# APPENDIX 5. SCE STANDARD BEST MANAGEMENT PRACTICES (BMPs)

SCE Standard Best Management Practices (BMP)

**BMP: Vehicle and Equipment Maintenance**

**Description**

Prevent or reduce the discharge of pollutants to storm water from vehicle and equipment maintenance by running a "dry site." This involves using off-site facilities, performing work in designated areas only, providing cover for materials stored outside, checking for leaks and spills, containing and cleaning up spills immediately, and training employees and subcontractors.

**Approach**

- Keep vehicles and equipment clean, don't allow excessive build-up of oil and grease.
- Use off-site repair shops as much as possible. Maintaining vehicles and equipment outdoors or in areas where vehicle or equipment fluids may spill or leak onto the ground can pollute stormwater. If you maintain a large number of vehicles or pieces of equipment, consider using an offsite repair shop. These businesses are better equipped to handle vehicle fluids and spills properly.
- Performing this work off-site can also be economical by eliminating the need for a separate maintenance area.
- If maintenance must occur on-site, use designated areas, located away from drainage courses, to prevent the run-on of storm water and runoff of spills.
- Always use secondary containment, such as a drain pan or drop cloth, to catch spills or leaks when removing or changing fluids.
- 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 of properly.
- Regularly inspect on-site vehicles and equipment for leaks, and repair immediately.
- Check incoming vehicles and equipment (including delivery trucks, and employee and subcontractor vehicles) 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, antifreeze, cleaning solutions, automotive batteries, hydraulic, and transmission fluids.
- Train employees and subcontractors in proper maintenance and spill cleanup procedures.

**Requirements**

**Costs (Capital, O&M)**

- All of the above are low cost measures.

**Maintenance**

- Keep ample supplies of spill cleanup materials on-site.
- Inspect maintenance areas on a regular schedule.

Limitations

- Sending vehicles/equipment off-site should be done in conjunction with BMP C/PS8 (Stabilized Construction Entrance).

### Additional Information - Vehicle and Equipment Maintenance

Outdoor vehicle or equipment maintenance is a potentially significant source of storm water pollution. Activities that can contaminate storm water include engine repair and service, particularly changing or replacement of fluids, and outdoor equipment storage and parking (dripping engines).

Listed below is further information if you must perform vehicle or equipment maintenance on-site.

Waste Reduction

Parts are often cleaned using solvents such as trichloroethylene, 1, 1, 1-trichloroethane, or methylene chloride. Many of these parts cleaners are harmful and must be disposed of as a hazardous waste. Reducing the number of solvents makes recycling easier and reduces hazardous waste management costs. Often, one solvent can perform a job as well as two different solvents. Also, if possible, eliminate or reduce the amount of hazardous materials and waste by substituting non-hazardous or less hazardous materials. For example, replace chlorinated organic solvents (1, 1, 1 -trichloroethane, methylene chloride, etc.) with non-chlorinated solvents. Non-chlorinated solvents like kerosene or mineral spirits are less toxic and less expensive to dispose of properly. Check list of active ingredients to see whether it contains chlorinated solvents. The "chlor" term indicates that the solvent is chlorinated. Also, try substituting a wire brush for solvents to clean parts.

Recycling/Disposal

Separating wastes allows for easier recycling and may reduce disposal costs. Keep hazardous and non-hazardous wastes separate, do not mix used oil and solvents, and keep chlorinated solvents (like 1,1,1-trichloroethane) separate from non-chlorinated solvents (like kerosene and mineral spirits). Promptly transfer used fluids to the proper waste or recycling drums. Don't leave full drip pans or other open containers lying around.

Oil filters disposed of in trash cans or dumpsters can leak oil and contaminate storm water. Place the oil filter in a funnel over a waste oil recycling drum to drain excess oil before disposal. Oil filters can also be recycled. Ask your oil supplier or recycler about recycling oil filters.

Do not dispose of extra paints and coatings by dumping liquid onto the ground or throwing it into dumpsters. Allow coatings to dry or harden before disposal into covered dumpsters.

Store cracked batteries in a non-leaking secondary container. Do this with all cracked batteries, even if you think all the acid has drained out. If you drop a battery, treat it as if it is cracked. Put it into the containment area until you are sure it is not leaking.

Do not bury used tires.

## BMP: Vehicle and Equipment Cleaning

### Description

Prevent or reduce the discharge of pollutants to storm water from vehicle and equipment cleaning by using off-site facilities, washing in designated areas only, eliminating discharges to the storm drain by infiltrating or recycling the wash water and training employees and subcontractors.

### Approach

- Use off-site commercial washing businesses as much as possible. Washing vehicles and equipment outdoors or in areas where wash water flows onto the ground can pollute storm water.
- If you wash a large number of vehicles or pieces of equipment, consider conducting this work at an off-site commercial business. These businesses are better equipped to handle and dispose of the wash waters properly. Performing this work off-site can also be economical by eliminating the need for a separate washing operation at your site.
- If washing must occur on-site, use designated, bermed wash areas to prevent wash water contact with storm water, creeks, rivers, 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.
- Use phosphate-free, biodegradable soaps.
- Educate employees and subcontractors on pollution prevention measures.
- Do not permit steam cleaning on-site. Steam cleaning can generate significant pollutant concentrations leading to potential storm water and groundwater contamination.

### Requirements

#### Costs (Capital, O&M)

- All of the above are low cost measures.

#### Maintenance

- Minimal; some berm repair maybe necessary.

### Limitations

- Even phosphate-free, biodegradable soaps have been shown to be toxic to fish before the soap degrades.
- Sending vehicles/equipment off-site should be done in conjunction with PS7 (Stabilized Construction Entrance).

## BMP: Vehicle and Equipment Fueling

### Description

Prevent fuel spills and leaks, and reduce their impacts to storm water by using off-site facilities, fueling in designated areas only, enclosing or covering stored fuel, implementing spill controls, and training employees and subcontractors.

### Approach

- Use off-site fueling stations as much as possible. Fueling vehicles and equipment outdoors or in areas where fuel may spill/leak onto the ground can pollute storm water. If you fuel a large number of vehicles or pieces of equipment, consider using an off-site fueling station. These businesses are better equipped to handle fuel and spills properly. Performing this work off-site can also be economical by eliminating the need for a separate fueling area at your site.
- If fueling must occur on-site, use designated areas, located away from drainage courses, to prevent the runon of storm water and the runoff of spills.
- Discourage "topping-off" of fuel tanks.
- Always use secondary containment, such as a drain pan, when fueling 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 of properly.
- Carry out all Federal and State requirements regarding stationary above ground storage tanks.
- Do not use mobile fueling of mobile construction equipment around the site; rather, transport the equipment to designated fueling areas. With the exception of tracked equipment such as bulldozers and perhaps small forklifts, most vehicles should be able to travel to a designated area with little lost time.
- Train employees and subcontractors in proper fueling and cleanup procedures.

### Requirements

#### Costs (Capital, O&M)

- All of the above measures are low cost, except for the capital costs of above ground tanks that meet all local environmental, zoning, and fire codes.

#### Maintenance

- Keep ample supplies of spill cleanup materials on-site.
- Inspect fueling areas and storage tanks on a regular schedule.

### Limitations

- Sending vehicles/equipment off-site should be done in conjunction with PS7 (Stabilized Construction Entrance).

## BMP: Hazardous Waste Management

### Description

Prevent or reduce the discharge of pollutants to storm water from hazardous waste through proper material use, waste disposal, and training of employees and subcontractors.

### Approach

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,
- Fertilizers, herbicides and pesticides,
- Acids for cleaning masonry,
- Soil stabilization additives such as calcium carbonate,
- Asphalt products, and
- Concrete curing compounds.

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

- Sandblasting grit mixed with lead-, cadmium-, or chromium-based paints,
- Asbestos, and
- PCBs (particularly in older transformers).

The following steps will help reduce storm water pollution from hazardous wastes:

#### Material Use

- Use all of the product before disposing of the container.
- Do not remove the original product label, it contains important safety and disposal information.
- Do not over-apply fertilizers, herbicides, and pesticides. Prepare only the amount needed. Follow the recommended usage instructions. Over application is expensive and environmentally harmful. Till fertilizers and lime into soil rather than hydroseeding. Apply surface dressings 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. People applying pesticides must be certified in accordance with Federal and State regulations.

#### Waste Recycling/Disposal

- Select a designated waste collection area on-site.
- Hazardous materials and wastes 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.
- Recycle any useful material such as used oil.
- Make sure that toxic liquid wastes (used oils, solvents, paints) and chemicals (acids, pesticides, additives, curing compounds) are not disposed of in dumpsters designated for construction debris.
- Arrange for regular waste collection before containers overflow.

- Make sure that hazardous waste is collected, removed, and disposed of only at authorized disposal areas.

Training

- Train employees and subcontractors in proper hazardous waste management.
- Warning signs should be placed in areas recently treated with chemicals.
- Place a stockpile of spill cleanup materials where it will be readily accessible.
- If a container does spill, clean up immediately.

Requirements

Costs (Capital, O&M)

- All of the above are low cost measures.

Maintenance

- Inspect hazardous waste receptacles and area regularly.
- Arrange for regular hazardous waste collection.

Limitations

- Hazardous waste that cannot be re-used or recycled must be disposed of by a licensed hazardous waste hauler.

## BMP: Solid Waste Management

### Description

Prevent or reduce the discharge of pollutants to storm water from solid or construction waste by providing designated waste collection areas and containers, arranging for regular disposal, and training employees and subcontractors.

### Approach

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, masonry products, and
- Domestic wastes including food containers such as beverage cans, coffee cups, paper bags, plastic wrappers, and cigarettes.

The following steps will help keep a site clean and reduce storm water pollution:

- Select a designated waste collection area on-site.
- When possible, locate containers in a covered area.
- Provide an adequate number of containers with lids or covers that can be placed over the container to keep rain out or to prevent loss of wastes when it's windy.
- Collect site trash daily.
- Erosion and sediment control devices tend to collect litter. Remove this solid waste promptly.
- Salvage or recycle any useful material.
- Make sure that toxic liquid wastes (used oils, solvents, paints) and chemicals (acids, pesticides, additives, curing compounds) are not disposed of in dumpsters designated for construction debris.
- Arrange for regular waste collection before containers overflow.
- Plan for additional containers and more frequent pickup during the demolition phase of construction.
- If a container does spill, clean up immediately.
- Make sure that construction waste is collected, removed, and disposed of only at authorized disposal areas.
- Train employees and subcontractors in proper solid waste management.

### Requirements

#### Costs (Capital, O&M)

- All of the above are low cost measures.

#### Maintenance

- Collect site trash daily.
- Inspect construction waste area regularly.
- Arrange for regular waste collection.

### Limitations

- There are no major limitations to this best management practice.

## BMP: Spill Prevention and Control

### Description

Prevent or reduce the discharge of pollutants to storm water 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.

This best management practice covers only spill prevention and control. However, Material Delivery and Storage and Material Use, also contain useful information, particularly on spill prevention. For information on wastes, see the waste management BMPs in this appendix.

### Approach

The following steps will help reduce the storm water impacts of leaks and spills:

#### General Measures

- 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.

#### Cleanup

- 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 damp mop for general cleanup, and an absorbent material for larger spills. If the spilled material is hazardous, then the used cleanup materials are also hazardous and must be sent to either a certified laundry (rags) or disposed of as hazardous waste.
- Never hose down or bury dry material spills. Sweep up or excavate the material and dispose of properly. See the waste management BMPs in this chapter for specific information.

#### Reporting

- Report spills to local agencies, such as the Fire Department; they can assist in the cleanup.
- Federal regulations require that any oil spill into a water body or onto an adjoining shoreline be reported to the National Response Center (NRC) at 800-424-8802 (24 hour).

Use the following measures related to specific activities:

#### Vehicle and Equipment Maintenance

- If maintenance must occur on-site, use a designated area, located away from drainage courses, to prevent the runon of storm water and the runoff of spills.
- Regularly inspect on-site vehicles and equipment for leaks, and repair immediately.
- Check incoming vehicles and equipment (including delivery trucks, and employee and subcontractor vehicles) for leaking oil and fluids. Do not allow leaking vehicles or equipment on site.
- Always use secondary containment, such as a drain pan or drop cloth, to catch spills or leaks when removing or changing fluids.
- Place drip pans or absorbent materials under pacing equipment when not in use.
- Use adsorbent materials on small spills rather than hosing down or burying the spill. Remove the adsorbent materials promptly and dispose of properly.
- Promptly transfer used fluids to the proper waste or recycling drums. Don't leave full drip pans or other open containers lying around.

- Oil filters disposed of in trash cans or dumpsters; can leak oil and contaminate storm water. Place the oil filter in a funnel over a waste oil recycling drum to drain excess oil before disposal. Oil filters can also be recycled. Ask your oil supplier or recycler about recycling oil filters.
- Store cracked batteries in a non-leaking secondary container. Do this with all cracked batteries, even if you think all the acid has drained out. If you drop a battery, treat it as if is cracked. Put it into the containment area until you are sure it is not leaking.

Vehicle and Equipment Fueling

- If fueling must occur on-site, use designated areas, located away from drainage courses, to prevent the runon of storm water and the runoff of spills.
- Discourage "topping-off" of fuel tanks.
- Always use secondary containment, such as a drain pan, when fueling to catch spills/leaks.

Requirements

Costs (Capital, O & M)

- Prevention of leaks and spills is inexpensive. Treatment and/or disposal of contaminated soil or water can be quite expensive.

Maintenance

- Keep ample supplies of spill control and cleanup materials on-site, near storage, unloading, and maintenance areas.
- Update your spill cleanup materials as changes occur in the types of chemicals on site.

Limitations

- If necessary, use a private spill cleanup company.

## BMP: Material Use

### Description

Prevent or reduce the discharge of pollutants to storm water from material use by using alternative products, minimizing hazardous material use on-site, and training employees and subcontractors.

### Approach

The following materials are commonly used on construction sites:

- Pesticides and herbicides,
- Fertilizers,
- Detergents,
- Petroleum products such as fuel, oil, and grease, and
- Other hazardous chemicals such as acids, lime, glues, paints, solvents, and curing compounds.

Use of these materials on-site can pose the following risks:

- Storm water contamination,
- Injury to workers or visitors,
- Groundwater contamination, and
- Soil contamination.

Therefore, the following steps should be taken to minimize your risk:

- Use less hazardous, alternative materials as much as possible.
- Use as few hazardous materials on-site as possible.
- Limit material usage to designated areas only.
- Follow manufacturer's instructions regarding uses, protective equipment, ventilation, flammability, and mixing of chemicals.
- For pesticides in particular, personnel who use pesticides should be trained in their use. The California Department of Pesticide Regulation and county agricultural commissioners license pesticide dealers, certify pesticide applicators, and conduct on-site inspections.
- Do-not over apply fertilizers, herbicides, and pesticides. Prepare only the amount needed.
- Follow the recommended usage instructions. Over-application is expensive and environmentally harmful. Till fertilizers and lime into the soil rather than hydroseeding. Apply surface dressings 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.
- Train employees and subcontractors in proper material use.

### Requirements

#### Costs (Capital, O & M)

- All of the above are low cost measures.

#### Maintenance

- Maintenance of this best management practice is minimal.

### Limitations

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

## BMP: Material Delivery and Storage

### Description

Prevent or reduce the discharge of pollutants to storm water from material delivery and storage by minimizing the storage of hazardous materials on-site, storing materials in a designated area, installing secondary containment, conducting regular inspection, and training employees and subcontractors.

This best management practice covers only material delivery and storage. For other information on materials, see Material Use, or Spill Prevention and Control. For information on wastes, see the waste management BMPs in this appendix.

### Approach

The following materials are commonly stored on construction sites:

- Pesticides and herbicides,
- Fertilizers,
- Detergents,
- Petroleum products such as fuel, oil, and grease, and
- Other hazardous chemicals such as acids, lime, glues, paints, solvents, and curing compounds.

Storage of these materials on-site can pose the following risks:

- Storm water contamination,
- Injury to workers or visitors,
- Groundwater contamination, and
- Soil contamination.

Therefore, the following steps should be taken to minimize your risk:

- Designate an area of the construction site for material delivery and storage.
  - Place near the construction entrance, away from waterways
  - Avoid transport near drainage paths or waterways
  - Surround with earth berms (see DRI, Earth, Dika)
  - Place in an area which will used to stabilize any residential materials
- Storage of reactive, ignitible, or flammable liquids must comply with the fire codes of your area. Contact the local Fire Marshal to review site materials, quantities, and proposed storage area to determine specific requirements. See the Flammable and Combustible Liquid Code, NFPA30.
- Keep an accurate, up-to-date inventory in your SWPPP of the materials delivered and stored on site.
- Keep your inventory down. Store only the amount you need, for only as long as you need it.
- Store as few hazardous materials on-site as possible.
- Handle hazardous materials as infrequently as possible.
- Designate a secure material storage area away from drainage courses and near the site entrance.
- Whenever possible, store materials in a covered area with secondary containment such as an earthen dike, horse trough, or even kid's wading pool for non-reactive materials such as detergents, oil, grease and paints. Small amounts of material may be secondarily contained in “bus boy” trays or concrete mixing trays.

- Do not store chemicals, drums, or bagged materials directly on the ground. Place these items in secondary containment.
- If drums must be kept in an uncovered area, store them at a slight angle to reduce ponding of rainwater in the lids and to reduce corrosion.
- Try to keep chemicals in their original containers, and keep them well labeled.
- Train employees and subcontractors.
- Employees trained in emergency spill cleanup procedures should be present when dangerous materials or liquid chemicals are unloaded.

Requirements

Cost (Capital, O & M)

- All of the above are low cost measures.

Maintenance

- Keep the designated storage area clean and well organized.
- Conduct routine weekly inspections and check for external corrosion of material containers.
- Keep an ample supply of spill cleanup materials near the Storage area.

Limitations

- Storage sheds often must meet building and fire code requirements.

## BMP: Employee/Subcontractor Training

### Description

Employee/subcontractor training, like maintenance or equipment, is not so much a best management practice as it is a method by which to implement BMPs. This fact sheet highlights the importance of training and of integrating the elements of employee/subcontractor training from the individual source controls into a comprehensive training program as part of a company's Storm Water Pollution Prevention Plan (SWPPP). It includes the overall objectives and approach for assuring employee/subcontractor training in storm water pollution prevention.

### Objectives

Employee/subcontractor training should be based on four objectives:

- Promote a clear identification and understanding of the problem, including activities with the potential to pollute storm water,
- Identify solutions (BMPs),
- Promote employee-subcontractor ownership of the problems and the solutions, and
- Integrate employee/subcontractor feedback into training and BMP implementation.

### Approach

- Integrate training regarding storm water quality management with existing training programs that may be required for your business by other regulations such as: the Illness and Injury Prevention Program (11PP) (SB 198) (California Code of Regulations Title 8, Section 3203), the Hazardous Waste Operations and Emergency Response (HAZWOPER) standard (29 CFR 1910.120), the Spill Prevention Control and Countermeasure (SPCC) Plan (40 CFR 112), and the Hazardous Materials Management Plan (Business Plan) (California Health and Safety Code, Section 6.95).
- Businesses, particularly smaller ones that may not be regulated by Federal, State, or local regulations should develop a training program to reduce their potential to pollute storm water.
- Train employee/subcontractors in proper and consistent methods for disposal.
- Consider posting the quick reference table around the job site or in the on-site office trailer to reinforce training.
- Train employee/subcontractors in standard operating procedures and spill cleanup techniques described in the BMP fact sheets. Employee/subcontractors trained in spill containment and cleanup should be present during the loading/unloading and handling of materials.
- Personnel who use pesticides should be trained in their use. The California Department of Pesticide Regulation and county agricultural commissioners 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 employee/subcontractors can be lost by unknowing off-site contractors, so make sure they are well informed about what they are expected to do on-site.

## BMP: Scheduling

### Description

Sequencing the construction project to reduce the amount and duration of soil exposed to erosion by wind, rain, runoff, and vehicle tracking.

### Suitable Applications

Proper sequencing of construction activities to reduce erosion potential should be incorporated into the schedule of every construction project. Use of other, more costly yet less effective, erosion and sedimentation controls, may often be reduced through proper construction sequencing.

### Approach

- Project design considerations: Design project to integrate into existing land contours. Significant regrading of a site will require more costly erosion and sedimentation control measures and may require that on-site drainage facilities be installed.
- Incorporate existing, natural areas: Inventory and evaluate the existing site terrain and vegetation. Disturbance of highly erosive natural areas (e.g., steep, unstable slope areas, watercourses) should be minimized, while protecting other areas may enhance site aesthetics. Construction should not disturb these areas (see ESC2).
- Avoid rainy periods: Schedule major grading operations during dry months. Allow enough time before rainfall begins to stabilize the soil with vegetation or physical means (see ESC 10 to 24) or to install temporary sediment trapping devices (see ESC 50 to 56).
- Practice erosion and sediment control year round: Erosion may be caused during dry seasons by "freak" rainfall, wind and vehicle tracking. Therefore, keep the site stabilized year-round, and retain wet season sediment trapping devices.
- Minimize soil exposed at one time! Schedule projects to disturb only small portions of the site at any one time. Complete grading as soon as possible. Immediately stabilize the disturbed portion before grading the next portion. Practice staged seeding--revegetate cut and fill slopes as the work progresses.
- Trenching: Close and stabilize open trenches as soon as possible. Sequence trenching projects so that most open portions of the trench are closed before new trenching is begun.

### Requirements

#### Cost

Construction scheduling to reduce erosion may increase other construction costs due to reduced economies of scale in performing site grading. The cost-effectiveness of scheduling techniques should be compared with the other, less effective erosion and sedimentation controls to achieve a cost-effective balance.

### Limitations

There are no significant limitations to the use of this BMP.

## BMP: Silt Fence

### General Description

A silt fence is a temporary sediment barrier consisting of filter fabric stretched across and attached to supporting posts, entrenched, and, depending upon the strength of the fabric used, supported with wire fence. Silt fences trap sediment in two ways: (1) by intercepting and detaining small amounts of sediment from disturbed areas during construction operations in order to promote sediment from behind the fence: and (2) by decreasing the velocity of flows up to 0.5 cfs in swales.

Silt fences may be used for perimeter control, placed upstream of the point(s) of discharge of runoff from a site, but before the flow becomes concentrated. They may also be used as interior controls below disturbed areas where runoff may occur in the form of sheet and rill erosion, and perpendicular to minor swales or ditch lines for up to one acre contributing drainage areas. Silt fences are not intended for use in detaining concentrated flows, and are only applicable for sheet or overland flows.

### Suitable Applications

- Along the perimeter of the site
- Along streams and channels
- Across swales with small catchments
- Below the toe of a cleared slope
- Around temporary spoil areas
- Below other small cleared areas

### Installation/Application

#### Planning:

Silt fences are preferable to straw barriers in many cases. Laboratory work at the Virginia Highway and Transportation research Council has shown that silt fences can trap a much higher percentage of suspended sediments than can straw bales. While the failure rate of silt fences is lower than that of straw barriers, there are many instances where silt fences have been improperly installed. The following installation methods can improve performance and should be followed:

- Construct along a level contour.
- Silt fences should remain in place until the disturbed area is permanently stabilized.
- Provide sufficient room for sediment removal equipment between the silt fences and toes of slopes or other obstructions.
- Turn the ends of the filter fence uphill to prevent stormwater from flowing around the fence.
- Leave an undisturbed or stabilized area immediately downslope from the fence.
- Do not place in live steams or intermittently flowing channels.

#### Design:

Limit the upstream drainage area to 1 acre or less when used alone or in combination-with-sediment basin in a larger site..

Limit the maximum slope perpendicular to the fence line, should be 1:1.

Limit the maximum sheet or overland flow path length to any point along the fence to 100 feet.

Limit the concentrated flows reaching the fence to 0.5

Selection of a filter fabric is based on soil conditions at the construction site (which affect the equivalent opening size (EOS) fabric specification) and characteristics of the support fence (which affect the choice of tensile strength). The designer shall specify a filter fabric that retains the soils found on the construction site yet will have openings large enough to permit drainage and prevent clogging. The following criteria is recommended for selection for the equivalent opening size:

a. If 50 percent or less of the soil, by weight, will pass the U.S. Standard Sieve No. 200, select the EOS to retain 85 percent of the soil. The EOS should not be finer than EOS 70.
b. For all other soil types, the EOS should be no larger than the openings in the U.S. Standard Sieve No. 70 (0.0083 in. [0.21 mm.]) except where direct discharge to a stream, lake or wetland will occur, then the EOS shall be no larger than Standard Sieve No. 100.

To reduce the chance of clogging, it is preferable to specify a fabric with openings as large as allowed by the criteria. No fabric should be specified with an EOS smaller than U. S. Standard Sieve No. 100 (0.0059 in. (0. 15 mm)). If 85 percent or more of a soil, by weight, passes through the openings in a No. 200 sieve (0.0029 in. (0.074 mm)), filter fabric shall not be used. Most of the particles in such a soil would not be retained if the EOS was too large, and they would clog the fabric quickly if the EOS was small enough to capture the soil.

The fence should be supported by a wire mesh if the fabric selected does not have sufficient strength and bursting strength characteristics for the planned application (as recommended by the fabric manufacturer). Filter fabric material shall contain ultraviolet ray inhibitors and stabilizers to provide a minimum of six months of expected usable construction life at a temperature range of 0°F to 120°F.

Installation Guidelines:

Filter fences are to be constructed on a level contour. Sufficient area should exist behind the fence for ponding to occur without flooding or overtopping the fence.

a. Posts should be spaced a maximum of 6 feet apart and driven securely into the ground a minimum of 30 inches.
b. A trench should be excavated approximately 8 inches wide and 12 inches deep along the line of posts and upslope from the barrier.
c. When standard strength filter fabric is used, a wire mesh support fence should be fastened securely to the upslope side of the posts using heavy-duty wire staples at least 1 inch long, tie wires or hog rings. The wire should extend into the trench a minimum of 4 inches.
d. The standard strength filter fabric should be stapled or wired to the fence, and 20 inches of the fabric should extend into the trench. When extra-strength filter fabric and closer post spacing are used, the wire mesh support fence may be eliminated and filter fabric stapled or wired directly to the posts.
e. The filter fabric should be purchased in a continuous, cut to the length of the barrier to avoid use of joints. When joints are necessary, filter cloth should be spliced together only at a support post, with a minimum 6 inch overlap, and both ends securely fastened to the post.
f. The trench should be backfield with 3/4-inch minimum diameter washed gravel or compacted native material.

## Requirements

### Maintenance

- Inspect monthly during dry periods and immediately after each rainfall. Repair as necessary. Sediment must be removed when it reaches approximately one third the height of the fence, especially if heavy rains are expected.
- Filter fences should not be removed until the upslope area has been permanently stabilized.

## Limitations

- Filter fences will create a temporary sedimentation pond on the upstream side of the fence which may cause temporary flooding. Fences not constructed on a level contour will be overtopped by concentrated flow resulting in failure of the filter fence.
- Filter fences are not practical where large flows of water are involved, hence the need to restrict their use to drainage areas of one acre or less, and flow rates of less than 0.5 cfs.
- Problems may arise from incorrect selection of pore size and/or improper installation.
- Do not allow water depth to exceed 1.5 feet at any point.
- Improperly installed fences are subject to failure from undercutting, overlapping, or collapsing.

## BMP: Straw Bale Barriers

### General Definition

A straw bale barrier consists of a series of secured anchored bales placed to intercept sediment-laden runoff from small drainage areas of disturbed soil. The barrier ponds runoff and allow sediment to settle. Straw bale dikes should not be used for extended periods of time because they tend to rot and fall apart.

The straw bale dike is used where there are no concentrations of water in a channel or drainage way, and where erosion would occur from sheet flow. These barriers are typically constructed, below disturbed areas subject to sheet flow of runoff to intercept and detain sediment.

### Suitable Applications

- Along the perimeter of the site
- Along streams and channels
- Across swales, with small catchments
- Around temporary spoil areas
- Below other small, cleared areas

### Installation/Application Criteria

Straw bale barriers should be used for drainage areas no more than 1/4 acre per 100 feet of barrier length in any size, with no more than 100 ft upstream of any port along the barrier. The barrier should be placed along a level contour no greater than 2:1. When installed and maintained according to the guidelines on this fact sheet, straw bale dikes remove approximately 67% of the sediment transported in construction site runoff. This optimum efficiency can only be achieved through careful maintenance with special attention to replacing rotted or broken bales. Barrier should be constructed on a level contour to prevent concentration of flow against a small portion of the barrier.

An effective straw bale barrier should be installed in the following manner:

1. Bales should be placed on the contour and in a row with ends tightly abutting the adjacent bales.
2. Leave area for runoff to pond upstream of the barrier by locating barrier away from the toe of the slopes. This also provides access for maintenance.
3. Each bale should be embedded in the soil a minimum of (4) inches and placed so the bindings are horizontal. Bindings placed on soil will soon disintegrate and cause the barrier to fail.
4. Bales should be securely anchored in place be either two stakes or re-bars driven through the bale. The first stake in each bale shall be driven toward the previously laid bale at an angle to force the bale together. Stakes should be driven flush with the bale.
5. Remove when it has served its usefulness so as not to block or impede storm flow or drainage.

Requirements

Costs

- Straw bale typically cost about $4 per lineal foot

Maintenance

- Inspect weekly and after each rain
- Replace bales which have decomposed or whose bindings have broken
- Remove sediment -behind the barrier when it-reaches-a depth of 6 inches

Limitations

- Straw bale dikes are not to be used for extended periods of time because they tend to rot and fall apart.
- Suitable only for sheet flow on slopes of 2% or flatter.
- Not appropriate for large drainage areas, limit to one acre or less.
- Straw bales lose their effectiveness rapidly due to rotting, thus constant maintenance is required.
- Not recommended for concentrated flow, channel flow, and live streams.
- Bale bindings of jute or cotton not recommended.
- Straw bale barriers have not been as effective as expected due to improper use. These barriers have been placed in streams and drainage ways where runoff volumes and velocities have caused the barriers to wash out. In addition, failure to stake and entrench the straw bale has allowed undercutting and end flow.

## BMP: Sand Bag Barrier

### General Definition

Stacking sandbags along a level contour creates a barrier which detains sediment-laden water, ponding water upstream of the barrier and promoting sedimentation.

### Suitable Applications

Sandbag berms may be used during construction activities in stream beds and utility construction in channels, temporary channel crossing for construction equipment, etc. Sandbag berms may also be installed parallel to roadway construction. Sandbag berms may also be used to create temporary sediment traps, retention basins and in place of straw bales or silt fences. Examples of applications include:

- Check dams across stream channels
- Barrier for utility trenches or other construction in a stream channel
- Temporary channel crossing
- Barrier on a slope in place of straw bales or silt fences
- Direct or divert flow
- Create temporary sediment basin or retention basin
- Near the toe of slopes
- At construction perimeter

### Advantages

- Provides a semi-permeable barrier in potentially wet areas
- More permanent than silt fences or straw bales
- Allows for easy relocation on site to meet changing needs during construction

### Installation/Application

Sandbag berms are appropriate to use when construction of check dams or sumps in a stream is undesirable. The sandbag berms can provide the same function as a check dam without disturbing the stream or vegetation. The sandbag berm will also allow a small sediment retention area to be created prior to construction of final detention basins. For installation of a sandbag berm, the following criteria should be observed:

- Drainage Area - Up to -five (5) acres
- Height of Berm - 18 inches minimum height, measured from the top of the existing ground at the upslope toe to the toe of the barrier
- Width of Berm - 48 inches minimum width measured at the bottom of the barrier; 18 inches at the top
- Sandbag Size - length: 24 to 30 inches, width: 16 to 18 inches, and thickness: 6 to 8 inches. Weight: 90 to 125 pounds.
- Sandbag Material - Polypropylene, polyethylene or polyamide woven fabric, minimum unit weight four (4) ounces per square yard, mullen burst strength exceeding 300 psi and ultraviolet stability exceeding 70 percent. Use of burlap is discouraged since it rots and deteriorates easily.
- Grade of Sand - Coarse sand, gravel.
- Runoff water shall flow over the tops of the sandbags or through four (4) inch polyvinyl chloride.

Requirements

Maintenance

- Inspect after each rain
- Reshape or replace damaged sandbags immediately
- Remove sediment when it reaches six inches in depth

Limitations

- Sandbags are more expensive than other barriers, but also more durable
- Burlap should not be used for sandbags

## BMP: Stabilized Construction Entrance

### General Description

The construction entrance practice is a stabilized pad of aggregate underlain with filter cloth located at any point where traffic will be entering or leaving a construction site to or from a public right-of-way, street, alley, sidewalk or parking area.

### Suitable Applications

- All points of construction ingress and egress
- Unpaved areas where sediment tracking occurs from site onto paved roads

### Installation/Application Criteria

- Construct on level ground where possible
- Stones should be 2-3 inches
- Minimum depth of stones should be 8 inches or as recommended by soils engineer
- Length should be 50-foot minimum, and width should be 15-foot minimum
- Provide ample turning radii as part of entrance

### Requirements

#### Cost

- Ranges from $750 to $1200 depending upon region and availability of material

#### Maintenance

- Inspect monthly and after each rainfall
- Replace gravel material when surface voids are visible
- Remove all sediment deposited on paved roadways within 24 hours
- Remove gravel and filter fabric at completion of construction

### Limitations

The stabilized construction entrance plan should be reviewed as part of the project traffic control plan.

- Construct on level ground.
- Stabilized construction entrances are rather expensive to construct and when a wash rack is included, a sediment trap of some kind must also be provided to collect wash water runoff.
- Requires periodic top dressing with additional stones
- Should be used in conjunction with Wash Rack BMP, if appropriate
- Should be used in conjunction with street sweeping on adjacent public right-of-way

## Additional Information - Stabilized Construction Entrance

A stabilized pad of aggregate underlain with filter cloth located at any point where traffic will be entering or leaving a construction site to or from a public right-of-way, street, alley, sidewalk or parking area. The purpose of a stabilized construction entrance is to reduce or eliminate the tracking of sediment onto public rights-of-way or streets. Reducing trackout of sediments and other pollutants onto paved roads helps prevent deposition of sediments into local storm drains and production of airborne dust.

Where traffic will be entering or leaving, a stabilized construction entrance should be used at all points of construction ingress and egress. NPDES permits require that appropriate measures be implemented to prevent track out of sediments onto paved roadways, which is a significant

source of sediments derived from mud and dirt carryout from the unpaved roads and construction sites.

Stabilized construction entrances are not very effective in removing sediment from equipment leaving a construction site. Efficiency is greatly increased when a washing rack is included as part of a stabilized construction entrance. The entrance should be built on level ground. Advantages of the Stabilized Construction Entrance is that it does remove some sediment from equipment and serves to channel construction traffic in and out of the site at specified locations.

Design & sizing considerations include the aggregate for stabilized construction entrance aprons shell be 2 to 3 inches in sized, washed, well-grades gravel or crushed rock. The minimum apron dimensions will be 15 feet by 50 feet and 8 inches deep for one-way ingress/egress traffic.

Entrance must be properly graded to prevent runoff from leaving the construction site. When wash areas are provided, washing shall be done on an area stabilized with crushed stone which drains into a properly constructed sediment trap or basin (pond). Sediment barriers shall be provided to prevent sediments from entering into the stormwater sewer system, ditch, or waterway.

## BMP: Dust Controls

### General Description

Dust control measures are used to stabilize soil from wind erosion, and reduce dust generated by construction activities. Dust which settles on surfaces both on-site and off-site may be washed by storm water into waterways.

California's Mediterranean climate, with short wet seasons and long, hot, dry seasons, allows the soils to thoroughly dry out. During these dry seasons, construction activities are at their peak, and disturbance and exposed areas are increasingly subject to wind erosion, sediment tracking and dust generated by construction equipment.

Dust control, as a BMP, is a practice that is already in place for many construction activities. Los Angeles, the North Coast and Sacramento, among others have enacted dust control ordinances for construction activities that cause dust to be transported beyond the construction property line. Recently, the State Air Resources Control Board has, under the authority of the Clean Air Act, started to address air quality in relation to inhalable particulate matter less than 10 microns (PM-10). Ninety percent of the SC particles are considered to be dust. Existing dust control regulations by local agencies, municipal departments, public works department, and/or public health departments are in place in some regions within California. For jurisdictions that have no formal dust control regulations and/or standards, Section 10, 17 and 18 of Caltrans' Standard Specifications provide detailed provisions for dust control practices.

Many local agencies require dust control in order to comply with local nuisance laws, opacity laws (visibility impairment) and the requirements of the Clean Air Act. The following are measures that local agencies may have already implemented as requirements for dust control form contractors:

- Construction & Grading Permits: Require provisions for dust control plans;
- Opacity Emission Limits: Enforce compliance with California air pollution control laws;
- Increase overall enforcement activities: Priority given to cases involving citizen complaints;
- Maintain Field Application Records: Require records of dust control measures from contractor;
- Stormwater Pollution Prevention Plan: (SWPPP): Integrate dust control measures into SWPPP.

### Dust Control Practices

Dust control BMP's generally stabilize exposed surfaces and minimize activities that suspend or track dust particles. For heavily traveled and disturbed areas, wet suppression (watering), chemical dust suppression, gravel or asphalt surfacing, temporary gravel construction entrances, equipment wash-out areas, and haul truck covers can be employed as dust control, applications. Permanent or temporary vegetation and mulching, and sand fences can be employed for areas of occasional or no construction traffic. Preventive measures would include minimizing surface areas to be disturbed.

Many of the reasonably available control measures for controlling dust from construction sites can also be implemented as BMPs for storm water pollution prevention. Those BMPs include:

- Pave, vegetate, or chemically stabilize access points where unpaved traffic surfaces adjoin paved roads,
- Provide covers for haul trucks transporting materials that contribute to dust,
- Provide for wet suppression or chemical stabilization of exposed soils,
- Provide for rapid clean-up of sediments deposited on paved roads,
- Furnish stabilized construction road entrances and vehicle wash down areas,
- Stabilize unpaved haul roads, parking and staging areas,
- Reduce speed and trips on unpaved roads,
- Implement dust control measures for material stockpiles,
- Prevent drainage of sediment laden storm water onto paved surfaces,
- Stabilize abandoned construction sites using vegetation or chemical stabilization methods, and
- Limit the amount of areas disturbed by clearing and earth moving operations by scheduling these activities in phases.

For the chemical stabilization, there are many products available as dust palliatives for chemically stabilizing gravel roadways and stockpiles.

Suitable Applications

- Clearing and grading activities
- Construction vehicle traffic on unpaved roads
- Drilling and blasting activities
- Sediment tracking onto paved roads
- Soil and debris storage piles
- Batch drop from front end loaders
- Areas with unstabilized soil

Installation/Application Criteria

- Schedule construction activities to minimize the area where, and time period when soils are exposed
- Quickly stabilize exposed soils using vegetation, mulching, spray-on adhesives, calcium chloride, sprinkling , and stone/gravel layering
- Identify and stabilize key access points prior to commencement of construction
- Minimizing the impact of dust by anticipating the direction of prevailing winds
- Direct most construction traffic to stabilized roadways within the project site

Requirements

Cost

- Reference Caltrans Cost Schedule for regional cost ranges.

Maintenance

- Most dust control measures require frequent, often daily, attention.

Limitations

- Oil treated subgrades should not be used because the oil may migrate into drainageways and/or seep into the soil.

- Chemically treated subgrades may make the soil water repellant, interfering with long-term infiltration, and the vegetation/re-vegetation of the site. Some chemical dust suppressants may be subject to freezing and may contain solvents and should be handled properly.
- Asphalt, as a mulch tack or chemical mulch, requires a 24 hour curing time to avoid adherence to equipment, worker shoes, etc. Application should be limited because asphalt surfacing may eventually migrate into the drainage system.
- In compacted areas, watering and other liquid dust control measures may wash sediment or other constituents into the drainage system.

## BMP: Concrete Waste Management

### Description

Prevent or reduce the discharge of pollutants to storm water from concrete waste by conducting washout off-site, washing in designated areas only, eliminating discharges to the storm drain by infiltrating or recycling the wash water and training employees and subcontractors.

### Approach

- Store dry and wet materials under cover, away from drainage areas.
- Avoid mixing excess amounts of fresh concrete or cement on-site.
- Perform washout of concrete trucks off site or in designated areas only. Do not wash out concrete trucks into storm drains, open ditches, streets, or streams.
- Do not allow excess concrete to be dumped on-site, except in designated areas.
- For onsite washout:
  - Locate washout area at least 50 feet from storm drains, open ditches, or water bodies. Do not allow runoff from this area by constructing a temporary pit or bermed area large enough of liquid and solid waste.
  - Wash out wastes into the temporary pit where the concrete can set, be broken up, and then 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 storm drain. Collect and return sweepings to aggregate base stock pile, or dispose in the trash.
- Educate employees and subcontractors in proper concrete waste management.

### Requirements

#### Costs (Capital, O&M)

- All of the above are low cost measures.

#### Maintenance

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

### Limitations

- Off-site washout of concrete wastes may not always be possible.

## BMP: Contaminated Soil Management

### Description

Prevent or reduce the discharge of pollutants to storm water from contaminated soil and highly acidic or alkaline soils by conducting pre-construction surveys, inspecting excavations regularly, and remediating contaminated soil promptly.

### Approach

Contaminated soils may occur on your site for several reasons including:

- Past site uses and activities,
- Detected or undetected spills and leaks, and
- Acid or alkaline solutions from exposed soil or rock formations high in acid or alkaline-forming elements.

The following steps will help reduce storm water pollution from contaminated soil:

- Conduct thorough site planning including pre-construction geologic surveys.
- Look for contaminated soil as evidenced by discoloration, odors, or differences in soil properties.
- Seal bedrock fractures with grout or bentonite to reduce seepage from excavation.
- 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 building construction is much less expensive than after the buildings are in place.
- Test suspected soils at a certified laboratory.
- If the soil is contaminated, work with the local regulatory agencies to develop options for treatment and/or disposal.

### Requirements

#### Costs (Capital, O&M)

- Prevention of leaks and spills is inexpensive. Treatment and/or disposal of contaminated soil can be quite expensive.

#### Maintenance

- Inspect excavated areas daily for signs of contaminated soil.
- Implement Spill Prevention and Control to prevent leaks and spills as much as possible.

### Limitations

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