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ENVIRONMENTAL STEWARDSHIP

Regulating Deicing Runoff from Highway Operations

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This paper describes the increasing regulatory pressure on the runoff of roadway deicing chemicals projects future trends in the permitting of those discharges.

In recent years, increasing attention has been paid to the environmental consequences of pavement deicing activities. With the advent of the Clean Water Act's storm water permitting program in 1987, the U.S. Environmental Protection Agency was given an express mandate to control storm water discharges through federal wastewater discharge permits. Deicing discharges from roadways were excluded largely in the first phase of that program. Phase II of the storm water program brings a new focus on the potential water quality impact of highway deicing runoff. With this focus comes the increased likelihood that dischargers adjacent to impaired waters will be subjected to stringent permit terms.

As these trends mature, states may conclude that the issuance of permits for highway deicing runoff should be the rule rather than the exception. To meet this challenge, state departments of transportation and other entities responsible for roadway deicing activities should begin to think through the options with which they will be presented. Working with regulatory agencies early on to ensure that potential water quality impacts will be fairly and accurately characterized will be critical. Equally important will be advance work with permitting agencies to frame permitting strategies that would not unduly burden roadway deicing operations.

TWO PERSPECTIVES ON ROAD SALT RUNOFF

> *"**Is Highway Runoff a Serious Problem?***
> *Not necessarily. . . . When applied heavily and frequently, deicing chemicals can pollute receiving waters, but . . . [h]ighway runoff is generally not harmful."*
> (Reproduced from U.S. Federal Highway Administration Technology Brief)

> *"**Science Assessment Finds Road Salts Toxic to the Environment***
> *In 1995, an expert advisory panel made up of scientists, environmentalists, health organizations, industry and other governments agreed on a list of 25 substances to be assessed for their toxicity to the environment and to human health under the Canadian Environmental Protection Act (CEPA). . . . The scientific assessment was carried out to determine the exact effects road salts were having on the environment.*
>
> *The conclusion is that road salts are toxic to the environment*

> *especially to streams, small lake ecosystems and to groundwater because of their widespread use and should be added to the List of Toxic Substances under CEPA.* (Reproduced from News Release by Environment Canada)

INTRODUCTION

Different observers often have starkly different assessments of the environmental implications of the road salt runoff from highway deicing operations. These somewhat edited, but fundamentally representative excerpts from Canadian and U.S. publications seem to reflect differences in perspective on this subject across the shared border. In Canada, with colder temperatures and a longer average icing season, concerns about the environmental effects of road salt runoff have crystallized into scientific assessment and regulatory action. In the United States, where the climate results in widely varying degrees of reliance on road salt to keep highways passable and safe, highway deicing runoff has received less focused attention, and both science and regulatory control have been less evident. That laissez-faire climate is about to change—perhaps radically.

Historically, U.S. environmental laws placed little emphasis on the regulation of any kind of storm runoff, including runoff from highway deicing operations. As those regulatory programs have matured, however, the importance of controlling storm water runoff has gained greater prominence. Today, an entire wing of the federal Clean Water Act's[1] National Pollutant Discharge Elimination System (NPDES) is devoted to managing pollutants borne by storm water.[2]

As the storm water permitting program continues to evolve, it promises to expand federal involvement in and control over roadway deicing discharges. Among other things, it will bring discharges from an increasing number of road-miles into the permitting system; it will establish and evaluate a database describing the impact of those discharges' potential to affect the quality of surface waters adversely; and it will provide the basis for further, more stringent regulation.

Perhaps equally important is what entities other than the U.S. Environmental Protection Agency (EPA) and the states may do with the information developed under this unfolding system. Private environmental groups will, for the first time, have access to information that characterizes the quality and impact of deicing runoff. They also will have the procedural tools, through the permitting process, to become involved in the development of storm water permits for new and existing highways drainage systems. That level of day-to-day citizen involvement in highway operating practices will present a multitude of new challenges for state highway managers.

From sources both public and private, then, it is reasonable to expect a major increase in the intensity with which highway deicing runoff is regulated in the United States. Whether it is in the need for permits, the need for the first time to assess the applicability of stringent numeric water quality–based discharge limitations, or the challenge of citizen participation in the regulatory and compliance enforcement arenas, state highway managers will see their environmental challenges begin multiply over the next 5 years.

This article provides a survey of the development of the regulatory systems that are beginning to control highway deicing discharge and the consequences of that growing control. It also discusses actions that the industry might consider to manage and direct the oncoming surge of regulatory and enforcement activity.

SOURCES AND CHARACTERISTICS OF DEICING RUNOFF

Runoff from highway deicing results from the co-mingling of deicing materials used with pavement runoff of storm water and snowmelt. A number of substances are used for treating and deicing roadway surfaces, including calcium magnesium acetate (CMA), potassium acetate (KAc), sodium chloride (NaCl), calcium chloride ($CaCl_2$), and magnesium chloride ($MgCl_2$). CMA and KAc are understood commonly to be the deicing chemicals with the smallest environmental footprints. The salts, NaCl, $CaCl_2$, and $MgCl_2$, leave residues of chloride ions that can be swept up in storm water runoff or snowmelt and carried into adjacent drainage ditches to be discharged into downstream surface waters. It is these deicing compounds that are the focus of the most intense environmental scrutiny.

Chloride concentrations from roadway deicing can be substantial. Although natural background concentrations in water may be only a few parts per million, roadway runoff during deicing operations has been measured as high as 18,000 mg/l. Resulting chloride concentrations in the environment also can be significant. Values measured in lakes can vary from 15 to 300 mg/l in rural settings to 2,000 to 5,000 mg/l in urban impoundments. Streams have been documented to carry concentrations as high as 4,300 mg/l.[3]

These values become important because of the relatively low thresholds at which chlorides can do harm to freshwater aquatic species. Acute toxicity (i.e., mortality) can result for half of the exposed *Ceriodaphnia dubia* at concentrations as low as 1,400 mg/l. Chronic toxicity is present at much lower concentrations, with about 10% of freshwater aquatic species affected adversely by concentrations at and above 240 mg/l.[4] It is against this backdrop that the regulatory control of highway deicing runoff has developed.

HISTORY OF REGULATION IN THE UNITED STATES

There have been three distinct eras of storm water regulation in the United States. The pre-1987 period, when the NPDES program was originally established by the Clean Water Act, was in effect the first. Following that came the Phase I period of the federal storm water program, which was designed to issue discharge permits to the highest priority sources of contaminated storm water. Finally, today, there is Phase II of the storm water program, which addresses all other sources, including municipal separate storm sewer systems in so-called small municipalities. As we have passed from one era into the next, the degree of scrutiny focused on storm water discharges has increased, and ever more benign discharges have been required to obtain NPDES permits.

The development of this storm water regulatory program parallels, and in large measure drives, the expansion of the NPDES program into the permitting of roadway deicing discharges. For this reason, it is worthwhile for highway managers to take a few moments to understand how and why their discharges are coming under this new form of regulatory control.

Pre-1987 Period

From its enactment in 1972 until amendments made in 1987, the federal Clean Water Act contained a single standard for determining whether a discharge required a permit. When there was an addition of pollutants to waters of the United States through a point source, then there

was a discharge required to have a permit. Permits were issued initially by EPA and increasingly by delegated state agencies under what was known as the NPDES program.

Although countless storm water discharges, including many of those from highways during deicing operations, have always been required to have permits under that basic standard, it was rare for EPA or the states to issue an NPDES permit solely for storm water before 1987. In large measure this was because the permitting agencies were focused on controlling much more severe and visible sources of pollution in the process wastewater discharges from industry and the sanitary sewage discharges of municipalities. Permitting agencies committed their resources to bringing those discharges under control first and honored the requirement to permit storm water discharges only in the breach.

Phase I Storm Water Program

Once the major industrial and municipal discharges had been brought under some degree of control, EPA in the 1980s began focusing on the extent to which contaminants could be carried into surface waters by storm water. Following a number of studies variously addressed to urban runoff and nonpoint source discharges, EPA concluded that the lion's share of the pollution not yet permitted was being conveyed to the nation's streams and rivers by storm water runoff and snowmelt. With public attention beginning to focus on this previously ignored, but clearly jurisdictional set of discharges, Congress took action.

Phase I Program

In 1987, Congress passed substantive amendments to the 1972 Clean Water Act that among other things established a dedicated storm water permitting program for the first time.[5] In the fine tradition of Washington, however, Congress jump-started storm water permitting by first outlawing it.

The 1987 amendments forbade EPA or the states to require permits for storm water *except* for storm water from certain high-priority industrial sectors. EPA was left to identify these presumably dirty industries, and it did so in a 1990 rulemaking. Permits were required of those sources of storm water by the early 1990s, and storm water pollution prevention plans were required of the newly permitted sources. The amendments and their implementing regulations also called for the permitting of storm water from municipal collection systems known as municipal separate storm sewer systems (MS4s) operated by large and medium-sized municipalities. Special pollution prevention and planning requirements were imposed on these municipal dischargers. In addition to these enumerated industrial and municipal storm water sources, any discharge of storm water that a permitting authority concluded had the potential to adversely affect water quality could be specially designated as requiring a permit, regardless of the industrial or municipal activity it might have arisen from.

Applicability to Highway Deicing Runoff

Highway runoff from deicing operations was not among the industrial activities from which storm water was required to be permitted under Phase I of the program. Moreover, state- or federally owned and operated highways generally did not fall into the definition of an MS4

operated by a large or medium-sized municipality. As a result, roadway deicing runoff was not, as a matter of course, drawn into the NPDES permitting program by the Phase I regulations.

Equally important, it was a rare case in which any storm water discharge was specially called out for permitting solely on the basis of its potential to harm water quality. On the relatively rare occasions that this occurred, the discharge usually was one that was so visible and notorious in its impact that local public opinion cried out for its control. Because deicing discharges most often occur in the dead of winter, and because chloride contamination is invisible to the naked eye, it is doubtful that more than a handful of highway deicing discharges were required to have permits under this first phase of the storm water program.

Phase II Storm Water Program

With the passage of time, the high-priority storm water discharges were brought into the permitting program. Now it was time to pursue the less important, presumably less damaging sources. Thus, Phase II of the federal storm water program was born in 1999. [6]

Phase II Program

Under Phase II, five major additions or changes to the program occurred. First, EPA determined that states would be responsible for designating additional industrial sources of storm water for permitting. As opposed to the approach taken in Phase I, second-tier industrial storm water dischargers would need to be affirmatively identified by state program offices rather than simply be identified on the basis of a nationally uniform federal regulation. Second, small municipal systems were covered by the permitting program for the first time. In general, these small MS4s needed to be in what were called urbanized areas in order to be designated automatically for permitting. Third, small MS4s not in urbanized areas could be designated specially under Phase II as requiring a permit if they satisfied criteria set out in the federal rule as applied by the states. Fourth, the threshold for permitting construction runoff was lowered from 5 acres in Phase I to 1 acre in Phase II. Finally, the new regulation provided that all storm water permittees (both under Phase I and Phase II) could be exempt from the obligation to maintain a permit if they certified (and maintained the certification) that storm water at the site did not come into contact with process materials.

The provisions governing small MS4s are of greatest interest to highway managers. On their face these regulations, which require permits of small MS4s, would seem not to apply to highway drainage ditches and the like. In fact, however, the reach of these requirements is very extensive.

The definition of MS4, for example, encompasses many structures and systems that are not the traditional, municipally owned and operated city storm water systems. An MS4 [40 C.F.R. 122.26(b)(8)] for purposes of Phase II is defined to include all separate storm sewer systems (i.e., systems that are used to convey only storm water) that are

a. Owned or operated by a state, city, town borough, county, parish, district, association, or other public body (created by or pursuant to state law). . ., including special districts under state law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or a designated and approved

management agency that discharges into waters of the United States (under section 208 of the Clean Water Act);

b. Designed or used for collecting or conveying storm water;
c. Not a combined sewer; and
d. Not part of a Publicly Owned Treatment Works (POTW) as defined at 40 C.F.R. 122.2.

Under this definition, many storm conveyances that are publicly owned by entities other than municipalities are included within the class of small MS4s that Phase II newly subjects to permitting.

Moreover, the term "urbanized area" is equally broadly defined under the new regulations. According to EPA's Phase II guidance package, an urbanized area is

> a land area comprising one or more places—central place(s)—and the adjacent densely settled surrounding area—urban fringe—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. EPA Storm Water Phase II—Final Rule, Fact Sheet 2.1 (January 2000).

In combination, these two definitions require permitting of any publicly owned separate storm sewer system that happens to fall within the boundaries of an urbanized area. The systems need not be owned by a political subdivision specific to the urbanized area, and they do not need to be under the control of or operated by any such local political subdivision. Once a system is found to satisfy the definition of a Phase II MS4, it becomes subject to permitting simply by virtue of its location within an urbanized area.[7]

Similarly broad under Phase II are the states' powers to specially designate MS4s that are not in urbanized areas. States were required to establish designation criteria by December 9, 2002 (or by December 8, 2004, if a watershed plan was in place) by which such out-of-area MS4s are to be identified. Designation criteria must include the following at a minimum:

a. Discharge to sensitive waters,
b. High population density,
c. High growth or potential for growth,
d. Significant contributor of pollutants to waters of the United States, and
e. Ineffective protection of water quality concerns by other programs.

These criteria must be applied to jurisdictions with a population of at least 10,000 with a population density of at least 1,000 people per mi^2. They may, but need not, be applied to lesser population concentrations.

Applicability to Highway Deicing Runoff

Although there may be some academic potential to debate whether these new permitting requirements apply to public highway runoff structures, EPA and many state environmental departments clearly have concluded that they do apply. For example, EPA's own guidance materials go out of their way to address the breadth of the definition of MS4 as follows:

> What constitutes an MS4 is often misinterpreted and misunderstood. The term MS4 does not solely refer to municipally owned storm sewer systems, but rather is a term of art with a much broader application that can include, . . . State departments of transportation . . . An MS4 also is not always just a system of underground pipes—it can include roads with drainage systems, gutters, and ditches.[8]

This statement makes clear EPA's intention to require permits for otherwise jurisdictional discharges into (or, at least through) highway drainage systems, including drainage resulting from roadway deicing operations.

State officials also have acknowledged that the Phase II program is broad enough to require permitting of highway deicing runoff. A number of state environmental agencies have already developed extensive guidance on the need for Phase II permits and the most effective means of managing storm water from roadways in Phase II urbanized areas. The Mississippi Department of Environmental Quality, for example, has issued a lengthy and detailed guidance manual addressing both the department's understanding of the broad scope of the new permitting requirements and the various controls and practices that might be employed to satisfy certain expected permit terms.[9] Similar excellent summaries of Phase II permitting requirements and available best management practices have been produced by the environmental agencies and departments of transportation (DOTs) of Michigan, Washington State, and California, among others. These states and others have concluded that the Phase II program will require permitting for the first time of highway deicing and other runoff that occurs in urbanized areas.

Consistent with this view, EPA offers a simplified means of determining whether a specific roadway falls within an urbanized area for purposes of the Phase II program. EPA maintains an excellent website dedicated to showing the areas that the agency understands to have been automatically designated as urbanized areas, within which small MS4s are required to obtain permit coverage.[10] This website can produce both general land use and detailed road- and street-specific maps derived from the 2000 census. These maps allow state DOTs to identify those portions of the roadways within their states that are subject to permitting under Phase II.

In sum, then, the Phase II storm water program represents the first general mandate to obtain NPDES permits for highway runoff from deicing activities. Although limited geographically in most cases to urbanized areas, Phase II will bring numerous roadway discharge points into the permitting program for the first time. Some but by no means all of the consequences of the expansion on NPDES permitting into the transportation infrastructure are discussed below.

CONSEQUENCES OF NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM EXPANSION

The expanding reach of the NPDES permitting program into the nation's transportation infrastructure has come in two phases: the transition from the pre-1987 period to the Phase I program and the transition from the Phase I program to the more encompassing Phase II program. Consequences to the transportation system of this expansion are well known with respect to the transition to Phase I and can be fairly predicted for the transition to Phase II of the

program. Beyond the immediate impact of the Phase II regulation, however, lies a third class of consequences. These are the consequences that will be felt after transportation systems' initial exposure to the permitting program produces data that characterize (perhaps for the first time in the United Sates) the environmental impacts of deicing runoff. Each of these three types of consequences to the nation's transportation infrastructure will be explored briefly.

Consequences of Phase I

The Phase I storm water program had little tangible effect on state and federal transportation systems. Because roadway deicing was not identified as one of the high-priority sources of pollutants required to be regulated in that first phase, there was no systematic imposition of NPDES permits on these discharges. Similarly, it was only municipal governments that were subject to the Phase I permitting requirements imposed on large and medium-sized cities.

The only provision of Phase I that had any real potential to reach roadway deicing discharges was the grant to environmental agencies of the power to single out individual discharges that were believed to be a threat to water quality for permitting. Because of a lack of data on the chlorides concentrations in highway deicing runoff, a lack of systematic information on the environmental impact of chlorides, and a higher priority assigned to permitting storm water from the named Phase I industries, however, few, if any, permits were required on this basis. At most, Phase I of the storm water program may have caused state DOTs to begin systematizing their environmental stewardship activities.

Consequences of Phase II

The beginning of the Phase II program marked the beginning of systematic permitting of storm water (and deicing) runoff from highway operations. With this initial exposure to the NPDES program will come a number of obligations that highway managers may be unaccustomed to.

Permit Terms

For example, Phase II storm water permits require the development and implementation of a storm water management plan designed to reduce the discharge of pollutants to the maximum extent practicable (MEP) standard of performance. The program must include certain minimum control measures, including such novel requirements as public participation and outreach, public participation in plan development, elimination of all nonstorm water contributions, development of construction site runoff controls; and development of a post-construction storm water management program. [11] In addition, the permit will require the implementation of pollution prevention measures and the evaluation and assessment of the degree to which the controls developed pursuant to the permit have resulted in measurable progress in controlling pollutants.[12] Record-keeping obligations will apply as will an obligation to report annually on the progress of the program in reducing pollutant discharges.[13]

Possibility of Numeric Discharge Limitations

With these enhanced stewardship and record-keeping requirements comes a far more substantive, if less obvious, obligation. In addition to complying with the relatively flexible MEP standard that can be satisfied by applying best management practices, Phase II permittees may also be required to comply with any more-stringent effluent limitations necessary to protect water quality.[14] Translated, this means that Phase II permittees may be required to comply with numeric, pollutant-specific effluent limits if necessary to meet water quality standards. While EPA's guidance recommends that permitting authorities not impose such additional requirements until after a systematic review of data collected under Phase II is conducted in 2012, it also suggests that more stringent limitations be imposed where there is concrete evidence that the discharge is responsible for an impairment of water quality.[15] The United States Court of Appeals for the Ninth Circuit has taken a slightly different tack and ruled that (in the Ninth Circuit[16] at least) permit writers have the discretion to impose numeric water quality–based limits on municipal storm water discharges but are not required by law to do so.[17]

Public Participation and Enforcement

Finally, permitting of highway runoff under Phase II will provide citizens with procedural opportunities to challenge both the permitting and the compliance records of highway discharge systems. Under the Clean Water Act, any interested party may become involved in permitting proceedings. Although EPA and many states had thought to avoid that involvement by permitting Phase II dischargers under so-called general permits,[18] a case decided recently by the United States Court of Appeals for the Ninth Circuit has thrown that strategy into doubt by holding that even general permits must include a measure of public participation.[19] EPA has recently issued guidance for EPA regions and states to follow in order to conform to the court's ruling,[20] but EPA acknowledges that corrective rulemaking would be required to define the form of public involvement and agency review of notices of intent (NOIs) that will be injected into the general permitting process.

Moreover, private individuals and groups are authorized to file suit under the Clean Water Act to enforce the provisions of NPDES permits. Private enforcement under the act can result in imposition of the same civil penalties as could be recovered by EPA, injunctive relief, and the assessment of an award directly to plaintiff organizations for their legal fees and expenses.

Consequences Beyond Phase II

It is apparent that Phase II of the storm water permitting program exposes many highway deicing dischargers to regulation under the NPDES program for the first time. The immediate consequences of that exposure are discussed above. In the longer term, however, there are serious potential consequences of which highway managers must be aware. While these consequences are hypothetical at this point in history, they represent an educated estimate of how the program may evolve to impose ever-tighter control over roadway deicing discharges.

Loss of Access to General Permits

In most states, general permits will be used to simplify permitting for Phase II dischargers. At present, general permits require only the filing of a simple form to obtain coverage, and need not be tailored to meet the demands of an individual discharger. In many states, however, as well as under certain EPA general permits, the availability of the general permit is limited to those discharges that do not constitute a threat to the water quality of the streams into which they flow. To the extent highway deicing runoff is demonstrated to produce an impairment in water quality (because of chlorides concentrations, for example), general permitting may become unavailable. The alternative to general permitting is to obtain an individual permit—a much longer, costlier, and more involved process.

Increased Monitoring Requirements

Where storm water from a Phase II discharger is suspected of causing a violation of water quality standards, the discharger can be subjected to substantially more burdensome monitoring requirements. These include monitoring of the discharge itself and of ambient conditions of the receiving waters, as well a requirement to perform assessments of other kinds of the quality and integrity of the receiving waters.[21] Such monitoring is both costly and intended to establish the basis for the imposition of numeric limitations on the discharge.

Numeric Effluent Limitations

Once the stage is set with sufficient data, Phase II storm water discharges may be subjected to numeric effluent limitations as needed to protect water quality.[22] Achieving compliance with water quality–based effluent limitations for any storm water discharge would constitute a new serious challenge. The intermittent nature of the discharge makes traditional treatment both inefficient and often cost-prohibitive. Meeting numeric chlorides limitations for a highway deicing discharge would be especially challenging, as the chlorides in such discharges are already in solution and could be removed only by application of one of several costly treatment technologies. (Note, however, that the applicability of numeric water quality–based effluent limitations to municipal storm water discharges remains a question of much contention with at least one federal court of appeals holding that such limitations are not mandatory.)[23]

Special Designation for Permitting Where Discharge Is into Impaired Waters

Even where a roadway storm sewer system is not located in an urbanized area, the regulations target it for permitting under Phase II if its discharge causes or contributes to an impairment of water quality in the receiving waters.[24] In many cases, storm water from highways will be discharged into one of the tens of thousands of surface waters listed by the states as impaired waters requiring special remedial attention.[25] Where the impairment identified by the state is related to the pollutants discharged from the roadway drainage system, the regulations suggest that permits will be required regardless of whether the site is within an urbanized area.[26] This element of the program may bring far more roadway deicing discharges into the system than originally anticipated by EPA.

Public Participation and Citizen Enforcement Actions

As noted above, along with NPDES permitting come public participation in the permitting process and susceptibility to private enforcement actions brought by individuals and citizens' organizations. Private environmental groups can be expected to begin to recognize that permitted road salt runoff provides them an opportunity to impose the most stringent form of Clean Water Act regulatory control—water quality–based effluent limitations—on discharges from the winter operations of highways. More important, local groups may begin to use these tools much as they use the Endangered Species Act, the National Historic Preservation Act, and the National Environmental Policy Act, to slow and even block roadway construction that they oppose for other reasons. Citizen challenges to general permits, participation in the development of individual permits, and enforcement actions for failure to obtain or comply with required permits can, thus, be expected to present new challenges to highway managers as a result of Phase II storm water permitting.

HIGHWAY INDUSTRY RESPONSE

Even if only a fraction of the consequences suggested above come to pass, highway departments and state DOTs around the country will be faced with a major new challenge. Managing highways to maximize safety in winter has always been the principal and arguably the only objective of responsible roadway maintenance operations. With the advent of NPDES permitting, those operations now also will be faced with the need to comply with largely foreign environmental controls and will be confronted by environmental and local interest groups with agendas only tangentially related to transportation. How the industry responds to and manages this challenge as it is forming is critical to the shape of highway operations in the next decade.

Some might argue that it is premature to consider industry options now because the Phase II program is still relatively new, and the challenges it presents are only beginning to crystallize. This author, for one, would disagree with such advice. Regulatory programs often take shape over the course of many years and in response to the combined input of all participating stakeholders. To wait until challenges become problems is to wait too long for an industry with such an enormous investment in its existing infrastructure. With all humility, then, the following potential courses of action are presented for consideration by those involved:

- Track EPA and state environmental agencies' efforts to refine and implement the Phase II program. This will allow the industry to recognize important opportunities and potential missteps by the agencies in time to provide the appropriate input. Remember also that state agencies' actions are important not just within their jurisdiction but also for the influence they exert on regulators in other states.
- Develop data that accurately characterize the fate and transport of chlorides in highway deicing runoff. Too little information on this subject has been developed under conditions found in the United States. Information of this kind can assist in establishing that deicing discharges are not problematic under certain circumstances and that certain management techniques are effective in controlling pollutants associated with highway deicing activities.
- Continue to aggressively explore alternative deicing technologies, application strategies, and runoff management strategies. New materials and practices often are the key to

managing evolving environmental responsibilities. Moreover, continued research will help to validate assertions that certain superficially attractive alternatives are not feasible. All the time that this research is ongoing, remember to keep the environmental regulatory agencies apprised of the seriousness of this effort and its tangible results.

- Systematically educate state environmental agencies as well as the EPA about the safety benefits derived from the use of deicing chemicals and the real efforts of state highway personnel to manage those discharges responsibly. Developing and maintaining an industry position as a credible and responsible partner with the regulatory agencies will pay dividends throughout the life of the program.
- Do not allow private environmental groups of local interest groups to dictate the ultimate form of regulation applied to highway deicing runoff. Although all stakeholders are entitled to be heard, the industry is the most knowledgeable and accountable party at the table. Do not surrender carelessly that position by assuming that the transportation industry's position is so well known that it needs no advocate.
- Work to develop Phase II permits that effectively manage highway deicing runoff without crippling the operations responsible for the maintenance of safe conditions on the nation's highways in winter.
- Monitor and, if necessary, become involved in the continuing debate over the applicability of water quality–based effluent limitations to municipal storm water discharges.

Advances in federal and state permitting of storm water discharges are reaching into the discharge of deicing runoff from highway operations. The pace at which that regulatory control is expanding will increase as more sites are permitted and as more information about the nature of deicing runoff becomes available. The industry can meet this challenge by working internally, with the Transportation Research Board, with private entities, and with the environmental agencies involved to ensure the protection of the nation's waters is achieved in a manner consistent with the safe and efficient management of winter weather.

NOTES

1. 33 U.S.C. 1251, et seq.
2. The NPDES program is established primarily under Section 402 of the Clean Water Act, with the portion of the permitting program addressing storm water situated at Section 402(p). 33 U.S.C. 1342(p).
3. Assessment Report—Road Salts. Environment Canada, 2001. Available at www.ec.gc.ca/substances/ese/eng/psap/final/roadsalts.cfm.
4. *Id*.
5. See 33 U.S.C. 1342(p).
6. 64 *Federal Regulation* 68722 (December 8, 1999).
7. It is important to note that while Phase II expands permitting for municipally owned systems only to the extent of including small municipalities, the new rule sweeps in highway systems in small, medium, and large cities—potentially any system located in an area that satisfies the definition of an urbanized area that is not already permitted. This expansion of the NPDES program is thus much broader as applied to state-owned highway storm water systems than it is when applied to municipally owned city storm water systems.

8. EPA Fact Sheet 2.1 at 1 (emphasis added).
9. Mississippi's Department of Transportation Phase II Storm Water Guidance Manual. General Permits Branch of the Office of Pollution Control, Mississippi Department of Environmental Quality, October 2002.
10. http://cfpub1.epa.gov/npdes/stormwater/urbanmaps.cfm
11. 40 C.F.R. 122.34(b).
12. 40 C.F.R.122.34(b) and (g)(1).
13. 40 C.F.R.122.34(g)(2) and (3).
14. 40 C.F.R. 122.34(e)(1).
15. 40 C.F.R. 122.34(e)(2).
16. The states within the Ninth Circuit are Alaska, Arizona, California, Hawaii, Idaho, Montana, Nevada, Oregon, and Washington.
17. *Defenders of Wildlife v. Browner*, 191F.3d 1159, 1166 (9th Cir. 1999). See also *Environmental Defense Center Inc. v. EPA*, 344F.3d 832 (9th Cir. 2003).
18. General permits under the Clean Water Act have been available historically upon the filing of a notice of intent (NOI). Once the minimal information on the NOI was submitted, the permit terms would apply automatically to the discharger without the need for a formal, and public, permitting process.
19. *Environmental Defense Center, Inc., et al. v. U.S. Environmental Protection Agency*, 344 F.3d 832 (9th Cir. 2003).
20. Memorandum from James Hanlon to EPA Water Management Division directors, *Implementing the Partial Reward of the Storm Water Phase II Regulations Regarding Notices of Intent and NPDES General Permitting for Phase II MS4s*, April 16, 2004.
21. 64 *Federal Regulation* at 68788, col. 2.
22. 64 *Federal Regulation* at 68787-68791. See also, note 15, supra.
23. See note 17, supra.
24. 64 *Federal Regulation* at 68789-68791.
25. States must list impaired waters (waters not expected to meet water quality standards after application of technology-based effluent limitations to all point sources). These listings are then the basis for evaluation under the total maximum daily load (TMDL) program, which determines the stream's tolerance for each pollutant of concern and then allocates that loading among permissible point sources, nonpoint sources of pollution, a reserve for growth, and a safety factor to account for any scientific uncertainty in the analysis. 33 U.S.C. 1313(d); 40 C.F.R. Part 130.
26. This special designation for permitting can be waived where the pollutants of concern are projected to be adequately controlled under wasteload allocations contained in a TMDL or where there is an affirmative finding that there is no adverse impact on water quality. 64 *Federal Regulation* at 68790-91. While this subject is beyond the scope of this article, it is worth noting that the exemption provided here is extremely narrow and in practice may be supported only in rare cases.