Upon the framework of the 1972 CWA, Congress, through statutes, and EPA, through regulations to implement the statutes, have built a complexity of federal water pollution control regulations. Citizen involvement, encouraged and assisted by the 1972 CWA, and citizen enforcement, which the CWA authorizes, have been (and still are) important factors in the construction of the regulations. The stringency of limitations imposed upon discharges is affected significantly by the goals and the objective of the 1972 CWA.

The objective of the Clean Water Act is:

"to restore and maintain the chemical, physical, and biological integrity of the nation's waters."

To achieve that objective, the CWA establishes two goals:

- to achieve a level of water quality which "provides for the protection and propagation of fish, shellfish, and wildlife" and for recreation "in and on the water" by July 1983; and
- to eliminate the discharge of pollutants into waters of the United States by 1985

The "no discharge" goal was written into early drafts of the 1972 act and the "no discharge" language remains. These goals have not been attained. They may be unattainable. But the regulations continue to increase in number, in complexity, and in stringency.

Impact on Water Quality of Storm Water Discharges

What is the impact of storm water discharges on the water quality of the nation's waters? By EPA's own admission, "Assessments of water quality are difficult to perform and verify."² However, several national assessments of water quality are available.

Under Section 305 of the CWA, as amended by the WQA, states are required to submit biennial reports in which they are asked to indicate the fraction of the state's waters that were assessed as well as the fraction that were fully supporting, partly supporting, or not supporting designated uses. For waters with use impairments, states were asked to determine impacts due to diffuse sources (agricultural and urban runoff), municipal sewage, industrial process wastewaters, combined sewer overflows, and other sources, and then to combine impacts to arrive at estimates of the relative percentage of state waters affected by each source. In this manner, the relative importance of the various sources was assessed, and weighted national averages were calculated. All results are combined into a report which is submitted periodically to Congress.

The "National Water Quality Inventory, 1988 Report to Congress" indicated that of the rivers, lakes, and estuaries that were assessed by the states (approximately 1/5 of stream miles, 1/3 of lake areas, and 1/2 of estuarine waters), roughly 70% to 75% were supporting the uses for which they were designated. For those with use impairments, the 1988 assessment concluded that pollution from diffuse sources, such as runoff from urban areas, construction sites, land disposal, agricultural lands, and resource extraction was the leading cause of water quality impairment.²

In its citation of this 1988 report, the Natural Resources Defense Council separated the diffuse sources. NRDC's presentation of the 1988 report states:⁷

"In 1988 the States reported that, of the waters they had assessed:

- 30% of river and stream miles were not healthy enough to support fishing and swimming. The major causes:

agricultural runoff (55%)
logging runoff (8%)
urban and construction runoff (14%)
- 26% of lake acres were too polluted for fishing and swimming. The major causes of lake contamination were:

agricultural runoff (58%)
urban runoff (28%)

- 29% of estuary square miles were partially or totally unable to support their designated uses. Urban runoff, agriculture, construction, and combined sewer overflows were significant sources of impairment in estuaries."

The 1990 report, "National Water Quality Inventory, 1990 Report to Congress" indicates that roughly 30% of identified cases of water quality impairment are attributable to storm water discharges from sources including separate storm sewers, construction sites, waste disposal, and resource extraction.²

To provide a better understanding of the nature of urban runoff from commercial and residential areas, EPA provided funding and guidance to the Nationwide Urban Runoff Program (NURP).²

The NURP, administered from 1978 through 1983, included 28 projects throughout the nation. Several thousands of individual storms, representing more than 100 different watersheds, were evaluated. The areas designated for study were residential, commercial, and light industrial areas. No heavy industrial areas or agricultural areas were included.

One focus of NURP was to characterize the water quality of discharges from separate storm sewers. Many thousands of constituent concentration observations were made for a wide range of pollutants, including nutrients, heavy metals, solids, and oxygen demand. A special sub-study monitored over 120 priority pollutants in storm water.

The wide variability of storm water pollutant concentrations and runoff volumes was clearly demonstrated. Therefore, annual pollutant yields, which were calculated on the basis of these results, also varied greatly.

In terms of weighted national averages and in comparison with the effluent from secondary sewage treatment plants, solids in storm water were found to be about "an order of magnitude" greater and chemical oxygen demand (COD) was as great.²

One result of the monitoring for 120 priority pollutants was that 77 priority pollutants were detected in samples of storm water discharges. Twenty-four priority pollutants were detected in at least 10% of the samples.²

Although the NURP did not evaluate construction site runoff, other studies have done so. They show that sediment loadings from construction sites are typically

10 to 20 times that of agricultural lands and 1,000 to 2,000 times that of forest lands.²

Statutory and Regulatory Emphasis on Storm Water Discharge

The regulation of municipal and industrial storm-water discharges has been controversial since enactment of the 1972 CWA. That controversy persisted in large part because Congress failed to devise a regulatory program tailored to storm water discharges, leaving EPA the unpleasant choice of regulating all storm water discharges from point sources in the same fashion as that for process wastewater from major industries, or to leave such discharges unregulated. The first choice is unworkable because of the potentially vast number of such discharges and the high cost of treating all of them; the second choice would have left a number of major discharges of toxic and other pollutants completely unregulated.⁶

EPA has issued NPDES storm water rules previously, but not one was successfully implemented.⁸ The most recent rule, issued in 1984, was remanded following a lawsuit by NRDC against EPA.²

In the 1987 Water Quality Act which amended the CWA, Congress mandated a timetable for storm water regulations; listed five types of storm water discharges for which NPDES permits must be obtained before October 1, 1992; designated general control strategies; set dates for promulgation of regulations; set dates for permit applications; and ordered EPA to implement (not until October 1, 1992) regulations to control all other discharges from separate storm water collection systems.²

Permitting Process for Discharges Regulated Under Recent Rule

Groups Affected: In the November 16, 1990, *Federal Register*, EPA published regulations for NPDES permit requirements for storm water discharges associated with industrial activities, discharges from large municipal separate storm-sewer systems (those serving a population of 250,000 or more), and discharges from medium municipal separate storm-sewer systems (those serving a population of 100,000 to 250,000).²

General Permitting Strategy: EPA estimates that 100,000 industrial facilities and 220 cities and counties will have to be permitted under the new rule.² This represents a significant expansion of the NPDES program, putting a burden on resource-strained states and on the regulated community. EPA admits that even 100,000 new NPDES permittees would impose

"overwhelming" administrative burdens on both EPA and states with NPDES authority if traditional NPDES permits had to be written.⁸ So, based on EPA's interpretation of court directives regarding its flexibility under the CWA, the agency "wrote the new rule with an eye toward maximizing its flexibility and cost-effectiveness."⁸ The November 1990 rule does the following:

- adopts a pollution prevention strategy that in most cases will not require permit-holders to treat storm water discharges
- allows municipal permittees to propose appropriate control programs
- allows states a great deal of discretion in setting permit requirements
- focuses on mitigating the greatest risks by limiting the scope of covered industrial activities to those directly related to manufacturing, processing, or raw materials storage
- provides a flexible permitting program that allows industrial facilities to discharge under individual, group, or general permits

Writing for the *Journal of the American Water Works Association*, Mark Scharfenaker states that, "The strategy is a major departure from the traditional NPDES command-and-control method of monitoring and treatment to meet end-of-pipe numeric water quality standards for specific pollutants."⁸

Industrial Permit Requirements: EPA has defined the term "storm water discharge associated with industrial activity" in a comprehensive manner which addresses over 100,000 facilities. These facilities are classified into eleven categories by their Standard Industrial Classification (SIC) code.² Segregated storm water discharges associated with parking lots and office buildings do not require a permit. Some municipal areas such as some landfills, some wastewater treatment facilities, and airports are defined as areas of industrial activities. All construction activities where five or more acres of land are disturbed also are defined as industrial activities. This latter inclusion affects the nation's highway departments.

There are three permit options associated with industrial activity. These options are individual permits, group permits, and general permits.

Individual permit applications require the development and submission of relatively detailed site-specific data including the following:⁹

- a topographic and site drainage map
- an estimate of drained area
- information on recent significant spills
- quantitative sampling data taken during a storm event
- location of outfalls
- a description of exposed materials
- a description of pollutant sources
- a certification that outfalls have been tested for non-storm-water discharges.

The regulations are very specific about the data required. For example, "quantitative sampling taken during a storm event" requires that samples be collected from a storm event that is greater than 0.1 inch of rain and at least 72 hours from the last 0.1 inch of rain. In addition, the duration and total rainfall for the storm event should be from 1/2 to 1-1/2 times the average or median storm event in that area. The data required includes maximum flow rate, total volume of discharge, and the method of flow measurement or estimate for the storm event. Also, the date, the duration and amount of the rainfall, and the time from the last 0.1 inch of rainfall must be recorded.⁹

Two types of samples are defined. The first is a "first flush grab sample" taken during the first 30 minutes of the storm event. The second type is a "flow-weighted composite sample" for the entire storm event. Each type of sample will be analyzed separately for pollutants.⁹

The group application allows certain classes of industries to reduce costs by requiring quantitative data from only 10 percent of the group's members. All group applications must be submitted directly to EPA regardless of whether included facilities are in states that have NPDES authority.⁸ EPA can reject particular members of a group application and require that they submit individual applications. When EPA approves a group application, the agency will formulate model permit language for each group and distribute it to each state or EPA region in which applicants are located. States and EPA regional offices can adopt the model language or modify it to fit state regulations. Then they

have the option of developing individual permits for each member of the group or developing a general permit for group members.

General permits are expected to cover most industrial discharges. General permits consolidate many discharges under a single permit and require permittees to file a relatively inexpensive notice of intent (NOI) to comply with the general permit. The NOI requirements for the permit typically do not require the collection of monitoring data. EPA intends to have NOIs sent to a central processing site. EPA is expected to adopt its general permit by May 1992.⁸

Use of general permits is not possible in some states because some states have the authority to issue NPDES permits but do not have the authority to issue general, industrial storm-water-discharge permits, and EPA is not allowed to issue any kind of discharge permit in states that have NPDES primacy. As of December 1991, 38 states and territories have NPDES authority, but 11 of these states do not have general permit authority, leaving industries in these states without the option of general permit coverage.⁸

The one definite requirement for all industrial activities affected by the storm water rule is that they must be permitted, regardless of whether the facility discharges storm water directly to surface waters or through municipal storm sewers. Discharges to sanitary sewers do not require permits since the effluent from publicly owned treatment works already is regulated stringently.

Municipal Permit Requirements: "Municipal separate storm sewer" is defined as any conveyance or system of conveyances that is owned or operated by a state or local government entity designed for collecting and conveying storm water which is not part of a Publicly Owned Treatment Works.² The application requirements do not apply to discharges from combined sewers (systems designed as both a sanitary sewer and a storm sewer). Municipal separate storm sewer systems which are addressed by the November 16, 1990, regulations include storm sewers located in one of 173 cities with a population of 100,000 or more, or located in one of the 47 counties identified by EPA as having large populations in unincorporated, urbanized areas.

A municipal permit application consists of two parts. Part 1 requires the following:¹

- description of existing legal authority to control discharges to the system
- source identification information

- discharge characterization including the following:
 - monthly mean rain and snow-fall estimates
 - existing quantitative data on volume and quality of storm-water discharges
 - a list of receiving water bodies and existing information on the impacts of receiving waters.
 - field screening analysis for illicit connections and illegal dumping
- characterization plan identifying representative outfalls for further sampling in part 2 of the application
- description of existing management programs to control pollutants from the municipal separate storm sewer and to identify illicit connections
- description of financial budget and resources currently available to complete part 2 of the application process

The regulatory specificities embodied in these general requirements demonstrate that this is not a simple process. For example, "field screening analysis for illicit connections and illegal dumping" requires municipalities to lay a grid over a map of their separate storm sewer system. This grid must consist of north/south and east/west lines spaced 1/4 mile apart. One point in each grid cell is to be selected for field screening. The maximum number of grid cells required is 500 for large municipalities and 250 for medium-sized municipalities. All these field screening points are to be described and examined for flow during dry weather (a period preceded by at least 72 hours with no precipitation). Any flow observed is to be analyzed (field screening methods are acceptable for the analysis) with the following data recorded for each sample:

- color
- odor
- turbidity
- presence of surface sheen/scum
- total phenol
- other relevant observations
- flow rate
- methods (physical and/or chemical) used to analyze samples
- detergents or surfactants
- pH
- total chlorine
- total copper

Part 2 of the municipal permit requires the following:

- demonstration of adequate legal authority to control discharges, prohibit illicit discharges, require compliance, and carry out inspections, surveillance, and monitoring
- source identification indicating the location of all major outfalls and identifying facilities that discharge storm water associated with industrial activity through the municipal separate storm sewer
- discharge-characterization data including the following:
 - quantitative data from 5-10 representative locations in approved sampling plans
 - data for selected conventional pollutants and heavy metals with estimates of the annual pollutant load and event mean concentration of system discharges for them
 - proposed schedule to provide estimates of seasonal pollutant load and the mean concentration for certain detected constituents in a representative storm event
 - proposed monitoring program for representative data collection
- proposed management program including descriptions of the following:
 - structural and source-control measures that are to be implemented to reduce pollutants in runoff from commercial and residential areas
 - program to detect and remove illicit discharges
 - program to monitor and control pollutants from municipal landfills; hazardous waste treatment, disposal, and recovery facilities; SARA Title III, and Section 313 facilities; and other priority industrial facilities
 - program to control pollutants in construction site runoff

- estimated reduction in loadings of pollutants as a result of the management program
- fiscal analysis of necessary capital and operation and maintenance expenditures.

Note that a description of fiscal resources is required for each part of the application. In the discussion of this requirement, the guidance manual includes the following statement:²

"EPA is interested in the applicant's commitment to implement storm water quality programs. A measure of commitment is the amount of money devoted to current programs."

Costs

EPA estimates municipalities will spend about 4.2 million dollars per year applying for storm water permits. The average large system is expected to spend \$77,000 and 4,500 hours to complete the application process. The average medium-sized system is expected to spend about \$50,000 and 3,000 hours to apply.²

EPA estimates that the average preparation cost of an individual permit application would be \$2,007 and 28.6 hours.² Group application and notice of intent to be covered by general permit should cost less than \$100.²

These costs are for the permit application process only. The costs for meeting the permit requirements year after year are not included in these figures.

New Storm Water Program Challenged by NRDC Lawsuit

The storm water discharge program already is complicated, costly, confusing, and controversial. It could become more so because of a pending lawsuit initiated by NRDC.

Upon EPA's release of its storm water regulations in November 1990, NRDC issued a news release, parts of which are quoted as follows:¹⁰

The Natural Resources Defense Council (NRDC) praised today's release by the U. S. Environmental Protection Agency (EPA) of new water pollution rules addressing poison runoff contamination in urban and industrial areas. While hailing them as an important first step, NRDC criticized the new

regulations for not going far enough to combat this problem.

Under 1987 amendments to the Clean Water Act, cities with a population of 100,000 or more are required to apply for permits under the National Pollutant Discharge System [*sic*] (NPDES). But in its December 1988 proposed regulation, EPA would have regulated only "incorporated" places meeting the cutoff. NRDC sharply criticized the earlier proposal which would have excluded hundreds of major urbanized areas such as heavily developed suburbs of Los Angeles, New York, Miami, and Washington, D. C. "The EPA met us half way," explained NRDC Senior Attorney Bob Adler [*sic*] by adding 47 of the most urbanized counties in the country. "Still," said Adler, "the final regulations cover only about half of the urban areas required by the 1987 law."

Industries discharging poison runoff are also required to file for runoff permits. However, Adler criticized EPA for "replacing the exception for cities with equally illegal loopholes for many industries." EPA included "only industrial activities they believe cause the worst problems," said Adler who added that "the law created no such discretion, requiring compliance by all discharges associated with industrial activity."

NRDC also criticized EPA for failing to impose actual mandatory control requirements. Expressing the fear that EPA is "smothering the problem with paper," rather than addressing the real environmental problem, Environmental Engineer Diane Cameron stated that "EPA continues to promote a toothless 'write-your own permit' program under which the cities themselves, rather than EPA, decide what poison runoff controls are adequate." Cameron urged that "what is required is on-the-ground poison runoff pollution control, not just boxes full of meaningless permit applications."

NRDC filed its action in the U. S. Court of Appeals for the Ninth Circuit, which heard oral arguments in the fall of 1991.⁸ Dozens of industry groups have filed as intervenors to protect their interests.

Some of the claims in NRDC's suit, as follows, are that EPA:⁸

- illegally extended statutory deadlines for permit applications and reviews
- illegally excluded certain sources of discharges from the rule
- failed to mandate specific pollution control methods
- illegally allowed submission of group permits for industrial facilities without adequate public notice and comment
- failed to include all municipalities with separate storm drains serving more than 100,000 people
- decided to regulate construction activities only on sites of 5 acres or more

Conclusion

Storm water, by its nature, is a nonpoint source of pollution. Nonpoint sources originally were exempt from the NPDES permit program which was to enable the Congressional goal of no pollutant discharges whatsoever by 1985.⁵

Several court cases have considered the question of whether runoff is a point source, that is required to have an NPDES permit under the original program, or a nonpoint source, that is exempt from the permit process but that is still subject to applicable discharge standards.⁵ Since usually urban runoff enters receiving waters through a conduit, or sometimes through a ditch, it fits the statutory definition of point-source discharge. Legally, it has been decided that storm water is a point source discharge, to be regulated under the NPDES permit program.

EPA's recent implementation of storm water regulations under the NPDES permit program is just the first phase of storm-water permitting. The WQA requires EPA to regulate, by October 1, 1992, discharges from sources other than those currently targeted, which means that few discharges to separate storm sewers will avoid eventual regulation.⁸

EPA states that "storm water discharge permits will provide a mechanism for monitoring the discharge of pollutants to waters of the United States and for establishing source controls where necessary."⁴ This could mean that eventually, this nation will be treating

much of its storm- water runoff before allowing it to be discharged.

What is the point of all this? The authors do not claim to have the wisdom to answer this question but desire to pose it.

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