San Bernardino County Stormwater Program

MUNICIPAL ACTIVITIES POLLUTION PREVENTION STRATEGY

Order No. 96-32

NPDES No. CAS618036

Submitted by:

San Bernardino County
Flood Control District

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SECTION ONE

1.1 BACKGROUND

The San Bernardino County Flood Control District (District), together with the County of San Bernardino (County) and the incorporated cities within the Santa Ana River Basin were jointly issued a National Pollutant Discharge Elimination System (NPDES) Municipal Stormwater Permit (PERMIT) (NPDES Permit No. CAS 618036) by Order No. 96-32 by the California Regional Water Quality Control Board, Santa Ana Region (Regional Board) on March 8, 1996. The County, the District, and the cities of Big Bear Lake, Chino, Chino Hills, Colton, Fontana, Grand Terrace, Highland, Loma Linda, Montclair, Ontario, Rancho Cucamonga, Redlands, Rialto, San Bernardino, Upland, and Yucaipa are hereinafter referred to as the co-permittees.

Section V, Provision 19 of the PERMIT requires that the co-permittees develop a Municipal Activities Pollution Prevention Strategy (MAPPS), i.e., a pollution prevention strategy that addresses public agency facilities and associated activities which are considered to be activities of concern regarding stormwater pollution.

1.2 PURPOSE AND OBJECTIVES

The purpose of the MAPPS is to help co-permittees develop appropriate pollution prevention programs to ensure that public agency facilities and associated activities that are not currently required to obtain coverage under the General Industrial Activities Stormwater Permit do not contribute pollutants to the waters of the United States. For the purposes of this strategy, the term "facilities" is defined as a location where industrial type activities occur including vehicle and equipment fueling and maintenance, material transfer and storage, waste management and storage, and other activities which may result in exposure of potential pollutants to stormwater.

The objectives of the MAPPS are as follows:

- Help the co-permittees identify those public agency facilities and associated activities that are of concern with respect to stormwater pollution;
- Help the co-permittees identify pollutants of concern associated with the identified public agency facilities and associated activities;
- Provide a list of potential source control Best Management Practices (BMPs) for evaluation for selection as candidate BMPs by the co-permittees;
- Assist the co-permittees with the development of facility monitoring programs which will assess the need for source controls and monitor the effectiveness of the BMPs selected by the co-permittees; and
- Help the co-permittees develop a schedule for training of public agency staff to ensure proper implementation of the selected BMPs.

1.3 HOW TO USE THE POLLUTION PREVENTION STRATEGY

The MAPPS is intended to be used by the co-permittees as a guidance document for the development of appropriate control strategies specific to each co-permittee and its facilities and associated activities that are of concern with respect to stormwater pollution. The MAPPS may be especially useful in the identification of potential stormwater pollution problems and the selection of candidate BMPs applicable to specific sources of stormwater pollutants associated with facilities identified by a co-permittee. Section 2 of the strategy includes a matrix, Table 1, which summarizes the types of facilities of concern operated by each co-permittee. Section 2 also identifies the activities associated with these facilities that may be potential sources of stormwater pollutants. Section 3 describes the potential pollutants associated with the activities identified in Section 2, and Section 4 presents a list of potential source control BMPs for evaluation by the co-permittees for selection as candidate BMPs. These potential BMPs are presented in a matrix format in Table 3, indicating which BMPs may be most appropriate for each of the activities identified in Section 2. Section 5 describes the schedule for training of public agency staff to ensure the proper implementation of the selected BMPs. Section 6

describes the model monitoring program that will be implemented by the co-permittees to measure the effectiveness of the selected BMPs.

Based on the information compiled in Sections 2 and 3, including the types of facilities operated, associated activities, and potential pollutants, and a knowledge of the BMPs currently being implemented at each facility, the co-permittees may use the list of potential source control BMPs presented in Section 4 to develop strategies and select BMPs for pollution prevention that are tailored to each municipal facility. The steps for using the MAPPS to develop facility specific strategies may be summarized as follows:

1. Refer to Table 1 (Section 2) to identify which types of municipal facilities have been determined to be facilities of concern regarding stormwater pollution for a particular co-permittee. Next, refer to Appendix A to obtain the specific activities performed at a facility type.
2. Refer to Table 3 (Section 4) and locate on the matrix the potential source control BMPs which are most applicable to the activities conducted at a type of facility.
3. Conduct initial facility evaluations as described in Section 6 and identify appropriate BMPs from the list of potential source control BMPs in Appendix B. Also, consider any other appropriate BMPs not listed.
4. Identify any capital and/or operations and maintenance costs associated with the implementation of the selected BMPs.
5. Meet with affected municipal departments to select BMPs for implementation at identified facilities and develop facility specific strategies.
6. Obtain approval of the selected BMPs through appropriate City Council or Board action and obtain resources needed to implement the selected BMPs.
7. Prepare a schedule for implementation of the selected BMPs in consultation with the affected municipal departments.

8. Train appropriate staff to ensure proper implementation of the selected BMPs.
9. Monitor the effectiveness of the selected BMPs implemented at each facility.
10. Update each facility's pollution prevention strategy as necessary.

SECTION TWO

The following types of facilities have been determined by the co-permittees to be facilities of concern regarding stormwater pollution:

- maintenance yards (including corporate, equipment, transit maintenance, public works, fleet maintenance, civic center, and parks and recreation equipment yards);
- hazardous materials storage facilities;
- fire and police stations;
- animal shelters; and
- municipal swimming pools.

All co-permittee facilities which are individually covered under the General Industrial Activities Stormwater Permit or other NPDES permit, (e.g. water treatment plants, airports, or landfills), are not included as part of this MAPPS guidance document. A description of the common activities that may be performed at each of the facilities listed above that may have an impact on stormwater quality follows.

Maintenance Yards

- loading, unloading, handling, and storage of animal wastes, anti-freeze, asphalt, batteries, chemicals, concrete, dead animals, diesel wastes, emulsions, fertilizer, fuel, green wastes, hazardous materials, herbicides, new and used oil, oil/grease spills, paint products, pesticides, scrap metal, solvents, trash and debris, and washwater;
- filling of aboveground and underground storage tanks (ASTs and USTs) with fuels;
- dispensing of fuels;
- vehicle and equipment maintenance;

- vehicle and equipment parking and storage;
- vehicle, equipment, and material washing and steam cleaning;
- leak and spill cleanup; and
- landscape, garden, general maintenance and cleaning, and off-site maintenance activities (e.g. streets and road maintenance, drainage facility maintenance, etc.)

Hazardous Materials Storage Facilities

- loading, unloading, handling, and storage of potentially hazardous materials; and
- leak and spill cleanup.

Fire and Police Stations

- loading, unloading, handling, and storage of antifreeze, chemicals, new and used oil, scrap metal, and trash and debris;
- filling of ASTs and USTs with fuels;
- dispensing fuel;
- vehicle and equipment maintenance;
- vehicle and equipment parking and storage;
- vehicle washing and steam cleaning;
- leak and spill cleanup; and
- landscape, garden, and general maintenance and cleaning.

Animal Shelters

- loading, unloading, handling, and storage of dead animals and animal wastes for off-site recycling, chemicals, and fuel; and
- vehicle, equipment, and material washing;

- leak and spill cleanup; and
- landscape, garden, and general maintenance and cleaning.

Swimming Pools

- storage and use of chemicals, including chlorine;
- filter maintenance and backwashing; and
- landscape, garden, and general maintenance and cleaning.

Table 1 summarizes the type of these facilities operated by all of the co-permittees.

TABLE 1. PUBLIC AGENCY FACILITIES

CO-PERMITTEE	Equipment Yards	Corporate Yards	Fleet Maintenance Yards	Parks and Recreation Yards	Civic Center Yards	Fire Stations	Police Stations	Hazardous Materials and Storage Facilities	Animal Shelters	Swimming Pools
San Bernardino County Flood Control District	X									
San Bernardino County	X	X	X	X	X	X	X	X	X	X
Big Bear Lake		X	X			X		X	X	
Chino		X	X				X	X		X
Chino Hills		X								
Colton		X				X	X			X
Fontana		X					X	X		X
Grand Terrace		X			X					
Highland		X								
Loma Linda		X				X		X		
Montclair		X			X	X	X			
Ontario	X	X	X	X		X	X	X		X
Rancho Cucamonga	X	X	X	X		X	X	X	X	
Redlands		X		X		X	X	X	X	
Rialto		X	X			X	X	X		X
San Bernardino		X	X	X		X	X	X	X	X
Upland		X				X	X	X	X	
Yucaipa	X			X				X		X

SECTION THREE

A listing of the potential pollutants that may be associated with each of the general activities described in Section 2 is presented in a matrix format in Table 2. Table 2 is a compilation of the potential pollutants that may be associated with each co-permittee's municipal facilities and activities. Identification of the potential pollutants at each co-permittee's municipal facilities is necessary in order to select appropriate BMPs that will adequately address potential stormwater pollution problems.

The co-permittees are also required to eliminate non-stormwater discharges. A non-stormwater discharge is defined as any discharge to a municipal storm drain system that is not composed entirely of stormwater.

The PERMIT prohibits all non-stormwater discharges except for the following:

- discharges covered by an NPDES permit or approved by the Regional Board;
- discharges from potable water line flushing and other potable water sources;
- discharges from fire fighting and fire hydrant testing and flushing;
- discharges from landscape irrigation, lawn watering, and other irrigation activities;
- diverted stream flows;
- rising groundwater and natural springs;
- uncontaminated groundwater infiltration and uncontaminated pumped groundwater;
- passive foundation drains;
- air conditioning condensate;
- water from crawl space pumps;
- passive footing drains;
- discharges from individual residential vehicle washing (not including discharges from mobile sources);
- flows from riparian habitats and wetlands;

- dechlorinated swimming pool discharges;
- street washwater and run-off from fire fighting; and
- waters not otherwise containing wastes as defined in California Water Code Section 13050 (d).

During the development of the facility specific strategies outlined in Section 1, the co-permittees will begin identifying any existing non-stormwater discharges and characterizing the discharges with respect to frequency, volume, flow, and duration. The co-permittees will also evaluate short term source control BMPs to mitigate the impacts from the non-stormwater discharges and develop a schedule for elimination or permitting of the discharge.

TABLE 2. POTENTIAL POLLUTANTS OF CONCERN

POTENTIAL POLLUTANTS	Material Loading/ Unloading/Handling/ Storage	Filling of ASTs/USTs	Dispensing Fuel	Vehicle/ Equipment Maintenance	Vehicle/Equipment Parking and Storage	Vehicle/Equipment/ Material Washing and Steam Cleaning	Leak and Spill Cleanup	Landscape, Garden, and General Maintenance and Cleaning
Animal Wastes	X							
Anti-freeze	X			X	X		X	
Asphalt	X							
Batteries	X			X				
Chemicals	X			X	X		X	
Concrete	X						X	
Dead Animals	X							
Diesel Wastes	X			X			X	
Emulsions	X						X	
Fertilizer	X						X	
Fuel	X	X	X	X			X	
Green Wastes	X							X
Hazardous Materials	X			X	X		X	X
Herbicides	X						X	X
New/Used Oil	X			X			X	
Oil and Grease Spills	X			X	X	X	X	
Paint Products	X						X	X
Pesticides	X						X	X
Scrap Metal	X			X				
Sediment	X							X
Solvents	X			X			X	
Trash and Debris	X							X
Washwater	X					X		

SECTION FOUR

Based on the facilities and associated activities identified in Section 2 and the pollutants of concern identified in Section 3, a list of potential source control BMPs has been developed for evaluation by the co-permittees. This list references BMPs identified in the *California Storm Water Best Management Practices Handbooks (Industrial and Municipal Handbooks)*. These source control BMPs will be evaluated by each co-permittee as candidate BMPs for implementation at each co-permittee's facilities. Following the selection of BMPs for an identified facility, each co-permittee will prepare an implementation schedule to ensure that these facilities are not sources of pollutants into the waters of the United States. The list of potential source control BMPs includes the following:

Industrial Handbook References

SC1 Non-Stormwater Discharges to Drains

SC2 Vehicle and Equipment Fueling

SC3 Vehicle and Equipment Washing & Steam Cleaning

SC4 Vehicle and Equipment Maintenance and Repair

SC5 Outdoor Loading/Unloading of Materials

SC6 Outdoor Container Storage of Liquids

SC8 Outdoor Storage of Raw Materials, Products, and By-Products

SC9 Waste Handling and Disposal

SC10 Contaminated or Erodible Surface Areas

SC11 Building and Grounds Maintenance

SC14 Employee Training

Municipal Handbook References

SC0 Public Education/Participation

SC1 Land Use Planning/Management

SC10 Housekeeping Practices

SC11 Safer Alternative Products

SC20 Material Storage Control

SC30 Storm Drain System Signs

SC40 Vehicle Leak and Spill Control

SC41 Aboveground Tank Leak and Spill Control

SC50 Illegal Dumping Control

SC60 Illicit Connection - Prevention

SC61 Illicit Connection - Detection and Removal

SC71 Catch Basin Cleaning

SC75 Detention/Infiltration Device Maintenance

SC76 Storm Channel/Creek Maintenance

Construction Handbook References

CA1 Dewatering Operations

CA2 Paving Operations

CA3 Structure Construction and Painting

CA10 Material Delivery and Storage

CA11 Material Use

CA12 Spill Prevention and Control

CA21 Hazardous Waste Management

CA22 Contaminated Soil Management

CA23 Concrete Waste Management

CA24 Sanitary/Septic Waste Management

CA30 Vehicle and Equipment Cleaning

CA31 Vehicle and Equipment Fueling

CA32 Vehicle and Equipment Maintenance

CA40 Employee/Subcontractor Training

A matrix identifying potential BMPs that may be appropriate to implement for the municipal facilities and associated activities identified in Section 2 is presented in Table 3. There may be additional BMPs which would be appropriate for implementation at a co-permittee's facilities that are not identified in Table 3. Fact sheets which describe each potential BMP are included in Appendix B.

TABLE 3. POTENTIAL SOURCE CONTROL BMPS

Activities \ Potential BMPs	BMP References from Industrial Handbook										
	SC1	SC2	SC3	SC4	SC5	SC6	SC8	SC9	SC 10	SC11	SC14
Material Loading /Unloading/Handling/Storage	X				X	X	X	X	X		X
Filling of ASTs/USTs		X									X
Dispensing Fuel		X									X
Vehicle/Equipment Maintenance/Parking and Storage	X			X							X
Vehicle/Equipment/Material Washing and Steam Cleaning	X		X								X
Leak and Spill Cleanup											X
Landscaping, Garden, and General Maintenance and Cleaning	X								X	X	X

Activities \ Potential BMPs	BMP References from Municipal Handbook													
	SC0	SC1	SC10	SC11	SC20	SC30	SC40	SC41	SC50	SC60	SC61	SC71	SC75	SC76
Material Loading /Unloading/Handling/Storage	X	X	X	X	X	X	X	X	X					
Filling of ASTs/USTs							X	X						
Dispensing Fuel	X		X	X			X	X						
Vehicle/Equipment Maintenance/ Parking and Storage	X		X	X			X	X						
Vehicle/Equipment/Material Washing and Steam Cleaning				X										
Leak and Spill Cleanup	X	X	X	X	X	X	X	X	X	X	X			X
Landscaping, Garden, and General Maintenance and Cleaning	X	X	X	X								X	X	X

TABLE 3. POTENTIAL SOURCE CONTROL BMPS (Continued)

Activities \ Potential BMPs	BMP References from Construction Handbook													
	CA1	CA2	CA3	CA10	CA11	CA12	CA21	CA22	CA23	CA24	CA30	CA31	CA32	CA40
Material Loading/Unloading/Handling/Storage		X	X	X	X		X	X		X				X
Dispensing Fuel				X			X	X						X
Vehicle/Equipment Maintenance & Parking				X			X	X			X	X	X	X
Leak and Spill Cleanup			X	X		X	X	X		X				X
Landscaping/General Maint./Cleaning					X									X
Dewatering Operations	X				X									X
Paving & Concrete Operations		X							X					X

SECTION FIVE

Each co-permittee will train appropriate staff to ensure proper implementation of the selected candidate BMPs. Training schedules will be developed after the co-permittees select BMPs specific to each facility that is identified as an area of concern with respect to stormwater pollution. In addition to developing training schedules, the co-permittees may need to schedule activities including identification of staff who require training, development of training programs and training materials, and implementation of the training programs.

SECTION SIX

The following monitoring program to be implemented by the co-permittees has been developed to assess stormwater pollution control measures and identify where improvements or additional measures may need to be implemented. The monitoring program provides a mechanism to identify potential pollutant problems, assess the effectiveness of existing pollution control measures, and identify additional pollution prevention measures (i.e., BMPs) and program improvements for implementation. The monitoring program includes procedures for conducting an annual inspection, completing an inspection report form, and recordkeeping and reporting.

An initial annual inspection will be performed no later than June 1, 1997. This initial inspection will serve as the initial facility evaluation and a baseline for year to year comparisons of the effectiveness of the selected BMPs. Information obtained during the initial facility evaluation will be used by the co-permittees in identifying appropriate BMPs for subsequent approval and implementation by affected municipal departments. Inspections will be performed annually thereafter at those facilities determined by the co-permittees to be facilities of concern regarding stormwater pollution.

6.1 ANNUAL INSPECTION PROCEDURES

Annual inspections will be performed by each co-permittee at the types of facilities identified in Section 2. Each annual inspection will include:

- a facility site walk;
- the completion of an annual inspection report; and
- a re-inspection of facilities where deficiencies are found.

In general, the facility site walk is used to observe and document the extent of overall good housekeeping practices and other stormwater BMPs. The facility site walk includes, but is not limited to, inspections of:

- outdoor areas where trash, waste, and scrap materials are stored;
- outdoor areas where new materials and supplies, especially liquids, are stored;
- fueling islands;
- outside areas where vehicle/equipment maintenance is performed;
- areas immediately outside of buildings in which vehicle/equipment maintenance is performed; and
- areas where vehicle/equipment washing is performed.

These areas of the facility will be inspected to note whether, for example:

- materials are properly contained, stored, and disposed of;
- areas where vehicles, equipment, and materials should be covered with a tarp, moved indoors, or provided with a drip pan while parked or stored;
- spills, leaks, and drips have been cleaned up and where absorbent and containers for used absorbent materials need to be provided;
- buckets containing liquids are sealed and stored in designated areas;
- all drums and containers are properly labeled as to their contents;
- hoses are present and what they are used for;
- non-stormwater discharges (e.g., washwater) are occurring; and
- surface runoff or excessive roof drainage is contacting potential pollutant sources and contributing to nonpoint source pollution.

A Model Annual Inspection Procedures Checklist (Model Checklist) has been developed to provide guidance to staff who will perform facility site walks. A copy of the Model Checklist is included in appendix C. The Model Checklist includes:

- facility name (i.e., Corporation Yard No. 1);
- facility address;
- facility's responsible contact person, phone;
- name of staff conducting the inspection;
- title of staff conducting the inspection; and
- date of inspection.

The Model Checklist provides guidance on important source areas to be inspected and is intended for use during the facility site walk. For each inspection area/item listed under "Areas/Items To Be Inspected" a notation is made as to whether the area was inspected (YES), not inspected (NO), or is not applicable to the facility (NA). If an area/item is not inspected during the facility site walk, a note is also made in the "Comments" section to explain why the area/item was not inspected and what action, if any, needs to be taken to inspect this area in the future. Additional areas that are inspected may be written in at the bottom of the Model Checklist.

6.2 ANNUAL INSPECTION REPORTING

An annual inspection report is also completed for each facility during the annual inspection to provide documentation that a comprehensive inspection has been performed. The annual inspection report is primarily used to document whether a facility is implementing BMPs which are appropriate for its activities, identify any potential stormwater pollution problems, and record recommendations for improvements. A Model Annual Inspection Report (Model Report) is included in Appendix C.

For each facility that is inspected, the following information is recorded on the Model Report:

- facility name (i.e., Corporation Yard No. 1);
- facility address;
- facility's responsible contact person, phone;
- name of staff conducting the inspection;
- title of staff conducting the inspection; and
- date of inspection.

During the facility site walk, for each BMP listed in the Model Report under "Facility Activities," an indication is made as to whether the BMP is being implemented (YES), is not being implemented (NO), or is not appropriate for the facility (NA). If a selected BMP is not being adequately implemented, a note is also made in the "Comments" column to indicate what action needs to be taken to implement the BMP or that the BMP is no longer appropriate. Notes may also be made to characterize non-stormwater discharges or if additional BMPs need to be implemented.

Facilities where deficiencies are noted during the annual inspection will be re-inspected within 90 days. Deficiencies may include poor housekeeping practices, failure to implement appropriate BMPs, or the existence of non-stormwater discharges.

6.3 RECORDKEEPING AND REPORTING

Upon completion of the annual inspections, copies of the reporting forms will be forwarded to the co-permittee's stormwater compliance coordinator for review and recordkeeping. Copies of the annual inspection reports will be kept for five years.

APPENDIX A

APPENDIX A *PUBLIC AGENCY FACILITIES AND ACTIVITIES MATRICES FOR CO-PERMITTEES*

San Bernardino County Flood Control District
County of San Bernardino
City of Big Bear Lake
City of Chino
City of Chino Hills
City of Colton
City of Fontana
City of Grand Terrace
City of Highland
City of Loma Linda
City of Montclair
City of Ontario
City of Rancho Cucamonga
City of Redlands
City of Rialto
City of San Bernardino
City of Upland
City of Yucaipa

PUBLIC AGENCY FACILITIES AND ACTIVITIES

SAN BERNARDINO COUNTY FLOOD CONTROL DISTRICT

Activities	Equipment Yards
Material Loading/Unloading/Handling/Storage	X
Filling of ASTs/USTs	X
Dispensing Fuel	X
Vehicle/Equipment Maintenance	X
Vehicle/Equipment Parking and Storage	X
Vehicle/Equipment/Material Washing and Steam Cleaning	X
Leak and Spill Cleanup	X
Landscape, Garden, and General Maintenance and Cleaning	X

PUBLIC AGENCY FACILITIES AND ACTIVITIES

COUNTY OF SAN BERNARDINO

Activities	Equipment Yards	Corporate Yards	Fleet Maintenance Yards	Parks and Recreation Yards	Civic Center Yards	Police and Fire Stations	Hazardous Materials and Storage Facilities	Animal Shelters/ Swimming Pools	Other **
Material Loading/Unloading/Handling/Storage	X	X	X	X	X	X	X	X	X
Filling of ASTs/USTs	X	X	X	X	X	X			X
Dispensing Fuel	X	X	X	X	X	X			X
Vehicle/Equipment Maintenance	X	X	X	X	X	X			
Vehicle/Equipment Parking and Storage	X	X	X	X	X	X		X	X
Vehicle/Equipment/Material Washing and Steam Cleaning	X	X	X	X	X	X			
Leak and Spill Cleanup	X	X	X	X	X	X	X	X	X
Landscape, Garden, and General Maintenance and Cleaning	X	X	X	X	X	X	X	X	X

** Other

Agricultural Commisioner
Big Bear CSD
Facilities Management
General Services Agency
Gilbert Street Offices
Norcal-Milliken Landfill
Office of Management Services
Old Court House
S.B. Co. Medical Center
S.B. Co. Library
S.B. Co. Housing
Temporary Emergency Operations
Traffic Operations Section
Vector Control
Wastewater Treatment Plant

PUBLIC AGENCY FACILITIES AND ACTIVITIES

CITY OF BIG BEAR LAKE

Activities	Corporate Yards	Fleet Maintenance Yards	Fire Stations	Hazardous Materials and Storage Facilities	Animal Shelters
Material Loading/Unloading/Handling/Storage	X	X	X	X	X
Filling of ASTs/USTs	X	X	X		
Dispensing Fuel	X	X	X		
Vehicle/Equipment Maintenance	X	X	X		
Vehicle/Equipment Parking and Storage	X	X	X		
Vehicle/Equipment/Material Washing and Steam Cleaning	X	X	X		
Leak and Spill Cleanup	X	X	X	X	X
Landscape, Garden, and General Maintenance and Cleaning	X	X	X		X

PUBLIC AGENCY FACILITIES AND ACTIVITIES

CITY OF CHINO

Activities	Corporate Yards	Fleet Maintenance Yards	Police Stations	Hazardous Materials and Storage Facilities
Material Loading/Unloading/Handling/Storage	X	X		X
Filling of ASTs/USTs	X	X		
Dispensing Fuel	X	X		
Vehicle/Equipment Maintenance	X	X		
Vehicle/Equipment Parking and Storage	X	X	X	
Vehicle/Equipment/Material Washing and Steam Cleaning	X	X		
Leak and Spill Cleanup	X	X	X	X
Landscape, Garden, and General Maintenance and Cleaning	X	X	X	X

PUBLIC AGENCY FACILITIES AND ACTIVITIES

CITY OF CHINO HILLS

Activities	Corporate Yards
Material Loading/Unloading/Handling/Storage	X
Filling of ASTs/USTs	X
Dispensing Fuel	X
Vehicle/Equipment Maintenance	X
Vehicle/Equipment Parking and Storage	X
Vehicle/Equipment/Material Washing and Steam Cleaning	X
Leak and Spill Cleanup	X
Landscape, Garden, and General Maintenance and Cleaning	X

PUBLIC AGENCY FACILITIES AND ACTIVITIES

CITY OF COLTON

Activities	Corporate Yards	Fire Stations	Police Stations	Swimming Pools
Material Loading/Unloading/Handling/Storage	X	X	X	X
Filling of ASTs/USTs	X	X		
Dispensing Fuel	X	X		
Vehicle/Equipment Maintenance	X	X		
Vehicle/Equipment Parking and Storage	X	X	X	
Vehicle/Equipment/Material Washing and Steam Cleaning	X	X	X	X
Leak and Spill Cleanup	X	X	X	X
Landscape, Garden, and General Maintenance and Cleaning	X	X	X	X

PUBLIC AGENCY FACILITIES AND ACTIVITIES

CITY OF FONTANA

Activities	Corporate Yards	Police Stations	Hazardous Materials and Storage Facilities	Swimming Pools
Material Loading/Unloading/Handling/Storage	X	X	X	X
Filling of ASTs/USTs	X	X		
Dispensing Fuel	X	X		
Vehicle/Equipment Maintenance	X	X		
Vehicle/Equipment Parking and Storage	X	X		
Vehicle/Equipment/Material Washing and Steam Cleaning	X	X		X
Leak and Spill Cleanup	X	X	X	X
Landscape, Garden, and General Maintenance and Cleaning	X	X	X	X

PUBLIC AGENCY FACILITIES AND ACTIVITIES

CITY OF GRAND TERRACE

Activities	Corporate Yards	Civic Center Yards
Material Loading/Unloading/Handling/Storage	X	X
Filling of ASTs/USTs		
Dispensing Fuel		
Vehicle/Equipment Maintenance		
Vehicle/Equipment Parking and Storage	X	X
Vehicle/Equipment/Material Washing and Steam Cleaning		
Leak and Spill Cleanup	X	X
Landscape, Garden, and General Maintenance and Cleaning	X	X

PUBLIC AGENCY FACILITIES AND ACTIVITIES

CITY OF HIGHLAND

Activities	Corporate Yards
Material Loading/Unloading/Handling/Storage	X
Filling of ASTs/USTs	X
Dispensing Fuel	X
Vehicle/Equipment Maintenance	X
Vehicle/Equipment Parking and Storage	X
Vehicle/Equipment/Material Washing and Steam Cleaning	X
Leak and Spill Cleanup	X
Landscape, Garden, and General Maintenance and Cleaning	X

PUBLIC AGENCY FACILITIES AND ACTIVITIES

CITY OF LOMA LINDA

Activities	Corporate Yards	Fire Stations	Hazardous Materials and Storage Facilities
Material Loading/Unloading/Handling/Storage	X	X	X
Filling of ASTs/USTs	X	X	
Dispensing Fuel	X	X	
Vehicle/Equipment Maintenance	X		
Vehicle/Equipment Parking and Storage	X	X	
Vehicle/Equipment/Material Washing and Steam Cleaning	X	X	
Leak and Spill Cleanup	X	X	X
Landscape, Garden, and General Maintenance and Cleaning	X		X

PUBLIC AGENCY FACILITIES AND ACTIVITIES

CITY OF MONTCLAIR

Activities	Corporate Yards	Civic Center Yards	Fire Stations	Police Stations
Material Loading/Unloading/Handling/Storage	X	X	X	X
Filling of ASTs/USTs	X	X	X	X
Dispensing Fuel	X	X	X	X
Vehicle/Equipment Maintenance	X	X		
Vehicle/Equipment Parking and Storage	X	X	X	X
Vehicle/Equipment/Material Washing and Steam Cleaning				
Leak and Spill Cleanup	X	X	X	X
Landscape, Garden, and General Maintenance and Cleaning	X	X	X	X

PUBLIC AGENCY FACILITIES AND ACTIVITIES

CITY OF ONTARIO

Activities	Equipment Yards	Corporate Yards	Fleet Maintenance Yards	Parks and Recreation Yards	Fire Stations	Police Stations	Hazardous Materials and Storage Facilities	Swimming Pools
Material Loading/Unloading/Handling/Storage	X	X	X	X	X	X	X	X
Filling of ASTs/USTs	X	X	X		X	X		
Dispensing Fuel	X	X	X		X	X		
Vehicle/Equipment Maintenance	X	X	X					
Vehicle/Equipment Parking and Storage	X	X	X		X	X		
Vehicle/Equipment/Material Washing and Steam Cleaning	X	X	X					
Leak and Spill Cleanup	X	X	X	X	X	X	X	X
Landscape, Garden, and General Maintenance and Cleaning	X	X	X	X	X	X	X	X

PUBLIC AGENCY FACILITIES AND ACTIVITIES

CITY OF RANCHO CUCAMONGA

Activities	Equipment Yards	Corporate Yards	Fleet Maintenance Yards	Parks and Recreation Yards	Fire Stations	Police Stations	Hazardous Materials and Storage Facilities	Animal Shelters
Material Loading/Unloading/Handling/Storage	X	X	X	X	X	X	X	X
Filling of ASTs/USTs	X	X	X		X	X		X
Dispensing Fuel	X	X	X		X	X		X
Vehicle/Equipment Maintenance	X	X	X		X			
Vehicle/Equipment Parking and Storage	X	X	X		X	X		
Vehicle/Equipment/Material Washing and Steam Cleaning								
Leak and Spill Cleanup	X	X	X	X	X	X	X	X
Landscape, Garden, and General Maintenance and Cleaning	X	X	X	X	X	X	X	X

PUBLIC AGENCY FACILITIES AND ACTIVITIES

CITY OF REDLANDS

Activities	Corporate Yards	Parks and Recreation Yards	Fire Stations	Police Stations	Hazardous Materials and Storage Facilities	
Material Loading/Unloading/Handling/Storage	X	X	X	X	X	X
Filling of ASTs/USTs	X	X	X	X		
Dispensing Fuel	X	X	X	X		
Vehicle/Equipment Maintenance	X	X				
Vehicle/Equipment Parking and Storage	X	X	X	X		X
Vehicle/Equipment/Material Washing and Steam Cleaning	X	X				
Leak and Spill Cleanup	X	X	X	X	X	X
Landscape, Garden, and General Maintenance and Cleaning	X	X	X	X	X	X

PUBLIC AGENCY FACILITIES AND ACTIVITIES

CITY OF RIALTO

Activities	Corporate Yards	Fleet Maintenance Yards	Fire Stations	Police Stations	Hazardous Materials and Storage Facilities	Swimming Pools
Material Loading/Unloading/Handling/Storage	X	X	X	X	X	X
Filling of ASTs/USTs	X	X	X	X		
Dispensing Fuel	X	X	X	X		
Vehicle/Equipment Maintenance	X	X				
Vehicle/Equipment Parking and Storage	X	X	X	X		X
Vehicle/Equipment/Material Washing and Steam Cleaning	X					
Leak and Spill Cleanup	X	X	X	X	X	X
Landscape, Garden, and General Maintenance and Cleaning	X	X	X	X	X	X

PUBLIC AGENCY FACILITIES AND ACTIVITIES

CITY OF SAN BERNARDINO

Activities	Corporate Yards	Fleet Maintenance Yards	Parks and Recreation Yards	Fire Stations	Police Stations	Hazardous Materials and Storage Facilities	Animal Shelters	Swimming Pools
Material Loading/Unloading/Handling/Storage	X	X	X	X	X	X	X	X
Filling of ASTs/USTs	X	X	X	X	X			
Dispensing Fuel	X	X	X	X	X			
Vehicle/Equipment Maintenance	X	X	X					
Vehicle/Equipment Parking and Storage	X	X	X	X	X			
Vehicle/Equipment/Material Washing and Steam Cleaning	X	X	X					
Leak and Spill Cleanup	X	X	X	X	X	X	X	X
Landscape, Garden, and General Maintenance and Cleaning	X	X	X	X	X	X	X	X

PUBLIC AGENCY FACILITIES AND ACTIVITIES

CITY OF UPLAND

Activities	Corporate Yards	Fire Stations	Police Stations	Hazardous Materials and Storage Facilities	Animal Shelters	Other **
Material Loading/Unloading/Handling/Storage	X	X	X	X	X	X
Filling of ASTs/USTs	X	X	X			
Dispensing Fuel	X	X	X			
Vehicle/Equipment Maintenance	X					
Vehicle/Equipment Parking and Storage	X	X	X			
Vehicle/Equipment/Material Washing and Steam Cleaning	X					
Leak and Spill Cleanup	X	X	X	X	X	X
Landscape, Garden, and General Maintenance and Cleaning	X	X	X	X	X	X

** Other - Wastewater Treatment Plant

PUBLIC AGENCY FACILITIES AND ACTIVITIES

CITY OF YUCAIPA

Activities	Equipment Yards	Parks and Recreation Yards	Hazardous Materials and Storage Facilities	Swimming Pools
Material Loading/Unloading/Handling/Storage	X	X	X	X
Filling of ASTs/USTs				
Dispensing Fuel				
Vehicle/Equipment Maintenance	X			
Vehicle/Equipment Parking and Storage	X	X		
Vehicle/Equipment/Material Washing and Steam Cleaning				
Leak and Spill Cleanup	X	X	X	X
Landscape, Garden, and General Maintenance and Cleaning				

APPENDIX B

Industrial Handbook References

SC1 Non-Stormwater Discharges to Drains

SC2 Vehicle and Equipment Fueling

SC3 Vehicle and Equipment Washing & Steam Cleaning

SC4 Vehicle and Equipment Maintenance and Repair

SC5 Outdoor Loading/Unloading of Materials

SC6 Outdoor Container Storage of Liquids

SC8 Outdoor Storage of Raw Materials, Products, and By-Products

SC9 Waste Handling and Disposal

SC10 Contaminated or Erodible Surface Areas

SC11 Building and Grounds Maintenance

SC14 Employee Training

Municipal Handbook References

SC0 Public Education/Participation

SC1 Land Use Planning/Management

SC10 Housekeeping Practices

SC11 Safer Alternative Products

SC20 Material Storage Control

SC30 Storm Drain System Signs

SC40 Vehicle Leak and Spill Control

SC41 Aboveground Tank Leak and Spill Control

SC50 Illegal Dumping Control

SC60 Illicit Connection - Prevention

SC61 Illicit Connection - Detection and Removal

SC71 Catch Basin Cleaning

SC75 Detention/Infiltration Device Maintenance

SC76 Storm Channel/Creek Maintenance

Construction Handbook References

CA1 Dewatering Operations

CA2 Paving Operations

CA3 Structure Construction and Painting

CA10 Material Delivery and Storage

CA11 Material Use

CA12 Spill Prevention and Control

CA21 Hazardous Waste Management

CA22 Contaminated Soil Management

CA23 Concrete Waste Management

CA24 Sanitary/Septic Waste Management

CA30 Vehicle and Equipment Cleaning

CA31 Vehicle and Equipment Fueling

CA32 Vehicle and Equipment Maintenance

CA40 Employee/Subcontractor Training

INDUSTRIAL HANDBOOK REFERENCES

4. SOURCE CONTROL BMPs

INTRODUCTION

This chapter describes specific source control Best Management Practices (BMPs) for common industrial activities that may pollute storm water. Chapter 2 led you through the steps of identifying activities at your facility that can pollute storm water while Chapter 3 provided guidance on selection of BMPs. This chapter provides you with the BMPs that best fill your facility's need. Best management practices for each of the activities shown below are provided in the following fact sheets.

Each fact sheet contains a cover sheet with:

- A description of the BMP
- Approach
- Requirements
  - Cost, including capital costs, and Operation and Maintenance (O&M)
  - Maintenance (including administrative and staffing)
- Limitations

The side bar presents information on where this BMP applies, targeted constituents, and an indication of the level of effort and cost to implement.

Further information is also provided in additional sheets. This information includes a more detailed description of the BMP, requirements to implement, examples of effective programs, and references.

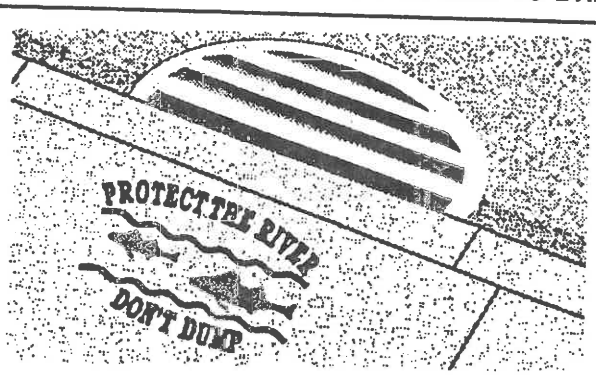
BMPs are provided for each of the following industrial activities consistent with Worksheet 4 in Chapter 2.

Industrial Activities Requiring BMPs

SC1	Non-Storm Water Discharges to Drains
SC2	Vehicle and Equipment Fueling
SC3	Vehicle and Equipment Washing and Steam Cleaning
SC4	Vehicle and Equipment Maintenance and Repair
SC5	Outdoor Loading/Unloading of Materials
SC6	Outdoor Container Storage of Liquids
SC7	Outdoor Process Equipment Operations and Maintenance
SC8	Outdoor Storage of Raw Materials, Products, and By-Products
SC9	Waste Handling and Disposal
SC10	Contaminated or Erodible Surface Areas
SC11	Building and Grounds Maintenance
SC12	Building Repair, Remodeling, and Construction
SC13	Over-Water Activities
SC14	Employee Training

Fact sheet SC14, Employee Training, is a compilation of the training aspects of the individual source control fact sheets. Its purpose is to facilitate the integration and development of a comprehensive training program for all industrial activities at a facility.

ACTIVITY: NON-STORM WATER DISCHARGES TO DRAINS



Applications

- Manufacturing
- Material Handling
- Vehicle Maintenance
- Construction
- Commercial Activities
- Roadways
- Waste Containment
- Housekeeping Practices

DESCRIPTION

Eliminate non-storm water discharges to the storm water collection system. Non-storm water discharges may include: process wastewaters, cooling waters, wash waters, and sanitary wastewater.

APPROACH

The following approaches may be used to identify non-storm water discharges:

- Visual Inspection
  - The easiest method is to inspect each discharge point during dry weather.
  - Keep in mind that drainage from a storm event can continue for three days or more and groundwater may infiltrate the underground storm water collection system.
- Piping Schematic Review
  - The piping schematic is a map of pipes and drainage systems used to carry wastewater, cooling water, sanitary wastes, etc.
  - A review of the "as-built" piping schematic is a way to determine if there are any connections to the storm water collection system.
  - Inspect the path of floor drains in older buildings.
- Smoke Testing
  - Smoke testing of wastewater and storm water collection systems is used to detect connections between the two systems.
  - During dry weather the storm water collection system is filled with smoke and then traced to sources. The appearance of smoke at the base of a toilet indicates that there may be a connection between the sanitary and the storm water system.
- Dye Testing
  - A dye test can be performed by simply releasing a dye into either your sanitary or process wastewater system and examining the discharge points from the storm water collection system for discoloration.

REQUIREMENTS

Costs (Capital, O&M)

- Can be difficult to locate illicit connections especially if there is groundwater infiltration.

LIMITATIONS

- Many facilities do not have accurate, up-to-date schematic drawings.
- TV and visual inspections can identify illicit connections to the storm sewer, but further testing is sometimes required (e.g. dye, smoke) to identify sources.

Targeted Constituents

○	Sediment
●	Nutrients
●	Heavy Metals
●	Toxic Materials
◒	Floatable Materials
●	Oxygen Demanding Substances
●	Oil & Grease
●	Bacteria & Viruses

● Likely to Have Significant Impact
○ Probable Low or Unknown Impact

Implementation Requirements

◒	Capital Costs
○	O&M Costs
○	Maintenance
◒	Training

● High ○ Low

SC1

Best Management Practices

Additional Information — Non-Storm Water Discharges to Drains

Facilities subject to storm water permit requirements must include a certification that the storm water collection system has been tested or evaluated for the presence of non-storm water discharges. The State's General Industrial Storm Water Permit requires that non-storm water discharges be eliminated prior to implementation of the facility's SWPPP.

Non-storm water discharges to the storm water collection system may include any water used directly in the manufacturing process (process wastewater), air conditioning condensate and coolant, non-contact cooling water, cooling equipment condensate, outdoor secondary containment water, vehicle and equipment wash water, sink and drinking fountain wastewater, sanitary wastes, or other wastewaters. Table 4.1 presents disposal option information for specific types of wastewaters.

To ensure that the storm water system discharge contains only storm water, industry should:

- Locate discharges to the municipal storm sewer system or waters of the United States from the industrial storm sewer system from:
  - "as-built" pipeline schematics, and
  - visual observation (walk boundary of plant site).
- Locate and evaluate all discharges to the industrial storm sewer system (including wet weather flows) from:
  - "as-built" pipeline schematics,
  - visual observation,
  - dye tests,
  - TV camera,
  - chemical field test kits, and
  - smoke tests.
- Develop plan to eliminate illicit connections:
  - replumb sewer lines,
  - isolate problem areas, and
  - plug illicit discharge points.
- Develop disposal options.
- Document that non-storm water discharges have been eliminated by recording tests performed, methods used, dates of testing, and any on-site drainage points observed.

REFERENCES

General Industrial Storm Water Permit, SWRCB, 1992.

NPDES General Permit for Discharges of Storm Water Associated with Industrial Activity in Santa Clara County to South San Francisco Bay or its Tributaries, SFBRWQCB, 1992.

Storm Water Management for Industrial Activities: Developing Pollution Prevention Plans, and Best Management Practices, EPA 832-R-92-006, USEPA, 1992.

SC1



TABLE 4.1 QUICK REFERENCE - DISPOSAL ALTERNATIVES
(Adopted from Santa Clara County Nonpoint Source Pollution Control Program - December 1992)

All of the waste products on this chart are prohibited from discharge to the storm drain system. Use this matrix to decide which alternative disposal strategies to use. **ALTERNATIVES ARE LISTED IN PRIORITY ORDER.**

Key: HHW Household hazardous waste (Government-sponsored drop-off events)
POTW Publically Owned Treatment Plant
Reg.Bd. Regional Water Quality Control Board (Oakland)
"Dispose to sanitary sewer" means dispose into sink, toilet, or sanitary sewer clean-out connection.
"Dispose as trash" means dispose in dumpsters or trash containers for pickup and/or eventual disposal in landfill.
"Dispose as hazardous waste" for business/commercial means contract with a hazardous waste hauler to remove and dispose.

DISCHARGE/ACTIVITY	BUSINESS/COMMERCIAL Disposal Priorities	Approval	RESIDENTIAL Disposal Priorities
General Construction and Painting; Street and Utility Maintenance			
Excess paint (oil-based)	1. Recycle/reuse. 2. Dispose as hazardous waste.		1. Recycle/reuse. 2. Take to HHW drop-off.
Excess paint (water-based)	1. Recycle/reuse. 2. Dry residue in cans, dispose as trash. 3. If volume is too much to dry, dispose as hazardous waste.		1. Recycle/reuse. 2. Dry residue in cans, dispose as trash. 3. If volume is too much to dry, take to HHW drop-off
Paint cleanup (oil-based)	Wipe paint out of brushes, then: 1. Filter & reuse thinners, solvents. 2. Dispose as hazardous waste.		Wipe paint out of brushes, then: 1. Filter & reuse thinners, solvents. 2. Take to HHW drop-off.
Paint cleanup (water-based)	Wipe paint out of brushes, then: 1. Rinse to sanitary sewer.		Wipe paint out of brushes, then: 1. Rinse to sanitary sewer.
Empty paint cans (dry)	1. Remove lids, dispose as trash.		1. Remove lids, dispose as trash.
Paint stripping (with solvent)	1. Dispose as hazardous waste.		1. Take to HHW drop-off.
Building exterior cleaning (high-pressure water)	1. Prevent entry into storm drain and remove offsite 2. Wash onto dirt area, spade in 3. Collect (e.g. mop up) and discharge to sanitary sewer	POTW	
Cleaning of building exteriors which have **HAZARDOUS MATERIALS** (e.g. mercury, lead) in paints	1. Use dry cleaning methods 2. Contain and dispose washwater as hazardous waste (Suggestion: dry material first to reduce volume)		

DISCHARGE/ACTIVITY	BUSINESS/COMMERCIAL Disposal Priorities	Approval	RESIDENTIAL Disposal Priorities
General Construction and Painting; Street and Utility Maintenance (cont'd)			
Non-hazardous paint scraping/ sand blasting	1. Dry sweep, dispose as trash		1. Dry sweep, dispose as trash
HAZARDOUS paint scraping/sand blasting (e.g. marine paints or paints containing lead or tributyl tin)	1. Dry sweep, dispose as hazardous waste		1. Dry sweep, take to HHW drop-off
Soil from excavations during periods when storms are forecast	1. Should not be placed in street or on paved areas 2. Remove from site or backfill by end of day 3. Cover with tarpaulin or surround with hay bales, or use other runoff controls 4. Place filter mat over storm drain Note: Thoroughly sweep following removal of dirt in all four alternatives.		
Soil from excavations placed on paved surfaces during periods when storms are not forecast	1. Keep material out of storm conveyance systems and thoroughly remove via sweeping following removal of dirt		
Cleaning streets in construction areas	1. Dry sweep and minimize tracking of mud 2. Use silt ponds and/or similar pollutant reduction techniques when flushing pavement		
Soil erosion, sediments	1. Cover disturbed soils, use erosion controls, block entry to storm drain. 2. Seed or plant immediately.		
Fresh cement, grout, mortar	1. Use/reuse excess 2. Dispose to trash		1. Use/reuse excess 2. Dispose as trash
Washwater from concrete/mortar (etc.) cleanup	1. Wash onto dirt area, spade in 2. Pump and remove to appropriate disposal facility 3. Settle, pump water to sanitary sewer	POTW	1. Wash onto dirt area, spade in 2. Pump and remove to appropriate disposal facility 3. Settle, pump water to sanitary sewer
Aggregate wash from driveway/patio construction	1. Wash onto dirt area, spade in 2. Pump and remove to appropriate disposal facility 3. Settle, pump water to sanitary sewer	POTW	1. Wash onto dirt area, spade in 2. Pump and remove to appropriate disposal facility 3. Settle, pump water to sanitary sewer

DISCHARGE/ACTIVITY	BUSINESS/COMMERCIAL Disposal Priorities	Approval	RESIDENTIAL Disposal Priorities
General Construction and Painting; Street and Utility Maintenance (cont'd)			
Rinsewater from concrete mixing trucks	1. Return truck to yard for rinsing into pond or dirt area 2. At construction site, wash into pond or dirt area		
Non-hazardous construction and demolition debris	1. Recycle/reuse (concrete, wood, etc.) 2. Dispose as trash		1. Recycle/reuse (concrete, wood, etc. 2. Dispose as trash
Hazardous demolition and construction debris (e.g. asbestos)	1. Dispose as hazardous waste		1. Do not attempt to remove yourself. Contact asbestos removal service for safe removal and disposal 2. Very small amounts (less than 5 lbs) may be double-wrapped in plastic and taken to HHW drop-off
Saw-cut slurry	1. Use dry cutting technique and sweep up residue 2. Vacuum slurry and dispose off-site. 3. Block storm drain or berm with low weir as necessary to allow most solids to settle. Shovel out gutters; dispose residue to dirt area, construction yard or landfill.		
Construction dewatering (Nonturbid, uncontaminated groundwater)	1. Recycle/Reuse 2. Discharge to storm drain		
Construction dewatering (Other than nonturbid, uncontaminated groundwater)	1. Recycle/reuse 2. Discharge to sanitary sewer 3. As appropriate, treat prior to discharge to storm drain	POTW Reg. Bd.	
Portable toilet waste	1. Leasing company shall dispose to sanitary sewer at POTW	POTW	
Leaks from garbage dumpsters	1. Collect, contain leaking material. Eliminate leak, keep covered, return to leasing company for immediate repair 2. If dumpster is used for liquid waste, use plastic liner		

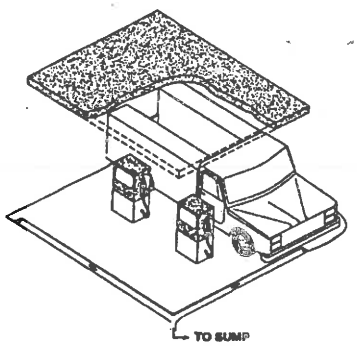
DISCHARGE/ACTIVITY	BUSINESS/COMMERCIAL Disposal Priorities	Approval	RESIDENTIAL Disposal Priorities
General Construction and Painting; Street and Utility Maintenance (cont'd)			
Leaks from construction debris bins	1. Insure that bins are used for dry nonhazardous materials only (Suggestion: Fencing, covering help prevent misuse)		
Dumpster cleaning water	1. Clean at dumpster owner's facility and discharge waste through grease interceptor to sanitary sewer 2. Clean on site and discharge through grease interceptor to sanitary sewer	POTW POTW	
Cleaning driveways, paved areas * (Special Focus = Restaurant alleys Grocery dumpster areas) * Note: Local drought ordinances may contain additional restrictions	1. Sweep and dispose as trash (Dry cleaning only). 2. For vehicle leaks, restaurant/grocery alleys, follow this 3-step process: a. Clean up leaks with rags or absorbents. b. Sweep, using granular absorbent material (cat litter). c. Mop and dispose of mopwater to sanitary sewer (or collect rinsewater and pump to the sanitary sewer). 3. Same as 2 above, but with rinsewater (2c)(no soap) discharged to storm drain.		1. Sweep and dispose as trash (Dry cleaning only). 2. For vehicle leaks, follow this 3-step process: a. Clean up leaks with rags or absorbents; dispose as hazardous waste. b. Sweep, using granular absorbent material (cat litter). c. Mop and dispose of mopwater to sanitary sewer.
Steam cleaning of sidewalks, plazas * * Note: Local drought ordinances may contain additional restrictions	1. Collect all water and pump to sanitary sewer. 2. Follow this 3-step process: a. Clean oil leaks with rags or adsorbents b. Sweep (Use dry absorbent as needed) c. Use no soap, discharge to storm drain		
Potable water/line flushing Hydrant testing	1. Deactivate chlorine by maximizing time water will travel before reaching creeks		
Super-chlorinated (above 1 ppm) water from line flushing	1. Discharge to sanitary sewer 2. Complete dechlorination required before discharge to storm drain		

DISCHARGE/ACTIVITY	BUSINESS/COMMERCIAL Disposal Priorities	Approval	RESIDENTIAL Disposal Priorities
Landscape/Garden Maintenance			
Pesticides	1. Use up. Rinse containers use rinsewater as product. Dispose rinsed containers as trash 2. Dispose unused pesticide as hazardous waste		1. Use up. Rinse containers, use rinsewater as pesticide. Dispose rinsed container as trash. 2. Take unused pesticide to HHW drop-off
Garden clippings	1. Compost 2. Take to Landfill		1. Compost 2. Dispose as trash.
Tree trimming	1. Chip if necessary, before composting or recycling		1. Chip if necessary, before composting or recycling
Swimming pool, spa, fountain water (emptying)	1. Do not use metal-based algicides (i.e. Copper Sulfate) 2. Recycle/reuse (e.g. irrigation) 3. Determine chlorine residual = 0, wait 24 hours and then discharge to storm drain.	POTW	1. Do not use metal-based algicides (i.e. Copper Sulfate) 2. Recycle/reuse (e.g. irrigation) 3. Determine chlorine residual = 0, wait 24 hours and then discharge to storm drain.
Acid or other pool/spa/fountain cleaning	1. Neutralize and discharge to sanitary sewer	POTW	
Swimming pool, spa filter backwash	1. Reuse for irrigation 2. Dispose on dirt area 3. Settle, dispose to sanitary sewer		1. Use for landscape irrigation 2. Dispose on dirt area 3. Settle, dispose to sanitary sewer
Vehicle Wastes			
Used motor oil	1. Use secondary containment while storing, send to recycler.		1. Put out for curbside recycling pickup where available 2. Take to Recycling Facility or auto service facility with recycling program 3. Take to HHW events accepting motor oil
Antifreeze	1. Use secondary containment while storing, send to recycler.		1. Take to Recycling Facility
Other vehicle fluids and solvents	1. Dispose as hazardous waste		1. Take to HHW event
Automobile batteries	1. Send to auto battery recycler 2. Take to Recycling Center		1. Exchange at retail outlet 2. Take to Recycling Facility or HHW event where batteries are accepted
Motor home/construction trailer waste	1. Use holding tank. Dispose to sanitary sewer		1. Use holding tank, dispose to sanitary sewer.

DISCHARGE/ACTIVITY	BUSINESS/COMMERCIAL Disposal Priorities	Approval	RESIDENTIAL Disposal Priorities
Vehicle Wastes (cont'd)			
Vehicle Washing	1. Recycle 2. Discharge to sanitary sewer, never to storm drain	POTW	1. Take to Commercial Car Wash. 2. Wash over lawn or dirt area 3. If soap is used, use a bucket for soapy water and discharge remaining soapy water to sanitary sewer.
Mobile Vehicle Washing	1. Collect washwater and discharge to sanitary sewer.	POTW	
Rinsewater from dust removal at new car fleets	1. Discharge to sanitary sewer 2. If rinsing dust from exterior surfaces from appearance purposes, use no soap (water only); discharge to storm drain.	POTW	
Vehicle leaks at Vehicle Repair Facilities	Follow this 3-step process: 1. Clean up leaks with rags or absorbents 2. Sweep, using granular absorbent material (cat litter) 3. Mop and dispose of mopwater to sanitary sewer.		
Other Wastes			
Carpet cleaning solutions & other mobile washing services	1. Dispose to sanitary sewer	POTW	1. Dispose to sanitary sewer
Roof drains	1. If roof is contaminated with industrial waste products, discharge to sanitary sewer 2. If no contamination is present, discharge to storm drain		
Cooling water Air conditioning condensate	1. Recycle/reuse 2. Discharge to sanitary sewer	POTW	
Pumped groundwater, infiltration/ foundation drainage (contaminated)	1. Recycle/reuse (landscaping, etc.) 2. Treat if necessary; discharge to sanitary sewer 3. Treat and discharge to storm drain	Reg. Bd. POTW Reg. Bd.	
Fire fighting flows	If contamination is present, Fire Dept. will attempt to prevent flow to stream or storm drain		

DISCHARGE/ACTIVITY	BUSINESS/COMMERCIAL Disposal Priorities	Approval	RESIDENTIAL Disposal Priorities
Other Wastes (cont'd)			
Kitchen Grease	1. Provide secondary containment, collect, send to recyler. 2. Provide secondary containment, collect, send to POTW via hauler.	POTW	1. Collect, solidify, dispose as trash
Restaurant cleaning of floor mats, exhaust filters, etc.	1. Clean inside building with discharge through grease trap to sanitary sewer. 2. Clean outside in container or bermed area with discharge to sanitary sewer.		
Clean-up wastewater from sewer back-up	1. Follow this procedure: a. Block storm drain, contain, collect, and return spilled material to the sanitary sewer. b. Block storm drain, rinse remaining material to collection point and pump to sanitary sewer. (no rinse-water may flow to storm drain)		

ACTIVITY: VEHICLE AND EQUIPMENT FUELING



DESCRIPTION

Prevent fuel spills and leaks, and reduce their impacts to storm water.

APPROACH

- Design the fueling area to prevent the runon of storm water and the runoff of spills:
  - Cover fueling area if possible.
  - Use a perimeter drain or slope pavement inward with drainage to sump.
  - Pave fueling area with concrete rather than asphalt.
- Where covering is infeasible and the fuel island is surrounded by pavement, apply a suitable sealant that protects the asphalt from spilled fuels.
- If dead-end sump is not used to collect spills, install an oil/water separator.
- Install vapor recovery nozzles to help control drips as well as air pollution.
- Discourage "topping-off" of fuel tanks.
- Use secondary containment when transferring fuel from the tank truck to the fuel tank.
- Use adsorbent materials on small spills and general cleaning rather than hosing down the area. Remove the adsorbent materials promptly.
- Carry out all Federal and State requirements regarding underground storage tanks, or install above ground tanks.
- Do not use mobile fueling of mobile industrial equipment around the facility; rather, transport the equipment to designated fueling areas.
- Keep your Spill Prevention Control and Countermeasure (SPCC) Plan up-to-date.
- Train employees in proper fueling and cleanup procedures.
- For a quick reference on disposal alternatives for specific wastes see Table 4.1, SC1.

REQUIREMENTS

- Costs (Capital, O&M)
  - The retrofitting of existing fueling areas to minimize storm water exposure or spill runoff can be expensive. Good design must occur during the initial installation. Extruded curb along the "upstream" side of the fueling area to prevent storm water runon is of modest cost.
- Maintenance
  - Clean oil/water separators at the appropriate intervals.
  - Keep ample supplies of spill cleanup materials on-site.
  - Inspect fueling areas and storage tanks on a regular schedule.

LIMITATIONS

- Oil/water separators are only as effective as their maintenance program.

Applications

- *Manufacturing*
- *Material Handling*
- *Vehicle Maintenance*
- *Construction*
- *Commercial Activities*
- *Roadways*
- *Waste Containment*
- *Housekeeping Practices*

Targeted Constituents

- ○ *Sediment*
- ○ *Nutrients*
- ◐ *Heavy Metals*
- ◐ *Toxic Materials*
- ○ *Floatable Materials*
- ○ *Oxygen Demanding Substances*
- ◐ *Oil & Grease*
- ○ *Bacteria & Viruses*

◐ *Likely to Have Significant Impact*
○ *Probable Low or Unknown Impact*

Implementation Requirements

- ◒ *Capital Costs*
- ○ *O&M Costs*
- ◒ *Maintenance*
- ◒ *Training*

◐ *High* ○ *Low*

SC2

Best Management Practices

Additional Information — Vehicle and Equipment Fueling

Spills from fueling or from the transfer of fuels to the storage tank can be a significant source of pollution. Fuels carry contaminants of particular concern to humans and wildlife, such as heavy metals, toxic materials, and oil and grease, which are not easily removed by storm water treatment devices. Consequently, control at the source is particularly important. Adequate control can be achieved with careful design of the initial installation, retrofitting of existing installations, and proper spill control and cleanup procedures, as described below.

Design

With new installations, design the fueling area to prevent the runon of storm water and the runoff of spills. This can be achieved by contouring the site in the appropriate fashion. Covering the site is the best approach but may not be feasible if very large mobile equipment is being fueled. Storm water runon can be diverted around the fueling area by an extruded curb or with a "speed bump", if vehicle access is needed from this direction. Spills can be contained within the fueling area either by using a perimeter drain or by sloping the pavement inward with drainage to a sump. In both cases the drain can be connected to the storm drain with a valve that is only closed during fueling operations and left open at all other times. Pave the fueling area with Portland cement concrete rather than asphalt, since the latter will gradually disintegrate and be washed from the site.

Spill Control

The following spill control measures will reduce spilling or reduce the loss of spilled fuels from the site:

- Install vapor recovery nozzles.
- Do not "top off" tanks.
- Place secondary containment around the fuel truck when it is transferring fuel to the storage tank. The truck operator should remain with the truck while the transfer is in progress.
- Place a stockpile of spill cleanup materials where it will be readily accessible.
- Use dry methods to clean the fueling area whenever possible. If you periodically clean by pressure washing, place a temporary plug in the downstream drain and pump out the accumulated water. Properly dispose the water.
- Train employees on proper fueling and cleanup procedures.

Designated Area

If your facility has large numbers of mobile equipment working throughout the site and you currently fuel them with a mobile fuel truck, consider establishing a designated area for fueling. 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. Place temporary "caps" over nearby catch basins or manhole covers so that if a spill occurs it is prevented from entering the storm drain.

Examples of Effective Programs

- The Spill Prevention Control and Countermeasure (SPCC) Plan, which is required by law for some facilities, is an effective program to reduce the number of accidental spills.
- The City of Palo Alto has an effective program for commercial vehicle service facilities. Many of the program's elements, including specific BMP guidance and lists of equipment suppliers, are also applicable to industrial facilities.

REFERENCES

Best Management Practices for Automotive-Related Industries, Santa Clara Valley Nonpoint Source Pollution Control Program, 1992.

Best Management Practices for Industrial Storm Water Pollution Control, Santa Clara Valley Nonpoint Source Pollution Control Program, 1992.

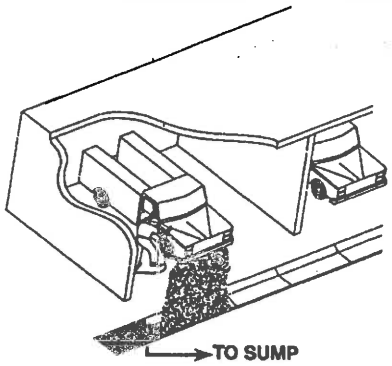
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SC2



ACTIVITY: VEHICLE AND EQUIPMENT WASHING & STEAM CLEANING



Applications

- *Manufacturing*
- *Material Handling*
- *Vehicle Maintenance*
- *Construction*
- *Commercial Activities*
- *Roadways*
- *Waste Containment*
- *Housekeeping Practices*

DESCRIPTION

Prevent or reduce the discharge of pollutants to storm water from vehicle and equipment washing and steam cleaning.

APPROACH

- Consider off-site commercial washing and steam cleaning businesses.
- Use designated wash areas, preferably covered to prevent contact with storm water and bermed to contain wash water.
- Discharge wash water to sanitary sewer, after contacting local sewer authority to find out if pretreatment is required.
- Educate employees on pollution prevention measures.
- Consider filtering and recycling wash water.
- Do not permit steam cleaning wash water to enter the storm drain.
- For a quick reference on disposal alternatives for specific wastes see Table 4.1, SC1.

REQUIREMENTS

- Capital costs vary depending on measures implemented.
  - Low cost ($500-1,000) for berm construction.
  - Medium cost ($5,000-20,000) for plumbing modifications (including re-routing discharge to sanitary sewer and installing simple sump).
  - High cost ($30,000-150,000) for on-site treatment and recycling.
- O&M costs increase with increasing capital investment.
- Maintenance
  - Berm repair and patching.
  - Inspection and maintenance of sumps, oil/water separators, and on-site treatment/ recycling units.

LIMITATIONS

- Some municipalities may require pretreatment and monitoring of wash water discharges to the sanitary sewer.
- Steam cleaning can generate significant pollutant concentrations requiring permitting, monitoring, pretreatment, and inspections. The measures outlined in this fact sheet are insufficient to address all the environmental impacts and compliance issues related to steam cleaning.

Targeted Constituents

- ● *Sediment*
- ● *Nutrients*
- ● *Heavy Metals*
- ● *Toxic Materials*
- ○ *Floatable Materials*
- ● *Oxygen Demanding Substances*
- ● *Oil & Grease*
- ○ *Bacteria & Viruses*

- ● *Likely to Have Significant Impact*
- ○ *Probable Low or Unknown Impact*

Implementation Requirements

- ◒ *Capital Costs*
- ○ *O&M Costs*
- ○ *Maintenance*
- ◒ *Training*

● *High* ○ *Low*

SC3

Best Management Practices

Additional Information — Vehicle and Equipment Washing and Steam Cleaning

Washing vehicles and equipment outdoors or in areas where wash water flows onto the ground can pollute storm water. If your facility washes or steam cleans a large number of vehicles or pieces of equipment, consider contracting out this work to a commercial business. These businesses are better equipped to handle and dispose of the wash waters properly. Contracting out this work can also be economical by eliminating the need for a separate washing/cleaning operation at your facility.

If washing/cleaning must occur on-site, consider washing vehicles inside the building to control the targeted constituents by directing them to the sanitary sewer where they can be pretreated or sent directly to the sanitary treatment facility. Washing operations outside should be conducted in a designated wash area having the following characteristics:

- Paved with Portland cement concrete,
- Covered or bermed to prevent contact with storm water,
- Sloped for wash water collection,
- Discharges wash water to the sanitary or process waste sewer, or to a dead-end sump. Discharge pipe should have a positive control valve that allows switching between the storm drain and sanitary or process sewer,
- Clearly designated, and
- Equipped with an oil/water separator (see Chapter 5, TC7, Oil/Water Separators and Water Quality Inlets).

Examples of Effective Programs

The City of Palo Alto has an effective program for commercial vehicle service facilities. Many of the program's elements, including specific BMP guidance and lists of equipment suppliers, are applicable to industrial vehicle service facilities.

The U.S. Postal Service in West Sacramento has a new vehicle wash system that collects, filters, and recycles the wash water.

REFERENCES

Best Management Practices for Automotive-Related Industries, Santa Clara Valley Nonpoint Source Pollution Control Program, 1992.

Best Management Practices for Industrial Storm Water Pollution Control, Santa Clara Valley Nonpoint Source Pollution Control Program, 1992.

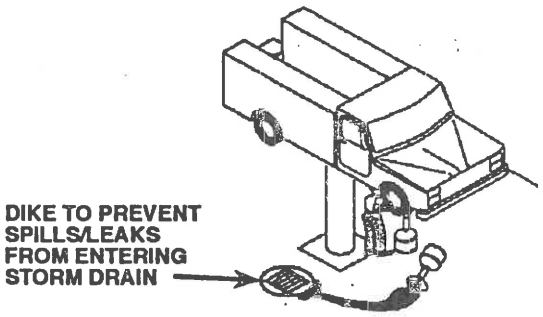
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Water Quality Best Management Practices Manual, City of Seattle, 1989.

SC3

Best Management Practices

ACTIVITY: VEHICLE AND EQUIPMENT MAINTENANCE AND REPAIR



Applications

- *Manufacturing*
- *Material Handling*
- *Vehicle Maintenance*
- *Construction*
- *Commercial Activities*
- *Roadways*
- *Waste Containment*
- *Housekeeping Practices*

DESCRIPTION

Prevent or reduce the discharge of pollutants to storm water from vehicle and equipment maintenance and repair by running a dry shop.

APPROACH

- Keep equipment clean, don't allow excessive build-up of oil and grease.
- Keep drip pans or containers under the areas that might drip.
- Do not change motor oil or perform equipment maintenance in non-appropriate areas. Use a vehicle maintenance area designed to prevent storm water pollution.
- Inspect equipment for leaks on a regular basis.
- Segregate wastes.
- Make sure oil filters are completely drained and crushed before recycling or disposal..
- Make sure incoming vehicles are checked for leaking oil and fluids.
- Clean yard storm drain inlets(s) regularly and especially after large storms.
- Do not pour materials down drains or hose down work areas; use dry sweeping.
- Store idle equipment under cover.
- Drain all fluids from wrecked vehicles.
- Recycle greases, used oil or oil filters, antifreeze, cleaning solutions, automotive batteries, hydraulic, and transmission fluids.
- Switch to non-toxic chemicals for maintenance when possible.
- Clean small spills with rags, general clean-up with damp mops and larger spills with absorbent material.
- Paint signs on storm drain inlets to indicate that they are not to receive liquid or solid wastes.
- Train employees.
- Minimize use of solvents.
- For a quick reference on disposal alternatives for specific wastes see Table 4.1, SC1.

REQUIREMENTS

- Costs (Capital, O&M) - Should be low, but will vary depending on the size of the facility.
- Maintenance - Should be low if procedures for the approach are followed.

LIMITATIONS

- Space and time limitations may preclude all work being conducted indoors.
- It may not be possible to contain and clean up spills from vehicles/equipment brought on-site after working hours.
- Drain pans (usually 1 ft. x 1 ft.) are generally too small to contain antifreeze, which may gush from some vehicles, so drip pans (3 ft. x 3 ft.) may have to be purchased or fabricated.
- Dry floor cleaning methods may not be sufficient for some spills. Use three-step method instead.
- Identification of engine leaks may require some use of solvents.

Targeted Constituents

- ○ *Sediment*
- ○ *Nutrients*
- ● *Heavy Metals*
- ● *Toxic Materials*
- ○ *Floatable Materials*
- ○ *Oxygen Demanding Substances*
- ● *Oil & Grease*
- ○ *Bacteria & Viruses*

- ● *Likely to Have Significant Impact*
- ○ *Probable Low or Unknown Impact*

Implementation Requirements

- ○ *Capital Costs*
- ◒ *O&M Costs*
- ◒ *Maintenance*
- ◒ *Training*

● *High* ○ *Low*

SC4

Best Management Practices

Additional Information — Vehicle and Equipment Maintenance and Repair

Vehicle or equipment maintenance is a potentially significant source of storm water pollution. Activities that can contaminate storm water include engine repair and service (parts cleaning, spilled fuel, oil, etc.), replacement of fluids, and outdoor equipment storage and parking (dripping engines). For further information on vehicle or equipment servicing, see SC2, Vehicle and Equipment Fueling, and SC3, Vehicle and Equipment Washing and Steam Cleaning.

Waste Reduction

Parts are often cleaned using solvents such as trichloroethylene, 1,1,1-trichloroethane or methylene chloride. Many of these cleaners are harmful and must be disposed of as a hazardous waste. Cleaning without using liquid cleaners (e.g. wire brush) whenever possible reduces waste. Prevent spills and drips of solvents and cleansers to the shop floor. Do all liquid cleaning at a centralized station so the solvents and residues stay in one area. Locate drip pans, drain boards, and drying racks to direct drips back into a solvent sink or fluid holding tank for re-use.

Safer Alternatives

If possible, eliminate or reduce the amount of hazardous materials and waste by substituting non-hazardous or less hazardous materials. For example:

- Use non-caustic detergents instead of caustic cleaning agents for parts cleaning (ask your supplier about alternative cleaning agents).
- Use detergent-based or water-based cleaning systems in place of organic solvent degreasers. Wash water may require treatment before it can be discharged to the sewer. Contact your local sewer authority for more information.
- 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.
- Choose cleaning agents that can be recycled.
- Contact your supplier or refer to trade journals for more waste minimization ideas.

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.

Recycling

Separating wastes allows for easier recycling and may reduce treatment 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).

Many products made of recycled (i.e., refined or purified) materials are available. Engine oil, transmission fluid, antifreeze, and hydraulic fluid are available in recycled form. Buying recycled products supports the market for recycled materials.

Spill Leak Clean Up

Clean leaks, drips, and other spills with as little water as possible. Use rags for small spills, a damp mop for general cleanup, and dry absorbent material for larger spills. Use the following three-step method for cleaning floors:

1. Clean spills with rags or other absorbent materials.
2. Sweep floor using dry absorbent material.
3. Mop floor. Mop water may be discharged to the sanitary sewer via a toilet or sink.

SC4



Good Housekeeping

Also consider the following measures:

- Avoid hosing down your work areas. If work areas are washed, direct wash water to sanitary sewer.
- Collect leaking or dripping fluids in drip pans or containers. Fluids are easier to recycle if kept separate.
- Keep a drip pan under the vehicle while you unclip hoses, unscrew filters, or remove other parts. Use a drip pan under any vehicle that might leak while you work on it to keep splatters or drips off the shop floor.
- Promptly transfer used fluids to the proper waste or recycling drums. Don't leave full drip pans or other open containers lying around.

Do not pour liquid waste to floor drains, sinks, outdoor storm drain inlets, or other storm drains or sewer connections. Used or leftover cleaning solutions, solvents, and automotive fluids and oil are toxic and should not be put in the sanitary sewer. Post signs at sinks to remind employees, and paint stencils at outdoor drains to tell customer and others not to pour wastes down drains.

Oil filters disposed of in trash cans or dumpsters can leak oil and contaminate storm water. Most municipalities prohibit or discourage disposal of these items in solid waste facilities. Place the oil filter in a funnel over the waste oil recycling or disposal collection tank to drain excess oil before disposal. Oil filters can be crushed and recycled. Ask your oil supplier or recycler about recycling oil filters.

Put pans under leaks to collect fluids for proper recycling or disposal. Keeping leaks off the ground reduces the potential for storm water contamination and reduces cleanup time and costs. If the vehicle or equipment is to be stored outdoors, oil and other fluids should be drained first.

Designate a special area to drain and replace motor oil, coolant, and other fluids, where there are no connections to the storm drain or the sanitary sewer and drips and spills can be easily cleaned up.

Be especially careful with wrecked vehicles, whether you keep them indoors or out, as well as vehicles kept on-site for scrap or salvage. Wrecked or damaged vehicles often drip oil and other fluids for several days.

- As the vehicles arrive, place drip pans under them immediately, even if you believe that the fluids have leaked out before the car reaches your shop.
- Build a shed or temporary roof over areas where you park cars awaiting repair or salvage, especially if you handle wrecked vehicles. Build a roof over vehicles you keep for parts.
- Drain all fluids, including air conditioner coolant, from wrecked vehicles and "part" cars. Also drain engines, transmission, and other used parts.
- 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.

Examples of Effective Programs

The City of Palo Alto has an effective program for commercial vehicle service facilities. Many of the program's elements, including specific BMP guidance and lists of equipment suppliers, are also applicable to industrial vehicle service facilities.

Pick N Pull Auto Dismantlers in Rancho Cordova drains all fluids from automobiles before they enter the yard.

Ecology Auto Wrecking in Rialto is surrounded by a steel plate/concrete fence and has a completely paved lot that is graded to a central low point. Collected storm water is channeled through as underground drainage system of clarifiers

SC4

Best Management Practices

and then stored in a 60,000 gallon UST before being processed through a filter system. In addition, the work area is covered, ventilated and has an additional sump. Vehicle fluids are drained in this area and segregated for recycling.

All Auto Parts, Fontana, has a complete water recycling system in a 10,000 square foot concrete slab surrounded by a curb that contains all the runoff and sends it to the recycling system. All receiving, dismantling, and shipping occurs on the slab.

REFERENCES

Best Management Practices for Automotive-Related Industries, Santa Clara Valley Nonpoint Source Pollution Control Program, 1992.

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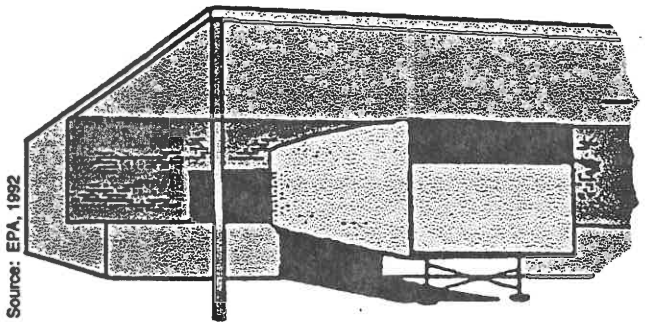
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SC4

Best Management Practices

ACTIVITY: OUTDOOR LOADING/UNLOADING OF MATERIALS


Source: EPA, 1992

DESCRIPTION

Prevent or reduce the discharge of pollutants to storm water from outdoor loading/ unloading of materials.

APPROACH

- Park tank trucks or delivery vehicles so that spills or leaks can be contained.
- Cover the loading/unloading docks to reduce exposure of materials to rain.
- Seal or door skirt between trailer and building can also prevent exposure to rain.
- Design loading/unloading area to prevent storm water runon:
  - grading or berming, and
  - position roof downspouts to direct storm water away from loading/unloading areas.
- Contain leaks during transfer.
- Use drip pans under hoses.
- Make sure fork lift operators are properly trained.
- Employee training for spill containment and cleanup.

REQUIREMENTS

- Costs (Capital, O&M) - Should be low except when covering a large loading/unloading area.
- Maintenance
  - Conduct regular inspections and make repairs as necessary. The frequency of repairs will depend on the age of the facility.
  - Check loading and unloading equipment regularly for leaks:
    - valves,
    - pumps,
    - flanges, and
    - connections.

LIMITATIONS

- Space and time limitations may preclude all transfers from being performed indoors or under cover.
- It may not be possible to conduct transfers only during dry weather.

Applications

- Manufacturing
- **Material Handling**
- Vehicle Maintenance
- **Construction**
- **Commercial Activities**
- Roadways
- Waste Containment
- **Housekeeping Practices**

Targeted Constituents

- ○ Sediment
- ● Nutrients
- ● Heavy Metals
- ● Toxic Materials
- ● Floatable Materials
- ● Oxygen Demanding Substances
- ● Oil & Grease
- ○ Bacteria & Viruses

- ● Likely to Have Significant Impact
- ○ Probable Low or Unknown Impact

Implementation Requirements

- ◒ Capital Costs
- ○ O&M Costs
- ○ Maintenance
- ◒ Training

◐ High ○ Low

SC5

Best Management Practices

Additional Information — Outdoor Loading/Unloading of Materials

The loading/unloading of materials usually takes place outside. Loading or unloading of materials occurs in two ways: materials in containers or direct liquid transfer. Materials spilled, leaked or lost during loading/unloading may collect in the soil or on other surfaces and be carried away by runoff or when the area is cleaned. Rainfall may wash pollutants from machinery used to unload or move materials. The loading or unloading may involve rail or truck transfer.

The most important factors in preventing these constituents from entering storm water is:

- Limit exposure of material to rainfall.
- Prevent storm water runon.
- Check equipment regularly for leaks.
- Contain spills during transfer operations.

Loading or unloading of liquids should occur in the manufacturing building so that any spills that are not completely retained can be discharged to the sanitary sewer, treatment plant, or treated in a manner consistent with local sewer authorities and permit requirements. Best management practices include:

- Use overhangs or door skirts that enclose the trailer.
- Park tank trucks during delivery so that spills or leaks can be contained.
- Design loading/unloading area to prevent storm water runon which would include grading or berming the area, and positioning roof downspouts so they direct storm water away from the loading/unloading areas.
- Check loading and unloading equipment regularly for leaks, including valves, pumps, flanges and connections.
- Look for dust or fumes during loading or unloading operations.
- Use a written operations plan that describes procedures for loading and/or unloading.
- Have an emergency spill cleanup plan readily available.
- Employees trained in spill containment and cleanup should be present during the loading/unloading.
- Establish depots of cleanup materials next to or near each loading/unloading area, and train employees in their use.
- For loading and unloading tank trucks to above and below ground storage tanks, the following procedures should be used.
  - The area where the transfer takes place should be paved. If the liquid is reactive with the asphalt, Portland cement should be used to pave the area.
  - Transfer area should be designed to prevent runon of storm water from adjacent areas. Sloping the pad and using a curb, like a speed bump, around the uphill side of the transfer area should reduce runon.
  - Transfer area should be designed to prevent runoff of spilled liquids from the area. Sloping the area to a drain should prevent runoff. The drain should be connected to a dead-end sump or to the sanitary sewer. A positive control valve should be installed on the drain.
- For transfer from rail cars to storage tanks that must occur outside, use the following procedures:
  - Drip pans should be placed at locations where spillage may occur, such as hose connections, hose reels, and filler nozzles. Use drip pans when making and breaking connections.
  - Drip pan systems should be installed between the rails to collect spillage from tank cars.

REFERENCES

Best Management Practices for Industrial Storm Water Pollution Control, Santa Clara Valley Nonpoint Source Pollution Control Program, 1992

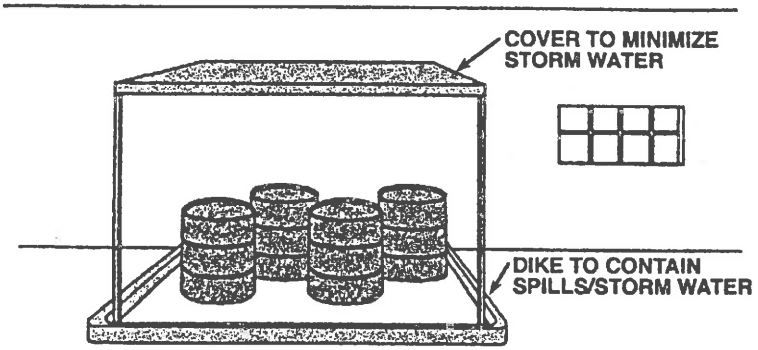
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SC5

Best Management Practices

ACTIVITY: OUTDOOR CONTAINER STORAGE OF LIQUIDS



DESCRIPTION

Prevent or reduce the discharge of pollutants to storm water from outdoor container storage areas by installing safeguards against accidental releases, installing secondary containment, conducting regular inspections, and training employees in standard operating procedures and spill cleanup techniques.

APPROACH

- Protect materials from rainfall, runon, runoff, and wind dispersal:
  - Store materials indoors.
  - Cover the storage area with a roof.
  - Minize storm water runon by enclosing the area or buiding a berm around it.
  - Use "doghouse" for storage of liquid containers.
  - Use covered dumpsters for waste product containers.
- Storage of oil and hazardous materials must meet specific Federal and State standards including:
  - Spill Prevention Control and Countermeasure Plan (SPCC) Plan,
  - secondary containment,
  - integrity and leak detection monitoring, and
  - emergency preparedness plans.
- Train operator on proper storage.
- Safeguards against accidental releases:
  - overflow protection devices to warn operator or automatic shut down transfer pumps,
  - protection guards (bollards) around tanks and piping to prevent vehicle or forklift damage, and
  - clear tagging or labeling, and restricting access to valves to reduce human error.
- Berm or surround tank or container with secondary containment system:
  - dikes, liners, vaults, or double walled tanks.
- Some municipalities require that secondary containment areas be connected to the sanitary sewer, prohibiting any hard connections to the storm drain.
- Facilities with "spill ponds" designed to intercept, treat, and/or divert spills should contact the appropriate regulatory agency regarding envirinmental compliance.

REQUIREMENTS

- Cost (Capital, O&M)
  - Will vary depending on the size of the facility and the necessary controls.
- Maintenance: Conduct routine weekly inspections.

LIMITATIONS

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

Applications

- *Manufacturing*
- *Material Handling*
- *Vehicle Maintenance*
- *Construction*
- *Commercial Activities*
- *Roadways*
- *Waste Containment*
- *Housekeeping Practices*

Targeted Constituents

- ○ *Sediment*
- ○ *Nutrients*
- ● *Heavy Metals*
- ● *Toxic Materials*
- ○ *Floatable Materials*
- ● *Oxygen Demanding Substances*
- ○ *Oil & Grease*
- ○ *Bacteria & Viruses*

- ● *Likely to Have Significant Impact*
- ○ *Probable Low or Unknown Impact*

Implementation Requirements

- ◒ *Capital Costs*
- ◒ *O&M Costs*
- ◒ *Maintenance*
- ◒ *Training*

◐ *High* ○ *Low*

SC6

Best Management Practices

Additional Information — Outdoor Container Storage of Liquids

Accidental releases of materials from aboveground liquid storage tanks, drums, and dumpsters present the potential for contaminating storm waters with many different pollutants. Materials spilled, leaked or lost from storage containers and dumpsters may accumulate in soils or on the surfaces and be carried away by storm water runoff. These source controls apply to containers located outside of a building used to temporarily store liquid materials. It should be noted that the storage of reactive, ignitable, or flammable liquids must comply with fire codes.

Container Management

To limit the possibility of storm water pollution, containers used to store dangerous waste or other liquids should be kept inside the building unless this is impractical due to site constraints. If the containers are placed outside, the following procedures should be employed:

- Dumpsters used to store items awaiting transfer to a landfill should be placed in a lean-to structure or otherwise covered. dumpsters shall be kept in good condition without corrosion or leaky seams.
- Garbage dumpsters shall be replaced if they are deteriorating to the point where leakage is occurring. It should be kept undercover to prevent the entry of storm water. Employees should be made aware of the importance of keeping the dumpsters covered and free from leaks.
- A fillet should be placed on both sides of the curb to facilitate moving the dumpster.
- Waste container drums should be kept in an area such as a service bay. If drums are kept outside, they must be stored in a lean-to type structure, shed or walk-in container to keep rainfall from reaching the drums.

Storage of reactive, ignitible, or flammable liquids must comply with the fire codes of your area. Practices listed below should be employed to enhance the fire code requirements.

- Containers should be placed in a designated area.
- Designated areas should be paved, free of cracks and gaps, and impervious in order to contain leaks and spills.
- Liquid waste should be surrounded by a curb or dike to provide the volume to contain 10 percent of the volume of all of the containers or 110 percent of the volume of the largest container, whichever is greater.
- The area inside the curb should slope to a drain.
  - For used oil or dangerous waste, a dead-end sump should be installed in the drain.
  - All other liquids should be drained to the sanitary sewer if available. The drain must have a positive control such as a lock, valve, or plug to prevent release of contaminated liquids.
- The designated storage area should be covered.
- Containers used for liquid removal by an employees must be placed in a containment area.
  - A drip pan should be used at all times.
- Drums stored in an area where unauthorized persons may gain access must be secured to prevent accidental spillage, pilferage, or any unauthorized use.
- Employees trained in emergency spill cleanup procedures should be present when dangerous waste, liquid chemicals, or other wastes are loaded or unloaded.

The most common causes of unintentional releases:

- External corrosion and structural failure,
- Installation problems,
- Spills and overfills due to operator error,
- Failure of piping systems (pipes, pumps, flanges, couplings, hoses, and valves), and
- Leaks during pumping of liquids or gases from truck or railcar to a storage facility or vice versa.

Operator Training/Safeguards

Well-trained employees can reduce human errors that lead to accidental releases or spills. Employees should be familiar with the Spill Prevention Control and Countermeasure Plan. The employee should have the tools and knowledge to

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immediately begin cleaning up a spill if one should occur. Operator errors can be prevented by using engineering safe guards and thus reducing accidental releases of pollutant. Safeguards include:

- Overflow protection devices on tank systems to warn the operator to automatically shutdown transfer pumps when the tank reaches full capacity,
- Protective guards (bollards) around tanks and piping to prevent vehicle or forklift damage, and
- Clearly tagging or labeling all valves to reduce human error.

Tank systems should be inspected and tank integrity tested regularly. Problem areas can often be detected by visually inspecting the tanks frequently. Problems or potential problems should be corrected as soon as possible. Registered and specifically trained professional engineers can identify and correct potential problems such as loose fittings, poor welding, and improper or poorly fitted gaskets for newly installed tank systems. The tank foundations, connections, coatings, and tank walls and piping systems also should be inspected. Inspection for corrosion, leaks, cracks, scratches in protective coatings, or other physical damage that may weaken the tank system should be a part of regular integrity testing.

Secondary Containment

Tanks should be bermed or surrounded by a secondary containment system. Leaks can be detected more easily and spills can be contained when a secondary containment systems are installed. Berms, dikes, liners, vaults, and double-wall tanks are examples of secondary containment systems.

One of the best protective measures against contamination of storm water is diking. Containment dikes are berms or retaining walls that are designed to hold spills. Diking is an effective pollution prevention measure for above ground storage tanks and railcar or tank truck loading and unloading areas. The dike surrounds the area of concern and holds the spill, keeping spill materials separated from the storm water side of the dike area. Diking can be used in any industrial facility, but it is most commonly used for controlling large spills or releases from liquid storage areas and liquid transfer areas.

For single-wall tanks, containment dikes should be large enough to hold the contents of the storage tank for the facility plus rain water. For trucks, diked areas should be capable of holding an amount equal to the volume of the tank truck compartment. Diked construction material should be strong enough to safely hold spilled materials. Dike materials can consist of earth, concrete, synthetic materials, metal, or other impervious materials. Strong acids or bases may react with metal containers, concrete, and some plastics. Where strong acids or bases or stored, alternative dike materials should be considered. More active organic chemicals may need certain special liners for dikes. Dikes may also be designed with impermeable materials to increase containment capabilities. Dikes should be inspected during or after significant storms or spills to check for washouts or overflows. Regular checks of containment dikes to insure the dikes are capable of holding spills should be conducted. Inability of a structure to retain storm water, dike erosion, soggy areas, or changes in vegetation indicate problems with dike structures. Damaged areas should be patched and stabilized immediately. Earthen dikes may require special maintenance of vegetation such as mulching and irrigation.

Curbing is a barrier that surrounds an area of concern. Curbing is similar to containment diking in the way that it prevents spills and leaks from being released into the environment. The curbing is usually small scaled and does not contain large spills like diking. Curbing is common at many facilities in small areas where handling and transfer liquid materials occur. Curbing can redirect contaminated storm water away from the storage area. It is useful in areas where liquid materials are transferred from one container to another. Asphalt is a common material used for curbing; however, curbing materials include earth, concrete, synthetic materials, metal, or other impenetrable materials. Spilled materials should be removed immediately from curbed areas to allow space for future spills. Curbs should have manually-controlled pump systems rather than common drainage systems for collection of spilled materials. The curbed area should be inspected regularly to clear clogging debris. Maintenance should also be conducted frequently to prevent overflow of any spilled materials as curbed areas are designed only for smaller spills. Curbing has the following advantages:

- Excellent runon control,
- Inexpensive,
- Ease of installment,
- Provides option to recycle materials spilled in curb areas, and
- Common industry practice.

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Maintenance

- Weekly inspection should be considered and include:
  - Check for external corrosion and structural failure,
  - Check for spills and overfills due to operator error,
  - Check for failure of piping system (pipes, pumps, flanges, coupling, hoses, and valves),
  - Check for leaks or spills during pumping of liquids or gases from truck or rail car to a storage facility or vice versa,
  - Visually inspect new tank or container installation loose fittings, poor welding, and improper or poorly fitted gaskets, and
  - Inspect tank foundations, connections, coatings, and tank walls and piping system. Look for corrosion, leaks, cracks, scratches, and other physical damage that may weaken the tank or container system.

Examples of Effective Programs

The "doghouse" design has been used to store small liquid containers. The roof and flooring design prevent contact with direct rain or runoff. The doghouse has two solid structural walls and two canvas covered walls. The flooring is wire mesh about secondary containment. The unit has been used successfully at Lockheed Missile and Space Company in Sunnyvale.

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Best Management Practices for Industrial Storm Water Pollution Control, Santa Clara Valley Nonpoint Source Pollution Control Program, 1992.

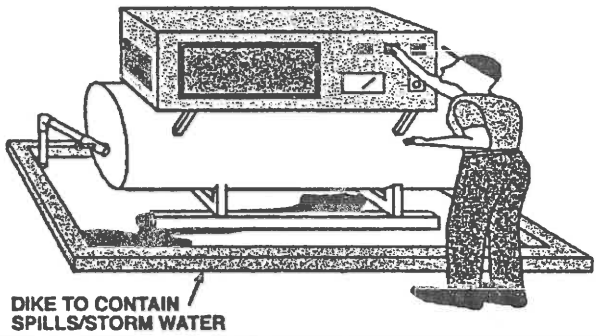
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Water Quality Best Management Practices Manual, City of Seattle, 1989.

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Best Management Practices

ACTIVITY: OUTDOOR PROCESS EQUIPMENT OPERATIONS AND MAINTENANCE



Applications

- *Manufacturing*
- *Material Handling*
- *Vehicle Maintenance*
- *Construction*
- *Commercial Activities*
- *Roadways*
- *Waste Containment*
- *Housekeeping Practices*

DESCRIPTION

Prevent or reduce the discharge of pollutants to storm water from outdoor process equipment operations and maintenance by reducing the amount of waste created, enclosing or covering all or some of the equipment, installing secondary containment, and training employees.

APPROACH

- Alter the activity to prevent exposure of pollutants to storm water.
- Move activity indoors.
- Cover the area with a permanent roof.
- Minimize contact of storm water with outside manufacturing operations through berming and drainage routing (run on prevention).
- Connect process equipment area to pubic sewer or facility wastewater treatment system.
- Clean regularly the storm drainage system.
- Use catch basin filtration inserts (Chapter 5, TC6, Media Filtration) as a means to capture particulate pollutants.
- Some municipalities require that secondary containment areas (regardless of size) be connected to the sanitary sewer, prohibiting any hard connections to the storm drain.

REQUIREMENTS

- Costs (Capital, O&M)
  - Variable depending on the complexity of the operation and the amount of control necessary for storm water pollution control..
- Maintenance
  - Routine preventive maintenance, including checking process equipment for leaks.

LIMITATIONS

- Providing cover may be expensive.
- Space limitations may preclude enclosing some equipment.
- Storage sheds often must meet building and fire code requirements.

Targeted Constituents

- ● *Sediment*
- ○ *Nutrients*
- ● *Heavy Metals*
- ● *Toxic Materials*
- ○ *Floatable Materials*
- ○ *Oxygen Demanding Substances*
- ● *Oil & Grease*
- ○ *Bacteria & Viruses*

● *Likely to Have Significant Impact*
○ *Probable Low or Unknown Impact*

Implementation Requirements

- ● *Capital Costs*
- ◒ *O&M Costs*
- ◒ *Maintenance*
- ◒ *Training*

● *High* ○ *Low*

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Best Management Practices

Additional Information — Outdoor Process Equipment Operations and Maintenance

Outside process equipment operations can contaminate storm water runoff. Activities, such as rock grinding or crushing, painting or coating, grinding or sanding, degreasing or parts cleaning, landfills, waste piles, wastewater and solid waste treatment and disposal, and land application are process operations that use hazardous materials and that can lead to contamination of storm water runoff. Pollutants from the wastewater and solid waste treatment and disposal areas result from waste pumping, additions of treatment chemicals, mixing, aeration, clarification, and solids dewatering.

Possible storm water contaminants include heavy metals, toxic materials, and oil and grease. Waste spilled, leaked, or lost from outdoor process equipment operations may build up in soils or on other surfaces and be carried away by storm water runoff. There is also a potential for liquid waste from lagoons or surface impoundments, associated with outdoor equipment operations, to overflow to surface waters or soak the soil, which can be picked up by storm water runoff.

The preferred (and possibly the most economical) action to reduce storm water pollution is to alter the nature of activity such that pollutants are not exposed to storm water. This may mean perfoming the activity during dry periods only or substituting benign materials for more toxic ones. Actions other than altering the activity include enclosing the activity in a building and connecting the floor drains to the sanitary sewer. The area used by the activity may be so great as to make enclosure prohibitively expensive. Building cost can be reduced by not covering the sides, and thus eliminating the need for ventilating and lighting systems. When certain parts of the activity are the worst source of pollutants, those parts can be segregated and enclosed or covered.

Curbs can be placed around the immediate boundaries of the process equipment. The storm drains from these interior areas can be connected to the facility's process wastewater system.

Reducing the amount of waste that is created and consequently the amount that must be stored or treated is another way to reduce the potential for storm water contamination from outside manufacturing activities. Waste reduction BMPs are available for a wide range of industries and are designed to provide ideas and ways to reduce waste (see References).

Hydraulic/Treatment Modifications

If storm water becomes polluted, it should be captured and treated. If you do not have your own process wastewater treatment system, consider discharging to the public sewer system. Use of the public sewer might be allowed under the following conditions:

- If the activity area is very small (less than a few hundred square feet), the local sewer authority may be willing to allow the area to remain uncovered with the drain connected to the public sewer.
- It may be possible under unusual circumstances to connect a much larger area to the public sewer, as long as the rate of storm water discharges do not exceed the capacity of the wastewater treatment plant. The storm water could be stored during the storm and then transferred to the public sewer when the normal flow is low, such as at night.

The majority of the pollutants in storm water are discharged over time by the small, high frequency storms. Less polluted runoff from the infrequent large storms can be bypassed to the storm drain. To implement this BMP, a hydraulic evaluation of the downstream sewer system should occur in consultation with the local sewer authority.

Industries that generate large volumes of process wastewater typically have their own treatment system that discharges directly to the nearest receiving water. These industries have the discretion to use their wastewater treatment system to treat storm water within the constraints of their permit requirements for process treatment. It may also be possible for the industry to discharge the storm water directly to its effluent outfall without treatment as long as the total loading of the discharged process water and storm water does not exceed the loading had a storm water treatment device been used. This could be achieved by reducing the loading from the process wastewater treatment system. Check with your Regional Water Quality Control Board, as this option would be subject to permit constraints and potentially regular monitoring.

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Best Management Practices

REFERENCES

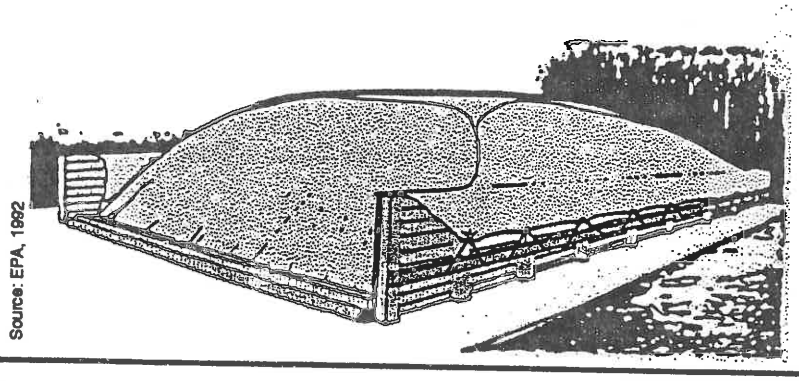
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Water Quality Best Management Practices Manual, City of Seattle, 1989.

ACTIVITY: OUTDOOR STORAGE OF RAW MATERIALS, PRODUCTS, AND BY- PRODUCTS


Source: EPA, 1992

Applications

- Manufacturing
- **Material Handling**
- Vehicle Maintenance
- **Construction**
- **Commercial Activities**
- Roadways
- Waste Containment
- **Housekeeping Practices**

DESCRIPTION

Prevent or reduce the discharge of pollutants to storm water from outdoor material and product storage areas by enclosing or covering materials, installing secondary containment, and preventing storm water runon.

APPROACH

- Protect materials from rainfall, runon, runoff and wind dispersal:
  - Store material indoors.
  - Cover the storage area with a roof.
  - Cover the material with a temporary covering made of polyethylene, polypropylene, or hypalon.
  - Minimize storm water runon by enclosing the area or building a berm around the area.
  - Use "doghouse" for storage of liquid containers.
- Parking lots or other surfaces near bulk materials storage areas should be swept periodically to remove debris blown or washed from storage area.
- Install pellet traps at storm water discharge points where plastic pellets are loaded and unloaded.
- Keep liquids in a designated area on a paved impervious surface within a secondary containment.
- Keep outdoor storage containers in good condition.
- Use berms and curbing.
- Use catch basin filtration inserts (Chapter 5, TC6, Media Filtration)

REQUIREMENTS

- Costs (Capital, O&M)
  - Costs should be low except where large areas may have to be covered.
- Maintenance
  - Berm and curbing repair and patching.

LIMITATIONS

- Space limitations may preclude storing some materials indoors.
- Some municipalities require that secondary containment areas (regardless of size) be connected to the sanitary sewer, prohibiting any hard connections to the storm drain.
- Storage sheds often must meet building and fire code requirements.

Targeted Constituents

- ● Sediment
- ○ Nutrients
- ● Heavy Metals
- ● Toxic Materials
- ● Floatable Materials
- ○ Oxygen Demanding Substances
- ● Oil & Grease
- ○ Bacteria & Viruses

- ● Likely to Have Significant Impact
- ○ Probable Low or Unknown Impact

Implementation Requirements

- ◒ Capital Costs
- ○ O&M Costs
- ○ Maintenance
- ◒ Training

● High ○ Low

SC8

Best Management Practices

Additional Information — Outdoor Storage of Raw Materials, Products, and By-Products

Raw materials, by-products, finished products, containers, and material storage areas exposed to rain and/or runoff can pollute storm water. Storm water can become contaminated by a wide range of contaminants when materials wash off or dissolve into water or are added to runoff by spills and leaks.

Paved areas should be sloped in a manner that minimize the pooling of water on the site, particularly with materials that may leach pollutants into storm water and/or groundwater, such as compost, logs, and wood chips. A minimum slope of 1.5 percent is recommended.

Curbing should be placed along the perimeter of the area to prevent the runon of uncontaminated storm water from adjacent areas as well as runoff of storm water from the stockpile areas. The storm drainage system should be designed to minimize the use of catch basins in the interior of the area as they tend to rapidly fill with manufacturing material. In these cases, consider the use of the catch basin insert filter described in Chapter 5, TC6 (Media Filtration). The area should be sloped to drain storm water to the perimeter where it can be collected or to internal drainage alleyways where material is not stockpiled. If the raw material, by-product, or product is a liquid, more information for outside storage of liquids can be found under SC6, Outdoor Container Storage of Liquids.

Examples

The "doghouse" design has been used to store small liquid containers. The roof and flooring design prevent contact with direct rain or runoff. The doghouse has two solid structural walls and two canvas covered walls. The flooring is wire mesh about secondary containment. The unit has been used successively at Lockheed Missile and Space Company in Sunnyvale.

REFERENCES

Best Management Practices for Industrial Storm Water Pollution Control, Santa Clara Valley Nonpoint Source Pollution Control Program, 1992.

Storm Water Management for Industrial Activities: Developing Pollution Prevention Plans, and Best Management Practices, EPA 832-R-92-006, EPA, 1992.

Water Quality Best Management Practices Manual, City of Seattle, 1989.

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ACTIVITY: WASTE HANDLING AND DISPOSAL





Applications

- Manufacturing
- Material Handling
- Vehicle Maintenance
- Construction
- Commercial Activities
- Roadways
- Waste Containment
- Housekeeping Practices

DESCRIPTION

Prevent or reduce the discharge of pollutants to storm water from waste handling and disposal by tracking waste generation, storage, and disposal; reducing waste generation and disposal through source reduction, re-use, and recycling; and preventing runon and runoff from waste management areas.

APPROACH

- Maintain usage inventory to limit waste generation.
- Raw material substitution or elimination.
- Process or equipment modification.
- Production planning and sequencing.
- SARA Title III, Section 313 requires reporting for over 300 listed chemicals and chemical compounds. This requirement should be used to track these chemicals although this is not as accurate a means of tracking as other approaches.
- Track waste generated.
  - Characterize waste stream.
  - Evaluate the process generating the waste.
  - Prioritize waste streams using: manifests, biennial reports, permits, environmental audits, SARA Title III reports, emission reports, NPDES monitoring reports.
  - Inventory reports.
  - Data on chemical spills.
  - Emissions.
  - Shelf life expiration.
- Use design data and review: process flow diagram, materials and applications diagram, piping and instructions, equipment list, plot plan.
- Use raw material and production data and review: composition sheets, materials safety data sheets (MSDS), batch sheets, product or raw material inventory records, production schedule, operator data log.
- Use economic data and review:
  - Waste treatment and disposal cost.
  - Product utility and economic cost.
  - Operation and maintenance labor cost.
- Recycle materials whenever possible.
- Maintain list of and the amounts of materials disposed.
- Waste segregation and separation.
- Check industrial waste management areas for spills and leaks.
- Cover, enclose, or berm industrial wastewater management areas whenever possible to prevent contact with runon or runoff.
- Equip waste transport vehicles with anti-spill equipment.

Targeted Constituents

- ○ Sediment
- ○ Nutrients
- ● Heavy Metals
- ● Toxic Materials
- ○ Floatable Materials
- ○ Oxygen Demanding Substances
- ● Oil & Grease
- ○ Bacteria & Viruses

- ● Likely to Have Significant Impact
- ○ Probable Low or Unknown Impact

Implementation Requirements

- ○ Capital Costs
- ◒ O&M Costs
- ○ Maintenance
- ◒ Training

● High ○ Low

SC9



- Minimize spills and fugitive losses such as dust or mist from loading systems.
- Ensure that sediments or wastes are prevented from being tracked off-site.
- Training and supervision.
- Stencil storm drains on the facility's property with prohibitive message regarding waste disposal.
- For a quick reference on disposal alternatives for specific wastes see Table 4.1, SC1.
- Consider ordering industry-specific or waste stream-specific guidance from PPIC (see Appendix G).

REQUIREMENTS

- Costs (Capital, O&M)
  - Capital and O&M costs for these programs will vary substantially depending on the size of the facility and the types of waste handled. Costs should be low if there is an inventory program in place.
- Maintenance
  - None except for maintaining equipment for material tracking program.

LIMITATIONS

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

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Additional Information — Waste Handling and Disposal

Industrial waste management activities occur in areas that can contaminate storm water and include landfills, waste piles, wastewater and solid waste treatment and disposal, and land application. Typical operations which affect storm water pollution may include waste pumping, treatment chemicals storage, mixing, aeration, clarification, and solids dewatering.

Waste Reduction

Waste spilled, leaked, or lost from waste management areas or outside manufacturing activities may build up in soils or in other surfaces and be carried away by storm water runoff. There is also a potential for liquid waste from lagoons or surface impoundments to overflow to surface waters or soak the soil where pollutants may be picked up by storm water runoff.

Waste reduction for manufacturing activities is the best way to reduce the potential of storm water contamination from waste management areas. Reduction in the amount of industrial waste generated can be accomplished using many different types of source controls such as:

- Production planning and sequencing.
- Process or equipment modification.
- Raw material substitution or elimination.
- Loss prevention and housekeeping.
- Waste segregation and separation.
- Close loop recycling.

An approach to reduce storm water pollution from waste handling and disposal is to assess process activities at the facility and reduce waste generation. The assessment is designed to find situations where waste can be eliminated or reduced and emissions and environmental damage can be minimized. The assessment involves collecting process specific information, setting pollution prevention targets, and developing, screening and selecting waste reduction options for further study. Starting a waste reduction program is economically beneficial because of reduced raw material purchases and lower waste disposal fees. In addition, material tracking systems to increase awareness about material usage can reduce spills and minimize contamination, thus reducing the amount of waste produced.

Spill/Leak Control

Waste can be prevented from contaminating storm water by checking waste management areas for leaking containers or spills. Corroded or damaged containers can begin to leak at any time. Transfer waste from these damaged containers into safe containers. Dumpsters should be covered to prevent rain from washing waste out of holes or cracks in the bottom of the dumpster. Leaking equipment including valves, lines, seals, or pumps should be repaired promptly.

Vehicles transporting waste should have spill prevention equipment that can prevent spills during transport. The spill prevention equipment includes:

- Vehicles equipped with baffles for liquid waste.
- Trucks with sealed gates and spill guards for solid waste.

Loading or unloading wastes can contaminate storm water when the wastes are lost from the transfer. Loading systems can also be used to minimize spills and fugitive emission losses such as dust or mist. Vacuum transfer systems can minimize waste loss.

Runon/Runoff Prevention

Storm water runon should be prevented from entering the waste management area. Storm water pollution from runon can be prevented by enclosing the area or building a berm around the area. Other alternatives for reducing storm water pollution include:

- Preventing the waste materials from directly contacting rain.

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Best Management Practices

- Moving the activity indoor after ensuring that all safety concerns such as fire hazard and ventilation are addressed.
- Covering the area with a permanent roof.
- Covering waste piles with temporary covering material such as reinforced tarpaulin, polyethylene, polyurethane, polypropylene or hypalon.

To avoid tracking materials off-site, the waste management area should be kept clean at all times by sweeping and cleaning up spills immediately. Vehicles should never drive through spills. If necessary, wash vehicles in designated areas before they leave the site, and control the wash water.

Minimizing the runoff of polluted storm water from land application of industrial waste on-site can be accomplished by:

- Choosing a site where:
  - slopes are under 6 percent
  - the soil is permeable
  - there is a low water table
  - it is located away from wetlands or marshes
  - there is a closed drainage system
- Avoiding applying waste to the site:
  - when it is raining
  - when the ground is frozen
  - when the ground is saturated with water
- Growing vegetation on land disposal areas to stabilize soils and reduce the volume of surface water runoff from the site.
- Maintaining adequate barriers between the land application site and the receiving waters. Planted strips are particularly good.
- Using erosion control techniques
  - mulching and matting,
  - filter fences,
  - straw bales,
  - diversion terracing,
  - sediment basins.
- Performing routine maintenance to ensure the erosion control or site stabilization measures are working.

Examples of Effective Programs

The port of Long Beach has a state-of-the-art database for identifying potential pollutant sources, documenting facility management practices, and tracking pollutants.

REFERENCES

Best Management Practices for Industrial Storm Water Pollution Control, Santa Clara Valley Nonpoint Source Pollution Control Program, 1992.

Publications Than Can Work For You!; California Department of Toxic Substances Control, Sacramento, CA, 1991 (A list and order form for waste minimization publications from the State).

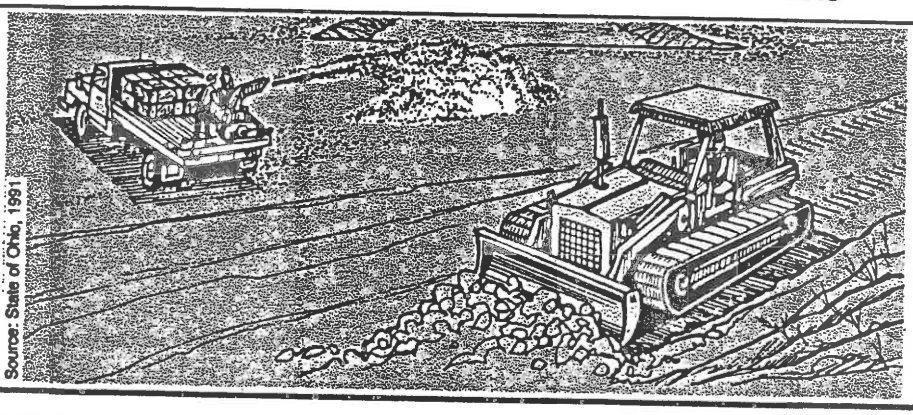
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ACTIVITY: CONTAMINATED OR ERODIBLE SURFACE AREAS



DESCRIPTION

Prevent or reduce the discharge of pollutants to storm water from contaminated or erodible surface areas by leaving as much vegetation on-site as possible, minimizing soil exposure time, stabilizing exposed soils, and preventing storm water runon and runoff.

APPROACH

This BMP addresses soils which are not so contaminated as to exceed criteria (see Title 22 California Code of Regulations for Hazardous Waste Criteria), but the soil is eroding and carrying pollutants off in the storm water.

Contaminated or erodible surface areas can be controlled by:

- Preservation of natural vegetation,
- Re-vegetation,
- Chemical stabilization,
- Removal of contaminated soils, or
- Geosynthetics.
- For a quick reference on disposal alternatives for specific wastes see Table 4.1, SC1.

REQUIREMENTS

- Cost (Capital, O&M)
  - Except for preservation of natural vegetation, each of the above solutions can be quite expensive depending upon the size of the area.
- Maintenance
  - Maintenance should be minimal, except possibly if irrigation of vegetation is necessary.

LIMITATIONS

Disadvantages of preserving natural vegetation or re-vegetating include:

- Requires substantial planning to preserve and maintain the existing vegetation.
- May not be cost-effective with high land costs.
- Lack of rainfall and/or poor soils may limit the success of re-vegetated areas.

Disadvantages of chemical stabilization include:

- Creation of impervious surfaces.
- May cause harmful effects on water quality.
- Is usually more expensive than vegetative cover.

Applications

- *Manufacturing*
- *Material Handling*
- *Vehicle Maintenance*
- ***Construction***
- *Commercial Activities*
- ***Roadways***
- *Waste Containment*
- *Housekeeping Practices*

Targeted Constituents

- ● *Sediment*
- ● *Nutrients*
- ● *Heavy Metals*
- ● *Toxic Materials*
- ● *Floatable Materials*
- ● *Oxygen Demanding Substances*
- ● *Oil & Grease*
- ○ *Bacteria & Viruses*

● *Likely to Have Significant Impact*
○ *Probable Low or Unknown Impact*

Implementation Requirements

- ◒ *Capital Costs*
- ◒ *O&M Costs*
- ○ *Maintenance*
- ○ *Training*

◒ *High* ○ *Low*

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Best Management Practices

Additional Information — Contaminated or Erodible Surface Areas

Of interest here are areas within the industrial site that are bare of vegetation and therefore subject to erosion. They may or may not be contaminated from past or current activities. Activity may or may not be occurring in the area of interest. According to the State's General Industrial Activity Storm Water Permit, the SWPPP must include BMPs that deal with these situations. If the area is temporarily bare because of construction, see SC12, Building Repair, Remodeling, and Construction.

Contaminated or erodible surfaces can result from the human activities such as vegetation removal, compacting or disturbing soil, and changing natural drainage patterns. Industries must identify the areas of contaminated or erodible surfaces. The areas may include:

- Heavy activity where plants cannot grow.
- Soil stockpiles.
- Steep slopes.
- Construction areas.
- Demolition areas.
- Any area where soil is disturbed.

The most effective way to control erosion is to preserve existing vegetation. Preservation of natural vegetation provides a natural buffer zone and an opportunity for infiltration of storm water and capture of pollutants in the soil matrix. By preserving stabilized areas, it minimizes erosion potential, protects water quality, and provides aesthetic benefits. This practice is used as a permanent control measure. Vegetation preservation on-site should be planned before disturbing the site. Preservation requires good site management to minimize the impact of construction when construction is underway. Proper maintenance is important to ensure healthy vegetation that can control erosion. Different species, soil types, and climatic conditions will require different maintenance activities such as mulching, fertilizing, liming, irrigation, pruning and weed and pest control. Maintenance should be performed regularly especially during construction phases.

Advantages of preservation of natural vegetation are:

- Can handle higher quantities of storm water runoff than newly seeded areas.
- Increases the filtering capacity because vegetation and root systems are usually dense in preserved natural vegetation.
- Enhances aesthetics.
- Provides areas for infiltration, thus reducing the quantity and velocity of storm water runoff.
- Allows areas where wildlife can remain undisturbed.
- Provides noise buffers and screens for on-site operation.
- Usually requires less maintenance than planting new vegetation.

The measure of choice is to leave as much native vegetation on-site as possible, thereby reducing or eliminating the problem. However, assuming the site already has contaminated or erodible surface areas, there are three possible courses of action:

1. Re-vegetate the area if it is not in use and therefore not subject to damage from site activities. In as much as the area is already devoid of vegetation, special measures are likely necessary. Lack of vegetation may be due to the lack of water and/or poor soils. The later can perhaps be solved with fertilization. Or the ground may simply be too compacted from prior use. Improving soil conditions may be sufficient to support vegetation. If available process wastewater can be used for irrigation, see Construction Best Management Practice Handbook for procedures to establish vegetation.

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2. Chemical stabilization (for example ligno sulfate) can be used as an alternate in areas where temporary seeding practices cannot be used because of season or climate. It can provide immediate, effective, and inexpensive erosion control. Application rates and procedures recommended by the manufacturer should be followed as closely as possible to prevent the product from forming ponds and creating large areas where moisture cannot penetrate the soil. The advantages of chemical stabilization include:
   - Easily applied to the surface.
   - Effective in stabilizing areas.
   - Provides immediate protection to soils that are in danger of erosion.

3. Removal of contaminated soils is a last resort and quite expensive. The level and extent of the contamination must be determined. This determination and removal must comply with State and Federal regulations, permits must be acquired, and fees paid.

4. Geosynthetics include those materials that are designed as an impermeable barrier to contain or control large amounts of liquid or solid matter. Geosynthetics have been developed primarily for use in landfills and surface impoundments, and the technology is well established. There are two general types of geosynthetics: geomembranes(impermeable) and geotextiles(permeable).
   - Geomembranes are composed of one of three types of impermeable materials: elastomers(rubbers), thermoplasics(plastics), or a combination of these two types of materials. The advantages of these materials include: 1) the variety of compounds available, 2) sheeting is produced in a factory environment, 3) polymeric membranes are flexible, and 4) simple installation. The disadvantages include: 1) chemical resistance must be determined for each application, 2) seaming systems may be a weak link in the system, and 3) many materials are subject to attack from biotic, mechanical, or environmental sources.
   - Geotextiles are uncoated synthetic textile products that are not water tight. They are composed of a variety of materials, most commonly polypropylene and polyester. Geotextiles serve five basic functions: 1) filtration, 2) drainage, 3) separation, 4) reinforcement, and 5) armoring.

   For more information on geosynthetics, see the reference below.

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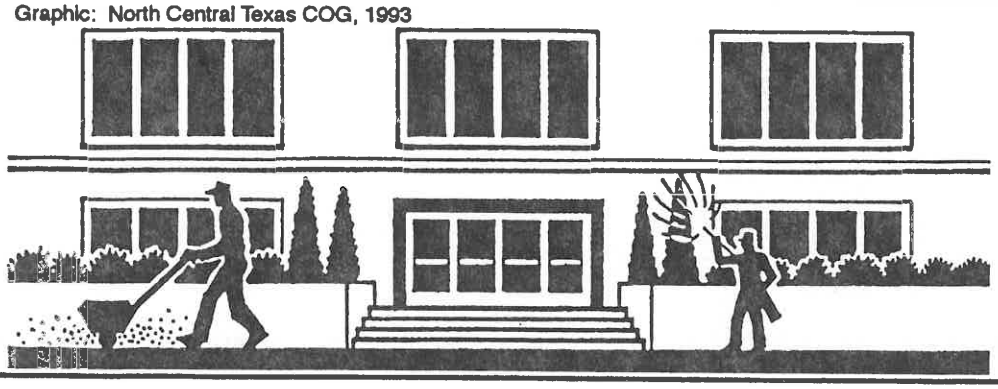
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SC10

Best Management Practices

ACTIVITY: BUILDING AND GROUNDS MAINTENANCE

Graphic: North Central Texas COG, 1993



DESCRIPTION

Prevent or reduce the discharge of pollutants to storm water from buildings and grounds maintenance by washing and cleaning up with as little water as possible, preventing and cleaning up spills immediately, keeping debris from entering the storm drains, and maintaining the storm water collection system.

APPROACH

- Leaving or planting native vegetation to reduce water, fertilizer, and pesticide needs.
- Careful use of pesticides and fertilizers in landscaping.
- Integrated pest management where appropriate.
- Sweeping of paved surfaces.
- Cleaning of the storm drainage system at appropriate intervals.
- Proper disposal of wash water, sweepings, and sediments.
- For a quick reference on disposal alternatives for specific wastes see Table 4.1, SC1.

REQUIRMENTS

- Costs (Capital, O&M)
  - Cost will vary depending on the type and size of facility.
  - Overall costs should be low in comparison to other BMPs.
- Maintenance
  - The BMPs themselves relate to maintenance and do not require maintenance as they do not involve structures.

LIMITATIONS

- Alternative pest/weed controls may not be available, suitable, or effective in every case.

Applications

Manufacturing
Material Handling
Vehicle Maintenance
Construction
Commercial Activities
Roadways
Waste Containment
Housekeeping Practices

Targeted Constituents

- ● *Sediment*
- ● *Nutrients*
- ● *Heavy Metals*
- ● *Toxic Materials*
- ● *Floatable Materials*
- ● *Oxygen Demanding Substances*
- ● *Oil & Grease*
- ○ *Bacteria & Viruses*

● *Likely to Have Significant Impact*
○ *Probable Low or Unknown Impact*

Implementation Requirements

- ○ *Capital Costs*
- ◒ *O&M Costs*
- ◒ *Maintenance*
- ◒ *Training*

◐ *High* ○ *Low*

SC11

Best Management Practices

Additional Information — Building and Grounds Maintenance

Buildings and grounds maintenance includes taking care of landscaped areas around the facility, cleaning of parking lots and pavement other than in the area of industrial activity, and the cleaning of the storm drainage system. Painting and other minor or major repairs of buildings is covered in SC12 (Building Repair, Remodeling, and Construction). Certain normal maintenance activities can generate materials that must be properly disposed. Other maintenance activities can enhance water quality if they are carried out more frequently and/or in a more deliberate fashion.

Pesticide/Fertilizer Management

Landscape maintenance involves the use of pesticides and fertilizers. Proper use of these materials will reduce the risk of loss to storm water. In particular, do not apply these materials during the wet season as they may be carried from the site by the next storm. When irrigating the landscaped areas, avoid over-watering not only to conserve water but to avoid the discharge of water which may have become contaminated with nutrients and pesticides.

It is important to properly store pesticides and application equipment, and to dispose the used containers in a responsible manner, consistent with state regulations. 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.

Written procedures for the use of pesticides and fertilizers relevant to your facility would help maintenance staff understand the "do's" and "don'ts". If you have large vegetated areas, consider the use of integrated pest management (IPM) techniques to reduce the use of pesticides.

Parking/Storm Sewer Maintenance

A parking area that drains to the same storm drainage system as the industrial activity that is to be permitted must also be evaluated for suitable BMPs. Storm water from parking lots may contain undesirable concentrations of oil, grease, suspended particulates, and metals such as copper, lead, cadmium, and zinc, as well as the petroleum byproducts of engine combustion. Deposition of air particulates, generated by the facility or by adjacent industries, may contribute significant amounts of pollutants.

The two most appropriate maintenance BMPs are periodic sweeping and cleaning catch basins if they are part of the drainage system. A vacuum sweeper is the best method of sweeping, rather than mechanical brush sweeping which is not as effective at removing the fine particulates.

Catch basins in parking lots generally need to be cleaned every 6 to 12 months, or whenever the sump is half full. A sump that is more than half full is not effective at removing additional particulate pollutants from the storm water. If the storm drain lines have a low gradient, less than about 0.5 feet in elevation drop per 100 feet of line, it is likely that material is settling in the lines during the small, frequent storms. If you have not cleaned the storm drain system for some time, check the lines as well. If they are not cleaned, the catch basins will likely be filled during the next significant storm by material that is washed from the lines. Also, install "turn-down" elbows or similar devices on the outlets of the catch basins; they serve to retain floatables, oil and grease.

Clearly mark the storm drain inlets, either with a color code (to distinguish from process water inlets if you have them) or with the painted stencil of "DO NOT DUMP WASTE". This will minimize inadvertent dumping of liquid wastes.

Sweepings and sediments from these maintenance activities are generally low in metals and other pollutants and therefore can be disposed on-site or to a construction debris landfill. Test the material if there is a reasonable doubt whether metals or other pollutants are present. If concentrations of contaminants are high, it indicates that other BMPs may be needed to eliminate or reduce emissions from the source. If a vactor truck is used to clean the storm drainage system,

dirty water will be generated. This water should not be discharged to the storm drainage system as it is silt laden and contains much of the pollutants that were removed by the catch basins. The water should be disposed to the process wastewater system, if you have one, or to the public sewer if permission is granted by the local sewer authority. Alternatively, the water can be placed somewhere on the site where it can evaporate.

The cleaning of the paved surfaces and catch basins in the areas of industrial activity has been discussed previously in SC5 (Loading and Unloading of Materials), SC7 (Outdoor Process Equipment Operations and Maintenance), and SC8 (Outdoor Storage of Raw Materials, Products, and Byproducts).

If some employees have cars that are leaking abnormal amounts of engine fluids, encourage them to have the problem corrected.

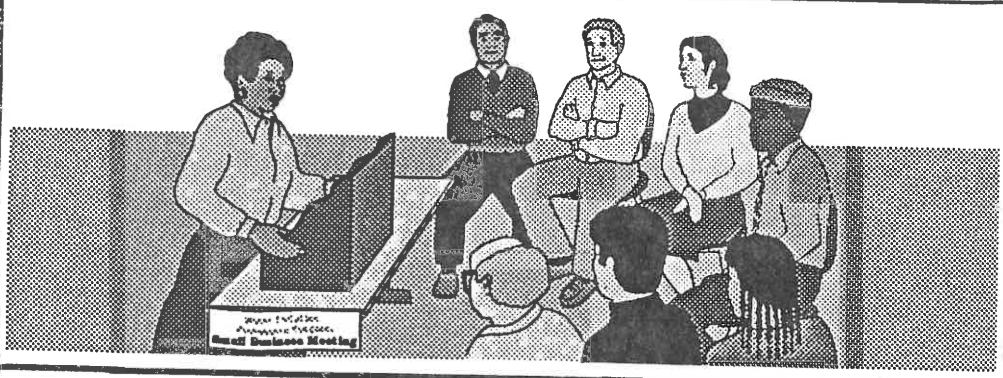
Examples of Effective Programs

Information on integrated pest management may be obtained from the Bio-Integral Resource Center, P.O. Box 7414, Berkeley, CA 94707, 510-524-2467.

REFERENCES

Best Management Practices for Industrial Storm Water Pollution Control, Santa Clara Valley Nonpoint Source Pollution Control Program, 1992.

ACTIVITY: EMPLOYEE TRAINING



Applications

- *Manufacturing*
- *Material Handling*
- *Vehicle Maintenance*
- *Construction*
- *Commercial Activities*
- *Roadways*
- *Waste Containment*
- *Housekeeping Practices*

DESCRIPTION

Employee training, like equipment maintenance, 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 training from the individual source controls into a comprehensive training program as part of a facility's Storm Water Pollution Prevention Plan (SWPPP).

The specific employee training aspects of each of the source controls are highlighted in the individual fact sheets. The focus of this fact sheet is more general, and includes the overall objectives and approach for assuring employee training in storm water pollution prevention. Accordingly, the organization of this fact sheet differs somewhat from the other fact sheets in this chapter.

OBJECTIVES

Employee 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 ownership of the problems and the solutions; and
- Integrate employee 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 (IIPP) (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 are not regulated by Federal, State, or local regulations, may use the information in this Handbook to develop a training program to reduce their potential to pollute storm water.

LISTING OF INDUSTRIAL ACTIVITIES

Employee training is a vital component of many of the individual source control BMPs included in this chapter. Following is a compilation of the training aspects of the source control fact sheets.

SC14

Best Management Practices

SC1 Non-Storm Water Discharges to Drains

- Use the quick reference on disposal alternatives (Table 4.1) to train employees in proper and consistent methods for disposal.
- Consider posting the quick reference table near storm drains to reinforce training.

SC2 Vehicle and Equipment Fueling

- Train employees in proper fueling and cleanup procedures.
- The SPCC Plan may be an effective program to reduce the number of accidental spills from fueling.

SC3 Vehicle and Equipment Washing and Steam Cleaning

- Train employees in standard operating procedures and spill cleanup techniques described in the fact sheet.

SC4 Vehicle and Equipment Maintenance and Repair

- Train employees in standard operating procedures and spill cleanup techniques described in the fact sheet.
- Paint stencils to remind employees not to pour waste down storm drains.

SC5 Outdoor Loading/Unloading of Materials

- Use a written operations plan that describes procedures for loading and/or unloading.
- Have an emergency spill cleanup plan readily available.
- Employees trained in spill containment and cleanup should be present during loading/unloading.
- Make sure fork lift operators are also properly trained.

SC6 Outdoor Container Storage of Liquids

- Registered and specifically trained professional engineers can identify and correct potential problems such as loose fittings, poor welding, and improper or poorly fitted gaskets for newly installed tank systems.
- Employees trained in emergency spill cleanup procedures should be present when dangerous waste, liquid chemicals, or other wastes are handled.

SC7 Outdoor Process Equipment Operations and Maintenance

- The preferred and possibly most economical action to reduce storm water pollution is to alter the activity. This may mean training employees to perform the activity during dry periods only or substituting benign materials for more toxic ones.

SC8 Outdoor Storage of Raw Materials, Products, and By-Products

- Train employees in standard operating procedures and spill cleanup techniques described in the fact sheet.

SC9 Waste Handling and Disposal

- Train employees in standard operating procedures and spill cleanup techniques described in the fact sheet.
- Paint stencils to remind employees not to pour waste down storm drains.

SC10 Contaminated or Erodible Surface Areas

- Training is not a significant element of this best management practice.

SC11 Building and Grounds Maintenance

- 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.
- Written procedures for the use of pesticides and fertilizers relevant to your facility would help maintenance staff understand the "do's" and "don'ts". If you have large vegetated areas, consider the use of integrated pest management (IPM) techniques to reduce the use of pesticides.

SC12 Building Repair, Remodeling, and Construction

- Proper education of off-site contractors is often overlooked. The conscientious efforts of well trained employees can be lost by unknowing off-site contractors, so make sure they are well informed about what they are expected to do.

SC13 Over-Water Activities

- Post signs to indicate proper use and disposal of residual paints, rags, used oil, and other engine fluids.
- Educate tenants and employees on spill prevention and cleanup.
- Include appropriate language in tenant contracts indicating their responsibilities.

MUNICIPAL HANDBOOK REFERENCES

4. SOURCE CONTROL BMPs

INTRODUCTION

This chapter describes specific source control Best Management Practices for use by municipalities to reduce pollutants in its storm water discharges. Chapter 2 provided a comprehensive review of a municipal Storm Water Management Program while Chapter 3 led you through the steps of identifying BMPs that become a part of the SWMP. Fact sheets are provided for each of the BMP categories shown in the box.

Each fact sheet contains a cover sheet with:

- A description of the BMP
- Approach
- Requirements
  - Cost considerations
  - Regulations
  - Administrative and Staffing
  - Equipment
  - Training
- Public Education/Participation
- Limitations

The side bar presents information on where this BMP applies, targeted constituents, and an indication of the level of effort and costs to implement.

For some BMPs, further information, including examples of effective programs and references, is provided in additional sheets.

Source Control BMPs

Public Education
SC0 Public Education/Participation

Planning Management
SC1 Land Use Planning/Management

Material Use Controls
SC10 Housekeeping Practices
SC11 Safer Alternative Products

Material Exposure Controls
SC20 Material Storage Control
SC21 Vehicle Use Reduction

Material Disposal and Recycling
SC30 Storm Drain System Signs
SC31 Household Hazardous Waste Collection
SC32 Used Oil Recycling

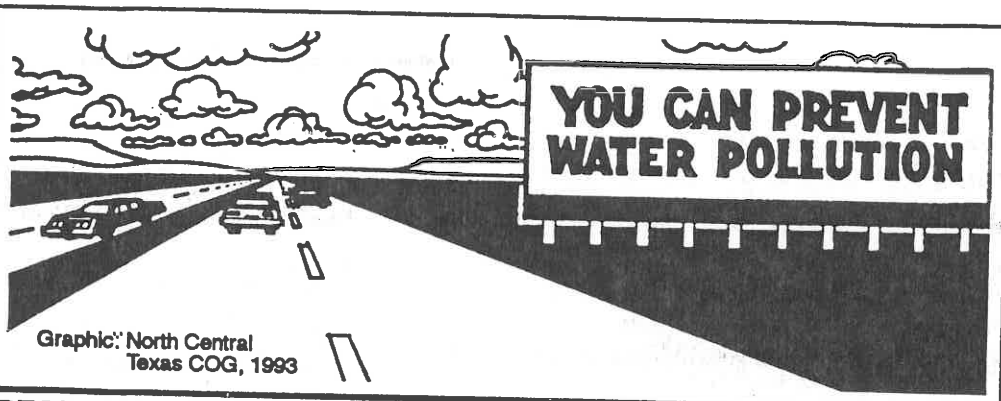
Spill Prevention and Cleanup
SC40 Vehicle Leak and Spill Control
SC41 Aboveground Tank Leak and Spill Control

Illegal Dumping Controls
SC50 Illegal Dumping Control

Illicit Connection Controls
SC60 Illicit Connection-Prevention
SC61 Illicit Connection-Detection and Removal
SC62 Leaking Sanitary Sewer Control

Street/Storm Drain Maintenance
SC70 Street Cleaning
SC71 Catch Basin Cleaning
SC72 Vegetation Controls
SC73 Storm Drain Flushing
SC74 Roadway/Bridge Maintenance
SC75 Detention/Infiltration Device Maintenance
SC76 Storm Channel/Creek Maintenance

BMP: PUBLIC EDUCATION/PARTICIPATION



Graphic: North Central Texas COG, 1993

Program Elements

- *New Development*
- *Residential*
- *Commercial Activities*
- *Industrial Activities*
- *Municipal Facilities*
- *Illegal Discharges*

DESCRIPTION

Public education/participation, like an ordinance or a piece of 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 integrating elements of public education and participation into a municipality's overall plan for storm water quality management. Public education/participation are vital components of many of the individual source control BMPs that follow in this chapter.

A public education and participation plan provides the municipality with a strategy for educating its employees, the public, and businesses about the importance of protecting storm water from improperly used, stored, and disposed of pollutants. Municipal employees must be trained, especially those that work in departments not directly related to storm water but whose actions affect storm water. Residents must become aware that a variety of hazardous products are used in the home and that their improper use and disposal can pollute storm water. Increased public awareness also facilitates public scrutiny of industrial and municipal activities and will likely increase public reporting of incidents. Businesses, particularly smaller ones that may not be regulated by Federal, State, or local regulations, must be informed of ways to reduce their potential to pollute storm water.

The specific public education/participation aspects of each of the source controls are highlighted in the individual fact sheets. The focus of this fact sheet is more general, and includes the overall objectives and approaches for assuring public involvement in local storm water management programs. Accordingly, the organization of this fact sheet differs somewhat from the other fact sheets in this chapter.

OBJECTIVES

The public education and participation plan should be based on four objectives:

- Promote a clear identification and understanding of the problem and the solutions,
- Identify responsible parties and efforts to date,
- Promote community ownership of the problems and the solutions, and
- Integrate public feedback into program implementation.

APPROACH

- Pattern a new program after the many established programs from municipalities around the state and country. Whenever possible, integrate storm water public education/participation into existing programs from other departments at your municipality.

SC0

Best Management Practices

BMP: PUBLIC EDUCATION/PARTICIPATION (CONTINUE)

- Implement public education/participation as a coordinated campaign in which each message is related to the last.
- Present a clear and consistent message and image to the public regarding how they contribute to storm water pollution and what they can do to reduce it.
- Expand definition of "public" to include small businesses and construction site operators who often possess the same limited levels of awareness of the problems, regulations, and solutions as the "general" public. As a result, small businesses need the same level of technical assistance (education) and participation in the process as the "general" public.
- Utilize multi-media to reach the full range of audiences.
- Translate messages into the foreign languages of the community to reach the full spectrum of your populace and to avoid misinterpretation of messages.
- Create an awareness and identification with the local watershed.
- Involve focus or advisory groups in the development of a public education/participation plan. This will create a much more effective plan as well as promote ownership of the plan by those involved.
- Use everyday language in all public pieces. Use outside reviewers to highlight and reduce the use of technical terminology, acronyms, and jargon.
- Make sure all statements have a sound, up-to-date technical basis. Do not contribute to the spread of misinformation.
- Break up complicated subjects into smaller more simple concepts. Present these concepts to the public in a metered and organized way to avoid "overloading" and confusing the audience.

Additional Information — Public Education/Participation

Approach

Public education and participation are critical elements of many of these source control BMPs. As each municipality chooses source controls, and develops and implements its SWMP, it is very important that the public education and participation aspects of the chosen source controls be integrated into an overall plan. The presentation of a well coordinated and comprehensive campaign will be much more effective and efficient at reaching the target audiences than a series of separate actions whose relation to one another may not be evident.

Target Audiences

To effectively achieve these objectives, the implementation of a public education and participation plan requires that the full range of target audiences be identified and provided with appropriate information and outreach. The following audiences should be included:

- Political - Elected officials and heads of departments, agencies, and commissions;
- Technical (Internal) - Municipal department and agency staffs;
- Technical (External) - State agencies (Cal-EPA, SWRCB, IWMB, ARB), regional agencies (e.g., ABAG, SCAG, AMBAG, water and transportation agencies), and neighboring governments;
- Business - Commercial and industrial, including trade associations;
- Construction - Developers and contractors;
- Community Groups - Fraternal, ethnic, hobby, horticultural, senior citizen, and service;
- Environmental Groups;
- General Public/Residential;
- Schools/Youth Groups;
- Media - Print and electronic, and
- Pollutant-defined - Groups of individuals defined by the specific pollutant(s) they discharge (e.g., used motor oil, pesticides).

Strategic Activities

The public must have a clear understanding of the problem of storm water pollution in order to bring about the behavioral changes needed to reduce the discharge of pollutants. Part of this "clear understanding" involves increasing the public's realization of their "place" in the watershed. The public should be educated about the watershed, where they live in relation to it, and how their behavior affects the health of the whole watershed. Ultimately, municipal employees, citizens, and businesses must realize that they contribute to storm water pollution and that by modifying their behavior they can contribute to the solution. Implementation of the public education and participation plan is the mechanism by which this understanding is attained, and these behavioral changes are brought about.

It has been estimated that some individuals require exposure to the same message up to seven times, from a variety of media, before behavior modification occurs. Therefore, given limited resources, the key question is not what one activity (e.g., fair) or media (e.g., radio) is best, but what mixture of these elements is most effective for the target audience.

In light of this information, the public education and participation plan should include a variety of activities to reach and educate the target audiences. These activities may include:

- Program Planning and Tracking - Public surveys and database;
- Program Identity - Program message, logo, and tag line;
- Collateral Material - Newsletter, fact sheets, brochures, posters;
- Coordinating Committees;
- Media Campaign - Press releases, advertising, public service announcements;

SC0



Additional Information — Public Education/Participation

- Residential Programs - Storm drain stencilling, home toxics checklist/alternatives, and specific neighborhood projects;
- Presentations - Environmental booth, speakers bureau, and special events;
- Business Programs - Workshops, publications, and green business projects;
- Construction Programs - Workshops, educational materials, and certification;
- Consumer Programs - Point of purchase displays and printed grocery bags; and
- School Education - Facility tours, contests, and curriculum.

Elements of a Model Public Education/Participation Plan

The following elements of a model plan are based on plans developed in California and elsewhere. The list of elements is intended as a guideline or menu only. The list of activities is by no means exhaustive, and new activities are being developed by communities on an ongoing basis. The actual level, priority, and schedule of activities in your agency's public education/participation plan must be based on your community's needs and resources. Communities have typically developed 5-year plans to match the length of their NPDES permit. There are some activities that should occur before others. These activities are listed as a group first, followed by a general list of other activities.

Start-Up Activities

- Program Planning and Tracking (Public survey and database) - A public survey is an important tool to assess the use of toxic materials, perceptions of health risk, disposal practices, support and willingness to pay for new programs, and overall environmental awareness. The survey results will educate you as to your community's needs and guide the development and implementation of your public education and participation plan. Surveys are equally important in establishing a baseline for evaluating the effectiveness of your program. As such, surveys should be conducted on a regular basis (e.g, biannual) to gauge your program's success. Strongly consider the use of a professional survey firm. Surveys conducted in an unscientific manner often provide poor information at best, and misinformation at worst.

  A database is another important program assessment tool that should be initiated before the program begins. The database can maintain information on mailing lists, phone inquiries, material distributions, spill incident data, and levels of effort. As much as possible, the program's effort should be quantified to track its progress and to provide feedback to the public and to the regulatory agencies.

- Program Identity (Message, logo, and tag line) - The development of a consistent image which appears on all materials distributed by your program will promote an understanding of the program, its mission, and its interconnectedness with other issues and programs. The development of a program logo with such high public exposure should be performed by a professional graphics firm.

- Coordinating committees - The work of other agencies within your municipality and other groups outside of the municipality often touches on some part of the storm water quality issue as a byproduct of these groups' efforts. Committees should be established that coordinate the storm water public education/participation program with other environmental education efforts within the municipality and at the schools. Likewise, successful implementation of the storm water management program cuts across most municipal departments requiring that representatives from these departments meet regularly to coordinate their efforts.

SC0

Best Management Practices

Additional Information — Public Education/Participation

Other Activities

- Media Campaign (Press releases, advertising, and public service announcements) - The media (radio, television, and newspapers) offers both widespread coverage and the opportunity to repeat the same message. Cultivate media support and involvement by educating media staff on the purpose of the program. Press releases and public service announcements (PSAs) may be produced on a regular basis to inform the public about upcoming events, household hazardous waste collections, and sources of additional information. Billboards and municipal vehicle (buses, street sweepers) placards are another effective media for transmitting the program logo and tag line.

- Collateral Material (Newsletter, fact sheets, brochure, and posters) - Produce newsletters at regular intervals to inform program participants, the general public, and businesses about the program. Fact sheets may be used to inform the public about specific issues. Brochures provide an overall picture of the program and can be used to highlight the program's comprehensiveness and long term nature. Posters may be displayed at municipal offices for both public education and municipal staff training, and distributed to schools and businesses.

- Residential Programs (Storm drain stencilling, home toxics checklist/alternatives, and specific neighborhood projects) - Because of its short development time and low maintenance costs, storm drain stencilling is often one of the first activities implemented by communities. Likewise, a home toxics checklist/alternatives publication, developed initially to meet household hazardous waste regulations, may be integrated into the public education effort about storm water quality. Some larger communities are targeting specific neighborhoods for more concentrated and immediate education, because of their geographic position in a watershed.

- Presentations (Environmental booth, speakers bureau, and special events) - Direct contact between the municipal staff implementing the storm water management program and the public can be a highly effective way of educating target audiences. Environmental booths can be especially effective because they distribute the message in a three dimensional, sometimes interactive way. A special event can bring extra attention to the program by highlighting a milestone, particularly if reporters from the media cover the event.

- Construction Programs (workshops, educational materials and certification) - Contractors and developers often need education on sources, impacts, and control of pollutants from construction sites. Site operators often need assistance in developing erosion and sediment controls. A certification program may be appropriate for all construction site operators, plan reviewers and inspectors. The certification program would establish a minimum-competency level for those involved in preparing and implementing erosion and sediment control plans, and storm water pollution prevention plans.

- Business Programs (Workshops, publications, and "green" business project) - Some businesses are more likely than others to contribute to storm water pollution. Municipality's can take advantage of this by defining and focusing education efforts on priority businesses. Small businesses, in particular, need assistance with understanding the problems and being made aware of alternatives and solutions. The use of an educational, positive incentive-based program for small businesses is often much more effective than a traditional command-and-control approach.

- Consumer Programs (Point of purchase displays and printed grocery bags) - Point of purchase displays can be very effective because they convey the program's message directly to the consumer at the time and place the purchase decision is being made. Grocery bags printed with the program logo and tag line are a quick and effective way to give brief information to many people.

SC0



- School Education (Facility tours, contests, and curriculum) - The most effective long term method to modify behavior is to educate people at an early age. Facility tours of the wastewater treatment plant, sewer system, household hazardous waste collection center, and other municipal facilities provides children with a first hand look at the processes involved with treating waste and reinforces the awareness that substances deposited to the storm drain are not treated. Contests to develop posters, calendars, etc. are a fun way to raise children's awareness and the accuracy of the resulting products can provide feedback as to effectiveness of other educational efforts. An environmental curriculum covering recycling, energy use, air and water pollution can be a highly effective but long term educational activity. Several groups have recently developed or are developing curricula (see below).

Examples of Effective Programs

There are a number of communities with effective public education/participation programs. The most pro-active include Santa Clara County and the City of Palo Alto, Alameda County, the City and County of San Francisco, the Santa Monica Bay Restoration Project, City of Los Angeles Clean Water Program, City of Santa Monica, the Municipality of Metropolitan Seattle (Metro), and the Unified Sewerage Agency of Washington County, Oregon. In addition, large businesses, such as PG&E, have used inserts in their bill mailings to educate their customers. The California Coastal Commission and the Lindsay Museum are both developing a curriculum targeted at nonpoint source pollution, and the San Francisco Estuary Project has already developed such a curriculum for K-12.

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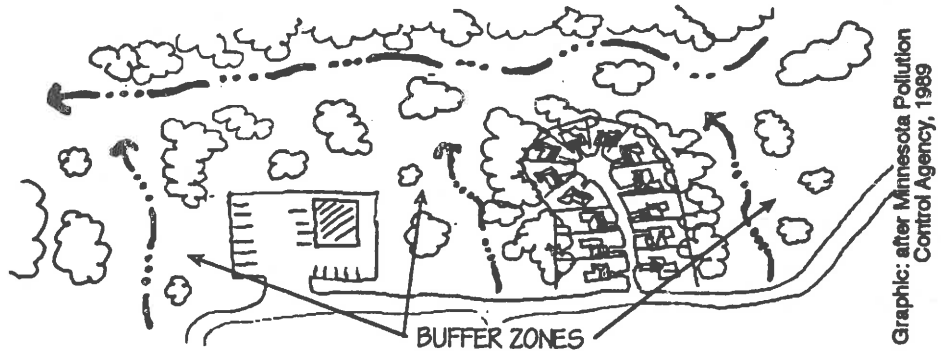
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SC0



BMP: LAND USE PLANNING/MANAGEMENT



Program Elements

- ***New Development*** (●)
- ***Residential***
- ***Commercial Activities***
- ***Industrial Activities***
- ***Municipal Facilities***
- ***Illegal Discharges***

DESCRIPTION

This BMP presents an important opportunity to reduce pollutants in storm water runoff by using a comprehensive planning process to integrate water quality concerns into the development and redevelopment process. It is applicable to all types of land use and represents one of the most effective pollution prevention practices.

APPROACH

The land use planning process need not be complex. A basic schematic model involves:

- Phase 1 - Goals: Determination of clear-cut water quality goals.
- Phase 2 - Study: Identification of planning area then gathering of pertinent data and the writing of a description of the planning area and its associated problems.
- Phase 3 - Analysis and Synthesis: Determine and prioritize the water quality needs as they relate to land use.
- Phase 4 - Recommendations: Future courses of action are developed to address the identified problems and needs determined previously.
- Phase 5 - Adoption: The recommendations are presented to a political body for acceptance and implementation.
- Phase 6 - Implementation: Recommendations adopted by the political body are implemented by the locality.

REQUIREMENTS TO IMPLEMENT

- Cost Considerations
  - Majority of costs are associated with establishing a comprehensive land use plan which addresses the quality of storm water runoff after projects.
- Regulatory
  - Ordinances are usually required to implement and enforce land use plans including those relating storm water runoff quality.
  - Several federal and state initiatives influence land use planning: the National Environmental Policy Act, the California Environmental Quality Act, the Clean Water Act, the Clean Air Act, and the State General Plan process and State Subdivision Map Act.
- Administrative/Staffing
  - Site plans and/or environmental impact documents for projects must be reviewed for compliance.
  - Additional staff may be required to implement site plan review and an inspection program.

Targeted Constituents

- ● ***Sediment***
- ◒ ***Nutrients***
- ● ***Heavy Metals***
- ● ***Toxic Materials***
- ○ ***Floatable Materials***
- ○ ***Oxygen Demanding Substances***
- ○ ***Oil & Grease***
- ○ ***Bacteria & Viruses***

- ● ***Likely to Have Significant Impact***
- ○ ***Probable Low or Unknown Impact***

Implementation Requirements

- ○ ***Capital Costs***
- ○ ***O&M Costs***
- ● ***Regulatory***
- ◒ ***Staffing***
- ○ ***Training***
- ● ***Administrative***

● ***High*** ○ ***Low***

SC1

Best Management Practices

PUBLIC EDUCATION/PARTICIPATION

- To gain the necessary support for land use policies, education of the participants in the development process is a necessity.
- Developers, builders and contractors should be educated regarding the positive environmental impacts of land use management including the improvement to storm water runoff quality.
- To increase awareness, education materials should be as specific as possible about the impact of land use policies on watersheds and water quality.
- GIS (Geographic Information Systems) can be a dynamic and effective tool to illustrate water quality impacts.

LIMITATIONS

- Land use planning/management frequently addresses sensitive public issues. Restrictions on certain land uses for the purpose of mitigating storm water pollution may be politically unacceptable.
- The use of land use controls and planning for water quality improvements may be limited by the lack of staff to enforce various aspects of local zoning and building codes.
- The planning process addresses many public needs and legal requirements which often are in conflict with one another. It is difficult but extremely important to integrate and balance these sometimes competing programs.

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Additional Information — Land Use Planning/Management

Purpose

Land use planning/management represents an important long range approach to minimizing the increase of pollutants in storm water runoff. A comprehensive planning process for municipalities should be used to ensure that land use practices do not result in increased pollution of or contamination to receiving water. Management measures may include modifications or restrictions of certain land use activities. Greater restrictions may be required where development can effect impaired, threatened, or significant water bodies.

Subdivision regulations, zoning ordinances, tentative map reviews and improvement plan reviews are tools that may used to mitigate storm water contamination in developing areas. Subdivision regulations, zoning, and tentative map processes are planning tools where municipal agencies can require conditions of approval or establish improvement/construction standards to meet the water quality objectives within specific watersheds.

Subdivision regulations deal with development on a case-by-case basis and may be used to regulate design and improvements through improvement/construction standards. Zoning ordinances influence development by managing the types of land use activities (single family residential, commercial, etc.) allowed within specific watersheds. Establishing open space areas for future sedimentation basins, land conversation, and management of high density areas in sensitive areas can be made. The tentative map process allows for a final environmental analysis for consistency with the water quality objectives established in the general plan and zoning ordinance. Specific discharge facilities, reductions in directly connected impervious areas (DCIAs) and treatment controls are considered during this process. The improvement plan review process is the mechanism where municipal agency would implement and monitor compliance with any required conditions of approval established during the planning process.

Water Quality Impacts

One objective of land use planning/management is to mitigate negative water quality impacts in developing areas by managing the types of land uses. Management of land use provides the greatest certainty of water quality protection with the least maintenance requirements. Effective practices can be used to control pollutants associated with impervious covers. Where such practices are not feasible, impervious cover limitations may be an effective tool. For example, impervious cover limitations is one of the more effective land use management tools, since nationwide research has consistently documented increases in pollutant loads with increases in impervious cover (see SC74, Roadway/Bridge Maintenance). The establishment of environmental reserves or buffers can also be very effective in protecting wetlands and riparian corridors (see SC76, Storm Channel/Creek Maintenance). Preserving existing vegetation (see ESC2, Construction Handbook) is another important concept in the effort to reduce negative water quality impacts.

Other land use management concepts include cluster zoning directing development and watershed planning. Cluster zoning concentrates development and construction to a limited portion of a site leaving the remaining portion undisturbed. Directing development to specific areas of a developing community can be an important investment in water quality protection. Directing heavy development away from environmentally sensitive areas can greatly reduce the detrimental impacts of nonpoint source pollution. Watershed planning identifies existing or potential water quality problems and specifies measures to prevent or mitigate water quality degradation.

Land Use Planning Methodology

The purpose of a comprehensive plan is to guide decisions regarding storm water quality for existing and future uses of land within the locality. Developing a land use plan for water quality management need not be a complex process. A basic schematic model involves:

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- Phase 1 - Goals: Determination of clear-cut water quality goals by the municipality working with local public and private sector participants (advisory groups, planning commissions, etc.). Goals should act as a target (e.g. "no further degradation of local waters" or "minimize impact from total suspended solids", etc.) and as a mission statement for the community. Public participation and awareness should come from "watershed awareness" and "watershed identification". The commitment to the health of the watershed and improved water quality should be the first goal of any public education effort involving community participation in land use planning and management. Public involvement in setting these goals is critical to gaining public acceptance of the recommendations that follow in the process. Consideration of other municipal goals (e.g., affordable housing) should also be included.

- Phase 2 - Study: Gathering of pertinent data and the writing of a description of the planning area (municipality, county, watershed, etc.) and its associated problems to develop an understanding of the various water quality needs. If the planning area is not the watershed, describe the planning area's relation to the overall watershed.

- Phase 3 - Analysis and Synthesis: Working with local groups, the municipality determines and prioritizes the water quality needs as they relate to the watershed or planning area and forms the basis for his recommendations for the locality.

- Phase 4 - Recommendations: Future courses of action are developed to address the identified problems and needs determined previously.
  - Frequently new zoning ordinances and/or conditions of approval are required to manage land use.
  - Regulations can be adopted to plan the amount of impervious area after project or development completion.

- Phase 5 - Adoption: The recommendations are presented to a political body for acceptance and implementation.

- Phase 6 - Implementation: Recommendations adopted by the political body are implemented by the locality.
  - Managing the land use requires a mechanism to assess project and other development plans at various stages to insure compatibility with land use goals.
  - Environmental impact assessment procedures at the federal or state/local level can be used in conjunction with site plan review as a means to assess the impact to storm water runoff from projects.

Costs

Costs of construction and long-term maintenance and operations will vary depending on the water quality objectives and the BMPs incorporated into the comprehensive planning process. The costs to develop or modify a comprehensive plan to fully incorporate water quality objectives will be smaller compared to the potential construction and O & M costs. In fact, land use planning can be one of the most cost-effective means of storm water quality management as it provides a means of managing activities within a watershed consistent with water quality objectives.

Regulatory Issues

A broad array of regulatory issues are involved with land use planning and management at all governmental levels. Several federal policies and programs influence land use, some of which are: the National Environmental Policy Act (NEPA), the Clean Water Act (CWA), the Coastal Zone Management Act (CZMA), the Clean Air Act (CAA), and the State General Plan process and Subdivision Map Act.

NEPA influences land use by requiring environmental impact statements for federal actions on growth-shaping projects such as subsidies for highways, treatment facilities, power plants, etc. How a project will impact land use over time must be addressed in the NEPA process. The CWA affects decisions regarding the location of industrial facilities through the National Pollution Discharge Elimination System (NPDES) permit program. Industrial wastewaters (along with storm

SC1



water runoff from most industrial facilities) must be permitted and treated in many instances to minimize impact on a watershed.

The CZMA was passed by Congress to assist states in developing institutions, plans, and procedures to manage land use in coastal areas. There are no sanctions against States that fail to prepare adequate coastal plans. The principal incentive for State action is the availability of federal grants under the act. Amendments to the CZMA in 1990 provide it much greater specificity regarding best management practices for storm water runoff. The amendments require the State to have a complete review of all its nonpoint source pollution programs, including urban storm water control. The amendments also require that the State demonstrate that enforceable mechanisms and policies are in place to control urban runoff, including those areas not part of a NPDES program.

The CAA can also have substantial impact on land use. Its pre-construction review requirements for major stationary sources of air-borne residuals can influence where industries locate.

The State has two major regulatory procedures: (1) the California Environmental Quality Act (CEQA) and (2) the Subdivision Map Act (Map Act). CEQA requires local municipal agencies to prepare environmental documentation or prepare statement of negative declaration regarding the significant environmental effects of a proposed project. While storm water pollution effects are not specifically required in the analysis, impacts on water, including diversions and runoff, are required to be addressed by CEQA and its guidelines (see Guidelines Appendix H and the environmental checklist form). The Map Act grants local governments the authority to implement policies related to environmental issues. These policies must be written with findings of fact supported by substantial evidence and must be consistent with the local agency's general plan. The Act also requires that the legislative body of a city or county deny approval of a tentative subdivision map if it makes the finding, among others, that "the design of the subdivision or the proposed improvements are likely to cause substantial environmental damage or substantially and avoidably injure fish or wildlife or their habitat".

At the local level, each agency is required to prepare a long-term, comprehensive general plan (General Plan). The General Plan is required to address seven elements; three of which often address water quality issues. These elements are the open space, conservation and land use elements. The conservation element may specifically cover "the prevention and control of the pollution of streams and other waters." The land use element is the principal portion of the General Plan that can affect water quality because it establishes the types, intensity, and density of development. Land use planning, zoning ordinances and subdivision regulations are the implementation tools of the General Plan. In addition, the General Plan can be a powerful tool for protecting water quality. The establishment of requirements for a erosion control ordinance, revegetation, and the other construction activity BMPs (see Construction Handbook) can have their basis in the General Plan/zoning process. Specific plans, where required, should provide as much specific detail as possible regarding land use management decisions and water quality issues.

Public Education /Participation

Establishing a comprehensive land use management plan requires a broad base of public support. The land use policies developed as a part of the planning process are frequently sensitive issues as they restrict the activities of land owners. As such, extensive public information programs are usually a necessity to educate the public regarding the positive environmental impacts of land use management. Citizens should be represented throughout the planning process and this can be accomplished through a citizens advisory group.

Limitations

Land use planning/management frequently addresses sensitive public issues and will generally develop policies that will not be universally accepted within the locality. As such, implementation of the necessary restrictions on certain land uses required to mitigate storm water pollution may not be politically feasible.

SC1



Additional Information — Land Use Planning/Management

The various aspects of land use planning/management are designed to control development in specific ways. General Plans are designed to control the pace of development while zoning can restrict the types of permissible development. Poor planning often leads to "leap-frog" development whereby vacant land near a city's center is bypassed for less expensive land on the outskirts. Another limitation of the zoning ordinances is that development interests can obtain a "variance" which allows exemptions to the zoning ordinance, however variance can also be legitimately used to minimize or delete expensive improvements where it can clearly demonstrate that they are not necessary.

Examples of Effective Programs

Because of a strong desire to protect the pristine Edwards aquifer from degradation, the City of Austin, Texas, has chosen to manage the impact of new development in two fundamental ways: through treatment control requirements and impervious area minimization requirements. Austin, through its Comprehensive Watersheds Ordinance, requires that impervious cover on residential development in certain areas of the city be limited. Sedimentation and filtration ponds which will capture and treat the first one-half inch of runoff from a site are required for developments of higher intensity such as commercial developments.

In California, Orange County has used its planning process to establish conditions of approval that require water quality management plan to identify specific BMPs to control pollutants in runoff.

REFERENCES

City of Austin, "Environmental Criteria Manual: Land Development Code", City of Austin, Texas, 1989.

Florida Department of Environmental Regulation, "Florida Development Manual: A Guide to Sound Land and Water Management", Florida Department of Environmental Regulation, 1988.

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Office of Planning and Research, "Planning, Zoning, and Development Laws," State of California Governor's Office, Office of Planning and Research, 1990.

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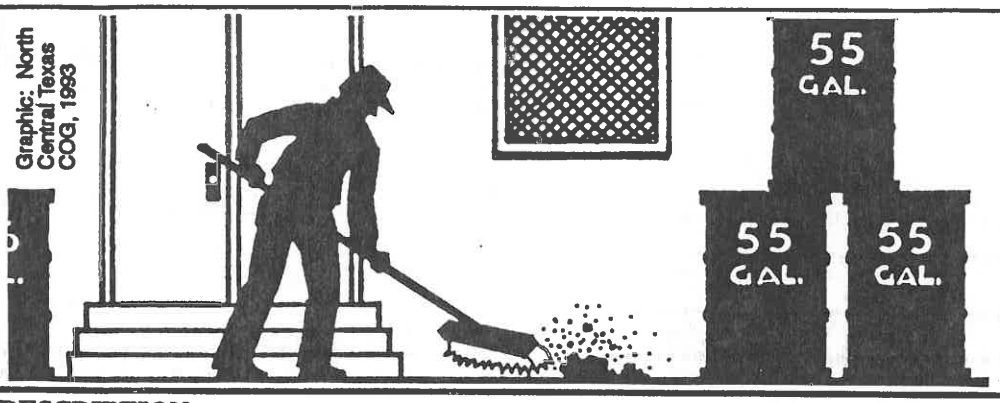
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SC1



BMP: HOUSEKEEPING PRACTICES



Program Elements

- *New Development*
- *Residential* (●)
- *Commercial Activities*
- *Industrial Activities*
- *Municipal Facilities* (●)
- *Illegal Discharges*

DESCRIPTION

Promote efficient and safe housekeeping practices (storage, use, and cleanup) when handling potentially harmful materials such as fertilizers, pesticides, cleaning solutions, paint products, automotive products, and swimming pool chemicals. Related information is provided in BMPs SC11, Safer Alternative Products; SC31, Household Hazardous Waste Collection; SC32, Used Oil Recycling; and the Spill Prevention and Cleanup BMPs (SC40/SC41). For information on specific activities at municipal facilities, see Chapter 4, Industrial Handbook.

APPROACH

- Pattern a new program after the many established programs from municipalities around the state and country. Integrate this best management practice as much as possible with existing programs at your municipality.
- This BMP has two key audiences, municipal employees and the general public.
- Implement this BMP in conjunction with SC11, Safer Alternative Products.
- For a quick reference on disposal alternatives for specific wastes, see Table 4.1, SC50, Illegal Dumping Control.

REQUIREMENTS

- Cost Considerations
  - The primary cost is for staff time as noted below.
- Regulations
  - There are no regulatory requirements to this BMP. Existing regulations already require municipalities to properly store, use, and dispose of hazardous materials.
- Administrative / Staffing
  - Staff to train municipal employees and to coordinate public education efforts.
- Equipment
  - There are no major equipment requirements to this BMP.
- Training
  - Municipal employees who handle potentially harmful materials should be trained in good housekeeping practices. Personnel who use pesticides must be trained in their use. The California Department of Pesticide Regulation license pesticide dealers, certify pesticide applicators and conduct on-site inspections.

PUBLIC EDUCATION / PARTICIPATION

- Public awareness is a key to this BMP.

LIMITATIONS

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

Targeted Constituents

- ● *Sediment*
- ● *Nutrients*
- ○ *Heavy Metals*
- ● *Toxic Materials*
- ○ *Floatable Materials*
- ● *Oxygen Demanding Substances*
- ● *Oil & Grease*
- ○ *Bacteria & Viruses*

- ● *Likely to Have Significant Impact*
- ○ *Probable Low or Unknown Impact*

Implementation Requirements

- ○ *Capital Costs*
- ◒ *O&M Costs*
- ○ *Regulatory*
- ◒ *Staffing*
- ● *Training*
- ○ *Administrative*

● *High* ○ *Low*

SC10

Best Management Practices

Additional Information — Housekeeping Practices

Municipal facilities should follow the best management practices outlined in Chapter 4 of the Industrial Handbook, most of which include good housekeeping measures. Municipalities should develop controls on the application of pesticides, herbicides, and fertilizers in public right-of-ways and at municipal facilities. Controls may include:

- List of approved pesticides and selected uses;
- Product and application information for users;
- Equipment use and maintenance procedures; and
- Record keeping and public notice procedures.

For the general public, municipalities should establish a public education program that provides information on such items as storm water pollution and the beneficial effects of proper disposal on water quality; reading product labels; safer alternative products; safe storage, handling, and disposal of hazardous products; list of local agencies; and emergency phone numbers. The programs listed below have provided this information through brochures or booklets that are available at a variety of places including municipal offices, household hazardous waste collection events or facilities, and public information fairs.

The following discussion provides some general information on good housekeeping that may be provided to the general public. More specific information on particular chemicals may be found in the references listed below.

- Always use caution when handling any hazardous household product. Many products contain toxic chemicals that can cause severe injury or death.
- Store household hazardous products securely and away from children, pets, and sources of heat, sparks, and flames.
- Store products in their original containers and keep them well labeled. Do not store chemicals in food containers.
- Read and follow use instructions.
- Avoid contact with eyes and skin. Wear gloves and eye protection when using hazardous substances. Do not wear contact lenses which can absorb hazardous vapors.
- Work in only well ventilated areas.
- Use up all of the product before disposing or give extra to friends, neighbors or community groups.
- Do not dispose of household hazardous waste:
  - in trash,
  - down storm drains or into creeks,
  - down sink or toilet,
  - onto the ground, or
  - by burning.
- Do dispose of hazardous wastes at household hazardous waste collection events or facilities.

The California Integrated Waste Management Board's Recycling Hotline, 1-800-553-2962, provides information on household hazardous waste collection programs and facilities.

Examples of Effective Programs

There are a number of communities with effective programs. The most pro-active include Santa Clara County and the City of Palo Alto, the City and County of San Francisco, and the Municipality of Metropolitan Seattle (Metro).

REFERENCES

The Bay Begins at Your Door (Brochure), Santa Clara Valley Nonpoint Source Pollution Control Program, (No date).

Guide to Hazardous Products Around the Home (Booklet), Household Hazardous Waste Project, 1989.

SC10



Additional Information — Housekeeping Practices

Hazardous Household Products: A Guide to the Disposal of Hazardous Household Products and the Use of Non-Hazardous Alternatives, California Department of Toxic Substance Control.

Household Cleaners and Polishes, Chemical Hazards in the Home (Brochure), Golden Empire Health Planning Center, (No date).

Solvents, Chemical Hazards in the Home (Brochure), Golden Empire Health Planning Center, (No date).

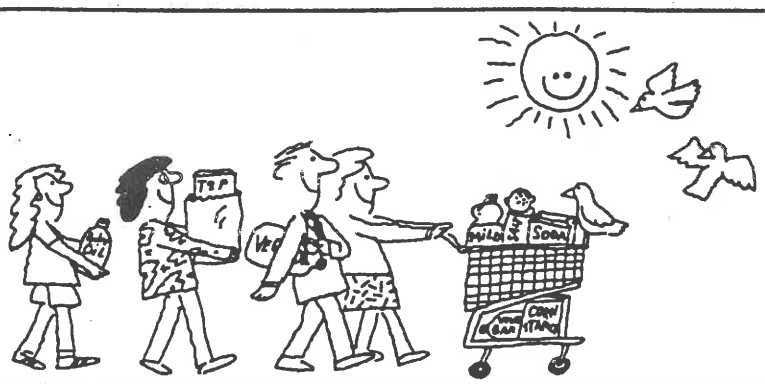
Take Me Shopping: A Consumer Guide to Safe Alternatives for Household Hazardous Products (Booklet), Santa Clara County and City of Palo Alto, 1992.

Your Guide to Less Toxic Shopping: Safer Alternatives for Your Home and Life! (Booklet), San Francisco Household Hazardous Waste Program, 1992.

SC10

Best Management Practices

BMP: SAFER ALTERNATIVE PRODUCTS



Graphic: San Francisco Household Haz Waste Program, 1992

Program Elements

- *New Development*
- *Residential* ●
- *Commercial Activities*
- *Industrial Activities*
- *Municipal Facilities* ●
- *Illegal Discharges*

DESCRIPTION

Promote the use of less harmful products. Alternatives exist for most product classes including fertilizers, pesticides, cleaning solutions, and automotive and paint products.

Related information is provided in SC10, Housekeeping Practices; SC31, Household Hazardous Waste Collection; SC32, Used Oil Recycling; and the Spill Prevention and Cleanup BMPs (SC40/SC41). For information on specific activities at municipal facilities, see Chapter 4, Industrial Handbook.

APPROACH

- Pattern a new program after the many established programs from municipalities around the state and country. Integrate this best management practice as much as possible with existing programs at your municipality.
- This BMP has two key audiences, municipal employees and the general public.
- Implement this BMP in conjunction with SC10, Housekeeping Practices.
- For a quick reference on disposal alternatives for specific wastes, see Table 4.1, SC50, Illegal Dumping Control.

REQUIREMENTS

- Cost Considerations
  - The primary cost is for staff time as noted below.
- Regulations
  - This BMP has no regulatory requirements. Existing regulations already require municipalities to reduce the use of hazardous materials. Safer alternatives for use by the general public are presented through education rather than required by regulation.
- Administrative / Staffing
  - Staff to educate municipal employees and to coordinate public education efforts.
- Equipment
  - There are no major equipment requirements to this BMP.
- Training
  - Municipal employees who handle potentially harmful materials should be trained in the use of safer alternatives.
  - Purchasing departments should be encouraged to procure less hazardous materials.

PUBLIC EDUCATION / PARTICIPATION

- Awareness is the key to this BMP. It promotes a willingness to try alternatives and to modify old behaviors.

LIMITATIONS

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

Targeted Constituents

- ● *Sediment*
- ● *Nutrients*
- ○ *Heavy Metals*
- ● *Toxic Materials*
- ○ *Floatable Materials*
- ● *Oxygen Demanding Substances*
- ● *Oil & Grease*
- ○ *Bacteria & Viruses*

- ● *Likely to Have Significant Impact*
- ○ *Probable Low or Unknown Impact*

Implementation Requirements

- ○ *Capital Costs*
- ◒ *O&M Costs*
- ○ *Regulatory*
- ◒ *Staffing*
- ● *Training*
- ○ *Administrative*

● *High* ○ *Low*

SC11

Best Management Practices

Additional Information — Safer Alternative Products

Employees at municipal facilities and the general public can both be educated about safer alternatives by using information developed by a number of municipalities and organizations including the programs listed below.

The following discussion provides some general information on safer alternatives. More specific information on particular hazardous materials and the available alternatives may be found in the references listed below.

- Automotive products - Less toxic alternatives are not available for many automotive products, especially engine fluids. But there are alternatives to car polishes, degreasers, windshield washer solution. Re-refined, recycled oil is also becoming available.
- Cleaners - Vegetable-based or citrus-based soaps are available to replace petroleum-based soaps/detergents.
- Paint products - Water-based paints, wood preservatives, stains, and finishes are available.
- Pesticides - Specific alternative products or methods exist to control most insects, fungi, and weeds.
- Fertilizers - Compost and soil amendments are natural alternatives.

Examples of Effective Programs

There are a number of communities with effective programs. The most pro-active include Santa Clara County and the City of Palo Alto, the City and County of San Francisco, and the Municipality of Metropolitan Seattle (Metro). The Bio-Integral Resource Center (BIRC) in Berkeley conducts research, and produces brochures and a newsletter on Integrated Pest Management (IPM).

REFERENCES

Note: Many of these references provide alternative products for materials that typically are used inside and disposed to the sanitary sewer as well as alternatives to products that usually end up in the storm drain.

Guide to Hazardous Products Around the Home (Booklet), Household Hazardous Waste Project, 1989.

Hazardous Household Products: A Guide to the Disposal of Hazardous Household Products and the Use of Non-Hazardous Alternatives, California Department of Toxic Substance Control (no date).

Heal the Bay, Safer Alternatives to Household Hazardous Waste, (no date).

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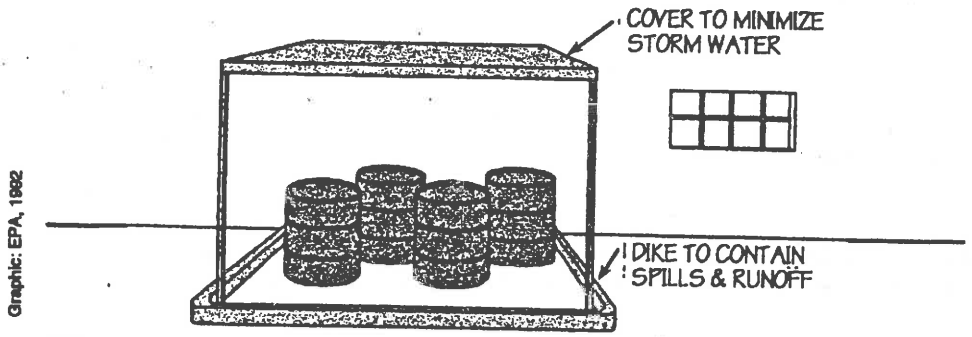
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Your Guide to Less Toxic Shopping: Safer Alternatives for Your Home and Life! (Booklet), San Francisco Household Hazardous Waste Program, 1992.

SC11

Best Management Practices

BMP: MATERIAL STORAGE CONTROL



Graphic: EPA, 1992

Program Elements

- *New Development*
- *Residential*
- *Commercial Activities*
- *Industrial Activities*
- *Municipal Facilities* (●)
- *Illegal Discharges*

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 inspections, and training employees and subcontractors.

This best management practice primarily covers material delivery and storage for municipal operations. For material storage related to the general public (e.g., storage of pesticides) refer to SC10 Housekeeping Practices. For other information on municipality handling of materials, see Spill Prevention and Cleanup BMPs (SC40/SC41) and Material Disposal and Recycling BMPs (SC30-SC32). The Industrial Handbook also contains material management information for industrial activities at municipal facilities.

APPROACH

- The key is to design and maintain material storage areas that reduce exposure to storm water:
  - Store materials inside or under cover on paved surfaces.
  - Use secondary containment.
  - Minimize storage and handling of hazardous materials.
  - Inspect storage areas regularly.
- For a quick reference on disposal alternatives for specific wastes, see Table 4.1, SC50, Illegal Dumping Control.

REQUIREMENTS

- Cost Considerations
  - Will vary depending on the size of the facility and the necessary controls.
- Regulations
  - Storage of reactive, ignitible, or flammable liquids must comply with the Uniform Fire Code and the National Electric Code.
- Administrative / Staffing
  - Accurate and up-to-date inventories should be kept of all stored materials.
- Equipment
  - Keep an ample supply of spill cleanup materials near the storage area.
- Training
  - Employees should be well trained in proper material storage.

PUBLIC EDUCATION / PARTICIPATION

- Employee education is paramount for successful BMP implementation.

LIMITATIONS

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

Targeted Constituents

- ○ *Sediment*
- ● *Nutrients*
- ○ *Heavy Metals*
- ● *Toxic Materials*
- ○ *Floatable Materials*
- ○ *Oxygen Demanding Substances*
- ● *Oil & Grease*
- ○ *Bacteria & Viruses*

- ● *Likely to Have Significant Impact*
- ○ *Probable Low or Unknown Impact*

Implementation Requirements

- ◒ *Capital Costs*
- ◒ *O&M Costs*
- ○ *Regulatory*
- ○ *Staffing*
- ● *Training*
- ◒ *Administrative*

● *High* ○ *Low*

SC20

Best Management Practices

Additional Information — Material Storage Control

The following materials are commonly stored at municipal facilities:

- 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 can pose the following risks:

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

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

- Employees trained in emergency spill cleanup procedures should be present when dangerous waste, liquid chemicals, or other wastes are delivered.
- Store materials inside or under cover whenever possible.
- Designate a secure material storage area that is paved with Portland cement concrete, free of cracks and gaps, and impervious in order to contain leaks and spills.
- Drums stored in an area where unauthorized persons may gain access must be secured to prevent accidental spillage, pilferage, or any unauthorized use.
- Whenever possible, store materials in secondary containment.
- Do not store chemicals, drums, or bagged materials directly on the ground. Place these items 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.
- Storage of reactive, ignitible, or flammable liquids must comply with the local codes. Contact the Fire Marshal to review site materials, quantities, and proposed storage area to determine specific requirements. See the Flammable and Combustible Liquid Code, NFPA30.
- When designing a storage area, include measures to prevent and contain spills (see BMPs SP1/SP2).
- Keep an accurate, up-to-date inventory 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.
- Try to keep chemicals in their original containers, and keep them well labeled.
- Train employees in proper storage measures.
- Keep the designated storage area clean and well organized.
- Conduct routine weekly inspections and check for external corrosion of material containers.

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Best Management Practices for Industrial Storm Water Pollution Control, Santa Clara Valley Nonpoint Source Pollution Control Program, 1992.

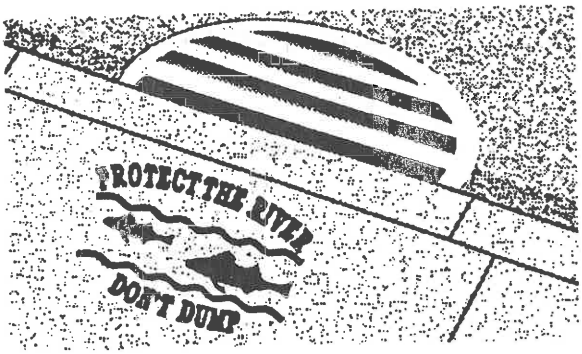
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Water Quality Best Management Practices Manual, City of Seattle, 1989.

SC20



BMP: STORM DRAIN SYSTEM SIGNS



Program Elements

- New Development
- Residential
- Commercial Activities
- Industrial Activities
- Municipal Facilities
- Illegal Discharges

DESCRIPTION

Stenciling of the storm drain system (inlets, catch basins, channels, and creeks) with prohibitive language/graphic icons discourages the illegal dumping of unwanted materials.

APPROACH

- Create a volunteer work force to stencil storm drain inlets, and use municipal staff to erect signs near drainage channels and creeks.
- For a quick reference on disposal alternatives for specific wastes, see Table 4.1, SC50, Illegal Dumping Control.

REQUIREMENTS

- Cost Considerations
  - Volunteer work force serves to lower program cost.
  - Stenciling kits require procurement of durable/disposable items.
  - Need for storage/maintenance of stenciling kits requires planning.
  - Program can aid in the cataloging of the storm drain system.
- Regulations
  - Develop and enforce an ordinance that requires inlets, catch basins, channels, and creeks to be fitted with anti-dumping, pollution prevention signs.
- Administrative/Staffing
  - Primary staff demand is for program setup to provide marketing and training.
  - Ongoing/follow-up staff time is minimal because of volunteer services.
  - Minimum 2 persons are required for high traffic areas, commercial and industrial zones.
  - Staff requirement at program headquarters for emergencies, questions, etc.
- Equipment
  - Storm drain stenciling kits.
- Training
  - Training sessions of approximately 10-15 minutes will cover stenciling procedures, including how to stencil, record keeping, problem drain notation, etc.
  - Proper health and safety protocol (buddy system, traffic, health concerns, etc.).

PUBLIC EDUCATION/PARTICIPATION

- Promote volunteer services (individual and business) through radio/television and mail-out campaigns.
- Public reporting of improper waste disposal by a HOTLINE number stenciled onto the storm drain inlet.

Targeted Constituents

- ● Sediment
- ● Nutrients
- ○ Heavy Metals
- ● Toxic Materials
- ● Floatable Materials
- ● Oxygen Demanding Substances
- ● Oil & Grease
- ○ Bacteria & Viruses

● Likely to Have Significant Impact
○ Probable Low or Unknown Impact

Implementation Requirements

- ○ Capital Costs
- ◒ O&M Costs
- ○ Regulatory
- ○ Staffing
- ◒ Training
- ○ Administrative

● High ○ Low

SC30

Best Management Practices

BMP: STORM DRAIN SYSTEM SIGNS (Continue)

LIMITATIONS

- Private property access limits stenciling to publicly-owned areas.
- Program is highly dependent on volunteer response.
- Storm drain inlets that are physically blocked will be missed or require follow-up.
- High traffic/commercial/industrial zones will be responsibility of city staff.
- Ongoing maintenance to maintain readable signs.

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Additional Information — Storm Drain System Signs

Storm drain system signs act as highly visible source controls that are typically stenciled directly adjacent to storm drain inlets. The signs contain brief statements that discourage the dumping of improper materials into the storm drain system. Graphical icons, either illustrating anti-dumping symbols or images of receiving water fauna, are effective supplements to the anti-dumping message. The intent of such a storm drain system stenciling program is to enhance public awareness of the pollutant effect on local receiving waters from storm water runoff and also to discourage individual's habitual waste disposal actions (e.g. automotive fluids and landscaping wastes).

Approach

An effectively implemented stenciling program encourages change in personal behavior and helps minimize non-point source pollutants from entering the storm drain system. An additional benefit is that waste and catch basin maintenance is minimized through the reduction of disposed materials into storm drain inlets. Finally, some stenciling programs include posting of community hotline numbers for effective reporting and monitoring of improper disposal practices, plus the encouragement of use of household hazardous waste collection and used oil recycling programs.

An important aspect of a stenciling program is the distribution of informational flyers that educate the neighborhood (business or residential) about storm water pollution, the storm drain system, and the watershed, and that provides information on alternatives such as recycling, household hazardous waste disposal, and safer products.

Storm drain inlet stenciling programs are generally handled through community volunteer efforts. Municipal staff must first organize, market, and provide training for program initialization. However, through an aggressive public education program, the majority of the labor should be generated through volunteer services. Successful programs have involved substantial input from business, civic, school, neighborhood, and environmental organizations. Encourage schools, churches, girl/boy scout troops, and environmental groups to add storm drain stenciling as a lesson/field trip to existing activities. This provides a ready-made labor force to use the stenciling materials developed by the municipality.

The stenciling project can be part of a larger volunteer "watershed awareness" public education program. Stenciling should be the easiest volunteer activity, or the first step in "watershed awareness" education, ultimately leading to an all volunteer water quality monitoring program. Municipal staff must initially provide an inventory of curb inlets and develop the stencil. The stenciled language is most effective if it represents a consistent message adopted from the city's public education department. Communities in California have used messages such as: "No Dumping, Flows to Bay", "Protect the Bay, Don't Dump", and "Dump No Waste, Flows to Bay." Program logos and generalized drawings of a fish or a bird may be added to provide a visual aid as well. Once the storm inlet language is determined, stencil painting kits must be ordered and training programs/instruction sheets may be developed.

The storm drain stenciling kits include stencil, paint, paint brush, plastic gloves, catch basin map, clipboard, instructions, liability release form, identification form, rags, whisk broom or brush, paper towels, trash bags, safety vests, and a 5-gallon bucket to hold materials.

Readability of stencils is critical to their effectiveness. Wherever possible stencils should be painted on a smooth surface such as cement, as opposed to asphalt. As with any painting, surface preparation is key to paint adhesion and thus readability and durability. Extra effort expended to clean the surface during the initial painting helps reduce the need for re-painting. Some programs have gone so far as to paint a background color first followed by the stencil in a contrasting color to increase readability.

Many communities use water-based latex exterior paint from their traffic control departments. Brands include: Fuller O'Brien, Arvoe Stripping Paint, Sherman-Williams Metalex, and All-Kids Traffic Paint. Spray paints should have a VOC rating of less than 250 (required by EPA). If there is concern over spray paints, a refillable paint brush called

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"Quick-Painter" may be used. It is easier to handle (children can use it), it is more legible than spray paint, and it also avoids the environmental problem of having to properly dispose of spray cans.

Because a stenciling program involves primarily volunteer services, liability release forms and volunteer identification notices should also be administered. Training sessions should be restricted to residential or low traffic areas for safety purposes. Municipal staff should be responsible for stenciling efforts in most commercial and industrial land use sectors. Regardless of the manpower, an attempt should be made to accurately log all curb inlets that have been stenciled, which will also aid the municipality's efforts to catalog the storm sewer system. Tracking of stenciled inlets and the overall cost of the program is necessary to monitor the success of the program. Municipal staff may be accessible during non-work hours to handle questions, provide instruction, and respond to emergency situations. Program generated waste materials should be centrally collected by municipal staff to ensure proper waste disposal.

Costs

One municipality from the State of Washington has estimated that stenciling kits cost approximately $50 each. Stencils may cost about $8 each including the die cost on an order of 1,000. Re-orders cost about $1/stencil. Stencil designs may be available from other communities. Stencil kits should be provided on a loan basis to volunteer groups free of charge with the understanding that kit remnants are to be returned.

Channel/Creek Signs

Channel and creek signs are another way of providing a pollution prevention message near the point of discharge. These signs can use the same language as the stencil, but are affixed to a metal or wood placard and mounted to a post. Sign installation requires a level of expertise and equipment that most volunteers do not possess, so public works staff time is an additional implementation cost.

New Development

For the private areas of a new development, the municipality may consider requiring developers to purchase and paint stencils near new inlets or catch basins, and to install channel/creek signs with a pollution prevention message. As an alternative, the developer could reimburse the municipality's costs to perform the work. In addition, the municipality can develop and enforce an ordinance that requires inlets, catch basins, channels, and creeks in new developments, both public and private, to be fitted with signs with a pollution prevention message.

Examples of Effective Programs

The City of Palo Alto has a combined volunteer/contractor program which greatly facilitates storm drain stenciling. The City retained the Conservation Corps to paint approximately 75% (2,000) of it's storm drains, leaving the 25% (700) of its drains in more residential areas to be done by volunteers. This strategy speeds up the stenciling, reduces the City's liability, supports a worthwhile program, and still allows plenty of storm drains for volunteers to paint.

The Association of Bay Area Governments (ABAG) sponsored a nine-county stenciling effort on Earth Day 1992. ABAG has up-to-date information on stencil and program development.

The stencil for the City of Huntington Beach includes the municipal code section number for illegal dumping to facilitate incident reporting and enforcement. In Santa Monica, the city provides a packet of material regarding storm water pollution including a catch basin stencil kit.

REFERENCES

Best Management Practices Program for Pollution Prevention, City and County of San Francisco, Uribe & Associates, Oakland, California, 1990.

SC30



Additional Information — Storm Drain System Signs

Municipal Storm Water Discharge Management Program, City of Stockton, California, Camp Dresser & McKee, Walnut Creek, 1992.

Regional Water Quality Control Plants' News, City of Palo Alto, California, 1991.

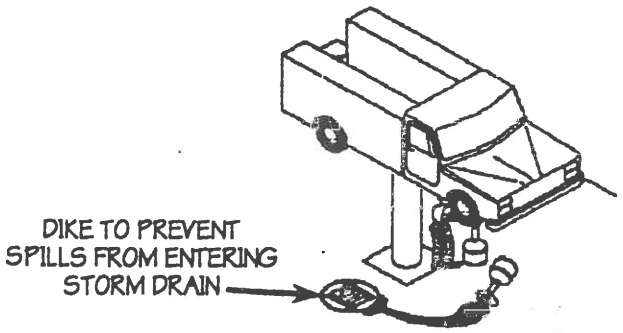
Storm Water Program Guidance Manual for the Puget Sound Basin, (Draft), City of Seattle, Washington, Drainage and Wastewater Utility, 1992.

Urban Runoff: A Pollution Abatement Program, Heal the Bay, Santa Monica, California, 1992.

SC30

Best Management Practices

BMP: VEHICLE LEAK AND SPILL CONTROL



Program Elements

- *New Development*
- *Residential*
- *Commercial Activities*
- *Industrial Activities*
- *Municipal Facilities* (●)
- *Illegal Discharges*

DESCRIPTION

Prevent or reduce the discharge of pollutants to storm water from vehicle 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 BMP covers only prevention and cleanup of spills from vehicles. SC41 contains information on prevention and cleanup of spills from aboveground storage tanks. See SC4 in the Industrial Handbook for more information regarding BMPs for vehicle maintenance shops (such as municipal service centers or corporation yards).

APPROACH

Vehicles will leak and spill fluids. The key is to reduce the frequency and severity of leaks and spills, and when they do occur, to prevent or reduce the environmental impacts.

- Perform fluid removal and changes inside or under cover on paved surfaces.
- Properly store hazardous materials and waste.
- Have spill cleanup supplies readily available.
- Clean up spills and leaks immediately.
- Use dry cleanup methods.
- For a quick reference on disposal alternatives for specific wastes, see Table 4.1, SC50, Illegal Dumping Control.

REQUIREMENTS

- Cost Considerations
  - Prevention of leaks and spills is inexpensive. Treatment and/or disposal of contaminated soil or water can be quite expensive.
- Regulations
  - This is not a major element of this best management practice.
- Administrative / Staffing
  - This BMP has no major administrative or staffing requirements.
- Equipment
  - Keep ample supplies of spill control and cleanup materials at municipal facilities, near storage and maintenance areas.
  - Update spill cleanup materials as changes occur in the types of chemicals on-site.
- Training
  - Training is crucial to reducing the frequency, severity, and impacts of leaks and spills.

PUBLIC EDUCATION / PARTICIPATION

- Encourage the general public to regularly inspect and maintain their vehicles.

LIMITATIONS

- For larger spills, a private spill cleanup company or Hazmat team may be necessary.

Targeted Constituents

- ○ *Sediment*
- ○ *Nutrients*
- ● *Heavy Metals*
- ● *Toxic Materials*
- ○ *Floatable Materials*
- ○ *Oxygen Demanding Substances*
- ● *Oil & Grease*
- ○ *Bacteria & Viruses*

- ● *Likely to Have Significant Impact*
- ○ *Probable Low or Unknown Impact*

Implementation Requirements

- ○ *Capital Costs*
- ◒ *O&M Costs*
- ○ *Regulatory*
- ○ *Staffing*
- ● *Training*
- ○ *Administrative*

● *High* ○ *Low*

SC40

Best Management Practices

Additional Information — Vehicle Leak and Spill Control

Major spills on roadways and other public areas are generally handled by highly trained Hazmat teams from local fire departments or environmental health departments. The measures listed below pertain to leaks and smaller spills at vehicle maintenance shops (such as municipal service centers or corporation yards).

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 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 the material and dispose of properly.

Reporting

- Report spills to local agencies, such as the fire department; they can assist in 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

- Perform all vehicle fluid removal or changing inside or under cover to prevent the runon of storm water and the runoff of spills.
- Regularly inspect 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.
- Immediately drain all fluids from wrecked vehicles.
- Store wrecked vehicles or damaged equipment under cover.
- Place drip pans or absorbent materials under heavy equipment when not in use.
- Use adsorbent materials on small spills rather than hosing down 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 it is cracked. Put it into the containment area until you are sure it is not leaking.

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Additional Information — Vehicle Leak and Spill Control

Vehicle and Equipment Fueling

- Design the fueling area to prevent the runon of storm water and the runoff of spills:
  - Cover fueling area if possible.
  - Use a perimeter drain or slope pavement inward with drainage to a sump.
  - Pave fueling area with concrete rather than asphalt.
- If dead-end sump is not used to collect spills, install an oil/water separator.
- Install vapor recovery nozzles to help control drips as well as air pollution.
- Discourage "topping-off" of fuel tanks.
- Use secondary containment when transferring fuel from the tank truck to the fuel tank.
- Use adsorbent materials on small spills and general cleaning rather than hosing down the area. Remove the adsorbent materials promptly.
- Carry out all Federal and State requirements regarding underground storage tanks, or install above ground tanks.
- Do not use mobile fueling of mobile industrial equipment around the facility; rather, transport the equipment to designated fueling areas.
- Keep your Spill Prevention Control and Countermeasure (SPCC) Plan up-to-date.
- Train employees in proper fueling and cleanup procedures.

Municipal Spill Prevention/Response

For the purposes of developing a spill prevention and response program to meet the storm water regulations, municipalities should use information provided in this fact sheet, SC41, and the spill prevention/response portions of the fact sheets in Chapter 4, Industrial Hanbook, for specific activities. The program should:

- Integrate with existing emergency response/hazardous materials programs (e.g. Fire Department);
- Develop procedures to prevent/mitigate spills to storm drain systems;
- Identify responsible departments;
- Develop and standardize reporting procedures, containment, storage, and disposal activities, documentation, and follow-up procedures; and
- Address spills at municipal facilities, as well as public areas.

Examples of Effective Programs

The City of Palo Alto includes spill prevention and control as a major element of its highly effective program for commercial and municipal vehicle maintenance shops.

REFERENCES

Water Quality Best Management Practices Manual, City of Seattle, 1989.

Best Management Practices for Automotive-Related Industries, Santa Clara Valley Nonpoint Source Pollution Control Program, 1992.

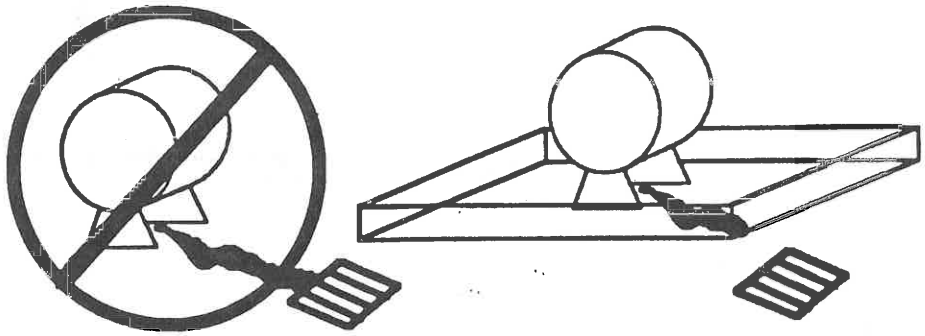
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Best Management Practices for Industrial Storm Water Pollution Control, Santa Clara Valley Nonpoint Source Pollution Control Program, 1992.

SC40



BMP: ABOVEGROUND TANK LEAK AND SPILL CONTROL



Program Elements

- *New Development*
- *Residential*
- *Commercial Activities*
- *Industrial Activities*
- *Municipal Facilities*
- *Illegal Discharges*

DESCRIPTION

Prevent or reduce the discharge of pollutants to storm water from aboveground storage tanks by installing safeguards against accidental releases, installing secondary containment, conducting regular inspections, and training employees in standard operating procedures and spill cleanup techniques.

APPROACH

- Integrate efforts with existing aboveground petroleum storage tank programs through the local Fire Department and Health Department; and area and business emergency response plans through the City, County, or Fire District.
- Use engineering safeguards to reduce the chance for spills.
- Perform regular maintenance.
- For a quick reference on disposal alternatives for specific wastes, see Table 4.1, SC50, Illegal Dumping Control.

REQUIREMENTS

- Cost Considerations
  - Will vary depending on the size of the facility and the necessary controls.
- Regulations
  - State regulations exist for facilities with a storage capacity of 10,000 gallons or more of petroleum to prepare a Spill Prevention Control and Countermeasure Plan (SPCC) Plan (Health & Safety Code Chapter 6.67).
  - State regulations also exist for storage of hazardous materials (Health & Safety Code Chapter 6.95), including the preparation of area and business plans for emergency response to the releases or threatened releases.
  - Consider requiring smaller secondary containment areas (less than 200 sq. ft.) to be connected to the sanitary sewer, prohibiting any hard connections to the storm drain.
- Administrative / Staffing
  - This BMP has no major administrative or staffing requirements.
- Equipment
  - Keep ample supplies of spill control and cleanup materials at municipal facilities.
  - Update your spill cleanup materials as changes occur in the types of chemicals stored on-site.
- Training
  - Employees should be well-trained in spill prevention and cleanup.

PUBLIC EDUCATION / PARTICIPATION

- Employees should be educated about aboveground storage tank requirements.

LIMITATIONS

- For larger spills, a private spill cleanup company or Hazmat team may be necessary.

Targeted Constituents

- ○ *Sediment*
- ○ *Nutrients*
- ○ *Heavy Metals*
- ● *Toxic Materials*
- ○ *Floatable Materials*
- ○ *Oxygen Demanding Substances*
- ● *Oil & Grease*
- ○ *Bacteria & Viruses*

- ● *Likely to Have Significant Impact*
- ○ *Probable Low or Unknown Impact*

Implementation Requirements

- ○ *Capital Costs*
- ◒ *O&M Costs*
- ○ *Regulatory*
- ○ *Staffing*
- ● *Training*
- ○ *Administrative*

● *High* ○ *Low*

SC41

Best Management Practices

Additional Information — Aboveground Tank Leak and Spill Control

Accidental releases of materials from aboveground liquid storage tanks present the potential for contaminating storm water with many different pollutants. Materials spilled, leaked, or lost from tanks may accumulate in soils or on impervious surfaces and be carried away by storm water runoff.

The most common causes of unintentional releases are:

- Installation problems,
- Failure of piping systems (pipes, pumps, flanges, couplings, hoses, and valves),
- External corrosion and structural failure,
- Spills and overfills due to operator error, and
- Leaks during pumping of liquids or gases from truck or rail car to a storage tank or vice versa.

Storage of reactive, ignitible, or flammable liquids should comply with the Uniform Fire Code and the National Electric Code. Practices listed below should be employed to enhance the code requirements.

- Tanks should be placed in a designated area.
- Tanks located in areas where firearms are discharged should be encapsulated in concrete or the equivalent.
- Designated areas should be paved with Portland cement concrete, free of cracks and gaps, and impervious in order to contain leaks and spills.
- Liquid materials should be stored in UL approved double walled tanks or surrounded by a curb or dike to provide the volume to contain 10 percent of the volume of all of the containers or 110 percent of the volume of the largest container, whichever is greater.
- The area inside the curb should slope to a drain.
  - For used oil or dangerous waste, a dead-end sump should be installed in the drain.
  - All other liquids should be drained to the sanitary sewer if available. The drain must have a positive control such as a lock, valve, or plug to prevent release of contaminated liquids.
  - Accumulated storm water in petroleum storage areas should be passed through an oil/water separator.

Well-trained employees can reduce human errors that lead to accidental releases or spills. The employee should have the tools and knowledge to immediately begin cleaning up a spill if one should occur. Employees should be familiar with the Spill Prevention Control and Countermeasure Plan. The plan should include (see the Health & Safety Code for specific requirements):

- Description of the facility, owner and address, activities and chemicals present,
- Facility map,
- Notification and evacuation procedures,
- Cleanup instructions, and
- Identification of key spill response personnel.

Employees responsible for aboveground storage tanks and liquid transfers should be thoroughly familiar with the plan and the plan should be readily available.

Operator errors can be prevented by using engineering safeguards and thus reducing accidental releases of pollutants. Safeguards include:

- Overflow protection devices on tank systems to warn the operator to automatically shutdown transfer pumps when the tank reaches full capacity,
- Protective guards (bollards) around tanks and piping to prevent vehicle or forklift damage, and
- Clearly tagging or labeling all valves to reduce human error.

SC41



Additional Information — Aboveground Tank Leak and Spill Control

Maintenance is critical to preventing leaks and spills. Conduct routine weekly inspections and:

- Check for external corrosion and structural failure,
- Check for spills and overfills due to operator error,
- Check for failure of piping system (pipes, pumps, flanger, coupling, hoses, and valves),
- Check for leaks or spills during pumping of liquids or gases from truck or rail car to a storage facility or vice versa,
- Visually inspect new tank or container installation for loose fittings, poor welding, and improper or poorly fitted gaskets, and
- Inspect tank foundations, connections, coatings, and tank walls and piping system. Look for corrosion, leaks, cracks, scratches, and other physical damage that may weaken the tank or container system.
- During the wet season, accumulated storm water should be released frequently.
- Periodically, integrity testing should be conducted by a qualified professional.

REFERENCES

Water Quality Best Management Practices Manual, City of Seattle, 1989.

Storm Water Management for Industrial Activities: Developing Pollution Prevention Plans and Best Management Practices, USEPA, July 1992.

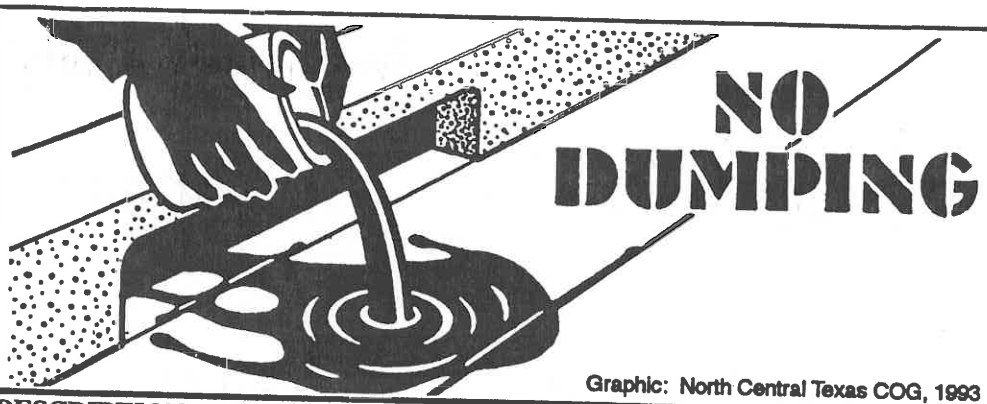
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Stormwater Management Manual for the Puget Sound Basin (The Technical Manual): Volume IV - Urban Land Use BMPs, Washington State Department of Ecology, 1992.

SC41



BMP: ILLEGAL DUMPING CONTROL



Graphic: North Central Texas COG, 1993

Program Elements

- *New Development*
- *Residential*
- *Commercial Activities*
- *Industrial Activities*
- *Municipal Facilities*
- *Illegal Discharges* (●)

DESCRIPTION

Implement measures to detect, correct, and enforce against illegal dumping of pollutants on streets and into the storm drain system and creeks. The remedial focus of this best management practice contrasts with the preventative focus of the Material Disposal and Recycling BMPs (SC30-SC32) in this chapter. Illegal discharges through physical connections are addressed in BMPs SC60-SC62 (Illicit Connection Controls).

APPROACH

- Public awareness is the key to this BMP. Train municipal employees and educate the general public to recognize and report illegal dumping.
- Deputize municipal staff with the authority to write environmental tickets.
- Establish system for tracking incidents.
- Use the quick reference on disposal alternatives at the end of this fact sheet (Table 4.1) to train municipal employees and to educate businesses, contractors, and the general public in proper and consistent methods for disposal.

REQUIREMENTS

- Cost Considerations
  - The primary cost is for staff time as noted below. The cost depends on how aggressively a program is implemented.
  - Municipal cost for containment and disposal may be borne by the discharger.
- Regulations
  - Municipal codes should include sections prohibiting the discharge of soil, debris, refuse, hazardous wastes, and other pollutants into the storm drain system.
- Administrative / Staffing
  - Requires technical staff to detect and investigate illegal dumping violations, and to coordinate public education.
  - Legal staff is required to pursue prosecution of significant cases.
- Equipment
  - A database is useful for defining and tracking the magnitude of the problem.
- Training
  - Training of technical staff in identifying and documenting illegal dumping incidents is required.

PUBLIC EDUCATION / PARTICIPATION

- Awareness of the issue accomplishes two things. The receiver of the information understands the issue and therefore is unlikely to cause a problem, plus their awareness often helps detect other violations.

LIMITATIONS

- The elimination of illegal dumping is dependent on the availability, convenience, and cost of alternative means of disposal.

Targeted Constituents

- ● *Sediment*
- ○ *Nutrients*
- ● *Heavy Metals*
- ● *Toxic Materials*
- ● *Floatable Materials*
- ● *Oxygen Demanding Substances*
- ● *Oil & Grease*
- ● *Bacteria & Viruses*

- ● *Likely to Have Significant Impact*
- ○ *Probable Low or Unknown Impact*

Implementation Requirements

- ○ *Capital Costs*
- ◒ *O&M Costs*
- ○ *Regulatory*
- ◒ *Staffing*
- ● *Training*
- ○ *Administrative*

● *High* ○ *Low*

SC50

Best Management Practices

Additional Information — Illegal Dumping Control

Substances illegally dumped on streets and into the storm drain system and creeks include paints, used oil and other automotive fluids, construction debris, chemicals, fresh concrete, leaves, grass clippings, and pet wastes. All of these wastes can cause storm water and receiving water quality problems as well as clog the storm drain system itself.

One of the keys to success is increasing the number of people on the street who are aware of the problem and who have the tools to at least identify the incident, if not correct it. There are a number of ways of accomplishing this:

- Train municipal staff from all departments (public works, utilities, street cleaning, parks and recreation, industrial waste inspection, hazardous waste inspection, sewer maintenance) to recognize and report the incidents.
- Deputize municipal staff who may come into contact with illegal dumping with the authority to write illegal dumping tickets for offenders caught in the act (see below).
- Educate the public. As many as 3 out of 4 people do not understand that in most communities the storm drain does not go to the wastewater treatment plant. Unfortunately, with the heavy emphasis in recent years on public education about solid waste management, including recycling and household hazardous waste, the sewer system (both storm and sanitary) has been the likely recipient of cross-media transfers of waste.
- Provide the public with a mechanism for reporting incidents such as a hot line and/or door hanger (see below).
- Help areas where incidents occur more frequently set up environmental watch programs (like crime watch programs).
- Another mechanism for public reporting is volunteer water quality monitoring. Volunteers can be trained to notice and report the presence and suspected source of an observed pollutant to the appropriate public agency.

The establishment of a system for tracking incidents will help identify:

- Illegal dumping "hot spots",
- Types and quantities (in some cases) of wastes,
- Patterns in time of occurrence (time of day/night, month, or year),
- Mode of dumping (abandoned containers, "midnight dumping" from moving vehicles, direct dumping of materials, accidents/spills), and
- Responsible parties.

A tracking system also helps manage the program by indicating trends, and identifying who, what, when, and where efforts should be concentrated.

Examples of Effective Programs

The Bureau of Street Cleaning and Urban Forestry in the City and County of San Francisco has authorized a force of three Environmental Patrol Officers to issue citations enforcing the municipal litter codes. San Francisco is planning on extending this authority to other employees including industrial waste inspectors.

The City of Palo Alto has developed a public participation program for reporting dumping violations. When a concerned citizen or public employee encounters evidence of illegal dumping, a door hanger (similar in format to hotel "Do Not Disturb" signs) is placed on the front doors in the neighborhood. The door hanger notes that a violation has occurred in the neighborhood, informs the reader why illegal dumping is a problem, and notes that illegal dumping carries a significant financial penalty. Information is also provided on what citizens can do as well as contact numbers for more information or to report a violation.

The Port of Long Beach has a state of the art database incorporating storm drain infrastructure, potential pollutant sources, facility management practices, and a pollutant tracking system.

The State Department of Fish and Game has a hotline for reporting violations called CalTIP (1-800-952-5400). The phone number may be used to report any violation of a Fish and Game code (illegal dumping, poaching, etc.).

The California Department of Toxic Substances Control's Waste Alert Hotline, 1-800-69TOXIC, can be used to report hazardous waste violations.

SC50



REFERENCES

Hazardous Waste Alert; A Citizen's Guide to Enforcement, California Department of Toxic Substances Control, 1990.

TABLE 4.1 QUICK REFERENCE - DISPOSAL ALTERNATIVES
(Adopted from Santa Clara County Nonpoint Source Pollution Control Program - December 1992)

All of the waste products on this chart are prohibited from discharge to the storm drain system. Use this matrix to decide which alternative disposal strategies to use. **ALTERNATIVES ARE LISTED IN PRIORITY ORDER.**

Key: HHW Household hazardous waste (Government-sponsored drop-off events)
POTW Publically Owned Treatment Plant
Reg.Bd. Regional Water Quality Control Board (Oakland)
"Dispose to sanitary sewer" means dispose into sink, toilet, or sanitary sewer clean-out connection.
"Dispose as trash" means dispose in dumpsters or trash containers for pickup and/or eventual disposal in landfill.
"Dispose as hazardous waste" for business/commercial means contract with a hazardous waste hauler to remove and dispose.

DISCHARGE/ACTIVITY	BUSINESS/COMMERCIAL Disposal Priorities	Approval	RESIDENTIAL Disposal Priorities
General Construction and Painting; Street and Utility Maintenance			
Excess paint (oil-based)	1. Recycle/reuse. 2. Dispose as hazardous waste.		1. Recycle/reuse. 2. Take to HHW drop-off.
Excess paint (water-based)	1. Recycle/reuse. 2. Dry residue in cans, dispose as trash. 3. If volume is too much to dry, dispose as hazardous waste.		1. Recycle/reuse. 2. Dry residue in cans, dispose as trash. 3. If volume is too much to dry, take to HHW drop-off
Paint cleanup (oil-based)	Wipe paint out of brushes, then: 1. Filter & reuse thinners, solvents. 2. Dispose as hazardous waste.		Wipe paint out of brushes, then: 1. Filter & reuse thinners, solvents. 2. Take to HHW drop-off.
Paint cleanup (water-based)	Wipe paint out of brushes, then: 1. Rinse to sanitary sewer.		Wipe paint out of brushes, then: 1. Rinse to sanitary sewer.
Empty paint cans (dry)	1. Remove lids, dispose as trash.		1. Remove lids, dispose as trash.
Paint stripping (with solvent)	1. Dispose as hazardous waste.		1. Take to HHW drop-off.
Building exterior cleaning (high-pressure water)	1. Prevent entry into storm drain and remove offsite 2. Wash onto dirt area, spade in 3. Collect (e.g. mop up) and discharge to sanitary sewer	POTW	
Cleaning of building exteriors which have **HAZARDOUS MATERIALS** (e.g. mercury, lead) in paints	1. Use dry cleaning methods 2. Contain and dispose washwater as hazardous waste (Suggestion: dry material first to reduce volume)		

DISCHARGE/ACTIVITY	BUSINESS/COMMERCIAL Disposal Priorities	Approval	RESIDENTIAL Disposal Priorities
General Construction and Painting; Street and Utility Maintenance (cont'd)			
Non-hazardous paint scraping/ sand blasting	1. Dry sweep, dispose as trash		1. Dry sweep, dispose as trash
HAZARDOUS paint scraping/sand blasting (e.g. marine paints or paints containing lead or tributyl tin)	1. Dry sweep, dispose as hazardous waste		1. Dry sweep, take to HHW drop-off
Soil from excavations during periods when storms are forecast	1. Should not be placed in street or on paved areas 2. Remove from site or backfill by end of day 3. Cover with tarpaulin or surround with hay bales, or use other runoff controls 4. Place filter mat over storm drain Note: Thoroughly sweep following removal of dirt in all four alternatives.		
Soil from excavations placed on paved surfaces during periods when storms are not forecast	1. Keep material out of storm conveyance systems and thoroughly remove via sweeping following removal of dirt		
Cleaning streets in construction areas	1. Dry sweep and minimize tracking of mud 2. Use silt ponds and/or similar pollutant reduction techniques when flushing pavement		
Soil erosion, sediments	1. Cover disturbed soils, use erosion controls, block entry to storm drain. 2. Seed or plant immediately.		
Fresh cement, grout, mortar	1. Use/reuse excess 2. Dispose to trash		1. Use/reuse excess 2. Dispose as trash
Washwater from concrete/mortar (etc.) cleanup	1. Wash onto dirt area, spade in 2. Pump and remove to appropriate disposal facility 3. Settle, pump water to sanitary sewer	POTW	1. Wash onto dirt area, spade in 2. Pump and remove to appropriate disposal facility 3. Settle, pump water to sanitary sewer
Aggregate wash from driveway/patio construction	1. Wash onto dirt area, spade in 2. Pump and remove to appropriate disposal facility 3. Settle, pump water to sanitary sewer	POTW	1. Wash onto dirt area, spade in 2. Pump and remove to appropriate disposal facility 3. Settle, pump water to sanitary sewer

DISCHARGE/ACTIVITY	BUSINESS/COMMERCIAL Disposal Priorities	Approval	RESIDENTIAL Disposal Priorities
General Construction and Painting; Street and Utility Maintenance (cont'd)			
Rinsewater from concrete mixing trucks	1. Return truck to yard for rinsing into pond or dirt area 2. At construction site, wash into pond or dirt area		
Non-hazardous construction and demolition debris	1. Recycle/reuse (concrete, wood, etc.) 2. Dispose as trash		1. Recycle/reuse (concrete, wood, etc. 2. Dispose as trash
Hazardous demolition and construction debris (e.g. asbestos)	1. Dispose as hazardous waste		1. Do not attempt to remove yourself. Contact asbestos removal service for safe removal and disposal 2. Very small amounts (less than 5 lbs) may be double-wrapped in plastic and taken to HHW drop-off
Saw-cut slurry	1. Use dry cutting technique and sweep up residue 2. Vacuum slurry and dispose off-site. 3. Block storm drain or berm with low weir as necessary to allow most solids to settle. Shovel out gutters; dispose residue to dirt area, construction yard or landfill.		
Construction dewatering (Nonturbid, uncontaminated groundwater)	1. Recycle/Reuse 2. Discharge to storm drain		
Construction dewatering (Other than nonturbid, uncontaminated groundwater)	1. Recycle/reuse 2. Discharge to sanitary sewer 3. As appropriate, treat prior to discharge to storm drain	POTW Reg. Bd.	
Portable toilet waste	1. Leasing company shall dispose to sanitary sewer at POTW	POTW	
Leaks from garbage dumpsters	1. Collect, contain leaking material. Eliminate leak, keep covered, return to leasing company for immediate repair 2. If dumpster is used for liquid waste, use plastic liner		

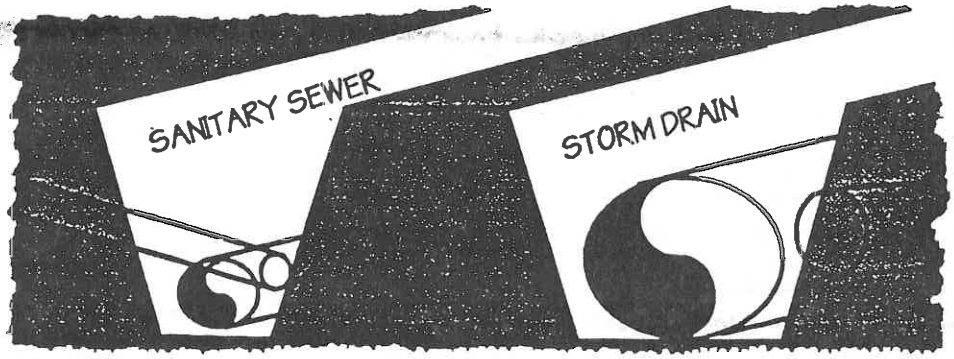
DISCHARGE/ACTIVITY	BUSINESS/COMMERCIAL Disposal Priorities	Approval	RESIDENTIAL Disposal Priorities
General Construction and Painting; Street and Utility Maintenance (cont'd)			
Leaks from construction debris bins	1. Insure that bins are used for dry nonhazardous materials only (Suggestion: Fencing, covering help prevent misuse)		
Dumpster cleaning water	1. Clean at dumpster owner's facility and discharge waste through grease interceptor to sanitary sewer 2. Clean on site and discharge through grease interceptor to sanitary sewer	POTW POTW	
Cleaning driveways, paved areas * (Special Focus = Restaurant alleys Grocery dumpster areas) * Note: Local drought ordinances may contain additional restrictions	1. Sweep and dispose as trash (Dry cleaning only). 2. For vehicle leaks, restaurant/grocery alleys, follow this 3-step process: a. Clean up leaks with rags or absorbents. b. Sweep, using granular absorbent material (cat litter). c. Mop and dispose of mopwater to sanitary sewer (or collect rinsewater and pump to the sanitary sewer). 3. Same as 2 above, but with rinsewater (2c)(no soap) discharged to storm drain.		1. Sweep and dispose as trash (Dry cleaning only). 2. For vehicle leaks, follow this 3-step process: a. Clean up leaks with rags or absorbents; dispose as hazardous waste. b. Sweep, using granular absorbent material (cat litter). c. Mop and dispose of mopwater to sanitary sewer.
Steam cleaning of sidewalks, plazas * * Note: Local drought ordinances may contain additional restrictions	1. Collect all water and pump to sanitary sewer. 2. Follow this 3-step process: a. Clean oil leaks with rags or adsorbents b. Sweep (Use dry absorbent as needed) c. Use no soap, discharge to storm drain		
Potable water/line flushing Hydrant testing	1. Deactivate chlorine by maximizing time water will travel before reaching creeks		
Super-chlorinated (above 1 ppm) water from line flushing	1. Discharge to sanitary sewer 2. Complete dechlorination required before discharge to storm drain		

DISCHARGE/ACTIVITY	BUSINESS/COMMERCIAL Disposal Priorities	Approval	RESIDENTIAL Disposal Priorities
Landscape/Garden Maintenance			
Pesticides	1. Use up. Rinse containers use rinsewater as product. Dispose rinsed containers as trash 2. Dispose unused pesticide as hazardous waste		1. Use up. Rinse containers, use rinsewater as pesticide. Dispose rinsed container as trash. 2. Take unused pesticide to HHW drop-off
Garden clippings	1. Compost 2. Take to Landfill		1. Compost 2. Dispose as trash.
Tree trimming	1. Chip if necessary, before composting or recycling		1. Chip if necessary, before composting or recycling
Swimming pool, spa, fountain water (emptying)	1. Do not use metal-based algicides (i.e. Copper Sulfate) 2. Recycle/reuse (e.g. irrigation) 3. Determine chlorine residual = 0, wait 24 hours and then discharge to storm drain.	POTW	1. Do not use metal-based algicides (i.e. Copper Sulfate) 2. Recycle/reuse (e.g. irrigation) 3. Determine chlorine residual = 0, wait 24 hours and then discharge to storm drain.
Acid or other pool/spa/fountain cleaning	1. Neutralize and discharge to sanitary sewer	POTW	
Swimming pool, spa filter backwash	1. Reuse for irrigation 2. Dispose on dirt area 3. Settle, dispose to sanitary sewer		1. Use for landscape irrigation 2. Dispose on dirt area 3. Settle, dispose to sanitary sewer
Vehicle Wastes			
Used motor oil	1. Use secondary containment while storing, send to recycler.		1. Put out for curbside recycling pickup where available 2. Take to Recycling Facility or auto service facility with recycling program 3. Take to HHW events accepting motor oil
Antifreeze	1. Use secondary containment while storing, send to recycler.		1. Take to Recycling Facility
Other vehicle fluids and solvents	1. Dispose as hazardous waste		1. Take to HHW event
Automobile batteries	1. Send to auto battery recycler 2. Take to Recycling Center		1. Exchange at retail outlet 2. Take to Recycling Facility or HHW event where batteries are accepted
Motor home/construction trailer waste	1. Use holding tank. Dispose to sanitary sewer		1. Use holding tank, dispose to sanitary sewer.

DISCHARGE/ACTIVITY	BUSINESS/COMMERCIAL Disposal Priorities	Approval	RESIDENTIAL Disposal Priorities
Vehicle Wastes (cont'd)			
Vehicle Washing	1. Recycle 2. Discharge to sanitary sewer, never to storm drain	POTW	1. Take to Commercial Car Wash. 2. Wash over lawn or dirt area 3. If soap is used, use a bucket for soapy water and discharge remaining soapy water to sanitary sewer.
Mobile Vehicle Washing	1. Collect washwater and discharge to sanitary sewer.	POTW	
Rinsewater from dust removal at new car fleets	1. Discharge to sanitary sewer 2. If rinsing dust from exterior surfaces from appearance purposes, use no soap (water only); discharge to storm drain.	POTW	
Vehicle leaks at Vehicle Repair Facilities	Follow this 3-step process: 1. Clean up leaks with rags or absorbents 2. Sweep, using granular absorbent material (cat litter) 3. Mop and dispose of mopwater to sanitary sewer.		
Other Wastes			
Carpet cleaning solutions & other mobile washing services	1. Dispose to sanitary sewer	POTW	1. Dispose to sanitary sewer
Roof drains	1. If roof is contaminated with industrial waste products, discharge to sanitary sewer 2. If no contamination is present, discharge to storm drain		
Cooling water Air conditioning condensate	1. Recycle/reuse 2. Discharge to sanitary sewer	POTW	
Pumped groundwater, infiltration/ foundation drainage (contaminated)	1. Recycle/reuse (landscaping, etc.) 2. Treat if necessary; discharge to sanitary sewer 3. Treat and discharge to storm drain	Reg. Bd. POTW Reg. Bd.	
Fire fighting flows	If contamination is present, Fire Dept. will attempt to prevent flow to stream or storm drain		

DISCHARGE/ACTIVITY	BUSINESS/COMMERCIAL Disposal Priorities	Approval	RESIDENTIAL Disposal Priorities
Other Wastes (cont'd)			
Kitchen Grease	1. Provide secondary containment, collect, send to recyler. 2. Provide secondary containment, collect, send to POTW via hauler.	POTW	1. Collect, solidify, dispose as trash
Restaurant cleaning of floor mats, exhaust filters, etc.	1. Clean inside building with discharge through grease trap to sanitary sewer. 2. Clean outside in container or bermed area with discharge to sanitary sewer.		
Clean-up wastewater from sewer back-up	1. Follow this procedure: a. Block storm drain, contain, collect, and return spilled material to the sanitary sewer. b. Block storm drain, rinse remaining material to collection point and pump to sanitary sewer. (no rinse-water may flow to storm drain)		

BMP: ILLICIT CONNECTION-PREVENTION



Program Elements

- New Development
- Residential
- Commercial Activities
- Industrial Activities
- Municipal Facilities
- Illegal Discharges

DESCRIPTION

Prevent unwarranted physical connections to the storm drain system from sanitary sewers, floor drains, etc. through regulation, regular inspection, testing, and education.

APPROACH

The following steps are components of this BMP:

- Ensure that existing municipal building and plumbing codes prohibit non-storm water physical connections to the storm drain system.
- Require visual inspection at new land developments during the construction phase.
- Develop a schedule and allocation of staff and resources to implement prevention program.
- Develop documentation and record keeping protocols to track inspections and catalog the storm drain system.
- Use techniques such as zinc chloride smoke testing, fluorometric dye testing and television camera inspection to verify physical connections.
- For a quick reference on disposal alternatives for specific wastes, see Table 4.1, SC50, Illegal Dumping Control.

REQUIREMENTS

- Cost Considerations
  - Zinc chloride smoke, fluorometric dye testing and television camera inspection.
  - Additional labor and equipment cost for verification of plumbing connections.
- Regulations
  - Ensure that existing building and plumbing codes prohibit inappropriate physical connection to the storm drain system and provide adequate legal authority to prevent illicit connections.
  - Implement procedures to inspect and verify that new construction development does not illegally interface with storm drain system.
- Administrative/Staffing
  - Building, plumbing, and drainage system inspectors must verify and document that inappropriate discharges do not physically connect to storm drain system.
  - Zinc chloride smoke, fluorometric dye testing, or television inspection may be necessary for verification.
  - Additional staff time required for verification and documentation of proper connections to storm drain system.

Targeted Constituents

- ○ Sediment
- ● Nutrients
- ○ Heavy Metals
- ○ Toxic Materials
- ○ Floatable Materials
- ● Oxygen Demanding Substances
- ○ Oil & Grease
- ● Bacteria & Viruses

- ● Likely to Have Significant Impact
- ○ Probable Low or Unknown Impact

Implementation Requirements

- ○ Capital Costs
- ◒ O&M Costs
- ○ Regulatory
- ◒ Staffing
- ○ Training
- ◒ Administrative

- ● High ○ Low

SC60

Best Management Practices

PUBLIC EDUCATION/PARTICIPATION

- Community awareness program (using various media) targeting appropriate audiences (homeowners, businesses, contractors, etc.) to warn against improper connections to the storm drain system and encourage public reporting of illegal connections through the community hotline telephone number.
- Community notification required for zinc chloride smoke and fluorometric dye testing in targeted areas.

LIMITATIONS

- Proper connections may be verified on date of inspection, but could be altered afterwards by "boot legged" connections.
- Cost for inspection equipment.
- Removal of illicit connection from storm drain system to sanitary sewer may require approval of local sewering agency.

SC60



Additional Information — Illicit Connection-Prevention

Improper physical connections to the storm drain system can occur in a number of ways, such as overflow cross-connects from sanitary sewers and floor drains from businesses like auto shops and restaurants.

Illegal connections can occur in new as well as existing development. Improper connections in areas of new development can be prevented through inspection and verification techniques. The first measure of prevention is to make sure that existing municipal building and plumbing codes prohibit any unwarranted, non-permitted physical connections to the storm drain system. Building and plumbing code inspectors, in addition to new land development project inspectors, must visually inspect to ensure that illegal connections are not being physically tied to the storm conveyance system. A schedule, proper documentation, and record keeping is essential to the function of such inspections. The schedule and documentation helps catalog the storm drain system and is required by the regulations. Visual inspection, however, is not a very reliable means of verifying the status of new physical connections and their final destination. Continued monitoring throughout the entire construction phase would be necessary to guarantee that new physical connections between the sanitary sewers and storm drains had been prevented though the inspection process.

Requirements to Implement

In order to most accurately verify and prevent new physical connection tie-ins to the storm drain system, some of the more labor and equipment intensive techniques used for illegal connection detection should be utilized (See SC61, Illicit Connection Detection and Removal). Zinc chloride smoke and fluorometric dye testing are the most effective verification technologies. Fluorescent dye testing involves the introduction of a dye such as fluorescein in a discharge point suspected of exhibiting an illicit connection. The dye is flushed down with clear water. Downstream points are observed for the presence of dye. If dye comes through, then an illicit connection has been identified.

Smoke tests may also be used to trace illicit connection. Smoke tests may be conducted without water and can be used to trace connections upstream as well as downstream. Smoke is introduced at either a discharge point or an outfall and "flushed" through the system with fans. Caution and effective communication are important during smoke testing so the presences of smoke is not perceived as an indication of a fire by those unaware of the test.

In situations where dye or smoke tests fail to identify illicit connections, an internal visual inspection of the system may be necessary. Manual visual and television camera inspection of storm drain piping can be utilized in the verification process. These techniques are expensive for most municipalities and therefore may not always be feasible. Arrangements to coordinate and share inspection equipment between municipal wastewater departments and building/plumbing/new development code inspectors may be a solution and become an integral part of the inspection process.

Public awareness and education programs can facilitate a compliance effort to prevent new storm water system connections. Such programs targeted towards contractors and developers can help minimize such activity in areas of new development. Local media awareness campaigns can warn against new connections to the stormdrain system. Community notification would be necessary in the vicinity of areas targeted for zinc chloride smoke or fluorometric dye verification testing for potential new connections.

REFERENCES

Cross-connection Investigations For Storm Water Permit Applications, Lalor, M.M. et. al., WPCF Annual Conference, 1991.

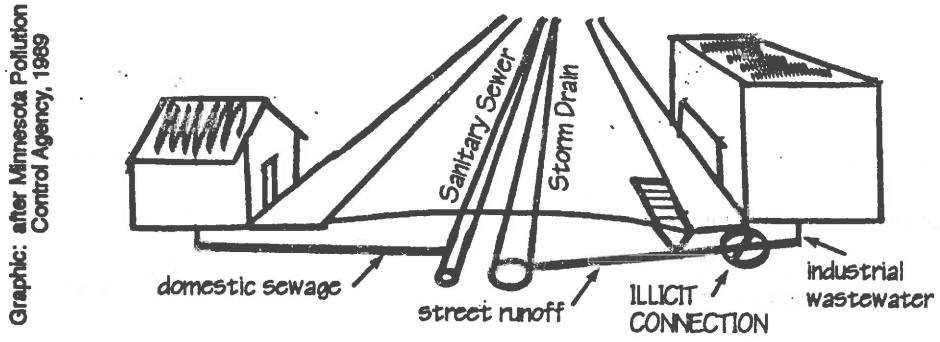
Draft Manual of Practice - Identification of Illicit Connections, USEPA, Permits Division (EN-336), 1990.

Municipal Storm Water Discharge Management Program, City of Stockton, California, 1992.

SC60

Best Management Practices

BMP: ILLICIT CONNECTION-DETECTION AND REMOVAL



Program Elements

- New Development
- Residential
- Commercial Activities
- Industrial Activities
- Municipal Facilities
- Illegal Discharges

DESCRIPTION

Implement control procedures for detection and removal of illegal connections from the storm drain conveyance system. Procedures include field screening, follow-up testing, and complaint investigation.

APPROACH

- Field screening program.
- Sampling program.
- Zinc chloride smoke testing (suspected source testing).
- Fluorometric dye testing (suspected source testing).
- Television camera inspection.
- Physical inspection testing.
- Citizens' complaint on the community hotline to report suspected illegal connections.
- For a quick reference on disposal alternatives for specific wastes, see Table 4.1, SC50, Illegal Dumping Control.

REQUIREMENTS

- Cost Considerations
  - Program initialization costs for procuring necessary equipment and training.
  - Exploration of equipment sharing with municipal wastewater departments.
  - Illegal connection location techniques are very labor and equipment intensive.
- Regulations
  - Enact ordinance granting "right-of-entry" to locate potentially responsible parties.
- Administrative/Staffing
  - Minimum 2-person teams required for field screening and sampling activities.
  - Larger staff teams required for zinc chloride smoke and fluorometric dye testing, or television camera inspection and physical inspection with confined space entry.
  - Staffing of a community hotline telephone number.
  - Program coordination needed for emergencies, record keeping, etc.
- Training
  - OSHA-required Health and Safety Training (29 CFR 1910.120) plus annual refresher training (as needed).
  - OSHA Confined Space Entry training (Cal-OSHA Confined Space, Title 8 and Federal OSHA 29 CFR 1910.146).
  - Procedural training (field screening, sampling, smoke/dye testing, TV inspection).

Targeted Constituents

- ○ Sediment
- ● Nutrients
- ○ Heavy Metals
- ○ Toxic Materials
- ○ Floatable Materials
- ● Oxygen Demanding Substances
- ○ Oil & Grease
- ● Bacteria & Viruses

- ● Likely to Have Significant Impact
- ○ Probable Low or Unknown Impact

Implementation Requirements

- ○ Capital Costs
- ● O&M Costs
- ◒ Regulatory
- ● Staffing
- ○ Training
- ◒ Administrative

● High ○ Low

SC61

Best Management Practices

- Equipment
  - Personal protective equipment (PPE), (hard hats, boots, plastic gloves, coveralls).
  - Sampling containers/equipment.
  - EPA-recommended storm water test kits.
  - Zinc chloride smoke and dispersal fans.
  - Fluorometric dye and fluorometer (optional).
  - Pipeline television camera with videocassette recorder.
  - Self-contained breathing apparatus (SCBA).
  - Oxygen/combustible and hydrogen sulfide gas meters.
  - Vehicle(s).
  - Walkie talkies.

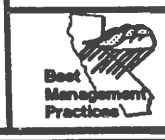
PUBLIC EDUCATION/PARTICIPATION

- Encouragement of public reporting of improper waste disposal or evidence of illicit connections.
- Community notification required in targeted areas for zinc chloride smoke or fluorometric dye testing.

LIMITATIONS

- Private property access rights needed to perform field screening/testing along storm drain system right-of-ways.
- Requirements of municipal ordinance authority for suspected source verification testing necessary for guaranteed rights of entry.

SC61



Additional Information — Illicit Connection-Detection and Removal

Control procedures for detection and removal of existing illegal connections tied to storm drain conveyance systems involves a multi-phased effort. Evidence of illegal connections is generally only detectable at storm drain outfall (end-of-pipe) locations. Therefore, the initial phase of source identification is through a field screening program, a sampling program, or a combined effort of both programs. A reactionary mechanism, based on citizens' complaint reporting, also serves as a preliminary identification of a potential illegal connection source. Secondary or follow-up phases of illegal connection identification require further investigations upgradient of pipelines or drainage ways to isolate illegal system tie-ins.

Field Screening

The field screening program should continue work conducted as part of the Part 1 permit application process and provide for continued field screening during the term of the permit. The program should include details on:

- Departmental responsibility,
- Frequency of inspections,
- Procedures and equipment,
- Documentation,
- Criteria for identifying and setting priorities, and
- Maps and check lists.

The field screening effort should also reconsider whether any of the non-storm water discharges listed in Table 4.1 (see SC50) are sources of pollutants.

The initial control procedure typically begins with a routine field screening program during dry weather conditions. EPA defines dry weather conditions as a time period of 72 hours or more in which no greater than one-tenth inch of rainfall was received in the areas of investigation. Presence of dry weather flow or other suspect visual or odorous characteristics that are typical of normal conditions should be noted in field logbooks for documentary purposes. The field screening process may involve either:

- Notation of visual observations at suspect outfalls,
- Field-testing of dry weather flows with an EPA-approved storm water test kit for copper, chlorine, phenol, detergents/surfactants and pH, or
- Sample collection for analytical testing of suspected parameters.

The intent of the routine field screening program is to identify outfalls that have characteristics of illegal connections. Identified suspect outfalls may then be monitored on a more frequent field screening basis or if evidence is primarily conclusive, then a follow-up storm drain system investigation may commence.

Follow-Up

Storm drain investigations generally begin at suspect outfalls and work upgradient until either the source is identified or there is no evidence to warrant further investigation. The detection process may be expedited by field screening every other manhole, open channel outfall, or combination thereof to most quickly isolate the potential source. Bisecting watersheds and working up or down gradient, dependent on observed conditions, has also been used effectively to expeditiously isolate the approximate location of an illegal connection. Isolation of an illegal connection within the storm drain piping requires utilization of one or more of the following location techniques:

- Fluorometric Dye Testing (see SC60 for brief description).
- Zinc Chloride Smoke Testing (see SC60 for brief description).
- Pipeline Television Camera Inspection.
- Physical Inspection Testing (pipes >39 inches).

SC61



Additional Information — Illicit Connection-Detection and Removal

A municipal program for sharing resources (Fluorometric dye, zinc chloride smoke, TV inspection equipment) between the wastewater and storm water departments can greatly reduce the capital budget expenditures associated with such an important program. Otherwise, capital outlays would be very substantial if the municipality chooses to separately fund the equipment procurement for the individual public works departments. Even with a resource sharing program, illegal connection location techniques require a substantial capital commitment in labor and equipment provisions.

Generally, a municipal ordinance requirement is necessary for granting "rights of entry" to pinpoint principal responsible parties (PRP) through smoke or dye testing verification techniques. Otherwise, in-pipe television camera inspection or physical pipeline inspection are required in lieu of a municipal ordinance granting access for verification of suspected illegal connections. Physical inspection of larger pipes requires trained personnel, certified for confined space entry. Once located, the illegal connection should be corrected by being plugged using "In-situ Form" or equivalent connection removal processes. The PRP should be served a Notice of Violation regarding the illegal connection, fined for the violation, and provide reimbursement for the cost of correcting the illegal connection.

Public Education/Participation

Public education programs will also aid in the monitoring of illegal connections by making individuals aware of evidence of unwarranted discharges to the storm drain system. A community hotline for reporting such evidence can greatly supplement the storm water department's field screening efforts. The usage of smoke or dye testing requires notification of the public in the immediate areas to be tested.

Examples of Effective Programs

City of Stockton, Municipal Storm Water Discharge Management Program contains a comprehensive program element created to prevent, detect, and eliminate illegal connections to storm drains.

City of Fort Worth, Texas, Drainage Water Pollution Control Program. An "action" oriented program designed for corrective measures utilizing innovative biotoxicity testing. Staffing requirements are one full time person per year for a total labor cost of $30,000. Equipment, supplies, and services cost approximately $50,000 per year.

REFERENCES

"The Illicit Connection-EPA Storm Water Regulations Field Screening Program and the City of Houston's Successful Screening System." Presented at Texas Water Pollution Control Association Conference, Glanton, Theo et al., 1991.

Investigation of Inappropriate Pollutant Entries into Storm Drainage Systems - A User's Guide, R. Pitt and M. Lalor, USEPA, 1992.

National Pollutant Discharge Elimination System Permit Application Regulations for Storm Water Discharges; Final Rule. 40 CFR Parts 122, 123, and 124, U.S. EPA, Federal Register 55 (222), November 16, 1990.

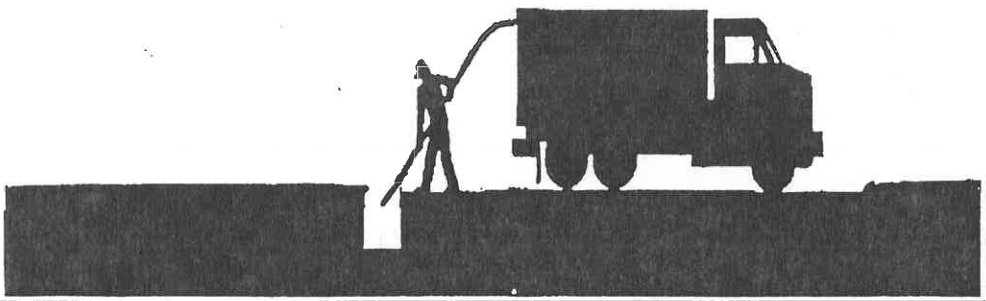
Operational Guide, City of Fort Worth, Texas, Drainage Water Pollution Control Program, Department of Public Health, 1989.

Ozone Disinfection and Treatment of Urban Storm Drain Dry-Weather Flows, Santa Monica Bay Restoration Project, 1992.

SC61

Best Management Practices

BMP: CATCH BASIN CLEANING



Program Elements

New Development

Residential

Commercial Activities

Industrial Activities

Municipal Facilities

Illegal Discharges

DESCRIPTION

Maintain catch basins and storm water inlets on a regular basis to remove pollutants, reduce high pollutant concentrations during the first flush of storms, prevent clogging of the downstream conveyance system, and restore the catch basins' sediment trapping capacity. A catch basin is distinguished from a storm water inlet by having at its base a sediment sump designed to catch and retain sediments below the overflow point. This fact sheet focuses on the cleaning of accumulated sediments from catch basins.

APPROACH

- Aggressively enforce anti-littering and illegal dumping ordinances.
- Catch basins should be cleaned regularly to reduce the possibility of sediment and pollutant loading from the flushing effect of storm water inflow.
- Prioritize maintenance to clean catch basins and inlets in areas with the highest pollutant loading.
- Keep accurate operation logs to track program.

REQUIREMENTS

- Cost Considerations
  - An aggressive catch basin cleaning program could require a significant capital and O&M budget. A careful study of cleaning effectiveness should be undertaken before increased cleaning is implemented.
- Regulations
  - There are no regulatory requirements for this BMP. Municipal codes should include sections prohibiting the disposal of soil, debris, refuse, hazardous waste, and other pollutants into the storm drain system, and prohibiting littering.
- Administrative / Staffing
  - Two-person teams may be required to clean catch basins with vactor trucks.
  - Arrangements must be made for proper disposal of collected wastes.
- Equipment
  - Except for small communities with relatively few catch basins that may be cleaned manually, most municipalities will require mechanical cleaners such as eductors, vacuums, or bucket loaders.
- Training
  - Crews must be trained in proper maintenance, including record keeping and disposal.

PUBLIC EDUCATION / PARTICIPATION

- Educate contractors (cement, masonry, painting) and utility employees (telephone, cable, gas and electric) about proper waste (solid and liquid) disposal.

LIMITATIONS

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

Targeted Constituents

- ● *Sediment*
- ○ *Nutrients*
- ● *Heavy Metals*
- ○ *Toxic Materials*
- ● *Floatable Materials*
- ● *Oxygen Demanding Substances*
- ● *Oil & Grease*
- ○ *Bacteria & Viruses*

- ● *Likely to Have Significant Impact*
- ○ *Probable Low or Unknown Impact*

Implementation Requirements

- ● *Capital Costs*
- ● *O&M Costs*
- ○ *Regulatory*
- ● *Staffing*
- ◒ *Training*
- ◒ *Administrative*

● *High* ○ *Low*

SC71

Best Management Practices

Additional Information — Catch Basin Cleaning

Regular maintenance of public and private catch basins and inlets is necessary to ensure their proper functioning. Clogged catch basins are not only useless but may act as a source of sediments and pollutants. In general, the keys to effective catch basins are:

- At least annual inspections. Municipal staff should inspect public and private facilities to ensure compliance with the following:
  - Immediate repair of any deterioration threatening structural integrity.
  - Cleaning before the sump is 40% full. Catch basins should be cleaned as frequently as needed to meet this standard.
  - Stenciling of catch basins and inlets (see SC30, Storm Drain System Signs).
- Clean catch basins in high pollutant load areas just before the wet season to remove sediments and debris accumulated during the summer.
- Keep accurate logs of the number of catch basins cleaned.
- Record the amount of waste collected.
- Consider implementing employee deputization and spill tracking measures in SC50, Illegal Dumping Control, in conjunction with this BMP to facilitate control of illegal dumping.

Public education should be implemented in conjunction with the public education effort in SC50, Illegal Dumping Control, to raise awareness of the problem. Information in the Construction Handbook regarding waste management (BMPs CA20-CA24) may be used to develop a program for contractors.

REFERENCES

Best Management Practices for Storm Drainage Facilities (Draft), Maintenance Subcommittee, Alameda County Urban Runoff Clean Water Program, 1992.

Protecting Water Quality in Urban Areas: Best Management Practices for Minnesota, Minnesota Pollution Control Agency, 1989.

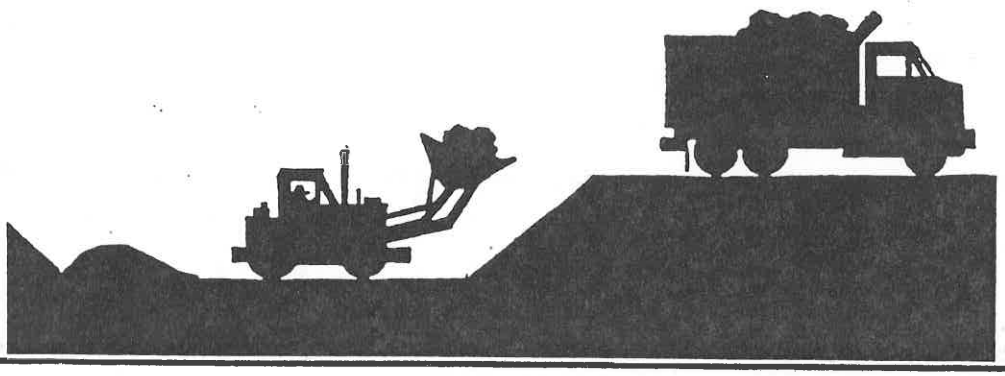
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Street Cleaning Practice, American Public Works Association, 1978.

SC71



BMP: DETENTION/INFILTRATION DEVICE MAINTENANCE



Program Elements

- *New Development*
- *Residential*
- *Commercial Activities*
- *Industrial Activities*
- *Municipal Facilities* (●)
- *Illegal Discharges*

DESCRIPTION

Proper maintenance and siltation removal is required on both a routine and corrective basis to promote effective storm water pollutant removal efficiencies for wet/dry detention pond and infiltration devices.

APPROACH

- Remove silt after sufficient accumulation.
- Periodically clean accumulated sediment and silt out of pre-treatment inlets.
- Infiltration device silt removal should occur when the infiltration rate drops below 1/2 inch per hour.
- Removal of accumulated paper, trash, and debris should occur every six (6) months or as needed to prevent clogging of control devices.
- Vegetation growth should not be allowed to exceed 18 inches in height.
- Mow the slopes periodically and check for clogging, erosion and tree growth on the embankment.
- Corrective maintenance may require more frequent attention (as required).

REQUIREMENTS

- Cost Considerations
  - Frequent sediment removal can be labor intensive and costly. However, properly designed ponds allow for easy removal of accumulated sediments at relatively minor cost.
  - Cost of waste material for transport and disposal.
- Administrative/Staffing
  - Two-person teams may be needed for routine silt removal and excavation.
  - Program manager needed to track maintenance activities and provide field assistance.
  - Staff team needed for corrective maintenance activities.
- Regulations
  - Permits may be required by Corps or Engineers, Fish & Wildlife or State Fish & Game.
- Equipment
  - Vehicles, dump trucks, bulldozers, trackhoes, excavators, mowers, weed trimmers, sickles, machetes, shovels, rakes, and personal protective equipment (PPE), (goggles, dust masks, coveralls, boots, gloves).
- Training
  - Appropriate excavation and maintenance procedures.
  - Proper waste disposal procedures.

Targeted Constituents

- ● *Sediment*
- ○ *Nutrients*
- ● *Heavy Metals*
- ○ *Toxic Materials*
- ○ *Floatable Materials*
- ◐ *Oxygen Demanding Substances*
- ○ *Oil & Grease*
- ◐ *Bacteria & Viruses*

- ◐ *Likely to Have Significant Impact*
- ○ *Probable Low or Unknown Impact*

Implementation Requirements

- ◒ *Capital Costs*
- ◒ *O&M Costs*
- ○ *Regulatory*
- ◒ *Staffing*
- ○ *Training*
- ○ *Administrative*

● *High* ○ *Low*

SC75

Best Management Practices

BMP: DETENTION/INFILTRATION DEVICE MAINTENANCE (Continue)

PUBLIC EDUCATION/PARTICIPATION

- Create a public education campaign to explain the function of wet/dry detention pond/infiltration devices and their operational requirements for proper effectiveness
- Encourage the public to report wet/dry detention pond/infiltration devices needing maintenance

LIMITATIONS

- Wet detention pond dredging can produce slurried waste that often exceeds the requirements of many landfills
- Frequent sediment removal is labor and cost intensive

SC75



Additional Information — Detention/Infiltration Device Maintenance

Maintenance

Proper maintenance of detention pond and infiltration device systems is a source control procedure necessary to ensure effective storm water pollutant removal efficiency. Routine and corrective maintenance needs should be monitored after storms for proper function of wet ponds, extended detention basins, and infiltration device structures. Proper maintenance of these structures requires periodic silt/sediment and trash debris removal, as well as timely vegetation control. Detention basin silt removal should occur when the accumulated depth exceeds six (6) inches on average in basins without sediment traps. In basins with sediment traps, silt removal should occur when accumulation exceeds four (4) inches.

More frequent sediment removal is recommended, especially in areas where roadway drainage provides a significant runoff component. High accumulation rates of heavy metal contaminants (lead, zinc, copper) have been identified in these BMP structures adjacent to high traffic areas. In order to avoid situations of hazardous waste disposal, sediment dredging and excavation should be given frequent priority.

Maintenance crews may require access vehicles, dump trucks, bulldozers, and dredging/excavation equipment. Manual use equipment (such as rakes, shovels, sickles, machetes) may suffice for maintenance of dry detention ponds and infiltration device systems. Staffing will require a minimum of two (2) person crews for health and safety reasons and effective structural BMP maintenance. A program manager should oversee operations either in the field or be readily accessible for providing procedural advice or direction. For corrective maintenance activities, a contingent team of field staff should be ready to mobilize for remedial action.

A public awareness campaign for educating the community of the operational and maintenance requirements of these BMP structures for pollutant removal effectiveness would assist in the monitoring of these systems. A community phone number for the reporting of structures - public and private- in need of maintenance would help to provide corrective maintenance as required.

REFERENCES

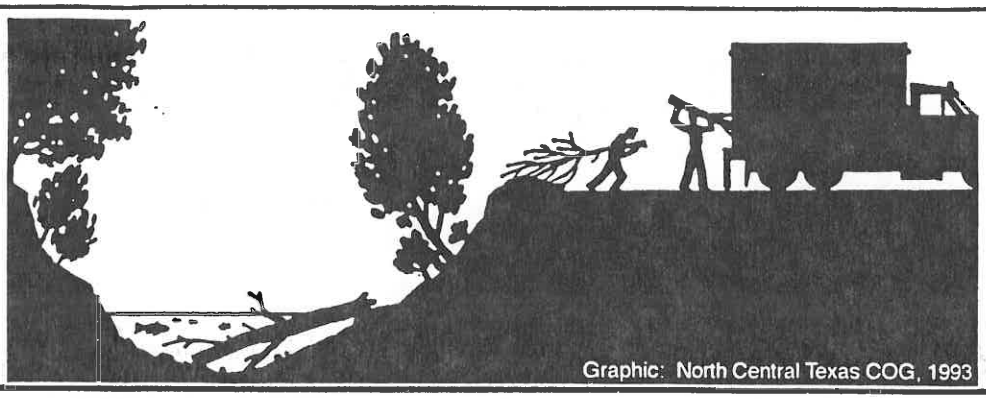
Florida Development Manual: A Guide to Sound Land and Water Management, Storm water and Erosion and Sediment Control BMPs for Developing Areas, Florida Department of Environmental Regulation, 1988.

Environmental Criteria Manual, Design Guidelines for Water Quality Control, City of Austin, Texas, 1989.

SC75



BMP: STORM CHANNEL/CREEK MAINTENANCE



Program Elements

- (●) New Development
- Residential
- Commercial Activities
- Industrial Activities
- (●) Municipal Facilities
- (●) Illegal Discharges

DESCRIPTION

Reduce pollutant levels in storm water by regularly removing illegally-dumped items and material from storm drainage channels and creeks. Modify channel characteristics to enhance pollutant removal and/or hydraulic capacity.

APPROACH

- Identification of illegal dumping hot spots; regular inspection and clean up of hot spots and other storm drainage areas where illegal dumping and disposal occurs.
- Posting "No Littering" signs with a phone number for reporting a dumping in-progress.
- Adoption and enforcement of substantial penalties for illegal dumping and disposal.
- Modification of storm channel characteristics to improve channel hydraulics, to increase pollutant removals, and to enhance channel/creek aesthetic and habitat value.
- Maintenance of accurate logs to evaluate materials removed and improvements made.

REQUIREMENTS

- Cost Considerations
  - Purchase and installation of signs.
  - Cost of vehicle(s) to haul illegally-disposed items and material to landfills.
  - Rental of heavy equipment to remove larger items (e.g., car bodies) from channels.
  - Purchase of landfill space to dispose of illegally-dumped items and material.
  - Capital and maintenance costs for channel modifications.
- Regulations
  - Adoption of substantial penalties for illegal dumping and disposal.
- Administration/Staffing
  - Larger municipalities should commit at least one full-time staff person; smaller municipalities at least one part-time staff person. Additional staff as-needed.
- Equipment and Materials (see discussion above).
- Training
  - Channel maintenance and use of heavy equipment.
  - Identification and handling of hazardous materials/wastes.

PUBLIC EDUCATION/PARTICIPATION

- Education on the need for proper disposal of refuse.
- Notification of penalties for illegal dumping/disposal.

LIMITATIONS

- Clean-up activities may create a slight disturbance for local aquatic species.
- Access to items and material on private property may be limited.
- Trade-offs may exist between channel hydraulics and water quality/riparian habitat.
- Worker/public safety may be at risk in crime-ridden or homeless-populated areas.
- If storm channels or basins are recognized as wetlands, many activities, including maintenance, may be subject to regulation.

Targeted Constituents

- (●) Sediment
- (○) Nutrients
- (●) Heavy Metals
- (○) Toxic Materials
- (●) Floatable Materials
- (●) Oxygen Demanding Substances
- (●) Oil & Grease
- (○) Bacteria & Viruses

- (●) Likely to Have Significant Impact
- (○) Probable Low or Unknown Impact

Implementation Requirements

- (○) Capital Costs
- (◒) O&M Costs
- (◒) Regulatory
- (◒) Staffing
- (●) Training
- (○) Administrative

(●) High (○) Low

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Best Management Practices

Additional Information — Storm Channel/Creek Maintenance

Clean-up Activities

Although illegally dumped items have not been quantified in terms of their contribution to storm water runoff pollution, the potential exists for significant reductions in runoff metals loadings as a result of comprehensive storm channel and creek maintenance. Potentially significant sources of toxic pollutants in storm channels and creeks may include the following:

- Car bodies and automotive scrap,
- Car batteries,
- Tires,
- Hazardous materials/waste,
- Various metallic items (shopping carts, furniture, appliances, etc.),
- Animal waste, and
- Wastes from homeless people encampments.

In addition to the obvious benefit of reducing pollutants in storm water runoff, an equally important benefit of channel/creek maintenance is the dramatic aesthetic improvement achieved by removing all illegally-dumped wastes from a given stretch of a storm channel or creek. Use of such areas for illegal dumping creates an eyesore and reflects poorly on a community that might otherwise be making a conscientious effort to improve the environment. Consequently, storm channel/creek maintenance efforts should not focus solely on removing those items known to pose a threat to water quality. Instead, the effort should be directed toward all illegally dumped materials, including common household trash, litter, and non-metallic and/or inert materials of all kinds. In this way, water quality improvement and significant aesthetic enhancement can both be achieved.

Channel Modification/Improvement

Urbanization, particularly land clearing and construction, tends to disrupt stream equilibrium, by temporarily intensifying sediment yield to streams. In addition to the cleanup practices described above, implementation of the erosion and sediment control BMPs presented in the Construction Handbook can also significantly reduce the effects of urbanization on streams.

It should be noted that any person, government agency, or public utility proposing an activity that will change the natural (emphasis added) state of any river, stream, or lake in California, must enter into a stream or Lake Alteration Agreement with the Department of Fish and Game. The developer-applicant should also contact local governments (city, county, special districts), other state agencies (SWRCB, RWQCB, Department of Forestry, Department of Water Resources), and Federal Corps of Engineers and USFWS.

Flow Management

Flow management has been one of the principal motivations for designing urban stream corridors in the past. Such needs may or may not be compatible with the storm water quality goals in the stream corridor.

Downstream flood peaks can be suppressed by reducing throughflow velocity. This can be accomplished by reducing gradient with grade control structures or increasing roughness with boulders, dense vegetation, or complex banks forms. Reducing velocity correspondingly increases flood height, so all such measures have a natural association with floodplain open space. Flood elevations laterally adjacent to the stream can be lowered by increasing throughflow velocity.

However, increasing velocity increases flooding downstream and inherently conflicts with channel stability and human safety. Where topography permits, another way to lower flood elevation is to lower the level of the floodway with drop structures into a large but subtly excavated bowl where flood flows are allowed to spread out.

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Additional Information — Storm Channel/Creek Maintenance

Stream Corridor Planning

Urban streams receive and convey storm water flows from developed or developing watersheds. Planning of stream corridors thus interacts with urban storm water management programs. If local programs are intended to control or protect downstream environments by managing flows delivered to the channels, then it is logical that such programs should be supplemented by management of the materials, forms, and uses of the downstream riparian corridor. Any proposal for stream alteration or management should be investigated for its potential flow and stability effects on upstream, downstream, and laterally adjacent areas. The timing and rate of flow from various tributaries can combine in complex ways to alter flood hazards. Each section of channel is unique, influenced by its own distribution of roughness elements, management activities, and stream responses.

Flexibility to adapt to stream features and behaviors as they evolve must be included in stream reclamation planning. The amenity and ecology of streams may be enhanced through the landscape design options of 1) corridor reservation, 2) bank treatment, 3) geomorphic restoration, and 4) grade control.

Corridor reservation - Reserving stream corridors and valleys to accommodate natural stream meandering, aggradation, degradation, and overbank flows allows streams to find their own form and generate less ongoing erosion. In California, open stream corridors in recent urban developments have produced recreational open space, irrigation of streamside plantings, and the aesthetic amenity of flowing water.

Bank treatment - The use of armoring, vegetative cover, and flow deflection may be used to influence a channel's form, stability, and biotic habitat. To prevent bank erosion, armoring can be done with rigid construction materials, such as concrete, masonry, wood planks and logs, riprap, and gabions. Concrete linings have been criticized because of their lack of provision of biotic habitat. In contrast, riprap and gabions make relatively porous and flexible linings. Boulders, placed in the bed reduce velocity and erosive power.

Riparian vegetation can stabilize the banks of streams that are at or near a condition of equilibrium. Binding networks of roots increase bank shear strength. During flood flows, resilient vegetation is forced into erosion-inhibiting mats. The roughness of vegetation leads to lower velocity, further reducing erosive effects.
Structural flow deflection can protect banks from erosion or alter fish habitat. By concentrating flow, a deflector causes a pool to be scoured in the bed.

Geomorphic restoration - Restoration refers to alteration of disturbed streams so their form and behavior emulate those of undisturbed streams. Natural meanders are retained, with grading to gentle slopes on the inside of curves to allow point bars and riffle-pool sequences to develop. Trees are retained to provide scenic quality, biotic productivity, and roots for bank stabilization, supplemented by plantings where necessary.

A restorative approach can be successful where the stream is already approaching equilibrium. However, if upstream urbanization continues, new flow regimes will be generated that could disrupt the equilibrium of the treated system.

Grade Control - A grade control structure is a level shelf of a permanent material, such as stone, masonry, or concrete, over which stream water flows. A grade control structure is called a sill, weir, or drop structure, depending on the relation of its invert elevation to upstream and downstream channels.

A sill is installed at the preexisting channel bed elevation to prevent upstream migration of nickpoints. It establishes a firm base level below which the upstream channel can not erode.

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A weir or check dam is installed with invert above the preexisting bed elevation. A weir raises the local base level of the stream and causes aggradation upstream. The gradient, velocity, and erosive potential of the stream channel are reduced. A drop structure lowers the downstream invert below its preexisting elevation, reducing downstream gradient and velocity. Weirs and drop structure control erosion by dissipating energy and reducing slope velocity.

When carefully applied, grade control structures can be highly versatile in establishing human and environmental benefits in stabilized channels. To be successful, application of grade control structures should be guided by analysis of the stream system both upstream and downstream from the area to be reclaimed.

Examples of Effective Programs

The California Department of Water Resources began the Urban Stream Restoration Program in 1985. The program provides grant funds to municipalities and community groups to implement stream restoration projects. The projects reduce damages from streambank and watershed instability and floods while restoring streams' aesthetic, recreational, and fish and wildlife values.

In Buena Vista Park, upper floodway slopes are gentle and grassed to achieve continuity of usable park land across the channel of small boulders at the base of the slopes.

The San Diego River is a large, vegetatively lined channel, which was planted in a variety of species to support riparian wildlife while stabilizing the steep banks of the floodway.

REFERENCES

Ferguson, B.K. 1991. Urban Stream Reclamation, p. 324-328, Journal of Soil and Water Conservation.

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Best Management Practices

CONSTRUCTION HANDBOOK REFERENCES

4. BMPs FOR CONTRACTOR ACTIVITIES

INTRODUCTION

This chapter describes specific Best Management Practices (BMPs) for common construction activities that may pollute storm water. Chapter 2 led you through the steps of identifying activities at your site that can pollute storm water, while Chapter 3 provided guidance on BMP selection. This chapter will provide a list of BMPs that can be used to fit your site's needs.

BMP fact sheets are provided for each of the contractor's activities, noted in the box, are consistent with Worksheet 4 in Chapter 2.

Each fact sheet contains a cover sheet with:

- A description of the BMP
- Approach
- Requirements
  - Costs, including capital costs, and operation and maintenance (O&M) costs
  - Maintenance (including administrative and staffing)
- Limitations
- References

The side bar presents information on which BMP objective applies, targeted constituents, and an indication of the level of effort and costs to implement. For some BMPs, further information is provided in additional sheets.

Contractor Activities

Construction Practices
- CA1 Dewatering Operations
- CA2 Paving Operations
- CA3 Structure Construction and Painting

Material Management
- CA10 Material Delivery and Storage
- CA11 Material Use
- CA12 Spill Prevention and Control

Waste Management
- CA20 Solid Waste Management
- CA21 Hazardous Waste Management
- CA22 Contaminated Soil Management
- CA23 Concrete Waste Management
- CA24 Sanitary/Septic Waste Management

Vehicle and Equipment Management
- CA30 Vehicle and Equipment Cleaning
- CA31 Vehicle and Equipment Fueling
- CA32 Vehicle and Equipment Maintenance

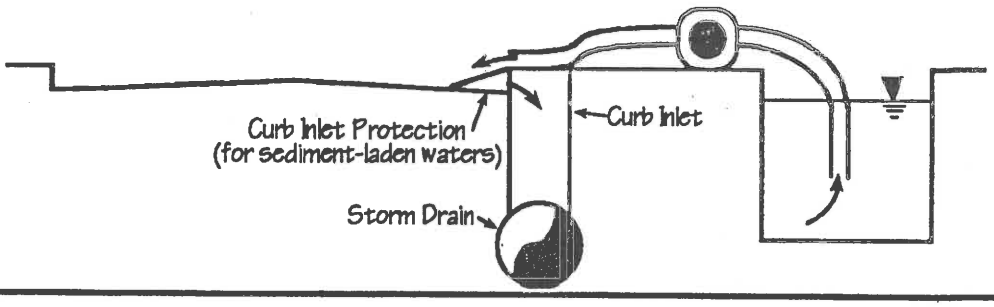
Contractor Training
- CA40 Employee/Subcontractor Training

These BMP fact sheets are suitable for inclusion in many storm water pollution prevention plans for typical contractor activities. The BMPs listed are not an exhaustive list, nor will every BMP be appropriate for every situation. Therefore, suggested BMPs which are inappropriate may be deleted and additional BMPs for specific site conditions should be added. In addition, your selection and implementation of BMPs should be reviewed on a regular basis to match the changing conditions at construction sites.

TABLE 4.1 CONTRACTOR ACTIVITIES AND BMP OBJECTIVES

	BMP CATEGORY	BMP OBJECTIVES						
		PRACTICE GOOD HOUSE-KEEPING	CONTAIN WASTE	MINIMIZE DISTURBED AREA	STABILIZE DISTURBED AREA	PROTECT SLOPES AND CHANNELS	CONTROL SITE PERIMETER	CONTROL INTERNAL EROSION
	Construction Practices							
CA01	Dewatering Operations	✓				✓	✓	✓
CA02	Paving Operations	✓						
CA03	Structure Construction and Painting	✓			✓			
	Material Management							
CA10	Material Delivery and Storage	✓						
CA11	Material Use	✓						
CA12	Spill Prevention and Control	✓						
	Waste Management							
CA20	Solid Waste Management		✓					
CA21	Hazardous Waste Management		✓					
CA22	Contaminated Soil Management		✓	✓	✓			
CA23	Concrete Waste Management		✓					
CA24	Sanitary/Septic Waste Management		✓					
	Vehicle and Equipment Management							
CA30	Vehicle and Equipment Cleaning	✓					✓	✓
CA31	Vehicle and Equipment Fueling	✓						
CA32	Vehicle and Equipment Maintenance	✓						
	Contractor Training							
CA40	Employee/Subcontractor Training	✓	✓					

ACTIVITY: DEWATERING OPERATIONS



Objectives

- Housekeeping Practices
- Contain Waste
- Minimize Disturbed Areas
- Stabilize Disturbed Areas
- Protect Slopes/Channels
- Control Site Perimeter
- Control Internal Erosion

DESCRIPTION

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

APPROACH

There are two general classes of pollutants that may result from dewatering operations; sediment, and toxics and petroleum products. A high sediment content in dewatering discharges is common because of the nature of the operation. On the other hand, toxics and petroleum products are not commonly found in dewatering discharges unless, the site or surrounding area has been used for light or heavy industrial activities, or the area has a history of groundwater contamination. The following steps will help reduce storm water pollution from dewatering discharges:

Sediment

- Use sediment controls to remove sediment from water generated by dewatering (See Sediment Trap (ESC 55) and Sediment Basin (ESC 56) in Chapter 5).
- Use filtration to remove sediment from a sediment trap or basin. Filtration can be achieved with:
  - Sump pit and a perforated or slit standpipe with holes and wrapped in filter fabric. The standpipe is surrounded by stones which filters the water as it collects in the pit before being pumped out.Wrapping the standpipe in filter fabric may require an increased suction inlet area to avoid clogging and unacceptable pump operation.
  - Floating suction hose to allow cleaner surface water to be pumped out.

Toxics and Petroleum Products

- In areas suspected of having groundwater pollution, sample the groundwater near the excavation site and have the water tested for known or suspected pollutants at a certified laboratory. Check with the Regional Water Quality Control Board and the local wastewater treatment plant for their requirements for dewatering, additional water quality tests, and disposal options.
- With a permit from the Regional Water Quality Control Board, you may be able to recycle/reuse pumped groundwater for landscape irrigation, or discharge to the storm sewer. With a permit from the local agency, you may be able to treat pumped groundwater and discharge it to the municipal wastewater treatment plant via the sanitary sewer.
- For a quick reference on disposal alternatives for specific wastes, see Table 4.2, CA40, Employee/Subcontractor Training.

Targeted Pollutants

- ● Sediment
- ○ Nutrients
- ◒ Toxic Materials
- ○ Oil & Grease
- ○ Floatable Materials
- ○ Other Construction Waste

- ● Likely to Have Significant Impact
- ○ Probable Low or Unknown Impact

Implementation Requirements

- ◒ Capital Costs
- ◒ O&M Costs
- ◒ Maintenance
- ◒ Training
- ○ Suitability for Slopes >5%

● High ○ Low

CA1

Best Management Practices

CONTRACTOR ACTIVITY: DEWATERING OPERATIONS (Continue)

REQUIREMENTS

- Costs (Capital, O&M)
  - Sediment controls are low cost measures.
  - Treatment and/or discharge of polluted groundwater can be quite expensive.
- Maintenance
  - Maintain sediment controls and filters in good working order. (See Chapter 5 for details)
  - Inspect excavated areas daily for signs of contaminated water as evidenced by discoloration, oily sheen, or odors.

LIMITATIONS

- The presence of contaminated water may indicate contaminated soil as well. See CA22 (Contaminated Soil Management) in this chapter for more information.

REFERENCES

Blueprint for a Clean Bay-Construction-Related Industries: Best Management Practices for Storm Water Pollution Prevention; Santa Clara Valley Nonpoint Source Pollution Control Program, 1992.

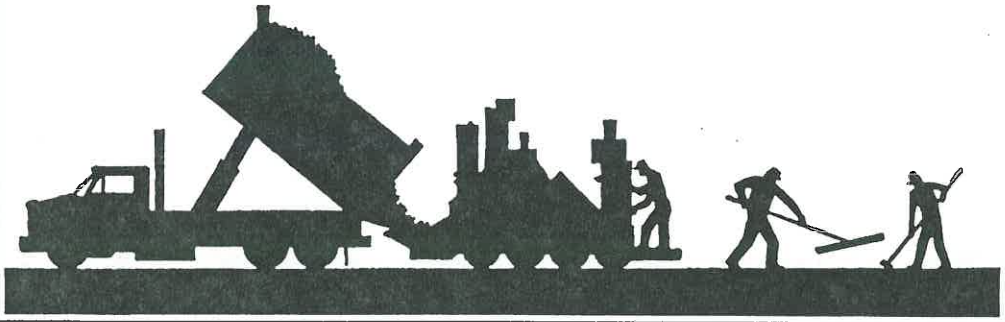
Storm Water Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices, EPA 832-R-92005; USEPA, April 1992.

CA1



ACTIVITY: PAVING OPERATIONS

Graphic: North Central Texas COG, 1993



DESCRIPTION

Prevent or reduce the discharge of pollutants from paving operations, using measures to prevent runon and runoff pollution, properly disposing of wastes, and training employees and subcontractors.

APPROACH

- Avoid paving during wet weather.
- Store materials away from drainage courses to prevent storm water runon (see CA10 Material Delivery and Storage).
- Protect drainage courses, particularly in areas with a grade, by employing BMPs to divert runoff or trap/filter sediment (see Chapter 5).
- 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. See CA32 (Vehicle and Equipment Maintenance) and CA12 (Spill Prevention and Control) in this chapter.
- Cover catch basins and manholes when applying seal coat, tack coat, slurry seal, fog seal, etc.
- Shovel or vacuum saw-cut slurry and remove from site. Cover or barricade storm drains during saw cutting to contain slurry.
- If paving involves portland cement concrete, see CA23 (Concrete Waste Management) in this chapter.
- If paving involves asphaltic concrete, follow these steps:
  - Do not allow sand or gravel placed over new asphalt to wash into storm drains, streets, or creeks by sweeping. Properly dispose of this waste by referring to CA20 (Solid Waste Management) in this chapter.
  - Old asphalt must be disposed of properly. Collect and remove all broken asphalt from the site and recycle whenever possible.
  - If paving involves on-site mixing plant, follow the storm water permitting requirements for industrial activities.
- Train employees and subcontractors.

REQUIREMENTS

- Costs (Capital, O&M)
  - All of the above are low cost measures.
- Maintenance
  - Inspect employees and subcontractors to ensure that measures are being followed.
  - Keep ample supplies of drip pans or absorbent materials on-site.

LIMITATIONS

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

Objectives

- **Housekeeping Practices**
- Contain Waste
- Minimize Disturbed Areas
- Stabilize Disturbed Areas
- Protect Slopes/Channels
- Control Site Perimeter
- Control Internal Erosion

Targeted Pollutants

- ◒ Sediment
- ○ Nutrients
- ◒ Toxic Materials
- ◒ Oil & Grease
- ○ Floatable Materials
- ○ Other Construction Waste

- ● Likely to Have Significant Impact
- ○ Probable Low or Unknown Impact

Implementation Requirements

- ○ Capital Costs
- ○ O&M Costs
- ◒ Maintenance
- ◒ Training
- ○ Suitability for Slopes >5%

● High ○ Low

CA2

Best Management Practices

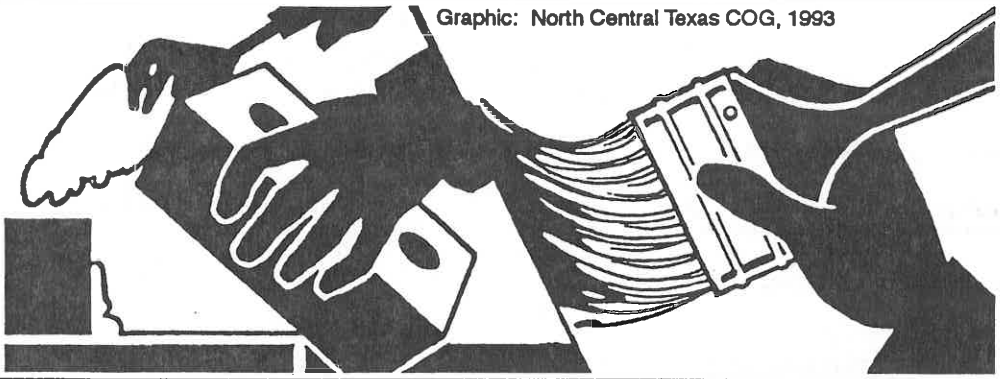
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Blueprint for a Clean Bay-Construction-Related Industries: Best Management Practices for Storm Water Pollution Prevention; Santa Clara Valley Nonpoint Source Pollution Control Program, 1992.

Hot-mix Asphalt Paving Handbook, U.S, Army Corps of Engineers, AC 150/5370-14, Appendix I, July 1991.

CA2

ACTIVITY: STRUCTURE CONSTRUCTION AND PAINTING



Graphic: North Central Texas COG, 1993

DESCRIPTION

Prevent or reduce the discharge of pollutants to storm water from structure construction and painting by enclosing or covering or berming building material storage areas, using good housekeeping practices, using safer alternative products, and training employees and subcontractors.

APPROACH

- Keep the work site clean and orderly. Remove debris in a timely fashion. Sweep the area.
- Use soil erosion control techniques if bare ground is exposed (See Chapter 5).
- Buy recycled or less hazardous products to the maximum extent practicable.
- Conduct painting operations consistent with local air quality and OSHA regulations.
- Properly store paints and solvents. See CA10 (Material Delivery and Storage) in this chapter.
- Properly store and dispose waste materials generated from the activity. See the waste management BMPs (CA20 to CA24) in this chapter.
- Recycle residual paints, solvents, lumber, and other materials to the maximum extent practicable.
- Make sure that nearby storm drains are well marked to minimize the chance of inadvertent disposal of residual paints and other liquids.
- Clean the storm drain system in the immediate construction area after construction is completed.
- Educate employees who are doing the work.
- Inform subcontractors of company policy on these matters and include appropriate provisions in their contract to make certain proper housekeeping and disposal practices are implemented.
- For a quick reference on disposal alternatives for specific wastes, see Table 4.2, CA40, Employee/Subcontractor Training.

REQUIREMENTS

- Costs (Capital, O&M)
  - These BMPs are generally of low to moderate cost.
- Maintenance
  - Maintenance should be minimal.

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 hauler.

Objectives

- *Housekeeping Practices*
- *Contain Waste*
- *Minimize Disturbed Areas*
- *Stabilize Disturbed Areas*
- *Protect Slopes/Channels*
- *Control Site Perimeter*
- *Control Internal Erosion*

Targeted Pollutants

- ○ *Sediment*
- ○ *Nutrients*
- ◒ *Toxic Materials*
- ○ *Oil & Grease*
- ● *Floatable Materials*
- ● *Other Construction Waste*

- ● *Likely to Have Significant Impact*
- ○ *Probable Low or Unknown Impact*

Implementation Requirements

- ○ *Capital Costs*
- ○ *O&M Costs*
- ○ *Maintenance*
- ◒ *Training*
- ○ *Suitability for Slopes >5%*

● *High* ○ *Low*

CA3

Best Management Practices

- Be certain that actions to help storm water quality are consistent with Cal- and Fed-OSHA and air quality regulations.

Construction and painting activities can generate pollutants that can reach storm water if proper care is not taken. The sources of these contaminants may be solvents, paints, paint and varnish removers, finishing residues, spent thinners, soap cleaners, kerosene, asphalt and concrete materials, adhesive residues, and old asbestos insulation. For specific information on some of these wastes see the following BMPs in this chapter:

CA20 Solid Waste,
CA21 Hazardous Waste, and
CA23 Concrete Waste.

More specific information on structure construction practices is listed below.

Erosion and Sediment Control

If the work involves exposing large areas of soil or if old buildings are being torn down and not replaced in the near future, employ the appropriate soil erosion and control techniques described in Chapter 5.

Storm/Sanitary Sewer Connections

Carefully install all plumbing and drainage systems. Cross connections between the sanitary and storm drain systems, as well as any other connections into the drainage system from inside a building, are illegal. Color code or flag pipelines on the project site to prevent such connections, and train construction personnel.

Painting

Local air pollution regulations may, in many areas of the state, specify painting procedures which if properly carried out are usually sufficient to protect storm water quality. These regulations may require that painting operations be properly enclosed or covered to avoid drift. Use temporary scaffolding to hang drop cloths or draperies to prevent drift. Application equipment that minimizes overspray also helps. When using sealants on wood, pavement, roofs, etc, quickly clean up spills. Remove excess liquid with absorbent material or rags.

If painting requires scraping or sand blasting of the existing surface, use a drop cloth to collect most of the chips. Dispose the residue properly. If the paint contains lead or tributyl tin, it is considered a hazardous waste. Refer to the waste management BMPs in this chapter for more information.

Mix paint indoors, in a containment area, or in a flat unpaved area not subject to significant erosion. Do so even during dry weather because cleanup of a spill will never be 100% effective. Dried paint will erode from sloped surfaces and be washed away by storms. If using water based paints, clean the application equipment in a sink that is connected to the sanitary sewer or in a containment area where the dried paint can be readily removed. Properly store leftover paints if they are to be kept for the next job, or dispose of properly.

Roof work

When working on roofs, if small particles have accumulated in the gutter, either sweep out the gutter or wash the gutter and trap the particles at the outlet of the downspout. A sock or geofabric placed over the outlet may effectively trap the materials. If the downspout is lined tight, place a temporary plug at the first convenient point in the storm drain and pump out the water with a vactor truck, and clean the catch basin sump where you placed the plug.

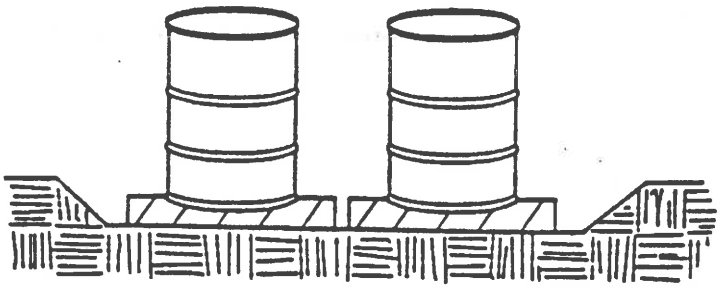
REFERENCES

Blueprint for a Clean Bay-Construction-Related Industries: Best Management Practices for Storm Water Pollution Prevention; Santa Clara Valley Nonpoint Source Pollution Control Program, 1992.

CA3



ACTIVITY: MATERIAL DELIVERY AND STORAGE



Objectives

- Housekeeping Practices
- Contain Waste
- Minimize Disturbed Areas
- Stabilize Disturbed Areas
- Protect Slopes/Channels
- Control Site Perimeter
- Control Internal Erosion

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 inspections, and training employees and subcontractors.

This best management practice covers only material delivery and storage. For other information on materials, see CA11 (Material Use), or CA12 (Spill Prevention and Control). For information on wastes, see the waste management BMPs in this chapter.

APPROACH

The following materials are commonly stored on construction sites:

- Soil,
- Pesticides and herbicides,
- Fertilizers,
- Detergents,
- Plaster or other products,
- 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 pollution,
- Injury to workers or visitors,
- Groundwater pollution, and
- Soil contamination.

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

- Designate areas of the construction site for material delivery and storage.
  - Place near the construction entrances, away from waterways
  - Avoid transport near drainage paths or waterways
  - Surround with earth berms (see ESC30, Earth Dike.)
  - Place in an area which will be paved
- Storage of reactive, ignitable, 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.
- For a quick reference on disposal alternatives for specific wastes, see Table 4.2, CA40, Employee/Subcontractor Training.
- Keep an accurate, up-to-date inventory of materials delivered and stored on-site.
- Keep your inventory down.

Targeted Pollutants

- ◒ Sediment
- ◒ Nutrients
- ◒ Toxic Materials
- ◒ Oil & Grease
- ◒ Floatable Materials
- ○ Other Construction Waste

- ● Likely to Have Significant Impact
- ○ Probable Low or Unknown Impact

Implementation Requirements

- ○ Capital Costs
- ○ O&M Costs
- ○ Maintenance
- ◒ Training
- ○ Suitability for Slopes >5%

● High ○ Low

CA10

Best Management Practices

- Minimize hazardous materials on-site storage.
- Handle hazardous materials as infrequently as possible.
- During the rainy season, consider storing materials in a covered area. Store materials in secondary containments such as an earthen dike, horse trough, or even a children'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 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 labeled.
- Train employees and subcontractors.
- 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 (See CA22). If the area is to be paved, pave as soon as materials are removed to stabilize the soil.

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.

REFERENCES

Best Management Practices and Erosion Control Manual for Construction Sites; Flood Control District of Maricopa County, AZ, September 1992.

Blueprint for a Clean Bay-Construction-Related Industries: Best Management Practices for Storm Water Pollution Prevention; Santa Clara Valley Nonpoint Source Pollution Control Program, 1992; Santa Clara Valley Nonpoint Source Pollution Control Program, 1992.

Coastal Nonpoint Pollution Control Program: Program Development and Approval Guidance, Working Group Working Paper; USEPA, April 1992.

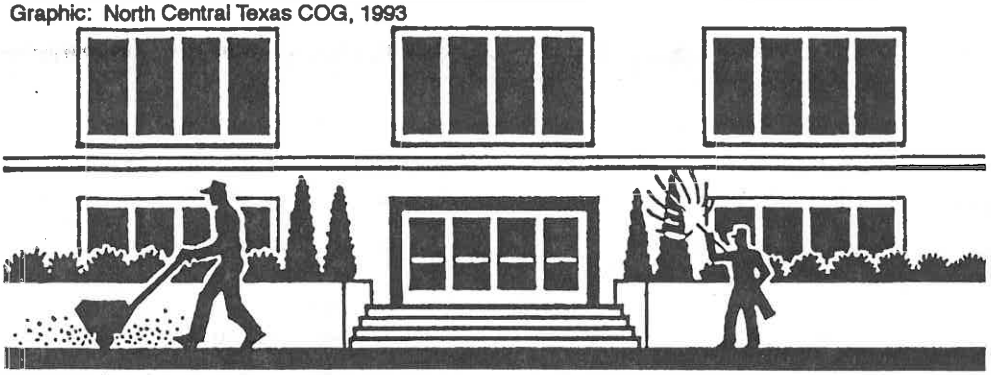
Storm Water Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practices, EPA 832-R-92005; USEPA, April 1992.

CA10



ACTIVITY: MATERIAL USE

Graphic: North Central Texas COG, 1993



Objectives

- *Housekeeping Practices*
- *Contain Waste*
- *Minimize Disturbed Areas*
- *Stabilize Disturbed Areas*
- *Protect Slopes/Channels*
- *Control Site Perimeter*
- *Control Internal Erosion*

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,
- Plaster and other products,
- 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 pollution,
- Injury to workers or visitors,
- Groundwater pollution, and
- Soil contamination.

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

- Use less hazardous, alternative materials as much as possible.
- Minimize 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. 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. Unless on steep slopes, till fertilizers 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.

Targeted Pollutants

- ○ *Sediment*
- ◒ *Nutrients*
- ◒ *Toxic Materials*
- ◒ *Oil & Grease*
- ◒ *Floatable Materials*
- ○ *Other Construction Waste*

- ● *Likely to Have Significant Impact*
- ○ *Probable Low or Unknown Impact*

Implementation Requirements

- ○ *Capital Costs*
- ○ *O&M Costs*
- ○ Maintenance
- ◒ *Training*
- ○ *Suitability for Slopes >5%*

● *High* ○ *Low*

CA11

Best Management Practices

ACTIVITY: MATERIAL USE (Continue)

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.

REFERENCES

Blueprint for a Clean Bay-Construction-Related Industries: Best Management Practices for Storm Water Pollution Prevention; Santa Clara Valley Nonpoint Source Pollution Control Program, 1992; Santa Clara Valley Nonpoint Source Pollution Control Program, 1992.

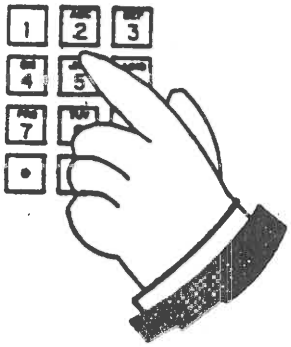
Coastal Nonpoint Pollution Control Program: Program Development and Approval Guidance, Working Group Working Paper; USEPA, April 1992.

Storm Water Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practices, EPA 832-R-92005; USEPA, April 1992.

CA11



ACTIVITY: SPILL PREVENTION AND CONTROL



Objectives

- Housekeeping Practices
- Contain Waste
- Minimize Disturbed Areas
- Stabilize Disturbed Areas
- Protect Slopes/Channels
- Control Site Perimeter
- Control Internal Erosion

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, CA10 (Material Delivery and Storage) and CA11 (Material Use), also contain useful information, particularly on spill prevention. For information on wastes, see the waste management BMPs in this chapter.

APPROACH

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

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.

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.
- Designate responsible individuals.

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 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. Clean up as much of the material as possible and dispose of properly. See the waste management BMPs in this chapter for specific information.

Reporting

- Report significant spills to local agencies, such as the Fire Department; they can assist in cleanup.
- Federal regulations require that any significant 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).

Targeted Pollutants

- ○ Sediment
- ○ Nutrients
- ◒ Toxic Materials
- ◒ Oil & Grease
- ○ Floatable Materials
- ○ Other Construction Waste

- ◒ Likely to Have Significant Impact
- ○ Probable Low or Unknown Impact

Implementation Requirements

- ○ Capital Costs
- ◒ O&M Costs
- ○ Maintenance
- ◒ Training
- ○ Suitability for Slopes >5%

◒ High ○ Low

CA12

Best Management Practices

ACTIVITY: SPILL PREVENTION AND CONTROL (Continue)

Use the following measures related to specific activities:

Vehicle and Equipment Maintenance

- If maintenance must occur on-site, use a designated area and/or a secondary containment, 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 paving 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 pollute 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 it 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 prevention and control plan and stock cleanup materials as changes occur in the types of chemicals on-site.

LIMITATIONS

- If necessary, use a private spill cleanup company.

REFERENCES

Blueprint for a Clean Bay-Construction-Related Industries: Best Management Practices for Storm Water Pollution Prevention; Santa Clara Valley Nonpoint Source Pollution Control Program, 1992; Santa Clara Valley Nonpoint Source Pollution Control Program, 1992.

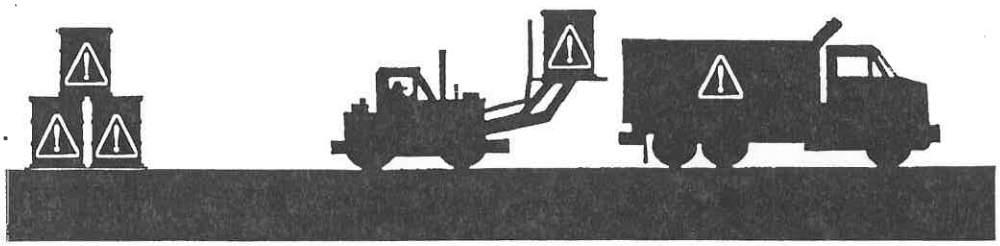
Storm Water Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices, EPA 832-R-92005; USEPA, April 1992.

CA12



ACTIVITY: HAZARDOUS WASTE MANAGEMENT

Graphic: North Central Texas COG, 1993



Objectives

- Housekeeping Practices
- **Contain Waste**
- Minimize Disturbed Areas
- Stabilize Disturbed Areas
- Protect Slopes/Channels
- Control Site Perimeter
- Control Internal Erosion

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;
- Herbicides and pesticides;
- Acids for cleaning masonry; 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 herbicides and pesticides. Prepare only the amount needed. Follow the recommended usage instructions. Over-application is expensive and environmentally harmful. 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.
- Do not clean out brushes or rinse paint containers into the dirt, street, gutter, storm drain, or stream. "Paint out" brushes as much as possible. Rinse water-based paints to the sanitary sewer. Filter and re-use thinners and solvents. Dispose of excess oil-based paints and sludge as hazardous waste.

Targeted Pollutants

- ○ Sediment
- ○ Nutrients
- ◒ Toxic Materials
- ○ Oil & Grease
- ○ Floatable Materials
- ○ Other Construction Waste

- ● Likely to Have Significant Impact
- ○ Probable Low or Unknown Impact

Implementation Requirements

- ○ Capital Costs
- ○ O&M Costs
- ◒ Maintenance
- ◒ Training
- ○ Suitability for Slopes >5%

● High ○ Low

CA21

Best Management Practices

ACTIVITY: HAZARDOUS WASTE MANAGEMENT (Continue)

Waste Recycling/Disposal

- Select designated hazardous waste collection areas 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 or water-based paint.
- Make sure that toxic liquid wastes (used oils, solvents, and 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 (e.g. excess oil-based paint and sludges) is collected, removed, and disposed of only at authorized disposal areas.
- For a quick reference on disposal alternatives for specific wastes, see Table 4.2, CA40, Employee/Subcontractor Training.

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 reused or recycled must be disposed of by a licensed hazardous waste hauler.

REFERENCES

Blueprint for a Clean Bay-Construction-Related Industries: Best Management Practices for Storm Water Pollution Prevention; Santa Clara Valley Nonpoint Source Pollution Control Program, 1992.

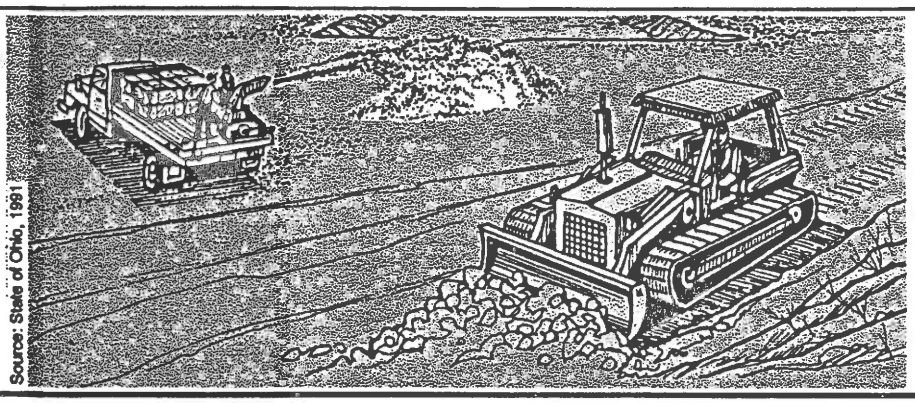
Processes, Procedures, and Methods to Control Pollution Resulting from all Construction Activity; USEPA, 430/9-73-007, 1973.

Storm Water Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices, EPA 832-R-92005; USEPA, April 1992.

CA21



ACTIVITY: CONTAMINATED SOIL MANAGEMENT



Objectives

- Housekeeping Practices
- **Contain Waste**
- **Minimize Disturbed Areas**
- **Stabilize Disturbed Areas**
- Protect Slopes/Channels
- Control Site Perimeter
- Control Internal Erosion

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.

Most developers conduct pre-construction environmental assessments as a matter of routine. Recent court rulings holding contractors liable for cleanup costs when they unknowingly move contaminated soil, highlight the need for contractors to confirm that a site assessment is completed before earth moving begins.

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, 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 local regulatory agencies to develop options for treatment and/or disposal.
- For a quick reference on disposal alternatives for specific wastes, see Table 4.2, CA40, Employee/Subcontractor Training.

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 CA12, Spill Prevention and Control, to prevent leaks and spills as much as possible.

Targeted Pollutants

- ◒ Sediment
- ○ Nutrients
- ◉ Toxic Materials
- ○ Oil & Grease
- ○ Floatable Materials
- ○ Other Construction Waste

◉ Likely to Have Significant Impact
○ Probable Low or Unknown Impact

Implementation Requirements

- ○ Capital Costs
- ◒ O&M Costs
- ◒ Maintenance
- ◒ Training
- ○ Suitability for Slopes >5%

◉ High ○ Low

CA22

Best Management Practices

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. See CA1 (Dewatering Operations) in this chapter for more information.

REFERENCES

Blueprint for a Clean Bay-Construction-Related Industries: Best Management Practices for Storm Water Pollution Prevention; Santa Clara Valley Nonpoint Source Pollution Control Program, 1992.

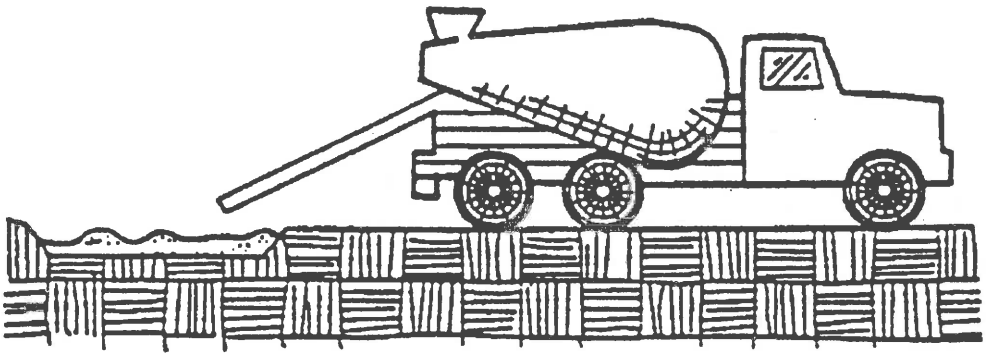
Processes, Procedures, and Methods to Control Pollution Resulting from all Construction Activity; USEPA, 430/9-73-007, 1973.

Storm Water Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices, EPA 832-R-92005; USEPA, April 1992.

CA22



ACTIVITY: CONCRETE WASTE MANAGEMENT



Objectives

- *Housekeeping Practices*
- *Contain Waste*
- *Minimize Disturbed Areas*
- *Stabilize Disturbed Areas*
- *Protect Slopes/Channels*
- *Control Site Perimeter*
- *Control Internal Erosion*

DESCRIPTION

Prevent or reduce the discharge of pollutants to storm water from concrete waste by conducting washout off-site, performing on-site washout in a designated area, and training employees and subcontractors.

APPROACH

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

- 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 on-site 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 for 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.
- Train employees and subcontractors in proper concrete waste management.
- For a quick reference on disposal alternatives for specific wastes, see Table 4.2, CA40, Employee/Subcontractor Training.

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.

Targeted Pollutants

- ○ *Sediment*
- ○ *Nutrients*
- ○ *Toxic Materials*
- ○ *Oil & Grease*
- ○ *Floatable Materials*
- ◒ *Other Construction Waste*

- ● *Likely to Have Significant Impact*
- ○ *Probable Low or Unknown Impact*

Implementation Requirements

- ○ *Capital Costs*
- ○ *O&M Costs*
- ◒ *Maintenance*
- ◒ *Training*
- ○ *Suitability for Slopes >5%*

● *High* ○ *Low*

CA23

Best Management Practices

REFERENCES

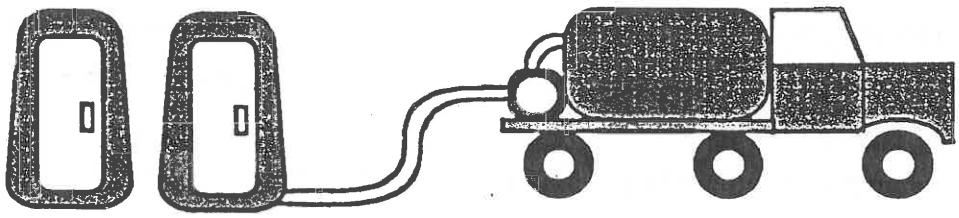
Best Management Practices and Erosion Control Manual for Construction Sites; Flood Control District of Maricopa County, AZ, July 1992.

Blueprint for a Clean Bay-Construction-Related Industries: Best Management Practices for Storm Water Pollution Prevention; Santa Clara Valley Nonpoint Source Pollution Control Program, 1992.

Storm Water Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices, EPA 832-R-92005; USEPA, April 1992.

CA23

ACTIVITY: SANITARY/SEPTIC WASTE MANAGEMENT



Objectives

- *Housekeeping Practices*
- *Contain Waste* (●)
- *Minimize Disturbed Areas*
- *Stabilize Disturbed Areas*
- *Protect Slopes/Channels*
- *Control Site Perimeter*
- *Control Internal Erosion*

DESCRIPTION

Prevent or reduce the discharge of pollutants to storm water from sanitary/septic waste by providing convenient, well-maintained facilities, and arranging for regular service and disposal.

APPROACH

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

- Locate sanitary facilities in a convenient location.
- Untreated raw wastewater should never be discharged or buried.
- Temporary septic systems should treat wastes to appropriate levels before discharging.
- If using an on-site disposal system (OSDS), such as a septic system, comply with local health agency requirements.
- Temporary sanitary facilities that discharge to the sanitary sewer system should be properly connected to avoid illicit discharges.
- If discharging to the sanitary sewer, contact the local wastewater treatment plant for their requirements.
- Sanitary/septic facilities should be maintained in good working order by a licensed service.
- Arrange for regular waste collection by a licensed hauler before facilities overflow.
- For a quick reference on disposal alternatives for specific wastes, see Table 4.2, CA40, Employee/Subcontractor Training.

REQUIREMENTS

- Costs (Capital, O&M)
  - All of the above are low cost measures.
- Maintenance
  - Inspect facilities regularly.
  - Arrange for regular waste collection.

LIMITATIONS

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

REFERENCES

Best Management Practices and Erosion Control Manual for Construction Sites; Flood Control District of Maricopa County, AZ, September 1992.

Storm Water Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices, EPA 832-R-92005; USEPA, April 1992.

Targeted Pollutants

- ○ *Sediment*
- ○ *Nutrients*
- ○ *Toxic Materials*
- ○ *Oil & Grease*
- ○ *Floatable Materials*
- ◒ *Other Construction Waste*

- ● *Likely to Have Significant Impact*
- ○ *Probable Low or Unknown Impact*

Implementation Requirements

- ○ *Capital Costs*
- ○ *O&M Costs*
- ◒ *Maintenance*
- ○ *Training*
- ○ *Suitability for Slopes >5%*

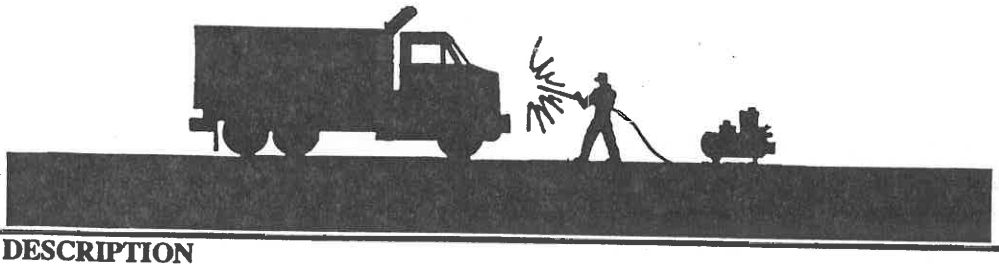
● *High* ○ *Low*

CA24

Best Management Practices

ACTIVITY: VEHICLE AND EQUIPMENT CLEANING

Graphic: North Central Texas COG, 1993



DESCRIPTION

Prevent or reduce the discharge of pollutants to storm water from vehicle and equipment cleaning by using off-site facilities, washing in designated, contained areas only, eliminating discharges to the storm drain by infiltrating or recycling the wash water, and/or 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 paved surfaces or into drainage pathways 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.
- For a quick reference on disposal alternatives for specific wastes, see Table 4.2, CA40, Employee/Subcontractor Training.

REQUIREMENTS

- Costs (Capital, O&M)
  - All of the above are low cost measures.
- Maintenance
  - Minimal, some berm repair may be 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 ESC24 (Stabilized Construction Entrance).

REFERENCE

Swisher, R.D., 1987. Surfactant Biodegradation, Marcel Decker Corporation

Objectives

- Housekeeping Practices
- Contain Waste
- Minimize Disturbed Areas
- Stabilize Disturbed Areas
- Protect Slopes/Channels
- Control Site Perimeter
- Control Internal Erosion

Targeted Pollutants

- ○ Sediment
- ○ Nutrients
- ◒ Toxic Materials
- ◒ Oil & Grease
- ○ Floatable Materials
- ○ Other Construction Waste

- ● Likely to Have Significant Impact
- ○ Probable Low or Unknown Impact

Implementation Requirements

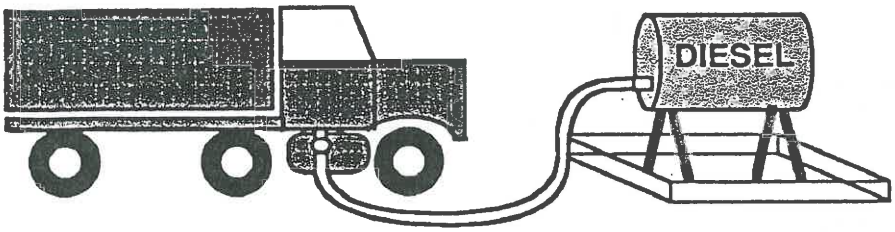
- ◒ Capital Costs
- ○ O&M Costs
- ◒ Maintenance
- ○ Training
- ○ Suitability for Slopes >5%

● High ○ Low

CA30

Best Management Practices

ACTIVITY: VEHICLE AND EQUIPMENT FUELING



Objectives

- *Housekeeping Practices*
- *Contain Waste*
- *Minimize Disturbed Areas*
- *Stabilize Disturbed Areas*
- *Protect Slopes/Channels*
- *Control Site Perimeter*
- *Control Internal Erosion*

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 paved surfaces or into drainage pathways 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 or drop cloth, 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.
- Avoid 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 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.
- For a quick reference on disposal alternatives for specific wastes, see Table 4.2, CA40, Employee/Subcontractor Training.

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 ESC24 (Stabilized Construction Entrance).

Targeted Pollutants

- ○ *Sediment*
- ○ *Nutrients*
- ◒ *Toxic Materials*
- ◒ *Oil & Grease*
- ○ *Floatable Materials*
- ○ *Other Construction Waste*

- ● *Likely to Have Significant Impact*
- ○ *Probable Low or Unknown Impact*

Implementation Requirements

- ◒ *Capital Costs*
- ○ *O&M Costs*
- ◒ *Maintenance*
- ◒ *Training*
- ○ *Suitability for Slopes >5%*

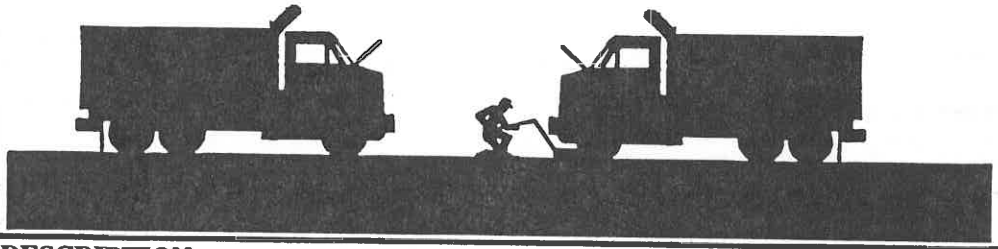
● *High* ○ *Low*

CA31

Best Management Practices

ACTIVITY: VEHICLE AND EQUIPMENT MAINTENANCE

Graphic: North Central Texas COG, 1993



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 storm water. If you maintain a large number of vehicles or pieces of equipment, consider using an off-site 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 runon of storm water and the 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.
- For a quick reference on disposal alternatives for specific wastes, see Table 4.2, CA40, Employee/Subcontractor Training.

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.

Objectives

- **Housekeeping Practices** (●)
- Contain Waste
- Minimize Disturbed Areas
- Stabilize Disturbed Areas
- Protect Slopes/Channels
- Control Site Perimeter
- Control Internal Erosion

Targeted Pollutants

- ○ Sediment
- ○ Nutrients
- ◒ Toxic Materials
- ◒ Oil & Grease
- ○ Floatable Materials
- ○ Other Construction Waste

- ● Likely to Have Significant Impact
- ○ Probable Low or Unknown Impact

Implementation Requirements

- ○ Capital Costs
- ○ O&M Costs
- ○ Maintenance
- ◒ Training
- ○ Suitability for Slopes >5%

● High ○ Low

CA32

Best Management Practices

LIMITATIONS

- Sending vehicles/equipment off-site should be done in conjunction with ESC24 (Stabilized Construction Entrance).

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). For further information on vehicle or equipment servicing, see CA30, Vehicle and Equipment Cleaning, and CA31, Vehicle and Equipment Fueling.

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.

REFERENCES

Best Management Practices and Erosion Control Manual for Construction Sites; Flood Control District of Maricopa County, AZ, September 1992.

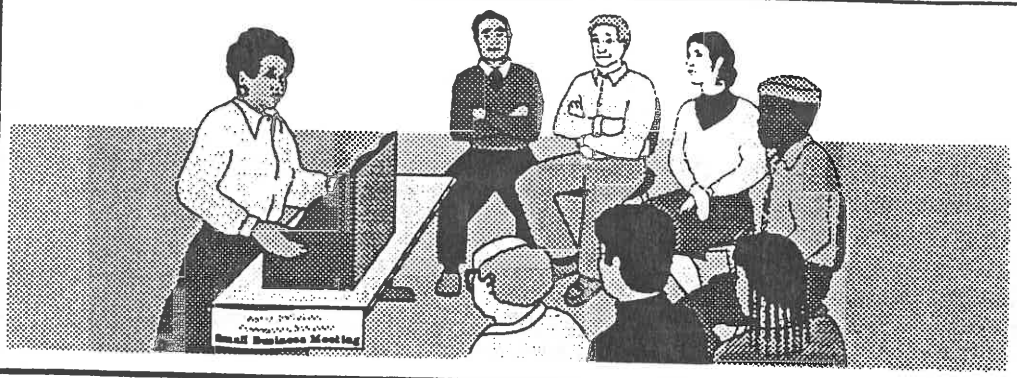
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Coastal Nonpoint Pollution Control Program: Program Development and Approval Guidance, Working Group Working Paper; USEPA, April 1992.

CA32



ACTIVITY: EMPLOYEE/SUBCONTRACTOR TRAINING



Objectives

- *Housekeeping Practices*
- *Contain Waste*
- *Minimize Disturbed Areas*
- *Stabilize Disturbed Areas*
- *Protect Slopes/Channels*
- *Control Site Perimeter*
- *Control Internal Erosion*

DESCRIPTION

Employee/subcontractor training, like maintenance or a piece of 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).

The specific employee/subcontractor training aspects of each of the source controls are highlighted in the individual fact sheets. The focus of this fact sheet is more general, and includes the overall objectives and approach for assuring employee/subcontractor training in storm water pollution prevention. Accordingly, the organization of this fact sheet differs somewhat from the other fact sheets in this chapter.

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 (IIPP) (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, may use the information in this Handbook to develop a training program to reduce their potential to pollute storm water.
- Use the quick reference on disposal alternatives (Table 4.2) to train employee/subcontractors in proper and consistent methods for disposal.

CA40

Best Management Practices

ACTIVITY: EMPLOYEE/SUBCONTRACTOR TRAINING (Continue)

- 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 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.

CA40

Best Management Practices

TABLE 4.2 QUICK REFERENCE - DISPOSAL ALTERNATIVES
(Adopted from Santa Clara County Nonpoint Source Pollution Control Program - December 1992)

All of the waste products on this chart are prohibited from discharge to the storm drain system. Use this matrix to decide which alternative disposal strategies to use. **ALTERNATIVES ARE LISTED IN PRIORITY ORDER.**

Key: HHW Household hazardous waste (Government-sponsored drop-off events)
POTW Publically Owned Treatment Plant
Reg.Bd. Regional Water Quality Control Board (Oakland)
"Dispose to sanitary sewer" means dispose into sink, toilet, or sanitary sewer clean-out connection.
"Dispose as trash" means dispose in dumpsters or trash containers for pickup and/or eventual disposal in landfill.
"Dispose as hazardous waste" for business/commercial means contract with a hazardous waste hauler to remove and dispose.

DISCHARGE/ACTIVITY	BUSINESS/COMMERCIAL Disposal Priorities	Approval	RESIDENTIAL Disposal Priorities
General Construction and Painting; Street and Utility Maintenance			
Excess paint (oil-based)	1. Recycle/reuse. 2. Dispose as hazardous waste.		1. Recycle/reuse. 2. Take to HHW drop-off.
Excess paint (water-based)	1. Recycle/reuse. 2. Dry residue in cans, dispose as trash. 3. If volume is too much to dry, dispose as hazardous waste.		1. Recycle/reuse. 2. Dry residue in cans, dispose as trash. 3. If volume is too much to dry, take to HHW drop-off
Paint cleanup (oil-based)	Wipe paint out of brushes, then: 1. Filter & reuse thinners, solvents. 2. Dispose as hazardous waste.		Wipe paint out of brushes, then: 1. Filter & reuse thinners, solvents. 2. Take to HHW drop-off.
Paint cleanup (water-based)	Wipe paint out of brushes, then: 1. Rinse to sanitary sewer.		Wipe paint out of brushes, then: 1. Rinse to sanitary sewer.
Empty paint cans (dry)	1. Remove lids, dispose as trash.		1. Remove lids, dispose as trash.
Paint stripping (with solvent)	1. Dispose as hazardous waste.		1. Take to HHW drop-off.
Building exterior cleaning (high-pressure water)	1. Prevent entry into storm drain and remove offsite 2. Wash onto dirt area, spade in 3. Collect (e.g. mop up) and discharge to sanitary sewer	POTW	
Cleaning of building exteriors which have **HAZARDOUS MATERIALS** (e.g. mercury, lead) in paints	1. Use dry cleaning methods 2. Contain and dispose washwater as hazardous waste (Suggestion: dry material first to reduce volume)		

DISCHARGE/ACTIVITY	BUSINESS/COMMERCIAL Disposal Priorities	Approval	RESIDENTIAL Disposal Priorities
General Construction and Painting; Street and Utility Maintenance (cont'd)			
Non-hazardous paint scraping/ sand blasting	1. Dry sweep, dispose as trash		1. Dry sweep, dispose as trash
HAZARDOUS paint scraping/sand blasting (e.g. marine paints or paints containing lead or tributyl tin)	1. Dry sweep, dispose as hazardous waste		1. Dry sweep, take to HHW drop-off
Soil from excavations during periods when storms are forecast	1. Should not be placed in street or on paved areas 2. Remove from site or backfill by end of day 3. Cover with tarpaulin or surround with hay bales, or use other runoff controls 4. Place filter mat over storm drain Note: Thoroughly sweep following removal of dirt in all four alternatives.		
Soil from excavations placed on paved surfaces during periods when storms are not forecast	1. Keep material out of storm conveyance systems and thoroughly remove via sweeping following removal of dirt		
Cleaning streets in construction areas	1. Dry sweep and minimize tracking of mud 2. Use silt ponds and/or similar pollutant reduction techniques when flushing pavement		
Soil erosion, sediments	1. Cover disturbed soils, use erosion controls, block entry to storm drain. 2. Seed or plant immediately.		
Fresh cement, grout, mortar	1. Use/reuse excess 2. Dispose to trash		1. Use/reuse excess 2. Dispose as trash
Washwater from concrete/mortar (etc.) cleanup	1. Wash onto dirt area, spade in 2. Pump and remove to appropriate disposal facility 3. Settle, pump water to sanitary sewer	POTW	1. Wash onto dirt area, spade in 2. Pump and remove to appropriate disposal facility 3. Settle, pump water to sanitary sewer
Aggregate wash from driveway/patio construction	1. Wash onto dirt area, spade in 2. Pump and remove to appropriate disposal facility 3. Settle, pump water to sanitary sewer	POTW	1. Wash onto dirt area, spade in 2. Pump and remove to appropriate disposal facility 3. Settle, pump water to sanitary sewer

DISCHARGE/ACTIVITY	BUSINESS/COMMERCIAL Disposal Priorities	Approval	RESIDENTIAL Disposal Priorities
General Construction and Painting; Street and Utility Maintenance (cont'd)			
Rinsewater from concrete mixing trucks	1. Return truck to yard for rinsing into pond or dirt area 2. At construction site, wash into pond or dirt area		
Non-hazardous construction and demolition debris	1. Recycle/reuse (concrete, wood, etc.) 2. Dispose as trash		1. Recycle/reuse (concrete, wood, etc. 2. Dispose as trash
Hazardous demolition and construction debris (e.g. asbestos)	1. Dispose as hazardous waste		1. Do not attempt to remove yourself. Contact asbestos removal service for safe removal and disposal 2. Very small amounts (less than 5 lbs) may be double-wrapped in plastic and taken to HHW drop-off
Saw-cut slurry	1. Use dry cutting technique and sweep up residue 2. Vacuum slurry and dispose off-site. 3. Block storm drain or berm with low weir as necessary to allow most solids to settle. Shovel out gutters; dispose residue to dirt area, construction yard or landfill.		
Construction dewatering (Nonturbid, uncontaminated groundwater)	1. Recycle/Reuse 2. Discharge to storm drain		
Construction dewatering (Other than nonturbid, uncontaminated groundwater)	1. Recycle/reuse 2. Discharge to sanitary sewer 3. As appropriate, treat prior to discharge to storm drain	POTW Reg. Bd.	
Portable toilet waste	1. Leasing company shall dispose to sanitary sewer at POTW	POTW	
Leaks from garbage dumpsters	1. Collect, contain leaking material. Eliminate leak, keep covered, return to leasing company for immediate repair 2. If dumpster is used for liquid waste, use plastic liner		

DISCHARGE/ACTIVITY	BUSINESS/COMMERCIAL Disposal Priorities	Approval	RESIDENTIAL Disposal Priorities
General Construction and Painting; Street and Utility Maintenance (cont'd)			
Leaks from construction debris bins	1. Insure that bins are used for dry nonhazardous materials only (Suggestion: Fencing, covering help prevent misuse)		
Dumpster cleaning water	1. Clean at dumpster owner's facility and discharge waste through grease interceptor to sanitary sewer 2. Clean on site and discharge through grease interceptor to sanitary sewer	POTW POTW	
Cleaning driveways, paved areas * (Special Focus = Restaurant alleys Grocery dumpster areas) * Note: Local drought ordinances may contain additional restrictions	1. Sweep and dispose as trash (Dry cleaning only). 2. For vehicle leaks, restaurant/grocery alleys, follow this 3-step process: a. Clean up leaks with rags or absorbents. b. Sweep, using granular absorbent material (cat litter). c. Mop and dispose of mopwater to sanitary sewer (or collect rinsewater and pump to the sanitary sewer). 3. Same as 2 above, but with rinsewater (2c)(no soap) discharged to storm drain.		1. Sweep and dispose as trash (Dry cleaning only). 2. For vehicle leaks, follow this 3-step process: a. Clean up leaks with rags or absorbents; dispose as hazardous waste. b. Sweep, using granular absorbent material (cat litter). c. Mop and dispose of mopwater to sanitary sewer.
Steam cleaning of sidewalks, plazas * * Note: Local drought ordinances may contain additional restrictions	1. Collect all water and pump to sanitary sewer. 2. Follow this 3-step process: a. Clean oil leaks with rags or adsorbents b. Sweep (Use dry absorbent as needed) c. Use no soap, discharge to storm drain		
Potable water/line flushing Hydrant testing	1. Deactivate chlorine by maximizing time water will travel before reaching creeks		
Super-chlorinated (above 1 ppm) water from line flushing	1. Discharge to sanitary sewer 2. Complete dechlorination required before discharge to storm drain		

DISCHARGE/ACTIVITY	BUSINESS/COMMERCIAL Disposal Priorities	Approval	RESIDENTIAL Disposal Priorities
Landscape/Garden Maintenance			
Pesticides	1. Use up. Rinse containers use rinsewater as product. Dispose rinsed containers as trash 2. Dispose unused pesticide as hazardous waste		1. Use up. Rinse containers, use rinsewater as pesticide. Dispose rinsed container as trash. 2. Take unused pesticide to HHW drop-off
Garden clippings	1. Compost 2. Take to Landfill		1. Compost 2. Dispose as trash.
Tree trimming	1. Chip if necessary, before composting or recycling		1. Chip if necessary, before composting or recycling
Swimming pool, spa, fountain water (emptying)	1. Do not use metal-based algicides (i.e. Copper Sulfate) 2. Recycle/reuse (e.g. irrigation) 3. Determine chlorine residual = 0, wait 24 hours and then discharge to storm drain.	POTW	1. Do not use metal-based algicides (i.e. Copper Sulfate) 2. Recycle/reuse (e.g. irrigation) 3. Determine chlorine residual = 0, wait 24 hours and then discharge to storm drain.
Acid or other pool/spa/fountain cleaning	1. Neutralize and discharge to sanitary sewer	POTW	
Swimming pool, spa filter backwash	1. Reuse for irrigation 2. Dispose on dirt area 3. Settle, dispose to sanitary sewer		1. Use for landscape irrigation 2. Dispose on dirt area 3. Settle, dispose to sanitary sewer
Vehicle Wastes			
Used motor oil	1. Use secondary containment while storing, send to recycler.		1. Put out for curbside recycling pickup where available 2. Take to Recycling Facility or auto service facility with recycling program 3. Take to HHW events accepting motor oil
Antifreeze	1. Use secondary containment while storing, send to recycler.		1. Take to Recycling Facility
Other vehicle fluids and solvents	1. Dispose as hazardous waste		1. Take to HHW event
Automobile batteries	1. Send to auto battery recycler 2. Take to Recycling Center		1. Exchange at retail outlet 2. Take to Recycling Facility or HHW event where batteries are accepted
Motor home/construction trailer waste	1. Use holding tank. Dispose to sanitary sewer		1. Use holding tank, dispose to sanitary sewer.

DISCHARGE/ACTIVITY	BUSINESS/COMMERCIAL Disposal Priorities	Approval	RESIDENTIAL Disposal Priorities
Vehicle Wastes (cont'd)			
Vehicle Washing	1. Recycle 2. Discharge to sanitary sewer, never to storm drain	POTW	1. Take to Commercial Car Wash. 2. Wash over lawn or dirt area 3. If soap is used, use a bucket for soapy water and discharge remaining soapy water to sanitary sewer.
Mobile Vehicle Washing	1. Collect washwater and discharge to sanitary sewer.	POTW	
Rinsewater from dust removal at new car fleets	1. Discharge to sanitary sewer 2. If rinsing dust from exterior surfaces from appearance purposes, use no soap (water only); discharge to storm drain.	POTW	
Vehicle leaks at Vehicle Repair Facilities	Follow this 3-step process: 1. Clean up leaks with rags or absorbents 2. Sweep, using granular absorbent material (cat litter) 3. Mop and dispose of mopwater to sanitary sewer.		
Other Wastes			
Carpet cleaning solutions & other mobile washing services	1. Dispose to sanitary sewer	POTW	1. Dispose to sanitary sewer
Roof drains	1. If roof is contaminated with industrial waste products, discharge to sanitary sewer 2. If no contamination is present, discharge to storm drain		
Cooling water Air conditioning condensate	1. Recycle/reuse 2. Discharge to sanitary sewer	POTW	
Pumped groundwater, infiltration/ foundation drainage (contaminated)	1. Recycle/reuse (landscaping, etc.) 2. Treat if necessary; discharge to sanitary sewer 3. Treat and discharge to storm drain	Reg. Bd. POTW Reg. Bd.	
Fire fighting flows	If contamination is present, Fire Dept. will attempt to prevent flow to stream or storm drain		

DISCHARGE/ACTIVITY	BUSINESS/COMMERCIAL Disposal Priorities	Approval	RESIDENTIAL Disposal Priorities
Other Wastes (cont'd)			
Kitchen Grease	1. Provide secondary containment, collect, send to recyler. 2. Provide secondary containment, collect, send to POTW via hauler.	POTW	1. Collect, solidify, dispose as trash
Restaurant cleaning of floor mats, exhaust filters, etc.	1. Clean inside building with discharge through grease trap to sanitary sewer. 2. Clean outside in container or bermed area with discharge to sanitary sewer.		
Clean-up wastewater from sewer back-up	1. Follow this procedure: a. Block storm drain, contain, collect, and return spilled material to the sanitary sewer. b. Block storm drain, rinse remaining material to collection point and pump to sanitary sewer. (no rinse-water may flow to storm drain)		

APPENDIX C

APPENDIX C — *INSPECTION RECORDS*

Model Facility Site Walk Checklist
Model Annual Inspection Report

MODEL FACILITY SITE WALK CHECKLIST

Facility Name: _____

Facility Address: _____

Facility Contact Person/Phone: _____

Name of Staff Conducting Inspection: _____

Title: _____ Date: _____

AREAS/ITEMS TO BE INSPECTED	INSPECTION PERFORMED			
	YES	NO*	NA	COMMENTS
Inspect:				
• outdoor areas where trash, waste, and scrap materials are stored.				
• outdoor areas where new materials and supplies, especially liquids, are stored.				
• fueling islands.				
• outside areas where vehicle/equipment maintenance is performed.				
• areas immediately outside of buildings in which vehicle/equipment maintenance is performed.				
• areas where vehicle/equipment washing is performed.				
Note Whether:				
• materials are properly contained, stored, and disposed of.				
• areas where vehicle, equipment, and materials should be covered with a tarp, moved indoors, or provided with a drip pan while parked or stored.				
• spills, leaks, and drips have been cleaned up and where absorbent and containers for used absorbent materials need to be provided.				

MODEL FACILITY SITE WALK CHECKLIST (Continued)

AREAS/ITEMS TO BE INSPECTED	INSPECTION PERFORMED			
	YES	NO*	NA	COMMENTS
Observe Whether:				
• buckets containing liquids are sealed and stored in designated areas.				
• all drums and containers are properly labeled as to their contents.				
• hoses are present and what they are used for.				
• non-stormwater discharges (e.g., washwater) or excessive roof drainage is contacting contaminated areas of the facility and contributing to nonpoint source pollution.				
Additional Areas/Items Inspected:				
•				
•				
•				
•				
•				

* Explain in the Comments column why the area/item was not inspected and what action, if any, needs to be taken.

Signed: _____

Title: _____

MODEL ANNUAL INSPECTION REPORT

Facility Name: _____

Facility Address: _____

Facility Contact Person/Phone: _____

Name of Staff Conducting Inspection: _____

Title: _____ Date: _____

FACILITY ACTIVITIES	BMPs IMPLEMENTED			
	YES	NO*	NA	COMMENTS
Material Loading/Unloading/Handling/Storage				
• Are loading/unloading areas covered?				
• Is the use of safer alternative products promoted?				
• Are wastes tracked, re-used, and recycled properly?				
• Are materials stored indoors or in covered and bermed areas?				
• Is secondary containment provided, where appropriate?				
• Are materials stored in covered, bermed areas?				
• Are material and waste containers covered and/or have lids?				
• Are material stockpiles stored indoors or covered with a roof or tarp?				
• Are materials returned to designated storage areas after use?				
• Are storage areas and material containers protected from equipment and vehicle traffic?				

MODEL ANNUAL INSPECTION REPORT (Continued)

FACILITY ACTIVITIES	BMPs IMPLEMENTED			
	YES	NO*	NA	COMMENTS
Filling of ASTs/USTs				
• Is the filling of ASTs/USTs monitored?				
• Do ASTs have secondary containment where appropriate?				
• Is secondary containment in place during filling of ASTs/USTs?				
Dispensing Fuel				
• Is fueling monitored?				
• Are signs posted warning against "topping off" and requiring monitoring during fueling operations?				
• Are pump shut off valves clearly marked?				
• Is the fueling area designed to prevent runon of stormwater and runoff of spills?				
Vehicle/Equipment Maintenance				
• Is there a preventive maintenance program?				
• Are maintenance activities conducted indoors or under cover?				
• Are maintenance activities conducted on paved surfaces in designated areas?				
• Are vehicle and equipment wastes collected, recycled, and disposed of properly?				

MODEL ANNUAL INSPECTION REPORT (Continued)

FACILITY ACTIVITIES	BMPs IMPLEMENTED			
	YES	NO*	NA	COMMENTS
Vehicle/Equipment Parking and Storage				
• Are vehicles and equipment kept off erodible areas?				
• Are vehicles and equipment parked and stored in designated areas only?				
• Are drip pans placed under stored vehicles and equipment to contain leaks?				
Vehicle/Equipment /Material Washing and Steam Cleaning				
• Are signs prohibiting vehicle and equipment washing and steam cleaning posted?				
• Are washing and steam cleaning activities performed offsite at commercial facilities or in designated areas?				
• Are designated wash areas covered and bermed?				
• Are washing and steam cleaning discharges prevented from entering the storm drain system?				
Leak and Spill Cleanup				
• Are leaks and spills cleaned up immediately using dry methods (i.e., brooms, rags, or absorbents)?				
• Are materials to clean up spills and leaks easily accessible and clearly marked?				

MODEL ANNUAL INSPECTION REPORT (Continued)

FACILITY ACTIVITIES	BMPs IMPLEMENTED			
	YES	NO*	NA	COMMENTS
• Are used absorbents and spill cleanup materials and contaminated soils promptly and properly disposed?				
Landscape, Garden, and General Maintenance and Cleaning				
• Have non-storm discharges to the storm drains been eliminated?				
• Are good housekeeping practices implemented and reminders posted in appropriate locations?				
• Are work areas and outside areas kept clean and orderly?				
• Are garbage and waste materials collected and disposed of regularly?				
• Is the use of less harmful (i.e., safer alternative) products promoted?				
• Are employees trained and regularly informed of BMPs and good housekeeping practices and trained in the use of spill control materials?				

* Indicate in the "Comments" column what action will be taken to implement the BMP or that the BMP is no longer appropriate.

Signed: _____

Title: _____

PREPARING A SWPP

2. HOW TO PREPARE A STORM WATER POLLUTION PREVENTION PLAN

INTRODUCTION

Chapter 2 provides a six step process to develop a Storm Water Pollution Prevention Plan (SWPPP). Presented here is a brief overview.

Step 1: Do you have to complete a SWPPP? - The first step is to determine if you have to prepare a SWPPP. Those businesses that fit the categories described in the General permit must prepare a SWPPP (see Appendix B).

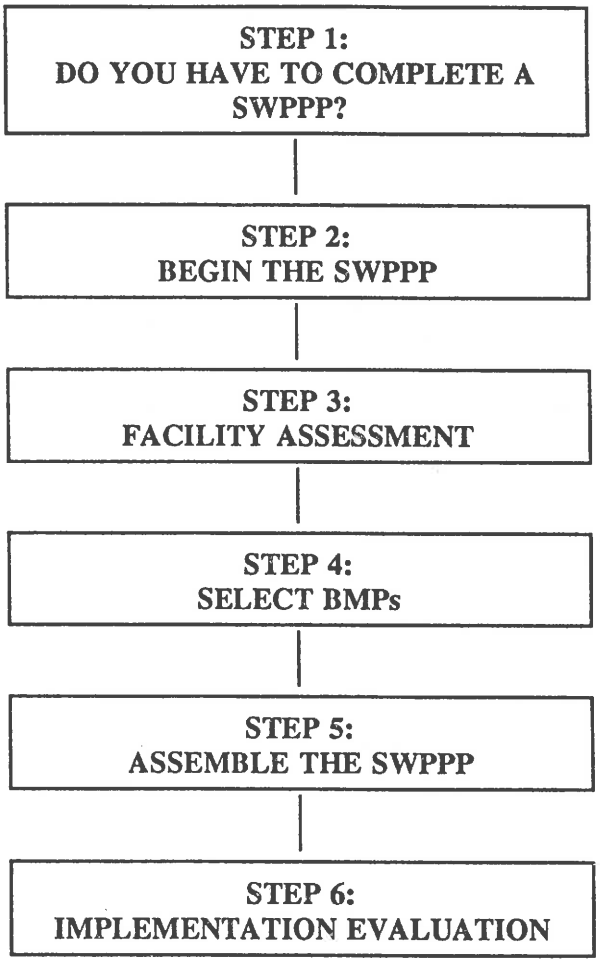
Step 2: Begin the SWPPP - The second step involves identifying the SWPPP Leader, forming a Pollution Prevention Team, and gathering existing relevant reports, information, data, and drawings.

Step 3: Facility Assessment - The SWPPP Leader with the assistance of the Pollution Prevention Team conducts an assessment of the facility, drainage patterns, identifying activities of concern, and the presence and effectiveness of Best Management Practices (BMPs) already in-place. Worksheets for conducting an assessment are provided at the end of this chapter.

Step 4: Select Best Management Practices - BMPs are selected to deal with the identified sources of storm water pollution. Emphasis is placed on source control BMPs with the adoption of treatment control BMPs if only clearly needed.

Step 5: Assemble the SWPPP - All of the information, data, and analysis are assembled into the SWPPP. Implementation and evaluation procedures are defined. Roles and responsibilities are defined. Legal requirements such as signatures of responsible parties are obtained.

Step 6: Implement and Evaluate - The SWPPP is implemented and its effectiveness evaluated. Adjustments are made in the SWPPP to redress observed inadequacies.



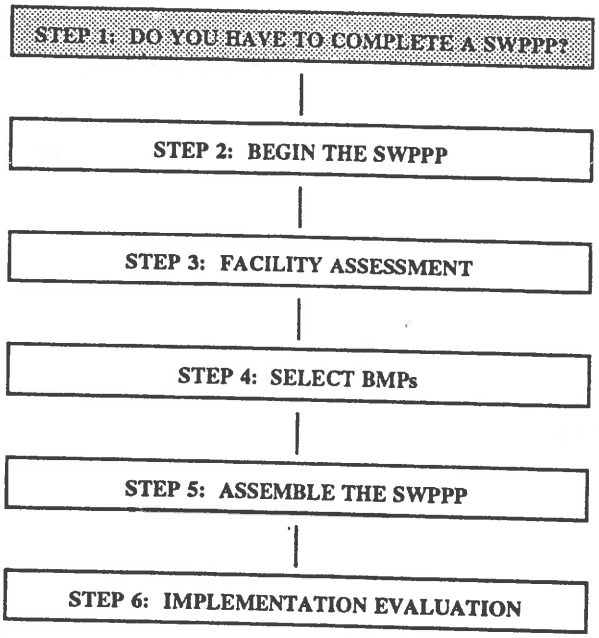
STEP 1: DO YOU HAVE TO COMPLETE A SWPPP?

Appendix B provides a list of industrial activities that are subject to the NPDES general permit which includes the preparation of a SWPPP. Table 2 of the appendix is a list of industrial activities that require the facility, where these activities take place, to have a NPDES permit while, Table 3 of the appendix provides a list of industrial activities that could possibly fall under the NPDES permit. In either event, the facilities where these industrial activities take place have the option of obtaining an individual NPDES permit or a general permit. It should be noted that some industrial activities although not listed in Appendix B should practice effective water pollution prevention and may be required to have a permit in the future. Also government owned or operated facilities that contain the activities listed in Appendix B are required to obtain a general permit and to prepare a SWPPP.

The critical decision to be made by the business that owns the facility is the classification of the facility by Standard Industrial Classification (SIC) code. In many instances, the SIC code is assigned based on the primary activity of the business and not the facility activity. Consequently, the SIC code has little resemblance to the activities actually occurring on site.

In California, the decision whether a facility is required to obtain a general permit is determine by what activity takes place on the site. It is the industrial activities at the facility site (and subsequent SIC code classification) that determine whether a general permit is required not the primary business of the facility owner. For example, a school district must obtain a general permit for its bus maintenance facility even though the primary business of the district is education.

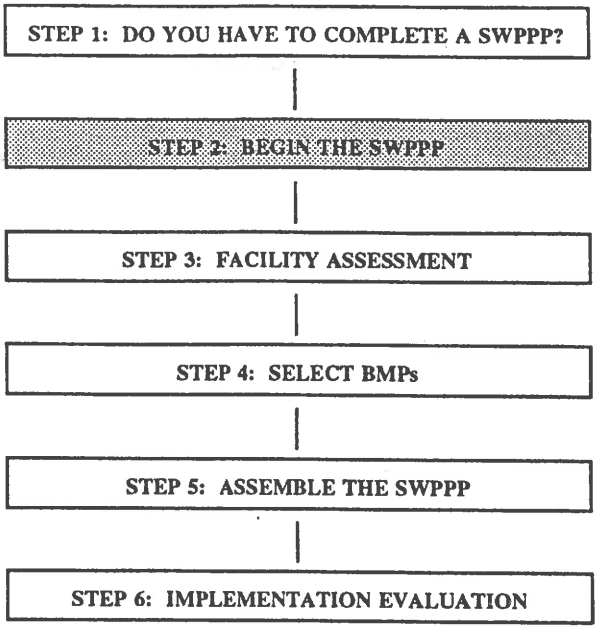
Many businesses in California already have NPDES permits for storm water. These



permits were issued because the businesses either belong to a category for which Federal regulations were previously established, or because a problem was identified by the respective Regional Water Quality Control Board (RWQCB). RWQCBs have the authority to require a NPDES permit of any facility that is discharging storm water, not just those identified in Appendix B.

STEP 2: BEGIN THE SWPPP

The development of a SWPPP is not intended to be a complicated and expensive process, and the facility should look to doing as much of the SWPPP as possible. Technical consultants are available and can be a valuable asset. However, facility personnel should first become aware of the permit requirements, demonstrate site awareness as it relates to SWPPP, and be familiar with the BMPs that will be implemented. By taking this approach, facility personnel will be able to identify specific technical assistance more appropriate for a technical consultant. In any event, the following four things should be done first:



1. **Decide who will develop and implement the SWPPP.** If the facility is small, an individual may be sufficient. If the facility is large or complex, it would be better to designate a Pollution Prevention Team under the leadership of one individual. The size and composition of the team should be appropriate to the complexity of the facility. The team should consist of representatives from all departments, at all levels, that will have a role in implementing the SWPPP. The role of each member should be specified. The Pollution Prevention Team may have personnel that overlap with related pollution control responsibilities such as a spill prevention and response team.

   The SWPPP should contain a statement of management's policy and responsibilities for implementing the SWPPP, the responsibilities of each division, and the members of the Pollution Prevention Team.

2. **Review Appendix A for specifications on the content of the SWPPP.** Items of particular significance include: site map(s) showing the topography and drainage system, narrative description of the facility relevant to the potential for storm water pollution, list of pollutants that may reach the storm water, facility size, significant spills or leaks of toxic and hazardous pollutants to storm water that have occurred after November 19, 1988, existing sampling data, and existing and proposed BMPs.

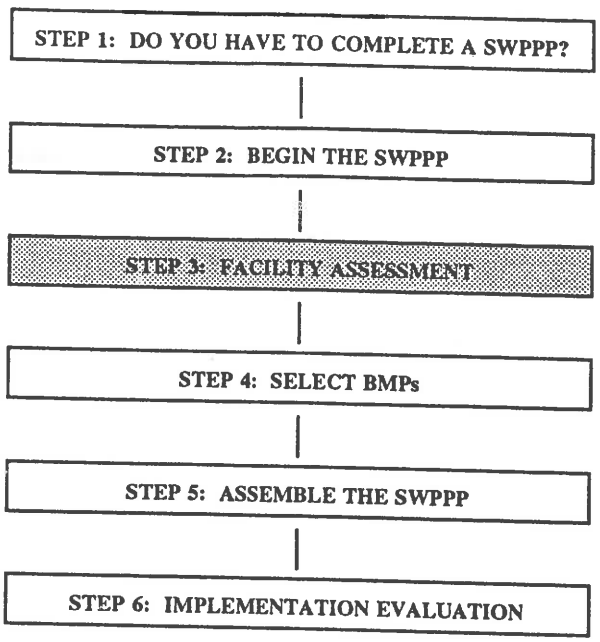
3. **Gather background information.** The Team Leader should assemble the information and currently available data to be used in Step 3, Facility Assessment. This may include drawings of the facility's drainage system indicating locations of conveyance systems and drainage surveyor's boundaries; storm water quality data previously collected; requirements of the RWQCB regarding the surface water body into which the facility discharges, etc.

4. **Identify related environmental management plans and regulations.** These may include air pollution control, spill prevention and response, OSHA, fire code, and temporary storage of hazardous waste and materials. The Pollution Prevention Team should consider in Step 3 how these various plans affect, integrate with, or conflict with the SWPPP.

STEP 3: FACILITY ASSESSMENT

Use the Pollution Prevention Team to the maximum extent possible to assess the facility. The team is a likely wealth of information and will aid in the preparation of the worksheets. Including the team throughout the development of the SWPPP makes it more likely that they will understand, support, and therefore implement the SWPPP.

The recommended approach for determining which BMPs to use is to identify key activities or activity areas that are likely sources of pollutants. The BMPs are grouped in Chapter 4 according to the key activities which are introduced later in this section. The Team Leader proceeds as follows with involvement by the Pollution Prevention Team to the maximum extent possible.



1. **Prepare a preliminary site map.** A base map of the facility is most likely already available which shows the location of buildings and key surface facilities. Show the storm water conveyance systems with the location of the discharge outfall(s) and the drainage boundary to each outfall. Some field work will likely be necessary.

   Although facilities often have drawings of the drainage system, the drainage boundaries are usually not indicated. A level and rod can be used to quickly delineate the boundaries. Locations of all catch basins should be identified. Note areas where sheet flow directly enters the subject water body. Show treatment control BMPs (Chapter 5) already in place.

   Note buildings and/or activities that may be sources of non-storm water discharges to the storm water system: process wastewater, non-contact cooling water, wash water, sanitary wastewater. These possibilities may be inferred from such things as the age of each facility building with older buildings more likely to have inappropriate connections. Remodeling may have resulted in inadvertent connections of non-storm lines to the storm drains.

2. **Complete a Materials Inventory** (see Worksheets 1 and 2 on pages 2-9 and 2-10). How materials are stored and handled has a bearing on the potential for water pollution. A knowledge of the type and location of materials will provide insight into the pollutants likely to be present. Completing Worksheets 1 and 2 may be useful in this regard. Worksheet 1 lists all materials whereas Worksheet 2 lists only those significant materials that are regularly exposed to storm water. See the Glossary for a definition of "significant".

3. **Complete a Spills Inventory.** The SWPPP must include a history of significant spills since November 19, 1988. Worksheet 3 may be useful for this requirement. The word "significant" requires interpretation. List releases of oil or hazardous substances in excess of reportable quantities. Superfund Amendments and Reauthoization Act (SARA) Title III, Section 313 facilities must describe releases of "water priority" chemicals to land or water that have

occurred during the three years prior to permit issuance.

Although you are required to include in the SWPPP only the significant spills, identifying areas where smaller spills occur frequently is also useful. Note on the site map the areas where repeated spills have occurred, or where the risk of spill is particularly significant.

4. **Begin an Activities Checklist.** Worksheet 4 lists activities following the format of Chapter 4, and provides space to indicate BMPs already in place. Check Chapter 4 for the BMPs relating to each activity area to see if you are already using them. Make some judgment as to whether they are 100% effective at this time, or how they might be improved if necessary. Mark the area of each activity on the preliminary site map. Completing the Activities Checklist facilitates BMP selection (Step 4). Completion of the checklist can be done with input from the Pollution Prevention Team and by touring the facility site.

5. **Conduct a facility site tour to confirm or locate activities.** Confirm the existence and nature of activities noted in Worksheet 4, and the nature of existing BMPs for each activity. Confirm the as-built drawings of the drainage system. During the tour, answer the following general questions:

   - Are catch basins full of sediment and not being cleaned regularly?
   - Does the facility show signs of poor housekeeping such as accumulated debris in open areas that is not being swept, uncovered materials, etc.?
   - Are there signs of spills, pools, stains, or other traces of fuels and chemicals that have been spilled?
   - Do you find leaking equipment, pipes, containers, or lines?
   - Do storage containers show signs of leakage?
   - Are containers and exposed piping labeled?
   - Are clean-up tools readily available (drip pans, absorbents, rags, etc.).

   Also complete Worksheet 5 which is a useful tool for identifying the BMPs that deal with the minimum requirements specified in the general permit. Note any flows present in the drainage system during dry weather as this is an indication of non-storm water discharges.

6. **Identify non-storm water discharges to the drainage system** (Worksheets 6 and 7). Chapter 4 provides a procedure for identifying non-storm water discharges. The regulations require that these be acted upon immediately and therefore the corrective process must begin immediately. You must certify this process. The certification should include: identification of potential non-storm water discharges; a description of the results of any tests for such discharges; the testing method used and the date; the site drainage points that were directly observed during the test. Worksheet 6 may be used for the certification. Allowable non-storm water discharges are presented in Chapter 4.

   If certification is not feasible because you do not have access to some point in the drainage system or because you are in the process of eliminating the discharge, you must notify the RWQCB of the situation. You must notify the RWQCB of any potential sources of non-storm water discharges for which you could not perform the necessary testing and why. Notification to the RWQCB should also include a responsive time schedule to complete elimination. Discharges that are essential to industrial operations, but that cannot be eliminated should be noted. For "essential" discharges you may request and the RWQCB will consider additional general permits. See Appendix A for the specific requirements. Worksheet 7 may help in this regard.

7. **Summarize existing storm water quality data.** Prepare a list of contaminants that have a reasonable potential to be present in the storm water discharge in significant quantities, and an estimate of the annual quantities of these contaminants.

8. **Conduct more detailed field studies if necessary.** Complex facilities may require extensive field work to locate the drainage systems and outfalls. Some analysis of storm samples including flow measurements may be desirable to obtain a better understanding of the situation.

9. **Complete the site map.** Show on the site map the various activities and their boundaries, particularly if an activity extends across more than one drainage boundary. A series of map overlays may be necessary for complex facilities. Note areas of particular concern.

10. **Consider the potential and relative significance of each activity to cause storm water pollution.** This will be judgmental, based on the relative percentage of area covered by each activity, the nature of the activity, and the types of pollutants.

11. **Complete an Assessment Summary.** Compile all of the above information for review and comment by the Pollution Prevention Team. This summary will serve as the basis for Step 4. You should have sufficient information to determine which areas and/or activities may be contributors to storm water pollution, and which BMPs are most suitable. Prioritization of BMP implementation may also be apparent at this time.

STEP 4: SELECT BEST MANAGEMENT PRACTICES

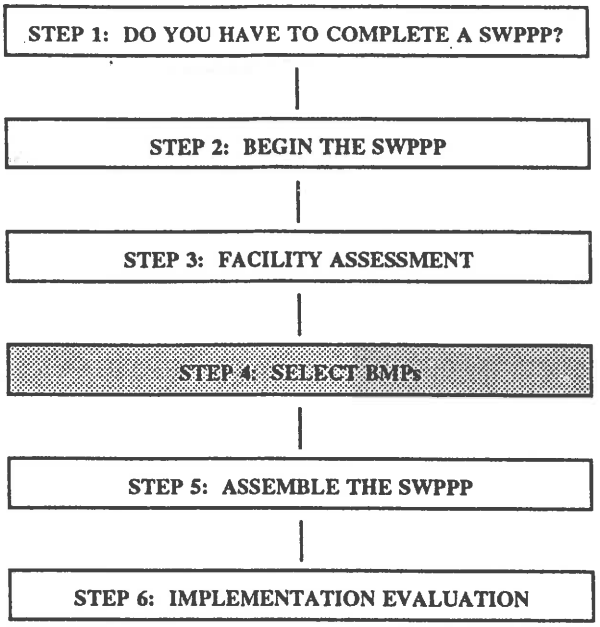
The next step is to select BMPs. BMPs are measures to prevent or mitigate pollution. They are very broad class of measures, many of which may already be use for reasons unrelated to storm water pollution. The selection process is introduced here but covered in detail in Chapter 3.

The permit states that compliance will be achieved if you have: (1) completed a SWPPP consistent with the content requirements identified in Appendix A; (2) terminated non-storm water discharges to the storm water system; and (3) implemented BMPs which are sufficient to meet numeric effluent standards for those industries for which such standards have been developed (see Appendix A).

BMPs can be placed into two groups: Source control and Treatment control. Source control BMPs (Chapter 4) are those that prevent contact between the storm water and the pollution source, or capture and handle the pollutant runoff before it reaches a drainage system. Examples include:

- Moving an outdoor operation indoors.
- Placing storage containers for recyclable oil in a shed or under a lean-to.
- Labelling containers and exposed piping
- Using drip pans.
- Preventing runoff of storm water from a clean area across a potential source of pollution.

Treatment control BMPs (Chapter 5) treat the storm water to remove the pollutant (referred to as "storm water management practices" in the general permit). Examples include catch basins with sumps, oil water separators, and grass swales.



BMPs must be selected that, at minimum, cover these general areas:

- good housekeeping,
- preventive maintenance,
- spill prevention and control,
- sediment and erosion prevention.

STEP 5: ASSEMBLE THE SWPPP

Completing the SWPPP requires several actions.

Prepare the Implementation Plan

Chapter 6 provides detailed suggestions on how to implement and evaluate the relative success of the SWPPP. The general permit does specify that you:

- Designate the personnel responsible for carrying out the SWPPP.
- Develop an inspection process to determine if BMPs are being implemented.
- Keep records of the inspections, follow-up actions, and implementation of the BMPs.
- Train staff so they understand the SWPPP.

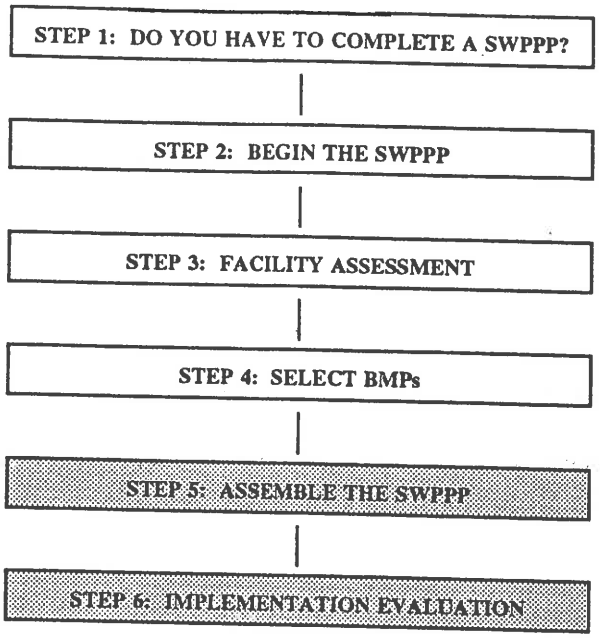
Action must be taken immediately with non-storm water discharges to the storm water system. You options: eliminate the discharge, reclaim or reuse the water, discharge to a sanitary sewer, or apply for a NPDES permit.

Obtain Required Signatures

The SWPPP is to include the signature and title of the person responsible for the SWPPP, the dates of its initial preparation and each amendment (see Appendix A, Section C).

Determine Plan Location

An official copy of the SWPPP is to be located at the facility, not off-site. However, if an office is not located at the facility (e.g., landfill), then the SWPPP should be kept at the appropriate administrative office. The SWPPP is primarily for use by the Pollution Prevention Team, not the RWQCB or the public. Therefore, locating the SWPPP off-site would negate its purpose. However, a copy of the SWPPP must be submitted to the RWQCB on request or be available for review should a representative of the RWQCB come on-site. The SWPPPs are considered to be available to



the public pursuant to Section 308(b) of the Clean Water Act, and therefore are available to the public at the RWQCB office when SWPPPs have been submitted to the RWQCB.

Provide for Plan Modifications

The RWQCB can require changes in the SWPPP. Upon reviewing the SWPPP, the Board may find that it does not meet one or more of the requirements set forth in Appendix A. The Board will notify you of the deficiencies. Modifications must be made to the SWPPP with 30 days of notification, unless the notification provides a different period.

STEP 6: IMPLEMENTATION EVALUATION

Finally, implement the SWPPP. It is important, as well as required by the general permit, that the frequent inspections occur to check if BMPs are being implemented, and to evaluate their relative effectiveness (see Chapter 6).

MATERIAL INVENTORY

(Adopt from EPA, 1992)

Worksheet No. 1
Completed By:_____
Title:_____
Date:_____

Instructions: List all materials used, stored, or produced onsite. Assess and evaluate these materials for their potential to contribute pollutants to storm water runoff. Also complete Worksheet 3 if the material has been exposed during the last three years.

Material	Purpose/Location	Quantity (units)		Quantity Exposed in Last 3 Years*	Likelihood of contact with storm water.	Past Significant Spill or Leak**	
		Used	Produced			Yes	No

* Explain on separate sheet if quantity was more than the "minimum?"
** Explain items checked yes on a separate sheet.

MATERIAL INVENTORY

(Adopt from EPA, 1992)

Worksheet No. 2
Completed By:_____
Title:_____
Date:_____

Instructions: Based on your material inventory, describe the significant materials that were exposed to storm water during the past three years and/or are currently exposed. For the definition of "significant materials" see Appendix E of the handbook.

Description of Exposed Significant Material	Period of Exposure	Quantity Exposed (units)	Location (as indicated on the site map)	Method of Storage or Disposal (e.g., pile, drum, tank)	Description of Material Management Practices (e.g., pile covered, drum sealed)

SPILLS INVENTORY

(Adopt from EPA, 1992)

Worksheet No. 3
Completed By:_____
Title:_____
Date:_____

Instructions: Record below all significant spills and significant leaks of toxic or hazardous pollutants that have occurred at the facility in the three years prior to the effective date of the permit.

Definitions: Significant spills include, but are not limited to, releases of oil or hazardous substances in excess of reportable quantities.

1st Year Prior

Date (month/day/year)	Check Box		Location (as indicated on site map)	Description				Response Procedure	Preventive Measures Taken
	Spill	Leak		Type of Material	Quantity	Source, If Known	Reason		

2nd Year Prior

Date (month/day/year)	Check Box		Location (as indicated on site map)	Description				Response Procedure	Preventive Measures Taken
	Spill	Leak		Type of Material	Quantity	Source, If Known	Reason		

3rd Year Prior

Date (month/day/year)	Check Box		Location (as indicated on site map)	Description				Response Procedure	Preventive Measures Taken
	Spill	Leak		Type of Material	Quantity	Source, If Known	Reason		

WORKSHEET #4
ACTIVITIES ASSESSMENT CHECKLIST

Name of Reviewer:	Date:

ACTIVITIES - Check each activity present at site	EFFECTIVENESS		
	HIGH	MED.	LOW
☐ Non-storm water discharges to drains. Describe BMPs in place:			
☐ Vehicle and equipment fueling. Describe BMPs in place:			
☐ Vehicle and equipment washing and steam cleaning. Describe BMPs in place:			
☐ Vehicle and equipment maintenance and repair. Describe BMPs in place:			
☐ Outdoors loading/unloading of liquid materials. Describe BMPs in place:			
☐ Outdoor container storage of liquids. Describe BMPs in place:			
☐ Outdoor process equipment operations and maintenance. Describe BMPs in place:			
☐ Outdoor storage of raw materials, products and byproducts. Describe BMPs in place:			
☐ Waste handling and disposal. Describe BMPs in place:			
☐ Contaminated or erodible surface areas. Describe BMPs in place:			
☐ Building and grounds maintenance. Describe BMPs in place:			
☐ Building repair, remodeling, and construction. Describe BMPs in place:			
☐ Over-water activities. Describe BMPs in place:			

WORKSHEET #5
CHECKLIST FOR CONSIDERATION OF MINIMUM BMPs

Check which of the following describe your facility.

Name of Reviewer:	Date:

Yes	No	N/A	
☐	☐	☐	Are outside areas kept neat and clean?
☐	☐	☐	Is the facility orderly and neat?
☐	☐	☐	Is process debris removed regularly?
☐	☐	☐	Is the area clear of excessive dust from industrial operations?
☐	☐	☐	Is there no evidence of leaks and drips from equipment and machinery?
☐	☐	☐	Are employees regularly informed of the importance of good housekeeping?
☐	☐	☐	Are catch basins, storm conveyance pipes, and storm water treatment facilities cleaned at the appropriate intervals (see Chapter 5)?
☐	☐	☐	Are good housekeeping procedures and reminders posted in appropriate locations?
☐	☐	☐	Are vehicle maintenance activities kept indoors and kept from "creeping" out the front door of the maintenance shop?
☐	☐	☐	Are containers for chemical substances and for temporary storage of wastes labeled?
☐	☐	☐	Is vehicle and equipment washing done in a designated area so that the wash water can be discharged to the sanitary or process wastewater sewer?
☐	☐	☐	Are regular housekeeping practices carried out?
☐	☐	☐	Is there a spill prevention and response team?
☐	☐	☐	Are appropriate spill containment and cleanup materials kept on-site and in convenient locations?
☐	☐	☐	Are cleanup procedures for spills followed regularly and correctly?
☐	☐	☐	Are used absorbent materials removed and disposed in a timely manner?
☐	☐	☐	Are personnel regularly trained in the use of spill control materials?
☐	☐	☐	Is exposed piping and process equipment regularly inspected and/or tested to uncover conditions that could cause breakdowns or failures resulting in discharges of pollutants to surface waters?
☐	☐	☐	Are drainage ditches or the areas around the outfall(s) free of erosion?
☐	☐	☐	Are unpaved outdoor areas protected from water or wind erosion?

Any items checked "No" require consideration in the selection of BMPs.
N/A = Not Applicable.

NON-STORM WATER DISCHARGE ASSESSMENT AND CERTIFICATION

(Source: EPA, 1992)

Worksheet #6
Completed by: _____
Title: _____
Date: _____

Date of Test or Evaluation	Outfall Directly Observed During the Test (identify as indicated on the site map)	Method Used to Test or Evaluate Discharge	Describe Results from Test for the Presence of Non-Storm Water Discharge	Identify Potential Significant Sources	Name of Person Who Conducted the Test or Evaluation

CERTIFICATION

I, _____ (responsible corporate official), certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

A. Name & Official Title (type or print)	B. Area Code and Telephone No.
C. Signature	D. Date Signed

NON-STORM WATER DISCHARGE ASSESSMENT AND FAILURE TO CERTIFY NOTIFICATION

(Source: EPA, 1992)

Worksheet # 7
Completed by: _____
Title: _____
Date: _____

Directions: If you cannot feasibly test or evaluate an outfall due to one of the following reasons, fill in the table below with the appropriate information and sign this form to certify the accuracy of the included information.

List all outfalls not tested or evaluated, describe any potential sources of non-storm water pollution from listed outfalls, and state the reason(s) why certification is not possible. Use the key from your site map to identify each outfall.

Important Notice: A copy of this notification must be signed and submitted to the RWQCB within 180 days of the effective date of this permit.

Identify Outfall Not Tested/Evaluated	Description of Why Certification Is Infeasible	Description of Potential Sources of Non-Storm Water Pollution

CERTIFICATION

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations, and that such notification has been made to the RWQCB within 180 days of _____ (date permit was issued), the effective date of this permit.

A. Name & Official Title (type or print)	B. Area Code and Telephone No.
C. Signature	D. Date Signed

MATERIAL SAFETY DATA SHEET SAMPLE

HOW TO READ AND UNDERSTAND A MATERIAL SAFETY DATA SHEET

Although General Industry Safety Order 5194, the CAL/OSHA regulation which implements the Hazardous Substances Information and Training Act specifies what information must be included in a material safety data sheet (MSDS), it does not specify the format to be used. Therefore, many manufacturers and formulators have developed their own formats—and, as a result, it may take careful reading to get the information you need from an MSDS.

The Hazardous Substances Information and Training Act states that a completed OSHA form 20 (blank form 20s are available from OSHA: 415-455-7430) can be used by manufacturers and formulators to fulfill the requirements regarding development of an MSDS for any of their products which are listed, or which contain substances listed, as hazardous in Section 339 of Title 8 (a copy of the List of Hazardous Substances is available from CAL/OSHA Communications, 525 Golden Gate Ave.-3rd Floor, San Francisco, CA 94102; 415-557-2237).

Here is a sample of what a complete MSDS will look like and some guidelines about how to read an MSDS. Unfortunately, many MSDS have been found not to contain complete and accurate information. If you have any doubt about the accuracy of an MSDS, call HESIS, the CAL/OSHA Consultation Service, or the Division of Occupational Safety and Health's MSDS Unit (see page 8 for phone numbers).

GUIDELINES FOR READING AND UNDERSTANDING AN MSDS

Not all Material Safety Data Sheets will contain all of the information discussed in this article and the information will vary depending upon the degree to which the material is hazardous. But this will give you an idea of the kind of information you should expect to find when you read an MSDS.

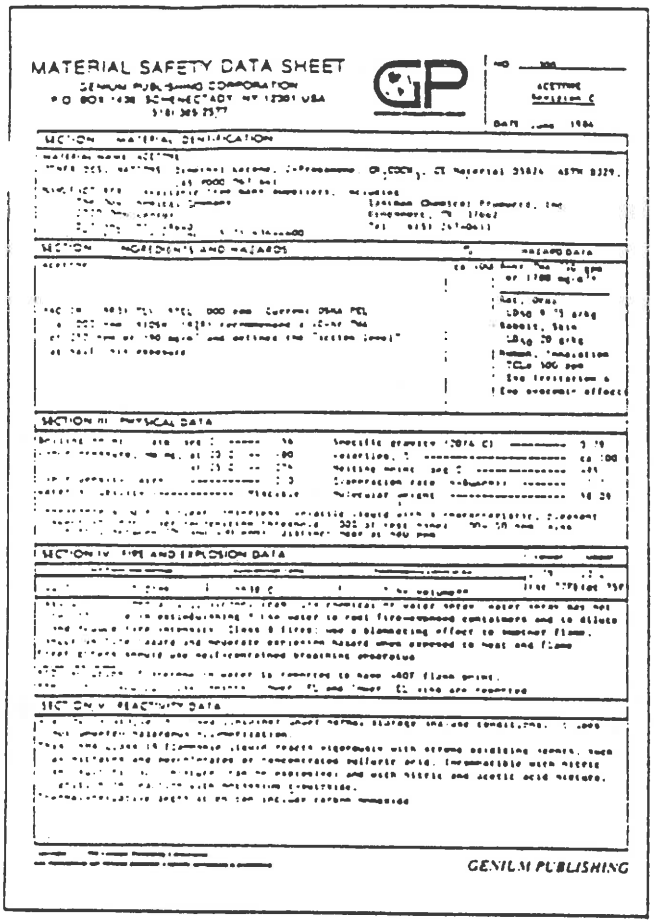
If the MSDS is blank or has only a trade name and a lot of N.A.s ("not applicable") on it, it is not going to be useful. Most MSDS have at least some of the information filled in. By cross checking the information in various sections, you can determine what you need to know about the hazards of the material.

I. PRODUCT IDENTIFICATION

- The manufacturer or distributor listed should be able to provide detailed information on the hazards of the material(s) covered by the MSDS.
- Does the trade name on the MSDS agree with the one on the label on the container?
- The synonyms should be those most commonly used for the product.
- Make sure the chemical name, and the formula are listed for single substances and that the trade or brand name and the chemical family is listed if the substance is a mixture. You will find ingredient information in Section II.

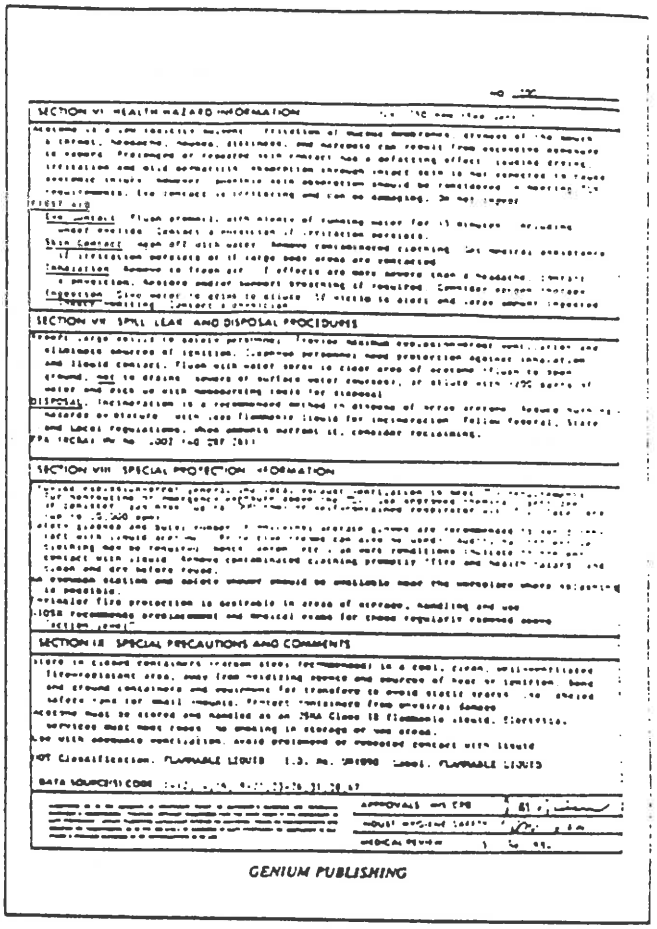
II. HAZARDOUS INGREDIENTS

- The materials listed should be those in the product which individually are listed in the List of Hazardous Substances, Section 339 of Title 8 of the California Administrative Code. One component of a multicomponent product might be listed because of its toxicity (the health hazards it poses), another because of its flammability, and a third both for its toxicity and its reactivity.
- Toxic hazard data should be stated in terms of concentration, mode of exposure or test, and animal used; i.e., 100 ppm LC 50 (lethal concentration) rat, 25 mg/M LD 50 (lethal dose) oral mouse or permissible exposure limit from published sources such as Section 5155 of Title 8 of the California Administrative Code or the TLV list published by the American Conference of Governmental Industrial Hygienists.
- Flammable or reactive data should be included as well as flash point, shock sensitivity, or brief data to indicate the nature of the hazard.



MATERIAL SAFETY DATA SHEET

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If the concentration of the material in the mixture is 1% or greater and/or has a TLV (Threshold Limit Value) or a PEL (Permissible Exposure Limit)—check it against:

1. Section III—Physical Hazard Data. All of this section should be filled in if the substance is a solvent, catalyst or vehicle.

2. Section IV—Fire and Explosion Data. All of this section should be filled in with either numbers or procedures if the substance is either a solvent, catalyst, vehicle, oxidizer, or explosive metal.

3. Section V—Health Hazard Information. If a substance has a TLV, it most likely presents a health hazard(s). Be sure the "effects of overexposure" line lists both the long term (chronic) and short term (acute) consequences of exposure. This is especially true for substances which have some sort of toxic rating, such as LD 50, either in Section I or Section II.

4. Section VI—Reactivity Data. This section should be filled out if the substance is a catalyst, a polymer, a copolymer, a concentrated acid, base or other reactive substance. Also, a chemical may be incompatible with some other substance(s). That some other substance(s) should be listed on the "incompatibility" line.

5. Section VII. If the chemical has a TLV, procedures to follow in the event of a spill or leak should be specified.

6. Section VIII—Special Protection. If the substance has a TLV, this section should always have some information in it no matter what kind of substance it is, because it will either pose a breathing hazard or a skin or eye hazard. This section must give information on protection against any or all of these kinds of exposures.

7. Section IX—Special Precautions. If the substance is flammable, highly reactive, corrosive, explosive, or has some other dangerous properties, this section must have information on special handling and storage.

III. PHYSICAL DATA

This section is one of the most important and useful sections on the MSDS both for assessing how hazardous the substance is and how completely the MSDS is filled out. This is especially true for solvents, and that is why solvents are used as an example throughout this article.

The data in this section should be for the total mixture or product. Don't be put off by the terms. Once you know the definitions of the terms, you can make cross checks.

Terms:

● **Boiling Point** is the temperature in degrees Fahrenheit or Centigrade at which liquid boils (or becomes gas). Ranges are given for mixtures.

● **Vapor Pressure.** A high vapor pressu indicates that a liquid will evaporate easi

The term 'volatile' is used to describe a li uid that evaporates easily. This is impo tant to know because it indicates that a concentrations can build up quickly wh the material is worked with in its liqu form. Materials with high vapor pressur can be especially hazardous if you a working with them in an enclosed area in an area with poor air circulation. Vac pressures are measured in units tors millimeters of mercury (mm Hg) at a ce tain temperature. Xylene with a vap pressure of 10 mm Hg at 27°-32°C a toluene with a vapor pressure of 36 mm at 30° C are two solvents, for instance, t use of which can lead to hazardous concentrations. However, even materi with lower vapor pressures may pose inhalation hazard because the method handling (for example, spraying vers brushing) also affects the concentration air. A vapor pressure always has to lis temperature too.

● **Vapor Density** is the relative density weight of a vapor or gas compared with equal volume of air. If the vapor density c substance is less than one, it will tend rise in air; if the vapor density is grea than one, it will fall in air. Substances w

high vapor densities pose a particu problem because they will collect in bottom of tanks.

● **Solubility** in water refers to the percentage by weight of the substance which can be dissolved in water. Less than 0.1% is considered negligible; 0.1-1% is slight; 1-10% is moderate; more than 10% is appreciable; and if it can be dissolved in all proportions, it has complete solubility.

● **Appearance and Odor** may help you identify the substance you are working with. Do not rely on odor to indicate whether there is a hazardous concentration of the substance in air. Some substances can reach hazardous levels and not have a noticeable odor.

● **Specific Gravity** refers to the ratio of the weight of a volume of liquid to the weight of an equal volume of water at a specified temperature. If a substance has a specific gravity greater than one, it will sink in water; if it has a specific gravity less than one, it will float in water.

● **Percent Volatile by Volume** refers to the percentage of a liquid or solid that evaporates at room temperature. The higher the percentage, the faster the substance will evaporate.

● **Evaporation Rate** is the rate at which the material evaporates compared either to ether which evaporates very quickly or to butyl acetate which evaporates very slowly. The chemical which is used for comparison (ether or butyl acetate) should be listed. If a substance has an evaporation rate greater than one, it evaporates more quickly than the chemical it is compared to; if the rate is less than one, it evaporates more slowly than the chemical it is compared to.

The information in the Physical Data section is useful for the control of toxic vapors. Boiling point, vapor density, percent volatile, vapor pressure and evaporation are all useful for designing proper ventilation systems. This information is also useful for design and use of adequate fire and spill containment equipment and procedures.

Make these checks. The boiling point, vapor pressure, % volatile, and evaporation rate are all characteristics of a substance which gives off vapors into the air. If one of these characteristics has been listed, all of them should be filled out.

If a material has a % volatile greater than 10%, a boiling point below 100°C, and a vapor pressure over 5 or 6 millimeters of mercury (mm Hg), check the following sections to make sure they are filled out and for information:

1. Check the TLV in Section II. A Low TLV (i.e. less than 10) means that the material can be very hazardous. You may be better off using a highly volatile substance, like acetone, with a high TLV, than a less volatile substance like benzene with a low TLV. In fact, a useful way to compare the hazards of solvents when selecting a solvent to use is to divide the evaporation rate by the TLV and see which one is higher, and therefore more hazardous.

2. In Section IV, check to see that the Flash Point and Flammable Limits are filled out. A substance with a vapor pressure of over 5 mm Hg at room temperature and an evaporation rate of greater than 1 and a flash point of less than 140°F and low LEL (less than 2%) can be a dangerous fire hazard, especially if the % volatile is also high.

3. Check Section V "effects of overexposure" to see if breathing the vapors of the substance can be harmful.

4. Check Section VIII, Special Protection Information, to see whether there are recommendations for respiratory protection and/or ventilation controls. If the substance has a TLV and is volatile, this section must be filled out.

5. Make sure that there are some recommendations for storage and handling in Section IX Special Precautions, especially if the substance has a vapor density that is heavier than air.

IV. FIRE AND EXPLOSION DATA

If you're working with flammables, solvents, peroxides, explosives, metal dusts and other unstable substances, this section is important. If the product does not pose a fire hazard, that should be stated in this section.

Some terms you need to know are:

● **Flash Point** is the lowest temperature at which a liquid gives off enough vapor to make an ignitable mixture of vapor in air in a test container. Flash Point and autoignition shoud be listed in temperature degrees Fahrenheit or Centigrade, or both. Liquids with flash points below 140°F are specially classified liquids by OSHA and require special precautions. Check Section IX, Special Precautions, to see what they are.

● **Flammable Liquids—LEL (lower explosive limit) and UEL (upper explosive limit)** are the lower and upper limits of vapor and air concentration, given as percent, which can cause an explosion. The flash point and flammable limits are the most important when related to the boiling point, vapor pressure, % volatile and evaporation rate in Section III. If any one of these items is listed, all of the items should be listed in order to provide enough information about the hazards of the material.

● **Extingishing Media** means what kind of fire extingusher to use. If the substance is not flammable and/or is completely inert, the MSDS should say so. Otherwise this line must always be filled out.

● **Special Fire Fighting Procedures and Unusual Fire and Explosion Hazards** would need to be described for any combustible material. Some concentrated corrosives, calcium carbide or reactive metals, must not have water applied in case of fire. Check Section II to see if the material is a catalyst, and check Section VI for reactivity with water and polymerization in water or air.

V. HEALTH HAZARD INFORMATION

● **Health Hazard Data** should be the combined estimate of the hazard of the product. This might be stated as a time-weighted average concentration, permissible exposure limit (PEL) or TLV. Other data such as LD 50 might be used.

● **Routes of Exposure** should contain information about the potential hazard from absorption of the product, the severity of the effect, and the basis for that determination. The basis might be animal studies, analogy with similar products, or human exposure.

Typical comments might be:

—skin contact, single short contact—no adverse effects likely.

—prolonged or repeated skin contact—mild irritation and possibly some blistering.

—eye contact—some pain and mild transient irritation. No corneal scarring.

Check Section II to see if TVLs are listed for any of the ingredients. If TLVs are listed there, they should also be listed in this section; make sure the numbers are the same. If the substance is a mixture of several compounds and a TLV for the mixture is listed in this section, this is only appropriate if all of the ingredients in the mixture contributing to the TLV have the same harmful health effects, such as petroleum solvent vapors which cause drowsiness and unconsciousness. Check Sections I and VI for this information.

● **Routes of Exposure** should list common effects by route of exposure, usually inhalation or absorption by skin contact. It should include chronic and acute effects; as well as information on carcinogenicity, teratogenicity, or mutagenicity. Many MSDS lack information on chronic effects.

If inhalation is a primary route of exposure, check the following sections:

—Section III because this section can help you determine how great the hazard might be. Chemicals with high vapor pressure and high volatility usually pose more of an inhalation problem than chemicals with low vapor pressure and low volatility.

—Section VIII because this section should give information on proper respiratory protective devices (with type specified and/or necessary ventilation requirements).

If skin contact or absorption is a problem, Section VIII should list proper protective equipment (gloves and eye and skin protection).

) Effects of Overexposure should indiate relevant signs, symptoms and disases that could result from acute and hronic exposure to the hazardous bstance.

-mergency and First Aid Procedures hould contain treatment information that ould be used by paramedics and individuis trained in first aid.

Any substance with a TLV should have mergency first aid procedures listed for cute exposures, especially if the material as a low TLV. Check Section IV to see if ie chemical presents any unusual fire or xplosive hazards.

Note to Physician should include spea information which would be important) a doctor including required or recomiended preplacement and periodic medial examinations, diagnostic procedures, nd medical management of overexposed mployees.

I. REACTIVITY DATA

The information in this section will ssist in determining safe storage and andling of hazardous, unstable substan-s. Instability or incompatibility of the proict to common substances such as water, rect sunlight, metals used in piping or ntainers, acids, alkalies, etc. should be ted here.

tability—Cross check with other ons:

1. Section II: A mixture may be unstable the ingredients include catalysts and. hicles, peroxides, explosives, and other istable or highly reactive substances.

2. Section IV: are there unusual fire and plosive hazards?

3. Section IX: if there are very specific structions in this section regarding preutions to take in handling and storage, it ay indicate that the material is unstable.

Incompatibility—Common materials or ntaminants which the specific material uld be expected to come into contact th and which could produce a reaction ould be listed here. Conditions to avoid ould also be listed. Sections IV and IX ay contain information on incompatibilnot listed in Section VI.

Hazardous Decomposition Products ould list products released it the subance is exposed to aging, heating, burng, oxidation, or allowed to react. The oduct's shelf life should also be listed in s section when applicable. Although ie materials are innocuous in their origiform, when they are exposed to the itions such as aging, burning, etc., , may form hazardous products.

1. Check Section IV for fire and explosn hazards regarding these chemicals.

Hazardous Polymerization is a reaction with extremely high or uncontrolled release of energy. If this section is checked, the conditions under which it could occur should be explained.

1. Check Section II. If the substance contains any catalyst and vehicle it may indicate that hazardous polymerization can occur.

VII. SPILL OR LEAK PROCEDURES

● Detailed procedures and protective clothing and equipment and/or ventilation to be used for cleaning up a spill and safe disposal should be indicated here.

1. Check Section II for TLV. A low TLV such as HCN has with a TLV of 10 ppm indicates greater health hazard than a high TLV such as acetone has with a TLV of 750 ppm.

2. Check Section III for volatility and vapor pressure. A high vapor pressure indicates a greater volatility and a greater hazard.

3. Check Section IV for fire and explosive data (combustible and flammable?)

4. Check Section V for health data (inhalation hazard? skin contact hazard?)

5. Check Section VI for reactivity (incompatability? hazardous polymerization? unstable?)

6. Check Section VIII for information on personal protective equipment.

For example, if a material has a low TLV, is highly volatile, is flammable, unstable and has severe effects of overexposure listed, then very specific procedures on handling a spill or leak need to be spelled out. This section should state whether the substance is incompatible with common cleanup procedures or media (such as water).

● **Waste Disposal Methods:** If labeling and special handling of clean-up residue is necessary, that should be stated along with the appropriate method of disposal—for instance, sanitary landfill, incineration, etc.

1. Check Section II. If hazardous materials are listed, there should be specific procedures for waste disposal.

2. Check Section IV, VI, and IX to make sure that the waste disposal method doesn't create another problem.

VIII. SPECIAL PROTECTION INFORMATION

● **Respiratory Protection:**

1. Check Section V to see if inhalation is a probable means of overexposure.

2. Check Section III to see how volatile the substance is, to determine the potential degree of hazard.

o if respirators are required or recommended, the type and class should be stated, such as "supplied air" or "organic vapor cartridges," or suitable for dust no more toxic than lead, etc.

o if protective clothing is required, the type and material of that clothing should be indicated.

● Ventilation

1 Check Sections II, III, and V, volatility and route of exposure to assess the degree of inhalation hazard. If the substance is very volatile and the TLV is low, local exhaust ventilation, which captures contaminants at the point where they are generated) is probably the most effective control. Mechanical, general or dilution ventilation is not recommended for chemicals with low TLV, especially if they are highly volatile or have high evaporation rates.

● Protective Gloves

1. Check Section II for TLV of substances and Section V to determine if the skin is a primary route of exposure.

2. If gloves are recommended, the type should be specified. Check Section I for chemical family to make sure proper gloves are being recommended.

● Eye Protection

1. Check Section V for information regarding hazards to the eye. First aid procedures may be listed, such as flooding with water. If splashes may occur, eye protection and eyewash facilities should be recommended.

IX. SPECIAL PRECAUTIONS

● How to label the substance, or required signs to be posted might be listed here, as well as any information on safety or health which has not been covered in other sections of the MSDS.

1. Check Section III for volatility, Section IV for flash point and flammability, Section V for exposures and Section VI for reactivity. If all of them are left blank or filled with NA, but this Section IX is filled out in detail it should make you question the completeness and accuracy of the MSDS. In that case, you may need to check back with the manufacturer of the product.

● References to published guides or procedures for more specific information for identification, handling or storage of the product might be listed here. Other information such as Department of Transportation markings and classification and other freight, handling or storage requirements and environmental control procedures might be listed here.

It is essential that the name and address of the responsible person who prepared the MSDS and the date the information was compiled be included in the MSDS so that you can contact that person for additional information if necessary.

This article is adapted from a concept and information supplied by Scott McAllister-CAL/OSHA Consultation Service and Patty Quinlan—Labor Occupational Health Program. □

MATERIAL SAFETY DATA SHEET

I. PRODUCT IDENTIFICATION

TRADE NAME (as labeled)

MANUFACTURER'S NAME

Address (complete mailing address):

Phone number for additional information:

Date prepared or revised

Name of preparer*

II. HAZARDOUS INGREDIENTS

Chemical Names	CAS Numbers	Percent*	Exposure Limits in Air (give units) _ ACGIH TLV OSHA PEL Other (specify)

III. PHYSICAL PROPERTIES

Vapor density (air=1)

Specific gravity

Solubility in water

Vapor pressure, mmHg at 20 °C

Appearance and odor

Melting point or range, °F

Boiling point or range, °F

Evaporation rate (butyl acetate = 1)

HOW TO DETECT THIS SUBSTANCE* (warning properties of substance as a gas, vapor, dust, or mist)

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*Not a required category.

NOTE: All required categories should be addressed. If any item is not applicable, or no information is available, the space must be marked to indicate that.

This voluntary form is provided by Cal/OSHA to assist MSDS preparers and users. Any format may be used as long it contains all the required information.

IV. FIRE AND EXPLOSION

Flash Point, °F (give method)

Auto ignition temperature, °F

Flammable limits in air, volume %: lower (LEL)___ upper (UEL)___

Fire extinguishing materials:

___ water spray ___ carbon dioxide ___ other:

___ foam ___ dry chemical

Special firefighting procedures:

Unusual fire and explosion hazards:

V. HEALTH HAZARD INFORMATION

SYMPTOMS OF OVEREXPOSURE for each potential route of exposure.

Inhaled:

Contact with skin or eyes:

Absorbed through skin:

Swallowed:

HEALTH EFFECTS OR RISKS FROM EXPOSURE. Explain in lay terms. Attach extra page if more space is needed.

Acute:

Chronic:

FIRST AID: EMERGENCY PROCEDURES

Eye Contact:

Skin Contact:

Inhaled:

Swallowed:

SUSPECTED CANCER AGENT?

_____ NO: This product's ingredients are not found in the lists below.

YES: ___ Federal OSHA ___ NTP ___ IARC

California employers using Cal/OSHA - regulated carcinogens must register with Cal/OSHA. The Cal/OSHA and Federal OSHA carcinogen lists are similar.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE

VI. REACTIVITY DATA

Stability: ___Stable ___Unstable
Conditions to avoid:

Incompatibility (materials to avoid):

Hazardous decomposition products (including combustion products):

Hazardous polymerization: ___May occur ___Will not occur
Conditions to avoid:

VII. SPILL, LEAK, AND DISPOSAL PROCEDURES

Spill response procedures (include employee protection measures) :

Preparing wastes for disposal (container types, neutralization, etc.):

NOTE: Dispose of all wastes in accordance with federal, state and local regulations.

VIII. SPECIAL HANDLING INFORMATION

Ventilation and engineering controls

Respiratory protection (type)

Eye protection (type)

Gloves (specify material)

Other clothing and equipment

Work practices, hygienic practices

Other handling and storage requirements

Protective measures during maintenance of contaminated equipment