
CASE STUDY: North Carolina National Guard Combined Support Maintenance Shop (CSMS)

Location:	Raleigh, NC (Wake County)
Industry:	National Guard - Automotive Maintenance (SIC: 9711)
Pollution Prevention Application:	Solvent Substitution, Recycling, Reusable and Biodegradable Cleaning Supplies
Annual Savings:	\$5500
Payback Period:	Not Applicable
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Background

The North Carolina National Guard's Combined Support Maintenance Shop (CSMS) in Raleigh services military vehicles up to 20 tons in weight from 100 armories throughout NC. These vehicles include CVCVs, HUMMWVs, tankers, forklifts and earth-moving equipment. The shop is typically staffed by a crew of 34 mechanics. In response to increasing costs for hazardous waste management and a Federal Executive order mandating a 50% reduction in pollutants by 1997 (1994 baseline), the facility has implemented a range of sound pollution prevention and waste management practices over the past 3 years. These practices have reduced the quantities of waste generated by the facility and also resulted in monetary savings.

Waste Reduction Activities

Aqueous Jet Washer

In 1993 the facility purchased an aqueous jet washer. This large 2,000-pound unit cleans a range of vehicle components up to an entire engine block in size. The parts washer uses 140 gallons of recirculated biodegradable soap solution, typically over a 40 minute cycle time. Small quantities of defoamer and rust inhibitor must also be added to the solution periodically. When not in use, the soap solution is held in a reservoir that has an oil skimmer attachment to remove oil and grease. After conducting initial testing for metals, the facility found the spent soap solution could be dumped to the sewer system every 2-3 weeks.

The jet washer costs \$10,000, and batches of solution cost \$45 to prepare and must be replaced every three weeks. This results in an annual raw materials cost of approximately \$800. However, since the installation of the aqueous jet washer, the facility has been able to eliminate 2 parts washers and 1 carburetor cleaner. The annual operating costs of the parts washers are approximately \$1400, so \$600 are saved annually in operating costs alone. Additional benefits include reduced labor invested in hazardous waste management and reduced liability since hazardous waste is not generated on-site or shipped off-site. The washer has proven so effective that the facility plans to purchase another unit in the near future.

Biodegradable Solvent

The facility recently began a trial period with a Safety-Kleen aqueous solution parts washer. This new unit uses a baking soda type cleaner in place of traditional

mineral spirits based cleaners. The vendor claims the spent solution may not have to be handled as a hazardous waste depending on the nature of the parts being cleaned. If this proves to be the case, the facility will begin implementing the new machines at the end of the trial period, and plan to replace the majority of the mineral based solvent cleaners with biodegradable ones.

Oil Testing

When a vehicle is serviced, the oil is sampled and tested for metals content at a military laboratory to determine if the oil needs to be replaced. If the metals content is above a threshold level, the oil is removed for recycling the next time the vehicle comes to the shop. Replacing oil only when it is contaminated rather than at certain mileage intervals has significantly reduced the frequency of oil changes and also reduced virgin oil consumption and spent oil management. The facility estimates this practice has reduced oil consumption by 15-20%. (Several laboratories in NC provide this testing service. The charge is around \$5, which is generally cheaper than the cost of the replacement oil and labor required).

Recycling

Used oil and antifreeze is collected and recycled. Additionally, the facility purchased an oil filter crusher. After the filters are crushed, the oil is drained and recycled.

TABLE 1: RECYCLING AT CSMS

Material	\$ Cost/unit	Quantity recycled	Cost Savings, \$
Oil	2.00/gal	1275 gallons	2550
Antifreeze	0.46/gal	575 gallons	265
Crushed oil filters	127/drum	1 drum	381

Biodegradable Floor Cleaner

The facility cleans its floor every 2 weeks with a biodegradable floor cleaner. This cleaner can be rinsed directly to the drain and sewage system.

Laundering of Shop Rags

The facility sends 38,400 shop rags for laundering and reuse each year at a cost of \$720. This reduces virgin rag consumption and the quantity of solid waste sent off-site to a landfill each year.

Annual Savings

The aqueous jet washer saves \$600 per year in operating costs. The oil recycling saves approximately \$500 per year. Total cost savings from all recycling at the facility are approximately \$3200 per year. At an estimated cost of \$0.05 per rag, washable shop rags save approximately \$1200 per year. The total cost savings for all waste reduction projects is approximately \$5500.