

STREET SWEEPING POLLUTANTS

Sweepers Pty Ltd - Issues important to sweeping frequency and machine type!

Having had 15 years' experience selling, servicing and training operators in the use of sweeping equipment, Mark Scull, Managing Director of "Wombat Sweepers" an operating division of Sweepers Pty Ltd has developed a keen insight into the practicalities of the various types of equipment and the results obtainable.

In our contract division one of the key reasons for sweeping which has increased since the awareness of pollution run off, is for the removal and control of fine dust. In previous years contractors and warehouse owners often used a fire hose to wash debris down the drain, an obnoxious practice that is still practiced by the irresponsible few! Councils and environmental departments have become increasingly aware of the dangers of pollutant runoff from Industry and streets into our pristine water ways and have policed this in a responsible way bringing better work practices for Industry.

The problematic PM10 fines as the California study below refers to them represent those very fine particles that are easily airborne and can be water soluble. During my time selling Road sweepers to councils in Qld and NSW some council's have done monitoring of water runoff and found increased sweeping frequency particularly reduced pollution runoff. Also some councils have carried out performance extracting comparisons of different sweepers to examine how much of the fine particles are not collected after a sweeper passes a certain sample test area.

With Industrial sweeping we have to use sweepers with expensive fabric filters to ensure we do not create unnecessary dust hazards on building sites. Only with the best filtration systems can we sweep very fine thick building dust without causing a problem on a construction site. This is an important requirement to avoid shut downs and also for the health of our operators and all workers on site.

Municipal sweeping:

The sweeping of suburban areas covers a range of areas such as - The CBD precincts, small shopping areas and car parks, suburban streets and maybe some industrial areas. In most streets particularly those with reasonable traffic flow the unseen pollutant is the tyre and brake dust that is continually present. If you sit with a white sheet of paper beside a busy road and just watch the amount of dust you will get in a short time that comes from passing road traffic you will be surprised. It is vital that sweeping of council roadways is not just focussed on the kerb and channel. Yes this is the obvious area that the eye will look for the accumulation of rubbish, leaf litter and dirt. A build-up of rubbish maybe due to a heavy leaf fall, disposed litter or recent construction. Sometimes too long an interval between cleaning

will give a considerable build-up of fine particles if no rain has washed them into our water ways. It never ceased to amaze me when training and demonstrating sweepers in various shires and councils have a small layer of dirt in the kerb could translate into a tonne or two of weight in less than one hour sweeping.

With road sweepers as the Californian article will state we basically have a choice in Australia of two types of sweepers, Regenerative air sweepers and Suction broom sweepers. Whilst there are other effective sweepers used in the USA they are not sold in Australia and so it is not viable to consider them.

To explain how a sweeper works let's consider the basic function of what they do.

1. All sweepers are Vacuums sweepers acting like a vacuum at home, which have a suction pipe and a filter.
2. The reason for non-performance is often the same as a home vacuum, a blocked suction pipe or a blocked filter.

Now let us consider the difference between a traditional broom sweeper (with a belly broom suspended and open to the air) that means a broom under the truck and that of a regenerative air sweeper which has a suction and blast pod or box under the truck with no spinning broom.

If we look at the kerb side of the truck both sweepers will have a gutter broom which is designed to scavenge the litter from the kerb and bring it under the suction head or pipe where it is lifted to the hopper.

On a broom sweeper, the broom under the truck centre if running which is optional, will push debris towards the left side into the suction head path.

The regenerative air sweeper has a suction head built into a rectangular box that seals on the ground under the truck. The regenerated or recirculated air rushes across and from a blast orifice at the rear mixing with rushing air from its front to collect litter from across the trucks centre and that gathered by the gutter broom. This function works all the time and has little cost as the air is doing the broom work exactly as mechanics use air blowers to move dust and we use blowers to remove leaf litter.

What produces the regenerated free air?

In the suction broom trucks, 100% of the vacuumed air drawn through the suction tube into the debris hopper is filtered through a coarse screen then exits via the top or rear of the machine.

The regenerative air sweepers diverts 50-60% of this air back down to the suction head or box and is used as an air broom.

How is dust controlled?

Both systems rely on water as a dust suppressant which is imperative, without water, dust will be blasted into the atmosphere.

Under the broom truck if the dust is fine water is needed to suppress the disturbed dust and some will be repainted back onto the road surface to remain where it was once dry again.

The regenerative air does not need water under the hood as it is fully contained with negative pressure and all goes up the suction pipe into the debris hopper.

The air broom from my experience has a far better cleaning ability of fine particles from the road surface. The running cost is less and the road swept constantly 2.6 meters from the kerb lessens the load of material being dumped into our storm water.

With the option to not use the centre broom on a broom suction sweeper one has to ask is the road surface being swept or just the kerb.

Whilst selling sweepers in North Qld, I installed two regenerative air sweepers for cleaning heavy metal dust around the ship loading ports. Dust such as copper, zinc and lead. The EPA would often close the sweeping operation immediately when a non-regenerative machine was sent to do the task as the amount of measured air pollution was unacceptable.

For the same reason this type of sweeper was installed into several RIO TINTO sites with sensitive dust issues on large processing sites.

In Summary:

All sweepers will sweep and the quality of the machines in the market are excellent, and in some cases I would recommend a broom machine over a regenerative machine. I would also recommend in many cases a rear elevator machine with a fabric filter in many operations but to this day these machines have not been sold in Australia and to bring one machine in would be a logistical problem for service back up.

With leafy shires such as the Redlands, I recommend the regenerative system as this is a good practice for normal litter removal and also helps in the removal of PM10 fines more effectively that would otherwise enter our water ways. As our population on the bay side increases, it is incumbent on us all to do our utmost to preserve the condition of our beautiful water ways for our children and us. Cleaning the roads at regular cycles is a key part of this process and more cost effective than building enormous sediment traps.

Ramsey-Washington Metro Watershed District
2346 Helen Street
North St. Paul, Minnesota 55109
651.704.2089
<http://www.rwmwd.org>
June 2005

Ramsey-Washington Metro Watershed
District - June 2005
Schilling Consultant Services
46 Bertha Court
Mahtomedi, MN 55115
Phone: (651) 773-3598
E-mail: jgschilling@comcast.net

Schilling, J.G. 2005. Street Sweeping – Report No. 1, State of the Practice. Prepared for Ramsey-Washington Metro Watershed District (<http://www.rwmwd.org>). North St. Paul, Minnesota. June 2005.

Street sweeping equipment has evolved significantly in the last 15 years and will continue to do so as two aspects relating to the practice move forward. First, Phase 1 and 2 storm water permits and associated Storm Water Pollution Prevention Plans (SWPPP) will likely become more comprehensive as regulatory agencies require further controls on non-point source pollution. With Total Maximum Daily Load (TMDL) studies being completed over the next ten years, these same permits will contain more stringent requirements. Street sweeping equipment and the associated practice will be looked at more favourably as a cost-effective non-point source control measure.

Second, additional research studies may shed information on street sweeping as a practice that improves water quality. Subsequently, this may result in equipment and operational upgrading that may produce more fuel-efficient sweepers, greater use of waterless sweepers or implementing new technology (e.g. captive hydrology). Regulatory requirements and research findings may drive street sweeper manufacturers to respond to an increasing market for newer technologies.

Mechanical brush sweepers are effective at removing coarse materials and gross pollutants. They are less effective removing fine materials often associated with various pollutants and may expose such materials to wash-off. High-efficiency street sweepers and associated operations may increase the percent of total solids removal from 30 – 70+%. Street sweeping frequencies approximately monthly to biweekly and varied depending upon land

use and transportation features have been shown as being most effective for pollutant removal.

As a pollution control practice, street sweeping is cost-effective when compared to structural best management practices such as detention ponds, and settling or filtering devices and prolongs their operational efficiency and required maintenance. As a pollution prevention or source control measure when integrated with other structural and non-structural BMPs, high-efficiency street sweeping improves water quality and reduces ongoing habitat deterioration.

Regenerative-air sweeper:

While the California air quality situation requiring PM10 controls and sweeper certification resulted in industry equipment changes, mechanical sweepers were slowly being replaced or augmented by regenerative-air technology. Regenerative-air technology attempts to increase the removal of both coarse and fine materials on typical pavement with cracks or uneven sections where sediment would become lodged. To capture sediments, these sweepers are equipped with gutter brooms and a pick-up head. The gutter brooms direct materials towards the pick-up head. The regenerative-air process blows air into one end of the horizontal pick-up head and onto the pavement dislodging materials entrained within cracks and uneven pavement. The other end of the pick-up head has a suction hose that immediately vacuums out the materials within the pick-up head into a hopper.

Advantages: Ability to pick-up most gross pollutants (trash, road debris, vegetation) and especially coarse as well as some fine grained materials entrained within cracks and uneven pavement sections that mechanical brooms cannot reach. Significantly greater pick-up of soluble pollutants and fine road surface materials than mechanical sweepers and some units can operate in a dry mode (Minton, G.H. et al., 1998).