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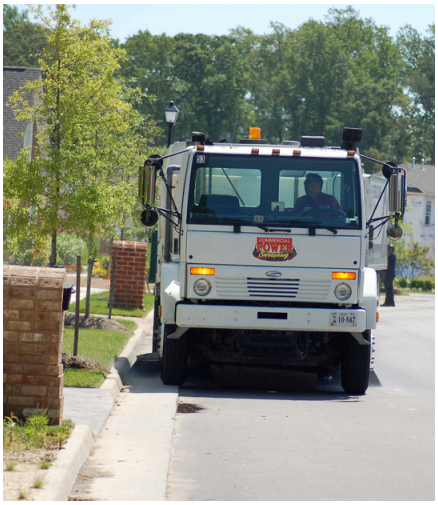
Power Sweepers Remove Stormwater Pollutants

Designers of sweeping programs need to learn about the relatively inexpensive role sweeping has in removing pollutants from the runoff stream. Street cleaning has the broadest potential for reducing stormwater pollution in the urban environment. That's because half of all the rain that falls on impervious surfaces connected to urban stormwater collection systems is falling on pavement.

In the past five years, updated sweeper designs that are much more efficient at picking up accumulated contaminants have entered the market. Yet, many jurisdictions that are now imposing stormwater runoff taxes and spending high dollars in an attempt to reduce their runoff pollution have, at the same time, cut back on their sweeping efforts. The only rational reason can be that they lack knowledge about the positive, relatively cost-effective impact a well-planned environmental sweeping program now can attain.

CWA Requirements

Wherever Clean Water Act compliance is required, sweeping program designers need to learn about the role newer sweepers can have in removing pollutants from the runoff stream.
Studies confirm the real-world pickup efficiency of today's broom sweepers is probably only between 20 and 35%. Despite this fact, mechanical broom sweepers continue to be the leading type used by municipalities in the United States.



As municipalities struggle to reduce non-point source pollutants and meet the Best Management Practices requirements of Phase I and II, newer technologies of regenerative air and vacuum sweeper models are clearly a better choice. These have both been shown to raise pickup efficiencies into the 60 to 90% and above range.

A study of structural BMPs by the California Department of Transportation indicates the cost per pound of pollutant removed (as Total Suspended Solids) runs $10 to $60, not including land costs.

In contrast, sweeping industry studies by well-known researcher, Roger Sutherland, of Oregon-based Pacific Water Resources, indicate that newer mechanical broom sweepers reduce TSS in stormwater at a cost of $5 to $10 per pound. Regenerative air and vacuum-assisted sweepers offer an even higher level of efficiency, removing TSS at a cost of $2 to $5 per pound.

Sutherland's company has also developed modeling software that uses historic rainfall data, which in most locales spans over 50 years, to accurately predict sweeping efficiencies for watersheds. This has aided a number of municipalities in determining relative pickup volume at given sweeping frequency intervals without having to conduct costly studies of their own.

Sutherland's Livonia, Michigan, study found the optimal frequency (during the nine months when sweeping can occur in snowbelt areas) for residential areas was about once every three weeks. Every two weeks is typically reasonable for higher-density residential and general commercial. In major traffic areas, like arterials, optimal sweeping was determined to be once per week. Optimal frequency depends, however, upon accumulation of the contaminated material typically called street dirt.

Monitoring accumulation can be of great value, as well as determining the chemical component of what is collecting on given roadways. Not only can a correctly designed sweeping program remove a significant amount of targeted chemicals; correct sweeping also has a positive impact on the gross pollutants that contribute sediment, silt, and organic debris to streams and other waterways.

Another efficiency sweeping offers is that it prolongs the operational efficiency of structural-based devices, as well as reduces the ongoing maintenance they require. Although by no means a silver bullet, widespread agreement is developing that sweeping should begin taking a more central role in stormwater runoff plans.

Charging Off Costs

Well-informed NPDES managers, aware of how cost-effective sweeping is when compared to infrastructure-based solutions, are now making an increase in air sweeping frequency a foundation of their stormwater runoff plans. The problem they're faced with is that, even in the face of the EPA mandates, their budgets are still largely based on the frequency of sweeping needed to provide a pleasing aesthetic value and, to a lesser extent, keep storm drains flowing.

Because of sweeping's now-demonstrated lower-cost-per-pound of pollutant removal, jurisdictions under Phase I or II mandates clearly should develop an optimal sweeping frequency designed to minimize the overall cost of meeting their non-point pollutant reduction goals.

Only by comparing sweeping to end-of-the-pipe solutions, like sedimentation tanks and filters, grassy swales, detention ponds, and all the other infrastructure-based solutions now emerging, can the most cost-effective mix of sweeping and other technologies be attained.

Once an optimal, least overall cost for achieving TMDL limits (or attainment of other goals) has been established for a given watershed, the next question is figuring out how to pay for that mixture of solutions. Some cities are now including the sweeping department within the overall budget for stormwater runoff reduction. That way, if a stormwater utility fee is being collected through NPDES mandates, the cost of sweepers and sweeping can be funded as a component.