# What To Do With Street Sweepings and Vac Trucks

With the Industrial Revolution unfolding in the late 18th century, opportunities for employment and a chance to improve living conditions drew increasing concentrations of people to relocate to the cities where these new manufacturing facilities were located. The origins of this new chapter in world history is traced to Great Britain where their burgeoning economic development, related to their primacy in the world at that time, started around 1760 running through 1840.

**Growing Pains**

Coinciding to this rising tide of opportunity, large groups of people located in the cities where they gathered in increasing concentrations, putting stresses on living conditions there. It was during this time period when the United States, following the struggle for independence, began to build alliances and cooperation with Great Britain. Benjamin Franklin was sent to London to represent US interests. Being a practical man, he was a keen observer of the human condition.

One of the outcomes of high concentrations of people living together is the accumulation of wastes and debris. As the story goes, while in London, Benjamin Franklin observed an older impoverished woman sweeping the street in front of homes there in hopes of being paid for her work. Noticing that the accumulation of dust and dirt in the streets were not being attended to as a general practice, he hired her to sweep the entire street. This supposedly was the seed of sanitation that was firmly planted in his mind when he returned to the United States.

Among the many influences Benjamin Franklin injected into the early development of the United States, organizing cities to handle the effects of the rising second wave of the Industrial Revolution unfolding in the new nation was one of them. Through writing and talking with key influencers, based on observations in London and in his own streets in Philadelphia, the stage was set towards building a systematic approach to setting up and maintaining a clean and livable environment in these bustling new industrialized cities.

**Building a Better Mouse Trap**

The primary driver for organized cleaning of the paved streets was to minimize the build-up of dirt that impeded movement when rains made a muddy mess of the streets. Benjamin Franklin advocated for the regular sweeping of the streets and placing the sweepings

near the drain grates letting the rain carry away the collected dirt.

Because of the sheer size of the cities involved, it rapidly became impractical to have the work done manually. The invention of the first mechanical street sweeper was attributed to Joseph Whitmore in Manchester, England in 1843. In the United States the first patented device for street cleaning was granted to C.S. Bishop in 1849. With the introduction of the automobile on the continent at the turn of the 20th century, it shortly followed with the development of the motor driven sweeper by John Murphy in 1911. It was the Elgin Sweeper Company that is attributed with the first commercialized design of the forerunner to modern street sweepers.

**Changing Mission**

In the early days, the focus of street sweeping was removing trash to minimize vector attraction and disease, as well as keeping the streets clean to minimize air quality issues and prevent dirt and mud buildup. Trash and debris were collected by the sweepers and sent to landfill. The finer dirt particles were gathered near storm drains and conveyed away by storm events.

We explored the evolution of the modern Wastewater Resource Recovery Facilities in earlier articles such as Resource Hero: The Treatment Plant Operator. Awareness of the effect on the environment caused by centralized activities of waste collection and treatment (WWTP) birthed the Clean Water Act in 1972 Subsequent regulations were also applied to cleaning of the streets. The method of conveying away sand and dirt collected by the sweeping activity through stormwater flush was determined to be an avenue contributing to pollutants entering the soils and waterways. Increased focus on Storm Water Management drove the NPDES Phase II to consider and implement minimum control measures or Best Management Practices (BMPs) for stormwater pollution control.

**Where Do We Put the Stuff?**

Initially the sedimentation collected along with the trash and debris where sent to landfill.

As more vehicles appeared on the roadways, higher concentrations of hydrocarbon deposits and metals contamination became an increasing concern.

Sedimentation traps designed to capture the roadway sand and grit were concentrators of the material and also a concern for more concentrated forms of potential pollutants. Tighter regulations on what could be sent to landfill and limited availability of space became a critical factor influencing how this material would be disposed.

**Transforming Waste Into Resource**

Similar to WWTP conversions to WRRF in wastewater treatment, what was formerly considered useless waste was reexamined in the collected materials from Street Sweepers and Vac-Trucks. In particular the development of the best management practices (BMPs) by the majority of Cities and States started to reveal various solutions.

Because street sweeping can remove sedimentation containing contaminants from the pavement before they enter the storm sewer system, it is an effective non-structural BMP for reducing the impact of contaminated runoff on surface water. The EPA recommends street sweeping as a best-practice that cities should engage in to mitigate contaminated stormwater.

*Acceptance of street sweepings*

The net result is an increase in the material collected. The expense associated with increased collection, transportation and disposal became a serious obstacle. A means to address and mitigate for this additional burden through the BMP process revealed two avenues. One was reduction of volume of the material and another was to extract usable resource from the waste material.

Some of the earliest actions were to simply allow the water to drain out from the stockpiled sweepings and catch basin slurry. This method proved to be labor intensive and involved holding areas that were not always available.

In many of the BMPs developed, it was determined that resource could indeed be extracted. Some possible uses considered are:

- Winter Traction Anti-Skid Material (Road sand for ice)
- Fill Material (Roadbed, slope flattening, berms, pot hole fill)
- Compost Additive
- Substitute aggregate in concrete or asphalt

**Processing Centers Emerging**

As the saving in volume reduction manifests and increased recycle material are made available, we are seeing centralized processing centers designed to offload sweepers and vac-trucks in similar fashion to what is done with septage receiving facilities. These systems are designed to wash, separate, and classify the material in an automated process.

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Considering costs to handle and transport the sweepings/catch basin slurry, there are two key factors that help drive the feasibility of a centralized facility:

- Cities collect street sweeping and vactor truck cleanouts proactively to minimize waterway pollutants in stormwater.
- Raw materials are collected for asphalt and concrete, which are needed by the road surface and construction material producers.

In certain cases, these facilities can be located close to end users of the material such a concrete or asphalt manufacturing plants. With the ability to isolate, classify, and extract gravel, sand, and organics there are facilities in Germany doing co-digestion for energy generation that are in close proximity to take the extracted organics to contribute to gas production in the digestors.

One wonders what Benjamin Franklin would think…

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