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FINDING THE WAYS THROUGH THE PHASE II MAZE: COASTAL COLD WEATHER MS4S AND THE EPA'S NEW STORMWATER REGULATORY PROGRAM

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I. INTRODUCTION

The coastlines of the United States are composed of over 90,000 miles of estuarine waters and nearly 60,000 miles of ocean shoreline.[1] The aesthetic allure and quality of life offered by this valuable national natural resource continues to catalyze explosive population migrations coastward, and demographic experts predict that up to seventy-five percent of the United States population will live, work, or vacation along the nation's shorelines within the next decade.[2] Unfortunately, in most areas this increased use is sure to carry with it a substantial environmental price in the form of increased pollution.[3] The stark reality of the current and future seaward migration is that it will have significant adverse effects on the fragile marine and coastal ecosystems that coastal communities depend on for industry, recreation, tourism and healthy living if affirmative steps are not immediately taken to control its impact. To complicate matters further, the "appropriate" steps are neither simple, clear-cut, nor, in many instances, agreed-upon, and their formulation and implementation will necessarily

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1. THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY, 2000 NATIONAL WATER QUALITY INVENTORY 24 (2000), *available at* http://www.epa.gov/305b/2000report/ (last visited Apr. 26, 2005).

2. *Id.* at 36.

3. 55 Fed. Reg. 47,990, 48,038 (1990) (increased pollution is directly related to population growth). The correlation between increased urban development and increased contamination of local water bodies was affirmatively established by the United States Geological Survey (USGS) in 1998. *See* 64 Fed. Reg. 68,722, 68,726 (Dec. 8, 1999) (codified at 40 C.F.R. pts. 9, 122, 123 & 124). Though this evidence surprised few when it was released, it does underscore the importance of responsible urban planning as the nation's population continues to migrate toward its coasts.

require a pooling of public and private resources, political consensus and synergistic behavior among state and local governments, private industry and the general citizenry if "sustainable urbanism"[4] is ever to be achieved in coastal regions.

This Comment concerns itself principally with an acute seasonal coastal pollution problem that has been historically ignored and chronically under-studied—seasonal storm and meltwater runoff in coastal cold weather urban municipalities—and how the implementation of recent federal stormwater rules, namely the Environmental Protection Agency's (EPA's) "Phase II" stormwater regulations, affect cash-strapped state and local governments in watershed regions who are faced with competing policy concerns and unbalanced budgets. This Comment endeavors to provide an overview of the entire issue, first from a legal, then a technological, and, finally, from a policy perspective. However, in order to fully understand the breadth of this problem, and Congress's response to it, one must first gain a cursory understanding of the nature in which, because of variable weather and topographical patterns, toxic foreign substances are deposited within the ecosystem by way of storm and meltwater runoff, and, when deposited, how such substances affect coastal ecosystems. What follows is a brief introduction to the problem posed by stormwater runoff in general and an explanation of Congress's response.

A. *Stormwater Runoff Generally*

As stormwater flows over impervious urban surfaces where percolation[5] is minimal or nonexistent, it picks up myriad types of pollution, including toxic heavy metals, acids, raw sewage, pesticides, industrial and biological wastes, oil and floatable garbage.[6] If not diverted to treatment facilities, polluted storm and meltwater will eventually find its way into surrounding watercourses, contaminating drinking water, adversely affecting aquatic organisms and plant life, and often impairing biodiversity

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4. *See* Dan Tarlock, *City Versus Countryside: Environmental Equity in Context*, 21 FORDHAM URB. L. J. 461, 477 (1994) ("sustainable urbanism" requires a coherent "vision of a just and sustainable city to inform the many public policy choices that we make about environmental protection and social equity in an urban environment.").

5. Percolation is the downward movement of liquid water through soil.

6. 64 Fed. Reg. 68,722, 68,724, 68,727 (Dec. 8, 1999). In fact, every eight months, eleven million gallons of oil – the equivalent of the 1989 Exxon *Valdez* oil spill – run off the nation's streets and driveways and into its waters. PEW OCEANS COMMISSION, AMERICA'S LIVING OCEAN: CHARTING A COURSE FOR SEA CHANGE vi (2003), *available at* http://www.pewtrusts.org/pdf/env_pew_oceans_final_report.pdf (last accessed May 5, 2005).

and ecosystem health in area waters.[7] In addition to its effects on coastal habitats, ineffectively managed stormwater is responsible for widespread soil erosion, flooding, costly property damage, and decreased recreational opportunities and tourism-related activities.[8] Thus, effective management of stormwater is not only necessary from a public health point of view, but is also integral to a municipality's local quality of life and general demographic desirability.

Yet as vital as effective stormwater management practices are to all municipalities, the seasonal storm and meltwater runoff patterns faced by municipalities located in cold weather regions present a much more difficult problem for solution. While warmer weather regions must primarily account for runoff in its liquid form throughout the year—a fairly well-developed and understood practice—snowy cold weather municipalities must manage highly variable, region-specific hydrologic patterns every winter and spring, a practice that is poorly understood from hydrologic engineering and technology standpoints.[9] During winter rain-on-snow events and the spring melt, the water table is at its highest, the frozen, snow- and ice-covered ground is unable to absorb additional water, biological processes are greatly reduced, and drainage infrastructure frequently malfunctions. Even more problematic, however, is the high level of pollutants that has accumulated in the winter snowpack and on impervious urban surfaces during months of subfreezing temperatures. At the onset of the spring melt, a toxic pollutant cocktail silently waits to be released into area surface and ground waters by warmer temperatures and drenching rains.

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7. CEDO MAKSIMOVIC et al., URBAN DRAINAGE IN COLD CLIMATES 110 (United Nations International Hydrological Program 2000) *available at* http://unesdoc.unesco.org/images/0012/001225/122599eo.pdf (last accessed May 5, 2005) [hereinafter MAKSIMOVIC]. *See also* 64 Fed. Reg. 68,722, 68,724 (Dec. 8, 1999) ("Uncontrolled storm water discharges from areas of urban development negatively impact receiving waters by changing the physical, biological, and chemical composition of the water, resulting in an unhealthy environment for aquatic organisms, wildlife, and humans.").

8. *Id.* at 123.

9. Gary L. Oberts, *Snowmelt Research and Management: Ready For the Next Big Step*, KEYNOTE ADDRESS – "STORMWATER MANAGEMENT IN COLD CLIMATES – PLANNING, DESIGN AND IMPLEMENTATION" 2 (Nov. 3-5, 2003) [hereinafter Oberts]. Mr. Oberts notes that "[b]ecause much of the science of hydrology developed to predict the response from drastic rainfall events, the impacts of snowmelt have not historically received the attention that we would like." *Id.*

The Greater Portland, Maine area, with a population of approximately 230,000[10] and an average annual snowfall of over seventy inches,[11] is a prototypical example of this complicated phenomenon. Like many other coastal municipalities, the Portland region is heavily dependent on tourism, and its citizens have a strong appetite for its natural resources and a deep appreciation of its recreational opportunities. Unfortunately, like many other coastal cold weather municipalities, area shellfish flats and beaches are often closed due to actual or potential bacterial contaminations, area waters regularly fail to meet state minimum water quality standards, and local marine life exhibits unusually high levels of lead and mercury. The city has a tradition of managing storm and meltwater runoff with an eye toward flood control rather than local water quality. Not surprisingly, stormwater runoff is the single greatest contributor of contaminants to area waters.[12] Finally, like many other coastal municipalities, Greater Portland's population is steadily increasing.[13] In short, the Greater Portland watershed stands to benefit greatly from improved stormwater management practices in surrounding communities as the Greater Portland economy stands to suffer in the short term from increased regulatory burdens. Due to the difficult position local policymakers have been placed in by limited financial resources, history has proven that any progress made with respect to stormwater management in the Greater Portland region, or elsewhere, is usually incremental.

B. Congress's Response to the Nation's Stormwater Problem

In 1987, Congress took steps to address stormwater pollution and local municipalities' slow response to it when it made significant amendments

10. City of Portland, *About Portland*, http://www.ci.portland.me.us/ (last visited Mar. 15, 2005).

11. National Weather Service, Portland, Maine, Jetport Normals Based on Nat'l Weather Service Observations 1961-1990, *available at* http://www.erh.noaa.gov/er/gyx/climo/pwmnormals.html (last visited Mar. 15, 2005).

12. CASCO BAY ESTUARY PROJECT, STORMWATER AND CASCO BAY, *available at* http://www.cascobay.com/environ/plan/storm.htm (last visited Mar. 15, 2005).

13. The population of Cumberland County, of which the City of Portland is a part, increased 9.2 percent between 1990 and 2000 and another 2 percent between 2000 and 2003. U.S. Census Bureau, *Maine Quick Facts*, *available at* http://quickfacts.census.gov/qfd/states/23/23005.html (last visited Mar. 15, 2005). The population of York County, where Portland and Boston lie within a commutable distance, increased 13.5 percent between 1990 and 2000 and another 6 percent between 2000 and 2003. *Id.*, *available at* http://quickfacts.census.gov/qfd/states/23/23031.html (last visited Mar. 15, 2005). By way of comparison, Maine's total population increased just 3.8 percent between 1990 and 2000 and 2.4 percent between 2000 and 2003. *Id.*, *available at* http://quickfacts.census.gov/qfd/states/23000.html (last visited Mar. 15, 2005).

to the Clean Water Act (CWA)[14] that would fundamentally change the way the nation's municipalities look at environmentally sensitive stormwater management practices.[15] Gravely concerned by the environmental problems associated with unconstrained discharge of polluted stormwater into United States waters, Congress added Section 402(p)[16] to the CWA in order to more forcefully target the nation's stormwater problems at the state and local levels. In general, Section 402(p) sets forth a two-phased regime. "Phase I," the regulations for which were promulgated by the EPA in 1990, directly regulates municipal separate storm sewer systems (MS4s) serving populations exceeding 100,000 persons (large and medium MS4s).[17] "Phase II," the rules for which were promulgated by the EPA in 1999, directly regulates MS4s serving populations of fewer than 100,000 but more than 10,000 persons (small MS4s).[18]

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14. 33 U.S.C.S. §§ 1251-1387 (2004).

15. Ironically, it took an excruciatingly long time for Congress's vision to be applied at the local level, in no small part due to municipal opposition to Congress's costly new plan. *See, e.g.*, Natural Res. Def. Council v. EPA, 966 F.2d 1292 (9th Cir. 1992); Envtl. Def. Ctr., Inc. v. EPA, 344 F.3d 832 (9th Cir. 2003), *cert. denied sub nom.* Tex. Cities Coalition on Stormwater v. EPA, 541 U.S. 1085 (2004); City of Abilene v. EPA, 325 F.3d 657 (5th Cir. 2003).

16. 33 U.S.C.S. § 1342(p) (2004).

17. 40 C.F.R. pts. 122-124. Phase I also places restrictions on large scale construction and industrial activities. *Id.*

18. 40 C.F.R. §§ 122.26(a)(9)(i)(A) - (B). Phase II also applies to construction activities disturbing five acres or less and other problem areas as defined by the EPA. *Id.* The regulatory program also applies to smaller incorporated municipalities operating MS4s if the EPA determines that they are a "part" of a larger regulated MS4. Steven J. Koorse, *The Uncertainties of Urban Stormwater Regulation, in* STORMWATER RUNOFF AND RECEIVING SYSTEMS: IMPACT, MONITORING AND ASSESSMENT 250 (Edwin E. Herricks ed., 1995) [hereinafter Koorse].

Section 402(p)(1) placed a temporary moratorium on Section 402(p)'s applicability to small MS4s pending results of EPA studies conducted pursuant to Section 402(p)(5). Section 402(p)(5) required the EPA to identify sources of stormwater pollutants and establish procedures and methods to control pollutants as "necessary to mitigate impacts on water quality." 33 U.S.C.S. §§ 1342(p)(1) and (p)(5). Following a Section 402(p)(5) study and consultations with state and local officials, Section 402(p)(6) required the EPA to establish a comprehensive program to protect water quality. *Id.* § 1342(p)(6). The EPA initially proposed the Phase II regulations in 1998. Proposed Regulations for Revision of the Water Pollution Control Program Addressing Storm Water Discharges, 63 Fed. Reg. 1536 (proposed Jan. 9, 1998). In October 1999, Congress passed legislation preventing the EPA from promulgating the Phase II rule until the EPA furnished Congress with a report concerning certain aspects of the rule and published the proposed regulation in the Federal Register for public comment. Pub. L. No. 106-74, § 431(c), 113 Stat. 1097. Later that same month, the EPA submitted the required report and finally promulgated the rules. Regulations for Revision of the Water Pollution Control Program Addressing Storm Water

In general, Congress, by way of Section 402(p), charged the EPA with directly regulating, through a permitting regime conducted pursuant to the National Pollutant Discharge Elimination System (NPDES),[19] municipal, industrial and construction-based "point source"[20] stormwater discharges

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Discharges, 64 Fed. Reg. 68,722 (Dec. 8, 1999) (codified at 40 C.F.R. pts. 9, 122, 123, and 124).

Although the stormwater threat has been a major concern for federal policymakers for much of the past quarter century, the implementation of the "phased" rules has been a major feat for the EPA, who is charged with Section 402(p)'s implementation and enforcement. During the 1990s, the EPA routinely butted heads with Congress, the courts of law and the courts of public opinion, and it took nearly fifteen years for the EPA to successfully implement all of the pieces of Section 402(p) into the comprehensive regulatory scheme envisioned by Congress in 1987. Phase II represents the final piece of the regulatory puzzle, storming onto the landscape of municipal environmental regulation on March 10, 2003. For a general discussion of stormwater regulatory systems prior to the Phase II permitting regime, *see* PETER H. LEHNER ET AL., STORMWATER STRATEGIES: COMMUNITY RESPONSE TO RUNOFF POLLUTION 25 (Natural Resources Defense Council 1999), *available at* http://www.nrdc.org/water/pollution/storm/stoinx.asp (last accessed Apr. 27, 2005).

19. The National Pollutant Discharge Elimination System (NPDES) is defined as "the national program for issuing, modifying, revoking and reissuing, terminating, monitoring and enforcing permits, and imposing and enforcing pretreatment requirements, under sections 307, 402, 318, and 405 of the CWA." 40 C.F.R. § 122.2 (2004). NPDES permitting is authorized by the Clean Water Act. The NPDES permitting program controls water pollution by regulating the discharge of pollutants into the waters of the United States. EPA, *National Pollutant Discharge Elimination System*, *available at* http://cf.pub.epa.gov/npdes (last accessed Mar. 27, 2004).

20. A point source is "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, or vessel or other floating craft, from which pollutants are or may be discharged." 33 U.S.C.S. § 1362(14) (2004). Stormwater runoff that is not channeled by a "point source" is not regulated by the CWA. *See* Or. Nat'l Desert Ass'n v. Dombeck, 172 F.3d 1092, 1095 (9th Cir. 1998). However, due to the unique nature of urban hydrology, almost all diffuse "non-point source" urban stormwater runoff is channeled through a point source as a matter of flood prevention necessity, and thus is subject to the CWA. *See* Natural Res. Def. Council v. EPA, 966 F.2d 1292, 1295 (9th Cir. 1992); National Pollutant Discharge Elimination System Permit Application Regulations for Storm Water Discharges: Application Deadlines, 56 Fed. Reg. 56,548 (Nov. 5, 1991). In fact, courts have held that a conduit need not even be manmade to fall within the statutory definition so long as some human disturbance has caused the stormwater to be channeled through natural terrain features. Sierra Club v. Abston Construction Co., 620 F.2d 41, 45 (5th Cir. 1980) ("Nothing in the [Clean Water Act] relieves [dischargers] from liability simply because [they] did not construct those conveyances, so long as they are reasonably likely to be the means by which pollutants are ultimately deposited into a navigable body of water."). Consequently, even the unintentional channeling of pollutants through the use of natural terrain features may constitute illicit point source discharge if not done pursuant to the restrictions of an NPDES permit.

into United States waters.[21] Phase I, with its comparatively strict performance requirements, targets larger-scale polluters—generally large and medium-sized MS4s—by requiring them to establish management practices designed to reduce their discharge of stormwater pollutants by the "maximum extent practicable" as a condition of obtaining their NPDES stormwater permits.[22] On the other hand, the more flexible Phase II is targeted at small MS4s, generally smaller-scale polluters, and it requires them to implement into their stormwater best management practices permit requirements containing the following six "minimum measures" as a condition of receiving their NPDES permits: (1) creation of a public education and outreach program; (2) involvement and participation of the public in policy solutions; (3) detection and elimination of illicit discharges; (4) control of construction site stormwater runoff; (5) management of post-construction stormwater runoff; and (6) prevention of pollution in all municipal operations.[23]

All small MS4s are eligible for an NPDES permit under Phase II if they agree to (and do) comply with the permit's six "minimum measures." Like Phase I, a Phase II NPDES permit also requires that stormwater pollutants be reduced by the "maximum extent practicable."[24] However, due to their smaller size and limited resources, the more flexible six "minimum measures" will presumably assist small MS4s in better meeting Congress's vision. If a small MS4 decides that it does not wish to implement the six "minimum measures," it may apply for an NPDES permit under the "alternative permit option," which requires the small MS4 to comply with the stricter and more costly Phase I requirements.[25] In any event, all municipalities must obtain an NPDES permit through one of the two regulatory schemes,[26] as Congress has rendered unlawful all non-permitted point source discharges into United States waters.[27]

Notwithstanding the regulatory scheme under which their municipalities are regulated, municipal policymakers should take note that the nation's stormwater problems lend themselves to no quick or inexpensive

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21. 33 U.S.C.S. § 1362(7) (2004) defines "navigable waters" as "waters of the United States." *Id.* The EPA has construed "waters of the United States" broadly. The definition includes all waters that have ever been or ever may be used in interstate or foreign commerce (for recreation or other purposes), waters from which fish are or could be taken and sold in interstate commerce, all impoundments and tributaries of such waters and all wetland adjacent to such waters. 40 C.F.R. § 122.2 (2004).

22. 40 C.F.R. § 122.26 (2004).

23. 40 C.F.R. § 122.34(b) (2005).

24. 33 U.S.C.S. § 1342(p)(3)(B)(iii) (2004).

25. *See* Envtl. Def. Ctr., Inc. v. EPA, 344 F.3d 832, 847 (9th Cir. 2003).

26. 33 U.S.C. § 1342(a).

27. *See id.* § 1311(a).

fixes, although the identification and elimination of point source pollution and the reduction of impervious urban surfaces are the most effective means of alleviating additional financial pressures associated with widespread stormwater pollution. The effective implementation of any stormwater management program will necessarily require the harnessing of adequate public and private resources and the cooperation of an educated local citizenry. Municipalities' historical neglect of the stormwater problem[28] is responsible for some of the most polluted waters in the nation's history;[29] it is, therefore, imperative that these municipalities take steps to address some of the environmental problems their citizens have caused. Doing so in a cost-effective manner may very well represent the most significant environmental policy challenge state and local governments have faced in modern times.[30]

II. THE CLEAN WATER ACT § 402(P): PHASE II

In 1987, Congress passed the Water Quality Act, which significantly amended the CWA to allow the EPA or an authorized state government to directly regulate municipal and industrial stormwater discharges into

28. Some commentators have argued that the historical failure of state and local governments to address environmental concerns in urban areas is due to a general lack of incentive to do so. *See, e.g.,*Tarlock, *City Versus Countryside*, 21 FORDHAM URB. L. J. at 461-62. Professor Tarlock argues that the environmental movement paid little attention to the distributional effects of environmental policy because federal policies traditionally focused on the national benefits of pollution control rather than regional or local benefits. *Id.* Recent efforts by federal, state and local policymakers have made steps toward reforming this view as they take steps to target pollution at its local sources. The leading example of this movement is Congress's 1987 amendments to the Clean Water Act—principally Congress's addition of § 402(p). *See* 33 U.S.C.S. § 1342(p) (2004).

29. In fact, stormwater runoff has contributed to the impairment of some 45 percent of estuaries and has been cited by the EPA as a "leading cause" of ocean impairment. 64 Fed. Reg. 68,722, 68,726 (Dec. 8, 1999).

30. *See* Koorse, *supra* note 18, at 245 (noting that over 13,000 previously unregulated municipalities would be affected by Phase II permitting). The Phase II regulations automatically cover all small MS4s located in "urbanized areas" and potentially cover MS4s located outside urban areas. ENVIRONMENTAL PROTECTION AGENCY, STORM WATER PHASE II FINAL RULE, URBANIZED AREAS: DEFINITION AND DESCRIPTION (Dec. 1999), *available at* http://www.epa.gov/npdes/pubs/fact2-2.pdf (last visited Mar. 29, 2004). The EPA has defined an "urbanized area" as "a land area comprising one or more places . . . and the adjacent densely settled surrounding area . . . that together have a residential population of at least 50,000 and an overall population density of at least 1,000 people per square mile." *Id.* at 1. For a detailed collection of urbanized area maps developed by EPA on a state-by-state basis, visit http://cfpub.epa.gov/npdes/stormwater/urbanmaps.cfm (last visited Mar. 29, 2004).

United States waters.[31] The 1987 amendment tightened up considerable slack in the CWA by setting forth distinct parameters for the formulation of a comprehensive regulatory scheme aimed at targeting all "point source" stormwater discharges into United States waters. The amendments also established ambitious deadlines by which all stormwater dischargers were required to apply for and implement NPDES permits that would regulate their stormwater discharges.[32] The 1987 amendments established two separate pollution control objectives, which revolved around the NPDES permitting concept: (1) technology-based effluent limitations for existing point sources and performance standards limiting effluents for new point sources; and (2) water quality standards for all point sources.[33] The Phase II stormwater regulations arise from authority granted to the EPA via the 1987 amendments to the CWA.[34]

A. Phase II Permitting Requirements

As noted above, Phase II is directed at lower-level municipal stormwater dischargers and represents the second part of the CWA's two-phased regulatory scheme.[35] Phase II, like Phase I, which regulates MS4s

31. 33 U.S.C. § 1342. Under the EPA's NPDES permitting scheme, a state may assume the position as permit issuer so long as the requirements it imposes on permittees are no less stringent than those that would be imposed by the EPA directly. *See id.* § 1342(b); *see also* Koorse, *supra* note 18, at 247.

32. 33 U.S.C.S. § 1342(p) (2004); Natural Res. Def. Council v. EPA, 966 F.2d at 1295. Due to the administrative difficulty in implementing Congress's plan, the EPA routinely missed statutory and court-imposed deadlines for the implementation of stormwater regulations. *See* Koorse, *supra* note 18, at 247. Eventually, the EPA settled upon the prudent and practicable course of dealing with the most problematic stormwater dischargers first. *Id.*

33. Koorse, *supra* note 18, at 246.

34. *See* 33 U.S.C.S. § 1342(a) (2004).

35. The history of Phase II is long and complicated. The EPA originally proposed the Phase II Rule in January 1998, although it had been under consideration since 1994 when a temporary moratorium on the NPDES permitting of small MS4s expired. Envtl. Def. Ctr., Inc. v. EPA, 344 F.3d 832, 842 (9th Cir. 2003). In October 1999, Congress blocked the EPA from promulgating the rule before submitting a study regarding its expected impact. *Id.* Originally, stormwater regulation was an ancillary concern of the EPA's, as exemplified in the agency's attempt during the 1970s to exempt certain types of point source stormwater discharge from the NPDES regime. The EPA's actions were eventually overruled in Natural Res. Def. Council v. Train, 396 F.Supp. 1393 (D.D.C. 1975) and Natural Res. Def. Council v. Costle, 568 F.2d 1369 (D.C. Cir. 1977). Congress's response to the uncertainties regarding the EPA's statutory authority under the CWA was resolved through the addition of Section 402(p) to the Act in 1987, which charged the EPA with directly regulating most point source stormwater discharges. Koorse, *supra* note 18, at 248.

serving population areas exceeding 100,000 persons,[36] requires all small MS4s seeking to discharge pollutants into United States waters to obtain an NPDES permit.[37] The NPDES permitting requirements are the result of the CWA's prohibition on the discharge of *any pollutant* by any person or entity into waters of the United States, except as permitted through an NPDES permit.[38] Yet Phase II differs from Phase I in a number of ways. Most significantly, Phase II permits allow lower-level dischargers to elect to be regulated by the EPA or eligible state entity pursuant to the flexible six "minimum measures," which must be implemented into a small MS4's stormwater best management practices. The six minimum measures are a less burdensome alternative to the strict permit requirements, numeric effluent limitations and compulsory management programs imposed by the Phase I regulations.[39] The EPA believes that the minimum measures are the

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36. The initial Phase I permit application was published on November 16, 1990. National Pollutant Discharge Elimination System Permit Application Regulations for Storm Water Discharges, 55 Fed. Reg. 47, 990 (codified at 40 C.F.R. pts. 122-124). Phase I addressed MS4s in 173 cities and 47 counties in addition to the regulation of specific problem areas as defined by the EPA on a case-by-case basis. The Phase I regulations required the regulated municipalities to submit a stormwater permit application for such industrial activities as municipal wastewater treatment plants, landfills, construction activities and municipal transportation activities. Michael Cook, *EPA's Permit Program for Stormwater*, STORMWATER RUNOFF AND RECEIVING SYSTEMS: IMPACT, MONITORING AND ASSESSMENT 397-398 (Edwin E. Herricks ed. 1995).

37. 33 U.S.C.S. §§ 1311(a), 1342(a) (2004). Municipality, while not defined in Congress's 1987 amendments to the CWA, is defined in its 1972 amendments as "a city, town, borough, county, parish, district, association, or other public body created by or pursuant to State law and having jurisdiction over disposal of sewage, industrial wastes, or other wastes, or an Indian tribe or an authorized Indian tribal organization, or a designated and approved management agency under . . . [33 U.S.C. § 1288]." 33 U.S.C.S. § 1362 (2004).

38. 33 U.S.C. §§ 1311(a), 1352(12) (2004). The Clean Water Act defines "pollutant" to include "dredged soil, solid waste, incinerator residue, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, radioactive materials, heat, wrecked or discarded equipment, rock, sand, cellar dirt, and industrial, municipal, and agricultural waste discharged to water." *Id.* § 1362(6) (2004). Therefore, the CWA definition of "pollutant" is clearly broad enough to encompass stormwater discharges from all MS4s notwithstanding their geographical location.

39. As a general rule, NPDES permits impose numeric effluent limitations on the discharge of pollutants into United States waters. 33 U.S.C. §§ 1311(b), 1342(a) (2004). 33 U.S.C. § 1362(11) defines "effluent limitation" as any restrictions "on quantities, rates, and concentrations of chemical, physical, biological, and other constituents which are discharged from point sources into navigable waters, the waters of the contiguous zone, or the ocean." *Id.* The EPA may, however, exempt MS4s from the effluent limitations by way of 33 U.S.C. § 1342(p), which authorizes the EPA to issue NPDES permits to MS4s that effectively prohibit the introduction of non-stormwater into the MS4 and establish best

most effective means for small MS4s to reduce their stormwater pollutants by the "maximum extent practicable," given the financial and technological limitations experienced by smaller urban communities. The inherent flexibility in meeting the Phase II NPDES permit requirements is especially important for small MS4s operating in cold weather regions during the late winter and early spring months, where point source pollutant levels routinely spike and inflexible management programs tailored to address poorly understood stormwater issues can be impracticable to implement and administer.

The EPA has described the Phase II rules as taking a "best management practice" approach to NPDES permitting requirements for small MS4s by allowing them to tailor their stormwater regulation programs to their own unique needs.[40] However, the EPA certainly has not diluted the strict compliance measures necessary in order for a small MS4 to exercise the authority granted by an NPDES permit. At minimum, in order to receive an NPDES permit, and therefore legally discharge stormwater into United States waters, small MS4s are required to develop, implement and enforce a comprehensive stormwater management plan designed to eliminate the discharge of pollutants by the "maximum extent practicable" standard. In order to meet the objective, small MS4s subject to Phase II permitting must incorporate into their stormwater best management practices (BMPs) public education and outreach; public involvement and participation; illicit discharge detection and elimination; construction site water runoff control; post-construction stormwater management; pollution prevention controls for municipal operations; and stormwater treatment practices with measurable performance criteria.

The Phase II program contemplates a number of avenues through which a small MS4 can obtain an NPDES permit. A small MS4 may choose to be regulated under an applicable "general permit,"[41] in which case the MS4 must submit a notice of intent to comply with the terms of the general permit and to implement the six minimum measures.[42] Alternatively, a small MS4 may choose to apply for an individual Phase II permit, in which case the MS4 would also be required to comply with the six minimum

management practices that reduce stormwater pollutants by the "maximum extent practicable." *Id.* § 1342(p)(3) (2004). *See* Defenders of Wildlife v. Browner, 191 F.3d 1159, 1165 (9th Cir. 1999). This more flexible permit is known as a "management permit." City of Abilene v. EPA, 325 F.3d 657, 659-60 (5th Cir. 2003).

40. EPA, STORM WATER PHASE II FINAL RULE: AN OVERVIEW 1 (2000).

41. A "general permit" is defined as "an NPDES 'permit' issued under [40 C.F.R. § 122.28] authorizing a category of discharges under the CWA within a geographical area." 40 C.F.R. § 122.2 (2004).

42. 40 C.F.R. §§ 122.33(b)(1), 122.34(d)(1)(i), 122.34(b) (2004).

measures.[43] Lastly, a small MS4 may apply for a Phase I permit under the "alternative permit option," which allows it to opt out of the six minimum measures by complying with numeric effluent limitations or permit requirements aimed at larger-scale municipal polluters.[44]

B. Recent Attacks on Phase II

Phase II was recently challenged in the Ninth Circuit Court of Appeals on numerous constitutional and statutory grounds.[45] The court largely upheld the Phase II regulatory scheme as within the broad discretion Congress granted the EPA through section 402(p) of the CWA. Although the Phase II challengers have thus far failed to substantively change the requirements of Phase II through the courts, their arguments *have* forced the EPA to alter the original Phase II scheme, which did not give small MS4s the "alternative permit option," *i.e.*, the option to be regulated under the Phase I requirements.[46]

In the creation of the Phase II regulations, the EPA walked the Tenth Amendment tightrope. Thus, it is not surprising that the regulatory program's challengers have voiced forceful arguments centered around the principle that "the Federal Government may not compel the States to implement, by legislation or executive action, federal regulatory programs."[47] Nevertheless, Phase II challengers, like their Phase I brethren, have been unsuccessful in their arguments that their permits unconstitutionally require them to regulate third parties within their boundaries according to federal standards and to implement and administer a federal regulatory scheme in contravention of the Tenth Amendment.[48]

Congress's authority to regulate stormwater discharge into United States waters arises from the Tenth Amendment's grant to Congress of the power to provide for the general welfare of the country and the power to regulate commerce among the states.[49] Congress's police and commerce

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43. 40 C.F.R. 122.34 (2004).

44. 40 C.F.R. 122.26(d) (2004).

45. *See* Envtl. Def. Ctr. v. EPA, 344 F.3d 832 (9th Cir. 2003), *cert. denied sub nom.* Tex. Cities Coalition on Stormwater v. EPA, 124 S. Ct. 2811 (2004).

46. *See* Brief of Petitioner at 32, Envtl. Def. Ctr. v. EPA, 344 F.3d 832 (9th Cir. 2003) (Nos. 00-70014; 00-70734; 00-70822).

47. Printz v. United States, 521 U.S. 898, 925 (1997). The Tenth Amendment states that "the powers not delegated to the United States by the Constitution . . . are reserved to the States respectively, or to the people." U.S. CONST. amend. X.

48. Envtl. Def. Ctr., 344 F.3d at 844-45. *See also* City of Abilene v. EPA, 325 F.3d 657 (5th Cir. 2003) (unsuccessful Tenth Amendment attack on Phase I regulatory scheme by medium MS4s).

49. U.S. CONST. art. I, § 8. The phrase "interstate commerce" has generally been

powers are quite broad with respect to what it may do to regulate stormwater discharges into United States waters, but its powers do have some well-defined limits. The Supreme Court has recognized that "Congress may not simply commandeer the legislative processes of the States by directly compelling them to enact and enforce a federal regulatory program."[50] This principle applies regardless of the federal program's political importance.[51] Furthermore, Congress may not circumvent this principle by simply requiring state and local governments to regulate third parties pursuant to the federal regulatory program.[52] Congress, if it determines regulation to be appropriate, must do so through federal regulatory channels and not through regulatory channels of the states.[53] The Court has recognized that these principles extend to all state political subdivisions.[54]

While the Court has found that Congress may not *compel* the states to enact or administer a federal regulatory program, it has noted that Congress may *encourage* the states to enact and administer a federal regulatory program, for example, through incentives.[55] This "carrot and stick" approach was used by the federal government to persuade states to comply

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interpreted to mean discourse between the states or a state and a territory of the United States. BLACK'S LAW DICTIONARY 263 (7th Ed. 1999).

50. New York v. United States, 505 U.S. 144, 161 (1992) (quoting Hodel v. Va. Surface Mining, 452 U.S. 264, 288 (1981) (internal quotation marks omitted).

51. *See, e.g., id.* (disposal of low-level radioactive waste); Printz v. United States, 521 U.S. 898 (1997) (background checks for handgun purchasers). *But see* Garcia v. San Antonio Metro. Transit Auth., 469 U.S. 528 (1985) (upholding constitutionality of applying Fair Labor Standards Act's minimum-wage and overtime requirements to an unwilling municipal transit authority). In *Garcia*, the Court established the following four-pronged test for determining whether state activity is immune from a federal regulation enacted under the Commerce Clause of the Tenth Amendment: (1) the federal regulation must regulate "States as States"; (2) the regulation must "address matters that are indisputably attributes of state sovereignty"; (3) state compliance with the regulation must "directly impair the State's ability to structure integral operations in areas of traditional governmental functions"; and (4) the federal interest "must not be such that [it] justifies state submission." *Id.* at 537 (quoting Nat'l League of Cities v. Usery, 426 U.S. 833 (1976)). The Court noted that under the *Garcia* test a federal interest might be so important that it overrides competing state interests in federalism. However, decisions subsequent to *Garcia* have firmly established that the Tenth Amendment continues to shield state and local governments from federal "commandeering" despite the importance of a particular federal regulatory program. *See* New York v. United States, 505 U.S. at 161.

52. Reno v. Condon, 528 U.S. 141, 151 (2000).

53. Printz v. United States, 521 U.S. 898, 922 (1997) (arguing that the "power of the Federal Government would be augmented immeasurably if it were able to impress into its service—and at no cost to itself—the police officers of the 50 States").

54. *Id.* at 931 n.15.

55. New York v. United States, 505 U.S. 144, 166-7 (1992).

with the Low-Level Radioactive Waste Policy Amendments Act of 1985,[56] as addressed by the Supreme Court in *New York v. United States*.[57] In *New York*, Congress had permitted states to impose surcharges on radioactive wastes received from other states and/or to gradually increase the cost of access to their sites and then to deny access altogether to waste generated in certain other states.[58] The Court reasoned that the Tenth Amendment allowed Congress to authorize states to burden interstate commerce through taxes and to discriminate against interstate commerce through denial of access.[59] Although not exactly analogous, the channeling, treatment, and disposal of stormwater passing over state and municipal boundaries present similar legal and political policy concerns to those raised in *New York*.

In addition to the "carrot and stick" approach, the courts have also, consistent with the Tenth Amendment, permitted Congress to regulate interstate commerce through the states by giving the states the right to choose how they wish to implement a federal regulatory program, provided, however, that at least one "constitutional option" exists. At least one court has implicitly recognized that an alternative may be so difficult that a state governmental body may be "covertly" forced to choose in a certain manner.[60] The success of the "Hobson's Choice" argument in the Tenth Amendment context remains to be seen, although the Ninth Circuit recently dismissed such an argument in the Phase II context.[61] Apparently, covert "encouragement" is permissible as long as it is not tantamount to "coercion," and as long as the state governmental bodies are not forced to choose between two coercive regulatory programs.[62] In other words, at least one of the options must be constitutional and non-coercive. The crux of the Tenth Amendment analysis ultimately lies in a state's ability to retain the ultimate decision of whether or not to implement a specific federal regulatory program.[63] If the citizens retain the choice, the Tenth Amendment has not been offended and Congress has not overstepped its powers under Art. 1, § 8.[64]

Making the obvious and realistic assumption that municipalities have no practical choice but to discharge stormwater into United States waters as a matter of simple necessity, without more, requiring the states to enact

56. 42 U.S.C. § 2021(b) (2004).
57. 505 U.S. 144 (1992).
58. *Id.* at 171.
59. *Id.*
60. City of Abilene v. EPA, 325 F.3d 657, 662 (5th Cir. 2003).
61. Envtl. Def. Ctr. v. EPA, 344 F.3d 832, 848 (9th Cir. 2003).
62. *See* New York v. United States, 505 U.S. at 176.
63. *Id.* at 168.
64. *Id.*

and administer Phase II would appear to violate the Tenth Amendment.[65] Not only does it compel the states to regulate third parties as part of a federal regulatory scheme, but it also robs state governmental bodies of the right to decide whether or not to implement the program at all. The EPA itself recognized the Tenth Amendment problem,[66] and modified its Phase II regime to allow states to opt out of the Phase II program by offering an unenticing alternative: the option to elect the "alternative permit option," which would impose on small MS4s the same burdensome and costly numeric effluent limitations or strict management permits applicable to large and medium MS4s.[67] The Ninth Circuit recently found that the choice afforded small MS4s was not "coercive" so as to violate the Tenth Amendment,[68] and the Fifth Circuit recently upheld the Tenth Amendment constitutionality of the "alternative permit option" when it found that the Phase I requirements were constitutional.[69] The Ninth Circuit's analysis is set forth in greater detail below.

65. Interestingly, the EPA argued before the Ninth Circuit that the federal stormwater regulations could be altogether avoided by MS4s were municipalities to elect not to discharge stormwater into United States waters in the first place. *Envtl. Def. Ctr.*, 344 F.3d at 847 n.22. The Court did not reach the argument. *Id.*

66. National Pollutant Discharge Elimination System—Regulations for Revision of the Water Pollution Control Program Addressing Storm Water Discharges, 64 Fed. Reg. 68,722, 68,765 (Dec. 8, 1999) (codified at 40 C.F.R. pts. 9, 122, 123, and 124).

67. *See* 40 C.F.R. § 122.26(d) (2004). In order to receive a Phase I permit, a municipality is responsible for creating a master plan to reduce the discharge of pollutants through the regulation of illicit discharges and the implementation of best management practices to reduce stormwater pollutants. 40 C.F.R. § 122.33(b)(2)(ii) (2004).

68. Envtl. Def. Ctr. v. EPA, 344 F.3d at 848.

69. City of Abilene v. EPA, 325 F.3d 657, 663 (5th Cir. 2003). In *City of Abilene*, the municipal plaintiffs argued, *inter alia*, that Phase I permitting violated the Tenth Amendment because it compels them to "administer a federal regulatory scheme." *Id.* at 659. The Court found that Phase I did not offend the Tenth Amendment because the regulations gave the municipal plaintiffs the choice of whether to be permitted pursuant to rigid effluent limitations or by way of a management permit. *Id.* at 662-63. The management permit option potentially required the municipal plaintiffs to regulate third parties. *See id.* at 660. However, the Court determined that the effluent limitation option did not violate the Tenth Amendment because "the proposed numeric end-of-pipe permits would not have required the [municipal plaintiffs] to regulate their own citizens but instead, by requiring the [municipal plaintiffs] to meet effluent limitations, would have regulated them in the same manner as other dischargers of pollutants." *Id.* at 663. Because the numeric end-of-pipe option was constitutional, the court determined that the Phase I permitting options presented no constitutional defect so long as the municipal plaintiffs had the ability to choose between permitting under the numeric effluent limitations option or under the management permit option. *Id.* at 662-63.

1. Environmental Defense Center v. EPA

Although the EPA's inclusion of the "alternative permit option" appears to be an undisguised last minute attempt to save the Phase II regulations from constitutional infirmity, as noted, the Ninth Circuit recently upheld the constitutionality of the choice given to small regulated MS4s in *Environmental Defense Center, Inc. v. EPA*.[70] The court determined that "[w]ith the Phase II Rule, EPA gave the operators of small MS4s a choice: either implement the regulatory program spelled out by the Minimum Measures described at 40 C.F.R. § 122.34(b), or pursue the Alternative Permit option and seek a permit under the Phase I Rule as described at 40 C.F.R. § 122.26(d)."[71] Although the Ninth Circuit did not directly address the Tenth Amendment constitutionality of Phase I, it approvingly cited *City of Abilene v. EPA*,[72] a recent Fifth Circuit opinion that upheld the Phase I regulations on Tenth Amendment grounds.[73]

In *Environmental Defense Center*, the municipal plaintiffs challenged the Phase II permitting scheme in the Fifth, Ninth and D.C. Circuits in three independent actions that were eventually consolidated before the Ninth Circuit.[74] The plaintiffs argued that the scheme, among other things, "impermissibly require[d them] to regulate their own citizens in contravention of the Tenth Amendment[75] and to communicate a federally mandated message in contravention of the First Amendment."[76]

In regard to the Tenth Amendment claim, the Ninth Circuit determined that Phase II presented no constitutional problem because it allowed the municipal plaintiffs to choose which "phase" they wished to be regulated under. Despite the plaintiffs' claim that they were being presented with a "Hobson's Choice,"[77] the court was unmoved, finding that no unconsti-

70. 344 F.3d 832 (9th Cir. 2003).

71. *Id.* at 847.

72. 325 F.3d 657 (5th Cir. 2003).

73. Envtl. Def. Ctr. v. EPA, 344 F.3d at 847-48. Though the Ninth Circuit has never passed on the constitutionality of Phase I in regards to the Tenth Amendment, it did review the Phase I rules on other grounds in the early 1990s. *See* Natural Res. Def. Council v. EPA, 966 F.2d 1292 (9th Cir. 1992).

74. Envtl. Def. Ctr. v. EPA, 344 F.3d at 843. The Environmental Defense Center, joined by intervenor National Resources Defense Council, also argued that Phase II failed to meet the requirements of the Clean Water Act because it constituted a plan of "impermissible self-regulation," did not provide a means for public participation and failed to address significant sources of runoff pollution.

75. *Id.* at 843.

76. *Id.*

77. Brief of Petitioner at 23-24, Envtl. Def. Ctr., Inc. v. EPA, 344 F.3d 832 (9th Cir. 2003) (Nos. 00-70014; 00-70734; 00-70822).

tutional coercion occurred.[78] In other words, the court held that the EPA had successfully averted the Tenth Amendment issue by giving the municipal plaintiffs the choice to be regulated under the more burdensome Phase I regulations recently upheld on Tenth Amendment grounds by the Fifth Circuit in *City of Abilene v. EPA*.[79]

The municipal plaintiffs also challenged the Phase II minimum measures as violative of the First Amendment, arguing that the requirements compelled them to voice the EPA's "political message"[80] through the "Public Education and Outreach"[81] and "Illicit Discharge Detection and Elimination"[82] permitting requirements.[83] Pursuant to their Phase II permit requirements, small MS4s are required to distribute educational materials to their communities concerning stormwater impacts on water quality and regarding the steps that industry and private citizens can take to reduce stormwater pollutants and minimize illicit or improper waste disposal.[84] The municipal plaintiffs argued that the First Amendment prevented the EPA from requiring them, as a condition of obtaining a Phase II permit, to publicize messages they might not otherwise want to communicate.[85]

Despite these concerns, the Ninth Circuit found that "the purpose of the challenged provisions is legitimate and consistent with" the goals of the CWA.[86] The court acknowledged that the *state* "may not constitutionally require an *individual* to disseminate an ideological message," but reasoned that requiring a municipality discharging stormwater into United States

78. Envtl. Def. Ctr. v. EPA, 344 F.3d at 848. The court did not consider whether the Phase I numeric effluent limitation option is so impracticable for Phase II municipalities that it is tantamount to no choice at all. However, due to the importance attached to Phase II by federal officials, it seems unlikely that mere cost and administrative difficulties would suffice. The Fifth Circuit recently addressed the issue indirectly in the Phase I context when it noted that "if the alternative to implementing a federal regulatory program does not offend the Constitution's guarantees of federalism, the fact that the alternative is difficult, expensive or otherwise unappealing is insufficient to establish a Tenth Amendment violation." City of Abilene v. EPA, 325 F.3d 657, 662 (5th Cir. 2003).

79. *Id.*

80. Envtl. Def. Ctr., Inc. v. EPA, 344 F.3d at 848.

81. 40 C.F.R. § 122.34(b)(1)(i) (2004) (Phase II regulated MS4s "must implement a public education program to distribute education materials to the community or conduct equivalent outreach activities about the impacts of storm water discharges on water bodies and the steps that the public can take to reduce pollutants in storm water runoff.").

82. *Id.* at § 122.34(b)(3)(ii)(D) (Phase II regulated MS4s must "inform public employees, businesses, and the general public of hazards associated with illegal [stormwater] discharges and improper disposal of waste.").

83. Envtl. Def. Ctr., Inc. v. EPA, 344 F.3d at 848.

84. 40 C.F.R. §§ 122.34(b)(1)(i), 122.34(b)(3)(ii)(D) (2004).

85. Envtl. Def. Ctr. v. EPA, 344 F.3d at 848.

86. *Id.* at 849.

waters to educate the public about the hazards associated with polluted stormwater "falls short of compelling such speech."[87] According to the court, the requirements did not compel a specific message to be delivered, but merely required the implementation of "appropriate education and public information activities that need not include any specific speech at all."[88] Appearing to invoke a sliding scale of importance on the value of the challenged speech, the court reasoned that the interests at issue were not of the same order as those discussed in *Wooley v. Maynard*,[89] which invalidated a New Hampshire law requiring the phrase "Live Free or Die" to be displayed on the state's license plates.[90] The court further reasoned that "[i]nforming the public about safe toxin disposal is non-ideological; it involves no 'compelled recitation of a message' and no 'affirmation of belief.'"[91] The court concluded that, because the requirements did not impermissibly compel speech and because they were consistent with the overall CWA regulatory program, they did not violate the First Amendment.[92]

III. STORMWATER DRAINAGE IN COLD WEATHER CLIMATES[93]

"The drainage of a city in the interest of the public health and welfare is one of the most important purposes for which the police power can be exercised."[94] However, because of their smaller tax bases and cash-

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87. *Id.* (emphasis added).

88. *Id.*

89. 430 U.S. 705 (1977).

90. Envtl. Def. Ctr. v. EPA, 344 F.3d at 849.

91. Envtl. Def. Ctr. v. EPA, 344 F.3d at 850 (quoting Prune Yard Shopping Ctr. v. Robins, 447 U.S. 74, 88 (1980)).

92. *Id.* at 851. In finding that the First Amendment was not violated, the Ninth Circuit declined to address the EPA's arguments that the plaintiff municipalities are not afforded full First Amendment protection pursuant to *Muir v. Ala. Educ. TV Comm'n*, 688 F.2d 1033, 1038 n.12 (5th Cir. 1982) (government speech is unprotected by the First Amendment and may be subject to legislative limitation) or that the plaintiff municipalities could avoid their First Amendment concerns by seeking a permit under the Phase I "alternative permit option." *Id.* at 849 n.23.

93. Though many of the stormwater management policies explored in this Comment are equally applicable to MS4s regulated by Phase I, this Comment's principal focus is on small MS4s in cold weather coastal areas that are subject to Phase II regulation, *i.e.*, those with between 10,000 and 100,000 residents. This Comment also assumes that the bulk of small MS4s will choose the more flexible Phase II regime and forgo their option of implementing the burdensome regulatory scheme mandated by Phase I under the "alternative permit option."

94. New Orleans Gaslight Co. v. Drainage Comm'n of New Orleans, 197 U.S. 453, 460 (1905).

strapped local governments, small MS4s in cold weather regions will no doubt recognize that the relative importance of stormwater *pollutant* management hinges on financial resources and the magnitude of other competing policy concerns. Because cold weather municipalities experience significantly different and costlier stormwater management problems than do municipalities in warmer regions, cost-effective stormwater management plans are integral to the good faith achievement of the six "minimum measures" of the Phase II regime. In order to reduce pollutant loading in stormwater flows by the "maximum extent practicable," small MS4s that operate in cold weather regions must engineer and implement practices that reflect the special pollution problems associated with many months of subfreezing temperatures and pollutant loading. For their part, rapidly growing coastal municipalities located in cold weather regions must also plan with an eye toward future growth as the nation's population continues to migrate seaward.

Ideally, all MS4s will set goals to implement stormwater management schemes that will prevent stormwater pollutants from ever entering and harming coastal and marine ecosystems in the first place. However, without improved technology and engineering methods in cold weather regions, this goal is simply unachievable. Due to their different climates and topographies, cold weather regions' stormwater practices should reflect at least a rudimentary understanding of the unique abilities of snow and ice to trap huge amounts of pollutants and the season's inability to wash them away regularly through frequent rainfall events. Only after this understanding has been achieved can responsible policies be implemented that will reduce stormwater pollutants by the "maximum extent practicable."

A. *The Unique Pollutant-Trapping Abilities of Snow and Ice*

When the atmospheric temperature is below freezing, super-cooled water droplets begin to collect around specks of atmospheric particulate. A snowflake is formed, and it begins its slow descent toward earth. While it falls, its coarse crystals scour the atmosphere, collecting microscopic airborne aerosols. The snowflake eventually settles on the ground, perhaps on top of a polluted roadway containing petroleum byproducts, heavy metals and animal wastes. If it is cold enough, other snowflakes collect. Automobiles drive over the accumulations, jarring loose asphalt with their studded snow tires while discharging petroleum pollutants and exhaust fumes onto the accumulated snow. Accumulated roadway snow and roadway pollutants are then plowed into banks on the sides of the road by heavy machines that further dislodge asphalt with their tires and plows and discharge more petroleum byproducts onto the pavement and into the snow. The heavy machines spread ice-melting road salt containing chloride and other toxic pollutants, which gets mixed into, and begins to melt, the frozen pollutant cocktail. After the flakes cease to fall, much of this pollution sits for many months, locked in roadside bankings. As the pollutants sit in the snowpack, they are splashed with polluted roadway slush and meltwater, constantly inundated with airborne pollutants picked up from surrounding impervious surfaces and penetrated by animal wastes, sand and other insoluble materials. The snowpack darkens and short-wave solar radiation increases, warming the snow and forcing liquid water and soluble pollutants to the bottom of the snowpack, where they are slowly and irregularly released. Eventually, the clouds darken again and the wintry cycle repeats itself.

This thumbnail sketch of pollutant activity during the winter months is over-simplified, though it does demonstrate snow and ice's unique ability to harness huge amounts of pollution at a time when the ecosystem is least able to process it. Soils are frozen and snow-covered, and stormwater retention ponds, if they exist, are iced over. Drainage infrastructure is blocked by snow and ice, and frequently malfunctions. Biological activity in aquatic habitats is at its lowest levels of the year. All the while the day-to-day hustle and bustle of urban life continues to deposit pollutants that stand ready to be discharged come spring rains and warmer temperatures.

In warm climates, rains regularly rinse urban areas of pollutant buildup throughout the year. Cold weather municipalities face not only the problem of controlling the sheer amount of liquid water their infrastructure is suddenly forced to process, but also must simultaneously control the high level of pollution that storm and meltwater carry into surrounding waters during late winter and early spring storms. The first piece of the problem—the practical considerations necessary for preventing flooding and property damage—proves why MS4s traditionally channeled untreated stormwater and meltwater into area receiving waters. However, due to its complexity and variability, the second piece—the environmental considerations necessary for preventing coastal and marine ecosystem damage—poses a more formidable challenge to environmentally sensitive hydrologic engineering practices that are in harmony with the objectives of the Phase II stormwater regulation.

Briefly forgetting about the requirements of Phase II, it quickly becomes clear that coastal cold weather municipalities face many obstacles that demand serious planning, advanced and advancing technology, adequate financing and improved synergies between the public and private sectors. Small cold weather MS4s must take into account future industrial, commercial and recreational needs in designing stormwater management systems that adequately address their current population needs, and they must figure out how to finance such systems. For the faster growing coastal municipalities, it is nearly certain such needs will increase greatly in the short and long term, and these governments must concern themselves even more deeply with the multiple variables that affect the efficiency and efficacy of their stormwater management practices.

B. Basic Hydrologic Concepts

For many years, stormwater management practices consisted of "one-size-fits-all" engineering for every region.[95] However, the seemingly infinite variability of urban topography and weather patterns in cold weather regions make certain that BMPs designed for warm weather are not "best" for cold weather. This variability is typified by the urban hydrologic cycle, or the process water undergoes after it falls upon impervious urban surfaces such as pavement, roofs and concrete, as liquid precipitation. Such water will do one or more of three basic things after it falls to the ground: It will percolate into pervious ground surfaces, *e.g.*, areas with natural cover, and return to the atmosphere through transpiration processes; it will evaporate; or it will become runoff and drain overground into surface waters like lakes, streams or oceans, whether it is actively channeled there or not. Due to the increased number of impervious surfaces in urban areas, stormwater runoff typically accounts for the largest percentage of the urban hydrologic equation, increasingly so as a particular region becomes more and more developed.

Stormwater runoff is a natural part of the hydrologic cycle, but the amount and intensity of runoff depends on the ability of natural and manmade features to process the amount of water produced by falling, running and melting precipitation. Urban areas typically experience lower groundwater recharge and transpiration rates than areas with natural ground cover, and therefore seriously alter the natural hydrologic cycle by changing the amount and intensity of runoff through the modification and destruction of natural drainage features.[96] Such changes consistently produce an almost immediate impact on the quality of surrounding waters in coastal municipalities during the spring melt period.

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95. Oberts, *supra* note 9, at 10.

96. "For example, a one-acre [paved] parking lot can produce sixteen times more stormwater runoff than a one-acre meadow each year." METROPOLITAN COUNCIL, URBAN SMALL SITES BEST MANAGEMENT PRACTICE MANUAL 1-4 (2000), *available at* http://www.metrocouncil.org/environment/watershed/bmp/manual.htm. [Hereinafter "METROPOLITAN COUNCIL"].

1. Intelligent Stormwater Management Practices for Urban Hydrologic Patterns

Setting up an effective stormwater management program is a major and complex undertaking. Innovative computer modeling has increased the accuracy and effectiveness of hydrologic engineering by accounting for complexities inherent in the size and shape of the drainage area, the area's natural drainage features and natural slope, the watershed's ability to store runoff and the porosity of the area's surrounding soil.[97] However, the science is still plagued with ambiguities and inefficiencies. Therefore, the most effective way to control stormwater runoff and its inherent ability to collect and concentrate pollutants is to address runoff at its sources, and innovative engineering helps municipalities to design programs that do just that.

Unfortunately, the understanding of cold climate hydrology is still in its infancy, and practices for controlling pollutants in winter and spring runoff are not well developed.[98] As a result, accurate computer modeling has not advanced to a point where runoff pollutants can be effectively contained at or near their sources. This is primarily because hydrologic engineering and BMP selection in cold weather urban areas is largely an imperfect and location-specific science that varies greatly on a daily, weekly and monthly basis. In contrast to warm weather municipalities where stormwater pollutants are naturally controlled through more frequent rainfall events, cold weather municipalities must account for and manage months of pollutant buildup during a compressed time period generally running from April through May in the Northern Hemisphere. In addition to extremely high pollutant levels during this period, such municipalities must also account for a marked increase in the intensity of stormwater flow during spring rainstorms caused by accelerated melting and inefficiently operating stormwater infrastructure. Finally, such municipalities must also consider the complex melting patterns of the winter snowpack, which lead to irregular releases of different snowpack pollutants throughout the spring melt period.[99] Given these complexities, stormwater management practices for cold weather regions should be broken down into the following three main components in order to target runoff at its most significant sources: control of flow intensity, consideration of urban topography, and elimination of likely stormwater constituents. Policymakers should take note that the degree to which these three distinct components will be

97. *Id.* at 1-8.

98. Oberts, *supra* note 9, at 2.

99. *Id.* at 7.

implemented into a workable and successful stormwater model has as much to do with data and technology as it does with the knowledge, skill and experience of the stormwater management program's modelers.[100]

a. The Intensity of Stormwater Flow

In urban areas, there is generally no question as to whether rainfall and meltwater will become runoff; the lost storage and flow function of soil due to the prevalence of impervious surfaces makes it a certainty.[101] The question for planners and engineers, then, is how much runoff will be produced from normal rainfall events and snowpack melting patterns and where the resulting storm and meltwater runoff will be channeled. Because natural terrain features that used to play an important role in controlling stormwater have been steamrolled and cemented, urban municipalities must compensate for the "normal flow"[102] produced by routine storms during the spring thaw by way of systems that reroute runoff into receiving surface waters, such as oceans, rivers and ponds, or, more desirably, local disposal and storage facilities via underground pipes.[103] In normal conditions, such systems respond quite effectively to even high intensity rainfalls.[104] However, when storms exceed the capacity of these systems, excess water flows untreated via natural drainage point sources such as streets, footpaths and parks, resulting in flooding, property damage, and surface water pollution.

In cold weather areas, the intensity of spring rainfall events is generally less than that of summer rainfall events. However, because the intensity of the runoff flow is increased by the flow generated by a melting snowpack and the environment's decreased ability to compensate, rain-on-snow events and the spring melt frequently overload stormwater management systems in urban areas.[105] Where high intensity summer rainfall events can generate MS4 overflows ranging from minutes to hours, lower intensity rain-on-snow events and long-term thaw periods can generate overflows

100. MAKSIMOVIC, *supra* note 7, at 8.

101. In cold weather regions, frozen soil's sharply decreased ability to absorb rainfall and meltwater further contributes to significant winter and spring levels of stormwater runoff.

102. In reality, the flow is no longer "normal" because urbanization has altered the amount, intensity and path of stormwater flows. *See* ANNE WHISTON SPIRN, THE GRANITE GARDEN: URBAN NATURE AND HUMAN DESIGN 13, 91 (1984) (stating that urban runoff short circuits the hydrologic cycle, often with disastrous results). "Normal" stormwater flow as expressed in this Comment is intended to describe urban municipalities as they are now, not as they were before urbanization.

103. MAKSIMOVIC, *supra* note 7, at 25.

104. *Id.*

105. *Id.* at 106.

ranging from days to weeks in cold weather regions.[106] These untreated overflows are normally channeled directly into area receiving waters.

In order to deal with the variability of meltwater patterns and the specific stormwater needs of cold weather regions, "meltwater treatment practices" that are specifically designed to operate in cold climates should be developed by all small MS4s operating in such regions.[107] More specifically, coastal municipalities should aim to cut the problem off at its sources by concentrating on the reduction of the potential for the occurrence of high levels of runoff instead of channeling all their energies into reacting to seasonal system overloads and malfunctions. The only way to do so effectively is to decrease impervious urban surfaces or to modify them so that they produce less runoff.

Among the many ways to decrease runoff levels, street design, parking lot design, and "green" rooftop design have the potential to decrease runoff by the largest extent through relatively simple and inexpensive methods.[108] Many initiatives can be taken to cut down on stormwater through the intelligent modification of existing streets, including narrower street widths and improved drainage design. "Curbless" roadways featuring drainage swales and turf pavers[109] are important options that should be seriously considered. In addition to roadway management and design, intelligent parking lot design can also result in significantly decreased runoff levels at a relatively low cost to developers. The simplest practices include imposing a maximum number of spaces a development may provide, reducing the size of parking spaces, and promoting shared parking lots.[110] Although many of these practices would surely be unpopular in many areas, for example in those that experience parking shortages or in cold weather regions where citizens own a disproportionately large number of sizable four-wheel drive vehicles, municipal planners should attempt to strike a balance between parking needs and the reduction of stormwater pollution. Parking spots dedicated to compact cars could be used in general parking areas and spillover parking lots with pervious surfaces could be used for larger vehicles.[111] Also, municipalities could promote shared parking lots by offering certain incentives for businesses with peak parking demands at different times of the day or week to share parking facilities.[112] Lastly, planted areas strategically placed around parking lots can be used to

106. *Id.* at 30.
107. Oberts, *supra* note 9, at 12.
108. *See* METROPOLITAN COUNCIL, *supra* note 96, at 3-5, 3-17, 3-29 (2000).
109. *Id.* at 3-6, 3-23.
110. *Id.* at 3-17.
111. *Id.*
112. *Id.*

confront runoff and filter stormwater pollutants on-site.[113] Increased awareness of the stormwater problem can be expected to significantly increase public cooperation with such initiatives.

"Green" rooftops are an especially innovative (and unique) way to reduce the amount of stormwater runoff. In general, green rooftops are veneers of living vegetation installed atop buildings. Such rooftops having many practical advantages, including improved insulation, increased sound absorption, and extended rooftop life.[114] Such rooftops have been shown to dramatically reduce cumulative annual runoff, sometimes by as much as fifty percent.[115] Furthermore, their symbolic advantages may actually outweigh their practical advantages. Such highly visible examples of innovative creativity will no doubt draw attention to policy initiatives aimed at curbing stormwater runoff and serve as aesthetically pleasing indicators of progress in local environmental affairs. Because of their practical and symbolic significance, green rooftop designs should be seriously considered by developers and private individuals as a means of reducing stormwater runoff in their communities.[116]

b. Urban Topography

In all of stormwater management, determining the path of stormwater flow may indeed be the most vexing question because it is normally the most complicated and the most subject to variability, especially in cold weather areas. The reason for this variability is the fact that stormwater runoff literally comes from everywhere in an urban municipality: streets, rooftops, parking lots, patios, and flooded streams and ponds. It also frequently comes from not-so-local sources, such as adjacent and "up-stream" neighbors, because catch basins, pipes, and outfalls are commonly owned by more than one municipality.[117] To complicate matters further,

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113. *Id.* at 3-18. For example, deep-rooted prairie plants can hold up to a half-inch of stormwater on their leaves and in the thatch that they create. *Id.* at 3-17.

114. METROPOLITAN COUNCIL, *supra* note 96, at 3-30 (2000).

115. *Id.* at 3-29.

116. Many urban planners have begun doing just that. Although "green" rooftop design is common in Europe, it is just being introduced into the United States. Envtl. News Network Staff, *Green Rooftop Technology Saves Energy, Cools Air*, CNN, Jan. 1, 2001, *available at* http://archives.cnn.com/2001/NATURE/01/01/rooftop.gardens.enn/ (last visited Mar. 16, 2005). Cities such as Chicago, Portland, Oregon, and Washington, D.C., have begun to conduct research on the benefits of green rooftop design. *Id.* A high profile example of the actual implementation of such technology can be found in Boston's recently renovated John W. McCormack Post Office and Courthouse, where a green rooftop has been installed to decrease stormwater runoff and better dissipate summer heat. Ted S. Bowen, *A Boston Federal Building is Going Green at Age 72*, N.Y. TIMES, Dec. 8, 2004, at C6.

117. 55 Fed. Reg. 47, 990, 48, 040-44 (1990) (to be codified at 40 C.F.R. pts 122-124).

urban municipalities are often not even aware of all point sources within their jurisdiction, making it impossible to monitor stormwater pollutants and to identify their sources.[118] Therefore, the most vile outfalls may be left unregulated and little improvement in area water quality will be observed even though a municipality allocates significant resources to creating, implementing and enforcing a comprehensive stormwater management strategy.

Generally, in order to accurately predict the path of stormwater runoff in most regions, municipal planners must analyze the size and shape of the drainage area, the nature of the stream network, the slope of the surrounding land and the main drainage channel, the storage detention abilities of the watershed, and the amount of impervious surface area in the region.[119] Planners and developers must also account for changes in already disrupted flow patterns brought on by further urban development. Yet planners in cold weather regions must consider substantially more, including the roles played by decreased biological activity, ice blockage, infrastructure malfunctions, and high pollutant levels in late winter and early spring runoff. In designing an appropriate stormwater model, it is generally recommended that planners maintain preexisting hydrologic conditions to the maximum extent possible.[120] This is especially true in coastal regions, where the fragile ecosystems are often highly susceptible to the impacts of poorly managed stormwater[121] and the exorbitantly high demand for a small amount of land makes coastal over-development a near certainty.

Even taking all relevant factors into account and despite adequate planning, effective localized stormwater management invariably becomes a trial-and-error process for most cold weather municipalities. Given the seemingly infinite number of variables that must be accounted for when devising a stormwater management plan that can be practically implemented, even sophisticated computer modeling programs dedicated to the task cannot render exact determinations of the quantities and qualities of stormwater runoff.[122] This is especially true in cold weather

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118. Joel B. Eisen, *Toward a Sustainable Urbanism: Lessons From Federal Regulation of Urban Stormwater Runoff*, 48 WASH. U. J. URB. & CONTEMP. L. 1, 16 (1995). Many MS4s, especially those in older municipalities, cross jurisdictional lines and merge with contiguous systems, resulting in a complex organization of pipes, conveyances, and outfalls that are difficult to locate. *Id.* at 16 n.78.

119. METROPOLITAN COUNCIL, *supra* note 96, at 1-8 (2000).

120. *Id.* at 1-9.

121. *Id.*

122. Richard Attanasio & Daniel Danicic, *Comparing Three Stormwater Pollutant Load Models*, Pub. Works, Apr. 1994, at 51 (concluding that no available model provides "exact answers").

urban municipalities, where the highly variable pollutant-loading and melting characteristics of a snowpack are, despite recent efforts,[123] still not thoroughly understood.[124]

i. BMP Selection Matrix

The trial-and-error uncertainty prevalent in cold weather stormwater management practices can be significantly limited through the implementation of a stormwater treatment BMP selection matrix.[125] Effectively tailored BMPs require a large amount of foresight by public officials and planners. Therefore, a preliminary assessment of BMPs should be conducted before the first shovel is even sunk into the ground. Stormwater control and treatment BMPs should be devised, evaluated and implemented in the following order: (1) assessment of stormwater treatment suitability; (2) assessment of physical feasibility factors; and (3) assessment of community and environmental factors.[126] The first component, stormwater treatment suitability, involves the assessment of a particular BMP, or a group of BMPs working in concert, by asking whether the BMP (or group of BMPs) meets the stormwater rate, volume, and water quality treatment requirements of the particular area.[127] The fact that a particular BMP does not alone meet any one requirement should not be determinative of its fate. Such failure, however, is an indication that more than one BMP is needed to adequately address the specific area's storm and meltwater runoff issues.[128]

Where stormwater treatment suitability involves the effectiveness of BMPs, physical feasibility governs their use at a particular site. There may be physical constraints that preclude the use of a particular BMP or group

123. Oberts, *supra* note 9, at 3. Recently, however, the international scientific, academic, commercial, and government communities have come together to pool their collective resources in order to better understand the unique impacts stormwater runoff has on cold weather climates. The international conference, titled "Stormwater Management in Cold Climates: Planning, Design, and Implementation," was held in Portland, Maine, in late 2003 and featured engineers, scientists, government employees, and product manufacturers. The conference was the first of its kind in North America to specifically address the issues faced by cold weather urban municipalities. The event included participants from Norway, Sweden, Iceland, New Zealand, Canada and twenty-two American states. *Cold Climate Stormwater, Stormwater Management in Cold Climates: Planning, Design, and Implementation*, *available at* http://www.cascobay.usm.maine.edu/coldsw.html (last visited Mar. 1, 2004).

124. Oberts, *supra* note 9, at 3.

125. METROPOLITAN COUNCIL, *supra* note 96, at 2-3 (2000).

126. *Id.*

127. *Id.*

128. *Id.* at 2-4.

of BMPs, including slope, surrounding soils, drainage area and water table.[129] Additionally, urban BMPs must be able to accommodate "hotspots," or surrounding areas that produce highly contaminated stormwater runoff, for example, runoff originating from highly industrialized areas.[130] In order to prevent contaminated stormwater from entering surrounding watercourses, it is essential that drainage practices in cold weather regions take into account geographical as well as temporal water quality issues when addressing a particular storm and meltwater problem.

Lastly, a BMP must be evaluated according to its potential effects on the community and the environment.[131] BMPs that radically change the aesthetic landscape or create nuisance problems can be expected to be met with lower public acceptance rates. Lower public acceptance rates may result in increased litigation and increased noncompliance levels, surely not the "best" result from a stormwater management policy perspective. Similarly, BMPs must be evaluated according to their effects on surrounding ecological habitat, primarily on their abilities to provide suitable wildlife and wetland habitat.[132] No matter how effective a BMP is at controlling storm and meltwater runoff and pollution, it should also have a balanced impact on the area's natural habitats.

c. Controlling Stormwater Pollutants

Stormwater runoff carries many ground-level soluble and solid pollutants that adversely affect water quality. Unlike liquid water, however, snow is also an "effective scavenger of atmospheric pollutants."[133] Any airborne material collected by snowflakes as they fall to the earth is almost certain to show up in meltwater.[134] The sources of storm and meltwater pollution include the byproducts of industrial, residential and commercial land uses,[135] yet chlorides and sodium are by far the most distinct pollutants in the melt and stormwater of many cold weather regions due to their concentrated presence in ice-melting road salt.[136] In addition to chlorides and sodium, the usual suspects normally include organic and

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129. *Id.* at 2-3.
130. *Id.* at 2-6.
131. *Id.* at 2-3.
132. *Id.* at 2-8.
133. Oberts, *supra* note 9, at 6.
134. *Id.*
135. METROPOLITAN COUNCIL, *supra* note 96, at 1-9 (2000).
136. Oberts, *supra* note 9, at 13. Chlorine is problematic because it easily moves through all commonly used treatment devices and into ground and surface waters. *Id.* Chlorine can also lower pH levels and dissociate heavy metals into more soluble forms. *Id.* Sodium disrupts the physical structure of the soil column. *Id.*

inorganic particulates, nutrients, heavy metals, polynuclear aromatic hydrocarbons, and cyanide.[137]

There is a direct correlation between the amount of development and human activity in an area and the presence of pollutants in that same area.[138] Thus, urban areas are particularly susceptible to pollutant buildup over extended periods of subfreezing temperatures. In an effort to identify the sources of stormwater pollutants, municipalities may be forced to use extremely expensive biomonitoring methods. Yet only when a pollutant has been identified and attributed to a particular source can a municipality act to eliminate the problem through normal regulatory channels.

The intensity of rainstorms greatly affects the amount of pollutant loading in stormwater. Urban BMPs must typically take into account the varying intensity of seasonal precipitation. There are three distinct types of rainfall categories in United States cold weather regions: common rainfall events, amounting to less than 0.5 inches; intermediate rainfall events, amounting to between 0.5 and 1.5 inches; and intense rainfall events, amounting to more than 1.5 inches.[139] Intermediate rainfall events account for 75 percent of pollutant loading in developed areas.[140] When mixed with spring melt conditions, as much as 65 percent of sediment, organic, nutrient and lead loads for the year can be discharged through stormwater and meltwater during an extremely short period of time.[141]

Thus, the question in cold weather regions becomes how to control pollutant levels to make for cleaner stormwater during the late winter and early spring months. One answer is to create a separate municipal entity to focus exclusively on stormwater runoff issues. Many municipalities have taken steps to create stormwater utilities to specifically deal with stormwater management issues.[142] Through stormwater utilities, munici

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137. *Id.* at 7. According to the PEW Oceans Commission, 60 percent of the nation's coastal rivers and bays are moderately to severely degraded by nutrient runoff, which is responsible for harmful algae blooms and the degradation or loss of sea grass, kelp beds and coral reefs. PEW OCEANS COMMISSION, AMERICA'S LIVING OCEAN: CHARTING A COURSE FOR SEA CHANGE (2003), *supra* note 6 at vi.

138. METROPOLITAN COUNCIL, *supra* note 96, at 1-4.

139. *Id.* at 1-9 to 1-11.

140. *Id.* at 1-11.

141. *Id.* Sediments are suspended solids, such as dirt and sand. They are responsible for smothering sensitive aquatic organisms in spawning areas. Nutrients include nitrogen and phosphorus and are found in animal waste, fertilizers and malfunctioning septic systems. They contribute to algae growth and reduced water clarity. Organic materials include grass clippings and leaves. They reduce oxygen in receiving waters and contribute to fish kills. Heavy metals such as lead are found in brake linings, vehicle emissions and metallic roofs. They contribute to water toxicity, sediment, and fish kills. *Id.* at 1-12 tbl.1-2.

142. INTERNATIONAL CITY MANAGEMENT ASSOCIATION, MIS REPORT, *Stormwater*

palities generally aim to internalize costs by requiring residents and industries to pay service fees or special assessments in proportion to the extent that they contribute to the runoff problem or benefit from a specific development project.[143] Stormwater utilities are normally responsible for implementing federal stormwater control regulations, though neither federal law nor the EPA requires them to do so.[144] Stormwater utilities are also traditionally responsible for conducting widespread public outreach and education efforts, which are mandated by Phase II stormwater permits.

In addition to reducing the number of impervious surfaces in the urban environment and managing stormwater runoff through stormwater utilities, huge inroads into pollution control can be made by simply focusing attention on streets and parking lots during the spring melt. Studies have indicated that streets and parking lots account for as much as eighty percent of total runoff volume in urban areas and are therefore responsible for the channeling of significant amounts of pollutants into area waters.[145] Of all BMPs designed to reduce pollutant levels by the "maximum extent practicable," frequent and timely street sweeping is commonly the most effective, cheapest, and simplest way to reduce high pollutant loads during the late winter and early spring months apart from physically removing the snowpack from impervious urban surfaces. Street sweeping, when done frequently and at the appropriate time, has the potential to reduce all potential stormwater pollutants by significant amounts.[146]

Given street sweeping's ability to minimize stormwater pollutants to a great extent during the late winter and early spring months, municipalities should aim to increase its efficacy even more by limiting winter pollutants

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Management, Vol. 22 No. 11 at 3 (1990).

143. *Id.* In *City of Gainesville v. Florida*, 863 So. 2d 138 (Fla. 2003), the Florida Supreme Court considered the propriety of stormwater utility financing options, particularly the distinction between "user fees" and "special assessments." As demonstrated in *Gainesville*, where the Florida Department of Transportation claimed the utility lacked the statutory authority to impose a special assessment upon it, the distinction may be important as it relates to the utility's ability to impose fees on municipal and state government-operated bodies.

144. Eisen, *supra* note 118, at 77.

145. METROPOLITAN COUNCIL, *supra* note 96, at 3-35. In fact, there are a number of simple ways to reduce stormwater pollutants, including the removal of animal wastes deposited near watercourses and runoff planes, decreased or modified use of fertilizers, pesticides and herbicides, and stricter and more frequent inspection standards for automobiles and other motor vehicles. *Id.* at 3-47, 3-51. However, the initial focus for most municipalities operating small MS4s should be on "pavement management" techniques, such as street sweeping, that afford the greatest positive impact on area water quality at the lowest cost to the municipality.

146. *Id.* at 3-35.

at their source. When combined with alternative de-icing products, such as calcium magnesium acetate, and minimized sand and salt application rates during winter storms, street sweeping can have a huge positive impact on area water quality. With a little ingenuity, street sweeping can also prove to be a low cost alternative to more complex stormwater pollutant control practices. Certain street sweeping equipment can be converted to other uses, such as sanding and plowing, enabling municipalities to decrease the number of pieces of equipment they own while increasing the efficiency of the pieces they do own.[147] Cost reduction can also be accomplished through simple recycling. Often, street sweepings can be reused by first screening out larger debris and then remixing the sweepings with new sand and salt for reapplication to roads, parking lots and sidewalks.[148]

In order to implement such strategies, cold weather municipalities may find it beneficial to train small groups of highly qualified municipal employees to manage road and parking lot-derived stormwater pollutants, creating a more responsive and knowledgeable stormwater management team.[149] Such self-sufficient "stormwater rapid response units" (SRUs) could be administered through a particular municipality's stormwater utility.

2. Cold Weather Effects on Stormwater Drainage Infrastructure

Due to the sheer amount of rain and meltwater that must be managed during the spring melt season coupled with ice blockage of pipes and drainage ponds, reduced biological activity and frozen soils, cold weather stormwater drainage infrastructure is heavily burdened during the onset of the spring melt.[150] In order to prevent urban flooding, such infrastructure must account for months' worth of frozen precipitation accumulations in addition to warm weather rains. Because such systems need significantly more maintenance attention than warm weather systems, sufficient funding must be allocated to their preventative and spot maintenance schedules.

There are many factors that contribute to ineffective management of stormwater pollutants in cold weather areas. However, through the use of SRUs, infrastructure malfunctions due to inadequate maintenance can be significantly minimized. Yet maintenance and care cannot counter the effects of poorly-designed stormwater management infrastructure when reduced biological activity and frozen soils drastically reduce nature's

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147. *Id.* at 3-36.
148. *Id.* at 3-37.
149. *See id.*
150. METROPOLITAN COUNCIL, *supra* note 96, at 1-9 (2003).

contribution to the stormwater management effort. Many BMPs rely on natural processes such as percolation and transpiration to help manage stormwater pollutants. However, during the winter months, percolation is minimal and plants are dormant. Therefore, pollutant loading during the spring melt must be managed nearly exclusively by stormwater treatment facilities.

Unfortunately, overflows and flooding are frequent and problematic effects of improperly designed stormwater systems, and pollutant levels are commonly an ancillary concern during the late winter and early spring months in cold weather regions.[151] Under Phase II permitting, such an attitude is no longer acceptable. To be sure, such events can never be eliminated entirely. However, the probability that they will occur can be significantly minimized through the reduction of impervious urban surfaces and the development of higher quality stormwater runoff control initiatives. For many MS4s, SRUs would be a sufficient way to address the stormwater runoff problems throughout the year. However, other MS4s, the victims of rapid and unintelligent urban development, will be forced to completely overhaul their stormwater management infrastructure. For such municipalities, the revenues generated by a stormwater utility will be integral in the financing of such initiatives.

IV. CONCLUSION

The EPA's Phase II stormwater regulations present many formidable obstacles to cold weather MS4s located in coastal regions. As a result of these new federal stormwater regulations, such communities are now required to implement comprehensive stormwater management schemes that reduce pollutant levels by the "maximum extent practicable" standard while at the same time planning for the expected explosion in population growth along the nation's coastlines during the coming decades, which will further tax municipal resources and create more pollution. Burdened by a general lack of understanding by members of the scientific and engineering communities concerning environment pollutant loading during extended periods of subfreezing temperatures, and plagued by a complacent attitude toward the stormwater pollutant problem by their policymakers, such communities must now confront their stormwater pollutant issues proactively.

The Phase II permitting scheme has effectively given small MS4s the ability to functionally define "practicability," a vague concept at best given the differing budgetary, technological and political barriers of the nation's

151. MAKSIMOVIC, *supra* note 7, at 78.

municipal governments and their historical neglect for stormwater runoff issues. The looming question of how the public will respond also remains significant as state and local policymakers grapple with Phase II and attempt to develop workable stormwater management programs that serve the interests of all citizens. These programs are sure to be sometimes inconvenient, frequently costly, and almost certainly controversial, and can be expected to influence short-term voting patterns. Consequently, unanimity in an unwavering long term commitment to creating workable stormwater management practices by all public officials is essential in order to gain the public approval necessary to make the reduction of pollution attributable to stormwater a reality.

The success of Phase II is heavily reliant on the public's awareness of the stormwater pollutant problem and its active participation in remedying the situation. Public education, outreach, involvement, and participation are cornerstones of the required six "minimum measures" of the Phase II NPDES permitting program, and for good reason. The first step to achieving public cooperation is through public awareness programs aimed at educating the public about ways stormwater runoff and its pollutant constituents can be reduced. In many areas, the second and most important step will be the creation of stormwater utilities that will regulate the behavior of citizens through the assessment of a fee or tax directly attributable to the public's pro rata contribution to stormwater runoff. Ideally, stormwater utilities in these areas will be directly responsible for administering a comprehensive stormwater management program reflective of the specific needs of the community. As a final step, municipalities, with the assistance of state and federal resources, must begin making regular improvements to existing infrastructure to better account for changes in population patterns and distributions and to take advantage of improving technologies. Important synergies between the stormwater utility and other municipal entities less knowledgeable about stormwater pollutant management will be necessary for the successful implementation of a comprehensive stormwater management plan that grows with the community.

Bellevue, Washington's plan for stormwater control is one of the earliest stormwater success stories and one worthy of much consideration.[152] Though Bellevue currently has a population exceeding 100,000, the city operated a "small" MS4 throughout much of the last forty years. Bellevue is within Washington's coastal watershed region, and it

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152. A more in-depth version of Bellevue's stormwater story can be found in INTERNATIONAL CITY MANAGEMENT ASSOCIATION, *supra* note 142 at 4 – 7. This Comment's general discussion of Bellevue is directly attributable to the above-cited source.

experiences annual snowfall totals that approximate twenty inches. However, spring runoff patterns are greatly affected by the melting of winter snows in surrounding mountainous regions, and Bellevue's contribution to the stormwater pollutant management effort in Washington is integral to maintaining and improving water quality in area waterways.

During the 1970s and 1980s, long before environmentally sound stormwater management programs were mandatory, Bellevue had taken many pioneering steps toward controlling stormwater runoff and stormwater pollution through the creation of a stormwater utility. The stormwater utility was established to prevent property damage, maintain hydrologic balance and "protect water quality for the safety and enjoyment of citizens and the preservation and enhancement of wildlife habitats."[153] In establishing its utility, Bellevue engaged in five years of public outreach and consensus-building efforts.

Initially, the utility had difficultly implementing its rate structure, which assessed fees according to a piece of property's contribution to stormwater runoff, *i.e.*, its level of imperviousness. The utility imposed lesser fees for runoff controls on property and required on-site runoff detention for new developments. In order to gain the public support necessary to make a bond offering that it would use to finance itself, the utility established a special commission to oversee rates, budgets and programs, held an advisory vote on its plan, and created an independent accounting department to manage the utility's financial affairs.

Bellevue's stormwater utility has five major departments that manage its programs. They include an administrative unit, which is responsible for policy development, comprehensive drainage planning and general administration; a development unit, which reviews plans for developments to ensure all developments comply with the utility's policies and standards; an operations and maintenance unit, which is responsible for maintenance, repair and emergency response; a capital improvements unit, which plans and designs improvements to infrastructure, acquires property and constructs flood control and water quality treatment projects; and a water quality unit, which is responsible for monitoring receiving waters and pollution events and coordinating with other municipal and state agencies.

As noted, the utility's rate structure is based on the amount of runoff a specific piece of property creates. The utility divides its users into the following five rate classifications: undeveloped, light development, moderate development, heavy development, and very heavy development. The utility keeps an up-to-date database that reflects changes in property

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153. *Id.* at 4.

ownership, subdivisions, parcel size, and rate classification. The major source of the utility's revenue is from its user rates.

The central pillar of Bellevue's stormwater utility is its management philosophy, which addresses developmental, environmental, and economic considerations arising from property usage. The utility instituted policies that limited or precluded development that was out of harmony with natural features or posed the potential to harm environmentally sensitive areas, and it placed the burden on developers to prove that their proposed developments would not harm the environment. These policies were able to ward off significant political pressure from developers because the utility was able to garner sufficient public support in favor of its measures. The public's support was directly tied to the economics of the utility customer rates and by the utility's unwavering long-term commitment to controlling stormwater runoff pollution.

The story of Bellevue is a story of proactive stormwater management practices that should be emulated by all small MS4s. In fact, the utility has been so successful in changing the public's view toward stormwater management that its measures have produced very few lawsuits. As the Bellevue example demonstrates, small MS4s need not be deterred from implementing utilities of their own that will reflect their own regional stormwater issues and implement their policies in a manner that accounts for varying public needs.

The Phase II regulations' strongest asset is their ability to push small MS4s to adopt a Bellevue-type forward-looking philosophy toward stormwater management. To be sure, the implementation of effective stormwater management practices that reduce stormwater pollutants by the maximum extent practicable will be substantially more burdensome for faster growing cold weather municipalities in coastal watershed regions. However, the difficulties such municipalities experience in this endeavor will also spark increased scientific research, improved engineering practices, and widespread public awareness of a historically ignored problem. As these municipalities continue to experience high rates of growth and development, they will have already planted the seeds of sustainable urbanism. Continued support by all levels of government, private industry and private citizens will strengthen sustainable urbanism's roots, and continued improvement in environmental initiatives will nourish its growth.

In order to accomplish Congress's vision of eliminating stormwater pollutant discharge into the nation's waters, all municipalities must make a long term commitment to controlling point and non-point source runoff, reducing impervious areas, educating citizens and private industry, and controlling regional development patterns. A failure on any of these fronts will compromise the stormwater initiative and further harm coastal and marine environments. The achievement of long-term policy goals aimed at curbing stormwater pollution requires a large amount of cooperation between state and local governments and private citizens and industry, but it can be done.