
40 CONTRACTOR ACTIVITY CONTROL MEASURES

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40.1 INTRODUCTION

A range of activities on construction sites has the potential to pollute stormwater. These activities include:

- construction practices
- materials management
- waste management
- vehicle and equipment management

The actions and measures that can be implemented to avoid polluting stormwater runoff during construction are outlined below. These actions and measures are drawn from Camp Dresser & McKee et al. (1993) and summarised in Table 40.1.

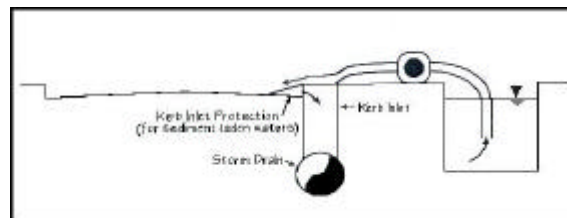
The following information is provided on each BMP:

- a description of the BMP
 - actions and measures
- and, where applicable,
- maintenance requirements
 - limitations

The chapter is intended to be a general overview/checklist for use by local authorities. It should be implemented with regulations at a Local Authority level (some Authorities already do this).

40.2 CONSTRUCTION PRACTICES

40.2.1 De-watering Operations



(a) Description

Prevent or reduce the discharge of pollutants to stormwater from dewatering operations by using sediment controls and by testing groundwater for pollution.

Table 40.1 Contractor Activities and BMP Objectives

BMP CATEGORY	BMP OBJECTIVES						
	Practice Good House-keeping	Contain Waste	Minimise Disturbed Area	Stabilise Disturbed Area	Protect Slopes and Channels	Control Site Perimeter	Control Internal Erosion
<i>Construction Practices</i>							
Dewatering Operations							
Paving Operations							
Structure Construction and Painting							
<i>Material Management</i>							
Material Delivery and Storage							
Material Use							
Spill Prevention and Control							
<i>Waste Management</i>							
Solid Waste Management							
Hazardous Waste Management							
Contaminated Soil Management							
Concrete Waste Management							
Sanitary /Septic Waste Management							
<i>Vehicle and Equipment Management</i>							
Vehicle and Equipment Cleaning							
Vehicle and Equipment Fuelling							
Vehicle and Equipment Maintenance							
<i>Contractor Training</i>							

Employee/Subcontractor Training

There are two general classes of pollutants that may result from dewatering operations; sediment, and toxins and petroleum products. High sediment content in dewatering discharges is common in runoff caught in sediment basins unless actions are undertaken to reduce sediment concentrations. On the other hand, toxins and petroleum products are not commonly found in dewatering discharge unless, the site or surrounding area has been used for light or heavy industrial activities, or the area has a history of groundwater contamination.

(b) Actions and Measures

For sediment basins, either:

- filter discharges (with coarse grained soils) using a perforated or slit riser pipe wrapped in filter fabric, or
- dose captured runoff (with fine grained or dispersive soils) with a flocculating agent prior to pumping water from the basin.

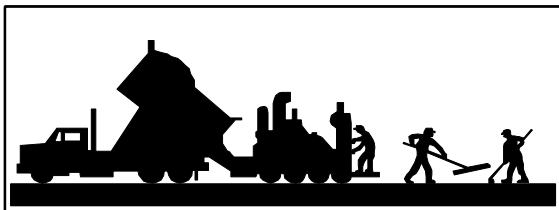
In either case, the quality of discharge from de-watering operations shall meet the INWQS standards for TSS and turbidity as appropriate. In areas suspected of having polluted groundwater, sample the groundwater near the excavation site and have the water tested at a certified laboratory in accordance with DOE requirements. Review and select an appropriate disposal option for any polluted water discharged during de-watering after discussion with DOE and/or the Local Authority.

(c) Maintenance Requirements

- Maintain sediment controls and filters in good working order.
- Inspect excavated areas daily for signs of contaminated water as evidenced by discolouration, oily sheen, or odours.

(d) Limitations

Contaminated water may indicate the presence of soil as well.

40.2.2 Paving Operations*(a) Description*

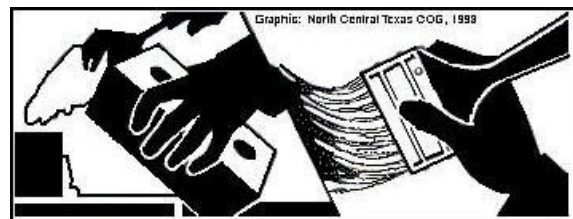
To prevent or reduce the discharge of pollutants from paving operations by using measures to prevent pollution by runoff and runoff, properly disposing of wastes, and training employees and subcontractors. Runoff of surface water from uphill onto paved areas and runoff from areas being paved can pollute stormwater by entraining particles and chemicals in the runoff.

(b) Actions and Measures

- Avoid paving during wet weather.
- Locate materials storage areas such that they will not be subject to stormwater runoff from streams and on-site drainage structures.
- Leaks and spills from paving equipment can contain toxic levels of heavy metals and oil and grease. Place drip pans or absorbent materials under paving equipment when not in use. Clean up spills with absorbent materials rather than burying.
- Cover manholes when applying seal coat, slurry seal, fog seal, etc.
- If paving involves asphaltic concrete:
 - do not allow sand or gravel placed over new asphalt to wash into drains, streets, or creeks. Paving should be swept and excess sand and gravel collected and removed from the site
 - collect and remove all broken asphalt from the site and recycle whenever possible
 - all material removed from the site must be disposed of in compliance with local regulations

(c) Maintenance Requirements

- Inspect employees and subcontractors to ensure that measures are being followed.
- Keep ample supplies of drip pans or absorbent material on-site.

40.2.3 Structure Construction and Painting

(a) Description

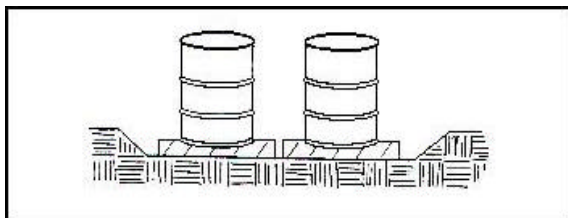
The construction and painting of structures can generate pollutants that can reach stormwater if proper care is not taken. Contaminant sources may be solvents, paints and varnish removers, finishing residues, spent thinners, soap cleaners, kerosene, asphalt and concrete materials, adhesive residues, and old asbestos insulation. Building materials should be enclosed, covered, or bermed and employees and subcontractors should be trained in appropriate practices.

(b) Actions and Measures

- Keep the work site clean and orderly. Remove debris in a timely fashion. Sweep the area if appropriate.
- Use soil erosion control techniques if bare ground is exposed (refer Chapter 38 and 39).
- Conduct painting operations consistent with local air quality and health regulations.
- Properly store paints and solvents.
- Properly store and dispose of waste materials generated from the activity.
- Recycle residual paints, solvents, timber, and other materials to the maximum extent practicable.
- Do not dispose of residual paints and other liquids into stormwater drains or watercourses.
- Clean all the drains in the immediate construction area after construction is completed.
- Educate employees who are doing the work.
- Include appropriate provisions in subcontracts to make certain proper housekeeping and disposal practices are implemented.

(c) Limitations

- Safer alternative products may not be available, suitable, or effective in every case.
- Hazardous waste that cannot be re-used or recycled must be disposed of by a licensed hazardous waste contractor.

40.3 MATERIALS MANAGEMENT**40.3.1 Material Delivery and Storage***(a) Description*

To prevent or reduce the discharge of pollutants to stormwater by minimising the storage of hazardous materials on-site, storing materials in a designated area, installing secondary containment, conducting regular inspections, and training employees and subcontractors in appropriate practices.

The following materials are commonly stored and used on construction sites:

- soil;
- pesticides and herbicides;
- fertilisers;
- detergents;
- plaster or other products;
- petroleum products such as fuel, oil, and grease;
- other hazardous chemicals such as acids, lime, paints, solvents, and curing compounds.

(b) Actions and Measures

- Designate areas of the construction site for material delivery and storage.
 -) place near the construction entrances, away from stormwater drains and waterways
 -) avoid transport near drainage paths or waterways
 -) surround with earth berms
 -) place in an area which will be paved
- Storage of reactive, ignitable, or flammable liquids must comply with the relevant codes.
- Keep an accurate, up-to-date inventory of materials delivered and stored on-site.
- Keep inventories as small as practicable.
- Minimise on-site storage of hazardous materials.
- Handle hazardous materials as infrequently as possible.
- During the rainy season, consider storing materials in a covered area.
- Do not store chemicals, drums, or bagged materials directly on the ground. Place these items on a pallet and when possible, in secondary containment.
- If drums must be kept uncovered, store them at a slight angle to reduce ponding of rainwater on the lids and to reduce corrosion.
- Try to keep chemicals in their original containers and keep them well labelled.
- Employees trained in emergency spill cleanup procedures should be present when dangerous materials or liquid chemicals are unloaded.
- If significant residual materials remain on the ground after construction is complete, properly remove materials and any contaminated soil. If the area is to

be paved, pave as soon as materials are removed to stabilise the soil.

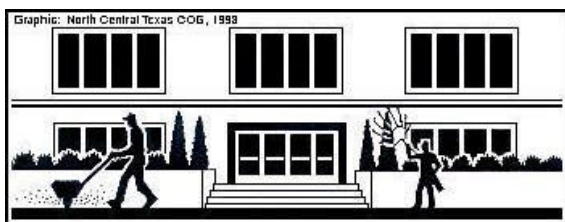
(c) *Maintenance Requirements*

- Keep designated storage areas clean and organised.
- Conduct routine weekly inspections and check for external corrosion of material containers.
- Keep an ample supply of spill cleanup materials near storage areas.

(d) *Limitations*

Storage sheds should meet building and fire code requirements.

40.3.2 Materials Use



(a) *Description*

To prevent or reduce the discharge of pollutants to stormwater from material use by minimising hazardous material use on-site, and training employees and subcontractors in appropriate practices.

(b) *Actions and Measures*

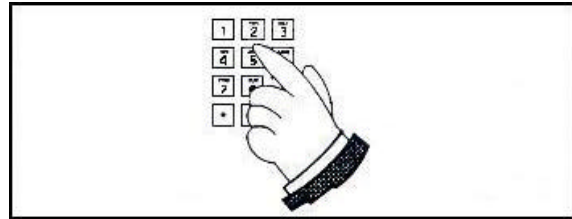
- Use less hazardous, alternative materials as much as possible.
- Minimise the use of hazardous materials on-site.
- Use materials only where and when needed to complete the construction activity.
- Follow manufacturer's instructions regarding uses, protective equipment, ventilation, flammability, and mixing of chemicals.
- Personnel who use pesticides should be trained in their use.
- Fertilisers, herbicides, and pesticides should not be over-applied. Prepare only the amount needed. Follow the recommended usage instructions. Over-application is expensive and environmentally harmful. Unless on steep slopes, till fertilisers into the soil rather than hydroseed. Apply surface dressing in several smaller applications, as opposed to one large application, to allow time for infiltration and to avoid excess material being carried off-site by runoff. Do not apply chemicals just before it rains.

- Train employees and subcontractors in the proper use of materials.

(c) *Limitations*

Alternative materials may not be available, suitable, or effective in every case.

40.3.3 Spill Prevention and Control



(a) *Description*

To prevent or reduce the discharge of pollutants to stormwater from leaks and spills by reducing the chance for spills, stopping the source of spills, containing and cleaning up spills, properly disposing of spill materials, and training employees and subcontractors.

(b) *Actions and Measures*

- Define "Significant Spill". Different materials pollute in different amounts. Make sure that each employee knows what a "significant spill" is for each material they use, and what is the appropriate response for "significant" and "insignificant" spills.
- Hazardous materials and wastes should be stored in covered containers and protected from vandalism.
- Place a stockpile of spill cleanup materials where it will be readily accessible.
- Train employees in spill prevention and cleanup.
- Designate responsible individuals.
- Clean up leaks and spills immediately.
- On paved surfaces, clean up spills with as little water as possible. Use a rag for small spills, a dump mop for general cleanup and absorbent material for larger spills. If spilled material is hazardous, then the used cleanup materials are also hazardous and must be disposed of as hazardous waste.
- Never hose down or bury dry material spills. Clean up as much of the material as possible and dispose of properly.
- Report significant spills to the DOE or Local Authority so they can assist in cleanup.
- Refer to Section 40.5 for spill prevention guidelines for vehicles and equipment.

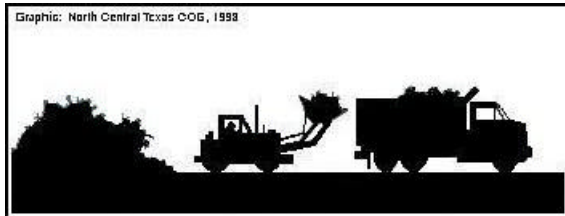
(c) Maintenance Requirements

- Keep ample supplies of spill control and cleanup materials on-site near storage, unloading, and maintenance areas.
- Prepare a plan for spill prevention and control. Update the plan as necessary and stock cleanup materials as changes occur in the types of chemicals on-site.

Alternative materials may not be available, suitable, or effective in every case.

(d) Limitations

It may be necessary to use a private spill cleanup company on some projects.

40.4 WASTE MANAGEMENT**40.4.1 Construction Waste Management***(a) Description*

To prevent or reduce the discharge of pollutants to stormwater from solid or construction wastes by providing designated waste collection areas and containers, arranging for regular disposal, and training employees and subcontractors in waste management techniques. Solid waste is one of the major pollutants resulting from construction. Construction debris includes:

- solid waste generated from trees and shrubs removed during land clearing, demolition of existing structures (rubble), and building construction
- packaging materials including wood, paper and plastic
- scrap or surplus building materials including scrap metals, rubber, plastic, glass pieces, and masonry products
- domestic waste from site accommodation including food containers such as cans, coffee cups, paper bags and plastic wrapper, and cigarettes

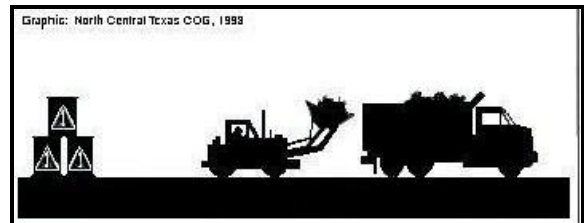
(b) Actions and Measures

- Select and use suitable and accessible on-site waste collection areas.
- Inspect waste storage bins for leaks and direct the subcontractor to repair any bin that is not watertight.

- Comply with local regulations for the management of solid waste.
- Do not burn waste on-site.
- Locate containers in a covered area and/or in a secondary containment.
- Provide an adequate number of containers with lids or covers that can be placed over the container to keep out rain and to prevent loss of wastes when it's windy.
- Plan for additional containers and more frequent pickup during the demolition phase of construction.
- Collect site trash daily if necessary, especially during rainy and windy conditions.
- Erosion and sediment control devices tend to collect litter. Remove this solid waste promptly.
- Make sure that toxic liquid wastes (used oils, solvents, and paints) and chemicals (acids, pesticides, additives, curing compounds) are not disposed of in waste storage bins designated for construction debris.
- Do not hose out waste storage bins on-site.
- Arrange for regular waste collection before containers overflow.
- If a container does spill, clean up immediately.
- Make sure that construction waste is collected, removed, and disposed of only at authorized landfill disposal areas.

(c) Maintenance Requirements

- Collect site rubbish daily.
- Inspect construction waste areas regularly.
- Arrange for regular waste collection.

40.4.2 Hazardous Waste Management*(a) Description*

Many of the chemicals used on-site can be hazardous materials, which become hazardous waste upon disposal. These wastes may include:

- paints and solvents
- petroleum products such as oils, fuels, and grease
- herbicides and pesticides
- acids for cleaning masonry
- concrete curing compounds

In addition, sites with existing structures may contain wastes, which must be disposed of in accordance with Federal, State, or local regulations. These wastes may include:

- sandblasting grit mixed with lead-based, cadmium-based, or chromium-based paint
- asbestos
- other "scheduled" wastes

(b) *Actions and Measures*

(i) *Materials Use*

- Use all of a product before disposing of the container.
- Do not remove original product labels as they contain important safety and disposal information.
- Do not over-apply herbicides and pesticides. Prepare only the amount needed. Follow the recommended usage instructions. Over-application is expensive and environmental harmful. Apply surface dressing in several smaller applications, as opposed to one large application, to allow time for infiltration and to avoid excess material being carried off-site by runoff. Do not apply these chemicals just before it rains.
- Do not clean out brushes or rinse containers into a gutter, stormwater drain, or stream.
- Dispose of excess oil-based paints and sludge as hazardous waste.
- Place a stockpile of spill cleanup materials where it will be readily accessible.
- If a container does spill, clean up immediately.

(ii) *Waste Recycling/Disposal*

- Select and use designated on-site hazardous waste collection areas.
- Hazardous materials and waste should be stored in covered containers and protected from vandalism.
- Place hazardous waste containers in secondary containment.
- Do not mix wastes, this can cause chemical reactions, make recycling impossible, and complicate disposal.
- Hazardous materials must be labelled and stored in accordance with DOE requirements.
- Recycle any useful material such as used oil or water-based paint.
- Make sure that toxic liquid wastes (used oils, solvents, paints) and chemicals (acids, pesticides, additives, curing compounds) are not disposed of in waste storage bins designated for construction debris.
- Make sure that hazardous waste (e.g. excess oil-based paint and sludge) is collected, removed, and disposed of only at authorised disposal areas.

(iii) *Training*

- Train employees and subcontractors in proper hazardous waste management.
- Warning signs should be placed in areas recently treated with chemicals.

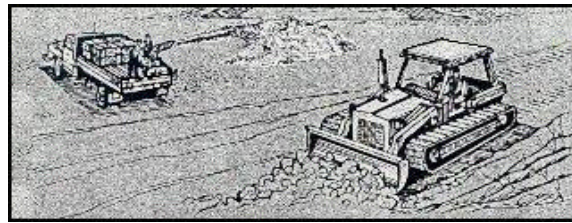
(c) *Maintenance Requirements*

- Inspect hazardous waste receptacles and areas regularly.
- Arrange for regular waste collection before containers overflow.

(d) *Limitations*

- Hazardous wastes that cannot be recycled must be disposed of by a licensed hazardous waste contractor.

40.4.3 Contaminated Soil Management



(a) *Description*

Contaminated soils occur on a site for several reasons including:

- past site uses and activities
- detected or undetected spills and leaks
- acid or alkaline solutions from exposed soil or rock formations high in acid or alkaline-forming elements

Contractors may be liable for clean-up costs when they unknowingly move contaminated soil. This highlights the need for contractors to confirm that a site assessment has been completed before earth moving commences.

To prevent or reduce the discharge of pollutants to stormwater from contaminated soil and highly acidic or alkaline soils, conduct pre-construction surveys, inspect excavations regularly, and remediate contaminated soil promptly.

(b) *Actions and Measures*

- If necessary, conduct thorough site planning pre-construction geologic surveys.
- Look for contaminated soil as evidenced by discoloration, odours, differences in soil properties,

abandoned underground tanks or pipes, or buried debris.

- Prevent leaks and spills to the maximum extent practicable. Contaminated soil can be expensive to treat and/or dispose of properly. However, addressing the problem before construction is much less expensive than after the structures are in place.
- Test suspected soils at a certified laboratory.
- If the soil is contaminated, work with the DOE and/or Local Authority to develop options for treatment and/or disposal.

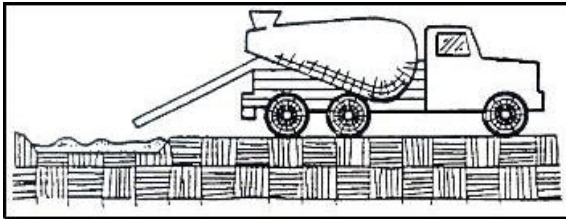
(c) *Maintenance Requirements*

- Conduct daily inspections of excavated areas for signs of contaminated soil.
- Implement spill prevention and control to prevent leaks and spills as much as possible.

(d) *Limitations*

- Contaminated soils that cannot be treated on-site must be disposed of by a licensed hazardous waste contractor.
- The presence of contaminated soil may indicate contaminated water as well.

40.4.4 Concrete Waste Management



(a) *Description*

To prevent or reduce the discharge of pollutants to stormwater from concrete waste by conducting on-site washout in a designated area.

(b) *Actions and Measures*

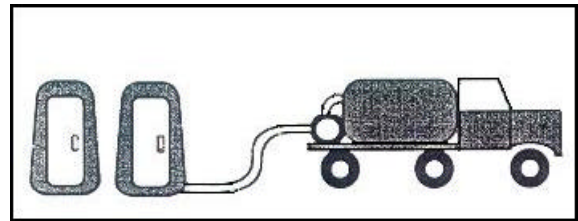
- Store dry and wet materials under cover, away from stormwater drainage areas.
- Avoid mixing excess amounts of fresh concrete or cement on-site.
- Perform washout of concrete trucks in designated areas only.
- Do not wash out concrete trucks into stormwater drains, open ditches, streets, or streams.
- Do not allow excess concrete to be dumped on-site except in designated areas.

- For on-site washout:
 - locate washout areas at least 15 m from stormwater drains, open ditches, or water bodies. Do not allow runoff from this area by constructing a temporary pit or bermed area large enough for liquid and solid waste
 - wash out wastes into the temporary pit where the concrete can set, be broken up, and disposed of properly
- When washing concrete to remove fine particles and expose the aggregate, avoid creating runoff by draining the water to a bermed or level area.
- Do not wash sweepings from exposed aggregate concrete into the street or a stormwater drain. Collect and return sweepings to an aggregate base stockpile, or dispose of in a waste storage bin.

(c) *Maintenance Requirements*

- Inspect subcontractors to ensure that concrete wastes are being properly managed.
- If using a temporary pit, dispose of hardened concrete on a regular basis.

40.4.5 Sanitary/Septic Waste Management



(a) *Description*

To prevent or reduce the discharge of pollutants to stormwater from sanitary/septic waste by providing convenient, well-maintained facilities and arranging for timely service and disposal.

(b) *Actions and Measures*

Sanitary or septic wastes should be treated or disposed of in accordance with Federal, State, or local requirements. These requirements may include:

- Locate sanitary facilities in a convenient location.
- Untreated raw wastewater should not be discharged or buried.
- Temporary septic systems should treat wastes to appropriate levels before discharging.
- If using an on-site disposal system, such as a septic system, comply with local health agency requirements.
- Temporary sanitary facilities that discharge to the sewer system should be properly connected to avoid illicit discharges.

- Sanitary/septic facilities should be maintained in good working order.
- Arrange for regular waste collection by a licensed subcontractor before facilities overflow.

(c) *Maintenance Requirements*

- Inspect facilities regularly.
- Arrange for regular waste collection.

40.5 VEHICLE AND EQUIPMENT MANAGEMENT

40.5.1 Vehicle and Equipment Cleaning



(a) *Description*

To prevent or reduce the discharge of pollutants to stormwater from vehicle and equipment cleaning by using off-site facilities, or designated, contained on-site areas where discharge to stormwater drains is prevented by infiltrating or recycling the wash water.

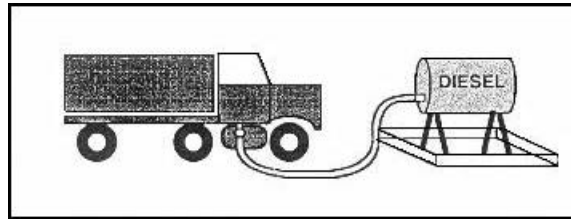
(b) *Actions and Measures*

- Use off-site commercial washing facilities if available.
- If washing must occur on-site, use designated bermed wash areas to prevent wash water from discharging into stormwater drains, streams, and other water bodies. The wash area can be sloped for wash water collection and subsequent infiltration into the ground.
- Use as little water as possible to avoid having to install erosion and sediment controls for the wash area.
- Preferably use phosphate-free, biodegradable soaps.
- Do not permit steam cleaning on-site. Steam cleaning can generate significant pollutant concentrations.

(c) *Limitations*

Even phosphate-free, biodegradable soaps have been shown to be toxic to fish before the soap degrades.

40.5.2 Vehicle and Equipment Fuelling



(a) *Descriptions*

Fuelling vehicles and equipment in areas where fuel can spill or leak onto paved surfaces or into drainage pathways can pollute stormwater.

To prevent fuel spills and leaks and reduce their impacts to stormwater, use off-site facilities, fuel in designated on-site areas only, enclose or cover stored fuel, implement spill controls, and train employees and subcontractors.

(b) *Actions and Measures*

- Use approved off-site commercial fuelling facilities where available.
- If fuelling occurs on-site; use designated areas, located away from stormwater drains to prevent the runoff of stormwater and the runoff of spills.
- Always use secondary containment, such as a drain pan or drop cloth, when fuelling to catch spills/leaks.
- Place a stockpile of spill cleanup materials where it will be readily accessible.
- Use adsorbent materials on small spills rather than hosing down or burying the spill. Remove the adsorbent materials promptly and dispose or properly.
- Avoid mobile fuelling of mobile construction equipment around the site, transport the equipment instead to designated fuelling areas. With the exception of tracked equipment such as bulldozers and perhaps forklifts, most vehicles should be able to travel to a designated area with little lost time.
- Train employees and subcontractors in proper fuelling and cleanup procedures.

(c) *Maintenance Requirements*

- Keep ample supplies of spill cleanup materials on-site.
- Regularly inspect fuelling areas and storage tanks for leaks and signs of corrosion.

40.5.3 Vehicle and Equipment Maintenance



(a) Description

Maintaining vehicles and equipment outdoors or in areas where vehicle or equipment fluids may spill or leak onto the ground can pollute stormwater.

To prevent or reduce the discharge of pollutants to stormwater from vehicle and equipment maintenance, it is better to run a "dry site". This involves using approved off-site facilities, performing work in designated areas only, providing cover for materials stored outside, checking for leaks and spills, and containing and cleaning up spills immediately.

(b) Actions and Measures

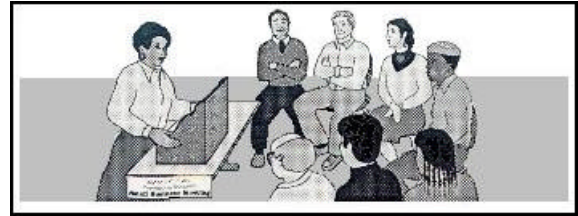
- Keep vehicles and equipment clean, don't allow excessive build-up of oil and grease.
- Consider using off-site facilities to maintain vehicles and equipment.
- If maintenance must occur on-site, use designated areas, located away from stormwater drains to prevent the runoff of stormwater and the runoff of spills.
- On large sites, establish a properly equipped, covered workshop on-site for maintenance.
- Always use secondary containment, such as a drain pan drop cloth, to catch spills or leaks when removing or changing fluids.
- Place a stockpile of spill cleanup materials where it be readily accessible.
- Use adsorbent materials on small spills rather than hosing down or burying the spill. Remove the adsorbent materials promptly and dispose of properly.
- Regularly inspect on-site vehicles and equipment for leaks and repair immediately.
- Check incoming vehicles and equipment for leaking oil and fluids. Do not allow leaking vehicles or equipment on-site.
- Segregate and recycle wastes, such as greases, used oil or oil filters, cleaning solutions, automotive batteries, and hydraulic and transmission fluids.

Train employees and subcontractors in proper maintenance and spill cleanup procedures.

(c) Maintenance Requirements

- Keep ample supplies of spill cleanup materials on-site.
- Regularly inspect maintenance areas and workshops.

40.6 EMPLOYEE/SUBCONTRACTOR TRAINING



(a) Description

Employee and subcontractor training, like maintenance or a piece of equipment, is a method to implement BMPs rather than a BMP in itself. Training is extremely important and the elements of employee and subcontractor training from the individual source controls should be integrated into a comprehensive training program as part of a company's integrated ESCP.

The specific employee and subcontractor training aspects of each of the source control are highlighted in the previous sections of this chapter. The focus of this section is more general, and includes the overall objectives and approach for assuring that all employee and subcontractor are properly trained in stormwater pollution prevention.

(b) Objectives

Employee and subcontractor training should be based on four objectives:

- To promote a clear identification and understanding of the problem, including activities with the potential to pollute stormwater.
- To identify solutions (BMPs) to stormwater pollution problems.
- To promote employee and subcontractor responsibility and accountability for the problems and solutions.
- To integrate employee and subcontractor feedback into training and BMP implementation.

(c) Approach

- Integrate training regarding stormwater quality management with existing training programs that may be required by other regulations.
- Train employees and subcontractors in standard operating procedures and spill cleanup techniques. Employees or subcontractors trained in spill

- containment should be present during the loading, unloading, and handling of materials.
- Personnel who use pesticides should be trained in their use. The Authority shall license pesticide dealers, certify pesticide applicators, and conduct on-site inspections.
- Proper education of off-site contractors is often overlooked. The conscientious efforts of well-trained employees and/or subcontractors can be lost by unknowing off-site contractors, therefore, make sure they are well informed about what they are expected to do on-site.