Stormwater Best Management Practice

Municipal Vehicle and Equipment Maintenance

Minimum Measure: Pollution Prevention/Good Housekeeping for Municipal Operations
Subcategory: Municipal Activities

Description

Municipal vehicle and equipment maintenance activities can generate a number of hazardous materials and wastes. If improperly managed, these materials can cause pollutant contributions to stormwater discharges and significant impacts to downstream water quality. This means that vehicle and equipment maintenance facilities might also be considered stormwater hot spots: areas that generate significant loads of hydrocarbons, trace metals and other pollutants that can affect the quality of stormwater discharges.

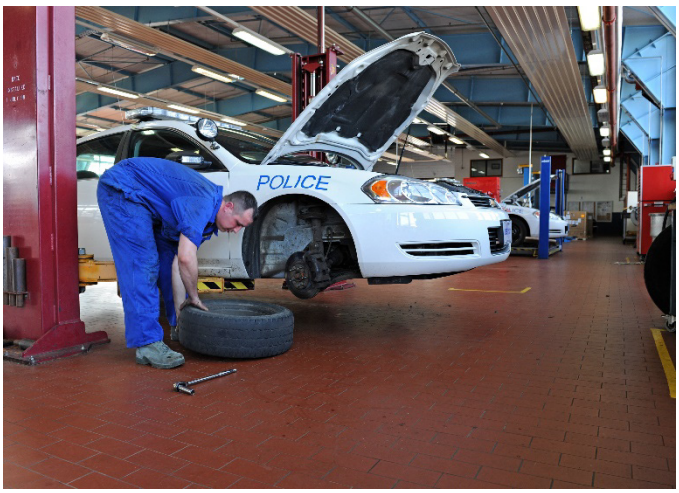
Vehicle maintenance facilities can generate wastes such as:

- Solvents (e.g., degreasers, paint thinners)
- Antifreeze
- Brake fluid and brake pad dust
- Battery acid
- Motor oil
- Fuel (gasoline, diesel, kerosene)
- Lubricating grease

Municipal staff who properly store automotive fluids, do maintenance in protected areas and thoroughly clean up spills can help reduce the effects of automotive maintenance practices on stormwater discharges and, consequently, local water resources.

Applicability

Municipal activities require the use of various vehicles and equipment across many departments, such as public works operation and maintenance vehicles, police cars, fire trucks, and school and public transit buses. Because of this, a single community may have many maintenance facilities. Maintaining this equipment requires changing various parts and fluids, activities that can contribute to stormwater pollution through accidental spills or negligent practices. For example, in the United States about 350 million gallons of used engine oil each year is improperly disposed (DOE, 2006). Although governments often regulate stormwater discharges from most municipal facilities because of the "hot spot" nature of these activities, it is important to routinely implement best practices such as those outlined below.



A police car being maintained inside a municipal maintenance facility.

Photo Credit: U.S. Air Force photo/Senior Airman Nathanael Callon

Siting and Design Considerations

The most effective way to minimize wastes generated by automotive maintenance activities is to prevent that waste's production in the first place.

For wastes a facility cannot avoid producing, "dry shop" techniques are a helpful way to reduce the potential for stormwater contamination from liquid discharges. Dry shop techniques limit comingling of waste materials with stormwater or wash water, which can wash pollutants into storm drains. Dry shop techniques include doing all maintenance activities inside or under cover and cleaning up spills immediately without water whenever possible. In addition, for activities that use solvents and generate a lot of waste liquids, a facility can hire a solvent service to supply parts and cleaning materials and to collect spent solvent.

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In addition to dry shop practices, various structural and non-structural practices can further reduce pollutant discharges from vehicle maintenance facilities. The following list is not comprehensive; all facilities are different and should develop their own, specific targeted practices. Still, the following practices can serve as a starting point and as examples for a custom pollution prevention program.

For more information on related good housekeeping practices, see the following fact sheets:

- Materials Management
- Municipal Facilities Management
- Municipal Vehicle and Equipment Washing
- Municipal Employee Training and Education
- Municipal Vehicle Fueling
- Spill Response and Prevention
- Hazardous Materials Storage

Structural Practices Examples

- Seal all floor drains.
- Label drains, wash sinks and other entry points to indicate outfall location (e.g., internal collection container, sanitary sewer, storm sewer).
- Install berms or other measures to contain spills and prevent surface drainage from entering storm drains.
- Locate work areas on impermeable surfaces (i.e., not on grass or gravel).
- If indoor storage space is limited, build covered hazardous material storage areas that include raised platforms for items like waste drums or corrodible containers.

Waste Reduction Examples

- Keep the number of solvents used to a minimum. It makes recycling easier and reduces hazardous waste management costs.
- Perform all liquid cleaning at a centralized station to ensure that solvents and residues stay in one area.
- Locate drip pans and draining boards to direct solvents back into a solvent sink or holding tank for reuse.
- Reuse or recycle products on-site or through coordination with local recycling companies.

Use of Safer Alternatives Examples

- Use non-hazardous cleaners instead of organic solvent degreasers when possible. Non-hazardous cleaners generally include detergent-based or water-based solutions.
- Replace chlorinated organic solvents like trichloroethylene (TCE) with non-chlorinated ones like kerosene or mineral spirits.
- Purchase recycled products, such as engines, oil, transmission fluid, antifreeze and hydraulic fluid, to help support the recycled products market.
- Steam clean or pressure wash parts (ensuring to collect and properly dispose of rinse water) instead of using solvents.

Spill Containment and Cleanup Examples

- Update facility schematics to accurately reflect all plumbing and drainage connections.
- Use as little water as possible to clean spills, leaks and drips.
- Follow the spill prevention plan.
- Keep a supply of spill response materials appropriate for the activities performed on-site.
- In the event of a spill, cover drains with drain mats.

Good Housekeeping Examples

- Store hazardous materials indoors or in covered areas.
- Conduct employee training and public outreach to reinforce proper disposal practices.
- Clearly label storage and disposal containers to prevent cross-contamination and accidental misuse.
- Closely monitor parked vehicles for leaks and place drip pans under any leaks to collect the fluids for proper disposal or recycling.
- Immediately remove fluids from wrecked vehicles to prevent leakage while in storage.
- Promptly transfer used fluids to recycling drums or hazardous waste containers.
- Dispose of liquid waste properly and regularly.
- Store cracked batteries in leakproof secondary containers.

Even with good housekeeping practices, local pretreatment requirements from the local sewer authority

or specific containment requirements for wellheads or water supply protection areas may direct facilities that discharge to sanitary sewer systems to treat their wastewater before releasing it. This is due to the sensitivity of most biological wastewater treatment processes to hazardous substances. Facilities often use structural pretreatment devices for this treatment. For example, they can use oil/water separators, settling chambers or filtration devices to remove solids, oil and grease. All drainage systems and wastewater treatment plants are different, however, and it is important for all maintenance facilities to follow all state and local requirements.

Limitations

There are a number of limitations to implementing best practices at vehicle and equipment maintenance facilities. Space and time constraints may rule out indoor work. Containing spills from vehicles brought on-site after working hours may be impossible. Installing structural treatment devices for pretreatment of wastewater discharges can be expensive. Recycled materials and fluids may cost more than non-recycled materials, and municipalities may face a lack of recycled materials providers. They may also encounter an absence of businesses that provide hazardous waste removal, solvent recycling or other services.

Maintenance Considerations

Routine maintenance is key to keeping best practices effective. Regular training of employees on current best practices should also be part of that maintenance program.

Staff should regularly inspect outdoor areas, especially parking areas for vehicles awaiting repair, for drips, spills and improperly stored materials (e.g., unlabeled containers, auto parts that might contain grease or fluids).

The proper functioning of structural practices is an important maintenance consideration for facilities that pretreat their wastewater before discharge. Systems like oil/water separators need routine cleanout of oil, grease and any other accumulated deposits—usually at least once a month, and more often during periods of heavy rainfall so that pollutants do not bypass the system altogether. For any structural treatment system, it is important to follow the manufacturer's recommended maintenance schedule.

Effectiveness

It's difficult to quantify the effectiveness of vehicle and equipment maintenance best management practices at removing pollutants. However, some studies have evaluated individual practices with some success. In a review of a study of two auto recycler facilities, Robbins (2000) notes that structural and non-structural practices were measurably effective at reducing oil and grease concentrations as well as biological toxicity of stormwater discharge. The first site, evaluated over 10 years, incrementally implemented practices including draining vehicle fluids before stripping, sending stormwater through a multi-chambered oil-water separator, and building a roof over the dismantling area. The cumulative effect of all practices was a reduction in acute toxicity from 100 percent to 14 percent and a steady decline in discharged oil and grease concentrations. At another facility, an oil-water separator and an aeration-flocculation treatment system (more advanced and effective than a passive oil/water separator) together lowered lead and oil and grease concentrations by nearly 90 percent.

Municipalities may develop their own measurable performance standards to assess relative progress against baseline conditions. Keeping track of spill frequencies, documenting the volume of fluids recycled, and monitoring the use of chemical cleaning supplies are all ways to increase the efficiency of existing operations and motivate employees to implement best practices.

Cost Considerations[1]

Purchase of new equipment or modification of existing facilities can be expensive. An oil/water separator can cost anywhere from several thousand dollars for a simple, single tank, above-ground version to nearly $200,000 for a professionally installed underground unit (RSMeans, 2020). Oil/water separators also need regular cleaning and maintenance, though other practices that reduce the total pollutant load to the system can lessen maintenance intervals.

Replacement or modification of existing equipment may be a more affordable option. For instance, installation of water-based cleaning equipment to replace solvent cleaning stations can cost between $700 and $17,000 depending on equipment type (EBMUD, 2004).

Many educational and non-structural measures cost little or nothing. Installing signage, improving labeling systems, adjusting storage and work areas, incorporating routine inspections and improving recordkeeping practices can be quick and relatively inexpensive practices.

Good housekeeping practices during vehicle and equipment maintenance can have additional cost benefits beyond waterway protection. For example, proper management of hazardous materials reduces employee exposure and potential work disruptions due to illness or injury. Pollution prevention efforts, meanwhile, reduce an organization's risk of enforcement action, private legal claims and damage to reputation.

[1] Prices updated to reflect inflation and reported in 2020 dollars. Inflation data obtained from the Bureau of Labor Statistics CPI Inflation Calculator website: https://data.bls.gov/cgi-bin/cpicalc.pl

Additional Information

Additional information on related practices and the Phase II MS4 program can be found at EPA's National Menu of Best Management Practices (BMPs) for Stormwater website

References

East Bay Municipal Utility District (EBMUD). (2004). *Pollution prevention practices for automotive facilities.*

Robbins, G. (2000). Pollution prevention for auto recyclers. *Watershed Protection Techniques*, *1*(4).

RSMeans. (2020). Oil/water separators, coalescing [Online data file]. RSMeans data from Gordian.

Disclaimer

This fact sheet is intended to be used for informational purposes only. These examples and references are not intended to be comprehensive and do not preclude the use of other technically sound practices. State or local requirements may apply.